

## A6VE Series Variable plug-in motor

### ■ Product show and brief introduction

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#### open and closed circuits

Series 63  
Sizes 55,107  
Nominal pressure 40MPa  
Maximum pressure 45MPa



### ■ Features

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- Variable plug-in motor with axial tapered piston rotary group of bent-axis design, for hydrostatic drives in open and closed circuits
- Far-reaching integration in mechanical gears due to recessed mounting flange located in the center of the case (extremely space-saving construction)
- Easy to install, simple to plug into the mechanical gearbox (no configuration specifications to be observed)
- Tested unit ready to install
- For use preferably in mobile applications
- The displacement can be continuously changed from  $V_g \text{ max}$  to  $V_g \text{ min}=0$ .
- The wide control range enables the variable motor to satisfy the requirement for high speed and high torque
- The output speed depends 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.

## Model Code

A6V	E	55	HD1	D	/63	W	-V	Z	L	010	F	P	B
Axial piston unit	Operating mode	Size	Control unit	Pressure control	series	Direction of rotation	Sealing material	Drive shaft	Mounting flange	Port plate for working line	Speed sensor	Connector for solenoids	Beginning of control
A6V: bent-axis design, variable	E: plug-in motor	55 107	See below	(only for HD, EP) D: pressure control, fixed setting	63	Viewed on drive shaft, bidirectional	FKM (fluoroelastomer)	See below	L: ISO 3019-2 2-hole	See below	No code: without speed sensor F: Prepared for HDD speed sensor	No code: without solenoid P: DEUTSCH molded connector, 2-pl, without suppressor diode	A: at $V_g$ min (standard for HA) B: at $V_g$ max (standard for HD, HZ, EP, EZ)

## Control unit

	55	107	
Proportional control, hydraulic	$\Delta P_{st}=10\text{bar}$ $\Delta P_{st}=25\text{bar}$	✓ ✓	HD1 HD2
Proportional control, electric	U=12V U=24V	✓ ✓	EP1 EP2
Two-point control, electric	U=12V U=24V	✓ ✓	EZ3 EZ4
Two-point control, hydraulic	/	/	HZ1 HZ3
Automatic control, high-pressure related	With minimum pressure increase $\Delta p \leq \text{approx. } 10\text{bar}$ With pressure increase $\Delta p=100\text{bar}$	✓ ✓	HA1 HA2

## Drive shafts

	55	107	
Splined shaft DIN5480	✓ ✓	✓ ✓	A Z

## Port plate for working line

	55	107	
SAE working ports A and B at rear	without valve Flushing and boost-pressure valve, mounted	✓ ✓	010 017
SAE working ports A and B opposite	without valve Flushing and boost-pressure valve, mounted	✓ ✓	020 027



## Technical Data

### Hydraulic fluid

The A6VE fixed displacement motor is suitable for use with mineral oil

### Viscosity range

We recommend that a viscosity (at operating temperature) for optimum efficiency and service life purposes of

$$V_{opt} = \text{optimum viscosity } 16 \dots 36 \text{ mm}^2/\text{s}$$

Be chosen, taken the tank temperature (open circuit) into account.

### Limits of viscosity range

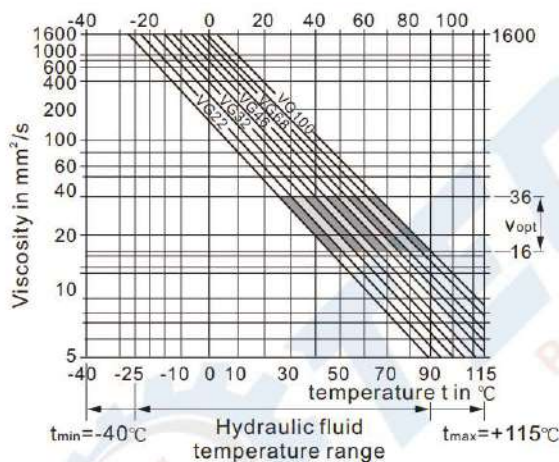
The following values apply in extreme cases:

$V_{min} = 5 \text{ mm}^2/\text{s}$   
short term ( $t < 3 \text{ min}$ ) at max. permitted temperature  
 $t_{max} = 115^\circ\text{C}$

$V_{max} = 1600 \text{ mm}^2/\text{s}$   
short term ( $t < 3 \text{ min}$ ) with cold start ( $P < 3 \text{ MPa}$ ,  
 $n \leq 1000 \text{ rpm}$ ,  $t_{min} = -40^\circ\text{C}$ )

Note that the maximum hydraulic fluid temperature must not be exceeded locally either (e.g. bearing area). The temperature in the bearing area is depending on pressure and speed up to 12K higher than the average case drain temperature.

### Selection diagram



### Details regarding the choice of hydraulic fluid

The correct selection of hydraulic fluid requires knowledge of the operating temperature in relation to the ambient temperature, in an open circuit the tank temperature.

The hydraulic fluid should be selected so that within the operating temperature range, the operating viscosity lies within the optimum range ( $V_{opt}$ ) (see shaded section of the selection diagram). We recommend that the highest possible viscosity range should be chosen in each case.

Example: At an ambient temperature of  $X^\circ\text{C}$  an operating temperature of  $60^\circ\text{C}$  is set in the circuit. In the optimum operating viscosity range ( $V_{opt}$ ; shaded area) this corresponds to the viscosity classes VG 46 or VG 68; to be selected: VG 68.

Please note: The leakage fluid temperature, which is affected by pressure and rotational speed, is always higher than the tank temperature. At no point in the system may the temperature be higher than  $115^\circ\text{C}$ .

### Filtration

The finer the filtration, the cleaner the fluid and the longer the service life of the axial piston unit.

To ensure proper function of the axial piston unit, the hydraulic fluid must have a cleanliness level of at least

20/18/15 according to ISO 4406.

At very high hydraulic fluid temperatures ( $90^\circ\text{C}$  to max.  $115^\circ\text{C}$ ), a cleanliness level of at least

19/17/14 according to ISO 4406 is required.

### Operational pressure range

maximum pressure in port A or B

Nominal pressure  $P_N$  \_\_\_\_\_ 40 MPa

Maximum pressure  $P_{max}$  \_\_\_\_\_ 45 MPa

Total pressure (A+B)  $P_{max}$  \_\_\_\_\_ 70 MPa

Please note:

For Z axis stretch, if driving gear drive shaft radial load (gear and triangle belt), allowing the nominal pressure of  $P_N = 31.5 \text{ MPa}$ .

### Direction of flow

Direction of rotation, viewed on drive shaft

clockwise \_\_\_\_\_ counter-clockwise \_\_\_\_\_

A to B \_\_\_\_\_ B to A \_\_\_\_\_

The minimum speed  $n_{min}$  is unlimited. For uniform,  $n_{min}$  should not be less than 50 rpm.

### Shaft seal

#### Permissible pressure loading

The service life of the shaft seal is influenced by the rotational speed of the axial piston unit and the leakage pressure in the housing (case pressure). Momentary ( $t < 0.1 \text{ s}$ ) pressure peaks of up to 1 MPa are allowed. Case pressure of a continuous 0.2 MPa maximum are permitted to be able to utilize the entire speed range. Higher case pressure are permissible at lower rotational speeds. The service life of the shaft seal decreases with increasing frequency of pressure peaks and increasing mean differential pressure. The case pressure must be equal to or higher than the ambient pressure.

### Temperature range

The FKM shaft seal ring may be used for leakage temperature from  $-25^\circ\text{C}$  to  $+115^\circ\text{C}$ . For application cases below  $-25^\circ\text{C}$ , an NBR shaft seal is required (permissible temperature range:  $-40^\circ\text{C}$  to  $+90^\circ\text{C}$ ).

### Effect of pressure on beginning of control

An increase in case pressure affects the beginning of control of the variable motor when using the following control options:

HA1T: increase

HD, HA, HA.U, EP: increase

The factory setting for the beginning of control are made at  $P_{abs} = 0.2 \text{ MPa}$  case pressure.

## Technical Data

### Datasheet (theoretical values)

Size			55	107
Displacement	$V_{g \max}$	mL/r	54.8	107
	$V_{g0}$	mL/r	0	0
Maximum rotational speed (while adhering to the maximum permissible inlet flow)	$n_{\max}$ at $V_{g \max}$	rpm	4450	3550
	$n_{\max1}$ at $V_g < V_{g \max}$	rpm	7000	5600
	$n_{\max}$ at $V_{g0}$	mL/r	8350	6300
Maximum flow	$Q_{v \max}$	L/min	224	380
Torque	$T_{\max}$ at $V_{g \max}$	Nm	349	681
Rotational stiffness		Nm/ $^\circ$	700	1560
Moment of inertia for rotary group	J	kgm <sup>2</sup>	0.0042	0.0127
Case volume	V	L	0.75	1.5
Weight approx.	m.	kg	26	47

See the HA6VM technical data sheet for additional information

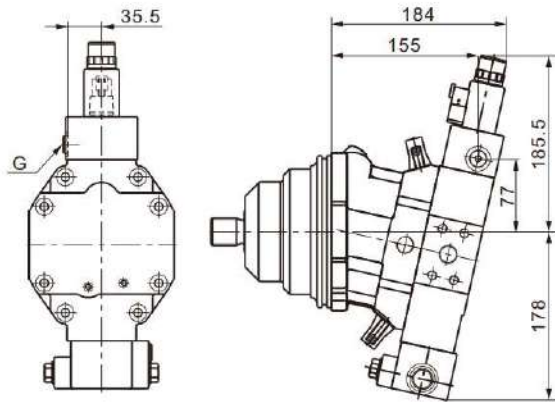
- Allowable displacement and intake pressure for rotational speed
- Allowable radial and axial forces on the drive shaft
- Description and specification of displacement

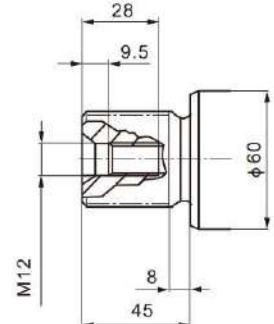
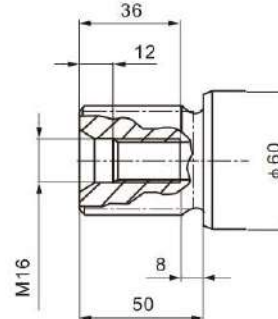
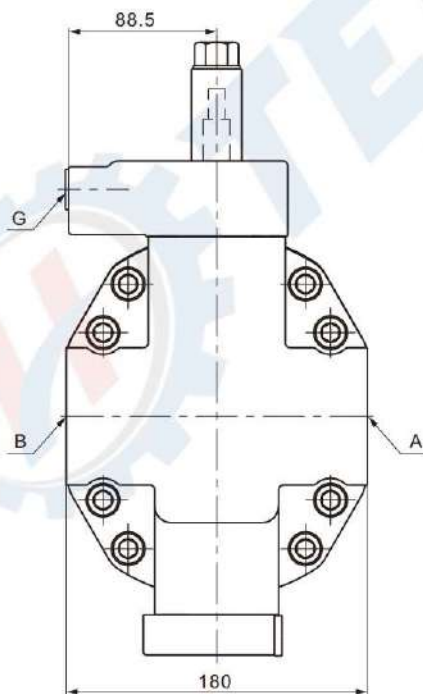
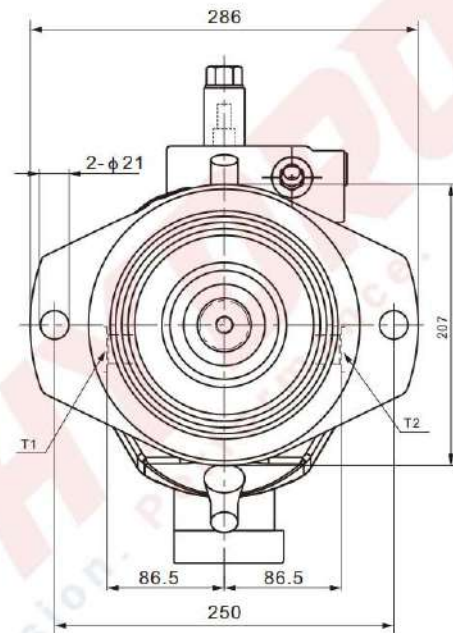




■ Installation dimensions Size 55

EP1,EP2:Proportional control,electric

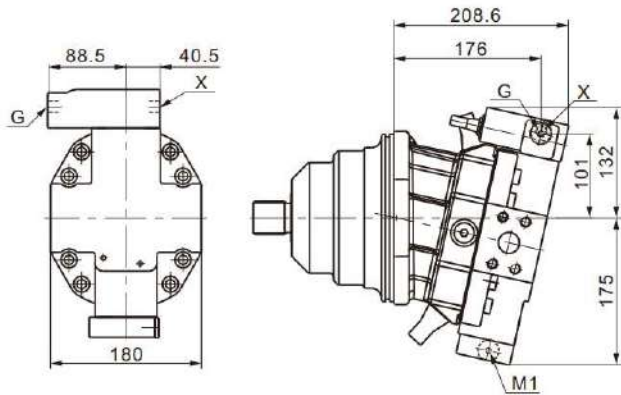




Ports		
A,B	Working port	1 in
	Fastensing thread A/B	M10, 17 deep
T <sub>1</sub>	Drain port	M18×1.5, 12 deep
T <sub>2</sub>	Drain port	M18×1.5, 12 deep
G	Synchronous control	M14×1.5, 12 deep
M1	Control pressure measuring port	M14×1.5, 12 deep

■ Installation dimensions Size 107

HD1,HD2:Proportional control,hydraulic



X Pilot pressure port M14×1.5, 12 deep



## Flushing and boost-pressure valve

The flushing and boost-pressure valve is used to remove heat from the hydraulic circuit.

In a closed circuit, it is used for flushing the case and safeguarding the minimum boost pressure.

Hydraulic fluid is directed from the respective low pressure side into the motor housing. This is fed into the reservoir, together with the leakage. In the closed circuit, the removed hydraulic fluid must be replaced by cooled hydraulic fluid supplied by the boost pump.

The valve is mounted on the port plate or integrated (depending on the control type and size)

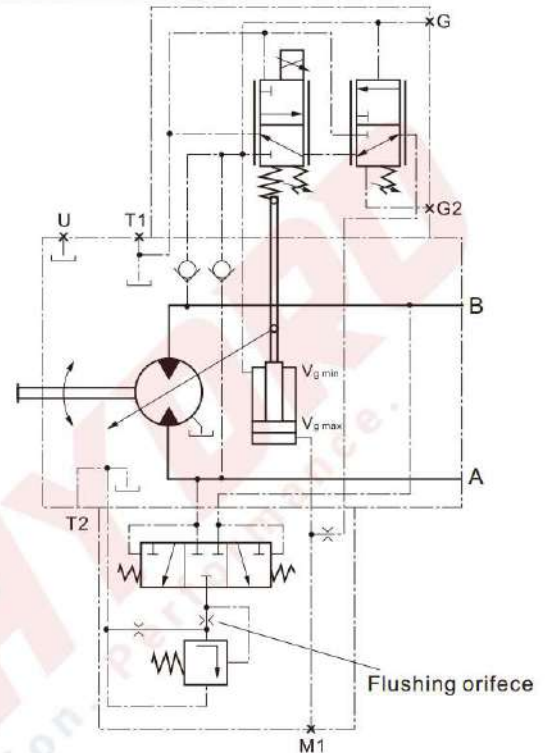
### Flushing flow (at low pressure $P_{lp}=2.5\text{MPa}$ )

Size	Flow
55	3.5L/min
107	8L/min

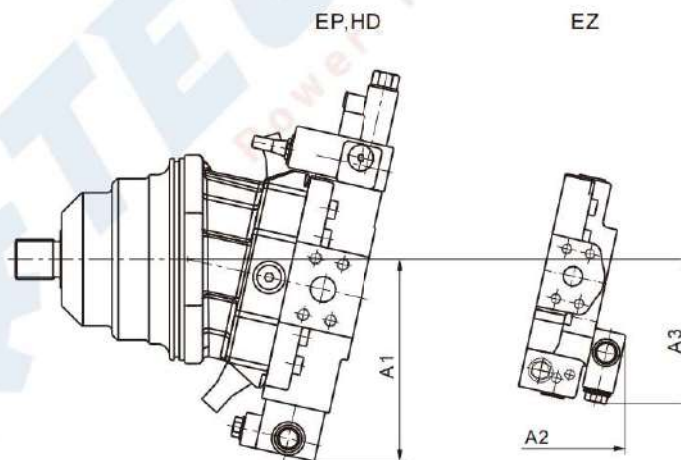
The flushing flows deviating from the values in the table, please state the required flushing flow when ordering.

The flushing flow without orifice is approx. 12 to 14 L/min.

Characteristic curve



### Installation dimensions



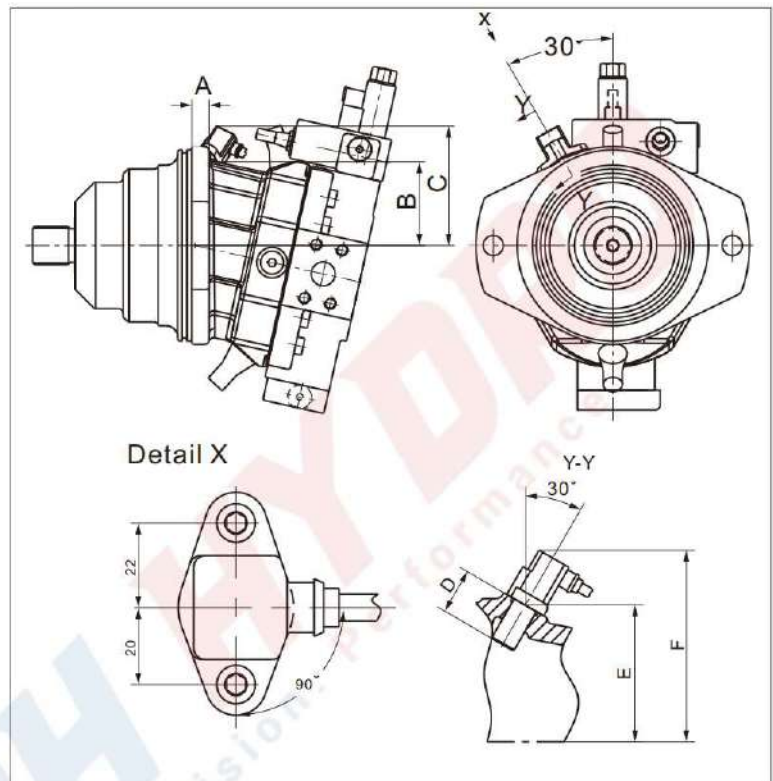
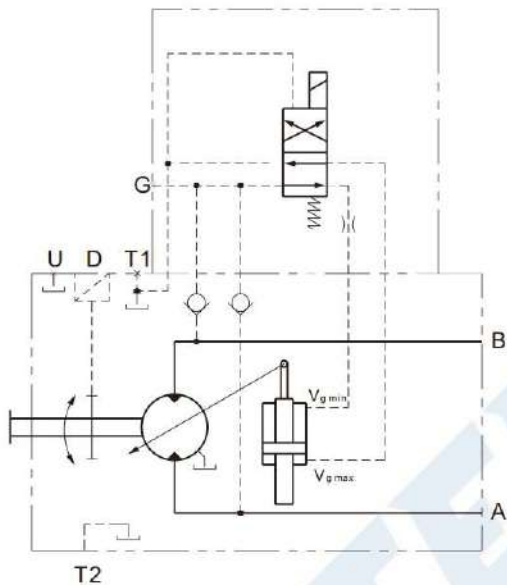
Size	A1	A2	A3
55	176	176	151
107	200	-	-

## Speed sensor

- Type F is used for speed measurement
- Dimensions

HA6VE... Type F (" for speed measurement ", no sensor) drive shaft with teeth. The toothed drive shaft rotates and generates a signal proportional to the speed. This signal is detected by the sensor and transmitted to the calculation processing part. Type F is suitable for mounting on the HDD Hall speed sensor. The HDD sensor is connected in a flat surface with two locking screws.

- Circuit diagram EP



Size	Number of teeth	A	B	C	D	E	F
55	54	25.8	72.2	110.3	32	83.4±0.1	121.7
107	67	14.7	83.1	121.2	32	95.9±0.1	141.7

## Installation instructions

### General

The axial piston unit must be filled with hydraulic fluid and air bled during commissioning and operation. This must also be observed following a longer standstill as the axial piston unit may empty via the hydraulic lines. Particularly in the installation position "drive shaft upwards", filling and air bleeding must be carried out completely as there is, for example, a danger of dry running.

The leakage in the housing area must be directed to the reservoir via the highest drain port.

### Installation position

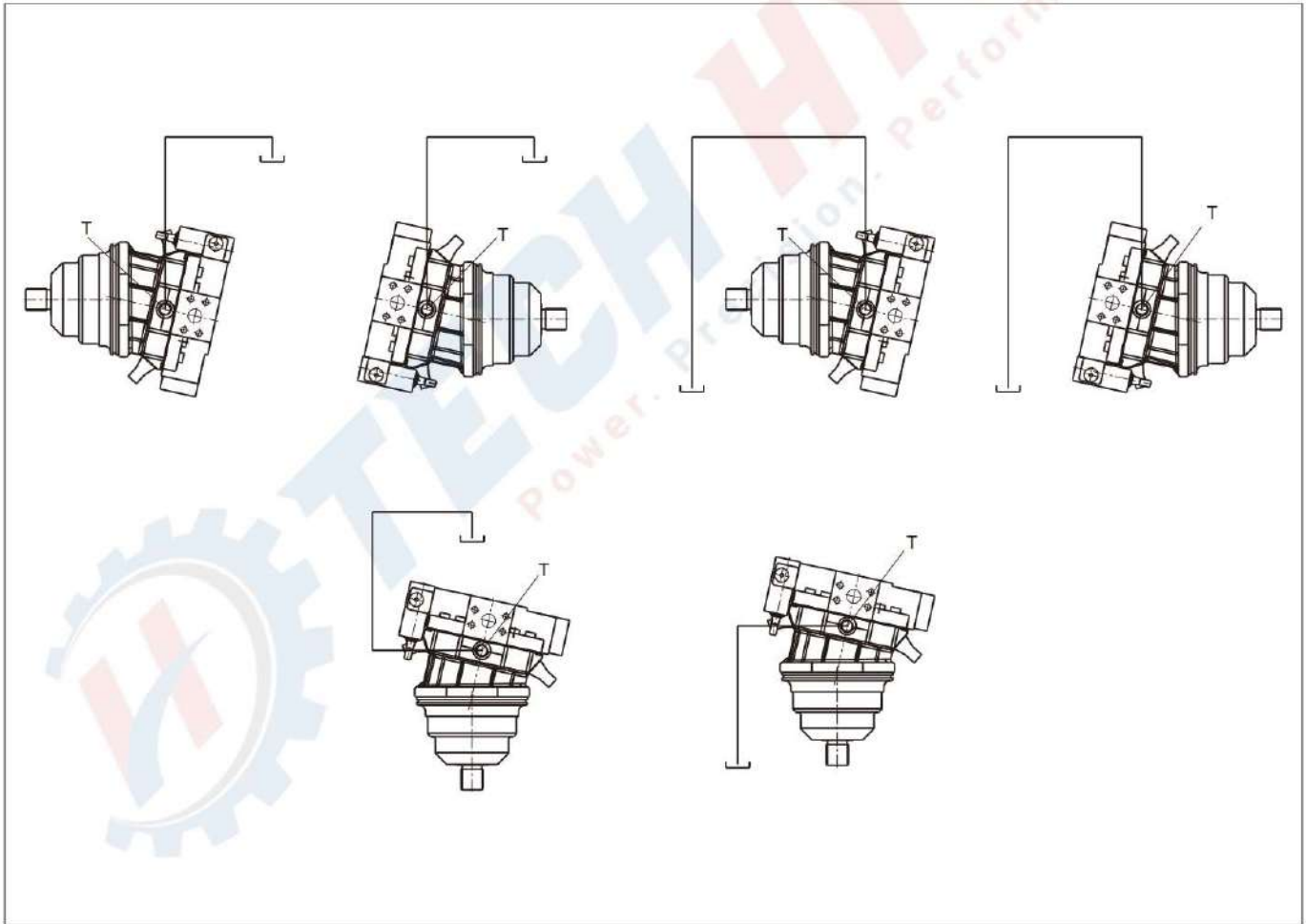
See the following examples. Further installation positions are available upon request.

### Below-reservoir installation (standard)

Below-reservoir installation means that the axial piston unit is installed outside of the reservoir and below the minimum fluid level of the reservoir.

### Above-reservoir installation

Above-reservoir installation means that the axial piston unit is installed above the minimum fluid level of the reservoir. A check valve in the reservoir line (cracking pressure 0.05 Mpa) can prevent draining of the housing area.





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