



VTUX / VUVX P5/4 - Multi efficiency valve

Explanation and overview of the possibilities offered by the P5/4 multi-efficiency valve

VUVX-BK10-P54...
5/4 valve

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1 Designation and Part number - P5/4 - Multi efficiency valve

Typ/Name	Part number	Function
VUVX-BK10-P54E-MZHF-1T1L	8187067	5/4-Way valve
VUVX-BK10-P54EO-MZHF-1T1L	8224867	5/4-Way valve with additional exhaust function
VUVX-..T1	8000850	(Baukasten)

Table 1.1: Overview designation



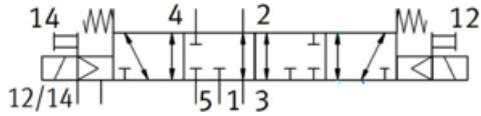
Note

Detailed product information, operating instructions, etc. ... :

è www.festo.com

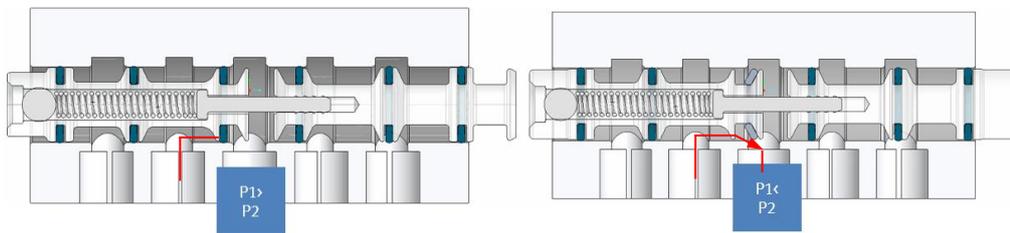
2 Main usage

The P54 multi-efficiency valve is fitted with a split piston, allowing the valve to be set to four switching positions. Depending on which side was previously controlled, the valve has two basic/center positions.



The valve is also available with an additional optional exhausting function.

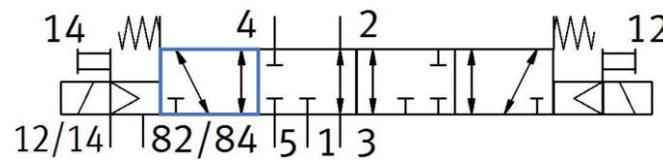
The energy stored in the actuator (e.g., a cylinder) can escape with the additional exhausting function as soon as the pressure at port 1 (P_1 = compressed air supply) is vented and thus becomes lower than the pressure in the cylinder chamber (here, P_2).



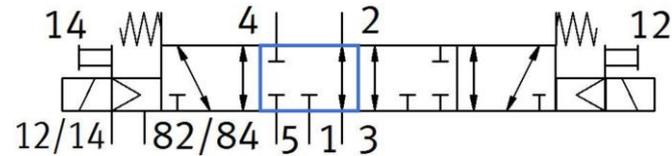
The valve is primarily used to enable the VTUX-digital functions (Embedded version) and Smart Switching Lite functions.

The valve also offers other advantages. These additional applications are described here starting in Chapter 6.

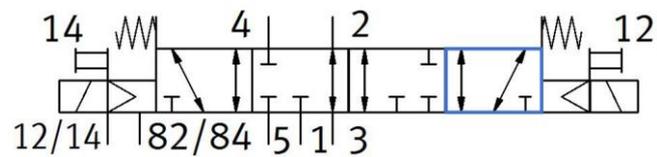
By activating coil 14, the valve is brought into the working position “4-Ventilated / 2-Vented”:



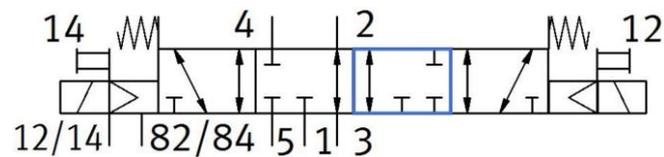
If the switching signal is removed, the valve switches to the left-hand blocking position “4-Blocked / 2-Vented”:



By activating coil 12, the valve is brought into the working position “2-Ventilated / 4-Vented”:



If the switching signal is removed again, the valve is switched to the right blocking position “4-Vented / 2-Blocked”:



2.1 Smart Switching Lite/ SmSw Lite (Basic)

The P54 multi-efficiency valve is the basement for achieving energy savings and cycle time improvements through intelligent control. The intelligent control is achieved using a PLC function block in the customer's PLC. The function block is provided by Festo. Depending on the application, a cycle time improvement of up to 28% and a reduction in energy consumption of up to 60% can be achieved.

If you would like to learn more, you can find further details in the function block application note:

https://www.festo.com/de/de/search/?tab=SUPPORT_PORTAL&q=6ccdefb6-6aae-4870-92f0-&documentTypeGroup=EXPERT_KNOWLEDGE&documentTypes=



Note

By setting the individual/manual ventilation time (via function block or directly), a pressure in the end position can also be set or limited if the external conditions do not change. See 3.5

2.2 VTUX Digital Functions Embedded (Pro)

For this approach, the P54 multi-efficiency valve is the basement for additional functionality, too. In combination with a special intelligent VABX subbase/manifold subbase (integrated intelligence and sensor technology), improved motion quality can be achieved and, in addition to energy savings and cycle time improvements, the following added value can be created:

- Pressure sensors for all 8 working outputs (4 valve positions)
- Pressure limitation in the end position without additional components
- Open for future options

The Digital Functions Embedded approach has all the necessary intelligence and feedback fully integrated into the VTUX. This simplifies handling for you as the customer (no additional component is required). The pressure feedback makes all pneumatic transparent.

3 Other options

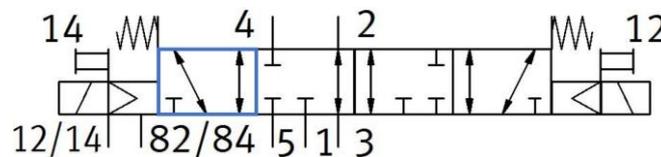
3.1 Keep cylinder position in case of power failure

The P54 multi-efficiency valve is also ideal for keeping vertically mounted cylinders in position in the event of a power failure.

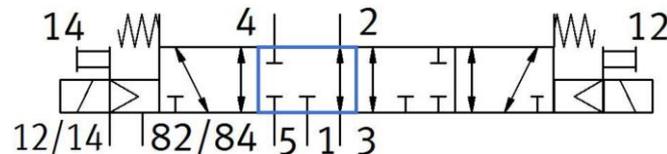
For example:

Activating coil 14 moves the vertically mounted cylinder upward.

Working outlet 4 is ventilated.



If the voltage drops, the valve switches to the center position and blocks working output 4, preventing it from falling. The second cylinder chamber remains open and is not blocked. Depending on the mass/leakage, gravity may cause the cylinder to sink, but a complete fall is prevented. Please observe the applicable safety regulations.



3.2 Keep cylinder position in case of power failure in combination with an automatic exhaust option

The P54 Multi-Efficiency Valve (with additional venting function) can, on the one hand (see 6.1), lock one cylinder chamber and prevent movement/falling in the center position.

The additional venting function, which is triggered by the supply pressure connection "1," allows the stored energy to escape from the cylinder if desired.

The venting capacity is approximately 125 l/min (2 to 1 or 4 to 1).

When venting using this function, a residual pressure of approximately 0.1 bar remains in the system.

The middle position allows functional advantages, but if venting is required in an exceptional situation (worker enters the area and wants to work on the hoses), this can also be achieved via the valve without additional components.

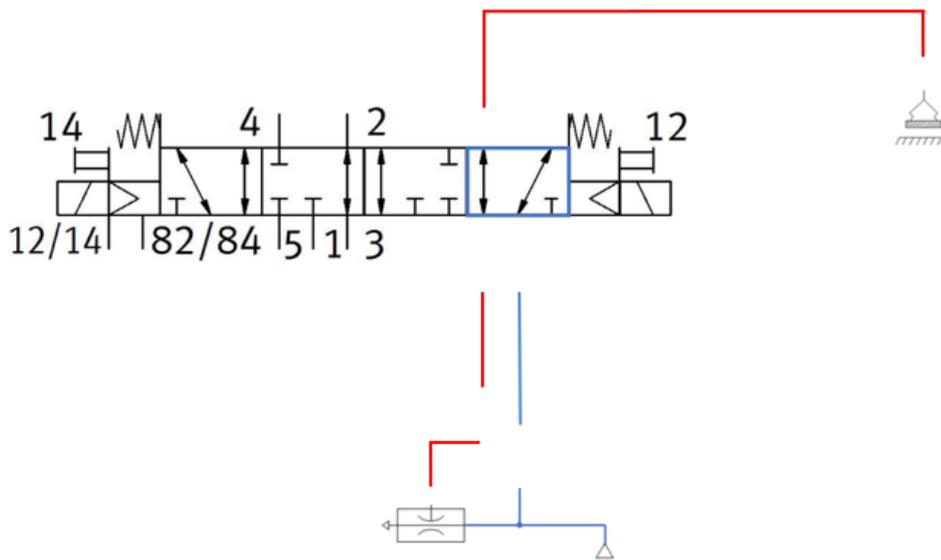
Thus, the valve reacts differently to power failure and interruption of the compressed air supply.

3.3 Vacuum switching with P54E

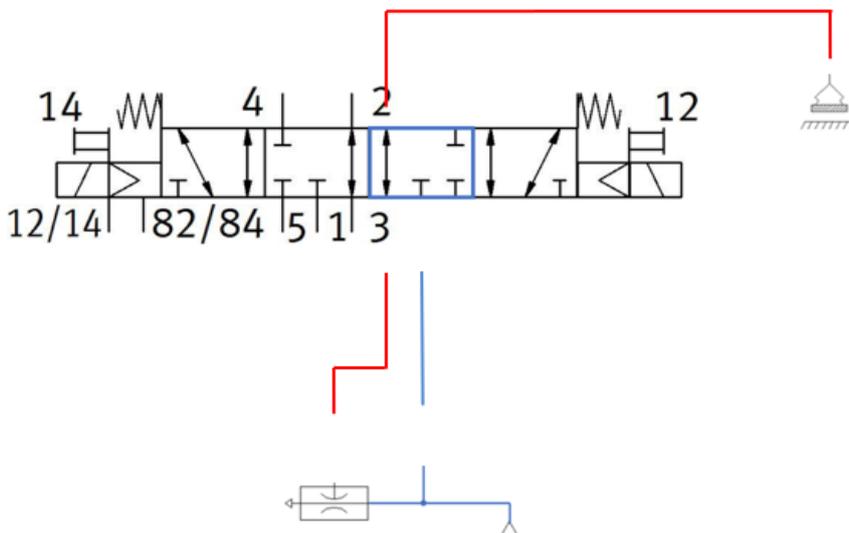
The P54 multi-efficiency valve can be used in vacuum applications, achieving a so-called "latching function." Latching means that the last state remains when the voltage drops. This means that when the vacuum is active, this position is maintained by the mechanical base position even after the voltage drops. The vacuum supply must be connected via connection 5/3 of the VTUX.

Vacuum can not be supplied to port 1, working port 5 must be used for vacuum, as shown in the image below. The ejection pulse is supplied via port 1. Ensure that the pressure at port 1 is sufficient; otherwise, please apply pilot air externally.

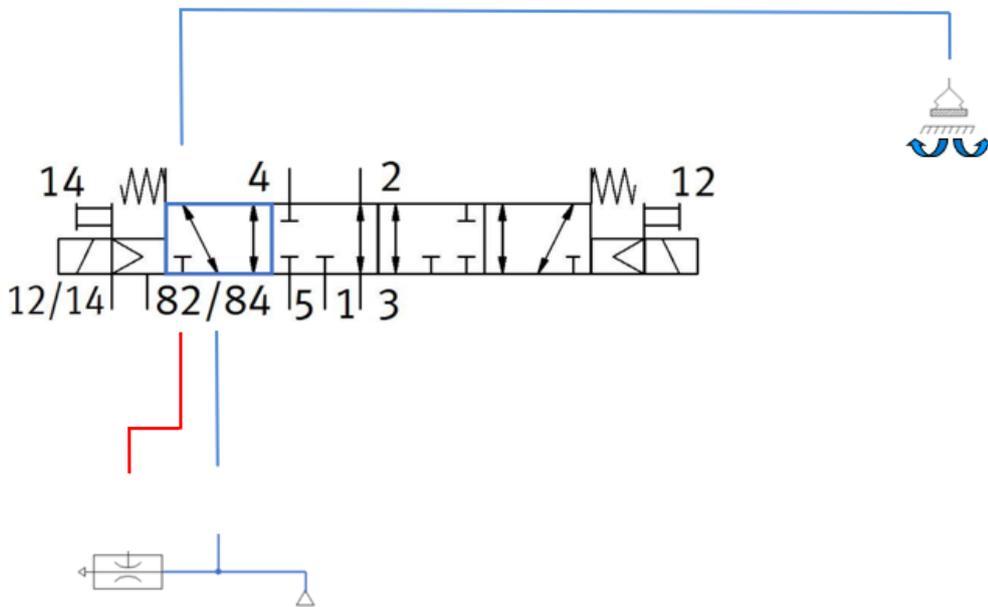
By setting the coil 14 the vacuum is switched on to the suction cup.



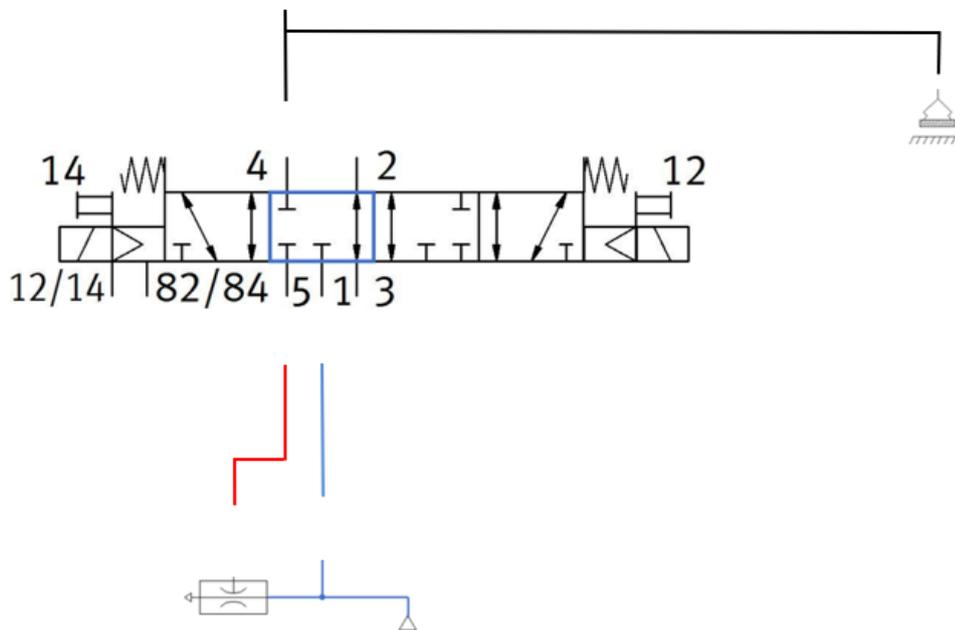
If the voltage drops in the suction position (or if coil 14 is reset), the valve moves to the center position, where the vacuum operation continues. This is called latching.



By setting the coil 12 the vacuum is switched off and the ejection pulse is activated.



By resetting coil 12, the ejection pulse is deactivated and we return to the rest position. Valve channels 1, 5, and 4 are closed. (No vacuum and no ejection pulse at the suction cup.)



3.4 Use in KAT 3 PLD Applications

Please consider the safety application note: **TBD**

Other options

3.5 Process control

The signal duration can be used to specify the filling level and thus the pressure and force in the cylinder chamber in the end position. If a higher pressure is required, a longer signal duration must be selected.

If a lower pressure is required, the signal duration must be reduced.

This control is suitable for cyclical applications where leakage has no influence on the final pressure, as no readjustment is required. Variations can also be achieved by changing the signal duration.

Required



To adjust the process, a manometer/pressure sensor can be connected, for example.