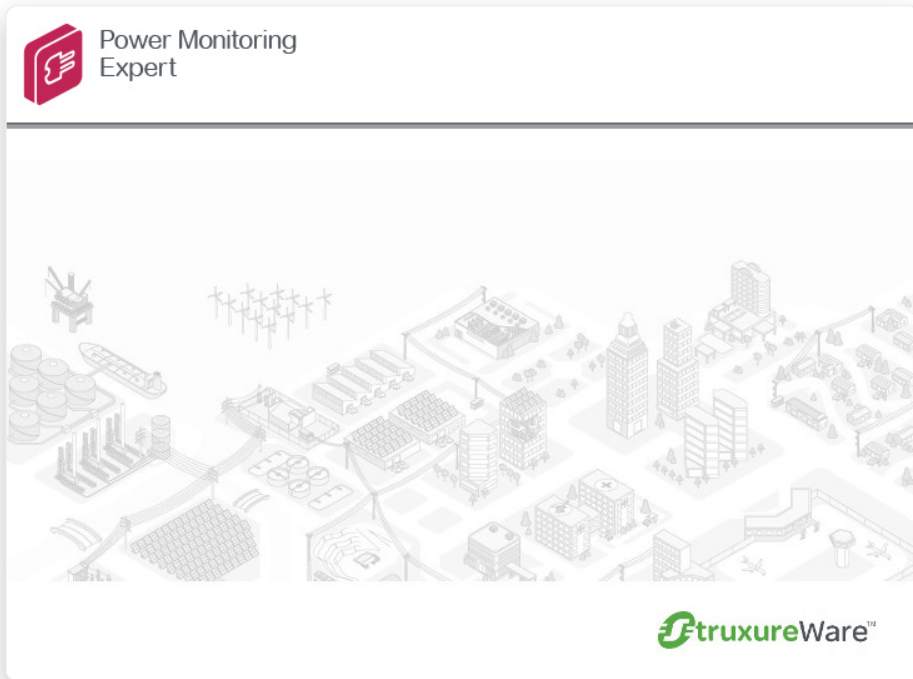


StruxureWare™

Power Monitoring Expert 8.0 Hierarchy Manager – Help Topics

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Safety information

Important information

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of either symbol to a "Danger" or "Warning" safety label indicates that an electrical hazard exists which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates a hazardous situation which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a hazardous situation which, if not avoided, **could result in** death or serious injury.

⚠ CAUTION

CAUTION indicates a hazardous situation which, if not avoided, **could result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

Please note

Electrical equipment should be installed, operated, serviced and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

Safety precautions

During installation or use of this software, pay attention to all safety messages that occur in the software and that are included in the documentation. The following safety messages apply to this software in its entirety.

WARNING

UNINTENDED EQUIPMENT OPERATION

- Do not use the software for critical control or protection applications where human or equipment safety relies on the operation of the control action.
- Do not use the software to control time-critical functions because communication delays can occur between the time a control is initiated and when that action is applied.
- Do not use the software to control remote equipment without securing it with an authorized access level, and without including a status object to provide feedback about the status of the control operation.

Failure to follow these instructions can result in death or serious injury.

WARNING

INACCURATE DATA RESULTS

- Do not incorrectly configure the software, as this can lead to inaccurate reports and/or data results.
- Do not base your maintenance or service actions solely on messages and information displayed by the software.
- Do not rely solely on software messages and reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Consider the implications of unanticipated transmission delays or failures of communications links.

Failure to follow these instructions can result in death, serious injury, equipment damage, or permanent loss of data.

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Hierarchy Manager

Depending on the number of devices you are currently monitoring, organizing the data coming from those devices can be a difficult task. Hierarchy Manager allows you to organize the devices in StruxureWare™ Power Monitoring Expert into recognizable views by defining their relationships as parts of a system model. Once the model has been created, energy data associated with the hierarchy can be grouped, aggregated, and used by other components of Power Monitoring Expert.

The Hierarchy Manager views are intended to represent the real world electrical, physical, and business characteristics of your organization. The items contained in a view, and how those items relate to each other are specified using a template approach. There are several example templates included in the product to help you create the views applicable to your organization. One of these templates is configured when Power Monitoring Expert is first installed.

The following topics provide specific information regarding the features and use of the Hierarchy Manager application:

- [Hierarchy templates](#)
- [Nodes](#)
- [Properties](#)
- [Common elements of hierarchy templates](#)
- [Meter apportionment](#)
- [Virtual meter](#)
- [Example hierarchy](#)
- [Using hierarchies in Power Monitoring Expert](#)

The hierarchies, nodes, relationships and views are configured via a web interface called Hierarchy Manager, which is launched from the **Management Console > Tools** menu. Once configured, views of the hierarchy structure can be used in different areas of Power Monitoring Expert.

Note

Before using Hierarchy Manager, ensure that devices, logical devices, or managed circuits have been added to Power Monitoring Expert through the Management Console feature.

Hierarchy templates

When the Hierarchy Manager application opens, everything displayed in the application is based on the hierarchy template defined in the system. This template defines the parameters of the model. If you were to describe the physical layout of a building for example, you could

describe the name of the building, each floor of the building, and the rooms or areas that each floor contains. The hierarchy template for a building's physical layout does the same thing, using tabs or Nodes to represent the different aspects of the model.

Note that a **Virtual Meter** Node is included in the hierarchy templates. You can define virtual meters without associating them with a hierarchy, or you can include virtual meters in a hierarchy the same way that you can include devices. Virtual meters are available for the Tabular, Trend, and the Hourly, Multi Device, and Single Device Usage reports in the Reports application.

Each Node contains instances of that particular Node type, which in turn are defined by a set of properties. These properties not only define the different parts of the model, they also define the relationships that exist between the different Nodes. This is useful when aggregating the device data used in other parts of Power Monitoring Expert.

Once the model has been created, the devices that are collecting data can be associated with the different levels of the hierarchy that are defined in the template.

Nodes

A Node can be described as the building block of a hierarchy. Nodes are used to model a customer system and can represent:

- Electrical equipment
- Logical concepts
- Physical locations
- Other real-world objects

Nodes are displayed in Hierarchy Manager as a set of tabs. Each tab is labeled with the name of the part of the model it represents. Each Node displays a number of Node instances in a grid format. In Hierarchy Manager, a Node can be described as the type of object required to model a system, while Node instances can be thought of as the reference to the real-world objects in that system. For example, if 'Car' is used as an example of a Node, then 'my Corvette' could describe an instance of the Car Node.

A hierarchy that represents the physical layout of a company's industrial site might have a Site Node, a Building Node, and an Areas Node. Each of those Nodes can contain instances of that Node type. Under the Building Node for example, you could list the different buildings located in a particular site. The Properties of each of these Nodes are specified by the user.

Each Node instance is represented in the system as a set of properties that define the characteristics of that instance. These properties can be further broken down into Attributes and References.

Properties

Attributes and References can be used to describe the properties of a Node, and their relationships to other Nodes. These properties provide the context that helps to describe the different parts of the model. For example, a Node called Floors may contain attributes such

as floor number, and references such as the association between the Floors Node and the Building Node, or the association between Floors and Areas.

Attributes

The Attributes of a Node describe the properties of that Node, such as its name and characteristics. These Attributes could include the breaker rating of an electrical panel or contact information of a tenant. For example, a Node called Buildings that is part of a physical layout hierarchy could have an Attribute such as the building name.

Attributes are configurable by entering information into an Attribute field. To add Attribute content to a new Node instance, select a tab and click **Add**. To edit existing Attribute content, highlight an existing Node instance and click **Edit**. When the **Properties** dialog opens, select an attribute field by clicking in the applicable field and entering the necessary information. Click **OK** when you finish specifying all of the necessary attributes for the Node.

References

References describe how a Node in a hierarchy is associated with other Nodes. For example, in a hierarchy that describes the physical layout of a company's building, a Node called Floor could have a reference that describes its association with a Node called Areas. These references indicate which offices are part of each floor. In this example, since a Floor can contain many offices, it is considered a one-to-many association. Since an office can only be associated with a single floor, it is considered a one-to-one association. By making these connections between the Nodes, the hierarchy structure of the model begins to take shape.

Reference fields require clicking **Add**, **Edit**, or **Delete**. To add reference content to a Node instance, click **Add** for the reference, then select the appropriate entry from the list that appears. You can also enter dynamic hierarchy time ranges in this section.

To edit existing reference content, highlight an entry from the grid, click **Edit**, then make the necessary changes. In most cases, this change would involve either the start or end dates of the particular reference.

To delete existing reference content, select an entry from the applicable reference type and click **Delete**.

Note

The Delete button should not be used to end an association with a particular Node instance. In situations where a relationship between two Node instances ends after a certain date, the ideal solution is to edit the references and change the **To** field to a specific end date that defines the time range for the relationship. See "[Example Hierarchy](#)" on page 12 for more information.

Common elements of Hierarchy Manager

The components that make up Hierarchy Manager can appear differently depending on the hierarchy template installed in the system. Although these different hierarchy templates can have different tab and property names, and the relationships between the Nodes differ, the

method used to modify the hierarchy is similar for most templates. This section provides information regarding the basic steps to modifying a hierarchy, regardless of the template used.

Hierarchy Manager has a series of tabs across the top of the page. These tabs are the representation of the Nodes. Clicking on any of these tabs displays the instances of the Node types in a grid format.

The process involved with creating an instance of a Node type is the same for most hierarchy templates. To create a new instance, select the applicable tab and click **Add**. The **Properties** window opens, containing fields that represent the properties for that particular Node instance. Any required fields are identified with a **Required** message. Click in the attribute fields and enter the necessary information. Reference fields are selected from a grid, and can also have a time dimension associated with them (see "[Dynamic hierarchy](#)" on page 11 for additional information). Click **Add** to open the **Select** dialog and select the applicable item from the grid. If there are no items to choose from, you may have to create a new instance for that Node type.

To edit an instance of a Node type, click the applicable tab, select an instance from the grid and click **Edit**. Make the changes to the applicable fields in the **Properties** dialog and click **OK**.

To delete an existing instance of a Node type, select the applicable tab, select an instance on that tab and click **Delete**. After you confirm the delete action, the instance disappears from the grid, and any reference information regarding the deleted instance is removed from all affected Node instances.

Tree View

Displaying the views of a template is also similar for most template types. You can see the view of a hierarchy by clicking the **Show Views** link. This link provides a visual of the different levels of the hierarchy, and the date range for each entry of the hierarchy.

Date Range: Use the **To** and **From** fields to select the date range to display the hierarchy.

Available Views: Use this section to switch between different views if there is more than one view available. The available views are determined by the hierarchy template. Click **Update** when any changes to the date range, the scale, or available view are made.

Scale: Select **Days** or **Months** to provide the appropriate scale to the hierarchy view.

Beside each hierarchy level is a bar that indicates when in the date range the Node was part of the hierarchy. If the bar has a rounded edge, the Node reference has an end date within the date range. If the bar has a square edge, the Node reference continues beyond the date range.

You can click the pencil (edit) icon to the left of the bars to open and edit the properties for the related item.

If you do not see a node in the hierarchy view, make sure the date range includes the date that Node was part of the hierarchy. Hovering the pointer over a hierarchy entry provides the date range for that entry.

Dynamic hierarchy

Another feature of Hierarchy Manager is the ability to assign devices or Node instances for discrete units of time. Instead of devices existing in either an assigned or unassigned state independent of time, a device can be assigned to one Node instance for a specific length of time, then assigned to another instance for another length of time.

With this time dimension, Hierarchy Manager can be used by organizations that require an ever-changing representation of their system. If one customer moves out and another moves in, that change can be reflected in the hierarchy. Energy and power usage can be tracked for each tenant over time, and billing information can be collected, aggregated, and displayed in a report.

Note

If your hierarchy does not change over time you do not need to set the date ranges for the various devices or Node instances. In Power Monitoring Expert, these static hierarchies exist from the date when the system was first commissioned (system start), to the farthest date the system recognizes (end of time).

Replacing or reconfiguring a device can also be captured in a hierarchy. If a device requires replacement or reconfiguring, it can be unassigned from an instance on a specific date, and the new or reconfigured device assigned to the same instance. The entry for the unassigned device is greyed-out and italicized in the hierarchy if the **End Date** is the current date or earlier.

Dynamic hierarchies are established when you are creating or editing the properties of a Node instance that is associated with a device. For example, if Customer A is set to lease a rack from a data center, the racks and circuits can be assigned to that customer on a specific date. When the customer's lease expires, the racks and circuits can be unassigned on the expiration date and reallocated to another customer.

See the [Example Hierarchy](#) for details on how to use the Dynamic hierarchies function.

Meter apportionment

Meter apportionment allows you to assign a percentage of a device that has been assigned to an area. For example, if a common area is monitored by a single meter but shared by two tenants, for billing purposes you may want to allocate only a portion of the meter to each tenant. If tenant 1 uses 60% of the common area and tenant 2 uses 40%, you can attach 60% of a meter's reading to the tenant 1 area node and the other 40% to the tenant 2 area node.

Virtual meter

A virtual meter allows you to aggregate measurements from any combination of devices, apportioned meters, or other virtual meters available in Hierarchy Manager. The newly created virtual meter can be assigned to a node in Hierarchy Manager just like any other device, and appears in dialogs that have a **Views** selection. You can even create an apportioned meter from a virtual meter.

Examples:

- Assume that there are several feeder meters connected to the main power bus and you want to calculate the total power usage. You can create a virtual meter that includes each of the feeder meters. Then you can choose one of the reports supporting virtual meters to generate a report showing the total power usage for the virtual meter. The reports supporting virtual meters are Hourly, Multi Device, and Single Device Usage reports, and Tabular and Trend reports.
- Assume that there is a large area monitored by a single meter (M1). Within that area is a single room that is monitored by a separate meter (M2). Tenant 1 is using the small room and Tenant 2 is using the remaining area. To calculate Tenant 2's power usage, the readings from M2 must be subtracted from the readings of M1. This can be accomplished by assigning M1 and an apportioned meter of M2 with an allocation of -100%, removing M2's readings from Tenant 2's power usage calculation.

The alternative is to create a virtual meter. For example, create a new virtual meter **Tenant_2_Net_Meter**, and assign the two devices, M1 and M2 (-100%), to the virtual meter. The virtual meter is assigned to Tenant 2's node. If at some time in the future a new meter is added, you can edit the virtual meter to include the new meter.

Example Hierarchy

The following example provides information regarding the usage of the default template (Site, Building, Area), and a scenario which illustrates the basic functionality of the Hierarchy Manager feature.

In this scenario, you are the facility manager for Faber College. The college is made up of three buildings, two of which have already been added to Hierarchy Manager. Building Three has just been completed, and you must add this building information into Hierarchy Manager. This involves creating a new building and areas, and adding devices to their appropriate locations, all beginning on a specific date.

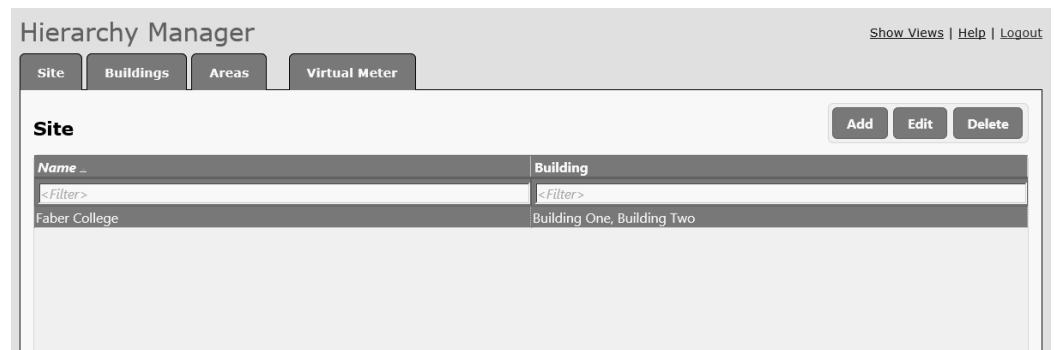
At the same time, renovations to Building Two have just been completed which include the replacement of several meters. In Hierarchy Manager, you must swap the old devices with the new by changing the end date for the existing devices to the day they were removed. New devices must be associated with their correct areas and their start dates must correspond to the date they were installed.

To add new Building and Area information into the hierarchy:

1. Open Management Console and click **Tools > Hierarchy Manager**.
2. Provide an Operator-level or Supervisor-level user name and password. Click **OK**.

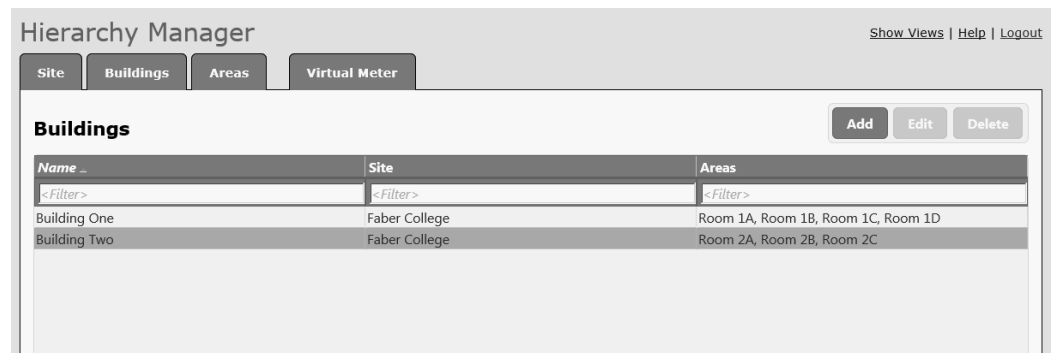
The Hierarchy Manager Web page opens. A set of tabs near the top of the page represent each Node type.

In the following steps, devices have already been added to the system through Management Console, and the hierarchy has been populated with site, building, and area information. For additional information regarding adding devices to the system, refer to the "Management Console" section of the *StruxureWare Power Monitoring Expert 8.0 User Guide*.



3. Click the **Buildings** tab.

The **Buildings** grid displays the building names, the site they are part of, and the areas assigned to each building. In this example, Building Three must be added to the hierarchy.



4. Click **Add** above the Buildings grid to open the buildings **Properties** dialog.

Name	Start Date	End Date
------	------------	----------

Name	Start Date	End Date
------	------------	----------

To add a new building in Hierarchy Manager, type the new building name in the **Name** field and associate it with the site and applicable areas.

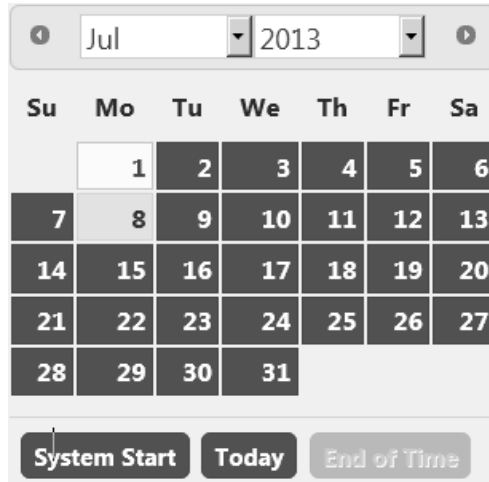
5. Click the **Name** field and enter the name of the building. For this example the name is Building Three.
6. Click **Add** above the Site grid to open the **Add Site References** dialog and select the site name from the grid, in this case Faber College..

Name	Building
<Filter>	<Filter>
<input checked="" type="checkbox"/> Faber College	Building One, Building Two

From:* System Start To:* End of Time
* start of day

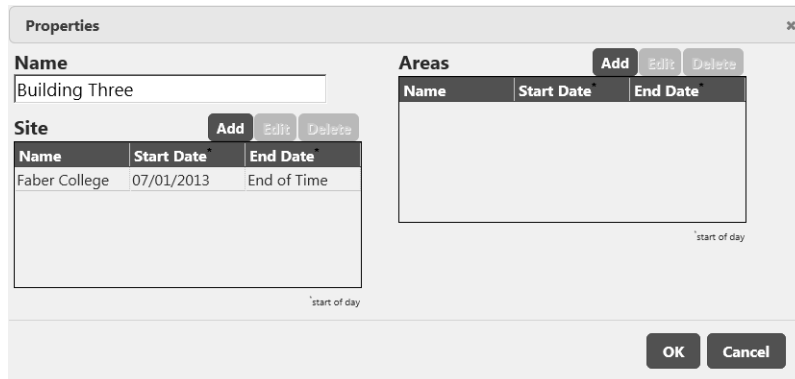
7. Click the **From** date field or click the calendar icon beside it. Select the start date from

the calendar. For this example, select the first day of July.



When you select the date, the calendar closes.

8. Confirm that the date has changed in the **From** field and click **OK**.



9. Click **Add** above the **Areas** grid to open the **Add Areas Reference** dialog.

In the grid the only areas displayed are those that have already been associated with Building One and Building Two. The areas for Building Three have not been created yet. When you create the new areas, you can associate them with this building from the **Areas** tab. Click **Cancel** to return to the Buildings grid.

10. Click the **Areas** tab.

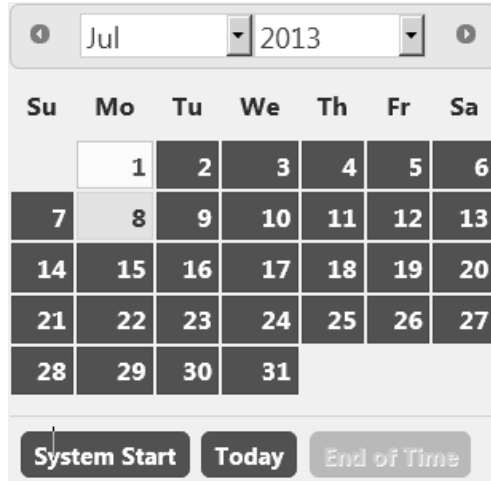
In this example, four new areas need to be created: Room 3A to Room 3D. These areas must be associated with the new building, and have the correct devices associated with each area. The date for all of these is to be set for the first of July.

11. Click **Add** above the **Areas** grid to open the areas **Properties** dialog.

12. Click the **Name** field and enter the name of the area. In this example, the name is Room 3A.
13. Click **Add** above the **Building** grid to open the **Add Building References** dialog.
14. Select the building from the grid. In this case Building Three.
15. Click the **From** field or click the calendar icon beside it. Select the start date from the calendar. For this example, select the first day of July.

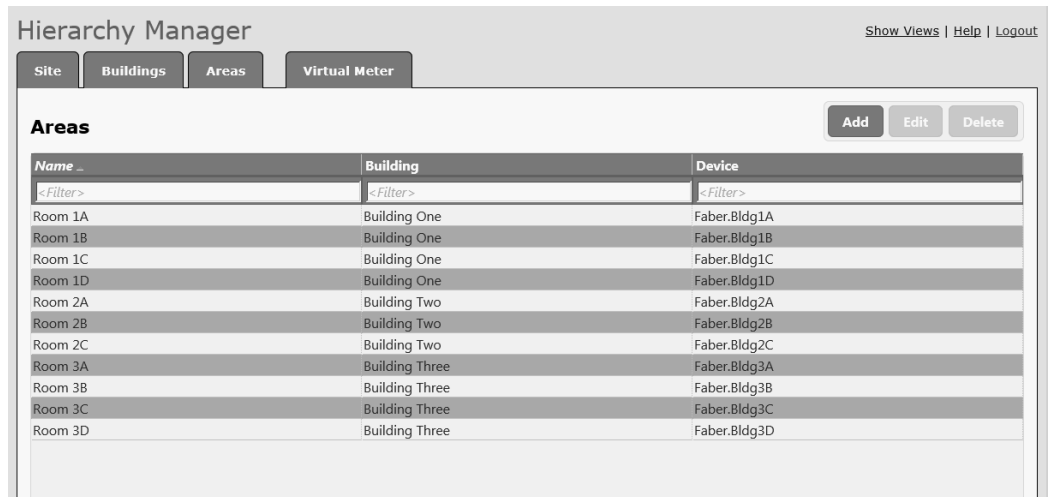
When you select the date, the calendar closes.

16. Confirm that the date has changed in the **From** field and click **OK**.
17. Click **Add** above the **Device** grid to open the **Add Device References** dialog.
18. Select the device you want assigned to the area. In this example, Faber.bldg3A.
19. Click the **From** field or click the calendar icon beside it. Select the start date from the calendar. For this example, select the first day of July.



When you select the date, the calendar closes.

20. Confirm that the date has changed in the **From** field and click **OK**.
21. Follow the same steps to create the remaining areas.

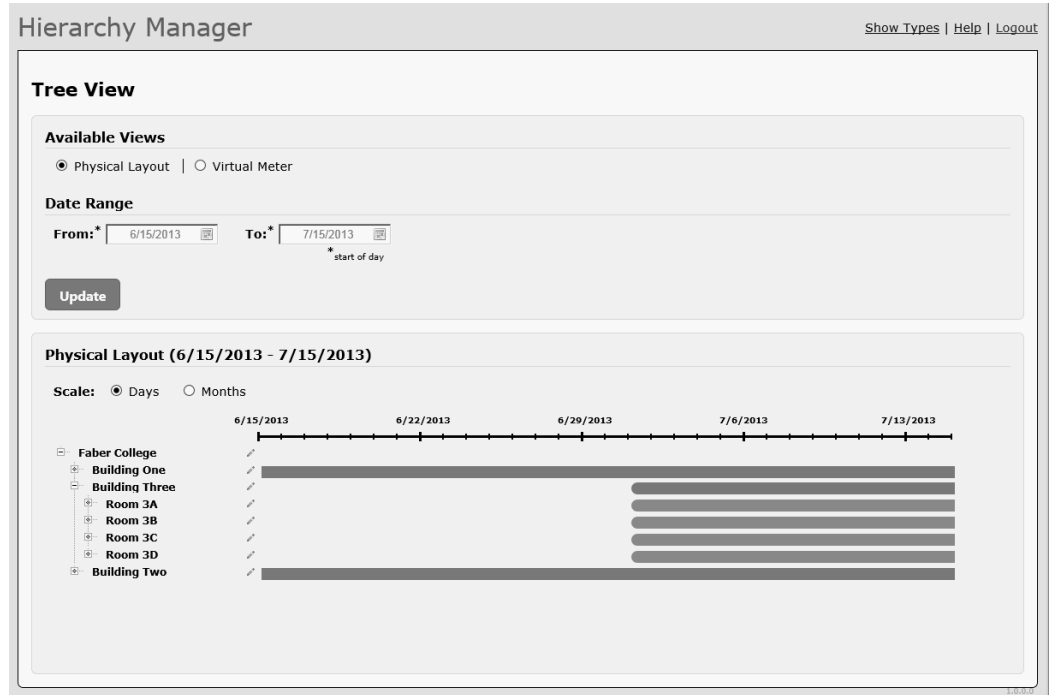


To see the new parts of the hierarchy, switch to the **Tree View** by clicking **Show Views**. In this window, you can select the type of view you want to see (if multiple views are available), and the date range you want to view.

Click:

- The plus sign in the view to expand that entry.
- The minus sign beside an entry to collapse that part of the hierarchy.
- The pencil (edit) icon to open and edit the properties for the related item.

- The bar for each entry to see the Node name and the effective date range for that entry.



Click **Show Types** to return to the Hierarchy Manager page.

The next part of the example involves replacing two devices in Building Two after a renovation. This device replacement is represented in Hierarchy Manager by changing the end dates for the devices to reflect when they are removed. Once this is done, assign new devices to the areas with their start dates set to the day the actual devices are installed.

In this example, the devices associated with Room 2B and 2C in Building Two have been replaced. The first step is to change the end dates for the devices associated with these areas.

When this task is complete:

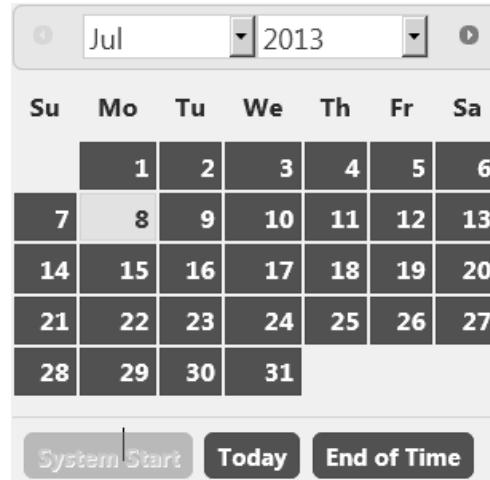
- The entry for the device is greyed-out and italicized in the hierarchy if the **End Date** is the current date or earlier.
- Any reports that include these areas only includes data collected by these devices up to this new end date.

Note

Date ranges extend from start of day to start of day. This means that the end date does not include data collected for that day.

1. Open Hierarchy Manager and click the **Areas** tab.
2. Select Room 2B in the grid and click **Edit** to open the **Properties for Room 2B** dialog.

- Click Faber.Bldg2B in the **Device** grid and click **Edit** to open the **Edit Device References** dialog.
- Click the **To** field, or click the calendar icon beside it. Select the end date from the calendar. For this example, select July 1.



When you select the date, the calendar closes.

- Confirm that the date has changed in the **To** field and click **OK**.

You can now associate the new device with this area. For the purposes of this example the new device has already been added to the system through Management Console.

- Click **Add** above the **Device** grid to open the **Add Device References** dialog.
- Select the new device from the grid. In this case, select Faber.Bld2BN.
- Click the **From** field, or click the calendar icon beside it. Select the start date from the calendar. For this example, select July 1.

When you select the date, the calendar closes.

- Confirm that the date has changed in the **From** field and click **OK**.
- Perform the same operation for Room 2C.

When you complete these tasks, any reports that include these areas with a date range that extends beyond the device start date includes data collected by these new devices.

Meter apportionment example

You can create an apportioned meter when you add a device to a hierarchy node. There is a percentage text box field in the device selection dialog. This text box defaults to 100%, and leaving the value at 100% adds the device to the node. You can change this value to anything other than 100% to create an apportioned meter. The percentage can be a negative, positive, or integer value. The percentage field is restricted to 15 characters. Time intervals for apportioned meters function in the same way as devices.

Note

You cannot edit the percentage for an apportioned device once you set it. To change the percentage, you need to change the end date and add the device with a new start date and updated apportionment percentage, or delete it from the hierarchy and add it again as new entry with the required percentage.

Add Device References ✕

	Full Name	Group	Name
	<Filter>	cm	<Filter>
<input type="checkbox"/>	CM.4000T_84_247	CM	4000T_84_247

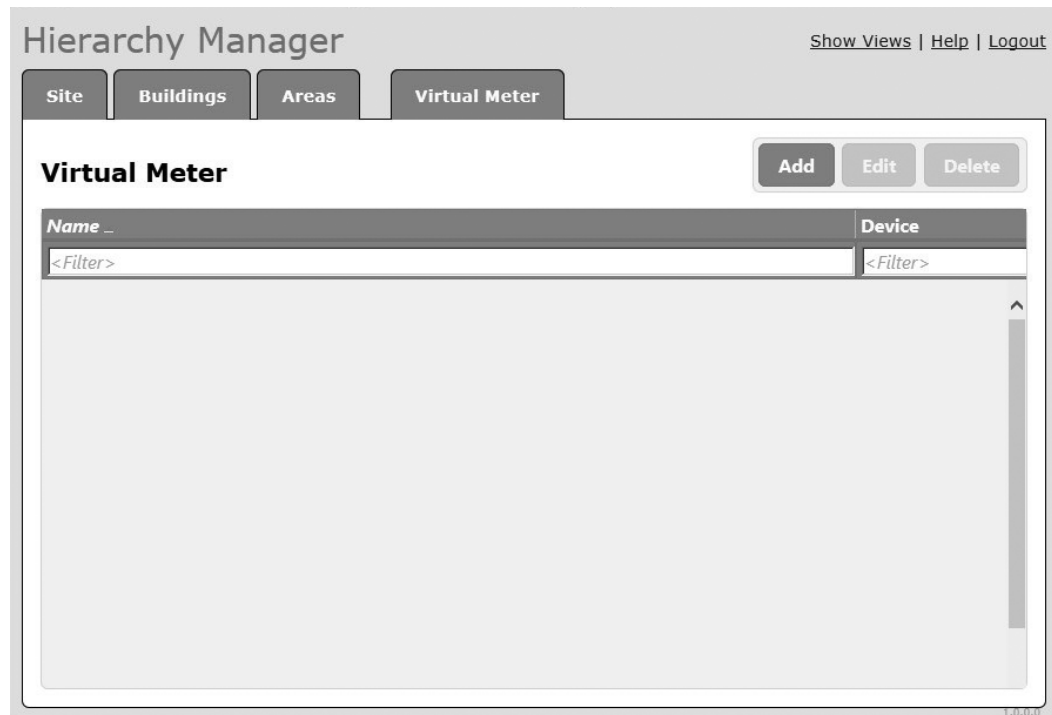
Percentage

From: **To:**

* start of day

Virtual meter example

The **Virtual Meter** tab includes **Add**, **Edit**, and **Delete** controls above a data grid showing any previously created virtual meters.



Add: Selecting **Add** displays a dialog allowing you to name a new virtual meter and to select other devices to attach to it. You can attach a device, a previously created virtual meter or an apportioned meter in the same way they would attach a device to a hierarchy node. Time intervals of the attached devices operate in the same manner as time intervals on meters attached to hierarchy nodes.

Edit: Editing a virtual meter is similar to editing the relationship between a hierarchy node and a device. You can add, edit, or delete virtual meters but you need to ensure that your changes respect time intervals.

For example, if you are replacing a meter, you need to update the **End Date** for it and you need to specify an appropriate **Start Date** for the new meter. Do not delete the original meter as this removes the meter historically.

Delete: You can delete a virtual meter but you need to take care when doing so. When you delete a virtual meter, the relationships between all hierarchy nodes and the virtual meter are removed.

Adding a virtual meter to a hierarchy node:

Once a virtual meter is created it appears in device lists with the other devices. You can attach a virtual meter to a hierarchy node in the same way as the other devices.

Using hierarchies

You can use a hierarchy in other Power Monitoring Expert components. In the Dashboards application in the Web Applications component, you can use hierarchies in the gadget data series selector to select data from a source based on its location in the hierarchy. Selecting a hierarchy **View** allows you to group device data at different aggregation points in the hierarchy. For example, it is possible to create a dashboard that depicts the energy usage of a single floor in a building as a single data series even though there are multiple meters monitoring different circuits.

You can also use hierarchies in the Hourly, Multi Device, and Single Device Usage reports and the Tabular and Trend reports available in the Reports application. You can use the source selector for these reports to select items from the hierarchy to include in the report. As in the Dashboards application, a hierarchy View groups device data at different aggregation points, which are then displayed in a report. In addition to the default reports mentioned above, hierarchies can also be used in custom reports that have been created for use in different solutions.

Review the "Dashboards" and "Reports" topics in the *Web Applications Help* for information regarding the use of hierarchies and virtual meters.

StruxureWare Power Monitoring Expert 8.0
Hierarchy Manager – Help Topics

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