



InsuLogix® G2

Acetylene, Hydrogen, and Moisture Monitor

Installation Guide

Installation Guide
for
InsuLogix® G2

Acetylene, Hydrogen, and Moisture Monitor

Catalog Number 1015-313

Read this entire manual before installing.

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The information presented in this manual is believed to be adequate for the intended use of the product. If the product or its individual instruments are used for purposes other than those specified herein, confirmation of their validity and suitability must be obtained from Megger. Refer to the warranty information below. Specifications are subject to change without notice.

WARRANTY

Online monitoring products supplied by Megger are warranted against defects in material and workmanship for a period of two years following shipment. Our liability is specifically limited to replacing or repairing, at our option, defective equipment. Equipment returned to the factory for repair must be shipped prepaid and insured. Contact your MEGGER representative for instructions and a return authorization (RA) number. Please indicate all pertinent information, including problem symptoms. Also specify the serial number and the catalog number of the unit. This warranty does not include batteries, lamps, or other expendable items, where the original manufacturer's warranty shall apply. We make no other warranty. The warranty is void in the event of abuse (failure to follow recommended operating procedures) or failure by the customer to perform specific maintenance as indicated in this manual.

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ABOUT THIS GUIDE

This installation guide describes the process of installing, both mechanically and electrically, the InsuLogix G2 Acetylene, Hydrogen, and Moisture monitor and its optional accessories. Photos of connections to the unit are included to facilitate the installation.

The guide also provides instructions on initial software configuration of the monitor. These are the minimum recommended tasks required to ensure a high-level customer experience and include items such as entering owner and transformer information, calibration parameters, setting the time and date, and configuring communications to the device. Additional configuration of the device, such as relay configuration and alarm threshold modifications, may be necessary depending on the end user's application.

Installation of the InsuLogix G2 shall be performed only by qualified personnel. Consult Megger Technical Support with any questions or concerns about the installation process.

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SAFETY

Safety is the Responsibility of the User

Only qualified and trained operators should operate the InsuLogix G2. Each operator must read and understand this Instruction Manual prior to operating the equipment. The Safety precautions, herein, are not intended to replace your Company's Safety Procedures.

General Safety Precautions



Warning: Use of this product in a manner not specified by the manufacturer (Megger) or outlined in this product manual may result in damage to the equipment and the protection provided by the equipment may be impaired.



Warning: Additional combustible fault gases, not measured by this monitor, may be present in small quantities. Always follow site safety procedures when working with combustible gas.



Warning: This product contains a non-hazardous Class 1 laser.

Input Power Precautions

This device has an autosensing (AC or DC) power input and has 3 terminals on the power input board. L/DC+, N/DC-, and GND. Input power for the InsuLogix G2 must be within the following ranges:

Cat. No 1015-313 90V -264 V AC, 47 - 63 Hz, 160 VA; 127-370 V DC, 120 W



Figure 1: Input Power Board

When using AC, the neutral pole must be at ground potential. Before making connection to the power source, determine that the instrument rating matches the voltage of the power source. Do not bypass the grounding connection.

The ground terminal of the input supply (green or yellow/green wire) must be connected to the protective ground (earth) terminal of the line power source.

The control circuits of the instrument are fuse protected. A fuse is located on the input power board on the side panel and is replaceable by the operator. To avoid electric shock and fire hazard, use only the fuse specified below switch module on side panel.

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WARNING

Before replacing the fuses, disconnect the input power from the live power source.

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INSTALLATION

Being IP66 (NEMA 4X) rated, the InsuLogix G2 is designed to be used in harsh environmental conditions that are seen in substations around the world. Various types of precipitation, snow melt, dust, sand, temperature extremes, and direct sunlight were all considered during the design of the monitor.

Ideally the InsuLogix G2 should be mounted near the oil return pipe coming from the bottom of a radiator. In general, it should be installed on a 1.5” valve at least one foot higher than the transformer tank bottom, but as close as possible to the oil return pipe into the tank. The maximum height limit should maintain the ability for a tech standing on the ground to easily install the monitor and clearly see the monitor's LCD. Care should be taken to minimize the overall connection length from the transformer valve to the monitor. It is recommended to keep this overall connection length below 6 inches to avoid an increase in response time.

Required Tools

The following is a list of required and/or recommended tools to perform the installation of the InsuLogix G2.

- Oil catch pan & Oil absorbent pads
- Clean, lint-free rags
- Methyloxolane or equivalent
- Teflon™ tape (e.g., 3/4” wide)
- Rectorseal No. 5 pipe thread sealant or equivalent (optional)
- Two large wrenches (pipe or crescent) for 1.5” fitting and 3.13” union nipple
- Crescent adjustable wrench for conduit gland fittings
- 1/8” Allen wrench
- Philips screwdriver
- Terminal screwdriver
- Ring terminals & crimp tool

- Ferrules and crimp tool (optional)

Mechanical

Mounting the InsuLogix G2

The InsuLogix G2 shall be mounted on oil filled transformers equipped with a 1 ½” valve or suitable adapter made of brass, stainless steel, or black steel. To facilitate installation, a union along with a 1 ½” MNPT nipple is provided with each InsuLogix G2. Use of these fittings is recommended to eliminate the need to rotate the unit during mounting. Do NOT use galvanized fittings as the coating on them is known to react with the oil and generate hydrogen, thus skewing the data collected by the monitor.

1. Ensure that the transformer valve is closed prior to removing the cap/plug if one exists
2. Prepare the valve by wiping away any dirt, oil, or other debris that may have accumulated on the threads with a clean, lint free rag
3. Apply Teflon tape and/or a thread sealant (RectorSeal No. 5 or equivalent) to one end of the nipple and screw it into the transformer valve
4. Apply Teflon tape and/or thread sealant to the exposed end of the nipple and thread the male end of the union fitting onto it
 - a. Using two appropriately sized wrenches or large adjustable wrenches, snug the connections to the valve without changing the orientation of the valve
5. Apply Teflon tape and/or a thread sealant to the male NPT fitting on the InsuLogix G2 and thread the female end of the pipe union onto it
 - a. Snug the connection on the InsuLogix G2
6. Taking care that the monitor is lined up properly with the fitting on the transformer valve, join the two ends of the union fitting using the union nut

Note: This step should be performed by 2 people. One to hold the monitor steady and one to tighten the fittings.

- a. Tighten the connection such that the display of the monitor is right side up and the bottom of the monitor is parallel to the ground or transformer pad
7. Purge the air from the piping and transformer valve using the sample/purge valve on the rear panel of the monitor

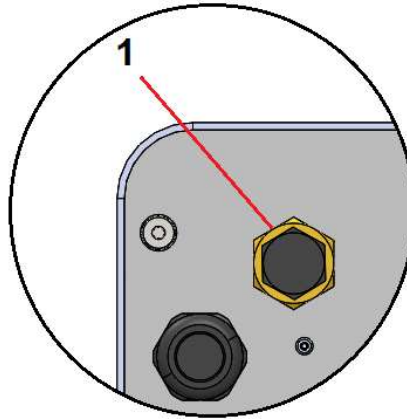


Figure 2: Purge/Sample Port

Item	Type	Comments
1	Sample/Purge Valve	High Flow L Valve, 1/4" – 18 NPTF



Warning: Always ensure there is positive pressure on the transformer tank prior to opening the transformer valve. Failure to do so may result in air from the piping going back into the transformer tank during the purge process.

- a. Connect the piece of 1/4" ID tubing to the barb fitting of the LT Sample Probe (both supplied with each monitor)



Figure 3: LT Sample Probe + Tubing (1015-318)

- b. Unscrew the dust cap from the sample/purge valve on the rear panel of the InsuLogix G2

- i. The cap is tethered to the valve by a small chain to prevent loss or contamination of the cap caused by it falling on the ground
 - c. Screw the LT Sample Probe into the sample/purge valve to open the stopper in the valve
 - d. Using one hand on the free end of the tubing to direct oil flow into an oil pan or bottle, slowly open the transformer valve
 - i. Air will exhaust out first, followed by oil that still has air bubbles in it. Continue to let the oil flow until it is free of bubbles
 - e. Allow at least 600 mL (20 oz) of oil to flow out and ensure there are no longer any bubbles
 - f. Unscrew the sample probe to stop the flow of oil
 - g. Replace the dust cap by screwing it back onto the sample/purge valve to prevent contamination of future samples
8. Remove the tubing and wipe down the assembly with a clean rag to remove all oil from the exterior of the piping, purge port, and back panel of the monitor
 9. Inspect the installation for leaks
 - a. If any leaks are found, close the valve on the transformer and attend to them prior to continuing



WARNING: *Always allow at least 600 mL (20 oz) of oil to flow out while purging the system on initial installation or after moving it to a new transformer to ensure the system is properly flushed.*

Note: *Properly dispose of the ¼” tubing following installation as this tubing is intended for one time use only. Reuse of tubing may contaminate future oil samples. 24 in lengths of this tubing are sold as accessories under part number 2016-324.*

Electrical

To perform the electrical part of the installation the cover will need to be removed to provide access to the terminal blocks.

1. Remove the four screws, two on each side of the monitor, near the bottom of the cover using an 1/8" Allen wrench for monitors built before March 2023 or a Philips screwdriver for newer units
2. Lift the cover straight up, exposing the internal components of the InsuLogix G2.

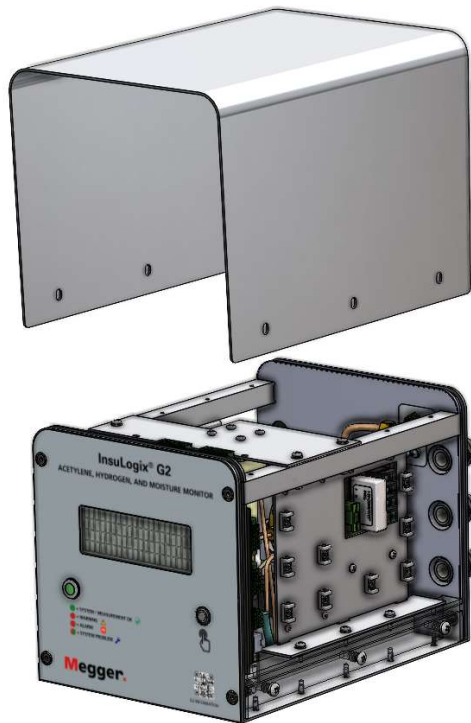


Figure 4: Cover Lifted Off

Three 3/4" conduit gland fittings are provided on the left side of the rear panel of the monitor to facilitate separation of voltages and communication wires. In addition, a sealed/shielded RJ45 connector is provided for local connection to the monitor.

Note: *The mating IP67 Ethernet plug (1015-317) for this port to be used as a permanent connection point to SCADA is included.*

Use of conduit during the electrical installation process is at the discretion of the end user.

Connection Locations

Electrical connections to the system will be made to two PCBs, the Input Power Board and the Main Board. The Input Power Board is located conveniently on the side of the unit

close to the rear panel. The balance of the connections are made to the Main Board near the front panel of the unit.

Tie wrap anchor points are provided on the inside plate on the same side of the unit as the gland fittings to facilitate a clean install.

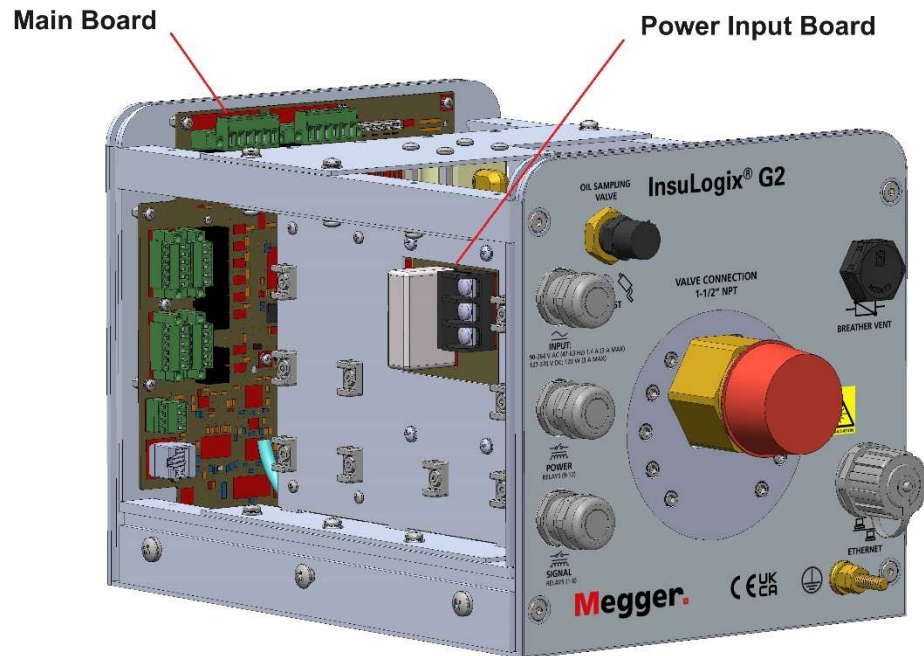


Figure 5: Terminal Board Locations

Connecting Input Power

Input power connections are made to terminals L, N, and G (labeled top to bottom) on the Input Power Board. The system is equipped with an autosensing power supply that accepts either 90-264 VAC or 127-370 VDC and is fused at 3A.



WARNING: Always ensure that the input power circuit is de-energized prior to making connections both to the monitor and in the transformer control cabinet. Failure to do so can result in damage to equipment and/or personal injury.

In the interest of separation of voltages, it is recommended to use the top gland fitting for the input power connection. Once input power is connected and if other wiring connections are to be made to the InsuLogix G2 at this time, do not turn on the power to the monitor yet.



WARNING: If a disconnect is to be installed local to the monitor, DO NOT position the monitor/disconnect in such a way that operation of the disconnect is impeded in any way.

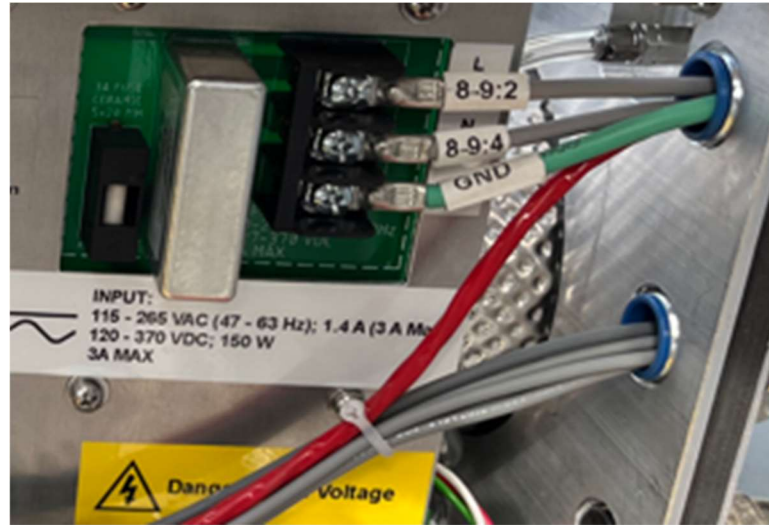


Figure 6: Input Power Connection

Wiring the Relay Outputs

Twelve (12) programmable Form C relay outputs are provided to allow for hard-wired signals to an RTU or Supervisory Control and Data Acquisition (SCADA) system.

Signal Relays (1-8)

The signal relays are found along the side of the Main PCB.

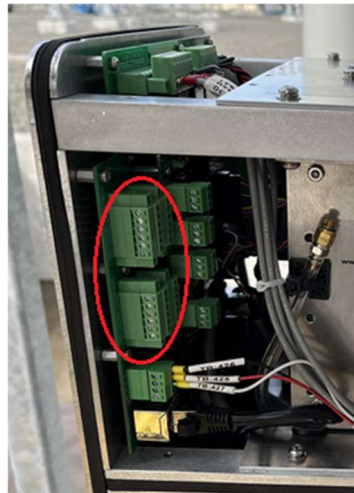


Figure 7: Signal Relay Location

The orientation of the signal relay (1-8) terminals is shown in the table below. These terminals can accept 16-26 AWG stranded wire and have a tightening torque of 3.0 lb-in/0.34 Nm.

Edge of Main PCB	RLY8 NO	RLY7 NO
	RLY8 COM	RLY7 COM
	RLY8 NC	RLY7 NC
	RLY5 NO	RLY6 NO
	RLY5 COM	RLY6 COM
	RLY5 NC	RLY6 NC
	RLY4 NO	RLY3 NO
	RLY4 COM	RLY3 COM
	RLY4 NC	RLY3 NC
	RLY1 NO	RLY2 NO
	RLY1 COM	RLY2 COM
RLY1 NC	RLY2 NC	

Figure 8: Signal Relay Terminal Detail



WARNING: *The maximum switching voltage rating of the signal relays is 125 VAC or 60 VDC. These relays shall NOT be used with 125 VDC. See the G2 User Guide for more information on contact ratings.*

Power Relays (9-12)

The power relays are located along the top side of the Main PCB.

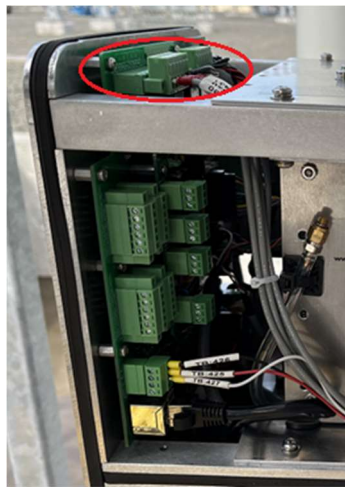


Figure 9: Power Relay Location

For the power relays (9-12) the terminals from left to right are RLY(X) NC, RLY(X) COM, RLY (X) NO. These terminals can accept 12-24 AWG stranded wire and have a tightening torque of 5.0 lb-in/0.56 Nm.

Wiring the Network Communications

In addition to the hardwired relays, the InsuLogix G2 comes standard with Modbus RTU and TCP communication protocols for connection to external data acquisition systems.

DNP3 and IEC 61850 are offered as optional protocols which can be included at the time of order. Dependent on the specific application, either RS-485 or Ethernet (TCP/IP) may be used for Modbus & DNP3 communication, while IEC 61850 requires the use of Ethernet.

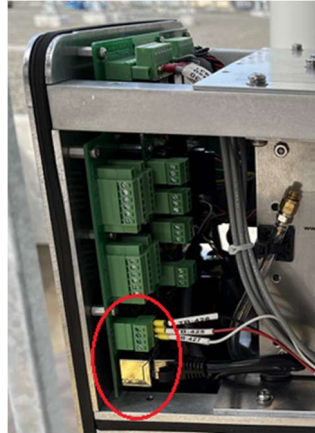


Figure 10: Communication Ports Location

RS-485

Connection to the monitor using RS-485 standard shall be done using the 2-wire connection method. Use only shielded twisted pair plus ground communication cable for wiring of communications from the InsuLogix G2 to a data acquisition system.

Terminate wires to data acquisition system such that Data (A)- on one end is connected to Data (A)- on the other and, likewise, Data (B)+ is connected to Data (B)+ on the other end.

The connector for RS-485 accepts 16-26 AWG stranded wire and has a tightening torque of 3.0 lb-in/0.34 Nm.

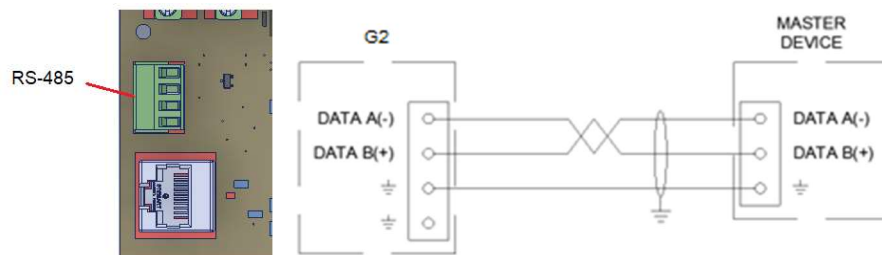


Figure 11: RS-485 Wiring Diagram

Ethernet (TCP/IP)

When using Ethernet to integrate the InsuLogix G2 into the end user network, two options for install are available:

1. The RJ45 receptacle on the rear panel of the unit is IP67 and the mating plug (1015-317) can be used to maintain the IP67 rating of this connection.
2. Alternatively, the user may opt to use the lower gland fitting and connect their Ethernet cable directly to the main PCB. This will require unplugging the installed Ethernet patch cord that connects the main PCB to the rear panel receptacle.



Warning: *When wiring directly to the main PCB, be sure to fully wrap the metalized connectors of the patch cord that was unplugged with electrical tape to insulate them from shorting to the monitor's metal panels.*

Use CAT 5e cable or better for Ethernet networking connections.

NOTE: *The external Ethernet port may be used as a temporary connection point to the monitor without the use of the IP67 plug when weather permits, however this is true only when option 2 (above) is not used.*

Wiring the Analog Output Module (optional accessory)

The optional analog output module provides four 4-20 mA signals, one each for acetylene (ppm), hydrogen (ppm), relative humidity (%) and water content in oil (ppm). Pictured below, this module is factory installed in each unit, however, must be activated by the factory prior to use.



Figure 12: Analog Output Module (1015-315)

Use only shielded twisted pair cables for connecting the InsuLogix G2 analog outputs to a data acquisition system. Use of a multi-pair cable is acceptable and, in many cases, will be preferred to reduce the number of cables pulled to the monitor's gland fittings.

The connectors on the analog output module accept 16-26 AWG stranded wire and have a tightening torque of 3.0 lb-in/0.34 Nm.



Figure 13: Analog Outputs Location

Connect the cable shield wire to the provided shield terminal for the associated output. When using a multi-pair cable, tie the shield wire to any of the shield connection points on the analog output module as they are tied together internally on the module.

Note: The cable shield should be connected at one end only to avoid introducing a ground loop into the circuit.

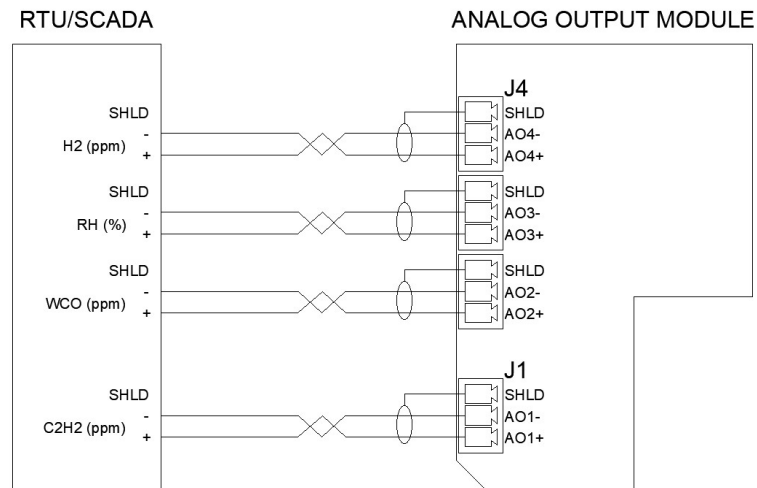


Figure 14: Analog Output Wiring Diagram

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SYSTEM CONFIGURATION

Once the G2 has been installed and is powered on, the next step is performing the initial configuration of the monitor. The initial configuration covers the minimum settings that need to be updated for proper functionality of the monitor. This includes configuring the device information, calibration parameters, communications, and setting the time/date of the device.

All configuration for the InsuLogix G2 is done through the locally hosted webserver User Interface (UI), which is compatible with Chrome and MS Edge.

Logging into the Monitor

To log into the InsuLogix G2:

1. Using a computer that is connected to the same LAN as the monitor or connected directly to the back of the unit, enter the IP address of the system in the navigation bar of the browser
 - a. This will launch the UI, which will open to the login screen shown below
2. Enter the appropriate username and password, then click the Login button
 - a. To edit settings of the InsuLogix G2, an administrator level login is required. The default administrator username is **sysadmin** with password **G2Gen2**

Note: It is strongly recommended that the user change the password to the default logins for security.

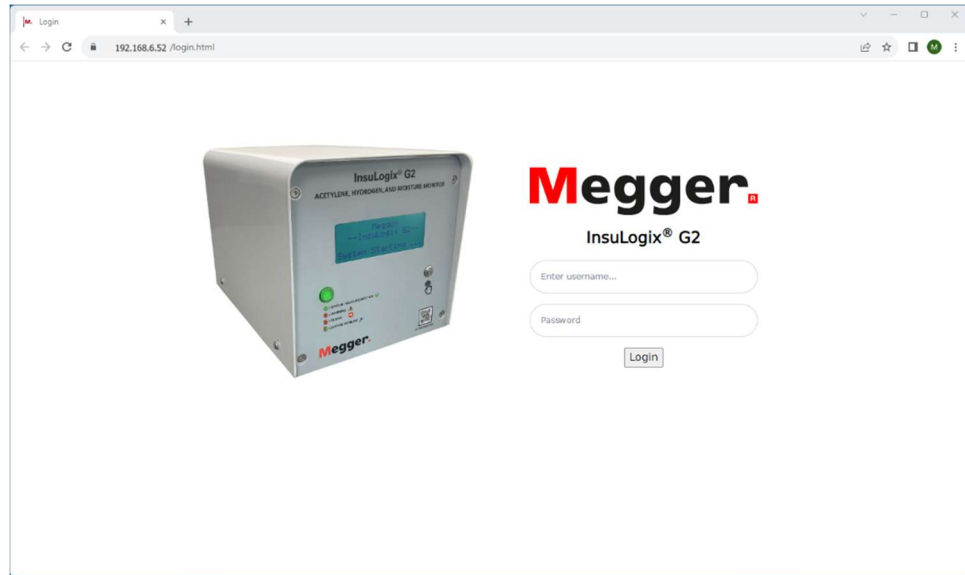


Figure 15: Login Screen

Once logged into the system, the Dashboard screen will be displayed. This screen provides a snapshot of the current readings of the monitor. The navigation menu is located on the left side of the screen. Clicking on each of the buttons in this menu will direct the user interface to that screen.

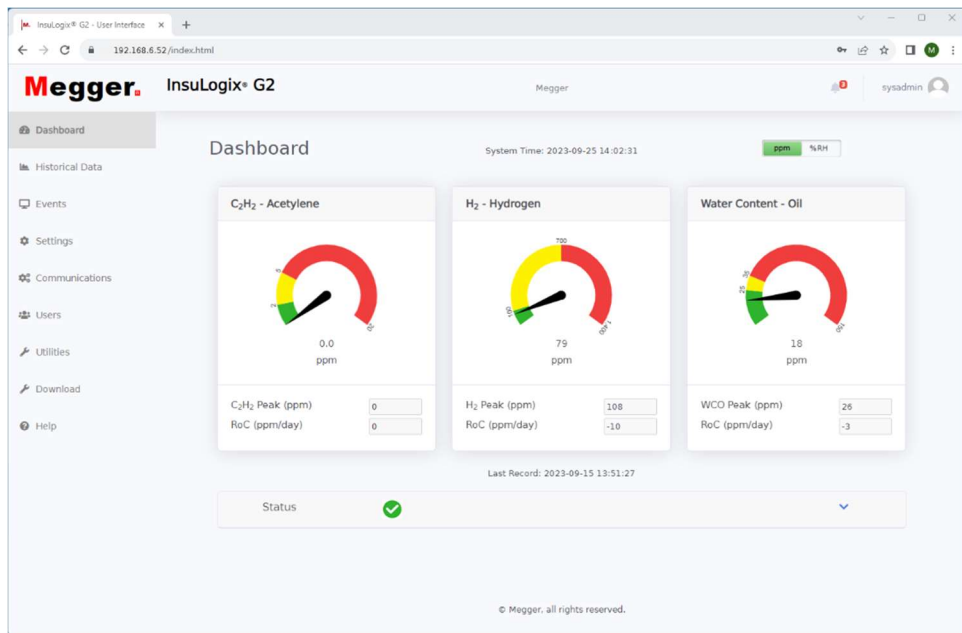


Figure 16: Dashboard Screen

Configuring the Device Information

Using the menu on the left side of the screen, navigate to the Settings screen. The first tab, Device, hosts the owner information as well as the user editable calibration parameters for the monitor.

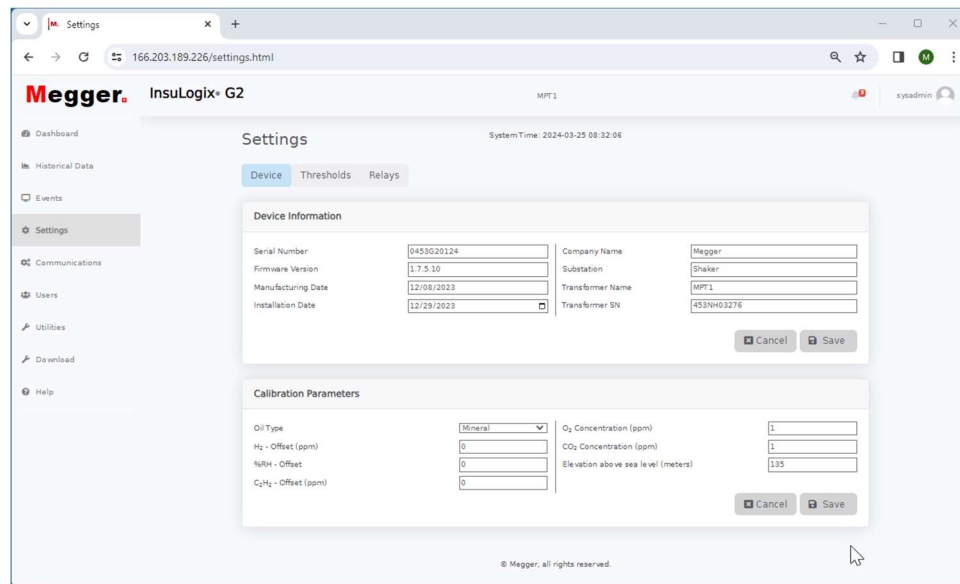


Figure 17: Device Settings Screen

The items on this screen that shall be configured/confirmed during initial configuration are:

- Installation Date

The installation date can be updated by either entering the information directly in the field, or by clicking on the calendar icon and choosing the date from the pop-up calendar.

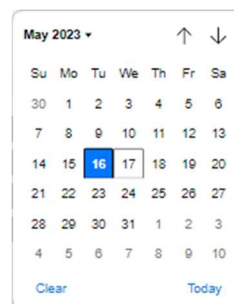


Figure 18: Calendar Pop-Up

To select today's date, simply click on the Today button at the bottom right corner of the calendar.

- Owner Information

The Owner Information section contains the owner's name as well as fields that pertain to the substation and transformer where the unit is installed. The information in these fields will be displayed on the printable graphs and will also be included in the first few lines of CSV files.

- Oil Type (Mineral Oil or Natural Ester)
- O2 Concentration (ppm) – from recent offline DGA report
- CO2 Concentration (ppm) – from recent offline DGA report
- Elevation (meters)

Once all updates are made to these settings, click the Save button in the lower right corner of the screen to write the updates to system memory.

Configuring Communications

If a communication protocol is to be used to transfer data to an RTU or SCADA system, navigate to the Communications screen and configure the protocol settings. The first two fields in the protocol settings are for use with DNP3 to set the Outstation ID (ID of InsuLogix G2 on network) and the Ethernet port that the protocol will use. The same is true of the next two fields when using Modbus protocol.

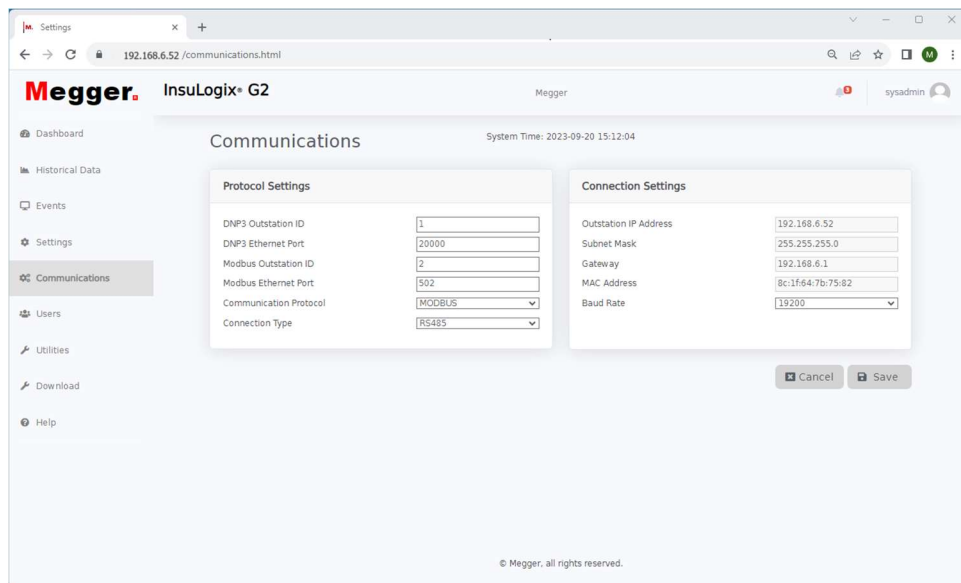


Figure 19: Communications Screen

Using the last two fields at the bottom of the list select the desired protocol (Modbus, DNP3, or IEC 61850) and the Connection Type (RS485 or TCP/IP). To follow best

practices for processor usage, only one of the connections will be active for protocol communication.

Note: Ethernet port settings are configured using the System tab on the Utilities page

Once all desired updates are made to these settings, click the Save button to write the updates to the system memory.

Setting the Time and Date

Setting the time and date of the monitor is critical to ensuring that the timestamps for the data are accurate. Navigate to the Utilities screen and click on the System tab.

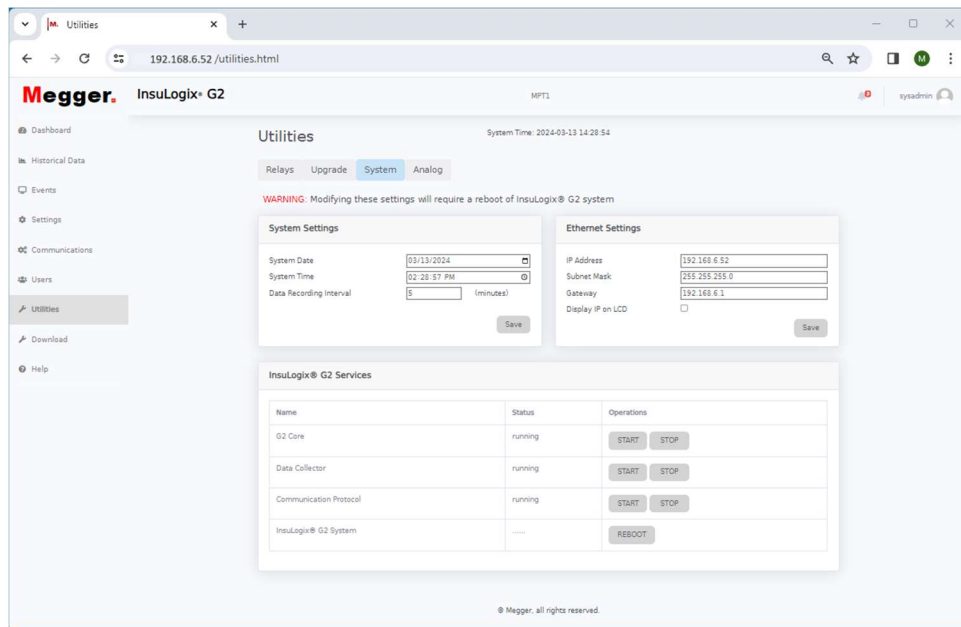


Figure 20: System Utilities

In the System Settings section, use the fly outs to set the System Date and System Time. The G2 will need to be rebooted, per the pop-up below, if any of these parameters are modified once save is pressed.

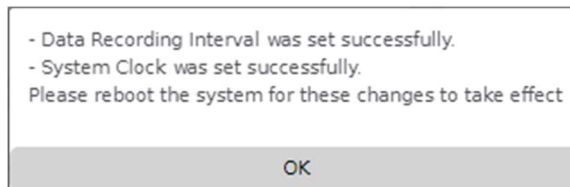


Figure 21: System Clock Save Pop-Up

On the right side of the System tab, the current Ethernet settings are displayed and can be modified if desired. Note there is a checkbox below the Ethernet settings to select whether

to display (default) or not display the IP address on the front panel LCD. Uncheck this box to disable this feature. As was the case with the System Settings, if any changes are made to the Ethernet Settings, the G2 must be rebooted.

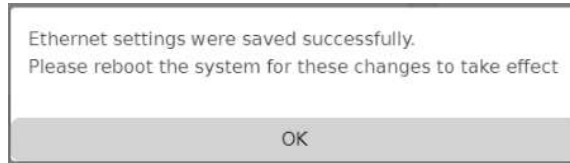


Figure 22: Ethernet Settings Save Pop-Up

Note: In the event that an invalid address is entered for any of the Ethernet port settings, an error message will be displayed alerting the user to the issue. These settings cannot be saved to the monitor with an invalid value in one of these fields.



Figure 23: Invalid Ethernet Settings Pop-Up

To reboot the monitor from the user interface, click on the Reboot button located at the bottom of the G2 Services section of this screen.

This completes the minimum initial configuration of the InsuLogix G2 monitor, and it is now ready for operation.

APPENDIX A – WIRING DIAGRAM

The diagram below shows all possible power, control, and communication wiring connections for the InsuLogix G2.

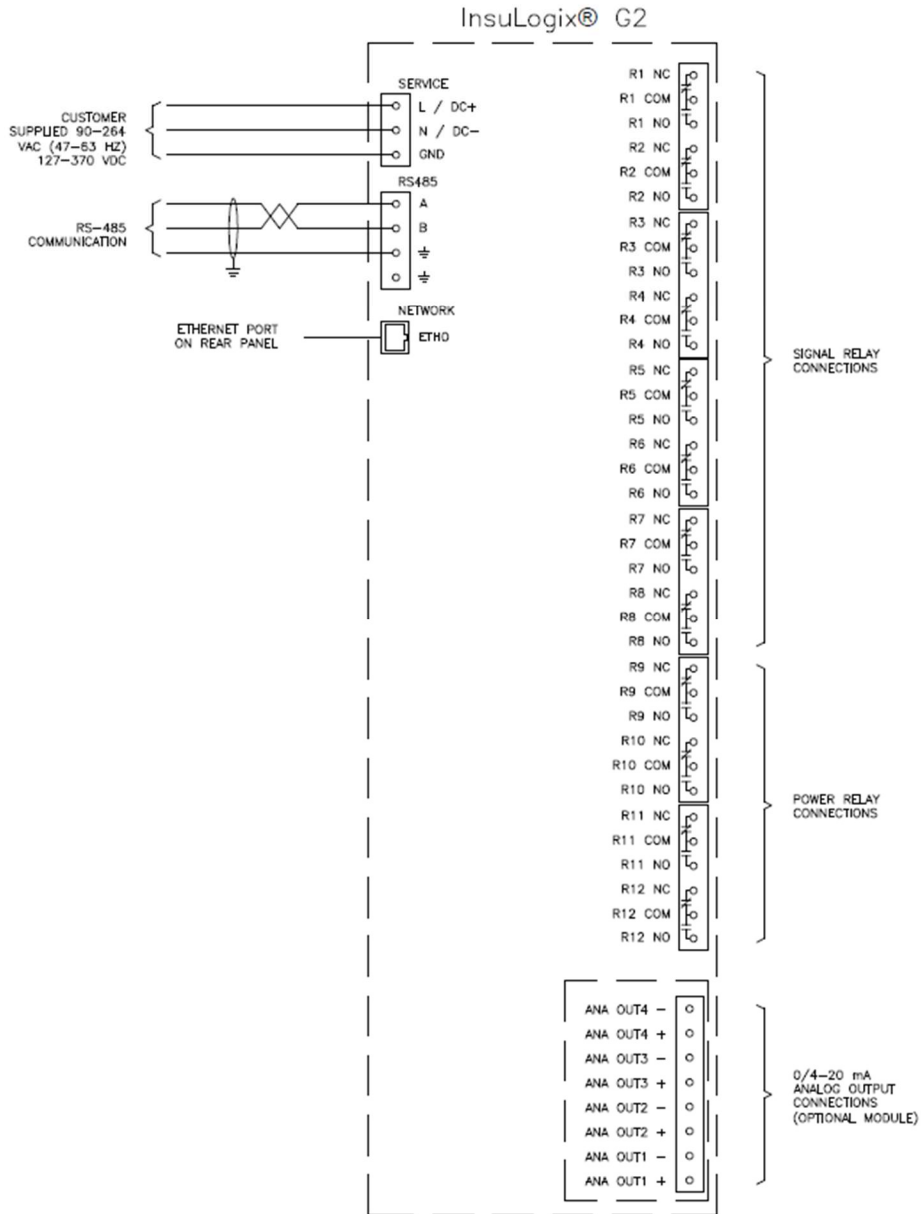


Figure 24: System Wiring Diagram

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