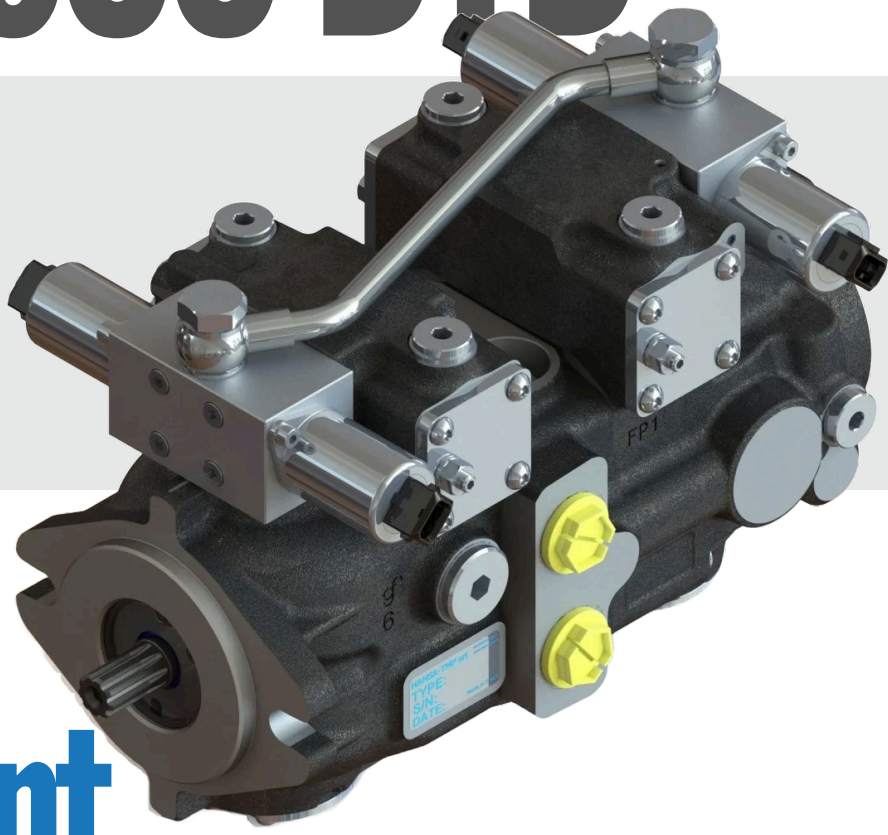
HANSA-TMP

TPV 1300 BTB

(Displ. 6 – 21 cc/rev)



Variable Displacement Closed Loop System Axial Piston Pump

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GENERAL INFORMATION

- TPV 1300 BTB is a variable displacement, compact tandem axial piston pump, with swashplate system, for closed loop hydrostatic transmissions.

- Flow rate is proportional to the rotation speed and displacement, and is continuously variable.
  It increases as the swashplate angle moves from “0” to maximum position.
  If the swashplate is positioned beyond the neutral point, the flow rate respectively follows one of the two directions.

- The TPV 1300 BTB is equipped with a boost pump, “gerotor” type of new design and high efficiency to keep the circuit pressurised, to compensate the oil leakages of the hydrostatic transmission, to avoid cavitation of the piston pump and to supply low pressure oil flow to the remote controls of the pumps and of the hydraulic transmission (max 3 MPa).

- The standard version is of mechanical type on which, by means of a lever, the change of flow in the two directions is obtained.

- This series of pumps can be with a hydraulic servo control or electro-proportional control which allows the control of the pump by means of hydraulic or electric joysticks.

- Moreover the pump is fitted with relief valves and it is adapted for assembly of auxiliary gear pumps.

- The compact tandem TPV 1300 BTB, are available with splined or parallel shaft and can be supplied with options such as purge valve, screw by-pass valve and, for security, "man on board" valve.

- The piston pumps are to be considered as individual components for the purposes of Directive 98/37/EC, therefore have been built to be integrated into a circuit or to be assembled with other components to form a machine or system. They can be operated only after they have been installed in the machine/system which they are intended for.

- The TPV 1300 BTB pumps must be used to create, manage and regulate oil flow in a closed loop system. Any other use should be considered improper.

- The pumps are built according to the technology normally used for this type of product. There is the risk of injury or damage to personnel during their installation and use if you do not respect the normal safety instructions or if used by untrained personnel.

TECHNICAL SPECIFICATIONS

The housing and the distributor cover of the pumps TPV 1300 are made in cast iron.
The flow rate is proportional to the rotation speed and the displacement is continuously variable. It increases as the swash-plate angle moves from "0" to maximum position.
If the swash-plate is positioned out of the neutral position, the flow respectively follows one of the two directions.

Typical applications

- construction equipment
- green mowers
- zero turn machines
- agricultural machines
- utility vehicles
- forest vehicles
- logistic machines

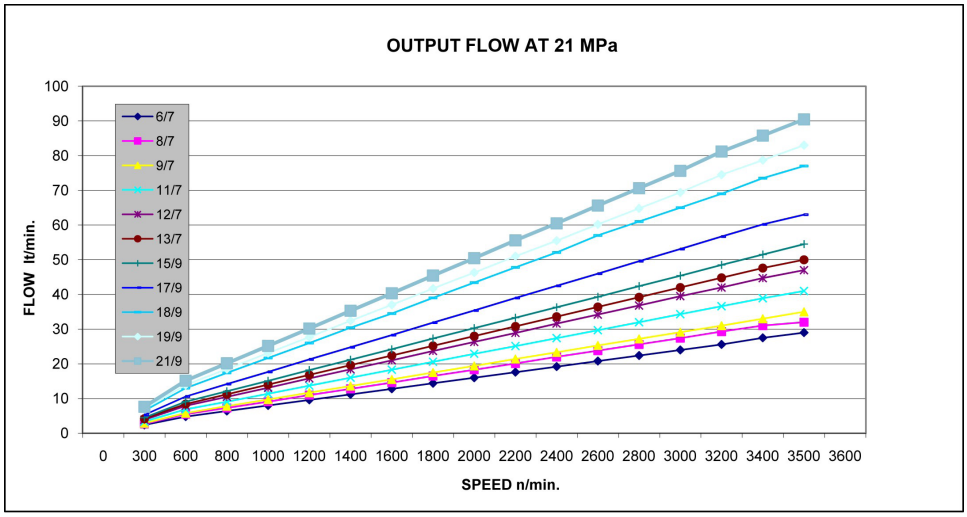
PUMP MODEL		TPV 6-7	TPV 8-7	TPV 9-7	TPV 11-7	TPV 12-7	TPV 13-7	TPV 15-9	TPV 17-9	TPV 18-9	TPV 19-9	TPV 21-9
Max. Displacement	cm^3	7,4	8,9	9,6	11,2	12,8	13,6	15,00	17,1	18,2	19,4	21,15
Flow rating(1)	l/min	25,01	31,96	34,74	40,32	46,08	48.88	54,00	61,77	66,37	69,84	76,4
Power rating(1)	kW	8,75	11,18	12,15	14,11	16,12	17,11	18,9	21,61	23,23	24,44	31,73
Boost pump displacement	cm^3/n	5,4										
Rated pressure	MPa	30						25			22	
Max. pressure	MPa	35	35	35	35	35	35	30	30	30	28	
Max. relief valve setting	MPa	38										
Standard boost pressure (2)	MPa	0,6 (Mechanical Control) 2 (Hydraulic / Electric Servo Control)										
Suction pressure	MPa (assoluta)	> = 0,08										
Max. case pressure	MPa	0,15										
Min. shaft speed	n/min	500										
Rated speed	n/min	3.600									2900	
Max. speed	n/min	3.900									3200	
Max. oil temperature	°C	80										
Oil viscosity	cSt	15-40										
Fluid contamination		18/15/12 ISO 4406 (NAS 7)										
Dry weight (single pump)(3)	kg	11										
Dry weight (tandem pump)(3)	kg	23										

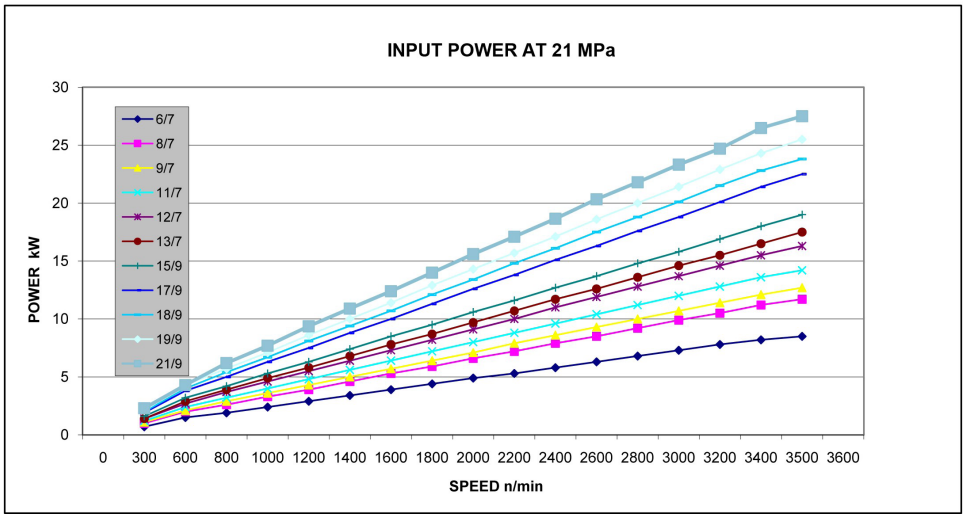
(1) 3.600 n/min 21 MPa
(2) 1.000 n/min
(3) Nominal data, weight varies depending on configuration and optional

SYSTEM DESIGN PARAMETERS

HYDRAULIC MEASURE	USEFUL FORMULAS	CONVERSION FACTORS
Flow rate: Q = (l/min)	$\mathbf{Q} = V\ [cm^3/n] \times \eta_v \times n \times 10^{-3}$	1 l/min = 0,2641 US Gal/min
Pressure: P = (MPa)		1 MPa = 145 PSI
Displacement: V = (cm^3/n)		
Torque: M = (Nm)	$\mathbf{M} = \frac{\Delta p\ [MPa] \times V\ [cm^3/n]}{6.283 \times \eta_m}$	1 Nm = 8,851 in lbs
Power: P = (kW)	$\mathbf{P} = \frac{\Delta p\ [MPa] \times V\ [cm^3/n] \times n}{60 \times 1000 \times \eta_t}$	1 KW = 1,36 HP
Shaft speed: n = n/min		
Hydraulic efficiency: = ηv		
Mechanical efficiency: = ηm		
Overall efficiency: = ηt		
		1 mm = 0,0394 in
		1 kg = 2,205 lbs
		1 N = 0,2248 lbs

PERFORMANCE DIAGRAM





Performance diagrams

- The diagrams show the data of maximum speed and maximum continuous pressure.
- Data may vary depending on pump displacement.

Pressure

- Continuous pressure: is the average pressure for continuous work, which must not be exceeded, to ensure a correct and long lasting service of the pump.
- Maximum pressure: is the maximum allowable pressure for short periods and must never be exceeded.

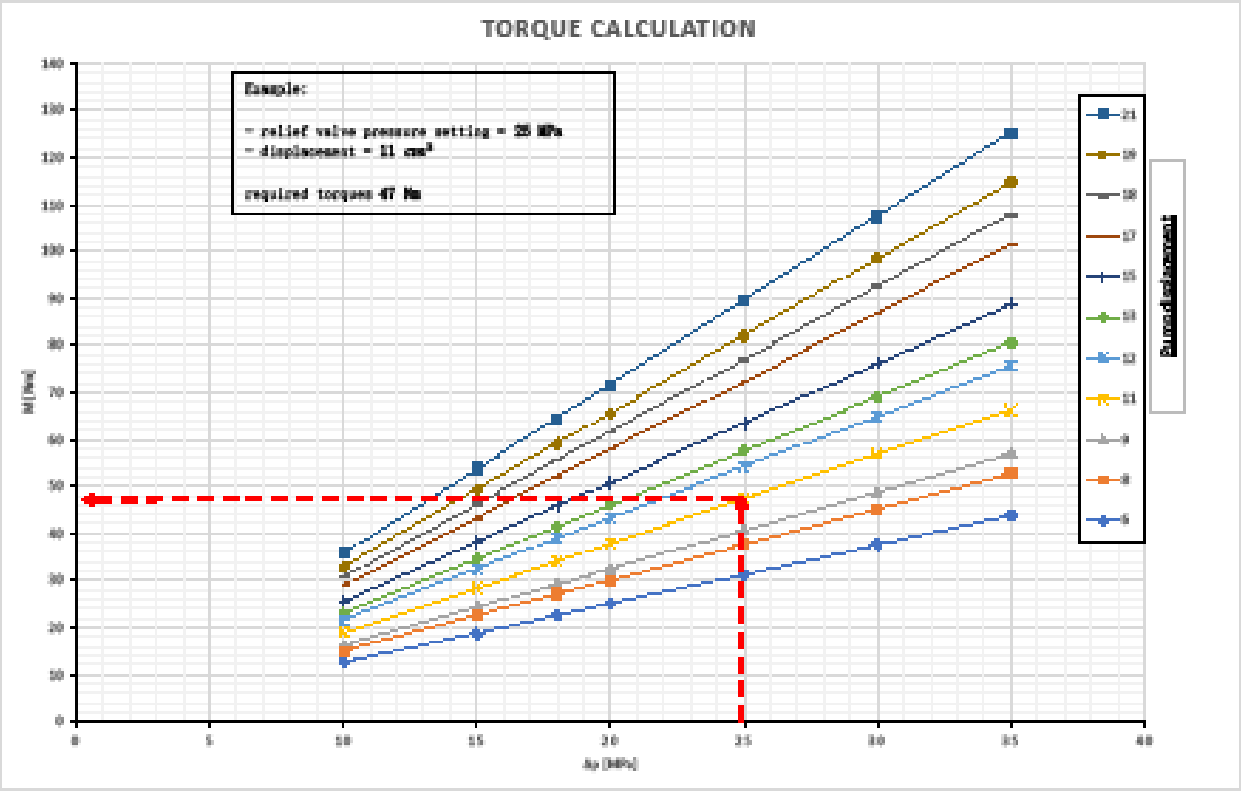
Speed

- Continuous work speed: is the maximum recommended speed for continuous operation of the pump under full load.
- Maximum speed: is the maximum permissible speed for the pump for short periods and not fully loaded. The use of the pump with this speed can reduce the life cause a loss of power or hydrostatic braking capacity.

Caution

Any damage caused to the pump can reduce or eliminate the hydrostatic braking capacity. It is therefore necessary to provide an auxiliary braking system capable of stopping and supporting the weight of the complete machine, in the event of loss of hydrostatic power.

TORQUE CALCULATION



For a correct selection of the product, it is necessary to verify that the selected shaft is able to guarantee the mechanical resistance to the specific operating conditions.

The check involves comparing the torque value reached in the heaviest working condition with the one allowed by the pump shaft.
For multiple pump, is necessary to consider the sum of the torques required for each pump units.

The displacements and the working pressures for each unit are required for the verification.
With these data is possible to calculate analytically or through the use of graph, the total torque required to the shaft.

The following equation shows the torque value:

$$\boldsymbol{M}\ [Nm] = \sum_{i=1}^{k} \frac{\boldsymbol{V_i}\left[\frac{cm^3}{n}\right] \cdot \boldsymbol{\Delta p_i}[MPa]}{\boldsymbol{2 \cdot \pi \cdot \eta_m}}$$

V_i = i pump displacement i, expressed in cm^3;
Δp_i = i pressure difference between pump inlet and outlet, expressed in bar;
η_m = mechanical efficiency that we can assume equal to 0,94;
k = number of pumps.

INSTALLATION INSTRUCTIONS

Standards for the installation, start up and maintenance

- When mounting the pump above the minimum level of the tank, distance of the highest point of the pump over the oil level MUST NOT exceed 250 mm.

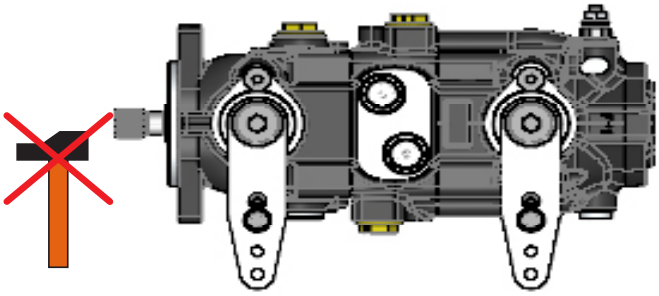
- To reduce the noise level typical of all piston pumps we recommend:
  - use hoses instead of pipes
  - limit to a minimum the length of eventual pipes
  - fix rigid pipe sections with special supports equipped with rubber vibration dampening devices
  - use pipes and hoses with a diameter according to the speed values below:

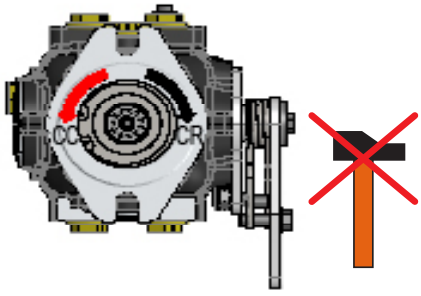
    Suction line = 0,6 ÷ 1,2 m / s
    Drain = 1,5 ÷ 3,6 m / s
    Pressurized lines = max 6 m / s

- To calculate the speed of the oil in the lines refer to the formula below:

    V = (Q * 21,22) / D
    V = speed (m/s)
    Q = flow rate (l/min)
  D = internal pipe/hose diameter (mm)

- In any case NEVER use pipes/hoses or fittings with diameter smaller than that of the corresponding ports on the pump. This indication is ABSOLUTELY OBLIGATORY for the drain line to avoid to pressurize the pump housing and extrude the lip seal of the pump shaft.
- During mounting cure the alignment of the pump, concentric with the drive shaft sleeve to prevent overloading of the bearing.
- For the hydraulic system, we recommend using pipes/hoses washed internally with hydraulic oil or, even better, with solvent.
- Special care must be taken when cleaning the inside of the tank (painting is recommended after sand blasting).
- To improve the functionality of the boost pump, it is recommended to place it below minimum tank level.
- The pumps can be installed in any direction and position.
  For further information contact our Technical Department.





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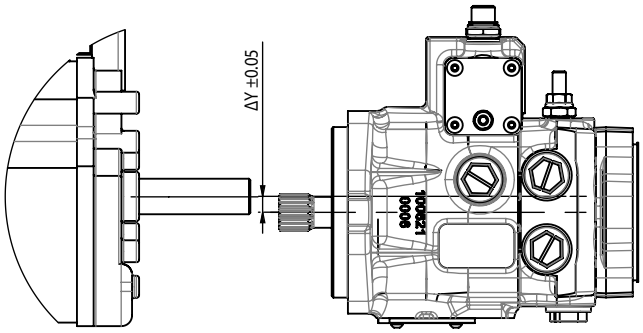
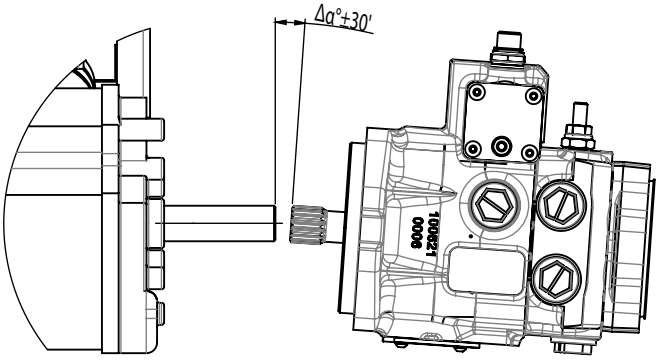
INSTALLATION INSTRUCTIONS





Shaft Coupling

To connect the pump shaft to the engine flywheel or prime motor shaft use a flexible coupling. The alignment must be within the tolerances indicated in the figures.
For an optimal function of the pump the shaft should not be subjected to radial or axial loads. In the presence of radial and axial loads the maximum allowable values are shown below.
During the installation or removal, do not force the coupling of the pump shaft, but always use the threaded hole on the shaft.

Start up

- Before starting fill the tank and the other components with new filtered oil. You should run a flushing of the complete hydraulic system (see Use and Maintenance Manual). Check that the low pressure value is correct (refer to the Use and Maintenance Manual).
- Restore the oil level in the tank.

Maintenance

- The first oil change should be made after 500 hours of operation. Later change the oil every 2000 hours.
- The first replacement of the filter cartridge has to be made after 50 hours for a preliminary circuit cleaning. Then after further 500 hours.
- These frequencies have to be reduced in the case where the indicator shows the clogging of the filter cartridge and in case of operation in environments with a high level of contamination.

CAUTION

- Always work with the utmost attention to the moving parts; do not use loose or fluttering clothing.
- Do not approach rotating wheels, tracks, chains or shafts if not properly protected, or when they may start moving without notice.
- Do not loosen or disconnect fittings and pipes/hoses while the engine is running.
- Avoid oil leaks in order to prevent environmental pollution.

Load capacity of rear shaft (through drive shaft)

- The rear shaft is not able to carry radial loads.

HYDRAULIC FLUID

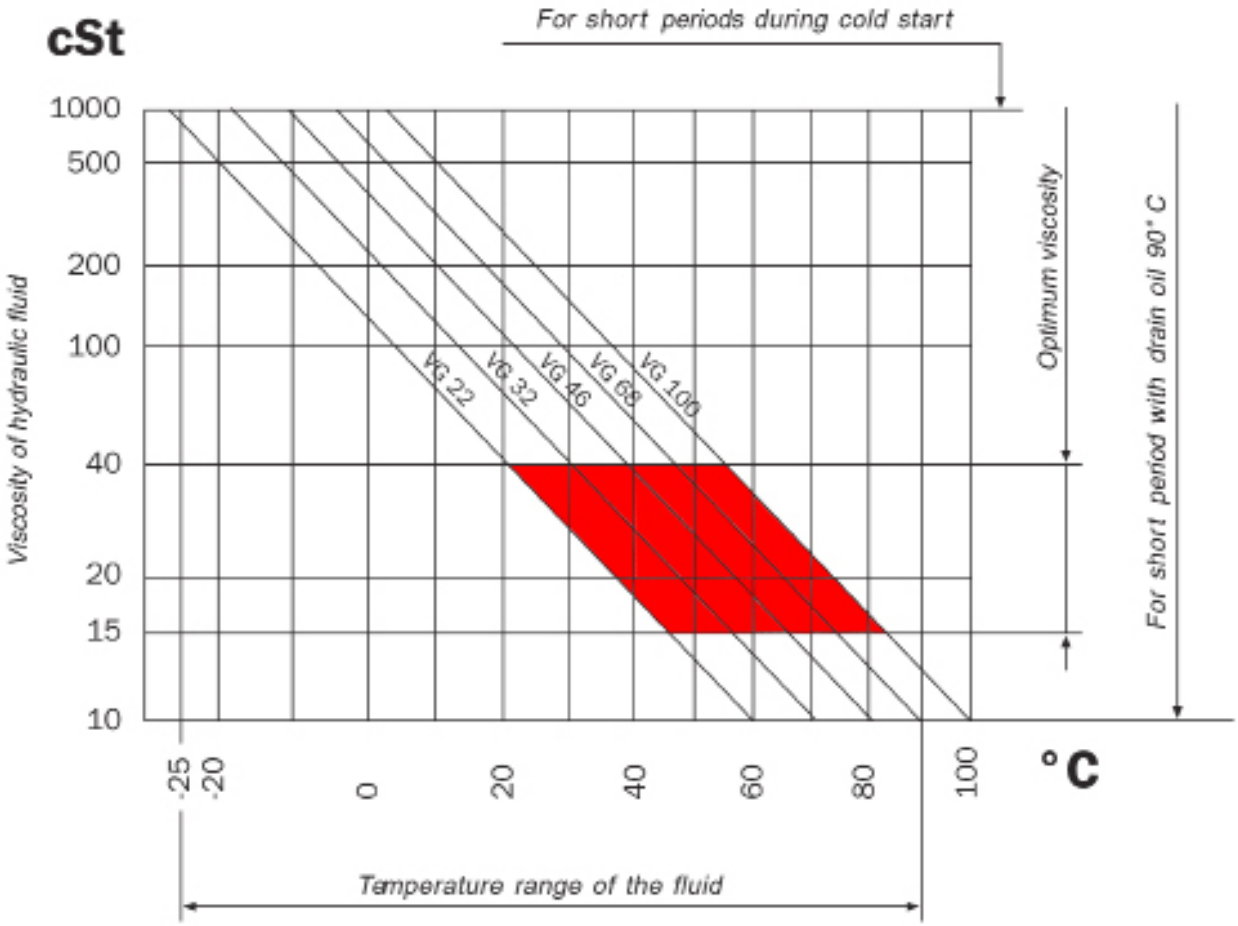
Viscosity

The maximum duration and the maximum efficiency are related to the optimum range of viscosity.
Viscosity = optimal operating viscosity 15 ÷ 40 cSt referred to the temperature of the closed circuit.

Minimum viscosity = 10 cSt for short moments and with the maximum temperature of the drain oil at 90 °C.
Max. viscosity = 1000 cSt for a few seconds, only during cold starting.

Working conditions

For working conditions apply the following limits:



HANSA - TMP cannot be held responsible concerning non compliance of these instructions and observance of safety regulations, although not covered by this document.

HYDRAULIC FLUID FILTRATION

The contaminating particles suspended in the hydraulic fluid cause the wear of the hydraulic mechanisms moving parts.
On hydraulic pumps these parts operate with very small dimensional tolerances.
In order to prolong the parts life, it is recommended to use a filter that maintains the hydraulic fluid contamination class at max.

8 according to NAS 1638
5 according to SAE, ASTM, AIA
19/17/14 according to ISO 4406

According to the type of application decided for the pump, it is necessary to use filtration elements with a filtration ratio of:

$$ß_{(X)}\ 20 \div 30 \geq 75$$

making sure that this ratio does not worsen together with the increasing of the filter cartridge differential pressure. While the pump is working, its temperature increases (over 80° to 110°C) with negative effects on pump performances; as a consequence, it is important to observe a max. contamination level of:

7 according to NAS 1638
4 according to SAE, ASTM, AIA
18/16/13 according to ISO 4406

If these values cannot be secured, the component life will consequently be reduced and it is recommended to contact our Tech. Dept.

Suction filters

The suction filters will have a clogging indicator and bypass. The max. pressure drop of the filtration element must not exceed 0,04 absolute MPa (0,08 absolute MPa with cold start).

Filter assembling

The suction filter is mounted in the suction line. Check that the pressure before the boost pump is 0,8 absolute bar, measured on the pump suction port (0,05 MPa for cold starting).

ORDER CODE

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
TPV / TPVS	1300	06 I 06	CR	SS2	B	F1	SHI I SHI	OAL I OAL	20 I 20	06	20	000	B2	000	0	00	G	00
TPVT3		06 I 06 I 06					SHI I SHI I SHI	OAL I OAL I OAL	20 I 20 I 20									

Pag.

0 - Pump model

TPV = Closed loop circuit tandem pump
TPVS = Closed loop circuit special tandem pump
TPV-T3 = Closed loop circuit triple pump

1 - Pump series

1300 = TPV Pump 1300

2 - Pump displacement

6 = 7,4 cm³/n **8** = 8,9 cm³/n **9** = 9,6 cm³/n **11** = 11,2 cm³/n
12 = 12,8 cm³/n **13** = 13,6 cm³/n **15** = 15 cm³/n **17** = 17,1 cm³/n
18 = 18,2 cm³/n **19** = 19,4 cm³/n **21** = 21,15 cm³/n

3 - Rotation

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

4 - Shaft

PS3 = Parallel keyed shaft 18 mm. diam. with increased bearing for external radial load 19
SS2 = Splined shaft Z9 - 16/32" D.P. 19
SS3 = Splined shaft Z13 - 16/32 D.P. 19
SS4 = Splined shaft Z11 - 16/32 D.P. 20
20

5 - Swashplate bearings

B = Bushings
C = Needle roller bearing
Attention: In case of displacement 21 cc with working pressure greater than or equal to 250 bar, select configuration B - SELF-LUBRICATING BUSHINGS

6 - Mounting flange

F1 = SAE-A 2 holes - pilot diam. 82,55 mm. 21
F2 = SAE-B 2 holes - pilot diam. 101,6 mm. (available only with servo-control) 21
21

7 - Pump controls

	F1	F2	
DM = Direct mechanical (without control lever)	X		22
BC = Tapered bush	X		22
LC = Direct Mechanical Control with Lever	X		24
DMS = Control lever with return to zero position (torsion spring standard diameter 3,6 mm.)	X		25
DMS (30) = Control lever with return to zero position (torsion spring diameter 3 mm.)	X		26
DMS (33) = Control lever with return to zero position (torsion spring diameter 3,3 mm.)	X		
DMS (44) = Control lever with return to zero position (torsion spring diameter 4 mm.)	X		
DMS (50) = Control lever with return to zero position (torsion spring diameter 5 mm.)	X		
DMZ = Control lever with return to zero position (red compression spring)	X	X	
SHI = Integrated hydraulic servo control	X	X	28
SHIC = Integrated hydraulic servo control (compact version)	X	X	30
SEI 1 = Integrated electro-proportional servo control 12V DC	X	X	32
SEI 2 = Integrated electro-proportional servo control 24V DC	X	X	34
SEI 1 D = Integrated electro-proportional servo control 12V DC DEUTSCH	X	X	34
SEI 2 D = Integrated electro-proportional servo control 24V DC DEUTSCH	X	X	37
			37

(continued)

ORDER CODE

8 - Control devices position (pump seen from the front on the drive shaft side) **39**

Device control DM, BC

OA = Upper position
OB = Lower position

Device control LC, DMS e DMZ

LA = Left lever upper position
LB = Left lever lower position
RA = Right lever upper position
RB = Right lever lower position

Device control SHI - SEI (all)

OAL = Upper servo position, left zero screw (STD)
OBL = Lower servo position, left zero screw
OAR = Upper servo position, right zero screw
OBR = Lower servo position, right zero screw

	OA	OB	LA	LB	RA	RB	OAL	OBL	OAR	OBR
DM	X	X								
BC	X	X								
LC			X	X	X	X				
DMS			X	X	X	X				
DMZ			X	X	X	X				
SHI							X	X	X	X
SEI							X	X	X	X

9 - Relief valve pressure setting

10 = 10 MPa **15** = 15 MPa **18** = 18 MPa
20 = 20 MPa **25** = 25 MPa **30** = 30 MPa
35 = 35 MPa

10 - Boost pump

00 (yy) = Without boost pump [indicate flow rate (yy)]
06 = Boost pump STD C-B1-B2 (5,4 cm³/rev)
For pressures other than STD, required between 0.5 MPa and 3 MPa MAX (calibration carried out at 1000 rpm).
If in doubt contact our technical department.

11 - Boost pressure

05 = 0.5 MPa **06** = 0.6 MPa (1) **07** = 0.7 MPa **08** = 0.8 MPa **09** = 0.9 MPa
10 = 1.0 MPa **11** = 1.1 MPa **12** = 1.2 MPa **13** = 1.3 MPa **14** = 1.4 MPa
15 = 1.5 MPa **16** = 1.6 MPa **17** = 1.7 MPa **18** = 1.8 MPa **19** = 1.9 MPa
20 = 2.0 MPa (2) **21** = 2.1 MPa **22** = 2.2 MPa **23** = 2.3 MPa **24** = 2.4 MPa
25 = 2.5 MPa **26** = 2.6 MPa **27** = 2.7 MPa **28** = 2.8 MPa **29** = 2.9 MPa
30 = 3.0 MPa

Note: Boost pressures are recorded at 1000 n/min
Note 1: STD for DM-BC-LC-DMS-DMZ control pumps
Note 2: STD for SHI-SEI control pumps

	00	06
		5,4
C	X	X
B1	X	X
B2	X	X

12 - Boost flow rating

000 = Like boost pump	**030** = 3 l/min	**035** = 3,5 l/min	**040** = 4 l/min
045 = 4,5 l/min	**050** = 5 l/min	**055** = 5,5 l/min	**060** = 6 l/min
065 = 6,5 l/min	**070** = 7 l/min	**075** = 7,5 l/min	**080** = 8 l/min
085 = 8,5 l/min	**090** = 9 l/min	**095** = 9,5 l/min	**100** = 10 l/min
110 = 11 l/min	**120** = 12 l/min	**130** = 13 l/min	**140** = 14 l/min
150 = 15 l/min	**160** = 16 l/min	**170** = 17 l/min	**180** = 18 l/min
190 = 19 l/min	**200** = 20 l/min	**210** = 21 l/min	**220** = 22 l/min
230 = 23 l/min	**240** = 24 l/min	**250** = 25 l/min	**260** = 26 l/min
270 = 27 l/min	**280** = 28 l/min	**290** = 29 l/min	**300** = 30 l/min
310 = 31 l/min	**320** = 32 l/min	**330** = 33 l/min	**340** = 34 l/min

WARNING: For red flow rate, contact our technical department.

13 - Cover/rear mounting flange

C = Closed cover **41**
B1 = For German standard pump GR1 mounting (pilot flange ø32) **41**
B2 = For German standard pump GR2 mounting (pilot flange ø52) **41**

(continued)

ORDER CODE

14 - Gear pump displacements (also available multiple gear pumps e.g. 204+117)

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			

15 - Gear pumps connections **42**

0 = Without gear pump

F = Connection with holes for flange **42**

G = Connection with GAS holes (BSPP) **42**

Attention: For GR 1 pumps, GAS ports is standard; for GR 2 pumps flanged is standard

16 - Optional **43**

00 = Without optional

FB = Conversion flange from SAE-A to SAE-B **43**

ST = Conversion coupling from 9 teeth to 13 teeth **43**

VS = Flushing valve **44**

SB = Screw by-pass **46**

SB (0.8) = Perforated screw by-pass ø0.8 for DMS control pumps

SB1 = Screw by-pass (rotated position of 180° - lower) **47**

SB1 (0.8) = Perforated screw by-pass ø0.8 for DMS control pumps (rotated position of 180° - lower)

FBST = Conversion flange from SAE-A to SAE-B + Conversion shaft 9 teeth to 13 teeth **48**

MOB = Man On Board (only SHI and SEI versions) **49**

17 - Ports

Combination		S	A-B	T-T1	P1-P2	Ma-Mb	IN-OUT	G
		Suction	Ports	Tanks	Pilot	Pressure connection	Remote filter connection	Suction pressure connection
G	GAS Ports (STD)	1/2" BSPP	1/2" BSPP	1/2" BSPP	1/4" BSPP	1/4" BSPP	3/8" BSPP	1/4" BSPP
U	UNF Ports (1)	7/8-14 UNF	7/8-14 UNF	7/8-14 UNF	9/16-18 UNF	9/16-18 UNF	7/8-14 UNF	9/16-18 UNF

Note 1: only on request and minimum quantity of 50 pieces.

18 - Restrictor on servo control (only SHI and SEI versions)

00 = Without restrictor

06 = Restrictor orifice ø0,6 mm

07 = Restrictor orifice ø0,7 mm

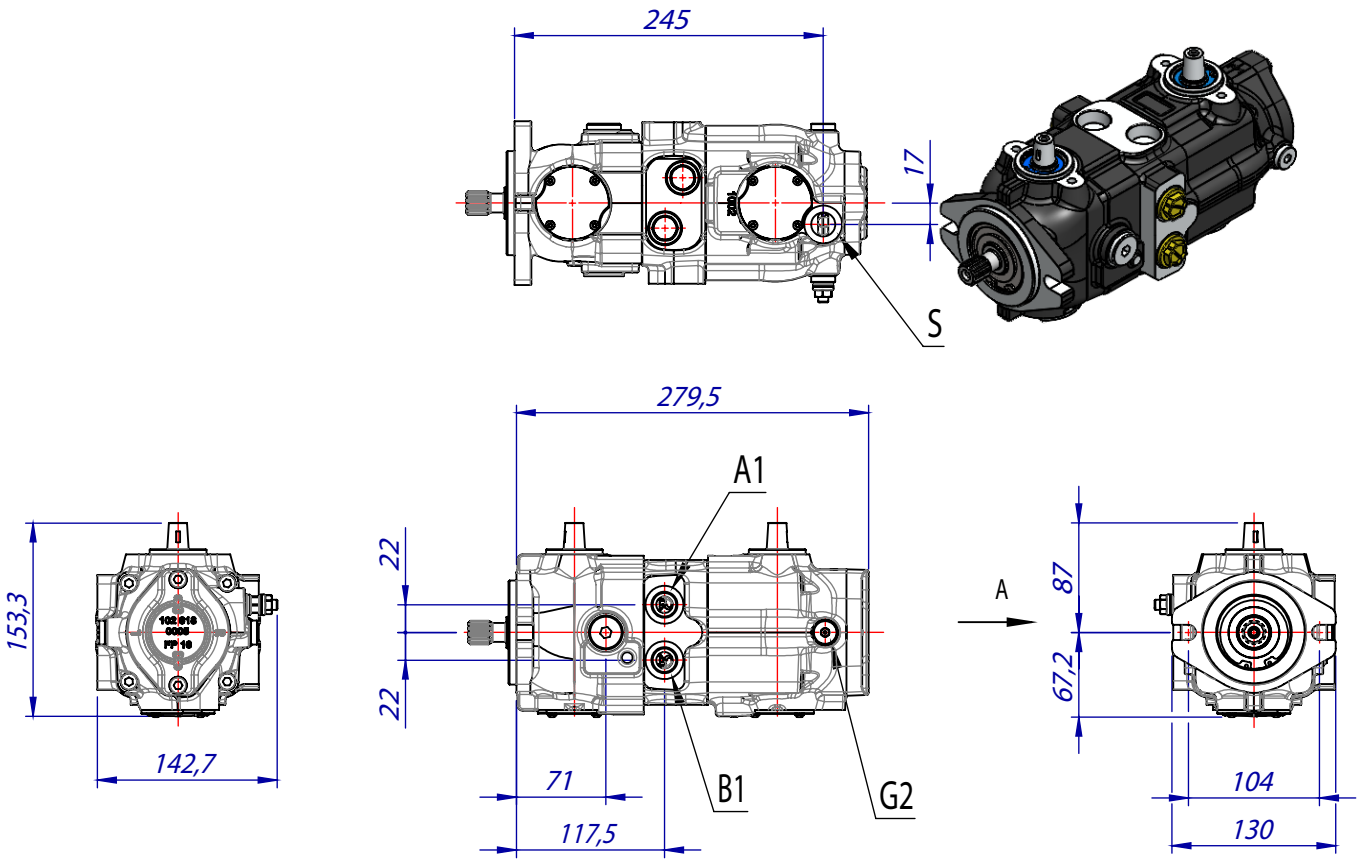
08 = Restrictor orifice ø0,8 mm

10 = Restrictor orifice ø1,0 mm

12 = Restrictor orifice ø1,2 mm

TANDEM PUMP

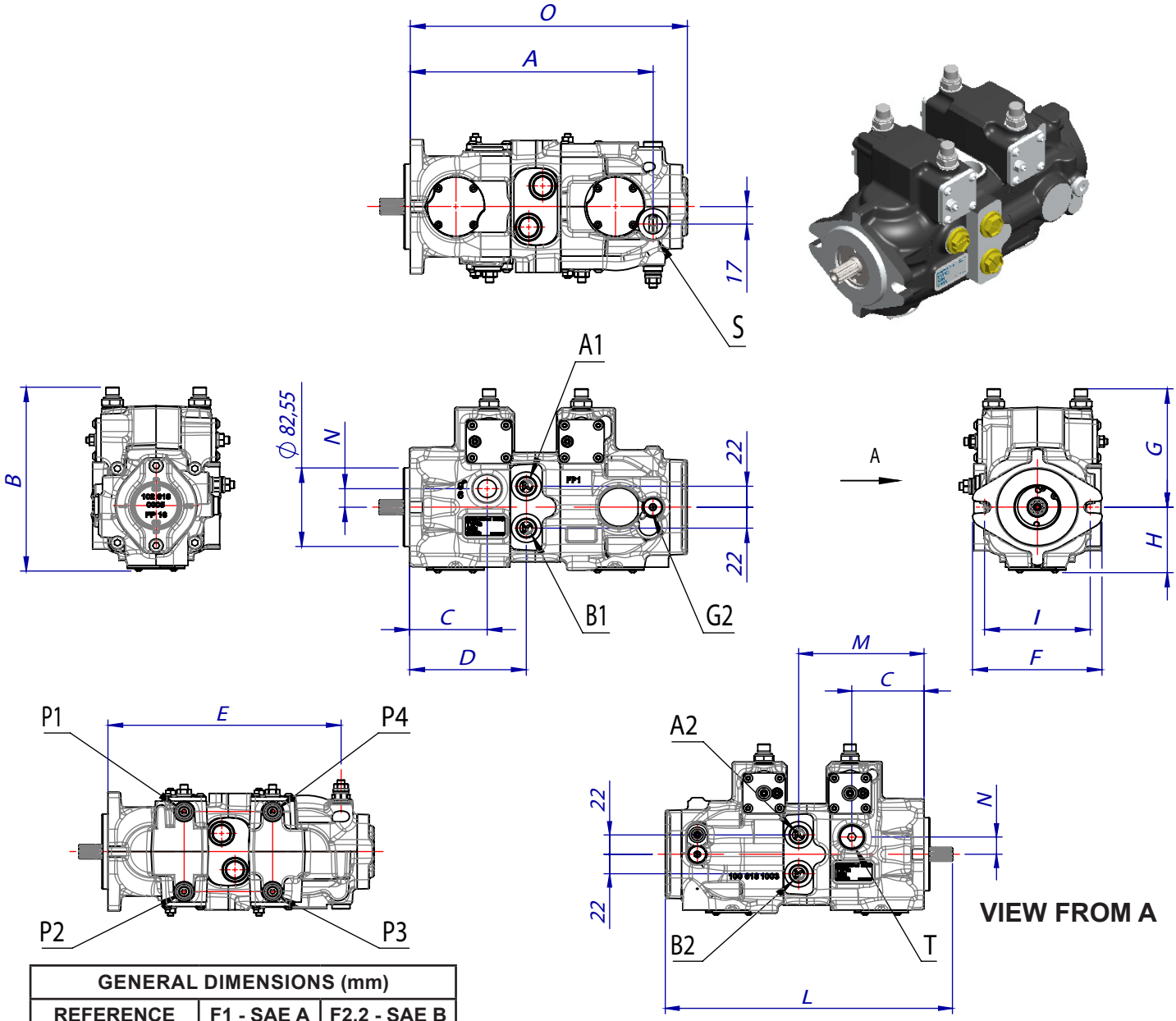
(Direct mechanical control - overall dimensions)



PIPES CONNECTION		
REFERENCE	**DESCRIPTION**	**F1 - SAE A**
A1 - B1	Main ports pump 1	1/2" BSPP
A2 - B2	Main ports pump 2	1/2" BSPP
T	Drain	1/2" BSPP
S	Suction	1/2" BSPP
G1 - G2	Boost pump pressure gauge ports	1/4" BSPP

PUMP WITH SHI - HYDRAULIC SERVO CONTROL

(overall dimensions)



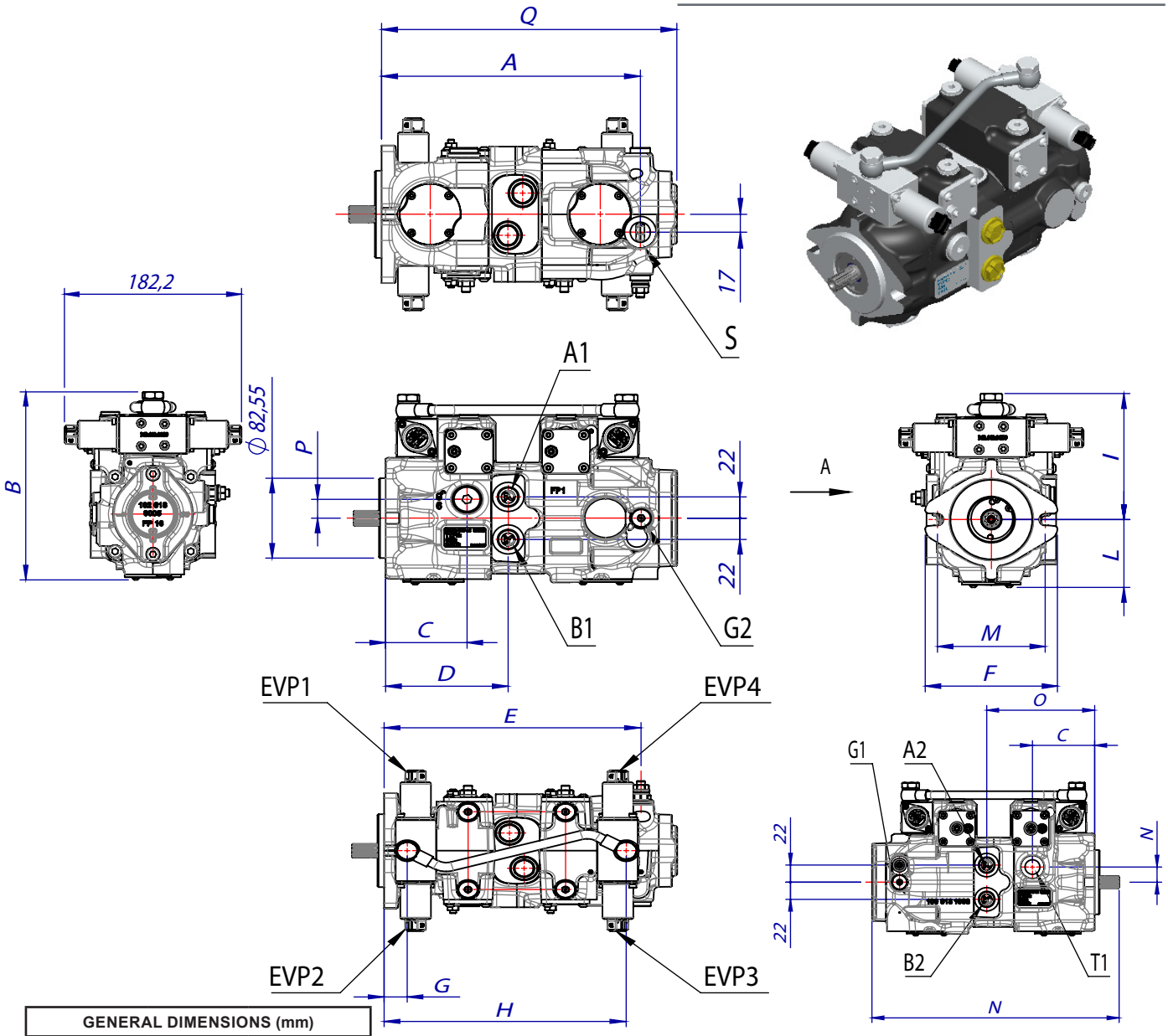
VIEW FROM A

GENERAL DIMENSIONS (mm)		
REFERENCE	F1 - SAE A	F2.2 - SAE B
A	245	246
B	193,2	190,2
C	78	79
D	117,5	118,5
E	245	246
F	130,4	174,6
G	124,5	121,5
H	68,7	68,7
I	106,4	146
L	310,2	320,5
M	135,5	136,5
N	19,5	19,5
O	279,5	280,5

PIPES CONNECTION			
REFERENCE	DESCRIPTION	F1 - SAE A	F2.2 - SAE B
A1 - B1	Main ports pump 1	1/2" BSPP	1/2" BSPP
A2 - B2	Main ports pump 2	1/2" BSPP	1/2" BSPP
T1- T2	Drain	1/2" BSPP	1/2" BSPP
S	Suction	1/2" BSPP	1/2" BSPP
G1 - G2	Boost pump pressure gauge ports	1/4" BSPP	1/4" BSPP
P1 - P2	Pilot pressure pump 1	1/4" BSPP	1/4" BSPP
P3 - P4	Pilot pressure pump 2	1/4" BSPP	1/4" BSPP

PUMP WITH SEI - ELECTRO-PROPORTIONAL SERVO CONTROL

(overall dimensions)



GENERAL DIMENSIONS (mm)		
REFERENCE	F1 - SAE A	F2.2 - SAE B
A	245	246
B	192,5	196,5
C	78	79
D	117,5	118,5
E	245	246
F	130	174,6
G	22	23
H	231	232
I	126,3	127,8
L	66,2	68,7
M	104	146
N	310,2	320,5
O	135,5	136,5
P	0	19,5
Q	279,5	280,5

VIEW FROM A

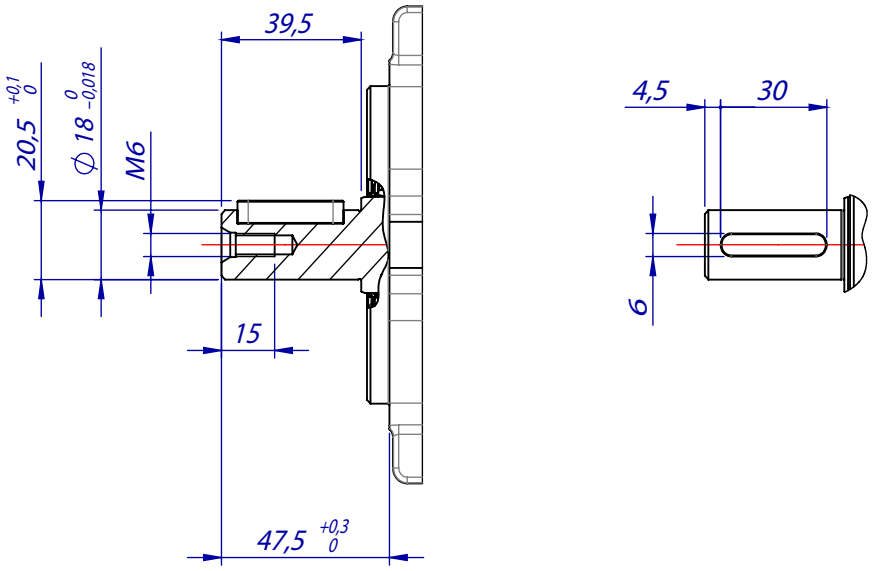
PIPES CONNECTION			
REFERENCE	DESCRIPTION	F1 - SAE A	F2.2 - SAE B
A1 - B1	Main ports pump 1	1/2" BSPP	1/2" BSPP
A2 - B2	Main ports pump 2	1/2" BSPP	1/2" BSPP
T1 - T2	Drain	1/2" BSPP	1/2" BSPP
S	Suction	1/2" BSPP	1/2" BSPP
G1 - G2	Boost pump pressure gauge ports	1/4" BSPP	1/4" BSPP

MOUNTING FLANGES AND SHAFT

PS3

PARALLEL KEYED SHAFT

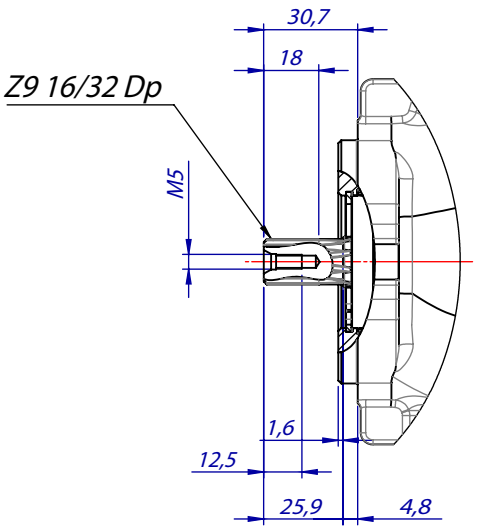
Diam. 18 mm.
Max. torque = 85 Nm



SS2

SPLINED SHAFT 16/32 DP

ANSI standard B92.2-1970 CLASS 5
Max. torque = 120 Nm



(continued)

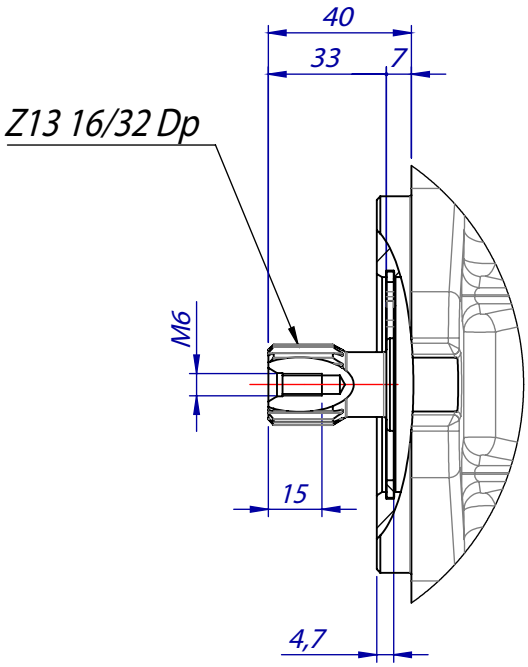
MOUNTING FLANGES AND SHAFT

SS3

SPLINED SHAFT Z = 13 16/32 DP

ANSI standard B92.2-1970 CLASS 5

Max. torque = 320 Nm

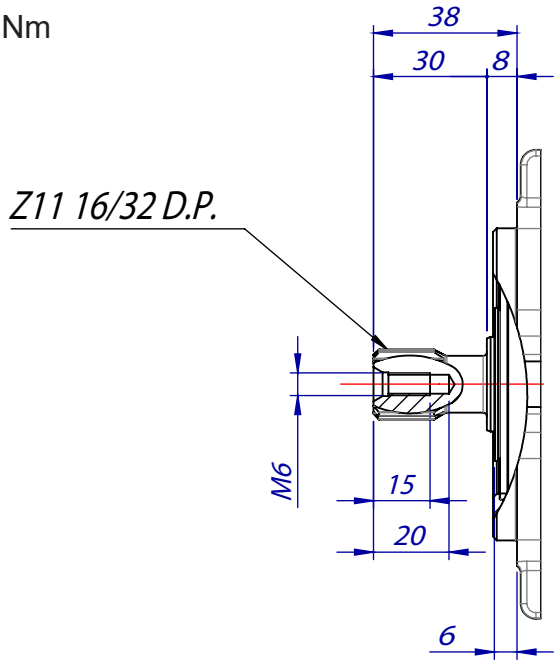


SS4

SPLINED SHAFT Z = 11 16/32 DP

ANSI standard B92.2-1970 CLASS 5

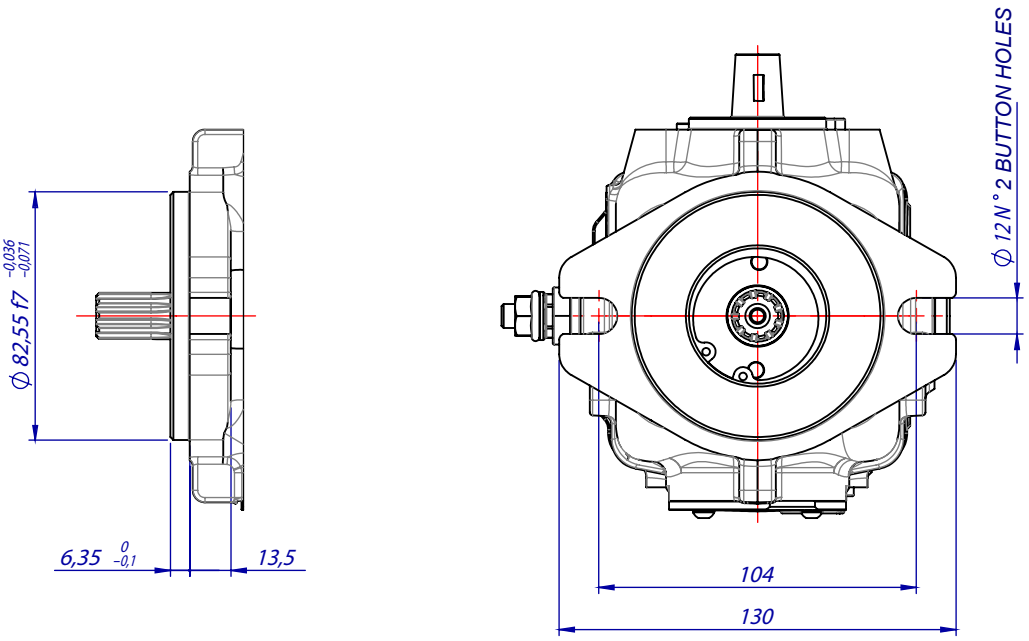
Max. torque = 160 Nm



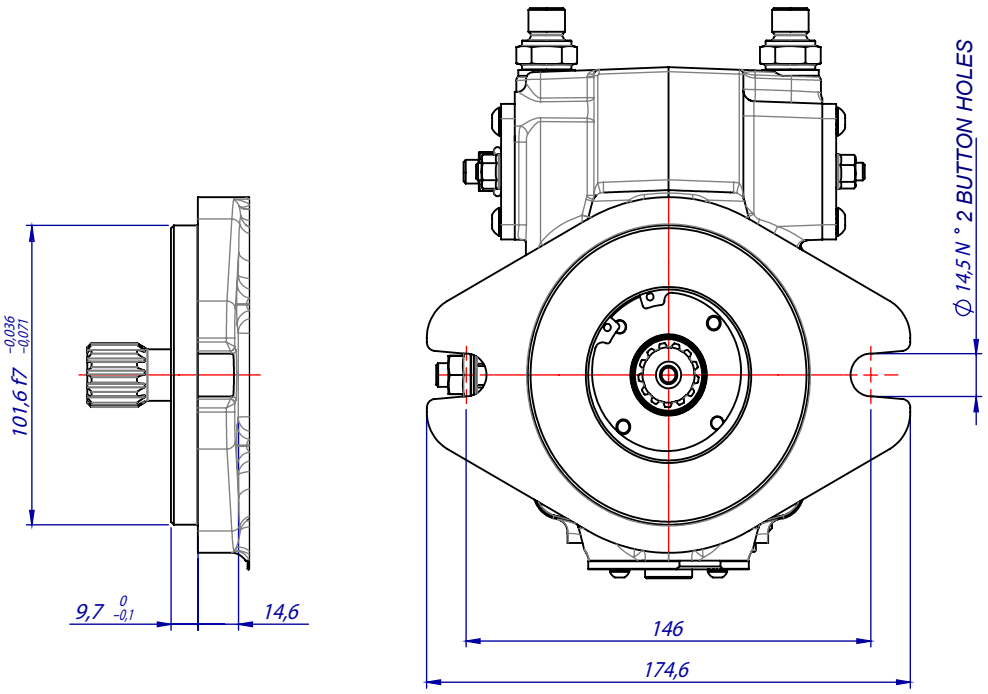
Attention: For the application of multiple pumps the total absorbed torque must not exceed the indicated value.

(continued)
MOUNTING FLANGES AND SHAFT

F1
SAE A - 2 HOLES FLANGE



F2
SAE B - 2 HOLES FLANGE

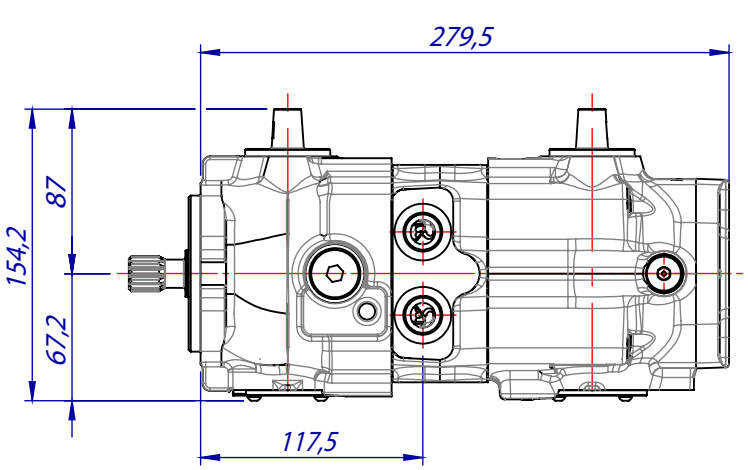


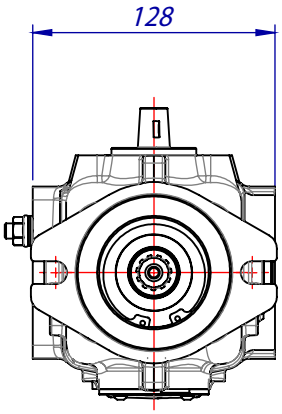
DM

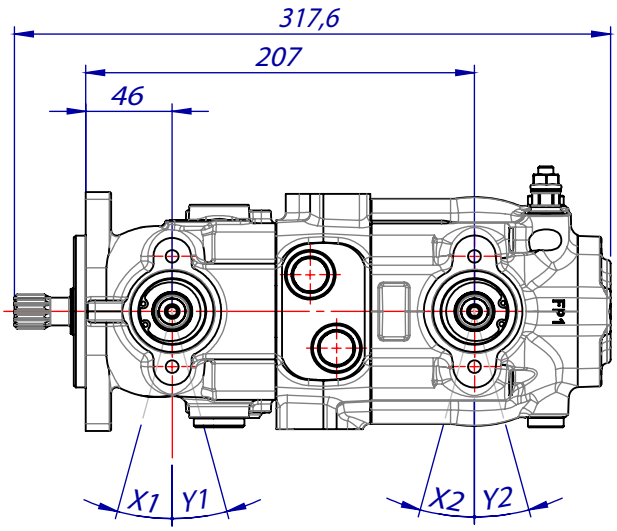
DIRECT MECHANICAL CONTROL

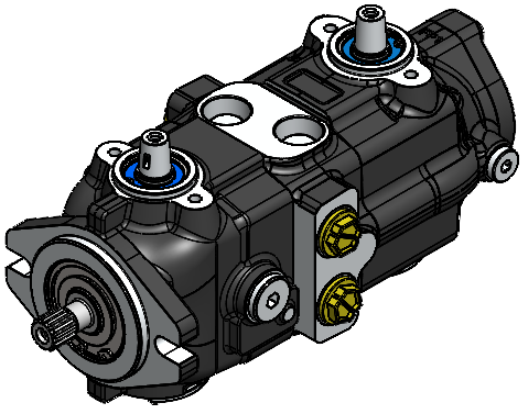
The change of pump displacement is given by clockwise or conter clockwise rotation of the drive pin of the oscillating plate.

The control's pivot is directly connected to the pump swashplate.









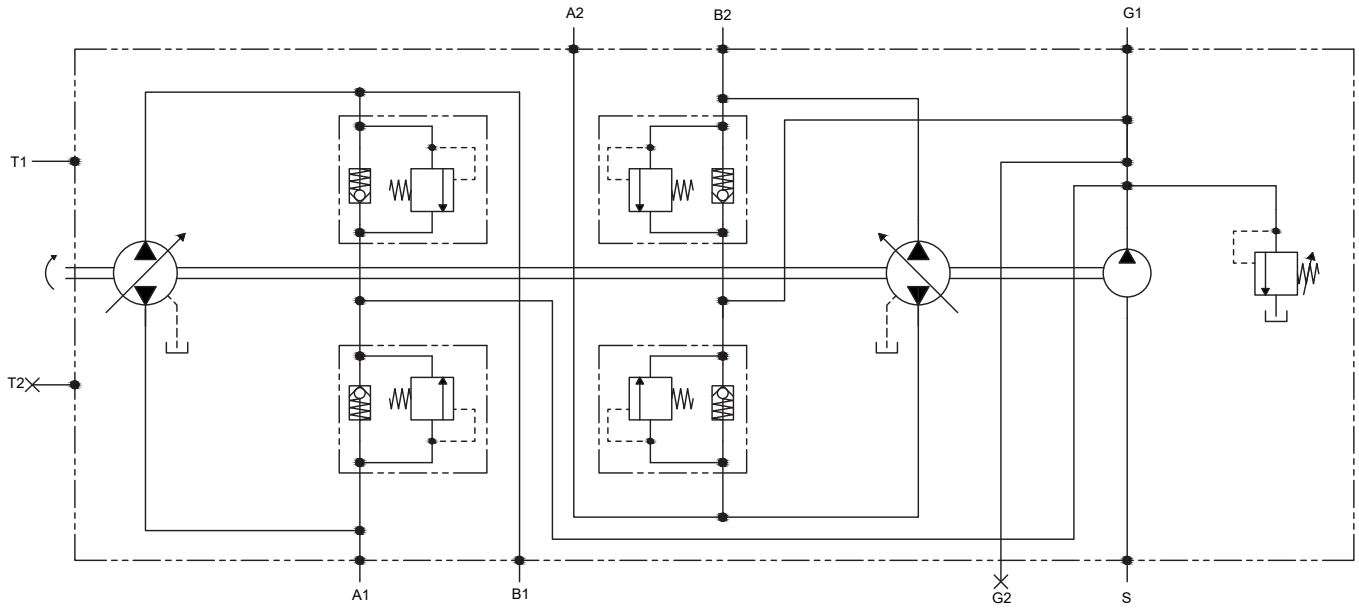
LEVER ANGLE											
Pump Model	6/7	8/7	9/7	11/7	12/7	13/7	15/9	17/9	18/9	19/9	21/9
Lever Angle (X - Y)	10°	12°	13°	15°	17°	18°	15°	17°	18°	19°	19°

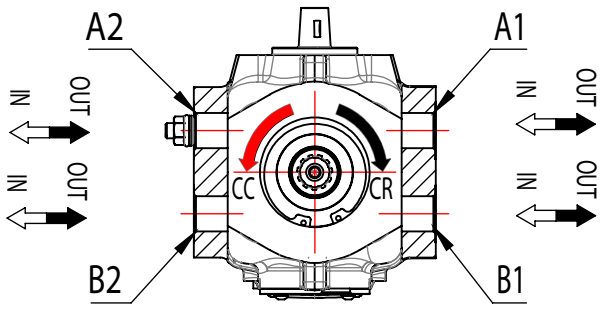
(continued)

DM

DIRECT MECHANICAL CONTROL

HYDRAULIC CIRCUIT



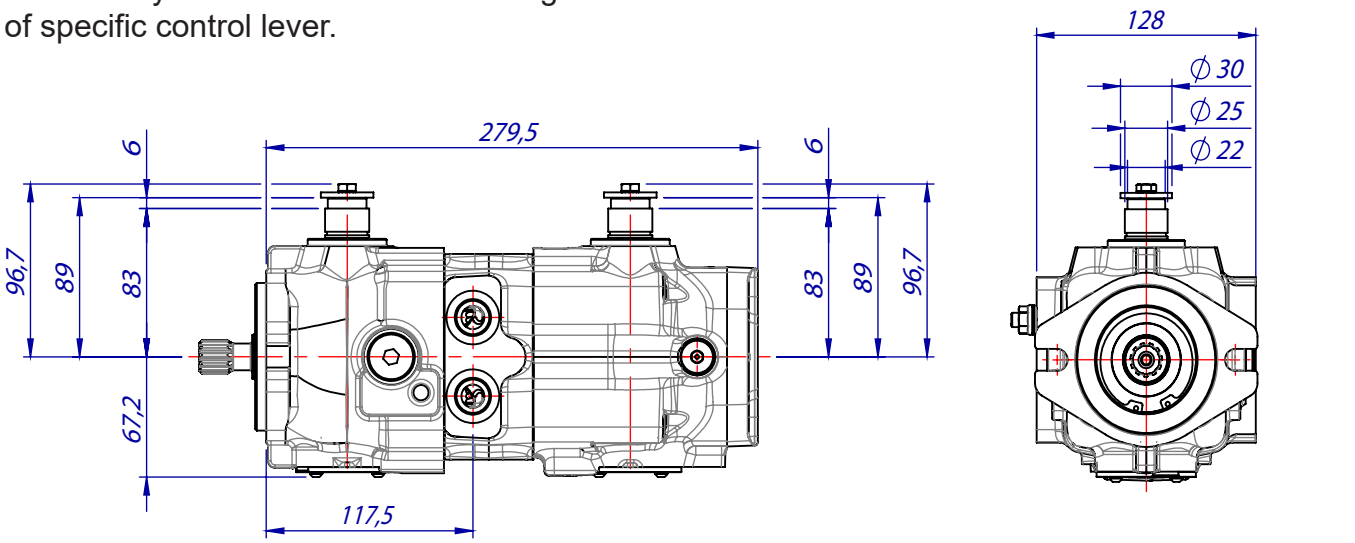


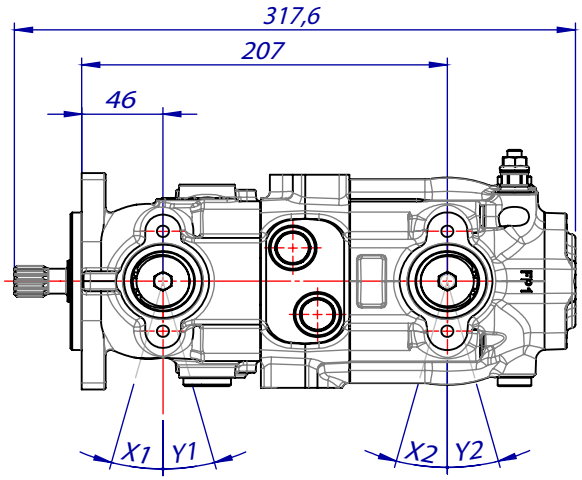
FLOW DIRECTION	PRIMARY PUMP			SECONDARY PUMP		
Rotation	Lever position	OUT	IN	Lever position	OUT	IN
Clockwise (CR)	X_1 Y_1	B_1 A_1	A_1 B_1	X_2 Y_2	A_2 B_2	B_2 A_2
Counter clockwise (CC)	X_1 Y_1	A_1 B_1	B_1 A_1	X_2 Y_2	B_2 A_2	A_2 B_2

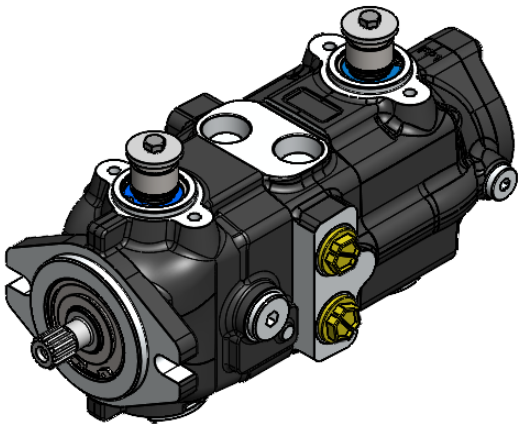
BC

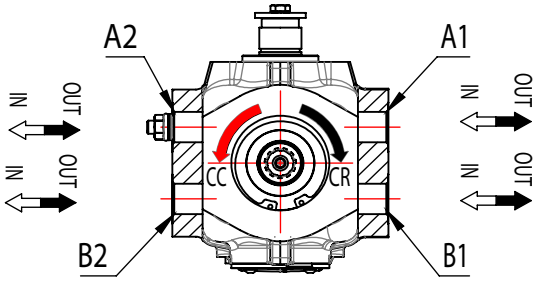
TAPERED BUSH

Tapered bush with Woodruff key UNI 6606, external cylindric. Suitable for arrangement of specific control lever.







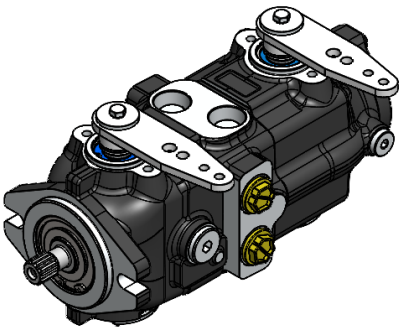


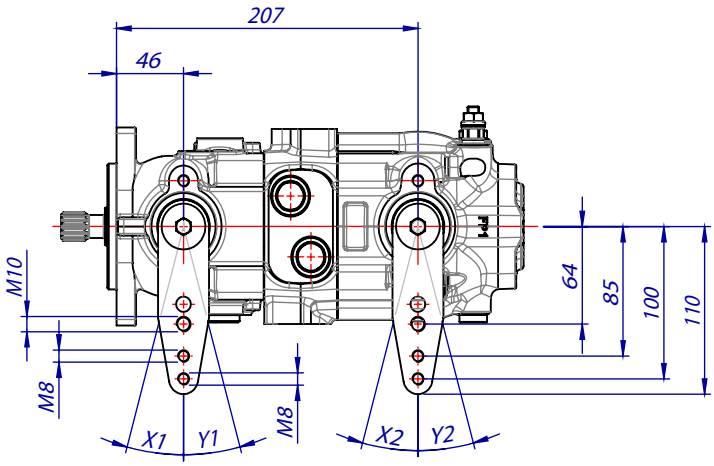
FLOW DIRECTION	PRIMARY PUMP			SECONDARY PUMP		
Rotation	Lever position	OUT	IN	Lever position	OUT	IN
Clockwise (CR)	X_1 Y_1	B_1 A_1	A_1 B_1	X_2 Y_2	A_2 B_2	B_2 A_2
Counter clockwise (CC)	X_1 Y_1	A_1 B_1	B_1 A_1	X_2 Y_2	B_2 A_2	A_2 B_2

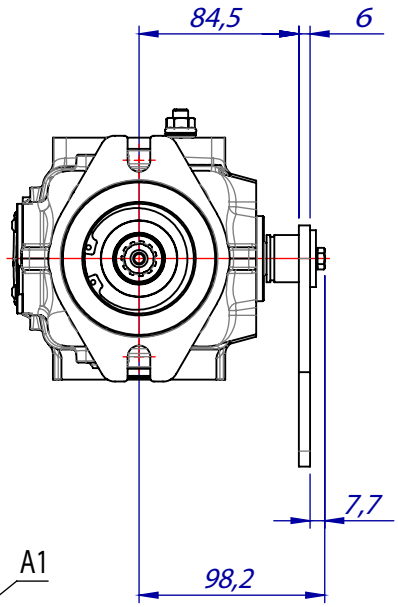
LC

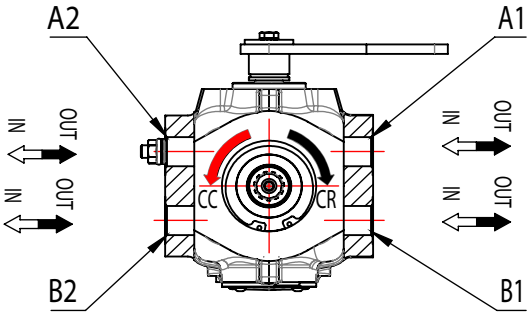
DIRECT MECHANICAL CONTROL WITH LEVER

The pump displacement variation is obtained by rotating the lever in a clockwise or counter-clockwise direction.
The control's pivot is directly connected to the pump swashplate.









LEVER ANGLE											
Pump Model	6/7	8/7	9/7	11/7	12/7	13/7	15/9	17/9	18/9	19/9	21/9
Lever Angle (X - Y)	10°	12°	13°	15°	17°	18°	15°	17°	18°	19°	19°

FLOW DIRECTION	PRIMARY PUMP			SECONDARY PUMP		
Rotation	Lever position	OUT	IN	Lever position	OUT	IN
Clockwise (CR)	X_1 Y_1	B_1 A_1	A_1 B_1	X_2 Y_2	A_2 B_2	B_2 A_2
Counter clockwise (CC)	X_1 Y_1	A_1 B_1	B_1 A_1	X_2 Y_2	B_2 A_2	A_2 B_2

DMS

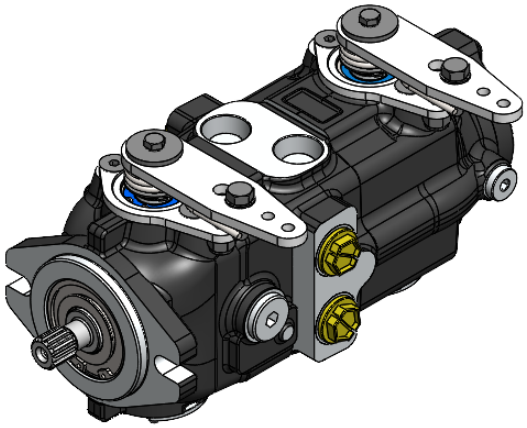
CONTROL LEVER WITH RETURN TO ZERO FLOW POSITION

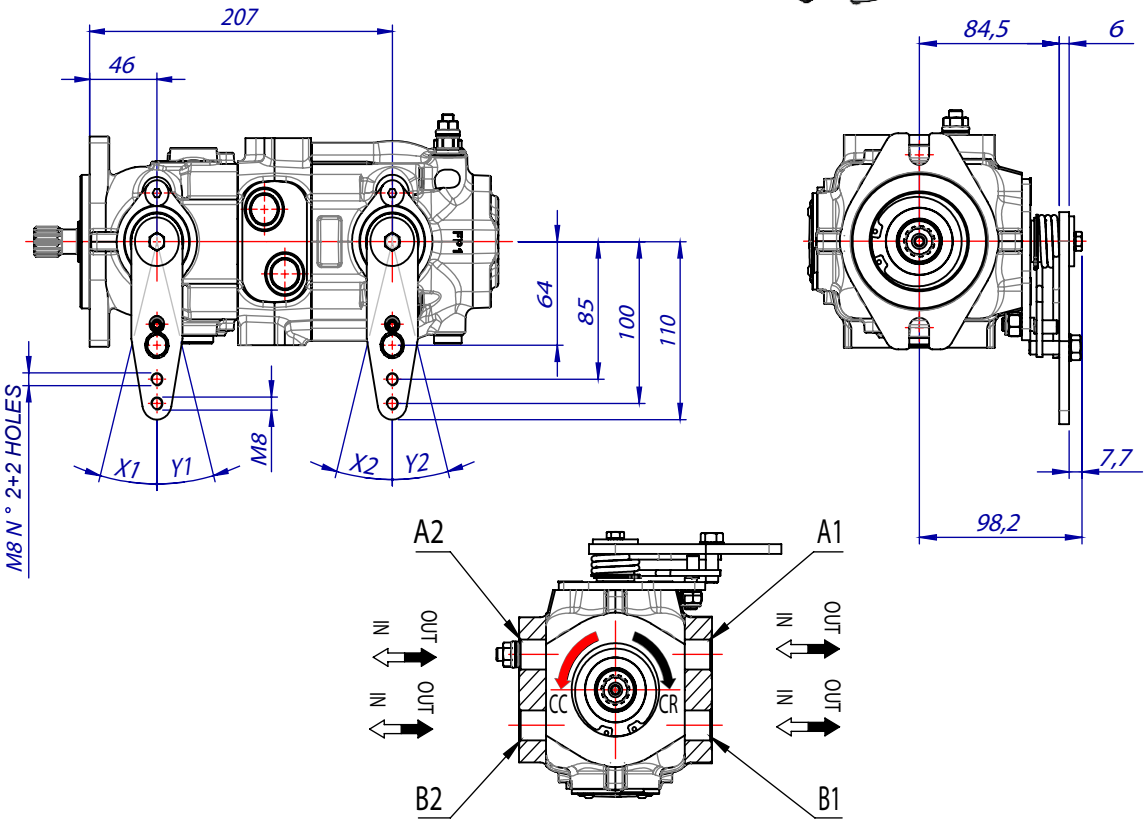
(torsion spring)

The pump displacement variation is obtained by rotating the lever in a clockwise or counter-clockwise direction.

Return to zero is obtained trough a spring integrated in the lever shaft.

The control's pivot is directly connected to the pump swashplate.





FLOW DIRECTION	PRIMARY PUMP			SECONDARY PUMP		
Rotation	Lever position	OUT	IN	Lever position	OUT	IN
Clockwise (CR)	X_1 Y_1	B_1 A_1	A_1 B_1	X_2 Y_2	A_2 B_2	B_2 A_2
Counter clockwise (CC)	X_1 Y_1	A_1 B_1	B_1 A_1	X_2 Y_2	B_2 A_2	A_2 B_2

LEVER ANGLE										
Pump Model	6/7	8/7	9/7	11/7	12/7	13/7	15/9	17/9	18/9	19/9	21/9
Lever Angle (X - Y)	10°	12°	13°	15°	17°	18°	15°	17°	18°	19°	19°

(continued)

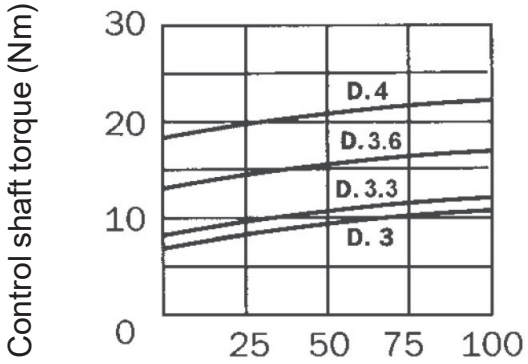
DMS

CONTROL LEVER WITH RETURN TO ZERO POSITION

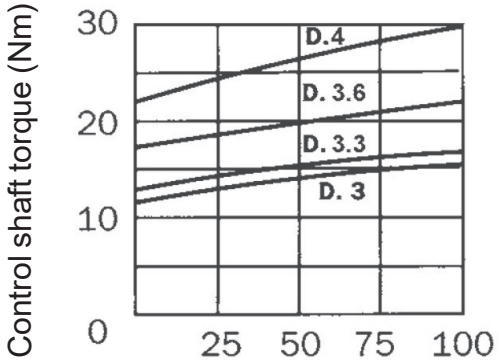
(torsion spring)

Standard spring diameter: 3,6 mm
Other available diameters: 3 - 3,3 - 4 - 5

Lever force - 10 MPa



Lever force - 20 MPa

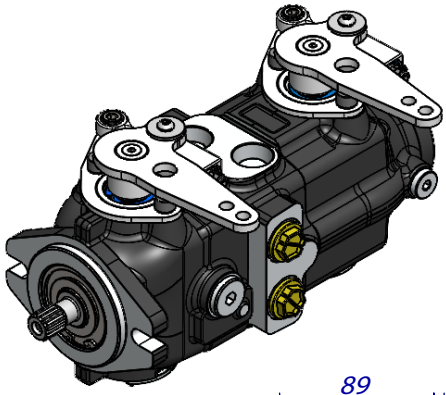


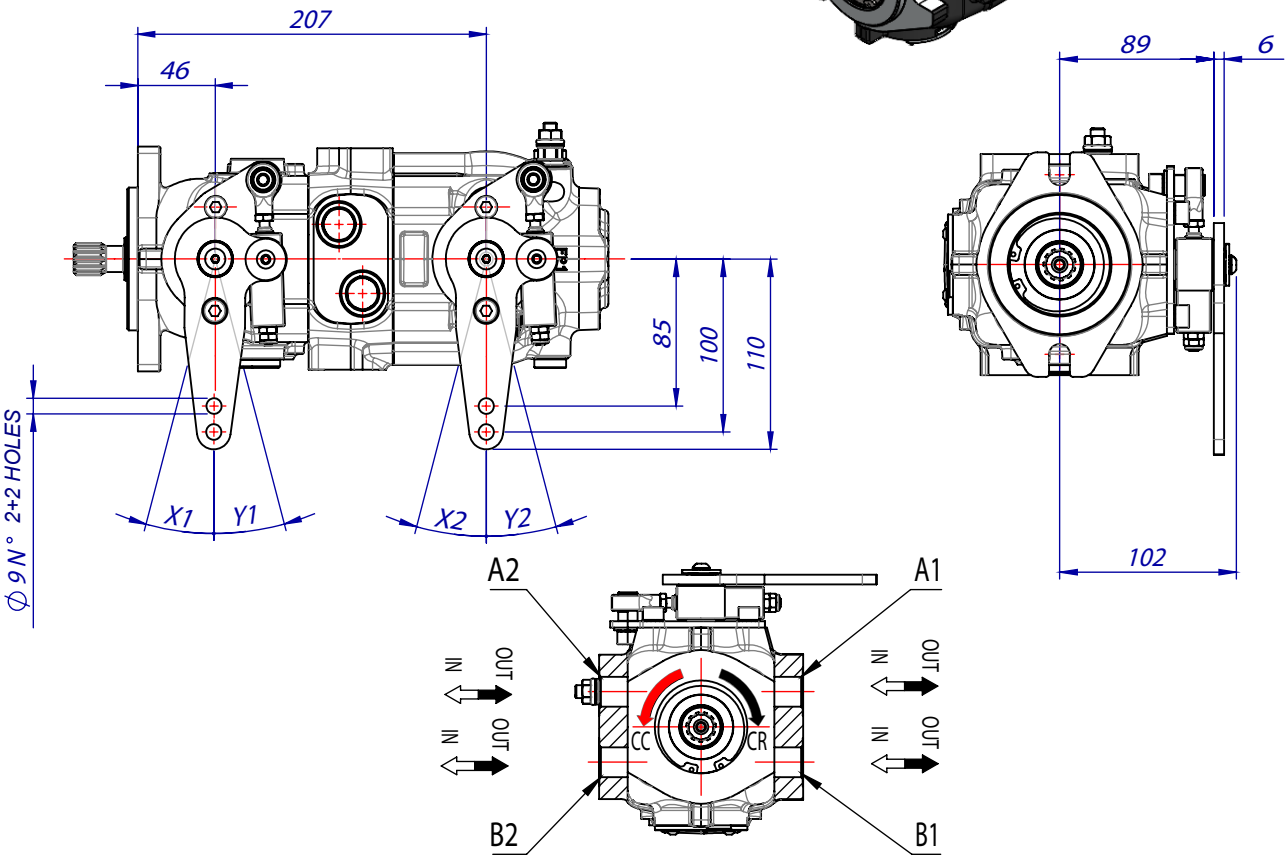
DMZ

CONTROL LEVER WITH RETURN TO ZERO POSITION

(compression spring)

The pump displacement variation is obtained by rotating the lever in a clockwise or counter-clockwise direction.
Return to zero is obtained trough a spring integrated in the lever shaft. The control's pivot is directly connected to the pump swashplate.





FLOW DIRECTION	PRIMARY PUMP			SECONDARY PUMP		
Rotation	Lever position	OUT	IN	Lever position	OUT	IN
Clockwise (CR)	X_1 Y_1	B_1 A_1	A_1 B_1	X_2 Y_2	A_2 B_2	B_2 A_2
Counter clockwise (CC)	X_1 Y_1	A_1 B_1	B_1 A_1	X_2 Y_2	B_2 A_2	A_2 B_2

LEVER ANGLE											
Pump Model	6/7	8/7	9/7	11/7	12/7	13/7	15/9	17/9	18/9	19/9	21/9
Lever Angle (X - Y)	10°	12°	13°	15°	17°	18°	15°	17°	18°	19°	19°

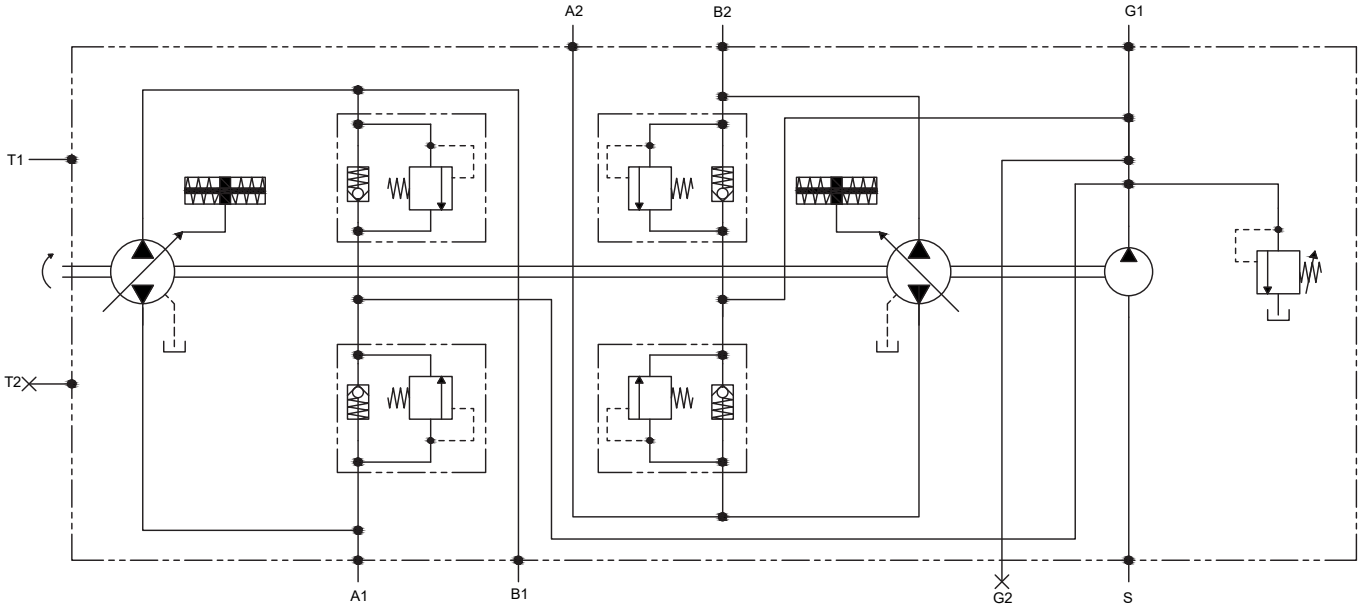
(continued)

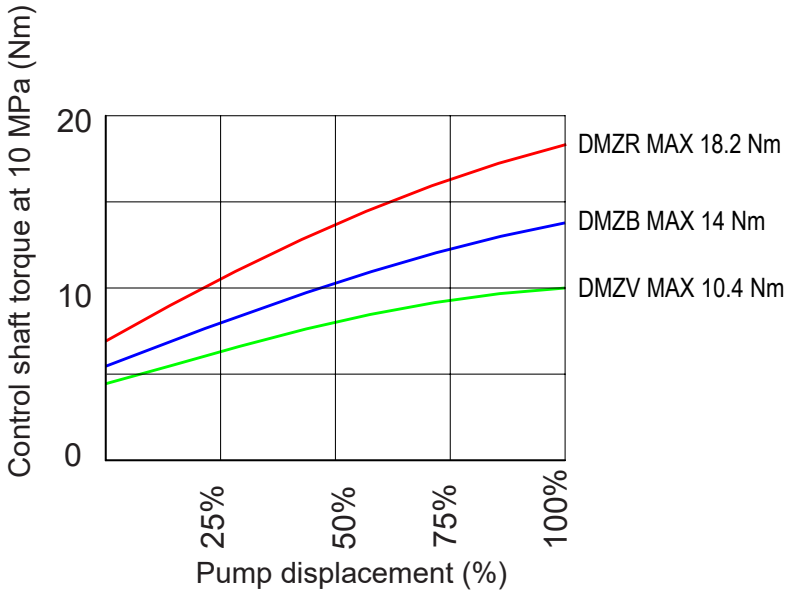
DMZ

CONTROL LEVER WITH RETURN TO ZERO POSITION

(compression spring)

HYDRAULIC CIRCUIT

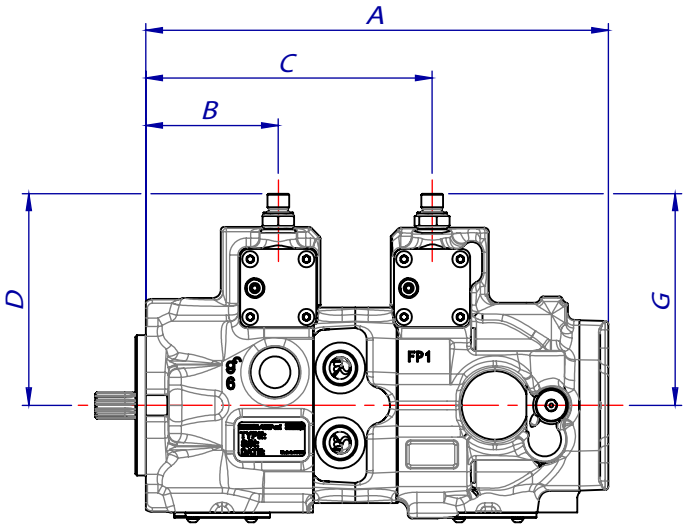


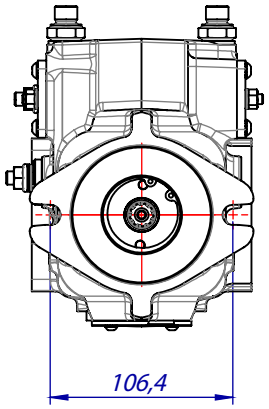


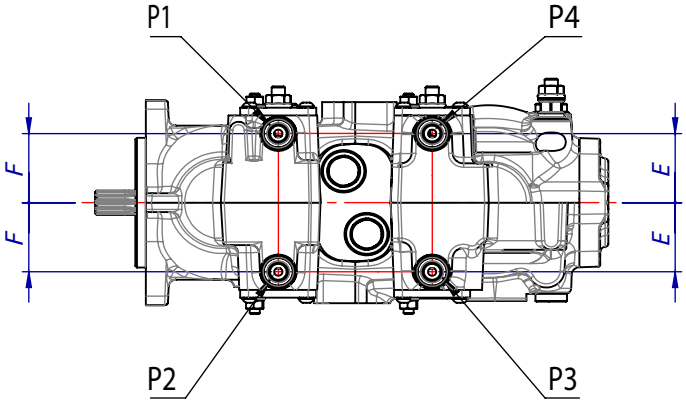
SHI

HYDRAULIC SERVO-CONTROL

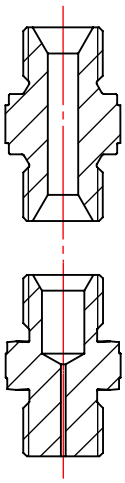
The pump displacement variation is obtained by adjusting the pressure on P1, P2, P3 and P4 servo control ports by means of a hydraulic proportional joystick (with integrated pressure reducing valves).
The servo control supply can be obtained by taking pressure from the boost pump (G1-G2 ports).The servo control return time can be adjusted by inserting a restrictor on the joystick supply line (0, 5 ÷ 1,2 mm).
The servo control operation curve, in both directions, goes from 0,4 MPa to 1,8 MPa (tolerance (± 5 %).
The adjusting curve of the hydraulic joystick has to be a little wider (0,3 MPa ÷ 1,9 MPa).
Suggested curves for HPV series Joysticks: CR062 (see HT/73/B/105/0919/E catalogue).



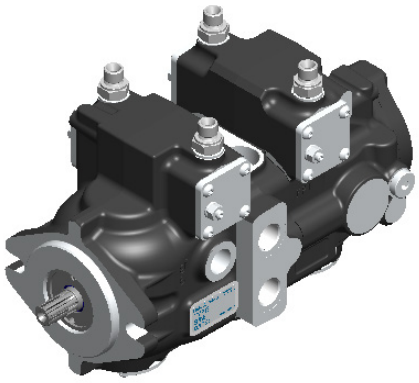




STANDARD CONNECTOR



OPTIONAL RESTRICTOR ORIFICE.
SEE POINT 18 ORDER CODE
FOR AVAILABILITY DIAMETERS



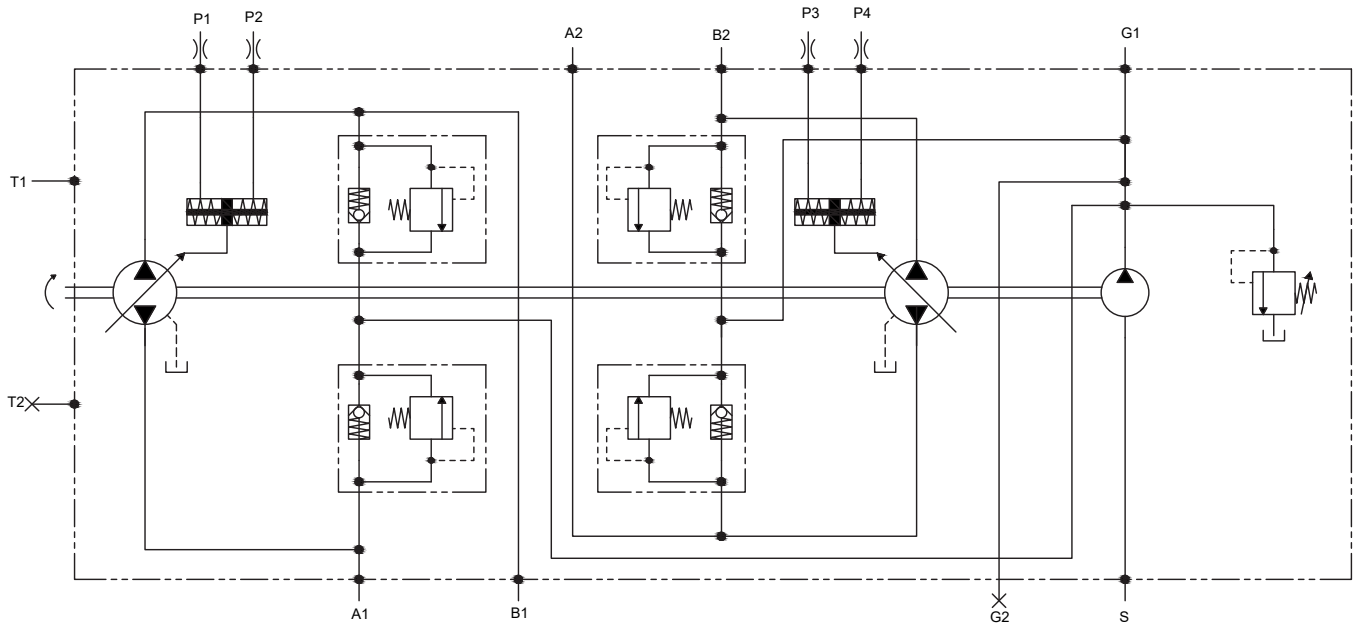
GENERAL DIMENSIONS (mm)		
REFERENCE	F1 - SAE A	F2.2 - SAE B
A	279,5	280,5
B	80	81
C	173	174
D	124,5	121,5
E	44	44
F	44	44
G	124,5	124,5

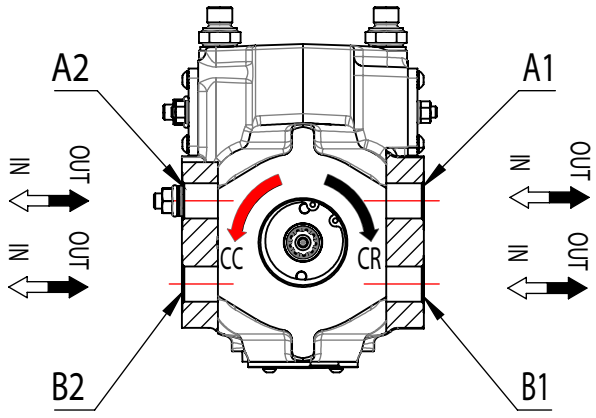
(continued)

SHI

HYDRAULIC SERVO-CONTROL

HYDRAULIC CIRCUIT





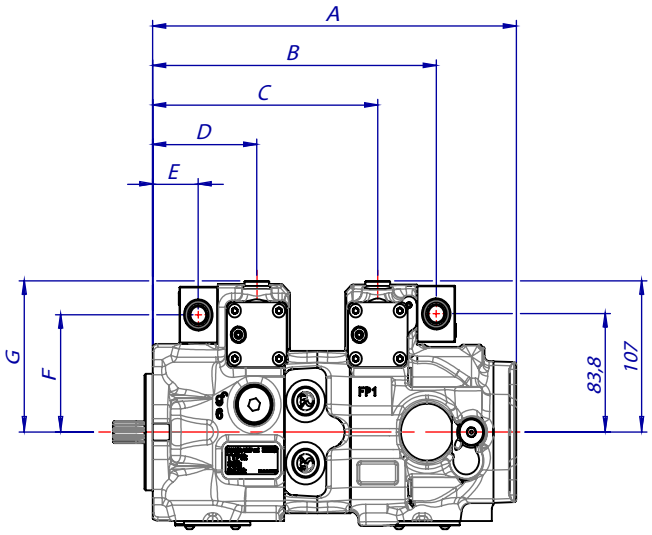
FLOW DIRECTION	PRIMARY PUMP			SECONDARY PUMP		
Rotation	Port	OUT	IN	Port	OUT	IN
Clockwise (CR)	P_1 P_2	B_1 A_1	A_1 B_1	P_3 P_4	A_2 B_2	B_2 A_2
Counter clockwise (CC)	P_1 P_2	A_1 B_1	B_1 A_1	P_3 P_4	B_2 A_2	A_2 B_2

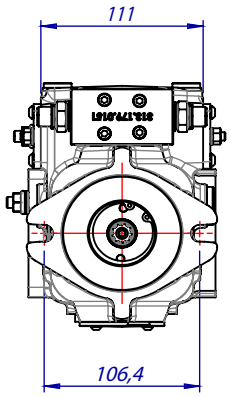
SHIC

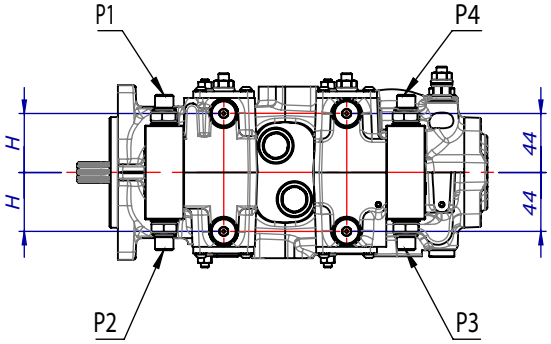
COMPACT HYDRAULIC CONTROL

(with side pilot ports)

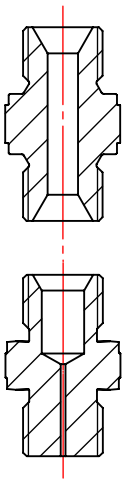
The pump displacement variation is obtained by adjusting the pressure on P1, P2, P3 and P4 servo control ports by means of a hydraulic proportional joystick (with integrated pressure reducing valves). The servo control supply can be obtained by taking pressure from the boost pump (G1- G2 ports).
The servo control return time can be adjusted by inserting a restrictor on the joystick supply line (0,5 ÷ 1,2 mm). The servo control operation curve, in both directions, goes from 0,4 MPa to 1,8 MPa (tolerance (± 5 %).
The adjusting curve of the hydraulic joystick has to be a little wider (0,3 MPa ÷ 1,9 MPa).
Suggested curves for HPV series Joysticks: CR062 (see HT/73/B/105/0919/E catalogue).



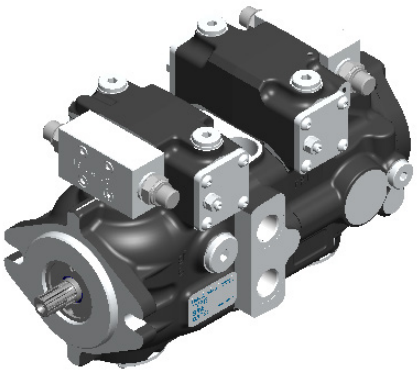




STANDARD CONNECTOR



OPTIONAL RESTRICTOR ORIFICE.
SEE POINT 18 ORDER CODE
FOR AVAILABILITY DIAMETERS



GENERAL DIMENSIONS (mm)		
REFERENCE	F1 - SAE A	F2 - SAE B
A	279,5	280,5
B	218	219
C	173	174
D	80	81
E	35	36
F	83	83
G	107	107
H	44	44

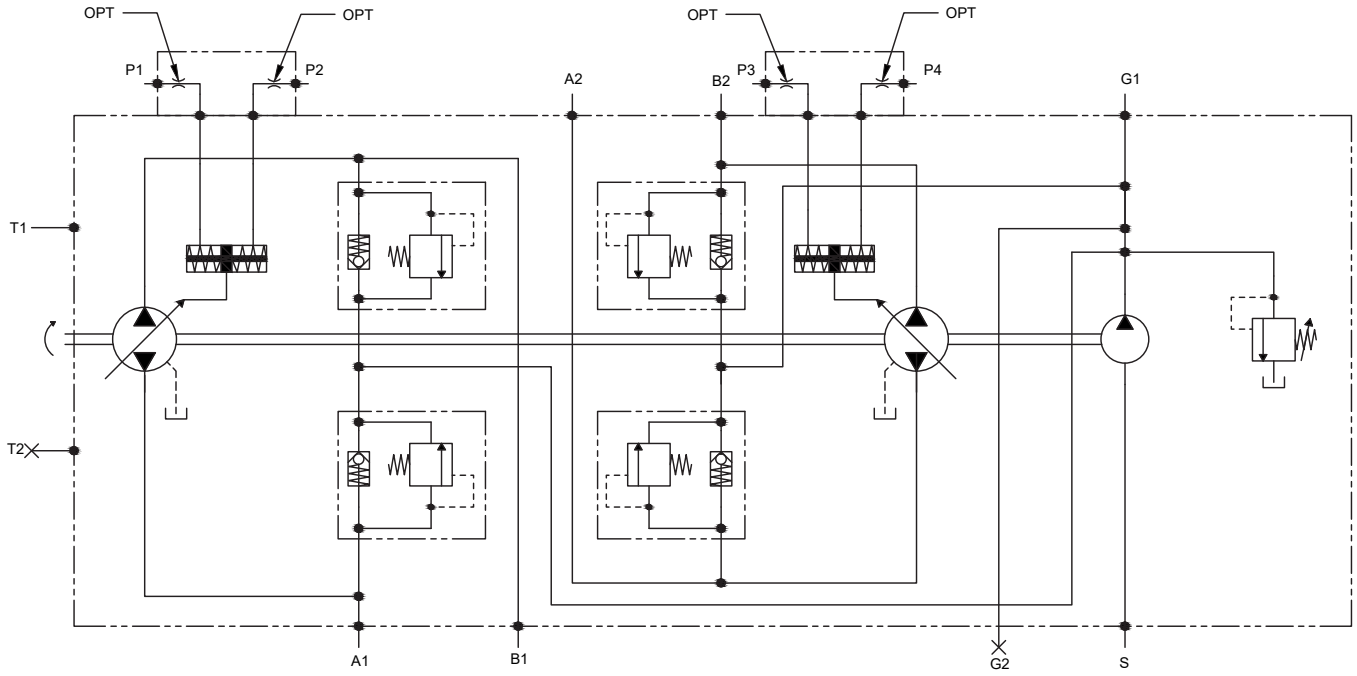
(continued)

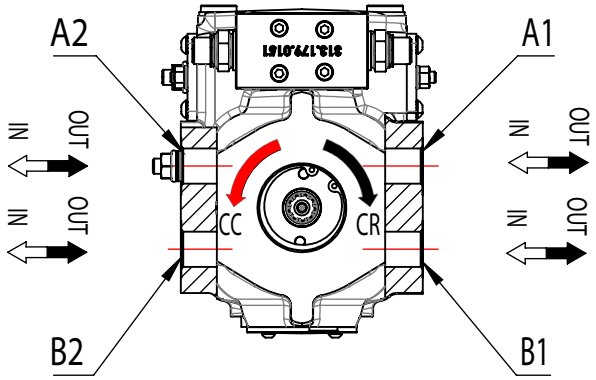
SHIC

COMPACT HYDRAULIC CONTROL

(with side pilot ports)

HYDRAULIC CIRCUIT





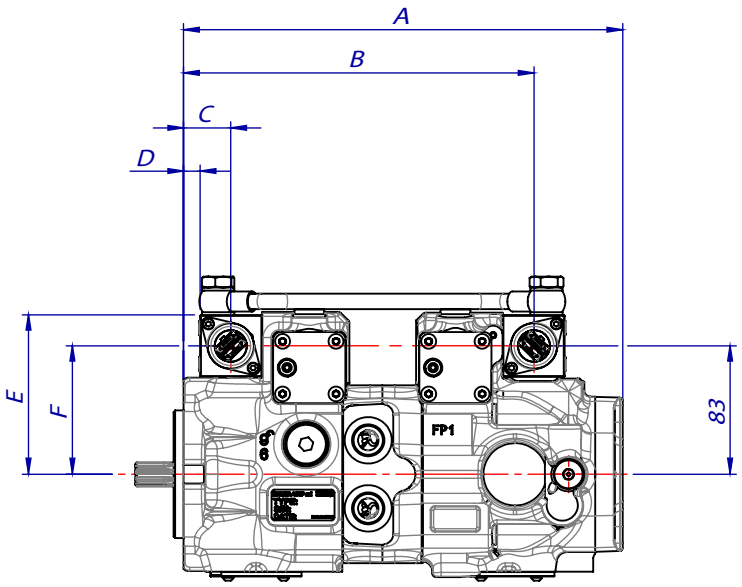
FLOW DIRECTION	PRIMARY PUMP			SECONDARY PUMP		
Rotation	Port	OUT	IN	Port	OUT	IN
Clockwise (CR)	P_1 P_2	B_1 A_1	A_1 B_1	P_3 P_4	A_2 B_2	B_2 A_2
Counter clockwise (CC)	P_1 P_2	A_1 B_1	B_1 A_1	P_3 P_4	B_2 A_2	A_2 B_2

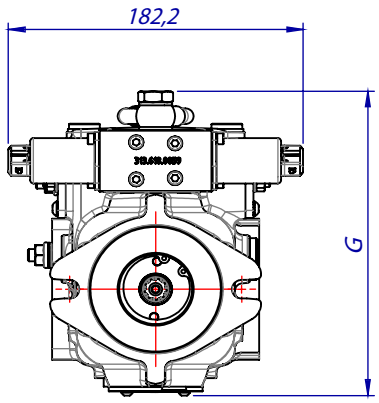
SEI 1 (12V DC)
SEI 2 (24V DC)

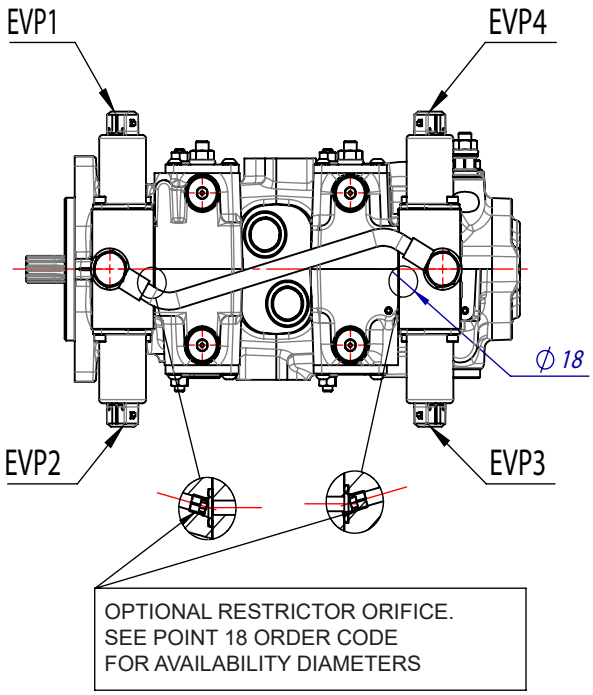
PROPORTIONAL ELECTRIC SERVO CONTROL

(AMP junior timer connector)

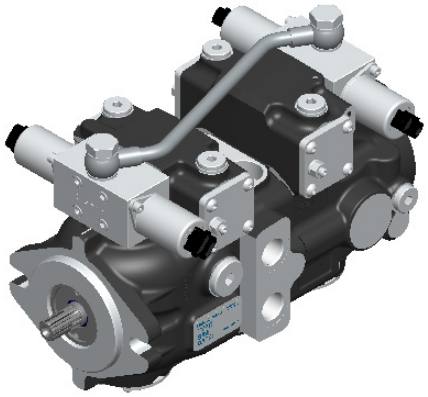
The pump displacement variation is obtained by an electric signal, which varies approximately:
- from 315 to 630 mA (24V DC voltage)
- from 630 to 1260 mA (12V DC voltage)







OPTIONAL RESTRICTOR ORIFICE.
SEE POINT 18 ORDER CODE
FOR AVAILABILITY DIAMETERS



GENERAL DIMENSIONS (mm)		
REFERENCE	F1 - SAE A	F2 - SAE B
A	279,5	280,5
B	223	224
C	30	31
D	10,5	11,5
E	103	103
F	83	83
G	196,5	196,5

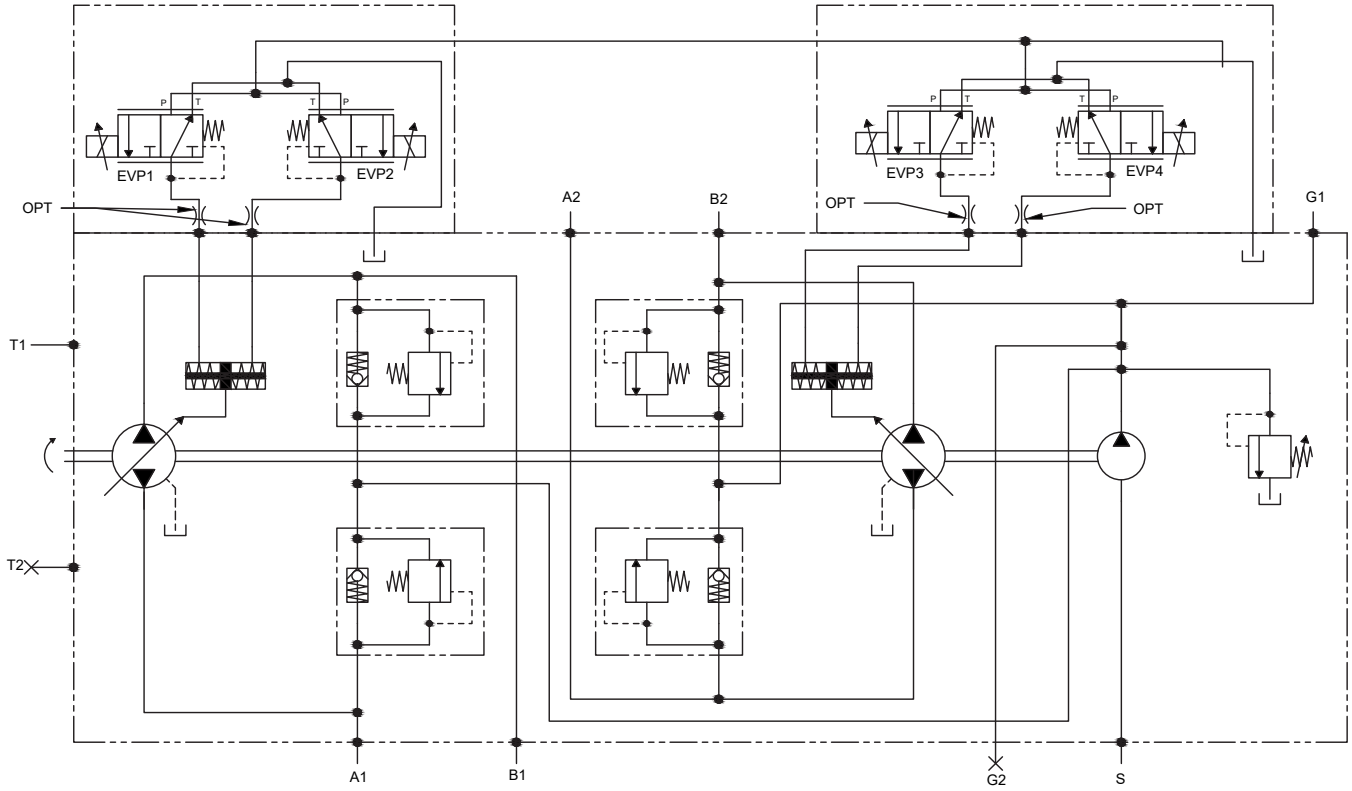
(continued)

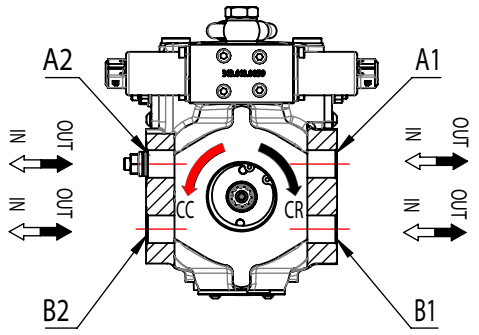
SEI 1 (12V DC)
SEI 2 (24V DC)

PROPORTIONAL ELECTRIC SERVO CONTROL

(AMP junior timer connector)

HYDRAULIC CIRCUIT





FLOW DIRECTION	PRIMARY PUMP			SECONDARY PUMP		
Rotation	EVP	OUT	IN	EVP	OUT	IN
Clockwise (CR)	EVP1 EVP2	B_1 A_1	A_1 B_1	EVP3 EVP4	A_2 B_2	B_2 A_2
Counter clockwise (CC)	EVP1 EVP2	A_1 B_1	B_1 A_1	EVP3 EVP4	B_2 A_2	A_2 B_2

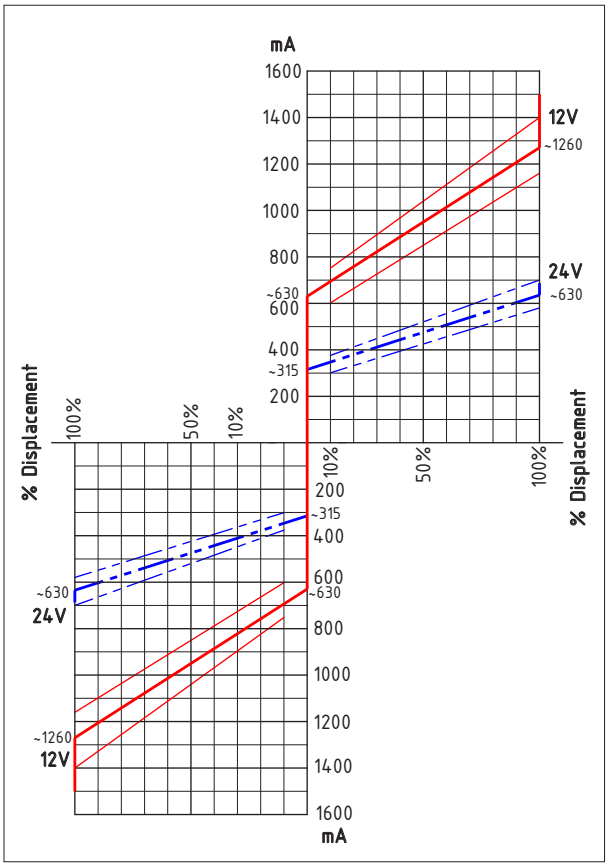
(continued)

SEI 1 (12V DC)
SEI 2 (24V DC)

PROPORTIONAL ELECTRIC SERVO CONTROL

(AMP junior timer connector)

CURRENT-DISPLACEMENT GRAPHIC



ELECTRICAL FEATURES		
Voltage	12 V DC	24 V DC
Electric current	1500 mA	750 mA
Load resistence	4,72 Ω ± 5%	20,8 Ω ± 5%
Type of control	Current control	
	PWM 100 Hz (suggested)	
Type of connection	AMP Junior Timer	
Protection class	Until IP6K6 / IPX9K	

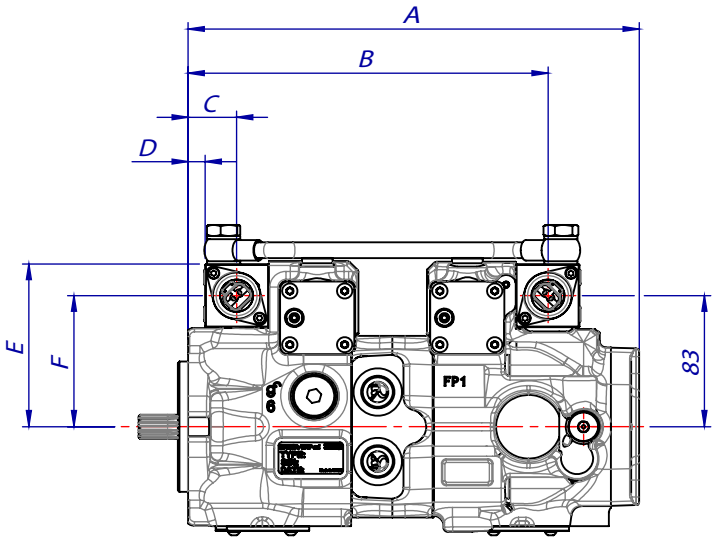
HYDRAULIC FEATURES	
Max. pressure (P, T)	pP= 5 MPa, pT= 3 MPa
Hysteresis (w/PWM)	<0,07 MPa (pA=2,0)
	<0,1 MPa (pA=2,5)
	<0,15 MPa (pA=3,5)
Filtration ratio	125 µm
Oil contamination level	Min. filtration ratio: 20/18/15
	According ISO 4406
	Hydraulic oil DIN 51524
Min./max. oil temperature	From -20 to +90°C

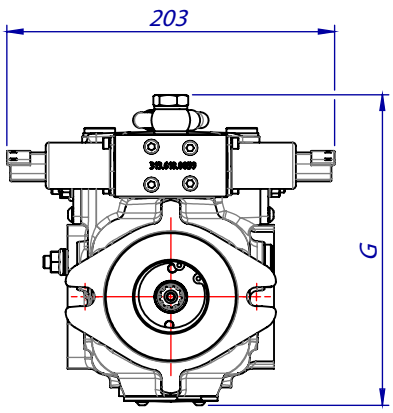
SEI 1D (12V DC)
SEI 2D (24V DC)

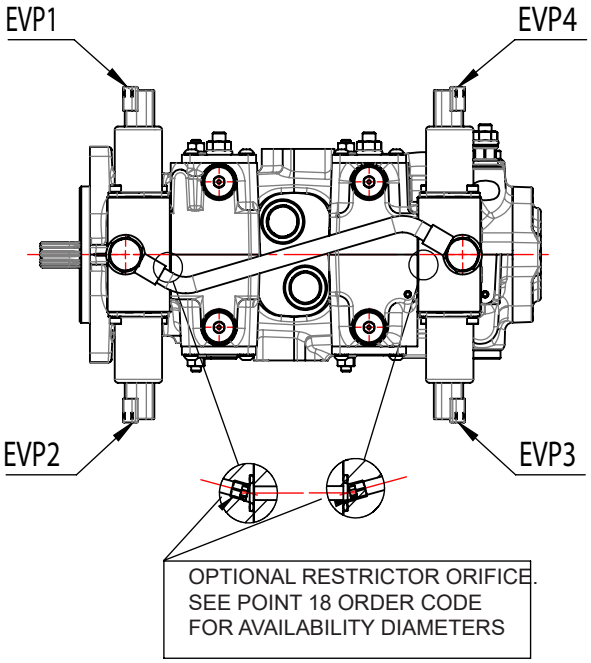
ELECTRO SERVO PROPORTIONAL CONTROL

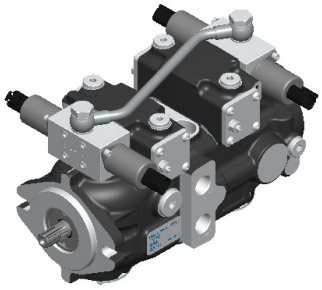
(DEUTSCH connector)

The pump displacement variation is obtained by an electric signal, which varies approximately:
- from 315 to 630 mA (24V DC voltage)
- from 630 to 1260 mA (12V DC voltage)









GENERAL DIMENSIONS (mm)		
REFERENCE	F1 - SAE A	F2 - SAE B
A	279,5	280,5
B	223	224
C	30	31
D	10,5	11,5
E	103	103
F	83	83
G	196,5	196,5

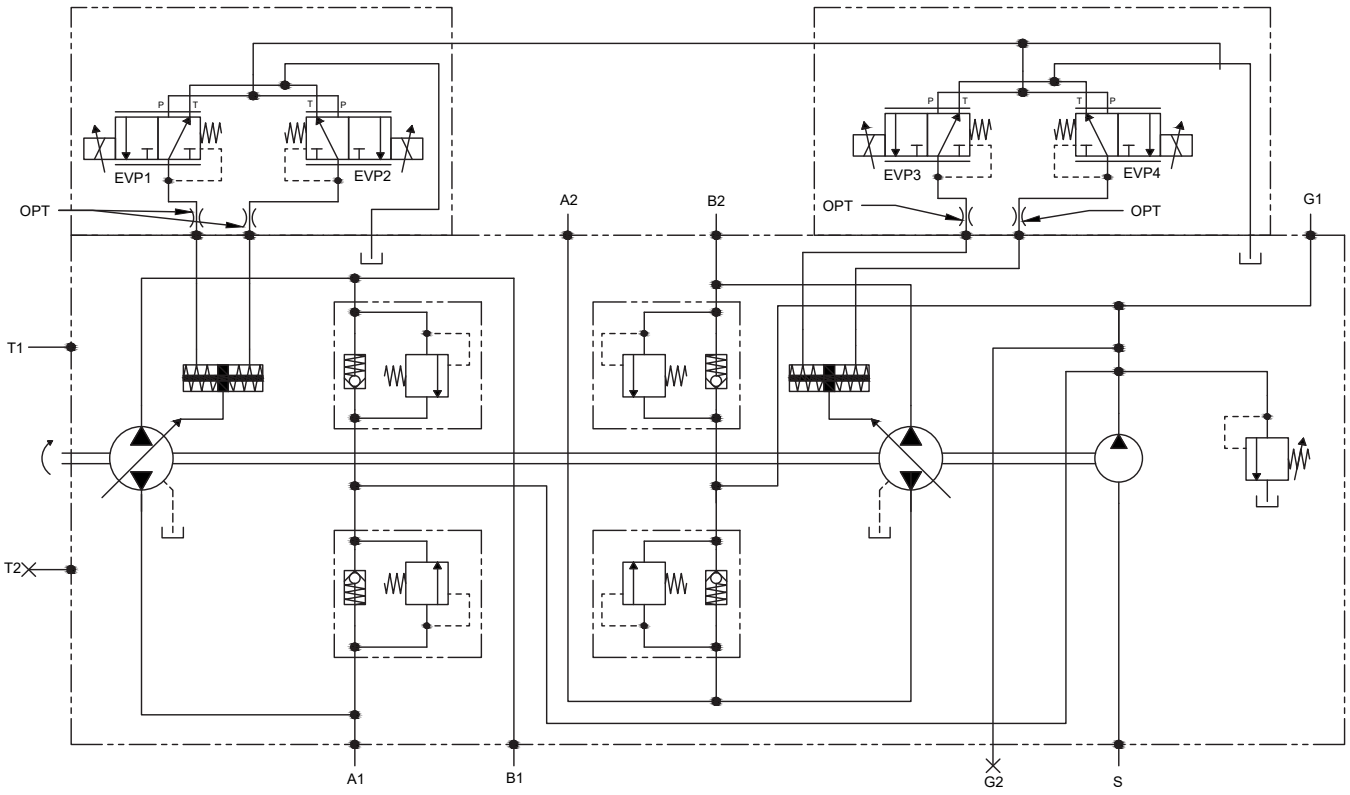
(continued)

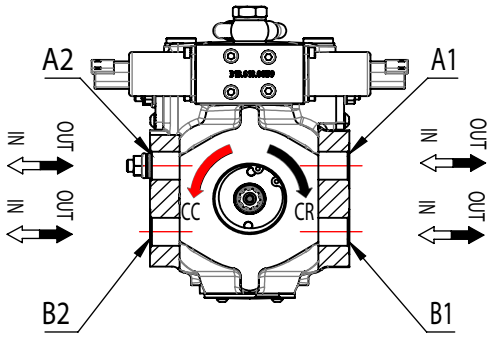
SEI 1D (12V DC)
SEI 2D (24V DC)

ELECTRO SERVO PROPORTIONAL CONTROL

(DEUTSCH connector)

SCHEMA IDRAULICO

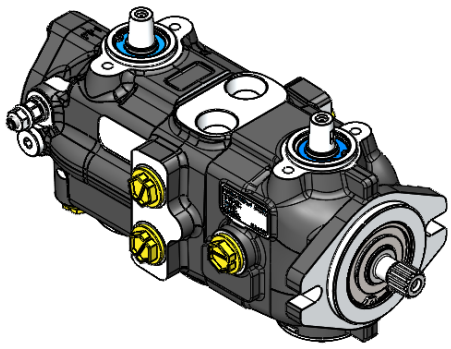




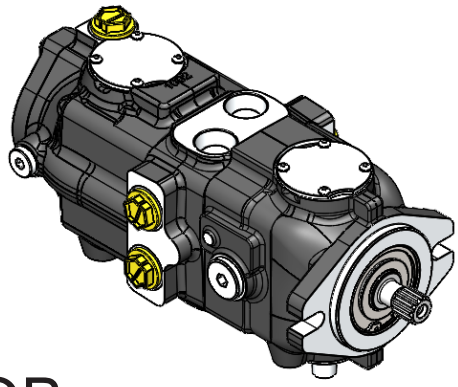
FLOW DIRECTION	PRIMARY PUMP			SECONDARY PUMP		
Rotation	EVP	OUT	IN	EVP	OUT	IN
Clockwise (CR)	EVP1 EVP2	B_1 A_1	A_1 B_1	EVP3 EVP4	A_2 B_2	B_2 A_2
Counter clockwise (CC)	EVP1 EVP2	A_1 B_1	B_1 A_1	EVP3 EVP4	B_2 A_2	A_2 B_2

CONTROL DEVICE POSITION

(Primary and Secondary Pump)



OA



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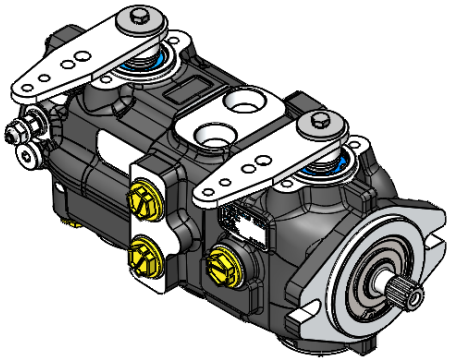
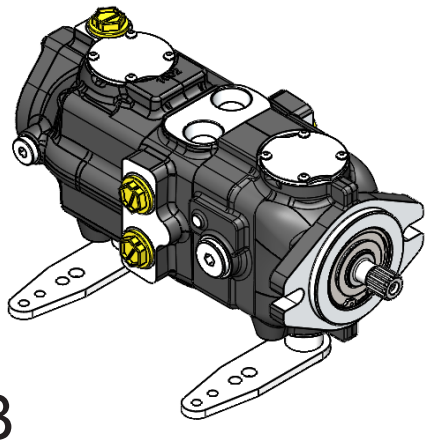
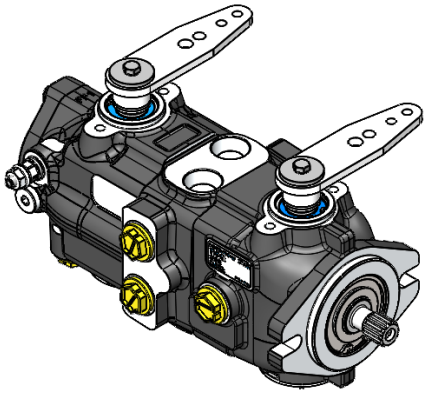


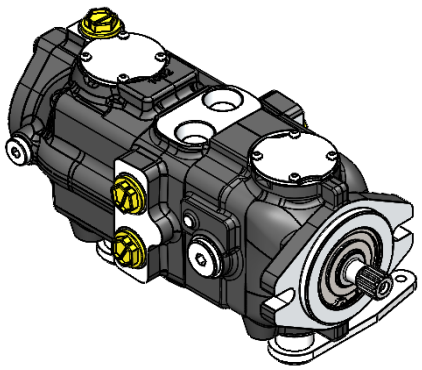
LA



LB



RA

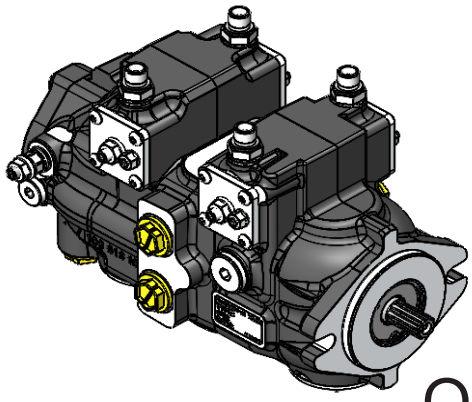


RB

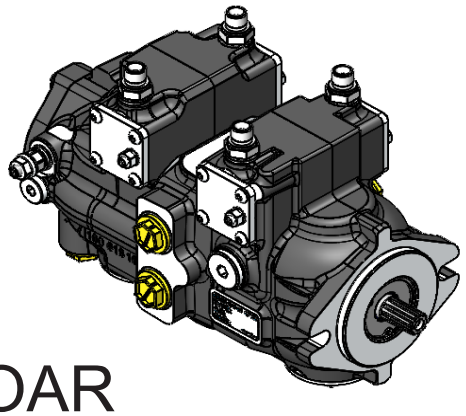
CONTROL DEVICE POSITION

(Primary and Secondary Pump)

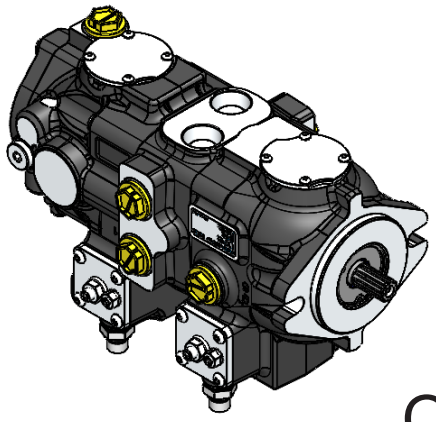
(STD)



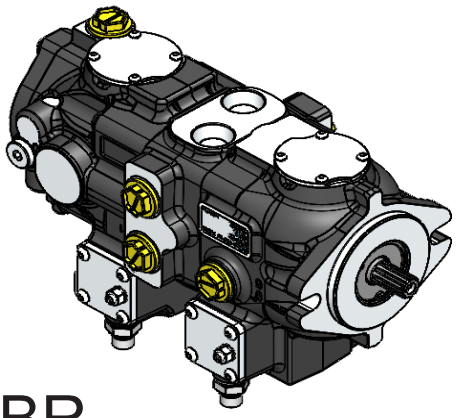
OAL



OAR



OBL

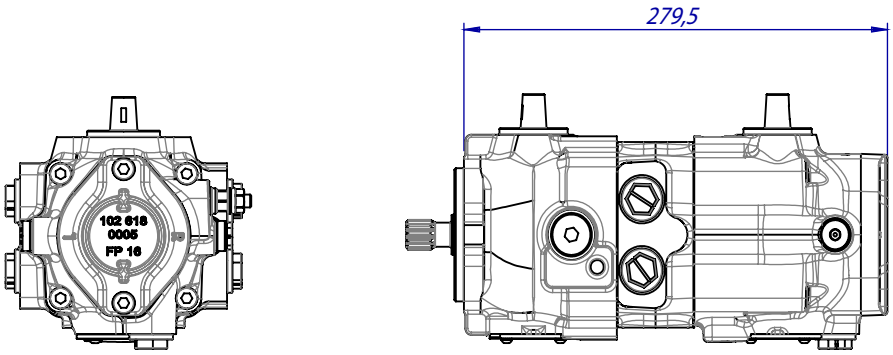


OBR

REAR PUMP MOUNTING FLANGES

C

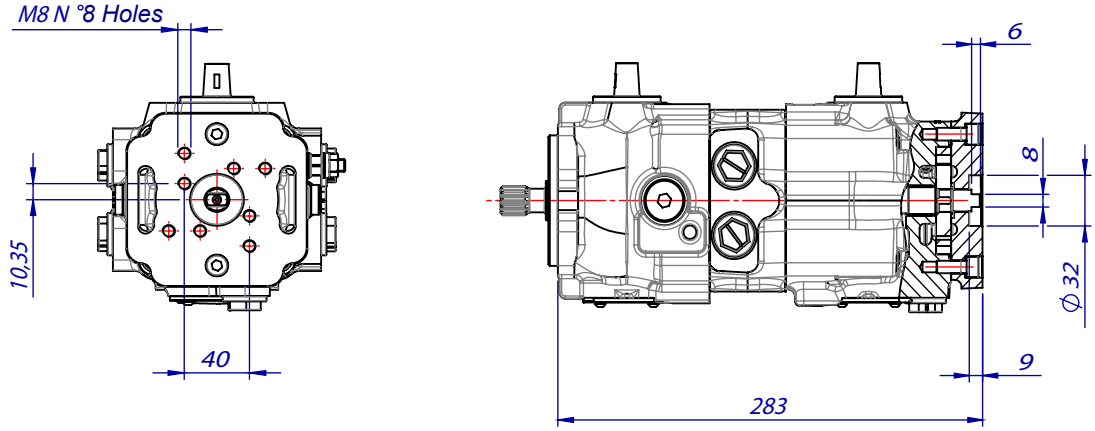
CLOSED COVER WITHOUT REAR FITTING



B1

GERMAN STANDARD

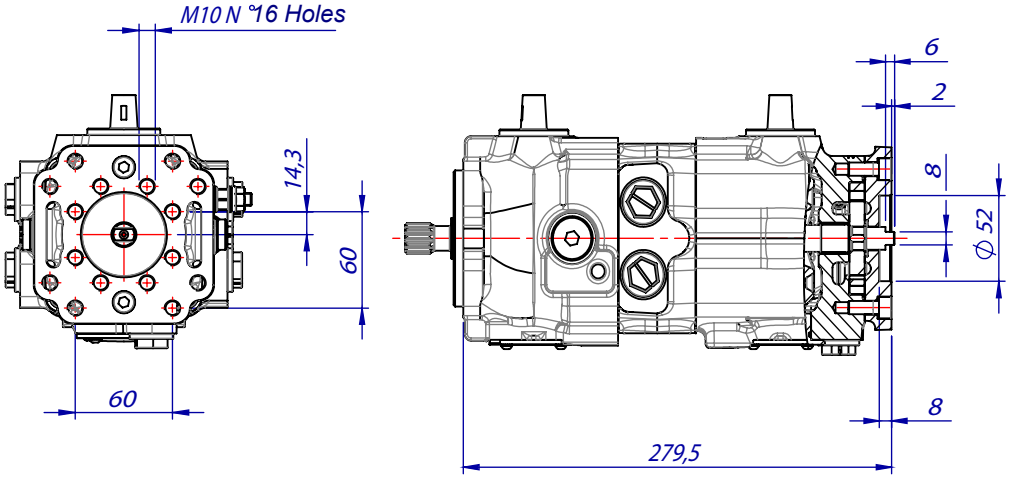
Four possible mounting positions (every 90°)
Max. torque = 70 Nm



B2

GERMAN STANDARD

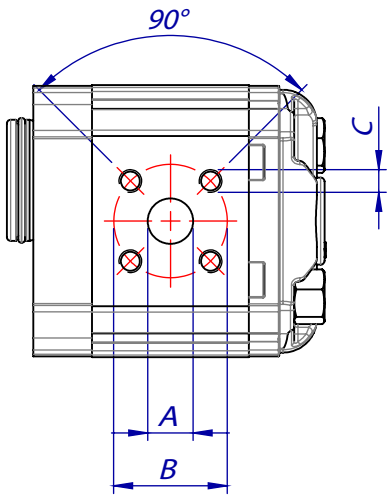
Four possible mounting positions (every 90°)
Max. torque = 70 Nm



GEAR PUMPS CONNECTION

F

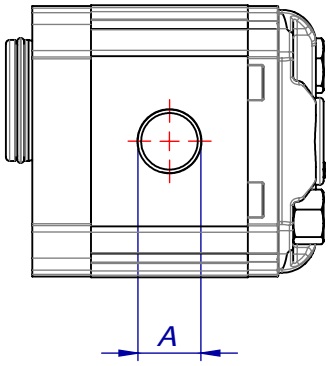
OPTIONAL
GROUP 1



PUMP CONNECTION SIZE					
SUCTION IN			OUTLET OUT		
A	*B*	*C*	*A*	*B*	*C*
12 mm	30 mm	M6	12 mm	30 mm	M6

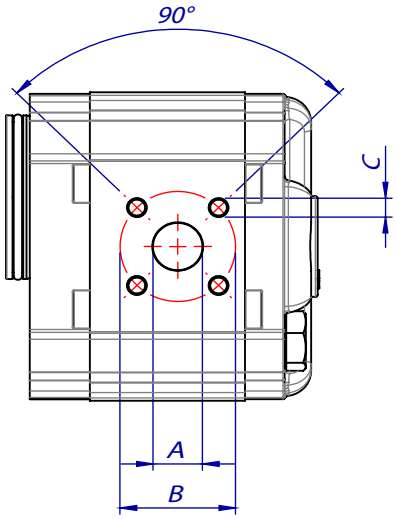
STANDARD
GROUP 1

G



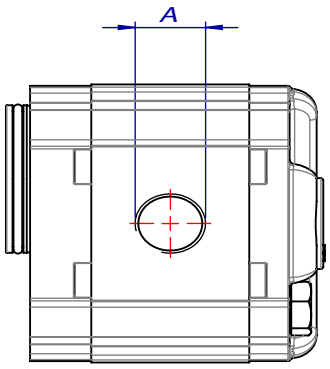
PUMP CONNECTION SIZE	
SUCTION IN	OUTLET OUT
A	*A*
3/8" BSPP	3/8" BSPP

STANDARD
GROUP 2



PUMP CONNECTION SIZE					
SUCTION IN			OUTLET OUT		
A	*B*	*C*	*A*	*B*	*C*
20 mm	40 mm	M6	15 mm	35 mm	M6

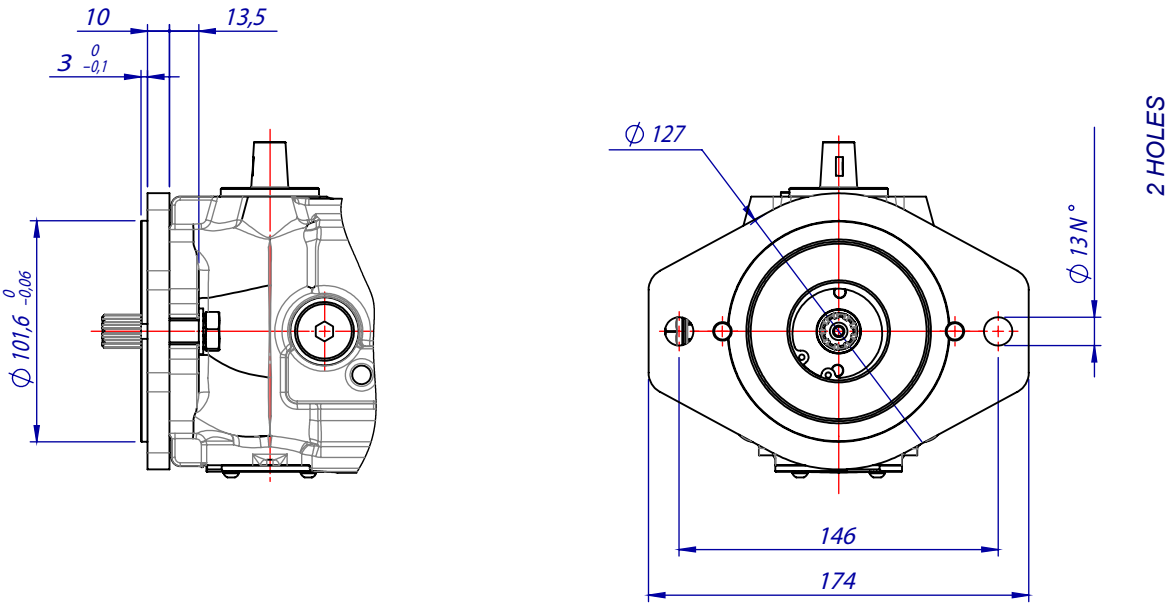
OPTIONAL
GROUP 2



PUMP CONNECTION SIZE		
DISPLACEMENT	SUCTION IN	OUTLET OUT
cm³/n	*A*	*A*
4	G 1/2"	G 1/2"
6		
8		
11	G 3/4"	
14		
16		
19		
22		
26		
31		

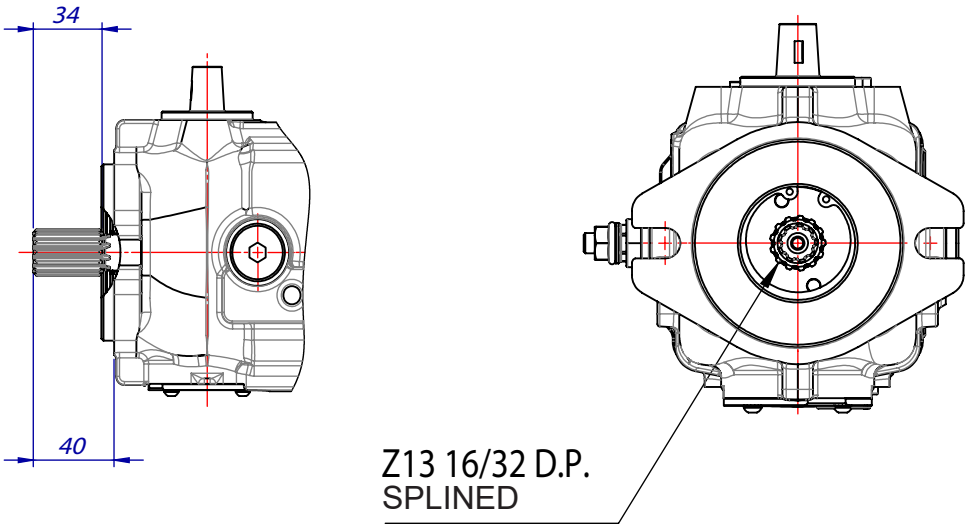
OPTIONAL FB

ADAPTOR FLANGE FROM SAE A - SAE B



OPTIONAL ST

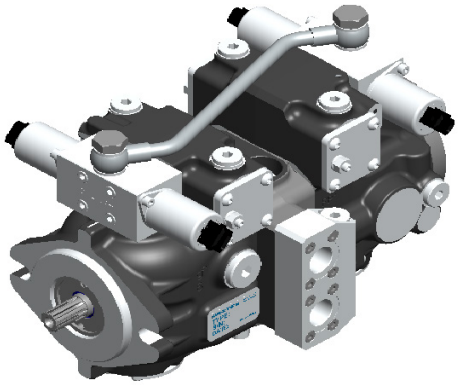
COUPLING Z = 9 / Z = 13
(SAE-A / SAE-B CONVERSION OF SHAFT)

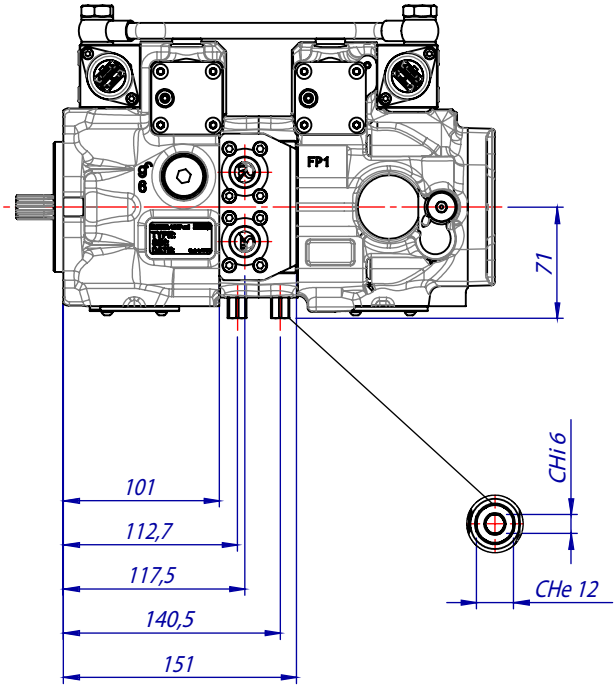


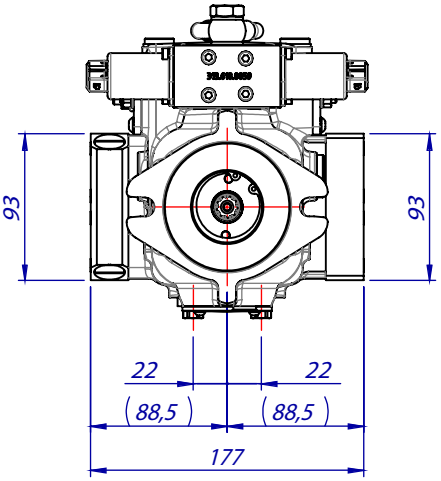
OPTIONAL VS-SB

FLUSHING VALVE WITH SCREW BY-PASS

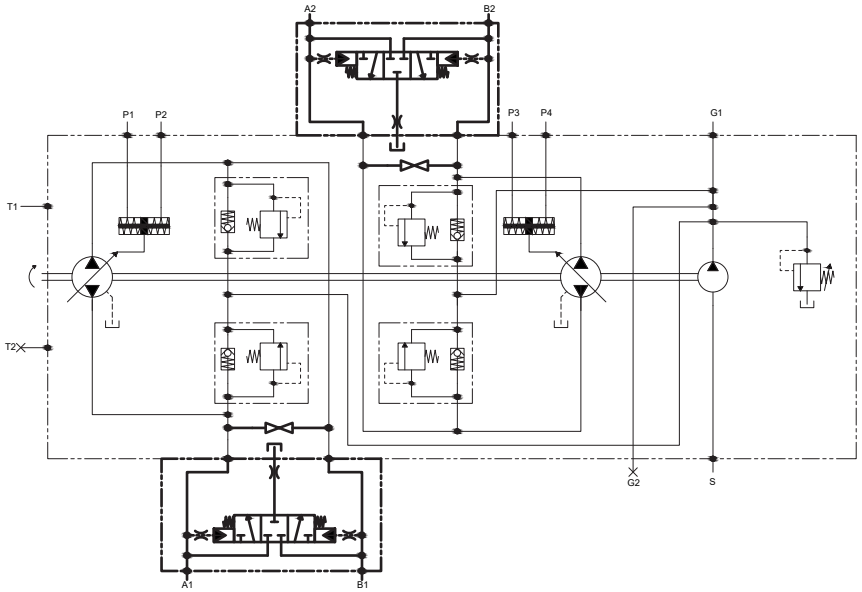
The TPV 1300 BTB pumps are available with flushing valve with screw by-pass.
The valve consists of a spring centered shuttle spool connecting automatically the low pressure line (boost) with the reservoir removing heat from the system. The quantity of the flushing oil is a function of the low system pressure (boost) and the size of the orifice on the valve (different orifices are available referred to the system pressure). The spool shifts at a differential pressure of about 0,8 MPa (116 PSI).







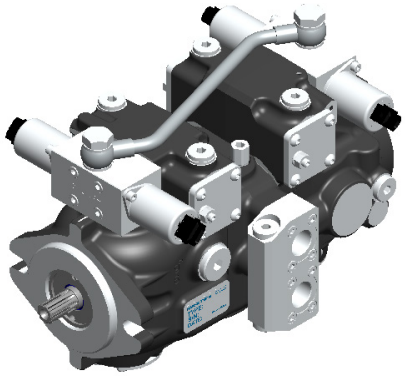
HYDRAULIC CIRCUIT

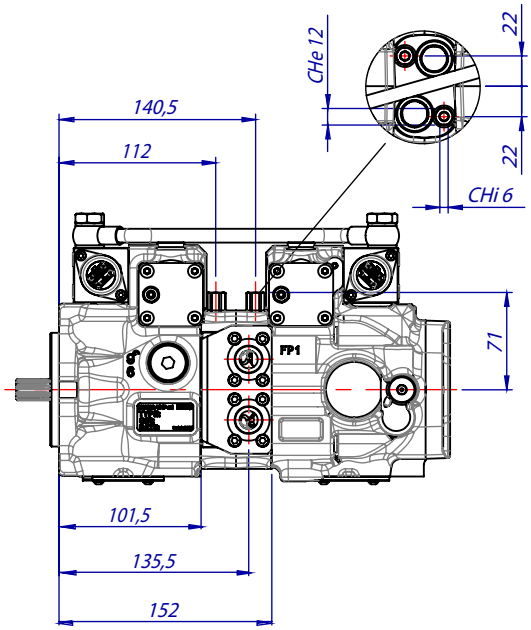


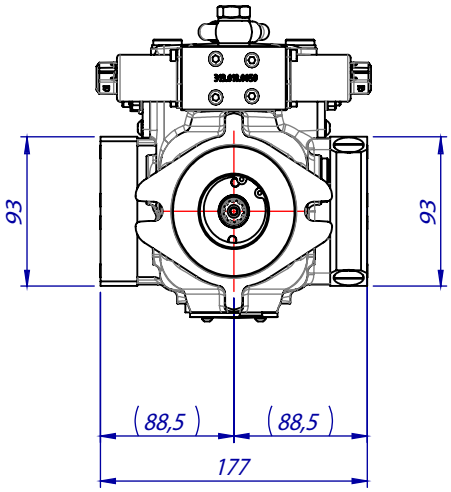
OPTIONAL VS-SB1

FLUSHING VALVE WITH SCREW BY-PASS (180° rotated position)

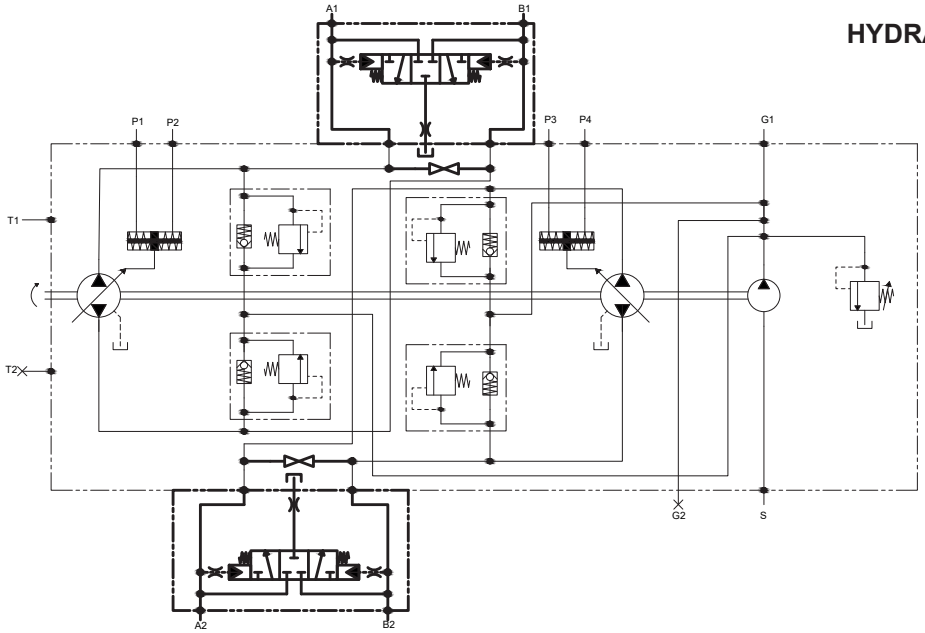
The TPV 1300 BTB pumps are available with flushing valve with screw by-pass in 180° rotated position. The valve consists of a spring centered shuttle spool connecting automatically the low pressure line (boost) with the reservoir removing heat from the system. The quantity of the flushing oil is a function of the low system pressure (boost) and the size of the orifice on the valve (different orifices are available referred to the system pressure). The spool shifts at a differential pressure of about 0,8 MPa (116 PSI).







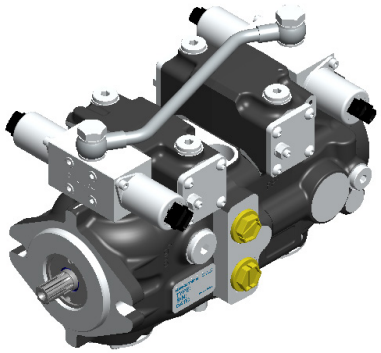
HYDRAULIC CIRCUIT

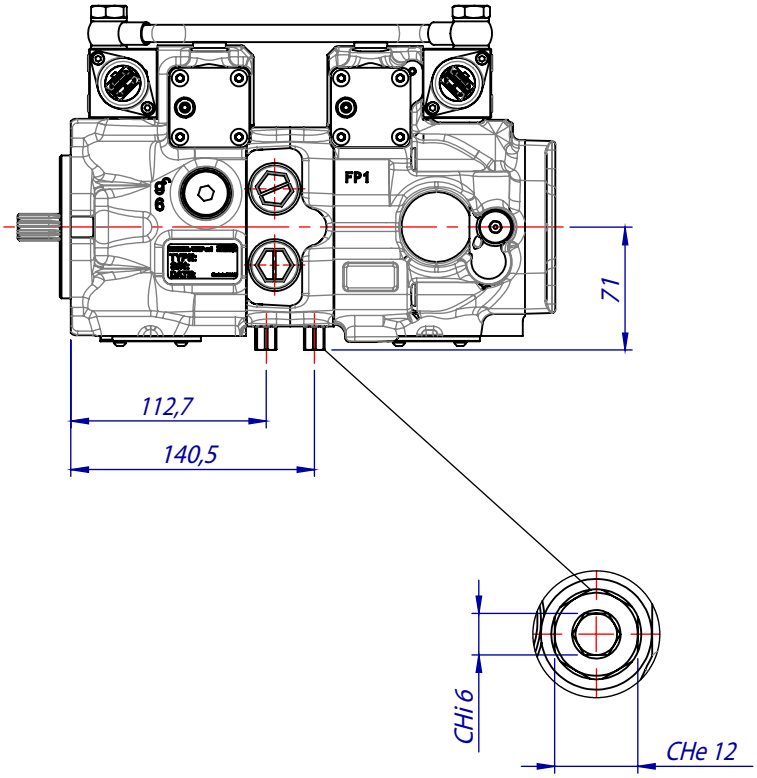


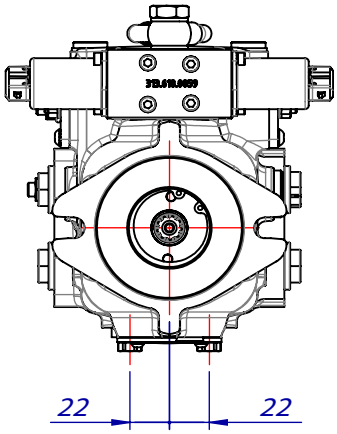
OPTIONAL SB

SCREW BY- PASS

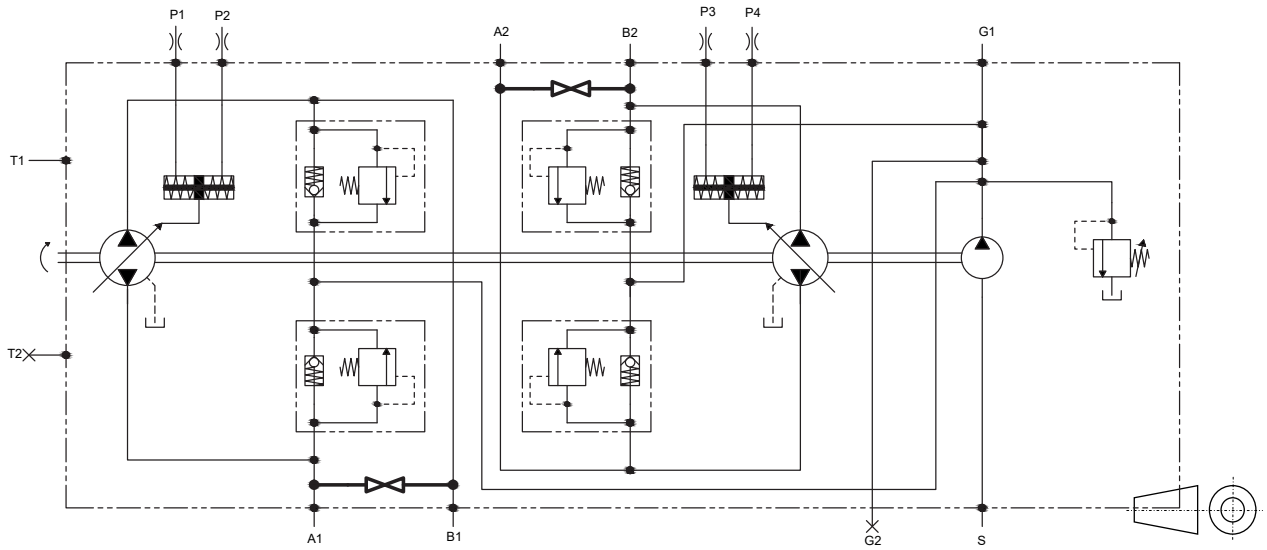
To by pass the oil flow from one direction to the other, with the pump not running or in emergency condition a by pass screw can be actuated to connect the 2 lines of the hydraulic system. The orifice is completely open after 4 counter-clockwise rotations of the screw.







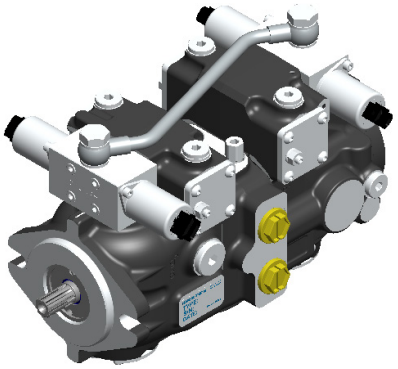
HYDRAULIC CIRCUIT

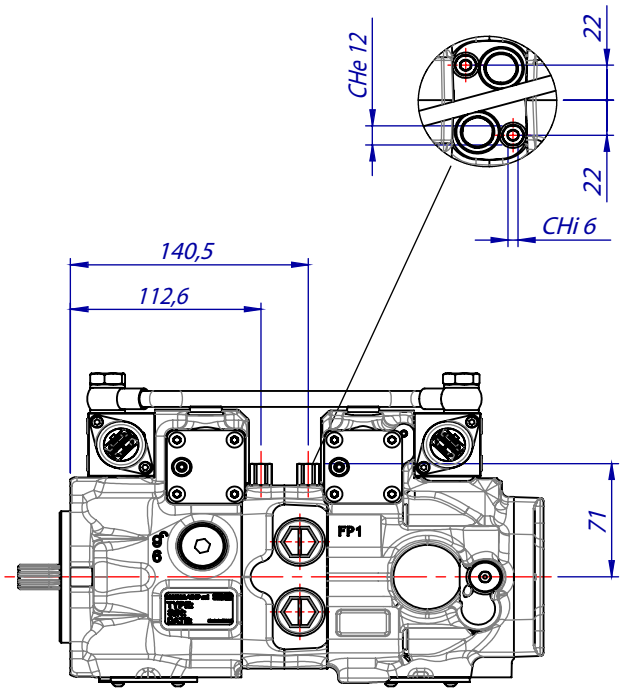


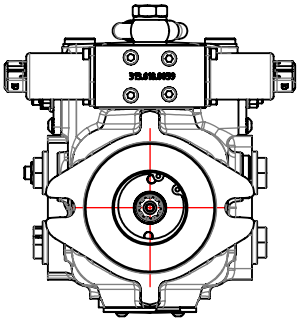
OPTIONAL SB1

SCREW BY-PASS (180° rotated position)

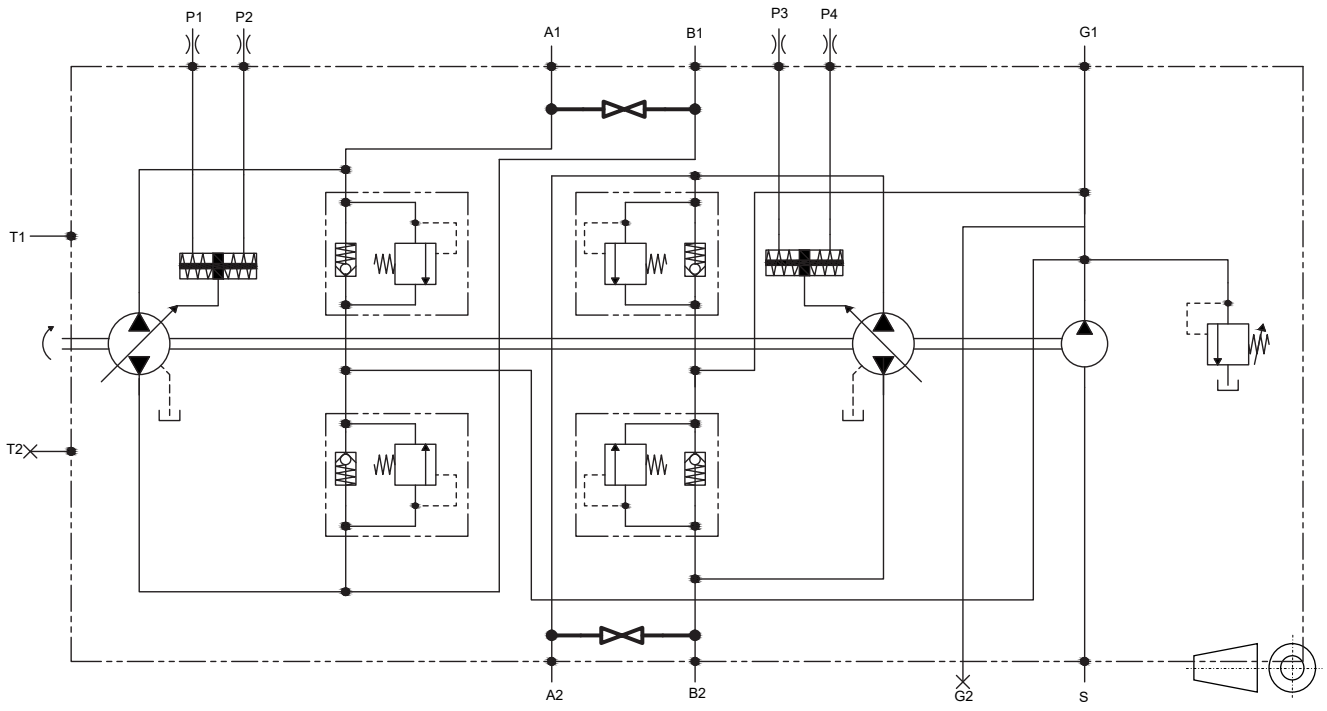
To by pass the oil flow from one direction to the other, with the pump not running or in emergency condition a by pass screw can be actuated to connect the 2 lines of the hydraulic system. The orifice is completely open after 4 counter-clockwise rotations of the screw.





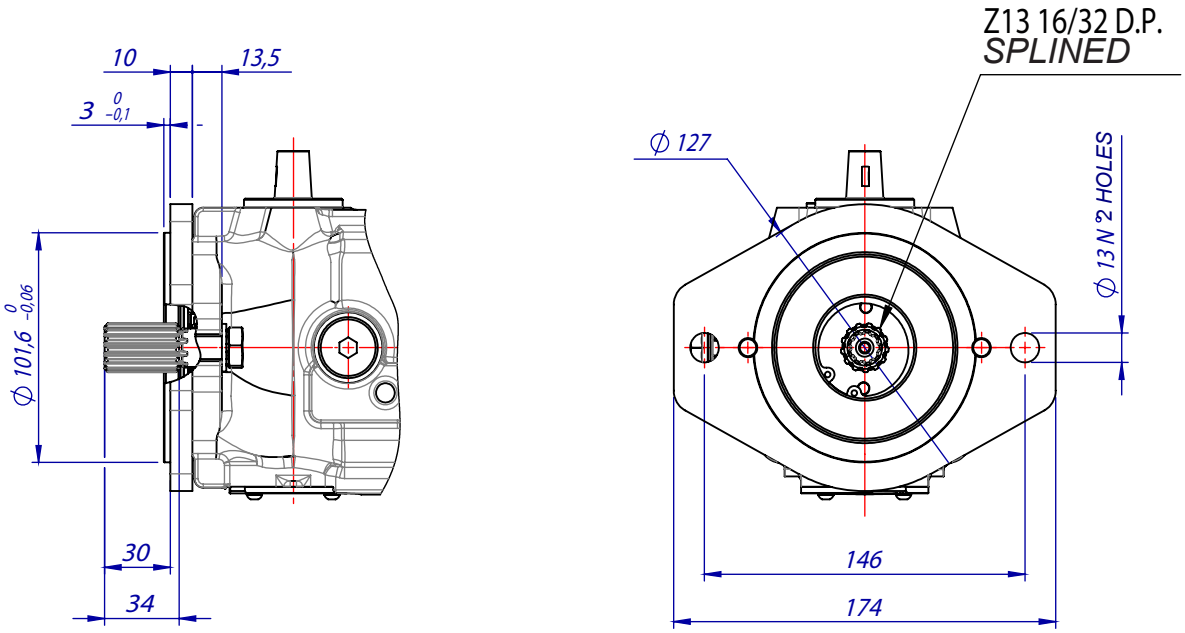


HYDRAULIC CIRCUIT



OPTIONAL FBST

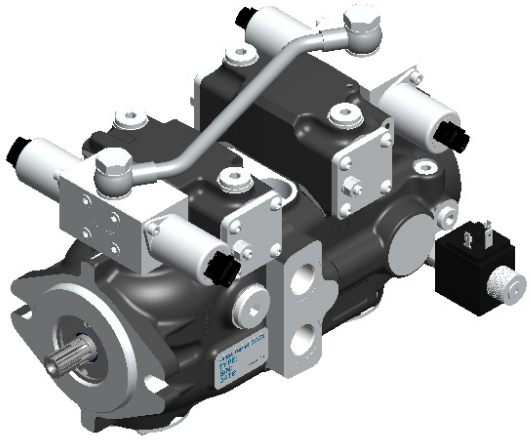
SAE-A / SAE-B MOUNTING FLANGE + CONVERSION COUPLING

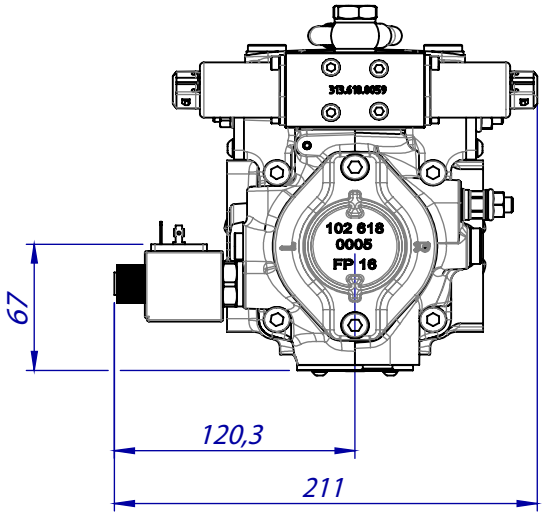


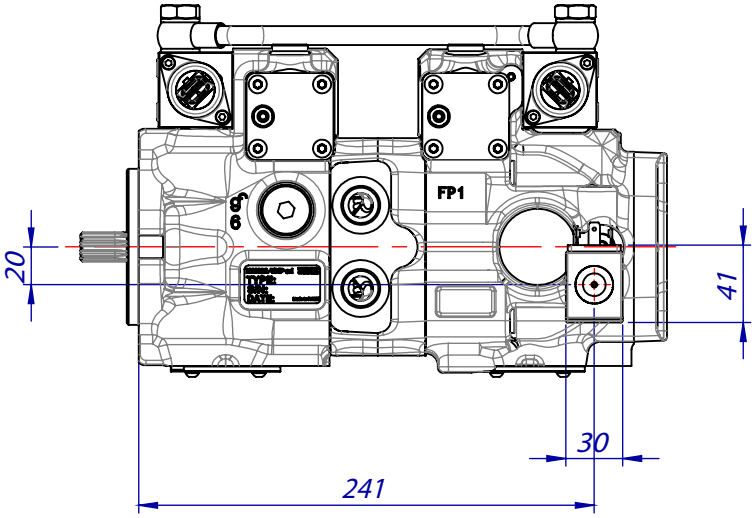
OPTIONAL MOB

MAN ON BOARD

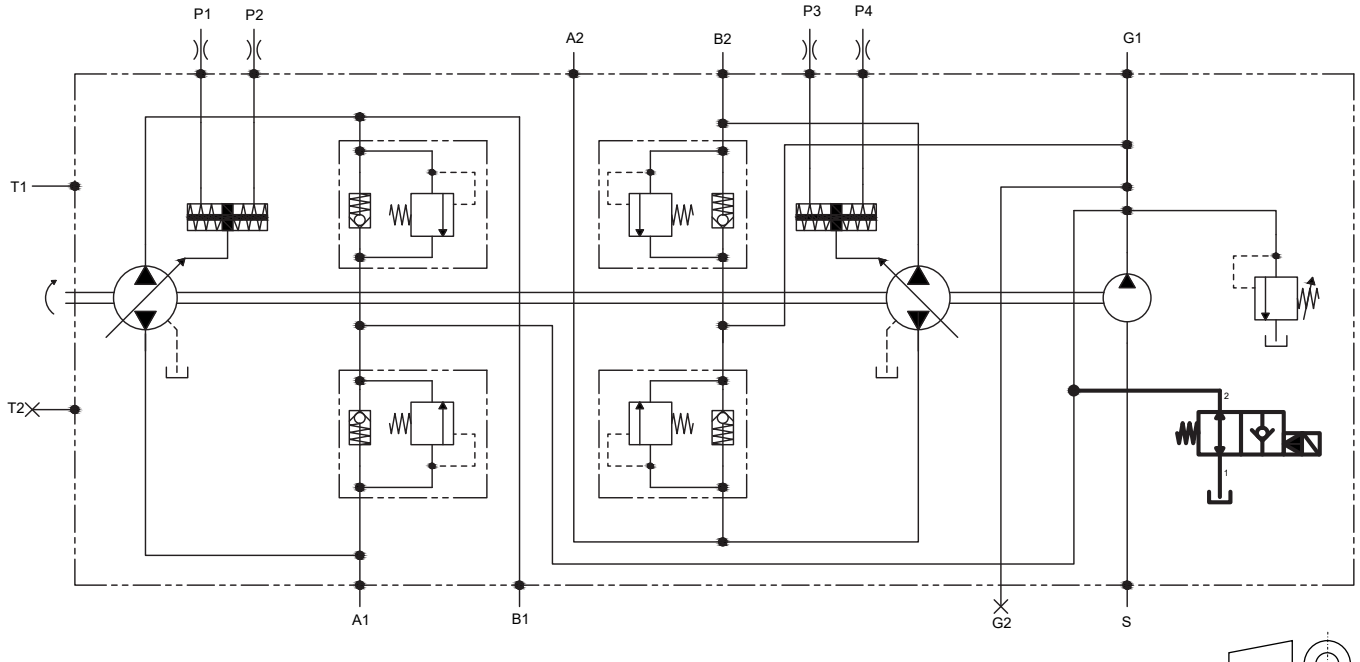
A normally open solenoid valve cuts the oil flow when not activated.
The valve allows oil flow to feed the hydraulic system only if activated (the operator is seated).
The solenoid valve is available for 12V or 24V DC voltage.







HYDRAULIC SCHEME



(continued)

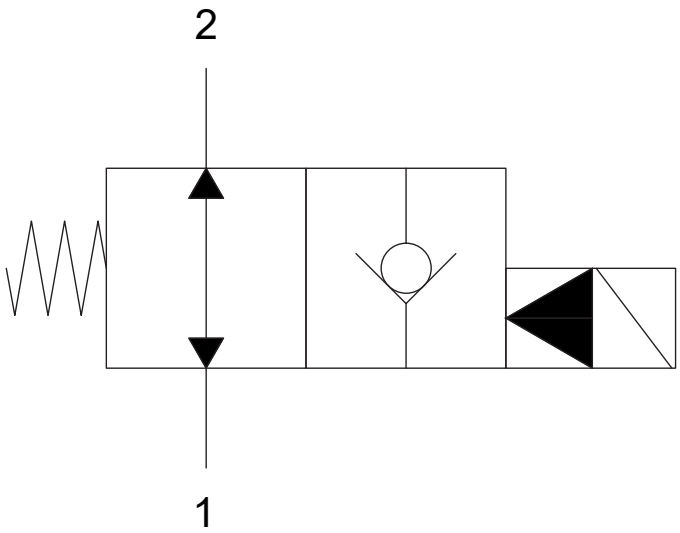
OPTIONAL MOB

MAN ON BOARD

TECHNICAL FEATURES

VALVE MOB - Hydraulic characteristics	
Max. operating pressure	30 MPa
Max. flow	40 l/min.
Internal leakage	max. 5 drops/min. at 30 MPa
Response time	energized 20 ms
De-energized	30 ms
Temperature range	from -20°C to 90°C

VALVE MOB - Electrical characteristics	
Power	18 W
Various voltage options available	(AC/DC)
Wire insulation	Class H
Duty factor	ED 100%
Supply power tolerance	+ 10%, - 15% (DC)
Ambient temperature	from -30°C to 60°C
Several connection options available	



TROUBLESHOOTING

TROUBLES	CAUSE	REMEDY
High noise level	Too high rotation speed of the pump.	Reduce pump rotation speed.
	Wrong rotation direction.	Check the rotation direction of the pump.
	Obstruction in suction line - air in the suction line - wrong oil viscosity - diameter of suction line too small.	Check oil type and viscosity. Check internal diameter of suction line. Remove restrictions. Check oil level of reservoir. Eliminate air intake.
	Not correct connection of the pump. Not correct diameter of pipes / hoses.	Check the pump connections and the pipe / hose diameters according to notes.
	Vibrations of relief valves .	Check the inlet suction line - Check and replace relief valves.
	Internal parts worn out.	Check and replace.
	Wrong pump connection to the prime mover.	Check connections and rotation of direction.
	Too low rotation speed of the pump.	Increase the pump rotation speed.
Low flow rate	Obstructions in the suction line - wrong viscosity.	Check oil type and viscosity. Check internal diameter of suction line. Remove restrictions. Check oil level of reservoir. Eliminate air intake.
	Low remote control pressure.	Check and adjust.
	High internal leakage.	Check the case drain flow.
	Low rotation speed of the pump.	Increase speed of the pump.
Instable or low pressure	Obstruction of suction line - air in the suction line - wrong oil viscosity - diameter of suction line too small.	Check oil type and viscosity. Check internal diameter of suction line. Remove restrictions. Check oil level of reservoir. Eliminate air intake.
	Vibration of relief valves.	Check the inlet suction line. Check and replace relief valves.
	Internal parts worn out.	Check and replace.
Over heating	High oil temperature at suction inlet.	Check the cooling system.
	Internal parts worn out.	Check - replace.
	Wrong setting of pressure relief valves.	Check - adjust the setting of relief valves.

ACCESSORIES

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

For more detailed information ask for catalogue HT 15 F 206 0518 IE

Hydraulic Remote Servo Controls

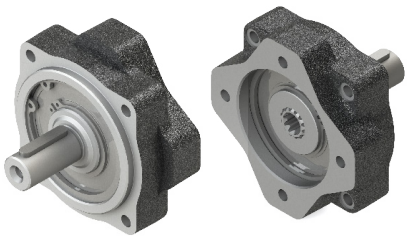
For more detailed information ask for catalogue HT 73 B 105 0919 E

Electric and Electronic Remote Servo Controls

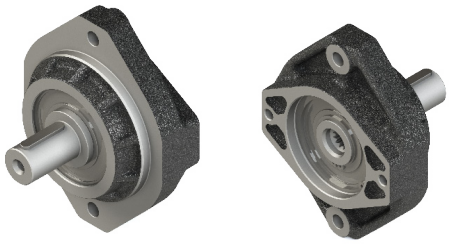
For more detailed information ask for catalogue HT 73 B 203 0516 E

Belt Drive Support BDS SAE-A / SAE-B

For more detailed information ask

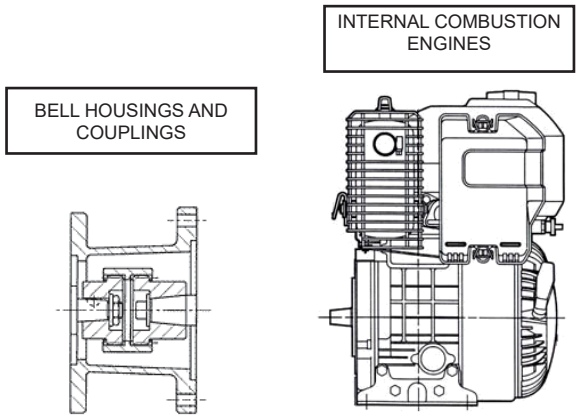


SAE-A



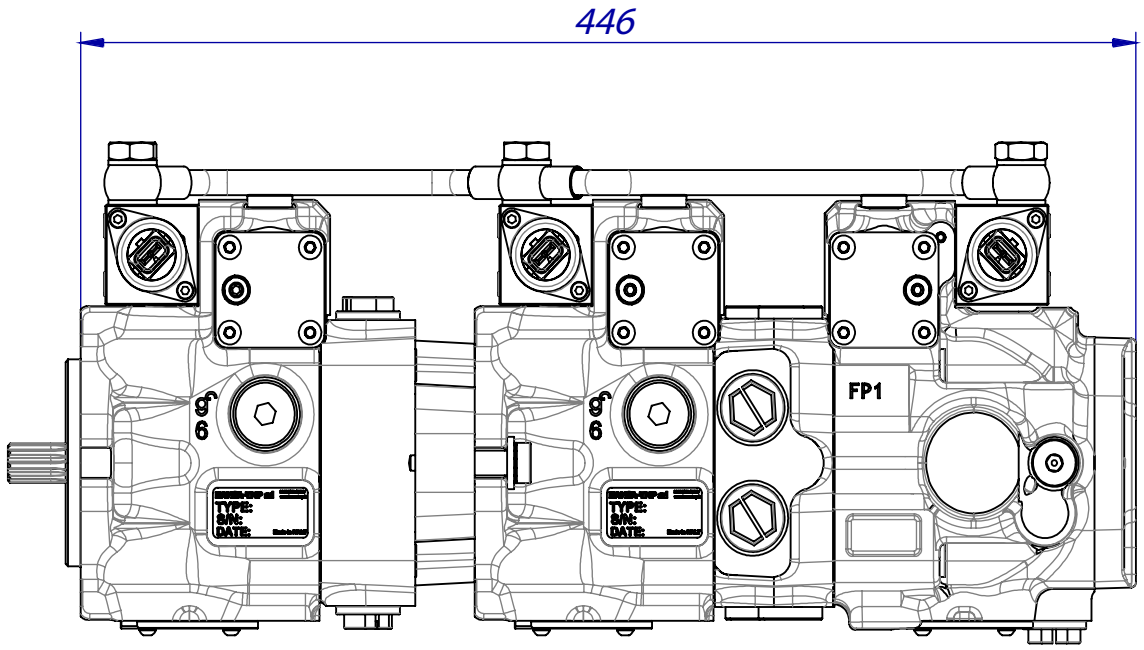
SAE-B

Bell Housings and Couplings for Pump Assembly on Internal Combustion Engines

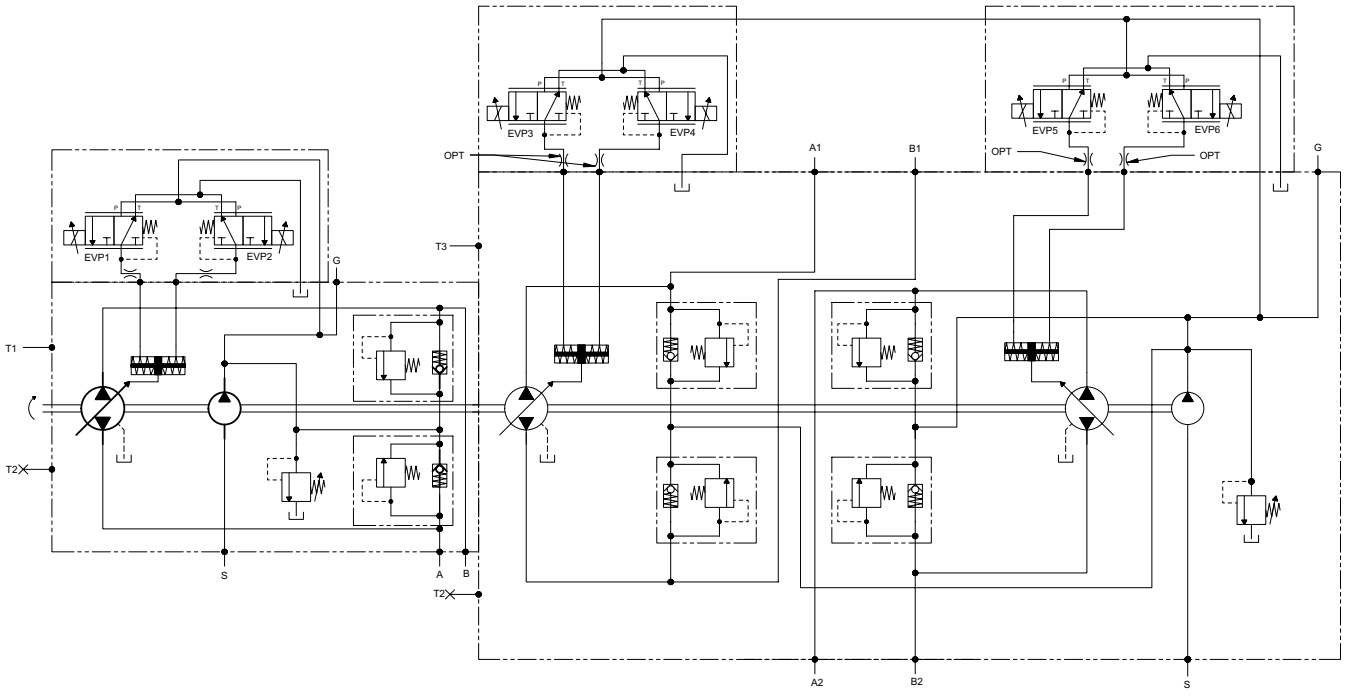


For more detailed information ask our technical departement.

TRIPLE PUMP - CONFIGURATION EXAMPLE



HYDRAULIC CIRCUIT



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PUMPS

Closed Loop Axial Piston Pumps (Variable Displacement) - 6-110 cc

Model	Displacement $cm^3/n.$	Rated Pressure MPa	Peak Pressure MPa	Maximum speed n/min.	Weight kg (single pump)
TPV 1100 TPV 1300	6, 8, 9, 11, 12, 13	30	35	3.600	8,8
	15, 17		30		
	18		30		
	19, 21	22	28	3.200	
TPV-TPVTC 1500	17, 18, 19, 21	35	40	3.600	14
TPV 3200	21, 28	25	35		22
TPV-TPVT 3600	26, 28, 30, 31, 32, 34, 36, 38, 43	40	45		28
TPV 4300	32, 38, 45, 50	28	35		23
TPV 5000	46, 50, 64	30	40		29
TPV 9000	55	40	45	4.000	55
	72			4.100	68
	90			4.000	
	110			3.800	

Open Loop Axial Piston Pumps (Fixed Displacement) - 32-50 cc

Model	Displacement $cm^3/n.$	Rated Pressure MPa	Peak Pressure MPa	Maximum speed n/min.	Weight kg (single pump)
TPF 60	35, 40, 46	35	42	2.800	20,5
	50		41	2.500	

Bent Axis Pumps - 12-130 cc

Model	Displacement $cm^3/n.$	Rated Pressure MPa	Peak Pressure MPa	Maximum speed n/min.	Weight kg
TPB - TAP 70	12.6	35	40	3.300	7,5
	17.0			3.200	
	25.4			2.550	8,5
	34.2			2.250	
	41.2, 47.1			2.200	15,5
	56.0			2.100	
	63.6			2.050	
	83.6, 90.7, 108.0			1.700	27,0
	130.0			1.600	29,5
The table values can change in function of the configuration.					

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