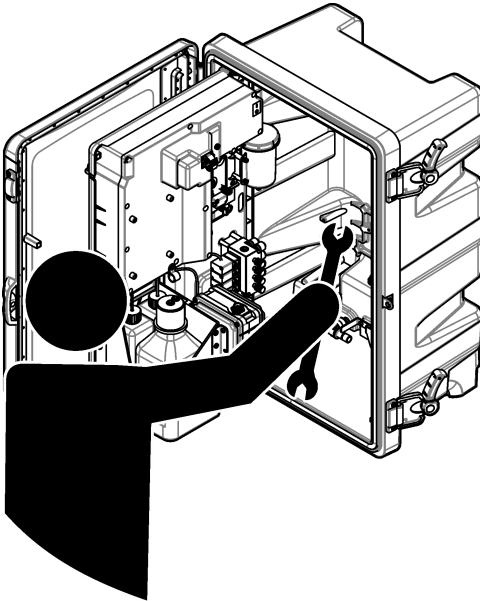




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Polymetron NA9600 sc Na⁺

06/2022, Edition 6



Maintenance and Troubleshooting
维护和故障排除

English.....3

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Section 1 Safety information

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

Section 2 Show the active errors, warnings and reminders

The display background and the status indicator light will change to red when an error occurs or to yellow when a warning occurs.

- **Error**—red display background and status indicator light. A significant problem occurred that affects the instrument operation. The current measurement stops and the analyzer goes into shutdown mode.
- **Warning**—yellow display background and status indicator light. An event occurred that can cause a future problem. The analyzer continues to operate.
- **Reminders**—wrench symbol shows on the display and yellow status indicator light. The time for a maintenance task has passed.

Do the steps that follow to show the active errors, warnings and reminders:

Note: To see all of the possible errors, warnings and reminders and their help information, push **diag**, then select **ANALYZER HELP**.

1. Push **diag**, then select **DIAGNOSTICS**. The active errors, warnings and reminders are shown.
2. Select an error, warning or reminder from the list.
3. Select an option.

Option	Description
ACKNOWLEDGE	Acknowledges the selected error, warning or reminder. When all of the active errors, warnings and reminders are acknowledged, the display background changes back to white and the status indicator light changes back to green.
VIEW HELP	Shows help information for the selected error, warning or reminder.

Section 3 Maintenance



⚠ DANGER
Multiple hazards. Only qualified personnel must conduct the tasks described in this section of the document.

3.1 Maintenance schedule

Table 1 shows the recommended schedule of maintenance tasks. Facility requirements and operating conditions may increase the frequency of some tasks.

Table 1 Maintenance schedule

Task	3 months	As necessary
Replace the calibration and reactivation solutions on page 4	X	
Replace the conditioning solution on page 6	X	
Replace the KCl electrolyte on page 8	X	
Replace an input power fuse on page 10		X

3.2 Clean the instrument

NOTICE

Never use cleaning agents such as turpentine, acetone or similar products to clean the instrument including the display and accessories.

Clean the exterior of the instrument with a moist cloth and a mild soap solution.

3.3 Clean spills

CAUTION



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

1. Obey all facility safety protocols for spill control.
2. Discard the waste according to applicable regulations.

3.4 Replace the calibration and reactivation solutions

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.

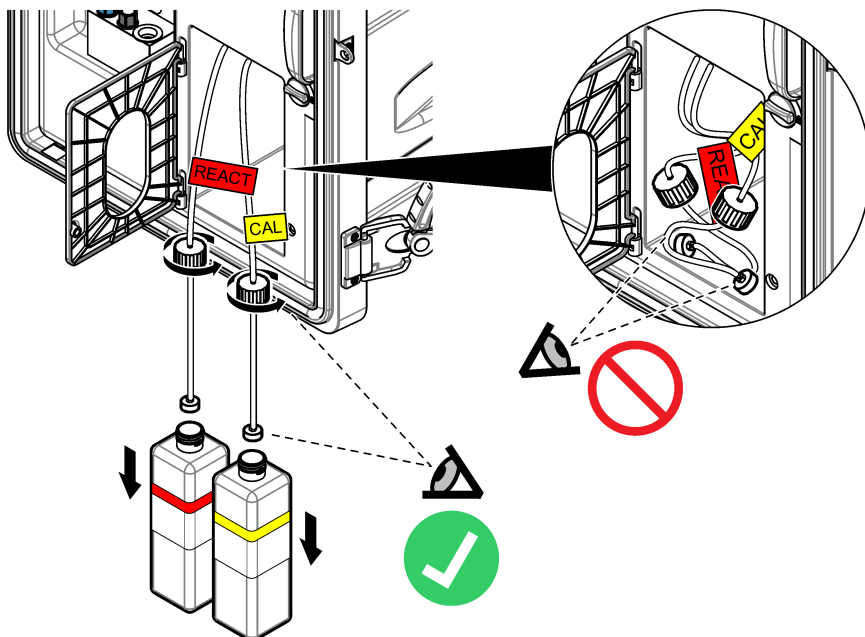
Replace the reactivation solution and calibration solution at 3-month intervals or when less than 10% full.

Items supplied by the user:

- Personal protective equipment (refer to MSDS/SDS)
- 0.5M Sodium Nitrate (NaNO_3), 500 mL
- 10-ppm Sodium Chloride Standard (NaCl), 500 mL
- Deionized water, 100 mL

1. Put on the personal protective equipment identified in the safety data sheet (MSDS/SDS).
2. Push **menu**, then select STOP ANALYZER.
Note: If START ANALYZER shows, the analyzer is already in standby mode.
3. Replace the reactivation solution and calibration solution as follows:
 - a. Remove the reactivation solution and calibration solution bottles from the analyzer. Refer to [Figure 1](#).
Note: Only analyzers with the auto calibration option have a calibration solution bottle.
 - b. Discard the solutions in the bottles into an applicable drain.
 - c. Flush the bottles with deionized water.
 - d. Fill the calibration solution bottle with new 10-ppm Sodium Chloride (NaCl) solution (500 mL). The calibration solution bottle has a label with a yellow stripe.
Note: To prepare 10-ppm Sodium Chloride (NaCl) solution, refer to the operations manual.
 - e. Fill the reactivation solution bottle with new 0.5M Sodium Nitrate (NaNO₃) solution (500 mL). The calibration solution bottle has a label with a red stripe.
Note: To prepare 0.5M Sodium Nitrate (NaNO₃) solution, refer to the operations manual.
 - f. Install the bottles in the analyzer. Make sure that the tubing with a red "REACT" label is put in the bottle that has a label with a red stripe.
 Make sure that the tubing with a yellow "CAL" label is put in the bottle that has a label with a yellow stripe.
4. Enter the bottle levels as follows:
 - a. Push **menu**, then select REAGENTS/STANDARDS.
 - b. Select SET REACT LEVEL, then enter 100%.
 - c. Select SET STANDARD LEVEL, then enter 100%.
5. Select PRIME REAGENTS.
6. When the prime reagents step is complete, push **menu**, then select START ANALYZER.

Figure 1 Bottle removal



3.5 Replace the conditioning solution

▲ WARNING



Inhalation hazard. Do not breathe Diisopropylamine (DIPA) or ammonia fumes. Exposure may result in severe injury or death.

▲ WARNING



Chemical exposure hazard. Diisopropylamine (DIPA) and ammonia are a flammable, corrosive and toxic chemical. Exposure may result in severe injury or death.

▲ WARNING



Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Read the safety data sheet from the supplier before bottles are filled or reagents are prepared. For laboratory use only. Make the hazard information known in accordance with the local regulations of the user.

▲ CAUTION



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

Replace the conditioning solution at 3-month intervals or when less than 10% full. Use DIPA (recommended) or ammonia (more than 28%) for the conditioning solution.

Items supplied by the user:

- Personal protective equipment (refer to MSDS/SDS)
- Diisopropylamine (DIPA) 99%, 1 L bottle
- Bottle adapter for Merck® or Orion® DIPA bottles if applicable

Replace the conditioning bottle as follows:

1. Put on the personal protective equipment identified in the safety data sheet (MSDS/SDS).
2. Push **menu**, then select STOP ANALYZER.

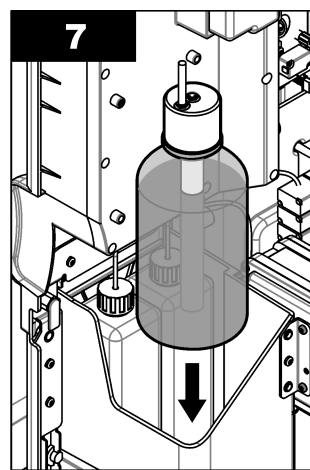
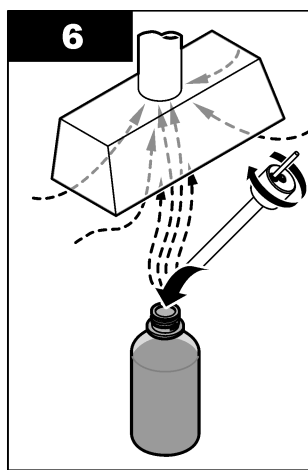
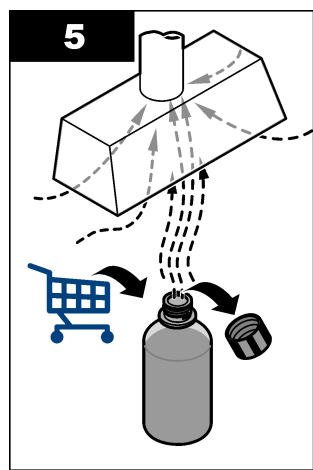
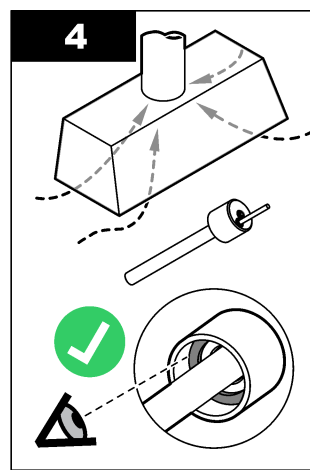
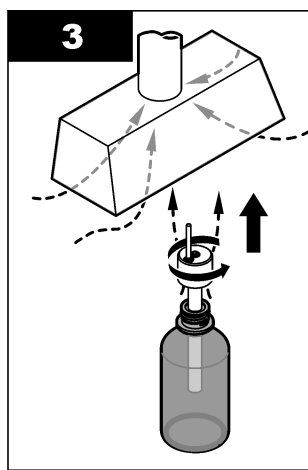
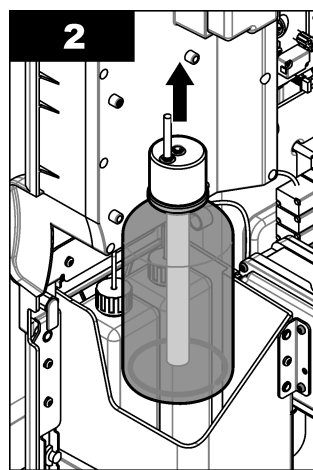
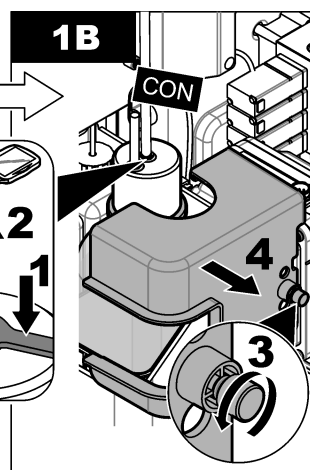
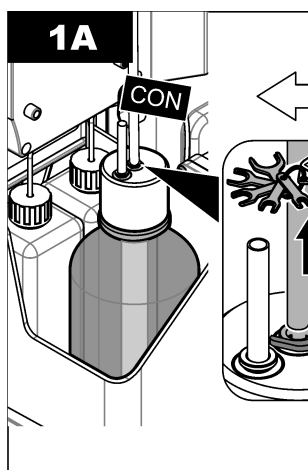
Note: If START ANALYZER shows, the analyzer is already in standby mode.

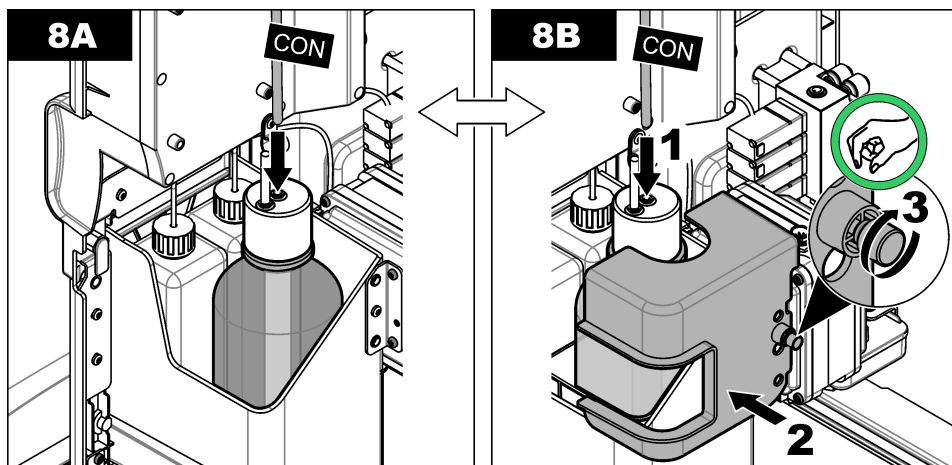
3. Turn the latch on the analytic panel to the unlock position. Open the analytics panel.
4. Replace the conditioning solution bottle. Refer to the illustrated steps that follow.

Note: Analyzers with the optional cationic pump have two tubes that go in the conditioning bottle cap. Remove both tubes.

Note: At illustrated steps 1 and 8, only analyzers without an enclosure have a conditioning bottle holder.

Do illustrated steps 3–6 under a fume hood if available. Do not breathe DIPA or ammonia fumes.





5. For analyzers with the optional cationic pump, install the outlet tube from the cationic pump back into the off-center hole in the cap.
6. Close the analytics panel. Turn the latch on the analytics panel to the locked position.
7. Enter the bottle level as follows:
 - a. Push **menu**, then select REAGENTS/STANDARDS.
 - b. Select SET COND LEVEL, then enter 100%.
8. Push **menu**, then select START ANALYZER.

3.6 Replace the KCl electrolyte

⚠ 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.

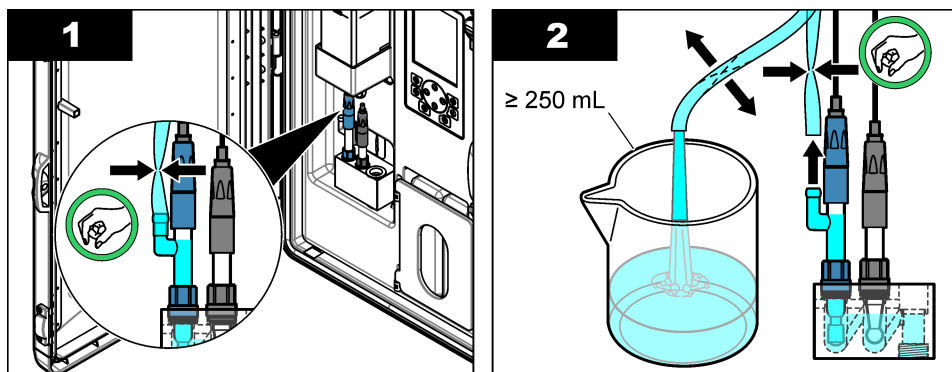
Replace the KCl electrolyte in the KCl electrolyte reservoir at 3-month intervals.

Items to collect:

- Personal protective equipment (refer to MSDS/SDS)
- 3M KCl electrolyte, 200 mL
- Small container, 250 mL or larger

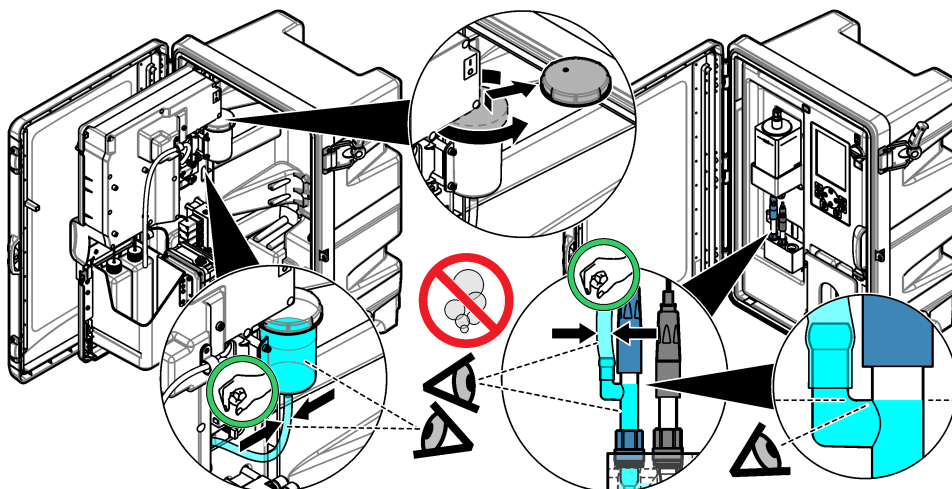
Replace the KCl electrolyte as follows:

1. Put on the personal protective equipment identified in the safety data sheet (MSDS/SDS).
2. Drain the contents of the KCl electrolyte reservoir into the small container. Refer to the illustrated steps that follow. Discard the KCl electrolyte into an applicable drain.



3. Install the KCl electrolyte tube back on the reference electrode.
4. Fill the KCl electrolyte reservoir as follows:
 - a. Turn the latch on the analytics panel to the unlocked position. Open the analytics panel.
 - b. Remove the lid from the KCl electrolyte reservoir. Refer to [Figure 2](#).
 - c. Fill the reservoir 90% full (approximately 200 mL).
 - d. Install the lid.
5. Push the air bubbles out of the KCl electrolyte tube as follows:
 - a. From the front of the analytics panel, squeeze the KCl electrolyte tube with thumb and finger to push the air bubbles up the tube to the reservoir. Refer to [Figure 2](#).
 - b. When an air bubble is near the reservoir, use two hands to squeeze the tube from the front and back of the analytics panel to push the air bubble up.
 - c. Continue to squeeze the tube until the KCl electrolyte in the reference electrode is at the top of the glass junction where the KCl electrolyte enters the electrode. Refer to [Figure 2](#).
6. Close the analytics panel. Turn the latch on the analytics panel to the locked position.
7. Enter the bottle level as follows:
 - a. Push **menu**, then select REAGENTS/STANDARDS.
 - b. Select SET KCL LEVEL, then enter 100%.

Figure 2 Fill the KCl electrolyte reservoir



3.7 Replace an input power fuse

⚠ DANGER



Electrocution hazard. Remove power from the instrument before this procedure is started.

⚠ DANGER



Fire hazard. Use the same type and current rating to replace fuses.

Examine the fuses. Replace any open fuses with new fuses.

Item supplied by user: T 1.6 A, 250 VAC fuse

1. Disconnect the power cord from the electrical outlet.
2. Remove the electrical access cover. Refer to the illustrated steps in [Figure 3](#).
3. Replace the fuse. Refer to the illustrated steps in [Figure 4](#)
4. Install the electrical access cover. Tighten all of the screws to keep the environmental rating of the enclosure.
5. Close the analytics panel. Turn the latch on the analytics panel to the locked position.
6. Connect the power cord to an electrical outlet.
7. Push **menu**, then select START ANALYZER.

Figure 3 Electrical access cover removal

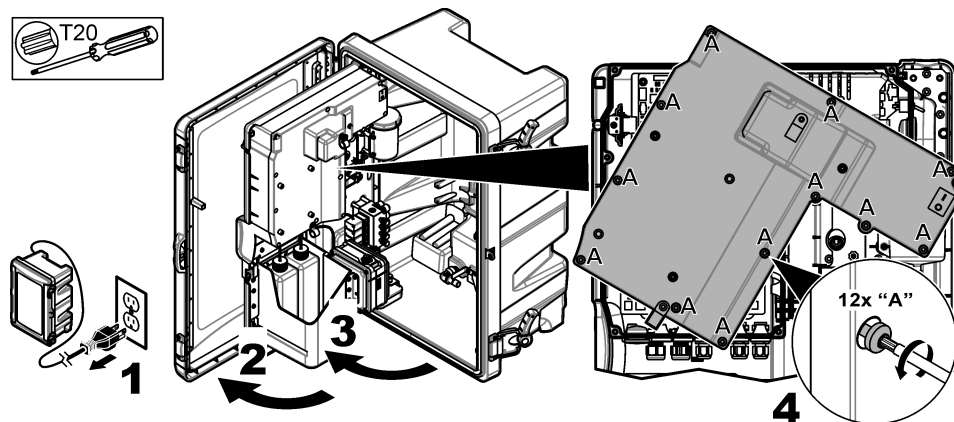
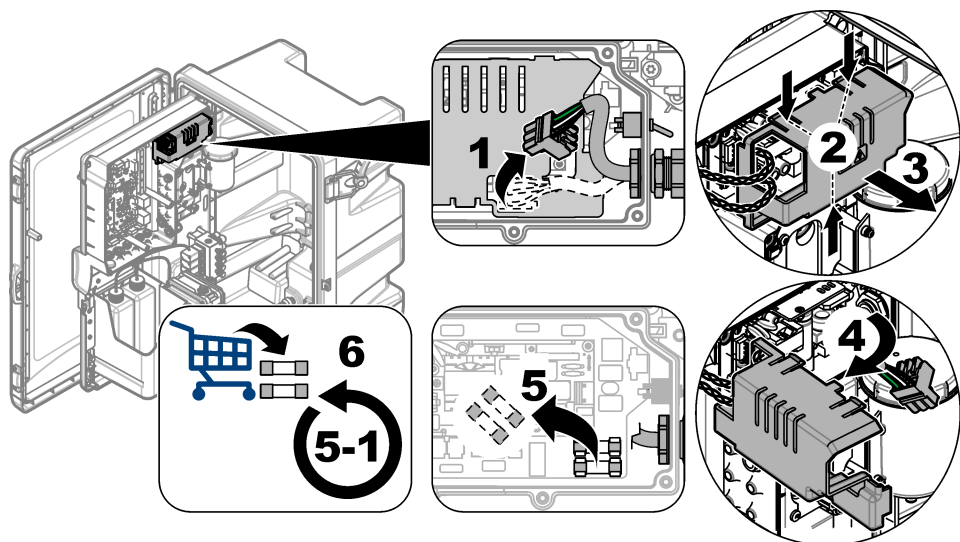


Figure 4 Power fuse replacement



3.8 Prepare the analyzer for a short-term shutdown

Prepare the analyzer for a short-term shutdown (2 days to 1 week) as follows:

Items supplied by user: Clamp scissors

1. Push **menu**, then select STOP ANALYZER.

Note: If START ANALYZER shows, the analyzer is already in standby mode.

2. Attach clamp scissors (metal or plastic) to the end of the KCl electrolyte tube to stop the flow of KCl electrolyte to the reference electrode.

Note: When the analyzer is in standby mode or off, KCl electrolyte continues to flow out of the reference electrode. KCl electrolyte will slowly fill the left chamber of the measurement cell and come out the top of the left chamber.

3. Turn the shut-off valves on the sample line(s) to off.

4. If power must be removed from the analyzer, add reactivation solution to the middle chamber of the measurement cell to prevent damage to the sodium electrode.

Note: After 4 hours in standby mode, the analyzer automatically adds reactivations solution to the middle chamber of the measurement cell.

3.9 Prepare the analyzer for a long-term shutdown

⚠ WARNING



Chemical exposure hazard. Obey laboratory safety procedures and wear all of the personal protective equipment appropriate to the chemicals that are handled. Read the safety data sheet from the supplier before bottles are filled or reagents are prepared. For laboratory use only. Make the hazard information known in accordance with the local regulations of the user.

⚠ CAUTION



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

Prepare the analyzer for a long-term shutdown (more than 1 week) as follows:

Items supplied by user:

- Small container, 250 mL or larger
- Deionized water, 1.5 L
- Clean, no-lint cloth

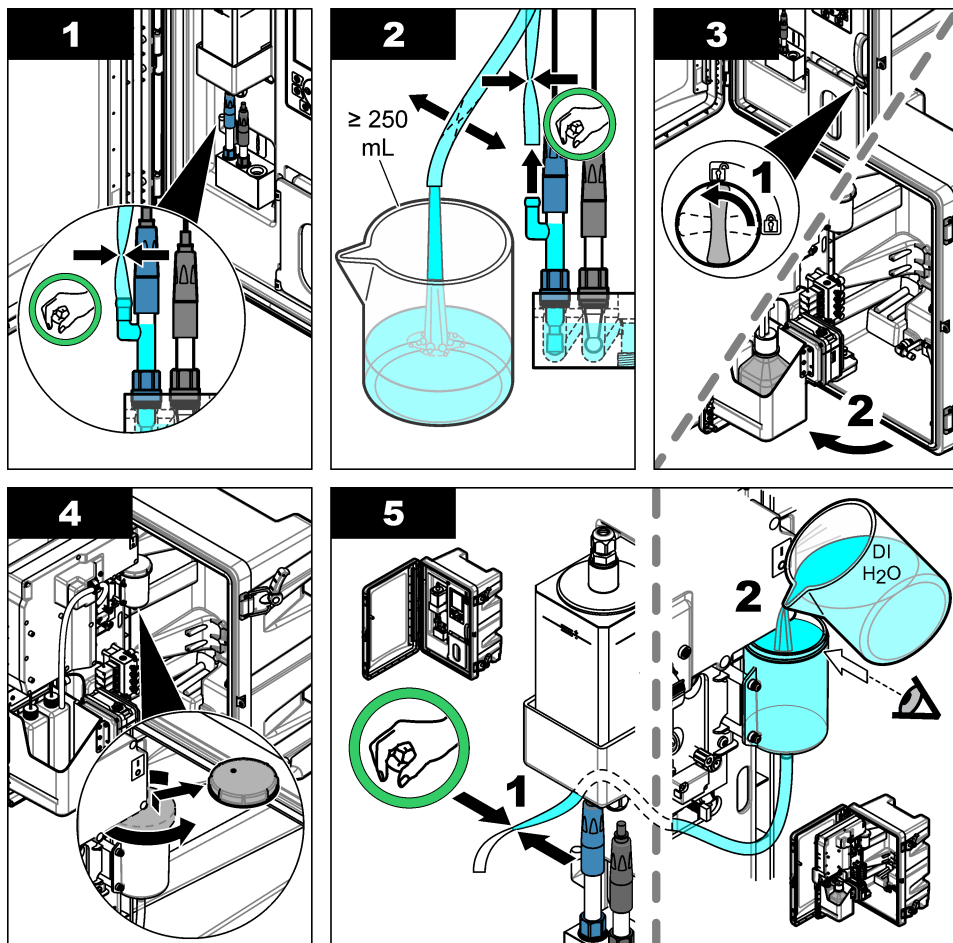
Items to collect:

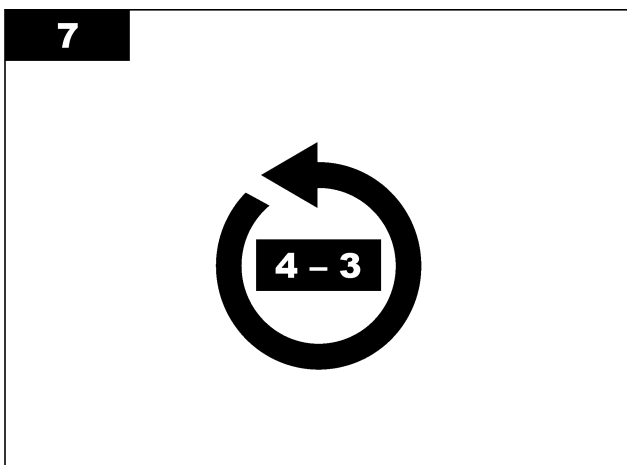
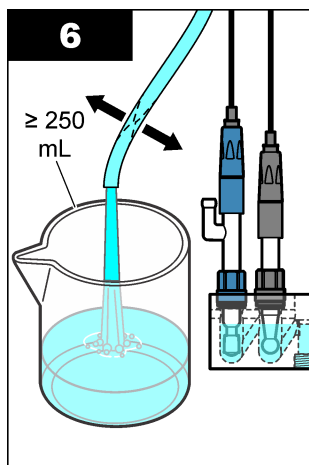
- Storage bottles for electrodes (2x)
- Protective caps for electrodes (2x)
- Black cover for glass junction of reference electrode

3.9.1 Drain and rinse the KCl electrolyte reservoir

Refer to the illustrated steps that follow.

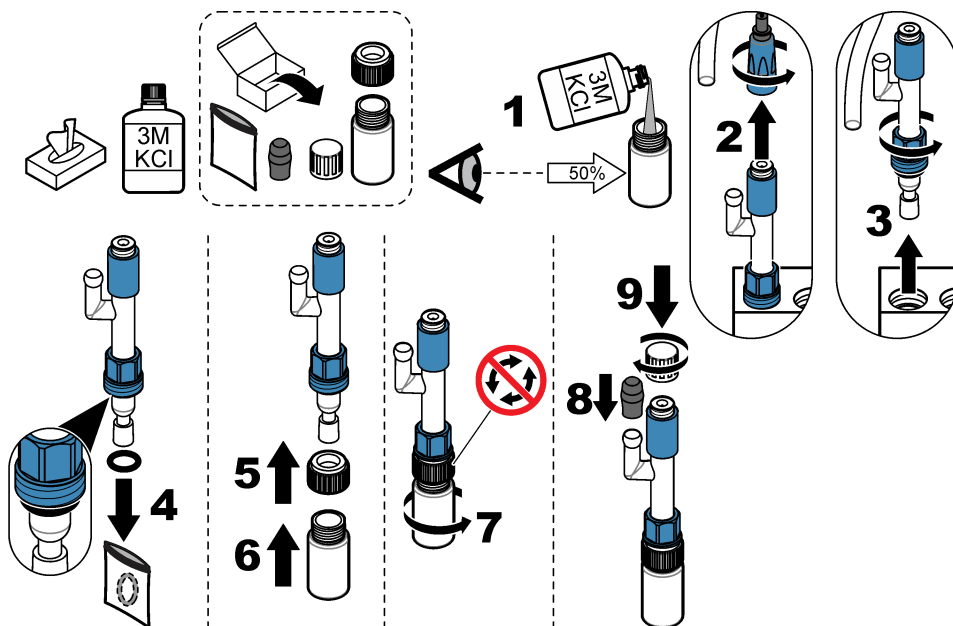
Put on the personal protective equipment identified in the safety data sheet (MSDS/SDS).





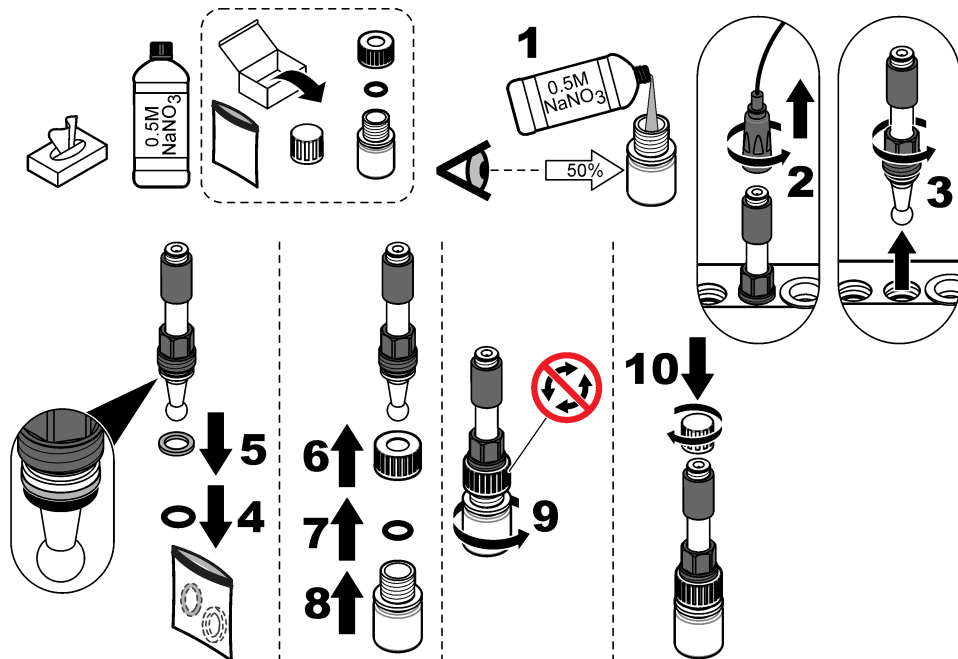
3.9.2 Remove the reference electrode

Refer to the illustrated steps that follow.



3.9.3 Remove the sodium electrode

Refer to the illustrated steps that follow.



3.9.4 Disconnect the conditioning solution bottle

⚠ WARNING



Inhalation hazard. Do not breathe Diisopropylamine (DIPA) or ammonia fumes. Exposure may result in severe injury or death.



⚠ WARNING

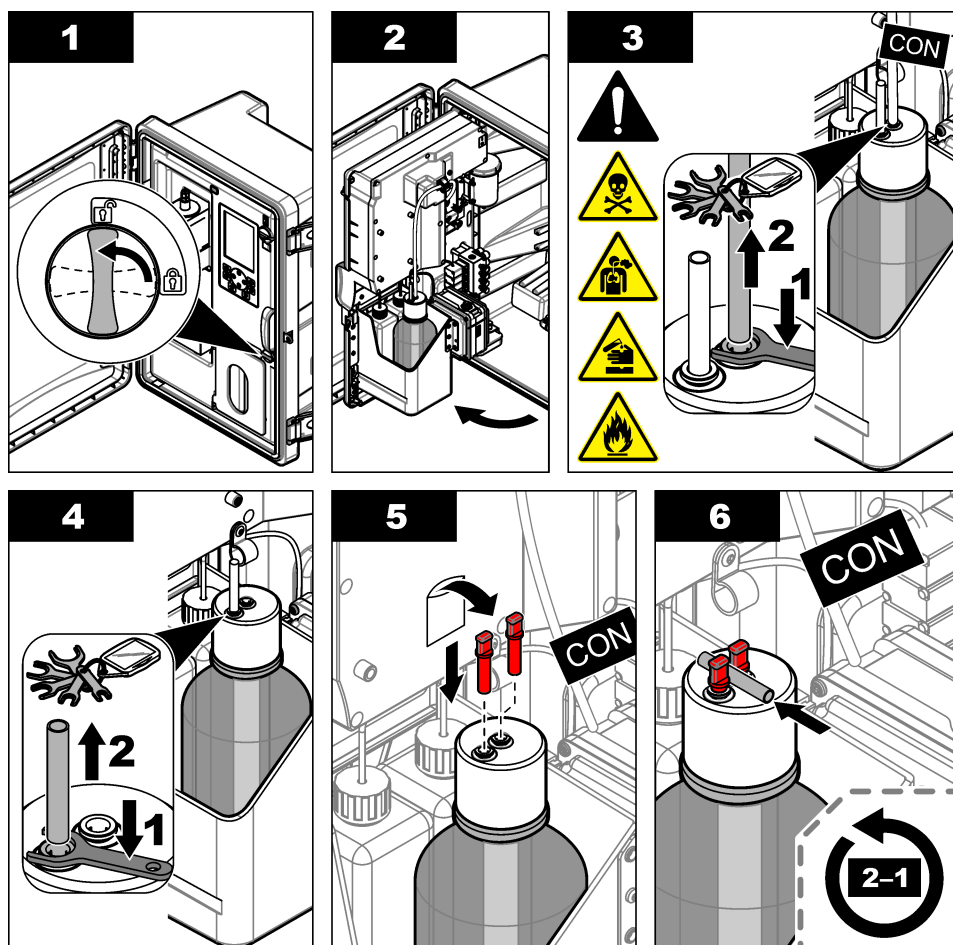


Chemical exposure hazard. Diisopropylamine (DIPA) and ammonia are a flammable, corrosive and toxic chemical. Exposure may result in severe injury or death.



Refer to the illustrated steps that follow.

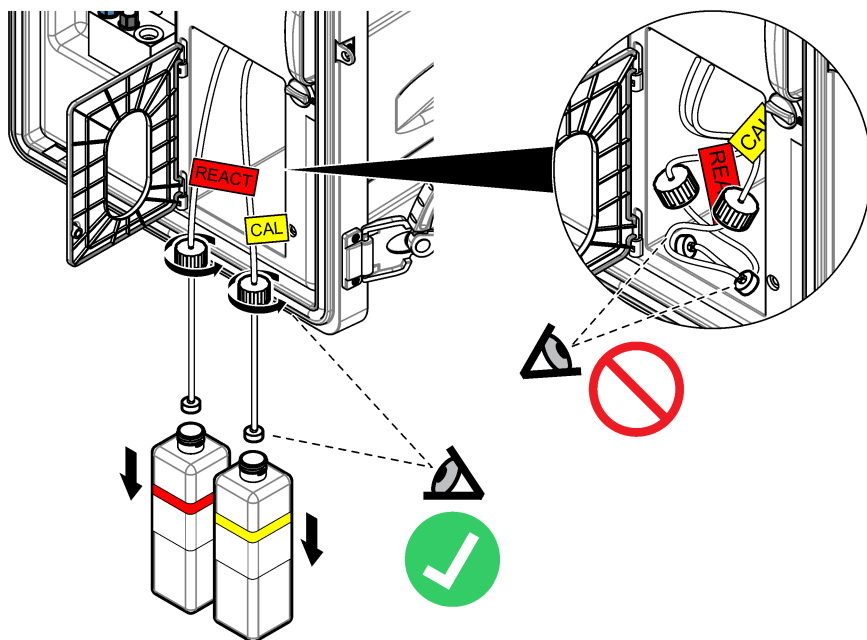
Put on the personal protective equipment identified in the safety data sheet (MSDS/SDS).



3.9.5 Flush the reagent tubing

1. Put on the personal protective equipment identified in the safety data sheet (MSDS/SDS).
 2. Remove the reactivation solution and calibration solution bottles from the analyzer. Refer to [Figure 5](#).
- Note:** Only analyzers with the auto calibration option have a calibration solution bottle.
3. Discard the solutions in the bottles into an applicable drain.
 4. Flush and then fill the bottles $\frac{1}{2}$ full with deionized water.
 5. Install the bottles in the analyzer.
 6. Push **menu**, then select REAGENTS/STANDARDS > PRIME REAGENTS. The reagent tubing is flushed with deionized water.

Figure 5 Bottle removal



3.9.6 Drain the overflow vessel

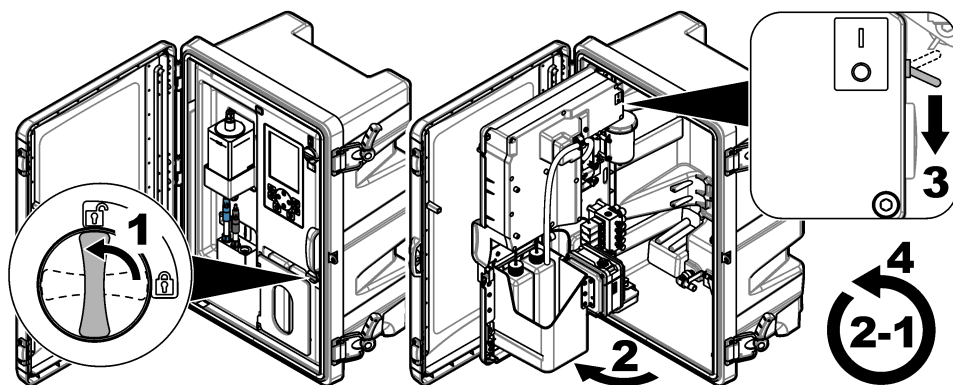
1. Push **diag**, then select **PERFORM TEST** and push **enter**.
2. Push **enter** to select **YES**.
3. Select **SAMPLE DRAIN**, then push **enter**.
4. Enter 150 seconds.
5. Push **enter** two times.
6. When the overflow vessel is empty, push **back**.
7. Push **home**.

3.9.7 Shut down the analyzer

Remove power and sample to the analyzer as follows:

1. Set the power switch to off. Refer to [Figure 6](#).
2. Close the analytics panel. Turn the latch on the analytics panel to the locked position.
3. Disconnect the power cord from the electrical outlet.
4. Turn the shut-off valves on the sample line(s) to off.
5. Use a clean, no-lint cloth to remove the water from overflow vessel.
6. Use a clean, no-lint cloth to remove the water from the left chamber and middle chamber of the measurement cell.

Figure 6 Set the power switch to off



3.9.8 Discard the deionized water in the bottles

1. Remove the reactivation solution and calibration solution bottles from the analyzer. Pull the bottle caps down so they hang below the analyzer.
Do not let the bottle cap or internal tubing touch the analyzer to prevent contamination.
2. Discard the deionized water in the bottles.
3. Let the bottles fully air dry.
4. Install the bottles in the analyzer.
5. Close the analyzer door.

Section 4 Troubleshooting

Problem	Possible cause	Solution
The status bar does not show on the measurement screen.	The channel shown on the measurement screen is not the channel being measured.	Push the UP or DOWN arrow until the channel being measured shows on the measurement screen.
A channel does not show on the measurement screen when the UP or DOWN arrow key is pushed.	The channel is not selected in the display settings.	Push menu , then select SETUP SYSTEM > DISPLAY SETUP > ADJUST ORDER > SEE CURRENT ORDER . If the channel is not shown, push back , then select ADD MEASUREMENTS . Push the LEFT arrow to select or unselect a checkbox.

Problem	Possible cause	Solution
A channel is not being measured.	The channel is not activated.	Push menu , then select SETUP SYSTEM > CONFIGURE ANALYZER > CONFIGURE SEQUENCER > ACTIVATE CHANNELS. Add the channel. Push the LEFT arrow to select or unselect a checkbox.
	The channel is not in the channel measurement sequence.	Push menu , then select SETUP SYSTEM > CONFIGURE ANALYZER > CONFIGURE SEQUENCER > SEQUENCE CHANNELS. Push the UP and DOWN arrows to select a row, then push the LEFT or RIGHT arrow to select a channel. S1 is the first channel measured followed by S2, S3 and S4. <i>Note: Do not select channels that contain the symbol "~" (e.g., 4-~SAMPLE4). Channels that contain the symbol "~" are not measured.</i>
"UNSTABLE READING" warning occurs.	The rinsing time between channel measurements is too short.	Push menu, then select SETUP SYSTEM > CONFIGURE ANALYZER > MEASUREMENT > SET MEASURE CYCLE > MAX CYCLE TIME or CYCLE TIME. Increase the MAX CYCLE TIME or CYCLE TIME setting to increase the rinsing time.
"SAMPLE MISSING" warning occurs.	The shut-off valve on the sample line is closed.	Turn the shut-off valve to open.
	The sample line is not plumbed correctly.	Make sure that the sample line is connected to the correct plumbing port. Refer to <i>Plumbing ports</i> in the installation manual.
	The sample flow valve is closed.	Start the startup wizard. Push menu , then select SETUP SYSTEM > STARTUP ANALYZER. Push enter until prompted to adjust the sample flow rate. Turn the sample flow valve counter-clockwise to increase the flow rate to 6–9 L/hour on each channel.
	The solenoid valve for the channel does not operate correctly.	Push diag , then select PERFORM TEST > SAMPLE DRAIN to drain the overflow vessel. Push diag , then select PERFORM TEST > SAMPLE DELIVERY to open the sample valve. If sample does not flow into the overflow vessel, examine the sample valve wiring. Replace the sample valve if necessary.

Problem	Possible cause	Solution
"PH TOO LOW" warning occurs.	The cover was removed from the right chamber of the measurement cell.	Install the cover on the right chamber of the measurement cell.
	The conditioning solution bottle is less than 10% full or empty.	Replace the conditioning solution. Refer to Replace the conditioning solution on page 6.
	There is an air leak in the conditioning bottle cap.	<ul style="list-style-type: none"> • Make sure that the conditioning bottle cap is on tight. • Examine the washer in the bottle cap. If wear or damage is seen, replace the washer. • Examine the plastic flange on the rim of the bottle. If wear or damage is seen, replace the conditioning solution bottle.
	There is an air leak in the conditioning tubing.	Look for a blockage or air leak in the conditioning tubing. Replace tubing as necessary. <i>Note: The conditioning tubing contains gas, not solution.</i>
	The conditioning valve does not operate correctly.	Push diag , then select PERFORM TEST > CONDITIONING VALVE to open the conditioning valve. If conditioning gas does not flow into the right chamber of the measurement cell (seen as bubbles), replace the conditioning valve.
"CALIBRATION FAIL" warning occurs.	The value of the calibration solution in the auto calibration settings is different from the value on the calibration solution bottle.	Change the calibration solution value in the calibration menu to the value on the calibration solution bottle. Refer to <i>Set the auto calibration settings</i> in the operations manual.
	The calibration solution bottle is empty.	Replace the calibration solution. Refer to Replace the calibration and reactivation solutions on page 4.
	There is a leak or blockage in the calibration solution tubing.	Look for a blockage or leak in the tubing. Replace the tubing as necessary.
	The calibration solution pump does not operate correctly.	<p>Push diag, then select PERFORM TEST > SAMPLE DRAIN to fully drain the overflow vessel.</p> <p>Push diag, then select PERFORM TEST > CAL STD DELIVERY to set the calibration solution pump to on. If calibration solution does not flow to the overflow vessel, replace the calibration solution pump.</p>
	The stir bar does not turn. <i>Note: The stir bar turns intermittently.</i>	Push diag , then select PERFORM TEST > MIXER to set the mixer motor to on. If the stir bar does not move, replace the mixer motor.
	The stir bar is not in the overflow vessel.	Make sure that the stir bar is in the overflow vessel.

Problem	Possible cause	Solution
"REACT VOLTAGE LOW" warning occurs.	The reactivation solution bottle is empty.	Make sure that the end of the reactivation solution tube is at the bottom of the bottle. Replace the reactivation solution. Refer to Replace the calibration and reactivation solutions on page 4.
	The sodium electrode does not operate correctly.	<ul style="list-style-type: none"> • Make sure that the sodium electrode is installed correctly. Refer to the installation manual. • Make sure that there is no air in the glass bulb of the sodium electrode.
	The reference electrode does not operate correctly.	<ul style="list-style-type: none"> • Remove the reference electrode from the measurement cell. Lift the collar that is on the glass part to let some KCl electrolyte flow out. Push the collar down and turn the collar less than 1/4 of a turn to lock the collar. When the collar is locked, the collar does not turn. Install the reference electrode in the measurement cell. • Make sure that the reference electrode is installed correctly. Refer to the installation manual. • To identify if the problem is fixed, push diag, then select SENSOR REACTIVATION to do a reactivation.
	There is a leak or blockage in the reactivation solution tubing.	Look for a blockage or leak in the tubing. Replace tubing as necessary.
	The reactivation solution pump does not operate correctly.	Push diag , then select PERFORM TEST > REACT SOL DELIVERY > HIGH to set the reactivation solution pump to a high flow rate. If reactivation solution does not flow to the middle chamber of the measurement cell, replace the reactivation solution pump.

Problem	Possible cause	Solution
The instrument readings are not stable.	The analyzer was started less than 2 hours ago.	Let the analyzer operate for 2 hours to become stable.
	The electrode cable(s) are cross-threaded on the electrodes.	Disconnect the cable from the electrode. Push the connector fully down on the electrode connector, then turn the connector until finger tight.
	The electrode cables are connected to the wrong electrodes.	Connect the blue cable to the reference electrode. Connect the black cable to the sodium electrode.
	The KCl electrolyte flow rate is too fast.	Remove the reference electrode from the measurement cell. Push the collar down and turn the collar less than 1/4 of a turn to lock the collar. When the collar is locked, the collar does not turn. If the collar is not locked, the KCl electrolyte will flow too fast from the reference electrode into the measurement cell.
The measurements are not accurate.	The analyzer is not calibrated.	Calibrate the analyzer. Refer to <i>Do a calibration</i> in the operations manual. For the best accuracy, calibrate the analyzer at 7-day intervals (weekly).
	Auto reactivation is disabled or the interval between reactivations is more than 24 hours.	Start an auto reactivation. Push diag , then select SENSOR REACTIVATION. <i>Note: For the best accuracy, set auto reactivation to on. Set the interval to 24 hours. Refer to the operations manual.</i>
	The reactivation solution bottle is empty.	Replace the reactivation solution. Refer to Replace the calibration and reactivation solutions on page 4.
	There is a leak or blockage in the reactivation solution tubing.	Look for a blockage or leak in the tubing. Replace the tubing as necessary.
	The reactivation solution pump does not operate correctly.	Push diag , then select PERFORM TEST > REACT SOL DELIVERY > HIGH to set the reactivation solution pump to a high flow rate. If reactivation solution does not flow to the middle chamber of the measurement cell, replace the reactivation solution pump.
The stir bar in the overflow vessel does not turn.	The mixer does not operate correctly. <i>Note: The stir bar turns intermittently.</i>	Push diag , then select PERFORM TEST > MIXER to set the mixer motor to on. If the stir bar does not move, replace the mixer motor.

Problem	Possible cause	Solution
The KCl electrolyte consumption is too fast ¹ .	The collar on the glass part of the reference electrode is not locked.	Remove the reference electrode. Push the collar up. Push the collar down and turn the collar less than 1/4 of a turn to lock the collar. Refer to the illustrated steps in <i>Install the reference electrode</i> in the installation manual. When the collar is locked, the collar does not turn. If the collar is not locked, the KCl electrolyte will flow too fast from the reference electrode into the measurement cell.
The KCl electrolyte consumption is too slow ² .	The collar on the glass part of the reference electrode was not turned to break the seal.	Remove the reference electrode. Carefully turn the collar to break the seal. When the collar turns easily, the seal is broken. Refer to the illustrated steps in <i>Install the reference electrode</i> in the installation manual. Push the collar down and turn the collar less than 1/4 of a turn to lock the collar. When the collar is locked, the collar does not turn. If the collar is not locked, the KCl electrolyte will flow too fast from the reference electrode into the measurement cell.
A relay indicator on the measurement screen is flashing.	The overfeed timer has expired.	Reset the overfeed timer. Refer to Reset the overfeed timer for relays on page 22. Note: The overfeed timer setting is only enabled when the relay SET FUNCTION setting is set to FEEDER CONTROL.

4.1 Reset the overfeed timer for relays

The overfeed timer setting for the relays prevents a condition that keeps the measurement value higher than the setpoint or deadband setting (e.g., damaged electrode or a process upset) from keeping a relay switched on continuously. The overfeed timer limits how long the relays and their connected control element stay on independent of the conditions.

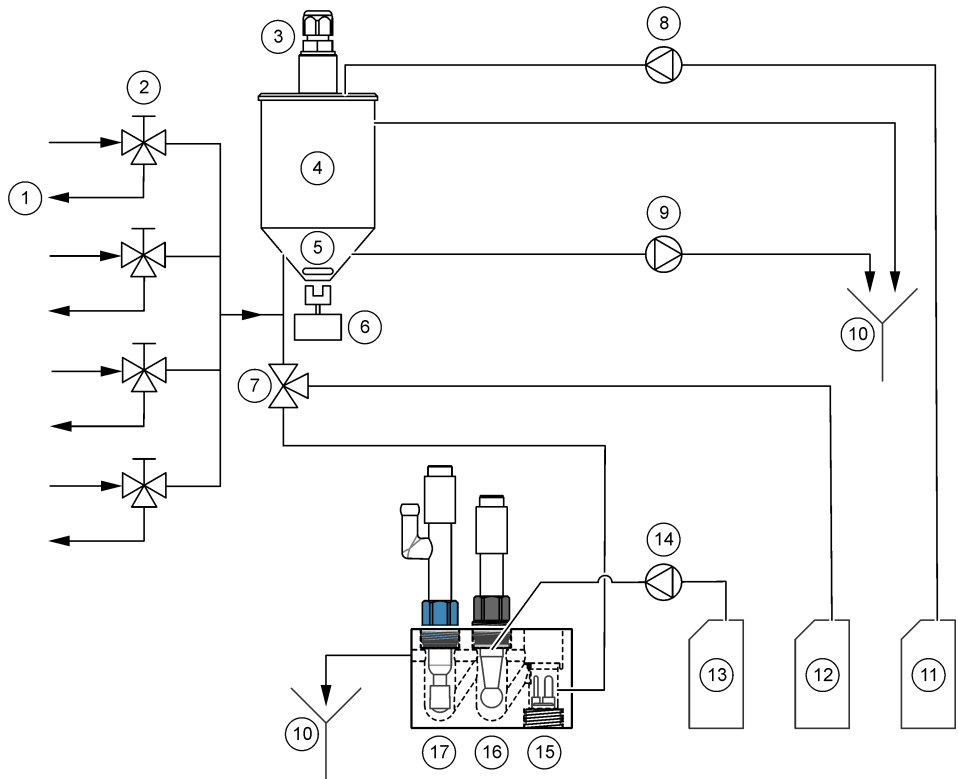
When the select time interval for the overfeed timer expires, the relay status flashes on the top-right corner of the measurement screen until the overfeed timer is reset. Push **diag**, then select OVERFEED RESET to reset the overfeed timer.

¹ The KCl electrolyte consumption is too fast if the level of the reservoir decreases by more than 3 mm (1/8 in.) in two days

² The KCl electrolyte consumption is too slow if the level of the reservoir decreases less than 1 mm in two days

Section 5 Diagnostics

5.1 Plumbing schematic



1 Sample bypass drain	7 Conditioning valve	13 Reactivation solution
2 Sample inlet	8 Calibration solution pump ³ .	14 Reactivation solution pump
3 Level sensor	9 Drain pump	15 Temperature sensor
4 Overflow vessel	10 Drain	16 Sodium electrode
5 Stir bar	11 Calibration solution ³	17 Reference electrode
6 Mixer motor	12 Conditioning solution	

5.2 Start an analyzer test

Start an analyzer test to identify if the status indicator light, mixer motor, a pump or a valve operate correctly.

³ Only analyzers with the auto calibration option have a calibration solution pump and calibration solution.

1. Push **diag**, then select **PERFORM TEST**.
2. Select an option.

Option	Description
REACT SOL DELIVERY	Starts the reactivation solution pump. The reactivation solution flows into the middle chamber of the measurement cell. Note: <i>The measurement cell is the clear block where the electrodes are installed.</i>
SAMPLE DELIVERY	Sets the sample solenoid valve for the selected channel to open. The sample flows into the overflow vessel. Note: <i>If the overflow vessel is full, the level of the water in the overflow vessel will not change. To drain the overflow vessel, do the SAMPLE DRAIN test.</i>
CAL STD DELIVERY	Note: <i>The CAL STD DELIVERY option is only available on analyzers that have the auto calibration option.</i> Sets the calibration solution pump to on. The calibration solution flows into the overflow vessel.
CONDITIONING VALVE	Sets the conditioning valve to open. The conditioning gas flows into the right chamber of the measurement cell. Note: <i>The measurement cell is the clear block where the electrodes are installed.</i>
SAMPLE DRAIN	Sets the drain pump to on. The water in the overflow vessel drains out the chemical drain tube.
MIXER	Sets the mixer motor to on. The stir bar in the overflow vessel turns.
STATUS LED	Sets the status indicator light to continuously cycle: yellow, red, green.
AIR PUMP	Note: <i>The AIR PUMP option is only available when the optional cationic pump is installed.</i> Sets the cationic pump to on. The cationic pump pushes air into the conditioning solution (DIPA) bottle. Refer to the <i>Product overview</i> section of the installation manual to identify the location of the cationic pump in the analyzer.
SELECT SCRIPT	Note: <i>The SELECT SCRIPT option is for Service use only.</i> Sets the analyzer to use the normal instrument script or the test script.

5.3 Start a 4–20 mA output or relay test

Start a 4–20 mA output or relay test to identify if a 4–20 mA output or relay operation is correct.

1. Push **diag** and select **OUTPUTS**.
2. Select an option.

Option	Description
TEST 4–20 mA	Sets the signal (mA) at the selected 4–20 mA output. Measure the current at the 4–20 mA output with a multimeter.
TEST RELAY	Sets the selected relay to on (energized) or off (not energized). Measure the resistance across the relay with a multimeter to identify if the relay is open or closed.

Option	Description
HOLD OUTPUTS	Holds the outputs at the last value or sets them to the transfer value. ACTIVATION —Select LAUNCH to hold the outputs at the last value or set them to the transfer value. Select RELEASE to let the outputs operate normally. SET OUTMODE —Select HOLD OUTPUTS to hold the outputs at the last value. Select TRANSFER OUTPUTS to set the outputs to the transfer value. Refer to the operations manual to set the transfer value for the outputs. SET CHANNELS —Select ALL to select all of the channels. Select ANALYZER to select all of the channels for the selected analyzer.
OUTPUT STATUS	Shows the signals (mA) at the 4–20 mA outputs.
SIMULATE MEASUREMENT	Enters an analyzer reading on a selected channel to do an output test. The simulation stops after the user exits the screen. SELECT SOURCE —Selects the analyzer. SET PARAMETER —Selects the channel. SET SIM VALUE —Sets the analyzer reading.

5.4 Show the analyzer information

To show the analyzer information that follows, push **menu**, then select VIEW DATA > ANALYZER DATA. Refer to [Table 2](#).

Table 2 Analyzer data descriptions

Item	Description
DATE/TIME	Current time (24-hour format) and date identified in the settings
NAME	Name of analyzer
TYPE	Type of analyzer
AMBIENT TEMP	Ambient temperature of the analyzer
CONDITION SOL LEVEL	Solution level of the conditioning solution bottle
REACT SOL LEVEL	Solution level of the reactivation solution bottle
STANDARD LEVEL	Solution level of the calibration solution bottle
KCL LEVEL	Solution level of the KCl electrolyte reservoir
LAST REACTIVATION	Date the last auto reactivation was done
LAST CAL	Date the last calibration was done
LAST SERVICE	Last service date
SOFTWARE VERS	Software version installed
DD FIRMWARE	Version of the device driver firmware installed
DD CONTENT	Version of the data content of the device driver
SCRIPT VERSION	Version of the script file directory block
SCRIPT CONTENT	Version of the script file directory content
MEAS_CONTROL SW REV	Revision of the measurement control software installed
SERIAL NUMBER	Serial number of analyzer

5.5 Show the analyzer status and system data

To show the current analyzer status, Modbus status, system data or I2C data, do the steps that follow:

1. Push **diag**.
2. Select an option.

Option	Description
CURRENT STATUS	OPERATION —Current measurement mode. SAMPLE CHANNEL —Current sample channel. STEP STATUS —Current step in the measurement cycle. STEP TIME —Step time remaining. MINUTES LEFT —Minutes left in current step. COMPLETION —% completed of the measurement cycle.
MODBUS STATS	Shows the status of the Modbus ports: sensor, controller, network and service. Shows the number of good and bad transmissions.
SYSTEM DATA	AMBIENT TEMP —Measured ambient temperature in Celsius (C). POWER SOURCE FREQUENCY —Line power frequency (Hz). POWER SOURCE VOLTAGE —Line power (AC). 12V VOLTAGE —Measured power supply voltage (VDC). 3.3V VOLTAGE —Measured regulated 3.3 V supply (VDC). 12V CURRENT —Measured 12 V power supply current (amperes).
I2C DATA	Shows the communication information (I ² C) and the version number.

5.6 Show Service information

Use the Service menu to show or set the service history for the instrument parts.

1. Push **diag**.
2. Select **SERVICE**.
3. Select an option.

Option	Description
CONSUMABLE	Shows a list of consumable parts. Shows the date of the last replacement and the number of days since the part was replaced. Reset the counter after a part is replaced.
SERVICE PART	<i>Note: The SERVICE PART option is only available for Service use only.</i> Shows a list of parts and the date of the last service. The customer service representative resets the counter after a part is replaced.
ANNUAL MAINTENANCE	Shows the date of the last annual maintenance, the date of the next annual maintenance and the number of days before the next annual maintenance is due. Reset the counter after annual maintenance.
EDIT ELECTRODES SN	Records the serial numbers of the electrodes.
SERVICE HISTORY	Shows the maintenance tasks done and the date (e.g., Replace reactivation solution). START TIME — Shows the data recorded after the selected date and time. NUMBER OF READINGS — Shows the selected number of data points.
POST ENABLE	NO —Hardware diagnostics are not done when power is applied to analyzer. YES —Hardware diagnostics are done when power is applied to analyzer.

Section 6 Replacement parts and accessories

⚠ WARNING



Personal injury hazard. Use of non-approved parts may cause personal injury, damage to the instrument or equipment malfunction. The replacement parts in this section are approved by the manufacturer.

Note: Product and Article numbers may vary for some selling regions. Contact the appropriate distributor or refer to the company website for contact information.

Reagents and standard solutions

Description	Quantity	Item no.
3M KCl electrolyte solution	250 mL	LZW9500.99
3M KCl electrolyte solution	500 mL	363140,00500
Diisopropylamine (DIPA) 99%	1 L	2834453
Sodium Chloride Standard, 10 ppm	1 L	2835153
Sodium Nitrate, 0.5 M	500 mL	2507149

Replacement parts

Description	Quantity	Item no.
Conditioning solution bottle with cap, empty	1	8352000
Washer, conditioning bottle cap	1	8417200
Elbow fitting, drain, ½-in., polypropylene	1	6772800
Electrode, reference	1	09240=C=0310
Electrode, sodium	1	09240=C=0320
Fuse, 1.6 A, 250 V, 5 x 20 mm	1	5208300
Fuse, 5 A, 250 V, slow-blow, 5 x 20 mm	1	4693800
Installation Kit, 1-channel analyzer, analyzer with enclosure	1	8375400
Installation Kit, 2-channel analyzer, analyzer with enclosure	1	8375300
Installation Kit, 4-channel analyzer, analyzer with enclosure	1	8371500
Installation Kit, 1-channel analyzer, analyzer without enclosure	1	8375700
Installation Kit, 2-channel analyzer, analyzer without enclosure	1	8375600
Installation Kit, 4-channel analyzer, analyzer without enclosure	1	8375500
Mixer motor	1	8420000
Panel mount screws, M6 x 20 pan head, stainless steel, Torx	4	8415500
Piercing tool for internal electrical plugs, metal tube, used with 8379900	1	8380000

Replacement parts (continued)

Description	Quantity	Item no.
Piercing tool for internal electrical plugs, metal plate, used with 8380000	1	8379900
Pressure regulator, 0.3 bar (4 psi), non-adjustable	1	6782900
Pump, calibration solution	1	8364300
Pump, drain	1	8357400
Pump, reactivation solution	1	8364200
Shut-off valve, 6 mm OD tubing	1	8385200
Stir bar	1	W_4510_001_FF
Strain-relief fitting (cable gland), PG9 4 mm to 8 mm	1	8356300
Strain-relief fitting (cable gland), NPT ½-in. 4 mm to 9 mm	1	8368400
Table mounting brackets	2	8370400
Screws, table mounting bracket, #8 x ½ stainless steel, Torx	2	8412200
Tubing, chemical and case drain, 17.5 mm (¹¹ / ₁₆ -in.) OD x 3.2 mm (¹ / ₈ -in.) thick	2 m (6.5 ft)	LZX278
Tubing, sample, 6 mm OD x 4 mm ID	5.5 m (18 ft)	6772500
Tubing cutter	1	8385400
Wall mounting brackets	2	8364100
Screws, wall mounting bracket, M4 x 10 flat stainless steel, Torx	2	8412500
Valve, conditioning	1	8367600
Valve, sample	1	8370200

Accessories

Description	Quantity	Item no.
Bottle adapter, DIPA bottle, Merck	1	09073=C=0350
Bottle adapter, DIPA bottle, Orion	1	09073=C=0360
Filter, sample inlet, 100 µm, ¼-inch OD tubing	1	595=010=005
Filter, sample inlet, 100 µm, 6-mm OD tubing	1	595=010=000
Heat exchanger, 4-channels maximum	1	8368900
Cationic Upgrade Kit	1	8371200
Power cord, North American	1	9179700
1 Channel to 4 Channel Upgrade Kit	1	8365100
2 Channel to 4 Channel Upgrade Kit	1	8365000
Auto Calibration Upgrade Kit	1	8368000
Tubing adapter, 6 mm OD to ¼-inch OD	2	09245=A=8300

目录

1 安全信息 第 29 页	4 故障排除 第 43 页
2 显示激活的错误、警告和提醒 第 29 页	5 诊断 第 47 页
3 维护 第 29 页	6 备件与附件 第 50 页

第 1 节 安全信息

请参阅安装手册，了解一般安全信息、危险说明和警告标签说明。

第 2 节 显示激活的错误、警告和提醒

有错误出现时显示屏背景和状态指示灯将变为红色，或者，有警告出现时将变为黄色。

- **错误**—显示屏背景和状态指示灯呈红色亮起。说明出现了一个影响仪器操作的严重问题。当前测量将会停止，分析仪进入关闭模式。
- **警告**—显示屏背景和状态指示灯呈黄色亮起。说明发生了一个在未来会产生问题的事件。分析仪将继续操作。
- **提醒**—显示屏上显示扳手符号，状态指示灯呈黄色亮起。说明维护任务的执行时间已过。

执行以下步骤以显示激活的错误、警告和提醒：

注：要查看所有可能出现的错误、警告和提醒及相关帮助信息，请按 **diag**，然后选择“分析仪帮助”。

1. 先按 **diag**，随后选择“诊断”。随后将显示激活的错误、警告和提醒。
2. 从列表中选择错误、警告或提醒。
3. 选择一个选项。

选项	说明
接受	确认选定的错误、警告或提醒。确认所有活跃的错误、警告和提醒后，显示屏背景将恢复白色，状态指示灯将恢复绿色。
查看帮助	显示选定的错误、警告或提醒的帮助信息。

第 3 节 维护



▲ 危险

多重危险。只有符合资质的专业人员才能从事文档本部分所述的任务。

3.1 维护计划

表 1 中列出了建议的维护任务计划。不同的设施要求和工作条件可能要求更频繁地执行某些任务。

表 1 维护计划

任务	3 个月	按需要
更换校准溶液和活化液 第 30 页	X	
更换调节溶液 第 31 页	X	
更换氯化钾电解液 第 34 页	X	
更换电源输入保险丝 第 36 页		X

3.2 清洁仪器


注意

切勿使用松节油、丙酮或类似清洁剂来清洁仪器，包括显示屏和附件。

使用湿布和加温的肥皂溶液清洁仪器的外部。

3.3 清洁溅出物

警告



化学品暴露风险。请遵循地方、区域和国家法规处置化学品和废弃物。

- 1. 遵守所有与泄漏控制有关的设备安全协议。
- 2. 根据适用法规处理废液。


3.4 更换校准溶液和活化液

警告



化学品暴露风险。遵守实验室安全规程，穿戴适用于所处理化学品的所有个人防护装备。有关安全规程，请参阅当前安全数据表(MSDS/SDS)。

警告



化学品暴露风险。请遵循地方、区域和国家法规处置化学品和废弃物。

每隔 3 个月或当试剂余量少于 10% 时更换一次活化液和校准溶液。

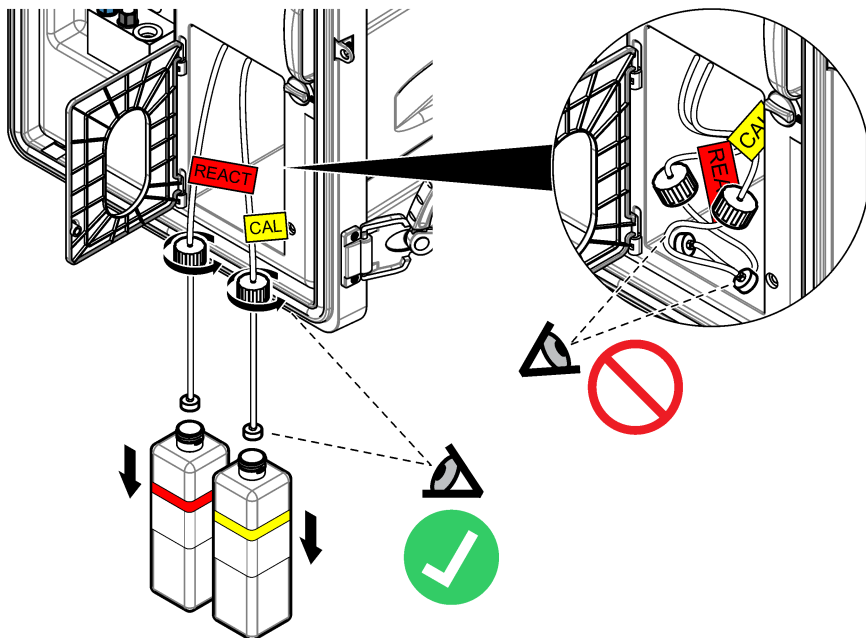
用户提供的物品:

- 个人防护装备（请参阅 MSDS/SDS）
 - 0.5M 硝酸钠 (NaNO₃)，500 mL
 - 10 ppm 氯化钠校准溶液 (NaCl)，500 mL
 - 去离子水，100 mL
1. 穿戴安全数据表 (MSDS/SDS) 中标明的个人防护装备。
 2. 按 **menu**，然后选择“停止分析仪”。
注：如果显示“启动分析仪”，表示分析仪已处于待机模式。
 3. 按照以下步骤更换活化液和校准溶液：
 - a. 将活化液瓶和校准溶液瓶从分析仪中取出。请参见 [图 1](#)。
注：只有具有自动校准选项的分析仪才配有校准溶液瓶。
 - b. 将瓶中的溶液倒入合适的下水道。
 - c. 用去离子水冲洗瓶子。
 - d. 向校准溶液瓶中加入新制备的 10 ppm 氯化钠 (NaCl) 溶液 (500 mL)。校准溶液瓶贴有带黄色条纹的标签。
注：要制备 10 ppm 氯化钠 (NaCl) 溶液，请参阅操作手册。
 - e. 向活化液瓶中加入新制备的 0.5M 硝酸钠 (NaNO₃) 溶液 (500 mL)。校准溶液瓶贴有带红色条纹的标签。
注：要制备 0.5M 硝酸钠 (NaNO₃) 溶液，请参阅操作手册。
 - f. 将瓶子装入分析仪。确保将带红色“REACT”标签的管子放入带红色条纹标签的瓶子中。

确保将带黄色“CAL”标签的管子放入带黄色条纹标签的瓶子中。

4. 按照以下步骤输入瓶子的液位：
 - a. 按 **menu**，然后选择“试剂/标准液”。
 - b. 选择“设置活化试剂液位”，然后输入 100%。
 - c. 选择“设置标准液液位”，然后输入 100%。
5. 选择“灌注试剂”。
6. 完成灌注试剂步骤后，按 **menu**，然后选择“启动分析仪”。

图 1 取下瓶子



3.5 更换调节溶液

▲ 警告



吸入危害。切勿吸入二异丙胺 (DIPA) 蒸气或氨气。接触后可能导致严重伤害甚至死亡。

⚠ 警告



化学品接触危险。二异丙胺 (DIPA) 和氨气均为易燃、具有腐蚀性和毒性的化学品。接触后可能导致严重伤害甚至死亡。

⚠ 警告



化学品暴露风险。遵守实验室安全规程，穿戴适用于所处理化学品的所有个人防护装备。请在加注瓶子或制备试剂之前阅读供应商的安全数据表。仅供实验室使用。请按照用户当地法规的要求公开危险信息。

⚠ 警告



化学品暴露风险。请遵循地方、区域和国家法规处置化学品和废弃物。

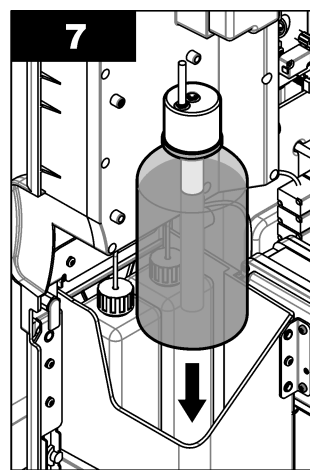
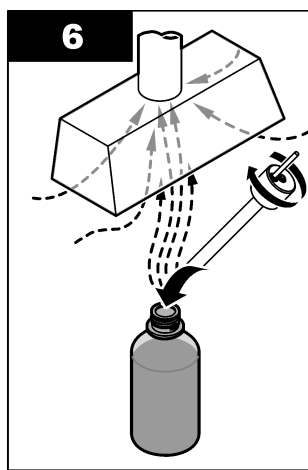
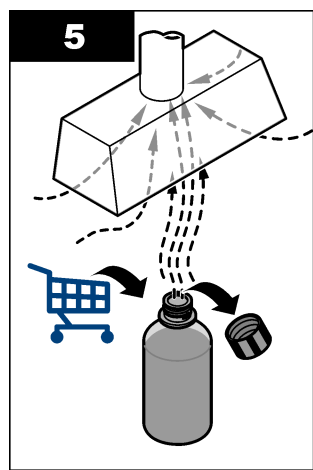
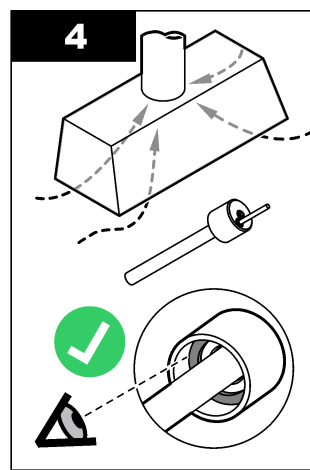
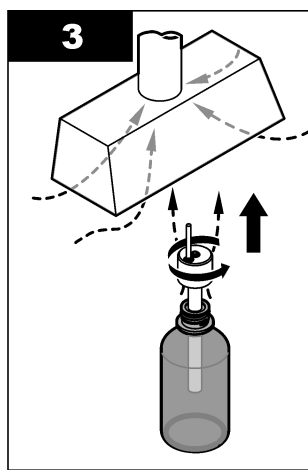
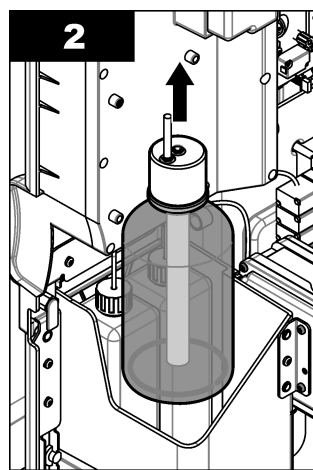
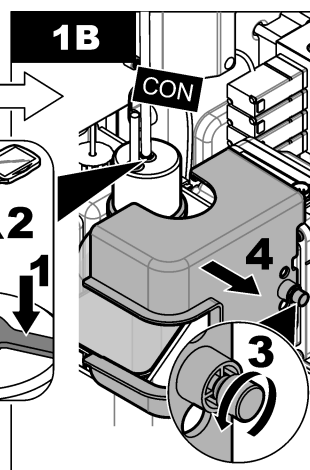
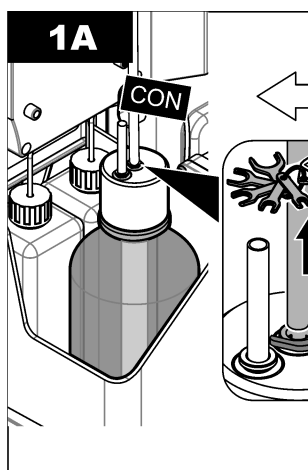
每隔 3 个月或当试剂余量少于 10% 时更换一次调节溶液。将 DIPA（推荐）或氨水（浓度高于 28%）用作调节溶液。

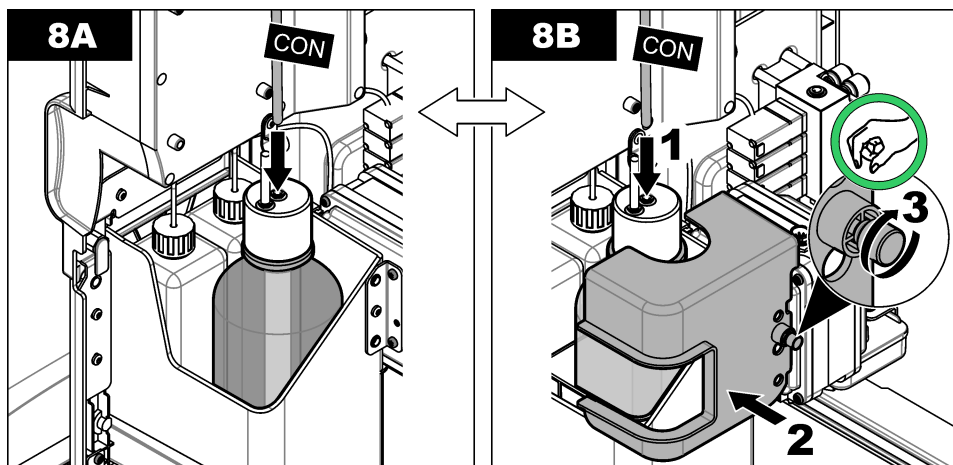
用户提供的物品：

- 个人防护装备（请参阅 MSDS/SDS）
- 二异丙胺 (DIPA)，99%，1 L 瓶装
- Merck® 或 Orion® DIPA 瓶转接头（若适用）

按照以下步骤更换调节溶液瓶：

1. 穿戴安全数据表 (MSDS/SDS) 中标明的个人防护装备。
2. 按 **menu**，然后选择“停止分析仪”。
注： 如果显示“启动分析仪”，表示分析仪已处于待机模式。
3. 将分析面板上的门锁转到解锁位置。打开分析面板。
4. 更换调节溶液瓶。请参见以下图示步骤。
注： 如果分析仪选配了阳床泵，则有两根管子插入调节溶液瓶的盖子中。取下这两根管子。
注： 在图示步骤 1 和 8 中，仅不带外壳的分析仪具有调节溶液瓶架。
如果条件允许，应在通风柜中执行图示步骤 3–6。切勿吸入 DIPA 蒸气或氨气。





5. 对于选配了阳床泵的分析仪，将阳床泵的出口管装回到瓶盖上的偏心孔中。

6. 关闭分析面板。将分析面板上的门锁转到锁定位置。

7. 按照以下步骤输入瓶子的液位：

- 按 **menu**，然后选择“试剂/标准液”。
- 选择“设置调节试剂液位”，然后输入 100%。

8. 按 **menu**，然后选择“启动分析仪”。

3.6 更换氯化钾电解液

▲ 警告



化学品暴露风险。遵守实验室安全规程，穿戴适用于所处理化学品的所有个人防护装备。有关安全规程，请参阅当前安全数据表(MSDS/SDS)。

▲ 警告



化学品暴露风险。请遵循地方、区域和国家法规处置化学品和废弃物。

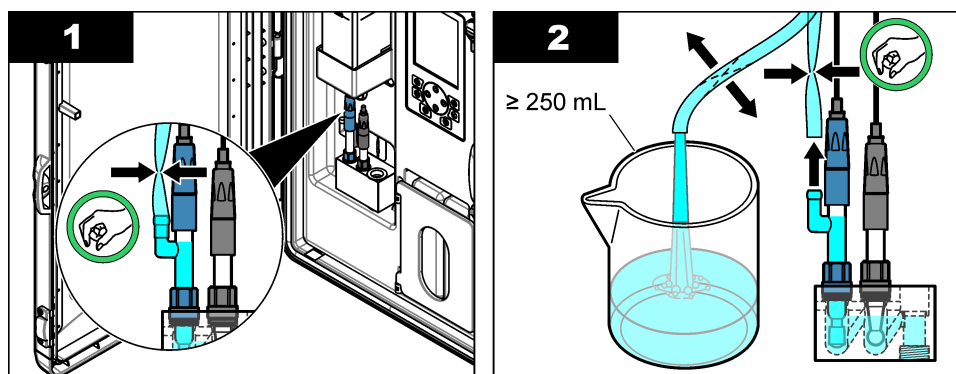
每隔 3 个月更换一次氯化钾电解液存储池中的氯化钾电解液。

需准备的物品：

- 个人防护装备（请参阅 MSDS/SDS）
- 3M 氯化钾电解液，200 mL
- 小容器，250 mL 或更大

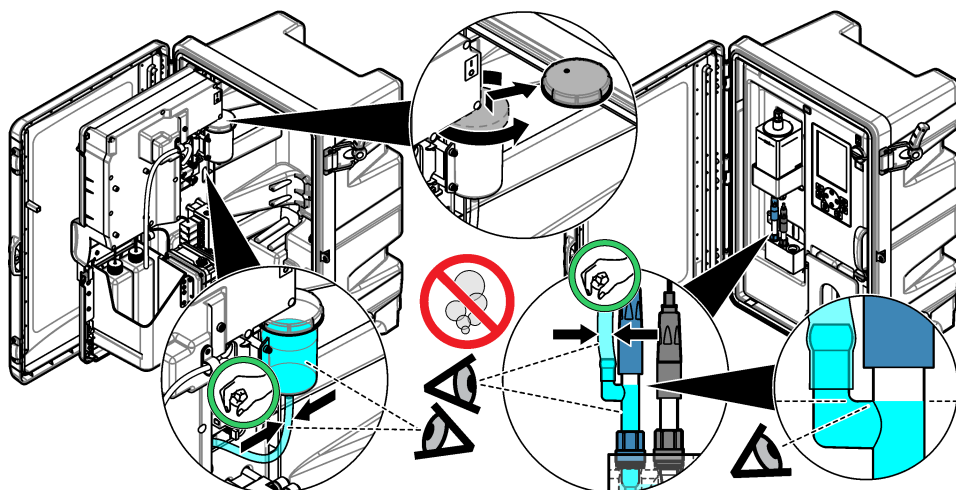
按照以下步骤更换氯化钾电解液：

- 穿戴安全数据表 (MSDS/SDS) 中标明的个人防护装备。
- 将氯化钾电解液存储池中的残液倒入小容器中。请参见以下图示步骤。将氯化钾电解液倒入适当的下水道中。



3. 将氯化钾电解液管重新安装到参比电极上。
4. 按照以下步骤向氯化钾电解液存储池加注电解液：
 - a. 将分析面板上的门锁转到解锁位置。打开分析面板。
 - b. 取下氯化钾电解液存储池的盖子。请参见图 2。
 - c. 向存储池加注至 90% 满液位（约 200 mL）。
 - d. 装回盖子。
5. 按照以下步骤将气泡挤出氯化钾电解液管：
 - a. 从分析面板的前侧用拇指和食指挤压氯化钾电解液管，使气泡沿着管子朝存储池的方向移动。请参见图 2。
 - b. 当气泡接近存储池时，在分析面板的正面和背面用双手挤压管子，使气泡向上移动。
 - c. 继续挤压管子，直到参比电极中的氯化钾电解液位于玻璃接头（氯化钾电解液从这里进入电极）的顶部。请参见图 2。
6. 关闭分析面板。将分析面板上的门锁转到锁定位置。
7. 按照以下步骤输入瓶子的液位：
 - a. 按 **menu**，然后选择“试剂/标准液”。
 - b. 选择“设置氯化钾液位”，然后输入 100%。

图 2 加注 KCl 电解液储罐



3.7 更换电源输入保险丝

⚠ 危险



电击致命危险。开始本步骤之前，断开仪器的电源。

⚠ 危险



火灾危险。使用类型和额定电流相同的保险丝对原来的保险丝进行更换。

检查保险丝。使用新保险丝更换任何熔断的保险丝。

用户提供的物品： T 1.6 A, 250 VAC 保险丝

1. 从电源插座上拔下电源线。
2. 卸下电气检修盖。请参考 图 3 中所示的步骤。
3. 更换保险丝。请参考 图 4 中所示的步骤。
4. 装上电气检修盖。拧紧所有螺钉，以保持外壳的环境防护等级。
5. 关闭分析面板。将分析面板上的门锁转到锁定位置。
6. 将电源线连接至一个插座。
7. 按 **menu**，然后选择“启动分析仪”。

图 3 拆卸电气检修盖

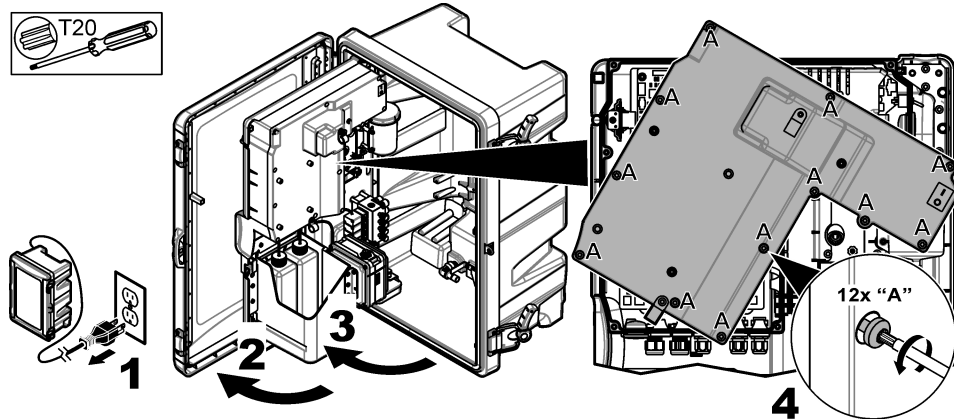
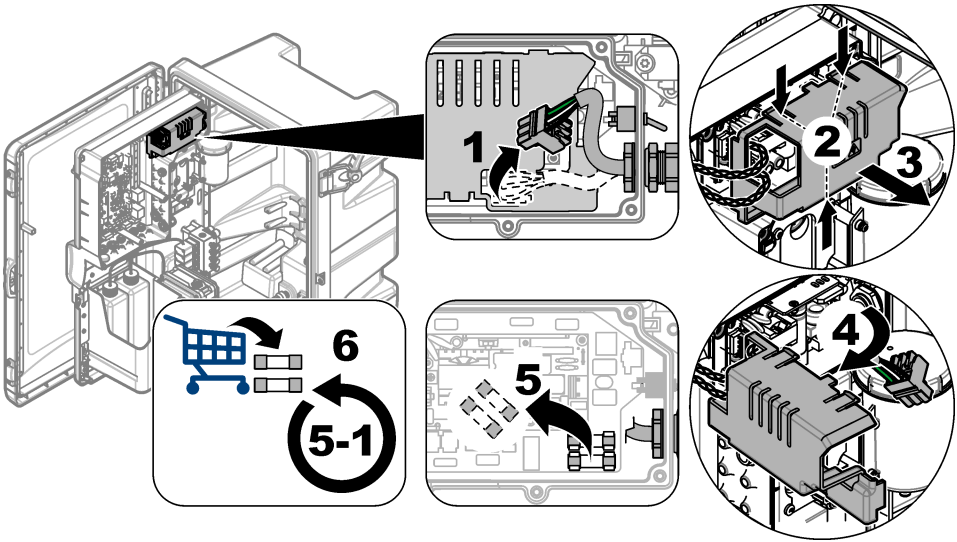


图 4 更换电源保险丝



3.8 分析仪短期关机的准备工作

按照以下步骤执行分析仪短期（2 天至 1 周）关机的准备工作：

用户提供的物品：止流夹

- 1. 按 **menu**，然后选择“停止分析仪”。
注： 如果显示“启动分析仪”，表示分析仪已处于待机模式。
- 2. 将止流夹（金属或塑料）夹到氯化钾电解液管的末端，以截断至参比电极的氯化钾电解液流。
注： 当分析仪处于待机模式或关机时，氯化钾电解液会继续从参比电极流出。氯化钾电解液将缓慢注入测量池的左侧孔位以及从左侧孔位顶部流出。
- 3. 关闭水样管线上的截止阀。
- 4. 如果必须切断分析仪的电源，则向测量池的中间孔位添加活化液，以防止钠电极损坏。
注： 处于待机模式 4 小时后，分析仪会自动向测量池的中间孔位添加活化液。

3.9 分析仪长期关机的准备工作

警告	
	化学品暴露风险。遵守实验室安全规程，穿戴适用于所处理化学品的所有个人防护装备。请在加注瓶子或制备试剂之前阅读供应商的安全数据表。仅供实验室使用。请按照用户当地法规的要求公开危险信息。
警告	
	化学品暴露风险。请遵循地方、区域和国家法规处置化学品和废弃物。

按照以下步骤执行分析仪长期（1 周以上）关机的准备工作：

用户提供的物品：

- 小容器，250 mL 或更大

- 去离子水, 1.5 L
- 洁净无尘布

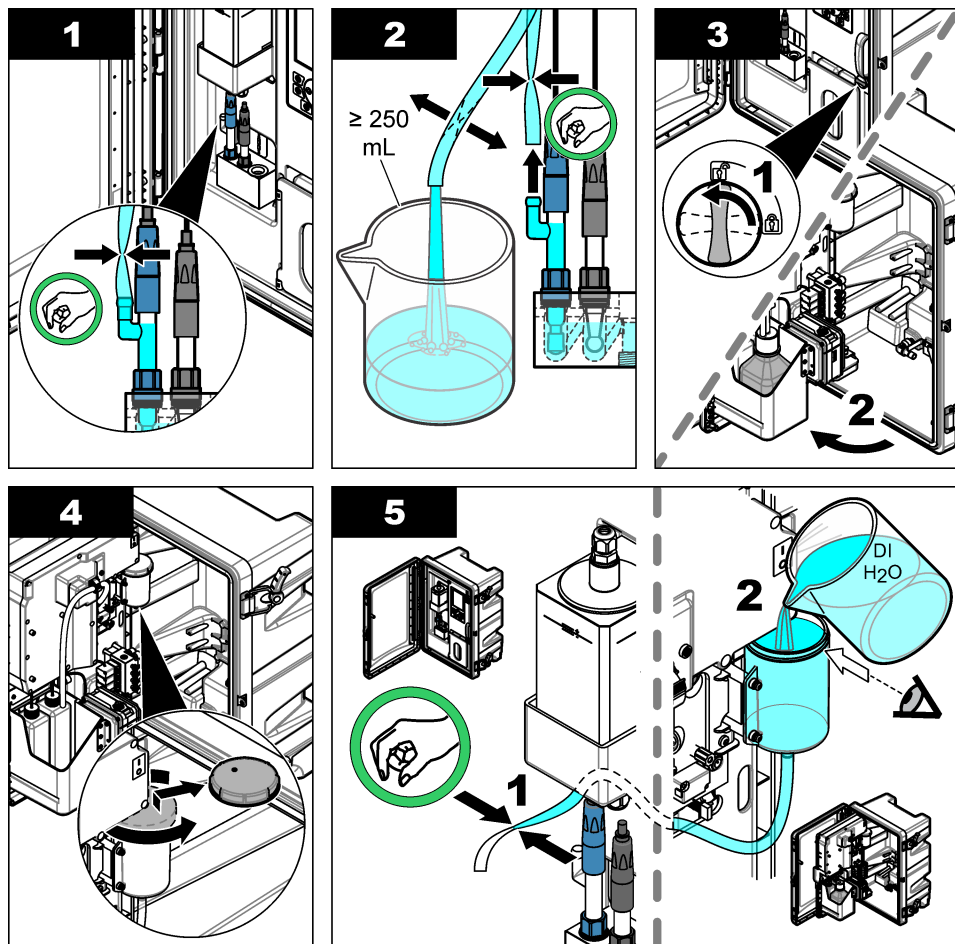
需准备的物品:

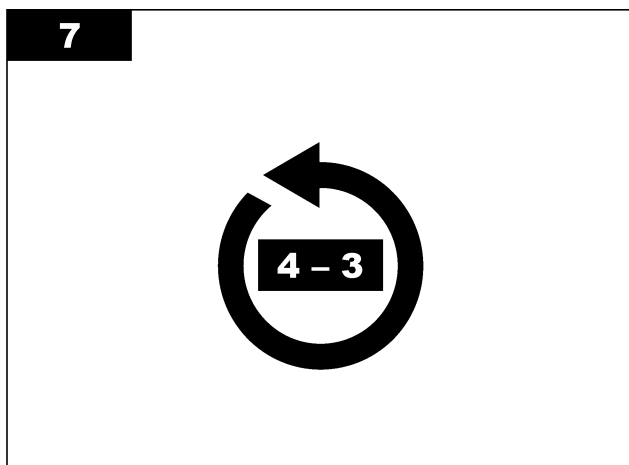
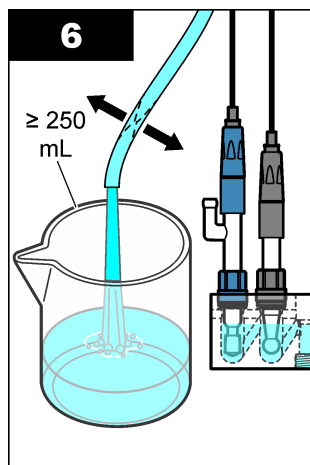
- 电极贮藏瓶 (2 个)
- 电极保护帽 (2 个)
- 参比电极玻璃接头的黑色保护盖

3.9.1 排空氯化钾电解液存储池并进行冲洗

请参见以下图示步骤。

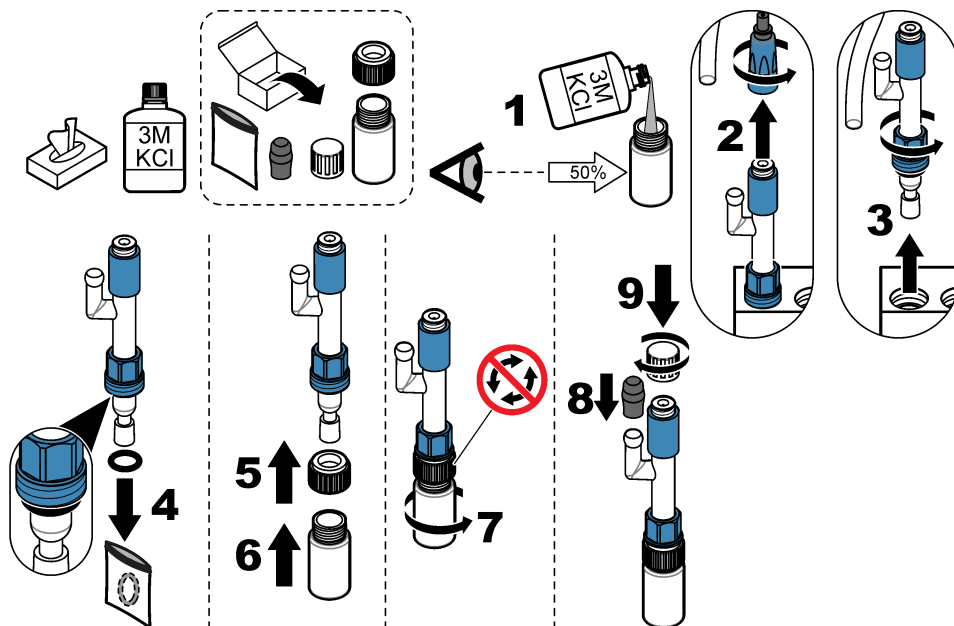
穿戴安全数据表 (MSDS/SDS) 中标明的个人防护装备。





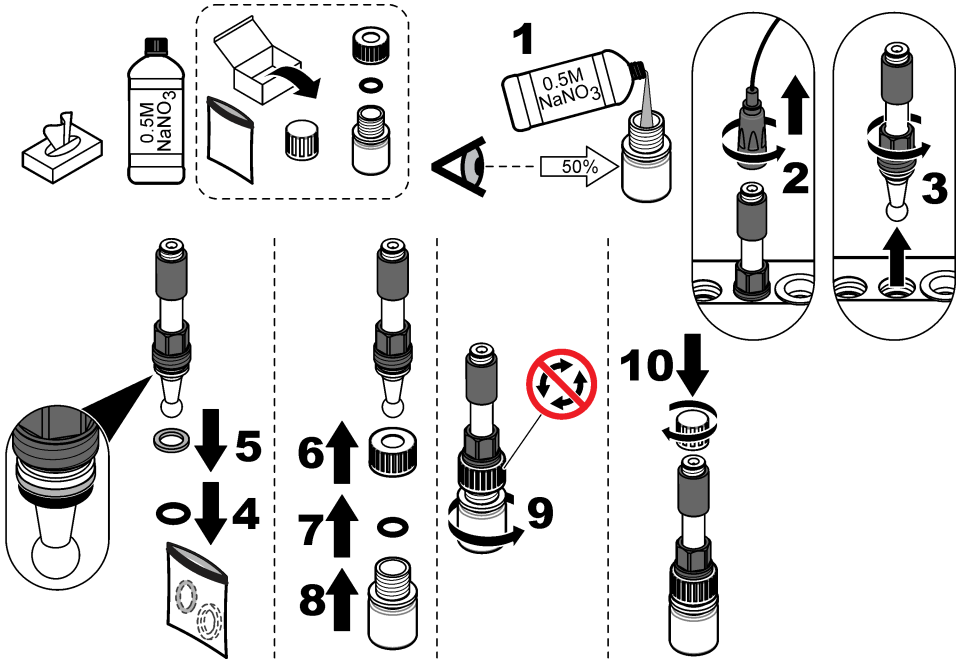
3.9.2 取下参比电极

请参阅以下图示步骤。



3.9.3 取下钠电极

请参阅以下图示步骤。

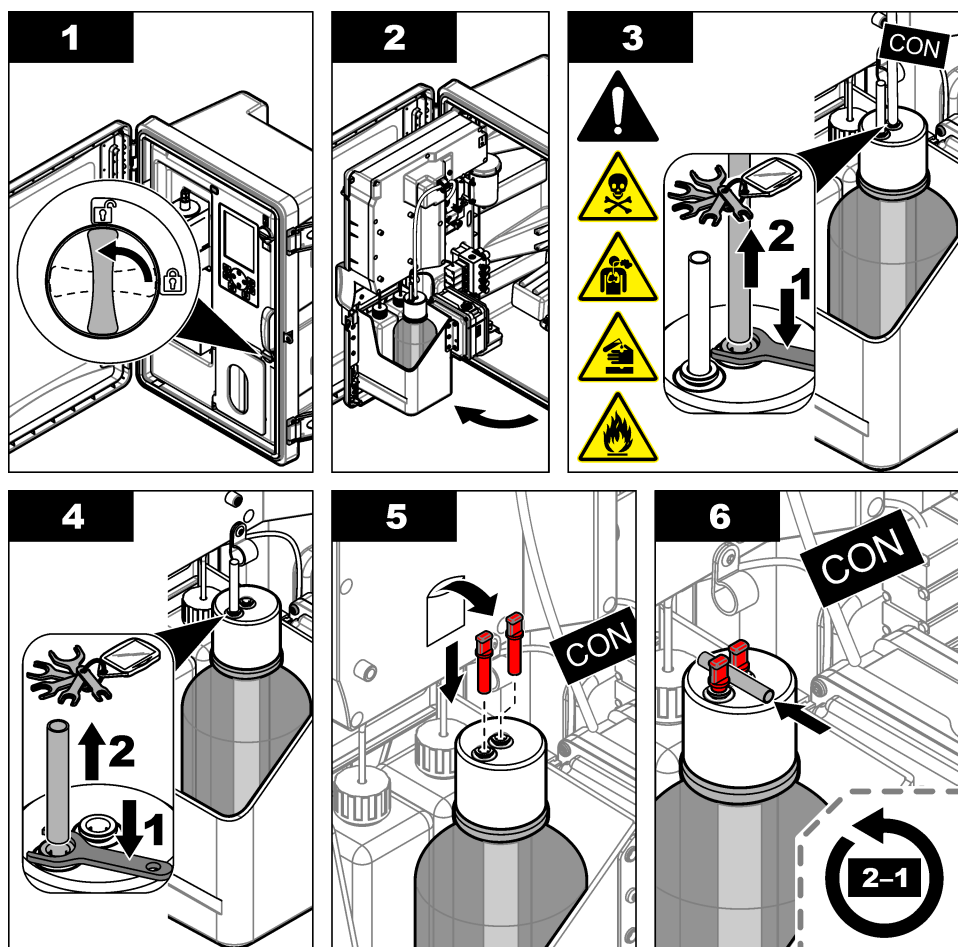


3.9.4 断开调节溶液瓶的连接

▲警告	
	吸入有害。切勿吸入二异丙胺 (DIPA) 蒸气或氨气。接触后可能导致严重伤害甚至死亡。
▲警告	
	化学品接触危险。二异丙胺 (DIPA) 和氨气均为易燃、具有腐蚀性和毒性的化学品。接触后可能导致严重伤害甚至死亡。

请参见以下图示步骤。

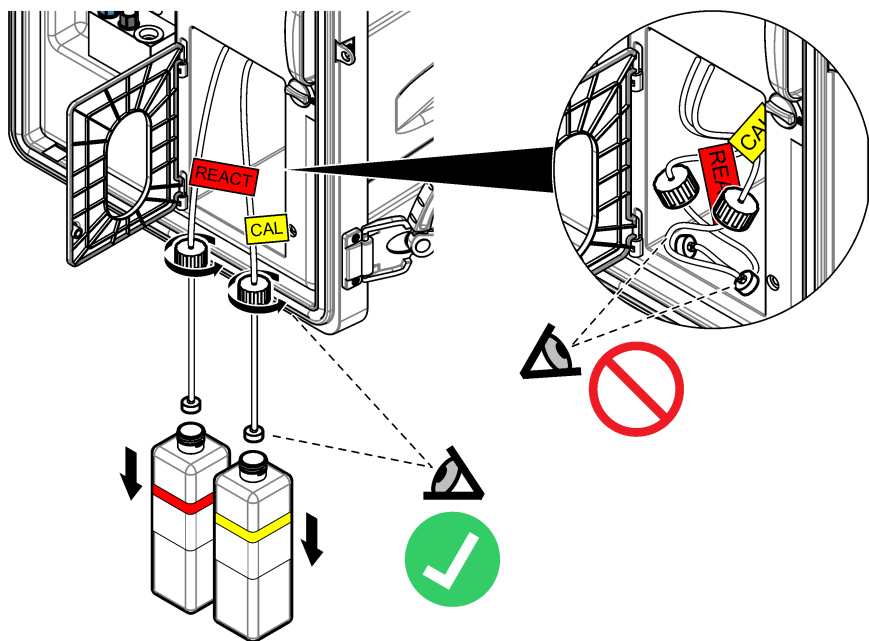
穿戴安全数据表 (MSDS/SDS) 中标明的个人防护装备。



3.9.5 冲洗试剂管

1. 穿戴安全数据表 (MSDS/SDS) 中标明的个人防护装备。
2. 将活化液瓶和校准溶液瓶从分析仪中取出。请参见图 5。
注： 只有具有自动校准选项的分析仪才配有校准溶液瓶。
3. 将瓶中的溶液倒入合适的下水道。
4. 用去离子水冲洗瓶子，然后加入去离子水，加至 $\frac{1}{2}$ 满液位。
5. 将瓶子装入分析仪。
6. 按 **menu**，然后选择“试剂/标准液 > 灌注试剂”。用去离子水冲洗试剂管。

图 5 取下瓶子



3.9.6 排空溢流池

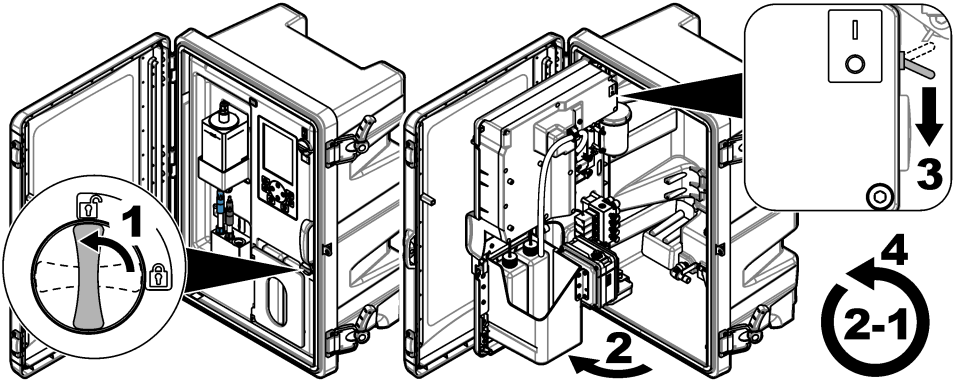
1. 按 **diag**，然后选择 执行测试，并按 **enter**。
2. 按 **enter** 以选择“是”。
3. 选择 样本池排空，然后按 **enter**。
4. 输入 150 秒。
5. 按 **enter** 两次。
6. 当溢流池为空时，按 **back**。
7. 按 **home**。

3.9.7 关闭分析仪

按照以下步骤断开分析仪的电源和水样：

1. 将电源开关设置为关。请参见图 6。
2. 关闭分析面板。将分析面板上的门锁转到锁定位置。
3. 从电源插座上拔下电源线。
4. 关闭水样管线上的截止阀。
5. 使用洁净无尘布擦干溢流池中残留的水。
6. 使用洁净无尘布擦干测量池左侧和中间孔位中残留的水。

图 6 将电源开关设置为关



3.9.8 将瓶中的去离子水倒掉

- 1. 将活化液瓶和校准溶液瓶从分析仪中取出。拉下瓶盖，使其悬挂在分析仪下方。
请勿让瓶盖或内部管道接触分析仪，以防止受到污染。
- 2. 将瓶中的去离子水倒掉。
- 3. 让瓶子完全晾干。
- 4. 将瓶子装入分析仪。
- 5. 关闭分析仪门。

第 4 节 故障排除

问题	可能的原因	解决方案
测量屏幕上不显示状态栏。	测量屏幕上显示的通道不是正被测量的通道。	按 向上 或 向下 箭头键，直到被测量的通道显示在测量屏幕上。
按 向上 或 向下 箭头键时，测量屏幕上不显示通道。	在显示设置中未选择通道。	按 menu ，然后依次选择“设置系统 > 显示设置 > 调整顺序 > 查看当前顺序”。 如果未显示通道，先按 back ，然后选择添加测量数据。按 向左 箭头键可选中或取消选中复选框。
通道未被测量。	通道未启用。	按 menu ，然后依次选择“设置系统 > 分析仪配置 > 配置排序器 > 启用通道”。添加通道。按 向左 箭头键可选中或取消选中复选框。
	通道不在通道测量序列中。	按 menu ，然后依次选择“设置系统 > 分析仪配置 > 配置排序器 > 通道排序”。 按 向上 和 向下 箭头键选择一行，然后按 向左 或 向右 箭头键选择一个通道。S1 是首个被测量的通道，然后是 S2、S3 和 S4。 注： 不要选择含有符号“~”（例如 4~SAMPLE4）的通道。含有符号“~”的通道不会被测量。
出现“不稳定读数”警告。	通道测量之间的冲洗时间太短。	先按 menu ，然后依次选择“设置系统 > 分析仪配置 > 测量 > 设置测量周期 > 最长周期时间”或“周期时间”。增加最长周期时间或周期时间设置，延长冲洗时间。

问题	可能的原因	解决方案
出现“样本 缺失”警告。	水样管线上的截止阀已关闭。	打开截止阀。
	水样管线未正确连接。	确保将水样管线连接至正确的管线口。请参阅安装手册中的 <i>管线口</i> 。
	水样流量阀已关闭。	打开启动向导。按 menu ，然后选择“设置系统 > 启动分析仪”。 按 enter ，直到系统提示您调整水样流速。逆时针转动样品流量阀，将每个通道的水样流速增加到 6–9 L/h。
	通道的电磁阀工作不正常。	按 diag ，然后选择“执行测试 > 样本池排空”，以排空溢流池。按 diag ，然后选择“执行测试 > 样本输送”，以打开取样阀。如果水样不流入溢流池，则检查取样阀接线。必要时更换取样阀。
出现“PH 值太低”警告。	测量池右侧孔位的盖子已拆下。	装上测量池右侧孔位的盖子。
	调节溶液瓶中的试剂余量少于 10% 或为空。	更换调节溶液。请参见 更换调节溶液 第 31 页。
	调节溶液瓶盖漏气。	<ul style="list-style-type: none">• 确保调节溶液瓶盖已拧紧。• 检查瓶盖中的垫圈。如有磨损或损坏，请更换垫圈。• 检查瓶口边的塑料法兰。如有明显的磨损或损坏，请更换调节溶液瓶。
	调节溶液管路漏气。	查看调节溶液管路是否堵塞或漏气。如有必要，请更换管路。 注： 调节溶液管路含有气体，而不是溶液。
	调节阀工作不正常。	按 diag ，然后选择“执行测试 > 调节阀”，以打开调节阀。如果调节气体不流入测量池的右侧孔位（会看到气泡），则更换调节阀。
出现“校准失败”警告。	自动校准设置中的校准溶液值不同于校准溶液瓶上的值。	将校准菜单中的校准溶液值更改为校准溶液瓶上的值。请参阅操作手册中的 <i>设置自动校准</i> 。
	校准溶液消耗完。	更换校准溶液。请参见 更换校准溶液和活化液 第 30 页。
	校准溶液管路存在泄漏或堵塞。	查看管路是否堵塞或泄漏。如有必要，请更换管子。
	校准泵工作不正常。	按 diag ，然后选择“执行测试 > 样本池排空”，以完全排空溢流池。 按 diag ，然后选择“执行测试 > 泵入校准溶液”，以将校准泵设为开启。如果校准溶液不流入溢流池，则更换校准泵。
	搅拌子不转动。 注： 搅拌子不是一直转动。	按 diag ，然后选择“执行测试 > 搅拌器”，以将搅拌器电机设为开启。如果搅拌子不转动，请更换搅拌器电机。
	溢流池中没有搅拌子。	确保搅拌子位于溢流池中。

问题	可能的原因	解决方案
出现“活化毫伏读数低”警告。	活化液已用完。	务必使活化溶液管子的末端位于瓶底。 更换活化液。请参见 更换校准溶液和活化液 第 30 页。
	钠电极工作不正常。	<ul style="list-style-type: none"> 确保正确安装钠电极。请参阅安装手册。 确保钠电极的玻璃泡中没有空气。
	参比电极工作不正常。	<ul style="list-style-type: none"> 从测量池中取出参比电极。提起玻璃部分上的箍圈，让一些氯化钾电解液流出。按下箍圈并旋转不到 1/4 圈，以锁紧箍圈。箍圈锁紧后将无法转动。将参比电极插入测量池中。 确保正确安装参比电极。请参阅安装手册。 要确认问题是否得到解决，先按 diag，然后选择“电极活化”以执行活化。
	活化液管路存在泄漏或堵塞。	查看管路是否堵塞或泄漏。如有必要，请更换管路。
	活化泵工作不正常。	按 diag ，然后依次选择“执行测试 > 泵入活化液 > 高”，以将活化泵设为高流速。如果活化液不流入测量池的中间孔位，则更换活化泵。
仪器读数不稳定。	分析仪启动时间不超过 2 小时。	让分析仪工作 2 小时以达到稳定状态。
	电极电缆接触不良。	从电极上断开电缆。将接头在电极插座上完全按下，然后转动接头，直至用手指拧紧。
	电极电缆连接至错误的电极。	将蓝色电缆连接至参比电极。将黑色电缆连接至钠电极。
	氯化钾电解液流速过快。	从测量池中取出参比电极。 按下箍圈并旋转不到 1/4 圈，以锁紧箍圈。箍圈锁紧后将无法转动。如果箍圈未锁紧，氯化钾电解液将从参比电极过快地流入测量池。
测量值不准确。	分析仪未校准。	校准分析仪。请参阅操作手册中的 执行校准 。为了获得最准确的读数，需要每隔 7 天（每周）校准一次分析仪。
	自动活化被禁用或两次活化之间的间隔时间超过 24 小时。	启动自动活化。按 diag ，然后选择“电极活化”。 注： 要获得最准确的读数，请将自动活化设置为开。将间隔时间设置为 24 小时。请参阅操作手册。
	活化液已用完。	更换活化液。请参见 更换校准溶液和活化液 第 30 页。
	活化液管路存在泄漏或堵塞。	查看管路是否堵塞或泄漏。如有必要，请更换管子。
	活化泵工作不正常。	按 diag ，然后依次选择“执行测试 > 泵入活化液 > 高”，以将活化泵设为高流速。如果活化液不流入测量池的中间孔位，则更换活化泵。
溢流池中的搅拌子不转动。	搅拌器工作不正常。 注： 搅拌子不是一直转动。	按 diag ，然后选择“执行测试 > 搅拌器”，以将搅拌器电机设为开启。如果搅拌子不转动，请更换搅拌器电机。

问题	可能的原因	解决方案
氯化钾电解液消耗过快 ¹ 。	参比电极的玻璃部分上的箍圈未锁紧。	取下参比电极。 将箍圈向上推。按下箍圈并旋转不到 1/4 圈，以锁紧箍圈。请参阅安装手册中的 <i>安装参比电极</i> 中所示的步骤。 箍圈锁紧后将无法转动。如果箍圈未锁紧，氯化钾电解液将从参比电极过快地流入测量池。
氯化钾电解液消耗过慢 ² 。	没有转动参比电极的玻璃部分上的箍圈以旋开密封。	取下参比电极。 小心地转动箍圈以解除密封。当箍圈能轻松转动时，表明密封已旋开。请参阅安装手册中的 <i>安装参比电极</i> 中所示的步骤。 按下箍圈并旋转不到 1/4 圈，以锁紧箍圈。箍圈锁紧后将无法转动。如果箍圈未锁紧，氯化钾电解液将从参比电极过快地流入测量池。
测量屏幕上的继电器指示灯闪烁。	过量定时器已到期。	重置过量定时器。请参见 <i>重置继电器的过量定时器</i> 第 46 页。 注： 仅当继电器“设置功能”被设置为“进给控制”时，方可启用过量定时器设置。

4.1 重置继电器的过量定时器

继电器的过量定时器设置用于防止出现当测量值一直高于设定值或死区设置（例如，因为电极损坏或工艺扰动）的情况发生时，使继电器能够一直接通。过量定时器可限制继电器及其所连控制元件保持接通的时间，不受条件影响。

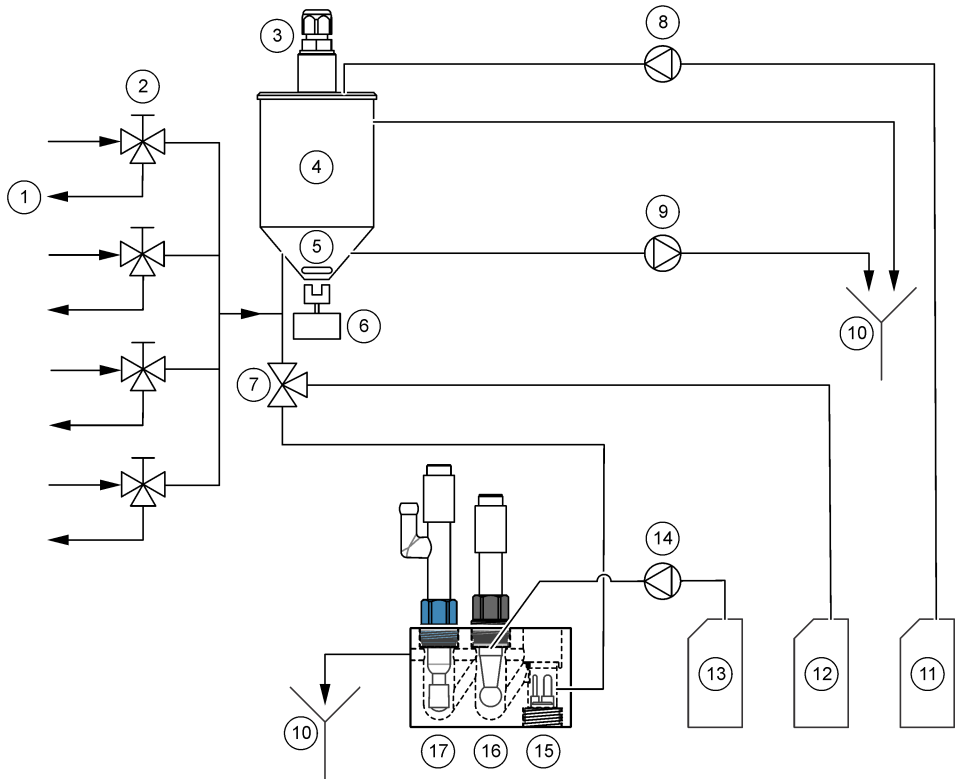
当超出过量定时器上选择的时间间隔时，继电器状态会在测量屏幕右上角闪烁，直到过量定时器被重置。按 **diag（诊断）**，然后选择过量重置即可重置过量定时器。

¹ 如果存储池中的液位在 2 天内下降超过 3 mm (1/8 in.)，则表明氯化钾电解液消耗过快

² 如果存储池中的液位在 2 天内下降不到 1 mm，则表明氯化钾电解液消耗过慢

第 5 节 诊断

5.1 分析仪流路图



1 水样旁通排放口	7 调节阀	13 活化液
2 水样入口	8 校准泵 ³	14 活化泵
3 液位传感器	9 排水泵	15 温度传感器
4 溢流池	10 下水道	16 钠电极
5 搅拌子	11 校准溶液 ³	17 参比电极
6 搅拌器电机	12 调节溶液	

5.2 启动分析仪测试

启动分析仪测试以验证状态指示灯、搅拌器电机、泵或阀门是否工作正常。

- 1. 按 **diag**，然后选择“执行测试”。
- 2. 选择一个选项。

选项	说明
泵入活化液	启动活化泵。活化液会流入测量池的中间孔位。 注： 测量池是安装电极的透明盒。

³ 只有具有自动校准选项的分析仪才配有校准泵和校准溶液。

选项	说明
样本输送	将选定通道的水样电磁阀设置为打开。水样会流入溢流池。 注： 如果溢流池已满，溢流池的水位将不会改变。要排空溢流池，请执行样本池排空测试。
泵入校准溶液	注： “泵入校准溶液”选项仅在具有自动校准选项的分析仪上可用。 将校准泵设置为开。校准溶液会流入溢流池。
调节阀	将调节阀设置为打开。调节气体会流入测量池的右侧孔位。 注： 测量池是安装电极的透明盒。
样本池排空	将排水泵设置为开。溢流池中的水从化学品排放管排出。
搅拌器	将搅拌器电机设置为开。溢流池中的搅拌子会转动。
状态 LED	将状态指示灯设置为连续循环：黄色、红色、绿色。
气泵	注： 仅当选装了阳床泵后，“气泵”选项才可用。 将阳床泵设为开启。阳床泵将空气送入调节溶液 (DIPA) 瓶。要确定阳床泵在分析仪中的位置，请参阅安装手册中的 产品概览 一节。
选择脚本	注： “选择脚本”选项仅用于维护用途。 将分析仪设置为使用正常的仪器脚本或测试脚本。

5.3 启动 4–20 mA 输出或继电器测试

启动 4–20 mA 输出或继电器测试以验证 4–20 mA 输出或继电器是否工作正常。

- 按 **diag**，然后选择“输出”。
- 选择一个选项。

选项	说明
测试 4-20mA	设置选定的 4–20 mA 输出端的信号 (mA)。用万用表测量 4–20 mA 输出端的电流。
测试继电器	将选定的继电器设置为开（通电）或关（未通电）。用万用表测量继电器的电阻，以验证继电器是否打开或关闭。
保持输出	将输出保持在最后一个值或将其设置为转换值。 启用 —选择“启动”可将输出保持在最后一个值或将其设置为转换值。选择“释放”即可让输出正常运行。 设置输出模式 —选择“保持输出”可将输出保持在最后一个值。选择“转换输出”可将输出设置为转换值。要为输出设置转换值，请参阅操作手册。 设置通道 —选择“全部”可选择所有通道。选择“分析仪”可将选定分析仪的通道全部选中。
输出状态	显示 4–20 mA 输出端的信号 (mA)。
模拟测量	在选定的通道上输入分析仪读数以执行输出测试。用户退出屏幕之后模拟将停止。 选择来源 —选择分析仪。 设置参数 —选择通道。 设置模拟值 —设置分析仪读数。

5.4 显示分析仪信息

要显示以下分析仪信息，请按 **menu**，然后依次选择“查看数据 > 分析仪数据”。请参见表 2。

表 2 分析仪数据说明

项目	说明
日期/时间	当前设置的日期和时间（24 小时格式）
名称	分析仪的名称
类型	分析仪的类型

表 2 分析仪数据说明（续）

项目	说明
环境温度	分析仪的环境温度
调节试剂的液位	调节溶液瓶中的液位
活化液液位	活化溶液瓶中的液位
标准液位	校准溶液瓶中的液位
氯化钾液位	氯化钾电解液储罐中的液位
上次活化	上一次自动活化日期
上次校准日期	上一次校准日期
上次维护	上一次维护日期
软件版本号	安装的软件版本
设备驱动程序固件	安装的设备驱动程序固件版本
设备驱动程序内容	设备驱动程序数据内容的版本
脚本版本	脚本文件目录块的版本
脚本内容	脚本文件目录内容的版本
测试控制模块版本	安装的测量控制模块版本
序列号	分析仪序列号

5.5 显示分析仪状态和系统数据

要显示当前的分析仪状态、Modbus 统计、系统数据或 I2C 数据，请执行以下步骤：

1. 按 **diag**。
2. 选择一个选项。

选项	说明
当前状态	操作 —当前测量模式。 样本通道 —当前样本通道。 分步状态 —测量周期中的当前步骤。 分步时间 —剩余的分步时间。 剩余分钟 —当前步骤中剩余的分钟数。 完成百分比 —测量周期已完成的百分比。
MODBUS 统计	显示 Modbus 端口的状态：传感器、控制器、网络及服务端口。显示良好传输与不良传输的次数。
系统数据	环境温度 —环境温度测量值 (C)。 电源频率 —交流电源频率 (Hz)。 电源电压 —交流电源电压 (AC)。 12V 电压 —12V 电源电压测量值 (VDC)。 3.3V 电压 —3.3 V 稳压电源测量值 (VDC)。 12V 电流 —12 V 电源电流测量值 (A)。
I2C 数据	显示通信信息 (I2C) 及版本号。

5.6 显示维护信息

使用“维护”菜单可显示或设置仪器部件的维护历史记录。

1. 按 **diag**。
2. 选择“维护”。

3. 选择一个选项。

选项	说明
可替换器件	显示易耗件列表。显示上次更换部件的日期以及自部件更换以来的天数。更换部件后重置计数器。
维护部件	注： “维护部件”选项仅用于维护用途。 显示部件列表及上次维护的日期。客户服务代表会在更换部件后重置计数器。
年度维护	显示上次年度维护日期、下次年度维护日期和距下次年度维护剩余的天数。年度维护后重置计数器。
编辑电极序列号	记录电极的序列号。
维护历史记录	显示已完成的维护任务和日期（例如替换活化试剂）。 开始时间 — 显示在选定的日期和时间之后记录的数据。 读数数量 — 显示选定的数据点数量。
上电硬件检测	否 — 在分析仪通电时不进行硬件诊断。 是 — 在分析仪通电时进行硬件诊断。

第 6 节 备件与附件

警告
人身伤害危险。使用未经批准的部件可能造成人身伤害、仪器损坏或设备故障。本部分中的更换部件均经过制造商的批准。

注：一些销售地区的产品和物品数量可能有所不同。请与相关分销商联系或参考公司网站上的联系信息。

试剂和校准溶液

说明	数量	货号
3M 氯化钾电解液	250 mL	LZW9500.99
3M 氯化钾电解液	500 mL	363140,00500
二异丙胺 (DIPA) 99%	1 L	2834453
氯化钠校准溶液, 10 ppm	1 L	2835153
硝酸钠, 0.5 M	500 mL	2507149

备件

说明	数量	货号
空的调节溶液瓶（带瓶盖）	1	8352000
调节溶液瓶盖的垫圈	1	8417200
弯管接头, 排水管, ½ in., 聚丙烯	1	6772800
参比电极	1	09240=C=0310
钠电极	1	09240=C=0320
保险丝, 1.6 A, 250 V, 5 x 20 mm	1	5208300
保险丝, 5 A, 250 V, 缓熔型, 5 x 20 mm	1	4693800
单通道分析仪安装套件, 带有外壳的分析仪	1	8375400

备件（续）

说明	数量	货号
双通道分析仪安装套件，带有外壳的分析仪	1	8375300
4 通道分析仪安装套件，带有外壳的分析仪	1	8371500
安装套件，1 通道分析仪，不带外壳的分析仪	1	8375700
安装套件，2 通道分析仪，不带外壳的分析仪	1	8375600
安装套件，4 通道分析仪，不带外壳的分析仪	1	8375500
搅拌器电机	1	8420000
面板安装螺钉，M6 x 20 盘头，不锈钢，梅花型	4	8415500
用于内部电源插头的穿孔工具，金属管，配合 8379900 使用	1	8380000
用于内部电源插头的穿孔工具，金属板，配合 8380000 使用	1	8379900
调压阀，0.3 bar (4 psi)，不可调	1	6782900
校准泵	1	8364300
排空泵	1	8357400
活化泵	1	8364200
截止阀，外径 6 mm 的管子	1	8385200
搅拌子	1	W_4510_001_FF
应力消除接头（电缆密封套），PG9 4 mm 至 8 mm	1	8356300
应力消除接头（电缆密封套），NPT ½-in.，4 mm 至 9 mm	1	8368400
台面安装支架	2	8370400
台面安装支架螺钉，#8 x ½ 不锈钢，梅花型	2	8412200
化学废液及漏液排放口管子，17.5 mm (¹¹ / ₁₆ in)外径 x 3.2 mm (¹ / ₈ in)厚	2 m (6.5 ft)	LZX278
水样管，6 mm 外径 x 4 mm 内径	5.5 m (18 ft)	6772500
切管器	1	8385400
壁挂安装	2	8364100
壁挂安装支架螺钉，M4 x 10 平头不锈钢，梅花型	2	8412500
调节阀	1	8367600
水样阀	1	8370200

附件

说明	数量	货号
瓶转接头，DIPA 瓶，Merck	1	09073=C=0350
瓶转接头，DIPA 瓶，Orion	1	09073=C=0360
过滤器，水样入口，100 µm，¼ in 外径管子	1	595=010=005

附件（续）

说明	数量	货号
过滤器，样品入口，100 μm，6 mm 外径管子	1	595=010=000
热交换器，4 通道（最大）	1	8368900
阳床升级套件	1	8371200
电源线，北美标准	1	9179700
1 通道变为 4 通道升级套件	1	8365100
2 通道变为 4 通道升级套件	1	8365000
自动校准升级套件	1	8368000
管子转接头，6 mm 外径至 ¼ in 外径	2	09245=A=8300

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