## INDEX



## FEATURES

- Hydraulic Units for Travelling Machinery.
- Variable axial piston pump of swashplate design for mobile concrete mixers ,closed circuit transmission.
- Flow is proportional to drive speed and displacement and is infinitely variable
- Adjust the angle of swashplate to realize the stepless variable
- Flow direction changes smoothly when the swashplate is moved through the neutral position
- Two pressure-relief valves are provided on the high pressure ports to protect the hydrostatic transmission (pump and motor) from overload.
- Auxiliary pump as the function of boosting pump & controlling oil pump
- The maximum boost pressure is limited by a built-in boost pressure- relief valve
- Nominal pressure 40MPa
- Long service life, high-precision bearings
- Parker seals

# 1 Model Description

| | | | | | |
|---|---|---|---|---|---|
| **Axial piston unit** | | | | | |
| Variable pump ,swashplate design, mobile concrete mixers | | | | | A4VT |
| **Operation mode** | | | | | |
| Pump, closed circuit | | | | | G |
| **Size** | | | | | |
| ▵Displacement Vg max(ml/r) | | 56 | 71 | 90 | |
| Control device [★ available; ☆ on request; — not available;] | | | | | |
| Hydraulic control , mechanical servo | | ☆ | ★ | ★ | HW |
| Proportional control, Electric,with emergency actuation and spring return | 12V | ☆ | ★ | ★ | Ep1 |
| | 24V | ☆ | ★ | ★ | Ep2 |
| **Mechanical stroke limiter** | | | | | |
| Without Mechanical stroke limiter [no short code] | | | | | |
| With Mechanical stroke limiter | | | | | M |
| **With ports X3, X4 for stroking chamber pressure** | | | | | |
| Without ports X3, X4 [no short code] | | | | | |
| With ports X3, X4 | | | | | T |
| **Series** | | | | | |
| | | | | | 3 |
| **Short code** | | | | | |
| | | | | | 2 |
| **Direction of rotation** | | | | | |
| Viewed from shaft end | | Clockwise | | | R |
| | | Counterclockwise | | | L |
| | | | | | |
| **Seals** | | | | | |
| NBR (nitrile-caoutchouc), shaft seal in FKM (fluor-caoutchouc) | | | | | N |
| FPM (Fluorocarbon rubber to DIN ISO 1629) | | | | | V |
| **Shaft end** | | | | | |
| Splined shaft SAE | | Without coupling flange | | | S |
| | | With coupling flange | | | L |
| Mounting flange | | 56 | 71 | 90 | |
| SAE 2 hole | | ★ | — | — | C |
| SAE 4 hole | | — | ★ | ★ | D |
| **Service line ports** | | | | | |
| A and B on same side [Metric, mounted by bolts. , connected by flange] | | | | | 10 |

# 1 Model Description

**Auxiliary pump & Through drive**

| Auxiliary pump | Mounting flange | Hub | |
|---|---|---|---|
| ★ | — | — | F00 |
| ★ | SAE A , 2hole | SAE A [N5/8" —9T 16/32DP] | F01 |
| ★ | SAE B , 2hole | SAE B [N7/8" —13T 16/32DP] | F02 |

| | | | | |
|---|---|---|---|---|
| **Valves** | | | | |
| With high-pressure pilot relief valve, with by pass system | — | ★ | ★ | 1 |
| With high-pressure relief valve, direct operated, with by pass system | ☆ | — | — | 5 |
| **Filtration, boost circuit** | | | | |
| Filtration in suction line of boost pumpS | | | | S |
| **Rotational speed sensor** | | | | |
| without rotational speed sensor [no short code] | | | | |
| With rotational speed sensorG | | | | G |

**Note**： ★ : available ； ☆ : on request ； — : not available

◆ **Ordering code**

HL — A4VT G / 3 2 — N

- HILEAD seires
- Axial piston unit
- Operation mode
- Size
- Control device
- Product series
- Short code
- Direction of rotation
- seals
- Shaft end
- Mounting flange
- Case drain port
- Auxiliary pump& Through drive
- Valves
- Filtration
- Rotational speed sensor

# 2. Specifications terms

The output flow : Q=Vg.n.ηv/1000 L/min

Torque : M=1.59 Vg.△P/10ηmh N.m

power : P=M.n/9549=Q.△P/60ηt kW

Note : Vg=capacity mL/r △P=pressure Mpa n= speed rpm

ηv = Volumetric efficiency

# 3. Technical data

**3.1 Performance parameters [these figures did not consider the efficiency of mechanical and volumetric efficiency]**

| Size | | | | 71 | 90 |
|---|---|---|---|---|---|
| Displacement | Variable pump | $Vg_{max}$ | $cm^3/r$ | 71 | 90 |
| | Auxiliary pump[at p=2MPa] Vg | | $Cm^3/r$ | 19.6 | 28.3 |
| Speed | Max speed | | rpm | 3300 | 3050 |
| | Min speed | | rpm | 500 | 500 |
| Flow | At n= nmax | | L/min | 234 | 275 |
| Power | At nmax △P=40MPa | | KW | 156 | 183 |
| Torque | At nmax △P=40MPa | | Nm | 451 | 572 |
| Weight | | | Kg | 48 | 50 |
| | | | | | |

**3.2 The working pressure range of hydraulic pump.**

3.2.1 [suction port] working pressure range[auxiliary pump]

Suction pressure Ps min : ≥0.8bar

3.2.2 Working pressure range of the case drain port.

a.Variable pump.

Nominal pressure P=40MPa Peak pressure Pmax =45MPa

b. Auxiliary pump.

Max pressure P=4MPa

3.2.2 Working pressure range of case drain.

Ports T1 , T2 case drain port ,permissive Max pressure : P=0.4MPa

Instant permissive Max pressure : P= 0.6MPa

**THE MATTERS NEEDING ATTENTION:**

a, During commissioning and operation,the pump body must be filled with hydraulic and airbled.

b,To reduce the noise, all connection pipeline isolates with flexible part and the fuel tank.

c, When the hydraulic pump continuously moving under the nominal pressure or the interrupted peak pressure, you must use the auxiliary unit to cool fluid, ensre that the fluid temperature does not surpass the prescribed limit, the fluid temperature in circuit not more than 115℃。

# 4. Implementation standard of the hydraulic pumps

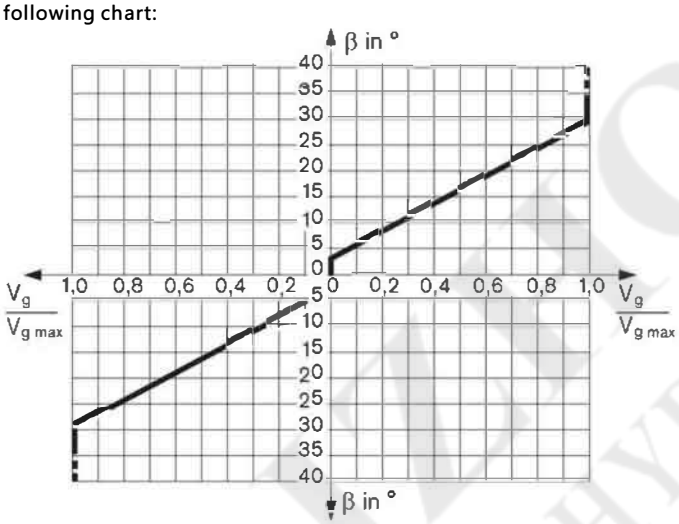
JB/T 7043-2006 hydraulic axial piston

# 5. Control parts

## 5.1 Hydraulic control, mechanical servo HW

5.1.1 Principle : Displacement related to the operation direction of control stick's a or b angle, fluid pass through the HW control unit, as a result, pressure variable to piston pump's variable cavity, realizing the stepless change of swashplate and displacement, fluid flowing direction controlled by stick's operation directional

5.1.2 The characteristic curve as following chart:




1

**Note :** a. Control lever :

Between 0 to ±Vgmax----------β=0° to ±29°

Mech. stop for β: ----------±40°

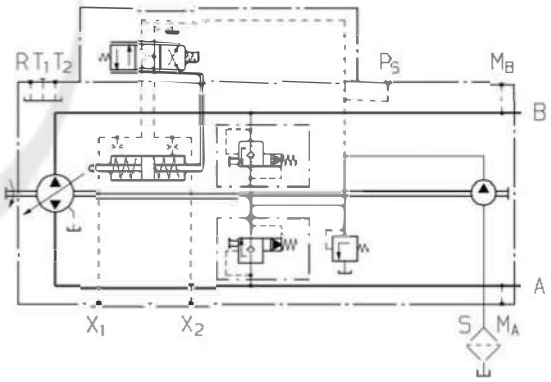
b. Torque of control stick :

Torque moving range ----------approximately 0.85 to 2.1N.m

Max. torque ----------7N.m

c. The characteristic curve affected by the piston pump's working condition [working pressure, oil temperature] is possibly offsetting.

5.1.3 Hydraulic System Chart :



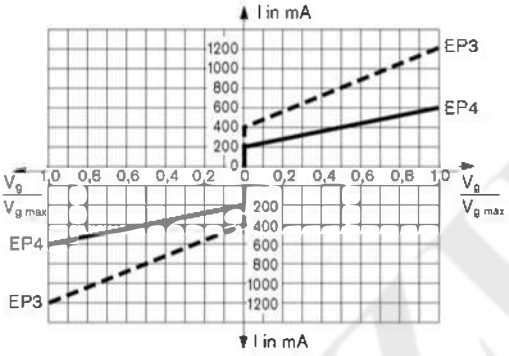

2

# 5. Control parts

**5.2 EP - proportional control, electric**

5.2.1 Principle : Displacement related to the two proportional electro-magnets [a & b] on current intensity, fluid pass through the EP control unit, as a result, pressure variable to piston pump's variable cavity, realizing the stepless change of swashplate and displacement, each electro-magnet corresponds a fluid flow direction.

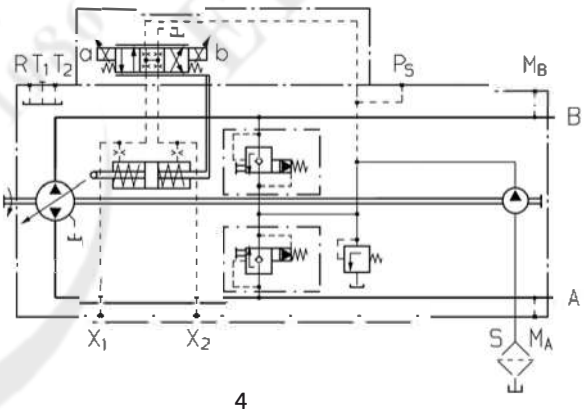
5.2.2 The characteristic curve chart:




3

| Type | Working Volts [Direct Current] | Controlled Current |
|---|---|---|
| EP1 | 24V | 400~1200mA |
| EP2 | 12V | 200~600 mA |

5.2.3 Hydraulic System Chart:



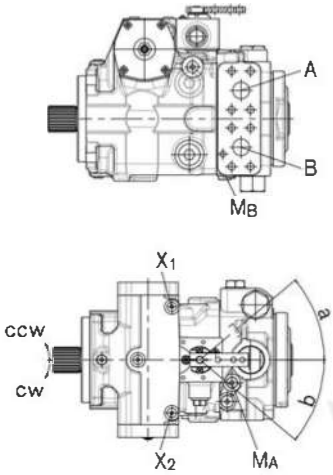

4

# 5. Control parts

**Note :**

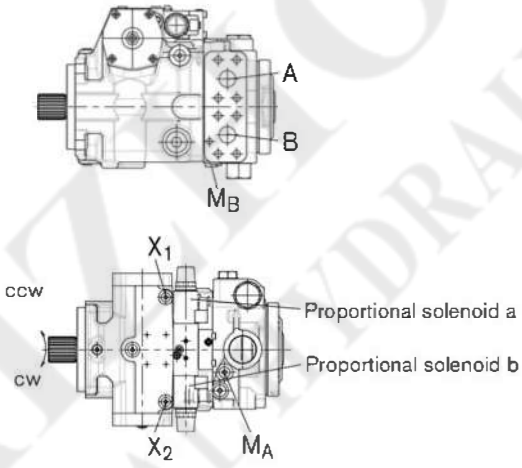
Assignment Direction of rotation - Control - Direction of through put flow

| Direction of rotation | Clockwise | | Anti clockwise | |
|---|---|---|---|---|
| Operating stick | a | b | a | b |
| Actuation of solenoid [EP] | b | a | b | A |
| Control pressure | X2 | X1 | X2 | X1 |
| Through put flow | B to A | A to B | A to B | B to A |
| Operating pressure | MA | MB | MB | MA |




Outline drawing of HW pump

5




Outline drawing of EP pump

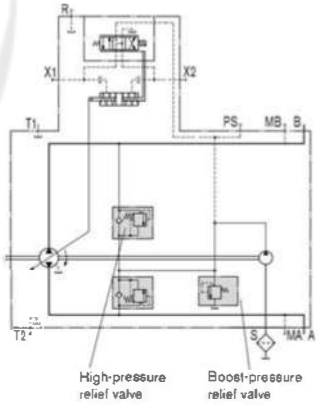
6

**High-pressure relief valves**

a. The two high-pressure relief valves protect the hydrostatic transmission (pump and motor) from overload. It limit the maximum pressure in the respective high-pressure line and serve at the same time as boost valves

b. Standard pressure setting: High- pressure relief valves P max------42MPa
Boost-pressure relief valve PSP -------2.2MPa
Please note: The valve settings are made at n= 1000 rpm and at Vg max (qv 1).
There may be deviations in the opening pressures with other operating parameters.

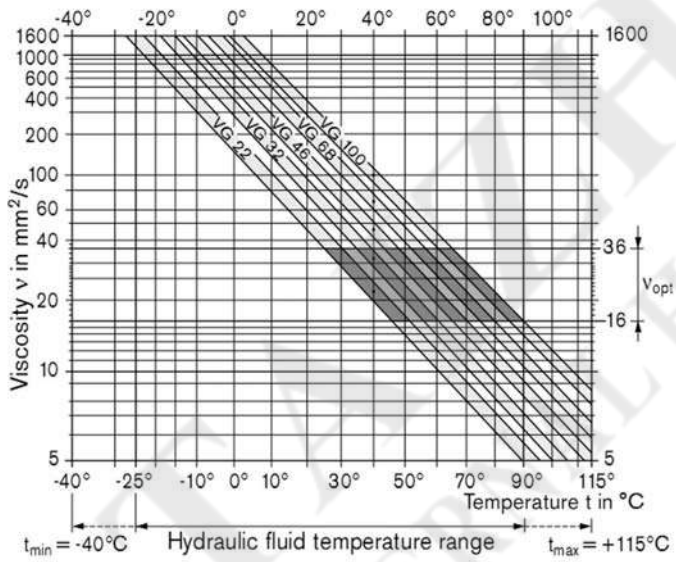
c. The position chart of Relief valve:



# 6. Fluid choice

6.1 In order to ensure the selection of fluid trouble-free and high-performance work. In the systems design period, you should choose the hydraulic fluid of the hydraulic system be based on conditions carefully, All the mineral oil are extent applicable to the axial piston unit, which Application of the basic division of the above depends on the relation ship of the water, temperature and viscosity, and consider oxidation and corrosion protection, material compatibility, air and water separation properties.

6.2 In order to ensure long service life of equipment, we recommend using the hydraulic fluid on working temperature, which the working viscosity is 16~36mm2/s. Please refer to the following chart, choose the viscosity of hydraulic fluid. Select the highest level of viscosity as possible in each working conditions.




8

6.3 In order to ensure the normal work of axial piston pump unit ,the Min grade requirement for the fluid clearness is:

Grade 18/15 In accordance with GB/T 14039-1993

Grade 9In accordance with NAS 1638

Grade 18/15 In accordance with ISO/DIS 4406

Fluid in the high temperature [75 ℃ ≤ t, t ≥90 ℃], the lowest grade for cleanliness:

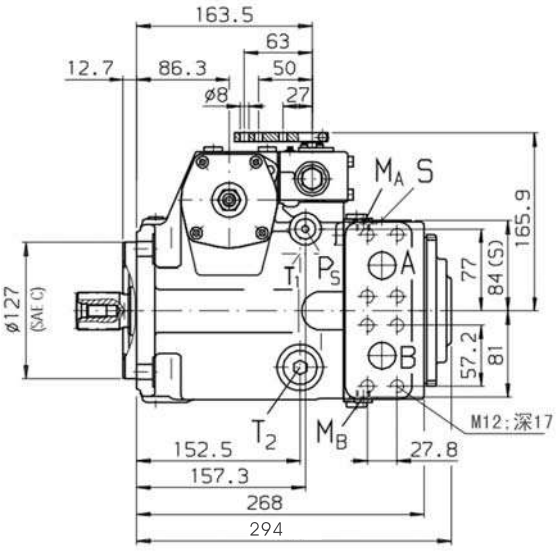
Grade 17/14 In accordance with GB/T 14039-1993

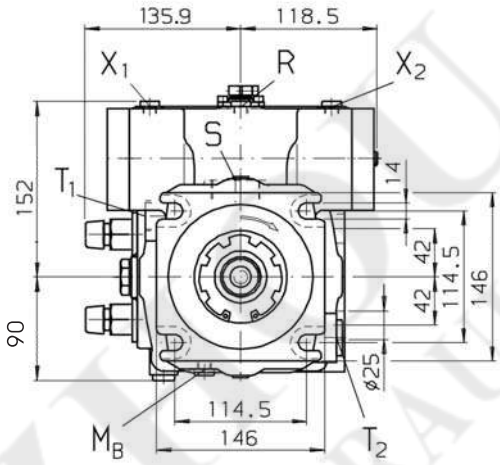
Grade 8In accordance with NAS 1638

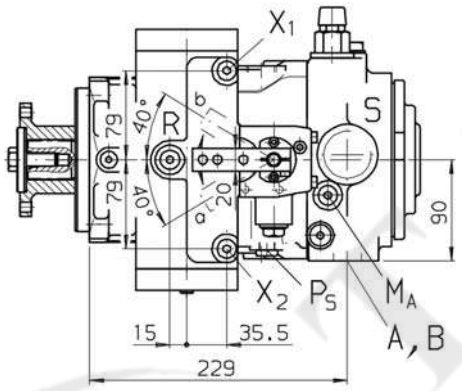
Grade 17/14 In accordance with ISO/DIS 4406

# 7.Dimensions & Size of piston pump.

**Dimensions & Size HL–A4VTG–71 [Fig: HW VARIABLE]**



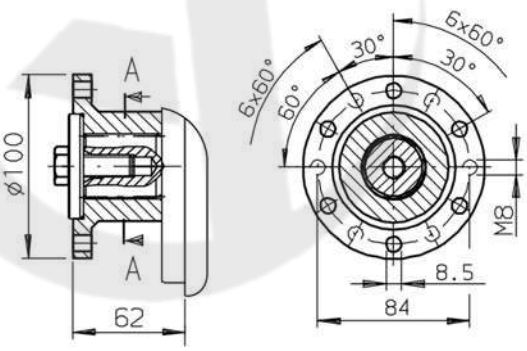

9

Ports

| | | |
|---|---|---|
| A, B | Service line SAE 1" | |
| | 420 bar (peak pressure) | M26×1.5 deep 16 |
| $T_1$ | case drain or fill | M26×1.5 deep 16 |
| $T_2$ | case drain | M12×1.5 deep 16 |
| $M_A$ | Measuring pressure A | M12×1.5 deep 12 |
| $M_B$ | Measuring pressure B | M12×1.5 deep 12 |
| R | Air bleed | M16×1.5 deep 12 |
| S | Suction | M42×2 deep 18 |
| $X_1$, $X_2$ | Control pressure | M12×2 deep 12 |
| | (upstream of orifice) | |
| $P_S$ | Pilot pressure inlet | M14×1.5 deep 12 |

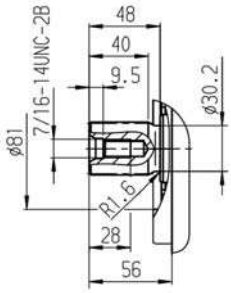
**Shaft ends**

A-A side




10

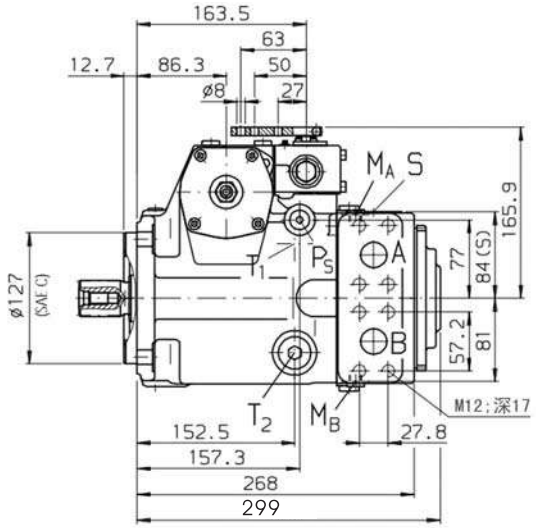
L
Splined shaft
SAE 1 3/8 "
with coupling flange

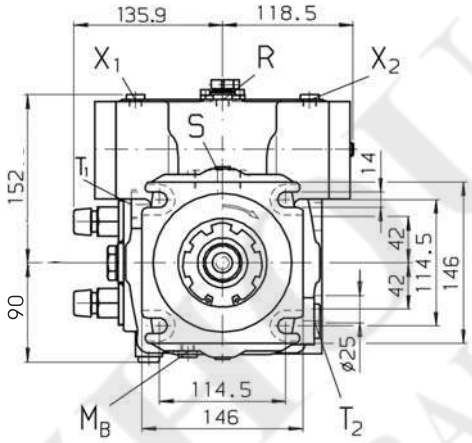


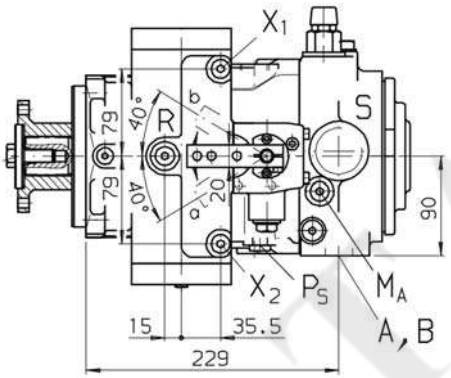

S
Splined shaft SAE 1 $^3/_8$ "
pressure angle 30°
21 teeth 16/32 pitch
flat root
side fit
tolerance class 5
ANSI B92.1a-1976

# 7.Dimensions & Size of piston pump.

**Dimensions & Size HL-A4VTG-90 [Fig : HW VARIABLE]**



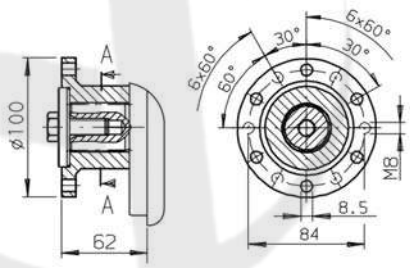

Ports

| | | |
|---|---|---|
| A, B | Service line SAE 1″<br>420 bar (peak pressure) | |
| $T_1$ | Tank | M26×1.5 deep 16 |
| $T_2$ | Tank | M26×1.5 deep 16 |
| $M_A$ | Measuring pressure A | M12×1.5 deep 12 |
| $M_B$ | Measuring pressure B | M12×1.5 deep 12 |
| R | Air bleed | M16×1.5 deep 12 |
| S | Suction | M42×2 deep 18 |
| $X_1$, $X_2$ | Control pressure (upstream of orifice) | |
| $P_S$ | Pilot pressure inlet | M14×1.5 deep 12 |

11

## Shaft ends

A-A side



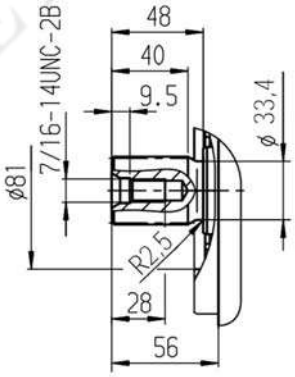

L

Splined shaft

SAE 1½ "

with coupling flange

12




S

Splined shaft SAE 1½ "

pressure angle 30°

23 teeth 16/32 pitch

flat root

side fit

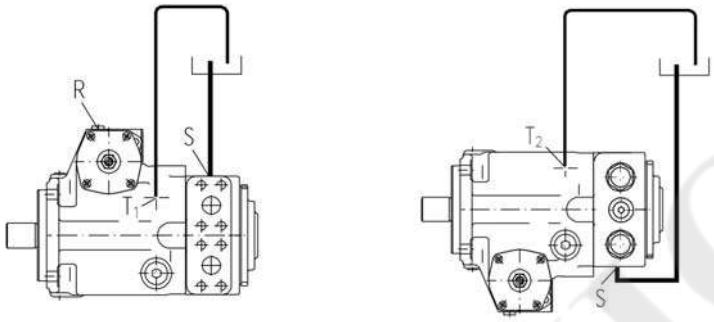
tolerance class 5

ANSI B92.1a-1976

# 8. Installation instructions

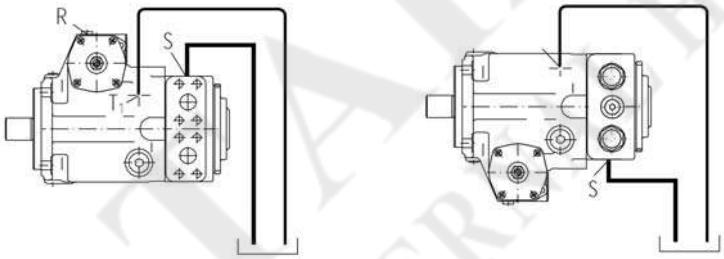
## 8.1 Installation position

a. Below-tank installation (standard), Pump below the minimum fluid level of the tank. The suction line andcase drain line must flow into the tank below the minimum fluid level 200MM , Installing drawing as following:




13

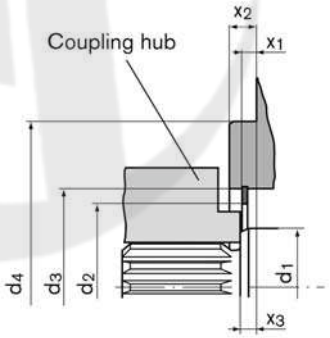
b. Above-tank installation Pump above the min. fluid level of the tank, The suction line and case drain line must flow into the tank below the minimum fluid level 200MM , Observe the maximum permissible suction height hs max = 800 mm, Installing drawing as following:




14

c. Installation situation for coupling assembly

To ensure that rotating components (coupling hub) and fixed components (case, retaining ring) do not come into contact with each other, the installation conditions described here must be observed.




| NG | ød1 | ød2 min | ød3 | ød4 | x1 | x2 | x3 |
|---|---|---|---|---|---|---|---|
| 71 | 45 | 66,5 | 81 | 127 | 7,0 | 12,7 | 8 |
| 90 | 45 | 66,5 | 81 | 127 | 7,0 | 12,7 | |

15

# 8. Installation instructions

**8.2 Installation instructions**

a. During commissioning and operation, the axial piston unit must be filled with hydraulic fluid and air bled. This is also to be observed following a relatively long stand still as the system may empty via the hydraulic lines.

b. The case drain in the case interior must be directed to the tank via the highest tank port. C. The minimum suction pressure at port S must not fall below 0.8 bar absolute (cold start 0.5 bar absolute).