

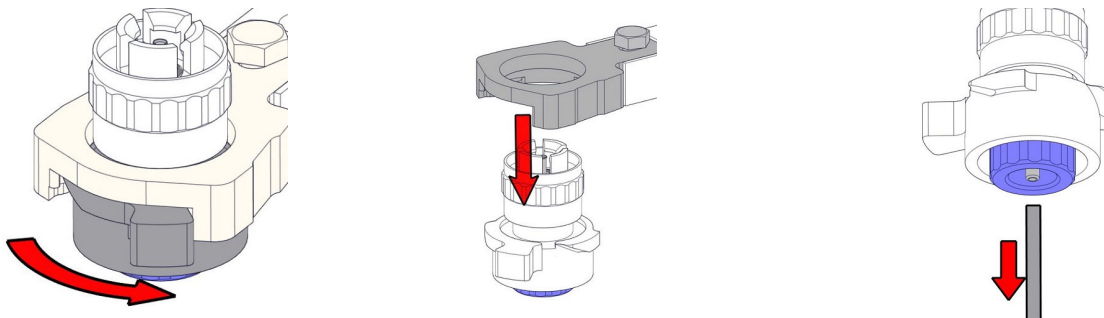
**Work instruction Number 233**
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**Purpose:** Maintenance level 4

**Safety:** Bio Hazard area

**Instrument:** Starrsed TL

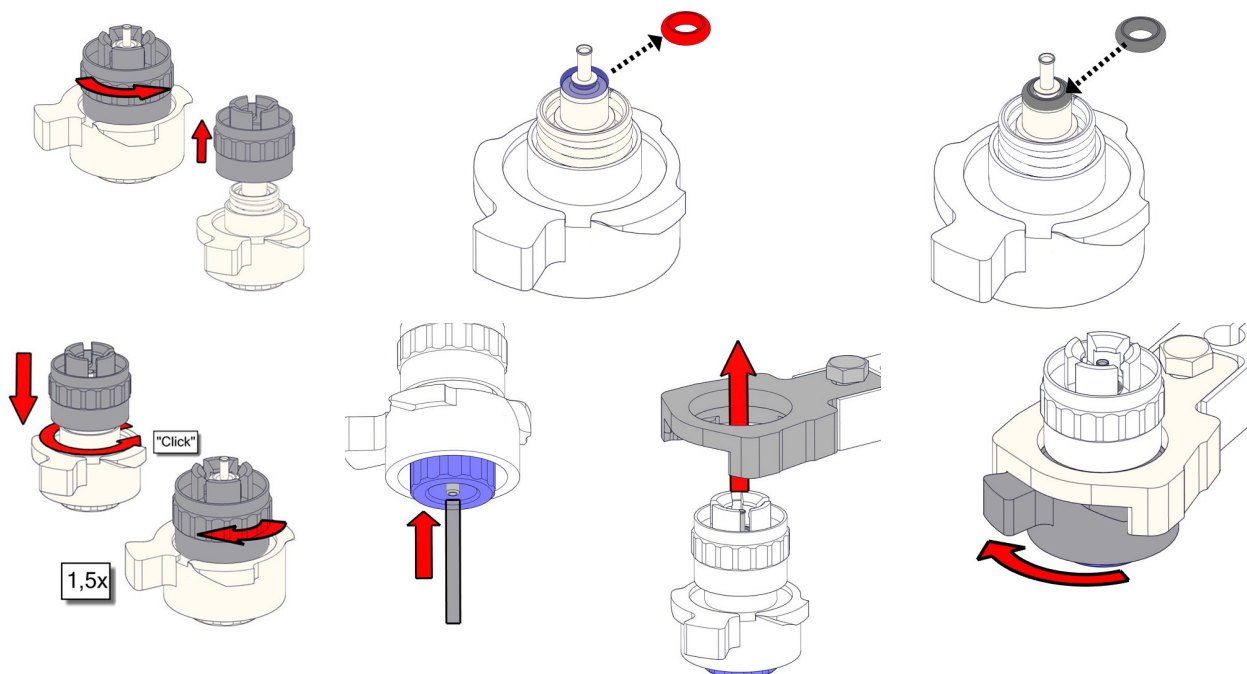
**Revision:** 003, 2019

Inactivate the instrument in the LAS.

**Clean fill nozzle and exchange O-ring Fill Nozzle**


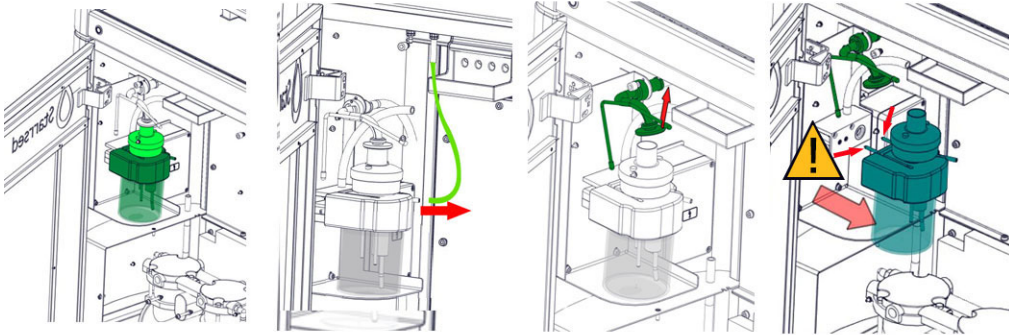
The use of a toothbrush and detergent is recommended.

1. Carefully scrub the fill nozzle inner part.
2. Use a tissue to dry the fill nozzle.



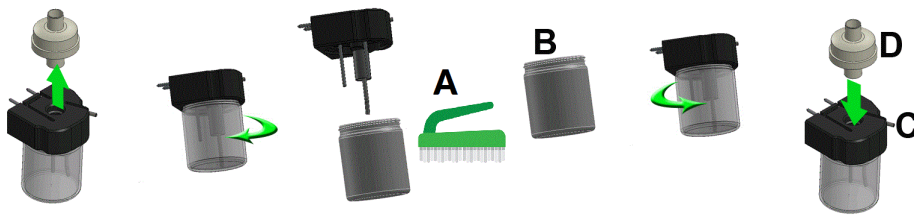
## Clean liquid separator

### Removing



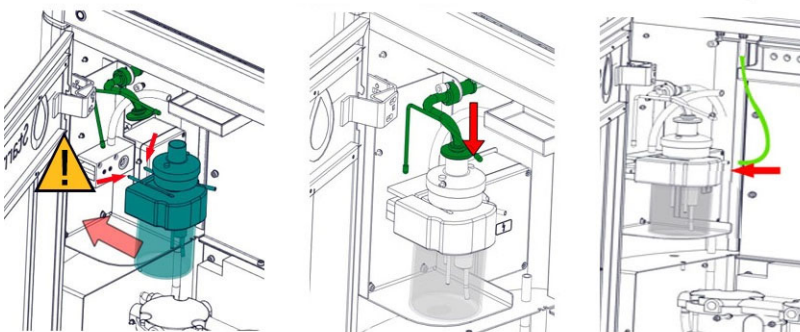
- A. Clean all parts with hot water and a brush.
- B. Use some acid free vaseline on the screw-thread of the glass jar.

### Cleaning

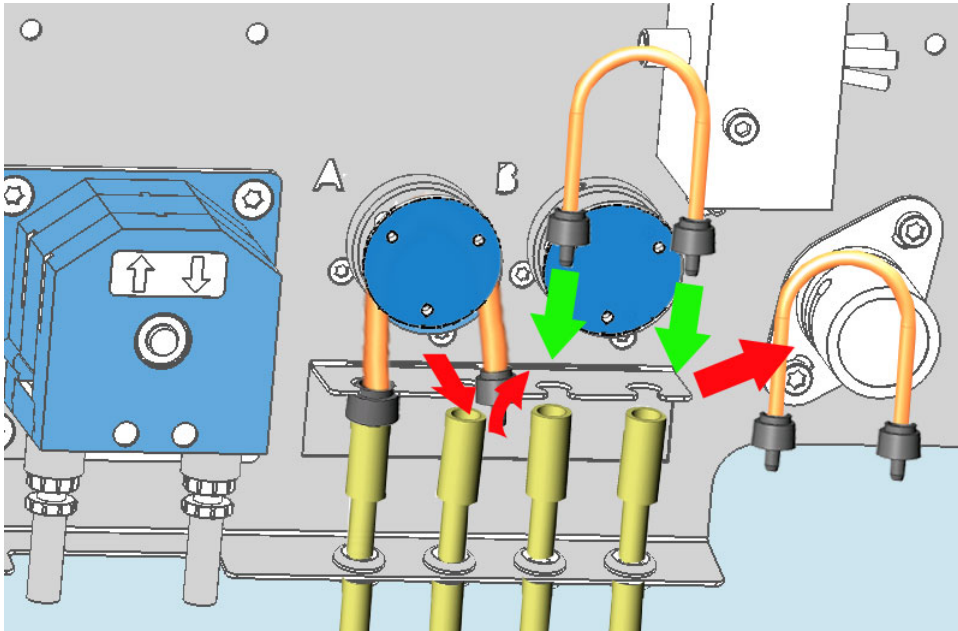


- C. A little silicon grease on the rim of separator will make the assembling and adjustment easier.
- D. If applicable replace the bacterial HEPA filter (For Maintenance Level 4: Exchange filter QWLV040002)

### Replacing

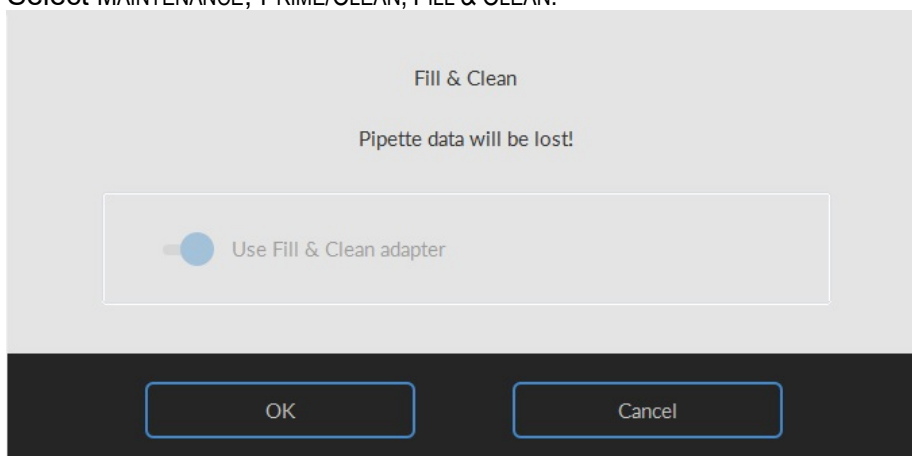


## Exchange peristaltic pump tubes



### Fill and clean

1. Fill beaker with hot de-ionized water ( $\pm 130$  ml,  $\pm 80^{\circ}\text{C}$ ).
2. Add  $\pm 15$  ml cleaning agent (QRR 010905) to the hot de-ionized water.
3. Mix the solution well.
4. Fill adapter TLAX110906 with the cleaning solution.
  - Turn adapter upside down and remove red cap (from dummy tube) and start filling the adapter until the dummy sample tube is filled without air.
  - Place red cap on dummy sample tube and turn adapter again, fill the adapter completely. Check for air in the dummy sample tube.
5. Ensure that the Starsted TL is in Service mode, the status is also indicated with orange LED light.
6. Enable "Sample Mode On"
7. Ensure the needle is in "Down" position.
8. Select MAINTENANCE; PRIME/CLEAN, FILL & CLEAN.



9. Select button OK. Now the tube disk can be moved freely.
10. Place the adapter with dummy tube on the tube disk. Ensure tubing between adapter and dummy sample tube is below the tube disk.



11. Rotate the tube disk until the dummy sample tube is centered over the needle.
12. Close the hood and press CONTINUE.
13. The needle goes up and the fill and clean process is started. (This cycle takes about 90 minutes).
14. When all the pipettes are filled, the needle goes back to the home position.
15. Remove the adapter unit.

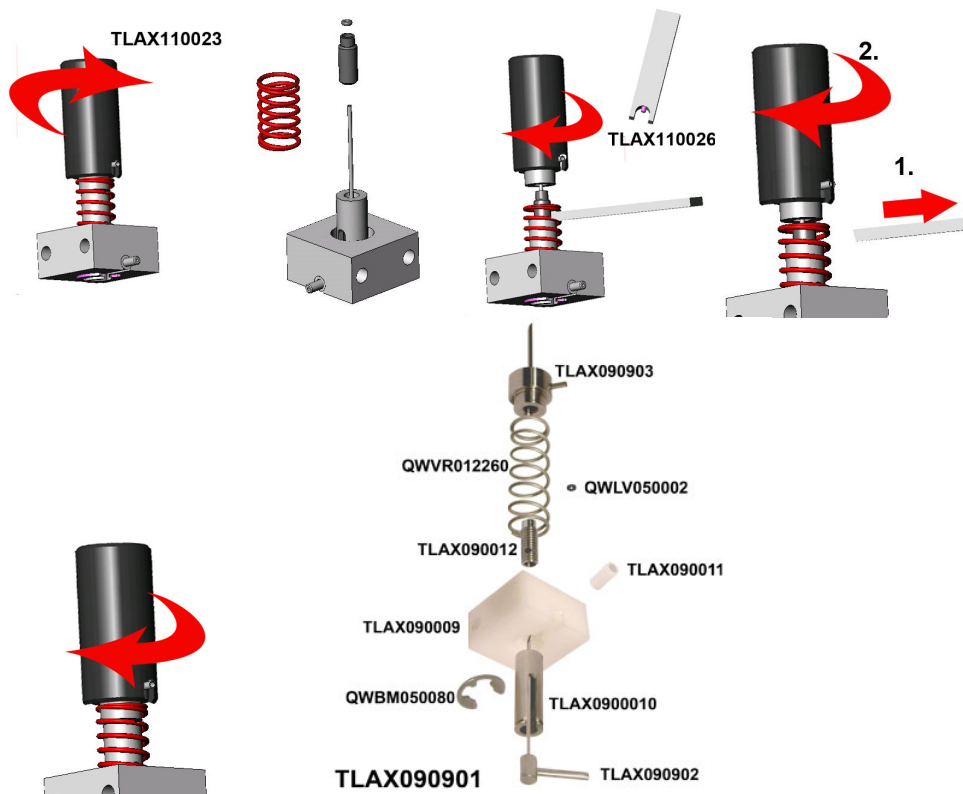
### Replace needle O-ring



For assembling and disassembling the special needle holder tool TLAX110023 and spanner TLAX110026 are needed.

### Needle removal

1. Remove drip tray (metal sheet under needle unit, behind door)
2. Disconnect both tubes.
3. Loosen the knurled knob.
4. Remove the complete needle assembly outside the instrument.
5. Clean the needle with a disinfectant.



### O-ring replacement

1. Use the needle tool TLAX110023 to loosen the outer needle from the needle holder.  
**Warning:** Be aware of spring tension
2. Store outer needle in tool TLAX110023.



3. Remove the spring QWVR0012260.
4. Loosen TLAX090012 O-ringscrew from the needle holder.
5. Remove the O-ring QWLV050002.
6. If needed: Grease the outside of the inner needle base by removing TLAX090011.
7. Fit a new O-ring QWLV050002 carefully, and press the O-ring into the recess.
8. Place the O-ring screw over the inner needle so that the internal hexagonal hole is facing the inside of the needle holder.
  - The small hole in the O-ring screw should stay about 2 mm above the holder.
9. Place the spring QWVR012260 over the inner needle, insert the special O-ring screw spanner TLAX110026, and tighten the O-ring screw slightly.

- Hold the needle assembly block tight and turn just the spring clockwise.
10. Insert the outer needle carefully into the needle tool TLAX110023, place the inner needle, without damaging the inner needle tip, straight through the outer needle.
  11. Hold the spanner TLAX110026 in one hand, and tighten (hand-tight) the outer needle by turning the needle tool TLAX110023 clock-wise.
  12. Remove the spanner TLAX110026, hold the needle assembly by the assembly block, and tighten the outer needle firmly with TLAX110023.
  13. Check if the pipes are facing the same direction.
  14. Compress the needle assembly, it should move smoothly.

#### Check for leakage

1. Check the needle assembly for leakage by short-circuiting both ends of the outer needle with a short length of tubing.
2. Connect a syringe with air to the inner needle and immerse it in water.
3. Pressurize it with the syringe - air bubbles should not be visible.
4. Dry all parts.

#### Needle assembly

1. Place the needle back on the instrument.
2. Fasten the knurled knob, do not fasten too tight
3. Connect both tubes to the needle.
4. Place drip tray.

#### Sensor check

##### Vacuum pressure check

- Go to tab MAINTENANCE -> CHECK SENSOR. Select CHECK FLOW SENSOR box.  
Flow: 0925-**0980**-1020 Abs: 0300- **0320** -0340  
If the flow is not in range there might be a blockage in the vacuum flow line to the flow sensor.

##### Fill Stop sensor check

- Go to tab MAINTENANCE -> CHECK SENSOR. Select CHECK FILL STOP SENSOR box.  
Fill stop sensor FS 90..**140**..165

##### Diluter Start sensor check

- Go to tab MAINTENANCE -> CHECK SENSOR. Select DILUTER START SENSOR box.  
Diluter start sensor 400-700

##### Measure sensor check

- Go to tab MAINTENANCE -> CHECK SENSOR. Select CHECK MEASURE SENSOR box.  
Measure sensor MS 40..**50**..60

#### Temperature sensor check

- Go to tab MAINTENANCE -> CHECK SENSOR. Select CHECK TEMPERATURE SENSOR box.  
Temperature sensor                      TS [Room temperature]

#### Diluent flow sensor check

- Go to tab MAINTENANCE -> CHECK SENSOR. Select CHECK DILUENT FLOW SENSOR box.  
Press test. When test is finished, signal Standby and Flow must shown as activated.

#### Separator check

- Go to tab MAINTENANCE -> CHECK SENSOR. Select CHECK SEPARATOR SENSOR box.  
Separator sensor <200 **600** >700

#### Final step

1. Check system for leakage.
2. Check drip trays under pump assembly and needle assembly.
3. Open carousel plate and inspect the peristaltic pump tubes and connections for leaks.
4. Check tubing from the syringe for trapped air bubbles.
5. Check Diluent syringe for trapped air bubbles.
6. If trapped air bubbles are found, go to tab [MAINTENANCE], click button [PRIME / CLEAN] and perform the [PRIME DILUENT] function.
7. Clean needle top with disinfectant.
8. Wipe stainless steel plates below the pipettes with disinfectant.
9. Close cover/front doors and activate the instrument in the LAS.