SmartDiagnostics Software
Version 3.9.0
User Manual

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Logging In

- You will receive an email from SmartDiagnostics®.
- In the email, there is a link to create a password for your user account.
- Click on the link and you will be directed to the SmartDiagnostics® website to set a password.
- The password must contain at least 8 characters of any combination of letters, numbers, and symbols.
- Once a password has been set, click the Save button.
- After reading and accepting the End User License Agreement (EULA), you will be logged into the system.
**User Options & Information Menu**

The dropdown menu allows users to set up their personal profile, change their password, log off, access this manual, read the terms of use (end user license agreement), request assistance, and find out more about SmartDiagnostics®.

**Profile**

- The first tab contains **User Information**. This is where a user can change their email address and add a phone number for SMS (Short Message Service) text **notifications**.
- The second tab is **Units**. This section allows the user to set preferences for Date, Time Format, Velocity, Acceleration, Frequency, Pressure, and Temperature Units.

**Change Password**

The **Change Password** page allows users to create a new password by entering their current password, along with creating and confirming a new one.

**Navigation**

The Navigation pane appears on the left side of the screen and is comprised of the Hierarchy Tree, Filters, and Indicator Legend. At the top of the Navigation pane is the **Hierarchy Tree** which is composed of the selected Corporation (along with its Locations and Systems) or the selected System (along with its Assets,
Asset Groups, and Monitoring Points). While in the Trend, Alerts, or Edit tabs, the resizable Filters menu and Indicator Legend will appear beneath the System Tree. A system can have up to five profile levels (sub system A, sub system B, Asset group, asset, monitoring point).

**View Tabs**

The view tabs occupy the right margin of the screen and dictate the content found in the center window of SmartDiagnostics®. The number of tabs displayed depends on the currently selected hierarchy level and permissions of the current user. While both the Map and Settings tabs appear at all levels of the hierarchy, the Edit tab is only visible to administrators. The Network tab is only exposed when the location level is selected. Trend, Alerts, and Events tabs display throughout the system tree. The Dashboard tab only displays after a KCF Sentry Engineer creates a widget at the corporation or location level.

**Hierarchy Trees**

These trees can be found at the top of the Navigation pane on the left side of the screen. The hierarchy tree is the main navigation feature.

**Corporate Tree**

Corporations are the highest level of the SmartDiagnostics® hierarchy and can be selected from the leftmost Breadcrumb dropdown menu (by corporate users). Each corporation tree contains three distinct hierarchy layers to help organize data.

👩 Corporation is the first hierarchy layer and is represented by a globe icon.

<Location> Locations are the second hierarchy layer and appear as factory icons.

Examples: city, state, plant, site, facility

📦 Systems are the third hierarchy layer and appear as folder icons.

Examples: building, structure, production or assembly line

 hasher Master systems are the default system type. Master systems need to be manually configured and sensors added. These systems are denoted by the (regular) folder icon.

 ☑️ Collector dependent systems use existing master systems to populate groups and indicators. These systems are denoted by a folder icon with a map pin and are exclusively generated by KCF Sentry Engineers.
**System Tree**

Systems are the third level of the SmartDiagnostics® hierarchy and can be selected from the corporate tree or the corresponding Breadcrumb dropdown menu. Within each system tree, there are as many as five layers of hierarchy that can be established to help further organize data.

- **Systems** (see the description above for additional information)
- **Sub System A** (see the description above for additional information)
- **Sub System B** (see the description above for additional information)
- **Asset Groups** are the fourth layer and are also represented as folder icons. Examples: an area, region, collection, section of a line, complex machine
- **Assets** This level typically represents an actual machine (pump, motor, fan, etc.).
- **Monitoring Points** represent where a sensor will monitor the asset. Assets may have several monitoring points, each one having a separate sensor assigned.
- **Indicator Groups** are the lowest grouping which will contain a group of indicators displaying metrics from single sensor. Often indicator groups are delineated by X/Y axis or vertical/horizontal.

**Status Color**

When an [alarm or warning](#) is triggered, the icons will change their color to alert the user. Note that these colors will propagate upwards though the hierarchy tree.

- A **black** icon means that the indicators are functioning within established parameters.
- A **yellow** icon indicates that a warning threshold has been surpassed in at least one indicator.
- A **red** icon signals that an alarm threshold was exceeded (and probably requires attention).
**Breadcrumb Navigation**

At the top of your browser screen will display the Breadcrumb navigation, which is clickable and will navigate the system to the profile level clicked on. The icons and levels exactly match those in the profile hierarchy. The last ‘breadcrumb’ offers the Sensor menu:

- **Sensor** menu (the farthest right-hand breadcrumb). When clicked, this button will either display a dropdown menu of sensors (assigned to indicators within the current hierarchy selection) or it will directly open the modal of the only available sensor:

![Sensor menu](image)

**Edit & View Modes**

Located beneath the view tabs *(on lower right of screen)*, this switch is only visible/accessible to administrators and toggles between the **View** and **Edit** modes. The **View** mode is the default for all users while the **Edit** mode is used to perform configuration changes. Once the **Edit** mode is engaged, the navigation and various content within the currently selected view will become editable.

**Edit Mode Icons**

When an administrator switches to **Edit mode**, the hierarchy tree reveals three additional icons.

- The icon to the immediate left of the group layer icons is the **Move** icon. Click and drag this icon to relocate the corresponding group along with any other groups and indicators beneath it.
- The first icon to the right of the system/group name is the **Add Group** icon. This icon allows an administrator to create a new group layer within the hierarchy.
- The last icon is the **Delete** icon. This icon allows an administrator to delete the corresponding layer along with any other groups and indicators beneath it.
System Configuration

This section covers how to set up the software to monitor your systems using SmartDiagnostics® Sensors. By reading this section carefully and planning your systems’ layout, you will be able to customize the software hierarchy to your preference. This includes organization of key data views and notification features for valuable real-time data from your sensor nodes.

Corporate Logo

The default globe icon in the top left breadcrumb can be modified by a corporation admin to display a customized corporate logo.
*KCF typically creates the corporate account with the corporate logo, but this may be edited by Corporate Admin users.

- Select the corporation level of the hierarchy tree (or use the breadcrumb)
- Click on the Settings tab
- Switch from View to Edit mode
- Click on the icon next to the corporate name (directly above the Abbreviation text)
- A pop-up modal will appear with instructions concerning the image specifications
  - Accepted image file types: .jpeg, .jpg, .svg, and .png
  - Maximum file size: 5MB
  - SVG files scale best and look clean at all resolutions
  - PNG files with transparent backgrounds also look professional
  - If possible, use a relatively square logo (excessively wide or tall logos may appear distorted)
- Click the Upload Icon button (or drag and drop the image onto the gray box)
- Select the desired image
- Click the Open button
- Close the corporation logo modal

System Name

First, give the System a name. A System name typically describes a building, structure, production or assembly line, etc.

- Select the Settings tab.
- Switch from View to Edit mode.
- In the middle of the page, click the blue underlined System Name text.
- Type a name for the system and click the blue check box.
  - Example: Production Line 1
Creating Groups

As outlined in the System Tree section, groups exist within the system to assist with organization.

- Switch from View to Edit mode.
- To create a new Asset Group, click the Add Group icon (⊕) next to the System name.
- Provide a name in the input box.
  - Example: Section A
- Within each Asset Group, Assets can be created.
- To create an Asset, click the Add Group icon (⊕) next to your Asset Group name. Assets behave the same as Asset Groups and are simply an extra layer of hierarchy to help organization (like folders in a file system).

Abbreviations

Abbreviations are used throughout the hierarchy for easier and quicker navigation. By default, most of the Breadcrumbs will only display the first 5 characters of a name. If these first 5 characters aren’t the best description for ease of navigation, you can assign a different abbreviation.

- Choose the hierarchy level in the Tree.
- Switch from View to Edit mode
- Hierarchy level abbreviations can be set by clicking on the [Click to set] blue hyperlink just beneath the name.
- For Indicator abbreviations, click the Indicators tab.
- Select the Details table button.
- Beneath the Abbreviation table column, click the [Click to set] blue hyperlink that corresponds to the desired indicator row.
- Enter the 5-character abbreviation you’d like to use for this Indicator.
- Click the blue checkbox button to set the abbreviation.

Templates

Templates can be created at the System, Asset Group, Asset, and Monitoring Point hierarchy levels. This feature can make setup faster, since you can build a single group as a template, and then produce additional copies of it quickly.

- Select the system or group in the tree that you want to make into a Template
- Switch from View to Edit mode
Click the **Save as Template** button to the right of the system/group name

Give this Template a name and description
- You can decide to save a new template or overwrite an existing one

Click the **Save Template** button

Click the Add Group icon (+) next to a System/Group name to create a new hierarchy sub-level
- Templates can also be used to create brand new systems
- Open the System Breadcrumb and select the Create System option

In the pop-up modal, provide a name for the new group

Open the **Template** dropdown and choose the desired template
- Templates with too many hierarchy layers (for the new group to support) will display an asterisk (*) next to their name and cannot be selected

Click the **Add New** button

The new System/Group will be organized in the same manner as the one the template was created from

### Adding Indicators

Indicators are the specific data metrics which are driven by Sensors. These indicators can be added to any of the layers of hierarchy. Examples: Peak Acceleration, Peak Velocity, RMS, Damage Accumulation, temperature, battery voltage, etc.

- Select a hierarchy level within the System Tree (System, Asset Group, Asset, or Monitoring Point).
- Select the **Settings tab**.
- Switch from View to **Edit mode**.
- Click **Add Indicator**, which is located between the Indicators tab and table. This will launch a pop-up modal to set up the Indicator.
- In the pop-up modal, give the Indicator a **Name**.
  - Example: 1271 Temperature
- Choose the measurement **Type** desired.
  - Example: Temperature
- Assign the **Sensor** that feeds data to this indicator (see “Assigning Sensors” below for more details.
  - Note sensor assignment is not required for the initial creation of the indicator.
- Click the **Add New** button to generate your indicator.
Assigning Sensors

Sensors are assigned to the monitoring point through the 'Monitoring Point Details' tab.

- Select the Settings tab.
- Switch from View to Edit mode.
- Within the Navigation menu, select a monitoring point.
- Click on 'Sensor Assignment.'
  - In the Sensor drop-down menu, choose the sensor you want to supply data to this Monitoring Point.
  - The Advanced menu allows users to modify the history of the Sensor assignment.
- When finished, click the Save button. You have successfully assigned a Sensor to a monitoring point.
- Click on Update Interval to set the amount of time the sensor sends data to the system.
- Click on Sampling Frequency and choose a value to apply to the sensor.

Click on the Trend view tab on the right side. After a few minutes, data points should begin to populate the Trend graph.

The Monitoring Point tab is available at all system folder levels. When a system level is selected, and you are viewing Monitoring Points tab, this table displays all available monitoring point’s information. In [Edit] mode, users can batch edit/assign Sampling frequency, Update Interval, and/or Operating Mode of any or all sensors listed. To edit all records in the monitoring point table, click the blue header title and make changes as needed. All values in the table will update. To edit individual records, click on the value to edit and make changes.

Asset Details

SmartDiagnostics will provide full functionality only when Asset Details for each asset is fully filled in. At any asset-level on the profile tree (marked by the motor icon: 🍀), navigate to the Settings tab, and toggle the view/edit to [edit].
• **Type** – General asset type.
• **Category** – Choices are based on Type selected.
• **Fault marker** – This will automatically offer a logical option based on asset type+ category. Enter a ‘Running Speed Multiplier’ number here. The Custom fault marker will appear on the Fault Marker table adjacent to the Spectrum plot on the Trend. This custom marker can only be edited on the Asset Details page, and not from the Fault Marker table.
• **Size** – (HP)
• **Image** – Select and add multiple images of this asset including where sensors are placed.
• **Location** – Asset location within the facility (text input).
• **Expected run speed** – This option field fills in asset running speed on the Spectrum plot and creates a running speed indicator that displays on the trend plot. Three options:
  • **Fixed**: enter a static run speed that may not change
  • **Ranged**: enter an expected speed range. The running speed indicator trend line will display the median value between the high and low values.
• **Asset Criticality** – Scale of 1-4:
  1. **Extreme** – Asset shuts down entire plant and would have immediate and long-lasting production loss.
  2. **High** – Asset shuts down part of plant or threatens to slow plant production if not attended to immediately
  3. **Moderate** – Production is not immediately impacted but problem requires attention to prevent future production losses
  4. **Low** - Redundancy exist or asset is not essential to production process
• **Manufacturer** – Asset manufacturer (text input).
• **Model** – Asset model (text input).
• **Add Page Metadata** (Corporate Admin + Sentry Users only) – Input for data integrations (advanced users only)
• **Bearings** – Select one or multiple bearings the asset contains. These bearings can also be specified per monitoring point.
• **Notes** – (text input)
• **Asset Economics** – this information
• **Cost** – Dollar amount for total cost of that asset.
• **Machine life** – Rating for machine life (number known or taken from machine information).
• **Install date** – Date of asset installation.
• **Annual Run Time** – Annual run time in hours (estimated or known).
• **Overhaul cost** – Expected cost per overhaul event.
• **Expected Unscheduled Downtime** – Number of hours of expected downtime to complete an unexpected repair or overhaul event.
• **Lost production cost** – Dollar amount per hour of lost production.
• **Rated Power Consumption** – Number (known or taken from machine information).

**Monitoring Points**

Within the Settings view tab, all Monitoring Points can be viewed in a table. Choose a profile level-any level from Asset to System. This table displays the Group path, Monitoring Point name, Sensor serial number, Nickname, Monitoring Point Type, Sampling Frequency, Update Interval, Operating Mode (pressure sensors only), and Running Speed Multiplier.

With ‘Edit’ mode toggled on, all blue colored columns (Sampling Frequency, Update Interval, Operating Mode (pressure sensors only), and Running Speed Multiplier) can be edited. By clicking on the column header, all rows of the table will be edited together (batch edit), or individual row values can be selected and edited.

**Running Speed Multiplier**

Monitoring Points may have a running speed multiplier. This value takes the 'Expected Speed' from the Asset details and multiplies it by a factor that may represent a gearbox ratio or other geared connections that will operate at a different speed than the expected asset running speed. This will appropriately affect the running speed value of that monitoring point’s indicators.

**Filters**

SmartDiagnostics filters reduce the metrics displaying on the **Trend**, **Alerts**, and **Settings** views. Default filters included with the software include Axial (all, X or Y axis), Damage Accumulation, Overall Vibration, Peak Acceleration, Peak Velocity, RMS Velocity, Temperature, Vibration Bands, and battery Voltage. The menu can be resized by selecting and dragging the header up or down.

While expanded, the menu will display a listing of all Filters contained within the current account (across all Systems). A filter can be applied or removed by clicking on it within the list, and multiple filters can be selected by holding the [Ctrl] or [Shift] keys and selecting. **Filter order** can be changed when in [edit] mode: click the ellipsis to the left of the filter name and drag to the desired location in the filter list.
Note that only Administrators can create, edit, or delete filters by switching from View to **Edit mode**.

- **Clicking** on the magnifying glass icon will replace the Filter menu header text with a dropdown containing a **Search** input box and results list. Click the **X** icon to leave the search dropdown and return to the selected Filter header text.

- **Clicking** on the upward facing chevron will instantly expand the filter menu to its previous position. **Clicking** on the downward facing chevron will collapse the filter menu to the top of the **Indicator Legend** header.

- The **+** icon opens a pop-up modal displaying all the options available to create a **New** filter and is only visible to Administrators. In addition to providing a name, the user can lock the Y axis values for the filter view on the trend, select the desired Indicator Type(s), Component(s), Make(s), Model(s), Location(s), Orientation(s), or Tag(s) and add them to the filter. Selections will appear in the region beneath the “Filtering by” header text and can be removed by clicking on their corresponding buttons. The “Results”, located in the footer of the modal, displays how many indicators would be displayed if the filter were applied in its current state.

- **The pencil icon allows Administrators to **Edit** an existing filter by opening a pop-up modal nearly identical to the one used for creating new filters. The major difference being that this modal is populated with the name and selections of the corresponding filter.**

- **Administrators can **Delete** filters by simply clicking the **X** icon located to the right of the associated filter name within the list.**

**Indicator Legend**

The Indicator Legend appears at the bottom of the **Navigation** pane when the user is in the **Trend**, **Alerts**, or **Settings** views. The legend can be resized by selecting and dragging the header up or down. While expanded, the legend will display a listing of all Indicators contained within the current **System Tree** selection.

Each Indicator listed displays a representative **alarm status**, abbreviated navigation path, name, and Trend graph color. By hovering over this legend, a tooltip will display the full indicator path name.

- **Indicators can be selected and deselected individually by clicking on them within the list or collectively by clicking the checkbox icon in the header. When deselected, the indicator data will be hidden from the Trend graph, Alerts, and Edit tables.**
Clicking on the upward facing chevron will instantly expand the legend to its previous position. Clicking on the downward facing chevron will collapse the legend to the bottom of the screen.

Dashboard Tab

This view is used to present important metrics within the corporate tree and can only be implemented by administrators. After a widget is created, these dashboards become visible to all users with access to the corresponding corporation or location hierarchy level.

Widgets

Dashboard widgets are resizable information modules that present specific data sources to users. Below are instructions on how to create and modify a dashboard widget.

- Switch from View to Edit mode.
- Click on the + Add button.
- Provide a Widget Title and Widget Type in the designated input boxes.
  - Display Types: Number, Gauge, Time Series, Pie Chart, and Bar Chart.
- Select the Hierarchy Level(s) for this dashboard widget.
  - Corporation dashboard widgets can show locations and system information.
  - Location dashboard widgets can display systems, groups, and indicators.
- ‘Group used for calculations’ are the profile level group’s data you wish to view in the widget.
- The ‘Within Each Group/Indicator Calculate’ determines what data will be represented by the widget.
  - Query Types: Average, Last, Alarm Severity Average, Alarm Severity Max, On Time, Percent Time In Alarm, Percent Time In Warning, Percent On Time, Time In Alarm, and Time In Warning.
- An optional Filter can be applied to these data sources (depending on the selection).
- Units can be specified to provide context in the widget (depending on the Query Type).
- The Calculation Value to Display can also be specified (depending on previous selections).
  - Calculations: Min, Max, and Mean
- Click the Apply button.
- The newly created widget will appear in the top left corner of the dashboard.
- These widgets can be moved by clicking and dragging them to the desired location (while in Edit mode).
- Hovering the cursor (in Edit mode) over the widget will display edit features (delete, resize).
Time Ranges

The dropdown menu (near the top right of the Dashboard) sets the time range to the most recent 2 hours, 12 hours, 1 day, 2 days, 1 week, 1 month, 6 months, or 1 year. Selecting a time range while in Edit mode will set the default value for the dashboard.

Full Screen Mode

The four-arrowed icon (located in the top right corner of the Dashboard) enters and exits full screen mode. This mode allows the Dashboard to occupy the entire screen by removing the banner, navigation, and view tabs. Both dark and light variants of the full screen mode are available. The Esc and F11 keys can also be used to quickly leave full screen mode.

Map Tab

The Map view allows users to create a dashboard-like view using an image, often a picture or aerial view of a location, plant, floor, or machine. On this map image, icons can be placed representing sensors or groups of sensors, and the icons can be configured to display current values or current statuses of those indicators or groups of indicators.

In this way, the Map view can provide a quick overview of the health of all the machines at or below that level. To create a custom Map, follow these steps:

- On the view tab, be sure that the Map tab is selected.
- Switch from View to Edit mode.
- Click on the + New button (located near the top left of the view).
- Provide a Name for the map within the input box.
- When finished, click the Create button.
- Click the Image button (located near the top right of the view).
- To add images to this list, click the Add New button in the modal footer.
- The tab switches to the Map Library: click the Add Images button and a window will appear.
  o You can also drag and drop an image onto the light gray box surrounding the Add Image button.
- Browse for the file you wish to upload.
  o The image file size cannot exceed 10 MB and must be one of the following formats: .svg, .png, .jpeg, .jpg, .gif, or .bmp. Vector image files (such as .svg) will typically provide the best viewing results on various screen resolutions and window sizes.
- After an image is selected, click the Open button.
- Click on the Map tab to return to the Map view.
• The newly added image should now display in the **Image** modal. Select the desired image from the list and the modal will close to reveal the mapped image.

• Right-click anywhere on the map image to reveal options for adding customized text, status icons, and values.
  
  o Note that some of these options are available at certain hierarchy levels while others are not.

• Each hierarchy layer (Corporation, Location, System, Group, Subgroup, Sub-Subgroup) can have multiple maps associated with them.
  
  o Examples: aerial images of a work site, different views of a piece of machinery, or upstairs and downstairs images of a facility.

• Maps can be selected, created, renamed, deleted, and modified while in Edit mode.

• The map can also be displayed in full screen mode to create a dashboard-like experience.

**Image Library**

The image library is a sub-tab located within the Map view tab. As the name implies, this is where all images used in SmartDiagnostics are stored and organized. From the Image Library, you can upload images in bulk or upload individually by drag-and-drop from your computer or clicking within the box at the top of the screen. Folders are easy to create and name and can be nested for optimal organization. Images can be moved into folders by drag-and-drop from within the library or ‘upload images’ will bring files directly into the folder that is currently selected. Tools available in the library include image rotation, add to asset details, delete.

The Image Library is organized so that the Corporation level has its own image library separate from each location’s library.
**Trend Tab**

This view displays graphs of sensor data to monitor trends over time, providing a detailed look at data from a particular data point on the trend line. Learning to navigate the Trend view will greatly help you perform analysis of your System’s data.

**Plot Display**

The Trend tab has 3 plot displays available, selectable by clicking the blue ‘Plot Display’ button in the upper left corner on the trend screen. Selection 1 will show only a large Trend plot; [2] will show the Trend plot and one Spectrum; [3] will show the Trend, the frequency spectrum and the time domain. Below the spectrum plots is a selection for [Freq | Time], so either plot is available when the plot display is set to [2].

**Zooming In**

- The first way to zoom in on an area of a Trend graph is to click and drag the mouse cursor over the desired area of focus. A blue shaded area will show the area you are selecting to zoom in on.
  - Click and drag the cursor horizontally
  - Click and drag the cursor vertically to zoom in on a magnitude range.
  - If using a mouse, roll the scroll wheel to zoom in and out quickly on a graph.

- Another method for zooming in on a desired time range is to click and drag the handles at the bottom of the graph.

**Time Ranges**

On the bottom right of the graph there are time range buttons for setting the x-axis of the graph. The options include the most recent: hour, 12 hours, day, two days, week, month, 6 months, year, and a Custom field that allows users to select a specific date range.

**Down Sampling Interval**

In addition to Time Range, the bottom right of the graph contains a dropdown menu ‘Avg by:’ where you can select a time interval to view down sampled data. By selecting a time interval on this dropdown, the trend graph will display the average value for the selected interval over the highlighted time range (in this image, a 1d time range plotted with 1d interval will only yield one data point). This data display also interpolates the averaged data to better see trends over your selected time frame.
Note: The default is ‘Auto’ which will display all data points available (i.e. no down sampling). It will always be best to select an interval smaller than the time range. For example, an 8h interval selected over a 1d time range will display maximum of 3 data points. This is a valuable tool to discern data trends over desired time frames.

**Automatic Scrolling**

The automatic scrolling feature allows the Trend graph to actively shift the time range (x-axis) as data is collected. Located below the graph and next to the time range buttons, the Auto scroll button (when selected) causes the graph to periodically update the x-axis range as new data becomes available. For instance, if a user selects a one-hour range (“1h” button) and clicks Auto scroll, the one-hour range will be maintained but the beginning and ending times will shift with the incoming data. So, if this user clicked the auto scroll button at 12:00pm, after one hour the x-axis will have a range from 12:00pm to 1:00pm. When the Stop auto scroll button is clicked, the graph returns to the default static mode where the x-axis range is stationary.

**Set Y-Axis Range**

Changing the Trend graph’s y-axis range can be accomplished by clicking on the Set y-axis range... button. The pop-up modal allows users to deselect the Automatic y-axis range and set their own Max and Min ranges for both the Left and Right sides of the graph. This feature changes the Y axis for the current Trend graph and will reset upon refresh or changing profile level. This setting will temporarily override any Y axis locking set up for filters.

**Export Trend Data**

The SmartDiagnostics® software allows a user to Export time series data to a comma separated values (.csv) file that can be viewed as a spreadsheet.

- Select the desired time range for the data using the buttons found on the bottom right of the Trend Graph.
  - The maximum export range is one week.
- Click the Export button located on the bottom left of the graph.
- Once clicked, the button will display a spinning loading icon while it assembles the data.
- When finished, the .csv file is downloaded through the browser to the default location.
  - Safari users will be redirected to a separate page that can be saved manually. Just right-click (two fingers) the page, Save Page As..., set Format to Page Source, append ".csv" to the end of the file name, and click Save.
- Note that the bottom Spectrum Graph data can also be transmitted to a CSV file through the Export button located beneath it.
Event Content

This feature can be used to mark specific developments on the graph trend line, for instance, a maintenance event or the start of a trend to be monitored.

- To create ‘Event Content’, click on a data point within the trend line. A vertical line will intersect the point with a flag located at the top and to the right of said line.
- Clicking the pushpin icon within this flag will display detailed information concerning the selected data point. Simply click on the circled x icon to collapse/unpin the detailed information.
- To save this data as Event Content, click the + icon within the flag and a pop-up modal will appear.
- Refer to the Event Content section below for intermediate steps.
- The flag will now stay at the selected point in the trend line as a reminder of that event. At any time in the future, you can click on the pushpin icon to expand it and see all the information you entered.
- In the top-right hand corner above the trend is a check box ‘Show Event Content.’ Unchecking this will remove all saved Event Content from displaying on the trend. Pinned points will still display on the trend.

- Note: when a sensor's sampling frequency is edited, an automatic event content flag will appear when the sensor updates to the new sampling frequency. This flag will display the previous and new sampling frequency. This event content can only be edited with notes but ‘title’, ‘created by’, ‘time’ and monitoring point are assigned by the event and are not editable.
Spectrum Graphs

The spectrum graphs display detailed burst data. SmartDiagnostics offers both the frequency and time domain plots, selectable as needed.

- Once zoomed in to a time period of interest on the Trend Graph, select a data point by clicking on it.
- When a data point is selected, the Spectrum Graph appears in the lower portion of the window.
- Within the Spectrum Graph, there are multiple ways to view the data selected from that one point in the Trend Graph. These options vary based on the type of indicator being viewed.
- For a vibration indicator, the available views are velocity and acceleration. Either one can be shown in the frequency or time domain. The frequency domain view can be toggled between linear or log scales using the buttons with those labels.
- Rotation speeds and baselines can also be displayed and set (in Edit mode) within the Spectrum Graph.
- The frequency spectrum plot can be toggled to a natural spline interpolated line.

Fault Marker Table

When viewing the frequency spectrum plot, a table appears on the right-hand side of the screen. This table displays the running speed (1x), bearing fault frequencies (BPFO, BPFI, BSF, FTF) and the electric line frequency for North America (60hz) represented as (2xlF).

Below the table is the bearing selection and running Speed input. Frequency values will display on the table once you have selected a bearing and a running speed. As the speed or selected bearing change the fault frequencies will update accordingly.
• If your asset or monitoring point does not have bearing(s) associated, click on ‘Search’ within the bearing dropdown box (on either [Asset Details] or [Monitoring Point Details]). A new modal window will appear-use the modal to search for and add the correct bearing that this sensor is monitoring. Double click or click [Add Bearings] to add your desired bearing to the Asset bearings. Then click [Finish] when complete.
• Once you have added a bearing, this bearing will be associated to that asset and easily available/selectable in the marker table for future analysis.
• Next, set a running speed. This can be typed into the Running speed box, or you can turn on the (1x) marker and drag it on the frequency graph. The running speed will update as you drag the (1x) marker.

![Add Bearings modal window]

Once a running speed is set, it will be the running speed for all data points moving forward or until the running speed is updated. Running speed does not perpetuate backwards in the data history.
• Once running speed is set, all the bearing fault frequencies can be turned on/off by clicking the down-pointing arrow icon in the marker table. Each fault frequency is color coded. Fault frequency markers cannot be dragged (only the (1x) marker).
**Custom Markers**

In addition to bearing fault markers, SmartDiagnostics also supports custom markers for quick display of asset’s properties like fan blades, pistons, and gear teeth.

- When in ‘edit’ mode, click on this icon below the marker table to add a custom flag.
- A dialog box will appear—add a 5-character marker name and a multiplier number. This number represents the number of blades, pistons, teeth, etc. that will get multiplied by the running speed and display on the frequency spectrum.

![Custom Markers](image)

**Marker Table: Sidebands and Harmonics**

The icons shown on the right are available, color coded, for each bearing fault frequency. Click on these icons to turn on the marker, harmonics, or sidebands. If a marker, harmonic or sideband is turned on, a yellow highlight box will note it as active. The plot example below shows the 1x, BPFO, BPFI, BSF, and FTF marker turned on. Only the 1x marker can be adjusted, although all other markers will move as the running speed (1x) marker is adjusted.

![Marker Table: Sidebands and Harmonics](image)

Harmonics of each fault frequency can be displayed, although the system will only allow one marker’s harmonic to display at a time to reduce clutter and confusion on screen. The same goes with sidebands: only one marker’s sidebands will display at a time. If a marker’s harmonics are on, sidebands will display for each harmonic marker that displays on the table. Zooming into a harmonic will turn off all other harmonic lines that are not on screen.
- Sideband spacing is selectable by the frequency of each marker
- Number of sidebands displayed is controlled with the ' # of Sidebands' dropdown below the marker table
- Sidebands are color coded the same as the frequency markers. The example above shows the BSF marker with 3 sidebands with FTF spacing. Notice the sideband marker lines are amber color (same as the FTF marker).
- Sidebands on all marker can be dragged, and the Sideband Spacing dropdown will display the spacing frequency
- Sideband marker color changes when dragged. When the spacing falls within 10hz of a fault frequency, it changes to that fault's marker color.
- If harmonics and sidebands are turned on for the same marker, sidebands will display around each harmonic that is displayed on the plot. Only harmonics displayed on the plot will show sidebands
- Click Hide All above the marker icons for turn off and clear the spectrum plot of markers

**Time Domain Plot**

The time domain plot will display when the Plot Display is set to 2 or 3. Use the [Freq | Time] button below the spectrum graph to view this plot. Time Domain also has a marker table that enables viewing the cycles based on the running speed. The markers can be dragged along the graph to align with peaks.
• With the Time Domain marker displayed, any marker (0 cyc, 1 cyc, 2x, 3x, etc) can be dragged, and the entire harmonic will move in sync
• The Running Speed dialogue indicates what the current running speed is set to (same running speed as the frequency plot)
• Clicking on the lock icon, unlocks the running speed. By dragging either the ‘0cyc’ or ‘1cyc’ marker the running speed can be adjusted
• When the lock icon is open/unlocked, the [cancel] button works as an undo if running speed has changed.
• Clicking the lock icon while it is open/unlocked will update the asset running speed. The frequency plot running speed will also update.
• Time domain table also includes the Peak and RMS vibration burst data values for that data point, as a quick reference

Hotkeys

Use these Hotkeys for quick navigation on the spectrum and trend plots

• “B” - Show/hide all markers in the fault frequency table
• Up Arrow - Selects previous fault marker in the fault frequency table (above)
• Down Arrow - Selects next fault marker in the fault frequency table (below)
• Right Arrow - Moves running speed (1x marker) forward to next point in spectrum graph
• Left Arrow - Moves running speed (1x marker) back to previous point in spectrum graph
• “L” - Show/hide the selected marker
• “H” - Show/hide harmonics of the selected marker
• “S” - Show/hide sidebands of the selected marker
• Spacebar - Toggles between CPM, Hz, or Orders units
• “<” ”,“ - Moves to previous point in trend graph (left caret/comma key)
• “>” ”.” - Moves to next point in trend graph (right caret/period key)
Alerts Tab

This view allows users to examine alarm and warning levels for their indicators. Notifications can be sent out to the users selected to warn of exceedances so that immediate monitoring or maintenance can be performed. Alerts and notifications are key items to set up to ensure that a problem condition is recognized immediately.

The Alerts tab has two distinct pages arranged into the Table and Heat Map tabs. These tabs provide different visual representations of the alarm and warning level data across the selected hierarchy layer.

Alerts Table

The Alerts Table provides a tabular view of indicators with an emphasis on their alarm and warning statistics.

Trend Links

The ‘Groups’, ‘Name’, and ‘Time of Alarm’ columns provide strategic links to the Trend view. Clicking on any of those hyperlinks will select that group from the System Tree and switch to the Trend view. Selecting an indicator name will deselect all other indicators from the Legend and proceed to the Trend view.

Time Ranges

On the top right of the Alerts table, there are buttons to select the most recent hour, 12 hours, day, two days, week, month, 6 months, year, and a Custom date field which allows the user to select a specific date range. These buttons will let you examine indicator data from the period of time you are interested in.

Value

- The Max button displays the highest measurement taken in the selected time frame.
- The Average button displays the average of all measurements taken in the selected time frame.
- The Current button shows Indicator status in real time.
**Alarm Severity (Status)**

When an alarm or warning threshold exceedance is detected by an indicator, the icon within the Status column will change to reflect the severity. Alarm severity values range from 0 to 10 and are represented by the icons listed below.

- The **green circle** represents alarm severity values between 0 and 5
- The **yellow triangle** depicts alarm severity values between 6 and 8
- The **red octagon** portrays alarm severity values between 9 and 10
- The **gray circle** suggests that the corresponding indicator is offline

**Time in Alarm/Warning**

These two table columns show a user the amount of time a specific indicator has exceeded the alarm or warning levels during on the time frame selected, helping users to prioritize maintenance or repair activities.

**Acknowledge**

When an alarm level is reached on an indicator, you may receive an email with information on the alarm or warning, and hyperlink text reading ‘Click here to acknowledge this event.’ Clicking this link will open to the Alerts table.

The Alerts table displays a column entitled ‘Acknowledge’, which prompts you to [Click to Acknowledge]. By clicking this green button, you are acknowledging that you’ve received an alarm notification. Clicking this green button also resets the alarm state, so you may receive new alarms. **When alarms go unacknowledged, system users will not receive notifications of new alarms, only reminders** of the original alarm. Note [Click to Acknowledge] may display on rows that an Alarm Severity (Status) that is not currently in alarm or warning. This means the alarm or warning threshold was exceeded at some point and is currently not in that alarm state.

Acknowledging alarms is important to maintaining a good continuous monitoring system. **Unacknowledged alarms will mask further alarm or warning thresholds**—you will not receive new alarm notifications on these unacknowledged indicators, you will only receive reminders (if reminders are set in the Alarm Settings).

**Summary Table Averages**

The summary footer displays the averages for each page and is located at the bottom of the Alerts table.

| Summary Table Averages | 1.5450 | 3.1 | 4.0% | 5.0% | 65.2% |

**Export Data**

Just like the Trend graphs, users can export Alert table data to a .csv file that can be viewed as a spreadsheet.

- Select the desired time range for the data using the buttons found on the bottom right of the table.
- Click the **Export** button also located on the bottom right.
- The .csv file is then downloaded through the browser to the default location.
**Heat Map**

The Heat Map provides a graphical representation of alert data using colors to indicate the severity over intervals of time.

**Data Types**

There are four types of alert data that control the content of the heat map cells.

- **Alarm Severity Max** displays the maximum alarm severity number (0-10) reported for the group or indicator over each time interval.
- **Alarm Severity Avg** depicts the average alarm severity number (0-10) calculated by the group or indicator over each time interval.
- **Alarm Time** represents the time spent within the alarm threshold by the group or indicator per time interval.
- **Warning Time** portrays the time spent within the warning threshold by the group or indicator per time interval.

**Levels**

The level buttons represent the hierarchy levels of the system tree and determine the rows of the Heat Map. Only buttons corresponding to hierarchy levels below the currently selected level are accessible. For instance, if an Asset is selected in the system tree, only the Monitoring Point and Indicators buttons will be available.

**Time Ranges**

Just like the Alerts Table, buttons to select the most recent hour, 12 hours, day, two days, week, month, 6 months, year, and a Custom time range can be found in the top right corner. These buttons allow users to examine indicator data over a specified period of time.
**Time Intervals**

The dropdown to the right of the time ranges allows users to split the current time range into segments based on the interval selected. Time interval options include one hour, eight hours, 12 hours, one day, and one week. The number of options available to the user depends on the selected time range.

**Cell Tooltip**

Hovering the cursor over a particular cell in the Heat Map will cause a tooltip to appear. The top row displays the abbreviated path and name of the current group or indicator. The next two lines depict the start and end time of the current cell. The last line of the tooltip will either show the alarm severity number (0-10) or the time in alarm/warning (depending on the data type selected).

**Cell Navigation**

Clicking on a heat map cell will behave in one of the two ways depicted below.

- If the currently selected level is a group (Asset Group, Asset, or Monitoring Point):
  - Selects that group in the system tree (corresponding to that row)
  - Displays the next level in the heat map
- If the currently selected level is Indicator:
  - Deselects all other indicators in the legend (not corresponding to that row)
  - Switches the active view to the Trend graph
  - Zooms into the selected time interval (corresponding to that column)

This is an effective approach to quickly navigate through a system tree to find and view problematic indicators over specific intervals of time.

**Zooming In**

In addition to setting the time range, users can also click and drag their cursors horizontally (left to right or right to left) to zoom in on the highlighted time range. This feature functions similarly to zooming in on the Trend graph and is a great tool for quickly isolating a specific time frame.

**Color Palettes**

The heat map offers distinct color palettes that can be applied to the cells. These color palettes can easily be swapped by simply clicking on the currently selected one.
The first palette offers discrete colors ranging from blue, green, yellow, orange, and red. This palette is useful for establishing an overview of alert performance for the selected groups or indicators.

The second palette displays a gradient color range from white to red to black. This palette is great for exposing the most problematic time periods for selected groups or indicators.

The third palette shows discrete colors of green, yellow, and red. This palette mimics the color scale traditionally used for alarm severity icons.

**Events Tab**

This view provides users with the ability to record and monitor the various events that occur within their system. Proper utilization of the Events view can help to make sense of correlations and provide reasons for changes in the data.

**Time Ranges**

At the top right of the Events view exist time range buttons for setting the x-axis of the plot. The options include the most recent: hour, 12 hours, day, two days, week, month, 6 months, year, and a Custom field that allows users to select a specific date range. Note that zooming in and out on the plot’s x-axis can also be achieved by using the scroll wheel on the user’s mouse.

**Export**

Event content may be exported to a spreadsheet for easy documentation. To export, select a timeframe of 1 month (1m) or less and use the profile tree to select a specific system or subsystem’s events to export. The exported report will be emailed to the logged in user after it runs. **Export limits:** time frame of 1 month or less. The export spreadsheet has the following columns:

- Date/Time of event
- Tree hierarchy path (where the event was assigned to)
- Group Name
- Group Type
• Tag Title (Event title)
• Type of tag
• Event Description
• Tag creator (user who entered the event content)

**Event Window**

This feature can be used to organize Event Content into a broader development window. For instance, you may want to record the implementation and observation of a newly installed part.

- Switch from View to **Edit mode**.
- Click the **+ Window** button near the top left corner of the view to launch a pop-up modal.
- Provide a **Name** for this Event Window.
- Choose an **Activity**: Watch, Inspect, or Maintain.
- Select the **Importance**: Low, Medium, or High.
- Set the **Start Date**.
  - Note that the End, Identified, and Close Dates can also be applied to the Event Window.
- **Assign** any existing Event Content pertaining to this window in the region just above the modal footer.
  - Event Content can also be assigned by selecting and dragging it to the desired window row in the plot.
- **Save** the Event Window.
- Note that the Events view plot will now display a row and shaded region corresponding to the newly created window.
  - Editing an existing event window can be accomplished by clicking on the pencil (edit) icon located to the right of the window name in the Events plot.

**Event Content**

This feature can be used to mark specific cases affecting the trend data, for instance, a maintenance event or the start of a trend to be monitored. Follow the steps below to create Event Content from the Events view.

- Switch from View to **Edit mode**.
- Click the **+ Content** button near the top left corner of the view.
• Select the type of content to be added from the **Add Content** dropdown list, click the **Add**... button and a new modal will replace the first.
  
  o The fields in this second modal will vary depending on the content type selected.
  o In the example below, the “Note” option was selected.
• This modal allows users to add a title and detailed information to the Event Content.
  
  o If created from the Trend graph, the time will be set by default to the selected data point. Users can manually adjust the time if needed.
  o The event content is also automatically set to the hierarchy level selected on the Trend graph. This field can also be manually altered if desired by the user.
• Click **Save** after setting the values of the Event Content.
• The first modal will reappear with the newly created Event Content appearing in the Existing Content list.
  
  o Clicking on the pencil icon next to the Content name will return the user to the second modal to edit settings.
• Click on the **Close** button to exit the modal and return to the previous screen.

**Filter**

These three buttons are located to the right of the **+ Content** button and determine which events are visible in the plot.

• **Open** displays only open events
• **Closed** displays only closed events
• **All** displays both open and closed events.

**Network Tab**

Before a System can be built, it is important to verify that all the hardware is communicating. The location **Network** tab will display all the tools needed to accomplish this. Note that this tab pertains to the location level of the hierarchy, so clicking it while inside a **system tree** will automatically select the parent location of the current system.
The Network tab has five distinct sub-tabs: Hardware Alerts, Sensor Status, Hardware Event Logs, Notification settings, and Manage Network.

**Hardware Alerts**

The Hardware Alerts tab displays all KCF sensors with battery voltage of 2.85v or lower for at least 1 hour. If battery voltage returns to 2.9v, the sensor will automatically be removed from the list. This may occur with temperature variation. This listing can also be emailed in a daily or weekly digest form and can be used as a list of batteries to change. Navigate to the ‘Notification Settings’ tab and turn on ‘Sensor Low Battery Alerts’ to receive these email notifications. This list can be exported to an Excel spreadsheet by clicking on the [Export] button at the top of the list.

**Sensor Status**

The Sensor Status tab allows users to quickly see the status of the Sensors, Primary Receiver Nodes (PRNs), and Collection Servers that make up their system/account.

- A green check mark next to a sensor indicates that it is functioning as expected.
- A red ‘X’ next to an item means that it is offline or malfunctioning.
- Hovering the cursor over these icons or names will provide additional information regarding their current status.
- Sensor nicknames can be set in the second column of this table to help with identification.
• Signal Strength of the sensor is listed and is a good way to determine if your sensor is well connected to receiver devices.

Hardware Event Logs

The Hardware Event Logs tab provides a comprehensive list of all hardware related events for Base Stations, Receivers, and Nodes in the selected location. Note that acknowledging and addressing these events is necessary to prevent erroneous or inconsistent data.

Hardware Notifications

This tab allows administrators to create and manage subscriptions to hardware notification emails. This notification is sent every 24 hours to the provided list of users when base stations are malfunctioning (go offline). Click [+ Subscription], and a new row will appear. Click the [Off] toggle and wait a moment as the notification activates. Then click on [Add Users] who will receive the notifications. The Actions column [X] will remove the row and notification subscription.

Manage Network

The Manage Network tab gives a more detailed breakdown of the hardware. On this screen, a user can see the last update of the Collection Server, verify that a PRN is working, set nicknames, and make changes to the Sensors’ configuration settings (such as sampling frequency).

Select the appropriate Base Station from the blue dropdown button.

To verify that the PRN(s) are working, look for a Receiver icon with the serial number (and nickname) next to it beneath the Collection Server information.

Clicking on the Receiver icon expands a list of all the Sensors that are communicating with that PRN. You can click on each individual Sensor to get more information on that Sensor.

If this is an on-premises (local) installation (and not a Cloud-based account), follow the setup steps in the “On Premises Setup” section.
Settings Tab

The Settings view tab is available at all levels of the hierarchy and displays various information pertaining to that level. The Corporate level Settings gives you access to Corporate users and permissions. The Location level Settings allows specific location user and permissions, user-created templates for creating system tree groups, and content codes which can be customized for the Content Events feature.

Note that some of the Settings view functionality was previously covered in the System Configuration section.

Corporation Settings

At the Corporation level, click Settings, then Corporation Users tab located beneath the name and abbreviation

- Click on the Full Name of a user to open a pop-up modal
- From this modal, the Corporation Role can be set to a Corporation Admin, User, or None
  - Corporate Admin = access to all locations and the corporate level, with edit capability
  - Corporation User = access to all locations and the corporate level, without editing capability
  - None = no access to the corporation level (users will have access to selected locations only)
- Location Admins and Users have a role of None at this level
- Access to individual locations can be set by clicking on the Edit link within the Permissions column
- Only Location Admins and Users can have their location permissions limited
Location Settings

At the Location level, click the **Location Users** tab located beneath the name and abbreviation:

- Click on the full name of a user to open a pop-up modal.
- From this modal, the **Location Role** can be set to a Location Admin or User.
- Access to individual systems can also be set at the bottom of this modal.

The **Templates** tab displays all group creation templates that may be saved when setting up any hierarchy tree levels. Within this tab, templates can be downloaded and uploaded. The **Content Codes** tab displays all of the available types of ‘event content,’ which are selectable when adding notes or content to the trend or from the Events view tab. Users with access can also add or remove content codes types that may suit that particular location or industry.

Note that corporate users will not appear in this list.

Creating New Users

New users can be created at both the Corporation Users and Location Users tabs:

- Switch from View to **Edit mode**
- Click the **Add User** button to launch a pop-up modal.
- Provide the First Name, Last Name, Email address, Username, and Role for this user.
- Corporation Admins and Users must be created at the corporation level.
- Location Admins and Users can be created at either level.
- If created at the corporation level, Location Admins and Users are appointed the role of None and must be assigned to locations in the **Permissions** table column.
- Click the **Add User** button in the modal footer when finished.
- The modal closes and an email is sent to the specified email address.
- A link is provided within the email enabling the user to establish a password and log in.
Indicators Table

This tab pertains to the system and group levels and displays a table of all indicators within the selected hierarchy level. This includes all indicators within the level itself and all indicators within its subgroups. Adding new indicators and assigning them to sensors are previously covered topics.

The four buttons beneath the Indicators tab determine what columns and content are displayed in the table. The Quick Setup button displays the basic configurations of the indicators. The Labels button pertains to component, location, make, model, orientation, and tags associated the indicators. The Alarm Settings button concerns high/low alarms, high/low warnings, notification criteria that allows you to set a ‘percentage time in alarm’ rule, off threshold, and baseline properties. The Details button applies to update interval, sample frequency, band definition, rotation speed, and damage exponents.

User Access

These tabs allow Administrators to create new and manage existing users at the corporation, location, and system levels.

Roles & Permissions

Administrators can control user access to corporations, locations, and systems through the Users tabs.

- Select the desired Corporation, Location, or System from the hierarchy tree or breadcrumb menu
- Switch from View to Edit mode
- At the System level, click the User Access tab located beneath the name and abbreviation
- Highlight users in the left list and click the > button to deny them access to the system
- Highlight users in the right list and click the < button to grant them access to the system
- Note that corporate users will not appear in these lists

On-Premises Password Change

On-premises (local) installations will not send an email when the password is changed in the Edit User modal. Instead, the account administrator can manually set the desired password for the user within the modal itself by clicking [hidden] and providing one in the input box.

Alarms & Warnings

Prior to sending out alert notifications, the system must first have Warning and/or Alarm levels set for indicators so that it knows when an exceedance has occurred.

- In the System Tree, select the hierarchy level (system/group) that contains the Indicator you wish to configure.
- The Indicators tab (beneath the system/group name and abbreviation) should be selected by default.
• Select the **Alarm Settings** table button to see all the alarm and warning settings for indicators.
  
  o The **Quick Setup** table (selected by default) only displays the (high) **Alarm** and (high) **Warning** columns.

  ![Group 1](image)

  ![Table of Indicators and Notifications](image)

• Switch from View to **Edit mode**

• To set individual Alarm and Warning values, click the blue underlined **[Click to set]** hyperlink.
  
  o All indicator types (such as Temperature) have both High and Low Warnings and Alarms.
  
  o Clicking on the blue table column header will allow the user to set this value for all indicators visible in the table.

• Select the checkbox on the left first to activate the Warning or Alarm level.

• Enter in a value in the input box.
  
  o High Alarm ≥ High Warning ≥ Low Warning ≥ Low Alarm

• Finally, click the blue check mark to save the changes.

**Notifications**

After the **Alarm/Warning** levels have been established, you can set up Notifications.

• Choose the hierarchy level (system/group) in the System Tree.

• Select the **Notifications** tab (beneath the system/group name and abbreviation).

• Switch from View to **Edit mode**

• Click the **+ Add New** button (located just below the Indicators tab).

• Choose whether to receive notifications for **Warnings**, **Alarms**, or both by clicking the checkboxes under each.

• Use the checkboxes beneath **Email** and **SMS** (text messaging) to establish how notifications will be dispersed to users.
• The **Escalate** button ( ) determines if another user will receive the Notifications if the initial user does not acknowledge the Notification for a specified period of time.
  o When the symbol is colored black there is no Escalation. When the button is clicked it will change to red ( ) letting the user know it’s turned on.
• Once the Escalate button is selected, you can select the Reminder Interval and Users.
• To change the Escalate and Reminder Interval times, click the blue hyperlinked text.
• After a time has been chosen, click the blue checkbox.
• To set the Users, click on your username in blue text.
• Start typing the first couple letters of a username and the dropdown menu will automatically find user names containing the letters provided.
• Select the desired username and click the blue checkbox when finished.
• To remove a Notification, click the black X on the far right of the screen (beneath the **Delete** column header).

**Snooze Notifications**

Email and text message alarm notifications can be snoozed (paused). This is a useful feature for when assets have known issues and alarm notifications are not necessary, or if alarm notifications need to be delayed. Snoozing notifications only affects indicator warnings and alarms and does not snooze hardware, email, or text notifications. Snoozing does not pause sensor data (see Pausing Indicators). Any indicator that reaches warning or alarm thresholds while snoozed will still display the level of warning or alarm in the Alert table. These alerts can be acknowledged as normal.

To Snooze notifications, navigate to the Settings tab and to the profile (system, asset, monitoring point), and click the Snooze button.

Next, a modal pop-up ‘Snooze Alert Notifications’ will display which system entities are being Snoozed. From here, several options are available:

• The Start Date is the present date/time. Clicking [Save Changes] will **snooze the notifications indefinitely** until un-snoozed by a user.
• Clicking ‘Set End Date’ will set up a snooze that will start at the present date/time and an end date to which the snooze will end automatically.

• A ‘Queued Snooze’ can be set up for the future. Set a ‘Start Date’ in the future and an end date, and the ‘Queued Snooze’ will automatically start and end on the dates specified. The Snooze button will now display as ‘Snooze Queued’.

To end or stop the snoozed notifications, simply click [Un-Snooze Notifications].

Pausing Indicators

Pausing allow users to stop collecting data on an indicator or group of indicators for a time of their choosing. For example, when sensors are temporarily moved from one machine to another and you do not want this new data to display on the old system.

• To pause a System or Group of Indicators:
  o Select the desired hierarchy level in the system tree
  o Switch from View to Edit mode
  o Locate the Running/Paused button near the top right corner of the screen
  o Click this button to change the state of this level, sub-levels, and all indicators within them

• To pause a single Indicator:
  o Select the Indicators tab beneath the group name and abbreviation
  o Click the Quick Setup table button (if it wasn’t already by default)
  o Switch from View to Edit mode
  o Click the play button (▶) in the far right Action column of the table to change the state
Mobile Interface

SmartDiagnostics also provides a streamlined interface for mobile device users to access and view information. These interface changes automatically display when using a smartphone, tablet, or other internet-capable mobile device.

- The entire navigation pane (tree, filters, and indicator legend) is collapsed by default and can be expanded by clicking the > Tree button on the left side of the screen.
- View tabs display only their respective icons (no text) on the right side of the screen.
- Various button groups (such as time ranges) are presented as dropdown menus.
- The time range text is now abbreviated in relative values instead of absolute.
- The SmartDiagnostics logo is compressed to provide more room for breadcrumbs in the top banner.
Appendix

Hotkeys

**Hotkeys** for the spectrum and trend plots

- "B" - Show/hide all markers in the fault frequency table
- ↑ Up Arrow - Selects previous **fault marker** in the fault frequency table (above)
- ↓ Down Arrow - Selects next **fault marker** in the fault frequency table (below)
- → Right Arrow - Moves running speed (1x marker) forward to next point in spectrum graph
- ← Left Arrow - Moves running speed (1x marker) back to previous point in spectrum graph
- "L" - Show/hide the selected **marker**
- "H" - Show/hide **harmonics** of the selected marker
- "S" - Show/hide **sidebands** of the selected marker
- Spacebar - Toggles between CPM, Hz, or Orders units
- "<" '," - Moves to previous point in **trend** graph (left caret/comma key)
- ">" "." - Moves to next point in **trend** graph (right caret/period key)

**Damage Accumulation™ Automatic Baseline Normalization**

Damage Accumulation™ (DA) is based on a baseline value that should represent normal operating condition. When a sensor's sampling frequency is changed from the originating baseline sampling frequency, the DA values will often shift dramatically and may not result in a trend line or values that suitable for analysis. To solve this, SmartDiagnostics will automatically recalculate a DA baseline 'normalizing ratio' in the background that will normalize the DA values on the trend.

If you change the sampling frequency of a sensor, the DA trend line will stop displaying at that point. This is because the system is recalculating a normalizing ratio and is using data points at the new sampling frequency to calculate this. If the sampling frequency is changed once, the DA trend will take 24 hours to normalize. After 24 hours the DA trend will back-fill the last 24 hours of DA data and then stream data normally. If the sampling frequency is changed more than once in within 24 hours, the DA will recalculate immediately upon the second change.

**Cases that will not be normalized**

1. It is assumed that data before and after the sampling frequency change have similar characteristics (speed, gear, etc.). Therefore, if a user changes the sampling frequency and the machine changes characteristics in a significant way, SmartDiagnostics may save incorrect normalization values to the database.

2. SmartDiagnostics is also not solving for the case where a user changes the sampling frequency for a very short period of time. With a dataset less than 10 minutes, SmartDiagnostics simply adjust the DA value to match the previous values (by a simple ratio).
3. Negative Damage Accumulation values may result if the baseline is set using data sampled when the machine is off, and the sampling frequency is changed from a low sampling frequency to a higher sampling frequency. This can be solved by choosing a baseline from data sampled when the machine is on.