Building Optimization Broker Guide

Exported: 12/01/2023

Legal Declarations

Copyright

Trademarks

Warranty

Limitation of Liability

License Agreement

Table of Contents

Overview

WennSoft's Building Optimization Broker (BOB) platform brings together building and service request data in one location, providing service request management and contracting businesses a holistic view of the buildings, assets, and clients they have under contract. BOB provides information that facilitates a proactive approach to building management in lieu of scheduled maintenance and fix on fail.

Accepting a Company Invitation

A Company Invitation is created when an administrator invites you to join a Company within BOB. You will receive an email with a link to sign up for an Account.

If this is your first time signing in, you will need to sign up for an account using the email address to the invitation was sent. After you have signed in, your account profile displays on the My Account dashboard.

Creating a User Account

1. Go to bob.key2act.io[1].
2. Select *Sign Up*.
3. Enter the following required information:
    - **First Name**
    - **Last Name**
    - **Email**: Enter the same email that you initially used.
    - **Phone Number**: Enter your phone number, including the country code.
    - **Password**: The password requirements are at least:
        - 8 Characters
        - 1 Number
        - 1 Special Character
        - 1 Uppercase Character
        - 1 Lowercase Character
4. Select *Sign Up*.
5. After creating your account, a manual review including the verifying SaaS agreement and contacting your CSM will be performed by K2A.
6. Once approved, you will receive an email that the account is active.
7. When the Account Confirmation email arrives, select *Sign In* in the email.
8. Log into your Building Optimization Broker account.

Signing In or Out

Signing In

1. To log into your account, go to https://bob.key2act.io.[2]
2. Enter your **Email** and **Password**.

---

1 http://bob.key2act.io/
2 https://bob.key2act.io./

3. Select *Sign In*.

Signing Out

1. Select the menu icon on the top right of the window next to your displayed name.
2. Select *Sign Out*.

Switching Companies

User Accounts are independent of Companies. As such, you can switch between Companies that your User has access to from any application.

1. Select the *App Drawer* icon in the top left.
2. Under **Switch Company**, select the current company to display the company drop-down.
3. Select the company.

User Profile

On the My Account dashboard, you can edit your profile, set the default company that you will automatically log into, add companies, and you can update your password.

Viewing Your Account Information

1. From the Mega Navigation, select **User Profile**.
2. On the My Account dashboard, the **Account Information** card displays the following information:
    - Name
    - Email
    - Phone

Setting Your Default Company

Your default company is the company that displays after you have signed in.

To mark a company as your default company:

1. From the Mega Navigation, select **User Profile**.
2. On the **Default Company** card, select the drop-down next to the current company name.
3. Select a different company to use as your Default Company.

> ⚠ If you have been invited to only one Company, that Company is automatically set as the default. If you have additional Company invites, you can edit the default Company.

Creating a Company in My Account

A new or additional Company can also be created from the Admin dashboard. See Working with Companies (page 185) for more information.

1. From the Mega Navigation, select **User Profile**.

2. On the My Account dashboard, on the Default Company card, select *Create New Company*.
   If you are creating an additional company, select the drop-down arrow to the right of the current company and then select *Create New Company*.
3. Complete the fields in the **Create Company** pane:
   - **Company Name** - Enter a unique Company name.
   - **Contractor Type** - Used to establish contract amounts and how they will be distributed based on equipment, material, labor, subcontractor, and other associated costs. Using the cost and associated type labor costs are calculated within the program.
   - **Company Time Zone** - Choose the time zone where the Company is located.
   - **Company Logo** - Upload your Company logo to brand deliverables from the program. The logo and accent colors are used on emails sent on behalf of your company from Advanced Communications.
   - **Accent Color** - Color used to identify your company within reports within the program. This color can either be selected using a color selection tool or hex by using a hex format (#000000). Using an accent color you can brand your program reports to match your business colors.
   - **Search for Address** - Enter the physical rooftop address into this field. We will fill out the address fields.
4. Select *Create*.
5. The default company's name displays at the top of the drop-down. (Select the drop-down to display a list of additional companies.)

Creating an Additional Company in My Account

1. From the Mega Navigation, select **User Profile**.
2. On the My Account dashboard, select the drop-down arrow to the right of the current company and then select *Create New Company*.
3. Complete the fields in the pane:
   - Company Name
   - Address 1
   - Address 2
   - City
   - State
   - ZIP
4. Select *Create*.
5. The default company's name displays at the top of the drop-down. Select the drop-down to display a list of additional companies.

Resetting Your Password

From the Login Page

1. On the login page, select *Forgot Password?*
2. On the Forgot Password page, enter your **Email**.
3. Select *Reset Password*.
4. Check your email inbox for the verification code.
5. On the Reset Password page, enter the **Verification Code**.
6. Enter your new **Password**. The password requirements are at least 8 characters, one number, one special character, one capital letter, and one lowercase letter.
7. Select *Update*.
8. You are redirected to the login page where you can enter your **Email** and new **Password**.
9. Select *Sign In*.

From BOB

1. If you are currently logged into BOB, select your user name in the top right corner.
2. Select *Update Password*.
3. In the Change Password window, enter your current (old) password.
4. Enter the new password.
5. Enter the new password again.
6. Select *Update*.

K2A Core

In K2A Core, you can view, edit, or deactivate sub-entities at an entity-level. For example, if you select K2A Core > Company > Equipment, you can view, edit, or deactivate equipment of all clients associated with the company.

Company

View, edit, or deactivate entities at the company-level.

- **Client**
  The Client View displays all clients associated with the company. The table displays the client name, business type, and address information. See Client Entity Management (page 5).
- **Site**
  The Site View displays all sites associated with the company. The table displays the site name, building type, area, unit of measure, address information, campus, and time zone. See Site Entity Management (page 6).
- **Equipment**
  The Equipment View displays all equipment associated with the company. The table displays the equipment name, client, site, equipment type, manufacturer, model number, serial number, associated system, and area. See Equipment Entity Management (page 7).
- **Settings**
  Settings display the company settings and is only available to users with administrator access.

Client

View, edit, or deactivate the entities at the client-level.

- **Site**
  The Site View displays all sites associated with the client. The table displays the site name, building type, area, unit of measure, address information, campus, and time zone. See Site Entity Management (page 6).
- **Equipment**
  The Equipment View displays all equipment associated with the client. The table displays the equipment name, client, site, equipment type, manufacturer, model number, serial number, associated system, and area. See Equipment Entity Management (page 7).
- **Contact**
  The Contact View displays all client-level contacts. The table displays the contact name, email, title, primary telephone number, and SMS number. The primary contact's name displays as bolded text. See Working with Contacts (page 77).

Sites

View, edit, or deactivate entities at the site-level.

- **Equipment**
  The Equipment View displays all equipment associated with the site. The table displays the equipment name, client, site, equipment type, manufacturer, model number, serial number, associated system, and area. See Equipment Entity Management (page 7).
- **System**
  The System View displays all systems associated with the site. The table displays the system name, client, site, and system type.
- **Contact**
  The Contact View displays all site-level contacts. The table displays the contact name, email, title, primary telephone number, and SMS number. See Working with Contacts (page 77).

Company Entity Management

From the Company Entity Management, you can access:

- Client Entity Management (page 5)
- Site Entity Management (page 6)
- Equipment Entity Management (page 7)
- System Entity Management (page 8)

Client Entity Management

A Client is representative of your customer. In K2A Core or the Company Dashboard, you can view, edit, or deactivate all the entities within a client.

Creating a Client

1. You can create a new client from K2A Core (K2A Core > Entities > Client) or from the Client Dashboard.
2. Select the *Actions* button (top right).
3. Select *Create Client*.
4. In the Add New Client window, complete the following information:
   - **Client Name**: Enter the unique client name.
   - **Business Type**: Select business type.
5. In the **Search for Address** field, enter the physical address and select the correct address from the displayed options. The additional address fields will automatically populate.
6. Select *Create*.

> ⚠ To add the Primary Contact to the client, you will need to select the ellipsis icon to the right of the client (after creating the client) and select the *Edit*.

Editing a Client

1. You can edit a client from K2A Core (K2A Core > Entities > Client) or from the Client Dashboard.

2. Select the ellipsis icon to the right of the client.
3. Select *Edit*.
4. In the Edit Client window, you can edit any of the fields.
5. (Optional) Select the **Primary Contact** drop-down and then select an existing client contact. The primary contact name displays as bolded text in the Contacts table.
6. Select *Update*.

Deactivating a Client

1. You can deactivate a client from K2A Core (K2A Core > Entities > Client).
2. Select the ellipsis icon to the right of the client.
3. Select *Deactivate*.
4. Select *Update*.

Site Entity Management

A site is used to represent a physical building. A site belongs to a client. Depending on how you access the Site Management page, you may be prompted to select the site's client.

Creating a Site

1. You can create a new client from K2A Core (K2A Core > Entities > Site) or from the Site Dashboard.
2. Select the *Actions* button (top right).
3. Select *Add New Site*.
4. In the Add New Site window, select the **Client**.
5. In the Site Details section, complete the following information:
    - **Site Name**: Enter a unique site name.
    - **Building Type**: Select the type of building.
    - **Area Unit of Measure**
        - **Square Feet**: Enter the square footage of the site.
        - **Square Meter**: Enter the square meterage of the site.
    - **Search for Address**: Enter the physical address and select the correct address from the displayed options. The additional address fields will automatically populate.
    - **Time Zone**: Select the time zone where the site is located.
    - **Fuel Types**: Select one or more fuel types (optional).
    - **Energy/Facilities/Sales Contact** (optional): Select the contact for each of these fields.
6. In the Campus Details section, select an existing campus to associate the site with or select *Add New Campus*.
7. Select *Save*.

Editing a Site

1. You can create a new client from K2A Core (K2A Core > Entities > Site) or from the Site Dashboard.
2. Select the ellipsis icon to the right of the site.
3. Select *Edit*.
4. In the Edit Site window, you can edit any of the fields except for the client.

5. Select *Save*.

Deleting a Site

> Deleting a site will also permanently delete any systems, areas, equipment, and sensors that are children of the site.

To delete a site:

1. You can create a new client from K2A Core (K2A Core > Entities > Site) or from the Site Dashboard.
2. Select the ellipsis icon to the right of the site.
3. Select *Deactivate*.
4. In the Delete Site window, select *Delete.*

Equipment Entity Management

Equipment represents an asset at a site. Equipment can serve any number of areas and be associated with any number of systems. Depending on how you access the Equipment Management page, you may be prompted to select the equipment's client and/or site.

Creating Equipment

1. Access the Equipment from K2A Core or from the Equipment Dashboard.
2. Select the *Actions* button and then select *Create New Equipment*.
3. In the Add New Equipment window, select the **Client**.
4. Select the **Site**.
5. Complete the following information:
    - **Equipment Name**: Enter the equipment name.
    - **Equipment Type**: Select the equipment type.
    - **Manufacturer (optional)**: Select the manufacturer.
    - **Model Number (optional)**: Enter the model number.
    - **Serial Number (optional)**: Enter the serial number.
6. In the Area & System Details section, you can optionally associate the equipment to an **Area** and/or **System**.
7. Select *Save*.

Editing Equipment

1. Access the Equipment from K2A Core or from the Equipment Dashboard.
2. Select the ellipsis icon to the right of the equipment.
3. Select *Edit*.
4. In the Edit Equipment window, you can edit any of the fields except for the client and site.
5. Select *Save*.

Deleting Equipment

> Deleting equipment will also delete the sensors listed under the equipment.

1. Access the Equipment from K2A Core or from the Equipment Dashboard.
2. Select the ellipsis icon to the right of the equipment.
3. Select *Deactivate*.
4. In the Delete Entity window, select *Yes*.
5. The Equipment is deleted.

System Entity Management

A system is a collection of equipment that works in unison to serve a purpose. Equipment can be tied to one or many systems. Depending on how you access the System Entity Management page, you may be prompted to select the system's client and/or site.

Creating a System

1. Access the system from K2A Core or from the System Dashboard.
2. Select the *Actions* button and then select *Create New System*.
3. In the Add New System window, select the **Client**.
4. Select the **Site**.
5. Complete the following information:
    - **System Name**: Enter the system name.
    - **System Type**: Select the system type.
    - **Equipment**: Select one or more pieces of equipment to associate with the system.
6. Select *Save*.

Editing System

1. Access the system from K2A Core or from the System Dashboard.
2. Select the ellipsis icon to the right of the system.
3. Select *Edit*.
4. In the Edit System window, you can edit any of the fields except for the client and site.
5. Select *Save*.

Deleting a System

> Deleting a system will also delete any sensors that are children of the system.

1. Access the system from K2A Core or from the System Dashboard.
2. Select the ellipsis icon to the right of the system.
3. Select *Deactivate*.
4. In the Delete Entity window, select *Yes*.
5. The system is deleted.

BOB Dashboards

Use the operational dashboards to:

- Quickly visualize the health of your building portfolio to pinpoint high priority issues, visualize trends, recommend fixes, as well as to export data as a .CSV file.
- At a Glance Fault and Score Visibility
  Explore and interact with building data faults and scores by:
  - **Company**: Portfolio of Clients, Site, System, and Equipment
  - **Client**: Portfolio of Sites, Systems, and Equipment
  - **Site**: Portfolio of System and Equipment
- Quickly visualize sensor, fault, and score time-series data trends by Equipment and Systems.

Viewing the Executive Summary

The Executive Summary Dashboard displays automatically after login and is also accessible from the Company mega menu. This dashboard assists you in identifying high-priority issues that can be managed by exception to reduce time to quickly identify surface issues and improve energy, comfort, and more.

- Use the filters above the tiles to limit the Executive Summary to a specific client or client and site as well as equipment type or system type.
- Select the **Open in Full** icon in the top right corner of any tile to view a larger tile.
- You can also rearrange the location of the tiles on the dashboard by dragging and dropping the tile(s).
- To add or limit the tiles that display, select the **Settings** icon located at the top right of the displayed tiles. You are not limited to the number of tiles that display. You may need to refresh your browser after clicking out of the tiles list to see your changes.

The Executive Summary currently includes interactive dashboard tiles that include, but are not limited to:

- **10 Worst Performing Equipment/Systems**:
  - View the 10 worst-performing equipment or systems along with the number of faults, how many High, Medium, and Low faults, and the score percentage.
  - Select the equipment/system name to zoom to the Equipment/System Dashboard.
- **Average Score**: View the average score of all sites or all clients.
- **BAS Agent Connectivity**: Displays current agent connectivity status and the number of total points polled from the agents to be able to quickly identify how agents are communicating within your BAS network.
- **Faults by Priority**: Displays the high, medium, and low priority faults for the selected company based on the timeframe selected. If a single fault lasts longer than 1 day the fault displays as 1 fault per day.
- **Site Scores**:
  - View all sites and their faults, High, Medium, and Low priorities, and the score percentage.
  - Select the site name to zoom to the Site Dashboard.
  - Click within the site row in the Site Score panel to filter the 10 Worst Performing Equipment by that site.
- **Faults by Rule**: Displays the rule name, issue type for the rule, and the number of current faults for the rule.
- **Faults by Site**: View the sites with faults on a map. You can zoom in or out to see more detail.

Exporting and Downloading Data

Exporting Dashboard Data

Users can export data from almost all the available data tables from the Dashboard by selecting the Actions button to the top-right of the displayed data table. The data exported options listed depend on which dashboard you are currently viewing.

1. On any Dashboard page, select *Actions*.
2. Select **Export Data**.
3. From the **Time** drop-down, select the timeframe for the data export.
4. Select *Export*.
5. Depending on your browser settings, the exported file saves to the default download folder or you may be prompted to save the export file.

> ⚠ The export process may take time to complete, depending on the size of the file and/or the timeframe selected.

Exporting Time Series Data

Users can batch export time-series sensor data to an Excel file (.xlsx or .csv) from the Action button for a piece of equipment or system. The Excel spreadsheet has a summary tab that lists the equipment and number of records and then each equipment/system has a tab that lists its timeseries data. The Current date displays the last 24 hours of data as of the displayed date and time.

1. On the **Equipment** or **Systems** Dashboard.
2. (Optional) Select the calendar icon to update the:
    - **Current**: Unmark Current to display the date/time selector or to refresh the last 24 hours of data up to the current time, leave marked.
    - **Timeseries date/time**: The current date/time is the default display. You can select a date/time range of up to 1 year of data. For more information, see Using the Date/Time Picker (page 11).
    - **Interval**: The default interval is 15 minutes. You can select 1, 5, 15, 30, or 60 minutes. The Interval drop-down only displays on the Equipment and Systems Dashboards.
3. Select *Go* to update the date/time and/or interval and return to the Equipment or Systems Dashboard.
4. Select *Actions*.
5. Select **Export Timeseries** to begin the export process.
6. The exported file saves to the default download folder set up in the browser.

Download a Graph

Users can download a graph image (.png) from the Actions button of any displayed graph within a Dashboard.

1. On the **Equipment** or **Systems** Dashboard.
2. (Optional) Select the calendar icon to update the:
    - **Current**: Unmark Current to display the date/time selector or to refresh the last 24 hours of data up to the current time, leave marked.
    - **Timeseries date/time**: The current date/time is the default display. You can select a date/time range of up to 31 days. For more information, see Using the Date/Time Picker (page 11).

- **Interval**: The default interval is 15 minutes. You can select 1, 5, 15, 30, or 60 minutes. The Interval drop-down only displays on the Equipment and Systems Dashboards.

3. Select *Go* to update the date/time and/or interval and return to the Equipment or Systems Dashboard.
4. Select the rule and/or up to 10 sensors and select *Go*.
5. Select *Actions* and then select **Download Graph** to download the image.
6. The image file saves to the default download folder set up in your browser.

Using the Date/Time Picker

Use the date/time picker located at the top left of any dashboard to change the date range for the displayed data. The initial view is the Current date and time.

To change the date range for the displayed date:

1. Select the calendar icon to the right of the displayed date and time.
2. Select the Current drop-down and choose from the following:
   - **Current**: Displays data for the current date and time.
   - **Previous 24 Hours**: Displays the data for the previous 24 hours from the current date/time.
   - **Custom**: Select a custom date/time range of up to 31 days for viewing data.

   > ⚠ On the Site, System, and Equipment Dashboards, the time intervals available to select are now dependent on the selected date range.
   >
   > - 4 Hours: All intervals available
   > - 24 Hours: Intervals of 5 minutes or greater
   > - 72 Hours: Intervals of 10 minutes or greater
   > - 31 Days: Intervals of 15 minutes or greater

3. If needed, you can change the displayed intervals. When the interval is changed, the data that is displayed within the dashboard will also adjust to that same time interval to show incremental data based on the selected interval.
4. Select *Go*.

Filtering Data

Dashboard Filtering

Filter the data that displays on the dashboards by selecting the Filter icon to the left of the Actions button. You can select one or more Types to display as well as you can select the Priorities to filter the results to.

- Client Dashboard - Filter by Business Type
- Site Dashboard - Filter by Building Type
- Equipment Dashboard - Filter by Equipment Type
- System Dashboard - Filter by System Type

To filter the displayed data:

1. On the appropriate dashboard, select the **Filter** icon.
2. Select the **Type** drop-down.

3. Mark one or more Types to display.
4. Click anywhere in the window behind the Types list to return to the Filter window.
5. Select any of the **Priorities** to filter the results even further.
6. Select *OK*.

> ⚠ To clear a filter selection, click the "x" on the filter name.

Column Filtering in Workbook Mode

To temporarily filter data displayed in the grid view from the dashboard, you can use Workbook Mode to display a filter row across the top of the data grid. You can use the lookup for 1 or more columns to select data to filter by. While the Workbook Mode is temporary, if you navigate to another tab or display a different view in the same dashboard for specific information, grid in Workbook Mode is still available. However, if you navigate to a different entity (equipment, system, company, etc.), the Workbook Mode is cleared.

To filter data using Workbook Mode:

1. Select the *Workbook Mode* button located above the dashboard.
2. The data columns that display are related to the dashboard. If you haven't selected any sensors yet, you can do this now. (Sensors can be selected before or after selecting Workbook Mode.)
3. Under each column header, enter or select the filter data and then select the Filter icon to select the filter type. Different data types may have additional field inputs. For example, numeric data types will have an increase/decrease dial, Boolean data types will have a drop-down selection, etc.
4. You can clear any filter by selecting the Clear Filter icon for the appropriate column. This clears the filter data and type.
5. The filtered sensor information displays dynamically as the filters are added/removed. If no records match the filters, the message "No records available" displays.

> ⚠ Using Workbook Mode you can also rearrange column headers if you prefer data to display in a different order of columns by dragging and dropping the column headers.

Filter Types

The filter types that are available are related to the data type to be filtered. Depending on the dashboard and filter selected you can filter data based on a filter type using the following criteria. For example, if you select a filter for company status that is equal to active, only companies with a status of active display.

Date	Temperature	Text	Boolean
• Is equal to • Is not equal to • Is after or equal to • Is after • Is before • Is before or equal to • Is null • Is not null	• Is equal to • Is not equal to • Is greater than or equal to • Is greater than • Is less than or equal to • Is less than • Is null • Is not null	• Contains • Does not contain • Is equal to • Is not equal to • Starts with • Ends with • Is null • Is not null • Is empty • Is not empty	• (All) • Is true • Is false

Complex Filtering

When using Workbook Mode, some dashboards have complex filtering enabled. You can create complex filters of your grid data using and/or statements to filter your displayed data for analytics. Complex filtering is accessed by selecting the filter icon below the data table.

1. Select the Complex Filtering icon below the data table.
2. In the Filter Builder, select the *Add Expression* button to add your first row.
3. Select the data type from the dropdown. This list is populated by the columns in the data table.
4. Select the filter expression:
    - Is equal to
    - Is not equal to
    - Is greater than or equal to
    - Is greater than
    - Is less than or equal to
    - Is less than
    - Is null
    - Is not null
5. Enter the value.
6. You can continue to add separate rows or you can use the *Group* button to create And/Or rows using the buttons.
7. Select *Apply* to save the filter

Navigating the Dashboards

When you first access Building Optimization Broker (BOB), the Company Dashboard is the initial dashboard that displays with BOB as the default application. Additional application names that display to the right of BOB are dependent upon the company and/or user access to that application like the Energy Utility Dashboard (page 81).

Use the operational dashboards to:

- Quickly visualize the health of your building portfolio to pinpoint high priority issues, visualize trends, recommend fixes, as well as to export data as a .CSV file.
- At a Glance Fault and Score Visibility
  Explore and interact with building data faults and scores by:
    - **Company**: Portfolio of Clients, Site, System, and Equipment
    - **Client**: Portfolio of Sites, Systems, and Equipment
    - **Site**: Portfolio of System and Equipment
- Quickly visualize sensor, fault, and score time-series data trends by Equipment and Systems.

Using the Mega Navigation

To quickly access a specific entity, use the mega navigation at the top of the window to select the company, client, site, and/or equipment and then select Go. You get navigate to just the company or down to the equipment level. To clear the selected entity (and its children) from the mega navigation, select the delete icon to the right of the displayed name.

Accessing Entity Dashboards

To access each entity's dashboard, select BOB and then select the dashboard name and/or the view. After selecting a View, a pop-up window may display where you may be required to select additional information. An entity is a general term used to imply company, client, site, equipment, and/or system.

Each entity (company, client, site, equipment, or system) dashboard also has a View drop-down above the data table where you can select the appropriate view to display.

Dashboards and Their Views

- Company Dashboard (page 18) (default)
    - Client View
    - Site View
    - Equipment View
    - System View
- Client Dashboard (page 22)
    - Site View
    - Equipment View
    - System View
- Site Dashboard (page 27)
    - Equipment View
    - System View
    - Scoring View
- Equipment Dashboard (page 39)
    - Sensors View
    - Faults View
    - Rules View
- System Dashboard (page 33)
    - Sensors View
    - Equipment View
    - Faults View
    - Rules View

Key Performance Indicators (KPIs)

The Site, System, and Equipment Dashboards display a Score Metric and Faults metric for the specific site that is a comparison over time.

- **Score**
    - **Average Score** - This score is the average score for the entity (Equipment, System) at the point in time the Site dashboard is accessed. Use the date/time picker to edit the timeframe to the last 24 hours or a custom time period. The average score will be updated to an average for that timeframe.
    - **Percent Change** - This is the score for the currently selected time frame compared to the previous time frame. The Percent Change is based on the displayed date range.

- **Period Fault Occurrences**
    - **Current Period Faults**: The number of times in and out of fault within the specified time period. If a fault has gone in and out of fault three times within that time period, this counts as 3. If the fault has stayed in fault during the time period, then this would count as 1. The fault number is not always 1:1.
    - **Previous Period Fault Occurrences**: The same definition as above but for the previous time period.

⚠ For smaller screen displays, a horizontal scrollbar displays so that you can scroll to additional KPIs.

Subscribing to Alert Notifications

When you subscribe to an alert, a notification is sent when a high priority rule for an entity (or its children) receives a fault. For example, if you subscribe to a company, you will receive alert notifications for the clients, sites, equipment, and systems of that company. You have the option to limit alert subscriptions to lower levels than a company, for example, subscribing to a client (and its children), a site (and its children), or even down to an alert for a system and/or equipment.

> ⚠ Alert notifications are only sent for high priority rules. If a medium or low priority rule for an entity (or its children) receives a fault, an alert notification will not be sent.

The email and/or SMS notifications use the information set up in your profile and/or the client contact profile. Alert notifications help you understand where opportunities may lie to improve performance or create a service request to investigate.

Levels of Alert Notifications

- **Company** (and children): Company Dashboard > Actions > Subscribe to Company
- **Client** (and children): Company Dashboard > specific client ellipsis > Subscribe to Alerts
- **Campus** (group of clients and children): Client Dashboard > Actions > Subscribe to Campus
- **Site** (and children): Client Dashboard > specific site ellipsis > Subscribe to Alerts
- **Area** (group of sites and children): Site Dashboard > Equipment or System View > Actions > Subscribe to Area
- **Equipment**:
    - Site Dashboard > Equipment View> specific equipment ellipsis > Subscribe to Alerts
    - Equipment Dashboard > Actions > Subscribe to Alerts
- **System**:
    - Site Dashboard > System View > specific system ellipsis > Subscribe to Alerts
    - System Dashboard > Actions > Subscribe to Alerts

Subscribing to Alerts

To subscribe to alert notifications:

1. On the entity dashboard, select Actions > Subscribe to <entity> or select the ellipsis icon to the right of the entity and then select Subscribe Alerts.
2. In the Subscribing to Alerts window, complete the following fields:
    - **Subscription Method** (select one or more):
        - Email
        - SMS
    - **Subscribe**:
        - Self
        - Client Contact: Select the contact from the dropdown list.
        - Both: Select to subscribe yourself and a client contact selected from the dropdown list.
3. Select *OK*.

Viewing and/or Updating a Subscription

Subscriptions are focused on displaying and managing notifications that you and your Client Contacts are subscribed to. You can unsubscribe from multiple subscriptions at once or on a per-subscription basis. For information on how to set up the subscriptions, see *Subscribing to Alerts*.

The following information is displayed:

- **Target**: Displays the target level of the subscription.
- **Entity**: The type of entity. For example, Client, Site, and Equipment.
- **Email/SMS**: Displays the type of notification set up for the subscription. When the subscription is created, you can receive an email, an SMS text message, or both.

The default view is your subscriptions. To view the Client Contact subscriptions, select **Client Contact**.

To update the subscription method:

1. From the mega navigation, select **Subscriptions**.
2. The My Subscriptions page displays all of your active subscriptions.
3. Select the ellipsis icon to the right of the target entity.
4. Select **Update Subscription**.
5. Mark/unmark the Subscription Method(s).

   ⚠ You can unmark both methods to not receive a notification but keep the subscription in your list. To remove/delete a subscription, you will need to unsubscribe.

6. Select *Update*.

Unsubscribing from an Alert Notification

To unsubscribe from alerts, select the menu icon at the top of the BOB window to access the Mega Navigation.

1. From the mega navigation, select **Subscriptions**.
2. The My Subscriptions page displays all of your active subscriptions.
3. Select the ellipsis icon to the right of the target entity.
4. Select **Unsubscribe**.

Managing Background Jobs

Administrators have access to view or manage dashboard background jobs that have been completed or are currently running in the background. You can see the status of any job that is currently running (In Process) or completed (Complete) in the background. If the job is completed you will see the date and time of the successful completion.

To access the Background Jobs window:

1. From the Dashboard, select the Background Jobs icon at the top right of the page.
2. You can delete jobs by one of the following methods:
   - Select the ellipsis to the right of an individual job and then select *Delete*.
   - Select one or more jobs by marking the check box(es) to the left of the job, select *Actions*, and then select *Delete*.
3. Select *Confirm*.

Column Filtering in Workbook Mode

To temporarily filter data displayed in the grid view from the dashboard, you can use Workbook Mode to display a filter row across the top of the data grid. You can use the lookup for 1 or more columns to select data to filter by. While the Workbook Mode is temporary, if you navigate to another tab or display a different view in the same dashboard for specific information, grid in Workbook Mode is still available. However, if you navigate to a different entity (equipment, system, company, etc.), the Workbook Mode is cleared.

To filter data using Workbook Mode:

1. Select the *Workbook Mode* button located above the dashboard.
2. The data columns that display are related to the dashboard. If you haven't selected any sensors yet, you can do this now. (Sensors can be selected before or after selecting Workbook Mode.)
3. Under each column header, enter or select the filter data and then select the Filter icon to select the filter type. Different data types may have additional field inputs. For example, numeric data types will have an increase/decrease dial, Boolean data types will have a drop-down selection, etc.
4. You can clear any filter by selecting the Clear Filter icon for the appropriate column. This clears the filter data and type.
5. The filtered sensor information displays dynamically as the filters are added/removed. If no records match the filters, the message "No records available" displays.

> ⚠ Using Workbook Mode you can also rearrange column headers if you prefer data to display in a different order of columns by dragging and dropping the column headers.

Filter Types

The filter types that are available are related to the data type to be filtered. Depending on the dashboard and filter selected you can filter data based on a filter type using the following criteria. For example, if you select a filter for company status that is equal to active, only companies with a status of active display.

Date	Temperature	Text	Boolean
• Is equal to • Is not equal to • Is after or equal to • Is after • Is before • Is before or equal to • Is null • Is not null	• Is equal to • Is not equal to • Is greater than or equal to • Is greater than • Is less than or equal to • Is less than • Is null • Is not null	• Contains • Does not contain • Is equal to • Is not equal to • Starts with • Ends with • Is null • Is not null • Is empty • Is not empty	• (All) • Is true • Is false

Complex Filtering

When using Workbook Mode, some dashboards have complex filtering enabled. You can create complex filters of your grid data using and/or statements to filter your displayed data for analytics. Complex filtering is accessed by selecting the filter icon below the data table.

1. Select the Complex Filtering icon below the data table.
2. In the Filter Builder, select the *Add Expression* button to add your first row.
3. Select the data type from the dropdown. This list is populated by the columns in the data table.
4. Select the filter expression:
    - Is equal to
    - Is not equal to
    - Is greater than or equal to
    - Is greater than
    - Is less than or equal to
    - Is less than
    - Is null
    - Is not null
5. Enter the value.
6. You can continue to add separate rows or you can use the *Group* button to create And/Or rows using the buttons.
7. Select *Apply* to save the filter

Company Dashboard

The Company Dashboard for your default company is the initial view when accessing the Dashboard. You can switch to a different company using the Quick Navigation at the top left of the window to select a different company (as well as you can select a client, site, and equipment) and then select Go. The Company Dashboard displays data at the company level.

You can drill down to view specific client, site, equipment, and systems dashboards by selecting the entity name.

The default view displays 10 entities per page. You can use the drop-down in the pagination controls to view 5, 10, or 20 entities per page as well as use the VCR buttons to navigate the pages. Use the Find field to search for a specific entity.

From the Company Dashboard, you can subscribe to alerts for the company (and children) or for clients (and children). See Subscribing to Alert Notifications (page 15).

For information on using Workbook Mode to filter and sort column data, see Filtering Data (page 12).

> ⚠ Fault information for all views on the Company Dashboard only displays when the Current timeframe is displayed. This includes the Faults, High, Medium, and Low columns.

View Company Information

Select the Info icon to the right of the company name to view additional information including:

- Company Address
- Contractor Type

Client View

From the Company Dashboard, the initial view displays the client information including:

- Client Name - Select a Client to view the Client Dashboard (page 22)
- Business Type
- Number of Sites
- Number of Faults

- Number of High Priority Faults
- Number of Medium Priority Faults
- Number of Low Priority Faults

Site View

Select the **Sites** to view all sites for the company.

The Site view displays the following:

- Site Name - Select a Site to view the Site Dashboard (page 27) (for the site's client)
- Client Name
- Building Type
- Location
- Number of Equipment
- Current Score Percentage
- Number of Faults
- Number of High Priority Faults
- Number of Medium Priority Faults
- Number of Low Priority Faults

Equipment View

Select the **Equipment** to view all equipment for the company.

The Equipment view displays the following:

- Equipment Name - Select a piece of equipment to view the Equipment Dashboard (page 39) (for the client and site)
- Client Name
- Equipment Type
- Area
- Number of Sensors
- Current Score Percentage

System View

Select the **System** to view all systems for the company.

The System view displays the following:

- System Name - Select a system to view the System Dashboard (page 33) (for the client and site)
- System Type
- Client Name
- Site Name
- Number of Equipment
- Number of Sensors
- Current Score Percentage

Health Monitor View

Select the **Health Monitor** view to display faults associated with rules and can also be used to create Service Requests.

The default view displays only rules with faults. You can clear the filter to view all rules by clicking the "x" on the Fault filter that displays to the left of the Actions drop-down.

The following information displays:

- Rule Name
- Client
- Site
- Equipment/System
- Target
- Status
- Fault Started
- Priority
- Issue Type

Select the ellipsis to the right of the rule and select View More Info to view additional rule information that includes:

- Rule
- Description
- Issue Types
- Target
- Status
- Last Successful Execution
- System Effect
- Recommendation

Column Filtering in Workbook Mode

To temporarily filter data displayed in the grid view from the dashboard, you can use Workbook Mode to display a filter row across the top of the data grid. You can use the lookup for 1 or more columns to select data to filter by. While the Workbook Mode is temporary, if you navigate to another tab or display a different view in the same dashboard for specific information, grid in Workbook Mode is still available. However, if you navigate to a different entity (equipment, system, company, etc.), the Workbook Mode is cleared.

To filter data using Workbook Mode:

1. Select the *Workbook Mode* button located above the dashboard.
2. The data columns that display are related to the dashboard. If you haven't selected any sensors yet, you can do this now. (Sensors can be selected before or after selecting Workbook Mode.)
3. Under each column header, enter or select the filter data and then select the Filter icon to select the filter type. Different data types may have additional field inputs. For example, numeric data types will have an increase/decrease dial, Boolean data types will have a drop-down selection, etc.
4. You can clear any filter by selecting the Clear Filter icon for the appropriate column. This clears the filter data and type.
5. The filtered sensor information displays dynamically as the filters are added/removed. If no records match the filters, the message "No records available" displays.

⚠ Using Workbook Mode you can also rearrange column headers if you prefer data to display in a different order of columns by dragging and dropping the column headers.

Filter Types

The filter types that are available are related to the data type to be filtered. Depending on the dashboard and filter selected you can filter data based on a filter type using the following criteria. For example, if you select a filter for company status that is equal to active, only companies with a status of active display.

Date	Temperature	Text	Boolean
• Is equal to • Is not equal to • Is after or equal to • Is after • Is before • Is before or equal to • Is null • Is not null	• Is equal to • Is not equal to • Is greater than or equal to • Is greater than • Is less than or equal to • Is less than • Is null • Is not null	• Contains • Does not contain • Is equal to • Is not equal to • Starts with • Ends with • Is null • Is not null • Is empty • Is not empty	• (All) • Is true • Is false

Complex Filtering

When using Workbook Mode, some dashboards have complex filtering enabled. You can create complex filters of your grid data using and/or statements to filter your displayed data for analytics. Complex filtering is accessed by selecting the filter icon below the data table.

1. Select the Complex Filtering icon below the data table.
2. In the Filter Builder, select the *Add Expression* button to add your first row.
3. Select the data type from the dropdown. This list is populated by the columns in the data table.
4. Select the filter expression:
    - Is equal to
    - Is not equal to
    - Is greater than or equal to
    - Is greater than
    - Is less than or equal to
    - Is less than
    - Is null
    - Is not null
5. Enter the value.
6. You can continue to add separate rows or you can use the *Group* button to create And/Or rows using the buttons.
7. Select *Apply* to save the filter

Working with Clients

A Client is representative of your customer. In K2A Core or the Company Dashboard, you can view, edit, or deactivate all the entities within a client.

Creating a Client

1. You can create a new client from K2A Core (K2A Core > Entities > Client) or from the Client Dashboard.

2. Select the *Actions* button (top right).
3. Select *Create Client*.
4. In the Add New Client window, complete the following information:
    - **Client Name**: Enter the unique client name.
    - **Business Type**: Select business type.
5. In the **Search for Address** field, enter the physical address and select the correct address from the displayed options. The additional address fields will automatically populate.
6. Select *Create*.

> ⚠ To add the Primary Contact to the client, you will need to select the ellipsis icon to the right of the client (after creating the client) and select the *Edit*.

Editing a Client

1. You can edit a client from K2A Core (K2A Core > Entities > Client) or from the Client Dashboard.
2. Select the ellipsis icon to the right of the client.
3. Select *Edit*.
4. In the Edit Client window, you can edit any of the fields.
5. (Optional) Select the **Primary Contact** drop-down and then select an existing client contact. The primary contact name displays as bolded text in the Contacts table.
6. Select *Update*.

Deactivating a Client

1. You can deactivate a client from K2A Core (K2A Core > Entities > Client).
2. Select the ellipsis icon to the right of the client.
3. Select *Deactivate*.
4. Select *Update*.

Client Dashboard

The Client Dashboard displays the site, equipment, and systems information for the selected client. You can switch to a different client using the Quick Navigation at the top left of the window to select a client (as well as you can select a site, and/or equipment) and then select Go.

You can drill down to view the specific site, equipment, and systems dashboards by selecting the entity name.

The default view displays 10 entities per page. You can use the drop-down in the pagination controls to view 5, 10, or 20 entities per page as well as use the Arrow buttons to navigate the pages. Use the Find field to search for a specific entity.

From the Client Dashboard, you can subscribe to alerts for the campus (group of clients and children) and/or for sites (and children). See Subscribing to Alert Notifications (page 15).

Clients are created, edited, and deleted from the Company Dashboard (page 18).

> ⚠ Fault information for all views on the Client Dashboard only displays when the Current timeframe is displayed. This includes the Faults, High, Medium, and Low columns.

- Client Equipment (page 23)
- Client Systems (page 24)

View Client Information

Select the Info icon to the right of the client name to view additional information including:

- Client Address
- Business Type
- Primary Contact

Client Sites

From the Client Dashboard, the initial view displays the site information including:

- Site Name - Select the Site Name to access the Site Dashboard (page 27).
- Building Type
- Location
- Number of Equipment
- Current Score Percentage
- Number of Faults
- Number of High Priority Faults
- Number of Medium Priority Faults
- Number of Low Priority Faults

Previewing Site Weather Data

The Preview Weather Data window displays the previous 4 hours of data in 30-minute increments, however, you can edit the time frame. A weather entity is automatically created when you create a site based on the zip code for that site. If changes to the site address are made, the weather entity updates automatically to the new zip code.

1. From the Client Dashboard, to view weather data for a site, select the ellipsis to the right of the site name or from the Site Dashboard, select *Actions*.
2. Select *Preview Weather Data*.
3. The information displayed in the Preview Weather Data window includes:
    - Start/End Date and Time
    - Time Stamp
    - Temperature
    - Humidity
    - Pressure
    - Minimum Temperature
    - Maximum Temperature
4. To close the window, click the X in the top right corner of the window.

Client Equipment

Select **View** and then select **Equipment** to view all equipment for the selected client.

The Equipment Dashboard displays the following:

- Equipment Name - Select the Equipment to access the Equipment Dashboard (page 39).

- Site Name
- Equipment Type
- Area
- Number of Sensors
- Current Score Percentage

Client Systems

Select **View** and then select **System** to view all systems for the selected client.

The Systems Dashboard displays the following:

- System Name - Select a System to access the System Dashboard (page 33).
- System Type
- Site Name
- Number of Equipment
- Number of Sensors
- Current Score Percentage

Health Monitor View

Select the **Health Monitor** view to display faults associated with rules and can also be used to create Service Requests.

The default view displays only rules with faults. You can clear the filter to view all rules by clicking the "x" on the Fault filter that displays to the left of the Actions drop-down.

The following information displays:

- Rule Name
- Client
- Site
- Equipment/System
- Target
- Status
- Fault Started
- Priority
- Issue Type

Select the ellipsis to the right of the rule and select View More Info to view additional rule information that includes:

- Rule
- Description
- Issue Types
- Target
- Status
- Last Successful Execution
- System Effect
- Recommendation

Column Filtering in Workbook Mode

To temporarily filter data displayed in the grid view from the dashboard, you can use Workbook Mode to display a filter row across the top of the data grid. You can use the lookup for 1 or more columns to select data to filter by. While the

Workbook Mode is temporary, if you navigate to another tab or display a different view in the same dashboard for specific information, grid in Workbook Mode is still available. However, if you navigate to a different entity (equipment, system, company, etc.), the Workbook Mode is cleared.

To filter data using Workbook Mode:

1. Select the *Workbook Mode* button located above the dashboard.
2. The data columns that display are related to the dashboard. If you haven't selected any sensors yet, you can do this now. (Sensors can be selected before or after selecting Workbook Mode.)
3. Under each column header, enter or select the filter data and then select the Filter icon to select the filter type. Different data types may have additional field inputs. For example, numeric data types will have an increase/decrease dial, Boolean data types will have a drop-down selection, etc.
4. You can clear any filter by selecting the Clear Filter icon for the appropriate column. This clears the filter data and type.
5. The filtered sensor information displays dynamically as the filters are added/removed. If no records match the filters, the message "No records available" displays.

⚠ Using Workbook Mode you can also rearrange column headers if you prefer data to display in a different order of columns by dragging and dropping the column headers.

Filter Types

The filter types that are available are related to the data type to be filtered. Depending on the dashboard and filter selected you can filter data based on a filter type using the following criteria. For example, if you select a filter for company status that is equal to active, only companies with a status of active display.

Date	Temperature	Text	Boolean
• Is equal to • Is not equal to • Is after or equal to • Is after • Is before • Is before or equal to • Is null • Is not null	• Is equal to • Is not equal to • Is greater than or equal to • Is greater than • Is less than or equal to • Is less than • Is null • Is not null	• Contains • Does not contain • Is equal to • Is not equal to • Starts with • Ends with • Is null • Is not null • Is empty • Is not empty	• (All) • Is true • Is false

Complex Filtering

When using Workbook Mode, some dashboards have complex filtering enabled. You can create complex filters of your grid data using and/or statements to filter your displayed data for analytics. Complex filtering is accessed by selecting the filter icon below the data table.

1. Select the Complex Filtering icon below the data table.
2. In the Filter Builder, select the *Add Expression* button to add your first row.
3. Select the data type from the dropdown. This list is populated by the columns in the data table.
4. Select the filter expression:
    - Is equal to

- Is not equal to
- Is greater than or equal to
- Is greater than
- Is less than or equal to
- Is less than
- Is null
- Is not null

5. Enter the value.
6. You can continue to add separate rows or you can use the *Group* button to create And/Or rows using the buttons.
7. Select *Apply* to save the filter

Working with Sites

A site is used to represent a physical building. A site belongs to a client. Depending on how you access the Site Management page, you may be prompted to select the site's client.

Creating a Site

1. You can create a new client from K2A Core (K2A Core > Entities > Site) or from the Site Dashboard.
2. Select the *Actions* button (top right).
3. Select *Add New Site*.
4. In the Add New Site window, select the **Client**.
5. In the Site Details section, complete the following information:
    - **Site Name**: Enter a unique site name.
    - **Building Type**: Select the type of building.
    - **Area Unit of Measure**
        - **Square Feet**: Enter the square footage of the site.
        - **Square Meter**: Enter the square meterage of the site.
    - **Search for Address**: Enter the physical address and select the correct address from the displayed options. The additional address fields will automatically populate.
    - **Time Zone**: Select the time zone where the site is located.
    - **Fuel Types**: Select one or more fuel types (optional).
    - **Energy/Facilities/Sales Contact** (optional): Select the contact for each of these fields.
6. In the Campus Details section, select an existing campus to associate the site with or select *Add New Campus*.
7. Select *Save*.

Editing a Site

1. You can create a new client from K2A Core (K2A Core > Entities > Site) or from the Site Dashboard.
2. Select the ellipsis icon to the right of the site.
3. Select *Edit*.
4. In the Edit Site window, you can edit any of the fields except for the client.
5. Select *Save*.

Deleting a Site

> Deleting a site will also permanently delete any systems, areas, equipment, and sensors that are children of the site.

To delete a site:

1. You can create a new client from K2A Core (K2A Core > Entities > Site) or from the Site Dashboard.
2. Select the ellipsis icon to the right of the site.
3. Select *Deactivate*.
4. In the Delete Site window, select *Delete.*

Site Dashboard

The Site Dashboard displays the equipment and systems information for the selected Site. You can switch to a different site using the Quick Navigation at the top left of the window to select a site (as well as you can select equipment) and then select Go. You can drill down to view specific equipment and systems dashboards by selecting the entity name. The default view displays 10 entities per page. You can use the drop-down in the pagination controls to view 5, 10, or 20 entities per page as well as use the VCR buttons to navigate the pages. Use the Find field to search for a specific entity. From the Site Dashboard, you can subscribe to alerts for an area (group of sites and children) and/or equipment (from the Equipment view) and/or systems (from the System view). See Subscribing to Alert Notifications (page 15). Sites are created, edited, and deleted from the Client Dashboard (page 22).

View Site Information

Select the Info icon to the right of the site name to view additional information including:

- Address
- Building Type
- Area
- Fuel Types
- Contacts (Sales, Facilities, and Energy)

View Site Weather Information

A weather identifier displays, i.e. sun, clouds, etc. as well as the current temp. The tooltip associated with the weather identifier displays additional information including the temperature low and high etc.

Key Performance Indicators

The Site Dashboard displays a Score Metric and Faults metric for the specific site that is a comparison over time.

- **Score**
  - **Average Score** - This score is the average score for the entity (Equipment, System) at the point in time the Site dashboard is accessed. Use the date/time picker to edit the timeframe to the last 24 hours or a custom time period. The average score will be updated to an average for that timeframe.
  - **Percent Change** - This is the score for the currently selected time frame compared to the previous time frame. The Percent Change is based on the displayed date range.

- **Period Fault Occurrences**
    - **Current Period Faults**: The number of times in and out of fault within the specified time period. If a fault has gone in and out of fault three times within that time period, this counts as 3. If the fault has stayed in fault during the time period, then this would count as 1. The fault number is not always 1:1.
    - **Previous Period Fault Occurrences**: The same definition as above but for the previous time period.

⚠ For smaller screen displays, a horizontal scrollbar displays so that you can scroll to additional KPIs.

Previewing Site Weather Data

The Preview Weather Data window displays the previous 4 hours of data in 30-minute increments, however, you can edit the time frame. A weather entity is automatically created when you create a site based on the zip code for that site. If changes to the site address are made, the weather entity updates automatically to the new zip code.

1. From the Client Dashboard, to view weather data for a site, select the ellipsis to the right of the site name or from the Site Dashboard, select *Actions*.
2. Select *Preview Weather Data*.
3. The information displayed in the Preview Weather Data window includes:
    - Start/End Date and Time
    - Time Stamp
    - Temperature
    - Humidity
    - Pressure
    - Minimum Temperature
    - Maximum Temperature
4. To close the window, click the X in the top right corner of the window.

Equipment View

From the Site Dashboard, the initial view displays the **Equipment** information including:

- Equipment - Select the equipment name to view the Equipment Dashboard (page 39).
- Equipment Type - Type of equipment displayed
- Sensors - Number of sensors
- Score - Current score percentage
- Faults - Number of faults
- High - Number of high priority faults
- Medium - Number of medium priority faults
- Low - Number of low priority faults

Systems View

Select the **Systems** view to display all systems for the company.

The Systems Dashboard displays the following:

- System - Select a system name to view the Systems Dashboard (page 33).
- System Type - Type of system displayed
- Equipment - Number of pieces of equipment
- Sensors - Number of sensors
- Score - Current score percentage

- Faults - Number of faults
- High - Number of high priority faults
- Medium - Number of medium priority faults
- Low - Number of low priority faults

Faults View

The Faults View displays the rule(s) and fault count as well as a bar graph to indicate when the fault(s) occurred for each rule. The current time is the default timeframe. You can select the date picker to select the previous 24 hours or create a custom timeframe of up to 14 days. The bar graph displays real-time fault information in 1-minute increments with a 4-hour timeframe. See below for bar graph information.

The rule section displays the following information:

- Rule and Equipment Affected
- Issue Type
- Priority
- Fault Count
- Current Status

Scoring View

Select the Scoring View to display the scoring information for the site. The Scoring tab defaults to the Score Grid view, however, you also can view the Score Graph by selecting the View drop-down.

1. Before the scoring information can be viewed, you will need to select the system and/or equipment type in the window that displays and then select *OK.*
2. The *Score grid* view displays the equipment and score and any associated rules and score. Select a rule in the middle section to display the timestamp information in a grid format. (Or you can select the Rules & Sensors filter to select a rule and any other optional sensors to display.)
3. Select the **View** drop-down to select *Score graph* to view the data in a graph format. Select a rule in the middle section to display that rule's score and the overall score in a graph format. (Or you can select the Rules & Sensors filter to select a rule and any other optional sensors to display.) You can view score information by hovering your mouse over any of the rule graph lines.

Health Monitor View

Select the **Health Monitor** view to display faults associated with rules and can also be used to create Service Requests.

The default view displays only rules with faults. You can clear the filter to view all rules by clicking the "x" on the Fault filter that displays to the left of the Actions drop-down.

The following information displays:

- Rule Name
- Client
- Site
- Equipment/System
- Target
- Status
- Fault Started
- Priority
- Issue Type

Select the ellipsis to the right of the rule and select View More Info to view additional rule information that includes:

- Rule
- Description
- Issue Types
- Target
- Status
- Last Successful Execution
- System Effect
- Recommendation

Adding a Formula Column

On the Equipment. System, and Site Dashboards in the Sensor or Score grid views, you can add a custom formula column using basic math (addition, subtraction, multiplication, and division). The formula columns can be saved into a configuration for the equipment/system dashboard. The formula column displays to the right of the column that was selected.

To add a formula column:

1. In the Sensor or Scor Grid view, to the right of a numeric column header, select the ellipsis.
2. Select *Add Formula Column*.

   ⚠ The Add Formula Column option is available if there are two or more numeric columns.

3. Enter a **Column Header** name.
4. Select the **Start Column** from the available numeric-only columns.
5. Select the **Operator**.
   - Plus: Select to add the values. (Start Column + End Column)
   - Minus: Select to subtract the End Column values from the Start Column values. (Start Column - End Column)
   - Times: Select to multiply the values. (Start Column x End Column)
   - Divide: Select to divide the End Column values into the Start Column values. (Start Column / End Column)
6. Select the **End Column** from the available numeric-only columns.
7. If needed, enter the decimal place value in the **Precision** field.
8. Select *Create.*

Column Filtering in Workbook Mode

To temporarily filter data displayed in the grid view from the dashboard, you can use Workbook Mode to display a filter row across the top of the data grid. You can use the lookup for 1 or more columns to select data to filter by. While the Workbook Mode is temporary, if you navigate to another tab or display a different view in the same dashboard for specific information, grid in Workbook Mode is still available. However, if you navigate to a different entity (equipment, system, company, etc.), the Workbook Mode is cleared.

To filter data using Workbook Mode:

1. Select the *Workbook Mode* button located above the dashboard.
2. The data columns that display are related to the dashboard. If you haven't selected any sensors yet, you can do this now. (Sensors can be selected before or after selecting Workbook Mode.)

3. Under each column header, enter or select the filter data and then select the Filter icon to select the filter type. Different data types may have additional field inputs. For example, numeric data types will have an increase/decrease dial, Boolean data types will have a drop-down selection, etc.
4. You can clear any filter by selecting the Clear Filter icon for the appropriate column. This clears the filter data and type.
5. The filtered sensor information displays dynamically as the filters are added/removed. If no records match the filters, the message "No records available" displays.

⚠ Using Workbook Mode you can also rearrange column headers if you prefer data to display in a different order of columns by dragging and dropping the column headers.

Filter Types

The filter types that are available are related to the data type to be filtered. Depending on the dashboard and filter selected you can filter data based on a filter type using the following criteria. For example, if you select a filter for company status that is equal to active, only companies with a status of active display.

Date	Temperature	Text	Boolean
• Is equal to • Is not equal to • Is after or equal to • Is after • Is before • Is before or equal to • Is null • Is not null	• Is equal to • Is not equal to • Is greater than or equal to • Is greater than • Is less than or equal to • Is less than • Is null • Is not null	• Contains • Does not contain • Is equal to • Is not equal to • Starts with • Ends with • Is null • Is not null • Is empty • Is not empty	• (All) • Is true • Is false

Complex Filtering

When using Workbook Mode, some dashboards have complex filtering enabled. You can create complex filters of your grid data using and/or statements to filter your displayed data for analytics. Complex filtering is accessed by selecting the filter icon below the data table.

1. Select the Complex Filtering icon below the data table.
2. In the Filter Builder, select the *Add Expression* button to add your first row.
3. Select the data type from the dropdown. This list is populated by the columns in the data table.
4. Select the filter expression:
    - Is equal to
    - Is not equal to
    - Is greater than or equal to
    - Is greater than
    - Is less than or equal to
    - Is less than
    - Is null
    - Is not null
5. Enter the value.
6. You can continue to add separate rows or you can use the *Group* button to create And/Or rows using the buttons.

7. Select *Apply* to save the filter

Working with Equipment

Equipment represents an asset at a site. Equipment can serve any number of areas and be associated with any number of systems. Depending on how you access the Equipment Management page, you may be prompted to select the equipment's client and/or site.

Creating Equipment

1. Access the Equipment from K2A Core or from the Equipment Dashboard.
2. Select the *Actions* button and then select *Create New Equipment*.
3. In the Add New Equipment window, select the **Client**.
4. Select the **Site**.
5. Complete the following information:
    - **Equipment Name**: Enter the equipment name.
    - **Equipment Type**: Select the equipment type.
    - **Manufacturer (optional)**: Select the manufacturer.
    - **Model Number (optional)**: Enter the model number.
    - **Serial Number (optional)**: Enter the serial number.
6. In the Area & System Details section, you can optionally associate the equipment to an **Area** and/or **System**.
7. Select *Save*.

Editing Equipment

1. Access the Equipment from K2A Core or from the Equipment Dashboard.
2. Select the ellipsis icon to the right of the equipment.
3. Select *Edit*.
4. In the Edit Equipment window, you can edit any of the fields except for the client and site.
5. Select *Save*.

Deleting Equipment

Deleting equipment will also delete the sensors listed under the equipment.

1. Access the Equipment from K2A Core or from the Equipment Dashboard.
2. Select the ellipsis icon to the right of the equipment.
3. Select *Deactivate*.
4. In the Delete Entity window, select *Yes*.
5. The Equipment is deleted.

Working with Systems

A system is a collection of equipment that works in unison to serve a purpose. Equipment can be tied to one or many systems. Depending on how you access the System Entity Management page, you may be prompted to select the system's client and/or site.

Creating a System

1. Access the system from K2A Core or from the System Dashboard.
2. Select the *Actions* button and then select *Create New System*.
3. In the Add New System window, select the **Client**.
4. Select the **Site**.
5. Complete the following information:
    - **System Name**: Enter the system name.
    - **System Type**: Select the system type.
    - **Equipment**: Select one or more pieces of equipment to associate with the system.
6. Select *Save*.

Editing System

1. Access the system from K2A Core or from the System Dashboard.
2. Select the ellipsis icon to the right of the system.
3. Select *Edit*.
4. In the Edit System window, you can edit any of the fields except for the client and site.
5. Select *Save*.

Deleting a System

> Deleting a system will also delete any sensors that are children of the system.

1. Access the system from K2A Core or from the System Dashboard.
2. Select the ellipsis icon to the right of the system.
3. Select *Deactivate*.
4. In the Delete Entity window, select *Yes*.
5. The system is deleted.

System Dashboard

The System Dashboard displays the sensors, faults, scores, rules, and equipment information for the selected system. From the System Dashboard, you can subscribe to alerts for system faults. See Subscribing to Alert Notifications (page 15). Systems are created, edited, and deleted from the Site Dashboard (page 27).

View System Information

Select the Info icon to the right of the system name to view additional information including:

- Site
- System Type

Key Performance Indicators (KPIs)

The System Dashboard displays a Score and Faults Metric for the specific system that is a comparison over time.

- **Score**
  - **Average Score** - This score is the average score for the entity (Equipment, System) at the point in time the Site dashboard is accessed. Use the date/time picker to edit the timeframe to the last 24 hours or a custom time period. The average score will be updated to an average for that timeframe.
  - **Percent Change** - This is the score for the currently selected time frame compared to the previous time frame. The Percent Change is based on the displayed date range.

- **Period Fault Occurrences**
  - **Current Period Faults**: The number of times in and out of fault within the specified time period. If a fault has gone in and out of fault three times within that time period, this counts as 3. If the fault has stayed in fault during the time period, then this would count as 1. The fault number is not always 1:1.
  - **Previous Period Fault Occurrences**: The same definition as above but for the previous time period.

⚠ For smaller screen displays, a horizontal scrollbar displays so that you can scroll to additional KPIs.

Faults View

The initial view displays the **Faults** to view the rule(s) and fault count as well as a bar graph to indicate when the fault(s) occurred for each rule. The current time is the default timeframe. You can select the date picker to select the previous 24 hours or create a custom timeframe of up to 31 days. The bar graph displays real-time fault information in 1-minute increments with a 4-hour timeframe. See below for bar graph information.

The rule section displays the following information:

- Rule name
- Issue Type
- Priority
- Fault Count
- Current Status

Bar Graph Information

The bar graph displays the real-time fault information in 1-minute increments within a four-hour timeframe for each rule. The bar colors indicate the priority assigned to the rule. (Red/High Priority, Orange/Medium Priority, Yellow/Low Priority)

Viewing fault information:

- You can view the start and end date/time of the fault by hovering your mouse over the bar on the chart.
- Use the scroll bar at the bottom of the window to scroll through the four-hour interval.

- The date/time displayed directly above the bar graph section indicates the currently displayed four-hour interval.
- To advance to the next four-hour interval, use the arrows to the right and left of the displayed date/time interval above the bar graph.

Additional Rule Information

Select the ellipsis to the right of the rule and select View More Info to view additional rule information that includes:

- Rule
- Description
- Issue Types
- Target
- Status
- System Effect
- Recommendation

Sensor Views

From the View drop-down, select Sensors and then select the sensor view to display. To the left of the timeframe, use the Sensor drop-down to select one or more sensors to display the fault data for that timeframe. After displaying the data, you can hide displayed sensor data by selecting its name above the graph. The name grays out to indicate that data is hidden. Select it again to unhide the data. Hover with your mouse over the data to view the data point information. For more information, see Sensors Overview (page 45). On the graph, you can zoom in and out by using your mouse wheel. You can also shift + click and drag to select a smaller time frame to focus on.

You can update the timeframe and intervals for the displayed data. See Using the Date/Time Picker (page 11). If you choose to export the data, the timeframe and intervals are also respected. See Exporting and Downloading Data (page 10).

Score Views

From the View drop-down, select Sensors, and then select the Score Graph or Score Grid. Use the Sensor drop-down to the far right to select the rule or sensors to display. The overall score is calculated based on the Rules that are targeting the equipment. See Scoring (page 136) for more information. Additionally, if you have created Per-Rule Scoring, this will also display on the line graph. Creating a Per-Rule Score is found in the Creating a Custom Rule (page 103) and Modifying a K2A Rule (page 101) topics. Scores default to being sorted from the lowest score to the highest.

You can update the timeframe and intervals for the displayed data. See Using the Date/Time Picker (page 11). If you choose to export the data, the timeframe and intervals are also respected. See Exporting and Downloading Data (page 10).

Score Grid

The Score Grid view displays the rule and rule score. Select the score to display:

- Timestamp: The date and time when the data occurred.
- Fault: If a fault is encountered during the time period selected, a Warning icon in red displays identifying when a rule is in fault within the time series data. If the rule is not in fault, a green checkmark icon displays.
  To view additional information, hover your mouse over the Fault icon (red or green) to view:
  - Formula Code
  - Fault Logic

    - Rule Aggregate and Type
    - Sensor Aggregates including the sensor name and type
- Formula Value Output:
- Sensor Data: Sensor data returned.

Score Graph

The Score Graph displays the equipment and corresponding score on a line graph. You can select the equipment and a specific rule to display the overall score and selected rule.

Raw Data

The Raw Data view displays the Health Score Records that changed. This would be any health score record, those in fault and those not, with the corresponding date time stamp, and the applicable sensor data.

Rules View

Select **Rules** to view the following information:

- Rule Name: Select the rule name to switch to the Sensor view with the applicable sensors already selected.
- K2A/Custom: Indicates if the rule is a K2A rule or a custom rule.
- Issue Types: Displays the issue types for the yule.
- Enable/Disable: Indicates if the rule is enabled or disabled.
- Priority Level
- Status

There are three statuses for Rules: Ok, In Fault, and Failure.

- **Ok**: The rule is evaluating properly and does not have a fault.
- **In Fault**: The rule is evaluating properly and, based on the criteria specified, there is a fault condition.
- **Failure**: The Rule has failed to evaluate. This can be because the equipment is missing data or sensors that are expected.

Select the ellipsis to the right of the rule and select View More Info to view additional rule information that includes:

- Rule
- Description
- Issue Types
- Target
- Status
- Last Successful Execution
- System Effect
- Recommendation

Equipment View

Select **Equipment** to view all equipment that is associated with the system.

The Equipment Dashboard displays the following:

- Equipment Name - Select equipment to view the Equipment Dashboard (page 39).
- Equipment Type
- Number of Sensors

- Score Percentage
- Number of Faults
- Number of High Priority Faults
- Number of Medium Priority Faults
- Number of Low Priority Faults

Health Monitor View

Select the **Health Monitor** view to display faults associated with rules and can also be used to create Service Requests.

The default view displays only rules with faults. You can clear the filter to view all rules by clicking the "x" on the Fault filter that displays to the left of the Actions drop-down.

The following information displays:

- Rule Name
- Client
- Site
- Equipment/System
- Target
- Status
- Fault Started
- Priority
- Issue Type

Select the ellipsis to the right of the rule and select View More Info to view additional rule information that includes:

- Rule
- Description
- Issue Types
- Target
- Status
- Last Successful Execution
- System Effect
- Recommendation

Adding a Formula Column

On the Equipment. System, and Site Dashboards in the Sensor or Score grid views, you can add a custom formula column using basic math (addition, subtraction, multiplication, and division). The formula columns can be saved into a configuration for the equipment/system dashboard. The formula column displays to the right of the column that was selected.

To add a formula column:

1. In the Sensor or Scor Grid view, to the right of a numeric column header, select the ellipsis.
2. Select *Add Formula Column*.

   ⚠ The Add Formula Column option is available if there are two or more numeric columns.

3. Enter a **Column Header** name.
4. Select the **Start Column** from the available numeric-only columns.
5. Select the **Operator**.
   - Plus: Select to add the values. (Start Column + End Column)

- Minus: Select to subtract the End Column values from the Start Column values. (Start Column - End Column)
- Times: Select to multiply the values. (Start Column x End Column)
- Divide: Select to divide the End Column values into the Start Column values. (Start Column / End Column)

6. Select the **End Column** from the available numeric-only columns.
7. If needed, enter the decimal place value in the **Precision** field.
8. Select *Create.*

Viewing Aggregate Totals

On the Sensor and Score Grids, you can display aggregate totals for Minimum Value, Maximum Value, or Average. The aggregate totals display at the bottom of the appropriate columns.

- Minimum: Displays the minimum value over the duration specified.
- Maximum: Displays the maximum value over the duration specified.
- Average: Displays the average value (dividing the sum of values by the total number of values) over the duration specified.

Column Filtering in Workbook Mode

To temporarily filter data displayed in the grid view from the dashboard, you can use Workbook Mode to display a filter row across the top of the data grid. You can use the lookup for 1 or more columns to select data to filter by. While the Workbook Mode is temporary, if you navigate to another tab or display a different view in the same dashboard for specific information, grid in Workbook Mode is still available. However, if you navigate to a different entity (equipment, system, company, etc.), the Workbook Mode is cleared.

To filter data using Workbook Mode:

1. Select the *Workbook Mode* button located above the dashboard.
2. The data columns that display are related to the dashboard. If you haven't selected any sensors yet, you can do this now. (Sensors can be selected before or after selecting Workbook Mode.)
3. Under each column header, enter or select the filter data and then select the Filter icon to select the filter type. Different data types may have additional field inputs. For example, numeric data types will have an increase/decrease dial, Boolean data types will have a drop-down selection, etc.
4. You can clear any filter by selecting the Clear Filter icon for the appropriate column. This clears the filter data and type.
5. The filtered sensor information displays dynamically as the filters are added/removed. If no records match the filters, the message "No records available" displays.

⚠ Using Workbook Mode you can also rearrange column headers if you prefer data to display in a different order of columns by dragging and dropping the column headers.

Filter Types

The filter types that are available are related to the data type to be filtered. Depending on the dashboard and filter selected you can filter data based on a filter type using the following criteria. For example, if you select a filter for company status that is equal to active, only companies with a status of active display.

Date	Temperature	Text	Boolean
• Is equal to • Is not equal to • Is after or equal to • Is after • Is before • Is before or equal to • Is null • Is not null	• Is equal to • Is not equal to • Is greater than or equal to • Is greater than • Is less than or equal to • Is less than • Is null • Is not null	• Contains • Does not contain • Is equal to • Is not equal to • Starts with • Ends with • Is null • Is not null • Is empty • Is not empty	• (All) • Is true • Is false

Complex Filtering

When using Workbook Mode, some dashboards have complex filtering enabled. You can create complex filters of your grid data using and/or statements to filter your displayed data for analytics. Complex filtering is accessed by selecting the filter icon below the data table.

1. Select the Complex Filtering icon below the data table.
2. In the Filter Builder, select the *Add Expression* button to add your first row.
3. Select the data type from the dropdown. This list is populated by the columns in the data table.
4. Select the filter expression:
    - Is equal to
    - Is not equal to
    - Is greater than or equal to
    - Is greater than
    - Is less than or equal to
    - Is less than
    - Is null
    - Is not null
5. Enter the value.
6. You can continue to add separate rows or you can use the *Group* button to create And/Or rows using the buttons.
7. Select *Apply* to save the filter

Equipment Dashboard

The Equipment Dashboard displays the sensors, faults, scores, raw data, and rules information for the selected equipment. You can switch to a different piece of equipment using the Quick Navigation at the top left of the window and then select Go. From the Equipment Dashboard, you can subscribe to alerts for equipment faults. See Subscribing to Alert Notifications (page 15). Equipment is created, edited, and deleted from the Site Dashboard (page 27).

View Equipment Information

Select the Info icon to the right of the equipment name to view additional information including:

- Site
- Equipment Type
- Manufacturer
- Model
- Serial Number
- Associated Systems

Key Performance Indicators (KPIs)

The Equipment Dashboard displays a Score and Faults Metric for the specific equipment that is a comparison over time.

- **Score**
  - **Average Score** - This score is the average score for the entity (Equipment, System) at the point in time the Site dashboard is accessed. Use the date/time picker to edit the timeframe to the last 24 hours or a custom time period. The average score will be updated to an average for that timeframe.
  - **Percent Change** - This is the score for the currently selected time frame compared to the previous time frame. The Percent Change is based on the displayed date range.

- **Period Fault Occurrences**
  - **Current Period Faults**: The number of times in and out of fault within the specified time period. If a fault has gone in and out of fault three times within that time period, this counts as 3. If the fault has stayed in fault during the time period, then this would count as 1. The fault number is not always 1:1.
  - **Previous Period Fault Occurrences**: The same definition as above but for the previous time period.

⚠ For smaller screen displays, a horizontal scrollbar displays so that you can scroll to additional KPIs.

Faults View

The initial view displays the **Faults** to view the rule(s) and fault count as well as a bar graph to indicate when the fault(s) occurred for each rule. The current time is the default timeframe. You can select the date picker to select the previous 24 hours or create a custom timeframe of up to 31 days. The bar graph displays real-time fault information in 1-minute increments with a 4-hour timeframe. See below for bar graph information.

The rule section displays the following information:

- Rule name
- Issue Type
- Priority
- Fault Count
- Current Status

Bar Graph Information

The bar graph displays the real-time fault information in 1-minute increments within a four-hour timeframe for each rule. The bar colors indicate the priority assigned to the rule. (Red/High Priority, Orange/Medium Priority, Yellow/Low Priority)

Viewing fault information:

- You can view the start and end date/time of the fault by hovering your mouse over the bar on the chart.
- Use the scroll bar at the bottom of the window to scroll through the four-hour interval.
- The date/time displayed directly above the bar graph section indicates the currently displayed four-hour interval.
- To advance to the next four-hour interval, use the arrows to the right and left of the displayed date/time interval above the bar graph.

Additional Rule Information

Select the ellipsis to the right of the rule and select View More Info to view additional rule information that includes:

- Rule
- Description
- Issue Types
- Target
- Status
- System Effect
- Recommendation

Sensor Views

From the View drop-down, select Sensors and then select the sensor view to display. To the left of the timeframe, use the Sensor drop-down to select one or more sensors to display the fault data for that timeframe. After displaying the data, you can hide displayed sensor data by selecting its name above the graph. The name grays out to indicate that data is hidden. Select it again to unhide the data. Hover with your mouse over the data to view the data point information. For more information, see Sensors Overview (page 45). On the graph, you can zoom in and out by using your mouse wheel. You can also shift + click and drag to select a smaller time frame to focus on.

You can update the timeframe and intervals for the displayed data. See Using the Date/Time Picker (page 11). If you choose to export the data, the timeframe and intervals are also respected. See Exporting and Downloading Data (page 10).

Score Views

From the View drop-down, select Sensors, and then select the Score Graph or Score Grid. Use the Sensor drop-down to the far right to select the rule or sensors to display. The overall score is calculated based on the Rules that are targeting the equipment. See Scoring (page 136) for more information. Additionally, if you have created Per-Rule Scoring, this will also display on the line graph. Creating a Per-Rule Score is found in the Creating a Custom Rule (page 103) and Modifying a K2A Rule (page 101) topics. Scores default to being sorted from the lowest score to the highest.

You can update the timeframe and intervals for the displayed data. See Using the Date/Time Picker (page 11). If you choose to export the data, the timeframe and intervals are also respected. See Exporting and Downloading Data (page 10).

Score Grid

The Score Grid view displays the rule and rule score. Select the score to display:

- Timestamp: The date and time when the data occurred.

- Fault: If a fault is encountered during the time period selected, a Warning icon in red displays identifying when a rule is in fault within the time series data. If the rule is not in fault, a green checkmark icon displays.
  To view additional information, hover your mouse over the Fault icon (red or green) to view:
  - Formula Code
  - Fault Logic
  - Rule Aggregate and Type
  - Sensor Aggregates including the sensor name and type
- Formula Value Output:
- Sensor Data: Sensor data returned.

Score Graph

The Score Graph displays the equipment and corresponding score on a line graph. You can select the equipment and a specific rule to display the overall score and selected rule.

Raw Data

The Raw Data view displays the Health Score Records that changed. This would be any health score record, those in fault and those not, with the corresponding date time stamp, and the applicable sensor data.

Rules View

Select **Rules** to view the following information:

- Rule Name: Select the rule name to switch to the Sensor view with the applicable sensors already selected.
- K2A/Custom: Indicates if the rule is a K2A rule or a custom rule.
- Issue Types: Displays the issue types for the yule.
- Enable/Disable: Indicates if the rule is enabled or disabled.
- Priority Level
- Status

There are three statuses for Rules: Ok, In Fault, and Failure.

- **Ok**: The rule is evaluating properly and does not have a fault.
- **In Fault**: The rule is evaluating properly and, based on the criteria specified, there is a fault condition.
- **Failure**: The Rule has failed to evaluate. This can be because the equipment is missing data or sensors that are expected.

Select the ellipsis to the right of the rule and select View More Info to view additional rule information that includes:

- Rule
- Description
- Issue Types
- Target
- Status
- Last Successful Execution
- System Effect
- Recommendation

Health Monitor View

Select the **Health Monitor** view to display faults associated with rules and can also be used to create Service Requests.

The default view displays only rules with faults. You can clear the filter to view all rules by clicking the "x" on the Fault filter that displays to the left of the Actions drop-down.

The following information displays:

- Rule Name
- Client
- Site
- Equipment/System
- Target
- Status
- Fault Started
- Priority
- Issue Type

Select the ellipsis to the right of the rule and select View More Info to view additional rule information that includes:

- Rule
- Description
- Issue Types
- Target
- Status
- Last Successful Execution
- System Effect
- Recommendation

Adding a Formula Column

On the Equipment. System, and Site Dashboards in the Sensor or Score grid views, you can add a custom formula column using basic math (addition, subtraction, multiplication, and division). The formula columns can be saved into a configuration for the equipment/system dashboard. The formula column displays to the right of the column that was selected.

To add a formula column:

1. In the Sensor or Scor Grid view, to the right of a numeric column header, select the ellipsis.
2. Select *Add Formula Column*.

   ⚠ The Add Formula Column option is available if there are two or more numeric columns.

3. Enter a **Column Header** name.
4. Select the **Start Column** from the available numeric-only columns.
5. Select the **Operator**.
   - Plus: Select to add the values. (Start Column + End Column)
   - Minus: Select to subtract the End Column values from the Start Column values. (Start Column - End Column)
   - Times: Select to multiply the values. (Start Column x End Column)
   - Divide: Select to divide the End Column values into the Start Column values. (Start Column / End Column)
6. Select the **End Column** from the available numeric-only columns.

7. If needed, enter the decimal place value in the **Precision** field.
8. Select *Create.*

Viewing Aggregate Totals

On the Sensor and Score Grids, you can display aggregate totals for Minimum Value, Maximum Value, or Average. The aggregate totals display at the bottom of the appropriate columns.

- Minimum: Displays the minimum value over the duration specified.
- Maximum: Displays the maximum value over the duration specified.
- Average: Displays the average value (dividing the sum of values by the total number of values) over the duration specified.

Column Filtering in Workbook Mode

To temporarily filter data displayed in the grid view from the dashboard, you can use Workbook Mode to display a filter row across the top of the data grid. You can use the lookup for 1 or more columns to select data to filter by. While the Workbook Mode is temporary, if you navigate to another tab or display a different view in the same dashboard for specific information, grid in Workbook Mode is still available. However, if you navigate to a different entity (equipment, system, company, etc.), the Workbook Mode is cleared.

To filter data using Workbook Mode:

1. Select the *Workbook Mode* button located above the dashboard.
2. The data columns that display are related to the dashboard. If you haven't selected any sensors yet, you can do this now. (Sensors can be selected before or after selecting Workbook Mode.)
3. Under each column header, enter or select the filter data and then select the Filter icon to select the filter type. Different data types may have additional field inputs. For example, numeric data types will have an increase/decrease dial, Boolean data types will have a drop-down selection, etc.
4. You can clear any filter by selecting the Clear Filter icon for the appropriate column. This clears the filter data and type.
5. The filtered sensor information displays dynamically as the filters are added/removed. If no records match the filters, the message "No records available" displays.

⚠ Using Workbook Mode you can also rearrange column headers if you prefer data to display in a different order of columns by dragging and dropping the column headers.

Filter Types

The filter types that are available are related to the data type to be filtered. Depending on the dashboard and filter selected you can filter data based on a filter type using the following criteria. For example, if you select a filter for company status that is equal to active, only companies with a status of active display.

Date	Temperature	Text	Boolean
• Is equal to • Is not equal to • Is after or equal to • Is after • Is before • Is before or equal to • Is null • Is not null	• Is equal to • Is not equal to • Is greater than or equal to • Is greater than • Is less than or equal to • Is less than • Is null • Is not null	• Contains • Does not contain • Is equal to • Is not equal to • Starts with • Ends with • Is null • Is not null • Is empty • Is not empty	• (All) • Is true • Is false

Complex Filtering

When using Workbook Mode, some dashboards have complex filtering enabled. You can create complex filters of your grid data using and/or statements to filter your displayed data for analytics. Complex filtering is accessed by selecting the filter icon below the data table.

1. Select the Complex Filtering icon below the data table.
2. In the Filter Builder, select the *Add Expression* button to add your first row.
3. Select the data type from the dropdown. This list is populated by the columns in the data table.
4. Select the filter expression:
    - Is equal to
    - Is not equal to
    - Is greater than or equal to
    - Is greater than
    - Is less than or equal to
    - Is less than
    - Is null
    - Is not null
5. Enter the value.
6. You can continue to add separate rows or you can use the *Group* button to create And/Or rows using the buttons.
7. Select *Apply* to save the filter

Sensors Overview

The Sensors view is accessed from either the Equipment or Systems Dashboard. The Sensors view initially displays the graph view without any sensors selected. Select the Sensor drop-down that displays to the left of the Start Time and select one or more sensors. You can also use the search field in the Sensor selection drop-down to find a specific sensor. On the graph, you can zoom in and out by using your mouse wheel. You can also shift + click and drag to select a smaller time frame to focus on. You can use Conditional Formatting to format data cells based on selected criteria. See Filtering Data (page 11).

A sensor is an entity representing a value that changes over time and always has a parent entity such as a piece of equipment or a system. A sensor points back to a single device object. You can access the Sensor Dashboard by selecting a piece of equipment or a system.

Sensors can be created, edited, and deleted from the Equipment Dashboard (page 39) and/or the System Dashboard (page 33).

Viewing Historical Sensor Data

Use the Sensors view displays the historical data for a specific equipment or system score, including the sensor values and score information over time in a single table.

Information displayed:

- Date Time Stamp
- Individual Rule Scores
- Supporting Time-Series information

To view the historical sensor data:

1. Access the Dashboard.
2. Select **View - Site**, and then **Equipment** or **System**.
3. On the dashboard, select the equipment or system's actual score percentage on the table to open the Faults View for that equipment/system.
4. Above the data table, the overall averaged scores are displayed based on the rules targeting the equipment. For more information, see Scoring (page 136).
5. On the Faults View, the data displays how the score values changed over time and supports sensor time-series data. See Equipment Dashboard (page 39) or System Dashboard (page 33) for information about Faults.
6. To change the sensor table view, at the top of the data table on the left side, select the **View - Sensor Graph** drop-down and select one of the following views:
    - **Sensor Graph**: (Default view) Displays a line graph of the selected sensors. Sensors are selected from the **Sensor - 0 Selected** drop-down to the top right of the graph.
    - **Sensor Grid**: Displays by row the timestamp and sensor scores in 15-minute intervals. To the right of the sensor, select the ellipsis to edit or delete the sensor.
    - **Overview**: Displays the general information for each sensor including:
        - Name: Displays the name of the sensor.
        - Sensor Type: Displays the sensor type.
        - Data Type: Displays the data type: boolean, float, integer, or string.
        - Units: Indicates the type of unit for float data types.
        - Source: Displays either "Device Object" in this is an actual sensor or "Calculation" if this is a calculated sensor.
        - Source Name: Displays the Device Object path for device objects or displays the calculation name when a calculation is used.
    - **Score Graph**: Displays a line graph of the sensor scores. You have the option to select to see a bar graph instead of the default line graph.
        - The default graph displays the Rules graph. This graph includes the Overall Score as well as the selected rule's score.
        - To view the Sensors graph for the selected rule, select Sensors from the drop-down.
        - Sensors associated with fault rules display background shade appropriately in the respective time frame.
    - **Score Grid**: The initial view displays the site score.
        - Displays by row: the timestamp, overall score, scores by rule in 15-minute intervals.
        - From the Sensor drop-down, select the sensors and rule to display on the grid. Only one rule may be selected. The sensors associated with the rule are selected in the sensor section of the drop-down.
        - Use the filters above the data columns on the table to filter the displayed data. See Filtering Data (page 11).
        - If a rule is updated and the rule's sensor filtering is changed during the timeframe that is run, instead of displaying the previously associated sensor name in the sensor column header, the header now shows "Unknown Sensor Filter". The data displays as "No Data" beginning when the

sensor association was broken. The data previous to the change still displays, but the sensor name does not.

Working with Views and Configurations

Once you've set up a sensor or score graph or grid view for a piece of equipment/system, you can save the view configuration by selecting the View icon in the top right corner. This will allow you to load data for a specific rule or sensors. You have the option to save the view as the default view to automatically load or as a view you can select to load when you are viewing that specific piece of equipment or system. Saving a view will also save the column location as well.

Saving a Configuration

To save a view and configuration:

1. After you have configured your Sensor Graph or Grid, select the View icon.
2. Select *Save View & Configuration*.
3. Enter the **View Name**.
4. Mark **Set as Default View** if you want this view to automatically load when accessing this view for the same equipment or system.
5. To share this view and configuration with another user, enter the recipient's email address and select ADD. You can enter additional recipients.
6. Select *Save*. If applicable, an email is sent to the recipient that contains a hyperlink to the configuration view that you've shared.

Viewing Saved View Configurations

1. On the Sensor Graph or Grid, select the View icon.
2. Select *My Views & Configurations*.
3. The View & Configuration table displays the following information:
    - View & Configuration Name: This is the name entered when the configuration was saved.
    - View Type: Displays if this is for equipment or a system.
    - Entity Name: Displays the name of the entity the saved view & configuration was created for.
    - Shared With: Displays the email address(es) the view has been shared with.
    - Default View: Indicates if the view was set up to be the default view.
4. Select the ellipsis to the right of a view configuration to:
    - Save As: Select to make a copy of the view configuration and save with a different name.
    - Edit: Edit the view configuration details including the name, mark as default view, and add/remove share email address(es).
    - Delete: Deletes the view configuration.

Editing a View & Configuration from the Sensor Graph or Grid

1. On the Sensor Graph or Grid, if you have default view that loads or if you've selected a view to load after selecting the view icon.
2. Make your changes on the Sensor Graph or Grid.

3. Select the View icon.
4. To update the view with your changes, select *Update*.
5. To save your changes as a new view configuration, select *Save As* and complete the fields as described above in Saving a Configuration.

Working with Sensors

Creating a Sensor

You can create a sensor from the Equipment or Systems Dashboard.

1. Access the Sensor View from the Equipment or Systems Dashboard.
2. Select the *Actions* button and then select *Add Sensor*.
3. The **Client**, **Site**, and **Equipment** or **System** auto-populate in the Add Sensor window.
4. Complete the following fields:
    - **Sensor Name**: Enter a unique name.
    - **Sensor Type**: Select the sensor type.
    - **Data Type**: Select the data type. If the data type is Float, you must specify a unit. If the data type is Boolean, String, or Integer, a unit is not required.
    - **Unit**: Select the unit.
    - **Device**: Select the device.
    - **Agent**: Select the agent.
    - **Device Object**: Select the device object.
    - **Conversion**: Select the conversion if you need to convert the raw data to a different data type. (For example, boolean to number.)
5. Select *Create.*

Creating a Calculated Sensor

A calculated sensor allows you to create a calculation based on readings obtained from other sensors, which allows more flexibility in how you use your data. This lets you model or abstract any additional analysis that you want and use it in any way a normal sensor can be. A calculated sensor can drive rule faults, calculations, and conditional formatting.

Create the calculated sensor the way you would create any other sensor. Except, when selecting the data source, instead of selecting a device and object from IoT Hub, select a K2A calculation. In the Formula Builder, you can configure the sensors you want to source for the calculation. You can create the output from that calculation will be your new calculated sensor. For a list of available K2A calculations see K2A Sensor Calculations (page 56).

Explanation of each function and operator available in the Formula Builder:

- Functions List (page 60)
- Operators List (page 59)

> ⚠ The calculated sensor is run for the first time in real-time to get a baseline value for the calculation. After this initial run, it will run on COV like all other calculated sensors.

To create a calculated sensor:

1. Access the Sensor View from the Equipment or Systems Dashboard.
2. Select the *Actions* button and then select *Add Sensor*. (You can also access the Sensor window by selecting the Sensor selection drop-down, and then selecting Configure > Actions > Add Sensors.)
3. The **Client**, **Site**, and **Equipment** (or **System**) auto-populate in the Sensor window and are display-only.

4. Mark **Use Calculation**.
5. When creating a calculated sensor, you have the option to select a K2A Calculation or you can build your own formula.

Using a K2A Sensor Calculation

K2A Sensor Calculations are available formulas where you will need to select the sensors to be used in the formula.

1. Select a K2A Calculation to display the formula in the Formula Builder section to the right.
2. Choose each Select Sensor dropdown and select the appropriate sensor, including any external sensors for the current site. (External sensors are created in the Sensor Configuration window. See Configure the Sensor Graph (page 54).)
3. The K2A Calculation may include constants for you to enter or edit.
4. You can edit or add to the K2A calculation by using the Operators across the top of the formula section and/or the Functions listed to the right of the formula section.
5. After you have completed your formula, select *Test Calculation*. You are required to test the calculation prior to saving the calculation.
6. Select *Save*.
7. The calculated sensor displays on your Sensor list.

Building Your Own Formula

You have the ability to create sensor calculations using the Formula Builder functions and operators.

1. You have the option to use functions to insert a function formula.
    - After inserting the optional function, choose each "Select Sensor Type" to select the sensor type associated with the equipment for your formula.
    - From the Select Sensor Type drop-down, you can add an external sensor for the current client site. (External sensors are created in the Sensor Configuration window. See Configure the Sensor Graph (page 54).)
    - You can use the operators across the top of the formula section to build your own formula and/or to add on to the function formula.

1. After you have completed your formula, select *Test Calculation*. You are required to test the calculation prior to saving the calculation.
2. Select *Save*.
3. The calculated sensor displays on your Sensor list.

Editing a Sensor

You can edit a sensor on the Equipment or Systems Dashboard in the Sensor Overview page.

1. Access the Equipment or Systems Dashboard.
2. From the View dropdown, select Sensors, and then select Overview.
3. On the Overview page, the Source column provides information on the sensor source.
4. Select the ellipsis to the right of the Source column and select *Edit*.
5. In the Update Entity window, edit the information.
6. Select *Update.*

Deleting a Sensor

You can delete a sensor on the Equipment or Systems Dashboard in the Sensor Overview page.

1. Access the Equipment or Systems Dashboard.

2. From the View dropdown, select Sensors, and then select Overview.
3. On the Overview page, the Source column provides information on the sensor source.
4. Select the ellipsis to the right of the Source column and select *Deactivate*.
5. In the Delete Entity window, select *Yes*.
6. The sensor is deleted.

Working with Custom Calculated Sensors

A calculated sensor allows you to create a calculation based on readings obtained from other sensors, which allows more flexibility in how you use your data. This lets you model or abstract any additional analysis you want and use this analysis any way a standard sensor can. A calculated sensor can drive rule faults, calculations, and conditional formatting.

Create the calculated sensor the way you would create any other sensor. Except, when selecting the data source, instead of selecting a device and object from IoT Hub, select a K2A formula/template or custom template calculation. There, you can configure the sensors you want to source for the calculation and specify the K2A calculation you want to perform. The output from that calculation will be your new calculated sensor.

Creating a Custom Calculated Sensor

To create a calculated sensor:

1. Access the Equipment or Systems Dashboard.
2. Select the *Actions* button and then select *Add New Calculated Sensor.*
3. The tabs available when creating a custom calculated sensor are:
    - **Template**: On the Template tab, you can create one or more templates based on a K2A formula or your custom formula. Keeping with the previous example, you can define what A and B are for each template for the selected equipment type. You can name the sensor and select additional sensor information at the template level or from the Assign tab. See Working with Templates[3] below.
    - **Assign**: On the Assign tab, you can assign the template to one or more pieces of equipment. See Assigning Templates to Equipment[4] below.

Working with Templates

A template contains pre-defined calculations that leverage formulas. You can create a template by selecting an existing formula or by selecting the Add icon to the right Company Templates. You can clone a K2A template or a Company template and then edit the template formula.

Explanation of each function and operator available in the Formula Builder:

- Functions List (page 60)
- Operators List (page 59)

Creating or Editing a Company Template

1. Access the Equipment or Systems Dashboard.
2. Select the *Actions* button and then select *Add New Calculated Sensor.*
3. Select the **Templates** tab.
4. You can create/edit a template by:
    - Selecting a formula to create a new template.

3 https://wennsoft.atlassian.net/wiki/spaces/BOB/pages/8300984#WorkingwithCustomCalculatedSensors-templates
4 https://wennsoft.atlassian.net/wiki/spaces/BOB/pages/8300984#WorkingwithCustomCalculatedSensors-assigning

- Selecting a K2A Template to edit.
- Selecting the Add icon to the right Company Templates to create a new template.
- Cloning an existing template. See Cloning a Template (page 51) below.

5. Enter or select the following at the top of the screen:
   - **Template Name**: Enter a name for the template.
   - **Equipment Type**: The equipment type auto-populates from the equipment where you initiated the custom calculated sensor from.
   - **Equipment**: The equipment name auto-populates from the equipment where you initiated the custom calculated sensor from.
6. In the formula section:
   - You have the option to use functions to insert a function formula.
   - After inserting the optional function, choose each "Select Sensor Type" to select the sensor type associated with the equipment for your formula.
   - From the Select Sensor Type drop-down, you can add an external sensor for any of the current client's sites. (External sensors are created in the Sensor Configuration window. See Configure the Sensor Graph (page 54).)
   - You can use the operators across the top of the formula section to build your own formula and/or to add on to the function formula.
7. Enter or select the following information at the bottom of the screen. If you are using a K2A template or a cloned template, this information will auto-populate. However, you can edit these fields.
   - **Sensor Name**: Enter the custom calculated sensor name. This name will display in the list of available calculated sensors.
   - **Sensor Type**: Select the sensor type.
   - **Data Type**
     - Boolean
     - Integer
     - Float
     - Text
   - **Display Data Type**
     - Boolean
     - Integer
     - Float
     - Text
   - **Raw Unit**: See Raw Unit List (page 61) for a detailed list of all raw units available.
   - **Display Unit**: The unit of measure that displays for the calculated sensor. Typically this defaults to the raw unit.
8. Select *Test Calculation* to verify the expression is valid. The tested calculation uses sample data to validate the formula and may not reflect actual results. The sample data is comprised of the first sensor value found for each sensor type in your formula.
9. Select *Save Template.*
   You are not prevented from saving an invalid expression.

Cloning a Template

K2A templates cannot be edited. However, if you can clone a K2A Template and Company Templates and then edit the cloned template.

1. Click the ellipsis to the right of the template and then select *Clone*.
2. The editable template is loaded on the right side.
3. Enter the Template Name.
4. Edit the template formula as needed.
5. See the steps above for field descriptions.

Assigning Templates to Equipment

Assigning the template to equipment is the final step in creating your calculated sensor.

To assign a template to equipment:

1. Access the Equipment or Systems Dashboard.
2. Select the *Actions* button and then select *Add New Calculated Sensor.*
3. Select the **Assign** tab.
4. Select the **Template** from the drop-down.
5. The Equipment Type defaults from the template, or you can select the **Equipment Type**.
6. The **Equipment** associated with the equipment type is displayed by the client and site. The template can be assigned to equipment across multiple clients and sites for the current company.
7. Mark specific pieces of equipment or to select all equipment, mark the checkbox to the left of the Equipment header.
8. Select *Preview Sensor*.
9. The list of equipment is displayed to the right, with the template formula displayed at the top of the page. While the equipment, client, and site names are grayed out and cannot be edited, you can edit the other fields such as sensor name, sensors, and constants.
    - If the equipment has the sensor(s) defined on the template, these sensors will auto-populate in the equipment row.
    - If the equipment does not have the sensor(s) defined on the template, the sensor drop-down displays "Select Sensor" and you can select the appropriate sensor, or if the equipment does not have a substitute sensor, a dashed line displays. You can add an external sensor for any of the current client's sites. (External sensors are created in the Sensor Configuration window. See Configure the Sensor Graph (page 54).)
10. Mark the checkbox to the left of the equipment to which the calculated sensor should be assigned or select the checkbox to the right of the Equipment header to mark all.
11. You can edit the following fields that may default from the template:
    - **Sensor Type**: The type of sensor.
    - **Data Type**
        - Boolean
        - Integer
        - Float
        - Text
    - **Display Data Type**
        - Boolean
        - Integer
        - Float
        - Text
    - **Raw Unit**: See Raw Unit List (page 61) for a detailed list of all raw units available.
    - **Display Unit**: The unit of measure that displays for the calculated sensor. Typically, this defaults to the raw unit.
12. Select *Create Sensor*.

Editing a Custom Calculated Sensor

A calculated sensor can be edited from the Sensor Overview from the Equipment or Systems Dashboard. The Formula Builder that was used during the creation process is used to edit the calculated sensor. You have the ability to view, edit, and create calculations on the fly within the sensor page. For information on how to use the Formula Builder, see Working with Templates (page 50) above.

You are able to edit the following:

- Sensor Name
- Sensor Type
- Data Type
- Display Data Type
- Raw Unit
- Display Unit
- Formula
  You are only able to edit the formula for the current sensor. To add or save templates, you will need to use the Template tab from the Create Calculated Sensor window. See Working with Templates (page 50).

To edit a calculated sensor:

1. Access the Equipment or Systems Dashboard.
2. From the View dropdown, select Sensors, and then select Overview.
3. On the Overview page, the Source column provides information on the sensor source. Calculated sensors are indicated with a calculator  icon along with the template name used for the calculation. If a template was not used for the calculation, Custom Calculation displays as the source name.
4. Select the ellipsis to the right of the Source column and then select *Edit*.
5. On the Edit Sensor page, the template is automatically selected in the list on the right with the formula displayed in the Formula Builder.
6. You can make the necessary changes that apply to this sensor only.
7. After you have completed your edits, select *Test Calculation*. You are required to test the calculation prior to saving the edited calculation.
8. Select *Save*.

Deleting a Custom Calculated Sensor

You can delete a custom calculated sensor from the Equipment or Systems Dashboard.

To delete a custom calculated sensor:

1. Access the Equipment or Systems Dashboard.
2. From the View dropdown, select Sensors, and then select Overview.
3. On the Overview page, the Source column provides information on the sensor source. Calculated sensors are indicated with a calculator icon along with the template name used for the calculation. If a template was not used for the calculation, Custom Calculation displays as the source name.
4. Select the ellipsis to the right of the Source column and then select *Delete*.
5. In the Delete Sensor window, you are prompted to verify that you want to delete the displayed calculated sensor.
6. Select *Yes* to delete the custom calculated sensor.

Conditional Formatting

Use conditional formatting on the sensor data tables to highlight cells or ranges of cells to help you visually detect critical issues and identify patterns and/or trends. Conditional formatting changes the appearance of cells on the basis of conditions that you specify. If the criteria are met, the cell range is formatted; if the criteria are false, the cell range is not formatted.

⚠ At this time, conditional formatting does not apply to columns that have a score generated from a rule.

To apply conditional formatting to a data table:

1. From the Sensor or Score view, select the ellipsis icon in the column header.
2. Select *Conditional Formatting*.
3. In the Add Conditional Formatting window, complete the following:
    - **Format cells that are**:
        - Between
        - Equals
        - Greater Than
        - Less Than
    - **Value**: Enter the value for the criteria. The selection available relates to the data type displayed in the column. For example, for the Timestamp column, you will be selecting a date.
    - **And**: For a "Between" format, you will need to select the second value. For other operands, this field is not available.
    - **With**: Select the display format for the cells that meet the criteria.
        - Light Green Fill, Dark Green Text
        - Light Yellow Fill, Dark Yellow Text
        - Light Grey Fill, Dark Grey Text
        - Light Red Fill, Dark Red Text
4. To add additional conditions that need to be met, select the *Add* icon to the right of the first row.
5. Select *Confirm* to save the conditional formatting.

Configure the Sensor Graph

Use the Sensor Configuration window to select 1 or more sensors to add to the Y-axis to the left of the graph and up to 5 Y-axes to the right of the graph. A sensor can only be plotted to 1 Y-axis, although you can plot more than one sensor to a single Y-axis. Using this feature you can add external sensors to compare one piece of equipment to another.

To configure the Sensor Graph:

1. On the Sensor view, select the **View** drop-down and then select **View - Configuration** or select the **Sensor** drop-down and then select *Configure*.
2. To add a sensor select "**+**" to the left of the sensor name from the Sensors list.
3. The sensor is added to the Selected Sensors and Plotting section. You can remove a sensor from this section by selecting "**-**" to the left of the sensor name in the sensor list on the left side of the window, selecting "**x**" to the left of the sensor in the Plotting section, or batch remove all of the sensors assigned to an axis by selecting the "**x**" to the right of the axis name.
4. Select the appropriate **Y-axis** radio button.
5. (Optional) Edit the Axis name, as needed. This name displays in the pop-up window as you hover over the line in the graph.
6. Select *Apply* if this is a one-time configuration that you do not want to save for future viewing or select *Save* to save this view as your default. You are returned to the Sensor Graph to view the sensors that you've plotted.

> ⚠ Boolean sensors are plotted in a separate chart below the line chart.

Grouping by Header

You can drag a column header to the "Drag a column header and drop it here" area below the Selected Sensors and Plotting title to group by that heading. For example, to group the selected sensors by unit, drag the Unit column header up to "Drag a column header and drop it here".

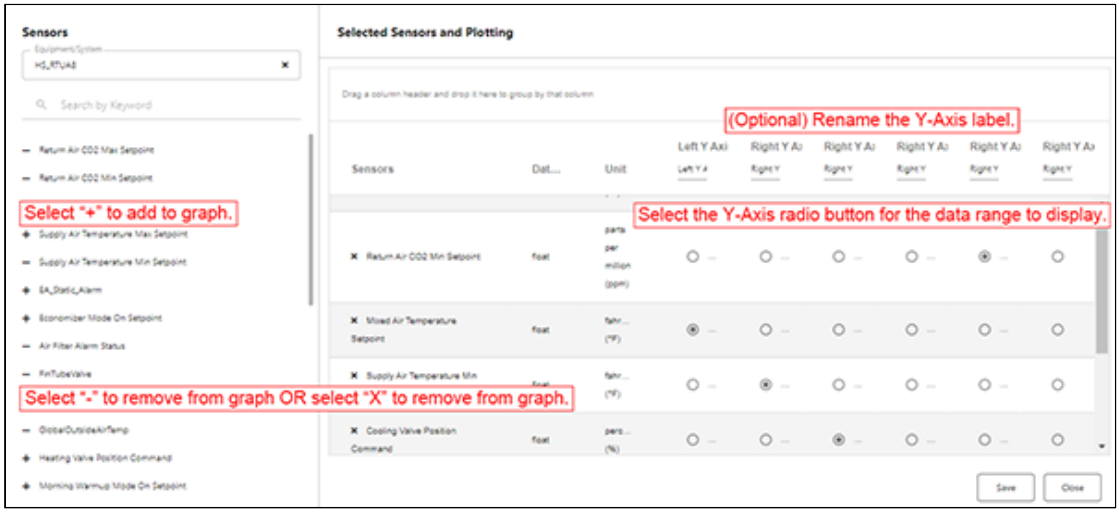
Sorting Data within the Configured Graph

When sorting data within the Configured Sensor graph, the data is sorted within each sensor grouping.

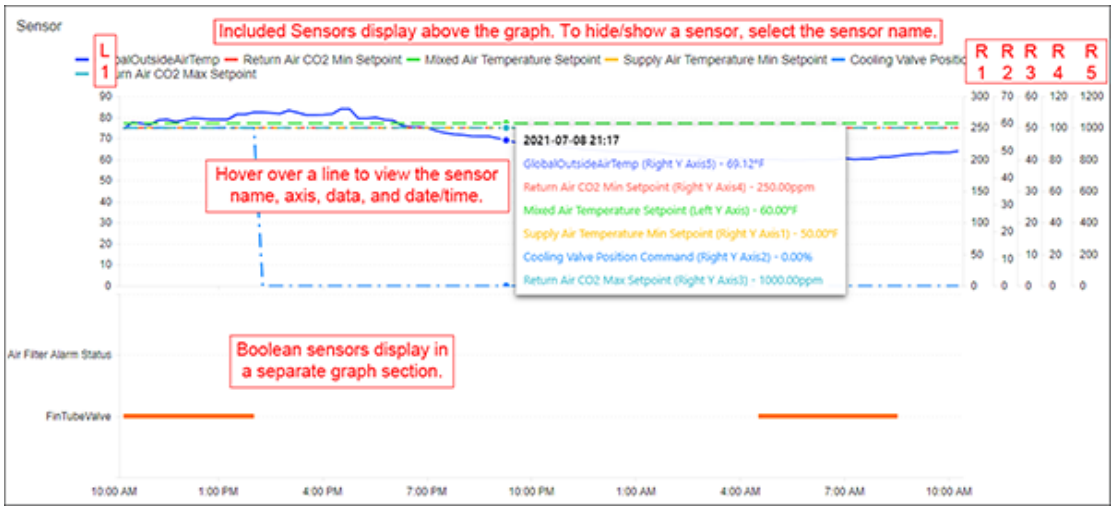
Examples

The number of Y-axes displayed on the graph correlates to the plotted Y-axes from the Configuration window. The examples below have all 6 Y-axes displayed.

Sensor Configuration



Sensor Graph with all Y-Axes displayed



Export Sensor Data

You can export sensor data based on the current sensor information displayed.

1. Access the Sensor View from the Equipment or Systems Dashboard.
2. After selecting the Rule or Sensors to display, you can export the data.
3. Select the *Actions* button and then select *Export*.
4. In the Export Data window, you can accept or edit the time range and the time interval.
5. Select *Export*.

K2A Sensor Calculations

WennSoft has predefined sensor calculations to choose from when creating your calculated sensors.

Name	Formula
Cooling Air Temperature Deviation	Cooling Air Temperature Setpoint - Cooling Air Temperature
Chilled Water Approach	(Evaporator Leaving Water Temperature) – (Evaporator Saturated Refrigerant Temperature)
Condenser Water Approach	(Condenser Saturated Refrigerant Temperature) – (Condenser Leaving Water Temperature)
Chilled Water Delta T	(Evaporator Entering Water Temp) – (Evaporator Leaving Water Temp)
Condenser Water Delta T	(Condenser Leaving Water Temp) – (Condenser Entering Water Temp)
Differential Steam Pressure Deviation	(abs(Differential Steam Pressure Setpoint - Differential Steam Pressure) / max(0.1, Differential Steam Pressure Setpoint)) * 100
Differential Water Pressure Deviation	(abs(Differential Water Pressure Setpoint - Differential Steam Pressure) / max(0.1, Differential Water Pressure Setpoint)) * 100
Heating Air Temperature Deviation	Heating Air Temperature Setpoint - Heating Air Temperature

Name	Formula
Outside Air Dewpoint	**Celcius to Celsius Formula** T_s = (243.04 × ln(**RH** / 100) + 17.625 **T**/(243.04 + **T**)) / (17.625 - ln(**RH** / 100) + 17.625 **T**/(243.04+**T**)) **Fahrenheit to Fahrenheit Formula** T_s = [(243.04 × ln(**RH** / 100) + 17.625 * ((**T** - 32) * 5/9)/(243.04 + ((**T** - 32) * 5/9))) / (17.625 - ln(**RH** / 100) + 17.625 * ((**T** - 32) * 5/9)/ (243.04 + ((**T** - 32) * 5/9)))] * 9/5 + 32 **Fahrenheit to Celcius Formula** T_s = (243.04 × ln(**RH** / 100) + 17.625 * ((**T** - 32) * 5/9)/(243.04 + ((**T** - 32) * 5/9))) / (17.625 - ln(**RH** / 100) + 17.625 * ((**T** - 32) * 5/9)/ (243.04 + ((**T** - 32) * 5/9))) **T**: Outside Air temperature **RH**: Outside Air Relative Humidity **T** and **RH** are existing sensors.
Outside Air Wet Bulb	**Celcius to Celsius Formula** T_w = **T** arctan(0.151977 (**RH** + 8.313659)1/2) + arctan(**T** + **RH**) − arctan(**RH** − 1.676331) + 0.00391838(**RH**)3/2arctan(0.023101**RH**) − 4.686035 **Fahrenheit to Fahrenheit Formula** T_w = [((**T** - 32) * 5/9) * arctan(0.151977 (**RH** + 8.313659)1/2) + arctan(((**T** - 32) * 5/9) + **RH**) − arctan(**RH** − 1.676331) + 0.00391838(**RH**)3/2arctan(0.023101**RH**) − 4.686035] * 9/5 + 32 **Fahrenheit to Celcius Formula** T_w = ((**T** - 32) * 5/9) * arctan(0.151977 (**RH** + 8.313659)1/2) + arctan(((**T** - 32) * 5/9) + **RH**) − arctan(**RH** − 1.676331) + 0.00391838(**RH**)3/2arctan(0.023101**RH**) − 4.686035 **T**: Outside Air temperature **RH**: Outside Air Relative Humidity **T** and **RH** are existing sensors.
Power	Current * Voltage
Power (kVa) **coming soon*	Power + Power + Power + Power
Primary Differential Water Pressure Deviation	(abs(Primary Differential Water Pressure Setpoint - Primary Differential Water Pressure) / max(0.1, Primary Differential Water Pressure Setpoint)) * 100
Primary Supply Water Temperature	Primary Supply Water Temperature Setpoint - Primary Supply Water Temperature

Name	Formula
Secondary Differential Water Pressure Deviation	(abs(Secondary Differential Water Pressure Setpoint - Secondary Differential Water Pressure) / max(0.1, Secondary Differential Water Pressure Setpoint)) * 100
Secondary Supply Water Temperature Deviation	Secondary Supply Water Temperature Setpoint - Secondary Supply Water Temperature
Space Air CO Deviation	Space Air CO Setpoint - Space Air CO
Space Air CO2 Deviation	Space Air CO2 Setpoint - Space Air CO2
Space Air Dewpoint	Space Air Temperature(C) - ((100 - Space Air Relative Humidity) / 5)
Space Air Methane Deviation	Space Air Methane Setpoint - Space Air Methane
Space Air PM2.5 Deviation	Space Air PM2.5 Setpoint - Space Air PM2.5
Space Air Relative Humidity Deviation	Space Air Relative Humidity Setpoint - Space Air Relative Humidity
Space Air Temperature Deviation	Space Air Temperature Setpoint - Space Air Temperature
Space Air TVOC Deviation	Space Air TVOC Setpoint - Space Air TVOC
Supply Air Flow Deviation	(abs(Supply Air Flow Setpoint - Supply Air Flow) / max(0.1, Supply Air Flow Setpoint)) * 100
Supply Air Pressure Deviation	(abs(Supply Air Pressure Setpoint - Supply Air Pressure) / max(0.1, Supply Air Pressure Setpoint)) * 100
Supply Air Temperature Deviation	Supply Air Temperature - Supply Air Temperature Setpoint
Supply Water Flow Deviation	(abs(Supply Water Flow Setpoint - Supply Water Flow) / max(0.1, Supply Water Flow Setpoint)) * 100
Supply Water Temperature Deviation	Supply Water Temperature Setpoint - Supply Water Temperature
Total Runtime	Sum of Time for time given for a True condition.

Operators List

On the Formula and Template tabs, the operators are displayed horizontally over the formula section.

- Math operators are used to perform arithmetic operations on numbers.
- Comparison operators are used to compare values.
- Other operators include variables and constants.
    - When you select Variable, a placeholder is added to the formula. If you are on the Formula tab, you will be able to select A or B or you can add another letter as a placeholder. On the Template tab, you will be able to select the sensors for the formula.
    - When you select Constant, you can enter the constant value. The constant value does not change in your formula.

Operator	Description	Example
	Plus sign to add two numbers.	1 + 1 = 2
	Minus sign to subtract two numbers.	2 − 1 = 1
	Times sign to multiply two numbers.	2 × 3 = 6
	Division sign (or obelus) to divide the right side by the left side.	6 ÷ 2 = 3

Operator	Description	Example
	Equal sign to show equality between 2 values (numbers, strings, variables, etc.) are strictly equal to each other. To be strictly equal, the values must be equal and have the same data type.	5 = 2+3 or 5 is equal to 2+3. True = True or True is equal to True.
	No equal sign to show inequality.	5 ≠ 4 or 5 is not equal to 4. True ≠ False or True is not equal to False.

<	Less than to show the right side is smaller than the left side.	4 < 5 or 4 is less than 5.
>	Greater than to show the right side is larger than the left side.	5 > 4 or 5 is greater than 4.
(	Parentheses () are used to change the order of an operation. Using parentheses makes the system do the calculation for the numbers inside the parentheses first, before calculating the rest of the formula. Parentheses are added by typing () on both sides of numbers, like (1+2). Formulas can have groups of parentheses.	3 x (1 + 2) 3 x 3 = 9 1+2 is calculated first and then that total is multiplied by 3. 3 x ((1+2) x (3 + 4)) 3 x (3 x 7) 3 x 21 = 63
)		
,	A comma is a separator between the input parts (parameters) of your formula.	sum(A, B, C)
VARIABLE	A variable is an alphabetic character that represents an unknown value. Variables are defined on the Template tab.	A + B
CONSTANT	A constant is a fixed value, such as the number 30. A constant does not change its value over time.	A + B x 30 or regardless of the numerical value of A or B, their sum will be multiplied by 30.

Functions List

On the Formula and Template tabs, functions run vertically down the formula section.

Functions are represented algebraically through formulas or equations. These equations describe the relationship between an independent and a dependent variable. You do not have to use functions to create your formula.

Function	Description
(n)	Converts a value to a number. For example, True = 0, False = 1.
Ceiling (n)	Rounds a number to the nearest integer.
Floor (n)	Rounds a number down, toward zero.

Function	Description
Round (n)	Rounds a number to a specified number of digits.
ABS (n)	Returns the absolute value of a number.
DayOfWeek	Returns the integer number of days as a timespan. (Sunday = 1, S)
HourOfDay	Returns the integer hour number of the day (0-23).
TimeOfDay	Returns the actual current date as a 'DAY MM DD HH:MM:SS.US YYYY TZ' format.
Max	Returns the maximum value in a list of arguments.
Min	Returns the minimum value in a list of arguments
Sqrt (n)	Returns a positive square root.

Raw Unit List

Download Raw Unit List XLSX[5] | PDF[6]

Raw Unit Category	Raw Unit	Formula
A		
Acceleration	meters per second squared	m/s^2
Angular Acceleration	radians per second squared	rad/s^2
Angular Momentum	joule second	Js
Angular Velocity	radians per second	rad/s
	revolutions per minute	rpm

5 https://wennsoft.atlassian.net/wiki/download/attachments/35392174/Raw%20Unit%20List.xlsx?api=v2&cacheVersion=1&modificationDate=1701456956799&version=1

6 https://wennsoft.atlassian.net/wiki/download/attachments/35392174/Raw%20Unit%20List.pdf?api=v2&cacheVersion=1&modificationDate=1701456956478&version=1

Raw Unit Category	Raw Unit	Formula
Apparent Energy	volt ampere hour	VAh
	kilovolt ampere hour	kVAh
	megavolt ampere hour	MVAh
Apparent Power	volt ampere	VA
	kilovolt ampere	kVA
	megavolt ampere	mVA
Area	square meter	m^2
	square millimeter	mm^2
	square centimeter	cm^2
	square kilometer	km^2
	square inch	in^2
	square foot	ft^2
	square yard	yd^2
	square mile	$mile^2$
	acre	$acre^2$
C		
Capacitance	farad	F
Cooling Efficiency	coefficient of performance	COP
	kilowatt per ton	kW/ton

Raw Unit Category	Raw Unit	Formula
	energy efficiency ratio	Btu/Wh
D		
Density	kilograms per cubic meter	kg/m^3
	micrograms per cubic meter	$\mu g/m^3$
Dimensionless	pixel	px
	decibel	db
	power factor	pf
	pH	
	percent relative humidity	%RH
	grams of water per kilogram dry air	$gH_2O/kgAir$
	volts per degree kelvin	V/K
	degree days celsius	°daysC
	degree days fahrenheit	°daysF
	percent obscuration per foot	%obsc/ft
	percent obscuration per meter	%obsc/m
	psi per degree fahrenheit	psi/°F
	square meters per newton	m^2/N
	watts per square meter degree kelvin	W/m^2K

Raw Unit Category	Raw Unit	Formula
	db milliVolt	dBmV
	db microVolt	dBµV
	parts per unit	ppu
	parts per million	ppm
	parts per billion	ppb
	grams per kilogram	g/kg
	radian	rad
	degrees angular	deg
	degrees phase	degPh
	steradian	sr
	nephelometric turbidity units	ntu
	formazin nephelometric unit	fnu
	power usage effectiveness	PUE
	data center infrastructure efficiency	DCIE
	percentage	%
	unitless	
E		
Electric Charge	coulomb	C
	ampere hour	Ah

Raw Unit Category	Raw Unit	Formula
Electric Conductance	siemens	S
Electric Current	ampere	A
	milliampere	mA
Electric Current Density	amperes per square meter	A/m^2
Electric Field Strength	volts per meter	V/m
Electric Potential	Volt	V
	milliVolt	mV
	kiloVolt	kV
	megaVolt	MV
Electric Resistance	ohm	Ω
	kilohm	kΩ
	megohm	MΩ
	milliohm	mΩ
Electrical Conductivity	siemens per meter	S/m
Electrical Resistivity	ohm meter	Ωm
Electromagnetic Moment	ampere square meter	Am^2
Energy	kilobtu	kBTU
	megabtu	MBTU
	joule	J

Raw Unit Category	Raw Unit	Formula
	kilojoule	kJ
	watt hour	Wh
	kilowatt hour	kWh
	megawatt hour	MWh
	btu	BTU
	horsepower hour	hph
	calorie	cal
	therm	therm
	tons refrigeration hour	tonrefh
	megajoule	MJ
	gigajoule	GJ
	newton meter	Nm
	cubic meters natural gas	m^3_gas
	cubic feet natural gas	ft^3_gas
	hundred cubic feet natural gas	
	thousand cubic feet natural gas	
	million cubic feet natural gas	
Energy by Area	joules per square meter	J/m^2
	watt hours per square meter	Wh/m^2

Raw Unit Category	Raw Unit	Formula
	watt hours per square foot	Wh/ft^2
	kilowatt hours per square meter	kWh/m^2
	kilowatt hours per square foot	kWh/ft^2
	megawatt hours per square meter	MWh/m^2
	megawatt hours per square foot	MWh/ft^2
	megajoules per square meter	MJ/m^2
	megajoules per square foot	MJ/ft^2
	kilobtu per square foot	$kBTU/ft^2$
	megabtu per square foot	$MBTU/ft^2$
Enthalpy	joules per gram	J/g
	joules per kilogram	J/kg
	joules per kilogram dry air	J/kg_dry
	btu per pound	BTU/lb
	btus per pound dry air	btu/lb_dry
	kilojoules per kilogram	kJ/kg
	kilojoules per kilogram dry air	kJ/kg_dry
	megajoules per kilogram dry air	MJ/kg_dry
	calorie per gram	cal/g
Entropy	joules per degree kelvin	J/°K

Raw Unit Category	Raw Unit	Formula
	kilojoules per degree kelvin	kJ/°K
	megajoules per degree kelvin	MJ/°K
F		
Force	newton	N
	pound force	lbf
Frequency	hertz	Hz
	kilohertz	kHz
	cycles per hour	cph
	cycles per minute	cpm
	megahertz	MHz
	per minute	/min
	per second	/s
	per hour	/h
	percent per second	%/s
	air changes per hour	ACH
G		
Grammage	kilograms per square meter	kg/m^2
	grams per square meter	g/m^2

Raw Unit Category	Raw Unit	Formula
H		
Heating Rate	degrees kelvin per second	K/s
	degrees celsius per hour	°C/h
	degrees celsius per minute	°C/min
	degrees fahrenheit per hour	°F/h
	degrees fahrenheit per minute	°F/min
	degrees kelvin per hour	K/h
	degrees kelvin per minute	K/min
I		
Illuminance	lux	lx
	footcandle	fc
	phot	ph
Inductance	henry	H
Irradiance	watts per square meter irradiance	W/m²_irr
Irradiance	watts per square foot irradiance	W/ft²_irr
L		
Length	meter	m

Raw Unit Category	Raw Unit	Formula
	micrometer	µm
	millimeter	mm
	centimeter	cm
	kilometer	km
	inch	in
	foot	ft
	yard	yd
	mile	$mile^2$
Luminance	candelas per square meter	cd/m^2
	candels per square foot	cd/ft^2
Luminous Flux	lumen	lm
Luminous Intensity	candela	cd
M		
Magnetic Field Strength	amperes per meter	A/m
Magnetic Flux	weber	Wb
Magnetic Flux Density	tesla	T
Mass	kilogram	kg
	milligram	mg
	gram	g

Raw Unit Category	Raw Unit	Formula
	ounce	oz
	pound	lb
	kilopound	klb
	metric ton	ton
	short ton	t
Mass Flow	kilograms per second	kg/s
	kilograms per hour	kg/h
	pounds per minute	lb/min
	pounds per hour	lb/h
	pounds per second	lb/s
	kilopounds per hour	klb/h
	grams per second	g/s
	grams per minute	g/min
	metric tons per hour	ton/h
	kilograms per minute	kg/min
Momentum	newton second	Ns
P		
Power	watt	W
	milliwatt	mW

Raw Unit Category	Raw Unit	Formula
	kilowatt	kW
	megawatt	MW
	gigawatt	GW
	btus per hour	BTU/h
	therms per hour	therm/h
	horsepower	hp
	foot pounds per second	ftlbs/sec
	tons refrigeration	tonref
	kilobtus per hour	kBTU/h
	megabtus per hour	MBTU/h
	joules per hour	J/h
	kilojoules per hour	kJ/h
	megajoules per hour	MJ/h
Power by Area	watts per square meter	W/m^2
	watts per square foot	W/ft^2
	kilowatts per square meter	kW/m^2
	kilowatts per square foot	kW/ft^2
	kilobtus per hour per square foot	$kBTU/h/ft^2$
Power by Volumetric Flow	watts per cubic meters per second	$W/m^3/s$

Raw Unit Category	Raw Unit	Formula
	watts per cubic feet per minute	W/cfm
	kilowatts per kilocubic feet per minute	kW/kcfm
	kilowatts per gallons per minute	kW/gal/min
Pressure	pascal	Pa
	kilopascal	kPa
	bar	bar
	atmosphere	atm
	pounds per square inch	psi
	centimeters of water	cmH_2O
	inches of water	in/wc
	millimeters of mercury	mmHg
	centimeters of mercury	cmHg
	inches of mercury	inHg
	hectopascal	hPa
	millibar	mbar
R		
Reactive Energy	volt ampere reactive hour	VARh
	kilovolt ampere reactive hour	kVARh

Raw Unit Category	Raw Unit	Formula
	megavolt ampere reactive hour	MVARh
Reactive Power	volt ampere reactive	VAR
	kilovolt ampere reactive	kVAR
	megavolt ampere reactive	MVAR
S		
Specific Entropy	joules per kilogram degree kelvin	J/kg°K
Surface Tension	newtons per meter	N/m
T		
Temperature	celsius	°C
	kelvin	K
	fahrenheit	°F
Temperature Differential	fahrenheit degrees	Δ°F
	celsius degrees	Δ°C
	kelvin degrees	ΔK
Thermal Conductivity	watts per meter degree kelvin	W/m°K
Time	nanosecond	ns
	microsecond	µs
	millisecond	ms

Raw Unit Category	Raw Unit	Formula
	hundredths second	cs
	tenths second	ds
	second	sec
	minute	min
	day	day
	week	wk
	julian month	mo
	year	yr
	hour	hr
	total hours	hrs
V		
Velocity	meters per second	m/s
	kilometers per second	km/s
	kilometers per hour	km/h
	miles per hour	mph
	feet per second	ft/s
	feet per minute	ft/min
	millimeters per second	mm/s
	millimeters per minute	mm/min

Raw Unit Category	Raw Unit	Formula
	meters per minute	m/min
	meters per hour	m/h
	knot	knot
Volume	cubic meter	m^3
	cubic millimeter	mm^3
	cubic centimeter	cm^3
	milliliter	mL
	hectoliter	hL
	liter	L
	kiloliter	kL
	cubic inch	in^3
	cubic foot	ft^3
	cubic yard	yd^3
	gallon	gal
	kilogallon	kgal
	quart	qt
	pint	pt
	fluid ounce	fl_oz
	imperial gallon	galUK

Raw Unit Category	Raw Unit	Formula
	hecto cubic foot	hft^3
Volumetric Flow	cubic meters per second	m^3/s
	milliliters per second	mL/s
	hectoliters per second	hL/s
	liters per second	L/s
	cubic feet per second	cfs
	cubic feet per minute	cfm
	cubic feet per hour	cfh
	kilocubic feet per minute	kcfm
	imperial gallons per minute	galUK/min
	liters per minute	L/min
	liters per hour	L/h
	cubic meters per minute	m^3/min
	cubic meters per hour	m^3/h
	Gallons per minute	gal/min

Working with Contacts

A contact is a person who is associated with a client and/or site, however, they lack login information. When creating a client contact, you have the ability to associate the contact with one or more sites belonging to the client. When creating a site contact, you have the option to create a client contact. However, you can also create site-only and/or client-only contacts. The primary client contact assigned to the client displays as bolded text. See Working with Clients (page 21).

You can access the client contact and site contact views from the following:

- **Client Contact**

    - On the Client Dashboard, select the View drop-down and select *Contact*.
    - You can select BOB > Site, and then select Contact View. You may be prompted to select the Client and then select *OK*.
- **Site Contact**
    - On the Site Dashboard, select the View drop-down and select *Contact*.
    - You can also select BOB > Site, and then select Contact View. You may be prompted to select the Client and Site and then select *OK*.

Working with Client Contacts

When creating a client contact, you can associate the contact with one or more sites belonging to the client.

Accessing Client Contacts

You can access the client contacts from the following methods:

- On the Client Dashboard, select the View drop-down and select Contact.
- You can also select BOB > Client, and then select Contact View. You may be prompted to select the Client and Site and then select *OK*.

Viewing Client Contacts

The Client Contact view displays a table of client contacts that includes the following information:

- Name
- Site

> ⚠ The Site column displays the site name if the client contact is assigned to one site. If the client contact is assigned to more than one site, the number of sites is displayed and you can hover your mouse over the number to view the sites.

- Email
- Title
- Primary Number
- SMS Number

Creating a Client Contact

1. On the Contact home screen, select *Actions* > *Add New Contact* to open the Client Contact screen.
2. In the Client Details section, complete the following fields (* indicates required field):
    - **Email Address***: Enter the contact's email address.
    - **First Name***: Enter the contact's first name.
    - **Last Name***: Enter the contact's last name.
    - **Title***: Select the contact's title.
    - **Search for Address***: Begin typing the physical address for the contact and select the appropriate address to auto-fill the address fields:

- Address
- City
- State
- Zip Code

3. Mark **Include all sites** to assign the contact to all the client sites. This will also create a Site Contact record for each of the sites the contact is assigned to. You can also assign the contact to specific sites.
4. In the **Phone Details** section, select *Add New* to add one or more telephone numbers.
5. Select the **Phone Type** and enter the telephone number and extension (if any). The extension field is limited to 6 characters.
6. If only one phone number is entered, this is automatically marked as the **Primary** telephone number. If additional telephone numbers are entered, you can mark the appropriate number as the primary.
7. Mark **SMS** if the mobile number can receive text messages.
8. Select the *Save icon* to the right of the phone number. To delete or clear the telephone data row, select the *Delete icon*.
9. In the Site Details section, the default view displays the sites the contact is assigned to or you can select the drop-down to view the sites the contact is not assigned to by selecting *View - Assigned*.
10. From the **Unassigned** view, select the ellipsis to the right of the site, and then select *Assign*. (To see the sites the contact is assigned to, select View - Unassigned and select Assigned.)
11. Select *Create*. If you've assigned the client contact to any sites, this will create contacts for each site.

Editing a Client Contact

> ⚠ Editing a contact record only applies to the contact that you are editing. This does not apply the changes to any other contact records that were created. For example, when you created the client contact and selected to create the contact record for all sites, the site contact records are not updated if you edit the client contact record.

1. On the Contact home screen, select the ellipsis to the right of the contact name.
2. Select Edit.
3. In the Client Details section, you can edit the following fields:
    - First Name
    - Last Name
    - Title
    - Address
4. Mark **Include in all new sites** to automatically create the contact at the site level for any new sites.
5. In the Site Details section, the default view displays the sites the contact is assigned to or you can select the drop-down to view the sites the contact is not assigned to by selecting *View - Assigned*.
6. From the **Unassigned** view, select the ellipsis to the right of the site, and then select *Assign*. (To see the sites the contact is assigned to, select View - Unassigned and select Assigned.)
7. Select *Save* to update the client contact.

Working with Site Contacts

When creating a site contact, you have the option to create a client contact. However, you can also create site-only and/or client-only contacts.

Accessing Site Contacts

You can access site contacts from the following:

- On the Site Dashboard, select the View drop-down and select Contact.
- You can also select BOB > Site, and then select Contact View. You may be prompted to select the Client and Site and then select *OK*.

Viewing Site Contacts

The Site Contact view displays a table of site contacts that includes the following information:

- Name
- Email
- Title
- Primary Number
- SMS Number

Creating a Site Contact

1. On the Contact home screen, select *Actions > Add New Contact* to open the Site Contact screen.
2. In the Client Details section, complete the following fields (* indicates required field):
    - **Email Address***: Enter the contact's email address.
    - **First Name***: Enter the contact's first name.
    - **Last Name***: Enter the contact's last name.
    - **Title***: Select the contact's title.
    - **Search for Address***: Begin typing the physical address for the contact and select the appropriate address to auto-fill the address fields:
        - Address
        - City
        - State
        - Zip Code
3. Mark **Create client contact** to create the client contact if it doesn't already exist.
4. In the **Phone Details** section, select *Add New* to add one or more telephone numbers.
5. Select the **Phone Type** and enter the telephone number and extension (if any).
6. If only one phone number is entered, this is automatically marked as the **Primary** telephone number. If additional telephone numbers are entered, you can mark the appropriate number as the primary.
7. Mark **SMS** if the mobile number can receive text messages.
8. Select the *Save icon* to the right of the phone number. To delete or clear the telephone data row, select the *Delete icon*.
9. Select *Create.* If you've assigned the site contact to the client, this will create the client contact.

Editing a Site Contact

⚠ Editing a contact record only applies to the contact that you are editing. This does not apply the changes to any other contact records that were created. For example, when you created the client contact and selected to create the contact record for all sites, the site contact records are not updated if you edit the client contact record.

1. On the Contact home screen, select the ellipsis to the right of the contact name.
2. Select *Edit*.
3. In the Client Details section, you can edit the following fields:
    - First Name
    - Last Name
    - Title
    - Address
4. Select *Save* to update the client contact.

Deleting Contacts

⚠ Deleting a client contact or a site contact only deletes the contact record for that entity. If you've created additional contact records, those records have not been deleted. For example, when you created the client contact and selected to create the contact record for all sites, the site contact records are not deleted.

Deleting a Contact

To delete a contact:

1. On the Contact home screen, select the ellipsis to the right of the contact.
2. Select *Delete*.

Bulk Deleting Contacts

To delete more than one contact:

1. On the Contact home screen, select the checkbox to the left of the contact(s) to be deleted.
2. Select *Actions* > *Delete*.

Energy Utility Dashboard

The Energy Utility Dashboard is a module that displays billed utility energy data for your sites and which are performing better than others.

⚠ To purchase the Energy Utility Dashboard, contact your WennSoft Customer Success Manager.

- Additional Definitions (page 83)

Company Dashboard

On the Company Dashboard, the following Energy metrics display for each site:

- Current Through
- Cost/SF
- Cost % Change
- Consumption/SF
- Consumption % Change
- Carbon/SF
- Carbon % Change
- EnergyStar® Score

Client Dashboard

On the Client Dashboard, the following Energy metrics display for each of that client's sites:

- Current Through
- Cost/SF
- Cost % Change
- Consumption/SF
- Consumption % Change
- Carbon/SF
- Carbon % Change
- EnergyStar® Score

Site Dashboard

On the Site Dashboard, the Energy KPI displays the following:

- Cost/SF vs last year (% change)
- Consumption/SF vs last year (% change)
- Carbon/SF vs last year (% change)

Available Metrics

- **Cost/SF** - This metric is also known in the industry as ECI (Energy Cost Intensity). This is the sum of the current total/usage costs for the "Current 12 Month Period" divided by the square footage of the building, once.
- **Cost/SF (Previous 12 Months)** - This metric follows the same calculation as the Cost/SF, but instead it uses the "Previous 12 Month Period" date range.
- **Cost/SF vs last year (% change)** - This is the percentage change delta between the Cost/SF (Current) and Cost/SF (Previous 12 Months).
- **Consumption/SF** - This metric is also known in the industry as EUI (Energy Use Intensity). This is the sum of the current energy usage (normalized to the common unit kBtus) for the "Current 12 Month Period" divided by the square footage of the building, once.
- **Consumption/SF (Previous 12 Months)** - This metric follows the same calculation as the Consumption/SF, but instead it uses the "Previous 12 Month Period" date range.
- **Consumption/SF vs last year (% change)** - This is the percentage change delta between the Consumption/SF and Consumption/SF (Previous 12 Months) periods.

- **Carbon/SF** - This is the sum of the current calculated carbon for the "Current 12 Month Period" divided by the square footage of the building, once. It is in the unit: Lbs of co2.
- **Carbon/SF (Previous 12 Months)**This metric follows the same calculation as the Carbon/SF metric, but instead it uses the "Previous 12 Month Period" date range.
- **Carbon/SF vs last year (% change)** - This is the percentage change delta between the Carbon/SF and Carbon/SF (Previous 12 Months) periods.

Additional Definitions

- **Energy Star Score Month Captured** - This is the date representing the month that the associated score was captured from Energy Star for this building.
- **Energy Star Score** - This the Energy Star score for this building in the month this score was captured.
- **effective_month** - This is the calendar month and year for the data in this respective row line item.
- **distribution_kbtus** - This is the sum of the energy used in this month, summed and converted to the common unit kBtus (1000 British Thermal Units).
- **property_max_demand** - Because demand should not be summed, Max Demand Consumption represents the peak demand of that energy type for the property in that month. That is, it always represents the maximum demand value recorded at the property from a single given meter (respective of energy type) in the month. It may be a different meter from month to month which registers the maximum demand value that month, but it will always be the highest demand value recorded across the property in the given month for the selected energy type.
- **Current 12 Month Period** - This date range always contains 12 months of data for the building. It begins at the current month this building has complete data through and continues back through the previous 11 months coming before it. This range updates continuously as the building rolls forward month to month.
- **Previous 12 Month Period** - This date range always contains 12 months of data for the building. However, it contains months that are 12 calendar months old relative to the "Current 12 month period". In other words, the oldest month in the "Previous 12 month period" is the 24th month from which the building is current through and its newest month is the 13th month from which the building is current through. This range also updates continuously as the building rolls forward month to month.

Service Requests

The Service Requests dashboard displays Service Requests for your Service Business. See Creating a Service Request (page 84) for more information.

On the Service Requests dashboard, In the left panel, you can view a list of Service Requests grouped by creation date.

The information that displays in this view includes:

- Client
- Requester Email Address
- Call Status
- Summary
- Last Update Date and Time
- Call Type icons
- Number of Appointments

Call Type Icons

Icon	Description
	Energy
	Comfort
	Mechanical
	Maintenance
	Controls
	Health and Safety

Accessing Service Requests

To access the Service Requests dashboard:

1. From the mega navigation, select Services or from the **App Drawer**, select **Service Requests**.
2. In the left navigation, select the **Management** icon.
3. On the Service Requests dashboard, you can do the following:
    - Creating a Service Request (page 84)
    - Sorting, Filtering, and Searching Service Request Data (page 85)
    - Viewing the Service Request Details (page 85)
    - Adding a Client Contact to a Service Request (page 86)
    - Creating an Appointment (page 87)
    - Notifying the Client (page 87)
    - Deleting a Service Request (page 88)
    - Deleting an Appointment (page 88)
    - Service Request Settings (page 88)

Creating a Service Request

A service request is a request for service to address a particular issue. Service requests can be created from:

- Service Requests > Select *New Service Request*.
- From an email sent from your customer. See Service Request Settings (page 88).
- Created automatically from a rule fault. See Service Request Settings (page 88).

Manually Creating a Service Request

1. If you are creating a service request from the Service Requests application, after you've selected to create the new service request, the Create Service Request window displays.
2. Complete the following fields, as needed. Required fields are marked with an asterisk below.
    - **Summary**: Enter a brief summary.
    - **Description:** Enter the description for the service request.
    - **Priority**: Select the priority level of the service request (Low, Medium, High)
    - **Issue Types**: Select one or more issue types. (Energy, Comfort)
    - **Client***: The Client the Service Request is created for.
    - **Site***: The Site the Service Request is created for.
    - **Target***: Select the Equipment or System that the Service Request is for. The available entities for the Site display in the drop-down.
    - **Site Contact**: Select the Site Contact. The available Contacts for the Site display in the drop-down.
    - **Area**: Select one or more Areas.
3. Select *Create* to generate the service request.

Sorting, Filtering, and Searching Service Request Data

Sorting Data

At the top of the window, you can designate how the service requests are sorted (Creation Date or Last Updated) and the time frame (Start Time and End Time).

Filtering Data

You can filter the information by selecting the *Filters* button. This opens a side window where you can enter any of the following criteria:

- **Clients**: Add any combination of business types or specific clients.
- **Sites**: Add any combination of building types and specific sites.
- **Equipment**: Add any combination of equipment types.
- **Systems**: Add any combination of system types
- **Issue Types**: Add any combination of issue types
- **Priorities**: Add any combination of priorities

You can clear the Filters by selecting the *Clear Filters* button.

Searching Data

Use the Search field at the top right of the dashboard.

Viewing the Service Request Details

1. Select the **App Drawer**icon.
2. Select **Service Requests.**

3. When you select a Service Request from the left panel, the Service Request details are displayed. The information that displays in this panel includes:
    - **Work Order ID**: Automatically generated.
    - **Client**: From the Service Request.
    - **Site**: From the Service Request.
    - **Health Icon**: Priority from the Building Optimization Broker data.
    - **Summary**: From the Service Request.
    - **Description**: From the Service Request.
    - **Call Type icons**: From the Service Request. You can add Call Types to the Service Request by selecting the **Add** icon.
    - **Created On Date**: The date that the Service Request was created.
    - **Last Update Date**: The date of the last update to the Service Request.
    - **Request Source**: Indicates how the Service Request was created.
        - **Email** - Sent from Client.
        - **API** - Created in Building Optimization Broker or via a 3rd Party web form.
        - **Rule** - Created from a Rule Fault.

Viewing Service Request Appointment Information

If there are any Appointments created for the Service Request, these will display in the Appointments section.

The Appointment information includes:

- Appointment
- Date/Time
- Technician
- Status: To see a list of possible statuses, see Service Statuses (page 195).

Viewing Service Request Call Information

The Service Request Call Information is displayed on the right panel.

The Call Information includes:

- Call Status: To see a list of possible statuses, see Service Statuses (page 195).
- Priority (Low, Medium, or High)
- Client
- Site
- Equipment/System
- Area
- Client Contact

Adding a Client Contact to a Service Request

While viewing the Service Request Details, you can add or edit the Client Contact information.

To access the Service Requests dashboard:

1. From the mega navigation, select Services, or from the **App Drawer**, select **Service Requests**.
2. In the left navigation, select the **Management** icon.
3. Select a Service Request to display the Service Request details.
4. In the Call Information panel, select *Add Client Contact*.

5. In the Add Client Contact window, enter or edit the following information. Required fields are indicated with an asterisk (*).
    - Contact Name*
    - Title*
    - Email*
    - Mobile Phone
    - Office Phone
    - Address 1*
    - Address 2*
    - City*
    - State*
    - Zip*
6. Select *Create*.

Creating an Appointment

Create an appointment for a Service Request. Creating an Appointment in the Building Optimization Broker will set the **Service Request Status** to **Open** to be used to create an FSM Service Call.

> ⚠ Appointments created in Building Optimization Broker will not be sent to Schedule.

To create an Appointment:

1. From the mega navigation, select Services, or from the **App Drawer**, select **Service Requests**.
2. In the left navigation, select the **Management** icon.
3. Select a Service Request.
4. Select the ellipsis icon in the top right corner of the Service Request Details.
5. Select **New Appointment**.
6. In the Appointment window, the Work Order Number is displayed in the title.
7. Select or enter the following information:
    - Primary Technician
    - Scheduled Date/Time
    - Last Update Date/Time
    - Appointment Status
    - Additional Technicians
    - Technician Notes
8. Mark **Send Client Communications on Create** to email the Client regarding the Appointment.
9. Select *Create*.

Notifying the Client

If you have made any changes to the Service Request and/or Appointment.

- You can send a notification by selecting the ellipsis icon when viewing the Service Request and then selecting *Send Communication*.
- You can send a notification by selecting the ellipsis icon to the right of the Appointment and then selecting *Send Communication*.
- Select *Save & Notify* in the lower right corner of the Service Request.

⚠ Clients and Service Statuses must be set up in Advanced Communications in order to send notifications to Clients. See Working with Advanced Communications (page 193) for more information.

Deleting a Service Request

Deleting a Service Call will remove the Service Call and all associated Service Appointments.

To delete a Service Request:

1. From the mega navigation, select Services, or from the **App Drawer**, select **Service Requests**.
2. In the left navigation, select the **Management** icon.
3. Select a Service Request.
4. Select the ellipsis in the top right corner of the Service Request Details.
5. Select **Delete**.
6. In the confirmation window, select *Delete*.

Deleting an Appointment

To delete an Appointment created in Building Optimization Broker:

1. From the mega navigation, select Services, or from the **App Drawer**, select **Service Requests**.
2. In the left navigation, select the **Management** icon.
3. Select a Service Request.
4. Select the ellipsis icon to the right of the Appointment.
5. Select **Delete**.
6. In the confirmation window, select *Delete*.

Service Request Settings

In Service Request Settings, you can:

- Enable Email to Service Call functionality
- Designate the permanent Email Alias that your clients will send Service Requests.
- Create and download the unique Email Templates that your Clients will use to create the Service Request emails.
- Enable Rules to apply to the Service Requests.

To access Service Request Settings:

1. From the mega navigation, select Services, or from the **App Drawer**, select **Service Requests**.
2. In the left navigation, select the **Settings** icon.

Email to Service Call Settings

Using the Building Optimization Broker, your customers or internal employees can Request Service by sending an email.

Enabling Email to Service Calls

1. From the mega navigation, select Services, or from the **App Drawer**, select **Service Requests**.
2. In the left navigation, select **Settings**.

3. On the **Email to Service Call** tab, select the toggle to enable the option for your Clients to email a request for service.
4. Enter a unique **Email Alias**. Once an email alias is entered, it cannot be changed.

> ⚠ An Email Alias is simply an email address that is created and used for email address forwarding. The Email Alias is a unique email address to your Company that a customer or 3rd party system uses to create a Service Request in BOB. It is not an actual user account, nor does it correspond to a user account on a mail server. This is NOT INTENDED for User-level outbound emails. Do not put your email address in this field.

Creating Client Email Templates

In this section, you are creating unique email templates for each of your Clients. Your Clients will use this Template when sending an email for a Service Request.

1. In the Email Templates section, select the **Client** drop-down to select a Client.
2. Select the operating system **Template** (Windows or Mac).
3. Select *Generate Email Template* to download the *template.eml* Email Template.
4. Select *Save*.

Email Template Example

> ⚠ All asterisks must be left in place and not deleted. Anything below the final *** is ignored.

- The Email Alias is auto-populated into the **To:** field.
- Your Client can enter an email **Subject** that summarizes the issue.

In the Body of the email:

- **Company ID** and **Client ID** auto-populate and must not be edited.
- The **Company Name** must not be edited.
- Your Client can enter:
    - **Priority**:
        - Low (default value)
        - Medium
        - High
    - **Issue Types**: Remove the issue types that do not apply to your request.
    - **Description**: Provide a description of the problem above the final asterisks ***.

Rule Fault to Service Call Settings

In the Rule Fault to Service Call Settings dashboard, you can enable and/or disable which Rules are allowed to automatically create a Service Request. Use the Search field at the top left to search for a specific rule.

1. From the mega navigation, select Services, or from the **App Drawer**, select **Service Requests**.
2. In the left navigation, select **Settings**.
3. Select the **Rule Fault to Service Call** tab.
4. On the **Rule Fault to Service Call** dashboard, you can enable/disable rules.
    - To enable individual rules, select the Enabled toggle to the right of the rule.
    - To enable one or more rules, mark the checkbox to the left of the rules to enable and then select the **Enable** toggle at the top right.

Reporting

⚠ The report generation time is dependent on the complexity and amount of data included in the report.

BAS Agent Report (Internal)

The BAS Agent Report provides the Super Admin user the ability to view the local agent IP information for the select company or for all companies. You can use the Workbook Mode to filter and/or sort the report. While this is a temporary report and is not stored for future viewing, you can export the results as an Excel .xlsx spreadsheet.

⚠ The report generation time is dependent on the complexity and amount of data included in the report.

The BAS Agent Report includes:

- Company Name:
- Agent Name
- Driver
    - BACnet Ethernet
    - BACnet IP
    - Niagara
    - Not Configured
- Serial Number
- Software Version
- Connected:
    - True
    - False
    - <blank>

Generating a BAS Agent Report

1. From the Mega Navigation, select **Reporting**.
2. Select **Actions** > **New Report**.
3. Select the **Report Type** dropdown and then select **BAS Agent Report**.
4. Click the **Select Company** dropdown and select **All Companies** or select a specific company.
5. Select *Generate*.

Exporting the BAS Agent Report

After generating the BAS Agent Report, you can export the results as an Excel .xlsx spreadsheet.

Column Filtering in Workbook Mode

To temporarily filter data displayed in the grid view from the dashboard, you can use Workbook Mode to display a filter row across the top of the data grid. You can use the lookup for 1 or more columns to select data to filter by. While the Workbook Mode is temporary, if you navigate to another tab or display a different view in the same dashboard for specific information, grid in Workbook Mode is still available. However, if you navigate to a different entity (equipment, system, company, etc.), the Workbook Mode is cleared.

To filter data using Workbook Mode:

1. Select the *Workbook Mode* button located above the dashboard.
2. The data columns that display are related to the dashboard. If you haven't selected any sensors yet, you can do this now. (Sensors can be selected before or after selecting Workbook Mode.)
3. Under each column header, enter or select the filter data and then select the Filter icon to select the filter type. Different data types may have additional field inputs. For example, numeric data types will have an increase/decrease dial, Boolean data types will have a drop-down selection, etc.
4. You can clear any filter by selecting the Clear Filter icon for the appropriate column. This clears the filter data and type.
5. The filtered sensor information displays dynamically as the filters are added/removed. If no records match the filters, the message "No records available" displays.

> ⚠ Using Workbook Mode you can also rearrange column headers if you prefer data to display in a different order of columns by dragging and dropping the column headers.

Filter Types

The filter types that are available are related to the data type to be filtered. Depending on the dashboard and filter selected you can filter data based on a filter type using the following criteria. For example, if you select a filter for company status that is equal to active, only companies with a status of active display.

Date	Temperature	Text	Boolean
• Is equal to • Is not equal to • Is after or equal to • Is after • Is before • Is before or equal to • Is null • Is not null	• Is equal to • Is not equal to • Is greater than or equal to • Is greater than • Is less than or equal to • Is less than • Is null • Is not null	• Contains • Does not contain • Is equal to • Is not equal to • Starts with • Ends with • Is null • Is not null • Is empty • Is not empty	• (All) • Is true • Is false

Complex Filtering

When using Workbook Mode, some dashboards have complex filtering enabled. You can create complex filters of your grid data using and/or statements to filter your displayed data for analytics. Complex filtering is accessed by selecting the filter icon below the data table.

1. Select the Complex Filtering icon below the data table.

2. In the Filter Builder, select the *Add Expression* button to add your first row.
3. Select the data type from the dropdown. This list is populated by the columns in the data table.
4. Select the filter expression:
    - Is equal to
    - Is not equal to
    - Is greater than or equal to
    - Is greater than
    - Is less than or equal to
    - Is less than
    - Is null
    - Is not null
5. Enter the value.
6. You can continue to add separate rows or you can use the *Group* button to create And/Or rows using the buttons.
7. Select *Apply* to save the filter

Inspection Report

The Inspection Report uses your existing rules (K2A and/or custom) and configuration to provide a site-level inspection to communicate site performance and opportunities for improvement in an easy-to-use PDF format. The Inspection Report includes an analysis of all HVAC equipment including the VAV units, FCU, AHUs, chillers, boilers, and other miscellaneous pieces of equipment. This report describes the service and maintenance issues found as well as presents opportunities for improvements to the building to help reduce energy costs and improve building performance. A generated Inspection Report is available for 7 days. If you need a permanent copy, you can download a PDF version from the Preview Inspection Report window.

The Inspection Report displays:

- Summary of the comfort, controls, energy, maintenance, mechanical, health, and safety.
- Site Metrics include an overall Site score percentage and a bar graph of the Site Scores.
- Issue Log displays the System and Equipment Issues including the priority levels.
- Space and outside air temperatures are based on the configured Space Air Sensors and Outside Air Sensors.

With a few mouse clicks you can answer questions like:

- Has my site improved or degraded over the past month compared to the previous month?
- What areas for improvement are there at my Site?
- How can I communicate with my customer the value of their Service Contract?

⚠ The report generation time is dependent on the complexity and amount of data included in the report.

Inspection Report Icons

In the Inspection Report, the following icons display to indicate the Priority levels.

Icon	Description
	No Issues
	Low Priority
	Medium Priority
	High Priority

Create an Inspection Report

1. From the Mega Navigation, select **Reporting**.
2. On the Reports dashboard, select **Actions** > **New Report**.
3. Select the **Report Type**. This may auto-populate to Inspection Report.
4. Enter a **Description** of the report. The description is displayed on the report.
5. (Optional) Mark **Show Period Comparison Grid** to include a grid that displays the equipment targeted for the selected rule that shows the previous and current period in fault, time in fault, and last time in fault. The period range is dependent on the time range selected for the report.
6. Select the **Time Range**:
    - Monthly: Select the Target Year and Target Month.
    - Today:
    - Week to Day
    - Month to Day
    - Quarter to Day
    - Previous Day
    - Previous Week
    - Previous Month
    - Previous Quarter
    - Custom Date: Select the date range.
7. Select the scope of the report:
    - **Client**
    - **Site**
    - **Equipment Type**
    - **Equipment**
    - **System**
8. Complete the **Rules**, **Configure**, and/or **Run Time** tabs, as needed.
9. Select *Save.*
10. When the report has finished generating, the new report is displayed in the Inspections Reports list.

Rules Tab

On the **Rules** tab, select the rules to include in the report. Select the checkbox to the left of the Available Rules header to select all rules or select one or more specific rules to be included. You can use the Workbook Mode to further filter the rules that display.

Configure Tab

On the **Configure** tab, select the Space Air Sensor and Outside Air Sensor to display on the report for the selected equipment.

Runtime Tab

On the Run Time tab, you can set up the building's scheduled occupancy hours, either one schedule for all the days or set up individual days. You can also set up more than one time range for all or individual days by selecting the Add button to the right of the completed time row to insert a blank start/end row. To clear the Occupied Hours, select the Reset button. Use the Workbook Mode to filter the list of objects. For more information on using Workbook Mode, see Filtering Data (page 11).

Occupied Hours

1. Select the **Sensor** radio button and then select the Occupancy Status to monitor.
2. Select the **Building Schedule** radio button and then set up the occupied hours for the building.
    - To set the schedule for all days, mark the All Days check box and then enter the start and end times.
    - To set the schedule for individual days, mark the day's check box and enter the start and end times.

Objects to Monitor

1. Select the equipment to apply the occupied hours for the report. Each piece of equipment and its sensor(s) are listed separately.
2. When you select more than two equipment objects, you can select the **Aggregate**:
    - **Sum**: Adds the values and displays them as a total on the Inspection Report.
    - **Average**: Creates and displays an average value (total of the values divided by the count) on the Inspection Report.

Editing a Configuration

To edit an inspection report configuration:

1. From the Mega Navigation, select **Reporting**.
2. To the right of the Target Site, select the ellipsis icon.
3. Select *Edit*.
4. Edit any of the fields, selected rules, and/or thresholds.
5. Select *Save*.

Clone a Configuration

To clone an inspection report configuration:

1. From the Mega Navigation, select **Reporting**.
2. To the right of the Target Site, select the ellipsis icon.
3. Select *Edit*.
4. Mark **Clone this configuration**.
5. Enter a **New Configuration Name**.

> ⚠ You can also edit any of the fields, selected rules, and/or thresholds.

6. Select *Save*.

View or Download an Inspection Report

To view the inspection report:

1. From the Mega Navigation, select **Reporting**.
2. To the right of the Target Site, select the ellipsis icon.
3. Select **Preview**.
4. In the Preview window, select **Download** to download the report as a PDF file. A generated Inspection Report is automatically removed 7 days from the system.

Delete an Inspection Report

To delete an inspection report before it is automatically removed after 7 days:

1. From the Mega Navigation, select **Reporting**.
2. To the right of the Target Site, select the ellipsis icon.
3. Select **Delete**.

Optimization Report

The Optimization Report provides a site-level equipment report to view equipment information in an easy-to-use Excel format. The report includes a summary page that lists the included equipment and its corresponding scores. The equipment on the summary page is hyperlinked to separate tabs for each piece of equipment and includes all sensors and the corresponding time-series data in 15-minute increments.

When setting up the Optimization Report, you can configure the column display order for the sensors for each equipment/system by reordering the sensor list using the arrows. Conditional formatting can be applied to any sensor.

> ⚠ The report generation time is dependent on the complexity and amount of data included in the report. Additionally, the timestamps are displayed on the report are based on the browser's time zone.

Creating an Optimization Report

1. From the Mega Navigation, select **Reporting**.
2. On the Reports dashboard, select **Actions** > **New Report**.
3. Select the **Report Type** drop-down and select **Optimization Report**.
4. Complete the following fields:
    - **Time Range**: Select the time range for the report or select *Custom Date*.
        - Previous 24 Hours (default value)
        - Previous 7 Days
        - Previous 14 Days
        - Custom Date: Select or enter the starting and ending dates.
    - **Client**: Select the client.
    - **Site**: Select the site.

- **Equipment Type** (optional): Select one or more equipment types or select *All* to include all equipment types.
- **Equipment**: Select one or more pieces of equipment or select *All* to include all equipment. The Equipment field is required if you do not select any systems. There is a limit of up to 255 pieces of equipment that can be selected.
- **System**: Select one or more systems or select All to include all systems. The System field is required if you do not select any equipment.

5. On the right side of the setup screen, select the equipment/system tab and select at least one sensor (required) to include on the report.
6. For each equipment/system, select the horizontal tab to:
    a. Reorder the sensor list for the report's column display order. Select the sensor and then use the up/down arrows to move the sensor on the list.
    b. Apply conditional formatting to any sensor. You can enter more than one conditional format by selecting the Add icon.
        i. Select the sensor and then select the format to apply. (Between, Equals, Greater Than, Less Than)
        ii. Enter the Value(s).
        iii. Select the formatting.
    c. Add an external sensor to the list of sensors.
        i. Select the Add icon to the right of the sensor search field.
        ii. In the External Sensor pop-up window, select the **Site**, **Entity**, and then select one or more **External Sensors**.
        iii. Select *Add*.
7. Select *Save*.
8. The Excel file is generated and automatically opens on your computer.

Sensor Count Report

This report displays a count of sensors grouped by agent, client, and site. You can sort by client, site, agent, or sensor count by selecting the column header. The Sensor Count Report can be exported to an Excel spreadsheet.

⚠ The report generation time is dependent on the complexity and amount of data included in the report.

1. From the Mega Navigation, select **Reporting**.
2. On the Reports dashboard, select **Actions** > **New Report**.
3. Select the **Report Type** drop-down and select **Sensor Count Report**.
4. Mark the Client(s) to be included on the report or mark **Select All** to include all clients.
5. Select *Generate*.

Watchdog Report

A Watchdog Report is used to provide a site-level equipment report to view equipment performance and opportunities for improvement in an easy-to-use PDF format.

⚠ The report generation time is dependent on the complexity and amount of data included in the report.

- Creating a Watchdog Report (page 97)
- Viewing a Watchdog Report (page 97)
- Deleting a Watchdog Report (page 98)

Creating a Watchdog Report

1. From the Mega Navigation, select **Reporting**.
2. On the Reports dashboard, select **Actions** > **New Report**.
3. Select the **Report Type** drop-down and select **Watchdog Report**.
4. Complete the following fields:
    - **Client**: Select the client.
    - **Site**: Select the site.
    - **Equipment Type** (optional): Select one or more equipment types or select *All* to include all equipment types.
    - **Equipment**: Select one or more pieces of equipment or select *All* to include all equipment.
    - **Status** or **Value** (optional): You can filter the equipment to a specific status (All, Good, OK, Bad) or to a specific value or range (such as greater than, greater than or equal to, less than, or less than or equal to). The default is set to Status and All.

      > ⚠ This filtering will affect the KPI information in the report. For example, the equipment score, minimum equipment score, maximum equipment score, and counts of equipment.

      Statuses and Related Scores:
        - Good: 75+
        - OK: 50-74
        - Bad: Less than 50
    - **Time Range**: Select the time range for the report or select *Custom Date*.
        - Monthly
        - Today
        - Week to Day
        - Month to Day
        - Quarter to Day
        - Previous Day
        - Previous Week
        - Previous Month
        - Previous Quarter
        - Custom Date: Select or enter the starting and ending dates.
5. Select *Save*.

Viewing a Watchdog Report

1. From the Mega Navigation, select **Reporting**.
2. On the Reports dashboard, select **View - Watchdog Reports**.
3. The created Watchdog reports are listed and the following information is displayed:
    - Target Client
    - Target Site
    - Start Date
    - End Date
    - Generated Date
4. To the right of the Watchdog report, select the ellipsis icon.
5. Select *Preview*.
6. Select *Download* to download the report.

Deleting a Watchdog Report

1. From the Mega Navigation, select **Reporting**.
2. On the Reports dashboard, select **View - Watchdog Reports**.
3. The created Watchdog reports are listed.
4. To the right of the Watchdog report, select the ellipsis icon.
5. Select *Delete*.
6. In the confirmation window, select *Confirm*.

Rules

Rule Builder is focused on leveraging the Sensors and other Entities created in Architect to monitor Equipment and System health using the data being collected from the BAS System. The data is available through Sensors that have been created in Architect and have been associated with a Device Object that was brought in via IoT Hub.

You have the option to use an existing K2A Rule (page 100), create a rule based on a K2A Rule (page 101), or create a custom Rule (page 103).

Real-Time Rules Engine

As data is received, and if the value has changed, rules and scoring are processed immediately to provide dynamic data you can use to make business decisions.

You can view the rule faults from the Equipment and Systems Dashboards on the default Faults view. Fault information is displayed in 1 minute intervals for a four-hour period. See Equipment Dashboard (page 39) or System Dashboard (page 33) for more information about viewing faults.

Accessing the Rule Builder

To access the Rule Builder, from the Mega Navigation, under APPS, select **Rules**.

When you access the Rule Builder, at the top right, you can view the following information:

- **Enabled Rules**: This displays the number of enabled rules.
- **Active Faults**: The number of active faults display.
- **Rule Failures**: The number of rule failures display.

The data table displays all the rules including:

- **Name**: Displays the name of the rule.
- **K2A/Custom**: Indicates if the rule is from the K2A Rule Library or is a custom rule.
- **Target Count**: Displays the target count for the rule.
- **Failure Count**: Displays the failure count for the rule.
- **Active Faults**: Displays the active failure count for the rule.
- **Enabled/Disabled**: Indicates if the rule is enabled.

Enable a Rule

A Rule can only be enabled if the Formula and Fault Logic have been created.

1. From the Mega Navigation, select **Rules**.
2. In the **Enable/Disable** column, select the **Enabled** slide.

> ⚠ You can also select the ellipsis icon to the right of the rule, select Manage, and select the Enabled slide.

Manage a Rule

1. From the Mega Navigation, select **Rules**.
2. To the right of a Rule, select the ellipsis icon.
3. Select *Manage.*
4. Edit the rule fields as needed.
5. Select *Save.*

> ⚠ K2A Rules cannot be edited, however, you can create a rule based on a K2A Rule. See Modifying a K2A Rule (page 101) for more information.

Recalculate a Rule

> ⚠ Access to the Rule Builder has been relocated to the mega navigation accessed from the Dashboard. In the future, this will be removed from the legacy navigation.

Recalculation allows you to re-run the Rule for a period of past data. This is especially useful if Formula or Fault Logic updates have been made. This also allows you to write a new Rule and then calculate when the targets would have been in Fault, based on historical data. A recalculation of Rules will also recalculate Scoring.

1. From the Mega Navigation, select **Rules**.
2. To the right of a Rule, select the ellipsis icon.
3. Select *Recalculate Rule.*
4. Type RECALCULATE, to confirm.
5. Mark the checkbox to be notified by email when the recalculation is complete.
6. Select *Save.*

> ⓘ Recalculating a Rule is a background process and may take several minutes to complete before fault data is available.

View Rule Targets

1. From the Mega Navigation, select **Rules**.
2. To the right of a Rule, select the ellipsis icon.
3. Select *View Targets.*

Additional Rule Processing

Sometimes when rule conditions are met, you may want them to trigger a fault and be alerted immediately. Other times, you may want to only generate a fault when a condition has been met for a period of time. Rule-level aggregates

provide the ability to go back through time-series after a rule has been evaluated. For instance, this rule must have been in a faulted state for more than 3 hours before a fault is generated.

1. From the Mega Navigation, select **Rules**.
2. To the right of a Rule, select the ellipsis icon.
3. Select *Manage*.
4. Locate **Additional Rule Processing**.
5. Select the drop-down menu, and select from the following:

Aggregate Type	Condition before a Fault will be generated
Occurrence Count	The rule must have been in a faulted state for a consecutive set number of times.
Change Count	The rule must have transitioned from a faulted state to an okay state and vice versa a set number of times over the duration specified.
Percent Active	The rule must have been in a faulted state for a set percentage of time over the duration specified.
Total Duration	The rule must have been in a faulted state for a set number of hours over the duration specified.

Debug a Rule

Use the Rule Debugger to determine why a rule contains an error.

1. From the Mega Navigation, select **Rules**.
2. To the right of a Rule, select the ellipsis icon.
3. Select Debugger.
4. The Rule Debugger page displays the following information:
    - **Date/Time**: Defaults to the current day's 24-hour time frame. You can edit the Start and End Dates/Times.
    - **Timestamp**: Displays the timestamp for the rule failure.
    - **Correlation ID**: Displays the correlation ID for the logged error.
    - **Error Message**: Displays the error message. If truncated, select the ellipsis icon and then select *View Full Error Message*.

Using a K2A Rule

The K2A Rule Library is a collection of rules, including target filters, that can be added to your company and used as-is or in a modified fashion. If a K2A rule is used as-is, when a K2A rule is updated by WennSoft, the rule will automatically be updated with the latest information. If a K2A rule is used in a modified fashion, when the K2A rule is updated by WennSoft, the rule will not be modified as not to overwrite the customizations made by the user. See Modifying a K2A Rule (page 101) for information on how to customize an existing K2A rule.

To use an existing K2A rule:

1. From the Mega Navigation, select **Rules**.
2. Select *Actions* > *Add Rule*.

3. In the Create Rule section, select the **Base Rule** drop-down, and then select the K2A rule. You can click in the **Base Rule** field and enter text to search for a rule.
4. Select the **Enabled** toggle and select **Save** to start using the K2A Rule.

> ⚠ You can also enable a rule (page 98) from the Rule Builder dashboard.

Modifying a K2A Rule

The K2A Rule Library is a collection of rules, including target filters, that can be instantiated and used as-is or in a modified fashion. If a K2A Rule is used as-is, when the K2A Rule is updated by WennSoft, the rule will automatically update and recalculate faults for the lifetime of the data. If a K2A Rule is used in a modified fashion, when a K2A Rule is updated by WennSoft, the rule will not be modified as not to overwrite the customizations made by the user.

Step One: Select the Base K2A Rule

1. From the Mega Navigation, select **Rules**.
2. Select *Actions* > *Add Rule*.
3. In the **Create Rule** section, select the **Base Rule** drop-down and select the rule. You can click in the **Base Rule** field and enter text to search for a rule.
4. Toggle **Customize** to *On*.
5. Edit the **Rule Name** as needed.
6. In the **Create Rule** section, select *Save*. (The section name changes from Add K2A Rule to Create Rule once Customize is toggled on.)

> ⚠ A Rule can be enabled in the Create Rule section, Edit Custom Rule section, and from the Rule Builder dashboard.

Step 2: Enter the Rule Target Filter

1. In the Rule Target Filter section, enter the following types or specific entities, as needed. You are required to select at least one Client and/or one Site and then at least one System or one Equipment.
    - **Clients**
    - **Sites**
    - **Equipment**
2. In the Edit Custom Rule section, select *Save.*

Step 3: Enter or Edit the Rule Properties

1. On the right pane, the *PROPERTIES* tab is displayed.
2. Select the **Rule Priority**.
3. Enter a **Description** that describes the rule. For example, "Supply temperature is above the active/effective setpoint by 5°F or more. Fan status is ON."
4. Enter the **System Effect** of this Rule. Enter a description of the effect of the rule. For example, "Occupant comfort can be impacted and you may receive calls that it is too warm in the space."
5. Enter the **Recommendation** for this Rule. The information entered in this field displays along with the rule information. You can enter potential causes for issues as well as a recommended solution. For example, for a supply temperature that is above the active/effective setpoint, you might enter: "Potential causes include:

Heating overrides, mechanical failure of the cooling valve not allowing cold water to pass and/or dampers not opening/closing properly. Check for overridden fans, valves, and dampers in the BAS."

6. Mark one or more **Issue Types**.
7. Under Additional Rule Processing, you can optionally select the **Rule Aggregate**. Rule aggregates provide the ability to look back through time series to get Sensor values. It also allows for Rule-level processing like "This Rule must be in a Fault state for 3 hours before a Fault is triggered."
   The Rule Aggregate options are:
   - None
   - Consecutive Duration
   - Change Count
   - Percent Active
8. In the Edit Custom Rule section, select *Save*.

Step 4: Set up or Edit the Sensor Filters

1. On the right pane, select the *SENSOR FILTERS* tab.
2. Select *New Sensor Filter*.
3. In the Add Sensor Filter window, select the **Sensor Source Type**.
   - **General Sensor** - See *Creating a General Sensor Filter* for more information.
   - **System Sensor** - See *Creating a System Sensor Filter* for more information.
   - **Equipment Sensor** - See *Creating an Equipment Sensor Filter* for more information.
   - **Weather Sensor** - See *Creating a Weather Sensor Filter* for more information.
4. In the Edit Custom Rule section, select *Save.*

Step 5: Enter or Edit the Formula

1. On the right pane, select the *FORMULA* tab.
2. Edit the Formula as needed. See *Working with Formula Editor blocks* for more information.
3. In the Edit Custom Rule section, select *Save*.

Step 6: Enter the Per Rule Score (optional)

The Rule Score is calculated based on a linear reset. As the formula moves between the 0 score value and the 100 score value, the Rule Score will be calculated proportionally. This allows you to view the overall score for a piece of equipment or system as well as a per rule score for that equipment.

1. On the right pane, select the *SCORE* tab.
2. Mark Use New Formula Based Scoring
3. Select the **Formula Output Data Type**. The formula output type should associate with the value type the formula will calculate.
   - **Analog** - Select for numerical values.
   - **Boolean** - Select for true/false values.
4. Enter the Score Values. As the Rule Score approaches the 0 Score Value, it will proportionately decrease the target entity's (equipment or system) score based on its priority.
   - **0 Score Value** - Enter the minimum score value.
   - **100 Score Value** - Enter the maximum score value.
5. Mark **Use Custom Weight (1-100)** to enter custom weight to control exactly how much each rule decrements the parent entity's score.

Step 7: Enter or Edit the Fault Logic

1. On the right pane, select the FAULT LOGIC tab.
2. Edit the Fault Logic as needed. See *Working with Fault Logic Editor Blocks* for more information.
3. In the Edit Custom Rule section, select *Save*.

Creating a Custom Rule

A rule within the program defines a set of facts, rules, and constraints that are used to gauge performance scoring criteria and event notification of devices in real-time, providing a quick analysis on how equipment is operating and performing while sending alerts when critical events and alarms occur. When using an existing rule you can make changes to the rule to meet your business needs. When the rule is changed it is no longer a system (pre-defined) rule, but is now classified as a custom (user-defined) rule.

Step 1: Create the Rule Name

1. From the Mega Navigation, select **Rules**.
2. Select *Actions* > *Add Rule*.
3. In the **Create Rule** section, select the **Base Rule** drop-down and then select *New Custom Rule*.
4. Enter in **Rule Name**. Enter a descriptive name for the rule. For example, "70A High Supply Temperature VS Setpoint (Single Setpoint, Fan Status = On)"

Step 2: Enter the Rule Target Filter

1. In the Rule Target Filter section, enter the following types or specific entities, as needed. You are required to select at least one Client and/or one Site and then at least one System or one Equipment.
    - **Clients**
    - **Sites**
    - **Equipment**
2. In the Edit Custom Rule section, select *Save.*

Step 3: Enter or Edit the Rule Properties

1. On the right pane, the *PROPERTIES* tab is displayed.
2. Select the **Rule Priority**.
3. Enter a **Description** that describes the rule. For example, "Supply temperature is above the active/effective setpoint by 5°F or more. Fan status is ON."
4. Enter the **System Effect** of this Rule. Enter a description of the effect of the rule. For example, "Occupant comfort can be impacted and you may receive calls that it is too warm in the space."
5. Enter the **Recommendation** for this Rule. The information entered in this field displays along with the rule information. You can enter potential causes for issues as well as a recommended solution. For example, for a supply temperature that is above the active/effective setpoint, you might enter: "Potential causes include: Heating overrides, mechanical failure of the cooling valve not allowing cold water to pass and/or dampers not opening/closing properly. Check for overridden fans, valves, and dampers in the BAS."
6. Mark one or more **Issue Types**.
7. Under Additional Rule Processing, you can optionally select the **Rule Aggregate**. Rule aggregates provide the ability to look back through time series to get Sensor values. It also allows for Rule-level processing like "This Rule must be in a Fault state for 3 hours before a Fault is triggered."

The Rule Aggregate options are:
    - None
    - Consecutive Duration
    - Change Count
    - Percent Active
8. In the Edit Custom Rule section, select *Save*.

Step 4: Set up or Edit the Sensor Filters

1. On the right pane, select the *SENSOR FILTERS* tab.
2. Select *New Sensor Filter*.
3. In the Add Sensor Filter window, select the **Sensor Source Type**.
    - **General Sensor** - See *Creating a General Sensor Filter* for more information.
    - **System Sensor** - See *Creating a System Sensor Filter* for more information.
    - **Equipment Sensor** - See *Creating an Equipment Sensor Filter* for more information.
    - **Weather Sensor** - See *Creating a Weather Sensor Filter* for more information.
4. In the Edit Custom Rule section, select *Save.*

Step 5: Enter or Edit the Formula

1. On the right pane, select the *FORMULA* tab.
2. Edit the Formula as needed. See *Working with Formula Editor blocks* for more information.
3. In the Edit Custom Rule section, select *Save*.

Step 6: Enter the Per Rule Score (optional)

The Rule Score is calculated based on a linear reset. As the formula moves between the 0 score value and the 100 score value, the Rule Score will be calculated proportionally. This allows you to view the overall score for a piece of equipment or system as well as a per rule score for that equipment.

1. On the right pane, select the *SCORE* tab.
2. Mark Use New Formula Based Scoring
3. Select the **Formula Output Data Type**. The formula output type should associate with the value type the formula will calculate.
    - **Analog** - Select for numerical values.
    - **Boolean** - Select for true/false values.
4. Enter the Score Values. As the Rule Score approaches the 0 Score Value, it will proportionately decrease the target entity's (equipment or system) score based on its priority.
    - **0 Score Value** - Enter the minimum score value.
    - **100 Score Value** - Enter the maximum score value.
5. Mark **Use Custom Weight (1-100)** to enter custom weight to control exactly how much each rule decrements the parent entity's score.

Step 7: Enter or Edit the Fault Logic

1. On the right pane, select the FAULT LOGIC tab.
2. Edit the Fault Logic as needed. See *Working with Fault Logic Editor Blocks* for more information.
3. In the Edit Custom Rule section, select *Save*.

Duplicate a Rule

1. From the Mega Navigation, select **Rules**.
2. Select the ellipsis icon.
3. Select *Duplicate.*

Disable a Rule

1. From the Mega Navigation, select **Rules**.
2. In the Enable/Disable column, select the toggle to disable the rule.

Delete a Rule

1. From the Mega Navigation, select **Rules**.
2. To the right of a rule, select the ellipsis icon.
3. Select *Delete.*
4. Confirm that you want to delete the rule by selecting *Yes*.

Working with Rule Sensor Filters

Rule sensor filters are a collection of defined filters that are made available to the rule formula and fault detector logic for calculating their respective outputs.

> ⚠ A sensor filter can only be created for a *saved* rule. Please ensure your rule has been saved before adding sensor filters.

Viewing Rule Sensor Filters

1. From the Mega Navigation, select **Rules**.
2. To the right of a rule, select the ellipsis icon.
3. Select *Manage*.
4. In the right-hand section, select the *SENSOR FILTERS* tab.
5. The Sensor Filters display in a table format and display the following information for each Sensor Filter:
    - Source Type
    - Entity Type
    - Sensor Type
    - Multi-Sensor Option (Not applicable to Weather Sensor Filters)
    - Sensor Sourcing (Not applicable to Weather Sensor Filters)
    - Sensor Aggregate

Creating a General Sensor Filter

A general sensor is typically used when your rule can span equipment or system types. For instance, you may have a rule that can target fan coil units as well as VAVs. In this case, you'll want to be able to source sensors independently of the equipment that is targeted.

⚠ A sensor can only be created for a *saved* rule.

To create a general sensor:

1. From the Mega Navigation, select **Rules**.
2. To the right of a rule, select the ellipsis icon and then select *Manage.*
3. Select *SENSOR FILTERS*.
4. Select *New Sensor Filter*.
5. In the Add Sensor Filter window, select the **Sensor Source Type** drop-down and select *General Sensor*. The window expands to show additional fields.
6. Select the **Sensor Type**. When creating a general sensor, all sensor types display in this list.
7. Select the **Multi-Sensor Option**. If the same sensor type exists multiple times within a system or equipment, you must select how to handle all of these sensor types with the rule you've created.
    - **First Sensor Found**
    - **Max Value of All Sensors**
    - **Min Value of All Sensors**
    - **Average Value of All Sensors**
8. Mark the **Sensor Sourcing** option(s). This allows a rule to take advantage of sensors external to the target of the rule. This is important when a specific rule target may not have a given sensor. When this occurs, Building Optimization Broker can look through the target's relationships and use one of their sensors (of the same type) in lieu of failing the rule because the target itself does not have the sensor.
    - **Check Equipment Target**
    - **Check Associated Symptoms**
    - **Check Sibling Equipment**
9. Select *Add Filter*.
10. In the Edit Custom Rule section, select *Save*.

Creating an Equipment Sensor Filter

An equipment sensor filter is used when you are specifying a sensor that can only exist on one equipment type. This is particularly useful when targeting **Systems** but looking for equipment-level sensors.

⚠ A sensor filter can only be created for a *saved* rule.

To create an equipment sensor filter:

1. From the Mega Navigation, select **Rules**.
2. To the right of a rule, select the ellipsis icon and then select *Manage.*
3. Select *SENSOR FILTERS*.
4. Select *New Sensor Filter*.
5. In the Add Sensor Filter window, select the **Sensor Source Type** drop-down and select *Equipment Sensor*. The window expands to show additional fields.
6. Select the **Equipment Type**.
7. Select the **Sensor Type**. When creating an equipment sensor, only the equipment sensor types display in this list.
8. Select the **Multi-Sensor Option**. If the same sensor type exists multiple times within a system or equipment, you must select how to handle all of these sensor types with the rule you've created.
    - **First Sensor Found**
    - **Max Value of All Sensors**
    - **Min Value of All Sensors**
    - **Average Value of All Sensors**

9. Mark the **Sensor Sourcing** option(s). This allows a rule to take advantage of sensors external to the target of the rule. This is important when a specific rule target may not have a given sensor. When this occurs, Building Optimization Broker can look through the target's relationships and use one of their sensors (of the same type) in lieu of failing the rule because the target itself does not have the sensor.
    - **Check Equipment Target**
    - **Check Sibling Equipment**
10. Select *Add Filter*.
11. In the Edit Custom Rule section, select *Save*.

Creating a System Sensor Filter

A system sensor filter is used when you want to find a sensor that would only exist on one system type. This is particularly useful when targeting **equipment** but looking for a sensor that may only exist in a specific **system**.

> ⚠ A sensor filter can only be created for a *saved* rule.

To create a system sensor filter:

1. From the Mega Navigation, select **Rules**.
2. To the right of a rule, select the ellipsis icon and then select Manage.
3. Select *SENSOR FILTERS*.
4. Select *New Sensor Filter*.
5. In the Add Sensor Filter window, select the **Sensor Source Type** drop-down and select *System Sensor*. The window expands to show additional fields.
6. Select the **System Type**.
7. Select the **Sensor Type**. When creating a general sensor, only system sensor types display in this list.
8. Select the **Multi-Sensor Option**. If the same sensor type exists multiple times within a system or equipment, you must select how to handle all of these sensor types with the rule you've created.
    - **First Sensor Found**
    - **Max Value of All Sensors**
    - **Min Value of All Sensors**
    - **Average Value of All Sensors**
9. Select *Add Filter*.
10. In the Edit Custom Rule section, select *Save*.

Creating a Weather Sensor Filter

A weather sensor is used to specify a sensor from the weather station tied to a site.

> ⚠ A sensor can only be created for a *saved* rule.

To create a weather sensor filter:

1. From the Mega Navigation, select **Rules**.
2. To the right of a rule, select the ellipsis icon and then select Manage.
3. Select *SENSOR FILTERS*.
4. Select *New Sensor Filter*.
5. In the Add Rule Sensor window, select the **Sensor Source Type** drop-down and select *Weather Sensor*.
6. Select the **Measurement**.
    - Temperature
    - Pressure

- Humidity
- Max. Temperature
- Min. Temperature

7. Select *Add Filter*.
8. In the Edit Custom Rule section, select *Save*.

Editing a Rule Sensor Filter

1. From the Mega Navigation, select **Rules**.
2. To the right of a rule, select the ellipsis icon and then select *Manage.*
3. Select *SENSOR FILTERS*.
4. To the right of a sensor, select the ellipsis icon.
5. Select *Manage*.
6. Edit the sensor filter.
7. Select *Update Filter*.
8. In the Edit Custom Rule section, select *Save*.

Deleting a Rule Sensor Filter

Deleting a sensor filter that is used within formula or fault logic will cause invalid logic. Please ensure that you remove the sensor filter from the formula and fault logic after deletion.

1. From the Mega Navigation, select **Rules**.
2. To the right of a rule, select the ellipsis icon and then select *Manage*.
3. Select *SENSOR FILTERS*.
4. To the right of a sensor filter, select the ellipsis icon.
5. Select *Delete*.
6. In the Edit Custom Rule section, select *Save*
   .

Sensor Aggregate

Sensor-level aggregates provide a grouping method for you to go back through time-series at a sensor-level to find things like count, average, delta, minimum, and maximum.

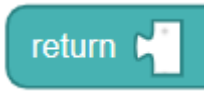
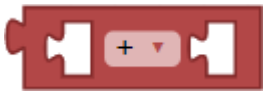
Aggregate Type	Description
Average	Use the average value over the duration specified.
Count	Count how many records exist over the duration specified.
First	Use the first record for the duration specified.
Last	Use the last record for the duration specified.
Max	Use the Maximum value over the duration specified.

Aggregate Type	Description
Min	Use the Minimum value over the duration specified.
Sum	Use the sum of all records over the duration specified.
Delta	Use the difference between the First and Last samples over the duration specified.

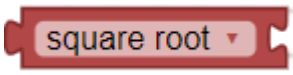
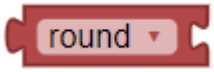
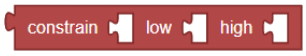
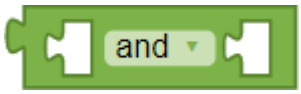
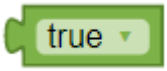
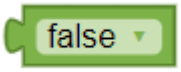
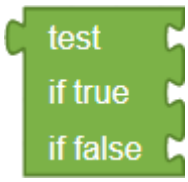
Working with Formula Editor Blocks

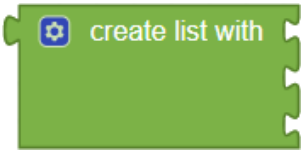
> ⚠ After making any changes, make sure to select *Save* in the Edit Custom Rule section.

The following blocks are available:

Block	Description
	**Return Block** Necessary for all formulas.
	**Sensor Block** Select the sensor from the drop-down menu.
	**Integer Block** A number.
	**Arithmetic Block** Return based on chosen arithmetic sign:

+	Returns the sum of two numbers
-	Returns the difference of two numbers
x	Returns the product of two numbers
÷	Returns the quotient of two numbers
^	Returns the first number raised to the power of the second number

Block	Description
	**Square Root Block** Returns the square root of a number.
	**Rounding Block** Returns the square root of a number.
	**Clamping Block** Constrains a number to be between the specified limits (inclusive).
	**Equality Block** Returns true if both inputs equal each other.
	**Inequality Block** Returns true if both inputs do not equal each other.
	**And Block** Returns true if both inputs are true.
	**Not Block** Returns true if the input is false, returns false if the input is true.
 	**True or False Block** Returns either true or false.
	**Null Able Type Block** Returns null.
	**Conditional Operator Block** Checks the condition in 'test', if the condition is true returns 'if true', if the condition is false returns 'if false'.

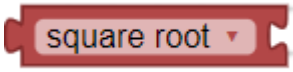
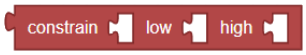
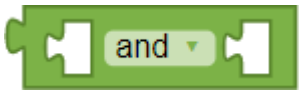
Block	Description
	**List Block** Creates a list with any number of items.
	Formula Value Output The value coming from your formula logic

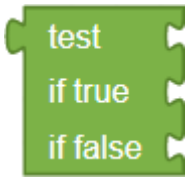
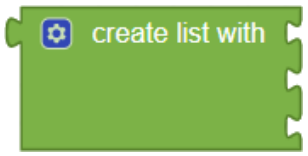
Working with Fault Logic Editor Blocks

The Fault Logic Editor allows you to select sensors, logic operators, math operators, etc. to configure a formula that results in an output. The rule fault logic has access to the rule formula output and all sensors defined in the Rule Sensors table. The values for each sensor for the particular timestamp can be used to calculate a rule fault logic output.

> ⚠ After making any changes, make sure to select *Save* in the Edit Custom Rule section.

Block	Description
	**Return Block** Necessary for all formulas.
	**Sensor Block** Select the sensor from the drop-down menu.
	**Integer Block** A number.

<table>
<tr><th>Block</th><th>Description</th></tr>
<tr><td> 
</td><td>Arithmetic Block
Return based on chosen arithmetic sign:<table>
<tr><td>+</td><td>Returns the sum of two numbers</td></tr>
<tr><td>-</td><td>Returns the difference of two numbers</td></tr>
<tr><td>x</td><td>Returns the product of two numbers</td></tr>
<tr><td>÷</td><td>Returns the quotient of two numbers</td></tr>
<tr><td>^</td><td>Returns the first number raised to the power of the second number</td></tr>
</table></td></tr>
<tr><td> 
</td><td>Square Root Block
Returns the square root of a number.</td></tr>
<tr><td> 
</td><td>Rounding Block
Returns the square root of a number.</td></tr>
<tr><td> 
</td><td>Clamping Block
Constrains a number to be between the specified limits (inclusive).</td></tr>
<tr><td> 
</td><td>Equality Block
Returns true if both inputs equal each other.</td></tr>
<tr><td> 
</td><td>Inequality Block
Returns true if both inputs do not equal each other.</td></tr>
<tr><td> 
</td><td>And Block
Returns true if both inputs are true.</td></tr>
<tr><td> 
</td><td>Not Block
Returns true if the input is false, returns false if the input is true.</td></tr>
</table>

Block	Description
	**True or False Block** Returns either true or false.
	**Null Able Type Block** Returns null.
	**Conditional Operator Block** Checks the condition in 'test', if the condition is true returns 'if true', if the condition is false returns 'if false'.
	**List Block** Creates a list with any number of items.
	Formula Value Output The value coming from your formula logic

K2A Rule Library

The K2A Rule Library is a collection of rules provided by WennSoft, including target filters, that can be instantiated and used as-is or in a modified fashion. If a K2A Rule is used as-is, when the rule is updated by WennSoft, the rule will automatically update with the latest information. If a K2A rule is used in a modified fashion, when the rule is updated by WennSoft, the rule will not be modified so as not to overwrite the customizations made by the user.

The following table lists the available K2A Rules:

Rule Name	Description	Equipment/System Types	Required Sensor Types
Air Filter Alarm	The air filter is dirty and needs to be replaced.	AHU (All Types), Heat Pump, RTU	Air Filter Alarm Status

Rule Name	Description	Equipment/System Types	Required Sensor Types
Ceiling Heat Stratification - High Discharge Air Temperature in Heating Mode (HWV)	Stratification in Ceiling Discharge and Return Applications ONLY Discharge Temperature is more than 15°F above the space temp in heating mode.	VAV (All Types), AHU (All Types), Unit Ventilator, Heat Pump (All Types), Fan Coil, Duct Reheat, Unit Heater	Supply Air Temperature Space Air Temperature Supply Valve Position Command Occupancy Command
Chw_Chiller Failed	The chiller is in a diagnostic shutdown condition.	Chiller (All Types)	Alarm Status
Chw_High Approach Temperature	The Chiller Approach Temperature is more than 6 deg during near full load conditions.	Chiller (All Types)	Compressor Capacity Supply Water Temperature Evaporator Saturated Refrigerant Temperature Enable
Chw_High Chiller Power Usage	The Chiller Compressor Capacity is more than 110%.	Chiller (All Types)	Enable Compressor Capacity
Chw_High Chw Delta T	The Chilled Water Delta Temp is greater than 10 degrees.	Chiller (All Types)	Supply Water Temperature Return Water Temperature Enable
Chw_High Chw Temp	The Chiller's Supply Water Temperature is more than 3 degrees above the Supply Water Temperature Setpoint.	Chiller (All Types)	Supply Water Temperature Setpoint Supply Water Temperature Enable
Chw_High Pressure	The Chiller's Supply Water Pressure is more than 10% above the Supply Water Pressure Setpoint.	Chiller (All Types)	Supply Water Pressure Supply Water Pressure Setpoint Enable

Rule Name	Description	Equipment/System Types	Required Sensor Types
Chw_High Tower Temp	The Leaving Tower Water Temp is more than 3 degrees above the setpoint.	Cooling Tower (All Types)	Supply Water Temperature Setpoint Supply Water Temperature Enable
Chw_Low Ambient Operation	The Chiller is operating while the ambient air temperature is less than 50 deg and could support economizing.	Chiller (All Types)	Outside Air Temperature Enable
Chw_Low Approach Temperature	The Chiller Approach Temperature is less than 4 deg during near full load conditions.	Chiller (All Types)	Compressor Capacity Supply Water Temperature Evaporator Saturated Refrigerant Temperature Enable
Chw_Low Chiller Power Usage	The Chiller Compressor Capacity is less than 25%.	Chiller (All Types)	Enable Compressor Capacity
Chw_Low Chw Delta T	The Chilled Water Delta Temp is less than 6 degrees.	Chiller (All Types)	Supply Water Temperature Return Water Temperature Enable
Chw_Low Chw Temp	The Chiller's Supply Water Temperature is more than 3 degrees below the Supply Water Temperature Setpoint.	Chiller (All Types)	Supply Water Temperature Setpoint Supply Water Temperature Enable
Chw_Low Pressure	The Chiller's Supply Water Pressure is more than 10% below the Supply Water Pressure Setpoint.	Chiller (All Types)	Supply Water Pressure Supply Water Pressure Setpoint Enable

Rule Name	Description	Equipment/System Types	Required Sensor Types
Chw_Low Tower Temp	The Leaving Tower Water Temp is more than 3 degrees below the setpoint.	Cooling Tower (All Types)	Supply Water Temperature Setpoint Supply Water Temperature Enable
Chw_Tower Freeze Alert	The Tower Water Leaving is less than 38 deg.	Cooling Tower (All Types)	Supply Water Temperature
Compressor Run Failure	The compressor is calling to run but is not running.	AHU (All Types), CRAC, CRAHU, Freezer, Heat Pump, RTU, Refrigerator, Split System	Compressor Command, Compressor Status
Compressor Running When Unoccupied	The compressor has statuses on when equipment is unoccupied.	AHU (All Types), CRAC, CRAHU, Freezer, Heat Pump, RTU, Refrigerator, Split System	Compressor Status, Occupancy Command
Damper Actuator Problem	Opening the damper is not increasing airflow, indicating that the damper is not moving properly.	VAV, Constant Volume Box	Supply Air Flow Delta over last hour, Supply Damper Position Command Delta over last hour
Dirty Air Filter	The air filter is dirty and needs to be replaced.	AHU (All Types), Heat Pump, RTU	Air Filter Alarm Status
Dirty Water Filter	The water filter is dirty and needs to be replaced.	Condenser Water	Water Filter Alarm Status
Discharge Static Pressure is Low	Discharge Air Static Pressure is below the Discharge Air Static Pressure Setpoint by 30% or more.	AHU, Heat Pump, Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, Packaged Rooftop Unit.	Discharge Air Pressure Discharge Air Pressure Setpoint Occupancy Command

Rule Name	Description	Equipment/System Types	Required Sensor Types
Discharge Static Pressure is High	Discharge Air Static Pressure is above the Discharge Air Static Pressure Setpoint by 30% or more.	AHU, Heat Pump, Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, Packaged Rooftop Unit.	Discharge Air Pressure Discharge Air Pressure Setpoint Occupancy Command
Domestic System Low Temperature	The supply water temperature from the domestic hot water system is below 122 degrees F.	Domestic Hot Water	Supply Water Temperature
Domestic System Unsafe High Temperature	The supply water temperature from the domestic hot water system exceeds 150 degrees F.	Domestic Hot Water	Supply Water Temperature
Duct Static Pressure Reset Failure	Supply Air Pressure Setpoint is a constant value over a 24-hour period, indicating no duct static pressure reset.	AHU (VAV)	Supply Air Pressure Setpoint Min for 1 hour, Supply Air Pressure Setpoint Max for 1 hour
Economizer is enabled but not operating	Economizer mode enabled but not operating, unit is not in free cooling mode (Enable Status)	Packaged Rooftop Unit, AHU (Generic), AHU (Variable Volume), AHU (Constant Volume), Energy Recovery Unit	Economizer Damper Position Command Makeup Damper Position Command Supply Fan Command
Economizer is operating when not enabled	Economizer mode is disabled but is operating in free cooling mode.	AHU (Constant Volume), Energy Recovery Unit, Packaged Rooftop Unit, AHU (Generic), AHU (Variable Volume)	Economizer Damper Position Command Makeup Damper Position Command
Equipment Run Failure	Equipment is commanded on but is not running.	ALL	Command, Status
Equipment Running More than 16 Hours Per Day	Equipment is running for more than 16 hours per day.	All	Status

Rule Name	Description	Equipment/System Types	Required Sensor Types
Equipment Running When Unoccupied	Equipment is running when not occupied to run.	ALL	Occupancy Command, Status
Fan Failure	The fan is commanded On but the Fan Status indicates it's Off	AHU, Heat Pump, Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series), Packaged Rooftop Unit.	Supply Fan Command Supply Fan Status
Fan On when not Commanded	The fan is running when commanded 'Off'	AHU, Heat Pump, Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series), Packaged Rooftop Unit.	Supply Fan Command Supply Fan Status

Rule Name	Description	Equipment/System Types	Required Sensor Types
Fan Status is False When Fan Command is True	The fan is commanded On but the Fan Status indicates it's Off.	Heat Pump, AHU (Generic), Exhaust Fan, Condensing Unit, Unit Heater, AHU (Constant Volume), Cooling Tower, Ductless Split System, Water Source Heat Pump, AHU (Variable Volume), Blower Coil, Fan Coil, Evaporative Condenser, VAV (Fan Powered - Series), Packaged Rooftop Unit, VAV (Fan Powered - Parallel), Unit Ventilator, Cooling Tower (Closed Loop), Energy Recovery Unit, AHU (Generic), AHU (Constant Volume), VAV (Reheat), Energy Recovery Unit	Supply Fan Command Supply Fan Status
High Average Return CO2	Return CO2 average levels are above the active/ effective return CO2 setpoint	AHU (Variable Volume), AHU (Constant Volume), AHU (Generic), Energy Recovery Unit, Packaged Rooftop Unit	Motion Sensor Status Return Air CO2 Return Air CO2 Setpoint
High Average Space CO2	Space CO2 average levels are above the active/ effective space CO2 setpoint	VAV (Fan Powered - Parallel), VAV (Cooling Only), Energy Recovery Unit, VAV (Reheat), VAV (Generic), Packaged Rooftop Unit, VAV (Fan Powered - Series), AHU (Generic), Exhaust Fan, VAV (Dual Duct), AHU (Constant Volume), Fan Coil, AHU (Variable Volume)	Motion Sensor Status Space Air CO2 Space Air CO2 Setpoint
High Condenser Approach	Condenser approach temperature is in excess of 4 degrees, indicating fouled tubes.	Chiller	Condenser Leaving Water Temperature, Condenser Saturated Refrigerant Temperature, Enable, Compressor Capacity

Rule Name	Description	Equipment/System Types	Required Sensor Types
High Discharge Air Temperature in Cooling Mode w/ DAT setpoint	The cooling component is "ON" and the discharge temperature is more than 5°F above the effective discharge temperature setpoint.	Packaged Rooftop Unit, VAV (Dual Duct), Blower Coil, VAV (Reheat), AHU (Variable Volume), AHU (Generic), AHU (Constant Volume), Energy Recovery Unit, VAV (Generic), Water Source Heat Pump, VAV (Cooling Only), Ductless Split System, VAV (Fan Powered - Series), VAV (Fan Powered - Parallel), Unit Ventilator, Fan Coil	Supply Air Temperature Supply Air Temperature Setpoint Cooling Command Occupancy Command
High Discharge Air Temperature in Cooling Mode w/ DAT Setpoint (CHW)	The Chilled Water Valve is open more than 50% and the discharge temperature is more than 5°F above the effective discharge temperature setpoint.	VAV (Fan Powered - Parallel), Fan Coil, Ductless Split System, AHU (Generic), Unit Ventilator, VAV (Fan Powered - Series), VAV (Generic), Duct Reheat, Packaged Rooftop Unit, AHU (Constant Volume), VAV (Cooling Only), AHU (Variable Volume), Blower Coil, VAV (Dual Duct), Water Source Heat Pump, VAV (Reheat), Energy Recovery Unit	Supply Air Temperature Supply Air Temperature Setpoint Cooling Valve Position Command Occupancy Command
High Discharge Air Temperature in Cooling Mode w/out DAT Setpoint (CHW)	The Chilled Water Valve is open more than 50% and the Discharge Temperature is less than 5°F below the space temp.	VAV (Cooling Only), Blower Coil, Unit Ventilator, AHU (Generic), VAV (Fan Powered - Parallel), AHU (Constant Volume), AHU (Variable Volume), Packaged Rooftop Unit, VAV (Fan Powered - Series), VAV (Generic), VAV (Dual Duct), Energy Recovery Unit	Supply Air Temperature Cooling Valve Position Command Space Air Temperature Occupancy Command

Rule Name	Description	Equipment/System Types	Required Sensor Types
High Discharge Air Temperature in Heating Mode with DAT setpoint (HWV)	Discharge air temperature is above discharge air setpoint by 5°F or more.	Duct Reheat, VAV (Fan Powered - Parallel), VAV (Generic), AHU (Constant Volume), AHU (Generic), Unit Heater, Blower Coil, Unit Ventilator, VAV (Reheat), Packaged Rooftop Unit, VAV (Fan Powered - Series), AHU (Variable Volume), Fan Coil, VAV (Dual Duct), Energy Recovery Unit	Supply Air Temperature Supply Valve Position Command Supply Air Temperature Setpoint Occupancy Command
High Discharge Air Temperature in Heating Mode w/out DAT setpoint	Heating is "ON" and the discharge air temperature is more than 30°F above the space temperature.	VAV (Fan Powered - Series), Duct Reheat, VAV (Generic), VAV (Cooling Only), Unit Heater, Energy Recovery Unit, AHU (Generic), VAV (Dual Duct), AHU (Constant Volume), Blower Coil, Ductless Split System, VAV (Reheat), Packaged Rooftop Unit, AHU (Variable Volume), VAV (Fan Powered - Parallel), Fan Coil	Supply Air Temperature Heating Load Space Air Temperature Occupancy Command
High Discharge Air Temperature in Heating Mode w/out DAT setpoint (HWV)	Hot Water Valve is greater than 30% and the discharge temperature is more than 30°F above the space temperature.	VAV (Generic), AHU (Variable Volume), AHU (Constant Volume), Duct Reheat, Unit Ventilator, AHU (Generic), VAV (Dual Duct), Fan Coil, VAV (Fan Powered - Parallel), Blower Coil, VAV (Fan Powered - Series), Packaged Rooftop Unit, Unit Heater, VAV (Reheat), Water Source Heat Pump, Energy Recovery Unit	Supply Air Temperature Space Air Temperature Supply Valve Position Command Occupancy Command
High Max Return CO2	The maximum reading for return CO2 levels is above the return CO2 setpoint	AHU (Generic), Energy Recovery Unit, AHU (Variable Volume), Packaged Rooftop Unit, AHU (Constant Volume)	Occupancy Command Return Air CO2 Return Air CO2 Setpoint

Rule Name	Description	Equipment/System Types	Required Sensor Types
High Max Space CO2	The maximum reading for space CO2 levels is above the space CO2 setpoint	AHU (Variable Volume), Exhaust Fan, VAV (Cooling Only), Packaged Rooftop Unit, VAV (Fan Powered - Parallel), Fan Coil, VAV (Fan Powered - Series), Energy Recovery Unit, VAV (Reheat), VAV (Generic), AHU (Generic), AHU (Constant Volume), VAV (Dual Duct)	Occupancy Command Space Air CO2 Space Air CO2 Setpoint
High Mixed Air Temperature during Economizing	Economizing is enabled and the mixed air temperature is above the mixed air setpoint.	Packaged Rooftop Unit, AHU (Generic), Energy Recovery Unit, AHU (Constant Volume), AHU (Variable Volume)	Economizer Damper Position Command Outside Air Temperature Mixed Air Temperature Setpoint Mixed Air Temperature Occupancy Command
High Outside Airflow	Outside Airflow is above the Outside Airflow Setpoint by 25% or more.	AHU, Heat Pump, Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series),	Occupancy Command Outside Airflow Outside Airflow Checkpoint
High Preheat Leaving Temperature in Preheat mode	Preheat leaving air temperature is above preheat temperature setpoint by 5°F or more	Packaged Rooftop Unit, Energy Recovery Unit, AHU (Constant Volume), AHU (Variable Volume), Fan Coil, AHU (Generic), Unit Ventilator, Blower Coil	Preheat Air Temperature Preheat Air Temperature Setpoint Outside Air Temperature Occupancy Command

Rule Name	Description	Equipment/System Types	Required Sensor Types
High Relative Humidity no Setpoint	The space humidity is above 60%	Water Source Heat Pump, AHU (Generic), AHU (Variable Volume), VAV (Dual Duct), Unit Ventilator, Duct Reheat, Fan Coil, VAV (Reheat), Unit Heater, VAV (Fan Powered - Parallel), VAV (Cooling Only), Blower Coil, Ductless Split System, Energy Recovery Unit, Packaged Rooftop Unit, AHU (Constant Volume), VAV (Fan Powered - Series), VAV (Generic)	Space Air Relative Humidity
High Relative Humidity with RH Setpoint	Space humidity is above the humidity setpoint	VAV (Fan Powered - Series), VAV (Dual Duct), AHU (Variable Volume), Fan Coil, Unit Heater, AHU (Generic), VAV (Reheat), VAV (Cooling Only), Ductless Split System, Water Source Heat Pump, Unit Ventilator, Energy Recovery Unit, Blower Coil, VAV (Generic), Packaged Rooftop Unit, AHU (Constant Volume), Duct Reheat, VAV (Fan Powered - Parallel)	Space Air Relative Humidity Space Air Relative Humidity Setpoint Occupancy Command
High Return Airflow	Return Airflow is above Return Airflow Setpoint by 25% or more.	AHU, Heat Pump, Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series),	Occupancy Command Return Airflow Return Airflow Checkpoint

Rule Name	Description	Equipment/System Types	Required Sensor Types
High Return CO2 Levels	Reading for return CO2 levels is above the return CO2 setpoint	AHU (Constant Volume), AHU (Variable Volume), Packaged Rooftop Unit, AHU (Generic), Energy Recovery Unit	Occupancy Command Return Air CO2 Return Air CO2 Setpoint
High Space CO2 Levels	Reading for space CO2 levels is above the space CO2 setpoint	VAV (Fan Powered - Parallel), VAV (Reheat), Energy Recovery Unit, Exhaust Fan, VAV (Cooling Only), VAV (Fan Powered - Series), AHU (Variable Volume), Fan Coil, VAV (Dual Duct), VAV (Generic), AHU (Generic), Packaged Rooftop Unit, AHU (Constant Volume)	Occupancy Command Space Air CO2 Space Air CO2 Setpoint
High Space Temperature Cooling Setpoint	Space Temperature is above the active/effective space setpoint by 3°F or more. Space Temperature is above the occupied cooling set point by 3°F or more.	Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series), Packaged Rooftop Unit.	Space Temperature Occupancy Command Occupied Cooling Setpoint
High Space Temperature Single Setpoint	Space Temperature is above the active/effective space setpoint by 3°F or more.	Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series), Packaged Rooftop Unit.	Space Temperature Occupancy Command Space Temperature Setpoint

Rule Name	Description	Equipment/System Types	Required Sensor Types
High Space Temperature Unoccupied Cool Setpoint	Space Temperature is above the unoccupied cooling setpoint by 3°F or more.	Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series), Packaged Rooftop Unit.	Space Temperature Occupancy Command Unoccupied Cooling Setpoint
High Space Temperature Single Unoccupied Setpoint	Space Temperature is above the unoccupied setpoint by 3°F or more.	Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series), Packaged Rooftop Unit.	Space Temperature Occupancy Command Space Temperature Setpoint
High Supply Airflow	Supply Airflow is above the Supply Airflow Setpoint by 25% or more.	AHU, Heat Pump, Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series), Packaged Rooftop Unit.	Supply Airflow Supply Airflow Checkpoint Occupancy Command
HtgChw_High Water Flow	The Water Flow is more than 10% above the Water Flow Setpoint.	Water Boiler, Heat Exchanger (Water), Chiller (Air Cooled), Chiller (Water Cooled)	Supply Water Flow Setpoint Supply Water Flow Enable
HtgChw_Low Water Flow	The Water Flow is more than 10% below the Water Flow Setpoint.	Chiller (Air Cooled), Water Boiler, Chiller (Water Cooled), Heat Exchanger (Water)	Supply Water Flow Setpoint Supply Water Flow Enable

Rule Name	Description	Equipment/System Types	Required Sensor Types
Isolation Sequence Failure	The chiller is disabled and isolation valves are open, passing water unnecessarily through an inactive chiller.	Chiller	Enable, Isolation Valve Command
Leaking Chilled Water Supply Valve	When the valve is at a closed position, supply water is still leaking by the valve, indicating it is not fully closed.	Chilled Water	Supply Valve Position Command, Supply Water Temperature, Return Water Temperature, Enable
Leaking Hot Water Supply Valve	When the valve is at a minimum position, supply water is still leaking by the valve, indicating it is not fully closed.	Hot Water	Supply Valve Position Command, Supply Water Temperature, Return Water Temperature, Enable
Leaking Supply Damper	When the damper is at a closed position, airflow is still being read.	VAV, Constant Volume Box	Supply damper position command, Supply air flow.
Not Economizing in Low OA Conditions	Outside Air Conditions are favorable for economizing, but economizing is currently disabled.	AHU (All Types), RTU	Economizer mode command, outside air temperature
Low Discharge Air Temperature in Cooling Mode w/ DAT Setpoint	Discharge Air Temperature is below discharge air setpoint by 5°F or more.	Water Source Heat Pump, Unit Ventilator, VAV (Dual Duct), AHU (Generic), Packaged Rooftop Unit, Ductless Split System, Energy Recovery Unit, AHU (Variable Volume), VAV (Generic), Fan Coil Blower Coil, AHU (Constant Volume), VAV (Cooling Only)	Supply Air Temperature Supply Air Temperature Setpoint Cooling Load Occupancy Command

Rule Name	Description	Equipment/System Types	Required Sensor Types
Low Discharge Air Temperature in Heating Mode w/ DAT Setpoint	Discharge Air Temperature is below discharge air setpoint by 5°F or more.	AHU (Generic), Unit Heater, Fan Coil, Water Source Heat Pump, AHU (Constant Volume), VAV (Fan Powered - Parallel), VAV (Reheat), Duct Reheat, AHU (Variable Volume), VAV (Dual Duct), Ductless Split System, VAV (Fan Powered - Series), Energy Recovery Unit, Packaged Rooftop Unit, VAV (Generic), Blower Coil, Unit Ventilator	Supply Air Temperature Supply Air Temperature Setpoint Heating Load Occupancy Command
Low Discharge Air Temperature in Heating Mode w/ DAT Setpoint (HWV)	Discharge air temperature is below discharge air setpoint by 5°F or more.	VAV (Generic), VAV (Fan Powered - Parallel), Packaged Rooftop Unit, Unit Ventilator, Blower Coil, AHU (Variable Volume), Unit Heater, Water Source Heat Pump, VAV (Fan Powered - Series), Energy Recovery Unit, AHU (Constant Volume), VAV (Reheat), Ductless Split System, Duct Reheat, Fan Coil, VAV (Dual Duct)	Supply Air Temperature Supply Valve Position Command Supply Air Temperature Setpoint Occupancy Command
Low Discharge Air Temperature in Heating Mode w/out DAT Setpoint	Heating Command is "ON" and the Discharge Air Temperature is less than 15°F above the space temp.	AHU (Constant Volume), Duct Reheat, VAV (Fan Powered - Parallel), VAV (Reheat), VAV (Fan Powered - Series), Blower Coil, Ductless Split System, Unit Ventilator, AHU (Variable Volume), VAV (Generic), Energy Recovery Unit, VAV (Dual Duct), Water Source Heat Pump, Packaged Rooftop Unit, Fan Coil, Unit Heater	Supply Air Temperature Space Air Temperature Heating Command Occupancy Command

Rule Name	Description	Equipment/System Types	Required Sensor Types
Low Discharge Air Temperature in Heating Mode w/out DAT Setpoint (HWV)	Hot Water Valve is 50% or more and the Discharge Air Temperature is less than 15°F above the space temp.	Water Source Heat Pump, Unit Ventilator, Duct Reheat, AHU (Constant Volume), VAV (Fan Powered - Parallel), Unit Heater, VAV (Generic), Blower Coil, VAV (Reheat), VAV (Dual Duct), AHU (Variable Volume), Ductless Split System, Packaged Rooftop Unit, VAV (Fan Powered - Series), Energy Recovery Unit, Fan Coil	Supply Air Temperature Space Air Temperature Supply Valve Position Command
Low Mixed Air Temperature	Mixed Air Temperature is below the Mixed Air setpoint	Energy Recovery Unit, AHU (Variable Volume), AHU (Constant Volume), Packaged Rooftop Unit, Blower Coil, Fan Coil, Unit Ventilator, AHU (Generic)	Mixed Air Temperature Mixed Air Temperature Setpoint
Low Outside Airflow	Low Outside Airflow is below the Outside Airflow Setpoint by 25% or more.	AHU, Heat Pump, Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series), Packaged Rooftop Unit.	Outside Airflow Outside Airflow Checkpoint Occupancy Command
Low PreHeat Leaving Temperature in Preheat mode	Preheat leaving air temperature is below preheat setpoint by 5 deg F or more	Packaged Rooftop Unit, Unit Ventilator, Blower Coil, Fan Coil, AHU (Generic), AHU (Variable Volume), AHU (Constant Volume), Energy Recovery Unit	Preheat Air Temperature Preheat Air Temperature Setpoint Outside Air Temperature

Rule Name	Description	Equipment/System Types	Required Sensor Types
Low Relative Humidity no Setpoint	Space humidity is below 35% relative humidity	VAV (Reheat), AHU (Variable Volume), AHU (Generic), Packaged Rooftop Unit, VAV (Generic), Fan Coil, VAV (Dual Duct), Unit Heater, VAV (Cooling Only), Water Source Heat Pump, Unit Ventilator, Ductless Split System, Duct Reheat, Energy Recovery Unit, VAV (Fan Powered - Series), VAV (Fan Powered - Parallel), Blower Coil, AHU (Constant Volume)	Space Air Relative Humidity
Low Return Airflow	Return Airflow is below Return Airflow Setpoint by 25% or more.	AHU, Heat Pump, Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series), Packaged Rooftop Unit.	Return Airflow Return Airflow Checkpoint Occupancy Command
Low Return CO2 Levels	Return CO2 levels are below ambient CO2 levels.	AHU (Variable Volume), Packaged Rooftop Unit, AHU (Constant Volume), Energy Recovery Unit, AHU (Generic)	Return Air CO2
Low Space CO2 Levels	Space CO2 levels are below ambient CO2 levels.	VAV (Generic), AHU (Variable Volume), Exhaust Fan, AHU (Constant Volume), AHU (Generic), Fan Coil, VAV (Fan Powered - Parallel), Packaged Rooftop Unit, VAV (Fan Powered - Series), VAV (Reheat), VAV (Cooling Only), VAV (Dual Duct), Energy Recovery Unit	Space Air CO2

Rule Name	Description	Equipment/System Types	Required Sensor Types
Low Space Temperature Occupied Heating Setpoint	Space temperature is below the occupied heating set point by 3°F or more.	Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series), Packaged Rooftop Unit.	Space Temperature Occupancy Command Occupied Heating Setpoint
Low Space Temperature Single Setpoint	Space temperature is below the active/effective setpoint by 3°F or more.	Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series), Packaged Rooftop Unit.	Space Temperature Occupancy Command Space Temperature Setpoint
Low Space Temperature Unoccupied Setpoint	Space temperature is below the unoccupied setpoint by 3°F or more.	Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series), Packaged Rooftop Unit.	Space Temperature Occupancy Command Space Temperature Setpoint
Low Supply Airflow	Supply Airflow is below Supply Airflow Setpoint by 25% or more.	AHU, Heat Pump, Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series),	Supply Airflow Supply Airflow Checkpoint Occupancy Command

Rule Name	Description	Equipment/System Types	Required Sensor Types
Modulating Heating without Discharge Air Temperature Setpoint, Low Discharge Air Temperature	Heating Command is 50% or more and the discharge air temperature is less than 15°F above the space temperature.	VAV (Dual Duct), AHU (Constant Volume), AHU (Generic), Ductless Split System, VAV (Generic), Packaged Rooftop Unit, VAV (Reheat), VAV (Cooling Only), Unit Ventilator, AHU (Variable Volume), VAV (Fan Powered - Series), Water Source Heat Pump, Unit Heater, VAV (Fan Powered - Parallel), Fan Coil, Blower Coil, Duct Reheat, Energy Recovery Unit	Supply Air Temperature Space Air Temperature Supply Valve Position Command Occupancy Command
Occupied Cooling Set Point Out of Range		VAV	
Occupied Cooling Setpoint Too High	The occupied cooling setpoint is above the recommended value of 76°F	Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series), Packaged Rooftop Unit.	Occupied Cooling Setpoint
Occupied Cooling Setpoint Too Low	The occupied cooling setpoint is below the recommended value of 72°F	Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series), Packaged Rooftop Unit.	Occupied Cooling Setpoint
Occupied Heating Set Point Out of Range		VAV	

Rule Name	Description	Equipment/System Types	Required Sensor Types
Occupied Heating Setpoint Too High	The occupied heating setpoint is above the recommended value of 72°F	Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series), Packaged Rooftop Unit.	Occupied Heating Setpoint
Occupied Heating Setpoint Too Low	The occupied heating setpoint is below the recommended value of 68°F	Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series), Packaged Rooftop Unit.	Occupied Heating Setpoint
Return CO2 is above ASHRAE guideline	Return CO2 levels are above the CO2 guidelines set by ASHRAE	AHU (Generic), Packaged Rooftop Unit, AHU (Variable Volume), Energy Recovery Unit, AHU (Constant Volume)	Return Air CO2
Space CO2 is above ASHRAE guideline	Reading for space CO2 levels is above the space CO2 setpoint	VAV (Generic), Packaged Rooftop Unit, AHU (Constant Volume), Energy Recovery Unit, AHU (Generic), Fan Coil, VAV (Dual Duct), VAV (Fan Powered - Series), VAV (Cooling Only), Exhaust Fan, AHU (Variable Volume), VAV (Fan Powered - Parallel), VAV (Reheat)	Space Air CO2

Rule Name	Description	Equipment/System Types	Required Sensor Types
Supply Air Temperature Reset Failure	The supply air temperature setpoint is constant over a 24-hour period, indicating no supply air temperature reset.	AHU (VAV)	Supply Air Temperature Setpoint Min for 1 hour, Supply Air Temperature Setpoint Max for 1 hour
Supply Water Temperature Reset Failure	Supply Water temperature setpoint is constant over a 24-hour period, indicating no supply Water temperature reset.	Chilled Water, Hot Water, Domestic Hot Water	Supply Water Temperature Setpoint Min for 1 hour, Supply Water Temperature Setpoint Max for 1 hour
System High Differential Pressure	The differential pressure in the system exceeds the setpoint by 20%	Chilled Water, Hot Water	differential water pressure, differential water pressure setpoint
System Low Differential Pressure	The differential pressure in the system is less than the setpoint by 20%	Chilled Water, Hot Water	differential water pressure, differential water pressure setpoint
Unoccupied Cooling Set Point Out of Range		VAV	
Unoccupied Cooling Setpoint Too High	The unoccupied cooling setpoint is above the recommended value of 82°F	Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series), Packaged Rooftop Unit.	Unoccupied Cooling Setpoint

Rule Name	Description	Equipment/System Types	Required Sensor Types
Unoccupied Cooling Setpoint Too Low	The unoccupied cooling setpoint is below the recommended value of 82°F	Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series), Packaged Rooftop Unit.	Unoccupied Cooling Setpoint
Unoccupied Heating Set Point Out of Range		VAV	
Unoccupied Heating Setpoint Too high	The unoccupied heating setpoint is above the recommended value of 65°F	Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series), Packaged Rooftop Unit.	Unoccupied Heating Setpoint
Unoccupied Heating Setpoint Too Low	The unoccupied heating setpoint is below the recommended value of 55°F	Ductless Split System, Water Source Heat Pump, Blower Coil, Fan Coil, Unit Ventilator, Unit Heater, VAV (Dual Duct), VAV (Parallel), VAV (Series), VAV (Fan Powered - Parallel), VAV (Fan Powered - Series), Packaged Rooftop Unit.	Unoccupied Heating Setpoint
Valve Actuator Problem - Cooling	Opening the cooling valve is not cooling, indicating that the valve is either not moving properly or a clogged strainer.	Chilled Water	Supply Water Temp Delta over last hour, Supply Valve Position Command Delta over last hour

Rule Name	Description	Equipment/System Types	Required Sensor Types
Valve Actuator Problem - Heating	Opening the heating valve is not heating, indicating that the valve is not moving properly or a clogged strainer.	Hot Water	Supply Water Temp Delta over last hour, Supply Valve Position Command Delta over last hour
VAV Parallel Fan Failure (Control Failure)	Fan status is off when the space temperature is less than the occupied heating setpoint	VAV (Fan Powered - Parallel)	Supply Fan Command Occupancy Command Space Air Temperature Occupied Heating Setpoint Space Air Temperature
VAV Parallel Fan Failure (Low Discharge Air Temperature)	The parallel fan is "ON" but the discharge air temperature is cool.\n	VAV (Fan Powered - Parallel)	Supply Air Temperature Supply Fan Command
VAV Parallel Fan Failure Unoccupied (Control Failure)	Fan status is off when the space temperature is less than the unoccupied heating setpoint.\n\n	VAV (Fan Powered - Parallel)	Supply Fan Command Occupancy Command Space Air Temperature Space Air Temperature Unoccupied Heating Setpoint
Water Differential Pressure Reset Failure	The Water Differential Pressure setpoint is constant over a 24-hour period, indicating no Water Differential Pressure reset.	Chilled Water, Hot Water, Domestic Hot Water	Water Differential Pressure Setpoint Min for 1 hour, Water Differential Pressure Setpoint Max for 1 hour
Water System High Temperature	The supply water temperature in the system exceeds its setpoint by 3 degrees.	Chilled Water, Hot Water, Condenser Water	supply water temp, supply water temp setpoint
Water System Low Temperature	The supply water temperature in the system is below its setpoint by 3 degrees.	Chilled Water, Hot Water, Condenser Water	supply water temp, supply water temp setpoint

Scoring

Scoring provides a simple way to visualize and communicate which equipment and systems are performing better or worse than others. In addition to storing an overall Score, users can now set up a Per Rule Score using the FVO and Scoring tab in Rules to determine what that individual Rule's score is for each equipment or system when the rule executes. This allows you to view the overall score for a piece of equipment or system as well as a per rule score for that equipment.

Overall Scores

With Building Optimization Broker's default scoring, each equipment or system starts with a score of 100%. As rules are evaluated, that score is decremented based on the priority of faults occurring on a piece of equipment or system. Low Priority faults impact an equipment or system's score less than a Medium or High Priority fault. See Creating a Custom Rule (page 103) or Modifying a K2A Rule (page 101) for information on setting priority for your Rules.

Here is a breakdown of how rule faults impact an equipment or system's score on their respective dashboard:

Fault Priority	Per Fault Decrement	Maximum Decrement
Low	5%	25%
Medium	15%	50%
High	50%	100%

Decrements are additive, however, there is a maximum value that Low and Medium faults can impact an equipment or system score.

Sample score calculations:

- Chiller with a single Low Priority fault: 95%.
- Chiller with a Low Priority fault and a High Priority fault: 45%.
- Chiller with two High Priority faults: 0%.

Custom Rule Scoring

When creating a custom rule score, when you are creating/editing a rule, select the Scoring tab to use the Formula Value Output from the Formula tab to create scoring criteria. Each Rule will have the ability to impact score or not. With custom rule scoring, you are setting the values for the 0 score and the 100 score. As the formula moves between the 0 score value and the 100 score value, the rule score will be calculated proportionally. This allows you to view the overall score for a piece of equipment or system as well as a per rule score for that equipment/system. For detailed steps, see Creating a Custom Rule (page 103) or Modifying a K2A Rule (page 101).

Example 1: On the Scoring tab, I select a value of 70 degrees for a 0 score for the rule. I also select a value of 75 degrees for a 100 score for the rule. The Rule will then calculate a 0-100% score for itself as well as a decrement for the Overall

score. If the temperature setpoint is 75 degrees, the score is 100%. Each fault decrement is 20% as there is a difference of 5 degrees for this example. If the temperature is 72.5 degrees, the score is 50%.

Example 2: On the Scoring tab, I select a value of 80 degrees for a 0 score for the rule. I also select a value of 75 degrees for a 100 score for the rule. The Rule will then calculate a 0-100% score for itself as well as a decrement for the Overall score. If the temperature setpoint is 75 degrees, the score is 100%. Each fault decrement is 20% as there is a difference of 5 degrees. If the temperature is 76.5 degrees, the score is 50%.

Example 1: Decreasing Temperatures			**Example 2: Increasing Temperatures**	
Score	**Value**		**Score**	**Value**
100	75		100	75
80	74		80	76
60	73		60	77
40	72		40	78
20	71		20	79
0	70		0	80
50	72.5		50	76.5

On the Dashboard, on the Equipment and/or System Dashboard, you can view the Per Rule Scoring on the line chart.

- In Reporting, as you drill into your equipment and systems you will see scoring information about each rule that is configured for that equipment or system.

Architect

Architect is focused on mapping device objects from the BAS Agents (configured in IoT Hub) to the Semantic Data Model and is used throughout Building Optimization Broker.

The Semantic Data Model includes clients, client contacts, campuses, sites, systems, areas, equipment, sensors, and unit conversions.

Working with Clients in Architect

A Client is representative of your customer.

For information about creating client and/or site contacts, see Working with Contacts (page 77).

Creating a Client

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. From the Architect home screen, at the top of the tree, select the *New Entity* button.
4. Select *Client* from the drop-down menu.
5. Fill in the following required fields:
    - Client Name
    - Business Type
    - Search for Address - Enter the physical rooftop address. We will fill out the remaining address fields.
6. Select *Create*.

For information about creating client and/or site contacts, see Working with Contacts (page 77).

Editing a Client

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. On the Architect home screen, expand Company to display a list of clients.
4. Select the client you'd like to edit.
5. Locate the *Client Action* panel.
6. Select *Edit Client Info.*
7. Edit intended fields.
8. Select *Save.*

For information about creating client and/or site contacts, see Working with Contacts (page 77).

Deleting a Client

Deleting a client will also permanently deletes any child records associated with the client. This includes sites, systems, equipment, sensors and client/site contacts.

To delete a client:

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. On the Architect home screen, expand Company to display a list of clients.
4. Select the client you'd like to delete.
5. Locate Client Actions
6. Select *Delete Client.*
7. Confirm the deletion by typing *Delete* in the text field provided.
8. Select *Delete.*

Working with Campuses

A campus is a collection of sites.

Creating a Campus

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. From the Architect home screen, at the top of the tree, select the *New Entity* button.
4. Select *Campus* from the drop-down menu.
5. Fill in the following fields:
    - Select Client
    - Campus Name
6. Select *Create.*

Editing a Campus

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. Expand on client on the tree to display a list of campuses.
4. Select the campus you'd like to edit.
5. Locate the *Campus Action* panel.
6. Select *Edit Campus Info.*
7. Edit intended fields.
8. Select *Save*

Deleting a Campus

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. On the Architect home screen, expand Company to display a list of campuses.
4. Select the campus you'd like to delete.
5. Locate *Campus Actions*
6. Select *Delete Campus.*
7. Confirm the deletion by selecting *Delete.*

Adding Sites to a Campus from Campus View

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. On the Architect home screen, expand the Client to view a list of sites.
4. Select the intended site.
5. Locate the *Site Actions* card.

6. Select *Add Sites.*
7. Select which sites you'd like to add.
8. Select *Add.*

Working with Sites in Architect

A site is used to represent a physical building. A site belongs to a client.

Creating a Site

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. From the Architect home screen, at the top of the tree, select the *New Entity* button.
4. Select *Site* from the menu.
5. Fill in the following required, unless indicated, fields:
    - **Client**: Select the client.
    - **Site Name**: Enter the unique site name.
    - **Building Type**: Select the type of building.
    - **Area Unit of Measure**
        - **Square Feet**: Provide the square footage of the site.
        - **Square Meter**: Provide the square meterage of the site.
    - **Fuel Types** (optional): Select one or more fuel types.
    - **Energy/Facilities/Sales Contact** (optional): Select the contact for each field.
    - **Search for Address**: Enter the physical address and select the correct address from the displayed options. The additional address fields will automatically populate.
    - **Time Zone**: Select the time zone where the site is located.
6. Select *Create.*

Editing a Site

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. On the Architect home screen, expand the Client to view a list of sites.
4. Select the intended site.
5. Locate the *Site Actions* card.
6. Select *Edit Site Info.*
7. Update the intended fields.
8. Select *Save.*

Deleting a Site

> Deleting a site will also permanently delete any systems, areas, equipment, and sensors that are children of the site.

To delete a site:

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. On the Architect home screen, expand the Client to view a list of sites.

4. Select the intended site.
5. Locate the *Site Actions* card.
6. Select *Delete Site.*
7. Confirm the deletion by typing *Delete*.
8. Select *Delete.*

Associating Equipment with a Site

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. On the Architect home screen, expand the client to view a list of sites.
4. Select the intended site.
5. Locate the *Site Actions* card.
6. Select *Create New Equipment*.
7. Fill in the following fields:
    - **Select Client**
    - **Select a Site** (this will be filtered by the client selected above)
    - **Equipment Name**
    - **Equipment Type**
    - **Select a Manufacturer** optional
    - **Model Number** optional
    - **Serial Number** optional
8. Select *Create.*

Adding Sites to a Campus from Sites View

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. On the Architect home screen, expand the client to view a list of sites.
4. Select the intended site.
5. Locate the *Site Actions* card.
6. Select *Add Site to Campus.*
7. Select the campus you'd like to add the sites to.
8. Select *Add.*

Working with Weather

A weather entity is automatically created when you create a site based on the zip code for that site. If changes to the site address are made, the weather entity updates automatically to the new zip code.

Working with Systems in Architect

A system is a collection of equipment that works in unison to serve a purpose. Equipment can be tied to one or many systems.

Creating a System

1. Select the **App Drawer** icon.

2. Select **Architect**.
3. From the Architect home screen, at the top of the tree, select the *New Entity* button.
4. Fill in the following required fields:
    - **Select Client**
    - **Select Site**
    - **System Name**
    - **System Type**
5. Select *Create.*

Editing a System

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. On the Architect home screen, expand the client to view a list of systems.
4. Select the intended system.
5. Locate the *System Actions* card.
6. Select *Edit System Info.*
7. Update the intended fields.
8. Select *Save.*

Deleting a System

> Deleting a system will also delete any sensors that are children of the system.

To delete a system:

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. On the Architect home screen, expand the Client to view a list of systems.
4. Select the intended system.
5. Locate the *System Actions* card.
6. Select *Delete System.*
7. Confirm the deletion by typing *Delete*.
8. Select *Delete.*

Associating Equipment with a System

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. On the Architect home screen, expand the client to view a list of systems.
4. Select the intended system.
5. Locate the *Site Actions* card.
6. Select *Create New Equipment*.
7. Fill in the following fields:
    - **Select Client**
    - **Select a Site** (this will be filtered by the client selected above)
    - **Equipment Name**
    - **Equipment Type**
    - **Select a Manufacturer** optional
    - **Model Number** optional

- **Serial Number** optional

8. Select *Create.*

System Modeling Guide

The purpose of this guide is to help understand modeling strategies on some common system types. Since similarly named sensor types can exist both within a system and the equipment within that system, it is helpful to distinguish the differences in the application of each. For each system type, we will define the system sensors as well as the equipment for that system. We will further break down the sensors for each equipment and how they may differ from the system sensors if similarly named. For more details on individual sensor types, see the Sensor Type Guide (page 151).

Chilled Water System

Chilled water systems typically link together all the pumps, chillers, and associated sensors in the loop dedicated to delivering chilled water throughout a building. Note this is discrete from a Condenser Water System which will be covered later in this guide.

System Sensors

Supply - The supply sensor types will be used to denote a sensor that is independent of any individual equipment like a chiller, but rather the supply portion of the loop as a whole. Supply water is used only in the absence of primary and secondary chilled water loops.

- Supply Water
- Supply Valve

Return - The return sensor types will be used to denote a sensor that is independent of any individual equipment like a chiller, but rather the return portion of the loop as a whole. Return water is used only in the absence of primary and secondary chilled water loops.

- Return Water

Primary/Secondary - Primary and Secondary distinction can be added to both supply and return in the presence of a secondary loop and clarifies that this is the supply of the primary loop. These are often used in applications where a primary loop can maintain a constant pump speed and the secondary loop modulates speed to control flow.

- Primary Supply Water
- Primary Supply Valve
- Primary Return Water
- Secondary Supply Water
- Secondary Supply Valve
- Secondary Return Water

Chiller

Supply - The supply of the chiller is the water that is being supplied out to the loop. This can be discrete from the system supply which is the combination of the supplies from all chillers in the loop.

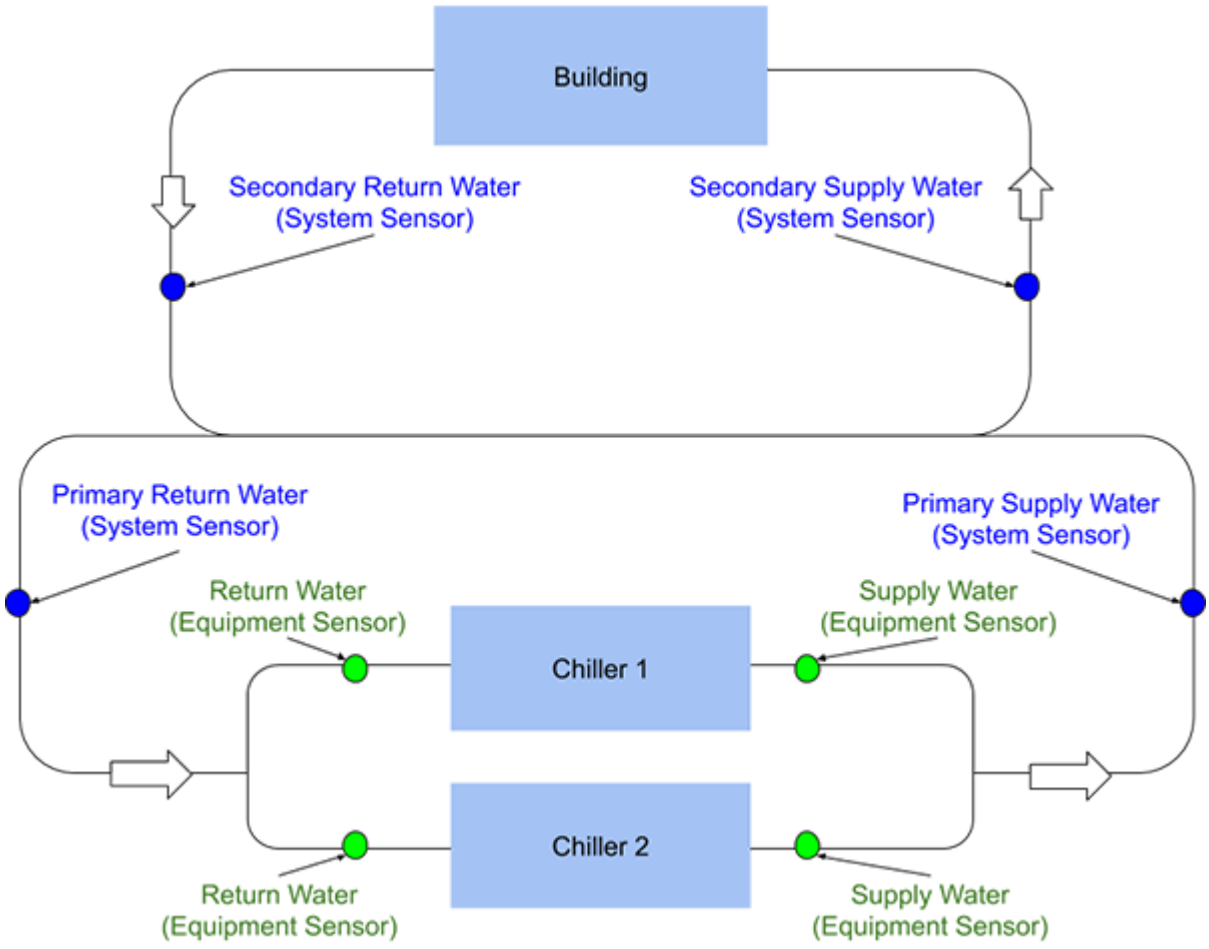
- Supply Water

Return - The return of the chiller is the water that is being returned to an individual chiller from the loop. This can be discrete from the system return, though it often has very similar readings.

- Return Water

Diagram

Below is a visual guide on where sensor placement would be in the loop and how they would be assigned to equipment or the system as a whole. System sensors are highlighted blue, and equipment sensors highlighted green.



VAV System

A VAV System links together the AHU and VAVs that work together to control temperature within associated spaces.

System Sensors

Generally, there are few true dedicated "system sensors" and most of the sensors are simply sourced from the AHU or VAVs associated. One caveat to how the sensors are set up is the relationship between "Supply Air" from the AHU and the "Source Air" to the VAV. These are effectively the same data point, and are typically modeled at the AHU. Relationship to the VAV can then be utilized as part of the system.

Equipment Sensors

Supply - The supply of the AHU is the air that is being delivered to a served space. In many applications, this may also be referred to as "Discharge".

- Supply Air
- Supply Fan

Return - The return of the AHU is the air that is being brought back to the unit from the served space.

- Return Air
- Return Fan

Exhaust - The exhaust of the AHU is the air that is being exhausted outside from within the served space to depressurize or allow for fresh air intake.

- Exhaust Air
- Exhaust Fan
- Exhaust Damper

Makeup - The makeup of the AHU is the outside air inlet source to add fresh air, make up for the air lost through exhaust, or to repressurize the space.

- Makeup Air
- Makeup Damper
- Makeup Fan

VAV

Supply - The supply of the VAV is the air that is being delivered to a served space. In many applications, this may also be referred to as "Discharge".

- Supply Air
- Supply Fan

Working with Areas

An area represents a sub-section of a site. Areas are used to identify important sections of a site. A default area is always created on site creation to represent the entire site. The default area cannot be modified. Equipment can be tied to one or more areas, as needed.

Creating an Area

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. Select the *New Entity* button.
4. Select *Area* from the drop-down menu.
5. Fill in the following fields:
    - **Client**: Select the client.
    - **Site Name**: Select the site.
    - **Name**: Enter the unique name for the area.
    - **Area Unit of Measure:** A quantity used as a standard of measurement.
        - **Square Feet**: Provide the square footage of the site.
        - **Square Meter**: Provide the square meterage of the site.
6. Select *Create.*

Adding Equipment to an Area

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. Expand a client to display a list of sites.
4. Expand the site to display a list of areas
5. Select the area to which you'd like to add equipment.
6. Locate the *Area Actions* panel.
7. Select *Add Equipment associated with Area.*
8. Select the equipment that serves this area.
9. Select *Add.*

Editing an Area

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. On the Architect home screen, expand the client to view a list of areas.
4. Select the intended area.
5. Locate the *Area Actions* card.
6. Select *Edit Area Info.*
7. Update the intended fields.
8. Select *Save*

Deleting an Area

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. Select the intended area.
4. Locate the *Area Actions* panel.
5. Select *Delete.*
6. Select *Delete* to confirm.

Working with Equipment in Architect

Equipment represents an asset at a site. Equipment can serve any number of areas and be associated with any number of systems.

Creating Equipment

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. Select the *New Entity* button.
4. Select *Equipment* from the drop-down menu.
5. Fill in the following fields:
    - **Select Client**
    - **Select a Site** (this will be filtered by the client selected above)
    - **Equipment Name**
    - **Equipment Type**
    - **Select a Manufacturer** optional
    - **Model Number** optional
    - **Serial Number** optional
6. Select *Create.*

Editing Equipment

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. Select the **Equipment**.
4. Locate the Equipment *Actions* card.
5. Select *Edit Equipment Info.*
6. Update the intended fields.
7. Select *Save.*

Deleting Equipment

> Deleting equipment will also delete the sensors listed under the equipment.

To delete equipment:

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. Select the **Equipment** you want to delete.
4. Locate the *Equipment Actions* card.
5. Select *Delete Equipment.*
6. Confirm the deletion by selecting *Delete* on the pop-up window.

Working with Sensors in Architect

A sensor is an entity representing a value that changes over time and always has a parent entity such as equipment or system. A sensor points back to a single device object.

Creating a Sensor

Sensors can be created for equipment or systems.

Creating a Sensor for Equipment

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. From the Architect home screen, select to expand a **Client** that holds the site you'd like to use to select equipment for adding a sensor.
4. Select the **Equipment** you'd like to add a sensor.
5. Under Equipment Actions, select *Add Sensor to Equipment.*
6. Fill in the following fields:
    - **Sensor Name**
    - **Select an Agent**
    - **Select a Device**
    - **Select a Device Object**[1,2]
    - **Select a Sensor Type**
7. Select *Create.*

Creating a Sensor for a System

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. From the Architect home screen, select to expand a client that holds the site you'd like to use to select a system for adding a sensor.
4. Select the system you'd like to add a sensor to.
5. Under System Actions select *Add Sensor to System.*
6. Fill in the following fields:
    - **Sensor Name**
    - **Select an Agent**
    - **Select a Device**
    - **Select a Device Object**[1,2]
    - **Select a Sensor Type**
7. Select *Create.*

⚠
1. Only one object can be linked to a sensor at a time.
2. Data type is controlled by the data type of the device object set up in IoT Hub.

Editing a Sensor

1. Select the **App Drawer icon**.
2. Select **Architect**.
3. On the Architect home screen, expand **Sites** to display a list of equipment.
4. Select the **Equipment** in which your sensor is located.
5. Locate the *Sensors* table.
6. Select the ellipsis icon.
7. Select *Edit Sensor* from the drop-down menu.
8. Edit the intended fields.
9. Select *Save*

Previewing Sensor Data

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. On the Architect home screen, expand **Sites** to display a list of equipment.
4. Select the **Equipment** in which your sensor is located.
5. Locate the *Sensors* table.
6. Select the ellipsis icon.
7. Select *Preview Data*.
8. The previous 4 hours of raw and display value data are displayed in 15-minute increments.
9. You can edit the **Start Time** and **End Time** to view additional information.
10. If no information is available, "No Data" displays.

Deleting a Sensor

Deleting a sensor will unlink it from the object, but the object will still retain any time-series data.

To delete a sensor:

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. On the Architect home screen, expand sites to display a list of equipment.
4. Select the equipment from which you'd like to delete a sensor.
5. Locate the *Sensors* table.
6. Select the ellipsis icon.
7. Select *Delete Sensor*.
8. To confirm the deletion, type *DELETE* in the text field provided.
9. Select *Confirm.*

Working with Unit Conversions

There are times when the Units used for the measurement, do not match the measurement standards for certain processes and applications. Converting such units to an extent that it can be applied properly is important.

Example Conversions

- Integer to Boolean
- String to Boolean
- Singlefloat to Boolean
- Integer to Integer
- Boolean to Boolean
- Boolean to Integer

Creating a Unit Conversion

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. From the Architect home screen, at the top of the tree, select the *New Entity* button.
4. Select *Unit Conversion* from the drop-down menu.
5. Fill in the following fields:
    - **Conversion Name**
    - **Raw Data Type**
    - **Display Data Type**
    - **Condition**- Select *Add Condition* if more conditions are necessary
    - **Result**
6. Select *Save.*

Editing a Unit Conversion

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. Select the *Unit Conversion* Icon from the left sidebar.
4. Select the **Unit Conversion** you'd like to edit.
5. Edit the intended fields.
6. Select *Save Conversion.*
7. Confirm these changes by selecting *Save.*

Deleting a Unit Conversion

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. Select the **Unit Conversion** icon from the left sidebar.
4. Select the **Unit Conversion** you want to delete.
5. Select *Delete* located in the right corner.
6. To confirm the deletion, type *DELETE.*
7. Select *Delete.*

Deleting a Unit Conversion will affect all Sensors that are using the Conversion. The Sensors will revert back to their Raw Data Types. This may impact the ability of Rules to produce faults.

Sensor Type Guide

The following is a breakdown of the different terms that can be found within the sensor type names and what they mean in our schema. These are broken down categorically by what the words describe, with a brief summary of each category. These categories are defined starting with the data types and expanding outward to all terms that can qualify and describe the data.

Data Type

These are terms that define the specific data relative to the control or monitoring system. They describe "how" we handle the data of the sensor types.

- **Command** - A binary or analog output intended to cause a specific action in the controlled elements.
- **Max Command** - An analog value intended to limit the maximum possible "Command" output.
- **Min Command** - An analog value intended to limit the minimum possible "Command" output.
- **Command Enum** - An multi-state command intended to cause one of a subset of specifically stated in the controlled entities.
- **Deadband** - An analog value that defines a buffer between two mutually exclusive states.
- **Enable** - A boolean value that is intended to indicate whether a controlled element will be allowed to become active.
- **Max Setpoint** - An analog value intended to limit the maximum possible "setpoint".
- **Min Setpoint** - An analog value intended to limit the minimum possible "setpoint".
- **Off Setpoint** - An analog value intended to indicate at what sensed value a particular state will be turned off.
- **On Setpoint** - An analog value intended to indicate at what sensed value a particular state will be turned on.
- **Value** - An analog input or calculated value representative of a physical measurement. Is excluded from the actual sensor name.
- **Setpoint** - An analog value that describes the desired value for a given "Reading" to which the system will drive some "Command".
- **Deviation** - An analog value that represents the difference between a controlled value and its target setpoint.
- **Status** - A boolean input that conveys the state a system, equipment, or component is currently in. Typically, associated with on/off.
- **Status Enum** - An enumerated input that conveys the state a system, equipment, or component is currently in.
- **Text** - A text value.

Limits

These terms describe limits that are placed on the system values.

- **High Limit** - The maximum allowable value for a controlled value prior to some kind of fault or alarm.
- **Low Limit** - The minimum allowable value for a controlled value prior to some kind of fault or alarm.
- **Max** - The highest input value for a configured value.

- **Min** - The lowest input value for a configured value.

Occupancy Status

These are terms that define the occupational and/or operational state of certain areas, equipment, and/or systems. It is the "when" of the physical aspects of the sensor types.

- **Occupied** - The areas served are recognized as having occupancy. This often correlates to an active state with the highest level of control.
- **Unoccupied** - The areas served are recognized as not having occupancy. This often correlates to an inactive state with the lowest or no level of control.
- **Standby** - The areas served are recognized as temporarily not having occupancy. This often correlates to an active state, but with a less precise level of control than the occupied state.

Control Variable

These are terms that define the specific information being monitored or controlled. This is the "what" of the stored information for the sensor type.

- **Alarm** - Indication of some kind of problem.
- **Capacity** - The amount that something can or is producing.
- **CO** - Carbon Monoxide gas level.
- **CO2** - Carbon dioxide gas level.
- **Communication** - Where or not something is in active communication with a control or monitoring system.
- **Current** - The current reading of an electrical system.
- **Dewpoint** - The temperature at which water will condense from the air, Typically, calculated from relative humidity and dry bulb temperature.
- **Energy** - The amount of energy being used, typically associated with a utility.
- **Enthalpy** - The amount of total heat energy in a system. Typically, used for comparisons of outside and return air sources to make economizing decisions.
- **Flow** - The rate at which some medium is moving.
- **Frequency** - The rate of oscillation of an alternating current.
- **Horsepower** - The horsepower of a motor.
- **Level** - The level of some medium relative to a container.
- **Load** - The calculated demand for some action. Typically, used in PID calculations for heating or cooling.
- **Methane** - The measured concentration of methane in the air.
- **Mode** - The state to which something operates. Typically, is described by heating or cooling as well as any number of other equipment or system-specific modes.
- **Motion Sensor** - The detection of movement within a space.
- **Scheduled Occupancy** - The state of whether a particular space is treated as occupied based upon a schedule.
- **Occupancy** - The state of whether something is treated as having occupancy.
- **Occupancy Sensor** - Whether occupancy is physically detected in a given space.
- **Open** - The boolean state of whether something is open. Typically, related to a valve, damper, or other physical control component.
- **O2** - Oxygen levels in a gas.
- **PM2.5** - The concentration of particulate matter less than 2.5 micrograms. Used in indoor air quality.
- **Position** - The physical analog position of something. Typically, related to a value, damper, or other component.
- **Power** - The rate at which electrical energy is transferred by a circuit.
- **Power Factor** - The ratio of real power absorbed by the load relative to the apparent power flowing in the circuit.
- **Pressure** - The force applied perpendicular to the surface of an object per unit of area.
- **Relative Humidity** - The amount of moisture in the air relative to how much moisture the air can hold at the given temperature and pressure.

- **Resistance** - Opposition to the flow of electricity.
- **RPM** - Revolutions per minute.
- **Run** - Boolean state of operation.
- **Runtime** - The accumulated time something has run.
- **Speed** - The speed at which something operates. Typically, in % relative to a motor.
- **Starts - Hourly** - The number of times an equipment or component has started per hour.
- **Starts - Daily** - The number of times an equipment or component has started per day.
- **Starts - Total** - The number of times an equipment or component has started of all detected instances.
- **Subcooling** - The deficit of temperature of a liquid below its temperature of saturation.
- **Superheat** - The excess of temperature of a vapor above its temperature of saturation.
- **Switch** - A binary status selector.
- **Temperature** - The dry bulb temperature without regard to humidity.
- **Time** - The amount of time something will or has happened.
- **Total Dissolved Solids** - Measurement of substances present in water loops. Typically, used relative to open water loops.
- **Total Volatile Organic Compounds (TVOC)** - The concentration of TVOC in the air. Used in indoor air quality.
- **Usage** - The quantity used of some kind of medium, Typically, a utility.
- **Voltage** - The electric potential between two points.
- **Wet bulb** - The wet bulb temperature of air. Typically, used to evaluate evaporative cooling functions.

Components

These terms describe the physical components that comprise the equipment and systems. These are typically serving some mechanical function. These add context to the "what" and "where" of the sensor types we define.

- **Coil** - A coil used to transfer energy, Typically, in the form of heat.
- **Compressor** - Compresses a medium, Typically, air or refrigerant.
- **Condenser** - Describes the sensors relative to the condenser portion of a refrigerant cycle.
- **Damper** - Controls the flow of air.
- **Economizer** - Describes the sensors and states relative to the preferential use of outside air over return air to reduce energy usage.
- **Evaporator** - Describes the sensors relative to the evaporator portion of a refrigerant cycle.
- **Door** - Encloses a space. Can be used as a measure of usage.
- **Drain Pan** - Collects moisture for a component or system, Typically, relevant to cooling applications where condensation or water flow may be present.
- **Fan** - Causes air flow.
- **Filter** - Cleans contaminants from a given medium.
- **Freezestat** - A special sensor used to indicate a risk of frozen components. Typically, leads to a physical equipment shutdown when tripped as part of a safety circuit.
- **Heater** - A component that heats a given medium.
- **Humidifier** - Introduces humidity to a space to maintain appropriate levels.
- **Phase Monitor** - Detects whether 3 phases of power are present for certain equipment that require it.
- **Pre-Filter** - Filter before the main filter, Typically, used in outside source applications.
- **Pump** - Causes the flow of a fluid medium, Typically, water.
- **Smoke Detector** - Detects the presence of smoke.
- **Stage** - The condition of a component that can have multiple stages. Typically, use in heating components.
- **Valve** - Controls the flow of a fluid medium, Typically, water.
- **Wheel** - A rotational component. Typically, we use in the context of heat recovery.

Medium

These terms describe the physical medium being measured and/or qualifying the types of components which we're detecting. These add context to the "what" of the sensor types we define.

- **Air** - Both used in terms of the atmosphere of given spaces and a medium to transfer heat for HVAC purposes.
- **Compressed Air** - Typically, used in older control systems and for certain mechanical applications.
- **Electric** - Used in any electrical component as well as utilities both from a usage and control standpoint.
- **Fuel** - Fuel sources that are Typically, measured by storage or usage.
- **Hot Gas** - The refrigerant in the portion of the cycle where it had picked up heat at the evaporator and is in a gaseous form. Typically, used in naming sensors related to hot gas bypass.
- **Ice** - Ice used Typically, in cooling storage.
- **Light** - The level of light detected. Can be indoor or outdoor.
- **Natural Gas** - Utility source, Typically, used in heating applications.
- **Oil** - Typically, used in refrigeration cycles.
- **Product** - Can be critical to certain retail and food service applications.
- **Refrigerant** - The medium by which heat is transferred in refrigeration systems.
- **Steam** - Typically, used in high temperature heating applications.
- **Water** - Can be consumed as a utility or utilized as a means to transfer heat for heating and cooling systems.

Position

These are terms that describe the relative position of a particular component, medium, or sensor to the equipment or system under which it is modeled. It is the physical "where" of the sensor types.

- **Bypass** - The part of a system or equipment that is meant to bypass some other element, usually relates to a valve or damper.
- **Return** - The part of a system or equipment that is returning some medium from a served entity in a loop (usually a space or equipment).
- **Supply** - The part of a system or equipment that is supplying some medium out to a served entity in a loop (usually a space or equipment).
- **Differential**- The difference between supply and return or entering and leaving readings. Typically, used in defining pressure differentials in a water loop.
- **Mixed** - The part of a system or equipment where two different medium sources are mixed. Typically, used for air within an AHU.
- **Entering** - The medium that is coming into a component in a closed loop such as a refrigerant cycle.
- **Leaving** - The medium that is leaving a component in a closed loop such as a refrigerant cycle.
- **Parallel** - Typically, refers to the plenum air source to a parallel VAV box. This source runs "parallel" to the primary air source and is used as a source of heating.
- **Saturated** - The refrigerant that is within a condenser or evaporator and changing its state.
- **Site** - Anything relative to the site as a whole such as pressure or utility usage.
- **Space** - Anything relative to a specific area within the site.
- **Outside** - From outside the site, Typically, used to describe air.

Purpose

These are terms that define the physical purpose a particular component, medium, or sensor is used in our equipment or systems. It is the physical "why" of the sensor types.

- **Cool Down** - Describes the sensors and states relative to a cool down function, allowing equipment or areas to cool down.
- **Cooling** - Describes the sensors and states intended to cool a particular medium.

- **Daytime Warmup** - Describes the sensors and states intended to warm spaces in a VAV system during normal operation.
- **Defrost** - Describes the sensors and states intended to remove frost from a refrigeration coil.
- **Dehumidification** - Describes the sensors and states intended to remove moisture from the air.
- **Design** - Describes the sensors that are input according to design specifications. Usually a manual input.
- **Dual Temp** - Describes the sensors relative to a coil that can provide either heating or cooling depending on mode.
- **Exhaust** - Describes the sensors that remove some medium out of the system.
- **Expansion** - Describes the sensors and states relative to expansion of some medium, Typically, refrigerant.
- **Free Cooling** - Describes the sensors and states relative to the usage of sufficiently cool outside air instead of mechanical cooling.
- **Heat Recovery** - Describes the sensors and states relative to the recovery of heat from exhaust to supply of a particular medium.
- **Heating** - Describes the sensors and states intended to heat a particular medium.
- **Isolation** - Describes the sensors and states relative to the isolation of a particular entity.
- **Makeup** - Describes the sensors relative to recovery of a medium from an outside source, usually to balance that which is exhausted or used.
- **Mechanical Cooling** - Describes the sensors and states relative to the usage of mechanical refrigeration as a means to cool.
- **Morning Warmup** - Describes the sensors and states intended to warm spaces in a VAV system during initial startup.
- **Night Purge** - Describes the sensors and states relative to the use of cool nighttime air to pre-cool a space prior to initial startup.
- **Optimal Start** - Describes the sensors and states relative to the use of a system or equipment start prior to typical scheduling in order to meet a target condition by a target time.
- **Optimal Stop** - Describes the sensors and states relative to the use of a system or equipment stop prior to typical scheduling in order to save energy.
- **Preheat** - Describes the sensors and states relative to heating an air source, Typically, to prevent freezing.
- **Recirculation** - Describes the sensors and states relative to a safety mechanism to recirculate a medium, Typically, to prevent freezing.
- **Reversing** - Describes the sensors and states relative to the reversal of some system of flow, Typically, refrigerant in a heat pump system.
- **Safety** - Describes sensors relative to something generally safety-related, Typically, like a safety switch in a circuit.
- **Terminal** - Describes the sensors calculated at a terminal unit, Typically, as a function of demand at those units.

Sub-System

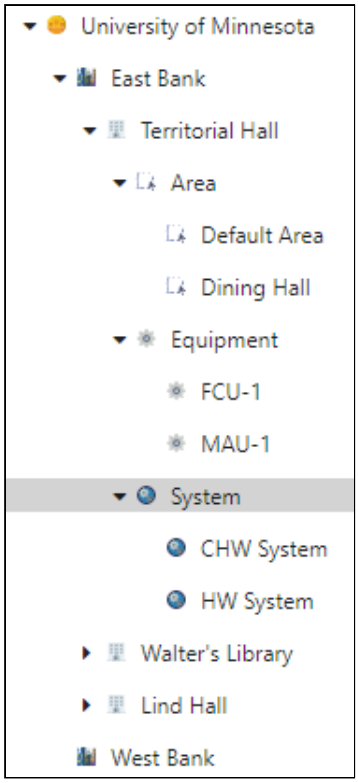
These are terms that describe whether the sensors may exist within a particular defined part of a system. This is independent of the system definitions themselves.

- **Primary** - The first part of a system that supplies a medium to some secondary equipment or system.
- **Secondary** - The part of a system that is itself supplied by a primary system and further conditions or controls the medium before serving it to the final supplied space or equipment.

Architect Examples

Education Example

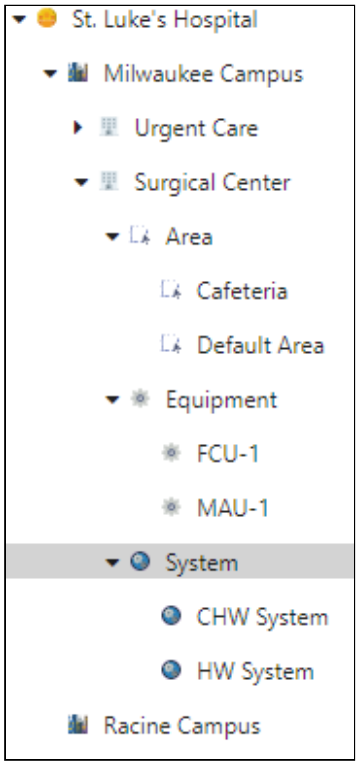
The following demonstrates how to build out an Education Client in Architect. This is what the finished tree looks like after each step is created.



- **Client**: The Client in this example is the University of Minnesota, within a Client of this type (Education- Higher) there are many Campuses and Sites.
- **Campus**: Campuses are logical groupings of Sites. In East Bank, there are three Sites: Territorial Hall, Walter's Library, and Lind Hall.
- **Sites**; Sites are representative of physical buildings. Territorial Hall is a residence/dormitory, Walter's Library is a library, and Lind Hall is a laboratory.
- **Area**: Areas separate a building into sub-sections. In this example, Territorial Hall, which has a building type of residence/dormitory has a Dining Hall in the basement.
- **Equipment**: The Equipment listed under Territorial Hall is the individual Equipment used in the building to heat and cool it.
- **System**: Systems are groups of Equipment that work together to serve a purpose. In this instance, there is a Chilled Water System and Hot Water System in Territorial Hall.

Healthcare Example

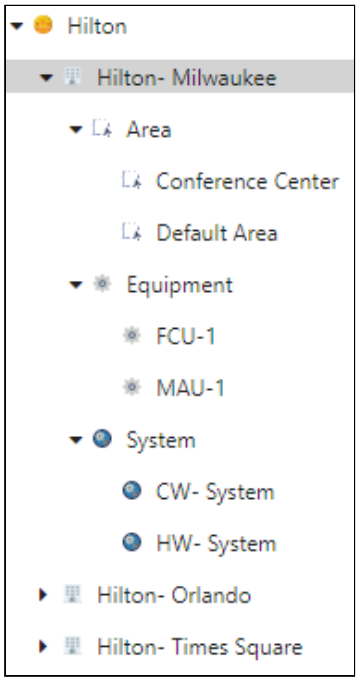
The following is an example of one of the many ways a healthcare Client can be broken into in Architect. This is what the finished tree looks like after each step is created.



- **Client**: The client in this example is St. Luke's, within a client of this type (Healthcare) there are many Campuses and Sites.
- **Campus**: Campuses are logical groupings of sites. In Milwaukee Campus, there are two Sites.
- **Sites**: Sites are representative of physical buildings. Urgent Care is an urgent care/clinic/other and Surgical Center is an ambulatory surgical center.
- **Area**: Areas separate a building into sub-sections. In this example, the surgical center also has a cafeteria in its building.
- **Equipment**: The Equipment listed under Surgical Center is the individual Equipment used in the building to heat and cool it.
- **System**: Systems are groups of Equipment that work together to serve a purpose. The Equipment associated with the hot and cold water system.

Hospitality Example

The following is an example of one of the many ways a hospitality Client can be broken into in Architect. This is what the finished tree looks like after each step is created.



- **Client**: The Client in this example is Hilton, within a Client of this type (Hospitality) there are no Campuses, but many Sites.
- **Sites**: Sites are representative of physical buildings. Hilton-Milwaukee, Hilton-Orlando, Hilton-Times Square are all hotels.
- **Area:** Areas separate a building into sub-sections. In this example, Hilton-Milwaukee also has a conference center.
- **Equipment**: The Equipment listed under Hilton-Milwaukee is the individual Equipment used in the building to heat and cool it.
- **System**: Systems are groups of Equipment that work together to serve a purpose. The Equipment associated with the hot and cold water system.

Using the Architect Wizard

The Architect Wizard is intended to help you map from IoT Hub to Architect as efficiently as possible. This is done by allowing you to map at the Profile level and then create multiple Equipment and Sensors in one step.

After you have created a Site, you can use the Architect Wizard to assist you in mapping Equipment and Sensors en masse.

1. Create your Client. See *Creating a Client* for more information.
2. Create your Site. See *Creating a Site* for more information.
3. Navigate to your Site in Architect.
4. In the **Site Actions** pane, select *Run Architect Wizard*.

Using Workbook Mode

Within the Architect Wizard you can use Workbook Mode to filter the displayed data after you have selected target item (agent and/or profile). The workbook mode is also available on the Create Equipment page.

1. Under each column header, enter or select the filter data and then select the Filter icon to select the filter type. Different data types may have additional field inputs. For example, numeric data types will have an increase/decrease dial, Boolean data types will have a drop-down selection, etc.
2. You can clear any filter by selecting the Clear Filter icon for the appropriate column. This clears the filter data and type.
3. The filtered sensor information displays dynamically as the filters are added/removed. If no records match the filters, the message "No records available" displays.
4. Using Workbook Mode you can also rearrange column headers if you prefer data to display in a different order of columns by dragging and dropping the column headers.

Running the Architect Wizard

Step 1: Select Agent

Select the Agent that contains all of the Devices you'd like to turn into Equipment and Sensors.

1. Use the **Agent** drop-down to select the **Target Agent**.
2. The **Available Profiles** table is populated and displays the Profile Name, Profile Type, and the Device Count.
3. Select *Next*.

Step 2: Select Profile

Select a specific Profile from the Agent selected in Step 1. This Profile will be used to generate a list of Devices for use in Equipment creation later on.

1. Use the **Profile** drop-down to select the **Target Profile**. The Profile selected will be mapped to an Equipment Type and will be used to create Equipment and Sensors.
2. The **Available Profile Objects** table is populated with the associated Profile Objects and displays the Object Name and Object Type.
3. Select *Next*.

Step 3: Configure Equipment

Provide information about the Equipment you'd like to create. This information will be applied to all Equipment in Step 4.

1. To configure the Equipment, complete the following fields:
    - Equipment Type
    - Manufacturer (optional)
    - Model Number (optional)
    - Serial Number (optional)
2. Select *Next*.

Step 4: Create Equipment

View a list of Equipment that will be created as a byproduct of steps 1-3. Each Device that is using the Profile selected in Step 2 for the Agent selected in Step 1 will be displayed on this table.

1. In the Create Equipment window, the Equipment that you have configured displays with the following information:
    - **Name**: Selected in Step 3.
    - **Identifier**: Selected in Step 3.
    - **Profile**: Selected in Step 2.
    - **Equipment Type**: Configured in Step 3.
    - **Existing Equipment**: Optional and is configured with the ellipsis icon to the right of the Equipment. A green checkmark is displayed if you've set this to use existing equipment.
2. Select the ellipsis icon to perform the following actions:
    - **Customize Equipment**: Select this option if you need to make any changes to the Equipment that is listed in the Create Equipment window.

- **Exclude Equipment**: Select to exclude the Equipment from the table. The Equipment displays with a strikethrough.
- **Include Equipment**: Select this to remove the strikethrough. This only displays if you've excluded Equipment.
- **Use Existing Equipment**: Select to select an existing piece of Equipment.

3. Select *Create Equipment*. A message displays that the Equipment was successfully created.

> ⚠ At this point in the Wizard, Equipment has been created. If you want to continue to Sensor creation, move on to Step 5. If you are finished with the Wizard operation, you can select *Exit Architect Wizard*.

Step 5: Map Object Sensors

Map any of the Profile Objects from the Profile selected in Step 2 to Sensors.

> ⚠ You do not need to map every Profile Object to a Sensor in order to move on.

1. To map an object, select the ellipsis icon to the right of the object.
2. Select **Configure Sensor**. (If you need to remove a configuration, select **Clear Sensor**.)
3. In the Configure Sensor window, enter the following:
    - Sensor Type
    - Sensor Name
    - Device Object: Display-only.
    - Raw Data Type: Display-only.

      > ⚠ If the Data Type is Float, you must specify a Unit. If the Data Type is Boolean, String, or Integer, Units are not required.

    - Raw Unit
    - Display Unit
    - Display Data Type
    - Conversion (optional)
4. Select Save to save the mapping for the object.
5. A green checkmark displays to indicate the object is configured.
6. When you are done mapping object sensors, select *Next*.

Step 6: Create Sensors

After you've mapped some Sensors, you're ready to create them. In this step, you will be prompted with a list of Sensors to be created. You should see that the Sensors mapped in Step 5 are now shown under the Equipment created in Step 3.

1. In the Create Sensors window, the Sensor(s) that you have configured displays with the following information:
    - **Name**: Configured in Step 5.
    - **Identifier**: Selected in Step 3.
    - **Profile**: Selected in Step 2
    - **Equipment Type**: Configured in Step 3.
2. Select *Create Sensors*.
    - The Status indicator displays how many Sensors have been created

- Individual Status is shown on the table indicating if a Sensor was created or, if creation failed, why did it fail.

Common Errors:

- This Device Object is Already Bound to a Sensor - This will display if the Device Object is currently bound to another Sensor.

> ⚠ Bulk sensor creation is a background process and may take a few minutes to complete.

Once Sensor creation is completed, the view will display success/failure messages in the table.

Congratulations! You've completed the Architect Wizard.

Working with Technicians

A Technician represents a person who performs work on a Client's Site.

Creating a Technician

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. From the Architect home screen, on the left navigation select the **Technician** icon.
4. Select *New Technician*.
5. Click *Select File* to add a photo of the technician. This photo is used in communication with the Clients.
6. Complete the following fields:
    - **First Name**: Enter the Technician's First Name.
    - **Last Name**: Enter the Technician's Last Name.
    - **Email**: Enter the Technician's Email Address. This email address is used to receive email communications from Building Optimization Broker.
    - **Phone**: Enter the Technician's Phone number. This number is used for sending SMS messages from Building Optimization Broker.
    - **Title**: Enter the Technician's Title.
    - **Seniority Level**: Select the Seniority Level of the Technician.
    - **Specialties**: Select one or more Specialties.
7. Select *Confirm.*

Deactivating a Technician

Deactivating a Technician removes the Technician from the Active list and can no longer be added to a Service Call. You would use this option if the Technician is already assigned to a Service Call and cannot be removed.

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. From the Architect home screen, on the left navigation select the **Technician** icon.
4. To the right of the Technician to be deactivated, select the ellipsis icon.
5. Select *Deactivate Technician*.
6. The Technician no longer displays in the Active Technician list.

You can view a list of Inactive Technicians by selecting *Show Inactive* at the top of the Technician list. This button only displays if there are inactive Technicians.

Activating a Technician

An inactive Technician can be set back to active.

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. From the Architect home screen, on the left navigation select the **Technician** icon.
4. Select *Show Inactive*.
5. To the right of the Technician to be activated, select the ellipsis icon.
6. Select *Activate Technician*.
7. The Technician is no longer displayed in the Inactive Technician list.

Deleting a Technician

A Technician can be deleted if the name is not assigned to a service request or appointment.

1. Select the **App Drawer** icon.
2. Select **Architect**.
3. From the Architect home screen, on the left navigation select the **Technician** icon.
4. Select *Delete Technician*.
5. Select *Delete*.

IoT Hub

IoT Hub provides the ability to manage all the BAS Agents for a company as well as set up integrations with Field Service Management systems.

BAS Agent Card

IoT Hub dashboard displays the BAS Agent card that displays the following agent information:

- **Total Agents:** The total number of BAS Agents.
- **Connect Agents:** The BAS Agents that are currently connected.

Select the *Manage Agent* button to display the BAS Agent dashboard. You can also access the BAS Agent dashboard by selecting the BAS Agent icon from the left navigation pane.

FSM Integration Card

FSM Integrations provides the ability to connect field service management systems (FSMs) to Building Optimization Broker.

- **Total Agents:** The total number of BAS Agents integrated with the FSM.
- **Connect Agents:** The number of BAS Agents currently connected with the FSM.

Select the Manage FSM Integrations button to display the FSM Integrations dashboard.

Working with BAS Agents

The BAS Agent dashboard displays a summary view of all BAS Agents found under the Company. You can access the BAS Agent dashboard by selecting *Manage BAS Agent* on the IoT Hub dashboard or by selecting the **BAS Agent** icon from the left navigation.

Use the search field to search for a specific BAS Agent.

The BAS Agents are listed in a table containing the following information.

- **Connection Status**: Displays a visual icon indicating the connection status.
- **Name**: Displays the name of the BAS Agent.
- **BAS Driver**: Displays the BAS Driver for the Agent.
- **Serial Number**: Displays the serial number. The agent serial number is printed on BAS hardware agents. For software agents, the serial number is displayed on the BAS Agent setup page within the software.
- **Firmware Version**: Displays the BAS Agent software firmware version.
- **BAS Load**: Displays the BAS Load percentage.

To the right of each BAS Agent, select the ellipsis icon to display a context menu that contains the following options. These options are also available on the Manage Agent page in the Agent Actions section.

- **Manage Agent**: Select to view detailed information about the Agent.
- **Assign Agent**: Select to assign a serial number to the Agent.
- **Rename Agent**: Select to rename the Agent.
- **Reboot Agent**: Select to reboot the Agent.
- **Restart Application**: Select to restart the Agent Application.
- **Ping Agent**: Select to ping the Agent.
- **Update Firmware**: Select to update the Agent firmware.
- **Delete Agent**: Select to delete the Agent.
    - If a BAS agent is associated with this Agent Configuration, the Serial Number will be released and will be available for assignment to a different Agent Configuration.
    - If you are just moving a BAS Agent to a different BAS, then you can leave this Agent Configuration and unassign the BAS Agent. This will allow you to assign a new BAS Agent at a later date to the current Agent Configuration.

Viewing Logs

All local and server logs are available in IoT Hub. Even if the Agent has disconnected, the logs will be available. You have the ability to change the Start/End Times and can export the log as a comma-separated values (CSV) spreadsheet.

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the BAS Agent card, select *Manage BAS Agents* OR select the **BAS Agent** icon from the left navigation.
4. Select the ellipsis icon to the right of the agent name.
5. Select *Manage Agent*.
6. On the Manage Agent dashboard, on the Agent Actions card, select *View Logs*.
7. On the View Logs page, select a log and the right panel will open detailing the log for that specific day.

Log Name	Description	Common Uses
Agent Actions	Communication between the BAS Agent and the Building Optimization Broker cloud infrastructure.	Viewing inventory scan progress for Niagara systems. Verifying updates to the Agent from the Building Optimization Broker UI, for example network configuration changes.
Agent Metrics	The on-board metrics for the BAS Agent.	
All Logs	Combined log composed of all other logs.	
Authorization	Authentication audit for the BAS Agent	
BACnet Broker	BACnet communications between the BAS Agent and the Building Optimization Broker.	
BACnet Driver	Diagnostic information for the BACnet driver on the BAS Agent.	Viewing inventory scan progress for BACnet systems. Viewing polling data for BACnet systems.
Heartbeat	Communication between the BAS Agent and the Building Optimization Broker client.	Verification that the Agent is checking in with the Building Optimization Broker.
Niagara Polling	Communication between the BAS Agent and the BAS for Niagara systems.	Verification of polling for Niagara systems.
Shadow	BAS Agent shadow interactions.	
System	System-level diagnostics on the BAS Agent	Checking for system reboots.

Adding a BAS Agent

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the BAS Agent card, select *Manage BAS Agents* OR select the **BAS Agent** icon from the left navigation.
4. On the BAS Agent dashboard, select the *New Agent* button.

5. In the New Agent Configuration window, enter the **Agent Configuration Name**.
6. (Optional) Enter the **Serial Number**. The agent serial number is printed on BAS hardware agents. For software agents, the serial number is displayed on the BAS Agent setup page within the software.
   The serial number is verified. If the serial number does not exist for the agent or if the serial number is already assigned to an Agent, a message displays.

   > ⚠ The serial number format is XXXXX-XXXXX-XXXXX-XXXXX-XXXXX. Five sets of five alphanumeric characters plus the hyphens.

7. Select the **Time Zone** where the Agent is installed.
8. Select *Create*.
9. Review the settings and then select *Create* to add the new BAS Agent.

Viewing BAS Agent Connection Status

After adding the BAS Agent, the BAS Dashboard displays the Connection Status.

Icon	Description
	Connected
	Not Connected
	No Status

Managing a BAS Agent

The BAS Agent Management dashboard provides information specific to the selected agent.

To access the BAS Agent Management dashboard:

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the BAS Agent card, select *Manage BAS Agents* OR select the **BAS Agent** icon from the left navigation.
4. Select the ellipsis icon to the right of the agent name.
5. Select *Manage Agent*.

Agent Information

- **Serial Number**: Displays the serial number.
- **IP Address**: Displays the Agent IP address.
- **Connection Status**: Displays the connection status and a visual icon indicating the connection status.
- **Firmware Version**: Displays the BAS Agent software firmware version.
- **Deployment:** Indicates the deployment type.
- **BAS Driver**: Displays the BAS Driver for the Agent.

- **Average BAS Load**: Displays the average BAS Load.

Agent Actions

- **View BAS Inventory**:
- **Configure BAS Network**:
- **Configure Alerts**:
- **View Logs**: Select to view logs associated with the Agent.

The following options are also available from the BAS Agents page using the context menu accessed by the ellipsis icon to the right of each BAS Agent.

The BAS Agent dashboard displays a summary view of all BAS Agents found under the Company. You can access the BAS Agent dashboard by selecting *Manage BAS Agent* on the IoT Hub dashboard or by selecting the **BAS Agent** icon from the left navigation.

Use the search field to search for a specific BAS Agent.

The BAS Agents are listed in a table containing the following information.

- **Connection Status**: Displays a visual icon indicating the connection status.
- **Name**: Displays the name of the BAS Agent.
- **BAS Driver**: Displays the BAS Driver for the Agent.
- **Serial Number**: Displays the serial number. The agent serial number is printed on BAS hardware agents. For software agents, the serial number is displayed on the BAS Agent setup page within the software.
- **Firmware Version**: Displays the BAS Agent software firmware version.
- **BAS Load**: Displays the BAS Load percentage.

Devices and Objects

This section displays the Devices and Objects associated with the BAS Agent. If you haven't added any devices or objects, a message displays to View BAS Inventory.

Working with BAS Network Configurations

The Network Configuration dashboard is used to set up different network settings.

> Once you have saved the driver configuration, you cannot edit the driver. You will need to create a new Agent configuration and re-assign the Agent.

To access the Network Configuration dashboard:

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the BAS Agent card, select *Manage BAS Agents* OR select the **BAS Agent** icon from the left navigation.
4. Select the ellipsis icon to the right of the agent name.
5. Select *Manage Agent*.
6. On the Agent Dashboard, on the Device and Objects card, select *Configure BAS Network*.
7. The sections displayed on the dashboard are dependent on the **BAS System Driver** selected.

BACnet-IP Configuration

1. On the Manage BAS Agent, select the ellipsis icon.
2. Select *Configure BAS Network*.
3. Select *BACnet-IP* from BAS System Driver.
4. Complete the **BAS Agent BACnet Settings.**
    - **BAS Agent BACnet Device ID**: Enter a unique number.
    - BAS Agent UDP Port:
    - Subnet Mask:
5. Complete the **BACnet Network BBMD Settings**. These settings are only needed if the BAS Agent will be connecting via BBMD to gain access to the BAS BACnet network.
    - **BBMD IP Address:** Enter the IP address.
    - **BBMD UDP Port:** Automatically set to 47808, but the text box provided allows for changes in unique situations.
6. Select a **Gateway Database File**, if needed. A gateway database file is generated using the Gateway Manager Tool. This file may be required to retrieve data from certain BACnet systems.
7. Review the **BACnet Advanced Settings**.

    ⚠ These values default in and will only need to be edited if the BACnet network requires different values.

    - **ADPU Timeout (ms)**: 6000
    - **ADPU Segment Timeout**: 6000
    - **ADPU Retires**: 3
    - **WHOIS Timeout (s)**: 30
    - **Read Queue Size**: 10
8. Select *Save*.

Tridium Niagara (oBIX) Configuration

⚠ To allow a BAS Agent to retrieve data from the JACE, an oBIX driver must be installed and enabled on the Niagara Station. There are 2 authentication types that will require the use of 2 different ports. Port 443 for the Login connection and any HTTPS port for the oBIX polling connection. Those 2 authentication types are N4 Digest and AX digest. The Niagara system's Authentication Scheme assigned to the user will determine the port used for login. For example, if (N4 Digest) or (AX Digest) is the user's assigned scheme then port 443 (HTTPS), is mandatory. In the Niagara System WebService page, the HTTPS port must be set to 443 and HTTPS ONLY must be set to false. If (Basic) is the user's assigned scheme then any port may be used except 443. The selected HTTP port in the Niagara System WebService page will determine the port number used for both oBIX and Login. The BAS Agent oBIX polling connection by default will attempt to connect to oBIX using port 80. The BAS Agent may connect utilizing other ports by specifying a port number in the Network Configuration. For example, if oBix was being reached via port 85 (HTTP), then 85 should be added to the Niagara Port of the JACE in the **Network Configuration**.

ⓘ BAS Agents require an HTTPS connection to Niagara Stations. HTTP connections are not supported. TLS 1.2+ is also required.

1. On the Manage BAS Agent, select the ellipsis icon.
2. Select *Configure BAS Network*.
3. Select *Tridium Niagara oBIX* from the BAS System Driver drop-down.
4. Complete the **Niagara Network Settings** to provide the BAS Agent with the Niagara Station IP, the associate oBIX lobby, and the authentication details required to communicate with the Niagara system.

Important: A BAS Agent requires an HTTPS connection to the Niagara Stations. HTTP connections are not supported.

- **Niagara Station IP Address**: Enter the IP Address in the text box provided.
- **Niagara HTTPS/HTTP Port**: This is typically 443.
- **oBIX Lobby Path**: This is typically *obix*, but it can be changed in the text box provided.
- **Authentication Type**: Select the authentication details required to communicate with the Niagara system. The default value is *Niagara4 Digest*, but you can select a different type from the drop-down.
  - HTTP Basic
  - Niagara AX Digest
  - Niagara 4 Digest
- **This is a device I trust**: Mark this checkbox if the host you are connecting to is trusted. If you do not trust the host, do not mark the checkbox. If the checkbox is marked, any certificates presented by the host to allow a secure connection made between the host and BAS Agent will be downloaded.

> ⚠ The Save button is disabled if the device is not trusted.

5. Enter your **Niagara Credentials**. The username and password for the Niagara connection are stored securely in the cloud. Note that credentials are read-only and are not available for access after saving.
   - **Station Username**: Enter your Niagara username.
   - **Station Password**: Enter your Niagara password.
6. Select the **Advanced Security Settings**.
   - **Require HTTPS**: Disabling the HTTPS requirement removes encryption and may lead to exposed data. WennSoft only recommends HTTPS.
   - **Require Certificate Validation**: It is best practice to require certificate validation. However, if the system is using a self-signed certificate, this may not be possible. If you are confident that the self-signed certificate is valid, or if there is no certificate in the case of HTTP access, this may be unchecked to allow access. WennSoft always advises users to validate certificates.
   - **Require Secure protocols (TLS1.2+)**: Protocols <TLS1.2 have known vulnerabilities that can be exploited and may lead to exposed data. WennSoft strongly recommends only using TLS v1.2+ to connect to the Niagara system. Lower versions of TLS or SSL as well as unsecured HTTP connections can lead to system vulnerability. WennSoft assumes no responsibility for use of insecure methods of data access.
   - **Use Custom Certificate Authority (CA)**
7. Select *Save*.

Assigning a BAS Agent

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the BAS Agent card, select *Manage BAS Agents* OR select the **BAS Agent** icon from the left navigation.
4. Select the ellipsis icon to the right of the agent name.
5. Select *Assign Agent*.
6. Enter the **Serial Number**. The serial number is verified. A message displays if the serial number does not exist for the agent or if the serial number is already assigned to an Agent.

> ⚠ The serial number format is XXXXX-XXXXX-XXXXX-XXXXX-XXXXX. Five sets of five alphanumeric characters plus the hyphens.

7. Select *Assign*.

Unassigning a BAS Agent

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the BAS Agent card, select *Manage BAS Agents* OR select the **BAS Agent** icon from the left navigation.
4. Select the ellipsis icon to the right of the agent name.
5. Select *Unassign Agent* to open a confirmation window.

   ⚠ The Unassign Agent option will only display in the context menu for an assigned agent.

6. Type *UNASSIGN CONFIGURATION* in the provided text field.
7. Select the *Unassign* button featured at the bottom of the modal.
8. Select *Done.*

Renaming a BAS Agent

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the BAS Agent card, select *Manage BAS Agents* OR select the **BAS Agent** icon from the left navigation.
4. Select the ellipsis icon to the right of the agent name.
5. Select *Rename Agent*.
6. Enter the **Agent Name**.
7. Select *Rename*.

Rebooting a BAS Agent

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the BAS Agent card, select *Manage BAS Agents* OR select the **BAS Agent** icon from the left navigation.
4. Select the ellipsis icon to the right of the agent name.
5. Select *Reboot Agent*.
6. Once rebooted, the icon will change to display the current status. See Viewing BAS Agent Connection Status (page 165).

⚠ If you navigate away from the page or refresh the page, the status icon may show offline as it is rebooting.

Restarting the BAS Agent Application

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the BAS Agent card, select *Manage BAS Agents* OR select the **BAS Agent** icon from the left navigation.
4. Select the ellipsis icon to the right of the agent name.
5. Select *Restart Application*.

Pinging a BAS Agent

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the BAS Agent card, select *Manage BAS Agents* OR select the **BAS Agent** icon from the left navigation.
4. Select the ellipsis icon to the right of the agent name.
5. Select *Ping Agent* from the context menu.
6. The connection status icon changes to display the agent is being pinged. If you hover over the icon, the status message displays "Pinging agent".
7. A status message displays indicating if the ping was successful or not.

Deleting a BAS Agent

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the BAS Agent card, select *Manage BAS Agents* OR select the **BAS Agent** icon from the left navigation.
4. Select the ellipsis icon to the right of the agent name.
5. Select *Delete Agent* from the context menu.
6. Type **DELETE** in the text field provided.
7. Select the *Delete* button at the bottom of the modal.

> Deleting a BAS Agent will also disassociate the hardware/software AWS IOT device and delete any devices and objects associated with that Agent.
> If you are just moving a BAS Agent to a different BAS, then you can leave this Agent Configuration and unassign the BAS Agent (page 169). This will allow you to assign a new BAS Agent at a later date to the current Agent Configuration.

Working with BAS Inventory

The BAS Inventory is a scan of the BAS that is stored in the cloud. Once a scan has completed, it will be available for interaction in the BAS Inventory view. Storing the latest scan allows you to configure your Agent and create Profiles, Devices, and Objects even when the Agent or BAS is offline.

The BAS Inventory dashboard displays the following information:

- Agent Name
- Type
- Display
- Profile
- Action

From the BAS Inventory, you can:

- Create a Profile
- Assign an existing Profile
- Create Devices and Objects

To access the BAS Inventory:

1. Select the **App Drawer**.

2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the BAS Agent card, select *Manage BAS Agents* OR select the **BAS Agent** icon from the left navigation.
4. Select the ellipsis icon to the right of the agent name.
5. Select *Manage Agent*.
6. Locate the Agent Actions card, and select *View BAS Inventory.*

Assigning an Existing Profile to a Device

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the BAS Agent card, select *Manage BAS Agents* OR select the **BAS Agent** icon from the left navigation.
4. Select the ellipsis icon to the right of the agent name.
5. Locate the Agent Actions card, and select *View BAS Inventory.*
6. Mark the checkboxes of the intended Devices.
7. Select *Use Existing Profile.*
8. Select the arrow under Profile Name
9. Select an existing Profile.
10. To save your changes, select *Done* in the right corner.

Creating a New Profile from the BAS Inventory

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the BAS Agent card, select *Manage BAS Agents* OR select the **BAS Agent** icon from the left navigation.
4. Select the ellipsis icon to the right of the agent name.
5. Locate the Agent Actions card, and select *View BAS Inventory.*
6. Select the ellipsis icon on the right.
7. Select *Create New Profile.*
8. Enter the **Profile Name**.
9. In the Select Objects section, mark the **Objects** to include in the Profile.
10. To save, select *Create Profile* in the right corner.

> ⚠ The Profile is not assigned to the Device in the database nor is the Device created until you select *Create Devices and Objects* on the BAS Inventory dashboard.

Creating Devices and Objects in BAS Inventory

After you've created a Profile, you are ready to create a Device and its Objects.

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the BAS Agent card, select *Manage BAS Agents* OR select the **BAS Agent** icon from the left navigation.
4. Select the ellipsis icon to the right of the agent name.
5. Locate the Agent Actions card, and select *View BAS Inventory.*

Once you've navigated to the BAS Inventory:

1. Check the checkbox next to one or more Devices.
2. Select *Use Existing Profile*
3. On the next screen, select the Profile that is representative of the Device(s).
4. Select *Assign*
5. When returned to the inventory, you should see the Profile you selected listed in the Profile column in the Inventory.
6. Check the checkboxes next to the Device(s)
7. Select *Create Devices and Objects.*

Manually Refreshing the BAS Inventory

To manually refresh the BAS Inventory:

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the BAS Agent card, select *Manage BAS Agents* OR select the **BAS Agent** icon from the left navigation.
4. Select the ellipsis icon to the right of the agent name.
5. Select *Manage Agent*.
6. Locate the Agent Actions card, and select *View BAS Inventory*.
7. Select *Refresh Inventory*.

Control System Compatibility

Protocols

oBIX

The oBIX (Open Building Information Xchange) driver supports HTTP or HTTPS communication. We can also optionally require TLS 1.2+.

We officially support oBIX communication with these versions of Tridium Niagara.

1. Niagara AX 3.8.401+
2. Niagara 4.X

Successful Implementations

- Distech Controls
- Honeywell Webs
- Johnson Controls FX
- Lynxspring
- Vykon

BACnet/IP

The BACnet/IP driver supports many native BACnet control systems as well as some proprietary protocols via our Gateway Manager.

Successful Implementations

- Alerton
- Automated Logic
- Carrier i-Vu
- Daikin/McQuay
- Distech Controls
- Johnson Metasys
- Niagara via Niagara BACnet Client
- Trane BCU
- Trane SC
- Trane Tracer SC+

Setting a Static IP Address

This optional step allows you to configure static IP addresses or change local configuration settings. It may not be required for most installations.

1. View available Wi-Fi networks on your computer.
2. Connect to your Agent's Wi-Fi network. Your Agent's Wi-Fi network is K2A-##### (the last 5 digits of your Agent's serial number).
3. Enter the Wi-Fi password. (Please contact K2A Support for the password.)
4. Once connected to your Agent's Wi-Fi network, open a web browser and navigate to https://192.168.7.1:57000[7] to access the on-board UI.

   > ⚠ Connecting to the onboard UI will only allow https connection. If you are unable to connect, please ensure that you are connecting to **https:**//192.168.7.1:57000

5. Enter the admin credentials. (Please contact K2A Support for the login credentials.)
6. On the BAS Agent dashboard, on the Agent Network Settings card, mark **Static IP Address**.
7. Enter the **IP Address** and make any updates to the **Subnet Mask**, **Gateway**, and **DNS Servers** as required.

   > ⚠ If you need to input multiple DNS Servers, use a "space" to delineate.

8. Select *Save*.

Scanning a BACnet Network

To allow a Building Optimization Broker BAS Agent to retrieve data from the BACnet, the IP information needs to be set up. This requires the basic Scanning BAS Networks steps with the addition of finding which BACnet device is the BBMD (BACnet Broadcast Management Device).

1. In Building Optimization Broker, select the **IoT Hub** application from the app drawer.
2. Select **Manage BAS Agent** on the *BAS Agents* card.

---

7 https://192.168.7.1:57000/

3. From the list of BAS Agents available, select the ellipsis icon to the right of the agent from which you want to scan a BAS, and select **Manage Agent**.

   ⚠ If you haven't created an agent yet, see Adding a BAS Agent (page 164).

4. On the Agent Management page, under the *Agent Actions* card, select **Configure BAS Network**.
5. On the *Network Configuration* page, under the *BAS System Driver* dropdown, select **BACNet-IP**. See BACnet-IP Configuration (page 167).
6. Under the *BAS Agent BACnet Settings*, enter the **BAS Agent BACNet Device ID** to the desired value if you wish to set up the Agent as a BACnet device, otherwise leave blank. **BAS Agent UDP Port** and **Subnet Mask** can typically be left at their default values of **47808** and **255.255.255.0**. Only change these values if your BAS configuration requires.
7. (Optional) Under the *BACnet Network BBMD Settings*, enter the **BBMD IP address** and **BBMD UDP Port** of the BACnet device that is has been assigned to be the BBMD (if applicable), otherwise, leave blank.
8. Select *Save*, if applicable.
9. Select the *BAS Agents* icon from the app tray and again select **Manage Agent** for your agent. This can also be done by selecting your agent name in the breadcrumb trail at the top of the *Network Configuration* page, select the Agent.
10. Under Agent Actions, select **View BAS Inventory**.
11. On the BAS Inventory screen, select **Refresh Inventory**.

    ⚠ Refreshing inventory will perform a background scan. This scan may take a few minutes depending upon the inventory size. You can check the agent connect status to see the progress of the scan. The status displays "inventory scanning" while the scan is in progress. See Working with BAS Inventory (page 170) and Viewing Logs (page 163) for more information.

Scanning a Niagara Network

The Network information needs to be set up to allow a Building Optimization Broker BAS Agent to retrieve data from a Niagara system.

1. In Building Optimization Broker, select the **IoT Hub** application from the app drawer.
2. Select **Manage BAS Agent** on the *BAS Agents* card.
3. From the list of BAS Agents available, select the ellipsis icon to the right of the agent from which you want to scan a BAS, and select **Manage Agent**.

   ⚠ If you haven't created an agent yet, see Adding a BAS Agent[8].

4. On the Agent Management page, under the *Agent Actions* card, select **Configure BAS Network**.
5. On the Network Configuration page, under the *BAS System Driver* dropdown, select **Tridium Niagara (oBIX)**. See Tridium Niagara (oBIX) Configuration (page 167).
6. Under Niagara Network Settings, enter the following:
   - **Niagara Station IP Address**: Enter the Internet Protocol (IP) address or web address.
   - **Niagara HTTPS/HTTP Port**: Enter the port number.
   - **oBIX Lobby Path**: This is typically *obix*.
7. Select the **Authentication Type**.
8. Mark **This is a device I trust**. BOB will download any certificates presented by the host.

8 https://docs.key2act.io/display/BOB/Adding+a+BAS+Agent

⚠ The Save button is disabled if this checkbox is not marked.

9. Under Niagara Credentials, enter the **Username** and **Password** for the Niagara connection.
10. In the Advanced Security Settings section, mark the appropriate security checkboxes. See Tridium Niagara (oBIX) Configuration (page 167) for more information.
11. Select *Save.*
12. Select the BAS Agents icon from the app tray and again select **Manage Agent** for your agent. This can also be done by selecting your agent name in the breadcrumb trail at the top of the Network Configuration page, and then select the Agent.
13. Under Agent Actions, select **View BAS Inventory**.
14. On the BAS Inventory screen, select **Refresh Inventory**.

⚠ Refreshing inventory will perform a background scan. This scan may take a few minutes depending on the inventory size. You can check the agent connect status to see the scan's progress. The status displays "inventory scanning" while the scan is in progress. See Working with BAS Inventory[9] and Viewing Logs[10] for more information.

Working with FSM Integrations

FSM Integrations provides the ability to connect field service management systems (FSMs) to Building Optimization Broker.

Creating an FSM Integration

It is recommended that you download the credentials.csv file to save a copy of the serial number and authorization key for future reference.

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the FSM Integrations card, select *Manage FSM Integrations* OR select the **FSM Integrations** icon from the left navigation.
4. On the FSM Integrations dashboard, select **New FSM Integration**.
5. In the New FSM Integrations window, enter the **FSM Integration Configuration Name**.
6. Select the **FSM Integration Driver Type**.
7. Select *Create*.

9 https://docs.key2act.io/display/BOB/Working+with+BAS+Inventory
10 https://docs.key2act.io/display/BOB/Viewing+Logs

8. In the FSM Integrations Credentials window, the credentials that are required by the FSM Integration to authenticate with your Building Optimization Broker Company are displayed.

   > ⚠ Select *View Key* to display the **Authorization Key**.

9. Select *Download Agent Credentials* to save a copy of the Serial Number and Authorization Key as a credentials.csv file on your workstation.

   > **IMPORTANT**
   >
   > This is the only time the credentials.csv file is available to download. If you misplace this information, you will be able to use the Rotating FSM Integration Credentials procedure to reset this information.

Configuring the FSM Integration

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the FSM Integrations card, select *Manage FSM Integrations* OR select the **FSM Integrations** icon from the left navigation.
4. On the FSM Integrations dashboard, select the ellipsis icon to the right of the FSM Integration to be configured.
5. Select **Manage FSM Integration**.
6. On the FSM Integrations page, under FSM Integration Actions, select **Configure FSM Integration** or if this is the first time accessing this page, select the **Configure FSM Integration** button on the right side of the window.
7. Enter the following information:
   - **Database Server Address**: Enter the SQL Server\Instance or IP address of the FSM.
   - **Username**: Enter the login username for logging into your FSM.

     > ⚠ Do not use the Admin login. (For example, "sa".) We recommend creating a user who has only the permissions required to perform the FSM Integrations function.

   - **Password**: Enter the password for the user for logging into your FSM.
   - **Signature Database**: Enter the Signature database name this FSM Integration will be communicating with.
8. Mark **Enable Auto-Sync** to allow the FSM Integration to send updates to the FSM data on a scheduled interval. The system will upload the Signature data (Customers, Locations, Technicians, Equipment, Status). If Enable Auto-Sync is not marked, you will need to manually synchronize after this initial upload.
9. Enter the **Refresh Time**. The time entered should be in the Agent's local Time Zone.
10. Select *Save*.

Syncing FSM Data to Building Optimization Broker

After you have configured the FSM Integration and the settings in your FSM software, your data synchronizes to Building Optimization Broker. If you unchecked the Enable Auto-Sync checkbox, the initial sync is automatically performed.

> ⚠ If you are using WennSoft's Signature, you will be utilizing Map2BOB to map your Signature and BOB entities. You will not use the Sync FSM Data to BOB option.

To view your ERP Data:

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the FSM Integrations card, select *Manage FSM Integrations* OR select the **FSM Integrations** icon from the left navigation.
4. On the FSM Integrations dashboard, select the ellipsis icon to the right of the FSM Integration to be configured.
5. Select **Manage FSM Integration**.
6. Refresh the browser window and the FSM data displays the uploaded inventory. You will see a list of Customers, Technicians, and Service Statuses.

Manually Syncing Signature Data to Building Optimization Broker

To manually synchronize the Signature Data:

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the FSM Integrations card, select *Manage FSM Integrations* OR select the **FSM Integrations** icon from the left navigation.
4. On the FSM Integrations dashboard, select the ellipsis icon to the right of the FSM Integration to be configured.
5. Select **Manage Integration**.
6. In the FSM Integrations Actions panel, select **Sync FSM Data to BOB**.

Viewing FSM Integration Information

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the FSM Integrations card, select *Manage FSM Integrations* OR select the **FSM Integrations** icon from the left navigation.
4. On the FSM Integrations dashboard, select the ellipsis icon to the right of the FSM Integration to be configured.
5. Select **Manage Integration**.
6. The FSM Integration Information section displays the following information:
    - **Serial Number**: The serial number that the FSM Integration was assigned.
    - **Connect Status**: Indicates if the FSM Integration is connected to the Signature Agent Service.
    - **Software Version**: Displays the Signature Agent for BOB software version.
    - **FSM Driver**: Displays the FSM Driver.
    - **FSM Database**: Displays the FSM Database

Viewing FSM Integrations

After you have completed the configuration and setup of the FSM Integration, the Customers, Technicians, and Service Statuses inventory from the FSW are displayed in the right panel, dependent on the tab selected.

To view the FSW Customers, Technicians, and Service Statuses:

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the FSM Integrations card, select *Manage FSM Integrations* OR select the **FSM Integrations** icon from the left navigation.
4. On the FSM Integrations dashboard, select the ellipsis icon to the right of the FSM Integration to be configured.
5. Select **Manage Integration**.
6. In the right panel, you can view the FSW Customers, Technicians, and Service Statuses by selecting the appropriate tab.
   If you aren't seeing this information, verify that you have:

- Configured the FSM Integration.
- Installed Signature Map2BOB.
- Set up the Building Optimization Broker Integration in Schedule.

Renaming an FSM Integration

When you rename an FSM Integration in Building Optimization Broker, the FSM Integration name change is also reflected in the Signature Agent for BOB software.

To rename the FSM Integration:

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the FSM Integrations card, select *Manage FSM Integrations* OR select the **FSM Integrations** icon from the left navigation.
4. On the FSM Integrations dashboard, select the ellipsis icon to the right of the FSM Integration to be configured and select **Rename Integration**. (Or you can select Manage Integration and then select Rename Integration from that window.)
5. Enter a new **Name**.
6. Select *Rename*.

Rotating FSM Integration Credentials

Rotating FSM Integration Credentials will delete the current FSM Integration Authorization Key and generate a new one. The FSM Integration using the current credentials will require the newly generated authorization key to be applied to the Signature Agent for BOB software. The serial number does not change.

To rotate FSM Integration Credentials:

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the FSM Integrations card, select *Manage FSM Integrations* OR select the **FSM Integrations** icon from the left navigation.
4. On the FSM Integrations dashboard, select the ellipsis icon to the right of the FSM Integration to be configured.
5. Select **Manage FSM Integration**.
6. In the FSM Integration Actions section, select **Rotate FSM Integration Credentials**.
7. Enter **ROTATE** in the **Confirmation** field.
8. Select *Rotate*.

Deleting an FSM Integration

When you delete an FSM Integration, if the Integration is associated with this Integration Configuration, the Serial Number will be released and will be available for assignment to a different FSM Integration.

If you are just moving an FSM Integration to a different FSM, then you can leave this FSM Integration Configuration and unassign the FSM Integration. This will allow you to assign a new FSM Integration at a later date to the current Integration Configuration.

To delete an FSM Integration:

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the FSM Integrations card, select *Manage FSM Integrations* OR select the **FSM Integrations** icon from the left navigation.

4. On the FSM Integrations dashboard, select the ellipsis icon to the right of the FSM Integration to be configured.
5. Select **Delete FSM Integration**.
6. Enter **DELETE** in the Delete Confirmation field.
7. Select *Delete*.

Setting up a Signature Integration with BOB

System Requirements

- Building Optimization Broker
- Map2BOB 1.1
- MobileTech 8.5 or later (optional)
- Schedule 4.6 or later
- Signature 2018 R4 or later
- Signature Agent 2.4 (optional)

Step 1: Create the FSM Integration

Please see the Building Optimization Broker (BOB) online documentation for information about Creating an FSM Integration (page 175).

Step 2: Configure the FSM Integration

Please see the BOB online document for information about Configuring the FSM Integration (page 176).

Step 3: Install and Configure Map2BOB on the Service Machine

Please see the Map2BOB 2021 (1.1)[11] online user guide for installation and configuration information. The BOB credentials in Map2BOB are shared with BOB Settings in MobileTech 8.5 or higher and Schedule 4.6 or higher.

Step 4: Link/Track ERP Entities and BOB Entities with Map2BOB in Signature

Please see the Map2BOB online user guide for the following:

- Mapping Locations and Sites[12]
- Mapping Customers and Clients[13]
- Mapping Contacts[14]
- Mapping Equipment[15]

11 https://wennsoft.atlassian.net/wiki/spaces/MAP2BOB11
12 https://wennsoft.atlassian.net/wiki/spaces/MAP2BOB11/pages/6819588/Mapping+Locations+and+Sites
13 https://wennsoft.atlassian.net/wiki/spaces/MAP2BOB11/pages/6819537/Mapping+Customers+and+Clients
14 https://wennsoft.atlassian.net/wiki/spaces/MAP2BOB11/pages/6819454/Mapping+Contacts
15 https://wennsoft.atlassian.net/wiki/spaces/MAP2BOB11/pages/6819499/Mapping+Equipment

Step 5: Enable BOB Dashboard in MobileTech

If you are using MobileTech 8.5 or higher, you have the option to add the BOB dashboard and tabs that display the Health Monitor information from Building Optimization Broker. Please see the MobileTech documentation for information about the Building Optimization Broker Settings[16]. For more information about viewing the Health Monitor information in MobileTech Help, see *BOB Dashboard and Tabs*.

Step 6: Set Up Advanced Communications (optional)

Building Optimization Broker Advanced Communications

You can use Advanced Comms to enable or disable email communications with Building Optimization Broker Clients when changes are made in Service Requests and you've selected to notify the client. Notifications are sent to both the requester, and to the client contact on the service request (if added), provided the Client has notifications enabled. In the Building Optimization Broker documentation, see Working with Advanced Communications (page 193).

Signature Agent Advanced Communications

You can use Signature Agent Advanced Communications to update customers about appointment and service call updates within Schedule. For more information, see the Signature Agent 2.4[17] documentation.

Step 7: Review Schedule User Guide for Processing Request Information

If you are using Schedule to create service calls from service requests in Building Optimization Broker, see *Processing Service Requests from Building Optimization Broker* in the Schedule User Guide for more information about viewing, accepting, or rejecting service requests.

Working with Profiles

Profiles are used to aid in getting data trending from a BAS in an efficient manner by templating Devices and their Object definitions. A Profile is a set of Objects and the data type those Objects represent. Each Device requires a Profile and Devices with different Object sets must have different Profiles. A Profile is created from the BAS Inventory. For more information on creating a new Profile, see Creating a New Profile from the BAS Inventory (page 171).

You can access the Profiles dashboard by selecting **Profiles** icon from the left navigation.

From the Profile dashboard, you can:

- Create a Profile
- View existing Profiles.
    - Name
    - Agent Driver
    - Profile Type
- Manage a Profile
    - Update a Profile Name.
    - Work with Profile Objects (Manage/Delete)
- Delete a Profile.
- Filter the displayed Profiles to show K2A or Custom Profiles.

16 https://wennsoft.atlassian.net/wiki/spaces/MT85/pages/6816526/Building+Optimization+Broker+Settings
17 https://wennsoft.atlassian.net/wiki/spaces/SignatureAgent24/overview

- Search for a specific Profile using the search box.
- Sort the displayed Profiles by the Profile name. Select the Profile header to change the sort from the default ascending to descending.

Working with Profile Objects

Profiles are made up of a set of Objects. Modifying, adding, or deleting a Profile Object will update all of the Devices that are using that Profile.

Adding a BacNET Profile Object

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. Select the Profiles icon from the left navigation.
4. Select the ellipsis icon to the right of the Profile.
5. Select *Manage Profile* to display the Profile dashboard.
6. Select *Add Profile Object*.
7. Enter or edit the following information:
    - **Name**: Enter a unique name.
    - **Object Type**: Select the BACnet Object Type.
    - **Proprietary Object ID**: If you select a Proprietary Object Type, you will need to provide the Property Object Type ID.
    - **Object Instance**: Provide the BACnet Object Instance.
    - **Property**: Select the BACnet Property. Most BACnet Objects you will be interested in will be Present Value.
    - **Property ID**: If you select Present Value, we'll fill in the Property ID with 85, if you select Other you'll need to provide the BACnet Object Property ID.
    - **Array Index**: The Array Index is only required for Proprietary Objects. If you have a Proprietary Object that does not have an Array Index, you can leave the field blank.
    - **Data Type**: Select the Data Type of the BACnet Object.
    - **Trend Interval**: Select a trend interval. The Trend Interval is used to gather data over the select time.
8. Select *Create*.

⚠ Changes made to a Profile will update all Devices using this Profile. Please double-check your work before making any changes.

Managing BACnet Objects

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. From the IoT Hub dashboard, on the BAS Agent card, select **Manage BAS Agents** OR select the **BAS Agent** icon from the left navigation.
4. Select the ellipsis icon to the right of the BAS Agent.
5. Select *Manage Agent* to display the BAS Agent Management dashboard.
6. Select the ellipsis icon to the right of the object.
7. Complete the following fields:
    - **Object Name**: Enter the BACnet object's name.
    - **Data Type**: Select the data type.
        - Boolean

        - Double Precision
        - Integer
        - Strong
    - **Object Type**: Select the object type.
        - Analog Input
        - Analog Output
        - Analog Value
        - Binary Output
    - **Object ID**: Enter the BACnet object's ID number.
    - **Trend interval**: Enter the BACnet object's trend interval.
8. Select *Save*.

⚠ Updating a Profile Object will update all Device Objects for Devices using that Profile.

Adding a Niagara Profile Object

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. Select the Profiles icon from the left navigation.
4. Select the ellipsis icon to the right of the Profile.
5. Select *Manage Profile* to display the Profile dashboard.
6. Select *Add Profile Object*.
7. Enter or edit the following information:
    - **Name**: Enter a unique name.
    - **oBIX Path**: Provide the oBIX Path.
    - **Object Type**: Select the Object Type.
    - **Data Type**: Select the Data Type of the BACnet Object.
    - **Trend Interval**: Select a trend interval. The Trend Interval is used to gather data over the select time.
8. Select *Create*.

⚠ Changes made to a Profile will update all Devices using this Profile. Please double-check your work before making any changes.

Managing a Niagara Object

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. Select the **Profiles** icon to access the Profiles dashboard.
4. Select the ellipsis icon to the right of the Niagara Object.
5. Select *Manage* from the context menu.
6. Edit the following fields, as needed:
    - **Object Name**: Enter the object name.
    - **Niagara Type**: Select the type:
        - **Boolean**: A binary value with only two states. Examples: true, false, or off, on.
        - **Double Precision**: An 8-byte floating point-type. Examples: 1.23456e300d, -1.23456e-300d, 1e1d.
        - **Integer**: A 4-byte point-type. Cannot contain a decimal. Examples: -2, -1, 0, 1, 2.
        - **String**: A string of one or more ASCII characters (and if alpha-numeric), often with some literal meaning.
    - **oBIX Path**: Enter the path for the Object.

- **Trend Interval**: Select the interval in minutes.

7. Select *Save*.

> ⚠ Updating a Profile Object will update all Device Objects for Devices using that Profile.

Deleting a Profile Object

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. Select the **Profiles** icon from the left navigation.
4. Select the ellipsis icon to the right of the profile that contains the profile object to be deleted.
5. Select *Manage*.
6. On the Profile Objects dashboard, you can either delete multiple objects or individually:
   - To delete multiple Profile Objects, mark the checkbox to the left of each object to be deleted. Then select *Delete Profile Object* at the top right of the window.
   - To delete one Profile Object, select the ellipsis icon to the right of the Profile Object and then select *Delete*.
7. Type **DELETE** in the text field provided.
8. Select the *Delete* button at the bottom of the modal.

> ⚠ Deleting a profile object will update objects for all devices that currently use this profile.

Changing Trend Intervals by Profile Objects

You can update Trend Intervals for all devices on a Profile Object from the Project Object dashboard. You can change just one Profile Object or you can update multiple Profile Objects.

> ⚠ You also have the ability to instead change Trend Intervals for Profile Objects at the Profile level. See Changing Trend Intervals by Profile (page 184) for more information.

To update the Trend Intervals of all devices within one or more Profile Objects:

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. Select the **Profiles** icon from the left navigation.
4. To the right of the Profile that contains the Profile Object to be updated, select the ellipsis icon.
5. Select *Manage*.
6. On the Profile Objects dashboard, mark one or more Project Object checkboxes.
7. Select *Change Trend Intervals* at the top right of the window.
8. Select the **Trend Interval** (minutes).
9. Select *Save*.

Create a Profile

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. Select the **Profiles** icon from the left navigation.
4. Select **Create Profile**.

5. In the Create Profile window, enter the **Profile Name**.
6. Select the **BAS Type**.

   ⚠ Profiles can only be applied to Devices of the same BAS Type.

7. Select **Create**.

Renaming a Profile

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. Select the **Profiles** icon from the left navigation.
4. To the right of the listed Profile, select the ellipsis icon.
5. Select *Manage*.
6. Enter the **Profile Name**.
7. Select *Update* to save your changes.

⚠ You can only change the name of custom Profiles, the K2A Profiles cannot be altered.

Deleting a Profile

Before you can delete a Profile, all Devices assigned to the Profile must be re-assigned to a different Profile OR you must delete all Devices assigned to this Profile.

⚠ Only Custom Profiles can be deleted.

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. Select the **Profiles** icon from the left navigation.
4. To the right of the listed Profile, select the ellipsis icon.
5. Select *Delete*.
6. A confirmation window displays that requires you to type **DELETE** in the text field provided.
7. Select *Delete*.
8. Select *Done*.

Changing Trend Intervals by Profile

You can update Trend Intervals for all Profile Objects on a Profile from the Profile dashboard.

⚠ You also can change Trend Intervals for all devices at the Project Object level. See Changing Trend Intervals by Profile Objects (page 183)for more information.

To update the Trend Intervals of all Profile Objects within a Profile:

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. Select the **Profiles** icon from the left navigation.
4. To the right of the listed Profile, select the ellipsis icon.
5. Select *Change Trend Interval*.

6. Select the **Trend Interval** (minutes).
7. Select *Save*.

Working with Downloads

The Downloads dashboard provides you with the ability to download the BAS Gateway Manager software. You can access the Downloads dashboard by selecting the Downloads icon from the left navigation.

Download the Gateway Manager

1. Select the **App Drawer**.
2. Select **IoT Hub**.
3. Select the **Downloads** icon to access the Downloads dashboard.
4. Select the ellipsis icon to the right of Gateway Manager.
5. Select *Download.zip*.
6. Navigate to where the Gateway-Manager-Tool.zip file should be stored and select *Save*.

Admin

Admin provides you with the ability to manage Companies, Users, and User Roles. You can also set up Advanced Communications, manage Scoring, and enter/edit billing information.

Accessing the Admin Dashboard

From the Mega Navigation, under Admin, select **Control Panel**.

Working with Companies

Each company is required to have at least one Admin user.

Creating a Company

A Company can be created from the Admin dashboard. If you are Creating a Company from My Account, see *Create a Company from My Account* for more information.

1. Select the **App Drawer** icon.
2. Select **Admin**.
3. On the Admin dashboard, if no companies currently exist, the **Company** card displays "You haven't been invited to join a Company".
4. Select *Create Company*.
5. Complete the fields in the **Create Company** pane:
    - **Company Name** - Enter a unique Company name.
    - **Contractor Type** - Select the Contractor Type(s).
    - **Company Time Zone** - Choose the time zone where the Company is located.
    - **Company Logo** - Upload your Company logo to brand deliverables from BOB. The logo and accent colors are used on emails sent on behalf of your company from Advanced Communications.

- **Accent Color** - Select your Company accent color, in hex format (#000000) to brand deliverables from BOB.
- **Search for Address** - Enter the physical rooftop address into this field. We will fill out the address fields.

6. Select *Create*.
7. The Company information is displayed on the card.

> ⚠ After creating a Company, you will be required to enter Billing Information. See *Adding Billing Information* for more information.

Creating Additional Companies

1. Select the **App Drawer** icon.
2. Select **Admin**.
3. On the Admin dashboard, on the Company card, select the **Company** drop-down.
4. Select *Create New Company*.
5. Complete the fields in the Create Company pane.
   - **Company Name**
   - **Contractor Type**
   - **Address 1**
   - **Address 2**
   - **City**
   - **State**
   - **Zip**
6. Select *Create*.

Editing a Company

1. Select the **App Drawer** icon.
2. Select **Admin**.
3. On the Admin dashboard, on the Company card, select the **Company** drop-down.
4. Select *Edit* ***<company name>***.
5. Update intended fields.
6. Select *Update*.

Working with Users

The Users card is accessed on the Admin dashboard. The card displays the number of Company Users and Invited Users. Invited Users are users who have been invited but have not accepted the invitation.

Viewing Users

The default view sorts Users alphabetically by their email address. Select any of the headers to change the sort.

1. Select the **App Drawer** icon.
2. Select **Admin** to access the Admin dashboard.
3. On the **User** card, select **Manage Users** to display a list of Users.
   If a User has been invited but does not have an account yet, their status displays as *Invited*.

Inviting a User

1. Select the **App Drawer** icon.
2. Select **Admin** to access the Admin dashboard.
3. On the **User** card, select **Manage Users**.
4. Select the **Invite User** icon.
5. In the **Invite User** window, enter the User's **Email Address** and select their **Role**.
6. Select *Create*.
    - If the User *does not* have an account set up, the User:
        - Receives an email invitation with a *SIGNUP* hyperlink.
        - Will need to sign up for an account. The User's account will be verified and an email is sent when the account is active.
        - The User can then log in.
    - If the User *does* have an account, the User:
        - Receives an email indicating that they have access to the Company.
        - Will see the Company in their account after they sign in.

Resending an Invitation

If a user without an account has not accepted the invitation, you can resend the invitation from the Users page.

1. Select the **App Drawer** icon.
2. Select **Admin** to access the Admin dashboard.
3. On the **User** card, select **Manage Users**.
4. Select the ellipsis icon to the right of the Invited user.
5. Select *Resend Invite*.

Changing a User's Role

1. Select the **App Drawer** icon.
2. Select **Admin** to access the Admin dashboard.
3. On the **User** card, select **Manage Users**.
4. Select the ellipsis icon to the right of the user.
5. Select **Manage User**.
6. Select a different **Role**.
7. Select *Save*.

Removing a User's Company Access

There may be an occasion to remove or revoke a User's access to a Company. Only Admin users have access to this capability.

> ⚠ Users cannot remove themselves from a Company or delete their User Account.

1. Select the **App Drawer** icon.
2. Select **Admin** to access the Admin dashboard.
3. On the **User** card, select **Manage Users**.
4. Select the ellipsis icon to the right of the user and then select *Remove User*.
5. The Company will no longer appear in the User's overview.

Working with Roles

A Role can be assigned to one or more users. A user can be assigned to only one role. User roles can be set up to have different permissions for each application. For more information on Read and Full Access permissions, see Additional Role Permission Information by Application (page 189).

⚠
- An administrator cannot edit their own user account, only another Admin user has the ability to do this.
- Any user with access to the Admin area cannot edit their own user and/or role.

Viewing Roles

The Roles window consists of the applications appearing horizontally across the top. If you have more applications than what is displayed on the window, a scroll arrow displays. The Role and its Permissions display vertically beneath each application. To display the permissions, select the drop-down arrow to the left of the Role name.

1. Select the **App Drawer** icon.
2. Select **Admin** to access the Admin dashboard.
3. On the **Role** card, select **Manage Roles**.
4. On the Roles window, to view the permissions associated with the role, select the drop-down to the left of the Role.
5. You may need to scroll horizontally to view the appropriate application.

Adding a Role

1. Select the **App Drawer** icon.
2. Select **Admin** to access the Admin dashboard.
3. On the **Role** card, select **Manage Roles**.
4. Select the **Add New Role** icon**.**
5. In the **Create Role** window that displays, enter the **Role Name** and **Description**.
6. Select *Create*.

Editing a Role Name

1. Select the **App Drawer** icon.
2. Select **Admin** to access the Admin dashboard.
3. On the **Role** card, select **Manage Roles**.
4. On the **Roles** window, select the Role from the **Role** drop-down.
5. Select the **Edit Role** icon.
6. In the Edit Role window, update the **Role Name**.
7. Select *Update*.

Editing a Role Description

1. Select the **App Drawer** icon.
2. Select **Admin** to access the Admin dashboard.
3. On the **Role** card, select **Manage Roles**.
4. On the **Roles** window, select the Role from the **Role** drop-down.

5. Select the **Edit Role** icon.
6. In the Edit Role window, update the **Role Description**.
7. Select *Update*.

Deleting a Role

A role may be deleted if it is not assigned to any users.

1. Select the **App Drawer** icon.
2. Select **Admin** to access the Admin dashboard.
3. On the **Role** card, select **Manage Roles**.
4. On the **Roles** window, select the Role from the **Role** drop-down.
5. Select the **Delete Role** icon.
6. In the message that displays, *Confirm* that the role is to be deleted. You may need to refresh your browser to verify that the Role has been deleted.

Working with User Role Permissions

A user role contains a set of action permissions available within an application.

> ⚠ A company must have at least one user assigned with the Admin role.

Assigning Permissions to Roles

1. Select the **App Drawer** icon.
2. Select **Admin** to access the Admin dashboard.
3. On the **Role** card, select **Manage Roles**.
4. On the **Roles** window, select the Role from the **Role** drop-down.
5. The available permissions displayed below each application name. You may find that you need to scroll to the right to view all applications.
    - The Admin role automatically has access to all permissions for each application. The Admin permissions are not editable.
    - Every role has Company Read access.
6. Under Application Permissions, select the permissions for the applications.
    - To mark all Read or Full Access permissions, mark the checkbox to the right of the application.
    - You can selectively mark category checkboxes.
7. The permission changes are saved automatically as you mark/unmark the checkboxes.

Additional Role Permission Information by Application

Admin Role	Description
Company Read	• Read Companies

Admin Role	Description
Company Full Access	• Deregister Companies • Modify Companies
Integrations Read	• Read Integrations • Read Installed Integrations
Integrations Full Access	• Install Integrations • Modify Integrations • Modify Installed Integrations • Update Authentication Key • Update Authentication Key • Invoke Integrations • Uninstall Integrations
Roles Read	• Read Authorization Roles
Roles Full Access	• Register Authorization Roles • Modify Authorization Roles • Deregister Authorization Roles
Service Call Read	• No permissions associated
Service Call Full Access	• Accept/Reject Service Requests
Users Read	• Read Accounts Associated with Companies
Users Full Access	• Revoke Access from Companies • Grant Access to Companies • Resend Invitation to Platform

Home - Deprecated 3/2/22	
Role	**Description**
Home Read	• Read Sites • Read Connect Site Scores • Read Signature Locations • Read Connect Sites • Read Connect Watchdog Events • Read Signature Equipment • Read Equipment Types • Read Site Equipment • Read Connect Devices • Read Remote Device Scores • Read Clients • Read Signature Customers
Home Full Access	• Unlink Signature Customer with ESMS Client • Link Signature Customer with ESMS Client • Deregister Clients • Modify Clients • Register Clients • Link Client with Site • Unlink Client from Site • Deregister Site Equipment • Modify Site Equipment • Register Site Equipment • Unlink Connect Device with ESMS Equipment • Link Connect Device with ESMS Equipment • Unlink Signature Equipment with ESMS Equipment • Register Sites • Deregister Sites • Modify Sites • Link Connect Site with ESMS Site • Unlink Connect Site with ESMS Site • Unlink Signature Locations with ESMS Sites • Link Signature Locations with ESMS Sites

Working with Scoring

Before you can view Scoring for your company, you will need to enable this feature. The Score Debugger window displays any timestamped error messages.

Scores are calculated using fault data. Scoring is performed at an Equipment- or Target-level, however, it is calculated based on the status of the rules that are running on it. High Priority Faults impact the score more than Low Priority.

Enabling Scoring

1. Select the **App Drawer** icon.
2. Select the **Admin** icon to access the Admin dashboard.
3. Locate the *Scoring* card.
4. Select the toggle to enable Scoring.

Viewing the Score Debugger

1. Select the **App Drawer** icon.
2. Select the **Admin** icon to access the Admin dashboard.
3. Locate the *Scoring* card.
4. To view the Score Debugger, select *Manage Scoring*.
5. The Timestamp Filter defaults to the current day in a 24-hour timeframe. You can edit this to display a specific timeframe.
6. In the Score Debugger window, the debug entries from Scoring are displayed.
7. The following Score Debugger information displays:
    - **Timestamp**
    - **Target**
    - **Error Message**
    - **Action**
8. You also have the option to *Disable/Enable* **Scoring** in the Score Debugger window.

Working with Billing Info

Before a company can be enabled, a billing contact will need to be provided. This should be the contact information for someone at your organization that is responsible for paying a bill.

Adding Billing Information

After you create a company, you must add billing formation to enable Building Optimization Broker.

1. Select the **App Drawer** icon.
2. Select **Admin**.
3. On the Admin dashboard,
4. Complete the following fields.
    - Billing Contact Name
    - Billing Contact Email
    - Billing Contact Phone
    - Address 1
    - Address 2
    - City
    - State
    - Zip
5. Select *Save.*

Editing Billing Information

1. Select the **App Drawer** icon.
2. Select the **Admin** icon to access the Admin dashboard.
3. Locate the Billing Info card.
4. Select *Edit Billing Information.*
5. Complete the Billing Information fields:
    - **Billing Contact Name**
    - **Billing Contact Email**
    - **Billing Contact Phone**
    - **Address 1**
    - **Address 2**
    - **City**
    - **State**
    - **Zip**
6. Select *Save.*

> ⚠ Note: Updating Billing Information will change your Company's billing status to "Awaiting Confirmation", however, you will not be locked out of your Company.

Working with Advanced Communications

You can use Advanced Comms to enable or disable email communications with Building Optimization Broker clients when changes are made in Service Requests and you've selected to notify the client. Notifications are sent to both the requester, and to the client contact on the Service Request (if added), provided the client has notifications enabled.

In Advanced Communications, you can:

- Enable or disable email communications with Building Optimization Broker clients when updates are made to service requests and service appointments.
- Enable communications for specific service status updates to be communicated to the enabled clients.
- Designate service status updates that require that the user confirms the communication to be sent prior to sending a communication to the enabled client. For a list of service statuses, see Service Statuses (page 195).
- Indicate which service statuses will alert technicians via an SMS text message of a status change for enabled service statuses

Setting up Client Communication

The Clients Settings page allows you to enable which Clients to generate HTML email communications and/or SMS Text communications for.

On the Advanced Communications dashboard, the Building Optimization Broker Clients display. Initially, only 20 Clients display per page. You can change the number of Clients to display by selecting the **Rows per page** drop-down and selecting a different number or you can navigate to additional pages by either selecting a page number or by using the scroll buttons. You can also use the Search field to find a specific Client.

1. Select the **App Drawer** icon.
2. Select the **Admin** icon to access the Admin dashboard.
3. The Advanced Communications card displays the **Total Clients** and the total **Enabled Clients**.
4. Select *Manage Advanced Comms*.

5. On the **Clients Settings** tab, you can:
    - Individually select the **Enabled** toggle to the right of the Client.
    - Select more than one checkbox to the left of each Client Name and then select **Enabled/Disabled** in the top right corner.
    - Select the checkbox to the left of the Client Name heading to mark all displayed Clients and then select **Enabled/Disabled** in the top right corner.

    > ⚠ If you have more than one page of Clients, you will need to go to each page to enable that page of Clients.

Setting up Service Status Communication

This page allows you to configure which Status values generate our HTML email communications and/or SMS Text communications.

For any Status where you have enabled communication, you can choose to have the communication be generated automatically or you can set “Required Confirmation Before Sending” to enabled to have the user indicate when it’s time to send communications for this Status value.

Initially, only 20 Service Statuses display per page. You can change the number of Statuses to display by selecting the **Rows per page** drop-down and selecting a different number or you can navigate to additional pages by either selecting a page number or by using the scroll buttons. Use the **Filter** field to find a specific Status.

To set up the Service Status Advanced Communications:

1. Select the **App Drawer** icon.
2. Select the **Admin** icon to access the Admin dashboard.
3. On the Advanced Communications card, select *Manage Advanced Comms*.
4. Select the **Service Status Settings** tab. See *Service Status Overview* for Status definitions.
5. On the Service Status Settings tab, you can enable the following options:
    - **Enable Communication**: Only the Service Statuses that have been enabled will have updates emailed to enabled Clients. If you have enabled your Clients but not the specific Status, an email will not be sent to the enabled Clients.
    - **Require Confirmation Before Sending**: Enable this option to require users to select a Send button prior to sending Status Update emails to your enabled Clients. If this is not enabled, automatic emails may be sent to enabled Clients. This will only apply to enabled Statuses.
    - **Alert Technician via SMS**: Enable to send an SMS text message to Technicians when a Service Appointment's Status changes to Cancelled, Rescheduled, and/or Scheduled.
6. For **Enable Communication** and **Require Confirmation Before Sending** options:
    - Select individual Service Entity Service Status options to the right of each entity's Status.
    - To enable one or more Service Statuses, you can mark multiple checkboxes to the left of the specific Service Entities, OR you can mark all the displayed Service Statuses by marking the checkbox to the left of the Service Entity heading, and then select **Enabled/Disabled Communication** and/or **Enable/Disable Confirmation** in the top right corner.

    > ⚠ If you have more than one page of Service Entities and their Statuses, you will need to navigate to each page to enable that page of Service Statuses.
7. The **Alert Technician via SMS** option needs to be enabled individually for any of the three available Service Appointment Statuses (Cancelled, Rescheduled, and/or Scheduled).

Service Statuses

The following Building Optimization Broker Service Statuses can be set up to have communication automatically sent, require confirmation before sending, and/or alert Technician via SMS.

Service Call Statuses

Status	Description
Complete	The service call has been completed.
Declined	The service request was declined in Schedule.
Error	The service request has an error.
Open	An appointment has been made for the Service Call in Building Optimization Broker.
Requested	The service request is created.

Service Appointment Statuses

Status	Description
Cancelled	The appointment is cancelled.
Complete	The appointment is complete.
Open	The appointment is assigned to the Technician.
Rescheduled	The appointment has been rescheduled.
Scheduled	The appointment is scheduled.
Tech Arrived	The technician has arrived at the Client site.
Tech Dispatched	The technician is on the way to the Client site.
Work Complete	The technician has completed the work.

Status	Description
Work Started	The technician has started the work.

Attribute Management

Attribute Management is used to set up attributes for different entities. For example, you can set up specific contact titles that are used globally in your BOB application.

1. From the Mega Navigation, under Admin, select **Attribute Management**.
2. In the Details section, select the **Entity** dropdown and select **Global**.
3. Select the corresponding **Attribute**. The attributes displayed depend on the selected entity, but may include:
    - Contact Title
    - Equipment Type
    - Job Issue Type
    - Priority
    - Sensor Type
    - Skill Level
    - Skill Type
    - System Type
    - Workorder Status
    - Workorder Status Reason
    - Workorder Type
4. In the Value Configuration section, the Available list displays attributes that are not currently assigned to the selected entity. Any proprietary attributes are also filtered out of the list.
5. Select *Add Attribute Value* to add a new attribute value to the Available list. Enter the title and then select the checkmark icon.
6. The current attribute values display in the Selected list. These attributes display, for example, when you select the Contact Title drop-down in a window.
7. You can use the buttons between the two lists to:
    - Add/remove one or more attributes to either list.
    - Reorder the list of attributes as they display in the drop-down. You can also drag and drop the attributes to the order you prefer.
8. Select *Save*.

Working with Conversions

There are times when the units used for the measurement, do not match the measurement standards for certain processes and applications. Converting such units to an extent that they can be applied properly is important. A conversion can be added to a sensor when creating or editing a sensor. See Working with Sensors (page 48).

In the Conversions window, the conversions that you create are displayed in the Company Conversions list. These conversions can be edited and/or deleted. The K2A Conversions are supplied by WennSoft. These conversions cannot be edited or deleted.

Creating a Conversion

1. From the Mega Navigation, under Admin, select **Conversions**.
2. Select New Conversion.
3. In the Builder section, complete the following fields:
   See Example Conversions (page 198) below.
   - **Conversion Name**: Enter a name.
   - **Raw Data Type**: Select the originating data type.
   - **Display Data Type:** Select the conversion data type.
   - **Default Result**: Select or enter the result.
4. If more conditions are necessary, you can add these in the Conditions section by entering the **Condition** value and then the **Result**.

   Examples

   If you are converting an Integer to a Boolean, additional conditions may be:
   - Condition is 0, then the Result is False.
   - Condition is 1, then the Result is True.
   - Condition is 2, then the Result is True.

   If you are converting a Text to a Boolean, additional conditions may be:
   - Condition is Occupied, then the Result is True.
   - Condition is Unoccupied, then the Result is False.
5. Select *Create.*

Editing a Conversion

Editing a sensor will affect all sensors that are using the conversion.

1. From the Mega Navigation, under Admin, select **Conversions**.
2. Select the *Unit Conversion* Icon from the left sidebar.
3. Select the conversion to edit.
4. Edit any of the following fields:
   - Conversion Name
   - Default Result
   - Conditions (editing existing or adding new)
5. To revert the conversion to its previously saved state, select *Actions* and then select *Reset*.
6. Select *Save.*

Deleting a Conversion

Deleting a conversion will affect all sensors that are using the conversion. The sensors will revert back to their raw data types. This may impact the ability of rules to produce faults.

1. From the Mega Navigation, under Admin, select **Conversions**.
2. Select the conversion you want to delete.
3. Select Actions located in the right corner and then select *Delete Conversion*.

Example Conversions

Raw Data	Display Data Type	Default Result
Boolean	Boolean	True or False
Boolean	Integer	Define integer.
Float	Boolean	True or False
Integer	Boolean	True or False
Integer	Integer	Define result.
Text	Boolean	True or False
Text	Integer	Define integer.
Text	Text	Define text.

API Docs

API Docs provide 3rd party developers (and customers) access to a set of REST APIs for interfacing with K2A applications. The REST API is currently in limited release. For information on how to use Swagger UI for API testing, see https://dzone.com/articles/how-to-use-swagger-ui-for-api-testing.

To access the Swagger UI API Docs:

1. From the mega navigation, select **API Docs**.
2. On the API Docs landing page, select from the following options. (Available options may change.)

- Accounts
- Admin
- Agent Configurations
- Agents
- API Metadata
- Areas
- Authorization
- Campus
- Clients
- Company
- Contacts
- Devices
- Entity Mappings
- Equipment
- External Clients
- External Contacts
- External Equipment
- External Sites
- External Technicians
- FetchScoreFaultKPI
- Health Checks
- Health History
- Profiles
- Report Bookmarks
- Reports
- Rules
- Scoring
- Sensor Calculations
- Sensor Data
- Sensors
- Sites
- Subscriptions
- Systems
- Units
- Weather Data
- Weather Stations
- Worker Processes

Glossary

A

Accent Color	Color used to identify your company within reports within the program. This color can either be selected using a color selection tool, or hex by using a hex format (#000000). Using an accent color you can brand your program reports to match your business colors. See Working with Companies (page 185).
Actions	Menu used to trigger procedures. For usage within a dashboard, click the Actions menu and then select the procedure you would like to run (e.g. create client, export data). See BOB Dashboards (page 9) for more information.
Active Faults	A device that is in fault for the specified time frame. Active Fault numbers are displayed dynamically within the Rule Builder based on time-series data. See Rules (page 98) for more information.
Admin	Within Admin, you can manage companies, user roles, user accounts, scoring, billing information, and advanced communications. See Admin (page 185) for more information.
Agent	A piece of hardware or software used to connect from your location to the WennSoft cloud. The agent is used to read and write data to the cloud and respond and react to events from your systems.
Agent Serial Number	The agent serial number is printed on BAS hardware agents. For software agents, the serial number is displayed on the BAS Agent setup page within the software.
Aggregates	Grouping method used within rule processing to help you look back through time-series data after a rule has been evaluated. See Additional Rule Processing (page 99).
Alerts	You can subscribe to alert notifications to receive an SMS and/or email when a rule fault occurs for the entity and its children. Alerts help you understand where opportunities may lie to improve performance or create a service request to investigate. See Subscribing to Alert Notifications (page 15) for more information.
Analog	BACnet device communication utilizes analog input values for network communication. See Managing BACnet Objects (page 181).

API Docs	Provides 3rd party developers (and customers) access to a set of REST APIs for interfacing with WennSoft applications. For more information and instructions for use, see API Docs (page 198).
Application	The generic term used for applications within the program (e.g. services, reporting, rules).
Application Permission	Determines user access to applications within the program (e.g. services, reporting, rules). See Working with Roles (page 188).
Apply	Button used to assign criteria within the program (e.g. apply agent, apply calculated sensor, apply profile).
Architect	Application focused on mapping device objects from BAS Agents (configured in the IoT Hub) to a data model used throughout the BOB program. The data model used in BOB includes clients, campuses, sites, systems, areas, etc. For more information, see Architect (page 137).
Area	A grouping of equipment used to identify a sub-section of a site. By using areas, you can identify important grouping sections of a site. A default area is when a site is created to represent the entire site, and cannot be modified. Equipment within an area can be used in one or more areas as needed. See Working with Areas (page 145)
Area Unit of Measure	A quantity used as a standard of measurement. When used for area, the measure defines how area is calculated within the program. See Creating an Area (page 146).
Axis	These fixed reference lines are located within graphs in the program to identify the x-axis and y-axis to identify trends and plot program data. See Configure the Sensor Graph (page 54).

B

Background Job	A process that runs behind the scenes without user intervention. Typical tasks for these processes may include logging, system monitoring, scheduling, exporting data, and user notifications. See Managing Background Jobs (page 16).
BACnet	A communication protocol for Building Automation and Control (BAC) networks that leverage industry standard protocols. See Managing BACnet Objects (page 181).

BAS	A building management system (BMS), otherwise known as a building automation system (BAS), is a computer-based control system installed in buildings that controls and monitors the building's mechanical and electrical equipment such as ventilation, lighting, power systems, fire systems, and security systems. This system is composed of both hardware and software.
BAS Agent	An agent specific to a building automation system (BAS) that contains drivers used to communicate with BAS system. See Working with BAS Agents (page 163).
BCU	A Building Control Unit (BCU) houses devices and objects that are used for program communication.
Blocks	Term used to represent elements used to create formula criteria within the Formula Editor. These blocks include formula elements such as sensors, logic operators, math operators, etc. See Working with Formula Editor Blocks (page 109).
Boolean	A data type used in computing that is algebraic in nature that looks for a status of an object (e.g. on/off, yes/no, true/false). This data type is used by BACnet objects within a BAS network. See Sensors Overview (page 45).
Building Type	Used to identify what a building is used for within a site (e.g. laboratory, data center, hospital, hotel, etc.). See Creating a Site (page 140).

C

Campus	A grouping of sites used for reporting and analysis within the program.
Change Count	Number of times a rule transitioned from a faulted state to an okay state and vice versa over the duration of time specified. See Additional Rule Processing (page 99).
Children	A data hierarchy is used throughout the program to group data. In this tree-like data organization structure child records are nested under a parent record. This structure allows reports to be generated based on the parent record that could include all associated child records currently nested under that parent record. For example, you can run a report for your entire building (parent) which includes reception, laboratory, and manufacturing (all children).

Client	A customer of a company that can only be associated with one company. The following is an example of data hierarchy in the program starting with the largest grouping to the smallest. • (Company>**Client**>Site>Equipment)
Company	A company is a grouping that houses all data for a specific company and can have more than one client. The following is an example of data hierarchy in the program starting with the largest grouping to the smallest. • (**Company**>Client>Site>Equipment)
Conditional Formatting	Method used to highlight cells or ranges of cells to help you visually detect critical issues and identify patterns or trends. When the criteria is met, the cell range is formatted. See Conditional Formatting (page 53).
Contact	An individual who works with the client is referred to as a client contact. This individual may also be used for contacting, if needed. See Adding a Client Contact to a Service Request (page 86).
Current Period Faults	The number of times an object falls in and out of fault within the specified time period used to track key performance indicators (KPI). For example, if a fault has gone in and out of fault three times within that time period, this counts as 3. If the fault has stayed in fault during the time period, then this would count as 1. See Key Performance Indicators (KPIs) (page 14).
Custom Rule	A rule within the program defines a set of facts, rules, and constraints that are used to gauge performance scoring criteria and event notification of devices in real-time, providing a quick analysis on how equipment is operating and performing while sending alerts when critical events and alarms occur. When using an existing rule you can make changes to the rule to meet your business needs. When the rule is changed it is no longer a system (pre-defined) rule, but is now classified as a custom (user-defined) rule. For more information, see Rules (page 98).

D

Dashboard	Used within the program as an interface to provide at-a-glance views of key performance indicators and data analysis, and may sometimes include graphical items for visual display. See Key Performance Indicators (KPIs) (page 14) .
Date/Time Picker	Used to limit data displayed by defining a date range and time. When using the date/time picker you can select to either use the current date and time, previous 24 hours, or a custom data and time of your choosing. See Using the Date/Time Picker (page 11).

Dataset	A logical grouping of data that is collected as a result of a query. This data may contain timing, temperatures, fault information, scoring, etc.
Deactivation	To make inactive. For example, a technician will not display in the active list for a service call if they are deactivated and not available. See Deactivating a Technician (page 161).
Debug	Process used to identify and remove errors when using rules. See Debug a Rule (page 100).
Decline	Used with service requests to deny a request.
Default Company	Once specified, the default company is the company you automatically are routed to after signing in to the program. The default company is set within your user profile for quick access to the correct data view. Different users can have different default companies to see the data that is impactful to them.
Delete	Action to remove existing information within the program. Typically, items such as permissions can only be deleted if they have not been assigned or are no longer in use (e.g. delete a role). See Deleting a Role (page 189).
Device	A control system in a Building Automation System (BAS) used to draw a conclusion on what action has to be taken (e.g. start the blower).
Device Object	A sensor, actuator, or virtual value (data point) within a device controller used to compare the actual state (e.g. temperature) with a target state.
Driver Configuration	Software that is loaded onto an Agent to provide it with the connectivity requirements needed to communicate with the given on-premise system.

E

Edit	Action to make change to existing information within the program (e.g. edit a role). See Editing a Role Description (page 188).

Ellipsis	A set of dots is known as an ellipsis (e.g.). Typically, used as an icon for use with rules, filters, and other items for modification within the program.
Email Alias	An email address created for and used only for email forwarding. For example, an email alias will be used for service calls within the program in order to forward service requests. Since this email address is not intended for outbound emails, we recommend not using your own personal email address. The email alias should be unique to your company and used only for forwarding the requests. See Email to Service Call Settings (page 88).
Energy	An application within the program that houses the Energy Utility Dashboard. This dashboard displays billed utility energy data for your sites and which are performing better than others. See Energy Utility Dashboard (page 81).
Entity	An entity is a tangible thing which can be distinctly identified. For example, company, equipment, sensor, system, etc.
Equipment	Hardware located at a site that can serve a number of areas (e.g. air handlers, water systems).
Equipment Sensor	Analog or digital inputs that measure and detect when a device is on or off (e.g. temperature, humidity, pressure).
Error Message	A displayed notification that the program encountered a problem. For example, when using the Rule Debugger, an error may display with a message providing details on why the rule failed. See Debug a Rule (page 100).
Export	To transfer data in a format that can be used by other programs (e.g. exporting dashboard data). See Exporting and Downloading Data (page 10).

F

Failure	An unsuccessful result of an action or set of actions. Device objects (sensors) are polled on a time interval to monitor the success and failure of their performance incrementally and reported to the program for target and failure counts also referred to as key performance indicators (KPIs). See Key Performance Indicators (KPIs) (page 14).

Failure Counts	An unsuccessful result of an action or set of actions that is counted per failed occurrence. Device objects (sensors) are polled on a time interval to monitor the success and failure of their performance incrementally and reported to the program for target and failure counts also referred to as KPIs. See Key Performance Indicators (KPIs) (page 14) .
Fault	Fault is another word for an unsuccessful result in a BAS system. Being able to identify the root cause of the fault is important to being able to fix the problem. Knowing a fault exists you can better identify observable symptoms that may help you fix the problem within your system.
Fault Detector Status	Displayed status that indicates the success or failure using rule logic.
Fault Logic Editor	This editor allows you to select sensors, logic operators, and math operators to configure formulas to gather calculated data. Logic that is created within this editor has access to the rule formula calculated data and all sensors defined in the Rule Sensors table. Using the values for each sensor for a specific timestamp you can calculate rule fault logic. See Working with Rule Sensor Filters (page 105).
Filter	Action used within the program to remove undesired results, or focus on specific data needed for use. For example, within a dashboard you can use a filter to display only results that are currently in an active status.
Formula	A mathematical expression used for calculation within the Formula Editor. See Working with Formula Editor Blocks (page 109).
Formula Editor	The Formula Editor allows you to select sensors, logic operators, math operators, etc. to configure a formula that results in an output. The rule formula has access to all sensors defined in the rule sensors table. The values for each sensor for the particular timestamp can be used to calculate a rule formula output.
FSM Integration	Used to connect field service management systems (FSMs) to the program. See Working with FSM Integrations (page 175).

G

General Sensor	Used when your rule spans equipment or system types. For instance, you may have a rule that can target fan coil units as well as VAVs. In this case, you'll want to be able to source sensors independently of the equipment that is targeted.

Grid	A framework of spaced lines that run across a display view and form a series of squares or rectangles. Within the program, the Sensor Grid displays equipment and time-series data for that associated equipment in a grid view.

H

Health Monitor	Display view within the dashboard to view company faults associated with rules that can also be used to create service requests.

I

In Fault	When an unsuccessful result of an action or set of actions is currently in failure for a device object (sensor).
Inspection Report	Report used to provide building performance and energy efficiencies utilizing program data that is collected from the Building Automation System (BAS). Using this report you can analyze the performance for opportunities for improvement. See Reporting (page 90).
Interval	The cadence of time that data is pulled from the BAS.
IoT	The Internet of things (IoT) describes physical objects (or groups of objects), that are embedded with sensors, processing ability, software, and other technologies, that connect and exchange data with other devices and systems over the Internet or other communication networks.

K

K2A Rule	A rule library containing a collection of rules provided by WennSoft that includes target filters that can be used as-is or modified, as needed. If a K2A rule is used as-is and the rule is updated by WennSoft, the rule will automatically update with the latest information. If the K2A rule is used and modified, when the rule is updated by WennSoft, the rule will not be modified since it has been customized to meet your business needs.
K2A Account	A WennSoft (K2A) account is required for access to Building Optimization Broker and was first introduced in ESMS.

KPI	Key Performance Indicators (KPIs) are a set of measurements used to gauge a company's overall long-term performance. They help determine a company's strategic, financial, and operational achievements. Within the program KPIs are accessible from the equipment, site, and system dashboards.

L

Logo	Image that represents the brand of your company used within the program for deliverables (e.g. reports, emails, etc.). See Working with Companies (page 185).

M

Measurement	When working with weather sensor filters measurements such as temperature, pressure, humidity, etc. are used to measure weather station data. See Creating a Weather Sensor Filter (page 107).
Mega Navigation	Also known as a mega menu, this expandable menu displays when you hover over a link or a defined area and displays multiple columns of menu choices. For more information, see BOB Dashboards (page 9).

N

Niagara	Also referred to as Tridium Niagara (oBIX) is a building management system that utilizes HTML framework to connect embedded devices or systems across a communication network. See Tridium Niagara (oBIX) Configuration (page 167).

O

Occurrence Count	Used within rule processing to keep count of objects in faulted state for a consecutive set number of times. See Additional Rule Processing (page 99).

P

Percent Active	The percentage of rules that have been in a faulted state for a set percentage of time over the duration specified, used within rule processing. See Additional Rule Processing (page 99) .

Percent Change	A KPI used for scoring. This value represents the score for the currently selected time frame compared to the previous time frame. See Key Performance Indicators (KPIs) (page 14).
Preview	Used in reporting to display your report results prior to printing. See Reporting (page 90).
Previous Period Fault Occurrences	A KPI used for scoring. The number of times in and out of fault for the prior time frame than the specified time period. See Key Performance Indicators (KPIs) (page 14) .
Priority	Used within the Health Monitor to represent the severity of the rule when in a faulted state (low, medium, high). See Working with Health Monitor[18].
Profile	A template representing where the device objects exist within a given device type. Profiles are used by agents to identify where devices and devices objects are located on a network for agent communication.
Profile Object	Provides the profile a specific location for a device object used for agent communication.

Q

Query	A precise data request for information retrieval from a database.
Quick Navigation	Navigation method accessible at the top of the program used to move through the dashboard. By selecting the company, client, site, and equipment and then selecting the Go button you can navigate to a specific view in the dashboard of data. See BOB Dashboards (page 9).

R

Read-Only	User role permission used for viewing, but not changing information within the program.

18 https://wennsoft.atlassian.net/wiki/pages/createpage.action?spaceKey=ZAR&title=Working+with+Health+Monitor

Recalculate	Process within the program to re-run a rule for a period of past data. This is helpful if you have made changes or updates to formulas or fault logic. See Recalculate a Rule (page 99).
Recommendation	The program provides a course of action "recommendation", when a rule is in a fault state but should be on target.
Role	A set of user permissions assigned to a user in the program (e.g. administrator).
Rule	A rule within the program defines a set of facts, rules, and constraints that are used to gauge performance scoring criteria and event notification of devices in real-time, providing a quick analysis on how equipment is operating and performing while sending alerts when critical events and alarms occur.
Rule Builder	This application is focused on leveraging sensors and other entities created in Architect to monitor equipment and system health using data being collected from the BAS system. The Rule Builder additionally utilizes rules to define constraints used to gauge system performance for scoring. See Rules (page 98).
Rule Library	A collection of rules provided by WennSoft, including target filters, that can be instantiated and used as-is or in a modified fashion. If a K2A Rule is used as-is, when the rule is updated by WennSoft, the rule will automatically update with the latest information. If a K2A rule is used in a modified fashion, when the rule is updated by WennSoft, the rule will not be modified as not to overwrite the customizations made by the user.
Rule Sensor Filter	A collection of defined filters that are made available to the rule formula and fault detector logic for calculating their respective outputs.
Rule Target	A piece of equipment or system. Rule targets are defined by a target filter in a rule. Rules can only target systems OR equipment, not both.

S

Score Graph	Graphical (default) display of a line graph for the selected sensors to display sensor scoring. See Sensors Overview (page 45).

Score Grid	Graphical grid view that displays sensor and scoring in 15-minute intervals. By default, this view displays the site score. See Sensors Overview (page 45) .
Score Value	Rule scoring is used within the program to view the overall score for a piece of equipment or system as well as per rule score for the equipment. Score values are used to proportionally decrease or adjust the score based on its priority using the minimum and maximum score values determined. See Creating a Custom Rule (page 103).
Scoring	Provides a simple way to visualize and communicate which equipment and systems are performing better or worse than others based on a score value. Rules are used as the basis of the scoring and can be weighted accordingly based on user setup. By default, each equipment or system starts with a score of 100%. As rules are evaluated, that score is decreased based on the priority of the faults that occur on a piece of equipment or system. For more information, see Scoring (page 136).
Sensor Aggregate	Combined sensor time-series data that can be evaluated at a sensor level to find things like count, average, delta, minimum, and maximums. For more information, see Sensor Aggregate (page 108).
Sensor Graph	A visual display view displaying a line graph of the selected sensors over time. See Configure the Sensor Graph (page 54).
Sensor Grid	Display view in a row format displaying sensor scores in time intervals.
Sensors	A sensor is an entity representing a value that changes over time and always has a parent entity such as a piece of equipment or a system. A sensor points back to a single device object. You can access the Sensor Dashboard by selecting a piece of equipment or a system. See Sensors Overview (page 45). The following are examples of sensor types within the program: • General sensors • Equipment sensors • System sensors • Weather sensors • Rule sensors
Service Request	A request for client service to address a particular issue. For more information, see Service Requests (page 83).

Site	A building with a physical mailing address that contains a group of equipment. The following is an example of data hierarchy in the program starting with the largest grouping to the smallest. • (Company>Client>Site>**Equipment**)
Site Score	Using the Inspection Report the site score is displayed for establishing site metrics used to gauge site performance.
Skill Level	The ability to classify a level of expertise for a given task. Used within the program in reference to service requests.
Skill Type	The ability to classify a type of expertise for a given task. Used within the program in reference to service requests.
Subject	Used within appointments to identify the purpose of the appointment. See Creating an Appointment (page 87).
Subscribe	Used to opt in to receive communication for program alerts that can be received by email or text message. See Subscribing to Alert Notifications (page 15).
Status	Used with service requests and appointments to identify the state of the call or appointment. For more information, see Service Statuses (page 195).
System	A collection of equipment that works together to serve a specific purpose. The system dashboard displays sensors, faults, scores, rules, and equipment information for the selected system. See System Dashboard (page 33).
System Effect	Used within the Health Monitor to describe what effect the rule has on the target entity when it is in the Fault state. See Working with Health Monitor[19].
System Sensor	A system sensor is created for a system, not a piece of equipment (e.g. CHW Different Pressure Sensor).

19 https://wennsoft.atlassian.net/wiki/pages/createpage.action?spaceKey=ZAR&title=Working+with+Health+Monitor

T

Target Count	Numeric value that represents a goal (target) that's used to represent the target count needed for optimal performance and efficiency within the Inspection Report. See Reporting (page 90).
Target Range	Time frame of month and year that is used for goal (target) calculations to gauge optimal performance and efficiency within the Inspection Report. See Reporting (page 90) .
Technician	A person who performs work on a client's site. See Working with Technicians (page 161).
Time-series Data	Data collected from a BAS system (listed or graphed) in time order over a period of time.
Time Zone	Used to determine how data is displayed and appointments are scheduled based on the time zone selected. Time zones allow you to set different time zones for different company's, if needed so the data is relevant to their location. See Creating a Site (page 140).
Trend Interval	Setting used to determine how often in minutes new data is collected. See Setting the Trend Interval[20].

U

Unit	Used to identify measurements (units) for certain processes and applications. See Working with Unit Conversions (page 149).
Unscheduled Appointments	Appointments that have not been scheduled. See Creating an Appointment (page 87).
Unsubscribe	Used to opt out of receiving communication for program alerts that can be received by email or text message. See Subscribing to Alert Notifications (page 15).

20 https://wennsoft.atlassian.net/wiki/spaces/CONNECT2018/pages/8619727/Setting+the+Trend+Interval

User	An individual who has a WennSoft account and has access to the Building Optimization Broker platform. Users can be invited into any number of companies with a single role in each company. See Working with Users (page 186).
User Details	Located within the User Profile to store detailed user information such as email address, phone number, address, time, and date information. See Working with Users (page 186).

W

Weather	Automatically created when you create a site based on the postal code for the site. If changes to the site address are made, the weather entity updates automatically to the new postal code. See Working with Weather (page 141).
Weight	When using custom rules you can enter custom weight values that determine how much each rule decrements the parent entity's score. See Creating a Custom Rule (page 103).
Workbook Mode	Interactive display mode used to filter and display data based on criteria you determine. Workbook Mode is a temporary filter view you can use to display different grid information and navigate to specific equipment, system, company information until the mode is cleared. See Filtering Data (page 11).

Contact Information

Support & Sales

Support Phone: 262-317-3800
Email: support@wennsoft.com
Hours: Normal support hours are 7:00 a.m. to 6:00 p.m. Central Time. After-hours and weekend support is available for an additional charge. Please contact WennSoft Support for additional information.

WennSoft will be closed in observance of the following holidays: New Year's Day, Presidents' Day, Memorial Day, Juneteenth, Independence Day, Labor Day, Veterans' Day, Thanksgiving Day, the Day after Thanksgiving, Christmas Day, and the Day after Christmas.

Support Plans
We're committed to providing the service you need to solve your problems and help your team maximize productivity.

We offer several Signature Enhancement and Support Plans to meet your needs and Extended Support Plans for retired product versions available at https://www.wennsoft.com/wsportal.

Sales
Phone: 262-317-3700
Fax: 262-317-3701

Address
WennSoft Headquarters
1970 S. Calhoun Rd.
New Berlin, WI 53151-1187

Phone: 262-821-4100 or 866-539-2228
Email: info@wennsoft.com
Website: www.wennsoft.com
Office hours: Monday through Friday from 8 a.m. to 5 p.m. Central Time.