

# SUB-TRANSMISSION OPTICAL MONITORING AND SECTIONALIZING SOLUTION

## Quick Start Guide



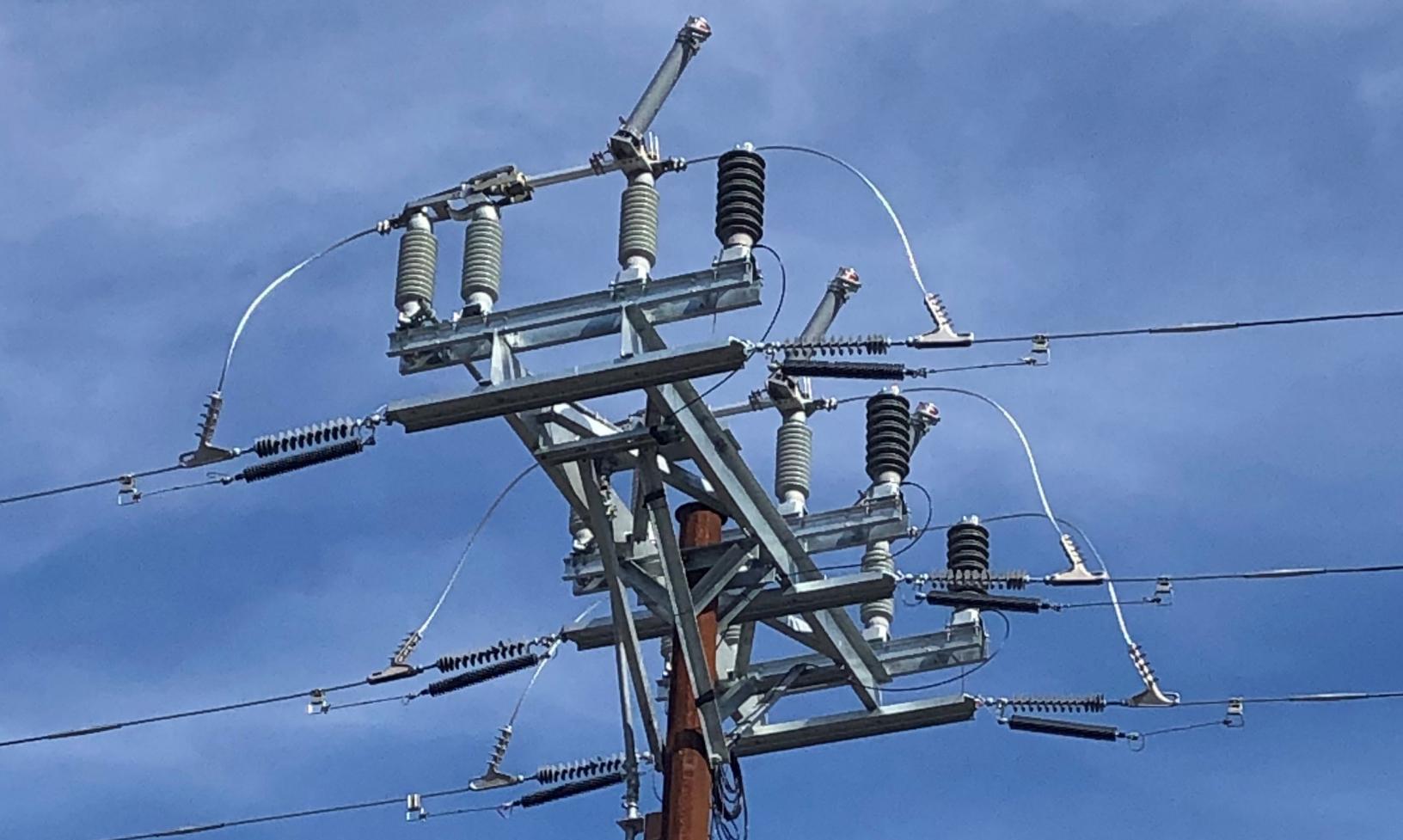
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## Introduction

The Hubbell Power Systems' sub-transmission optical monitoring and sectionalizing solution is designed for 46kV to 69kV overhead sub-transmission system applications. The sensors and RTU equipment measure bi-directional power flow, power quality and report fault events. The state-of-the-art optical design provides unmatched safety and accuracy. When provided with the Hubbell FlexMO motor operator and switch assemblies, the combined solution enables rapid isolation and sectionalizing of faulted segments to drastically improve outage and SAIDI performance metrics. This integrated kit from Hubbell saves utilities valuable time, effort, and project costs.

**⚠️ WARNING:** De-energize and properly ground any applicable and adjacent equipment before performing any installation or maintenance. Work should only be undertaken by qualified personnel.

**⚠️ CAUTION:** Follow your utility's approved safe work practices for handling and configuration of all equipment.



## Suggested Grounding



For proper operation this system must be grounded. In the event of an electrical short circuit, grounding reduces the risk of electric shock by providing an escape wire for the electric current. The system is equipped with a connection terminal for powering and grounding the system.

### ⚠ Warning



**WARNING:** Improper grounding of the system can result in a risk of electric shock.

## Suggested Handling



### ⚠ Warning



**WARNING:** Improper handling or storage can result in damage to the product, death or serious injuries.

## Suggested Packaging



### ⚠ Warning



**WARNING:** Do not use or install product that has damaged packaging or has been exposed to the elements for prolonged periods of time.

## 1. Air Break Switch Installation

Install the air break switch per the Hubbell switch installation manual - please consult your local Hubbell Customer Service Representative.



Figure 1. Sensor Sectionalizer Pole Assembly

## **2. Optical Sensor Installation**

The optical sensor installation is broken out into the following steps:

### **2.1 Insulation Removal**

Any covering on the line that will be in the way of direct connection of the sensor conductor clamps needs to be removed to install either style of overhead sensors. This includes but is not limited to tree guards, line guards or any other insulation that may cover the bare conductor.

### **2.2 Line Cleaning**

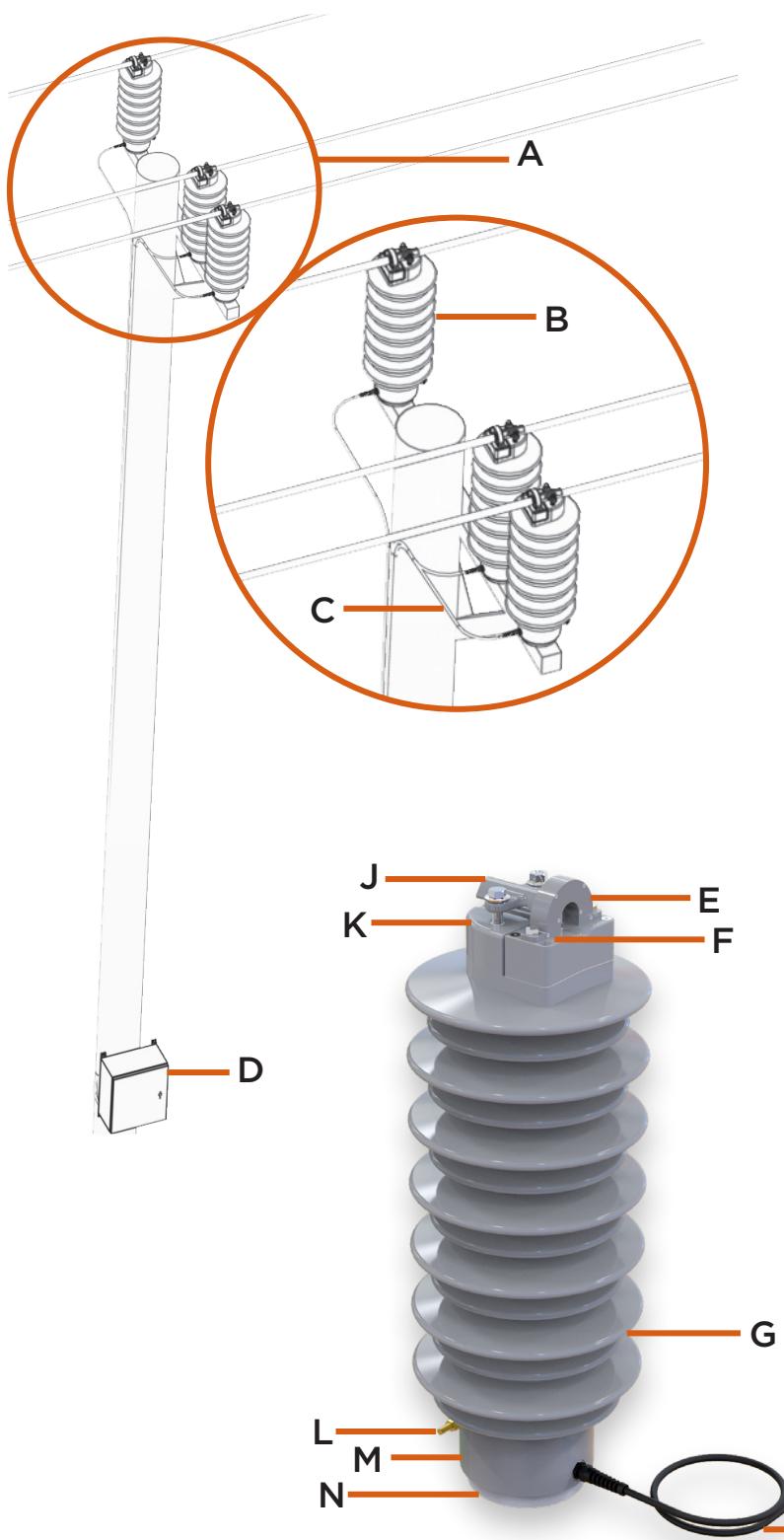
It is imperative for accurate measurement that all sensors are secured and maintain a solid direct connection to bare conductor. For each location an optical line post sensor is to be installed, the exposed conductor or busbar should be cleaned of any debris or residue to a clean like-new surface. Where this is not feasible, a new conductor may need to be installed.



**2.3 Overhead Optical Line-Post Sensor**  **CAUTION:** Installation may involve heavy lifting. To prevent personal injury, two persons should perform lifting activities as necessary.



**Figure 2. Optical Line Post Sensor,  
Combination Voltage & Current,  
4-72kV Rating**

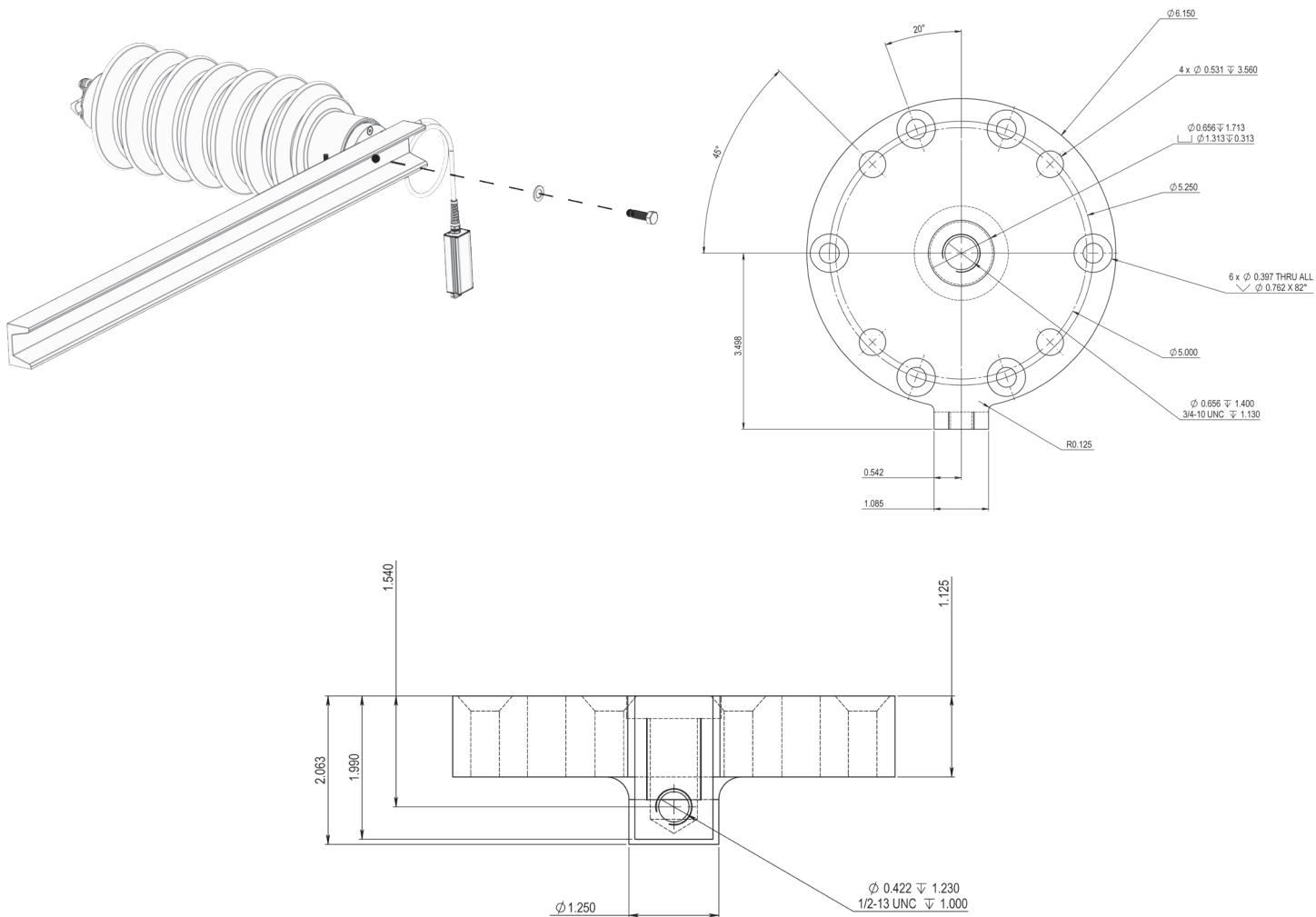


- A. Power Conductors
- B. Line-Post Sensor
- C. Optical Fiber Cable
- D. NEMA Enclosure
- E. Current Concentrator
- F. Current Concentrator Bolts
- G. Insulator Body
- H. Optical Fiber Cable
- I. Modular Connector
- J. Reversible Wire Clamp
- K. Reversible Wire Clamp Bolt
- L. Ground Reference Lug\*
- M. Current Flow Designation
- N. Sensor Mounting Plate

**Figure 3. Optical Line Post Sensor**

### 2.3.1

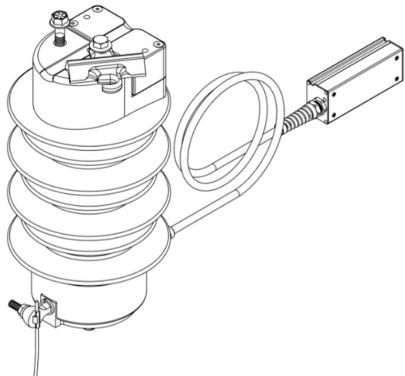
When horizontal arm is prepared, the sensors can be mounted directly to it, via a standard  $\frac{3}{4}$ -10 UNC mounting bolt or line post stud. Additionally, there are four  $\frac{1}{2}$ -13 threaded inserts in the bottom of the sensor, for added mounting strength. See Figure 4 for bolt pattern layout. Sensors can be installed vertically or horizontally. For horizontal installation, the cantilever rating for the sensors is 3000 pounds based on this bolt circle configuration.



**Figure 4. Optical Line Post Sensor – Mounting**

### 2.3.2

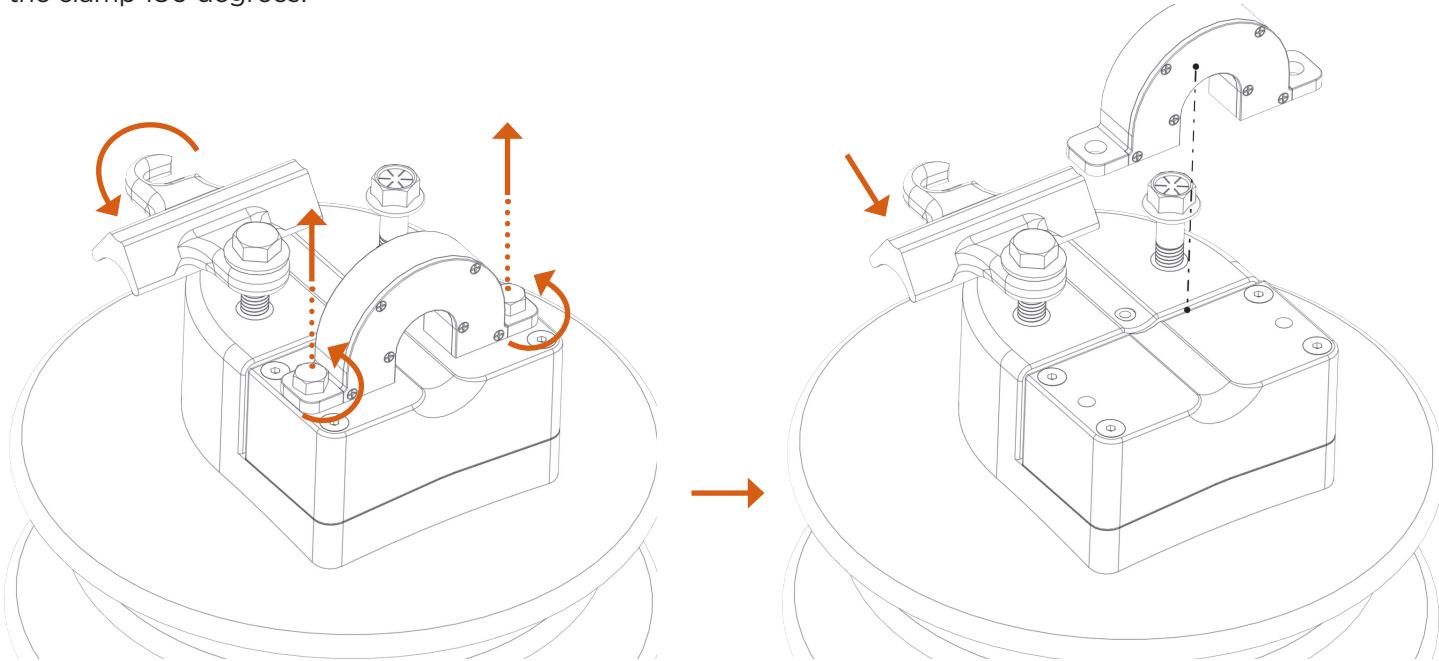
Place grounding conductor into ground reference lug and tighten nut. Hubbell recommends using 6 AWG wire. Sensor reference ground should be bonded to a local ground rod. The ground reference connection is not a path from voltage potential to ground, it is only a ground reference to eliminate any outside interference with the e-field for voltage measurement from any other objects in the vicinity of the sensors. For more information regarding grounding, please reach out to your local Hubbell representative.



**Figure 5. Optical Line Post Sensor - Grounding**

### 2.3.3

After sensor has been mounted on the arm, remove the current concentrator clamp from the sensor body by removing current concentrator bolts and open the reversable wire clamp by loosening the two bolts and turning the clamp 180 degrees.

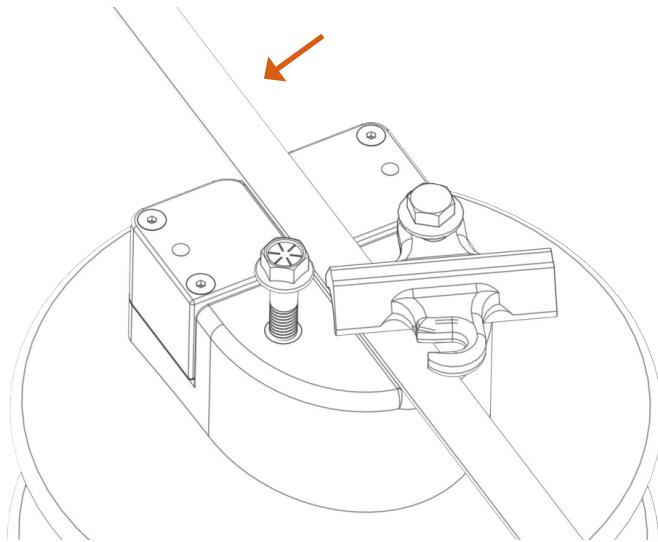


**Figure 6. Optical Line Post Sensor - Opening Clamp**



### **2.3.4**

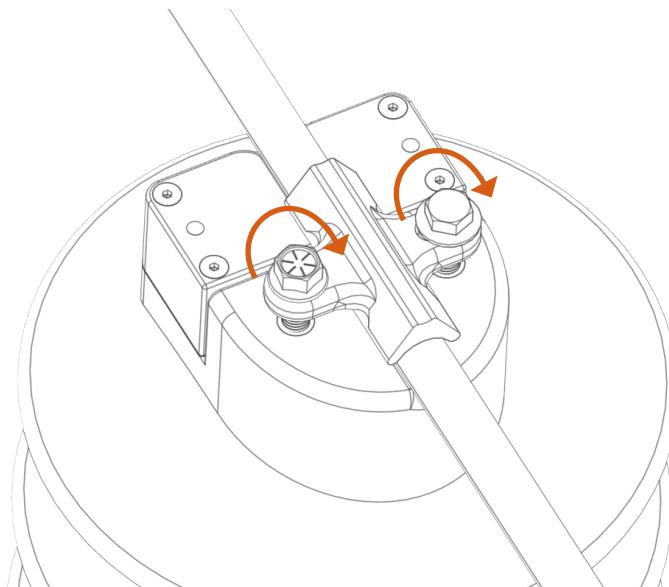
Place the conductor on the top groove of the sensor. The reversable wire clamp has two sizes of grooves on the top and bottom designed to be used with different size cables. To adjust the clamp to different size wire, just flip the clamp upside down.



**Figure 7. Optical Line Post Sensor - Reversible Wire Clamp**

### **2.3.5**

Close reversible wire clamp and tighten bolts. Applicable torque is 37.9 n·m.

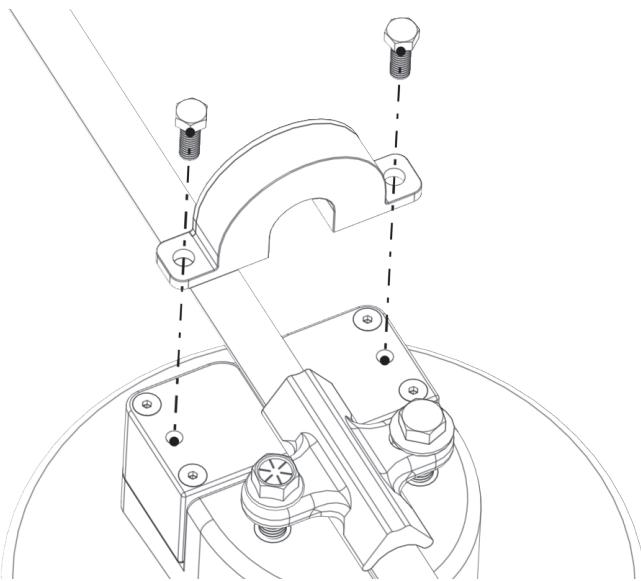


**Figure 8. Optical Line Post Sensor - Secure Wiring Clamp**



### **2.3.6**

Place current concentrator over conductor cable and tighten bolts. Applicable torque: 21.6 n·m.

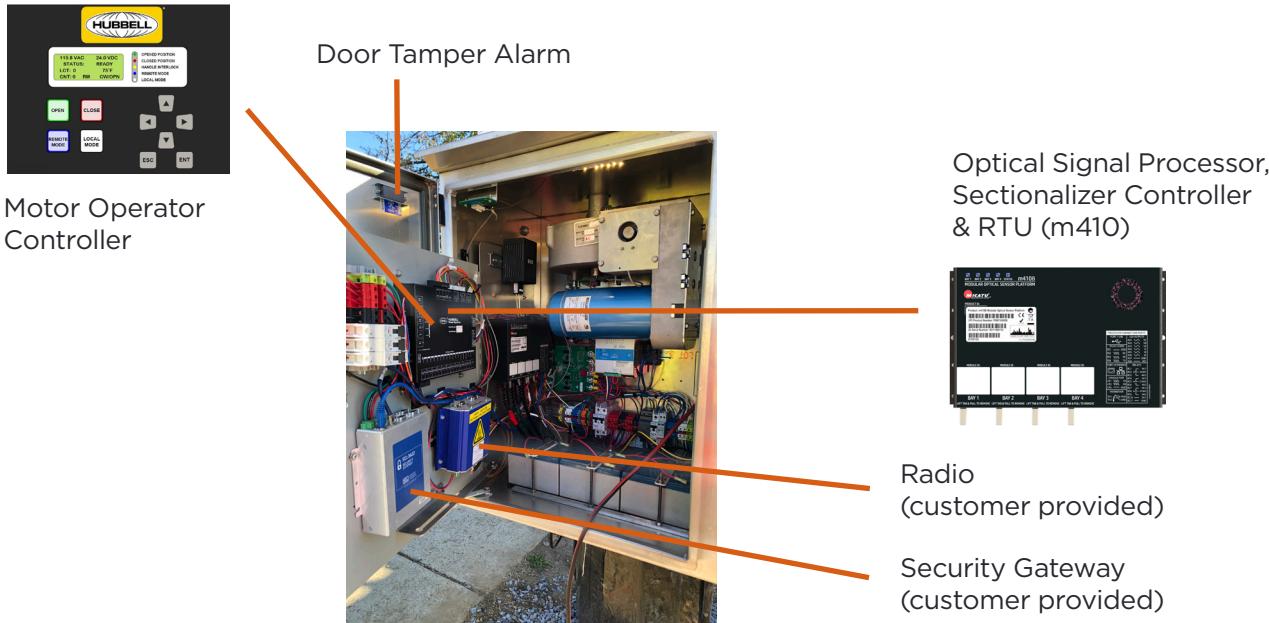


**Figure 9. Optical Line Post Sensor - Securing Current Concentrator**

If there is any additional cable slack, it can be either bundled at the top of the pole or inside of the enclosure. Please note: The suggested bend-radius for the optical cable is 11". Anything smaller than this may cause damage to the cables. We recommend protecting the optical cable with standard U-Guard or conduit.

### 3. Radio and Security Gateway Installation

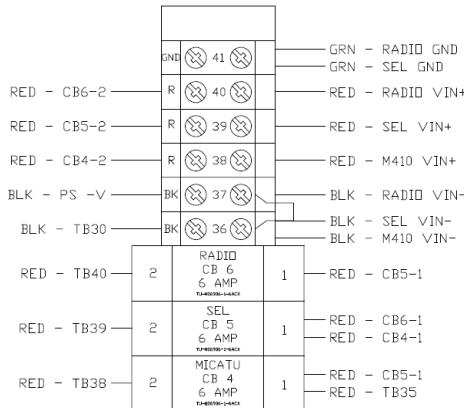
Mount customer-provided radio and security gateway devices on the inner door locations indicated in Figure 10 - RTU and Motor Operator Control Cabinet.



**Figure 10. RTU and Motor Operator Control Cabinet**

**⚠ CAUTION:** Risk of Electric Shock. To prevent electrical shock, turn off power to the cabinet breaker before installing or servicing unit. Equipment must be installed and serviced by competent personnel who have been trained and understand proper safety procedures. Failure to follow precautions can result in personal injury and equipment damage. Do not install or operate unit if any damage is noticed.

Connect radio and gateway power supply cables to cabinet power using the terminal block connections as indicated in Figure 11 - Terminal Block Wiring



**Figure 11. Terminal Block Wiring**

Configure radio and security gateway per vendor specifications



#### 4. m410 RTU Controller Cable Connections and Power Up

Connect optical sensor cables to the m410 RTU controller per Figure 14 - m410 RTU Controller – Cable Connections. The A phase sensor cable must be connected to Bay 1, B phase must be connected to Bay 2, and C phase must be connected to Bay 3.

Phase Sensor Cable	Connects to
A	Bay 1
B	Bay 2
C	Bay 3

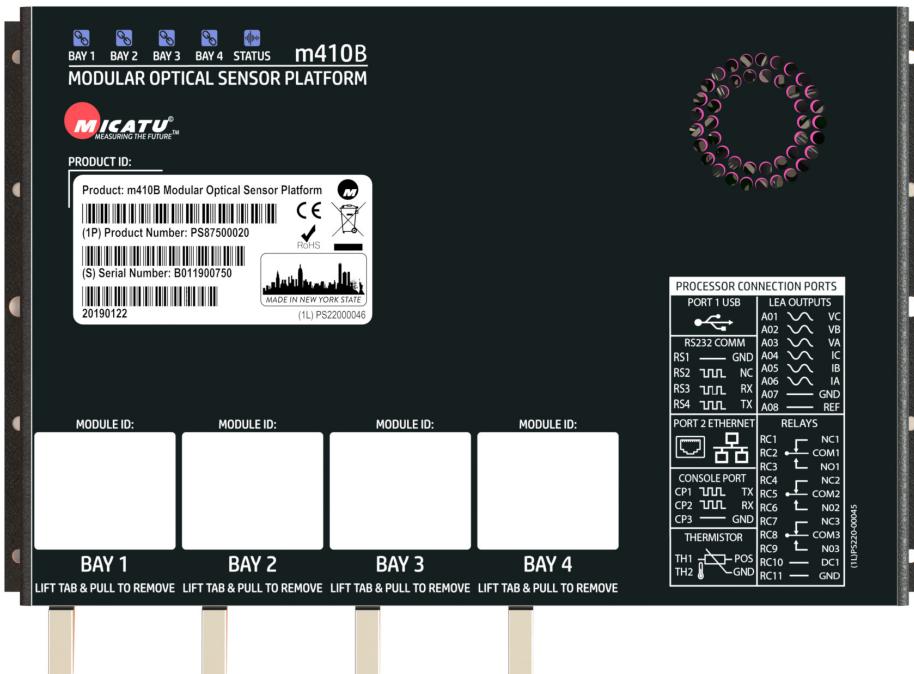


Figure 12. m410 RTU Controller - Top View

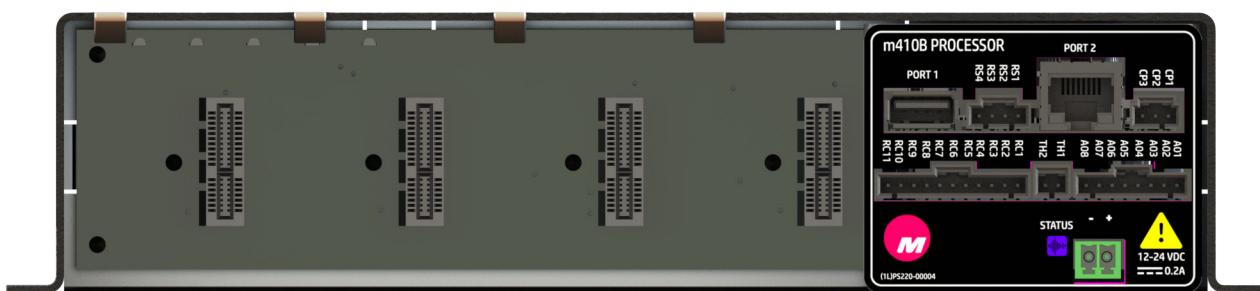


Figure 13. m410 RTU Controller - Front View



Bay 4 Sectionalizing Control Module Motor Operator Control Cables

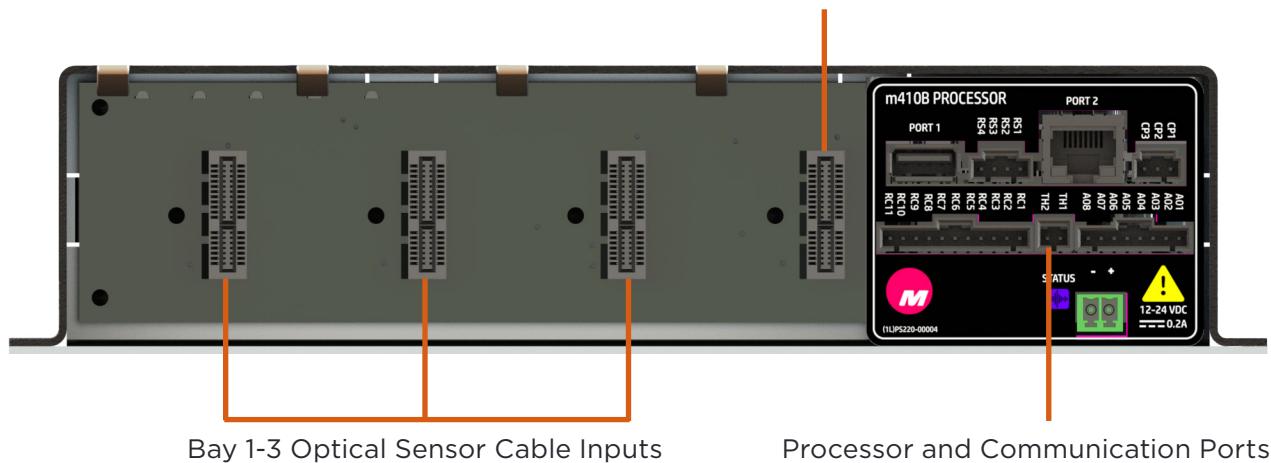
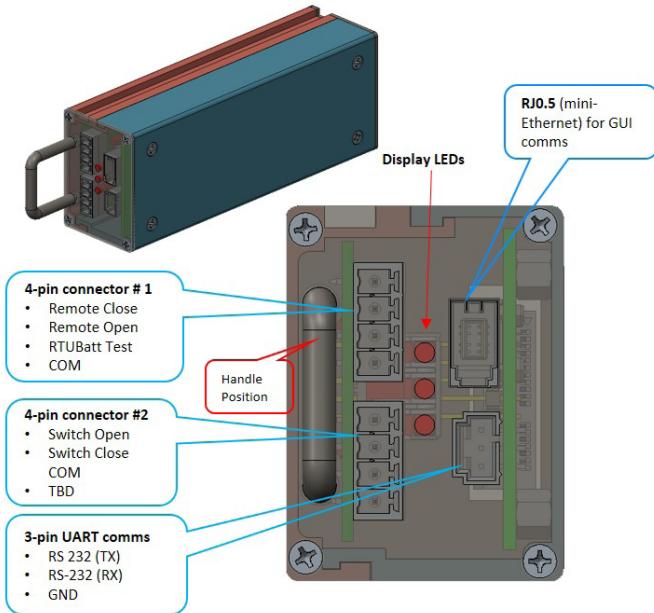


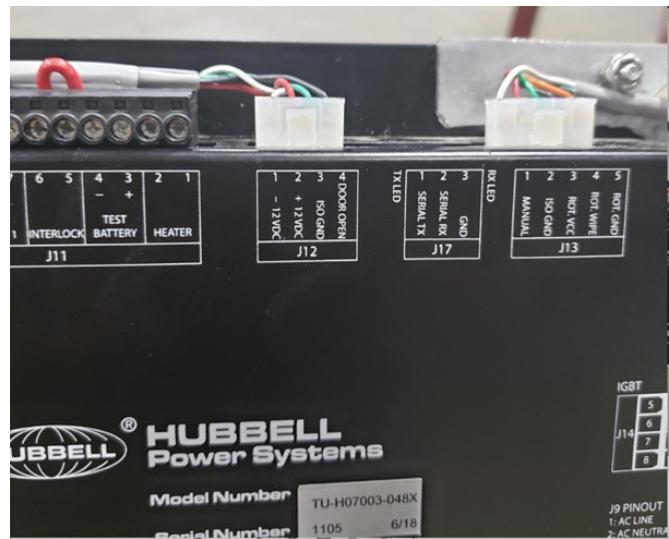
Figure 14. m410 RTU Controller – Cable Connections

Connect motor operator control cables to sectionalizing Control module connectors in Bay 4 per Figure 15- m410 Bay 4 Sectionalizing Control Module - Connectors and Figure 16 - Motor Operator - Communications Port.

- Connector 1: Control outputs from 4th bay control module to motor operator controller.
- Connector 2: Switch position status inputs from motor operator to 4th bay control module.
- UART Comms: Serial port communications between control module and motor operator port J17.



**Figure 15. m410 Bay 4 Sectionalizing Control Module - Connectors**



**Figure 16. Motor Operator - Communications Port**

Connect the m410 power connector to the cabinet 12-24 Vdc terminal block per Figure 17 - m410 Power Connector if not already connected.



**Figure 17. m410 Power Connector**

Connect the motor operator power cord to the cabinet power if not already connected.

Wire the cabinet to 120V mains power and turn on cabinet breakers per Figure 18 - Cabinet Power Breakers to enable cabinet power.



**Figure 18. Cabinet Power Breakers**

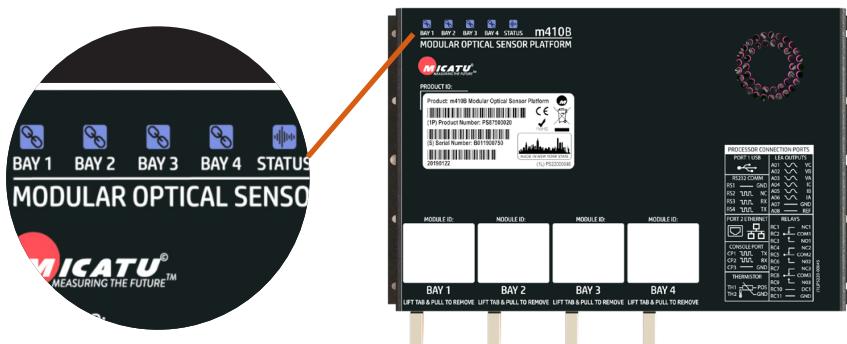


Allow approximately 60 seconds for the m410 to boot up, load system files and perform self-testing. The m410 status indicator LED is located on the top of the device per Figure 19 - m410 Status Indicator. Verify that the status indicator is solid green after boot up. If the status indicator is red, orange or flashing green, consult the m410 manual for troubleshooting the m410 status visual indicator LED.



**Figure 19. m410 Status Indicator**

The m410's default IP address is 169.254.0.200. The user's laptop must be initially configured for the same subnet as the m410. Set laptop IP address to 169.254.0.201. Connect the laptop Ethernet port to the m410 RJ45 connector with an Ethernet cable. Run the Micatu GUI executable to launch the GUI application.



**Figure 20. m410 Optical Sensor Status Indicators**



## 5. m410 RTU Configuration and Set Up

### 5.1 Download GUI Executable and Connect to m410

To set up the m410 controller, the Micatu GUI application is required. Please contact DL-Trinetics-Marketing@hubbell.com to obtain a copy of the GUI executable file.

The m410's default IP address is 169.254.0.200. The user's laptop must be initially configured for the same subnet as the m410. Set laptop IP address to 169.254.0.201. Connect the laptop

### 5.2 Set m410 IP Address to Security Gateway's Subnet

To enable the m410 to communicate with the customer-provided radio and security gateway, the m410 must be configured with a new IP address on the same subnet as the security gateway. In the GUI application, select the Network Settings menu.

- Set IP Address Type to Static
- Configure IP Address, Subnet Mask and Default Gateway to match the security gateway settings.

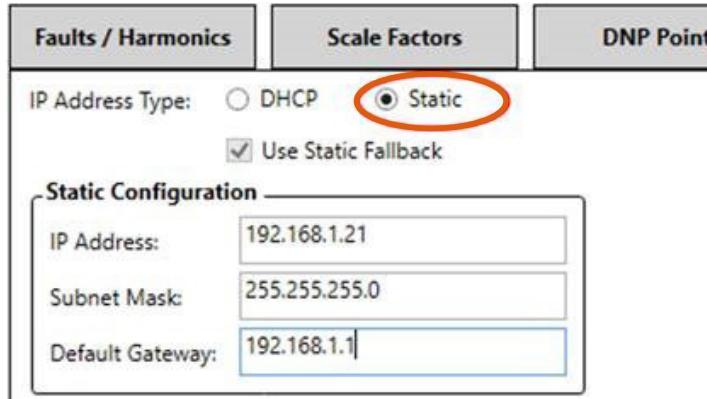


Figure 21. m410 IP Address Configuration



### 5.3 Configure DNP Settings

To enable the m410 to communicate to a SCADA system, the DNP Outstation and Master settings must be configured in the Sessions menu.

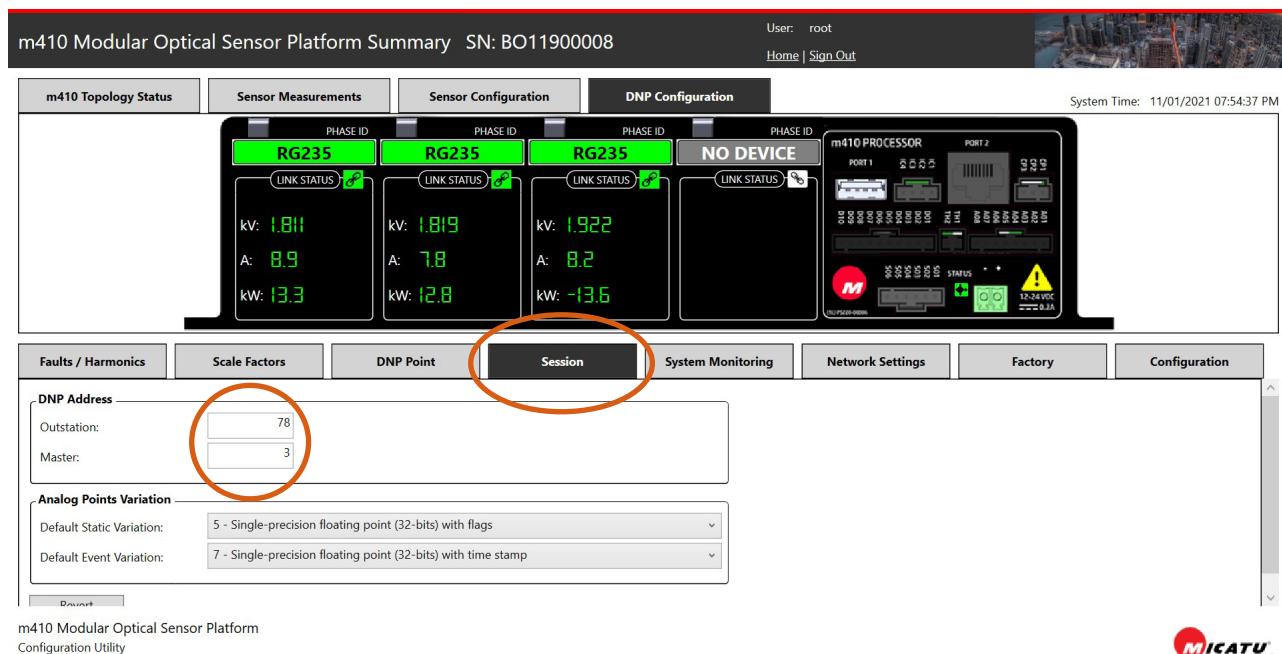


Figure 22. m410 DNP Configuration

### 5.4 Apply New Configuration Settings and Reboot

After changes are made, the m410 must be instructed to apply the new configuration settings and reboot. From the Configuration menu, select Apply Configuration.

Ignore potential warnings about O-Ratio values and click OK.

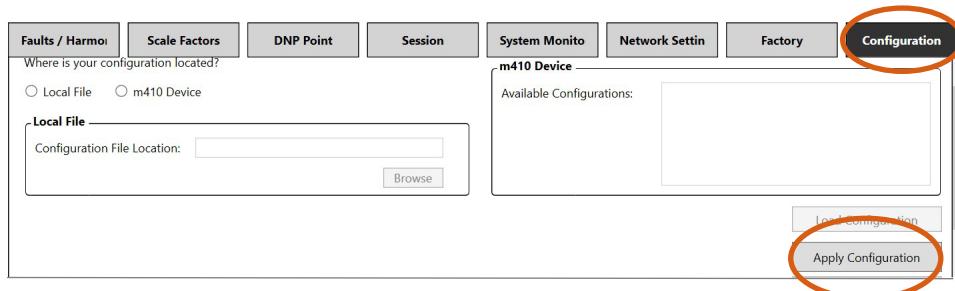
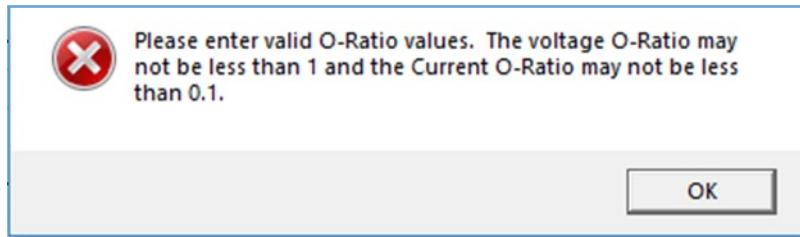


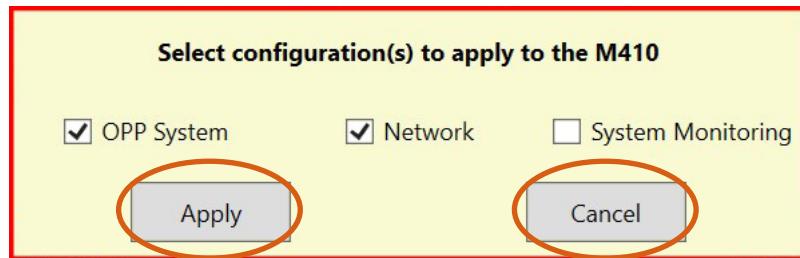
Figure 23. m410 - Apply Configuration Changes



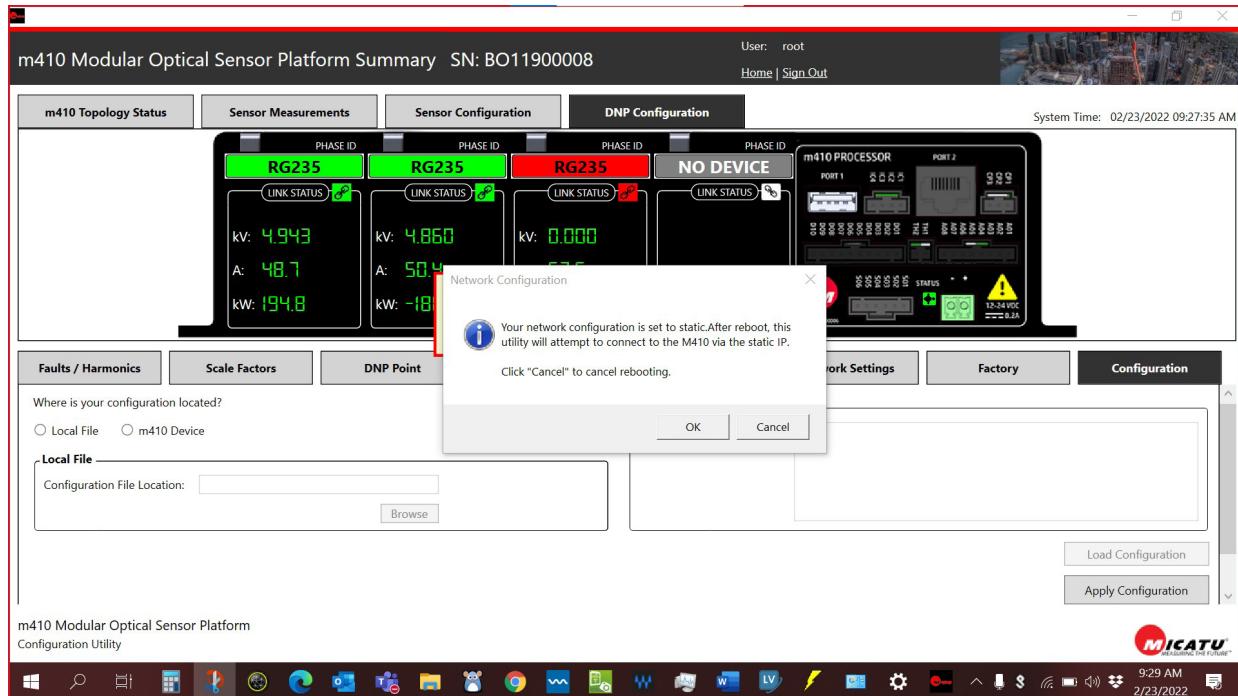


**Figure 24. m410 Confirm Configuration Changes**

When prompted to select which configuration changes to apply, select checkboxes for both OPP Systems and Network, then click Apply.



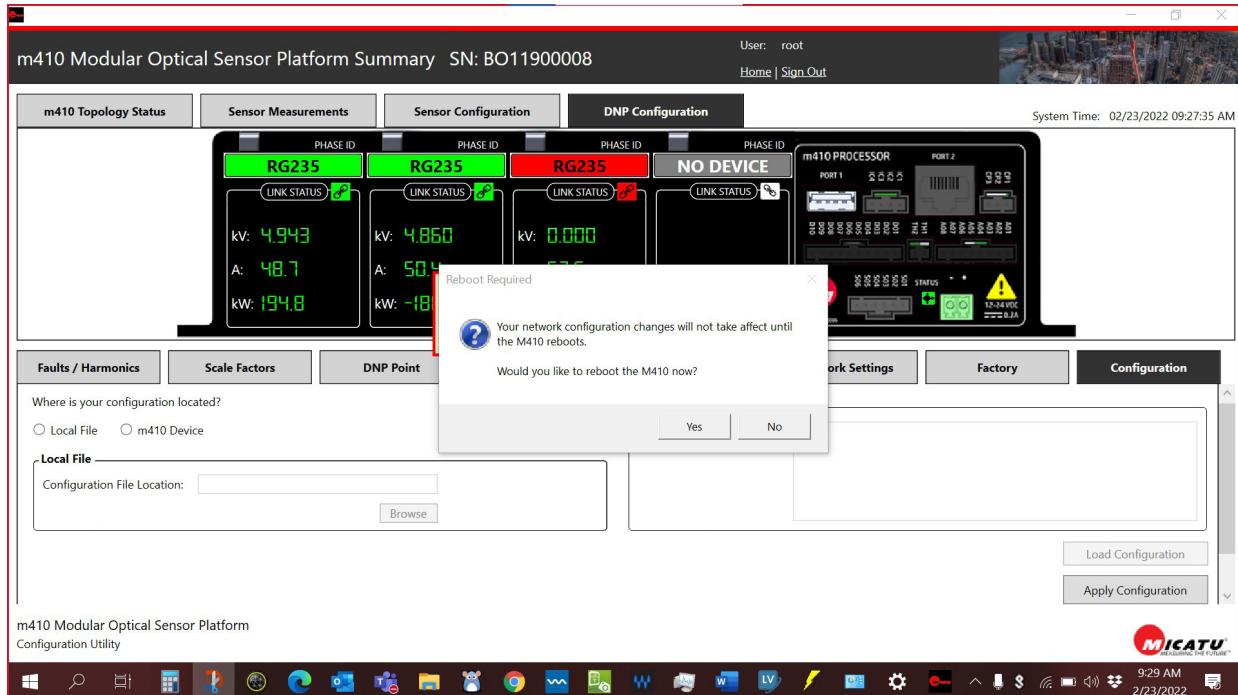
**Figure 25. m410 Select Configuration Changes To Apply**



**Figure 26. m410 Confirm Reboot**



The application will provide a reminder that the m410's IP address is being changed. For any further configuration of the m410 via the laptop and GUI, the laptop will need to use a different IP address on the newly configured subnet. Click OK to proceed with the reboot.



**Figure 27. m410 2nd Confirm Reboot**

## 6. Connect m410 RTU to Security Gateway

Connect an Ethernet cable from the security gateway (customer provided) to the m410 Port 2 RJ45 communications port per Figure 28 - m410 RTU Controller - Communications Ports. Verify that the IP addresses of the m410 and security gateway are on the same subnet.



**Figure 28. m410 RTU - Communications Ports**



*These instructions do not claim to cover all details or variations in equipment, nor to provide for all possible conditions to be met with concerning installation, operation, or maintenance of this equipment. If further information is desired or if particular problems are encountered which are not sufficiently covered in this guide, contact Hubbell Power Systems.*



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