19-KIT-132

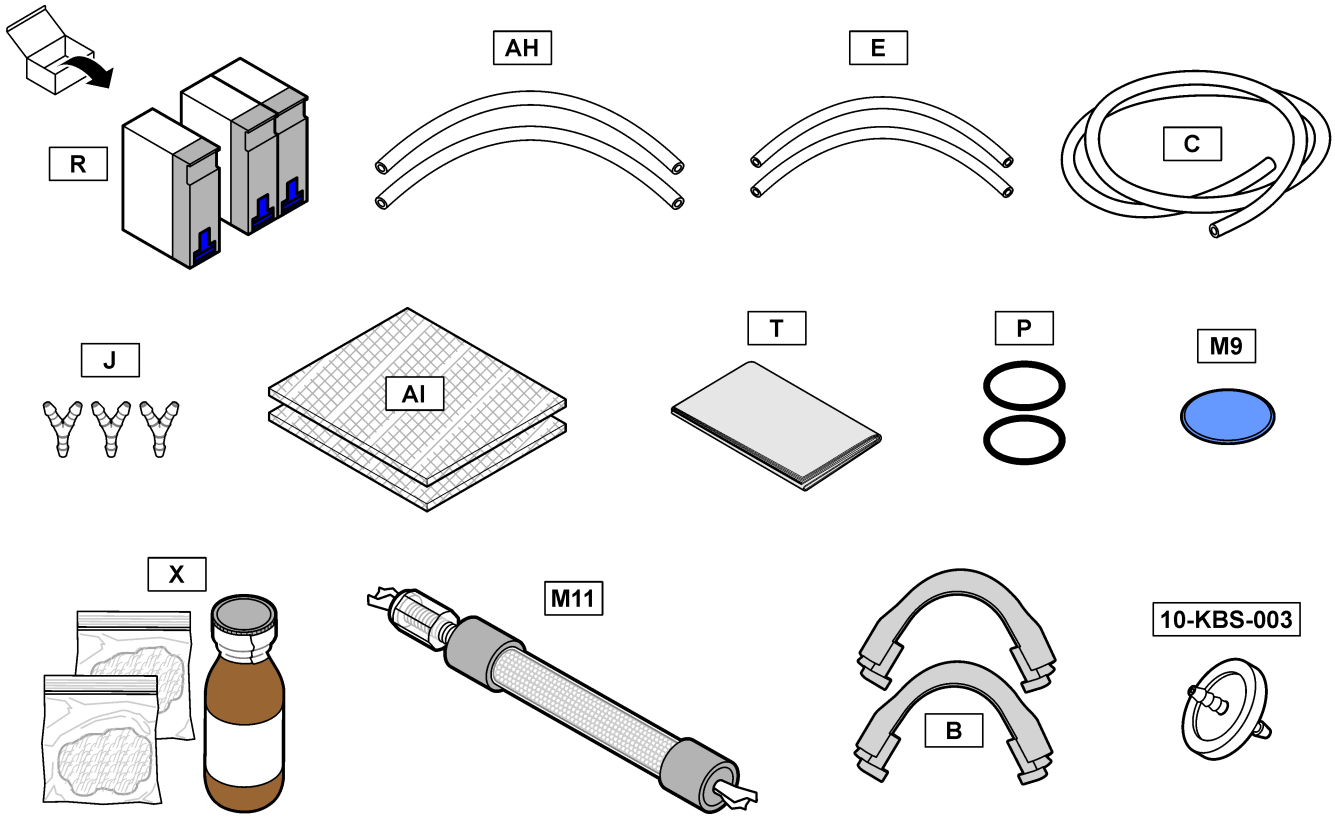
Safety information

Refer to the installation manual for general safety information, hazard descriptions and precautionary labels descriptions.

Product components

Make sure that all components have been received. Refer to Figure 1. If any items are missing or damaged, contact the manufacturer or a sales representative immediately.

Figure 1 Product components



Item	Quantity	Description	Item	Quantity	Description
B	2	Pump tube rails for the acid pump and base pump	T	1	Tissue to clean the CO_2 analyzer lenses
C	0.75 m	Pinch valve tubing (EMPP 562, 6.4 mm OD, 3.2 mm ID and 1.6 mm wall) Do not use C in the sample pump.	M9 (10-KNF-038)	1	PTFE diaphram for mixer reactor
E	2 x 120 mm	Tubing for the acid pump and base pump (EMPP 562, 5.6 mm OD, 2.4 mm ID and 1.6 mm wall)	X	1	Catalyst and PTFE wool (1.5 g x 2) for the ozone destructor
J	3	Y tube fittings for the pinch valves	M11 (19-PCS-205)	1	CO_2 filter for the base reagent container
P	2	Viton O-rings (72-0325-30) for the CO_2 analyzer and the ozone destructor Viton is a registered trademark of the Chemours Company.	AH (12-CPR-006)	2 x 152 mm	Tubing for the sample pump (Norprene, 6.4 mm OD, 3.2 mm ID and 1.6 mm wall)

Item	Quantity	Description	Item	Quantity	Description
R	3	Relays for the relay board (Omron G2R-2-SN)	10-KBS-003	1	HEPA filter
AI	2	Filters for the fan and the vent, 149 mm			

Maintenance checklist

NOTICE
Special models and applications can have more maintenance tasks.

Use the checklist that follows to complete the 6-month maintenance procedure. Do the tasks in the order given.

Task	Initial
Select OPERATION > START,STOP > FINISH & STOP or EMERGENCY STOP.	
Wait for the display to show "SYSTEM STOPPED".	
Remove the reagent from the reagent lines for safety. Refer to Flush the reagent lines on page 5.	
Remove power to the ozone destructor heater. Refer to Disconnect power to the ozone destructor on page 6. ***Note:*** *Do not open the ozone destructor when the ozone destructor is hot. The threaded connection on the ozone destructor can sieze if opened while hot.*	
Put on protective gloves to keep contamination out of the analyzer.	
Put on safety glasses for personal safety.	
Find item R in the kit.Replace the three 24 V plug-in relays on the relay board (81204001). The relay type is OMRON G2R-2-SN. Refer to Figure 3 on page 6.	
Make sure the sample (ARS) valve does not have a leak. Refer to Analysis enclosure on page 21 for the location. Refer to Examine the sample (ARS) valve for leaks on page 7.	
Replace the pump tubing and pinch valve tubing. Replace the pump tube rails. Refer to Replace the tubing on page 7.	
Make sure that the new tubing and pump tube rails are installed correctly. Refer to Examine the pumps on page 10.	
Make sure that the valves open and close correctly and there are no leaks. Refer to Examine the valves on page 11.	
Identify if salts have collected on the fitting at the bottom of the mixer reactor. Refer to Analysis enclosure on page 21 for the location. Remove the salts from the inlet tube.	
Make sure that there are no blockages in the tubing connected to the MANUAL fittings or SAMPLE fittings.	
Clean the ozone line filter. Flush the ozone line filter with deionized water or tap water. Let the filter become dry, then install the filter. Refer to Clean the ozone line filter on page 11.	
Use item AI to replace the filter in the fan and the vent housings. Refer to Replace the fan filter and vent filter on page 12. ***Note:*** *The air flow through the filters is from the soft side to the rigid side of the filter.*	
Make sure that the operation of the fan is correct. Set the fan to on. Select MAINTENANCE > DIAGNOSTICS > SIMULATE > FAN. ***Note:*** *At temperatures below 25 °C (77 F), the fan is off.*	
Remove the four M4 x 60 allen bolts on the CO_2 analyzer. Do not remove the two cross-slotted screws. Refer to Analysis enclosure on page 21 for the location. Find items T and P. Clean the CO_2 analyzer lenses and replace the O-ring in the CO_2 analyzer. Refer to Clean the lenses and replace the O-ring in the CO2 analyzer on page 14.	
Identify if there is CO_2 contamination in the oxygen supply. Refer to Examine the oxygen supply on page 15.	
Use item M9 to replace the PTFE diaphragm in the mixer reactor. Refer to Replace the PTFE diaphragm on page 16. **Important:** A torque screwdriver with a T20 bit calibrated to 1.4 Nm (or 3 mm allen bit calibrated to 1.5 Nm) must be used.	
When the ozone destructor heater is at ambient temperature, remove and open the ozone destructor. Refer to Analysis enclosure on page 21 for the location.	

Task	Initial
Find items X and P. Replace the PTFE wool, catalyst and O-ring in the ozone destructor. Refer to Replace the contents of the ozone destructor on page 19. Clean the PTFE discs with deionized water or tap water. Let the PTFE discs dry. Do not use compressed air or gas to clean the filters. ***Note:*** *In applications where the sample water contains HCl / Cl- (hydrochloric acid / chlorides) or HF / F- (hydrofluoric acid / flourides), replace the ozone destructor catalyst more frequently as necessary.*	
Connect power to the ozone destructor heater. Refer to Disconnect power to the ozone destructor on page 6.	
Find item M11. Replace the CO_2 filter that is connected to the base reagent container. Make sure that the connection is air tight. Refer to *Plumb the reagents* in the Installation and Operation Manual.	
Find item 10-KBS-003. Replace the HEPA filter. Refer to Replace the HEPA filter on page 13.	
Select MAINTENANCE > DIAGNOSTICS > SIMULATE. Select MFC. Set the flow to 20 L/h. Push ✔ to start the mass flow controller (MFC). The measured flow shows at the top of the display.	
Set the MFC flow to different setpoints (e.g., 40 L/h). Make sure that the operation of the MFC is correct at the different setpoints. ***Note:*** *If the flow shown is 0.0 L/h, the MFC is set to off.*	
Push ⮌ to go to the DIAGNOSTICS menu, then select PROCESS TEST > PRESSURE TEST. Select PRESSURE TEST, then push ✔. A pressure test starts (60 seconds).	
Make sure that the operation of the 4–20 mA outputs and the relays that are connected to external devices is correct. Refer to *Do a relay or 4–20 mA output test* in the Maintenance and Troubleshooting Manual.	
Select OPERATION > REAGENTS SETUP > INSTALL NEW REAGENTS. Change the reagent levels that show on the display as necessary.	
Measure deionized water five times at operation range 1 to remove the organic contamination added during maintenance from the analyzer. Connect deionized water to the MANUAL fitting. Refer to *Measure a grab sample* in the Installation and Operation Manual.	
Select CALIBRATION > ZERO CALIBRATION > RUN ZERO CALIBRATION to start a zero calibration.	
When stable zero readings occur and the analyzer completes a zero calibration without warnings, continue to the next task.	
Span calibration:	
Set the operation range and concentration of the calibration standards for span calibrations. Refer to *Start a span calibration or span check* in the Installation and Operation Manual.	
Prepare the calibration standard. Plumb the calibration standard container to the analyzer. Refer to *Install the calibration standard* in the Installation and Operation Manual.	
Start a span calibration. Select CALIBRATION > SPAN CALIBRATION > RUN SPAN CALIBRATION.	
When the analyzer completes the span calibration, select SPAN CHECK to do a span check at the other operation ranges if the analyzer uses more than one operation range. If necessary, adjust the span adjust values manually on the SPAN CHECK screen.	
Change the time and date on the analyzer as necessary. Select OPERATION > TIME & DATE.	
Select MAINTENANCE > DIAGNOSTICS > SERVICE > RESET SERVICE COUNTER to set the service counter to 200 days (default). ***Note:*** *The number of days on the service counter decreases when the analyzer is set to on, even when the analyzer is stopped.*	

Signed, Engineer		**Date**		
Signed, Customer		**Date**		

Flush the reagent lines

⚠CAUTION

Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.

⚠CAUTION

Chemical exposure hazard. Dispose of chemicals and wastes in accordance with local, regional and national regulations.

Remove the reagent from the reagent lines for safety.

1. Put on the personal protective equipment identified in the safety data sheets (MSDS/SDS).
2. Remove the tubes from the ACID and BASE ports on the side of the analyzer.
3. Plumb the ACID and BASE ports to a deionized water container. If deionized water is not available, use tap water.
4. Select CALIBRATION > ZERO CALIBRATION > RUN REAGENTS PURGE to start a purge cycle.
5. Do step 4 again.

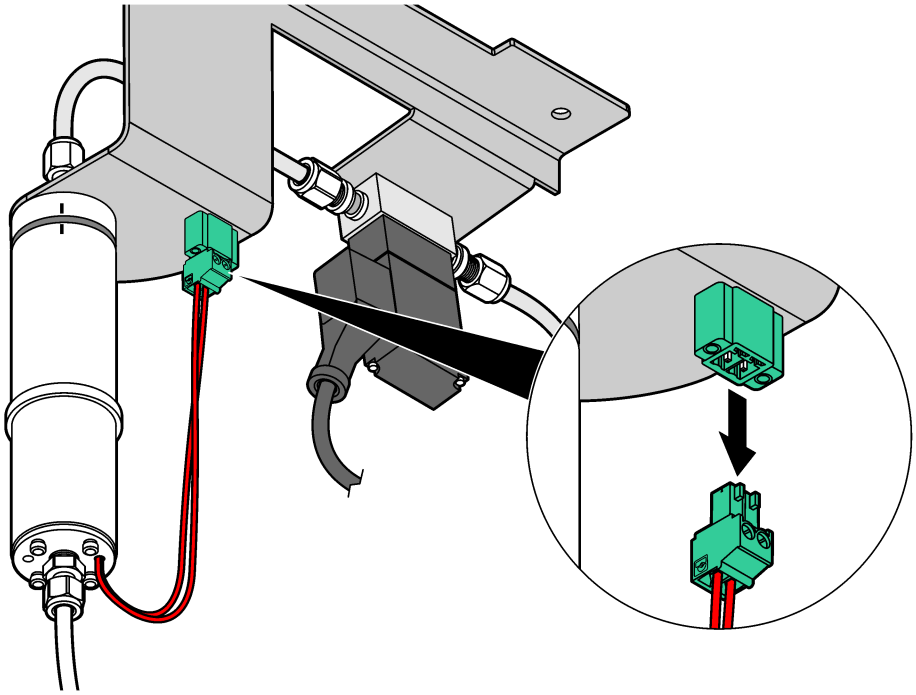
   The analyzer replaces the reagents in the reagents lines with water.
6. When the reagent purge cycle is complete, remove the tubing from the deionized water container and put them in open air.
7. Do step 4 two times.

   The analyzer replaces the water in the reagents lines with air.

Disconnect power to the ozone destructor

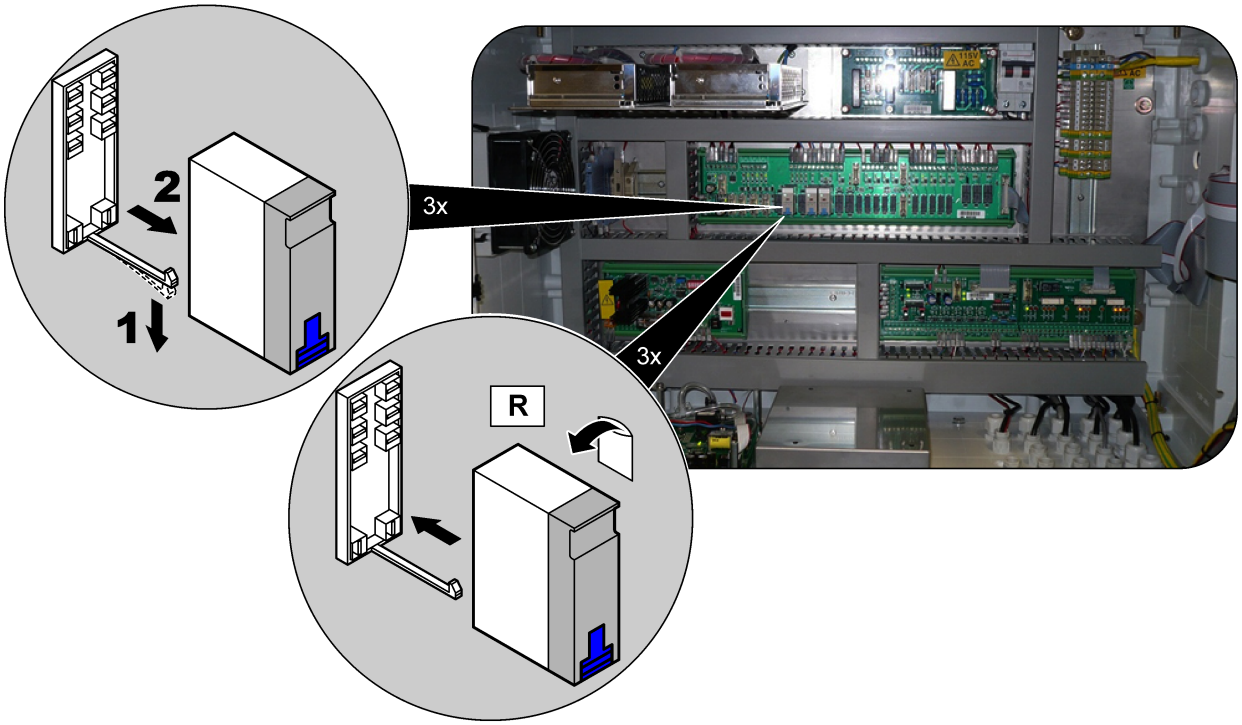
1. Find the ozone destructor. Refer to Analysis enclosure on page 21 for the location.
2. Find the red wires connected to the ozone destructor.
3. Disconnect the red wires at the green connector. Refer to Figure 2.

Figure 2 Disconnect power to the ozone destructor



Replace the 24 V plug-in relays

Figure 3 Replace the three relays on the relay board



Examine the sample (ARS) valve for leaks

Fill the sample lines with sample, then examine the sample (ARS) valve for leaks as follows:

1. Select MAINTENANCE > DIAGNOSTICS > PROCESS TEST.
2. Scroll down to SAMPLE PUMP TEST, then push ✔.
3. Select PUMP FORWARD TEST to fill the sample lines with sample.
4. Wait for the test to complete.
5. Push ⮌, then select PRESSURE TEST.
6. Select PRESSURE TEST again. A pressure test starts (60 seconds).
7. Examine the elbow fitting on the top port of the sample (ARS) valve. If there is a leak, bubbles or movement is seen in the sample bypass tubing. Look for a minimum of 2 minutes.

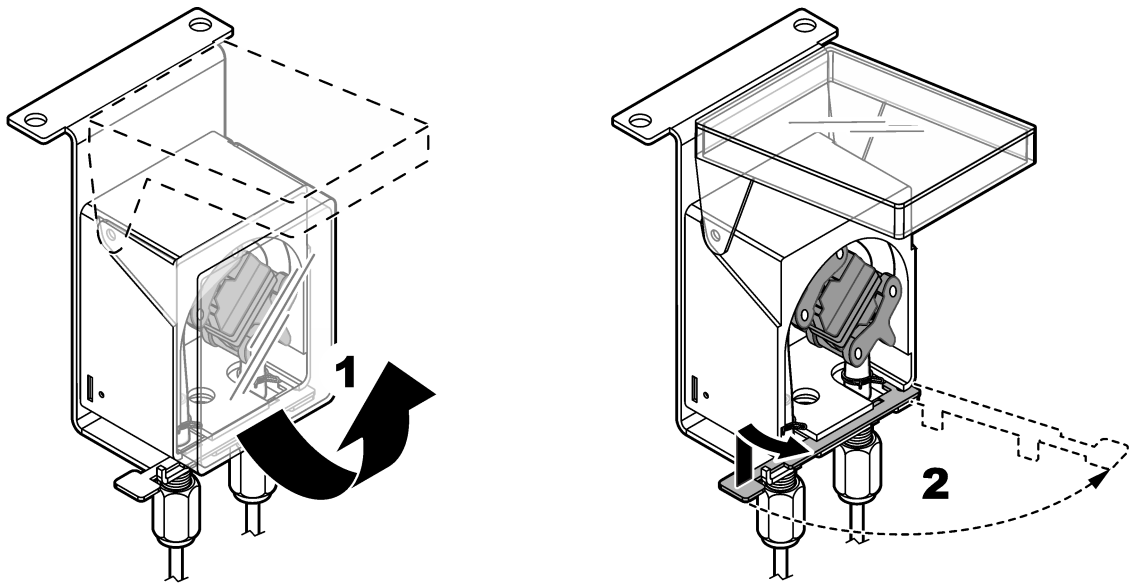
Replace the tubing

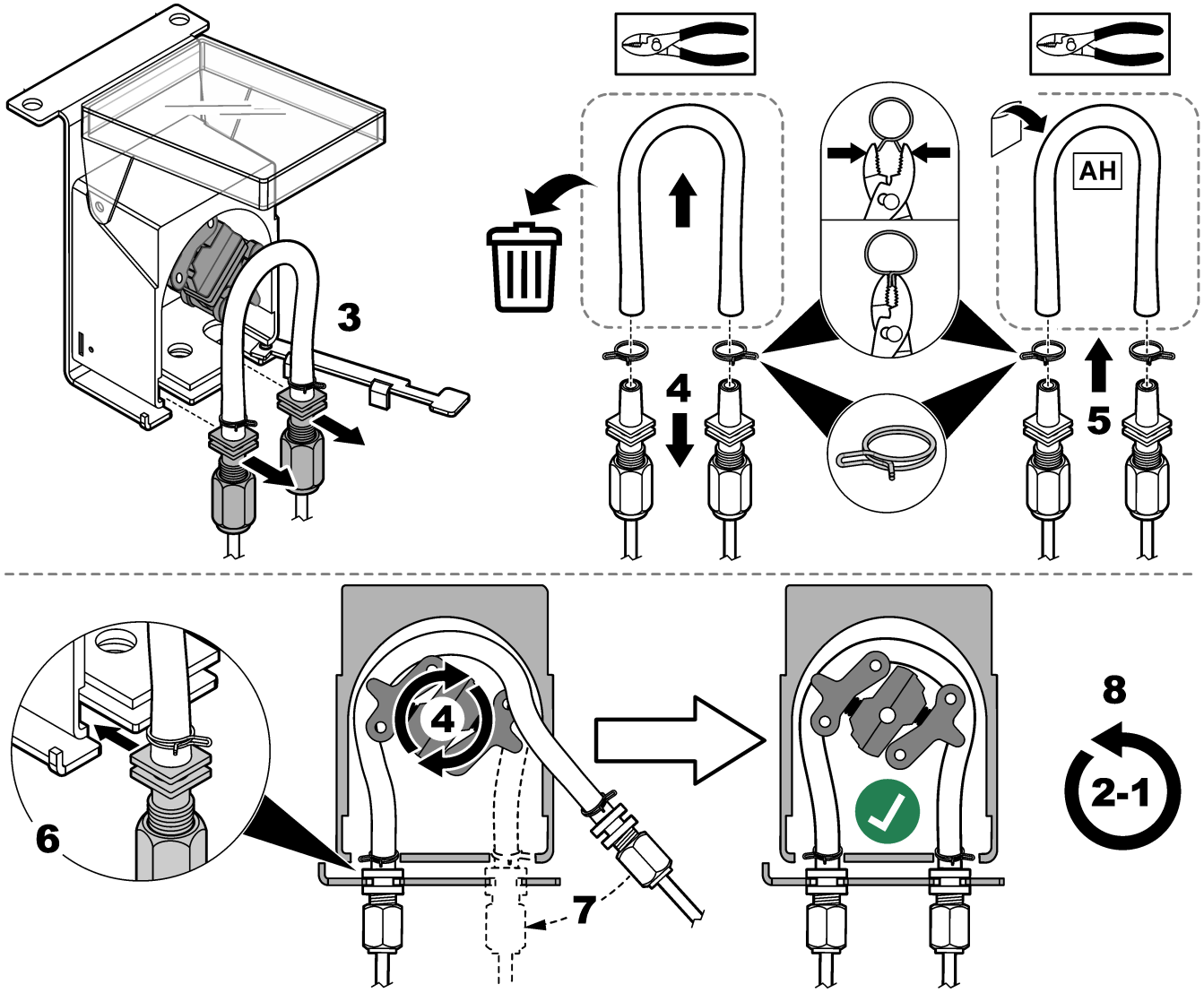
1. Use item AH to replace the tubing at the pump that has a clear cover (sample pump). Refer to the illustrated steps in Figure 4.

   Note:

   - Some process conditions make it necessary to replace the sample tube at 3 months intervals. Thus, an additional tube is supplied.
   - When the pump tubing is removed from the fitting, the pump tubing becomes distorted and should not be reused.

Figure 4 Replace the tubing at the sample pump



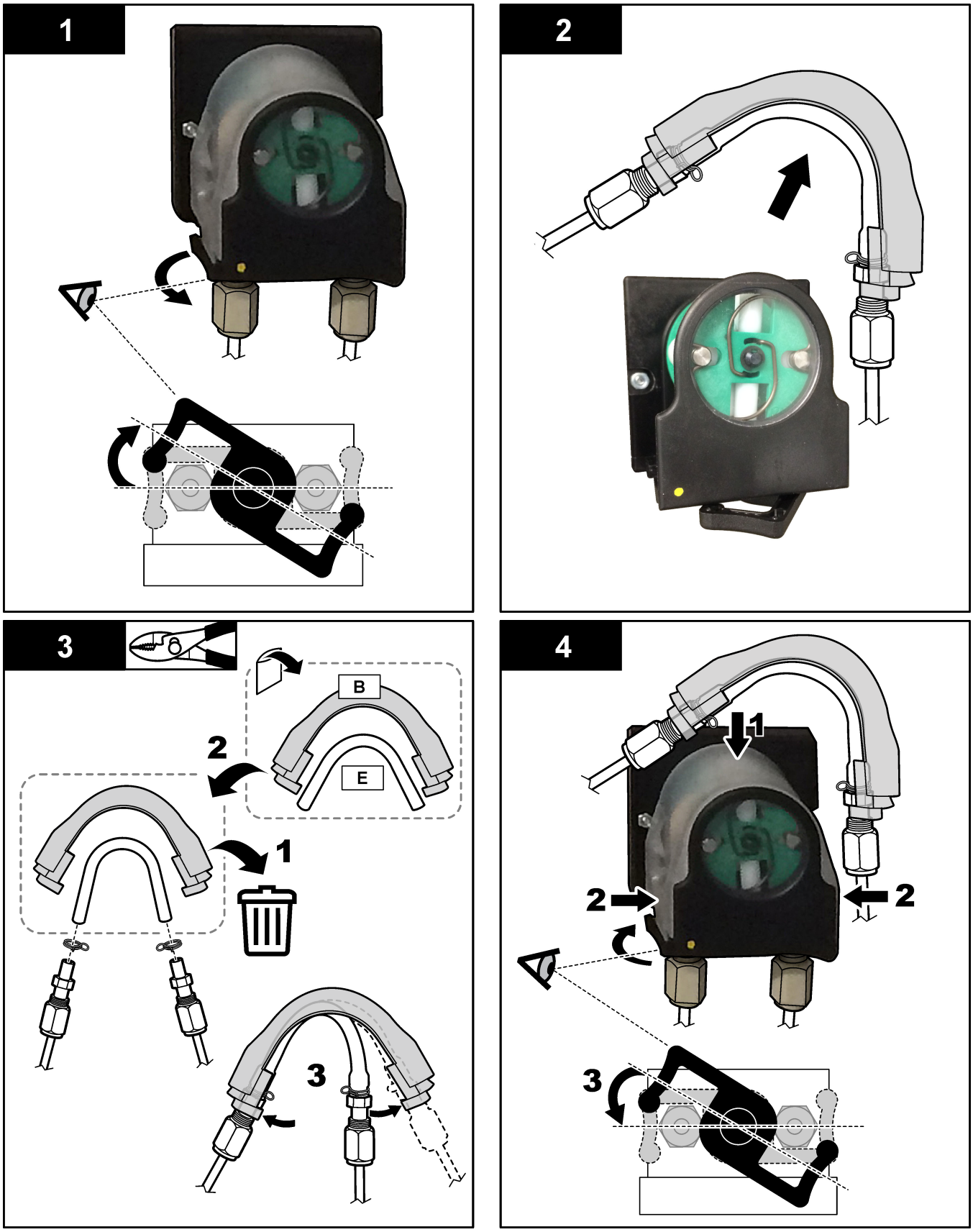


2. Replace the pump tube rails and pump tubing at the pumps that do not have clear covers (acid pump and base pump). Refer to Figure 5.

   At the acid pump and base pump, install the items that follow:

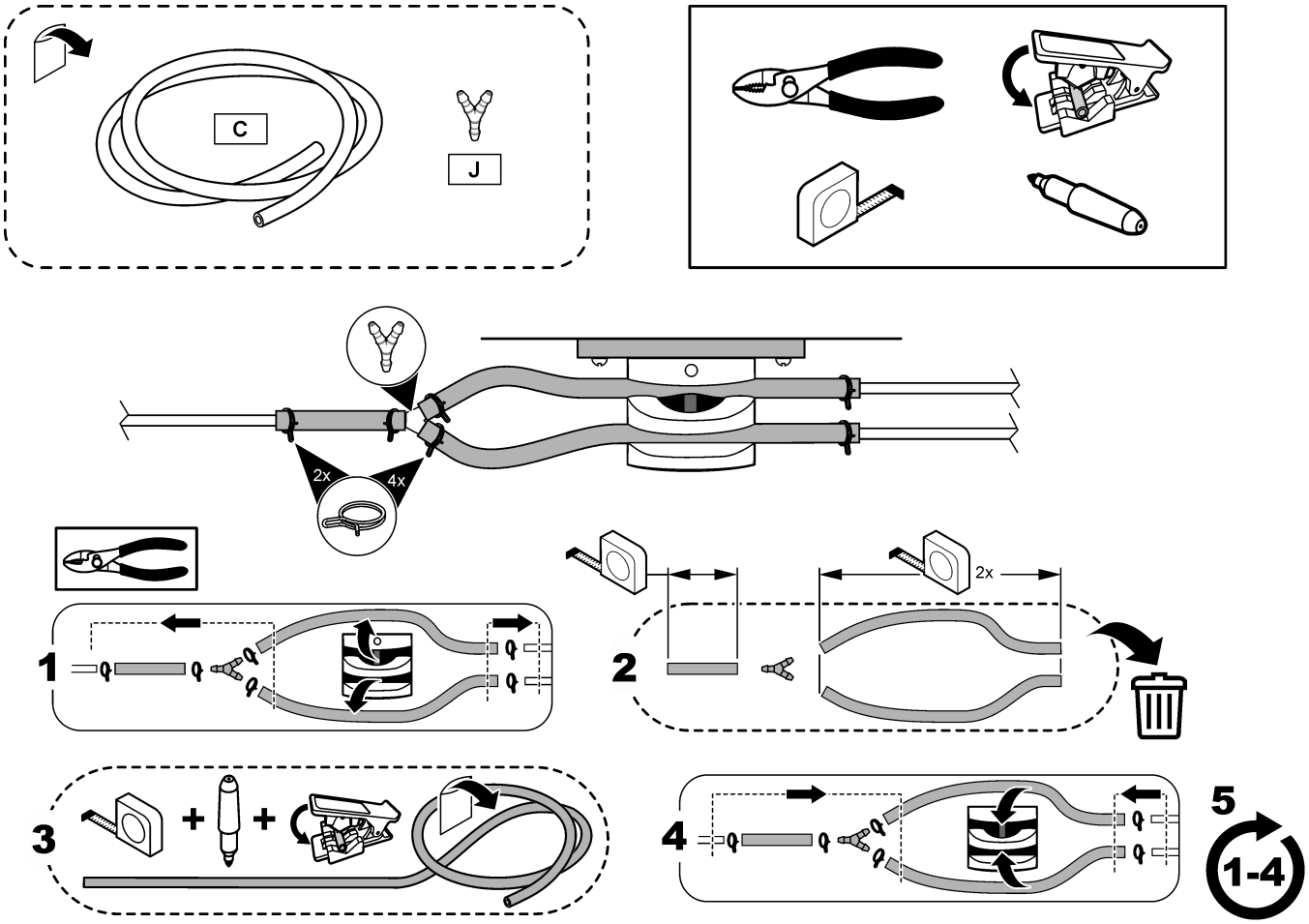
   - Item B—Pump tube rails
   - Item E—Pump tubing

Figure 5 Replace the tubing and pump tube rails at the pumps without clear covers



3. Use items C and J to replace the tubing and Y tube fittings at the pinch valve (manual/calibration valve). Refer to Figure 6. Refer to Analysis enclosure on page 21 for the location.
4. Use item C to replace the other EMPP 562, 6.4 mm OD and 3.2 mm ID tubing in the analyzer, if present.

Figure 6 Replace the pinch valve tubing and Y tube fittings



Examine the pumps

Make sure that the pump tubes and pump tube rails are installed correctly as follows:

1. Plumb the ACID and BASE ports to a deionized water container. If deionized water is not available, use tap water.
2. Remove the nut at the bottom of the tee fitting on the right side of the mixer reactor. Refer to Analysis enclosure on page 21.
3. Put a small container under the mixer reactor. Put the open end of the mixer reactor tubing in the container.
4. Put an empty graduated cylinder under the open end of the tee fitting.
5. Select MAINTENANCE > DIAGNOSTICS > SIMULATE.
6. Select ACID PUMP.
7. Select ON, then enter the number of pulses identified in Table 1.
8. Push ✔ to start the acid pump.
9. Wait the number of pulses identified in Table 1.
   1 pulse = ½ revolution, 20 pulses = 13 seconds, 16 pulses = 8 seconds
10. Compare the volume of water in the graduated cylinder to Table 1.
11. Do steps 4 and 6 to 10 again for the base pump.

Make sure that the difference in the measured volumes for the acid pump and base pump is 5% (0.2 mL) or less.

Note: *Due to an internal system interlock, the analyzer will prompt for a reactor purge cycle when the liquid level in the reactor is high. Select MAINTENANCE > DIAGNOSTICS > SIMULATE > RUN REAGENTS PURGE.*

12. Do steps 4 and 6 to 10 again for the sample pump.
13. Connect the tubing that was disconnected.

Table 1 Pump volumes

Pump	Pulses	Volume
ACID PUMP	20	3.9 to 4.9 mL
BASE PUMP	20	3.9 to 4.9 mL
SAMPLE PUMP	16	5.5 to 7.5 mL

Examine the valves

Make sure that the valves open and close correctly as follows:

1. Push ↩ to go to the SIMULATE menu.
2. Select ACID VALVE on the display to open the acid valve. The LED on the valve comes on when the valve is open.

   Refer to Analysis enclosure on page 21 for the locations of the valves.
3. Do step 2 again for the valves that follow:

   Note: *The LED on a valve comes on when the valve is open.*

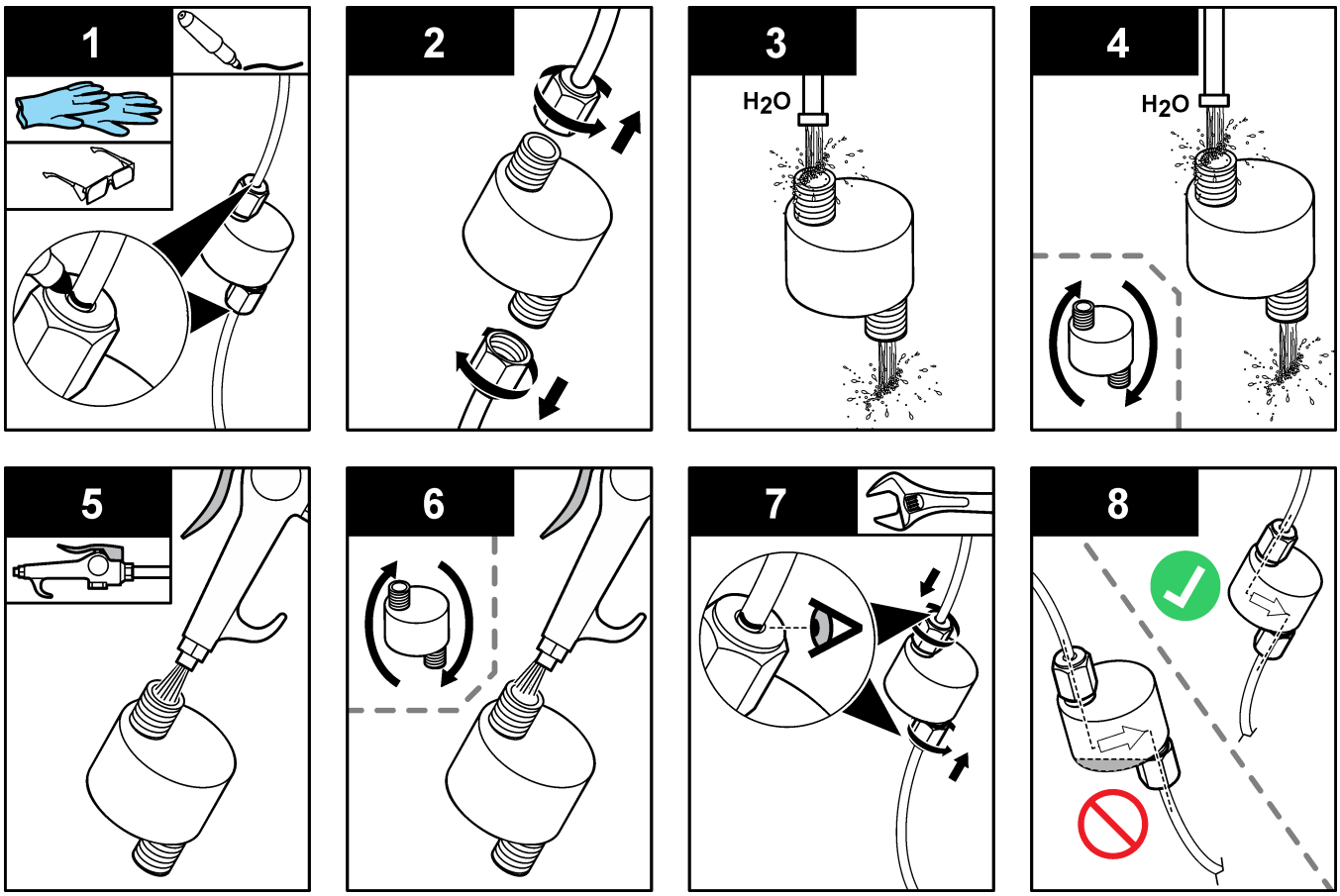
   - BASE VALVE
   - SAMPLE VALVE[1]
   - INJECTION VALVE
   - SAMPLE OUT VALVE[2]
   - EXHAUST VALVE
   - STREAM VALVE
   - MANUAL/CALIBRATION VALVE[3]
4. If the sample out valve, exhaust valve or injection valve does no open, disassemble the valve and clean the membrane seal.
5. Examine the tee fitting at the acid valve for manganese buildup. Clean the tubes and make sure that the acid reagent is correctly added to the reactor.

Clean the ozone line filter

Refer to the illustrated steps that follow. Refer to Analysis enclosure on page 21 to find the ozone line filter.

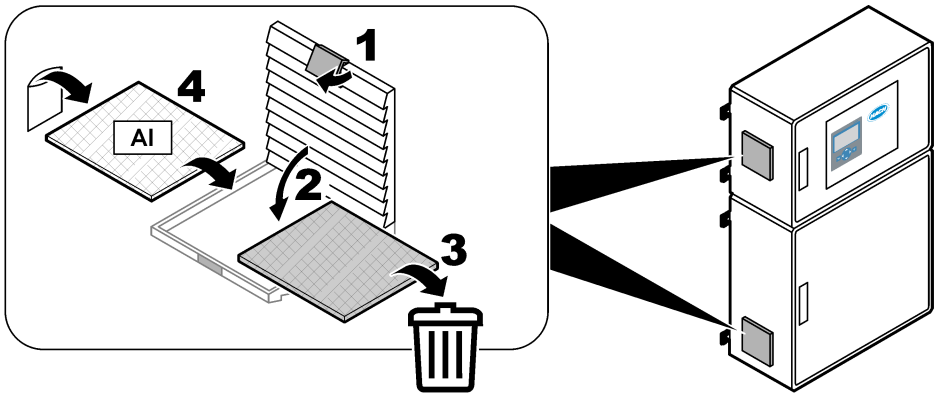
Put on safety glasses and gloves. The filter contains material that can cause corrosion.

[1] Make sure that the sample (ARS) valve turns to each position. LEDs 12, 13 and 14 are on at the Signal PCB.
[2] Make sure that the check purge valve (MV51) opens when the sample out valve opens if installed.
[3] Look for movement of the plunger.



Replace the fan filter and vent filter

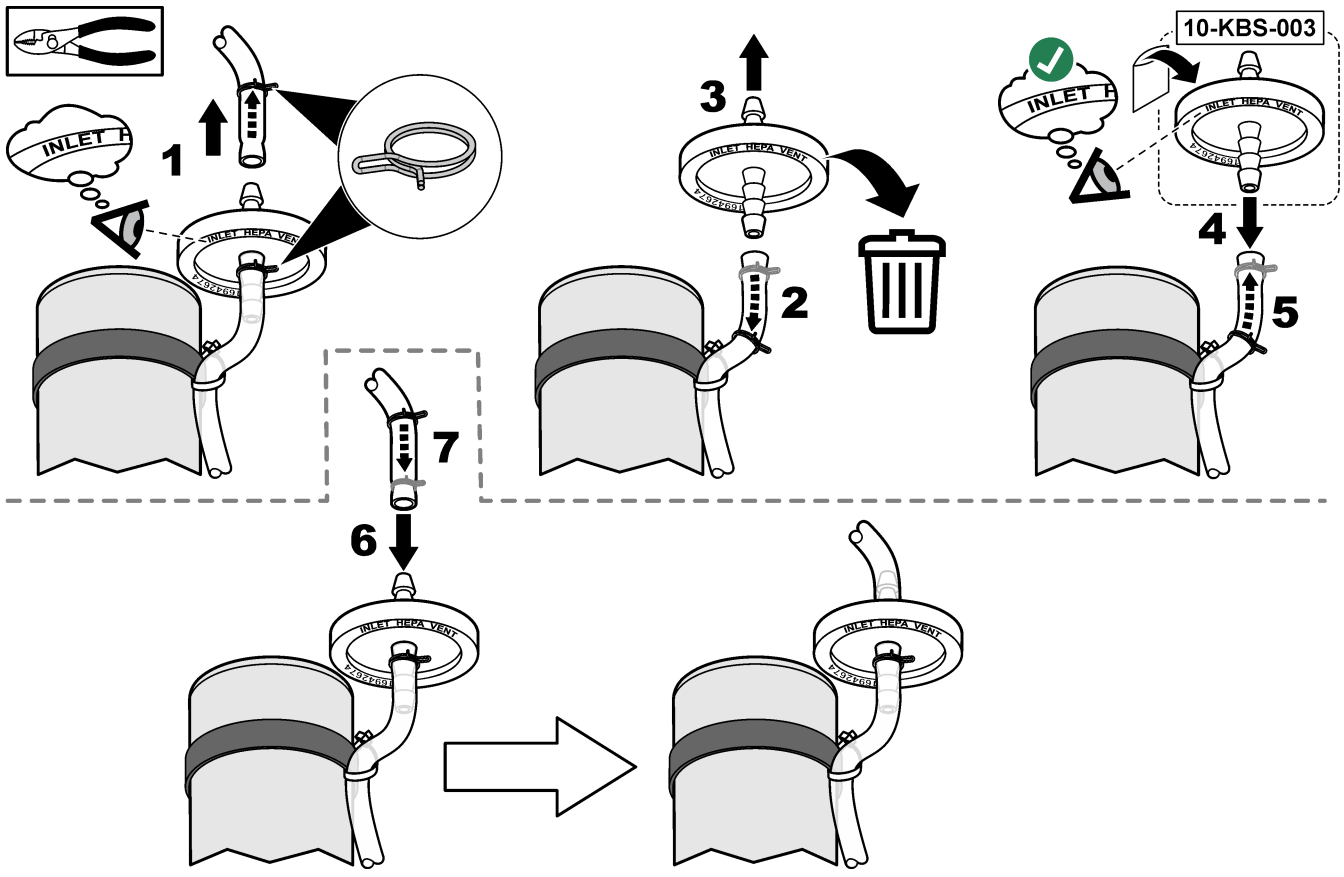
Refer to the illustrates steps that follow.



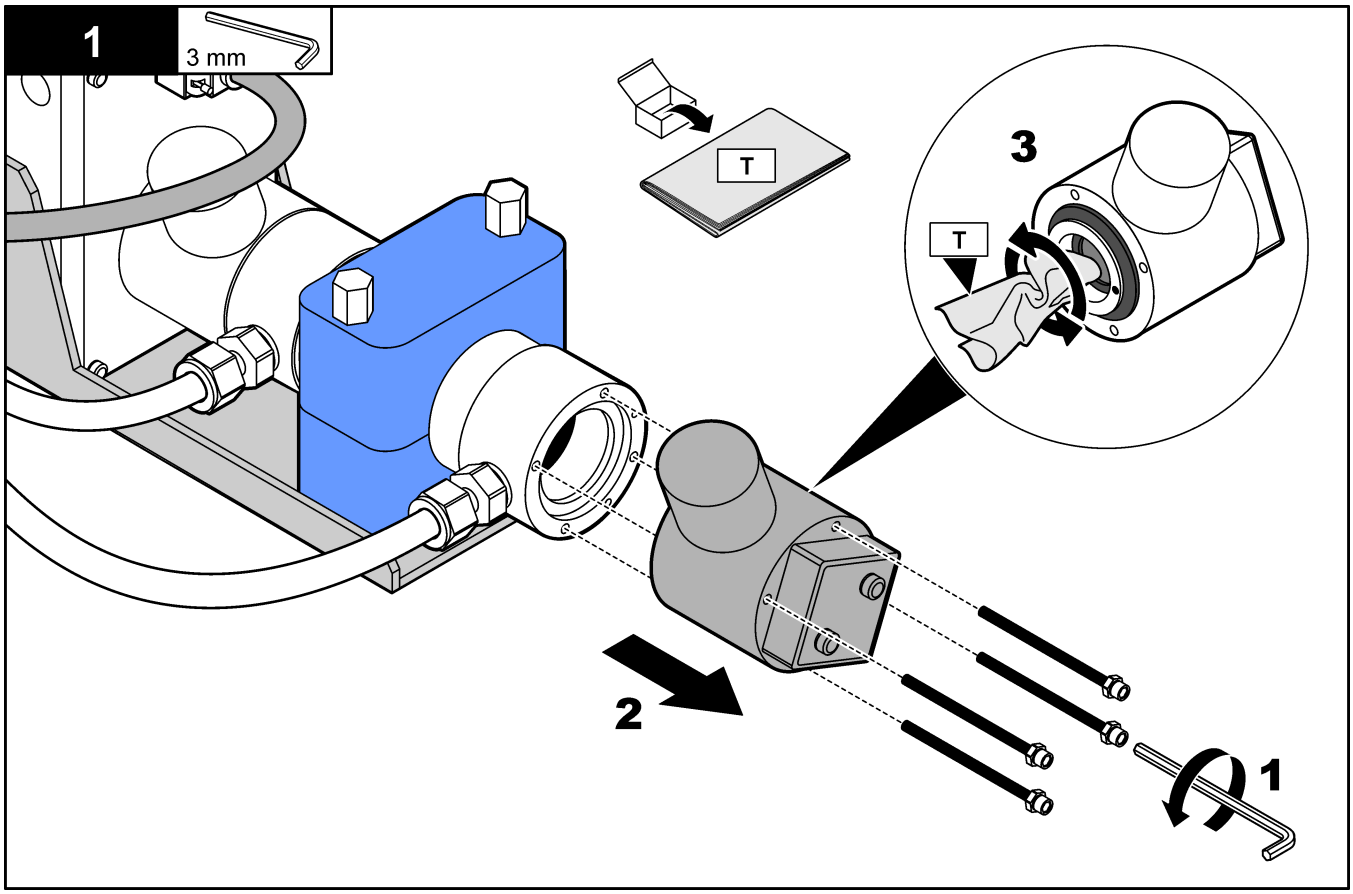
Replace the HEPA filter

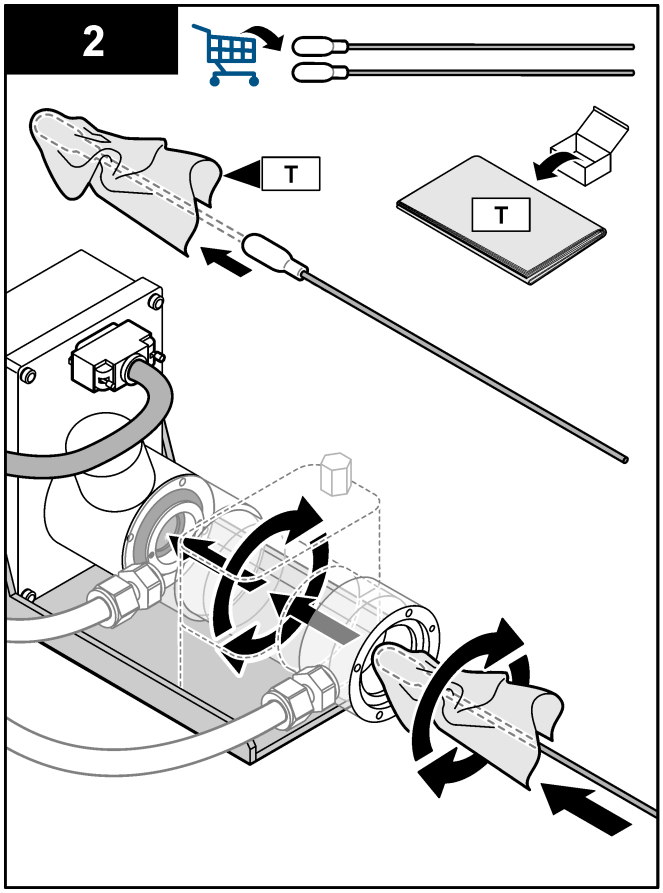
1. Make the oxygen tank empty as follows:
   a. Stop the instrument air to the analyzer.
   b. Select MAINTENANCE > DIAGNOSTICS > SIMULATE > MFC.
   c. Set the flow to 60 L/h. Push ✔ to start the mass flow controller (MFC). The measured flow shows at the top of the display.
   d. Operate the oxygen supply until the oxygen flow decreases to 0 L/h. The measured oxygen flow shows at the top of the display.
2. Install the new HEPA filter (10-KBS-003). Keep contamination away from the open tubing. Refer to Figure 7.
3. Start the instrument air to the analyzer.
4. Make sure that the instrument air pressure is 1.5 bar (21.7 psi) (or 1.2 bar (17.4 psi) when a BioTector compressor is used) when the oxygen concentrator is not in operation.
   Note: *When the oxygen concentrator is in operation, the instrument air pressure goes between 1.5 bar to 0.9 bar (21.7 to 13 psi).*
5. Select MAINTENANCE > DIAGNOSTICS > O2-CTRL STATUS.
6. Make sure that the pressure reading that shows on the display is 380 and 400 mbar at 1 L/h MFC flow (off).
   At 60L/h setpoint, the pressure should be 320 mbar minimum.

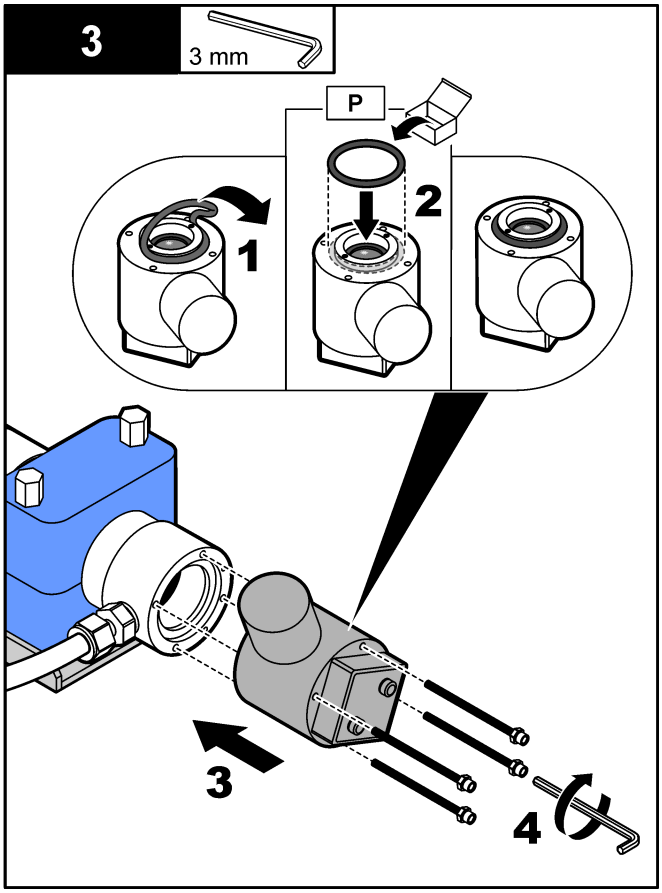
Figure 7 Replace the HEPA filter



Clean the lenses and replace the O-ring in the CO_2 analyzer







Examine the oxygen supply

Identify if there is CO_2 contamination in the oxygen supply as follows:

1. Let the oxygen concentrator operate for a minimum of 10 minutes.
2. Select MAINTENANCE > DIAGNOSTICS > SIMULATE.
3. Select MFC. Set the flow to 10 L/h.
4. Push ✔ to start the mass flow controller (MFC).
5. Operate the MFC for 5 minutes. The measured flow shows at the top of the display.
6. If the reading is not ± 0.5% of the CO_2 analyzer range (e.g., ± 50 ppm CO_2 if the analyzer range is 10000 ppm), do the steps that follow:
   a. Remove the CO_2 filter from the base reagent container.
   b. Install the CO_2 filter between the cooler and the CO_2 analyzer inlet port.
      Note: *Temporary connections can be made with EMPP tube.*
   c. Do steps 3 to 5 again.
      If the reading is not less than before, there is no CO_2 contamination in the oxygen supply.
      Identify if the CO_2 analyzer has dirty lenses. Identify if the CO_2 filters on the CO_2 analyzer have contamination. Identify if the CO_2 analyzer operation is correct.
   d. If the reading is less than before, there is CO_2 contamination in the oxygen supply.
   e. Remove the CO_2 filter from between the cooler and CO_2 analyzer inlet port.
   f. Connect the CO_2 filter to the base reagent container.

Replace the PTFE diaphragm

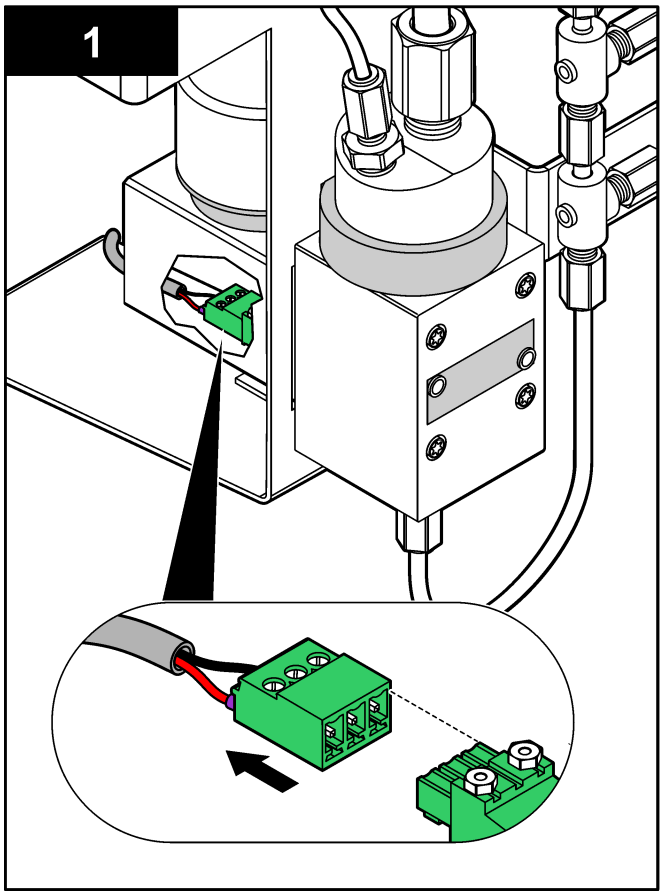
NOTICE

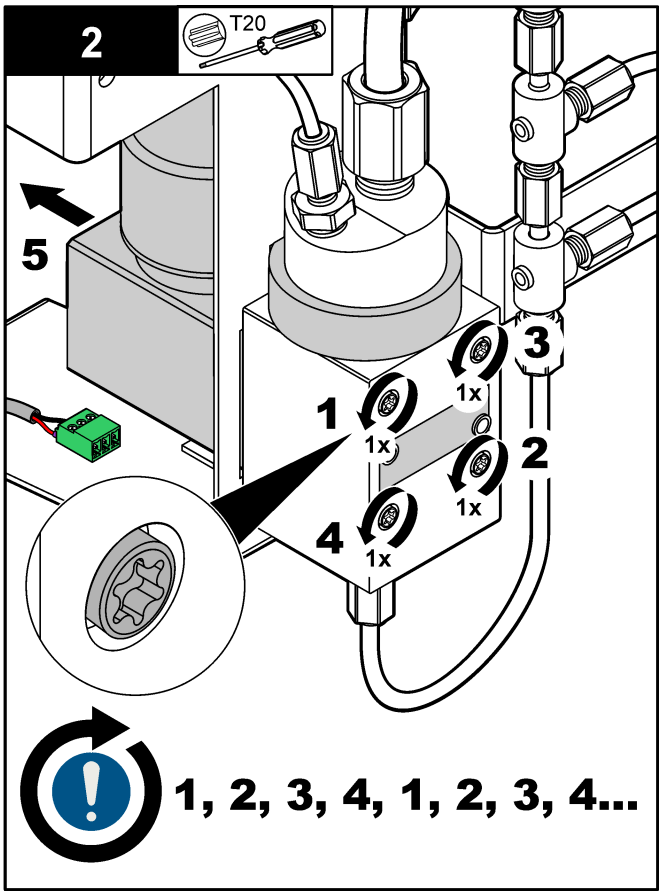
A torque screwdriver is necessary for the correct maintenance of the pump. Do not continue without a torque screwdriver.

Items to collect:

- Torque screwdriver calibrated to 1.4 Nm for pumps with Torx 20 screws (or 1.5 Nm for pumps with 3 mm allen screws)
- 3 mm Allen bit or Torx 20 bit
- Protective gloves
- Safety glasses

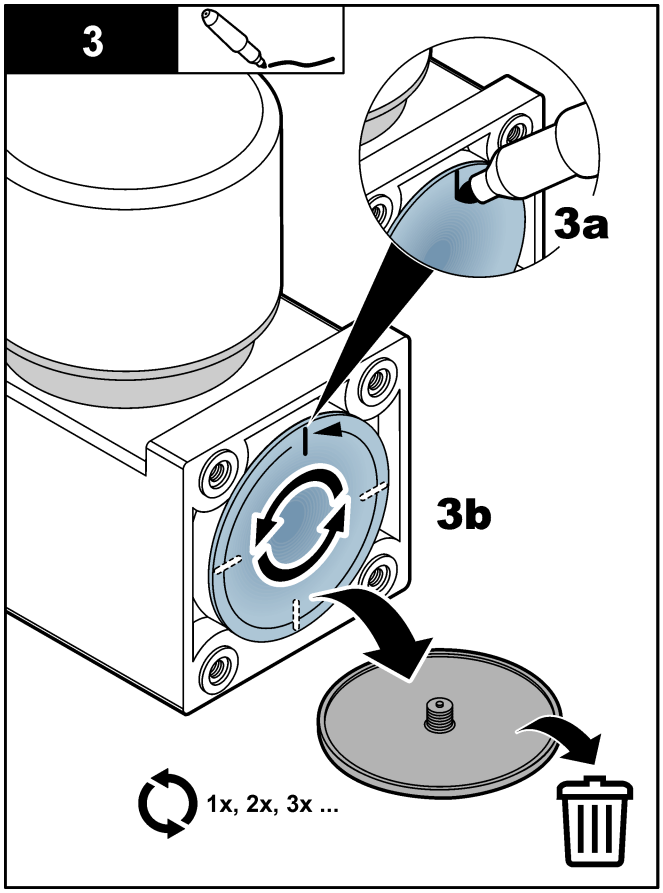
1. Disconnect the cable from the mixer reactor motor.
2. Loosen the screws in the sequence shown to prevent damage to the threads. Loosen the screws in small steps on each screw before the next screw is loosened. Then, remove the mixer reactor motor.

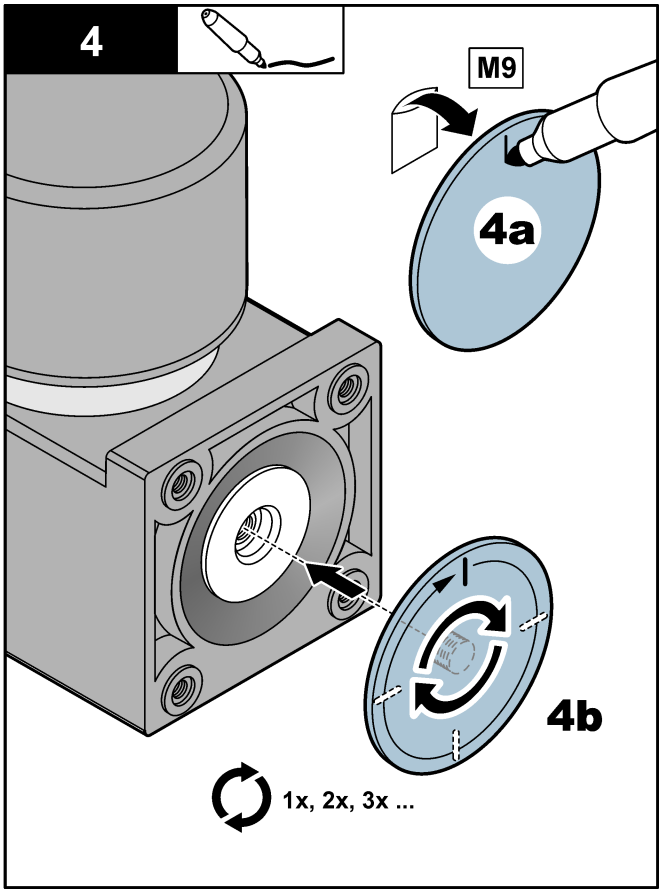




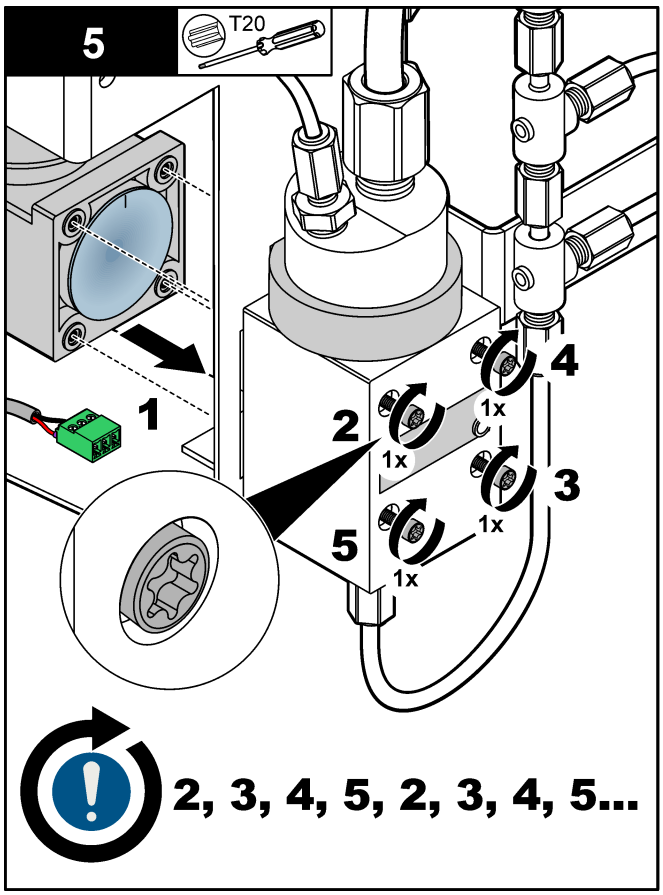
3. Mark the diaphragm. Use two hands to carefully turn the diaphragm. Count the number of rotations until the diaphragm is removed.
4. Install the new diaphragm. Count the number of rotations until the diaphragm is installed. If the number of turns is less than 7 or less than the number of turns to remove the old diaphragm, remove the diaphragm and try again.

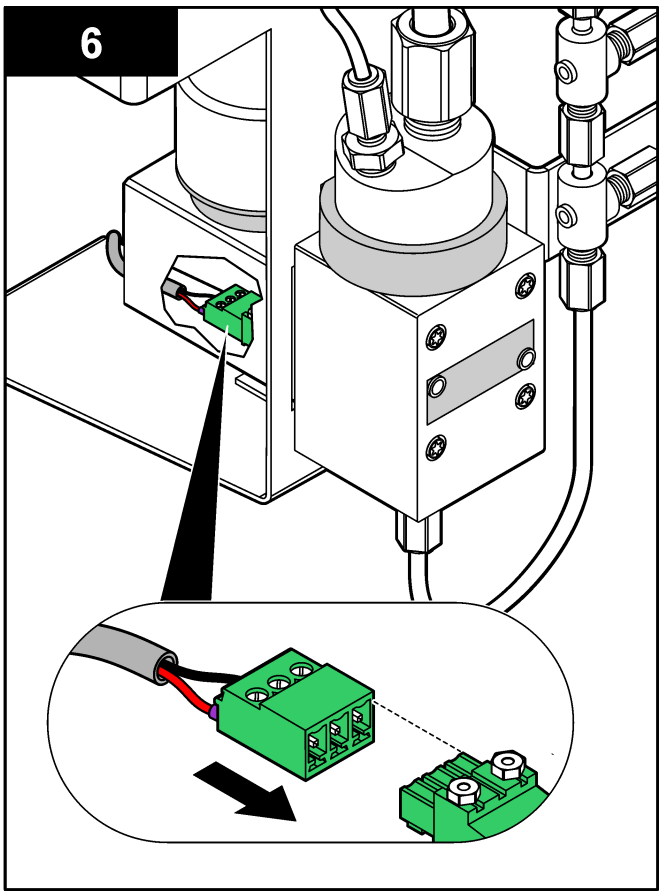
   Push the edge of the diaphragm down. Make sure that the diaphragm center is concave.





5. Install the mixer reactor motor. Use the torque screwdriver to tighten the screws in the sequence shown to prevent damage to the threads. Tighten the screws in small steps on each screw before the next screw is tightened.
6. Connect the cable to the mixer reactor motor.





Replace the contents of the ozone destructor

⚠CAUTION

Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Refer to the current safety data sheets (MSDS/SDS) for safety protocols.

⚠CAUTION

Chemical exposure hazard. Dispose of chemicals and wastes in accordance with local, regional and national regulations.

Read the safety information for the catalyst (Carulite) that is on the GHS label and the MSDS sheet before this task is started.

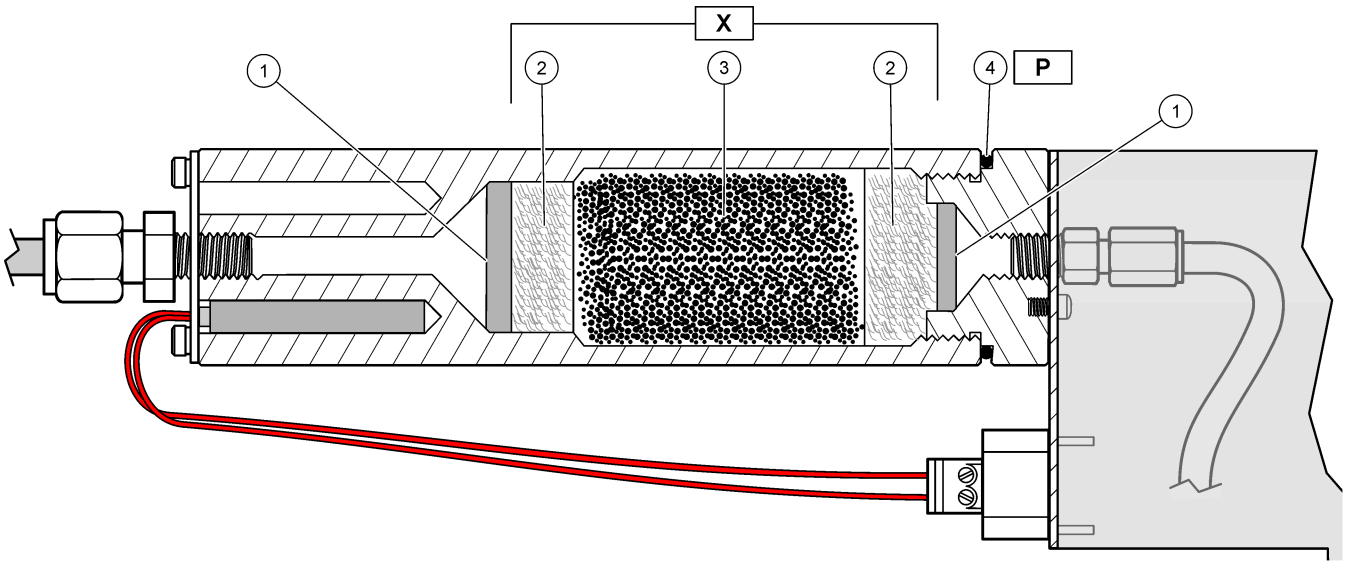
Clean the PTFE discs and replace the PTFE wool, catalyst and O-ring in the ozone destructor. Refer to Figure 8 and the illustrated steps that follow.

Clean the PTFE discs with deionized water or tap water. Let the PTFE discs dry. Do not use compressed air or gas to clean the filters.

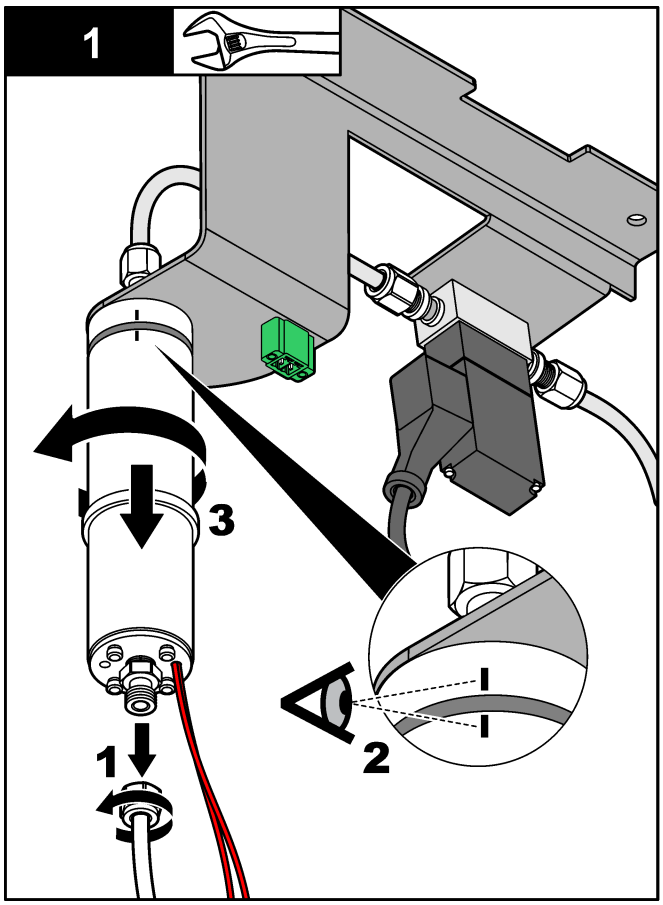
Notes:

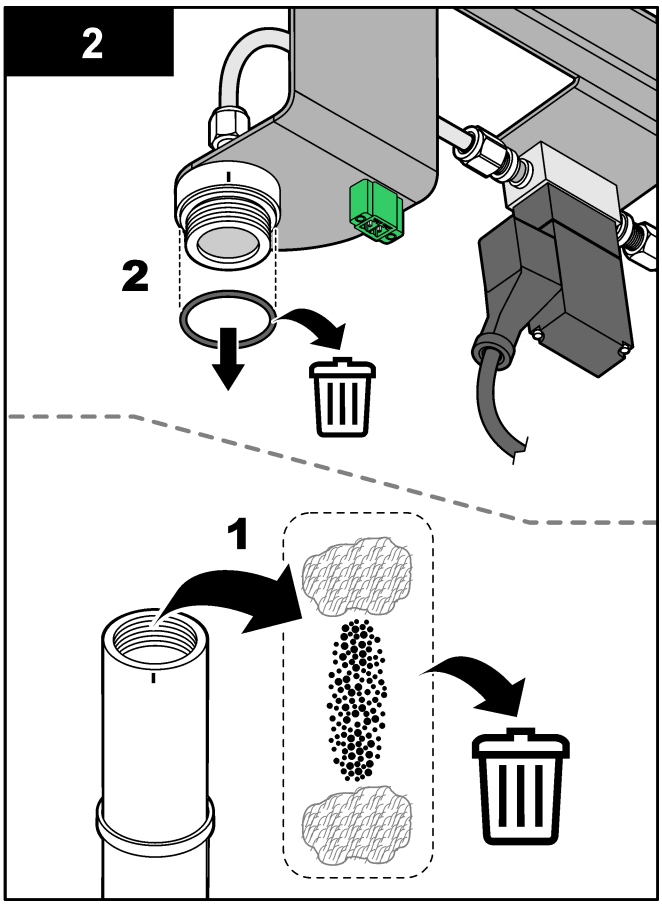
- Do not do this task when the ozone destructor is hot because the cap can seize, which will cause damage to the threads and result in air leaks.
- Do not use too much PTFE wool because the PTFE wool can restrict the flow of gas through the destructor.
- Do not push on the center of the PTFE disc because the disc can break.
- In applications that contain HCl or HF, replace the catalyst more frequently as necessary.

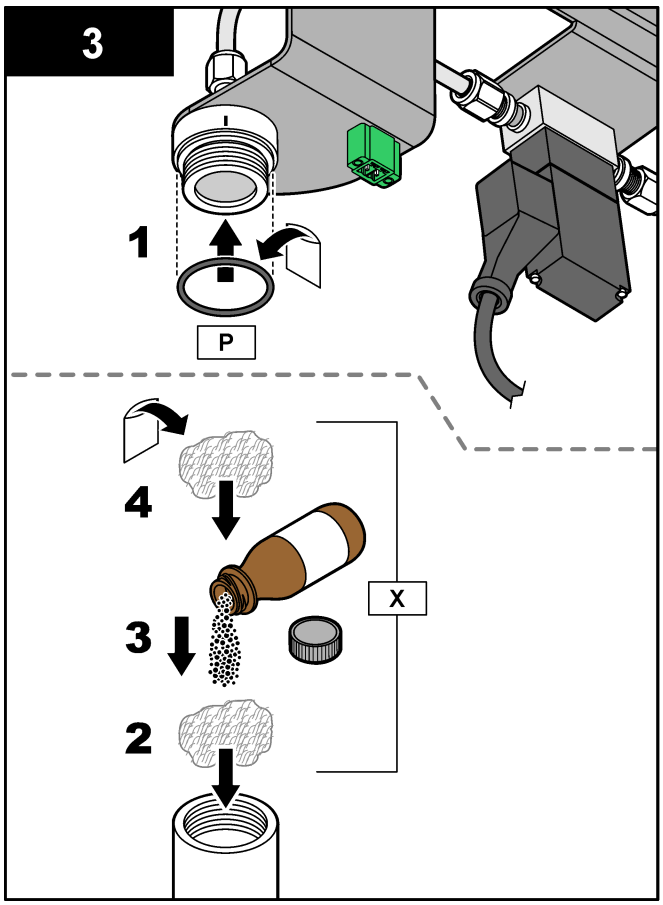
Figure 8 Contents of the ozone destructor



1 PTFE disc	**3** Catalyst (X)
2 PTFE wool (X)	**4** O-ring (P)


1
3
2
1


2
2
1


3
1
P
4
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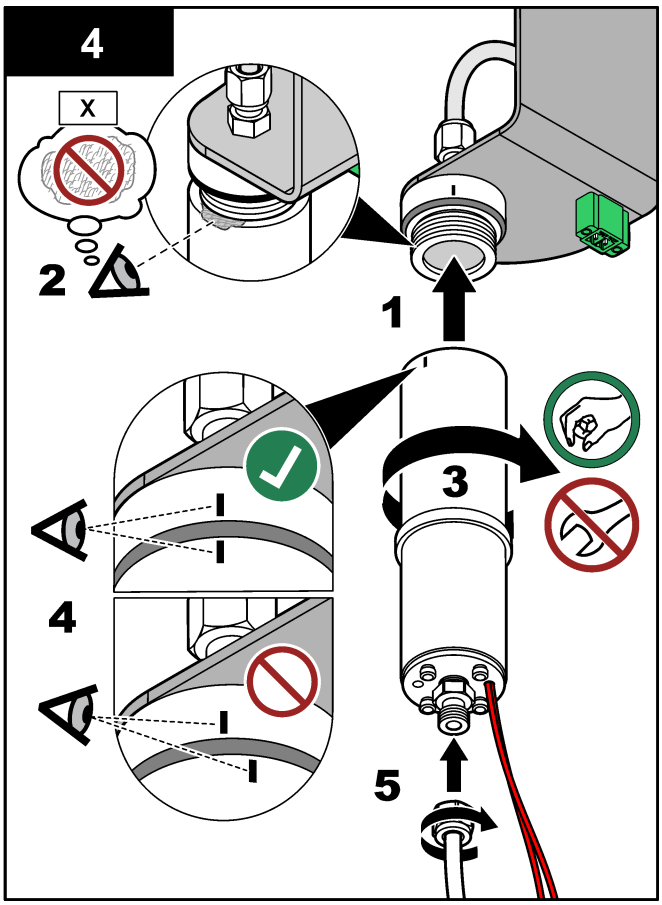
X


4
X
2
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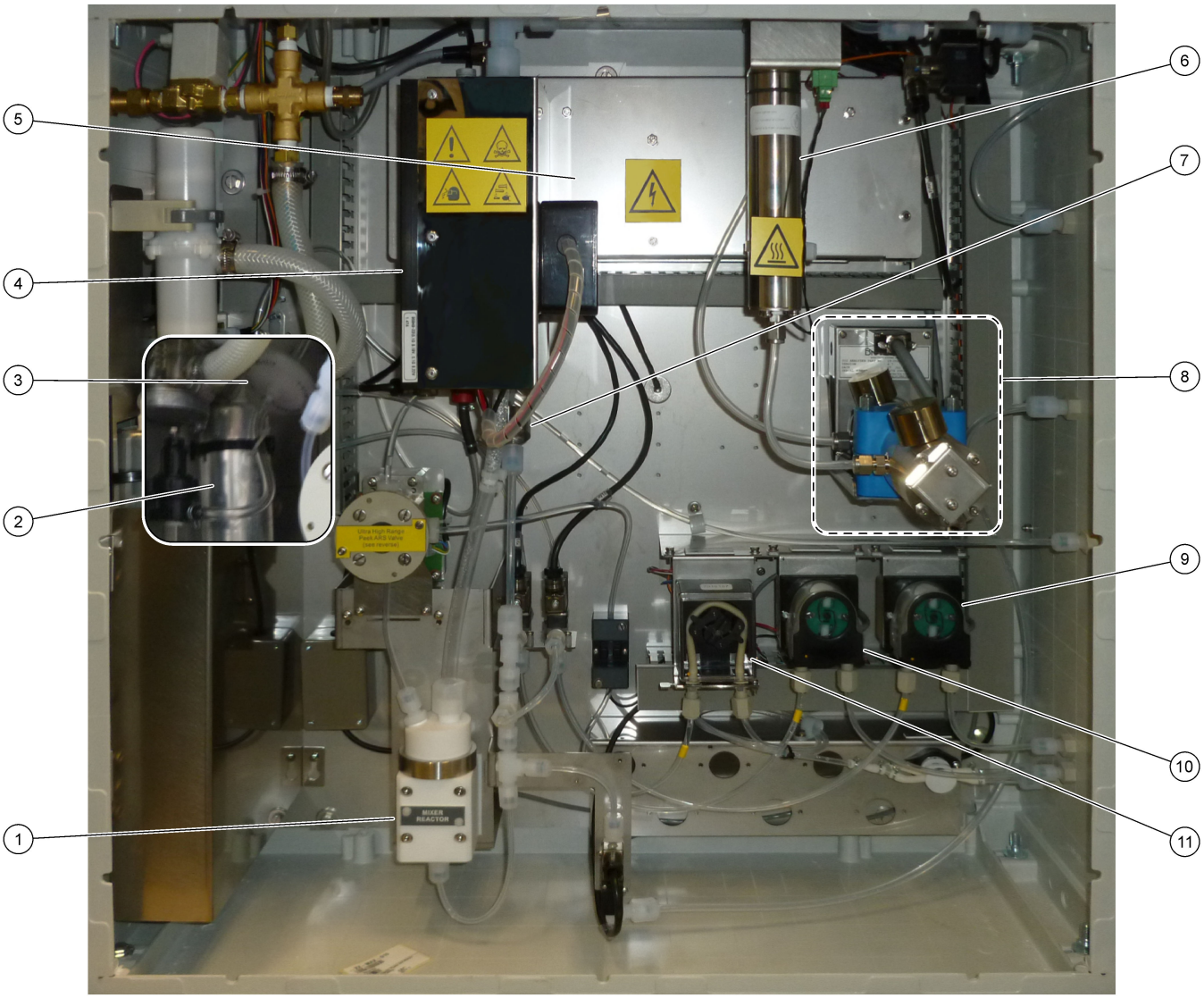
5

Analysis enclosure

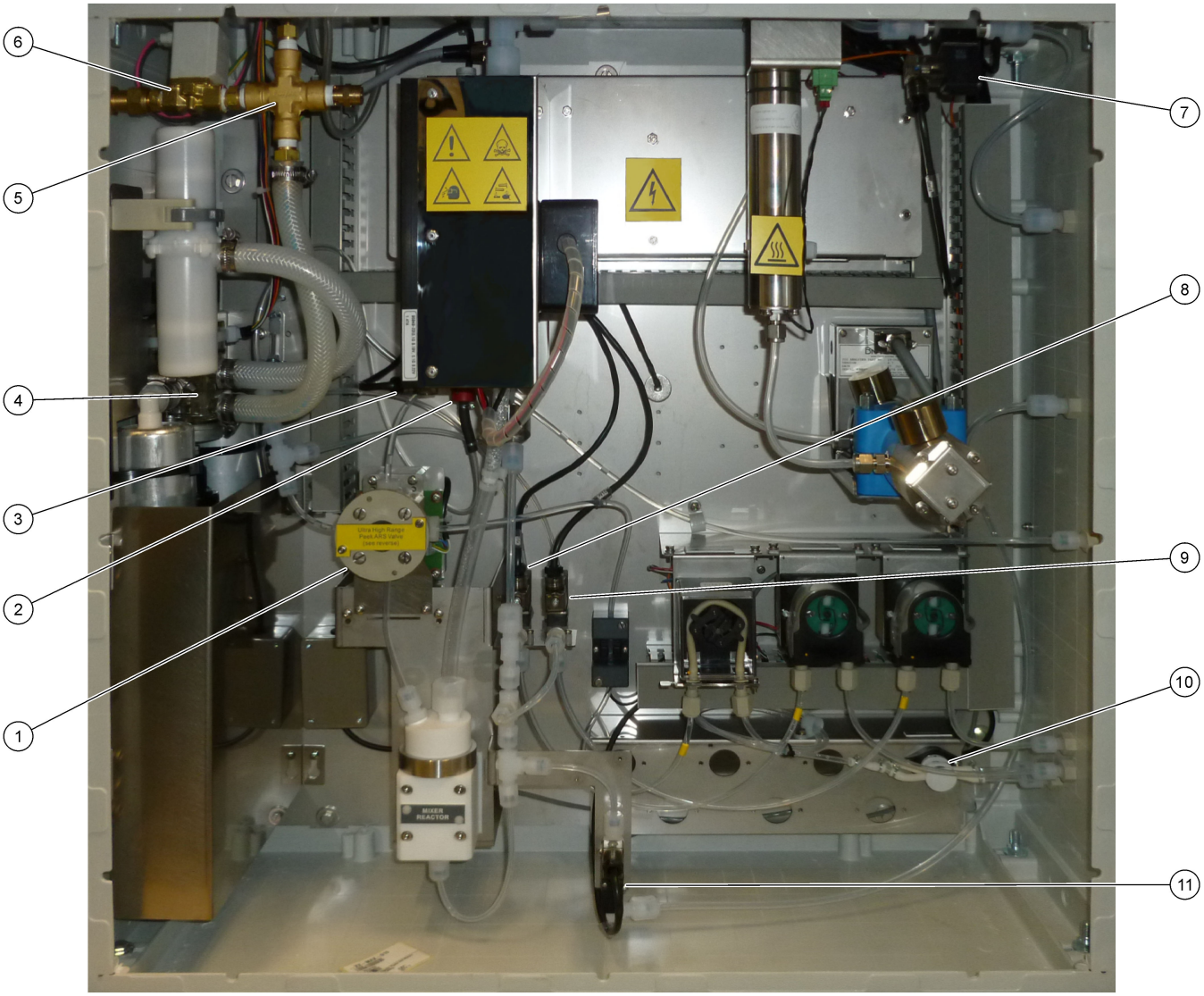
Figure 9 shows the pumps and components in the analysis enclosure. Figure 10 shows the valves in the analysis enclosure.

Figure 9 Analysis enclosure—Pumps and components



1 Mixer reactor	**7** Ozone line filter
2 Oxygen tank	**8** CO_2 analyzer
3 HEPA filter	**9** Base pump, P4
4 Cooler	**10** Acid pump, P3
5 Ozone generator	**11** Sample pump, P1
6 Ozone destructor	

Figure 10 Analysis enclosure—Valves



1 Sample (ARS) valve, MV4	**7** Exhaust valve, MV1
2 Non-return valve (check valve)	**8** Acid valve, MV6
3 Injection valve, MV7	**9** Base valve, P2
4 Rotary valve, OV2	**10** Manual/Calibration valve (span calibration valve), MV9
5 Pressure relief valve	**11** Sample out valve, MV5
6 Air isolation valve, OV1	

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