# Solenoid Operated Poppet Valve

**Model: M-SEW10...1X**

- ◆ Size 10
- ◆ Maximum working pressure 420/630 bar
- ◆ Maximum working flow 40 L/min

## Contents



## Features

- ● Direct operated solenoid directional poppet valve
- ● Closed port without leakage
- ● Switching flexibility even in high-pressure state long periods
- ● Air-gap DC solenoid with detachable coils (AC voltage available after rectification)
- ● The solenoid coil can be rotated by 90°
- ● Individual electrical connection

3/2-way directional seat valve

**General:**

The M-SEW10 directional valve is solenoid operated poppet valve. It controls the opening, closing and direction of the fluid.
The valve is mainly composed of valve body (1), solenoid (2), hardened valve system (3) and ball (4) as the closing element. The manual emergency operation (5) can be control the valve when the solenoid is not energized.

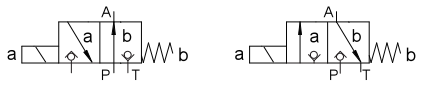
**Basic function:**

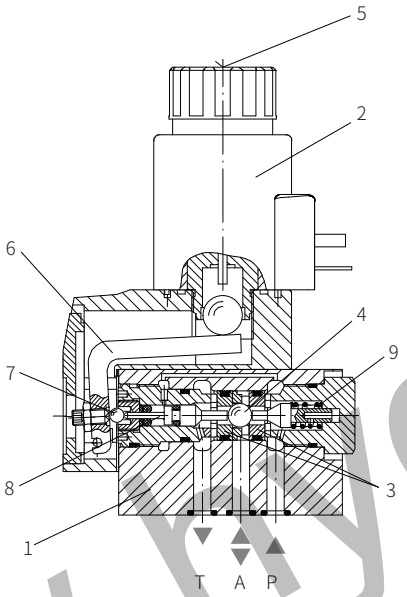
In the initial position, the spool (4) is pressed into the valve seat by the spring (9) and by the solenoid when in the switching position. The force of the solenoid (2) is applied to the actuating push rod (8) which is sealed on both sides through the lever (6) and the ball (7). The chamber between the two sealing elements is connected to the port P. Therefore, the valve system (3) is pressure compensated based on the actuating force (solenoid or spring). In this way, the valve can be used up to 630bar.

**Note:**

- The 3/2-way poppet directional valve has "negative cover function". Therefore, the port T must be always connected. That means the ports P-A-T are connected to each during the switching process (from the starting of the opening of one valve seat to the closing of the other valve seat). But this process is completed in a very short time, so it is irrelevant in almost all applications.
- It must ensure that the specified maximum flow does not exceeded the performance limit of the valve.
- If necessary, the cartridge throttle can be installed to limit the flow.

Symbol “U” Symbol “C”




Model M-3SEW10U...XJ/



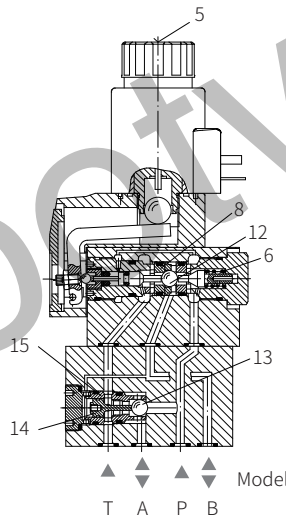






4/2-way poppet directional valve

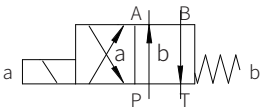
Initial position: When the solenoid is not energized, the force of the spring (6) keeps the ball spool (12) on the left valve seat (8). The port P is connected with A. The pump pressure oil acts on the large area of the control piston (15) through the control line from port A. The steel ball (13) is pushed to the other side of the valve seat (14), so the oil port P is connected to A and B to T.
Switching position: After the solenoid is energized, the oil port A is connected to T.In additional, the control line from the oil port A acts on the large area of the control piston (15) to unload to the tank. The pressure oil provided from the oil port P pushes the steel ball (13) to the valve seat (14). At this time, the oil port P is connected to B.



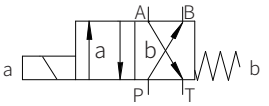

Model M-4SEW10Y...1XJ/

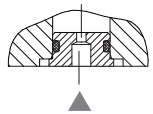
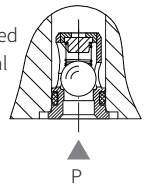
The seat valve with plus-1 plate as bellow:

Symbol “D”

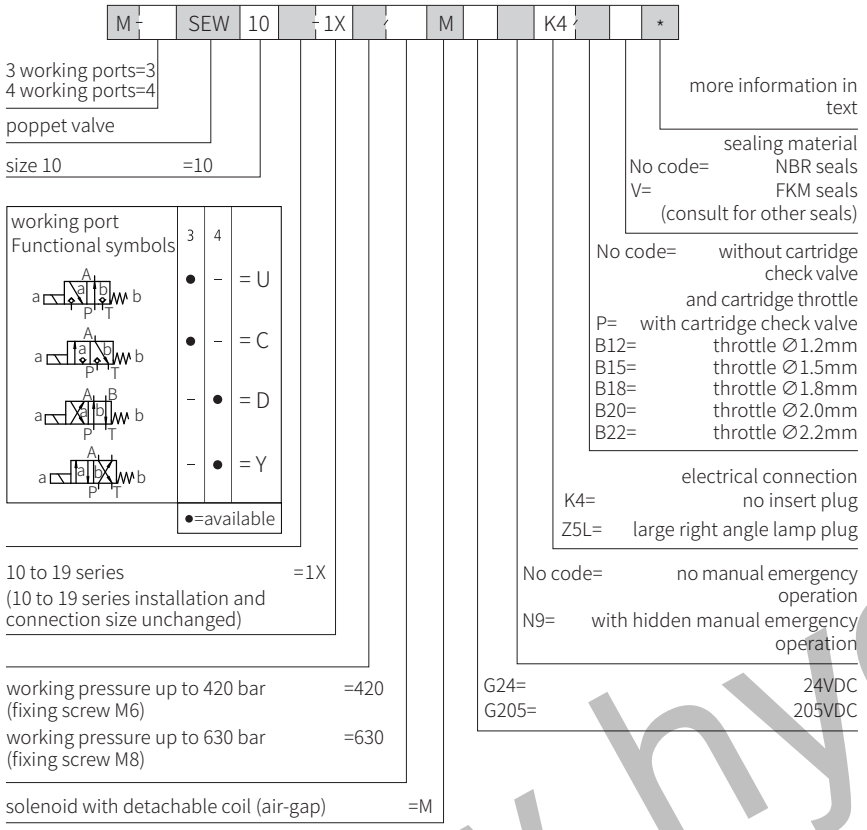



Symbol “Y”




| Cartridge throttle | Cartridge check valve |
|---|---|
| Due to the working conditions limitations, it may occur that the flow exceeds the performance limit of the valve during the switching process, then the use of a throttle is required.<br>Example:<br>-Accumulator operation<br>-Used as a pilot valve with internal pilot oil supply<br>  <br>3/2-way poppet valve<br>The throttle is inserted into the port P of the directional valve.<br>4/2-way poppet valve<br>The throttle is inserted into the oil port P of the plus-1 plate. | The cartridge check valve allows free flow from P to A and leak-free closure from A to P.<br>3/2-way poppet valve<br>The cartridge check valve is inserted into the oil port P of the directional valve.<br>  <br>4/2-way poppet valve<br>The cartridge check valve is inserted into port P of the plus-1 plate. |

## Models and specifications




## Technical parameters

| Overview | | | |
|---|---|---|---|
| Installation position | | | Optional |
| Environment temperature range | | °C | -30 to +50 (NBR seal) |
| | | | -20 to +50 (FKM seal) |
| Weight | 3/2-way valve | kg | 2.0 |
| | 4/2-way valve | kg | 3.5 |
| **Hydraulic** | | | |
| Maximum working pressure | | bar | See characteristic limit |
| Maximum flow | | L/min | 40 |
| Pressure medium | | | Mineral oil (HL, HLP)[1] in accordance with DIN 51524; Fast living organisms degraded oil according to VDMA 24568; HETG (Rapeseed oil)[1]; HEPG(Polyethyleneglycol)[2] ; HEES (Synthetic Fats)[2] |
| Pressure medium temperature range | | | -30 to +80 (NBR seal) |
| | | | -20 to +80 (FKM seal) |
| Viscosity range | | $mm^2/s$ | 28 to 500 |
| Cleanliness of oil[4] | | | The maximum allowable pollution level of oil is IS04406 Class 20/18/15 |

| Electrical | | | |
|---|---|---|---|
| Voltage type | | DC | AC |
| Available voltage[3] | V | 24、205 | Only available via rectifier |
| Allowable voltage tolerance (nominal voltage) | % | ±10 | |
| Power consumption | W | 30 | |
| Continuous power on time | % | 100 | |
| Switch time to ISO 6403 | | See below table | |
| Switching frequency | times/hour | 15000 (working pressure ⩽ 350bar)/3600 (working pressure ⩾ 350bar) | |
| Protection type to DIN 40050 | | IP65 with plug installed and fixed | |
| Maximum coil temperature | °C | 150 | |

1) For NBR seal and FKM seal
2) Only for FKM seal
3) Please consult for special voltage

4) The oil must meet the cleanliness degree requested by the components in the hydraulic system.
Effect oil filtration can prevent failure and increase the service life of the components.

Electrical protective conductor (PE ⏚) must be connected properly as rules

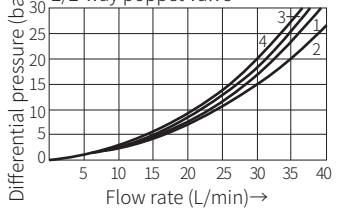
Switching time tms (Installation position: solenoid installed horizontally)

| Pressure P bar | Flow $q_v$ L/min | DC Solenoid Functional symbol U, C, D, Y | | | | | | AC Solenoid + Rectifier Functional symbol U, C, D, Y | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | $t_{on}$ No tank pressure | | | | $t_{off}$ | | $t_{on}$ No tank pressure | | | | $t_{off}$ | | | |
| | | U | C | D | Y | U/C | D/Y | U | C | D | Y | U | C | D | Y |
| 140 | 40 | 20 | 40 | 20 | 40 | 12 | 17 | 20 | 40 | 20 | 40 | 60 | 45 | 40 | 50 |
| 280 | 40 | 25 | 45 | 20 | 45 | 12 | 17 | 20 | 45 | 25 | 45 | 60 | 45 | 45 | 55 |
| 320 | 40 | 25 | 45 | 20 | 45 | 12 | 17 | 25 | 45 | 25 | 45 | 60 | 45 | 45 | 55 |
| 420 | 40 | 30 | 45 | 20 | 50 | 12 | 17 | 25 | 45 | 25 | 50 | 60 | 45 | 45 | 55 |
| 500 | 40 | 30 | 45 | 20 | 50 | 12 | 17 | 30 | 50 | 30 | 50 | 65 | 50 | 60 | 60 |
| 600 | 40 | 30 | 50 | 20 | 50 | 12 | 17 | 30 | 50 | 30 | 50 | 65 | 50 | 60 | 60 |

## Characteristic curve

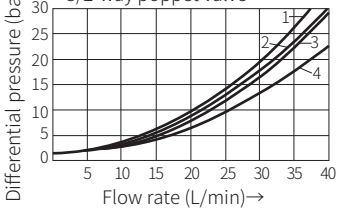
(Measured when using HLP46, $\vartheta_{oil}$=40°C ± 5°C)

p-$q_v$- characteristic curve
2/2-way poppet valve



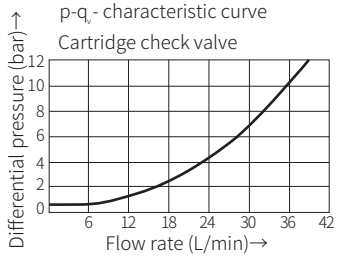

1 M - 3SEW10C..., P to A
2 M - 3SEW10C..., A to T
3 M - 3SEW10U..., P to A
4 M - 3SEW10U..., A to T

p-$q_v$- characteristic curve
3/2-way poppet valve

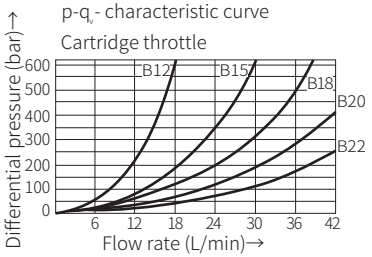



1 M - 4SEW10 $^{D}_{Y}$..., A to T
2 M - 4SEW10 $^{D}_{Y}$..., P to A
3 M - 4SEW10 $^{D}_{Y}$..., P to B
4 M - 4SEW10 $^{D}_{Y}$..., B to T

p-$q_v$- characteristic curve
Cartridge check valve




p-$q_v$- characteristic curve
Cartridge throttle




## Characteristic limit

(Measured when using HLP46, $\vartheta_{oil}$=40°C ± 5°C)

| | Functional symbol | Comment | Working pressure bar P | A | B | T | Flow L/min |
|---|---|---|---|---|---|---|---|
| Three-way circuit | "U" | Oil port pressure P≥A≥T | 420/630 | 420/630 | | 100 | 40 |
| | "C" | | 420/630 | 420/630 | | 100 | 40 |
| Two-way circuit (only for unloading function) | "U" | Pressure must be maintained in port A before switching from the original position to the switching position. Oil port pressure A≥T | | 420/630 | | 100 | 40 |
| | "C" | Oil port pressure A≥T | | 420/630 | | 100 | 40 |
| Four-way circuit (flow only in the direction of the arrow) | "D" | Single poppet valve (symbol "U") with plus-1 plate P≥A≥B≥T | 420/630 | 420/630 | 420/630 | 100 | 40 |
| | "Y" | Double poppet valve (symbol "C") with plus-1 plate P≥A≥B≥T | 420/630 | 420/630 | 420/630 | 100 | 40 |

The characteristic limit is measured when the solenoid is at operating temperature, at 10% below the standard voltage and without tank preloading.



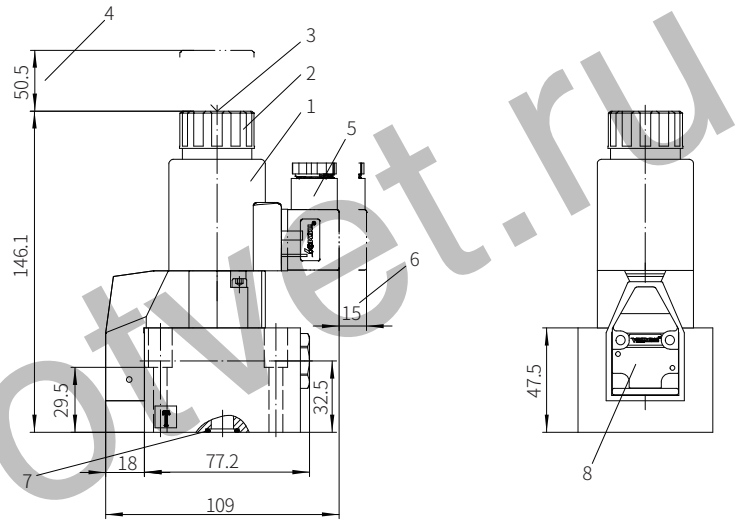


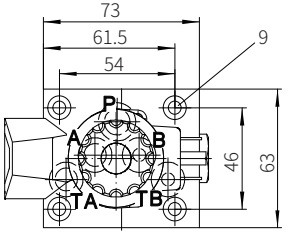


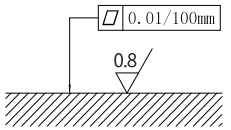
## Component size

Size unit: mm

3/2-way poppet directional valve, 420 bar



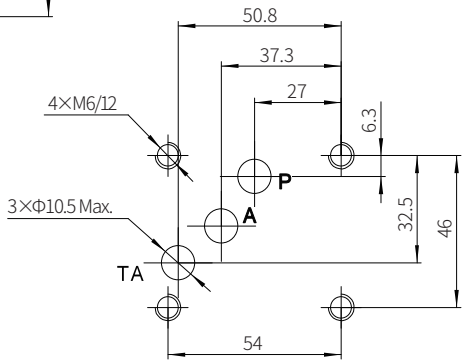



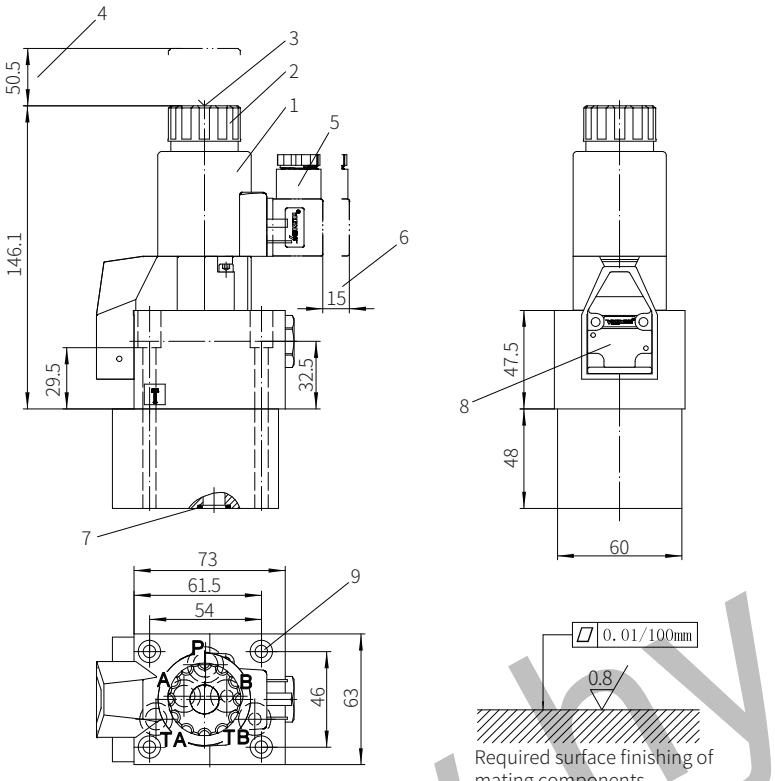

Required surface finishing of mating components

1 Solenoid
2 Solenoid nut
3 Hidden emergency button
4 Space required to remove nut
5 Plug
6 Space required to remove plug
7 O ring 12x2 (for oil port A, B, T)
O ring 14.2x1.78 (for oil port P)
8 Name plate
9 Valve connection hole

Valve fixing screw
M6x40-10.9 grade GB/T70.1-2000
Tightening torque $M_A$=13.7Nm



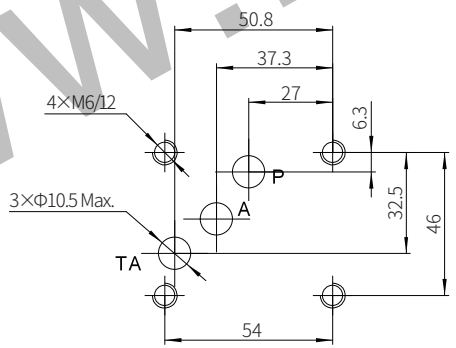
4/2-way poppet directional valve, 420 bar




Required surface finishing of mating components

1 Solenoid
2 Solenoid nut
3 Hidden emergency button
4 Space required to remove nut
5 Plug
6 Space required to remove plug
7 O ring 12x2 (for oil port A, B, T)
O ring 14.2x1.78 (for oil port P)
8 Name plate
9 Valve connection hole

Valve fixing screw
M6x90-10.9 grade GB/T70.1-2000
Tightening torque $M_A$=13.7Nm



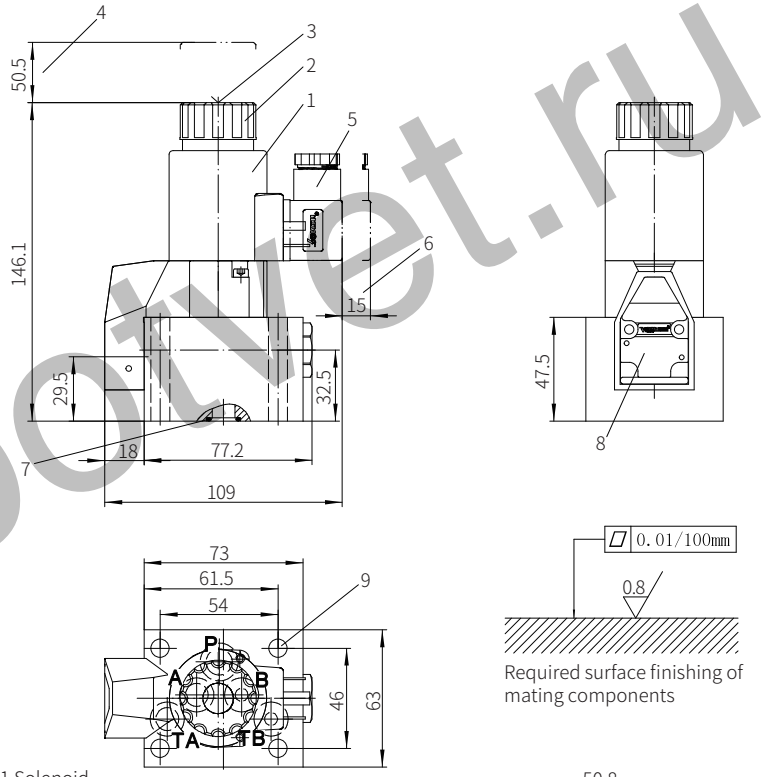








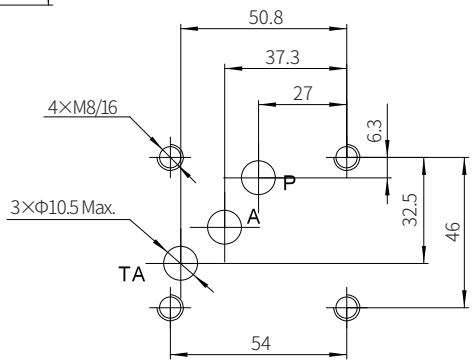

3/2-way poppet directional valve, 630 bar




Required surface finishing of mating components

1 Solenoid
2 Solenoid nut
3 Hidden emergency operation
4 Space required to remove nut
5 Plug
6 Space required to remove plug
7 O ring 12x2 (for oil port A, B, T)
O ring 14.2x1.78 (for oil port P)
8 Name plate
9 Valve connection hole

Valve fixing screw
M8x60-10.9 grade GB/T70.1-2000
Tightening torque $M_A$=34.3Nm

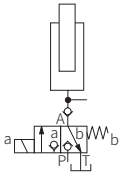


## Application examples



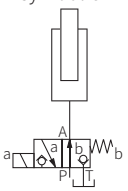
These examples only indicate some applications of the poppet valve but not include all functions

symbol C



2/2-way circuit with two poppet valves and check valve at port A
The check valve must be installed on the pipeline.
Initial position: The flow is blocked and the maximum pressure is allowed. Due to the check valve at port A, the pressure is held in the actuator even when the pump is turned off.
Switching position: The fluid flows freely and the maximum pressure is allowed. The oil is drained via port T. The only oil leakage occurring is that the oil flows to T during the switching process.

symbol U



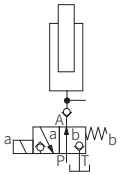
3/2-way circuit with a single poppet valve

Initial position: Lifting

The maintenance of position only depends on the stroke limit and the pressure at port P.

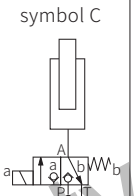
Switching position: Descending

symbol U



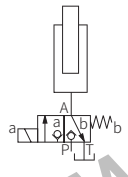
2/2-way circuit with a single poppet valve and check valve at port A
The check valve must be installed on the pipeline.
Initial position: The fluid flows freely and the maximum pressure is allowed. Due to the check valve at port A, the pressure is held in the actuator even when the pump is turned off.
Switching position: The flow is blocked and the maximum pressure is allowed. The oil is drained via port T. The only oil leakage occurring is that the oil flows to port T during the switching process.

symbol C



3/2-way circuit with two poppet valves and cartridge check valve at port P
The check valve is installed at port P of the 3/2-way poppet valve.
Initial position: Descending
Switching position: Lifting
The load can be held in any position when the pump is turned off and the solenoid is energized.

symbol C



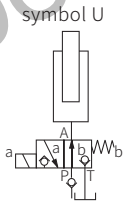
3/2-way circuit with two poppet valves

Initial position: Descending

Switching position: Lifting

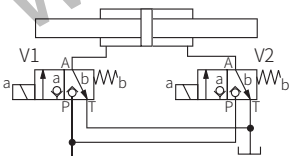
The maintenance of position only depends on the stroke limit and the pressure at port P.

symbol U



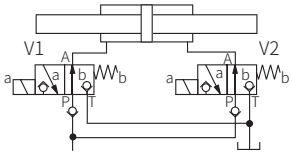
3/2-way circuit with a single poppet valve and cartridge check valve at port P
The check valve is installed at port P of the 3/2-way poppet valve.
Initial position: Lifting
The load can be held in any position when the pump is turned off.
Switching position: Descending

symbol C



4/3-way (4/4-way) circuit with two poppet valves
V1 and V2 in the initial position: Both ends of the cylinder are connected to the oil tank port.
V2 in switching position: the piston moves to the left.
V1 in switching position: the piston moves to the right.
V1 and V2 in switching position: Both ends of the cylinder are connected to the pump port. The fast movement is possible when a single rod cylinder with an area ratio of 2:1 is used.
Attention! When using single rod cylinders, the performance limit (double flow) of the valve and the maximum permissible working pressure (overpressure) must be taken into account!

symbol U



4/3-way (4/4-way) circuit with two poppet valves and cartridge check valve at port P of the 3/2-way poppet valve
V1 and V2 in the initial position: the piston is locked externally to prevent oil flow.
V2 in switching position: the piston moves to the right.
V1 in switching position: the piston moves to the left.
V1 and V2 in switching position: both ends of the cylinder are connected with the oil tank port.
Attention! When using single rod cylinders, the performance limit (double flow) of the valve and the maximum permissible working pressure (overpressure) must be taken into account!