

# Axial Piston Variable Pump HP2VC Series 3\*

Size: 56-180 mL/r  
Rated pressure: 40 MPa  
Max. pressure: 45 MPa



## Features

- Axial variable pump in swashplate design for hydrostatic drives in closed circuits
- The flow is proportional to the drive speed and displacement and is infinitely varied
- The output flow increases from zero to the maximum value as the swashplate swivels
- The flow direction changes when the swashplate is moved through the neutral position
- Various mutually compatible control options to provide diverse control and regulation functions
- Two pressure relief valves on each high-pressure side to prevent overloading of hydrostatic drives (pump and motor)
- Pressure relief valve with boost function
- Integrated boost pump works as the boost and control pump
- Maximum boost pressure limited by integrated boost-pressure relief valve
- With integrated pressure cut-off valve as standard

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## Model Code

|      | c | A | B | C | D | E | F | G | H | I | K  | M | N | P | R | S | T | U | X | Z |  |
|------|---|---|---|---|---|---|---|---|---|---|----|---|---|---|---|---|---|---|---|---|--|
| HP2V | C |   |   |   |   |   |   |   | 1 | / | 3* |   | - |   |   |   |   |   |   | - |  |

### Axial piston unit

|   |                                             |      |
|---|---------------------------------------------|------|
| - | Swashplate design, variable closed circuits | HP2V |
|---|---------------------------------------------|------|

### Operation

| C |                | 56 | 63 | 71 | 125 | 145 | 180 |   |
|---|----------------|----|----|----|-----|-----|-----|---|
|   | Closed circuit | ●  | ●  | ●  | ●   | ●   | ●   | C |

### Displacement

| A | Geometric displacement, in mL/r | 56 | 63 | 71 | 125 | 145 | 180 |  |
|---|---------------------------------|----|----|----|-----|-----|-----|--|
|---|---------------------------------|----|----|----|-----|-----|-----|--|

### Variable control method

| B |                   |                            |                          |          | 56 | 63 | 71 | 125 | 145 | 180 |     |
|---|-------------------|----------------------------|--------------------------|----------|----|----|----|-----|-----|-----|-----|
|   | Hydraulic control | Pilot pressure control     | Without inlet filtration |          | ●  | ●  | ●  | ●   | ○   | ●   | HD1 |
|   |                   |                            | With inlet filtration    |          | ●  | ●  | ●  | ●   | ○   | ●   | HD3 |
|   |                   | Mechanical servo           |                          |          | ●  | ●  | ●  | ●   | ○   | ○   | HW  |
|   | Electric control  | With proportional solenoid | Without inlet filtration | U=12V DC | ●  | ●  | ●  | ●   | ○   | ●   | EP1 |
|   |                   |                            |                          | U=24V DC | ●  | ●  | ●  | ●   | ○   | ●   | EP2 |
|   |                   |                            | With inlet filtration    | U=12V DC | ●  | ●  | ●  | ●   | ○   | ○   | EP3 |
|   |                   |                            |                          | U=24V DC | ●  | ●  | ●  | ●   | ○   | ○   | EP4 |
|   |                   | With switching solenoid    | Without inlet filtration | U=12V DC | ●  | ●  | ●  | ○   | ○   | ○   | EZ1 |
|   |                   |                            |                          | U=24V DC | ●  | ●  | ●  | ●   | ○   | ○   | EZ2 |
|   |                   |                            | With inlet filtration    | U=12V DC | ○  | ○  | ○  | ○   | ○   | ○   | EZ3 |
|   |                   |                            |                          | U=24V DC | ○  | ○  | ○  | ●   | ○   | ○   | EZ4 |

### Brake valve

| C |                                                |    |          |  | 56 | 63 | 71 | 125 | 145 | 180 |    |
|---|------------------------------------------------|----|----------|--|----|----|----|-----|-----|-----|----|
|   | Without brake valve (without code)             |    |          |  | ●  | ●  | ●  | ●   | ○   | ○   |    |
|   | only for HW control valve on the HW valve body | NO | U=12V DC |  | ○  | ○  | ○  | ○   | ○   | ○   | O1 |
|   |                                                |    | U=24V DC |  | ●  | ●  | ●  | ○   | ○   | ○   | O2 |
|   |                                                | NC | U=12V DC |  | ○  | ○  | ○  | ○   | ○   | ○   | C1 |
|   |                                                |    | U=24V DC |  | ●  | ●  | ●  | ○   | ○   | ○   | C2 |
|   | all control valve on the back cover            | NO | U=12V DC |  | —  | —  | —  | —   | —   | —   | O3 |
|   |                                                |    | U=24V DC |  | —  | —  | —  | —   | —   | —   | O4 |
|   |                                                | NC | U=12V DC |  | —  | —  | —  | —   | —   | —   | C3 |
|   |                                                |    | U=24V DC |  | —  | —  | —  | —   | —   | —   | C4 |

## Model Code

|      | c | A | B | C | D | E | F | G | H | I | K  | M | N | P | R | S | T | U | X | Z |  |
|------|---|---|---|---|---|---|---|---|---|---|----|---|---|---|---|---|---|---|---|---|--|
| HP2V | C |   |   |   |   |   |   |   | 1 | / | 3* |   | - |   |   |   |   |   |   | - |  |

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

|   |                                                              | 56 | 63 | 71 | 125 | 145 | 180 |   |
|---|--------------------------------------------------------------|----|----|----|-----|-----|-----|---|
| D | Without neutral position switch (without code)               | ●  | ●  | ●  | ●   | ○   | ○   |   |
|   | With neutral position switch (with DEUTSCH molded connector) | ●  | ●  | ○  | ●   | ○   | ○   | L |

### Pressure cut-off valve

|   |                                               | 56 | 63 | 71 | 125 | 145 | 180 |   |
|---|-----------------------------------------------|----|----|----|-----|-----|-----|---|
| E | Without pressure cut-off valve (without code) | ●  | ●  | ●  | ●   | ○   | ●   |   |
|   | With pressure cut-off valve                   | ●  | ●  | ●  | ●   | ○   | ●   | D |

### Stroke limiter

|   |                                                       | 56 | 63 | 71 | 125 | 145 | 180 |   |
|---|-------------------------------------------------------|----|----|----|-----|-----|-----|---|
| F | Without mechanical stroke limiter (without code)      | ●  | ●  | ●  | ●   | ○   | ●   |   |
|   | With mechanical stroke limiter, externally adjustable | ●  | ●  | ●  | ●   | ○   | ●   | M |

### Stroking chamber pressure port(X3/X4)

|   |                                   | 56 | 63 | 71 | 125 | 145 | 180 |   |
|---|-----------------------------------|----|----|----|-----|-----|-----|---|
| G | Without port X3/X4 (without code) | ●  | ●  | ●  | ●   | ○   | ●   |   |
|   | With port X3/X4                   | ●  | ●  | ●  | ●   | ○   | ●   | T |

### DA control valve

|   |                          |    |    |    |     |     |     |   |
|---|--------------------------|----|----|----|-----|-----|-----|---|
| H |                          | 56 | 63 | 71 | 125 | 145 | 180 |   |
|   | Without DA control valve | ●  | ●  | ●  | ●   | ○   | ●   | 1 |

### Series

|   |           |    |    |    |     |     |     |    |
|---|-----------|----|----|----|-----|-----|-----|----|
| I |           | 56 | 63 | 71 | 125 | 145 | 180 |    |
|   | Series 3* | ●  | ●  | ●  | ●   | ○   | ●   | 3* |

### Direction of rotation (viewed on drive shaft)

|   |                 | 56 | 63 | 71 | 125 | 145 | 180 |   |
|---|-----------------|----|----|----|-----|-----|-----|---|
| K | CW (right-hand) | ●  | ●  | ●  | ●   | ○   | ●   | R |
|   | CCW (left-hand) | ●  | ●  | ●  | ●   | ○   | ●   | L |

### Sealing material

|   |                           | 56 | 63 | 71 | 125 | 145 | 180 |   |
|---|---------------------------|----|----|----|-----|-----|-----|---|
| M | NBR seal + FKM Shaft seal | ●  | ●  | ●  | ●   | ○   | ●   | N |
|   | NBR seal + NBR Shaft seal | ●  | ●  | ●  | ●   | ○   | ●   | P |

## Model Code

|      | c | A | B | C | D | E | F | G | H | I | K  | M | N | P | R | S | T | U | X | Z |  |
|------|---|---|---|---|---|---|---|---|---|---|----|---|---|---|---|---|---|---|---|---|--|
| HP2V | C |   |   |   |   |   |   |   | 1 | / | 3* |   | - |   |   |   |   |   |   | - |  |

### Drive shaft

| N |                                  |                                        | 56 | 63 | 71 | 125 | 145 | 180 |   |
|---|----------------------------------|----------------------------------------|----|----|----|-----|-----|-----|---|
|   | Splined shaft<br>DIN 5480        | For single pump                        | ●  | ●  | ●  | ●   | ○   | ●   | Z |
|   |                                  | For the 1st pump of a combination pump | ●  | ●  | ●  | ●   | ○   | ○   | A |
|   | Splined shaft<br>ANSI B92.1-1976 | For single pump                        | ●  | ●  | ●  | ●   | ○   | ●   | S |
|   |                                  | With connecting flange                 | ●  | ●  | ○  | ○   | ○   | ○   | L |
|   |                                  | For the 1st pump of a combination pump | ●  | ●  | ●  | ●   | ○   | ●   | T |

### Mounting flange

| P |                    |  | 56 | 63 | 71 | 125 | 145 | 180 |   |
|---|--------------------|--|----|----|----|-----|-----|-----|---|
|   | 2-hole, SAE J744   |  | ●  | ●  | —  | —   | —   | —   | C |
|   | 4-hole, SAE J744   |  | —  | —  | —  | —   | —   | ●   | D |
|   | 2+4-hole, SAE J744 |  | —  | —  | ●  | ●   | ○   | —   | F |

### Working ports (viewed on drive shaft)

| R |                            |                                                | 56 | 63 | 71 | 125 | 145 | 180 |    |
|---|----------------------------|------------------------------------------------|----|----|----|-----|-----|-----|----|
|   | Ports at<br>opposite sides | Suction port downwards                         | ●  | ●  | ●  | ●   | ○   | ●   | 02 |
|   |                            | Suction port upwards                           | ●  | ●  | ●  | ●   | ○   | ●   | 03 |
|   | Ports at<br>same side      | Suction port downwards, working port leftwards | ○  | ○  | ○  | ○   | ○   | ○   | 10 |
|   |                            | Suction port upwards, working port rightwards  | ○  | ○  | ○  | ○   | ○   | ○   | 13 |

### Boost pump and through drive

| S | Splined shaft ANSI B92.1               |                           |        | 56          | 63 | 71 | 125 | 145 | 180 |   |     |
|---|----------------------------------------|---------------------------|--------|-------------|----|----|-----|-----|-----|---|-----|
|   | Integrated<br>boost<br>pump            | Without through drive     |        |             | ●  | ●  | ●   | ●   | ○   | ○ | F00 |
|   |                                        | Flange SAE J 744-82-2(A)  | 5/8"   | 9T 16/32DP  | ●  | ●  | ●   | ●   | ○   | ● | F01 |
|   |                                        | Flange SAE J 744-101-2(B) | 7/8"   | 13T 16/32DP | ●  | ●  | ●   | ●   | ○   | ● | F02 |
|   |                                        |                           | 1"     | 15T 16/32DP | ●  | ●  | ●   | ●   | ○   | ● | F04 |
|   |                                        | Flange SAE J 744-127-2(C) | 1 1/4" | 14T 12/24DP | ●  | ●  | ●   | ●   | ○   | ○ | F07 |
|   |                                        | Flange SAE J 744-152-2(D) | 1 3/4" | 13T 8/16DP  | ○  | ○  | ○   | ●   | ○   | ● | F69 |
|   |                                        | Flange SAE J 744-165-2(E) | 1 3/4" | 13T 8/16DP  | ○  | ○  | ○   | ○   | ○   | ● | F72 |
|   | Without<br>integrated<br>boost<br>pump | Without through drive     |        |             | ●  | ●  | ●   | ●   | ○   | ● | N00 |
|   |                                        | Flange SAE J 744-82-2(A)  | 5/8"   | 9T 16/32DP  | ●  | ●  | ●   | ●   | ○   | ● | K01 |
|   |                                        | Flange SAE J 744-101-2(B) | 7/8"   | 13T 16/32DP | ●  | ●  | ●   | ●   | ○   | ● | K02 |
|   |                                        |                           | 1"     | 15T 16/32DP | ●  | ●  | ●   | ●   | ○   | ● | K04 |
|   |                                        | Flange SAE J 744-127-2(C) | 1 1/4" | 14T 12/24DP | ●  | ●  | ●   | ●   | ○   | ● | K07 |
|   |                                        | Flange SAE J 744-152-2(D) | 1 3/4" | 13T 8/16DP  | ○  | ○  | ○   | ●   | ○   | ● | K69 |
|   |                                        | Flange SAE J 744-165-2(E) | 1 3/4" | 13T 8/16DP  | ○  | ○  | ○   | ○   | ○   | ● | K72 |

Model Code

|      | c | A | B | C | D | E | F | G | H | I | K  | M | N | P | R | S | T | U | X | Z |  |
|------|---|---|---|---|---|---|---|---|---|---|----|---|---|---|---|---|---|---|---|---|--|
| HP2V | C |   |   |   |   |   |   |   | 1 | / | 3* |   | - |   |   |   |   |   |   | - |  |

High-pressure relief valve

|   |                                                                    |          |                |    |    |    |     |     |     |   |
|---|--------------------------------------------------------------------|----------|----------------|----|----|----|-----|-----|-----|---|
| T |                                                                    |          |                | 56 | 63 | 71 | 125 | 145 | 180 |   |
|   | With high-pressure relief valve, pilot operated                    | 10-42MPa | With bypass    | —  | —  | ●  | ●   | ○   | ●   | 1 |
|   | With high-pressure relief valve,<br>direct operated, fixed setting | 27-42MPa | Without bypass | ●  | ●  | —  | —   | —   | —   | 3 |
|   |                                                                    |          | With bypass    | ●  | ●  | —  | —   | —   | —   | 5 |
|   |                                                                    | 10-25MPa | Without bypass | ●  | ●  | —  | —   | —   | —   | 4 |
|   |                                                                    |          | With bypass    | ●  | ●  | —  | —   | —   | —   | 6 |

Filtration<sup>1)</sup>

| U |                                                                                           |  |  |  | 56 | 63 | 71 | 125 | 145 | 180 |    |
|---|-------------------------------------------------------------------------------------------|--|--|--|----|----|----|-----|-----|-----|----|
|   | Integrated filter, without cold start valve, without contamination indicator              |  |  |  | ●  | ●  | ●  | ○   | ○   | ○   | A  |
|   | Integrated filter, with cold start valve, without contamination indicator                 |  |  |  | ●  | ●  | ●  | ○   | ○   | ○   | F* |
|   | Integrated filter, without cold start valve, with window type contamination indicator     |  |  |  | ●  | ●  | ●  | ○   | ○   | ○   | G  |
|   | Integrated filter, with cold start valve, with electrical signals contamination indicator |  |  |  | ○  | ○  | ○  | ○   | ○   | ○   | B* |
|   | Integrated filter, with cold start valve, with window type contamination indicator        |  |  |  | ●  | ●  | ●  | ●   | ○   | ○   | P* |
|   | External suction filter (not included in delivery, to be selected by customer)            |  |  |  | ●  | ●  | ●  | ●   | ○   | ●   | S  |
|   | External pressure filter (not included in delivery, to be selected by customer)           |  |  |  | ●  | ●  | ●  | ●   | ○   | ●   | D  |
|   | External fluid supply (optional, only for N00, K**)                                       |  |  |  | ●  | ●  | ●  | ●   | ○   | ●   | E  |

Solenoid connector

| X |                                                                         |  |  |  | 56 | 63 | 71 | 125 | 145 | 180 |   |
|---|-------------------------------------------------------------------------|--|--|--|----|----|----|-----|-----|-----|---|
|   | Without solenoid (without code)                                         |  |  |  | ●  | ●  | ●  | ●   | ○   | ●   |   |
|   | DEUTSCH molded connector, 2-pin, without suppressor diode <sup>2)</sup> |  |  |  | ●  | ●  | ●  | ●   | ○   | ●   | P |

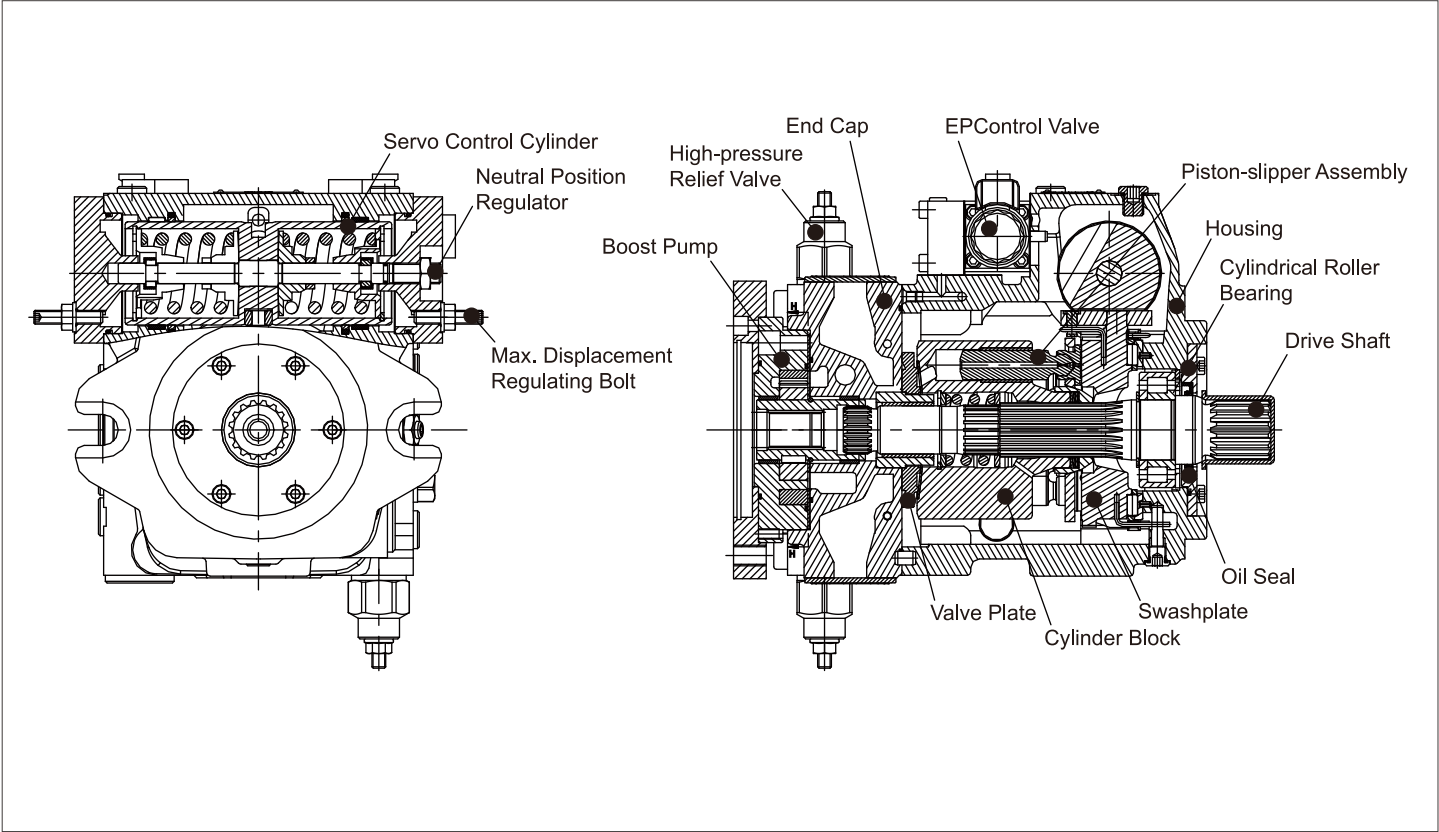
Special configuration

| Z |                                             |  |  |  | 56 | 63 | 71 | 125 | 145 | 180 |     |
|---|---------------------------------------------|--|--|--|----|----|----|-----|-----|-----|-----|
|   | Without special configuration(without code) |  |  |  | ●  | ●  | ●  | ●   | ○   | ●   |     |
|   | Special configuration                       |  |  |  | ○  | ○  | ○  | ○   | ○   | ○   | *** |

1) Filter: F/B/P opposite ports are available.  
 2) Connector model: Deutsch DT04-2p (for HWO/HWC/EP/EZ control).

● Available    ○ On request    — Not available    ■ Recommended model

> Structure



## > Hydraulic Fluid

Mineral oil

## > Working Viscosity

In order for the optimum efficiency and service life, it is recommended to select the working viscosity at working temperature within the range below:

$V_{opt}$  = optimal working viscosity 16...36 mm<sup>2</sup>/s

It is subject to the temperature of a closed circuit.

## > Limit Viscosity

Limit viscosity:

$V_{min}$  = 5 mm<sup>2</sup>/s

Short-term operation ( $t < 3$  min)

Permissible maximum temperature  $t_{max} = +115^{\circ}\text{C}$

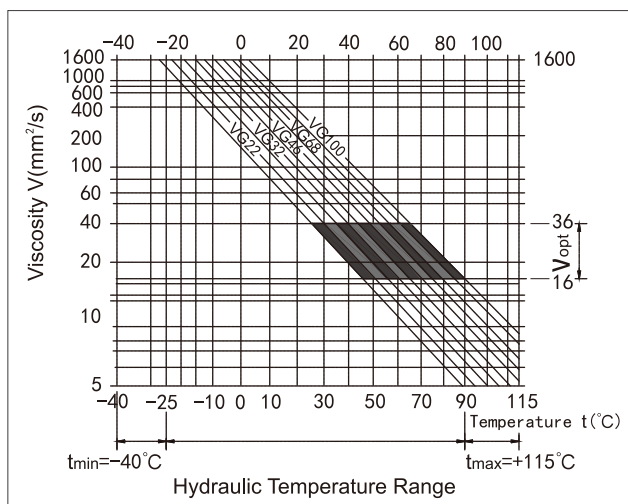
$V_{max}$  = 1600 mm<sup>2</sup>/s

Short-term operation ( $t < 3$  min)

Cold start ( $p \leq 3$  MPa,  $n \leq 1000$  rpm,  $t_{min} = -40^{\circ}\text{C}$ )

Only for no-load start, it must reach the optimum working temperature in 15 min.

## > Selection Diagram



## > Instructions on Selection of Hydraulic Fluid

The working temperature dependent on the ambient temperature is required for correct selection of hydraulic fluid. It refers to the circuit temperature of a closed circuit and the reservoir temperature of an open circuit.

The hydraulic fluid should be so selected that the working viscosity in the working range is within the optimum range ( $V_{opt}$ , the shaded area on the selection diagram). The higher viscosity is recommended under the same conditions.

For example:

At an ambient temperature of X °C, the working temperature of the circuit is 60 °C. The viscosity within the optimum range ( $V_{opt}$ , shaded area) is VG46 or VG68 and the latter should be selected.

Note:

The case drain temperature depends on the pressure and speed, and it is always higher than the circuit temperature. The temperature at any point within the system should not exceed +115 °C. Please contact us if the above condition cannot be maintained due to extreme working conditions.

## > Filtration

Finer filtration improves the cleanliness level of the hydraulic fluid, thus increasing the service life of the axial piston unit. To ensure normal operation of the axial piston unit, a cleanliness level of at least 20/18/15 according to ISO 4406 is to be maintained.

Based on the system and application, we recommend for HP2VC:

filter element  $\beta_{20} \geq 100$

$\beta$  should not decrease as differential pressure of the filter element increases.

When the hydraulic fluid has a high temperature (+90 °C to +115 °C), the cleanliness level should at least reach 19/17/14 according to ISO 4406.

Please contact us if the above cleanliness level cannot be maintained.

## > Working Pressure Range

Input

Variable pump (with external fluid supply, E) :

Boost pressure ( $n = 2000$  rpm)  $P_{sp}$  \_\_\_\_\_ 2 MPa

Boost pump:

Suction pressure  $P_{s \min}(V \leq 30 \text{ mm}^3/\text{s})$  \_\_\_\_\_  $\geq 0.08$  MP absolute pressure

## > Oil Seal

Permissible pressure load

The service life of the shaft seal depends on the pump speed and case drain pressure. It is recommended that the average lasting case drain pressure at working temperature is no greater than 0.3 MPa absolute pressure (as the speed falls, the maximum permissible case drain pressure is 0.6 MPa) and the short-term ( $t < 0.1$  s) permissible absolute pressure peak may reach 1 MPa.

The service life of the shaft seal decreases with increasing frequency of pressure peaks.

The case pressure must be equal to or greater than the external pressure at the shaft seal.

Temperature range

The FKM shaft seal may be used for case temperatures from -25 °C to +115 °C.

## Technical Data

| Size                                    | Unit                                                                  |                           |                  | 56     | 63     | 71     | 125    | 145 | 180    |
|-----------------------------------------|-----------------------------------------------------------------------|---------------------------|------------------|--------|--------|--------|--------|-----|--------|
| Displacement                            | Variable pump                                                         | $V_{g \max}$              | mL/r             | 56     | 63     | 71     | 125    | –   | 180    |
|                                         | Boost pump( $\Delta p=2\text{MPa}$ )                                  | $V_{g \text{ SP}}$        | mL/r             | 15.8   | 15.8   | 19.6   | 28.3   | –   | 39.8   |
| Speed                                   | Maximum speed at $V_{g \max}$                                         | $n_{\max \text{ cont}}$   | rpm              | 3600   | 3600   | 3300   | 2850   | –   | 2500   |
|                                         | Limit maximum <sup>1)</sup>                                           | $n_{\min \text{ limit}}$  | rpm              | 3900   | 3900   | 3600   | 3250   | –   | 2900   |
|                                         | Intermittent maximum <sup>2)</sup>                                    | $n_{\max \text{ interm}}$ | rpm              | 4500   | 4500   | 4100   | 3450   | –   | 3000   |
|                                         | Minimum                                                               | $n_{\min}$                | rpm              | 500    | 500    | 500    | 500    | –   | 500    |
| Flow                                    | At $n_{\max \text{ cont}}$ and $V_{g \max}$                           | $q_{v \max}$              | L/min            | 202    | 227    | 234    | 356    | –   | 450    |
| Power <sup>3)</sup>                     | At $n_{\max \text{ cont}}$ and $V_{g \max}$ , $\Delta p=40\text{MPa}$ | $P_{\max}$                | KW               | 134    | 151    | 156    | 237    | –   | 300    |
| Torque <sup>3)</sup>                    | At $V_{g \max}$ , $\Delta p=40\text{MPa}$                             | $T_{\max}$                | Nm               | 356    | 401    | 451    | 795    | –   | 1146   |
|                                         | At $V_{g \max}$ , $\Delta p=10\text{MPa}$                             | $T$                       | Nm               | 89     | 100    | 112.8  | 198.8  | –   | 286    |
| Moment of inertia of drive shaft        |                                                                       | $J$                       | $\text{Kgm}^2$   | 0.0066 | 0.0066 | 0.0097 | 0.0232 | –   | 0.0444 |
| Max. angular acceleration <sup>4)</sup> |                                                                       |                           | $\text{rad/s}^2$ | 24000  | 24000  | 21000  | 14000  | –   | 11000  |
| Max. speed change <sup>4)</sup>         |                                                                       |                           | rpm              | 72     | 72     | 69     | 55     | –   | 50     |
| Case volume                             |                                                                       | $V$                       | L                | 1.5    | 1.5    | 1.3    | 2.1    | –   | 3.1    |
| Weight (without through drive)          |                                                                       | $m$                       | KG               | 38     | 38     | 50     | 60     | 60  | 101    |

1) Power at half corner power (e.g. at  $V_{g \max}$  and  $P_n/2$ )

2) At high-speed no-load operation; at overspeed,  $\Delta p = 7\text{--}15\text{MPa}$  and  $V_{g \max}$ ; at reverse peak load,  $\Delta p < 30\text{MPa}$ ,  $t < 0.1\text{s}$

3) Without boost pump

4) For a single pump only

## Specification Calculation

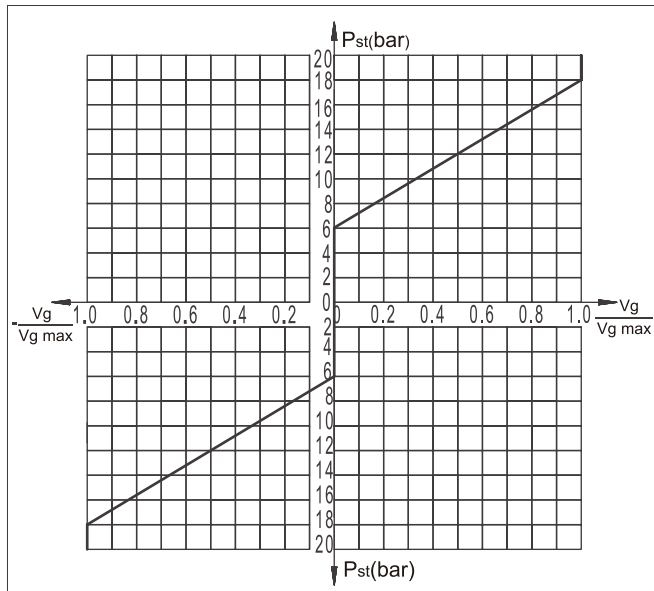
|        |                                                                                        |         |                                               |
|--------|----------------------------------------------------------------------------------------|---------|-----------------------------------------------|
| Flow   | $q_v = \frac{V_g \cdot n \cdot \eta_v}{1000}$                                          | [L/min] | $V_g$ = Displacement, mL/r                    |
|        |                                                                                        |         | $\Delta p$ = Differential pressure, MPa       |
| Torque | $T = \frac{V_g \cdot \Delta p}{2 \cdot \pi \cdot \eta_{mh}}$                           | [Nm]    | $n$ = Speed, rpm                              |
|        |                                                                                        |         | $\eta_v$ = Volumetric efficiency              |
|        |                                                                                        |         | $\eta_{mh}$ = Mechanical-hydraulic efficiency |
| Power  | $P = \frac{2 \pi \cdot T \cdot n}{60000} = \frac{q_v \cdot \Delta p}{60 \cdot \eta_t}$ | [KW]    | $\eta_t$ = Total efficiency                   |

## HD - Pilot Pressure Control

Dependent on the difference between the pilot pressure  $P_{st}$  (at ports Y1 and Y2) of two control lines, the variable cylinder of the pump obtains control pressure via the HD controller so that the swashplate moves to infinitely adjust the displacement. Each control line corresponds to one flow direction.

HD3: with inlet filter (standard)

HD1: without inlet filter (Not for new projects!)



$V_g$  Displacement at  $P_{st}$   
 $V_{g \max}$  Displacement at  $P_{st}=18\text{bar}$   
 Pilot pressure at port Y1 and Y2  $P_{st}=6\text{--}18\text{bar}$   
 Start of control 6bar  
 End of control 18bar (maximum displacement  $V_{g \max}$ )

### Note:

The HD controller must be unloaded to the neutral position with the external pilot control device on the reservoir.

The spring at the center of the pilot control device is not a safety device.

The spool may get stuck at any position due to contamination of the control device, such as hydraulic fluid pollutant, wear debris and foreign matters in the system, etc.

In this case, the pump flow no longer observes the operator's instructions.

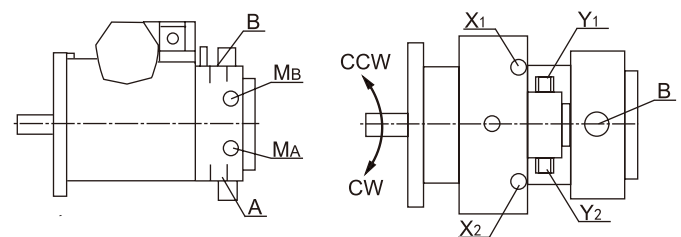
- Make sure the driven device can promptly reach a safety state (e.g. stop) with the emergency stop module.

- Always observe the cleanliness level according to ISO 4406:

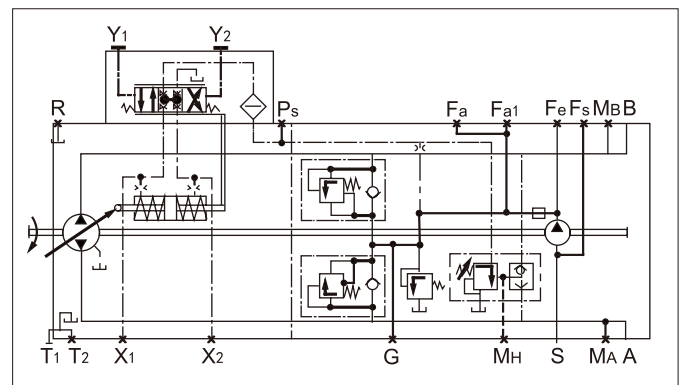
20/18/15 (< 90 °C) or 19/17/14 (> 90 °C)

## Correlation of Direction of rotation, Control and Flow direction

| Direction of rotation (viewed on drive shaft) |                |                |                  |                |                  |
|-----------------------------------------------|----------------|----------------|------------------|----------------|------------------|
|                                               | Size           | Pilot Pressure | Control Pressure | Flow Direction | Working Pressure |
| CW                                            | 56/63          | Y1             | X1               | A to B         | M <sub>B</sub>   |
|                                               |                | Y2             | X2               | B to A         | M <sub>A</sub>   |
|                                               | 71/125/145/180 | Y1             | X1               | B to A         | M <sub>A</sub>   |
|                                               |                | Y2             | X2               | A to B         | M <sub>B</sub>   |
| CCW                                           | 56/63          | Y1             | X1               | B to A         | M <sub>A</sub>   |
|                                               |                | Y2             | X2               | A to B         | M <sub>B</sub>   |
|                                               | 71/125/145/180 | Y1             | X1               | A to B         | M <sub>B</sub>   |
|                                               |                | Y2             | X2               | B to A         | M <sub>A</sub>   |

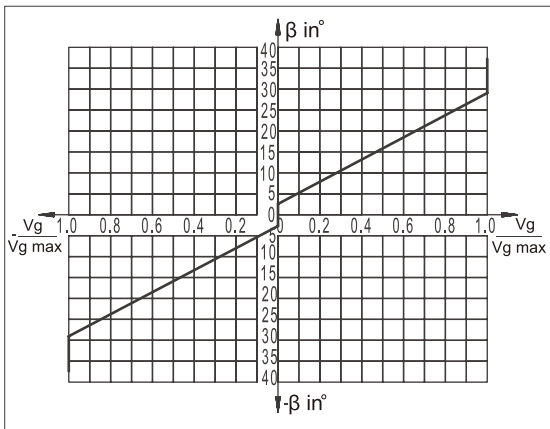


## Circuit diagram, HD3



HW - Mechanical Servo Control

Dependent on the moving direction a or b of the control lever, the variable cylinder of the pump obtains control pressure via the HW controller so that the swashplate moves to infinitely adjust the displacement. Each moving direction of the control lever corresponds to one flow direction.



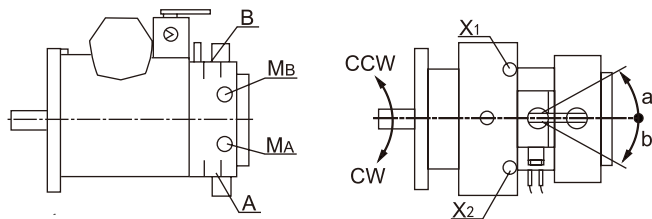
Swivel angle  $\beta$  of control lever:  
Start of control  $\beta=3^\circ$   
End of control  $\beta=29^\circ$ (maximum displacement  $V_{g \max}$ )  
Mechanical limit:  $\pm 40^\circ$

The maximum required torque at the control lever is 170 Ncm.  
The rotation of HW control lever must be limited with an external position sensor (set point device).

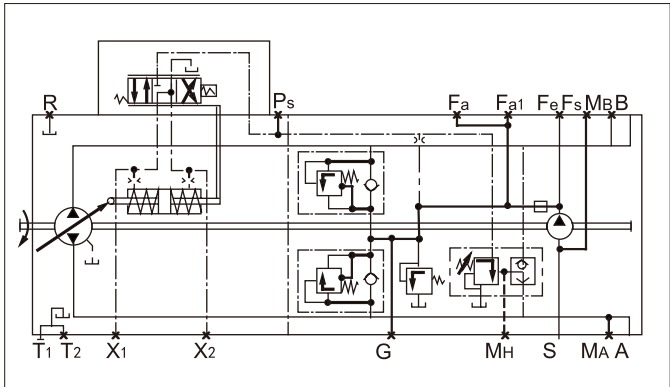
Note:  
When there is no torque on the HW control lever, spring centering enables the pump to move automatically to the neutral position ( $V_g = 0$ ) (independent of swivel angle).

Correlation of Direction of rotation, Control and Flow direction

| Direction of rotation (viewed on drive shaft) |                |                |                  |                |                  |
|-----------------------------------------------|----------------|----------------|------------------|----------------|------------------|
|                                               | Size           | Pilot Pressure | Control Pressure | Flow Direction | Working Pressure |
| CW                                            | 56/63          | a              | X2               | B to A         | MA               |
|                                               |                | b              | X1               | A to B         | MB               |
|                                               | 71/125/145/180 | a              | X2               | A to B         | MB               |
|                                               |                | b              | X1               | B to A         | MA               |
| CCW                                           | 56/63          | a              | X2               | A to B         | MB               |
|                                               |                | b              | X1               | B to A         | MA               |
|                                               | 71/125/145/180 | a              | X2               | B to A         | MA               |
|                                               |                | b              | X1               | A to B         | MB               |



Circuit diagram

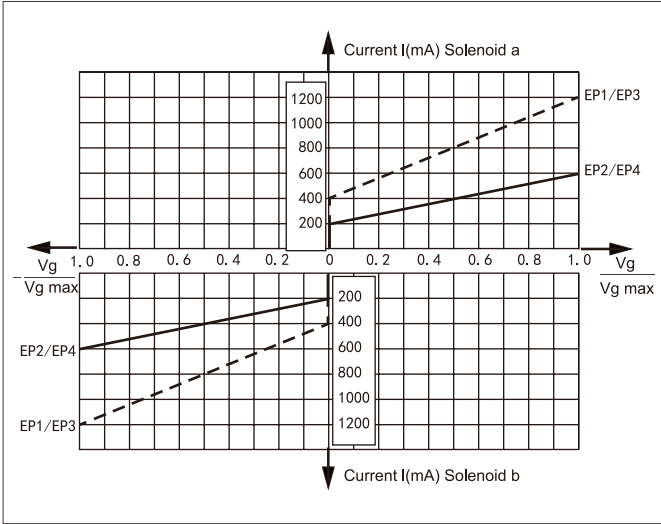


> EP - Electric Control with Proportional Solenoid

Dependent on the preset current I of the two proportional solenoids (a and b), the variable cylinder of the pump obtains control pressure via the EP controller so that the swashplate moves to infinitely adjust the displacement. Each proportional solenoid corresponds to one flow direction.

| Technical data, solenoid    | EP1/3         | EP2/4         |
|-----------------------------|---------------|---------------|
| Voltage                     | 12V DC (±20%) | 24V DC (±20%) |
| Control current             |               |               |
| Start of control $V_g=0$    | 400mA         | 200mA         |
| End of control $V_{g \max}$ | 1200mA        | 600mA         |
| Current limit               | 1.54A         | 0.77A         |
| Nominal resistance(20°C)    | 5.5 Ω         | 22.7 Ω        |
| Dither frequency            | 100Hz         |               |
| Duty cycle                  | 100%          |               |
| Type of protection          | IP65          |               |

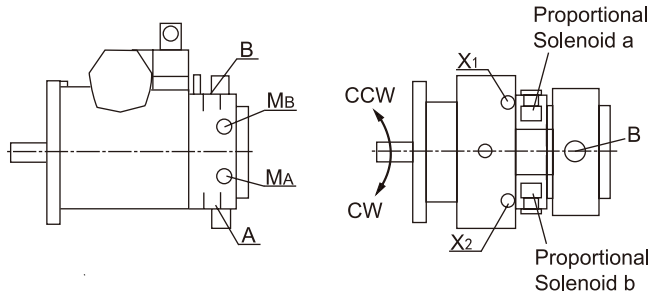
EP3/4: with inlet filter (standard)  
 EP1/2: without inlet filter (Not for new projects!)



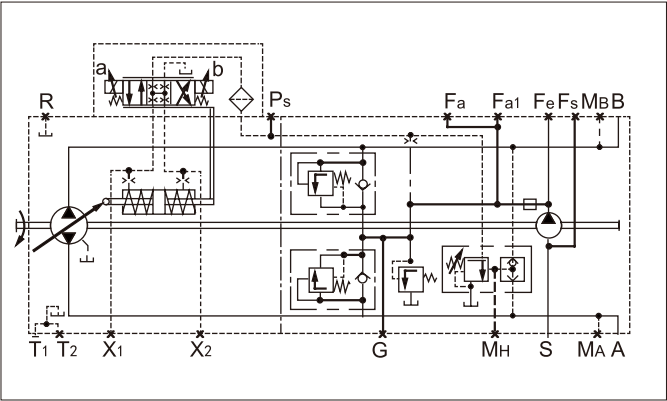
Note:  
 The spring at the center of the pilot control device is not a safety device. The spool may get stuck at any position due to contamination of the control device, such as hydraulic fluid pollutant, wear debris and foreign matters in the system, etc.  
 In this case, the pump flow no longer observes the operator's instructions.  
 - Make sure the driven device can promptly reach a safety state (e.g. stop) with the emergency stop module.  
 - Always observe the cleanliness level according to ISO 4406: 20/18/15 (< 90 °C) or 19/17/14 (> 90 °C)

Correlation of Direction of rotation, Control and Flow direction

| Direction of rotation (viewed on drive shaft) |                |                |                  |                |                  |
|-----------------------------------------------|----------------|----------------|------------------|----------------|------------------|
|                                               | Size           | Pilot Pressure | Control Pressure | Flow Direction | Working Pressure |
| CW                                            | 56/63          | a              | X1               | A to B         | M <sub>B</sub>   |
|                                               |                | b              | X2               | B to A         | M <sub>A</sub>   |
|                                               | 71/125/145/180 | a              | X1               | B to A         | M <sub>A</sub>   |
|                                               |                | b              | X2               | A to B         | M <sub>B</sub>   |
| CCW                                           | 56/63          | a              | X1               | B to A         | M <sub>A</sub>   |
|                                               |                | b              | X2               | A to B         | M <sub>B</sub>   |
|                                               | 71/125/145/180 | a              | X1               | A to B         | M <sub>B</sub>   |
|                                               |                | b              | X2               | B to A         | M <sub>A</sub>   |



Circuit diagram



➤ EZ - Electric Control with Switching Solenoid

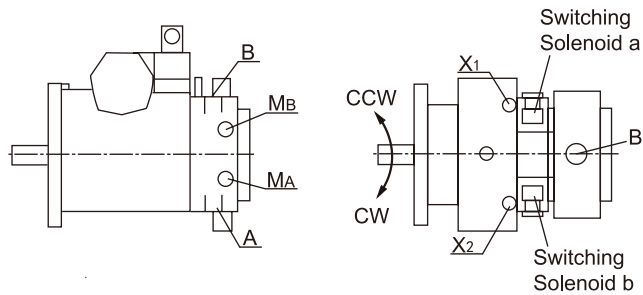
By switching on or off the switching solenoid a or b, the control cylinder of the pump obtains control pressure via the EZ controller so that the swashplate realizes adjustment between  $V_g=0$  and  $V_{g\max}$ . Each solenoid corresponds to one flow direction.

| Technical data, solenoid | EZ1                   | EZ2                   |
|--------------------------|-----------------------|-----------------------|
| Voltage                  | 12V DC ( $\pm 20\%$ ) | 24V DC ( $\pm 20\%$ ) |
| Neutral position $V_g=0$ | De-energized          | De-energized          |
| Position $V_{g\max}$     | Energized             | Energized             |
| Nominal resistance(20°C) | 5.5 $\Omega$          | 21.7 $\Omega$         |
| Rated power              | 26.2W                 | 26.5W                 |
| Minimum required current | 1.32A                 | 0.67A                 |
| Duty cycle               | 100%                  |                       |
| Type of protection       | IP65                  |                       |

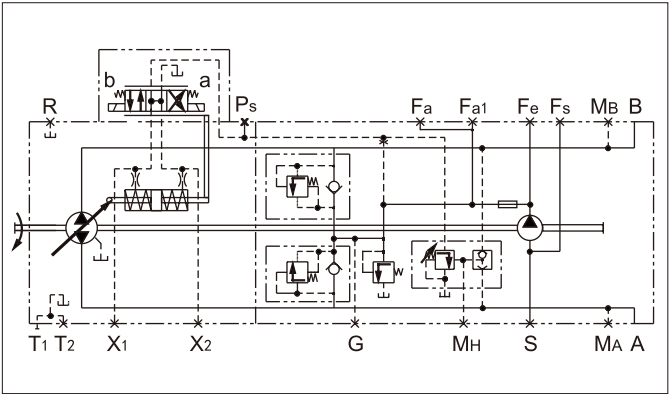
Standard: switching solenoid without manual emergency control.  
The manual emergency control realized by returning spring may be provided as required.

Correlation of Direction of rotation, Control and Flow direction

| Direction of rotation (viewed on drive shaft) |                |                |                  |                |                  |
|-----------------------------------------------|----------------|----------------|------------------|----------------|------------------|
|                                               | Size           | Pilot Pressure | Control Pressure | Flow Direction | Working Pressure |
| CW                                            | 56/63          | a              | X2               | B to A         | MA               |
|                                               |                | b              | X1               | A to B         | MB               |
|                                               | 71/125/145/180 | a              | X2               | A to B         | MB               |
|                                               |                | b              | X1               | B to A         | MA               |
| CCW                                           | 56/63          | a              | X2               | A to B         | MB               |
|                                               |                | b              | X1               | B to A         | MA               |
|                                               | 71/125/145/180 | a              | X2               | B to A         | MA               |
|                                               |                | b              | X1               | A to B         | MB               |



Circuit diagram



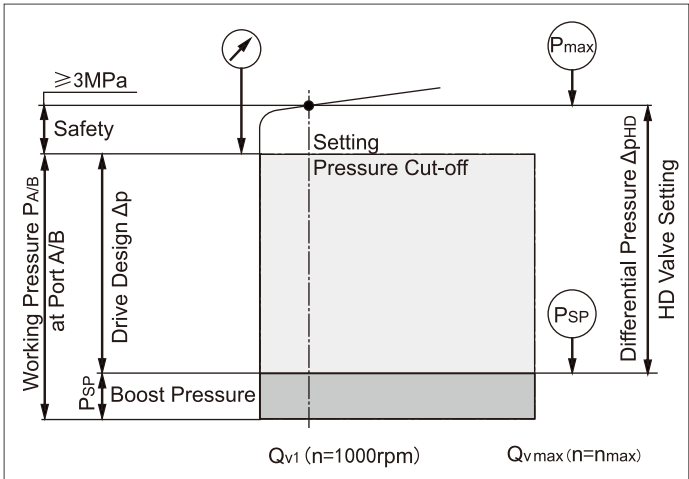
➤ High-pressure Relief Valve

Setting range

|                                                                     |                                                  |
|---------------------------------------------------------------------|--------------------------------------------------|
| High-pressure relief valve,<br>direct operated (size 56/63)         | Differential pressure<br>setting $\Delta p_{HP}$ |
| Setting range valve 3, 5<br>$\Delta p=27\text{--}42\text{MPa}$      | 42MPa                                            |
|                                                                     | 39MPa <sup>1)</sup>                              |
|                                                                     | 37MPa                                            |
|                                                                     | 35MPa                                            |
|                                                                     | 33MPa                                            |
|                                                                     | 31MPa                                            |
|                                                                     | 27MPa                                            |
| Setting range valve 4, 6<br>$\Delta p=10\text{--}25\text{MPa}$      | 25MPa                                            |
|                                                                     | 23MPa <sup>1)</sup>                              |
|                                                                     | 20MPa                                            |
|                                                                     | 16MPa                                            |
|                                                                     | 12MPa                                            |
| High-pressure relief valve,<br>pilot operated (size 71/125/145/180) | Differential pressure<br>setting $\Delta p_{HP}$ |
| Setting range valve 1<br>$\Delta p=10\text{--}42\text{MPa}$         | 42MPa                                            |
|                                                                     | 39MPa <sup>1)</sup>                              |
|                                                                     | 37MPa                                            |
|                                                                     | 35MPa                                            |
|                                                                     | 33MPa                                            |
|                                                                     | 31MPa                                            |
|                                                                     | 27MPa                                            |
|                                                                     | 25MPa                                            |
|                                                                     | 23MPa                                            |
|                                                                     | 20MPa                                            |
|                                                                     | 16MPa                                            |
|                                                                     | 12MPa                                            |

1) Standard differential pressure setting.  
Values when no special remarks are made when ordering.

Pressure setting diagram



Note: The high-pressure relief valve is set at  $n = 1000\text{rpm}$  and  $V_{g\text{ max}} (q_{v1})$ .  
Hint: boost pressure 3MPa, working pressure 40MPa  
Working pressure  $P_{A/B}$ -pressure  $P_{SD}$ +safety  
=differential pressure  $\Delta p_{HP}$  ( $40\text{--}3+3=40\text{MPa}$ )

Bypass function

The bypass function is only intended for short-term operation at reduced displacement, for example to tow a vehicle out of a danger zone.  
Do not exceed the corresponding flow  $Q = 30\text{L/min}$

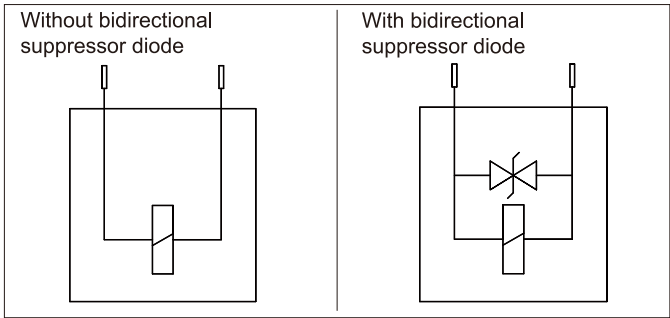
➤ Pressure Cut-off Valve, D

The pressure cut-off is a pressure control which adjusts the displacement of the pump to  $V_{g\text{ min}}$  after the set pressure is reached.  
The pressure cut-off valve prevents the operation of the high-pressure relief valve during acceleration or deceleration.  
The high-pressure relief valve protects against pressures occurring during fast swiveling of the swashplate and maximum pressure in the system.  
The setting range of the pressure cut-off valve may be anywhere within the entire working pressure range.  
However, the range must be set 3 MPa lower than the setting of the high-pressure relief valve.  
Please specify in plain text the setting of the pressure cut-off valve when ordering.

➤ Connectors for Solenoids

DEUTSCH DT04-2P-EP04  
Molded, 2-pin, without bidirectional suppressor diode \_\_\_\_\_ P  
Molded, 2-pin, with bidirectional suppressor diode \_\_\_\_\_ Q  
(only for control modules EZ1/2 and switching solenoids on DA)  
The installed connector is provided to ensure the following type of protection:  
IP67 DIN/EN 60529 and IP69K DIN 40050-9  
The protection circuit with bidirectional suppressor diode is needed to control over-voltage. Over-voltage is caused by switching off the current with switches, relay contacts or by disconnecting the connector while voltage is applied.

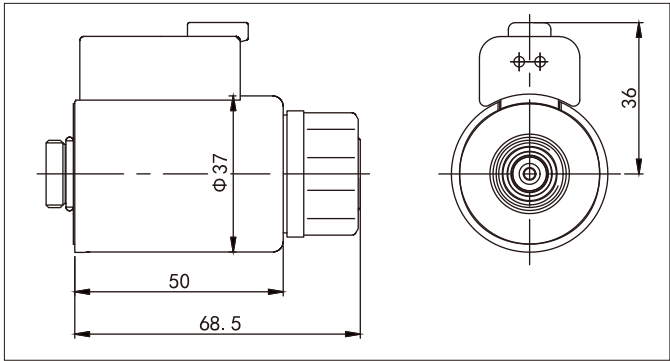
Fluid line symbol



Connector

DEUTSCH DTO6-2S-EP04  
1 housing \_\_\_\_\_ DT06-2S-EP04  
1 wedge \_\_\_\_\_ W2S  
2 sockets \_\_\_\_\_ 0462-201-16141

The connector is not included in the scope of delivery. This may be supplied on request.

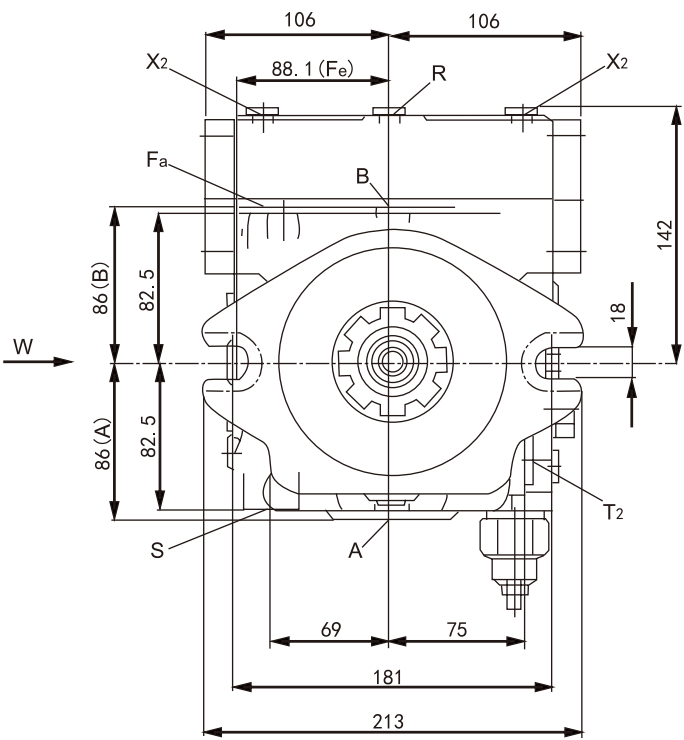
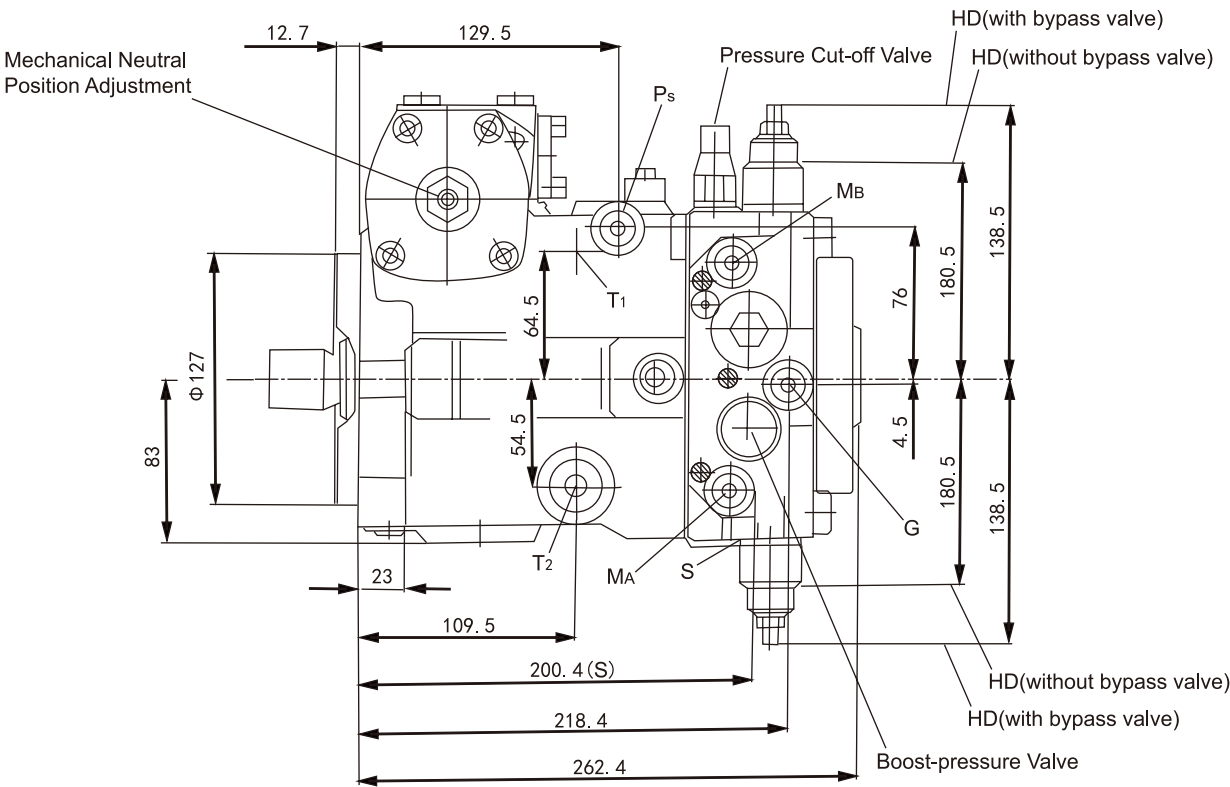


Change connector orientation  
If necessary, you may change the connector orientation by turning the solenoid.

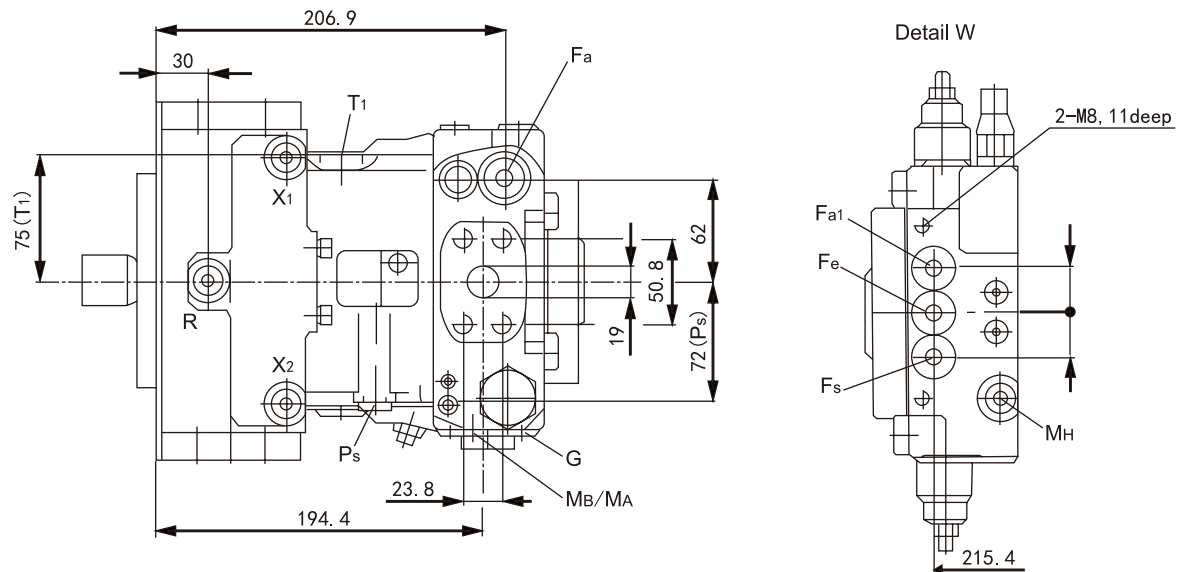
Installation Dimensions

Size 56/63

Without control valve



## Size 56/63



|       |                                             |                |
|-------|---------------------------------------------|----------------|
| A/B   | Working port (high pressure series)         | 3/4"           |
|       | Fastening thread A/B                        | M10, 17deep    |
| T1    | Case drain port or filling port             | M22x1.5,14deep |
| T2    | Case drain port                             | M22x1.5,14deep |
| MA/MB | Measuring port pressure A/B                 | M12x1.5,12deep |
| R     | Air bleed port                              | M12x1.5,12deep |
| S     | Boost suction port                          | M33x2,18deep   |
| X1/X2 | Control pressure port (upstream of orifice) | M12x1.5,12deep |

|                 |                                               |                 |
|-----------------|-----------------------------------------------|-----------------|
| G               | Pressure port, auxiliary circuit              | M14x1.5, 12deep |
| P <sub>s</sub>  | Control pressure inlet port                   | M14x1.5, 12deep |
| F <sub>a</sub>  | Filter outlet                                 | M18x1.5, 12deep |
| F <sub>a1</sub> | Filter outlet (a filter may be installed)     | M18x1.5, 12deep |
| F <sub>e</sub>  | Filter inlet                                  | M18x1.5, 12deep |
| F <sub>s</sub>  | Port from filter to suction line (cold start) | M18x1.5, 12deep |
| M <sub>H</sub>  | Balancing high-pressure port                  | M12x1.5, 12deep |

A technical drawing of a mechanical component, likely a bush or sleeve, shown in a cross-sectional view. The drawing includes the following dimensions:

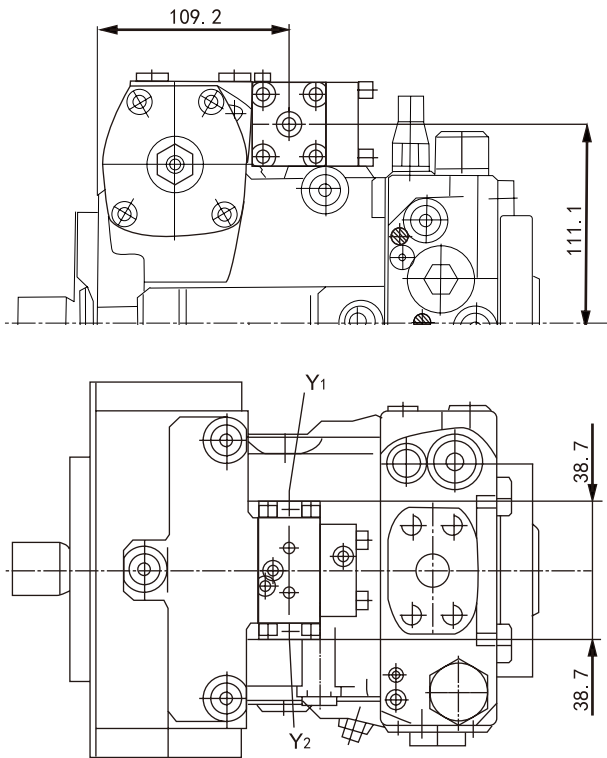
- Overall length:** 40
- Internal thread length:** 32
- Thread specification:** M12
- Radius at the end of the internal thread:** R1.6
- Distance from the left face to the start of the internal thread:** 9.5
- Distance from the right face to the centerline of the internal thread:** 28
- Outer diameter (left side):**  $\Phi 68$
- Inner diameter (right side):**  $\Phi 29.6$
- Total width of the flange on the right:** 50

Technical drawing of a 12-hole circular plate. The top view shows a circle with a diameter of 84 (Φ84) and 12 holes arranged in a circle with a diameter of 85 (Φ85). The holes have a diameter of 8.5 (Φ8.5) and are evenly spaced. The side view shows a cross-section of the plate with a thickness of 100 (Φ100) and a central hole with a diameter of 62. The side view is labeled "A-A 剖面".

Installation Dimensions

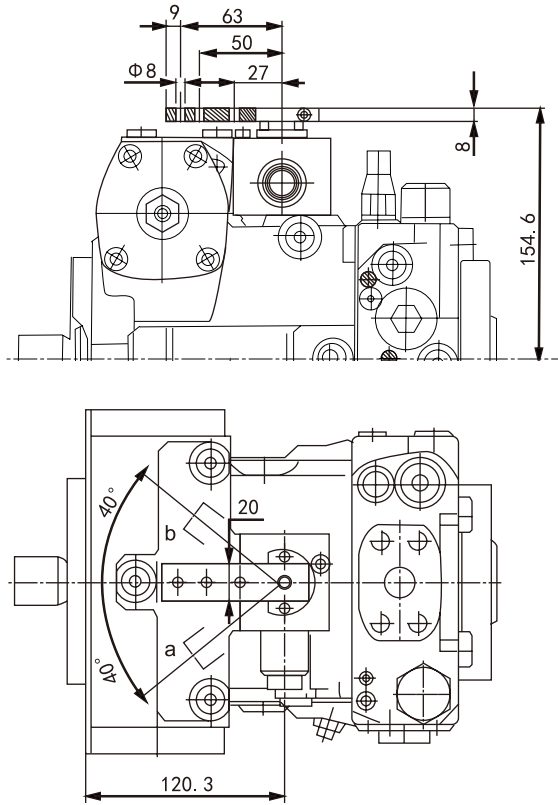
Size 56/63

HD hydraulic control, pilot pressure related

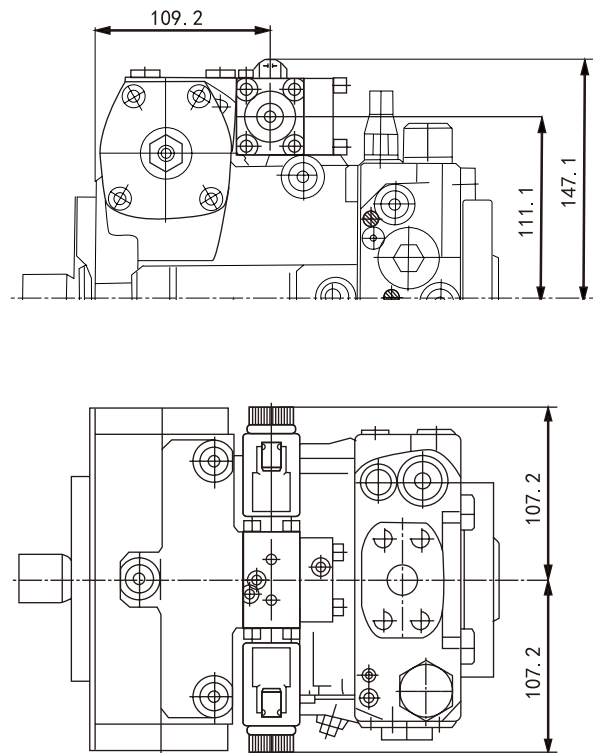


Y1/Y2 Remote control port M14x1.5, 12deep

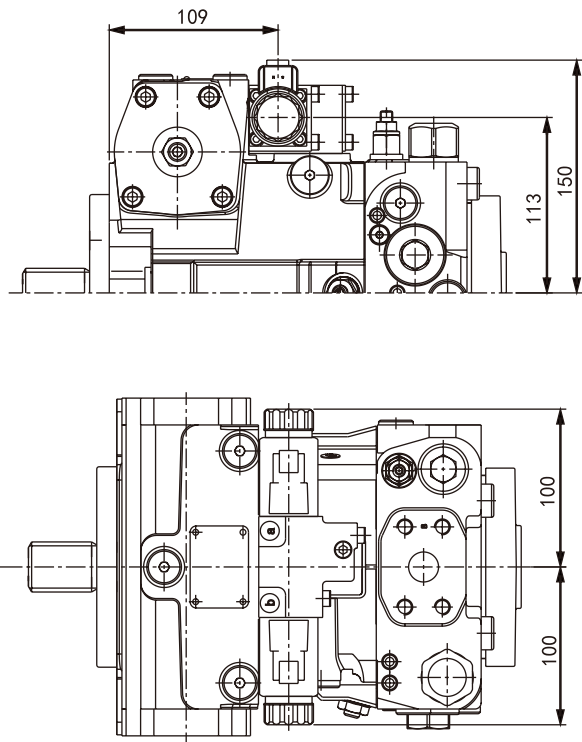
HW hydraulic control, mechanical servo



EP electric control, with proportional solenoid



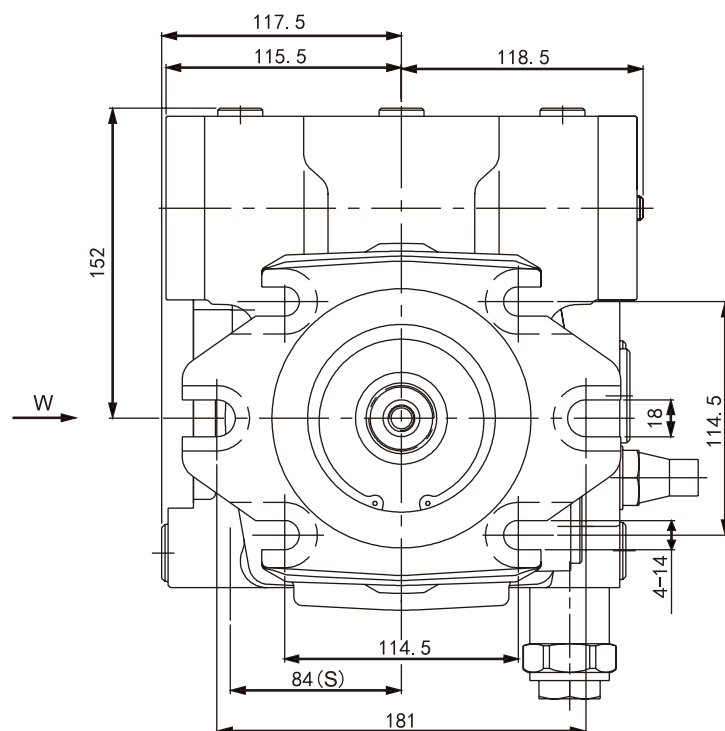
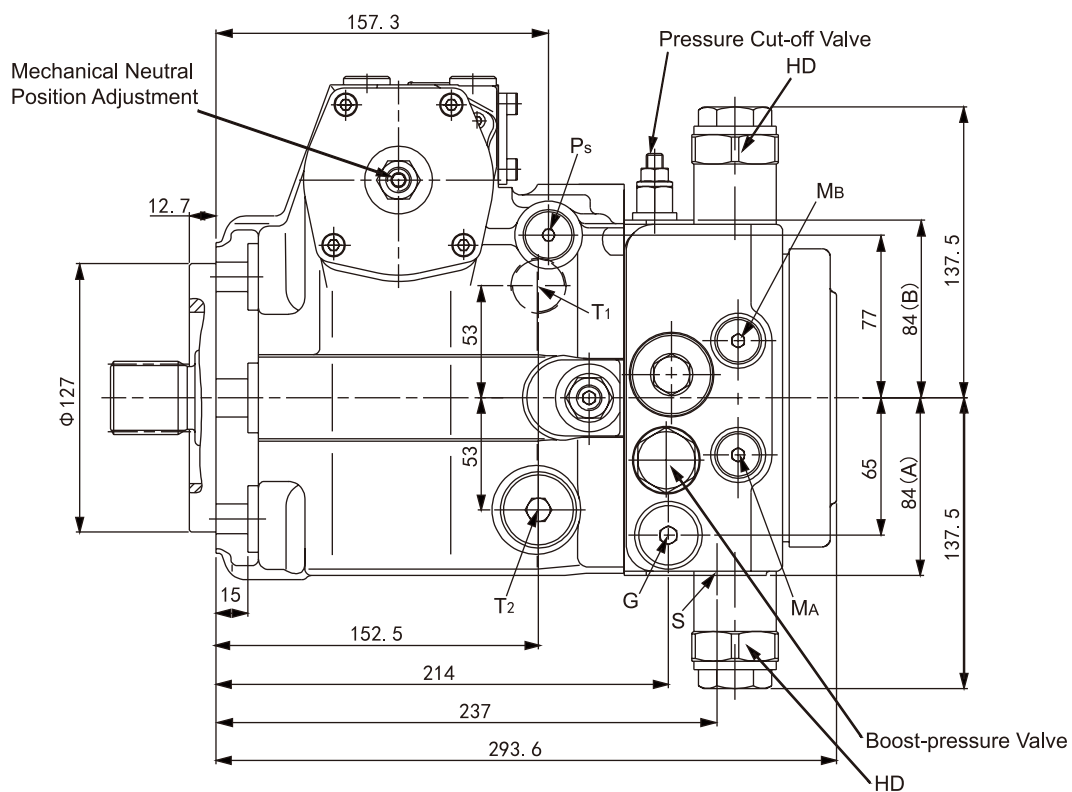
EZ electric control, with switching solenoid



## Installation Dimensions

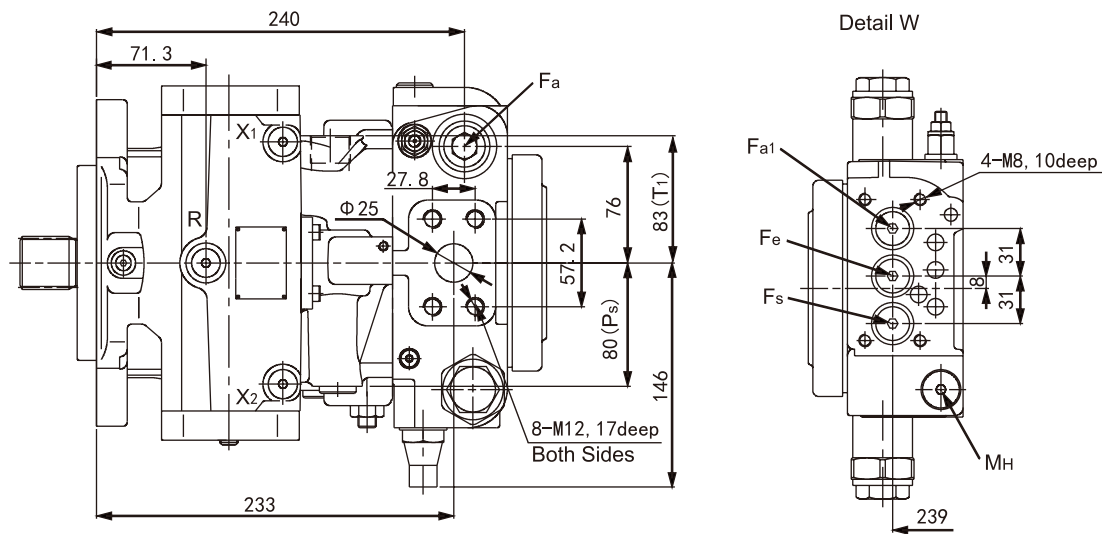
Size 71

Without control valve



Installation Dimensions

Size 71

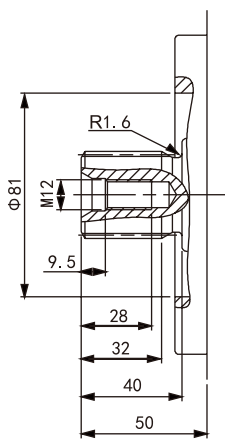


Ports DIN3852

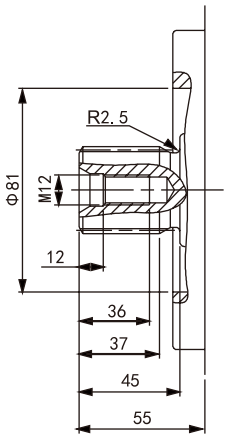
|       |                                     |                 |     |                                  |                 |
|-------|-------------------------------------|-----------------|-----|----------------------------------|-----------------|
| A/B   | Working port (high pressure series) | 1"              | G   | Pressure port, auxiliary circuit | M18x1.5, 14deep |
| T1    | Case drain port or filling port     | M26x1.5, 16deep | Ps  | Control pressure inlet port      | M14x1.5, 12deep |
| T2    | Case drain port                     | M26x1.5, 16deep | Fa  | Filter outlet                    | M26x1.5, 16deep |
| MA/MB | Measuring port pressure A/B         | M12x1.5, 12deep | Fa1 | Filter outlet                    | M22x1.5, 14deep |
| R     | Air bleed port                      | M12x1.5, 12deep | Fe  | Filter inlet                     | M22x1.5, 14deep |
| S     | Boost suction port                  | M42x2, 20deep   | Fs  | Port from filter to suction line | M22x1.5, 14deep |
| X1/X2 | Control pressure port (orifice)     | M12x1.5, 12deep | MH  | Balancing high-pressure port     | M12x1.5, 12deep |

Drive shaft

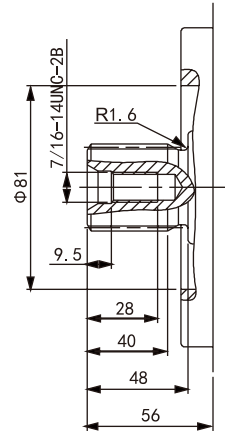
Splined shaft Z DIN 5480  
W35x2x30x16x9g



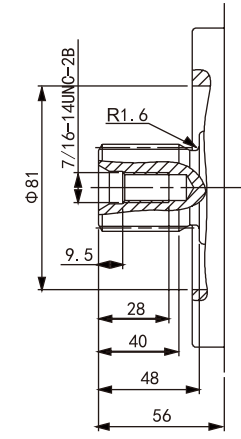
Splined shaft A DIN 5480  
W40x2x30x18x9g



Splined shaft S 1 1/4"  
14T 12/24DP



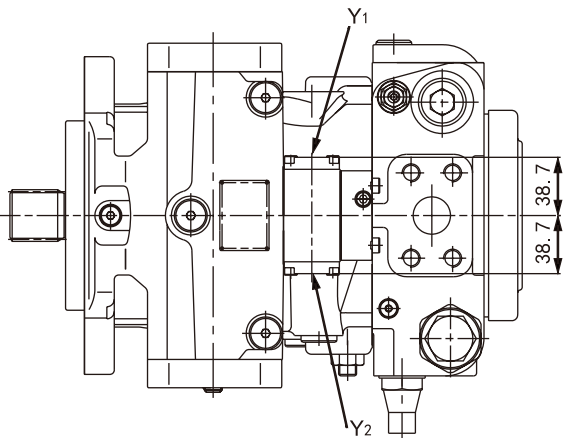
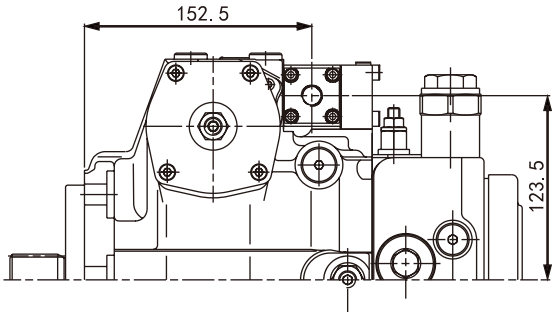
Splined shaft T 1 3/8"  
21T 16/32DP



Installation Dimensions

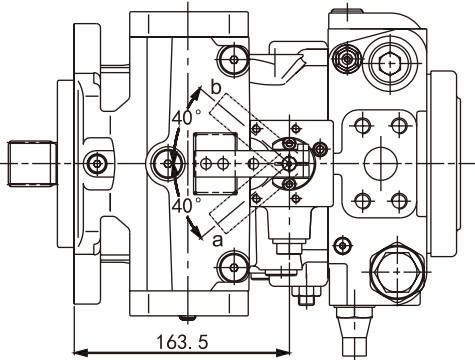
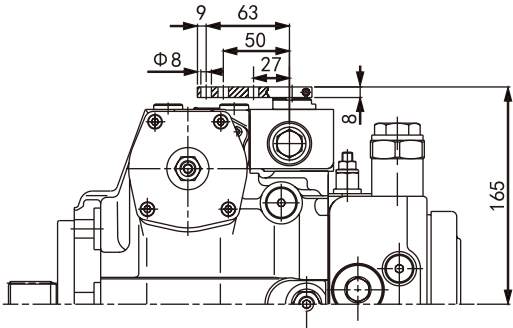
Size 71

HD hydraulic control, pilot pressure related

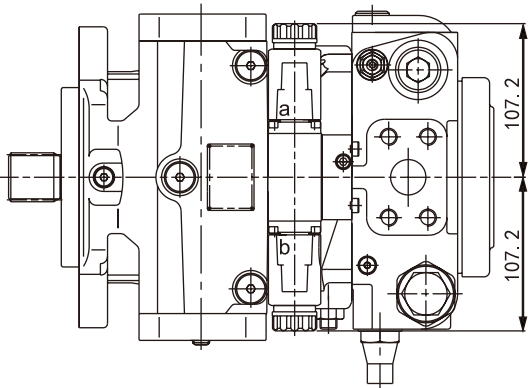
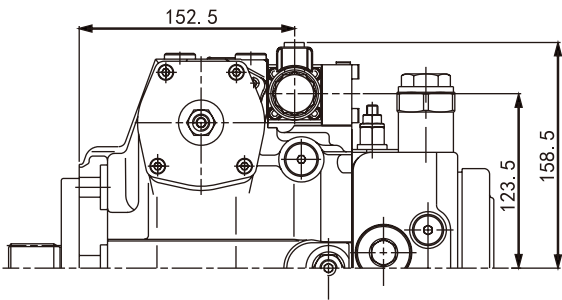


Y1/Y2 Remote control port M14x1.5,12deep

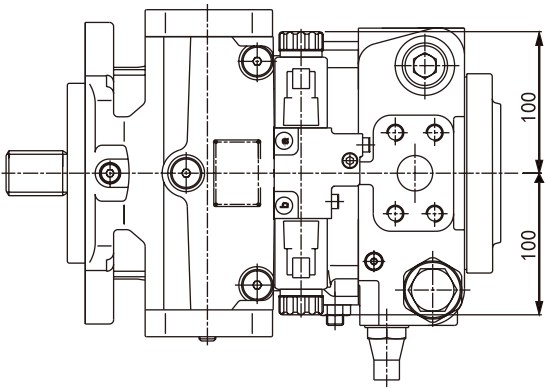
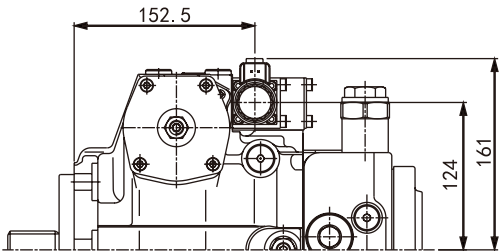
HW hydraulic control, mechanical servo



EP electric control, with proportional solenoid



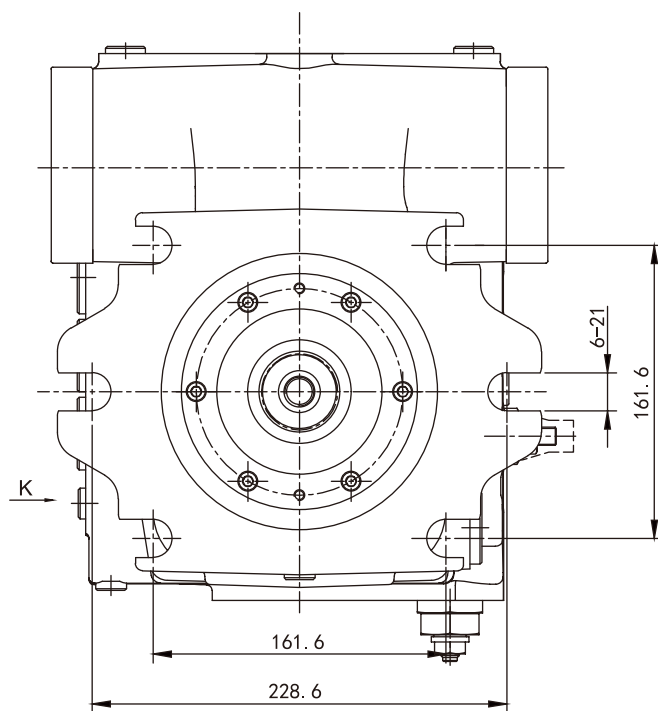
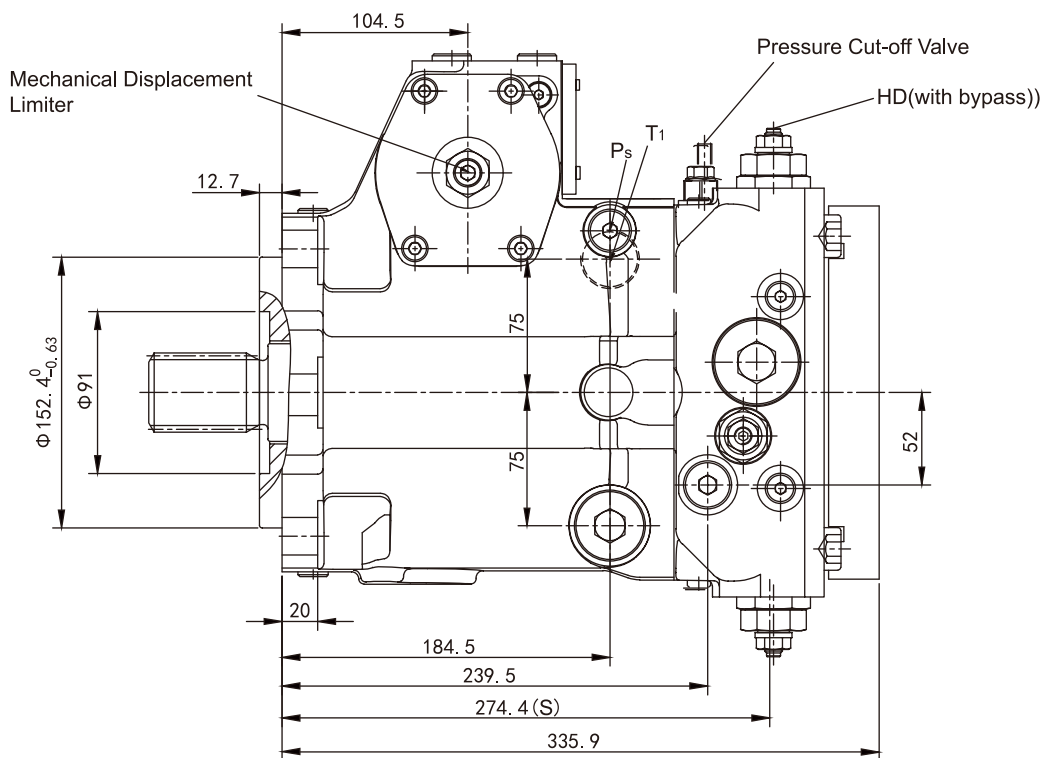
EZ electric control, with switching solenoid



Installation Dimensions

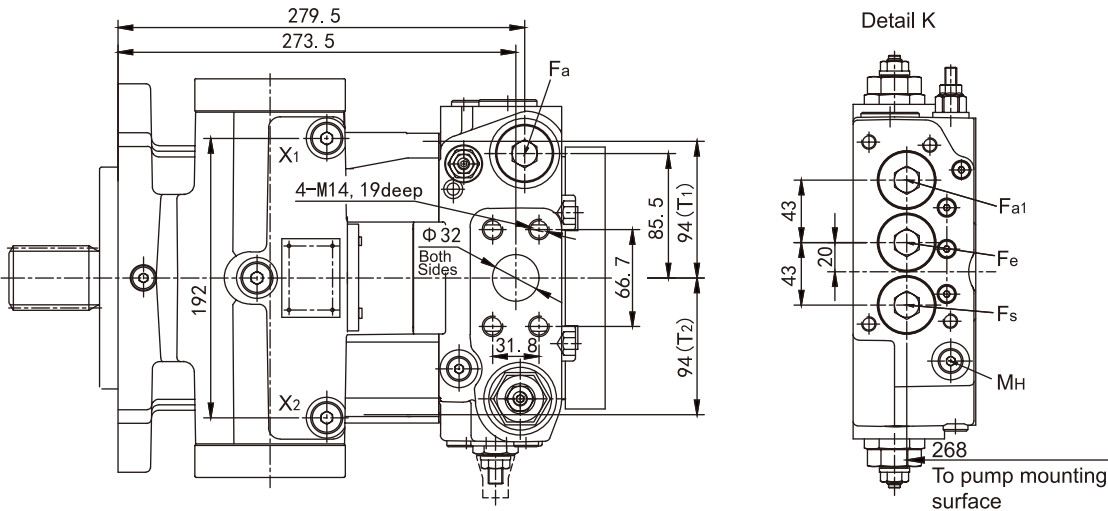
Size 125/145

Without control valve



Installation Dimensions

Size 125/145



Ports DIN3852

|       |                                     |                |     |                                  |                |
|-------|-------------------------------------|----------------|-----|----------------------------------|----------------|
| A/B   | Working port (high pressure series) | 1 1/4"         | G   | Pressure port, auxiliary circuit | M22x1.5,14deep |
| T1    | Case drain port or filling port     | M33x2,18deep   | Ps  | Control pressure inlet port      | M18x1.5,12deep |
| T2    | Case drain port                     | M33x2,18deep   | Fa  | Filter outlet                    | M33x2,18deep   |
| MA/MB | Measuring port pressure A/B         | M12x1.5,12deep | Fa1 | Filter outlet                    | M33x2,18deep   |
| R     | Air bleed port                      | M16x1.5,12deep | Fe  | Filter inlet                     | M33x2,18deep   |
| S     | Boost suction port                  | M48x2,22deep   | Fs  | Port from filter to suction line | M33x2,18deep   |
| X1/X2 | Control pressure port (orifice)     | M16x1.5,12deep | MH  | Balancing high-pressure port     | M12x1.5,12deep |

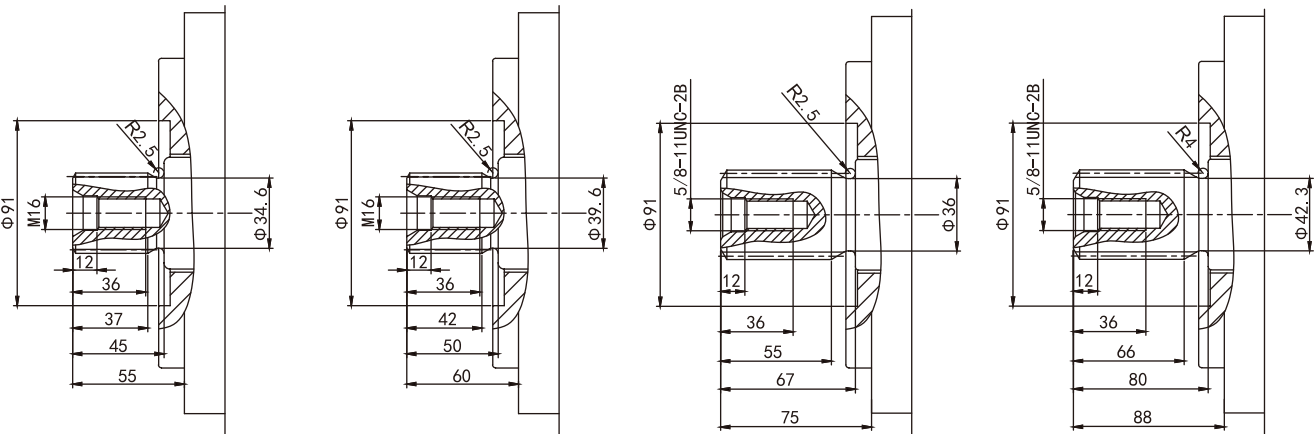
Drive shaft

Splined shaft Z DIN 5480  
W40x2x30x18x9g

Splined shaft A DIN 5480  
W45x2x30x21x9g

Splined shaft S 1 3/4"  
13T 8/16DP

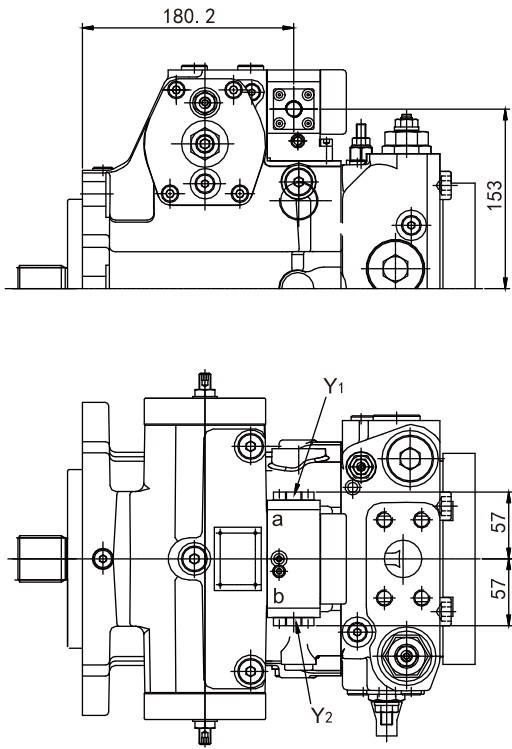
Splined shaft T 2"  
15T 8/16DP



Installation Dimensions

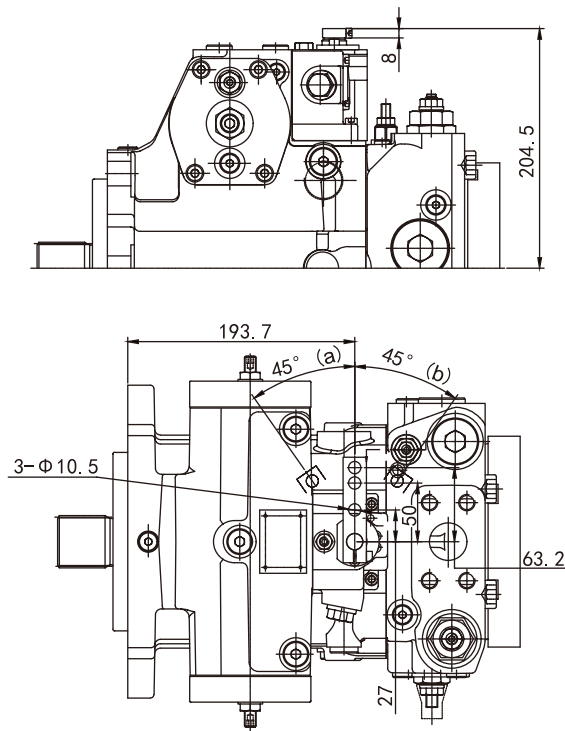
Size 125/145

HD hydraulic control, pilot pressure related

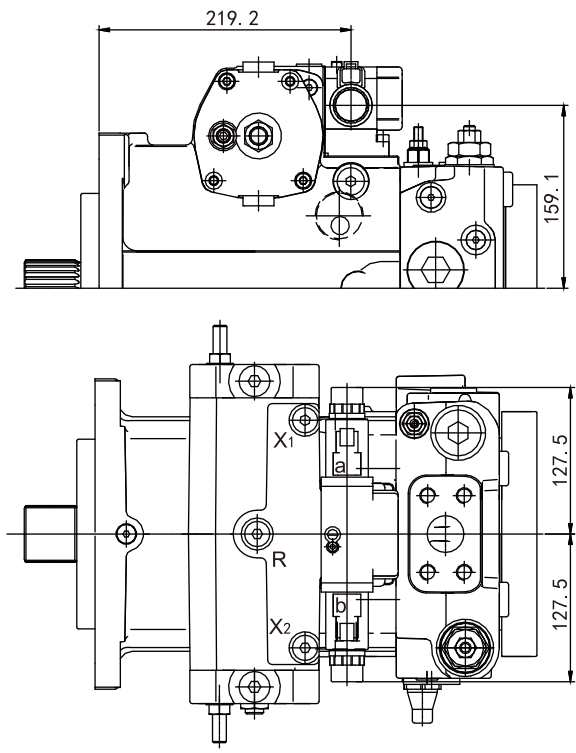


Y1/Y2 Remote control port M14x1.5, 12deep

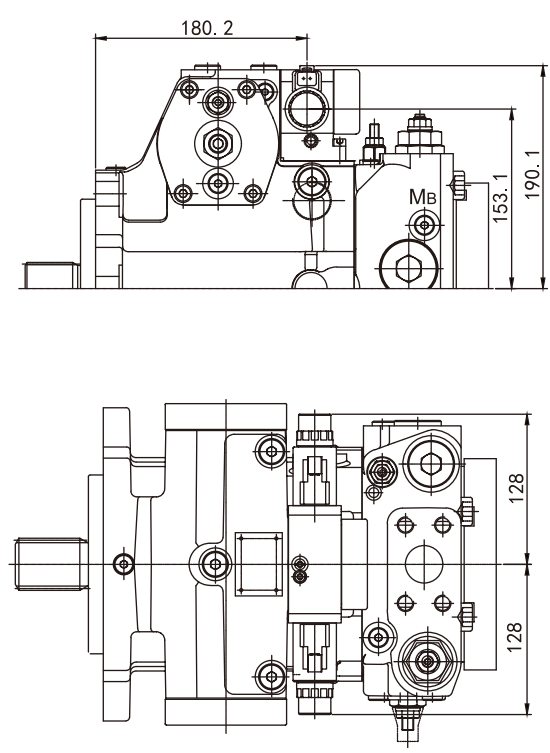
HW hydraulic control, mechanical servo



EP electric control, with proportional solenoid



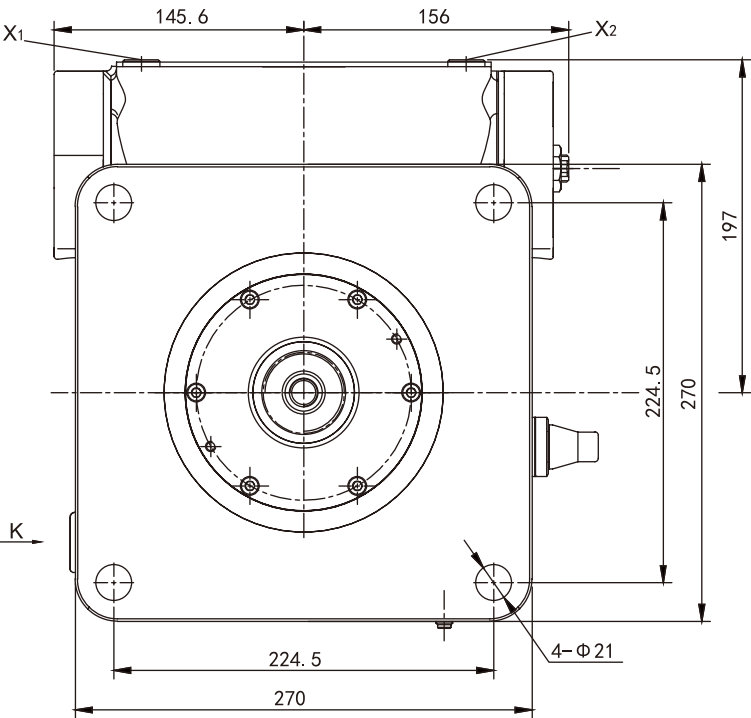
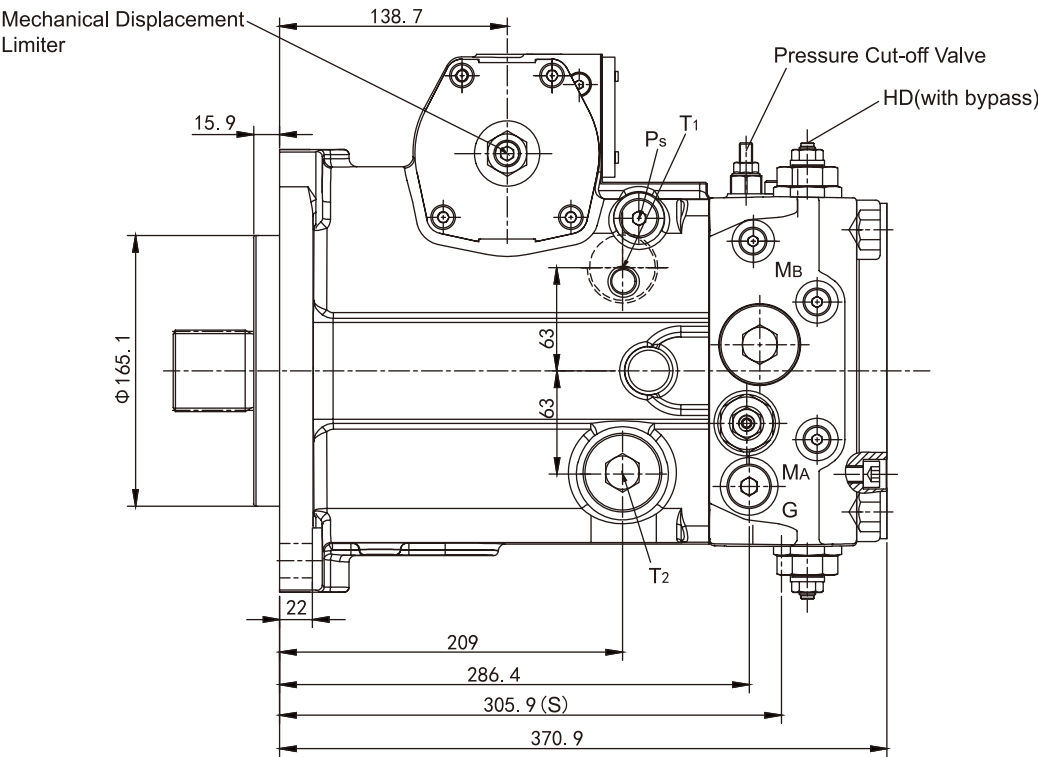
EZ electric control, with switching solenoid



Installation Dimensions

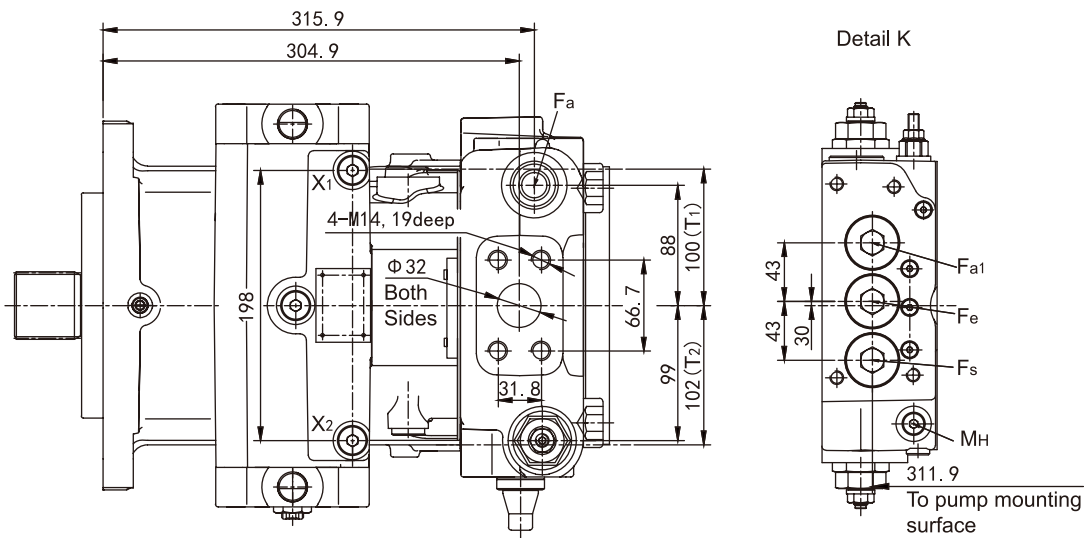
Size 180

Without control valve



Installation Dimensions

Size 180



Ports DIN3852

|       |                                 |                |     |                                  |                 |
|-------|---------------------------------|----------------|-----|----------------------------------|-----------------|
| A/B   | Working port                    | 1 1/4"         | G   | Pressure port, auxiliary circuit | M22x1.5, 14deep |
| T1    | Case drain port or filling port | M42x2,20deep   | Ps  | Control pressure inlet port      | M18x1.5, 12deep |
| T2    | Case drain port                 | M42x2,20deep   | Fa  | Filter outlet                    | M33x2, 18deep   |
| MA/MB | Measuring port pressure A/B     | M12x1.5,12deep | Fa1 | Filter outlet                    | M33x2, 18deep   |
| R     | Air bleed port                  | M16x1.5,12deep | Fe  | Filter inlet                     | M33x2, 18deep   |
| S     | Boost suction port              | M48x2,22deep   | Fs  | Port from filter to suction line | M33x2, 18deep   |
| X1/X2 | Control pressure port           | M16x1.5,12deep | MH  | Balancing high-pressure port     | M12x1.5, 12deep |

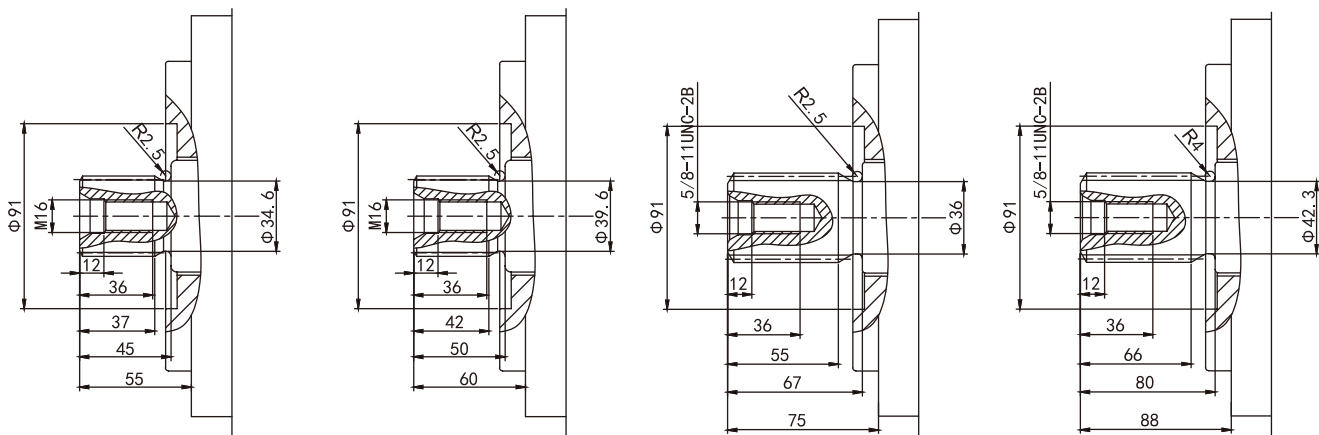
Drive shaft

Splined shaft Z DIN 5480  
W50x2x30x24x9g

Splined shaft A DIN 5480  
W70x2x30x22x9g

Splined shaft S 1 3/4"  
13T 8/16DP

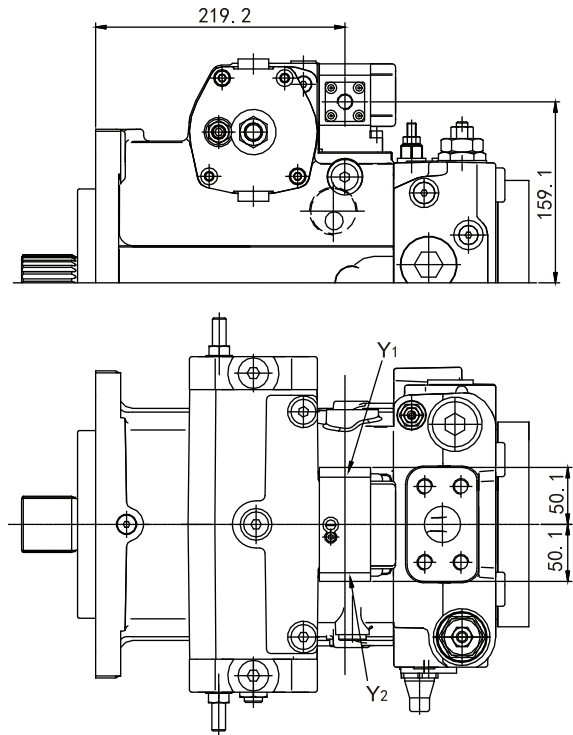
Splined shaft T 2"  
15T 8/16DP



Installation Dimensions

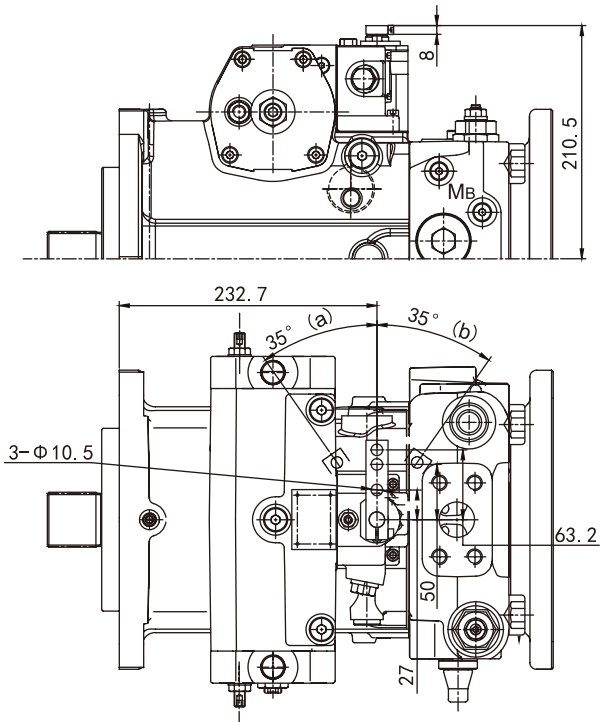
Size 180

HD hydraulic control, pilot pressure related

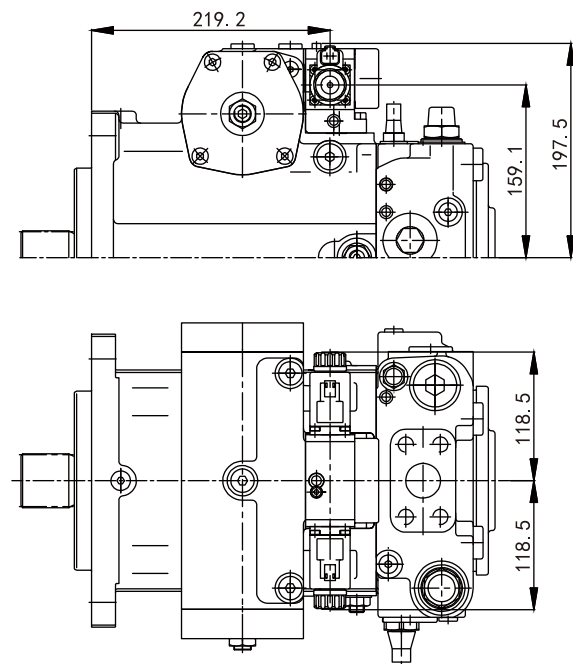


Y1/Y2 Remote control port M14x1.5,12deep

HW hydraulic control, mechanical servo



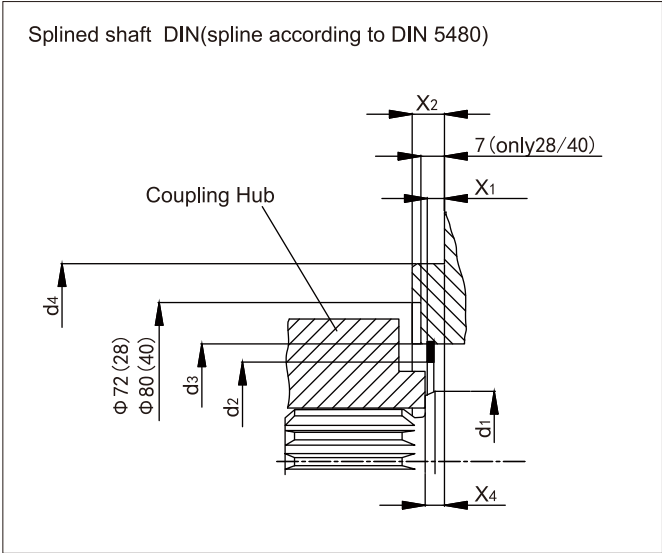
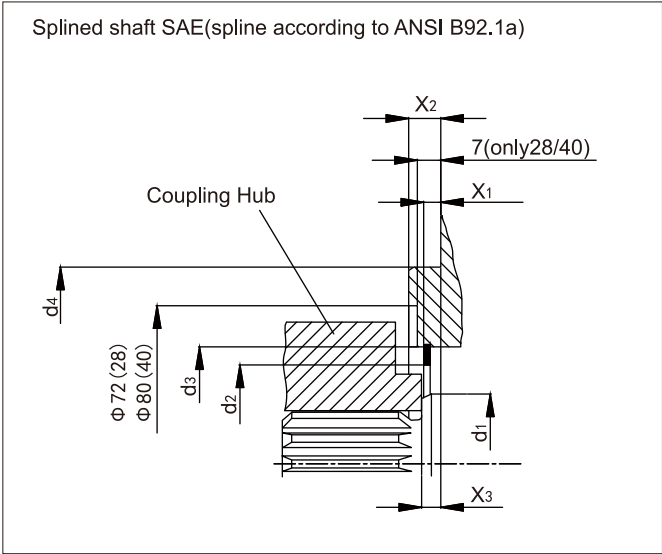
EP electric control, with proportional solenoid



➤ Installation dimensions for coupling assembly

To ensure the rotary components (coupling hub) and fixed components (valve body, retaining ring) will not come into contact with each other, the installation conditions below must be observed.  
This depends on the pump size and the splined shaft.

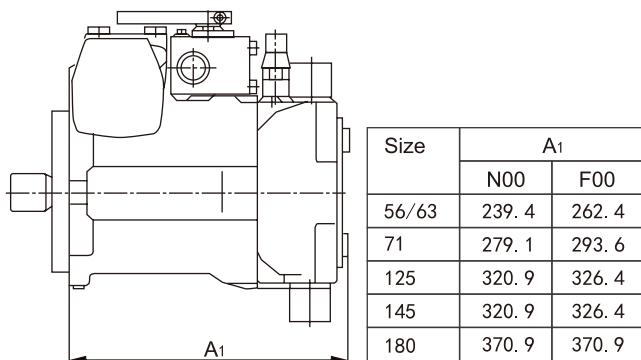
- Sizes 56 to 180 (not freely rotary):
- Splined SAE (shaft S or T)  
The outer diameter of the coupling hub must be smaller than the inner diameter d2 of the retaining ring in the area near the drive shaft collar (dimension X2 - X3).
  - Splined shaft DIN (shaft Z or A)  
The outer diameter of the coupling hub must be smaller than the case diameter d3 in the area near the drive shaft collar (dimension X2 - X4).



| Size | Φd1 | Φd1min | Φd3     | Φd4   | X1                  | X2                   | X3                                | X4                                 |
|------|-----|--------|---------|-------|---------------------|----------------------|-----------------------------------|------------------------------------|
| 56   | 40  | 54.4   | 68±0.1  | 127   | 7.0 <sup>+0.2</sup> | 12.7 <sub>-0.5</sub> | 8 <sup>+0.9</sup> <sub>-0.6</sub> | 10 <sup>+0.9</sup> <sub>-0.6</sub> |
| 63   | 40  | 54.4   | 68±0.1  | 127   | 7.0 <sup>+0.2</sup> | 12.7 <sub>-0.5</sub> | 8 <sup>+0.9</sup> <sub>-0.6</sub> | 10 <sup>+0.9</sup> <sub>-0.6</sub> |
| 71   | 45  | 66.5   | 81±0.1  | 127   | 7.0 <sup>+0.2</sup> | 12.7 <sub>-0.5</sub> | 8 <sup>+0.9</sup> <sub>-0.6</sub> | 10 <sup>+0.9</sup> <sub>-0.6</sub> |
| 125  | 55  | 76.3   | 91±0.1  | 152.4 | 7.0 <sup>+0.2</sup> | 12.7 <sub>-0.5</sub> | 8 <sup>+0.9</sup> <sub>-0.6</sub> | 10 <sup>+0.9</sup> <sub>-0.6</sub> |
| 145  | -   |        |         |       |                     |                      |                                   |                                    |
| 180  | 60  | 88     | 107±0.1 | 152.4 | 7.4 <sup>+0.2</sup> | 15.9 <sub>-0.5</sub> | 8 <sup>+0.9</sup> <sub>-0.6</sub> | 10 <sup>+0.9</sup> <sub>-0.6</sub> |

## Dimensions of Through Drive

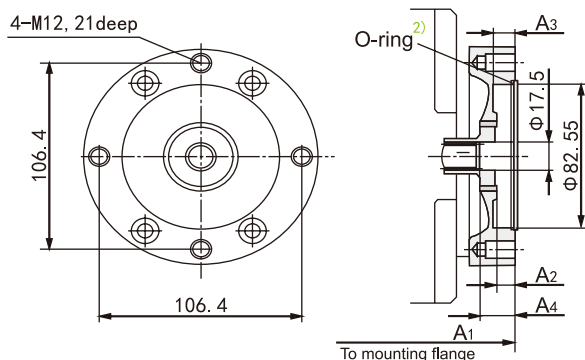
N00 without boost pump, without through drive  
F00 with boost pump, without through drive



F01/K01

Flange SAE J 744-82-2(A)

Hub for splined shaft ANSI B92.1a-1976 5/8" 9T 16/32DP<sup>1)</sup>  
(SAE J744-16-4(A))(O-ring, 82.27×1.78)

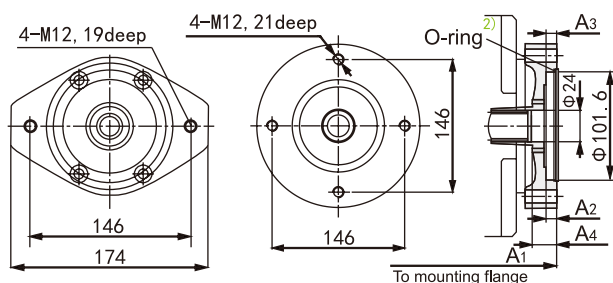


| Size  | A1 (F01) | A1 (K01) | A2   | A3  | A4   |
|-------|----------|----------|------|-----|------|
| 56/63 | 267.4    | 254.9    | 10   | 10  | 18   |
| 71    | 297.6    | 297.6    | 9    | 10  | 17   |
| 125   | 330.9    | 330.9    | 10.5 | 9   | -    |
| 145   | 330.9    | 330.9    | 10.5 | 9   | -    |
| 180   | 378.4    | 378.4    | 7.5  | 7.5 | 15.5 |

F02/K02

Flange SAE J 744-101-2(B)

Hub for splined shaft ANSI B92.1a-1976 7/8" 13T 16/32DP<sup>1)</sup>  
(SAE J744-22-4(B))(O-ring, 101.32×1.78)



Size 56/63

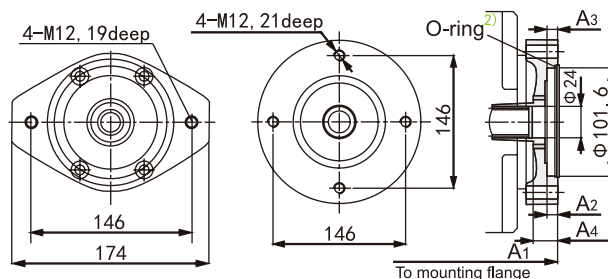
Size 71/125/145/180

| Size  | A1    | A2 | A3  | A4   |
|-------|-------|----|-----|------|
| 56/63 | 268.4 | 12 | 11  | 19.5 |
| 71    | 300.6 | 13 | 9.8 | 17   |
| 125   | 330.9 | 10 | 11  | 17   |
| 145   | 330.9 | 10 | 11  | 17   |
| 180   | 381.4 | 11 | 11  | 18   |

F04/K04

Flange SAE J 744-101-2(B)

Hub for splined shaft ANSI B92.1a-1976 1" 15T 16/32DP<sup>1)</sup>  
(SAE J744-25-4(B-B))(O-ring, 101.32×1.78)



Size 56/63

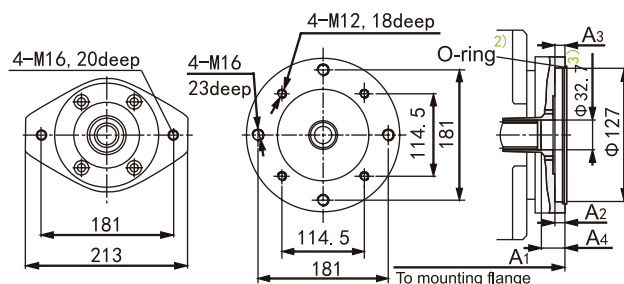
Size 71/125/145/180

| Size  | A1    | A2 | A3  | A4   |
|-------|-------|----|-----|------|
| 56/63 | 268.4 | 13 | 11  | 18.5 |
| 71    | 300.6 | 13 | 9.8 | 15.5 |
| 125   | 330.9 | 10 | 11  | 16.5 |
| 145   | 330.9 | 10 | 11  | 16.5 |
| 180   | 381.4 | 11 | 11  | 18   |

F07/K07

Flange SAE J 744-127-2(C)

Hub for splined shaft ANSI B92.1a-1976 1 1/4" 14T 12/24DP<sup>1)</sup>  
(SAE J744-32-4(C))(O-ring, 128×2.65)



Size 56/63

Size 71/125/145/180

| Size  | A1    | A2 | A3   | A4   |
|-------|-------|----|------|------|
| 56/63 | 272.4 | 15 | 14   | 17.5 |
| 71    | 303.6 | 15 | 13.5 | 20   |
| 125   | 335.9 | 15 | 15.5 | 22.5 |
| 145   | 335.9 | 15 | 15.5 | 22.5 |
| 180   | 384.8 | 14 | 19   | 17   |

Note: Size 125/145 without F07/K07

<sup>1)</sup> 30° pressure angle, flat root, side fit, tolerance class 5

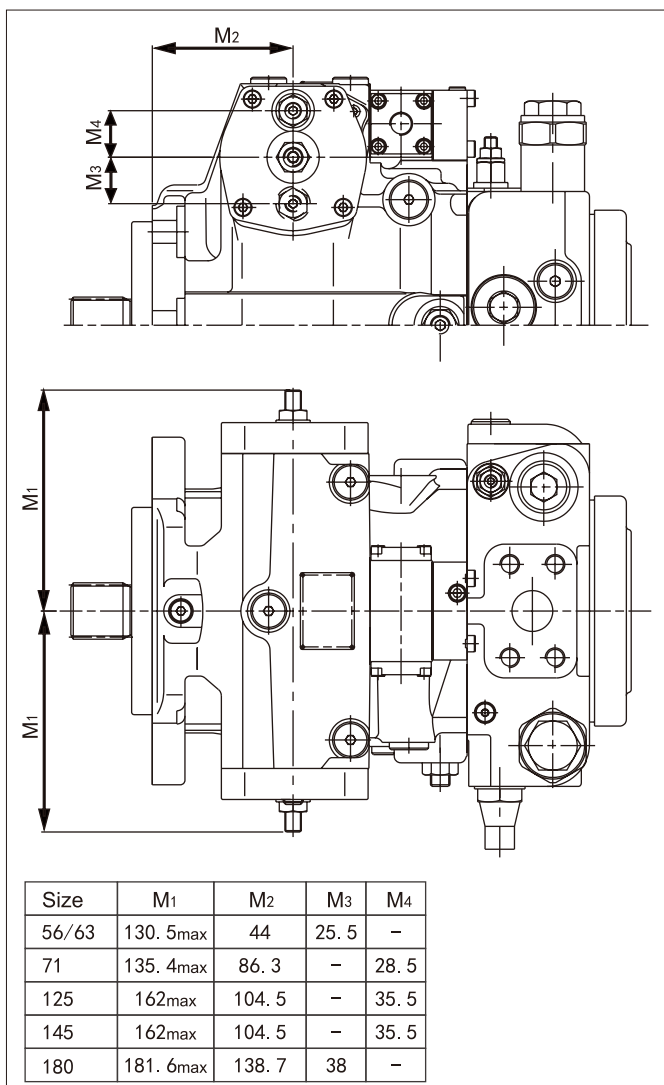
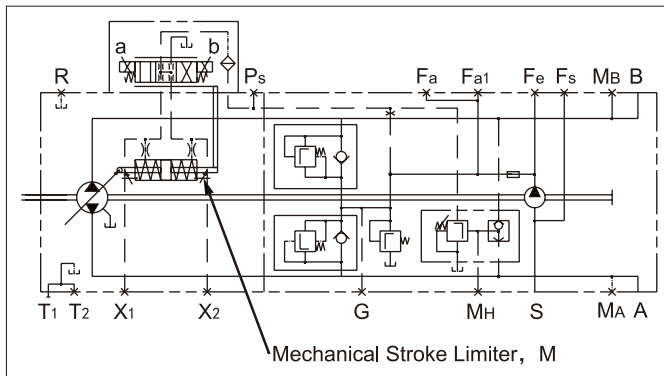
<sup>2)</sup> O-ring included in the scope of delivery

<sup>3)</sup> Size 71(Φ33)

➤ **Mechanical Stroke Limite, M**

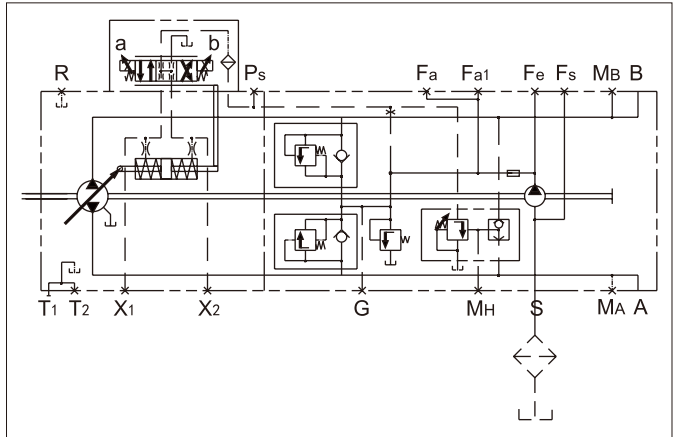
The mechanical stroke limiter is an auxiliary function for continual reduction of the maximum displacement of the pump, regardless of the control device used.

Two adjusting screws are used to limit the stroke of the stroking cylinder and thus the maximum swivel angle of the pump.



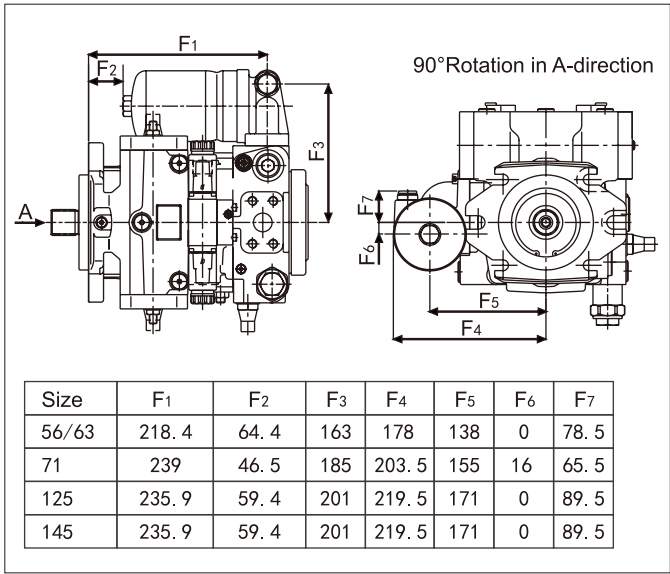
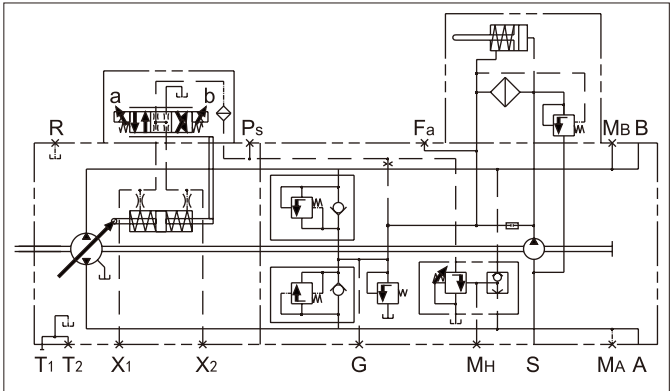
Filter

Standard: external suction filter  
Standard type S (preferred)  
Type of filter \_\_\_\_\_ filter without bypass  
Recommendation \_\_\_\_\_ with contamination indicator  
Flow resistance at filter element  
V=30mm<sup>2</sup>/s n=n<sub>max</sub> \_\_\_\_\_ Δp≤0.01MPa  
V=100mm<sup>2</sup>/s n=n<sub>max</sub> \_\_\_\_\_ Δp≤0.03MPa  
Pressure at suction port S  
V=30mm<sup>2</sup>/s \_\_\_\_\_ Δp≥0.08MPa  
Cold start(V=1600mm<sup>2</sup>/s, n≤1000rpm) \_\_\_\_\_ Δp≥0.05MPa  
The filter is not included in the scope of delivery.



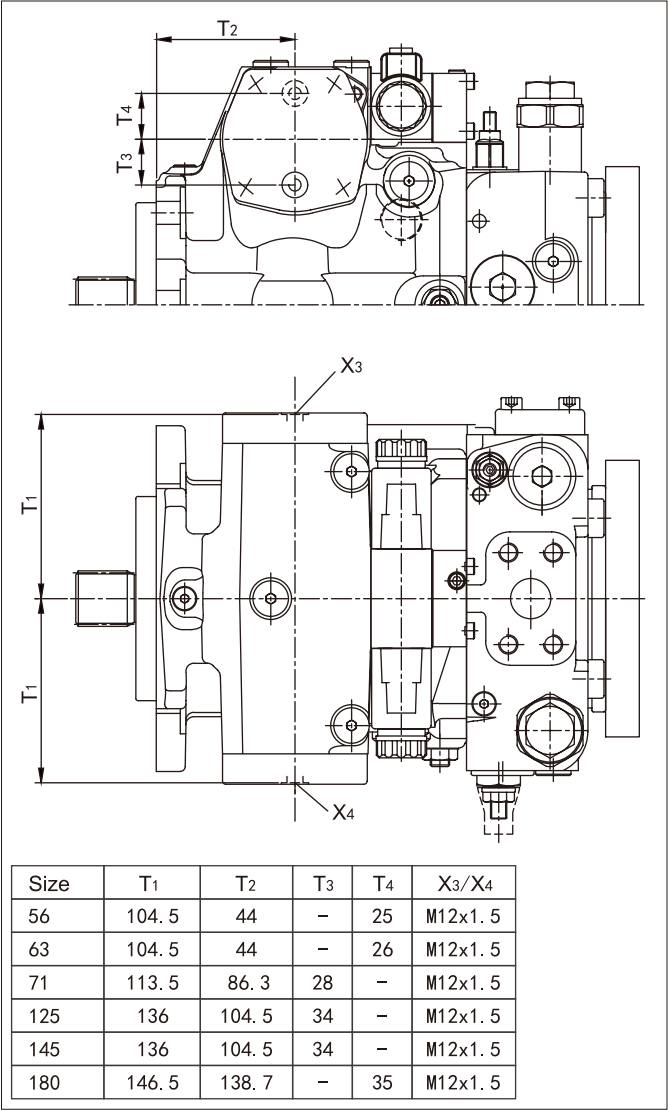
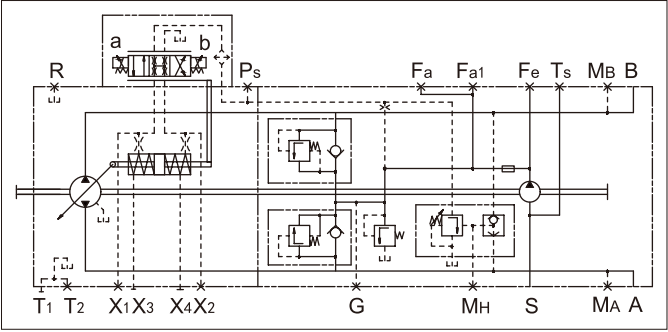
Version: integrated filter with cold start valve and visual contamination indicator, P

Type of filter \_\_\_\_\_ filter without bypass  
Filter size (absolute value) \_\_\_\_\_ 20μm  
Filter material \_\_\_\_\_ glass fiber  
Pressure capacity \_\_\_\_\_ 10MPa  
Filter arrangement \_\_\_\_\_ connected to pump  
Note:  
- The port plate has a cold start valve to prevent pump damages.  
The valve is open at flow resistance ≥0.6MPa  
- With visual contamination indicator  
Differential pressure (cracking pressure) Δp=0.5MPa



Variable Pressure Ports X3/X4, T

Stroking chamber pressure ports X3 and X4



Installation Instructions

General

The axial piston unit must be always be filled with hydraulic fluid and air bled during commissioning and operation. This must also be observed following a longer standstill as the system may empty via the hydraulic lines. The leakage in the housing must be directed to the reservoir via the highest drain port. The minimum suction pressure at port S must not fall below 0.08 MPa absolute pressure (or 0.05 MPa absolute pressure at cold start). Under all operating conditions, the suction line and case drain line must flow into the reservoir below the minimum fluid level.

Installation positions

See the examples below. Other installation positions may be provided as required.

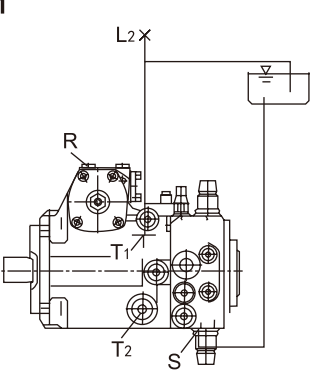
Below-reservoir installation (standard)

Pump below the minimum fluid level of the reservoir. Recommended installation positions: 1 and 2.

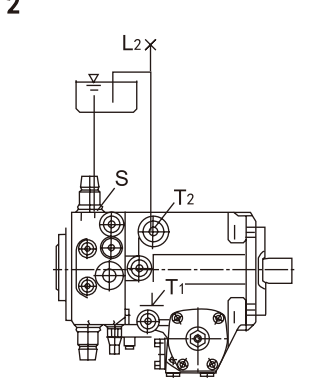
Above-reservoir installation

Pump above the minimum fluid level of the reservoir. Do not exceed the maximum permissible suction height  $h_{max}=800mm$ . Recommendation for installation position 8 (shaft upwards): Draining inside the housing may be prevented by installing a check valve (cracking pressure 0.05 MPa) in the drain line.

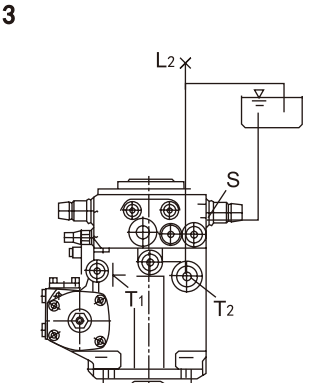
1



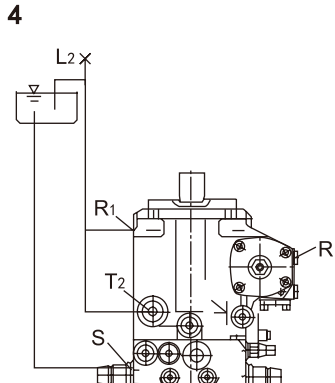
2



3

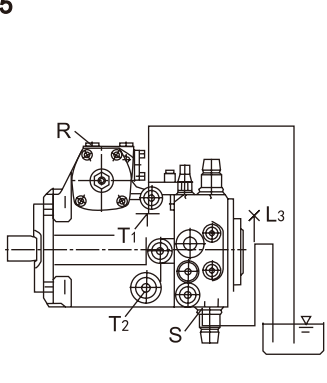


4

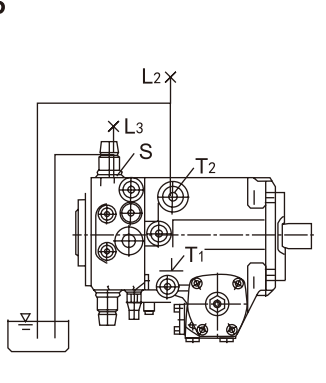


| Installation Position | Air Bleed | Filling Port |
|-----------------------|-----------|--------------|
| 1                     | R         | S+T1 (L2)    |
| 2                     | L2        | S+T2 (L2)    |
| 3                     | L2        | S+T2 (L2)    |
| 4                     | R+L2      | S+T2 (L2)    |

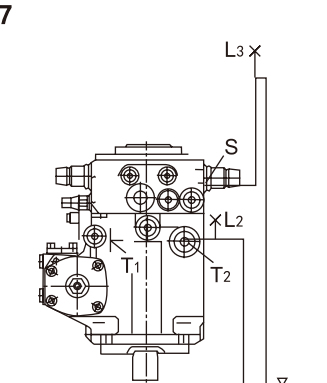
5



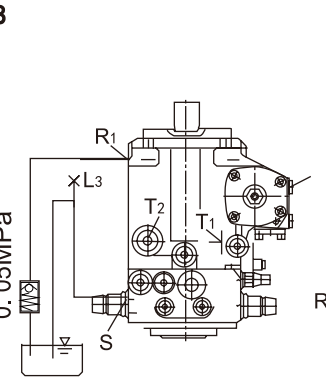
6



7



8



| Installation Position | Air Bleed | Filling Port    |
|-----------------------|-----------|-----------------|
| 5                     | R         | T1+L3           |
| 6                     | L2        | S (L3) +T2 (L2) |
| 7                     | L2+L3     | S (L3) +T2 (L2) |
| 8                     | R+L3      | S (L3) +T2      |

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HYTEK-REV1.0 03/2025

If there are any other modifications,no further notice will be given.