

# A4VTG Axial Piston Variable Pump

## SBT Series



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### 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





## 2. Specifications terms

The output flow :  $Q = V_g \cdot n \cdot \eta_v / 1000$  L/min  
 Torque :  $M = 1.59 \cdot V_g \cdot \Delta P / 10 \eta_m$  N.m  
 power :  $P = M \cdot n / 9549 = Q \cdot \Delta P / 60 \eta_t$  kW  
 Note :  $V_g$  = capacity mL/r  $\Delta P$  = pressure Mpa  $n$  = speed rpm  
 $\eta_v$  = 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 $V_{g_{max}}$ cm <sup>3</sup> /r     | 71   | 90   |
|              | Auxiliary pump[at p=2MPa] $V_g$ cm <sup>3</sup> /r | 19.6 | 28.3 |
| Speed        | Max speed rpm                                      | 3300 | 3050 |
|              | Min speed rpm                                      | 500  | 500  |
| Flow         | At $n = n_{max}$ L/min                             | 234  | 275  |
| Power        | At $n_{max}$ $\Delta P = 40$ MPa KW                | 156  | 183  |
| Torque       | At $n_{max}$ $\Delta P = 40$ MPa 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  $P_s$  min :  $\geq 0.8$ bar

#### 3.2.2 Working pressure range of the case drain port.

##### a. Variable pump.

Nominal pressure  $P = 40$ MPa Peak pressure  $P_{max} = 45$ MPa

##### b. Auxiliary pump.

Max pressure  $P = 4$ MPa

#### 3.2.2 Working pressure range of case drain.

Ports  $T_1$ ,  $T_2$  case drain port ,permissible Max pressure :  $P = 0.4$ MPa

Instant permissible Max pressure :  $P = 0.6$ MPa

### THE MATTERS NEEDING ATTENTION:

- During commissioning and operation, the pump body must be filled with hydraulic and airbled.
- To reduce the noise, all connection pipeline isolates with flexible part and the fuel tank.
- When the hydraulic pump continuously moving under the nominal pressure or the interrupted peak pressure, you must use the auxiliary unit to cool fluid, ensure that the fluid temperature does not surpass the prescribed limit, the fluid temperature in circuit not more than 115°C.

## 4. Implementation standard of the hydraulic pumps

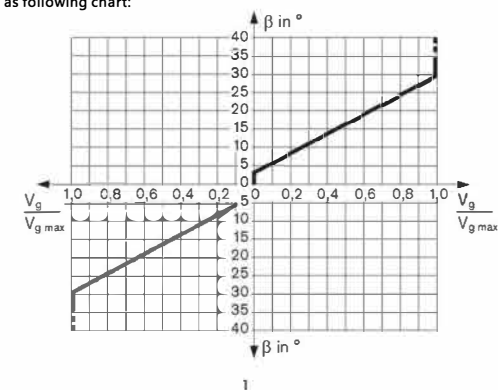
JB/T 7043-2006 hydraulic axial piston

## 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:



**Note :** a. Control lever :

Between 0 to  $\pm V_{g_{max}}$  -----  $\beta = 0^\circ$  to  $\pm 29^\circ$

Mech. stop for  $\beta$ : -----  $\pm 40^\circ$

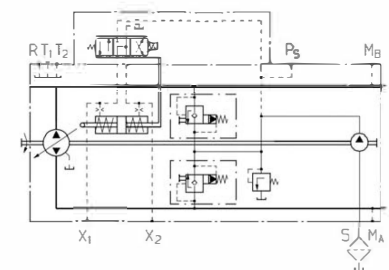
b. Torque of control stick :

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 :

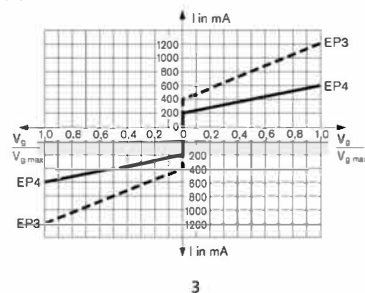


## 5. Control parts

### 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.

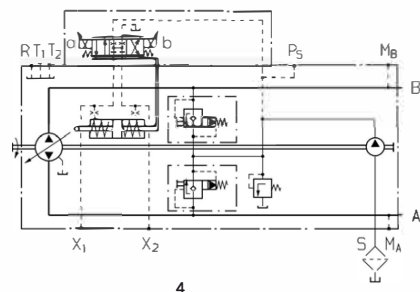
5.2.2 The characteristic curve chart:



3

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

5.2.3 Hydraulic System Chart:



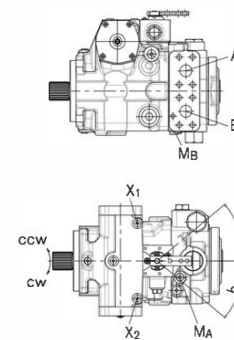
4

## 5. Control parts

### Note :

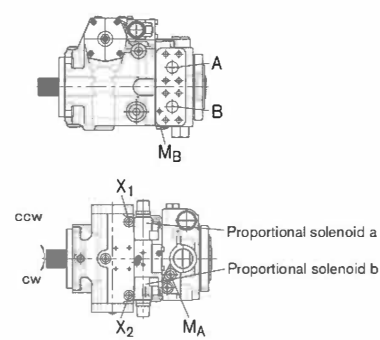
Assignment Direction of rotation - Control - Direction of through put flow

| 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

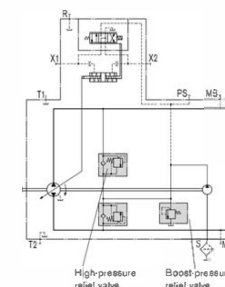


Outline drawing of EP pump

6

### High-pressure relief valves

- 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
- Standard pressure setting: High- pressure reliefvalves P max-----42MPa  
Boost-pressure reliefvalve 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.
- The position chart of Relief valve:



7





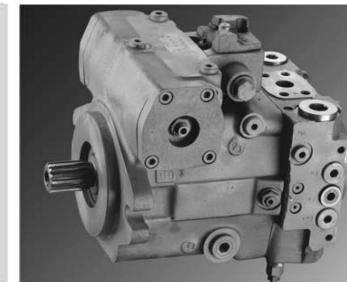
## 8. Installation instructions

### 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).



## A4VG Axial Piston Variable Pump



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### FEATURES

- Hydraulic Units for traveling Machinery.
- Variable axial piston pump of swashplate design for hydrostatic closed circuit transmissions
- 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-reliefvalves 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
- The integral pressure cut-off is standard
- Nominal pressure 40MPa
- Long service life, high-precision bearings
- Parker seals

# 1 Model Description

## 1 Model Description

### 01 Axial piston unit

Variable pump, swashplate design, used for traveling machinery. A4V

### 02 Operation mode

Pump, closed circuit G

### 03 Size

Displacement  $V_g$ (ml/r) 28 40 56 71 90 125

### 04 Control device [★ : available ; ☆ : on request ; — : not available]

|                                   |   |   |   |   |   |   |     |
|-----------------------------------|---|---|---|---|---|---|-----|
| mechanical servo                  | ☆ | ☆ | ★ | ★ | ★ | ☆ | HW  |
| speed related U=12VDC             | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | DA1 |
| speed related U=24VDC             | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | DA2 |
| pilot-pressure related            |   |   |   |   |   |   |     |
| without supply filtration         | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | HD1 |
| pilot-pressure related            |   |   |   |   |   |   |     |
| with supply filtration            | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | HD3 |
| with proportional solenoid,       |   |   |   |   |   |   |     |
| without supply filtration U=12VDC | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | EP1 |
| U=24VDC                           | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | EP2 |
| with proportional solenoid,       |   |   |   |   |   |   |     |
| with supply filtration U=12VDC    | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | EP3 |
| U=24VDC                           | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | EP4 |

### 05 with switch solenoid

With pressure cut-off (standard) ☆ ☆ ★ ★ ★ ☆ D

### 06 Neutral position switch (only for HW)

Without neutral position switch ☆ ☆ ★ ★ ★ ☆  
 With neutral position switch ☆ ☆ ★ ★ ★ ☆ L

### 07 Mechanical stroke limiter

Without mechanical stroke limiter (without code) ☆ ☆ ★ ★ ★ ☆  
 With mechanical stroke limiter, external variable ☆ ☆ ★ ★ ★ ☆ M

### 08 Ports X3, X4 for positioning pressure

Without ports X3, X4 ☆ ☆ ★ ★ ★ ☆  
 With ports X3, X4 ☆ ☆ ★ ★ ★ ☆ T

### 09 DA control valve

Without DA control valve ☆ ☆ ★ ★ ★ ☆ 1  
 With DA control valve ,  
 Fixed setting value ☆ ☆ ★ ★ ★ ☆ 2  
 With DA control clockwise ☆ ☆ ☆ ☆ ☆ ☆ 3L  
 valve , Mech. Adjusting anticlockwise ☆ ☆ ☆ ☆ ☆ ☆ 3R  
 by controlled stick

# 1 Model Description

## 10 Series

Series number ☆ ☆ ★ ★ ★ ☆ 32

## 11 Direction of rotation

Viewed from Shaft endclockwise R  
 anticlockwise L

## 12 Seals

NBR (nitrile-caoutchouc), shaft seal ring in FKM (fluor-caoutchouc) N

## 13 Shaft end

|                                  |   |   |   |   |   |   |   |
|----------------------------------|---|---|---|---|---|---|---|
| Splined shaft for single pump    | ☆ | ☆ | ★ | ★ | ★ | ☆ | Z |
|                                  | — | ☆ | ★ | ★ | ★ | ☆ | A |
| DIN 5480 for combination pump    | — | ☆ | ★ | ★ | ★ | ☆ | A |
| Splined shaft for single pump    | ☆ | ☆ | ☆ | ☆ | ☆ | ☆ | S |
|                                  | — | — | ☆ | ☆ | — | ☆ | T |
| ANSI B92.1a for combination pump | — | — | ☆ | ☆ | — | ☆ | T |

## 14 Mounting flange

SAE J744—2 hole ☆ ☆ ★ — — — C  
 SAE J744—2+4 hole — — — ★ ★ ☆ F

## 15 service line ports

|                                |                        |   |   |   |   |   |   |    |
|--------------------------------|------------------------|---|---|---|---|---|---|----|
| SAE flange port A/B            | ssuction port S bottom | — | ☆ | ★ | ★ | ★ | ☆ | 02 |
|                                | top and bottom         | — | ☆ | ★ | ★ | ★ | ☆ | 03 |
| SAE flange ports A/B same side | suction port S bottom  | ☆ | — | — | — | — | — | 10 |
|                                | suction port S at top  | ☆ | — | — | — | — | — | 13 |

## 16 Boost pump

|                            |   |   |   |   |   |   |     |
|----------------------------|---|---|---|---|---|---|-----|
| Without integrated boost   |   |   |   |   |   |   |     |
| pump without through drive | ☆ | ☆ | ★ | ★ | ★ | ☆ | N00 |
| with through drive         | ☆ | ☆ | ★ | ★ | ★ | ☆ | K.. |
| With integrated boost      |   |   |   |   |   |   |     |
| pump without through drive | ☆ | ☆ | ★ | ★ | ★ | ☆ | F00 |
| with through drive         | ☆ | ☆ | ★ | ★ | ★ | ☆ | F.. |

## 17 Through drive

Flange SAE J744 Hub for splined shaft 28 40 56 71 90 125

|            |                                           |   |   |   |   |   |   |     |
|------------|-------------------------------------------|---|---|---|---|---|---|-----|
| 82-2(A)    | $\frac{3}{8}$ in 9T $\frac{16}{32}$ DP    | ☆ | ☆ | ★ | ★ | ★ | ☆ | .01 |
| 101-2(B)   | $\frac{7}{8}$ in 13T $\frac{16}{32}$ DP   | ☆ | ☆ | ★ | ★ | ★ | ☆ | .02 |
|            | 1 in 15T $\frac{16}{32}$ DP               | ☆ | ☆ | ★ | ★ | ★ | ☆ | .04 |
| 127-2(C)   | 1 in 15T $\frac{16}{32}$ DP               | — | ☆ | — | — | — | — | .09 |
|            | 14T $\frac{16}{32}$ DP                    | — | — | ★ | ★ | ★ | ☆ | .07 |
| 152-2/4(D) | W35 2×30×16×9g                            | — | — | — | — | ★ | — | .73 |
|            | 1 $\frac{1}{2}$ in 13T $\frac{16}{32}$ DP | — | — | — | — | — | ☆ | .69 |

## 1 Model Description

| 18 Valves setting range                                                                            | 28                      | 40 | 56 | 71 | 90 | 125 |   |
|----------------------------------------------------------------------------------------------------|-------------------------|----|----|----|----|-----|---|
| With high-pressure relief valve, pilot operated                                                    | 10~42MPa with bypass    | —  | —  | —  | ★  | ★   | ☆ |
| With high-pressure relief valve, direct operated                                                   | 10~42MPa without bypass | ☆  | ☆  | ★  | —  | —   | — |
| (fixed setting)                                                                                    | 10~42MPa with bypass    | ☆  | ☆  | ★  | —  | —   | — |
|                                                                                                    | 10~25MPa without bypass | ☆  | ☆  | ★  | —  | —   | — |
|                                                                                                    | 10~25MPa with bypass    | ☆  | ☆  | ★  | —  | —   | — |
| 19. Filtration                                                                                     | 28                      | 40 | 56 | 71 | 90 | 125 |   |
| Filtration in the suction line of boost pump (filter not included in supply)                       | ☆                       | ☆  | ★  | ★  | ★  | ☆   | S |
| Filtration in pressure line of boost pump ports for external boost circuit filtration, (Fe and Fa) | ☆                       | ☆  | ★  | ★  | ★  | ☆   | D |
| 20 .Swivel angle indicator                                                                         | 28                      | 40 | 56 | 71 | 90 | 125 |   |
| Without swivel angle indicator                                                                     |                         |    |    |    |    |     |   |
| (without code)                                                                                     | ☆                       | ☆  | ★  | ★  | ★  | ☆   |   |
| Electrical swivel angle sensor                                                                     | ☆                       | ☆  | ☆  | ☆  | ☆  | ☆   | R |

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

## 1 Model Description

### ◆ Ordering code

|                                       | — | A4V | G |  |  | D |  |  |  | / | 32 | — | N |  |  |
|---------------------------------------|---|-----|---|--|--|---|--|--|--|---|----|---|---|--|--|
| series                                |   |     |   |  |  |   |  |  |  |   |    |   |   |  |  |
| Axial piston unit                     |   |     |   |  |  |   |  |  |  |   |    |   |   |  |  |
| Operation mode                        |   |     |   |  |  |   |  |  |  |   |    |   |   |  |  |
| Size                                  |   |     |   |  |  |   |  |  |  |   |    |   |   |  |  |
| Controlling method                    |   |     |   |  |  |   |  |  |  |   |    |   |   |  |  |
| with switch solenoid                  |   |     |   |  |  |   |  |  |  |   |    |   |   |  |  |
| Neutral position switch (only for HW) |   |     |   |  |  |   |  |  |  |   |    |   |   |  |  |
| Mechanical stroke limiter             |   |     |   |  |  |   |  |  |  |   |    |   |   |  |  |
| Ports X3, X4 for positioning pressure |   |     |   |  |  |   |  |  |  |   |    |   |   |  |  |
| DA control valve                      |   |     |   |  |  |   |  |  |  |   |    |   |   |  |  |
| Series                                |   |     |   |  |  |   |  |  |  |   |    |   |   |  |  |
| Direction of rotation                 |   |     |   |  |  |   |  |  |  |   |    |   |   |  |  |
| Seals                                 |   |     |   |  |  |   |  |  |  |   |    |   |   |  |  |
| Shaft extension                       |   |     |   |  |  |   |  |  |  |   |    |   |   |  |  |
| Mounting flange                       |   |     |   |  |  |   |  |  |  |   |    |   |   |  |  |
| Service line ports (UN fixing thread) |   |     |   |  |  |   |  |  |  |   |    |   |   |  |  |

### To continue :

|                        |  |  |  |  |  |
|------------------------|--|--|--|--|--|
|                        |  |  |  |  |  |
| Boost pump             |  |  |  |  |  |
| Through drive          |  |  |  |  |  |
| Valves                 |  |  |  |  |  |
| Filter                 |  |  |  |  |  |
| Swivel angle indicator |  |  |  |  |  |



## 2. Specifications terms

The outputflow :  $Q = V_g \cdot n \cdot \eta_v / 1000$  L/min

Torque :  $M = 1.59 V_g \cdot \Delta P / 10 \eta_m$  N.m

power :  $P = M \cdot n / 9549 = Q \cdot \Delta P / 60 \eta_t$  KW

Note :  $V_g$  = capacity mL/r  $\Delta P$  = pressure Mpa  $n$  = speed rpm

$\eta_v$  = Volumetric efficiency

## 3. Technical data

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

|                                                   |                    |       |       |       |       |       |       |
|---------------------------------------------------|--------------------|-------|-------|-------|-------|-------|-------|
| Size                                              |                    | 28    | 40    | 56    | 71    | 90    | 125   |
| Variable pump Displacement $V_g$ max              | cm <sup>3</sup> /r | 28    | 40    | 56    | 71    | 90    | 125   |
| Displacement for boost pump $V_g$ Sp              | cm <sup>3</sup> /r | 6.2   | 8.8   | 11.8  | 19.8  | 19.8  | 28.5  |
| Max speed $n_{max}$                               | rpm                | 4200  | 4000  | 3600  | 3300  | 3000  | 2800  |
| Min speed $n_{min}$                               | rpm                | 500   | 500   | 500   | 500   | 500   | 500   |
| Max flow $atn = n_{max}$                          | L/min              | 117.6 | 160   | 201.6 | 234.3 | 270   | 350   |
| Max power $atn = n_{max}$<br>( $\Delta P=40MPa$ ) | KW                 | 78.4  | 106.6 | 134.4 | 156.2 | 180   | 233.3 |
| Max Torque $atV=V_g$ max $\Delta P=40MPa$         | Nm                 | 178   | 254.4 | 356   | 451.5 | 572.4 | 795   |
| Fill volume $V$                                   | L                  | 1     | 1.1   | 1.5   | 1.5   | 1.5   | 2.2   |
| Weight                                            | Kg                 | 30    | 32    | 39    | 50    | 61    | 82    |

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

3.2.1 [suction port] working pressure range [auxiliary pump] Suction pressure  $P_s$  min :  $\geq 0.8$ bar

3.2.2 Working pressure range of the case drain port.

a. Variable pump.

Nominal pressure  $P = 40$ MPa Peak pressure  $P_{max} = 45$ MPa Total pressure [pressure A+ pressure B] = 70MPa

b. Auxiliary pump.

Max pressure  $P = 4$ MPa

3.2.3 Working pressure range of case drain.

Ports  $T_1$ ,  $T_2$  case drain port, permissive Max pressure :  $P = 0.6$ MPa

Instant [ $t < 0.1$ S] permissive Max pressure :  $P = 0.8$ MPa

When normal continual work, case drain pressure  $P \leq 0.3$ MPa

### The matters needing attention:

a, During commissioning and operation, the pump body must be filled with hydraulic fluid and air bled.

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, ensure that the fluid temperature does not surpass the prescribed limit, the fluid temperature in circuit not more than 115°C

## 4. Implementation standard of the hydraulic pumps

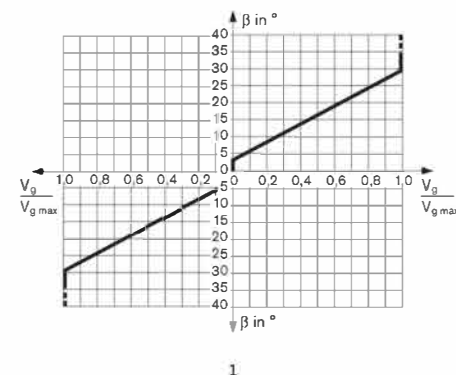
JB/T 7043-2006 hydraulic axial piston

## 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. If the pump simultaneously equipped with a DA control valve, then travelling drive device controlled automatically.

5.1.2 The characteristic curve as following chart :



1

Note : a. Control lever :

Between 0 to  $V_{gmax}$  -----  $\beta = 3^\circ$  to  $\pm 29^\circ$

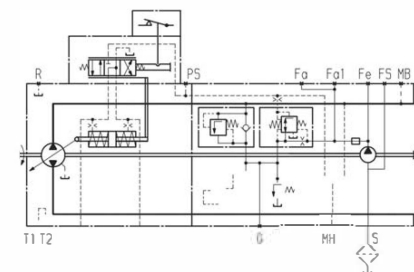
Mech. stop for  $\beta$  : ----- size 28~71 :  $\pm 40^\circ$

size 90~125  $\pm 35^\circ$

b. The characteristic curve is possibly offset by piston pump's working condition [working pressure, oil temperature];

c. The Max torque is 1.7 N.m on the control stick, when the HW control stick on control device does not have torque, the spring return function cause the oil pump return to the Neutral position automatically.

5.1.3 Hydraulic System Chart :



2

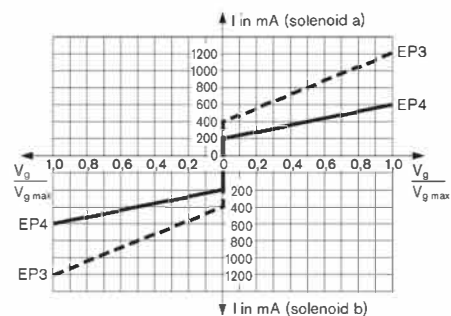


## 5. Control parts

### 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. If the pump simultaneously equipped with a DA control valve, then travelling drive device controlled automatically.

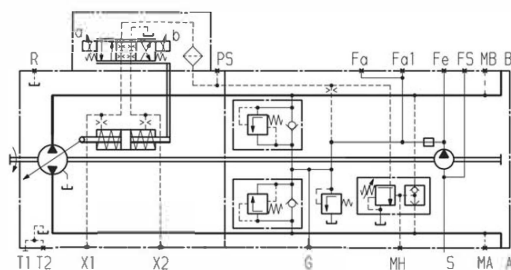
5.2.2 The characteristic curve chart :



3

| Technical parameters for solenoid | EP1/EP3         | EP2/EP4         |
|-----------------------------------|-----------------|-----------------|
| Voltage                           | 12V DC ( ±10% ) | 24V Dc ( ±10% ) |
| controlling current               | 400~1200 mA     | 200~600 mA      |
| Max. current                      | 1540 mA         | 770mA           |
| Frequency                         | 100Hz           | 100Hz           |
| Working time                      | 100%            | 100%            |

5.2.3 The characteristic curve chart:



4

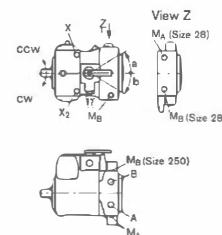
## 5. Control parts

Note :

### 1 . 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     |

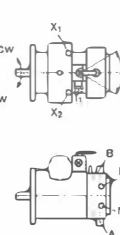
Sizes 28



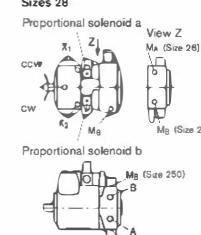
Outline drawing of HW pump

5

Sizes 40-125



Sizes 28



Outline drawing of EP pump

6

### 2 . 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

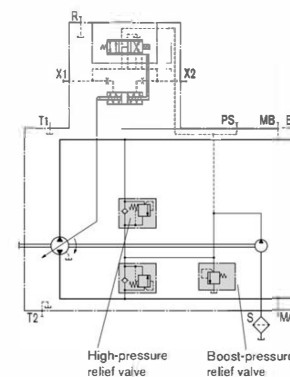
b. Standard pressure setting: High- pressure relief valves P max-----42MPa

Boost-pressure reliefvalve PSP ----- 4MPa

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.

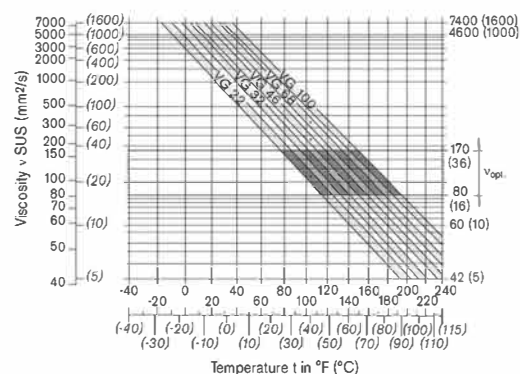
c. The position chart of Relief valve:



## 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 units, which Application of the basic division of the above depends on the relationship 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 16~36mm<sup>2</sup>/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.



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

Grade  $^{17}/_{15}$  In accordance with GB/T 14039-1993

Grade 9 In accordance with NAS 1638

Grade  $^{18}/_{15}$  In accordance with ISO/DIS 4406

Fluid in the high temperature [ $75^{\circ}\text{C} \leq t, t \leq 90^{\circ}\text{C}$ ], the lowest grade for cleanliness:

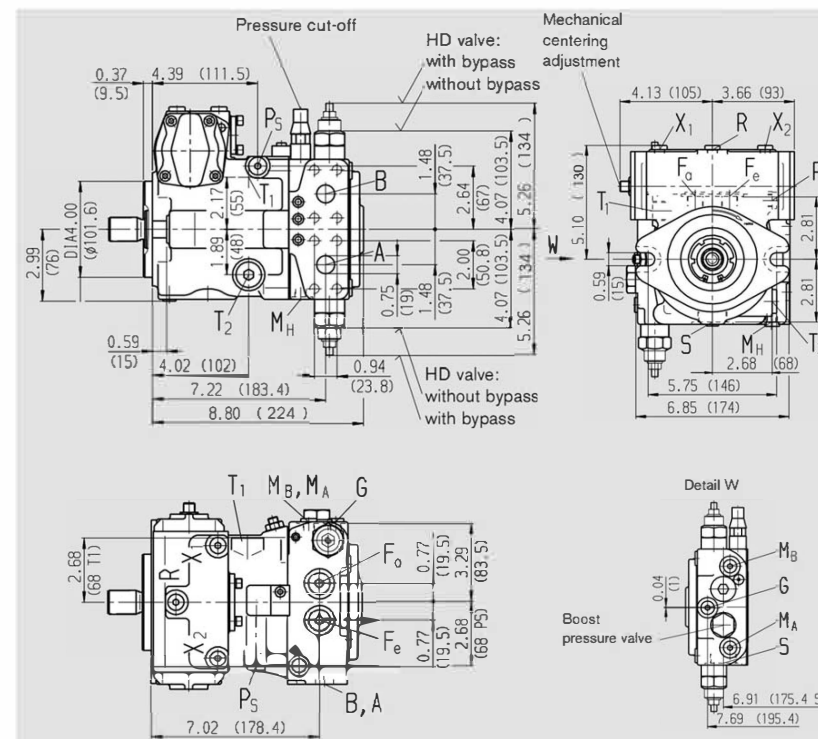
Grade  $^{17}/_{14}$  In accordance with GB/T 14039-1993

Grade 8 In accordance with NAS 1638

Grade  $^{17}/_{14}$  In accordance with ISO/DIS 4406

## 7. Dimensions & Size of piston pump

Unit Dimensions, size A4VG-28 [Fig : without control unit]



9

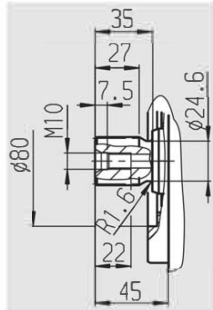
Ports

|                                 |                                                             |                                 |
|---------------------------------|-------------------------------------------------------------|---------------------------------|
| A, B                            | Service line ports (high-pressure series) fixing thread A/B | SAE $^{3}/_{16}$ in M10,14 deep |
| T <sub>1</sub>                  | case drain or fill                                          | M22X1.5,14 deep                 |
| T <sub>2</sub>                  | case drain                                                  | M22X1.5,14 deep                 |
| M <sub>A</sub> , M <sub>B</sub> | pressure gauge - operating pressure A, B                    | M22X1.5,12 deep                 |
| R                               | air bleed                                                   | M22X1.5,12 deep                 |
| S                               | boost suction port                                          | M33X2,18 deep                   |
| X <sub>1</sub> , X <sub>2</sub> | port for control pressures (before orifice)                 | M12X1.5,12 deep                 |
| G                               | pressure port for auxiliary circuits                        | M12X1.5,12 deep                 |
| P <sub>s</sub>                  | control pressure supply                                     | M14X1.5,12 deep                 |
| F <sub>i</sub>                  | filter output                                               | M18X1.5,12 deep                 |
| F <sub>e</sub>                  | filter input                                                | M18X1.5,12 deep                 |
| M <sub>H</sub>                  | port for balanced high pressure                             | M12X1.5,12 deep                 |



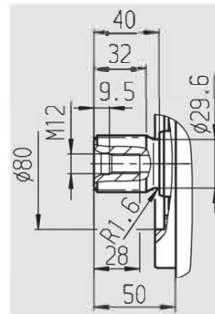
## 7. Dimensions & Size of piston pump

### Shaft ends



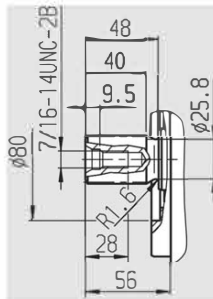
Z Splined shaft DIN 5480  
W30x2x30x14x9g

15



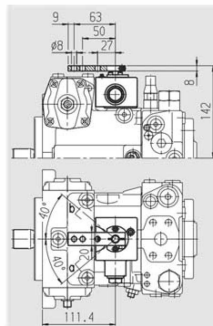
A Splined shaft DIN 5480  
W35x2x30x16x9g

16



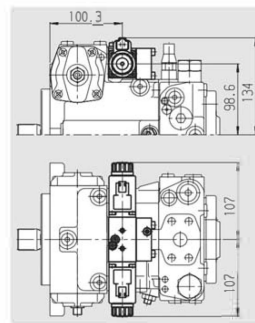
S Splined shaft SAE J744-32-4  
1 1/4 in 14T <sup>12</sup>/<sub>24</sub>DP

17



Hydraulic control, mechanical servo, HW

18

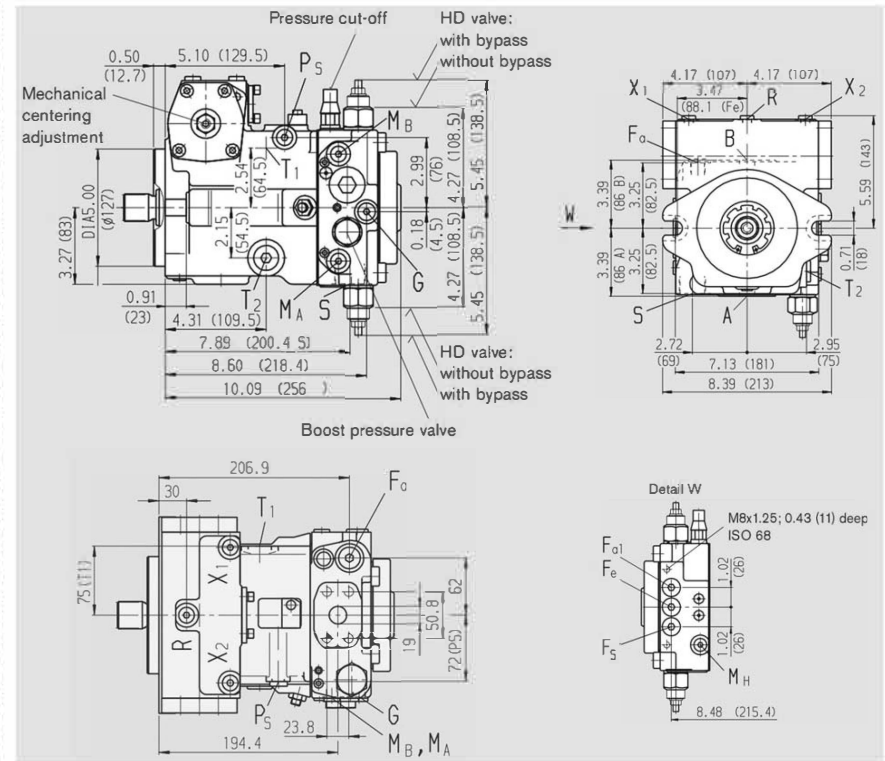


Electric control with proportional solenoid, EP

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## 7. Dimensions & Size of piston pump

**Unit Dimensions,size A4VG-56 [Fig : without control unit]**



## Ports

|                                 |                                             |                                     |
|---------------------------------|---------------------------------------------|-------------------------------------|
| A, B                            | service line ports (high-pressure series)   | SAE <sup>7</sup> / <sub>16</sub> in |
|                                 | fixing thread A/B                           | M10,17 deep                         |
| T <sub>1</sub>                  | case drain or fill                          | M22X1.5,14 deep                     |
| T <sub>2</sub>                  | case drain                                  | M22X1.5,14 deep                     |
| M <sub>A</sub> , M <sub>B</sub> | pressure gauge - operating pressure A, B    | M22X1.5,12 deep                     |
| R                               | air bleed                                   | M22X1.5,12 deep                     |
| S                               | boost suction port                          | M33X2,18 deep                       |
| X <sub>1</sub> , X <sub>2</sub> | port for control pressures (before orifice) | M12X1.5,12 deep                     |
| G                               | pressure port for auxiliary circuits        | M12X1.5,12 deep                     |
| P <sub>i</sub>                  | control pressure supply                     | M14X1.5,12 deep                     |
| F <sub>a</sub>                  | filter output                               | M18X1.5,12 deep                     |
| F <sub>A1</sub>                 | filter output (filter assembly)             | M18X1.5,12 deep                     |
| F <sub>e</sub>                  | filter input                                | M18X1.5,12 deep                     |
| F <sub>1</sub>                  | filter output                               | M18X1.5,12 deep                     |
| M <sub>H</sub>                  | port for balanced high pressure             | M12X1.5,12 deep                     |

20

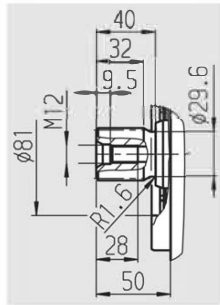
 $SAE^{3/4}$  in

M10,17 deep  
M22X1.5,14 deep  
M22X1.5,14 deep  
M22X1.5,12 deep  
M22X1.5,12 deep  
M33X2,18 deep  
M12X1.5,12 deep  
M12X1.5,12 deep  
M14X1.5,12 deep  
M18X1.5,12 deep  
M18X1.5,12 deep  
M18X1.5,12 deep  
M18X1.5,12 deep  
M12X1.5,12 deep

Electric control with proportional solenoid, EP

## 7. Dimensions & Size of piston pump

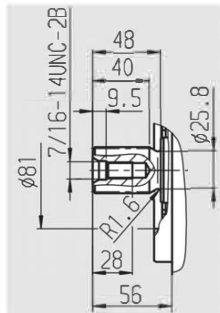
**Shaft ends**



Z Splined shaft DIN 5480

W35x2x30x16x9g

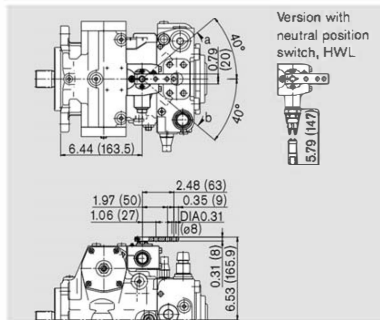
28



S Splined shaft SAE J744-32-4

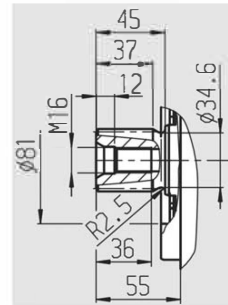
1 1/4 in 14T 12/24DP

30



Hydraulic control, mechanical servo, HW

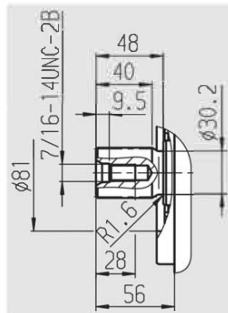
32



A Splined shaft DIN 5480

W40x2x30x18x9g

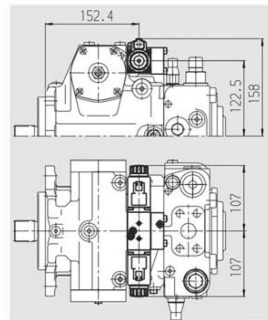
29



T Splined shaft SAE J744-25-4

 $1\frac{3}{8}\text{in } 21\text{T } 16/32\text{DP}$ 

31

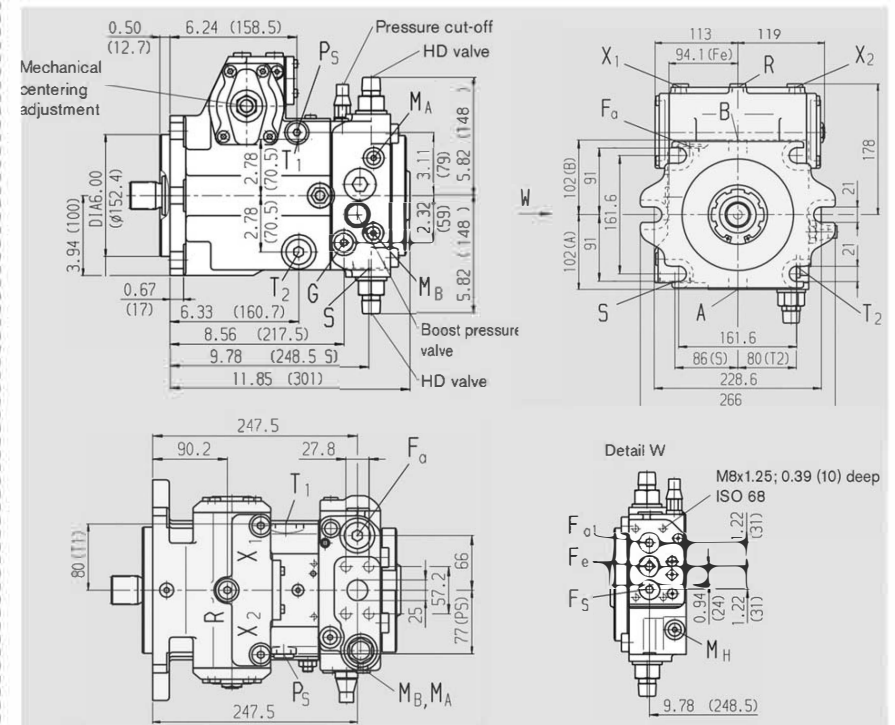


Electric control with proportional solenoid, EP

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## 7. Dimensions & Size of piston pump

**Unit Dimensions,size A4VG-90 [Fig : without control unit]**



## Ports

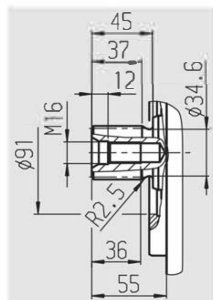
|                                 |                                             |                 |
|---------------------------------|---------------------------------------------|-----------------|
| A, B                            | service line ports (high-pressure series)   | SAE1 in         |
|                                 | fixing thread A/B                           | M12,18 deep     |
| T <sub>1</sub>                  | case drain or fill                          | M26X1.5,14 deep |
| T <sub>2</sub>                  | case drain                                  | M26X1.5,14 deep |
| M <sub>A</sub> , R              | pressure gauge - operating pressure A, B    | M12X1.5,12 deep |
| R                               | air bleed                                   | M16X1.5,12 deep |
| S                               | boost suction port                          | M42X2,18 deep   |
| X <sub>1</sub> , X <sub>2</sub> | port for control pressures (before orifice) | M12X1.5,12 deep |
| G                               | pressure port for auxiliary circuits        | M12X1.5,12 deep |
| P <sub>i</sub>                  | control pressure supply                     | M14X1.5,16 deep |
| F <sub>1</sub>                  | filter output                               | M26X1.5,16 deep |
| Fa <sub>1</sub>                 | filter output (filter assembly)             | M26X1.5,16 deep |
| F <sub>2</sub>                  | filter input                                | M26X1.5,16 deep |
| F <sub>3</sub>                  | filter output                               | M18X1.5,12 deep |
| H                               | port for balanced high pressure             | M12X1.5,12 deep |

34



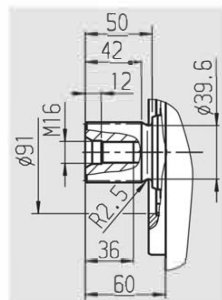
## 7. Dimensions & Size of piston pump

### Shaft ends



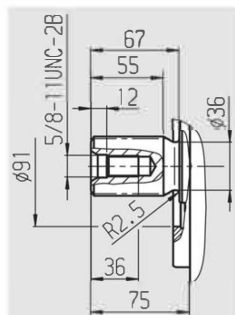
Z Splined shaft DIN 5480  
W40×2×30×18×9g

41



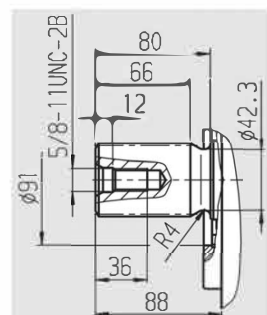
A Splined shaft DIN 5480  
W45×2×30×21×9g

42



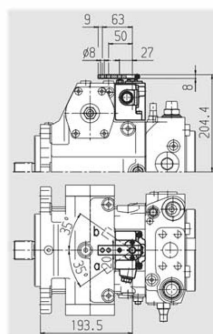
S Splined shaft SAE J744-44-4  
1 1/4 in 13T 1/16 DP

43



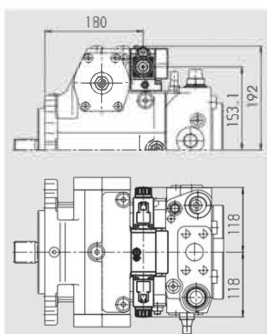
T Splined shaft SAE J744-50-4  
2 in 15T 1/16 DP

44



Hydraulic control, mechanical servo, HW

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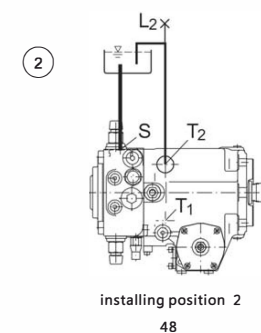
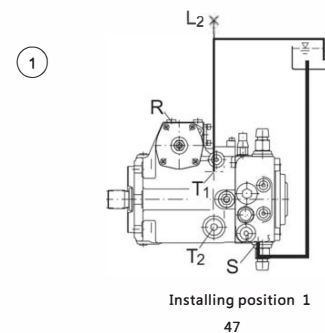
Electric control with proportional solenoid, EP

46

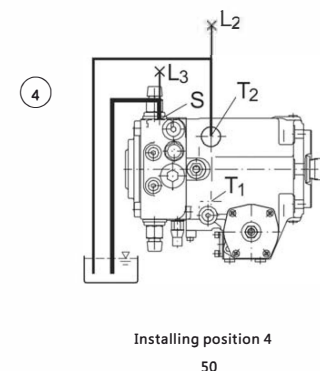
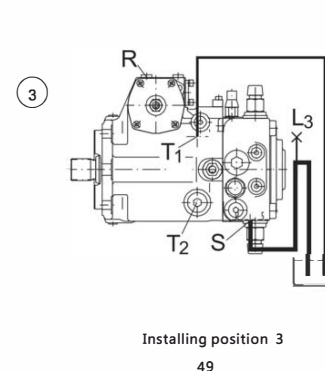
## 8. Installation instructions

### 8.1 Installation position

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



- 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:



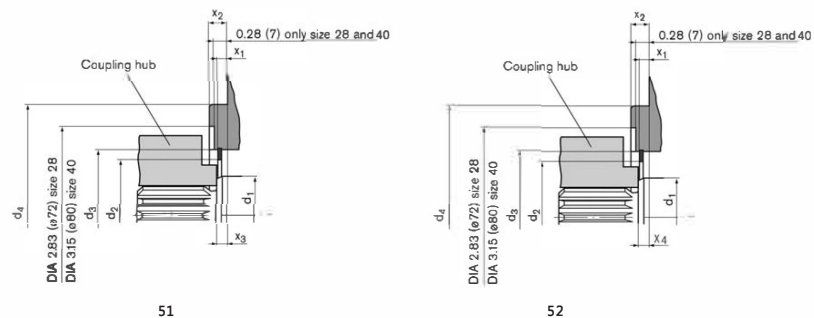
Note : the position for air bleed and fill port as below chart

| Installing position | Air bleed | Fill port           |
|---------------------|-----------|---------------------|
| 1                   | R         | S+T1 ( L2 )         |
| 2                   | L2        | S+T2 ( L2 )         |
| 3                   | R         | T1+L3               |
| 4                   | L2        | S ( L3 ) +T2 ( L2 ) |

## 8. Installation instructions

### 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.



| size | $\phi d_1$ | $\phi d_{2 \min}$ | $\phi d_3$ | $\phi d_4$ | $x_1$ | $x_2$ | $x_3$ | $x_4$ |
|------|------------|-------------------|------------|------------|-------|-------|-------|-------|
| 28   | 35         | 43.4              | 55         | 101.6      | 3.3   | 9.5   | 8     | 10    |
| 40   | 40         | 51.4              | 63         | 127        | 4.3   | 12.7  | 8     | 10    |
| 56   | 40         | 54.4              | 68         | 127        | 7.0   | 12.7  | 8     | 10    |
| 71   | 45         | 66.5              | 81         | 127        | 7.0   | 12.7  | 8     | 10    |
| 90   | 50         | 66.5              | 81         | 152.4      | 6.8   | 12.7  | 8     | 10    |
| 125  | 55         | 76.3              | 91         | 152.4      | 7.0   | 12.7  | 8     | 10    |
| 180  | 60         | 88                | 107        | 165.1      | 7.4   | 15.9  | 8     | 10    |

### 8.2 Installation instructions

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

## A2FM Axial Piston Fixed Motor



### INDEX

|                                                   |     |
|---------------------------------------------------|-----|
| 1. Model Description                              | 038 |
| 2. Specifications terms                           | 039 |
| 3. Technical data                                 | 040 |
| 4. Implementation standard of the hydraulic pumps | 040 |
| 5. Valves                                         | 041 |
| 6. Fluid choice                                   | 043 |
| 7. Dimensions & size of hydraulic motor           | 044 |
| 8. Installation instructions                      | 054 |

### FEATURES

- Hydraulic Units for traveling Machinery & industry using.
- Fixed motor with axial tapered piston rotary group of bent axis design, for hydrostatic drives in open and closed circuits.
- The output speed is dependent on the flow of the pump and the displacement of the motor.
- The output torque increases with the pressure differential between the high and low pressure sides and with increasing displacement.
- Long service life, high-precision bearings ; Parker seals
- Have the structural design of compact, light weight, low noise , High overall efficiency characteristics.

## 1 Model Description

### Axial piston unit

|                         |     |
|-------------------------|-----|
| Bent axis design, fixed | A2F |
|-------------------------|-----|

### Operation mode

|       |   |
|-------|---|
| Motor | M |
|-------|---|

### Size

|                                        |    |    |    |    |    |    |    |     |     |
|----------------------------------------|----|----|----|----|----|----|----|-----|-----|
| △Displacement Vg <sub>max</sub> (ml/r) | 28 | 32 | 45 | 56 | 63 | 80 | 90 | 107 | 125 |
|----------------------------------------|----|----|----|----|----|----|----|-----|-----|

### Series

|  |   |
|--|---|
|  | 6 |
|--|---|

### Index

|  |   |
|--|---|
|  | 1 |
|--|---|

### Direction of rotation

|                       |             |   |
|-----------------------|-------------|---|
| Viewed from shaft end | alternating | W |
|-----------------------|-------------|---|

### Seals

|                         |   |
|-------------------------|---|
| FKM (fluor-caoutchouc ) | V |
|-------------------------|---|

Shaft end [★ : available ; ☆ : on request ; — : not available ]

|                                | 28 | 32 | 45 | 56 | 63 | 80 | 90 | 107 | 125 |   |
|--------------------------------|----|----|----|----|----|----|----|-----|-----|---|
| Splined shaft DIN 5480         | ☆  | ☆  | ☆  | ★  | ★  | ☆  | ★  | ☆   | ☆   | A |
|                                | ☆  | —  | ☆  | ★  | —  | ☆  | —  | ☆   | —   | Z |
| Parallel keyed shaft, DIN 6885 | ☆  | ☆  | —  | ★  | ★  | ☆  | ★  | ☆   | ☆   | B |
|                                | ☆  | —  | ☆  | ★  | —  | ☆  | —  | ☆   | —   | P |

### Mounting flange

|           |    |    |    |    |    |    |    |     |     |   |
|-----------|----|----|----|----|----|----|----|-----|-----|---|
| ISO4 hole | 28 | 32 | 45 | 56 | 63 | 80 | 90 | 107 | 125 | B |
|-----------|----|----|----|----|----|----|----|-----|-----|---|

### Service line ports

|                                                |   |   |   |   |   |   |   |   |   |    |   |
|------------------------------------------------|---|---|---|---|---|---|---|---|---|----|---|
| Ports A and B                                  |   |   |   |   |   |   |   |   |   |    |   |
| SAE flange , rear                              | ☆ | ☆ | ☆ | ★ | ★ | ☆ | ★ | ☆ | ☆ | 01 | 0 |
| Ports A and B                                  | ☆ | ☆ | ☆ | ★ | ★ | ☆ | ★ | ☆ | ☆ | 02 | 0 |
| SAE flange, at side opposite                   | — | — | ☆ | ★ | ★ | ☆ | ★ | ☆ | ☆ | 7  |   |
| Ports A and B                                  |   |   |   |   |   |   |   |   |   |    |   |
| Threaded ports ,at side opposite               | ☆ | ☆ | — | — | — | — | — | — | — | 03 | 0 |
| Ports A and B                                  |   |   |   |   |   |   |   |   |   |    |   |
| Threaded ports ,at side and rear               | ☆ | ☆ | ☆ | ★ | ★ | — | — | — | — | 04 | 0 |
| Port A and B SAE flange at side(same side)     | ☆ | ☆ | ☆ | ★ | ★ | ☆ | ★ | ☆ | ☆ | 10 | 0 |
| Port plate for mounting a counterbalance valve | ☆ | ☆ | ☆ | ★ | ★ | ☆ | ★ | ☆ | ☆ | 18 | 1 |
| Port plate with pressure reliefvalves          | ☆ | ☆ | ☆ | ★ | ★ | ☆ | ★ | ☆ | ☆ | 19 | 1 |
|                                                | ☆ | ☆ | ☆ | ★ | ★ | ☆ | ★ | ☆ | ☆ |    | 2 |



## 1 Model Description

### Valves

|               |   |
|---------------|---|
| Without valve | 0 |
|---------------|---|

|                                                               |   |
|---------------------------------------------------------------|---|
| With pressure relief valves (without pressure sequence range) | 1 |
|---------------------------------------------------------------|---|

|                                                            |   |
|------------------------------------------------------------|---|
| With pressure relief valves (with pressure sequence range) | 2 |
|------------------------------------------------------------|---|

|                                     |   |
|-------------------------------------|---|
| With flush and boost pressure valve | 7 |
|-------------------------------------|---|

### Speed measurement

|                                     |  |
|-------------------------------------|--|
| Without speed measurement (no code) |  |
|-------------------------------------|--|

|                        |   |
|------------------------|---|
| With speed measurement | D |
|------------------------|---|

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

### ◆ Ordering code

|                       |   |     |   |   |   |  |   |   |   |  |  |  |  |  |  |  |  |  |  |
|-----------------------|---|-----|---|---|---|--|---|---|---|--|--|--|--|--|--|--|--|--|--|
|                       | — | A2F | M | / | 6 |  | W | — | V |  |  |  |  |  |  |  |  |  |  |
| HL series             |   |     |   |   |   |  |   |   |   |  |  |  |  |  |  |  |  |  |  |
| Axial piston unit     |   |     |   |   |   |  |   |   |   |  |  |  |  |  |  |  |  |  |  |
| Operation mode        |   |     |   |   |   |  |   |   |   |  |  |  |  |  |  |  |  |  |  |
| Size                  |   |     |   |   |   |  |   |   |   |  |  |  |  |  |  |  |  |  |  |
| Series                |   |     |   |   |   |  |   |   |   |  |  |  |  |  |  |  |  |  |  |
| Index                 |   |     |   |   |   |  |   |   |   |  |  |  |  |  |  |  |  |  |  |
| Direction of rotation |   |     |   |   |   |  |   |   |   |  |  |  |  |  |  |  |  |  |  |
| Seals                 |   |     |   |   |   |  |   |   |   |  |  |  |  |  |  |  |  |  |  |
| Shaft end             |   |     |   |   |   |  |   |   |   |  |  |  |  |  |  |  |  |  |  |
| Mounting flange       |   |     |   |   |   |  |   |   |   |  |  |  |  |  |  |  |  |  |  |
| Service line ports    |   |     |   |   |   |  |   |   |   |  |  |  |  |  |  |  |  |  |  |
| valves                |   |     |   |   |   |  |   |   |   |  |  |  |  |  |  |  |  |  |  |
| Speed measurement     |   |     |   |   |   |  |   |   |   |  |  |  |  |  |  |  |  |  |  |

## 2. Specifications terms

Flow :  $q_v = V_g \cdot n / 1000 \cdot \eta_v$  L/min

Output speed :  $n = q_v \cdot 1000 \cdot \eta_v / V_g$  rpm

Output torque :  $T = V_g \cdot \Delta P \cdot \eta_{mh} / 2 \cdot \pi$  N.m

power :  $P = 2\pi \cdot T \cdot n / 60000 = q_v \cdot \Delta P \cdot \eta_t / 60$  KW

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

$\eta_v$  = volumetric efficiency  $\eta_{mh}$ =mechanical efficiency  $\eta_t$ = overall efficiency



## 3. Technical data

### 3.1 Technical data

|                            |                    |      |      |      |      |      |      |      |      |      |
|----------------------------|--------------------|------|------|------|------|------|------|------|------|------|
| Size                       |                    | 28   | 32   | 45   | 56   | 63   | 80   | 90   | 107  | 125  |
| Displacement $V_{g_{max}}$ | cm <sup>3</sup> /r | 28   | 32   | 45.5 | 56   | 63   | 80.5 | 90   | 107  | 125  |
| Max. speed $n_{max}$       | rpm                | 6300 | 6300 | 5600 | 5000 | 5000 | 4500 | 4500 | 4000 | 4000 |
| Maxflow at $n = n_{max}$   | L/min              | 176  | 201  | 255  | 280  | 315  | 362  | 405  | 428  | 500  |
| Torque constants           | Nm/bar             | 0.45 | 0.51 | 0.73 | 0.89 | 1.0  | 1.27 | 1.43 | 1.70 | 1.99 |
| Torque $\Delta P=40MPa$    | Nm                 | 180  | 204  | 292  | 356  | 400  | 508  | 572  | 680  | 796  |
| Filling capacity           | L                  | 0.22 | 0.22 | 0.32 | 0.46 | 0.46 | 0.56 | 0.56 | 0.82 | 0.82 |
| Weight                     | Kg                 | 10   | 10   | 14   | 19   | 19.5 | 23   | 24   | 32   | 33   |

Note : 1 ) these figures did not consider the efficiency of mechanical and volumetric efficiency. rounded off the value.

### 3.2 Operational pressure range.

The Max pressure of ports A or B as following chart:

|                          |               |               |
|--------------------------|---------------|---------------|
| Size 28~125              | Shaft end A,Z | Shaft end B,P |
| Nominal pressure PN      | 40MPa         | 35MPa         |
| Peak pressure $P_{\max}$ | 45MPa         | 40MPa         |

Note : 1. With shaft end Z and P, a nominal pressure of  $p_N = 31.5\text{ MPa}$  is permissible for drives with radial loading of the drive shaft,  $P_N=31.5\text{ MPa}$ .

2. With shaft end Z, displacement range from 28 to 56 :  $P_N=35\text{ MPa}$  ,  $P_{\max}=40\text{ MPa}$

3. The pressure not more than 70MPa at port A and B.

### 3.3 Direction of rotation, (viewed on shaft end) .

- a.Clockwise , A to B
- b.counter-clockwise , B to A

### 3.4 Speed scope:

In situation most slow-speed of revolution  $n_{\min}$  which needs to move steadily cannot be lower than 50rpm, the highest rotational speed according to parameter list stipulation.

The Min speed  $n_{\min}$  is not more than 50rpm at normal running, Max speed refer to the above parameter chart.

### The matters needing attention:

- a. During commissioning and operation, the pump body must be filled with hydraulic fluid and air bled.
- b. The motor must be started up at low speed and no load until the system has been bled completely.
- c. To reduce the noise, all connection pipeline isolates with flexible part and the fuel tank.
- d. the fluid temperature in circuit not more than 115°C.
- e. The permissive case drain pressure determined by motor speed , Instant[ $t \leq 5\text{min}$ ] permissive Max peak pressure  $P_k \leq 1\text{MPa}$  ; the absolute pressure of case drain at constantly running is not more than 0.3MPa.

## 4. Implementation standard of the hydraulic pumps

JB/T 10829-2008 Hydraulic motor



## 5.valves

### 5.1 Flush and Boost Pressure Valve

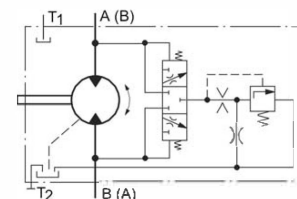
- a. The flush and boost pressure valve is used to remove heat from the closed control.
- b. To ensure that a minimum boost pressure is present (opening pressure 1.6MPa, fixed; note when setting primary valve).  
A side effect is flushing of the case. )

Standard flushing volumes : (at low pressure  $\Delta P=2.5\text{MPa}$  )

| No | Size       | Flushing volume |
|----|------------|-----------------|
| 1  | 45. 56. 63 | 3.5L/min        |
| 2  | 80. 90     | 5 L/min         |
| 3  | 107.125    | 8 L/min         |

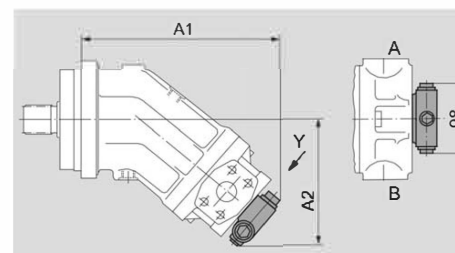
Note : orifices for flushing volumes adjusting.

c. Circuit diagram :



1

d.The installation position chart for flushing and boost pressure valve:Port plate 027: SAE flange ports, at side



2

| No | Size    | A1  | A2    |
|----|---------|-----|-------|
| 1  | 45.     | 223 | 151   |
| 2  | 56.63   | 239 | 159   |
| 3  | 80. 90  | 268 | 173.5 |
| 4  | 107.125 | 294 | 192   |

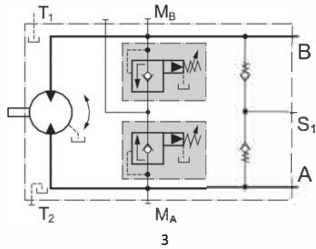


## 5.valves

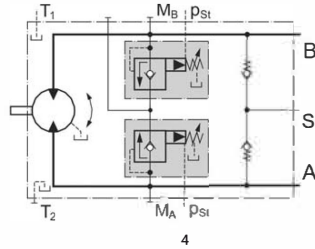
### 5.2. Pressure Relief Valves

- The pressure relief valves protect the motor from excess pressure. When the set opening pressure is reached the hydraulic fluid flows from the high pressure side to the low pressure side.
- Setting range opening pressure, at design without pressure sequence range 5MPa----42MPa "with pressure sequence range 2.5MPa----3MPa, opening pressure at pilot pressure applied.
- the principle chart for relief valve :

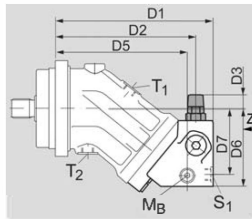
Design without pressure sequence range "191"



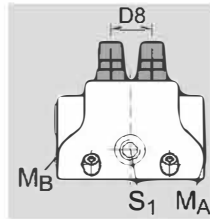
Design with pressure sequence range "192"



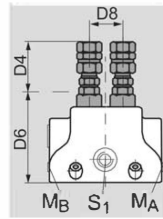
d. Installation position for relief valve.



5

view z  
Design without pressure  
sequence range "191"

6

view z  
Design with pressure  
sequence range "192"

7

Note: A, B Service line ports S1 Boosting (only for port plate 191/192)MA, MB Gauge ports (plugged)  
pSt Pilot pressure port (only for port plate 192)

Specifications & Size for ports :

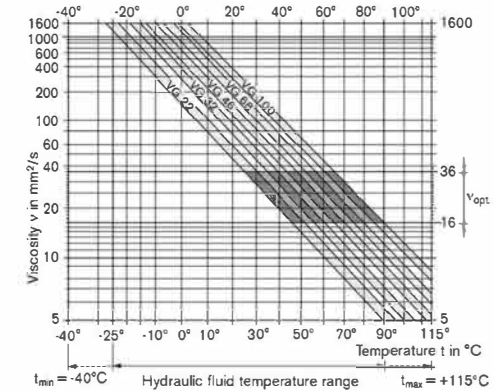
| Size      | A , B        | S1                | MA , MB           | P St  |
|-----------|--------------|-------------------|-------------------|-------|
| 28 , 32   | SAE 3/4 in   | M22×1.5 , deep 14 | M20×1.5 , deep 14 | G 1/4 |
| 45        | SAE 3/4 in   | M22×1.5 , deep 14 | M20×1.5 , deep 14 | G 1/4 |
| 56 , 63   | SAE 3/4 in   | M26×1.5 , deep 14 | M26×1.5 , deep 14 | G 1/4 |
| 80 , 90   | SAE 1 in     | M26×1.5 , deep 14 | M26×1.5 , deep 14 | G 1/4 |
| 107 , 125 | SAE 1 1/4 in | M26×1.5 , deep 14 | M26×1.5 , deep 14 | G 1/4 |

Specifications and Size for Assembly

| Size      | D1  | D2    | D3   | D4 | D5  | D6    | D7  | D8 |
|-----------|-----|-------|------|----|-----|-------|-----|----|
| 28 , 32   | 209 | 186   | 25   | 63 | 174 | 102   | 87  | 36 |
| 45        | 222 | 198   | 22   | 60 | 187 | 113   | 98  | 36 |
| 56 , 63   | 250 | 222   | 19   | 57 | 208 | 124   | 105 | 42 |
| 80 , 90   | 271 | 243,5 | 17,5 | 55 | 229 | 134   | 114 | 42 |
| 107 , 125 | 298 | 267   | 10   | 48 | 251 | 149,5 | 130 | 53 |

## 6. Fluid choice

- 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 units, which Application of the basic division of the above depends on the relationship of the water, temperature and viscosity, and consider oxidation and corrosion protection, material compatibility, air and water separation properties.
- In order to ensure long service life of equipment, we recommend using the hydraulic fluid on working temperature, which the working viscosity is 16~36mm<sup>2</sup>/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.



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- 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 9—In accordance with NAS 1638

Grade 18/15—In accordance with ISO/DIS 4406

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

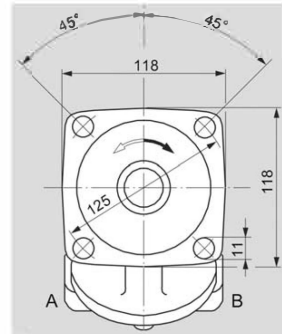
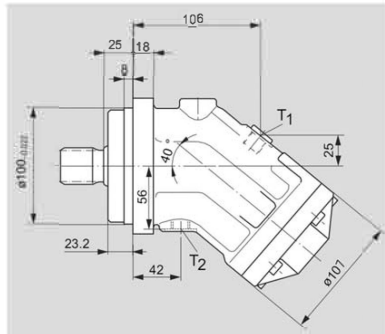
Grade 17/14—In accordance with GB/T 14039-1993

Grade 8—In accordance with NAS 1638

Grade 17/14—In accordance with ISO/DIS 4406

## 7. Dimensions & Sizes of hydraulic motor

### Unit Dimensions, Sizes A2FM-28/32



9

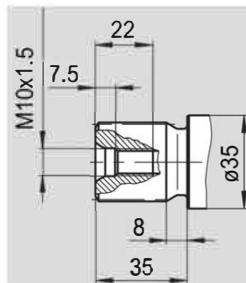
## Ports

**A, B** Service line ports (see port plates)

T1, T2 Case drain ports (T1 plugged) M16×1.5 , deep 12

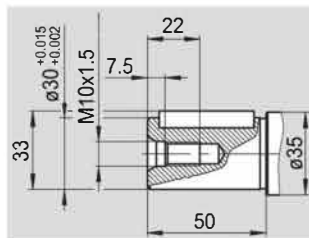
### Shaft ends

A Splined shaft DIN 5480  
W30x2x30x14x9g



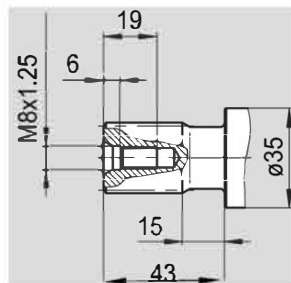
10

B Parallel keyed shaft DIN 6885  
8x7x40



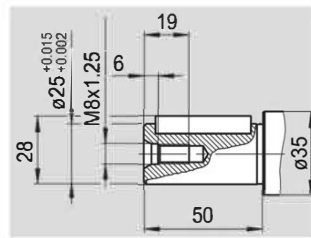
12

Z Splined shaft DIN 5480  
W25×1.25×30×18×9g



11

Parallelkeyed shaft DIN 6885  
8x7x40

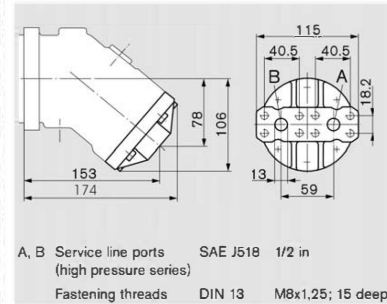


13

## 7. Dimensions & Sizes of hydraulic motor

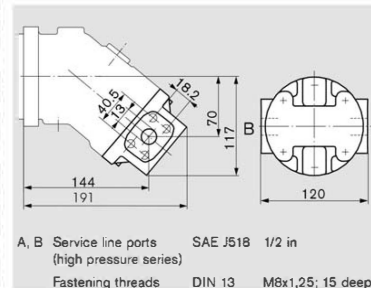
### Port plates

01 SAE flange ports, rear



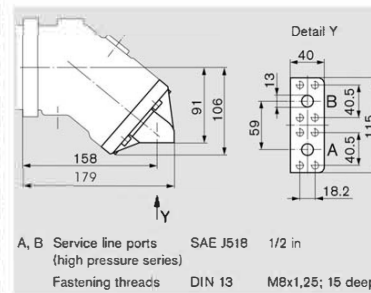
14

### 03 SAE Threaded ports, at side



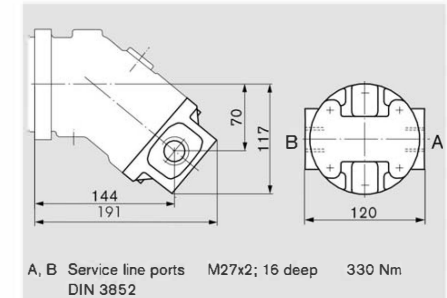
16

10 SAE flange ports, bottom



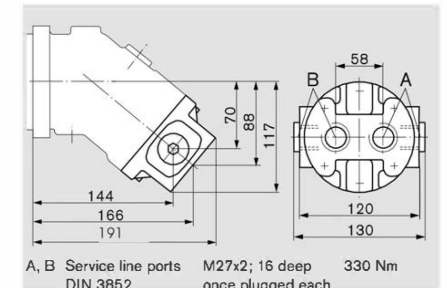
18

02 SAE flange ports, at side



15

#### 04 SAE Threaded ports, at side and rear

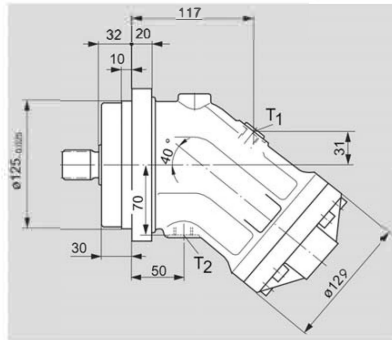


17



## 7. Dimensions & Sizes of hydraulic motor

### Unit Dimensions, Sizes A2FM-56/63



26

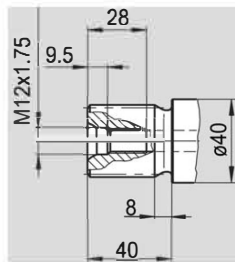
### Ports

A, B Service line ports (see port plates)

T<sub>1</sub>, T<sub>2</sub> Case drain ports (T<sub>1</sub> plugged) M18x1.5, deep 12

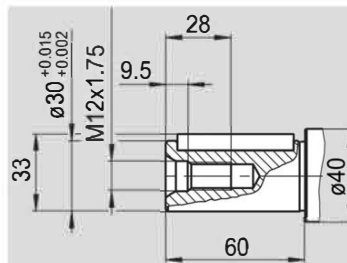
### Shaft ends

A Splined shaft DIN 5480  
W35x2x30x16x9g



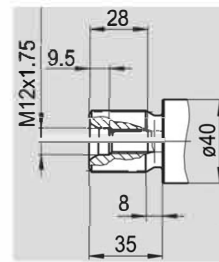
27

B Parallel keyed shaft DIN 6885  
10x8x50



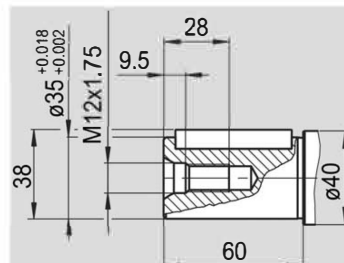
29

Z Splined shaft DIN 5480  
W30x2x30x14x9g



28

P Parallel keyed shaft DIN 6885  
8x7x50

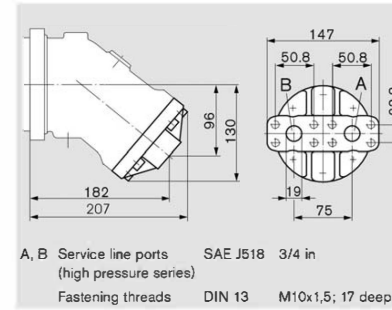


30

## 7. Dimensions & Sizes of hydraulic motor

### Port plates

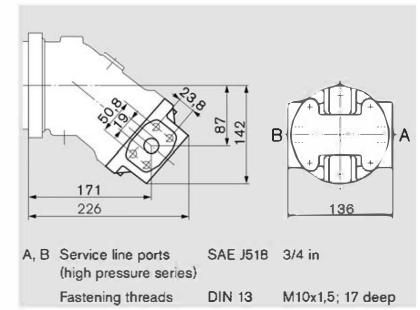
01 SAE flange ports, rear



A, B Service line ports SAE J518 3/4 in  
(high pressure series)  
Fastening threads DIN 13 M10x1.5; 17 deep

31

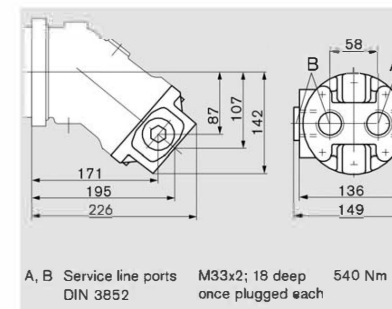
02 SAE flange ports, at side



A, B Service line ports SAE J518 3/4 in  
(high pressure series)  
Fastening threads DIN 13 M10x1.5; 17 deep

32

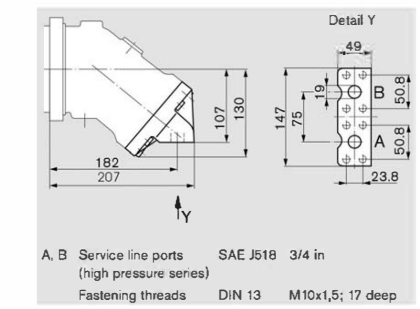
04 SAE Threaded ports, at side and rear



A, B Service line ports M33x2; 18 deep 540 Nm  
DIN 3852 once plugged each

33

10 SAE flange ports, bottom

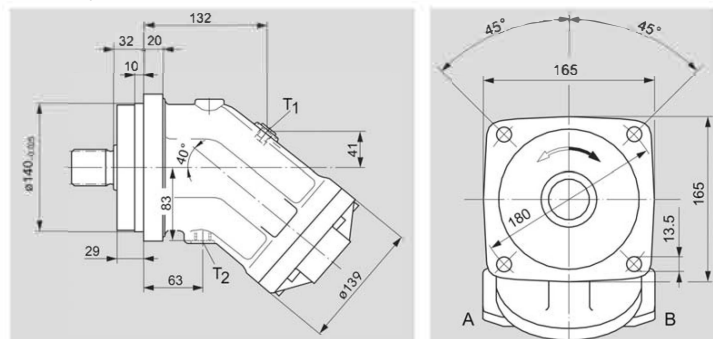


A, B Service line ports SAE J518 3/4 in  
(high pressure series)  
Fastening threads DIN 13 M10x1.5; 17 deep

34

## 7. Dimensions & Sizes of hydraulic motor

### Unit Dimensions, Size A2FM-80/90



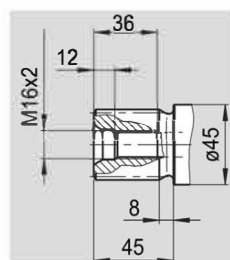
#### Ports

A, B Service line ports (see port plates)

T1, T2 Case drain ports (T1 plugged) M18×1.5, deep 12

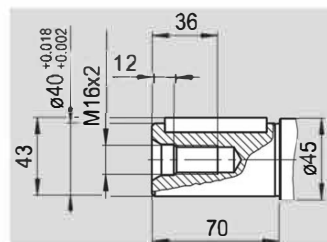
#### Shaft ends

A Splined shaft DIN 5480  
W40×2×30×18×9g



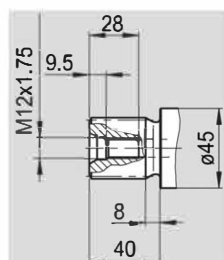
36

B Parallel keyed shaft DIN 6885  
12x8x56



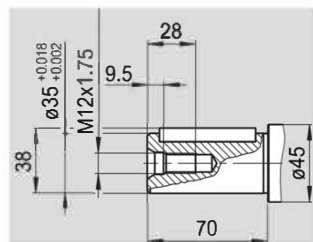
38

Z Splined shaft DIN 5480  
W35×2×30×16×9g



37

P Parallel keyed shaft DIN 6885  
10x8x56

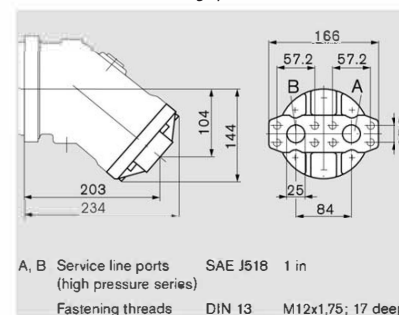


39

## 7. Dimensions & Sizes of hydraulic motor

### Port plates

#### 01 SAE flange ports, rear

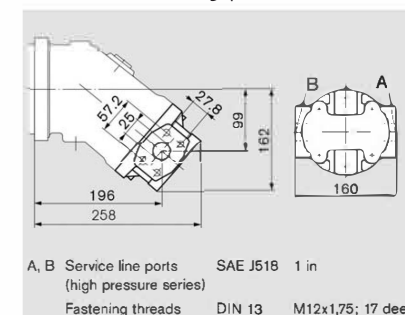


A, B Service line ports SAE J518 1 in  
(high pressure series)

Fastening threads DIN 13 M12x1,75; 17 deep

40

#### 02 SAE flange ports, at side

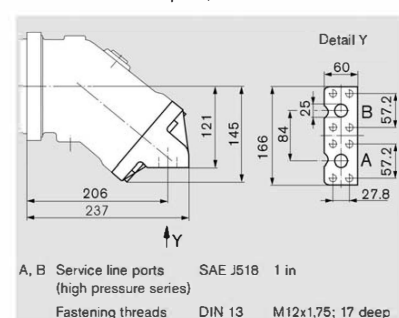


A, B Service line ports SAE J518 1 in  
(high pressure series)

Fastening threads DIN 13 M12x1,75; 17 deep

41

#### 10 SAE Threaded ports, bottom



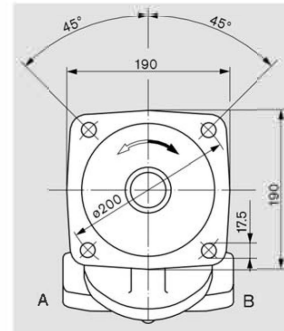
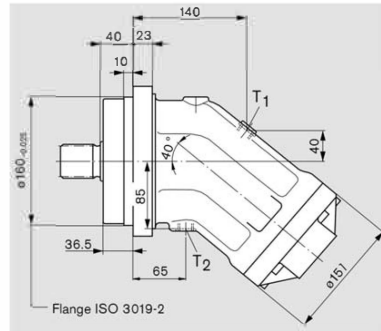
A, B Service line ports SAE J518 1 in  
(high pressure series)

Fastening threads DIN 13 M12x1,75; 17 deep

42

## 7. Dimensions & Sizes of hydraulic motor

### Unit Dimensions, Size A2FM-107/125



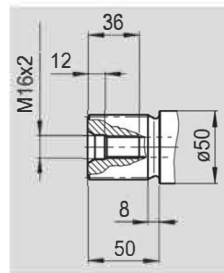
### Ports

A, B Service line ports (see port plates)

T1, T2 Case drain ports (T1 plugged) M18x1.5, deep 12

### Shaft ends

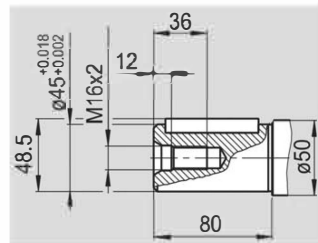
A Splined shaft DIN 5480  
W45x2x30x21x9g



44

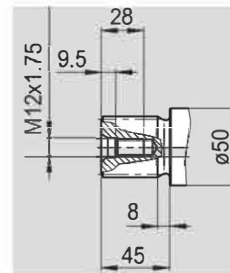
B Parallel keyed shaft DIN 6885

14x9x63



46

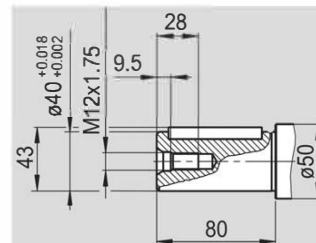
Z Splined shaft DIN 5480  
W40x2x30x18x9g



45

P Parallel keyed shaft DIN 6885

12x8x63

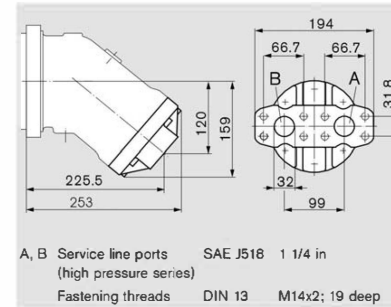


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## 7. Dimensions & Sizes of hydraulic motor

### Port plates

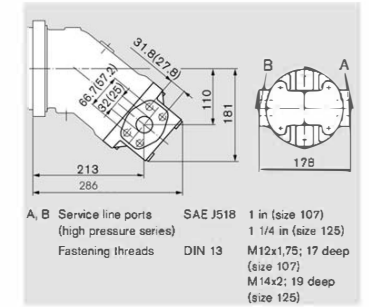
01 SAE flange ports, rear



A, B Service line ports (high pressure series)  
Fastening threads DIN 13 M14x2; 19 deep

48

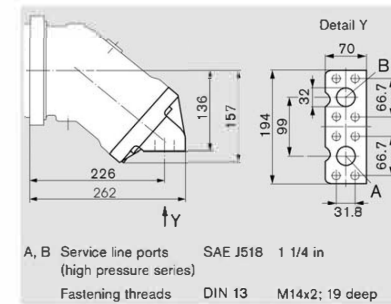
02 SAE flange ports, at side



A, B Service line ports (high pressure series)  
Fastening threads DIN 13 M12x1.75; 17 deep (size 107)  
M14x2; 19 deep (size 125)

49

10 SAE Threaded ports, bottom



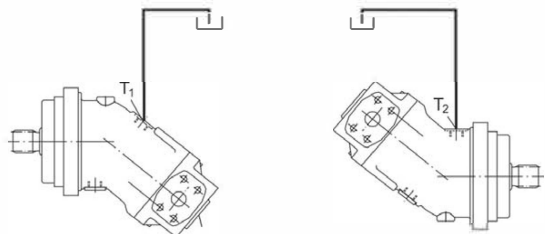
A, B Service line ports (high pressure series)  
Fastening threads DIN 13 M14x2; 19 deep

50

## 8. Installation instructions

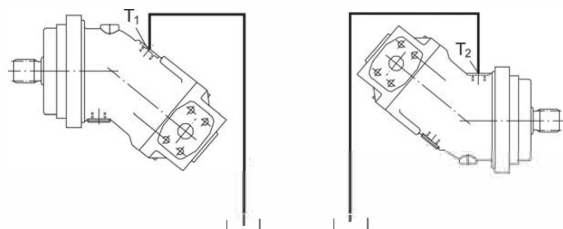
### 8.1 Installation position

- a. Motor below min. fluid level in the tank (standard), Minimum immersion depth of leakage line in tank: 200 mm (relative to the min. fluid level in the tank). Recommended Installation position as following:



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- b. Motor above min. fluid level in tank Proceed in same way as below the tank installation, Minimum immersion depth of leakage line in tank: 200 mm (relative to the min. fluid level in the tank). Recommended Installation position as following:



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### 8.2 Installation instructions

- a. The motor case must be completely filled up with hydraulic fluid during startup and during operation (filling the case chamber). The motor must be started up at low speed and no load until the system has been bled completely. If stopped for an extended period, fluid may drain out of the case through the service lines. When restarting, make sure that the case contains sufficient fluid.
- d. The leakage fluid inside the case chamber must be drained off to the tank through the highest case drain port. While Installation above the tank, Motor above min. fluid level in tank Putting a non-return valve (opening pressure 0,05 Mpa) in the leakage line can prevent the system emptying through the line.