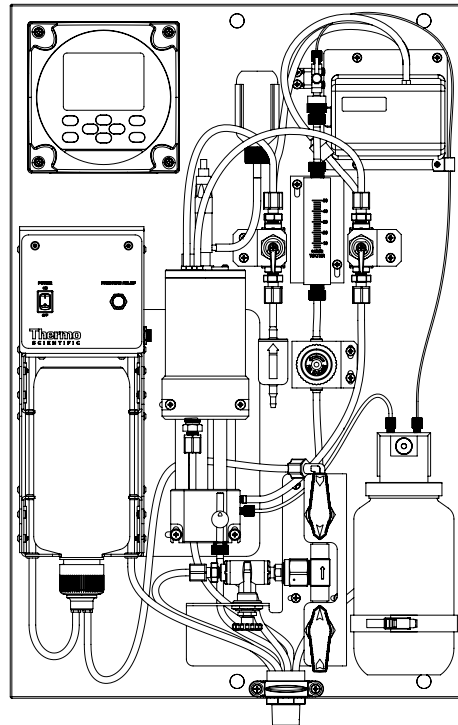


**Thermo Scientific Orion
2100 Series Grab Sampler
Installation Guide for
the 2111LL Low Level
Sodium Analyzer**



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This publication supersedes all previous publications on this subject.

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Chapter 1 Grab Sampler Installation

General Information

The grab sampler allows for rapid sample measurement where no online instrumentation is present and provides troubleshooting to validate readings without disturbing process operations. Operators can temporarily interrupt the flow of process sample to the 2111LL low level sodium analyzer and substitute it for a sample coming from the grab sampler. In this way, samples from other parts of the plant or validation and calibration standards can be analyzed.

Air Pump Shutoff and Start-up Procedure

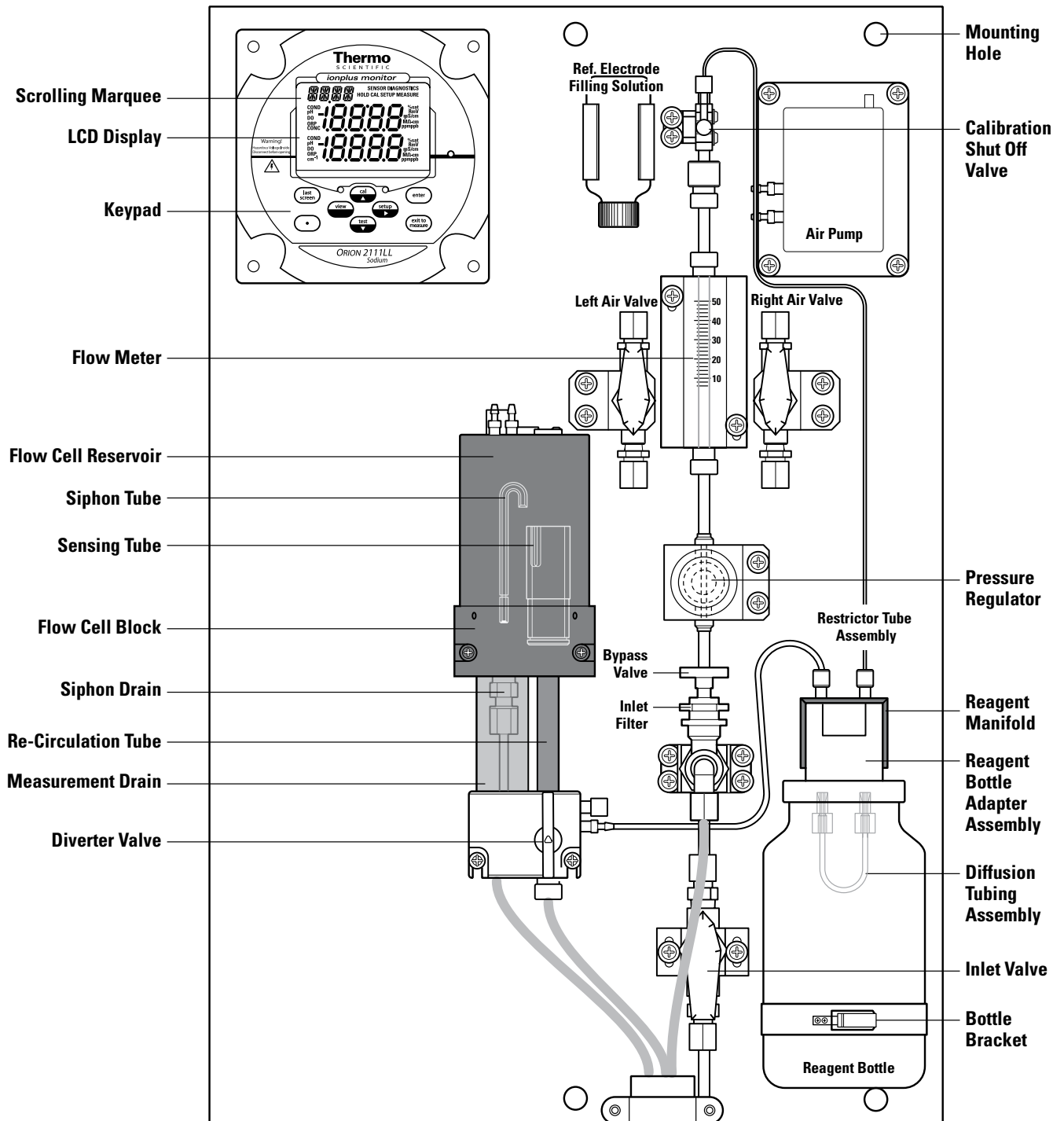
Warning: Turn off the air pump prior to removing reagent bottle. The air pump will spatter caustic reagent outward as bottle is removed. Wear rubber gloves and safety goggles to avoid possible injury from reagent residues in the system.

1. To access the air pump setting, press .
2. Press  /  to scroll through the setup parameters until TEST appears in marquee window.
3. Press  to access the TEST menu.
4. Press  /  to scroll through the TEST menu until AIR appears in the main display.
5. Press .
6. Press  /  to toggle between On and OFF settings for the air pump power. To turn the air pump off, select the OFF setting. To turn the air pump on, select the On setting. Changing the air pump setting to On or OFF will be indicated by a click sound.
7. Press  to accept the setting and return to the TEST menu.
8. Press  to return to the measure mode.

Required Tools

- Phillips head screwdriver
- Adjustable wrench
- Tubing cutter

Figure 1
2111LL Analyzer Components



Grab Sampler Installation Procedure

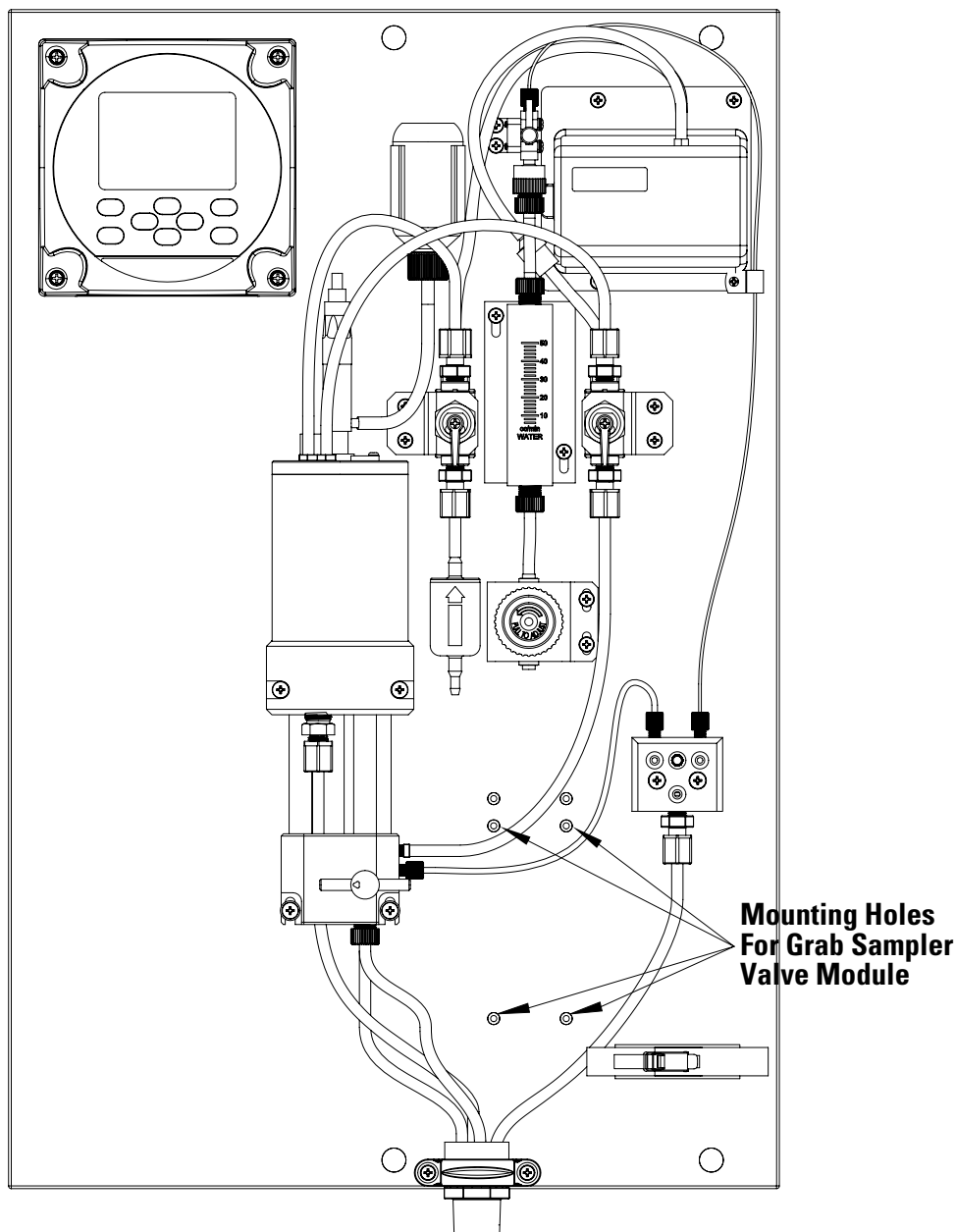
Warning: The reagent is hazardous. Use protective glasses and gloves when working with the reagent. Refer to the reagent bottle label and MSDS for precautions and work in a well ventilated area.

1. Shut down the analyzer.
 - a. Turn off the air pump. See the **Air Pump Shutoff and Start-up Procedure** section.
 - b. Disconnect the power to the analyzer.
 - c. Shut off the process pressure to the analyzer. The process sample supply must be shut off upstream of the analyzer. Do not just close the inlet valve on the analyzer.
2. Remove the reagent bottle from the analyzer and set it aside.
 - a. Loosen the thumb nut that secures the bottle to the manifold block and slide the bottle assembly off the mounting stud.
 - b. Note that some process sample may drip out of the manifold when you remove the reagent bottle.
 - c. Set the reagent bottle aside for later use. The reagent bottle should be stored in a well ventilated area.
3. Disconnect the process sample feed line to the inlet valve on the analyzer.
4. Remove the regulator bracket.
 - a. Loosen and remove the ring nut that holds the pressure regulator to the regulator bracket.
 - b. Remove the two screws that secure the bracket to the analyzer panel.
 - c. Slide the bracket off the regulator. The regulator will be held in position by the system plumbing.
 - d. Do not discard the loose components – they will be reassembled later during the installation process.
5. Disconnect the tube at the inlet of the pressure regulator.
 - a. Unscrew the ferrule nut on the pressure regulator inlet.

6. Remove the inlet valve and bypass valve assemblies from the analyzer.
 - a. Unscrew the ferrule nut on the pressure regulator inlet and disconnect the sample tube.
 - b. Remove the two screws that secure the inlet valve bracket to the analyzer panel.
 - c. If the unit includes a bracket connected to the bypass needle valve, remove the two screws that secure the bracket to the analyzer panel.
 - d. Remove the four screws that secure the bypass valve and particulate filter to the analyzer panel.
 - e. Remove the inlet valve and bypass valve assemblies from the analyzer panel.
7. Assemble the grab sampler mounting bracket to the analyzer panel.
 - a. Unscrew the four bolts that secure the flow cell assembly to the analyzer panel.
 - b. Place the grab sampler mounting bracket in position between the analyzer panel and the flow cell assembly. The mounting slots on the bracket should align with the mounting holes on the flow cell.
 - c. Secure the flow cell assembly and mounting bracket by reassembling the four mounting screws.
8. Assemble the new valve module to the analyzer. See **Figure 2**.
 - a. Assemble the black sample tube provided with the valve module to the sample valve. Insert one end of the 5.5" long piece of black tubing into the quick connect elbow at the bottom port of the 3-way sample valve. Insert the tube approximately $\frac{3}{4}$ " until it reaches the stop in the elbow.
 - b. Assemble the clear bypass drain tube provided with the valve module to the bypass fitting. Insert one end of the 10" long piece of clear tubing into the bypass fitting and tighten the compression nut on the fitting.
 - c. Place the valve module in position on the analyzer panel and secure it with four mounting screws. Route the drain lines from the flow cell and reagent manifold through the access holes in the valve bracket.
 - d. Slide the supplied ferrule nut onto the free end of the black tubing on the new valve assembly.

- e. Insert the free end of the black tubing into the inlet port on the pressure regulator. Verify that the tubing fits properly – it should bottom out against a stop in the regulator inlet without buckling or kinking. Trim the tubing if necessary. Tighten the ferrule nut to secure the tube to the regulator.
- f. Route the clear drain line from the valve module bypass valve around the bracket and down to the system drain.
- g. Connect the process inlet line to the empty leg of the quick-connect elbow fitting on the 2-way valve included in the valve module. Insert the process tubing until it bottoms out against a stop in the fitting.

Figure 2
2111LL Grab Sampler Valve
Module Mounting Holes



9. Re-assemble the regulator bracket.
 - a. Slide the bracket over the pressure regulator.
 - b. Secure the bracket to the analyzer panel with two mounting screws.
 - c. Replace the ring nut onto the pressure regulator and tighten it against the regulator bracket.
10. Mount the grab sampler assembly to the analyzer. See **Figure 3**.
 - a. Loosely assemble four #10-24 mounting screws to the threaded holes in the grab sampler mounting bracket.
 - b. Remove the sample bottle from the grab sampler and fit the unit onto the mounting screws on the bracket. Tighten the screws to secure the unit.
 - c. Snap the sample bottle back into the sampler housing.
 - d. Route the sample line from the bottle behind the flow cell and over to the compression-style elbow connected to the 3-way valve on the new valve module. Tighten the ferrule nut on the elbow to secure the tube.
 - e. Route the loose tube from the bottom right of the grab sample module to the system drain.
 - f. Connect the power supply to the power jack on the grab sampler.
11. Re-assemble the reagent bottle to the analyzer.
 - a. Check to be sure that none of the three O-rings on the reagent manifold block have been lost.
 - b. Assemble the reagent bottle onto the mounting stud on the manifold block and secure it with the thumb nut.
12. Return the analyzer to service.
 - a. Reconnect the power to the analyzer.
 - b. Open the process sample line to the analyzer assembly.
 - c. Turn on the air pump. See the **Air Pump Shutoff and Start-up Procedure** section.
 - d. Place the various valves in the process sample position. The 2-way inlet valve should be rotated counterclockwise so that it points up. The 3-way sample valve should be rotated clockwise so that it points down.

- e. Adjust the pressure regulator to maintain the correct process flow.
- f. Adjust the bypass valve to deliver the desired amount of bypass flow to drain.
- g. Verify that the various plumbing connections made during the installation are sealing properly. If a leak is detected, close the inlet valve and tighten the various fittings as needed.

Figure 3
2111LL Grab Sampler Mounting
Bracket Installation

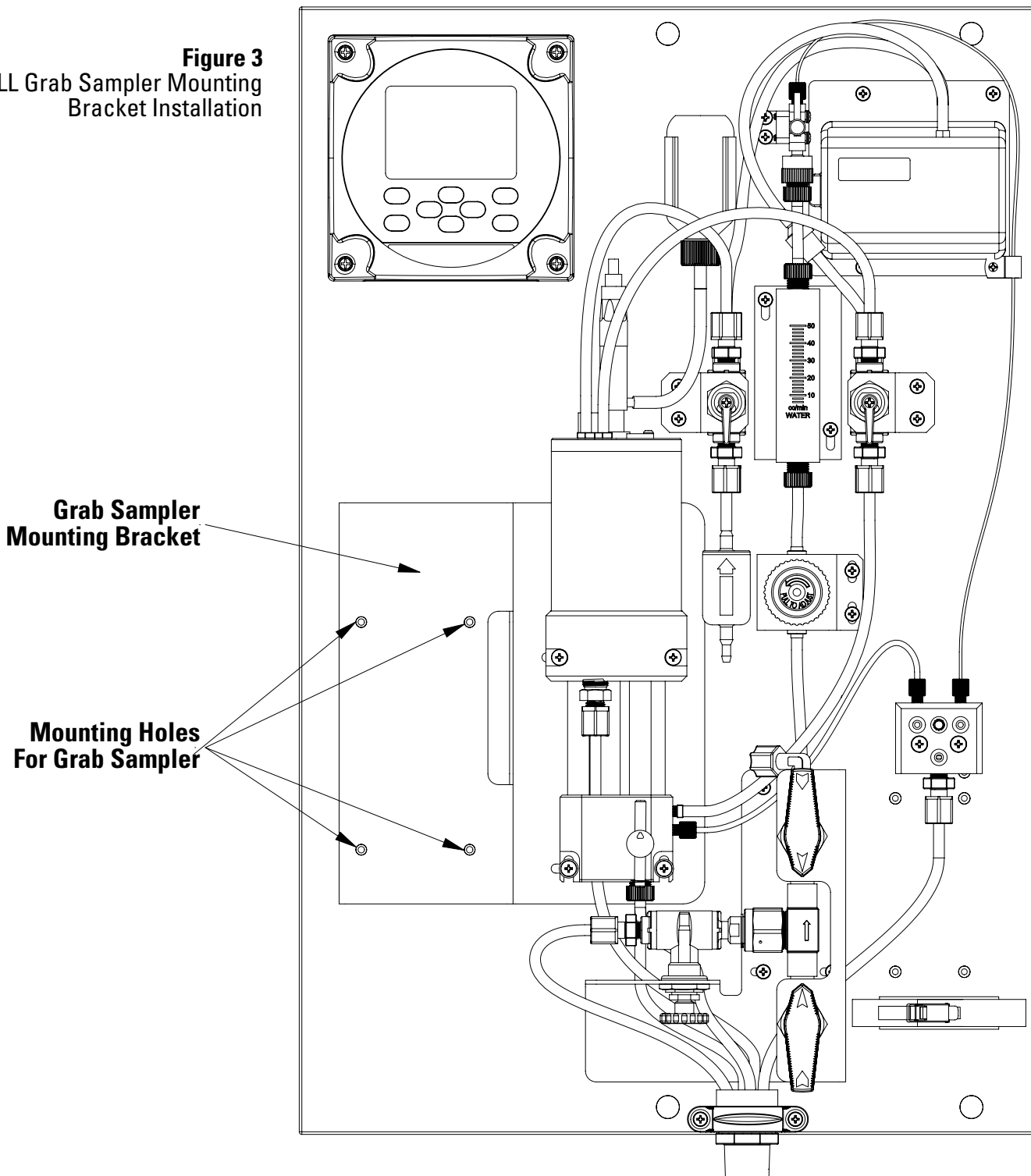
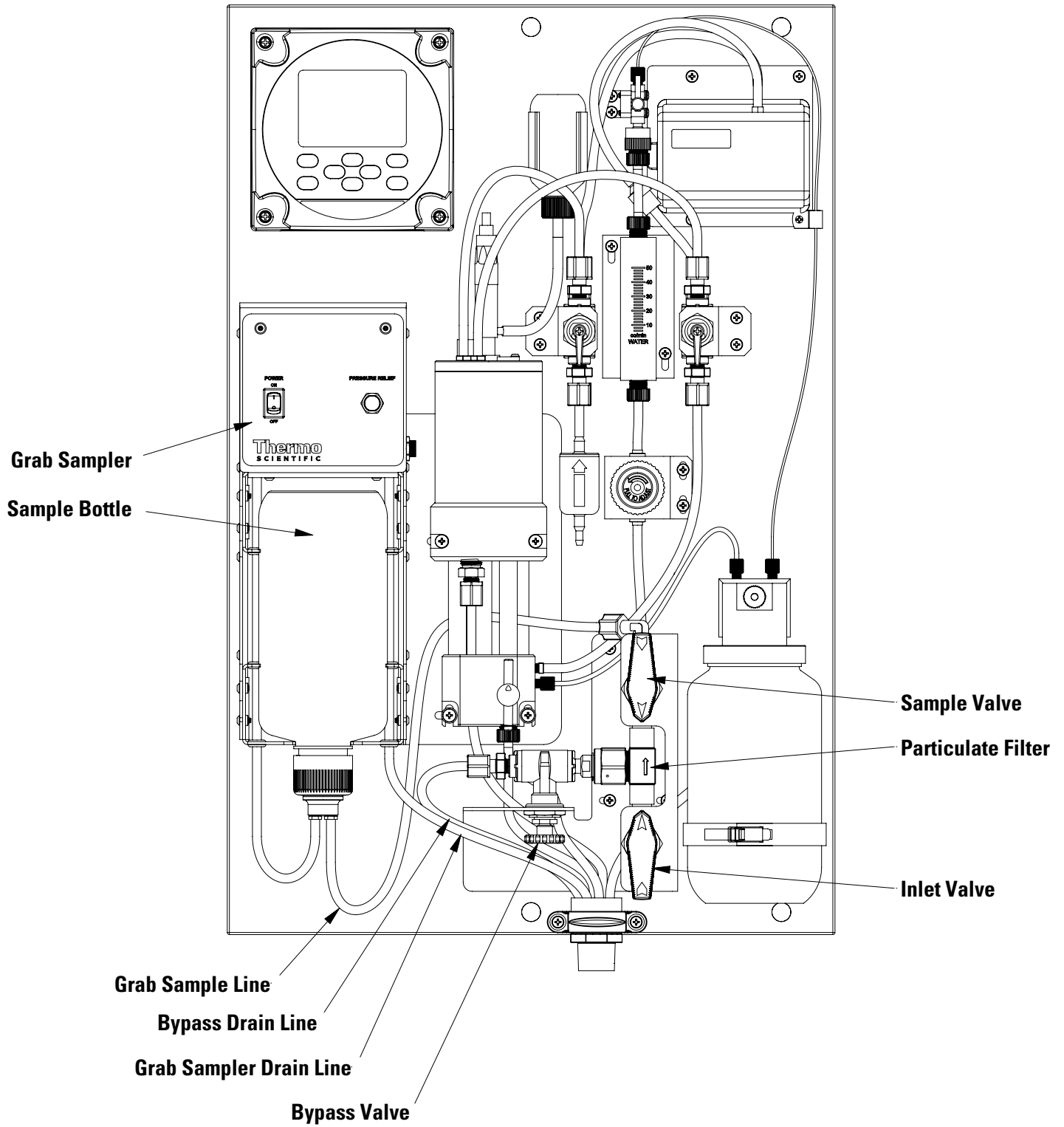


Figure 4
2111LL Grab Sampler Components



Chapter 2 Grab Sampler Measurement

Grab Sampler Measurement Procedure

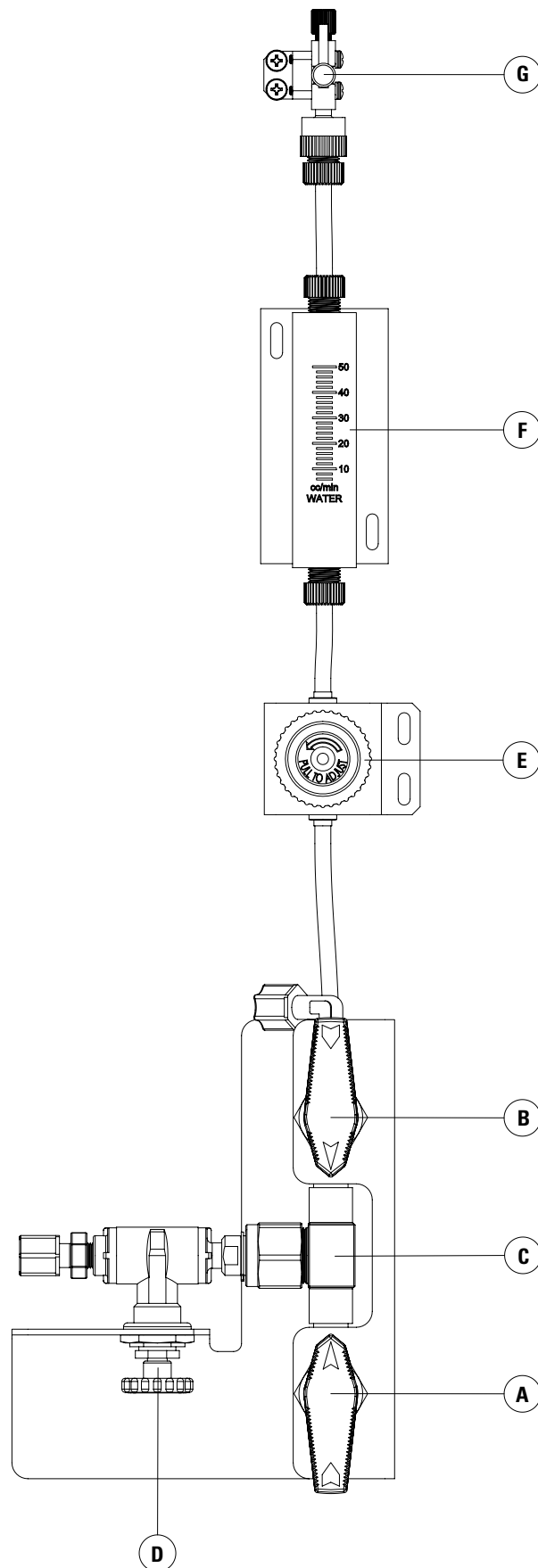
Refer to **Figure 5** for the location of the components identified in the following procedure.

1. Verify that the system is configured to take a standard measurement.
 - a. The diverter valve on the flow cell should be in the sample position with the indicator pointing to the left.
 - b. The calibration shutoff valve (**G**) should be open with the knob pointing up.
 - c. If the unit is equipped with air valves, they should both be in the measure position with the valve handles pointing down.
2. Prepare the sample bottle.
 - a. Rinse the bottle with deionized water and then with a small amount of the desired sample. Discard the rinse water.
3. Load the sample.
 - a. Fill the bottle with the sample.
 - b. Replace the cover on the bottle and load the bottle into the grab sampler.
4. Start the grab sampler.
 - a. Turn the grab sampler power switch on.
 - b. Allow the pump to run for 10 to 30 seconds to build pressure.
5. Turn the sample valve (**B**) to the grab sample position.
 - a. Turn the knob on the sample valve counterclockwise until it points upward.
 - b. The process stream will still be open to the particulate filter (**C**) and will continue to flow through the bypass valve (**D**). This will not interfere with the grab sample measurement and insures that the process stream is fresh when the grab sample measurement is complete.
 - c. Adjust the pressure regulator if required (see step 6).

6. Adjust the knob on the pressure regulator (**E**) so the ball in the flow meter (**F**) indicates 40 mL/minute flow.
 - a. Pull the knob out to unlock the setting and adjust the flow rate.
 - b. Turn the knob clockwise to increase the flow rate.
 - c. Turn the knob counterclockwise to decrease the flow rate.
 - d. Push the knob in to lock the setting.
7. Wait for the system to stabilize before taking the grab sample measurement.
 - a. The system will take time to flush any remaining process sample before the grab sample measurement stabilizes. The specific time required will depend on the sodium content of the residual process stream and the grab sample.

Figure 5
Components for Operating
the Grab Sampler

- Inlet Valve – A
- Sample Valve – B
- Particulate Filter – C
- Bypass Valve – D
- Pressure Regulator Knob – E
- Flow Meter – F
- Shut Off Valve – G



Returning the Analyzer to Process Sample Measurement

Refer to **Figure 5** for the location of the components identified in the following procedure.

1. After the grab sample measurement is complete, return the sample valve (**B**) to the process setting.
 - a. Turn the knob on the sample valve clockwise until it points downward.
 - b. Adjust the pressure regulator if required (see step 2).
2. Adjust the knob on the pressure regulator (**E**) so the ball in the flow meter (**F**) indicates 40 mL/minute flow.
 - a. Pull the knob out to unlock the setting and adjust the flow rate.
 - b. Turn the knob clockwise to increase the flow rate.
 - c. Turn the knob counterclockwise to decrease the flow rate.
 - d. Push the knob in to lock the setting.
3. Vent any residual pressure in the grab sampler system.
 - a. Press the pressure relief button on the grab sampler.
4. Rinse out the sample bottle.
 - a. Remove the sample bottle from the system and discard any remaining sample.
 - b. Rinse the inside of the bottle with clean, deionized water and allow it to dry.
 - c. Replace the bottle in the grab sampler.

Chapter 3 Customer Services

Servicing the Particulate Filter

Refer to **Figure 5** for the location of the components identified in the following procedure.

1. Close the inlet valve (**A**) to shut-off process flow to the system.
 - a. Turn the knob on the inlet valve counterclockwise until it points to the right.
2. Remove the cap on the particulate filter.
 - a. Loosen the panel nut on the bypass valve (**D**).
 - b. Unscrew the cap on the particulate filter (**C**).
 - c. Slide the bypass valve to the left in its mounting slot and pivot it to allow access to the interior of the particulate filter.
3. Service the filter element.
 - a. Remove the filter element from the particulate filter (**C**).
 - b. Clean the filter element. The cleaning agent should be compatible with the 316 stainless steel filter element.
4. Replace the filter element in the filter housing.
 - a. Install the filter element with the open end facing down.
5. Re-assemble the particulate filter cap (**C**).
 - a. Screw the filter cap back onto the filter body.
 - b. Tighten the panel nut on the bypass valve (**D**).
6. Re-open the inlet valve (**A**) to restore process flow to the system.
 - a. Turn the knob on the inlet valve clockwise until it points upward.

Assistance

After troubleshooting all components of your measurement system, contact Technical Support. Within the United States call 1.800.225.1480 and outside the United States call 978.232.6000 or fax 978.232.6031. In Europe, the Middle East and Africa, contact your local authorized dealer. For the most current contact information, visit www.thermo.com/contactwater.

For the latest application and technical resources for Thermo Scientific Orion products, visit www.thermo.com/waterapps.

Warranty

For the most current warranty information, visit www.thermo.com/processwater.

Ordering Information

Cat. No.	Description
21GRABLL	Low level sodium grab sampler / FAST QC™ upgrade module to fit existing 2111LL and 2111LLEN analyzers
21GRABXP	Grab sampler / FAST QC™ upgrade module to fit existing 2111XP, 2111XPEN, 2110XP, 2110XPEN, 2117XP, 2117XPEN, 2120XP and 2120XPEN analyzers (Not currently available for use with 2109XP or 2109XPEN fluoride analyzers)
21GRBT	Replacement bottle for 2100 series grab sampler
21GRPA	Air pump replacement kit for 2100 series grab sampler
21GRFK	Fittings kit for 2100 series grab sampler

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