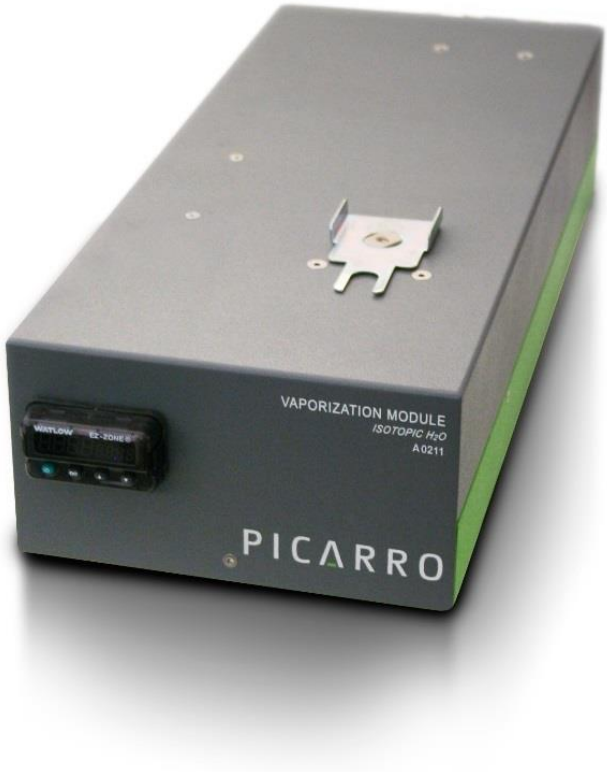
PICARRO

A0211 High-Precision Vaporizer
User Manual



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Notices

Thank you for purchasing a Picarro product. Your Picarro Vaporizer is a quality product that has been designed and manufactured to provide reliable performance.

This manual is an important part of your purchase as it will help familiarize you with the Vaporizer and explain the numerous features that have been designed into it. Please read this manual thoroughly before using your Picarro Vaporizer.

Please contact Picarro or your authorized Picarro distributor should you have questions regarding specific applications or if you require additional information.

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1. Introduction

This manual provides details on the installation and operation of the Picarro A0211 High Precision Vaporizer when used in conjunction with Picarro L2130-*i* or L2140-*i* instruments. The Picarro A0211 High-Precision Vaporizer in combination with the A0325 Autosampler is designed for high precision and delivers performance equaling or exceeding Isotope Ratio Mass Spectrometers (IRMS).

The vaporizer is also used as an interfacing device to calibrate ambient water vapor samples in conjunction with the Standards Delivery Module (SDM). This manual serves as a good general reference for the Vaporizer, but information on assembly and pairing with the SDM is largely located in the *A0101 Standards Delivery Module CRDS Setup User Manual* (document # 40-0005).

The Vaporizer is also often paired with the A0214 Micro Combustion Module (Figure 2). Instructions on installing or removing this additional module can be found in the *A0214 Micro Combustion Module™ (MCM) User Manual (*document # 40022). Importantly, systems using the MCM must use dry zero air, which contains O_2, as the carrier gas. Samples run through the Vaporizer and MCM with N_2 will not combust away organics.

1.1 Intended Use

The A0211 High-Precision vaporizer is an auxiliary module controlled by the Picarro L2130-i or L2140-i water isotope analyzer. Its main purpose is to vaporize discrete liquid sample and to dilute the water vapor with a water-free gas carrier such as Nitrogen or Zero Air before sending it to the inlet port of the analyzer. The vaporizer comes with an external vacuum pump that is needed to evacuate the vaporizer chamber of ambient air or prior samples.

Figure 1: A0325 Vaporizer Front Panel

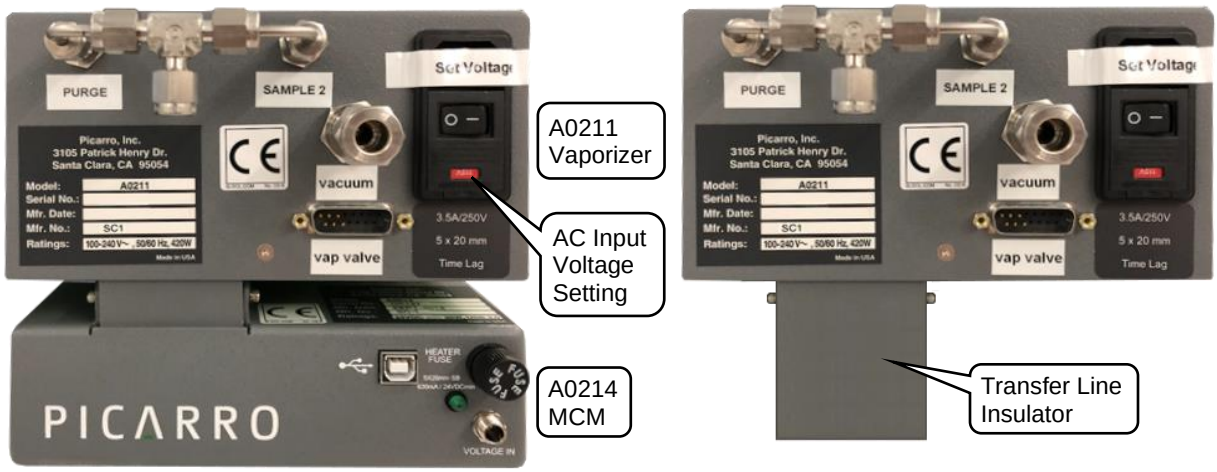


Figure 2: A0211 Vaporizer Rear Panel with/without A0214 MCM Attached

Figure 3: Vacuum Pump for Vaporizer – Side Views

1.2 A0211 Specifications

Table 1: A0211 Vaporizer Specifications

Parameter	Specification
Temperature Range	10 to 40 °C (ambient) –10 to 50 °C (storage)
Humidity	<85% R.H.
Liquid injection	1.8 µL (typical)
Liquid Salinity	Up to 200 g/l

Parameter	Specification
Swagelok Fittings	1/8” A0211 connections 1/4” Analyzer inlet connection 3/8” Vacuum connections
Operational Gas Flow N2 or Zero Air (< 100 ppm H_2O)	< 100 sccm
Standby Gas Flow N2 or Zero Air (< 100 ppm H_2O)	< 50 sccm
Dimensions	Width: 6.3” (16 cm) Height: 4.5” (12 cm) Length: 15.9” (41 cm)
Weight	12 lbs (5.4 kg)
Power Requirements	100 - 240 VAC 43 to 63 Hz, (Auto-sensing) 420 W at start-up 42 W during operation
Software	Picarro Analyzer Software Module

Table 2: Vacuum Pump Specifications

Parameter	Specification
Weight	6.5 kg (14.3 lbs)
Supply voltage or voltage range:	100 – 240 VAC (Voltage must be set manually per your region. See Section 4.2, Vacuum Pump Setup)
Frequency or frequency range:	50 – 60 Hz
Power or current rating:	150 W at start-up 150 W during operation

1.3 Acronyms

This manual may include various acronyms, units, and symbols.

Table 3: Acronyms, Formulas, Units, and Symbols

Acronym	Definition
cm	centimeters
CRDS	Cavity Ring-Down Spectroscopy
DAS	Data Acquisition System (the Analyzer)
GUI	Graphical User Interface
H_2O	Water
HB	Hotbox
MCM	Micro Combustion Module
mm	millimeters
ppm	Parts Per Million
SDM	Standards Delivery Module
TDS	Total Dissolved Solids
WB	Warm box
WLM	Wavelength Monitor Purge Port. The Port on the Analyzer the dry gas connects to. This keeps the spectroscopy accurate.
” (as in 1/4”)	Inches
‰	per mil
°C	Degrees Celsius

1.4 Text Conventions

The following conventions are used in the manual.

- *Italic* text identifies screen names, section reference links, and to emphasize important text or certain features.
- ***Bold Italic*** text identifies section reference links.
- **Bold** text is for actions to take (such as clicking on a UI button), caution and warning statements, and text you should type or select in screens.

2. Safety

2.1 Warning Symbols

The following icons are used throughout this manual to emphasize important information in the text. These icons indicate dangers to either the operator or to the vaporizer, and other important information.

Table 4: Warning/Information Icons

	Consult the user manual for important information (When you see this symbol placed at hazard points on equipment, consult the user manual).
 **NOTE**	**NOTE** is important information that you should be aware of before proceeding.
 **CAUTION**	**CAUTION** alerts you of a potential danger to equipment or to the user.
 **WARNING**	**WARNING** indicates an imminent danger to the user.
 **CAUTION**	**CAUTION** alerts user to high temperature hazard.
 **CAUTION**	**CAUTION** alerts user to electrical hazard.
 **REMINDER**	**REMINDER** is a helpful hint to procedures listed in the text.

2.2 General Safety

CE Certification

This Picarro product complies with European safety standards and the instrument is affixed with a CE label. This CE label is located on the rear of the instrument.

WARNING

Using this Vaporizer in a manner not specified by Picarro may result in damage to the vaporizer and render it unsafe to operate.

WARNING

The Vaporizer is for indoor use only and has an ingress protection rating of IPx-0. It is NOT protected against exposure to water including dripping, spraying, splashing or immersion.

WARNING

Do not operate in an explosive atmosphere. Do not operate in the presence of flammable gases or fumes.

CAUTION

The Vaporizer contains no user serviceable components except the Injection Port Septum, Salt Liner (if used), and Fuse. Do not attempt any other repairs. Instead, report all problems to Picarro Customer Service or your local distributor. Please contact Picarro if you have any questions regarding the safe operation of this equipment.

WARNING

This Vaporizer is designed to be used in an indoor environment. Do not operate or store the unit outside or exposed to the elements.

WARNING

If this equipment is used in a manner not specified by Picarro, the protection provided by the equipment may be impaired.

3. Unpacking

3.1 Inspect the Shipping Box

Picarro products are inspected and tested before leaving the factory. The shipping boxes provide proven safety from most dropping, crushing or spiking events.

Picarro shipping containers consist of:

- A Vaporizer box
- A Pump box

If the equipment arrives damaged, photograph the damage and contact Picarro (email pictures if possible) for consultation on best course of action.

3.2 Unpack the Shipping Boxes

Unpack the shipping boxes.

Table 5: Shipping Box Contents

Box 1 Contents	**Details**
High-Precision Vaporizer	Includes hardware and controller to vaporize liquid sample and send the gas sample to the Picarro analyzer.
A/C Power Cables (2)	Two power cables with connectors appropriate to your country are provided. The pump and vaporizer must be adjusted to local voltage.
Valve Control Cable	For communication between the vaporizer and analyzer.
MCM (if purchased)	Microcombustion Module, attached to the bottom of the vaporizer if purchased.
Transfer line insulator	If instrument ships with MCM, an inlet cover for protecting the line between the A0211 and instrument is provided in a small clear bag. Otherwise, this small gray box will be attached to the bottom of the vaporizer.
Box 2 Contents	**Details**
Pump Module	Provides vacuum required for purging the high-precision vaporizer. The pump must be adjusted to the local voltage. Follow the instructions in Section 4.2, Vacuum Pump Setup.

4. Hardware Setup

CAUTION

When the A0211 Vaporizer and the analyzer is being integrated to an external system, the safety of that system is the responsibility of the assembler of that system.

WARNING

Using this vaporizer in a manner not specified by Picarro may result in damage to the vaporizer and render it unsafe to operate.

CAUTION

During installation and operation, do not position the vaporizer so that it is difficult to operate the disconnecting device.

CAUTION

Do not block the vaporizer fan openings. The vaporizer must have 4-inch clearance at front and back to keep the temperature below 35 °C (the optimum operational temperature). Blocked fans result in lower airflow and can cause the analyzer to overheat.

CAUTION

Use the AC power cable supplied with the vaporizer or a similarly rated cable. Check with Picarro technical support if you have questions about power cable replacement. An inadequately rated power cable can result in equipment damage.

CAUTION

Cords shall be RATED for the maximum current for the equipment and the cable used shall meet the requirements of IEC 60227 or IEC 60245. Cords certified or approved by a recognized testing authority are regarded as meeting this requirement. The connector type used should be: IEC320 C13.

4.1 Vaporizer Setup

1. Connect the Vaporizer and the Analyzer using a Valve Cable: Attach the 15 pin end of the valve cable to the port labelled **Vap Valves** on the vaporizer and connect to the port labelled **Valves** on the analyzer (third connector from the left at the bottom row of the Analyzer).
2. Remove the caps from the vaporizer and analyzer gas connection inlet and vacuum connection ports. Save the caps from the vaporizer, analyzer, and pump. Reinstall the caps when these components are stored, moved or shipped.

WARNING

The inlet gas connector on the back panel of the Analyzer, and its immediate vicinity, runs hot during operation of the analyzer. Take care when connecting gas lines or working at the rear of the instrument to wear protective gloves or avoid contact with these surfaces.

3. Connect the Vaporizer (or Vaporizor with MCM) and the Analyzer via the gas delivery line as shown in Figure 4 and Figure 5. If using an autosampler, carefully align the analyzer and the autosampler relative to each other such that the gas delivery line hanging from the Vaporizer (or the Vaporizer/MCM) lines up to the inlet port of analyzer. Do not bend the delivery port in the process. If using an SDM or performing manual injections, seat the vaporizer feet on top of the instrument with the connection points aligned.

   If the delivery port is not horizontally aligned with the analyzer inlet port, either **a)** gently move the position of the vaporizer on the autosampler rail by loosening the clamps and retightening them after alignment, or **b)** move the instrument slightly to the left or right until the two align.

4. Verify the voltage of the vaporizer is set correctly (120 V or 220 V) by looking below the main switch under the “Set Voltage” tape. If the voltage shown is not correct, follow the instructions in ***Maintenance*, *Section 7.4***, to remove the fuse block. Flip the block over to set it to the proper voltage.

CAUTION

If the voltage of the vaporizer is not set properly to your power source voltage, the fuse will blow as soon as you turn on the vaporizer.

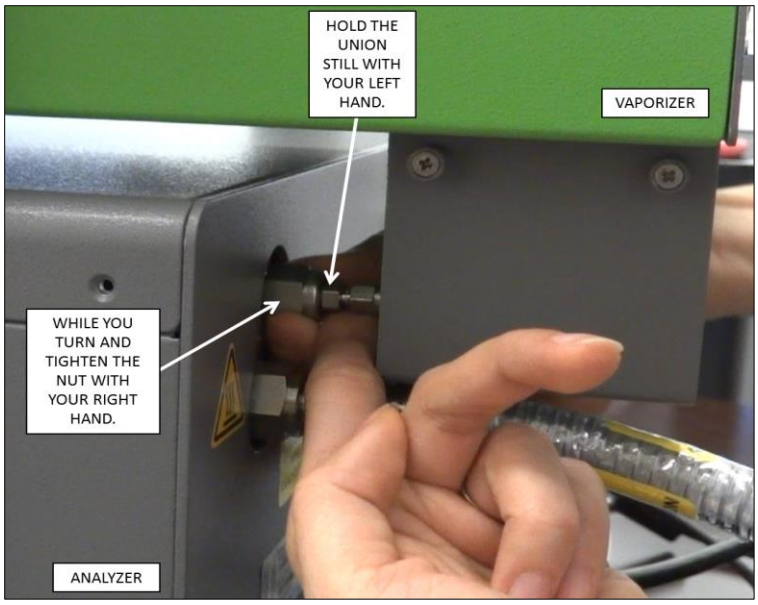


Figure 4: Aligning and Attaching Vaporizer Outlet to Analyzer Input

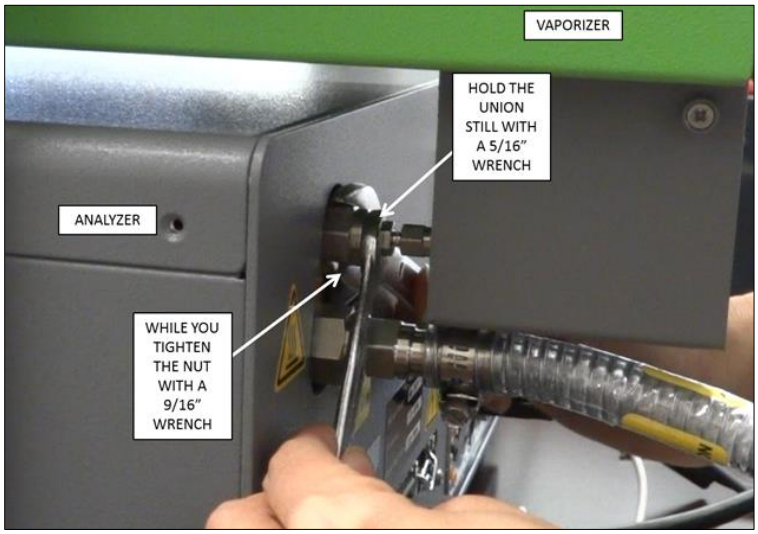


Figure 5: Tightening Vaporizer Outlet at Analyzer Input

4.2 Vacuum Pump Setup

5. Remove the caps from external vacuum pump. Save the caps for later use. Reinstall the caps when the pump is stored, moved, or shipped.
6. Set the vacuum pump input voltage to the correct level for your area by rotating the voltage selector switch located on the side of the pump next to the fuse holder (Figure 6).

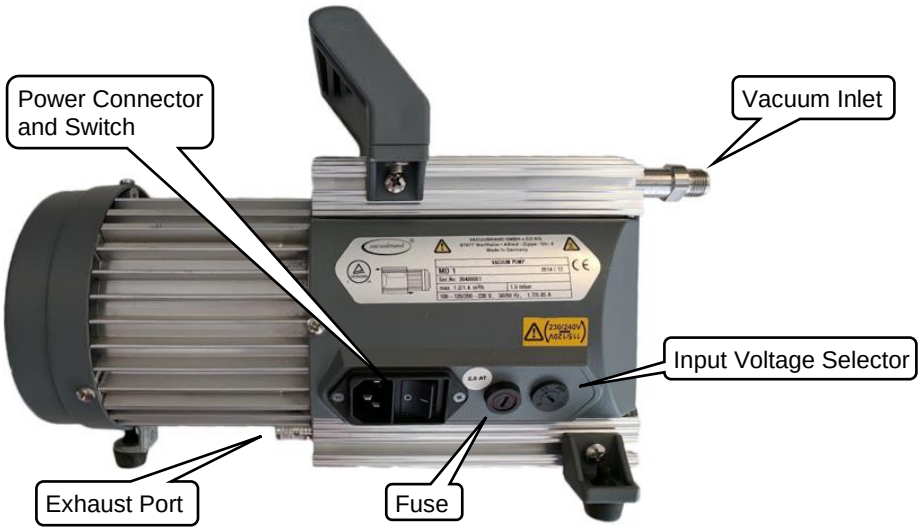


Figure 6: Vacuum Pump Voltage Selection

7. Attach the vacuum line between the vaporizer 3/8" vacuum port and its external vacuum pump. Hand tighten the nut, then make an additional 1/4 turn with an 11/16" wrench.

8. If not already done, attach the vacuum line between the analyzer 3/8” vacuum port and the external vacuum pump. Hand tighten the nut, then make an additional 1/4 turn with an 11/16” wrench.
9. Connect the AC power cable to the external vacuum pumps but do not plug the power cables into the wall.
10. If necessary, attach a tube to the external vacuum pump exhaust port and route the other end of the tube to a safe place for venting the mixture of sample gases.

5. Dry Gas Setup

A dry gas supply is required for the analyzer and the vaporizer. A large DrieRite container can be used for deployments where gas cylinders are not available. However, compressed gas cylinders provide a more consistent background and more maintenance-free operation.

For North American customers, Picarro strongly recommends purchasing the #A0923 “Zero air dry-gas kit” or #A0921 “N2 dry-gas kit” from Picarro, as these kits come with all recommended hardware, a cylinder pressure regulator with an appropriate delivery pressure range, and a set of tools and instructions on how to assemble the kit.

International customers should choose their regulators and hardware in consultation with a relevant application scientist or support specialist from Picarro, and in conjunction with their relevant compressed gas provider (e.g., Air Liquide). Along with this kit or equivalent parts, the customer will need to provide a cylinder adequate for providing dry gas to the instrument, typically for months to years. The customer’s local gas provider will be the best resource on which cylinders fit this description, but the customer should ensure the following:

- The tank should be high pressure, typically containing 1500+ psi of gas
- The tank should be compatible with CGA580 (N_2) or CGA590 (zero air) threads in North America, or with other relevant international thread standards for N_2 or air.
- The regulator should have a low delivery pressure range, ideally 0-10 psig, so that the customer can provide 2-3 psig pressure to the instrument reliably. Regulators with, e.g., 0-100 psig delivery ranges are not appropriate, and may damage the internal components of the vaporizer.

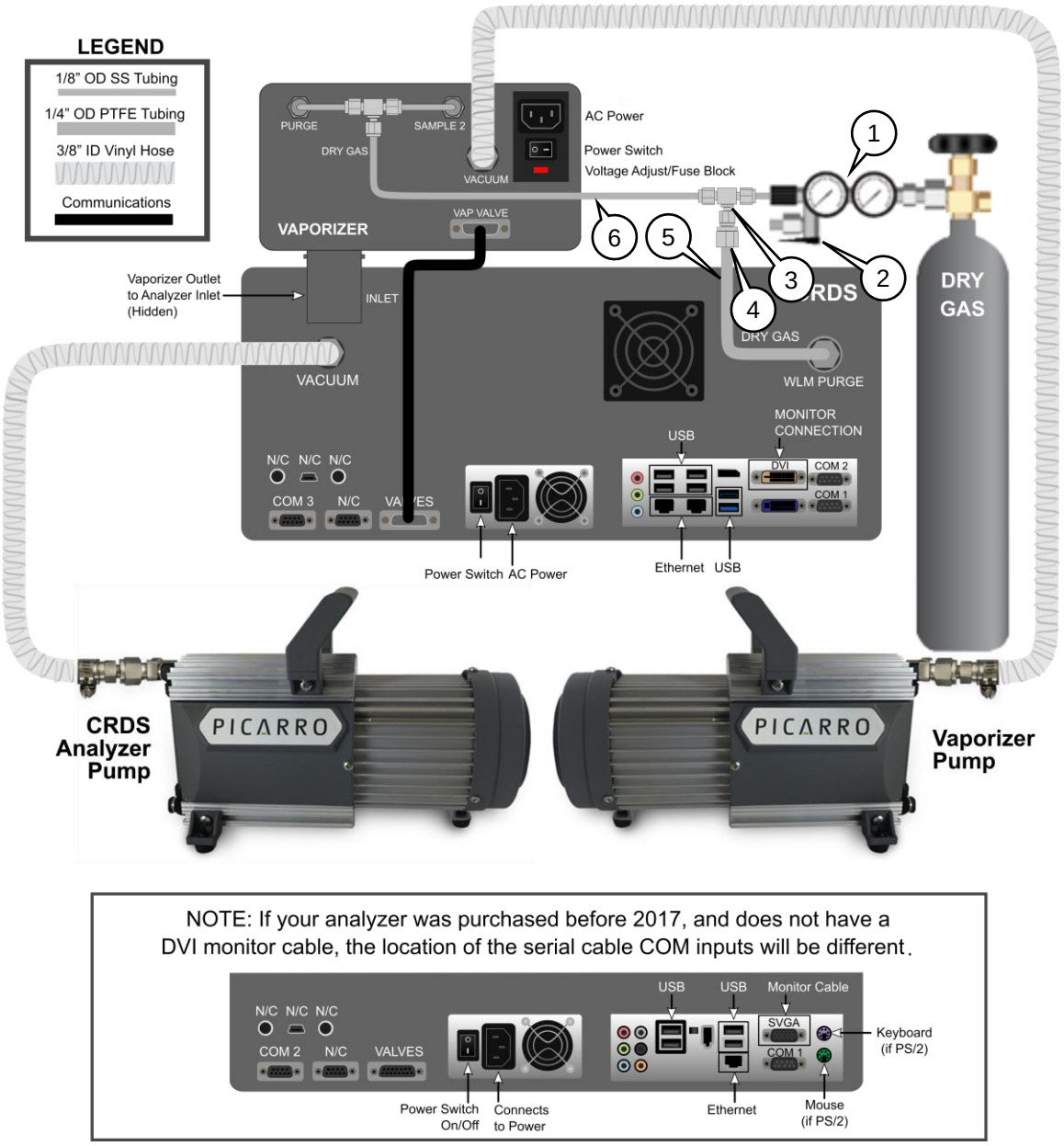
WARNING

When using compressed gases, follow all appropriate safety conventions, including use of eye protection, physical restraint of cylinders, etc.

5.1 Dry Gas Setup – Typical Configurations

Dry Gas Setup – A0211 Vaporizer

Figure 7 below illustrates how to connect dry gas to the water analyzer for setups not including the MCM. Please follow the instructions for setup in the ***L2140-I and L2130-I Isotopic Water Analyzer and Peripherals Installation and Operation Manual, PN 40035***.

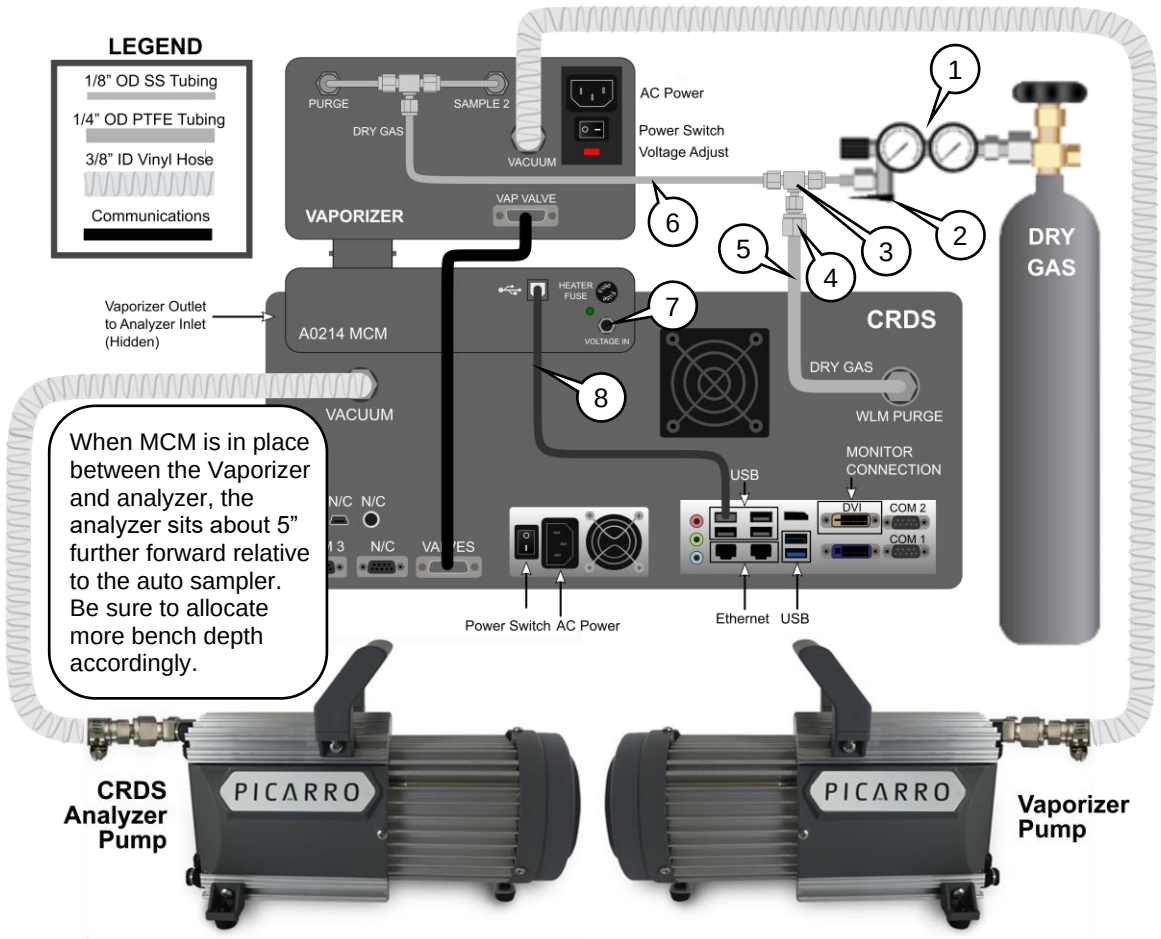


1. Q1-14B-580 (N_2) or Q1-14B-590 (zero air) or equivalent international regulator.
2. SS-OGM2-S2-A Swagelok Toggle Valve
3. SS-200-3 Swagelok 1/8" stainless steel Tee union
4. SS-400-R-2 Swagelok 1/8" (adapter fitting) to 1/4" (tube fitting) Reducing Union
5. 5033K31 McMaster-carr 1/4" OD Teflon (PTFE) tubing
6. SS-T2-S-028-20 Swagelok 1/8" OD stainless steel tubing

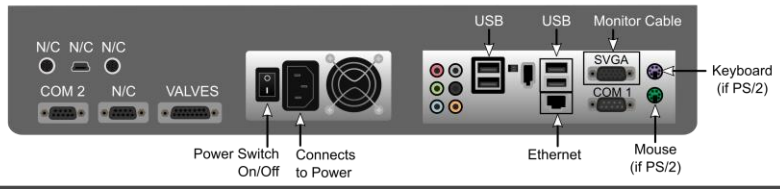
Figure 7: Dry Gas Connection Diagram

Dry Gas Setup – A0211 Vaporizer with A0214 Micro Combustion Module (MCM)

Figure 8 below illustrates how to connect dry gas to the water analyzer for setups that include the MCM. Please follow the instructions for setup in the ***L2140-I and L2130-I Isotopic Installation and Operation Manual, P/N 40035***.



NOTE: If your analyzer was purchased before 2017, and does not have a DVI monitor cable, the location of the serial cable COM inputs will be different.



1. Q1-14B-580 (N_2) or Q1-14B-590 (zero air) or equivalent international regulator.
2. SS-OGM2-S2-A Swagelok toggle valve
3. SS-200-3 Swagelok 1/8" stainless steel Tee union
4. SS-400-R-2 Swagelok 1/8" (adapter fitting) to 1/4" (tube fitting) Reducing Union

5. 5033K31 McMaster-carr 1/4" OD Teflon (PTFE) tubing
6. SS-T2-S-028-20 Swagelok 1/8" OD stainless steel tubing
7. MCM power connection from included power adapter
8. MCM USB communication from Analyzer

Figure 8: Dry Gas Connection Diagram – A0211 with A0214 MCM

5.2 Dry Gas Setup – Other Configurations

For all other configurations (e.g., Dual Mode, Manual Injections, Standards Delivery Module), see the relevant manuals, or see document 40035: ***L2140-i and L2130-i Isotopic Water Analyzer and Peripherals Installation and Operation Manual***.

6. Vaporizer Operation

6.1 Vaporizer Startup

The vaporizer typically takes tens of minutes to reach its 110 °C temperature setpoint. Start the vaporizer from the rear on/off switch around the same time as the L21x0-i instrument. Ensure that the carrier gas (zero air or N_2) is on and that the delivery pressure to the vaporizer is set to 2-3 psig. Gas will begin to flow through the vaporizer once the instrument reaches the cavity temperature and pressure setpoints, and initiates measurements.

6.2 Vaporizer Shutdown

The vaporizer will not shut down automatically when the L21x0-i instrument does. The vaporizer can be shut down via the rear on/off switch any time after the instrument shutdown procedure is initiated from the data viewer.

6.3 Recovery from Power Outage

After a power outage, the vaporizer will automatically start up and attempt to return to its 110 °C (nominal) temperature set point. If short power outages will be a routine operating environment, Picarro recommends using power conditioning or an uninterruptable power supply (UPS) to help prevent damaging the operating system, and to avoid software corruption problems.

6.4 Vaporizer Temperature Setting

The temperature in the vaporizer chamber is set via the controller pad located in the front of the vaporizer panel and should not need to be changed from the factory default value of 110 °C for the vast majority of customers.

If the set temperature must be adjusted for a good reason, the customer may do so by firmly pressing the up or down arrow. The green setpoint will change within a second or two, while the red (measured) value will change more slowly as the system warms or cools to reach the setpoint.

Figure 9: Temperature Controller

NOTE

The optimum vaporizer temperature setpoint is 110 °C.

6.5 Vaporizer Control

The Vaporizer is fully controlled by the Analyzer once it is turned on from the rear on/off switch.

1. Make sure the hardware setup is complete and the system turned on in the correct sequence. Refer to the **L2140-*i* and L2130-*i* Isotopic Water Analyzer and Peripherals Installation and Operation Manual, P/N 40035**.
2. Once the analyzer is turned on, the main CRDS Data Viewer of the analyzer will open automatically on the desktop screen. To understand all the functions of the main CRDS Data Viewer, see CRDS Data Viewer Functions section in the same **L21xx-*i* User Manual.** A sequence of start-up messages will also appear in the Status Log Message window of the main CRDS Data Viewer. For definitions, see **Common Status Log Messages**.
3. Double click on the **Coordinator Launcher** icon on the desktop.

   The coordinator software allows the analyzer to take measurements from multiple samples and is used to control the sample source and match the corresponding real time readout with the sample source. To learn more about the coordinator software (running the software, loading sample description, functions of the coordinator window), see the **Coordinator Software** section in the analyzer manual.
4. Choose and launch an appropriate coordinator mode from the choices in the drop down menu. The coordinator window will pop up.

NOTE

Customers with an MCM on their Vaporizer must select the "MCM" version of each of these Coordinator modes. Failure to use the MCM mode will lead to sample cooling and condensing in the MCM during the analysis period and can lead to biasing effects and inconsistency.

When using the MCM version, users will be asked whether to run the Coordinator software with the MCM "Warm" or "On". Customers should run it with the MCM on unless there is a strong desire to extend the life of the MCM when running very pure samples for which organics content is expected to be extremely low.

L2130-*i* Operation Modes

The modes available in the **L2130-*i*** in which the analyzer controls the vaporizer are:

- **Manual Inject:** Used for semi-automated measurement of liquid water samples with high precision. Requires A0211 High Precision Vaporizer and A0322 Syringe Guide. User manually injects samples after prompt. The vaporizer control and the analysis of liquid samples are automated. Each injection cycle takes 9 minutes.
- **High Throughput:** Used for faster measurement of liquid water samples with good precision. Automatically injects and analyzes liquid water samples. Each injection cycle takes 4 minutes.
- **High Precision:** Used to measure liquid water samples with maximum precision. Automatically injects and analyzes liquid samples. Each injection cycle takes 9 minutes.

The High Precision and High Throughput Coordinator Modes operate in the same fashion except that the steps of sample preparation and analysis are faster in the high throughput coordinator.

L2140-*i* Operation Modes

The modes available in the **L2140-*i*** in which the analyzer controls the vaporizer are:

- **O17 Manual Inject:** Used for semi-automated measurement of liquid water samples for $\delta^{18}O$, $\delta^{17}O$, δD, and ^{17}O-excess. Requires A0211 High Precision Vaporizer and A0322 Syringe Guide. User manually injects samples after prompt. The vaporizer control and the analysis of liquid samples are automated. This coordinator must be run in either the iH2O N2 O-17 mode or the iH2O Air O-17 mode. In this mode the coordinate will output $\delta^{17}O$ and ^{17}O-excess. Each injection cycle takes 9 minutes.
- **Manual Inject:** Used for semi-automated measurement of liquid water samples with high precision on $\delta^{18}O$ and δD. Requires A0211 high

precision vaporizer and A0322 Syringe Guide. User manually injects samples after prompt. The vaporizer control and the analysis of liquid samples are automated. Each injection cycle takes 9 minutes.

- **High Precision:** For interfacing with an autosampler for highest precision measurements of $\delta^{18}O$ and $\delta^{2}H$. This coordinator must be run in either the iH2O N2 mode or the iH2O Air mode. In this mode the coordinate **will not** output $\delta^{17}O$ and ^{17}O-excess. Each injection cycle takes 9 minutes.
- **High Throughput:** For interfacing with an autosampler for faster measurements of $\delta^{18}O$ and $\delta 2H$ with good precision. This coordinator must be run in either the iH2O N2 mode or the iH2O Air mode. In this mode the coordinate will not output $\delta^{17}O$ and ^{17}O-excess. Each injection cycle takes 4 minutes.
- **O17 High Precision:** For interfacing with an autosampler for highest precision measurements of $\delta 1^{8}O$, $\delta^{17}O$, δD and ^{17}O-excess. This coordinator must be run in either the iH2O N2 O-17 mode or the iH2O Air O-17 mode. In this mode the coordinate will output $\delta^{17}O$ and ^{17}O-excess.

To learn about all the other coordinator modes supported by the Picarro water analyzer (in different setups), see **Coordinator Modes** section in the **L2140-*i* and L2130-*i* Isotopic Water Analyzer and Peripherals Installation and Operation Manual, P/N 40035**.

6.6 Coordinators using the Micro Combustion Module (MCM)

Customers with a Micro Combustion Module (MCM) on their Vaporizer must select the **MCM** version of each of respective Coordinator modes mentioned above. Failure to use an MCM mode will lead to sample water vapor cooling and condensing in the MCM in between the vaporizer and instrument during the analysis period and can lead to biasing effects and temperature-linked imprecision.

When using the MCM version, users will be asked whether to run the Coordinator software with the MCM **Warm**, **On**, or **Off**. Customers should run with the MCM On unless there is a strong desire to extend the life of the MCM when running very pure samples for which organics content is expected to be extremely low. Setting the MCM to “warm” will keep the lines in between the vaporizer and instrument at roughly the temperature of the vaporizer, while turning the MCM on will set the combustion cartridge to a higher set point at which organics are combusted across the catalyst. An **Off** setting is available for diagnostic purposes, but not recommended for sample runs.

7. Maintenance

The Picarro Vaporizer requires minimal service or maintenance.

7.1 Vaporizer Injection Port Septum and Salt Liner (if used)

Septum (C0352)

The injector port septum should be replaced every 200-300 injections. The more closely grouped the needle piercings are on the septum, the earlier the septum will need to be replaced. If the septum is not changed, it will be difficult to maintain the vacuum inside the vaporizer, which will degrade the quality of the data. To purchase additional septa, visit store.picarro.com and enter C0352 in the Keyword Search pane.

Salt Liner (C0354)

Picarro recommends including a salt liner beneath the injection port septum if you are running water samples with significant salt content (brackish-saline). The salt liner captures dissolved solids as the water sample vaporizes to prevent the build-up of solids on the inside surfaces of the vaporizer. Swap out the liner every time you change the septum, about every 200 to 300 injections. To purchase additional salt liners, visit store.picarro.com and enter C0354 in the Keyword Search pane.

7.2 Required Tools and Materials

- Tweezers
- New septum
- New or clean salt liner (if used)
- 7/16 wrench (only if needed to remove injection port nut)

7.3 Replacing the Septum and Salt Liner (if used)

5. Is your autosampler running (i.e., actively injecting samples)?

If **yes**, click the **Change Septum** button in the Coordinator window (shown in Figure 10). This button is used to pause the autosampler and the vaporizer in the middle of an analysis to physically change the septum on the vaporizer.

If **no**, proceed directly to **Step 3**.

6. Wait for the **Change Septum** button to change to **Septum Changed** (Figure 10). This will happen when the current injection analysis is complete, sometimes taking several minutes.

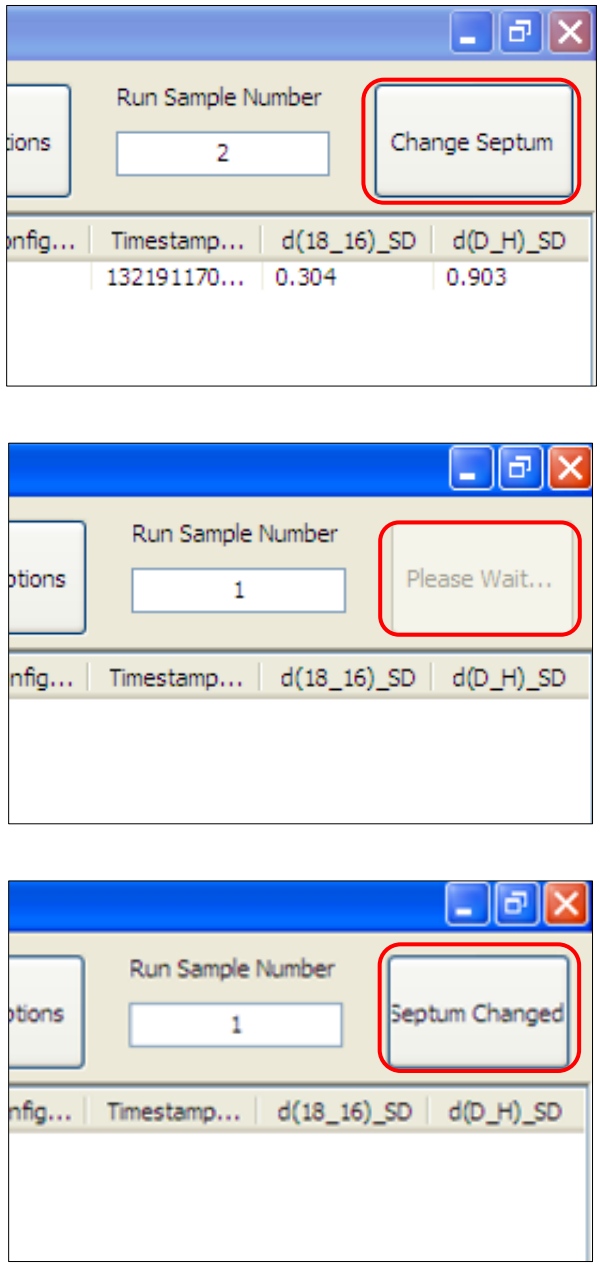


Figure 10: Change Septum Button Status Modes

7. Remove the protective metal cover from the injection port. There is a piece of insulation foam attached to the cover plate. Ensure that it stays attached to the plate. See Figure 11.

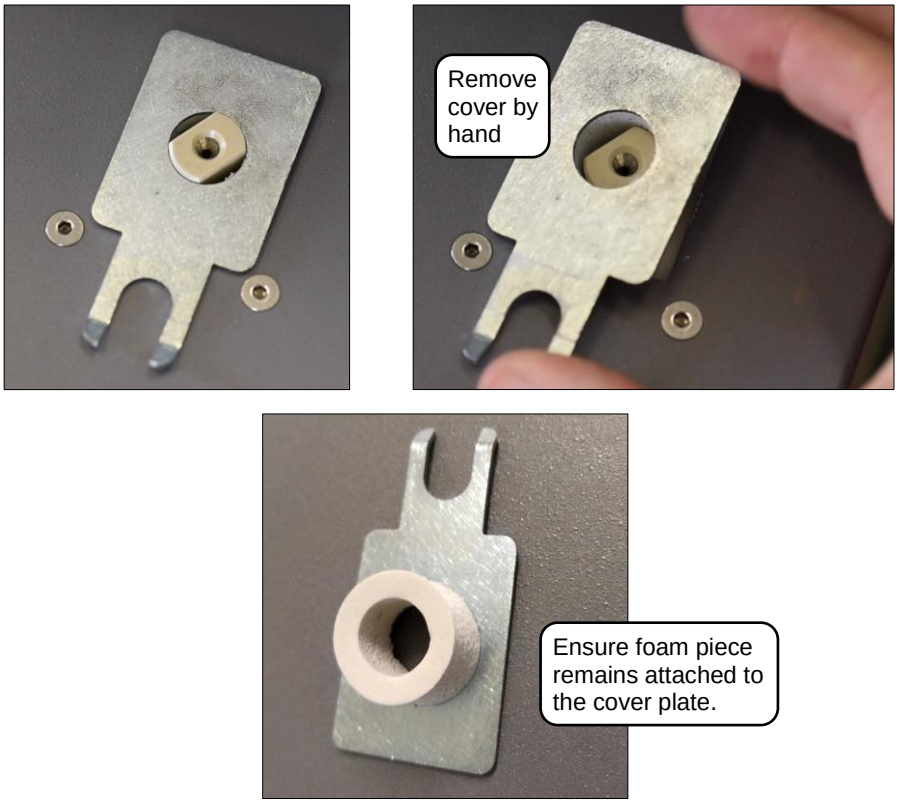


Figure 11: Injection Port Septum Cover Removal

8. Unscrew the cap of the port. If unable to unscrew by hand, loosen it with a wrench (but do not use the wrench when reinstalling).

WARNING

The bottom of the cap is very hot. Avoid direct contact to prevent burn injury.

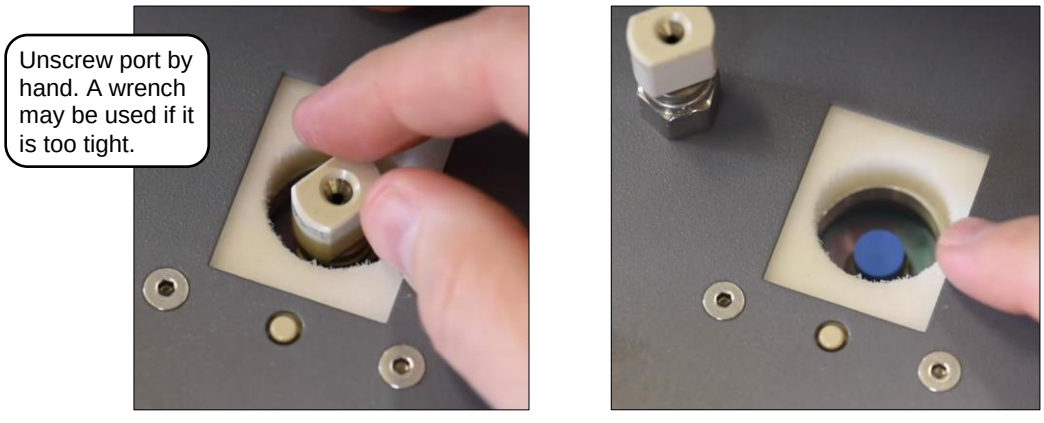


Figure 12: Port Cap Removal Exposing Septum (Blue)

9. The old septum will usually stick to the port, but if it is in the cap, use tweezers or a pick to remove the old septum.
10. If your system uses a salt liner, remove it at this time. Swap out the liner every time you change the septum; about every 200 to 300 injections. Soak it in deionized (DI) water until clean, or sonicate (remove the gasket first) to remove residue.

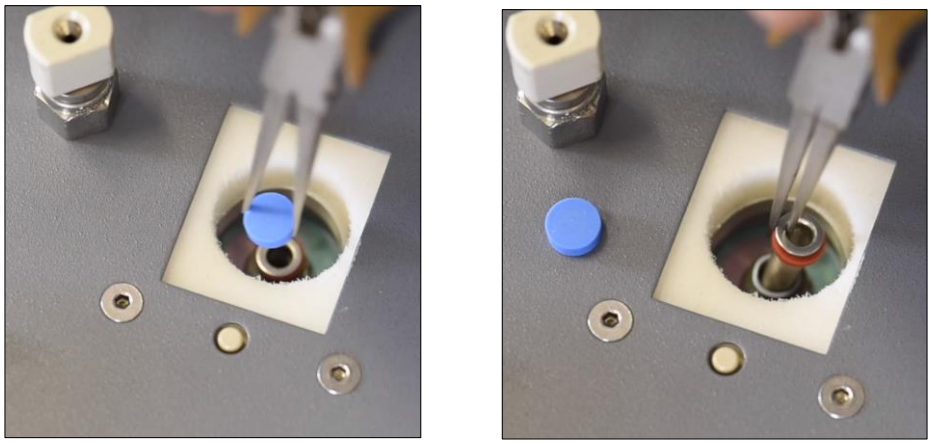


Figure 13: Septum and Salt Liner Removal (if used)

11. If used, insert a clean salt liner into the port.
12. Insert a new septum into the cap and screw the cap back onto the port by hand until it comes to a hard stop. This should be finger-tightened only. Do not use a wrench to tighten.

CAUTION

Equipment Damage: Do not over-tighten with a wrench, as the injector port may become damaged.

13. Replace the metal cover around the injection port.
14. If you did not use the Change Septum Button in the Coordinator window to change the septum, proceed to **Step 11**. Otherwise, click the Septum Changed button. The analyzer will restart the vaporizer purge cycle and then wait for the next sample injection.
15. Press **Continue** on the user interface; the analyzer will restart the vaporizer purge cycle and then wait for the next sample injection.

CAUTION

When using the coordinator Change Septum button in the middle of a run, try to do so before the first injection of a new sample. If performed on subsequent injections, the sample should be flagged, as ambient air memory effects may bias one or more injections.

7.4 Main Electrical Fuse Replacement

WARNING

When replacing the fuse, ensure the new one has the same rating as the original.

WARNING

Before replacing a fuse, make sure that the power switch is in the OFF position (Figure 14 left image), and that the power cord is disconnected.

Tools Required

- Flat head screw driver or long nose pliers

Replacing Main Electrical Fuse

1. Disconnect the main line power.
2. Use a small/flat tool (long nose pliers or flat head screw driver) to pry open the black power box door.
3. The power box door flips open as shown. Use the same tool to pry out the red fuse box. The fuse box slides out as shown.

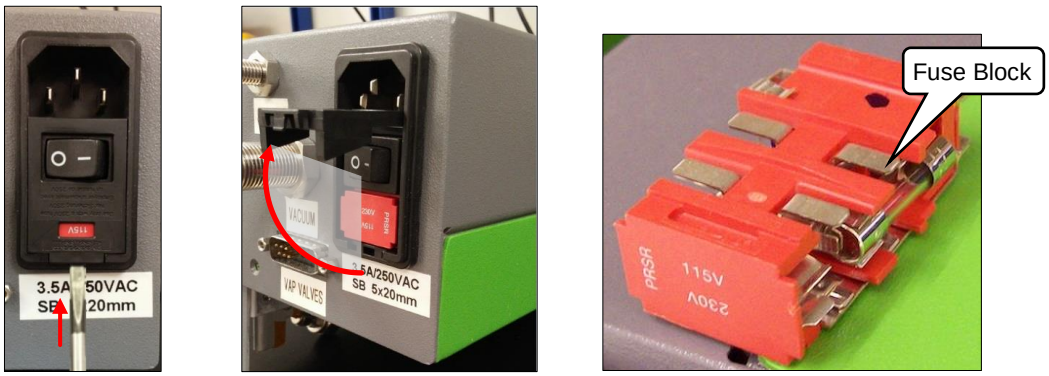


Figure 14: Fuse Replacement

4. Hold the fuse block so that the desired power supply voltage is read at the top. The fuse (3.5 A / 250 Vac Slow Blow 20 mm x 5 mm fuse) should be installed on the right side. On the opposite side, there should be no fuse and the clip should be in the correct position

7.5 Cleaning

Clean the outside of the vaporizer with a clean dry cloth. Only certified service technicians should access or clean the inside of the vaporizer.

8. Troubleshooting

This section lists problems that may occur during installation and operation of the vaporizer, and the corresponding step-by-step procedures provide resolution in most cases. If, these solutions do not solve the problem, contact Picarro Technical Support.

8.1 Vaporizer Controller Panel Does Not Illuminate

Pressing the back panel ON switch does not start the vaporizer. The controller panel is illuminated when the vaporizer is on.

1. Check that the AC power cord is attached and plugged into a working outlet.
2. Check that the rear ON-OFF switch near the AC power cord is in the ON position.
3. Check the voltage is set to proper voltage.
4. Check the fuse in the fuse box is not blown.

8.2 Incorrect Water Concentration Pulse Shape During Injection

During the sample analysis, the peak shape of the water concentration is not flat during the injection.

1. Check that the injection port nut is tightly fastened.
2. Check that the septum is not worn out.
3. Ensure the connection to the analyzer inlet is tightly fastened.
4. Check the **Leak-free Operation with a High Precision Vaporizer** section of the ***L2140-I and L2130-I Isotopic Installation and Operation Manual, P/N 40035*** for additional suggestions on cause and troubleshooting.
5. Call or email Picarro Technical Support for further diagnostic assistance at support@picarro.com or +1 408 962 3991.

9. Transportation and Storage

If the A0211 vaporizer will be transported or stored, use the following procedure to prepare and repack it into the original packaging.

CAUTION

When shipping or relocating the vaporizer, it is important to protect it from mechanical shocks. Failure to do so can compromise its performance. When shipping, use its original packaging only.

9.1 Shutdown and Preparation

CAUTION

A flow of clean, relatively dry gas should always be directed to the instrument for several minutes prior to shutting down. Trapping a high-moisture content gas sample in the cavity can cause condensation damage to the mirrors as the instrument cools from its operating temperature. See the analyzer user manual for specific shutdown instructions for your model analyzer.

1. Click on the **Shutdown** button located on the left side of the UI Data Viewer window.
2. A window will pop-up (Figure 15) prompting the user to confirm the shutdown. Once confirmed, the analyzer software and hardware will turn off.

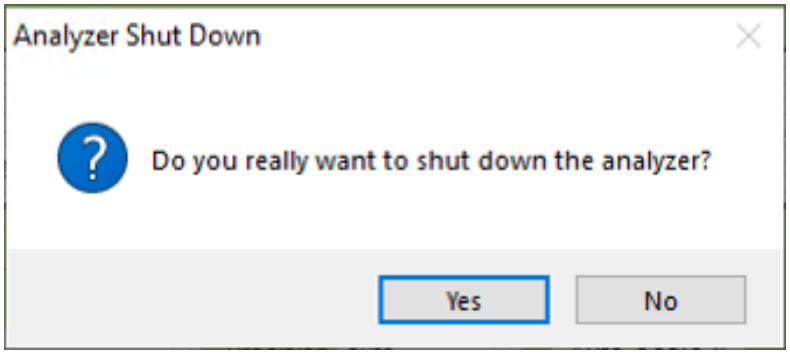


Figure 15: Shutdown Confirmation Pop-Up Dialog

3. Manually turn off the vaporizer, pump(s), and dry gas (if used).
4. Disconnect all tubing and electrical connections from the vaporizer.
5. To prevent contamination and possible damage to the connector threads, place caps on all gas connections.

9.2 Packing

1. Place the vaporizer in a plastic bag with a package of desiccant. Seal the bags with tape. If shipping the pump, do the same for it.
2. Pack the vaporizer and pump in their original shipping containers ensuring that all the foam pieces are in place to protect the equipment during shipping.