

ABB
LGR-ICOS™ Gas Analyzer
Facility/Site Preparation Manual
HAZLOC X-Purge C1D1 & 2
& HAZLOC Z-Purge C1D2



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Disclaimers

This manual documents the ABB CID1 & 2 LGR-ICOS Gas Analyzer. The Gas Analyzer hardware and software are periodically enhanced and modified; therefore, information in this document is subject to change without notice. Although we update technical manuals where appropriate to reflect hardware and software changes to the Gas Analyzer, ABB, Inc. makes no guarantee that the information in this manual is current to the LGR-ICOS Gas Analyzer model. The software documented in this manual is provided under license. It is against the law to copy the software on any other medium except as specifically allowed in the license agreement. The licensee may make one copy of the software for backup purposes. No part of this manual may be reproduced or transmitted in any form or by any means, electrical or mechanical, including photocopying and recording, for any purpose without the written consent of ABB, Inc.

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Warranty

Refer to your LGR-ICOS Gas Analyzer's unique sales contract for warranty specifications.

Copyright

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1 Introduction

This manual contains information on preparation and verification of the location selected for reception and mounting of the *LGR-ICOS* Gas Analyzer, including fittings requirements for the sample gas, exhaust gas, and purge lines, as well as AC power connection compliance.

It describes facility requirements for the installation of a Gas Analyzer and provides information about shipping and receiving, safety, acceptance tests, and training.

In general, it is the customer's responsibility to prepare the site and verify that it meets the specifications outlined in this document.

Only ABB personnel or their trained representatives are allowed to perform the on-site installation of the Gas Analyzer.

The customer should fill out both Table 1 Customer Facility Information, and Section 13: Installation Site Checklist and mail the completed forms to ABB Customer Support

2 Administration Interface

This section provides ABB technical/customer support contact information, including a table to complete and return to ABB customer support (Table 1 Customer Facility Information.)

Direct any questions regarding the facilities requirements or installation procedure to ABB Customer Support:
1 (650) 965-7772

Customer Facility Information

This section provides a customer information table (Table 1). Information in this table is used to provide customers with the appropriate support for their particular *LGR-ICOS* Gas Analyzer. Copy Table 1, fill in the information, and send a copy of the completed table to ABB Customer Support to the local ABB regional office in your area.

Table 1 Customer Facility Information

Customer Information	
Customer Name	
Department/Division	
Address	
City/State/Zip	
Main Phone Number	() -
Phone Number (Phone nearest to the installed instrument)	() - Ext.:
Department Manager	
Phone Number	() - Ext.:
Facility Manager	
Phone	() - Ext.:
Maintenance Personnel	
Phone	() - Ext.:
Primary Operating Hours	to , days per week
Off-hours Phone Number (if any)	() - Ext.:
Normal Hours Site Access? Requirements?	No Yes If Yes, please explain:
Off-hours Site Access Requirements?	No Yes If Yes, please explain:

3 Safety

This section provides pre-installation safety guidelines for the *LGR-ICOS* Gas Analyzer.

ABB personnel installs the Gas Analyzer. So long as the requirements in this facility guide are met, only normal safety practices need be observed during installation.

During normal operation, the Gas Analyzer is rated as a *Class 1- compatible* tool and poses no hazards to users.

There are some potentially hazardous devices – high voltage and lasers – within the Gas Analyzer that could be dangerous if its interlocks were defeated and the analyzer opened.

Entry in any part of the Gas Analyzer should only be performed by ABB, Inc. customer support personnel.

While power is on, never defeat safety interlocks to open the Gas Analyzer front panel.

Always de-energize the Gas Analyzer before opening its front enclosure panel.

If the instrument uses Nitrogen as its purge gas, make sure that the surrounding area is sufficiently ventilated to outside air to avoid asphyxiation due to a lack of oxygen as the instrument will leak Nitrogen into the atmosphere.

For more information on operation safety, refer to the Gas Analyzer User manual under Safety.

The enclosure of the Gas Analyzer is rated NEMA 4 and provide ingress protection IP54.

The Gas Analyzer intended use in an area that is classified as HAZLOC (Hazardous Area Location).

Non-Physical Conditions

During normal operation, the *LGR-ICOS* Gas Analyzer does not emit hazardous levels of radio frequencies, humidity, vibrations, odors, or ionizing and non-ionizing radiations.

However, the Gas Analyzer does dissipate heat into the ambient environment. For normal operating conditions, the total heat output is 324 BTU/hour. All of this heat (100%) is release into the local environment.

On X-Purge instrument, loss of exhaust vacuum, inlet gas pressure, or CDA pressure will affect Gas Analyzer performance and make the system inoperable, but these pressure losses pose no hazard to personnel because the loss of CDA pressure will shut the instrument off by removing its AC power and automatically close the inlet gas valve of instrument.

On Z-Purge instrument, loss of exhaust vacuum, inlet gas pressure, or CDA pressure will affect Gas Analyzer performance and make the system inoperable. Loss of CDA pressure will not shut down power to the instrument and will pose a hazard for the operator should the front panel be open and a spark event occurs causing an explosion.

Ambient Noise-Level Safety

During normal operation, the maximum noise level for the Gas Analyzer is approximately 55 dB(A).

Monitoring Communications

There are several methods in establishing communication with the *LGR-ICOS* Gas Analyzer:

- Ethernet: Direct communication with the instrument's main computer for external monitoring
- Modbus®: Analog data transfer for measured gas reading in volts
- USB: Data transfer using the instrument user interface

- Phoenix contact: 4-20 mA for gas measurements and system alarms.

Abnormal Operating Conditions

The *LGR-ICOS* Gas Analyzer configured with an X-Purge will shut down if a pressure switch triggers an opened circuit.

The *LGR-ICOS* Gas Analyzer configured with a Z-Purge will not shut down if a pressure switch triggers an opened circuit. The fault warning can be monitored through Air Purge Alarm port of the instrument.

Pre-installation Safety Checks

The following safety checks are to be performed by a certified ABB customer/technical support engineer, with the *LGR-ICOS* Gas Analyzer owner's safety representatives at the installation site. The installation site acceptance test is then signed-off by both the ABB and customer representatives.

Table 2 Safety Checks

X	Safety checks to perform
	On X-Purge instruments only, safety interlocks correctly shut down the Gas Analyzer when interlocked door/panel is opened, activating the internal pressure switch and turning off laser(s) (1 or 2) and closing the inlet gas valve in the process of powering down the unit.
	Insufficient CDA pressure activates the internal pressure switch and shuts down the X-Purge configured Gas Analyzer only. 2 wires output for internal pressure signal alarm is provided by the Gas Analyzer to identified pressure alarm for both X-Purge and Z-Purge Gas Analyzers.
	The Gas Analyzer provides the capability to lock out hazardous energy/gas sources prior to maintenance whenever AC power is remove from the instrument. When AC power is remove from the instrument, this action automatically close the inlet gas valve on the instrument.
	Site-specific installation does not degrade the Gas Analyzer ergonomic design factors.
	Interface to the building utilities works as intended.
	The <i>LGR-ICOS</i> Gas Analyzer is not intended for use in combustible dust environments.
	The <i>LGR-ICOS</i> Gas Analyzer is only intended to operate in Gas Group B,C,D & IIB+H2
	The <i>LGR-ICOS</i> Gas Analyzer has a Temperature Code (T4) 135°C

4 Clearances

This section provides tables showing the required clearances on all sides of the *LGR-ICOS* Gas Analyzer for all configurations.

The Gas Analyzer must be placed to allow full access to the front panel to be open and completely swung out. Clearance should be planned such that maintenance work can be done on the components within.

Tables in this section show both the service access and total space requirements for safe operation and maintenance of all Gas Analyzer models.

Table 3 Service Access Clearance Requirements

Side	Clearance
Front (user access)	36" (91.4 cm) ^{a,b}
Left	12" (30.48 cm) ^c
Right	12" (30.38 cm) ^c
Top (above instrument)	6" (15.24 cm)

NOTE All communication lines, excluding USB, are fed through a cable gland conduit hub on the Gas Analyzer left side panel.

Table 4 Total Space Requirements for the *LGR-ICOS* Gas Analyzer

Dimensions	Value
Width	54" (137.16 cm) ^d
Depth	52" (132.1 cm) ^e
Height	66" (167.0 cm) ^f

See Figure 1 for an illustration of the Gas Analyzer service access space requirements as outlined in Table 4.

^a Depth (front to back space) must be sufficient to allow service access.

^b Dimensions are from Article 110 of the National Electric Code. Access to the electronics in the measurement module is via a swing-out front panel, which extends out 30 in.

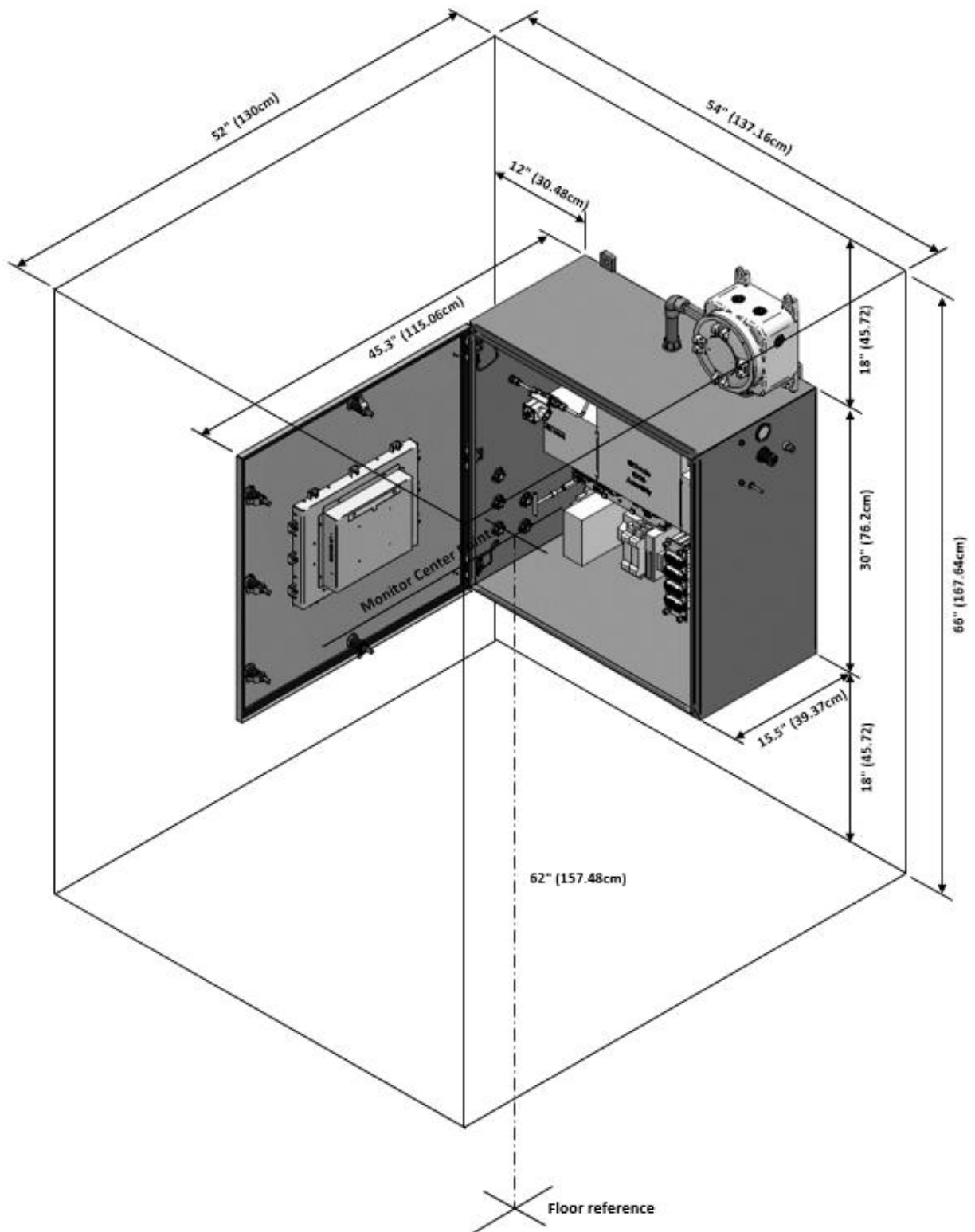
^c Left and right side accesses are required for external communication interfaces, inlet gas porting, and outward gas evacuation and system port.

^d Width (side-to-side) must be sufficient to allow service access.

^e Depth (front-to-back) must be sufficient to allow service access.

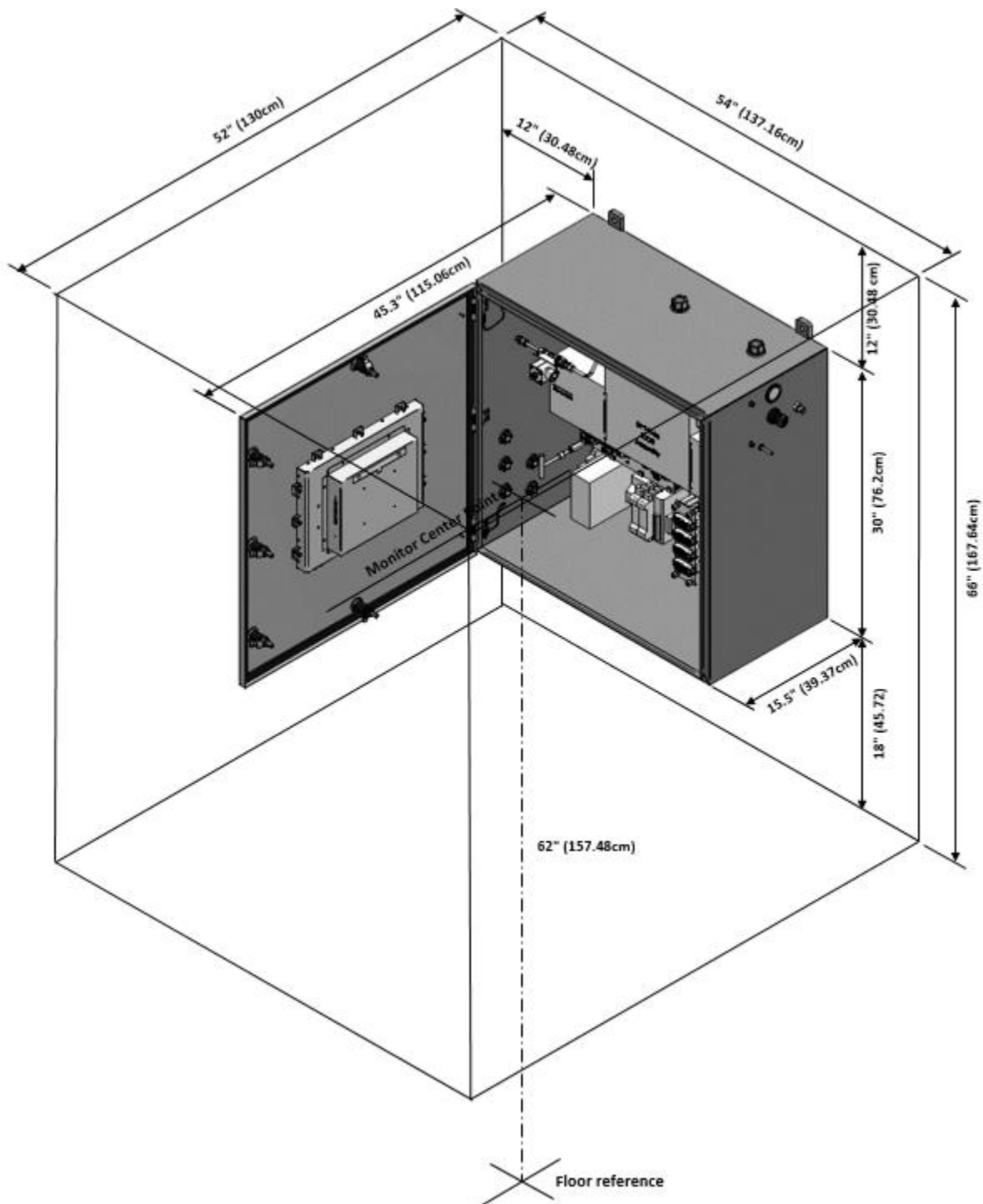
^f Total length extending from the top and bottom referencing the center of the instrument, the center of the monitor screen. To meet ergonomic requirements the instrument should be mounted at the height of ~ 62" above the floor to the center of the monitor screen.

Figure 1a X-Purge Service Space Requirements



NOTE: Dimensions are in inches. Dimensions in parentheses are in centimeters.

Figure 2b Z-Purge Service Space Requirements



NOTE: Dimensions are in inches. Dimensions in parentheses are in centimeters.

5 Facility Installation Requirements

This section describes the facilities requirements for the *LGR-ICOS* Gas Analyzer. The installation must provide these facilities at the levels required for the Gas Analyzer to operate within specifications.

Installation Category

The *LGR-ICOS* Gas Analyzer is an IEC 606364-4-443 Category II (over-voltage category) installation. Category II energy-consuming equipment is to be supplied from fixed installations.

Table 5 Over-voltage Category

Nominal Voltage (VAC)	Transient Voltage Tolerated		
	Category I	Category II	Category III
50	330	500	800
100	500	800	1500
150	800	1500	2500
300	1500	2500	4000
600	2500	4000	6000
1000	4000	6000	8000

Environmental Requirements

Table 6 summarizes environmental requirements for the *LGR-ICOS* Gas Analyzer.

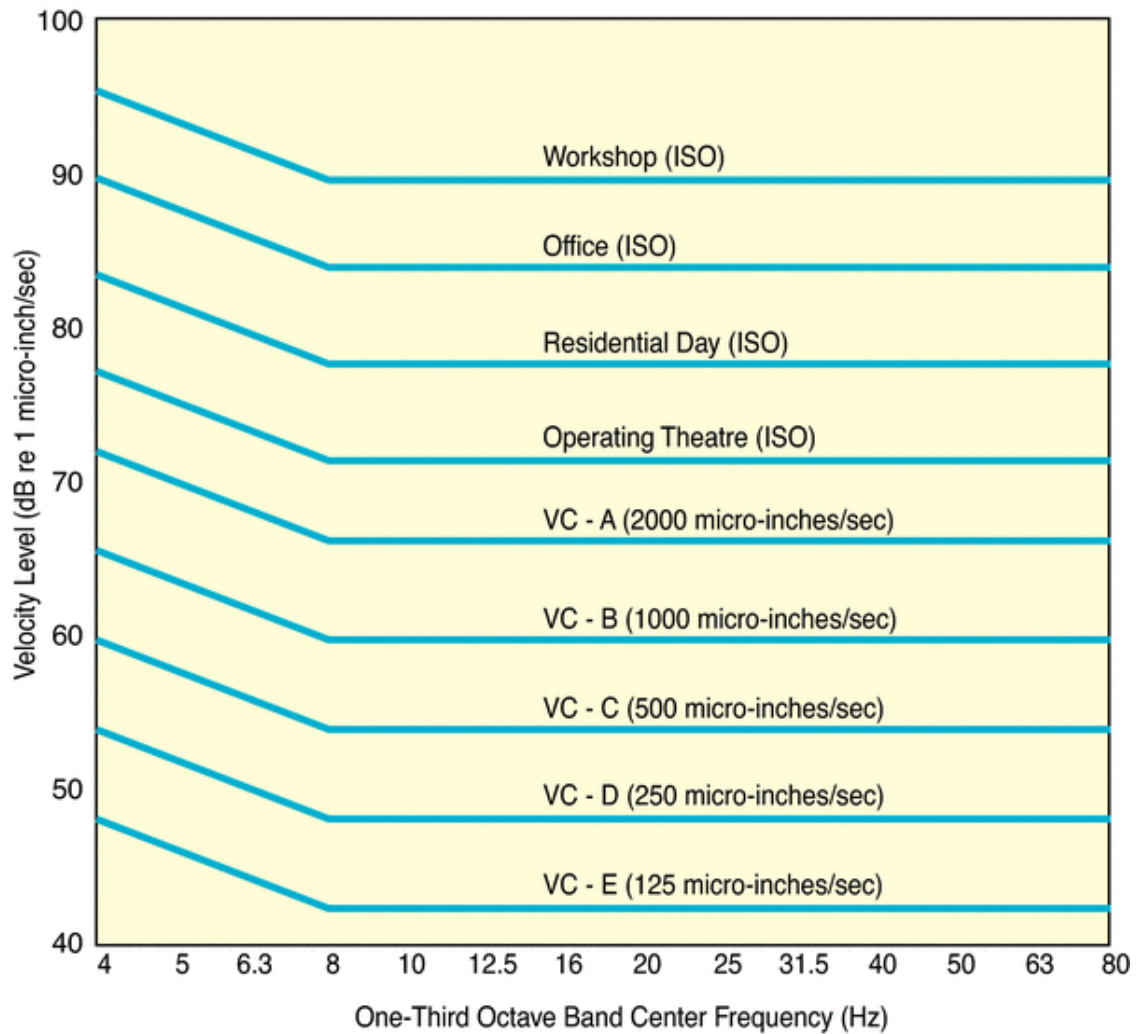
Table 6 Environmental Requirements Specifications

Requirement	Specification
Operational Ambient Temperature	–20°C to 50°C (sheltered with no direct sunlight or rain)
Non-Operational Temperature	–40°C to 70°C (sheltered)
Relative Humidity	Below the dew point for the area, avoiding condensation on surfaces
Floor Vibrations	ISO Workshop velocity level

Room Floor Vibration

The LGR-ICOS Gas Analyzer is sensitive to vibration. Vibration at the installation site must be below the ISO Workshop velocity level as shown in Figure 2.

Figure 3 ISO (Vibration) Criteria



Facilities Interface Requirements

Table 7 summarizes the electrical power interface requirements for the *LGR-ICOS* Gas Analyzer.

Table 7 Gas Analyzer Power Interface Requirements

Parameter	Specification
Power Equipment	The power circuit should not serve other loads.
Supply Point Interconnect	Class I Division 2 and EX zone 2 requirements. Up to 14 AWG stranded 3-conductor wire rated for ≥ 300 VAC (see Figure 6)
Supply Voltage	115 VAC model will operate between 90 VAC and 140 VAC 230 VAC model will operate between 190 VAC and 250 VAC
Phase	47/63 Hz, single phase
FLA Amps	0.81 A @ 117 VAC
ACT Interrupt Rating	10 kA
Short Circuit Current Rating (SCCR)	1 kA
Peak Current	In-rush current at power-on: 1.9 A peak @ 24 ms
Operating KVA	Average running load over 24-hour typical manufacturing cycle: 0.095 kVA
Wires ⁹	End user provided. 2 wires plus ground wire. Recommend 14 AWG.
Grounding	Dedicated ground, not neutral. Must be earth grounded.
Main Disconnect	Supplied by the customer at the Supply Point Interconnect. Junction box must be GUA-compliant.

Warning! : The instrument is not protected from polarity switching, and the Neutral conductor of the source electrical main circuit must remain at 0V potential.

⁹ It is the customer's responsibility to supply and connect the *LGR-ICOS* Gas Analyzer to the facility GUA-compliant junction box.

Note! : Obtain approval from local Authority Having Jurisdiction (AHJ) prior to power on of the Gas Analyzer after power and plumbing have been connected.

Table 8 Gas Analyzer Inlet Gas, CDA and Exhaust Interface Requirements

Requirements	Specification
Exhaust Gas Capacity	Up to 1 SLPM on a 0.25" OD, 0.1875" ID SST pipe
Exhaust Gas Fitting	0.25" (6.35 mm) Tube Swagelok
Inlet Gas Line Fitting	0.25" (6.35 mm) Tube Swagelok
Inlet Gas Maximum Temperature	105°C
Inlet Gas Maximum Gauge Pressure	10 psig
Clean Dry Air (CDA) Line Fitting	0.25" (6.35 mm) Tube Swagelok
Clean Dry Air (CDA) (Purge)	Minimum flow rate: 2 SCFM (57 LPM), < -40°C moisture dew point. Water and oil-free. Cleanliness: 99.996% pure (< 2 ppm H ₂ O, < 2 ppm total hydrocarbon). Mist separator can be used to achieve the cleanliness specification defined. Supply pressure range: 50 to 100 psig.

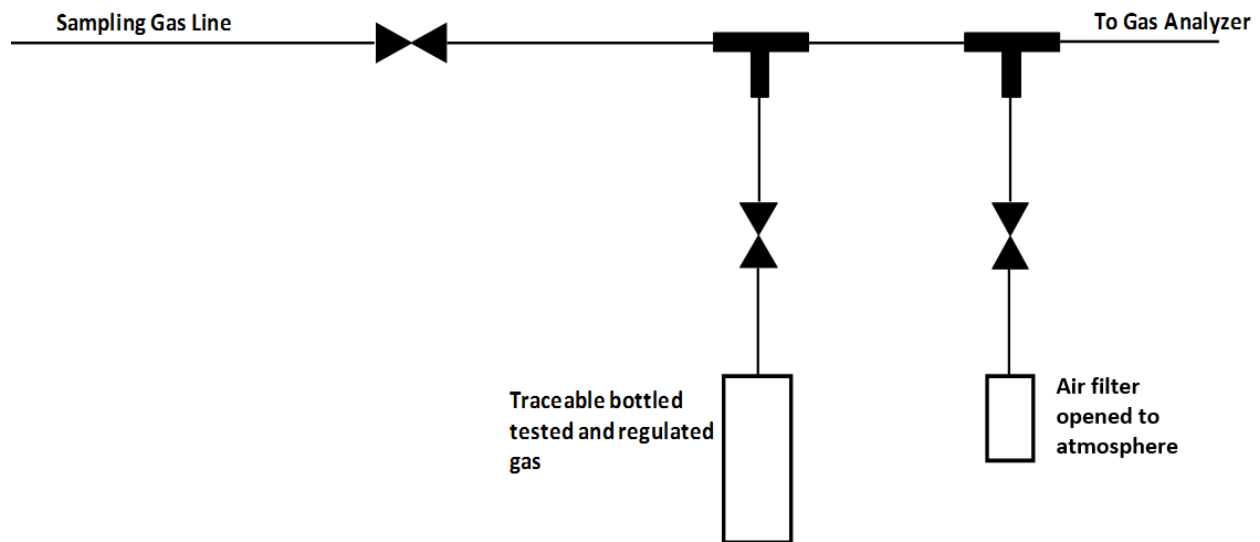
NOTE: To provide a safe environment when the Gas Analyzer needs servicing, all inlet and outlet gas lines must have a manual shutoff valve located near the instrument.

NOTE: The inlet gas line at the manual shutoff valve needs a switchable line that opens to filter atmospheric air and allow air through the inlet gas line during servicing of the Gas Analyzer, and another line for traceable tested and regulated gas for Gas Analyzer performance evaluation (see Figure 4). A check valve needs to be used for the filter air line and for the traceable regulated certified tested bottle gas.

NOTE: The customer provides the inlet gas, inlet CDA and exhaust gas lines. Connections are made at the facilities panel on the left and right side of the Gas Analyzer.

NOTE: Do not use liquid products for leak detection. Liquid can travel into the line at the point of the leak and contaminate the measurement source, thus impacting measurement performance.

Figure 4 Recommended Inlet Gas Line Configuration



Power Service

To ensure the reliability of the Gas Analyzer, the power circuit serving the instrument should not serve other loads. Transient-producing devices such as motors, induction heaters, etc. should be powered from a separate feeder to eliminate potential sources of noise interferences.

Failure of the Gas Analyzer due to voltage transients will void warranty and service contract agreements. If a problem is known to exist, an isolation transformer may be required.

Grounding

All Gas Analyzers are grounded through the AC power plug to the customer AC power source. This ground must be tied into one main grounding conductor. This ground wire is a dedicated ground—not a neutral—and must be carried back to a service ground that is earth grounded.

The ground wire should not be shared with other equipment between the power supply and the service ground point. Conduits must not be used as the only means of grounding.

External (Chassis) ground should match the shielded wire gage used for the main AC power connected to the instrument. This external ground should be an independent wire connected to protective earth.

Potential Power Problem Areas

All reasonable efforts have been made to ensure satisfactory operation from AC power supplied by most power companies. There are many outside variables over which neither the company nor ABB has any control. Power malfunctions can be caused by outside (radiated or conducted) transient electrical noise signals superimposed on the AC line.

The two basic types of power source failures are:

- **Power outages:** These include voltage sags exceeding SEMI F47 requirements and prolonged outages. If the frequency of such power failures is not acceptable for your operation, it may be necessary to install a standby power system or an uninterruptable power supply (UPS) that the customer can purchase on its own, based upon the instrument's electrical requirements as a baseline reference.
- **Transient electrical noise superimposed on power lines:** This may be caused by transient-producing equipment in the vicinity of the power company's distribution lines, or within or adjacent to your facilities. Lightning is another source of power transients.

The customer can install an optional standby power system or UPS. In such case, the UPS drives the EMO circuit leading to the Gas Analyzer. Further power isolation is not required, because the EMO circuit voltage presents no hazard.

Location Relative to Solvents and Acids

The sensitive optics in the *LGR-ICOS* Gas Analyzer must not be exposed to fumes from acids and solvents. Position the instrument at least 72" (1.83 m) from the source of such fumes.

Radiated & Conductive Frequencies Interference

Adequate shielding of communication cabling between the Gas Analyzer and the facility is recommended to ensure electromagnetic compatibility. Shielding is assured by routing the cable through a metallic conduit or by means of a hard usage cable where the other metallic foil or braided jacket provides the necessary shield. The cable shield shall be terminated only at the enclosure entry hub of the instrument, and shall provide a conductive path to ground. Alternately, Ethernet and/or Modbus communication cables to the Gas Analyzer may be a double shielded Category 6 S/FTP or SF/UTP type cable. Shielding of communication cable is required to suppress possible radiated and conductive interference affecting the instrument electronics function.

Lockout/Tag out Functionality

The lockout/tag out functionality for the *LGR-ICOS* Gas Analyzer is to be provided with a padlock-secured enclosure restricting access to the AC power. The holder of the key to the lockout/tag out padlock is the maintenance person whom is servicing it.

6 Equipment Facility Drawings

This section provides facilities drawings for the *LGR-ICOS* Gas Analyzer. The left and right views show the required facilities and their specifications, including exhaust gas, inlet gas, inlet CDA and power fittings.

Caution!



All drawings in this manual are for reference only. All critical dimensions or criteria must be confirmed on the latest revision of controlled drawings.

Figure 5a *LGR-ICOS* Gas Analyzer With X-Purge

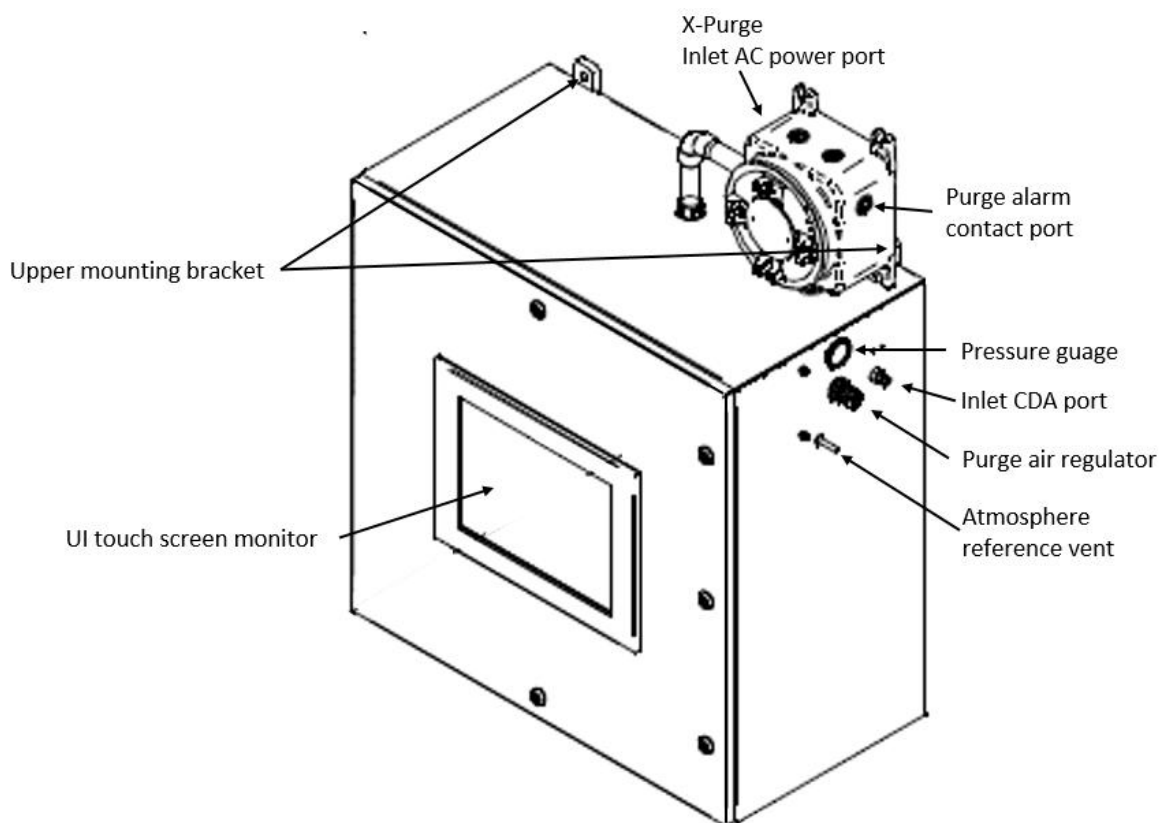
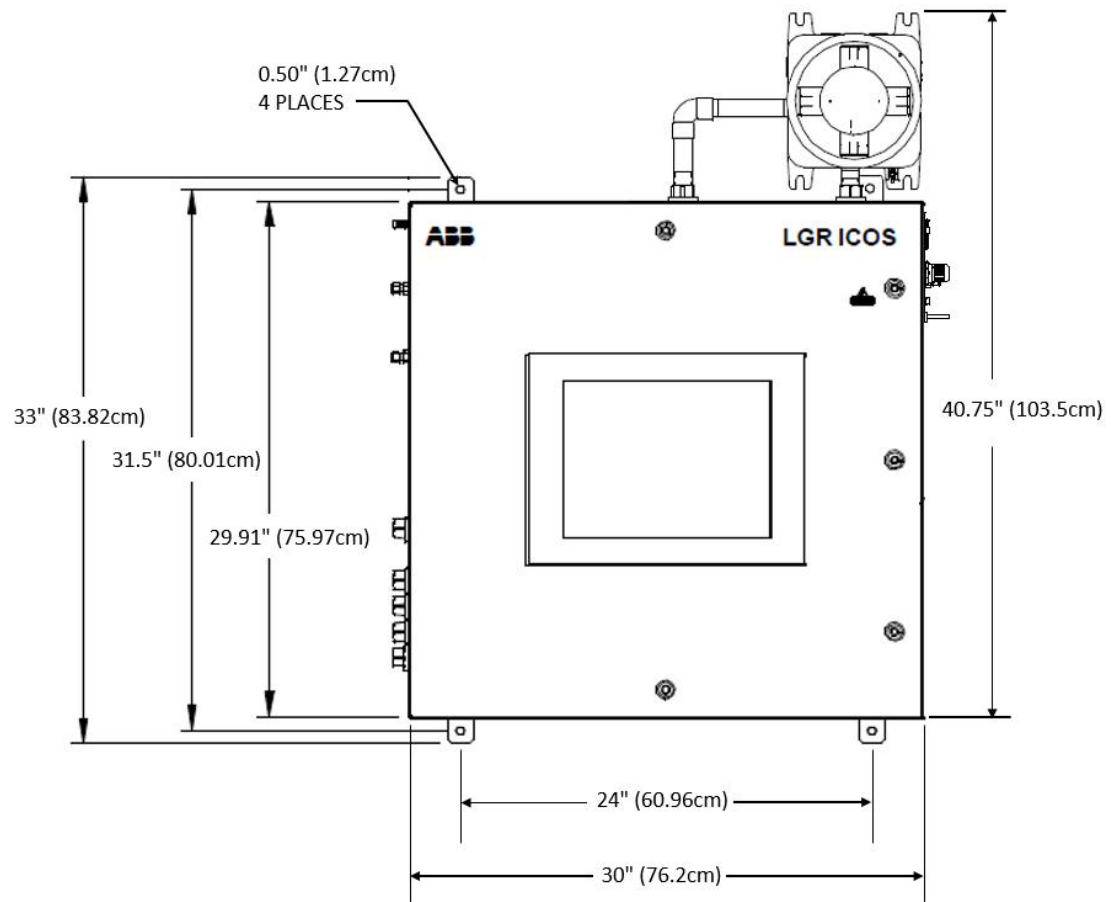


Figure 6a Front View – LGR-ICOS Gas Analyzer With X-Purge Overall Dimensions^h

NOTE: The Gas Analyzer four mounting holes (two on top and two on the bottom of the enclosure) are sized to fit 3/8" (10 mm) bolts.

^h All dimensions are in inches.

Figure 7a Right Side View – LGR-ICOS Gas Analyzer With X-Purge

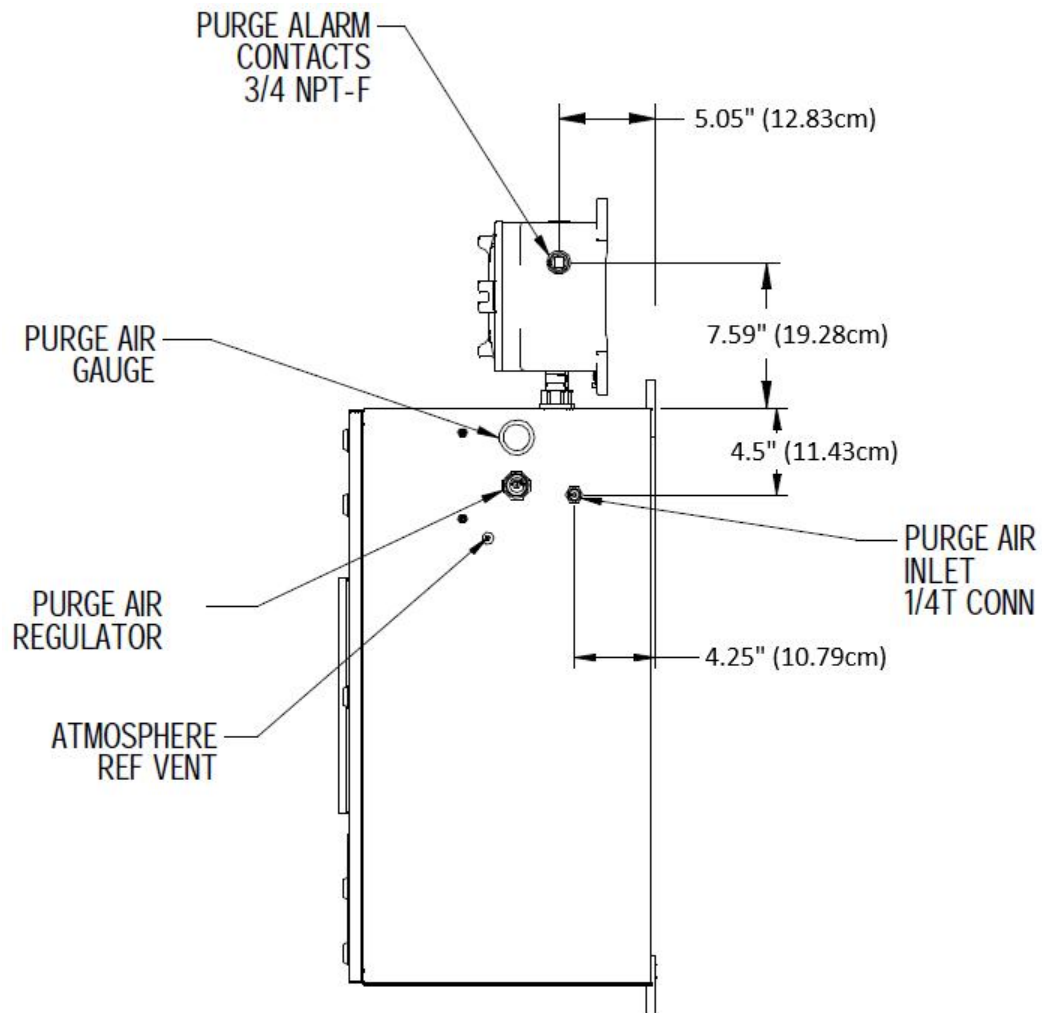


Figure 8a Top View – LGR-ICOS Gas Analyzer With X-Purge

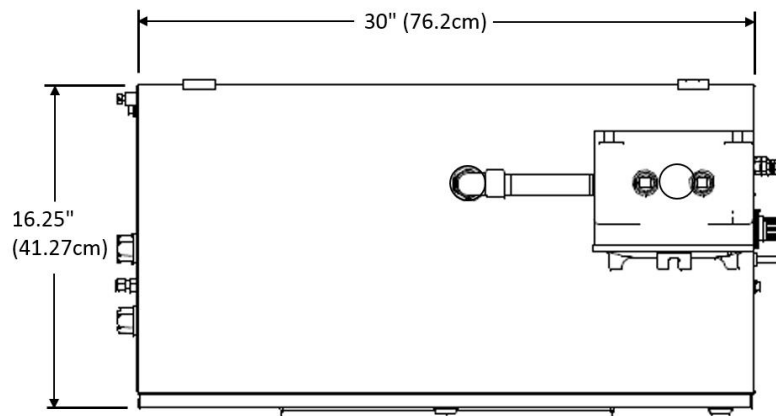
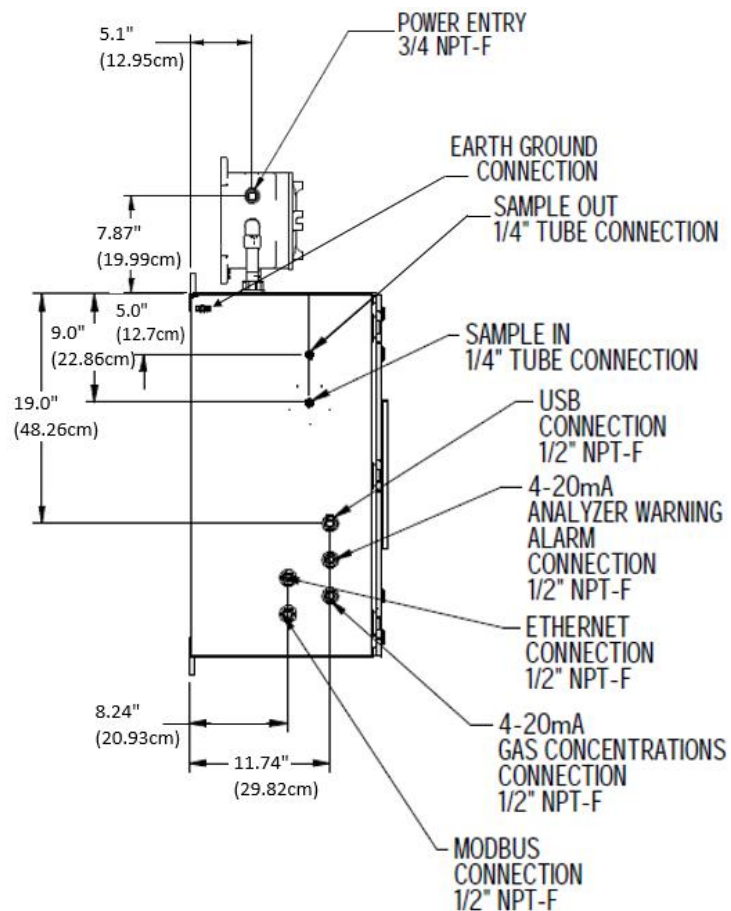


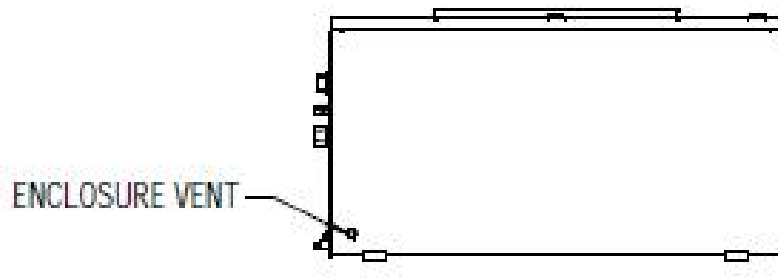
Figure 9a Left Side View – LGR-ICOS Gas Analyzer With X-Purge




Note 1: Customer supply Ethernet cables used for communication for both the Ethernet and Modbus TCP should be shielded in meeting CE EMC radiation and conductive requirements.

Note 2: M20 adaptor is included with the USB interface option.

Figure 10a Bottom View – LGR-ICOS Gas Analyzer With X-Purge

Table 9a Dimensions and Weightⁱ — LGR-ICOS Gas Analyzer With X-Purge

Physical Property	Dimension
Height	42.29" (107.42 cm)
Depth	16.25" (41.27 cm)
Width	30" (76.20 cm)
Weight	198 lbs. (89,8 kg)

Caution! 	<p>Be sure to refer to appropriate figures for the Gas Analyzer purchased to include the required access area for operation and servicing of the instrument. The access area dimensions must be added to the width and depth dimensions specified above. The access area dimensions significantly increase the total width and depth of the required installation space.</p>
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ⁱ Values in parentheses are based on the SI system.

Figure 5b LGR-ICOS Gas Analyzer With Z-Purge

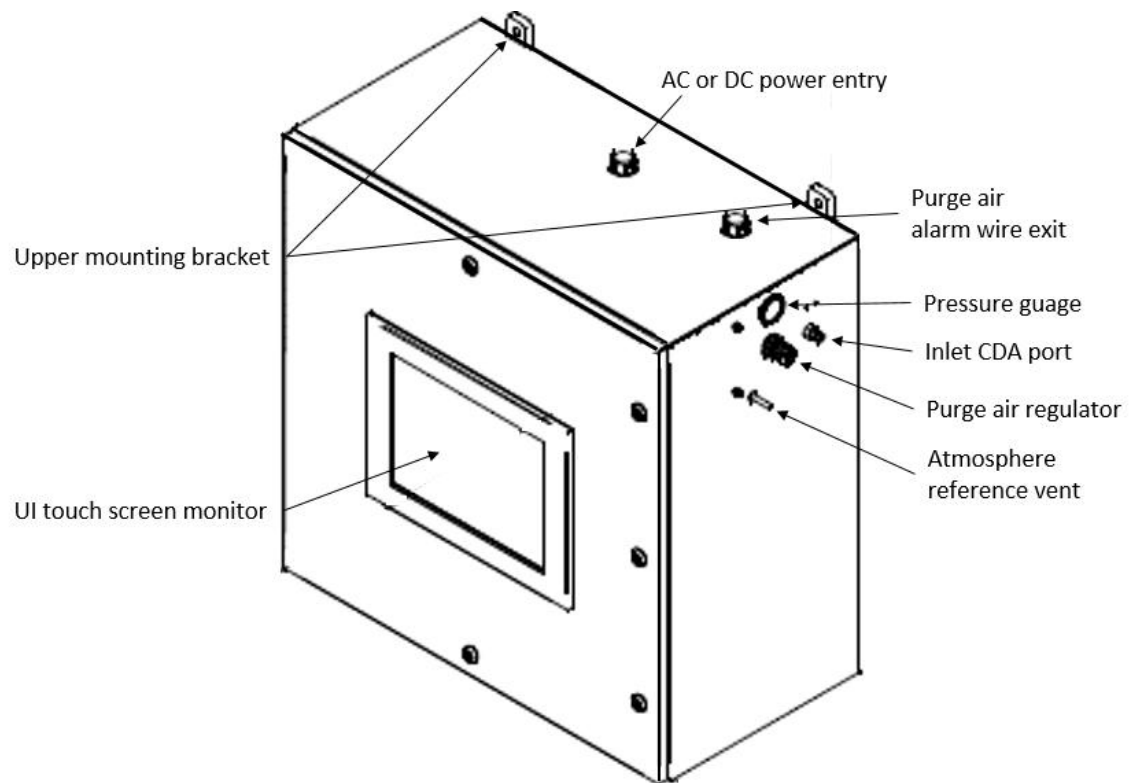
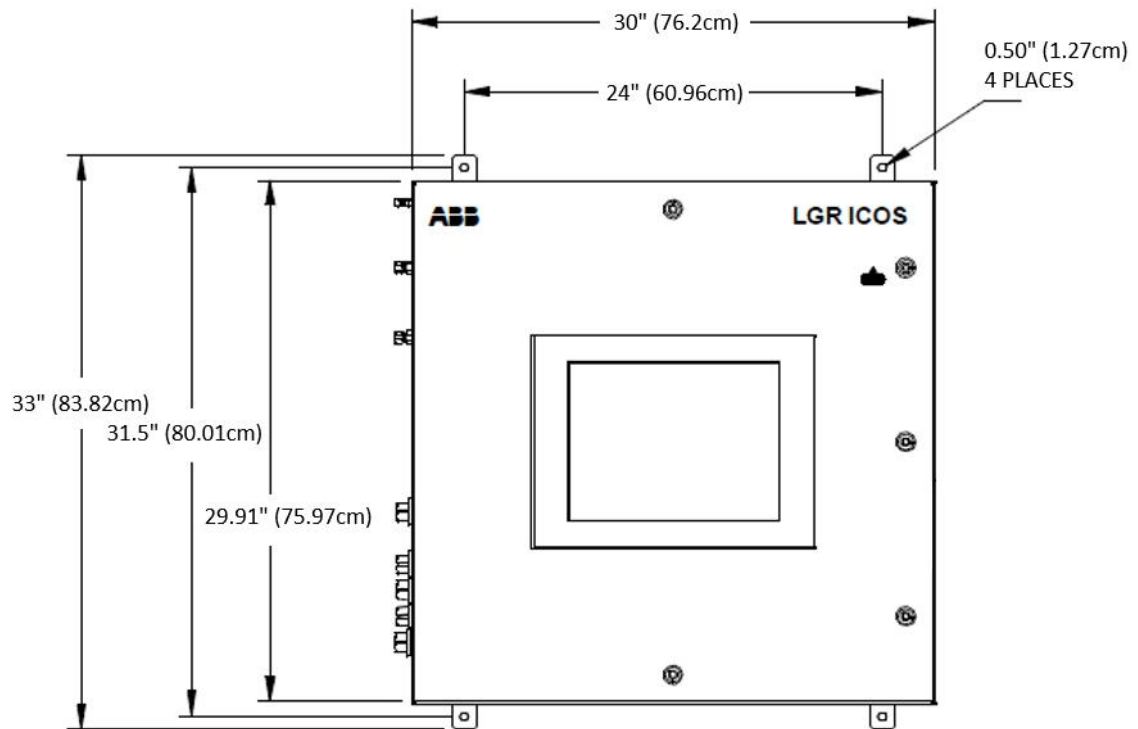


Figure 10b Front View – LGR-ICOS Gas Analyzer With Z-Purge Overall Dimensions¹

NOTE: The Gas Analyzer four mounting holes (two on top and two on the bottom of the enclosure) are sized to fit 3/8" (10 mm) bolts.

¹ Dimensions are both in inches and in centimeters (cm)

Figure 7b Right Side View – LGR-ICOS Gas Analyzer With Z-Purge

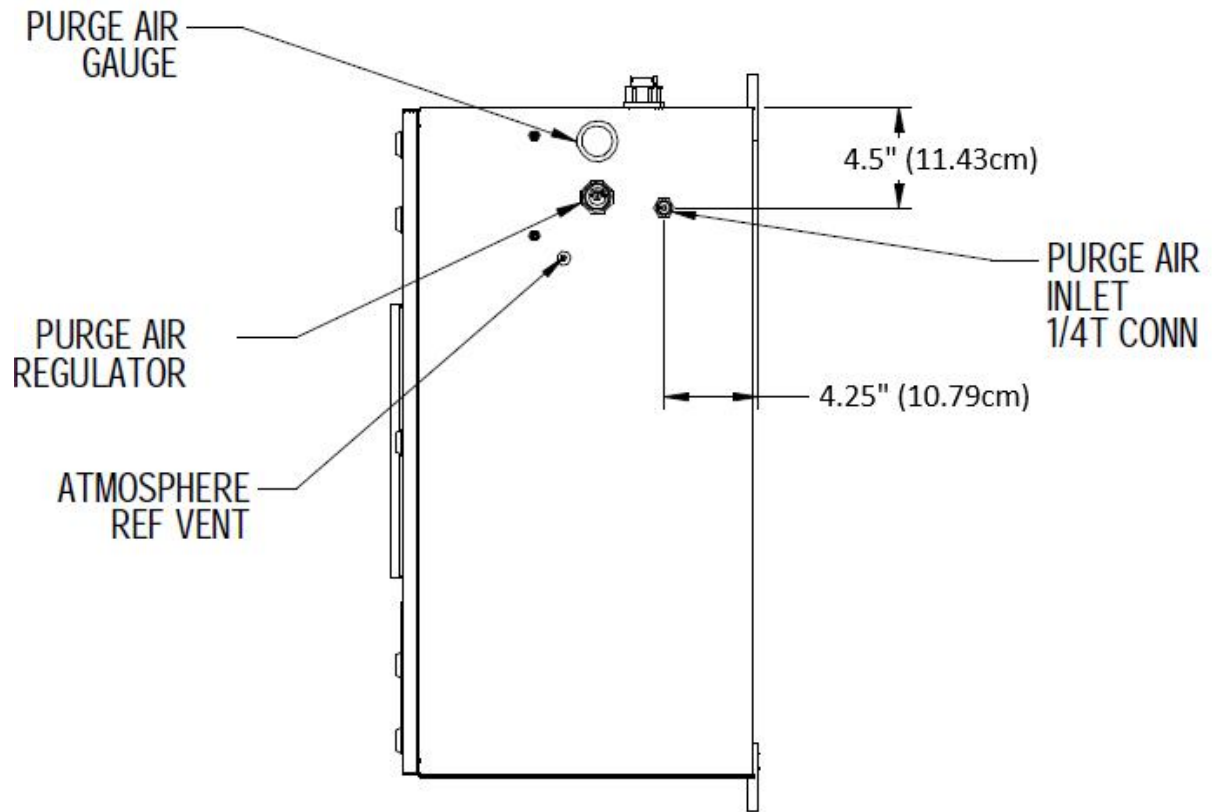


Figure 11b Top View – LGR-ICOS Gas Analyzer With Z-Purge

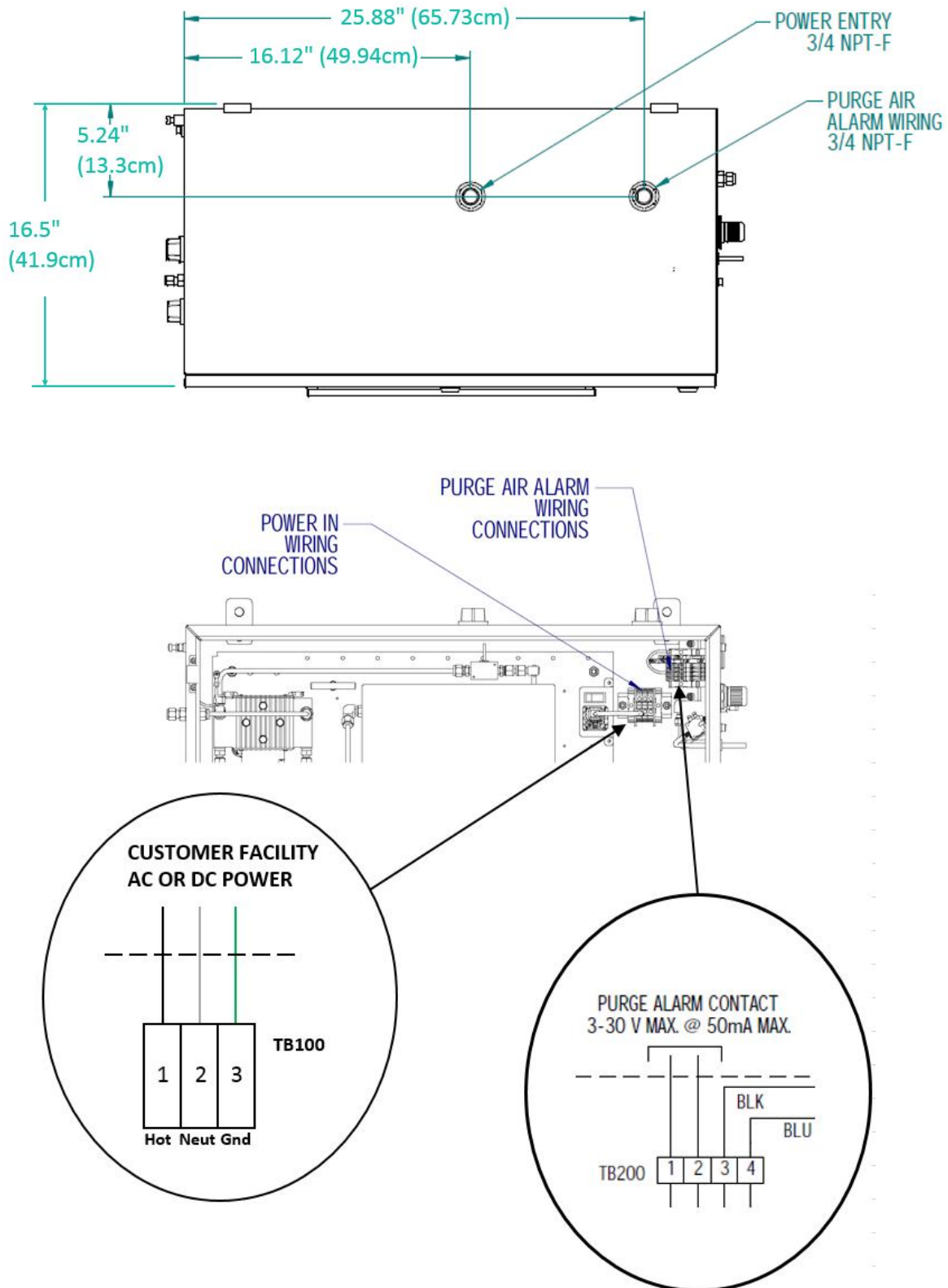
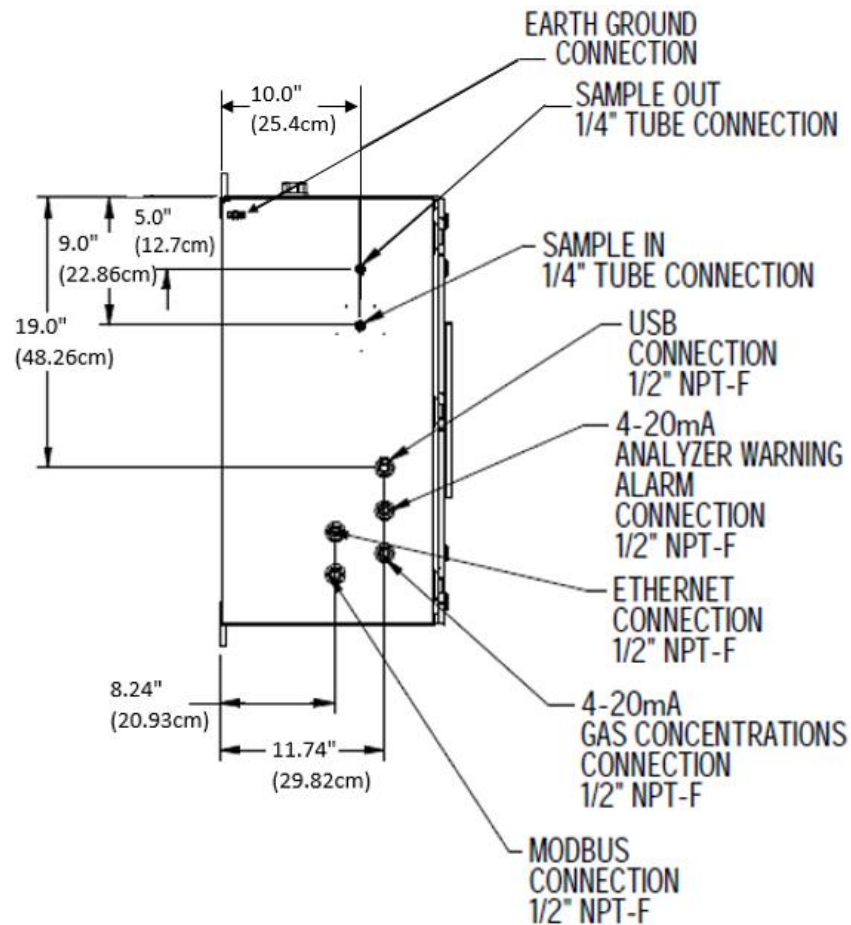


Figure 12b Left Side View – LGR-ICOS Gas Analyzer With Z-Purge



Note 1: Customer supply Ethernet cables used for communication for both the Ethernet and Modbus TCP should be shielded in meeting CE EMC radiation and conductive requirements.

Note 2: M20 adaptor is included with the USB interface option.

Figure 10b Bottom View – LGR-ICOS Gas Analyzer With Z-Purge

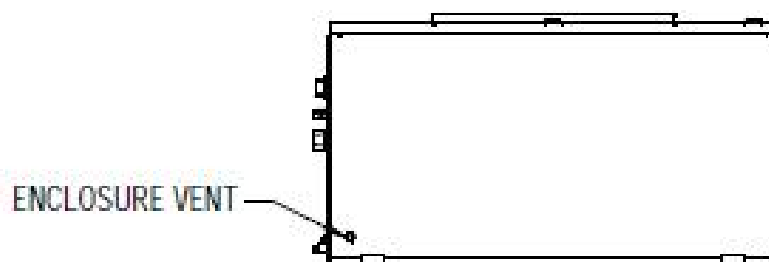


Table 10b Dimensions and Weight^k — LGR-ICOS Gas Analyzer With Z-Purge

Physical Property	Dimension
Height	29.91" (73.91 cm)
Depth	16.25" (41.27 cm)
Width	30" (76.20 cm)
Weight	188 lbs. (81.64 kg)


Caution!

Be sure to refer to appropriate figures for the Gas Analyzer purchased to include the required access area for operation and servicing of the instrument. The access area dimensions must be added to the width and depth dimensions specified above. The access area dimensions significantly increase the total width and depth of the required installation space.

^k Values in parentheses are based on the SI system.

7 Shipping, Receiving & Uncrating Requirements

This section provides table showing the shipping crate dimensions and weights for the *LGR-ICOS* Gas Analyzer.

	Use a forklift/pallet forklift to move the Gas Analyzer shipping crate. Use of hold down straps along with the forklift is strongly recommended to prevent damage from fall.
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Observe the following upon receiving the Gas Analyzer:

- Immediately after the Gas Analyzer arrives on site, contact ABB or their representatives.
- Use a forklift/pallet forklift to move the crate inside, but DO NOT open the crate until ABB or their representative personnel are present.
- Check Impact monitors (Refer to 7.1 Crate Impact Monitors).
- Do not store the Gas Analyzer outside.
- Keep the Gas Analyzer in a dry location, out of the weather, until it can be moved to the installation location.
- Do not remove the hermetically-sealed bag enclosing the Gas Analyzer until it is in a protected environment: clean, dry, and of moderate temperature. Opening the bag while the instrument is in an unprotected environment can damage the instrument.
- Dimensions can be obtained at section 6 from the drawings of the Gas Analyzer in its various views.
- Weight of the Gas Analyzer is approximately 198 lbs. (89,8 kg). The shipping crate weight is approximately 50 lbs. (22,6 kg).

Crate Impact Monitor

Each crate has impact and tilt monitors that measure whether an impact exceeded its maximum allowable value (25 g), or whether the crate was tipped during shipping.

If a crate impact sensor shows that 25 g was exceeded, do the following:

1. DO NOT refuse shipment.
2. Make a notation on the delivery receipt.
3. Report to ABB, Inc. customer support.
4. A Final QA Checklist of parts from ABB is inside the crate and can be checked when the crate is opened by trained ABB service personnel.

Crate Dimensions & Weight

The LGR-ICOS Gas Analyzer is shipped in one crate.

Following are tables showing the shipping crate dimensions and weights for the Gas Analyzer.

Table 10 Crate Dimensions & Weight

Physical Property	Crate 1 (Gas Analyzer)
Height	50" (2,08 m)
Depth	42" (1,98 m)
Width	50" (2,08 m)
Weights (Crate, instrument & subassemblies)	50 lbs. (22,6 kg) – Crate only 238 lbs. (107.95kg) to 248 lbs. (112,4 kg) – Crate & instrument

NOTE: *Uncrating of the Gas Analyzer is performed under the supervision of ABB personnel or their representatives.*

Immediately after the Gas Analyzer arrives on site, contact ABB or their representatives supporting that region. Use a forklift/pallet forklift to move the crate inside, but DO NOT open the crate until ABB personnel or their representatives are present.



Do not remove the hermetically-sealed bag enclosing the Gas Analyzer until it is in a protected environment that is clean, dry, and of moderate temperature. Opening the bag while the instrument is in an unprotected environment can damage the instrument.

If there is a major temperature difference between the outside of the building temperature and the room temperature of the site of where the instrument has been moved, allow the instrument several hours to warm up to the room temperature of the site to prevent condensation and damage within the instrument should the hermetically-sealed bags be removed.

Uncrating

Trained ABB service personnel or their representatives perform the uncrating of the LGR-ICOS Gas Analyzer with the assistance from the customer.

8 Installation Requirements

ABB personnel or their representatives are to install the *LGR-ICOS* Gas Analyzer.

Transport & Positioning of Equipment

The tool owner/customer is responsible for transporting the instrument to the site where it is to be installed.

A forklift, mobile hoist, or wheeled table is necessary to move the *LGR-ICOS* Gas Analyzer to the install site (it weighs approximately 248 pounds.) It is recommended to have a total of three people available to lift, position, level, and mount the Gas Analyzer against the wall.

9 Start-up Requirements

Start up, check out, and calibrations are performed by ABB personnel or their representatives.

Environmental/ambient operating conditions for the *LGR-ICOS* Gas Analyzer must be established prior to start-up.

Equipment Utilities Requirements

All facility connections, inlet gas, inlet CDA, exhaust, power, communications, and other requirements as defined by this manual based upon the options purchased, must be established and available to the equipment.

Personnel Requirements

It is recommended that a Facility Engineer and an associate be on site, or be on stand-by for consultation, lifting and mounting the *LGR-ICOS* Gas Analyzer to the wall.

10 Acceptance Tests

This section describes the required tests used to make sure that the facilities provided at the site meet the *LGR-ICOS* Gas Analyzer requirements, and that it can be operated within specification.

Facilities Acceptance Tests

Tests are performed to demonstrate that the facilities meet requirements.

A factory representative tests each of the requirements, and the ABB field service engineer or representative verifies that the result is within the specifications outlined in the following facility checklists:

- Table 6: Power Interface Requirements
- Table 7: Inlet Gas, Inlet CDA, and Exhaust Interface Requirements

Equipment Acceptance Tests

Tests are performed to demonstrate that the equipment meets requirements, after installation and start up.

The tests include instrument functionality, measurement accuracy, and repeatability. A factory representative completes a checklist and then "signs off" on the *LGR-ICOS* Gas Analyzer. It is recommended that the customer provides an inline to the Sampling Inlet Gas line to the Gas Analyzer, a bottle of "*traceable tested and regulated*" gas to validate instrument measurement performance in reference to the traceable gas sample. Customer main gas sample for the Gas Analyzer measurement can be contaminated with other element(s) resulting in an unexpected result away from the theoretical answer, thus is not recommended to be use as a monitoring sample.

11 Training Requirements & Policies

This section describes the ABB technical training policy, and the requirements for training personnel to operate the *LGR-ICOS* Gas Analyzer.

Installation Training

ABB personnel or their representatives perform the installation; therefore, no customer training is required for the installation process.

Operations Training

With each *LGR-ICOS* Gas Analyzer purchase, ABB provides informal, on-site operations training, which is typically performed by an ABB field service or applications engineer immediately after installation.

The User/Application Manual is available, describing the functions/setup of the Gas Analyzer.

12 Equipment Data Sheets

This section provides additional information about the *LGR-ICOS* Gas Analyzer, including equipment data, facilities requirements, etc.

Table 11 *LGR-ICOS* Gas Analyzer General Equipment Data

Instrument	System Description	Supplier
<i>LGR-ICOS</i> Gas Analyzer	Gas Analyzer able to measure up to 4 unique gases defined by the model selected by the customer.	ABB, Inc.
<i>LGR-ICOS</i> Gas Analyzer	X-Purge configured Gas Analyzer Z-Purge configured Gas Analyzer	ABB, Inc.

13 Checklists

This section provides pre-installation checklists to ensure that the installation site is ready to receive the instrument. Except as noted, these checklists apply to all models of the *LGR-ICOS* Gas Analyzers.

Copy the following tables, fill them out, and mail them completed to ABB, Inc. customer support.

- Table 12 – Instrument Transportation to Installation Site Checklist
- Table 13 – Environmental Checklist
- Table 14 – Exhaust Gas Checklist
- Table 15 – *LGR-ICOS* Gas Analyzer Inlet Gas Line Checklist
- Table 16 – *LGR-ICOS* Gas Analyzer Inlet CDA Line Checklist
- Table 17 – Electrical Checklist

Pre-Installation Checklists

Make sure that the following conditions are met before installation.

Table 12 *LGR-ICOS* Gas Analyzer Transportation to Installation Site Checklist

X	Perform these checks
	Clear floor area at least 8' by 8' (2,48 m by 2,48 m) for opening of the crate.
	Floors en route have no obstructions to allow use of a pallet forklift to move the Gas Analyzer to the target location.
	A hoist, forklift, or a table with wheels and a minimum of 3 people able to lift 198 lbs. (89,8 kg) the Gas Analyzer for wall mounting and securing it into place if a lifting device is not able.

Table 13 Environmental Checklist

X	Perform these checks
	Verify that ambient temperature is between -20°C to 50°C.
	Verify that the ambient temperature does not change more than +/- 5°C in less than 24 hours.
	Temperature variation should not exceed +/- 5°C; otherwise, measurement repeatability will be compromised.
	Verify that relative humidity does not exceed the dew point by looking for surface condensation in the surrounding area.
	Verify that the instrument location is at least 72" (1,83 m) from acid or solvent handling areas, and that these handling areas are well ventilated.

Installation Facilities Checklists

This section provides checklists for the installation site vacuum, exhaust, air, electrical, and environmental facilities.

Table 14 Exhaust Gas Checklist

X	Perform these checks
	Up to 1 SLPM on a 0.25" OD 0.1875" ID SST at point of system hook up meaning site exhaust must be able to draw this volume of gas; otherwise, back pressure to the LGR-ICOS Gas Analyzer will occur.

Table 15 LGR-ICOS Gas Analyzer Inlet Gas Line Checklist

X	Perform these checks
	Verify the inlet gas pipe can fit into a 0.25" (6,35 mm) Tube Swagelok from the left side of Gas Analyzer.
	Verify a manual shut-off valve is on the inlet gas line to be sampled and is accessible.
	Verify the gas is heated but does not exceed 105°C
	Verify the inlet gas pressure does not exceed 10 psig (maximum pressure allow).

Table 16 LGR-ICOS Gas Analyzer Inlet CDA Line Checklist

X	Perform these checks
	Verify that the inlet CDA pipe can fit into a 0.25" (6,35 mm) Tube Swagelok on the right side of the Gas Analyzer.
	Verify that the inlet CDA flow rate can meet the 2 ft ³ /min (57 LPM) with supply pressure ranging between 50 psig and 100 psig to maintain the Gas Analyzer positive internal pressure.
	Verify that a manual shut off valve is accessible on the inlet CDA line for purging the air and create a positive internal pressure in the Gas Analyzer.

NOTE: The Gas Analyzer requires CDA to purge the gas from the unit for gas ignition prevention as a safety requirement. Also, X-Purge Gas Analyzers will not be energized without the internal pressure exceeding the safety pressure cutoff switch within the unit. Z-Purge Gas Analyzers have no such restraints.

Table 17 Electrical Checklist

X	Perform these checks
	3 wires power connection at a GUA compliant junction box to connect to the <i>LGR-ICOS</i> Gas Analyzer 8' AC power cable. Third wire ground is earth ground.
	Verify facility meets the Class I Division 2, Group B, C, D, or EX Zone 2 requirements in support of the Gas Analyzer.
	Verify the VAC supply power to the Gas Analyzer is within 90VAC to 140VAC or 190VAC to 250VAC (single-phase) option dependent are met.
	Verify the VAC is operating between 47/63 Hz
	Verify that AC power connected to the instrument is clean and free of transients (transients must be < 1 kV peak and less than 20 μ sec in duration).
	Dedicated ground, not neutral, carried back to service ground or suitable protective earth.

14 Addenda

This section provides additional information about the *LGR-ICOS* Gas Analyzer

Environmental Controls for Shipping & Storage

The *LGR-ICOS* Gas Analyzer requires specific transportation to maintain tool integrity. Table 18 outlines the requirements for tool transportation from the ABB site to the customer's location.

Table 18 Tool Shipping and Storage Requirements

X	Shipping and Storage Requirements
	Ship via air ride vehicle is required.
	Temperature control range within 10°C to 30°C.
	Humidity control range from 10% to 80% with no condensation.
	To prevent condensation, the Gas Analyzer must be stabilized to room temperature before opening any of the bags. The length of time required to stabilize the Gas Analyzer depends upon the temperature of the instrument upon receipt.
	The Gas Analyzer within the crate or out of the crate must be stored out of the weather, preferably in a temperature-controlled environment, between –40°C and 70°C. It is recommended that the Gas Analyzer crate be stored away, should it be of future use for instrument upgrades or repair that may not be possible to be completed in the field.