NevadaNano

INSTALLATION MANUAL

MethaneTrack™

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Notices

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1. MethaneTrack™ Overview

NevadaNano's MethaneTrack™ is a low-cost network of rugged gas monitoring equipment to measure methane emissions and report leak location, leak rate and start and stop time to the operator. Utilizing an Industrial IoT (IIoT) network to detect methane in the air, MethaneTrack™ detects fugitive and operational emissions from a site and immediately alerts the operator of the location and the emission rate, facilitating rapid response and repair. Autonomous, continuous monitoring enables up to 99% reduction in emissions while reducing operational costs and boosting profits.

This document describes the procedure for correctly installing and verifying the operation of a MethaneTrack™ emissions monitoring system.

The system utilizes specialized monitoring devices called endpoints that measure airborne methane concentrations and transmit that data to the cloud for analysis. Endpoints are battery powered devices and use LoRa for local wireless data transmission to a gateway.

The system also includes an anemometer that measures wind direction and speed, and a gateway to transmit the data to the cloud. A solar power system may be required to power the gateway, for sites lacking mains power.

Software in the cloud analyzes the gas concentrations and wind data from the site to determine the location, size and start and stop time of any emissions. When correctly installed, the system provides automatic, continuous monitoring of a site for fugitive and operational emissions, tabulates the quantity of emissions and sends out alerts when a leak is detected.

2. Product Overview

2.1 System Components

This section provides an overview of all components included with the system. Familiarizing yourself with each part will help ensure proper installation and prevent confusion during setup. Please inspect all components before beginning the installation to verify that nothing is missing or damaged.

- Endpoint – (a) Power Module (b) Radio & Sensor Module
- Endpoint Magnetic Wand
- Endpoint Radio & Sensor Module Extraction Tool
- Hose Clamps
- Endpoint Magnetic Mount (Optional)
- Gateway including LoRa antenna, LoRa cable and ethernet cable
- Anemometer
- Power over ethernet (PoE) Injector – Mains (Optional)
- Power over ethernet (PoE) Injector – Solar (Optional)

2.2 Preparation for Installation

Proper preparation is essential to ensure a smooth and successful installation. This section outlines the necessary steps to get your workspace, tools, and components ready before beginning the installation process.

1. Determine which site(s) will be installed.
2. Obtain the site plans for the site(s).
3. Ensure all the MethaneTrack™ hardware and associated parts for each site are verified.
4. Ensure all required tools are available.
5. Ensure installers are aware of any and all site access and / or safety requirements
6. Determine the magnetic declination of the installation site to prepare for installation of the anemometer.

2.3 Tools and Equipment

Before beginning the installation, ensure you have the following tools available. Using the correct tools will help you complete the installation safely, efficiently, and without damaging any components.

- Cordless hand drill (brushless motor)
- Crescent Adjustable Wrench (6 inch)
- Screwdrivers, including slotted 3/16", 1/4", 5/16", Phillips 1, 2, 3
- Rachet / Screwdriver with an 8mm/5/16" 1/4" Drive 6 Point Metric Standard Socket
- Compass
- Tape Measure
- Electrical Tape
- Scotch® Wireless Weatherproofing Kit WK-101
- Antioxidant compound (NO-OX-ID, Penetrox, Noalox, Ox-Gard or equivalent)
- Cable Ties of assorted length (must be outdoor and UV rated)
- Cable Wire Snips / Diagonal Cutting Pliers
- 14 AWG grounding wire
- Angle Finder / Protractor (for setting the solar panel angle)
- RTK GPS receiver with L-Band capability e.g. https://www.sparkfun.com/sparkfun-rtk-facet-l-band.html

- Ensure your Android/Apple phone or tablet is installed with the SW Maps app.
  Android : https://play.google.com/store/apps/details?id=np.com.softwel.swmaps
  Apple : https://apps.apple.com/us/app/sw-maps/id6444248083
- Mobile/Cellular phone
- Endpoint Magnetic Wand
- Endpoint Radio & Sensor Module Extraction Tool
- Ladder (if required)
- Man lift (if required)

2.4 Waste Disposal Arrangements

Proper disposal of packaging materials, used components, and installation waste is important for safety, environmental responsibility, and regulatory compliance. This section outlines the recommended procedures for disposing of waste generated during the installation process. Please follow all local regulations and site-specific guidelines when handling and discarding waste materials. For a standard installation, the only waste created during an installation will be packaging materials (cardboard and plastic).

- Proper Disposal: Dispose of waste in a manner that prevents environmental contamination and health hazards.
- Waste Minimization: Reduce waste generation through efficient material usage, reuse, and recycling.
- Segregation: Separate different types of waste (e.g., general, recyclables, hazardous) for proper handling.
- Containerization: Use appropriate, secure, and labeled containers for waste collection and storage.
- Compliance: Follow all applicable local, state, and federal regulations for waste management and disposal

2.5 Safety Precautions

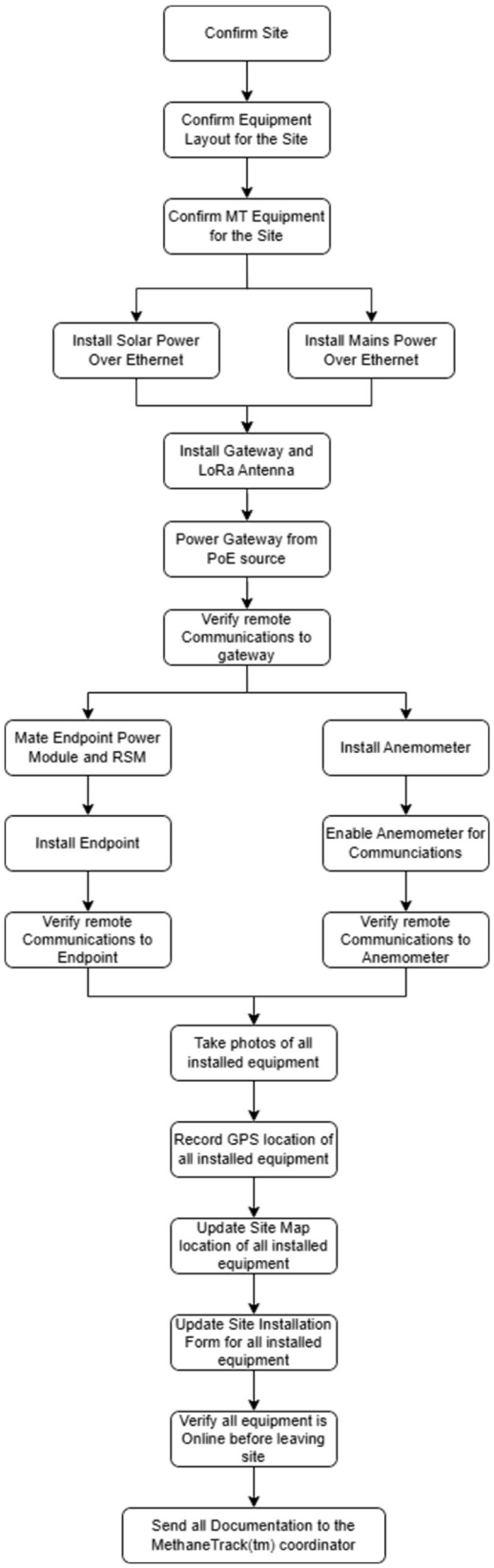
Before beginning any work, it is essential to review and follow all safety precautions. Guidelines are designed to protect both the person and the equipment from harm. Ignoring safety protocols can result in serious injury, equipment damage, or project delays. Always comply with site-specific safety requirements and applicable regulations. Specific safety precautions for each portion of the installation are included in the appropriate sections.

In addition, the proposed locations of all MethaneTrack™ equipment must be confirmed.

The endpoint is the ONLY Intrinsically Safe (rated for ATEX Class 1, Div1 and IECEx Zone 0 operation) equipment which can be installed in areas where potentially explosive gases may exist. All other equipment, such as anemometer, gateway, power over ethernet module and solar, must be installed in safe locations outside of the hazard zone.

METHANETRACK IS NOT COMPLIANT WITH INDUSTRIAL SAFETY STANDARDS FOR LIFE-CRITICAL SAFETY SYSTEMS. HOWEVER, WHEN USED IN CONJUNCTION WITH EXISTING LIFE-SAFETY CRITICAL SYSTEMS, THE DATA PRODUCED BY METHANETRACK CAN BE USED BY OPERATORS TO IMPROVE THE OVERALL OPERATION SAFETY OF A SITE.

2.6 High Level Flow for a typical MethaneTrack™ Installation



3. Installation Instructions

3.1 General Installation Instructions

Before commencing any work, determine the precise locations for all equipment per the site plan. Obtain approval of these locations from the site team. The endpoint is in the only EX-rated device; all other equipment is non-Ex-rated and must be located outside of the hazardous zone.

1. Confirm the locations for all equipment with the site operator/owner (if available).
2. If cellular is used for the backhaul, ensure the location chosen for the gateway has good cellular service.
3. For the endpoints, adjustments within 6 feet / 2 meter radius from the plan are allowed to avoid obstructions or meet operational needs.
4. The endpoints should be installed approximately at the same height or slightly higher than the potential leak sources nearby. The height can be adjusted 3 feet / 1 meter higher or lower than these leak sources if necessary to obtain a good mounting location.
5. Ensure that the gateway, anemometer and solar locations are outside of the hazardous zone.

The sequence for the installation should be as follows:

1. Install the gateway and LoRa antenna.
2. Install the power over ethernet (mains/solar)
3. Power the gateway and verify the gateway has communications to the MethaneTrack™ cloud. Communications can be verified via the FIT tool or Customer Support at NevadaNano.
   THE GATEWAY MUST BE COMMUNICATING WITH THE CLOUD BEFORE CONTINUING
4. Connect the Power Module to the Radio & Sensor Module.
5. Install the endpoint in the agreed locations
   NOTE: endpoints must be installed in a vertical orientation with the sensor opening pointing down.
6. Repeat for each endpoint to be installed.
7. Install the Anemometer and enable.
   Note: Ensure the Anemometer is pointing True North not Magnetic North.
8. Take photos of all the equipment.
9. Record equipment GPS locations.
10. Update site installation documentation.
11. Complete final system checks to ensure all equipment is communicating to the MethaneTrack™ cloud. Correct any issues before leaving the site.
12. Obtain customer sign-off on installation.
13. Upload the as-built site information to the MethaneTrack™ cloud or send to Customer Support at NevadaNano to complete.

3.2 Installation of the Power Over Ethernet Injector – Mains Power (if required)

WARNING

THIS EQUIPMENT MUST BE INSTALLED IN AN ENVIRONMENT THAT IS KNOWN TO NOT BE EXPLOSIVE.

The PIS2030 system is housed in a 7.63x4.63x3.09 Inch IP67 weatherproof enclosure.

The Connector System Interface consists of two Waterproof RJ45 PoE Connectors, and a Waterproof AC Connector.

Each of the RJ45 PoE Connector and AC Connector has an LED Indicator. The functions of the switch and LED status is summarized in a table and the picture below.

User Buttons and Ports

Item No.	Function	Description
1	AC PWR & LED	100 ~ 240V AC Power Input Port LED in ON (Green), when Power is connected
2	PoE Out Port & LED	PoE is Active, when LED is ON (Green)
3	Data IN	Data Input

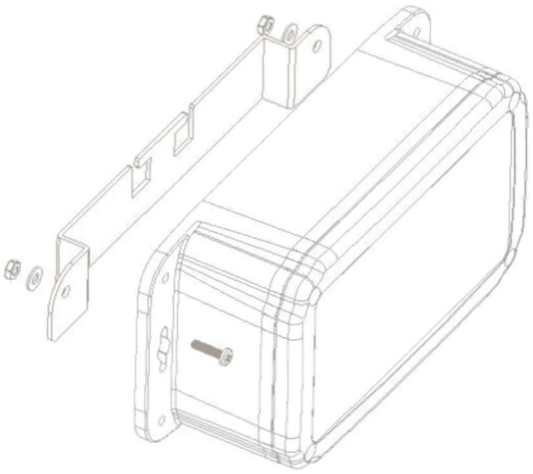
Earth Ground

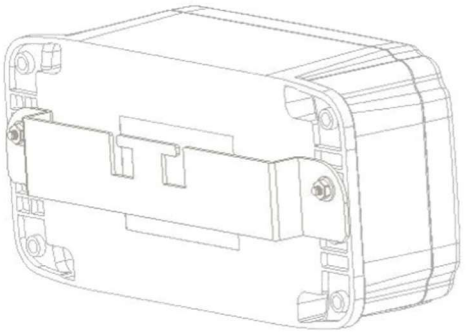
The system provides the grounding by using the Ground Wire to ground the equipment for safety and protection of the system. It is highly recommended that grounding procedures are performed for maximum safety and protection of equipment. Any product damage caused by improper or no grounding is not covered under warranty.

Package Contents

- Link Power PIS2030 Outdoor 30W Gigabit PoE Injector (1)
- WECK0001 Waterproof Ethernet Connector Kit (2)
- WPCK0001-3 - AC Power Cable with one 3-PIN AC Power Connector (1)
- User Manual (1)
- Warranty Sheet (1)
- (Optional Accessory) Pole Mount Kit

1. Locate wall/post/pole which has been designated for the PoE injector.
2. WALL mounting: Attach the PoE injector to the wall using the two integral mounting holes
   POLE / post mounting: Use the supplementary Outdoor Pole Mount Kit, which is designed be mounted to any 1-3/4” to 11-1/2” (diameter) pole or 9” square pole.





3. **Grounding the Switch by Using Ground Lug**
   To ground the injector, please use the grounding lug ⏚ shown in the figure below. If the ground contact in the power outlet is not connected to the ground, report and resolve the problem and reconstruct the grounding system.

Grounding Lug
Use a 14 AWG wire for grounding and secure with the M4 Screw on the Grounding Lug as indicated above

NOTE: For a non-U.S. plug, please identify the "Grounding Pin" based on your region or country's electric code.

4. Plug the AC power cord into the local power outlet.
5. The **PWR** LED will illuminate green to show the PoE injector is powered.

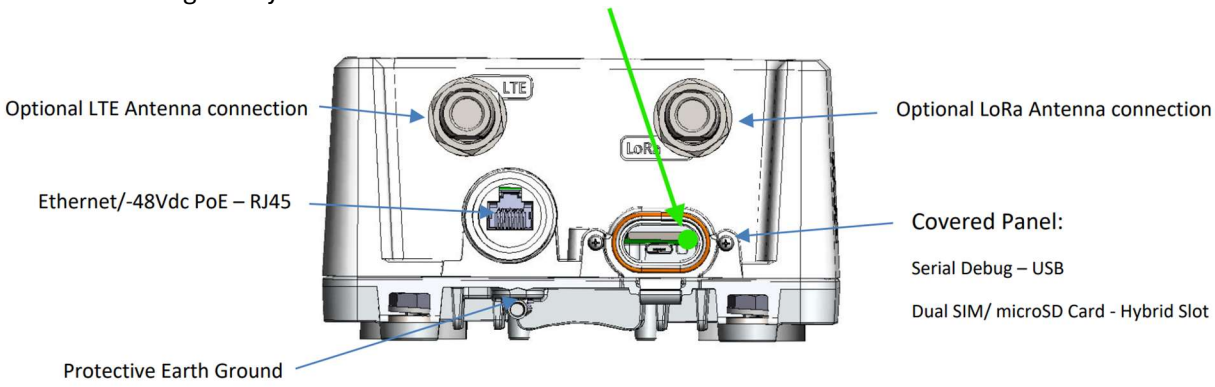
6. OPTIONAL: If you are making your own ethernet cable rather than using the ethernet cable supplied, please ensure that it is suitable for outdoor use and is to the T568B wiring standard.

7. The ethernet cable that is connected or to be to the gateway must be connected to the **PoE Out** ethernet socket on the PoE injector. Use the gland supplied to secure, and use Scotch Wireless Weatherproofing Kit, WK-101 to tape the connection to ensure no water or dust ingress.
   NOTE: to ensure a robust connection to **PoE Out** ethernet socket, the **outer sheathing covering the**

ethernet plug should be removed. This can be carefully removed with cutting pliers.

8. **If the gateway is installed** the PoE Out LED should illuminate green to show the PoE injector is connected to the gateway.

9. Check the gateway is powered by verifying that the green light is solid or flashing inside the SIM port on the underside of the gateway.



10. Communications to the gateway to be verified via the FIT tool and / or Customer Support at NevadaNano. **THIS MUST BE COMPLETED BEFORE CONTINUING**
11. Ensure the cables for power and ethernet are secured with cable ties every 30 centimeters / 12 inches.
12. Record the GPS location of PoE and gateway using RTK GPS receiver and App.
    And/or use the FIT tool or other suitable method to scan or record the bar code and record the serial number.

3.3 Installation of the Power Over Ethernet Injector – Solar Power (if required)

WARNING

THIS EQUIPMENT MUST BE INSTALLED IN AN ENVIRONMENT THAT IS KNOWN TO NOT BE EXPLOSIVE.

The solar system is used to power the gateway if 110-240V AC power is not available at the site.

Regardless of the system size supplied; the system consists of the following components:

- Solar panel
- Solar panel mount
- Solar charge controller with PoE output
- Weatherproof Aluminum or Polycarbonate Outdoor Enclosure
- Batteries
- Solar panel to charge controller cables
- Battery to charge controller cables

Installation of the 4.5-day Solar Power System. The installation process is nearly identical for the 1.5-day and 7-day systems.

DANGER! Avoid Powerlines! You Can Be Killed!

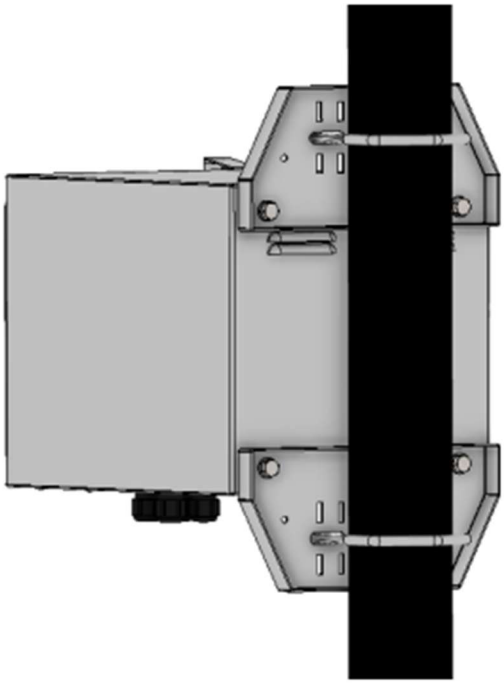
Take extreme care to avoid contact with overhead power lines, lights and power circuits. Contact with power lines, lights or power circuits may be fatal. Install equipment no closer than 20 feet from any power lines.

Safety: For your own protection, follow these safety rules.

- Perform as many functions as possible on the ground.
- Do not attempt to install on a rainy, windy or snowy day or if there is ice or snow accumulation at the install site or if the site is wet.

Recommended Tools: Phillips Screwdriver, 13mm and 10mm Wrench, 5/16” nut driver, Flat Blade Screwdriver

1. Install the solar panel mount assembly to a 2” to 4” pole. The solar panel should be facing South if in Northern Hemisphere. Avoid any shading of solar panels. Set the bracket angle for your optimum winter angle. $angle = (0.9 \times latitude) + 30°$
2. Fix the solar panel to the solar mount



TIP: install the batteries and other equipment in the enclosure after mounting the enclosure to the pole or wall.

3. Attach top and bottom brackets to the enclosure.
4. Mount the enclosure to a pole using U-Bolts and/or 4 hose clamps. The enclosure can also be wall mounted using appropriate lag bolts. Note that the batteries are heavy. Ensure that the lag bolts are engaged with structure able to support the weight.
5. Attach the included DIN Rail to the door using hardware provided.

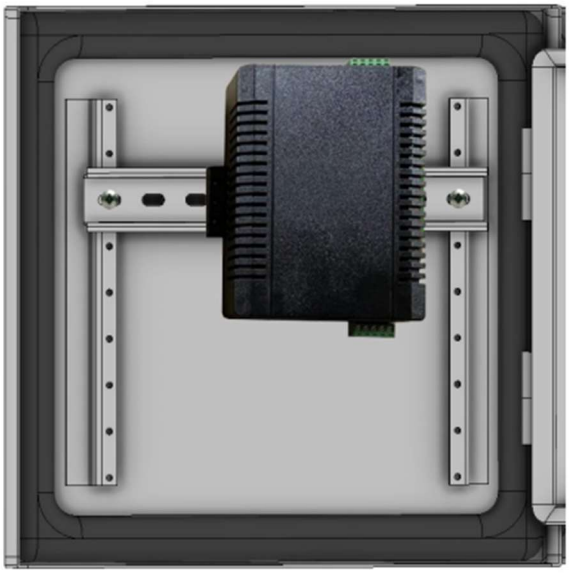
TIP: There are multiple cable gland feedthroughs in the bottom of the enclosure. If you are not using any of the feed throughs, you can cut a short piece of wire and insert into cable gland and tighten the cable gland to seal.

6. Remove the fuse from the battery cable(s), connect wires to the batteries, then install the batteries.
7. Attach the green DIN Rail clips to the controller using screws provided. The extra parts are not used.
8. Connect the battery wires and the wires from the PowerVent™ fan to the controller battery input. Be sure to observe proper polarity. (RED=+).

CAUTION: Reverse polarity connections will damage the equipment.

9. Connect the included solar panel cable to the controller PV inputs (Red to PV+). Do not connect the solar cable to solar panel connectors until the controller is connected to the batteries.

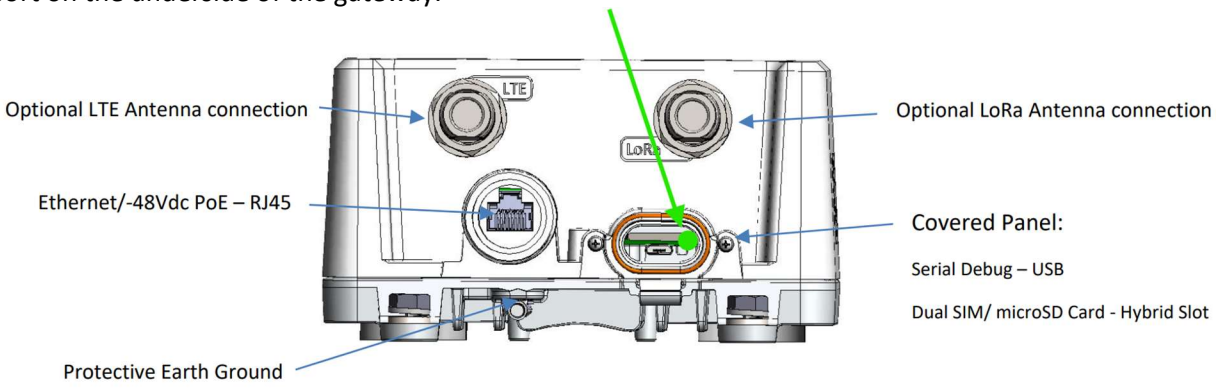
10. Connect the ethernet cable from the gateway to the solar charge controller **POE OUT** ethernet socket. The load will turn on automatically when the controller is energized with full battery voltage. Mount the PWM Solar controller to the DIN rail mounted on the enclosure door.
    Double check wiring and then re-install the battery cable fuse to energize the system. The PWM controller will power up and automatically detect the battery configuration.



11. Once the controller is energized, connect the solar panel connectors to the solar cable coming from the PWM controller.

CAUTION: Reverse polarity connections will damage the equipment.

12. Make sure the lid gasket is clean and free from any particles, then carefully close the cover, making sure that the wires are clear of the seam and hinge area. Use your own lock to secure the door.
13. Check the gateway is powered and communicating by verifying the green light is flashing inside the SIM port on the underside of the gateway.



14. Communications to the gateway to be verified via the FIT tool and / or Customer Support at NevadaNano. **THIS MUST BE COMPLETED BEFORE CONTINUING**
15. Record the GPS location of the Solar PoE and gateway using RTK GPS receiver and App.
    And/or use the FIT tool and / or other suitable method to record, scan the bar code / record the serial number.

3.4 Installation of the LoRa Cellular Gateway

WARNING

THIS EQUIPMENT MUST BE INSTALLED IN AN ENVIRONMENT THAT IS KNOWN TO NOT BE EXPLOSIVE.

The gateway kit contains the following components:

- Gateway (e.g. KONA Enterprise Gateway)
- Gateway pole mounting accessories (e.g. KONA Mounting Kit)
- LoRa antenna
- LoRa antenna mounting accessory
- LoRa antenna cable
- Ethernet cable

KONA Mounting Kit

KONA Enterprise Gateway

Cellular antenna - Optional extra

- Cellular antenna
- Cellular antenna mounting accessory
- Cellular antenna cable

LoRa Gateway Interface Connector Types

Interface	Connector Type	Mating Connector
LoRa Antenna	N-Type female	Industry standard N-Type male
Cellular Antenna	N-Type female	Industry standard N-Type male
Copper Ethernet	RJ45 Modular Jack	RJ45 modular plug followed by CAT 5e cable
Earth Ground	Compression lug	Industry standard single-hole lug, M4 (#8)

Safety: For your own protection, follow these safety rules.

- Perform as many functions as possible on the ground.
- Do not attempt to install on a rainy, windy or snowy day or if there is ice or snow accumulation at the install site or if the site is wet.

Recommended Tools:

- A 6-point metric socket set and torque wrench drive
- Weatherproofing tape kit for the RF connector (Scotch Wireless Weatherproofing Kit, WK101 recommended)
- Antioxidant compound (NO-OX-ID, Penetrox, Noalox, Ox-Gard or equivalent)
- Supplied pole mounting accessories (shown in) for pole mounting or appropriate screws or bolts (four sized M6) with any required anchors according to the wall construction for wall mounting.

Installation Overview

- The gateway is considered permanently connected equipment. The protective earth ground connection is always required.
- Ensure the gateway protective earth ground connection is properly terminated prior to the connection of any other interface.
- The gateway contains primary lightning surge suppression on the copper ethernet port, and the LoRa RF antenna port. The primary lightning protectors bridge the interface to chassis during over-voltages. Ensure that the protective earth ground connection is always in place.
- An external inline surge protector must be applied to the external cellular antenna port when used.
- The gateway does not contain a power disconnection device; a readily accessible disconnection device must be incorporated external to the gateway.

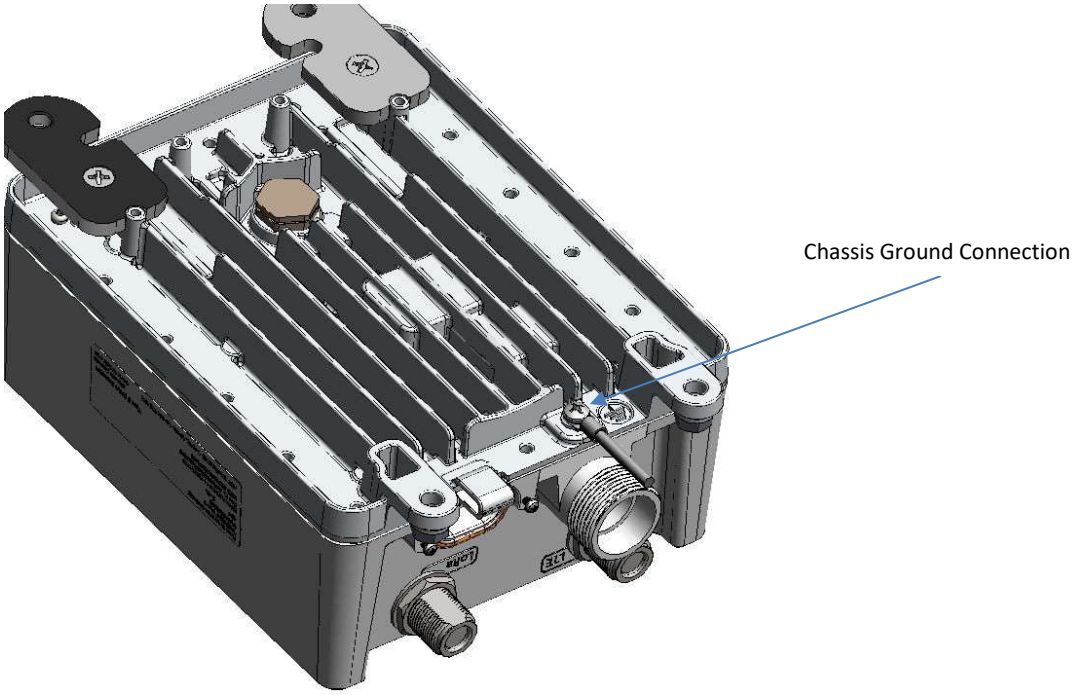
Installation Instructions

Ground Cable Installation

The protective earth ground connection is made through a M4/#8 on center hole lug with 10mm maximum OD to the ground termination point illustrated below. The recommended ground cable gauge is #10 AWG. The LoRa gateway grounding system shall follow local and national electrical codes. The protective earth ground conductor terminated at the hole lug point is mandatory and must be the first connection made to the LoRa gateway during installation. Proper routing and termination of this cable is key to robust performance; in high susceptibility installations, every effort shall be made to minimize connection inductance and ground bed resistance.

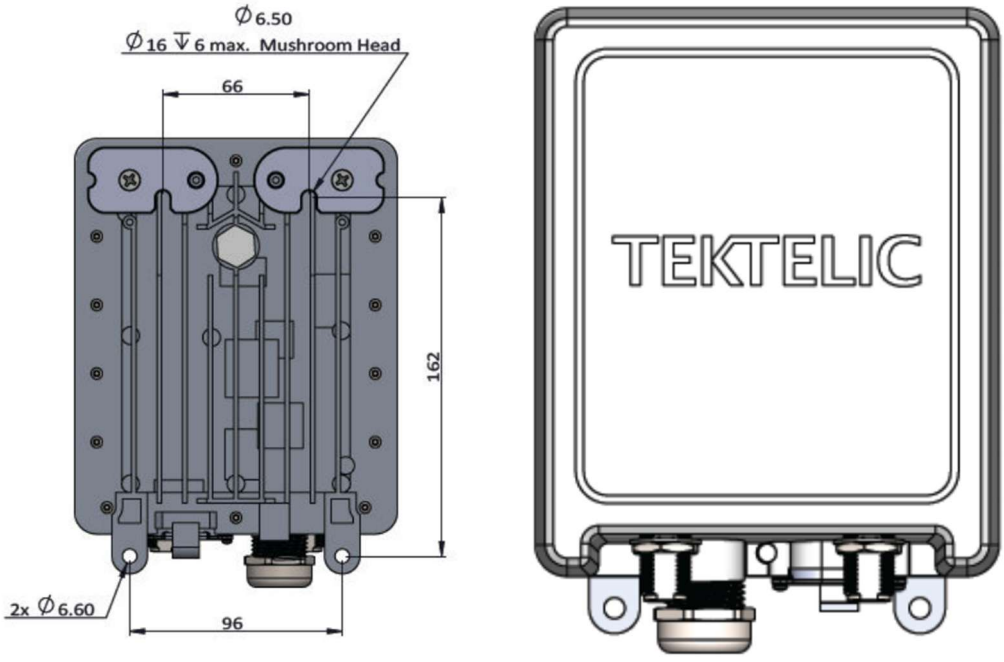
1. The ground cable installation steps are as follows
    a. Lightly abrade the surface of the casting ground area with a fine wire brush to remove the oxide layer.
    b. Use a clean cloth to remove any debris from the surface.
    c. Immediately coat the contact surface with a thin layer of antioxidant compound.

d. Install the ground cable through its single hole lug onto the chassis ground point using the supplied M4x0.7 -12mm bolt with flat, lock, and star washers, torqued to 2.4Nm (22 in·lbs).

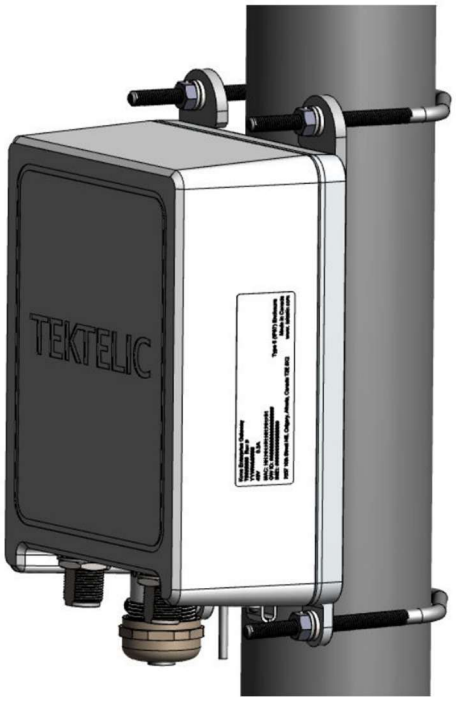


Gateway Installation

1. Ensure that all components required for installation are available.
2. Locate post/pole/wall which has been designated by the site.
3. The gateway is to be mounted at a minimum of 1.5 meters above ground level and in the vertical position for the GPS to function properly. The front of the gateway should face the strongest cellular signal.



4. The pole should be a minimum of 1 ½ inches in diameter and place the 2 x U clamps around the pole and feed them into the gateway mounts and tighten with a wrench to ensure gateway is secure.

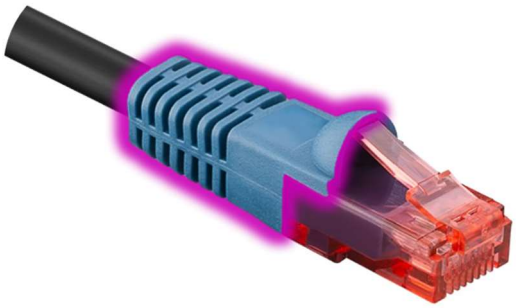


RF LoRa Antenna Cable and Antenna Installation

5. The LoRa antenna cable attaches to an N-Type connector located on the bulkhead of the gateway, labelled LoRa.
6. Torque the cable RF connector to 0.79 to 1.13 Nm (7 to 10 in·lbs).
7. The N-Type connector interface to a cable is not waterproof and must be taped. We recommend taping with Scotch Wireless Weatherproofing Kit, WK-101.
8. Install the LoRa antenna to the pole/post, using the provided fixings and clamp, ensuring the antenna is located as high as possible to improve signal quality.
9. Connect the LoRa antenna cable to LoRa antenna.
10. Cable tie the antenna cable every 30 cm to ensure its secure.

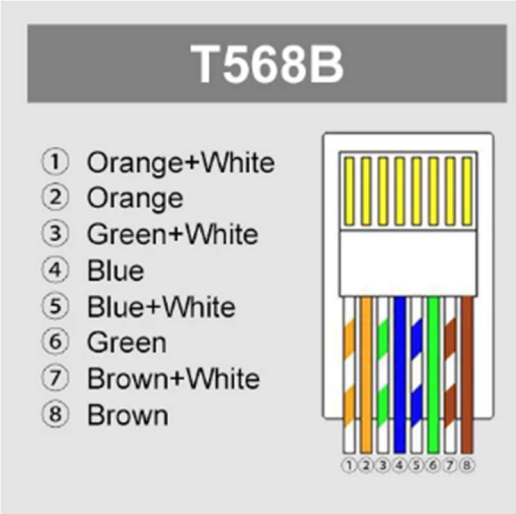
Ethernet Cable Installation

11. To ensure a robust connection to the **Gateway Ethernet PoE** socket, the **outer sheathing covering the ethernet plug** should be removed. This can be carefully removed with cutting pliers.



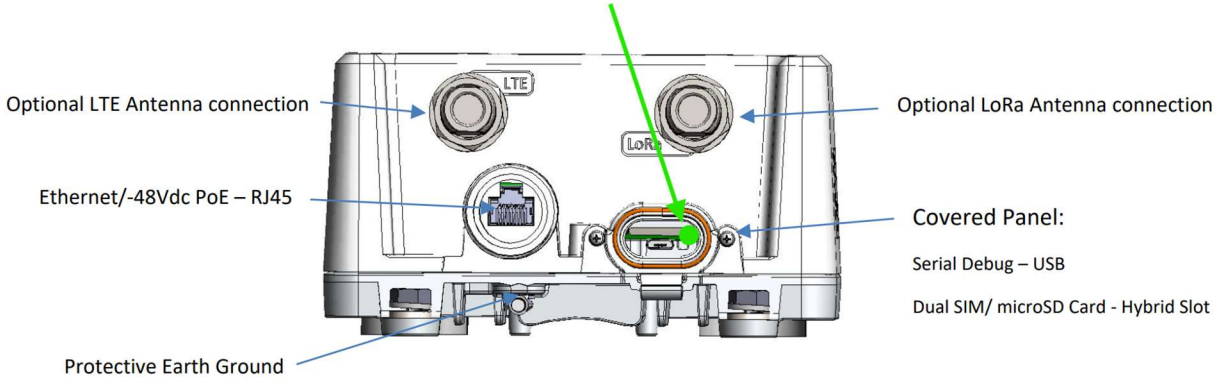
NOTE: If you are making your own ethernet cable rather than using the as supplied, please ensure that it

is suitable for outdoor use and is to the T568B wiring standard.



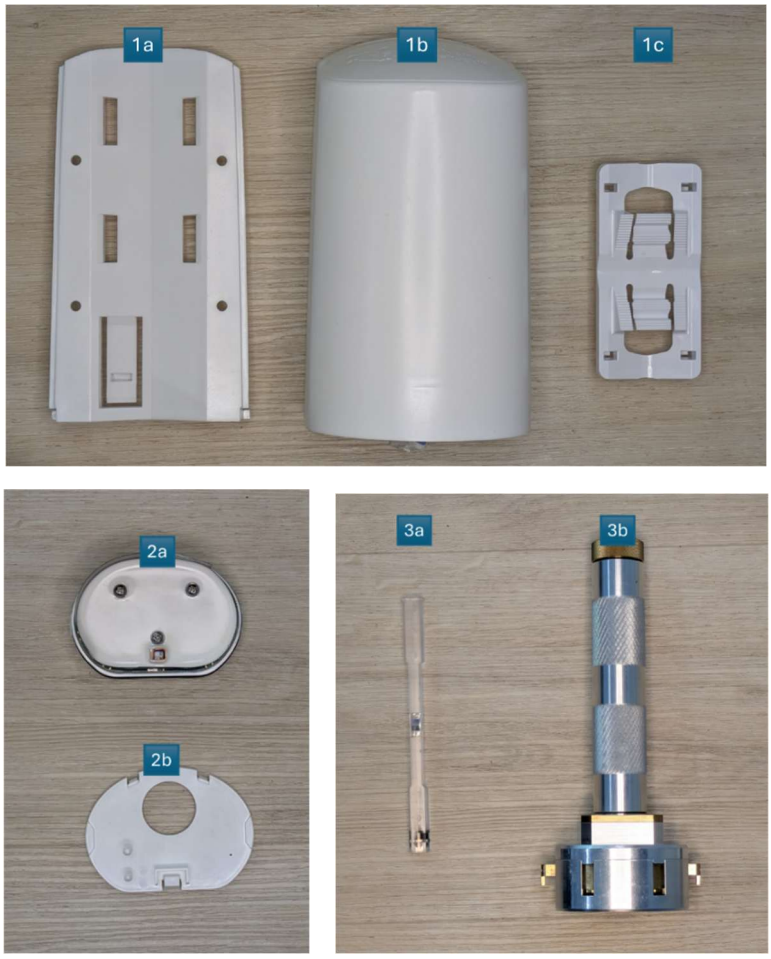
12. Install the ethernet cable into the **Gateway Ethernet PoE** socket by passing the ethernet cable through the cable gland supplied with the module.
    The cable gland grommet is designed to accept ethernet cables with a jacket diameter in the range of 4 to 6 mm.
13. Plug the cable into the modular jack on the module, then tighten the cable gland to the module with torque 6Nm.

14. Attach the ethernet cable to the pole using cable ties approximately every 30 cm (approximately 12 inches) all the way to ground level.
15. Terminate the ethernet cable into the PoE Solar or PoE Mains device, whichever is applicable.
16. Check the gateway is powered by verifying that the green light is solid or flashing inside the SIM port on the underside of the gateway.



17. Communications to the gateway must be verified via the FIT tool and / or Customer Support at NevadaNano. **THIS MUST BE COMPLETED BEFORE CONTINUING**
18. Record the GPS location of the gateway using RTK GPS receiver and App.
    And/or use the FIT tool and / or other suitable method to record, scan the bar code / record the serial number:

3.5 Endpoint: General Layout, Subassemblies, Accessories, and Tools



Item 1b is the Power Module. The Power Module is typically shipped with the vertical mounting bracket (1a) inserted into the slot in the back.

Item 1c is the adapter bracket for horizontal installations.

Item 2a is the Radio & Sensor Module; it is shipped with the Lid (2b) for the Radio & Sensor Module.

Item 3a is the Magnetic Wand tool that fits within a keyed portion of the bottom of the Radio & Sensor Module (2a) to power the assembled endpoint on and off.

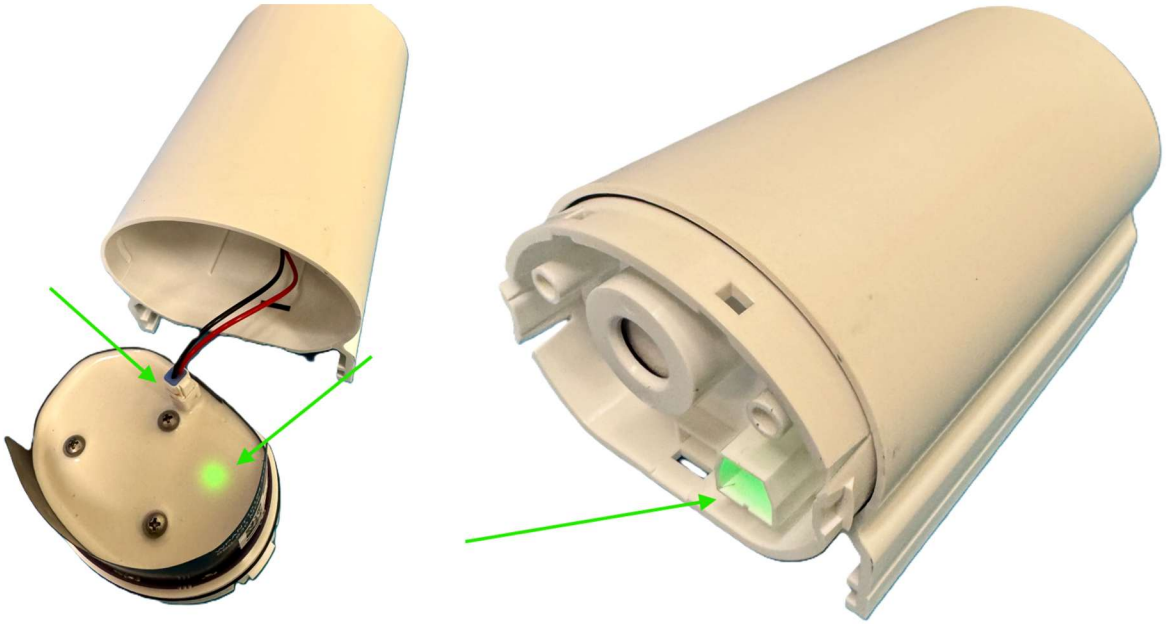
Item 3b is the Extraction Tool, to allow easy removal for the Radio & Sensor Module from the Power Module, if required.

3.6 Endpoint: Connecting the Radio & Sensor Module with the Power Module

WARNING

THESE STEPS ARE TO BE PERFORMED IN A CONTROLLED ENVIRONMENT THAT IS KNOWN TO NOT BE EXPLOSIVE.

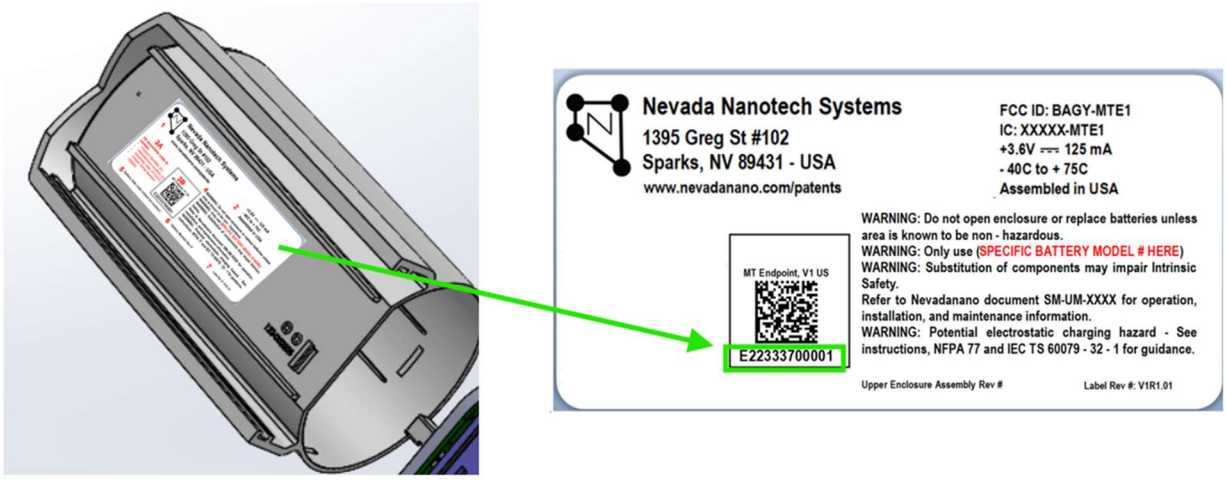
1. Connect the cable from Power module (1b) to the keyed receptacle on the Radio & Sensor Module (RSM) module (2a). Ensure that the connector is fully mated by firmly pressing the Power connector into the connector on the RSM.
2. The RSM will power up, and a green light will illuminate and flash on the RSM, visible underneath and from the top of the RSM.



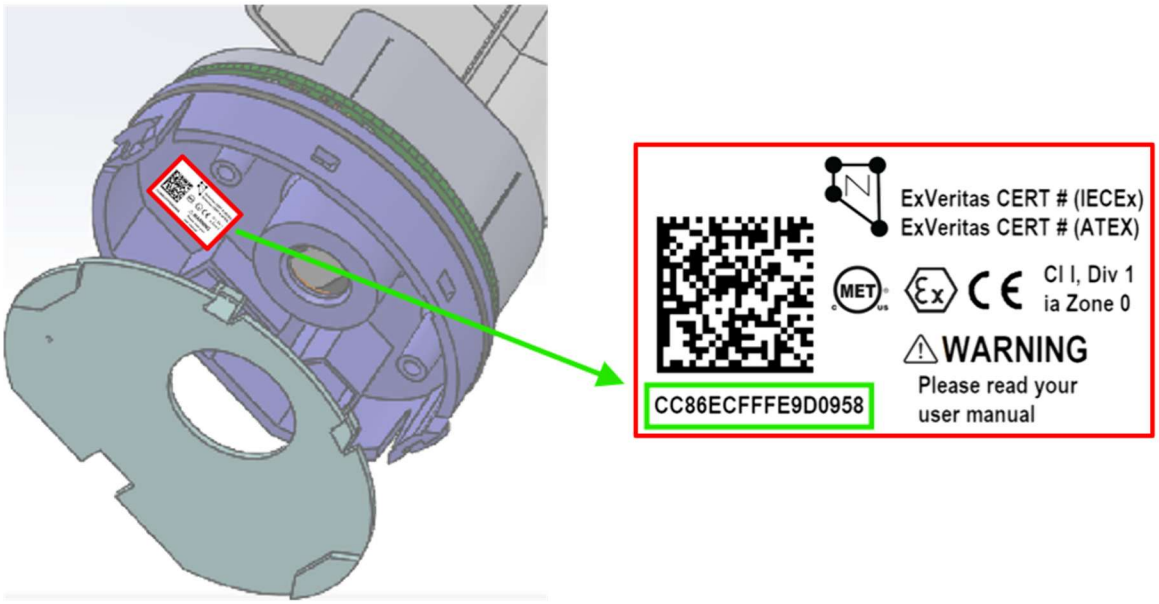
Wait for the endpoint to complete the 'startup sequence'. This typically takes up to 2 minutes and at the end the green light will turn off, verifying the 'startup sequence' was successful and the endpoint is connected to the MethaneTrack™ cloud.

NOTE : if after 2 minutes the light continues to flash green every 5 seconds, the endpoint cannot successfully communicate to the MethaneTrack™ cloud. This is typically because the gateway is not powered, so verify that the gateway is powered and online. If the gateway is verified as connected and online to the MethaneTrack™, power cycle the endpoint (OFF then ON) (see section 2.12 Endpoint : Using the Magnetic Wand to turn the endpoint ON and OFF).

Using the FIT tool and / or record, scan the bar code / record the serial number on the back of the Power Module and on the bottom of the RSM, shown in the Figures below.

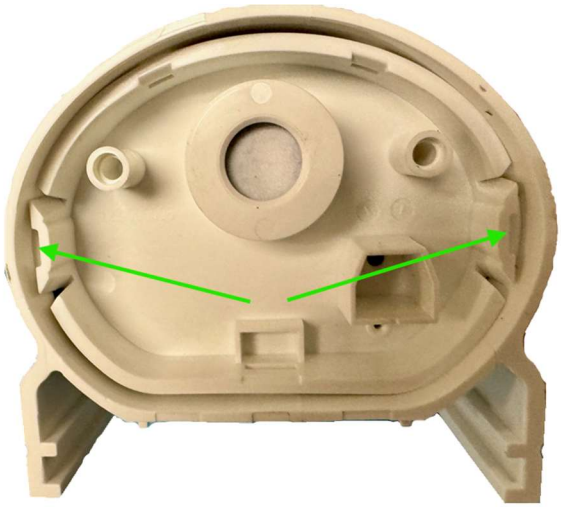


On the bottom of the Radio & Sensor Module.

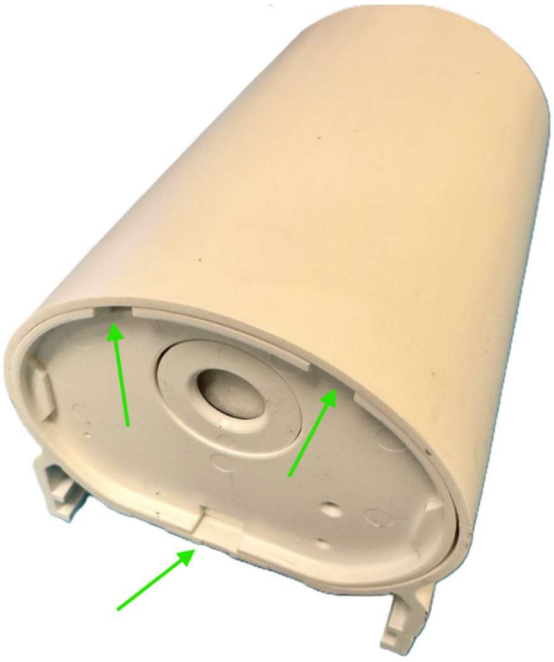


3. Ensure that the O-ring is firmly in place in the O-ring slot around the RSM.

4. Push the RSM (2a) into the Power module (1) until it clicks into place on both sides.
   You will hear two clicks verifying the RSM is installed connecting inside the Power module.



5. Fit the lid (2b) to endpoint the base of the endpoint. Ensure the lid is clicked into place on the 3 tabs.

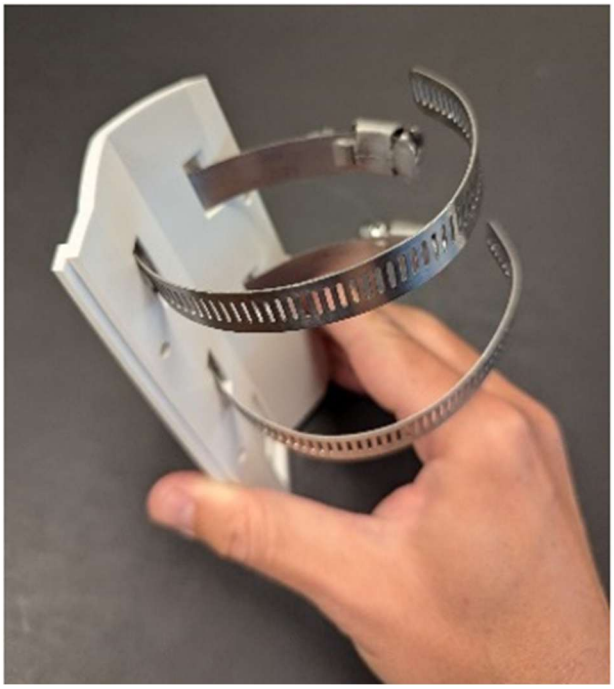


6. The endpoint is ready to be installed.

3.7 Endpoint: Installation

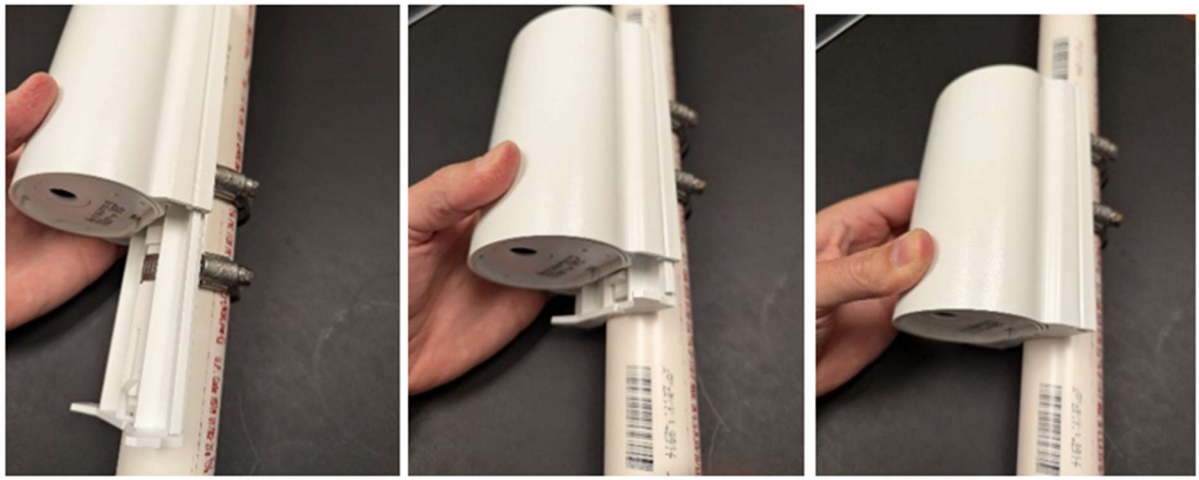
Installation of the Endpoint

1. Locate the mounting post/pole/surface for the endpoint, which has been designated by the site.
2. Fit two hose clamps to the endpoint bracket. The bracket shown below is for vertical mounting.



A supplementary horizontal adapter can be supplied for fitting horizontal piping, etc.
To install the horizontal adapter, snap the horizontal adapter into endpoint bracket.
Install one hose clamp

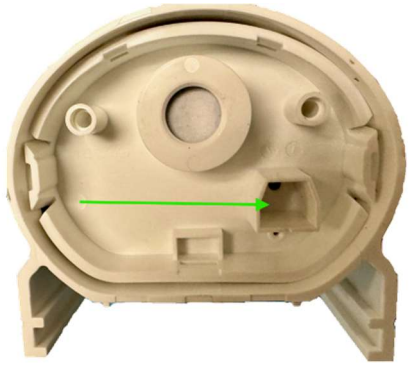
3. Mount the bracket to a vertical or horizontal post and tighten the hose clamp(s) in place
4. With the bracket installed, the fully assembled endpoint can be slid down onto the bracket until it 'clicks' into place.



5. Communications to the endpoint(s) to be verified via the FIT tool and / or Customer Support at NevadaNano.
6. Measure the height of endpoint from ground level with a tape measure
7. Record the GPS location of the endpoint(s) using RTK GPS receiver and App. Add the endpoint, serial number, GPS location and height to the as-built plan.

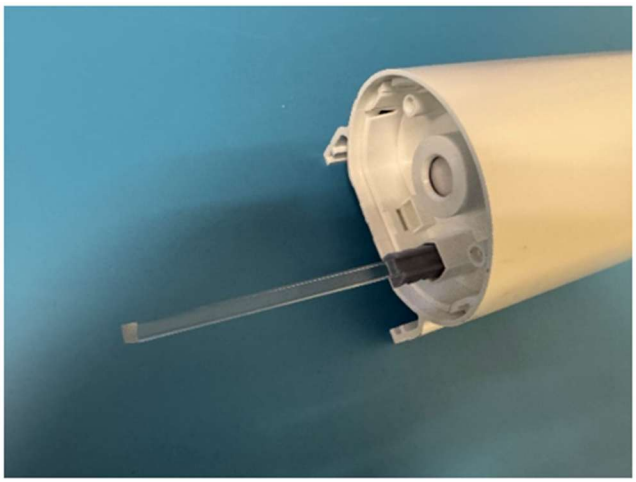
3.8 Endpoint: Using the Magnetic Wand to turn the endpoint ON and OFF

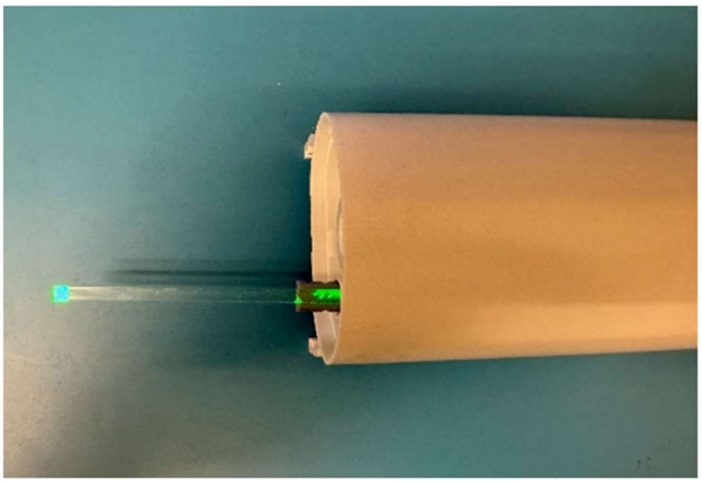
The Magnetic Tool is used to turn the endpoint on and off. The magnetic tool fits within a trapezoidal slot on the bottom of the endpoint.



Powering on the endpoint

1. Remove the lid from the base of the endpoint using a small flat bladed screwdriver.
2. Insert the magnetic tool into the slot and hold it for approximately 1-3 seconds. An internal green LED will activate and blink down the length of the magnetic tool.
3. Remove the magnetic tool within 10 seconds of seeing the blinking green LED light.
4. Wait until unit for the V1 to complete the 'startup sequence'. This typically takes up to 2 minutes and at the end the green light will stay off, verifying the 'startup sequence' was successful and the endpoint is connected via a power gateway to the MethaneTrack™ cloud.





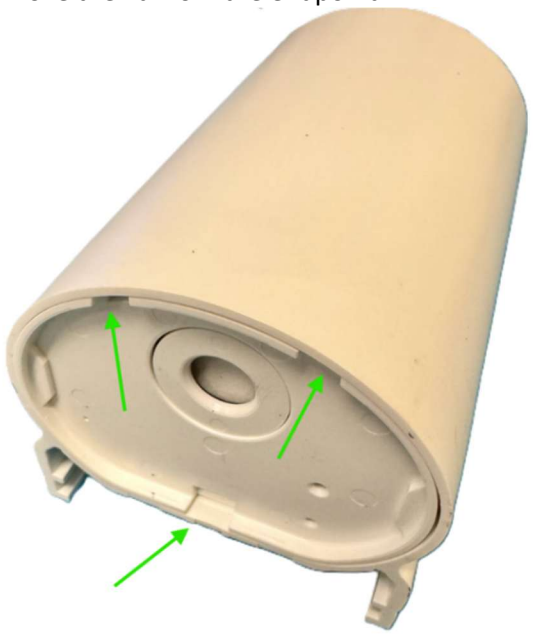
Powering off the endpoint

1. Inserting the magnetic tool into the slot and holding for approximately 10 seconds. An internal green LED will activate, shine down the length of the magnetic tool, and remain on for the remainder of the 10 seconds.
2. Once the steady green LED is off, remove the magnetic tool.
3. The endpoint is now powered off.

3.9 Power module (Battery) replacement: Decoupling the Radio & Sensor Module from the Power Module

1. Remove the endpoint from the mounting bracket by inserting a small screwdriver or other tool into the slot on the bottom of the installed endpoint, depress the latching feature, and slide the endpoint up on the bracket.


2. Remove the lid from the endpoint.




3. Separate the Radio & Sensor Module from the Power Module by depressing the two tabs on the Radio & Sensor Module. This can be done with traditional hand tools (left below) or with the Extraction Tool (right below) supplied by NevadaNano. Both options are shown.

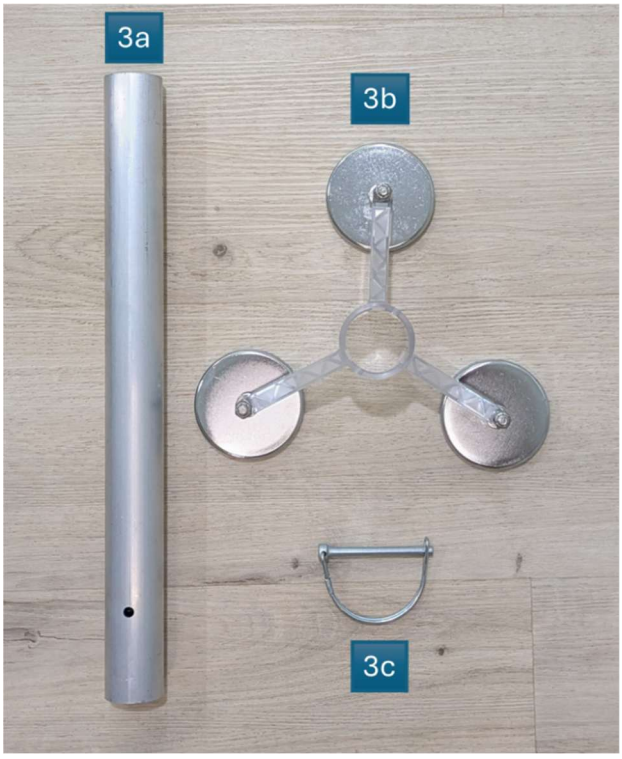
4. With two the two modules disengaged, remove the keyed power module cable from the connector fitting on the Radio & Sensor Module.

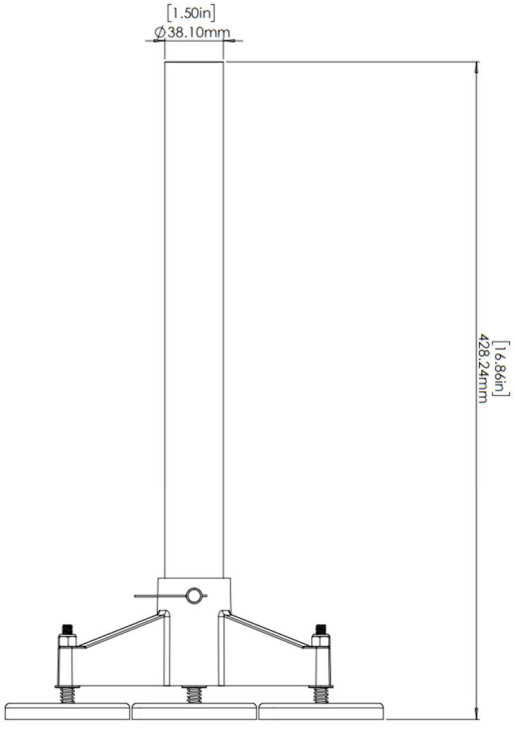
5. With the Power Module connector disconnected, a replacement Power Module can be connected to the Radio & Sensor Module.
   Follow the steps in *3.6 Endpoint: Connecting the Radio & Sensor Module with the Power Module* to re-assemble the endpoint

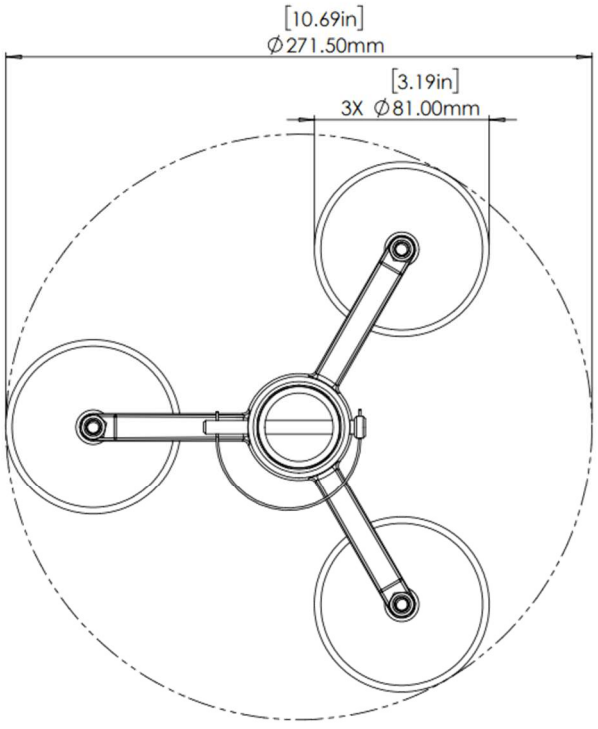
3.10 Endpoint: Magnetic Mount

The Magnetic Mount kit contains the following components:

- Item 3a is the Mount Post.
- Item 3b is the Mount Base.
- Item 3c is the Quick Release Safety Pin.



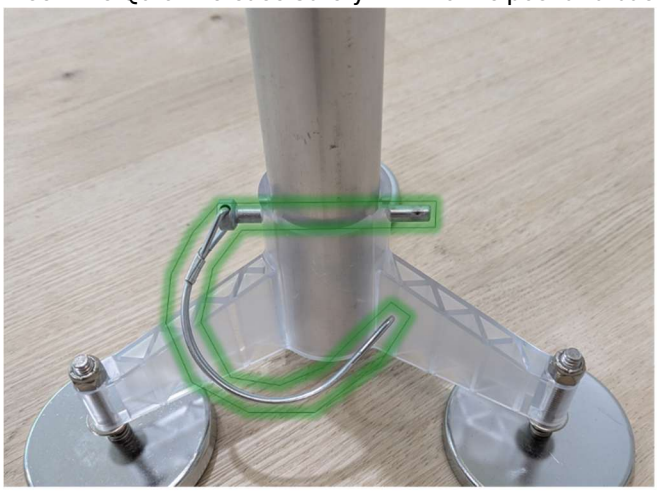


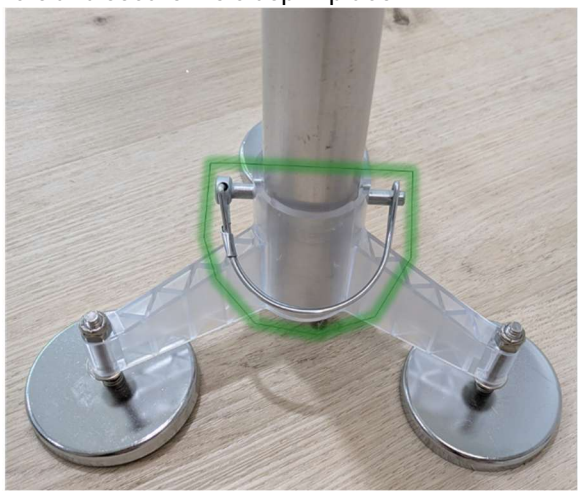


Assembly of the Magnetic Mount

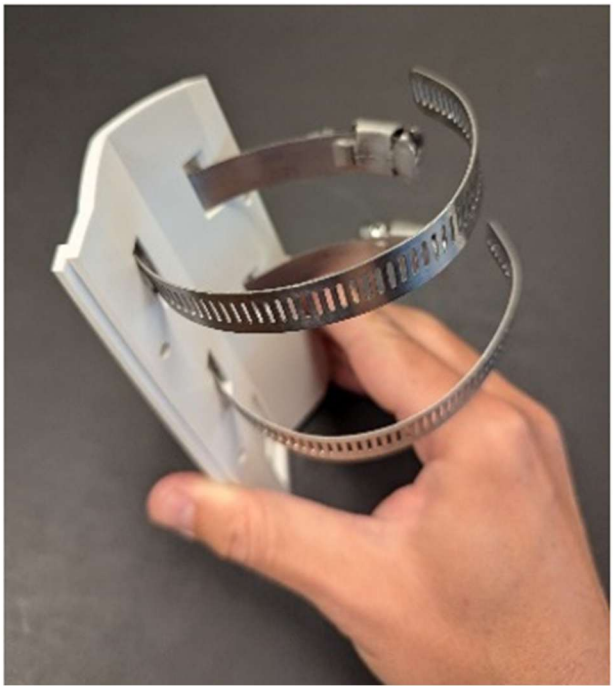
1. Insert the Mount Post into the Mount Base so that the Mount Post and Mount holes align.

2. Insert the Quick Release Safety Pin into the post and base hole and secure the clasp in place.





3. Fit two hose clamps to the endpoint bracket. The bracket shown below is for vertical mounting.



4. Secure endpoint bracket to the post, ensuring the bracket is located at the top of the post.

5. With the bracket installed, the fully assembled endpoint can be slid down onto the bracket until it 'clicks' into place.

6. The endpoint can be installed.

3.11 Installation of the LoRa Anemometer

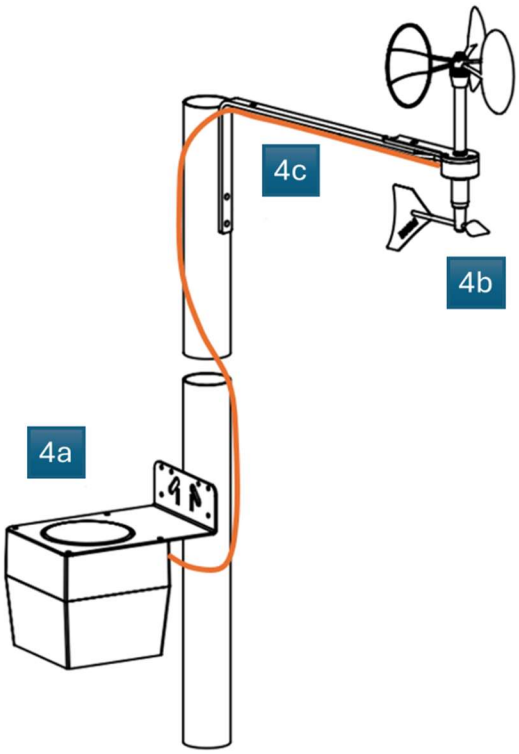
WARNING

THIS EQUIPMENT MUST BE INSTALLED IN AN ENVIRONMENT THAT IS KNOWN TO NOT BE EXPLOSIVE.

The anemometer offers simple construction, mounting, and simple electronics with integrated lightning protection for high levels of reliability. Its compact body size increases anemometer accuracy and reduces snow buildup for high data availability in winter.

The Anemometer kit contains the following components:

- Item 4a is the LoRa Wireless Transmitter
- Item 4b is the Anemometer, Wind Direction Vane, and 5-meter wire
- Item 4c is the L-Mounting Bracket
- Item 4d is the L-Bracket Nuts and Lock Washers

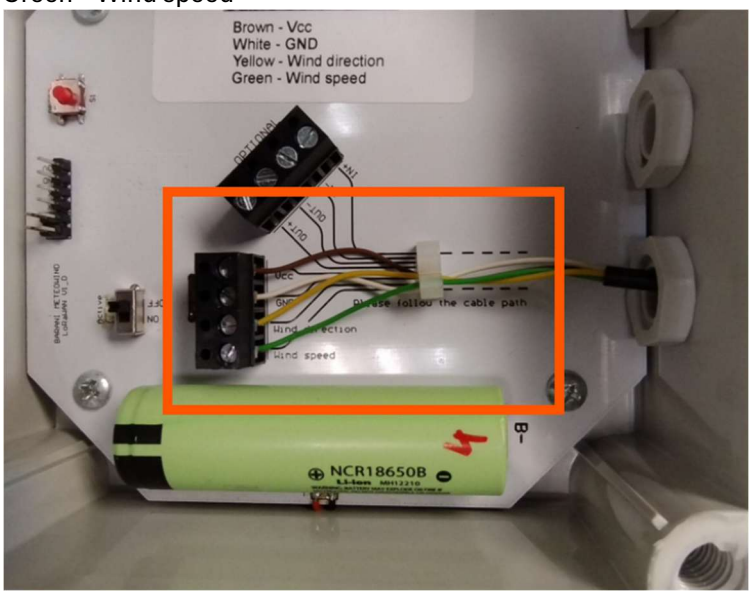


Locate post/pole which has been designated by the site. Ensure the location is away from buildings, trees and other large structures that could affect the wind.

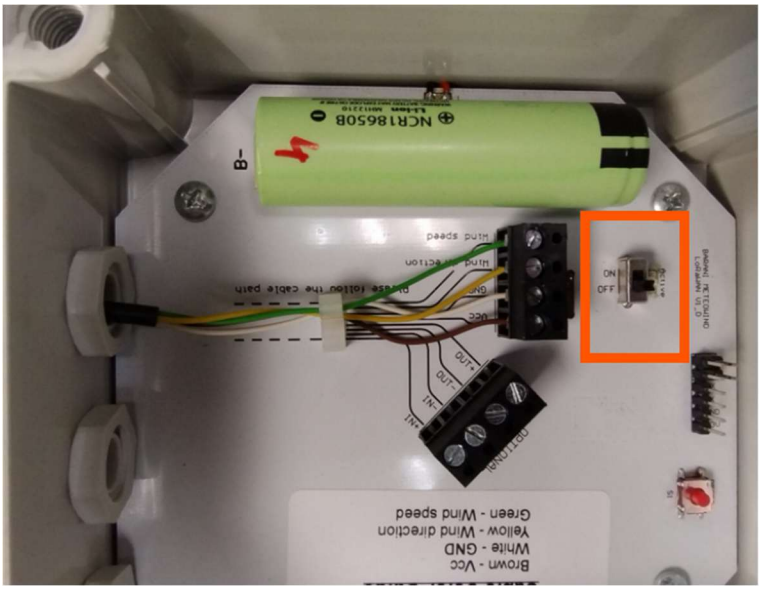
1. Secure the anemometer on the L-bracket with two screws and lock washers.
2. Mount the L-bracket and anemometer onto the post with two hose clamps. This should be approximately 5 to 7 feet above ground level.

3. With the use of a compass, mobile phone or other device ensure the anemometer is pointing True North, using the Magnetic Declination offset.
   To find True North for your location you will require your GPS location and access to the https://www.ngdc.noaa.gov/geomag/calculators/magcalc.shtml
   This will give you your Magnetic Declination offset for your location.
   The method for achieving this with a compass is using the Magnetic Declination offset. While holding the compass flat and away from metal and magnetic material, rotate the compass until the N arrow lines up with Magnetic Declination Offset. Then align the Anemometer to the N indicator on your compass.
4. Mount the wireless transmitter box L-bracket below the anemometer to make easily accessibility, while staying within reach of the supplied 5-meter connection wire to the anemometer.
   Make sure it is pointing generally Southward to keep the solar panel in the sun. This will be secured with hose clamps.

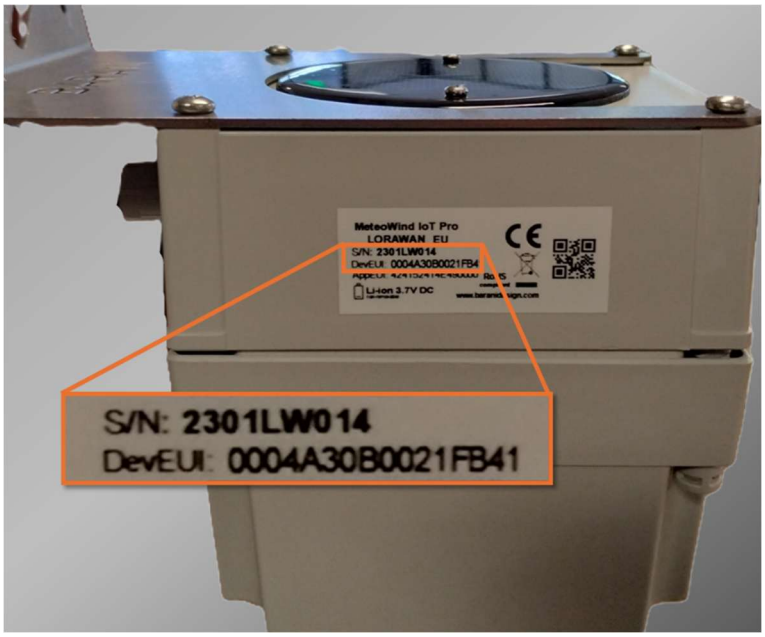
5. If the cable is not wired into the anemometer transmission box, remove the transmission box base using the 4 screws. Connect the 4 cables strands as per the diagram below, using a terminal screwdriver.
   The colors and connections are as follows and clearly labelled:
   Brown – Vcc
   White – GND
   Yellow – Wind direction
   Green – Wind speed



6. To turn ON, slide the dip switch to the ON position. ON state will be confirmed by multiple short red blinks of the LED light. The wind sensor is now active, measuring and logging. You will not see any additional blinks of the LED.



7. Refit the transmission box and tighter the 4 screws
8. With cable ties secure the 5-metre wire along the L-bracket and mounting structure every 30 cm.
9. Communications to the anemometer to be verified via the FIT tool or Customer Support at NevadaNano. **THIS MUST BE COMPLETED BEFORE CONTINUING**
10. Measure height of anemometer from ground level with a tape measure.
8. Record the GPS location, S/N and DevEUI of the anemometer (s) using RTK GPS receiver and App. And/or use the FIT tool or other suitable method to record, scan the bar code / record the serial number:



11. Add the anemometer details to the as-built plan.

3.12 Use of the FIT tool for completing the As-built site

WARNING

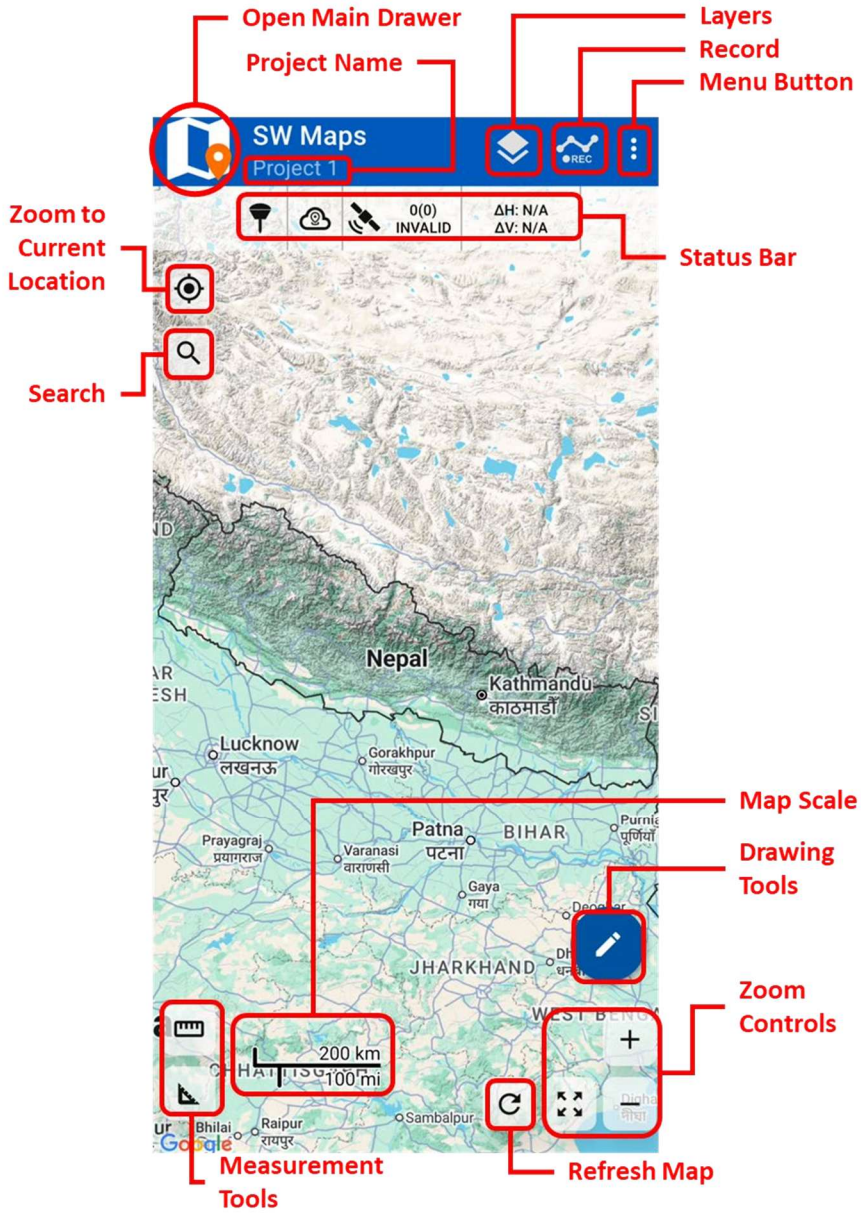
THIS EQUIPMENT (GPS DEVICE AND ANDROID/APPLE PHONE/TABLET) IS NON-EX RATED. THESE STEPS ARE TO BE PERFORMED IN A CONTROLLED ENVIRONMENT THAT IS KNOWN TO NOT BE EXPLOSIVE.

THE FOLLOWING INSTRUCTIONS ARE BASED ON THE ANDROID VERSION OF SW MAPS. THE INSTRUCTION MAY DIFFER SLIGHTLY ON APPLE AND ALSO DUE TO SUBSEQUENT UPDATES RELEASED BY SW MAPS.

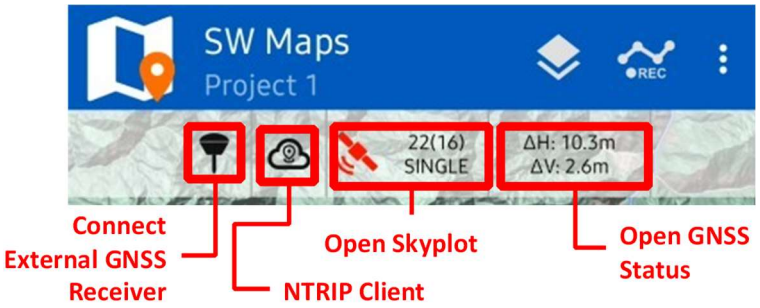
Before commencing ensure your Android/Apple phone or tablet is installed with the SW Maps app.
Android : https://play.google.com/store/apps/details?id=np.com.softwel.swmaps
Apple : https://apps.apple.com/us/app/sw-maps/id6444248083

1. Power on the **GPS device** and ensure the GPS unit has a good signal response.
   We would recommend 2-3 minutes initially with a horizontal accuracy resolution of less than 30cm, if possible.
2. Power on the phone or tablet.
3. Open the GPS app: **SW Maps**

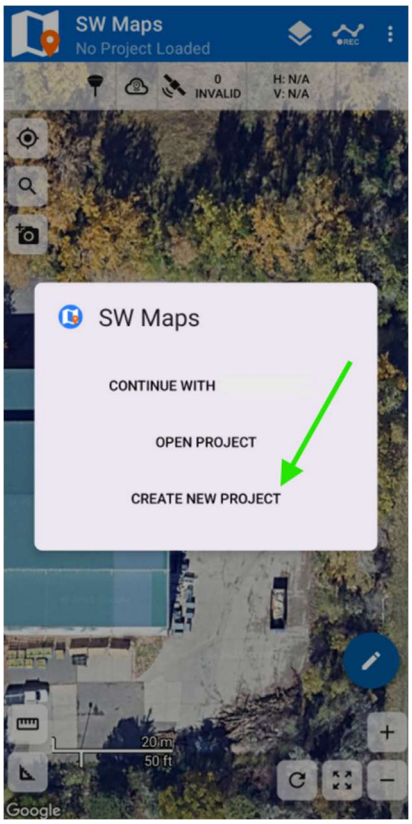
4. The SW Maps user interface has the following components.



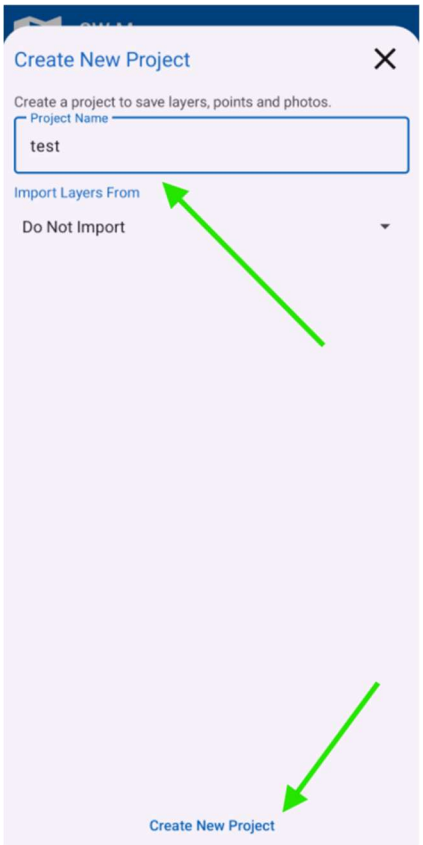
And Status Bar



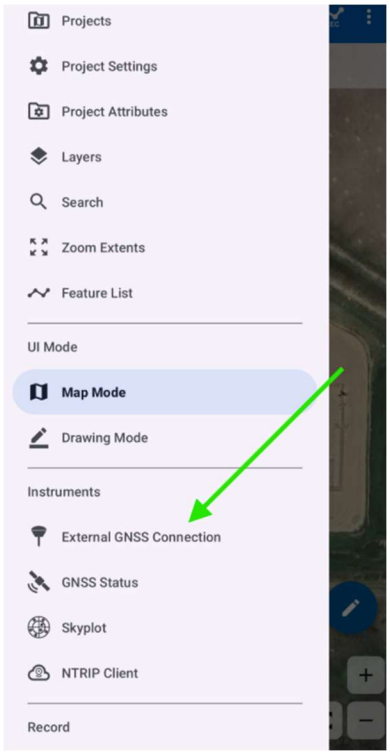
5. When prompted select **OPEN PROJECT** followed by **CREATE NEW PROJECT,** to create a new project for the site you are on.



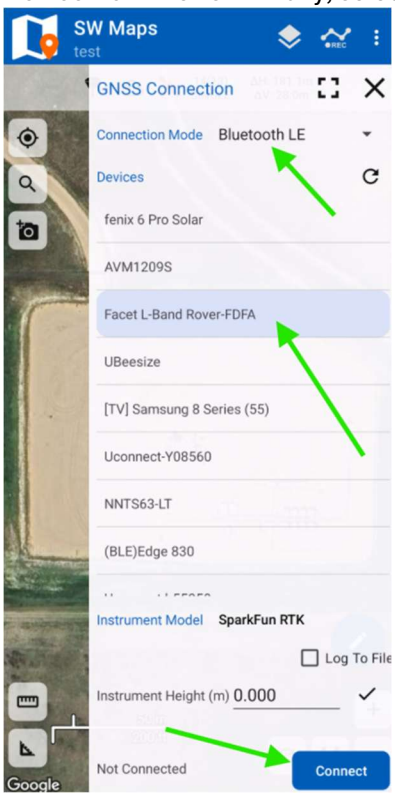
6. Add the **site reference / name** under the **Project Name** field and select **Create New Project.**



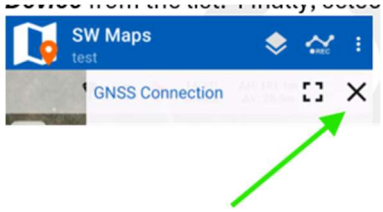
7. To connect to your external GPS device, select the **SW Maps** logo top left, followed by the **External GNSS Connection** option from the drop-down menu, or the **Connect External GNSS Receiver icon** on the main page.



8. On the GNSS Connection page ensure **Connection Mode** is **Bluetooth LE**. Select from the **Devices** the ***GPS Device*** from the list. Finally, select **Connect**.

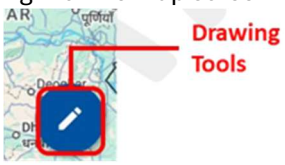


9. You can then close the **GNSS Connection** screen by selecting the cross at the top right.



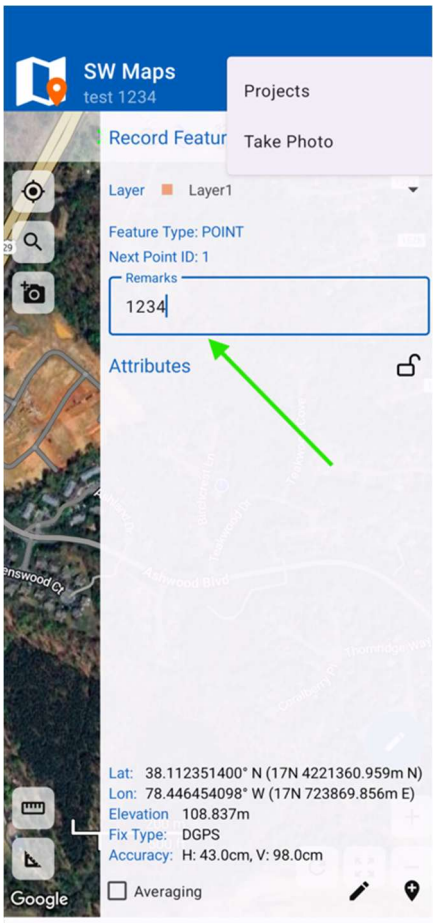
10. Place the **GPS device** on top/besides the associated MethaneTrack™ device i.e. endpoint, anemometer and gateway, and wait 60 seconds for GPS device location to be less than 30 cm horizontal accuracy.
11. Select the **Zoom to Current Location** icon on the top left, to center the map screen to the GPS device.

12. To record the GPS details for a MethaneTrack™ device, select the **Drawing Tools** (**Pencil)** icon at the bottom right of the map screen.



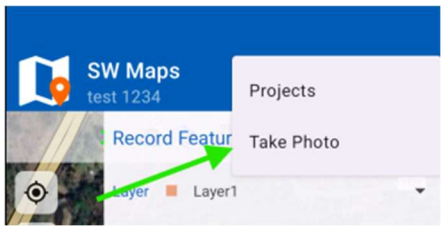
13. If you are prompted with the **Draw Feature** warning, select **YES** followed by **ADD** to create a new layer.
14. Select the **Drawing Tools** (**Pencil)** icon at the bottom right of the map screen again, and a menu will appear. Select **Record Using GPS.**

15. Under the **Remarks** field, add in the last 5 letters/number of the endpoint ID, gateway ID or anemometer ID depending on the equipment you are GPS tagging.



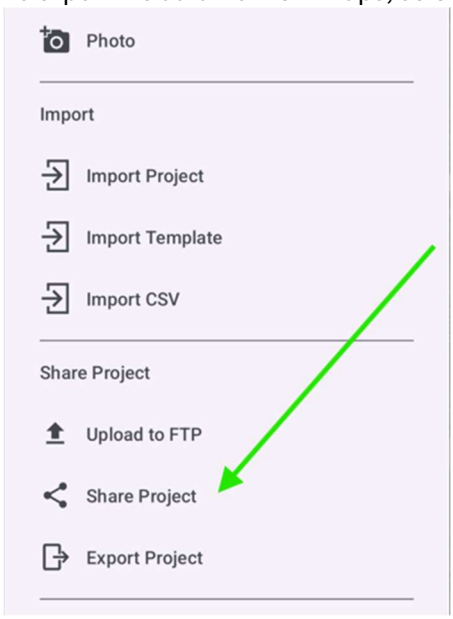
16. To save the GPS location and equipment name/ID, select the **Pin** icon on the bottom right. This will save the details.

17. To take a photo of the equipment, select the **3 horizontal dots** at the top right of the screen, and select **Take Photo** from menu.

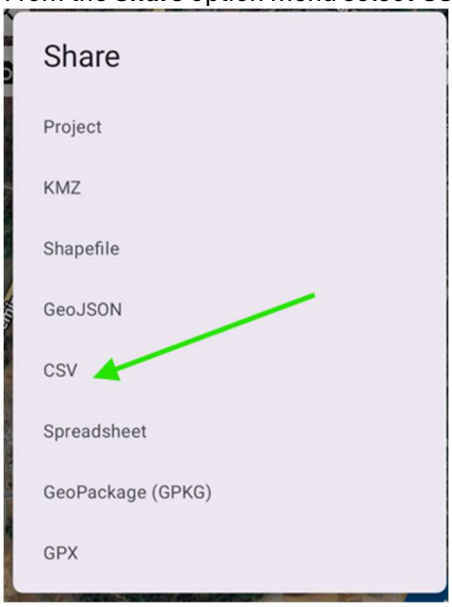


18. Use the **Take Photo Remarks** the last 5 letters/number of the endpoint ID, gateway ID or anemometer ID depending on the equipment you are GPS tagging. Select the **Save**

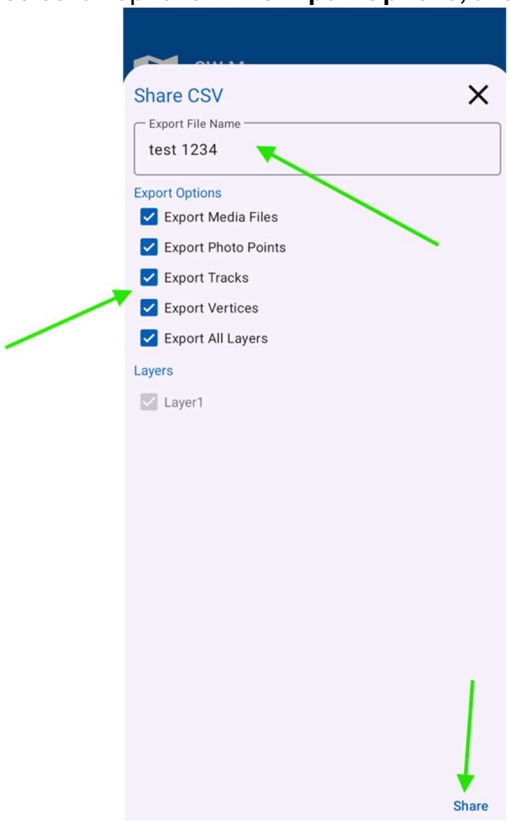
19. Repeat steps 14 to 18 for all endpoints(s), gateway(s) and anemometer(s) installed at the site.
20. To export the data from SW Maps, select the **SW Maps** icon and from the menu the **Share Project.**



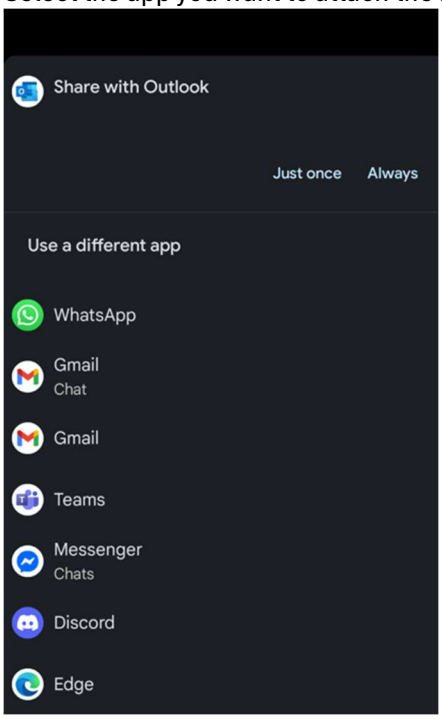
21. From the **Share** option menu select **CSV.**



22. From the **Share CSV** page, give the file a name i.e. site name/site reference in the **Export File Name** field, select all options in **the Export Options**, and finally select **Share.**



23. Select the app you want to attach the file to and send to your MethaneTrack™ coordinator.



3.13 Final Onsite System Check and Customer Approval

1. Contact the MethaneTrack™ Customer Support team at NevadaNano to ensure all equipment is communicating with the cloud, prior to departure.
   Please have the following information available
   i. Customer Name
   ii. Site Name
   iii. Installer Name
   iv. Installer Company
   v. Installer mobile number
   vi. Total number of endpoints, gateways and anemometers installed at the site
   vii. The last 5 digits of each endpoint SNR ID and its associated Power Module ID
   viii. Anemometer(s) ID
   ix. Gateway(s) ID
2. The MethaneTrack™ Customer Support team will verify that all hardware is communicating correctly
   i. If there are any issues, the MethaneTrack™ Customer Support team will identify the problem.
   ii. The onsite installer will correct any issues.
3. Installer to obtain customer sign-off on the as-built diagram, verifying that the installation has been completed as planned and to their satisfaction.
4. Upload the As-built site information to the cloud with customer signature if connectivity is sufficient. This step may be completed when back at the office.

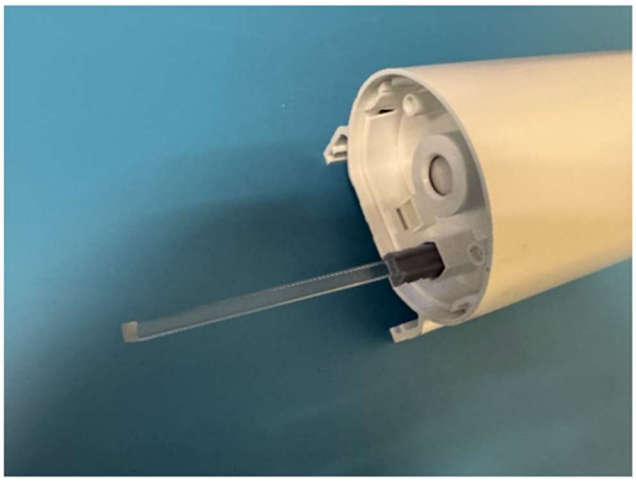
5. Trouble Shooting Guide

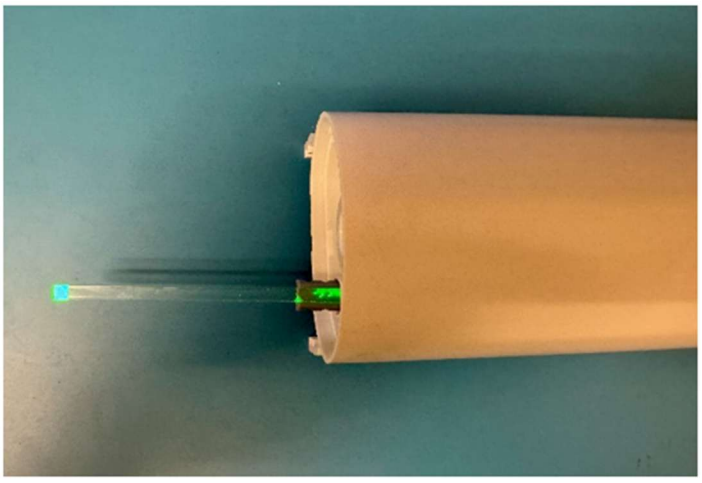
4.1 Endpoint

The endpoint is not connected or has lost connection to the MethaneTrack™ server. How to turn ON and OFF the endpoint and activate its LoRaWAN join requests

Powering off the endpoint

1. Inserting the magnetic tool into the slot and holding for approximately 10 seconds. An internal green LED will activate, shine down the length of the magnetic tool, and remain on for the remainder of the 10 seconds.
2. One the steady green LED is off, remove the magnetic tool.
3. The endpoint is now power off.





Powering on the endpoint

1. Remove the lid from the base of the endpoint using a small flat bladed screwdriver.
2. Insert the magnetic tool into the slot and hold it for approximately 1-3 seconds. An internal green LED will activate and blink down the length of the magnetic tool.
3. Remove the magnetic tool within 10 seconds of seeing the blinking green LED light.
4. Wait until unit for the V1 to complete the 'startup sequence'. This typically takes up to 2 minutes and at the end the green light will stay off, verifying the 'startup sequence' was successful and the endpoint is connected via a power gateway to the MethaneTrack™ cloud.

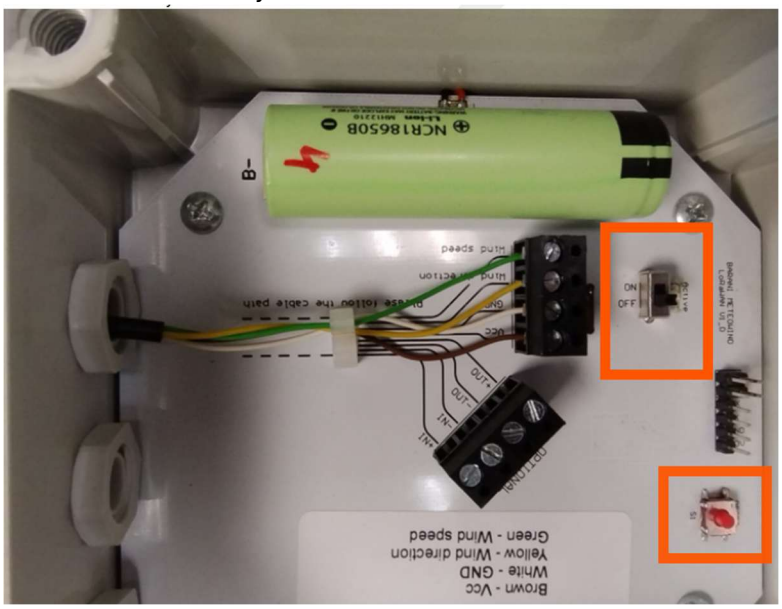
4.2 LoRa Anemometer

The Anemometer is not connected or has lost connection to the MethaneTrack™ server. How to turn ON and OFF the MeteoWind wireless wind sensor and how to RESET and activate its LoRaWAN join requests?

- A red reset button and an ON/OFF switch is located inside the MeteoWind IoT Pro transmitter box along with a red LED light next to the ON/OFF switch to confirm user inputs.

LoRaWAN RESET procedure to activate join requests

- Turn OFF the device by sliding the dip switch to the OFF position.
- Press and hold the red RESET button while simultaneously sliding the dip switch to the ON position.
- Confirmation of the LoRaWAN RESET will be multiple successive red blinks lasting about 5 seconds, which is about twice as many blinks as when the device is turned ON without reset.



MeteoWind IoT activation guide Turn ON / OFF / ACTIVATE LoRaWAN JOIN https://youtu.be/EulCmqFt29c?t=185

4.3 Lora Cellular Gateway

KONA Enterprise LED States

LED State	Functional Description	Action Required
No LED	No power to gateway.	Apply power to gateway. If the condition persists, contact customer support.
Solid Green	Gateway is operational with a packet forwarder running. LoRaWAN packet transmission and reception functions are operating normally.	No action required: Gateway is in stable state.
Flashing Green	Module is initializing.	Typical boot time is <2 minutes, but may take up to 15 in case of software upgrade.
	No downlink packets have been transmitted by the gateway in the last 10 minutes.	If after 15 minutes LED still flashing green, power up a sensor near gateway to initiate a Join Request. LED will transition to solid green when it transmits Network Server's Join Accept message.
	GPS unlocked for more than 24 hours.	If the Gateway has been powered up for over 24 hours and normal LoRaWAN traffic is present, check GPS antenna connection and make sure it has a clear view of the sky.
Solid Red	Unit is in fault condition and requires service	Undesired state. Power cycle the gateway. If the condition persists, contact customer support.

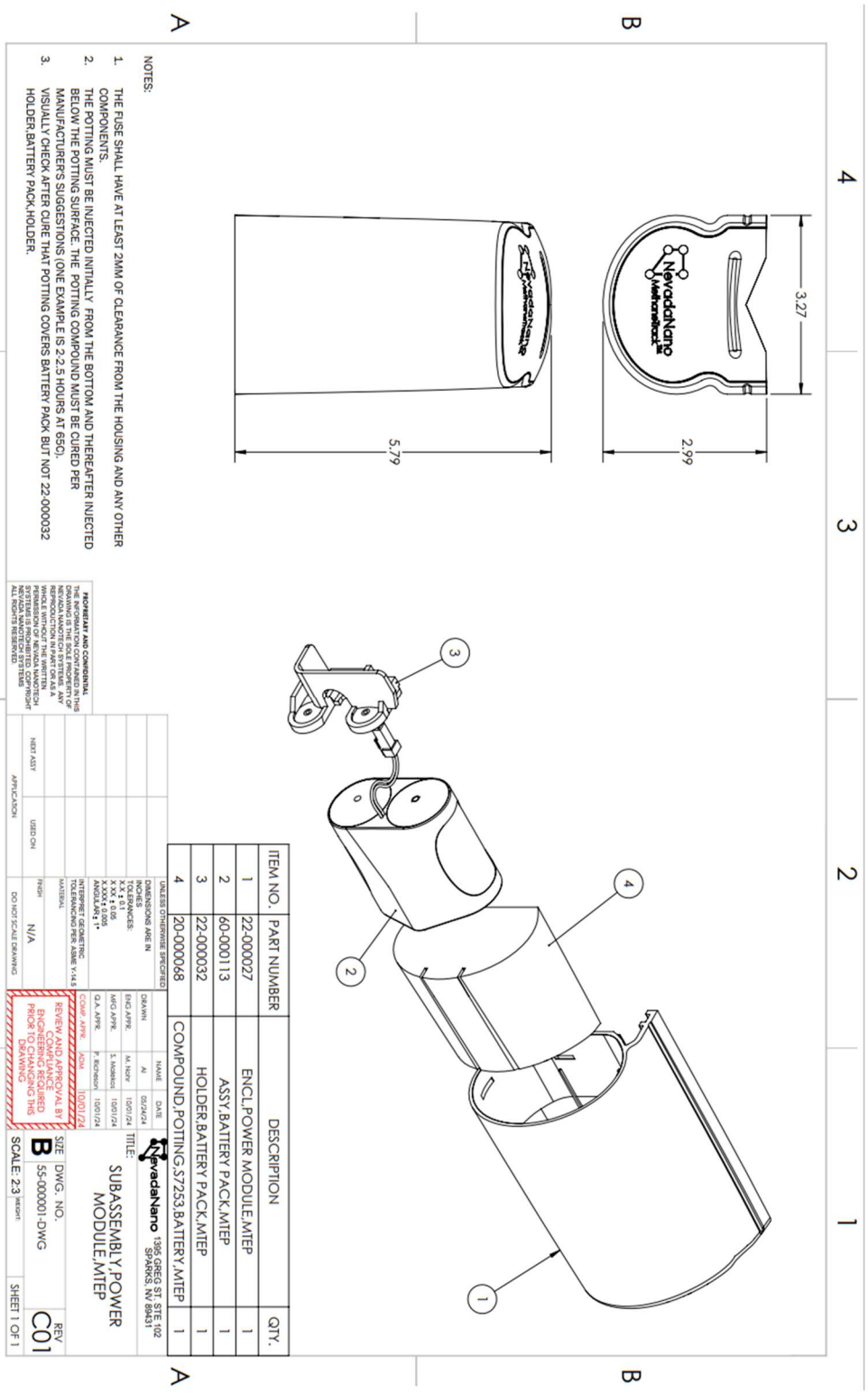
https://knowledgehub.tektelic.com/troubleshooting-kona-gateway-cellular-backhaul

If you are having issues getting your Kona gateway to connect to your SIM card's cellular provider, please see below for our general troubleshooting recommendations:

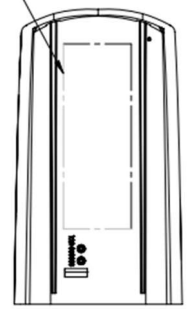
- **For starters, please check the following before moving onto the next troubleshooting steps:**
  - Has the SIM Card been inserted into the gateway?
  - Is the SIM Card you have installed "Active" and being provided service by your cellular provider? Please check with your cellular provider to ensure the SIM card has service.
  - Does your SIM card require any additional firmware to be installed? (i.e. Verizon, AT&T)
  - Is your gateway located in a place with good Cellular coverage?
- **Has the APN for the SIM card been correctly entered correctly**

6. Schematics / Layouts

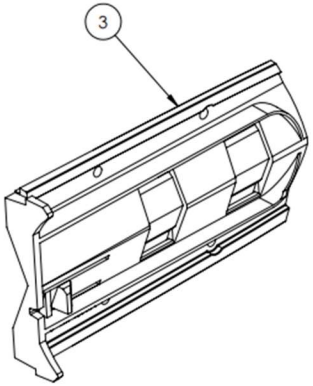
Representative sample of the mechanical drawings for select components. Drawings are subject to change without notice.

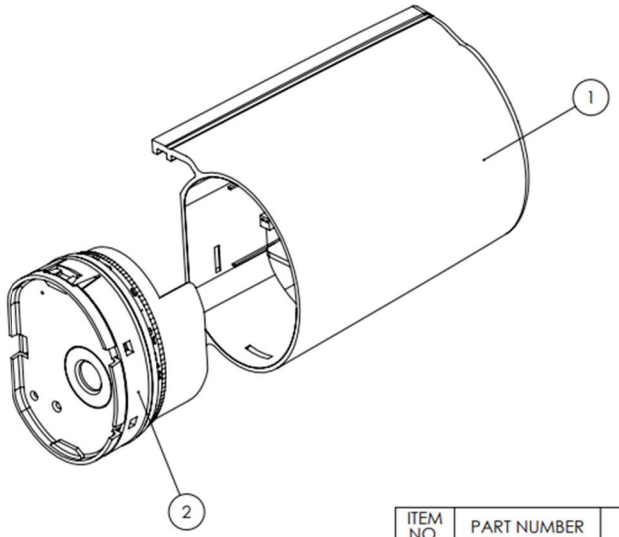


RESERVE LOCATION FOR ADHESION LABEL REFER TO DOC. 55-000001-DWG - V1EP POWER MODULE LABEL.



WALL BRACKET NOT SHOWN





ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	55-000001	SUBASSEMBLY,POWER MODULE,MTEP	1
2	53-000022	SUBASSEMBLY,RADIO AND SENSOR MODULE,MTEP	1
3	21-000006	BRACKET,WALL,MTEP	1

NOTES:
1. ALL DIMENSIONS APPLY AFTER FINISHING, PLATING AND HEAT TREATING.
2. BREAK ALL SHARP EDGES .03 - .13mm MAX.
3. DIMENSIONS LOCATING TRUE POSITION ARE BASIC.
4. ALL UNDIMENSIONED FEATURES ARE TO BE DEFINED BY CAD FILE AS SUPPLIED BY CUSTOMER TO PROFILE TOLERANCE OF 0.5mm, ⌓ 0.5 | A | B | C |.

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES (MM):
X.X ± 0.25
X.XX ± 0.10
X.XXX ± 0.050
ANGULAR ± 1°
INTERPRET GEOMETRIC TOLERANCING PER: ASME Y-14.5
MATERIAL: SEE NOTES
FINISH
NEXT ASSY | USED ON
APPLICATION | DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	AI	05/24/24
ENG APPR.	M. Nohr	10/01/24
MFG APPR.	S. Malekos	10/01/24
Q.A. APPR.	P. Richeson	10/01/24

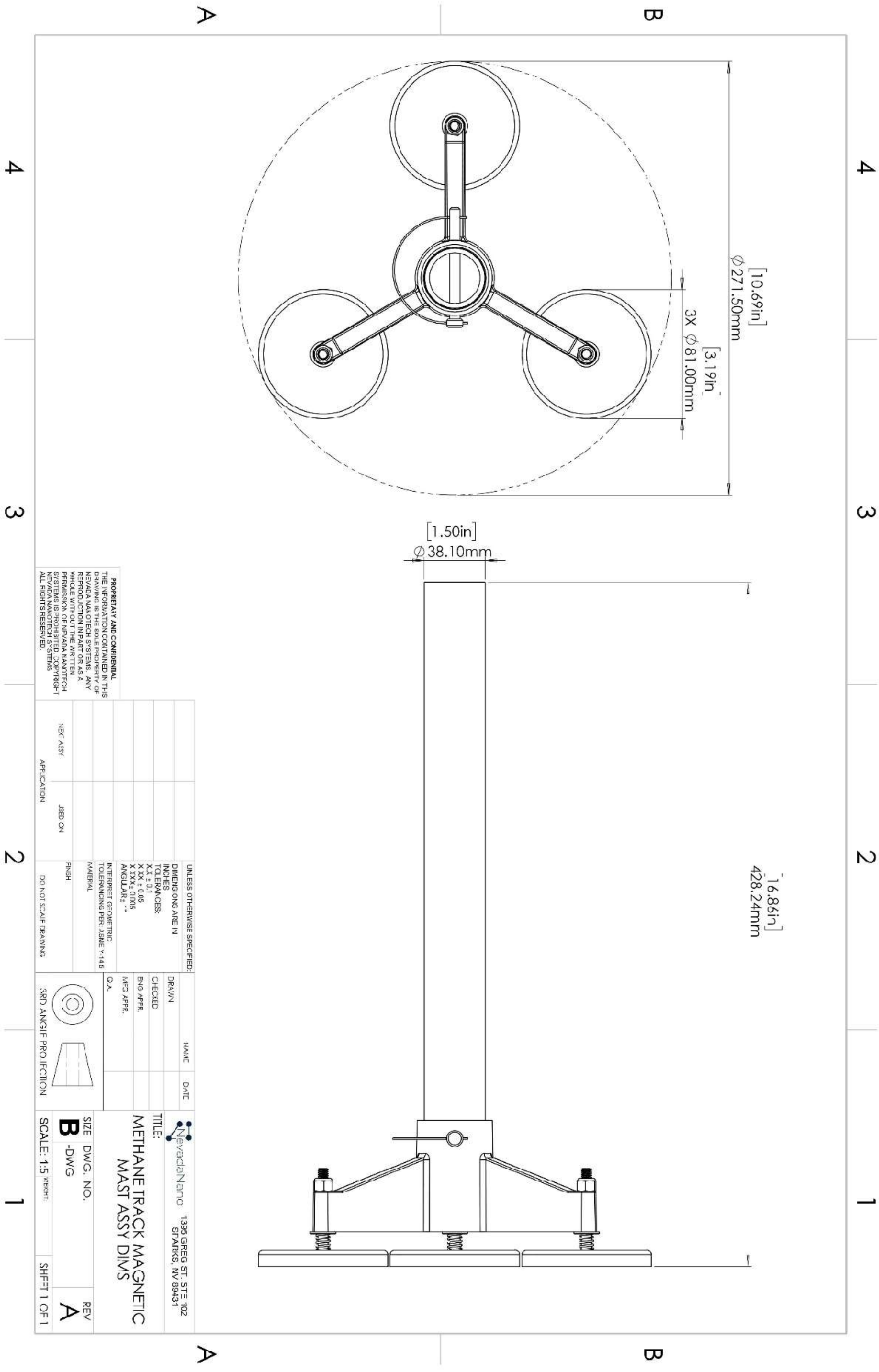
3RD ANGLE PROJECTION

NevadaNano 1395 GREG ST. STE 102 SPARKS, NV 89431

TITLE: ASSY,ENDPOINT,MTEP

SIZE B | DWG. NO. 60-000111-DWG | REV 01

SCALE: 2:3 | WEIGHT: GRAMS | SHEET 1 OF 1


[10.69in]
⌀271.50mm
3X ⌀81.00mm
[3.19in]
[1.50in]
⌀38.10mm
[16.86in]
428.24mm
NevadaNano
1395 GREG ST. STE 102
SPARKS, NV 89431
TITLE:
METHANE TRACK MAGNETIC
MAST ASSY DIMS
SIZE B
DWG. NO.
-DWG
REV A
SCALE: 1:5
SHEET 1 OF 1
3RD ANGLE PROJECTION

7. Contact Information

Global Support

Hours of Operation: Monday to Friday 8:00am USA eastern to 8:00pm USA eastern
Email: methanetracksupport@nevadanano.com

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