PART #: NETB13PIV
User Manual and Installation Guide

The PivotProxy® (Part # NETB13PIV) is designed for the monitoring of electrically driven pivots only. For hydraulically driven pivots, please refer to the user manual and installation guide for part # NETB13TL.

Revision History

Rev	Date	Description
A	November 26, 2013	Initial release of manual.

Customer Support:
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Phone: (800) 961-9549 x 2
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Business Address:
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netirrigate®

NET IRRIGATE STANDARD HARDWARE & SOFTWARE USER AGREEMENT (Revision D)

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b. Disruption of services. Customer acknowledges and agrees that net irrigate shall have the right to disrupt or otherwise suspend services integral to the hardware and software functions if payment is not received by its distributors or dealers or end users. Net irrigate shall have no liability for any damages arising from or related to such disruption or suspension.

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Vi. Non-exhaustive disclaimers. Customer acknowledges and agrees that acts of god, lightning strikes, floods, tornadoes, or use for which the product was not intended, theft, or attempted theft are not events covered by warranty. Net irrigate may deny customer support if products or services are used for any purpose other than which they were intended. Customer acknowledges that these disclaimers are not intended to be exhaustive.

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VIII. Export controls. Customer acknowledges that the licensing and distribution of the licensed software is subject to the export control laws and regulations of the united states of America, and any amendments thereof, which restrict exports and re-exports of software, technical data, and direct products of technical data. Customer agrees that it will not export or re-export any licensed software, or any information or documentation related thereto, directly or indirectly, without first obtaining permission to do so as required from the united states of America department of commerce's bureau of export administration, or other appropriate governmental agencies, to any countries, end-users, or for any end uses that are restricted by U.S. export laws and regulations, and any amendments thereof.

IX. Miscellaneous. Customer may not assign, transfer, or delegate any of its rights, duties or obligations hereunder, in whole or in part, without the prior written consent of net irrigate. Customer shall not disclose the terms and conditions of this agreement, except as may be required to implement and enforce the terms of this agreement, or as may be required by legal procedures or by law. In all matters relating to this agreement, customer and net irrigate shall act as independent contractors. This agreement shall be governed, construed, and interpreted under the laws of the state of indiana, to the exclusion of any conflict of law or choice of law rule or principle that might refer construction or interpretation of this agreement to the substantive law of another jurisdiction. Any action to enforce this agreement or for breach of this agreement shall be brought in a state or federal court situated in marion county, Indiana, and each of the parties hereby consents to personal jurisdiction of and venue in such courts, and waives any future right to object to this designation of jurisdiction and venue. The waiver or failure of any party to exercise in any respect any right provided for under this agreement shall not be deemed a waiver of any future right hereunder. This agreement shall bind the parties, their permitted successors, heirs, and assigns. No provision of this agreement which may be found to be unenforceable shall in any way invalidate any other provision or provisions of this agreement, all of which shall remain in full force and effect. Any ambiguities in this agreement shall not be strictly construed against the drafter of the language concerned but shall be resolved by applying the most reasonable interpretation under the circumstances, giving full consideration to the intentions of the parties at the time of contracting. There are no representations, promises, warranties or understandings relied upon by customer which are not contained herein. Customer shall be responsible for any and all taxes applicable to this agreement, excluding taxes on the income of net irrigate. In any collection action or litigation relating to this agreement, net irrigate shall be entitled to recover its costs of collection or litigation, including reasonable attorney's fee.

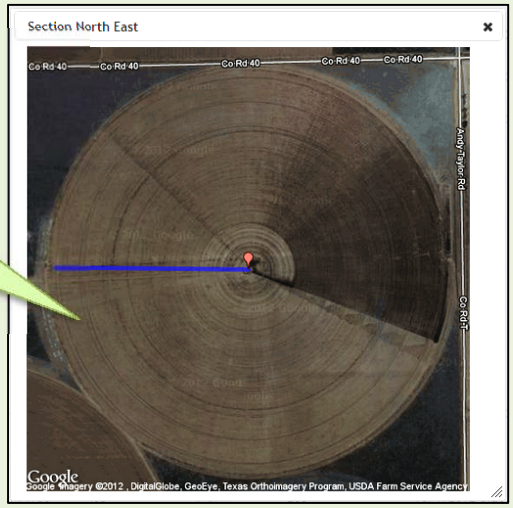
Contents

Applications

Part # NETB13PIV (branded the PivotProxy®) is specifically designed to be mounted on the end tower of any brand of electrically driven center pivot. Once installed and properly configured, the NETB13PIV provides the following remote monitoring functions:

Span Cable Theft Notifications	WireRat® technology, utilized by the NETB13PIV, is the only copper theft alarm product that works seamlessly with all brands of pivots and requires *no external power*. The NETB13PIV utilizes a patent-pending supervisory circuit that works strictly on lithium battery power for 3 to 5 years. When a pivot's span cable is cut or tampered with, the NETB13PIV sends instant text, voice, or email notifications that a possible theft is occurring.
Pivot Safety Stop Notifications	When a pivot transitions from walking to stopped, the NETB13PIV can send text, voice, or email notifications that the pivot's safety circuit has opened.
Remote Shutdown	The NETB13PIV contains a normally closed relay which can be wired in series with the pivot's safety circuit. Once configured, the normally closed relay can be actuated via mobile app or a phone call to our interactive voice response system by calling 800-961-9549x7.
GPS Monitoring and Virtual Stop-In-Slot Notifications	The NETB13PIV facilitates graphically monitoring the heading of a center pivot via our website and mobile applications. In addition, the NETB13PIV can be used to provide *virtual stop-in-slot alerts* such that text, voice, email notifications are sent, and the pivot may be set to shut down when a pivot reaches desired field headings.

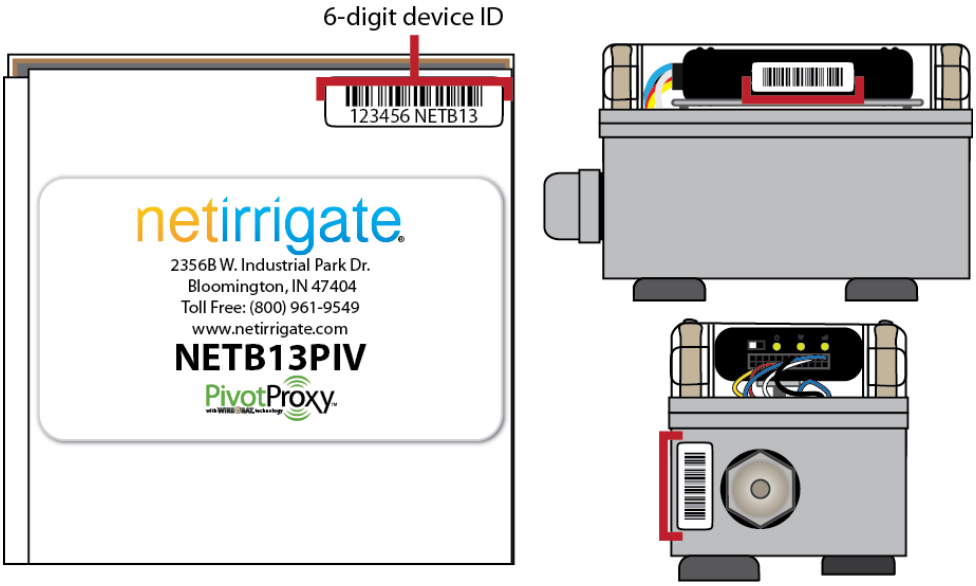
Example: *The NETB13PIV can send notifications or stop the pivot when the heading is at 270 degrees.*



Getting Started

Identifying the Device Id

All NETB13 products are uniquely identified by a 6 digit serial number which is barcoded on both the packaging carton and the physical unit. Net Irrigate refers to this number as the "Device Id".

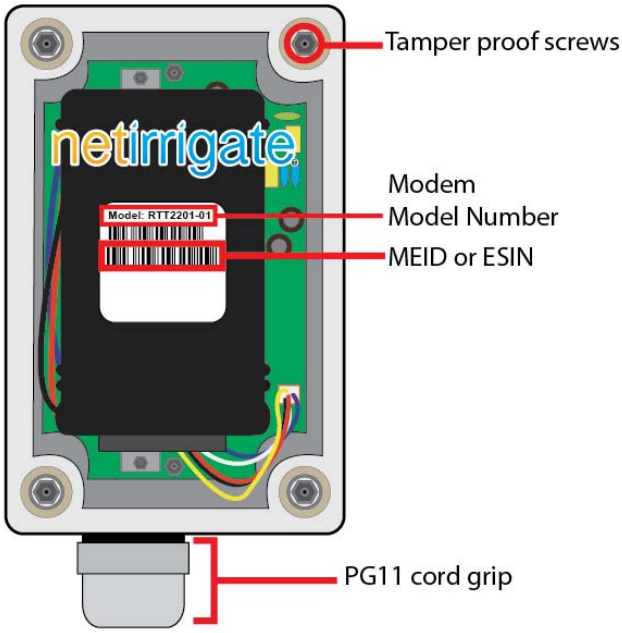


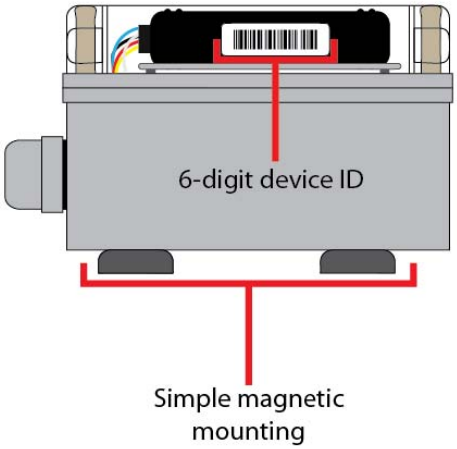
Package Contents

All NETB13PIV units ship with:

1. A ½" NPT Cord Grip to be used with the knock out on the pivot's end tower box.
2. Magnetic mounts which come pre-installed on the enclosure.
3. A 24" clamp pipe ideal band for safety-securing the unit.
4. A wire nut which may need to be used if wiring the NETB13PIV up for remote shutdown purposes.
5. An extra *Device Id* bar code sticker which can be placed on the panel of the center pivot so the associated *Device Id* can be identified at the pivot pad.

NETB13PIV Overview



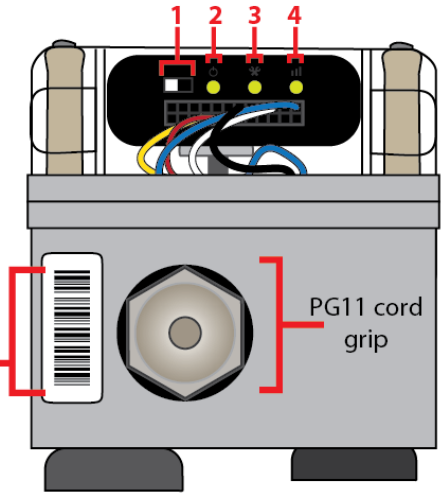


1. Internal battery switch- only applicable to devices with model #: RTT2201-00. If the model number ends in '-00' the switch should be to the left.

2. Power indicator light- will be solid when the device is powered up and has a cellular connection.

3. GPS indicator light- will be solid when GPS coordinates have been locked in. May take up to 5 minutes to initialize.

4. Cellular connection indicator light- will be solid when cellular connection is established. If it's flashing, then a connection has not yet been established.

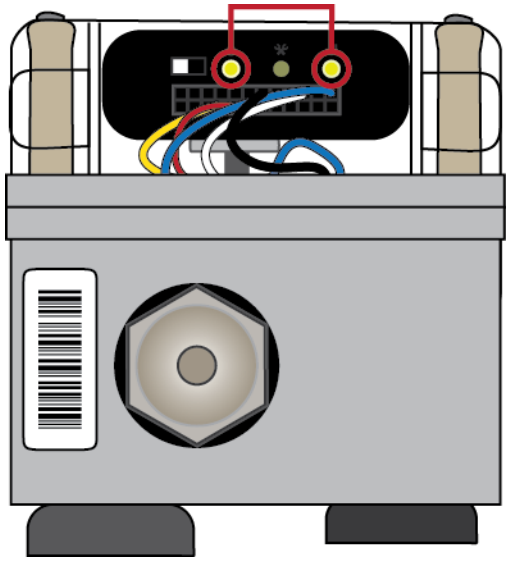


Black	AC Line (90-240VAC)
Blue	AUX AC Line (90-240VAC)
Red	NC Relay Common
White	Neutral
Green	NO Relay Contact

PivotProxy® Wire Guide

Bench Testing

Bench test the NETB13PIV at your shop, and at the pivot before installation. A simple bench test ensures a properly functioning unit and adequate wireless coverage. Bench testing involves the following procedure:



1. Identify the Device Id of the NETB13PIV. Recall that the serial number is barcoded on unit next to the cord grip and also on the modem inside the clear cover.
2. Log into the WireRat® iPhone app or netirrigate.net and create the new site for the customer.
3. Link the device to the new site, and *denote the site name on the device's cardboard box*.
4. Remove the wire nut from the green wire. Touch the green and white wires together, and hold for **10 seconds**. Separate the wires, and watch for the two outside lights on the modem to flash and then become solid.
5. Check the Event Log in the WireRat® iPhone app or the Incoming Events on www.netirrigate.net for a code '103'.
6. If you do not see an incoming '103' within 3 minutes, or do not have a computer, iPad, or iPhone available, please contact customer support at (800) 961-9549 x2.

Customer and Site Setup

Before installing the NETB13PIV on a pivot, it is best to setup the customer information, the irrigation site details, and the intended notification recipients in the NetIrrigate® system. Additionally, you will need to link this information to the *Device Id* you intend to mount. Setup is fast and easy and can be accomplished through one of three possible ways:

1. Login to the WireRat® iPhone App. WireRat® is available in the App Store. You may use the same login information as you would use to login to www.netirrigate.com. For information on how to use the iPhone app, please review the document entitled "*WireRat® 1.0 Dealer Guide*".

2. Login to www.netirrigate.com. If you do not yet have a username and password for your dealership, please contact customer support at (800) 961-9549 or email support@netirrigate.com. For details on how to utilize the dealer portal on www.netirrigate.com, please review the document entitled "*Net Irrigate Software Guide for Dealers*".

3. If you do not have access to a computer or the WireRat® iPhone App, just contact customer support at (800) 961-9549 and an agent will setup the customer, site, and notification recipients for you.

Functional Principles

How the PivotProxy® Works

The NETB13PIV utilizes the cellular network to communicate with Net Irrigate's server. When Net Irrigate's server receives codes from the device, it is able to translate the code into useful information and send the corresponding notifications. When installed correctly, the device functions as a circuit disruption monitor and a remote relay, enabling the device to alert our server when the circuit is disrupted and also to open and close the circuit.

Battery Backup

The NETB13PIV utilizes a custom designed lithium battery pack which is designed to operate the interval cellular radio modem for at least three years. Expected battery life could be as long as five years depending on environmental conditions and frequency of pivot operation. A working battery is imperative for proper functionality. The battery can be tested by following the bench testing procedures on the previous page.

Span Cable Theft Detection

The NETB13PIV checks for cut wire by sending a small supervisory current through the neutral and ground conductors of the pivot's span cable regardless of whether AC power is present or not. When this supervisory current is interrupted, an alarm code is triggered. The supervisory current is generated by the internal NETB13PIV batteries and works seamlessly with normal pivot operation.

In addition to the ever present supervisory circuit, WireRat® 3.0 technology provides a normally open cut wire alarm which is triggered by shorting the PivotProxy's blue wire to neutral or ground conductors. The design is intended to safeguard the pivot against ground to neutral shorts which may compromise the supervisory circuit.

Safety Stop Alerts

The NETB13PIV transmits safety stop notifications when it detects a *closed-to-open* transition in a pivot's 120VAC safety circuit. The NETB13PIV must see the circuit open for at least 40 seconds before transmitting a wireless notification that the circuit transitioned from *closed-to-open*. The time delay is to prevent false alarms due to loose wires, pivot jogging, and auto-reverse functionality. On non-standard pivots, paralleling off of any 120VAC control circuit that is hot when the pivot is running (in both forward and reverse) will suffice in monitoring for safety stops.

Remote Shutdown

If the NETB13PIV is wired correctly, it may be used to remotely stop a center pivot. Each NETB13PIV is equipped with a *normally closed* control relay. When a remote shutdown call is initiated, the coil on this control relay is wirelessly picked up, thereby interrupting the normally closed safety circuit. When the NETB13PIV senses the 120VAC supplied by the pivot panel has dropped out, the coil of the relay de-energizes, and the contact closes again thereby allowing the pivot to restart.

For remote shutdown functionality to properly work, the NETB13PIV must remain ON until the pivot completely drops out. The NETB13PIV must still receive 120VAC from the main pivot panel until the delay timer in the pivot drops out.

The remote-shutdown functionality utilizes the red wire in the NETB13PIV connection cord. If wiring for remote shutdown is not desired, tape off the red wire and do not put the safety circuit in series with the NETB13PIV. Instead, just parallel the black wire in the NETB13PIV connection cord to the appropriate 120VAC safety circuit OR connect the black and blue wires to the respective forward and reverse terminals of the pivot. **To avoid shorts, be sure to properly tape or cap off the red wire on the NETB13PIV if the unit is not being wired for remote shutdown purposes.**

GPS Monitoring

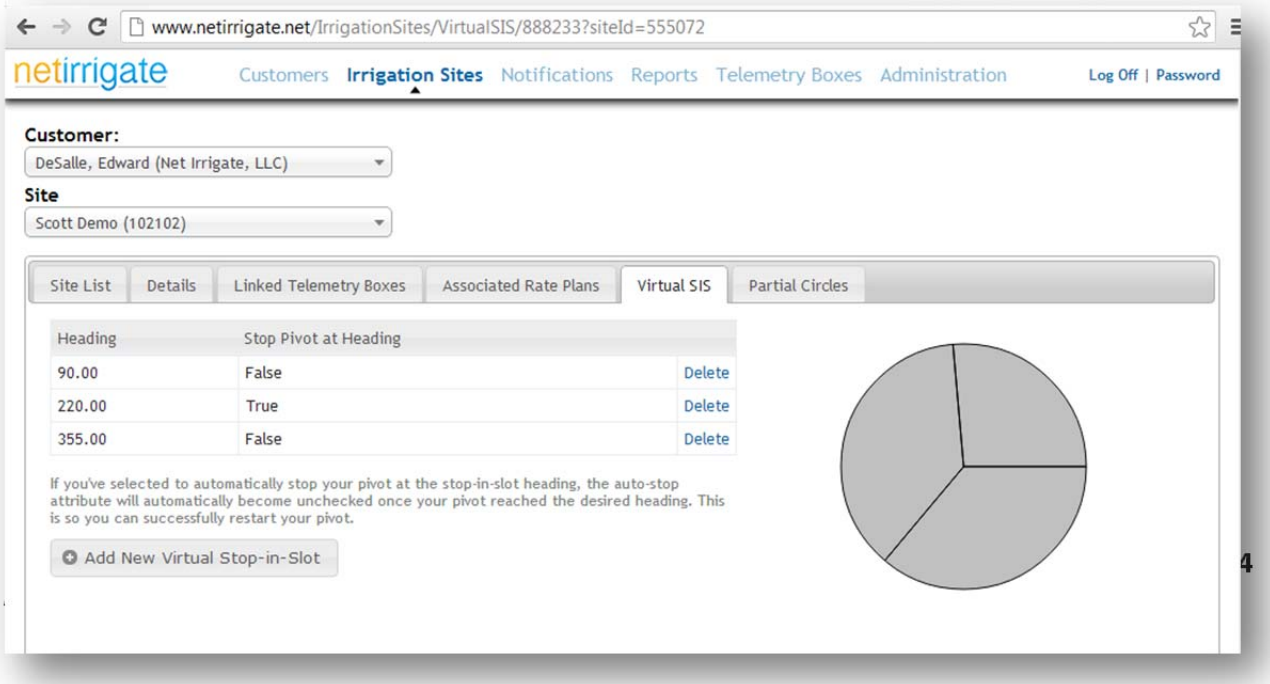
Pivot Heading

The NETB13PIV sends longitude and latitude coordinates to the NetIrrigate® servers every 15 minutes. If the longitude and latitude coordinates of the pivot pad are properly entered as part of the site details, the software on the server will use basic trigonometry to determine the angle or "heading" of the pivot. Determining the longitude and latitude coordinates of the pivot pad can be accomplishes with several smart phone apps, most consumer GPS devices, or even the WireRat® iPhone app. Alternatively, you may contact customer support at (800) 961-9549 and an agent will attempt to locate the pad of the pivot using Google Earth.

Virtual Stop-In-Slots

Because the NetIrrigate® servers monitor the heading of the pivot, notifications can be configured when the pivot reaches a desired a heading. Likewise, the pivot can be configured to automatically shut down when a desired heading is met. Up to 16 different virtual stop-in-slot points can be configured. Virtual stop-in-slot points can be configured via the NetIrrigate® web portal or by calling customer support at (800) 961-9549.

Sample Virtual Stop-In-Slot Configuration Screen on netirrigate.com



Mounting and Wiring the NETB13PIV

Ideally, the NETB13 should be mounted on the end tower of a pivot. This provides for greatest accuracy when utilizing GPS services. Likewise, mounting on the end tower provides for maximum protection against span cable theft.

1. **Ensure power to the pivot is completely off and the control panel is locked.**
2. Climb the tower of the pivot and allow the powerful magnets on the back of the NETB13PIV to adhere to the angle iron of the pivot. The NETB13PIV should be positioned vertically.

3. Remove the cover from the tower electrical box.
4. If the bottom of the tower box is not equipped with a standard ½" NPT knock-out, drill an appropriate hole to fit the black ½" NPT cord grip which is included in the NETB13PIV packaging.
5. Install the supplied cord grip and lock nut.
6. Run the tray cable from the NETB13PIV through the cord grip and into the tower box.
7. Follow the appropriate wiring diagram found in the appendices if you wish to utilize remote shutdown. Refer to the tables below if you would **NOT** like to utilize remote shutdown. If installing on a pivot brand not listed, please contact customer support at (800) 961-9549.

For setups WITHOUT implementation of remote-shutdown functionality

		NETB13PIV Wire Color				
		Black (120VAC In)	**Blue (120VAC In)**	**Red (NC Relay Out – 120VAC)**	**White (Neutral)**	**Green (GND)**
Pivot Brand Wire Color	**Valley**	Yellow-Red	Unused (Tape Off)	Unused (Tape Off)	White	Grounding Bar
	Zimmatic	Brown	Unused (Tape Off)	Unused (Tape Off)	White	Grounding Bar
	Reinke	Purple	Pink	Unused (Tape Off)	White	Grounding Bar
	Lockwood	Yellow	Orange	Unused (Tape Off)	White	Grounding Bar
	Pierce	Yellow	Unused	Unused (Tape Off)	White	Grounding Bar

For setups in which remote-shutdown functionality WILL be implemented, see wiring diagram in the respective Appendix listed below			
Pivot Brand	**Additional Relays Needed?**	**Appendix**	**Page #**
Valley	**No**	**A**	**15**
Zimmatic	**No**	**B**	**16**
Reinke	**Yes (only required for remote shutdown)**	**C**	**17**
Lockwood	**Yes (only required for remote shutdown)**	**D**	**18**
Pierce	**No**	**E**	**19**

8. Once the NETB13PIV wires are connected to the appropriate terminals, replace the cover on the tower box.
9. If necessary, zip-tie the NETB13PIV tray cable away from the mechanical levels beneath the tower electrical box to avoid kinks or obstructions.
10. Wrap the included 24" ideal band around the NETB13PIV unit for added security. While the mounting magnets are extremely strong, the ideal band is designed to protect against extremely severe weather.
11. Proceed to the testing procedure on the following page.

Testing Procedures

Setting up Notification Recipients

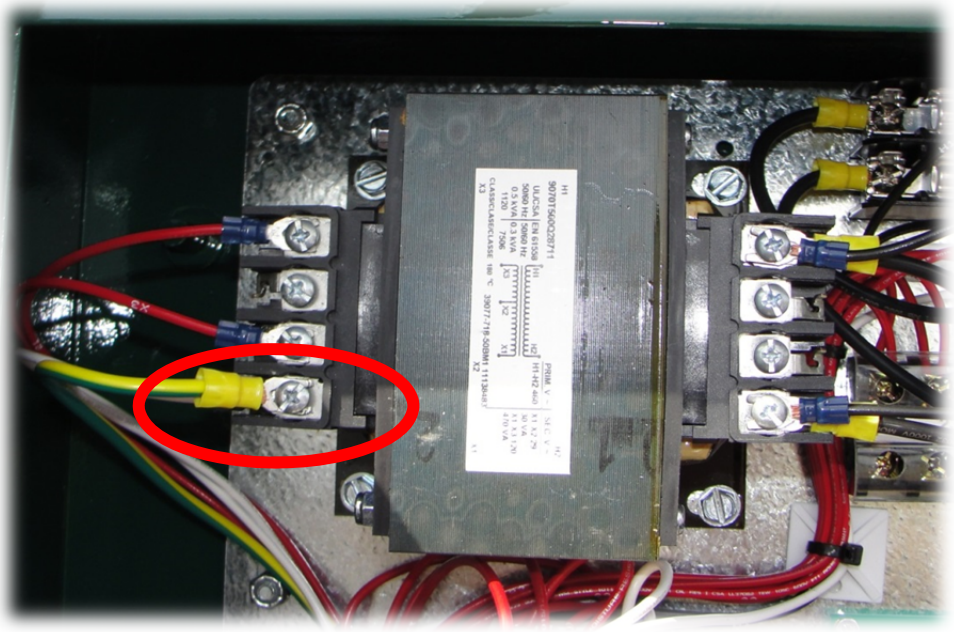
In order to successfully test span cable and safety stop alerts, one or more phone numbers must be associated with the respective alert on our website. You may easily set up notification recipients on the WireRat® iPhone app or our website. For detailed instructions on the adding a notification recipient via the WireRat® iPhone app,

Simulating Span Cable Cuts

Before testing the cut wire alarm, at least one notification recipient should be configured for the site in question. If this has not been done, please see previous section Customer and Site Setup. Once it is determined that a notification has been configured for a span cable cut event, follow the procedure below:

Primary Method

1. Go to the main panel at the pad and **ensure the power to the panel is completely off**.
2. Open both panel doors such that the control transformer within the pivot panel can be accessed.
3. If the pivot panel is equipped with a relay board, disconnect the clip to the relay board which may contain a neutral and ground conductor.
4. Locate X-2 on the control transformer. This is where the white and green wires are bonded.

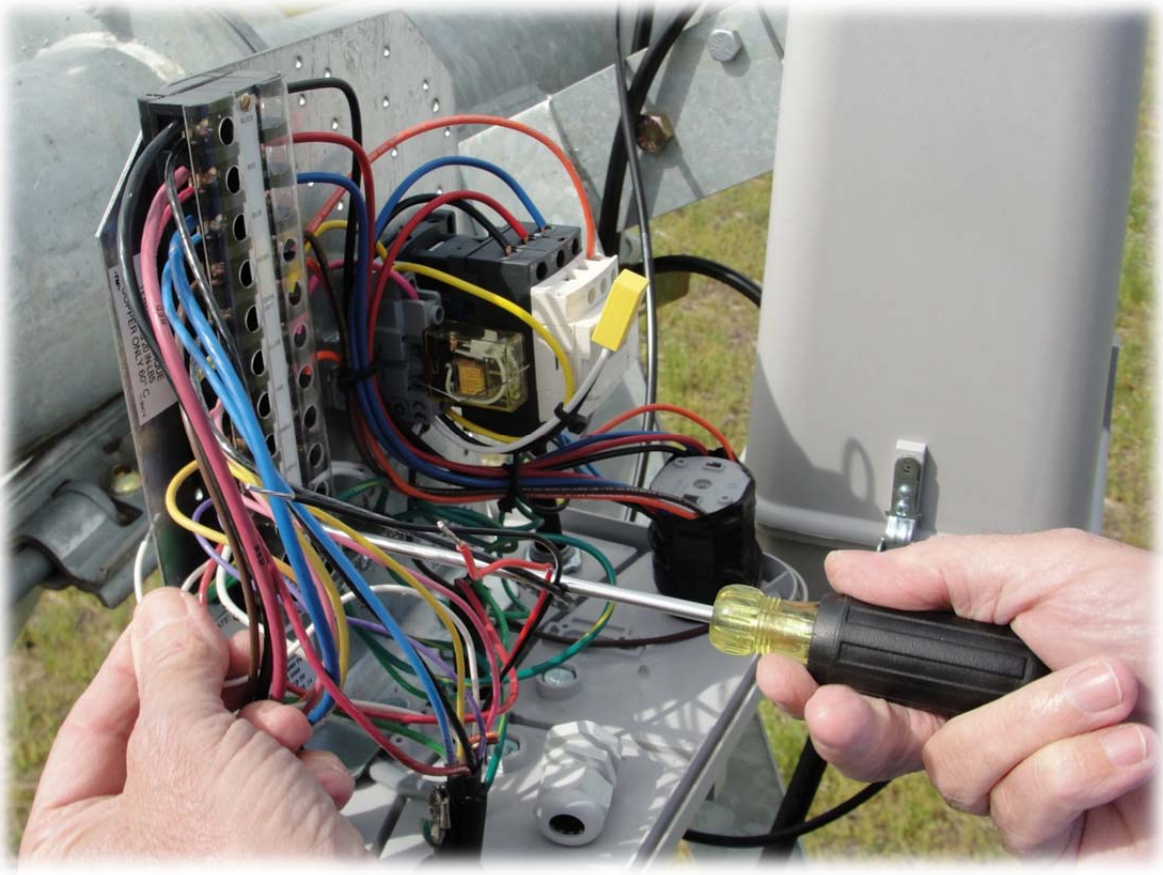


5. Remove the terminal screw and separate the white wire and the ground wire for at least 5 seconds.

6. Replace the wires and be sure to re-tighten the terminal screw.
7. Wait at least 3 minutes for a text, voice, or email alert which indicates a possible theft is occurring. If an alert is not received, try testing with the alternative method on the following page.

Alternative Method

1. **Ensure power to the pivot is off and the control panel is locked**.
2. Walk to the first drive tower, climb it, and remove the tower box cover.
3. Note the terminal numbers of where each wire is connected. There are two gauges of wire in the tower box. The smaller wire is what you will be working with. The span cable heading out toward the end tower is what will need to be disconnected sequentially.
4. Remove each 120VAC control circuit wire. This includes: safety, forward, reverse, percent timer, and end gun. **REMOVE THE WHITE NEUTRAL CONDUCTOR LAST**.
5. Wait at least 30 seconds and replace the wires to their respective terminals.
6. Replace the tower box cover.
7. Wait at least 3 minutes for a text, voice, or email alert which indicates a possible theft is occurring. If an alert is not received please contact customer support at (800) 961-9549.



Testing Safety Stop Notifications

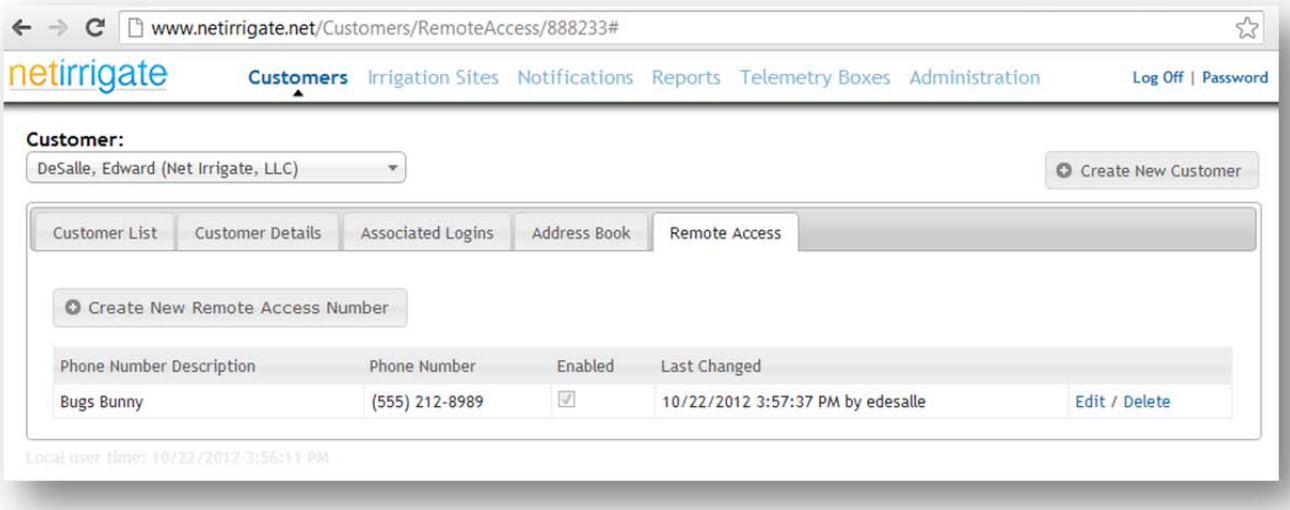
Before testing for safety stop notifications, at least one notification recipient should be configured for the site in question. If this has not been done, please see previous section Customer and Site Setup.

If desired, safety stop notifications can be configured for when the pivot both starts up and stops walking. Once it is determined that notification recipients have been configured for each respective alert, follow the procedure below:

1. Start the pivot walking in either forward or reverse.
2. In about three minutes, you should receive a message that says "*{NetIrrigate Site Name} is now running.*" Where *{NetIrrigate Site Name}* is the alias you've given to the irrigation site.
3. Once you receive the notification that the system is running, stop the pivot.
4. Within three minutes, you should receive a message that says "*{NetIrrigate Site Name} has stopped walking.*"
5. Repeat the process by walking the pivot in the opposite direction. To ensure proper functionality, **it is important to walk the pivot in BOTH directions**.
6. If any of the notifications fail, please contact customer support at (800) 961-9549.

Testing Remote Shutdown

Remotely shutting down the pivot is accomplished through the NetIrrigate® website, mobile apps, or Remote Shutdown Line. The NetIrrigate® Remote Shutdown Line uses caller id security to identify your list of pivots available for remote shutdown. To enable your phone to initiate remote shutdown calls, make sure your phone number exists and is enabled within the Remote Access tab within the NetIrrigate® Web Portal.

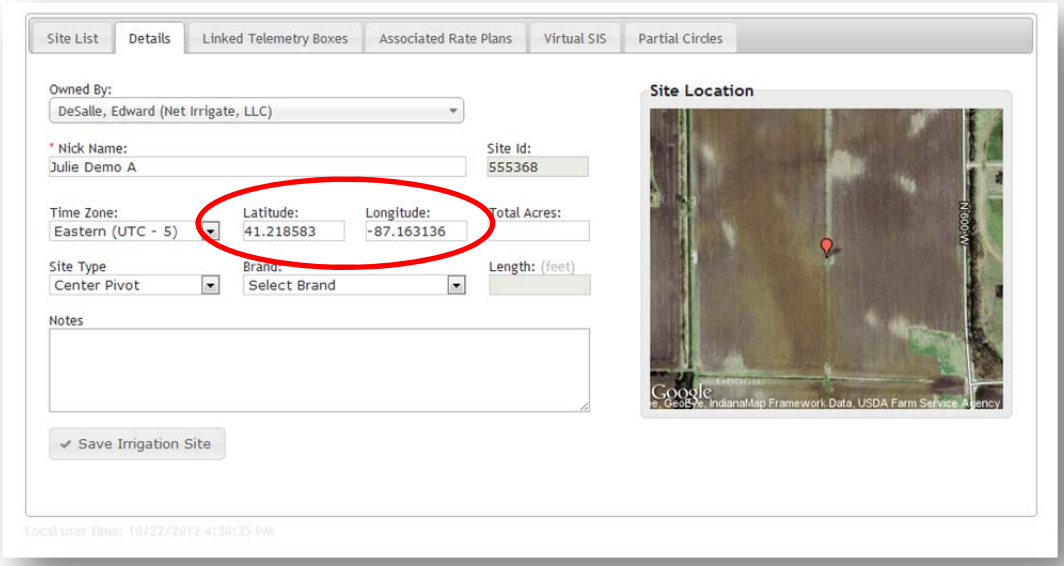


To initiate a remote shutdown call, **simply dial (800) 961-9549 x7**. The automated system will read off a list of your pivots available for remote shutdown. Follow the voice prompts and your pivot should shut down within two minutes. To use the website, navigate to **Reports**, and select Stop from

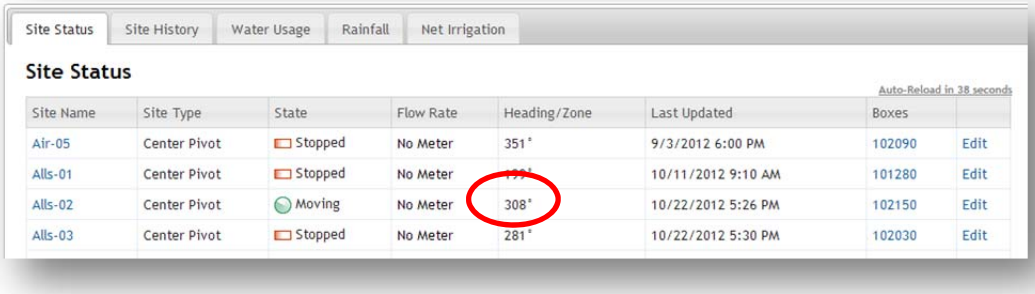
the far right column. The Net Irrigate app also has the power to remotely shutdown your pivot. You will receive a safety stop notification if a remote shutdown issued by any means is successful.

Testing GPS

Successful GPS monitoring begins by ensuring the latitude and longitude of the pivot pad have been entered into the NetIrrigate® website. The latitude and longitude of the pad may either be entered via the WireRat® iPhone app or via the site details tab in the NetIrrigate® web portal:



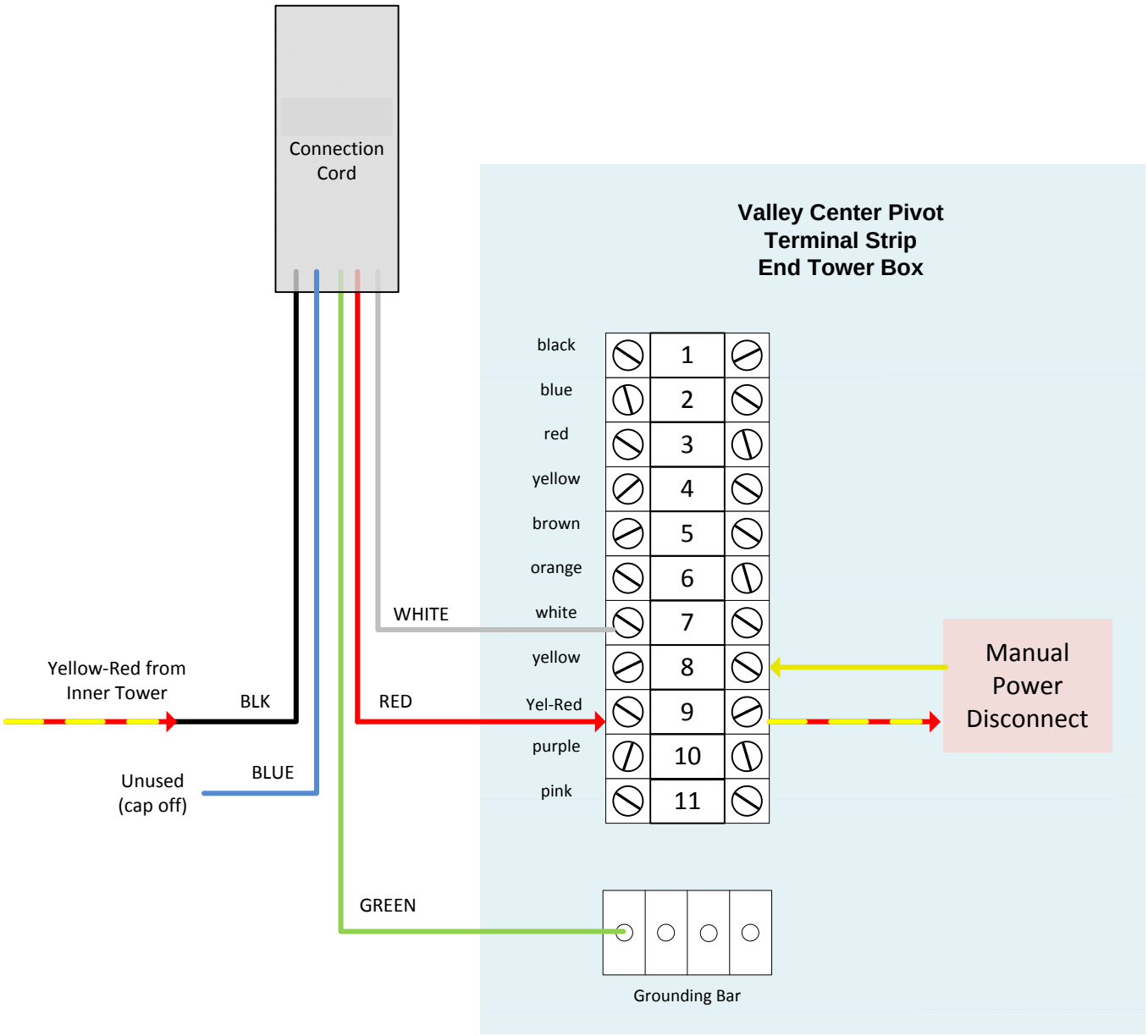
To acquire an initial pivot heading, **run the pivot for at least 6 minutes**. Once a GPS fix is established, the pivot heading should update on the Site Status report within the NetIrrigate® web portal.



If a virtual stop-in-slot alert is configured, the notification will trigger when the pivot is within 3° of either side of the configured heading. For example, if a virtual stop-in-slot notification is configured at 90°, the stop-in-slot notification will occur when the NETB13PIV periodically reports latitude and longitude which results in the heading of the pivot to be between 87° and 93°. The tolerance window is designed to compensate for the wide variance in pivot speeds and percent timer settings.

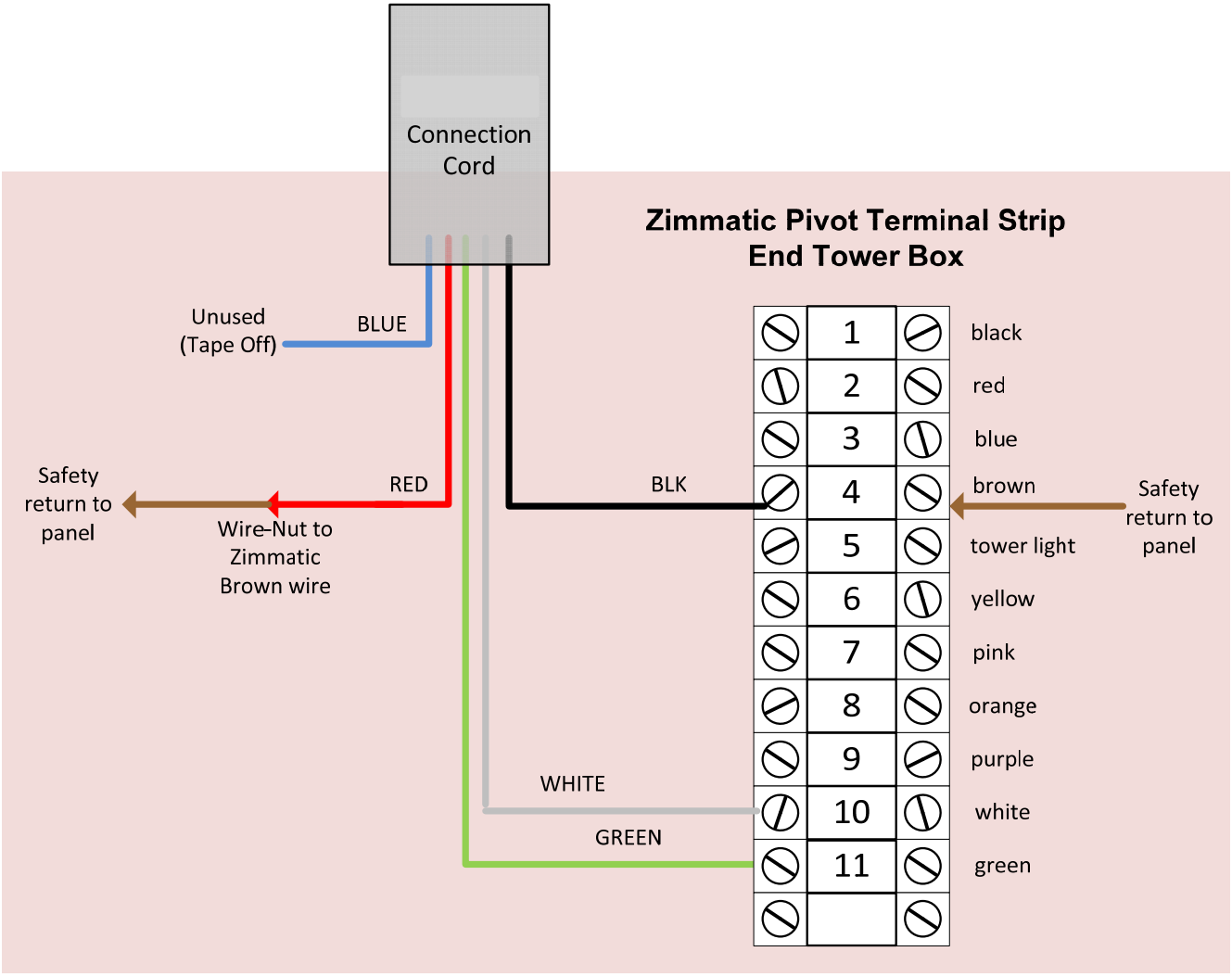
Appendix A – Valley Branded Pivots Wiring Diagram

1. Remove the yellow-red wire from the load side of the terminal strip.
2. Connect the red wire from the NETB13PIV to terminal 9 where the yellow-red wire was.
3. Wire-nut the removed yellow-red wire to the black wire on the NETB13PIV.
4. Connect the white wire on the NETB13PIV to terminal 7 (neutral).
5. Connect the green wire on the NETB13PIV to Ground.
6. The blue wire on the NETB13PIV is unused and should be taped off.



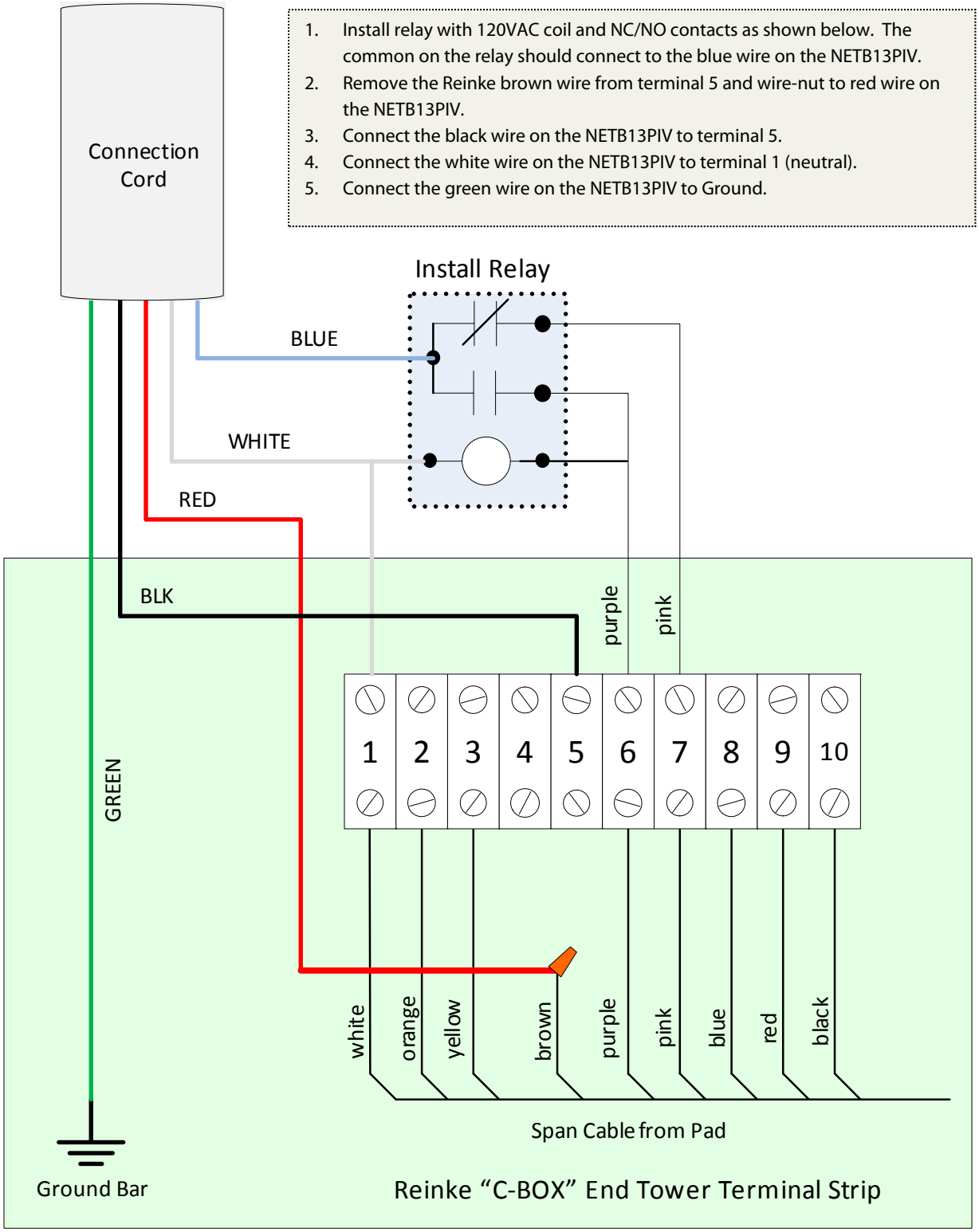
Appendix B – Zimmatic Branded Pivots Wiring Diagram

1. Remove the brown wire that is heading in the direction of the pivot pad from terminal 4.
2. Connect the black wire from the NETB13PIV to terminal 4 where the brown wire was.
3. Wire-nut the removed brown wire to the red wire on the NETB13PIV.
4. Connect the white wire on the NETB13PIV to terminal 10 (neutral).
5. Connect the green wire on the NETB13PIV to Ground.
6. The blue wire on the NETB13PIV is unused.



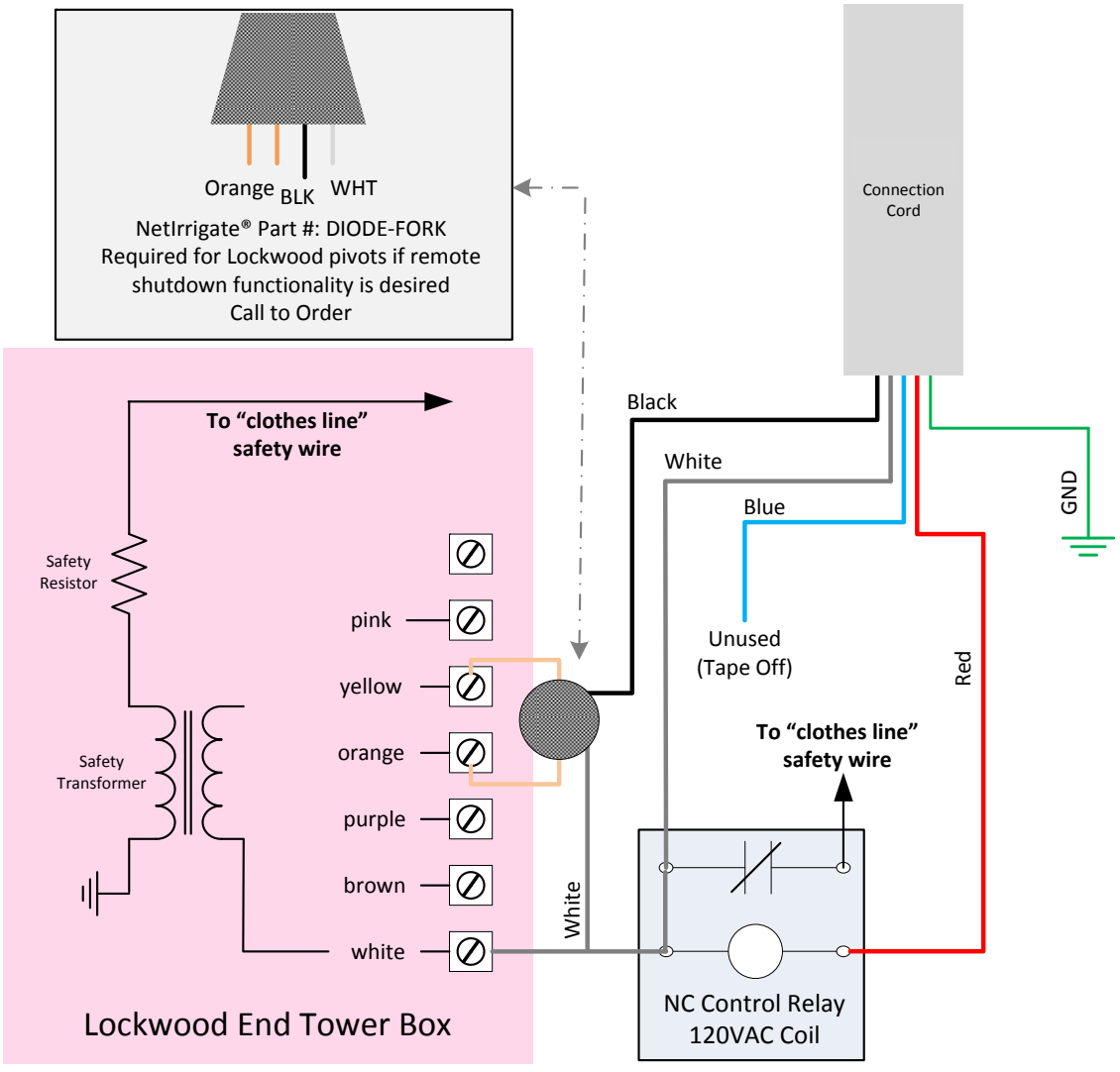
Appendix C – Reinke Branded Pivots Wiring Diagram

1. Install relay with 120VAC coil and NC/NO contacts as shown below. The common on the relay should connect to the blue wire on the NETB13PIV.
2. Remove the Reinke brown wire from terminal 5 and wire-nut to red wire on the NETB13PIV.
3. Connect the black wire on the NETB13PIV to terminal 5.
4. Connect the white wire on the NETB13PIV to terminal 1 (neutral).
5. Connect the green wire on the NETB13PIV to Ground.



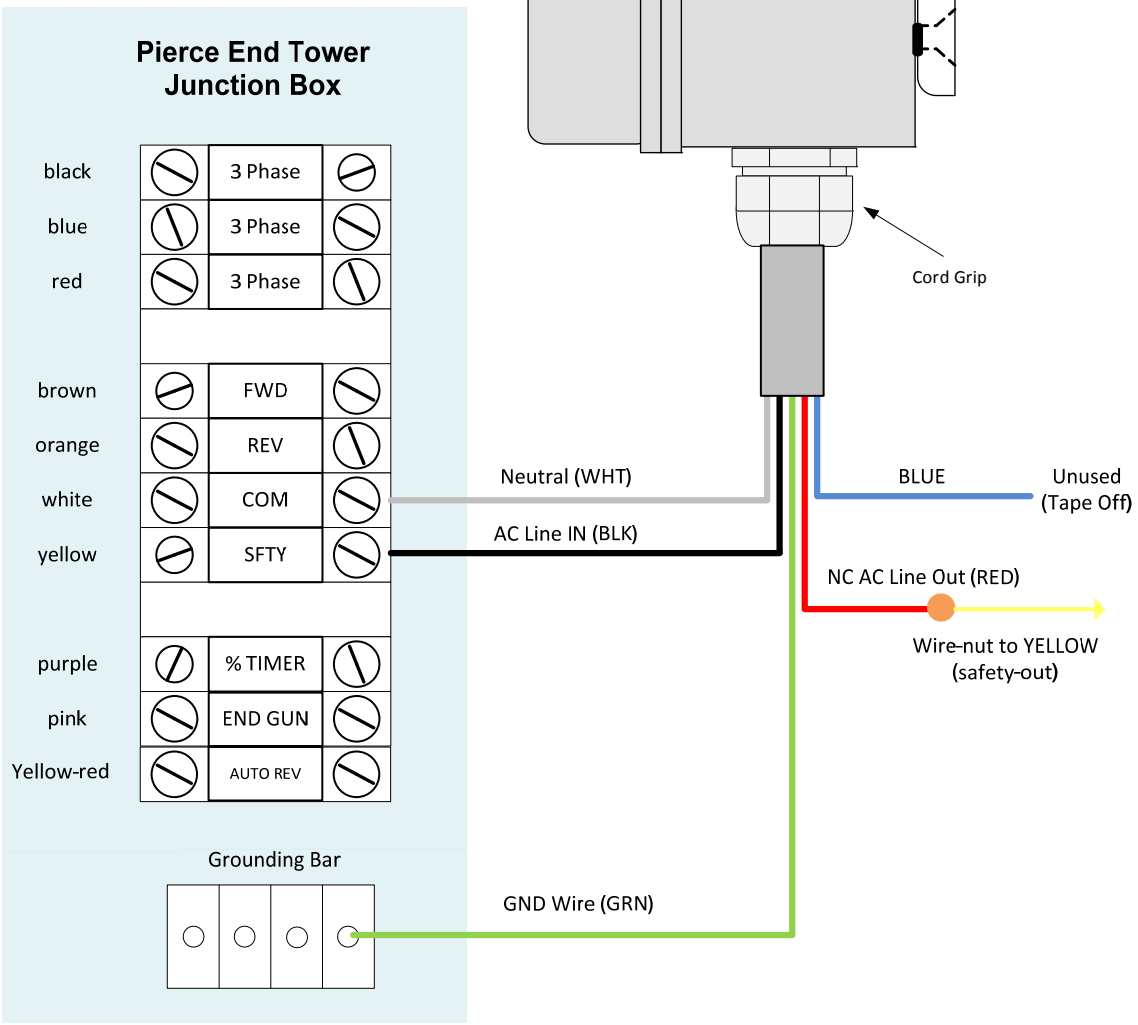
Appendix D – Lockwood Pivots Wiring Diagram

1. Install a control relay with NC contacts and a 120VAC coil as shown below.
2. Note that shorting neutral to the "clothes-line" on a Lockwood pivot will cause it to stop. The NETB13PIV will hold the short OPEN while the pivot is running in forward or reverse. An incoming remote shutdown command will drop-out the AC Line on the red wire closing the contact between neutral and the "clothes-line".
3. The blue wire on the NETB13PIV is unused. Tape or cap off.
4. Connect the green wire on the NETB13PIV to GND.



Appendix E – Pierce Branded Pivots Wiring Diagram

1. Remove yellow wire from outgoing side of the safety-out terminal and connect the black wire on the NETB13PIV to the terminal instead.
2. Wire-nut the removed yellow wire to the red wire on the NETB13PIV.
3. Connect the white wire on the NETB13PIV to terminal 7 (neutral).
4. Connect the green wire on the NETB13PIV to GND.
5. The blue wire on the NETB13PIV is unused.



netirrigate

Appendix F – Troubleshooting Span Cable Theft Alarms

PROBLEM: ALARM DOES NOT TRIGGER

If the span cable alarm does not trigger, it must be determined if the problem exists within the pivot or the NETB13PIV. The simplest way to determine if the NETB13PIV is functioning properly is to perform a bench test on the unit. If the NETB13PIV has already been installed, do the following:

1. Remove the NETB13PIV white wire from the tower box terminal strip. A red led light within the NETB13PIV enclosure should illuminate. If the red led light is lit, the problem is within the pivot. If it is not, proceed to #2.
2. Remove the NETB13PIV green wire from the tower box terminal strip or grounding bar. Hold the green wire tightly to the NETB13PIV white wire for 10 seconds and release. The red led light within the NETB13PIV enclosure should illuminate and the issue clearly lies within the pivot wiring. If the red LED light *does not* illuminate, the NETB13PIV is defective. Please call (800) 961-9549 for RMA procedures.
3. Successful operation of the span cable alarm requires at least 20,000 ohms of resistance between the neutral and ground conductors of the pivot. Locate the control transformer in the pivot control panel. Remove the bonding wire (green) from terminal X2 on the control transformer. Re-tighten the terminal screw to hold the remaining neutral wires (white) in place on X2.
4. If the pivot is equipped with a modern relay board, disconnect the clip to the relay board that contains ground and neutral conductors.
5. Using an **analog ohmmeter**, measure the resistance between the bonding wire (green) and terminal X2 (white) on the control transformer. The measured resistance should be greater than 20k (20,000) ohms. If the measured resistance is less than 20k ohms see Appendix F entitled "Common Causes of Low Ground Resistance".

   NOTE: We strongly recommend using an analog ohm meter with a 10K ohm scale (such as the Simpson meter pictured) to measure ground resistance. In our tests, digital meters often provide erroneous results in measuring ground resistance which may exceed 10,000 ohms.

PROBLEM: FALSE ALARMSWHILE RUNNING OR IDLE

False alarms may be triggered when the circuit resistance between the span cable neutral conductor (white) and the span cable ground conductor (green) rapidly increases to more than 50K ohms. Large changes in circuit resistance CAN be tolerated without triggering the alarm. For example:

- Abrupt changes in circuit resistance from near 0 ohms to 20K ohms *will not* trigger the alarm. The circuit resistance can repeatedly be changed from 0 ohms to 20K ohms without triggering the alarm.
- Gradual changes in circuit resistance from near 0 ohms to 50K ohms *will not* trigger the alarm.

Symptom	Probable Cause and Remedy
False alarms repeatedly are generated while the pivot is running in either direction	• AC Line is not connected to the black conductor on the NETB13PIV connection cord. The AC Line can usually be tapped off the pivot's 120VAC safety circuit. See appropriate wiring diagram.
False alarms occur repeatedly only when pivot is running in one direction	• Diode fork faulty or improperly installed. • Blue wire on NETB13PIV not connected to REV • Black wire on NETB13PIV not connected to FWD
False alarms randomly occur when pivot is sitting idle	• Dirty collector ring (most common on Zimmatic pivots). Clean collector ring with emery cloth. • Corroded rotary brush assembly at collector ring. Install a 2000 ohm 5 watt resistor between the neutral conductor and ground conductor across the outbound span cables at the collector ring. • Loose connection on ground or neutral terminals in tower boxes. This may occur due to deteriorating span cable cord grips on tower boxes.
False alarms occur on pivot start-up only	• Barricade stop is holding safety circuit open longer than expected, thus NETB13PIV cannot see AC Line signal until pivot moves completely off the barricade. Rewire to junction box before barricade stop switch. • Barricade stop switch is opening neutral conductor. • Transient voltage spikes from generator. Leave pivot panel in the OFF position while starting up generator.
False alarms when pivot stops	• Loose neutral or ground on pivot. • NETB13PIV box not securely mounted and rattling.

Appendix G – Common Causes of Low Ground Resistance

Three different types of digital multi-meters were field tested for measuring span cable resistance. All three digital meters gave erroneous readings. We assume that the capacitance between the span cable shield and the span cable conductors produce unreliable digital meter readings. The WireRat™ span cable alarm will function if the 'open' circuit resistance is 20,000 ohms or higher. If the 'open' circuit resistance is lower than 20K ohms locating the source of the grounds can be both difficult and time consuming. Some of the most likely causes of low ground resistance measurements are as follows:

I. Running Lights

a. Flexible cords to the running lights are cracked and water logged.
b. Running light lamp sockets are deteriorated and leak to ground.

II. Collector Rings

a. Corrosion and debris on brush holders.
b. Corrosion and deterioration on shaft assembly.

III. Causes Specific to Valley Branded Pivots

a. **Tower Boxes**
    i. The neutral wire that supplies the relay coil circuit chaffs on the sharp edge of the relay back plate. Newer tower boxes have a nylon cable strap to prevent chaffing.
    ii. Moisture, corrosion and debris build up on the terminals of the micro-switches mounted to the bottom plate of the tower box.
b. **Neutrals -** *although the alarm connects to the neutral wire (white) of the span cable, most of the other conductors in the cable become part of the supervisory circuit.*
    i. At each intermediate tower box the neutral (white) is connected to the forward and reverse conductors (brown, orange) through each motor contactor relay coil and micro-switch (600 ohms).
    ii. The de-watering timer at the second to last tower connects the neutral wire (white) to the safety out (yellow-red), and safety return (yellow) through the timer clock motor (1200 ohms).
    iii. The percent timer (purple) is connected to the neutral through the relay coil in the end tower (600 ohms).
    iv. The end gun circuit (pink) is connected to the neutral through the solenoid coils.
c. **Corner Arms -** depending on methodology at install time, certain Valley branded corner arm pivots may require an isolation relay in the end tower to disconnect the neutral conductor from the corner arm when the pivot is off. The relay coil can be supplied by safety out (yellow-red). If an isolation relay is not used the span cable to the corner arm will not be protected by the span cable alarm.

Appendix H- Incoming Event Code Overview

Understanding the codes sent by the PivotProxy® can be helpful during installation and troubleshooting. Below is an overview of codes you may encounter regularly when testing, installing, and troubleshooting PivotProxies®.

Event Code	Description
53	Periodic GPS reporting
66	IP address established
101	PivotProxy® has powered up, indicates the pivot is running
102	PivotProxy® has powered down, indicates the pivot has shutdown
103	Cut wire detected
104	Incoming command received to pick up relay coil
105	Remote relay coil energized
106	Incoming command received to drop out relay coil
107	Remote relay coil not energized
108	Normally open cut wire alarm
109	Ground or neutral wire loose while pivot running

You may see these codes for a given device two ways:

I. The WireRat® iPhone app: locate the irrigation site to which the device is linked on the WireRat® iPhone app. At the bottom navigation bar, select the Events tab. Here you can view the incoming events, associated messages, the timestamp, and how many notifications were triggered.

II. The www.netirrigate.net website: select Devices from the top navigation bar. Type the six digit device ID into the Device ID dropdown box. Select 'Incoming Events' from the secondary navigation bar.