OPI BLUE™

OPI BLUE WITH FAN AND HEATER CONTROL

INSTALLATION AND USER MANUAL

USR

OPI BLUE GATEWAY 2.0 USER MANUAL

USR-000001-A

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SIGNOFF

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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.

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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.

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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

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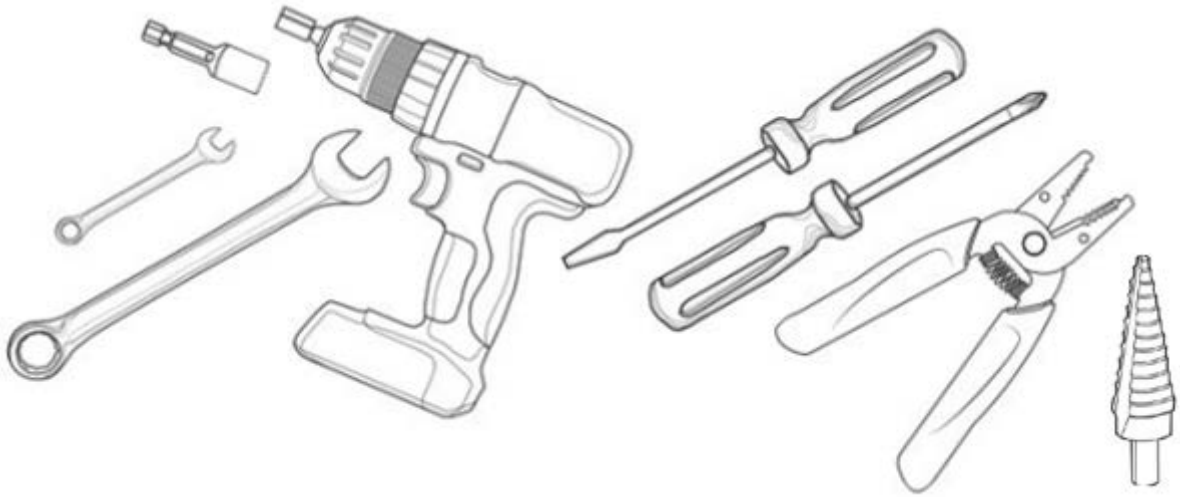
2. Tap **Forgot Password**
3. Enter email address and Tap **Send Link**.
4. An email “OPI Blue, Reset Your Password” will be sent to your email account.
5. Tap the **Reset My Password** link that appears in the email message.
6. A new browser window will open. Enter your email address a new password 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

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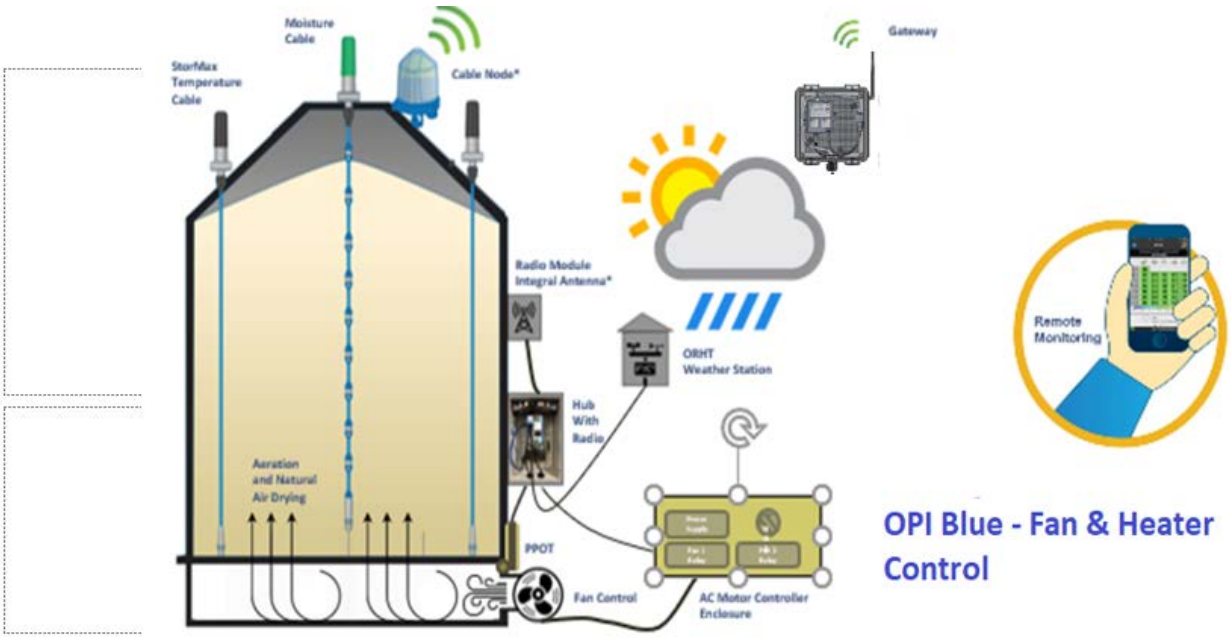
- #2 or #3 Philips screwdriver
- 1/8” flathead screwdriver
- Wire stripper with #14 and #20 AWG positions
- Drill step bit.

Site Overview



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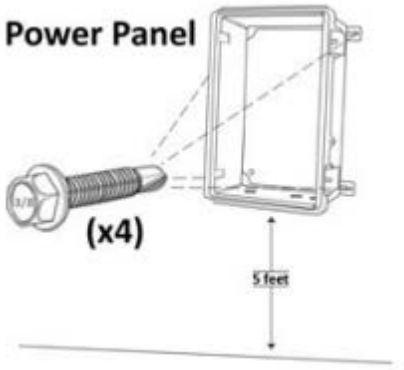
Power Panel

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.

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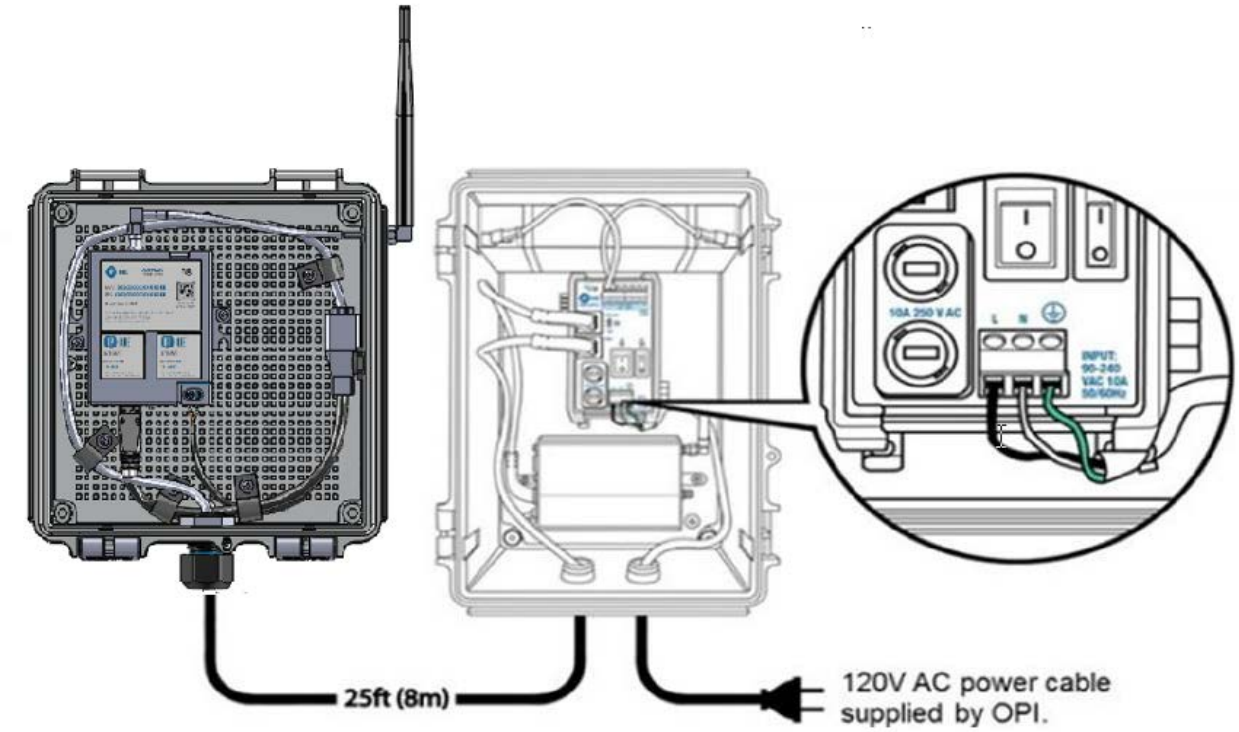

Power Panel and Wired Router

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.

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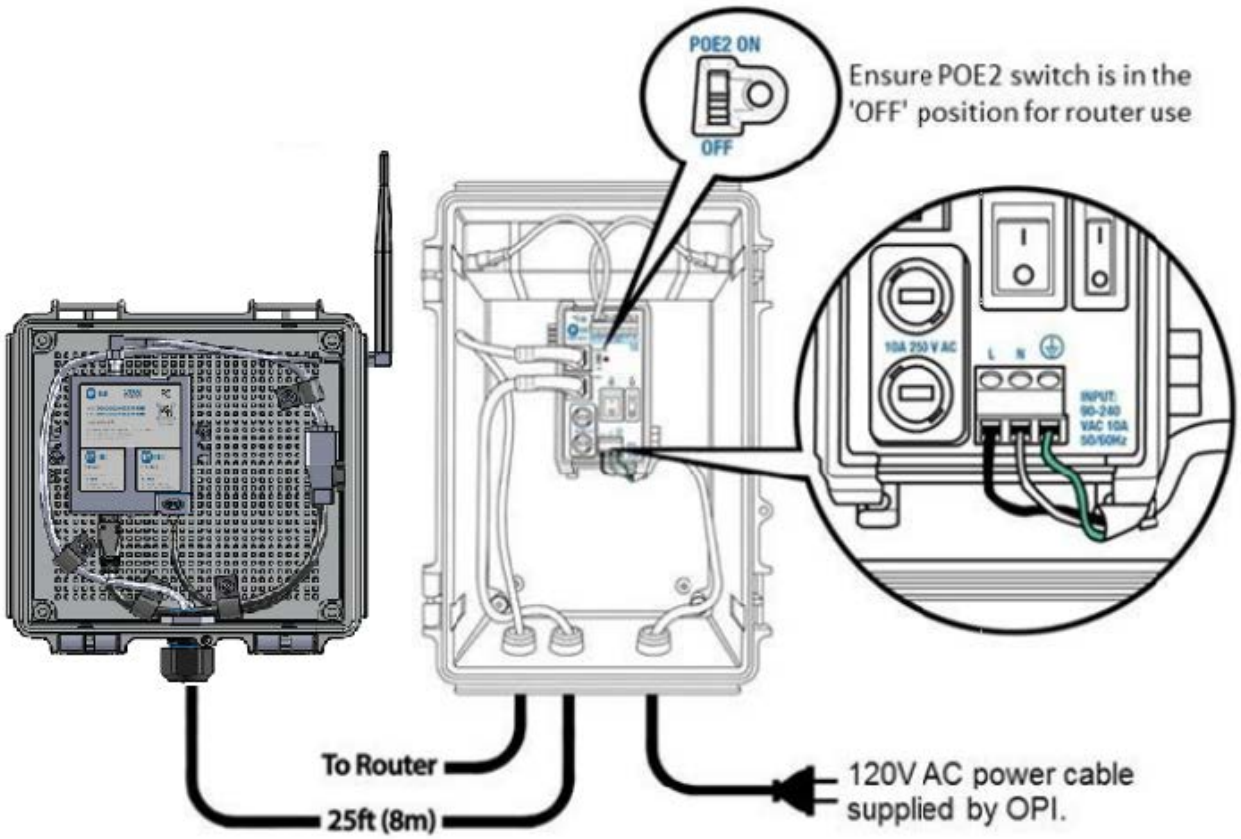

Gateways

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.

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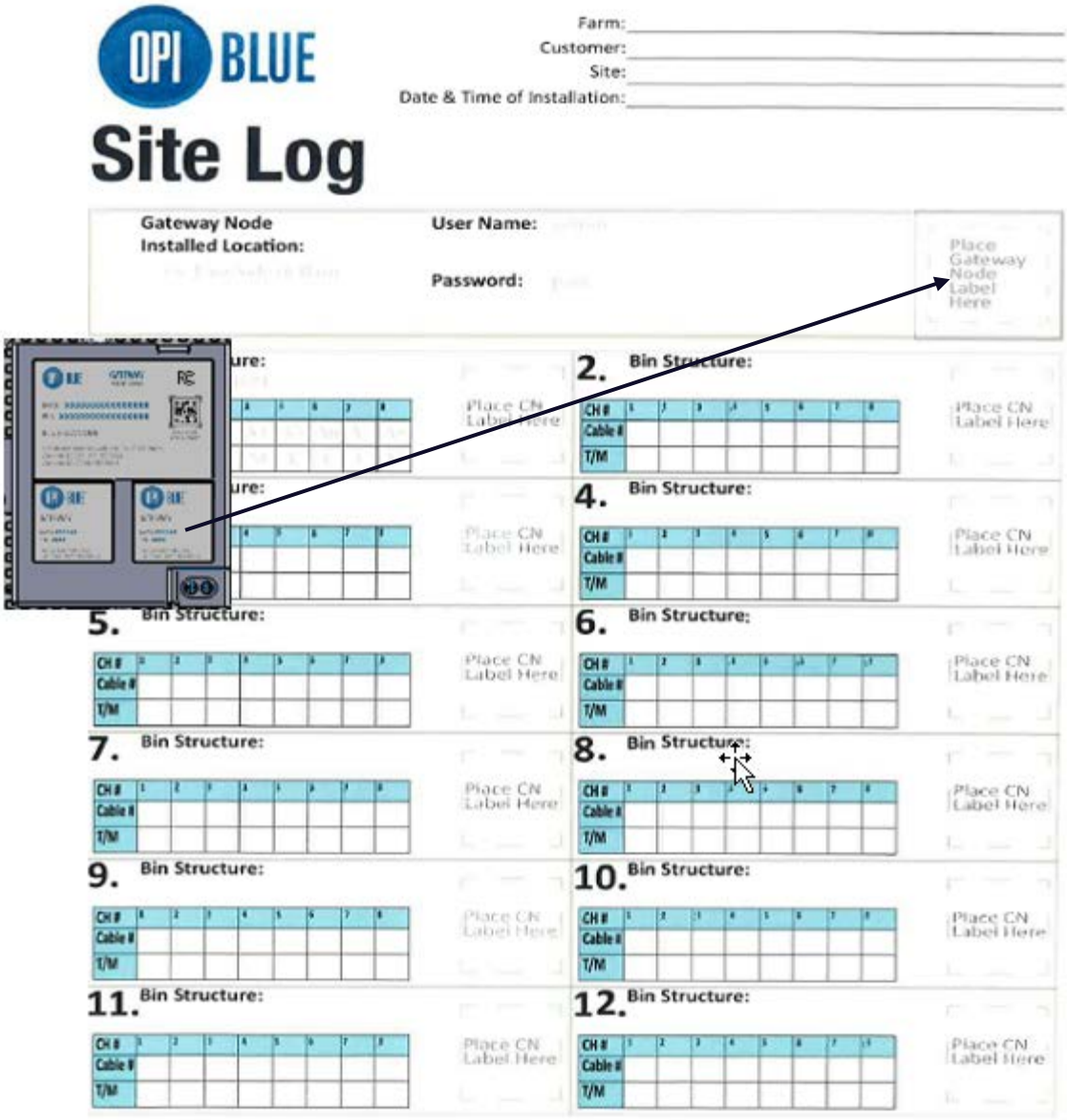

OPI BLUE

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

Site Log

Gateway Node
Installed Location:

User Name:

Password:

Place Gateway Node Label Here

1. Bin Structure:
2. Bin Structure:
3. Bin Structure:
4. Bin Structure:
5. Bin Structure:
6. Bin Structure:
7. Bin Structure:
8. Bin Structure:
9. Bin Structure:
10. Bin Structure:
11. Bin Structure:
12. Bin Structure:

CH #	1	2	3	4	5	6	7	8
Cable #								
T/M								

Place CN Label Here

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Mount the Gateway

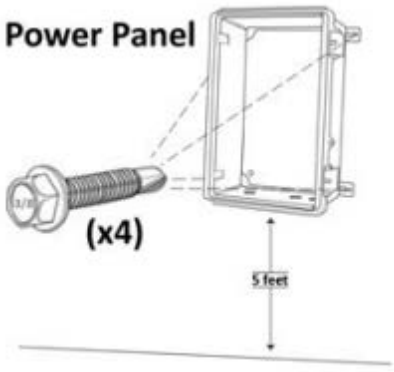
You are now ready to finish installation of the Power Panel Enclosure and Gateway Node.

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.



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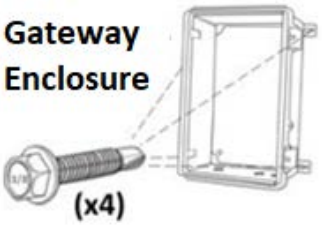
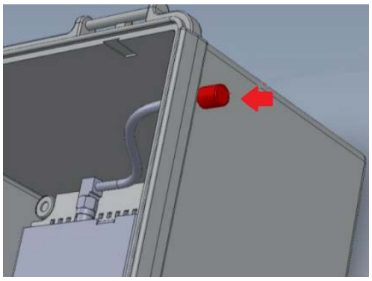
2. You are now ready to install the Gateway Node in its enclosure. Although in a slightly smaller enclosure than the Power Panel the Gateway uses the same cordless drill and 3/8’ Nut Drive bit to secure the 4 self-tapping screws through the foot mount in each corner to a flat surface. The surface used 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.



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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

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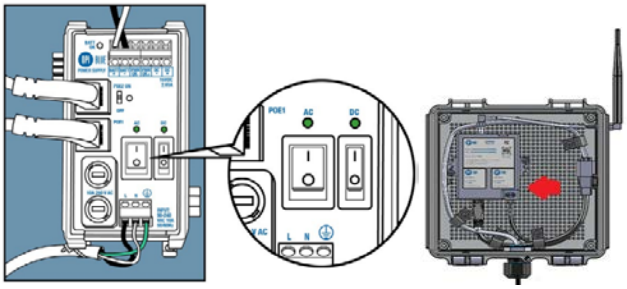
strain relief clockwise to tighten it around the cable to keep water out of the Enclosure.

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.

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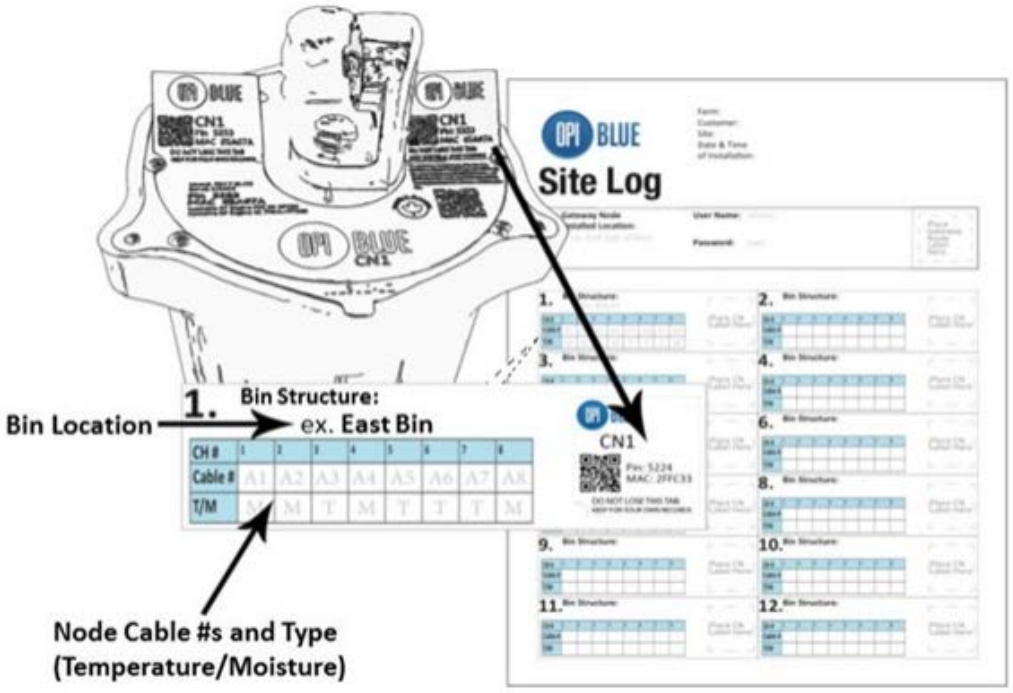
Cable Nodes

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.



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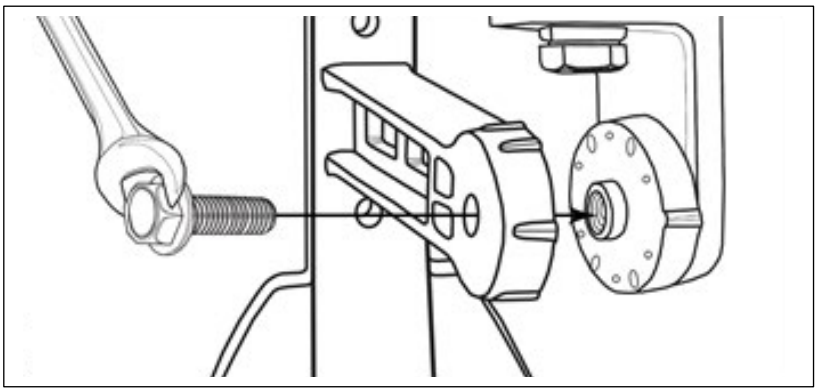
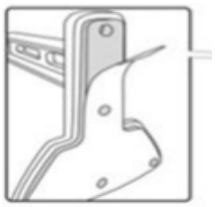
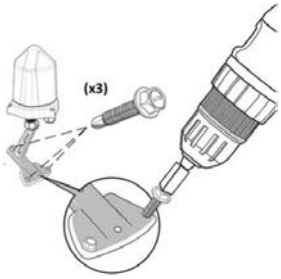
Mounting the Cable Nodes

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

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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.

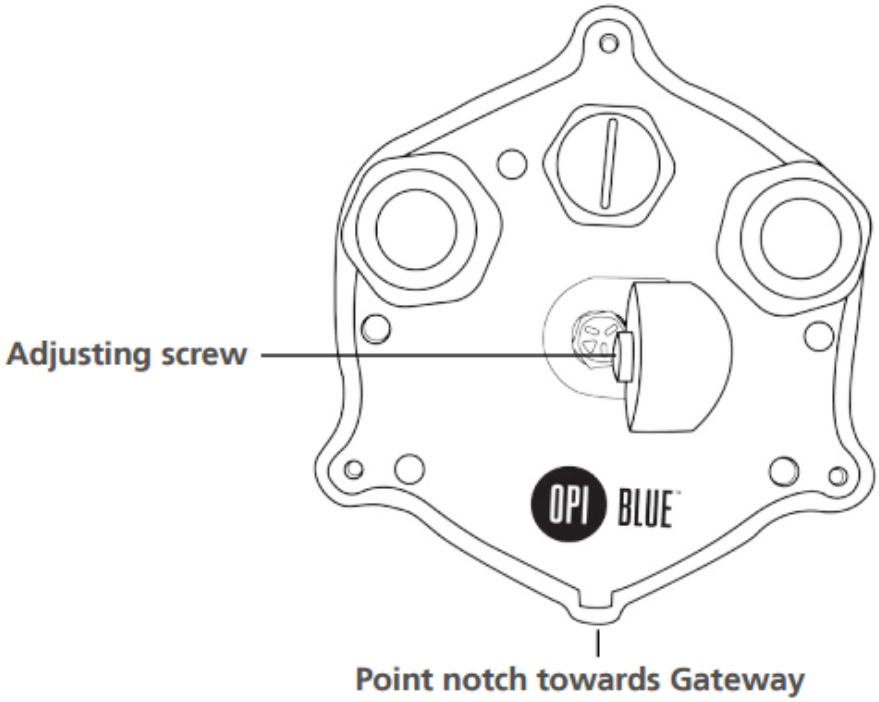

Fig. 1

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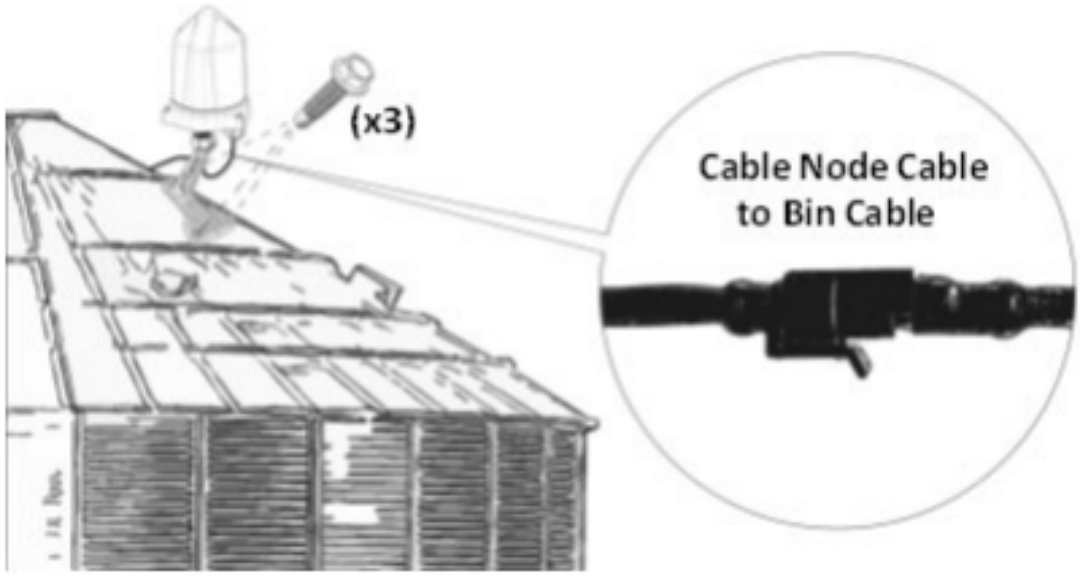
Cable Connections

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.



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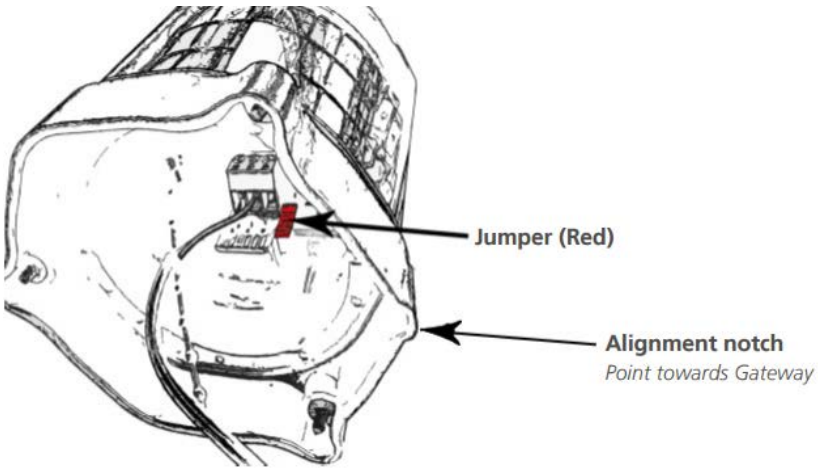
2. Using your Philips screwdriver loosen the three screws located on the outer edge of the base of the Cable Node and open the Cable Node up by lifting the dome off the base.

> **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.



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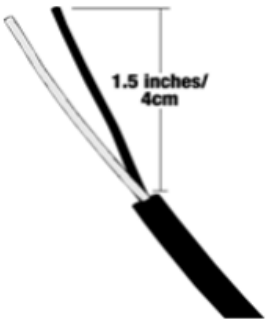
4. Take the jumper and turn it upside down before sliding it behind the prongs you just removed it from. This keeps it in a secure place should it ever be needed in the future to reset the Cable Node.
5. Realign the cover to the Cable Node base by lining the notch indicator on the cover to the notch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



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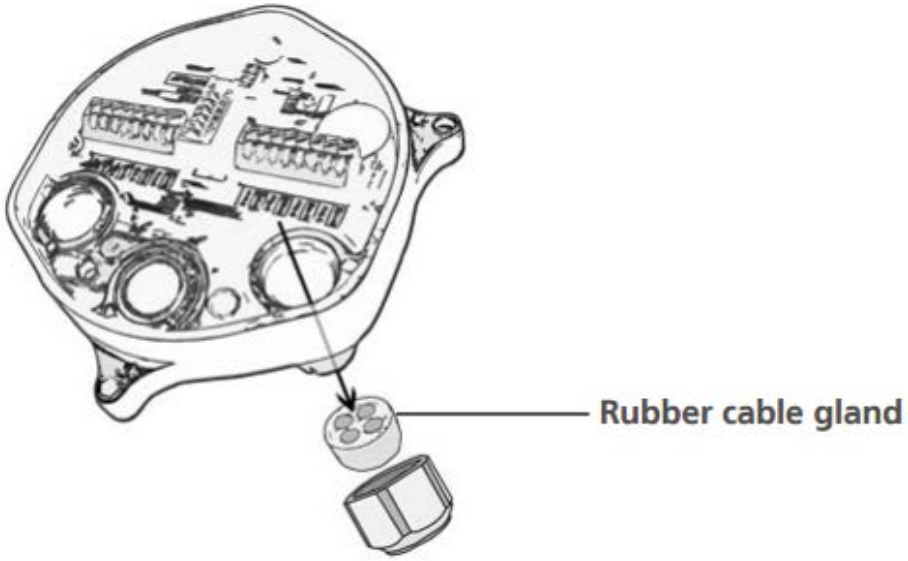
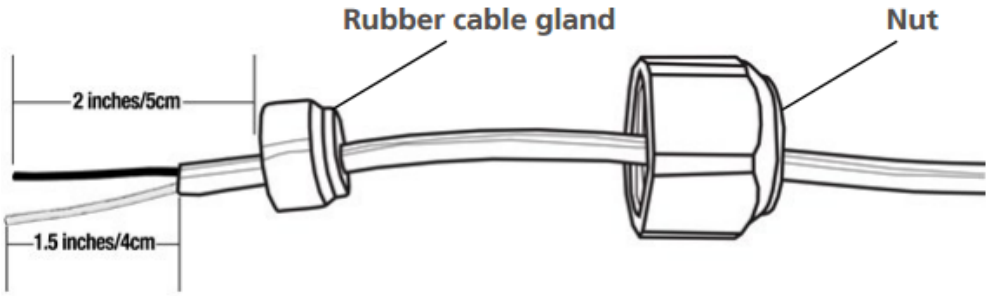


4. Use a small screwdriver to create a tiny opening in the membrane of the gland this way the cable lead wire can be fed through it.

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.



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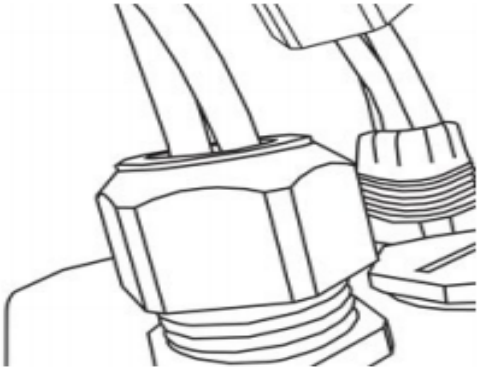
6. Once all the cables have been inserted into each membrane place the gland back inside the strain relief and using the 1 1/16 inch or adjustable wrench reattach it back on the Cable Node base. Repeat this process with the second strain relief if necessary.



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 exposed.

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

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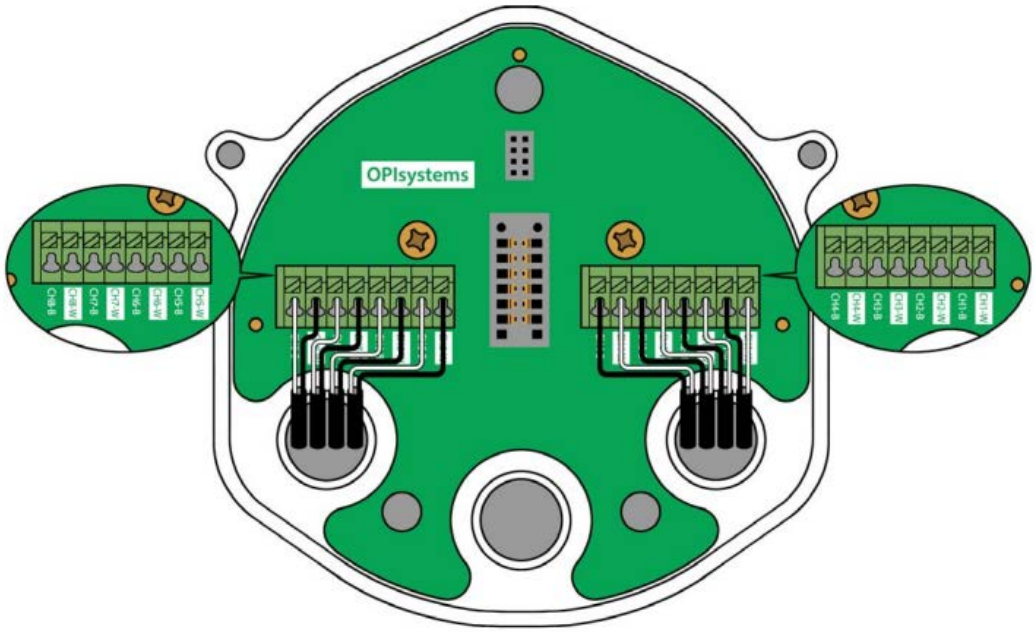
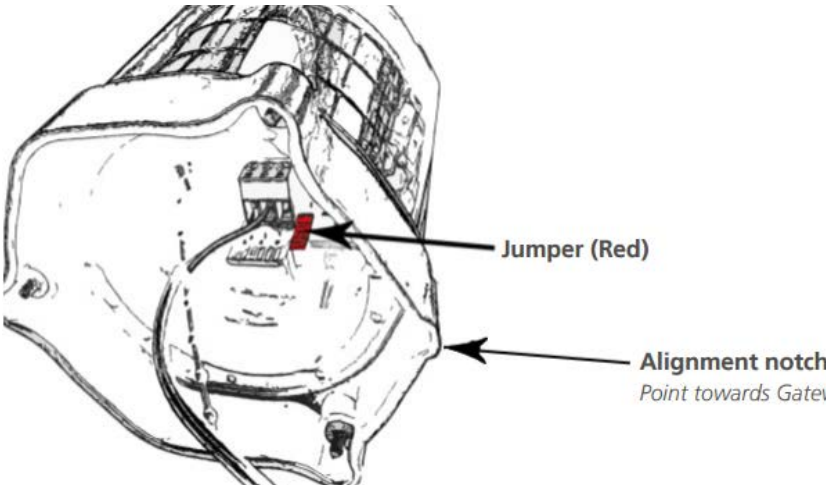


12. Turn the Cable Node dome upside down and locate the red jumper. Remove the red jumper to activate the Cable Node. Once the Cable Node has been activated it should make three blue flashes followed by five blue and red flashed.



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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.

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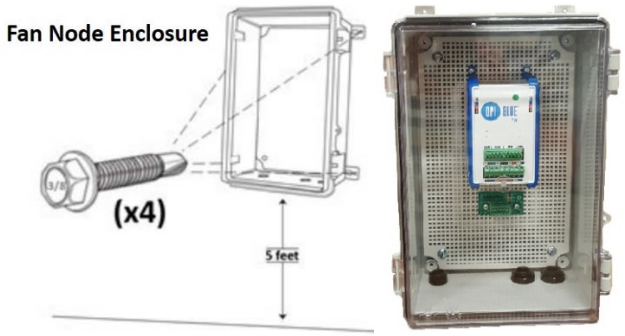
1. After selecting your Fan Node Enclosure location, begin by first mounting the Fan Node Enclosure at roughly eye level. Using a cordless drill attach the 4 x #12-14 ¾" Tek Screws into each of the four mount brackets to secure the enclosure in the desired location.



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.

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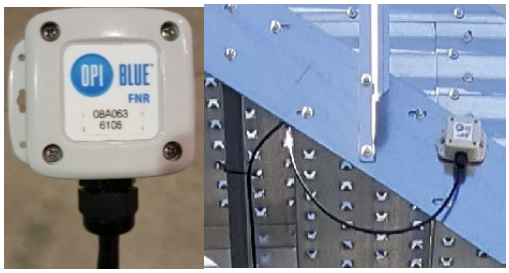
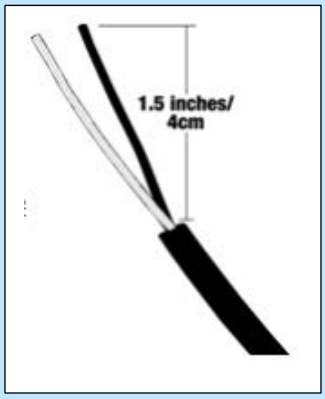


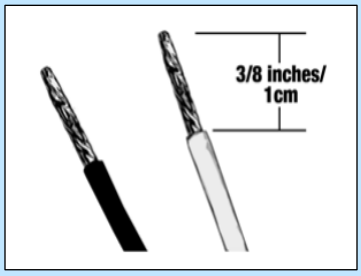
2. Bring the Communication cable (COM2) cable into the Fan Node enclosure through a strain relief and terminate in the proper connection.

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.



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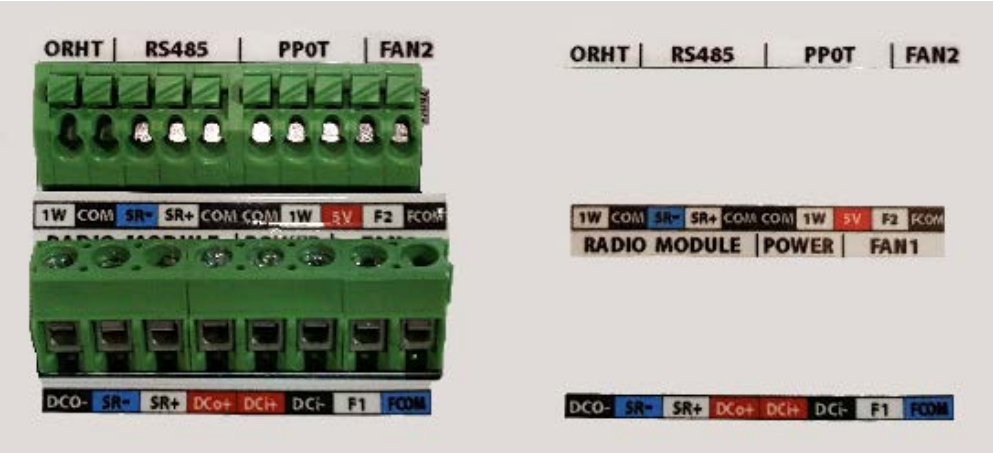
Note: The picture below shows a closeup of the termination connections on the Fan Node. Beside it is the label to provide a clearer picture without the termination connections obstructing the view.



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.

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RS485	**RS486:** 	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.

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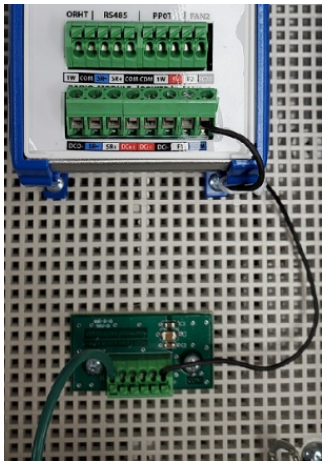

Note: All cable runs should be secured in place. It is recommended that the cables from the Fan Node Enclosure to the Fan Control Box be in conduit whenever possible. Additional cables from the Fan Node Radio, Weather Station (ORHT), Plenum Pressure Sensor (PPOT) to the Fan Node Enclosure should have 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.

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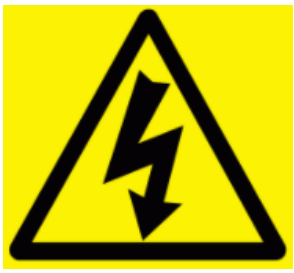
Once all the connections have been made into the Fan Node Enclosure, peel off the back of one of the supplied Fan Warning sticker and affix it to the appropriate fan(s) connected into the system. (There are three stickers supplied per system)

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.

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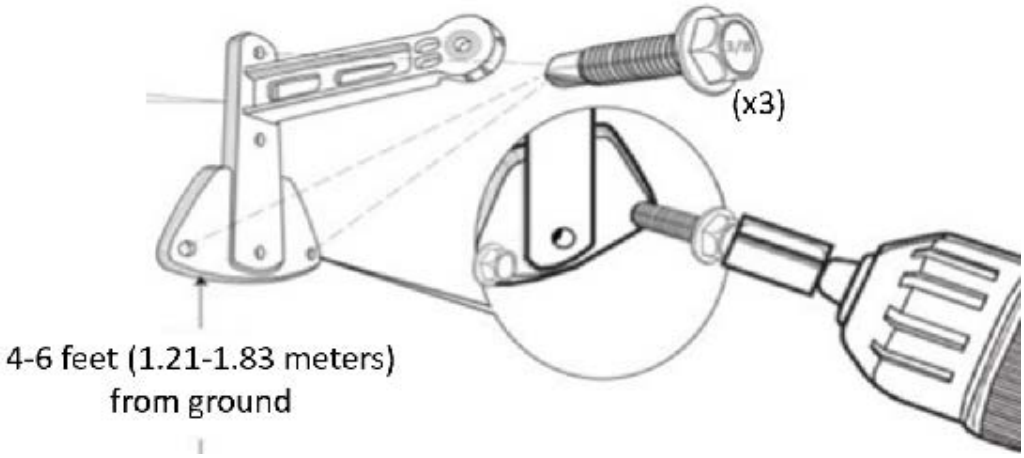
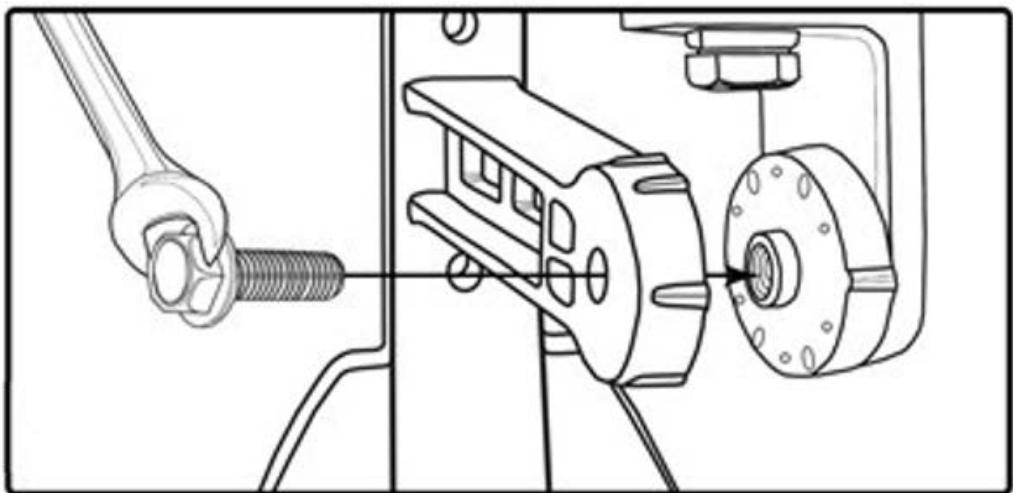
2. Using a cordless drill with a 3/8” Nut Driver attach the 3 self-tapping screws (Included in the Weather Station box) securing the foot mount in the desired location.

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.



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)



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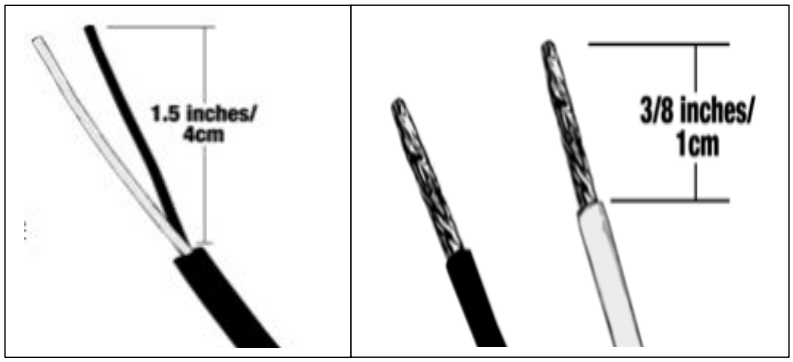
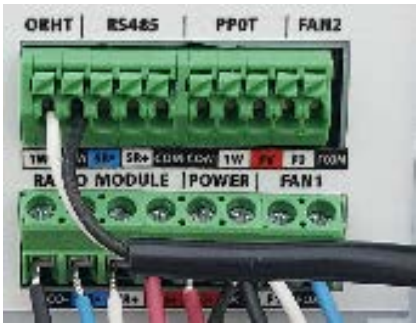
4. Run the INT2 lead wire to the Fan Node enclosure through the strain relief at the bottom. Cut the INT2 cable to the proper length before it has been terminated. This will ensure the correct length and avoid any excess cable or risk from it being cut too short.

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.



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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.

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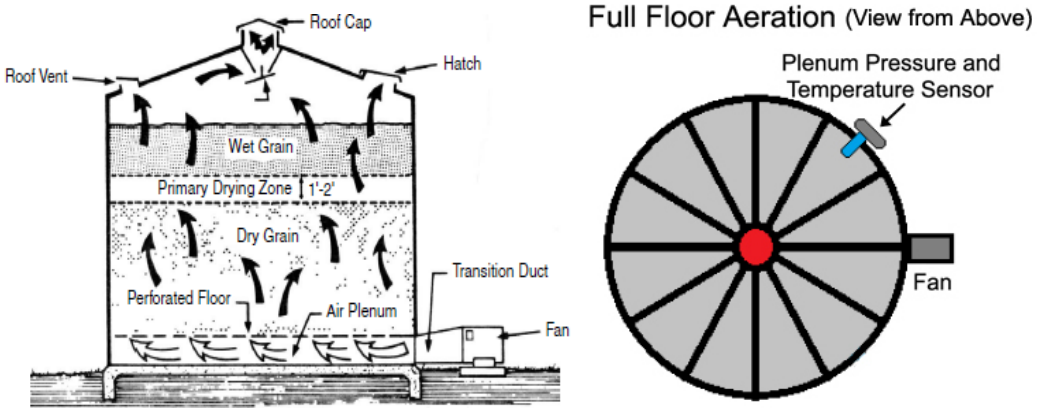
Note: ½ inch metal conduit is recommended to be run between the Plenum Pressure and Temperature Sensor (PPOT and the Fan Node enclosure. However, it typically needs to be installed by an experienced installer. As an alternative ½ inch watertight flex conduit can be used to provide a more cost effective 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).

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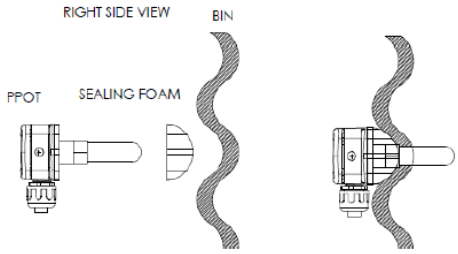
3. Mount the Plenum Pressure Sensor and Temperature Sensor (PPOT) to the bin surface using two 12-14 x ¾ self-drill screws provided.
4. Measure the correct length of conduit needed to reach from the PPOT to the Fan Node enclosure. Be sure to include extra length (3 feet or 1 meter) to accommodate a drip 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.

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OPI Blue with 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** – Provides an overview (health check) of the entire field operations. (All sites combined)

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.

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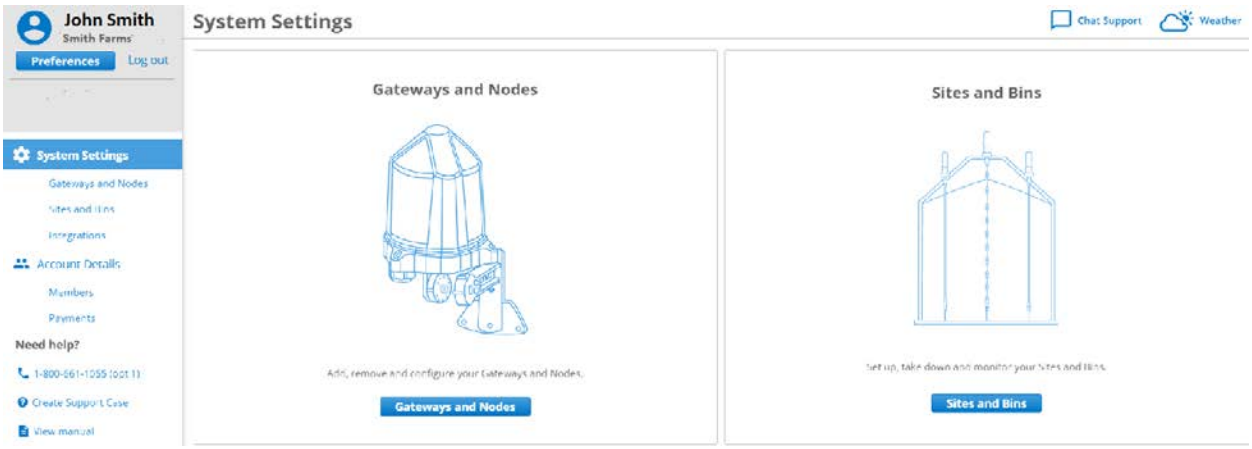
Home

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 an overview with four tiles in the center displaying pertinent information. The information is shown in the following categories: Grain Condition, Inventory, Global View and System Status. This screen can be accessed anytime by selecting **Home** from the menu 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.

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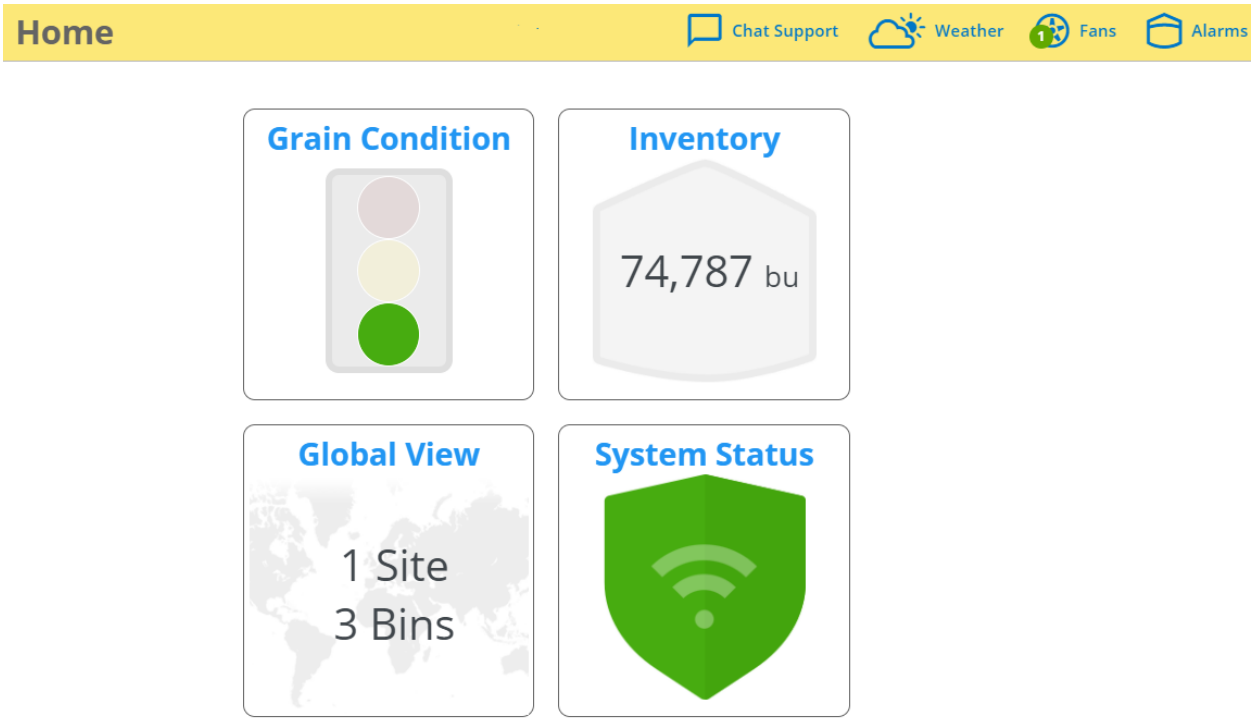
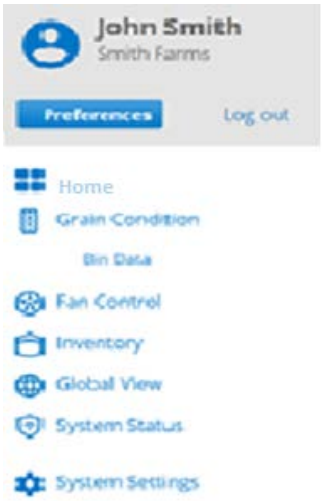


Note: All screen shots are shown in the **Desktop** view. If you are using a mobile device the same information is available; however, it may be necessary to scroll to view it due to the smaller screen size.

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.

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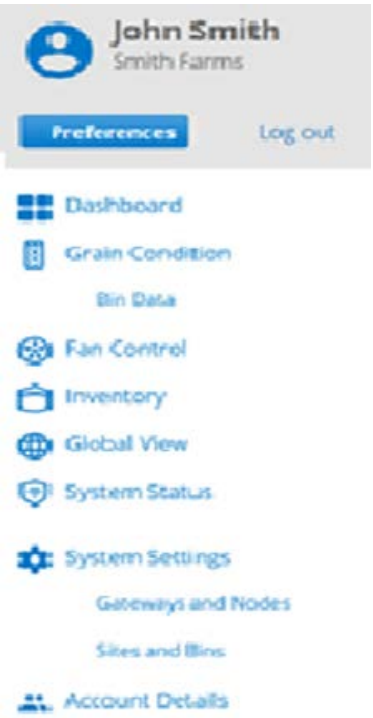

Alarms

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 Offline, Gateway A/C Power Loss, Cable Node Low Battery, Fan Node A/C Power Loss** and when an **Automated Fan Mode Switch to Manual Mode** due to a control issue..

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 **Home** screen.

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

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

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.

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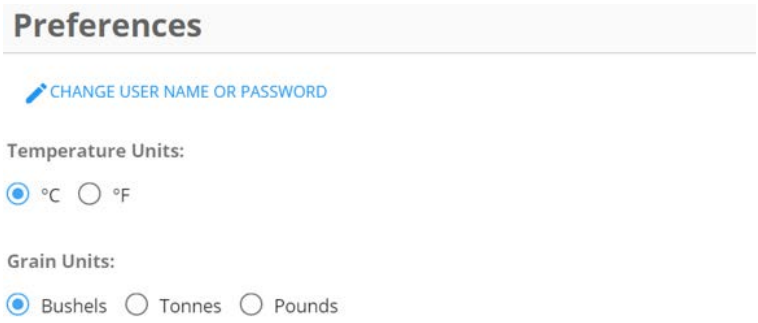

Alarm Preferences

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.

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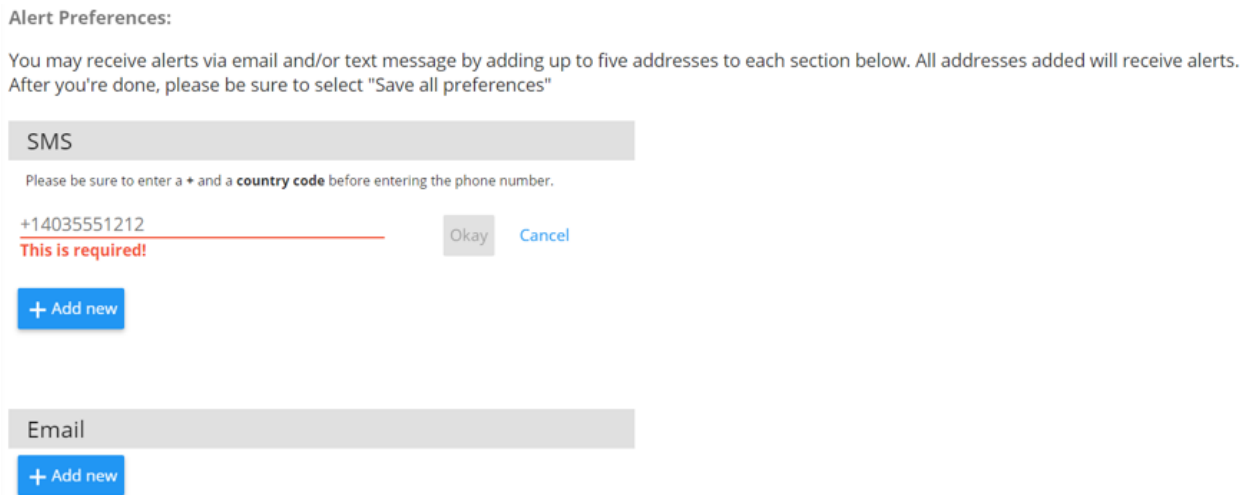

Settings and Configuration

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**

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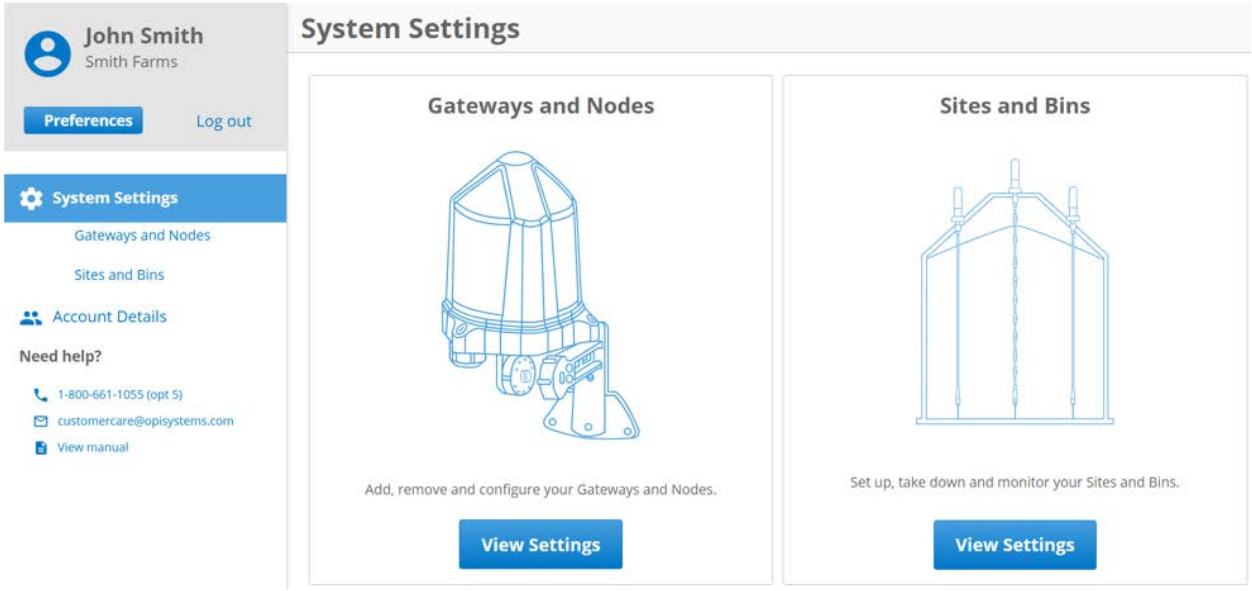
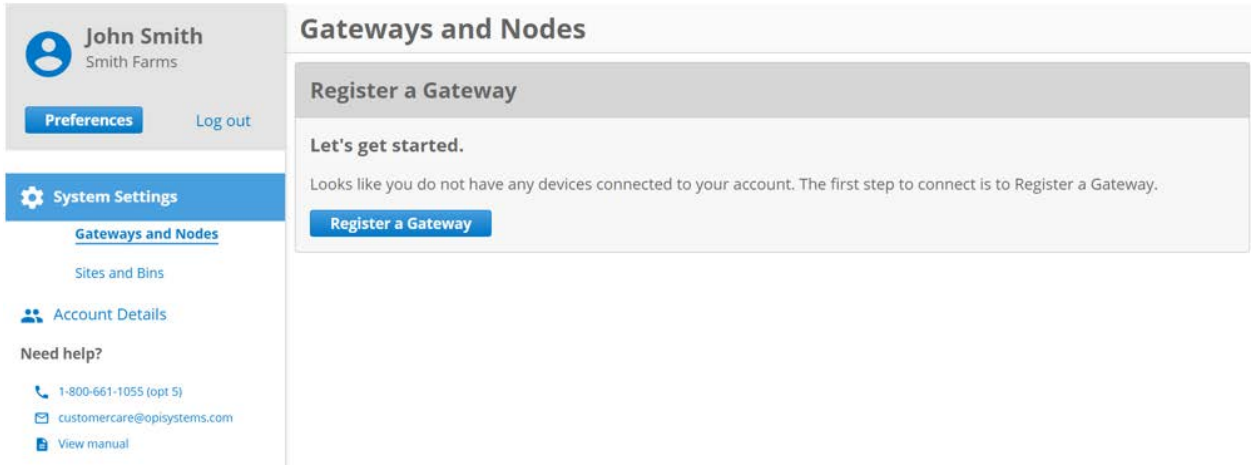
4.2.1 Gateways

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



2. Tap **Register a Gateway**



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

Note: In certain instances, the PIN # on the Gateway sticker may only have 3 digits. If this is the case add a zero before the first digit when entering the PIN #. (e.g., 0123)

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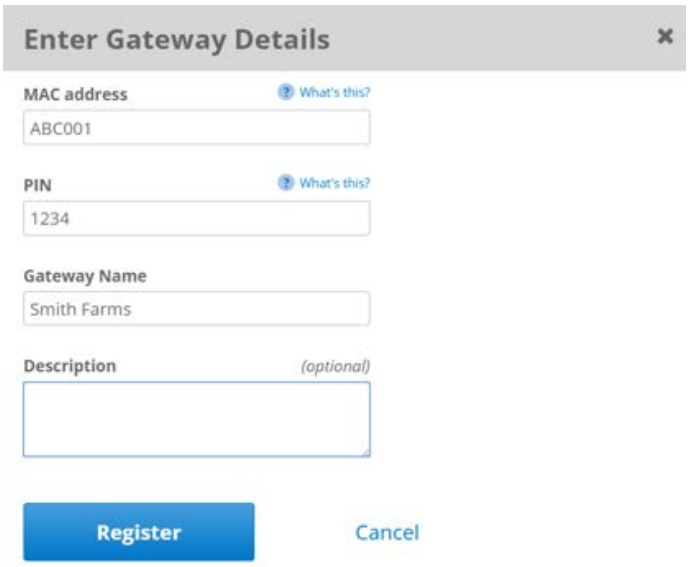
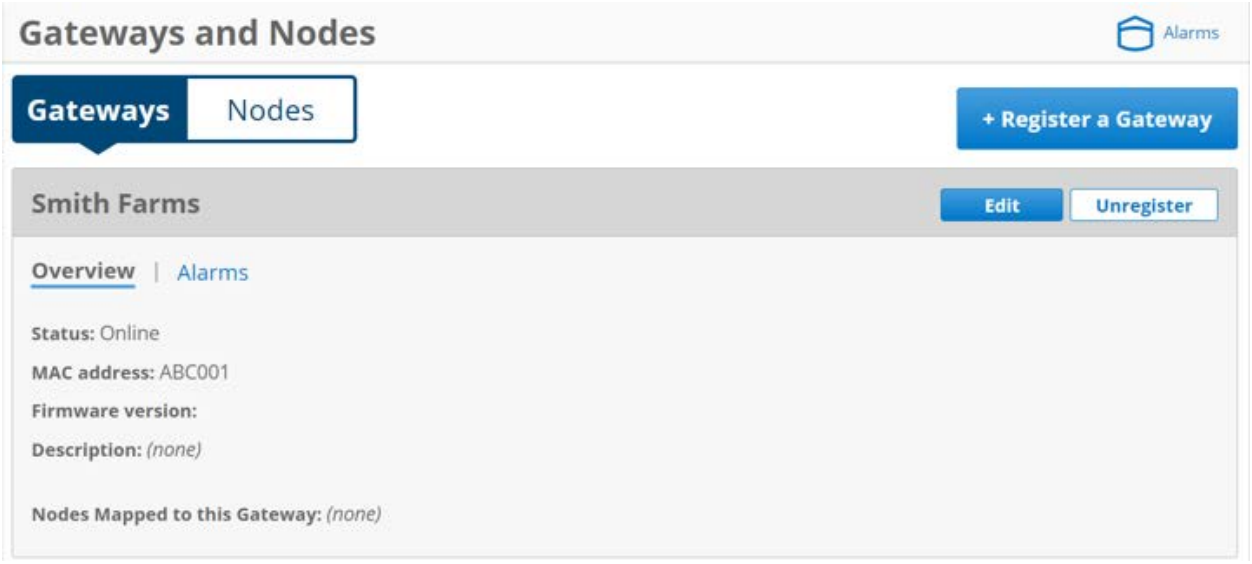


4. Tap **Register** button to finish the process.

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. It might take a couple of minutes to show the online status.



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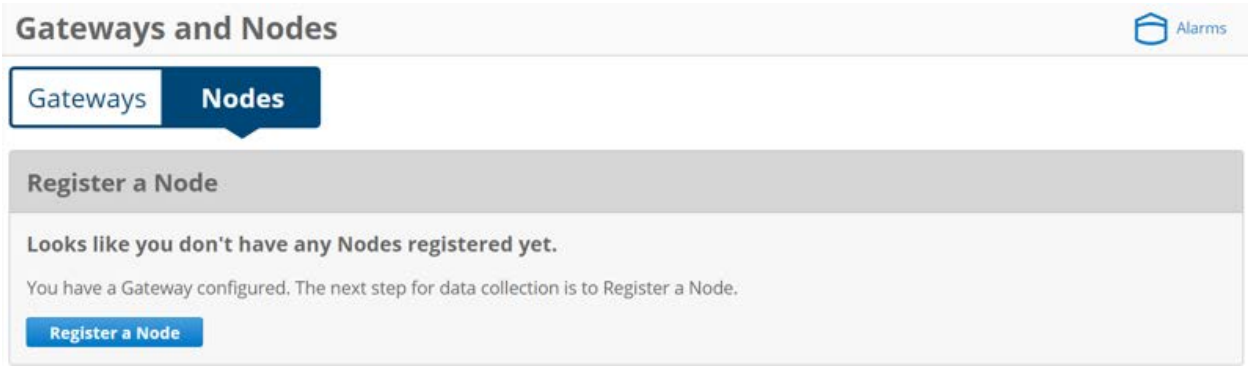
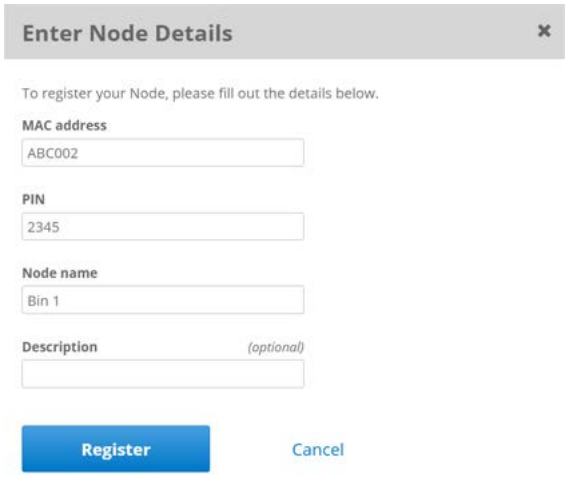
4.2.2 Cable Nodes

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



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

Note: In certain instances, the PIN # on the Cable Node sticker may only have 3 digits. If this is the case add a zero before the first digit when entering the PIN #. (e.g., 0123)



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.

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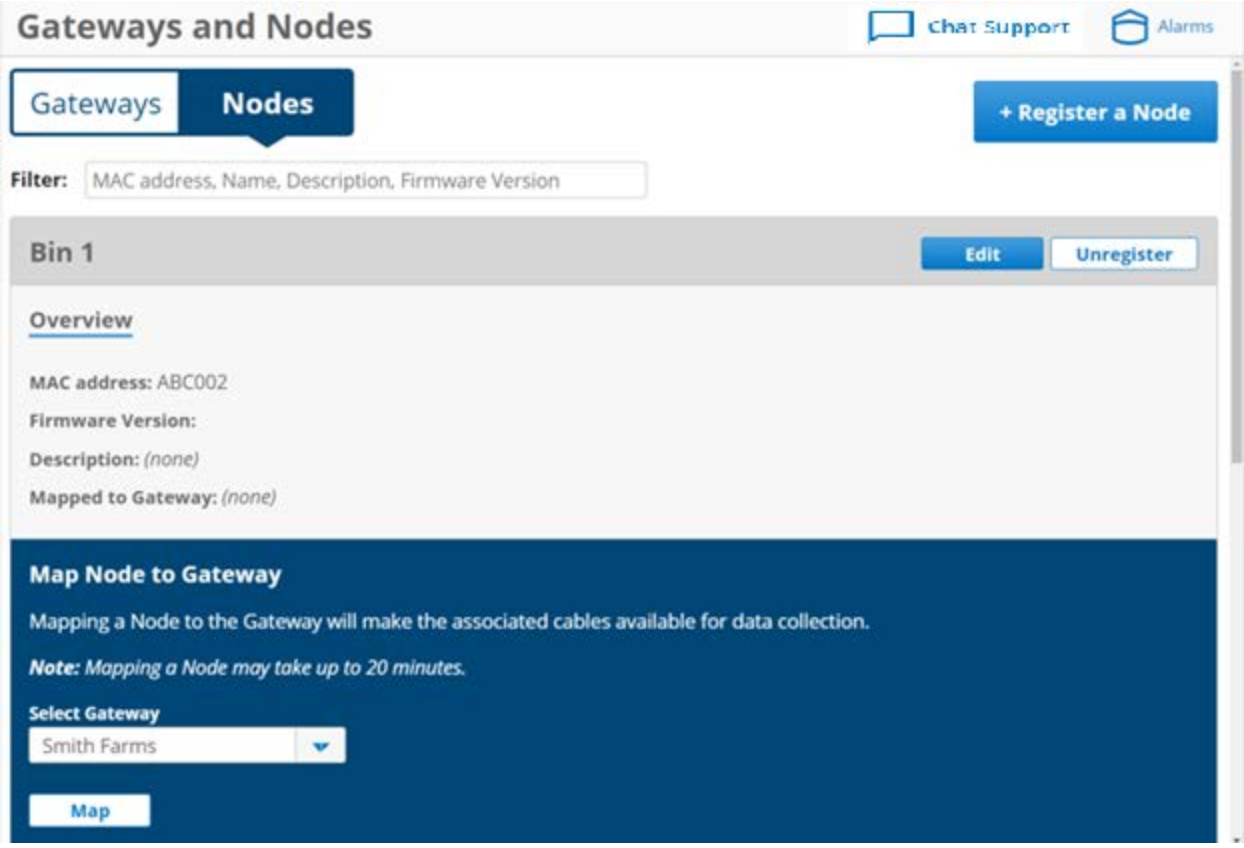
4.2.3 Map Cable Node to Gateway

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



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.

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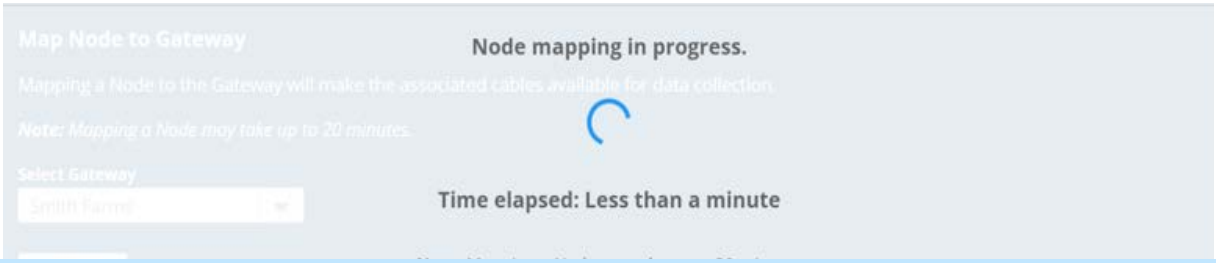
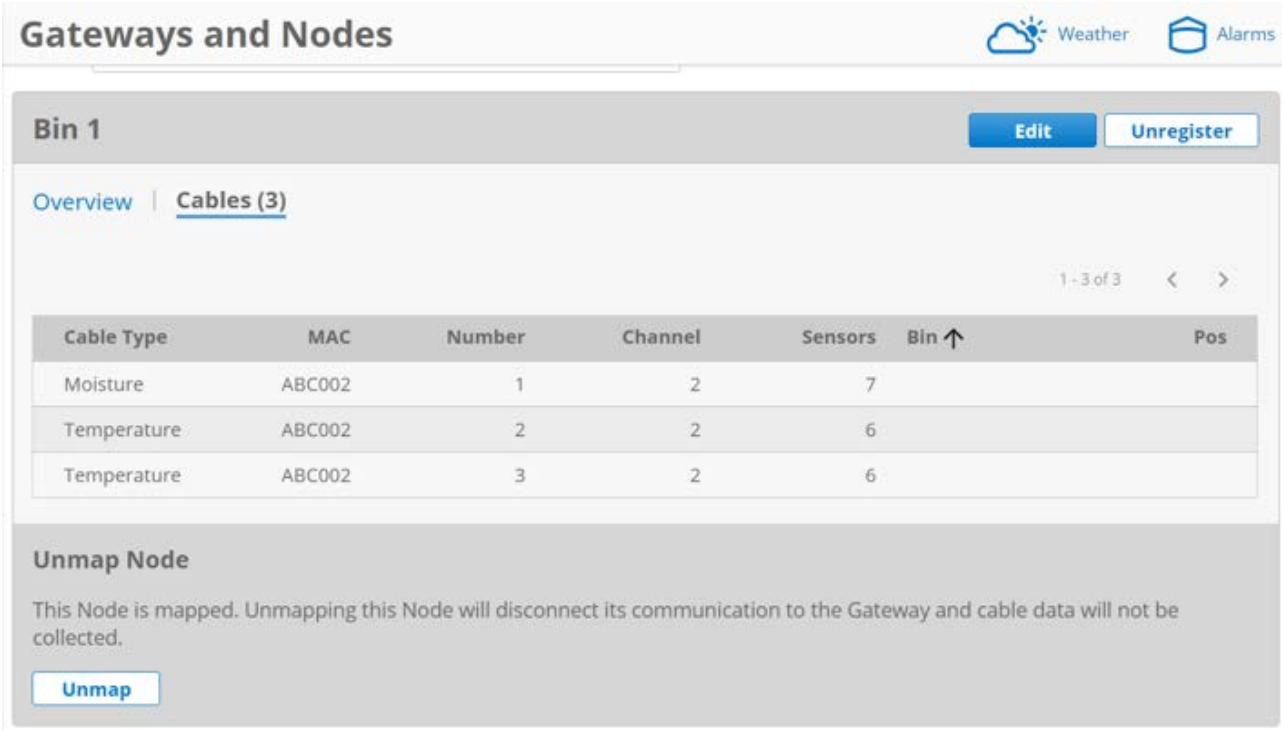


Note: Once a Cable Node has been mapped to a Gateway the cables associated to the Node will be displayed as shown below.



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.

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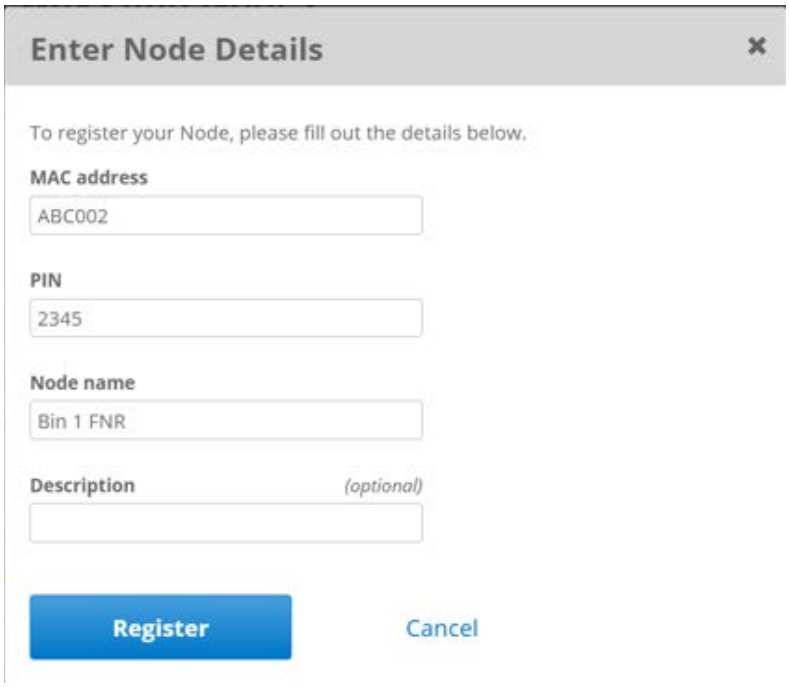
3. A pop up will appear. **Fill in** all applicable information (MAC Address, PIN, and Node Name)

Note: In certain instances, the PIN # on the Fan Node Radio sticker may only have 3 digits. If this is the case add a zero before the first digit when entering the PIN #. (e.g.,



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.

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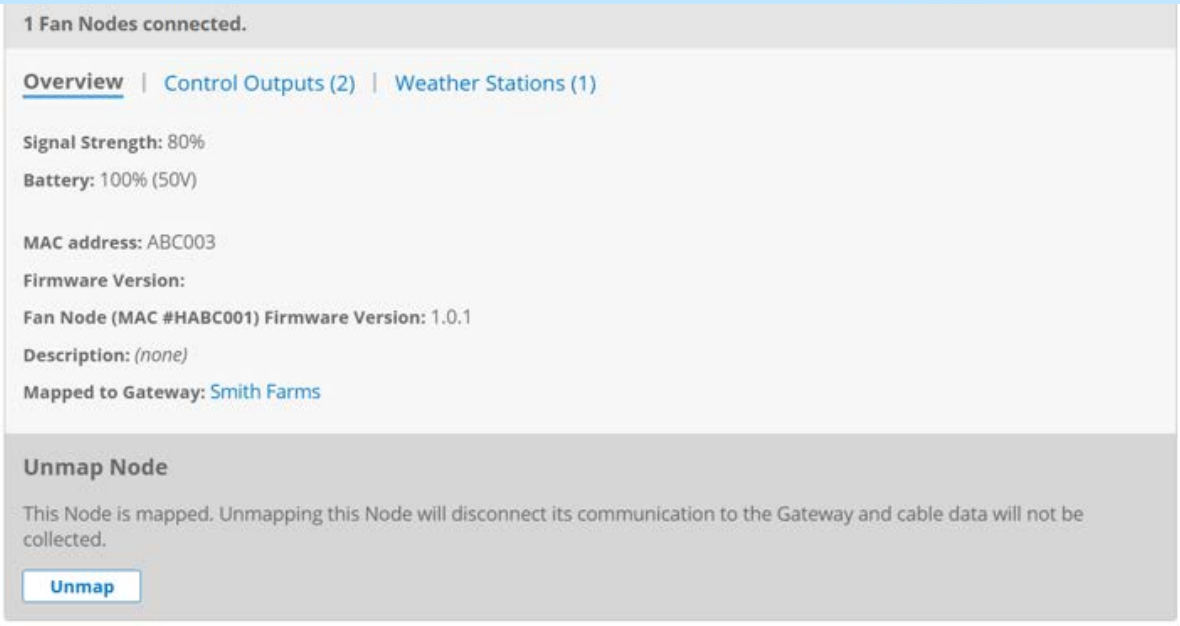
2. If there are multiple Gateways, select the appropriate one from the dropdown list and tap the **Map** button.

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

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.

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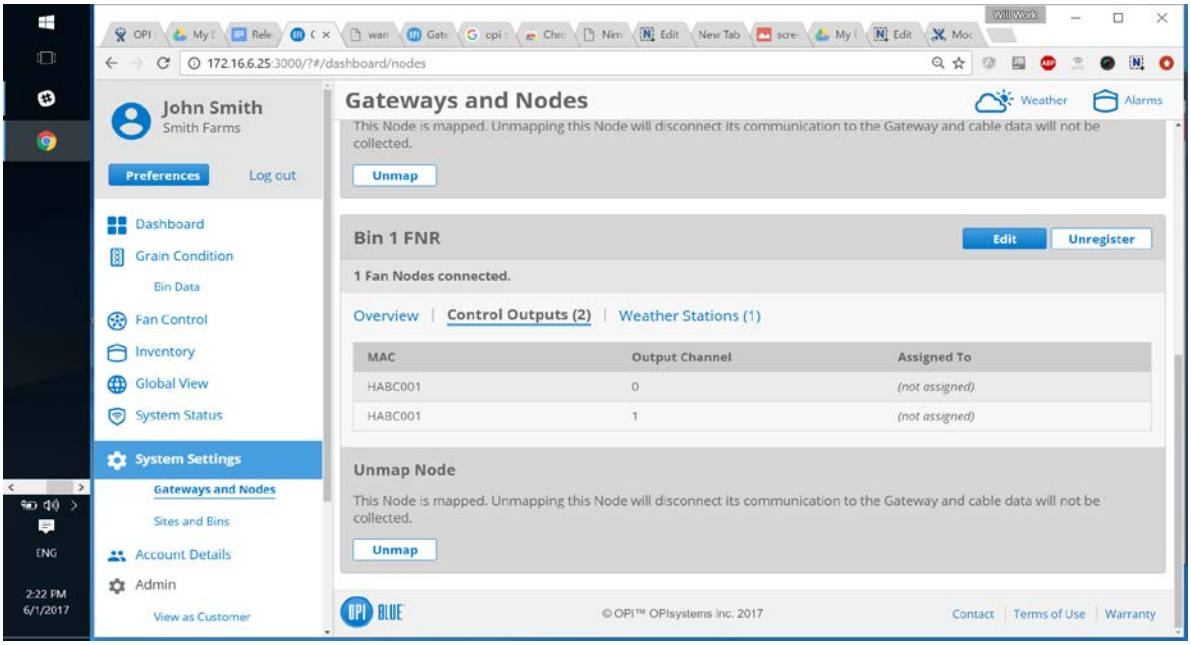

Note: The Weather Station Icon

will appear at the top right-hand

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**.

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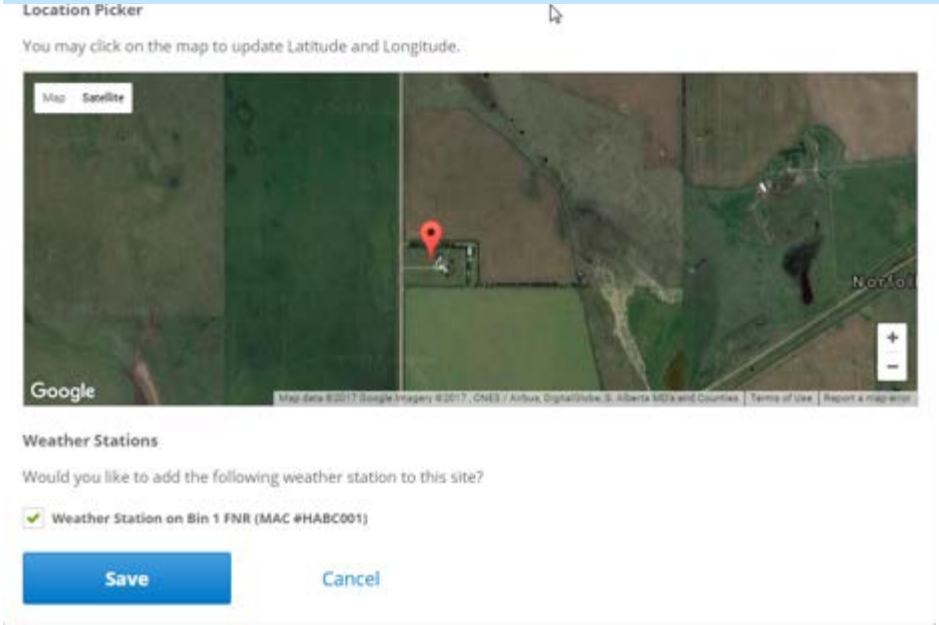
Note: If you are unsure of the Latitude and Longitude of your site location, you can use the map feature provided. Simply scroll on the map to the appropriate location and click on the location to place a marker. Once a marker has been placed the Latitude and Longitude fields will auto populate with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



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

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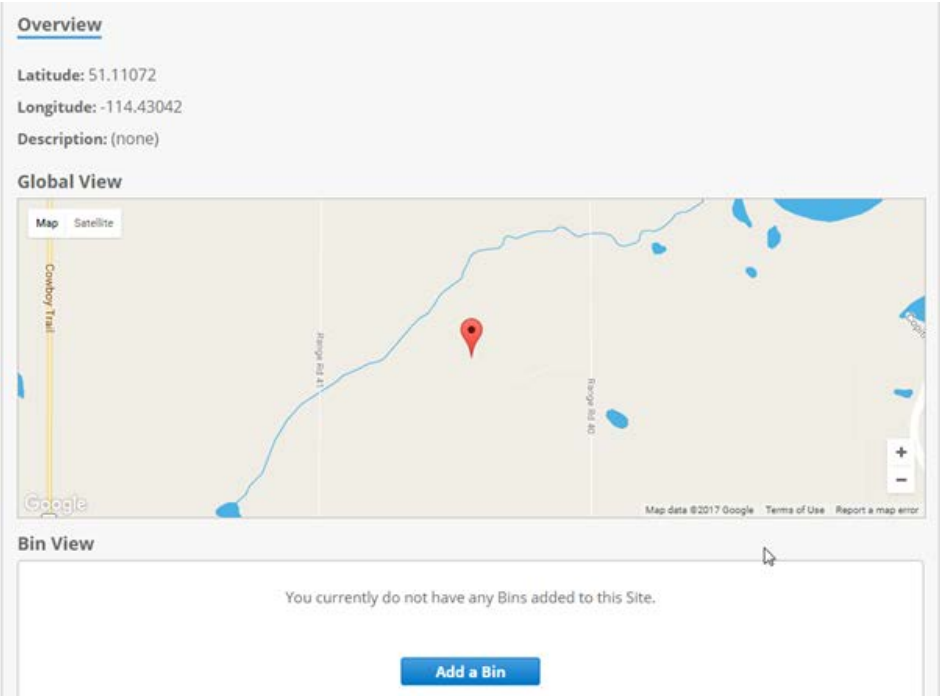

Bin Details

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)

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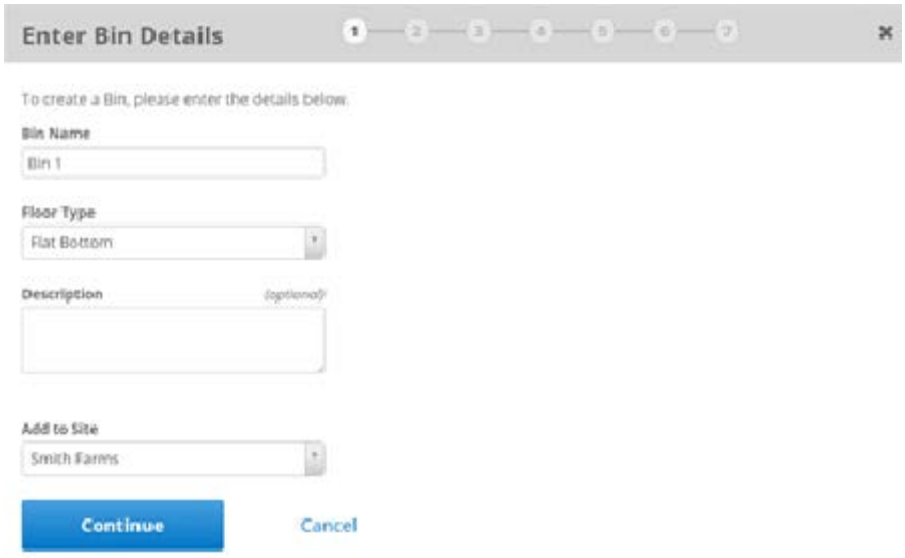

2. Tap the **Continue** button.

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 Moisture Meter selection or grain curves please contact OPIsystems Inc. at 1-800-661-1055 (Opt. 1)

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4. Tap the **Continue** button.

Enter Bin Parameters

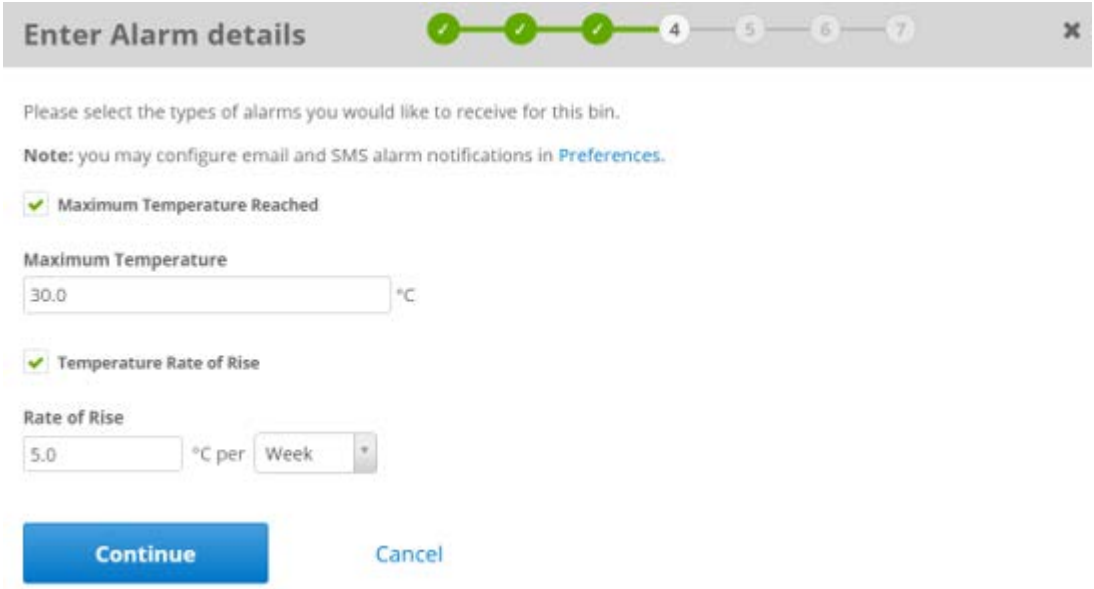
5. A pop up will appear on the screen. **Enter** all necessary Bin Parameter Info (Fill Date, Bin Capacity, Price and Grain Level).

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.



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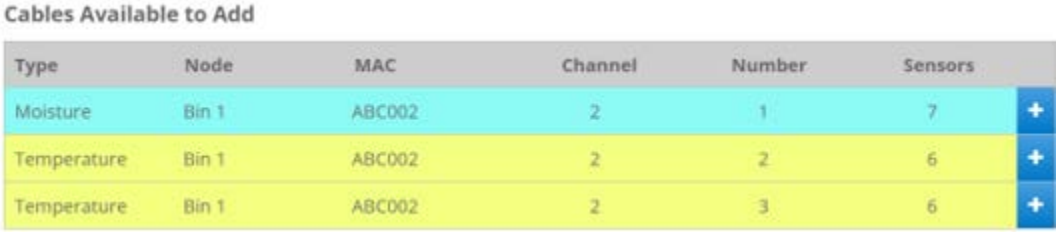
8. Tap the **Continue** button.

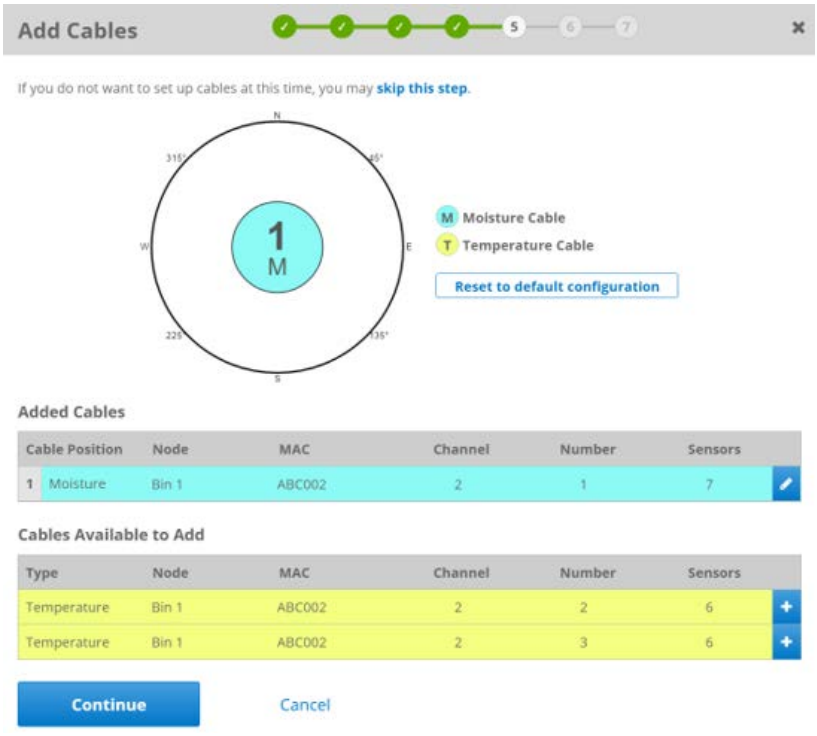
Add Cables

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.



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.



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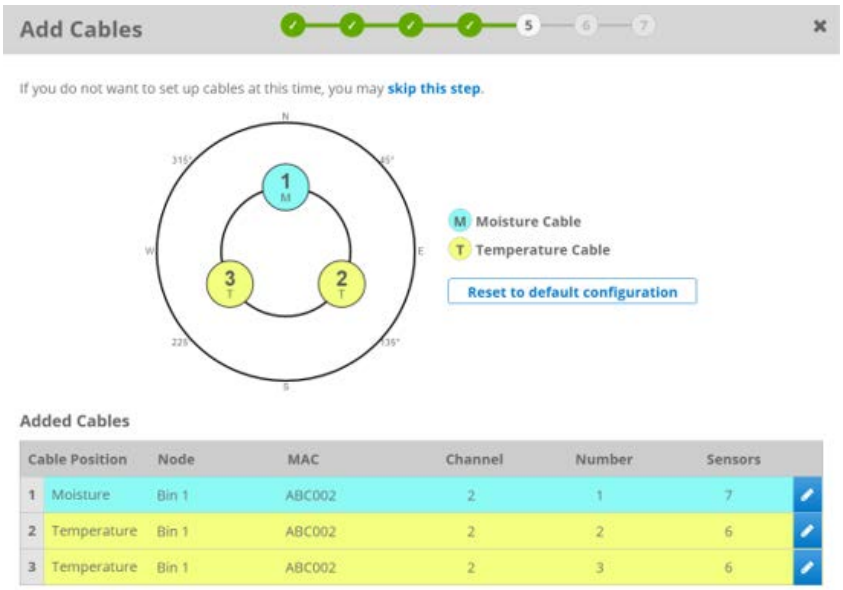
10. Repeat the process to add until all specified cables have been added to the bin.



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.

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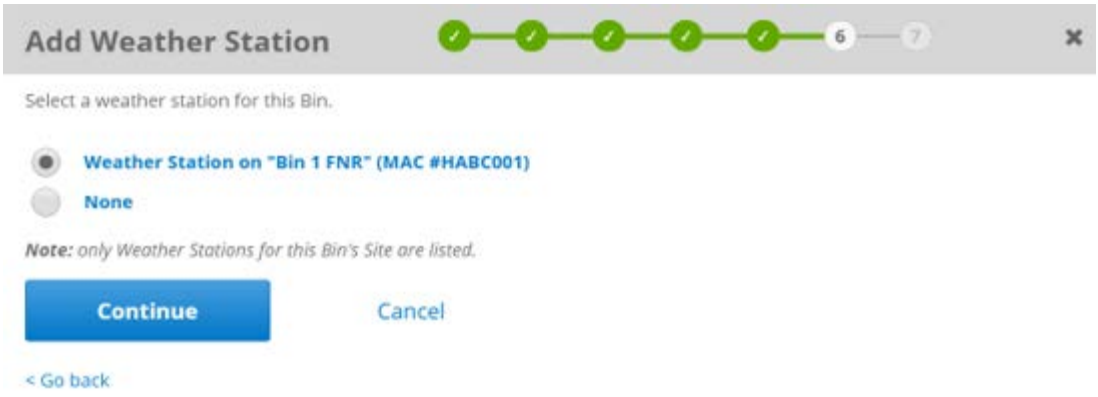
4.2.7 Add Weather Station

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.



14. Tap the **Continue** button.

4.2.8 Add Fan

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

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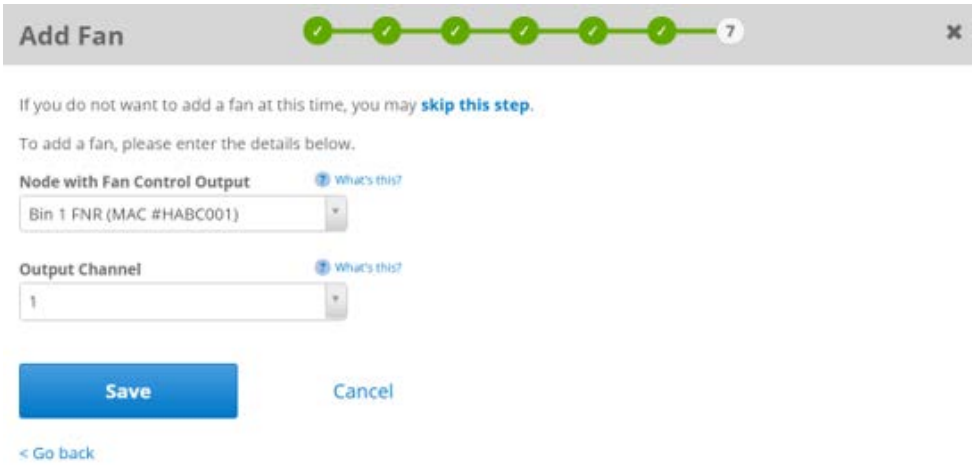
15. Use the **drop-down arrow** to select the appropriate Node with Fan Control Outputs (There might be many to chose from depending how many bins have fan control hardware installed on them.)



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

4.2.9 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

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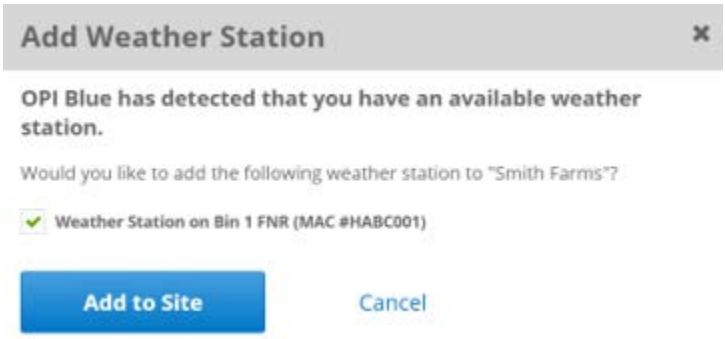
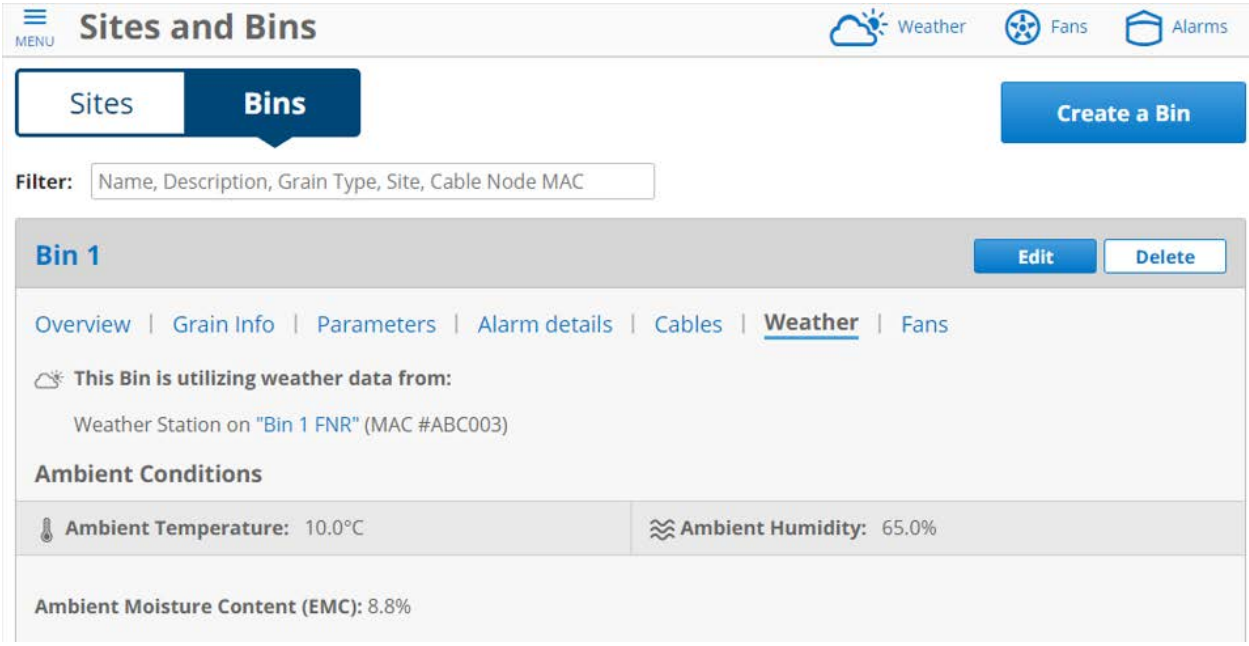
installed. **Place** a checkmark in the box beside the Weather Station to be added to the site.



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.



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)

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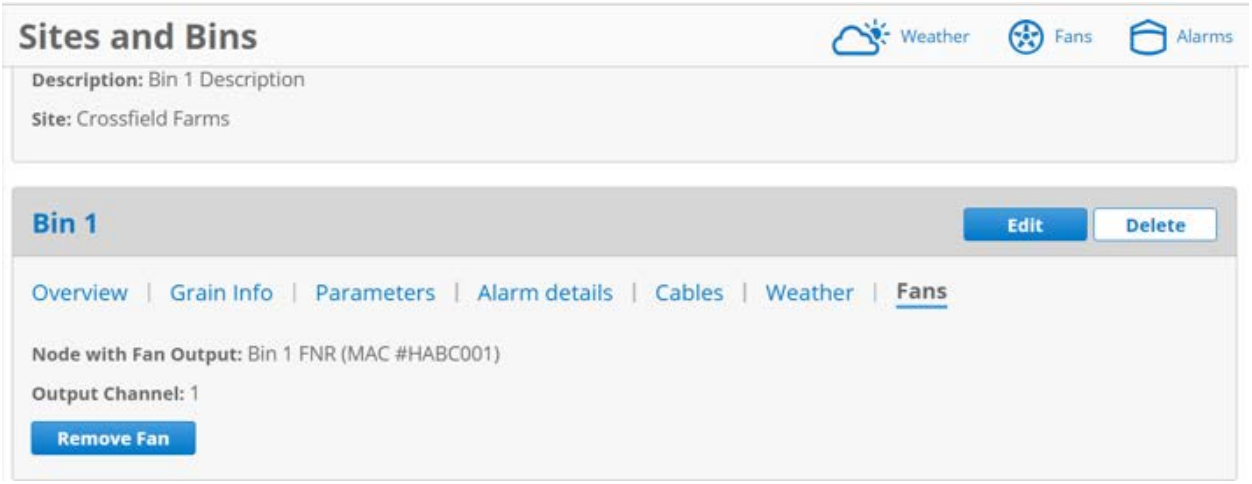
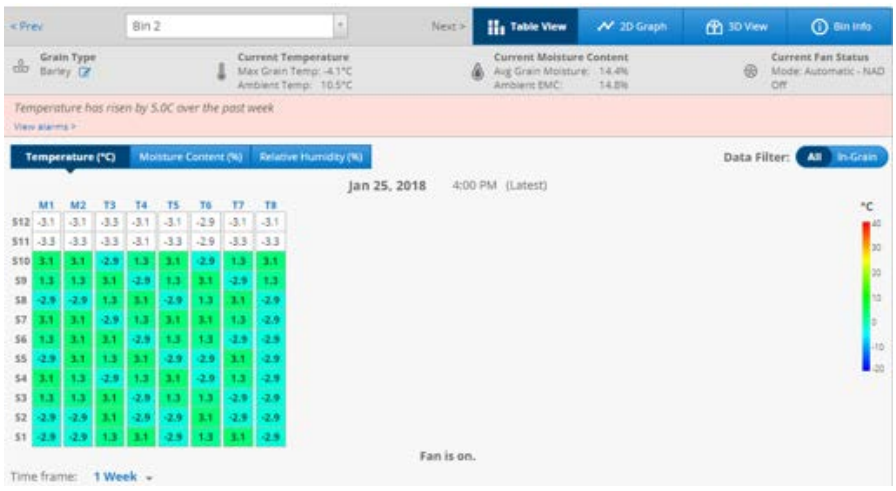


Features and System Use

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.



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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**.

Note: Getting a grain level indication in a structure can take 15-hours to achieve upon the initial filling of the structure. During this 15-hour period the automated fan control function can only be used if the **Override Disclaimer** is acknowledged by the grain manager. This Disclaimer is located on the **Fans Settings** page. (shown below)

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Important! To avoid damage, ensure there is grain in the bin before enabling Automated Fan Control.

The system may take up to 24 hours to determine grain level before starting.

☑ **Override and begin immediately. (Do not wait for grain level)**

Grain Level Confirmation

OPI Blue relies on an algorithm to compute which sensors are buried in the grain mass and thus verify that the bin does contain grain, allowing for safe operation of fans and heaters. You are about to override this safety feature, acknowledging:

1. **Grain levels and inventory may not be viewable immediately in OPI Blue;**
2. **Safety risks to equipment and personnel.**

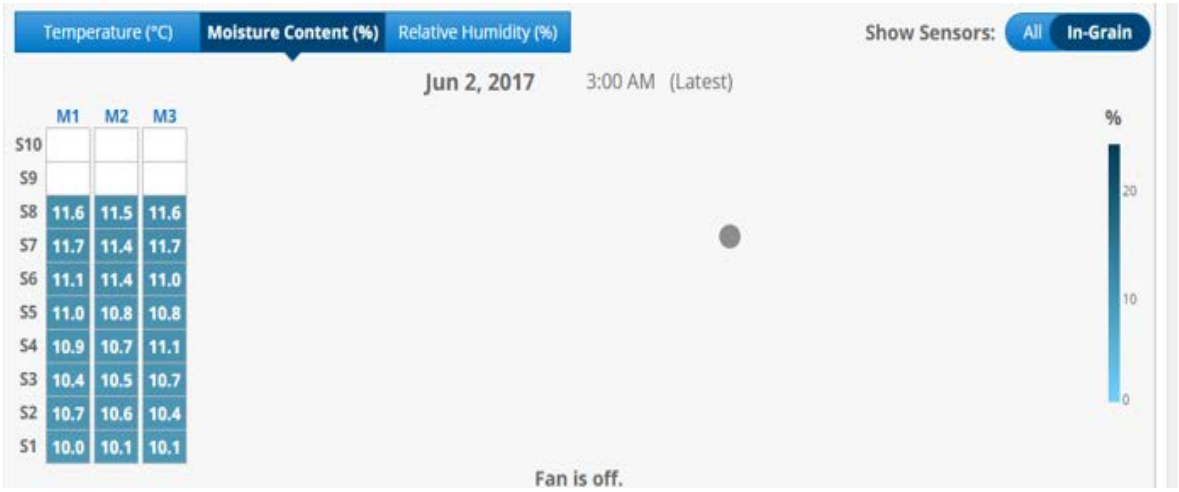
I acknowledge that running fans or heaters in an empty bin can cause serious damage or physical injury, as well as incorrect conditioning of grain. I confirm that I have visually inspected this bin, and deem the bin to be in a state to safely operate fans and/or heaters.

☐ **I have read and acknowledge the disclaimer.**

Apply these settings to other bins

Yes **No**

Save Cancel



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.

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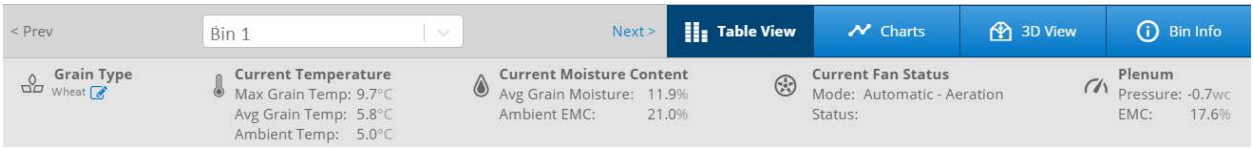
Across the top of the **Table View**, **2D Graph**, **3D View** and **Bin Info** screens there is useful information displayed with regards to the current bin that has been selected. This information is informative when it comes to the current conditions inside the bin, **Current Temperature**, **Current Moisture Content**, **Current Fan Status** and **Plenum Pressure** (If automated fan control enabled). In addition, the current Ambient Temperature and Ambient EMC is displayed which provides valuable information in determining when the fan(s) should be turned ON or OFF in manual mode.



Note: Using the **Quick Edit** function icon provides an easy means to edit **Bin Info**, **Grain Info**, **Parameters** and **Alarm Details.**

Charts

The Charts page will display data in a graphical form for a selected bin across a site. Unlike the Table View which displays current temperature and moisture readings, the graphed data is the logged historical readings. By selecting a cable, you will see the data displayed in the graph over a chosen duration of time. (1-Day, 1-Week, 2-Weeks, 1-Month, 3-Months, 6-Months, 1-Year, From Fill Date or a Custom Date)

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 increasing in temperature and deal with it accordingly prior to it becoming a hotspot. The graph also provides the visibility to see what is occurring

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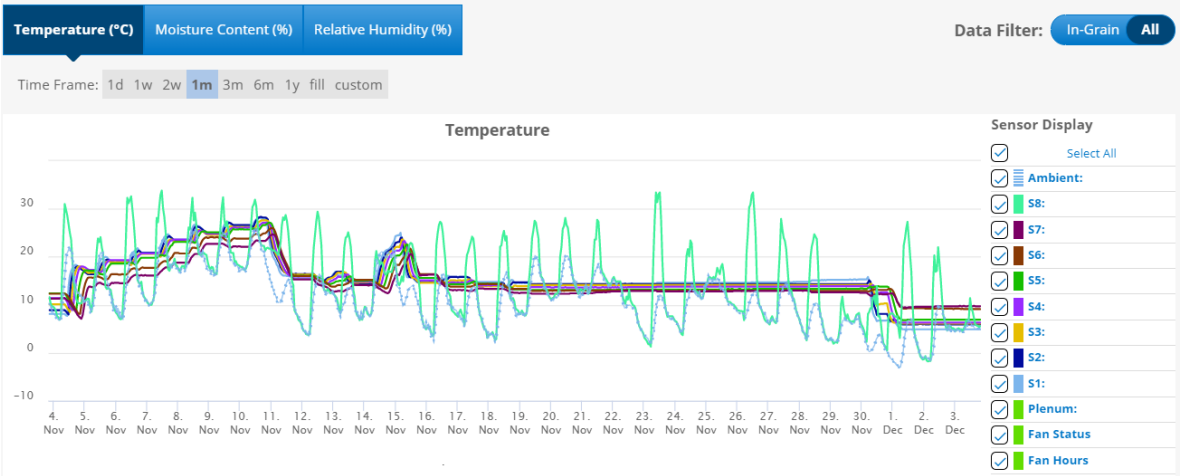
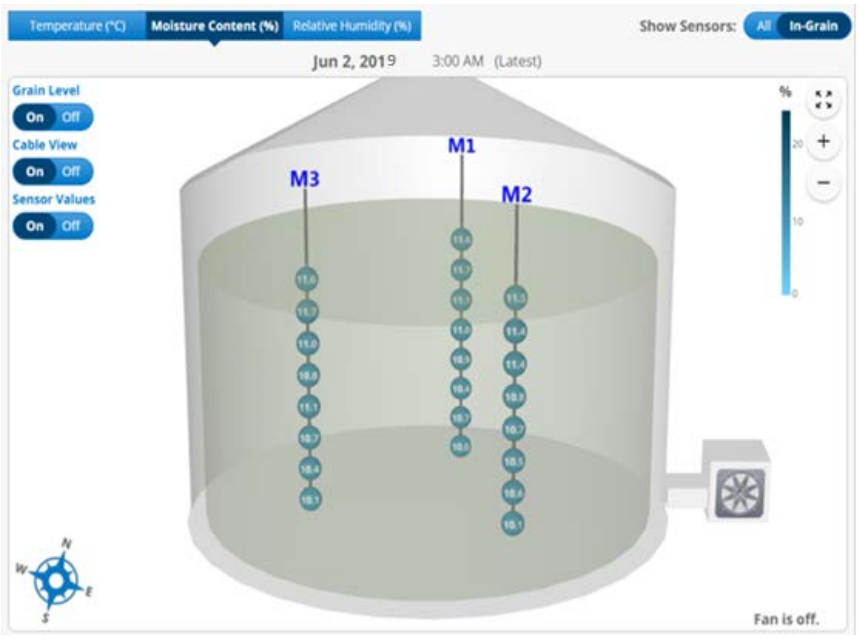
throughout a bin with regards to moisture and temperature management on a cable by cable basis.



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.



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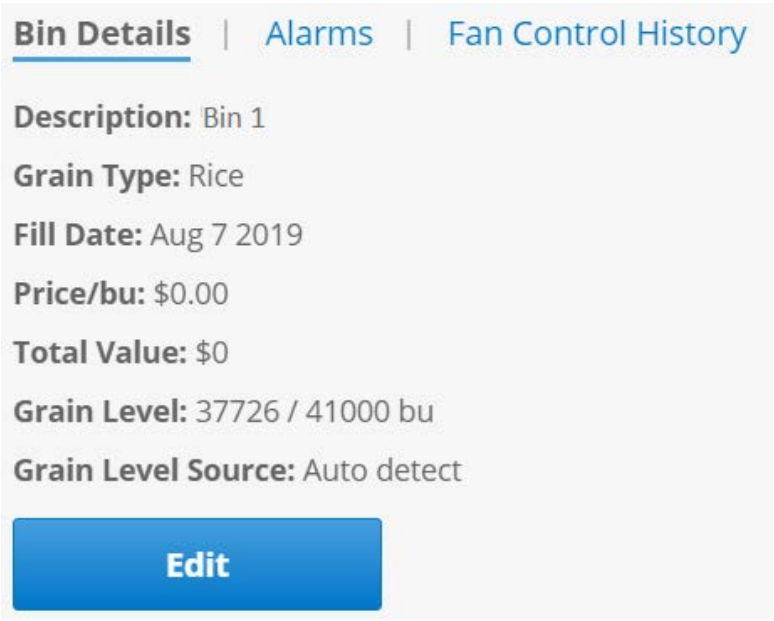
Bin Info

The **Bin Info** tab enables you to see **Bin Details**, **Alarms**, and **Fan Control History** depending on the chosen link.



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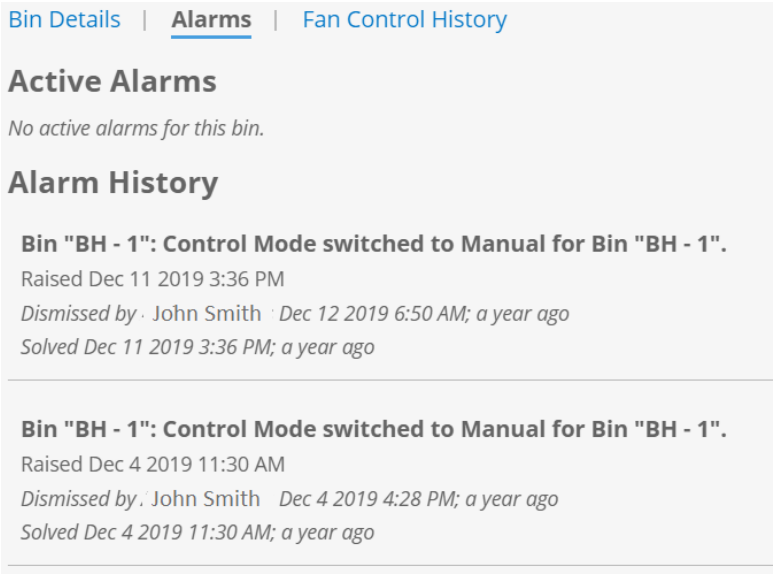
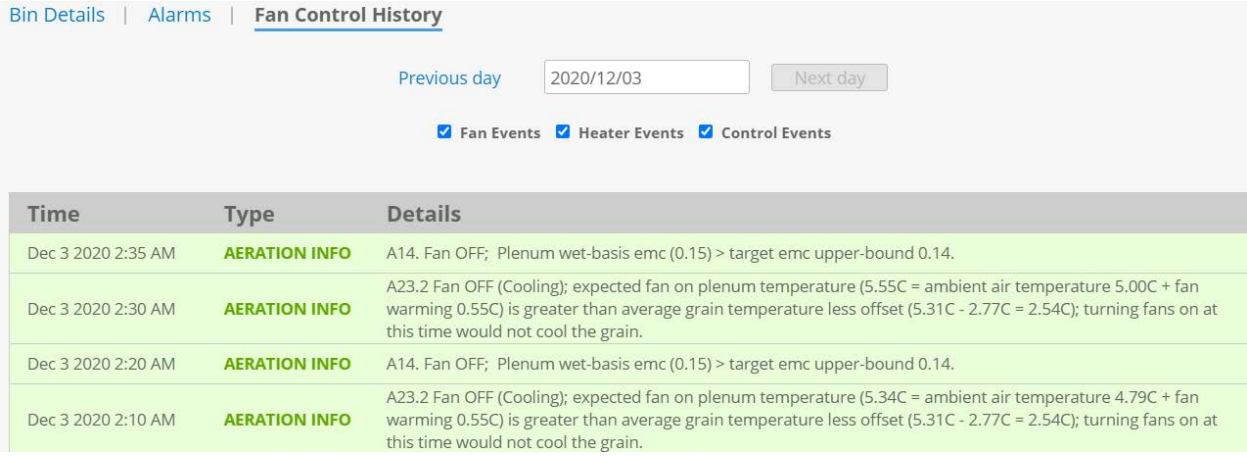
Alarms



Fan Control History (only visible if fan control is in place)



4.3.2 Site Summary

The **Site Summary** page can be accessed through the menu. This page provides the user with a customizable one stop shop where key data can be viewed in a table format for the selected **Site** and bins associated with the site. Clicking (tap

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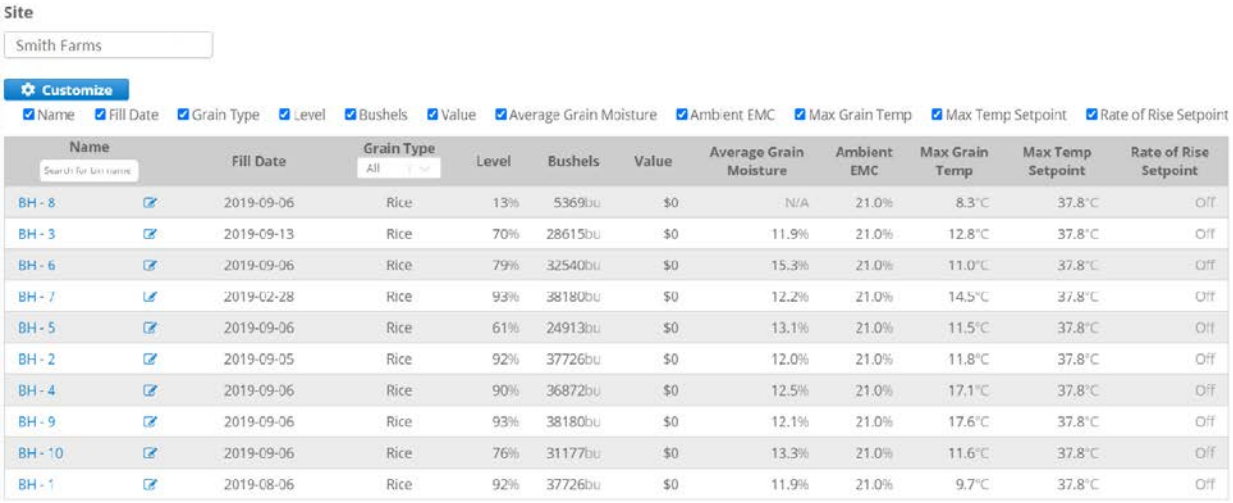
on mobile device) the **Customize** button enables the ability to select the various data headers that are determined to be most important to you by placing or removing a checkmark beside each.

Note: The **Site Summary** table can be filtered by clicking to the right of the column header to display the data in ascending or descending order. Using the **Quick Edit** function provides an easy means to edit **Bin Info**, **Grain Info**, **Parameters** and



Name	Fill Date	Grain Type	Level	Bushels	Value	Average Grain Moisture	Ambient EMC	Max Grain Temp	Max Temp Setpoint	Rate of Rise Setpoint
BH - 8	2019-09-06	Rice	13%	5369bu	$0	N/A	21.0%	8.3°C	37.8°C	Off
BH - 3	2019-09-13	Rice	70%	28615bu	$0	11.9%	21.0%	12.8°C	37.8°C	Off
BH - 6	2019-09-06	Rice	79%	32540bu	$0	15.3%	21.0%	11.0°C	37.8°C	Off
BH - 7	2019-02-28	Rice	93%	38180bu	$0	12.2%	21.0%	14.5°C	37.8°C	Off
BH - 5	2019-09-06	Rice	61%	24913bu	$0	13.1%	21.0%	11.5°C	37.8°C	Off
BH - 2	2019-09-05	Rice	92%	37726bu	$0	12.0%	21.0%	11.8°C	37.8°C	Off
BH - 4	2019-09-06	Rice	90%	36872bu	$0	12.5%	21.0%	17.1°C	37.8°C	Off
BH - 9	2019-09-06	Rice	93%	38180bu	$0	12.1%	21.0%	17.6°C	37.8°C	Off
BH - 10	2019-09-06	Rice	76%	31177bu	$0	13.3%	21.0%	11.6°C	37.8°C	Off
BH - 1	2019-08-06	Rice	92%	37726bu	$0	11.9%	21.0%	9.7°C	37.8°C	Off

4.3.3 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 seven specific alarm notifications that will show up in the system and that can be sent by SMS and email notification if configured by the user. Two alarms focus on the temperature of the grain, while the other three are system alarms.

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

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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**
5. **Node Battery Voltage is Low**
6. **Loss of Power to a Fan Node**
7. **Fan Automation Switch to Manual Mode** (due to an issue.)

Note: There are several ways in which you can view the alarms within the system. The simplest way is on the Home 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. If there are multiple alarms in a state a number will appear in the corresponding traffic light color indicating how many alarms are in that state. **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 Home screen. By clicking the alarm condition, you will see which bin it is associated with. If it is a **System Status Alarm** it will take you to the System Status page to view it.

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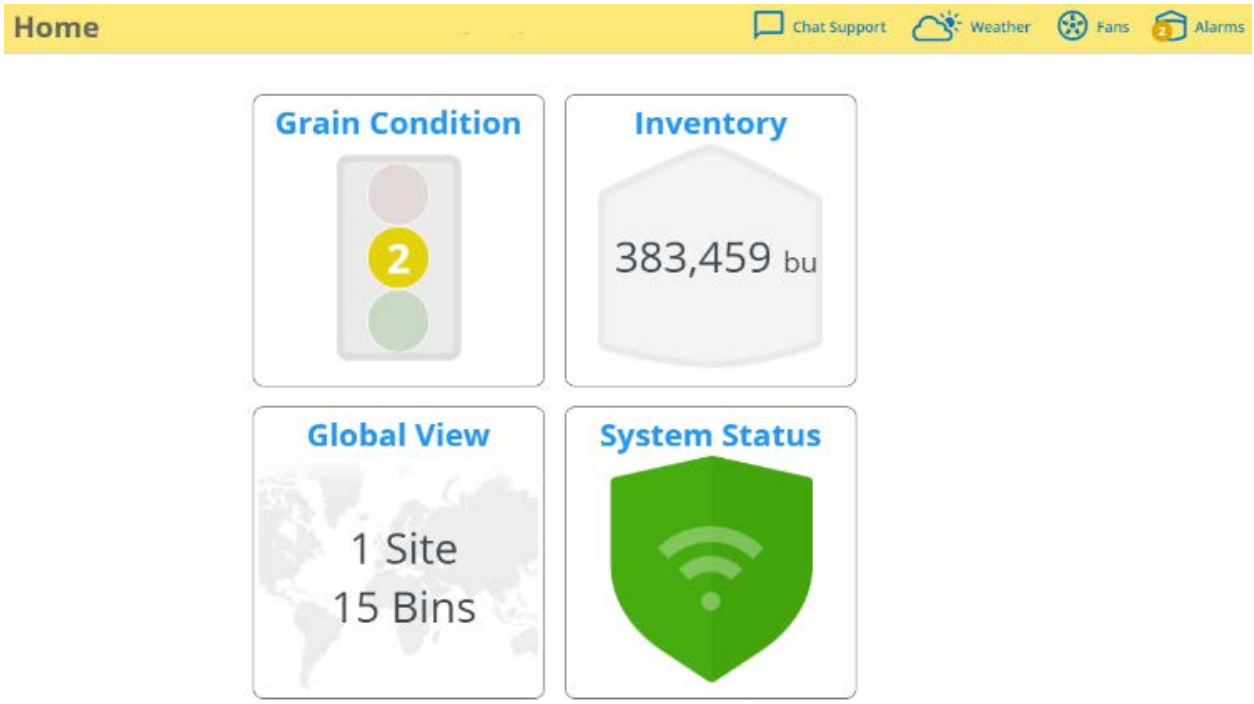
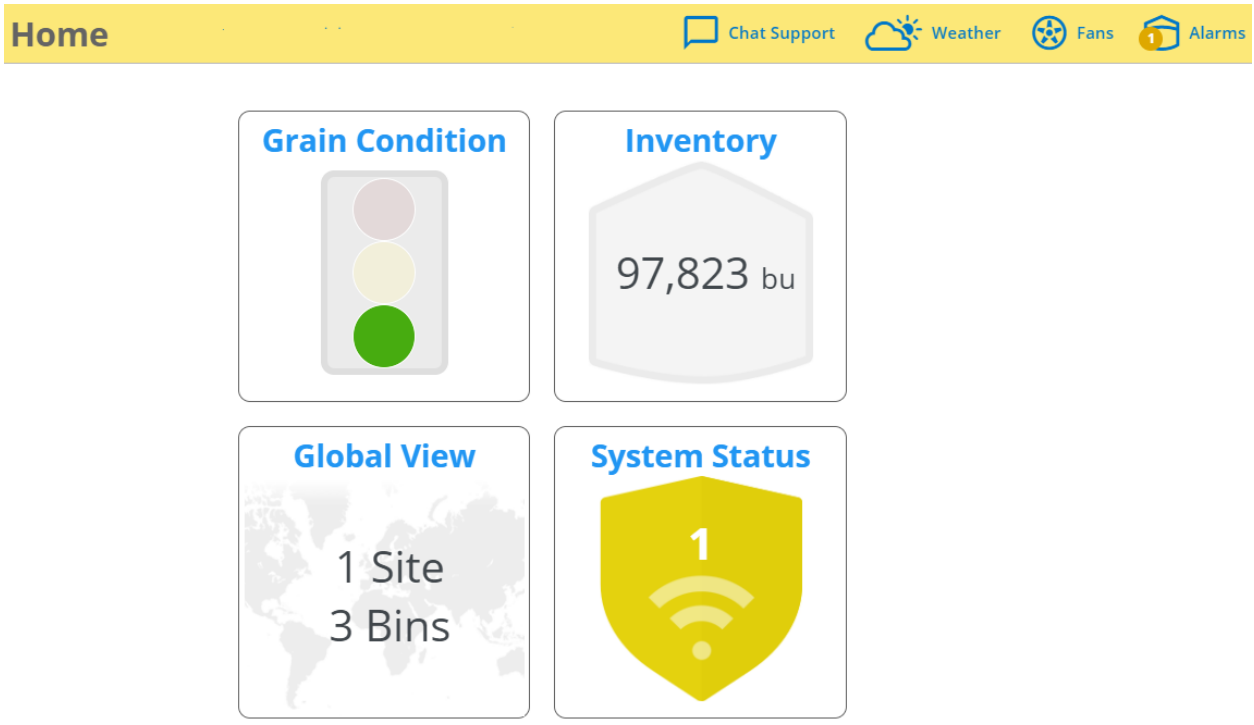


Two acknowledged **Grain Condition** alarms displayed.



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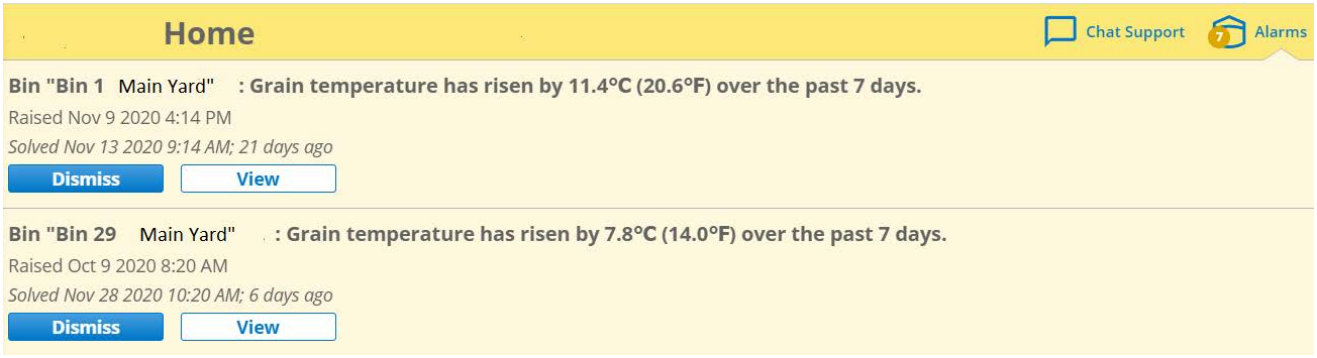
One acknowledged **System Status** alarm displayed.

Note: Any alarms that are **red** (active/unacknowledged) or **yellow** (active/acknowledged) will be visible on the alarm 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.



Two acknowledged alarms displayed by clicking on the alarm icon in the top right portion of the header. You have the option to investigate further by clicking the **View** button.

4.3.4 Grain Condition

The Grain Conditioning screen provides an overhead view of all the bins broken down on a site by site basis. (If multiple sites exist) 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.

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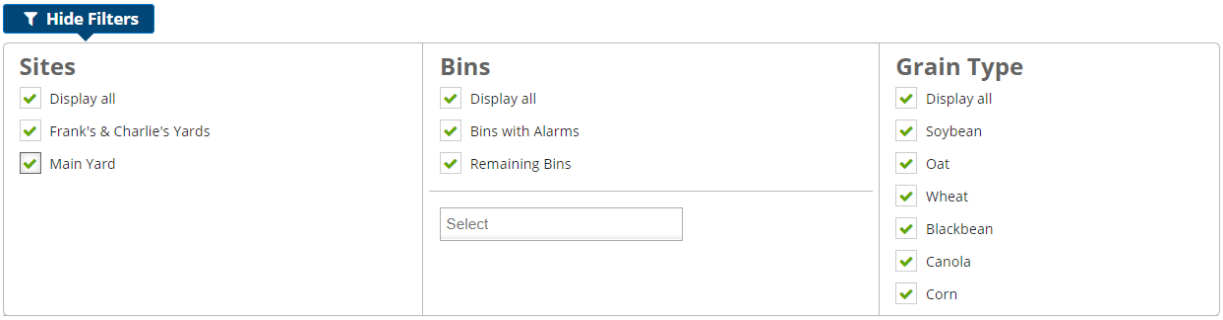
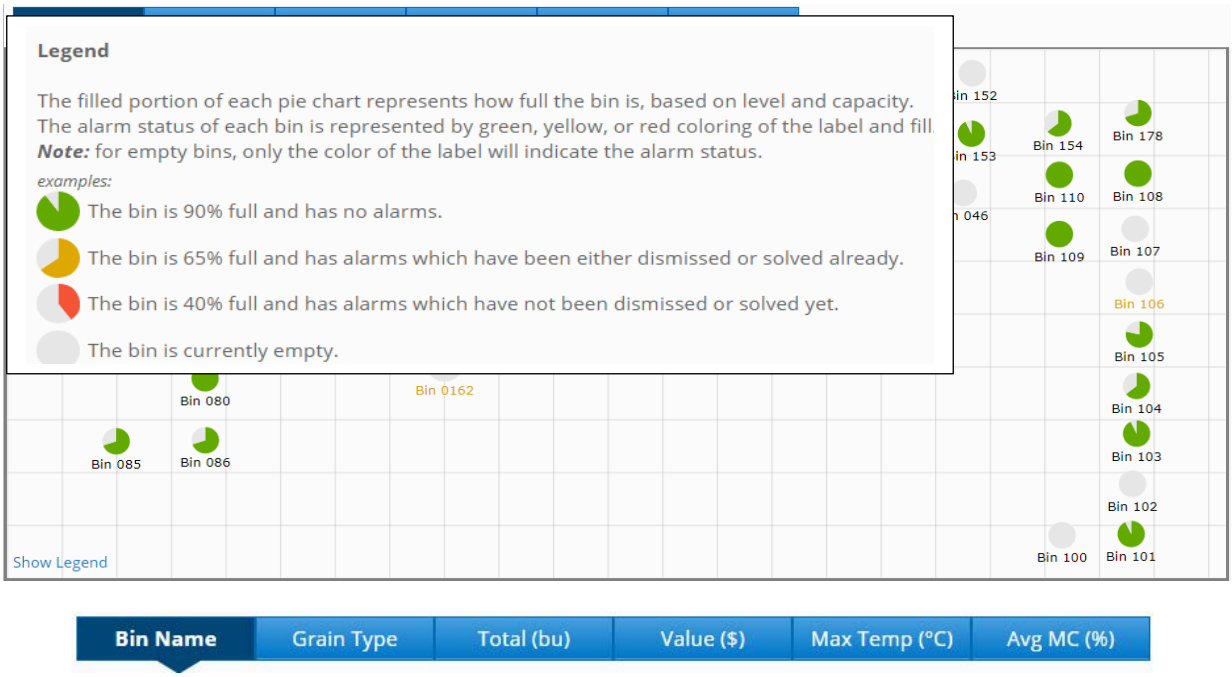


The overhead view provides a representation of how the bins have been laid out at the specified site. Each bin is color coded to provide a quick visual reference as to the condition based on alarm status. In addition, the amount of color within a bin represents the grain level within the structure. The grain level is either determined by the system or a manual value entered by the user. For a further explanation of the color coding or grain level status the **Legend** link is in the bottom left corner and can be referenced.



If data from a specific structure is desired, simply move your cursor over that structure (tap for mobile) and a tool tip will appear containing a small

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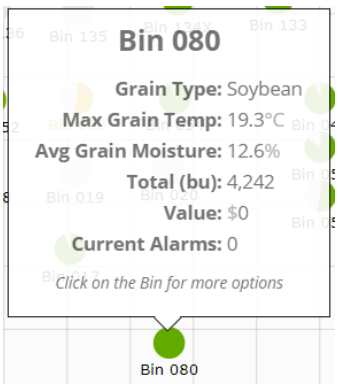
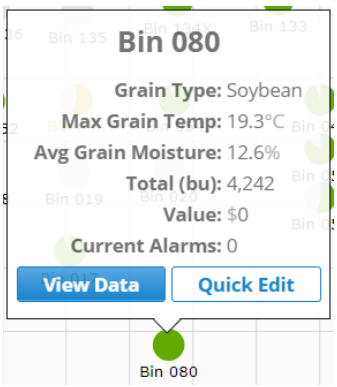
summary of key data for that structure. Clicking structure will bring up the **View Data** (takes to the **View Data** page) and **Quick Edit** (pop-up for editing structure information) buttons.





The **Grain Condition** tiles provide an overview of the current condition of the grain within the structure. If there are moisture and temperature cables in the structure, there will be a tab visible for each. The moisture tab will display the **Current (Average) Moisture**. 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 a Weather Station is installed at the site, the **Ambient EMC** will also be displayed. 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.

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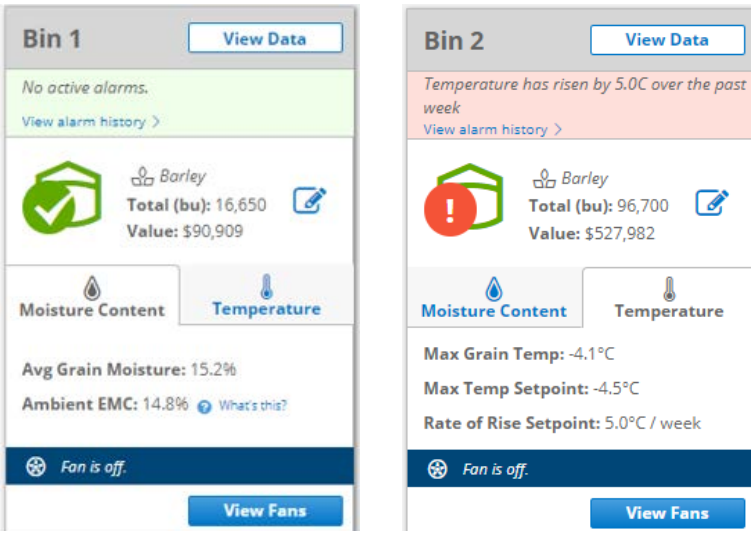
If a bin has any active alarms they will be displayed. Tap the **View Alarm History** link to view additional information pertaining to the active alarm or to view previous historical alarm information.



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.

Note: Using the **Quick Edit function** provides an easy means to edit **Bin Info**, **Grain Info**, **Parameters** and **Alarm Details.**

4.3.5 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).

Note: Inventory can either be manually entered or the system can auto determine the grain level using the temperature data from the cables.

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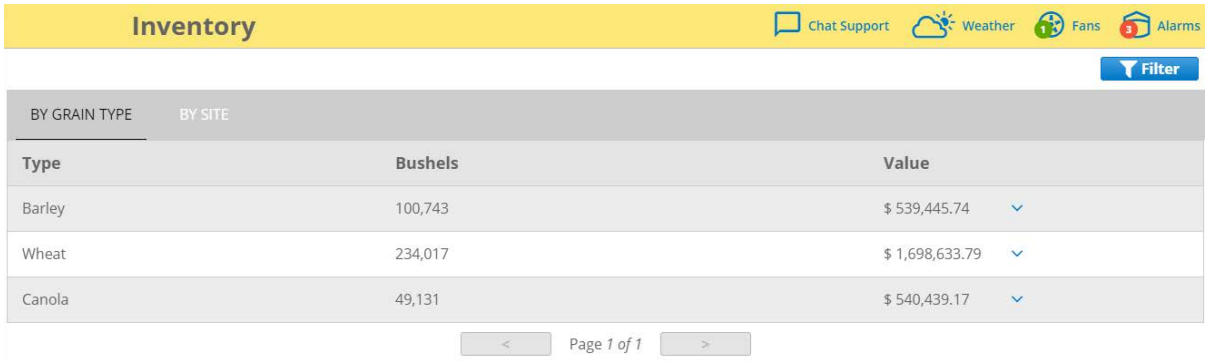
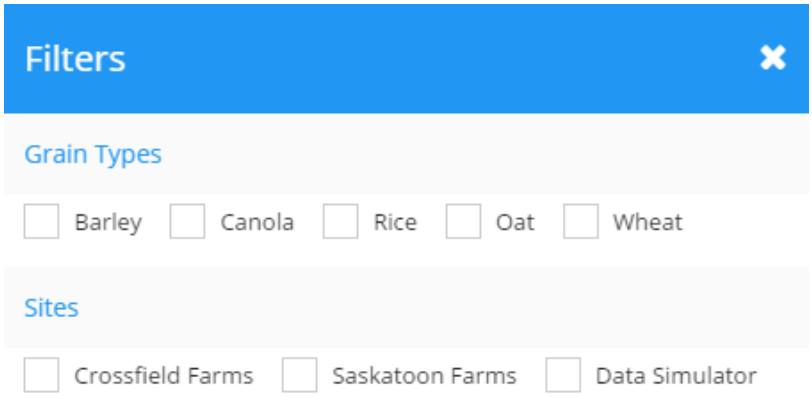


The filter option provides the ability to filter by one or more grain types as well if there are multiple sites one or more site can be selected. Place a checkmark in the desired selections you want to filter by and then tap the **X** to close the pop-up box.



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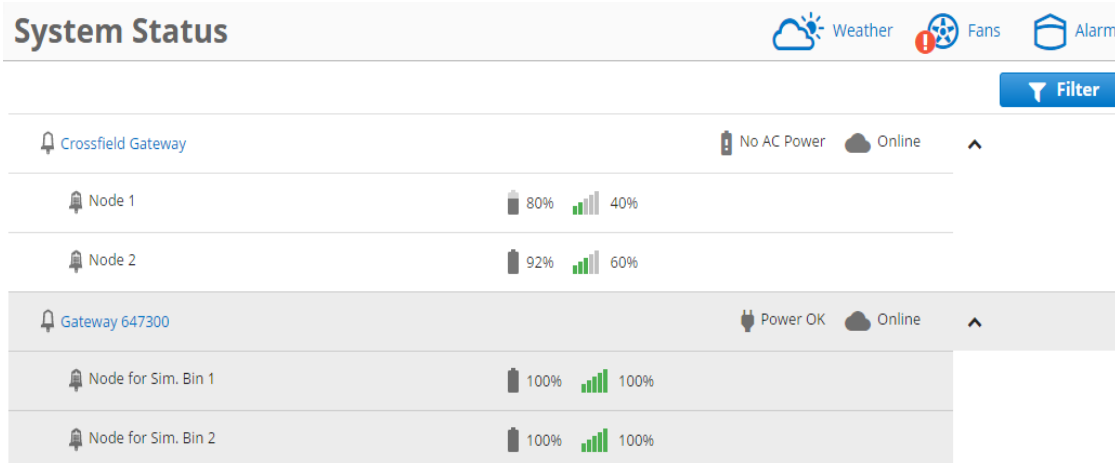
4.3.6 Global View

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.

4.3.7 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.



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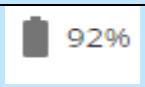
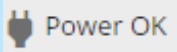
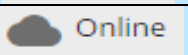
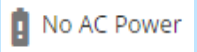
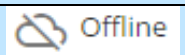
Note: The following are the displayed icons on the System Status screen.

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.

4.3.8 Permissions

Within the OPI Blue user interface you have the ability to “grant” permissions which ***can only be given to another registered OPI Blue account (email)***. The purpose is to enable greater flexibility and simplicity for dealers to be able to support their customer base without the need to request a username or password from them.

Once permissions have been granted the party receiving permission will immediately be able to access the end users’ account. The access will include full read/write ability. This access can be granted permanently or on an as needed basis.

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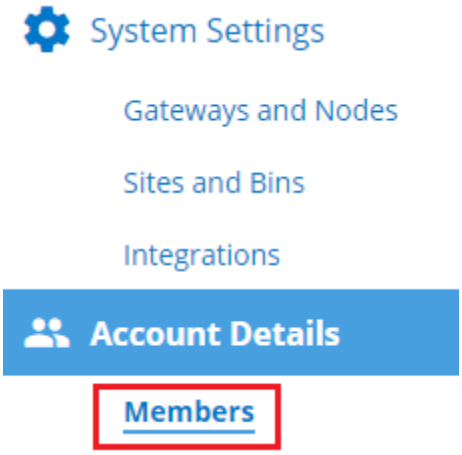
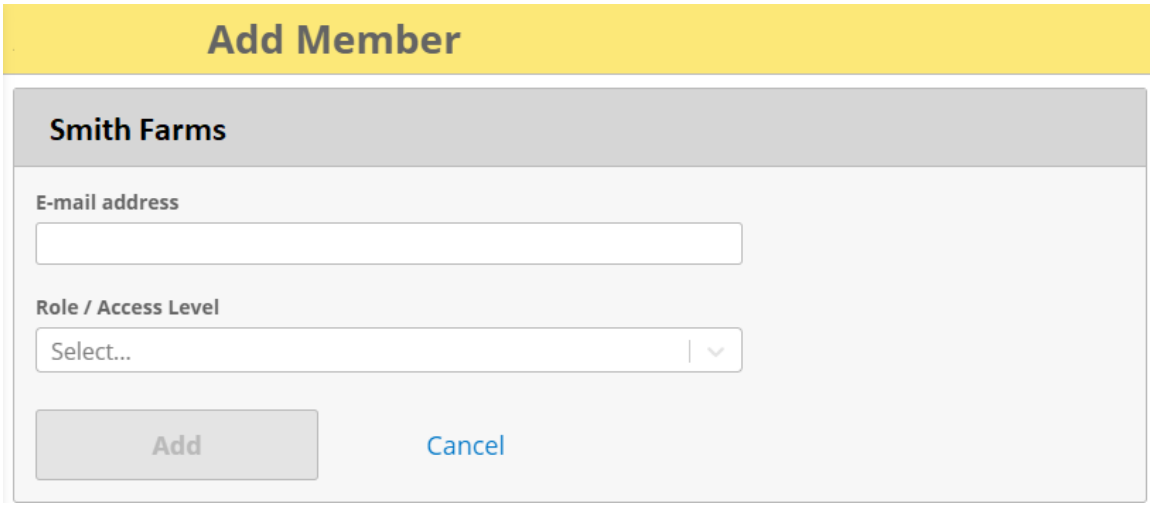
1. From the menu select **Members**



2. Click the **Add Members** button.

3. The **Add Member** popup box will appear. Enter the **Email Address** of the account you are looking to grant permission to access your account. **Reminder:** The email address must be that of another registered OPI Blue user.



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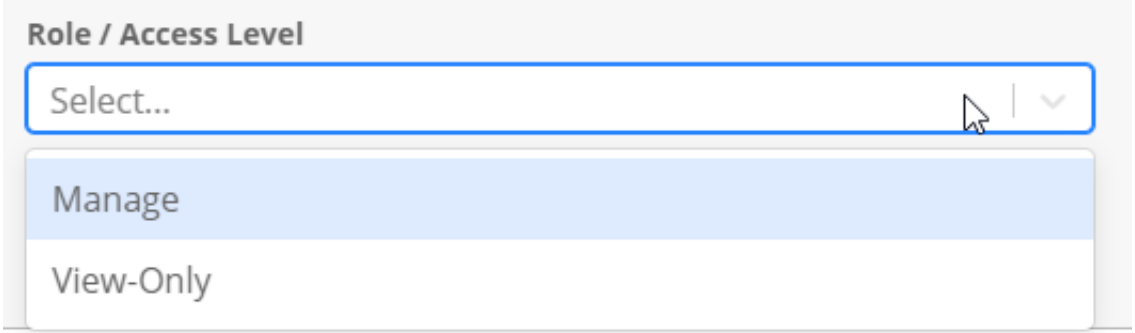
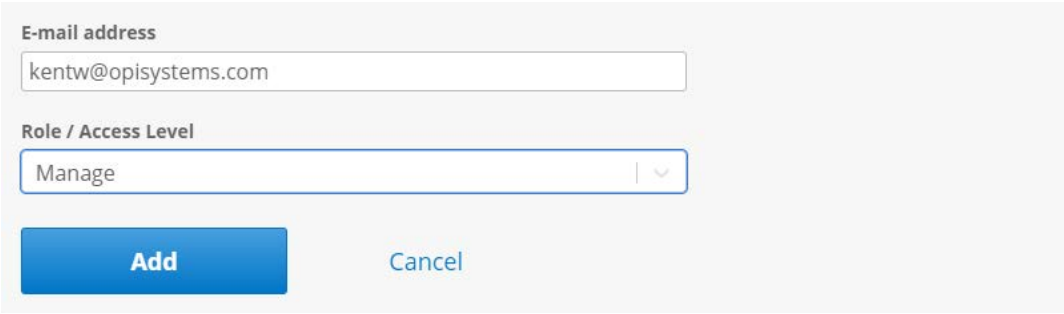
4. From the dropdown menu select the **Role/Access Level** the of the account that you are looking to grant permission to access your account. **Note:** The **Manage** role gives the user the ability to view and make changes on your account. The **View-Only** role gives the user the ability to view only and not make any changes on the account.



5. Click the **Add** button to grant permission to the desired email address.



6. It will show as successful upon completion. **Note:** The email address being granted permissions to access the account will

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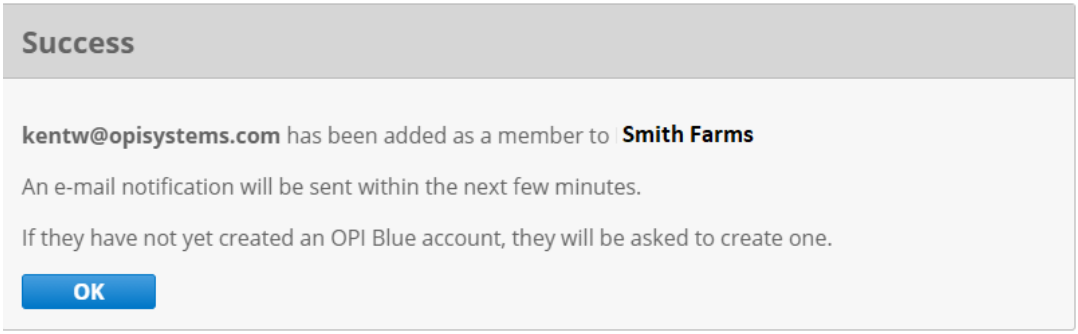
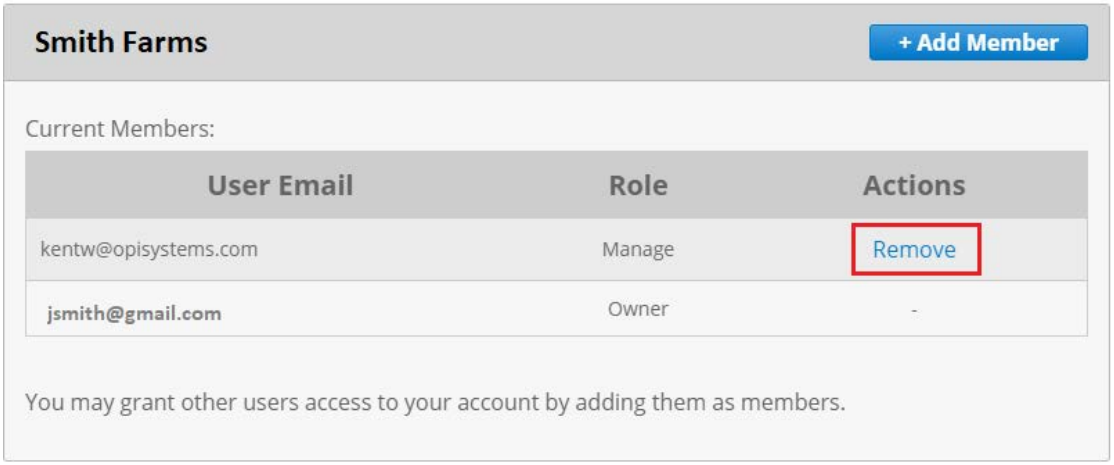


Note: Permission to access the account is granted immediately. Any accounts that have been granted permission will be listed in the **Member** page on the account.

7. If you are looking to remove an account that you had granted permissions to previously. Go back to the **Members** page and simply click on the **Remove** button.



Permissions - Accessing a Site

1. If you have been granted permissions to any other accounts you will be able to view these accounts by clicking on **Select Account** located at the top of the menu on the left-hand side. All accounts in which permissions has been granted will be listed on the Select Account page.

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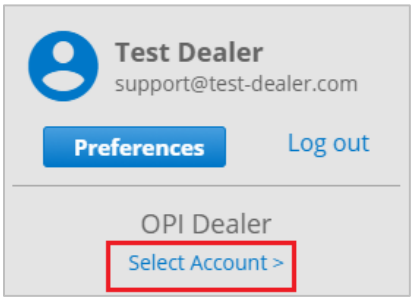
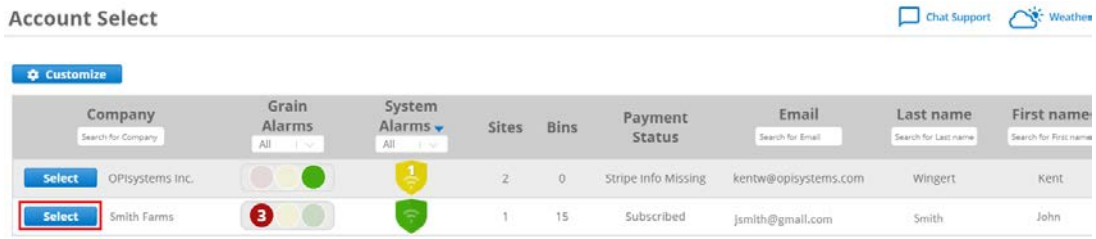


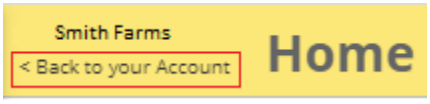
2. On the **Account Select** page, click on the **Select** button to access the desired account.



Note: The customer's Account Details and Payment functionality section from the menu will not be visible to anyone accessing another account when using permissions. This is to ensure the integrity of the account personal details and ensure they cannot be changed by anyone but the account holder themselves.

Exit Customer's Site

3. When finished in the customer account, click **Back to your Account** located in the left-hand side of the top banner.



Best Practices

Note: When accessing another account, it is critical that you **regularly verify** which system you are in especially when you are making changes to the other account. It is easy to lose track and incorrectly apply changes to the wrong account.

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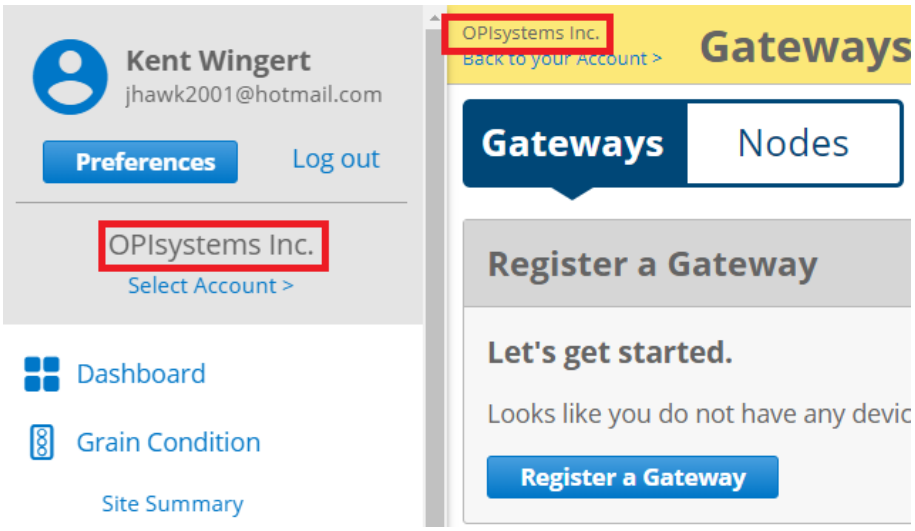
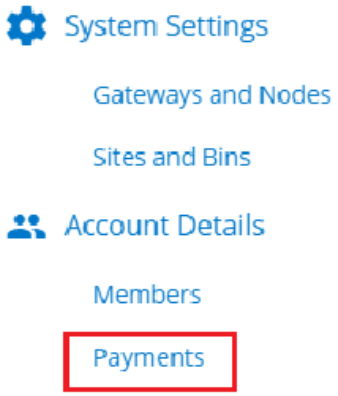
The account being accessed is always identified in two locations on the screen for verification.



4.3.9 Payments

The OPI Blue system is a subscription-based system that includes an annual fee. To simplify the billing and payment processing a **Payments** page has been included within the system. It can be accessed by locating it on the menu.



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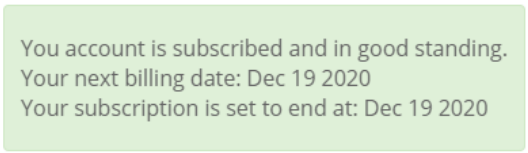
This payment function is meant to provide a secure confidential method to make your annual subscription payment. The **Payments** page and is broken down into three sections.

Section 1

Shows the current subscription, expiry date and a breakdown of the charges.

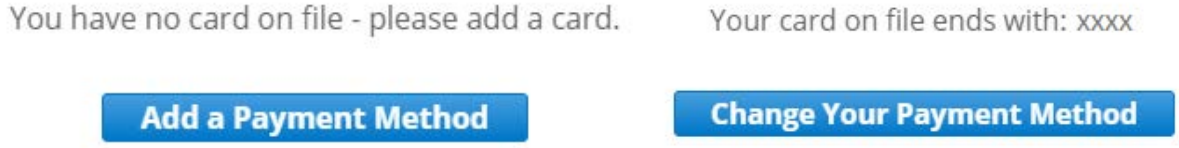


Your current subscription is composed of the following items:

Service	Price	Quantity
Cellular Connection	250 $ / connection / year	0
OPI Blue Gateway (with fan control)	600 $ / gateway / year	1
OPI Blue Gateway (without fan control)	250 $ / gateway / year	0
Your Subscription Total:	$600 + applicable taxes	

Section 2

Enables you to add (first time) or change a secured payment method (credit card) on file



To add your credit card information on file.

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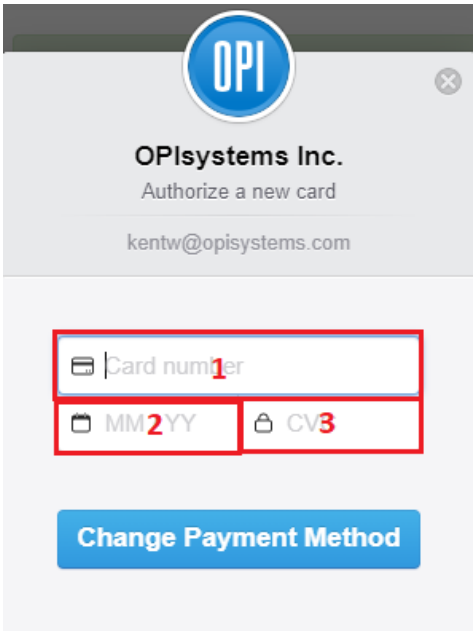
1. Click on the Add a Payment Method button.

2. A popup will appear. Enter your credit card number in the first field. Your expiry date (MM/YY) in the second field. Lastly, enter the CVC number in the third field.



3. Once all the information has been entered in the appropriate field, click the Change Payment Method button to save the information on file.

Section 3

Will show the upcoming subscription amount to be charged when your current subscription is nearing its expiry date.

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Service	Price	Quantity
OPI Blue Gateway (without fan control)	250 $ / gateway / year	0
OPI Blue Gateway (with fan control)	600 $ / gateway / year	2
Cellular Connection	250 $ / connection / year	0
Your Subscription Total:	$1200 + applicable taxes	

*Taxes: If you hold a tax exemption certificate, please email your exemption ID to taxes@opisystems.com, clarifying which sales taxes you are exempt from. If you are outside Canada or the USA, and your country is subject to import duties on software services, please be sure to declare these services with your tax authority.

Note: The subscription fee will be processed annually on the credit that has been put on file. You can update/change your credit card information as required by following the steps outlined above.

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, Natural Air-Drying, and Natural Air Drying with Heat algorithms.

The information is broken down into the most pertinent fan control information. Clicking the

at the top left corner will allow you to customize what information is display based on your preferences. Placing a checkmark beside the items you want displayed and leaving those you don't without one.

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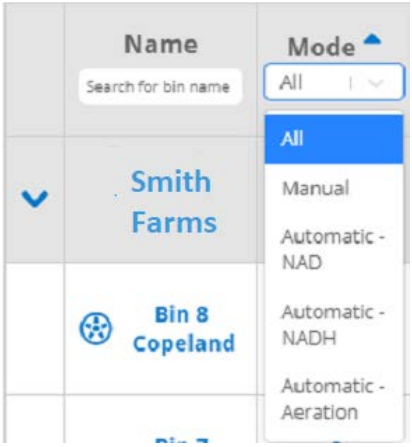
There are 4 columns that can be used to filter the data. **Name**, **Mode**, **State** and **Grain Type**. The ability to filter is especially useful for larger sites that have many bins across the site making it easier and faster to locate the specific information you are looking for.



If you are looking for a quick and simple way to turn your fan(s) and heater(s) ON in manual mode.

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

Actions Button	Result	Status
	Pushing the **Start Fan** 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 **Fan 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 Fan** 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.

Note: A grain level indication in a structure can take 24-hours to initially be achieved when grain is first put into a bin. During this 24-hour period the automated fan control function cannot be used as the system assumes the bin is empty. The level is determined using the data from the temperature sensors on the cables. This process takes time for the system to determine if a temperature sensor is in or out of the grain. On the **Fan Settings** page you can **override** this functionality and to have the fan(s) run in an automated mode without a grain lever determined.

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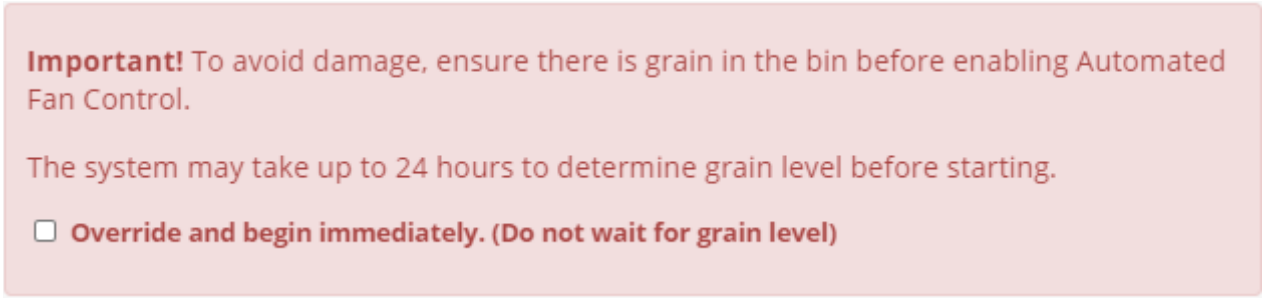
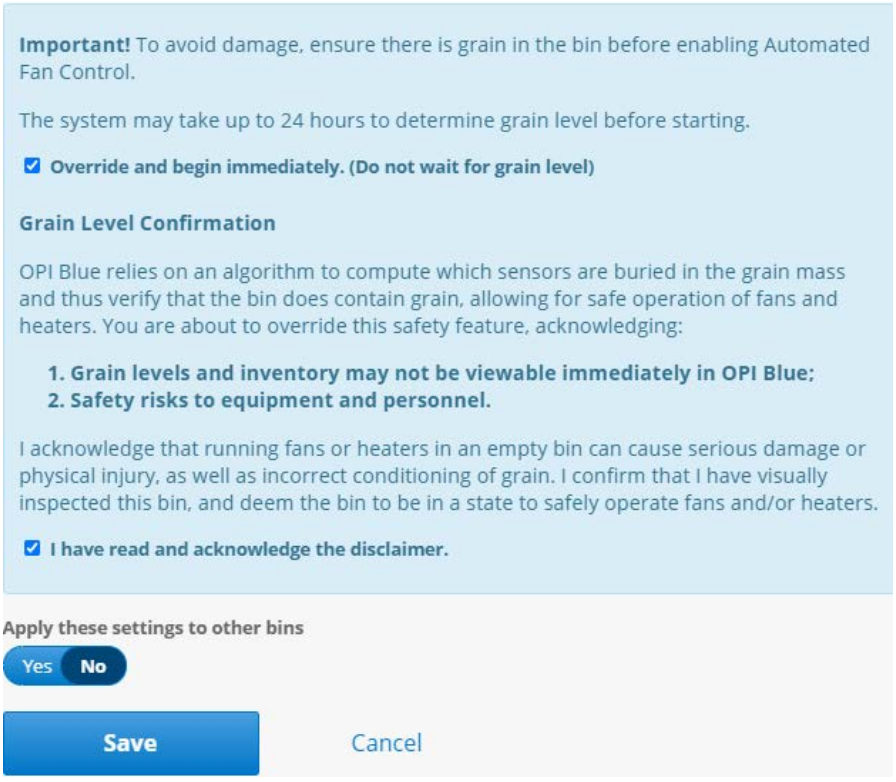
Using the Automated Fan Override functionality requires placing a checkmark in the box.



Review and be sure you understand the disclaimer. If you still would like to proceed place a checkmark to acknowledge the disclaimer and click the **Save** button.



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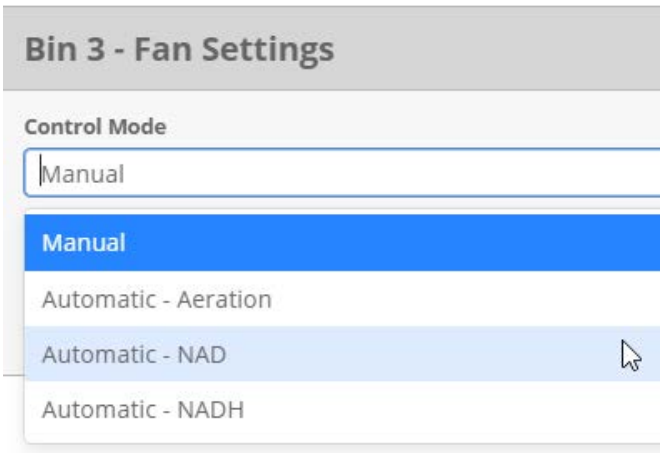
Note: One other thing to understand is that for any of the automated fan control algorithms to work you set a **Target EMC** and **Target Temperature.** With each using the sliders you also create a **Target EMC Range** and **Target Temperature Range**.

The conditions must be met for both the **Target EMC Range** and **Target Temperature Range** for the fan(s) to turn ON. When conditions do not fall within these ranges the fan(s) will turn OFF or remain OFF.

1. On the **Fan Control** page to setup Natural Air Drying (NAD), click on the manual wrench icon.

2. From the **Fan Settings** page use the dropdown menu to select the desired fan mode, **Natural Air Drying (NAD)**.



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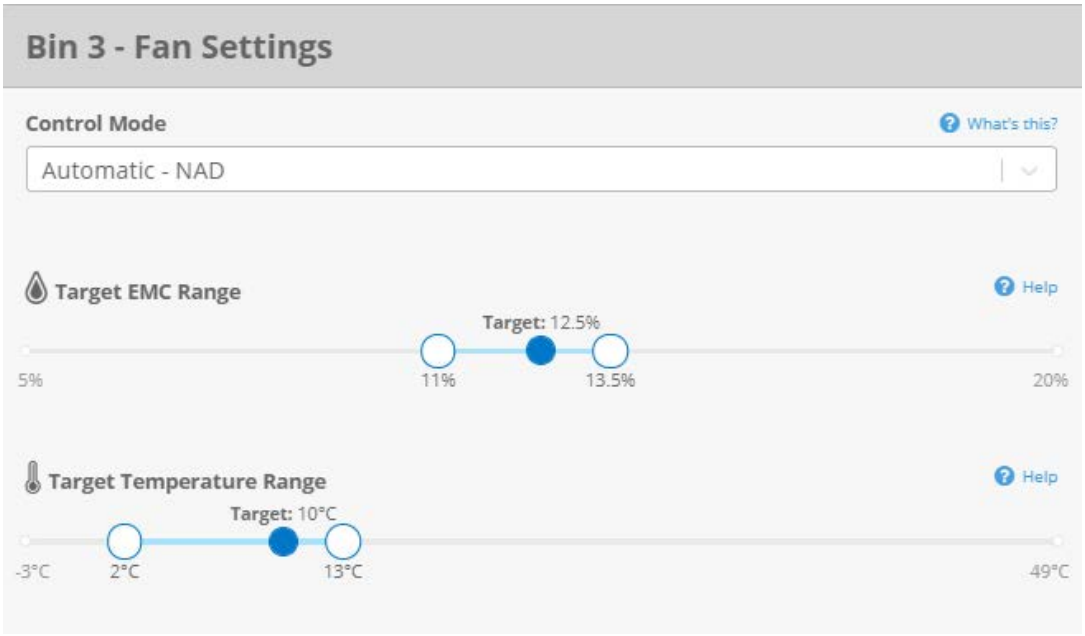
3. Use the sliders to set your **Target EMC** (Target EMC Range) and your **Target Temperature** (Target Temperature Range) and click Save. The fan(s) for this bin will now operate in an automated mode using your setpoints.



4.4.3 Natural Air Drying (NADH)

Note: Natural Air Drying with Heat (NADH) is an efficient control algorithm that enables effective in bin drying with the use of supplemental heat. You set 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.

Note: To use the NADH control algorithm you must have heaters installed. The NADH mode will only appear for the bin(s) that have a heater install on them. If there is no heater you will not see the NADH option available.

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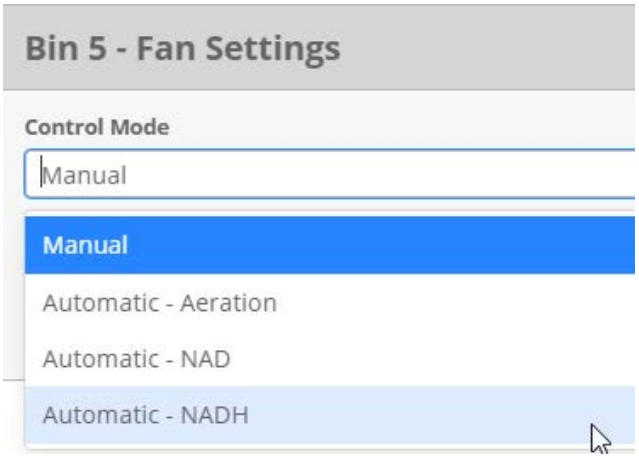
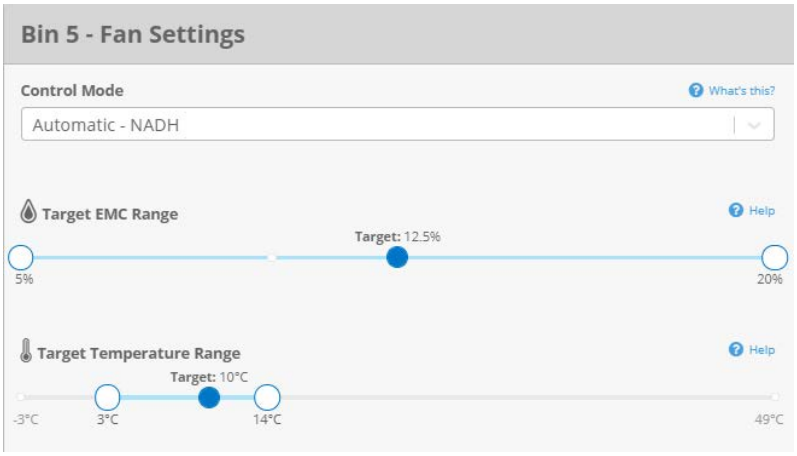
1. On the **Fan Control** page to setup Natural Air Drying (NADH), click on the manual wrench icon.

2. From the **Fan Settings** page use the dropdown menu to select the desired fan mode, **Natural Air Drying with Heat (NADH)**.



3. Use the sliders to set your **Target EMC** (Target EMC Range) and your **Target Temperature** (Target Temperature Range) and click Save. The fan(s) and heater(s) for this bin will now operate in an automated mode using your setpoints.



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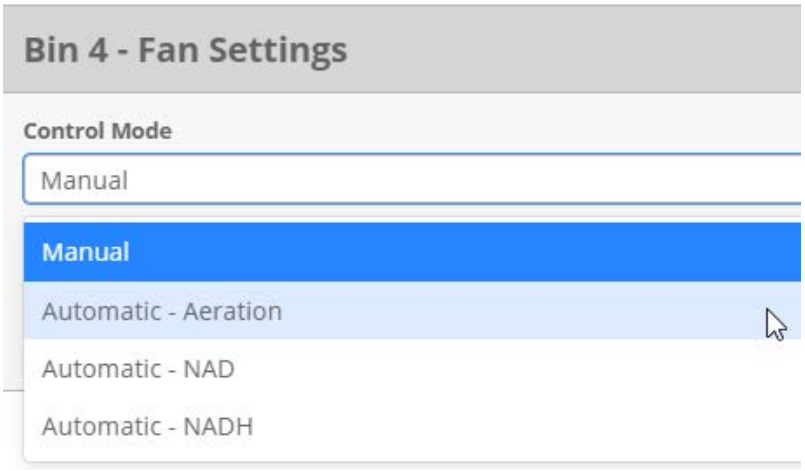
4.4.4 Aeration

Note: Aeration is the control algorithm used within the OPI Blue system once you have reached your desired target moisture. Aeration is about cooling and maintaining the grain at a uniform temperature throughout the entire grain mass. Achieving your target moisture in conjunction with a cool uniform temperature throughout the grain will enable safe storage of your grain over longer periods of time.

1. On the **Fan Control** page to setup Aeration, click on the manual wrench icon.

2. From the **Fan Settings** page use the dropdown menu to select the desired fan mode, **Aeration**.



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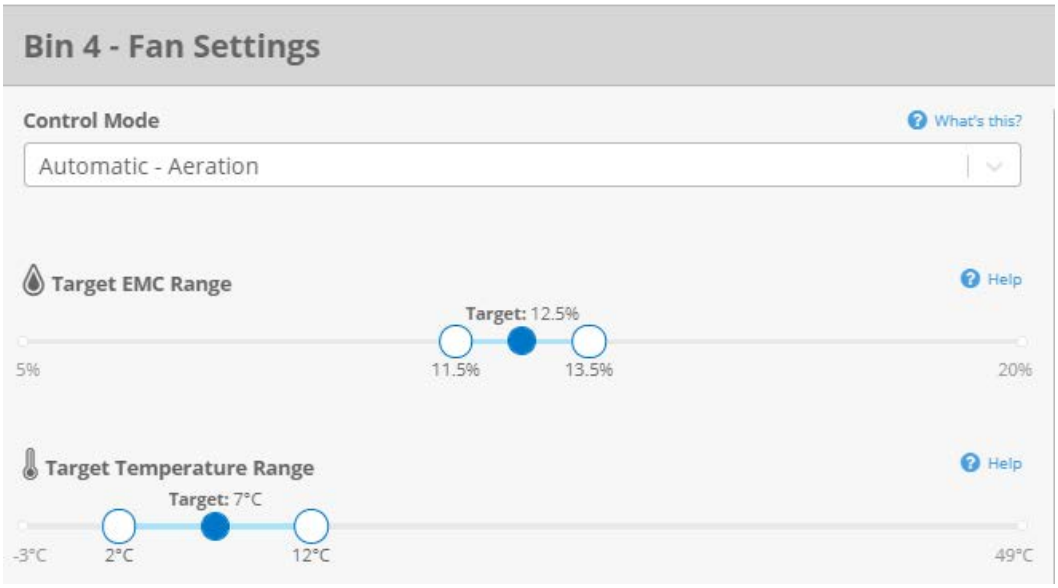
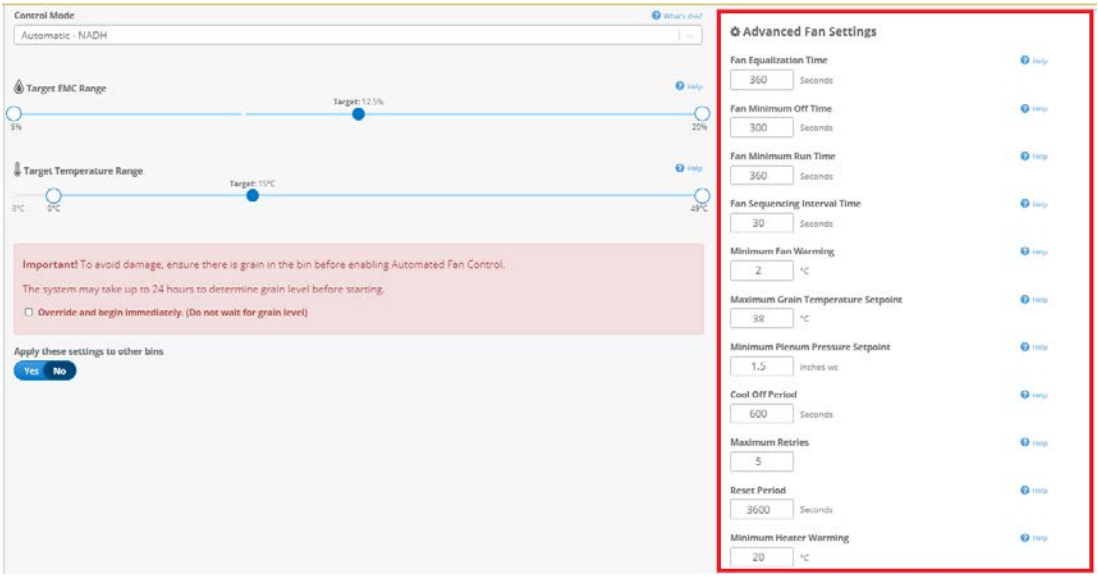
3. Use the sliders to set your **Target EMC** (Target EMC Range) and your **Target Temperature** (Target Temperature Range) and click Save.



There are also **Advanced Fan Settings** that can be accessed on the right-hand side of the **Control Mode** screen. The **Advanced Fan Settings** visible depends on the Fan Control mode selected. See the Advanced Fan Settings section to get a better understanding of each of these settings and what they mean.



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4.4.5 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. Not all advanced setting are visible for each automated fan mode.

Advanced Fan Setting	What Does It Do?
Fan Equalization Time 360 Seconds	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 300 Seconds	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.
Fan Minimum Run Time 360 Seconds	**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. It must be equal to or greater than the fan Equalization Time.

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Fan Sequencing Interval Time 30 Seconds	**Fan Sequencing Interval Time** is the minimum amount of time the system will wait between activating multiple fans.
Minimum Fan Warming 2 °C	**Fan Warming Value** is a measured 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.
Maximum Grain Temperature Setpoint 38 °C	**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. **Aeration only**.
Maximum Grain Temperature Spread Setpoint 12 °C	**Max Grain Temp Spread Setpoint**, is used to indicate the maximum allowable temperature spread within the grain mass. If the maximum temperature spread is exceeded the fan(s) will turn ON to drive the grain mass to a more uniform temperature throughout. **Aeration only**.
Minimum Air Temperature 0 °C	**Minimum Air Temp** is the minimum allowable air

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	temperature in which the fan(s) can be turned ON in order to avoid vents from freezing.
Minimum Plenum Pressure Setpoint 1.5 inches wc	**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 error message will appear and the automated fan control mode will be switched to manual mode.
Cool Off Period 600 Seconds	**Cool Off Period** should an automated mode be interrupted preventing fan((s)/heater(s) from running as expected the control system will wait with fans/heaters OFF for this length of time (in seconds) before retrying them.
Maximum Retries 5	**Maximum Retries** is the number of retries an automated mode will attempt prior to failing over to manual mode. If maximum retries is zero any alarm resulting in the interruption of an automated

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	control mode will result in a switch to manual fan control.
Reset Period 3600 Seconds	**Reset Period** is the number of seconds without a fan control automation interruption required to reset the fail counter to zero.
Minimum Heater Warming 20 °C	**Minimum Heater Warming** is the expected temperature rise at the plenum during the first heater ON cycle. If the measured Heater Warming value is found to be different than the initial value after the Heater Equalization Time has finished, then the new Heater Warming value is used for subsequent heater ON situations.
Heater Equalization Time 600 Seconds	**Heater Equalization Time** is the time in which fan and heater are ON waiting for the plenum sensor to reach its ultimate temperature biased on Ambient and Heater Warming.
Maximum Heater EMC 20	**Maximum Heater EMC** the heater will not be run if calculated Heater EMC exceeds this value.
Maximum Heater Temperature 38 °C	**Maximum Heater Temperature** is a maximum set temperature that when reached results in the heaters being shut OFF. This is a preventative measure to prevent damage to the grain that can occur when exposed to too high a temperature. **NADH only**.

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Minimum Ambient Temperature 0 °C	**Minimum Ambient Temperature** is a set temperature value in which a warning will appear to notify the user the risks of running the fans below freezing.
Minimum Heater Temperature Rise 6 °C	**Minimum Heater Temperature Rise** is the minimum calculated temperature increase at the plenum that must be achieved in order to validate that the heater(s) are physically running as expected when the system has called for them to be ON. **NADH only**.
☐ Failover to NAD?	**Fallover to NAD** occurs if NADH automated control is interrupted exceeding the maximum number of retries. If not selected and the maximum number of retries is exceeded the operation will revert to manual. **NADH only**.
NAD Failover Cool Off Period 3600	**NAD Fallover Cool Off Period** is a preset NAD setting for after a fan control failure in which the system will wait with fans/heaters off for this length of time (in seconds) before retrying. **NADH only**.
NAD Failover Maximum Retries 5	**NAD Fallover Maximum Retries** is a preset NAD setting for the maximum number of retries before failing over to NAD mode. When maximum retries is zero any panic will result in a switch to manual fan control. **NADH only**.

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NAD Failover Reset Period 3600	**NAD Fallover Reset Period** is a preset number of retries an automated mode will attempt prior to failing over to manual mode. If the maximum number of retries is zero any alarm resulting in the interruption of an automated control mode will result in a switch to manual fan mode.

4.4.6 Fan Control Analysis

The **Fan Control Analysis** can provide a user with a visual means to getting a better understand of when fan(s) and heater(s) are made of a particular bin. It is best used when selecting a week or less timeframe to minimize the over exposure to the data that can be presented.

You can view the following information in a graph form. Turn the data ON/OFF by selecting the data you want to display by clicking on the following information located underneath the graph section at the bottom of the screen.

1. Calculated Fan ON Plenum EMC
2. Calculated Heater ON Plenum EMC (if heater(s) are installed on a bin)
3. Calculated Fan ON Plenum Relative Humidity (RH)
4. Calculated Heater ON Plenum Relative Humidity (RH)
5. Ambient Temperature
6. Ambient Relative Humidity (RH)
7. Minimum Fan Warming
8. Minimum Heater Warming
9. Plenum Temperature

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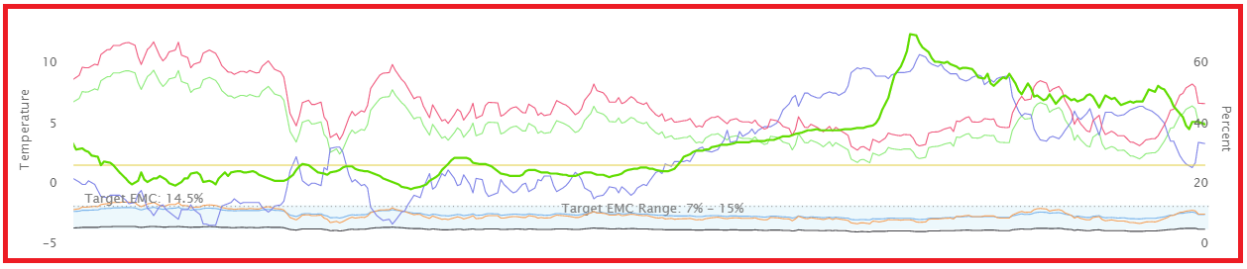
The data is broken down into four sections.

Section 1

Shows data based on the calculated plenum conditions, your set target EMC as well as your target EMC range.



Section 2

Any fan or heater control ON or OFF automated decision will be shown in this section.

Section 3

The fan and heater status are displayed here. **Green** bar indicates when the fan is ON and a **Red** indicates when the heater has come ON. Blank spaces indicate where the fan and/or heater or both are OFF.

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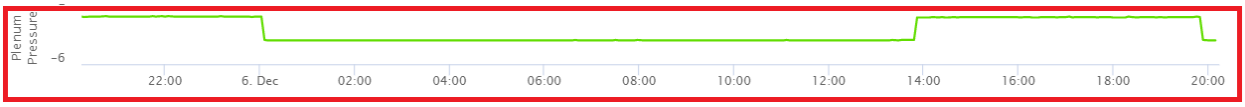
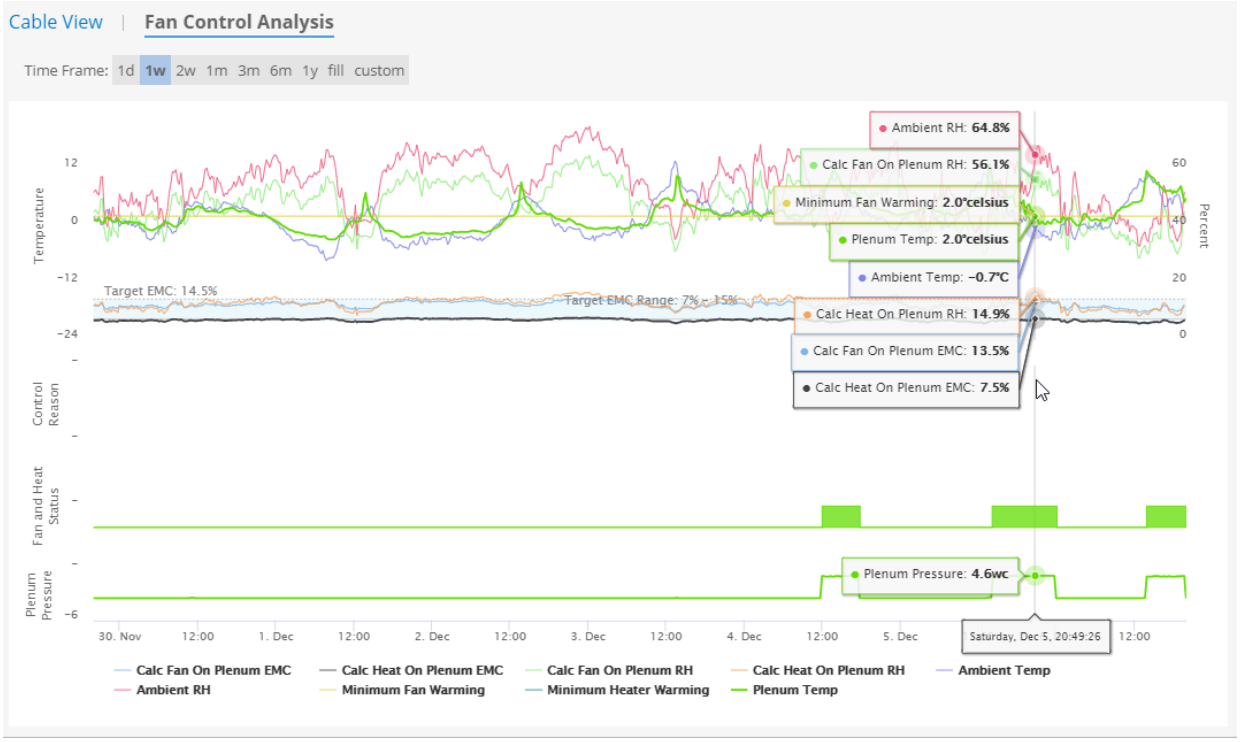
Section 4

Displays the measured pressure value from the plenum sensor for the selected data range.



Once the desire data you wish to see has been selected, moving your cursor over the graph area will display the data selected for that specific data and time.



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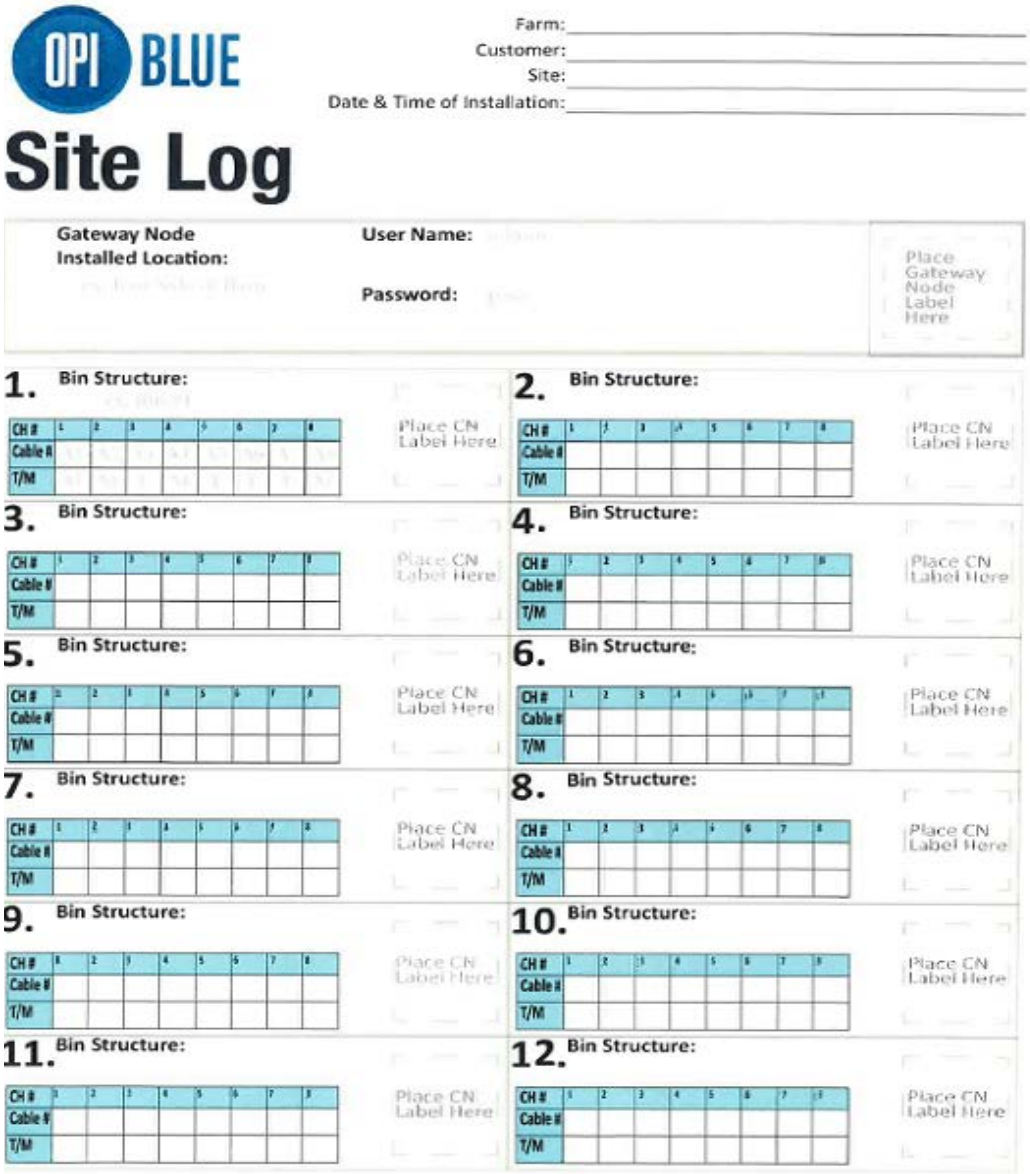
Site Log

Below is 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:

Place Gateway Node Label Here

1. Bin Structure:	CH #	1	2	3	4	5	6	7	8
Place CN Label Here	Cable #								
	T/M								

2. Bin Structure:	CH #	1	2	3	4	5	6	7	8
Place CN Label Here	Cable #								
	T/M								

3. Bin Structure:	CH #	1	2	3	4	5	6	7	8
Place CN Label Here	Cable #								
	T/M								

4. Bin Structure:	CH #	1	2	3	4	5	6	7	8
Place CN Label Here	Cable #								
	T/M								

5. Bin Structure:	CH #	1	2	3	4	5	6	7	8
Place CN Label Here	Cable #								
	T/M								

6. Bin Structure:	CH #	1	2	3	4	5	6	7	8
Place CN Label Here	Cable #								
	T/M								

7. Bin Structure:	CH #	1	2	3	4	5	6	7	8
Place CN Label Here	Cable #								
	T/M								

8. Bin Structure:	CH #	1	2	3	4	5	6	7	8
Place CN Label Here	Cable #								
	T/M								

9. Bin Structure:	CH #	1	2	3	4	5	6	7	8
Place CN Label Here	Cable #								
	T/M								

10. Bin Structure:	CH #	1	2	3	4	5	6	7	8
Place CN Label Here	Cable #								
	T/M								

11. Bin Structure:	CH #	1	2	3	4	5	6	7	8
Place CN Label Here	Cable #								
	T/M								

12. Bin Structure:	CH #	1	2	3	4	5	6	7	8
Place CN Label Here	Cable #								
	T/M								

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13. Bin Structure:

CH #	1	2	3	4	5	6	7	8
Cable #								
T/M								

Place CN Label Here

14. Bin Structure:

CH #	1	2	3	4	5	6	7	8
Cable #								
T/M								

Place CN Label Here

15. Bin Structure:

CH #	1	2	3	4	5	6	7	8
Cable #								
T/M								

Place CN Label Here

16. Bin Structure:

CH #	1	2	3	4	5	6	7	8
Cable #								
T/M								

Place CN Label Here

17. Bin Structure:

CH #	1	2	3	4	5	6	7	8
Cable #								
T/M								

Place CN Label Here

18. Bin Structure:

CH #	1	2	3	4	5	6	7	8
Cable #								
T/M								

Place CN Label Here

19. Bin Structure:

CH #	1	2	3	4	5	6	7	8
Cable #								
T/M								

Place CN Label Here

20. Bin Structure:

CH #	1	2	3	4	5	6	7	8
Cable #								
T/M								

Place CN Label Here

21. Notes/Comments:

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Appendix

The following components have been verified through testing and use on OPI Blue Fan Control sites. These components can be purchased directly from OPI or may be provided by the electrician completing the fan control wiring. 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.

Hand Off Auto Switch (HOA):

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- 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.

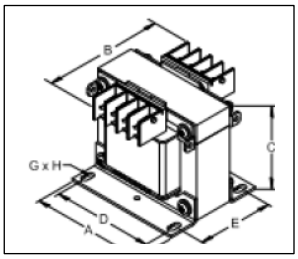

Fig 1

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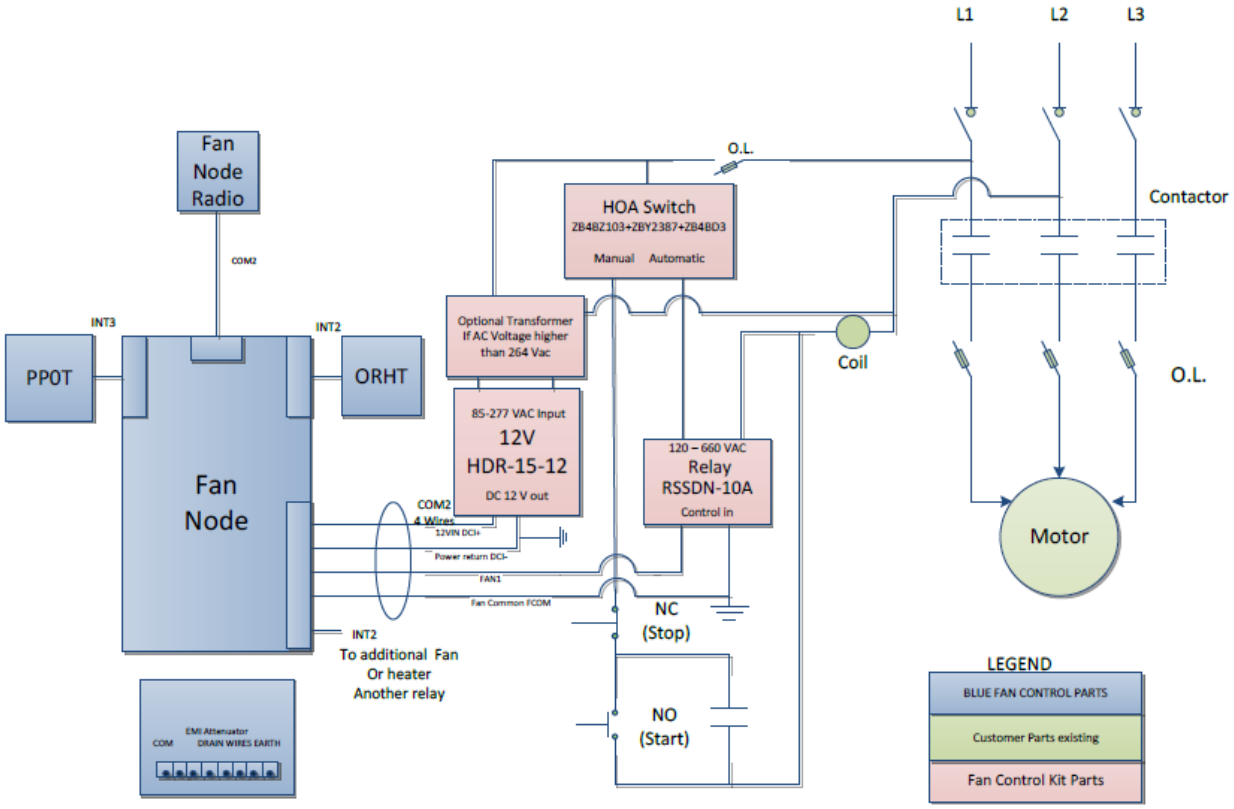
Example: OPI Blue – Fan Control System Schematic



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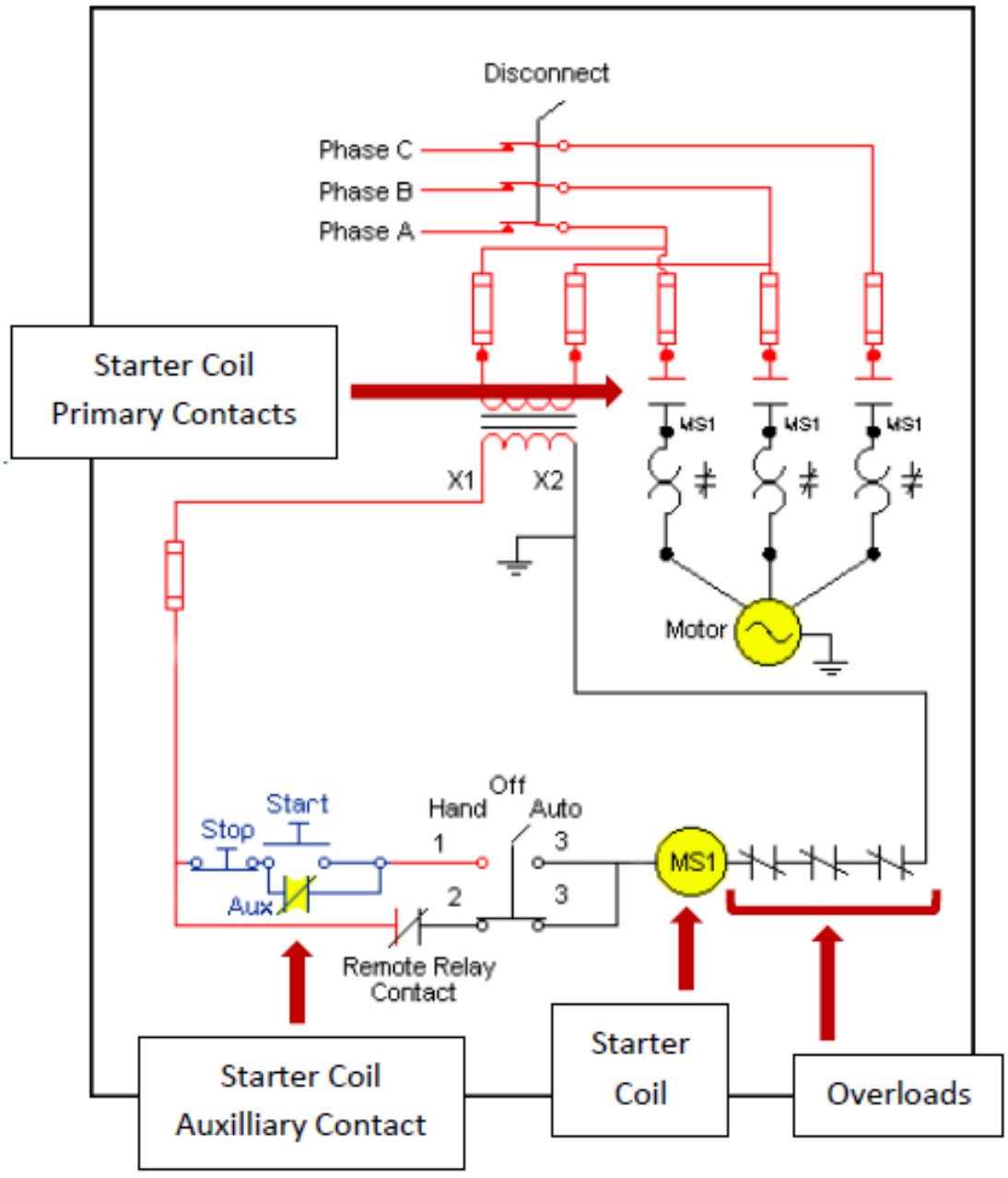
Example: Detailed HOA Schematic



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