PI Vision 2017 R2

User Guide

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PI Vision 2017 R2 User Guide

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Contents

What's new in PI Vision 2017 R2

PI Vision 2017 R2 introduces the following new features and enhancements:

- **Format values**

  When configuring symbols, you can specify how symbols show numbers, either as a database, general, or scientific format, or with a number of decimal places. See the topics to format or configure each symbol under Symbol types.

- **Asset switching enhancements**

  For displays with assets, you can:

  - Configure assets included in the display's asset list
  - Configure the asset list to treat the changed asset as a root asset and change any children or descendant assets
  - Hide the asset list for complex displays
  - Filter assets in the asset list

  See Assets in displays.

- **Hyperlinks in attribute values**

  Attributes that store a URL generate a hyperlink in value, table, and asset comparison table symbols.

- **Display organization**

  You can create folders to store PI Vision displays. You can also store PI Vision displays in the same folder as PI ProcessBook displays. See Folders.

- **XY plot**

  The XY plot symbol matches data items and plots the matched data points. With an XY plot, you can identify correlations in process data or changes in process. See XY plot.

- **Events table**

  The events table symbol shows all events for defined search criteria. By default, an events table shows events that are active in the time range for the assets on the display. See Create an events table.

Overview of PI Vision

Welcome to PI Vision!

PI Vision is the new name for PI Coresight (re-branded in March 2017). See the OSIsoft Tech Support article AL00314 - PI Coresight is now PI Vision (https://techsupport.osisoft.com/Troubleshooting/Alerts/AL00314).

PI Vision is an intuitive web-based application that enables you to easily retrieve, monitor, and analyze process engineering information.

PI Vision allows you to:

- Search for PI data on desktop or mobile platforms.
- Visualize PI data as symbols, such as trends, tables, values, gauges, and XY plots.
- Create a symbol collection.
- Configure multi-state symbols to create visual alarms for critical process states.
- Design, format and save displays for easy retrieval and further analysis.
- Analyze and compare events.
- Monitor process data in displays.
- Share displays with other members of a group or anyone with access to PI Vision.
- View PI ProcessBook displays.

Note:
For information about installing and administering PI Vision, see the "PI Vision Installation and Administration Guide" in Live Library (https://livelibrary.osisoft.com) or download the PDF version from the OSIsoft Tech Support Downloads page (https://techsupport.osisoft.com/Downloads/All-Downloads/).

Topics in this section

System requirements

PI Vision is supported by most modern browsers on a wide variety of computers, including tablets and phones running iOS or Android operating systems.

To start using PI Vision, navigate to the PI Vision application server that was set up by your administrator. By default installation, the address is: `https://`*`webServer`*`/PIVision` where *webServer* is the name of the PI Vision web server.

Based on the size of the device or browser window, PI Vision attempts to provide the best possible experience. Therefore, a user of a smaller device (smaller than an iPad mini) is by default redirected to the PI Vision mobile website `https://webServer/PIVision/m`.

The PI Vision mobile website shows you the displays and data items that you recently viewed. You can use search to find other displays and data items. You cannot create or update displays on the mobile website.

To get the most from PI Vision, OSIsoft recommends that you use PI Asset Framework (PI AF) to organize your PI System data. PI AF provides a consistent representation of your assets using asset-centric hierarchies and templates and allows you to extract maximum value from your operational data.

With PI AF, you'll be able to take full advantage of the following PI Vision features:

PI Vision Features	PI Data Archive ONLY	PI Data Archive + PI AF
Symbol Collection	✗	✓
Event Frames	✗	✓
Event Details	✗	✓
Event Comparisons	✗	✓
Events Table	✗	✓
Asset Comparison Table	✗	✓
Asset Swapping	✗	✓
Navigation Links with Asset Context	✗	✓

For more information about PI AF, see the OSIsoft Tech Support page PI Asset Framework (PI AF) Overview (https://techsupport.osisoft.com/Products/PI-Server/PI-AF/Overview/).

Note:
PI Vision uses cookies which could have legal implications based on Licensee's geographic location. Please consult with your legal department to make sure you are compliant with relevant laws, rules and regulations, including but not limited to, data protection and cookie directives.

Supported data types

PI Vision supports the following PI point data types:

- Digital (defined states)
- Int (16 and 32)
- Float (16, 32 and 64)
- String (text)
- Timestamp

PI Vision does not support the blob type.

PI Vision supports the following PI AF attribute value types:

- Byte
- Int (16, 32, and 64)
- Single
- Double
- String*
- DateTime*
- Boolean*
- Enumeration*

  *Not supported by Calculated Data function

PI Vision does not support the PI AF attribute value types Guid, Attribute, Element, File, or Array.

Keyboard shortcuts

PI Vision lets you use a number of keyboard shortcuts to accomplish your tasks faster. Here is a list of common commands:

Press	To Do This
CTRL + C	Copy an object
CTRL + V	Paste an object
CTRL + X	Cut an object
DELETE or BACKSPACE	Delete an object
Arrow keys	Move an object
CTRL + Click	Select multiple objects
CTRL + A	Select all objects
SHIFT + Drag	Resize an object while maintaining its proportions
CTRL + Z	Undo an action
CTRL + Y	Redo an action
CTRL + S	Save a display

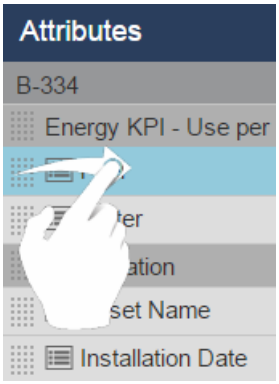
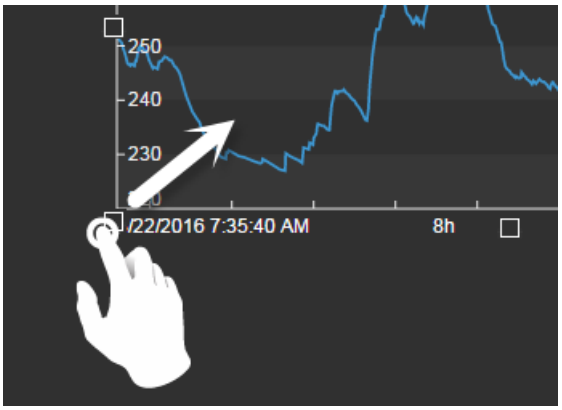
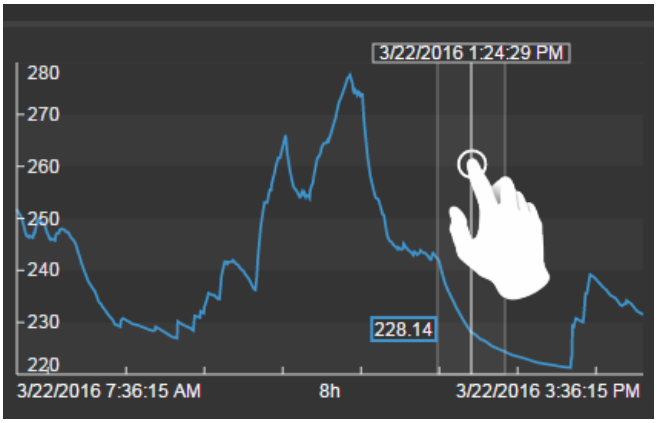
Touch-screen gestures

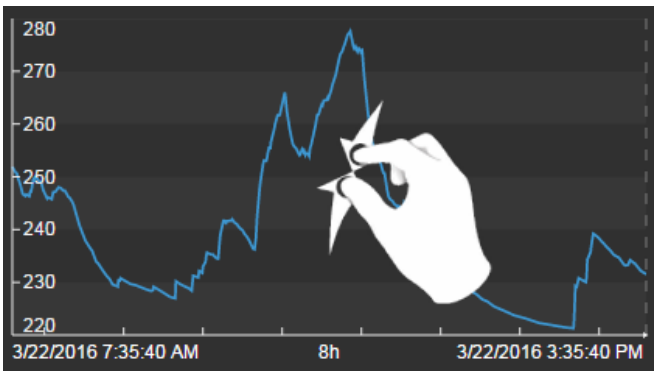
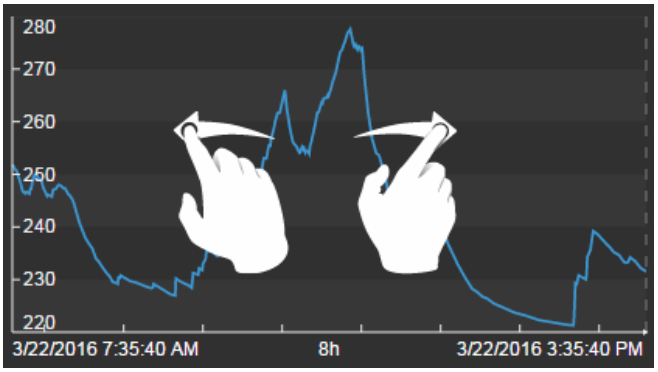
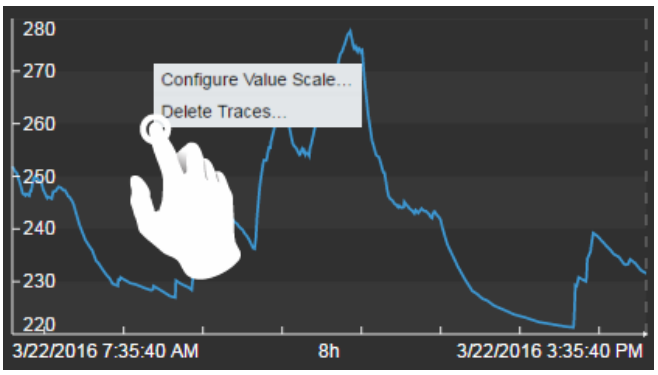
PI Vision works on all touch-screen devices.

If you are working on a laptop-tablet hybrid device such as a touch-screen laptop, you will see the Touch mode  button on the top right corner of the application. Touch mode is designed to optimize touch experience when using a 2-in-1 hybrid device. When you turn on Touch mode, data items in the Assets and Attributes panes will show gripper handles

and you will be able to scroll both panes with your finger. To turn Touch mode off, tap the Touch mode button again.

On any touch-screen device, you can use the following touch gestures when working in PI Vision.

To Do This	Gesture
Drag a data item from search results to the display.	Tap and hold the data item's gripper handle and slide the finger towards the display area. 
Resize a symbol, image, shape or text.	In **Design** mode, tap and hold the sizing handle and slide it to resize the object. 
Add a trend cursor.	Exit **Design** mode and tap anywhere on a trace. 

Zoom in and out on a trend.	Exit **Design** mode and pinch two fingers together to zoom out. Stretch two fingers apart to zoom in. The start time, end time, and duration will change for all the symbols on the display. 
Pan across a trend's time range.	Exit **Design** mode, tap and hold the plot area of a trend and slide right or left to move backwards or forwards in time. 
Show menus to configure or format symbols.	Tap and hold any symbol for a few seconds and quickly release your finger. 
Open a pop-up trend.	Exit **Design** mode and double-tap any data symbol (trend, table, value, or gauge) to view its data plotted as a as a pop-up trend in a separate, new display. The pop-up trend will show data from the symbol on the original display.
Zoom in or out of a display.	Pinch two fingers together to zoom out of a display. Stretch two fingers apart to zoom in.

Getting started

New to PI Vision? Let us help you start using the application right away.

Training videos

To better understand how to use PI Vision, check out our videos on the PI Vision YouTube playlist:

https://www.youtube.com/playlist?list=PLMcG1Hs2JbcvWPkSbIbQEJqsTX9Sa1nty

Topics in this section

Basic tasks

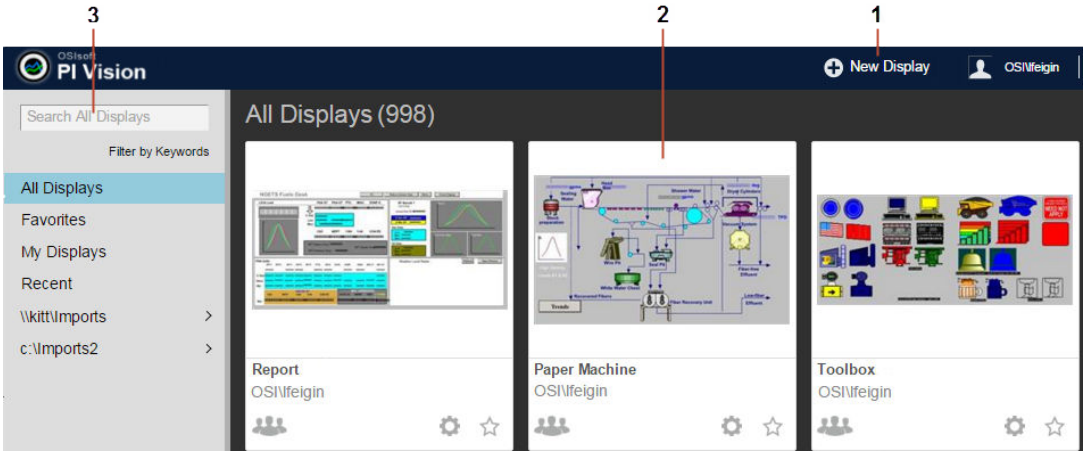
PI Vision organizes your process data into displays which contain symbols, such as trends, tables, values, or gauges. Displays are designed to represent your operational environment and can have symbols, shapes, images, and text.

The steps below will guide you through the basic procedures for creating symbols and designing displays in PI Vision.

Step 1: Create a new display or open an existing display on the home page

When you open PI Vision, you will see the home page with display thumbnails and a search box. The home page is your starting point for finding or creating displays containing PI data. To create a new display, click **New Display** 

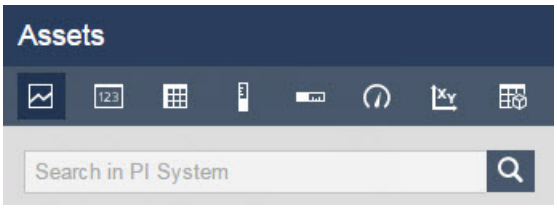
. To open an existing display, click a display thumbnail or use the search box to search for a display name or owner. (See Search for an existing display.)



1. **New Display:** Click to create a new display.
2. **Display Thumbnail:** Click to open an existing display.
3. **Search Box:** Search for existing displays.

Step 2: Search for your process data in a display

Once a new or existing display opens, search for your data in the Assets pane to the left of the display.



There are two ways to find PI data in the Assets pane:

- Search by entering search terms.
- Search by using the navigation tree.

Step 3: Visualize your process data as symbols and add them to a display

- After you find the data item you wish to visualize, select the desired symbol type from the symbol gallery at the top of the Assets pane. You can view your data as a trend, a value, a table, a vertical, horizontal, or radial gauge, an XY plot, or an asset comparison table.

- Click the data item in the search results and drag it onto the display to view it as a symbol with values.
- Move or resize the symbol or add new symbols to the display from the search results.

Step 4: Add shapes, text, or images

- Use the editing toolbar to add shapes, text, or images to the display. You can combine multiple shapes and images to create diagrams or drawings. The editing toolbar only appears when you are in **Design** mode.

- Right-click any shape, text or image to format it in the Format pane.

Step 5: Save a display

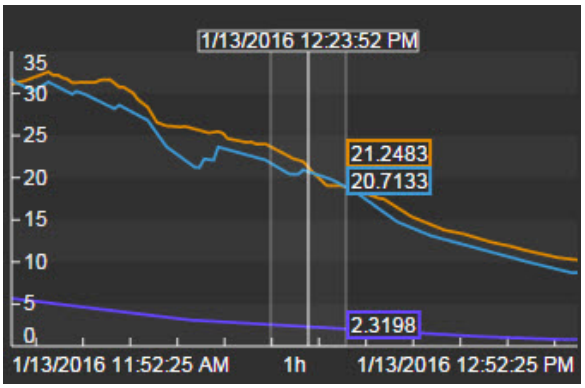
To save your display, click **Save**  in the top-right corner of the display. To save your display with a different name, click the down arrow next to **Save** and then click **Save As** and enter the name of your display in the window.

Next time you are on the home page, you will see your saved display's name and thumbnail.

Step 6: Exit Design mode to monitor a display

To lock your display and start monitoring it, exit **Design** mode by clicking  .

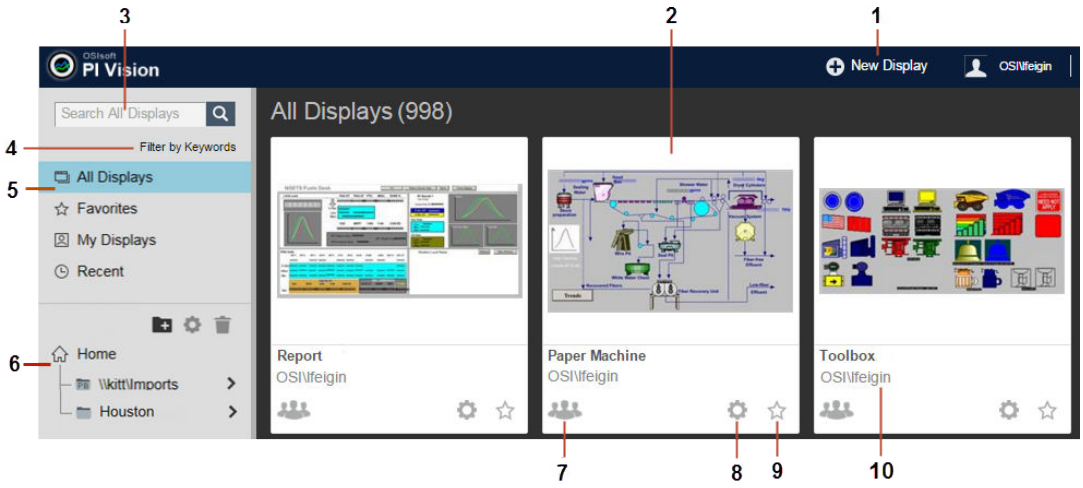
After you exit **Design** mode, you can view trend cursors by clicking on any trend or pan backwards or forwards in time by dragging the highlighted lower section of the trend left or right. (See Monitor displays.)



Home page

The PI Vision home page lists thumbnails of displays that you can access. The page shows groups of displays. When you first open the application, the home page shows all displays. You can set the page to show other groups of displays, such as favorite displays or recently used displays; you can also view displays stored in particular folders. Within a certain group of displays, you can search for displays with particular names or owners, or you can filter by keywords.

From the home page, you can share displays, delete displays, and mark displays as favorites. You can also create new displays. Administrators, and those with write-access, can create folders to organize displays. See Folders.



1. New display button
2. Display thumbnail
3. Search box
4. Filter displays by keywords
5. Predefined groups
6. Folders
7. Shared display icon
8. Settings
9. Favorites
10. Display owner

Videos

For more on this topic, watch the following video:

https://www.youtube.com/watch?v=b5KQTzEG73o&list=PLMcG1Hs2JbcvWPkSbIbQEJqsTX9Sa1nty

Topics in this section

- View a specific group of displays
- Search for an existing display
- Create a new display
- Organize displays with labels
- Share a display
- Mark a display as a favorite
- Delete a display

View a specific group of displays

The home page shows groups of displays. You can select a specific group of displays to view.

Procedure

1. In the pane on the left, select the group of displays to view:
   - Select a predefined group:
     - **All Displays**

       All public and private displays that you have access to.
     - **Favorites**

       Displays that you have marked as favorites (starred displays).
     - **My Displays**

       Displays that you have created.
     - **Recent**

       Displays that you used within the last seven days.

       When you select one of these groups, PI Vision shows the thumbnails from only that group and filters the search box to search within only that group of displays.
   - Select a folder

     Administrators can create folders to store displays. Displays are stored in exactly one folder. The **Home** folder stores displays not stored in another folder. A special icon PB marks folders that can store PI ProcessBook displays.

Results

The home page shows only the thumbnails from the selected group. Any new searches find matching displays within the selected group.

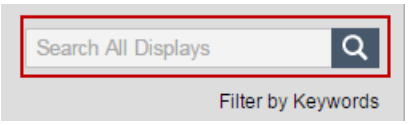
Search for an existing display

Within a selected folder or group of displays on the home page, you can search for displays with particular names or owners.

Procedure

1. Select the folder or predefined group that contains the display. See View a specific group of displays.

   The background text in the search box indicates the group or folder, such as "All Displays," searched.

2. In the search box, enter text found in the display name or the name of the owner.

You can enter wildcards, such as asterisks (*), when you do not know all the letters or words in the display name. A wildcard is a substitute character for a group of letters in a search phrase. PI Vision assumes an asterisk at the end of each entered search query. When you do not know the first one or more words of the display name, enter an asterisk in front of the search term. For example, enter `*dashboard` to find `Mixing Tank Dashboard`.

3. Press Enter or click **Perform Search** .

   PI Vision shows matching displays.

Create a new display

From the home page, you can create a new display.

Procedure

1. Click **New Display** 

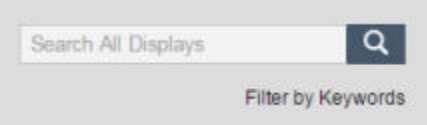
to open an empty display.
2. In the Assets pane, browse or search for data that you want to visualize. See Searching for data.
3. In the Assets pane toolbar, select a symbol type. See Visualizing data with symbols.
4. Drag an asset or attribute from the Assets pane into the display area.

   PI Vision inserts a symbol containing the selected data items into the display.

   For more information about creating displays, see Create displays in Design mode.

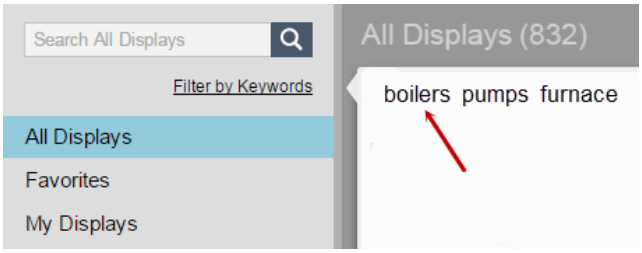
Organize displays with labels

To organize and filter your display thumbnails, you can use the **Filter by Keywords** feature located under the search box. You can create multiple labels for the same display and label as many displays as you wish. Once you create a display label, the search results will return only the displays tagged with that label.



Procedure

1. To create a display label, click **Edit display settings** on the thumbnail of the display.
2. Create a new label in the Display Settings window by entering keywords in the **Keywords** field.
3. After creating a display label, click **Filter by Keywords** icon under the search box on the home page and select that label.



The search results will only show the displays with that label.

If more than one display has the same label text, you can click the related displays icon on a thumbnail to find all displays with that label text. If a display has multiple labels, the related displays icon finds the thumbnail if the text of at least one label matches.

Share a display

By default, when you save a display, it can be viewed only by you, as indicated by the **Private display** icon on the display thumbnail. After creating a display, you can then share it with other users who will be able to open your display in a read-only mode.

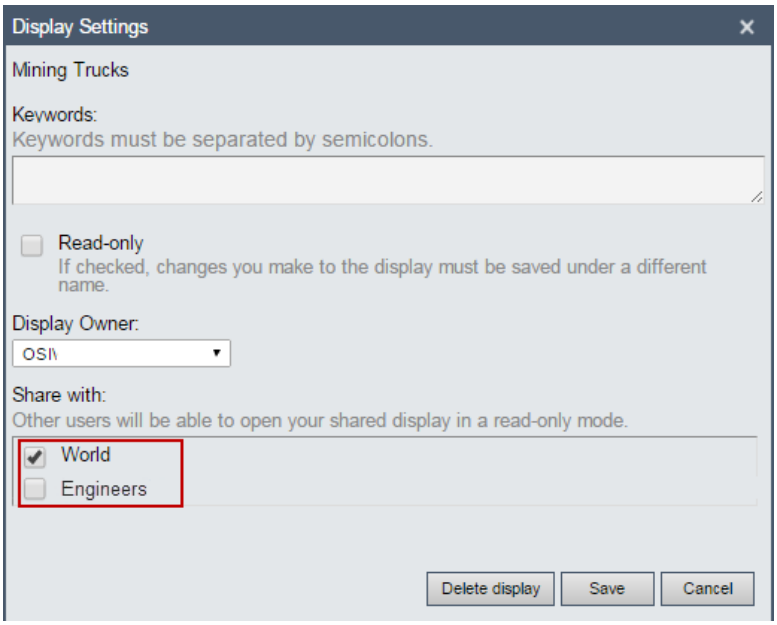
PI Vision allows you to share displays selectively with user groups you belong to. Your user groups are configured by a PI administrator using PI AF identities. A PI AF identity represents a set of access permissions for a group of users. The default PI AF identity group `World` allows you to share your display with everyone in your organization who is its member. Imported PI ProcessBook displays are shared with the PI AF identity `World` by default.

For more information about PI AF identities, see the PI Server topic "PI AF identities and mappings" in Live Library (https://livelibrary.osisoft.com).

Note:
A PI Vision administrator can reassign any user's display to a different user group as well as change the owner of a display in the Display Settings window.

Procedure

1. On the home page, click **Settings** on the display thumbnail.
2. In the Display Settings window, under **Share with**, select the check boxes next to user groups (PI AF identities) with which you want to share your display.



3. Click **Save**.

   The thumbnail icon changes from **Private display** to **Public display** .

Training video

For more on this topic, watch the following video:

https://www.youtube.com/watch?v=w9BARQyedeE&list=PLMcG1Hs2JbcvWPkSbIbQEJqsTX9Sa1nty

Mark a display as a favorite

From the home page, you can mark any display as a favorite. Displays marked as a favorite appear in the predefined favorites group.

Procedure

1. From the home page, click the star icon on the display thumbnail.

   PI Vision highlights the icon , indicating the display is a favorite.

Delete a display

You can delete a PI Vision display from the Display Settings window on the home page.

Note:
PI ProcessBook displays cannot be deleted from the home page. You delete PI ProcessBook displays by removing them directly from the import folder where they are stored.

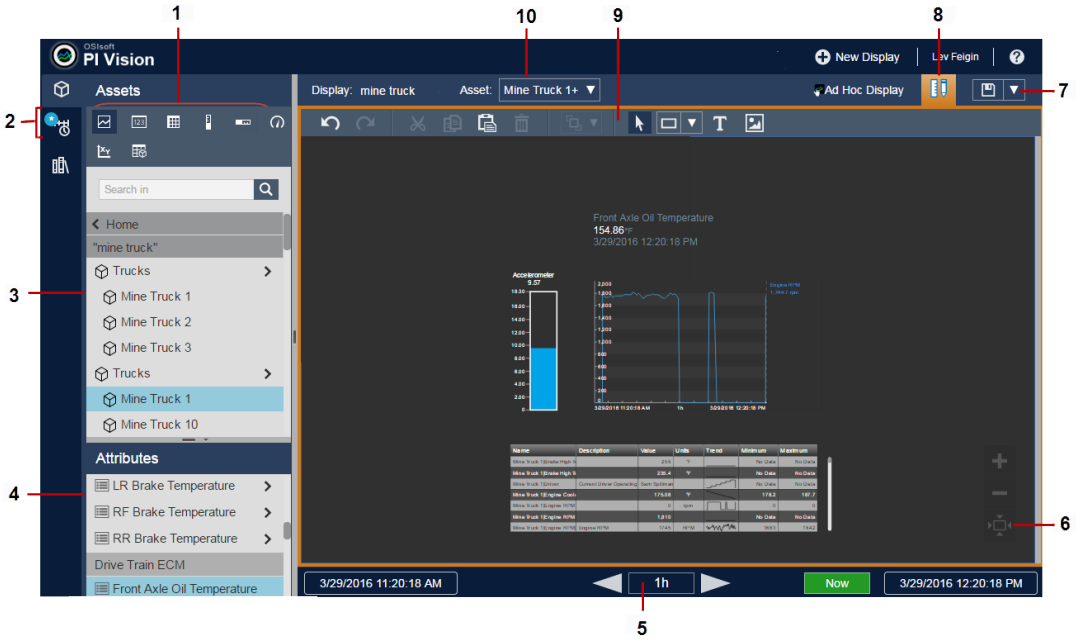
Procedure

1. To delete a PI Vision display, click the **Settings** icon  on the display thumbnail.
2. In the Display Settings window, click **Delete display**.

Display workspace

Displays are the foundation for visualizing data in PI Vision and act as containers for creating, editing and storing symbols that represent your operational environment. Owners of displays can make displays private or share the displays with other users. Each display has exactly one owner, a single user (initially the display creator). Administrators can change display ownership. Only the owner can save changes made to a display. Any changes other users make must be saved as a new display.

The following figure shows the components in a PI Vision display workspace.



1. Symbol gallery
2. Events tab
3. Assets pane
4. Attributes pane
5. Timebar control
6. Fit all and zoom
7. Save button
8. Design mode button
9. Editing toolbar
10. Asset list

From the display workspace, you can:

- Search for data
- Create symbols
- Add shapes, images, and text in Design mode
- Configure multi-state symbols
- Switch assets shown in symbols
- Monitor displays
- Use timebar controls
- Open the Events pane to analyze and compare events
- Save your display

Save displays

You must save displays to save changes that you make. You can save existing displays with a new name. You can also rename existing displays.

Procedure

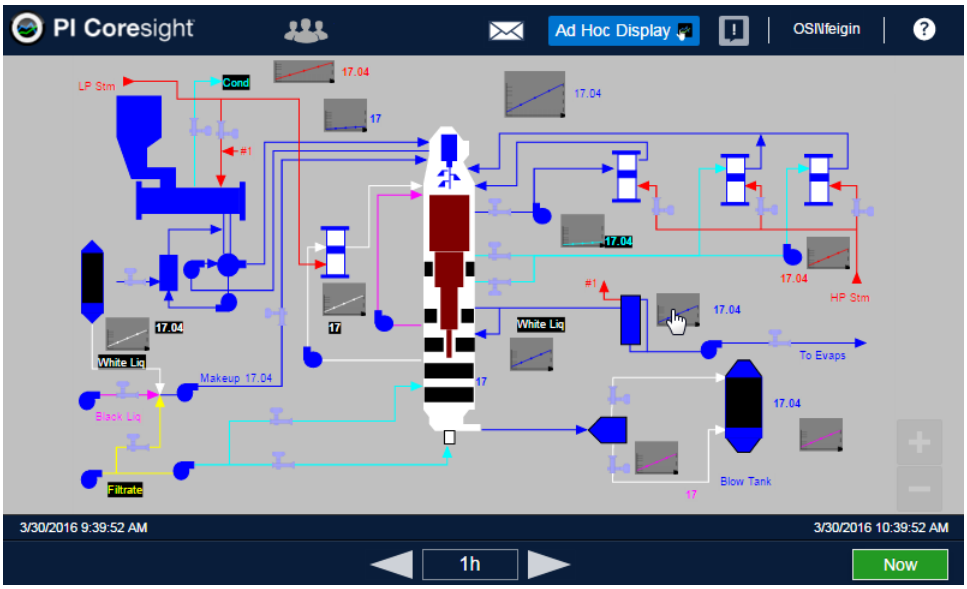
- Save changes made to a display:
  a. Click **Save**  on the title bar or press Ctrl+S.
  b. If the display has not yet been saved, the Save As window opens, where you enter the display name and click **Save**. You can also select a folder to store the display, if you have permission to write to folders.
- Save an existing display under a new name:
  a. Click the arrow next to the **Save** button, and then click **Save As**.

  b. In the Save As window, enter the new name for the display. You can also select a folder to store the display, if you have permission to write to folders.
  c. Click **Save**.
- Rename an existing display:
  a. Click the display name in the title bar.
  b. Enter a new name.
  c. Click **Save**  on the title bar or press Ctrl+S .

Open a PI ProcessBook display

The home page contains both PI Vision and PI ProcessBook display thumbnails. When you open a PI ProcessBook display and hover over any data symbol, the cursor changes to a hand.

Note:
PI ProcessBook displays cannot be deleted from the home page. You can delete them by removing them directly from the import folder where they are stored. To learn more about the PI ProcessBook import folder, see the PI Vision administration topic "Configure PI ProcessBook import folders" in Live Library (https://livelibrary.osisoft.com).



Procedure

1. Click a data symbol in a PI ProcessBook display to open its trend view. The trend's time range is based on the display's time range.

   Note:
   If you click a trend symbol, you see an enlarged version of the trend plus additional descriptive information.

2. Optionally, change the duration and shift the display range forward or backward in time to find the data that interests you.

   Note that the new duration and start and end times apply to the underlying display.

3. When you have finished looking at the symbol's trend view, click ✖ to close the trend.

   All dynamic symbols in the display now use the new duration and start and end times that you set for the preview. For example, if you change the duration to 1 day for a preview, when you close it, the original display now has a duration of 1 day.

4. To open a PI ProcessBook display as a PI Vision display, click the **Ad Hoc Display** button.

   A PI Vision display opens and shows your data in a single table. The ad hoc PI Vision display is read-only. If you want to save a copy of the display, click the down arrow next to the Save button to "Save as" and enter a new display name.

Searching for data

Before you can visualize your process data, you need to find it inside the display's Assets pane by either entering search terms or drilling down the navigation tree.

To help you understand the type of data you can find and visualize in a PI Vision display, here are the definitions and icons of the PI data types that you will be working with.

Data type	Description
 **PI DATA ARCHIVE SERVER**	PI Data Archive servers store time-series data (PI points) from different data sources and serve this data to client applications like PI Vision.
 **PI AF DATABASE**	PI AF databases represent the largest physical or logical assets in your process and consist of PI AF Assets and PI AF attributes.
 **PI AF ASSET**	PI AF assets are the building blocks of PI AF databases and represent smaller physical or logical entities in your process, such as a production site, process unit, equipment, or stage, etc.
 **PI AF ATTRIBUTE**	PI AF attributes are the building blocks of PI AF assets. Each PI AF attribute represents a unique property associated with an asset. PI AF attributes can hold simple values that stand for a process parameter, a process state (e.g., opened/closed), process status, etc.
 **PI POINT (TAG)**	PI points (or PI tags) are stored in the PI Data Archive servers and contain time-series data. Each PI point is a unique single point of measurement that makes up a stream of real-time operational data from a defined source (e.g., instrument).

When you open or create a PI Vision display, your PI AF databases and PI Data Archive servers are first shown in the Assets pane by default.

Topics in this section

- Search by entering search terms
- Search using the navigation tree

Search by entering search terms

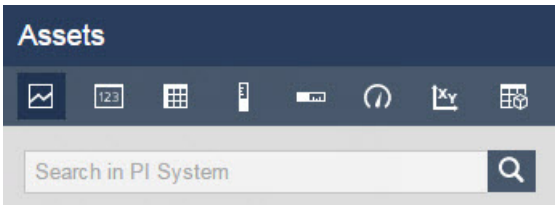
To find your data, open or create a display and search for your data in the Assets pane of the display. You can enter any search term, including the name of your data items such as PI AF assets (process equipment), PI AF attributes (process parameter), or PI points (tags).

Procedure

1. Create a new display or open an existing display on the home page.

- To create a new display, click **New Display**.
- To open an existing display, click a display thumbnail or use the search box to search for a display by name or owner.

2. On the display, search for your data in the search box of the Assets pane.



You can also search by drilling down the navigation tree. See Search using the navigation tree.

3. Enter a search term in the search box, and click  or press Enter. Do not use quotation marks when entering search terms. A search results list appears under the search box. To optimize your search, see About PI Vision's search engine.

4. Once you find the data item you wish to visualize, choose a symbol type from the symbol gallery. You can choose to see your data as a trend, a value, a table, a vertical, horizontal, or radial gauge, an XY plot, or an asset comparison table.

5. Click the data item and drag it from the Assets or Attributes panes onto the display.

   You can drag either the parent asset, which automatically adds all of its child attributes to the display, or drag only an individual attribute from the Attributes pane. Assets without attributes cannot be dragged.

   To drag multiple data items, press the CTRL key, select the data items, and drag them onto the display. For trends and tables, multiple data items will be combined into a single symbol.

6. To view the same or another data item as a different symbol type, change the symbol type in the symbol gallery and drag the data item onto the display.

About PI Vision's search engine

To optimize search engine performance, PI Vision makes use of keyword searching and does not support the use of quotation marks in search terms. If you enter a search phrase consisting of multiple words, the search engine will return items that match all of the individual words in that phrase. For example, a search for *fuel gas* will return *fuel gas*, *fuel gas flow*, and *light fuel gas*.

A search for a single word will return all phrases containing that word anywhere within a phrase.

Note:
PI Vision searches the following fields:

- Tag/Asset/Attribute Name
- Tag/Asset/Attribute Description

You can use wildcards such as asterisks (*) when you do not know all the letters in the search phrase. An asterisk is always assumed at the end of each entered search query.

Consider the following examples where asterisks are used in the search query:

Entered Search Query	Search Results
*Fl**	*Flow, Gas flow, Gas oil flow*
*F*w*	*Flow, Gas flow, Gas oil flow*
*Gas Fl**	*Gas flow, Gas oil flow*
G Fl**	*Gas flow, Gas oil flow*

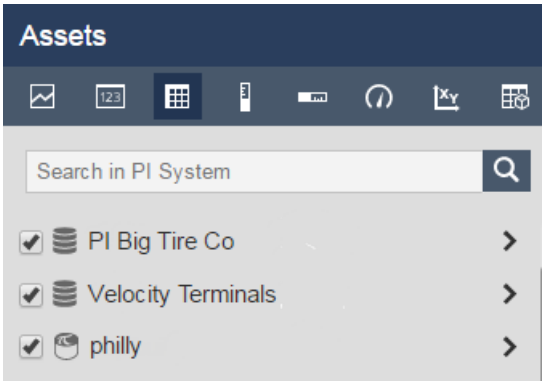
Note:
Asterisks (*) cannot match space characters. A search for *G*Fl** without a space will produce no results.

Search using the navigation tree

PI Vision's Assets pane shows a navigation tree to help you visualize your data hierarchy. You can use the navigation tree to find assets and their attributes by drilling down through the data hierarchy.

Procedure

1. In the Assets pane, select the check boxes next to the PI AF databases or PI Data Archive servers that you would like to explore.



   Click the arrow › to begin navigating to your assets. As you drill down to your assets, you can retrace your steps by clicking on the back arrows. Click **Home** to return to the list of your PI AF databases and PI Data Archive servers.

   If an asset has child attributes, they will be displayed in the Attributes pane.

2. Once you find the data item you wish to visualize, choose a symbol type from the Symbol Gallery. You can choose to see your data as a trend, a value, a table, a vertical, horizontal, or radial gauge, an XY plot, or an asset comparison table.

3. Click the data item and drag it from the Assets or Attributes panes onto the display. You can drag either the parent asset, which automatically adds all of its child attributes to the

display, or drag only an individual attribute from the Attributes pane. Assets without attributes cannot be dragged.

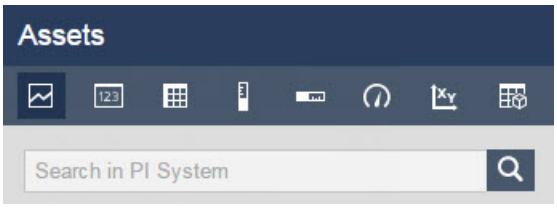
To drag multiple data items, hold down CTRL key, select the data items, and drag them onto the display. For trends and tables, multiple data items will be combined into a single symbol.

4. To create another symbol using a different symbol type, select another symbol type from the Symbol Gallery and drag a new data item onto the display.

Visualizing data with symbols

Once you find your process data, you can use symbols to visualize your data on a display. Depending on the symbol type, you can add multiple data items per symbol. You can continue adding data items after you create a symbol by dragging and dropping them from the search results. Symbols can show both dynamically updated data and static data. After the symbols are added to a display, you can position and resize them on the display area.

PI Vision offers eight types of symbols that you can use to visualize and monitor data. You can select your symbol types on the Symbol Gallery at the top of the Assets pane of the display.



The Symbol Gallery contains the following symbol types:

Icon	Symbol type	Purpose
	Trend	The trend symbol is a graph that lets you view values plotted against time. Trends allow you to add multiple data items per symbol.
	Value	Use the value symbol to view your data as a value.
	Table	Use the table symbol to view one or more data items in a table format. Tables allow you to add multiple data items per symbol.
	Gauges • Vertical • Horizontal • Radial	Vertical, horizontal, and radial gauge symbols provide a graphical view of the data value at the end time of the display range and can be customized to look like a variety of measuring instruments.
	XY Plot	The XY plot allows you to correlate X-axis data sources with Y-axis data sources to explore correlations between one or more pairs of data.
	Asset Comparison Table	The asset comparison table allows you to compare measurements and other process information by organizing your data by assets.

Topics in this section

- Create a symbol
- Symbol types
- Change a symbol type
- Select and group multiple symbols
- View a symbol as a popup trend
- Multi-state behaviors
- Contextual navigation links

- Symbol collection
- Excluded attributes

Create a symbol

You can create a symbol to visualize data in a display.

Procedure

1. In the Assets pane, find the data that you want to visualize in the symbol. See Searching for data.
2. Choose a symbol type in the symbol gallery.

   You can view data as a trend, value, table, gauge (vertical, horizontal, or radial), XY plot, or asset comparison table. A trend is the default symbol type.
3. Drag data items from the search results in the Assets or Attributes panes onto the display.

   PI Vision inserts the selected symbol on the display and visualizes the chosen data items in that symbol.

Symbol types

PI Vision offers eight types of symbols that you can use to visualize and monitor data.

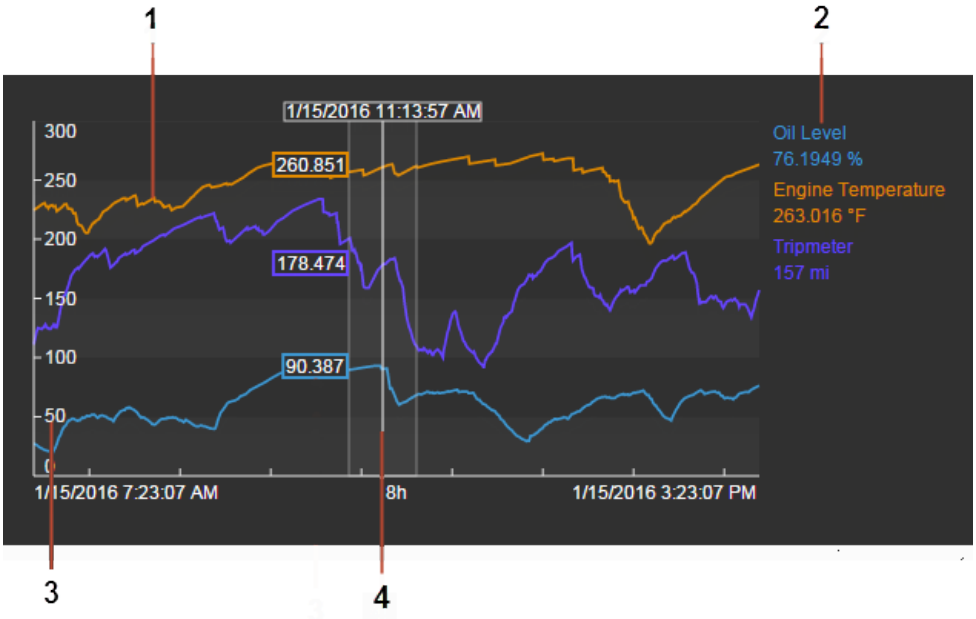
Topics in this section

- Trend
- Value
- Table
- Gauges
- XY plot
- Asset comparison table

Trend

Use a trend symbol to view values of one or more data items plotted against time on a graph. Trends are typically used to display time-series data, though they may also include non-time-series data.

To add a trend to a display, select the trend symbol  from the symbol gallery and then drag your data item from the search results onto the display.



1. **TRACES** are the lines drawn on a trend that represent a series of data points from a data item. When a trace is continuous, a line is drawn from measurement to measurement. When a trace is discrete, the value is propagated forward until a new value is recorded in the database. This results in horizontal and vertical lines for the tag (stepped trace).
2. **TREND LEGEND** provides quick details about data items that are part of a trend and include the data item's name, value, and unit of measure. The color of the legend corresponds with the trace line used to draw the data on the trend.
3. **VALUE SCALE** shows the range of values that appears within a trend.
4. **TREND CURSOR** helps you view your data with precision by showing a trend line, a legend value, and a time stamp. Trend cursors are synchronized across multiple trends. Moving the trend cursor over a trace changes the legend value. The legend value is the value of the data on a trace at the time selected by the trend cursor. You can only view trend cursors when you exit **Design** mode. (See Monitor trends with trend cursors.)

Value scale

Data values on a trend appear within a range of values that is referred to as the value scale. By default, the value scale shows a separate scale for each data item (represented by a trace). The scale indicates the highest high and lowest low values of the data items during the time range of the display.

You can change the value scale to use single consolidated scale for all data items, as opposed to separate scales for each data item. Value scale settings persist for each trend even after you close a display. You can also configure the maximum and minimum values of the value scale by choosing between the maximum and minimum of the trend's plotted values or its pre-configured maximum and minimum values. (See Format a trend and its value scale.)

Topics in this section

- Format a trend and its value scale
- Delete or hide a trace

- Monitor trends with trend cursors
- Pan across a trend's time range
- Zoom in on a trend

Format a trend and its value scale

Use the Format Trend pane to customize the trend by changing the foreground and background, value scale options, and the appearance of traces.

Procedure

1. Right-click the trend, and then click **Format Trend** to open the Format Trend pane.
2. Under **Trend Options**, customize the trend and its scale:
   - **Foreground**

     Select the color of the foreground, which includes the start and end time and the duration of the display.
   - **Background**

     Select the color of the background.
   - **Format**

     Select the default format for numbers in the trend:

Format	Description
Database	Show numbers in a format that depends on the data item: ▪ For PI points or PI AF attributes with a PI point data reference, the format depends on the value of the point's **`DisplayDigits`** attribute: ◦ Zero or positive numbers specify the number of digits to display to the right of the decimal point. ◦ Negative numbers specify the number of significant digits. ▪ For PI AF attributes without a PI point data reference, numbers show 5 significant digits. All data items show the thousands separator.
General	Show all significant digits for numbers except for trailing zeros. If the absolute value of the number is greater than $1x10^{7}$ or less than $1x10^{-5}$, the format will switch to use scientific notation.
Number	Show numbers in the custom format that you specify: ▪ **Decimal Places** The number of digits shown after the decimal. ▪ **Use 1000 separator** Select this check box to show the thousands separator in large numbers.
Scientific	Show numbers in the format 0.00E+00.

   - **Single or Multiple Scales**

     Select the number of scales shown on the axis:

- **Show single scale**

  Show only one value scale comprised of the lowest and highest values for all the traces in the trend.

- **Show multiple scales**

  Show separate high and low values for each individual data item on the trend. Each scale shows a pair of high and low limits along the top and bottom of the value scale. Incremental scale values are shown for the first trace.

  Note:
  These settings apply regardless of whether you set the scale according to minimum and maximum values of the trend's range of plotted values or to their configured database values.

◦ **Scale Range**

Select the range of values on the axis:

- **Use range of plotted values**

  Set the scale to the minimum and maximum plotted values of the trend's time range.

- **Use database settings**

  Set the scale to the data item's configured minimum and maximum values.

- **Enter custom settings**

  Set the maximum and minimum values manually by entering the **Top** and **Bottom** values.

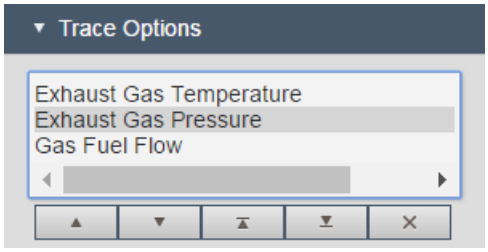
  Note:
  You can only set custom trend values for a trend that shows a single scale.

- **Invert Scale**

  Select this check box to reverse the scale's maximum and minimum values.

3. Under **Trace Options**, customize or delete the trend's individual traces.

   a. If you have multiple traces on the trend, use the list of traces to select the trace you want to configure or delete.



   - Use the left pair of up or down arrows to move the selected trace higher or lower on the trend in relationship to other traces.
   - Use the right pair of up or down arrows to move the selected trace all the way to the top or bottom of the trend.
   - Click **X** to delete the selected trace.

   b. Customize the appearance of the selected trace.

- **Color**

  Select the color of the trace.

- **Weight**

  Set the width of the trace.

- **Style**

  Select the style of the trace, which can be a line, dots, dashes of various lengths, or combinations of dashes and dots.

- **Format**

  Select the number format for the selected trace:

Format	Description
Trend Setting	Show numbers in the default format specified for the trend.
Database	Show numbers in a format that depends on the data item: ◦ For PI points or PI AF attributes with a PI point data reference, the format depends on the value of the point's **`DisplayDigits`** attribute: ◦ Zero or positive numbers specify the number of digits to display to the right of the decimal point. ◦ Negative numbers specify the number of significant digits. ◦ For PI AF attributes without a PI point data reference, numbers show 5 significant digits. All data items show the thousands separator.
General	Show all significant digits for numbers except for trailing zeros. If the absolute value of the number is greater than $1x10^{7}$ or less than $1x10^{-5}$, the format will switch to use scientific notation.
Number	Show numbers in the custom format that you specify: ◦ **Decimal Places** The number of digits shown after the decimal. ◦ **Use 1000 separator** Select this check box to show the thousands separator in large numbers.
Scientific	Show numbers in the format 0.00E+00.

c. If your trend has multiple scales, use the **Scale Range** list to specify the maximum and minimum values on the value scale of each trace.

   Select from the following options:

   - **Use range of plotted values**

     Set the scale of the trace to the minimum and maximum plotted values of the trend's time range.

   - **Use database settings**

     Set the scale of the trace to the data item's configured minimum and maximum values.

   - **Enter custom settings**

Set the maximum and minimum values of the trace manually by entering the **Top** and **Bottom** values.

4. Under **Reset**, click **Use default settings** to reset the trend and trace options to default settings.
5. Click the down arrow at the top of the pane and then click **Add Navigation Link** to add a navigation link to the symbol.

   See Add a navigation link to another display or website.

Delete or hide a trace

A trace is a single line on a trend. You can delete or hide traces on any trend.

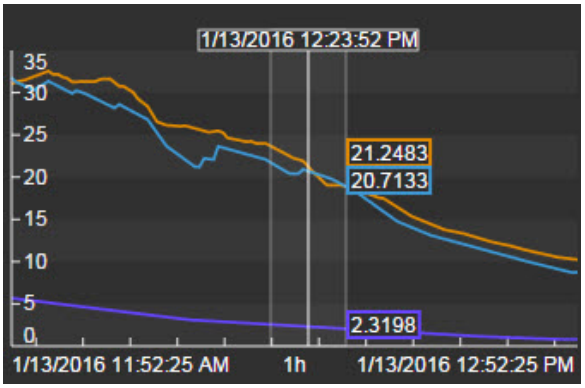
Procedure

1. To delete a trace, right-click anywhere on the trend and select **Format Trend** to open the Format Trend pane.
   a. Under **Trace Options**, use the trace list to select the trace you want to delete.
   b. Click the **X** to remove the data item and its corresponding trace from the trend.
2. To hide a trace, right-click its trend legend on the trend and select **Hide Trace**.

   The data item is grayed out, and you are no longer able to see its trace.
3. To show a hidden trace, right-click its grayed out trend legend and select **Show Trace**.

Monitor trends with trend cursors

Trend cursors help you view your data with precision by showing a trend line, a legend value, and a time stamp. Trend cursors are synchronized across multiple trends. Moving the trend cursor over a trace changes the legend value. The legend value is the value of the data on a trace at the time selected by the trend cursor.



Procedure

1. Exit **Design** mode by clicking .
2. Click anywhere on the trend to view trend cursors, which appear across all your trends on the display.

Pan across a trend's time range

To shift the time range on a trend backwards or forwards in time, you can either pan across the time range directly on the trend or use the timebar at the bottom of the display.

Procedure

1. To pan across the time range directly on the trend, exit **Design** mode by clicking  .
2. Move the cursor to the bottom of the trend until the cursor changes to a drag cursor.
3. Click the highlighted lower section of the trend and drag the trend left or right to pan across the time range backwards or forwards. Panning across an individual trend will change the time range of all the symbols on the display. The duration of the time range (1 hour, 8 hours, 1 day, etc.), will not be affected.

4. To return back to the "now" and get dynamically updating data for all the symbols, click the **Now** button  on the timebar.

Zoom in on a trend

The trend zoom is a powerful analysis tool that allows you to zoom in on a particular range of time and value in a display.

The trend zoom changes the start and end time for the *entire display*, thus affecting all symbols.

Procedure

1. Exit **Design** mode by clicking  .
2. Drag your pointer over any area of a trend. The area you drag over remains illuminated, while the remaining portions of the trend are grayed out.
3. Release the pointer. The trend redraws, zooming in on the area you just selected. The start time and end time of the display, and all trend traces are adjusted accordingly.

> **Note:**
>
> To cancel a trend zoom, click the Undo button or press CTRL+Z.

Value

Use the value symbol to show the value of a data item on your display. A value is the reading obtained for a data item at the end time of a display. It is shown as a number, time stamp, string, or digital state. If the data item stores a URL, then the symbol shows an active hyperlink in the display.

Value symbols are dynamic and update each time the underlying data item updates.

To add a value to a display, click the value symbol  in the symbol gallery, and then drag a data item from the search results onto the display.

Note:
When you create a value symbol from a data item that is in a null or shutdown state, the value symbol is darkened.

Topics in this section

- Format a value symbol
- Add a target indicator

Format a value symbol

Use the Format Value pane to create a short, custom label for your value symbol. You can also use it to hide the label, the units of measurement (UOM), or the time stamp as well as to change the fill, text, or value colors of the symbol.

Procedure

1. Right-click a value symbol and click **Format Value** to open the Format Value pane.
2. Under **Style**, set the colors, font, number format, and text alignment:
   - **Fill**

     Background color.
   - **Text**

     Color of text.
   - **Font Size**

     Size of font.
   - **Value**

     Color of value.
   - **Format**

     Number format:

Format	Description
Database	Show numbers in a format that depends on the data item: ▪ For PI points or PI AF attributes with a PI point data reference, the format depends on the value of the point's **DisplayDigits** attribute: ◦ Zero or positive numbers specify the number of digits to display to the right of the decimal point. ◦ Negative numbers specify the number of significant digits. ▪ For PI AF attributes without a PI point data reference, numbers show 5 significant digits. All data items show the thousands separator.
General	Show all significant digits for numbers except for trailing zeros. If the absolute value of the number is greater than $1x10^{7}$ or less than $1x10^{-5}$, the format will switch to use scientific notation.
Number	Show numbers in the custom format that you specify: ▪ **Decimal Places** The number of digits shown after the decimal. ▪ **Use 1000 separator** Select this check box to show the thousands separator in large numbers.
Scientific	Show numbers in the format 0.00E+00.

◦ **Text Alignment**

Either **Left**, **Center**, or **Right**.

3. Under **Visibility**, specify the information that appears in the value symbol
   ◦ **Label**

   Create a custom label or choose a default label from the list. Clear the check box to hide the label.

   ◦ **Units**

   Clear the check box to hide the units of measurement.

   ◦ **Timestamp**

   Clear the check box to hide the value's time stamp (consisting of a date and time).

   ◦ **Value**

   Clear the check box to hide the value.

   ◦ **Show Indicator**

   If the target is defined, select the check box to view the target indicator. See Add a target indicator.

4. Click the down arrow at the top of the pane and then click the option to add a multi-state or a navigation link to the symbol.

   See Multi-state behaviors or Add a navigation link to another display or website.

Add a target indicator

A target indicator allows you to compare your attribute's value against a target value. Using the target indicator, you can quickly see the departure of a variable from a set point and judge if your parameter is over or under the target value.

Note:
To use the target indicator, the attribute must have a value set for the limit attribute trait `Target` in PI System Explorer. For more information, see the PI Server topic "Attribute traits" in Live Library (https://livelibrary.osisoft.com).

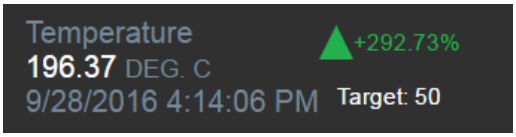
Target indicators are available for value symbols and table symbols. For more information about viewing the target in a table symbol, see Configure a table.

Procedure

1. Find the desired attribute that has a defined target in PI System Explorer and view it as a value symbol on the display.
2. Right-click the value symbol and click **Format Value** to open the Format Value pane.
3. In the Format Value pane, under **Target Value Indicator**, select the **Show Indicator** check box.

   Note:
   The **Show Indicator** check box will only appear for attributes that have a defined target in PI System Explorer.

   The target indicator arrow, the target value, and the target differential will be shown to the right of the attribute value.

4. Under **Target Value Indicator**, you can customize the target indicator by setting the following:

   a. **Show Differential**

      The differential shows the difference between the attribute value and the target value. To hide the differential, clear the check box.

      - **By Percent**: Show the differential as a percentage.
      - **By Value**: Show the differential as a value.

   b. **Show Target**

      To hide the target value, clear the check box.

   c. **Up Color**

      Select the color of the target arrow and the differential when the attribute's value is above the target value.

   d. **Down Color**

Select the color of the target arrow and the differential when the attribute's value is below the target value.

Table

Use the table symbol to add one or more data items to a display in a table format.

To add a table symbol to a display, click the table symbol  in the symbol gallery and then drag data items from the search results onto the display.

If the data item stores a URL, then the Value column contains an active hyperlink (depicted by) for the data item in the table.

To sort the data in columns in alphabetical or numerical order, click a column heading. Clicking the heading more than once reverses the sort order.

To resize columns hover your mouse cursor over a column separator in the table heading and move the double-arrow cursor to the appropriate width. Change the column order by clicking on a column header and dragging it to another location on the table, either left or right.

Note:
You can add dynamic search criteria to a table and automatically find, show, and update data from similar assets inside the table. See Add dynamic search criteria.

Configure a table

Use the Configure Table pane to customize the table's columns and rows.

The table symbol contains columns for the name, value, description, and other summary data about a data item. These summary data values take their intervals from the display's time range as defined in the time bar.

Procedure

1. Right-click the table and click **Configure Table** to open the Configure Table pane.
2. Under **Style**, select the table style that best accommodates your work environment. Choose from default, light, or dark.
3. Under **Columns**, select the check boxes next to the columns you want to include (and clear the check boxes next to the columns you want to exclude):

   - **Path**

     Full path of the data item. For PI points (tags), this is the path to the PI Data Archive server. For PI AF assets and attributes the path is the entire PI AF path up until the last asset-attribute pair.

     Note:
     Longer path names are truncated. Move the mouse pointer over the truncated path name to get the full text in a tooltip.

   - **Name**

     Name of the data item (for example, the PI points or asset-attribute pair).

   - **Description**

Description as defined in the descriptor property for PI points or the description attribute for PI AF data.

- **Value**

  Reading or snapshot obtained at the specified end time of the time bar. It is shown as a number or a digital-state string.

- **Units**

  Unit of measure for the data item.

- **Time**

  Time stamp when the value was last updated.

- **Trend**

  Graphic that provides a quick way to see how a data item is trending. For example, if an operator notices that the volume of a sparkline is escalating rapidly, it may be an indication that there might be a problem that requires further analysis.

- **Target**

  Aimed-for measurement value to which you can compare your attribute's value.

  Note:
  To see the target, a target must be defined when setting the limit attribute traits in PI System Explorer. For more information, see the PI Server topic "Attribute traits" in Live Library (https://livelibrary.osisoft.com).

- **Target Indicator**

  Arrow that indicates if your attribute is over or under the target value.

- **Target % Δ**

  Differential between the attribute value and the target value as a percentage.

- **Target Δ**

  Differential between the attribute value and the target value.

- **Average**

  Average value of the data item using the display range as the interval.

- **Minimum**

  Minimum value of the data item using the display range as the interval.

- **Maximum**

  Maximum value of the data item using the display range as the interval.

- **StdDev**

  Standard deviation of values on the display range.

- **Range**

  Difference between a data item's maximum and minimum values.

- **PStDev**

  Population standard deviation of values on the display range.

Note:
To change the order of columns, you can directly move them in the table.

4. Under **Numbers**, select the display format of numbers.

Format	Description
Database	Show numbers in a format that depends on the data item: ◦ For PI points or PI AF attributes with a PI point data reference, the format depends on the value of the point's **`DisplayDigits`** attribute: ▪ Zero or positive numbers specify the number of digits to display to the right of the decimal point. ▪ Negative numbers specify the number of significant digits. ◦ For PI AF attributes without a PI point data reference, numbers show 5 significant digits. All data items show the thousands separator.
General	Show all significant digits for numbers except for trailing zeros. If the absolute value of the number is greater than $1x10^{7}$ or less than $1x10^{-5}$, the format will switch to use scientific notation.
Number	Show numbers in the custom format that you specify: ◦ **Decimal Places** The number of digits shown after the decimal. ◦ **Use 1000 separator** Select this check box to show the thousands separator in large numbers.
Scientific	Show numbers in the format 0.00E+00.

5. Under **Rows**, use the rows list to select, move, or delete a row:
   - Use the left pair of up or down arrows to move the selected row higher or lower on the table.
   - Use the right pair of up or down arrows to move the selected row all the way to the top or bottom of the table.
   - Click **X** to delete the selected row.
6. Click the down arrow at the top of the pane and then click **Add Navigation Link** to add a navigation link to the symbol.

   See Add a navigation link to another display or website.

Gauges

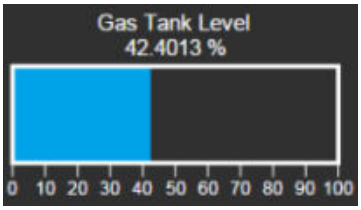
Gauge symbols provide a graphical view of the value reading at the end time of the display range, and allow you to determine at a glance whether that value is within an acceptable range. Gauges provide a scale, tick marks, and a bar, arc or pointer that indicates the current value.

Note:
If you hover over a gauge symbol with your mouse pointer a tooltip appears with additional information about your data item.

To add a gauge to a display, select the vertical  , horizontal  , or radial  gauge symbol icon from the Symbol Gallery.

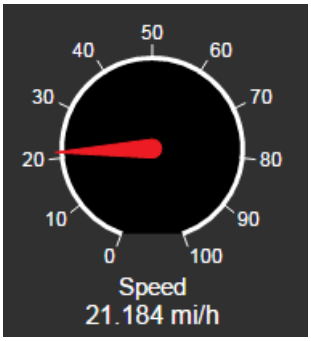
Horizontal or vertical gauge

Vertical and horizontal gauges show the current value of your data and provide a customizable bar, label, and scale.



Radial gauge

Radial gauges show the current value of your data and provide a customizable indicator, dial face, label, and scale.



Note:

When you create a gauge symbol from a data item that is in a null or shutdown state, the gauge symbol shows in black.

Topics in this section

- Format a horizontal or vertical gauge
- Format a radial gauge

Format a horizontal or vertical gauge

Use the Format Gauge pane to customize a horizontal or vertical gauge and change its appearance, scale, and labels.

Procedure

1. Right-click a gauge symbol and click **Format Gauge** to open the Format Gauge pane.
2. Under **Style**, customize the gauge's colors.
    - **Bar**

Color of the bar. The bar shows the value of a measurement on the scale.

- **Fill**

  Color of the fill. The fill is the gauge's background above the bar (or below the bar if the gauge is inverted).

- **Outline**

  Color of the border, value scale, and label.

- **Weight**

  Thickness of the border.

- **Value**

  Color of the value.

- **Format**

  Display format of the value.

Format	Description
Database	Show numbers in a format that depends on the data item: ▪ For PI points or PI AF attributes with a PI point data reference, the format depends on the value of the point's **DisplayDigits** attribute: ◦ Zero or positive numbers specify the number of digits to display to the right of the decimal point. ◦ Negative numbers specify the number of significant digits. ▪ For PI AF attributes without a PI point data reference, numbers show 5 significant digits. All data items show the thousands separator.
General	Show all significant digits for numbers except for trailing zeros. If the absolute value of the number is greater than $1x10^{7}$ or less than $1x10^{-5}$, the format will switch to use scientific notation.
Number	Show numbers in the custom format that you specify: ▪ **Decimal Places** The number of digits shown after the decimal. ▪ **Use 1000 separator** Select this check box to show the thousands separator in large numbers.
Scientific	Show numbers in the format 0.00E+00.

3. Under **Visibility**, select the check boxes next to the information that you want on the gauge.

   - **Label**

     Text that describes the gauge. Select a label from the list (an attribute name or description) or enter custom text.

   - **Value**

     Value of the attribute.

   - **Units**

Units of measurement for the attribute.

4. Under **Scale Range**, configure the maximum and minimum values on the scale.
   - **Use database settings**

     Set the scale to the data item's configured minimum and maximum values.

     Select the **Invert Scale** check box to reverse the start and end scale values.
   - **Enter custom settings**

     Set the maximum and minimum values of the gauge manually. Enter the **Top** and **Bottom** values for vertical gauges, or enter the **Right** and **Left** values for horizontal gauges. To reverse the start and end scale values, enter the numbers in reverse.
5. Click the down arrow  at the top of the pane and then click the option to add a multi-state or a navigation link to the symbol.

   See Multi-state behaviors or Add a navigation link to another display or website.

Format a radial gauge

Use the Format Gauge pane to customize a radial gauge and change its appearance, scales, and labels.

Procedure

1. Right-click the gauge and then click **Format Gauge** to open the Format Gauge pane.
2. Under **Style**, customize the appearance of the gauge:
   - **Type**

     Indicator type for the gauge. You can select an arc, a triangle, a pointer, or a line.
   - **Angle**

     Angle of the gauge's face.
   - **Indicator**

     Color of the gauge's indicator.
   - **Size**

     Size of the indicator.
   - **Fill**

     Color of the fill. The fill is the gauge's dial area. For an arc-type indicator, the fill is the arc's background.
   - **Outline**

     Color of the gauge's outline. The outline is the scale's border without the tick marks and scale labels.
   - **Weight**

     Thickness of the outline.
   - **Scale**

     Color of the scale's tick marks and labels.

- **Value**

  Color of the data value.

- **Format**

  Display format of the value.

Format	Description
Database	Show numbers in a format that depends on the data item: ▪ For PI points or PI AF attributes with a PI point data reference, the format depends on the value of the point's **`DisplayDigits`** attribute: ◦ Zero or positive numbers specify the number of digits to display to the right of the decimal point. ◦ Negative numbers specify the number of significant digits. ▪ For PI AF attributes without a PI point data reference, numbers show 5 significant digits. All data items show the thousands separator.
General	Show all significant digits for numbers except for trailing zeros. If the absolute value of the number is greater than $1x10^{7}$ or less than $1x10^{-5}$, the format will switch to use scientific notation.
Number	Show numbers in the custom format that you specify: ▪ **Decimal Places** The number of digits shown after the decimal. ▪ **Use 1000 separator** Select this check box to show the thousands separator in large numbers.
Scientific	Show numbers in the format 0.00E+00.

3. Under **Visibility**, customize the information you want to appear on the gauge:

   - **Label**

     Text that describes the gauge. Select a label from the list (an attribute name or description) or enter custom text.

   - **Value**

     Value of the attribute.

   - **Units**

     Units of measurement for the attribute.

   - **Label Location**

     Location of the label, either above or below the gauge.

   - **Scale**

     Amount of labels on the scale, either all or only the first and last labels.

4. Under **Scale Range**, configure the maximum and minimum values on the scale:

   - **Use database settings**

     Set the scale to the data item's configured minimum and maximum values.

Select the **Invert Scale** check box to reverse the start and end scale values.

- **Enter custom settings**

  Set the maximum and minimum values of the gauge manually. Enter the **Right** and **Left** values. To reverse the start and end scale values, enter the numbers in reverse.

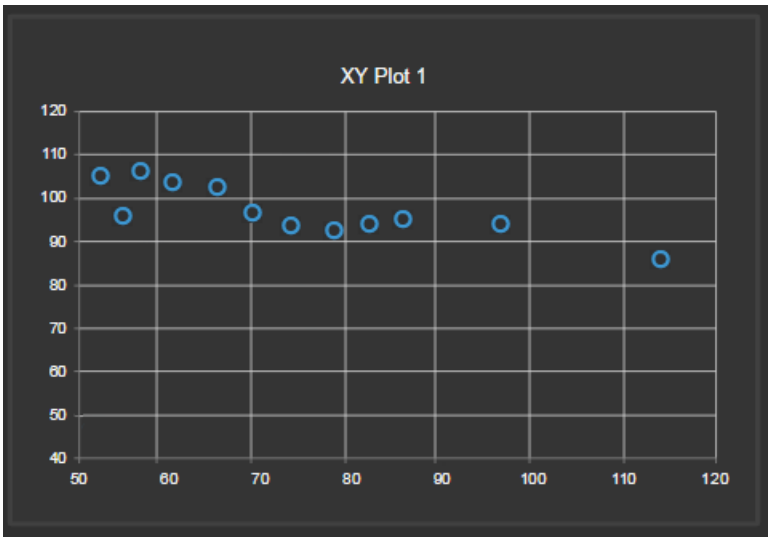
  Note:
  When working with data containing digital states (such as `LOW`, `HIGH`, `OPEN`, `CLOSE`, `ON`, or `OFF`) rather than numerical values, you will be able to select digital states from the list for the start and end of the scale. For more information, see the PI Server topic "Digital state sets" in Live Library (https://livelibrary.osisoft.com).

5. Click the down arrow at the top of the pane and then click the option to add a multi-state or a navigation link to the symbol.

   See Multi-state behaviors or Add a navigation link to another display or website.

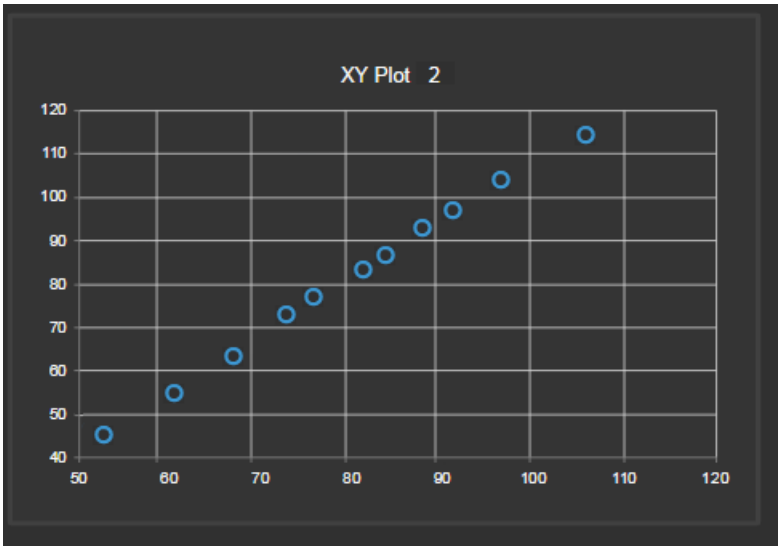
XY plot

Use an XY plot to correlate one or more X-axis data sources with one or more Y-axis data sources. On an XY plot (also called a scatter plot), each axis shows possible values from their respective data sources. The plot matches recorded values from the X-axis data source with recorded values from the Y-axis data source and marks each matched pair with a data point. For example the following image shows a basic scatter plot.



The example shows 10-minute intervals of two data items, A and B, for the last hour. Item A had 12 recorded values; item B had 16 recorded values. The number of plotted data points equals the number of pairs. Since A had fewer recorded values, the plot shows only 12 data points. PI Vision ignores the extra recorded values from point B. You can configure the method to pair values.

Correlation measures the strength of the relationship between two variables. The plot indicates correlation by the spread of the data points around a fitted straight line (for example, a straight line that indicates the trend of the data). In general, the closer the points are to the fitted line, the stronger the correlation. The following plot shows perfectly correlated data.



PI Vision provides the following XY plot capabilities:

Capability	Operational Requirement
Plot one or more process variables against an independent process variable for a specified period.	Identify correlations and anomalies in the process.
Plot multiple series with unique X-axis components.	Compare operations over multiple assets and time ranges.
Plot a theoretical reference curve alongside process data. Follow the steps in the OSIsoft Tech Support article KB01580 - Plot a reference curve on an XY Plot (https://techsupport.osisoft.com/Troubleshooting/KB/KB01580/).	Compare the performance of assets to an ideal benchmark operation.
Plot a current operating (single) point on a static curve.	Evaluate the current state of your process.

Topics in this section

- Create an XY plot
- Change attributes in an XY plot
- Configure data pairing for an XY plot
- Configure axis scales for an XY plot
- Format data pairs for an XY plot
- Configure general settings for an XY plot
- Compare attributes at different times on same XY plot

Create an XY plot

To create an XY plot, drag data items from the Assets pane to the display. A plot requires at least two data items.

Procedure

1. In the Assets pane, find the data items that you want to plot.
2. Click **XY Plot**  in the symbol gallery.
3. Drag the data items from the Assets pane to the display.

   PI Vision creates an XY plot and adds the data items:

   - If you drag a single data item, PI Vision creates an empty XY plot with the added item designated as the X-axis data source.
   - If you drag multiple items simultaneously, PI Vision designates one as the X-axis data source and others as Y-axis data sources.
   - If you drag any additional items, PI Vision adds the items as Y-axis data sources.
   - If you drag an asset rather than an attribute, PI Vision adds all the data items under that asset.

   After you dragged at least two items, PI Vision opens the Configure XY Plot pane and assigns default values. The plot shows color coded data points for paired values. Labels on the X- and Y-axes show their respective data source names.

After you finish

Customize the configuration of the XY plot:

- Change attributes in an XY plot
- Configure data pairing for an XY plot
- Configure axis scales for an XY plot
- Format data pairs for an XY plot
- Configure general settings for an XY plot

Change attributes in an XY plot

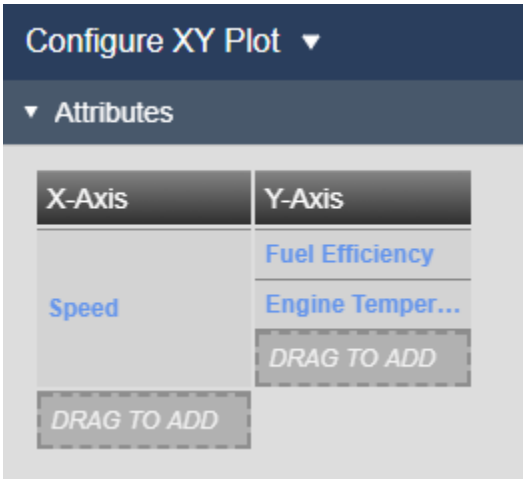
In an existing XY plot, use the Configure XY Plot pane to add attributes, to delete attributes, or to change the order of attributes.

Before you start

Open the Configure XY Plot pane:

- When creating a new XY plot, add a second data item.
- For an existing plot, right-click the plot and then click **Configure XY Plot**.

Under **Attributes**, the pane lists a table of attributes. Each row lists an attribute that appears on the X-axis and the paired attributes on the Y-axis.



Procedure

- Add attributes:

To add attribute to:	Do this:
X-axis	Drag an attribute from the Assets pane to the **DRAG TO ADD** cell in the X-axis column. PI Vision creates a new row in the table with the asset as an X-axis data source.
Y-axis	Drag an attribute from the Assets pane to the **DRAG TO ADD** cell in the Y-axis column of the row that contains the desired X-axis attribute. PI Vision pairs the new attribute with the attribute in the X-axis.

- Delete attributes:
  a. In the table, select the row that contains the attribute.
  b. Find the attribute under either **X Data Options** or **Y Data Options**.
  c. Click **Delete** .

  You cannot delete the only attribute in the X-axis.
- Change the order of attributes:
  a. In the table, select the row that contains the attribute.
  b. Find the attribute under either **X Data Options** or **Y Data Options**.
  c. Click **Down** to move the attribute down in the list, or click **Up** to move the attribute up in the list.

  You cannot delete the only attribute in the X-axis.

Configure data pairing for an XY plot

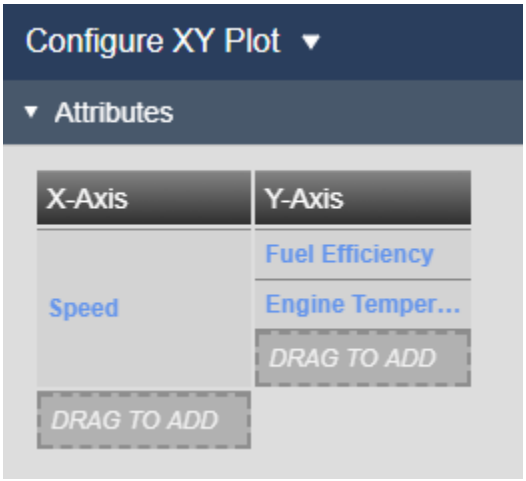
In an existing XY plot, use the Configure XY Plot pane to configure how PI Vision retrieves data for each attribute and matches recorded values for paired attributes to create a data point.

Before you start

Open the Configure XY Plot pane:

- When creating a new XY plot, add a second data item.
- For an existing plot, right-click the plot and then click **Configure XY Plot**.

Under **Attributes**, the pane lists a table of attributes. Each row lists an attribute that appears on the X-axis and the paired attributes on the Y-axis.



Procedure

1. Select an X-axis row.
2. Under **X Data Options**, configure the X-axis attribute.
   - From the **Data Retrieval** list, select the method to retrieve X-axis attribute data:
     - **Sampled**

       Retrieve interpolated X-axis values for the specified time range in regular intervals. For example, if the time range is one hour and the **Interval** is set to `10m`, then PI Vision retrieves six values spaced 10 minutes apart. This option provides a way to retrieve evenly sampled data.

       Note:
       If you select this method, you must specify the sampling interval for your data. Enter a value in the **Interval** field and select a unit of time (second, minute, hour, day, week, month, or year).

     - **Compressed**

       Retrieve the actual values at their recorded times in PI Data Archive between the specified start and end time.

     - **Current Value**

       Retrieve a single X-axis value at the current time of the display.
   - Select the **Use Custom Time Range** check box to enter a custom start and end time, which is independent of the display time range.

The custom time range setting applies to both X-axis and Y-axis data sources in the data pair.

Note:
To specify an offset, enter a PI time expression that contains only a time offset. The implied reference time is the end time of the display. See PI time expressions.

3. For each Y-axis attribute (listed under a separate **Y Data Options** section), configure the data pairing and data retrieval method.
   - Under **Data Pairing to X**, select the method to match this Y-axis attribute with the X-axis attribute:
     - **Paired by timestamp**

       PI Vision finds Y-axis attribute values using the time stamp of each retrieved X-axis value.
     - **Paired by position in the list**

       PI Vision retrieves Y-axis values independently of X-axis values and pairs the values by position in the list of values. (Y_1 is paired with X_1, Y_2 is paired with X_2, and so on.) This option allows you to specify different time ranges for X-axis and Y-axis values.

       Note:
       PI Vision ignores Y-axis values in excess of the number of retrieved X-axis values.
   - From the **Data Retrieval** list, select the method to retrieve Y-axis attribute data. Available retrieval methods depend on the selected data-pairing method.

     Retrieval methods for data paired by time stamp:
     - **Interpolated**

       Retrieve interpolated Y-axis values at the same time stamp as each retrieved X-axis data point. X-axis and Y-axis values for each data point represent process measurements from the same point in time.
     - **Exact time**

       Retrieve only actual Y-axis values with the same time stamp as the X-axis values.
     - **Exact time or previous value**

       Retrieve Y-axis values with the same time stamp as the X-axis values. When a Y-axis value is unavailable at the X-axis time stamp, use the previous Y-axis value.
     - **Exact time or next value**

       Retrieve Y-axis values with the same time stamp as the X-axis values. When a Y-axis value is unavailable at the X-axis time stamp, use the next Y-axis value.

     Retrieval methods for data paired by position:
     - **Sampled**

       Retrieve interpolated Y-axis values for the specified time range in regular intervals. If you choose this method, you must specify the **Interval** period for sampling your data.
     - **Compressed**

       Retrieve the actual values stored between the specified start and end time.

     For data paired by position, select the **Override X Time Range** check box to use a different time range. Enter the start and end times of the time range.

Configure axis scales for an XY plot

In an existing XY plot, use the Configure XY Plot pane to customize the value scales for the X- and Y-axis.

Procedure

1. Right-click the XY plot, and then click **Configure XY Plot** to open the Configure XY Plot pane.
2. Under **Scales**, configure the scales and their values:
   a. To view a separate scale for each Y-axis data source, select the **Multiple Y Scales** check box.
   b. From the **Scale Range** list, select the method for determining the minimum and maximum values on the scales:
      - **Use range of plotted values**

        Set the scale to the minimum and maximum plotted values during the plot's time range.
      - **Use database settings**

        Set the scale to the preconfigured minimum and maximum values.
      - **Enter custom settings**

        Set the maximum and minimum X and Y values by manually entering their values.
   c. From the **Color** list, select the color of the values on the scales.

Format data pairs for an XY plot

In an existing XY plot, use the Configure XY Plot pane to customize the format for each pair of X-axis and Y-axis attributes. You can set the color, marker, line, and number format for each data pair.

Before you start

Open the Configure XY Plot pane:

- When creating a new XY plot, add a second data item.
- For an existing plot, right-click the plot and then click **Configure XY Plot**.

Procedure

1. In the Configure XY Plot pane, expand the **Format** section.

   Tip:
   You can collapse the **Attributes** section.
2. Select the row in the table that corresponds to the X-axis and Y-axis data pair that you want to format.
3. Specify how the selected data pair appears in the XY plot:
   - **Color**

Select the color for the data pair.

- **Marker Style**

  Select the type of marker for each data point on the plot.

- **Most Recent Points**

  Select the number of recent data points to highlight in the **Count** list, and select the color for those points in the **Color** list.

- **Connecting Line**

  Select the check box to show a line connecting each data point.

- **Regression Line**

  Select the check box to show a linear regression line.

- **Correlation Coefficient**

  Select the check box to show the calculated correlation coefficient in the legend.

- **Legend**

  Select the information you want in the legend for the data pair.

- **Format**

  Select the number format for the data pair:

Format	Description
Default	Show numbers in the format specified for the plot under **General**.
Database	Show numbers in a format that depends on the data item: ▪ For PI points or PI AF attributes with a PI point data reference, the format depends on the value of the point's **`DisplayDigits`** attribute: ◦ Zero or positive numbers specify the number of digits to display to the right of the decimal point. ◦ Negative numbers specify the number of significant digits. ▪ For PI AF attributes without a PI point data reference, numbers show 5 significant digits. All data items show the thousands separator.
General	Show all significant digits for numbers except for trailing zeros. If the absolute value of the number is greater than $1x10^{7}$ or less than $1x10^{-5}$, the format will switch to use scientific notation.
Number	Show numbers in the custom format that you specify: ▪ **Decimal Places** The number of digits shown after the decimal. ▪ **Use 1000 separator** Select this check box to show the thousands separator in large numbers.
Scientific	Show numbers in the format 0.00E+00.

Configure general settings for an XY plot

In an existing XY plot, use the Configure XY Plot pane to configure general settings for the plot. You can configure the default number format, background, legend, and axes labels for the plot.

Before you start

Open the Configure XY Plot pane:

- When creating a new XY plot, add a second data item.
- For an existing plot, right-click the plot and then click **Configure XY Plot**.

Procedure

1. In the Configure XY Plot pane, expand the **General** section.

   Tip:
   You can collapse the **Attributes** section.

2. Specify desired properties of the XY plot:
   - **Format**

     Select the default format for numbers in the trend:

Format	Description
Database	Show numbers in a format that depends on the data item: ▪ For PI points or PI AF attributes with a PI point data reference, the format depends on the value of the point's **`DisplayDigits`** attribute: ◦ Zero or positive numbers specify the number of digits to display to the right of the decimal point. ◦ Negative numbers specify the number of significant digits. ▪ For PI AF attributes without a PI point data reference, numbers show 5 significant digits. All data items show the thousands separator.
General	Show all significant digits for numbers except for trailing zeros. If the absolute value of the number is greater than $1x10^{7}$ or less than $1x10^{-5}$, the format will switch to use scientific notation.
Number	Show numbers in the custom format that you specify: ▪ **Decimal Places** The number of digits shown after the decimal. ▪ **Use 1000 separator** Select this check box to show the thousands separator in large numbers.
Scientific	Show numbers in the format 0.00E+00.

   - **Background**

     Select the color of the background.

   - **Plot Title**

Select the check box to include a title, and then enter the title inside the text field, and select the position and color for the title.

- **Legend**

  Select the check box to show the plot's legend, and then select the position of the legend and color of text in the legend and the X-axis label.

- **Engineering Units**

  Select the check box to show the units of measurement on the legend and the X-axis label.

- **X-Axis Label**

  Select the check box to show an X-axis label, and then select the label.

- **Y-Axis Label**

  Select the check box to show the Y-axis label, and then select the label.

Compare attributes at different times on same XY plot

You can compare data points from different time periods on the same XY plot. For example, if a process repeats at a particular frequency, you can compare the values from different iterations of the same phase of the process, such as comparing morning startup to afternoon startup. Similarly, you can compare values to an ideal situation, such as a "golden batch" or optimal startup. Follow this procedure to plot additional points that show the same attributes already in an existing XY plot but at a different time.

Procedure

1. Right-click the XY plot, and then click **Configure XY Plot** to open the Configure XY Plot pane.
2. For each additional time period that you want plotted, add the paired attributes to the table under **Attributes**.
   a. Drag the X-axis attribute from the Assets pane to the **DRAG TO ADD** cell in the X-Axis column.
   b. Drag the Y-axis attribute from the Assets pane to the **DRAG TO ADD** cell in the Y-Axis column.
   c. Verify the data retrieval methods for the added attributes.

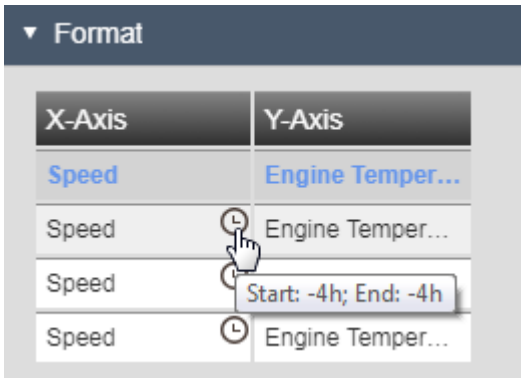
      For consistency, use the same data retrieval methods for comparable paired attributes.
3. Set the time period for each set of paired attributes.
   a. Select the row in the table under **Attributes** that corresponds to the paired attributes.
   b. Under **X Data Options**, select the **Use Custom Time Range** check box.
   c. Specify the time period for the selected paired attributes. Enter values in both **Start** and **End**.

      - For repeatable processes, select **Offset** and enter a PI time abbreviation for the time offset that represents the frequency of the process. For example, if a process happens twice a day, then it happens every 12 hours: enter `-12h`; if a process happens three times a day, then it happens every 8 hours: enter `-8h`.
      - For a reference process, such as a golden batch, select **Time** and enter the time when the reference process occurred.

After you specify a custom time range, PI Vision adds an icon to the X-axis label in the table, and a tooltip shows the time range.

4. Format each data pair for easy identification in the plot.
   a. Expand the **Format** section.

      A table lists each paired attribute. An icon marks rows where the time for the paired attribute differs from the display time, and a tooltip shows how the time differs.



   b. In the table of attributes, select the row that corresponds to the data pair you want to format.
   c. Set the properties to identify the data pair in the plot. For example, you can set color, marker style and color, and lines.

Asset comparison table

Use an asset comparison table to compare measurements and other process information by organizing data by assets. Each asset has its own row. Each column contains the asset's selected attributes. If an attribute stores a URL, then the cell becomes an active hyperlink (indicated by).

You can add dynamic search criteria to an asset comparison table to automatically find and show data from similar assets inside one table. See Add dynamic search criteria.

Note:
To sort the data in columns in numerical or alphabetical order, click a column heading. Clicking the column heading more than once reverses the sort order. To change the order of columns, select a column and drag it to another column inside the table.

Topics in this section

- Create an asset comparison table
- Configure an asset comparison table

Create an asset comparison table

Procedure

1. To add an asset comparison table to a display, select the asset comparison table symbol  from the Symbol Gallery.
2. Drag and drop one or more assets or attributes from the search results onto the display.

   Data from the same asset is organized on the same row.
3. Drag and drop additional assets to automatically create new rows with existing attribute columns.
4. Drag and drop additional attributes to perform the following:
   - Create new attribute columns for all assets in the table.
   - Create new asset rows if the additional attributes belong to new assets.

Configure an asset comparison table

Use the Configure Table pane to customize the asset comparison table.

Procedure

1. Right-click the table and then click **Configure Table** to open the Configure Table pane.
2. Under **Columns**, customize the attribute columns:
   - To add an attribute column to the table, select the attribute in the **Additional Attributes** list and click the up arrow.
   - To remove an attribute column from the table, select the attribute in the **Current Columns** list and click the down arrow.
   - To show the units of measurement in a column, click a column in the list and select the **Show Units** check box.

   Tip:
   To change the order of the columns, select a column's header in the table and drag it to another column.
3. Under **Numbers**, customize the format of numbers in the table.

Format	Description
Database	Show numbers in a format that depends on the data item: ◦ For PI points or PI AF attributes with a PI point data reference, the format depends on the value of the point's **DisplayDigits** attribute: ▪ Zero or positive numbers specify the number of digits to display to the right of the decimal point. ▪ Negative numbers specify the number of significant digits. ◦ For PI AF attributes without a PI point data reference, numbers show 5 significant digits. All data items show the thousands separator.
General	Show all significant digits for numbers except for trailing zeros. If the absolute value of the number is greater than $1x10^{7}$ or less than $1x10^{-5}$, the format will switch to use scientific notation.
Number	Show numbers in the custom format that you specify: ◦ **Decimal Places** The number of digits shown after the decimal. ◦ **Use 1000 separator** Select this check box to show the thousands separator in large numbers.
Scientific	Show numbers in the format 0.00E+00.

4. Under **Rows**, customize the asset rows.
   - To delete a row, select it on the list and click the trash icon.
   - To view the units of measurement, choose a row from the list and select the **Show Units** check box.
5. Click the down arrow at the top of the pane and then click the option to add a multi-state or a navigation link to the symbol.

   See Multi-state behaviors or Add a navigation link to another display or website.

Change a symbol type

After you create a symbol on the display, you can easily change it to a different symbol type. However, you cannot change an events table to a different symbol type.

Procedure

1. Right-click the existing symbol you want to change and click **Switch symbol to**.
2. From the sub-menu, select the new desired symbol type.

Note:
Multi-data item symbols like trends or tables can only transition into other multi-data item symbols. For example, tables can transition to trends and trends to tables. If a trend or a table only has one data item, then it can transition to any other symbol.

Select and group multiple symbols

When working in **Design** mode, you can select, move, copy/paste multiple symbols. Once multiple symbols are selected, you can group them into a single object.

Procedure

1. To select multiple symbols on your display, you can:
   - Click an empty area of the screen, hold down the mouse button, and drag your cursor over the section of the display that contains the symbols you want to select.
   - Hold CTRL and click on each of the symbols you want to select.

   To select all the symbols on the display at once, press CTRL + A.
2. To group selected symbols into a single object, right-click one of the selected symbols and click **Group Symbols**.

   You can move the group by clicking anywhere inside the group.
3. Once you group objects on the display, you can:
   - Select and edit any individual symbol inside the group by click the group and then clicking the symbol you want to select.
   - Save the group by saving the display.
   - Move the group in **Design** mode by dragging the object anywhere on the display.
4. To ungroup the symbols, right-click the group and click **Ungroup Symbols**

View a symbol as a popup trend

To get a more detailed view of your equipment, you can view any data symbol in a separate, new display as a popup trend. The popup trend lets you drill into the data from a single symbol by opening it in new screen. After you get a deeper look at your symbol inside a popup trend, you can return to your original display.

Procedure

1. Exit **Design** mode by clicking  .
2. To open a popup trend, double-click any data symbol on your display.

   Note:
   If the symbol contains a hyperlink, double-clicking the symbol takes you to the link and does not open the popup trend. To open the popup trend for a linked symbol, right-click it and click **Drill In** > **Popup Trend**. To learn more about hyperlinks in symbols, see Add a navigation link to a symbol.
3. After a popup trend opens, click inside it to view trend cursors. You can also use a trend zoom and pan across the popup trend's time range by dragging the lower section of the trend left or right.
4. To return to your original display, click the **Back** button.

Multi-state behaviors

With multi-state behaviors, you can transform value, gauge, and asset comparison table symbols, as well as shapes, images, and text into visual alarms. Objects configured with multi-states alter their color based on changing data values. Multi-state configuration assigns specific colors to ranges of values, corresponding to process states. When the data value of a multi-state object enters the assigned range, its color changes to indicate a different state.

You configure the number of value ranges (states), the maximum for each range, and the color for each range. When setting the color, you can also set the object to blink. When the data value enters a different value range, the multi-state object changes its color to match the configuration. You can make a multi-state object seem to disappear by setting the color to the display's background color. You can also assign a color for data in bad status (for example, a maximum permissible level).

For example, suppose you have a multi-state object that has two states. State 1 has a value range from 0 to 50 assigned the color blue. State 2 has a range from 50 to 100 assigned the color red. When the value reads 50 or below, the symbol appears blue; above 50, the symbol appears red.

Note:
To configure multi-state behaviors for limit attribute traits, at least two attribute traits must be enabled in PI System Explorer. Note that the minimum and maximum limit attribute traits override the zero and span PI point attributes, respectively, which are set in PI System Management Tools (SMT). For more information, see the PI Server topic "Attribute traits" in Live Library (https://livelibrary.osisoft.com).

The following objects support multi-state behaviors:

- Value symbols
- Gauge symbols
- Asset comparison tables
- Shapes
- Images
- Text

Training video

For more on this topic, watch the following video:

https://www.youtube.com/watch?v=Tz7c2wuL8OU&list=PLMcG1Hs2JbcvWPkSbIbQEJqsTX9Sa1nty

Topics in this section

- Configure multi-states for value and gauge symbols
- Configure multi-states for asset comparison tables
- Configure multi-states for shapes, images, or text

Configure multi-states for value and gauge symbols

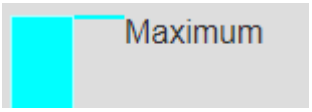
You can configure multi-state behaviors for value and gauge symbols. The attribute inside the symbol acts as a trigger for the multi-state behavior.

Procedure

1. Right-click a value or gauge symbol on the display, and then click either **Add Multi-State** or **Configure Multi-State** to open the Multi-State pane.

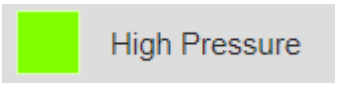
   For the attribute represented by the symbol, the pane shows available states and their associated colors. States correspond to:

   - Traits if the attribute has limit traits

     Limit traits for attributes are configured in PI System Explorer. For more information, see the PI Server topic "Attribute traits" in Live Library (https://livelibrary.osisoft.com).

   - Digital states if the attribute stores digital state values

   - Configurable numeric conditions

   The **Bad data** state indicates that a value is either out of range or contains no data.

2. If the pane lists configurable numeric conditions, set the conditions to the define the desired states:

   a. For each condition, enter the maximum value for the condition.

      The state applies when the value is greater than the previous condition and less than or equal to this value.

   b. To remove a condition, click **X** next to the condition.

   c. To add a condition, type a maximum value in the empty field below **Bad data** and then click **Add**.

3. Set the colors desired for each state:

   a. Click the color to open the color palette.

   b. Select the desired color for the state.

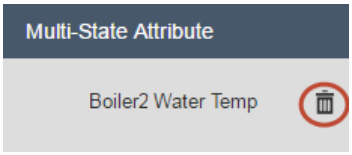
   c. Select the **Blink** check box if you want the cell to blink for this state.

Results

The symbol changes its color based on the current attribute value and the colors configured for the multi-state.

After you finish

To remove multi-state behavior, click the trash can icon at the top of the Multi-State pane.



Configure multi-states for asset comparison tables

In asset comparison tables, you can configure multi-state behaviors for columns that do not contain text or string values. You select the column and configure the values that trigger specific colors for cells in that column.

Procedure

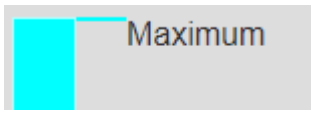
1. Right-click an asset-comparison-table symbol on the display, and then click either **Add Multi-State** or **Configure Multi-State** to open the Multi-State pane.

   The pane lists the current columns in the table.

2. From the **Current Columns** list, select the column that you want to configure, and then select the **Enable Multi-State** check box.

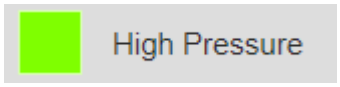
   For the attribute in the selected column, the pane shows available states and their associated colors. States correspond to:

   - Traits if the attribute has limit traits

     Limit traits for attributes are configured in PI System Explorer. For more information, see the PI Server topic "Attribute traits" in Live Library (https://livelibrary.osisoft.com).

   - Digital states if the attribute stores digital state values

   - Configurable numeric conditions

   The pane shows the available states for the attribute of the first row in the table.

   The **Bad data** state indicates that a value is either out of range or contains no data, or that the attribute value is incompatible with the configured states. For example, in columns that contain attributes configured for limit traits, then attributes without traits always appear in the **Bad data** state.

3. If the pane lists configurable numeric conditions, set the conditions to the define the desired states:

a. For each condition, enter the maximum value for the condition.

   The state applies when the value is greater than the previous condition and less than or equal to this value.

b. To remove a condition, click **X** next to the condition.

c. To add a condition, type a maximum value in the empty field below **Bad data** and then click **Add**.

4. Set the colors desired for each state:

   a. Click the color to open the color palette.

   b. Select the desired color for the state.

   c. Select the **Blink** check box if you want the cell to blink for this state.

Results

Each cell in the selected column changes its color based on the current attribute value and the colors configured for the multi-state.

After you finish

To remove multi-state behavior from a column, select the column in the Multi-State pane and clear the **Enable Multi-State** check box.

Configure multi-states for shapes, images, or text

You can configure multi-state behaviors for shapes, images, or text in your display.

Before you start

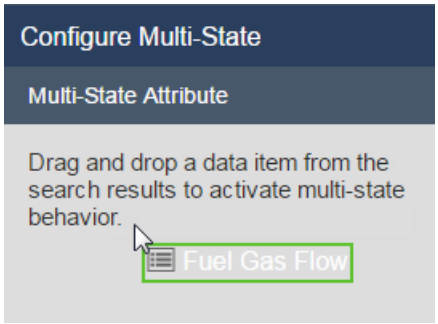
Draw shapes, upload images, or add text to your display. See Create displays in Design mode.

Procedure

1. Right-click the object on the display, and then click **Configure Multi-State** to open the Multi-State pane.
2. Connect the object to an attribute that triggers the multi-state:

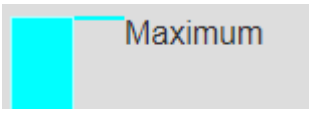
   a. Find an attribute in the Assets pane.

   b. Drag the attribute to the top of the Configure Multi-State pane.



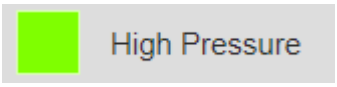
For the selected attribute, the pane shows available states and their associated colors. States correspond to:

- Traits if the attribute has limit traits



Limit traits for attributes are configured in PI System Explorer. For more information, see the PI Server topic "Attribute traits" in Live Library (https://livelibrary.osisoft.com).

- Digital states if the attribute stores digital state values



- Configurable numeric conditions

The **Bad data** state indicates that a value is either out of range or contains no data.

3. If the pane lists configurable numeric conditions, set the conditions to the define the desired states:
   a. For each condition, enter the maximum value for the condition.

      The state applies when the value is greater than the previous condition and less than or equal to this value.

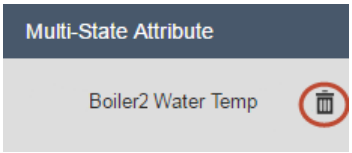
   b. To remove a condition, click **X** next to the condition.
   c. To add a condition, type a maximum value in the empty field below **Bad data** and then click **Add**.
4. Set the colors desired for each state:
   a. Click the color to open the color palette.
   b. Select the desired color for the state.
   c. Select the **Blink** check box if you want the cell to blink for this state.

Results

The shape, image, or text changes its color based on the current attribute value and the colors configured for the multi-state.

After you finish

To remove multi-state behavior, click the trash can icon at the top of the Multi-State pane.



Contextual navigation links

You can add a hyperlink to any object on your display except for an events table. (Each row in an events table is already a contextual link to the selected event.) You can also add hyperlinks inside a collection.

Once you add a hyperlink to an object, you can double-click it to navigate to a desired external website or another display.

A hyperlink can be configured to pass the asset context from the asset on the original *source* display to the asset on the *target* display. When the link is double-clicked, the *target* display asset will automatically change to match the context of the *source* display asset.

Note:
Linked symbols inside a collection or an asset comparison table will pass the asset context of the double-clicked symbol or asset row, respectively.

PI Vision can pass asset context from the following:

- Curent asset
- Root portion of the asset path

Current asset passed as context

For example, suppose a *source* display shows a dashboard with wind-speed gauges for ten wind turbines. When you double-click the gauge for Turbine 2, PI Vision opens a *target* display that provides a detailed operational view of Turbine 2 with its attribute data.

In this scenario, the link passes context from a multi-asset *source* display to a single-asset *target* display.

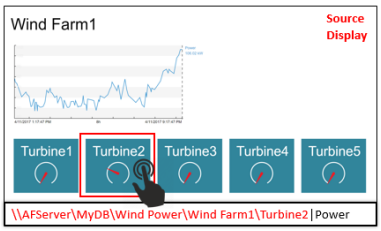
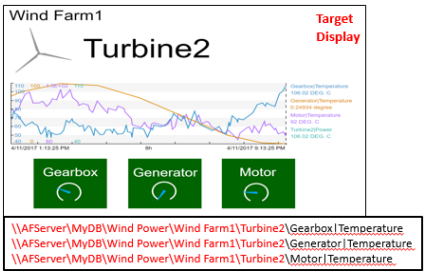
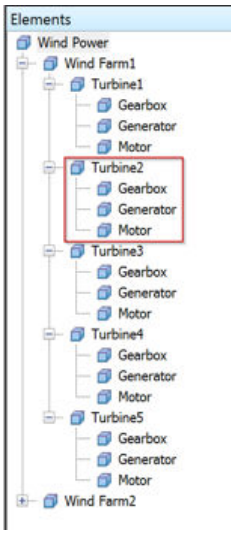
To set this type of asset context, click **Use current asset** in the Add Navigation Link pane.

Note:
If assets on the source display are based on different asset templates, their attribute names must match.

Root portion of the asset path passed as context

For example, suppose my source display shows a dashboard with wind-speed gauges for ten wind turbines. When you double-click the gauge for Turbine 2, PI Vision opens a detailed operational view of Turbine 2 with attribute data from both Turbine 2 and its child assets: Gearbox, Generator, and Motor.

In this scenario, the link passes the asset's path between a multi-asset *source* display and a multi-asset *target* display where the assets are related in the hierarchy. The *target* display updates with attribute data from the passed asset and its child or grandchild assets.

Source Display	Target Display	Asset Hierarchy
 Clicking on Turbine 2 on the *source* display passes the root portion of the asset path. (The root is shown in red.)		

To set this type of asset context, click **Use current asset as root** in the Add Navigation Link pane.

Note:
The assets passed to a target display with the **Use current asset as root** option should be at the same or parallel nodes in the PI AF hierarchy and have identically named hierarchies of child assets.

Training Video

For more on this topic, watch the following video:

https://www.youtube.com/watch?v=MUwyB70KH1Q&list=PLMcG1Hs2JbcvWPkSbIbQEJqsTX9Sa1nty

Add a navigation link to another display or website

You can add a navigation link to any symbol (other than an events table), shape, image, or text on your display, including any object inside a collection. The link can point to another *target* display or to an external website. The *target* display can automatically match the asset context of the *source* display that contains the hyperlink. You can also use links to change the asset context of your current display.

To use the hyperlink, exit **Design** mode before double-clicking the linked object.

Procedure

1. Right-click the object where you want to add a link, and then click **Add Navigation Link** to open the Add Navigation Link pane.
2. (Optional) To have the link change the asset context of the symbols on your current display, select the **Change context of current display** check box (under **Action**).

   By selecting this option, you can double-click linked symbols that contain different assets and change the asset context of the symbols without links on your current display.

> **Note:**
> You can use an asset comparison table or a collection with linked assets to change the asset context of the symbols on your current display.

3. To add a URL link to an external website, enter the URL in the **Hyperlink** field. (To open the external website in a separate browser tab, select **Open in a New Tab** check box.)

   > **Note:**
   > For security reasons, by default, you can only enter `http:` and `https:` protocols for external websites or `./#` and `#` for displays. An administrator can override these security settings. For more information, see the PI Vision administration topic "Override the security settings for navigational links" in Live Library (https://livelibrary.osisoft.com).

4. To add a link to another display, click **Search for Displays**.

   a. Enter the display name or owner in the **Search** field and click  .

      > **Tip:**
      > Use wildcards such as asterisks (*) when you do not know all the letters in the name.

      PI Vision lists all displays with your searched keywords.

   b. Select the display you want to link to.

5. If you want the *target* display to automatically match the time context of the *source* display that contains the link, select the **Set Start and End Time** check box.

6. If you want the *target* display to automatically match the asset context of the linked symbol on the *source* display that contains the link, select the **Set Asset Context** check box and specify how to pass the context.

   - Select **Use Current Asset** to pass the asset context from a multi-asset display to a single asset display.
   - Select **Use Current Asset as Root** to pass the root portion of the asset path as context.

     Use this option when the *target* display contains attributes of the *source* display asset as well as the attributes of its child assets.

     > **Note:**
     > The top-level assets should be at the same or parallel nodes in the PI AF hierarchy and have identical or very similar hierarchies of child assets.

   For more information about passing the asset context, see Contextual navigation links.

7. (Optional) When working with a static symbol like a shape, an image, or text, you can associate it with a desired asset by dragging the asset from the search results into the **Asset Context** field in the lower half of the pane. To set the asset context for the object in order for the target display to match the asset associated with the linked symbol, follow instructions in the previous step.

8. To go to the link inside the symbol, exit **Design** mode. You can either double-click on the linked symbol or right-click it, and then click **Drill In** > **Navigation Link**.

   To view the data symbol in a separate display as a popup trend, right-click the linked symbol, and then click **Drill In** > **Popup Trend** .

Symbol collection

A collection allows you to automatically find and see all similar assets on your display. With a collection, you can choose one or more data symbols and instantly view their related assets and attributes, without having to search for each asset separately.

For example, say you have ten pumps in one plant. You can view the flow rate attribute of Pump 1 and then convert its symbol into a collection that automatically finds and shows the flow rate for all ten pumps.

By changing the collection search criteria, you can customize your collection to view only those assets whose parameters fall within a desired range or which are in a specific state. The collection will update automatically as the parameters or state of the assets changes.

Note:
You can convert a symbol into a collection only if the symbol contains a PI AF attribute.

Training Video

For more on this topic, check out the following video:

https://www.youtube.com/watch?v=R8QPrNxCV1k&list=PLMcG1Hs2JbcvWPkSbIbQEJqsTX9Sa1nty

Topics in this section

Create a collection

Select one or more symbols, images, or text to convert them into a collection.

Note:
You cannot convert an XY plot or events table into a collection. An asset comparison table can only be converted into a single-symbol collection by adding dynamic search criteria. See Add dynamic search criteria.

Procedure

1. Convert one or more symbols, images, or text into a collection:
   - To convert a single symbol, right-click the symbol and click **Convert to Collection**.
   - To convert multiple symbols, select the desired symbols by holding CTRL or by dragging a selection box around them, and then right-click one of the selected symbols and click **Convert to Collection**.

   The collection replicates your selected objects for each related asset inside a separate canvas, which you can scroll, move, or resize.

Note:
To resize the collection canvas, you must enter **Design** mode.

2. To change the search criteria for the collection, right-click the collection and then click **Edit Collection Criteria** to open the Edit Collection Criteria pane.
3. To format the collection, right-click the collection and then click **Format Collection** to open the Format Collection pane.

Edit collection criteria

You can customize a collection by changing its search criteria. The collection will dynamically update to show only those symbols that meet your specified criteria. For example, using collection criteria, you can create a collection for wind turbines with speeds less than a certain value and electrical output greater than a certain value. The collection will automatically update to show only those wind turbines that are within these criteria.

Procedure

1. Right-click the collection and then click **Edit Collection Criteria** to open the Edit Collection Criteria pane.
2. Click the arrows to expand each search criteria and view more options.

   You can refine your search by selecting the following:

   a. **Database**

      Select a single PI AF database that contains the assets you want to retrieve.

   b. **Search Root**

      Enter the "search root" asset in the asset hierarchy. A search root is any specified node of an asset hierarchy. Once an asset is set as a search root, the collection only searches that asset and its children, but will not search the data hierarchy above the search root. The search root must consist of an asset hierarchy separated by backslashes, without including the PI AF server and database. For example: `Parent Asset\Child Asset \Child Asset 2`.

      To see all the descendants of the asset, such as grandchild assets, select the **Return All Descendants** check box.

      Note:
      If you do not set the search root but select the **Return All Descendants** check box, PI Vision retrieves all the assets from the selected database.

   c. **Asset Name**

      Enter the name of a specific asset. Use wildcards, such as question marks (?) and asterisks (*), to stand for single or multiple characters, respectively.

   d. **Asset Type**

      Find assets associated with a specific asset type and the values of up to five asset attributes:

      - **Asset Type**

        Select an asset template. PI Vision finds asset created from the selected template.

      - **Asset Attribute**

To find desired assets by their asset attributes, click the plus (**+**) sign, select an attribute from the list, select an operator, and enter a value.

If the value type of the attribute is enumeration set or Boolean, then click the arrow to select the value from a list. For more information, see the PI Server topic "Enumeration sets" in Live Library (https://livelibrary.osisoft.com).

For example, to see assets in the collection with temperature above 100 degrees, select your asset type, select `Temperature` as the Attribute, then select > from the list, and enter `100` in the value field.

Depending on the attribute type, you can select one of the following operators:

Operators	Description
=	Is equal to
≠	Is not equal to
<	Less than
<=	Less than or equals to
>	Greater than
>=	Greater than or equals to
In	Include multiple, non-numeric text values separated by semicolons.

Note:
PI AF does not support searches of attributes with an integer value type and a default UOM configured. See the PI Server topic "Create attribute templates" in Live Library (https://livelibrary.osisoft.com).

e. **Asset Category**

Select the asset category for the assets in the collection.

f. **Number of Results**

Enter the maximum number of assets you want to see in your collection.

g. **Asset Order**

Select the sort order for assets in the collection:

- **Ascending by Name**

  Organize the assets in the collection in ascending alphabetical order (A to Z).

- **Descending by Name**

  Organize the assets in the collection in descending alphabetical order (Z to A).

3. Click **Refresh** to perform the search.

Format a collection

Use the Format Collection pane to customize the collection's appearance and layout.

Procedure

1. Right-click the symbol collection and click **Format Collection** to open the Format Collection pane.
2. You can customize the **Style** of the collection by setting the following:

a. **Fill**

   Choose the background color for the collection canvas.

b. Customize the border.

   - **Border**: Choose the color of the border.
   - **Weight**: Choose the thickness of the border.
   - **Style**: Choose the style of the border, which can be a line, dots, dashes of various lengths, as well as combinations of dashes and dots.

3. You can customize the **Layout** of the collection by setting the following:

   a. **Wrapping**: Select **Left to right** to arrange the symbols horizontally relative to the left border. Select **Top to bottom** to arrange the symbols vertically relative to the top border.

   Note:
   Resize the collection canvas so it is large enough to contain your desired wrapping.

   b. **Inner Padding**: Enter the number of pixels between each asset in the collection.

   c. **Outer Padding**: Enter the number of pixels between the asset and the collection's border.

Modify a collection

You can modify any object in the collection by adding a navigation link, configuring, moving or deleting the object or by adding new objects to the collection.

Procedure

1. To modify the collection, right-click the collection and click **Modify Collection**.

   The collection switches to Modify mode and displays your symbols inside a stencil, showing one set of symbols for a single asset. The objects on the display that are outside of the modified collection are grayed out.

2. Once the collection is in Modify mode, you can change it by performing one or more of the following:

   - Search for data and add new data symbols to the collection.

     Note:
     You cannot add an asset comparison table, events table, or XY plot, which are disabled in Modify mode.

   - Switch symbol types.
   - Move, resize, copy/paste, or delete existing objects in the collection.
   - Format all objects in the collection.
   - Add navigation links to all objects inside the collection. See Contextual navigation links.

     Note:
     If you add a hyperlink to a symbol in the collection for one asset in Modify mode, the hyperlink will be rendered for all the assets of the same type inside the collection.

   - Configure multi-state behaviors for any object inside the collection. See Multi-state behaviors.

Note:
After you configure a multi-state for one of the objects, you can swap its "trigger" data source by dragging a new attribute into the **Multi-State Attribute** section of the Add Multi-State pane.

- Add images, text, shapes and graphics from the graphics library.

Note:
When modifying a collection, the rest of display is locked for editing. You cannot add, move or copy/paste items outside of the collection stencil.

3. After modifying the collection, click the exit button or right-click inside the empty area of the collection and click **Exit Modify Mode** to exit Modify mode.

   The collection refreshes and displays the modified symbols for all assets of the same type based on the collection search criteria.

Add dynamic search criteria

You can add dynamic search criteria to tables and asset comparison tables. Like a symbol collection, a table with dynamic search criteria will update to show only those assets that meet your specified criteria.

Note:
An asset comparison table can only show dynamic search criteria and cannot be converted into a symbol collection.

Procedure

1. To add dynamic search criteria to a table or an asset comparison table, right-click it and click **Add Dynamic Search Criteria**.
2. Use the Edit Search Criteria pane to change the search criteria for the table. See Edit collection criteria.

Excluded attributes

Assets created from a template can contain excluded attributes. When creating an instance of an asset from a template, designers might choose to exclude some attributes. Excluded attributes do not exist for a particular asset. For example, suppose a pump from manufacturer A records a temperature, but a pump from manufacturer B does not record a temperature. Designers can create a pump template with a temperature attribute, but exclude the attribute from pump 1 made by manufacturer B.

PI Vision handles excluded attributes automatically:

- In tables, PI Vision hides rows of excluded attributes.
- In asset comparison tables, PI Vision shows blank values for excluded attributes.
- In other symbols, PI Vision shows "N/A" for excluded attributes.

Working with displays

Displays are the foundation for visualizing data in PI Vision and act as containers for creating, editing and storing symbols that represent your operational environment. Once you design a display, you can lock it for editing and start monitoring it.

As a process engineer you can create a display that you use to hone in on a set of data and then quickly and easily share that display with others across your organization. You can also send the URL for a shared display in an email or instant message so that another user could view them in a read-only mode.

Topics in this section

- Create displays in Design mode
- Assets in displays
- Graphics library
- Monitor displays
- Export data from a display
- Change the display's background color
- Folders

Create displays in Design mode

Using **Design** mode, you can create displays by adding and arranging symbols, shapes, images, and text anywhere on the display.

When you add a symbol to a new display, the display is in **Design** mode. The **Design** mode button  will be active, and you will see an orange frame around your display and the editing toolbar. The editing toolbar allows you to add shapes, text, or images, as well as arrange objects on the display.

Here are the main tasks you can perform while working in **Design** mode:

- Create new symbols
- Move, resize, and arrange objects on the display
- Draw shapes
- Add text
- Upload images

To lock the display and start monitoring it, exit **Design** mode by clicking  . Once you exit **Design** mode, you can view trend cursors on any trend or pan across a trend's time range by dragging it. When the display is not in **Design** mode, you can still make some changes to it, such

as adding data items to existing symbols or swapping related assets in symbols. See Monitor displays.

Move, resize, and arrange objects

When working in **Design** mode, you can move, resize, and arrange all symbols, shapes, text, and images.

Select multiple objects

To select all the objects on the display, press Ctrl + A.

To select specific objects:

- Click a blank area of the canvas, hold down the mouse button and drag your cursor over the area containing the objects you want to select.
- Press Ctrl and click on the objects you want to select.

Once multiple objects are selected, they can be moved, copied and pasted, or deleted as a group. You can resize groups of text and value objects.

Move an object

Move the pointer over the symbol. When the pointer becomes  , click and drag the object anywhere on the display.

Resize an object

To increase or decrease the size of an object, select it and drag its sizing handle away from or toward its center. To set the precise size of value or text objects, right-click and then click **Format Value** or **Format Text** or **Format Symbols**; in the pane, select the desired size in the **Font Size** list.

Arrange multiple objects

To arrange multiple objects by aligning them or bringing one of them backward or forward, click the **Arrange** button  on the editing toolbar.

Here are the options for arranging or aligning display objects:

Bring to Front	Brings an object to the front of a stacked group of objects.
Send to Back	Brings an object to the back of a stacked group of objects.
Bring Forward	Brings an object up one placement to the front of the stacked group of objects.
Send Backward	Brings an object down one placement to the back of the stacked group of objects.
Align Left	Aligns the left side of the selected objects with the left edge of the left-most object.
Align Center	Aligns the center of the selected objects with the vertical center of the selected objects.
Align Right	Aligns the right side of the selected objects with the right edge of the right-most object.
Align Top	Aligns the top side of the selected objects with the top edge of the top-most object.
Align Middle	Aligns the selected objects in the horizontal middle selected objects.

Align Bottom	Aligns the bottom side of the selected objects with the bottom edge of the bottom-most object.
Distribute Horizontally	Moves the selected objects to evenly distribute them horizontally.
Distribute Vertically	Moves the selected objects to evenly distribute them vertically.

Cut, copy, or paste an object

To cut, copy, or paste an object, use keyboard shortcuts (Ctrl+X, Ctrl+C, Ctrl+V) or click the cut, copy or paste buttons on the editing toolbar.

Delete an object

Select the shape you want to delete and press either Delete or Backspace or click  on the editing toolbar.

Draw shapes

To create shapes, enter **Design** mode.

Procedure

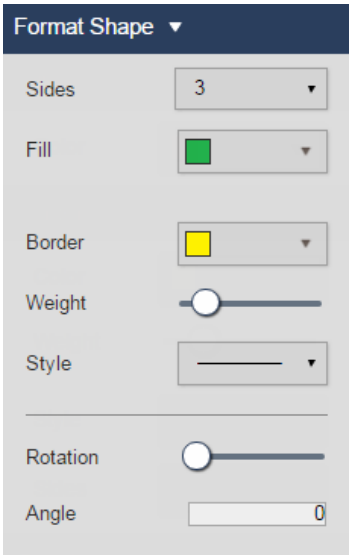
1. On the editing toolbar, click the down arrow next to the Shape icon  and then select a shape that you want to add from the drop-down menu. You can choose between a rectangle, an ellipse, a line, an arc, or a polygon.

2. Once you select a shape, click anywhere on the display, hold the mouse button and start drawing.
3. You can move the shape on the display or resize it by using the sizing handles. Combine multiple shapes to create diagrams and drawings. To select multiple shapes, use the CTRL key.
4. To format the shape, right-click it and click **Format Shape** to open the Format Shape pane. You can perform one of the following:
   - To change the colors of the **Fill** or the **Border**, click the color palettes.
   - To change the thickness of the border, move the **Weight** slider.
   - Choose the **Style** of the border, which can be a line, dashes of various lengths, dots, as well as combinations of dashes and dots.

- To rotate a shape, move the **Rotation** slider or manually enter the rotation **Angle** into the field.
- To create a triangle, select a polygon shape from the drop-down menu. In the Format Shape pane, set the number of **Sides** to 3.

Note:
A polygon can have up to 12 sides.



5. Click the down arrow at the top of the Format Shape pane to add a navigation link or a multi-state.

Add text

To add text to the display, enter **Design** mode.

Procedure

1. On the editing toolbar, click the Text icon and then click anywhere in the display.

   The Format Text pane opens.
2. On the Format Text pane, enter your text in the text field to create a label on the display.
   a. If you are adding a navigation link to the text, you can select the **Use navigation link address** check box to show the address as your text.

Note:
The maximum character limit is 520.

3. You can format the text by customizing the following options:
   - **Font Size**: Select the font size, in points.
   - **Color**: Select the text's font color.
   - **Fill**: Select the fill color.

- **Rotation**: Rotate the text using the rotation slider.
- **Angle**: Enter the rotation angle into the field.

4. Click the down arrow at the top of the pane and then click the option to add a multi-state or a navigation link to the symbol.

   See Multi-state behaviors or Add a navigation link to another display or website.

Upload images

You can add images to the display, such as pictures of equipment, diagrams, or screenshots of operational Human-Machine Interfaces (HMI). You can also create a display background by enlarging your image to the size of the display.

PI Vision supports most image file formats, including JPG, TIF, GIF (static and animated), BMP, and SVG. The maximum image size is 2 MB.

To upload an image, enter **Design** mode.

Procedure

1. On the editing toolbar, click the Image icon  and then click anywhere in the display.

   Click **Choose File** to browse to the file on your computer.

2. Select the file and click **OK**.

   - To change the image, double-click it and browse to a different file.
   - To resize the image, use the sizing handles. Hold the SHIFT key to resize the image proportionally.
   - To create a background image, enlarge the image to the size of the display, click the Arrange icon  on the editing toolbar, and then click **Send to Back**.
   - To rotate an image, right-click it and click **Format Image** to open the Format Image pane. Use the **Rotation** slider or manually enter the rotation **Angle** into the field.

Assets in displays

PI Vision lets you switch the assets in your display for other assets. For example, if your display contains symbols that visualize data items for your Tank 1 asset, you can switch the display to show Tank 2 instead. The title bar in the display shows an asset list. From the asset list, you can select a different asset to show in the display. You can configure the assets shown in the asset list and you can hide the asset list.

Topics in this section

- Switch assets shown in symbols
- Asset-list configuration

Switch assets shown in symbols

For displays that show the asset list, you can switch the assets shown in the display for other assets. Some displays let you switch multiple assets. Depending on the display configuration, switching an asset might affect only instances of that asset in the display or might affect child assets also.

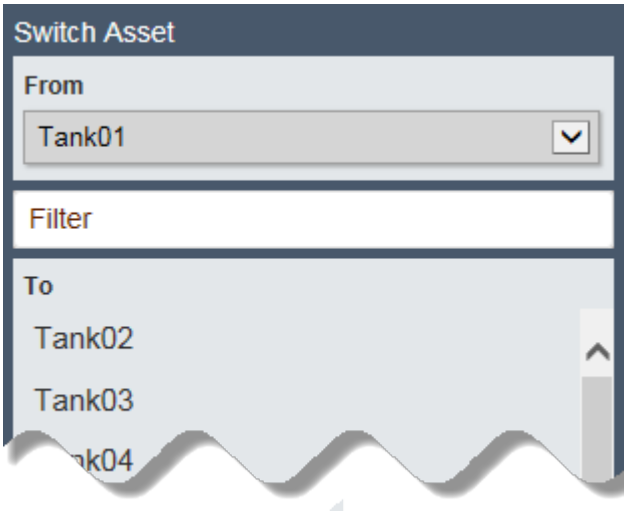
Procedure

1. Click the asset list 

in the title bar to open the **Switch Asset** menu.

   If the asset list has a plus **+** sign next to the name of the asset, you can switch more than one asset in the display.

2. If you can switch more than one asset, then from the **From** list, select the asset in the display that you want to switch.



3. From the **To** list, select the asset that you want to switch with the asset on the display.

Tip:
If the asset list is long, use the **Filter** field to filter the list of assets. Type text found in the asset name.

You can use the wildcard character * to match any number of characters; you can use the wildcard character ? to match a single character. PI Vision automatically assumes a leading and trailing * in any text that you type.

Results

PI Vision updates symbols in the display to show data for the selected asset. Depending on the display and configuration, all assets might change or only matching assets might change. See Asset-list configuration.

If assets are not based on the same template and an attribute is not defined for a new asset, then the display shows "No Data" for that attribute.

If assets are based on the same template and an attribute is excluded from the new asset, then the display shows "N/A" or a blank for that attribute. See Excluded attributes.

Asset-list configuration

Display viewers can switch the assets shown in a display by selecting a different asset in the display's asset list. Display creators can configure the asset list and control how changed assets affect the display. The asset list can show:

- Assets created from the same asset template

  With this default configuration, the asset list shows all other assets created from the same template as assets in the display. In displays with multiple assets, the asset list lets viewers pick the asset they want to switch. When viewers switch one asset, others remain unchanged. This can result in unexpected results if different assets in the display are related.

- Assets that match a specified criteria

  With this configuration, the asset list shows only assets that match criteria that display creators specify. Creators can also configure how the display treats the asset upon change. The display can treat the asset as a lone asset and apply the change to matching assets in the display (that is, assets with the same template or all assets if the assets do not have a template). Or, the display can treat the asset as a root asset, and apply the change to the asset and any child or descendant assets based on the hierarchy.

You can also configure the display to hide the asset list. Choose the option that makes most sense for the assets in your display and the intended use of your display.

By default, the asset list shows assets created from the same asset template as assets in the display.

Topics in this section

- Configure asset list to show specific assets
- Configure asset list to treat changed assets as root assets
- Hide asset list
- Asset-list options

Configure asset list to show specific assets

To have the asset list show a specific set of assets, display creators must configure the asset list to show assets from a defined search. This configuration can offer more flexibility than listing assets only based on templates.

Procedure

1. Open the configuration pane. There are two methods:
   - Right-click the display canvas, and then click **Configure Context Switching**.
   - In the asset list, click  **Configure asset context switching**.
2. Click **Show search results** to specify that a particular set of assets be listed.

   The pane lists additional configuration options for applying the selected asset to the display and for specifying the search criteria for the listed attributes. By default, the search criteria matches the assets currently in the display.

3. Under **Action**, click **Use current asset** to apply asset switches only to matching assets (that is, those with the same template or all assets if the assets do not have a template).
4. Specify the search criteria that lists the desired assets.

   The fields under **Search Criteria** define the assets to list; initially, they match the assets in the display. See Asset-list options.

   For example, suppose your database contains multiple sites and each site contains a set of tanks. To have the asset list show the tanks under a particular site, set the **Search Root** field to list the site.

Configure asset list to treat changed assets as root assets

To have asset changes apply to any child or descendant assets in the display, display creators must configure the asset list to show assets from a defined search and to treat the asset as a root asset. With this configuration, the display applies the change to the asset and changes corresponding child assets based on the hierarchy. This configuration is useful in displays that depict multiple assets at different levels in a hierarchy. With this configuration, when viewers switch the parent asset (the root asset) in the display, any child or descendant assets in the display update to match the selected parent.

Procedure

1. Open the configuration pane. There are two methods:
   - Right-click the display canvas, and then click **Configure Context Switching**.
   - In the asset list, click **Configure asset context switching**.
2. Click **Show search results** to specify that a particular set of assets be listed.

   The pane lists additional configuration options for applying the selected asset to the display and for specifying the search criteria for the listed attributes. By default, the search criteria matches the assets currently in the display.
3. Under **Action**, click **Use current asset as root** to apply asset switches to matching assets and matching child assets in the display.
4. Specify the search criteria that lists the desired assets.

   The fields under **Search Criteria** define the assets to list; initially, they match the assets in the display. See Asset-list options.

Hide asset list

You can hide the asset list to prevent viewers from switching the displayed assets to different assets. This might be useful in displays designed for specific assets or in complex displays that depict multiple assets.

Procedure

1. Open the configuration pane. There are two methods:
   - Right-click the display canvas, and then click **Configure Context Switching**.
   - In the asset list, click **Configure asset context switching**.
2. Click **Do not show**.

Asset-list options

Use the Configure asset context switching pane to configure the asset list:

- **Show assets of the same type**

  List assets created from the same asset template as the assets in the display. This is the default option. This option is useful for displays that show a single asset created from a template.

- **Show search results**

  List the assets from a particular part of the PI AF hierarchy or from a particular set of assets that you specify with search criteria. This option is useful for displays that have assets from multiple levels in a hierarchy or that have similar assets not based on templates. This option is also useful to limit the number of assets listed.

- **Do not show**

  Hide the asset list from a display. This option is useful for displays designed for specific assets or for complex displays that depict multiple assets where switching assets might be confusing.

Action

When you select **Show search results**, select the method the display uses to apply the selected asset to the display:

- **Use current asset**

  Change only the assets with the same template or all assets if the assets do not have a template.

- **Use current asset as root**

  For assets in the display at the same or lower hierarchical level, change the root path to match the selected asset. As a result, any lower-level objects in the hierarchy (such as child or grandchild assets) change to those under the selected asset.

Search Criteria

When you select **Show search results**, specify the search criteria that defines the listed assets:

- **Database**

  A single PI AF database that contains the assets you want listed.

- **Search Root**

  A node of the asset hierarchy used as the root of the asset search. PI Vision searches this asset and its child assets (but not any parent assets) to find matching assets to insert in the asset list. Specify the asset hierarchy by separating nodes with backslashes; do not include the PI AF server and database. For example: `Parent Asset\Child Asset\Child Asset 2`.

  Select the **Return All Descendants** check box to list all the descendants of the asset, such as grandchild assets.

- **Asset Name**

  A name of a specific asset. You can use wildcards, such as question marks (?) to stand for single characters and asterisks (*) to stand for multiple characters.

- **Asset Type**

  An asset template that all listed assets must be created from.

- **Asset Category**

  The asset category of the listed assets.

Graphics library

A large selection of graphics is available in the Graphics Library pane that you can open by clicking the Graphics Library tab  . The graphics belong to a wide range of categories, industries and themes. You can customize their color, fill type, and orientation. You can also configure a graphic's multi-state behavior and allow it to automatically change color depending on the state of the associated asset. See Configure multi-states for shapes, images and text.

Add a graphic

Procedure

1. To open the Graphics Library pane, click the Graphics Library tab  to the left of the Assets pane.

   Graphics categories are listed alphabetically and contain images from a variety of industries.
2. In the Graphics Library pane, click the category for the graphic you want to view and choose a graphic from that category.
3. To add the selected graphic to a display, perform one of the following:
   - Click the graphic and drag it onto the display.
   - Click the graphic and then click anywhere on the display to add the graphic.
   - Click the graphic, then click on the display while holding the mouse button and drag the mouse to place and size the graphic.

   Once you add a graphic, you can move or resize it.
4. To configure a multi-state for the graphic, right-click it and click **Configure Multi-State**. The color of the graphic's fill changes depending on the state. See Configure multi-states for shapes, images and text.

Format a graphic

Use the Format Graphic pane to customize the graphic's fill, flip orientation, or angle.

Procedure

1. Right-click the graphic and click **Format Graphic** to open the Format Graphic pane.
2. On the Format Graphic pane, you can configure the following options:
   a. **Fill Mode**

      The fill mode controls the way the image is drawn.

      - **Original**: View the graphic's original preset colors.
      - **Shaded**: Select a color for the shaded areas.
      - **Solid**: Select a solid color for the entire graphic.
      - **Hollow**: View only the graphic's outlines.

   b. **Flip**

      Select **Horizontal**, **Vertical**, or **Both** to change the orientation of the image. The default setting is **None**.

   c. **Rotation**

      Rotate the graphic using the rotation slider.

   d. **Angle**

      Enter the rotation angle into the field.
3. Click the down arrow at the top of the Format Graphic pane to add a navigation link or a multi-state.

Monitor displays

Outside of Design mode, you can monitor a display.

Tip:
You can use the timebar at the button of the display to pan across the display's time range, regardless of whether you are in Design mode or not.

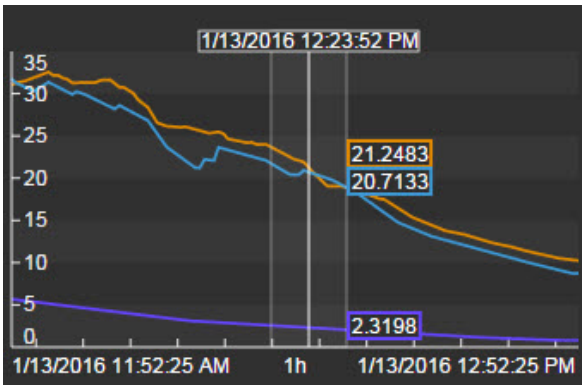
Before you start

Click **Monitor Operations**

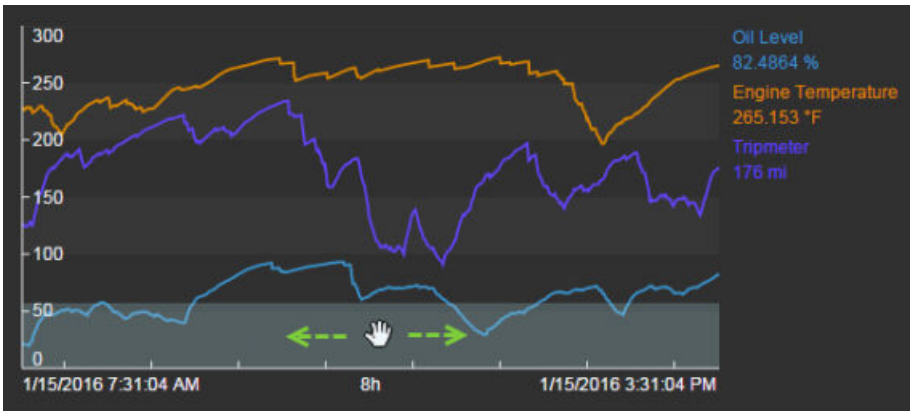
to exit Design mode. PI Vision locks the display, preventing you from accidentally making changes to any symbols.

Procedure

- View trend cursors by clicking on any trend. (See Monitor trends with trend cursors.)



- Pan across the display's time range by dragging the lower section of the trend left or right. (See Pan across a trend's time range.)



- Use trend zoom to zoom in on a particular range of time and value in a trend. (See Trend zoom.)
- Add data items to existing symbols on the display by dragging data items from the search results inside existing symbols.

  On a trend, a data item will show up as a new trace. On a table, a data item will show up as a new row. For value and gauge symbols, adding a data item swaps the existing data item with a new one.
- Search for data items and drag them to the display to create new symbols.

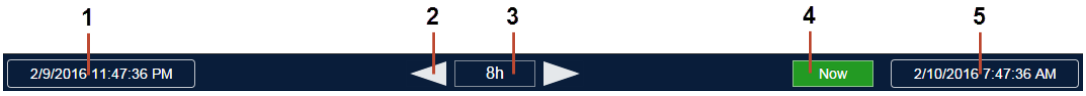
  When you create a new symbol, PI Vision automatically enters **Design** mode.
- View any data symbol (trend, table, value, or gauge) as a pop-up trend in a separate, new display by double-clicking the symbol.

  The pop-up trend shows data from the symbol on the original display. Click the pop-up trend to view trend cursors. You can also use a trend zoom, and pan across the pop-up trend's time range by dragging the lower section of the trend left or right.

Timebar control

The timebar control at the bottom of the display workspace shows the start and end time for all symbols on your display. The duration of the display time range appears in the space between the start and end times, and is initially set to 8 hours. If the end time for the display

time range is set to **Now** (*), symbols on the display will dynamically update as information from their data items changes.



1. Start time
2. Arrows shift the time range backwards or forwards
3. Duration button
4. Now button to return to current time
5. End time

The timebar control accepts valid PI System and Windows times, and launches an error message in the event you enter an unsupported time format. See PI Time for more information on acceptable inputs.

Topics in this section

- Change the time range for a display
- PI time
- Displayed data formats

Change the time range for a display

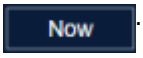
The timebar governs the time range for all symbols in a display. Use any of the following methods to change the time range:

Procedure

- In the timebar control, click the duration button 

to view the duration menu 

. This action resets the start time to accommodate the duration you select.
- Click the arrows to shift the display range forward or backward in time in increments of the display range.
- In the timebar control, click either the start or end time 

. An editable field appears that allows you to enter a new start time or end time to edit the time value. If the end time is set to an absolute time, or any time other than current time, the display will not update. For more information, see PI Time.
- In the timebar control, click the **Now** button 

. Once set, the **Now** button and display range remain highlighted and your symbols dynamically update.

PI time

You can use a special syntax, called PI time, to specify inputs for time stamps and time intervals. PI time uses specific abbreviations, which you combine to create time expressions.

Topics in this section

PI time abbreviations

When specifying PI time, you can use specific abbreviations that represent time units and reference times.

Time-unit abbreviations

Abbreviation	Full version	Plural version	Corresponding time unit
`s`	`second`	`seconds`	Second
`m`	`minute`	`minutes`	Minute
`h`	`hour`	`hours`	Hour
`d`	`day`	`days`	Day
`mo`	`month`	`months`	Month
`y`	`year`	`years`	Year
`w`	`week`	`weeks`	Week

To specify time units, you can specify the abbreviation, the full version, or the plural version of the time unit, such as `s`, `second`, or `seconds`. You must include a valid value with any time unit. If specifying seconds, minutes, or hours, you can specify a fractional value, such as `1.25h`. You cannot specify fractional values for other time units.

Reference-time abbreviations

Abbreviation	Full version	Corresponding reference time
*		Current time
`t`	`today`	00:00:00 (midnight) of the current day
`y`	`yesterday`	00:00:00 (midnight) of the previous day
`sun`[1]	`sunday`	00:00:00 (midnight) on the most recent Sunday
jun[2]	`june`	00:00:00 (midnight) on the current day in June of the current year
`dec` *DD*	`december` *DD*	00:00:00 (midnight) on the *DD*th day of December in the current year
YYYY		00:00:00 (midnight) on the current day and month in year *YYYY*
M-*D* or *M*/*D*		00:00:00 (midnight) on the *D*th day of month *M* in the current year
DD		00:00:00 (midnight) on the *DD*th day of the current month

[1]: Use the first three letters as an abbreviation for any day of the week: `sun`, `mon`, `tue`, `wed`, `thu`, `fri`, or `sat`.

[2]: Use the first three letters as an abbreviation for any month of the year: `jan`, `feb`, `mar`, `apr`, `may`, `jun`, `jul`, `aug`, `sep`, `oct`, `nov`, or `dec`.

PI time expressions

PI time expressions can include fixed times, reference-time abbreviations, and time offsets. A time offset indicates the offset direction (either + or -) and the offset amount (a time-unit abbreviation with a value).

For example, PI time expressions can have the following structure:

Structure	Example
Fixed time only	`24-aug-2012 09:50:00`
Reference-time abbreviation only	`t`
Time offset only	`+3h`
Reference-time abbreviation with a time offset	`t+3h`

Include at most one time offset in an expression; including multiple time offsets can lead to unpredictable results.

Time-stamp specification

To specify inputs for time stamps, you can enter time expressions that contain:

- Fixed times

  A fixed time always represents the same time, regardless of the current time.

Input	Meaning
`23-aug-12 15:00:00`	3:00 p.m. on August 23, 2012
`25-sep-12`	00:00:00 (midnight) on September 25, 2012

- Reference-time abbreviations

  A reference-time abbreviation represents a time relative to the current time.

Input	Meaning
`*`	Current time (now)
`3-1` or `3/1`	00:00:00 (midnight) on March 1 of the current year
`2011`	00:00:00 (midnight) on the current month and day in the year 2011
`25`	00:00:00 (midnight) on the 25th of the current month
`t`	00:00:00 (midnight) on the current date (today)
`y`	00:00:00 (midnight) on the previous date (yesterday)
`tue`	00:00:00 (midnight) on the most recent Tuesday

- Reference-time abbreviations with a time offset

  When included with a reference-time abbreviation, a time offset adds or subtracts from the specified time.

Input	Meaning
`*-1h`	One hour ago
`t+8h`	08:00:00 (8:00 a.m.) today
`y-8h`	16:00:00 (4:00 p.m.) the day before yesterday

Input	Meaning
`mon+14.5h`	14:30:00 (2:30 p.m.) last Monday
`sat-1m`	23:59:00 (11:59 p.m.) last Friday

- Time offsets

  Entered alone, time offsets specify a time relative to an implied reference time. The implied reference time might be the current clock time or another time, depending on where you enter the expression.

Input	Meaning
`-1d`	One day before the current time
`+6h`	Six hours after the current time

Displayed data formats

PI Vision displays numeric and date-time values in standard, easy-to-read formats.

Use your browser language settings to view the application in a different language. The language you choose also affects the representation of items such as:

- Date and time formats
- The decimal marker and thousand separator for numeric data

For example, if you view PI Vision in German, the decimal separator is a comma: `525,7`.

Export data from a display

You can export data from a display to an XML file or a CSV file. The exported files contain all the recorded values for all the data sources on the display for the time range of the display.

Procedure

1. Click the **Save As** arrow  to open the export options:
   - Click **Export as .xml** to create an XML file with source data from the display.
   - Click **Export as .csv** to create a CSV file with source data from the display.

   PI Vision retrieves up to 3600 values per data item and writes them to the exported file.

After you finish

Open the exported file in Microsoft Excel to view the data in a formatted spreadsheet:

- Exported XML files contain two worksheets:
  - A Display worksheet that lists interval data for the data items in the display. PI Vision automatically determines the interval size based on the display time range.
  - An Archive worksheet that lists archive data for all data items in the display.
- Exported CSV files contain one worksheet that lists the data source, time, and value for each recorded value for data items in the display.

Change the display's background color

To improve the visibility of your display, you can adjust its background color.

Procedure

1. Right-click inside an empty area of the display and click **Format Display**.
2. Under **Background**, choose a color from the color panel.

   Click the color wheel to choose a custom color by using a color slider or a color field or by entering a hexadecimal color value (#RRGGBB) in the top field.

Folders

PI Vision stores each display in a folder. By default, PI Vision stores displays in the **Home** folder.

Administrators can create other folders to organize displays. Administrators can give users read-access and write-access to a folder. Those with read-access can see the folder and displays within the folder. Those with write-access can see the folder, move displays into the folder, create displays in the folder, and create subfolders in the folder, as well as rename or delete subfolders, and set access to subfolders.

Folders let users more easily find displays and provide a place to store officially published displays.

Topics in this section

Create folders

You can create a subfolder in any folder that you have write-access to.

Procedure

1. From the left pane on the home page, click  to drill into the folder.

   PI Vision updates the view and highlights the folder.

2. Click **Add New PI Vision Folder** and then type the name of the new folder.

PI Vision creates the subfolder. The new folder will have the same access settings as its parent folder.

After you finish

If desired, change access to the folder. See Set folder access.

Folder permissions

PI Vision folders can have two possible permissions assigned to a PI AF identity. Permissions affect what users can do with a folder:

- **Read**

  See the folder and parent folders. However, users can only see displays that they own or that the owner shared with them.

- **Write**

  - Save or move displays into the folder
  - Create subfolders
  - Set the access to subfolders
  - Rename subfolders
  - Delete subfolders that users have write-access to

Set folder access

You can set access to a folder if you have write-access to its parent folder. Permissions control who can read and write to a folder (see Folder permissions). PI Vision grants access based on PI AF identities. Any user assigned to an identity has the access the folder grants that identity.

Procedure

1. From the left pane on the home page, select the folder and then click **Edit folder settings** to open the Folder Settings window.

   The window lists PI AF identities that can read and write to the folder, and identities currently not assigned any permission.

2. Set the desired access for the folder:

- To give an identity read-access, select an identity in the **Unassigned AF Identities** list and then click the arrow to move to the list of identities with access. A check mark automatically appears in the **Read** column.
- To give an identity write-access, select the **Write** check box.
- To remove write-access from an identity, clear the **Write** check box for that identity.
- To remove all access to the folder from an identity, select the identity and then click the arrow to move the identity to the **Unassigned AF Identities** list.

Note:
Changing folder access can affect other folders:

- If you grant an identity read-access to a subfolder, PI Vision also grants that identity read-access to any parent folders.
- If you remove read-access from a folder, PI Vision also removes read-access for that identity from any subfolders.

3. To apply this access to subfolders and displays in those folders, select the **Propagate permissions** check box.

   Upon save, PI Vision sets the same access to subfolders of the current folder and displays in the current folder and its subfolders, changing those displays to shared displays if necessary.

4. Click **Save** to save the changes.

Move displays into folders

You can move displays that you can edit to folders that you have write-access to.

Procedure

1. From the home page, select displays that you want to move:
   - Select the **Select all** check box to select all displays in the currently shown group of displays.
   - Click the check mark  in the display thumbnail. When you hover the thumbnail, the check mark becomes available for displays that you can edit.

   PI Vision highlights the thumbnail and the check mark  .

2. Click **Move displays** 

to open the Move To window.

3. Select the folder that you want to move the display to, and then click **Move**.

   PI Vision moves the selected displays to the selected folder.

Rename a folder

You can rename a folder If you have write-access to its parent folder.

Procedure

1. From the left pane on the home page, select the folder and then click **Edit folder settings** to open the Folder Settings window.
2. In the **Folder Name** box, enter the new name, and then click **Save**.

Delete a folder

You can delete a folder if you have write-access to the folder and its parent folder. When you delete a folder, PI Vision deletes any subfolders and moves any displays in the deleted folder or subfolders to the Home folder.

Procedure

1. From the left pane on the home page, select the folder and then click **Delete PI Vision Folder** .

Analyzing and comparing events

Events are important process or business time periods that affect your operations. For example, an event can capture asset downtime, process excursions, operator shifts, or batches. You can analyze your data in the context of these events rather than by continuous time periods. Each event has a name, start time, end time, and associated data items (event attributes).

PI Vision enables you to view and analyze your data during the time range of a particular event. For example, you may want to examine the performance of an asset during an operator shift or compare the data for several assets during a downtime period. You can compare multiple events on a single trend, analyze root causes, investigate an event by examining it in detail and annotate it with notes that you can share with colleagues.

Each event has a severity level associated with it. The severity level is marked in the Events pane with a color-coded bar in front of each event. Severity levels have the following default levels, names and color codes:

- Level 5: Critical
- Level 4: Major
- Level 3: Minor
- Level 2: Warning
- Level 1: Information
- Level 0: None (no color)

Training video

For more on this topic, watch the following video:

https://www.youtube.com/watch?v=0-xlahR77PU&list=PLMcG1Hs2JbcvWPkSbIbQEJqsTX9Sa1nty

Topics in this section

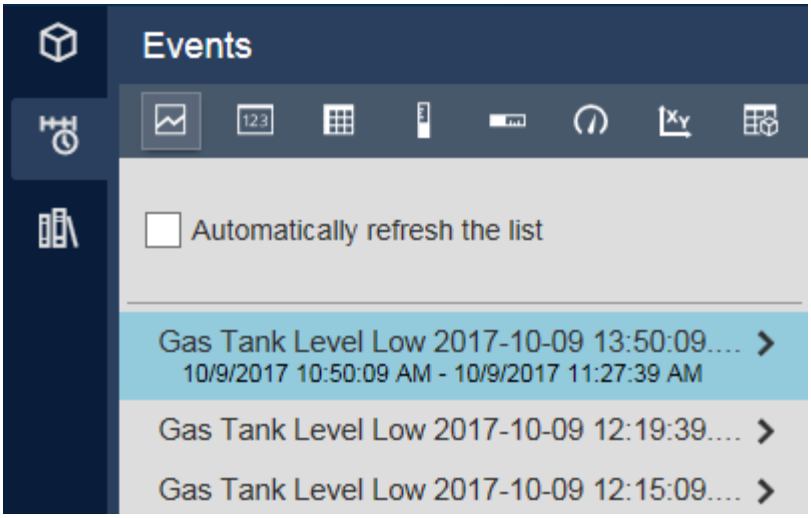
Discover events

Use the Events pane to view events related to assets in the display.

Procedure

1. Click the **Events** tab, located below the **Assets** tab, to open the Events pane.

The pane lists the events that match the criteria saved with the display. The default criteria finds events related to assets in the display and active during the time range in the display.



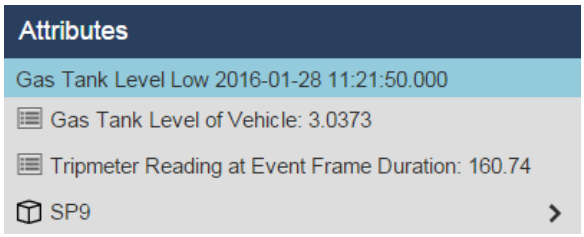
Note:
Listed events have the following conventions:

- Events in progress are marked with an asterisk (*)
- Events with default attributes show the event name followed by the default attribute in parenthesis

2. Configure the Events pane to update the events listed:
   - Select the **Automatically refresh the list** check box to have PI Vision automatically update the list periodically (every 5 seconds by default) and whenever you change the time range of the display.
   - Click **Edit Search Criteria** to change the criteria that determines the listed events. For more information, see Search for events.

   Any changes are saved with the display.
3. Learn more about the listed events:
   - Click an event to view its start time and end time.

     The Attributes pane below the Events pane shows the attributes of the selected event. Administrators define event attributes (the key parameters of the event) in PI System Explorer.



- For events with child events, such as a root cause, click the arrow › next to the event to drill down to the child event.
- To apply the time range of an event to all symbols on the display, right-click the event and then click **Apply Time Range**.

  PI Vision updates the time range of the display to match the time range of the selected event.

After you finish

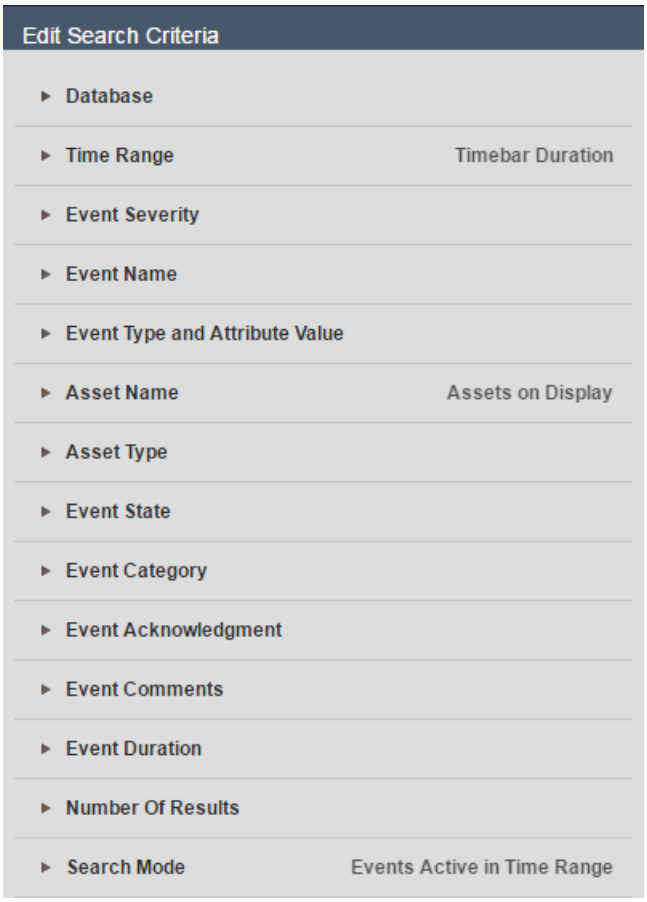
If you configure the display to automatically refresh the event list, then after you close the Events pane, a blue circle appears in the **Events** tab whenever PI Vision detects a new event.

Search for events

To find specific events, perform an advanced search by editing your search criteria.

Procedure

1. In the Events pane, click **Edit Search Criteria** to open the Edit Search Criteria pane.



2. Click the arrows to expand each search criteria and set appropriate values.

   - **Database**

     Select a single PI AF database that contains the events you want to retrieve.

     Note:
     The search will not work unless a database is selected.

   - **Time Range**

     Select the time range of the retrieved events:

     - **Timebar Duration**: Find events that occurred between the start and end time of your display.
     - **Any Time**: Find events that occurred at any time.
     - **Today**: Find events that occurred today.
     - **Last 7 Days**: Find events that occurred in the last 7 days.
     - **Last 30 Days**: Find events that occurred in the last 30 days.
     - **Custom Time Range**: Use the time picker to select the start and end time for your events or enter PI time.

- **Event Severity**

  Select the severity of retrieved events. Event severity levels are marked in the Events pane with a color-coded bar.

- **Event Name**

  Enter the name of the event you want to retrieve. You can use wildcards such as asterisks (*). For example, enter `*downtime*` to find Reactor 3 Downtime. Do not use quotation marks.

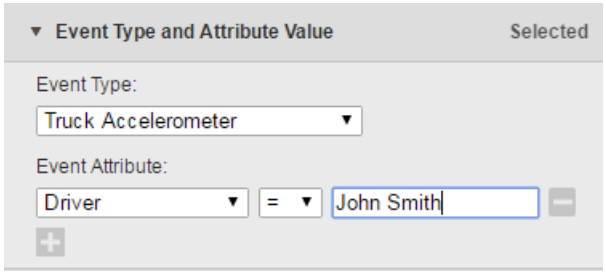
- **Event Type and Attribute Value**

  Specify event types and attribute values of retrieved events:

  - **Event Type**: Select an event type. Event types correspond to event-frame templates. For more information, see the PI Server topic "Event frame templates" in Live Library (https://livelibrary.osisoft.com).
  - **Event Attribute**: Specify attributes from the selected event type and specify desired values for those attributes. You can specify up to five event attributes. Click the plus (**+**) sign, select an attribute from the list, select an operator, and enter a value.

    For example, to find downtime events during which the temperature was above 100 degrees, select **Downtime** from the **Event Type** list and **Temperature** from the **Event Attribute** list, and then select **>** from the operator list and enter `100` in the value field.

    Note:
    If the attribute's value type is an enumeration set or a Boolean, you can select the value from the list by clicking the down-arrow. For more information, see the PI Server topic "Enumeration sets" in Live Library (https://livelibrary.osisoft.com).



- **Asset Name**

  Specify the asset associated with retrieved events:

  - **Any**: Search all assets in the database for associated events.
  - **Assets on Display**: Search assets on the current display for associated events. You must be connected to PI AF version 2017 R2 or later to use this option.
  - **Specify Name**: Enter the name of a specific asset that you want to search for associated events. Use wildcards such as question marks (?) and asterisks (*) to stand for single or multiple characters, respectively.

- **Asset Type**

  Select the asset template of assets referenced by retrieved events.

- **Event State**

  Select the state of retrieved events:

  - **Any**: Find events that are in progress or completed.
  - **In Progress**: Find events that are currently in progress.
  - **Completed**: Find events that are completed.

- **Event Category**

  Select the category of retrieved events. For more information, see the PI Server topic "Categorization of objects" in Live Library (https://livelibrary.osisoft.com).

- **Event Acknowledgment**

  Select the acknowledgement status of retrieved events:

  - **Any**: Find events with any acknowledgment status.
  - **Acknowledged**: Find events that users have acknowledged.
  - **Unacknowledged**: Find events that no user has acknowledged.

  You can acknowledge events on the event details page.

- **Event Comments**

  Select the comment status of retrieved events:

  - **Any**: Find events with and without comments.
  - **Has Comments**: Find events that have comments.
  - **No Comments**: Find events that do not have comments.

  You can insert comments to annotate events on the event detail page.

- **Event Duration**

  To retrieve events with a specific duration, select **Specify Duration** and enter the maximum and minimum duration of the desired event. Duration can be expressed in seconds, minutes, hours, or days.

- **Number of Results**

  Specify the number of events to retrieve:

  - **All Events**: Retrieve any number of matching events.
  - **Number of Most Recent Events**: Retrieve the specified number of events, starting with the most recent.
  - **Number of Earliest Events**: Retrieve the specified number of events, starting with the earliest event.

- **Search Mode**

  Select when the retrieved events occurred relative to the time range set in the **Time Range** criteria:

- **Events Active in Range**: Find events that were active at any time within the specified time range. These events might have begun before the start of the specified time range and ended after the end of the specified time range.
- **Events Entirely in Range**: Find events that began and ended within the specified time range.
- **Events Starting in Range**: Find events that began within the specified time range.
- **Events Ending in Range**: Find events that ended within the specified time range.

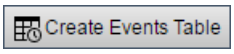
3. Select the **Return All Descendants** check box to also return all the descendants of the retrieved events, such as child events or grandchild events.
4. Click **Apply** to search for matching events and close the Edit Search Criteria pane.

   The search results appear inside the Events pane.

Create an events table

The events table provides a dynamically updating, tabular view of events that meet a specified criteria. Upon creation, the table shows the events from the Events pane, based on the criteria in the Edit Search Criteria pane. After you create an events table, you can change the events inside the table by changing the criteria in the Configure Table pane. From the table, you can easily filter and sort events. When you save your display, the sorting options on the events table are saved with the display.

Procedure

1. In the Events pane, click **Create Events Table** 

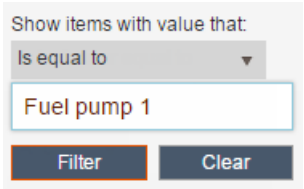
to create an events table on the display.

   The table shows all the events listed in the Events pane. If the pane does not contain events, the events table will be blank.

   Note:
   To automatically fit the content of a column, double-click the border to the right of the column's heading.

2. To filter the table items, click the filter icon to the right of any column heading and set the filtering parameters.

   Note:
   The options and choices of operators inside the filter menu vary by column.



   a. On the filter menu, enter or select a value or string, and then choose from some of the following operators:

Operators	Description
Is equal to	See only items with an entered text or value. Only those items whose names fully match your entry are shown.
Is not equal to	See items with values that do not equal to a specified text or value. Items whose names fully match your entry are not shown.
Starts with	See items that start with a specified text or value.
Ends with	See items that end with a specified text or value.
Contains	See items that contain a specified text or value.
Does not contain	See items that do not contain a specified text or value.
Is after or equal to	See items that start on or after a specified time.
Is after	See items that start after a specified time.
Is before or equal to	See items that start on or before a specified time.
Is before	See items that start before a specified time.
Is empty	See items that are blank.
Is not empty	See items that are not blank.

b. After choosing your filter options, click **Filter**.

   The table column shows only the items that have not been filtered out. The filter icon changes from white to blue, indicating that a filter is applied to that column. To clear the filter, open the filter menu again and click **Clear**.

3. To sort the table by column, click the header of a desired column.

   The column becomes a sorting column, which is indicated by a down arrow. To reverse the sort order, click the header of the column again.

4. To view the events of another related asset, use the asset list to switch assets (see Switch assets shown in symbols) or change the events search criteria in the Configure Table pane (see Configure an events table).

   Note:
   To use the asset list to switch related assets in the events table, the **Asset Name** criteria on the Configure Table pane must be set to **Selected Asset on Display**.

5. To add, remove, and sort columns, or to change the events search criteria, right-click the table and then click **Configure Table**. See Configure an events table.

6. To open the event details page that contains more information about a particular event, double-click the event's row in the table. See View event details and annotate events.

Configure an events table

Use the Configure Table pane to configure the columns, default sort order, and style of an events table. Upon creation, the table shows the events from the Events pane, and those search settings are copied to the Configure Table pane. After you create the table, use the Configure Table pane to change the search criteria that sets the events that appear in the table. The Configure Table pane opens automatically when you create an events table.

Procedure

1. If the pane is not open, right-click the events table, and then click **Configure Table**.
2. Under **Table Columns**, select the table columns and set the default sorting order.
   a. Select the check boxes next to the columns you want to appear to the table:
      - **Asset**: View the name of the asset associated with each event.
      - **Asset Path**: View the path in PI AF to the asset associated with each event.
      - **Event Type**: View the event type of each event.
      - **Start Time**: View the start time of each event, including the date.
      - **End Time**: View the end time of each event, including the date.
      - **Severity**: View the severity level of each event.
      - **Duration**: View the duration of each event.
      - **Reason**: View and edit the reason for each event.

        The reason is only available when a reason trait is identified for an attribute in the event template. This requires PI AF Server version 2017 R2 or later.
      - **Acknowledged By**: View the user who acknowledged each event.
      - **Acknowledged Date**: View the date when each event was acknowledged
      - **Acknowledgement**: View the Acknowledgement button and status. You can acknowledge an event directly from the table by clicking the Acknowledgement button.

   b. Select the default sorting order:
      - **Default Sort Column**: Select the column used to sort the events in the table.
      - **Default Sort Direction**: Select the direction, either **Ascending** (A to Z) or **Descending** (Z to A) alphanumeric order, to sort the column.

      Note:
      Changes to the **Table Columns** options are applied to the table as soon as they are made, without needing to click **Apply**.
3. Under **Style**, click the style for column and row shading.
4. Under **Edit Search Criteria**, set the criteria for events shown in the table.

   Note:
   Changing the criteria inside the Configure Table pane does not affect the events listed in the Events pane.

   - **Database**

     Select a single PI AF database that contains the events you want to retrieve.

     Note:
     The search will not work unless a database is selected.

- **Time Range**

  Select the time range of the retrieved events:

  - **Timebar Duration**: Find events that occurred between the start and end time of your display.
  - **Any Time**: Find events that occurred at any time.
  - **Today**: Find events that occurred today.
  - **Last 7 Days**: Find events that occurred in the last 7 days.
  - **Last 30 Days**: Find events that occurred in the last 30 days.
  - **Custom Time Range**: Use the time picker to select the start and end time for your events or enter PI time.

- **Event Severity**

  Select the severity of retrieved events. Event severity levels are marked in the Events pane with a color-coded bar.

- **Event Name**

  Enter the name of the event you want to retrieve. You can use wildcards such as asterisks (*). For example, enter `*downtime*` to find Reactor 3 Downtime. Do not use quotation marks.

- **Event Type and Attribute Value**

  Specify event types and attribute values of retrieved events:

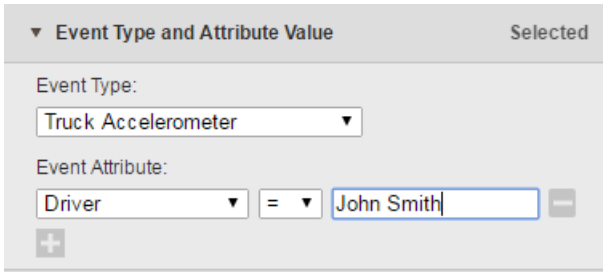
  - **Event Type**: Select an event type. Event types correspond to event-frame templates. For more information, see the PI Server topic "Event frame templates" in Live Library (https://livelibrary.osisoft.com).
  - **Event Attribute**: Specify attributes from the selected event type and specify desired values for those attributes. You can specify up to five event attributes. Click the plus (**+**) sign, select an attribute from the list, select an operator, and enter a value.

    For example, to find downtime events during which the temperature was above 100 degrees, select **Downtime** from the **Event Type** list and **Temperature** from the **Event Attribute** list, and then select **>** from the operator list and enter `100` in the value field.

    Note:
    If the attribute's value type is an enumeration set or a Boolean, you can select the value from the list by clicking the down-arrow. For more information, see the PI Server topic "Enumeration sets" in Live Library (https://livelibrary.osisoft.com).

    For the events table, you can use the `In` operator. For the value, specify multiple, non-numeric text values separated by semicolons. PI Vision returns events that match any of these values. If you specify the same attribute more than once with the `In` operator, PI Vision finds events that match any of the values specified for that attribute. If you specify different attributes with the `In` operator, PI Vision finds events that match the conditions specified for all the attributes.



- **Asset Name**

  Specify the asset associated with retrieved events:

  - **Any**: Search all assets in the database for associated events.
  - **Selected Asset on Display**: Search the selected asset in the asset list for associated events. If you select this option, then the table updates when you select a different asset from the asset list.
  - **Assets on Display**: Search assets on the current display for associated events. You must be connected to PI AF version 2017 R2 or later to use this option.
  - **Specify Name**: Enter the name of a specific asset that you want to search for associated events. Use wildcards such as question marks (?) and asterisks (*) to stand for single or multiple characters, respectively.

- **Asset Type**

  Select the asset template of assets referenced by retrieved events.

- **Event State**

  Select the state of retrieved events:

  - **Any**: Find events that are in progress or completed.
  - **In Progress**: Find events that are currently in progress.
  - **Completed**: Find events that are completed.

- **Event Category**

  Select the category of retrieved events. For more information, see the PI Server topic "Categorization of objects" in Live Library (https://livelibrary.osisoft.com).

- **Event Acknowledgment**

  Select the acknowledgement status of retrieved events:

  - **Any**: Find events with any acknowledgment status.
  - **Acknowledged**: Find events that users have acknowledged.
  - **Unacknowledged**: Find events that no user has acknowledged.

  You can acknowledge events on the event details page.

- **Event Comments**

  Select the comment status of retrieved events:

- **Any**: Find events with and without comments.
- **Has Comments**: Find events that have comments.
- **No Comments**: Find events that do not have comments.

You can insert comments to annotate events on the event detail page.

◦ **Event Duration**

To retrieve events with a specific duration, select **Specify Duration** and enter the maximum and minimum duration of the desired event. Duration can be expressed in seconds, minutes, hours, or days.

◦ **Number of Results**

Specify the number of events to retrieve:

- **All Events**: Retrieve any number of matching events.
- **Number of Most Recent Events**: Retrieve the specified number of events, starting with the most recent.
- **Number of Earliest Events**: Retrieve the specified number of events, starting with the earliest event.

◦ **Search Mode**

Select when the retrieved events occurred relative to the time range set in the **Time Range** criteria:

- **Events Active in Range**: Find events that were active at any time within the specified time range. These events might have begun before the start of the specified time range and ended after the end of the specified time range.
- **Events Entirely in Range**: Find events that began and ended within the specified time range.
- **Events Starting in Range**: Find events that began within the specified time range.
- **Events Ending in Range**: Find events that ended within the specified time range.

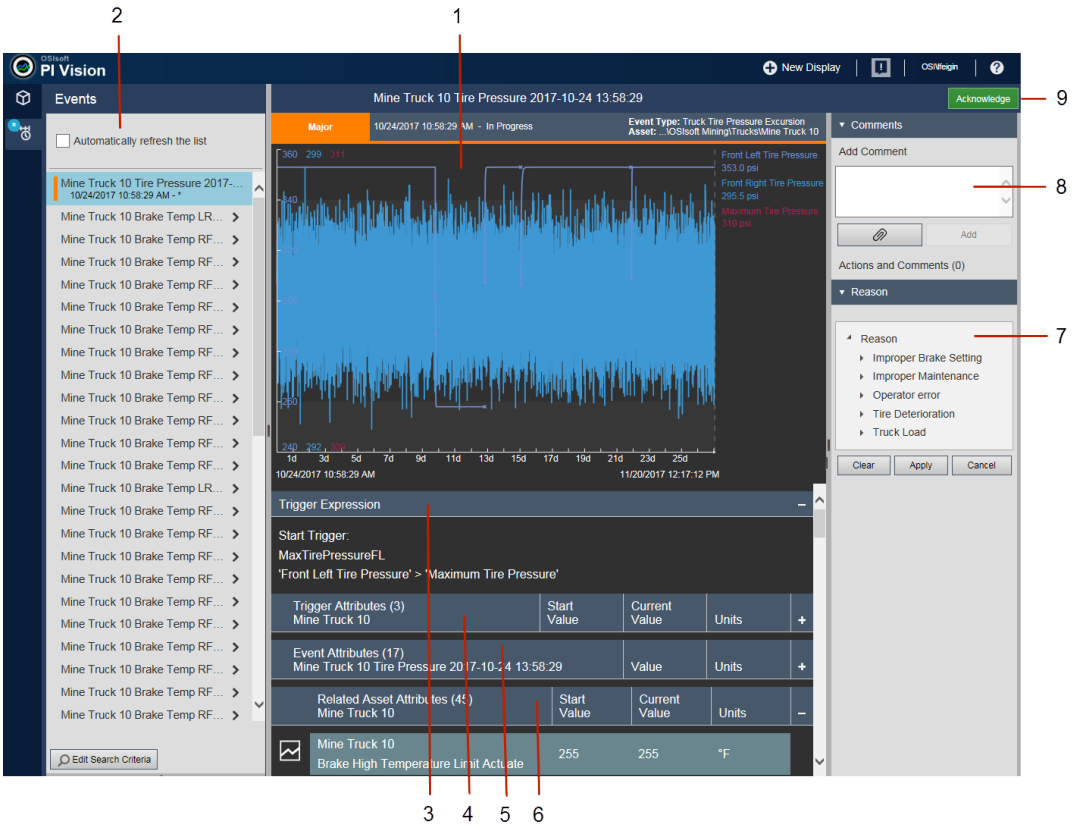
5. Select the **Return All Descendants** check box to also return all the descendants of the retrieved events, such as child events or grandchild events.
6. Click **Apply**.

   The events table updates to reflect the entered criteria.

Event details

The event details page shows the process behavior of an event's attributes inside a trend and tables. From the event details page, you can analyze, acknowledge, and annotate critical events.

Note:
From PI System Explorer, PI administrators grant permissions to acknowledge and annotate events (PI AF version 2016 or later is required). For more information, see the PI Vision administration topic "Set permissions to allow users to acknowledge and annotate events" in Live Library (https://livelibrary.osisoft.com).



1. Trend
2. Events pane
3. Trigger Expression table
4. Trigger Attributes table
5. Events Attributes table
6. Related Asset Attributes table
7. Reasons pane
8. Comments pane
9. Acknowledge button

Event details page

The event details page has the following features:

- Trend plots the behavior of the attributes associated with a referenced asset and the trigger attributes, if any, that contain numerical data.
- Events pane shows your events.
- Trigger Expression table (if defined) shows the trigger expression for the event. The page only shows the Trigger Expression table when the event has configured trigger settings and the trigger expression has been created. For more information, see the PI Server topic "Create an event frame generation analysis" in Live Library (https://livelibrary.osisoft.com).

- Trigger Attributes table (if defined) lists the names and values of attributes associated with the event's start triggers as set by the PI administrator. The page only shows the Trigger Attribute table if the trigger attributes have been set.
- Event Attributes table lists event attributes, which are attributes associated with an event.
- Related Asset Attributes table lists the names and values of attributes associated with a referenced asset during the event.
- Reason pane lists available reasons and shows the reason currently set for the event. You can clear the current reason or select and apply a new reason. The reason attribute is an enumeration set, which can be hierarchical in PI AF version 2017 R2 and later.
- Comments pane shows comments made and lets you add comments and attachments.
- Acknowledge button to acknowledge the event.

View event details and annotate events

Use the event details page to analyze, acknowledge, and annotate critical events.

Note:
To acknowledge and annotate events (to share comments and attachments related to the event with your colleagues), you require permission, granted by the PI administrator in PI System Explorer. Without proper permission, you can only view comments.

Procedure

1. In the Events pane, right-click any event in the list and then click **Event Details** to open the event details page.

   You can also open the event details page from the event-comparison page.
2. To view event details for another event, click a different event on the list.
3. Use the collapsible tables to add or remove attributes to and from the trend.
   a. To add an attribute to the trend, click the row containing that attribute.

      The row will be highlighted, and the attribute will appear on the trend.

      Note:
      Only attributes containing numerical data, with rows marked with a trend icon  , can be plotted. If the event attribute is a summary operation (Average, Min, Max, and so on), then the source attribute will be plotted, not the summary value.

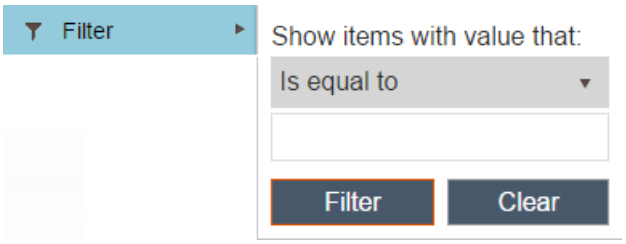
   b. To remove an attribute from the trend, click the highlighted row containing that attribute.

   c. To highlight the trace of an attribute on the trend, hover your mouse over the attribute in the table.
4. To filter the table items and see only the items you want, click the filter icon to the right of a column heading and set your filtering parameters on the filter menu.

   You can enter a value or string and choose from the following operators:

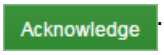
   - **Is equal to**: see only items with an entered text or value.
   - **Is not equal to**: see items with values that do not equal to an entered text or value.

- **Is empty**: see items that are blank.
- **Is not empty**: see items that are not blank.
- **Starts with**: see items that start with an entered text or value.
- **Ends with**: see items that end with an entered text or value.
- **Contains**: see items that contain an entered text or value.
- **Does not contain**: see items that do not contain an entered text or value.



After you click **Filter**, the table shows only the items that have not been filtered out. The filter icon on the column header changes from white to blue, indicating that a filter is in effect for that column. To clear the filter, open the filter menu again and click **Clear**.

Note:
Filtering is only available for events that have been completed. In-progress events cannot be included in the filter.

5. To acknowledge the event, click **Acknowledge** 

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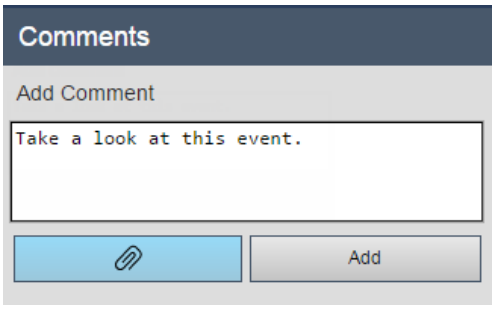
An acknowledgement is posted under **Actions and Comments** with your name and the time of acknowledgement.

Acknowledgements cannot be deleted or reassigned and are stored on the PI AF server.

6. To add a comment, enter the comment in the **Add Comment** field and click **Add**.



The comment is posted under **Actions and Comments** with your name and the time of the comment.

Note:
The text limit is 2500 characters.

7. To attach a file, click the **Attach** button  under the **Add Comment** field, browse to your file, click **Open**, and then click **Add**.

   The attachment is posted under **Actions and Comments** with your name and the time of attachment.

   Note:
   By default, the maximum file size for an attachment is 7 MB. Allowed file types include DOCX, PDF, TXT, XLSX, CVS, JPG, JPEG, SVG, TIFF, GIF, and PDI. Maximum file size and allowed file types can be configured by the PI administrator in PI AF version 2016 and later. For more information, see the PI Vision administration topic "Change event annotation file types and size limits" in Live Library (https://livelibrary.osisoft.com).

8. If desired, set or change the reason for the event:
   - To clear the current reason, click **Clear** and then click **Apply**.
   - To set a new reason, select the reason from the list and then click **Apply**.
9. To return to your display and exit the event details page, click the **Back** button.

Training video

For more on this topic, watch the following video:

https://www.youtube.com/watch?v=ufaQP2PL8Z8&list=PLMcG1Hs2JbcvWPkSbIbQEJqsTX9Sa1nty

Event details on a mobile device

On a mobile device, the event details page automatically opens inside the standard PI Vision website; you are not redirected to a mobile site. When viewing the event details page on your mobile device, you can use mobile-friendly features:

- Arrows support page navigation.
  - Tap the up arrow to hide the trend.
  - Tap the right arrow to add a comment.
  - Tap the left arrow to see trigger expressions (if any).
- If your device is in landscape mode, the trend opens full screen, unless you have chosen to hide the trend.
- If you tap inside the Comments pane, it opens full screen. Tap **X** to exit the Comments pane and return to the event details page.

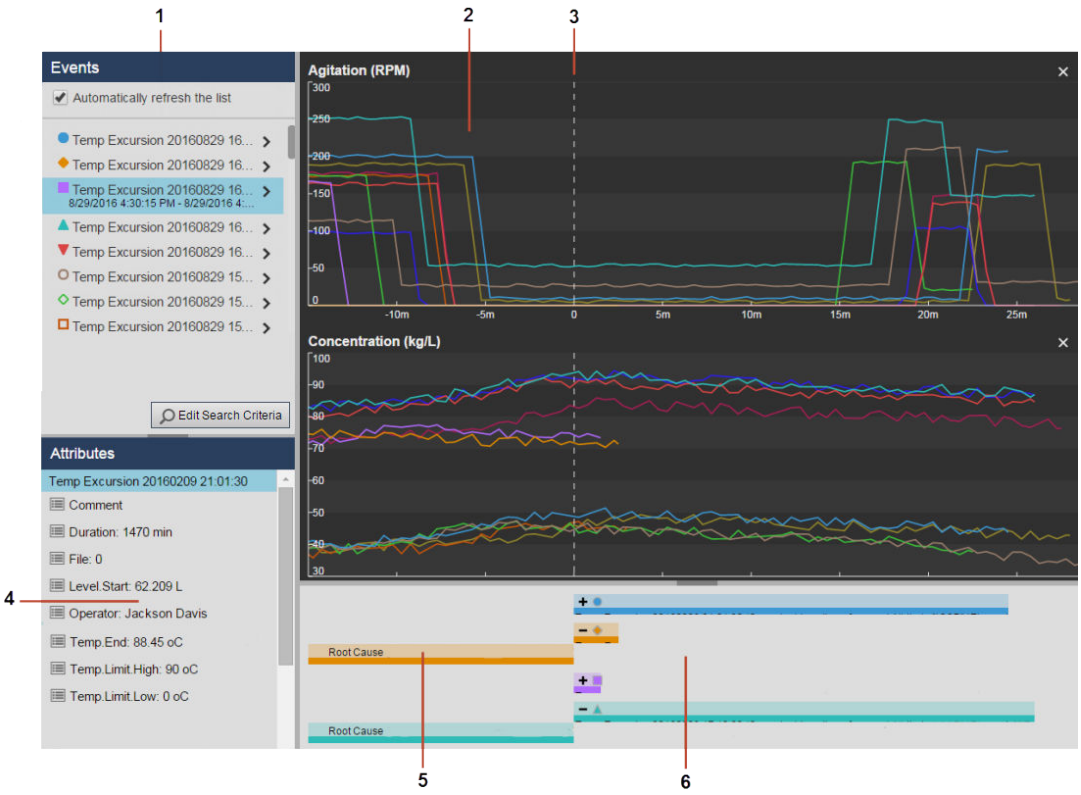
Event comparisons

PI Vision lets you easily compare events such as process downtime, process excursions, operator shifts, or batches. With the event-comparison feature, you can analyze process data across multiple events on a single overlay trend. The feature is designed to help you identify similarities and differences between events, assess subevents and determine root causes.

By default, the event-comparison page displays up to 11 events, including the event you selected in the Events pane as well as ten earlier events of the same type. Each event is color-

coded and has a legend marker next to its name to help you locate the event on the overlay trend and the Gantt chart.

The following figure shows the event-comparison page.



1. **EVENTS** pane listing all the events you are comparing.
2. **OVERLAY TREND** display showing overlay trends for each attribute of the event and the asset you wish to analyze. Each overlay trend shows multiple events for a single event attribute. For example, an overlay trend for an attribute called "Downtime" will show a graph with 11 traces with each trace representing a different downtime event.
3. **ZERO LINE** marking the start time of the event.
4. **ATTRIBUTES** pane listing all the attributes associated with the event you wish to analyze.
5. **ROOT CAUSE** showing the time period leading up to the event that is considered to be a "child" event.
6. **GANTT CHART** pane representing each event in the Events pane with a color-coded Gantt bar. The position and length of the Gantt bar reflects the start time, duration and end time of the event. The Gantt bar shows if there are "child" or other descendant events associated with the event, such as root causes.

Topics in this section

- Compare multiple events
- Pin reference events
- Add a new overlay trend to the display

- View child events in Gantt chart
- Align and zoom in on child events
- Perform root cause analysis
- Save an event comparison display

Compare multiple events

The event-comparison page shows overlay trends plotting the behavior of each event attribute during multiple related events.

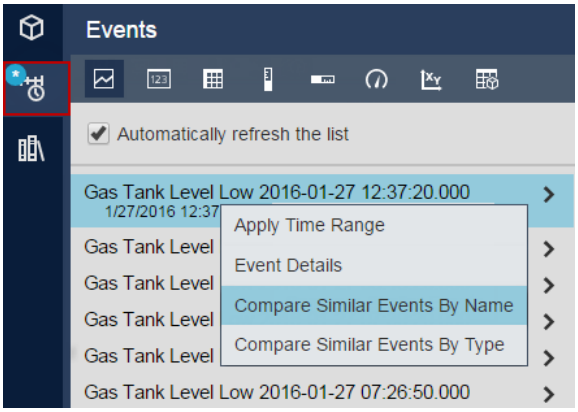
Note:
By default, when an event-comparison page is created, it contains overlay trends for each attribute that matches all of the following criteria:

- Appears on your PI Vision display
- Belongs to the referenced asset of the event you selected for comparison in the Events pane
- Uses a numeric data type

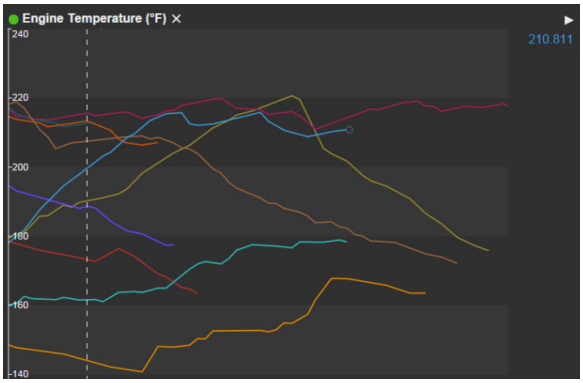
Procedure

1. In the Events pane, right-click the event you want to compare and click either **Compare Similar Events By Name** or **Compare Similar Events By Type**.

   When comparing events by name, the event-comparison page displays up to 11 events with the same name, event type, and referenced asset. When comparing events by type, the event-comparison page displays up to 11 events based on the same type and same referenced asset.



   If an event is currently "in-progress", it will have a circle at the end of its trace, and the overlay trend will show a green circle next to its title.



2. Select an event from the list to highlight its trace on the overlay trend and view its start and end time.

   Each event is color-coded and has a legend marker next to its name to help you locate the event on the overlay trend and the Gantt chart.

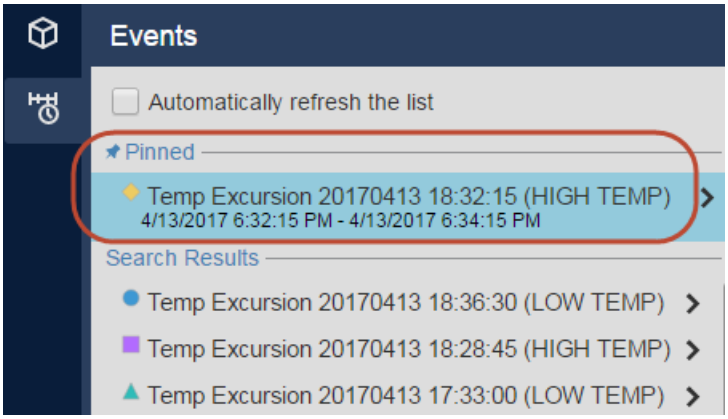
3. Click anywhere on the overlay trend to view a trend cursor.
4. To hide an event, right-click the event in the Events pane and click **Hide Event**. You can also right-click the event's color-coded bar in the Gantt chart and click **Hide Event**.

   The event will be hidden on each overlay trend and the Gantt chart, and will be grayed out in the Events pane.

5. To show a hidden event, right-click the grayed out event in the Events pane and click **Show Event**.
6. To delete an overlay trend, click the **X** icon next to the trend's title.

Pin reference events

Once you created an event-comparison page, you can pin events from the search results as your reference events. Pinned events are your benchmark events that remain at the top of the Events pane even after you perform new event searches. Once you no longer want an event to be pinned at the top of the pane, you can remove it from the **Pinned** events list.



Procedure

1. After you create an event-comparison page, right-click the event you want to pin in the Events pane and click **Pin Event**.

   The pinned event appears at the top of the pane in the **Pinned** section and have yellow legend marker next to them.

2. After you pin an event, you can perform the following operations:
   - To highlight the pinned event on the overlay trend, select the event in the Events pane.
   - To add another pinned event, right-click that event and click **Pin Event**.
   - To save the pinned event, save the event-comparison display by clicking **Save** and entering a display name.
   - To perform another event search while keeping your pinned events at the top of the Events pane, click **Edit Search Criteria**.
3. To unpin your pinned event, right-click it and click **Unpin Event**.

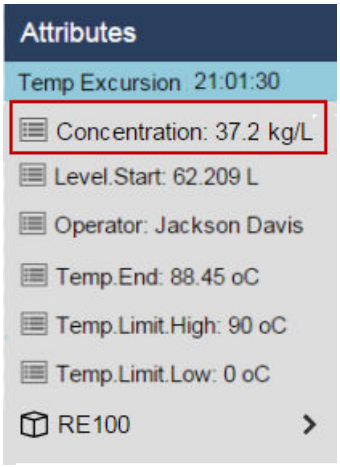
Add a new overlay trend to the display

PI Vision automatically selects which attributes to display as Overlay Trends. You can add new Overlay Trends by dragging additional event attributes to the display.

The Attributes pane lists all of the event's attributes. The last item in the Attributes pane is the event's referenced asset. A referenced asset is the asset that the event is associated with. You can view all of the referenced asset's attributes by clicking the triangle › next to the asset.

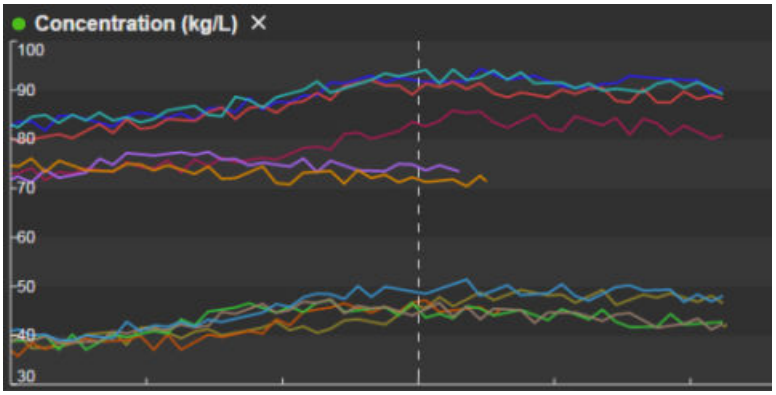
Procedure

1. Select an attribute that you wish to trend from the Attributes pane and drag it onto an Overlay Trend. The Attributes pane shows each attribute's value at the start time of the event.



Note:
If you do not see the attribute you are looking for, click the event's referenced asset at the button of the Attributes pane to view a full list of attributes.

2. The trend for the dragged attribute appears on the overlay trend with multiple color-coded traces. Each trace represents the same attribute's process behavior during multiple related events.



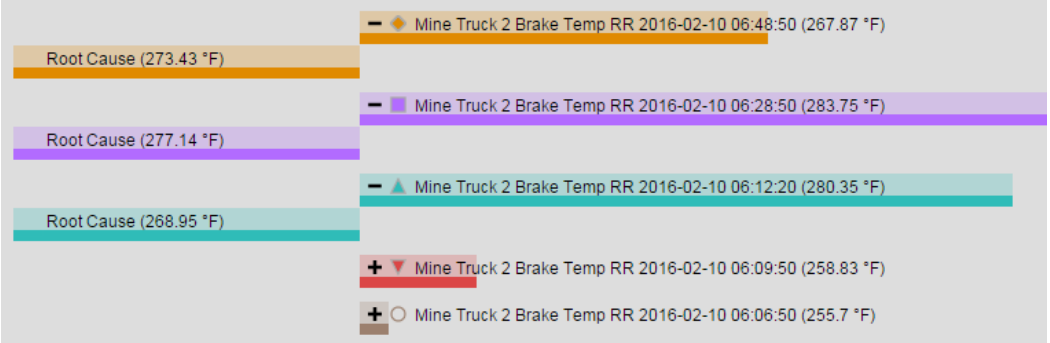
3. Select an event in the Events pane to highlight its trace on the overlay trend.

View child events in Gantt chart

The Gantt chart illustrates each event with a color-coded bar. The position and length of each Gantt bar reflects the start time, duration and end time of the event. The legend marker in front of the Gantt bar and its color corresponds to the legend marker and color of the event in the Events pane. If an event contains child events (sub-events), a plus icon will be displayed in front of the Gantt bar.

Procedure

1. To view child events on the Gantt chart, click the plus icon on the Gantt bar of the event you wish to analyze. Child events are shown as segments beneath the Gantt bar of each event.



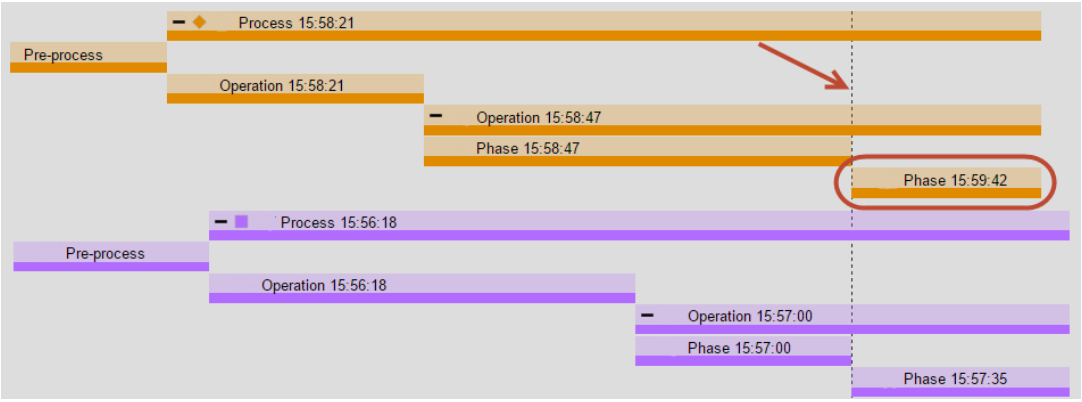
To hide child events, click the minus icon on the Gantt bar.

Align and zoom in on child events

By default, events on the Overlay Trends are aligned at the "zero time" line, which marks the relative start time of events. You can also align Overlay Trends to the start time of a selected child event in the Gantt chart as well as zoom in on the child events themselves.

When you align a selected child event, the sequentially corresponding child events of other parent events will also be aligned at the "zero time" line. Child events before or after the selected child event on the Gantt chart will be aligned relative to the "zero time" line. The events are aligned on both the Overlay Trends and the Gantt chart.

In this example, the selected child event (*Phase 15:59:42*) has been aligned at the "zero time" line.



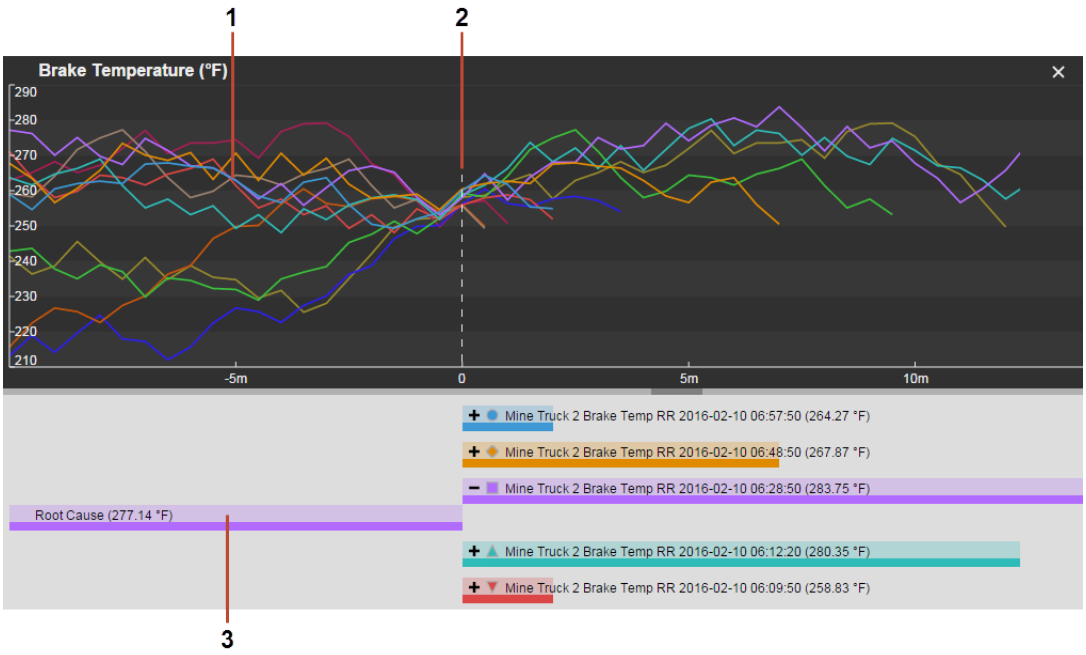
Note:
To align child events, child events must be identical for each compared event.

Procedure

1. To view child events on the Gantt chart, click the plus icon ✚ on the Gantt bar of the event you want to analyze.
2. To align the Overlay Trends to the start time of the selected child event, right-click the child event and click **Align**.
3. To zoom the Overlay Trends to the start and end time of the selected child event and examine this time segment in more detail, right-click the child event and click **Align and Zoom**.
4. To undo the aligning of child events, right-click the child event and click **Revert**.

Perform root cause analysis

To perform root cause analysis, you can view process data for a time period leading up to an event if the event has a root cause that has been defined (configured in PI Analytics). Root causes are shown as child events in the Overlay Trend and in the Gantt chart. A root cause is the first child event in a sequence of sub-events. Because a root cause is a period preceding an event, the root cause will appear to the left of the “zero time" line, which marks the start of the events.



1. Time period leading up to the events
2. Zero time line, marking the start of events
3. Root cause

Save an event comparison display

You can save an event comparison display just like a regular PI Vision display. All of the saved event comparison displays appear on the home page as thumbnails. A saved event comparison display contains the events' search criteria (such as database, time range, asset and event name, and so on) and data points for overlay trends.

Note:
When you open a saved event comparison display and perform an advanced events search, the Edit Search Criteria pane will automatically be populated with the saved search criteria.

Procedure

1. To save a new event comparison display, click **Save**  or press `Ctrl+S` and enter a display name.
2. To save the display with a new name, click the down arrow next to **Save** and then click **Save As**.

3. Enter a new event comparison display name in the Save As window.

   Next time you are on the home page, you will see your event comparison display's name and thumbnail. You can open the display from the home page with the same overlay trends, asset context, and events context.
4. To rename a saved display, open it, click the display's name in the **Display** field of the header, enter a new name, and save the display.

Training videos

To better understand how to use PI Vision, check out our training videos on the PI Vision YouTube playlist.

https://www.youtube.com/playlist?list=PLMcG1Hs2JbcvWPkSbIbQEJqsTX9Sa1nty.

Technical support and other resources

For technical assistance, contact OSIsoft Technical Support at +1 510-297-5828 or through the OSIsoft Tech Support Contact Us page (https://techsupport.osisoft.com/Contact-Us/). The website offers additional contact options for customers outside of the United States.

When you contact OSIsoft Technical Support, be prepared to provide this information:

- Product name, version, and build numbers
- Details about your computer platform (CPU type, operating system, and version number)
- Time that the difficulty started
- Log files at that time
- Details of any environment changes prior to the start of the issue
- Summary of the issue, including any relevant log files during the time the issue occurred

To ask questions of others who use OSIsoft software, join the OSIsoft user community, PI Square (https://pisquare.osisoft.com). Members of the community can request advice and share ideas about the PI System. The PI Developers Club space within PI Square offers resources to help you with the programming and integration of OSIsoft products.