
ABB MEASUREMENT & ANALYTICS | USER MANUAL

User Manual | OA-ICOS™

GLA151 Series QC Portable Analyzers



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Disclaimer

This document contains product specifications and performance statements that may be in conflict with other ABB published literature, such as product flyers and product catalogs. All specifications, product characteristics, and performance statements included in this document are suggested specifications only. In case of conflict between product characteristics in this document and specifications in the official ABB product catalogs, the latter takes precedence.

ABB reserves the right to make changes to the specifications of all equipment and software, and to the contents of this document, without obligation to notify any person or organization of such changes. Every effort has been made to ensure that the information contained in this document is current and accurate. Please contact ABB-LGR if you find any error in this document, so we can make appropriate corrections.

Cybersecurity

This product is designed to be connected to and to communicate information and data via a network interface. It is your sole responsibility to provide and continuously ensure a secure connection between the product and your network or any other network (as the case may be). You shall establish and maintain any appropriate measures (such as, but not limited to, the installation of firewalls, application of authentication measures, encryption of data, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ABB and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Patent

The analyzer technology is protected by patents:

- 7,468,797
- 6,839,140
- 6,795,190
- 6,694,067

Copyright

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Safety

The following pages provide important safety precautions.



Class of Laser Equipment

The analyzer is a Class 1 laser instrument when the case cover is closed for normal operation, and the lock is installed.

Certification

The analyzer certifications are listed in Table 1.

Table 1: Safety Certifications

Symbols	Standards Tested and Met
	2004/108/EU (EMC), EN61326-1
	Title 21 Code of Federal Regulations, chapter 1, sub-chapter J

WEEE Directive

The analyzer is not subject to WEEE Directive 2002/96/EC (Waste Electrical and Electronic Equipment) or relevant national laws (e.g. ElektroG in Germany).

The product must be disposed of at a specialized recycling facility. Do not use municipal garbage collection points. According to the WEEE Directive 2002/96/EC, only products used in private applications may be disposed of at municipal garbage facilities.

Labels

The following labels are at specific locations on or in the analyzer to identify hazardous areas. (Figure 1)



Figure 1: Radiation Labels

These labels are located on the enclosure covering the OA-ICOS™ cell. The fiber laser is visible only when the insulated enclosure is removed from the OA-ICOS™ cell.

Operator Safety

When the case cover is closed and locked into position, the analyzer runs safely, without risk to the operator. Modifying the analyzer to operate with the case cover open can injure personnel.



WARNING!

Bypassing the analyzer interlock switch to open the case cover during analyzer operations can cause serious bodily injury. Even though the analyzer provides a second layer of protection, such as a laser cover to prevent the user from the invisible laser beam or any secondary reflection from the laser on a reflective surface, it is not recommended to modify the analyzer to operate in an unsafe condition.

Electrical Hazards

The analyzer poses no electrical hazards. The analyzer components operate at ≤ 6.8 V DC.

Laser Hazards

The analyzer is a Class 1 laser product that complies with:

- 21 CFR 1040.10 and 1040.11
- EN 60825-1:2014



WARNING

The laser is classified as a Class IIIb when exposed. Only trained service personnel are authorized to open the housing or service the laser.

Using this analyzer in a manner not specified by ABB-LGR may result in damage to the analyzer and render it unsafe to operate.



WARNING

Only authorized persons may open the analyzer cover or perform internal maintenance. Contact ABB-LGR for maintenance instructions and maintenance kits. Make sure the analyzer is unplugged before working with the internal components. Failure to do so may result in damage to the analyzer and electric shock.

Safety Provisions for a Chemical Spill

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.

If a spill occurs:

- 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.

Text Formats and Warning Icons

Text Formats





This section describes text formats and warning icons used in this manual.

- *Italicized* text is used for emphasis in text and also to emphasize the names of screens or text fields.
- **Bold** text is used to show text that you type in fields and also button choices that you enter.

Warning Icons

Table 2 shows and describes the warning icons used in this manual.

Table 2: Warning Icon Descriptions

Icon	Meaning
 NOTE or IMPORTANT!	Emphasizes facts and conditions important to analyzer operation.
 WARNING!	General Warning Icon: gives general safety information that must be followed to avoid hazardous conditions.
 WARNING!	Electrical Warning Icon: warns of potential electrical shock hazard.
 WARNING!	Laser Warning Icon: warns of potential laser hazard.

Transportation and Storage of Boxed Analyzers

When transporting and storing boxed analyzers:




- Analyzers may be shipped in non-pressurized aircraft.
- Analyzers are fragile: Do not drop or smash boxed analyzers.
- Do not store analyzers outside in wet weather.
- Do not stack boxes more than five high.
- Analyzers may be safely stored at temperatures between -20°C and +60°C.



Save the original shipping materials to use when returning the analyzer to ABB-LGR if factory service or repair is needed.

Table 3 lists and describes the safety icons on ABB-LGR shipping boxes. Follow these instructions when transporting and storing boxed analyzers.

Table 3: Transportation and Storage Icon Descriptions

Icon	Meaning
	Store your analyzer in a sheltered, dry area. Do not let the box get wet.
	Transport and store the analyzer box with the arrows on the box pointing up.
	The analyzer is fragile. Transport carefully. Do not drop the box.

Warranty

Each ABB-LGR analyzer is warranted by ABB-LGR to be free from defects in material and workmanship. However, our sole obligation under this warranty shall be to repair or replace any part of the analyzer, which our examination discloses to have been defective in material or workmanship without charge and only under the following conditions:

1. The defects are called to the attention of ABB-LGR in writing within one year after the shipping date of the analyzer.
2. The analyzer has not been maintained, repaired or altered by anyone who was not approved by ABB-LGR.
3. The analyzer was used in the normal, proper, and ordinary manner and has not been abused, altered, misused, neglected, involved in an accident or damaged by an act of God or other casualty.
4. The purchaser (whether a distributor or direct customer of ABB-LGR, or a distributor's customer), packs and ships or delivers the analyzer to ABB-LGR's main office within 30 days after ABB-LGR has received written notice of the defect. Unless other arrangements have been made in writing, transportation to ABB-LGR is at customer's expense.
5. No-charge repair parts may be sent at ABB-LGR's sole discretion to the purchaser for installation by purchaser.
6. ABB-LGR's liability is limited to repair or replace any part of the analyzer free of charge if ABB-LGR's examination discloses the part to be defective.

The laws of some locations may not allow the exclusion or limitation on implied warranties or on incidental or consequential damages, so the limitations herein may not apply directly. This warranty gives you specific legal rights, and you may already have other rights, which vary from location to location. All warranties that apply, whether included by this contract or by law, are limited to the time period of this warranty, which is a twelve-month period commencing from the analyzer customer ship date or eighteen months from the date of shipment to an ABB-LGR authorized distributor, whichever is earlier.

Further information concerning this warranty may be obtained by writing or telephoning the Warranty Manager at ABB-LGR Customer Service.

ABB-LGR provides direct assistance in the use and application of all of its analyzers through email, telephone, and if necessary, in person.

Please contact icos.support@ca.abb.com and your local sales representative for more details.

Warranty Returns

If your product is defective, you may return it during its designated warranty period for a prompt exchange or repair. To return a product, please contact your local sales representative and ABB service support to request a Return Material Authorization (RMA) number. Requests for refunds and exchanges cannot be processed without a valid RMA number.

Please have the following information available when requesting an RMA number:

- Part Number
- Serial Number (Located on the side panel of the analyzer)
- Description of the Problem

The company-issued RMA number must be prominently displayed on the return package.

No returns will be accepted collect or C.O.D. On all warranty returns, ABB-LGR will pay the shipping charges on the return of the merchandise to the customer.

Customer Support

ABB provides product support services worldwide. To receive product support, either in or out of warranty, contact the ABB office that serves your geographical area, or the office indicated below:

ABB Inc. Measurement & Analytics
3400, rue Pierre-Ardouin
Quebec, (Quebec) G1P 0B2 Canada

Tel: 1 800 858 3847 (North America)
Tel: +1 418 877 2944 (Worldwide)
Fax: +1 418 877 2834
Technical Support: icos.support@ca.abb.com

Please contact icos.support@ca.abb.com and your local sales representative for more details.



NOTE

Please provide the serial number or sales order number of the analyzer.

1 Analyzer Overview

The OA-ICOS™ QC Portable Analyzer measures gas concentrations in parts per billion (ppb) and parts per million (ppm).



This analyzer is a Class 1 laser product.

Performance Specifications

Ambient Humidity

- <99% relative humidity non-condensing

Operating Temperature

- 5 - 45°C

Maximum Altitude

- 6,000 Feet

Power Requirements

- 60 Watts (typical) – 24-30 VDC (battery power)
- 66 Watts (typical) – 15-230 VAC, 50/60hz (AC adaptor)
- 120 Watts maximum

Fuse Ratings

- 32 VAC
- 10 Amps
- Fast-blow fuse

Cable Plugs and Voltage for EC Countries

- See page 83.



Always use the power supply cord provided by ABB-LGR. See page 83 for a description of power cords for a specific country.

External Dimensions

- 18.5" W x 14" D x 7" H

Weight

- 15 kg

Cell Volume

- 345 cc cavity
- 10 cc tubing
- Total volume = 355 cc

Standard Components

This section describes the analyzer components. Verify that these components arrived, before you begin the setup.

The standard components include:

- QC Portable Analyzer (GLA151 Series)
- Analyzer power cord
- AC/DC power supply
- External in-line filter (push-connect)
- Null modem type serial data cable
- USB flash drive
- Users Guide (this document)

Optional Components

- Multiport Inlet Unit, eight or sixteen channels (MIU-8, MIU-16)
 - Power cable
 - 25-pin control signal cable
- Maintenance kit (MTN-KIT-64). This recommended kit includes:
 - Rebuild kit for internal pump
 - Mirror cleaning kit
 - 32GB solid state hard drive
- Battery hook-up kit (ACC-UP-12V)
- Ultra-portable analyzer back pack (ACC-UP-BP)
- Wireless user interface with iPad (ACC-WIFI-iPad)
- Wireless user interface with Nexus7 tablet (ACC-WIFI-Android)
- Replacement fuses, in-line filters, side covers (915-9300-0000)
- Secondary AC-DC power supply (ACC-UP-AC)



WARNING

This analyzer has been CE certified using data cables three meters long or less. Connecting the analyzer using longer data-cables is not recommended.



The wireless user interface will not work if:

- **The analyzer has a system failure**
- **The hard drive fails or is corrupted**
- **Battery power to the analyzer is interrupted**

If any of these failures occur, you will need a mouse, keyboard and monitor to restart the analyzer. A back up hard drive is recommended.

If you have not received all of these components, contact ABB-LGR at icos.support@ca.abb.com.

Figure 2 shows the left side of the analyzer.

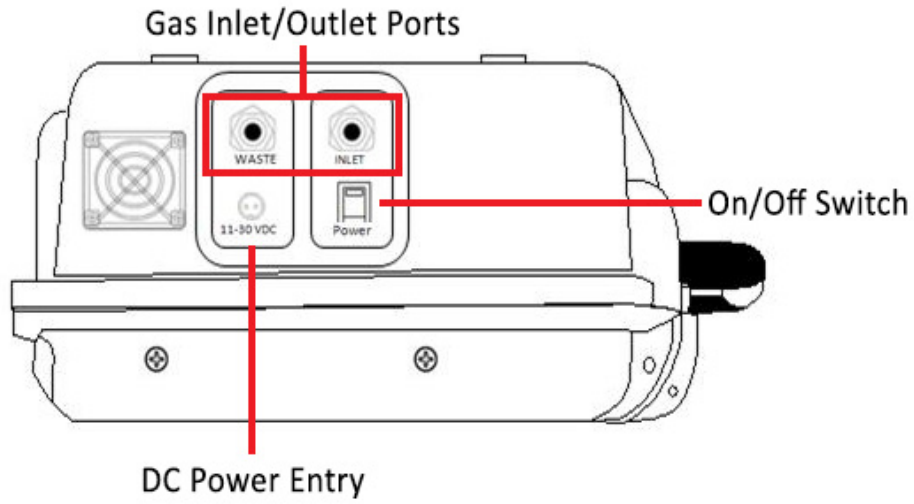


Figure 2: Left Panel

Figure 3 shows the right side of the analyzer.

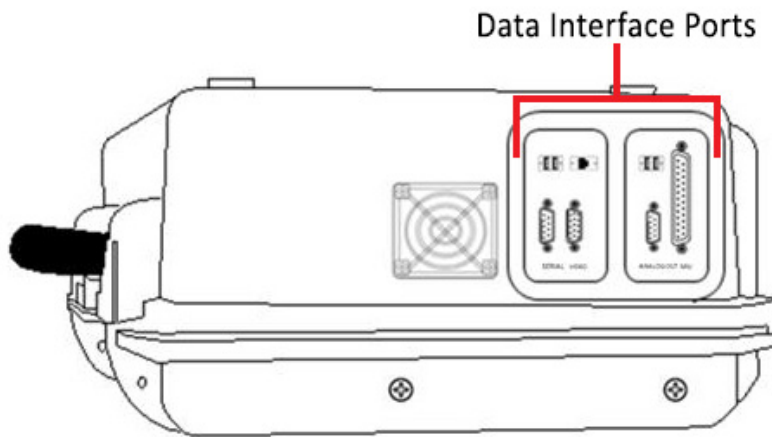


Figure 3: Right Panel

Power Connections

The power connector is on the left side panel of the analyzer. (Figure 4)

The analyzer can be powered two ways:

- Using the AC/DC power supply to the DC power inlet
- Using the battery hook-up kit (Optional)

The battery voltage must be in the range of *11-30 volts DC*. It has a continuous discharge rate to power 80 watts (or higher).

Figure 4 shows the power entry connector and the power switch.

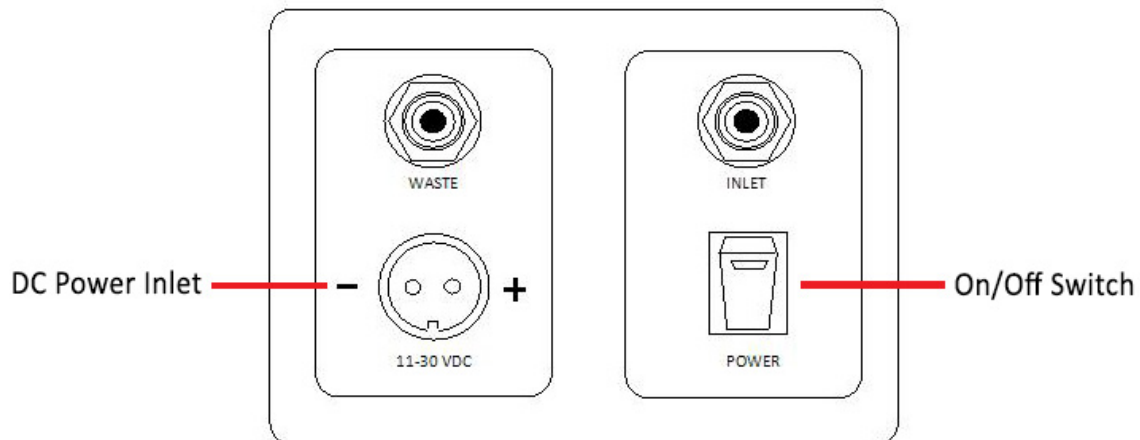


Figure 4: Power Connections and AC Voltage Selection Switch



The analyzer is equipped with a three-prong power plug. The third prong of the facility electrical outlets must be grounded. Failure to ground the third prong may result in electrical damage to the analyzer and electrical shock to the operator.

Emergency Shutdown Procedure

If the analyzer malfunctions and requires emergency shutdown:

1. Turn off the analyzer using the left side panel on/off switch. (Figure 2)
2. Unplug the power cord from the analyzer. (Figure 4)
3. Notify trained service personnel that the analyzer needs repair or servicing.

Data Interface Connection Ports

This section describes the data interface connections as shown in Figure 5. These connections vary from analyzer to analyzer depending on the ordered configuration.

- USB ports – Used for transferring data to a USB memory device, or to connect a USB keyboard and mouse.
- Ethernet port – Connects the analyzer to a local area network (LAN) and allows access to the data directory using an external computer.
- Serial port (9 pin D-sub) – For real-time digital measurement output.
- Video port (15 pin D-sub) – Connects an external monitor to the analyzer.
- Analog out port – Provides a DC voltage proportional to the measured gas concentration. If this output is connected to an external device, it must be terminated into a moderate to high impedance (>1 kOhm).
- MIU port (25-pin data port) – For connecting to a Multiport Inlet Unit (optional).

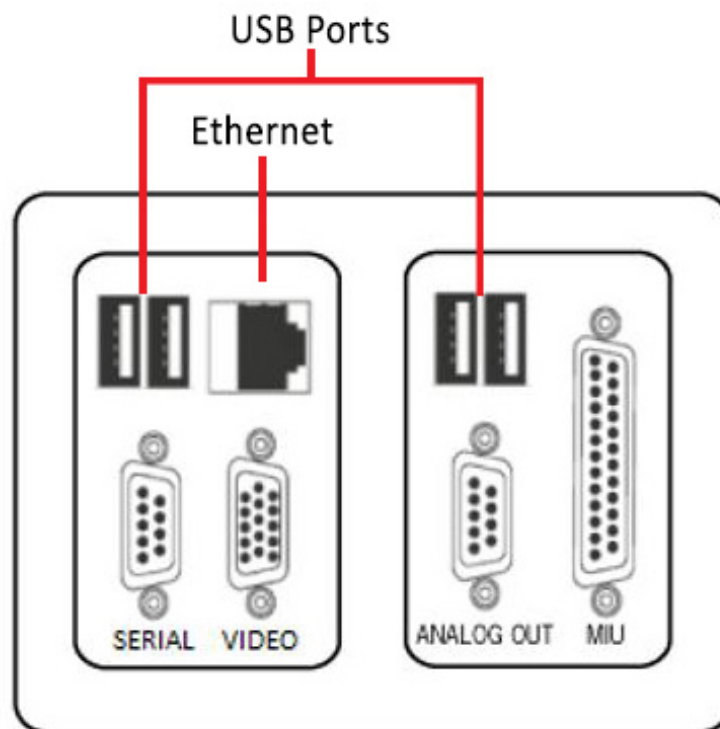


Figure 5: Data Interface Connection Ports

Gas Inlet/Outlet Connections

The gas inlet and outlet ports are located on the left side panel of the analyzer. (Figure 6)

- Gas to be measured is connected to the 1/4" push-connect *INLET* port.
- An external In-Line filter is provided, and can be attached to the *INLET* port.

During normal operation, the pump draws the sample through the analyzer inlet, and exhausts the sample through the waste port.

- The acceptable inlet gas pressure range is 0 to 10 psig.

The 1/4" push-connect *WASTE* port may be:

- Routed to the facility ventilation system, or
- Remain open, expelling non-hazardous gas into the room air.

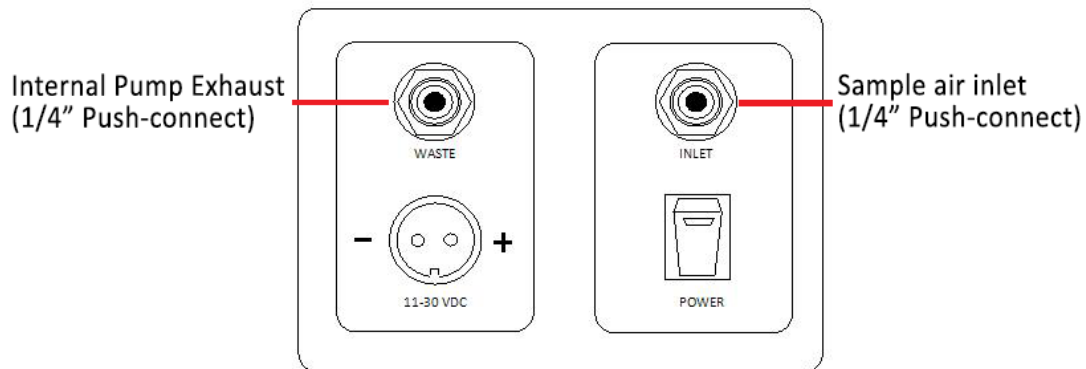


Figure 6: Gas Inlet/Outlets

Warning Labels and Descriptions

This section describes the warning labels shown on the analyzer.

- Table 4 gives a description of the warning labels.
- Figure 7 shows the location of the labels on the analyzer.

Table 4: Warning Labels and Descriptions



Label	Description
	<p>The laser is rated Class 3 (invisible laser radiation) when the housing is open. Only trained maintenance personnel may open the analyzer housing.</p>
	<p>General laser warning label.</p>



Figure 7: Warning Label Locations

2 Analyzer Setup

Connect the Power Cords

1. Connect the AC/DC power supply power cord from the power supply to a grounded outlet.
2. Connect the power connector cord on the power supply to the 11-30 VDC port on the left side of the analyzer. (Figure 4)

Connect the Data Interface Connections

1. See Figure 5 for a detailed description of the connections.

Connect the Inlet/Outlet Plumbing Connections

1. If applicable, connect a 1/4" sample tube (not provided) from the 1/4" push connect INLET port on the right panel of the analyzer to your sample source.
2. The provided External In-Line filter can be used for additional filtering by connecting to the 1/4" push connect INLET port on the right panel of the analyzer. (Figure 8)

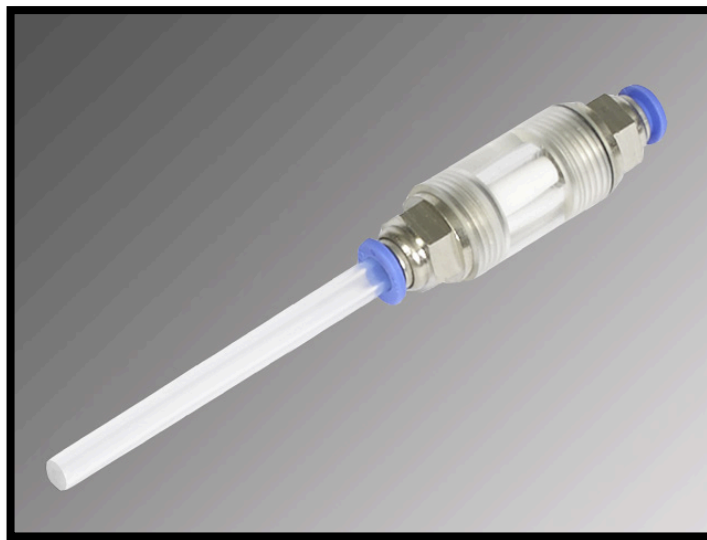


Figure 8: Portable Analyzer External In-Line Filter



To disconnect, push the outer ring around the Inlet and Waste ports to release the 1/4" tubing.

3 Initialize and Run the Analyzer

To initialize the analyzer:

1. Press the power switch on the left side of the analyzer to the **ON** position. (0 = OFF / - = ON)

The internal computer initializes, and a screen (Figure 9) displays as the program loads. The *Launch Service* screen displays after initialization. (Figure 11)



NOTE

The wireless interface will not work if:

- The analyzer has a system failure
- The hard drive fails or is corrupted
- Battery power to the analyzer is interrupted

If any of these failures occur, you will need a keyboard, mouse, and monitor to restart the analyzer. A back-up hard drive is recommended.

2. Click on the **launch button** to manually launch the analyzer.
 - a. The launch button is the abbreviated name of the gas analyzer. For example, the GLA151-N2OM1 button displays **N2O-CH4**. (Figure 11)
 - b. If you don't make a selection within 120-seconds, the analyzer automatically defaults to the *Main Panel Numeric* display. (Figure 17)
3. Click on the maintenance **SERVICE** button (Figure 11) if you need more time or need to choose a maintenance setting. (Figure 12)

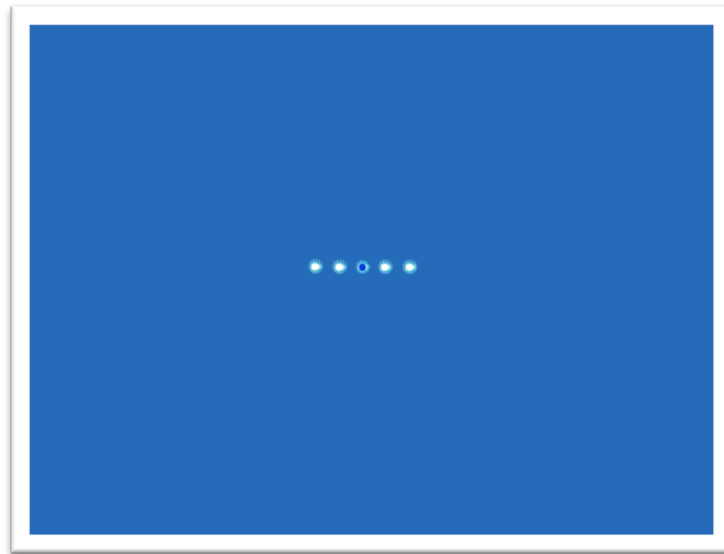


Figure 9: Start-up Screen in Busy Mode

File System Integrity Check

Once a month, the analyzer automatically performs a file system integrity check following initialization. Figure 10 shows the screen you see while the integrity check runs. The integrity check runs for one to two minutes before launching the analyzer's control software.



WARNING

Do not turn off the computer while the integrity check is running.

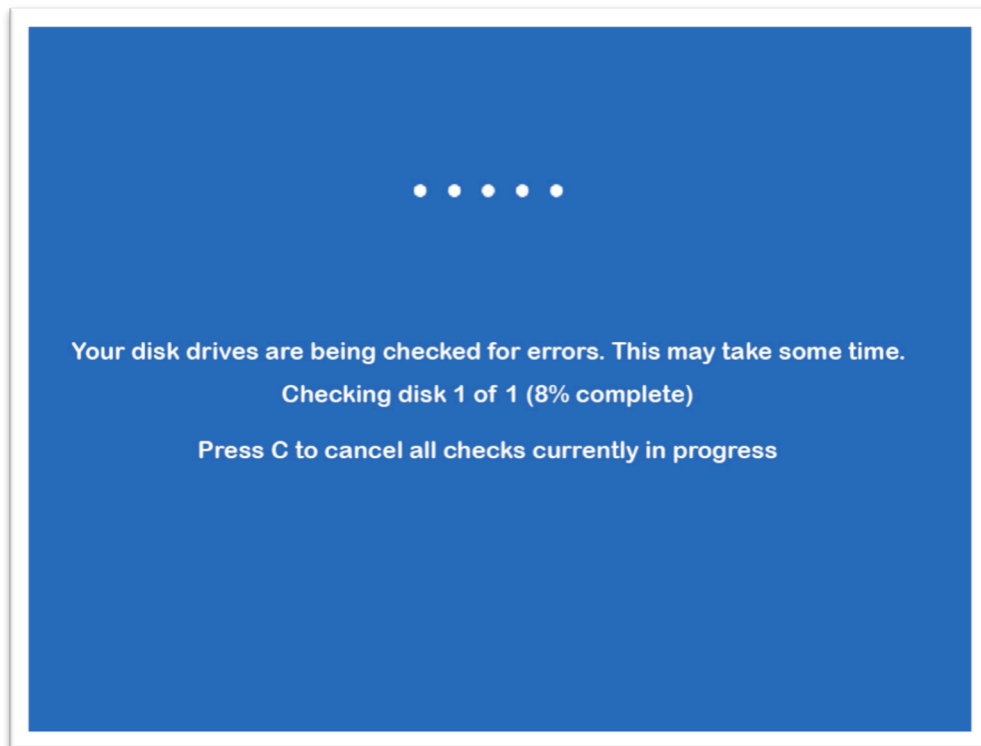


Figure 10: File System Integrity Check Screen

Thermal Stabilization

Run the analyzer for four hours before collecting data. This allows the internal temperature to stabilize. The exact final cell temperature will be analyzer specific (~25°C).

The Launch Service Screen

The *Launch Service* screen displays when initialization is completed. From this interface you can:

- Bypass the auto launch countdown to manually start recording measurements by clicking the **launch button**.
 - The launch button is the abbreviated name of the gas analyzer. For example, the GLA151-N2OM1 button displays **N2O-CH4**. (Figure 11)
- Open the auto launch window by clicking **Service**.
- Turn off the analyzer by clicking **Shutdown**.

Figure 11 shows the *Launch Service* screen.

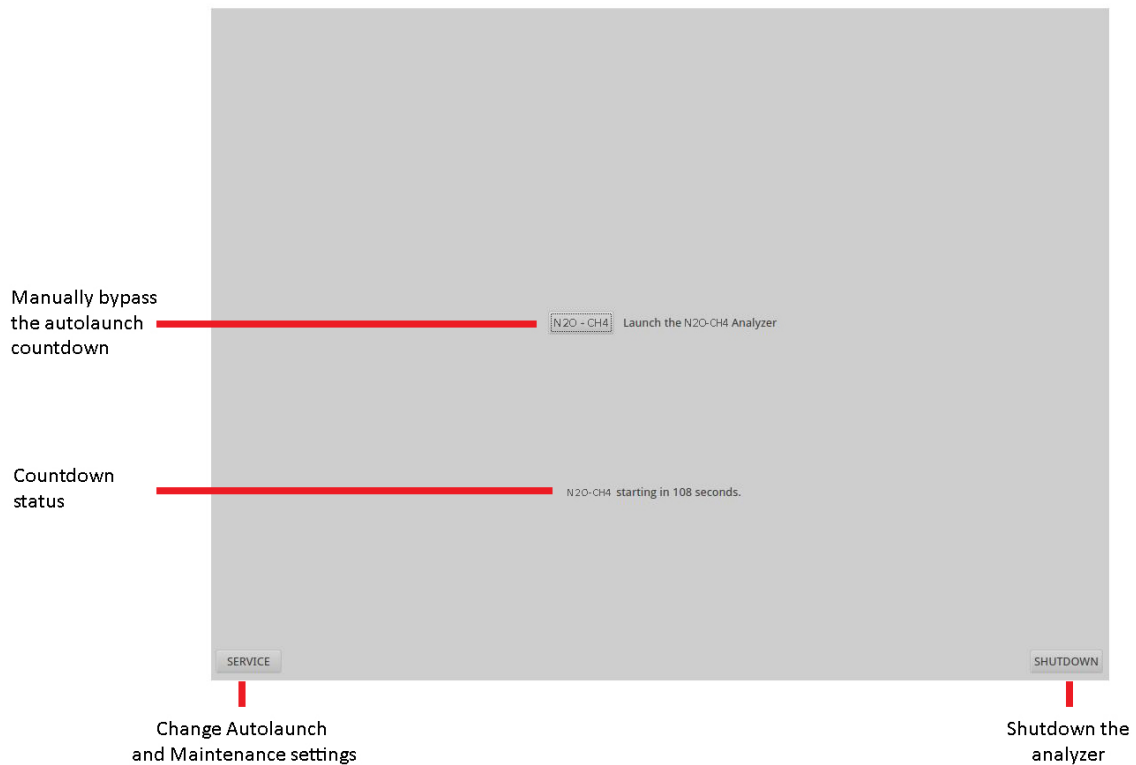


Figure 11: Launch Service Screen

The Auto Launch Screen

The Auto Launch and Maintenance settings are available when you click the **Service** button on the *Launch Service* screen. From this interface, you can:

- Change the auto launch delay timing.
- Transfer files from the internal hard drive to an external storage device connected via USB by clicking **Files**.
- Restore the analyzer's factory settings by clicking **Restore**.

Figure 12 shows the *Auto Launch* screen.

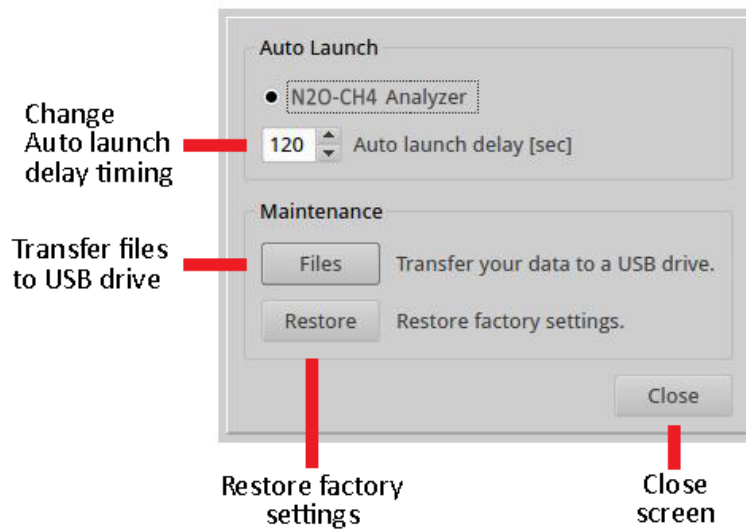


Figure 12: Auto Launch Screen

Login to Access Menu Options

To access the analyzer user interface features, log into the system as follows:

1. Click the **Security** button on the *User Interface Control Bar*. (Figure 13)

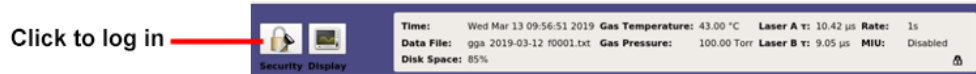


Figure 13: Control Bar Security Button

2. For initial login, use the default Linux credentials for the username and password (Figure 14), as follows:

User: lgr

Password: 3456789



WARNING

If you change and forget this password, you will not be able to recover it without a factory restore.



NOTE

There is only one Linux account.

Figure 14: Login Dialog Box

3. Click **Login**.

Main Panel

After the software launches, the *Main Panel* is displayed. Figure 15 shows the *Main Panel* for the GLA151-N2OM1. The gases displayed are dependent on the type of analyzer.

The operational status of the analyzer is displayed at the bottom of the main panel:

- **Green**: The analyzer is functioning properly.
- **Yellow**: The data may not be reliable, or maintenance is required soon.
- **Red**: The analyzer requires maintenance to correct an identified fault.



Refer to the *Alarm Status Display* section on pages 31 - 33 for detailed *Temperature Status* and *Analyzer Status* descriptions.

This panel contains the *User Interface Control Bar* (Figure 16) and *Numeric Display* (Figure 17)

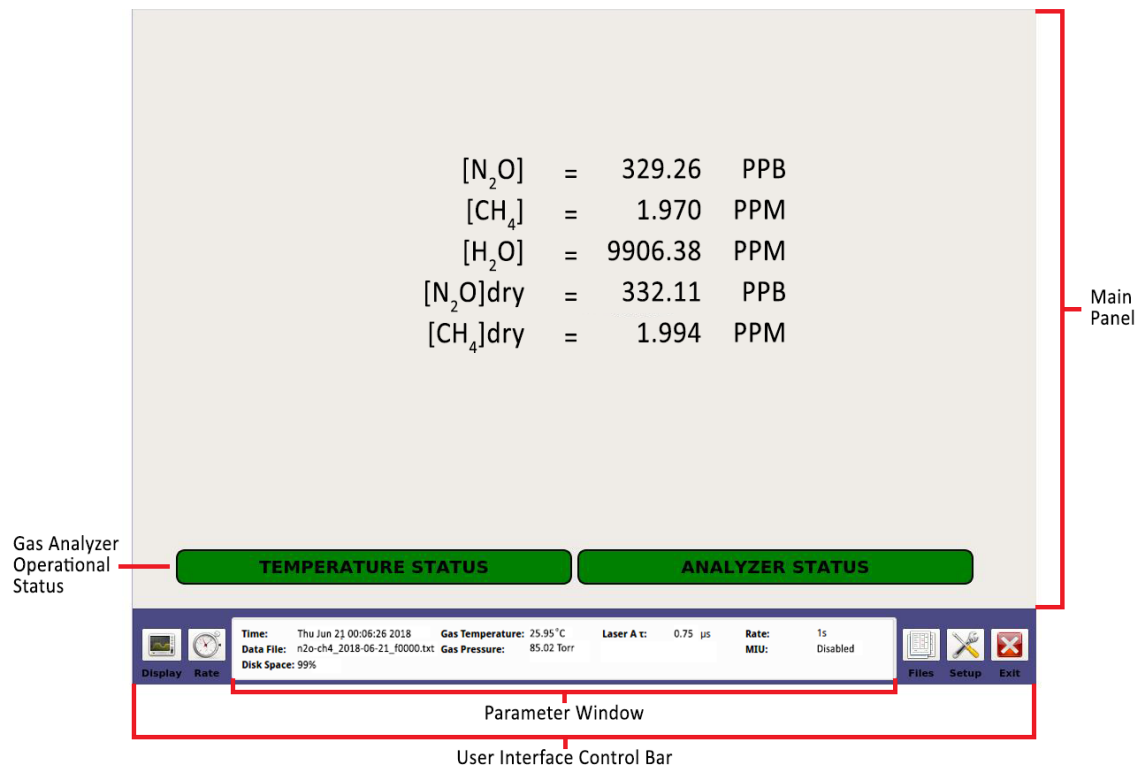


Figure 15: Main Panel

User Interface Control Bar

Use the control bar to operate the analyzer.

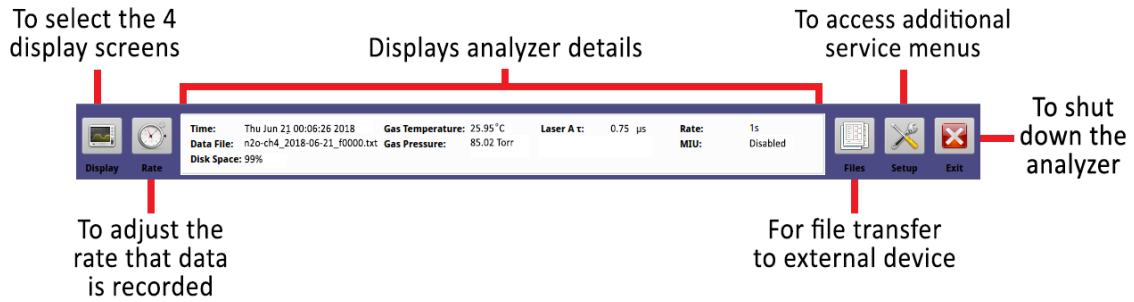


Figure 16: User Interface Control Bar

Display – Toggles through the four *Main Panel* display formats:

- **Numeric Display** – Default display. Displays the numeric readout of the last measurement. (Figure 17)
- **Alarm Status Display** – shows the operational status of the analyzer. (Figure 18)
- **Spectrum Display** – Displays the raw and fitted spectral scans. (Figure 19)
- **Time Chart Display** – Displays the concentration over time. (Figure 21)

Rate – Adjusts the rate at which data is written to the log file. (Figure 22)

Parameter Window – Displays the:

- Time – Current time
- Data File – Current filename to log data
- Gas Temperature – Temperature in Cell (Celsius - °C)
- Gas Pressure – Pressure in Cell (Torr)
- Laser A τ – Laser A ring-down time (micro-seconds - μ s)
- Laser B τ – Laser B ring-down time (micro-seconds - μ s)
 - Only applicable for two laser systems
- MIU – Multiport Inlet Unit
- Rate – Sampling Frequency
- Disk Space – Remaining hard-drive space

Files – Allows easy transfer of files onto USB storage devices.

Setup – Accesses additional configuration and service menus.

Exit – Exits the application and shuts down the analyzer.

Main Panel Displays

Click the **Display** button to change the display in the *Main Panel*. Clicking the **Display** button multiple times lets you cycle through the four main panel displays. When the analyzer is launched, it defaults to the *Numeric Display*. The four displays within the display function are:

- Numeric
- Alarm Status
- Spectrum
- TimeChart

This section describes the displays.

Numeric Display

This is the default display. It appears when the analyzer is first turned on or re-initialized.

Figure 17 shows an example of the *Numeric Display* screen for the GLA151-N2OM1. It displays the numeric readout of the last measurements of gas at a specific concentration. Concentrations vary depending on the type of analyzer.

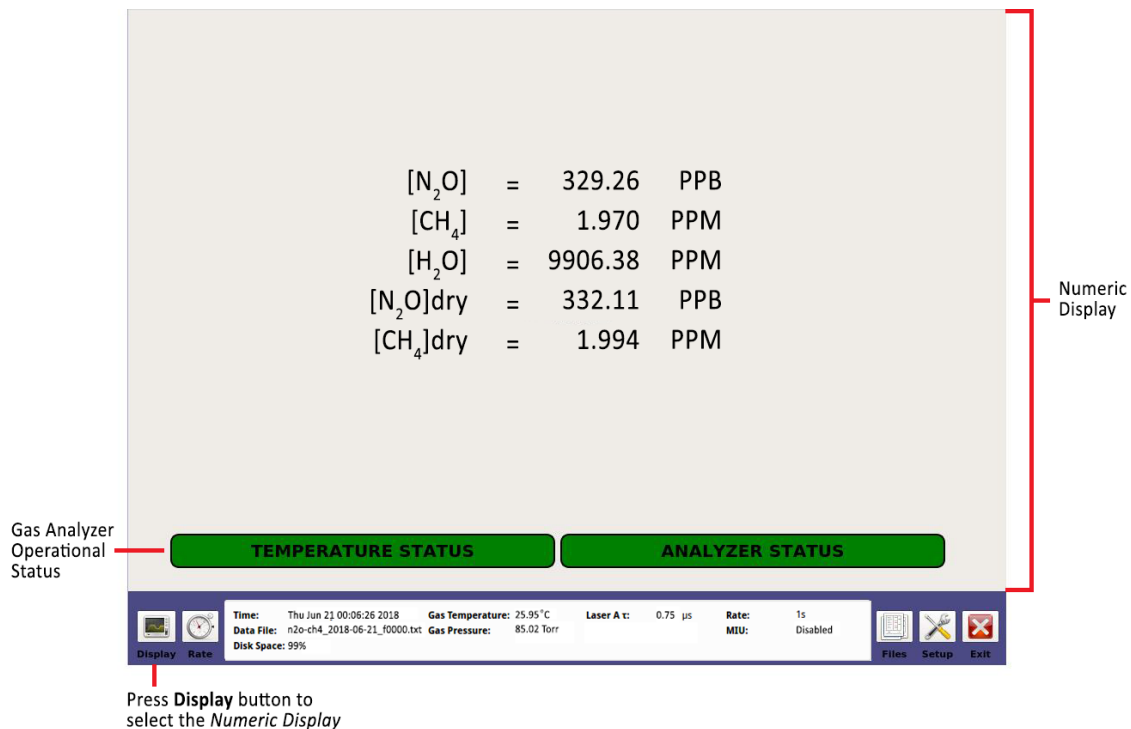


Figure 17: Numeric Display

Alarm Status Display

The *Alarm Status* display (Figure 18) shows the detailed operational status of the analyzer.

The *Alarm Status* is color-coded:

- **Green**: The analyzer is functioning properly
- **Yellow**: The data may not be reliable, or maintenance is required soon.
- **Red**: The analyzer requires maintenance to correct an identified fault.

Figure 18 shows the *Alarm Status Display* with all parameters functioning properly.

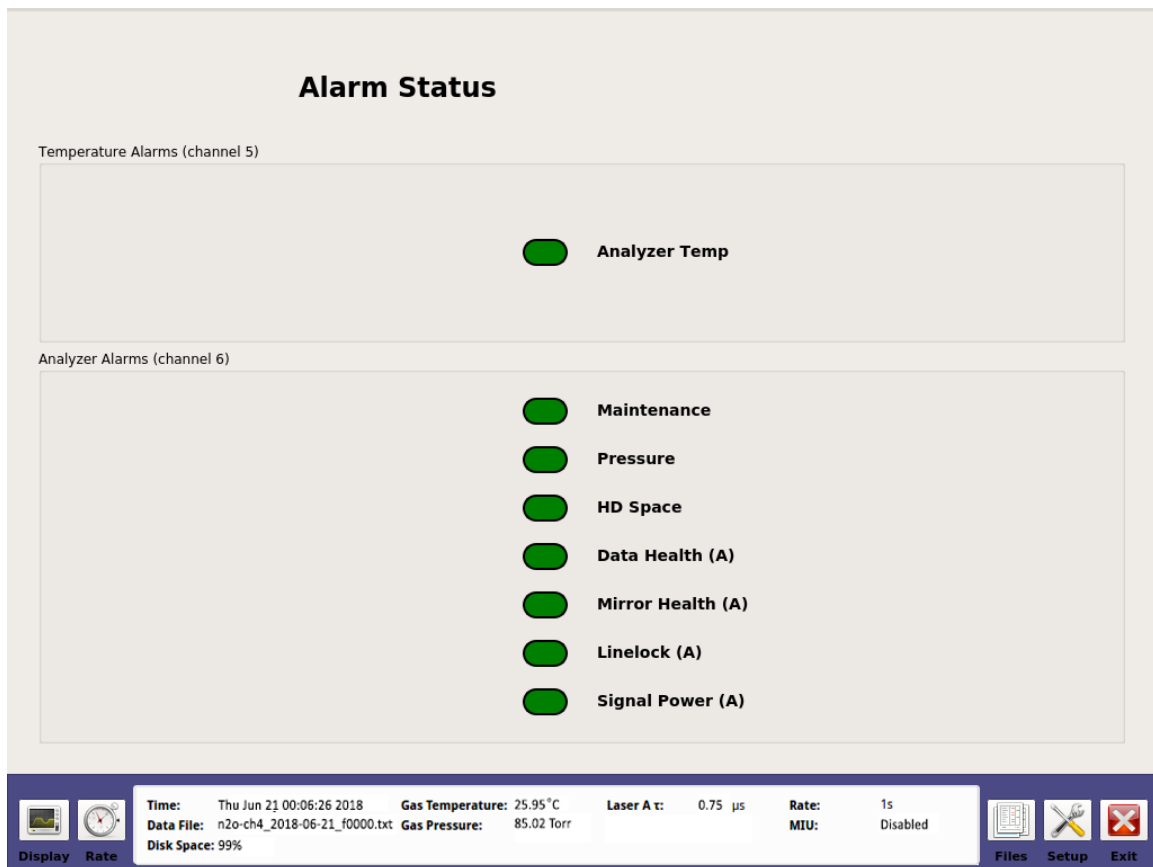


Figure 18: Alarm Status

Table 5 describes fault criteria for the Temperature Alarms.

Table 5: Fault Criteria for Temperature Alarms

Status	Sensor Read	Fault Condition	Description
10	Analyzer Temp	Temperature High/Low Alarm	The temperature exceeds the operating temperature range.
11	CROSS OVER		
14	Analyzer Temp	Temperature High/Low Warning	The temperature is > the high warning set point. The temperature is < the low warning set point.
17	Fault	NaN reading	Occurs when there is a false or undefined value. (NaN= not a number)
19	Dead Band		
20	Acceptable Range	No warning/alarm	No warning/alarm



If the *Alarm Status* is **Yellow** or **Red** please refer to the *Maintenance* section on page 59. If issue continues, please contact icos.support@ca.abb.com.

Table 6 describes fault criteria for the Analyzer Alarms.



'A' refers to Laser 1 and 'B' refers to Laser 2. Not all analyzers are equipped with 2 lasers.

Table 6: Fault Criteria for Analyzer Alarms

Status	Sensor Read	Fault Condition	Description
4	Data Health (A/B)	Fit is not optimal	The laser fitting condition is poor. Occurs when fit is no longer working, peaks have been lost, or spectrum is unknown.
5	Pressure	Not within operating range	Occurs when pressure is outside of the operating range.
6	HD Space	Limited hard drive space	Occurs when the internal hard drive has < 10% of space left. Delete unnecessary data files.
7	Mirror Health (A/B)	Mirrors have declined in reflectivity	Occurs when the ringdown time has degraded by > 20% of the factory value. Mirror cleaning is required.
8	Linelock (A/B)	Peak is outside control range	Occurs when linelock control voltage is no longer able to control.
9	Signal Power (A/B)	Signal power has degraded	Occurs when laser signal power has degraded by > 20% of the factory value.
10	Maintenance	Maintenance needed now	Occurs when the analyzer requires maintenance (every 381 days).
11	CROSS OVER		
12	Data Health (A/B)	Fit is not optimal	The laser fitting condition is not optimal. Occurs when residuals of fit go above normal operational values.
13	Pressure	Noisy	Occurs when the specified operational pressure is not optimal.
14	HD Space	Low space	Occurs when the internal hard drive has < 20% space left. Delete unnecessary data files.
15	Mirror Health (A/B)	Mirrors have declined in reflectivity	Occurs when the ringdown time has degraded by > 10% of the factory value.
16	Linelock (A/B)	Peak is drifting	Occurs when linelock control voltage is approaching control range limit.
17	Signal Power (A/B)	Signal power is degrading	Occurs when laser signal power has degraded by > 10% of the factory value.
18	Maintenance	Maintenance needed soon	Analyzer maintenance will be needed soon (every 360 days).

19 Dead Band			
20	Performance	No warning/alarm	No warning/alarm



If the *Alarm Status* is **Yellow** or **Red** please refer to the *Maintenance* section on page 59. If issue continues, please contact icos.support@ca.abb.com.

Spectrum Display

Click the **Display** button on the *User Interface Control Bar* to switch to *Spectrum Display*.

The top plot shows the voltage from the photo-detector as the laser scans across the absorption features.

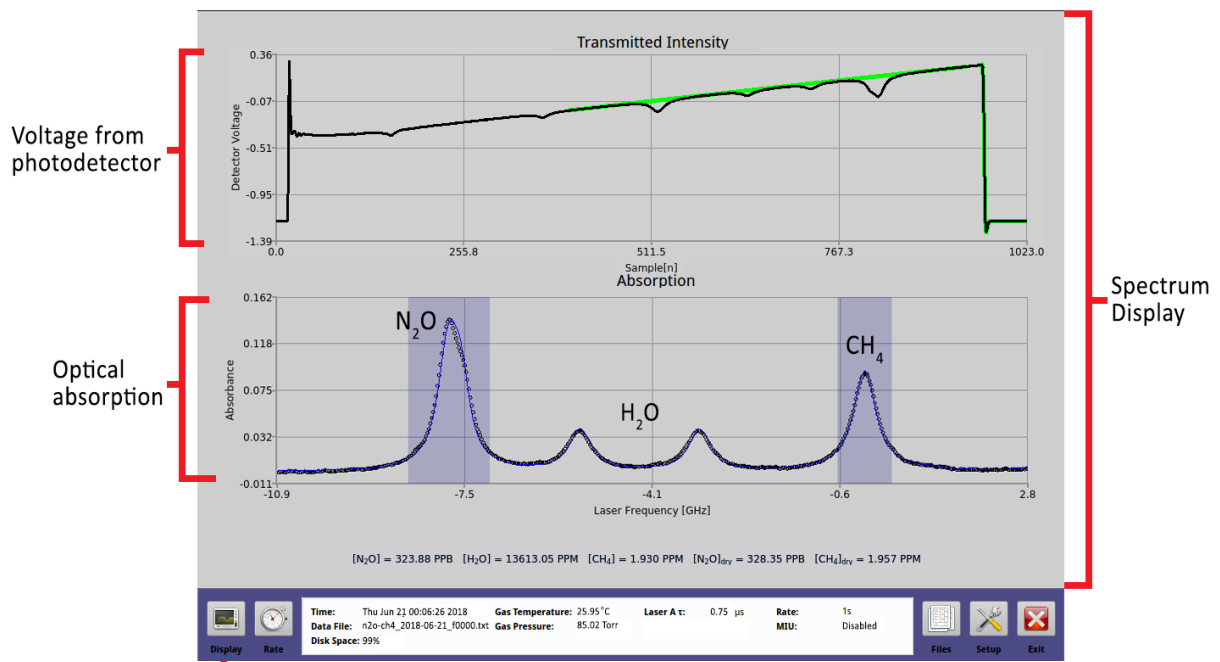
The bottom plot shows the corresponding optical absorption displayed as black circles, and the peak fit resulting from signal analysis as a blue line.

Figure 19 and Figure 20 show the *Spectrum Displays* for the following analyzers:

- GLA151-N2OM1
- GLA151-N2OCM

GLA151-N2OM1 Portable Methane / Nitrous Oxide Analyzer

The measured N_2O concentration is shown in parts per billion (ppb), and CH_4 and H_2O in parts per million (ppm) on the bottom of the *Spectrum Display*.

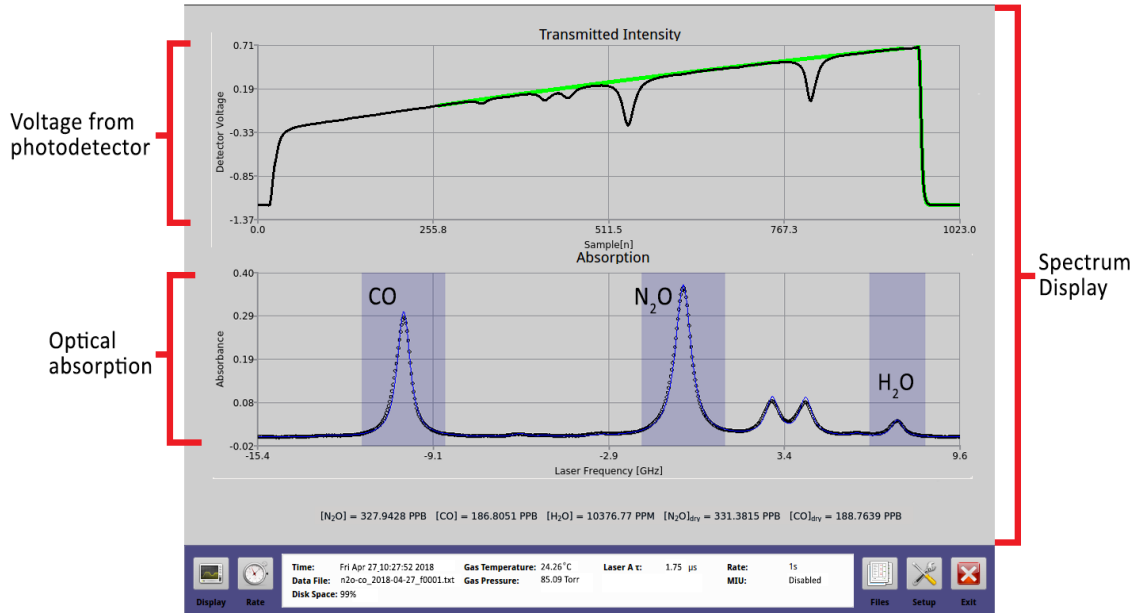


Press **Display** button to select the *Spectrum Display*

Figure 19: Spectrum Display (GLA151-N2OM1)

GLA151-N2OCM Portable Nitrous Oxide Analyzer / Carbon Monoxide Analyzer

The measured N_2O and CO concentrations are shown in parts per billion (ppb) and H_2O in parts per million (ppm) on the bottom of the *Spectrum Display*.



Press **Display** button to select the *Spectrum Display*

Figure 20: Spectrum Display (GLA151-N2OCM)

TimeChart Display

Click the **Display** button on the *User Interface Control Bar* to switch to *TimeChart* Display.

Figure 21 shows the *Time Chart* with a continuous flow of gas. A 10-point running average (in black) is shown going through the raw data (shown in blue).

Click on the **drop-down box** in the lower-right corner of either window to toggle between available gases, and to adjust the number of significant figures.

The data is saved to the file indicated in the left corner of the *parameter window*.

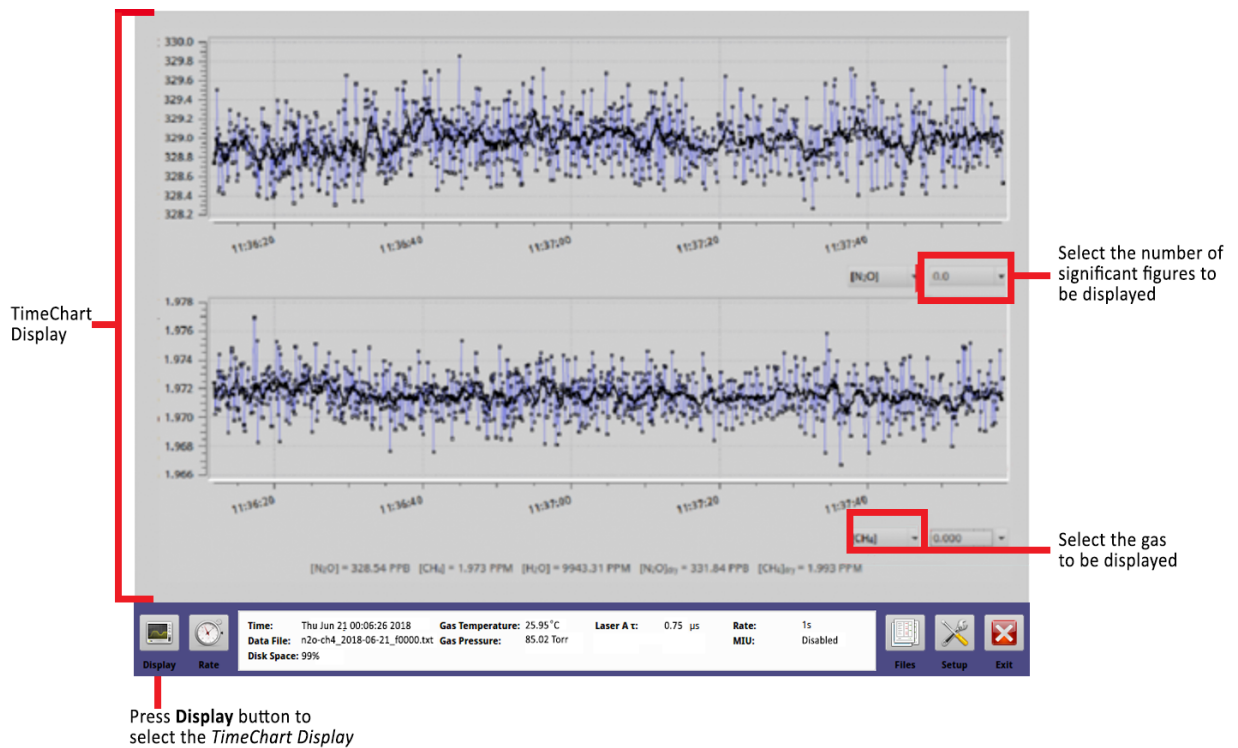


Figure 21: TimeChart Display

Rate Control

Data is acquired at 1 Hz rate and averaged for a selected interval (1 to 100 seconds) before being written to the data file and plotted on the time chart. Longer averaging periods (or equivalently, slower data acquisition rates) will yield better measurement precision than shorter averaging periods.

When the **Rate** button (clock icon) on the *User Interface Control Bar* (Figure 16) is selected, a pop-up box appears to allow rate control adjustments to the operating mode and plot frequency. (Figure 22)

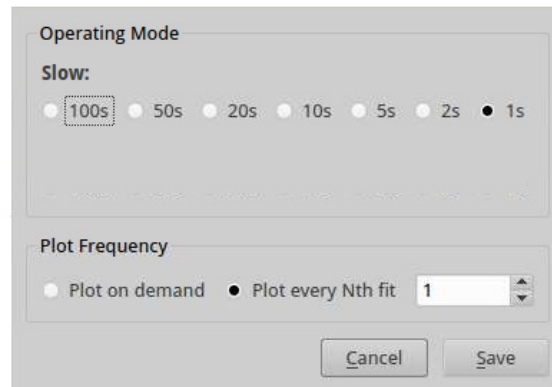


Figure 22: Rate Control Screen

The *Operating Mode* radio buttons allow you to change the rate at which data is written to the log file. To adjust the rate:

1. Click the **Rate** button (clock icon) on the *User Interface Control Bar*. (Figure 16)
The *Data Rate Control Adjustment* panel appears. (Figure 22)
2. Click the **Operating Mode** radio buttons to select the rate at which data is acquired.
 - a. Slow-flow mode
 - i. The internal pump is powered on.
3. Click **Save**.

The *Plot Frequency* radio buttons allow you to select between manually or automatically plotting the data. (Figure 22)

To adjust the frequency:

1. Click the **Rate** button (clock icon) on the *User Interface Control Bar*. (Figure 16)
The *Data Rate Control Adjustment* panel appears. (Figure 22)
2. Click the **Plot on Demand** radio button to manually plot the data.
 - a. When selected, the *Refresh Plot* button appears on the *Main Panel* display. When **Refresh Plot** button is selected, (Figure 21), current data is added to the *Main Panel* display.
3. Click the **Plot every Nth fit** radio button to automatically set the rate at which the data is updated on the *Main Panel* display.
 - a. For example, if you set the value to 5, a data point will be saved every 5 seconds.
4. Click **Save**.



The analyzer restarts sampling at whatever rate was set last.

Transfer Data Files

To transfer data files from the analyzer hard drive to a USB storage device:

1. Click the **Files** button on the *User Interface Control Bar* (Figure 16) to access the *File Transfer Menu*. (Figure 24)
2. Insert a USB storage device into the USB port on the side panel of the analyzer.
3. Click on the **Mount USB** button. (Figure 24)

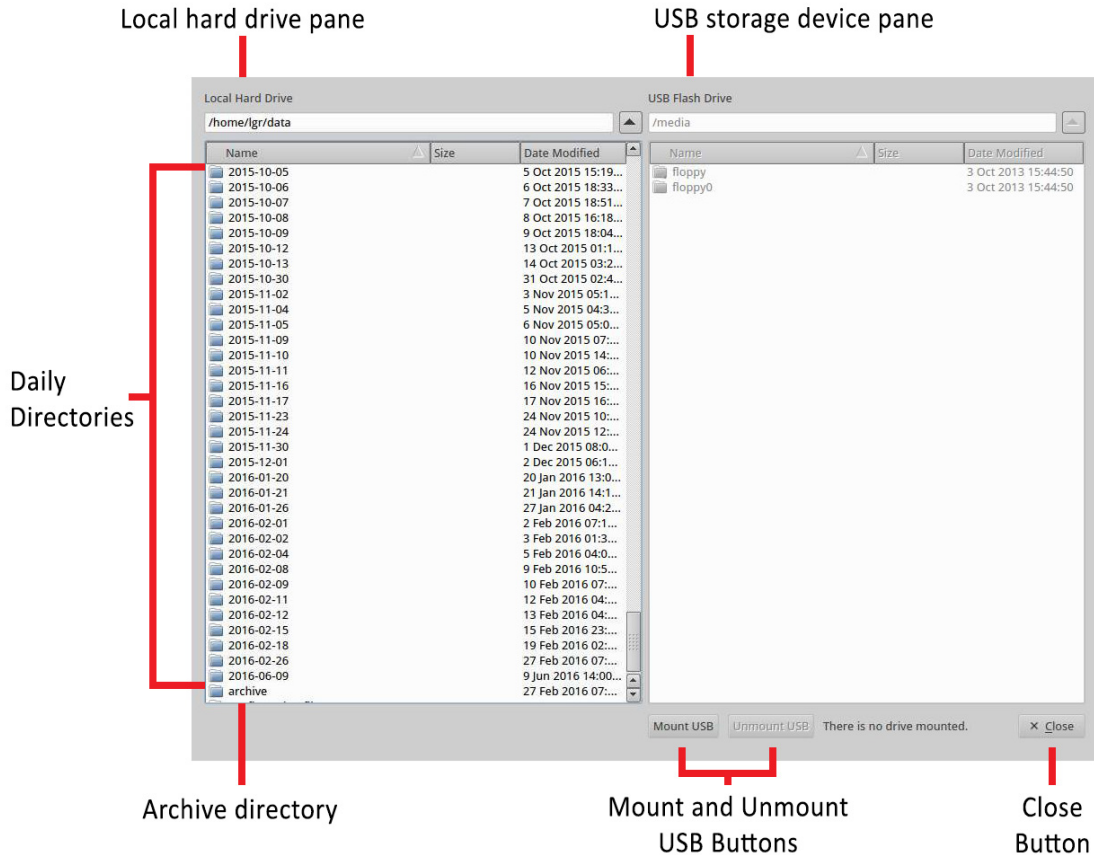


Figure 24: File Transfer Menu: Local Hard Drive (left pane) and USB Flash Drive (right pane)

4. Transfer data files from the analyzer hard drive to a USB storage device by dragging and dropping the files from the hard drive pane to the USB device pane. Use the left mouse button to highlight one or multiple files in the window. The directory windows default to the local hard drive on the left screen and the USB memory device on the right. Navigate through folders, create new folders, and delete files and folders.



USB drives should be no larger than 8GB. They must be FAT32 formatted.

When you have finished transferring files:

5. Click the **Unmount USB** button.
Wait for the *Safe to Remove USB Memory Device* message before removing the USB memory device.
6. Click **Close** to exit the *File Transfer Menu*.



NOTE

Removing the USB memory device before seeing the *Safe to Remove* pop-up message may result in loss of data.

Types of directories in the local hard drive

The analyzer hard drive contains two types of directories:

- Daily Directory
- Archive Directory

Daily Directory

The local hard drive (Figure 24) creates a daily folder containing new data files for each day that the analyzer operates.

To access the data files for a specific date, double-click the folder. Each file from that day is displayed in chronological order. (Figure 25)

Each file is a single zipped .txt file, using the following convention:
XXX_YYYY-MM-DD_f0000.txt.zip.

Examples of files in the daily directory are shown in Figure 25.

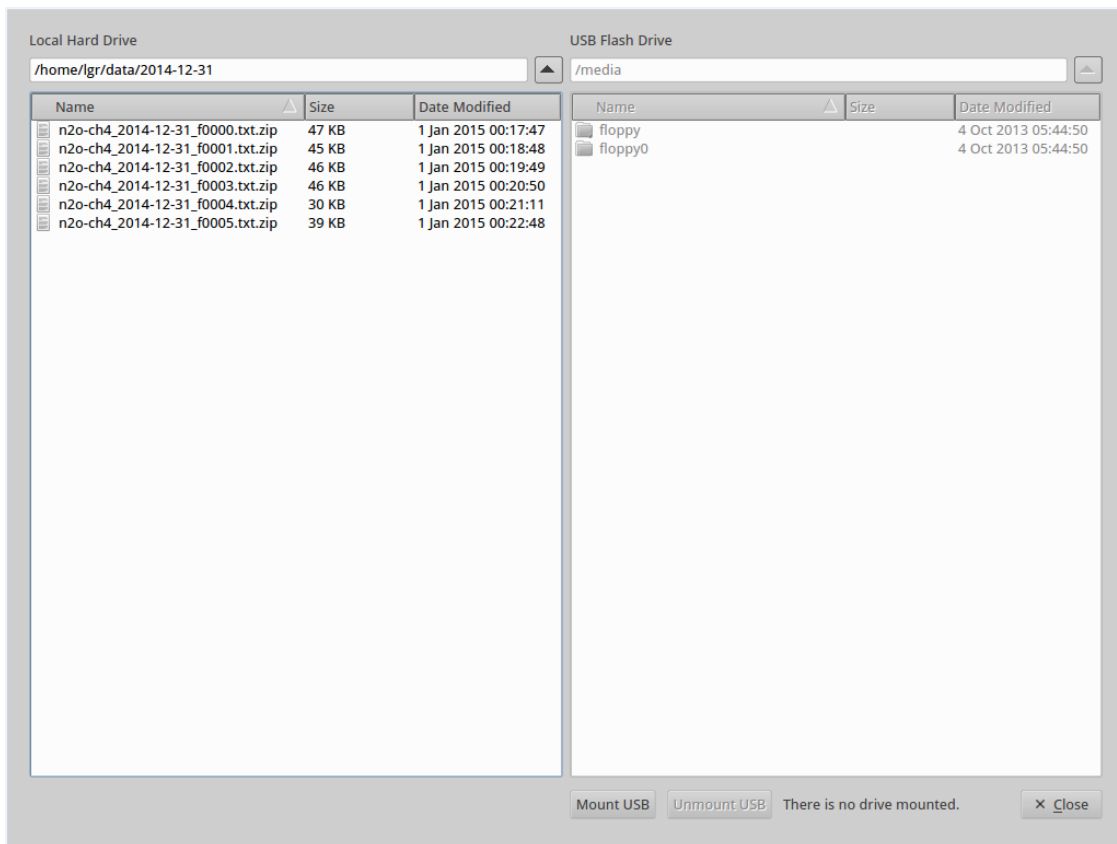


Figure 25: Daily Directory

Archive Directory

The local hard drive (Figure 24) creates an archived folder containing zipped files organized by date. (Figure 26)

To access the archived files, double-click the **Archive** folder. (Figure 24)

Each file is a single zipped .txt file, using the following convention: YYYY-MM-DD.zip. Each zipped file contains the data files for the day that the analyzer operated.

Examples of files in the archive directory are shown in Figure 26.

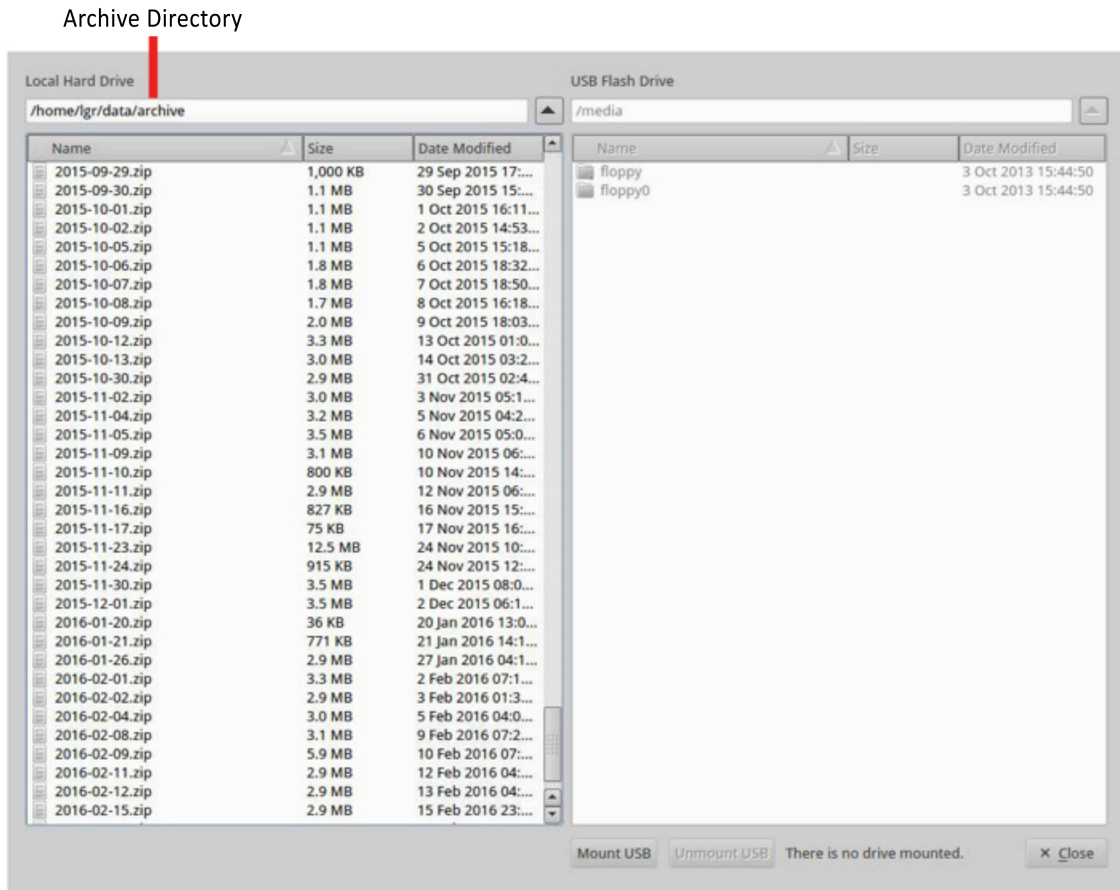


Figure 26: Archive Directory

File Transfer Error Screen

The *File Transfer Error screen* (Figure 27) displays when:

- The USB Key does not have enough storage space.
- The device is not recognized.

Try again with a correctly inserted USB device.



Figure 27: File Transfer Error

Setup Menu

The *Setup* menu allows access to additional configurations and services.

To enter *Setup* mode:

1. Click the **Setup** button on the *User Interface Control Bar*. (Figure 28)



Figure 28: Setup button on the User Interface Control Bar

2. The default *Time/Files* screen is displayed. (Figure 29)

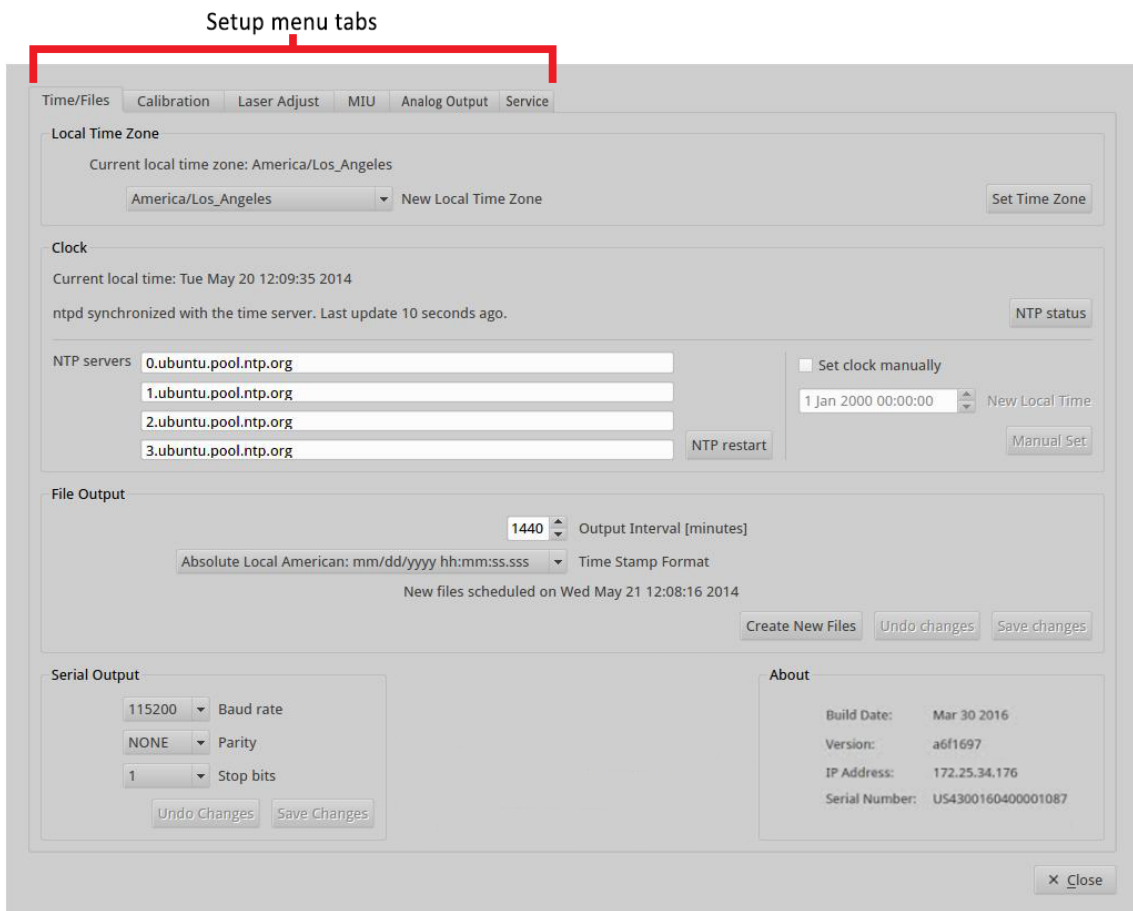


Figure 29: Setup Menu Tabs with Time/Files Screen Selected

The *Setup* menu has function tabs at the top of the screen that allows you to configure the analyzer mode and settings. (Figure 29) These tabs let you:

- Manage file saving settings
- Adjust the current time/date settings
- Configure the Serial Output
- Calibrate the analyzer to a local gas standard
- Enable the laser offset adjustment.
- Configure the optional Multi-Port Inlet Unit
- Configure the Analog Output
- Service screen for technicians to check on the status of the analyzer

Use these function tabs to make adjustments to the analyzer and its operation.

Time/Files Tab

The *Time/Files* menu allows you to adjust the time zone, manually set the clock, adjust the format of data files, and adjust the Serial Configuration.

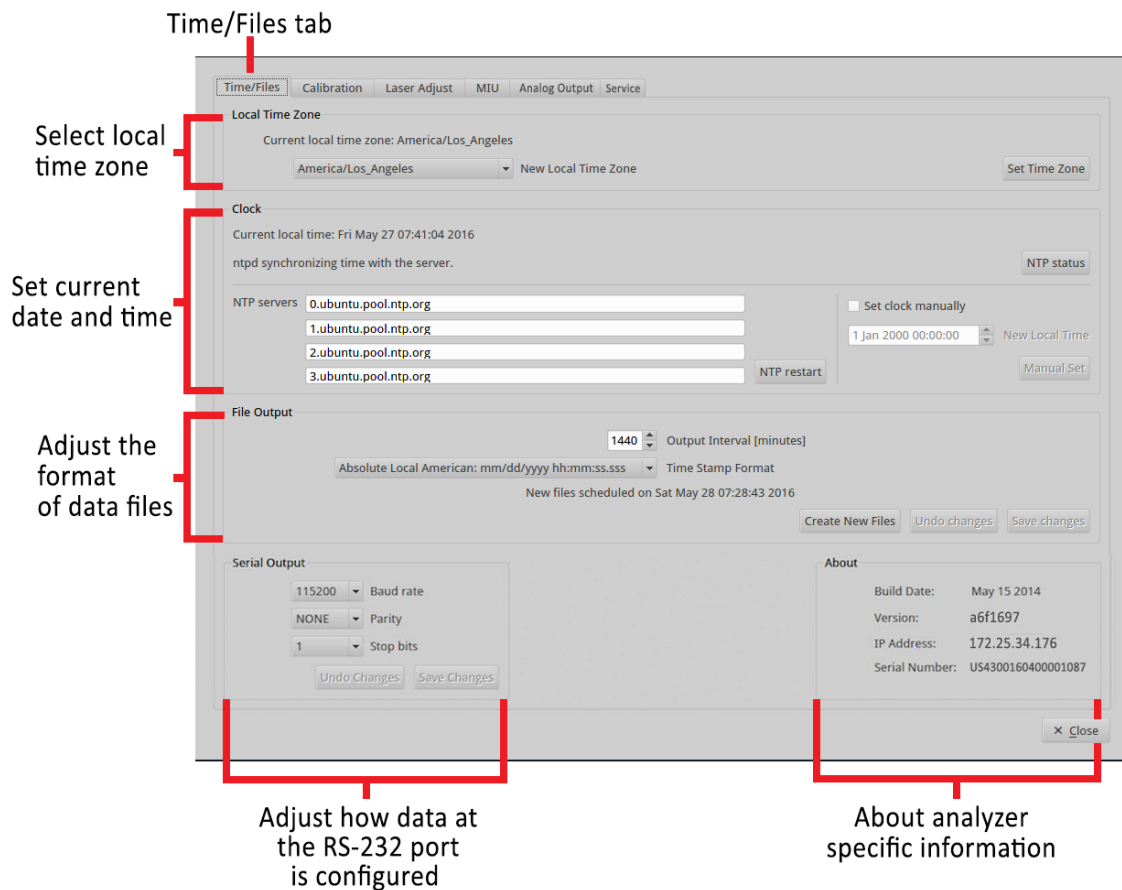


Figure 30: Functions of the Time/Files Menu

Local Time Zone

The *Local Time Zone* menu lets you adjust the current local time zone by selecting an option from the drop-down selection box.

Clock

The *Clock* menu lets you manually adjust the current time and date settings.

File Output

The *File Output* menu lets you adjust the timestamp format of the data files. The available timestamp formats are shown in Table 7.

New file creation intervals (when running continuously) can be set by adjusting the value in the **Output Interval [minutes]** spinner control box.

Table 7: Available Time Stamp Formats

Time Stamp Name	Format
Absolute Local American	mm/dd/yyyy, hh:mm:ss.sss
Absolute Local European	dd/mm/yyyy, hh:mm:ss.sss
Absolute GMT American	mm/dd/yyyy, hh:mm:ss.sss
Absolute GMT European	dd/mm/yyyy, hh:mm:ss.sss
Relative Seconds After Power On	ssssss.sss
Relative Seconds in Hours, Minutes, Seconds	hh:mm:ss.sss

Serial Output

The *Serial Output* menu lets you change how the data reported at the RS-232 port is configured. Standard settings are provided for:

- Baud Rate
- Parity
- Stop Bits

The actual rate of the serial output is equal to the Logged File Rate (i.e. 1 Hz) divided by the Rate specified in the *Time/Files* menu.



Use a null modem serial cable to connect the analyzer serial port to an external computer.

About

The *About* section displays analyzer specific information, such as the:

- Build Date of the current software
- Version of the code
- IP Address
- Serial Number of the analyzer

Calibration Tab

ABB-LGR recommends periodic referencing rather than calibration to ensure measurement accuracy and consistency. When calibration is necessary, follow the procedure detailed below.

Calibration Procedure:

1. Click the **Setup** button on the *User Interface Control Bar*. (Figure 16)
2. Select the **Calibration tab** at the top of the screen to enter the *Calibration* menu. (Figure 31)

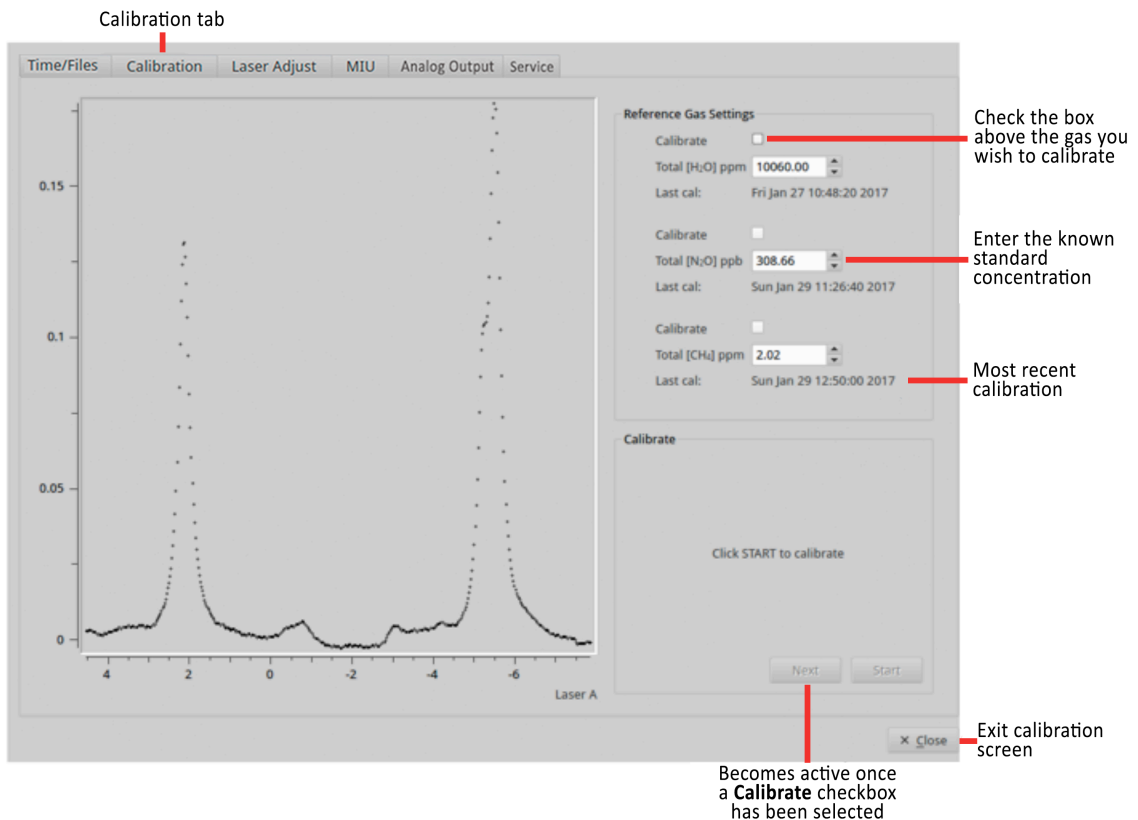


Figure 31: Calibration Setup Screen

3. On the top, right panel of the screen under *Reference Gas Settings*, select the checkbox next to the gas you wish to calibrate.
4. Enter the known concentration for your local gas standard.
5. Connect your reference gas supply to the 1/4" push-connect inlet port on the left side of the analyzer. (Figure 3)
6. Open the valve on your gas supply.
7. Click the **NEXT** button on the lower, right panel of the screen to begin calibration.

- Each step is displayed in the lower-right panel of the calibration screen as the analyzer performs the calibration. Figure 32 shows the calibration process as a flow chart.

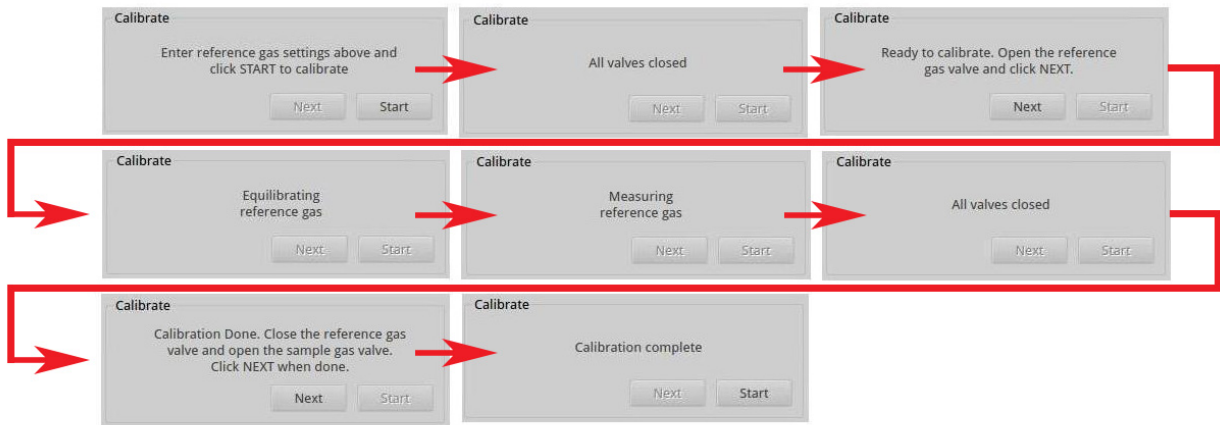


Figure 32: Calibration Flow

- When the *Calibration Complete* message is displayed, click the **CLOSE** button.
- Enter *TimeChart* by selecting the **Display** button on the *User Interface Control Bar*, and verify that the displayed concentration correctly corresponds to your local gas standard.
- Repeat steps 1-10 for each gas you wish to calibrate.



NOTE

The time of latest calibration is stored in *Reference Gas Settings* within the *Calibration* menu for future reference.

Laser Adjust Tab

Use the *Laser Adjust* tab to manually adjust the laser's wavelength to compensate for any cumulative drift. (Figure 33)

Laser adjustment may be needed for the following reasons:

- The laser's wavelength has drifted beyond the target range of the analyzer.
- The analyzer is operated outside the recommended temperature range.

Figure 33 shows the offset between absorption peaks and target lines.

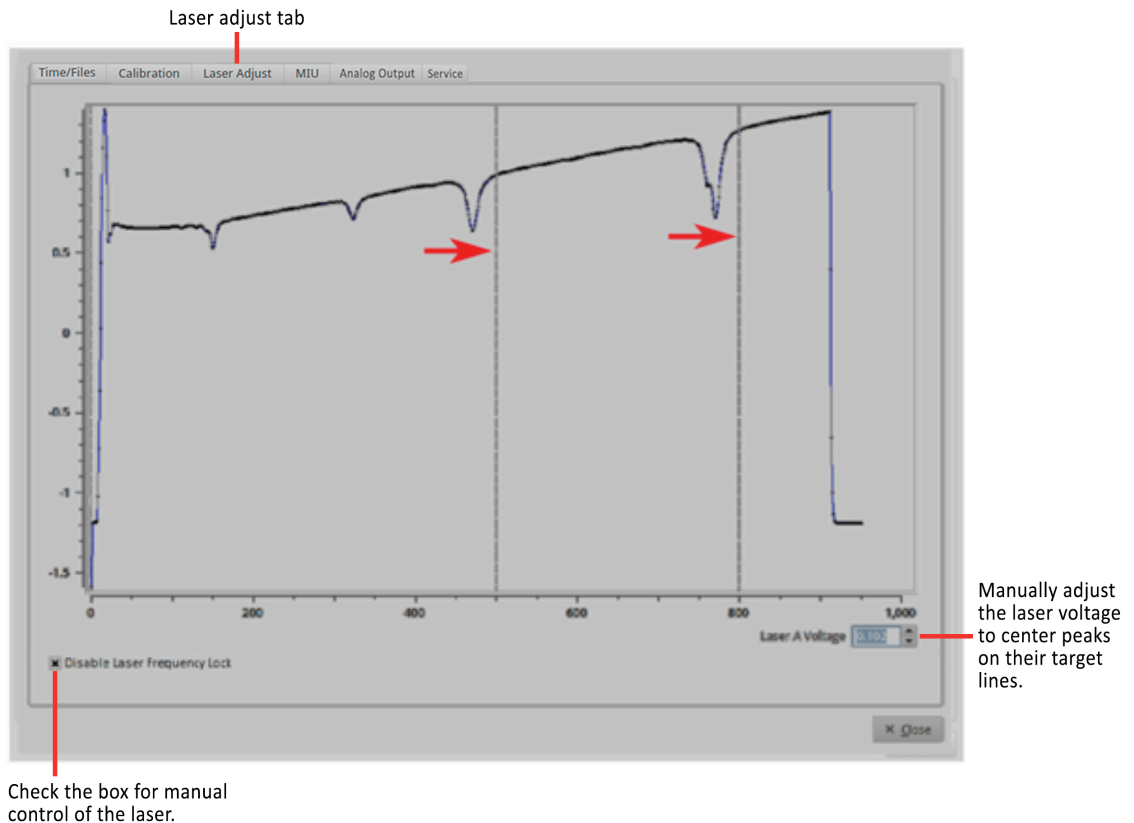


Figure 33: Absorption peaks off of target lines. Laser voltage adjustment needed.

Manually Adjust the Laser Offset

1. Click the **Setup** button on the *User Interface Control Bar*. (Figure 16)
2. Select the **Laser Adjust** tab at the top of the screen. (Figure 33)
3. Select the **Disable Laser Frequency Lock** check box to allow manual control of the laser.
4. Adjust the **Laser A Voltage** using the arrow buttons to shift the peaks until they are centered on their respective target lines.
 - a. Up Arrow: Peaks adjust to the right
 - b. Down Arrow: Peaks adjust to the left
5. Deselect the **Disable Laser Frequency Lock** check box. The software resumes automatic tracking and control of the laser wavelength.
6. Click **Close** to exit the menu and return to the *Main Panel*.

Figure 34 shows the laser voltage adjusted so that the absorption peaks are centered on the target lines.

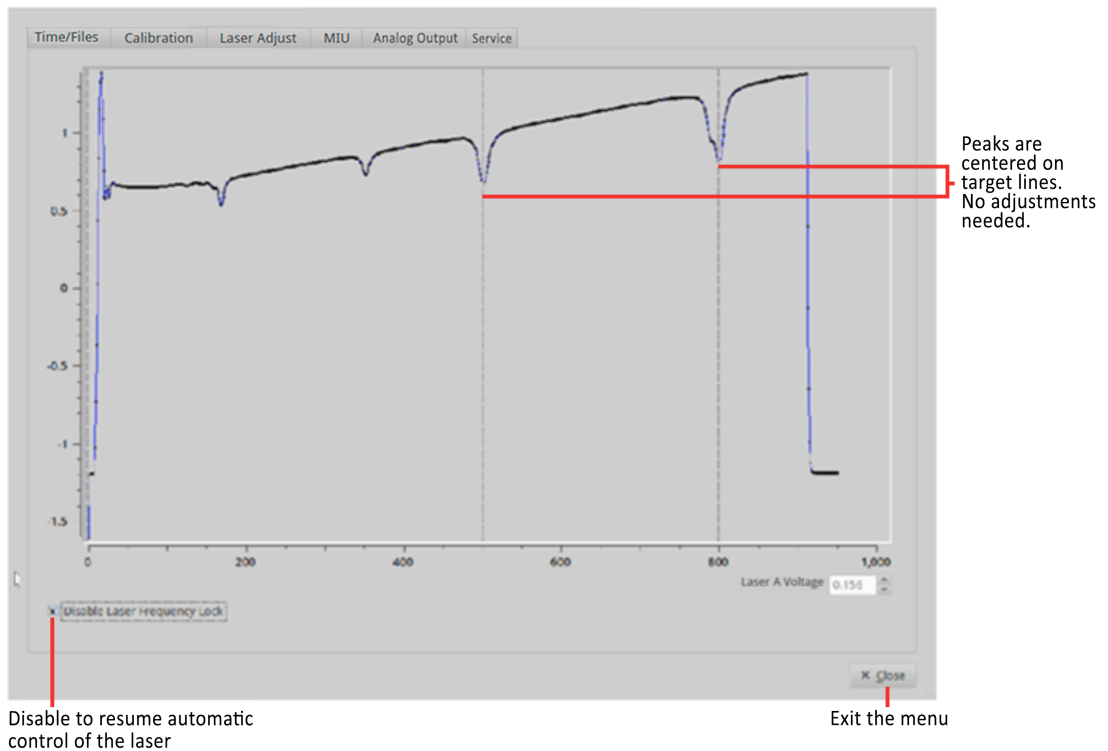


Figure 34: Absorption Peaks Centered Correctly on Target Lines

MIU tab

The (optional) Multi-Port Inlet Unit (MIU-8 or MIU-16) is an ABB-LGR accessory that allows automated control of 8 or 16 inlet ports (depending on the ordered configuration). These ports are directed to the inlet port of the analyzer for sampling unknown gases and reference gases.

The *MIU* menu can be configured to control which gases are introduced to the analyzer, and for how long. (Figure 35)

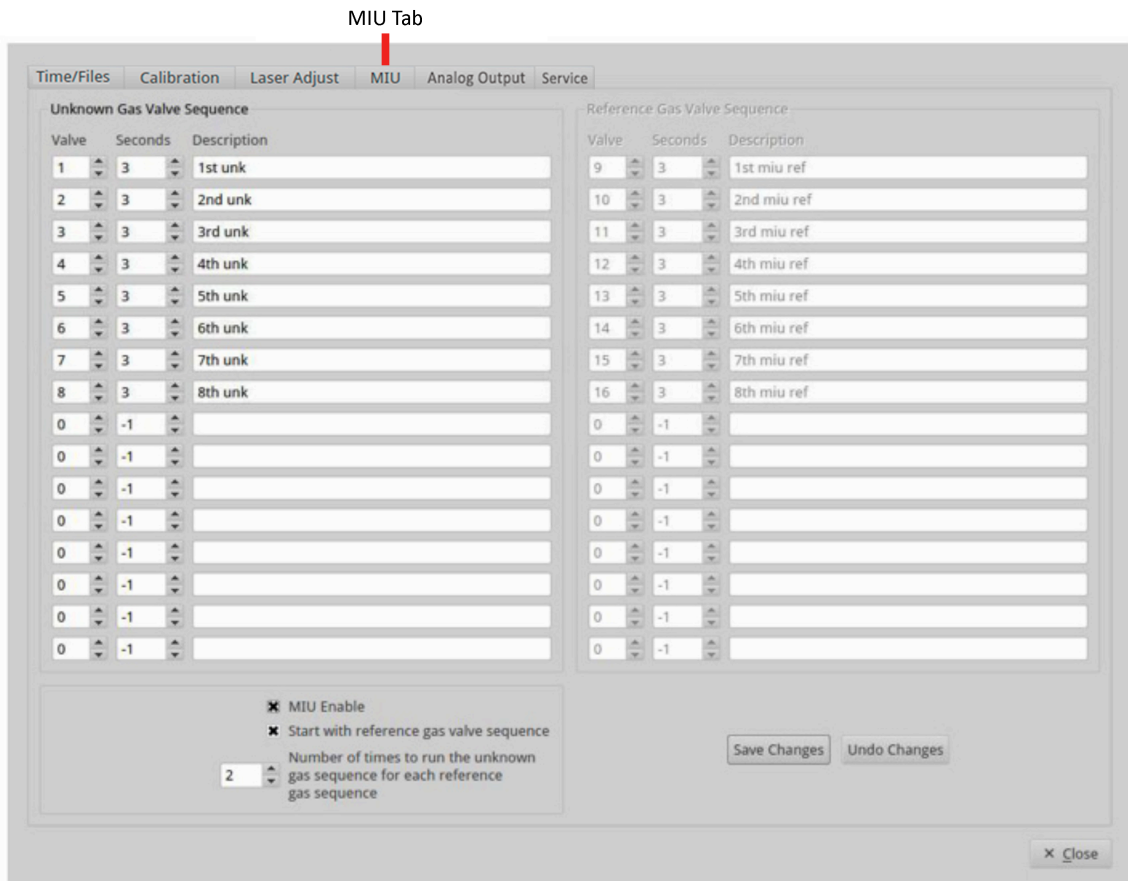


Figure 35: Control Menu for the (Optional) Multi-Port Inlet Unit (MIU-8 or MIU-16)

Analog Output Tab

The *Analog Output* port has a 16-bit voltage range from 0 to 5 volts.

The user can specify a conversion between gas concentration and the analog output voltage, using the spinner controls, or by manually typing a number into the field. (Figure 36) The dropdown spinner controls let you select the concentration value that will correspond to the maximum 5 VDC analog output.

For example:

- Set 5 Volts = 10 ppm on the expectation that the gases measured will be in the range near 2 ppm, with occasional bursts up to almost 10 ppm.
- Set 5 Volts = 5 ppm to get exactly two times greater sensitivity on the analog output, with the expectation that the concentration will not go above 5 ppm.



If the measured concentration goes above the maximum expected value for the Analog Output, the on-screen displays and data files continue to record the correct measured concentration, but the Analog Output will saturate at its maximum value of 5.0 volts until the concentration drops back into the expected range.

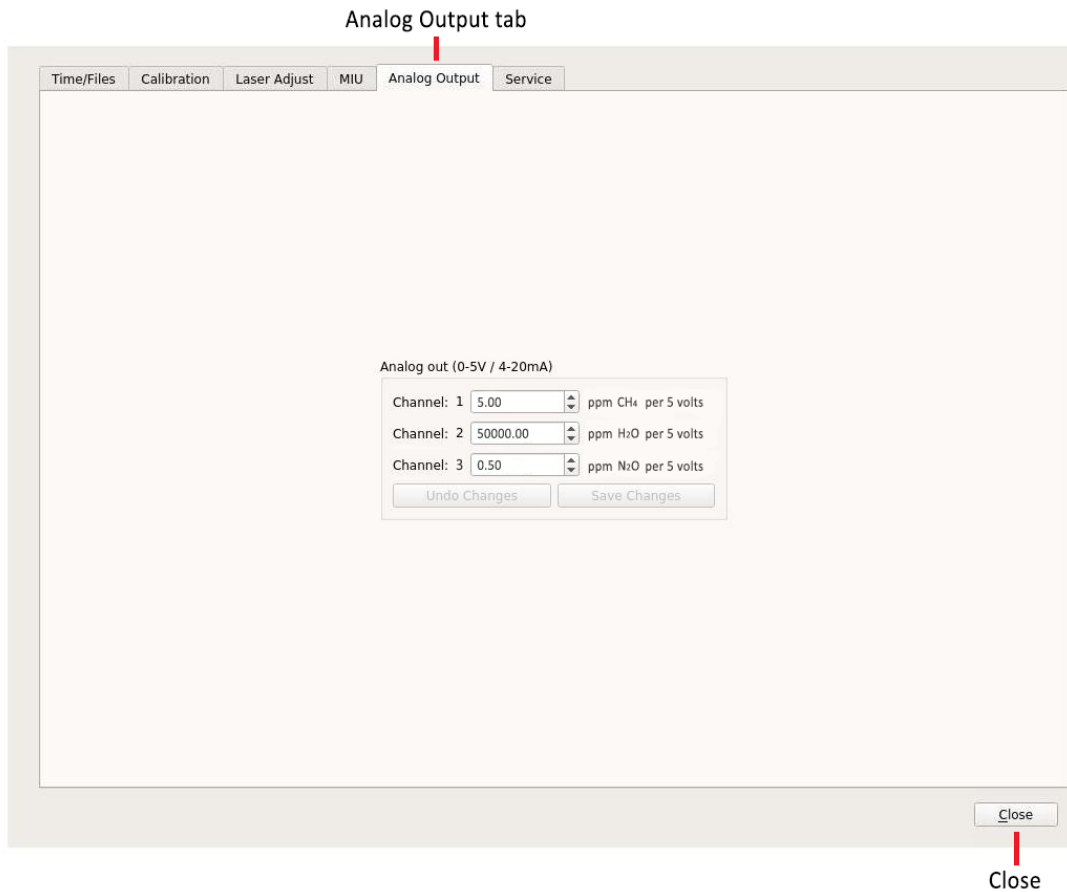


Figure 36: Analog Output Screen

Figure 37 shows the analog output connector and pin assignments for the connector.

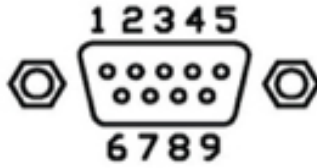


Figure 37: Analog Output Connector

Table 8 describes the pin assignments for the GLA151-N2OM1.

Table 8: D Sub Pins and Pin Assignments

D Sub Pins	Pin Assignment	Output Voltage
1	N ₂ O Signal	0-5 Volts
2	CH ₄ Signal	0-5 Volts
3	H ₂ O Signal	0-5 Volts
4	Empty	-
5	Empty	-
6	N ₂ O Ground	0
7	CH ₄ Ground	0
8	H ₂ O Ground	0
9	Empty	-

Table 9 describes the pin assignments for the GLA151-N2OCM.

Table 9: D Sub Pins and Pin Assignments

D Sub Pins	Pin Assignment	Output Voltage
1	N ₂ O Signal	0-5 Volts
2	CO Signal	0-5 Volts
3	H ₂ O Signal	0-5 Volts
4	Empty	-
5	Empty	-
6	N ₂ O Ground	0
7	CO Ground	0
8	H ₂ O Ground	0
9	Empty	-

Service Tab

ABB-trained field service engineers monitor the performance of the analyzer via the *Service* screen. (Figure 38)

- These settings determine the level of change that could affect measurement performance.
- The alarm threshold levels are analyzer dependent and are set based upon the last fixed setting.

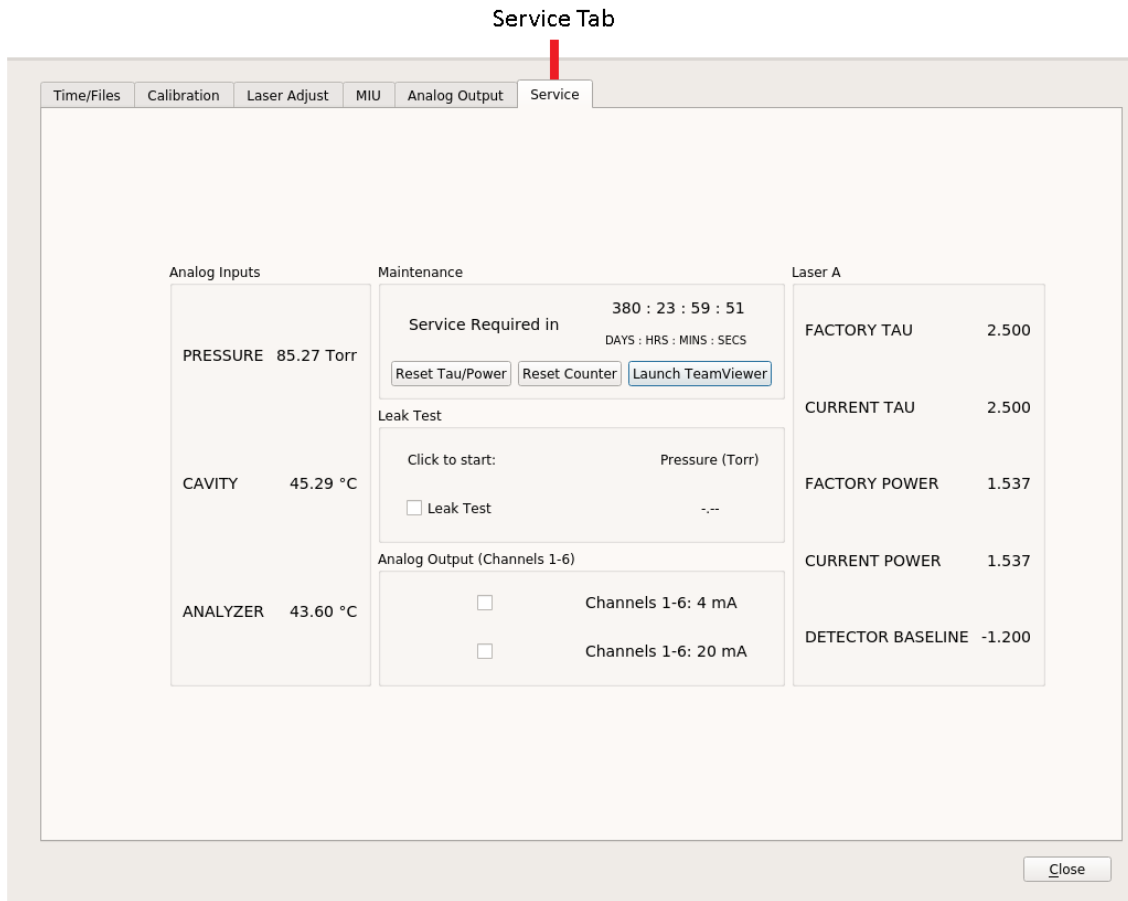


Figure 38: Service Screen

The *Service* tab contains 3 Service buttons:

- **Reset Tau/Power** button – resets the mirror ringdown time and laser power to current settings. This is typically done after mirrors have been cleaned.
- **Reset Counter** button – resets the # of days that maintenance is required. This is typically done after yearly maintenance.
- **Launch TeamViewer** button – TeamViewer allows service engineers to remotely access the analyzer if service needs are required.

Shutting Down the Analyzer

To shut down the analyzer:

1. Click the **Exit** button on the *User Interface Control Bar*. (Figure 39)
2. A pop-up box appears on the *Main Panel* and prompts you to verify that you want to shut down the analyzer to prevent accidental button presses from causing interruption in data acquisition. (Figure 40)

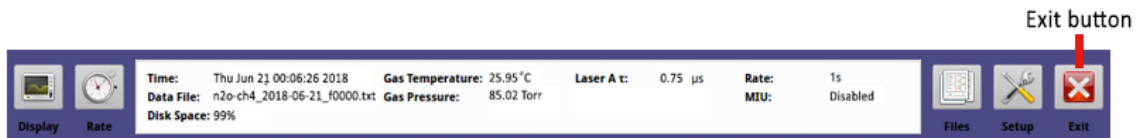


Figure 39: User Interface Control Bar Exit Button

3. Click the **OK** button to halt data acquisition, close the current data file, and display the shutdown screen. (Figure 40)

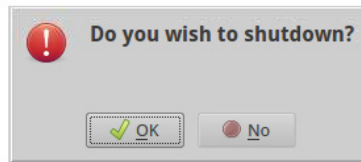


Figure 40: Analyzer Shutdown Prompt

4. When the “*You may turn off the instrument*” message displays (Figure 41), you can safely shut off power to the analyzer by pushing the **OFF** switch on the left panel of the analyzer. (Figure 2)

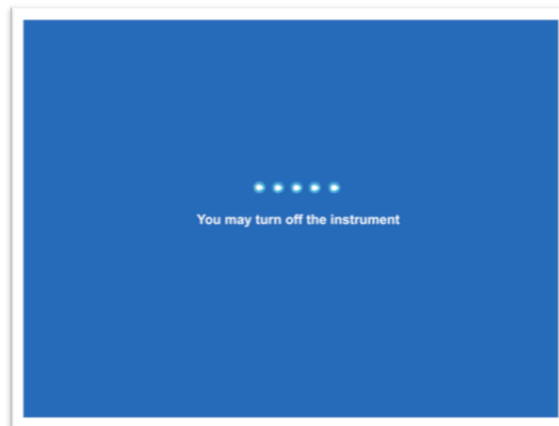


Figure 41: Final Shutdown Screen



NOTE

Failure to wait for the power down command to display before shutting off power to the analyzer may result in file system instability.

4 Maintenance

Daily Operation Checklist

Table 10 describes routine maintenance tasks that keep your analyzer operating smoothly.

Table 10: Maintenance Checklist

Frequency	Task
Every 1-2 days	<ul style="list-style-type: none">• On the <i>Spectrum Display</i>, verify that the spectrum is correct. The spectrum should appear as shown in Figure 19. Become familiar with the normal appearance of the spectrum (the best way of diagnosing analyzer performance). Any deviations from normal could indicate a problem with the analyzer.• Log the transmitted intensity displayed in the upper panel of the spectrum screen. Any decrease in transmitted intensity could be indicative of dirty mirrors.• Log the analyzer pressure. Any decrease in pressure could be indicative of an obstruction in the flow system. An increase in pressure could be indicative of a leak in the system, or a pump failure.
Every 3-6 days	<ul style="list-style-type: none">• Check the Laser Offset and adjust if necessary. (Figure 33)

Mirror Ring-Down Time and Maintenance

Measurement cell mirrors are protected from contamination by an internal inlet filter. With continued use the mirrors may gradually decline in reflectivity.

If a significant change occurs in the mirror ring-down time (for example, greater than 20% reduction), the precision of the measurements may be reduced.

Periodically note the ring-down time. If a significant reduction in ring-down time occurs:

- Request a mirror cleaning kit from ABB-LGR.
- If further maintenance is required, contact ABB-LGR for service.
 - Technical Support: icos.support@ca.abb.com



WARNING!

Only authorized persons may open the analyzer cover or perform internal maintenance. Make sure the analyzer is unplugged before working with the internal components. Failure to do so may result in damage to the analyzer and electric shock.

Replace the Fuse

If the fuse blows or is otherwise damaged, the analyzer automatically turns off.

To replace the fuse:

1. Flip the Power switch to **OFF** on the left side of the analyzer. (Figure 4)
2. Unplug the 11-30 VDC power connector from the left side of the analyzer. (Figure 4)
3. Unlatch the Case Securing Latches. (Figure 42)
 - a. Push the latch button.
 - b. Pull down on the latch.



Figure 42: Case Securing Latches

4. Open the case top. (Figure 43)



Figure 43: Open the Case Top

5. The fuse is located on the upper portion of the analyzer on the left side above the internal pump. (Figure 44)

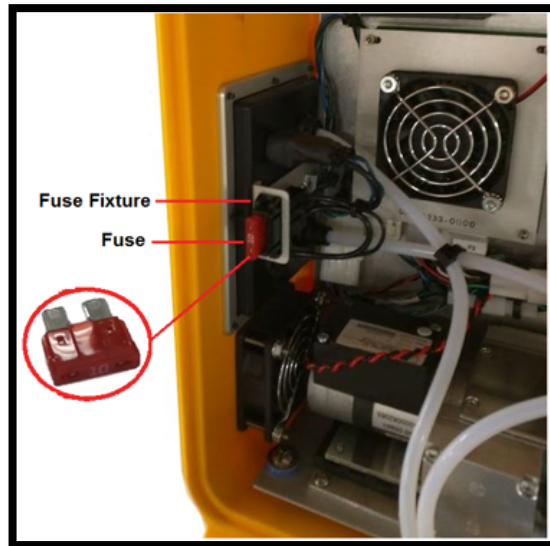


Figure 44: Analyzer Fused Inlet

6. Pull the fuse out of the fuse fixture. (Figure 45)



Figure 45: Remove the Fuse

7. Push the new fuse into the fuse fixture. (Figure 46)



Figure 46: Install the New Fuse in the Fuse Holder

8. Carefully close the case top and push the latches to lock the case.
9. Re-attach the 11-30 VDC power connector into the left side of the analyzer. (Figure 4)
10. Flip the Power switch to the **ON** position on the left side of the analyzer. (Figure 4)

Appendix A: Accessing Data Using the Ethernet

Appendix B explains how to access the analyzer data directory as a Windows Share using an Ethernet connection on a local area network (LAN).

The data files stored on the internal hard disk drive of the analyzer can be accessed as a Windows Share over a Local Area Network (LAN) Ethernet connection. For this function to operate, the analyzer must:

- Be connected to a Local Area Network (LAN) via the RJ-45 Ethernet connection on the side panel of the analyzer.
- Receive a response to a DHCP (Dynamic Host Configuration Protocol) request when the analyzer is initialized.

If the analyzer does not receive a reply, the analyzer:

- Disables the Ethernet port.
- Does not attempt another DHCP request until the analyzer is restarted.

When both conditions are met, the data directory can be accessed using a Windows computer on the same LAN.

To access the data directory:

1. Click **Start > Run**, and enter the IP address of the analyzer:
Example: \\192.168.100.29

Refer to the *Time/Files menu* (Figure 30) for the location of the analyzers' IP address.

2. Click **OK**.
3. Within 10 to 60 seconds, the *Windows Share* directory displays the subdirectory **lgrdata**.

Double-click on the **lgrdata** directory to see a listing of the data files stored on the internal hard drive of the analyzer.

Open or transfer any of the data files, as you would with any Windows share drive.

Additional Notes

The analyzer shared data directory is in the LGR workgroup. If it is not visible, browse for it in the Windows Network Neighborhood by entering the IP address of the analyzer. Figure 30 shows the location of the IP address.

The current data file of the analyzer can be open while measurement is in progress without interrupting the analyzer operation. The current data file is updated after every fourth KB, so a new data file will appear empty until enough data is collected to be written to the disk.

If a Local Area Network (LAN) is not available, plug the analyzer into a standalone broadband router (example: Netgear Model RP614) to enable the analyzer to obtain a Dynamic Host Configuration Protocol (DHCP) address from the router when the analyzer is started. Then, plug any Windows computer into the same broadband router to access the data directory.

A crossover Ethernet cable will NOT allow an external computer to access the shared data directory, as the analyzer will not obtain a DHCP address on initialization and will shut down its Ethernet interface.

It is possible to access the shared analyzer data directory from operating systems other than Windows. The analyzer uses a Samba server to share the data directory, which could be accessed by any appropriate Samba client application.

Appendix B: Wireless Router Setup (Optional)

The analyzer can be ordered with an optional TP-Link wireless router. If you ordered the wireless router option, it will be factory installed inside, or on the side of, the analyzer.

Configuration Options

Access-Point Mode

The router is shipped in Access-Point mode, by default. This appendix provides instructions on setting up the router in Access-Point mode. For information on other possible modes, refer to the TP-Link website at www.tp-link.com/support and enter the TP-Link model number (TL-WR802N).



You must restart the analyzer whenever you change router modes for the mode change to take effect.

Local Connection

You can also bypass the wireless router if you want to connect the analyzer to a local network. Refer to the *Connect Analyzer to Local Network* section on page 69 for instructions on this configuration.

Wireless Control Using Remote Device

For wireless control of the analyzer using a remote device, install the appropriate Virtual Network Client (VNC) software on your remote device. Refer to page 70 (Appendix C: Set Up Devices for Remote Access Using VNC Software) for details on setting up devices for remote access using VNC software (optional).

Configure Router for Access-Point Mode

1. Using a phone, tablet, or laptop, connect to the router using the SSID and password on the router. (Figure 47)

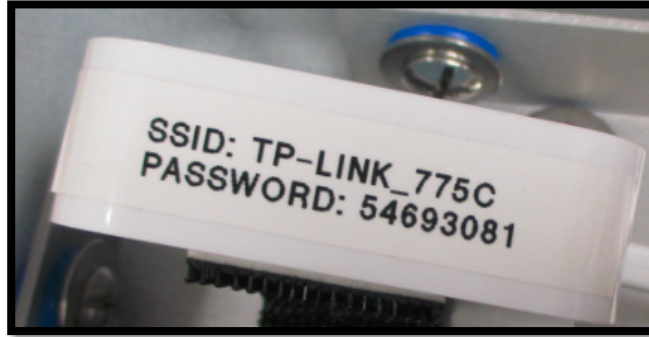


Figure 47: Router SSID and Password Location

2. On the same device, launch a Web browser, then type <http://tplinkwifi.net> in the address bar. (Figure 48)

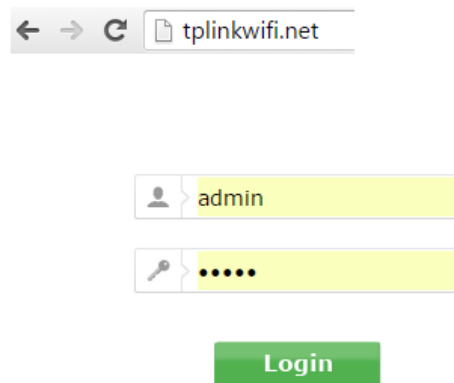


Figure 48: Logging In

3. Enter **admin** (in lowercase) for the username, and enter **Lgr123456789** for the password.
4. Click **Login**.

5. On the left panel, click **Quick Setup**. (Figure 49)

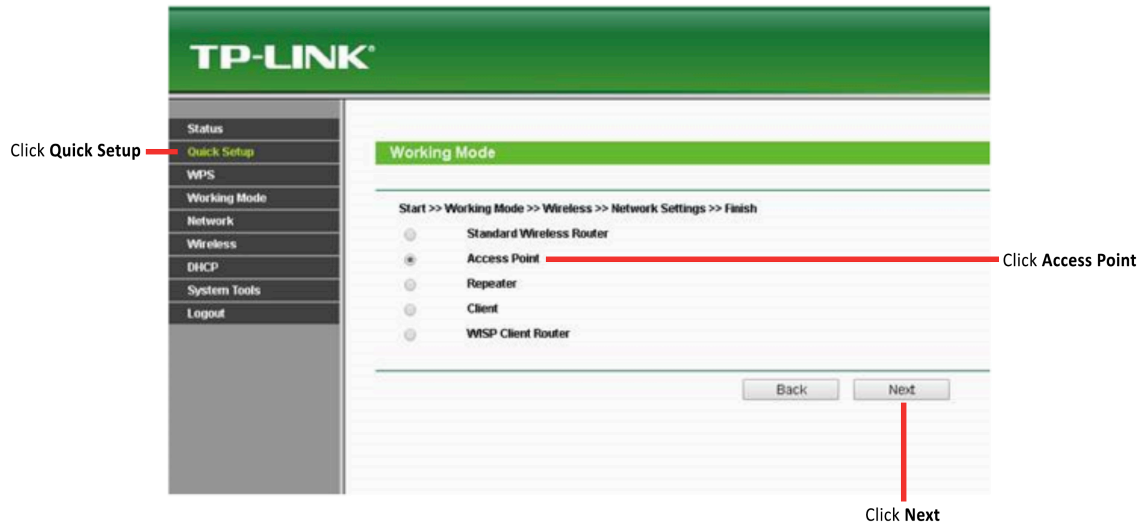


Figure 49: Start Router Configuration

6. Click **Next**.
7. In the *Main Panel*, select the **Access Point** button. (Figure 49)
8. Click **Next**.

9. In the *Wireless Setting* screen, do one of the following: (Figure 50)
- To keep the default *Wireless Network Name* and/or *AP Wireless Password*, click **Next**.
 - To change the default *Wireless Network Name* and/or *AP Wireless Password*, change the names in the *Wireless Network Name* and/or *AP Wireless Password* fields, then click **Next**.

The screenshot shows the 'Wireless Setting' screen with the following fields and values:

- Wireless Network Name (SSID): TP-LINK_0919 (also called SSID)
- Region: United States
- Warning: Ensure you select a correct country to conform local law. Incorrect settings may cause interference.
- Channel: Auto
- Wireless Security Mode: Most Secure(WPA/WPA2-PSK)
- Wireless Password: 12345670

Below the password field, there is a note: "You can enter ASCII or Hexadecimal characters. For Hexadecimal, the length should be between 8 and 64 characters; for ASCII, the length should be between 8 and 63 characters. For good security it should be of ample length and should not be a commonly known phrase."

Buttons: Back, Next

Figure 50: Wireless Setting Screen

10. In the *Network Setting* screen, click **Next**. (Figure 51)

The screenshot shows the 'Network Setting' screen with the following fields and values:

- Type: Smart IP (DHCP)
- Note: The IP parameters cannot be configured if you have chosen Smart IP (DHCP). In this situation the device will help you configure the IP parameters automatically as you need.
- IP Address: 192.168.0.254
- Subnet Mask: 255.255.255.0
- Note: We recommend you configure this AP with the same IP subnet and subnet mask, but different IP address from your root AP/Router.
- DHCP Server: Disable Enable

Buttons: Back, Next

Figure 51: Network Setting Screen

11. Click **Finish**.
12. Restart the analyzer.

Connect Analyzer to Local Network

1. Unplug the black cable from the router LAN/WAN port. (Figure 52)

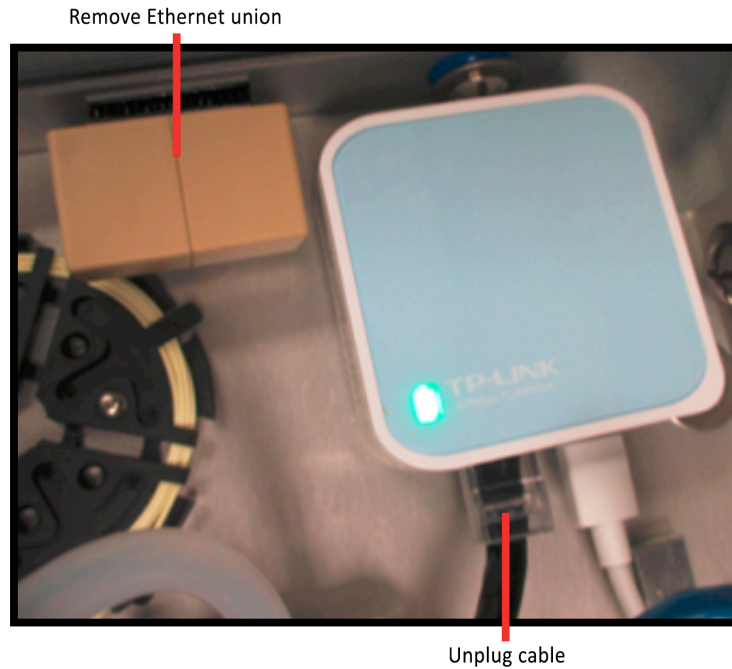


Figure 52: Unplug Cable and Remove Ethernet Union

2. Remove the Ethernet union (next to the router). (Figure 52)
3. Plug the black cable into either port of the Ethernet union. (Figure 53)

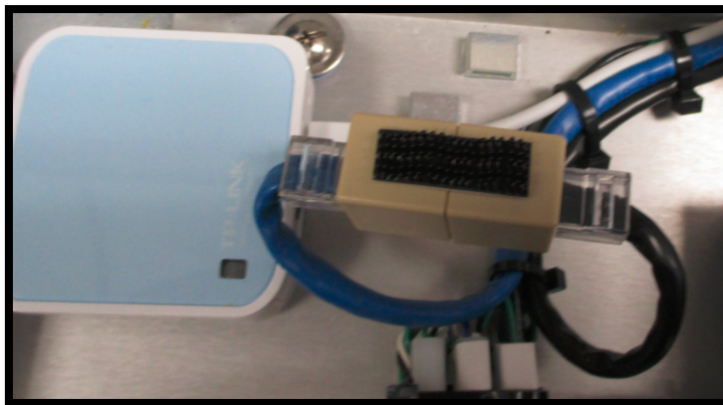


Figure 53: Plug Cables into Ethernet Union

4. Plug the blue cable into the other port of the Ethernet union. (Figure 53)
5. Connect a local area network (LAN) cable from an external computer to the analyzer Ethernet port, located on the external side panel.

Appendix C: Set Up Devices for Remote Access Using VNC Software

Listed below are three types of devices that can be connected to the analyzer through the wireless router to access information:

- Android OS based devices (smart phones and tablets)
- iOS based devices (smart phones, tablets, and laptops)
- Windows based devices (smart phones, tablets, and laptops)

Each of these devices uses Virtual Network Client (VNC) software to connect the analyzer through the router. Follow the instructions below to install and set up VNC software on the device you are connecting to the analyzer.

Set up VNC Software on Android Devices

1. On the Android device, go to **Settings > WiFi > Connect to Wireless Network**.
2. Connect to the wireless SSID network listed on the router sticker. Enter the TP-Link wireless router (example: **TP-LINK-775C**) as shown in Figure 47.
 - For ultraportable analyzers, the TP-Link wireless router is installed inside the analyzer and may be accessed by opening the case.
 - For all other analyzers, the optional TP-Link wireless router is attached to the outside of the case.
3. Select **SSID**.
4. Enter the wireless password printed on the router sticker. (Figure 47) Every router has a different, unique SSID number, and wireless password.
5. Select **Connect**. (Figure 54)

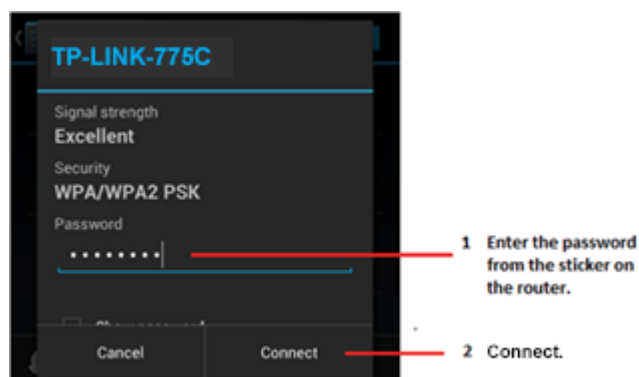


Figure 54: Password Connection Screen

6. A verification message appears, showing that the Android device is connected to the router. (Figure 55)

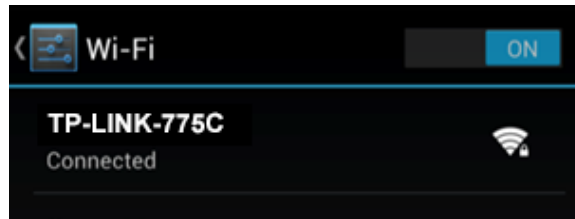


Figure 55: Connectivity Confirmation Screen

7. Ensure that the IP address of the Android device is correct by holding your finger down on the network connection icon. The IP address of the Android device is either 192.168.100.100 or 192.168.100.101.
 - a. Wireless devices can compete for dynamic addresses. If the 192.168.100.100 address does not connect, then use 192.168.100.101.
8. Record the IP address of the Android device because it will be necessary to refer to it in Step 12.
9. Install the VNC software by searching and installing from the Google Play store. Search for *Android-vnc-viewer* and install the application by tapping on the **Install** button. (Figure 56)



An Internet connection is required for this step.



Complete instructions for installing the Android-vnc-viewer can be found online at: <http://code.google.com/p/android-vnc-viewer/wiki/Documentation>

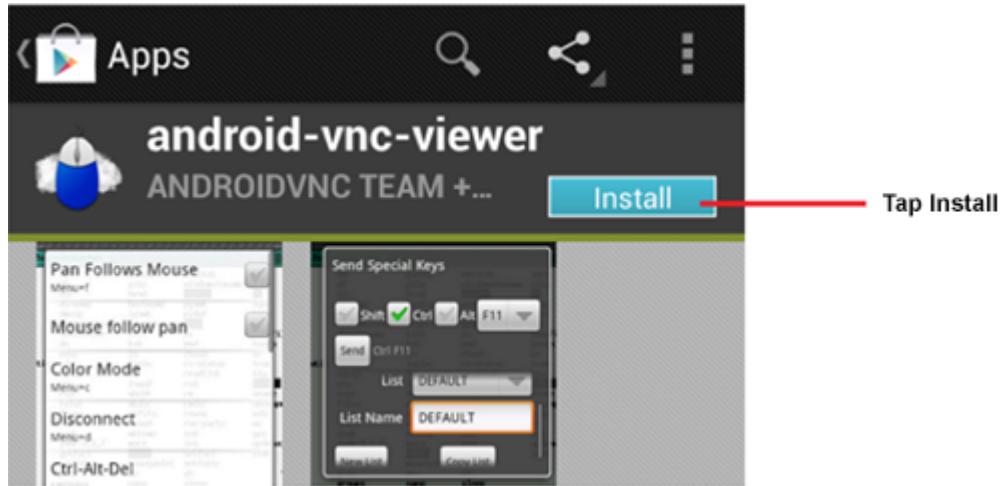


Figure 56: Android-vnc-viewer Install Screen

10. Open the VNC application on the Android device by selecting the **VNC** application icon. (Figure 57)



Figure 57: VNC Application Icon

11. The Android VNC screen appears. (Figure 58)



Figure 58: VNC Application Installation Setup Screen

12. In the *Address* field, enter the address of the analyzer (**192.168.100.100** or **192.168.100.101**) that you recorded in Step 8.

The IP address of the analyzer will be whichever address the Android device is not. For example, if the IP address of the Android device that was displayed in Step 8 is **192.168.100.101**, then the IP address of the analyzer will be **192.168.100.100**.

13. In the Password field, enter **lgrvnc**.

14. Tap the **Connect** button to connect the Android device to the analyzer. The analyzer software interface screen displays on the device. The screen size is adjustable to fit the screen of the device. (Figure 59)

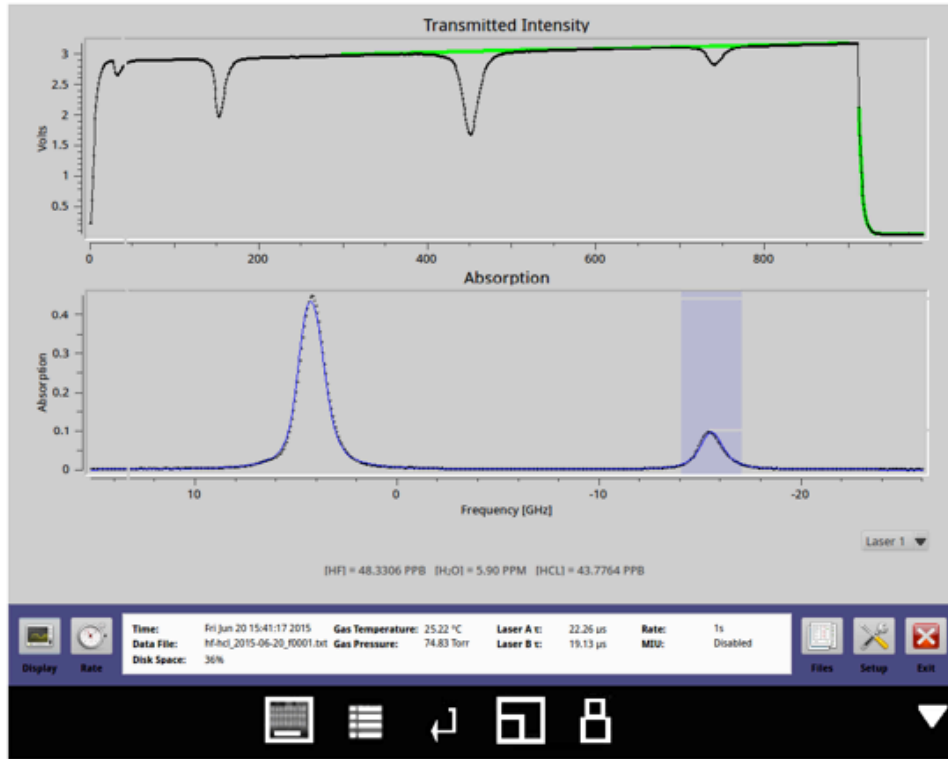


Figure 59: Analyzer Software Interface Display with Size Adjustment for Android Devices

Set up VNC Software on iOS Devices

1. On the iOS device, go to **Settings > WiFi**, then select the network from the list.
2. Connect to the wireless SSID network listed on the router sticker. (Figure 47)
Enter the TP-Link wireless router. (example: **TP-LINK-775C**)
 - For ultraportable analyzers, the TP-Link wireless router is installed inside the analyzer and may be accessed by opening the case.
 - For all other analyzers, the optional TP-Link wireless router is attached to the outside of the case.
3. Select your SSID network. For example, **TP-LINK-D036**. (Figure 60)



Figure 60: Network Connections Screen

4. The *Enter Password* screen appears. (Figure 61) In the Password field, enter the wireless password on the router sticker. (Figure 47)
5. Select **Join**.



Figure 61: Router Connection Screen

6. The *Network Connections* screen confirms that the iOS device is connected to the router. (Figure 62)



Figure 62: Router Connection Confirmation Screen

7. Select the network to check the IP address (**192.168.100.100** or **192.168.100.101**) of the device as shown in Figure 63.
 - a. Wireless devices can compete for dynamic addresses. If the 192.168.100.100 address does not connect, then use 192.168.100.101.
8. Record the IP address of the iOS device because it will be necessary to refer to it in Step 12.



Figure 63: Device IP Address Confirmation Screen

9. Install the VNC software by searching and installing it from the App store.
 - *Mocha VNC Lite for iOS* is the software used in this example. (Figure 64)
 - An Internet connection is required for this step.



Complete instructions for installing *Mocha VNC Lite for iOS* can be found online at: http://www.mochasoft.dk/iphone_vnc_help2/help.htm.

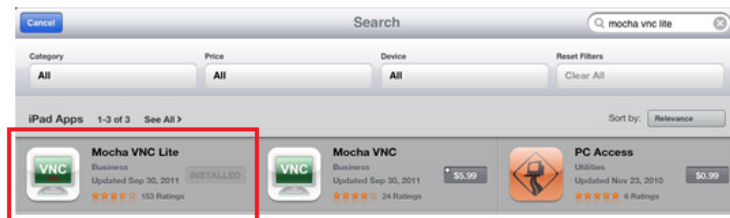


Figure 64: VNC Selection Screen

10. Open the application and select **Configure**. (Figure 65)

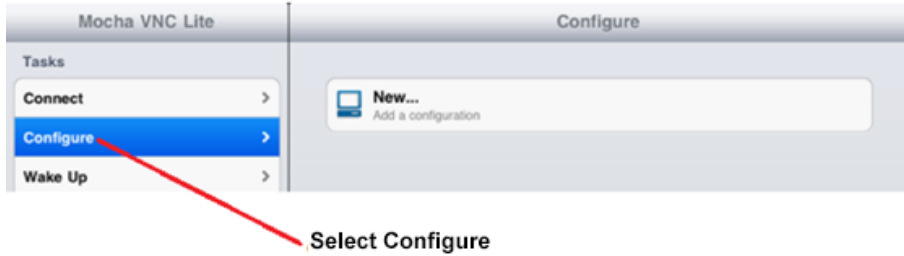


Figure 65: Mocha VNC Lite Configure (New) Screen

11. The *Configure Screen* prompts you for the server IP address and password. (Figure 66)



Figure 66: Mocha VNC Lite Configure Screen

12. Enter the analyzer's address in the *VNC server address* field (**192.168.100.100** or **192.168.100.101**), from Step 8.

The IP address of the analyzer will be whichever address the iOS device is not.

For example, if the IP address of the iOS device that was displayed in Step 8 is **192.168.100.101**, then the IP address of the analyzer will be **192.168.100.100**.

13. In the *VNC Password field*, enter **lgrvnc**.

14. Select **Connect**.

The *Setup Configuration* screen displays the IP address. (Figure 67)



Figure 67: Setup Configurations Screen

15. To connect the iOS device to the analyzer, tap the **IP Config** you set up. The analyzer software will display on the device. (Figure 68) The screen size is adjustable to fit the screen of the device.

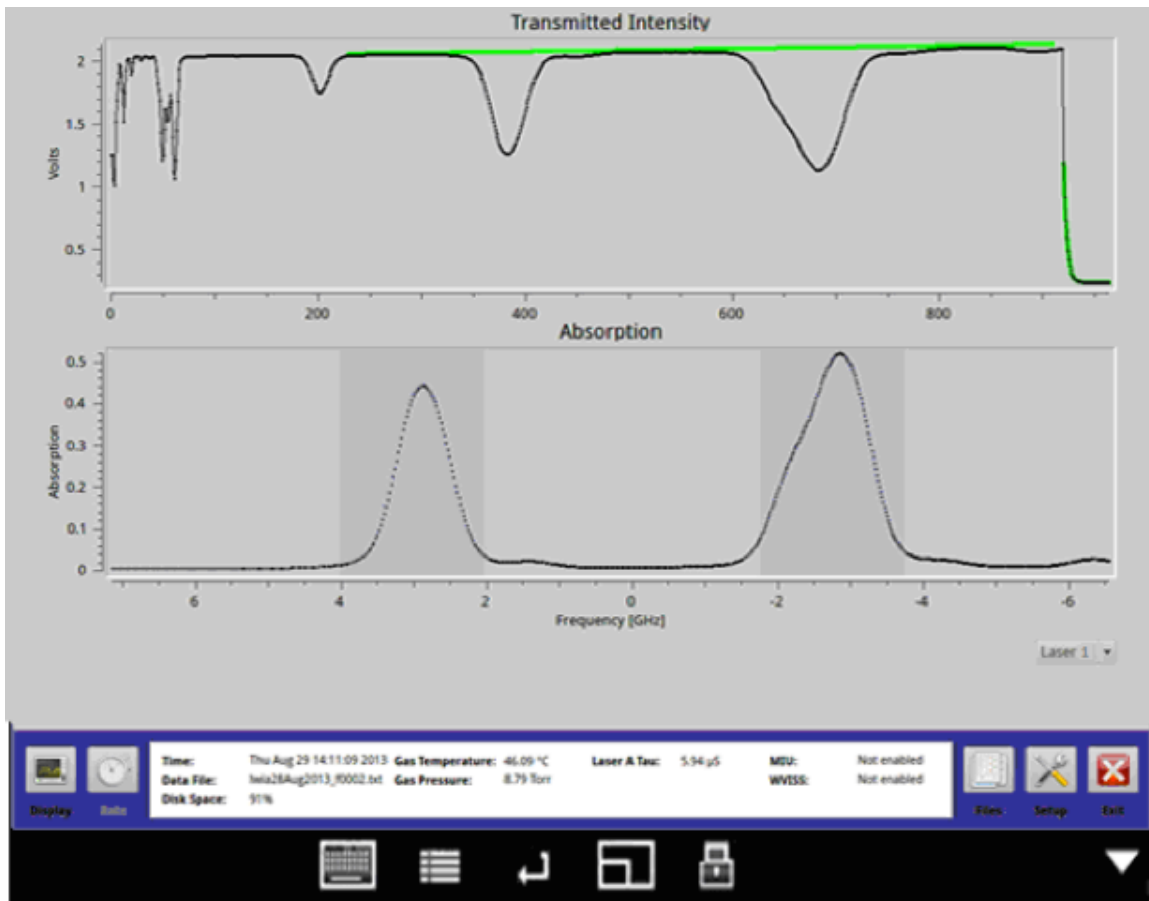


Figure 68: Analyzer Software Interface Screen (Size Adjustment for iOS Devices)

Set up VNC Software on Windows Devices

1. On the Windows device, open *Wireless Router* options.
2. Locate the sticker on the router. (Figure 47)
3. Click on the **Wireless Network Connections** icon in the bottom left of the screen (Figure 69) to open the *Windows Wireless Networks* dialog-box. (Figure 70)

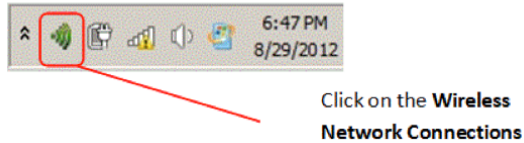


Figure 69: Wireless Connections Icon

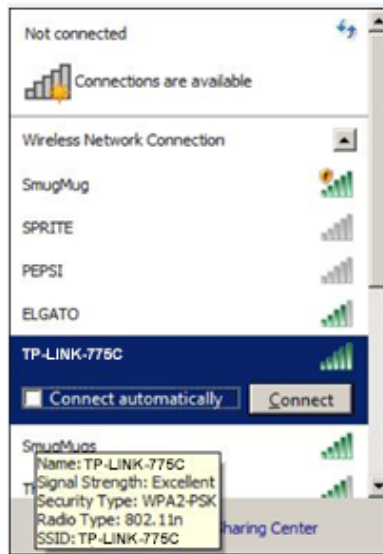


Figure 70: Windows Wireless Networks

4. Select the SSID network name listed on the router sticker, (Example: **TP-LINK-775C**), to display the *Connect to a Network* dialog-box. (Figure 71)
5. In the *Security key* field, enter the wireless password located on the router sticker. (Figure 47)
6. Click **OK**.



Figure 71: Network Connections Security Screen

7. The *Connection Status* dialog-box displays. (Figure 72)

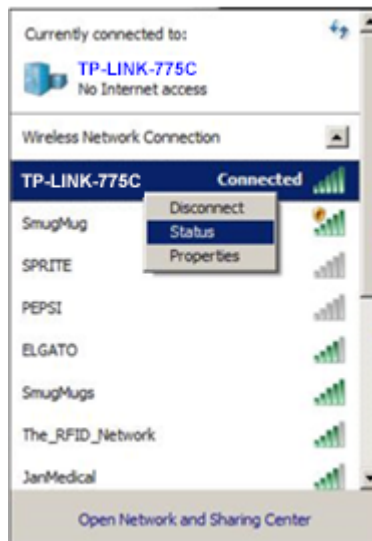


Figure 72: Current Connectivity Screen

8. Check the connection to make sure the device is connected through the wireless router by selecting the router. (Figure 73)



Figure 73: Wireless Network Connection Screen

9. Verify the IP address of the Windows device:
 - a. Right-click on the **TP-LINK-775C** network connection.
 - b. Click **Status**. (Figure 74)

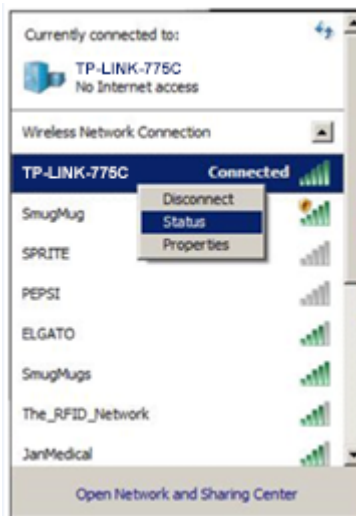


Figure 74: Current Connectivity Screen

10. The *Wireless Network Connection Status* dialog-box displays. (Figure 75)

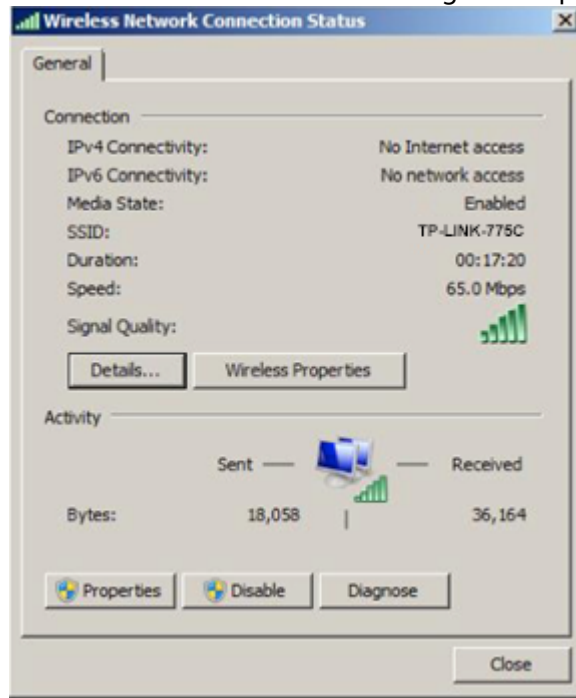


Figure 75: Wireless Network Connection Status Window

11. Click the **Details** button to display the *Network Connection Details* window. (Figure 76)

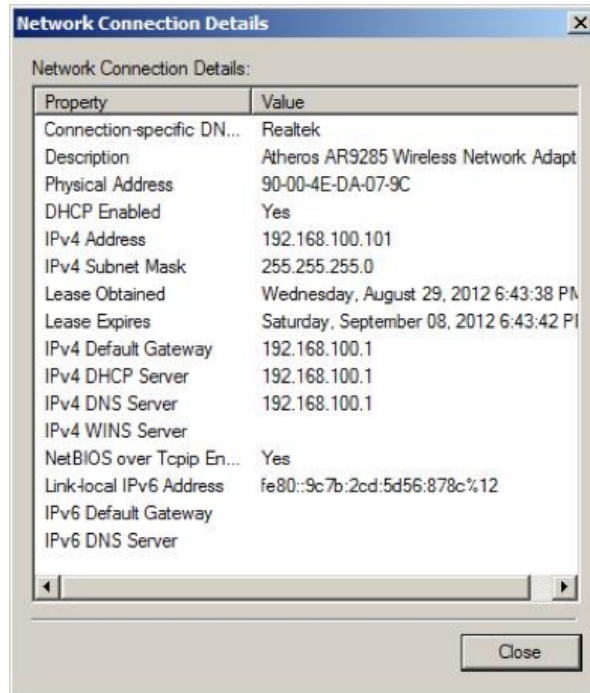


Figure 76: Network Connection Details Window

12. Verify the *Ipv4 Address* of the Windows device, which should be either **192.168.100.100** or **192.168.100.101**. For example, the Windows device IP address is **192.168.100.101**. (Figure 76)
13. Install the VNC software by going to the *RealVNC* website and downloading the RealVNC Viewer “EXE” file from <https://www.realvnc.com/en/connect/download/vnc/>
14. Open the program by clicking the **Connect** button. (Figure 77)

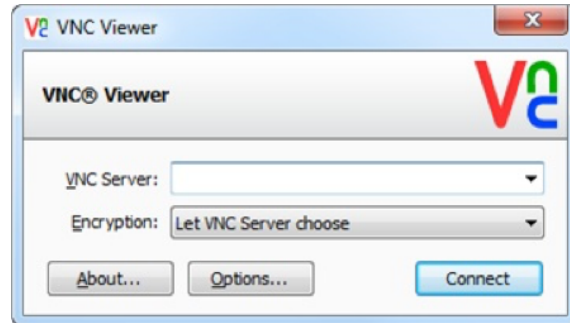


Figure 77: Real VNC Viewer Installation Screen

15. Enter the analyzer’s address in the VNC server address field (**192.168.100.100** or **192.168.100.101**), from Figure 76.

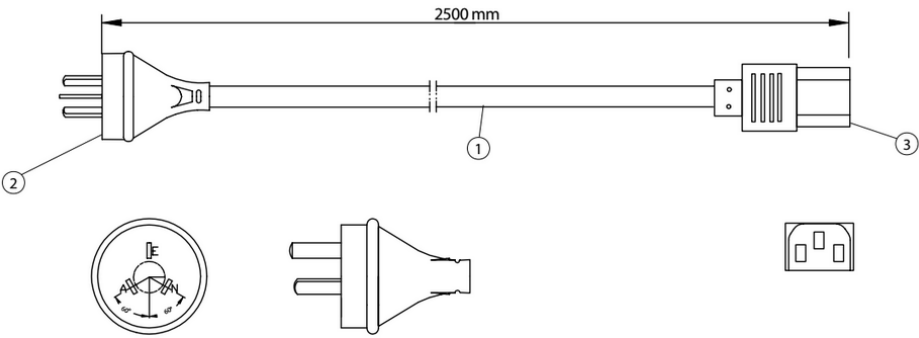
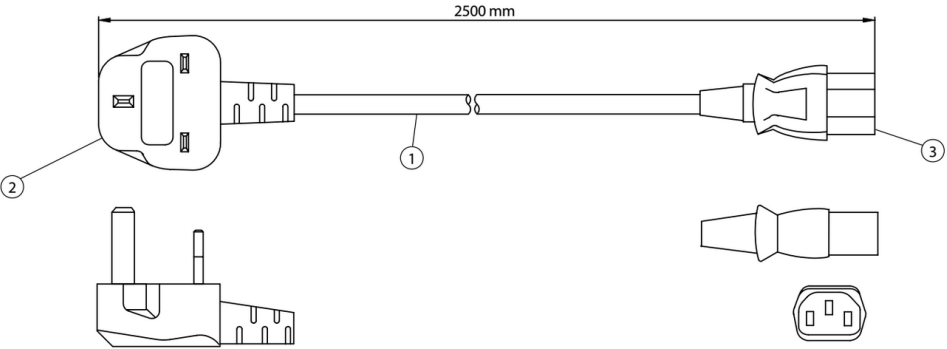
The IP address of the analyzer will be whichever address the Windows device is not. For example, if the IP address of the Windows device that was displayed in Step 12 is **192.168.100.101**, then the IP address of the analyzer will be **192.168.100.100**.

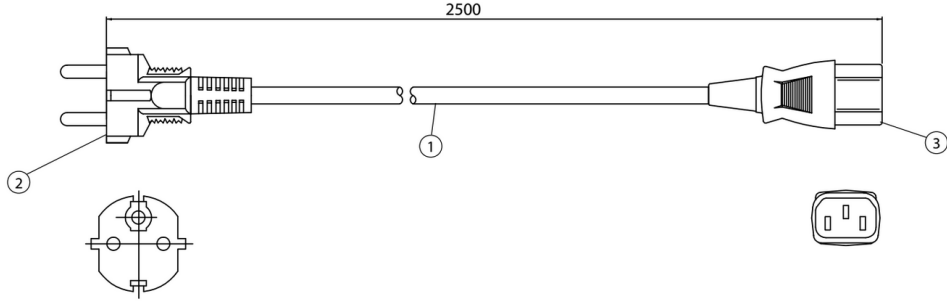
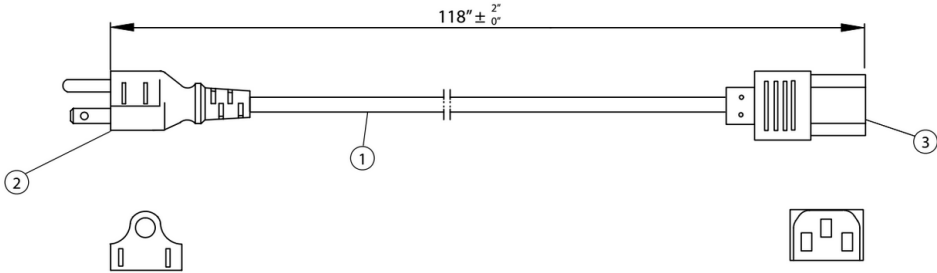
Wireless devices can compete for dynamic addresses. If the 192.168.100.100 address does not connect, then use 192.168.100.101.

Appendix D: Cables

Table 11 describes the power cables shipped with your analyzer.

Table 11: Power Cables

Region	Cable Specifications
<p>Australia and New Zealand</p>	 <ol style="list-style-type: none"> 1. CORDAGE: SAA, 3 x 1.0mm, UNSHIELDED, CEE COLOR CODE, TEMP. RATING 70°C, RATING: 250V 10A, JACKET COLOR: BLACK 2. PLUG: AS 3112/AUSTRALIAN 3. CONNECTOR: IEC 60320 C-13 APPROVALS: AUSTRALIA, NEW ZEALAND ROHS COMPLIANT
<p>United Kingdom</p>	 <ol style="list-style-type: none"> 1. CORDAGE: HO5VV-F, 3x1.00mm, CEE COLOR CODE, TEMP. RATING: 70°C, RATING: 250V, 10A, JACKET COLOR: BLACK 2. PLUG: UK PLUG BS1363A (SUPPLIED WITH 13A FUSE) 3. CONNECTOR: IEC 60320 C13 APPROVALS: UNITED KINGDOM, CE ROHS COMPLIANT

<p>Europe</p>	 <ol style="list-style-type: none"> 1. CORDAGE: H05VV-F, 3 x 1.0mm, UNSHIELDED, CEE COLOR CODE, TEMP. RATING 60°C, RATING: 250V 10A, JACKET COLOR: BLACK 2. PLUG: IEC 884/CEE7-VII 3. CONNECTOR: IEC 60320 C13 <p>APPROVALS: CB, GERMANY, DENMARK, NORWAY, FINLAND, BELGIUM, NETHERLANDS, SWEDEN, AUSTRIA, ROHS COMPLIANT</p>
<p>United States</p>	 <ol style="list-style-type: none"> 1. CORDAGE: SJT, 16AWG / 3C, UNSHIELDED, CEE COLOR CODE, TEMP. RATING 60°C, RATING: 125V 13A, JACKET COLOR: BLACK 2. PLUG: NEMA 5-15P 3. CONNECTOR: IEC 60320 C-13 <p>APPROVALS: UL, cUL ROHS COMPLIANT</p>



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