HANSA · TMP srl

HYDRAULIC COMPONENTS
HYDROSTATIC TRANSMISSIONS
GEARBOXES - ACCESSORIES

Certified Company ISO 9001:2015 - 14001:2015

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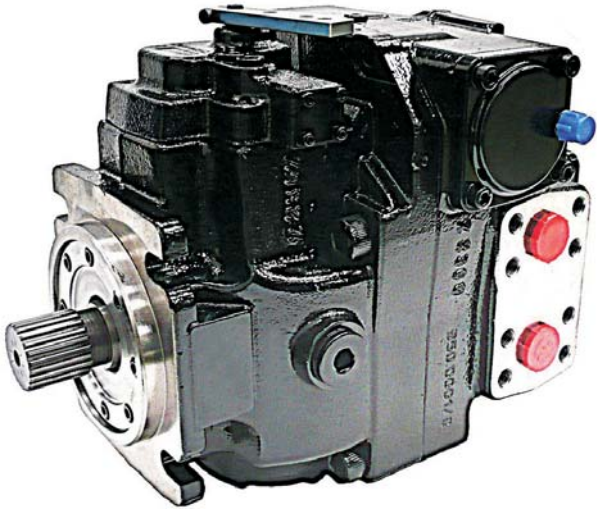
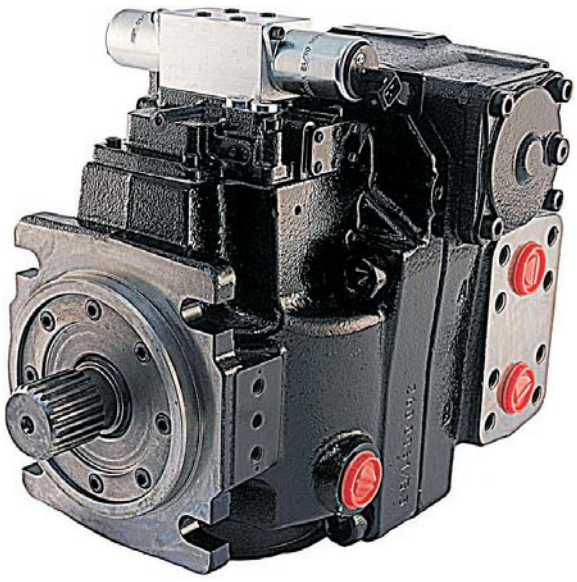
THE PRODUCTION LINE OF HANSA-TMP

Variable Displacement Closed Loop System Axial Piston Pump

TPV 9000





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1) ORDER CODE

1	2	3	4	5	6	7	8	9	10	11	12
TPV				**V**	**C4**						

1	PRODUCT GROUP AND FAMILY				
TPV	Axial piston pump for closed loop circuit				
2	DISPLACEMENT				
55	55,0 cm³ (@18°)				
55B*	55,0 cm³ (@18°)				
72	72,1 cm³ (@18°)				
72B*	72,1 cm³ (@18°)				
90	89,2 cm³ (@18°)				
110	110,0 cm³ (@18°)				
3	DIRECTION OF ROTATION	TPV55	TPV72	TPV90	TPV110
R	Right, i.e. clockwise (CW) view from shaft end	A	A	A	A
L	Left, i.e. counterclockwise (CCW) view from shaft end	A	A	A	A
4	CONTROL DEVICE	TPV55	TPV72	TPV90	TPV110
0	Without control, fixed displacement	R	R	R	R
MS	Manual servo control	A	A	A	A
MZ	Manual servo control with neutral position switch	A	A	A	A
MY1	Manual servo control with N.P. switch & 12V emergency stop	-	-	A	A
MY2	Manual servo control with N.P. switch & 24V emergency stop	-	-	A	A
MT	Manual servo for traction	-	-	A	A
MZT	Manual servo for traction control with neutral position switch	A	A	-	-
MX	Manual servo for traction with neutral position switch & BBS	A	A	-	-
RE1	Remote electric control 12V solenoid	-	-	A	A
RE2	Remote electric control 24V solenoid	-	-	A	A
E1	Electric ON/OFF control 12V solenoid	A	A	A	A
E2	Electric ON/OFF control 24V solenoid	A	A	A	A
EP1	Electric proportional control 12V solenoid	A	A	A	A
EP2	Electric proportional control 24V solenoid	A	A	A	A
HP	Hydraulic proportional pilot pressure related	A	A	A	A
HD	Hydraulic proportional pilot pressure related (direct acting)	A	A	A	A
5	SHAFT SEAL	TPV55	TPV72	TPV90	TPV110
V	Viton	-	A	A	A

* TPV 55B and TPV 72B are special simplified version of TPV 55 and TPV 72.
They are available only with MS or MY control, for typical application on transit concrete mixers.

1	2	3	4	5	6	7	8	9	10	11	12
TPV				**V**	**C4**						

6	MOUNTING FLANGE	TPV55	TPV72	TPV90	TPV110
B2	SAE J 744 – SAE B two bolts	-	-	-	-
C4	SAE J 744 – SAE C four bolts	A	A	A	A
S4	Special flange 4-holes for tandem coupling	A	R	-	-
7	SHAFT END	TPV55	TPV72	TPV90	TPV110
13N	ANSI B92.1A – 1976 – 7/8'' 13T 16/32 DP	-	-	-	-
14N	ANSI B92.1A – 1976 – 1 1/4'' 14T 12/24 DP	A	R	R	R
15N	ANSI B92.1A – 1976 – 1'' 15T 16/32 DP	-	-	-	-
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 coupling flange	R	R	R	R
21F1	ANSI B92.1A – 1976 – 1 1/2'' 21T 16/32 DP SPECIAL coupling flange	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
23F1	ANSI B92.1A – 1976 – 1 1/2'' 23T 16/32 DP SPECIAL coupling flange	-	-	A	A
C15	Tapered 1.5" shaft	-	R	R	R
T1	Tandem [hub for ANSI B92.1A – 1976 – 1 1/4'' 19T 16/32 DP for coupling with a TPV 90 front pump or a TPV 110 front pump	R	R	-	-
T2	Tandem [hub for ANSI B92.1A – 1976 – 24T 32/64 DP	A	-	-	-
T3	Tandem [hub for ANSI B92.1A – 1976 – 30T 32/64 DP	-	R	-	-
8	THROUGH DRIVE	TPV55	TPV72	TPV90	TPV110
0	No through drive	A	A	A	A
A1	Flange SAE A (SAE J 744) / Splined hub 9T-16/32 (ANSI B92.1A)	A	A	A	A
A3	Flange SAE A (SAE J 744) / Splined hub 11T-16/32 (ANSI B92.1A)	R	R	R	R
B1	Flange SAE B (SAE J 744) / Splined hub 13T-16/32 (ANSI B92.1A)	A	A	A	A
T1	Tandem [Flange SAE C (SAE J 744) / Splined shaft 19T-16/32 (ANSI B92.1A)]	-	R	R	R
T2	Tandem [Special flange 4-holes / Splined shaft 24T-32/64 (ANSI B92.1A)]	R	R	-	-
T3	Tandem [Special flange 4-holes / Splined shaft 30T-32/64 (ANSI B92.1A)]	-	R	-	-
9	CHARGE PUMP	TPV55	TPV72	TPV90	TPV110
0	No charge pump	-	-	-	-
CP0	Gerotor charge pump 13 cm^3	-	-	-	-
CP1	Gerotor charge pump 20 cm^3	A	A	R	R
CP2	Gerotor charge pump 28 cm^3 (for tandem configuration)	-	-	A	A
10	RELIEF VALVE SETTING	TPV55	TPV72	TPV90	TPV110
420	420 bar	A	A	A	A
380	380 bar	A	A	A	A
350	350 bar	A	A	A	A
330	330 bar	A	A	A	A
300	300 bar	A	A	A	A
280	280 bar	A	A	A	A

1	2	3	4	5	6	7	8	9	10	11	12
TPV				**V**	**C4**						

250	250 bar	A	A	A	A
220	220 bar	-	-	-	-
210	210 bar	A	A	A	A
200	200 bar	A	A	A	A
150	150 bar	A	A	A	A
11	CHARGE PRESSURE RELIEF VALVE SETTING	TPV55	TPV72	TPV90	TPV110
	at 2000 rpm and 0 displacement				
A	28 bar	A	A	A	A
12	SPECIAL FEATURES	TPV55	TPV72	TPV90	TPV110
B	With by-pass valve	A	R	R	R
Cxx	With cut-off valve preset at relief setting value -xx bar Standard setting: 20bar	A	A	A	A
Fxx	With flushing valve (xx l/min if not standard) Standard setting: 7 l/min (available settings 7 or 11 or 15 l/min)	A	R	R	R
D1	With 12V dead-man valve	A	R	R	R
D2	With 24V dead-man valve	A	R	R	R
EF	External filtration of pressure line of charge pump (filter not included)	R	R	R	R
IFC	Internal filtration of pressure line of charge pump (filter assembled on pump) with clogging indicator switch	R	R	R	R
IFV	Internal filtration of pressure line of charge pump (filter assembled on pump) with visual indicator	R	R	R	R
IFT	Internal filtration of pressure line of charge pump (filter assembled on pump) with both clogging indicator switch and visual indicator	R	R	R	R
K	Destroked maximum displacement	A	R	R	R
R	Adjustable maximum displacement	A	R	R	R
Px	Mounted with auxiliary pump	R	R	R	R

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

EXAMPLE											
1	2	3	4	5	6	7	8	9	10	11	12
TPV	90	R	MS	V	C4	23N	0	CP2	420	A	/...

2) MAIN FEATURES

2.1) General Information

TPV 9000 is a variable displacement, swash plate axial piston pump and it is used in 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 reduces 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 TPV 9000 pumps is equipped with two high pressure relief valves to protect the circuit from overloads and with anti-cavitation integrated system.

2.2) Technical Data

2.2.1) Operating Parameters

Model			TPV 55	TPV 72	TPV 90	TPV 110
Displacement	V	cm^3	55	72	90	110
Maximum speed	n_{max}	rpm	4.300	4.100	4.000	3.800
Minimum speed	n_{min}	rpm	500	500	500	500
Maximum flow	q_{max}	l/min	237	295	340	400
Nominal pressure	p_{nom}	bar	400	400	400	400
Maximum pressure	p_{max}	bar	450	450	450	450
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

2.2.2) Hydraulic Fluid

Recommended Hydraulic Fluid	Mineal 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

**Referred to the circuit temperature-closed circuit*

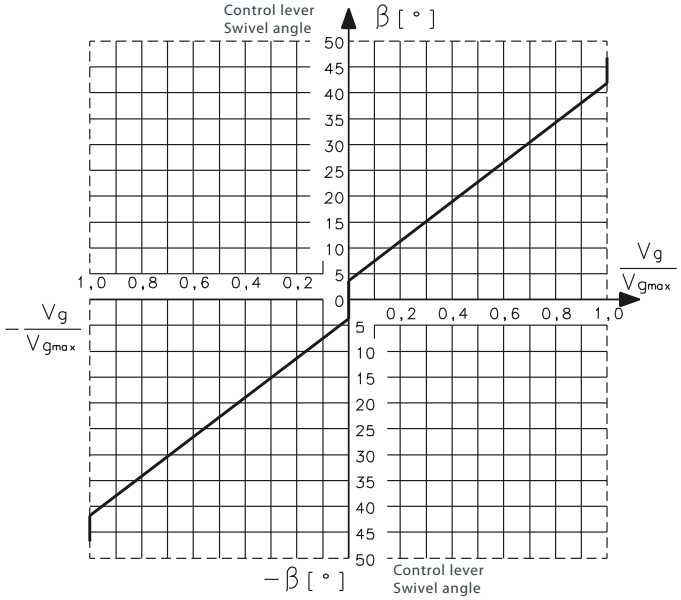
2.2.3) Filtration

It is recommended for an efficient and lasting working life, a solid particle contamination level of 18/16/13 in 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 in according to ISO4406

2.3) Controls

2.3.1) Manual controls (MS, MZ, MY1, MY2)

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 reset the lever to central position if no control takes place. The figure shows the relation between angle and displacement.

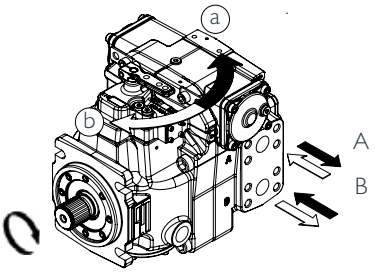


Characteristic points of operations	
Start of control at β	3,7°
End of control at β	41,7° (max displacement Vg_{max})
Mechanical stop for β	± 46,8°

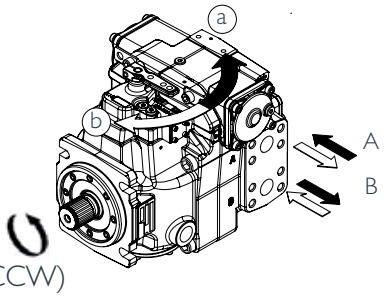
NOTE: the displacement control valve spool can get stuck due to contamination (fluid contamination or abrasion contamination from transmission components). This can result in pump flow different from operator request. Please check if the application require any safety devices (i.e. emergency stop) in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

R, L Direction of rotation – direction of the flow

		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

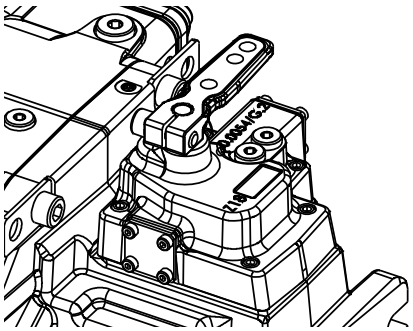


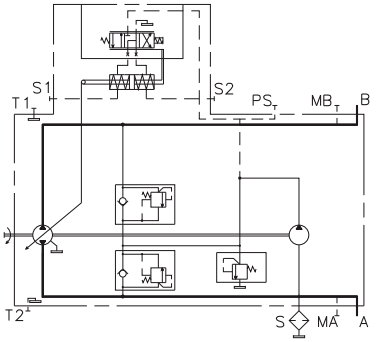
R (CW)



L (CCW)

MS, Manual proportional control

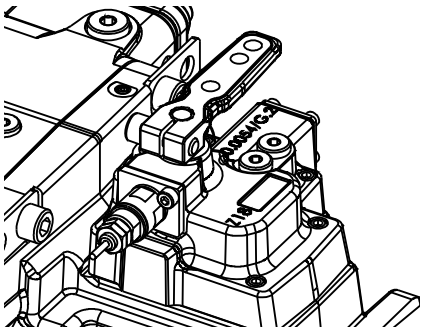


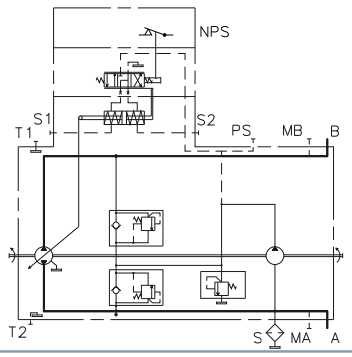


A, B	high pressure ports
S	charge pump inlet
T1, T2	case drains ports
MA, MB, PS	gauge port for system & charge pressure
S1, S2	servo piston gauge ports

MZ, Manual servo control with neutral position switch

Same configuration as MS control but with an additional switch which is closed when the lever is in neutral position. The switch opens when the lever is moved out of the neutral position. The switch provides a monitoring function for drive units which shall not be started unless the pump is in neutral, i.e. diesel engines.

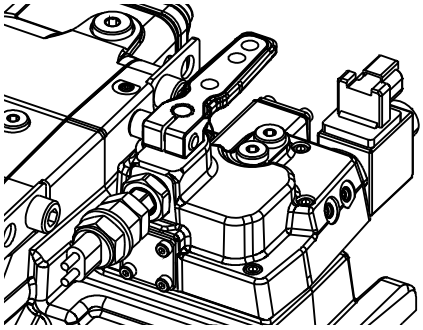


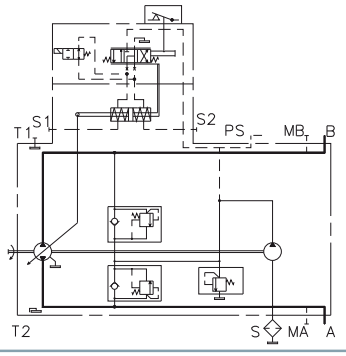


A, B	high pressure ports
S	charge pump inlet
T1, T2	case drains ports
MA, MB, PS	gauge port for system & charge pressure
S1, S2	servo piston gauge ports

MY1, Manual servo control with N.P. switch & 12V emergency stop
MY2, Manual servo control with N.P. switch & 24V emergency stop

Same configuration as MZ control with the addition of a two position solenoid valve for electric pump de-stroke. This valve provide stop or emergency function when needed (i.e. drum stop or emergency stop of a concrete mixer drum).

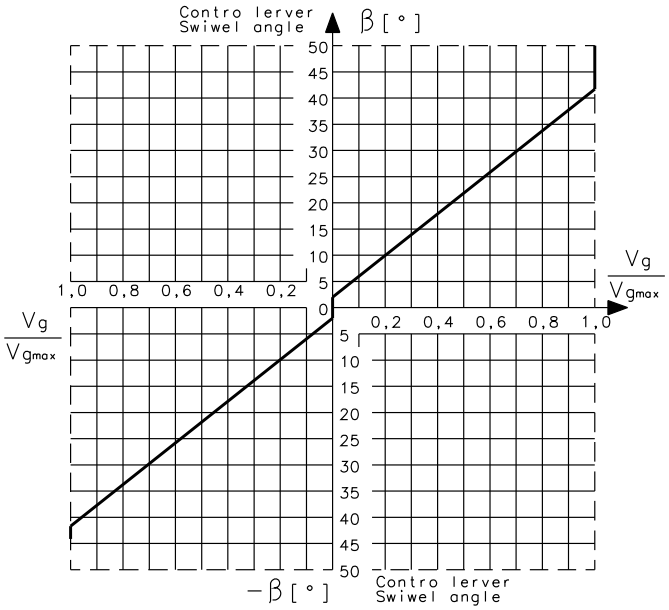




A, B	high pressure ports
S	charge pump inlet
T1, T2	case drains ports
MA, MB, PS	gauge port for system & charge pressure
S1, S2	servo piston gauge ports

2.3.2) Manual controls for traction (MT, MZT, MX)

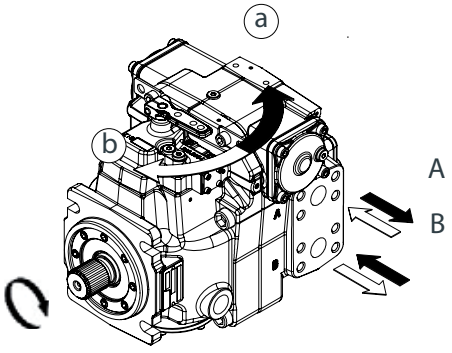
Same configuration of MS but with an open center spool. It is specifically designed for traction control on mobile vehicles.



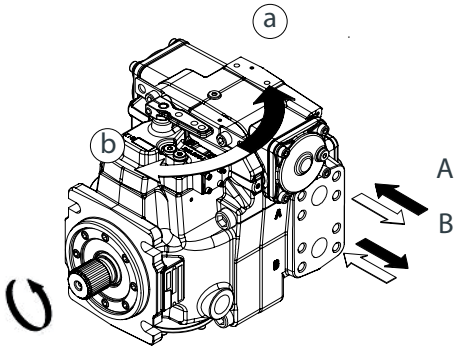
Characteristic points of operations	
Start of control at β	2°
End of control at β	40,6° (max displacement Vg_{max})
Mechanical stop for β	± 46,8°

R, L Direction of rotation – direction of the flow

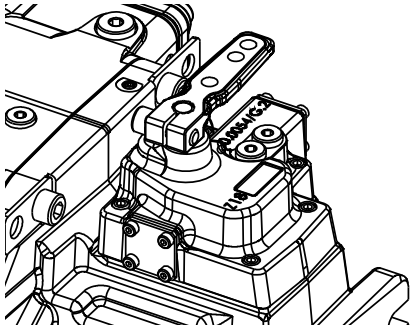
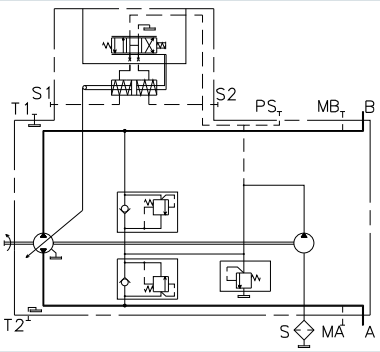
		lever direction	flow direction through the pump
Direction of rotation	**R** (CW)	a	B in to A out
		b	A in to B out
	L (CCW)	a	A in to B out
		b	B in to A out



R (CW)

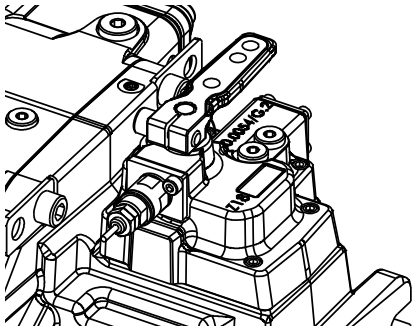


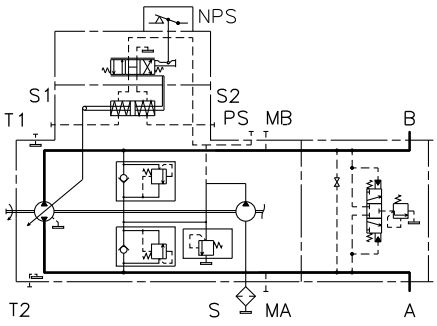
L (CCW)

MT, Manual servo for traction			
		A, B	high pressure ports
		S	charge pump inlet
		T1, T2	case drains ports
		MA, MB, PS	gauge port for system & charge pressure
		S1, S2	servo piston gauge ports

MZT, Manual servo control with neutral position switch (traction)

Same configuration as MT control but with an additional switch which is closed when the lever is in neutral position. The switch opens when the lever is moved out of the neutral position. The switch provides a monitoring function for drive units which shall not be started unless the pump is in neutral, i.e. diesel engines.

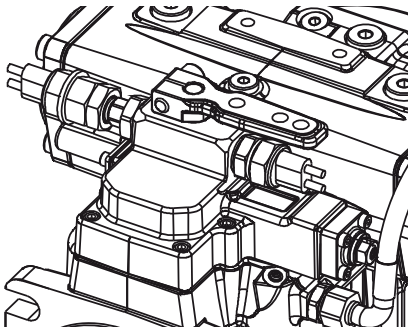


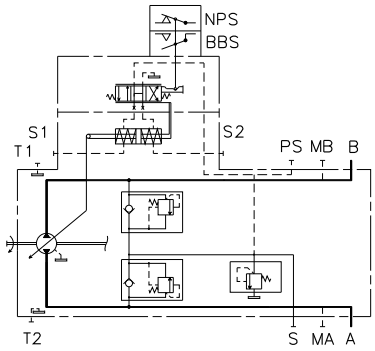


A, B	high pressure ports
S	charge pump inlet
T1, T2	case drains ports
MA, MB, PS	gauge port for system & charge pressure
S1, S2	servo piston gauge ports

MX, Manual servo for traction with neutral pos. switch & BB

A variant of MZT is the MX control, with an additional switch (BBS, i.e. back bell switch). The switch gets closed when the lever rotate in one of the two directions. It can be used for instance to activate a sound alarm when the vehicle travels backward.

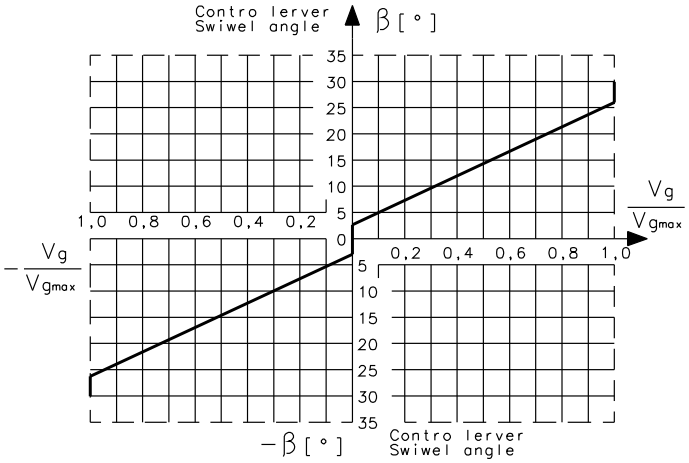




A, B	high pressure ports
S	charge pump inlet
T1, T2	case drains ports
MA, MB, PS	gauge port for system & charge pressure
S1, S2	servo piston gauge ports

2.3.3) RE, Remote electric control 12/24V solenoid

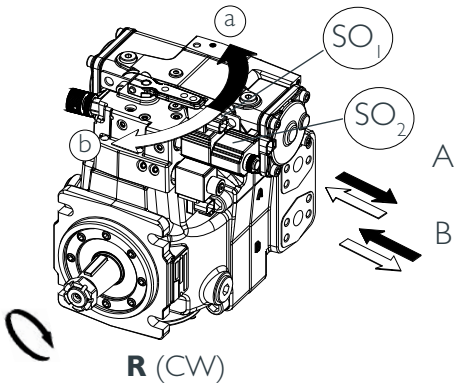
The remote electric control is a combined MS control with an integral hydraulic piston which is actuated by an integrated three position valve. The pumps is stroked or destroked by energizing either of the valve solenoids; when the solenoid is de-energized the pump stays at the last displacement reached by the pump. An additional solenoid is provided to implement the Stop function.



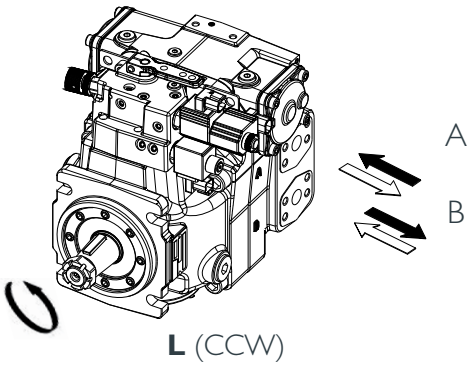
Characteristic points of operations	
Start of control at β	2,7°
End of control at β	26,5° (max displacement Vg_{max})
Mechanical stop for β	± 30°

R, L Direction of rotation – direction of the flow

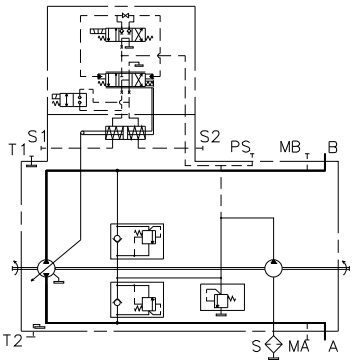
		lever	solenoid	flow direction through the pump
Direction of rotation	**R** (CW)	a	SO_1	B in to A out
		b	SO_2	A in to B out
	L (CCW)	a	SO_1	A in to B out
		b	SO_2	B in to A out



R (CW)

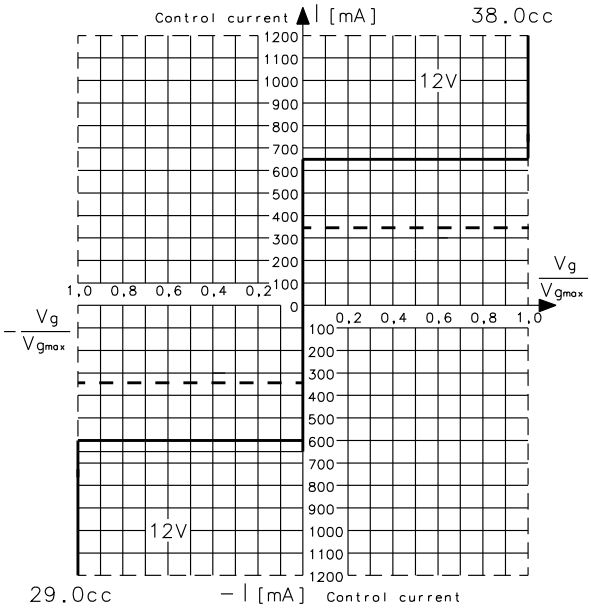


L (CCW)

Hydraulic scheme		
	A, B	high pressure ports
	S	charge pump inlet
	T1, T2	case drains ports
	MA, MB, PS	gauge port for system & charge pressure
	S1, S2	servo piston gauge ports

2.3.4) E, Electric ON/OFF control 12 /24V solenoid

When the solenoids are energized the pump swivels to maximum displacement in one of the two flow directions. 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 electric current and displacement.

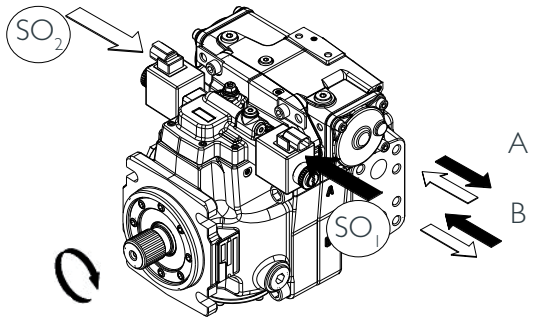


Solenoid technical data	E 1	E 2
Voltage	12 (±20%)	24 (±20%)
Current of Control		
Switching current	650 mA	330 mA

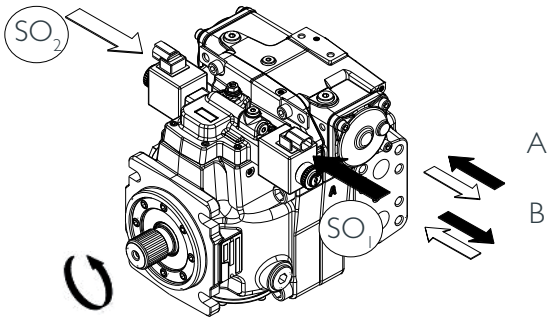
Standard solenoids include a manual pin-type override.

R, L Direction of rotation – direction of the flow

		solenoid	flow direction through the pump
Direction of rotation	**R** (CW)	SO_1	B in to A out
		SO_2	A in to B out
	L (CCW)	SO_1	A in to B out
		SO_2	B in to A out

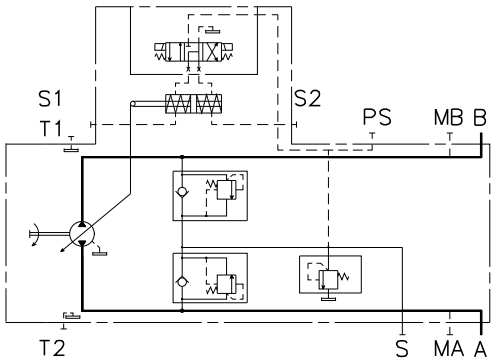


R (CW)



L (CCW)

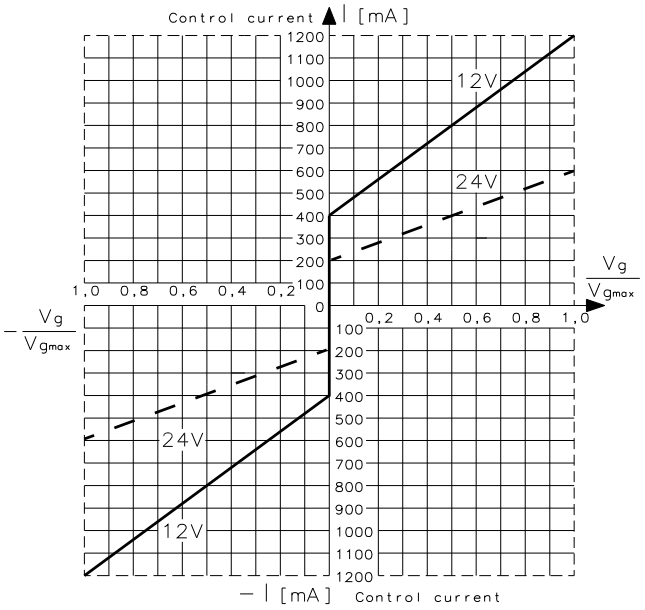
Hydraulic scheme



A, B	high pressure ports
S	charge pump inlet
T1, T2	case drains ports
MA, MB, PS	gauge port for system & charge pressure
S1, S2	servo piston gauge ports

2.3.5) 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 reset the control spool to central position if no control takes place.The figure shows the relation between electric current and displacement.

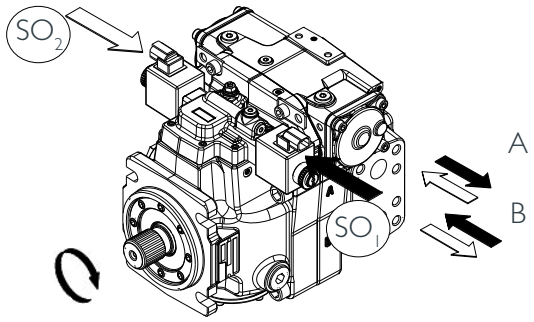


Solenoid technical data	EP 1	EP 2
Voltage	12 (±20%)	24 (±20%)
Current of Control		
Start at control at V_{g0}	400 mA	200 mA
End of control at V_{gmax}	1200 mA	600 mA

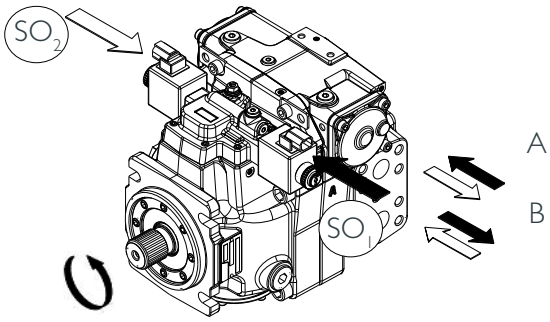
Note: the displacement control valve spool can get stuck due to contamination (fluid contamination or abrasion contamination from transmission components). This can result in pump flow different from operator request. Please check if the application require any safety devices (i.e. emergency stop) in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

R, L Direction of rotation – direction of the flow

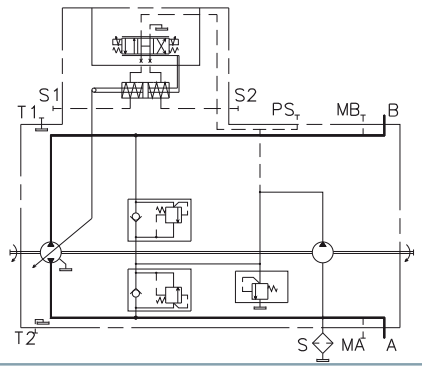
		solenoid	flow direction through the pump
Direction of rotation	**R** (CW)	SO_1	B in to A out
		SO_2	A in to B out
	L (CCW)	SO_1	A in to B out
		SO_2	B in to A out



R (CW)



L (CCW)

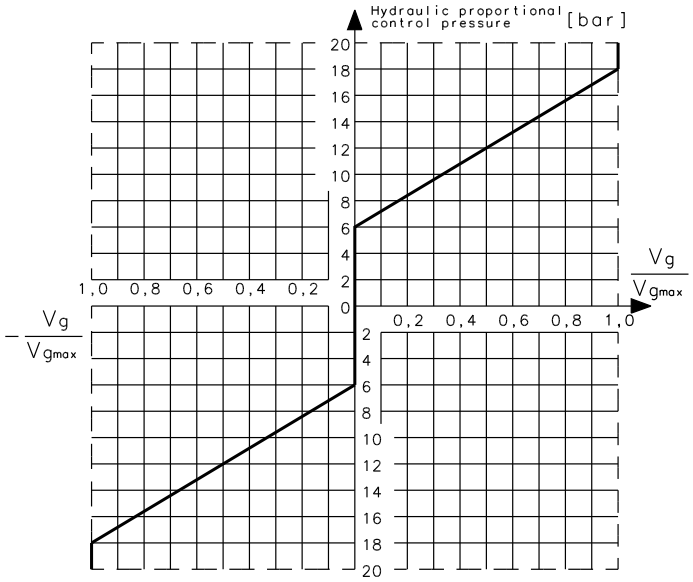
Hydraulic scheme		
	A, B	high pressure ports
	S	charge pump inlet
	T1, T2	case drains ports
	MA, MB, PS	gauge port for system & charge pressure
	S1, S2	servo piston gauge ports

2.3.6) HP, Hydraulic Proportional Control

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 feedback link between swashplate and control ensures the costance of the displacement despite pressure and speed working condition. The pump is fitted with a resetting device which automatically resets the control spool to central position if no control takes place. The figure shows the relation between pressure and displacement.

Control pressure	
Start at control at V_{g0}	6 bar
End of control at V_{gmax}	18 bar

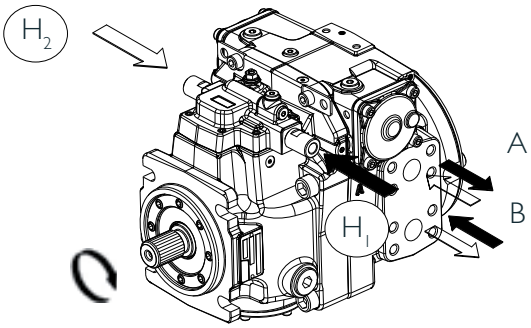
Note: the displacement control valve spool can get stuck due to contamination (fluid contamination or abrasion contamination from transmission components). This can result in pump flow different from operator request. Please check if the application require any safety devices (i.e. emergency stop) in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



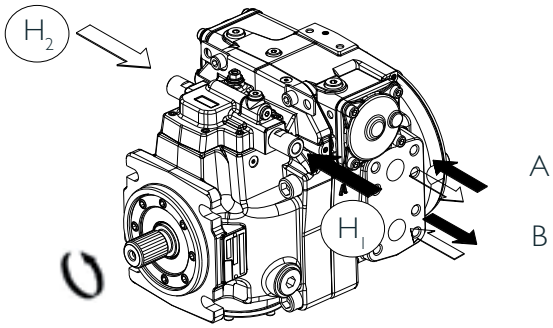
Suggested curves for HPV series Joysticks: CR112 (see HT 73/B/105/0417/E catalogue).

R, L Direction of rotation – direction of the flow

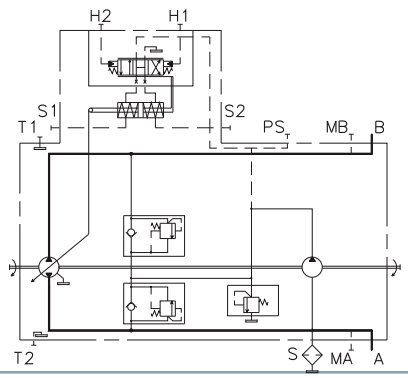
		Control Pressure Port	flow direction through the pump
Direction of rotation	**R** (CW)	H1	B in to A out
		H2	A in to B out
	L (CCW)	H1	A in to B out
		H2	B in to A out



R (CW)



L (CCW)

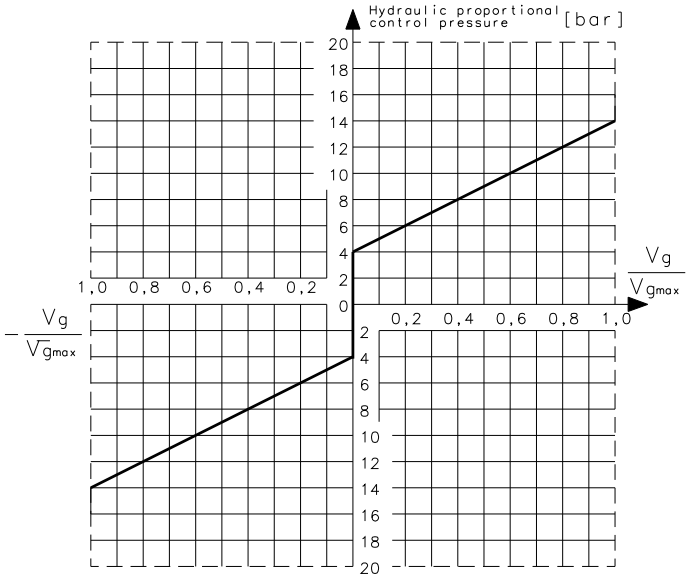
Hydraulic scheme		
	A, B	high pressure ports
	S	charge pump inlet
	T1,T2	case drains ports
	MA, MB, PS	gauge port for system & charge pressure
	S1, S2	servo piston gauge ports
	H1, H2	control pressure ports

2.3.7) HD, Hydraulic Direct Control

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 servo-piston, but is also influenced by load and pump speed. The pump is fitted with a resetting device which automatically reset the swashplate to central position if no control takes place. The figure shows the relation between pressure and displacement.

Control pressure	
Start at control at V_{g0}	4 bar
End of control at V_{gmax}	14 bar

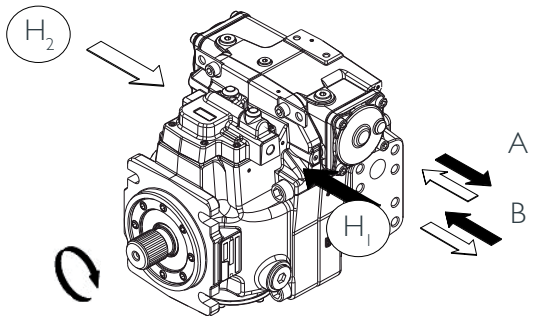
Note: the displacement control valve spool can get stuck due to contamination (fluid contamination or abrasion contamination from transmission components). This can result in pump flow different from operator request. Please check if the application require any safety devices (i.e. emergency stop) in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



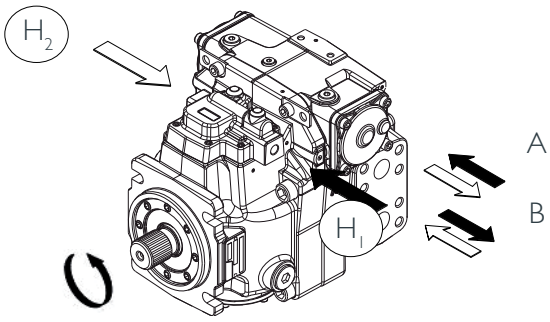
Suggested curves for HPV series Joysticks: CR041 (see HT 73/B/105/0417/E catalogue).

R, L Direction of rotation – direction of the flow

		Control Pressure Port	flow direction through the pump
Direction of rotation	**R** (CW)	H1	B in to A out
		H2	A in to B out
	L (CCW)	H1	A in to B out
		H2	B in to A out

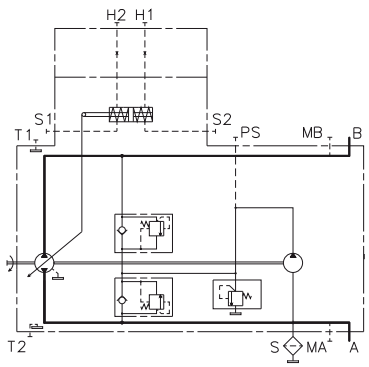


R (CW)



L (CCW)

Hydraulic scheme



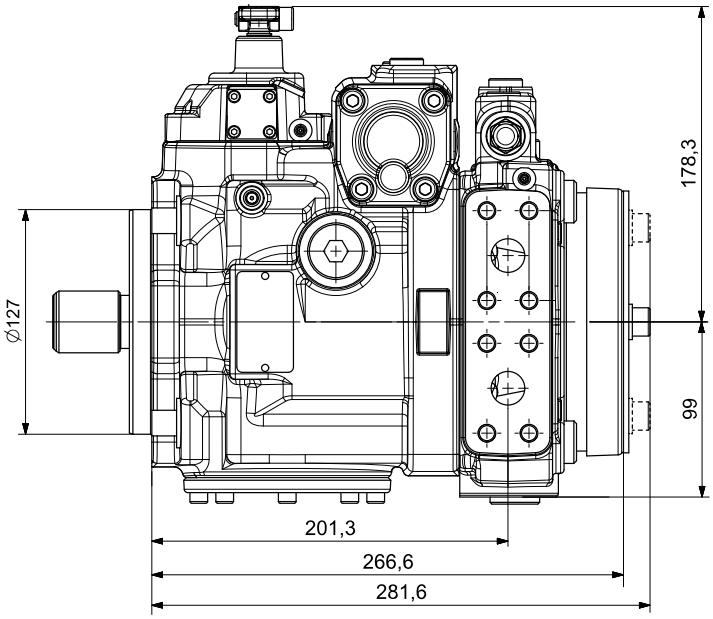
A, B	high pressure ports
S	charge pump inlet
T1, T2	case drains ports
MA, MB, PS	gauge port for system & charge pressure
S1, S2	servo piston gauge ports
H1, H2	control pressure port

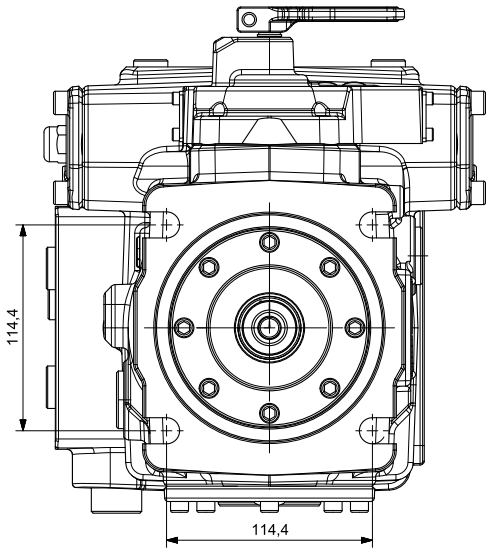
2.3.8) Installation details

MS, MZ, MT, MX, MY, RE manual proportional control
Control lever can be assembled in any position allowed by the 12-sided hole of the lever. Lever must be tightened to the control swivel at 35 Nm. Maximum requested torque to move the lever at its end of stroke is 260 cNm. A mechanical stop must be provided to prevent damages to the control valve due to excess of torque applied on the lever. NSS Neutral sensor switch The switch is normally closed (with lever in zero displacement position) and is encapsulated with wire leads Packard Weather Pack connector. Mating connector: 12010973. BBS Back bell switch: The switch is normally open (it closes with lever in one of the two displacement side) and is encapsulated with wire leads Packard Metri Pack connector. Mating connector: 15300027. MY and RE solenoids: The connector of the solenoid is DEUTSCH DT04-2P-EP04, contact pin 0460-202-16141. Mating connector: DEUTSCH DT06-2S-EP04. Refer to EP coils for other characteristics. No PWM is required to energize these coils. Solenoid nominal power is 18W (both 12V and 24V solenoids) for MY emergency and for RE pause resume function. Solenoid nominal power is 22W for RE displacement control (both 12V and 24V).
EP, Electric Proportional control & E, Electric ON/OFF 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 DT06-2S-EP04 • Wedge W2S • Contact-socket 0462-201-16141 The solenoid and the connector allow a protection 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. For EP control only: PWM frequency range: 100 Hz. Solenoid nominal power 23W (both 12V and 24V solenoids).
HP, Hydraulic Proportional control (with feedback)
The HP control por ts dimension is G1/4" ISO1179 standard. Tighten the connecting nipple at 25 Nm. Do not pressurize control por t H1 & H2 over 20 bar.
HD, Hydraulic Direct control (proportional without feedback)
The HD control por ts dimension is G1/4" ISO1179 standard. Tighten the connecting nipple at 25 Nm. Do not pressurize control por t H1 & H2 over 35 bar.

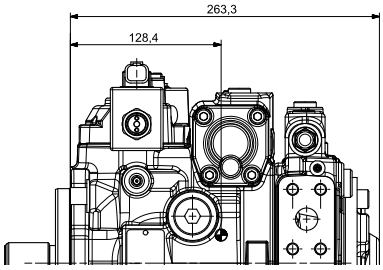
2.4) Sizes

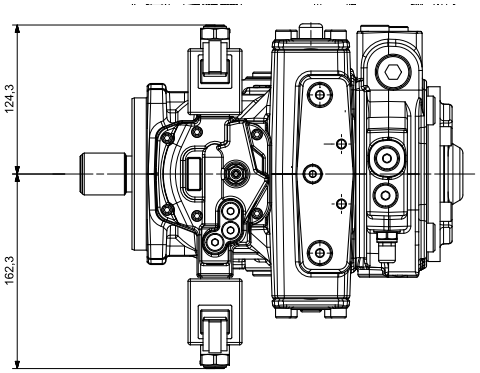
2.4.1) TPV 55





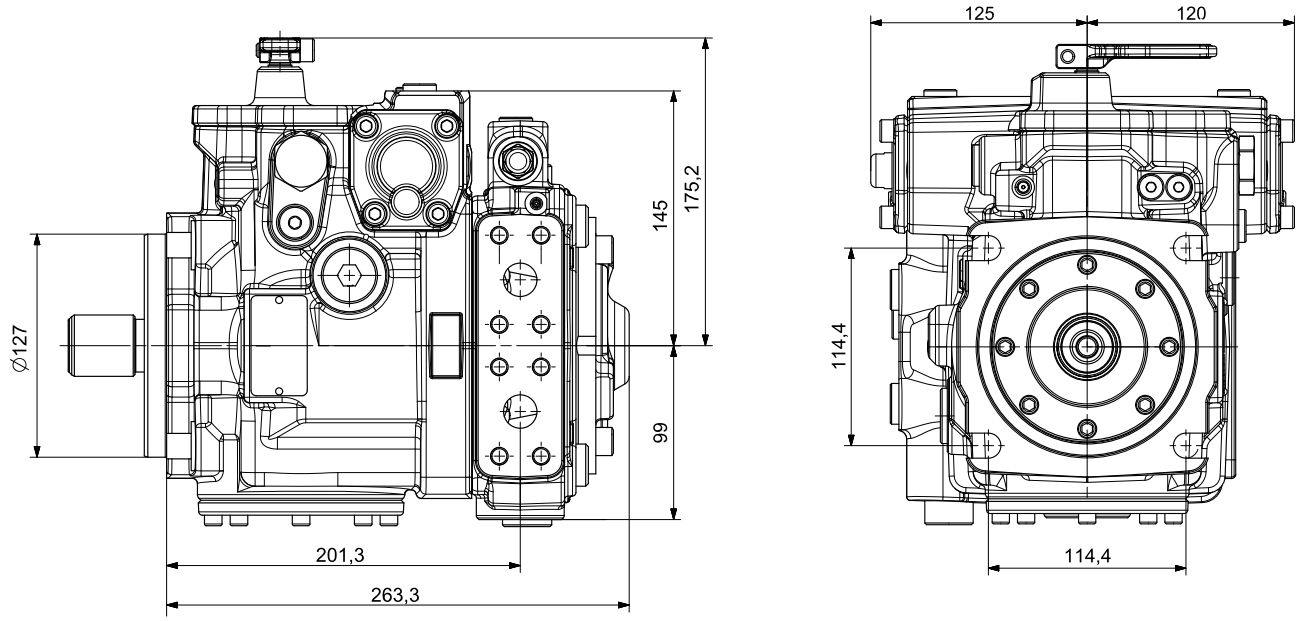
EP1, electric proportional control



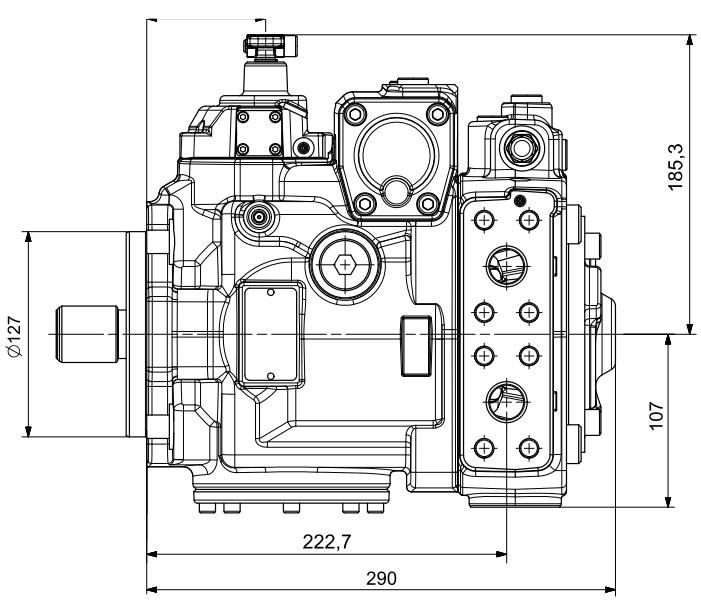


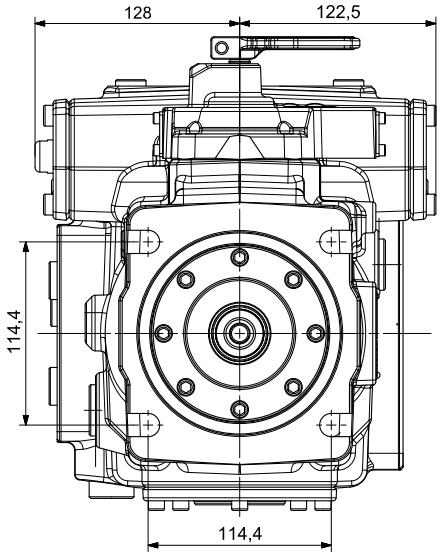
2.4.2) TPV 55B

TPV 55B is a special simplified version of TPV 55, available only with MS or MY control, for typical application on transit concrete mixers.

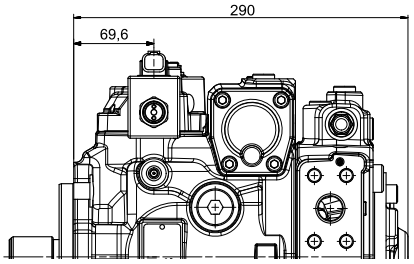


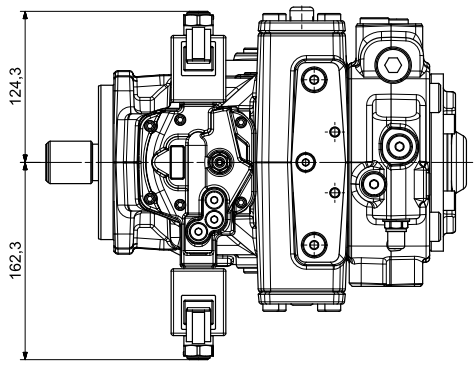
2.4.3) TPV 72



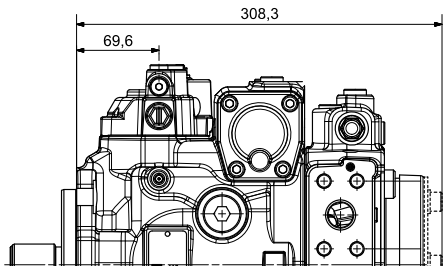


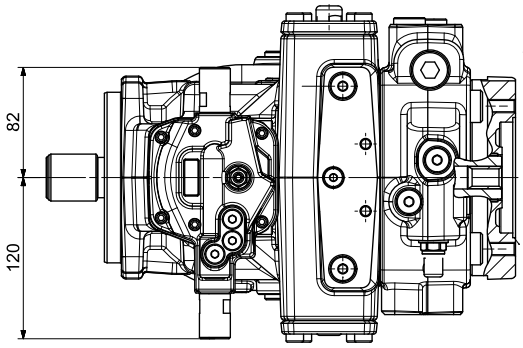
EP, electric proportional control





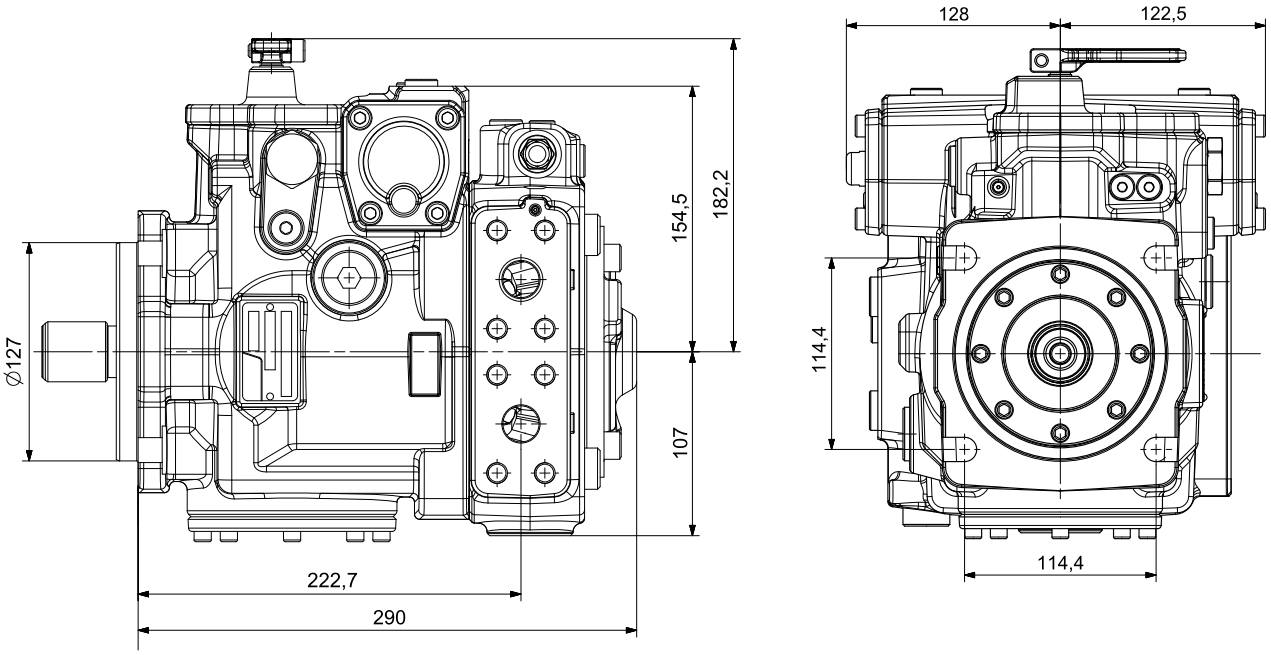
HP, hydraulic proportional control



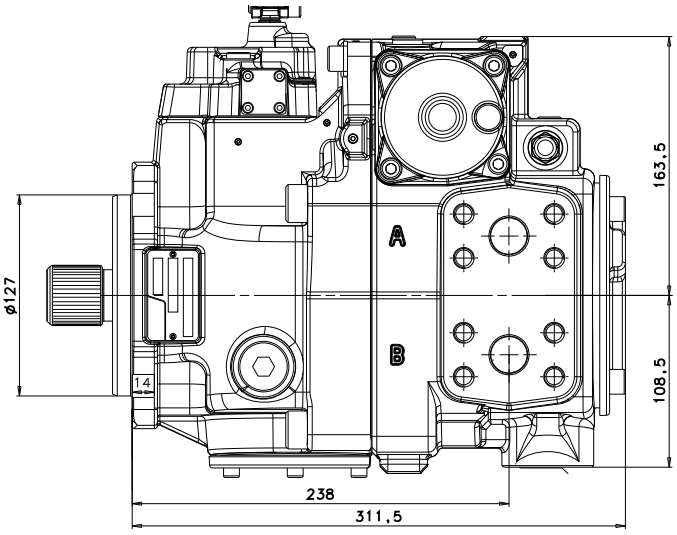


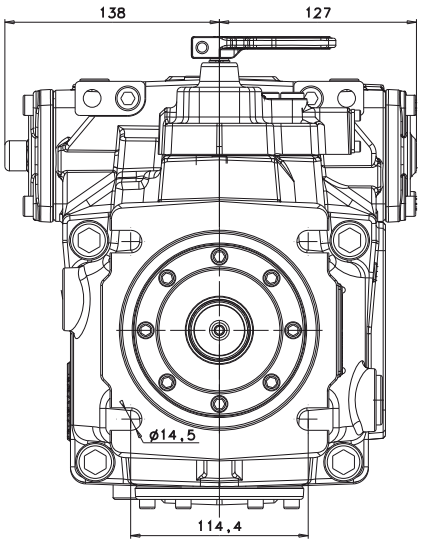
2.4.4) TPV 72B

TPV 72B is a special simplified version of TPV 72, available only with MS or MY control, for typical application on transit concrete mixers.

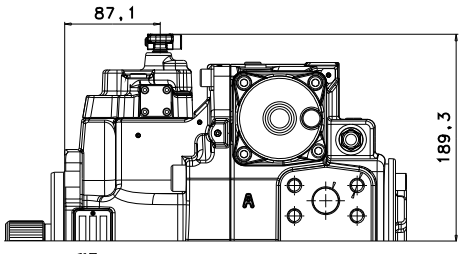


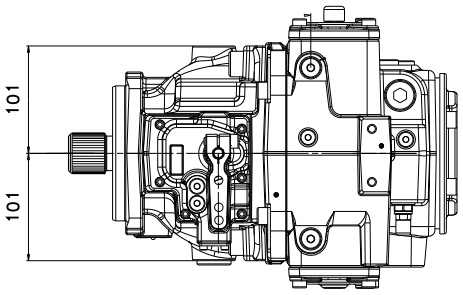
2.4.5) TPV 90 / 110



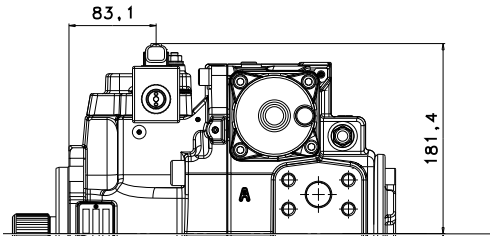


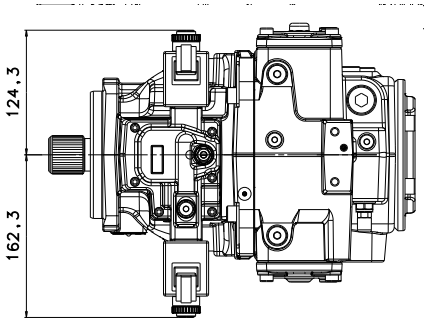
MS, manual control



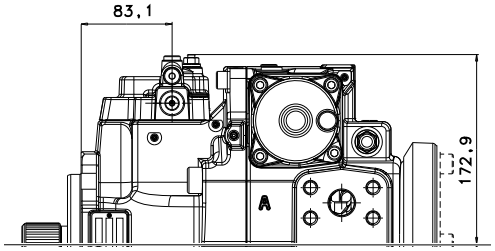


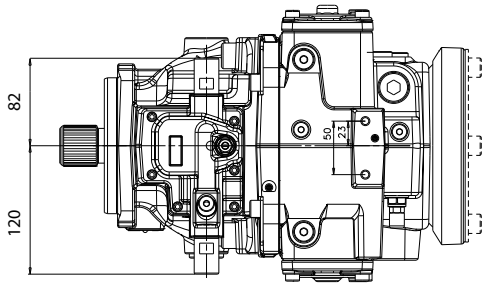
EP, electric proportional control



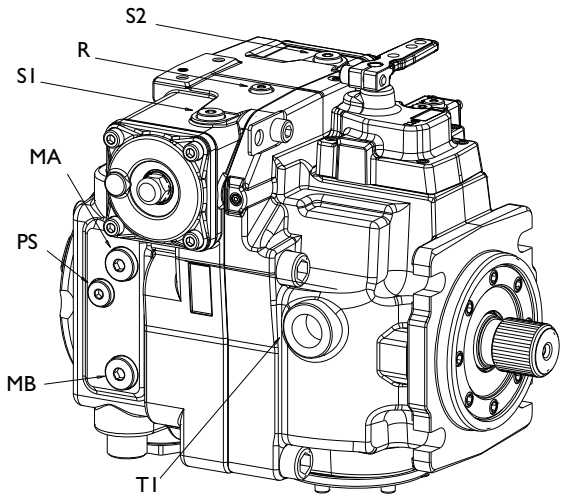


HP, hydraulic proportional control



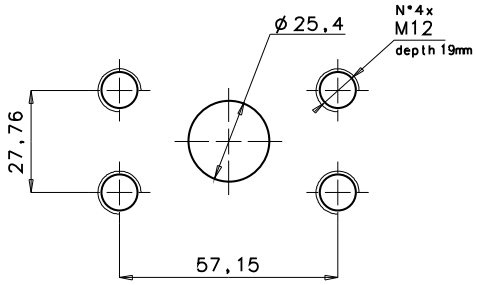


Ports



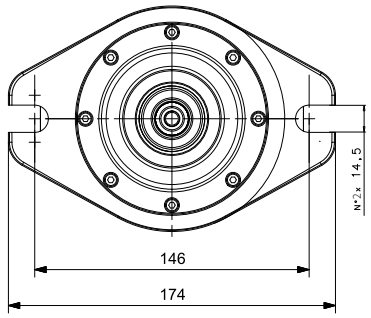
A,B	High pressure ports	SAE J518 code 62	1"
S	Charge pump inlet	ISO1179	
T1,T2	Case drain ports	ISO1179	3/4"
MA, MB	Gauge ports for system pressure	ISO1179	3/8"
PS	Gauge port for charge pressure	ISO1179	1/4"
R	Air bleed plug	ISO1179	1/8"
S1,S2	Servo piston pressure gauge port	ISO1179	1/4"

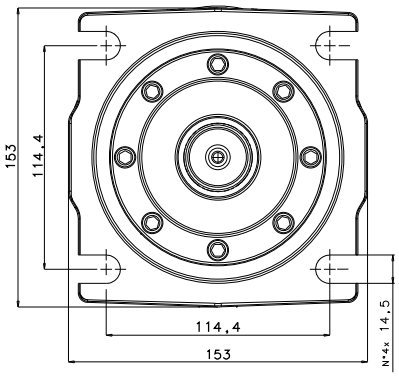
Details X - Port A/B

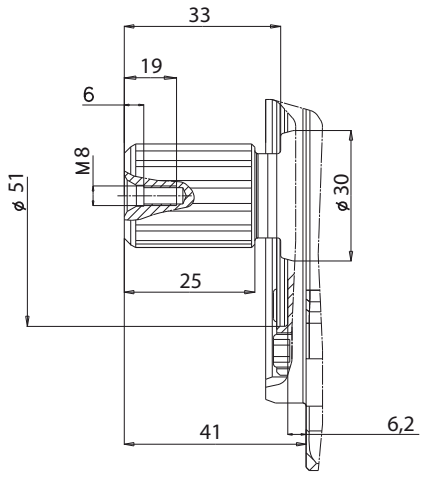
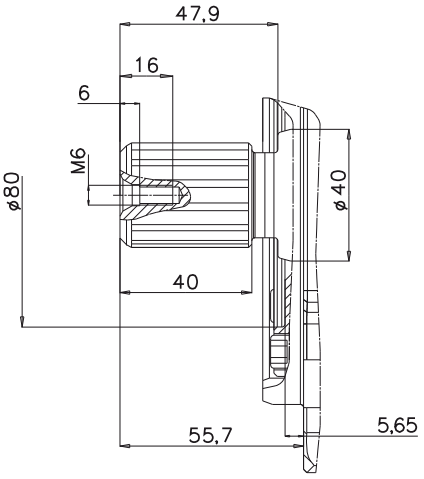
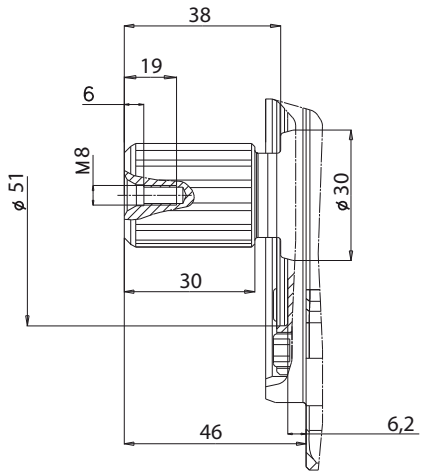
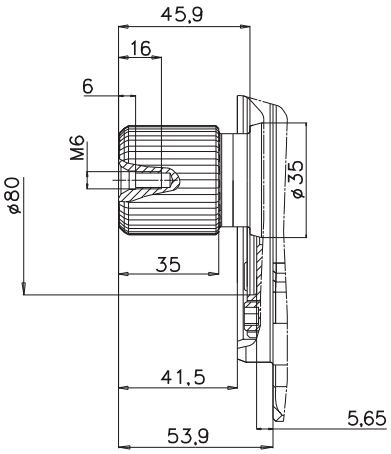
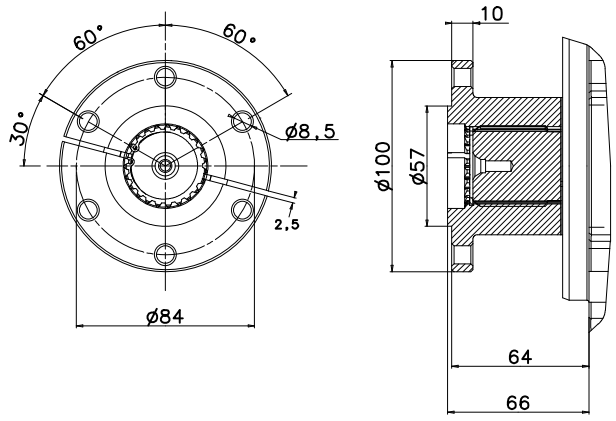
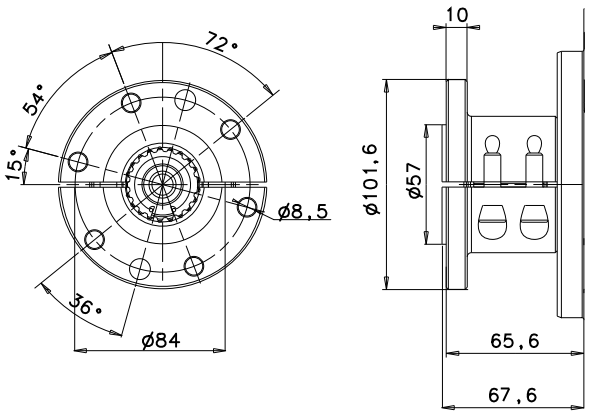


Mounting Flange

B2	SAE J 744 - Flange SAE B - 2 bolts	**C4**	SAEJ744 - Flange SAE C - 4 bolts

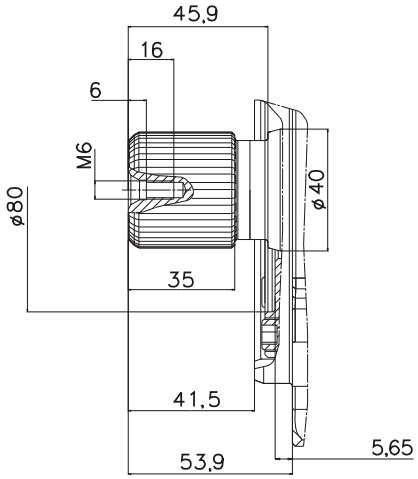




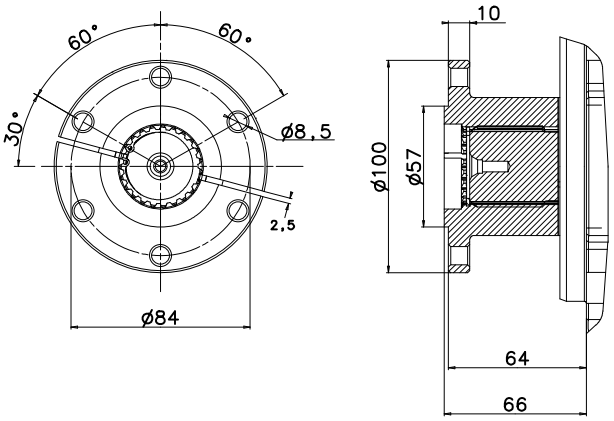
Shaft End			
13N	ANSI B92.1A – 1976 – 7/8" 13T 16/32 DP	**14N**	ANSI B92.1A – 1976 – 1 1/4" 14T 12/24 DP
			
15N	ANSI B92.1A – 1976 – 1" 15T 16/32 DP	**21N**	ANSI B92.1A-1976-1 3/8" 21T 16/32 DP
			
21F	ANSI B92.1A-1976-1 3/8" 21T 16/32 DP with coupling flange	**21F1**	ANSI B92.1A – 1976 – 1 1/2" 21T 16/32 DP SPECIAL coupling flange
			

Shaft End

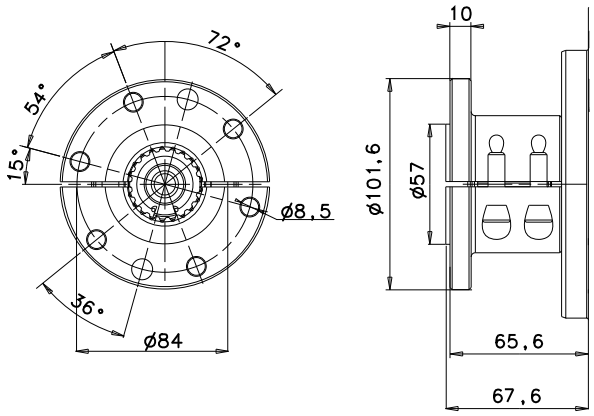
23N ANSI B92.1A – 1976 – 1 1/2'' 23T 16/32 DP



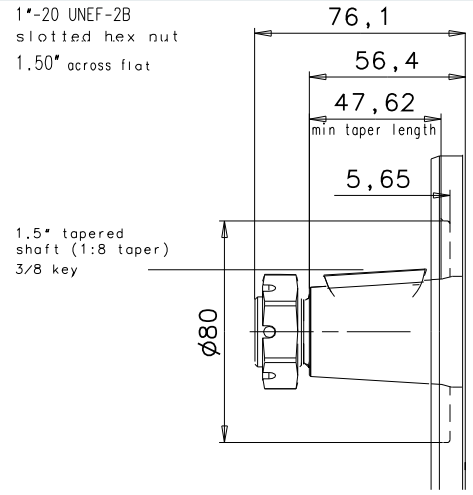
23F ANSI B92.1A – 1976 – 1 1/2'' 23T 16/32 DP with coupling flange



23F1 ANSI B92.1A – 1976 – 1 1/2'' 23T 16/32 DP SPECIAL coupling flange



C15 Tapered 1.5" shaft



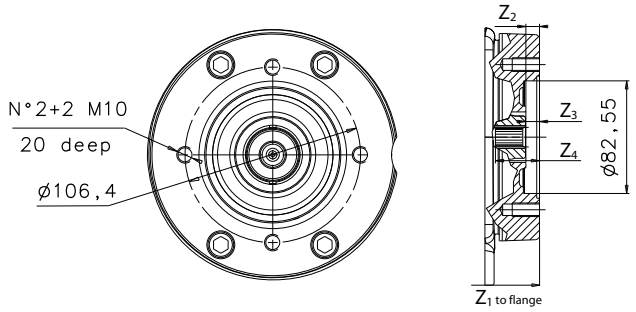
Theoretical maximum torques [Nm] Input shaft for single or tandem pumps (for drive shafts without radial force) (TE max)				
Input shaft	**TPV 55**	**TPV 72**	**TPV 90**	**TPV 110**
13T 16/32 DP	-	-	-	-
15T 16/32 DP	-	-	-	-
14T 12/24 DP	901	901	901	901
21T 16/32 DP	1252	1252	1167	1167
23T 16/32 DP	-	-	1450	1450
13T 8/16 DP	-	-	-	-
27T 16/32 DP	-	-	-	-

Theoretical maximum torques [Nm] Internal spline for tandem pumps (TD max)				
-	**TPV 55**	**TPV 72**	**TPV 90**	**TPV 110**
-	333	-	773	773

Theoretical maximum torques [Nm]				
Through drive	**TPV 55**	**TPV 72**	**TPV 90**	**TPV 110**
SAE A - 9T	128	128	128	128
SAE AA - 11T	192	192	192	192
SAE B - 13T	286	311	311	311
SAE C - 14T	-	-	773	773

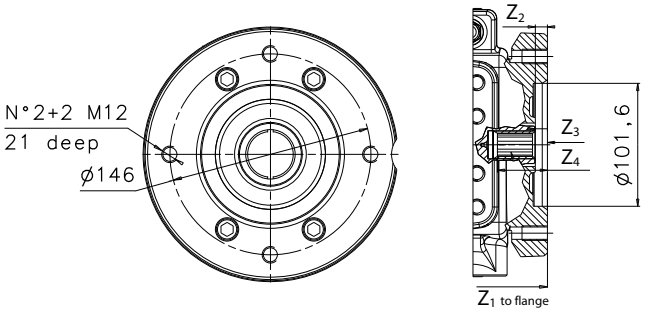
2.5) Through drive dimensions

Flange	Splined hub
AI - SAEJ744 82-2	ANSI B92.1A-1976 16/32 9T



	Z_1	Z_2	Z_3	Z_4
TPV55	272,6	10	10,3	32,3
TPV72	292,3	10	10,3	32,3
TPV90/110	324,8	10	10,3	32,3

Flange	Splined hub
BI - SAEJ744 101-2	ANSI B92.1A-1976 16/32 13T

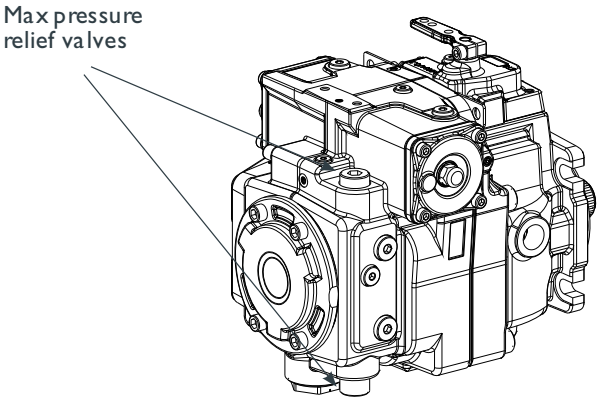


	Z_1	Z_2	Z_3	Z_4
TPV55	272,6	10	10,3	41,3
TPV72	292,3	10	10,3	41,3
TPV 90/110	324,8	10	10,3	41,3

2.6) High pressure relief valves

The pump is equipped with two relief pressure 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
other settings on requests	



2.7) Tightening torques

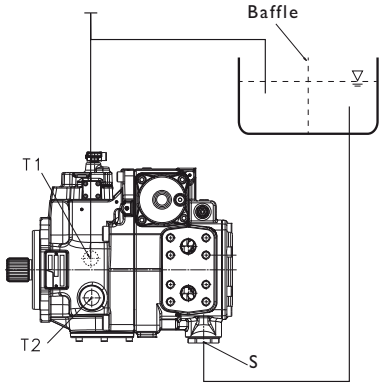
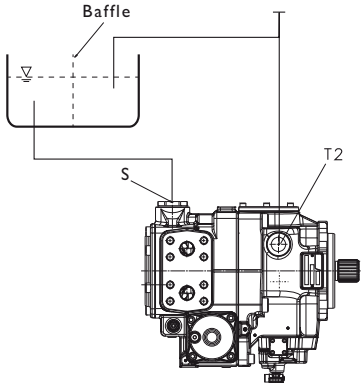
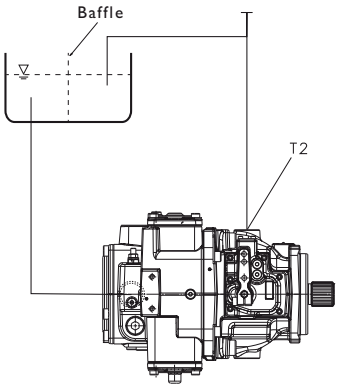
In the following table the you can see the tightening torques for the ports of the pump.

Port		Thread	Torque [Nm]
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

3) INSTALLATION INSTRUCTIONS

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

3.1) Below tank installation

	Pump Orientation	Notes
Horizontal shaft Control upwards High Pressure ports (A, B) on side		The case drain line must be always connected with the drain port positioned in the highest position
Horizontal shaft Control downwards High Pressure ports (A, B) on side		The case drain line must be always connected with drain port positioned in the highest position
Horizontal shaft Controls on side Pressure ports (A, B) on top		The case drain line must be always connected with drain port positioned in the highest position

3.2) Start-up procedure

3.2.1) 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 very short periods a viscosity of 7 cSt at high temperature and of 1600 cSt at cold start are allowable. For other types of oil please contact After Sales Department. Do not use water containing hydraulic oils (HFA, HFB & HFC).

Check that hydraulic fluid level (during the commissioning, the operation and after long storing period) is always adequate: case interior, suction line, service line have to be and remain filled with the correct hydraulic fluid to avoid unit malfunctions or damage.

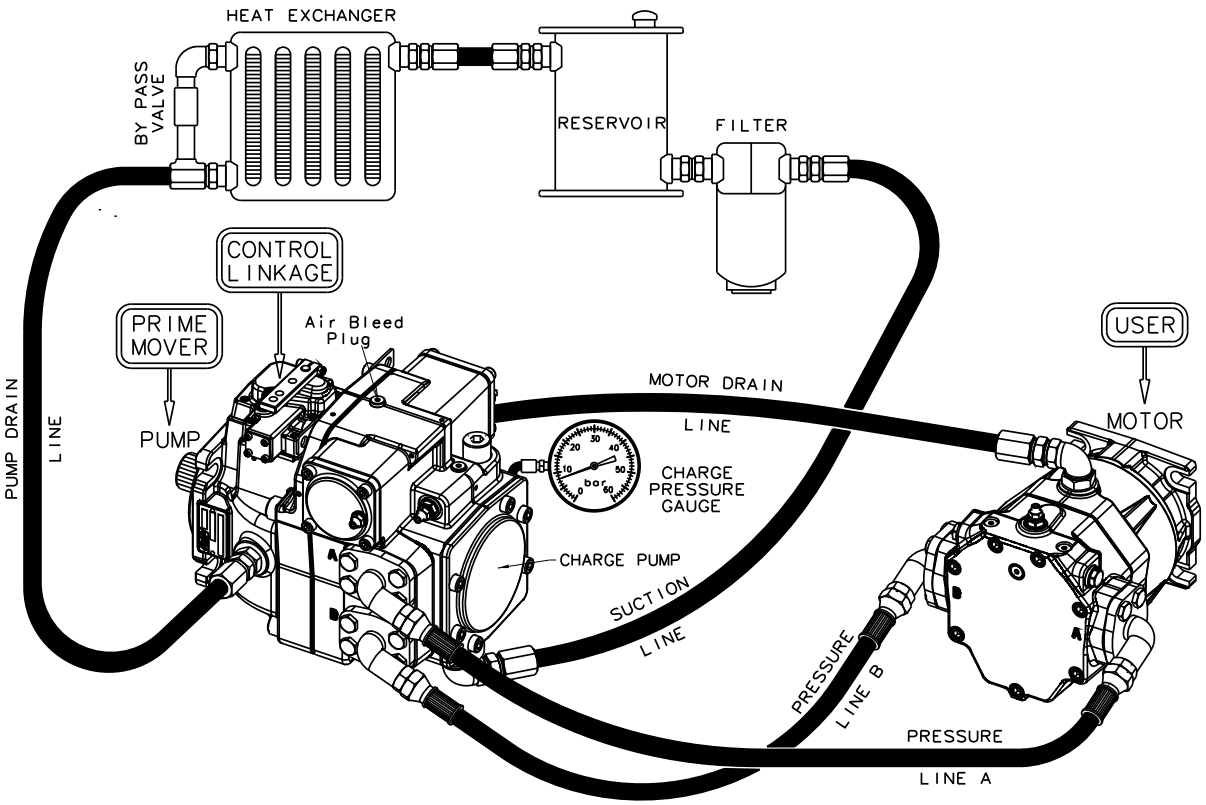
The tank must be fit with the right heat exchanger in order to keep the oil temperature within the required working viscosity range. Temperature limits are –25°C (-13°F) for cold start and 90°C (194°F) for peak temperature; these limit conditions can be maintained only for very short periods. In any 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; the tank must be provided with a breather. The breather should not allow for any type of contaminant to enter into the oil tank, including water/moisture. The pressure at charge pump inlet must be always above 0.8 bar.

The hydraulic circuit must be dimensioned in order to have no more than 3 bar continuous pressure and max 6 bar intermittent in the pump and motor case.

3.2.2) Hydraulic circuit



3.2.3) 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. Attach the pump to the Prime Mover (engine) and the motor to the User, 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 at the suction line and tighten the bolts.

6. Fill the tank with fresh and filtered oil

7. Loosen 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. Install a pressure gauge (0-60 bar / 0-870 PSI) on the PS port (see Charge Pressure Gauge on the picture of previous page).

11. Check if the User is free to move.

12. Connect the control to the control system of the machine.
- MS / MZ / MY / MT / MX / RE: tighten the control lever screw at 35 Nm
- E1.2 / EP1,2 / RE1,2 / MY / Dead Man: connect Deutsch with cables
- HP / HD: connect the control lines and tighten the nipples.

13. Start the prime mover (engine) at 500-800 rpm for around 5-10 seconds and check if charge pump gives pressure, by looking at the Charge Pressure Gauge. It is possible to unscrew the "Air Bleed Plug", without removing it, in order to make the air bleed freely; when oil appears, tighten the plug.
If the pump is not positioned with the "air bleed plug" at the top, use the highest drain port to perform the bleeding of the air.

14. Once the charge pressure signal is properly initiated and air is properly bled, run the engine for about 60 seconds and check the oil level. If oil level is low, stop the engine and fill up to proper level with fresh and filtered oil. Repeat this step until oil level is maintained constant.

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

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.; 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 500 ÷ 3.000 rpm contact the technical support.

18. Move the control lever slowly away from the 0 position, first at half stroke and then at full stroke in both directions for two or three times: pay attention since this will start moving the Motor and the User will have to be ready to work in safe conditions.
In case of MY control or Dead Man option ensure the relative solenoid is energized otherwise no pressure will reach the control and the servo piston.

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 on the tank and refill if necessary.

22. Check that the oil tank is fully closed.

23. Check there is no leakage in the circuit.

24. The hydraulic system is ready to work.

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 1000 TPV 1200 BTB	6, 8, 9, 11, 12, 13	21	30	3.600	8,8
	15, 17		28		
	18		27		
	19, 21	20	25	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	35	45		28
TPV 4300	32, 38, 45, 50	25	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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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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