WELCOME

OPI Blue Including Fan & Heater Control

This user manual has been created to assist you with the installation, configuration and set up as well as effectively using your OPI Blue, Cloud based system. This system has been designed to help you optimize the storage conditions in your bins to maximize the value of your grain.

The Manual includes instructions on how to:

- Register/Manage your account on www.managegrain.com
- Installation of all OPI Blue related hardware at your site.
- Setup and configuration of your site, bins, cables, Gateways, Weather Station (if applicable) as well as Fan Node and Fan Node Radio.
- Monitoring and managing all stored grain including manual or automated fan control (ON/OFF) through the User Interface.

To make things as easy and efficient as possible, we suggest you complete the installation and setup of your system in the following order:

1. Prior to the installation of any hardware, it is recommended that you log in to www.managegrain.com and create your user account.
2. Read all the Quick Guides and Installation Manuals that were in the boxes for the Gateway, Cable Nodes, Fan Node and Fan Node Radios.
3. Following the instructions proceed to install all applicable hardware at the site.
4. Login to www.managegrain.com website and go through the setup and configurations steps.
5. Enjoy your OPI Blue system.

To view installation videos (cables and OPI Blue hardware) please visit the OPIsystems YouTube channel at
https://www.youtube.com/channel/UCOMrB6OjIsv5yWmiP8CgTzw

If you have any questions regarding these instructions or the installation or operation of your OPI Blue system, please contact OPIsystems Customer Success.

OPI Blue Customer Success

Email: help@opisystems.com
Local 1-403-219-3177 (opt 1)
Toll Free: 1-800-661-1055 (opt 1)

Chat Support– Is available within the www.managegrain.com application. There is a small chat icon located in the header in the top righthand corner of each of the screens for easy access.

OPIsystems Inc. Contact Information

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Set Up & Manage User Account

To Create a New User Account and Repeat User Login Process
New Account Registration Process

1. Go to www.managegrain.com
2. Tap **Register New Account**
3. Enter all the required information requested. Tap **Register**. **Note:** Your password must be a minimum of 6 characters long.
4. A verification email "OPI Blue, please verify your email address" will be sent to the email address you entered in Step 3.
5. Tap the **Verify email address** link that appears in the email received.
6. A new browser window will open indicating that your email address has been "Confirmed"
7. Log into www.managegrain.com. Using the email address and password you have set during the registration process.

Standard Login Process

1. Go to www.managegrain.com
2. Enter your email address and password in the appropriate fields. **Note:** To avoid entering your email address each time you log in, check **Remember My Login**. With a check mark appearing in the box, the email address will automatically appear each time going forward.
3. Tap **Log In**. For a first-time login, the Account Details will open. For subsequent logins, it will be the Dashboard.

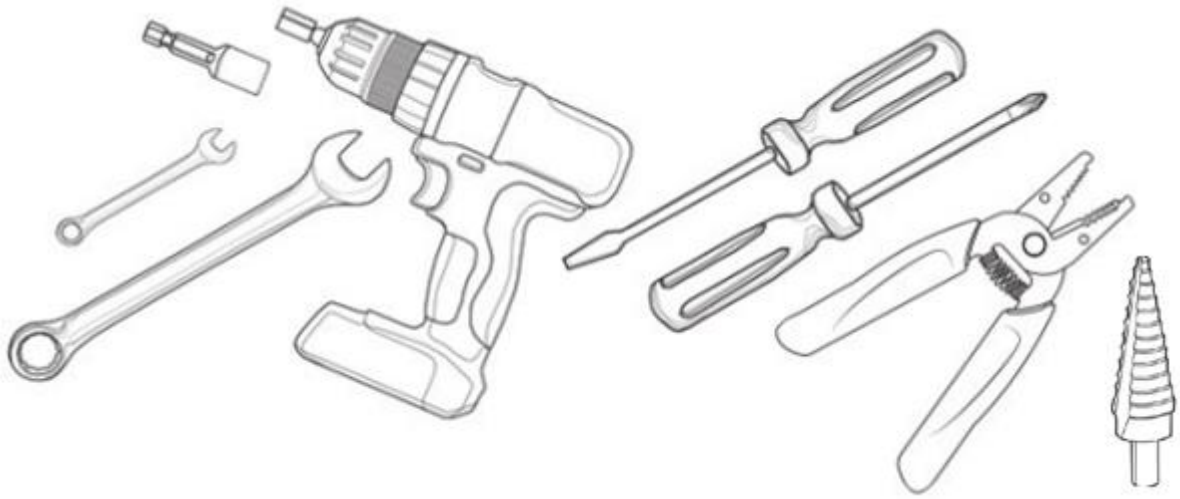
Forgot Password

1. Go to www.managegrain.com
2. Tap **Forgot Password**
3. Enter email address and Tap **Send Link**.

4. An email “OPI Blue, Reset Your Password” will be sent to your email account.
5. Tap the **Reset My Password** link that appears in the email message.
6. A new browser window will open. Enter your email address a new password and confirm your new password in the appropriate field.
7. Tap **Reset Password**
8. Once the password has been changed you can once again use the standard login procedure.

Install Site Equipment

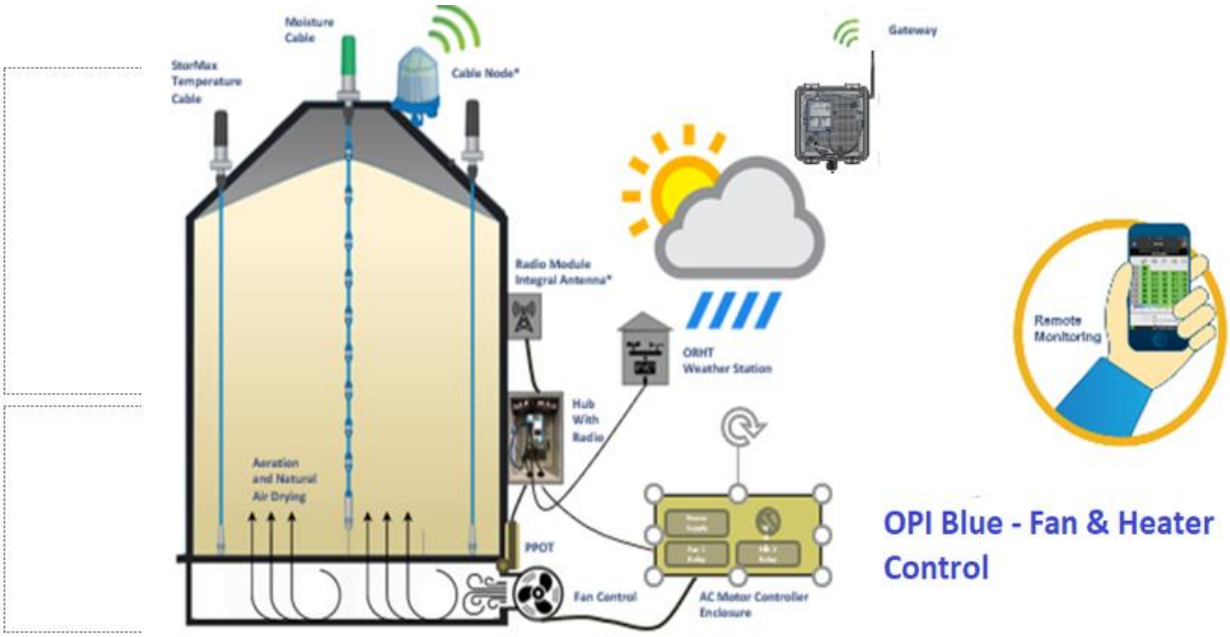
Required Installation Tools



- 7/16” wrench
- 1-1/16” wrench or adjustable equivalent wrench
- Drill with a 3/8” Nut Driver

- #2 or #3 Philips screwdriver
- 1/8” flathead screwdriver
- Wire stripper with #14 and #20 AWG positions
- Drill step bit.

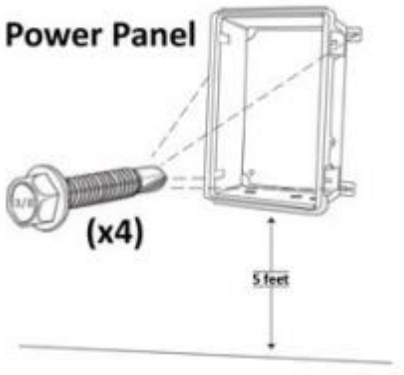
Site Overview



Power Panel

Mount Power Panel

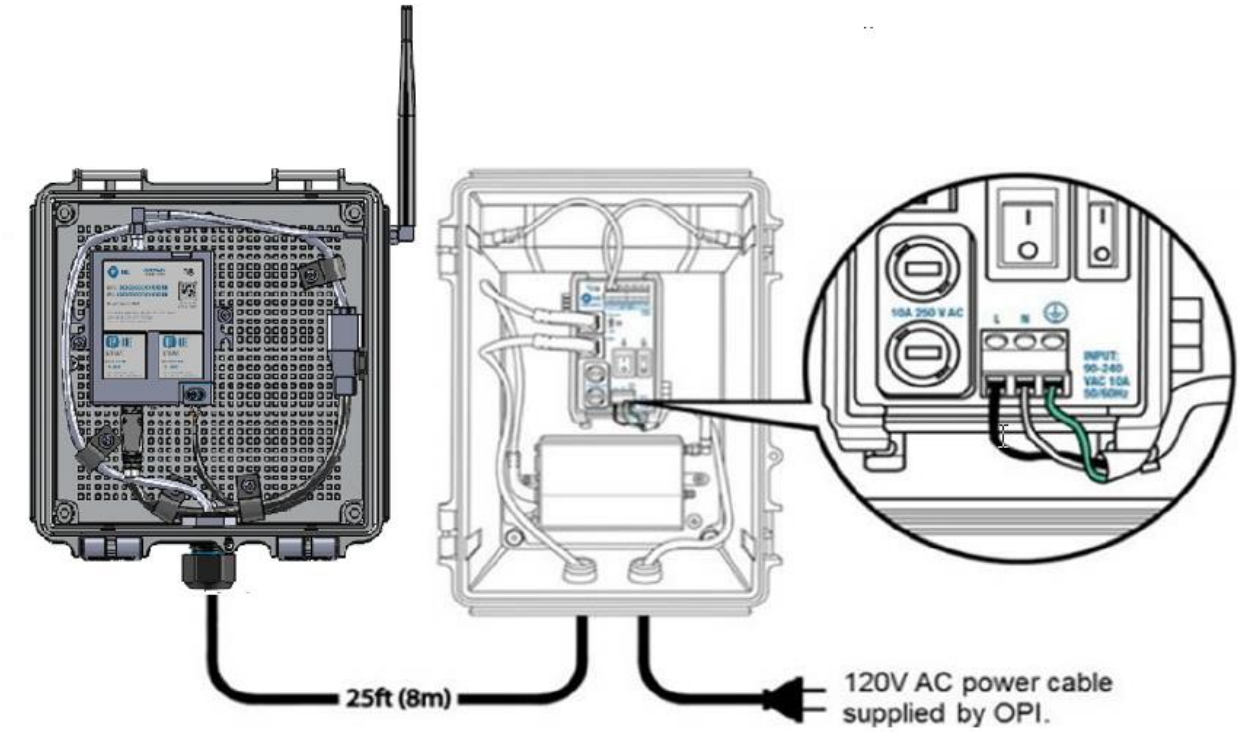
Mount the Power Panel enclosure onto a pole or a wall. **Note:** There needs to be A/C power available to provide power to the Power Panel. It should be mounted around eye level for easy access should servicing be required.



Power Panel and Cellular Connection

Connect the wires in the Power and Cellular Panel to match the image below. (Refer to the power supply PS-3515 manual for important installation instructions.)

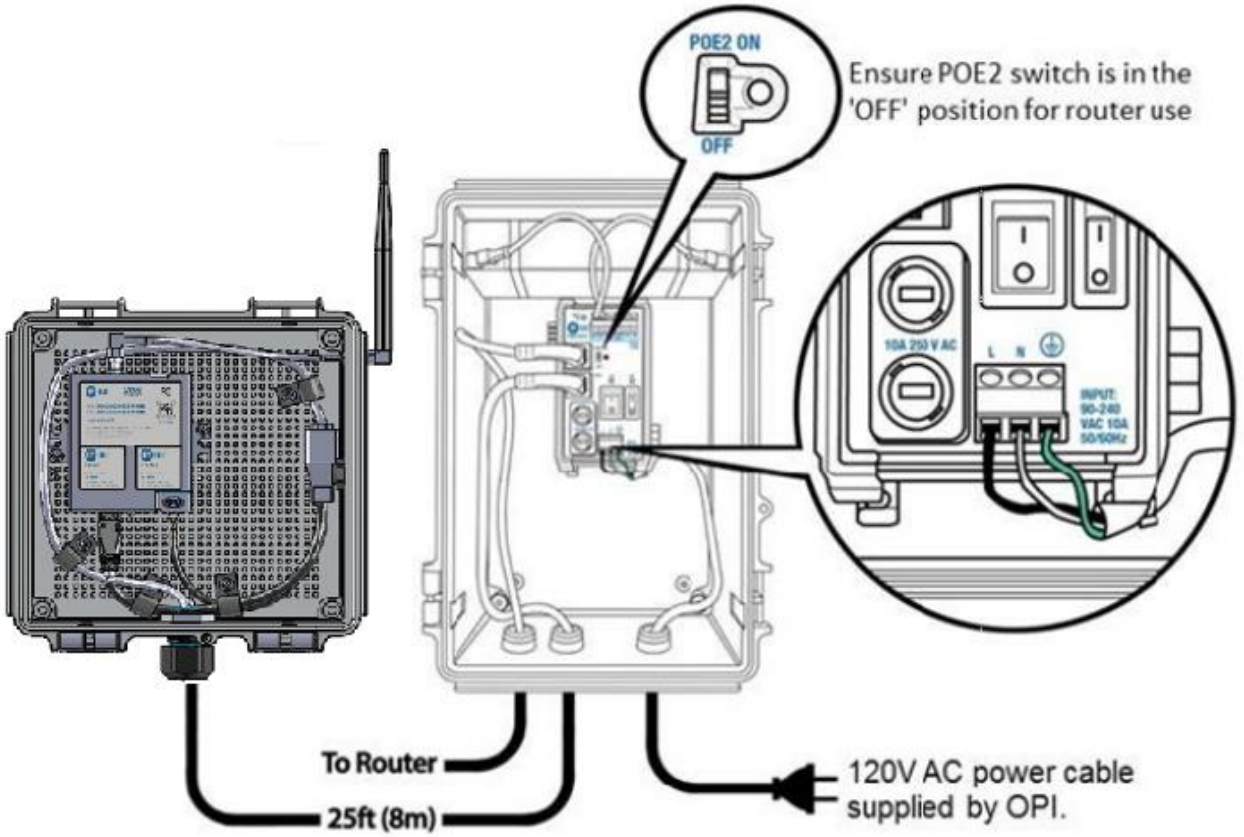
Note: The Gateway should be connected into the POE1 port and (If applicable) the Cellular Modem should be connected into the POE2 port on the Power Supply. Before connecting the A/C power source ensure that the red power cable is connected into the positive (+) battery terminal on the backup battery. Plug the A/C power cable into an A/C outlet. **Proceed** to the Gateway section before turning ON the power.



Power Panel and Wired Router

Connect the wires in the Power Panel to match the image shown below. (Refer to the power supply PS-3515 manual for important installation instructions.)

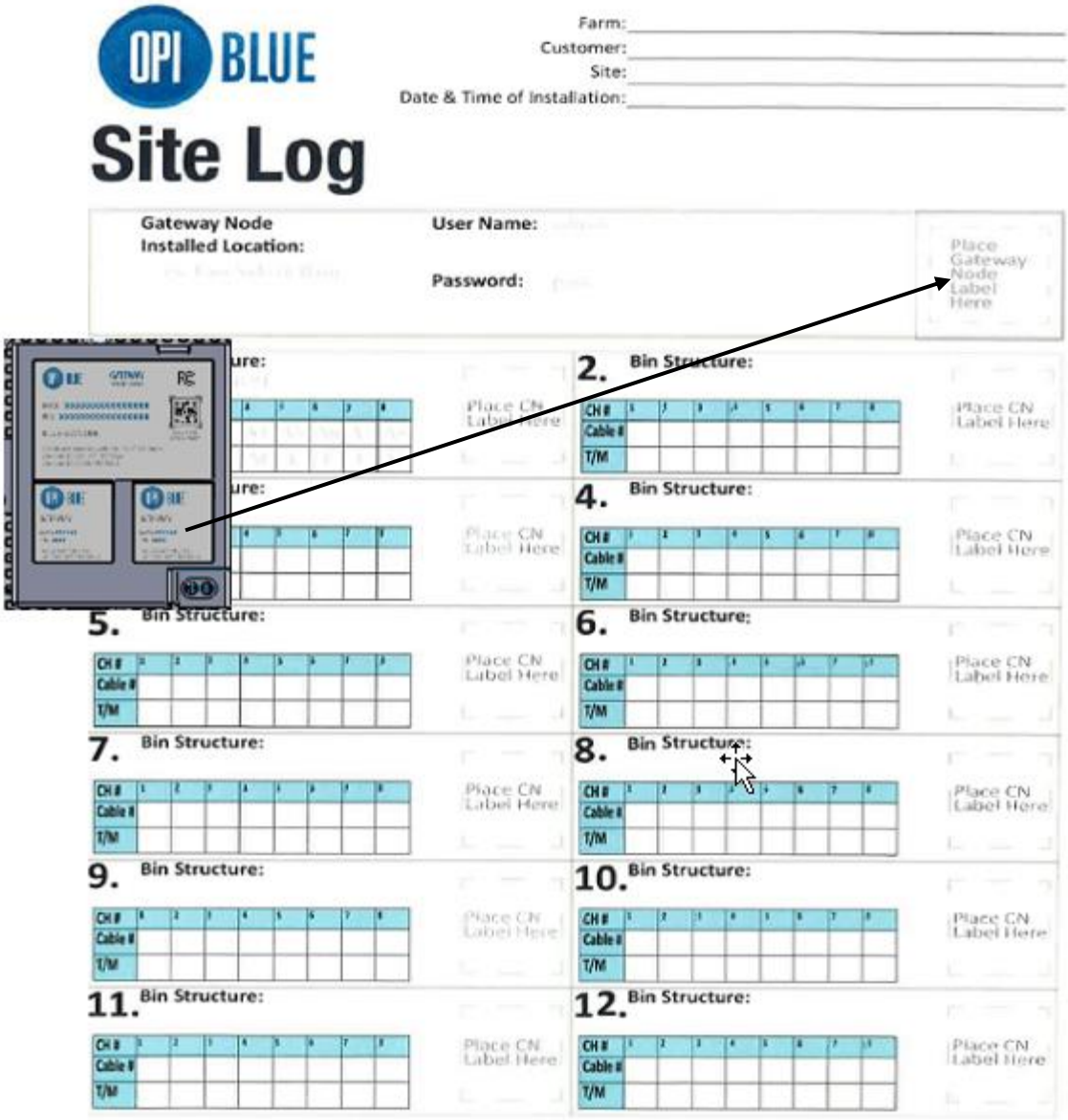
Note: Beside the POE2 port on the power supply there is a small toggle switch that needs to be switched down into the “OFF” position before connecting the ethernet cable to the router. Before connecting the A/C power source ensure that the red power cable is connected into the positive (+) battery terminal on the backup battery. Plug the A/C power cable into an A/C outlet. **Proceed** to the Gateway section before turning ON the power.



Gateways

Site Log

Note: An example of the Site Log is located on page 95-96 of this manual. The Site Log is used to provide a record of the bins along with what hardware is attached to each one. On the bottom of the Gateway and Cable Node there are stickers with the MAC Address and the PIN Number for each unit. Write the Bin Name/Number on the sheet and place the corresponding sticker beside it. This information is good reference material and will come in handy in the future should there be a need to troubleshoot any hardware or system issues.



Mount the Gateway

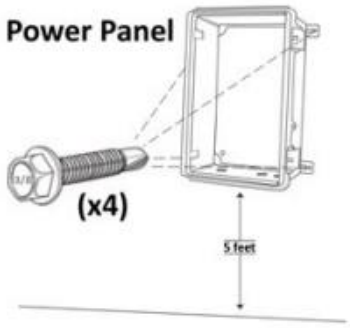
You are now ready to finish installation of the Power Panel Enclosure and Gateway Node.

Note: When selecting the location for the Gateway Node installation, remember to pick a location that has the best possible line of sight to the bins with the installed Cable Nodes and Fan Node Radios to maximize the communication level between devices. Also, make sure that the Gateway Power Panel Enclosure as access to a 120VAC power outlet.

The Gateway Node should be mounted within 2600 feet (800 meters) from the furthest Cable Node to ensure range limitations have not been exceeded.

The Gateway Node comes with a standard 25-foot (7.5 meter) ethernet cable connected to it. Make sure the Gateway Node is mounted within 24 feet of the Power Panel Enclosure, that way drip loops can be incorporated on the ends of the connection.

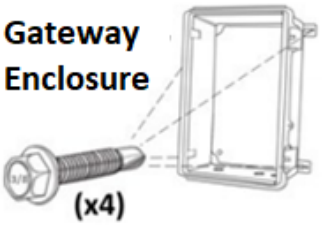
1. After selecting your Gateway Node and Power Panel Enclosure location, begin by first mounting the Power Panel Enclosure. Using a cordless drill with a 3/8” Nut Driver, attach the Power Panel Enclosure with the four (xxx) self-tapping screws to a flat surface. Ensure that the Power Panel Enclosure is as horizontal as possible, using a level if needed.



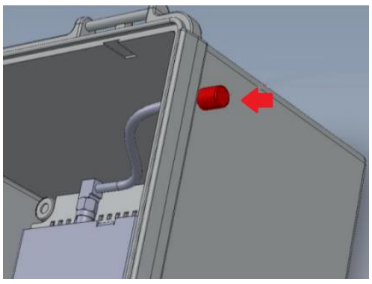
2. You are now ready to install the Gateway Node in its enclosure. Although in a slightly smaller enclosure than the Power Panel the Gateway uses the same cordless drill and 3/8’ Nut Drive bit to secure the 4 self-tapping

screws through the foot mount in each corner to a flat surface. The surface used could be a wall or a roof mount.

Note: The Gateway is connected to the Power Panel Enclosure by a 25-feet (8-meters) of ethernet cable. Typically, the Gateway is installed as high up as possible while maintaining the Power Panel Enclosure at eye-level.



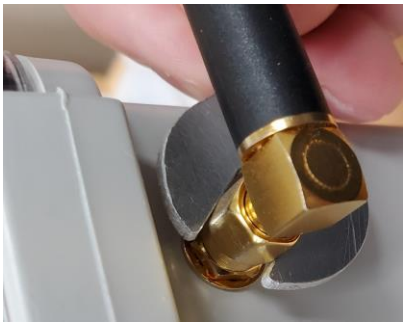
3. Create a drip loop with the Ethernet cable coming out the strain relief from the base of the Gateway Enclosure. Secure the cable in place using the supplied P-Clips. The drip loop ensures water will not run into the Gateway Node.
4. Using your fingers or small needle nose pilers gently turn and pull to remove the red antenna mount connector cover exposing the antenna mount.



5. Line up the antenna with the connection mount.

6. Hand tightened the antenna nut to the mount.

7. Use the supplied (inside the enclosure) 5/16” wrench to secure the antenna in place. Ensure the antenna is always secured vertical to the sky.

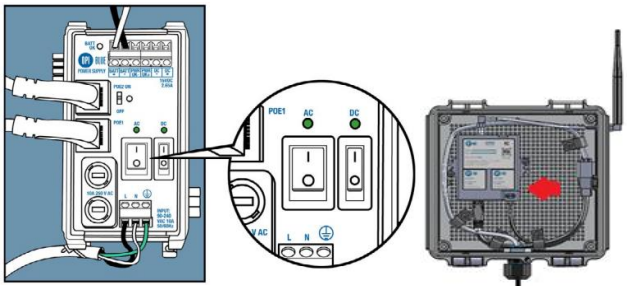


8. Run the Ethernet cable from the Gateway Enclosure to the Power Panel Enclosure. Run the cable into the Power Panel Enclosure box through the strain relief opening on the bottom of the Enclosure. Plug the Ethernet cable into the POE1 connection port on the power supply. Tighten the strain relief clockwise to tighten it around the cable to keep water out of the Enclosure.

9. Secure the Ethernet cable in place below the Enclosure with another drip loop using a P-Clip supplied. The remaining P-Clips can be used to secure the rest of the Ethernet cable at 3-feet (1-meter) increments.

10. Ensure the red power cable is connected into the positive (+) battery terminal on the backup battery. Plug the A/C power cable into an A/C outlet.

11. Turn both the A/C and D/C switches to the ON position on the power supply to power the Gateway.



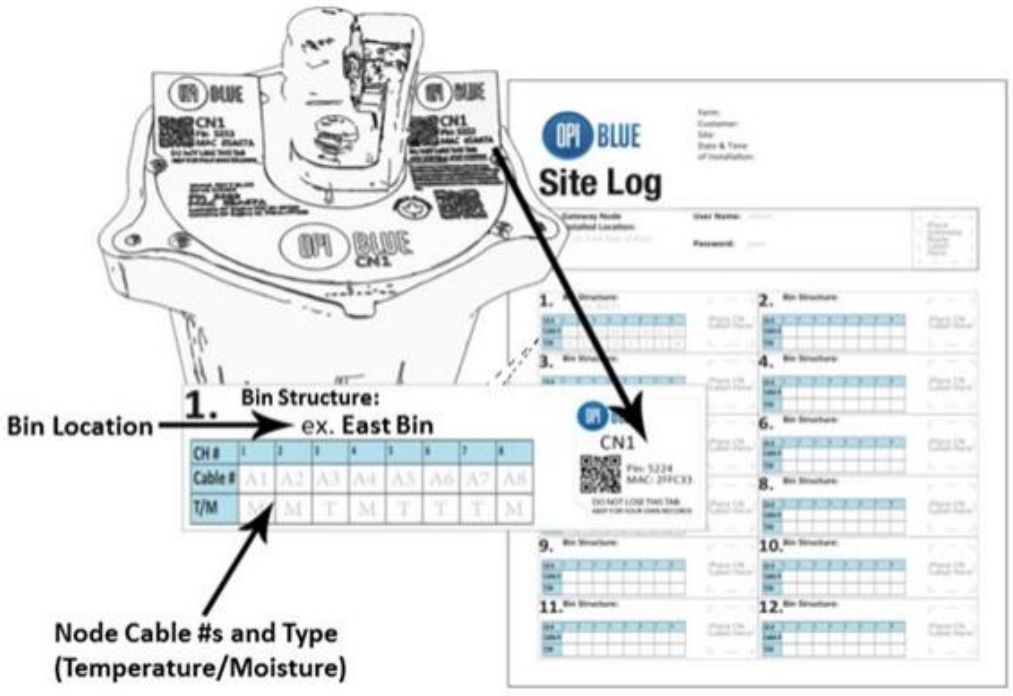
Note: The Gateway Node takes roughly two -minutes to run through its start up sequence. Four LED are located on the Gateway in the lower righthand corner, indicated by . During start up sequence all four LED lights on the Gateway will be **green**. After several seconds, Radio LED 1 is **green**, and Radio LED 2 is Off. Once start up sequence has been completed all PCB LED's turn Off and LED 1 turns **amber**.

Note: When cycling power to the Gateway Node it is important to switch both the A/C and D/C OFF. Failure to switch the D/C switch OFF would keep the Gateway ON using power from the battery backup.

Cable Nodes

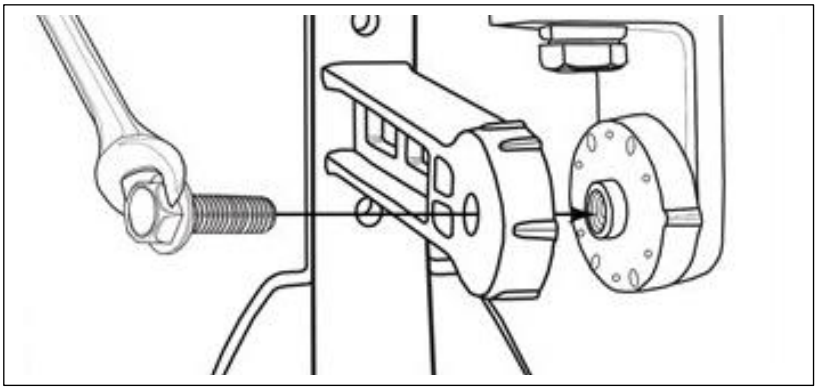
Site Log

Note: As previously noted an example of the Site Log is located on page 95 & 96 of this manual. Just like the Gateway on the bottom of the Cable Node there are stickers with the MAC Address and the PIN Number for each unit. Write the Bin Name/Number on the sheet and place the corresponding sticker beside it. This information is good reference material and will come in handy in the future should there be a need to troubleshoot any hardware or system issues.

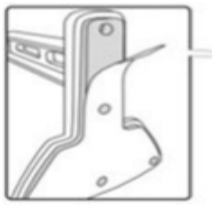


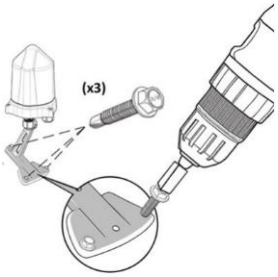
Mounting the Cable Nodes

1. You are now ready to install the Cable Node(s). While on the ground loosely attach the foot mount to the base of the Cable Node using the 7/16” bolt and washer with a 7/16” wrench.



2. Determine the location of the Cable Node on top of the bin roof. Peel the backing off the base of the foot mount and stick into place before bolting down.





Note: Magnetic foot mounts are also a potential option and provide installation flexibility.

3. Using the cordless drill with the 3/8” Nut Driver, secure the Cable Node in place with the three 3/8” self-tapping screws supplied. **Note:** You will need to adjust the position of the Gateway Node on the foot mount in order to attach all three self-tapping screws. Once the screws are in place, use the

7/16” wrench, tighten the Gateway Node on the foot mount so it is secured in a vertical position.

Note: There are three rules of thumb to keep in mind when installing a Cable Node: 1) They are solar powered units and to maximize the battery charge efficiency and effectives it is important that it has the best exposure to direct sun light possible. Installation of the Cable Node in a shaded area will restrict the charging capability and potentially compromise the reliability of the Cable Node. 2) The Cable Node needs to be installed with best line of sight possible to the Gateway Node with a maximum distance of 2624 feet (800 meters). Fig. 1.0 below illustrates the most effective orientation of the Cable Node to ensure best communication possible from Cable Node to Gateway Node. 3) The Cable Node should not be located where it is can be damaged by equipment (ie. Augers) or can be completely covered in snow.

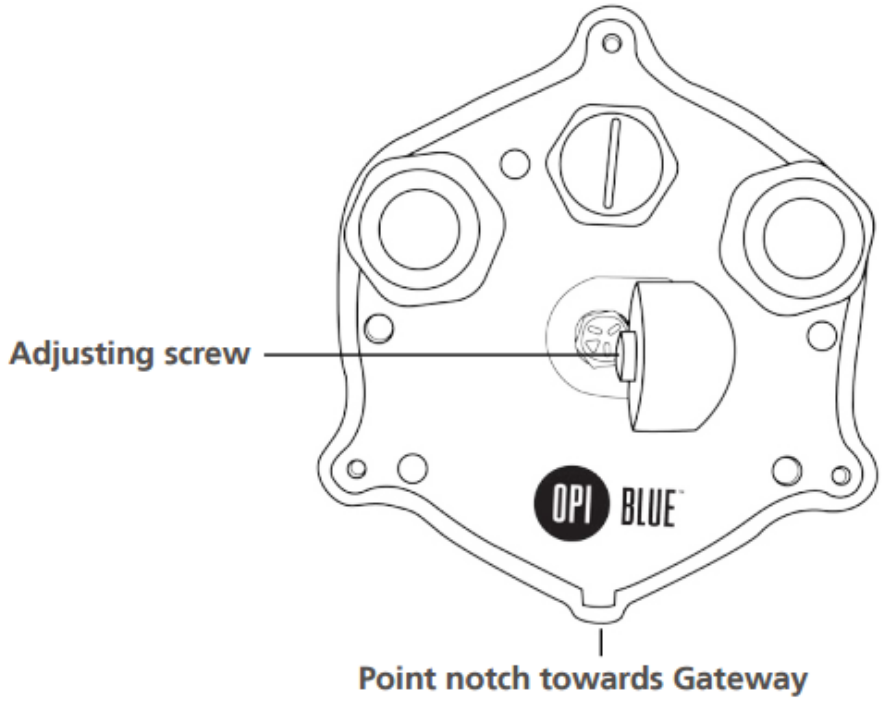


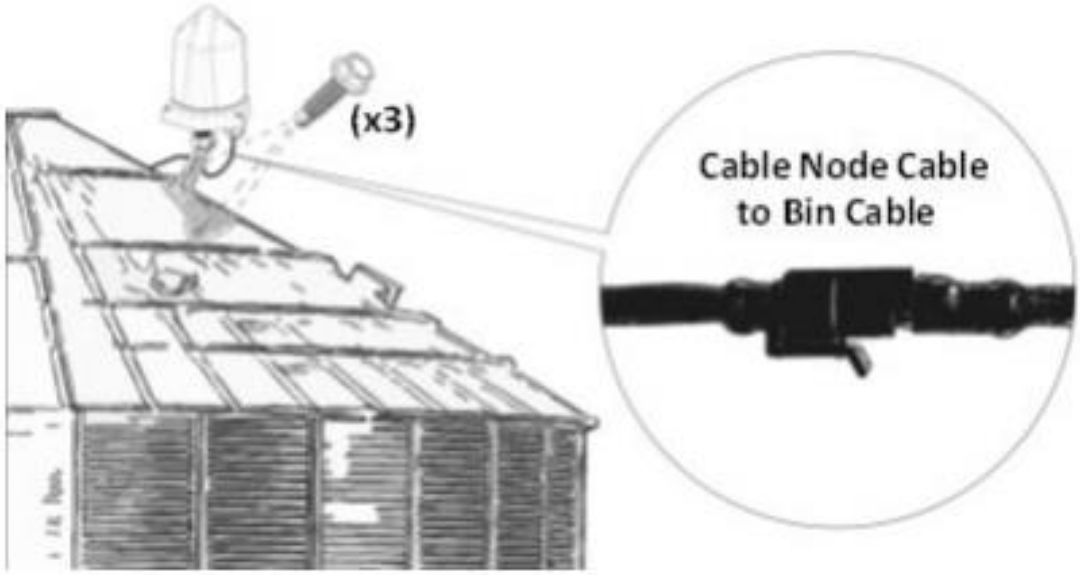
Fig. 1

Cable Connections

Depending on the type of cable configurations (number of cables in a bin) there will be either a single channel (CN01) or a multi-channel (CN08) Cable Node.

Single Cable Installation with Single Cable Node (CN01)

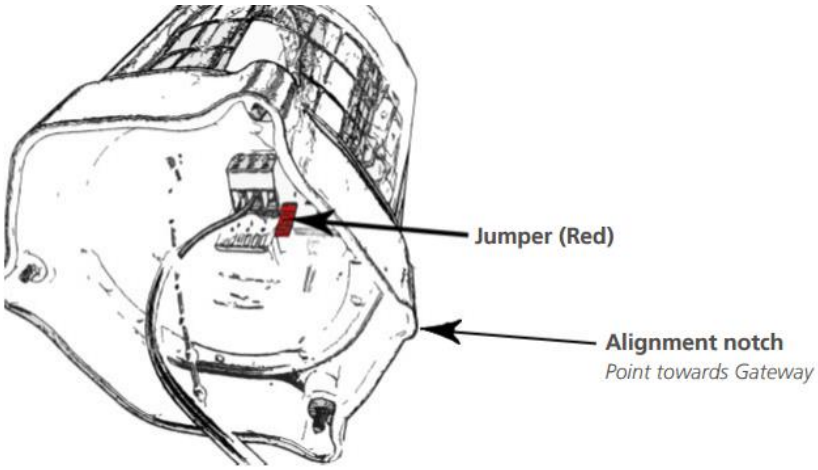
1. With the Cable Node secured in place on the bin roof, run the interconnect cable from the cable head to the Cable Node (if necessary). Each single channel cable node has a pre-installed pigtail with a connector attached to it. Connect the cable to the Cable Node by connecting the (Male/Female connectors) securely together.



2. Using your Philips screwdriver loosen the three screws located on the outer edge of the base of the Cable Node and open the Cable Node up by lifting the dome off the base.

> **Note:** The Cable Node dome is attached on the inside by a tether to avoid losing it off a bin roof.

3. Turn the Cable Node dome upside down and locate the red jumper. Remove the red jumper to activate the Cable Node. Once the Cable Node has been activated it should make three blue flashes followed by five blue and red flashed.



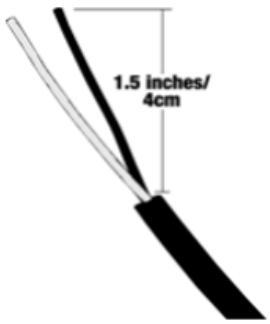
4. Take the jumper and turn it upside down before sliding it behind the prongs you just removed it from. This keeps it in a secure place should it ever be needed in the future to reset the Cable Node.

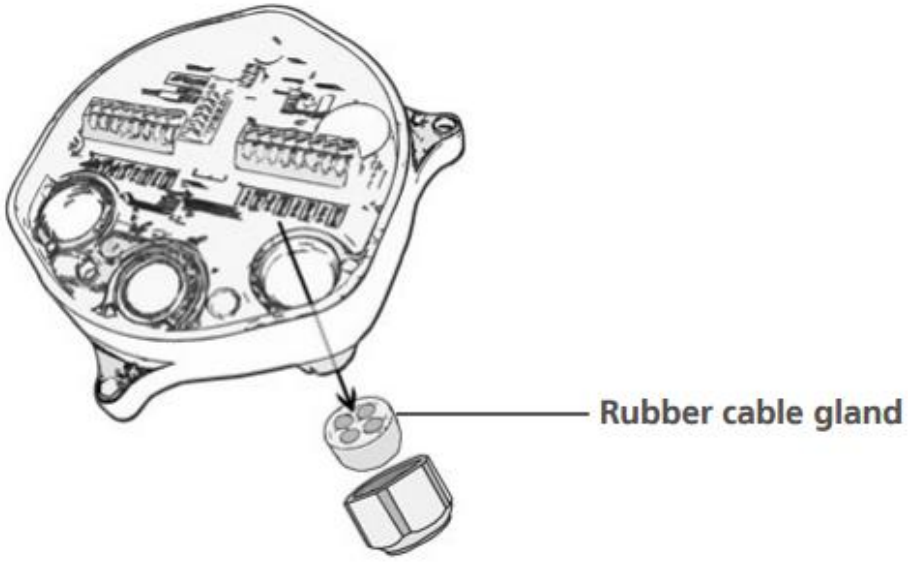
5. Realign the cover to the Cable Node base by lining the notch indicator on the cover to the notch indicator on the base. Tighten the three Philips screws to secure the dome back in place.
6. Secure a small drip loop in place with the six inches of slack from the cable interconnect cable (if available) with a tie wrap through the opening in the neck of the foot mount.

Multi-Cable Installation with Multi-Channel Cable Node (CN8)

1. With the Cable Node secured in place on the bin roof, run the interconnect cable from the various cable heads to the location of the Cable Node Each multi-channel cable node has two rubber glands installed on the bottom of the aluminum base. Each rubber gland has four membranes to accommodate up to a maximum of eight cables total.

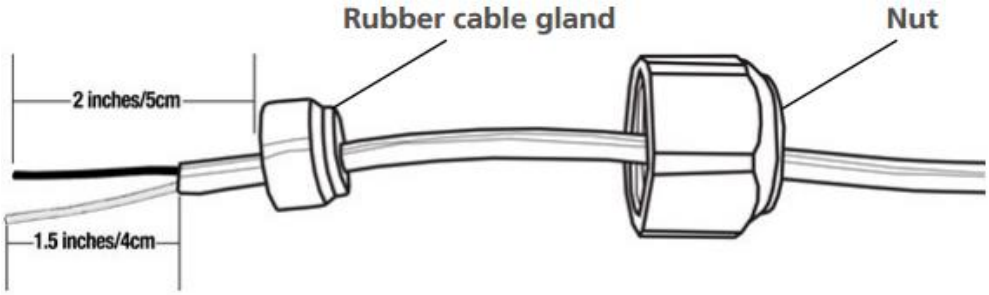
2. Take the interconnect cable leads and carefully strip 1.5 inches (4 cm's) from each cable jacket using a wire stripper to expose the black and white wire.
3. Use your 1 1/16" or adjustable wrench to remove the first strain relief from the bottom of the Cable Node and push the rubber gland from it.



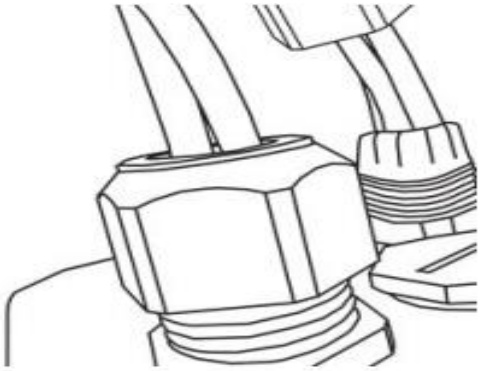


4. Use a small screwdriver to create a tiny opening in the membrane of the gland this way the cable lead wire can be fed through it.

5. Pull 2 inches (5 cm) of lead wire through the membrane for each one of the cables to be connected to the Multi-Channel Cable Node. Ensure that the number of membranes punctured matches the number of cables to be connected with a maximum of four cables per strain relief with one per membrane for a total of eight cables per Multi-Channel Cable Node.



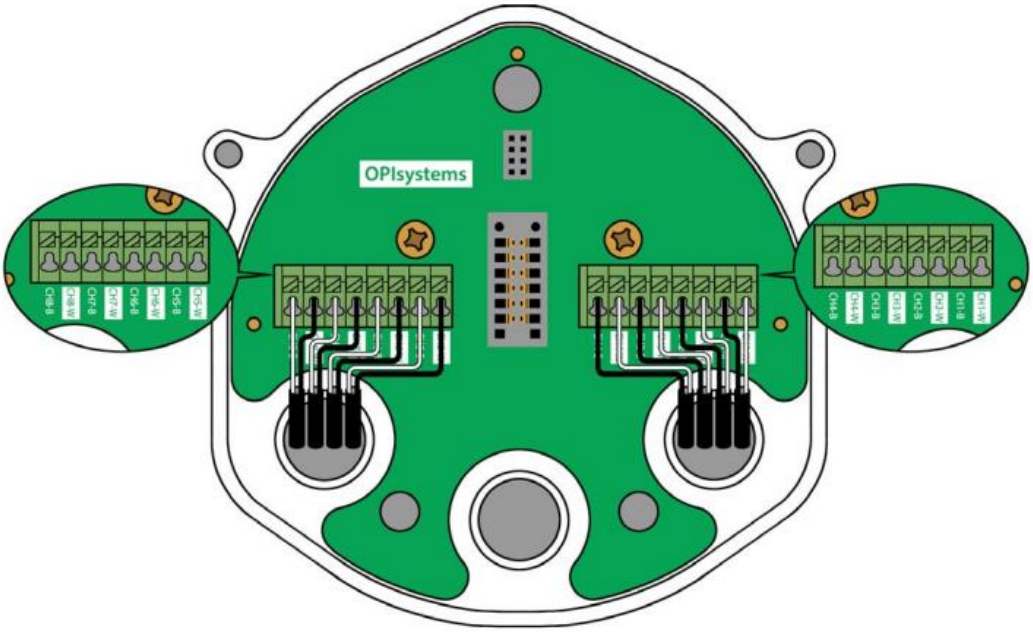
6. Once all the cables have been inserted into each membrane place the gland back inside the strain relief and using the 1 1/16 inch or adjustable wrench reattach it back on the Cable Node base. Repeat this process with the second strain relief if necessary.



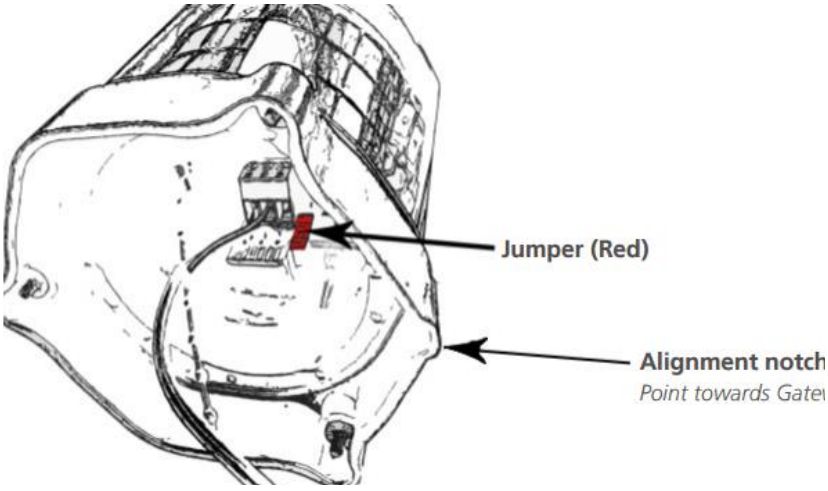
7. Take your wire strippers and remove 3/8” off both the black and white wire exposing the bare wires.

8. Take your sr[illegible] applicable channel tab and insert the black and white wire into the corresponding terminals. Ensure the wire is fully inserted in each terminal with no bare wires exposed.

   Do this until each of the cables has been connected into the Cable Node.



12. Turn the Cable Node dome upside down and locate the red jumper. Remove the red jumper to activate the Cable Node. Once the Cable Node has been activated it should make three blue flashes followed by five blue and red flashed.



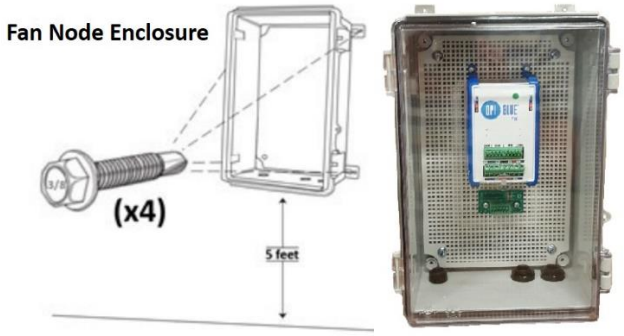
13. Take the jumper and turn it upside down before sliding it behind the prongs you just removed it from. This keeps it in a secure place should it ever be needed in the future to reset the Cable Node.
14. Realign the cover to the Cable Node base by lining the notch indicator on the cover to the notch indicator on the base. Tighten the three Philips screws to secure the dome back in place.
15. Secure a small drip loop in place with the six inches of slack from the cable interconnect cable (if available) with a tie wrap through the opening in the neck of the foot mount.

Fan Node

Note: The Fan Node is the connection bridge between the Fan Node Radio and the aeration fans onsite. The Fan Node has various inputs for the Fan Node Radio, Weather Station (ORHT), Plenum Pressure Sensor (PPOT), 12VDC power in addition to two outputs for fan and heater control purposes.

When selecting the location for the Fan Node please keep in mind that the Fan Node Radio has 50 feet (15 meters) of COM2 cable connected to it. Because the Fan Node Radio like a Cable Node needs best line of sight to the Gateway and needs to be connected into the Fan Node, it should be installed ensuring its location doesn't compromise the best line of sight required to maximize communication between the Fan Node Radio and the Gateway.

1. After selecting your Fan Node Enclosure location, begin by first mounting the Fan Node Enclosure at roughly eye level. Using a cordless drill attach the 4 x #12-14 ¾” Tek Screws into each of the four mount brackets to secure the enclosure in the desired location.



Fan Node Radio

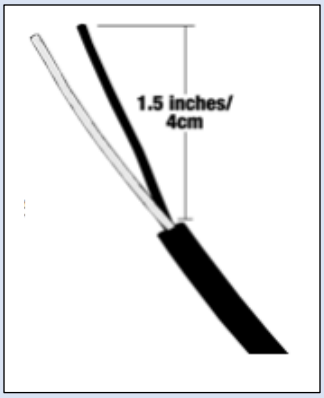
Note: A Fan Node Radio needs to have the cleanest line of sight possible to the Gateway to maximize the signal strength for communication purposes. A Fan Node Radio comes with 50 feet (15 meters) of Communication Cable (COM2) connected to it to provide flexibility in achieving the cleanest line of sight. When installing the Fan Node Radio, it should be as high as possible to avoid being blocked by machinery, tall metal objects or trees.

1. After determining the location in which the Fan Node Radio will be installed. Use the two #8 ¾ PPH Self Drilling Screws, mount the Fan Node Radio into the desired spot. When installing the Fan Node in place it should be flush mounted to the mounting surface with the OPI logo facing outward.

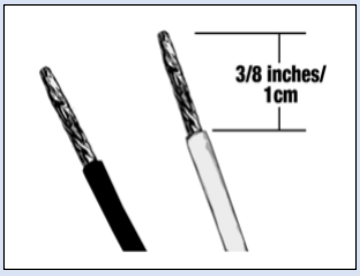
2. Bring the Communication cable (COM2) cable into the Fan Node enclosure through a strain relief and terminate in the proper connection.

Note: Because there can be several different inputs/outputs connected into a Fan Node it is best to keep the wires as neat and tidy as possible. This will help to maintain not only the quality of the system but, will also make it easier to service should a need arise in the future.

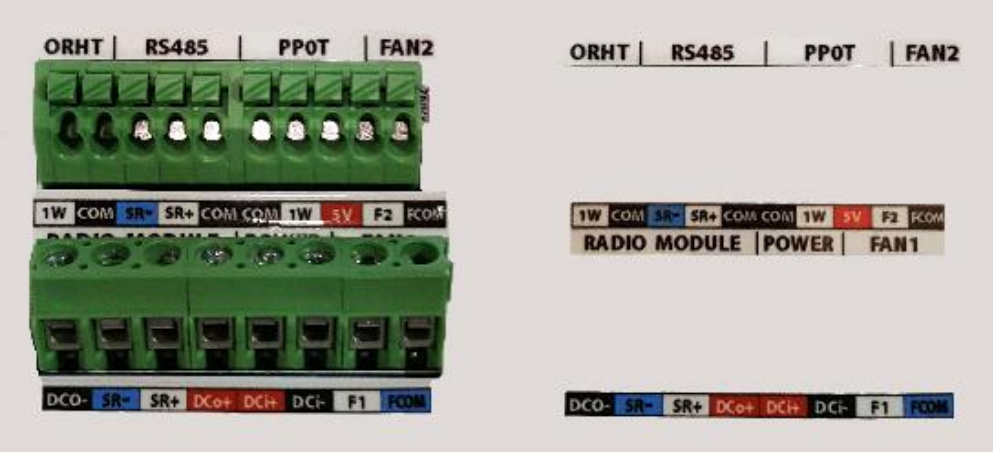
For all cable connections once, the cable has been fed through the strain reliefs at the bottom of the Fan Node enclosures and cut to the proper length. Strip 1.5 inches (4 cm's) off from the outer plastic cable jacket using a wire stripper to expose the internal wiring.



For all wires, use a 20-AWG wire stripper to remove 3/8 inch (1 cm) insulation. This ensures a good consistent termination of all wires. Use a 22-AWG wire stripper for the blue and white communication wires, removing a similar amount of insulation as before.



Note: The picture below shows a closeup of the termination connections on the Fan Node. Beside it is the label to provide a clearer picture without the termination connections obstructing the view.



To correctly terminate all connections into the Fan Node, use the **Termination Connection Guideline Chart below.**

Fan Node Termination Connection Guideline Chart		
Input/Output	**Connection**	**Notes**
Fan 1 & Fan 2	**Fan 1:** F1 FCOM **Fan 2:** F2 FCOM	Maximum two fan outputs per Fan Node. Connect Communication cable (COM2) from the outputs to the Fan or Heater Relay(s).
Weather Station (ORHT)	**ORHT:** 1W COM	INT2 cable connection. Black to Black and White to White terminations.
RS485	**RS486:** SR- SR+ COM	COM2 connection to SR- (Blue), SR+

		(White) & the COM (Black) terminations. This is used when connecting two Fan Nodes in parallel to one fan node radio.
Plenum Pressure Sensor (PPOT)	**PPOT:** 	INT3 cable connection. Black to Black, White to White & Red to Red terminations.
Fan Node Radio	**COM2 Cable:** 	Communication and power connection between the Fan Node and the Fan Node Radio.
Power In	**Power** 	From the 12VDC power supply terminate the wires into the DCi+ & DCi- termination.

Note: Within the Fan Node Enclosure pictured below, the Fan Node is an EMI Attenuator. This device is used to help remove any Electromagnetic Interference that may be generated. There are two preconfigured wires in the enclosure. The black wire is terminated from the FCOM connection on Fan Node and the COM termination on the Attenuator. The green ground wire from the Attenuator is run outside the enclosure. Any drain wires from the COM cable terminations can also be connected into the terminations on the left side of the Attenuator.

Note: All cable runs should be secured in place. It is recommended that the cables from the Fan Node Enclosure to the Fan Control Box be in conduit whenever possible. Additional cables from the Fan Node Radio, Weather Station (ORHT), Plenum Pressure Sensor (PPOT) to the Fan Node Enclosure should have P-Clips to secure them in place if conduit is not used.

Note: An end user or installer can complete the installation of the following OPI Blue hardware: **Gateway(s)**, **Cable Node(s)**, **Fan Node Radio(s)**, **Fan Node(s)**, **Weather Station** and **Cable(s)**.

If you are installing an OPI Blue Cloud system with Fan Control, it is important to recognize and understand that all electrical wiring that deals directly with the fan and heater control operation must be completed by a Certified Electrician. This includes: **Transformers**, **Power Supplies**, **Relays** and **Hand Off Auto Switches (HOA)**. Please follow all local electrical code guidelines applicable by law. Failure to follow these guidelines may result in incomplete operation of equipment, damage to the equipment or personal harm, resulting in severe injury or even death due to **High Voltages** ⚠ present.

See a list of optional Fan Control components located in the Appendix on page 89 at the end of the manual.

Once all the connections have been made into the Fan Node Enclosure, peel off the back of one of the supplied Fan Warning sticker and affix it to the appropriate fan(s) connected into the system. (There are three stickers supplied per system)

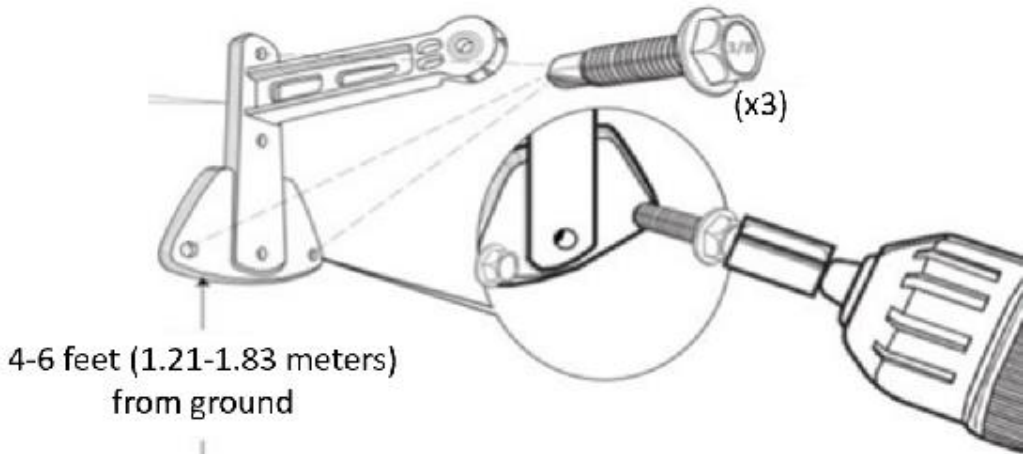
Supplied Warning Label (Exact sticker shown)

Provides notification whenever high Voltage A/C power is present.

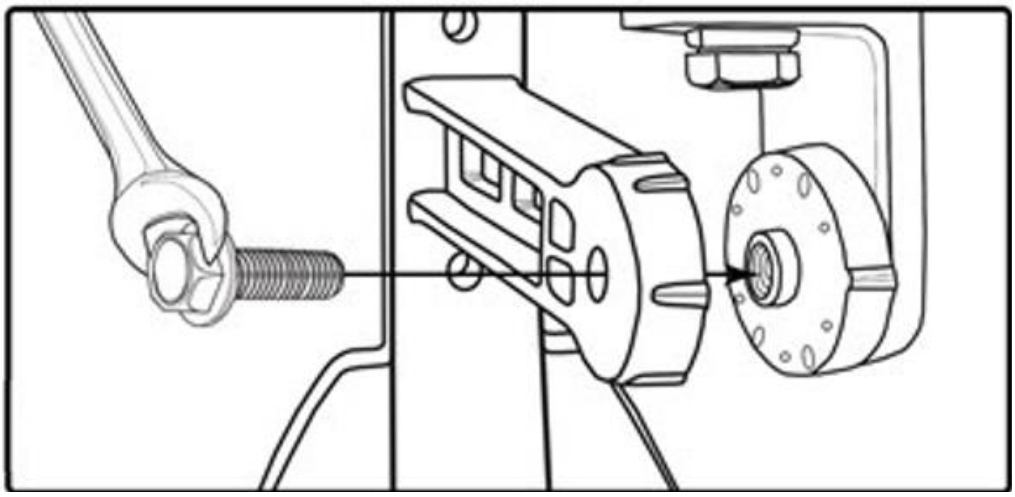
Weather Station (ORHT)

Note: The Weather Station (ORHT) comes with 100’ (30 meters) of INT2 cable for connection into a Fan Node Enclosure. It should be connected into the Fan Node in the Fan Node Enclosure, with your OPI Blue Cloud system. The Weather Station (ORHT) measures ambient temperature and relative humidity that is used to determine the Equilibrium Moisture Content of the ambient air. You will want to install the Weather Station near the bins/silos in an unobstructed area. It should not be located in a shaded area, or an area that is too close to the bins/silos that it gets influenced by the heat emitted from the fans and/or heaters when they are running. Also, do not install it directly on a bin roof or wall as the radiated heat from the surface can alter temperature values.

Note: If you are mounting on a pole attach using 2 self-tapping screws placed in the top center and bottom center position of the foot mount.



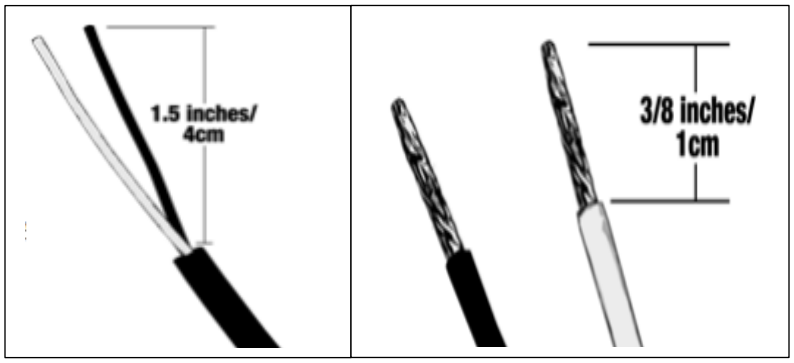
3. Attach the Weather Station to the foot mount using a 7/16-inch wrench and tighten so it is in a vertical position. (Typically, 90 degrees)



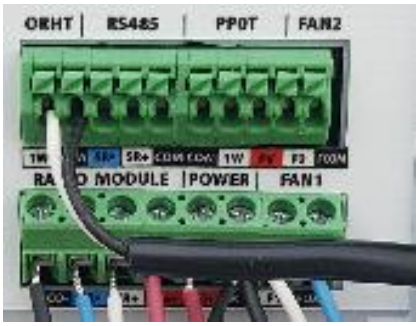
4. Run the INT2 lead wire to the Fan Node enclosure through the strain relief at the bottom. Cut the INT2 cable to the proper length before it has been

terminated. This will ensure the correct length and avoid any excess cable or risk from it being cut too short.

5. Once the INT2 has been cut to length strip (1.5 inches – 4 cm) off from the outer jacket off using a wire stripper to expose the black and white wire. Using a wire stripper remove 3/8 inch (1 cm) from the wire insulation. This ensures a good consistent termination of all wires.



6. Use a small flat edge screwdriver, terminate the wires in the appropriate ORHT connection port on the Fan Node.



7. Secure the INT2 cable between the Weather Station (ORHT) and the Fan Node enclosure using the P-Clips provided. The INT2 cable should be secured roughly every 4 feet (1.25 meters).

Weather Station (ORHT) shown mounted on a pole from two different angles.

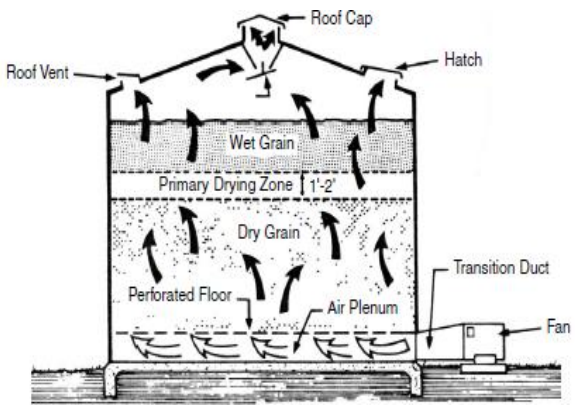
Plenum Sensor (PPOT)

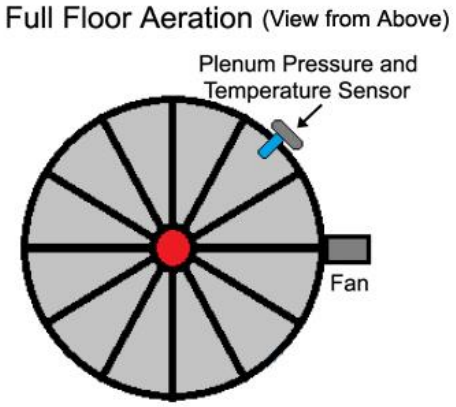
Note: There are two different Plenum Sensors. The older style Plenum Pressure and Temperature Sensor (PPOT) & the newer style. They have a different footprint; however, regardless which sensors your system has they both serve the same two purposes for your OPI Blue – Fan Control System.

They measure the temperature of the air inside the plenum. This is the air that is being introduced into the grain mass by the fans. The temperature of this air is different than the ambient air temperature measured by the Weather Station (ORHT) as there is a fan and/or heater warming effect that will increase the temperature as it enters the bin. The Plenum Senor also measures the static pressure change within the Plenum, (below the aeration floor in the bin) this provides validation through the measured pressure value that the fan(s) have physically turned on when triggered to do so either manually or through fan automation within the User Interface.

Note: ½ inch metal conduit is recommended to be run between the Plenum Pressure and Temperature Sensor (PPOT and the Fan Node enclosure. However, it typically needs to be installed by an experienced installer. As an alternative ½ inch watertight flex conduit can be used to provide a more cost effective and easier to install solution in this application. The Plenum Sensor has a ½ inch strain relief attached to the base.

1. Determine the optimal location for the Plenum Pressure and Temperature Sensor to be installed in the Plenum. (Between the concrete pad and the Aeration floor.) This should be installed in a location close enough to where the fan transition is located in order to get accurate pressure and temperature readings. See the example on the following page.

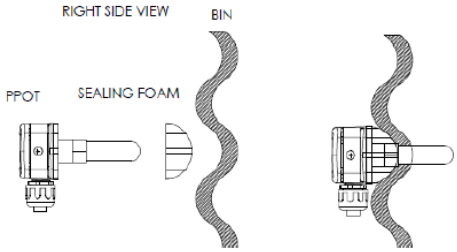




2. Using a step bit, (shown below) drill a 1 ¼ inch (3.1 cm) hole in the desired location ensuring it is located in the Plenum. (Between the concrete pad and the Aeration floor).

3. Mount the Plenum Pressure Sensor and Temperature Sensor (PPOT) to the bin surface using two 12-14 x ¾ self-drill screws provided.
4. Measure the correct length of conduit needed to reach from the PPOT to the Fan Node enclosure. Be sure to include extra length (3 feet or 1 meter) to accommodate a drip loop at both the PPOT and the Fan Node enclosure. (1/2 inch Flex conduit and J-Straps for securing conduit in place shown below)

5. Using a wire fish pull the INT3 cable from the PPOT through the ½ inch conduit.
6. Secure the ½ inch conduit to the ½ inch strain relief at the bottom of the PPOT and tighten the nylon nut to create a watertight connection.
7. The installed ½ inch conduit run (with a drip loop) from the PPOT to the Fan Node enclosure secured roughly every 4-5 feet (1.5 meters) with a J strap.



(Left) Older style PPOT installed with watertight flex conduit and J-Straps.

(Right) Newer PPOT with foam gasket to ensure an airtight seal with the bin once it has been installed in the plenum. If you are installing on fan transition (for a hopper bin) you would not require the foam gasket as it will create an airtight seal on a flat surface.

Note: Even though in theory the conduit is watertight, it is recommended that a small drain hole be put on the underside of the drip loop on the conduit. This ensures that should any water get inside the conduit it will be able to drain out.