HANSA · TMP srl

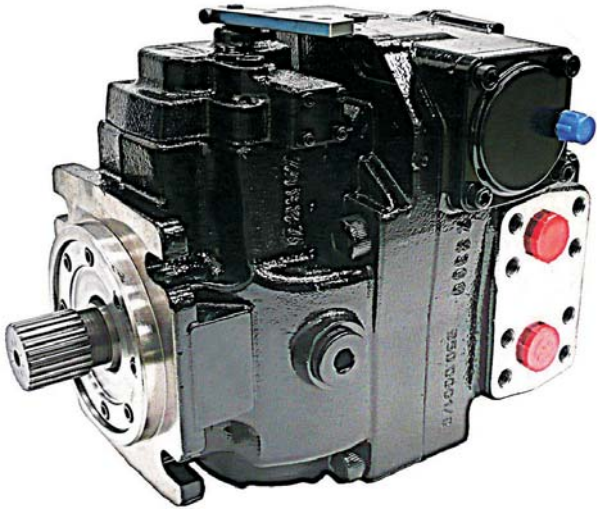
HYDRAULIC COMPONENTS
HYDROSTATIC TRANSMISSIONS
GEARBOXES - ACCESSORIES

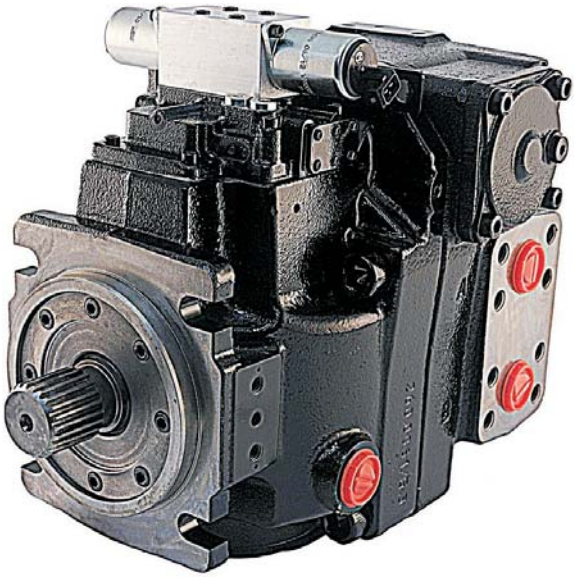
HT 16 / M / 851 / 0813 / E

THE PRODUCTION LINE OF HANSA-TMP

Variable Displacement Closed Loop System Axial Piston Pump

TPV 9000





CONTENTS

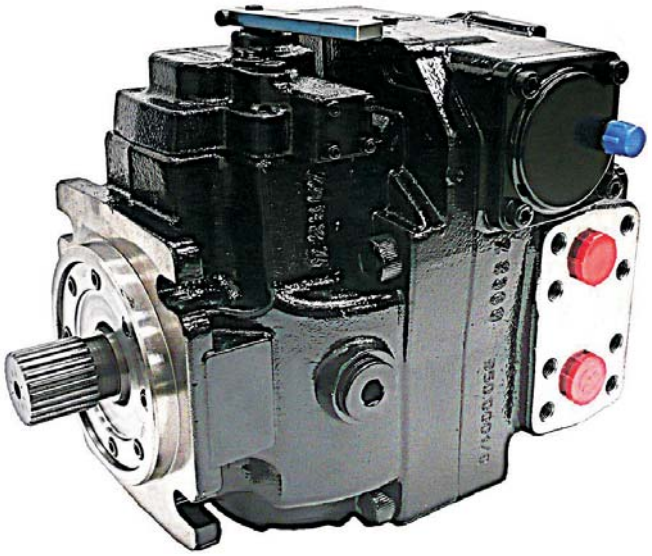
MAIN FEATURES

General Information

TPV 9000 is a variable displacement, swash plate axial piston pump and it is used in hydraulic closed loops.
The pump was developed for use on hydraulic transmissions, where high speeds and high torques are demanded.
The displacement can be varied by changing the inclination of the pump swash plate using a suitable proportional regulator.
The direction of flow can be changed with the variation of the swash plate inclination respect to a neutral point.
The construction features help to minimize the losses due to leakage and considerably reduce the frictions.
The small sizes allow easy installations and the technical solutions chosen optimize modulation of requested flow for a smooth and quiet operation.
The pump is equipped with two high pressure relief valves to protect the circuit from overloads and with anti-cavitation integrated system.

Filtration

It is recommended for an efficient and lasting working life, a solid particle contamination level of 18/16/13 according to ISO 4406.
To ensure said level of contamination is not exceeded, filter should be chosen accordingly, with filtration grade of $\beta 10 \geq 2$.
In any case the contamination level must not be below 20/18/15 according to ISO 4406.



ATTENTION

The pumps are made with heavy parts: secure the parts and use proper lifting equipment.

TECHNICAL DATA

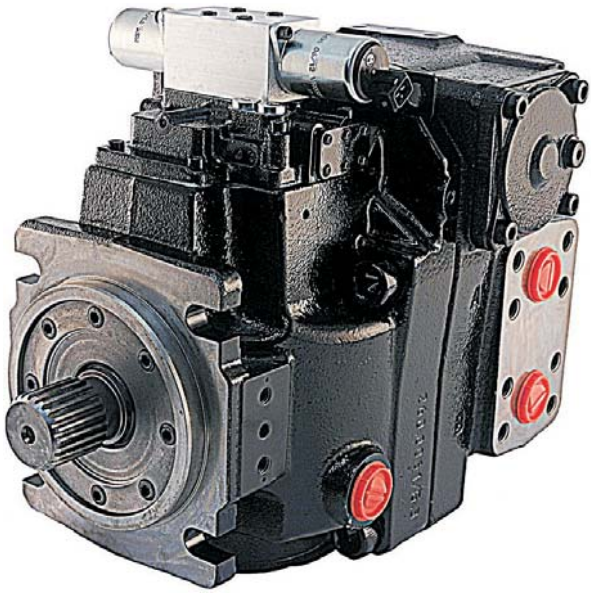
Operating Parameters

Model			TPV 72	TPV 90	TPV 110
Displacement	V	cm^3	72	90	110
Maximum speed	n_{max}	rpm	4.100	4.000	3.800
Minimum speed	n_{min}	rpm	500	500	500
Maximum flow	q_{max}	l/min	295	340	400
Nominal pressure	p_{nom}	bar	400	400	400
Maximum pressure	p_{max}	bar	450	450	450
Maximum power	P_{max}	Kw	156	180	210
Theoretical max torque	C_{max}	Nm	480	570	700

Hydraulic Fluid

Recommended Hydraulic Fluid	Mineral Oil High Viscosity Index		
Operating viscosity*	ν	cSt	16 ÷ 36
Maximum viscosity short term at cold start	$ν_{max}$	cSt	≤1600
Minimum viscosity at maximum temperature	$ν_{min}$	cSt	≥7
Maximum working temperature of the fluid	T_{max}	°C	90
Permissible temperature range of seals	ΔT	°C	-25 ÷ 120

** Referred to the circuit temperature-closed circuit*



ORDER CODE

EXAMPLE										
1	2	3	4	5	6	7	8	9	10	11
TPV	**90**	**R**	**MS**	**V**	**C4**	**23N**	**0**	**CP2**	**420**	**A**

1	PRODUCT GROUP AND FAMILY
TPV	Variable displacement closed loop system axial piston pump

2	DISPLACEMENT
72	72,1 cm^3 (@14,7°)
90	89,2 cm^3 (@18°)
110	110,0 cm^3 (@18°)

3	DIRECTION OF ROTATION	TPV 72	TPV 90	TPV 110
R	Right, i.e. clockwise (CW) view from shaft end	A	A	A
L	Left, i.e. counterclockwise (CCW) view from shaft end	A	A	A

4	CONTROL DEVICE	TPV 72	TPV 90	TPV 110
0	Without control, fixed displacement	R	R	R
MS	Manual servo control	A	A	A
MZ	Manual servo control with zero switch	R	R	R
EP1	Electric proportional control 12V DC	A	A	A
EP2	Electric proportional control 24V DC	A	A	A

5	SHAFT SEAL	TPV 72	TPV 90	TPV 110
V	Viton	A	A	A

6	MOUNTING FLANGE	TPV 72	TPV 90	TPV 110
C4	SAE J744 - SAE C four bolts	A	A	A

7	SHAFT END	TPV 72	TPV 90	TPV 110
14N	ANSI B92.1A-1976 - 1"1/4 - 14T - 12/24 DP	R	R	R
21N	ANSI B92.1A-1976 - 1"3/8 - 21T - 16/32 DP	A	R	R
21F	ANSI B92.1A-1976 - 1"3/8 - 21T - 16/32 DP with coupling flange	A	R	R
23N	ANSI B92.1A-1976 - 1"1/2 - 23T - 16/32 DP	-	A	A
23F	ANSI B92.1A-1976 - 1"1/2 - 23T - 16/32 DP with coupling flange	-	A	A

8	THROUGH DRIVE	TPV 72	TPV 90	TPV 110
0	No through drive	A	A	A
A1	Flange SAE A (SAE J 744) / Splined hub 9T - 16/32 (ANSI B92.1A)	A	A	A
B1	Flange SAE B (SAE J 744) / Splined hub 13T - 16/32 (ANSI B92.1A)	A	A	A

9	CHARGE PUMP	TPV 72	TPV 90	TPV 110
CP1	Gerotor charge pump 20 cm^3	R	R	R
CP2	Gerotor charge pump 28 cm^3	A	A	A

10	RELIEF VALVE SETTING	TPV 72	TPV 90	TPV 110
420	420 bar	A	A	A
350	350 bar	A	A	A
300	300 bar	A	A	A
250	250 bar	A	A	A

ORDER CODE

EXAMPLE										
1	2	3	4	5	6	7	8	9	10	11
TPV	**90**	**R**	**MS**	**V**	**C4**	**23N**	**0**	**CP2**	**420**	**A**

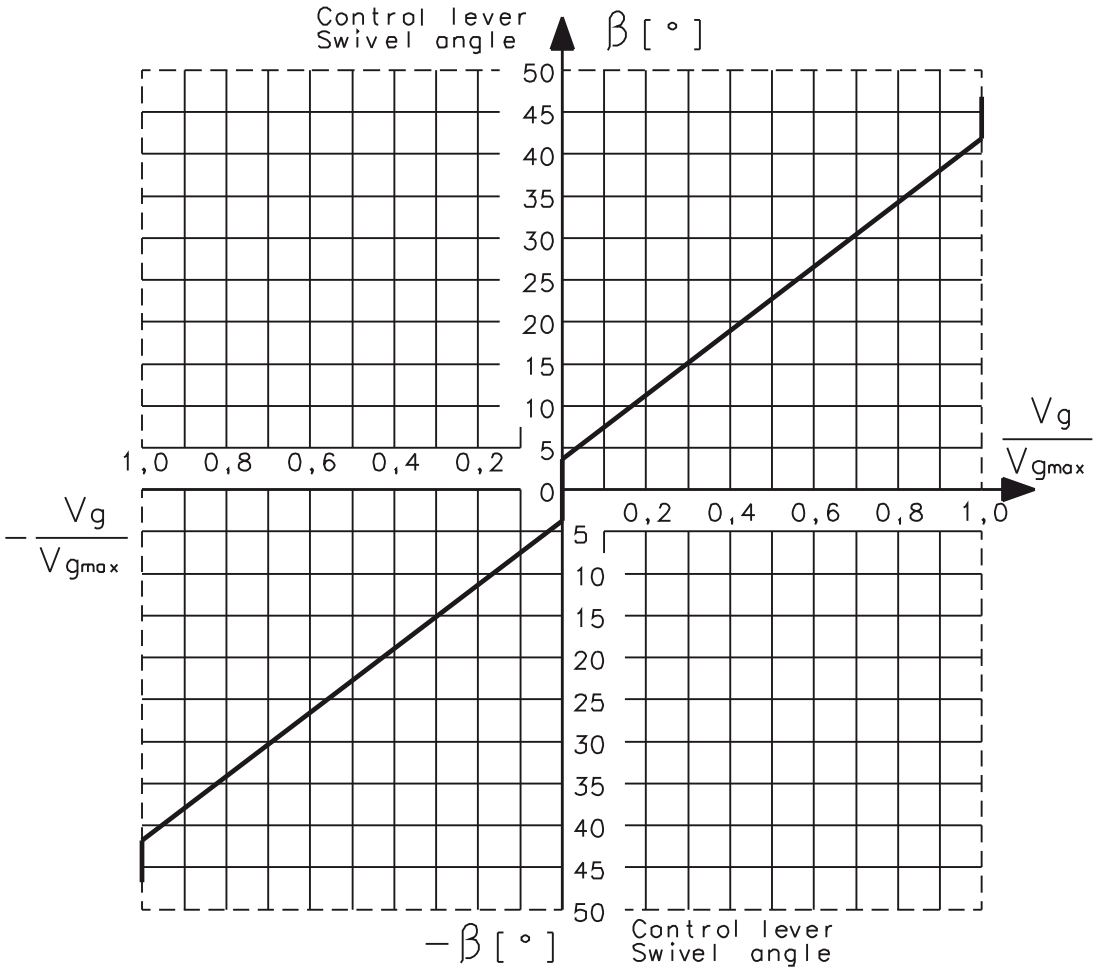
11	CHARGE PRESSURE RELIEF VALVE SETTING	TPV 72	TPV 90	TPV 110
A	25 bar	A	A	A
B	28 bar	R	R	R

LEGEND							
A	available (preferred)	**A**	available	**R**	on request	**-**	not available

CONTROLS

MS - Manual Proportional Control

With the manual proportional control **(MS)** the displacement of the pump is directly proportional to the angle of the lever.
The pump is fitted with a resetting device which automatically resets the swash plate to central position if no control takes place.
The figure shows the relation between angle and displacement.
Manual proportional control with zero switch **(MZ)** is available on request.



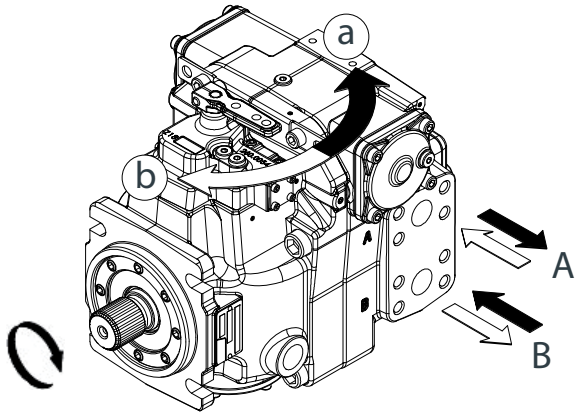
Characteristic points of operations	
Start of control at β	3,7°
End of control at β	41,7° (max displacement Vg_{max})
Mechanical stop for β	± 40°

CONTROLS

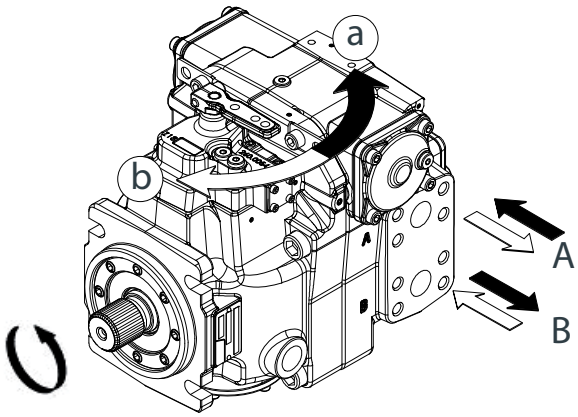
MS - Manual Proportional Control

R, L - Rotation Direction - Flow Direction

		lever direction	flow direction through the pump
Direction of rotation	R (CW)	a	B in to A out
		b	A in to B out
	L (CCW)	a	A in to B out
		b	B in to A out

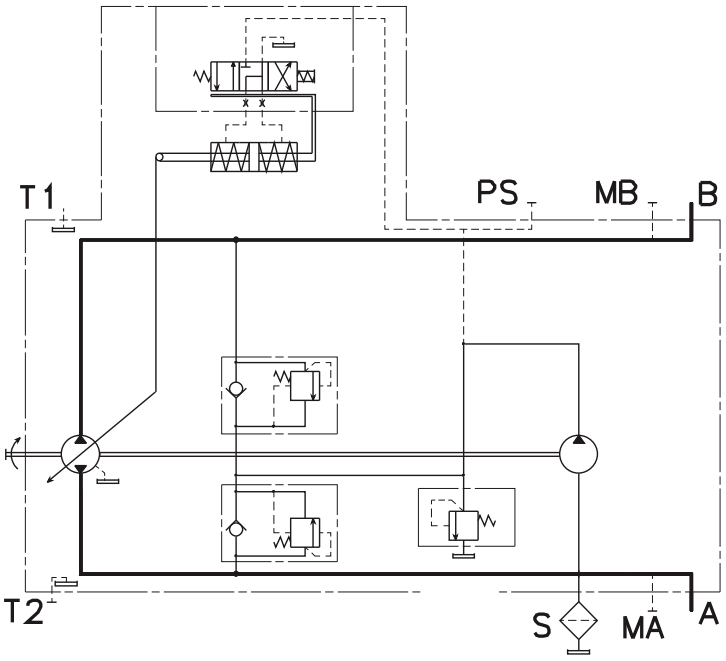


R (CW- Clockwise)



L (CCW- Counterclockwise)

Hydraulic Diagram

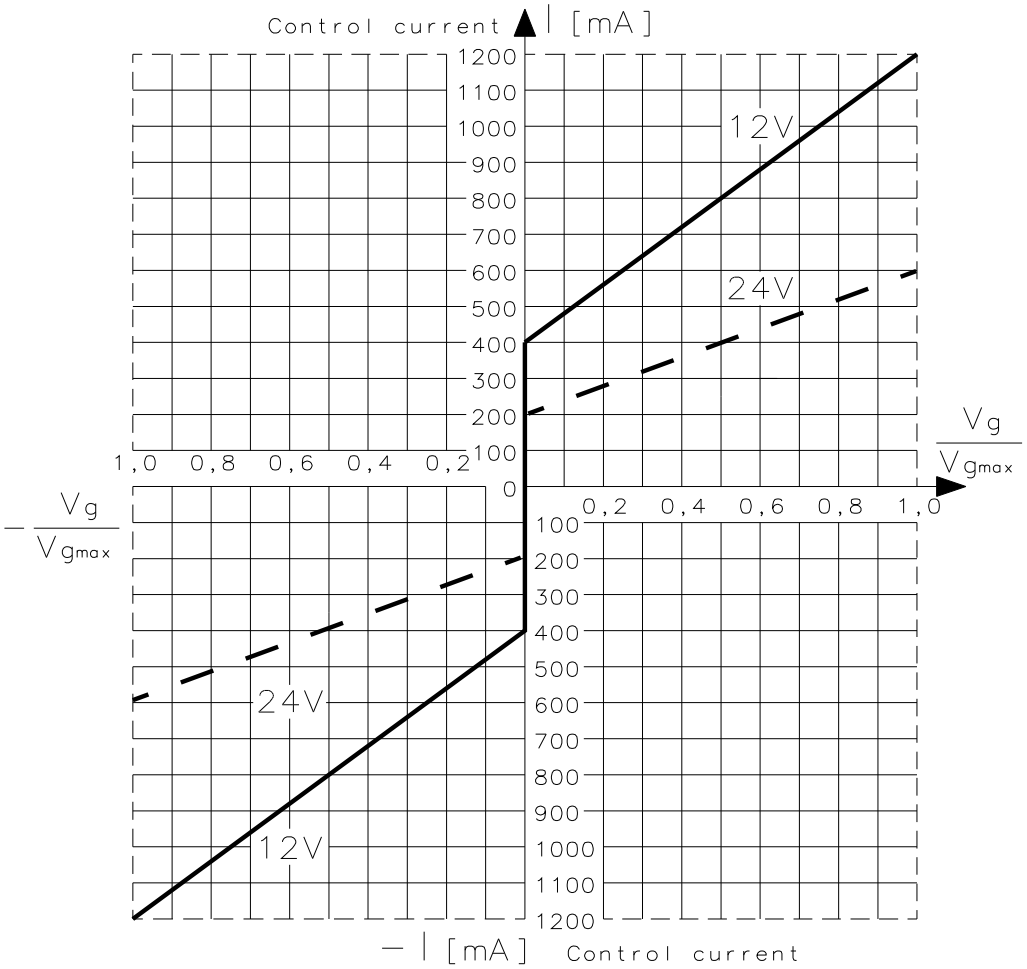


A, B	high pressure ports
S	charge pump inlet
T1,T2	case drain ports
MA, MB, PS	gauge port for system & charge pressure

CONTROLS

EP - Electric Proportional Control

With the electric proportional control (**EP**) the displacement of the pump is directly proportional to the input current applied to one of the two solenoids.
The pump is fitted with a resetting device which automatically resets the swash plate to central position if no control takes place.
The figure shows the relation between current and displacement.



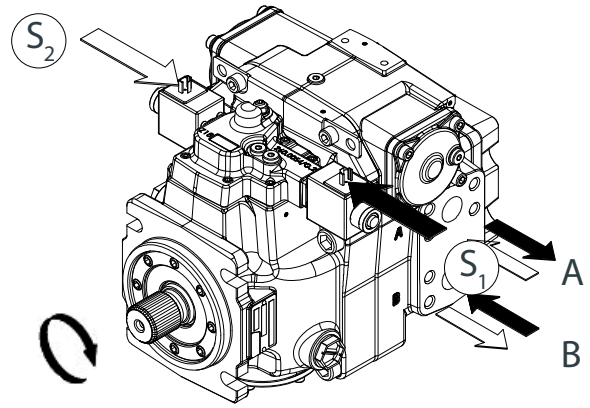
Solenoid technical data	EP 1	EP 2
Voltage	12 (±20%)	24 (±20%)
Current of Control		
Start at control at V_{g0}	400 mA	200 mA
End of control at V_{gmax}	1200 mA	600 mA

CONTROLS

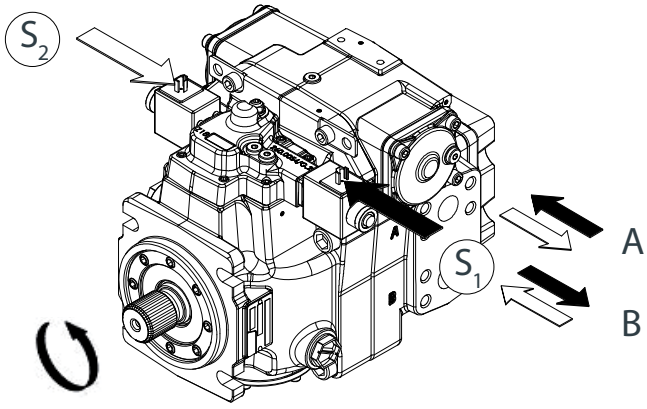
EP - Electric Proportional Control

R, L - Rotation Direction - Flow Direction

		solenoid	flow direction through the pump
Direction of rotation	R (CW)	S_1	B in to A out
		S_2	A in to B out
	L (CCW)	S_1	A in to B out
		S_2	B in to A out

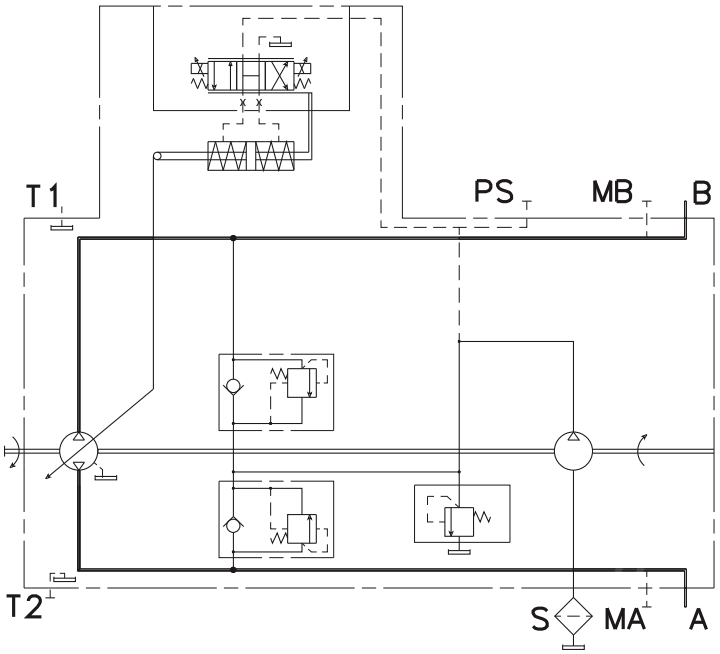


R (CW - Clockwise)



L (CCW - Counterclockwise)

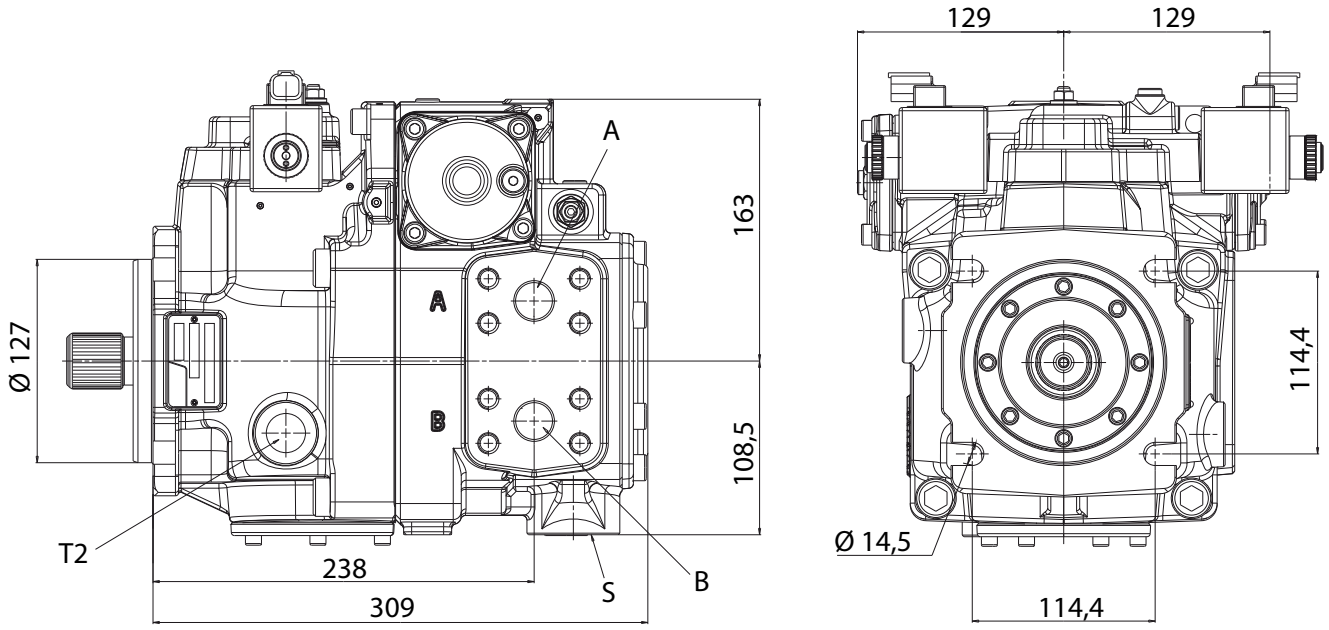
Hydraulic Diagram



A, B	high pressure ports
S	charge pump inlet
T1,T2	case drain ports
MA, MB, PS	gauge port for system & charge pressure

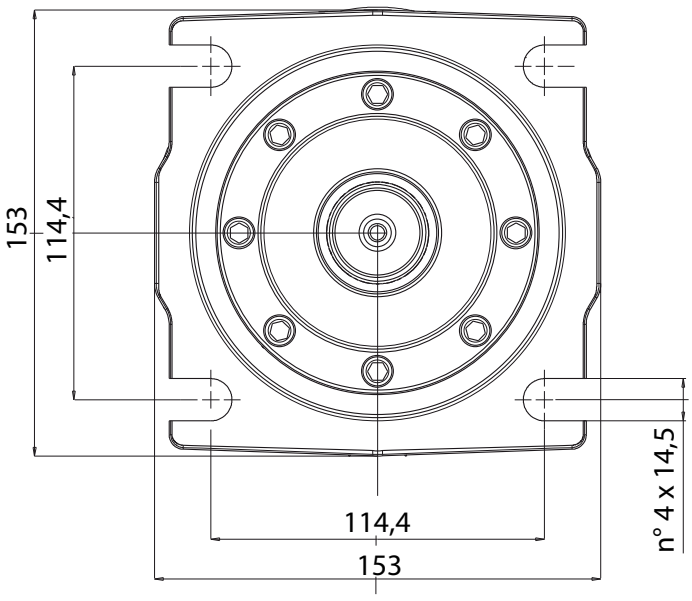
INSTALLATION DRAWINGS

Size 72 - 90 - 110



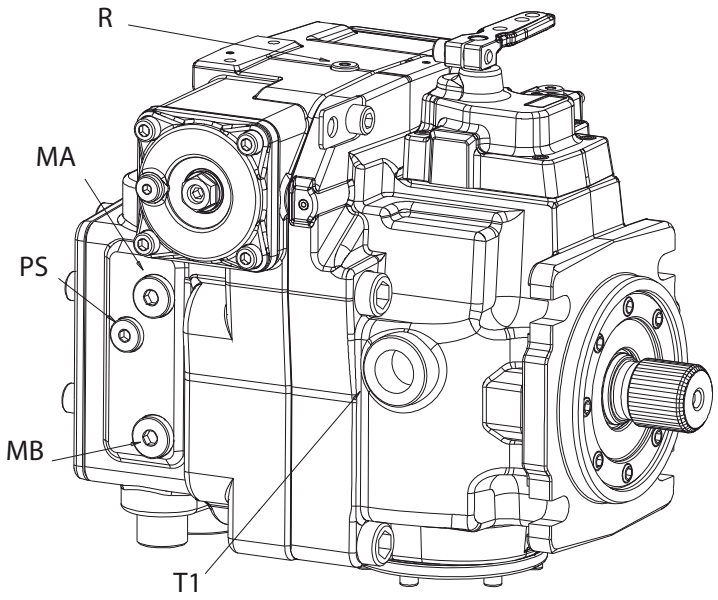
Mounting Flange

C4 - SAE J744 - Flange SAE C- 4 Bolts



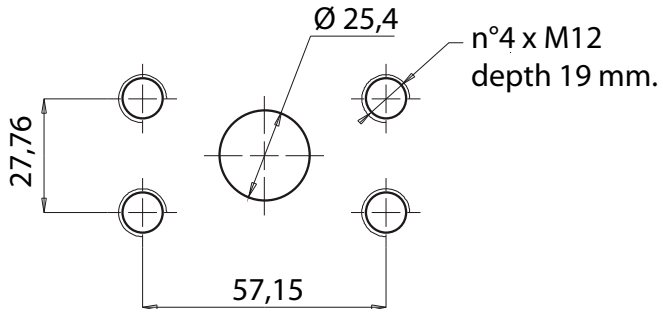
INSTALLATION DRAWINGS

Ports



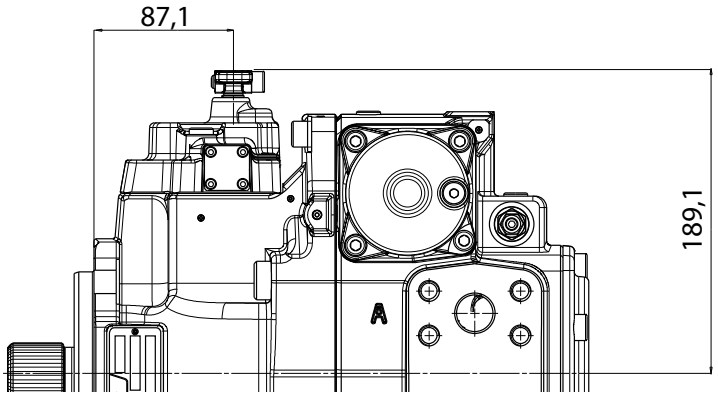
Port	Description	Standards	Size
A,B	High pressure ports	SAE Flange J518 code 62	1"
S	Charge pump inlet	ISO 1179	1-¼" BSP
T1,T2	Case drain ports	ISO 1179	3/4" BSP
MA, MB	Gauge ports for system pressure	ISO 1179	3/8" BSP
PS	Gauge port for charge pressure	ISO 1179	1/4" BSP
R	Air bleed plug	ISO 1179	1/8" BSP

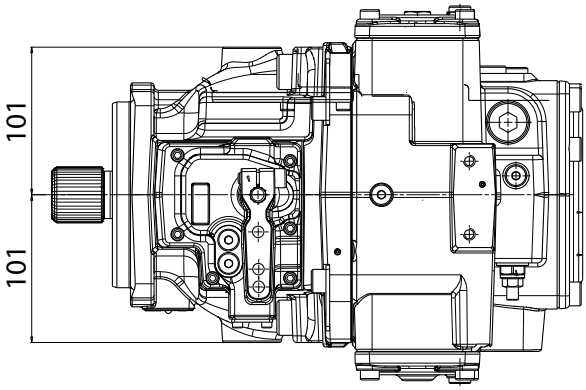
Detail Ports A-B (SAE Flange J518 - 1" - Code 62)



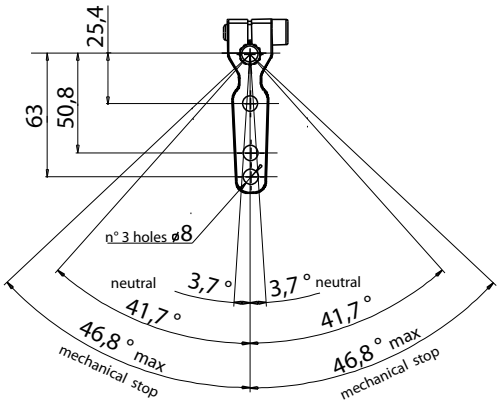
INSTALLATION DRAWINGS

MS - Manual Proportional Control

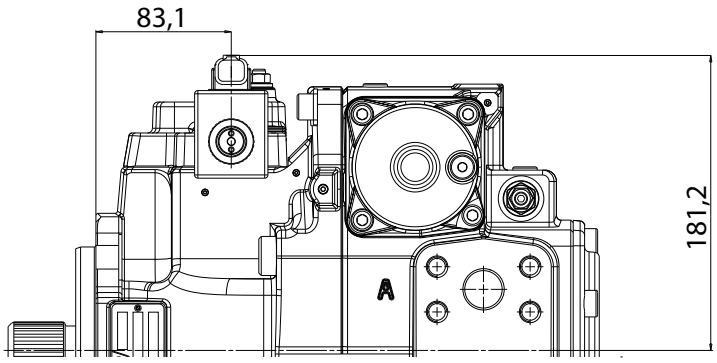


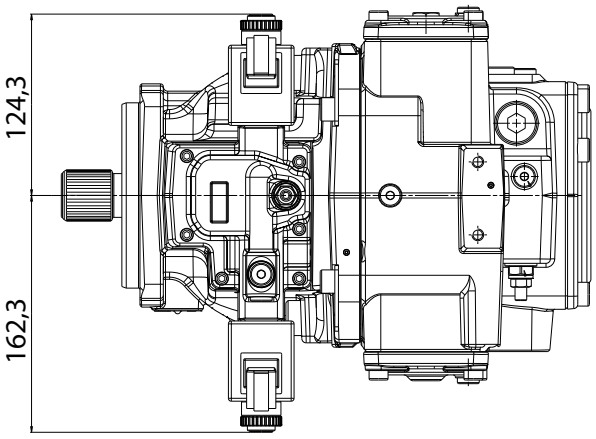


Lever Detail



EP - Electric Proportional Control



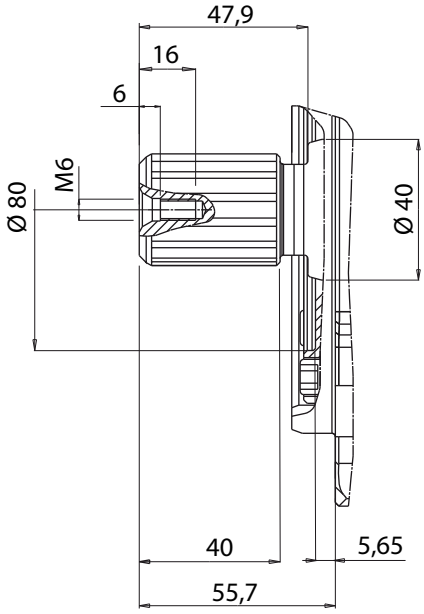


INSTALLATION DRAWINGS

Shaft End

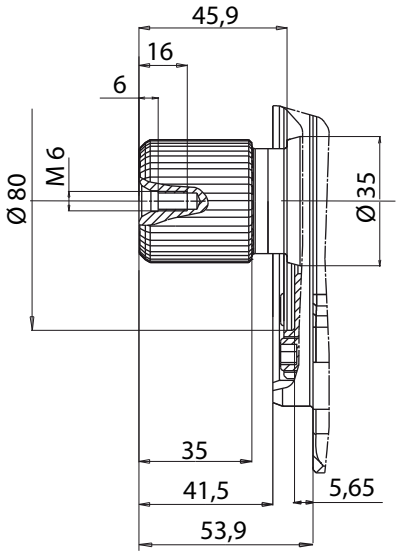
14N

ANSI B92.1A-1976 - 1"1/4 - 14T - 12/24 DP



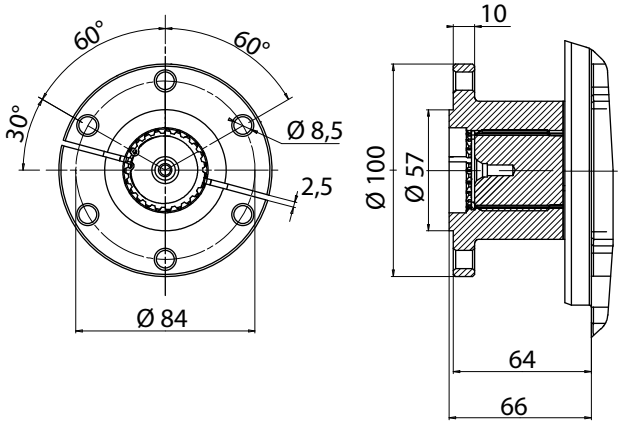
21N

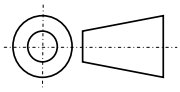
ANSI B92.1A-1976 - 1"3/8 - 21T - 16/32 DP



21F

ANSI B92.1A-1976 - 1"3/8 - 21T - 16/32 DP
with coupling flange



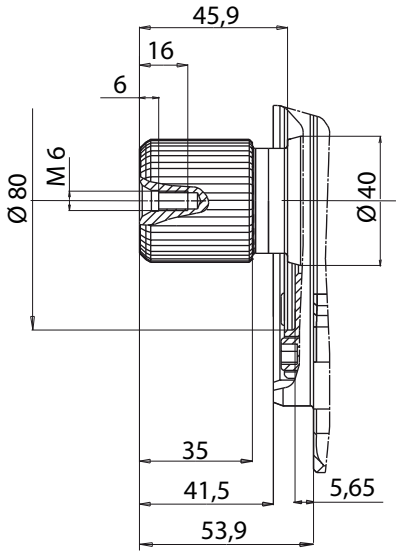


INSTALLATION DRAWINGS

Shaft End

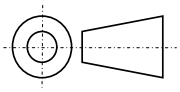
23N

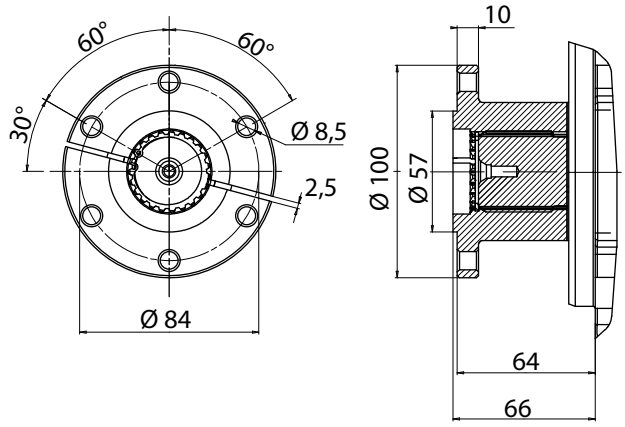
ANSI B92.1A-1976 - 1"1/2 - 23T - 16/32 DP



23F

ANSI B92.1A-1976 - 1"1/2 - 23T - 16/32 DP
with coupling flange

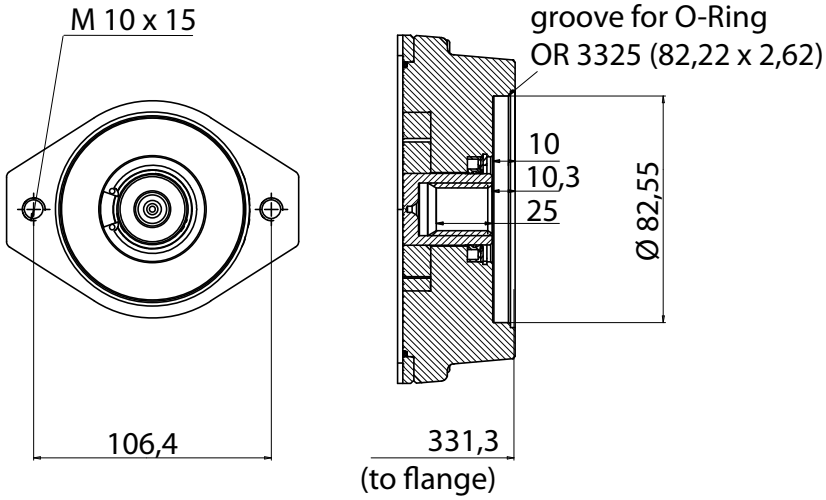




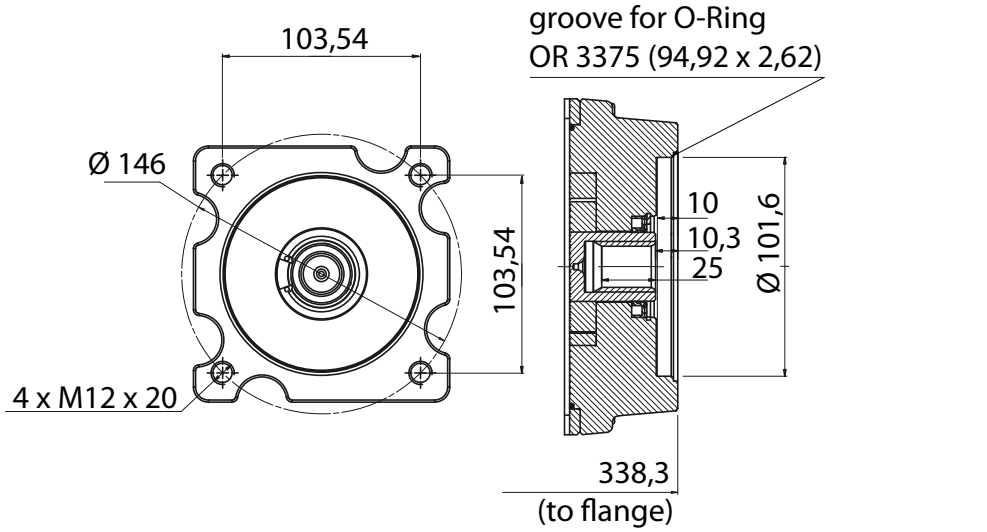
INSTALLATION DRAWINGS

Through Drive Dimensions

A1 - Flange SAE J744 82-2 — Splined Hub - ANSI B92-1A-1976 - 9T - 16/32 DP



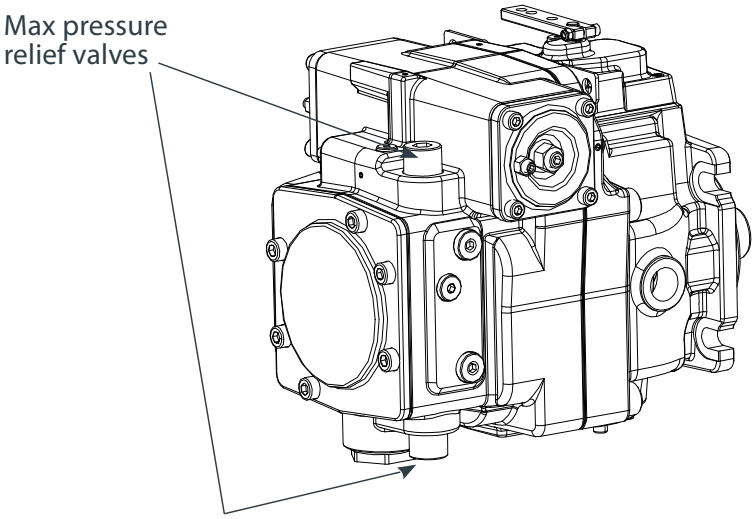
B1 - Flange SAE J744 101-2 — Splined Hub - ANSI B92-1A-1976 - 13T - 16/32 DP



TECHNICAL INFORMATION

High Pressure Relief Valves

The TPV 9000 pump is equipped with two pressure relief valves that prevent excessive pressures in the high pressure loop.
On a possible peak of pressure, the valve reacts quickly, opens its shutter and limits the pressure at the calibration value.
Valves also features anti-cavitation function to compensate the exchanged flow and losses due to leakage.



Relief valve setting	
420	420 bar
350	350 bar
300	300 bar
250	250 bar

Tightening Torques

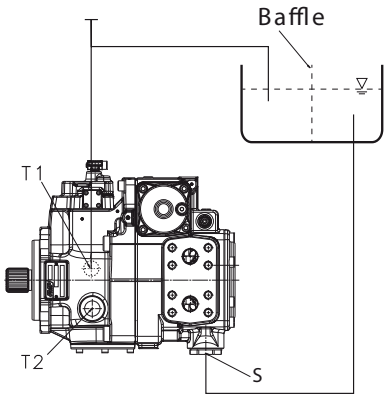
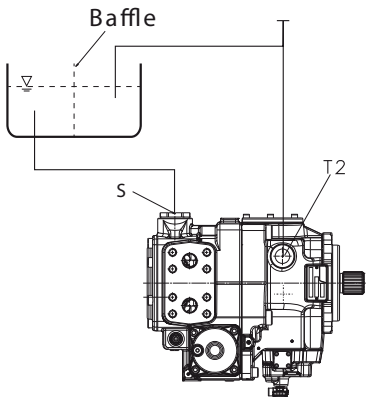
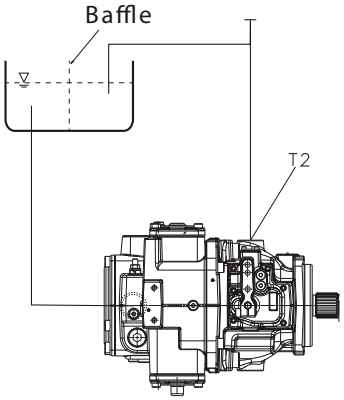
In the following table you can see the tightening torques for the pump ports.

Port		Thread	Torque [N m]
S	ISO 1179	1 ¼"	210
T1,T2	ISO 1179	3/4"	65
MA, MB	ISO 1179	3/8"	35
PS	ISO 1179	1/4"	25

INSTALLATION INSTRUCTIONS

The TPV 9000 pump can be installed in the following positions respect to the level of the tank of the hydraulic fluid.

Below tank installation

Pump Orientation		Notes
Horizontal shaft Control on top Service lines on side		The case drain line must be always connected with the drain port positioned in the highest position.
Horizontal shaft Control on bottom Service lines on side		The case drain line must be always connected with drain port positioned in the highest position.
Horizontal shaft Controls on side Vertical Service lines		The case drain line must be always connected with drain port positioned in the highest position.

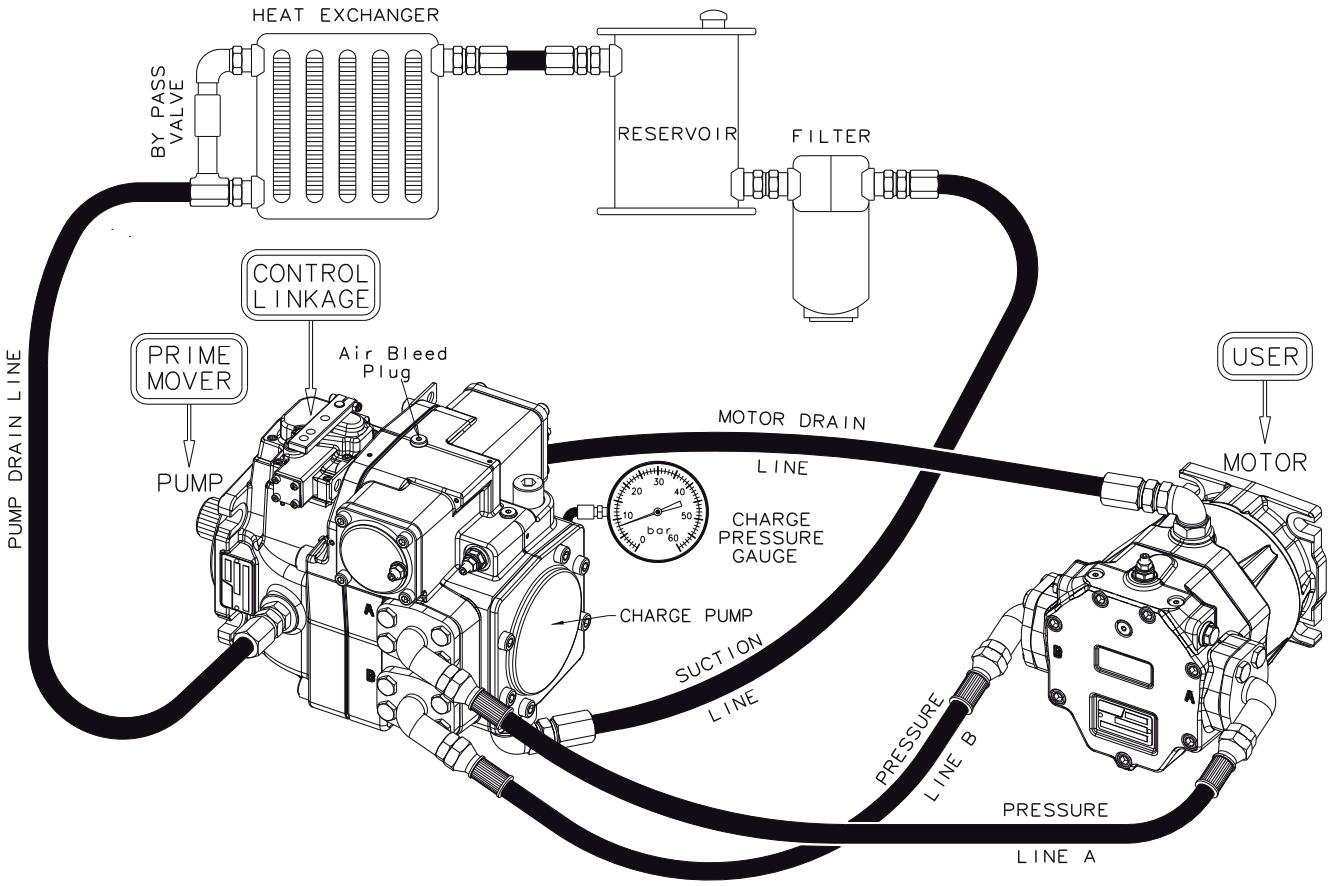
INSTALLATION INSTRUCTIONS

Start-up Procedure

Preliminary Indications

In order to avoid an unwanted movement of the User don't start the Prime Mover (engine) and don't connect the control linkage (lever) until expressly requested by the following procedure.
Use only Mineral Oil with High Viscosity Index, that can guarantee a viscosity of 16-36 cSt at working temperature.
For short periods a viscosity of 7 cSt at high temperature and of 1600 cSt at cold start are allowable.
The tank must be fitted with the right heat exchanger in order to keep the oil temperature between 60 and 90 °C.
Temperature limits are –25 °C for cold start and 120 °C for peak temperature, only for very short periods.
In any case the above viscosities must be fulfilled.
After the tank a filter must be placed (preferably with a clogging sensor), in order to guarantee the right oil cleanliness (b10≥2): for an efficient and lasting working life, a cleanliness of 18/16/13 according to ISO 4406 must be guaranteed. In any case not below 20/18/15 according to ISO 4406.
Pump must be installed below the tank and the tank must be provided with a breather.
The absolute pressure at charge pump inlet must be always above 0.8 bar (-0.2 bar gauge).
The hydraulic circuit must be dimensioned in order to have maximum 2 bar continuous pressure and max 6 bar intermittent in the pump and motor case.
Higher values can be withstood at low speed.

Typical Hydraulic Circuit



INSTALLATION INSTRUCTIONS

Start

During installation and start-up it is very important to keep maximum cleanliness, especially at the hydraulic connections, to avoid any dirt to get into the pump and motor.

1) Install the pump to the Prime Mover (engine) and the motor to the User (gearbox, drum, etc.), and tighten the bolts.

2) Connect the A/B pressure line and tighten the bolts.

3) Fill with fresh and filtered oil the pump case and the motor case, using the drain ports in the highest position; fill the oil till it reaches the same hole used for filling.

4) Connect the drain lines according to the sketch above and tighten the bolts.

5) Connect the cooler/tank/filter unit to the suction line and tighten the bolts.

6) Fill the tank with fresh and filtered oil.

7) Loose the suction line where it is connected to the pump. Wait for the oil to fill the hose and then tighten again.

8) Check all the connections on the hoses, insuring they are well tightened.

9) Remove the PS plug on the side of the charge pump in order to check the charge pressure (see Charge Pressure Gauge on the picture of previous page).

10) Fill with fresh oil the charge pump.

11) Install a pressure gauge on the PS port (see Charge Pressure Gauge on the picture of previous page).

12) Check if the User (gearbox/drum) is free to move.

13) Connect the control to the control system of the machine.

- MS / MZ: tighten control lever at 35 Nm
- EP1 / EP2: connect Deutsch Connectors with cables

14) Start the Prime Mover (Engine) at 700-1000 rpm for around 40 sec. for internal combustion engine or 20 sec. for electric motor and check if the charge pump gives pressure, by looking at the Charge Pressure Gauge.
It is possible to unscrew the "Air Bleed Plug", without remove it, in order to make the air bleed easier; when oil appears, tighten the plug.

15) Increase Prime Mover (Engine) speed at 2000 rpm: while keeping the control at 0 position (0 displacement) check that the charge pressure gauge shows charge pump pressure setting ± 1 bar (± 15 psi).

INSTALLATION INSTRUCTIONS

Start

16) If the pressure is not stable or it is stable at a very different value from charge pump pressure setting ± 1 bar (± 15 psi) there could be air inside the circuit: stop the engine, check hoses and connections and start engine again for 40 sec. (or 20 sec. for electric motor); if after 2-3 trials the problem is still there please contact technical assistance.

17) If the pressure is stable at charge pump pressure setting ± 1 bar (± 15 psi), set the engine speed at its normal working speed. If the engine speed is not in the range 1500÷3000 rpm contact the technical assistance.

18) Move the control slowly away from 0 position, first at half displacement and then at full displacement in both directions: the User will start moving.

19) When the hydraulic motor is running the charge pressure should go down by 3-5 bar (40-70 psi) difference; if this is not happening please contact technical assistance.

20) Stop the Prime Mover (Engine), remove the pressure gauge from PS port and put back the plug and tighten it.

21) Check oil level of the tank and refill if necessary.

22) Check the oil tank is duly closed.

23) Check there is no leakage in the circuit.

24) The hydraulic system is ready to work.

As HANSA-TMP has a very extensive range of products and some products have a variety of applications, the information supplied may often only apply to specific situations.

If the catalogue does not supply all the information required, please contact HANSA-TMP.
In order to provide a comprehensive reply to queries we may require specific data regarding the proposed application.

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The data is this catalogue refer to the standard product. The policy of HANSA-TMP consists of a continuous improvement of its products. It reserves the right to change the specifications of the different products whenever necessary and without giving prior information.

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