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Prediction with Precision

Field Services Installation Manual

Overview

This manual serves as a comprehensive roadmap for conducting site surveys and installing Nanoprecise condition monitoring sensors.

By integrating these sensors, organizations can shift from reactive to predictive maintenance, reducing unplanned downtime, extending equipment life, and improving overall operational efficiency.

The manual breaks down the essential steps and best practices required for a seamless and effective deployment of Nanoprecise hardware, from initial preparation and detailed on-site evaluations to installation procedures and final checks. Designed with field personnel in mind, it provides the critical insights and technical guidance needed to optimize sensor placement across diverse industrial environments.

By following the methodologies outlined in this guide, each installation is executed with precision, reliability, and full alignment with strategic maintenance objectives and Nanoprecise best practices.

For any additional questions, please reach out to customersuccess@nanoprecise.com.

Site Survey

The main outcomes from the site survey should be to:

- Obtain a general understanding of plant layout
- Build a rapport with onsite staff, whose cooperation will be instrumental during the installation.
- Obtain asset information, including equipment and machine information, equipment pictures, specific access and guarding requirements, and any other information that may be a barrier to installation.
- Understand the various mounting options to be utilized, on an asset-by-asset basis.
- Understand if there are specific temperature restrictions that will need to be accounted for, as well as any hazardous location considerations.
- Conduct a full and thorough connectivity assessment on an asset-by-asset basis, ensuring the proper identification and documentation of connectivity type, networking statistics, and the need for specific network boosting hardware to be considered.
- Compile a Bill of Materials (BOM) comprising of
  - Total sensor count
  - Model of sensor
  - Mounting hardware
  - Connectivity devices & hardware (cellular boosters, Wi-Fi gateways, antennas, cabling) from the on-site findings.

This allows the team to prepare and coordinate the proper materials to facilitate efficient sensor installation while on-site.

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Initial Preparations

- **Planning Site Visit Details**: It is important to formulate a plan for the site visit by collecting the following details:
  - The date and time of the visit.
  - Availability of a site map and site directions.
  - Contact details of the site manager and security personnel if available.
  - Any safety certification or orientation required to be completed, prior to site arrival and travel scheduling.

- **Site Access:**
  - Verify access requirements (badges, security clearance, etc.).
  - Confirm parking arrangements and unloading areas for equipment and tools if applicable.

- **Facility Layout:**
  - Review the layout of the facility prior to site arrival to understand facility breakdown by area, and to have a visual of sensor installation locations.
  - Identify and mark the locations of all machines that require sensors on the site map, if available.

Review Site Personal Protective Equipment (PPE) Requirements

Make sure to always review PPE requirements by site, as they may have specific PPE requirements or PPE ratings that may deviate from standard PPE.

Most sites require a combination of the following Standard PPE:

- Safety hardhat
- Safety glasses with side shields
- High-visibility vest or jacket
- CSA / ASTM / ANSI Approved steel-toe boots
- Gloves, preferably rated to ANSI A4 cut resistance.
- Hearing protection
- No jewelry.
- Long Hair/Beard should be retained or covered.

Some sites may require additional PPE, based on site-specific hazards:

- Respiratory protection
- Flame-resistant clothing / coveralls

Government and Regulatory Clearances

- **Security Clearances:**
  - Verify if any government or site-specific security clearances are required (TWIC, TSA clearance, etc.).
  - Ensure all personnel have the necessary clearances and identification.

- **Regulatory and Safety Compliance:**
  - Confirm adherence to OSHA regulations and any local safety standards.
  - Ask the site personnel for any other safety training or certification requirements to be completed and provided prior to site arrival (H2S alive, ISN, working from heights, etc.)
  - Ensure documentation for all certifications and training is up to date prior to scheduling travel.

Health and Safety Protocols

- Emergency Procedures:
  - Review the facility's emergency procedures and exits.
  - Confirm the location of first aid stations and AEDs.
  - Complete the Job Safety Analysis (JSA) prior to site arrival.
  - Job site hazard assessment and control measures during the site visit.

Please always be aware of and comply with local and site-specific requirements. The above information is used as a guideline for talking points to aid in awareness and is not all-encompassing. **Your safety is paramount.** Always review and get confirmation from a site representative if there is any information in question. If you have any questions while onsite call/text/what's app Rachel Green directly at +1 734-332-9776.

Mechanical Equipment Information

When surveying the equipment that sensors will be installed on, it is important to gather the following:

- Name of the area the asset is located in.
- Name of the machine.
- CMMS Asset # if available.
- Pictures of the assets, including top view, side view, and full view of the drive and driven parts of the asset. These pictures will help us understand the environment the asset is in, along with the system configuration of the equipment.
- Pictures of the nameplates and any other placard information for the asset, for all equipment in a system (example: motor nameplate, gearbox nameplate, centrifugal pump placard). These will usually include the HP, RPM, line frequency, bearing numbers, asset make and model, and much more. This information is crucial to building the online dashboard and configuring the sensors and should be input into the Equipment Information sheet.
- Note the presence of any guarding that may require modification, as well as any LOTO requirements, for each asset being surveyed.
- Note if assets are in hazardous locations, and ensure to note the hazardous ratings (i.e. C1D1, C1D2, etc.).
- Note if the machines are in a locations that will require special care for installation - LOTO, confined space, heights, etc.

This information is required for every asset being surveyed, and so these steps are repeated for all the assets in the facility.

Figure 1: Top View

Figure 2: Full View

Figure 3: Side View

Figure 4: Machine Name Plate

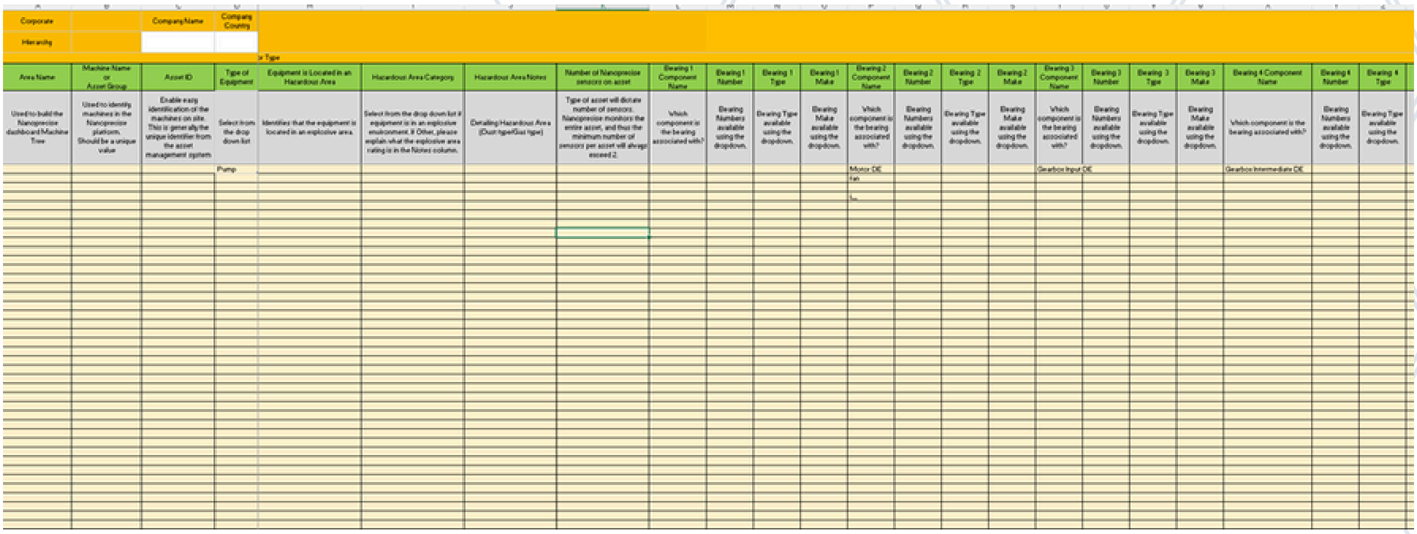

Figure 5: Equipment Information Sheet

The Equipment Information Sheet is linked here. Instructions on how to use the Equipment Information Sheet can be seen here.

Sensor Mounting Information

Once the equipment information is obtained, the next step in the equipment survey is to determine how and where the sensors will be mounted. Proper mounting is critical, as a well-placed and solid connection ensures we collect accurate and reliable data. High-quality data allows us to detect deviations in running conditions earlier and deliver actionable insights to the customer.

Every asset may require a different mounting approach.

- Some sensors may be mounted magnetically.
- Others may require epoxy applied to the magnet base for additional retention.
- In some cases, sensors may be stud-mounted directly to the asset using a pre-drilled and tapped hole.

The mounting method should always be selected together with the sensor location. Mounting location directly impacts the quality of the data collected. Sensors must be placed on a sturdy, integral part of the asset, and ideally as close as possible to the load-bearing component being monitored. For example, when mounting sensors on motors, they should be positioned in the same vertical plane as the bearings that support the drive shaft.

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Mounting Location

The location where a sensor is mounted plays a critical role in determining how effectively we can understand asset behavior and detect issues early. Ideally, sensors should be placed in the same plane as the load-bearing component being monitored.

In most cases, we monitor rotating equipment, such as motors and other mechanical assets. For these applications, the primary load-bearing components are typically the bearings or bushings, the parts that support the drive shaft or enable rotational motion.

These components operate under continuous stress and extreme conditions, which means that when a problem begins to develop, it usually appears here first and with characteristics that the sensors can accurately detect. The closer a sensor is mounted to these components, the more effectively it can capture subtle irregularities that indicate early-stage issues. This is why mounting sensors in-line and within the same vertical plane as these components significantly enhances our problem-detection capabilities.

Another important consideration is ensuring the chosen mounting location is on a solid, integral surface of the equipment—one that does not interfere with regular maintenance tasks. Avoid mounting sensors on surfaces where resonance or non-structural vibrations can occur, as these will distort the collected data. A common example is the fan shroud of a motor, which should never be used as a sensor mounting point because it produces inaccurate readings.

Finally, mounting locations should avoid areas with high pedestrian traffic. This helps prevent sensors from being accidentally bumped, knocked off, or disrupted during routine activities such as lubrication.

Mounting Hardware

Once the appropriate mounting location is identified for each component of the asset under survey, the next step is to determine which mounting hardware will be used. This process must be repeated for every asset being reviewed. In all cases, epoxy can be added to any mounting hardware option to provide additional retention.

Mounting hardware selection is determined during the site survey by placing the network testing sensor on the component where the final sensor will be installed and assessing which option provides the best fit.

Mounting Hardware Selection Criteria

- Flat Magnet: Use a flat magnet when there is a suitable flat surface on the asset. Example: On a motor drive end, if the bearing housing has a flat spot where the magnet sits evenly, a flat magnet is appropriate.

- Curved Magnet: Use a curved magnet when the surface is visibly curved and no flat surface is available. Example: On a motor drive end, if the test sensor with a flat magnet does not sit flush on the bearing housing, a curved magnet is required.

- B48 Flat Magnet: Use the B48 magnet primarily when mounting sensors on motor fins. This magnet also provides a higher pull force, making it suitable for applications where additional retention is needed.

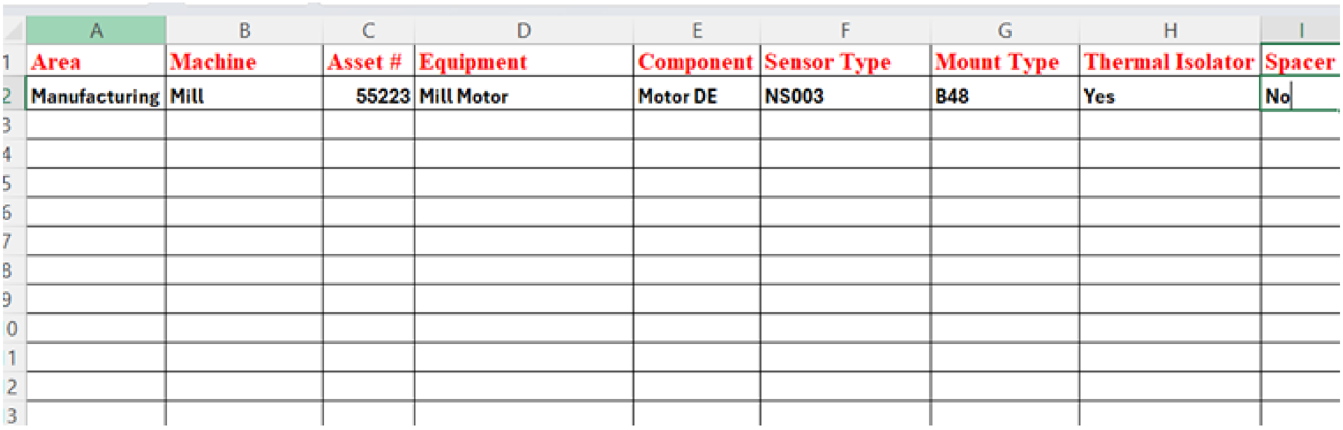
- Spacer: Use a spacer with any of the magnet options when vertical clearance is insufficient for the sensor to sit flat. Example: On the motor non-drive end, if the sensor cannot sit properly on the bearing housing due to fins blocking vertical clearance, a spacer is required.

- Thermal Isolator: Use a thermal isolator with any mounting option when the component's surface temperature regularly exceeds 80ºC.

- Stud Mount: Use a stud mount when the component cannot support a magnetic installation. This involves drilling and tapping a hole to mount the sensor directly.

Ensuring Proper Sensor Fit

Regardless of the hardware selected, the sensor must be mounted such that it does not feel loose or wobbly. The connection should feel firm, with the sensor sitting evenly on the surface. If there is any faint wobble, adjust the orientation of the sensor or slightly reposition the mounting location until the wobble is eliminated.



	A	B	C	D	E	F	G	H	I
1	Area	Machine	Asset #	Equipment	Component	Sensor Type	Mount Type	Thermal Isolator	Spacer
2	Manufacturing	Mill	55223	Mill Motor	Motor DE	NS003	B48	Yes	No

Figure 6: Filling up the site survey spreadsheet

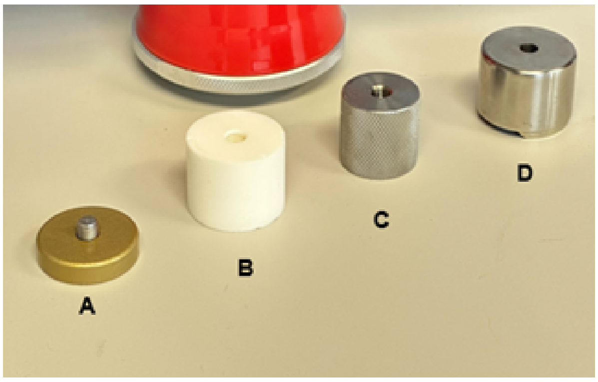


Figure 7: Various mounting attachments

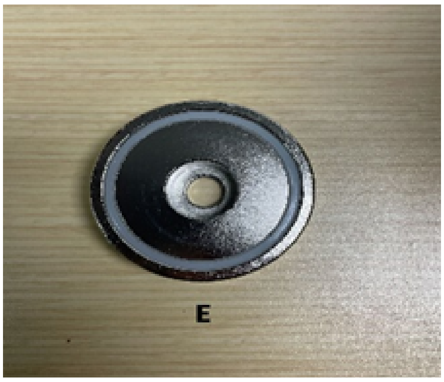


Figure 8: Larger magnet for fin mounts (B48)

Figure 9: Stud used for stud mounting

Connectivity Information

Once the machine information and mounting details for an asset are fully recorded, the next step in the survey is to perform the connectivity assessment. This assessment is critical for ensuring a smooth installation process and reliable long-term sensor performance.

The assessment must be conducted using a sensor configured for connectivity testing, with all required data retrieved from a web link associated with the specific test sensor.

Step 1: Determine Connectivity Method

The first step is to identify whether the deployment will use cellular or Wi-Fi. Based on this determination, the following information must be recorded from the web link:

- If Using Cellular, record the following metrics:
    - RSRP (dBm) – Signal strength
    - RSRQ (dBm) – Signal quality
    - MCC-MCN – Network operator identification code
    - Upload Speed (Kbps)
- If Using Wi-Fi, record the following metrics:
    - RSSI (dBm) – Wi-Fi signal strength
    - SSID – Name of the Wi-Fi network
    - Upload Speed (Kbps)
    - Password – Obtain from the site contact

For most Wi-Fi deployments, the client will have enterprise Wi-Fi in place. It is therefore essential to engage with the IT department to ensure appropriate firewall rules are configured. Contact Nanoprecise to obtain the full list of required firewall settings.

Step 2: Assess Additional Connectivity Hardware Needs

If the connectivity results indicate the need for a cellular booster or Wi-Fi gateway, the site survey must document:

- The proposed location for each unit
- The location of nearby power outlets
- Whether any electrical work or socket protection is required
- Whether the power supply is safely positioned away from workstations to prevent accidental unplugging

Understanding Connectivity

RSSI (Received Signal Strength Indicator)	RSSI is a relative measure of the usable strength of a wireless signal received by a device. It reflects the connection between the transmitting tower and the receiving device, incorporating any losses from noise, interference, or hardware limitations. RSSI is a direct reading, similar to checking a value on a gauge.
RSRP (Reference Signal Received Power)	RSRP measures the strength of the reference signal emitted from a tower, without factoring in losses. It represents the total signal strength at a specific point in space and is derived through algorithmic calculation rather than direct measurement. RSRP provides a more precise indication of tower signal power than RSSI.
RSRQ (Reference Signal Received Quality)	RSRQ indicates the quality of the signal being received. It is influenced by both signal power (RSRP) and any losses reflected in RSSI.
$RSRQ \propto RSRP / RSSI$,	This means that RSRQ behaves like a ratio between signal strength and signal loss (with additional factors excluded here for simplicity). A higher-quality signal results in an RSRQ value closer to zero.

Why These Metrics Are Negative

RSSI, RSRP, and RSRQ values appear as negative numbers because they represent very small but positive quantities on a logarithmic (dB) scale. For example, on a $\log_{10}$ scale, –2 dB = 10^{-2} = 0.01.

Expressing signals as –100 dB is far more practical than writing out extremely small decimal values like 0.0000000001.

Across all three measures, values closer to zero indicate stronger and more reliable connectivity.

Interpreting Connectivity Measures in Practice

While all connectivity metrics—RSSI, RSRP, and RSRQ—provide useful insights, RSRQ is the most important indicator when assessing overall connection quality. Because it reflects both signal power (RSRP) and losses/interference (RSSI), it gives us the clearest picture of how close we are to achieving the theoretical "best" connection. A value closer to zero indicates stronger quality and a more optimized connection.

How to Improve Connectivity

There are two primary avenues to improve connectivity:

- *Improving Signal Power (RSRP) using Cellular Boosters*: Boosters can increase RSRP, but cannot improve RSRQ. This is because a booster can only amplify the signal quality it receives; it cannot remove the interference or noise already present. However, boosters are still useful when the goal is to increase raw signal power. A booster setup typically includes:
  - A donor antenna positioned in an area with better signal quality
  - A server antenna that distributes the boosted signal to the sensors
  - By placing the donor antenna where RSRQ is naturally better, the booster effectively relocates that improved quality to the target area.

- *Improving Both RSRP & RSRQ by Addressing Environmental Factors*: cellular signals are electromagnetic waves with very low energy, and they are easily disrupted by surrounding objects and conditions. These disruptions create noise and interference, reducing both signal strength and signal quality. Common sources of interference include:
  - Metal structures (major impact)
  - Water and moisture
  - Power cables, motors, and other electronics
  - Dense physical structures of any kind
  - Other cellular signals

While some interference is unavoidable, strategic placement and environmental awareness can significantly reduce its impact.

Understanding Upload & Download Speeds

Upload and download speeds are influenced by connection quality, but the relationship is not absolute. Even with excellent RSRP and RSRQ readings, speeds may be slow due to external factors, such as:

- Limited bandwidth available from the network operator
- Heavy network traffic in the area
- Traffic management policies implemented by the operator

This means that strong signal readings do not always guarantee fast speeds. Speeds may also fluctuate throughout the day as network congestion changes.

Practical Assessment Approach

When assessing connectivity, all metrics are important, but the primary indicators are:

- RSRQ (most important)
- RSRP
- Data transfer speeds

If transfer speeds seem unusually low, take multiple readings over time.

- If speeds fluctuate, this may simply be traffic-related.
- If speeds remain consistently poor, consider testing other network operators in the area to identify one that offers more stable performance.

Ultimately, the goal is to find a consistent and reliable connection, understanding that some degree of fluctuation is normal.

Below you can see the recommended ranges for these connectivity strength indicators:

Network Type	Parameter	**Excellent**	**Good**	**Poor**
4G (LTE)	RSRP (dBm)	>-90	>-100	<-100
	RSRQ (dB)	<-7	>-10	<-10
LTE-M (CAT-M1)	RSRP (dBm)	>-90	>-100	<-100
	RSRQ (dB)	<-7	>-10	<-10
3G (WCDMA)	RSRP (dBm)	<-70	>-95	<-95
	RSRQ (dB)	<-7	>-10	<-10
2G (GSM)	RSRP (dBm)	<-60	>-75	<-75
Wi-Fi	RSRQ (dB)	<-60	>-75	<-75

Table 1 - Connectivity ranges for Wi-Fi and Cellular

To ensure the most accurate connectivity readings, the connectivity sensor must be placed directly on the asset under review, in the exact location where the final sensor will be installed. Once positioned, allow the sensor to run for at least 30 seconds before recording the values in the site survey spreadsheet. This process must be repeated for every asset included in the survey.

If the connectivity sensor is not in use, it must be powered off, as the special firmware used for connectivity testing will drain the battery rapidly.

Below are examples of the web link used to obtain connectivity data, along with a sample of a completed site survey spreadsheet. The Net Monitor page provides the key information required to assess connectivity, which will guide decisions regarding the potential need for a cellular booster or Wi-Fi gateway.

Ensuring strong connectivity is essential. A reliable connection contributes to longer sensor battery life and ensures consistent, dependable performance of the sensor throughout its operation.

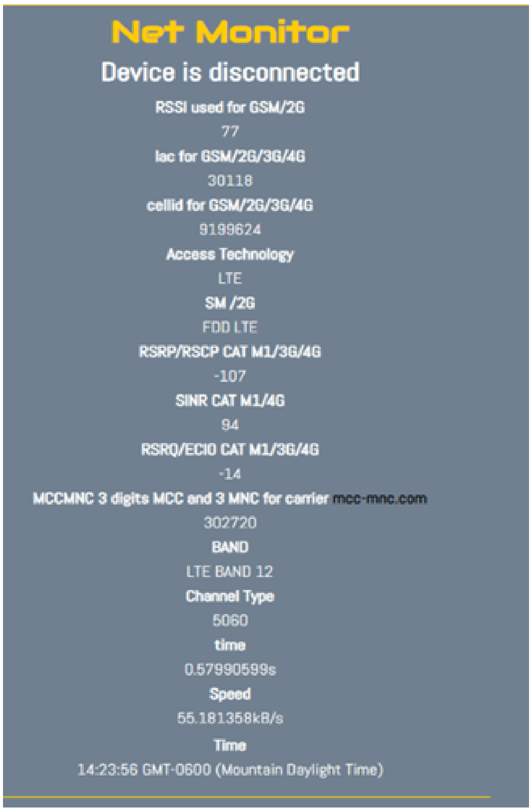


Figure 10: Cellular net monitor link

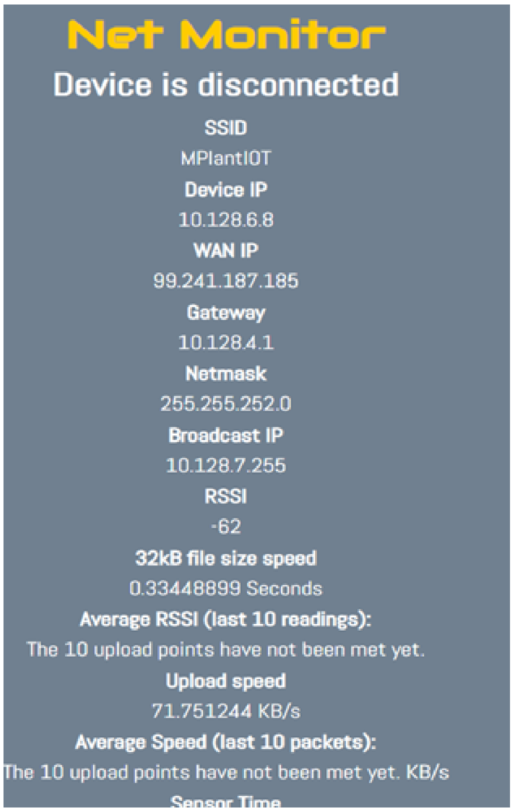


Figure 11: Wi-Fi net monitor link

Area	Machine	Asset #	Equipment	Component	Sensor Type	Mount Type	Thermal Isolator	Spacer	Connectivity Type (Cell or WiFi)	RSRP(dBm)	RSRQ(dBm)	MCC-MNC	RSSI WiFi (dBm)	Upload Speed (Kbps)
Manufacturing	Mill	55223	Mill Motor	Motor DE	NS003	B48	Yes	No	Cell	-114	-16	310410	N/A	115

Figure 12: Completed Site Survey Spreadsheet

Installation – Cellular Booster and Wi-Fi Gateway

When additional support is needed to ensure reliable connectivity, there are two main solutions available:

- Cellular Boosters: Cellular boosters amplify weak cellular signals in the area and are used when sensors rely on cellular connectivity. They improve signal strength (RSRP) and can help stabilize connectivity in locations where cell coverage is limited.
- Wi-Fi Gateways: Wi-Fi gateways use a cellular signal to create a local Wi-Fi network for sensors that connect via Wi-Fi. These are effective for improving Wi-Fi coverage within the facility.

Because Wi-Fi gateways still require a minimum level of cellular signal to operate, it is often possible, and sometimes necessary, to use both a cellular booster and a Wi-Fi gateway together. The booster improves the incoming cellular signal, which enhances the gateway's performance and helps achieve the desired connectivity outcome.

Note: Cell boosters can not improve signal quality, and if there is an issue here, that might need to be discussed with the customer.

Considerations When Installing Cellular Boosters

When installing a cellular booster system, it is essential to carefully plan the placement of three key components:

- Donor Antenna
- Booster Unit
- Server Antenna

Donor Antenna Placement

Figure 13: Directional Antenna, usually used as a donor antenna

The donor antenna is responsible for receiving the cellular signal that will be amplified. To ensure optimal performance:

- Place the donor antenna in an area with strong cellular signal, typically outside the building in an elevated location.
- Ideally, the antenna should have a clear line of sight to the nearest cell tower.
- If this is not possible, aim the antenna toward the tower while avoiding obstructions such as nearby buildings or metal structures.
- The donor antenna must be installed within 100 ft of the booster unit to allow proper cable routing.
- Ensure that you research where the nearest cell tower is on an online mapping tool before going to the site so that you have a plan of how to install the antenna.

Booster Unit Placement

Figure 14: G41 Booster

The booster unit should be placed:

- Within 100 ft of the donor antenna (to meet cable run limits).
- Within 5 ft of a power source, typically a wall outlet.
- In a location that is dry, accessible, and safe for long-term operation.

Donor Antenna Placement

The server antenna distributes the amplified signal to the sensors. Its placement depends on the coverage needs. Install the server antenna 60–100 ft from the booster unit.

Choose the antenna type based on the layout of the coverage area:

- Omni-Directional Antenna
  - Emits signal in a full 360-degree pattern, creating a donut/sphere-shaped coverage zone.
  - Ideal for rooms, open areas, or spaces with multiple coverage angles.

- Directional Antenna
  - Projects signal in a focused, forward-facing cone.
  - Useful when:
    - Covering a long aisleway,
    - Reaching an area far away from the antenna's mounting location,
    - You need to focus coverage on a specific section.

Figure 15: Omni-directional Antenna

Figure 16 – Directional Antenna, panel style, usually used as a server antenna

Always follow the manufacturer's installation instructions and recommendations included with the booster system. Proper placement and alignment are essential for maximizing signal strength and ensuring successful operation.

Considerations When Installing Wi-Fi Gateways

Wi-Fi gateways are generally simpler to set up compared to cellular boosters. They only need to be placed in an area with a modest cellular signal, even if the signal is not strong enough for sensors to connect directly, it is often sufficient for the gateway itself. The gateway must also be installed near a power source, typically a standard wall outlet.

Each gateway comes with a pre-configured SSID and password. Once plugged in and powered on, check the indicator lights on the unit to confirm that it is receiving a usable cellular signal.

Ideally, the gateway should show three bars or more to ensure reliable Wi-Fi performance.

After the gateway is powered and online:

- Use the connection test sensor to connect to the gateway's Wi-Fi network and verify proper operation.
- Ensure that all sensors in the area connect to the new Wi-Fi network by performing a blink-up procedure, which configures each sensor with the correct Wi-Fi parameters.

This ensures that the entire sensor cluster in the area is properly connected and communicating through the Wi-Fi gateway.

Figure 17 –Rut 241 Router

Sensor Installation – Surface Preparation

When beginning the sensor installation process, proper surface preparation is essential to ensure a secure and long-lasting sensor mount. If using a degreaser or solvent, always confirm that it has been approved for use by the site.

Before physically mounting the sensor, the following steps must be completed:

- Identify the Mounting Location: Determine the exact spot on the component where the sensor will be installed.

- Prepare the Surface: Use sandpaper or another abrasion tool to remove paint, rust, and debris from the mounting area. Exposing bare metal provides the best mounting surface. The most secure installations are:
  - Direct stud mounting (ideal), followed by
  - Metal-to-metal mounting with epoxy

- Clean the Surface: Using an approved degreaser or solvent, wipe the area thoroughly with a clean rag. This removes dust, debris, grease, and other contaminants that could prevent the sensor from adhering properly or cause uneven mounting. Proper cleaning also improves the bonding strength when epoxy is used.

- Apply Epoxy (If Used): Once the surface is clean and dry, and if epoxy is being used (highly recommended), ensure the epoxy itself is approved for use on-site. Apply the epoxy between the sensor base and the prepared metal surface. Hold the sensor firmly in place until the epoxy has set enough to support its weight.

- Dispose of Materials Safely: Ensure all used rags and disposable materials are discarded safely and in accordance with site guidelines.

Installation – Sensor Preparation

Once the surface has been fully prepared, the sensor must be powered on and inspected before mounting. Follow the steps below:

- Confirm the Correct Mounting Option: Ensure the sensor is fitted with the correct mounting hardware for the specific component (flat magnet, curved magnet, B48 magnet, spacer, thermal isolator, etc.).

- Power On the Sensor: Unscrew the sensor cap, switch the sensor on, and observe the LED indicators on both the A board and B board.

- Observe Initial LED Patterns
  - The A board will blink red continuously.
  - The B board will blink blue.
- This pattern indicates that the sensor is actively searching for, and attempting to connect to, the network.

- Verify Network Connection: Once a cellular connection is successfully established:
  - The A board LED turns green briefly.
  - The B board LED turns solid blue for about one second.
- After this confirmation, both LEDs will automatically turn off.

- Prepare for Mounting: Once both indicators have completed their sequence and turned off, the sensor is fully ready for installation. Screw the cap back on securely and proceed with the mounting steps.

Figure 18 – Green light blinking on the board

Figure 19 – Blue light blinking on the board

Installation – Mounting

Once all preparation steps are complete, the sensors are ready to be mounted. Proper orientation is critical, as it ensures accurate data capture. Each sensor has the XYZ axes visually marked on the bottom of the unit. The axes are defined as follows:

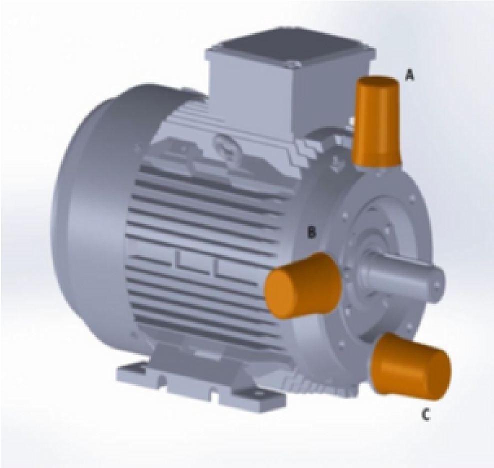
- Z-Axis – Horizontal Plane
  - Runs in line with the sensor's longitudinal axis.
  - Represents horizontal vibration or movement.
- Y-Axis – Vertical Plane
  - Parallel to the internal PCB.
  - Represents vertical vibration or movement.
- X-Axis – Out-of-Plane Direction
  - Perpendicular to the PCB surface.
  - Represents vibration or movement into or out of the mounting plane.

Correct orientation ensures the system can properly interpret vibration signatures and detect anomalies across all three axes.

Installation – Horizontal and Vertical Asset

When mounting on a horizontal asset, the following mounting orientations can be achieved (images displayed on the next page):

- Vertical mount, shaft aligned with sensor X
- Vertical mount, shaft aligned with sensor Y
- Horizontal mount, shaft aligned with sensor X
- Horizontal mount, shaft aligned with sensor Y
- Axial mount, Vertical (gravity) direction aligned with sensor Y
- Axial mount, Vertical (gravity) direction aligned with sensor X



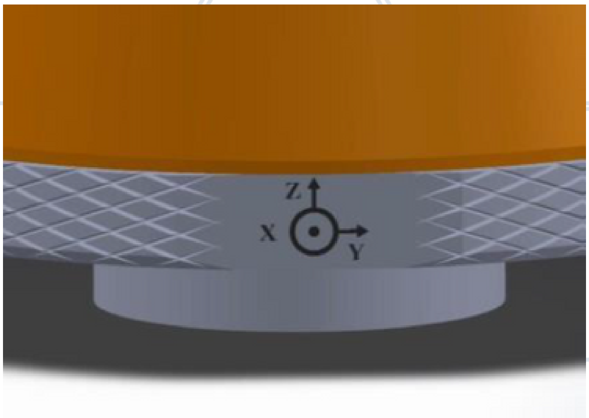
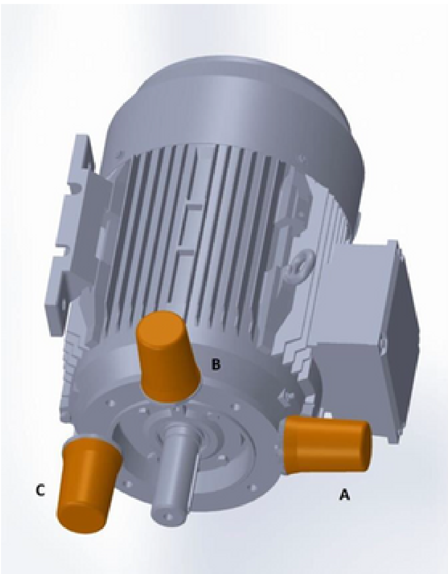


Figure 20 – Horizontal Asset Mounting Examples

Figure 21 – Sensor Base Orientation Markings

When mounting on a vertical asset, the following mounting orientations can be achieved:

- Radial mount, shaft aligned with sensor Y
- Radial mount, shaft aligned with sensor X
- Radial mount, shaft aligned with sensor Y
- Radial mount, shaft aligned with sensor X
- Axial mount, sensor X radial / Y radial.



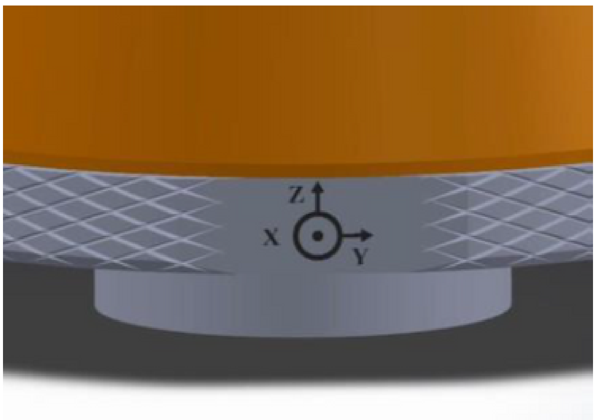


Figure 22 – Vertical Asset Mounting Examples

Figure 23 – Sensor Base Orientation Markings