OPI Blue, Cloud Version with Fan Control

Installation and User Manual

CONTENTS

1. **Welcome…… 1**
2. **Set Up/Manage User Account…… 2**
3. **Install Site Equipment…… 4**
   - 3.1 Site Overview…… 5
   - 3.2 Power Panel…… 6
   - 3.3 Gateways…… 8
   - 3.4 Cable Nodes…… 12
   - 3.5 Cable Connections…… 15
   - 3.6 Fan Nodes…… 21
   - 3.7 Fan Node Radios…… 22
   - 3.8 Weather Station (ORHT)…… 28
   - 3.9 Plenum Pressure and Temperature Sensor (PPOT)… 31
4. **OPI Blue, Cloud Version w/Fan Control…… 33**
   - 4.1 Home (Dashboard)
     - 4.1 Home Screen…… 34
   - 4.2 Settings and Configuration
     - 4.2.1 Gateways…… 39
     - 4.2.2 Cable Nodes…… 40
     - 4.2.3 Map Cable Nodes to Gateway…… 42
     - 4.2.4 Register Fan Node Radio…… 44
     - 4.2.5 Map Fan Node Radio to Gateway…… 45
     - 4.2.6 Create Site…… 47
     - 4.2.7 Create Bins…… 49
     - 4.2.8 Add Weather Station (ORHT) to Existing Site…. 56

4.3 Features and System Use
4.3.1 Bin Data…… 58
4.3.2 Alarms…….. 61
4.3.3 Grain Condition…….. 63
4.3.4 Inventory…….. 65
4.3.4 Global View…… 66
4.3.5 System Status…….. 66
4.4 Fan Control
4.4.1 Manual Fan Control…….. 67
4.4.2 Natural Air Drying (NAD)…….. 68
4.4.3 Aeration…… 71
4.4.4 Advanced Fan Settings…….. 73
5. Site Log…… 76
6. Appendix…… 77

1. WELCOME

OPI Blue, Cloud with Fan 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 manually controlling your fans (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 OPU Blue system.

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

© 2017 OPIsystems Inc

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

OPI Blue Customer Care

Email: customercare@opisystems.com
Phone: 1-403-219-3177 (Ext – 503)
Toll Free: 1-800-661-1055 (Opt 5)

OPIsystems Inc. Contact Information

Calgary, AB, Canada
Opisystems Inc – Head Office
50-2151 32nd Street NE.
Calgary, AB, Canada
T1Y 7G3

Phone: 403-219-3177
Toll Free: 800-61-1055
Fax: 403-219-3177

Lenexa, KS, USA
Integris USA
7300 W 110th Street STE 700
Overland Park, KS
66210

Phone: 913-653-8350
Toll Free: 800-61-1055
Fax: 913-535-0650

2. 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.

© 2017 OPIsystems Inc

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.

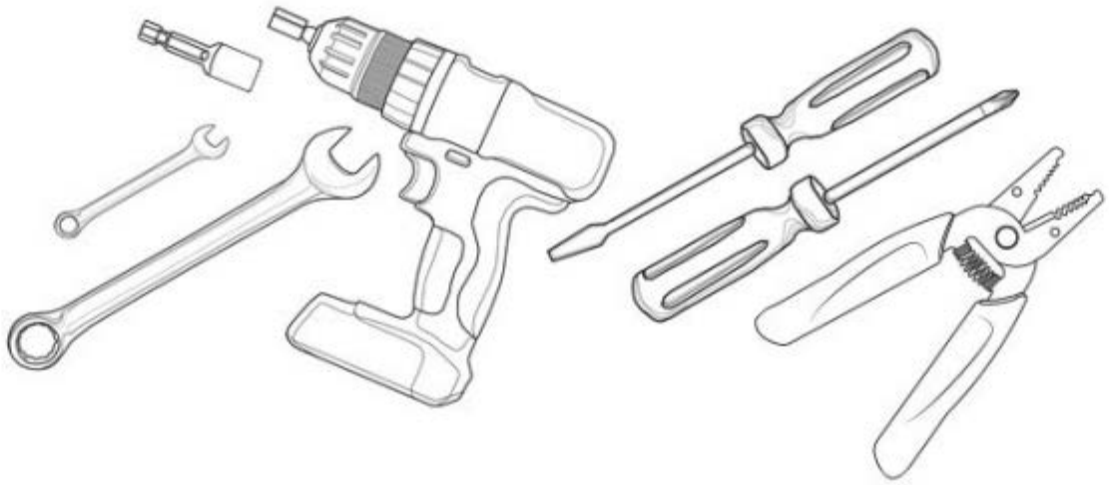
Forgot Password

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.

© 2017 OPIsystems Inc

3. Install Site Equipment

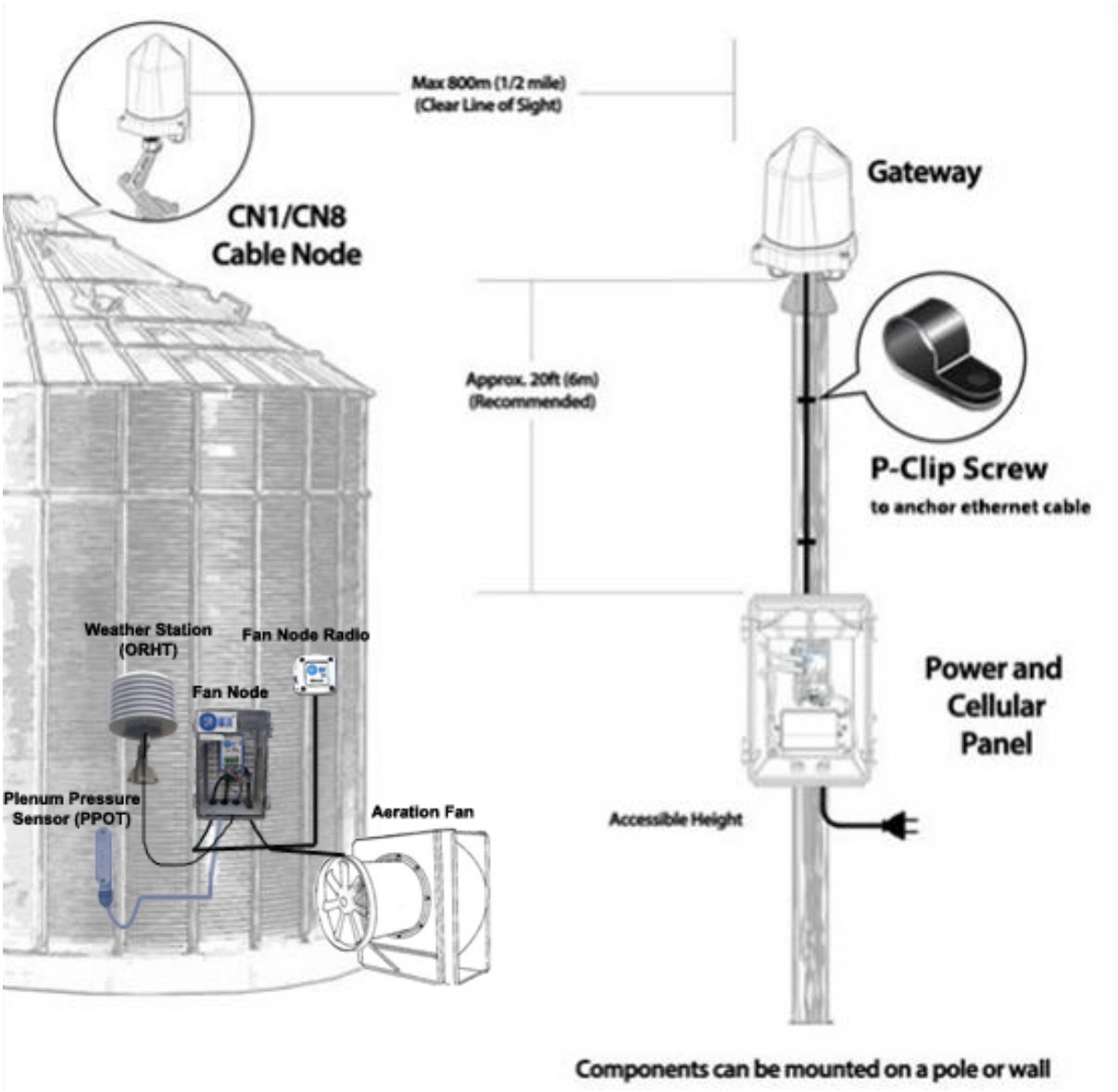
Required Installation Tools



- 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

© 2017 OPIsystems Inc

3.1 Site Overview

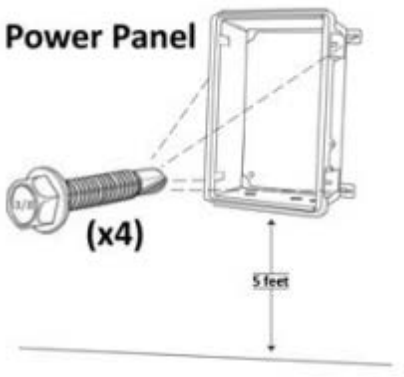


© 2017 OPIsystems Inc

3.2 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.

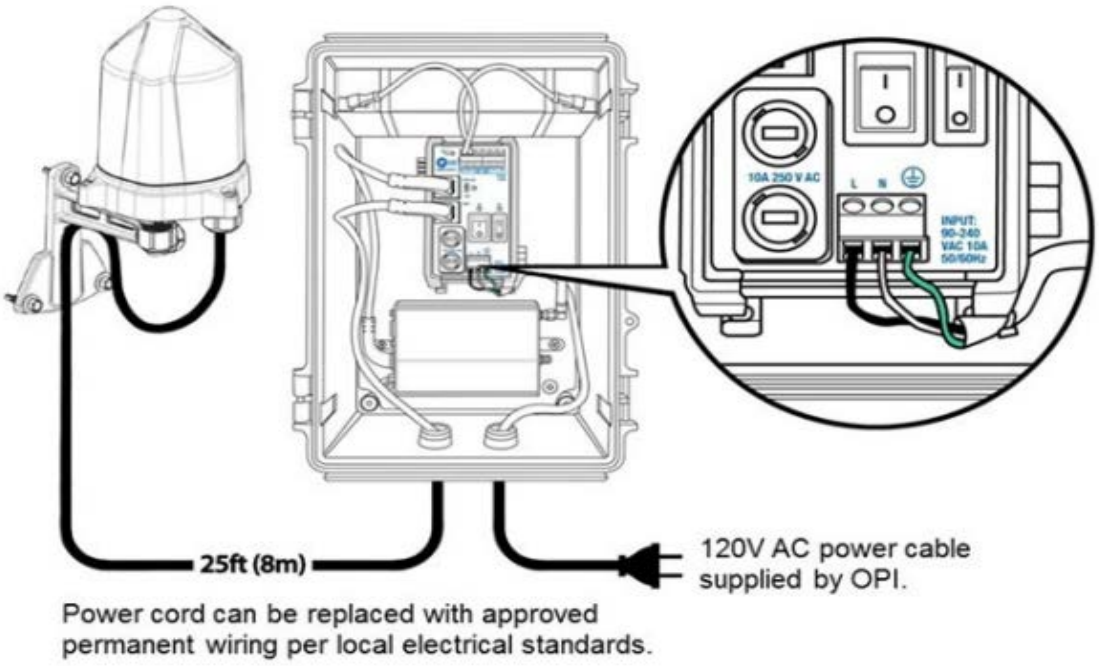


Power Panel and Cellular Connection

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.

© 2017 OPIsystems Inc

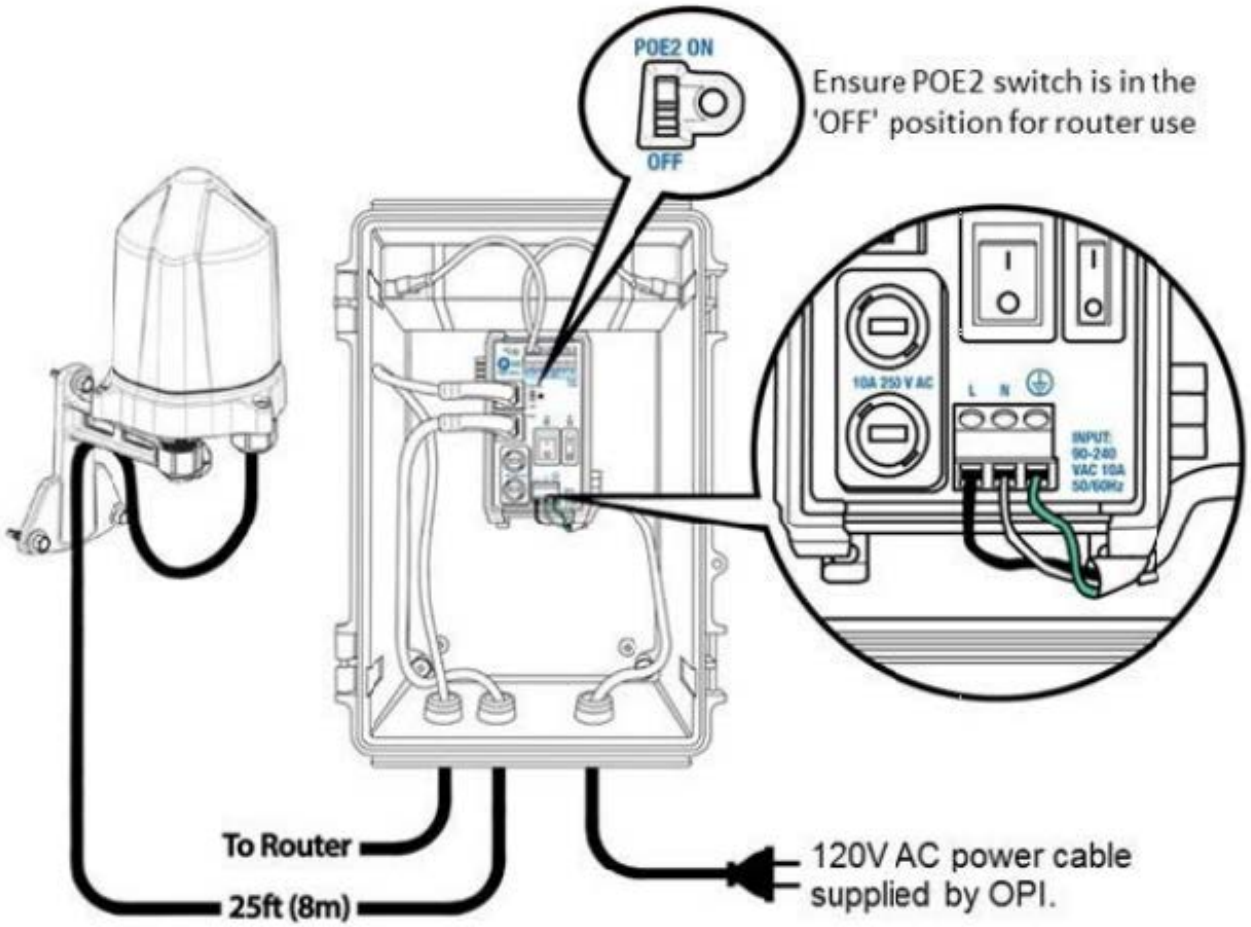


Power Panel and Wired Router

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.

© 2017 OPIsystems Inc

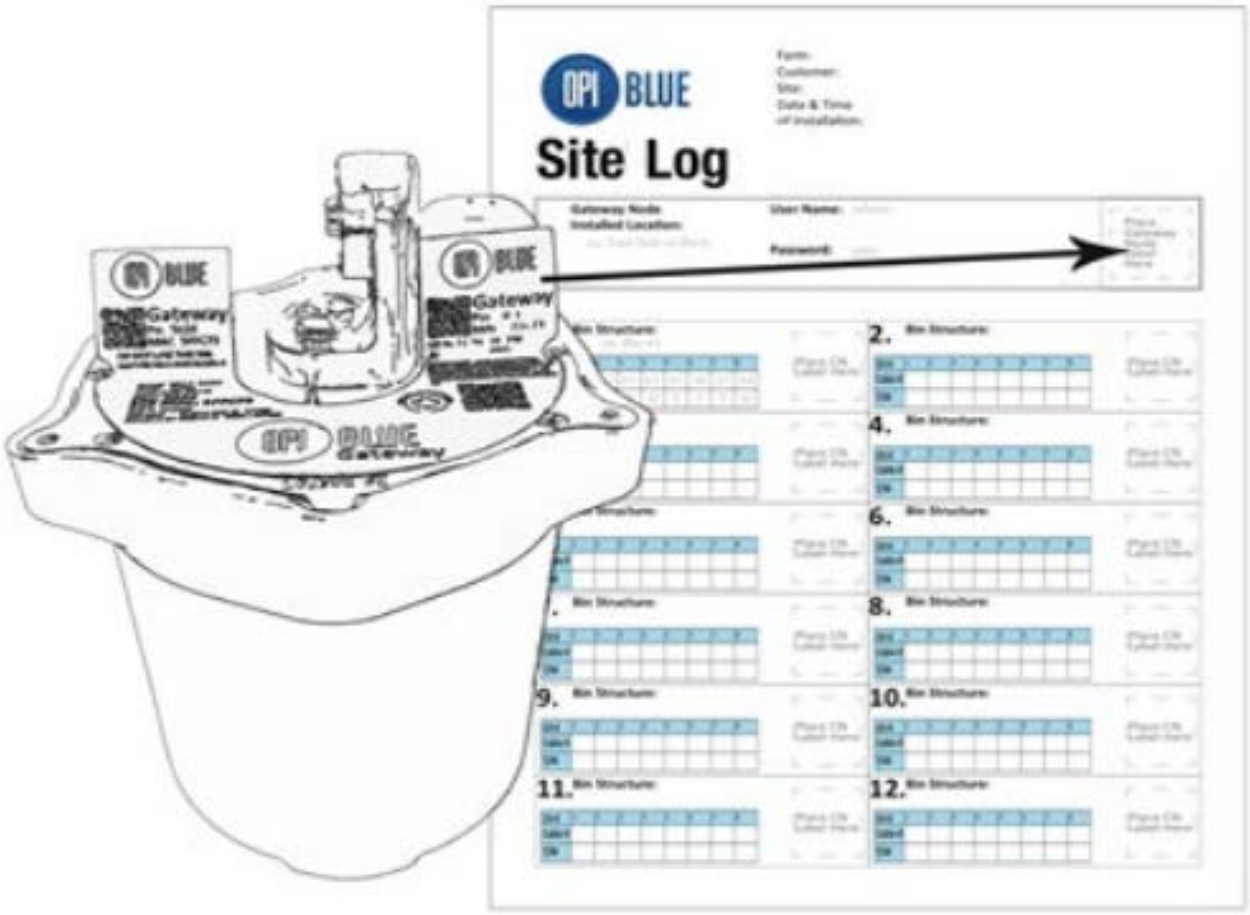


3.3 Gateways

Site Log

Note: An example of the Site Log is located on page 63 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.

© 2017 OPIsystems Inc



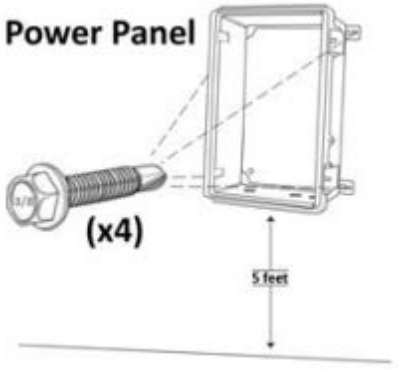
Note: When selecting the location for the Gateway Node installation, remember to pick a location that has the best possible line of sight to the bins with the installed Cable Nodes and Fan Node Radios to maximize the communication level between devices. Also, make sure that the Gateway Power Panel Enclosure as access to a 110VAC power outlet.

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

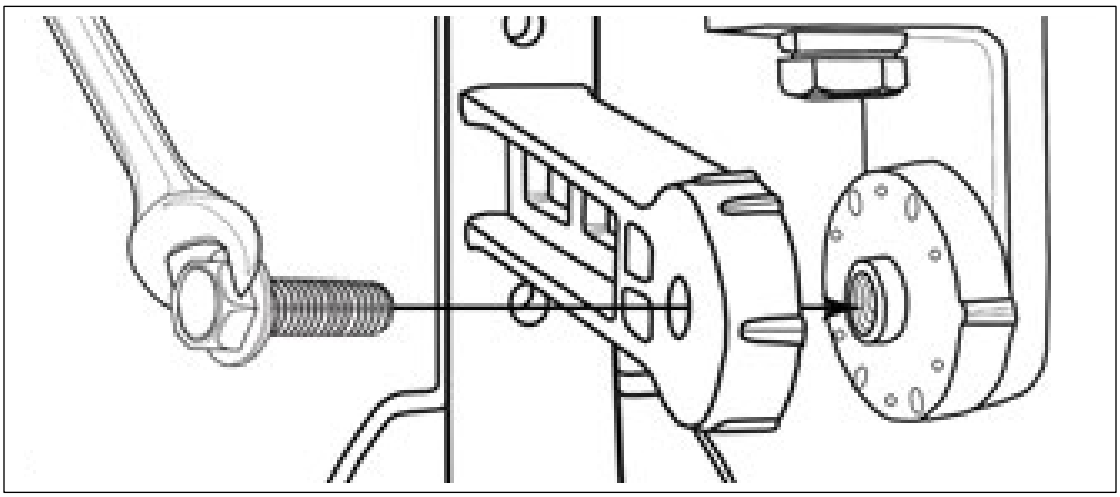
The Gateway Node comes with a standard 25 foot (7.5 meter) ethernet cable connected to it. Make sure the Gateway Node is mounted within 24 feet of the Power Panel Enclosure, that way drip loops can be incorporated on the ends of the connection.

© 2017 OPIsystems Inc

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. While on the ground loosely attach the foot mount to the base of the Gateway Node using the 7/16” bolt and washer with a 7/16” wrench.



3. Using the cordless drill with the 3/8” Nut Driver, secure the Gateway Node in place with the three 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

© 2017 OPIsystems Inc

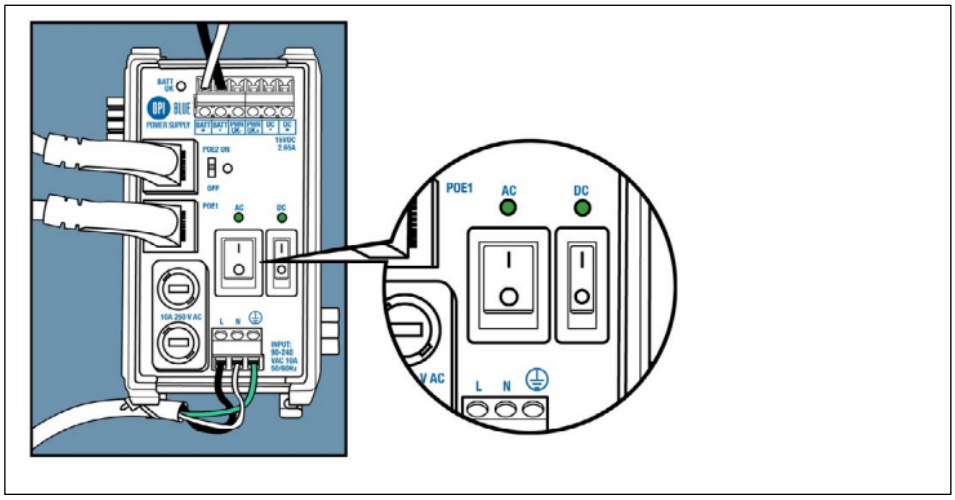
7/16” wrench, tighten the Gateway Node on the foot mount so it is secured in a vertical position.

4. Create a drip loop with the Ethernet cable coming from the base of the Gateway Node. Secure the cable using the tie wrap through the opening of the neck of the foot mount. The drip loop ensures water will not run into the Gateway Node.

5. Run the Ethernet cable from the Gateway Node 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 keep water out of the Enclosure box.
6. 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.

© 2017 OPIsystems Inc

7. 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.
8. Turn both the A/C and D/C switches to the ON position on the power supply. The Gateway Node takes roughly 60 seconds to run through its start up sequence. **Note:** Depending on the lighting you may or may not see flashing blue lights from the Gateway Node during the start up sequence.



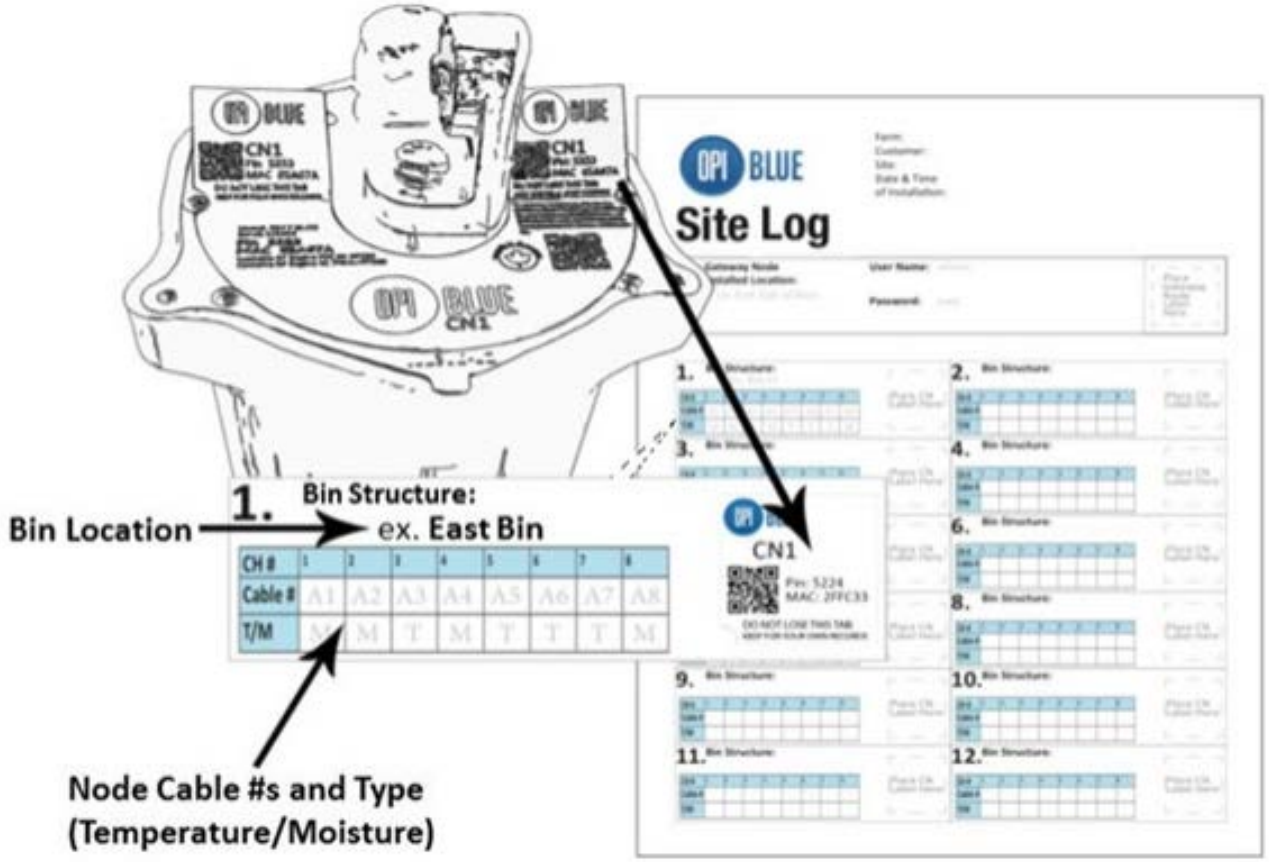
Note: When cycling power to the Gateway Node it is important to keep the power switch in the OFF position for 30 seconds before reapplying power. This will ensure the system has completely powered down.

3.4 Cable Nodes

Site Log

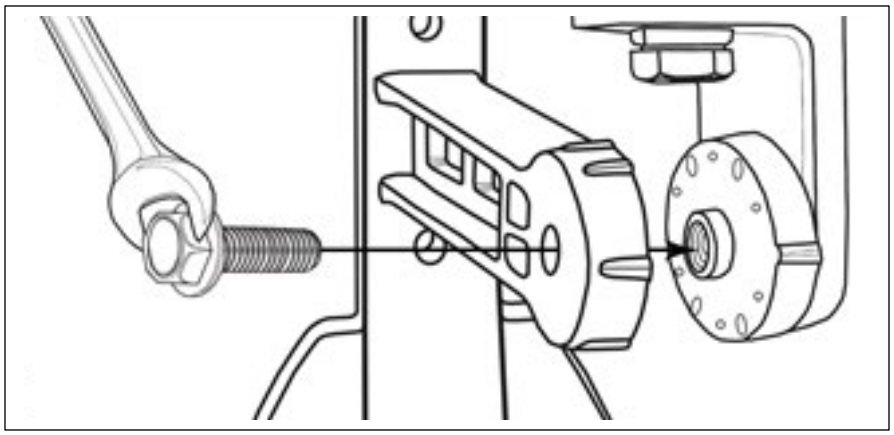
Note: As previously noted an example of the Site Log is located on page 63 of this manual. Just like the Gateway on the bottom of the Cable Node there are stickers with the MAC Address and the PIN Number for each unit. Write the Bin Name/Number on the sheet and place the corresponding sticker beside 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.

© 2017 OPIsystems Inc



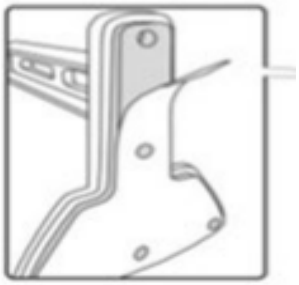
Mounting the Cable Nodes

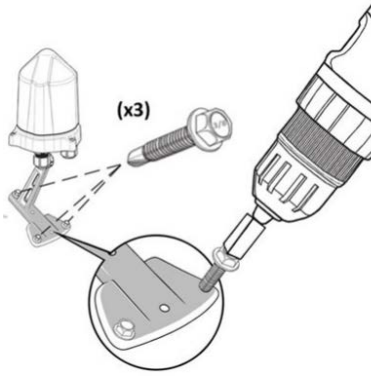
1. You are now ready to install the Cable Node(s). While on the ground loosely attach the foot mount to the base of the Cable Node using the 7/16” bolt and washer with a 7/16” wrench.



© 2017 OPIsystems Inc

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.





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 2600 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.

© 2017 OPIsystems Inc

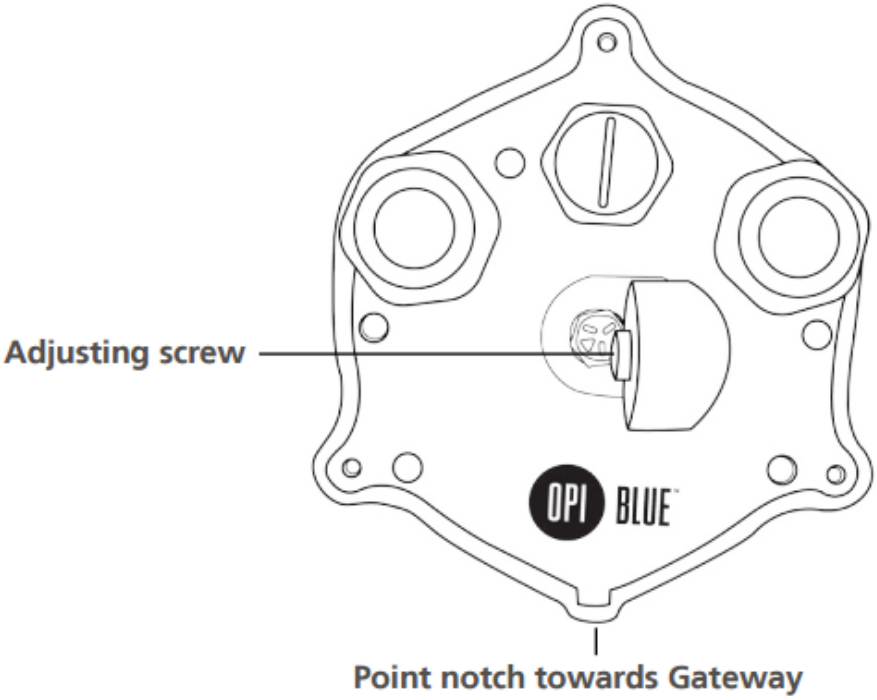


Fig. 1.0

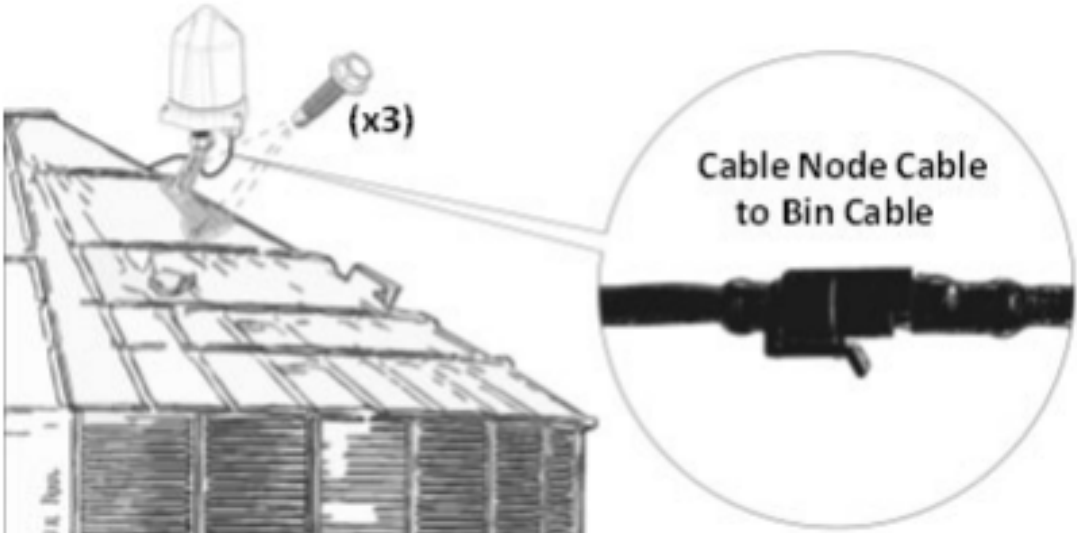
3.5 Cable Connections

Depending on the type of cable configurations (number of cables in a bin) there will be either a single channel (CN1) or a multi-channel (CN8) Cable Node.

Single Cable Installation with Single Cable Node (CN1)

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.

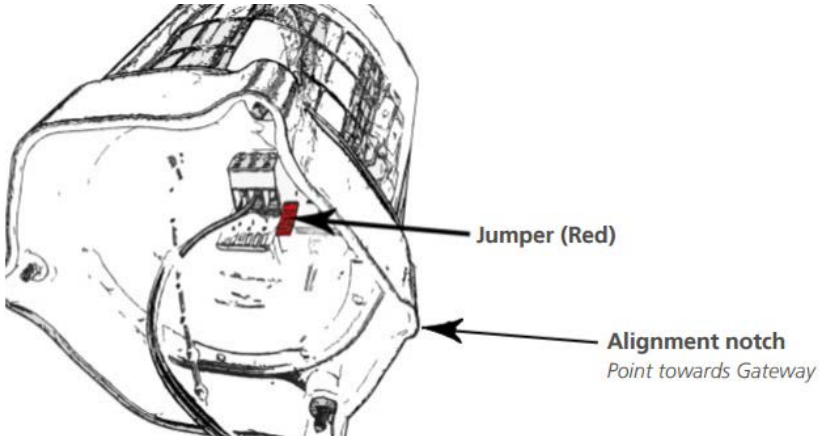
© 2017 OPIsystems Inc



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.



© 2017 OPIsystems Inc

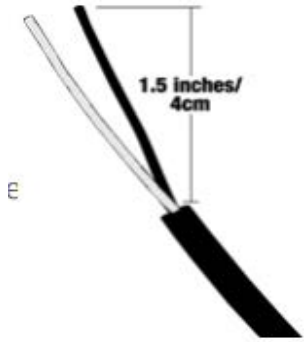
4. Take the jumper and turn it upside down before sliding it behind the prongs you just removed it from. This keeps it in a secure place should it ever be needed in the future to reset the Cable Node.
5. Realign the cover to the Cable Node base by lining the notch indicator on the cover to the notch 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.

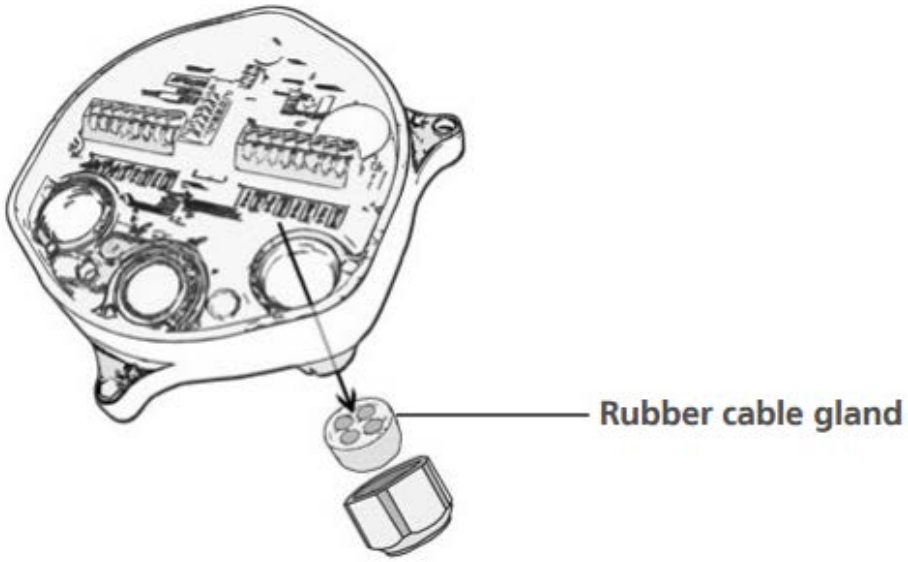
Multi-Cable Installation with Multi-Channel Cable Node (CN8)

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.

© 2017 OPIsystems Inc

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.

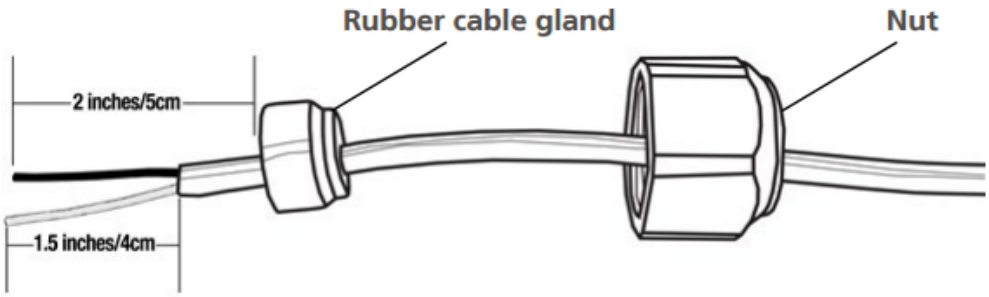




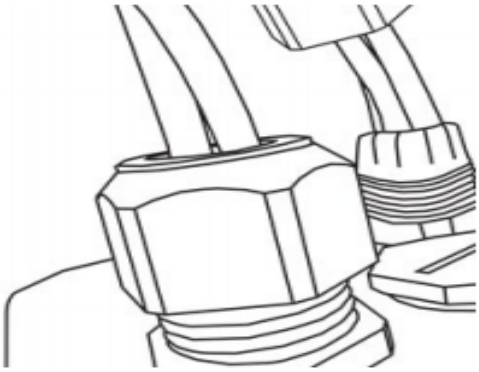
4. Use a small screwdriver to create a tiny opening in the membrane of the gland this way the cable lead wire can be fed through it.

5. Pull 2 inches (5 cm's) 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.

© 2017 OPIsystems Inc



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.

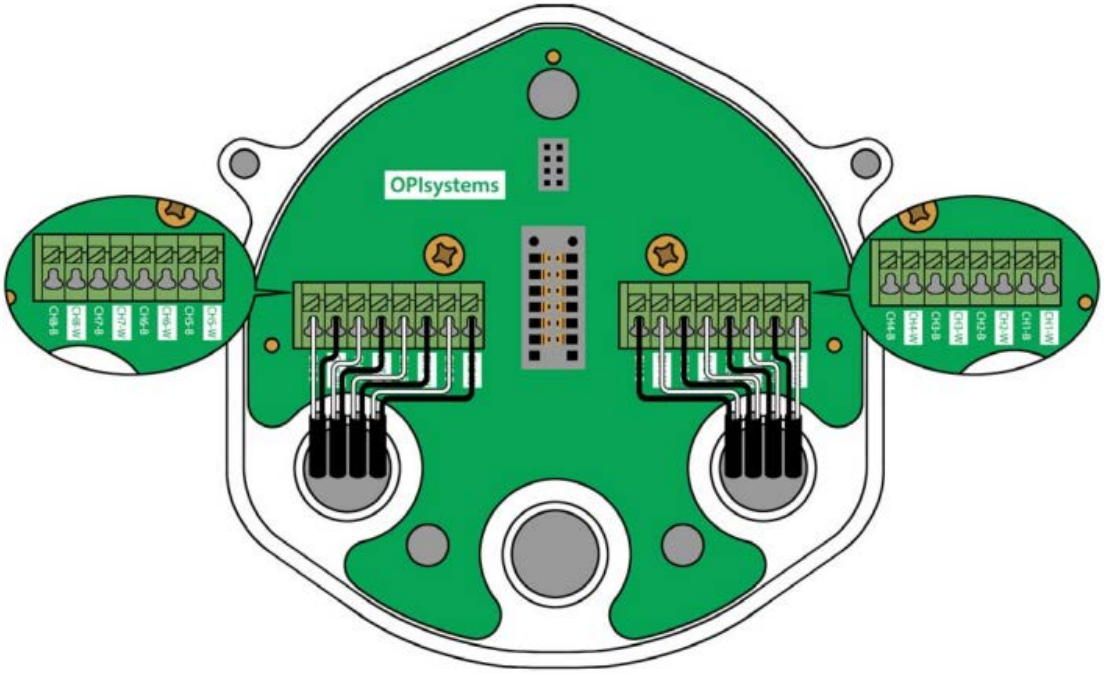


7. Take your wire strippers and remove 3/8” off both the black and white wire exposing the bare wires.

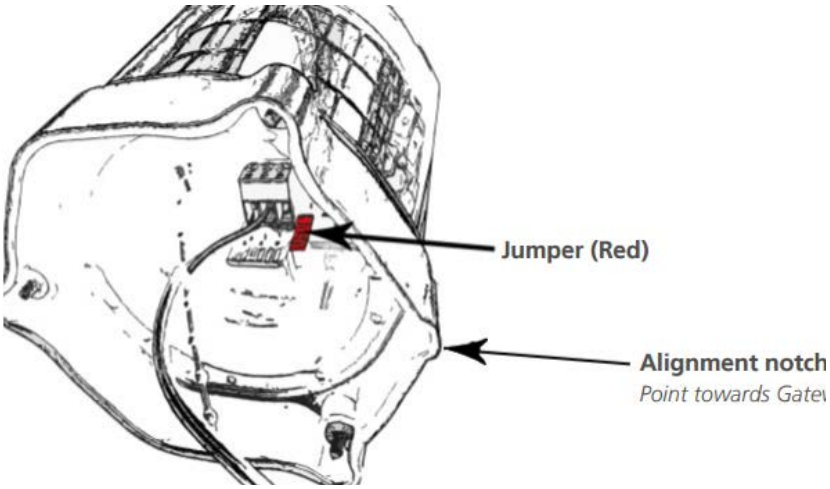
8. Take your small flat edge screwdriver to depress the applicable channel tab and insert the black and white wire into the corresponding terminals. Ensure the wire is fully inserted in each terminal with no bare wires

© 2017 OPIsystems Inc

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



9. 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.



© 2017 OPIsystems Inc

10. 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.
11. 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.
12. 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.

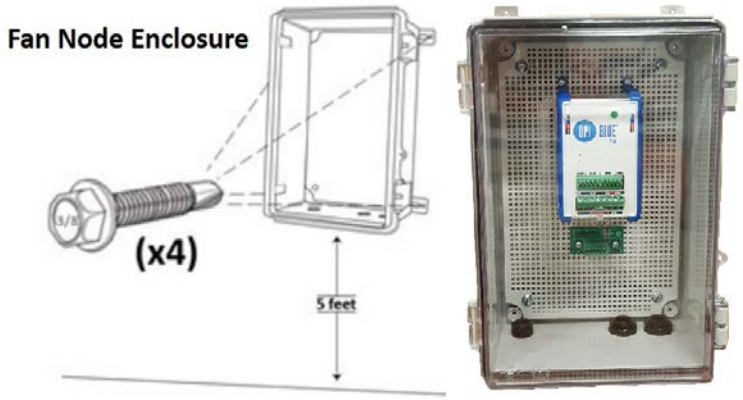
3.6 Fan Node

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 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.

© 2017 OPIsystems Inc

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.

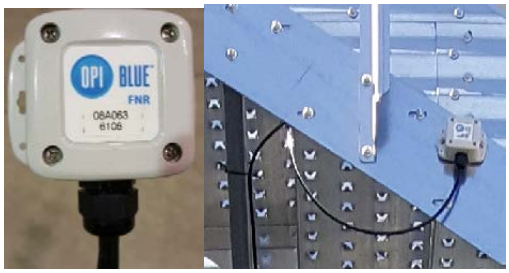


3.7 Fan Node Radio

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.

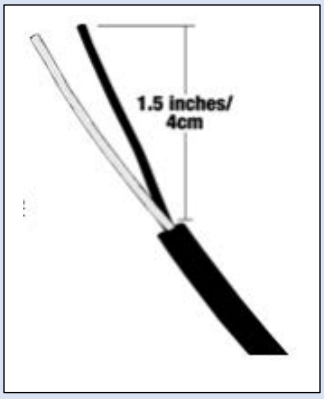
© 2017 OPIsystems Inc



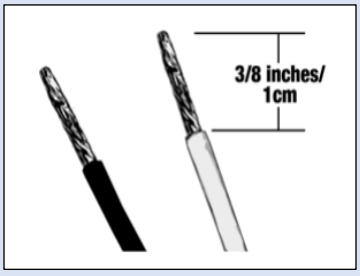
2. Bring the Communication cable (COM2) cable into the Fan Node enclosure through a strain relief and terminate in the proper connection.

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.

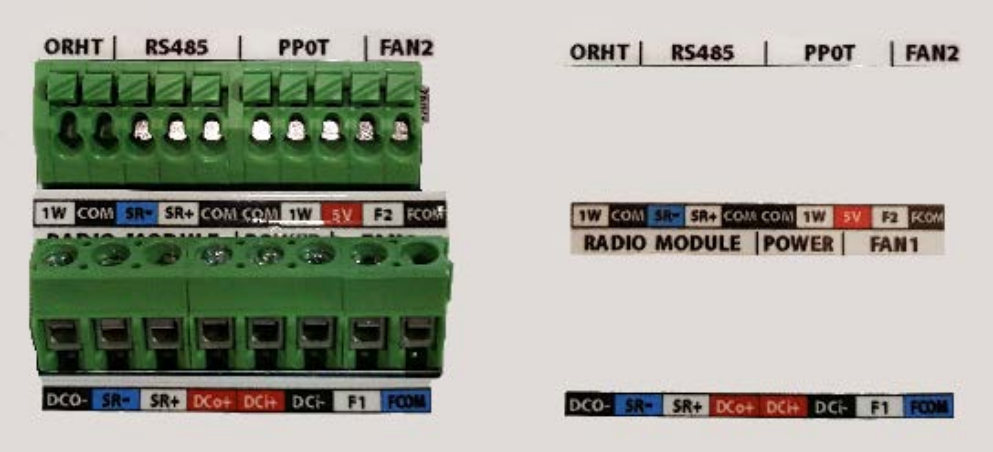


For all wires, use a 20-AWG wire stripper to remove 3/8 inch (1 cm) insulation. This ensures a good consistent termination of all wires. Use a 22-AWG wire stripper for the blue and white communication wires, removing a similar amount of insulation as before.



© 2017 OPIsystems Inc

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.**

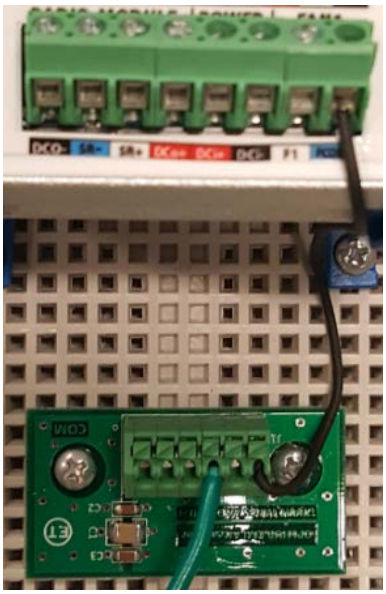
Fan Node Termination Connection Guideline Chart		
Input/Output	**Connection**	**Notes**
Fan 1 & Fan 2	**Fan 1:** F1 FCOM **Fan 2:** F2 FCOM	Maximum two fan outputs per Fan Node. Connect Communication cable (COM2) from the outputs to the Fan Relay.
Weather Station (ORHT)	**ORHT:** 1W COM	INT2 cable connection.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

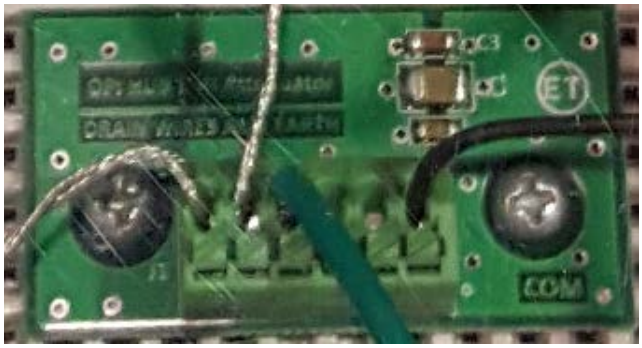
© 2017 OPIsystems Inc

		(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 located below the Fan Node is an EMI Attenuator. This device is used to help remove any Electromagnetic Interference that may be generated. A short piece of black power wire will be connected from the FCOM termination on the Fan Node into the far-right termination on the Attenuator label as COM. The green bin grounding wire and the remaining drain wires from the Communication cable (COM2) will be connected into open termination located on the left side.

© 2017 OPIsystems Inc





(Left) Black wire terminated in FCOM connection on Fan Node and COM termination on the Attenuator. (Above) Green ground wire and drain wires from Communication Cable (COM2) connected in open left terminations on 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 if 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.

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 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 64 at the end of the manual.

© 2017 OPIsystems Inc

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.

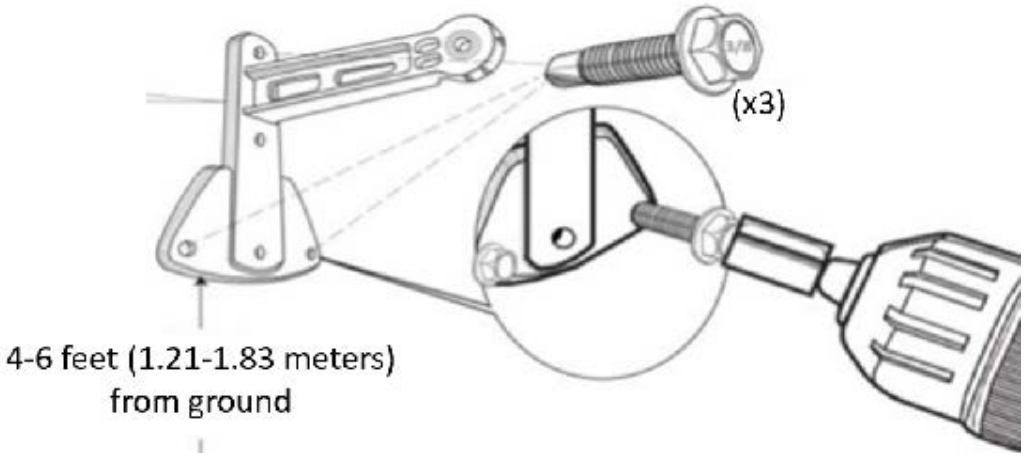
© 2017 OPIsystems Inc

3.8 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.

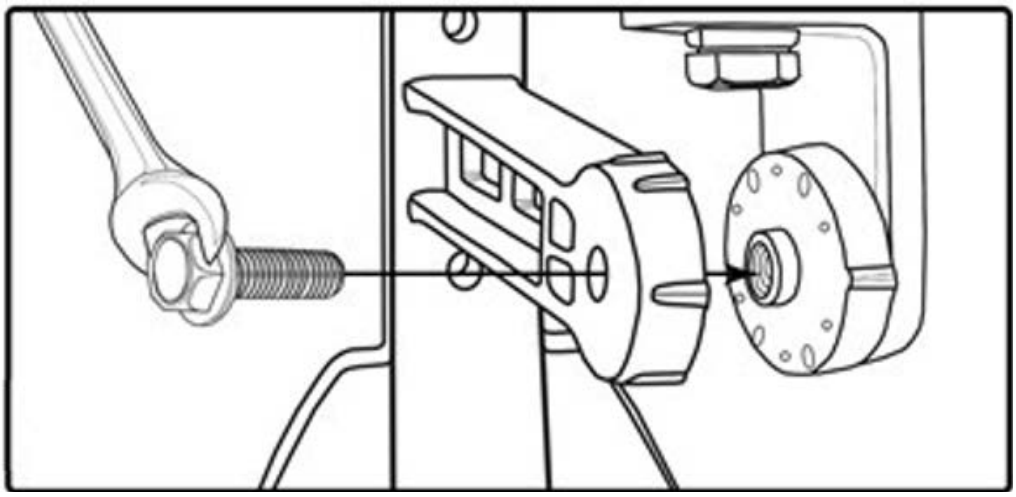
1. Determine the desired location keeping in mind the optimal location parameters.
2. Using a cordless drill with a 3/8” Nutsert attach the 3 self-tapping screws (Included in the Weather Station box) securing the foot mount in the desired location.

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.



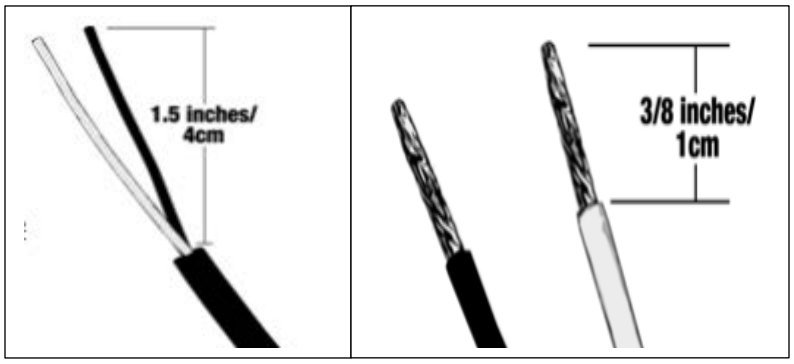
© 2017 OPIsystems Inc

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)



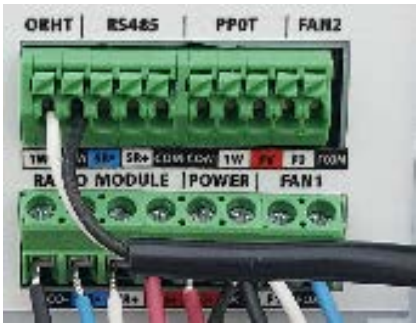
4. Run the INT2 lead wire to the Fan Node enclosure through the strain relief at the bottom. Cut the INT2 cable to the proper length before it has been terminated. This will ensure the correct length and avoid any excess cable or risk from it being cut too short.

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.



© 2017 OPIsystems Inc

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.

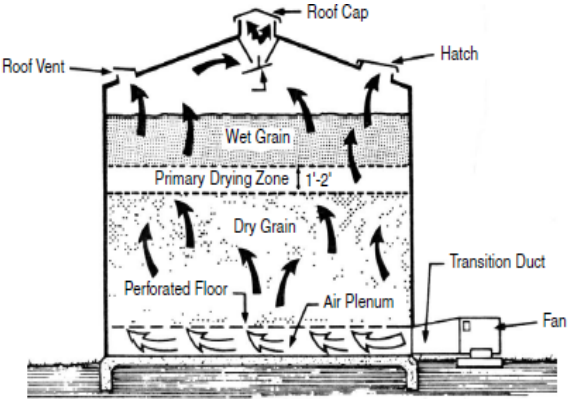
© 2017 OPIsystems Inc

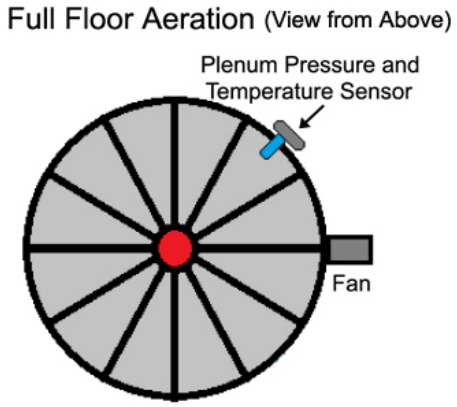
3.9 Plenum Pressure Sensor (PPOT)

Note: The Plenum Pressure and Temperature Sensor (PPOT) serves two purposes within your OPI Blue – Fan Control System. Having a temperature sensor installed in the Plenum enables the temperature of the air to be measured as it enters the bin. This is different than the ambient air temperature measured by the Weather Station (ORHT) as there is a fan warming effect that raises the temperature as it enters the bin. The Plenum Pressure and Temperature Sensor also measures a static pressure change within the Plenum, (below the false floor in the bin) which provides validation through this feedback that the fan(s) have physically turned on when triggered to do so 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 water tight flex conduit can be used to provide a more cost effective and easier to install solution in this application. The PPOT comes with 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 location shown below.





© 2017 OPIsystems Inc

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 strap 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 water tight connection.

© 2017 OPIsystems Inc

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.

4.0 OPI Blue, Cloud Version w/Fan Control

The OPI Blue www.managegrain.com is a 24 hour, seven days a week system that continuously monitors the grain storage conditions to ensure that the quality of the grain is maintained. The operational data collected from the storage facilities is pushed to the Cloud based servers on an hourly basis and is accessible through any device that has a web browser with an internet connection.

The OPI Blue Cloud platform continues to increase in features and functionality, adding to the flexibility and value it brings to managing your stored grain assets. By adding the Fan Node, Fan Node Radio along with a Weather Station (ORHT) into the system you now have the capabilities within the User Interface to not only monitor your grain but to also use the weather station data and fan control functionality to effectively and efficiently run your fans to condition your grain.

1. **Home Screen (Dashboard)** – Provides an overview (health check) of the entire field operations. (All sites combined)

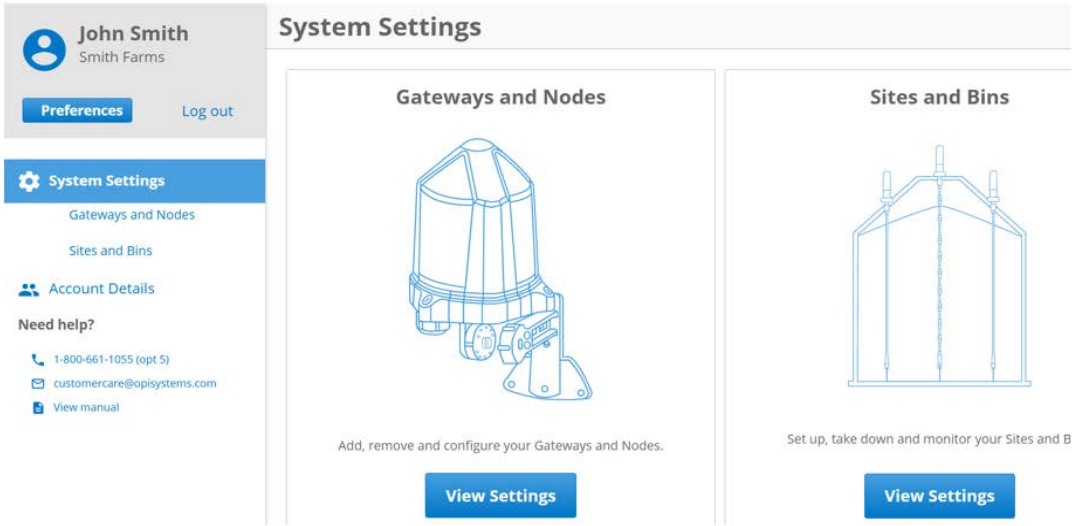
© 2017 OPIsystems Inc

2. **System Settings** – This is where all installed hardware (ie. Gateways, Cable Nodes, Fan Node, Fan Node Radio and Weather Station) is configured for use by OPI Blue. It is also where the user defines the values that are to be used to display operational results.
3. **Grain Condition** – This is where the collected data from the sites/bins is displayed so it can be monitored by the user.

4.1 Home (Dashboard)

Home Screen

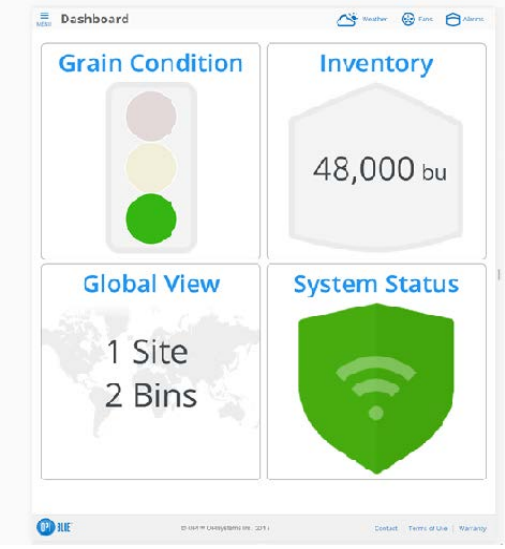
When you have logged into the www.managegrain.com website for the first time you will land on the **Systems Settings** page to begin the process of registering the hardware installed at the site and completing the configuration.



Each subsequent time that you log into the www.managegrain.com website, you will land on the home screen. The Home screen provides a Dashboard with four tiles in the center displaying pertinent information. The information is shown in

© 2017 OPIsystems Inc

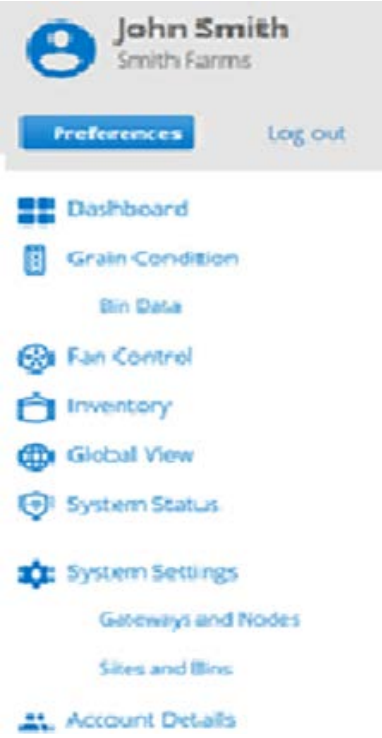
the following categories: Grain Condition, Inventory, Global View and System Status. This screen can be accessed anytime by selecting **Dashboard** from the menu screen when it appears down the left-hand side of the screen or by clicking on the OPI Blue logo located in the bottom left-hand corner of each screen.



Note: All screen shots are shown in the **Desktop** view. If you are using a mobile device the same information is available however; it may be necessary to scroll to view it due to the smaller screen size.

© 2017 OPIsystems Inc

Menu



Typically, the menu is not visible within the User Interface unless you tap the Menu Icon located in the top left-hand corner of the screen. When the menu is available the various options are listed down the left-hand side of the screen. Tap on the appropriate line from the menu to access the required option.

Alarms

Alarms are triggered by the OPI Blue system when certain conditions arise that are deemed to be outside the normal operating range of the bins with grain in storage being measured or certain system issues. Temperature alarms include **Rate of Rise** and **High Temperature**. System alarms can occur and these include **Gateway Connection Loss** and **Gateway A/C Power Loss**.

Other Functions

There are several other functions or pieces of information within the system that can be useful. They include:

OPI Blue Logo – Displayed on the bottom left-hand corner of all screen. Tapping it will take you back to the Dashboard.

Contact – Lists the contact information for both the Canada and US offices.

Terms of Use – Outlines the required user actions, terms of use etc.

© 2017 OPIsystems Inc

Warranty – Provides system warranty information and warranty process.

Help Option – Located at the bottom of the menu navigation.

Note: If the system has a Weather Station and/or is Fan Control enabled you will notice the following three icons located in the top right corner of each screen.

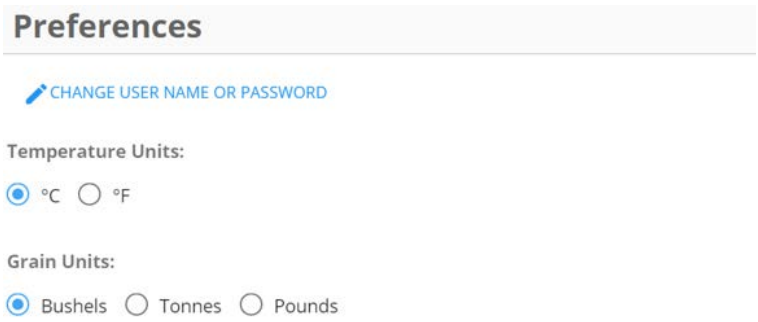
Icon	Action
	Tapping the Weather Icon will display Ambient Temperature and Humidity values across the top of the screen.
	Tapping the Fans Icon will take you to the Fan Control screen.
	Tapping the Alarms Icon will any active alarms.

Preference Settings

While making updates to your Preferences can be made at any time by tapping the menu icon opening the menu located in the top left-hand corner of the screen, it is recommended that the Preferences are set before moving onto the additional configuration steps.

1. Tap the **Preference** button.
2. Tap the **Radio** button to select the desired Temperature Units and the Grain Units.

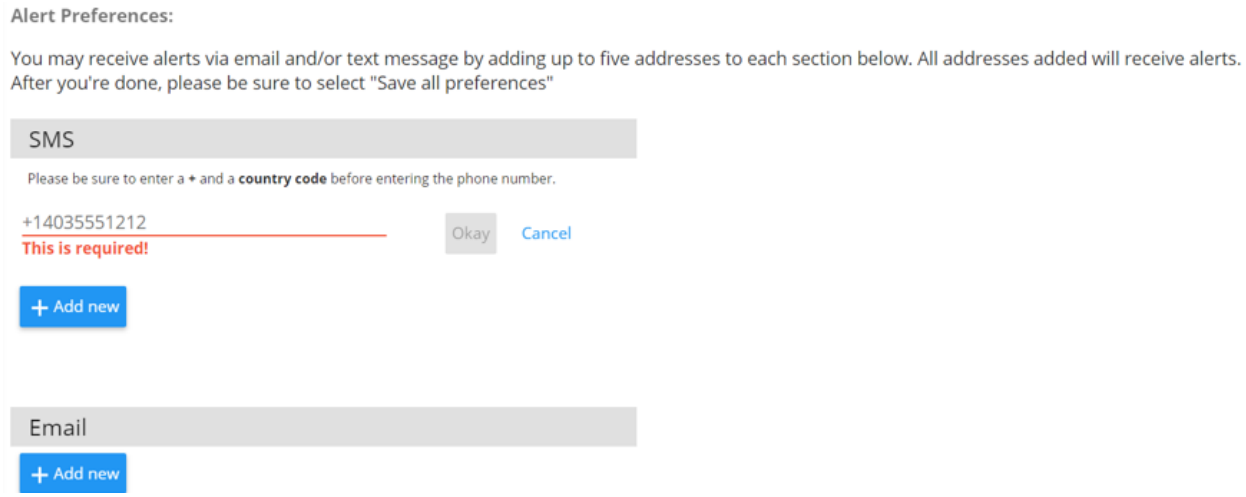
© 2017 OPIsystems Inc



Alarm Preferences

Note: Alarm notifications can be received by the end user(s) by setting the preferences (**Email** or **SMS/Text** Message). Up to 5 separate email addresses can be added along with up to 5 separate SMS numbers.

3. Under SMS or Email Tap the **+Add New** button
4. Type in the appropriate SMS phone # or email address, being sure to follow the exact format shown for SMS phone numbers.
5. Tap the **Okay** button to finish the existing SMS or email address.
6. Repeat the process to add all additional SMS and email addresses if necessary.
7. Tap the **Save all Preferences** button.



© 2017 OPIsystems Inc

4.2 Settings and Configuration

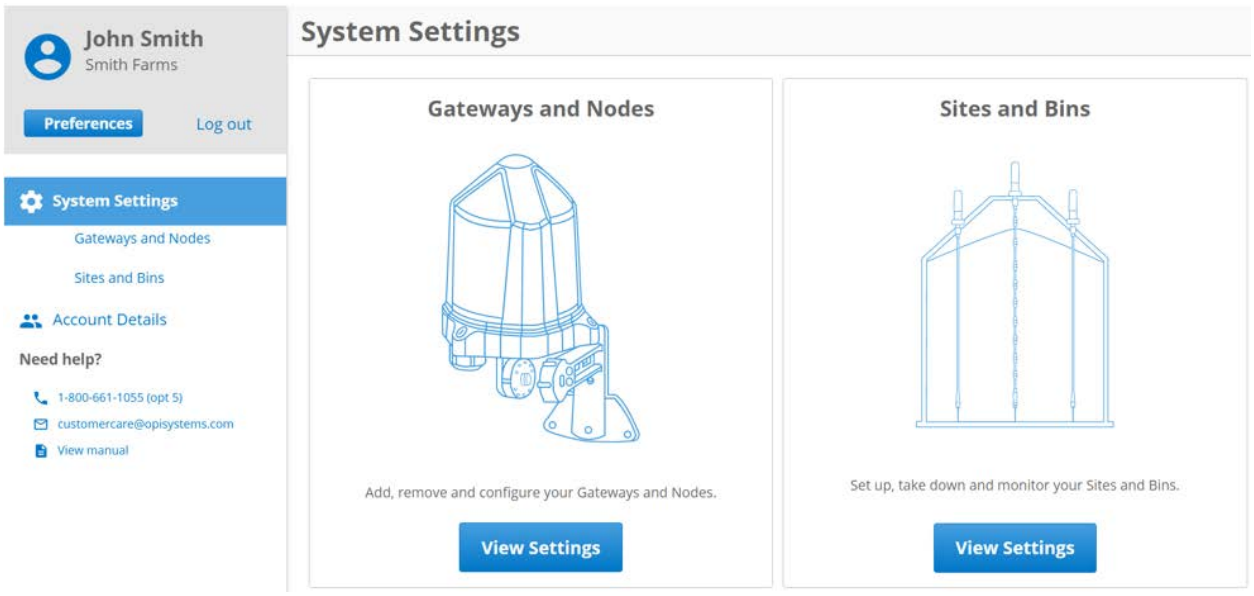
This section covers the setup and configuration of the physical hardware installed at the site. It is important that these steps are followed accurately to ensure all equipment is working as expected and reporting data

The instructions in this section will cover the configuration of the following items:

- **Gateways**
- **Cable Nodes**
- **Fan Node Radio**
- **Sites**
- **Bins**
- **Cables**
- **Weather Station**

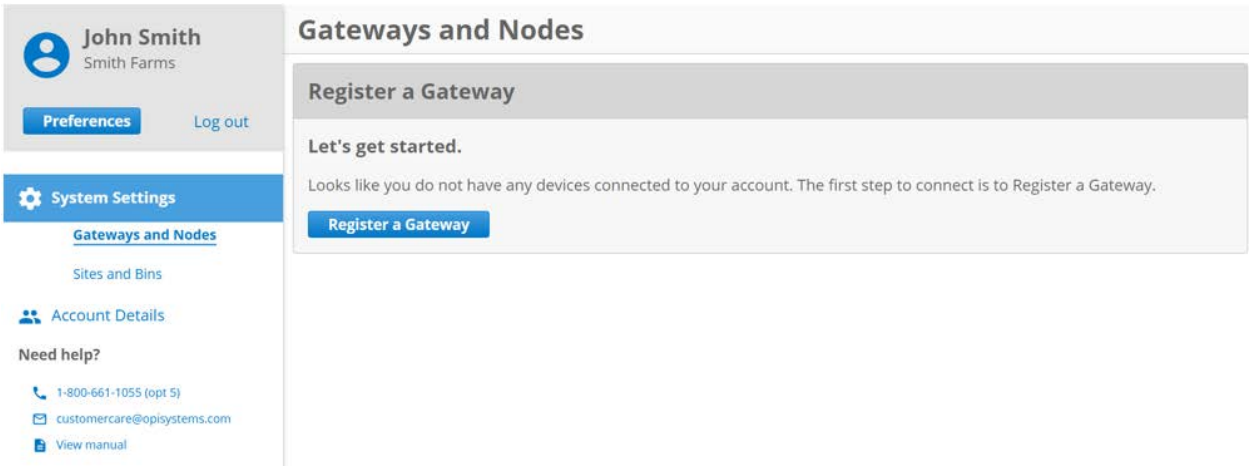
4.2.1 Gateways

1. Tap the **View Settings** button to start the process of registering a Gateway.

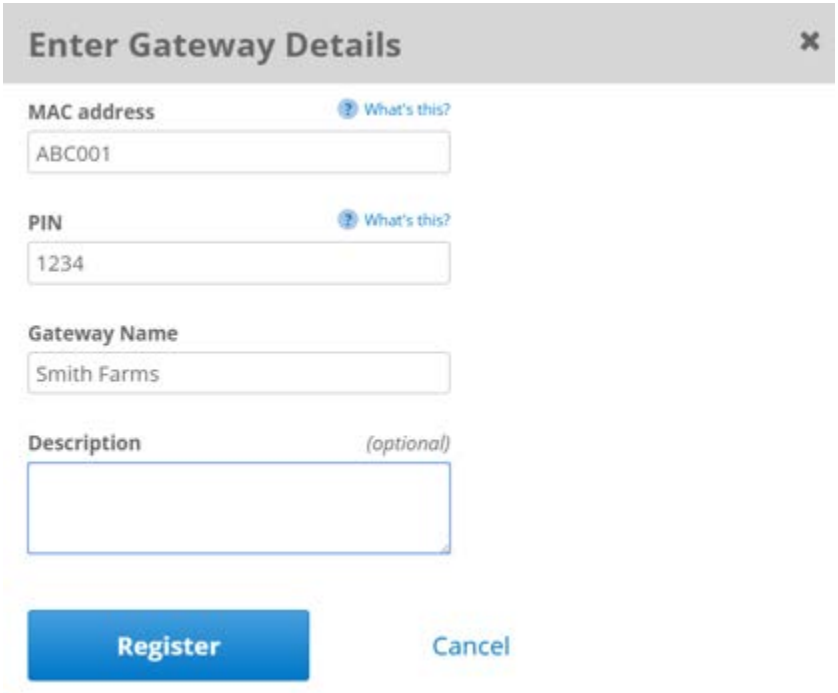


© 2017 OPIsystems Inc

2. Tap **Register a Gateway**



3. A pop up will appear. **Fill in** all applicable information (MAC Address, PIN and Gateway Name).



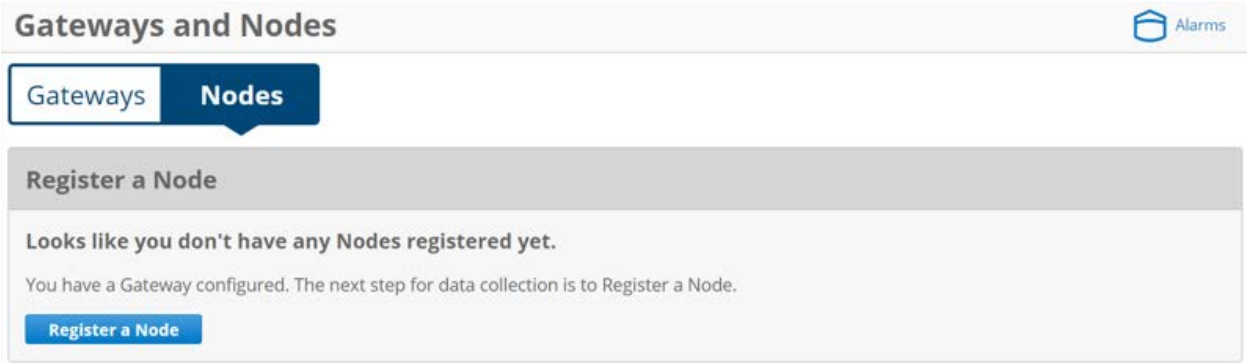
4. Tap **Register** button to finish the process.

Note: When the registration of the Gateway has been complete, you should see the following screen. It is important that the **Status** appear as Online. This way you will know it has been successful.

© 2017 OPIsystems Inc

4.2.2 Cable Nodes

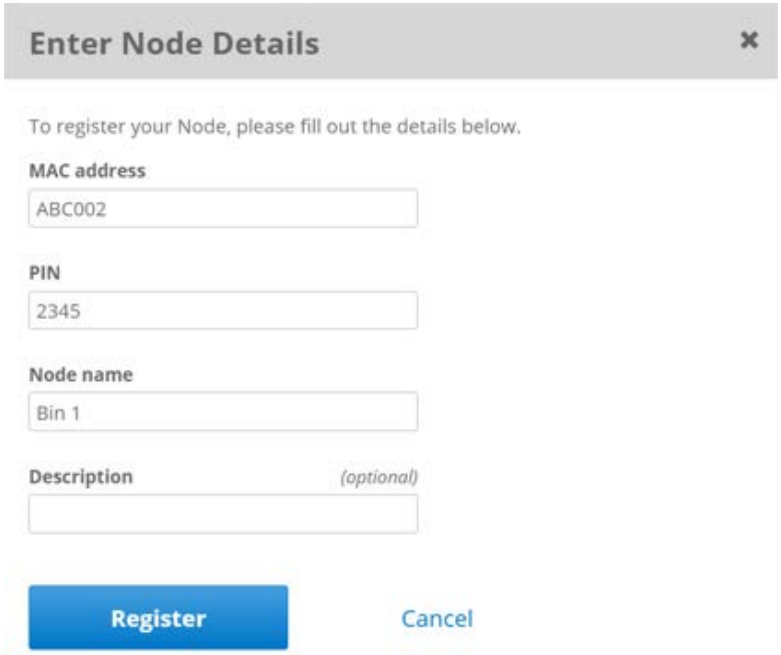
1. Tap the **Nodes** button to start the process of registering a Cable Node.



2. Tap **Register a Node** button.

© 2017 OPIsystems Inc

3. A pop up will appear. **Fill in** all applicable information (MAC Address, PIN, and Node Name).



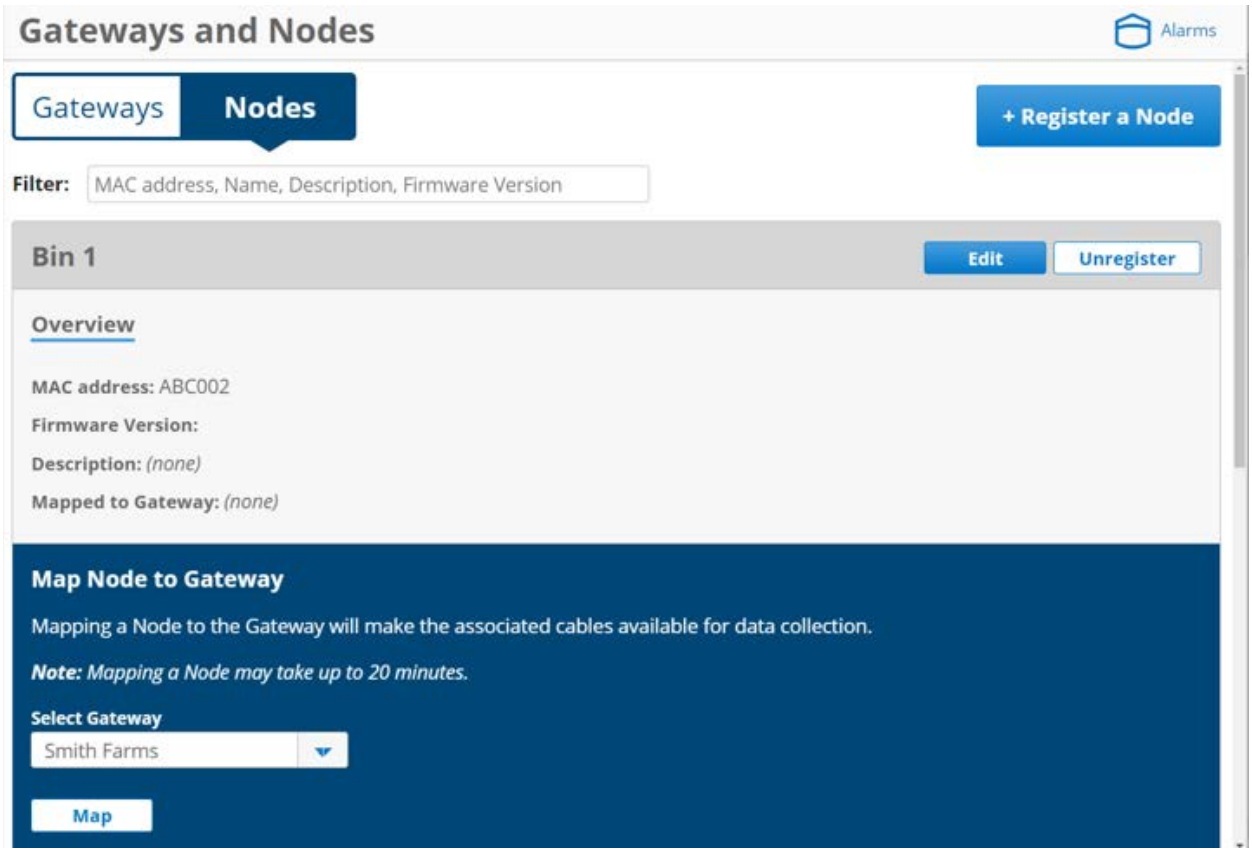
4. Tap **Register** button to finish the process.
5. Repeat the Cable Node registration process for all the Nodes that have been installed at the site until complete.

Note: Once all the Cable Node have been registered they will need to be **Mapped** to the associated Gateway onsite.

4.2.3 Map Cable Node to Gateway

1. Using the Filter select the Cable Node needing to be mapped to a Gateway.

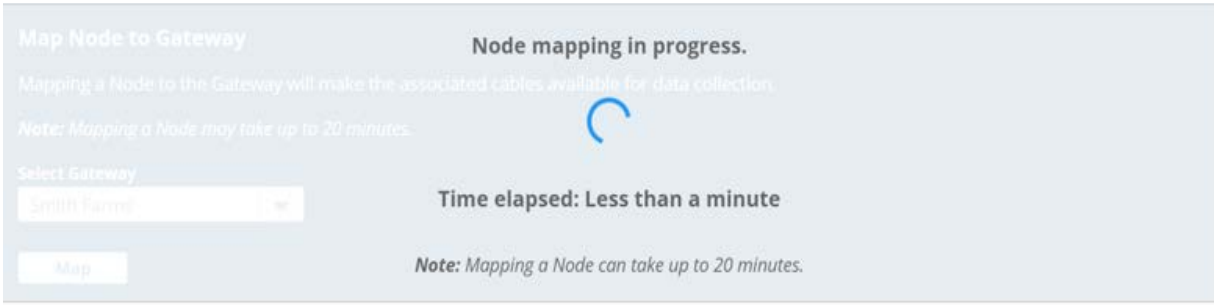
© 2017 OPIsystems Inc



Note: If there are multiple Gateways registered use the dropdown list to select the appropriate one the Cable Node needs to be mapped (associated) to.

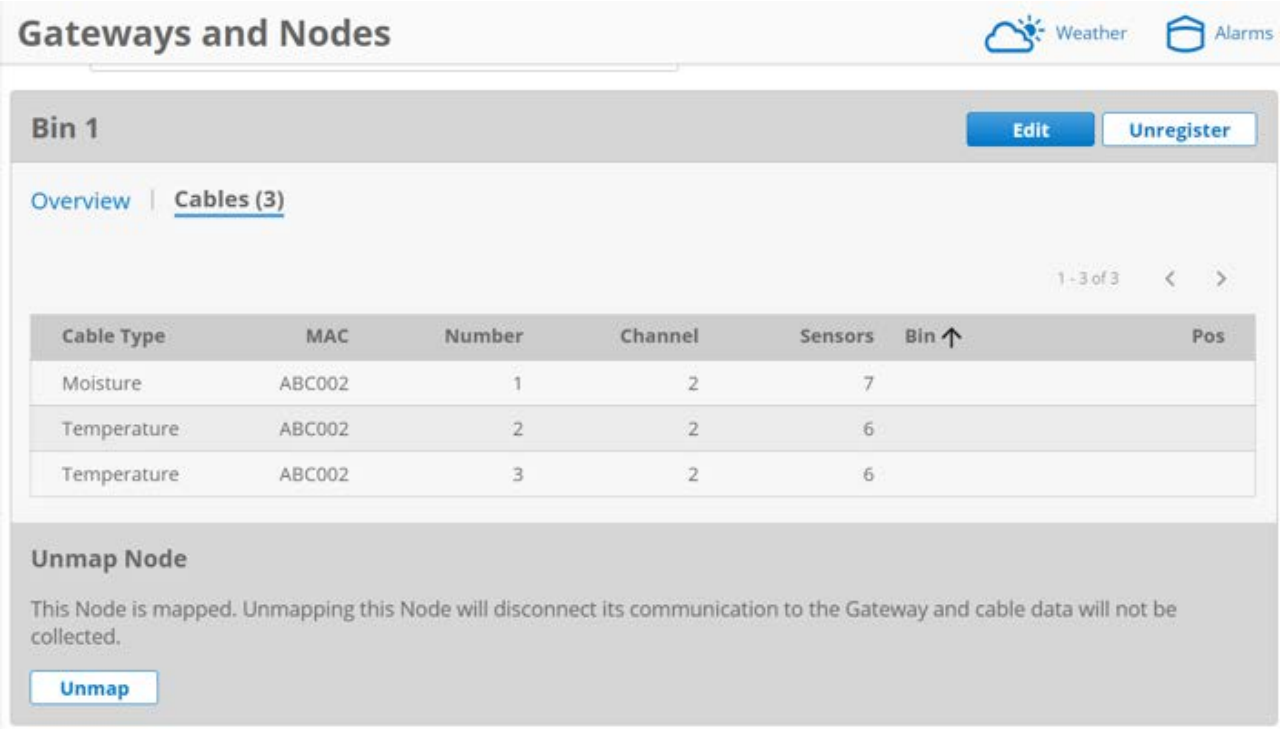
2. Select the appropriate Gateway from the dropdown list and tap the **Map** button.

Note: Mapping typically takes a couple minutes per Cable Node. During this process, the time elapsed will be displayed on the screen. If it takes longer than 20 minutes a time out message will appear. This typically indicates a communication issue.



© 2017 OPIsystems Inc

Note: Once a Cable Node has been mapped to a Gateway the cables associated to the Node will be displayed as shown below.

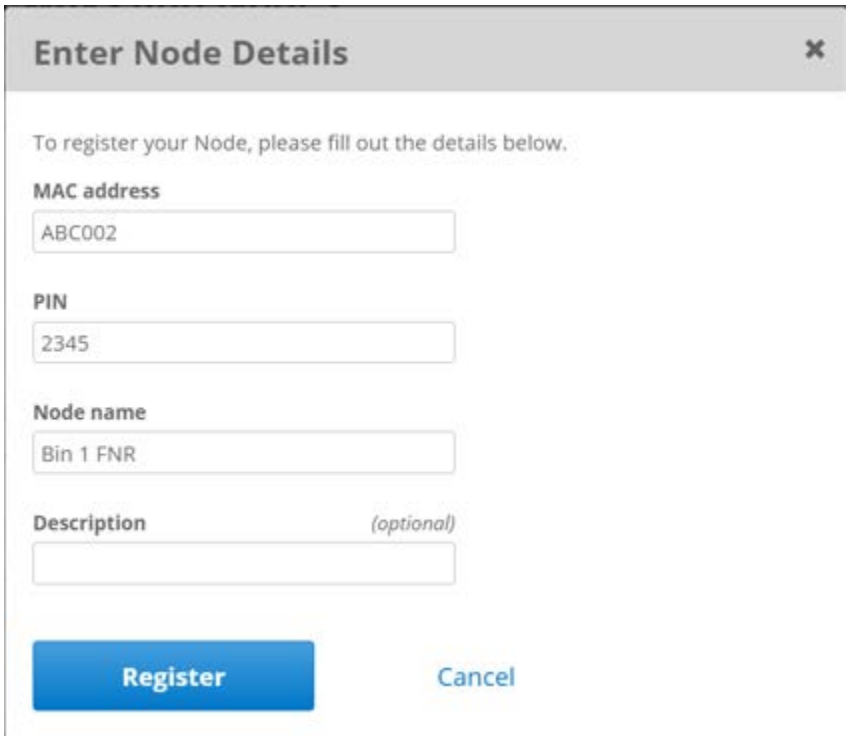


4.2.4 Register Fan Node Radio

1. Tap the **Nodes** button to start the process of registering a Fan Node Radio.
2. Tap **Register a Node** button.

© 2017 OPIsystems Inc

3. A pop up will appear. **Fill in** all applicable information (MAC Address, PIN, and Node Name).



4. Tap **Register** button to finish the process.
5. Repeat the Node registration process for all the Fan Node Radio that have been installed at the site until complete.

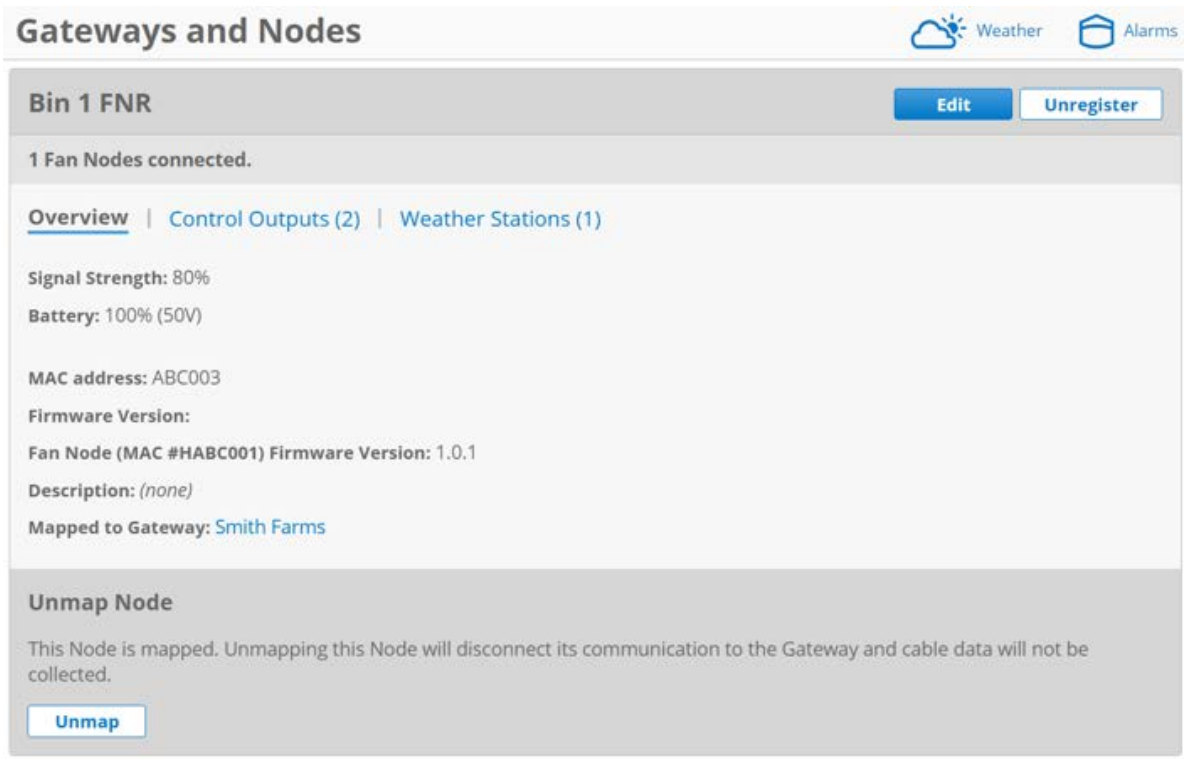
4.2.5 Map Fan Node Radio to Gateway

1. Using the Filter select the Fan Node Radio needing to be mapped to a Gateway.
2. If there are multiple Gateways select the appropriate one from the dropdown list and tap the **Map** button.

Note: Mapping typically takes a couple minutes per Fan Node Radio. During this process, the time elapsed will be displayed on the screen. If it takes longer than 20 minutes a time out message will appear. This typically indicates a communication

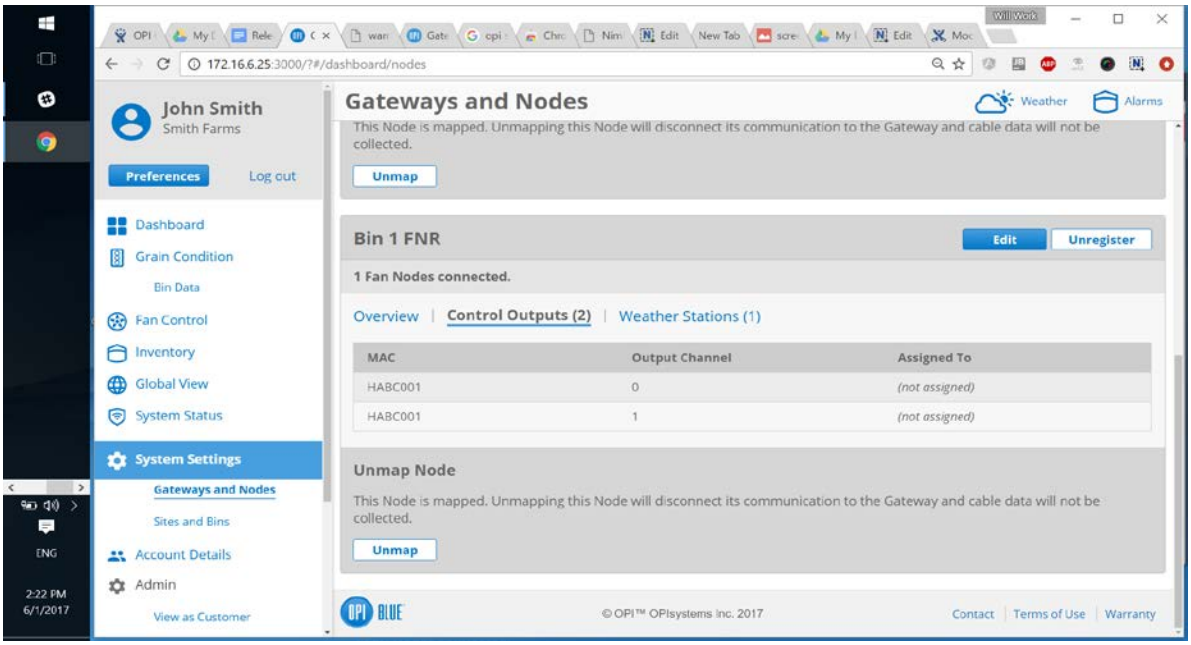
© 2017 OPIsystems Inc

Note: Once a Fan Node Radio has been mapped inputs (Weather Station) or outputs (Fans) that are connected to the Fan Node using registered Fan Node Radio will automatically be displayed as shown below.



Tap on either the **Control Outputs** or **Weather Station** to provide additional information by displaying the connected devices.

© 2017 OPIsystems Inc



Note: The Weather Station Icon

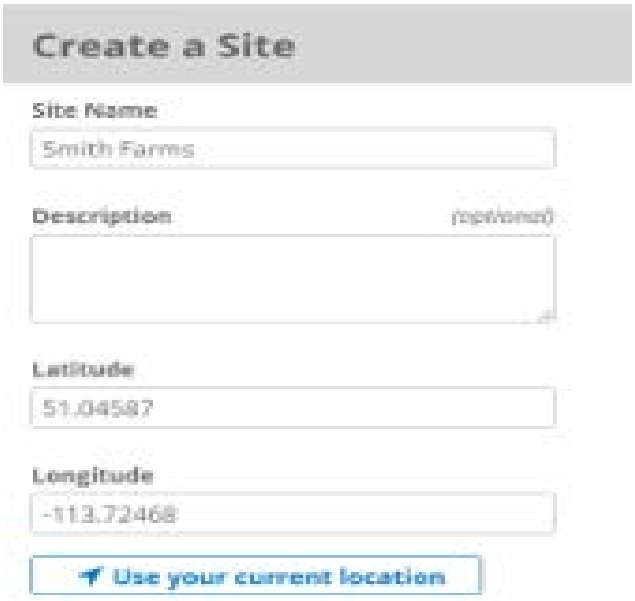
will appear at the top right-hand corner once a Fan Node with a Weather Station has been mapped.

4.2.6 Create a Site

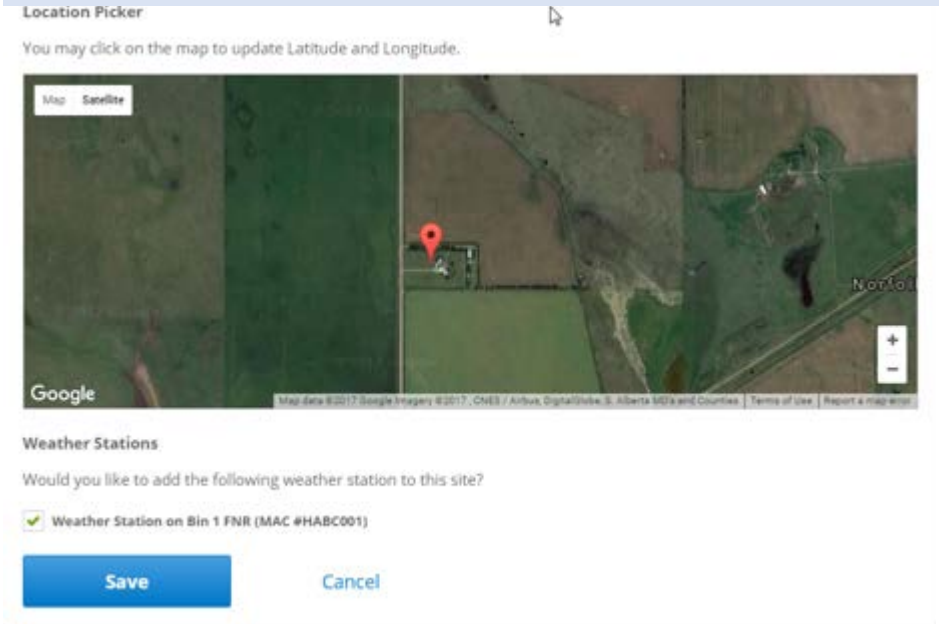
Note: Because the online system needs to match the physical sites, you will need to create the site and the associated bins on that site. If there is more than one site (Gateway in use) there will need to be multiple sites created.

1. From the menu tap on **Sites and Bins**.
2. Tap **Create a Site** button.
3. Fill in the required information, **Site Name** along with **Latitude** and **Longitude**.

© 2017 OPIsystems Inc



Note: If you are unsure of the Latitude and Longitude of your site location, you can use the map feature provided. Simply scroll on the map to the appropriate location and click on the location to place a marker. Once a marker has been place the Latitude and Longitude fields will auto populate with the information. Using the **Satellite** view on the map can aid in finding the exact location more easily.



4. If there is a Weather Station to be associated to this site, **place a checkmark** in the Weather Station box.

© 2017 OPIsystems Inc

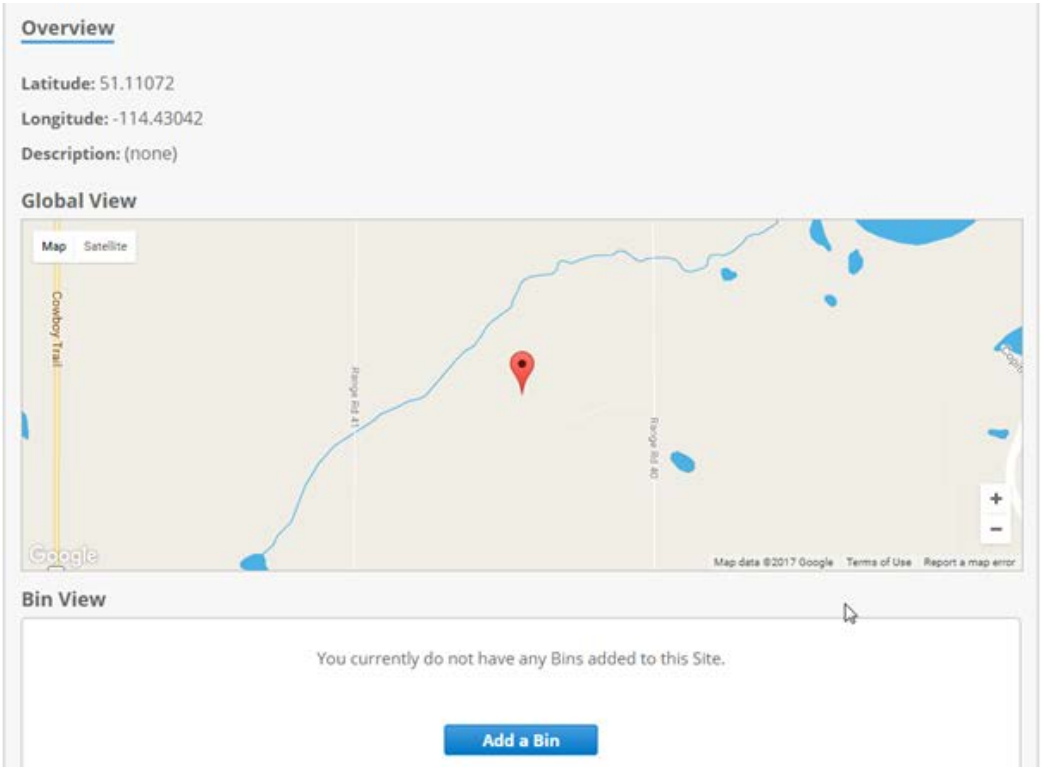
5. Tap the **Save** button.

Note: If there are addition sites, repeat the previously noted steps until all sites have been created. If there are no additional sites. Move onto creating bins to be added to the site(s).

4.2.7 Create Bins

Note: Creating Bins for a site is a relatively simple seven step process. The seven steps include: **Bin Details**, **Grain Info**, **Bin Parameters**, **Alarm Details**, **Add Cables**, **Add Weather Station** (if applicable), **Add Fans** (if applicable).

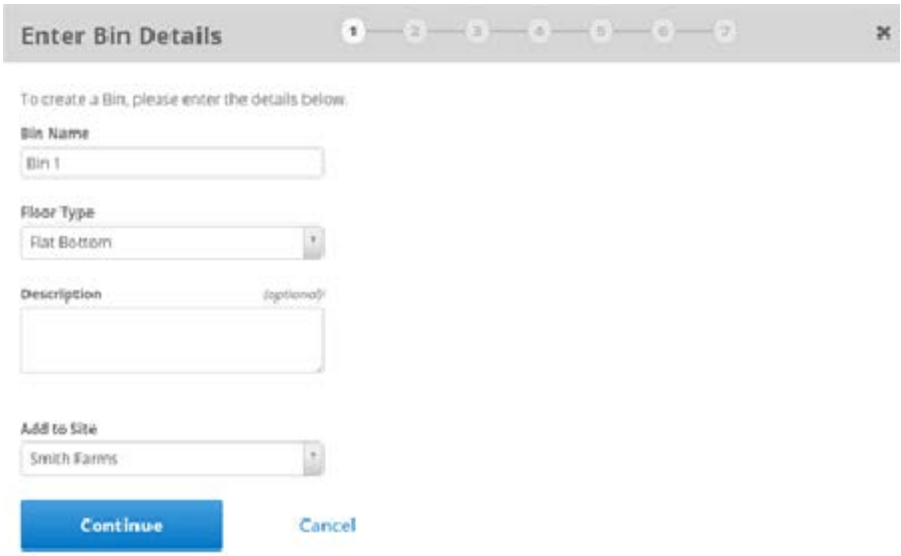
1. Tap the **Add a Bin** button located at the bottom of the Sites screen, located below the map. Alternatively, you can tap **Bins** button and the **Create a Bin** button within the bins screen.



© 2017 OPIsystems Inc

Bin Details

1. A pop up will appear on the screen. **Enter** all necessary Bin Details (Bin Name, Floor Type and using the drop-down Add to Site)



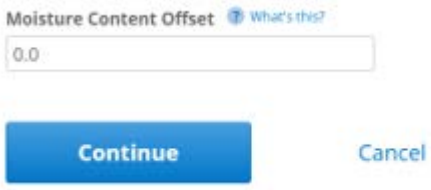
2. Tap the **Continue** button.

Enter Grain Info

3. A pop up will appear on the screen. **Enter** all necessary Grain Info (Meter Type, Grain Type, Class, Curve (Curve will auto populate if only one exists)).

Note: After all pertinent information has been entered, you will notice a **Moisture Content Offset** field. This field would be used if you notice a variance in the moisture readings in systems and those measured at the place you market your crop. OPIsystems Inc. has developed all the grain curves in house and they are calibrated for specific moisture meters. This greatly enhances the moisture reading data accuracy. Should you have any questions regarding the grain curves please contact OPIsystems Inc. at 1-800-661-1055 (Opt. 5)

© 2017 OPIsystems Inc



4. Tap the **Continue** button.

Enter Bin Parameters

5. A pop up will appear on the screen. **Enter** all necessary Bin Parameter Info (Fill Date, Bin Capacity, Price and Grain Level).

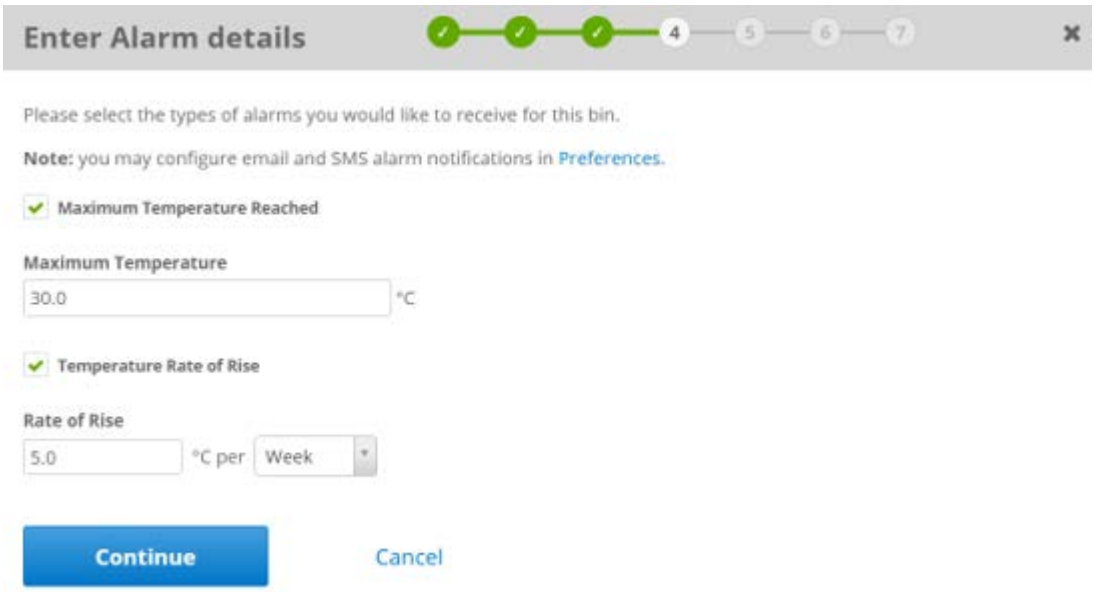
Note: There are two options for the Grain Level. Select **Auto Detect** or **Set Manually**. With the auto detect selected the system uses the cable data to determine the grain level in the bin by determining what sensors are in the grain and which are not. If it is set to manual a Level field appears and the bushel count of the grain in storage would be put into this field.

6. Tap the **Continue** button.

Enter Alarm Details

7. A pop up will appear on the screen. **Enter** all necessary Alarm Details, making sure a checkmark is in both the **Maximum Temperature Reached** and **Temperature Rate of** Rise to activate them.

© 2017 OPIsystems Inc



8. Tap the **Continue** button.

Add Cables

Note: Any cables that have been connected to a Cable Node will appear under the **Cable Available to Add** section.

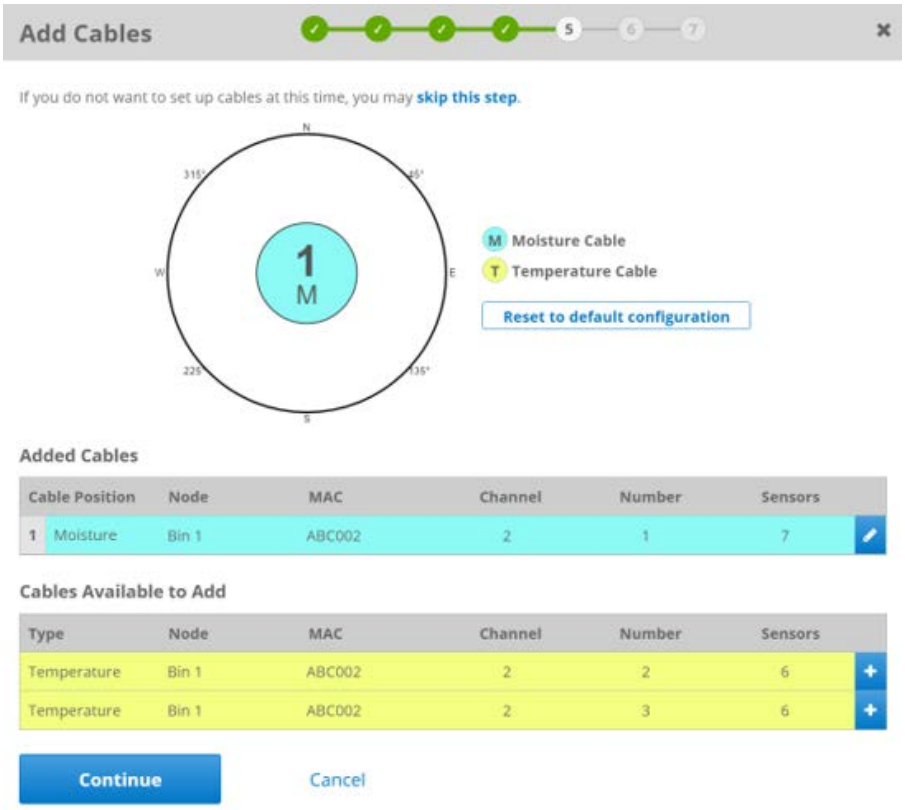
9. To add a cable(s) into a bin Tap the + at the end of a chosen cable.

Cables Available to Add

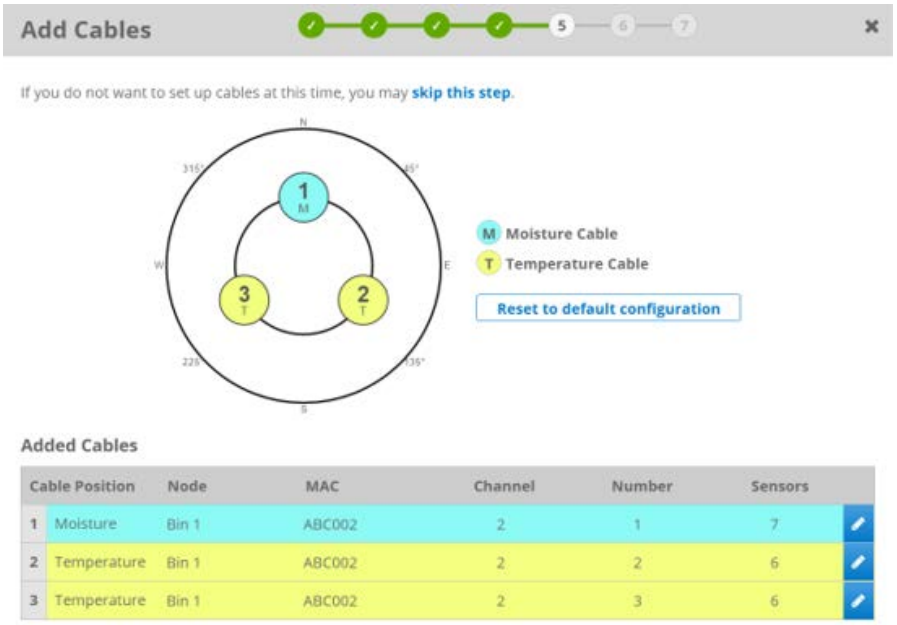
Type	Node	MAC	Channel	Number	Sensors	
Moisture	Bin 1	ABC002	2	1	7	+
Temperature	Bin 1	ABC002	2	2	6	+
Temperature	Bin 1	ABC002	2	3	6	+

The cable will move from the **Cables Available to Add** section to the **Added Cables** section and the added cable will appear inside the bin as shown below.

© 2017 OPIsystems Inc



10. Repeat the process to add until all specified cables have been added to the bin.



© 2017 OPIsystems Inc

11. *If necessary you can reposition the cables within the bin to ensure the proper location. Tap the located at the end of a specified cable to start the relocation process.

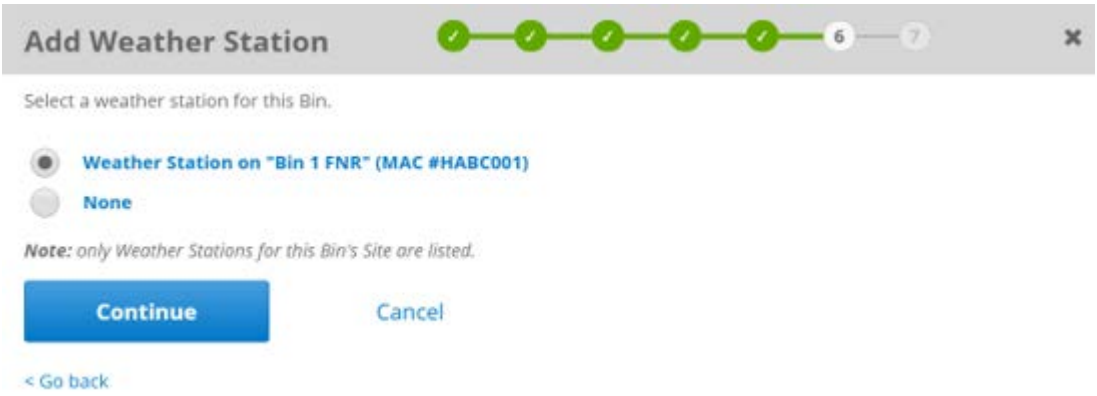
Note: When relocating cable(s) you can change the angle in which the cable angle has been set, in addition to changing the radius in which the cable has been positioned.

Add Weather Station

12. A pop up will appear if a Weather Station has been installed and you will be asked for confirmation to add to the bin/site. Tap the **Continue** button.

13. Any Weather Stations installed will be listed. **Select** the radio with the associated Weather Station or **Select** None if there will not be a Weather Station.

© 2017 OPIsystems Inc

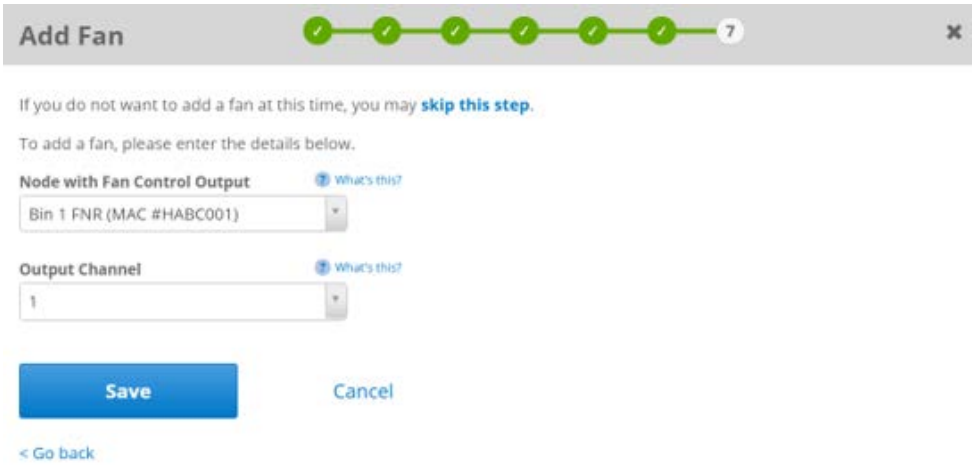


14. Tap the **Continue** button.

Add Weather

Note: The final step in the process will be to add any fans associated to the applicable bin.

15. Use the **drop-down arrow** to select the appropriate Node with Fan Control Outputs (There might be many to chose from depending how many bins have fan control hardware installed on them.)



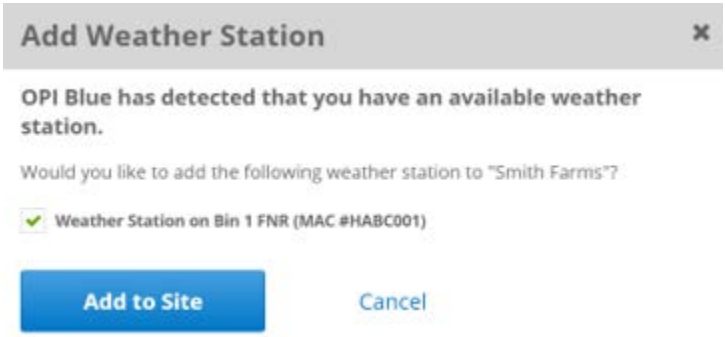
16. Tap the **Save** button. (A confirmation message shown below will appear.)

© 2017 OPIsystems Inc

4.2.8 Add a Weather Station to an Existing Site

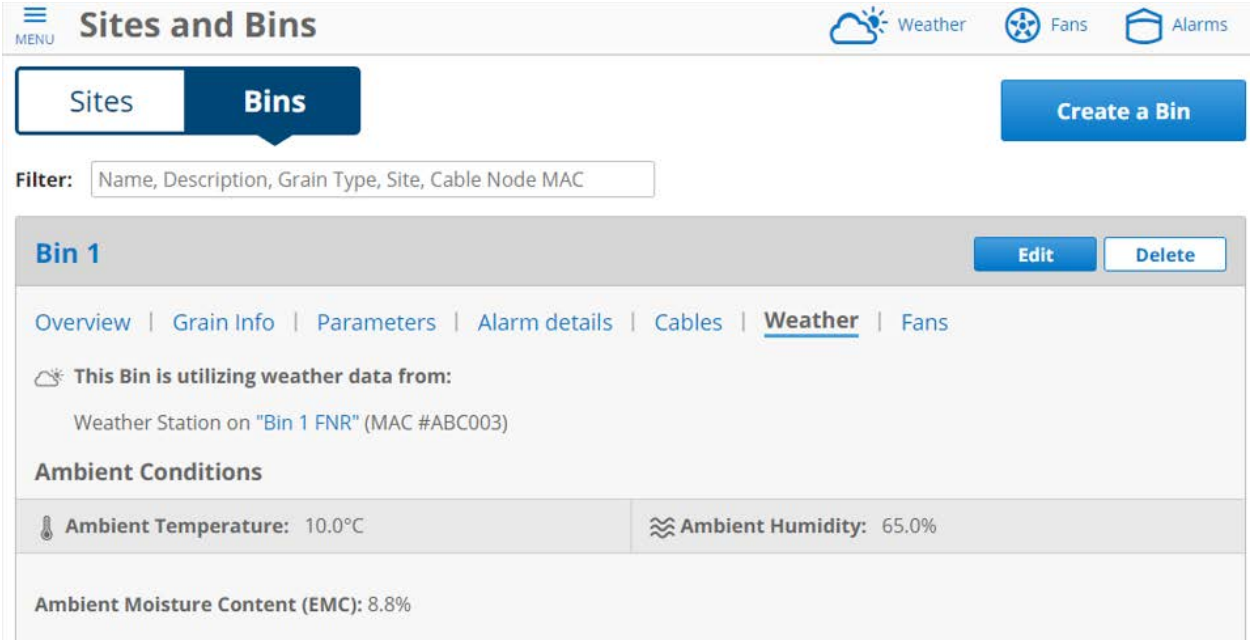
1. From the menu Tap **Sites and Bins** and scroll down. Tap the **Add Station** button.

2. An **Add Weather Station** pop up will appear on the screen. There might be more than one Weather Station visible depending on how many are installed. **Place** a checkmark in the box beside the Weather Station to be added to the site.

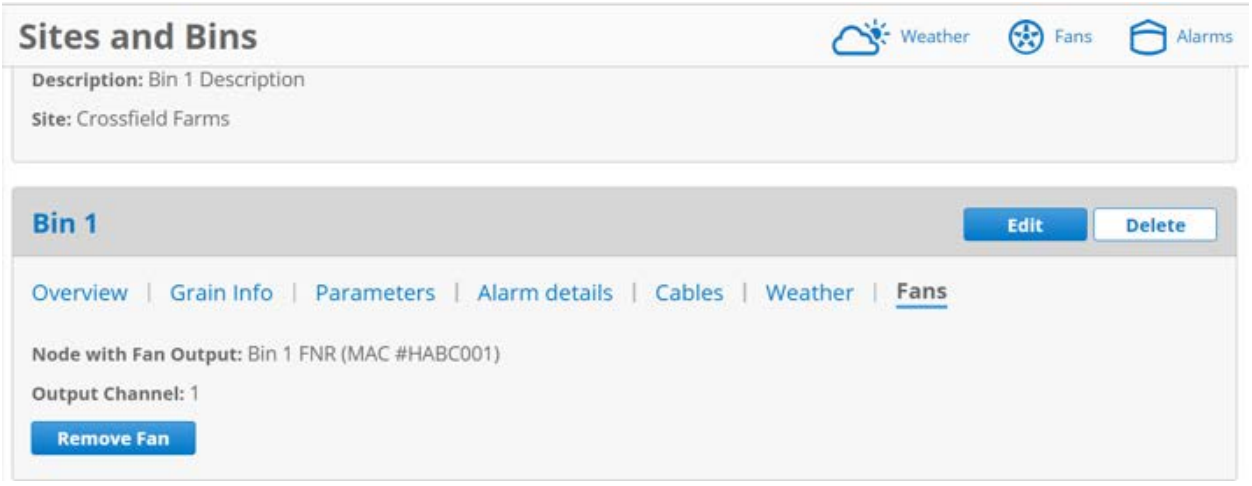


Note: Once the Weather Station has been added it will appear in the following manner on the Bins page. Providing valuable Temperature, Humidity readings for Ambient Conditions in addition to providing an Equilibrium Moisture Content (EMC) value.

© 2017 OPIsystems Inc



Note: The Fans connected into a system are displayed under the specific bin that the fan is installed on. They appear as a **Node with Fan Output**. (In the example below FNR (MAC #HABC001)



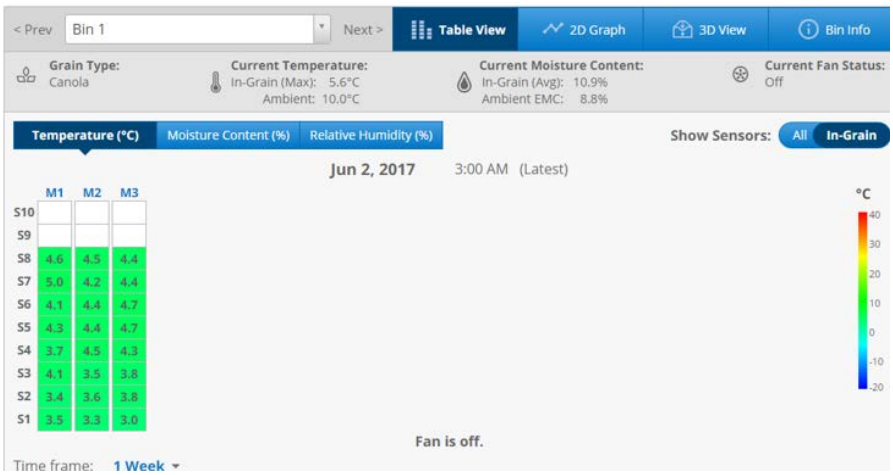
© 2017 OPIsystems Inc

4.3 Features and System Use

4.3.1 Bin Data

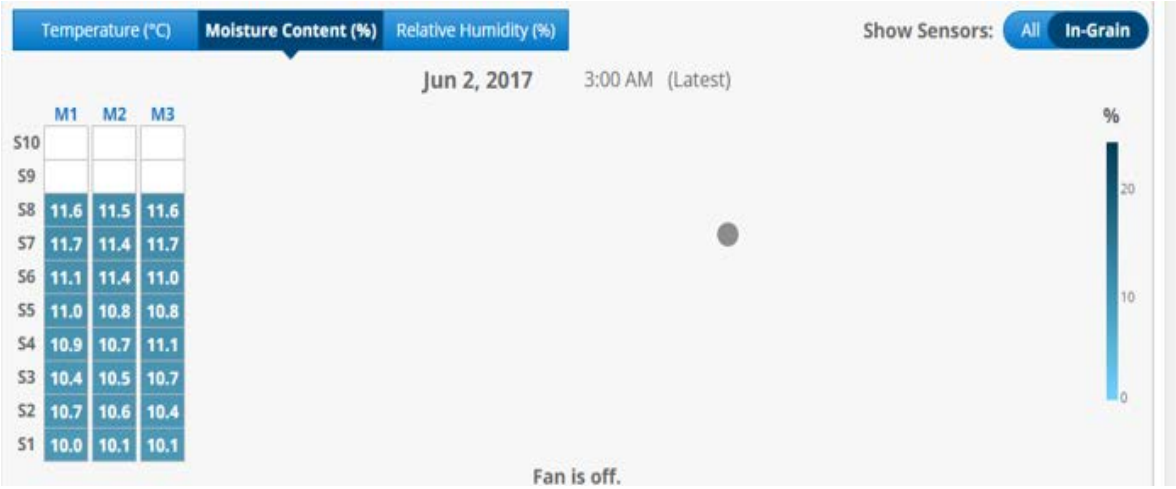
Table View

The Table view allows for a simple display of the cable data that is easy to read and understand. By selecting a bin, the data is organized with a list of cables displayed across the top of the table view and with the cable sensors displayed down the left-hand column.



For bins that have moisture cables installed, in addition to being able to view temperature data the humidity data and moisture data are also available to be displayed. For moisture data to appear a Grain Curve must be selected. To add a Grain Curve, go to **System Settings → Bins →** (Select Bin) **Grain Info → Edit**.

© 2017 OPIsystems Inc



Note: By default, the cable data will be displayed for all cable sensors. Using the **Show Sensors** toggle switch the system can be configured to display all sensor data or only the data from the sensors that the system has determined are in the grain.

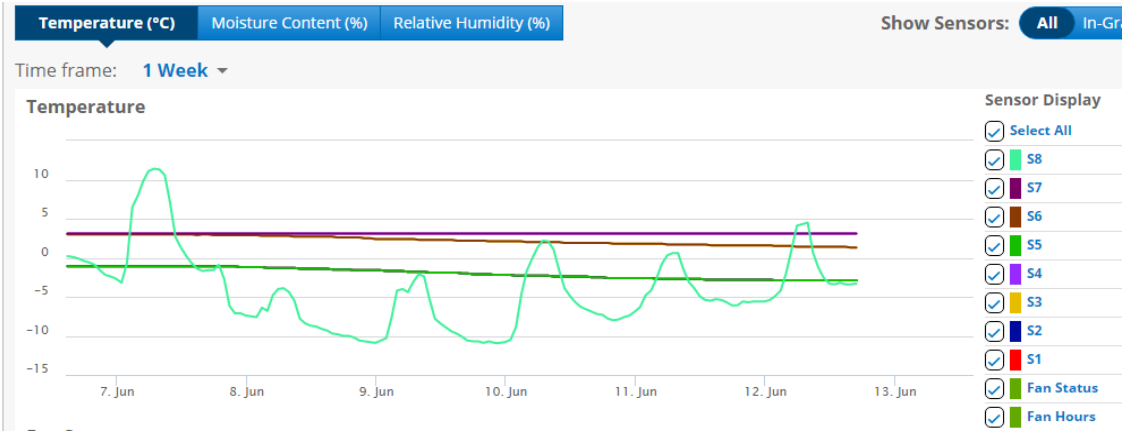
Across the top of the **Table View**, **2D Graph**, **3D View** and **Bin Info** there is useful information displayed with regards to the current bin that has been selected. This information is informative when it comes to the current conditions inside the bin, Max Temperature, Average Moisture Content. In addition, the current Ambient Temperature and Ambient EMC is displayed with provides valuable information in determining when the fans should be turned ON or OFF.

2D Graph

The 2D Graph shows data for a selected bin across a site. Unlike the Table View which displays current temperature and moisture readings, the 2D Graph's data are the logged historical readings. By selecting a cable, you will see the data in the 2D Graph is logged into the system on an hourly basis.

© 2017 OPIsystems Inc

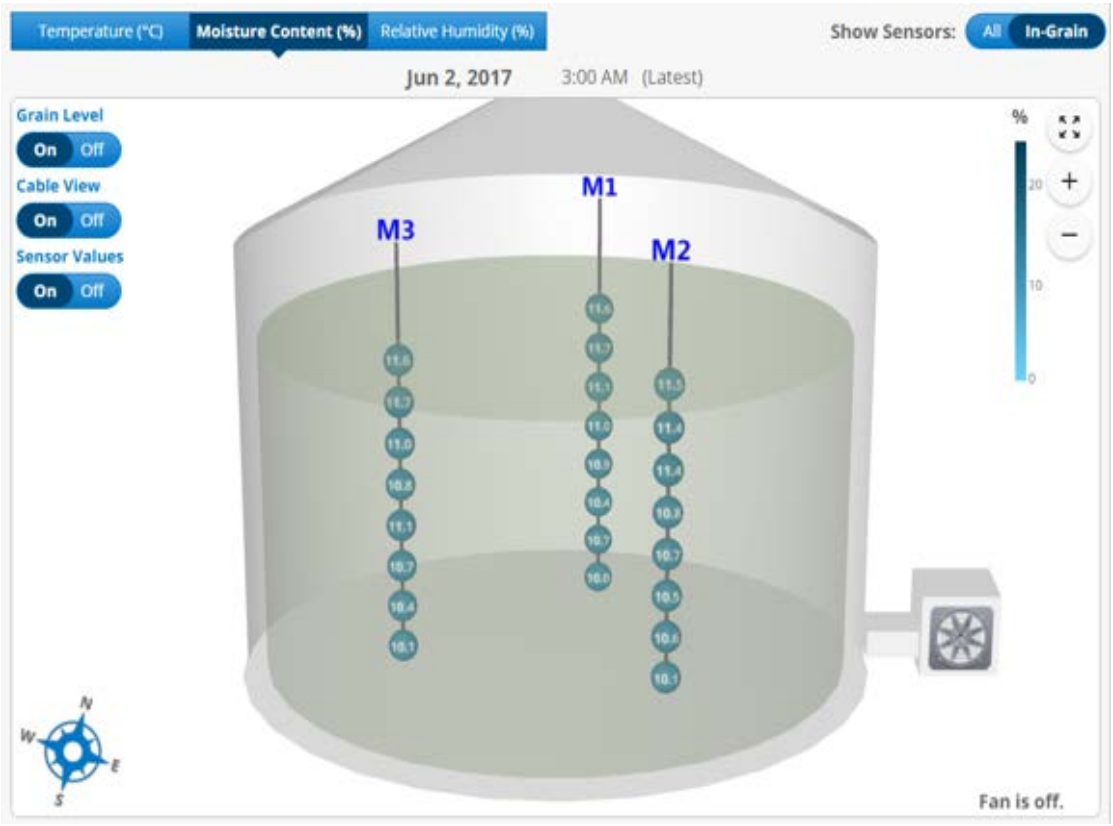
This historic data is especially helpful when it comes to watching trends over time. You can easily see if there are any sensors within a bin that are warming up and deal with it accordingly before it becomes a hotspot. The 2D Graph also provides the visibility to see what is occurring throughout the bin with regards to moisture and temperature management on an ongoing basis.



3D View

The 3D View provides a graphical 3D view of the bin, cables/sensors in addition to a visual display of the grain level within the bin. There are three toggle switches on the left-hand portion of the screen that enable the **Grain Level**, **Cable View** and **Sensor Values** to be turned ON/OFF depending on the user preference. Using the **Show Sensors** toggle switch the data displayed inside each sensor can also be turned ON/OFF to display all sensor data or only the data from the sensors that are determined within the grain.

© 2017 OPIsystems Inc



4.3.2 Alarms

Note: The alarm settings for each bin are setup during the **Create Bin** process. However; they can be adjusted if need after the fact. To change the Temperature Alarm setpoints go under **System Settings** → **Bins** → (Select Bin) **Alarm Details** → **Edit**.

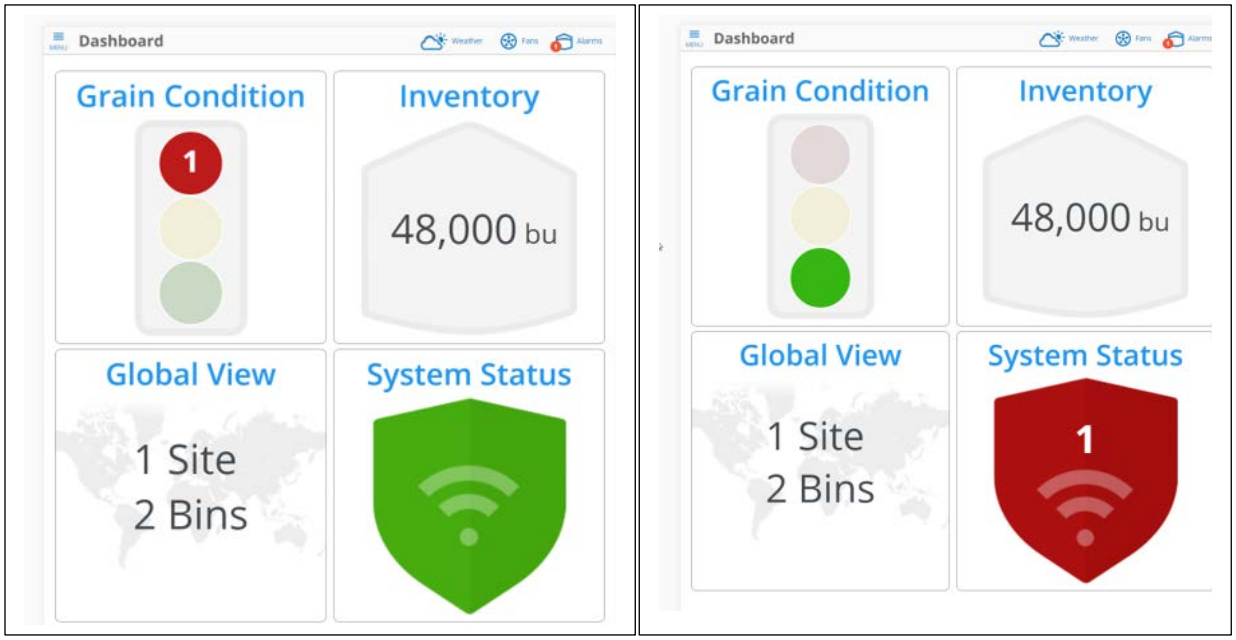
There are four specific alarm notifications that will show up in the system and that will be set by SMS and email notification if configured by the user. Two alarms focus on the temperature of the grain, while the other two are system alarms.

1. **High Temperature** (High-Temperature threshold set by user.)

© 2017 OPIsystems Inc

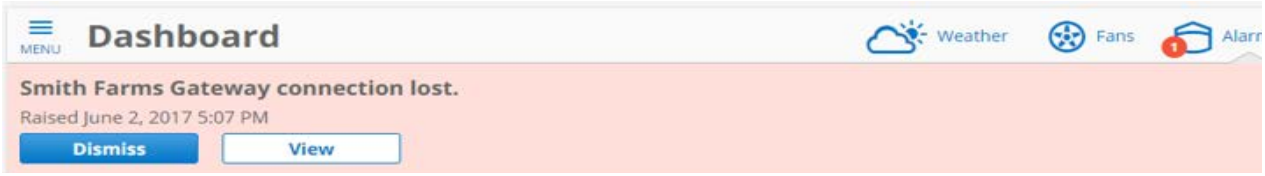
2. **Rate of Rise Temperature** (Rate of Rise threshold set by the user.)
3. **Gateway Connection Lost**
4. **Gateway Lost Line Power and Battery Backup Voltage is Low**

Note: There are several ways in which you can view the alarms within the system. The simplest way is on the Home/Dashboard screen when you log into the system. If there are any **Grain Condition alarms** (High Temperature and/or Rate of Rise Temperature) they will be displayed within the Traffic Light symbol. **Red** light means there are active Temperature Alarms that have not been acknowledged to this point. **Yellow** light indicates that there are active Temperature Alarms that are active however; they have been acknowledged. **Green** light provides a visual reference that there are no Grain Condition alarms. The same color coding is used identify **System Status alarms** on the Dashboard screen. By tapping the alarm condition, it will take you directly to the location of the alarm for viewing.



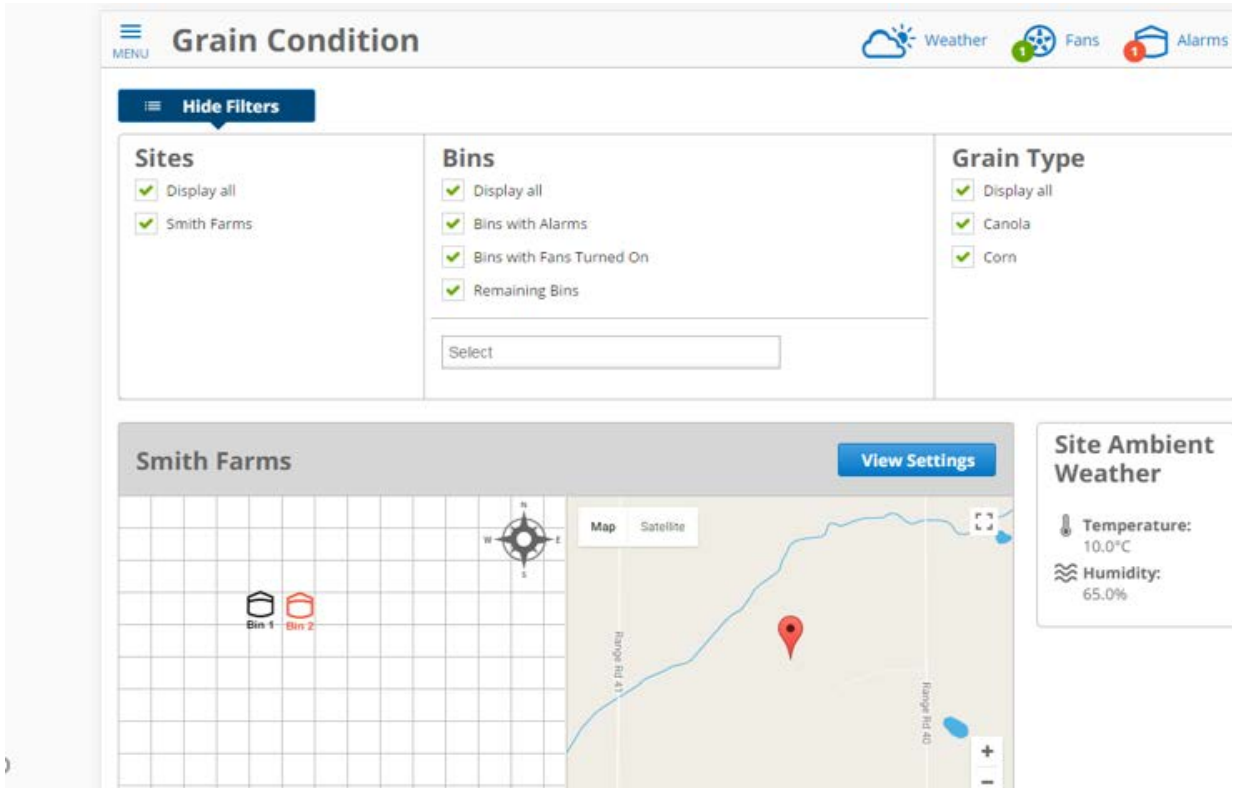
Note: Any alarms that are **red** (active/unacknowledged) or **yellow** (active/acknowledged) will be visible on the alarms icon in the top right-hand corner regardless of the screen you are on. Tapping the Alarms Icon will display what the alarm is and provide the options to dismiss or view the alarm. By viewing the alarm condition you will be taken directly to the location of the alarm for viewing.

© 2017 OPIsystems Inc



4.3.3 Grain Condition

The Grain Conditioning screen provides an overview of all the bins from all the sites. These bins can be filtered in several different ways to enable customized overviews specific to the user. Once the specified filters have been selected the bins matching the criteria will be displayed under the site map. Any site that has a Weather Station installed will display the Ambient Temperature and Humidity down the right side of the screen.

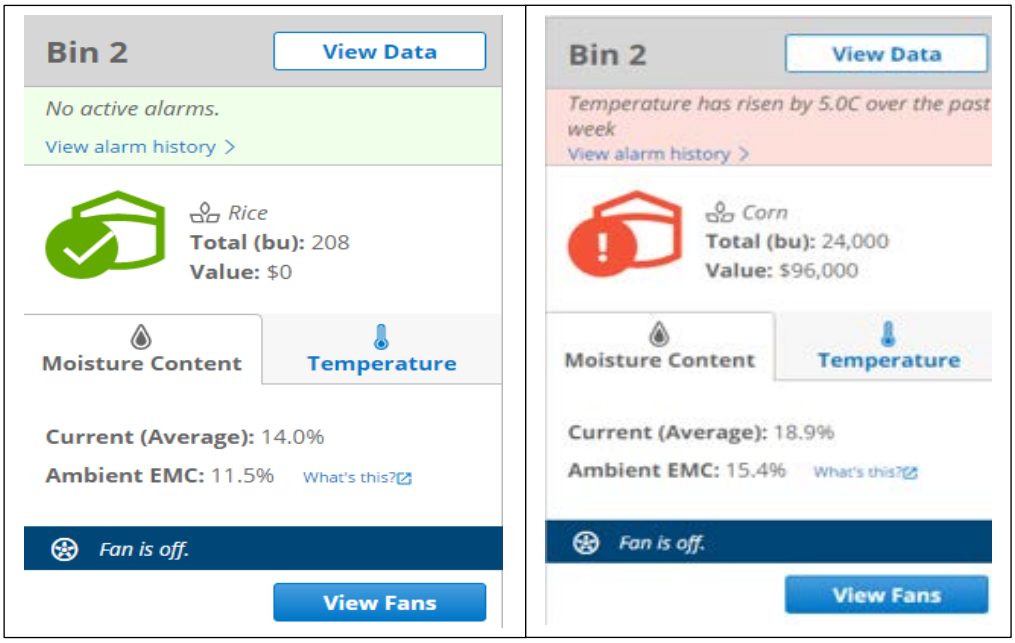


© 2017 OPIsystems Inc

Each bin displayed provides an overview of the current condition of the grain within the structure. If there are moisture and temperature cables in the bin there will be a tab visible for each. The Moisture tab will display the

Current (Average) Moisture and if a Weather Station is installed at the site the **Ambient EMC** will also be displayed. The Temperature tab will show the **Maximum Grain Temperature Reached** as well as the **Maximum Grain Temperature Set** (This will be the Maximum Temperature alarm set point the user has set.) If you are looking to do a deeper dive into the data, tapping the **View Data** button will open up the **Bin Data** where the **Table View, 2D Graph,** and **3D View** can be explored.

If a bin has any active alarms they will be displayed. Tap the **View Alarm History** link to view additional information pertaining to the active alarm or to view previous historical alarm information.

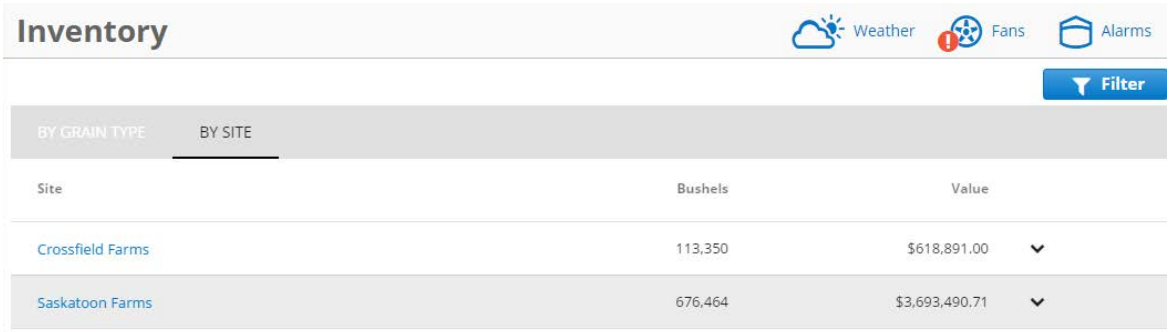


At the bottom of each of the bins that have fan control, the current fan status will be displayed. To drill down further to make changes to the fan status, tap the **View Fans** button to open the **Fan Control** page.

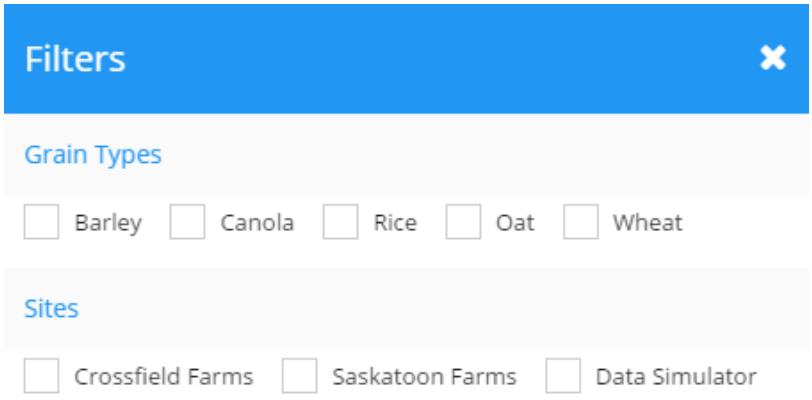
© 2017 OPIsystems Inc

4.3.4 Inventory

By selecting the Inventory option from the menu, you will be able to view any inventory data displayed by **Site**, **Grain Type**, **Bushels** and **Value** (If the price/bushel had previously been entered).



The filter option provides the ability to filter by one or more grain types as well if there are multiple sites one or more site can be selected. Place a checkmark in the desired selections you want to filter by and then tap the **X** to close the pop-up box.



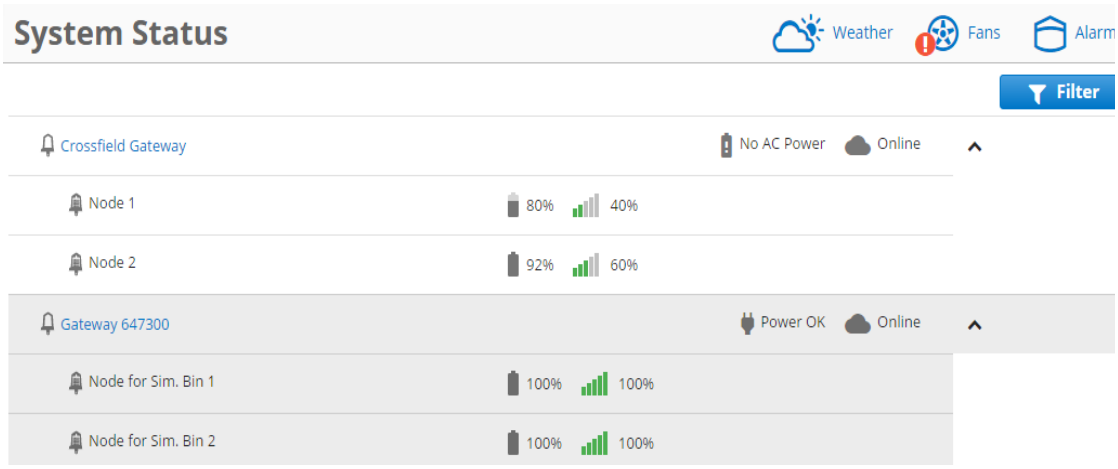
© 2017 OPIsystems Inc

4.3.5 Global View

The Global View displays any sites that have been set up on managegrain.com. All sites added during the initial set up will be displayed on the Global Map with a red stick pin marker and the site name displayed. Either the Map or the Satellite view can be used to display the site's location.

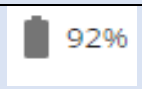
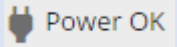
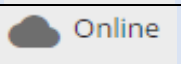
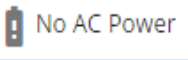
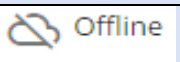
4.3.6 System Status

The System Status shows important vitals from the system. It provides the ability to display all sites currently installed or to select one or more specified sites. Place a checkmark in the desired selections you want to filter by and then tap the **X** to close the pop-up box.



© 2017 OPIsystems Inc

Note: The following are the displayed icons on the System Status screen.

Icon	Cable Nodes
	This provides a visual indication with regards to the battery charge percentage of a particular Cable Node.
	This indicated the communication signal strength between the Cable Node and the Gateway. 3 to 5 **Green** bars is considered good.
	Gateways
	Indicates that the Gateway is connected and has A/C power.
	Indicates that the Gateway is online and connected to the server.
	Indicates that there is no A/C power to the Gateway. The Gateway can still be online using the supplied battery backup.
	Indicates that the Gateway is unable to establish a connection to the server. Could be a power disruption or cellular or internet issue.

4.4 Fan Control

4.4.1 Manual Fan Control

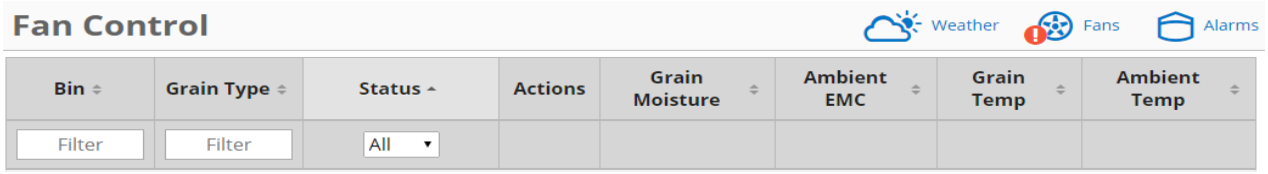
Reaching the **Fan Control** page can be accomplished in two ways; the **Fan Control** link located on the menu or by the **View Fans** button located on each individual bin that has fan control with the **Grain Condition** page.

Controlling your fans can be accomplished through one centralized location on the Fan Control page. With your OPI Blue system you have the flexibility to run your fans manually or switch to automated control with Aeration and Natural Air-Drying algorithms.

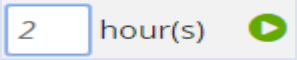
The information is broken down into the most pertinent fan control information grouped by site and bins. For larger sites, it has been easier to find a specific bin, by using the **Filter** option and typing in the name of the bin. The

© 2017 OPIsystems Inc

same **Filter** option has been included to find a specific grain type. There is also the flexibility to use the drop-down **Status** option to filter by a specified fan status.



Note: Manually controlling the fans (Turn ON/OFF) is a simple process with a few basic guidelines.

Actions Button	Result	Status
	Pushing the **Start** button turns the fan ON.	will be displayed until the fan has fully turned ON. Once the fan has turned ON the indicator will turn green and the fan run time will be displayed.
	Pushing the **Timer** allows for a set number of desired fan run time hours to be entered.	 Once the desired number of hours has been entered pushing the start button turns ON the fans. A countdown timer will appear and the fans will continue to run until that set duration runs out.
	Pushing the **Stop** button turns the fans OFF.	will be displayed the fan has fully turned OFF. Once the fan has turned OFF the indicator will be displayed.

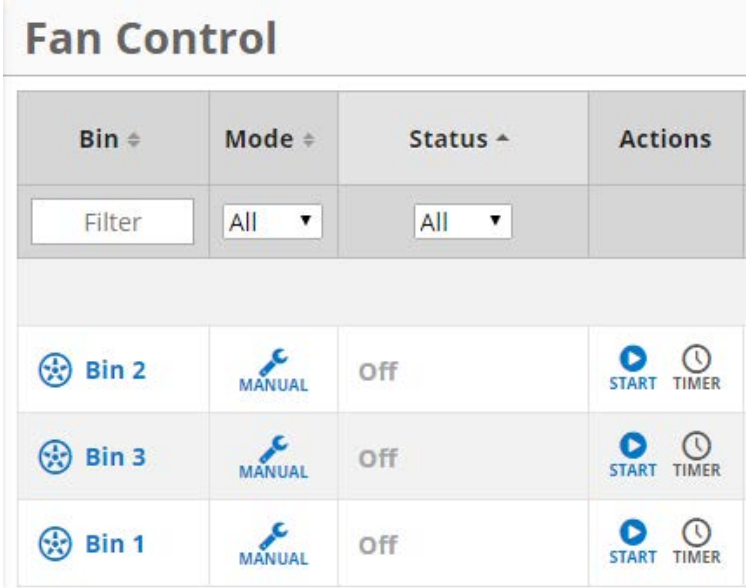
4.4.2 Natural Air Drying (NAD)

Note: Natural Air Drying (NAD) is an efficient control algorithm used within the OPI Blue system that enables effective in bin drying. You the user sets the moisture target you are looking to achieve and the allowable target moisture and temperature ranges in which the fans should run. This eliminates inefficiencies and energy waste.

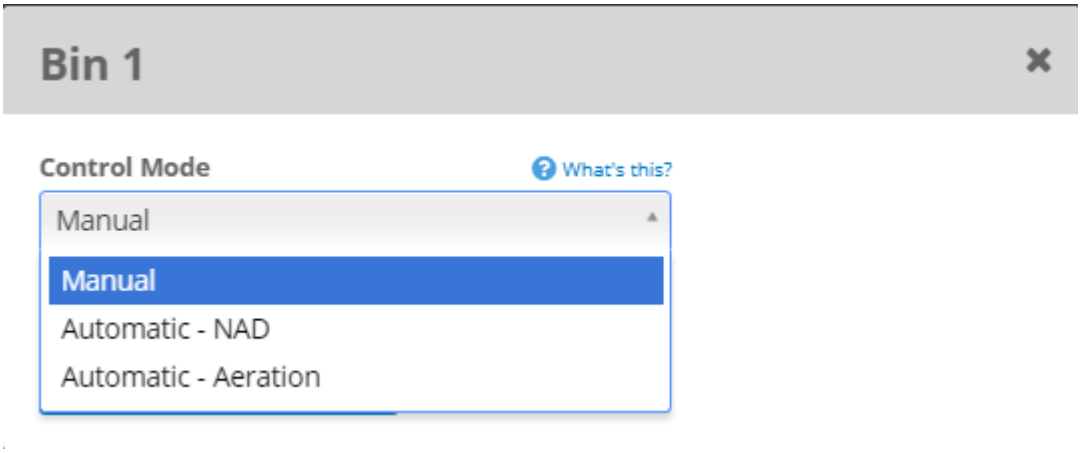
© 2017 OPIsystems Inc

Using the automated fan controls are as simple as going to the Fan Control page from the Fan Control link with the menu or hovering over the Fan Icon Fans and clicking the **View Fans** button.

When fan control is enabled the bins that have the fan control hardware installed on them will appear by default in the manual mode.



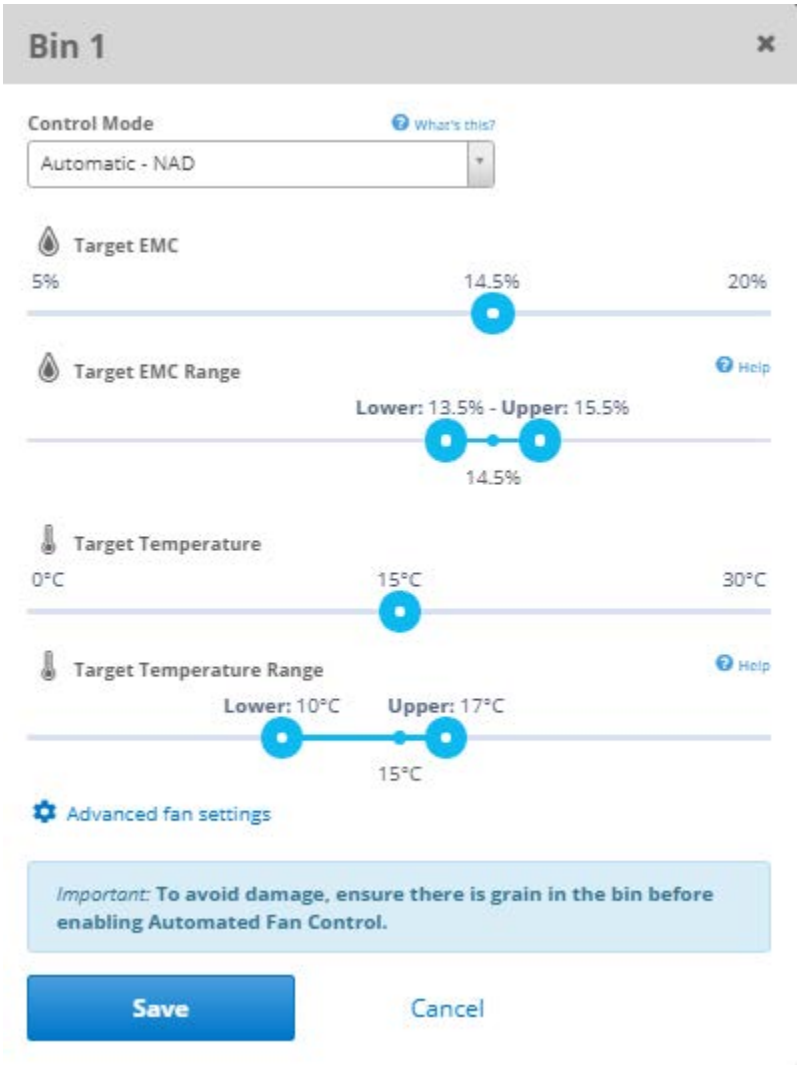
Under the mode column clicking on the MANUAL icon will cause the **Control Mode** box to appear in which you can select following three options: **Manual**, **Automatic - NAD** or **Automatic – Aeration**.



Clicking on the **Automated- NAD** mode brings up the Fan Setting page. This allows you to set the **Target EMC** (Equilibrium Moisture Content) which is your target

© 2017 OPIsystems Inc

moisture for the grain in storage. The **Target EMC Range** is an EMC Range in which the ambient EMC must be within in order for the system to call for the fans to be turned ON. The target and ranges can be set by easily sliding the sliders to the left or right to the desired setpoint. Once you are satisfied with the settings, click on the **Save button** to save the changes.



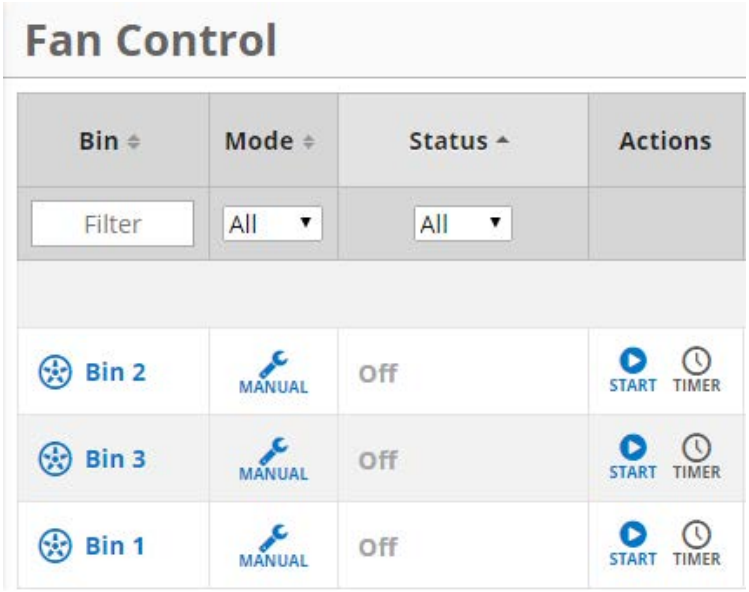
© 2017 OPIsystems Inc

4.4.3 Aeration

Note: Aeration is the control algorithm used within the OPI Blue system once you have reached your target moisture. Aeration is about cooling and maintaining the grain at a temperature level that will enable safe storage periods over long periods of time. This allows you the ability to carry your grain longer, selling it when you want to not because you have to.

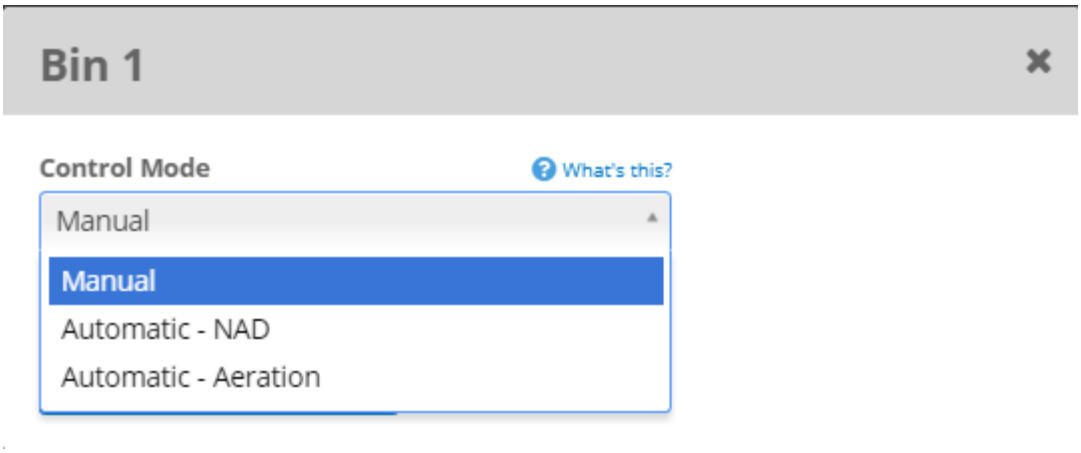
Using the automated fan controls are as simple as going to the Fan Control page from the Fan Control link with the menu or hovering over the Fan Icon Fans and clicking the **View Fans** button.

When fan control is enabled the bins that have the fan control hardware installed on them will appear by default in the manual mode.

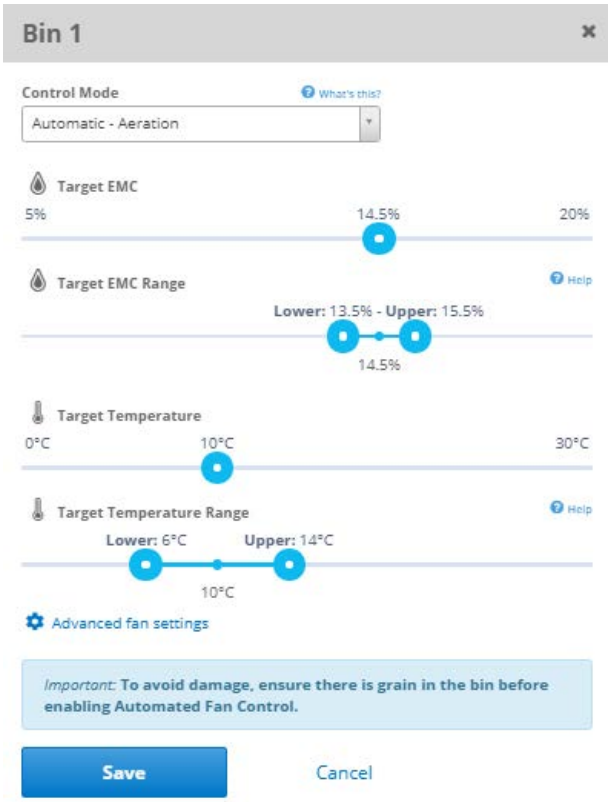


Under the mode column clicking on the MANUAL icon will cause the **Control Mode** box to appear in which you can select following three options: **Manual**, **Automatic - NAD** or **Automatic – Aeration**.

© 2017 OPIsystems Inc

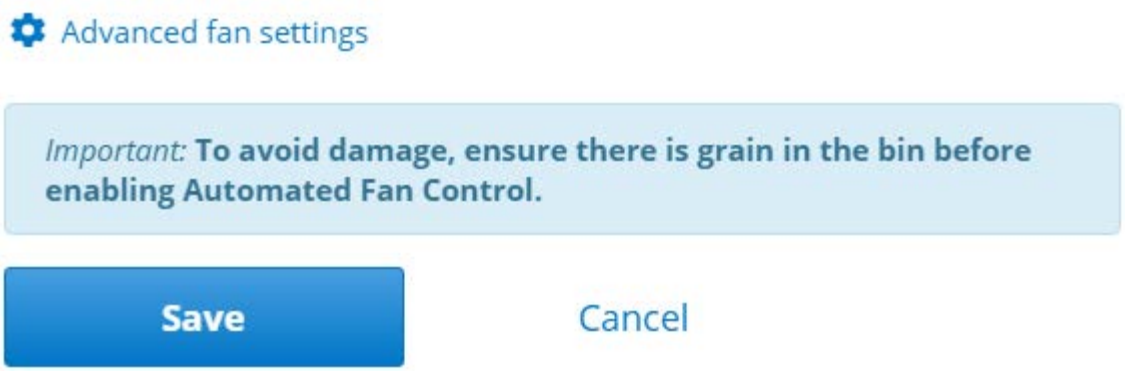


Clicking on the **Automated- NAD** mode brings up the Fan Setting page. This allows you to set the **Target Temperature** for the grain in storage. The **Target Temperature Range** is temperature Range in which the ambient temperature must be within in order for the system to call for the fans to be turned ON. The target and ranges can be set by easily sliding the sliders to the left or right to the desired setpoint. Once you are satisfied with the settings, click on the **Save button** to save the changes.



© 2017 OPIsystems Inc

There are also **Advanced Fan Settings** that can be accessed by clicking on the **Advanced Fan Settings** link, located at the bottom of the **Fan Setting Page**. See the Advanced Fan Settings section to get a better understanding of each of these settings and what they mean.



4.4.4 Advanced Fan Settings

All **Advanced Fan Settings** are user configurable. Each setting has a default value however; depending on user specific needs there may be situations where these values will need to be changed.

Advanced Fan Setting	What Does It Do?
Fan Equalization Time (seconds) Help 300	The **Fan Equalization Time**, is an allotted time after the fan(s) have turned ON to allow the plenum conditions to become equalized with ambient potential conditions.
Fan Minimum Off Time (seconds) Help 300	The **Fan Minimum Off Time**, is the minimum amount of time allotted that a fan must remain OFF before it can be turned ON again in an automated fan control mode. This prevents the fan(s) from cycling OFF/ON when conditions are right on the edge of a targeted EMC or Temperature set range.

© 2017 OPIsystems Inc

Fan Minimum Run Time (seconds) Help 300	**Fan Minimum Run Time**, like the Fan Minimum Off Time this is an allotted amount of time a fan(s) will remain ON in an automated fan control mode. This prevents the fan(s) from cycling OFF/ON when conditions are right on the edge of a targeted EMC or Temperature set range.
Fan Warming Value (°C) Help 2	**Fan Warming Value**, is a measure temperature value in the Plenum due to the heat compression when the fan(s) are ON. It can be measured at the Plenum or have a manual value set.
Grain Temp Offset (°C) Help 3	**Grain Temperature Offset**, is the difference required below the grain temperature to trigger the fan(s) to turn ON. This prevents the fan(s) from running when there is no grain in the structure.
Max Grain Temp Setpoint (°C) Help 38	**Max Grain Temp Setpoint**, is the maximum high temperature setpoint any sensor can reach within the grain mass before the system triggers the fan(s) to turn ON.
Max Grain Temp Spread Setpoint (°C) Help 12	**Max Grain Temp Spread Setpoint**, is used during Aeration fan control to provide the maximum temperature spread within the grain mass. If the maximum temperature spread is exceeded the fan(s) will turn ON to drive the

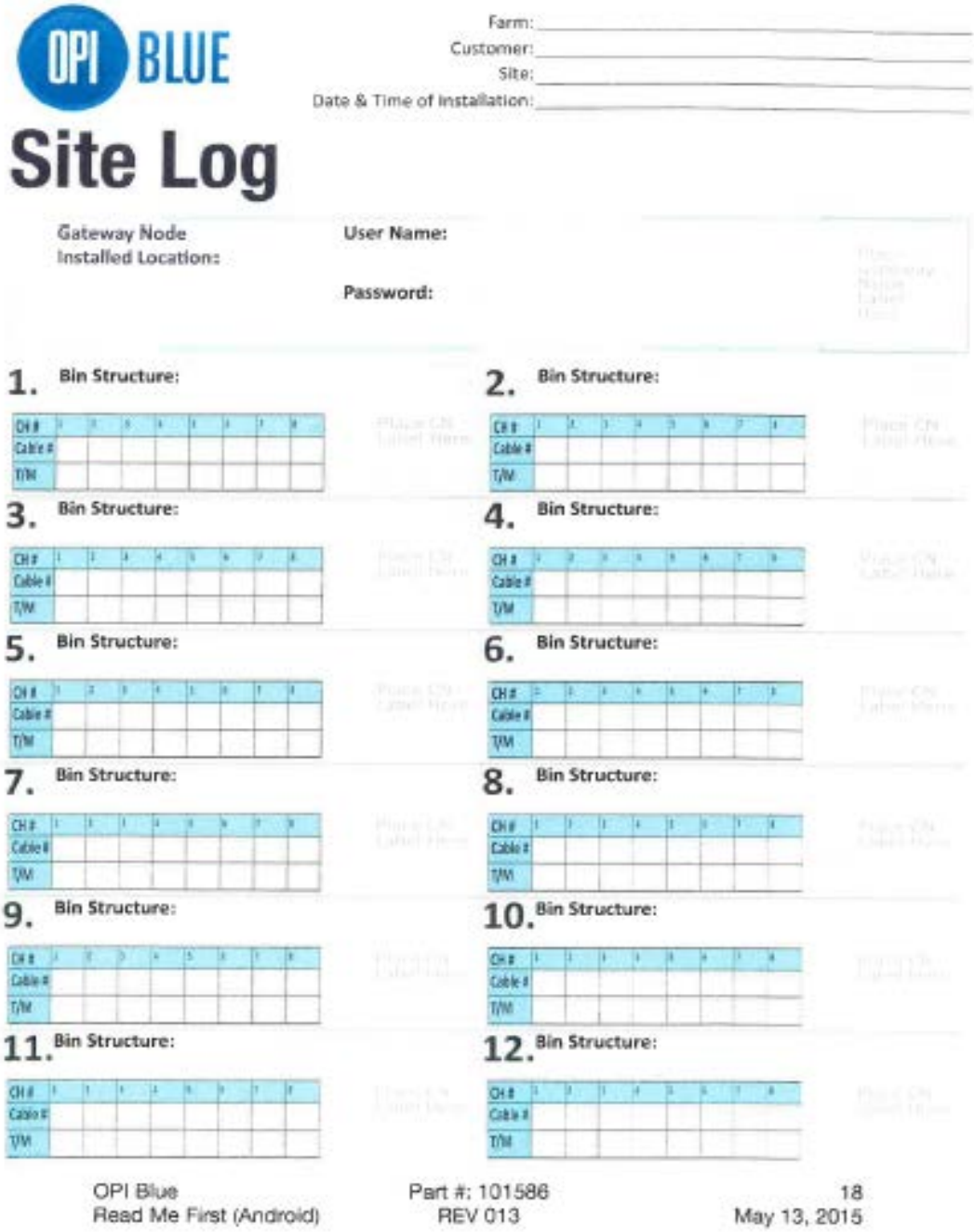
© 2017 OPIsystems Inc

	grain mass to a more uniform temperature throughout.
Minimum Air Temp (°C) Help 0	**Minimum Air Temp**, is the minimum allowable air temperature in which the fan(s) can be turned ON in order to avoid vents from freezing.
Plenum Pressure Setpoint (") Help 1.5	**Plenum Pressure Setpoint**, this is the minimum static pressure feedback setpoint that must be reached after the Fan Equalization period has been reached. The Plenum Pressure feedback provides validation that the fan(s) have physically turned ON when the system has called for them. If the minimum Plenum Pressure Setpoint is not reached after the Fan Equalization period has been reached an alarm will be triggered by the system.

© 2017 OPIsystems Inc

4.5 Site Log

Below is an example of a Site Log as previously referenced in the Gateway and Cable Node section of this manual.



OPI BLUE

Farm: _____
Customer: _____
Site: _____
Date & Time of Installation: _____

Site Log

Gateway Node
Installed Location:

User Name:

Password:

1. Bin Structure:

CH #							
Cable #							
T/M							

2. Bin Structure:

CH #							
Cable #							
T/M							

3. Bin Structure:

CH #							
Cable #							
T/M							

4. Bin Structure:

CH #							
Cable #							
T/M							

5. Bin Structure:

CH #							
Cable #							
T/M							

6. Bin Structure:

CH #							
Cable #							
T/M							

7. Bin Structure:

CH #							
Cable #							
T/M							

8. Bin Structure:

CH #							
Cable #							
T/M							

9. Bin Structure:

CH #							
Cable #							
T/M							

10. Bin Structure:

CH #							
Cable #							
T/M							

11. Bin Structure:

CH #							
Cable #							
T/M							

12. Bin Structure:

CH #							
Cable #							
T/M							

OPI Blue
Read Me First (Android)

Part #: 101586
REV 013

18
May 13, 2015

4.6 Appendix

These components were used during OPI Blue – Fan Control testing. These components may vary by site setup and are installation dependent. In all situations, these components should be verified that they meet the site requirements and all applicable electrical codes for the jurisdiction in which the installation is to occur.

Component Requirements

Power Supply:

- 12 VDC, >1 Amp power.
- <150 mVp-p ripple.
- Compliant with local UL/FCC/CE standards.
- Open and short circuit protection is highly recommended.
- The model used during our field testing (**Meanwell HDR-15-12**) which will work with a 277 VAC input and is DIN rail mountable.

Relay Outputs:

- 12V, 250 mA drive level to activate the relay.
- The model used during our field testing (**RSSDN-10A**) which can switch up to 10 A at 660 VAC input maximum.

It is highly recommended that an HOA Switch is installed to be able to disengage the automatic functionality. If an existing HOA Switch is in place there is no need to add an additional one.

© 2017 OPIsystems Inc

Hand Off Auto Switch (HOA):

- Must handle one phase Voltage for contactor activation circuit.
- Has three positions: HAND (ON), a fixed OFF position and a fixed AUTO position.
- The model used during our field testing (**Schneider Electric ZB4BD3** and **ZB4BZ103**).

Transformer:

Many sites now operate with higher A/C Voltages ⚠ than the 12 VDC power supply can handle (85-264 VAC). In these instances, a transformer is required to reduce the Voltage level to one that is suited for the power supply.

Example: When the Voltage is 600 VAC the **Hammond Power Solutions SP50ACP, 600:120 VAC 20VA** (Fig 1) transformer is suitable. To ensure the proper selection is made for installations involving a transformer a certified electrician is required in each circumstance.

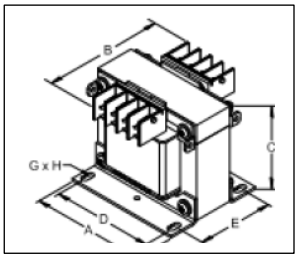
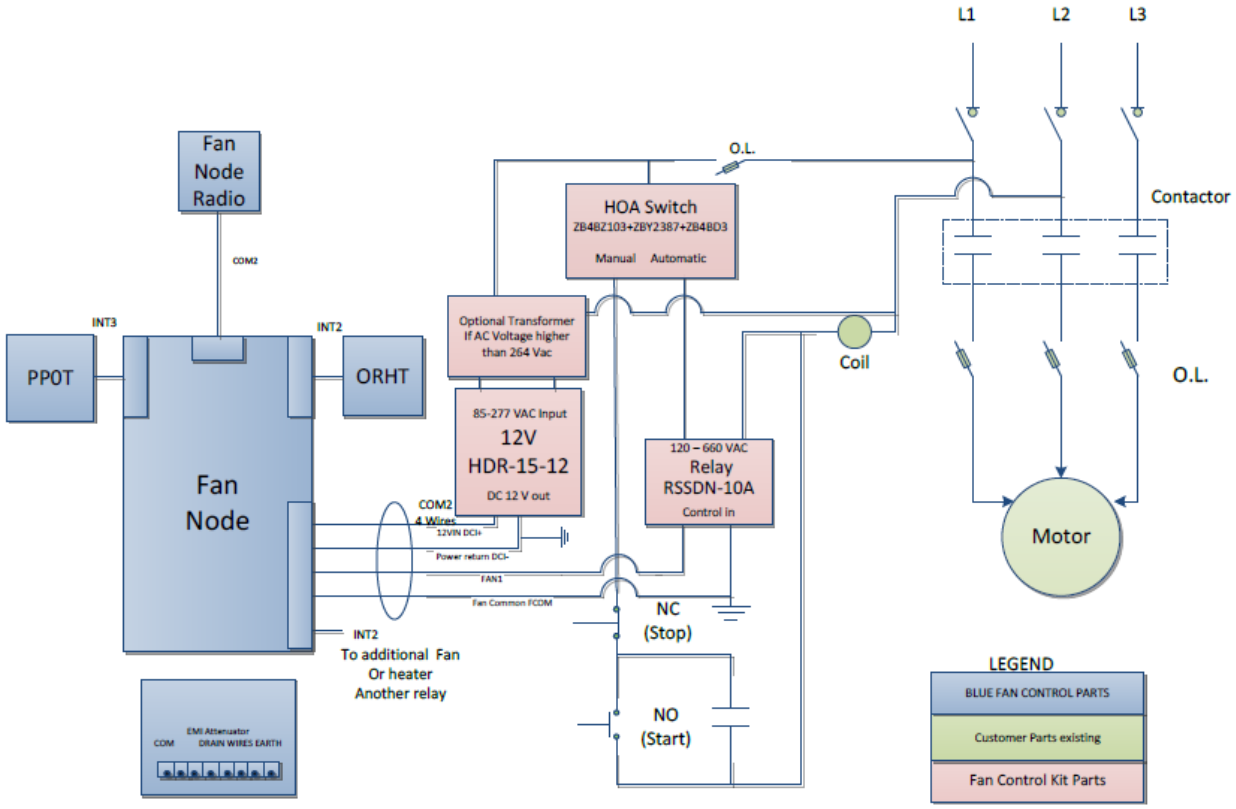


Fig 1

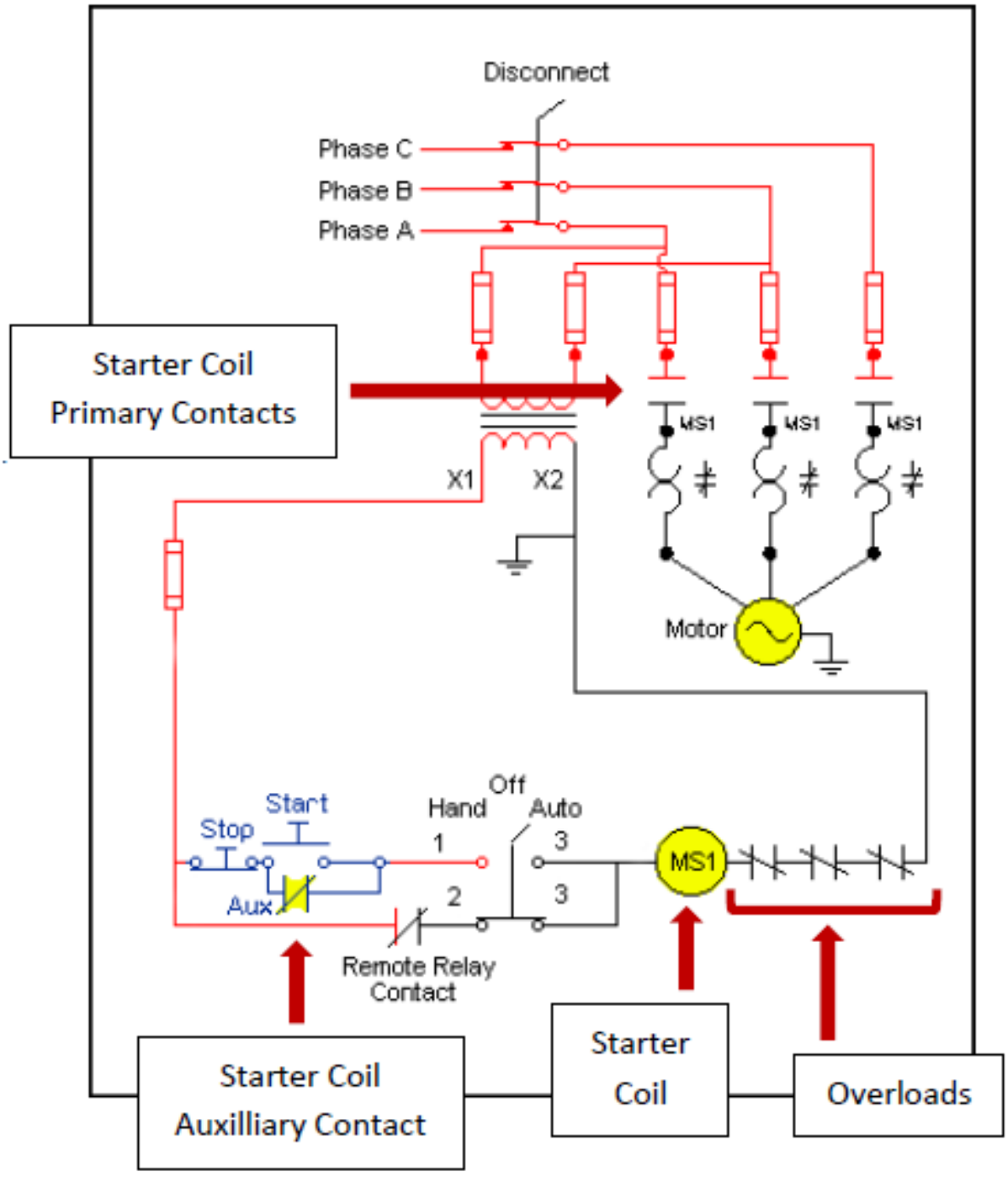
© 2017 OPIsystems Inc

Example: OPI Blue – Fan Control System Schematic



© 2017 OPIsystems Inc

Example: Detailed HOA Schematic



© 2017 OPIsystems Inc