ABB C1D2
LGR ICOS Gas Analyzer
Installation Manual

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Table of Contents

1 Introduction 3

2 Safety 4
- Emergency Contact Information 4
- Operator Safety 4
- Heavy Object Lifting and Caution Labels 5
- Pinch Point Hazards 6
- Hazardous Voltages 7
  - Safety Provisions 7
  - Location of Hazardous Voltages 7
  - Electrical Safety Task Types 8
  - Electrical Hazards During Normal Operation 8
  - Electrical Hazards During Service Operation 8
- Laser Hazards 9
- Burn Hazards 10
- Fire Hazards 11
  - Safety Provisions 11

3 Instrument Installation 13
- Uncrating 13
- Mounting the Gas Analyzer 14
- Pre-power Component Inspection 15
- Gas Analyzer Facilitation 15
- Purge Controller Alarms Connections 16
- System Power Up & Communication Checks 18
  - Changing the Modbus IP Address 27
  - Verify 4 - 20 mA Signal Output 26
- Baseline Measurements 29
- Connecting Customer Inlet and Exhaust Gas Line 30
- Customer Gas Sample Measurements 31
- Tool Acceptance & Sign-off 31

ABB C1D2 Gas Analyzer Customer Acceptance 30

1 Introduction

This manual provides the steps to properly install the ABB C1D2 LGR ICOS Gas Analyzer, to validate its measurement performances, and to verify external communication capabilities.

The Gas Analyzer installation procedure is step-by-step, from uncrating the instrument through taking gas measurements for instrument acceptance and sign-off by the customer. The procedure assumes that the installation engineer has attended a training class in support of the Gas Analyzer.

To avoid bodily injury to one-self and fellow workers in the same working area, it is the responsibility of the installation engineer to follow the written procedure in the order indicated. Take heed of all warnings and cautions related to the installation of the Gas Analyzer.

When all panels are closed, the Gas Analyzer is a Class 1 instrument.

NOTE: The LGR ICOS Gas Analyzer is a Class 1 laser product

2 Safety

The following pages provide important safety precautions.

Emergency Contact Information

In the event of an emergency occurring during installation, use, or service of the ABB C1D2 LGR ICOS Gas Analyzer, contact the ABB field service department at:

1-650-965-7772

Do not attempt to use the instrument until the emergency condition is resolved.

Operator Safety

When its front user interface panel is closed and locked into position, the LGR ICOS Gas Analyzer instrument runs safely, without risk to the operator. Operating the instrument in any other condition can damage the equipment or injure personnel. Follow these general safety guidelines at all times.

NOTE: The LGR ICOS Gas Analyzer is a Category II (overvoltage category) installation.

Do not operate the Gas Analyzer when the front panel is open.

- The panel protects against electrical shock and explosion due to gas leakage in the surrounding area.
- Should a spark occur, the Gas Analyzer is designed 1) to maintain a specific internal pressure, 2) to dilute and purge the instrument of possible internal gas leak(s), and 3) to contain explosions.
- The Gas Analyzer has an internal pressure bypass switch. Do not use the bypass switch when the instrument inlet gas line is connected to a flowing customer gas line.

Warning! 	Bypassing the internal pressure switch to open the front panel during instrument operations can cause serious bodily injury due to possible explosion and/or direct exposure to customer gas from possible internal leaks.

Heavy Object Lifting and Caution Labels

The Gas Analyzer, which weighs approximately 248 lbs., qualifies as a heavy object.

Caution!	The LGR ICOS Gas Analyzer should not be hand-carried. It is recommended that the unit be rolled to its final mounting site with a floor fork lift or a wheeled table. Lifting the instrument to the final mounting location should be accomplished, with guidance, with a hoist or fork lift.

Do the following when relocating the LGR ICOS Gas Analyzer:

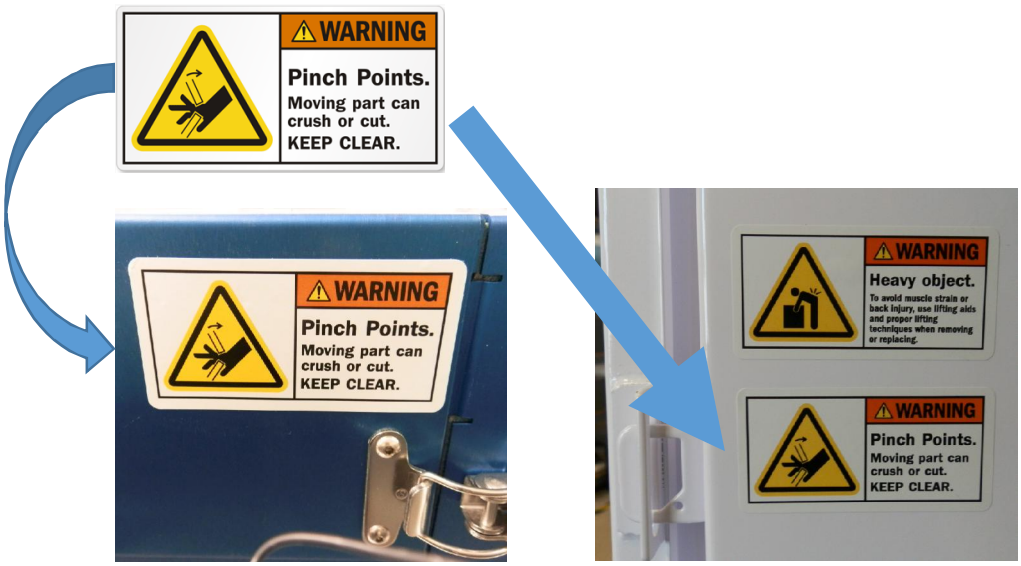
- Use a mechanical hoist, if available.
- Use a minimum of three people for lifting, moving and mounting the Gas Analyzer.
- Use proper lifting techniques:
    - Do not lift with your legs straight or from a forward bent position.
    - Bend your knees and lower your hips, using your leg muscles to lift.
    - Make sure that you stay as close to the load as possible.
- Test the load to make sure that you are able to lift it safely. If so, lift the load while keeping it as close to your body as possible.
- Avoid sudden movements and NEVER twist your body. A bending and twisting motion could cause the discs in your spine to rupture. If you have to turn the instrument, make sure that your hips and shoulders are always aligned; move your feet first so that you face the area where you can safely put down the load.
- If the load is not safe to lift by yourself, make sure that you get help. When two persons (or more) are performing the lift, make sure that your actions are synchronized. You must communicate with each other to avoid injury, and it is best for one person to make the calls so that you can lift together.
- Avoid lifting heavy objects with one hand. Always try to balance the load in both hands, or get a cart.

Fig. 1 Heavy Object Label and Location

Pinch Point Hazards

There are several pinch point hazards to personnel on or inside the Gas Analyzer. Pinch point hazard locations are marked with a pinch point label. One is next to the clamp that locks the blue heat shield in place, and the other is located on the instrument side panel.

Fig. 2 Pinch Point Label and Location

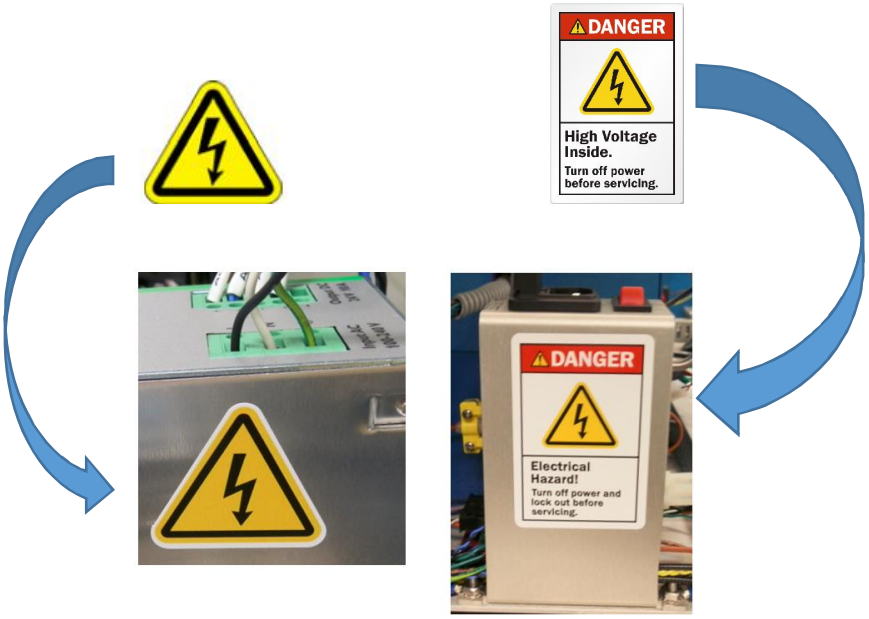


There are several pinch point hazards to personnel on or inside the Gas Analyzer. Pinch point hazard locations are marked with a pinch point label.

Hazardous Voltages

There are two voltage potentials operating above 30 volts RMS on the LGR ICOS Gas Analyzer. They provide 117V AC and are located at the power entry module that feeds the AC-to-DC voltage converter. Components at these two locations are marked with the electrical hazard label.

Figure 1 Electrical Hazard Label and Location



Safety Provisions

Insulation and enclosure protect instrument operators from contact with hazardous voltages during normal system operation. If a short circuit or other over-current condition occurs, the internal fuse protects the individual power supplies and disconnects the power line from the incoming power supply.

Location of Hazardous Voltages

Electrical hazard warning labels are applied wherever the removal of the panel can create an opportunity for contact with hazardous voltages.

Warning!	Only authorized personnel may perform maintenance inside the Gas Analyzer. Follow the “Lockout/Tag out” procedure (in the *Facility/Site Preparation Manual*) for the AC/DC power supply when servicing the Gas Analyzer.

Electrical Safety Task Types

When a procedure contains a task that takes place where exposure to electricity may happen, the task type is identified according to the *SEMI S2-93A* standard.

Should a technician or engineer perform additional communication connections on the LGR ICOS Gas Analyzer, be aware of the electrical task type encountered while performing these connections. Table 1 provides a list of SEMI S2-93A task types and their definitions.

Table 1 Electrical Safety Task Types

Type	Definition
Type 1	• Equipment is fully de-energized (electrically “cold”)
Type 2	• Equipment is energized • Live circuits are covered or insulated • Work is performed at a remote location to preclude accidental shock
Type 3	• Equipment is energized • Live circuits are exposed and accidental contact is possible • Potential exposures are less than 30 volts RMS, 42.2 volts peak, 240 volt-amps, and 20 joules
Type 4	• Equipment is energized • Live circuits are exposed and accidental contact is possible • Voltage potential are greater than 30 volts RMS, 42.2 volts peak, 240 volt-amps, 20 joules, or radio frequency (RF) is present
Type 5	• Equipment is energized • Measurements and adjustments require physical entry into the equipment, or equipment configuration will not allow the use of clamp-on probes

Electrical Hazards During Normal Operation

Normally, when the Gas Analyzer front panel is closed, the instrument is a Type 2 electrical safety task.

The insulation and front panel protect operators from electrical hazards. The front panel must remain in place during normal operation. The safety interlock, the instrument’s internal pressure interlock switch, protects operators from accidental exposure to Type 3 electrical hazards.

Electrical Hazards During Service Operation

Service to the LGR ICOS Gas Analyzer should only be performed by personnel that has completed service training for the instrument.

Personnel are not exposed to live circuits unless the front panel is opened and the pressure switch interlock is defeated or bypassed. Most service procedures require opening the front panel. During these tasks, service personnel is potentially exposed to Type 3 electrical hazards. A Type 4 electrical hazard is encountered when validating AC power coming from the facility while the outer case cover plate is removed from the AC inlet and purge.

There are no Type 5 tasks required for the Gas Analyzer.

Table 2 Type 3 Service Procedures

Procedures
Verifying the 24V DC power at the output of the AC-to-DC converter
Verifying the 24V DC power at the solid state relays, heaters, pumps, drivers, and Modbus

Table 3 Type 4 Service Procedures

Procedures
Verifying incoming and outgoing AC voltage at the port entry module
Verifying the AC voltage at the AC-to-DC converter

Laser Hazards

There are up to two lasers used in the LGR ICOS Gas Analyzer. The laser wavelength determines the type of gas to be measured. Under normal operation, with the instrument front panel closed, the Gas Analyzer spectroscopy device is a *Class 1 Laser Product* in accordance with *Title 21 Code of Federal Regulations, chapter 1, sub-chapter J*.

Class 1 Laser Product

Lasers used in the Gas Analyzer are rated Class 3B, >5 mW. Lasers are enclosed and not accessible unless the enclosure is removed for servicing. A laser warning label is affixed to the enclosure covering the laser(s).

Figure 2 Laser Radiation Labels

Lasers in the Gas Analyzer are not field serviceable. Should a laser failed in the field, the whole ICOS module will be replaced containing a complete aligned measurement optics. There is only one type of user-serviceable parts in the Gas Analyzer ICOS module: the ICOS mirrors that can be clean during preventive maintenance (PM) of the instrument.

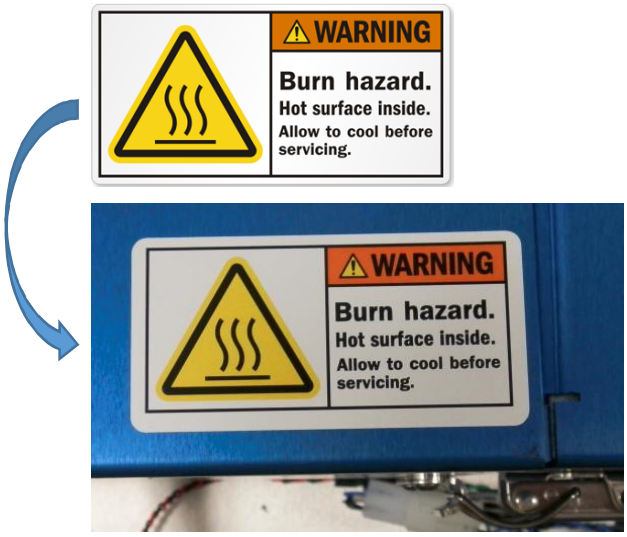
NOTE: Laser replacement requires the removal of the ICOS module from the main enclosure. The laser is contained within the ICOS module. The removed ICOS module can be ship back to ABB for repair.

Warning!	
	Lasers inside the Gas Analyzer are classified as Class 3B when accessed. Only trained service personnel is authorized to open the enclosure or service lasers.

Burn Hazards

Burn hazards are defined as components that can cause physical burns upon contact. The Gas Analyzer is designed to measure high-temperature gases at up to 105°C through the inlet gas line and throughout the ICOS module. The ICOS module is heated, and its temperature can be set up to maintain a 175°C operating temperature. The temperature set point of the ICOS module depends on the gas to be analyzed. Burn hazard labels are placed in the area of the instrument's inlet gas line and the ICOS insulated enclosure to help identify burn hazards inside the assembly.

Figure 3 Burn Hazard Label and Location



Burn hazards may be encountered during replacement or check of the ICOS heater, filter, thermocouple, and/or valve. Allow the system to cool off after it has been powered down for maintenance.

Fire Hazards

Small amounts of methanol and acetone are used to clean surfaces on the Gas Analyzer. A typical service procedure requires the use of less than 25 milliliters of such chemicals. These chemicals present a fire hazard. Use these chemicals only in accordance with local regulations and standards. Do not use these chemicals near open flames, sparks, or heat. Wipes soaked in such chemicals must be disposed of in accordance with requirements of 40 CFR, local fire department and environmental jurisdictions.

Figure 4 Fire Hazard Label

Safety Provisions

Follow these precautions when dealing with all chemicals:

- Keep all chemical containers away from heat, sparks, and open flames.
- Use only on grounded equipment and with non-sparking tools.
- Store in a cool, dry, and well-ventilated place, away from incompatible materials.

In case of a spill:

- Make sure all handling equipment is electrically grounded.
- Mop or wipe up, and then place all chemical-soaked items in containers approved by the US Department of Transportation (DOT) or the appropriate local regulatory agency.

Internal Pressure Switch

Both the X-Purge and Z-Purge Gas Analyzer is equipped with an internal pressure switch. Only the X-Purge internal pressure switch will cut off the AC power to the Gas Analyzer and prevent operators or service personnel from operating the instrument when the front panel is opened in a gaseous environment. This prevents possible explosions from sparks generated when connecting components or probing electronics in a live Gas Analyzer.

On Z-Purge configured instruments, the internal pressure switch only provides a warning signal if connected to the customer monitoring station. The switch will not remove AC power from the instrument.

Purging Air From Within The Gas Analyzer After Service

To prevent possible explosions upon power up, air inside the Gas Analyzer enclosure needs to be purged whenever the front panel was opened. To achieve this, the internal pressure interlock switch, part of the X-Purge controller, will not transfer power to the Gas Analyzer through its relay switch until the purge process is completed and the front panel is closed and sealed. Air within the Gas Analyzer enclosure will be diluted and replaced with either CDA from the customer facility to prevent any possibility of ignition. This process is automatically set on the X-Purge by the purge controller and takes about 22 minutes with the following condition: The source CDA pressure provided by the customer facility is ≥ 50 psi with the flow rate ≥ 57 LPM (2 SCFM).

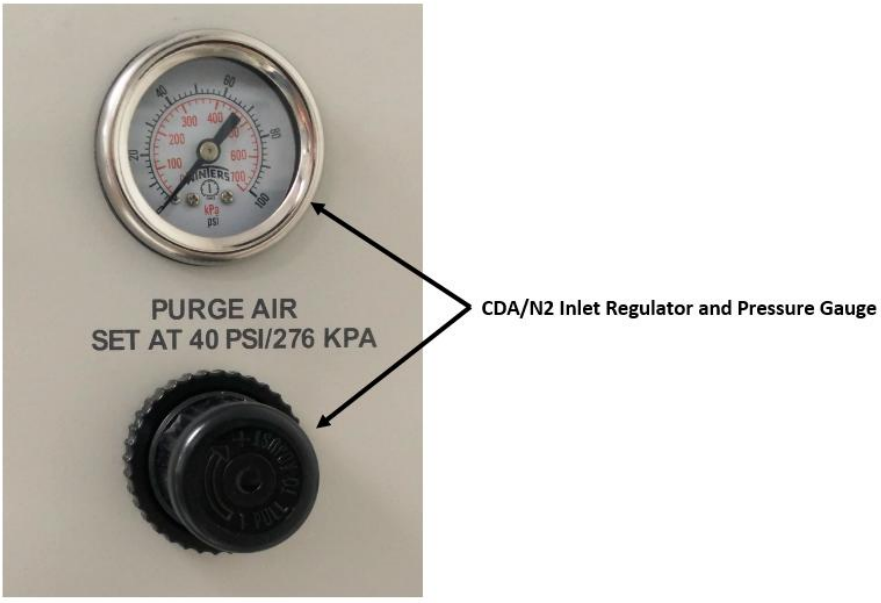
To purge air from a X-Purge configured enclosure:

STEP 1 Remove the internal pressure interlock switch bypass key from the bypass switch.

STEP 2 Close the front panel and secure it into place with all the locking clamps. If there is an air leak at the front panel while the instrument is pressurizing, the internal pressure interlock switch in the X-Purge configured instrument will not trip to allow power to pass through to the Gas Analyzer.

STEP 3 Verify there a pressure of at least 40 psi registers on the CDA inlet regulator.

Figure 5 Purge Gas Pressure Gauge and Regulator



STEP 4 Wait for the purge controller to finish purging air from within the Gas Analyzer enclosure, after about 22 minutes, the Gas Analyzer will restart for X-Purge configured instruments.

To purge air from a Z-Purge configured enclosure:

STEP 1 Close the front panel and secure it into place with all the locking clamps. If there is an air leak at the front panel while the instrument is pressurizing, the internal pressure interlock switch will trigger with an alarm, but will not stop the instrument from powering up.

STEP 2 Verify there a pressure of at least 40 psi registers on the CDA inlet regulator. If it does not register 40 psi, resolve the air leak and test again.

STEP 3 Wait for the purge controller to finish purging air from within the Gas Analyzer enclosure, after about 22 minutes, turn on the power from the GUA junction box to power on the Gas Analyzer.

Danger!	Failure to properly purge air from the instrument prior to its restart may cause serious injury or death from unexpected explosion.

3 Instrument Installation

Visually inspect the LGR ICOS Gas Analyzer crate for any damages from shipping. Check the Shockwatch to make sure that it did not exceed the 25g limit. Note down any fault, such as a hole in the crate, and report it to ABB's service management before uncrating the instrument.

If the crate is located outside, move it inside where the temperature in the enclosed area is similar to that of the instrument's final place for operation. When it is time to uncrate the instrument, if there is a large temperature difference between the outside location (where the crate was left) and the inside temperature, allow time for the instrument's internal temperature to match the temperature inside the enclosed area, thus preventing condensation from forming up on the instrument's surface when removing the protective bags.

Installation of the Gas Analyzer is a Type 4 electrical safety task.

Uncrating

When uncrating the Gas Analyzer, you will need three people able to lift a combined weight of 250 lbs.

Warning!	When lifting heavy objects, use a mechanical hoist, if available. Use at least three people to lift, move and mount the Gas Analyzer. Use proper lifting techniques: Do not lift with your legs straight, or from a forward bent position. Bend your knees and lower your hips, using your leg muscles to lift. Make sure that you stay as close to the load as possible.

Table 4 Tools Required for Uncrating

Required tools
Box cutter
Flat-blade screw driver
Hammer
Forklift or pallet carrier
Spirit level
Wheeled table or cart capable of carrying no less than 300 lbs.
ESD wrist grounding strap
Socket wrench and sockets
USB memory stick
Ethernet cable
ioSearch application software for ioLogik E1240 (Modbus)

1. [ ] Cut the two plastic straps securing the top and side crate covers to the bottom of the crate enclosure.
2. [ ] With a flat-blade screwdriver, pry off the spring clips around the crate that hold together the upper and lower part of the crate.
3. [ ] Remove the crate top and side covers and put them aside.

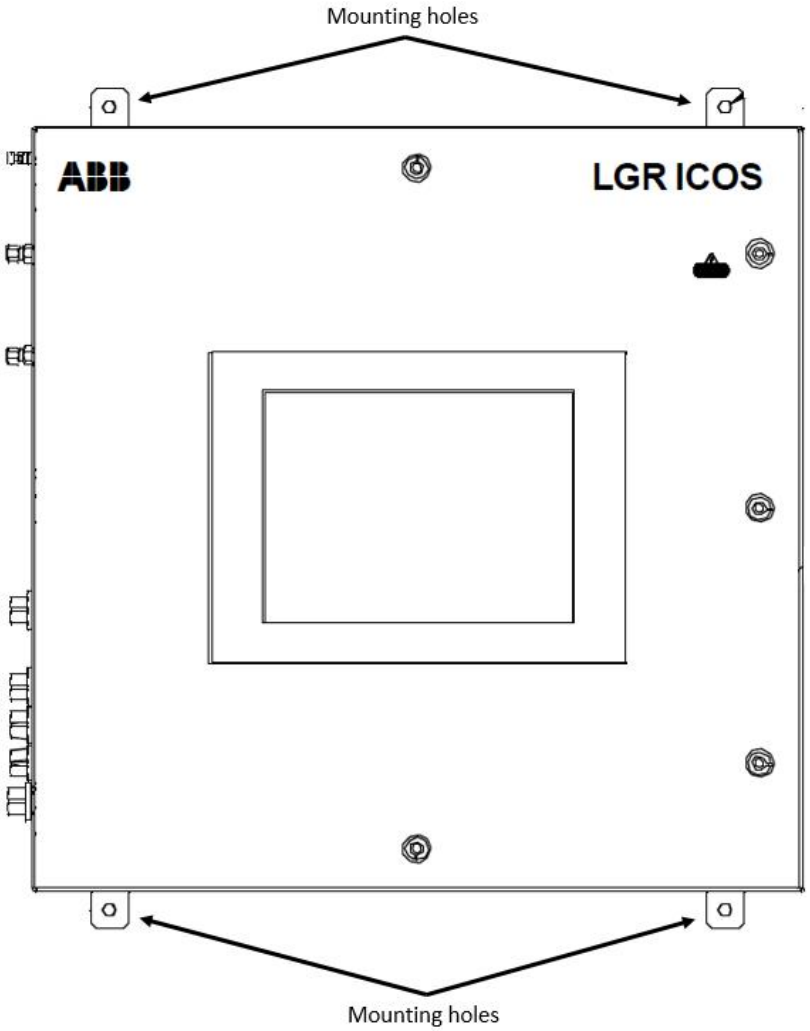
NOTE: Do not throw away the crate, spring clips, and tie-down straps as they will be necessary should the instrument need to go back for factory repairs or upgrades.

4. [ ] Remove the block and hold-down straps from the Gas Analyzer. Set them aside with the top and side covers.
5. [ ] With a wheeled table/cart, forklift or pallet carrier, move the Gas Analyzer to the selected location for installation. Keep with you the instrument baseline measurement data taken at ABB for baseline comparison when evaluating instrument performance.
6. [ ] At the selected location, cut open the bag surrounding the Gas Analyzer and remove the desiccant.

Mounting the Gas Analyzer

1. [ ] With the help of three people, lift the Gas Analyzer and mount the bottom two slotted holes to the lower support bolts on the wall. Then, using the support bolts as anchors, swing the top to lie flat against the wall. See Figure 6.

Figure 6 LGR ICOS Gas Analyzer Mounting Holes



2. [ ] Place a spirit level on top of the Gas Analyzer.
3. [ ] Tilt the Gas Analyzer so that the spirit level reads level.
4. [ ] Secure the top of the Gas Analyzer to the wall with two bolts.

5. [ ] Secure the bottom two bolts, locking the Gas Analyzer to the wall.
6. [ ] Remove the spirit level.

Pre-power Component Inspection

1. [ ] Put on the ESD wrist strap and connect the ground end to a grounded metal surface.
2. [ ] Back out the front panel clamps enough to open the front panel.
3. [ ] Visually inspect and gently tug on the LGR ICOS Gas Analyzer internal components, including cables, to make sure that they are well secured. Tighten any loose component. Do not tighten the ICOS module, but note anything out of place. Over tightening of the Swagelok can damage its seal and create a pressure leak.
4. [ ] Close the front panel and clamp it back into position.

Gas Analyzer Facilitation

5. [ ] Verify that the customer AC box feeding power to the Gas Analyzer is Class 1 Division 2 (C1D2) compliant, and that the junction power box is GUA-compliant. Do not connect the Gas Analyzer AC cables to the junction power box yet.

Warning! 	This is a Type 4 electrical safety task. Equipment is energized. Live circuits are exposed and accidental contact is possible: voltage potential is greater than 30 V RMS, 42.2 V peak, 240 VA, 20 joules; radio frequency (RF) is present. Follow the “Lockout/Tag out” procedure (in the *Facility/Site Preparation Manual*) when servicing the Gas Analyzer.

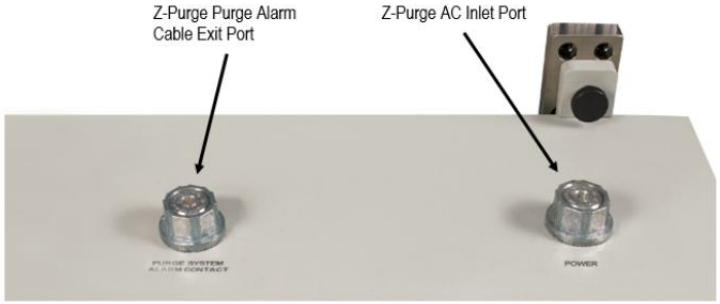
6. [ ] Make sure that the AC power line that feeds the Gas Analyzer is Class 1 Division 2 (C1D2) certified at the remote power box and that, on the customer side, the remote junction power box used is GUA-compliant.
7. [ ] Measure the AC voltage at the GUA compliant junction box that is to be connected to the Gas Analyzer.
8. [ ] On the Gas Analyzer power connection point, identified below the instrument serial number, verify that the voltage indicated, whether 115VAC or 230VAC, matches that of the customer source voltage.
9. [ ] On the customer side of the power supply, switch off the AC power line that will feed the instrument.
10. [ ] Route the power cord through a metal conduit pipe from the Gas Analyzer “Power” port located on the top panel of the Z-Purge boxes to the GUA-type junction power box. On the X-Purge boxes, the “AC in” is on the power module that is mounted on top of the Gas Analyzer as pictured in Figure 8.
11. [ ] Have the customer strip the three AC lead wires from Gas Analyzer and connect the following color-coded AC power wires to the GUA-type power box of the facility-supplied AC power. The black wire is live, the white wire is the neutral and the green wire is the ground.
12. [ ] For Z-Purge instruments at the Gas Analyzer end of the power cord, connect the black (hot) wire to TB100 slot 1, the white wire (neutral) to TB100 slot 2, and the green wire (ground) to TB100 slot 3. Reference Figure 8 for the terminal block location

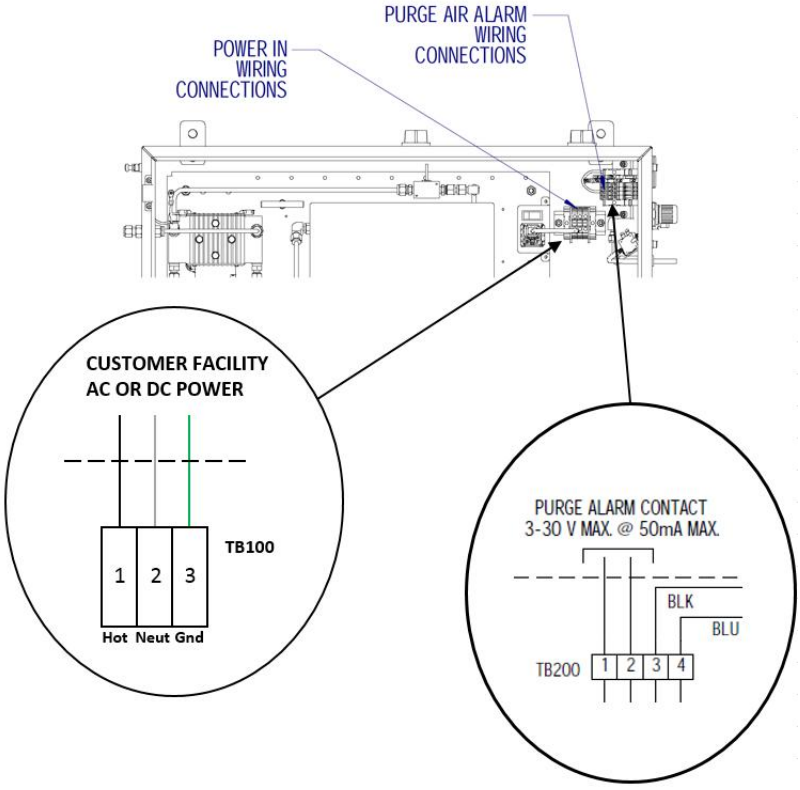
    a. Route the 2 wires for monitoring the system alarm through a conduit between the customer monitoring facility and the Z-Purge “Purge System Alarm Contact” port located on the top panel of the instrument. Insert the signal wire to Terminal Block (TB) 200 slot 1 and the signal return wire to slot 2. Reference Figure 8 for the terminal block location.

13. [ ] For X-Purge instruments at the Gas Analyzer end of the power cord, unscrew the front outer cover of the power module mounted on top of the instrument. Connect the black (hot) wire to TB49 slot 3, the white wire (neutral) to TB49 slot 5, and the green wire (ground) to TB49 slot 1. Reference Figure 8 for terminal block location

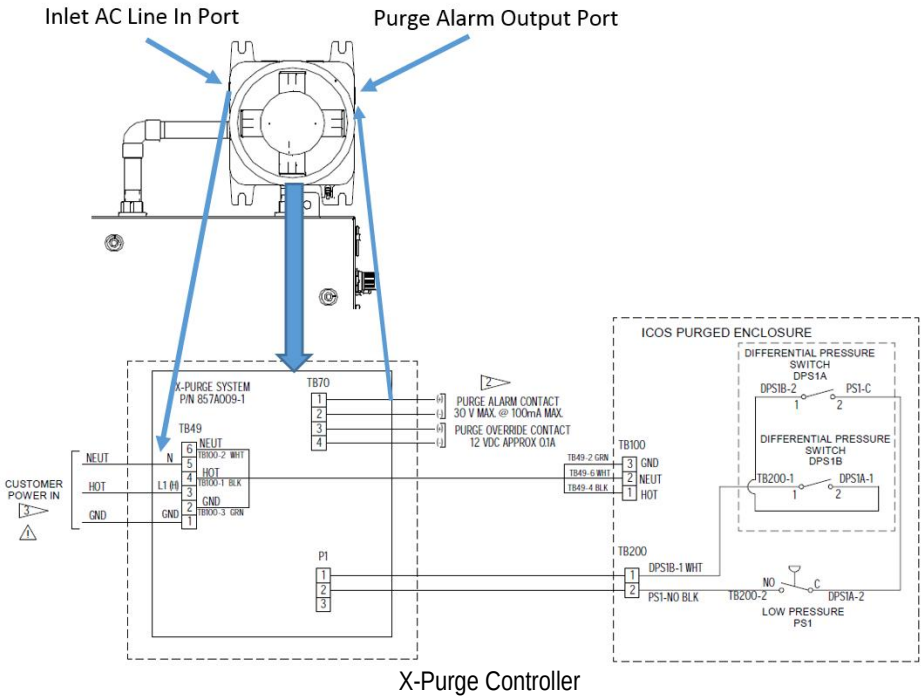
    a. Route the alarm 2 wires through a conduit between the customer monitoring facility and the X-Purge "Purge System Alarm Contact" port located on the right side of the power module. Insert the signal wire to Terminal Block (TB) 70 slot 1, and the signal return to slot 2.

Figure 8 LGR ICOS Gas Analyzer AC Inlet and Z-Purge, X-Purge Controller



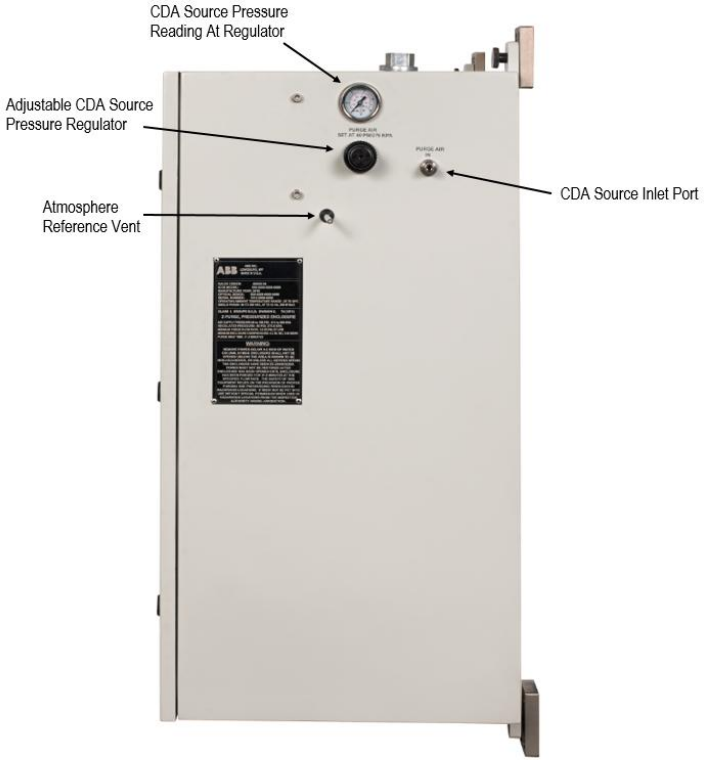


Z-Purge Controller



14. [ ] Connect the customer CDA line to the Gas Analyzer CDA inlet port. See Figure 9.

Figure 9 LGR ICOS Gas Analyzer CDA Inlet Location



15. [ ] Make sure the pressure gauge reads above 40 psig of the incoming CDA air.

Purge Controller Alarms Connection

16. [ ] Provide to the customer the Purge Controller alarms terminal block connections table (see Table 5) for them to have it connected to their facility. These are dry contact relays. Close condition represents no alarm. In this state, there should be around +20V at 100mA across TB70 pin 1and pin 2. If TB70 pin 1 and pin 2 registered ~ 0V, there is a fault with the instrument purge system.

Table 5 Purge Controller Alarms

TB70 Contact No.	Purge Alarm Signal Description	Wire End Labeled
1	Loss of purge pressure/flow alarm	X2-1
2	Loss of purge pressure/flow alarm-return	X2-2

17. [ ] Once both the Purge Controller Alarm and the AC power lines from the Gas Analyzer are connected to the facility, switch on the power on the facility's side.

System Power Up & Communication Checks

18. [ ] Remove caps from the Gas Analyzer gas inlet and exhaust outlet lines located on the left side panel of the instrument.

19. [ ] Power on the Gas Analyzer:

- [ ] For X-Purge units only, with the internal pressure interlock switch bypass key, disable the pressure switch sensor at the AC power connection terminal located outside the enclosure.
- [ ] Open the Gas Analyzer front panel.
- [ ] Switch on the AC power of the Gas Analyzer.
- [ ] Perform a soft shutdown of the Gas Analyzer operating system by selecting *Exit* follow by *Shutdown*. Do not switch off the AC power switch at the Gas Analyzer.
- [ ] Remove the internal pressure switch bypass key from the bypass switch.
- [ ] Close the front panel and clamp it into place with all the lock down clamps for a good seal.
- [ ] Verify that the CDA pressure is > 40 psig at the inlet CDA port.
- [ ] Wait 22 minutes.
- [ ] For the X-Purge, the Gas Analyzer should be booting back up after the 22 minutes. For the Z-Purge, measuring the two wires on TB70 pin 1 and pin 2, it should register 20V meaning the purge is completed.

Figure 7 LGR ICOS Gas Analyzer Pressure Switch Controller

Place holder for X-Purge key bypass Picture

20. [ ] For X-Purge configure systems only. Verify that the internal pressure switch sensor works properly and that the Gas Analyzer computer boots up upon successfully completing the Gas Analyzer enclosure air purge.

    [ ] Perform a soft shutdown of the Gas Analyzer operating system be selecting *Exit* and then *Ok*.

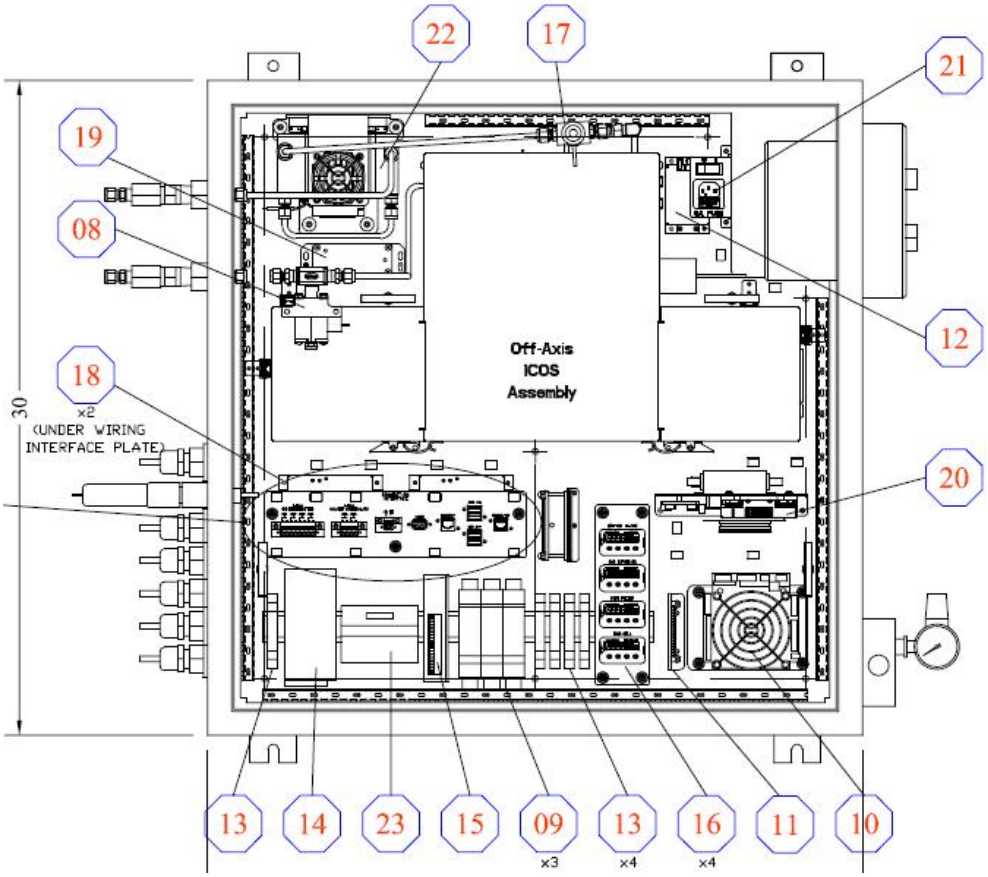
    [ ] Verify that the internal pressure switch sensor is functioning properly by opening the front panel. The instrument should shut down immediately.

    [ ] Have the instrument reboot by disabling the internal pressure switch sensor using the internal pressure switch bypass key.

Danger! 	Gas Analyzer configured with a Z-Purge will not remove the supplied AC power energizing it when its internal pressure switch is triggered. To remove the AC power feeding the Gas Analyzer internal components, the On/Off power switch on the Gas Analyzer must be switch to the Off position.

21. [ ] With the front panel open, verify that the Watlow temperature controller, the thermocouple, and the heater relays are working (Items 16 and 13 in Figure 8. Thermocouples are not visible.)

Figure 8 LGR ICOS Gas Analyzer Parts Location



The green display numbers on the right side of the temperature controller represent the target control temperature. The red display numbers on the left side represent the current thermocouple reading for the monitored device (see Figure 9).

When the left side numbers are lower than the right side numbers registered on the temperature controller, the green LED on the corresponding heater relay should be lit, indicating that the relay is energized and power is being fed to that specific heater unit. When the heater relay green LED is blinking (see

Figure 10), the component in which the heater is heating up has reached the target temperature and is doing an on/off sequence to maintain the target temperature.

If the left side numbers are greater than the right side numbers, the heater relay will disconnect and the corresponding green LED will be off. If this is not the action seen, troubleshoot and fix the issue(s) encountered.

Figure 9 Temperature Controller Display

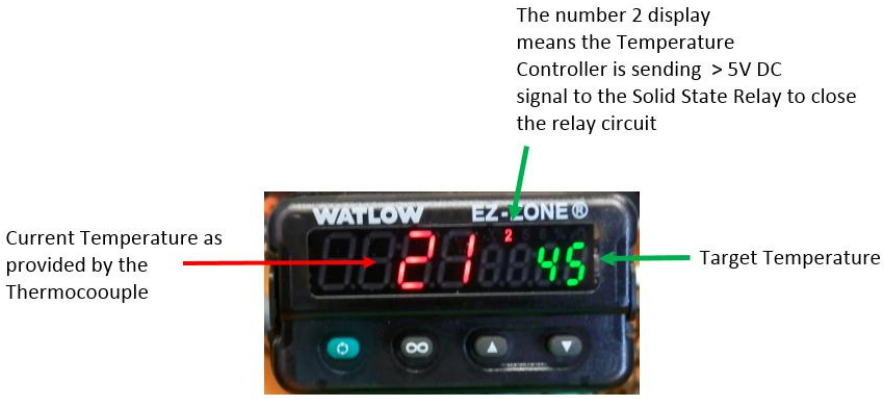
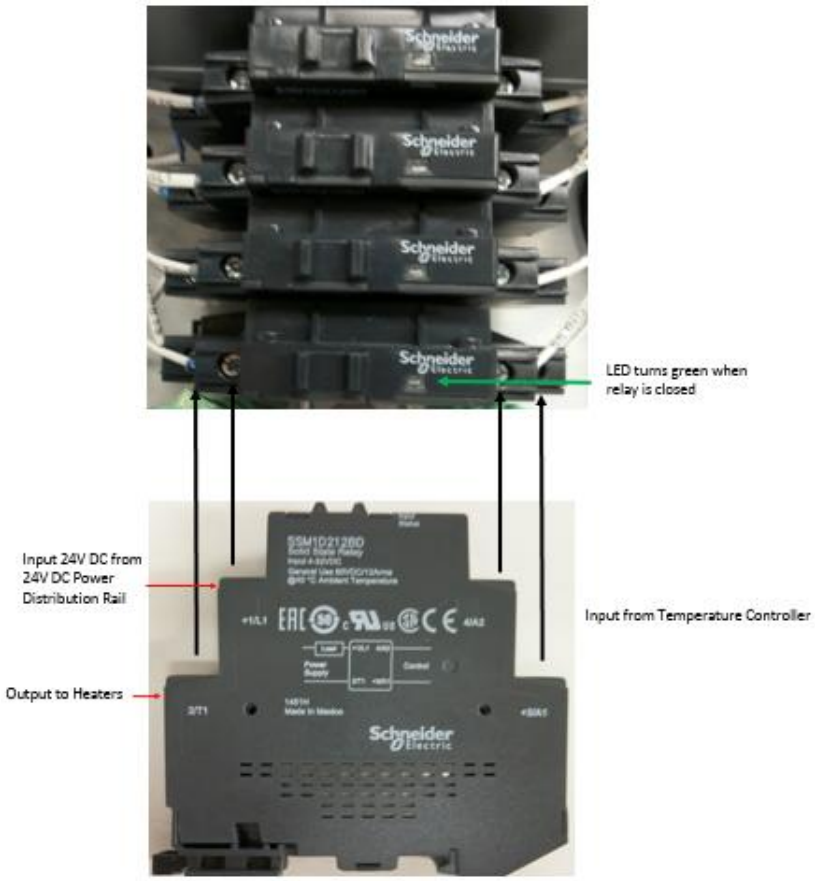


Figure 10 Heater Relays

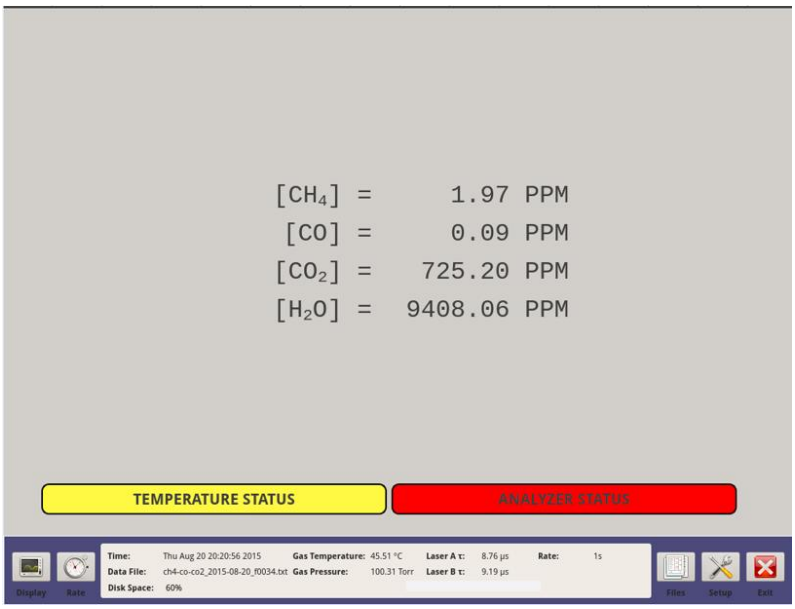


22. [ ] Close the front panel, but do not clamp it into position.

23. [ ] The Gas Analyzer should have completed its boot sequence and will be displaying the gas concentration per the instrument configuration (see Figure 11).

NOTE: Figure 11 displays an example of a gas type that may be different from the one configured on your instrument.

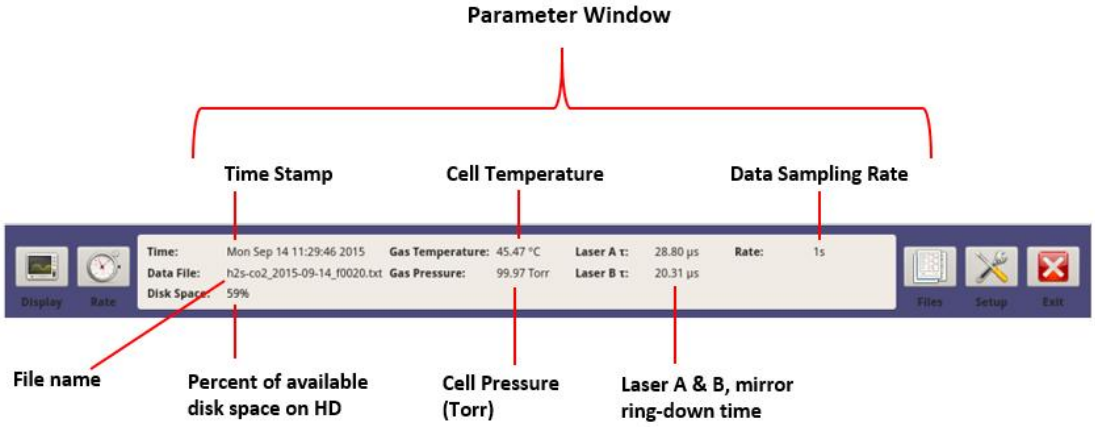
Figure 11 LGR ICOS Gas Analyzer Screen After Completing Initialization



24. [ ] The Gas Analyzer will display warnings and alarms at this stage. That is normal when the system has not reached it operating temperature for measurement. In about 20+ minutes the system warnings and alarms should turn green.

25. [ ] In the Control Bar (see Figure 15), look at the Cell Pressure value. The pressure reading is dependent upon the gas being measured.

Figure 12 LGR ICOS Gas Analyzer User Interface Control Bar



Make sure that the pressure value indicated (in "Torr" units) on the shipping data sheet that came with the instrument is similar to the value displayed on instrument. If cell pressure is off by +/- 1% from the target pressure level, determine the location of the pressure leak within the ICOS system (all interconnection points between the air entry on the instrument's right side and the exhaust exit point).

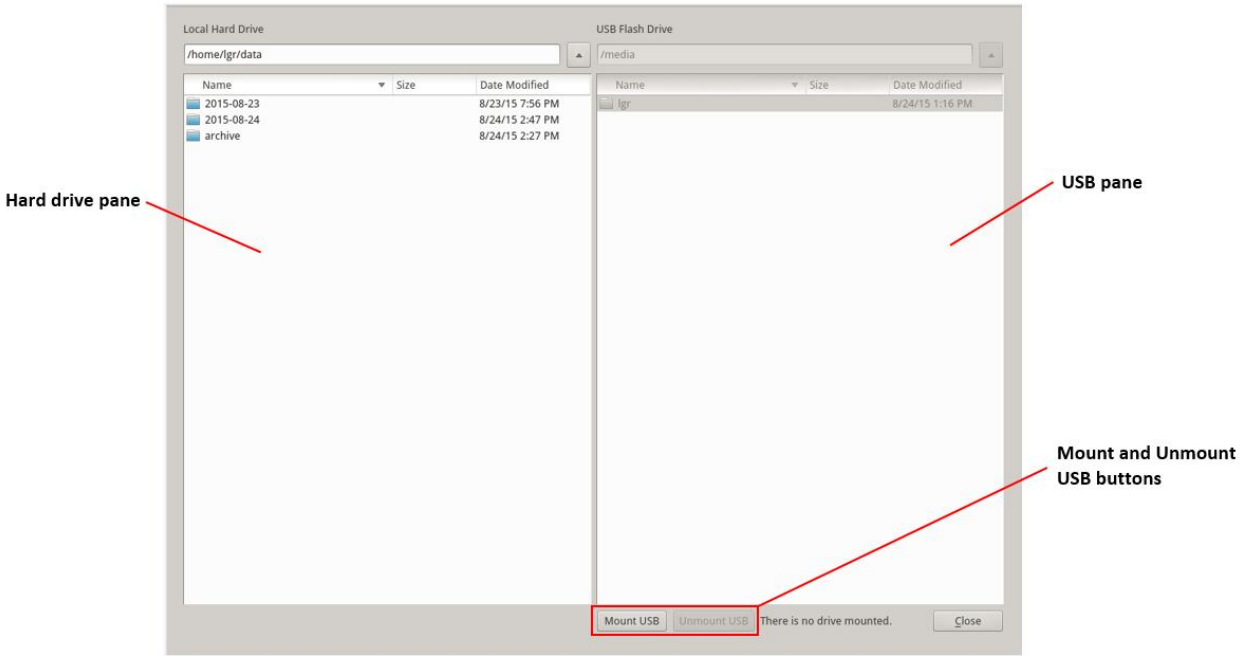
26. [ ] Verify the file transfer through the USB connection:

    [ ] Select the "File" tab in the Control Bar menu option to access the File Transfer menu.

    [ ] Insert a USB memory stick in the USB port of the communication interface board (Item 18 on Figure 8).

[ ] Select “Mount USB” to establish a link to the USB memory stick (see Figure 13).

Figure 13 LGR ICOS Gas Analyzer User Interface Mount USB Screen



[ ] Drag any data file from the hard drive pane to the USB Flash Drive pane.

[ ] Select “Unmount USB” to remove the USB memory stick from the system.

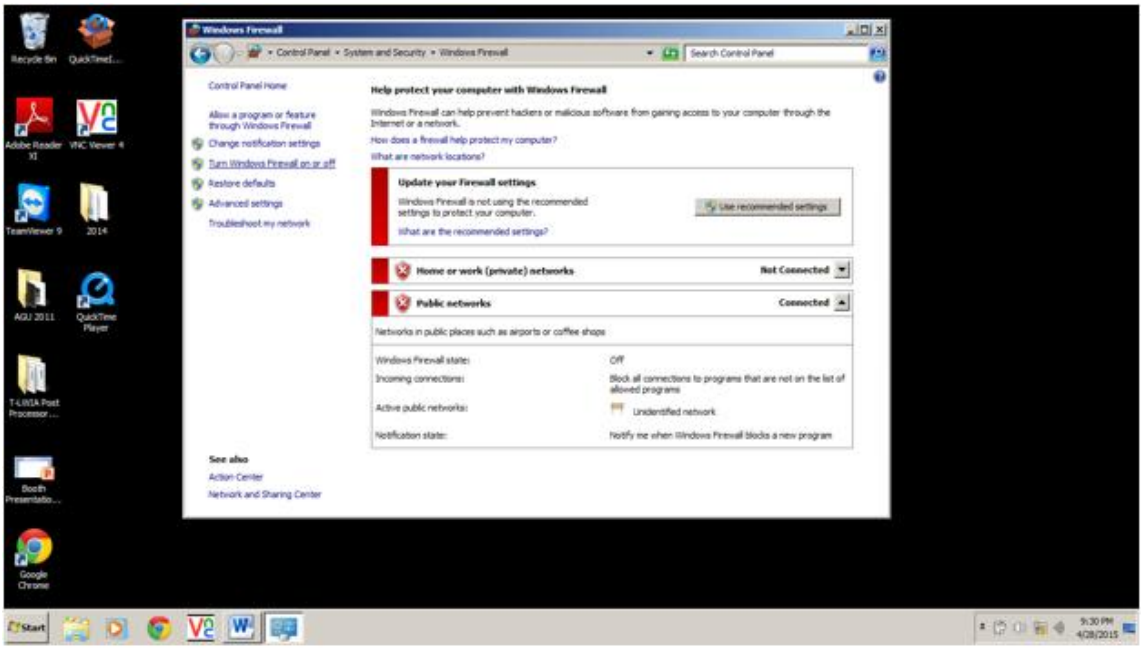
[ ] Close the data file menu screen by selecting “Close” at the bottom of the screen.

27. [ ] Verify the Modbus:

[ ] Connect either a straight-through or a cross-over Ethernet cable between your laptop and the Modbus Ethernet port on the Communication Interface Panel.

[ ] Disable your laptop firewall by selecting Start → Control Panel → Windows Firewall. In the Windows Firewall left side menu, select “Turn Windows Firewall on or off” (see Figure 14). Set the firewall to off.

Figure 14 Windows Firewall Setting Menu Screen



[ ] Close the Control Panel.

[ ] Connect the Ethernet cable between your laptop Ethernet port and the Modbus port on the communication interface panel.

[ ] If the ioSearch application program is not installed on your laptop, install it now. If you do not have the software, download it from Moxa.

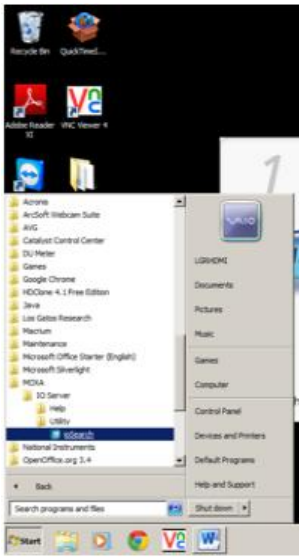
The url page is:
http://www.moxa.com/support/sarch_result.aspx?type=soft&prod_id=598&type_id=5

In the url page above, scroll down to “ioSearch Configuration Utility for ioLogik 1000 Series”.

Download and execute the file.

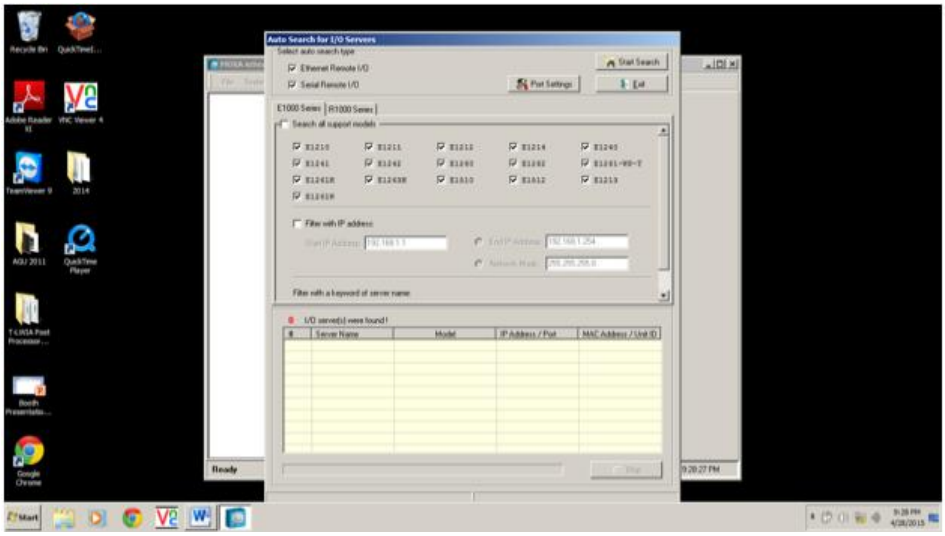
[ ] From Windows Start button, select ioSearch from the Moxa folder (see Figure 15).

Figure 15 ioSearch Program Location



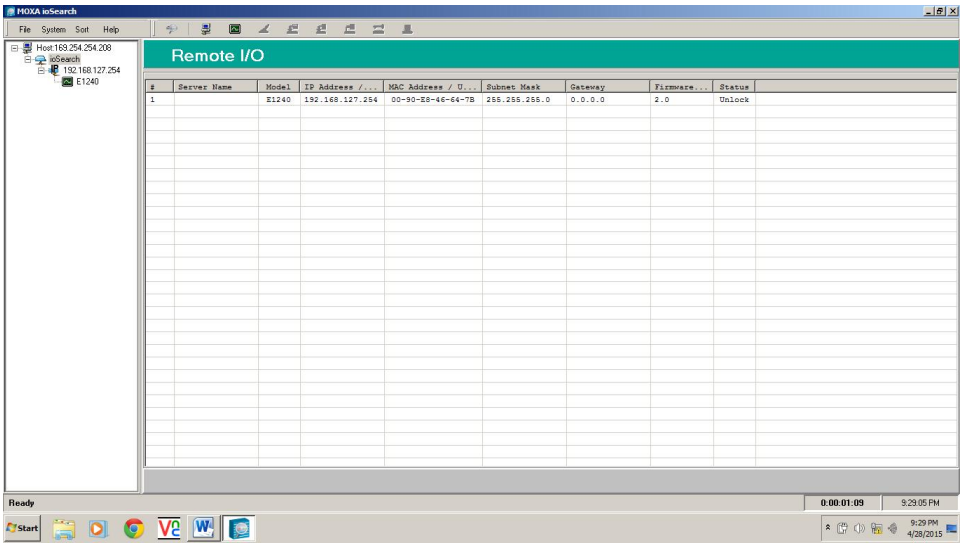
[ ] Upon executing ioSearch, the Auto Search for I/O Servers menu will be displayed (see Figure 16). Select the [Start Search] tab to locate the Modbus.

Figure 16 Auto Search for I/O Servers Menu Screen



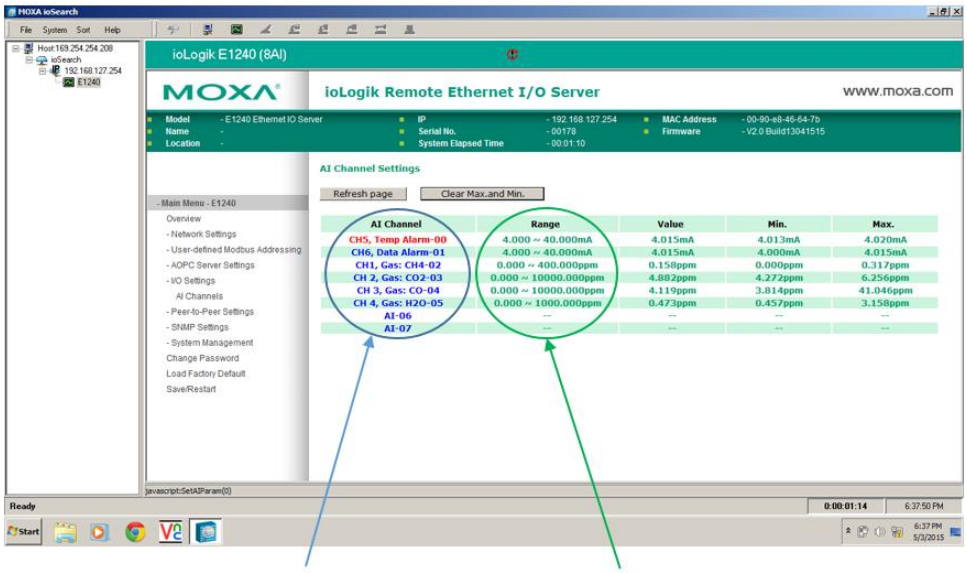
[ ] Once the ioLogik Modbus device is located, the following Remote I/O menu screen will appear, listing the ioLogik devices found.

Figure 17 Remote I/O Menu Screen



[ ] Select “E1240” on the left side tree. The “web console” appears, with the preset parameters currently loaded into the ioLogik Modbus device (see Figure 18).

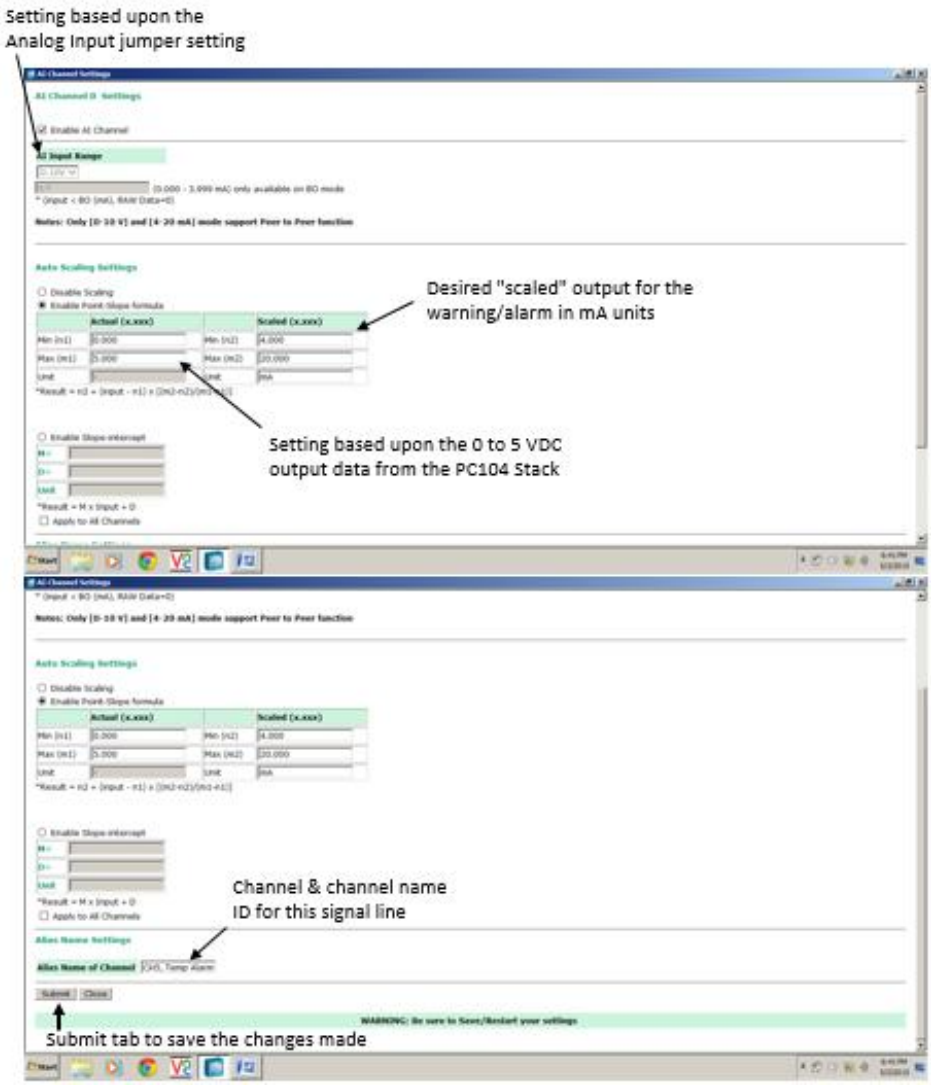
Figure 18 Analog Input Configuration Screen



[ ] Verify that the Gas Type under the “AI Channel” column corresponds to the one that the Gas Analyzer is configured to measure. Also, verify that “Range” is set to translate to mA for the Temp and Data Alarms, that the Gas type is in ppm or ppb. The final check would be to make sure the measured results under the “Value” column match the value displayed on the front panel for that particular gas type when the instrument is measuring the sample gas. In the “AI Channel” column, CH5, Temp Alarm-00, and CH6, Data Alarm-01 are the only two constant settings (4-20 mA in the “Range” column) on all Gas Analyzers. Each customer will most likely have unique gases they will want to measure, thus making each instrument different.

[ ] In the I/O Setting → AI Channel menu screen (see Figure 18), select the first item under the AI Channel, CH5, Temp Alarms-00 to check if it is properly “Scaled” to 4-20 mA for the 0–5 V input. When selecting an item from the AI Channel column, the AI Channel Settings screen will be displayed (see Figure 19). In the Auto Scaling Settings box, verify that the “Actual” min and max settings along with their corresponding “Scaled” min and max settings match that of the factory settings (part of the shipping documents that were shipped with the instrument). When you have verified all Actual to Scaling values for each item listed for all AI Channel settings, close the menu screen.

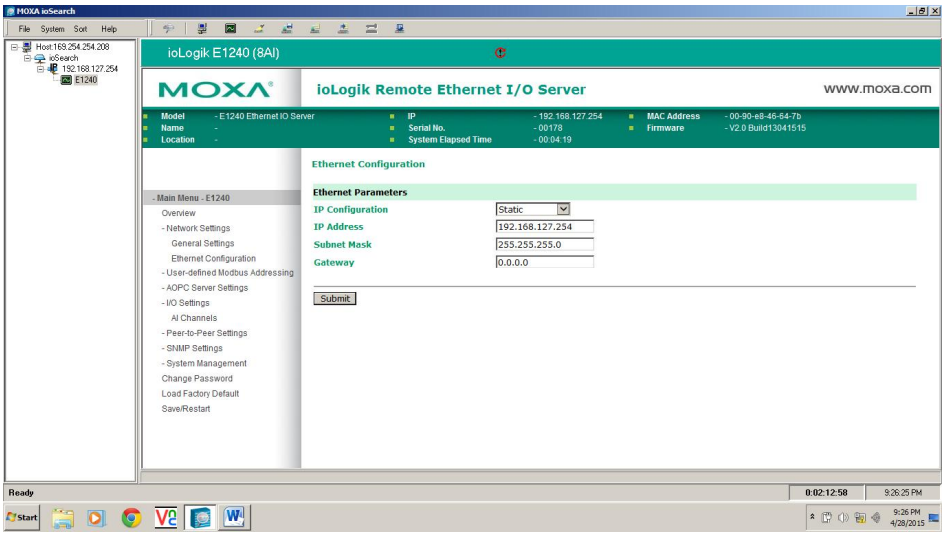
Figure 19 AI Channel Settings



Changing the Modbus IP Address

28. [ ] If the customer wants to change the Modbus IP address, select Network → Ethernet Configuration and the following menu screen will appear (Figure 20.)

Figure 20 ioLogik Ethernet Configuration Menu Screen



If the customer does make a change to the IP address of the ioLogik Modbus, the customer needs to select the [Submit] tab to save changes before exiting the menu screen. Otherwise, the new IP address will not be saved.

29. [ ] Quit the ioLogik application.

30. [ ] Disconnect the Ethernet cable linking the laptop from the communication interface panel.

Verify 4 – 20 mA Signal Output

31. [ ] Set the DVM to measure in mA in DC.

32. [ ] Put the DVM test lead to the Communication Interface Panel gas concentration (+) and (-) terminal. It should register a mA reading corresponding to the input DC voltage for that channel. For example: If there registered a 0 ppm gas concentration of the numeric display screen for the top first listed gas, the reading for gas concentration channel 1 will also be 4 mA. If it reads some concentration level, channel 1 would have a non-zero reading. The non-zero reading is scaled, similar to that performed per each AI channel on the Modbus per each gas type.

    The top numeric gas concentration represents channel 1 on the Communication Interface Panel. The 2nd gas concentration display represents channel 2 and so on.

33. [ ] Perform a soft shutdown of the Gas Analyzer operating system by selecting *Exit* and then *Ok*.

34. [ ] Close the front panel and secure it into place with all clamps.

35. [ ] Remove the internal pressure interlock switch key from the bypass switch.

36. [ ] Turn the air inlet valve to the “On” position.

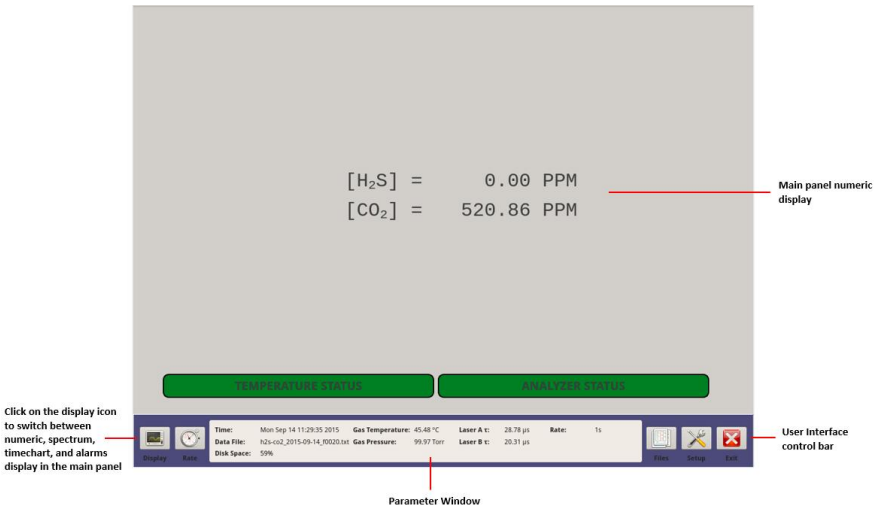
37. [ ] In about 12+ minutes, the Purge Controller should completed its purging of the air within the enclosure, and the Gas Analyzer will boot up afterward.

38. [ ] Turn the air inlet valve to the “Off” position if N_2 is used as the purge gas. If the purge gas is CDA, leave the air inlet valve in the “On” position.

Baseline Measurements

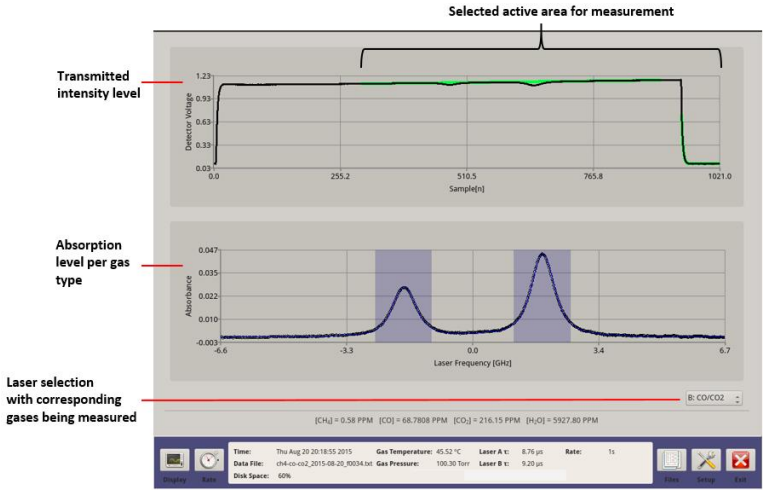
1. [ ] The screen displays the numeric readout for the measured gases (see Figure 21) will be the first screen displayed upon boot up.

Figure 21 LGR ICOS Gas Analyzer Gas Numeric Readout User Interface



2. [ ] Select “Display” to obtain the “Gas Spectrum” display (see Figure 22).

Figure 22 LGR ICOS Gas Analyzer Gas Spectrum Display



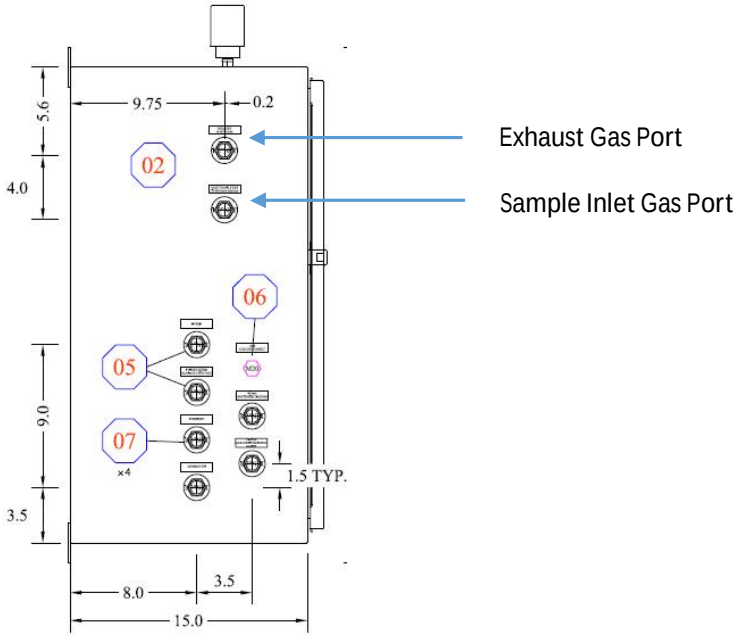
3. [ ] Verify the signature between the current gas display spectrum measuring air is the same as that performed at the factory prior to shipment of the instrument. The two spectrum profile signatures should overlap each other with the exception of the signal amplitude (because the two air samples are taken in different parts of the country).

Connecting Customer Inlet and Exhaust Gas Line

1. [ ] Connect the customer inlet gas line to the LGR ICOS Gas Analyzer sample inlet gas port (see Figure 23). Do not open the customer gas line to the instrument at this point of the installation. At this point, the customer gas line should be opened to atmosphere through a filter only (filtered air).

Warning!	Verify with the customer that the temperature of the sample gas connected to the instrument inlet gas line is <105°C, and its maximum gauge pressure entering into the instrument is <10 psig. Damage to the instrument can occur when operating outside of these specified limits.

Figure 23 LGR ICOS Gas Analyzer Sample Inlet Gas and Exhaust Gas Ports



2. [ ] Connect the Gas Analyzer exhaust gas line to the customer exhaust port (see Figure 23).
3. [ ] Open the exhaust valve on the customer exhaust line.

   Make sure that the customer exhaust line can draw up to 1 SLPM. If backpressure should occur from insufficient draw, the instrument "pressure" readings will go up followed by measurement instability.
4. [ ] Turn on the power to the Gas Analyzer by:
   - [ ] Verify inlet air pressure to > 4 psig.
   - [ ] Turn the air inlet valve to the "On" position.
   - [ ] In about 12+ minutes, enclosure air purge will be completed, and the Gas Analyzer will boot up.
   - [ ] Turn the air inlet valve to the "Off" position.
5. [ ] Make sure that there is no gas leak at the connection point between the C1D2 instrument and the customer incoming gas and exhaust line. Air is drawn in through the Gas Analyzer by the exhaust pump. Resolve any air leaks at the interface point.
6. [ ] Repeat the Baseline Measurement section to make sure that nothing has changed.
7. [ ] Close the filtered air check valve on the customer gas line.

Customer Gas Sample Measurements

1. [ ] Allow the instrument to warm up for 45 minutes.
2. [ ] Attach a bottle of certified, traceable, tested and regulated gas on the customer inlet gas line.
3. [ ] Open only the traceable, certified, tested and regulated gas line check valve on the customer sample gas line for accuracy, stability, and repeatability measurement validation.
4. [ ] Look at the main panel numeric display. Numbers should hold within the test gas measured values.
5. [ ] Select the Display tab to access the Spectrum Display screen. The sample tested and regulated gas should line up in the “optical absorption” graph (blue line [sample data] overlaying the black line [theoretical model]).

NOTE: If the model of the instrument purchased has two lasers for measurement of up to four gas types, the Laser “A:/B:” tab on the lower right side of the optical absorption screen allows the user to see how the measurement for the different gases is performing.

6. [ ] Save the measured data on the instrument for future reference when servicing the instrument.
7. [ ] Close off the valve of the traceable, certified, tested and regulated gas bottle.

Tool Acceptance & Sign-off

1. [ ] Present the baseline data of the instrument when shipped from the factory and the baseline data during installation, to show that the instrument is performing to the same level as the one obtained in the factory prior to shipping. Explain the reasons for signal amplitude differences from the air sample concentration at the customer site and at the ABB factory.
2. [ ] Show the customer test and regulated bottle gas measurement taken, demonstrating that the instrument is operating within specifications.
3. [ ] Have the customer sign the instrument acceptance form and make a copy for the customer.

ABB C1D2 Gas Analyzer Customer Acceptance

Customer: _____ Location: _____

Instrument Serial Number: _____ Model Number: _____

Performance Validation Checklist:

1. [ ] Internal pressure interlock performs as designed.
2. [ ] Communication lines performs as designed.
   - [ ] Ethernet connection and communication performs as designed (customer intranet to the Gas Analyzer facilitation dependent).
   - [ ] Modbus connection performs as designed.
   - [ ] USB data transfer.
   - [ ] 4-20 mA output performs as designed.
3. [ ] ICOS pressure matches factory results.
4. [ ] ICOS ring-down time matches factory results for the traceable, certified, regulated bottle gas.
5. [ ] Traceable tested and regulated bottle gas measurement agrees with certified measurement within the instrument uncertainty (+/- 1%).
6. [ ] Measurements are stable and repeatable per traceable gas and atmosphere air tested.

_____
CSE Name (print)

_____ Date: _____
CSE Signature

_____
Instrument Owner Name (print)

_____ Date: _____
Instrument Owner Signature

In signing this acceptance document, the customer/instrument owner fully accepts that data collected from the ABB C1D2 LGR ICOS Gas Analyzer meets all required measurement performance tests and performs as defined in the sales agreement.