OPERATING INSTRUCTIONS

Version 1.1
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Manufacturer

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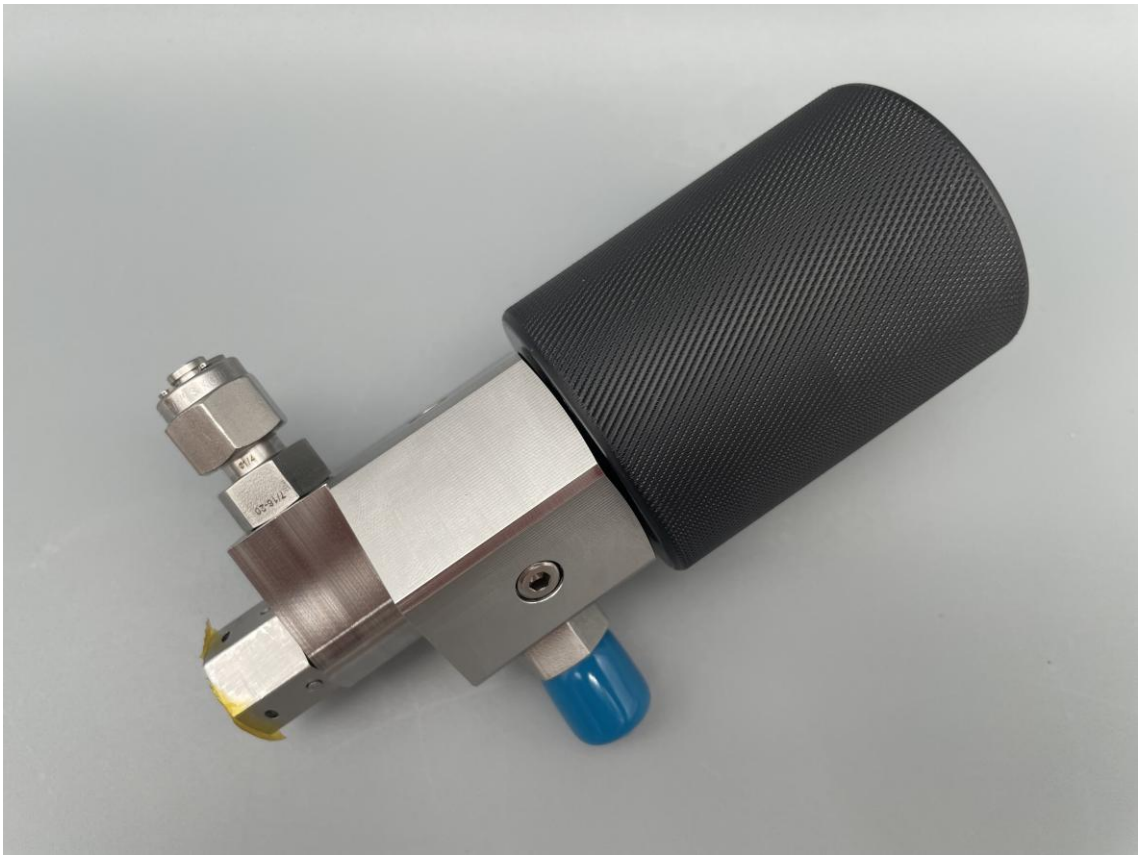
Germany

Product

Fill & Drain Valve F2-Family



Changelog

Version	Changes	Author	Verification	Release Date
V1.0	Baseline	Chiara Vetter		13.10.2025
V1.1	Updated installation procedure and added instructions for handling, storage and transport	Laurence Wolf	Niklas Peter	26.11.2025

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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.

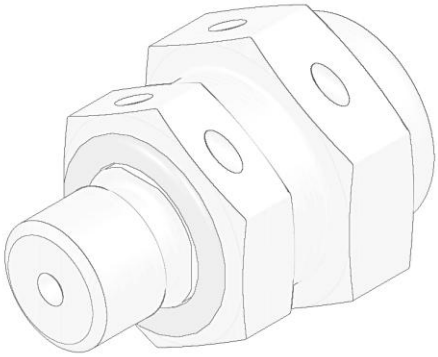
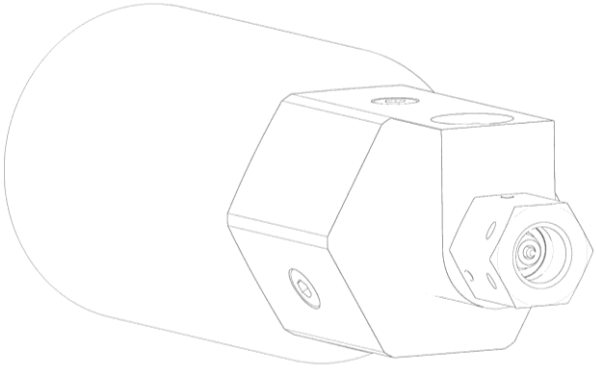
DANGER

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

2 VALVE CONFIGURATIONS

F2-Family – References

The entire manual is applicable to the entire F2 product family, except for the sections referenced in the table below, which provide model-specific operational details.

	***F2a Fill Drain Valve*** For model-specific operational details, see Section 4.1 Section 5.1
	***F2a Ground-Half Coupler (GHC)*** For model-specific operational details, see Section 4.2 Section 5.2

3 HANDLING

Before opening any packaged product, 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 4.1.

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 product inside by keeping the utilized blades far from all parts of the product. 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 product. Always handle the product 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 product in a fluid system, follow the steps outlined in Section 5. When the product 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 product 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 product. 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 product inside by keeping the utilized blades far from all parts of the product. Always handle the product 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 product in a fluid system, follow the steps outlined in Section 5. This shall only be done inside a cleanroom. The product may only be removed from the cleanroom when its outlets are connected to a closed fluid system or are securely capped (see Section 7). Beware that removing the product 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 product is not in use, ensure it is stored in accordance with the procedures outlined in Section 7.

4 INTERFACES

4.1 F2a Valve Fluidic Interfaces

The F2a valve consists of two separable parts: A cap (see Figure on the left) and the valve body (see Figure on the right). The valve body contains two fluidic interfaces, each equipped with threads to apply respective connections. The side marked “Tank Connector” in Figure 1 is connected to the tank that is supposed to be filled/drained. For specifications on the installation process, refer to Section 9. The other side can be connected to the Ground-Half Coupler (GHC) or plugged with the enclosed cap (see Figure).

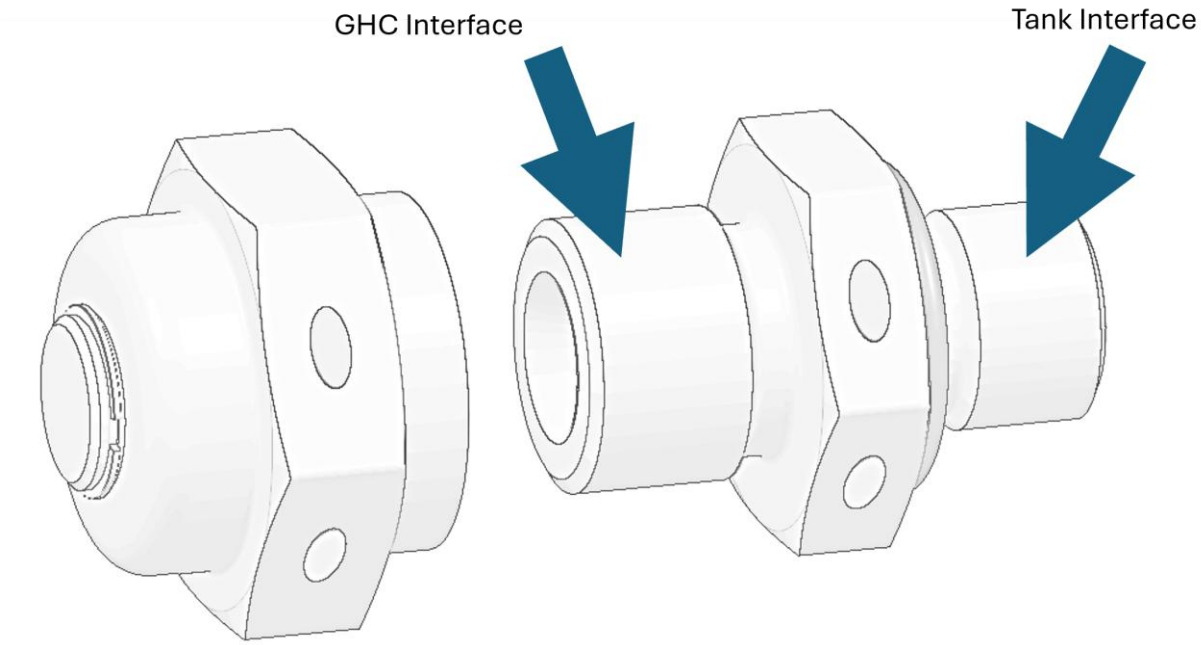


Figure 1: F2a valve with cap removed.

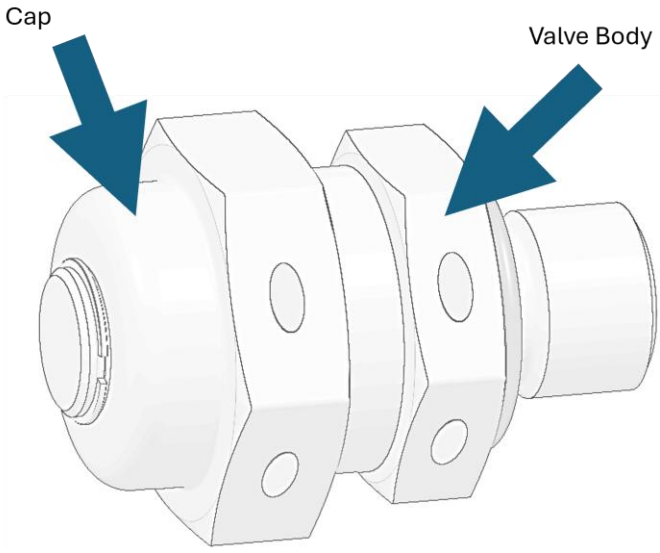


Figure 2: F2a valve with cap installed.

4.2 F2a GHC Fluidic Interfaces

The Ground-Half Coupler (GHC) features an interface that can be attached to an F2a valve and an external port, allowing for connection to a fluidic fill/drain system (see Figure 1). It also contains a drainage port, through which leakage can be routed away in a defined manner (see Figure 2).

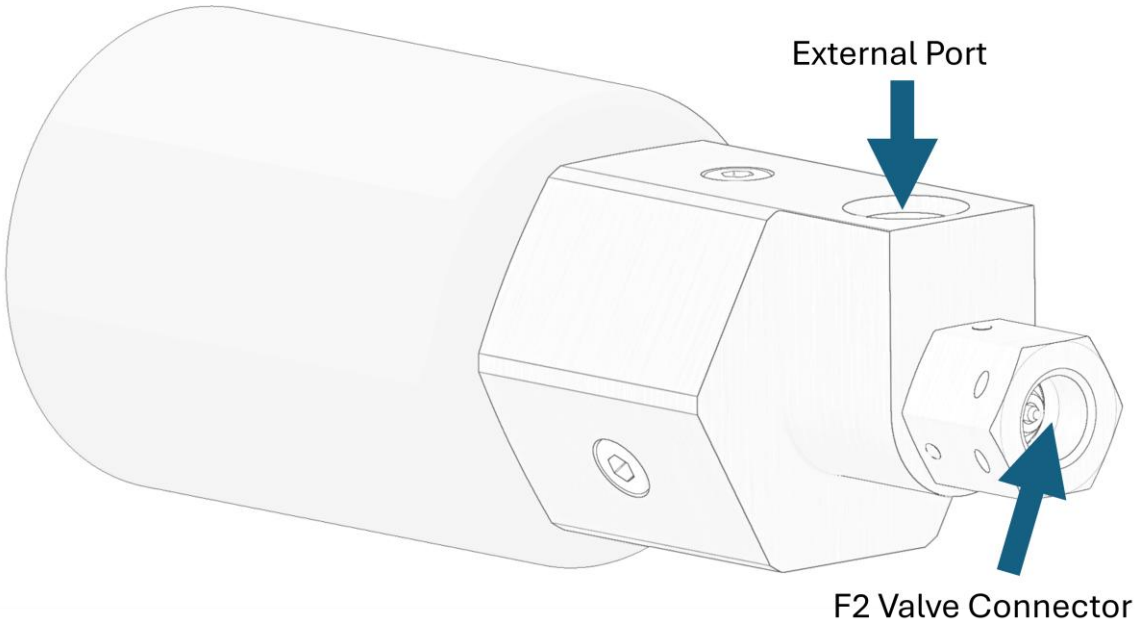


Figure 1: Main fluidic ports of the F2a GHC.

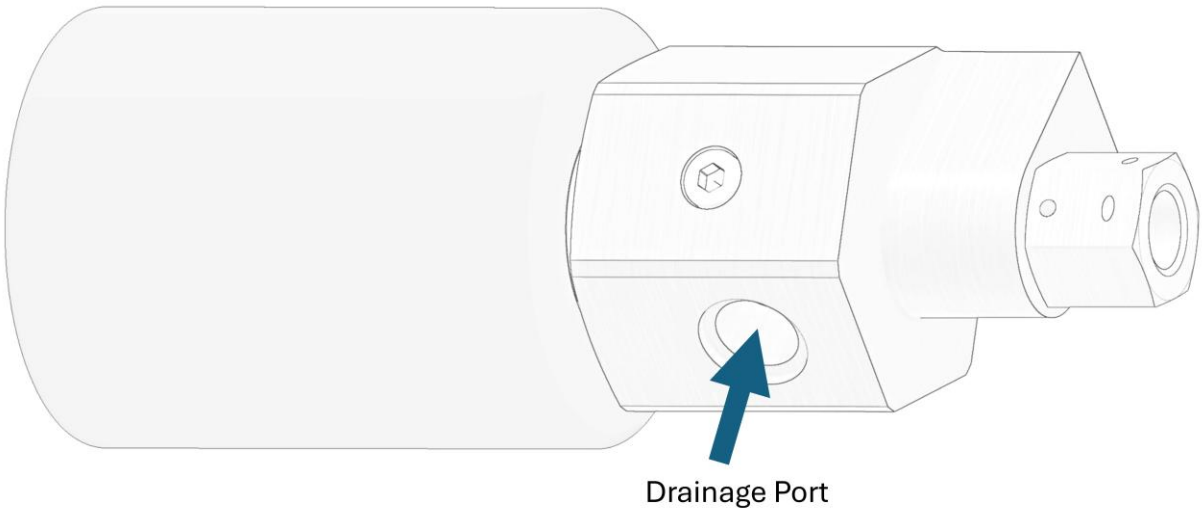


Figure 2: Drainage port of the F2a GHC.

5 INSTALLATION

5.1 Installation of F2a Valves

The F2a is installed into the tank via an M8x1.0 thread at 7.5 ±10% Nm. Before screwing in the valve, ensure to apply Chemours Krytox 240AC to the valve threads, O-ring, and “contact area” as highlighted in Figure 3.

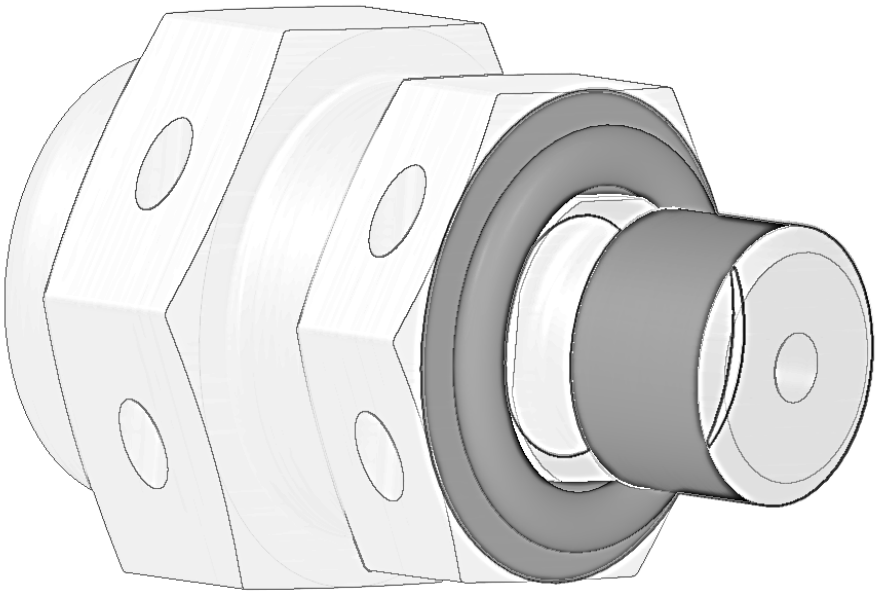


Figure 3: Lubrication surfaces of F2a valve.

Apply a tensioned steel locking wire (between Ø0.6 mm and Ø1 mm) between the hexagonal key-width of the valve body and an anchor point on the tank structure. Regard relevant norms for applying it. On the valve side, use the holes highlighted in Figure 4 for this.
The valve comes with a pre-installed cap, closing the connection port to the GHC. To remove it, loosen it while ensuring that a backing torque is applied to the valve body via the hexagonal key-width to prevent changing the preload on the joint between the valve and the tank. While no fueling or draining operations are conducted, the cap shall be installed onto the F2a valve body with a torque of 6 ±10% Nm. Ensure there is no gapping and to always apply a backing torque to the valve body! When vibration loads are projected after installation of the cap, ensure to apply a tensioned steel locking wire (between Ø0.6 mm and Ø1 mm) between the free hole of the valve body’s hexagonal key-width (the other one is occupied by the wire to the tank) and one of the holes in the cap’s side (see Figure 4). Regard relevant norms for applying it.

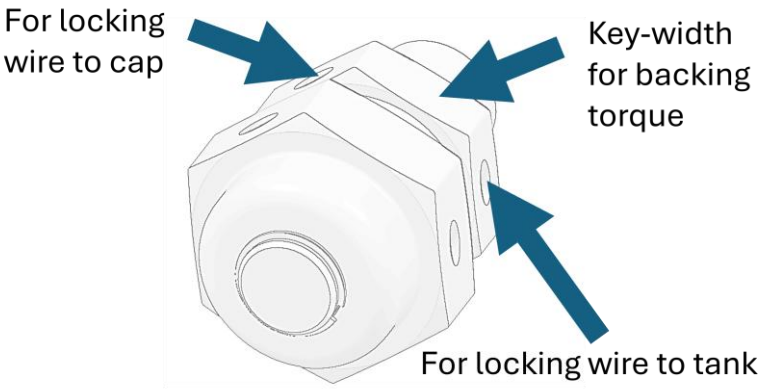


Figure 4: Locking wire position on F2a valves.

5.2 Installation of the GHC to F2a Valves

After the cap is removed according to Section 5.1, the F2a GHC is to be screwed onto the valve's connector with a torque of 8.5 ±10% Nm. Before screwing in the GHC onto the valve, ensure to apply Chemours Krytox 240AC to the threads of the valve and the GHC. Ensure that a backing torque is applied to the valve body via its hexagonal key-width to prevent changing the preload on the joint between the valve and the tank! Apply a tensioned steel locking wire (between Ø0.6 mm and Ø1 mm) between the hexagonal key-width of the valve body and the GHC (see Figure 5). Regard relevant norms for applying it. Ensure that the O-Ring at the bottom of the GHC's connector to the valve is not dislodged before or during installation.

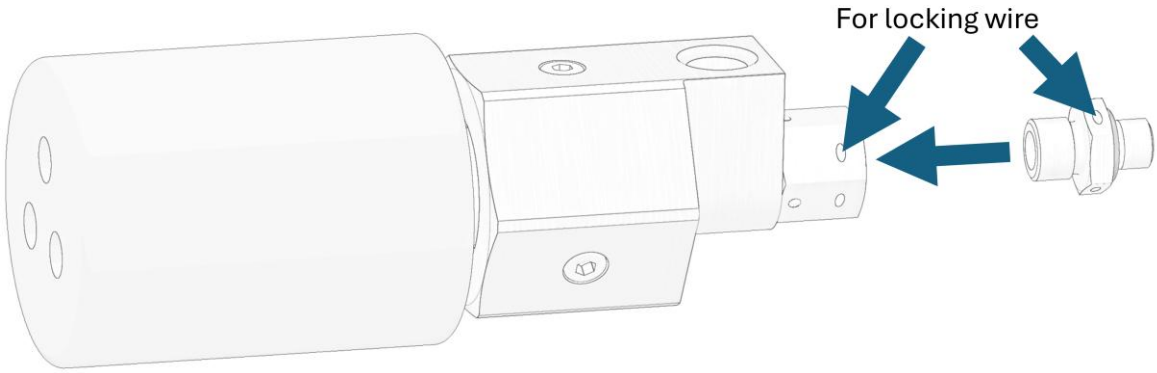


Figure 5: Installation of the GHC on the F2a valve.

To connect a drain line, apply a screw-in fitting of appropriate size with a flat seal to the drainage port of the GHC (refer to the respective data sheet of the GHC for size information). The fitting can be used to connect to a fluid system using either an appropriate tube fitting system or orbital welding to an existing metal tubing system. When welding the GHC into a fluid system, take appropriate measures to ensure the valve, apart from the inlet/outlet tubes, is not heated beyond the permissible maximum operating temperature (refer to the respective data sheet of the valve), 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 valve's inlet and outlet. For exact material information, refer to the respective data sheet of the GHC.
The drain line is only used for routing leakage, not for nominal draining of the tank. If no drainage of leakage is planned, the drainage port has to be closed with an appropriately sized plug or securely applied Kapton tape.

6 OPERATION

Before beginning nominal operation, ensure that you follow the integration steps outlined in Section 5. Before commencing nominal operation, turn the black cylindrical handle on the GHC as far counterclockwise as possible. This ensures the valve is in its closed state.

To open the F2a valve for fuelling/draining operations, turn the handle on the GHC clockwise until it snaps into an end position. To close the valve, turn the GHC's handle counter-clockwise. If excessive force is needed to turn the handle, make sure to apply a backing torque to the GHC body via its hexagonal key-width.

7 STORAGE

In case the product 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

Disconnect the fluidic connections one at a time. Ensure to directly close each port after disconnecting it. When a tube-fitting system is utilized to connect the product, 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 product is uninstalled, put it in a clean, sealable bag or container that does not contain any sharp objects. Make sure the cables are not pinched while doing so. Then store it in a clean, cool, and dry place.

7.2 Cleanroom Grade Storage

Only start disconnecting the fluidic connections once the product is in a cleanroom environment! After the connections are removed, close each port. When a tube-fitting system is utilized to connect the product, 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 product 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 product 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 product, ensure all fluidic ports are securely closed/capped, as specified in Section **Fehler! Verweisquelle konnte nicht gefunden werden.**. Put the product 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 product shall be added with a validated desiccant and a humidity indicator card. Afterwards put the hermetically sealed bag with the product 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 ±5°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 and cleanliness certificate, to confirm compliance with handling and quality requirements.