6 Maintenance

Maintenance work on the device must be carried out in non hazardous area and cooled state. In particular cleaning work with pressurized air must only be carried out in an non hazardous area.

During maintenance, remember:

– The equipment must be maintained by a professional familiar with the safety requirements and risks.
– Only perform maintenance work described in these operating and installation instructions.
– When performing maintenance of any type, observe the respective safety and operation regulations.

NOTICE

Please refer to the spare parts drawings attached when performing maintenance.

DANGER

Electrical voltage

Electrocution hazard.

a) Disconnect the device from power supply.
b) Make sure that the equipment cannot be reconnected to mains unintentionally.
c) The device must be opened by trained staff only.
d) Regard correct mains voltage.

CAUTION

Tilting risk

Damage of the device
Secure the device against any sudden translocation during maintenance.

CAUTION

Gas leakage

The sample gas pump should not be dismantled under pressure.

CAUTION

Use appropriate tools

According to DIN EN 1127-1, the operator is responsible to select and use appropriate tools.

DANGER

Danger of explosions, danger of poisoning from poisonous corrosive gases

During maintenance work, depending on the medium used, explosive and/or poisonous corrosive gases could escape, and this could lead to a danger of explosion or could be hazardous to health.

a) Inspect the leak tightness of your sampling system before putting the device into operation.
b) Ensure that gases that are hazardous to health are discharged safely.
c) Turn off the gas supply before beginning any maintenance or repair work and flush the gas lines with inert gas or air. Secure the gas supply so that it cannot be turned on unintentionally.
d) Protect yourself during maintenance from poisonous / corrosive gases. Wear appropriate protective equipment.

DANGER	**Explosion hazard due to incorrect replacement of components**
	The replacement of the components requires carefulness. Inexpert operation could lead to explosion. If you feel uncertain about any details of the operation, please bear in mind that the replacement should be done by the manufacturer only.

CAUTION	**Hot surface**
	Burning hazard According to the product type and operation conditions, the temperature may exceed 50 °C during operation. Depending on the conditions at the installation site it may be necessary to provide these areas with appropriate warning signs.

Depending on the quality of the sample gas to be pumped it may be neccessay to replace the valves at inlet and outlet from time to time (see chapter „Replacing the inlet and outlet valves“).

If the valves are heavily contaminated, in particular after just a short period of operation, then you should provide for particle filtration before the pump. This will increase the service life considerably.

6.1 Maintenance plan

Component	Duration in hours of operation	Work to be carried out	To be carried out by
Screws of the pump body	After 500 h	Tighten the screws to 3 Nm	Customer
Entire pump	Every 500 h	Inspect hose connections, protective and control devices, for correct functioning, contamination, leakages. In the event of any damage, replace and/or have it repaired by Bühler Technologies.	Customer
Entire pump	Every 8,000 h or in the event of heavy soiling	Cleaning of the entire pump, see “Cleaning the pump console”.	Customer
Entire pump	Six years from date of manufacture	Replace the entire pump	Customer
Valves	Every 8,000 h or in the event of pressure drop	Inspect the valves, replace if necessary, see “Replacing inlet and outlet valves”.	Customer
Bellow	Every 4,000 h or six months	Inspect by shutting off the suction line. Repair any damage, see “Inspecting the bellow”.	Customer
Bellow	After two years	Replace the bellow, see “Replacing the bellow”.	Customer

6.2 Inspecting the bellow

NOTICE

When following preventive maintenance according to the maintenance plan, a crack in the bellows is a rare malfunction, but cannot be completely eliminated.

NOTICE

If the bellow cracked, turn the pump off immediately!

NOTICE

If flammable gases (even above upper explosion limit (UEL)) or toxic gases are supplied, continuous monitoring of the pump is mandatory.

DANGER

Explosion hazard, danger of poisoning!

A crack in the bellows when conveying flammable or poisonous gasses may allow explosive or poisonous gas mixtures to leak or develop.
Monitor the pump with a flow- and/or vacuum monitoring system (see flow diagram).
If a pump defect occurs, shut it off immediately.

Since a crack **in the bellow allows** the ambient atmosphere to be sucked in and the sample gas pump continues to generate pressure, **the bellow on the sample gas pump must be inspected regularly**.

This is done by connecting a suitable shut-off unit and a suitable vacuum pressure gauge ahead of the sample gas input (see illustration). If during operation, after closing the suction line, no negative pressure is produced, the bellows is defective and must be replaced.

Please refer to the Maintenance schedule for maintenance intervals.

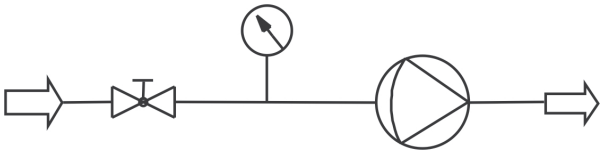
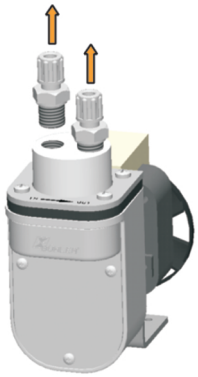
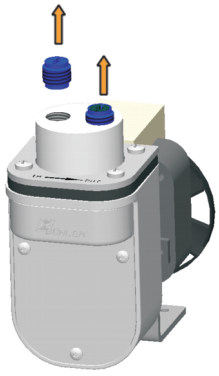


Fig. 3: Inspecting the bellow

6.3 Replacing the inlet and outlet valves



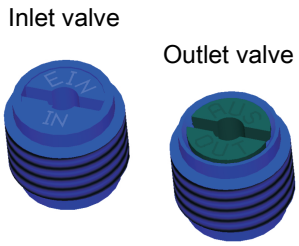


First detach the screw connections.

Unscrew the inlet or outlet valve with a wide slot screwdriver.

Attention: The PVDF and PVDF with bypass valve pump bodies already have PTFE gaskets installed in the gas inlets and outlets. These are also included in the valve spare parts kit. Remove the old gaskets before installing the new ones.

The inlet and outlet valves are identical. Their installation position determines the function. As shown in the image, the valves are blue on one side and black on the other. The valves are further marked “IN” or for inlet and “OUT” for outlet.

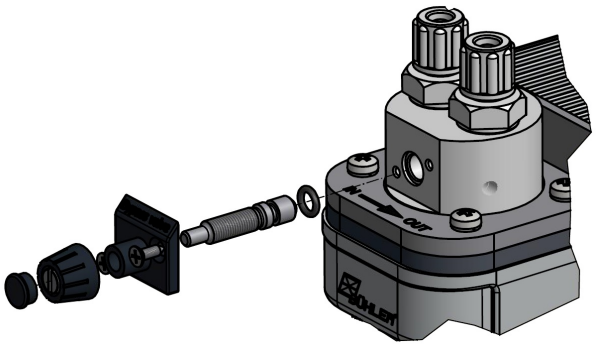


To assemble the sample gas pump, perform the steps in reverse order. When tightening the inlet and outlet valves be sure to observe the required tightening torque of max. 1 Nm. **CAUTION! Tightening the valves more will permanently deform the pump body, requiring replacement.**

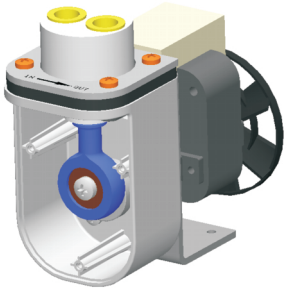
When installing the screw connection, ensure the connection is tight.

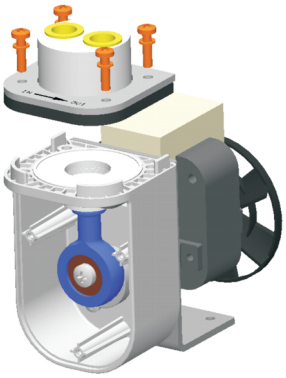
6.4 Replacing the O-ring on the bypass valve (optional)

- Loosen the two screws on the valve plate and carefully remove the entire unit.
- Coat the new O-ring with suitable O-ring grease (e.g. Fluoronox S90/2) and install in the spindle.
- Carefully insert the entire unit into the pump body while turning and tighten screws.



6.5 Replacing parts inside the pump housing

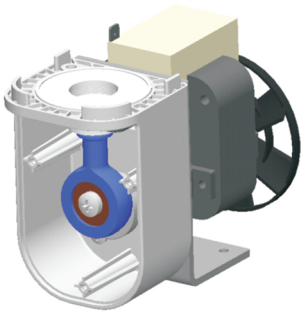


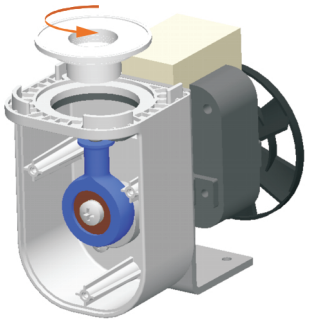


First detach the screw-in connections as described in chapter „Conversion to pump body pointing down“.

Loosen the 4 Torx screws M4x18 (Tx20) and lift the pump head along with mounting ring and foam cover off the console.

6.6 Replacing the bellow





To replace the bellow carefully unscrew it from the connecting rod counter clockwise. Be sure not to lose any installed shims.

Before reinstalling the bellow be sure it is not damaged.

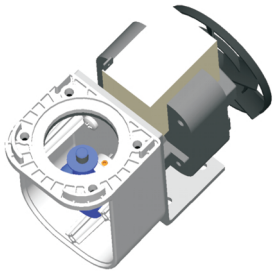
Reinstall hand tight in reverse order.

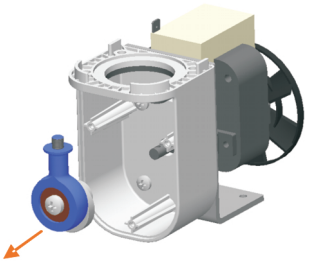
6.7 Crank gear replacement

NOTICE

Restrictions for connecting rod-eccentric replacement

The individual replacement of the eccentric, connecting rod or bearings is not allowed. Only the factory pre-assembled connecting rod-eccentric combination is suitable for replacement by the operator.





The crank gear consists of the connecting rod with ball bearing and eccentric.

After removing the bellow remove the set-screw inside the eccentric M3 using a size 1,5 setscrew wrench (or Tx6 for torx drive depending on the screw type).

The crank gear may now be removed from the motor shaft.

Before installing the replacement part remove any rust residue on the motor shaft and coat with non-resinous oil.

Reinstall the set screw with a drop of medium-strength threadlocker. When tightening the set screw, be sure it is seated in the locking hole on the shaft. Once it touches the bore, tighten the set screw 90° more.

6.8 Assembly of the sample gas pump

If the sample gas pump was removed, install in reverse order. Be sure the sealing surfaces of the below and pump head are clean and aren't scratched (even minimal grooves can cause leaks). First evenly tighten the 4 Torx screws M4x18 at 1 Nm. Then tighten the screws to 3 Nm.

CAUTION! Tighten each screw only once at 3 Nm. The bellow and pump body material (PTFE) is very weak and has high flow properties.

Check the sample gas pumps for tightness and proper function.

6.9 Cleaning the pump console

DANGER

Electrostatic charge (Spark formation)
Clean plastic parts and labels with damp cloth only.
Inflame of dust
If the device is used in dust ambiance, remove the layer from the components regularly. Also remove the dust layer in areas difficult to access.
Conserve the protective effect of the coating
To avoid potential ignition hazard, the protective effect of the coating must not be derogated by abrasion or corrosive media and must be conserved in any case.
Refinishing or repainting is **not** allowed!
Do not use sharp or pointed tools.

– Remove the three screws on the housing cover and remove the housing cover (see chapter „Conversion to pump body pointing down“).
– Clean any dust and other dirt off the sample gas pump.
– Wipe off stubborn dirt with a damp, clean cloth (do not use solvent-containing cleaning products).
– Reinstall housing cover and tighten the three screws on the housing cover.