



DASHBOARD USER MANUAL

Introduction

Welcome to the comprehensive manual of the Nanoprecise Dashboard, designed to provide a complete understanding of the platform's functionalities and features. As a dynamic maintenance professional, your journey through this manual will familiarize you with the intricacies and capabilities of the cutting-edge platform developed by Nanoprecise Sci Corp.

This manual will offer a clear and detailed explanation of each element and feature present on the dashboard. By thoroughly exploring the contents within, you will gain a deep insight into the diverse functionalities available, empowering you to leverage the platform's full potential.

Whether you are a seasoned professional or a novice user, this guide will serve as your key companion, enabling you to navigate through the dashboard with confidence and efficiency. We are confident that this manual will provide you with the necessary tools and knowledge to maximize your experience and drive your productivity to new heights.



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Login

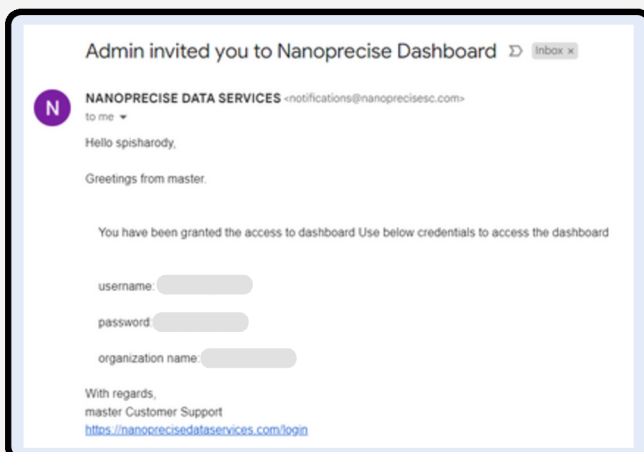
Nanoprecise Users

Access the website through the following link:
<https://nds.nanoprecisedataservices.com/login>



The screenshot shows the Nanoprecise login interface. At the top is the Nanoprecise logo. Below it are three input fields: 'Username/Email', 'Password', and 'Organization Name'. There are also checkboxes for 'Remember Me' and a link for 'Forgot Password?'. A prominent orange 'Sign In' button is located below the input fields. At the bottom, there is a link 'or Sign in with' followed by an 'SSO' button.

Enter the Username, Password, and Organization Name, received via email from notifications@nanoprecisesc.com, then click on "Sign In."



The screenshot shows an email notification from 'NANOPRECISE DATA SERVICES <notifications@nanoprecisesc.com>' to 'spisharody'. The email content includes: 'Greetings from master.', 'You have been granted the access to dashboard Use below credentials to access the dashboard', and three fields for 'username:', 'password:', and 'organization name:'. The email concludes with 'With regards, master Customer Support' and a link to <https://nanoprecisedataservices.com/login>.

Sample email with Credentials

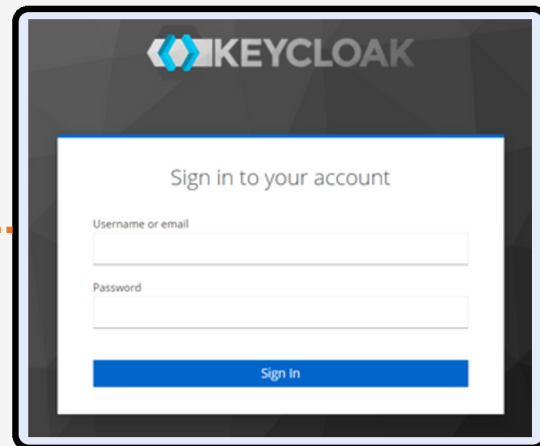
Login

SSO Users

Enter the “Organization Name” of the Company you are trying to access. If Organization is setup for SSO, it will redirect you to the “Sign In” page of your company SSO



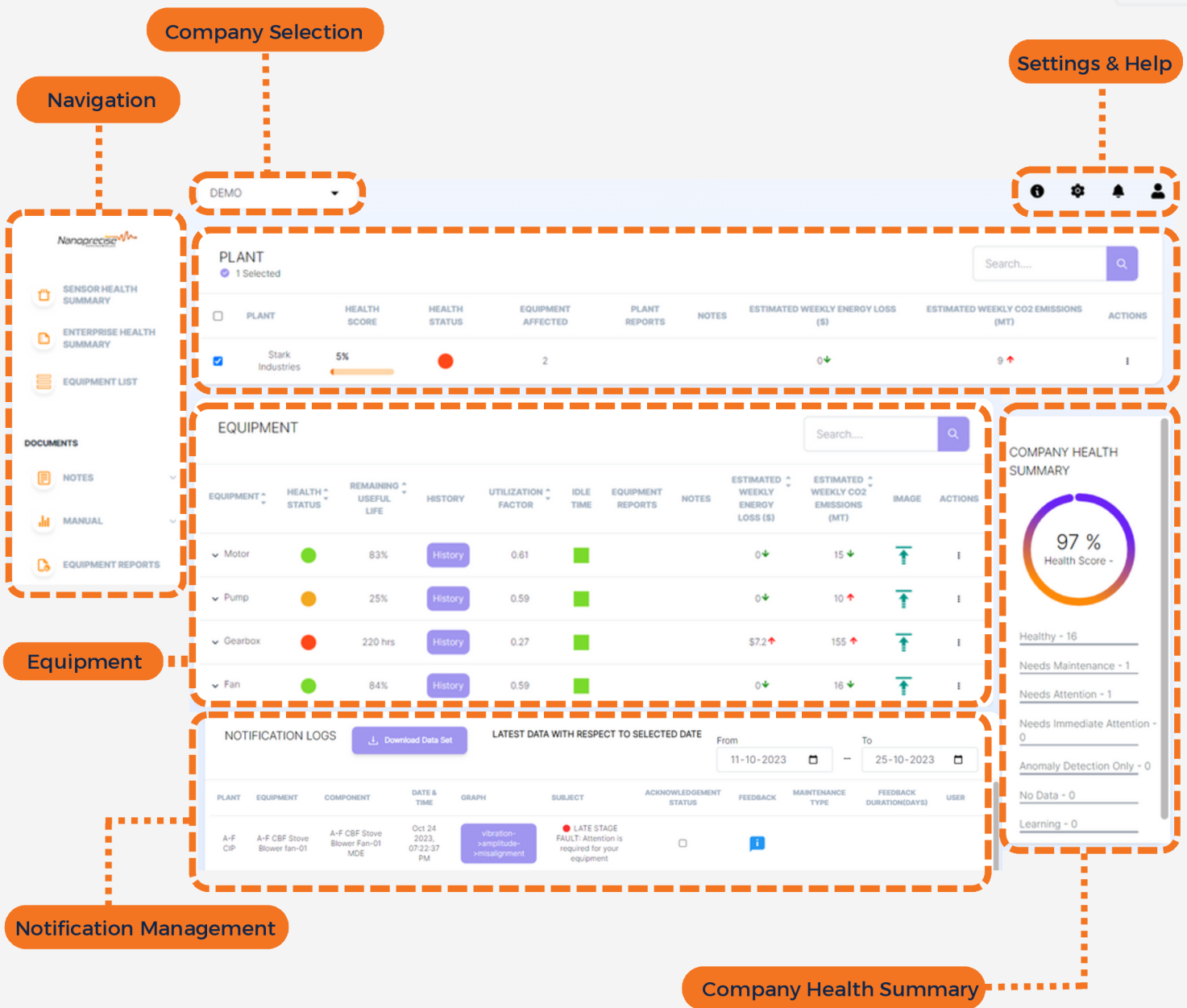
The screenshot shows the Nanoprecise Single Sign On page. It features the Nanoprecise logo at the top, followed by the text "Single Sign On". Below this is a text input field labeled "Organization Name". There is a checkbox labeled "Remember Me" and a prominent orange "Submit" button. At the bottom right, there is a link that says "Back to Login".



The screenshot shows the Keycloak Sign In page. It features the Keycloak logo at the top. Below the logo is the text "Sign in to your account". There are two text input fields: "Username or email" and "Password". At the bottom, there is a blue "Sign In" button.

Upon successful sign-in, you will be automatically redirected to the Nanoprecise Homepage. If you would like to setup SSO for your company, please contact your Nanoprecise representative or customer-success@nanoprecise.io

Homepage



PLANT

1 Selected

Search...

PLANT	HEALTH SCORE	HEALTH STATUS	EQUIPMENT AFFECTED	PLANT REPORTS	NOTES	ESTIMATED WEEKLY ENERGY LOSS (\$)	ESTIMATED WEEKLY CO2 EMISSIONS (MT)	ACTIONS
<input checked="" type="checkbox"/>	Stark Industries	5%	●	2		0 ↓	9 ↑	!

EQUIPMENT

Search...

EQUIPMENT	HEALTH STATUS	REMAINING USEFUL LIFE	HISTORY	UTILIZATION FACTOR	IDLE TIME	EQUIPMENT REPORTS	NOTES	ESTIMATED WEEKLY ENERGY LOSS (\$)	ESTIMATED WEEKLY CO2 EMISSIONS (MT)	IMAGE	ACTIONS
Motor	●	83%	History	0.61	■			0 ↓	15 ↓		!
Pump	●	25%	History	0.59	■			0 ↓	10 ↑		!
Gearbox	●	220 hrs	History	0.27	■			\$7.2 ↑	155 ↑		!
Fan	●	84%	History	0.59	■			0 ↓	16 ↓		!

NOTIFICATION LOGS

Download Data Set

LATEST DATA WITH RESPECT TO SELECTED DATE

From 11-10-2023 To 25-10-2023

PLANT	EQUIPMENT	COMPONENT	DATE & TIME	GRAPH	SUBJECT	ACKNOWLEDGEMENT STATUS	FEEDBACK	MAINTENANCE TYPE	FEEDBACK DURATION(DAYS)	USER
A-F CIP	A-F CBF Stove Blower fan-01	A-F CBF Stove Blower Fan-01 MDE	Oct 14 2023, 07:22:37 PM		vibration->amplitude->misalignment	<input type="checkbox"/>	!			

COMPANY HEALTH SUMMARY

97 % Health Score

- Healthy - 16
- Needs Maintenance - 1
- Needs Attention - 1
- Needs Immediate Attention - 0
- Anomaly Detection Only - 0
- No Data - 0
- Learning - 0

Navigation

Facilitates rapid access to various sections of the dashboard, with available options contingent upon user privileges and activated features.

Company Selection

Enables users with access to multiple companies to make selections from a dropdown menu.

Company Health Summary

Displays the total number of equipment under each health status for the currently selected plant/s.

Plant

This section furnishes an inclusive health assessment and status overview for each of the company's plants. The presentation is structured based on the health score, with the lowest scores taking precedence. By default, the first plant on the list is automatically selected, although the option to select multiple plants is available. The chosen plant's details will be displayed in the machine/equipment tab below, along with a concise "Plant Health Summary" on the right-hand side.

Features



Plant List: Encompasses a comprehensive listing of all company plants, each accompanied by a checkbox for selecting the desired plant(s) to populate the equipment list.



Health Score: Represents a computed value reflecting the overall health of a specific plant, derived from the collective health status of the respective equipment under that plant. (Refer to Appendix C for detailed information)



Health Status: Indicates the current health status of the most compromised equipment within the plant.



Equipment Affected: Displays the count of equipment exhibiting an increased health status within the plant.



Plant Report: Serves as a centralized repository for storing supplementary findings and reports specific to individual plants.



Notes: Facilitates the addition of remarks at various levels of the hierarchy.



Action: Enables users to rename both the equipment and plant names as needed.

Equipment

Based on the selected plant(s) (which can be multiple), the equipment will be listed in order of priority, with the lowest health score ranked first.

Features



Equipment List: Displays all equipment corresponding to the selected plant(s) from the Plant section.



Health Status: Determined by the active Fault Severity/stage (2/3/4) and the Remaining Useful Life (RUL). (Refer to Appendix C for detailed information)



Remaining Useful Life (RUL): Represents the remaining useful life of the most critical or degraded component in an equipment. Presented as a percentage up to 750 hours (+- 30 days), after which it is displayed in hours.



Utilization Factor: Indicates the percentage of running measurement points relative to the total measurement points.



Idle Time: Provides an indication if the equipment has not operated for a specific number of days. (Refer to notifications settings for details)



Image: Displays an image of the equipment.



Equipment Report: Serves as a central repository for analysis reports and additional findings.

Notifications

Notifications from the selected plant(s) (accessible to the user) will be exhibited for the previous 2 weeks, with the most recent appearing first.

Features



Plant/Equipment/Component: Indicates the location where the notification was triggered.



Date & Time: Displays the exact moment when the notification was triggered.



Graph: Provides a hyperlink redirecting to the component page that initiated the notification.



Subject: Specifies the subject of the notification.



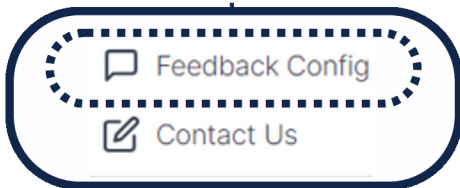
Acknowledgement Status: Allows for the acknowledgment of notifications, signifying that they have been reviewed. Users can hover over to view which user acknowledged it.



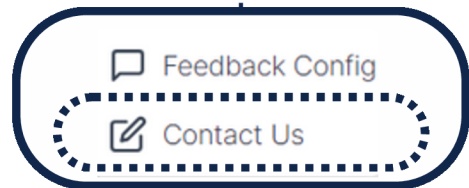
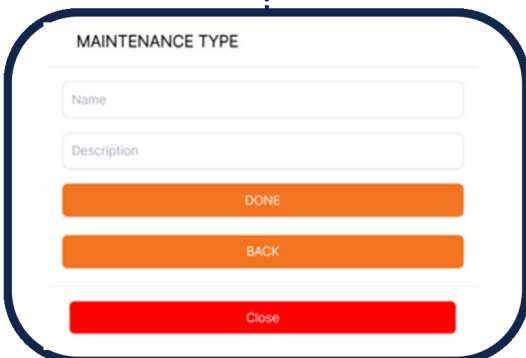
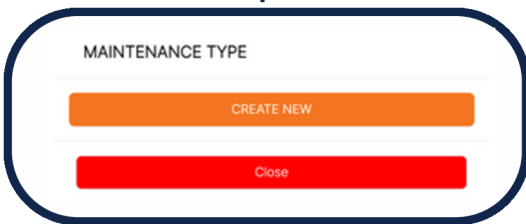
Feedback: Enables users to log follow-up actions resulting from a notification. Users can select a predefined maintenance type, provide a description, specify the time range, and allocate resources. Once saved, the entry will be visible in the notification log, facilitating the closure of the loop and ensuring a comprehensive record of actions taken and by whom.

Settings

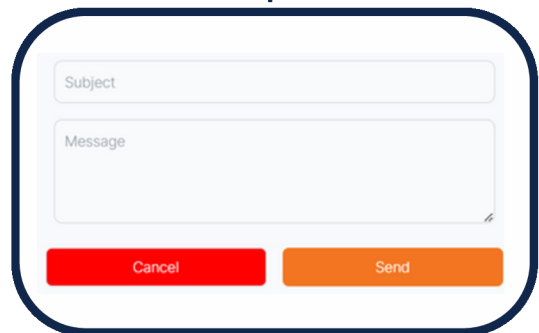
Provides access to various user and company settings, along with pertinent information concerning health statuses and notification types.



Customize Maintenance Types and Actions

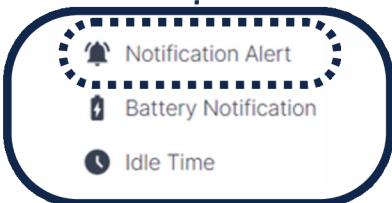


Reach out to customer-success@nanoprecise.io



Notifications

Enable and Control Pop-Up Notifications



NOTIFICATION ALERT SETTINGS X

Show pop-ups for new alerts :

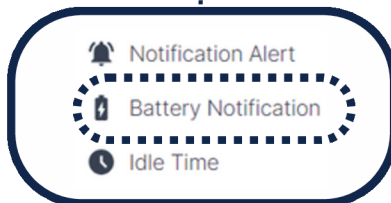
Play sound when new alert received :

Notifications Scan Interval : 5 Minutes v

Notifications Sound : Message Alert v

Submit
Test

Configure notifications for battery levels below a specific threshold



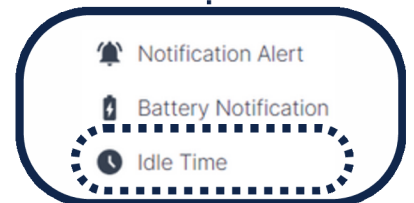
BATTERY NOTIFICATION SETTINGS X

Enable Battery Notification

2.5V
2.6V
2.7V
2.8V
2.9V
3V

Save

Establish configuration for displaying idle time indications in the equipment overview for a specified number of days

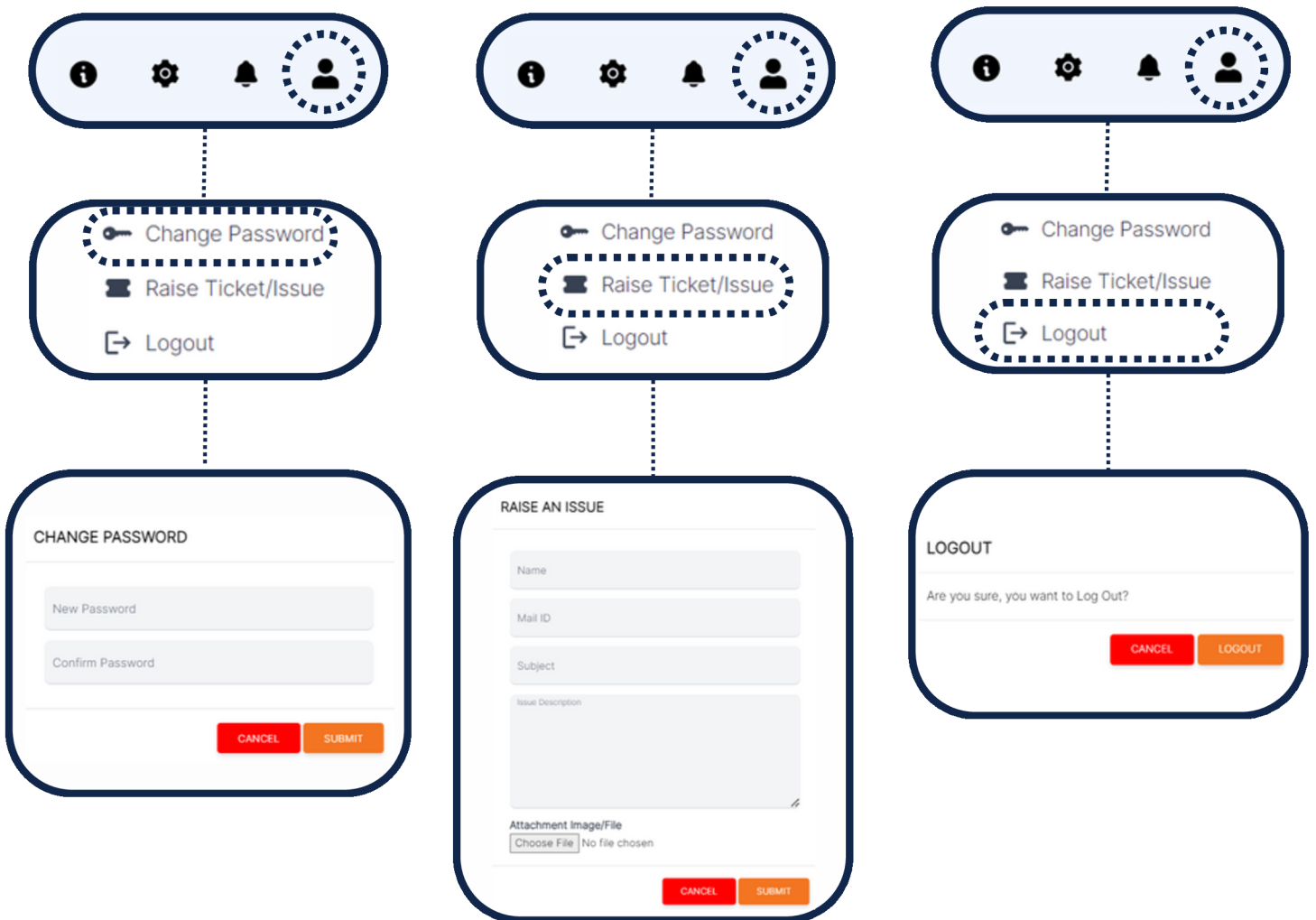


IDLE TIME SETTINGS

	Min	Max
■ Yellow	<input type="text" value="31"/>	<input type="text" value="60"/>
■ Orange	<input type="text" value="61"/>	<input type="text" value="90"/>
■ Red	<input type="text" value="91"/>	

User Settings

Access password modification, ticket submission, and logout functionalities



Info

The info button shows details on different notification types and what triggers each and also how we define health status based on Fault Severity and RUL

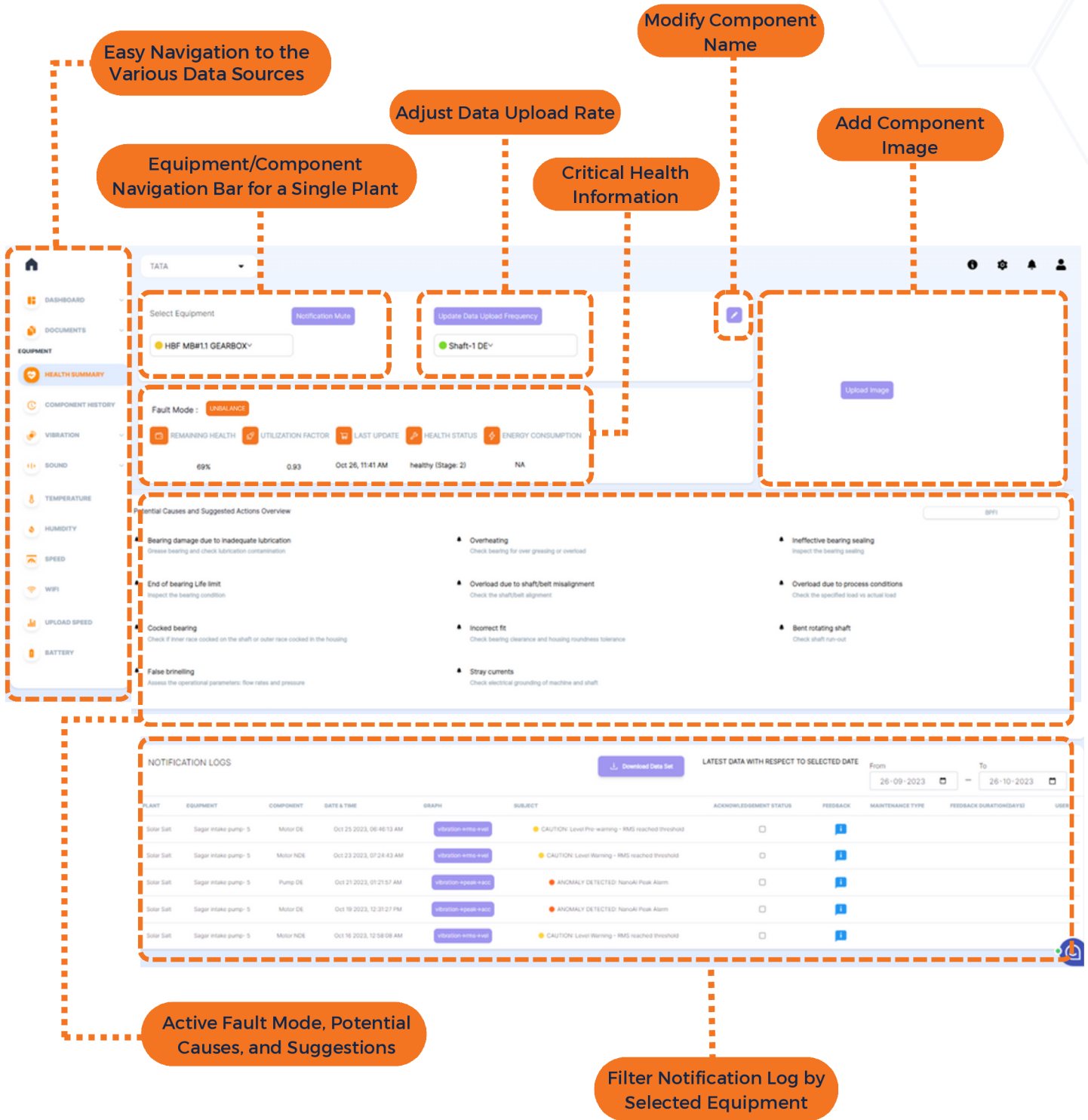


Summary on notification type and notification email subject:

Notification Source	Notification Type	Notification Email Subject
	Notifications on Health Status Summary and Remaining Useful Life (RUL)	<ul style="list-style-type: none"> LATE-STAGE FAULT: Attention is required for your equipment
	Notification by NanoAI Alarm	<ul style="list-style-type: none"> EARLY-STAGE Amplitude Alarm ANOMALY DETECTED: NanoAI RMS Alarm ANOMALY DETECTED: NanoAI Peak Alarm
Notifications from Cloud Computation	Notification by Email alarm	<ul style="list-style-type: none"> ANOMALY DETECTED: Sound RMS Alarm CAUTION: Level Alarm - Peak /RMS reached threshold

[Close](#)

Component Health Summary



The dashboard provides a comprehensive overview of component health for a selected plant (TATA). It includes a navigation sidebar, a main content area with various data points, and a notification log at the bottom.

Key Features and Callouts:

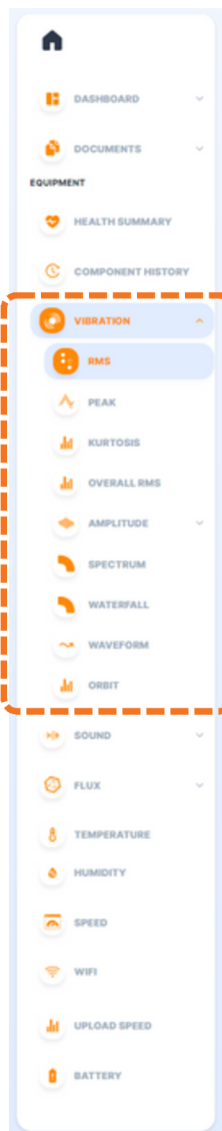
- Easy Navigation to the Various Data Sources:** A sidebar on the left lists various data sources like Dashboard, Documents, Equipment, Health Summary, Component History, Vibration, Sound, Temperature, Humidity, Speed, WiFi, Upload Speed, and Battery.
- Equipment/Component Navigation Bar for a Single Plant:** A dropdown menu at the top left allows selecting the plant (currently TATA).
- Adjust Data Upload Rate:** A button labeled 'Update Data Upload Frequency' is located near the equipment selection.
- Critical Health Information:** A 'Fault Mode' section displays 'UNBALANCE' and provides metrics for Remaining Health (69%), Utilization Factor (0.93), Last Update (Oct 26, 11:41 AM), Health Status (Healthy (Stage: 2)), and Energy Consumption (NA).
- Modify Component Name:** A pencil icon in the top right corner of the main content area allows editing the component name.
- Add Component Image:** An 'Upload Image' button is located in the top right corner of the main content area.
- Potential Causes and Suggested Actions Overview:** A central section lists various issues such as 'Bearing damage due to inadequate lubrication', 'End of bearing life limit', 'Cocked bearing', 'False brinelling', 'Overheating', 'Overload due to shaft/belt misalignment', 'Incorrect fit', 'Stray currents', 'Ineffective bearing sealing', 'Overload due to process conditions', and 'Bent rotating shaft', each with a brief description and suggested action.
- Active Fault Mode, Potential Causes, and Suggestions:** This section highlights the current fault mode and provides detailed information on potential causes and suggested actions.
- Filter Notification Log by Selected Equipment:** A 'Notification Logs' table at the bottom allows filtering data by equipment (e.g., Sagar Intake pump-5) and date range (From 26-09-2023 to 26-10-2023).

Navigation and General Functionality

Navigation

The data sources are individually selectable, and the navigation tree expands accordingly to display all available options within each data type.

Navigate seamlessly and explore the diverse functionalities available within the platform. Familiarize yourself with the comprehensive and user-friendly features that facilitate an enhanced user experience and streamlined operations.



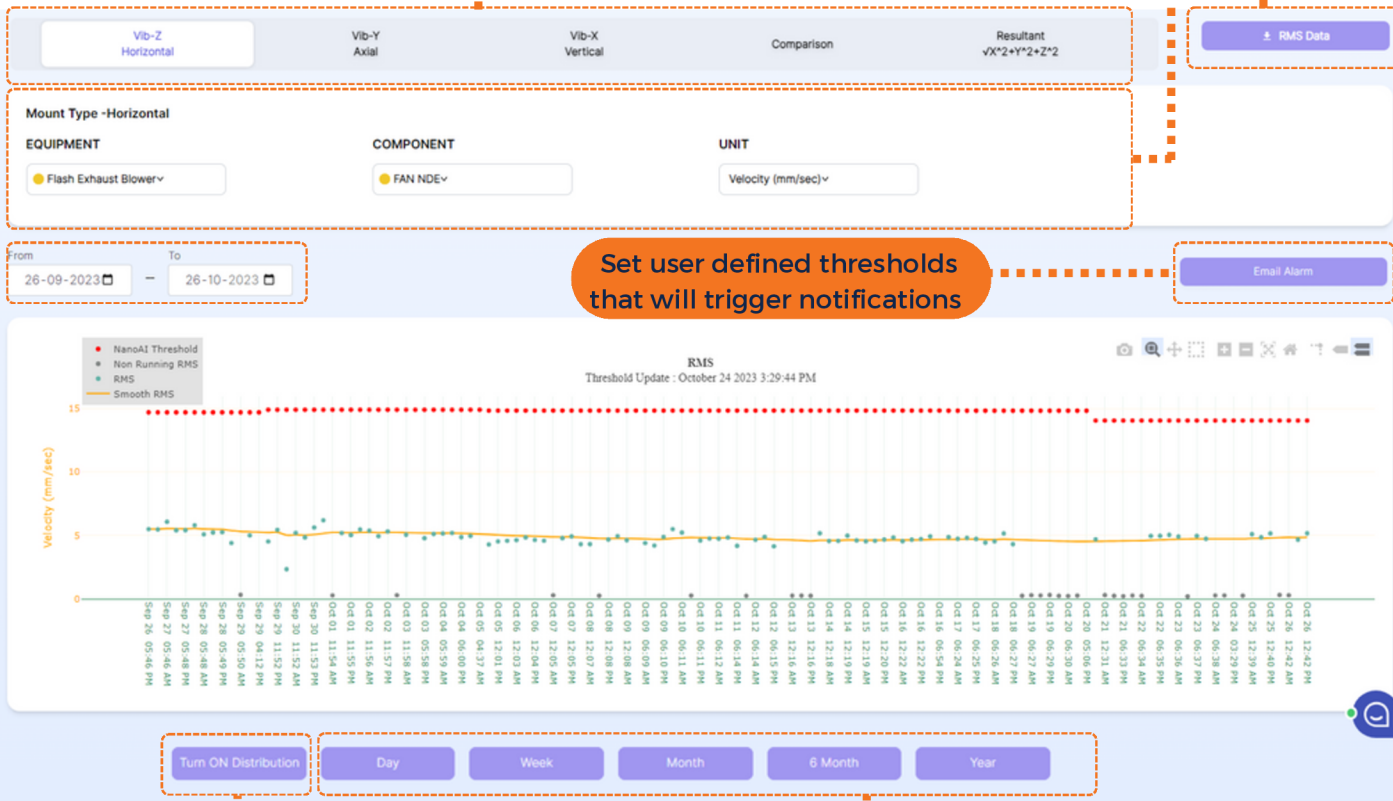
Vibration Parameters

Trending Graph Functionality

Select Direction (Z-Y-X),
Comparison, Resultant

Equipment, Component,
and Unit Selectors

Download Data



Set user defined thresholds
that will trigger notifications

Plot Time Axis to True Scale

Time Scaler for Swift Data Access within a Defined
Period; Select Dates to Display Corresponding Data

Amplitude Graph

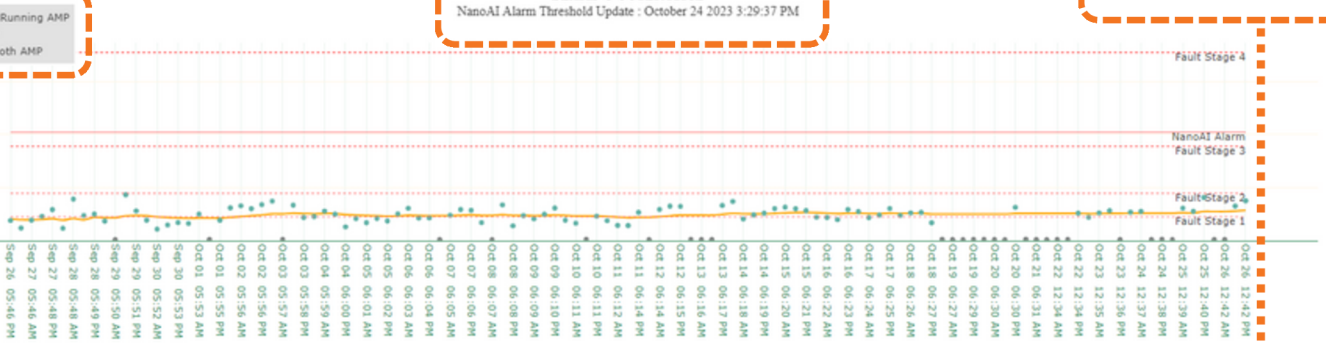
Title and when NanoAI was last updated time

BEARING OUTER RACE
NanoAI Alarm Threshold Update : October 24 2023 3:29:37 PM



Legend for Amplitude Graphs

Amp(mm/s)



Legend for Amplitude Graphs

- Non Running AMP
- AMP
- Smooth AMP

Zoom and other graph options

Legend for Vibration Graphs

- NanoAI Threshold
- Non Running RMS
- RMS
- Smooth RMS

Spectrum & Time Waveform Graph

Equipment, Component, Units and domain Selector

The screenshot displays the Nanoprecise software interface. At the top, there are three tabs for vibration directions: 'Vib-Z Horizontal', 'Vib-Y Axial', and 'Vib-X Vertical'. A 'Spectrum Data' button is located on the right. Below the tabs is a control panel with four dropdown menus: 'Mount Type -Horizontal', 'EQUIPMENT' (set to 'Flash Exhaust Blower'), 'COMPONENT' (set to 'FAN NDE'), 'UNIT' (set to 'Velocity (mm/sec)'), and 'DOMAIN' (set to 'Frequency Domain'). A date selector shows 'Oct 26 2023, 12:42:51 PM'. A note indicates 'Last 30 days data (Grey = Not Running). Last running speed is selected by Default'. The main area contains a spectrum graph with 'Velocity (mm/sec)' on the y-axis (0 to 5) and 'Frequency (Hz)' on the x-axis (0 to 7000). The graph shows a peak at approximately 1000 Hz. Above the graph are markers for 'RPM', 'BPF1', 'BPFO', and 'BSF'. A 'Turn On Range' button is highlighted, with a value of '1000' entered in the adjacent input field.

Turn On Frequency Axis Zoom Range

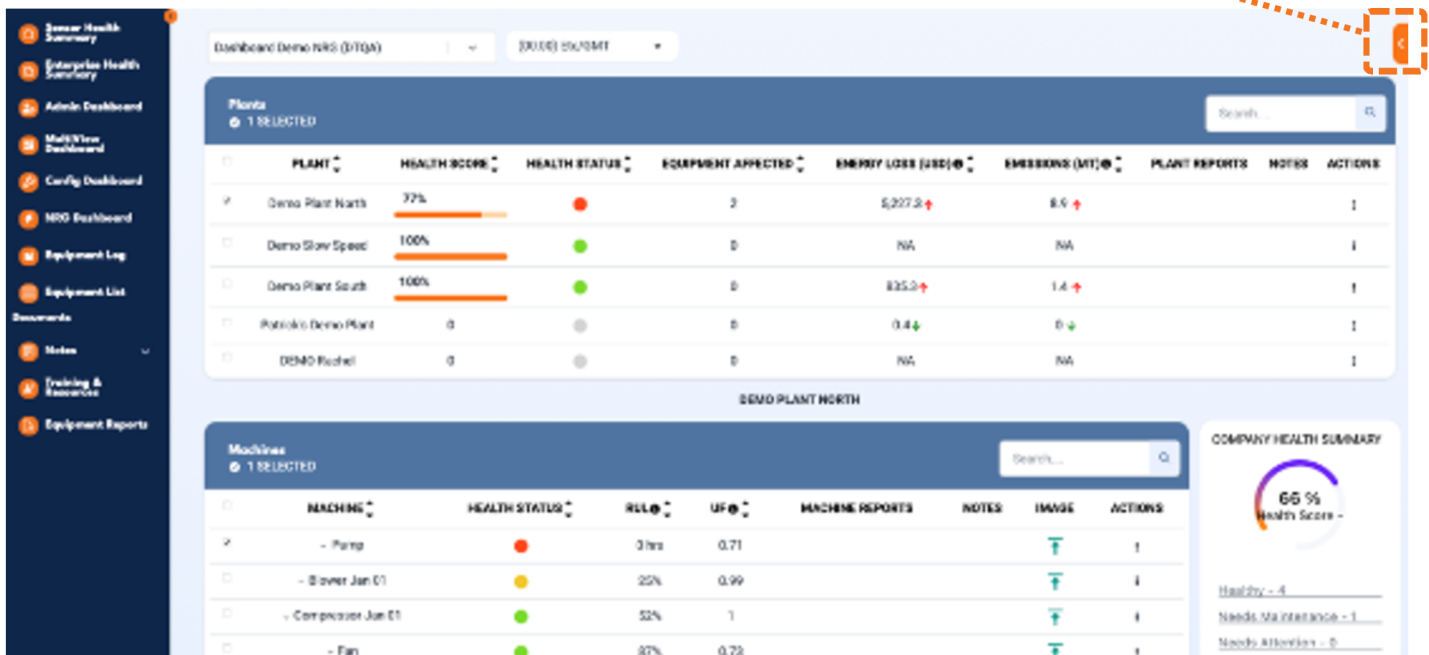
Frequency Markers

Equipment Log & Feedback

Where to find?

A quick access side panel can be found on the right-hand side of the Nanoprecise web platform.

Click here to access the Equipment Log to add feedback and view notifications



The screenshot displays the Nanoprecise web platform interface. On the left is a dark blue navigation sidebar with various menu items. The main content area shows a 'Plants' table with columns for Plant, Health Score, Health Status, Equipment Affected, Energy Loss (USD), Emissions (MT), Plant Reports, Notes, and Actions. Below this is a 'Machines' table with columns for Machine, Health Status, RLE, UFE, Machine Reports, Notes, Image, and Actions. On the right side of the interface, there is a 'COMPANY HEALTH SUMMARY' section with a circular gauge showing a 66% Health Score and three status indicators: Healthy - 4, Needs Maintenance - 1, and Needs Attention - 0. A callout box with a dashed orange border and a red arrow points to a small orange icon in the top right corner of the main content area, which is the 'Where to find?' side panel.

PLANT	HEALTH SCORE	HEALTH STATUS	EQUIPMENT AFFECTED	ENERGY LOSS (USD)	EMISSIONS (MT)	PLANT REPORTS	NOTES	ACTIONS
Demo Plant North	77%	●	0	\$,227.3 ↑	8.5 ↑			1
Demo Slow Speed	100%	●	0	NA	NA			1
Demo Plant South	100%	●	0	\$25.0 ↑	1.4 ↑			1
Patrick's Demo Plant	0	●	0	0.4 ↓	0 ↓			1
DEMO Rachel	0	●	0	NA	NA			1

MACHINE	HEALTH STATUS	RLE	UFE	MACHINE REPORTS	NOTES	IMAGE	ACTIONS
- Pump	●	0 hrs	0.71				1
- Blower Jan 01	●	25%	0.99				1
- Compressor Jan 01	●	52%	1				1
- Fan	●	87%	0.72				1

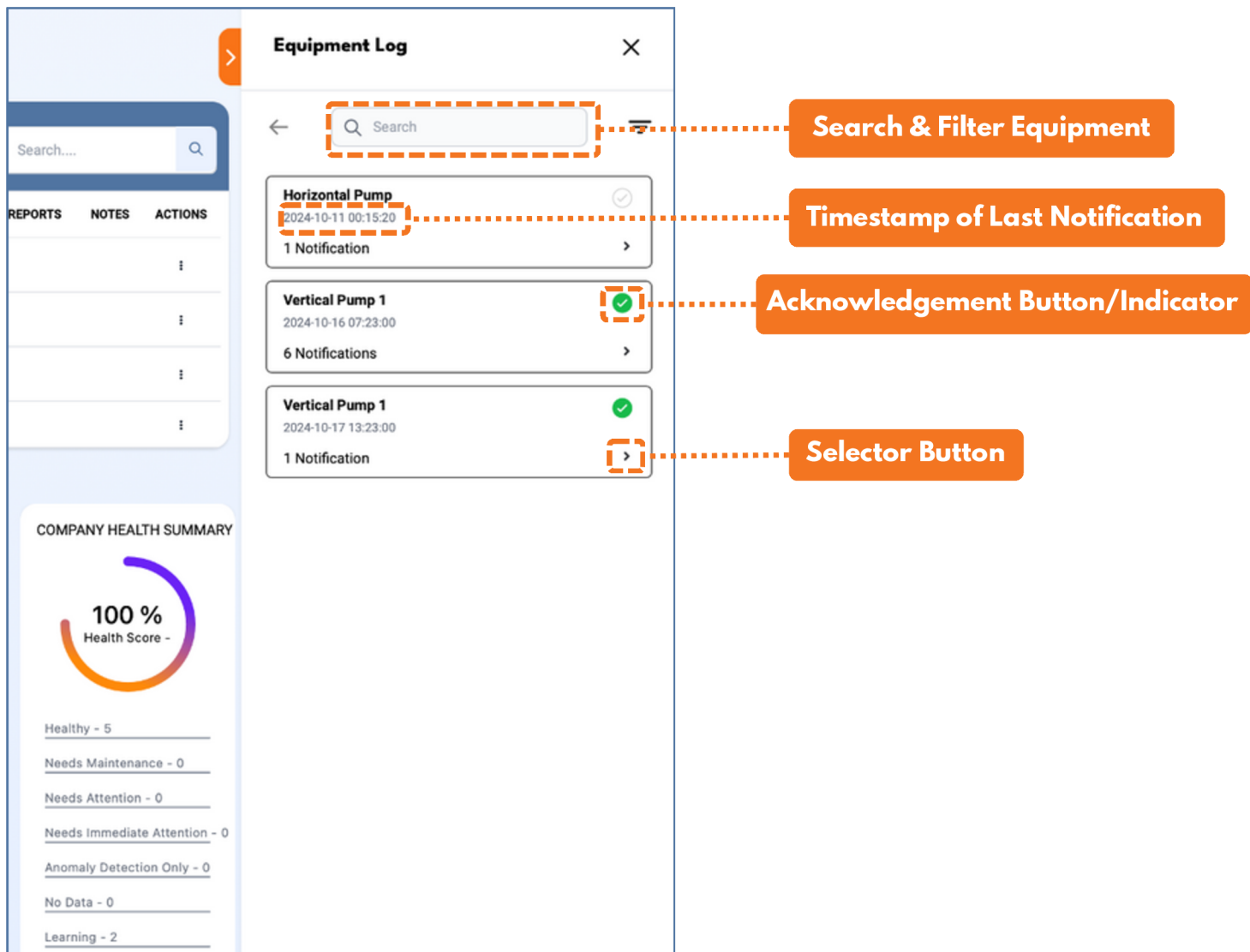
COMPANY HEALTH SUMMARY

66% Health Score

Healthy - 4
Needs Maintenance - 1
Needs Attention - 0

Equipment Log – Equipment List

View equipment that have observed notifications, sorted by acknowledgement status and recency. Use the search or filter functions to narrow down equipment. Click on an equipment of concern to investigate further.



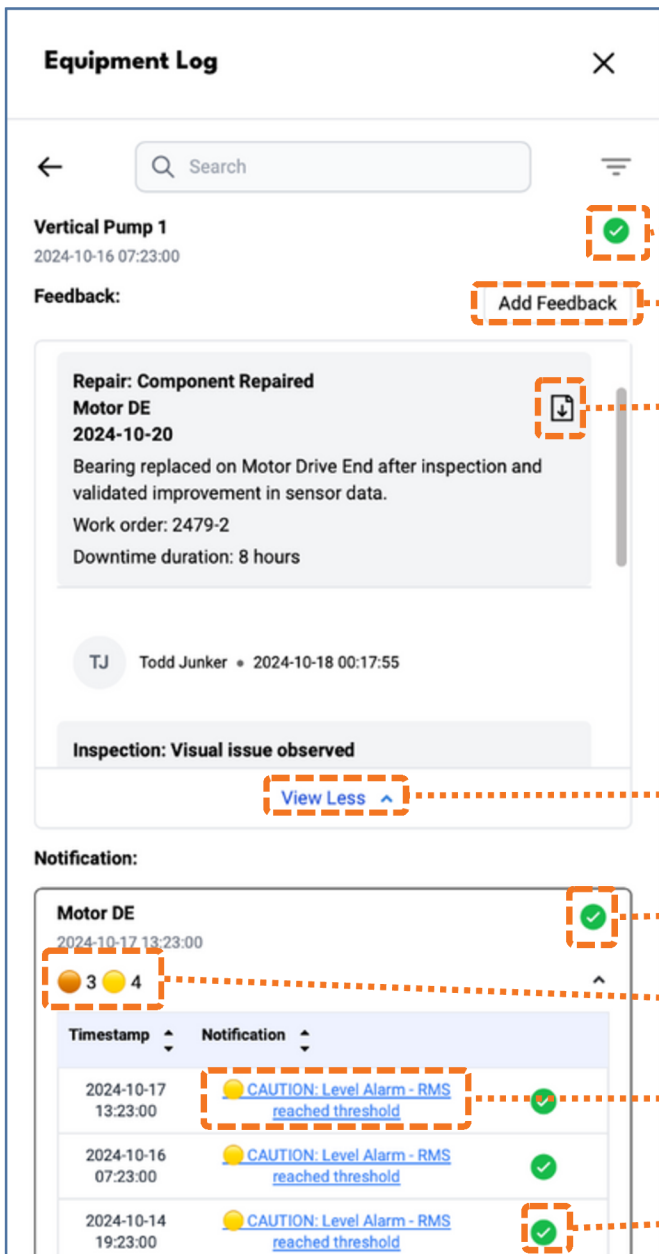
The screenshot displays the 'Equipment Log' interface. On the left, there is a sidebar with a search bar and a 'COMPANY HEALTH SUMMARY' section showing a 100% health score. The main area lists equipment items with their notification counts and timestamps. Callouts point to specific UI elements:

- Search & Filter Equipment:** Points to the search bar at the top of the log.
- Timestamp of Last Notification:** Points to the timestamp '2024-10-11 00:15:20' for the 'Horizontal Pump' entry.
- Acknowledgement Button/Indicator:** Points to the green checkmark icon next to the 'Vertical Pump 1' entry dated 2024-10-16.
- Selector Button:** Points to the right-pointing arrow icon next to the 'Vertical Pump 1' entry dated 2024-10-17.

Equipment	Last Notification Timestamp	Notification Count	Acknowledgement Status
Horizontal Pump	2024-10-11 00:15:20	1 Notification	Not Acknowledged
Vertical Pump 1	2024-10-16 07:23:00	6 Notifications	Acknowledged
Vertical Pump 1	2024-10-17 13:23:00	1 Notification	Not Acknowledged

Equipment Log – Equipment Details

Selecting an equipment then provides quick access to track and log maintenance activity, and a temporal view of notifications grouped by components that have observed any alerts/notifications.



Equipment Log [Close]

← [Search] [Filter]

Vertical Pump 1
2024-10-16 07:23:00

Feedback: [Add Feedback]

Repair: Component Repaired
Motor DE
2024-10-20
Bearing replaced on Motor Drive End after inspection and validated improvement in sensor data.
Work order: 2479-2
Downtime duration: 8 hours

TJ Todd Junker • 2024-10-18 00:17:55

Inspection: Visual issue observed
[View Less]

Notification:

Motor DE
2024-10-17 13:23:00

3 4

Timestamp	Notification	Status
2024-10-17 13:23:00	CAUTION: Level Alarm - RMS reached threshold	[Checkmark]
2024-10-16 07:23:00	CAUTION: Level Alarm - RMS reached threshold	[Checkmark]
2024-10-14 19:23:00	CAUTION: Level Alarm - RMS reached threshold	[Checkmark]

Acknowledge All Equipment's Notifications

Add Feedback Opens the Feedback Form

Download Attachment from Feedback

Expand/Collapse Feedback Thread

Acknowledge All Component's Notifications

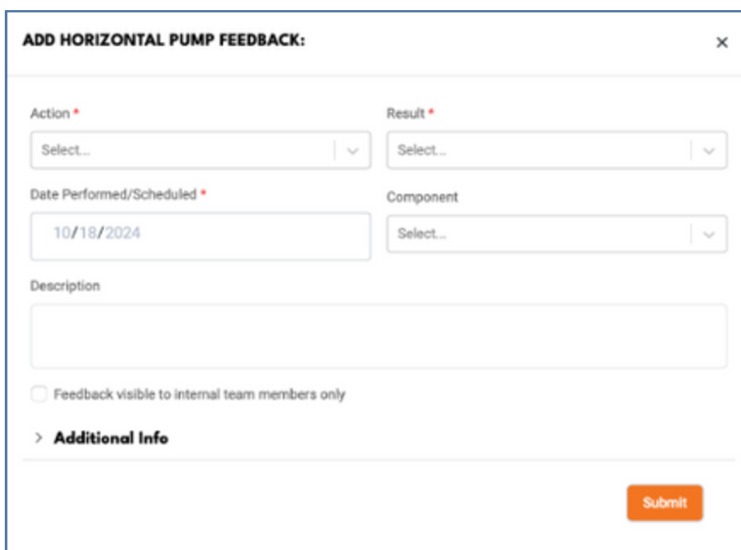
Notification Level & Count

View Alarm Graphs & Data

Acknowledge Individual Notifications

Feedback Form

Clicking the “Add Feedback” button opens the feedback form where users can share details on ongoing maintenance activity. The submitted feedback is posted on the feedback thread for the corresponding equipment – viewable by all users.



ADD HORIZONTAL PUMP FEEDBACK:

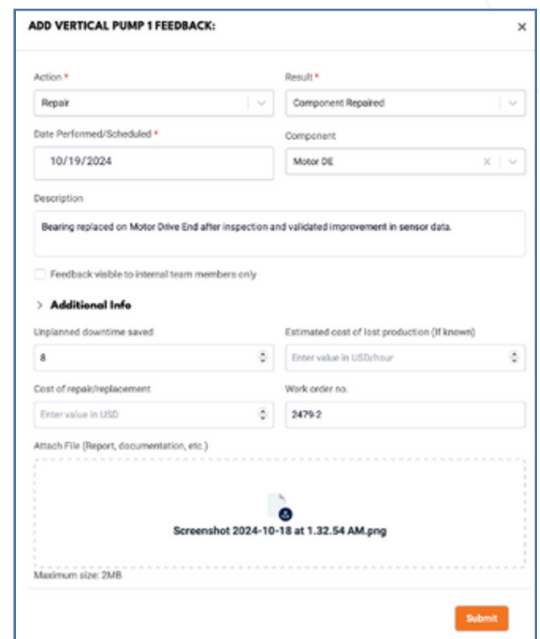
Action * Result *

Date Performed/Scheduled * Component

Description

Feedback visible to internal team members only

> **Additional Info**



ADD VERTICAL PUMP 1 FEEDBACK:

Action * Result *

Date Performed/Scheduled * Component

Description

Feedback visible to internal team members only

> **Additional Info**

Unplanned downtime saved Estimated cost of lost production (if known)

Cost of repair/replacement Work order no.

Attach File (Report, documentation, etc.)

Maximum size: 2MB

Form Features



Action: Select between a variety of maintenance activities from inspections to repairs and more. This provides a high-level view of the maintenance state.



Result: Select between different outcomes depending on the type of maintenance activity selected, such as a visual observation or equipment failure. This feeds into the platform’s automation and analytics capabilities.



Date Performed/Scheduled: Provide an estimate on when this maintenance activity was performed or will be performed.



Description: Provide context on the maintenance outcome being discussed. Feel free to add as much detail as possible to boost collaboration within the maintenance team.



Additional Info: Provide more details on the maintenance activity, such as Work order number, downtime/cost figures (for ROI calculations) and file attachments which could include reports or other relevant information.

Vibration

RMS, Peak, Kurtosis, Overall RMS

RMS

Vibration RMS is the root mean square of the entire frequency range of the vibration waveform. It describes the energy emitted by the machine, the higher the energy, the higher the RMS value is.

PEAK

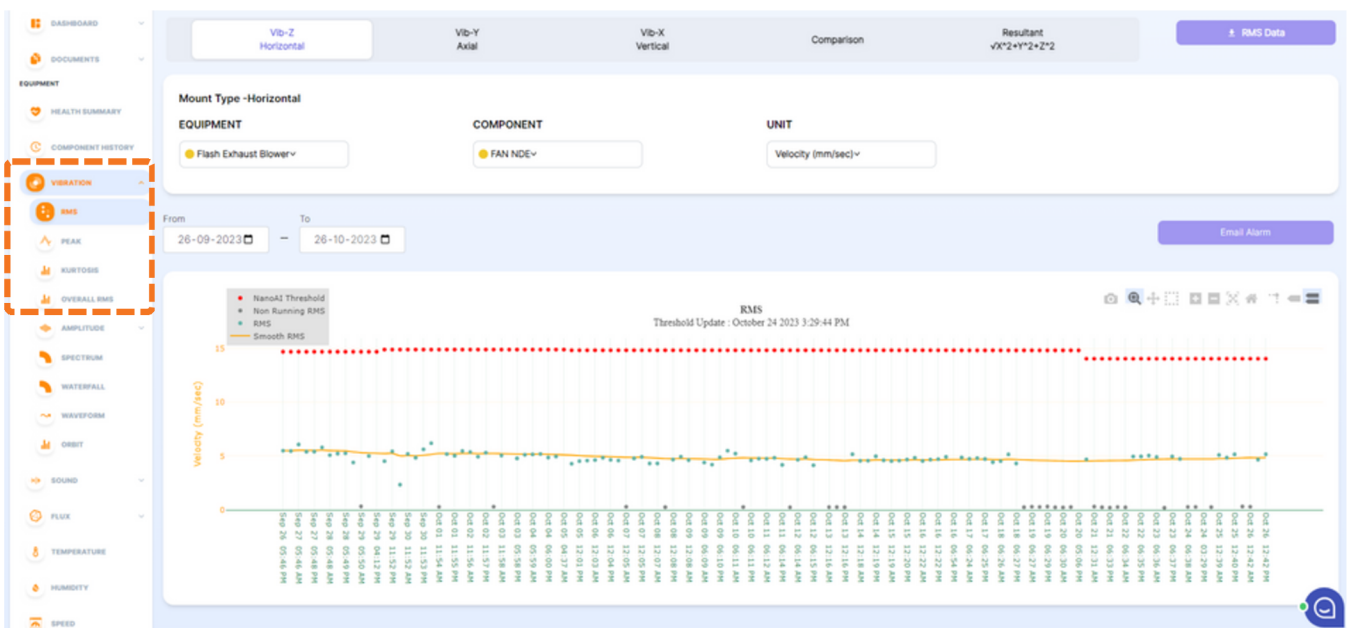
Vibration peak refers to the maximum excursion of the time wave from the zero point. The amplitude describes the severity of a specific fault mode.

KURTOSIS

Kurtosis provides a measure of the peak intensity within a vibration signal. Signals that have a higher kurtosis value have more peaks that are greater than three times the RMS value.

OVERALL RMS

Overall RMS is the root mean square of the vibration waveform from 2-1000 Hz as of ISO10816. It describes the energy emitted by the machine, the higher the energy, the higher the RMS value is.



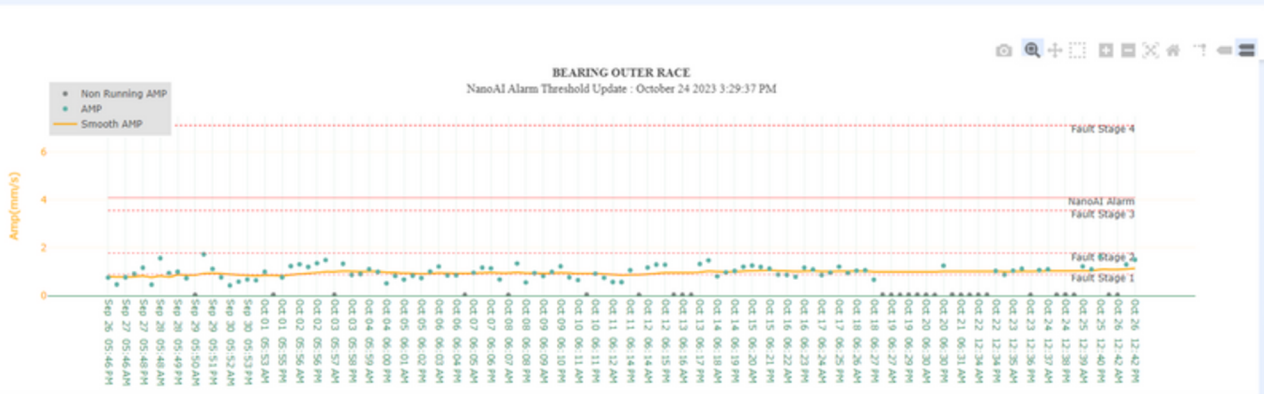
Amplitude

The amplitude graphs correspond to the monitored component, with each sensor configured to cover relevant fault modes based on its specific location. For instance, antifriction bearing faults are addressed through graphs for Bearing Inner Race, Bearing Outer Race, and Bearing Ball, while options for shaft faults encompass unbalance, misalignment, and looseness.

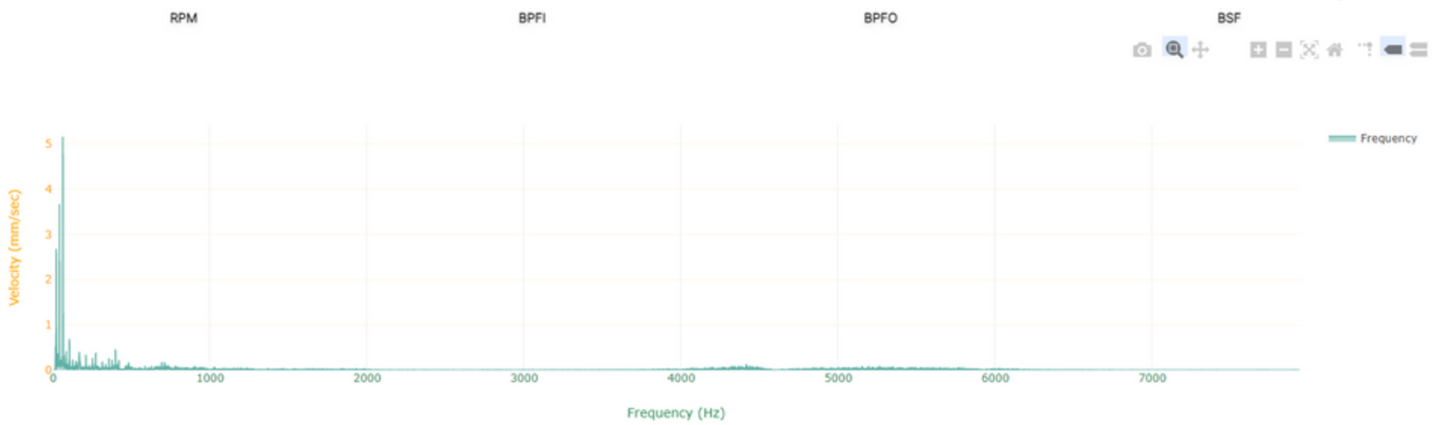
These graphs play a crucial role in determining the Remaining Useful Life (RUL) of a component, with each fault categorized into four stages. RUL is calculated as the time taken to reach Fault Stage 4, with the equipment deemed unstable upon crossing the Fault Stage 4 threshold. Appendix D provides additional insights into the initial setting of the Stage 4 threshold during the learning phase and its subsequent self-adaptive behavior.

Allows users to set customized stage 4 threshold

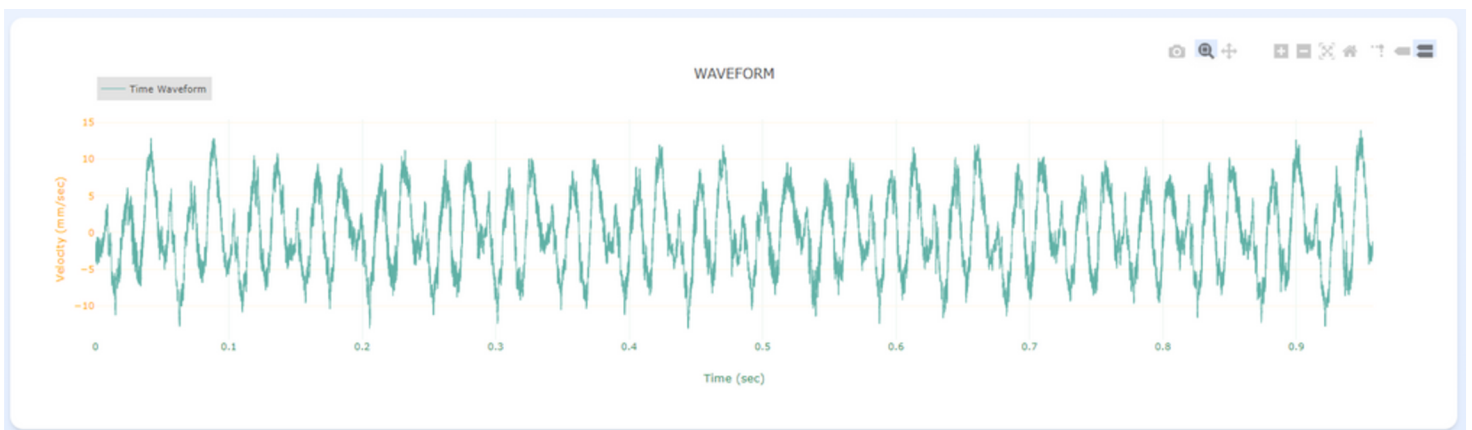
Stage Four Threshold



Spectrum



Waveform



Waterfall Spectrum

EQUIPMENT

Flash Exhaust Blower

COMPONENT

FAN NDE

UNIT

Velocity (mm/sec)

DOMAIN

Frequency Domain

Oct 26 2023, 12:42:51 PM x
Oct 25 2023, 12:39:10 AM x

Oct 26 2023, 06:42:27 AM x

Oct 26 2023, 12:42:01 AM x

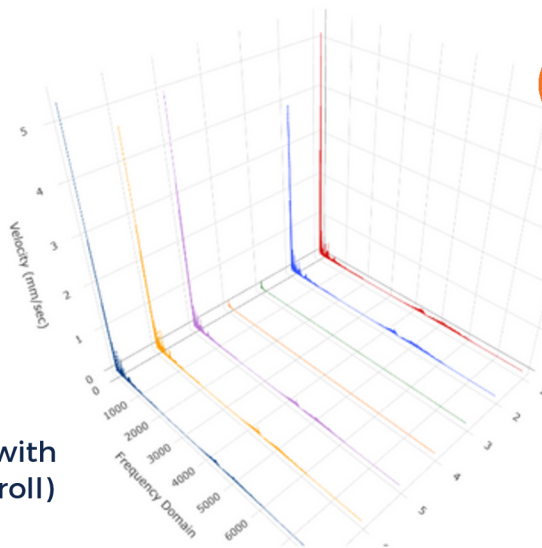
Oct 25 2023, 06:41:37 PM x

Oct 25 2023, 12:40:43 PM x

Oct 25 2023, 06:40:09 AM x

x

v



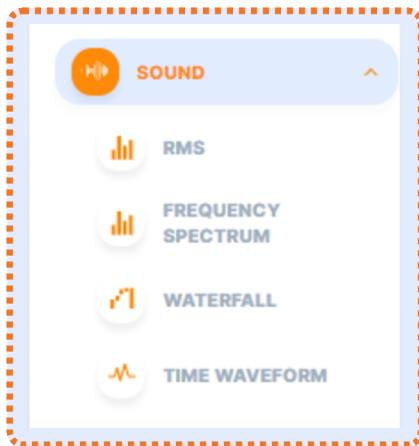
Allows to select up to 7 timestamps to plot in waterfall

Last 7 days running data is selected by default

Can be moved in 3D with mouse and zoom (scroll)

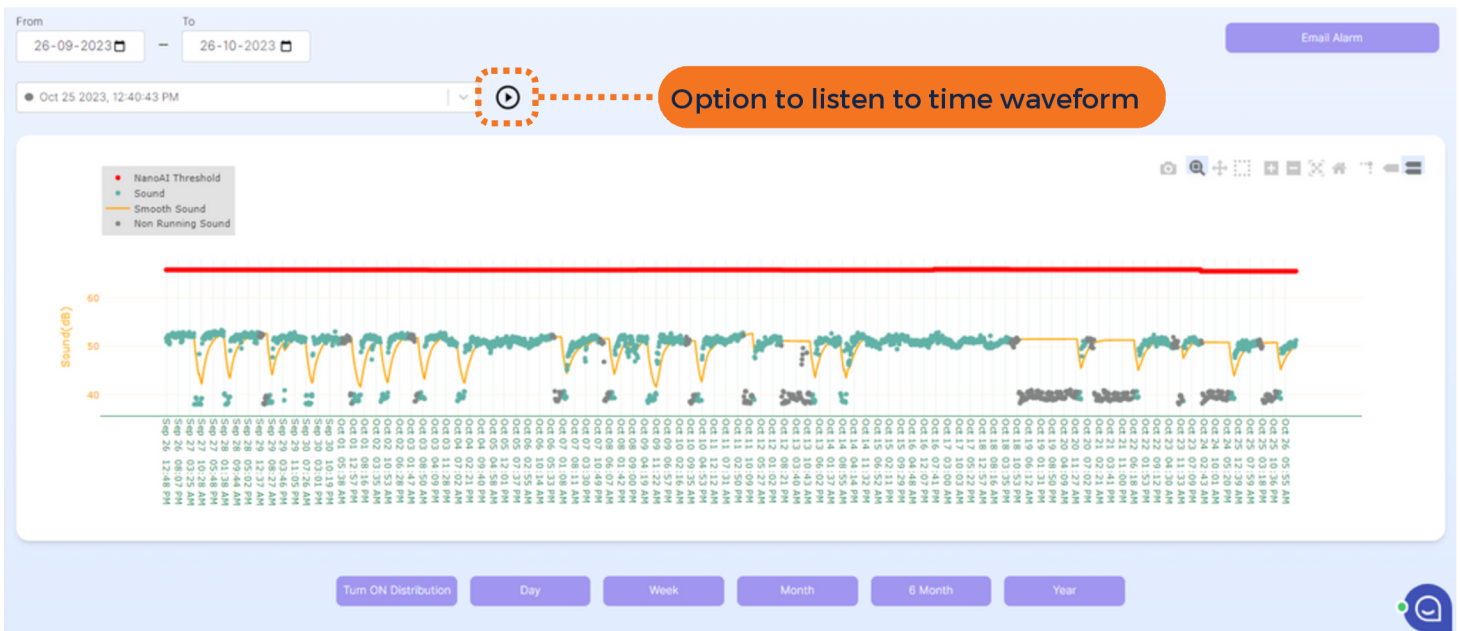
1	->	2023-10-26 12:42:51 PM
2	->	2023-10-26 06:42:27 AM
3	->	2023-10-26 12:42:01 AM
4	->	2023-10-25 06:41:37 PM
5	->	2023-10-25 12:40:43 PM
6	->	2023-10-25 06:40:09 AM
7	->	2023-10-25 12:39:10 AM

Sound

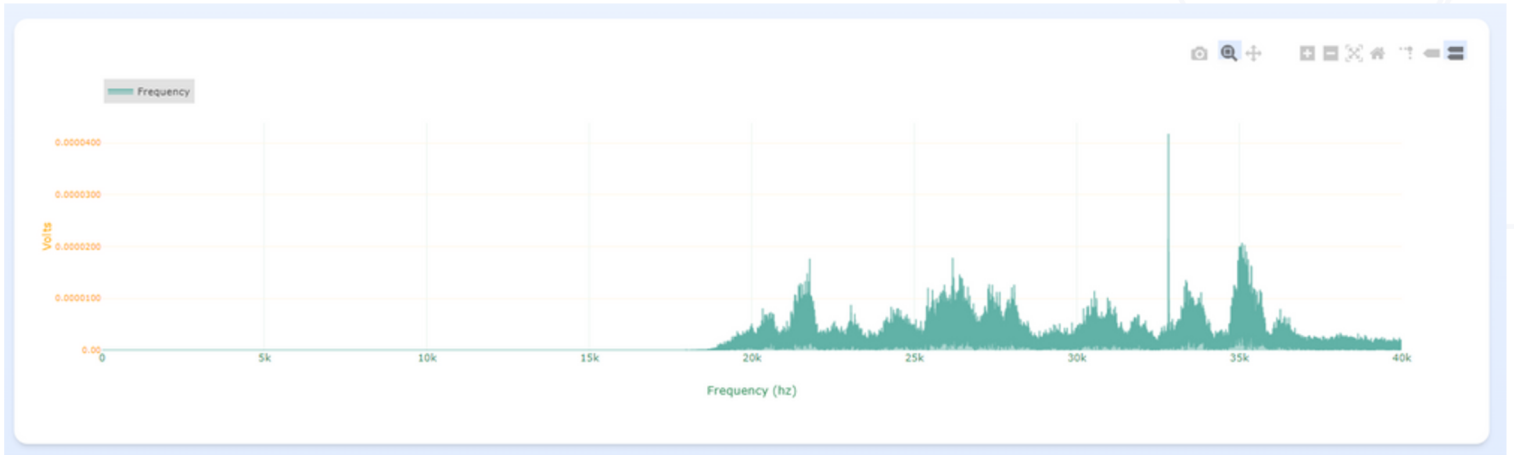


The acoustic emission data has a set frequency range of 20kHz - 40 or 80 kHz to capture the maximum amount of useful data, which is beyond human hearing range.

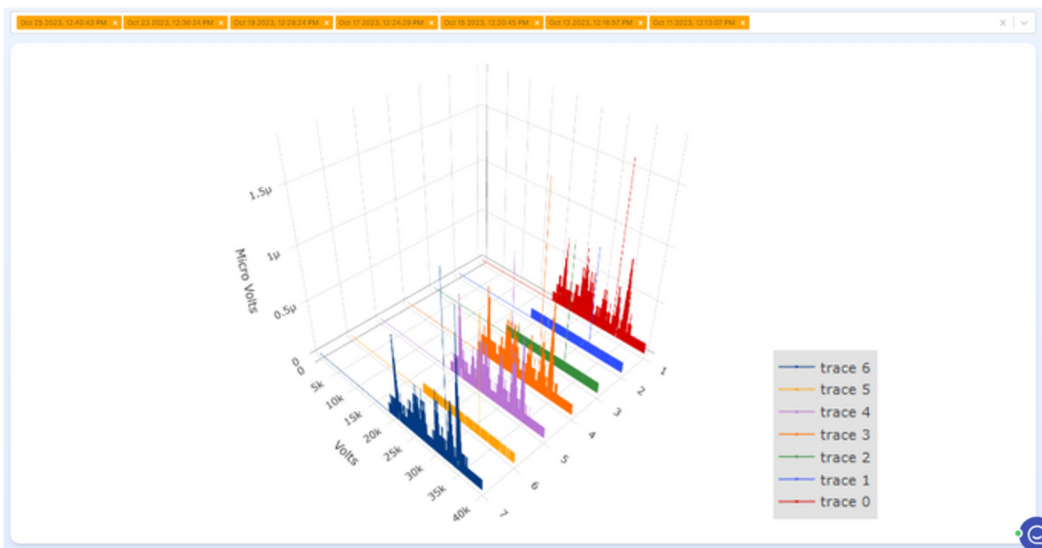
RMS



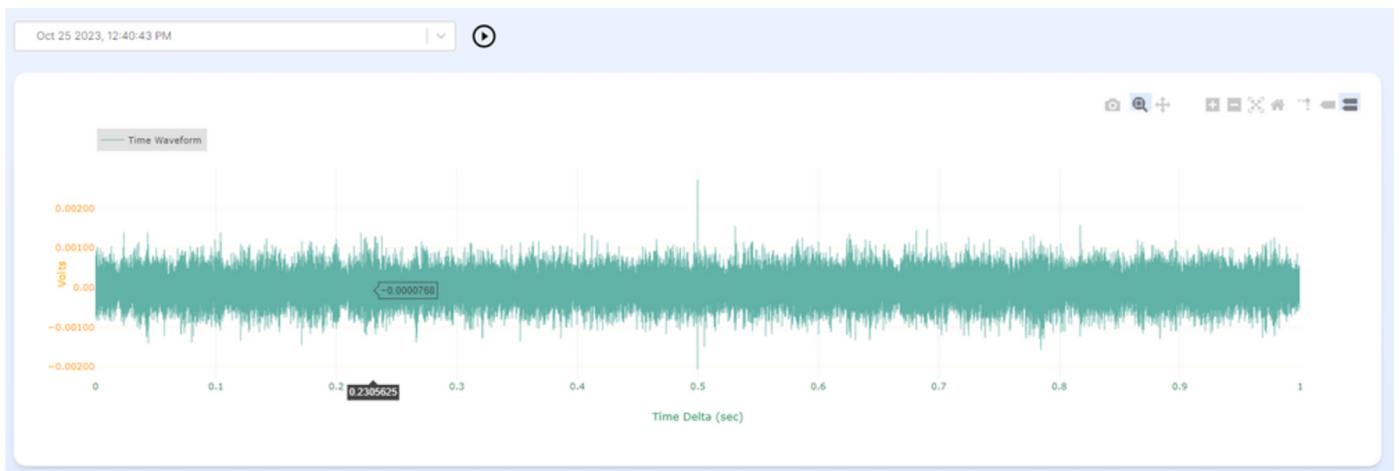
Spectrum



Waterfall Spectrum



Time Waveform



Magnetic Flux

The graph represents magnetic flux near the sensor mounting position. It displayed in RMS, Spectrum and Time Waveform.

Temperature

Temperature graph represents surface temperature of each location on which the sensor is mounted.

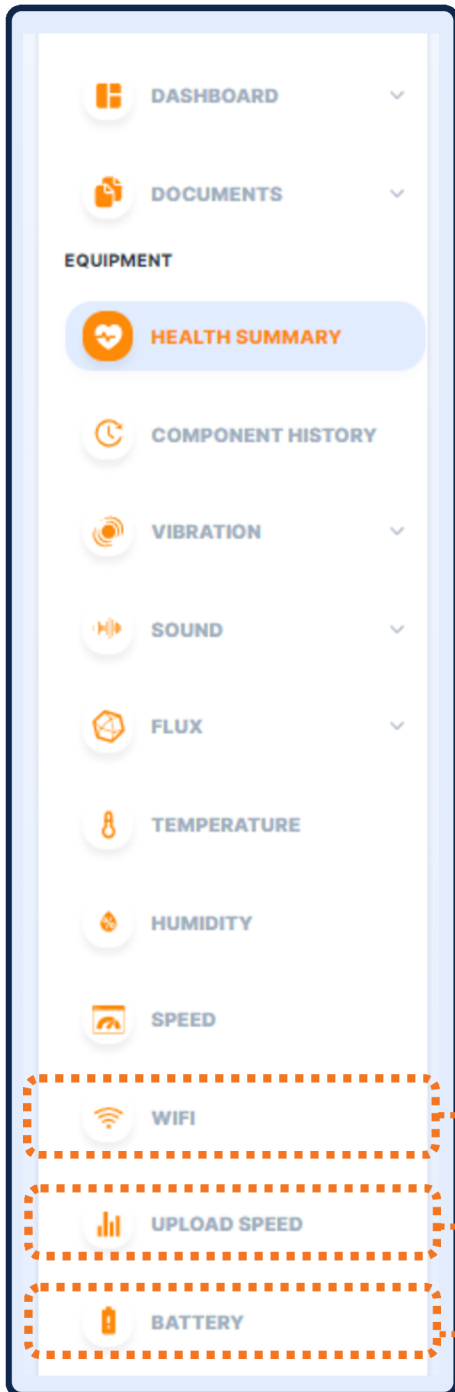
Humidity

The humidity graph represents the atmospheric humidity value near the sensor.

Speed

The speed graph provides RPM of the equipment, which is extracted from the vibration or flux signal.

Device Metrics



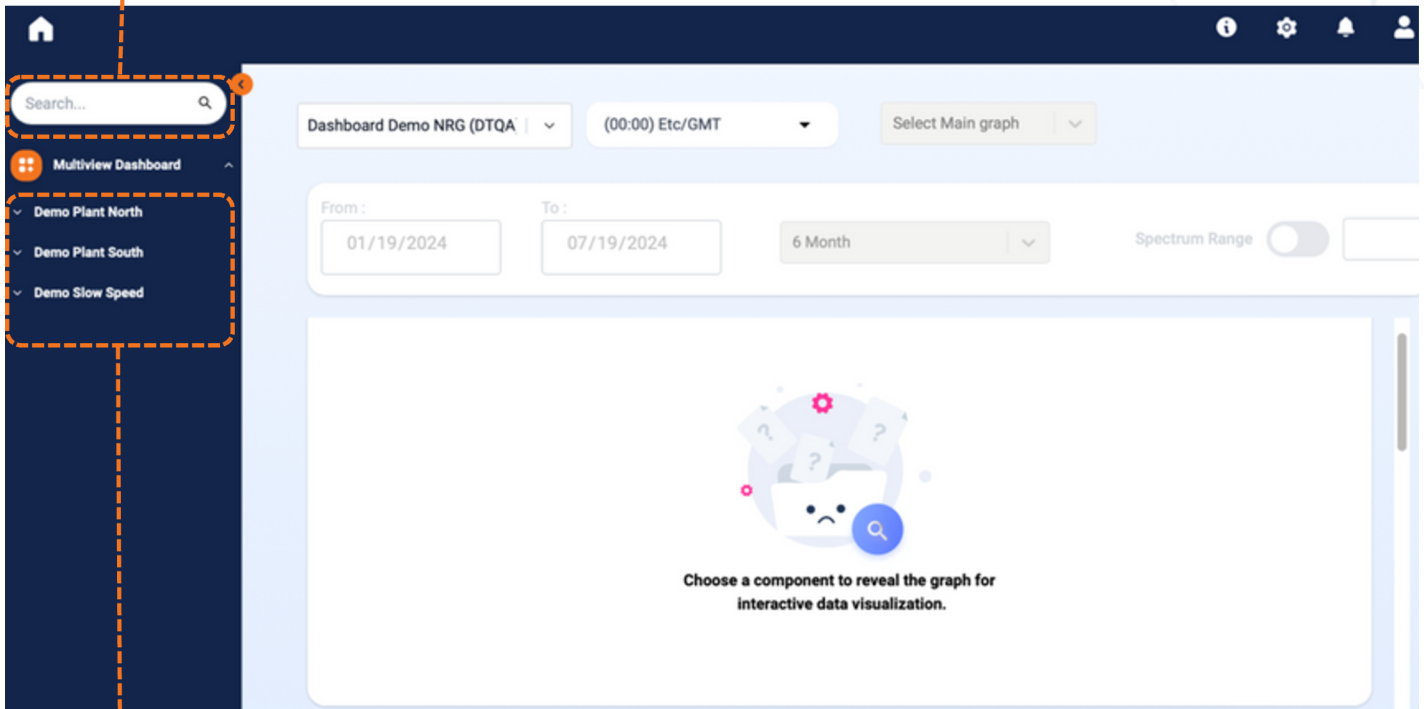
The Wi-Fi graph provides the strength of the network. Higher values (greater than -70dBm) represent good connectivity.

Upload speed is measured and displayed in trend with every data upload.

The battery graph indicates the current status of battery life.

Multi View Dashboard

Search Filter



Machine Tree

Getting Started

To populate Multiview dashboard, use the Machine Tree in the navigation pane to view the graphs for those component(s). Use the Search Filter to quickly identify plants, equipment, and components.

Select and compare charts across different components and data types.

If only one component is selected, RMS & Peak vibration, sound, and temperature charts will be shown. Vibration RMS will be the default chart for more than one component selected. Default chart is changed via the selector.

Multi View Settings

Highlighted Selections

Chart Period

Default Graph

Spectrum Frequency

Switch Between Quad View & List View



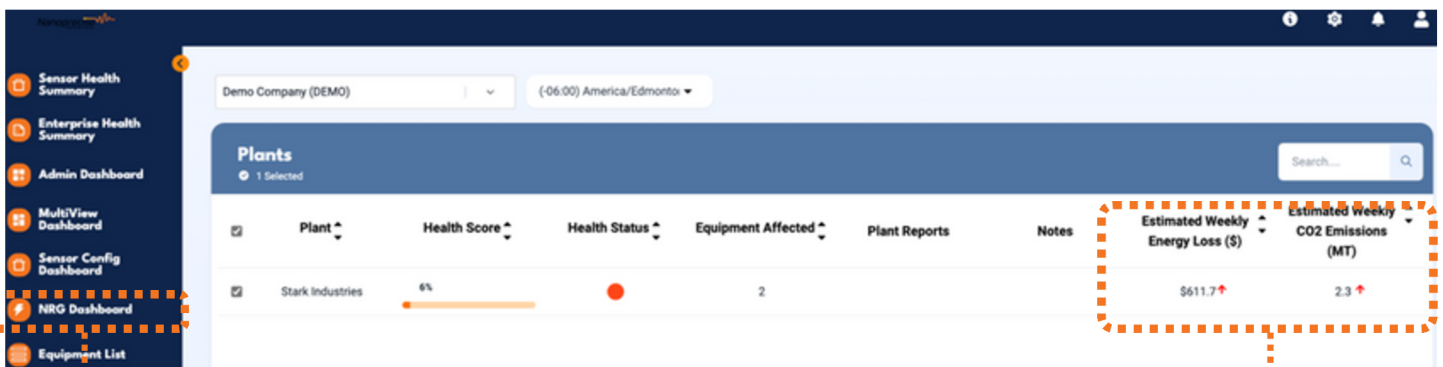
NRG Dashboard

Nanoprecise's NRG Dashboard revolutionizes maintenance strategies by focusing on energy optimization and sustainability. Through predictive analytics, it anticipates energy consumption changes and enables early fault detection to reduce energy waste and lower operating expenses.

Where to find

Access your NRG Dashboard via the left navigation pane upon logging into the Nanoprecise platform.

Login:

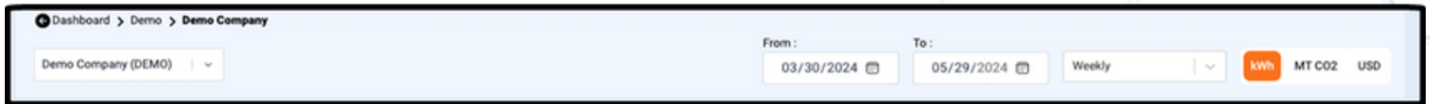


Plant	Health Score	Health Status	Equipment Affected	Plant Reports	Notes	Estimated Weekly Energy Loss (\$)	Estimated Weekly CO2 Emissions (MT)
Stark Industries	6%	●	2			\$611.7 ↑	2.3 ↑

Click here to access the NRG Dashboard!

NRG Monitor plant summary information

Settings



Company Selection

If applicable, and with the appropriate user credentials, users may view the NRG Dashboards for individual organizations and companies.

Note: Click home to return to the main landing page.

Chart Period

Use the “From” and “To” date selectors to set the time window when viewing the Historical Increased Energy Consumption chart. This helps observe the change over time. Toggle between: Daily, Weekly, Monthly and Quarterly intervals.

Chart Units

Toggle between units across Δ Energy Consumed (kWh), Δ Emissions Generated (MTCO₂) and Cost of Δ Energy Consumed (Using currency based on user’s region).

Note: This setting affects both the Total Change in Energy Consumption and Historical Change in Energy Consumption charts.

Total Change in Energy Consumption

Here is the aggregate change in power consumption across all equipment type classes. This delta (change) in power consumption is indicated as it relates to the baseline performance of individual equipment.

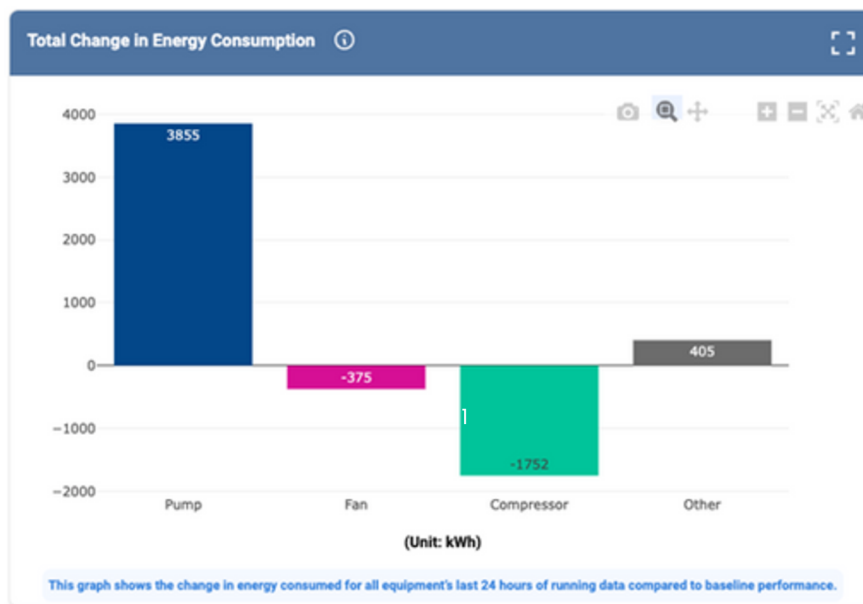


Chart Features



Equipment Type: Depending on the different types of equipment being monitored, they will show up as individual color-coded columns in this chart.



Total kWh Increase (or Decrease): For each equipment type column, the numerical value indicates the total kWh increase (negative value for decrease) of power consumption for all equipment of that equipment type.



Chart Viewer Controls: On top of the chart are the viewer controls. Users can download (screenshot), zoom, pan, and autoscale (reset zoom). Users can also enlarge the chart via the maximize icon on the top right.



Units Adjustment: The units selector on the top right of NRG Dashboard toggles Δ energy consumption metrics in the form of energy (kWh), emissions (MT CO₂), or currency (region-based). All metrics are equivalent estimates.

Total Power Rating for All Monitored Equipment

Here is the distribution of a plant/organization's equipment types and the total power rating across all their equipment (in Horsepower). This is for latest data shown today.

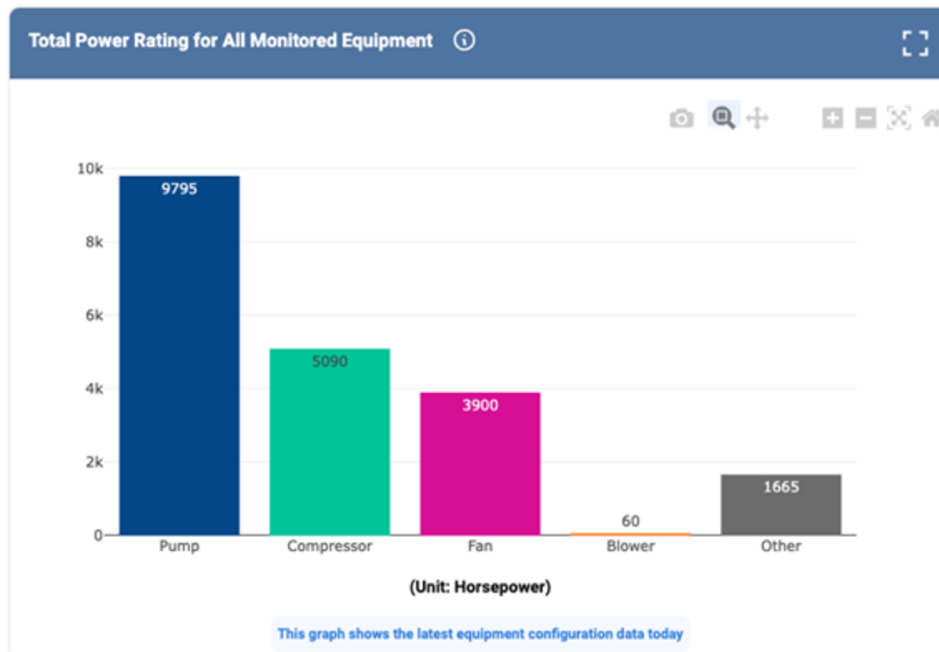


Chart Features



Equipment Type: Depending on the different types of equipment being monitored, they will show up as individual color-coded columns in this chart.



Total Horsepower Rating: For each equipment type column, the numerical value indicates the total horsepower of all equipment of that type. This data is static and unaffected by NRG Dashboard period or unit settings.



Chart Viewer Controls: On top of the chart are the viewer controls. Users can download (screenshot), zoom, pan, and autoscale (reset zoom). Users can also enlarge the chart via the maximize icon on the top right.

Historical Change in Energy Consumption

Here is a pareto chart on the trend for changes in power consumption for all an organization's equipment. This delta (change) in power consumption is indicated as it relates to the baseline performance¹ of individual equipment.

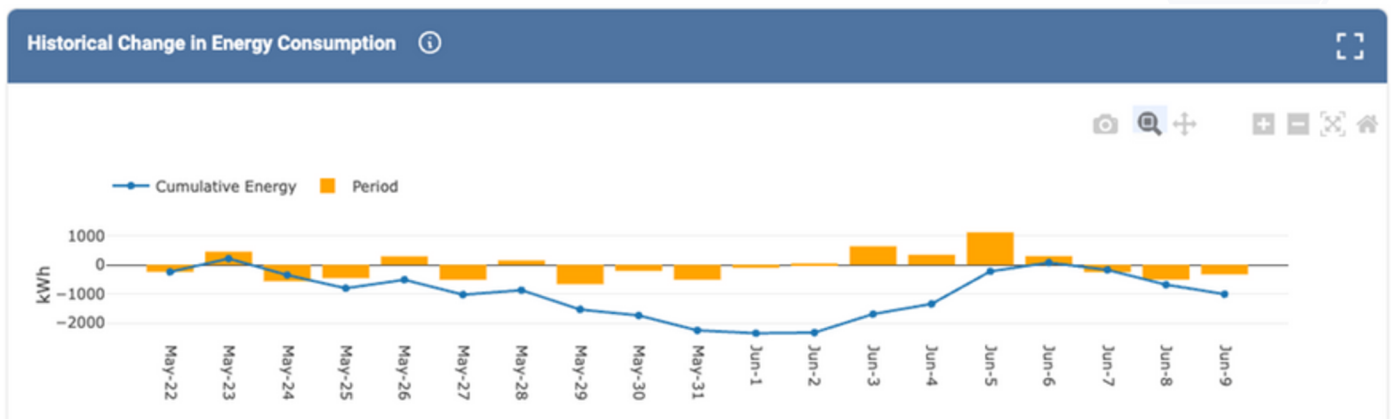


Chart Features



Total kWh Increase (or Decrease): For timestamp columns, the numerical value indicates the total kWh increase (negative value for decrease) of power consumption compared to baseline.¹ This is for all the company's equipment.



Cumulative Energy Losses (or Savings): The cumulative line shows the aggregate energy losses (negative value for savings) as time has passed.



Chart Viewer Controls: On top of the chart are the viewer controls. Users can download (screenshot), zoom, pan, and autoscale (reset zoom). Users can also enlarge the chart via the maximize icon on the top right.



Units Adjustment: The units selector on the top right of NRG Dashboard toggles Δ energy consumption metrics in the form of energy (kWh), emissions (MT CO₂), or currency (region-based). All metrics are equivalent estimates.



Period Adjustment: The period selector on the top right of NRG Dashboard can change the time interval (select window between two dates) and frequency (daily, weekly, monthly or quarterly) of the trend data.

Energy Intensity Last 24h

Here is the measured energy intensity for all a company's plants over the past 24 hours. This is a ratio of the change in power consumption for all equipment to the total rated power for all equipment. Higher values indicate more inefficiency when compared to baseline.¹

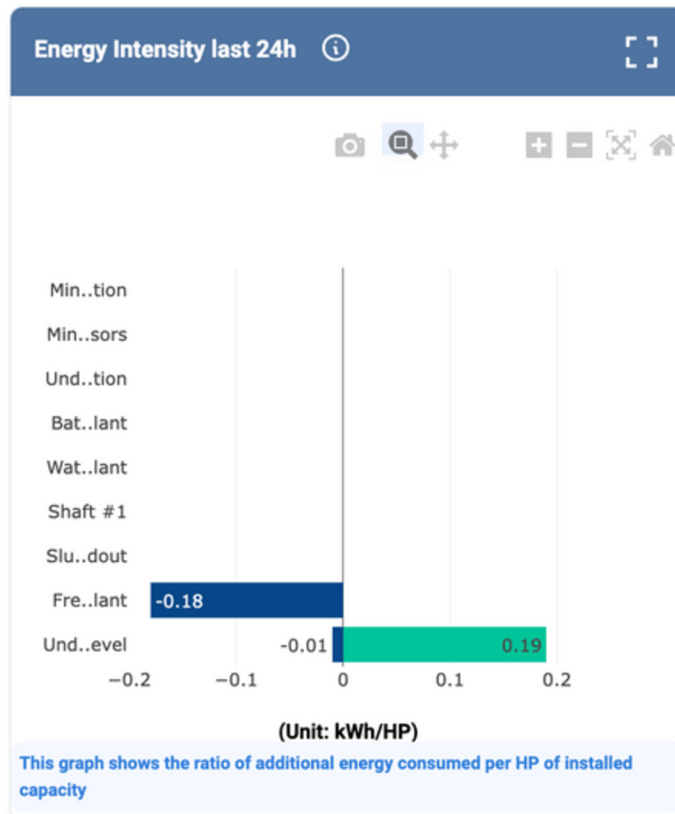


Chart Features



Plant: Depending on the user's access credentials, the rows of this chart will show the various companies/plants of the organization.



Energy Intensity: For each row, the numerical value indicates the energy intensity across all a plant's equipment for the past 24 hours. Higher values indicate increasing inefficiency while negative values suggest improvements.



Chart Viewer Controls: On top of the chart are the viewer controls. Users can download (screenshot), zoom, pan, and autoscale (reset zoom). Users can also enlarge the chart via the maximize icon on the top right.

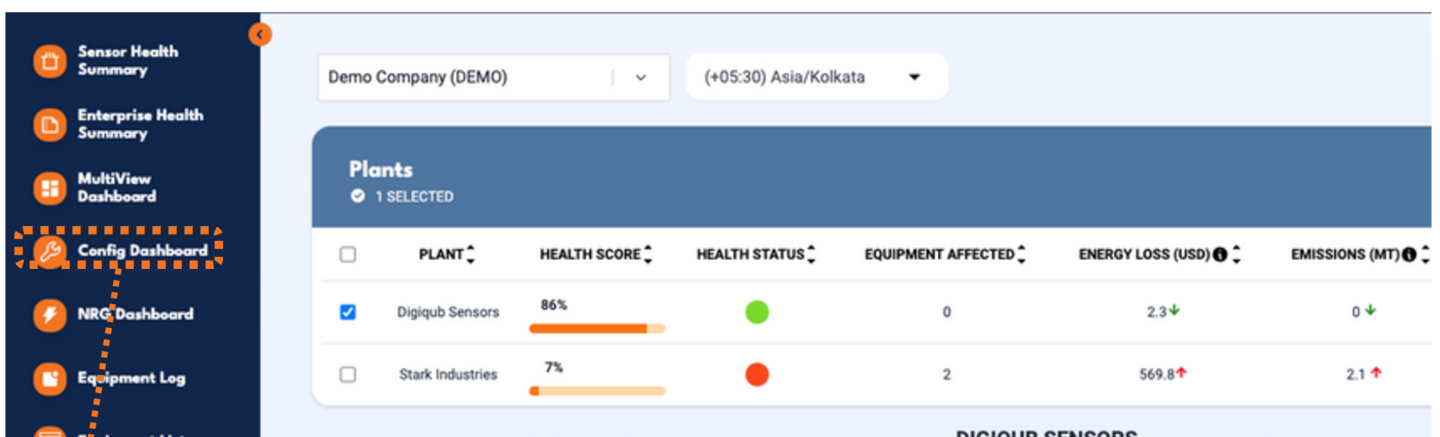
Config Dashboard

Nanoprecise's new Config Dashboard is designed to enhance usability and speed up the configuration process, by taking the configuration functionality of the DIY mobile app and adding it directly to the dashboard itself.

Where to find

Admins/Super Admins can find the "Config Dashboard" in the side menu upon logging into the Nanoprecise platform.

Login:



The screenshot shows the Nanoprecise dashboard interface. On the left is a dark blue side menu with several options: Sensor Health Summary, Enterprise Health Summary, MultiView Dashboard, Config Dashboard (highlighted with a dashed orange box and a dotted line pointing to a callout), NRC Dashboard, and Equipment Log. The main content area shows a header with 'Demo Company (DEMO)' and a time zone dropdown set to '(+05:30) Asia/Kolkata'. Below the header is a 'Plants' section with '1 SELECTED' and a table of plant data.

<input type="checkbox"/>	PLANT	HEALTH SCORE	HEALTH STATUS	EQUIPMENT AFFECTED	ENERGY LOSS (USD)	EMISSIONS (MT)
<input checked="" type="checkbox"/>	Digiqub Sensors	86%	●	0	2.3 ↓	0 ↓
<input type="checkbox"/>	Stark Industries	7%	●	2	569.8 ↑	2.1 ↑

[Click here to access the Config Dashboard!](#)

Dedicated Equipment & Component Tabs

Search & Sort Across all Columns

Download the Current Table

Company Name	Plant Name	Equipment Name	Equipment Type	Technical Info	Component Name	Component Type	Component Subtype	Min RPM
Dashboard Demo NRG(DTQA)	Demo	Firmware Test equip	other	⚠️	Config Test equip	blower	centrifugal	500
Dashboard Demo NRG(DTQA)	Demo	Firmware Test equip	other	⚠️	Firm 10.6.2 A1	blower	centrifugal	150
Dashboard Demo NRG(DTQA)	Demo	Test Demo	compressor	✅	Test	turbine	steam	300
Dashboard Demo NRG(DTQA)	Demo	Test Demo	compressor	✅	Test Demo	motor	dc	1500
Dashboard Demo NRG(DTQA)	Demo Plant North	Compressor	compressor	✅	Compressor DE	compressor	reciprocating	88
Dashboard Demo NRG(DTQA)	Demo Plant North	Fan	fan	✅	Fan DE	fan	centrifugal	100
Dashboard Demo NRG(DTQA)	Demo Plant North	Fan	fan	✅	Fan NDE	turbine	steam	832
Dashboard Demo NRG(DTQA)	Demo Plant North	Fan	fan	✅	Test-ABh	other	other	10
Dashboard Demo NRG(DTQA)	Demo Plant North	Sensor Config 2	fan	✅	20.0.2 NS003 D1	motor	ac	10
Dashboard Demo NRG(DTQA)	Demo Plant North	Sensor Config 2	fan	❌	20.0.2 NS003 D2	gearbox	fixedAxis	1795

Machine Tree

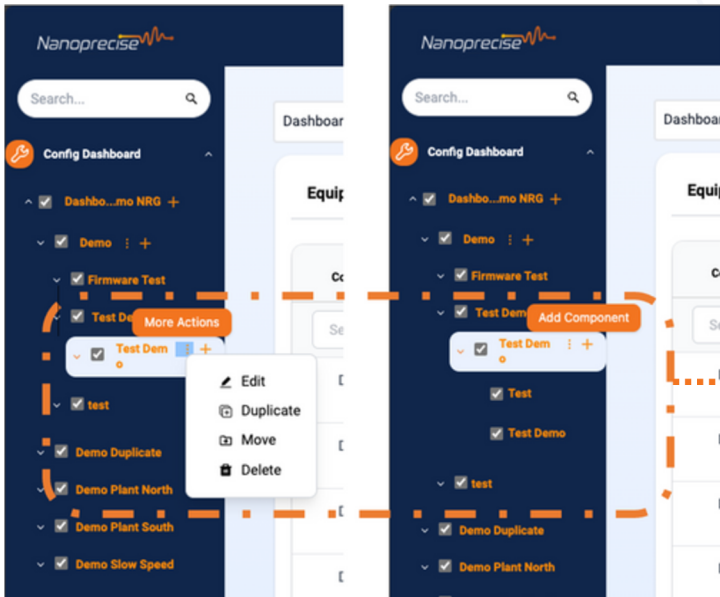
Status of Technical Info Completes & Access to Edit Technical Info

Getting Started:

- Navigate through the Machine Tree or Tabular view with "equipment" and "Component" tabs.

Key Features:

- **Hierarchical Management:** Easily add, configure, and manage equipment at different levels.
- **Asset Editing:** Edit, duplicate, move, or delete assets directly from the machine tree. Technical Info: Ensure data completeness with indicators for missing or complete info.
- **Quick Config:** Edit details like speed, horsepower, RPM, and bearing types via a popup.
- **Search:** Quickly find equipment or components by name or type.



Assets can be added, edited, duplicated, moved or deleted directly from the Machine tree.

Equipment		Component						
Equipment Name	Equipment Type	Technical Info	Component Name	Component Type	Component Subtype	Min RPM	Max RPM	Bearing Type
Rachel Test equipment	pump		SH-PC-022	pump	centrifugal	3600	-	Unknown
Rachel Test equipment	pump		Sensor-1 600a0c2a69e8156e	pump	centrifugal	0	-	Unknown
Blower	blower		Blower DE	motor	ac	832	3570	Anti-Friction Bearing
Blower	blower		Blower Test	other	other	302	602	Anti-Friction Bearing
Blower	blower		Motor DE	blower	centrifugal	1783	3100	Unknown
Compressor	compressor		Compressor DE	compressor	reciprocating	708	1770	Anti-Friction Bearing
Fan	fan		Fan DE	fan	centrifugal	1795	1799	Anti-Friction Bearing
Fan	fan		Fan NDE	turbine	steam	832	3570	Anti-Friction Bearing
Sensor Config 2	fan		20.0.2 NS003 D1	motor	ac	500	900	Unknown

Review Technical Info Completeness Status & select edit to add or update info

Find all relevant technical info in easy to navigate columns

Component Configuration:

REQUIRED INFO ⊕

Component Name

External ID (optional)

Component Type

Component Sub Type

What is the RPM ?

Required Technical Info, is needed to provide fault insights. Requested info will vary based on component type.

RECOMMENDED INFO ⚠

What is the bearing type? Journal Bearing Anti-Friction Bearing Unknown

What are the bearing number/model?

Recommended Technical Info, will assure optimal monitoring of all possible fault modes for the component type.

SENSOR INFO

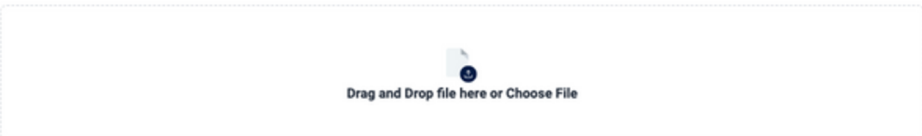
Sensor ID

Tag ID

Mount Configurations

Easily Assign/Reassign the SensorID and mounting config

COMPONENT IMAGE



Supported formats: JPG, PNG Maximum size: 2MB

Add pictures of the equipment and components

Appendix A

NanoAI Alarm & Adaptive Fault Amplitude Threshold

- **Threshold is automatically updated every 30 days based on the data of the last 30 days**
- **AI trained model is used to capture the features of data**
- **Threshold is set/modified to adapt to the features**
- **No prior knowledge is required from customer**
- **Alarms will be automatically sent to customer if RMS/Peak hits the threshold**
- **Applies to RMS/Peak of vibration signals (acceleration & velocity) and RMS of ultrasonic signals**
- **It can also be applied to Amplitude fault trends**

Appendix B

Vibration

Waveform

A plot of amplitude versus time. The waveform illustrates how the vibration signal (i.e., acc., vel., and dis.) appears when graphed as amplitude over time.

Spectrum

- A plot of amplitude versus frequency.
- The Spectrum is obtained by applying a Fast Fourier Transform (FFT) on Waveform, which breaks the signal down into specific amplitudes at various component frequencies
- If a machinery problem exists, FFT Spectrum provides information to help determine the location of the problem, the cause of the problem, and, with trending, how long until the problem becomes critical
- Because we know that certain machinery problems occur at certain frequencies, we analyze the FFT spectrum by looking for amplitude changes in certain frequency ranges

Frequency Spectrum Waterfall

- A three-dimensional plot in which multiple vibration spectra curves are displayed simultaneously
- On the Nanoprecise Dashboard, vibration frequency spectrum waterfall plot covers multiple spectra for the last 7 days
- By using the frequency spectrum waterfall plot, it can show how the frequency spectral structure changes over time

Amplitude

The maximum amplitude for the fault characteristic frequencies and its harmonics up to 10th order. This amplitude describes the severity of a specific fault mode. Nanoprecise uses such amplitudes for RUL calculation.

Vibration

Peak

Peak value in time domain. The maximum excursion of the time wave from the zero or equilibrium point in the time domain.

Kurtosis

Kurtosis is a statistical parameter used to characterize a signal. Kurtosis provides a measure of the peak of a vibration signal. Signals that have a higher kurtosis value have more peaks that are greater than three times the RMS value, which are, for mechanical vibration signals, the impulses introduced by the mechanical impacts, indicating the potential mechanical fault.

RMS

Root Mean Square is the square root of the average of the squared values of the vibration waveform. RMS describes the vibration energy in the machine. The higher the vibration energy, the higher the vibration RMS is.

Magnetic Flux

Time Waveform

The time waveform illustrates how the magnetic flux appears when graphed as amplitude over time.

Frequency Spectrum

A plot of amplitude in micro voltage versus frequency. The Flux spectrum describes the amplitude at each frequency component.

RMS

Root Mean Square is computed from the spectrum to quantify the magnetic flux energy emitted by the machine.

Sound

Time Waveform

The Acoustic Emission (AE) waveform illustrates how the AE signal appears when graphed as amplitude over time.

Frequency Spectrum

A plot of amplitude in micro voltage versus frequency. The AE spectrum describes the amplitude at each frequency component.

Frequency Spectrum Waterfall

- A three-dimensional plot in which multiple AE spectra curves are displayed simultaneously
- On Nanoprecise Dashboard, AE frequency spectrum waterfall plot covers multiple spectra for the last 7 days
- By using the frequency spectrum waterfall plot, it can show how the frequency spectral structure changes over time

RMS

Root Mean Square (RMS) is the square root of the average of squared values within the AE waveform. RMS characterizes the acoustic emission (AE) energy emitted by the machine. A higher AE energy level corresponds to an elevated AE RMS value.

Appendix C

Health Status

Health Status is defined by a combination of Fault Severity of the worst condition Fault Amplitude of that component and the Remaining Useful Life.

HELP INFORMATION

Based on the comprehensive signal processing and transfer learning techniques, fault severity is analyzed and trended subject to ASNT standards with proper severity stage categorization by our algorithm. Various health summary metrics in the dashboard are linked to the fault severity as mentioned in the following table:

Fault Severity	Remaining Useful Life	Health Status	Fault	Suggestion
lower than stage 2	>75%	Healthy	Not Available	None
stage 2	>50%	Healthy	Not Available	None
stage 2 & fault anomaly detected*	>50%	Needs maintenance review	Applicable fault	Review maintenance plan and parts availability
stage 3	>750 hours	Needs maintenance review	Applicable fault	Review maintenance plan and parts availability
stage 3	251-750 hours	Needs attention	Applicable fault	Schedule maintenance activity
stage 3	<250 hours	Needs immediate attention	Applicable fault	Repair immediately
stage 4	0	Needs immediate attention	Applicable fault	Repair immediately

*fault anomaly detected: fault amplitude data exceeds NanoAI Amplitude threshold

Health Score

Health score on Plant level is the average rating of each equipment health status under the plant. Assuming Plant A has 4 different equipment in it. Each equipment has 4 health modes with following health modes and associated score of ranking.

- Healthy - 3
- Needs Maintenance Review - 2
- Needs Attention - 1
- Needs Immediate Attention - 0

If two equipment are in the Healthy mode, 1 is in Needs Maintenance Review mode and 1 is in Needs Attention mode then the health score will be calculated by averaging the total score. In this case, it will be calculated as $3 + 3 + 2 + 1 / 12 = 0.75 = 75$ is the health score

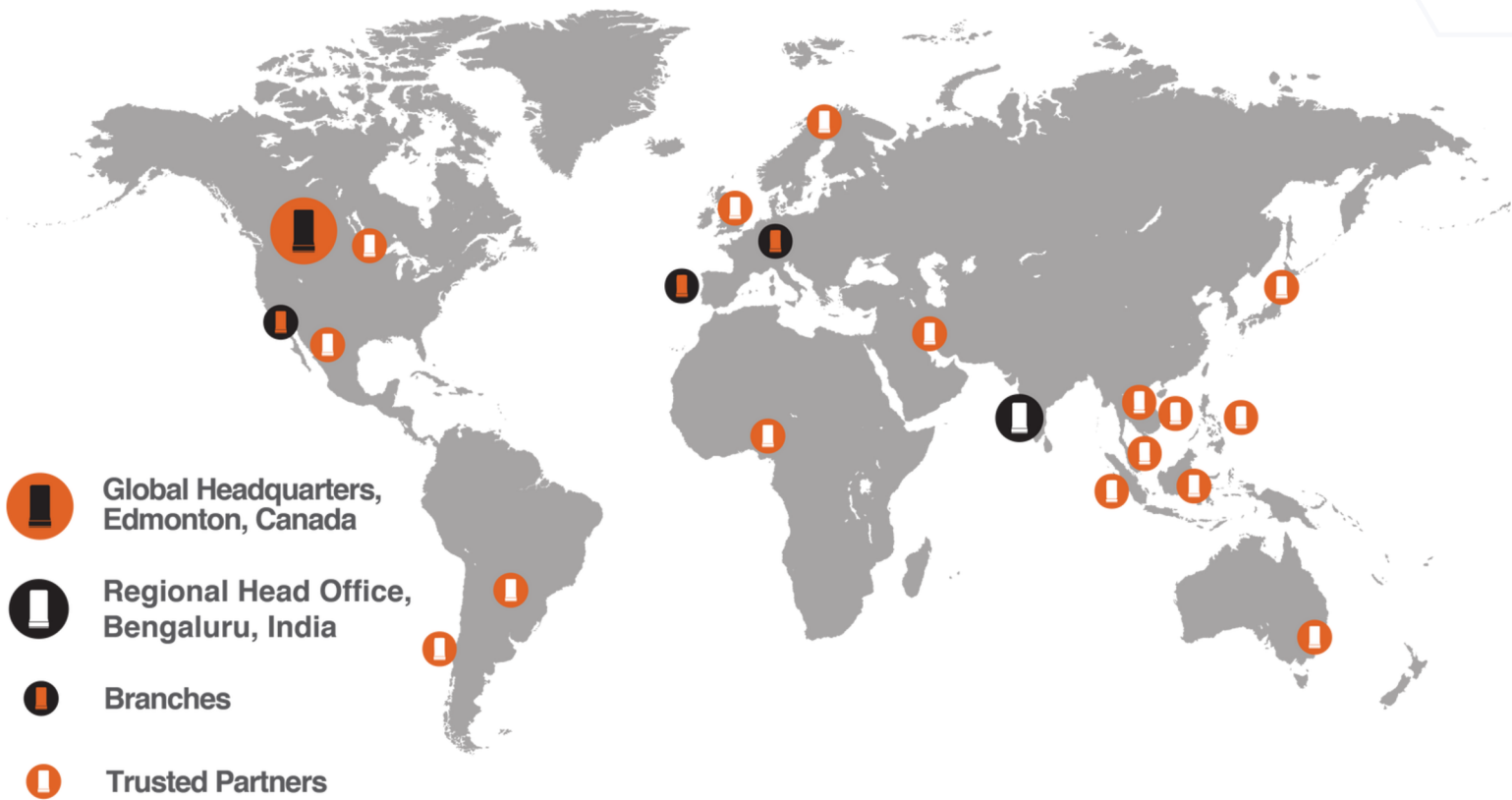
Remaining Useful Life

The Remaining Useful Life (RUL) in the notification is given either in percentage or in hours, by considering both the absolute amplitude values and the relative amplitude trend.

- **Absolute Amplitude Values:** Determining whether it is above or below Stage 3
- **Relative Amplitude Trend:** Determining whether it is increasing or not
 - If the trend is flat, even though its absolute value is beyond Stage 3, the predicted RUL to reach Stage 4 would still be very large
 - Otherwise, the increasing trend would lead to a short-predicted RUL to reach Stage 4.

Fault Stage	Predicted RUL in hours	RUL Representation on Dashboard
Stage 1	NA	Percentage
Stage 2	NA	Percentage
Stage 3	>750	Hours
	<750	Hours
Stage 4	>750	Hours
	<750	Hours
Note 2	Two factors are taken into consideration for RUL calculation: Absolute Amplitude and Relative Amplitude Increasing Trend.	
Note 1	By NA for Stage 1 and Stage 2, it means the RUL will be represented in percentage regardless of the value of predicted RUL in hours.	
Note 3	750 hours is around one month, being treated as the boundary to have RUL in percentage or in hours.	
Note 4	When the Remaining Useful Life (RUL) is expressed in hours, immediate action accompanied by a field check is necessary, as the escalating trend in detected fault amplitude would be substantial.	
Note 5	When the Remaining Useful Life (RUL) is presented as a percentage, continuous monitoring is required without immediate action, as the detected fault amplitude would likely remain relatively consistent.	

Global Presence



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