HANSA · TMP srl

HYDRAULIC COMPONENTS
HYDROSTATIC TRANSMISSIONS
GEARBOXES - ACCESSORIES

Certified Company ISO 9001 - 14001

ISO 9001 Certificate N° 12-Q-0200545-TIC
ISO 14001 Certificate N° 12-E-0200545-TIC

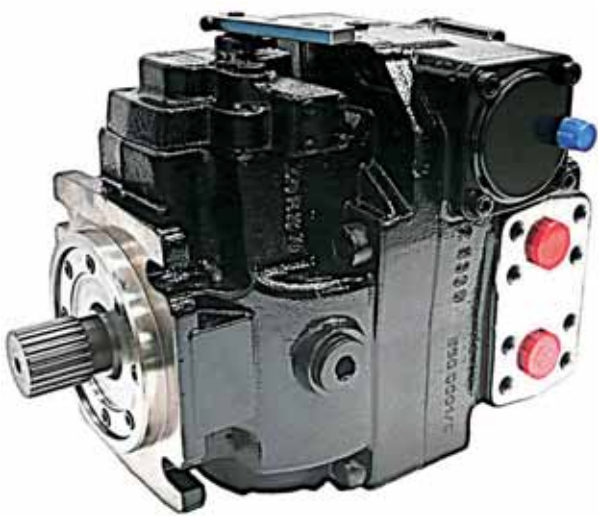
Via M. L. King, 6 - 41122 MODENA (ITALY)
Tel: +39 059 415 711
Fax: +39 059 415 729 / 059 415 730
INTERNET: http://www.hansatmp.it
E-MAIL: hansatmp@hansatmp.it

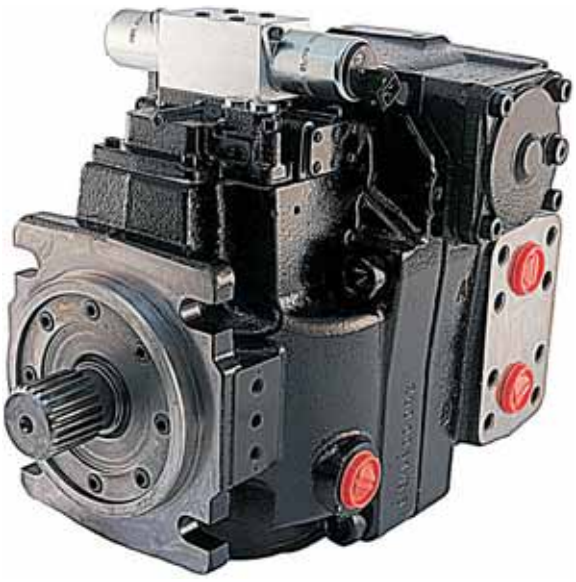
HT 16 / M / 852 / 0815 / E

THE PRODUCTION LINE OF HANSA-TMP

# Variable Displacement Closed Loop System Axial Piston Pump

# TPV 9000





## CONTENTS

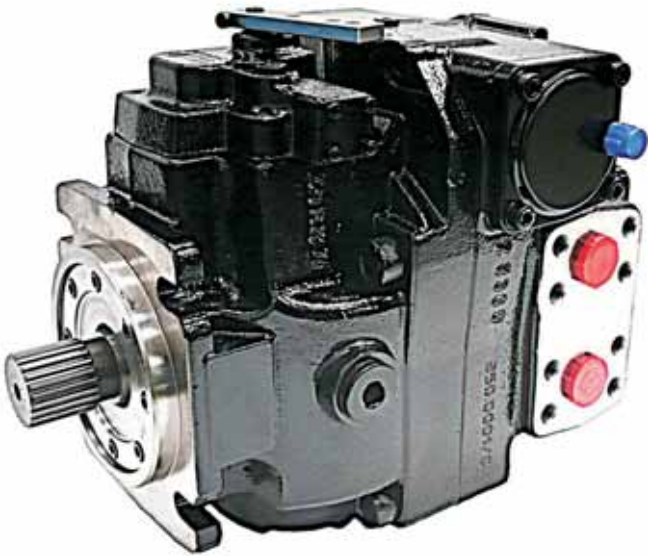
## MAIN FEATURES

### General Information

TPV 9000 is a variable displacement, swash plate axial piston pump and it is used in hydraulic closed loops.
The pump has developed for use on hydraulic transmissions, where high speeds and high torques are required.
The displacement can be varied by changing the angle of the pump swash plate using a suitable control device.
The direction of flow can be changed with the variation of the swash plate angle referred to the 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

To mantain 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 $\beta 10 \geq 75$.
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.

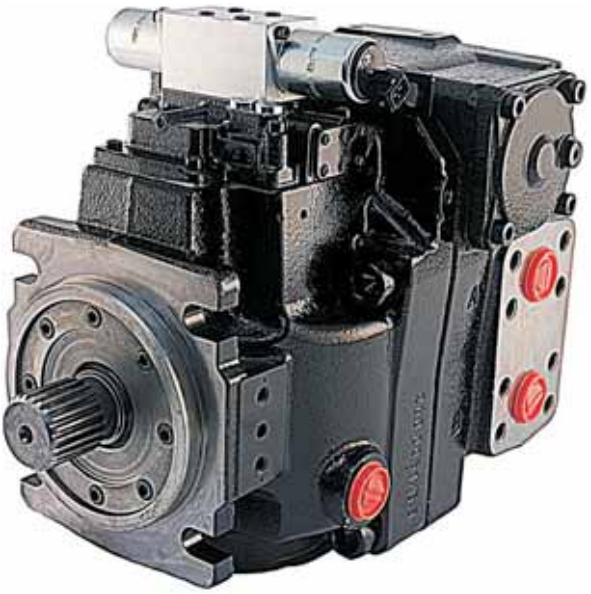
## TECHNICAL SPECIFICATIONS
### Operating Parameters

| Pump Model | | | TPV 55 | TPV 72 | TPV 90 | TPV 110 |
|---|---|---|---|---|---|---|
| Displacement | V | $cm^3$ | 55 | 72 | 90 | 110 |
| Maximum speed | $n_{max}$ | n/min. | 4.300 | 4.100 | 4.000 | 3.800 |
| Minimum speed | $n_{min}$ | n/min. | 500 | 500 | 500 | 500 |
| Maximum flow | $q_{max}$ | l/min. | 237 | 295 | 340 | 400 |
| Nominal pressure | $p_{nom}$ | MPa | 40 | 40 | 40 | 40 |
| Maximum pressure | $p_{max}$ | MPa | 45 | 45 | 45 | 45 |
| Maximum power | $P_{max}$ | Kw | 130 | 156 | 180 | 210 |
| Theoretical max. torque | $C_{max}$ | Nm | 350 | 480 | 570 | 700 |
| Weight | M | kg | 42 | 56 | 68 | 68 |
| Boost pump displacement | V | $cm^3$ | 20 | 20 | 28 | 28 |

### 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 | T | °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 |
|---|---|
| **55** | 55,0 $cm^3$ (@18°) |
| **72** | 72,1 $cm^3$ (@14,7°) |
| **90** | 89,2 $cm^3$ (@18°) |
| **110** | 110,0 $cm^3$ (@18°) |

| 3 | DIRECTION OF ROTATION | TPV 55 | TPV 72 | TPV 90 | TPV 110 |
|---|---|---|---|---|---|
| **R** | Right, i.e. clockwise (CR) view from drive shaft | A | A | A | A |
| **L** | Left, i.e. counterclockwise (CC) view from drive shaft | A | A | A | A |

| 4 | CONTROL DEVICE | TPV 55 | TPV 72 | TPV 90 | TPV 110 |
|---|---|---|---|---|---|
| **0** | Without control, fixed displacement | R | R | R | R |
| **MS** | Manual servo control with feed back | A | A | A | A |
| **EP1** | Electro-proportional control 12 V DC with feed back | A | A | A | A |
| **EP2** | Electro-proportional control 24 V DC with feed back | A | A | A | A |
| **HP** | Hydraulic proportional control with feed back | A | A | A | A |
| **HD** | Hydraulic proportional direct control | A | A | A | A |

| 5 | SHAFT SEAL | TPV 55 | TPV 72 | TPV 90 | TPV 110 |
|---|---|---|---|---|---|
| **V** | Viton | A | A | A | A |

| 6 | MOUNTING FLANGE | TPV 55 | TPV 72 | TPV 90 | TPV 110 |
|---|---|---|---|---|---|
| **C4** | SAE J744 - SAE C four bolts | A | A | A | A |

| 7 | DRIVE SHAFT | TPV 55 | 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 | A | R | R |
| **21F** | ANSI B92.1A-1976 - 1"3/8 - 21T - 16/32 DP with c. flange | A | 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 c. flange | - | - | A | A |

| 8 | THROUGH DRIVE | TPV 55 | TPV 72 | TPV 90 | TPV 110 |
|---|---|---|---|---|---|
| **0** | No through drive | A | A | A | A |
| **A1** | Fla. SAE A (SAE J 744) / Spl. sh. 9T - 16/32 (ANSI B92.1A) | A | A | A | A |
| **B1** | Fla. SAE B (SAE J 744) / Spl. sh. 13T - 16/32 (ANSI B92.1A) | A | A | A | A |

| 9 | BOOST PUMP | TPV 55 | TPV 72 | TPV 90 | TPV 110 |
|---|---|---|---|---|---|
| **CP1** | Gerotor boost pump 20 $cm^3$ | A | A | R | R |
| **CP2** | Gerotor boost pump 28 $cm^3$ | - | R | A | A |

| 10 | RELIEF VALVE SETTING | TPV 55 | TPV 72 | TPV 90 | TPV 110 |
|---|---|---|---|---|---|
| **420** | 42 MPa | A | A | A | A |
| **350** | 35 MPa | A | A | A | A |
| **300** | 30 MPa | A | A | A | A |
| **250** | 25 MPa | A | A | A | A |

## ORDER CODE (continued)

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

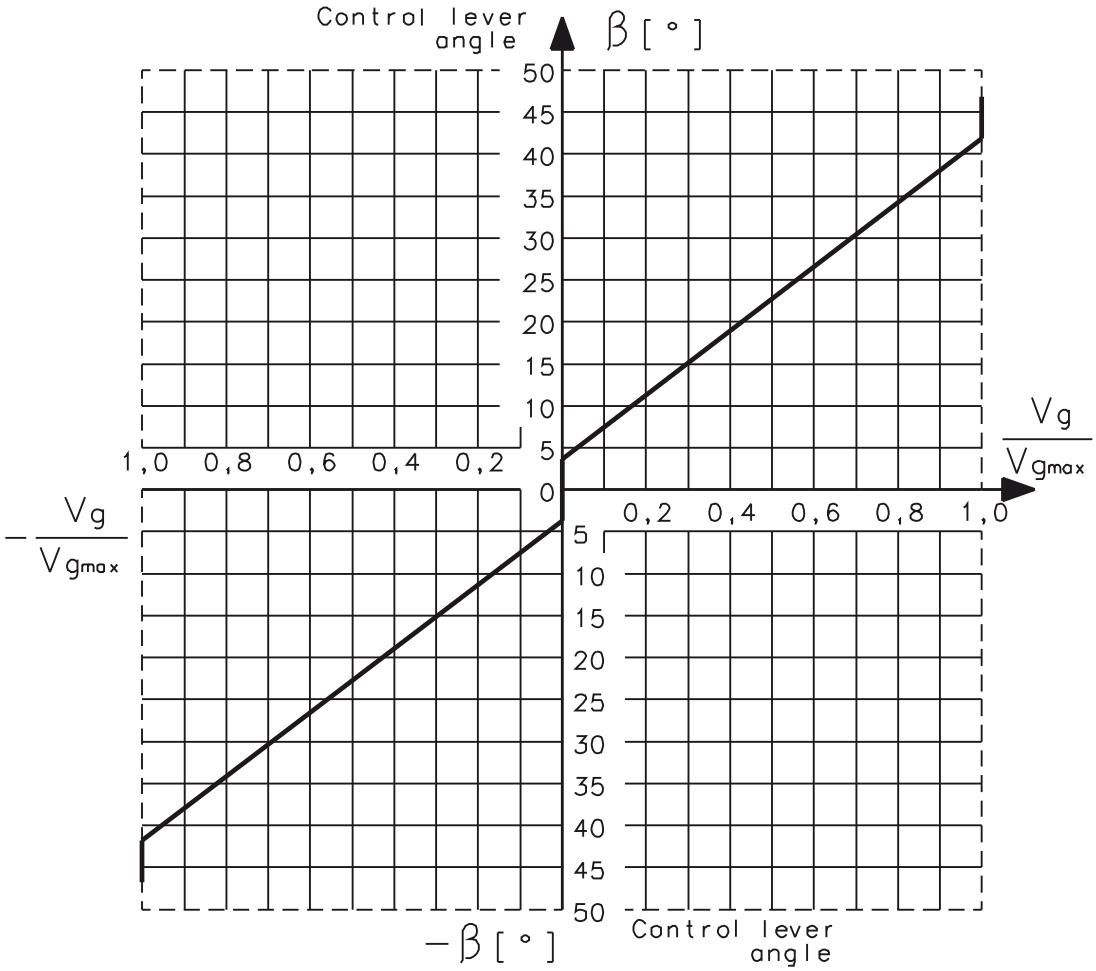
| 11 | BOOST PRESSURE RELIEF VALVE SETTING | TPV 55 | TPV 72 | TPV 90 | TPV 110 |
|---|---|---|---|---|---|
| **A** | 2,8 MPa | A | A | A | A |
| **B** | 2,5 MPa | R | R | R | R |

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

**CONTROLS (continued)**

## MS - Manual Proportional Control with Feed Back

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.



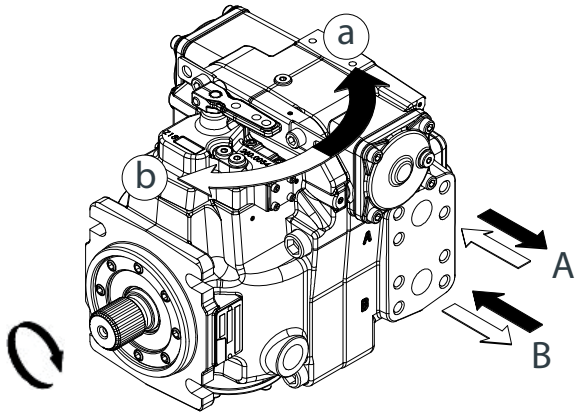

| Characteristic points of operations | |
|---|---|
| Start of control at β | 3,7° |
| End of control at β | 41,7° (max displacement $Vg_{max}$) |
| Mechanical stop for β | ± 46,8° |

**CONTROLS (continued)**

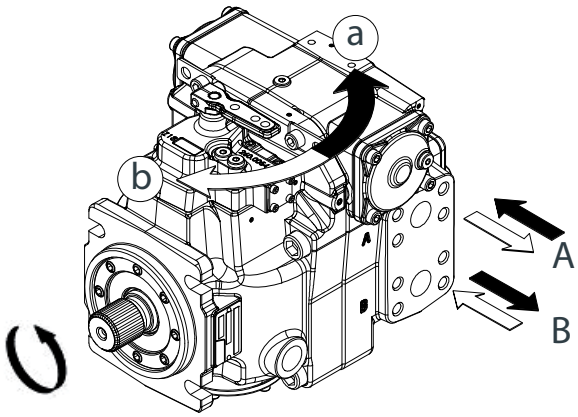
## MS - Manual Proportional Control with Feed Back (continued)

## R, L - Rotation Direction - Flow Direction

| | | lever direction | flow direction through the pump |
|---|---|---|---|
| Direction of rotation | R (CR) | a | B in to A out |
| | | b | A in to B out |
| | L (CC) | a | A in to B out |
| | | b | B in to A out |

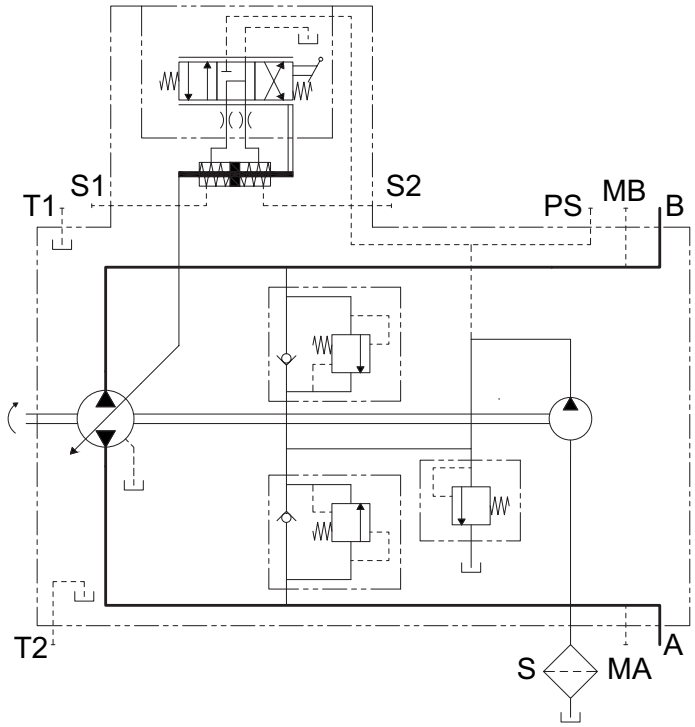



R (CR- Clockwise)




L (CC- Counterclockwise)

**Hydraulic Diagram**

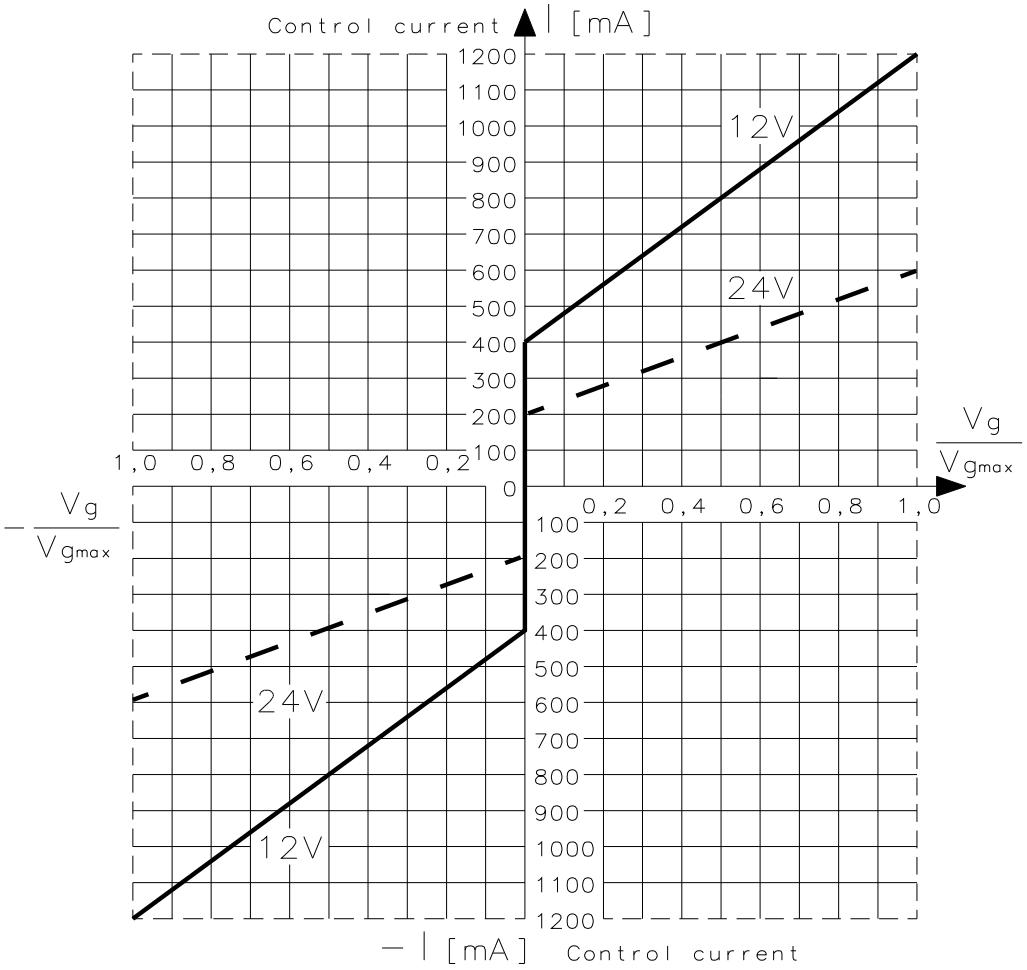



| | |
|---|---|
| A, B | high pressure ports |
| S | boost pump suction port |
| T1, T2 | case drain ports |
| MA, MB, PS | gauge ports for system & boost pressure |
| S1, S2 | servo piston gauge ports |

**CONTROLS (continued)**

## EP - Electro-Proportional Control with Feed Back

With the electro-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 neutral position if none of the solenoids is actuaded.
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 of control at $V_{g0}$ | 400 mA | 200 mA |
| End of control at $V_{gmax}$ | 1200 mA | 600 mA |

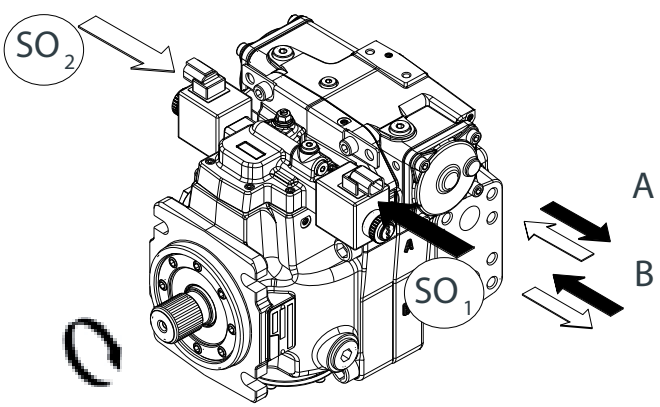
Note: the displacement control valve spool can get stuck due to contamination (fluid contamination or abrasion contamination from transmission components). This can result in pump flow different from operator request. Please check if the application require any safety devices (i.e. emergency stop) in order to put the transmission driven output in a safe condition.

**CONTROLS (continued)**

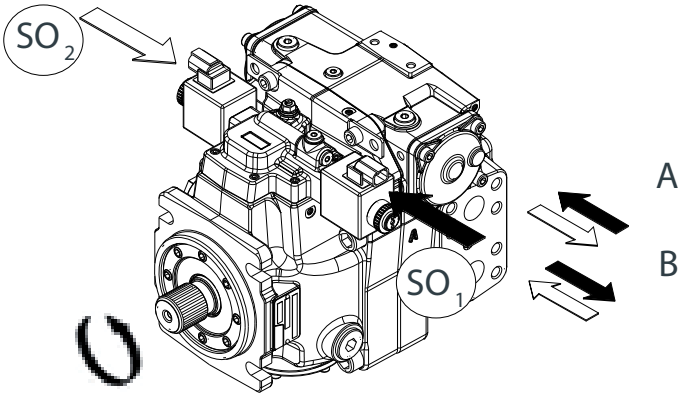
## EP - Electro-Proportional Control with Feed Back (continued)

## R, L - Rotation Direction - Flow Direction

| | | solenoid | flow direction through the pump |
|---|---|---|---|
| Direction of rotation | R (CR) | $SO_1$ | B in to A out |
| | | $SO_2$ | A in to B out |
| | L (CC) | $SO_1$ | A in to B out |
| | | $SO_2$ | B in to A out |

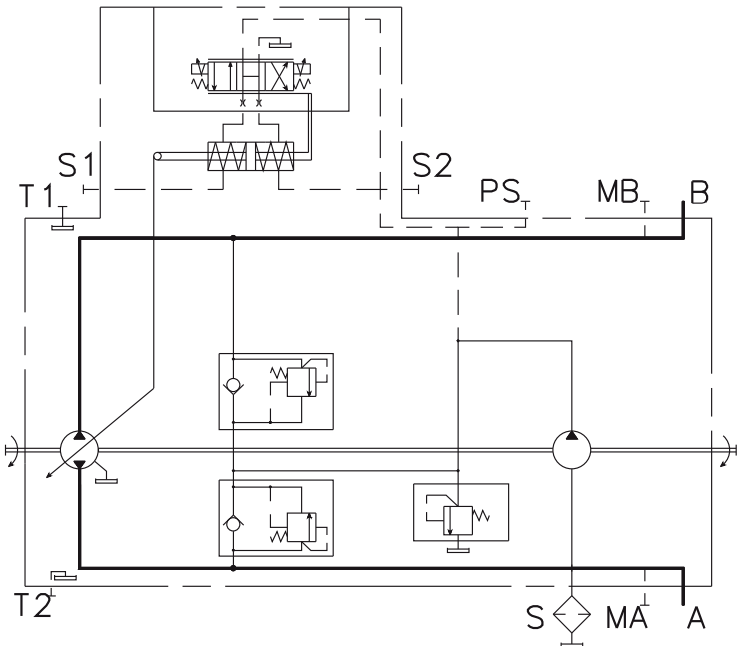



R (CR - Clockwise)




L (CC - Counterclockwise)

**Hydraulic Diagram**

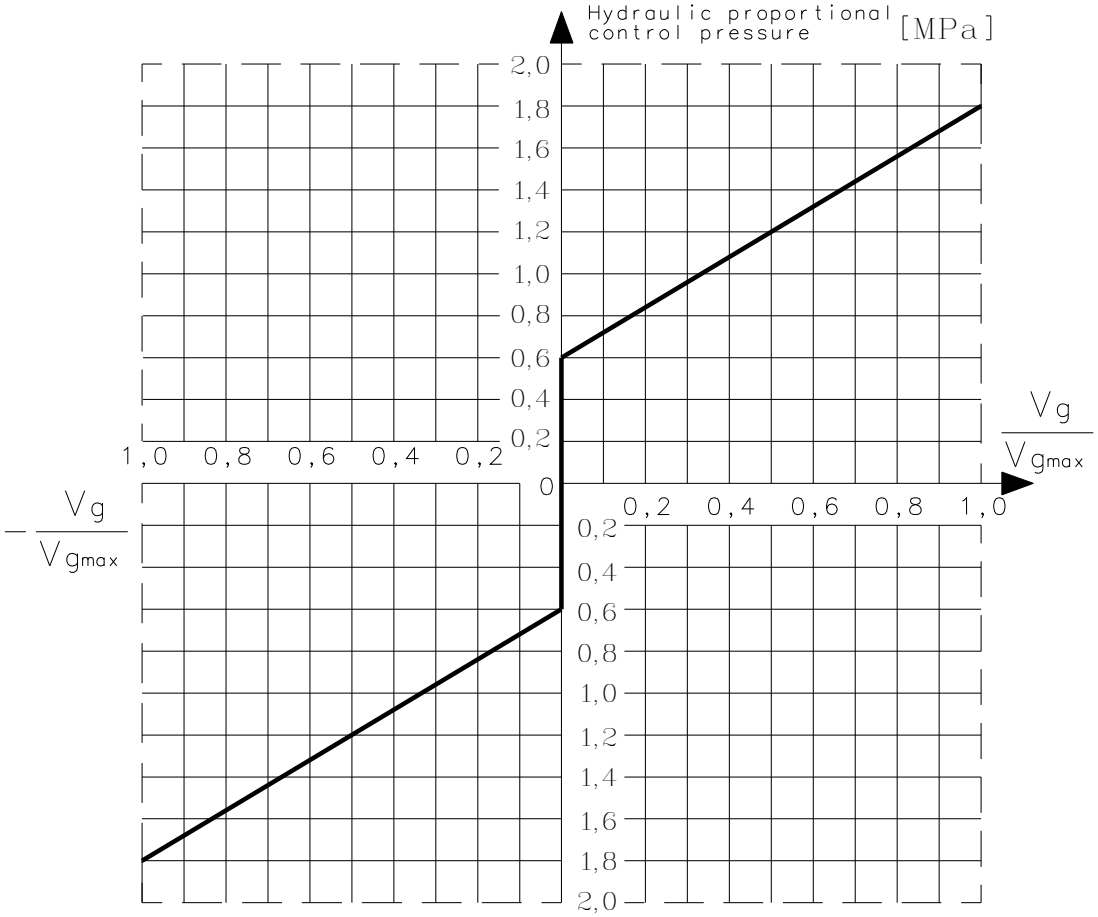



| | |
|---|---|
| A, B | high pressure ports |
| S | boost pump suction port |
| T1, T2 | case drain ports |
| MA, MB, PS | gauge ports for system & boost pressure |
| S1, S2 | servo piston gauge ports |

**CONTROLS (continued)**

## HP - Hydraulic Proportional Control with Feed Back

With the hydraulic proportional control **(HP)** the displacement of the pump is directly proportional to the pilot pressure applied to one of the two control pressure ports.
The pump is fitted with a resetting device which automatically reset the control spool to central position if no control takes place.
The figure shows the relation between pressure and displacement.




| Control pressure | |
|---|---|
| Start of control at $V_{g0}$ | 0,6 MPa |
| End of control at $V_{gmax}$ | 1,8 MPa |

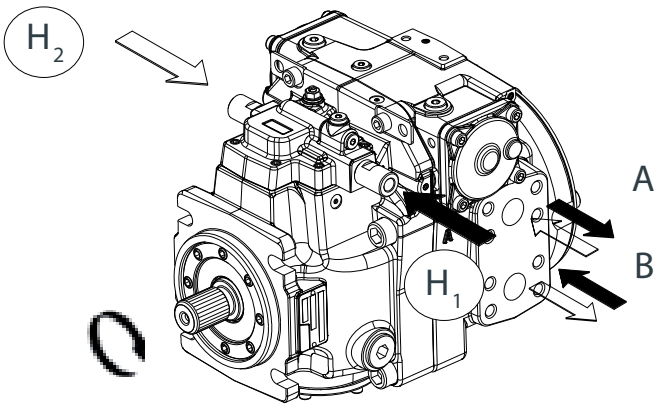
Note: the displacement control valve spool can get stuck due to contamination (fluid contamination or abrasion contamination from transmission components). This can result in pump flow different from operator request. Please check if the application require any safety devices (i.e. emergency stop) in order to put the transmission driven output in a safe condition.

**CONTROLS (continued)**

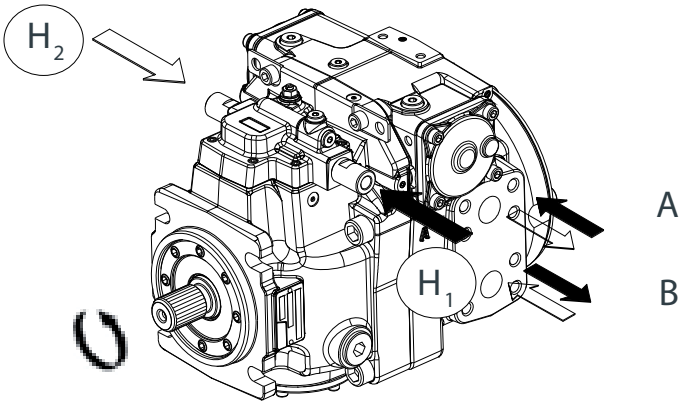
## HP - Hydraulic Proportional Control with Feed Back (continued)

## R, L - Rotation Direction - Flow Direction

| | | pressure port | flow direction through the pump |
|---|---|---|---|
| Direction of rotation | R (CR) | H1 | B in to A out |
| | | H2 | A in to B out |
| | L (CC) | H1 | A in to B out |
| | | H2 | B in to A out |

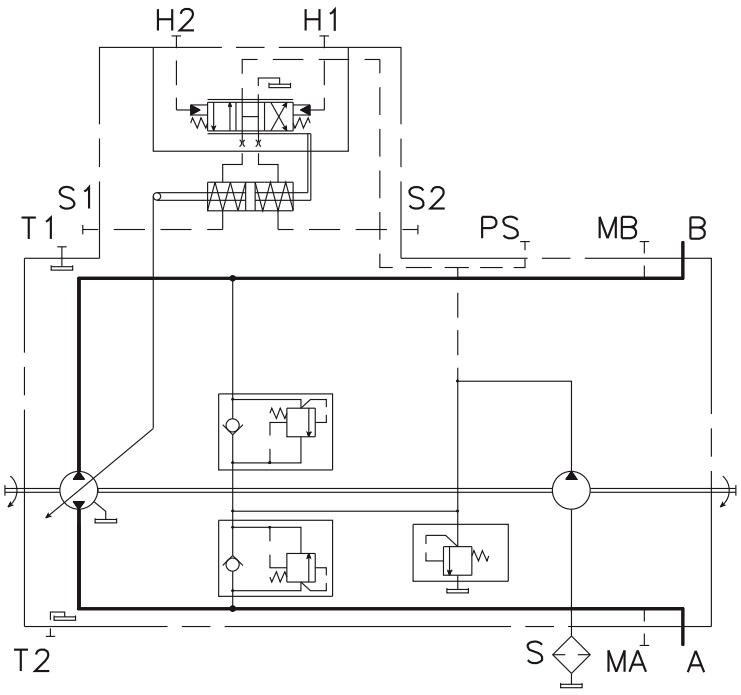



R (CR - Clockwise)




L (CC - Counterclockwise)

**Hydraulic Diagram**

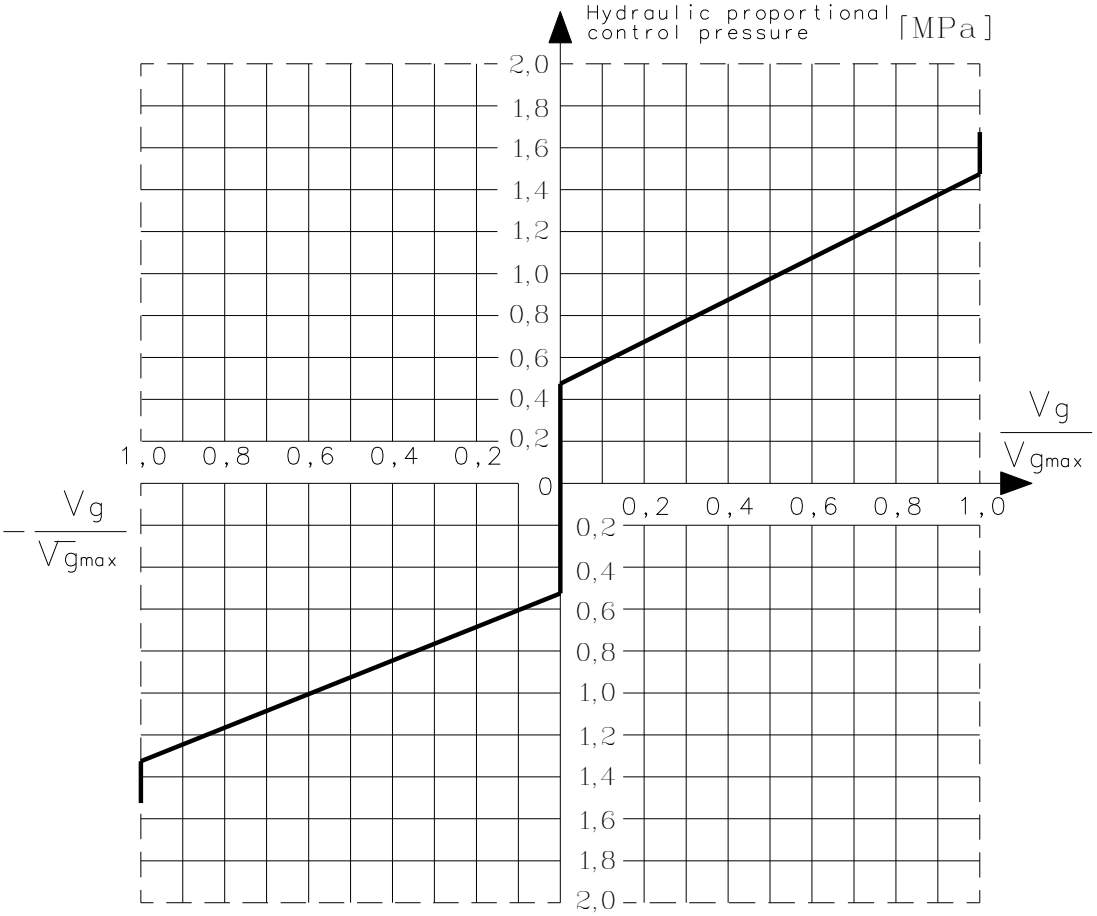



| | |
|---|---|
| A, B | high pressure ports |
| S | boost pump suction port |
| T1, T2 | case drains ports |
| MA, MB, PS | gauge ports for system & boost pressures |
| S1, S2 | servo piston gauge ports |
| H1, H2 | control pressure ports |

**CONTROLS (continued)**

## HD - Hydraulic Proportional Direct Control

With the hydraulic proportional direct control **(HD)**, without feedback, the displacement of the pump is directly proportional to the pilot pressure applied directly to one of the two sides of the servopiston, but is also influenced by load and of the pump speed.
The pump is fitted with a resetting device which automatically reset the swashplate to central position if the control is not actuated.
The figure shows the relation between pressure and displacement.




| Control pressure | |
|---|---|
| Start of control at $V_{g0}$ | 0,4 MPa |
| End of control at $V_{gmax}$ | 1,4 MPa |

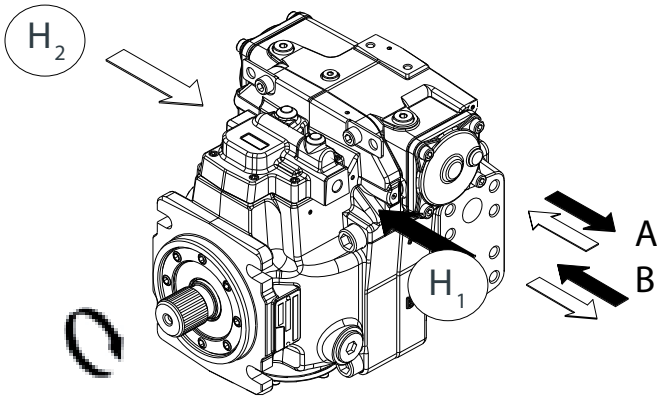
Note: the displacement control valve spool can get stuck due to contamination (fluid contamination or abrasion contamination from transmission components). This can result in pump flow different from operator request. Please check if the application require any safety devices (i.e. emergency stop) in order to put the transmission driven output in a safe condition.

**CONTROLS (continued)**

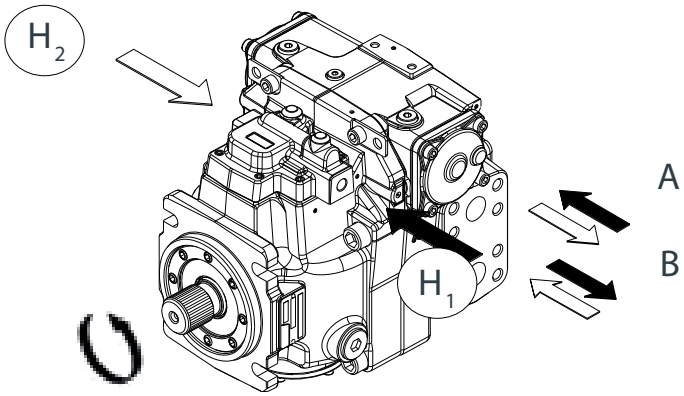
## HD - Hydraulic Proportional Direct Control (continued)

## R, L - Rotation Direction - Flow Direction

| | | pressure port | flow direction through the pump |
|---|---|---|---|
| Direction of rotation | R (CR) | H1 | B in to A out |
| | | H2 | A in to B out |
| | L (CC) | H1 | A in to B out |
| | | H2 | B in to A out |

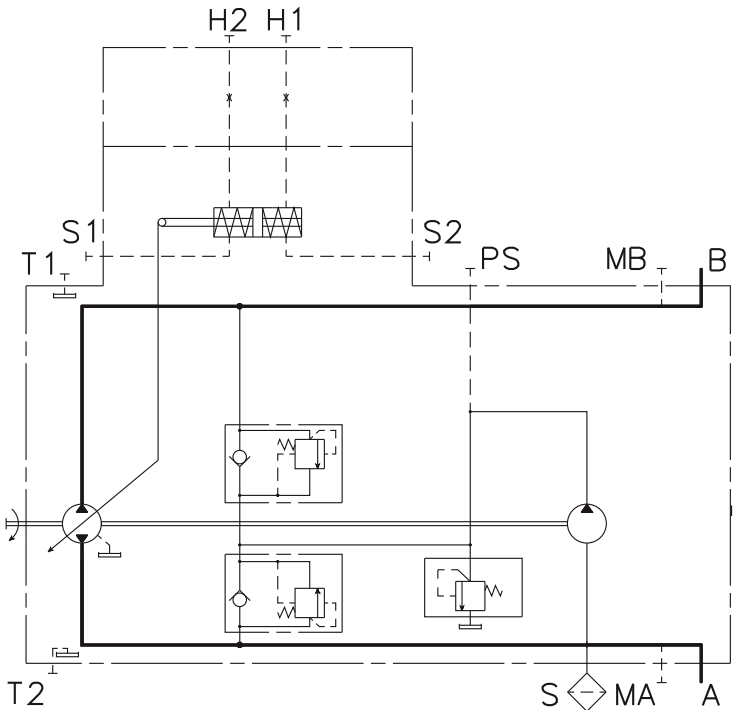



R (CR - Clockwise)




L (CC - Counterclockwise)

**Hydraulic Diagram**




| | |
|---|---|
| A, B | high pressure ports |
| S | boost pump suction port |
| T1, T2 | case drains ports |
| MA, MB, PS | gauge ports for system & boost pressures |
| S1, S2 | servo piston gauge ports |
| H1, H2 | control pressure ports |

**CONTROLS (continued)**

**Installation Details**

**MS, Manual Proportional Control**
The control lever can be assembled in any position allowed by the 12-sided hole of the lever.
The lever must be tightened to the control swivel with 35 Nm.
Maximum requested torque to move the lever at its end of stroke is 260 Nm.
A mechanical stop must be provided to prevent damages to the control valve due to excess of torque applied to the lever.

**EP, Electro-Proportional Control**
The connector of the solenoid is DEUTSCH DT04-2P-EP04, contact pin 0460-202-16141.
Mating connector: DEUTSCH DT06-2S-EP04 consisting of:
- Case DT06-25-EP04
- Wedge W 25
- Contact socket 0462-201-16141

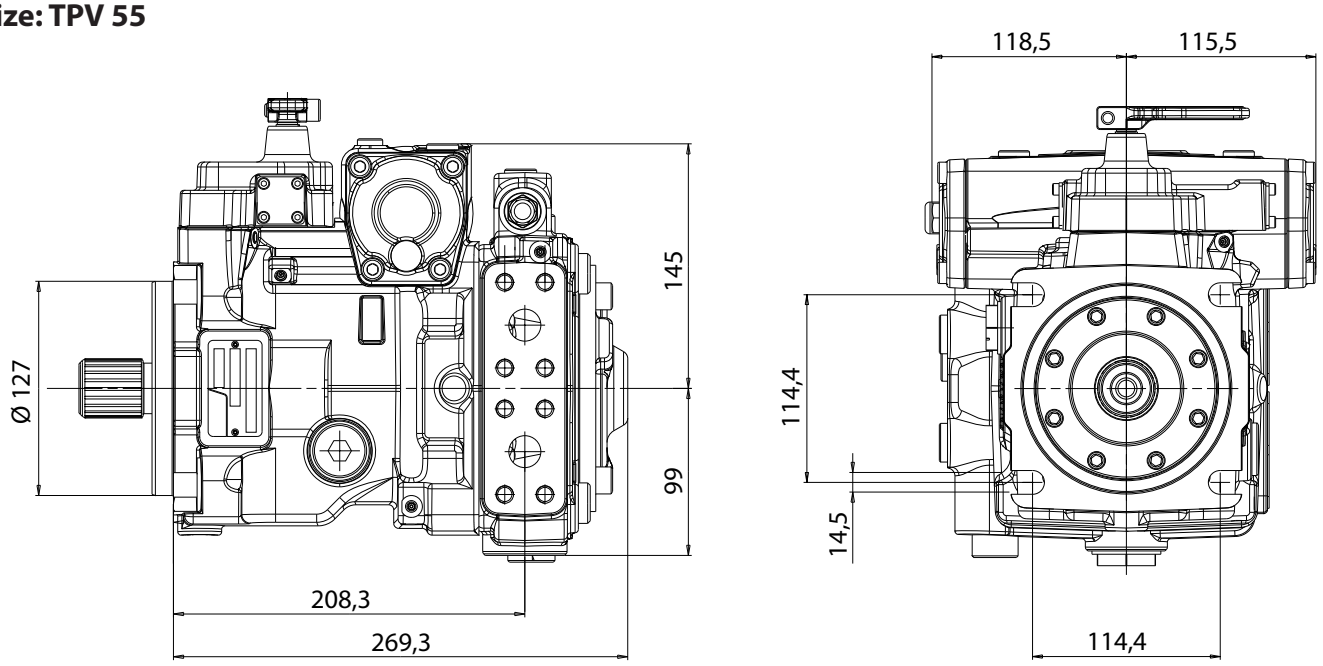
The solenoid and the connector have a protection class IP67 and IP69K according to DIN/EN 60529, when mounted with the proper sealing (the solenoid) and the proper mating plug (the connector).
Coil windings utilize Class H magnet wire (180 °C temperature rise above an ambient of 25°C).
Maximum ambient temperature for solenoids: +50°C. PWM frequency range: 100 Hz.
Solenoid nominal power 23W (both 12V and 24V solenoids).

**HP, Hydraulic Proportional Control** (with feedback)
The HP control ports dimension is G1/4" ISO 1179 standard.
Tighten the connecting nipples with 25 Nm.
Do not pressurize control ports H1 & H2 with more than 2,0 MPa.

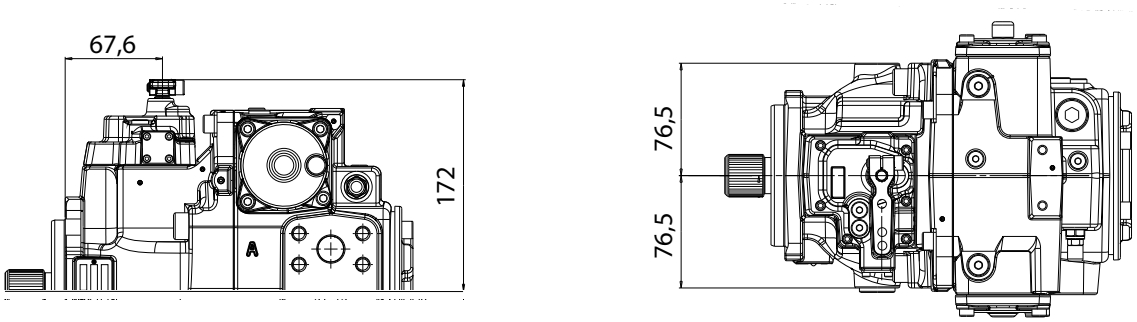
**HD, Hydraulic Proportional Direct Control** (without feedback)
The HP control ports dimension is G1/4" ISO 1179 standard.
Tighten the connecting nipples with 25 Nm.
Do not pressurize control port H1 & H2 with more than 3,5 MPa.

## INSTALLATION DRAWINGS

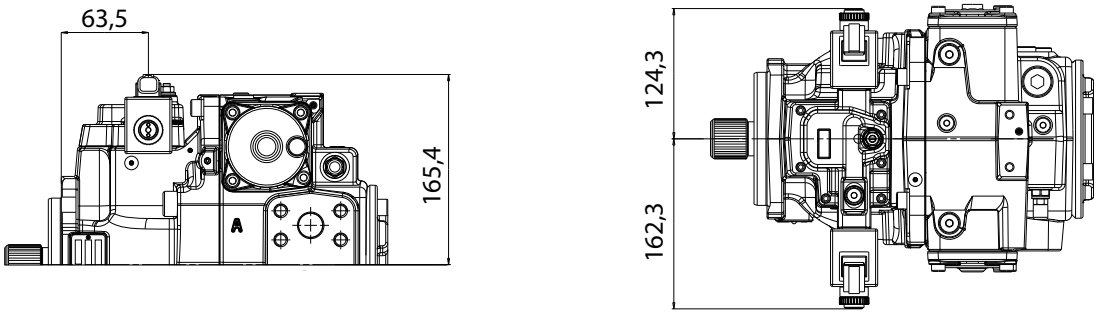
### Size: TPV 55



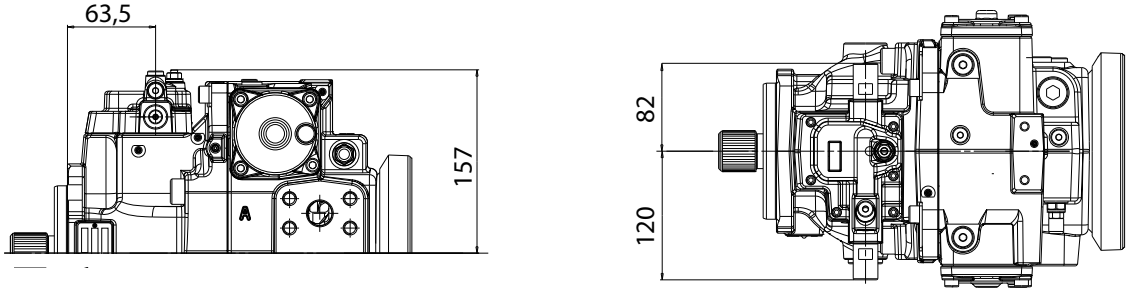

### MS - Manual Control




### EP - Electro-Proportional Control




### HP - Hydraulic Proportional Control

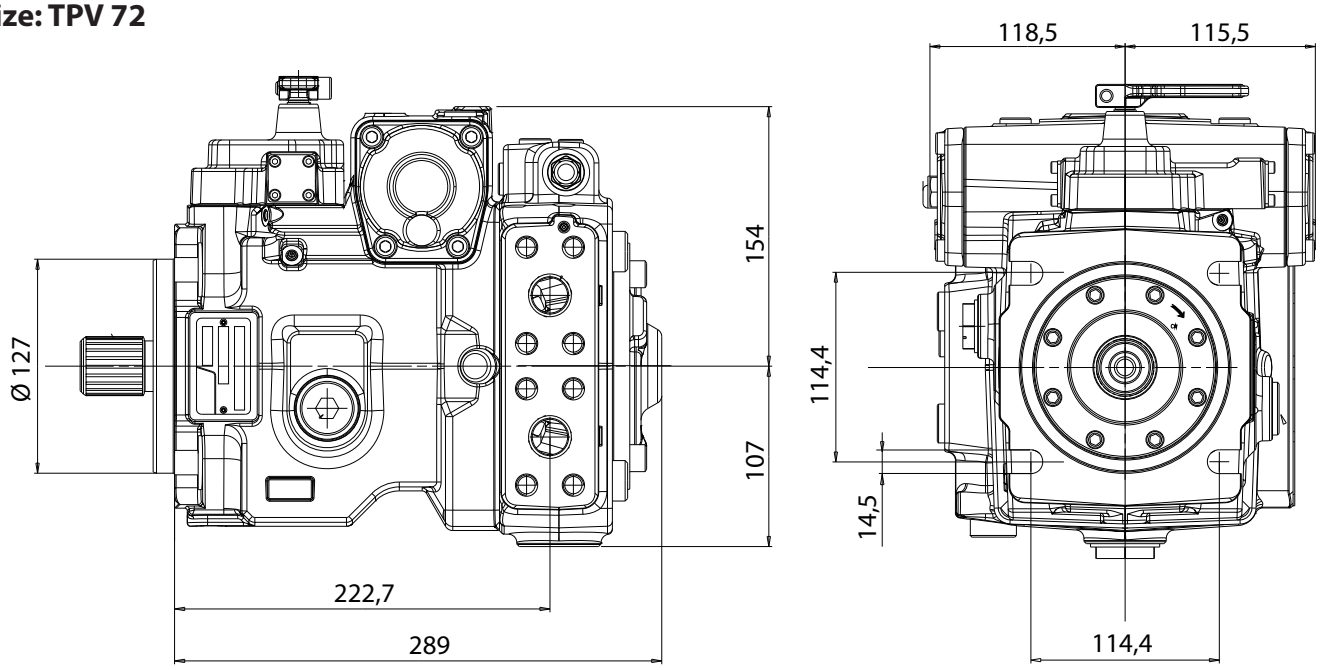



**HD - Hydraulic Proportional Direct Control -** not yet available

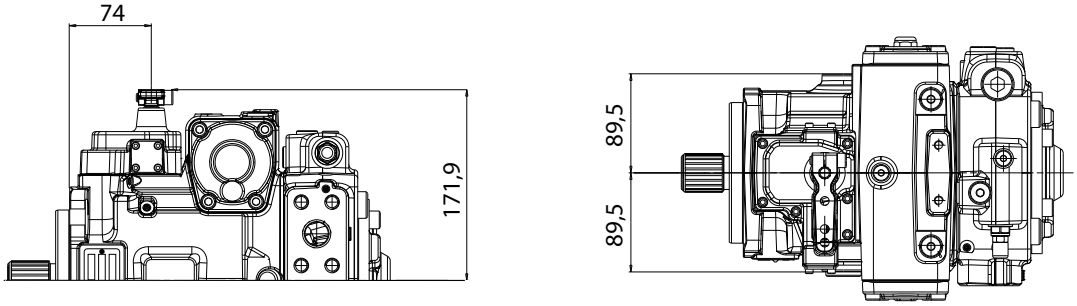
Not all the matches are available, for further details contact our technical department.

## INSTALLATION DRAWINGS (continued)

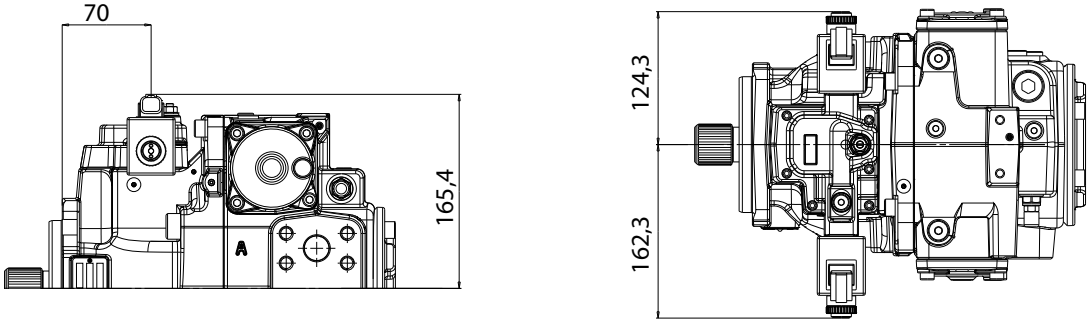
### Size: TPV 72



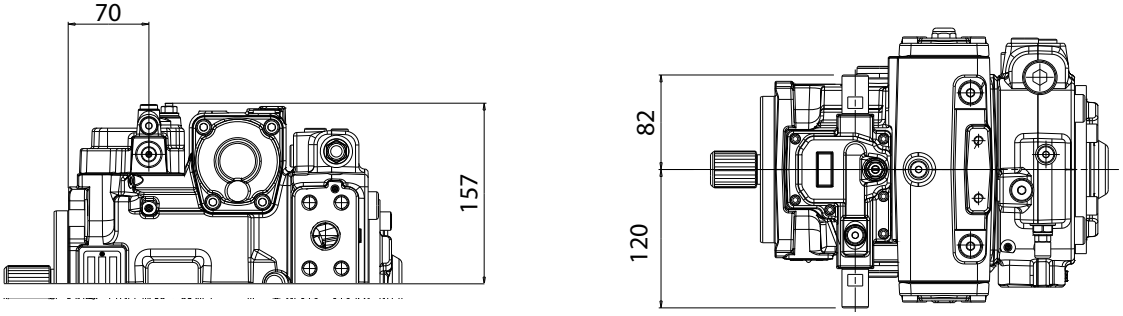

### MS - Manual Control




### EP - Electro-Proportional Control




### HP - Hydraulic Proportional Control

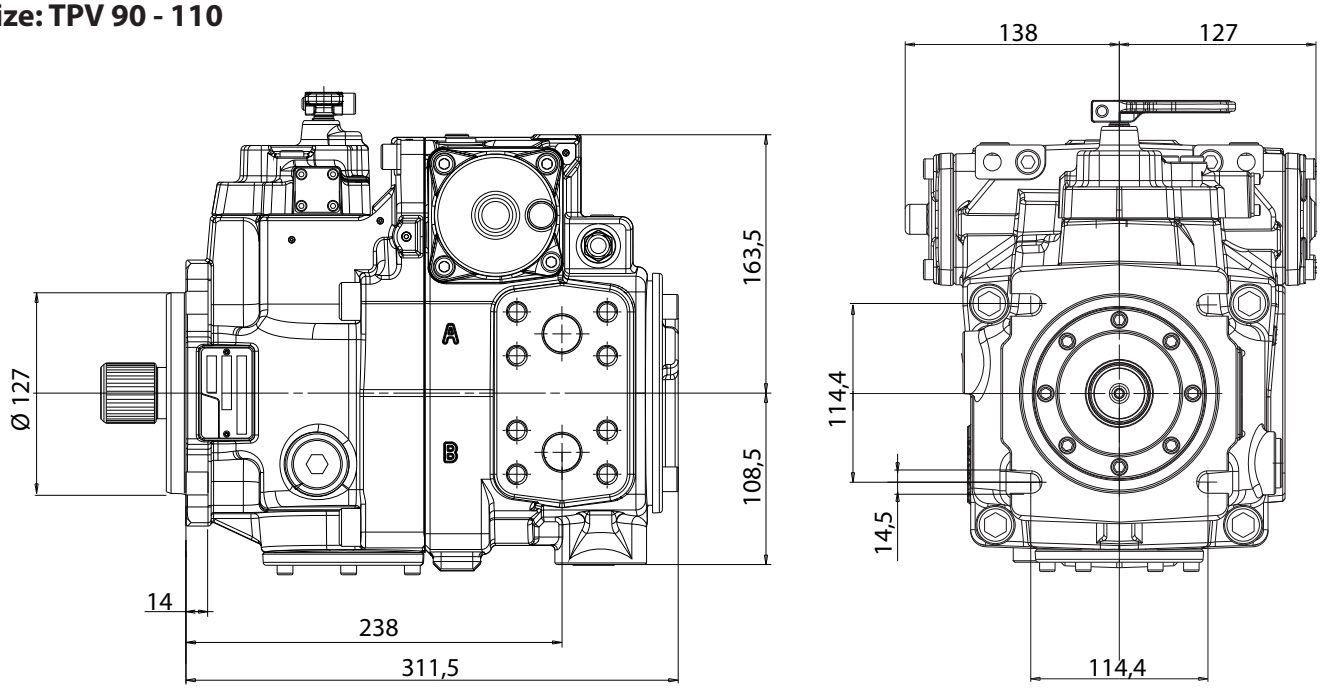



**HD - Hydraulic Proportional Direct Control -** not yet available

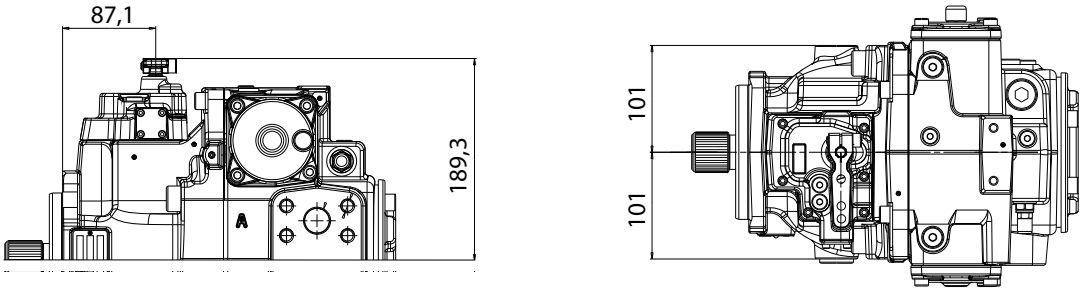
Not all the matches are available, for further details contact our technical department.

## INSTALLATION DRAWINGS (continued)

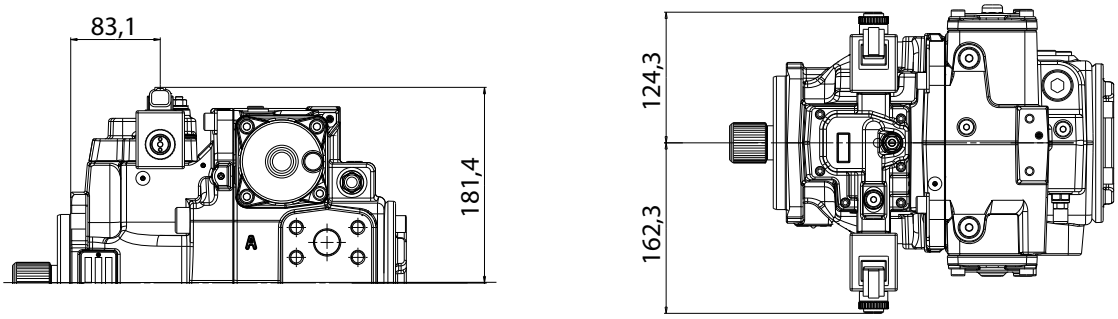
### Size: TPV 90 - 110



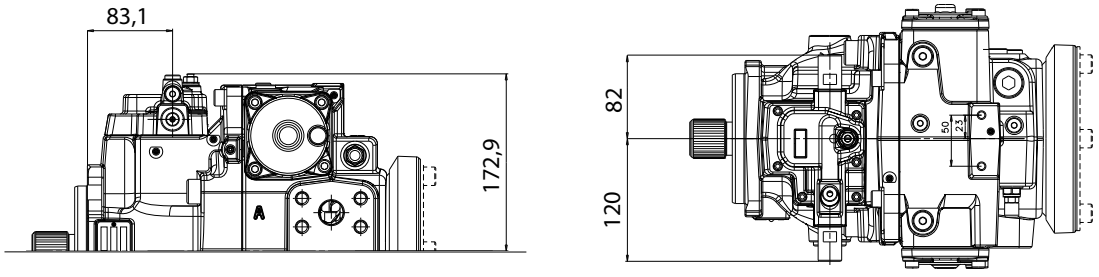

### MS - Manual Control




### EP - Electro-Proportional Control




### HP - Hydraulic Proportional Control

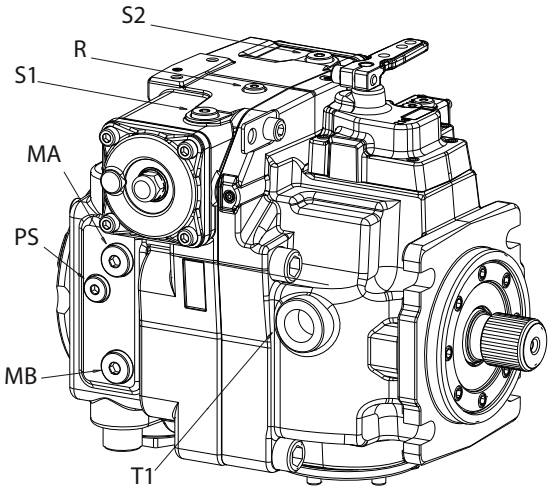



**HD - Hydraulic Proportional Direct Control -** not yet available

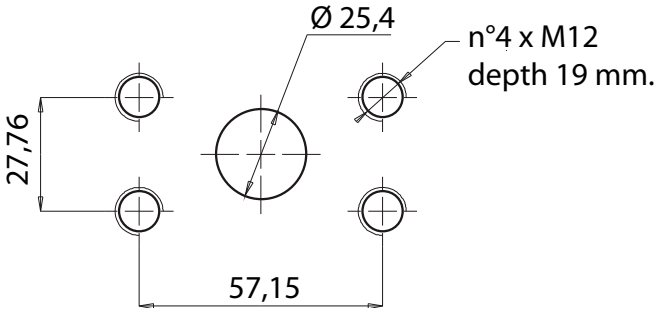
Not all the matches are available, for further details contact our technical department.

## INSTALLATION DRAWINGS (continued)

### Ports



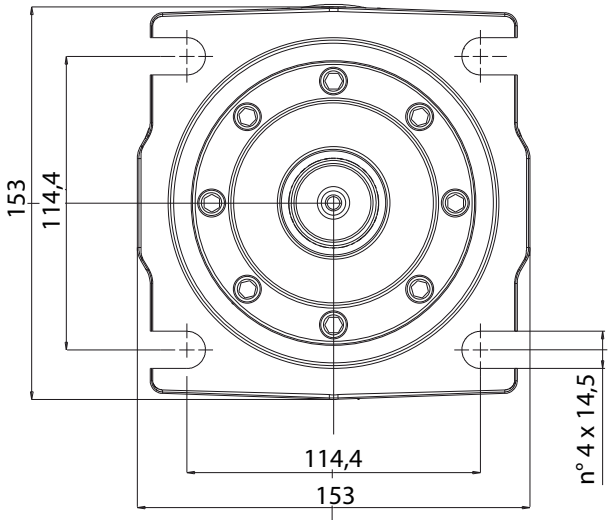

**Detail Ports A-B**
**(SAE Flange J518 - 1" - Code 62)**




| Port | Description | Standard | Size |
|---|---|---|---|
| A, B | High pressure ports | SAE J518 code 62 | 1" BSPP |
| S | Boost pump suction port | ISO1179 | 1" ¼ BSPP |
| T1,T2 | Case drain ports | ISO1179 | 3/4" BSPP |
| MA, MB | Gauge ports for system pressure | ISO1179 | 3/8" BSPP |
| PS | Gauge port for boost pressure | ISO1179 | 1/4" BSPP |
| R | Air bleed plug | ISO1179 | 1/8" BSPP |
| S1, S2 | Servo piston press. gauge ports | ISO1179 | 1/4" BSPP |

### Mounting Flange

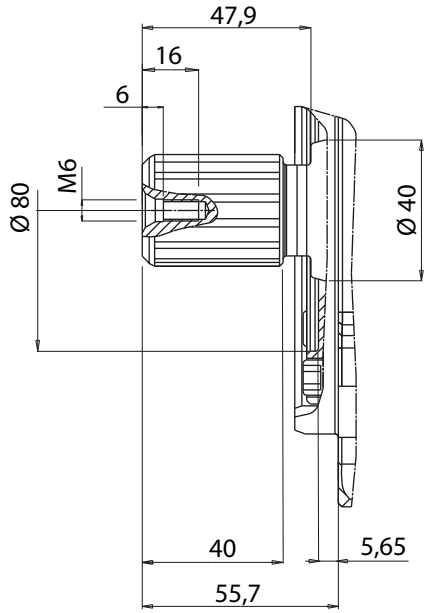
**C4 - SAE J744 - Flange SAE C- 4 Bolts**



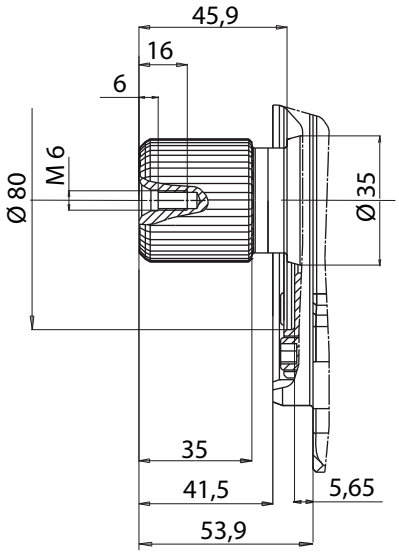
**INSTALLATION DRAWINGS (continued)**

**Drive Shaft**

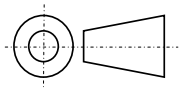
## 14N
**ANSI B92.1A-1976 - 1"1/4 - 14T - 12/24 DP**

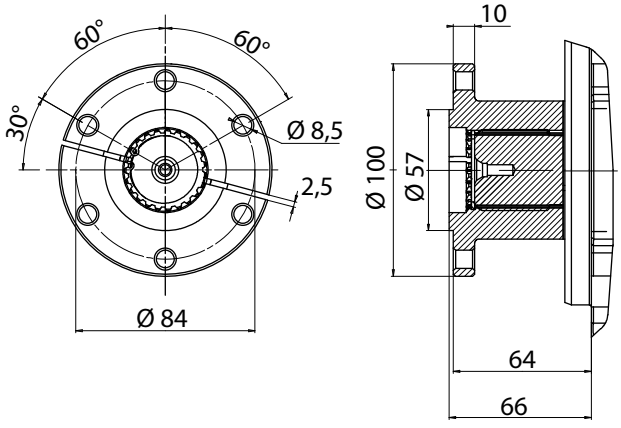



## 21N
**ANSI B92.1A-1976 - 1"3/8 - 21T - 16/32 DP**




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



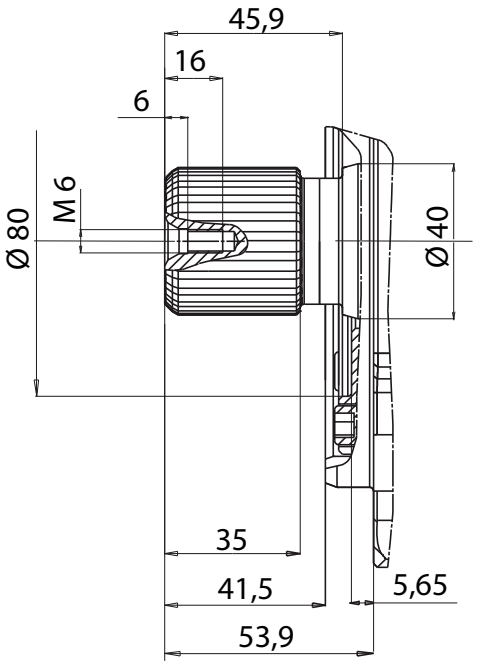


**INSTALLATION DRAWINGS (continued)**

**Drive Shaft**

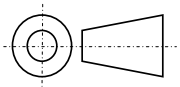
# 23N

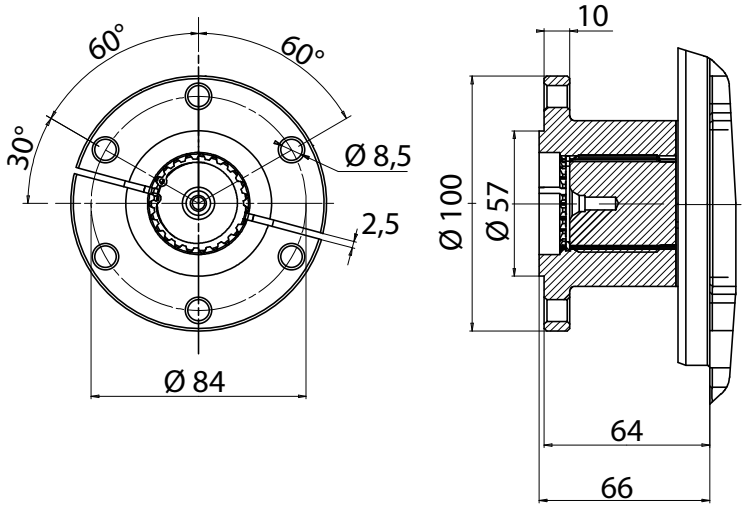
**ANSI B92.1A-1976 - 1"1/2 - 23T - 16/32 DP**




# 23F

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



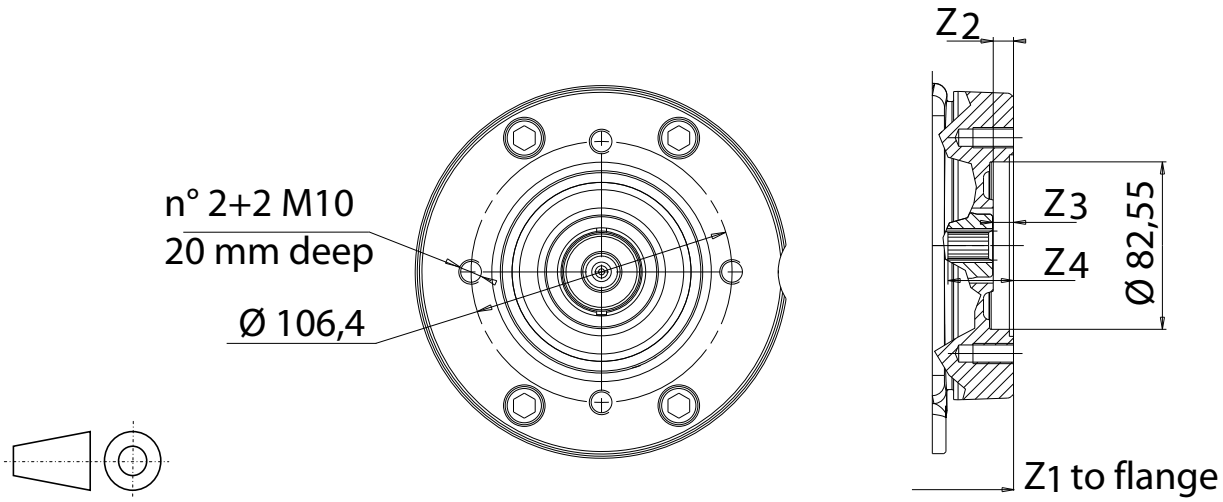


**INSTALLATION DRAWINGS (continued)**

**Through Drive Dimensions**

## A1 - Flange SAE-A J744 82-2

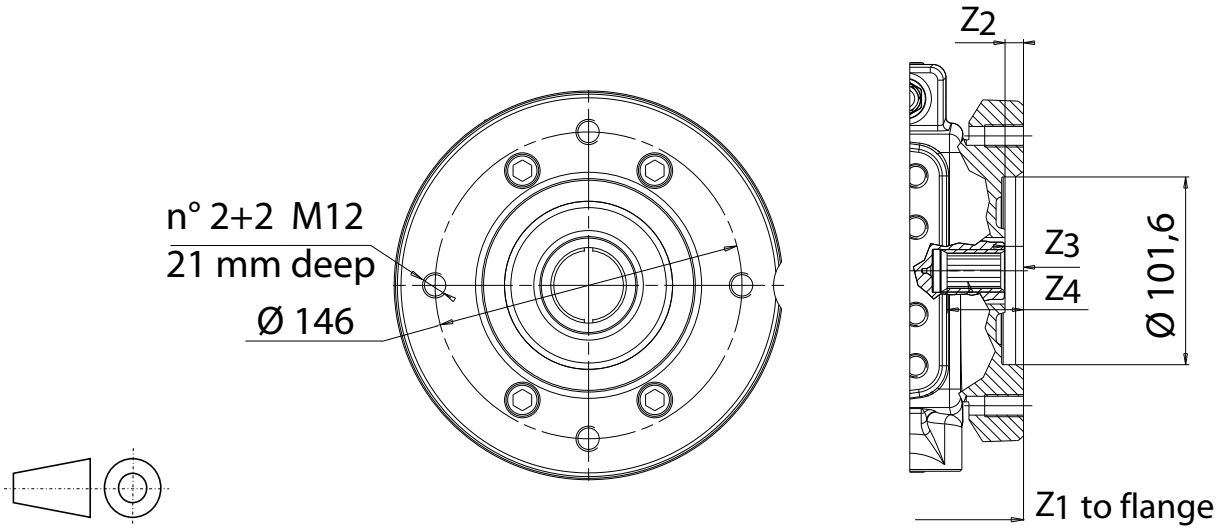
**Splined Hub - ANSI B92-1A-1976 - 9T - 16/32 DP**




| Splined hub | | | | |
|---|---|---|---|---|
| ANSI B92.1A-1976 16/32 9T | | | | |
| Pump size | $Z_1$ | $Z_2$ | $Z_3$ | $Z_4$ |
| TPV 55 | 272,6 | 10 | 10,3 | 32,3 |
| TPV 72 | 292,3 | 10 | 10,3 | 32,3 |
| TPV 90/110 | 324,8 | 10 | 10,3 | 32,3 |

## B1 - Flange SAE-B J744 101-2

**Splined Hub - ANSI B92-1A-1976 - 13T - 16/32 DP**

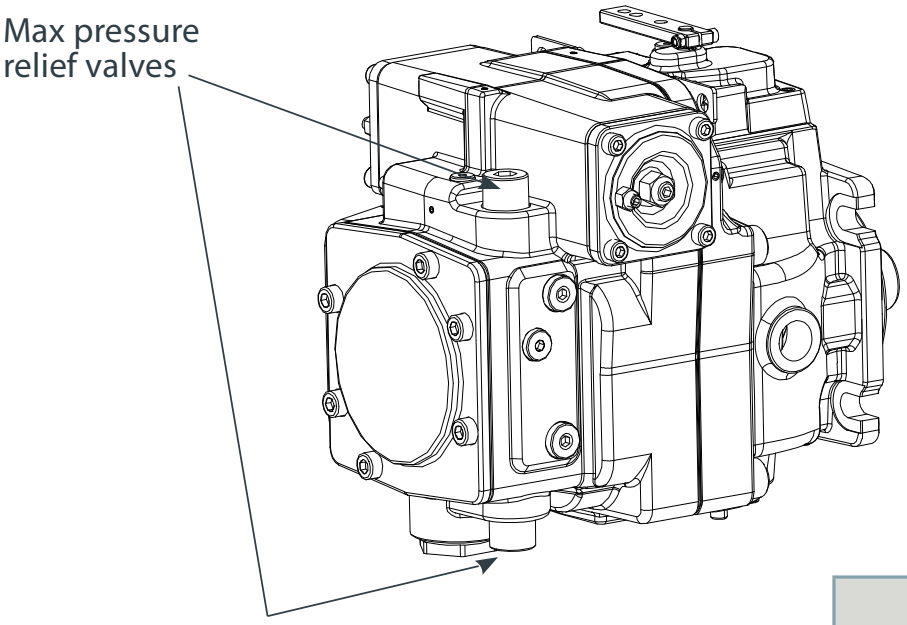



| Splined hub | | | | |
|---|---|---|---|---|
| ANSI B92.1A-1976 16/32 13T | | | | |
| Pump Size | $Z_1$ | $Z_2$ | $Z_3$ | $Z_4$ |
| TPV 55 | 272,6 | 10 | 10,3 | 41,3 |
| TPV 72 | 292,3 | 10 | 10,3 | 41,3 |
| TPV 90/110 | 324,8 | 10 | 10,3 | 41,3 |

## 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 to the calibration value.
Valves also feature anti-cavitation function to compensate the exchanged flow and losses due to leakage.




| Relief valve setting | |
|---|---|
| **420** | 42 MPa |
| **350** | 35 MPa |
| **300** | 30 MPa |
| **250** | 25 MPa |

### Tightening Torques

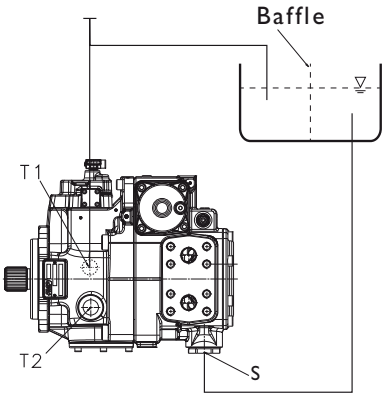
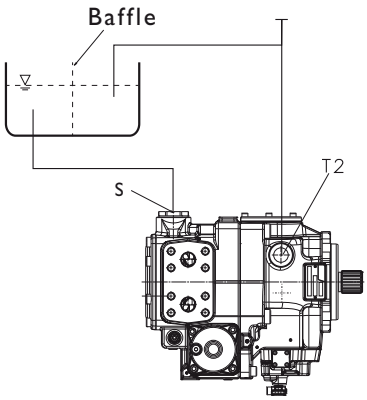
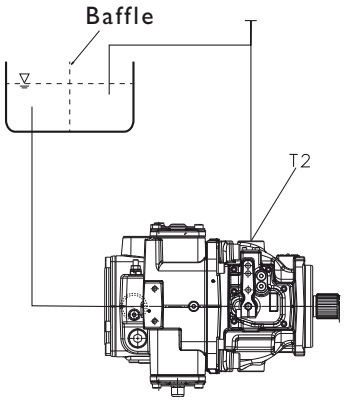
In the following table you can see the tightening torques for the fitting to the pump ports.

| Port | Standard | Thread | Torque [N m] |
|---|---|---|---|
| S | ISO1179 | 1 ¼" | 210 |
| T1,T2 | ISO1179 | 3/4" | 65 |
| MA, MB | ISO1179 | 3/8" | 35 |
| PS, S1, S2, HA, HB | ISO1179 | 1/4" | 25 |

## INSTALLATION INSTRUCTIONS

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

### Below tank installation

| Pump Position | | Notes |
|---|---|---|
| Horizontal shaft<br>Control upwards<br>High Pressure ports<br>A and B on side |  | The case drain line must be always connected with the drain port positioned in the highest position. |
| Horizontal shaft<br>Control downwards<br>High Pressure ports<br>A and B on side |  | The case drain line must be always connected with drain port positioned in the highest position. |
| Horizontal shaft<br>Control on side<br>High Pressure ports<br>A and B on top |  | The case drain line must be always connected with drain port positioned in the highest position. |

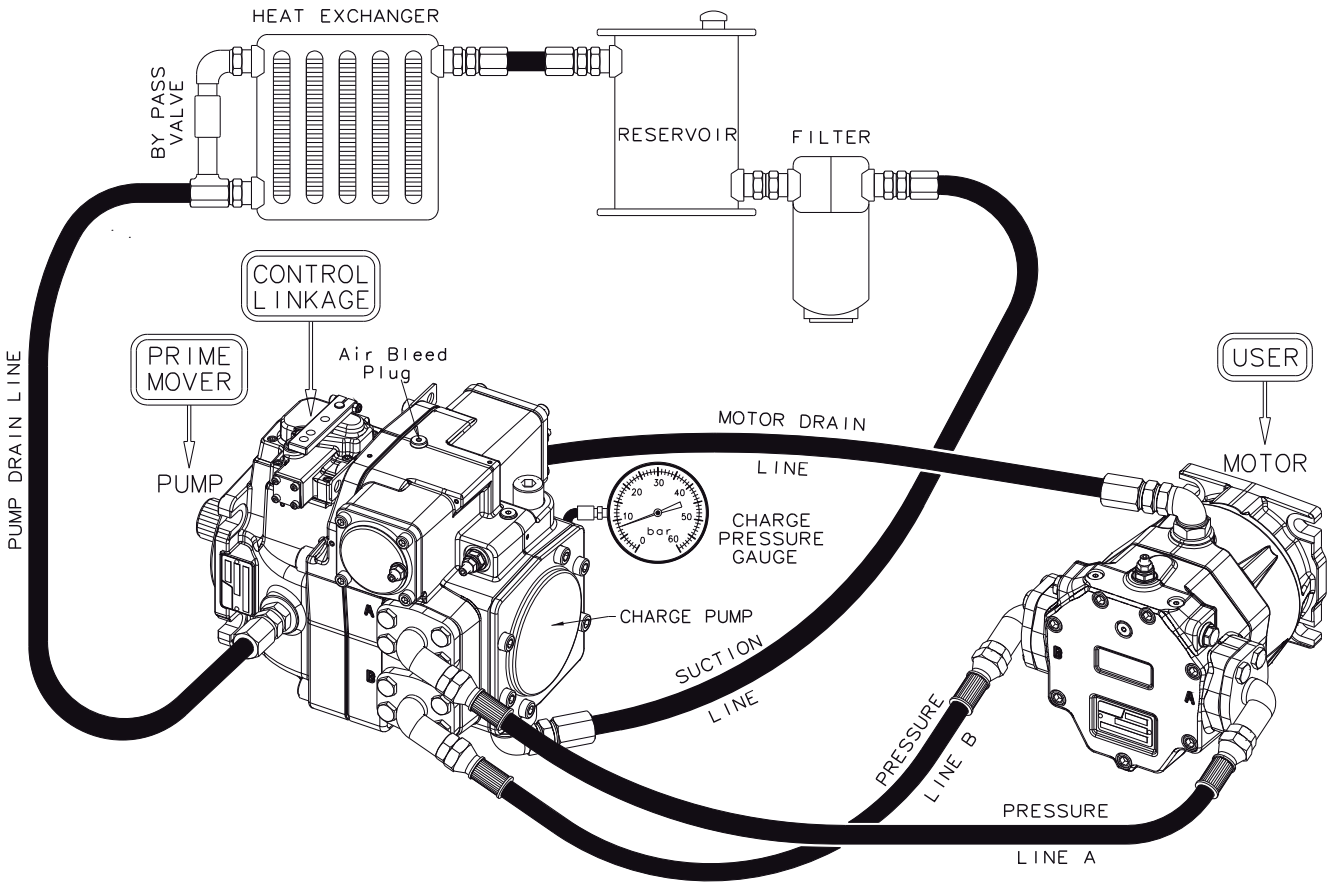
**INSTALLATION INSTRUCTIONS (continued)**

**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 (ß10≥75): 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 boost pump inlet must be always above 0,08 MPa (-0,02 MPa gauge).
The hydraulic circuit must be dimensioned in order to have maximum 0,2 MPa continuous pressure and max 0,6 MPa intermittent in the pump and motor case.
Higher values can be withstood at low speed.

**Typical Hydraulic Circuit**



**INSTALLATION INSTRUCTIONS (continued)**

**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 fittings on the hoses, insuring they are well tightened.

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

**10)** Fill with fresh oil the boost pump.

**11)** Install a pressure gauge on the PS port (see Boost 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: tighten control lever at 35 Nm
- EP1 / EP2: connect Deutsch Connectors with cables
- HP / HD: connect the control devices with flexible hoses

**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 boost pump gives pressure, by looking at the Boost Pressure Gauge.
It is possible to unscrew the "Air Bleed Plug", without removing it, in order to make the air bleed easier; when oil appears, tighten the plug.

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

**INSTALLATION INSTRUCTIONS (continued)**

**Start**

**16)** If the pressure is not stable or it is stable at a very different value from boost pump pressure setting ± 0,1 MPa (± 15 psi) there could be air inside the circuit: stop the engine, check hoses and fittings 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 our technical assistance.

**17)** If the pressure is stable at boost pressure setting ± 0,1 MPa (± 15 psi), set the engine speed at its normal working speed. If the engine speed is not in the range 1500÷3000 rpm contact our technical assistance.

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

**19)** When the hydraulic motor is running, the boost pressure should go down by 0,3 - 0,5 MPa (45 - 75 psi) difference; if this is not happening please contact our 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 that oil tank is duly closed.

**23)** Check that is no leakage in the circuit.

**24)** The hydraulic system is now 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.

Whilst every reasonable endeavour has been made to ensure accuracy, this publication cannot be considered to represent part of any contract, whether expressed or implied.

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**HYDRAULIC COMPONENTS**
**HYDROSTATIC TRANSMISSIONS**
**GEARBOXES - ACCESSORIES**

Via M. L. King, 6 - **41122 MODENA (ITALY)**
Tel: +39 059 415 711
Fax: +39 059 415 729 / 059 415 730
INTERNET: http://www.hansatmp.it
E-MAIL: hansatmp@hansatmp.it