

OPERATING INSTRUCTIONS

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Manufacturer

deltaVision GmbH
Hofmannstr. 50
81379 München
Germany

Product

Safety Valve
S4-Family



Changelog

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1 SAFETY



SAFETY

Strict compliance with these operating instructions is essential for the safe and enduring use of this product. No warranty is given in case of non-compliance with the operating instructions or improper handling of the product. This product is intended exclusively for use with the fluids specified in the respective data sheet of the valve. Use of the product under conditions not specified in the data sheet or contrary to the instructions contained therein is understood to be IMPROPER. The manufacturer assumes no liability for damage or loss resulting from improper use of the product.

No warranty is given in case the customer opens the product without prior written agreement of deltaVision GmbH.



WARNING

- The generally applicable safety regulations must be observed when planning, installing, and using the product. This encompasses, but is not limited to, regulations regarding safety in working with electrical systems, pressurized systems and hot objects.
- Appropriate measures must be taken to prevent unintentional incorrect handling or damage to the product.
- Valves or connections in the system must not be unscrewed or dismantled under pressure. Before dismantling pressure lines, make sure that they are depressurized.
- Before any intervention in the system, the supply voltage must be disconnected.



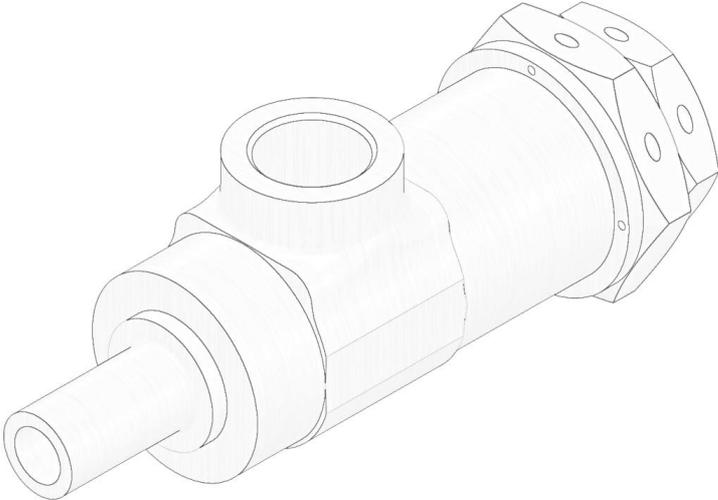
DANGER

Risk of injury! Be aware of the risks posed by operating high-pressure systems and adhere to applicable regulations, norms and standards!

2 S4 CONFIGURATIONS

S4-Family – References

The entire manual is applicable to the entire S4 safety valve family, except for the sections referenced in the table below, which provide model-specific operational details.

	<p>For model-specific operational details, see Section 4.1.1</p>
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3 HANDLING

Before opening any packaged valve, ensure that you identify the grade of cleanliness. If a note on the vacuum-sealed bag containing the valve indicates a cleanroom-processed grade, the steps outlined in Section 3.2 must be followed to warrant that the level of cleanliness is maintained. If no indication is present, follow the steps in Section 3.1.

3.1 Regular Handling

Open and handle the package and its contents only on a stable and clean surface, free from dust, chips/shavings, oil, and other substances. Remove the vacuum-sealed bag from the parcel and place it carefully onto the stable and clean surface. Cut open the vacuum-sealed bag at one of its sides with a clean, sharp knife or pair of scissors. Ensure that you do not damage the valve inside by keeping the utilized blades far from all parts of the valve, especially the cables. Remove the bubbled-wrapped valve from the vacuum bag and place it carefully on a stable, clean surface. Then start unwrapping the bubble wrap. Inside, you will find a hermetic plastic bag containing the valve. Always handle the valve with clean, washed hands or while wearing powder-free disposable gloves (e.g., from nitrile, latex, or similar materials)! Prepare yourself accordingly before opening the bag. Do not remove the orange Kapton tape covering the fluidic ports! To install the valve in a fluid system, follow the steps outlined in Section 5.1. When the valve is not in use, ensure it is stored in accordance with the procedures outlined in Section 7.

3.2 Cleanroom Handling

Open and handle the package and its contents only on a stable and clean surface, free from dust, chips/shavings, oil, and other substances. Remove the vacuum-sealed bag from the parcel and place it carefully onto the stable and clean surface. Cut open the vacuum-sealed bag at one of its sides with a clean, sharp knife or pair of scissors. Ensure that you do not damage the bubble-wrapped anti-static bag inside! Remove the bubbled-wrapped anti-static bag from the vacuum bag and place it carefully on a stable, clean surface. Then start unwrapping the bubble wrap. Inside, you will find a hermetic anti-static plastic bag containing the valve in a sealed extra bag. Do not open any contents of the anti-static bag outside of a cleanroom! Bring the bag near a cleanroom. Before entering the cleanroom with the bag, wipe the entire bag down with a lint-free wipe wetted with isopropyl alcohol (>90% concentration). Afterwards, blow all sides with pressurized, dry, and filtered gas and immediately commence entering the cleanroom. Inside, open the anti-static bag and remove the sealed bag containing the valve. Cut open the sealed bag at one of its sides with a clean, sharp knife or pair of scissors. Ensure that you do not damage the valve inside by keeping the utilized blades far from all parts of the valve, especially the cables. Always handle the valve while wearing powder-free disposable gloves (e.g., made from nitrile, latex, or similar materials), a cleanroom suit, and a hairnet. Prepare yourself accordingly before opening the bag. Do not remove the orange Kapton tape covering the fluidic ports! To install the valve in a fluid system, follow the steps outlined in Section 5.1. This shall only be done inside a cleanroom. The valve may only be removed from the cleanroom when its outlets are connected to a closed fluid system (see Section 5.1) or are securely capped (see Section 7). Beware that removing the valve from a cleanroom environment without putting it in a hermetically sealed bag or container beforehand, even with capped/connected fluid ports, will void the cleanliness standard of its outside. When the valve is not in use, ensure it is stored in accordance with the procedures outlined in Section 7.

4 INTERFACES

4.1 Fluidic Interfaces

4.1.1 S4b

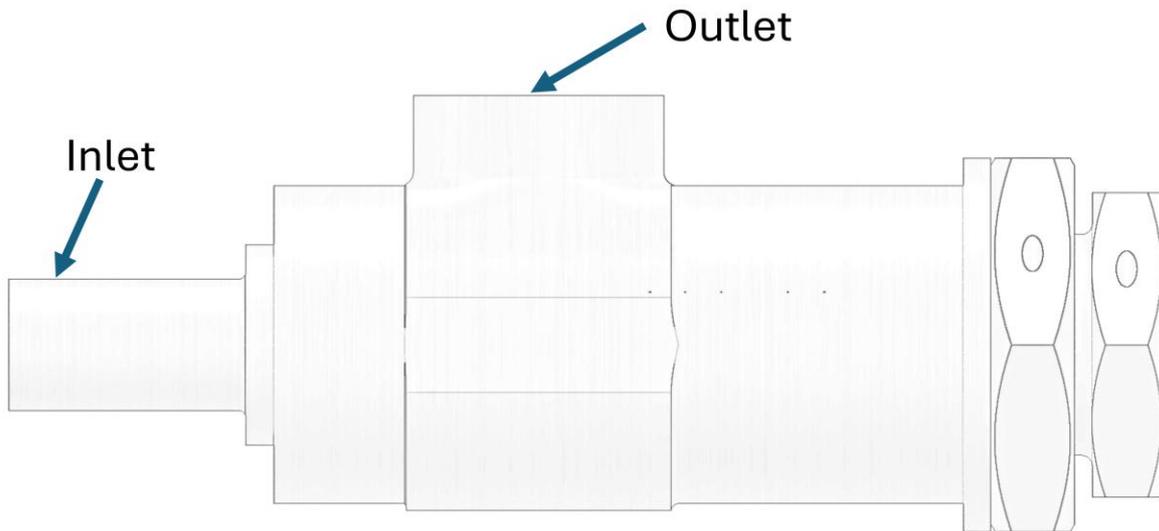


Figure 1. Fluidic interfaces of an S4b safety valve

5 INSTALLATION

Ensure that you always follow the handling instructions outlined in Section 4, relevant to your product, during the installation process. Pay attention that the inlet and outlet (see Section 4.1.1) are connected to the correct interfaces on your system side.

5.1 Fluidic Installation

When not installed in a fluid system, all safety valve ports must always be covered with clean caps/plugs or Kapton tape. Only remove the covers immediately before installing the safety valve into a fluid system to prevent contaminants from entering and potentially impairing its functionality. All tubing connected to the safety valve must be free from dust, chips/shavings, oil, and other substances before installation. Only operate the safety valve with an appropriate filter (pore size of $\leq 50 \mu\text{m}$) installed upstream of its inlet. If the outlet is connected to an environment with a lower cleanliness grade than the safety valve itself, measures must be taken to prevent contaminants from entering the safety valve. This can be achieved by installing an appropriate filter (pore size of $\leq 50 \mu\text{m}$) or a check valve downstream of the safety valve.

The inlet and outlet of the safety valve is a tube that can be connected to a fluid system using either an appropriate tube fitting system or orbital welding to an existing metal tubing system. For applying a tube fitting system (offered by companies such as Swagelok Company or FITOK Group), choose a ferrule set that fits the outer diameter of the safety valve's inlet tube (refer to the respective data sheet of the safety valve) and swage it according to the manufacturer's specification. Ensure the material of the ferrules is applicable for installation on the tube material of the safety valve.

Screw-in fittings of an appropriate thread size can be used to connect fluid lines to the outlet port. For information on the thread size of the port, refer to the respective data sheet of the safety valve. To seal the screw-in fitting/plug, apply a flat seal ring (from a material suitable for the applied media) fitting for the thread size on the shoulder of it. Before screwing in the fitting, apply a suitable lubricant such as Chemours Krytox 240AC on its thread. Then, tighten the screw-in fitting with a torque wrench to 16 Nm when using a metallic flat seal or 8 Nm when using a polymeric one. Always apply backing torque with a wrench/vice against the safety valve housing when tightening the fitting.

When welding the safety valve into a fluid system, take appropriate measures to ensure the safety valve, apart from the inlet/outlet, is not heated beyond the permissible maximum operating temperature (refer to the respective data sheet of the product), as this could permanently damage the product. If the application of corrosive media is projected, ensure an appropriate amount of purge gas is used during the welding process to not compromise the material's corrosion resistance at the welding seam. For optimal results, we recommend testing and calibrating the welding process with a test tube from the same material and with the same dimensions as the safety valve's inlet and outlet. For exact material information, refer to the product's respective data sheet.

6 OPERATION

Ensure the valve is correctly installed according to Section 5.1. The safety valve will open and release pressure from the volume it is connected to if the internal pressure exceeds its opening pressure. For details of the safety valve's set opening pressure, refer to its respective datasheet. Note, that the valve will start leaking before that pressure is reached and fully reseal only after a

certain pressure below the opening pressure is reached. For details on this, refer to the safety valve's respective datasheet.

7 STORAGE

In case the safety valve is not used in a fluid system, it must be appropriately stored to maintain its full performance capabilities. Depending on the cleanliness level of the product, adhere to the following respective steps.

7.1 Regular Storage

Ensure to directly close each safety valve port after disconnecting it. When a tube-fitting system is utilized to connect the valve, this may be done by applying suitable-sized, clean stainless-steel caps, free of chips/shavings, oil, and other substances. If no caps are available, the ports can be closed by applying clean Kapton tape on the ports. Ensure the tape is applied securely, with no gaps remaining. Do not use any tapes that leave residues, such as duct tape! After the safety valve is uninstalled, put it in a clean, sealable bag or container that does not contain any sharp objects. Then store it in a clean, cool, and dry place.

7.2 Cleanroom Grade Storage

Only start disconnecting the fluidic connections once the safety valve is in a cleanroom environment! After the connections are removed, close each valve port. When a tube-fitting system is utilized to connect the safety valve, this may be done by applying suitable-sized, clean stainless-steel caps, free of chips/shavings, oil, and other substances. If no caps are available, the ports can be closed by applying clean Kapton tape on the ports. Ensure the tape is applied securely, with no gaps remaining. Only use caps or tape that meets cleanroom standards. Do not use any tapes that leave residues, such as duct tape! After the valve is uninstalled, put it in a clean, hermetically sealable bag or container that does not contain any sharp objects. Only then may you remove the safety valve in its packaging from the cleanroom environment. Store it in a clean, cool, and dry place.

8 PACKING

8.1 Regular Packaging

Before packing the safety valve, ensure all fluidic ports are securely closed/capped, as specified in Section 7. Put the valve in a hermetically sealed bag together with a validated desiccant and a humidity indicator card. Cushion the component securely within shock-absorbent foam and enclose it in a sealed, rigid container. Ensure the container is clearly marked as “Fragile”, along with the component’s model number, identification code, and packaging date. Finally, close the container using tamper-evident tapes or seals to maintain integrity and provide assurance of proper handling.

8.2 Cleanroom Grade packaging

For all packaging efforts inside a cleanroom, exclusively use products cleaned to cleanroom-grade. Ensure the steps in Section 7.2 have been performed inside a cleanroom environment! The bag with the safety valve shall be added with a validated desiccant and a humidity indicator card. Afterwards put the hermetically sealed bag with the valve inside another plastic bag and heat-seal it. Place a brightly coloured sticker signifying the bag’s contents may only be opened in a cleanroom on a clearly visible spot on the outside of the bag. Only then may the bag with its contents be removed from the cleanroom environment! Cushion the component securely within shock-absorbent foam and enclose it in a sealed, rigid container. Ensure the container is clearly marked as “Fragile” and “Cleanroom Grade Components Inside” along with the component’s model number, identification code, and packaging date. Finally, close the container using tamper-evident tapes or seals to maintain integrity and provide assurance of proper handling.

9 TRANSPORTATION

To ensure safe and reliable transport, shipments should be maintained within a stable temperature range of 15°C to 25°C, avoiding fluctuations greater than $\pm 5^\circ\text{C}$. For added assurance, it is recommended to equip each package with active data loggers to monitor temperature, humidity, and shock throughout transit. Additionally, all shipments should be accompanied by proper documentation, including the transit manifest, cleanliness certificate, and verification of ESD protection, to confirm compliance with handling and quality requirements.