

# StruxureWare™

Power Monitoring Expert

Power Quality Advisor Module

Configuration Guide

7EN42-0133-00

03/2016



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As standards, specifications and designs change from time to time, please ask for confirmation of the information given in this publication.

# Safety information

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## 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 manual 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.

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# 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 incorrect 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.**

## About this Document

This guide is to help Application Engineers, third-party integrators, and other qualified personnel to configure and tuning the Power Quality (PQ) Advisor module.

## Supporting documentation

Refer to the following StruxureWare™ Power Monitoring Expert documents:

- *Installation Guide* 7EN02-0380-00.
- *User Guide* 7EN02-0379-00.
- *Design Guide* 7EN42-0118-00
- *Power Quality Advisor Design Guide* 7EN42-0132-00
- *Hierarchy Configuration Guide* 7EN42-0108-00
- *Web Applications – Help Topics* 7EN52-0384-00
- *Power Monitoring Expert 7.2 & 8 Licensing Guide* (available on the Power Monitoring Expert Exchange Community).

# Prerequisites

## Competency

Application Engineers who are responsible for deploying the PQ Advisor module must:

- Be familiar with StruxureWare™ Power Monitoring Expert, StruxureWare Power Monitoring, or PowerLogic ION Enterprise software systems.
- Be familiar with Schneider Electric power meters and circuit breakers.
- Be familiar with Microsoft Windows operating systems.
- Be familiar with Microsoft SQL Server.
- Have basic knowledge of power quality.
- Understand how PQ Advisor works, as documented in the *Power Quality Advisor Module Design Guide*.

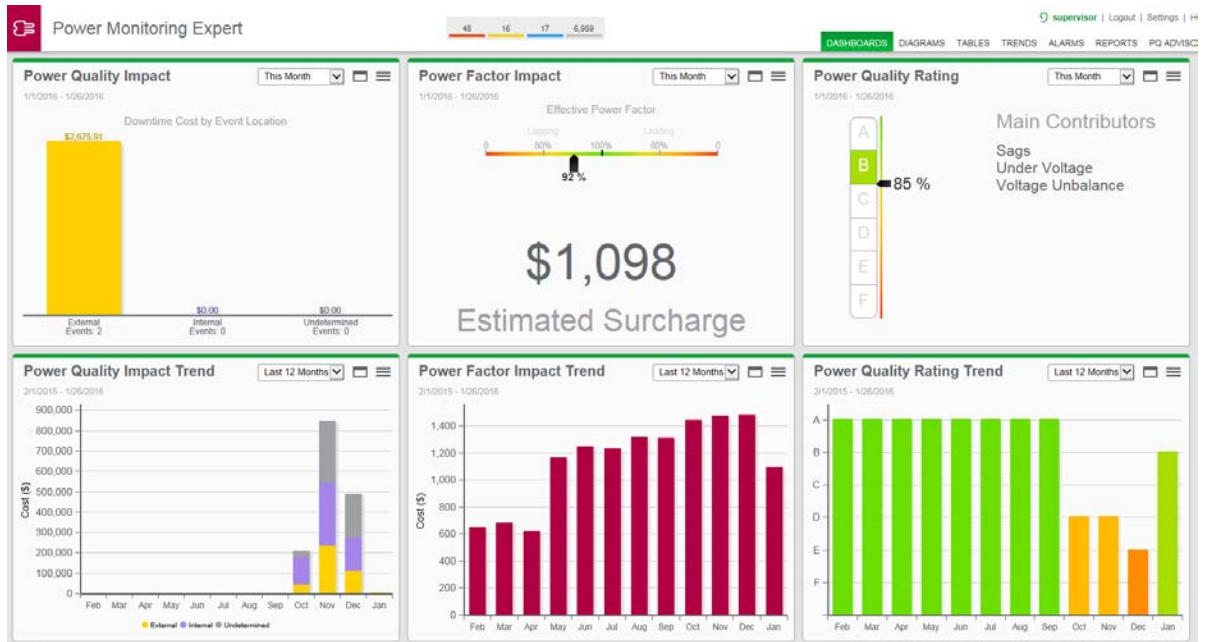
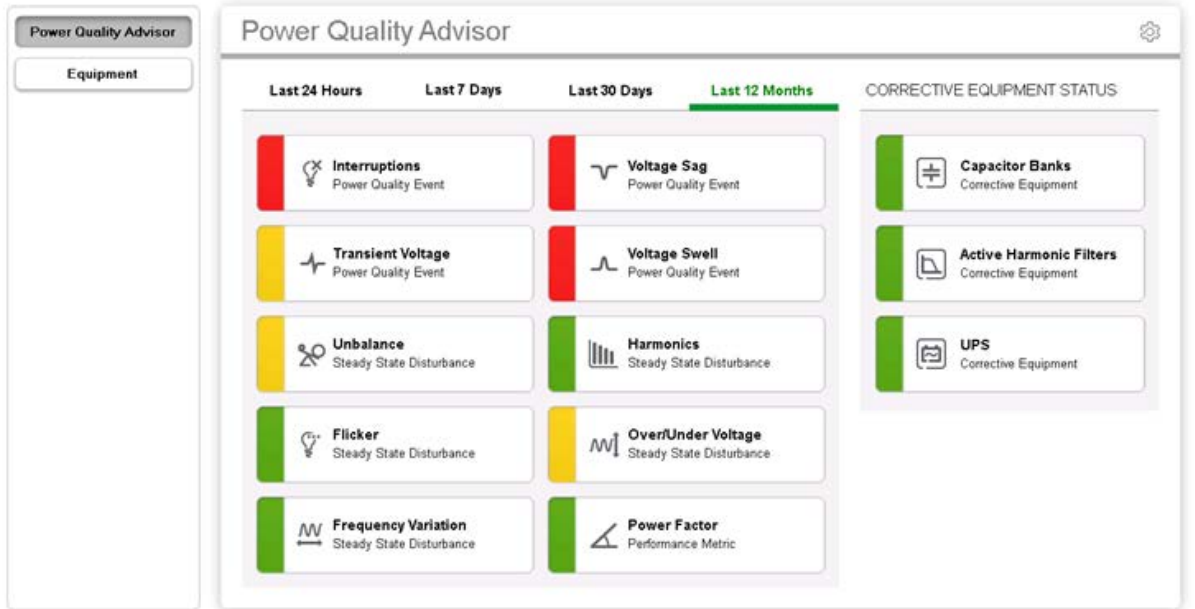
It is highly recommended that you take the PME PQ Advisor technical training from your local or regional training center.

## System Readiness

The PME system must be fully commissioned before starting the configuration of the PQ Advisor module.

# Power Quality Advisor Overview

Power Quality Advisor is an optional application module of Power Monitoring Expert (PME) software. It presents complex power quality information in a simpler form.



Refer to *StruxureWare Power Monitoring Expert Power Quality Advisor Design Guide* for more information about the PQ Advisor features.

# Configure the Monitoring Devices

The PQ Advisor can perform an analysis only when monitoring devices (power meters, circuit breakers) have been properly configured to capture power quality events and disturbances. This section describes how to:

- Enable Power Quality Event Detection.
- Enable Power Quality Disturbance Logging.
- Enable Time Synchronization.

Refer to *StruxureWare Power Monitoring Expert Power Quality Advisor Design Guide* for more information about power quality events and disturbances.

## Enable Power Quality Event Detection

See Appendix A – Meter Support List on page 74 for supported devices.

Enabling power quality event detection on the supported meters involves:

- Enabling Sag/Swell detection
- Enabling Transient detection

Disturbance direction detection (DDD) is enabled by default if supported.

**Note:** The disturbance direction detection (DDD) feature, available on select meters, is used to determine if the events are undetermined, internal or external to the system. Without DDD, all events will show as undetermined in the PQ Advisor features.

You can do this by using meter configuration tools (such as ION Setup), or by configuring the meter directly. Refer to the meter documentation for more information.

In addition, you can configure ION meters (such as, ION7650, PM8000, etc.), in PME Vista.

Victoria\_Bertram.DataCenter\_Lab Back to Power Quality

### Power Quality Setup

Enables	Sag/Swell														
Sag/Swell recording <input checked="" type="checkbox"/>	<table border="1"> <thead> <tr> <th>Basic</th> <th>Limit Learning</th> </tr> </thead> <tbody> <tr> <td colspan="2">Click to change value, then press Enter</td> </tr> <tr> <td>Swell limit <input type="text" value="110"/></td> <td>Learned Swell limit <input type="text"/></td> </tr> <tr> <td>Sag limit <input type="text" value="90"/></td> <td>Learned Sag limit <input type="text"/></td> </tr> <tr> <td>Change criteria <input type="text" value="10"/></td> <td>Learn Duration (days) <input type="text" value="30"/></td> </tr> <tr> <td>Nominal voltage <input type="text" value="120"/></td> <td>* Learn Mode <input type="text" value="Manual"/></td> </tr> <tr> <td></td> <td>Start Learning </td> </tr> </tbody> </table>	Basic	Limit Learning	Click to change value, then press Enter		Swell limit <input type="text" value="110"/>	Learned Swell limit <input type="text"/>	Sag limit <input type="text" value="90"/>	Learned Sag limit <input type="text"/>	Change criteria <input type="text" value="10"/>	Learn Duration (days) <input type="text" value="30"/>	Nominal voltage <input type="text" value="120"/>	* Learn Mode <input type="text" value="Manual"/>		Start Learning
Basic	Limit Learning														
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Harmonics Logging <input checked="" type="checkbox"/>															
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Basic	Limit Learning														
Click to change value, then press Enter															
Threshold <input type="text" value="125"/>	Learned Threshold <input type="text"/>														
	Learn Duration (minutes) <input type="text" value="30"/>														
	* Learn Mode <input type="text" value="Manual"/>														
	Start Learning														

\* If Learn Mode is Automatic, learned limits will be applied when learning is complete

Device Time 3/17/2016 01:33:43.093 PM  
Device Type 7650

After the power quality events are detected by the meter, they are classified by PME Power Quality Event Classification method and stored in PME database as:

- Interruptions
- Voltage Sag
- Voltage Swell
- Transient Voltage
- Over voltage
- Under voltage

Refer to *StruxureWare Power Monitoring Expert Design Guide* for more information about PME Power Quality Event Classification.

## Enable Power Quality Disturbance Logging

PQ Advisor consumes the periodical data logs for

- Voltage Unbalance
- Current Unbalance
- Voltage Harmonics
- Current Harmonics
- Frequency Variation
- Flicker

The supported meters are shown in Appendix A – Meter Support List on page 74. They are categorized as:

- **Logged by Default** – means the supported measurements are logged by the default. For these meters, no additional configuration is required. However, for brownfield installations, care must be taken to see if the configuration has been modified.
- **Not Logged by Default** – the meter measures the value but does not log it. You need to enable logging on these meters.

## Choose the Measurement to Log

The supported measurements and their corresponding register labels are in Appendix B – Measurement Support List on page 76.

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**Note:** For each disturbance category, choose only the appropriate/necessary measurements from the supported list to log. Do NOT log all of them – it can cause unwanted database growth, and performance issues.

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For example, for Voltage Unbalance, you may find both of the supported registers Voltage Unbalance L-L Worst and Voltage Unbalance L-N Worst available in a non-ION device. Choose the one which is required by your local standards.

Or, for Voltage Harmonics, you may find all of the 8 supported registers available in a non-ION device. If per-phase analysis is important to the customer on this device, choose the 3 per-phase measurements based on your system and standards. If per-phase analysis is not important (because of the load,

design, or other reasons), choose only one measurement; either THD Voltage L-L or THD Voltage L-N, which are the averages of the per-phase values.

## Enable the Logging

To enable the logging for devices categorized as “Not Logged by Default”:

- Supported measurements are logged by default for most ION meters, so configuration is not required. For some models, where the supported measurements are not logged by default, you can configure logging by using PME Designer.
- For non-ION meters, you can use PME Modbus Device Importer to configure logging:

**Note:** For non-ION devices, PQ Advisor only supports the logged instantaneous values. Do NOT log the calculated values (Mean, High, or Low). Leave the Log Interval set to the default 900 seconds.

Configure Logging and Calculation

Show downstream device columns

Select rows in the grid below  
Use the Editors below the grid to configure the selected rows

Register	Modbus Register	Log	Interval	Calculate	Log	Label	Calculate	Log	Label
Voltage Unbalance C-A	403042	<input type="checkbox"/>	900	<input type="checkbox"/>	<input type="checkbox"/>	Voltage Unbalan...	<input type="checkbox"/>	<input type="checkbox"/>	Voltage U
Voltage Unbalance C-N	403050	<input type="checkbox"/>	900	<input type="checkbox"/>	<input type="checkbox"/>	Voltage Unbalan...	<input type="checkbox"/>	<input type="checkbox"/>	Voltage U
Voltage Unbalance L-L Worst	403044	<input type="checkbox"/>	900	<input type="checkbox"/>	<input type="checkbox"/>	Voltage Unbalan...	<input type="checkbox"/>	<input type="checkbox"/>	Voltage U
Voltage Unbalance L-N Worst	403052	<input checked="" type="checkbox"/>	900	<input type="checkbox"/>	<input type="checkbox"/>	Voltage Unbalan...	<input type="checkbox"/>	<input type="checkbox"/>	Voltage U
Voltage Unbalance-Ack Status	411079	<input type="checkbox"/>	900	<input type="checkbox"/>	<input type="checkbox"/>	Voltage Unbalan...	<input type="checkbox"/>	<input type="checkbox"/>	Voltage U
Voltage Unbalance-Alarm Count	413549	<input type="checkbox"/>	900	<input type="checkbox"/>	<input type="checkbox"/>	Voltage Unbalan...	<input type="checkbox"/>	<input type="checkbox"/>	Voltage U
WAGES External Demand Elapsed Time...	403724	<input type="checkbox"/>	900	<input type="checkbox"/>	<input type="checkbox"/>	WAGES External ...	<input type="checkbox"/>	<input type="checkbox"/>	WAGES E
WAGES External Demand Elapsed Time...	403725	<input type="checkbox"/>	900	<input type="checkbox"/>	<input type="checkbox"/>	WAGES External ...	<input type="checkbox"/>	<input type="checkbox"/>	WAGES E
WAGES External Demand Interval	403722	<input type="checkbox"/>	900	<input type="checkbox"/>	<input type="checkbox"/>	WAGES External ...	<input type="checkbox"/>	<input type="checkbox"/>	WAGES E
WAGES External Demand Sub-Interval	403723	<input type="checkbox"/>	900	<input type="checkbox"/>	<input type="checkbox"/>	WAGES External ...	<input type="checkbox"/>	<input type="checkbox"/>	WAGES E

Register:  Log

All: Log Interval: 900 Seconds

Is Downstream Device

Downstream Device Name:

Include Name of Device Instance

Mean:  Calculate,  Log

High:  Calculate,  Log

Low:  Calculate,  Log

OK Cancel

Refer to *StruxureWare Power Monitoring Expert User Guide* for more information about using Designer and Modbus Device Importer.

- For the non-ION meters, especially PM800 (except PM810 without PME810LOG), CM3000, and CM4000, configure the on-board logging using meter configuration tools.

**Note:**

The PM800 Series devices are supported, except the PM810 without PME810LOG.

## Flicker

Flicker is only available when the supported meter has a PQ framework with EN50160 evaluation enabled. Refer to the meter documentation for more information.

Once enabled, the flicker measurements are logged in 10-minute intervals by default. There is no need to change the logging interval.

## Enable Time Synchronization

Time synchronization is crucial for:

- Event clustering (the same event seen by different devices is only counted once).
- Correctly associating the process impact alarms with power quality events.

The standard synchronization between PME server and devices is adequate for enabling PQ Advisor features.

- For Modbus devices, time synchronization through Modbus is activated by default.
- For all ION protocol devices (e.g. ION7650, PM8000, etc.), the application engineer needs to enable this feature.

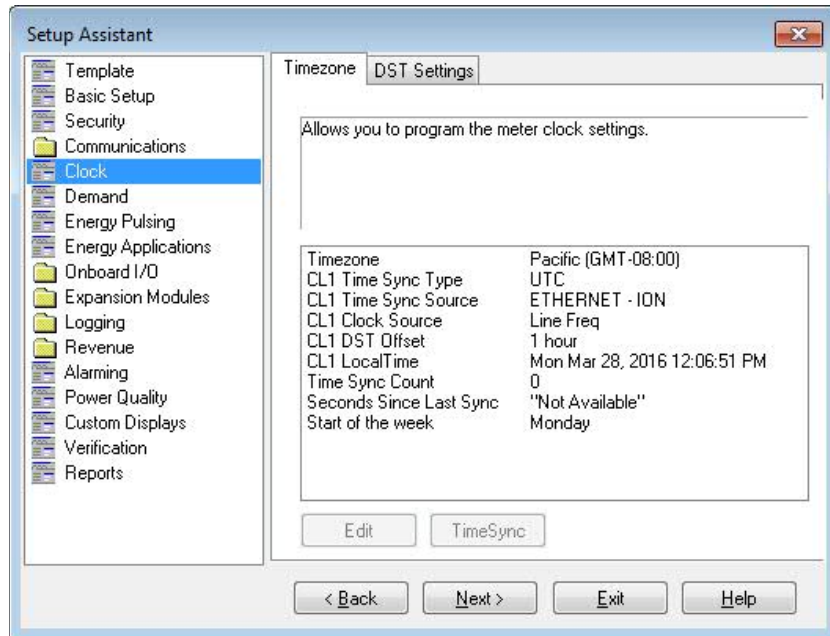
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**Note:** High accuracy of time synchronization (such as IRIG-B, etc.), can be used to address user requirements, but it is not required for PQ Advisor.

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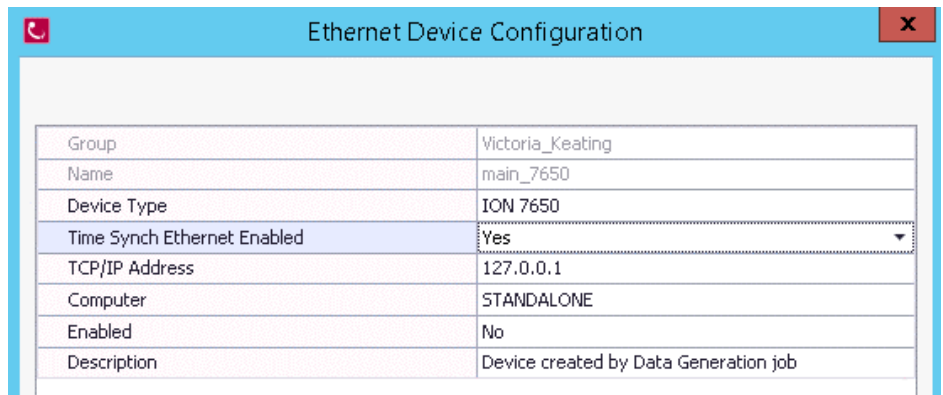
To enable PME time synchronization on an ION device:

1. Connect to the device using ION Setup. On the **Timezone** tab for **Clock**, change entry for the **CL1 Time Sync Source** to **ETHERNET - ION**. You can also do this on the meter front panel.



2. In Management Console:

- a. For an Ethernet device, set the **Time Synch Ethernet Enabled** to **Yes** in the **Ethernet Device Configuration**.



- b. For a serial device, set the **Time Synch ION Enabled** to **Yes** in the **Ethernet Gateway Site Configuration**.

Ethernet Gateway Site Configuration
✕

Name	TestLabSite
TCP/IP Address	10.168.26.36
TCP/IP Port	EtherGate COM1 7801
Computer	STANDALONE
Time Synch ION Enabled	Yes ▾
Time Synch 3XXX Enabled	No
Time Synch 3720 Enabled	No
Enabled	Yes
Description	

# Power Quality Advisor Configuration Overview

The Power Quality (PQ) Advisor module features are controlled by its feature license. Refer to *Power Monitoring Expert 7.2 & 8 Licensing Guide* on how to activate a license.

Once the PQ Advisor module is licensed, the following features do not require specific configuration to work:

- Power Quality Rating Gadgets
  - PQ Rating Gadget
  - PQ Rating Trend Gadget
- Power Quality Events Detail Gadgets
  - Power Quality Events Breakdown Gadget
  - Power Quality Events Impact Gadget
  - Power Quality Events Location Gadget

The features listed below require additional configuration to work, which will be described in the following sections

- PQ Advisor Diagrams
  - PQ Indicator Diagrams<sup>1</sup>
  - Standardized Equipment Diagrams
- Power Quality Impact Gadgets and Reports
  - Power Quality Impact Gadget
  - Power Quality Impact Trend Gadget
  - Power Quality Impact Report
- Power Factor Impact Gadgets
  - Power Factor Impact Gadget
  - Power Factor Impact Trend Gadget
- Power Quality Analysis Report<sup>2</sup>

<sup>1</sup> The PQ Indicator Diagrams are pre-configured with default settings. They work when you paste a simple framework in the PQ Advisor VIP.

<sup>2</sup> The Power Quality Analysis Report needs additional configuration only when the power factor section is enabled.

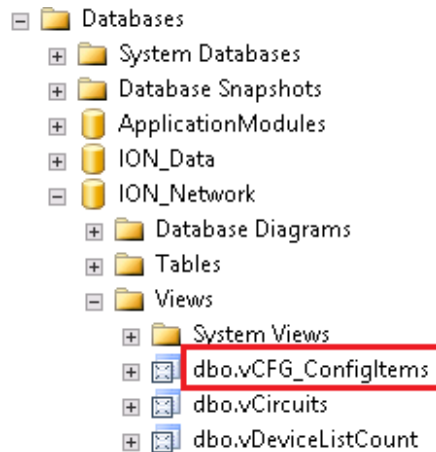
# Configure Global Parameters

You may need to change the global parameters, depending on the requirement of the customer's facility.

## Configure the Nominal Frequency

The default nominal frequency is 60Hz. To change this:

1. Go to SQL Server Management Studio, locate the `dbo.vCFG_ConfigItems` view in the `ION_Network` database, and right-click to select "Edit Top 200 Rows".



2. Find the **Frequency Nominal** row.
3. Set the Value to the appropriate local nominal frequency.

Module	Category	Item	Value
PQAnalytics	General Settings	Frequency Nominal	60

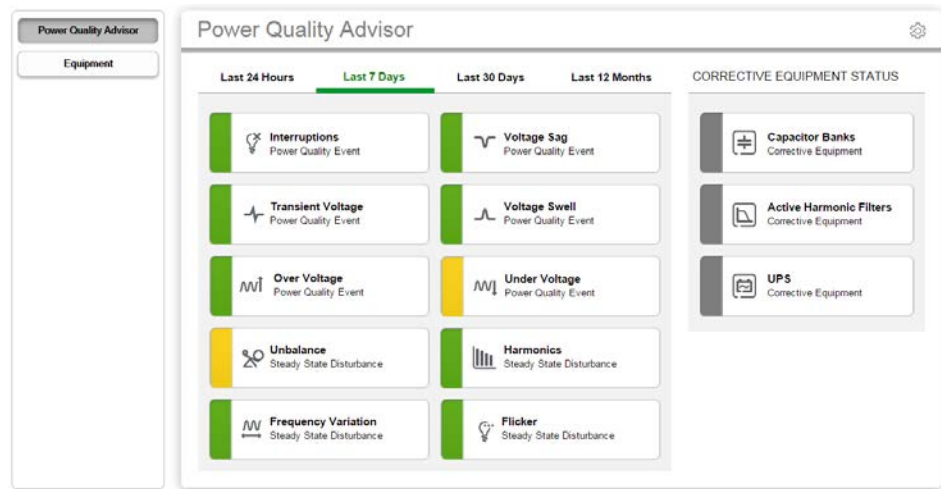
## Configure PQ Advisor Diagrams

The following sections describe how to configure the Power Quality (PQ) Advisor diagrams:

- Configure Power Quality Indicator Diagrams
- Configure the Standardized Equipment Diagrams
- Optional - Create a Power Quality Advisor Tab in the Web Interface

## Configure Power Quality Indicator Diagrams

The PQ Indicator Diagrams introduce simple green-yellow-red indicators for the most common power quality problems.



The PQ Indicator Diagrams are pre-configured with default settings. Complete the following steps to enable the functionality:

- Paste the Power Quality Advisor Framework
- Open the Power Quality Indicator Diagrams

## Paste the Power Quality Advisor Framework

The VIP Frameworks included with the Power Quality Advisor installation get data from the PQ Advisor Web Service in order to display values and drive the status objects in the PQ Advisor Indicator Vista Diagrams.

---

### Note:

The VIP.PQADVISOR ION Service must be running to proceed with the steps below. (The service is configured to start automatically.)

Installing the PQ Advisor framework onto an ION VIP Service other than VIP.PQADVISOR is not recommended.

Installing the PQ Advisor framework onto an ION VIP Service that has existing modules that have been put in by a user is not recommended.

---

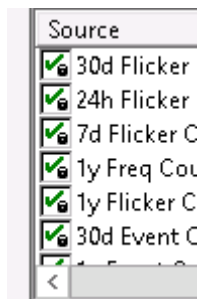
1. Open Power Monitoring Expert Designer.
2. Click **File > Open**.
3. Click the 'VIP.PQADVISOR' node and click **OK**.
4. Select the **Edit > Paste from framework** menu item.
5. Navigate to the folder containing the PQ Advisor Framework file:  
`{root install folder}\config\fmwk\PQ_Advisor`
6. Click the file `PQAdvisor_v1.0.0.0.fwn` and click **Open**.

---

**Note:** Use the most current version of the fwn file available.

---

7. In the Paste Summary dialog:
  - c. Ignore items with a red checkmark, as these are core modules that cannot have two instances in the same VIP. The existing modules will work with the new framework being pasted.
  - d. In the **Source** column, select the first list entry with a green checkmark, press and hold the **Shift** key, and then click the green checkmark icon in the checkbox on the final entry. This action applies the lock paste selection to all of the entries.



## **NOTICE**

### **UNINTENDED DEVICE OPERATION**

- Do not use the lock paste option to overwrite existing destination modules.
- Only use the lock paste option if you are an advanced user familiar with ION architecture.

**Failure to follow these instructions can result in operational differences in required modules.**

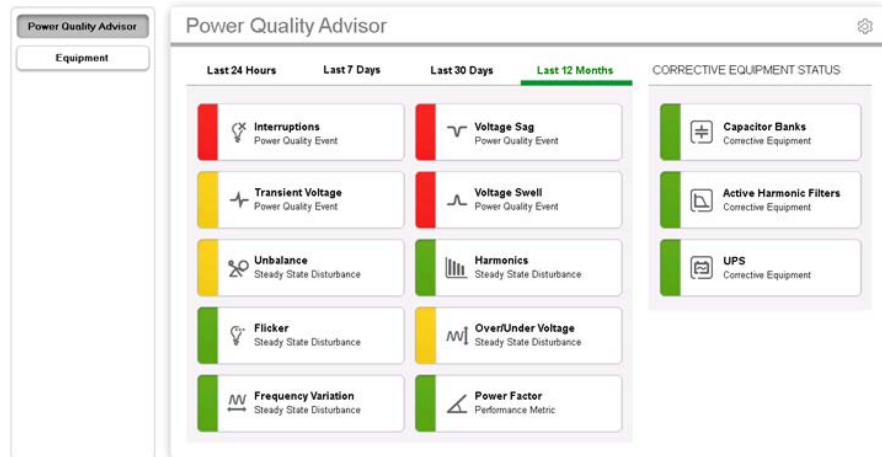
- e. In a new PME installation, no modules should be overwritten. In an existing PME installation there maybe conflicts and the framework paste may try to overwrite existing module; if this occurs double click the checkbox again so that it returns to just a checkmark, and note the module that created a conflict.
8. Press **OK** when pasting is complete.  
The Power Quality Advisor framework should now be visible in Designer.
  9. Click **Save** to complete the process.

## Open the Power Quality Indicator Diagrams

The PQ Indicator Diagrams are located under:

```
{root install folder}\config\diagrams\ud\PQ_Advisor
```

The diagrams start to function once the framework is pasted in the PQ Advisor VIP. You can link them to the existing Vista diagrams or use them separately.



**Note:** When a Power Quality Indicator has no supported device to feed it the required data, it should be disabled by following the procedures in the section Disable Unused Power Quality Indicators on page 68.

## Set the Query Server – Distributed System Only

When using distributed PME systems, set the query server node for the following landing page diagrams:

- PQAdvisor\_LandingPage\_24h\_V1.0.0.0.0.dgm
- PQAdvisor\_LandingPage\_7d\_V1.0.0.0.0.dgm
- PQAdvisor\_LandingPage\_30d\_V1.0.0.0.0.dgm
- PQAdvisor\_LandingPage\_12m\_V1.0.0.0.0.dgm

## Configure the Standardized Equipment Diagrams

The following sections describe how to set up and configure the Standardized Equipment Pages. Skip this section if corrective equipment does not exist in the system.

- Configure the Framework for the Equipment Diagrams
- Configure the Equipment Diagram Detail Pages
- Configure the Equipment Diagram Group Pages
- Configure the Equipment Diagram Landing Pages

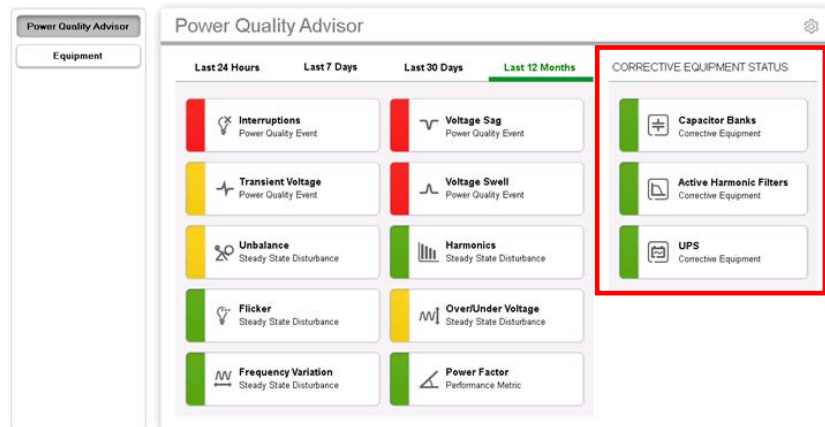
Unlike the PQ Advisor Indicator diagrams, the Equipment diagrams are not auto-functional pages, but rather templates that you use during commissioning to provide the user with equipment status displays with the same user experience and focus on simplification as the PQ Advisor Indicator pages.

The equipment diagram elements are:

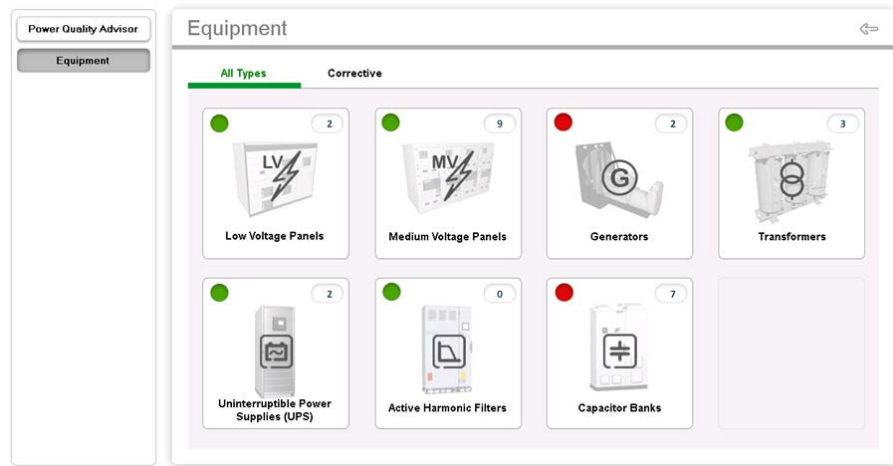
- Equipment Diagram Landing Pages
- Equipment Diagram Grouping Pages
- Equipment Diagram Detail Pages

### Equipment Diagram Landing Pages

The Corrective Equipment Status portion of the Power Quality Advisor page is a landing page.

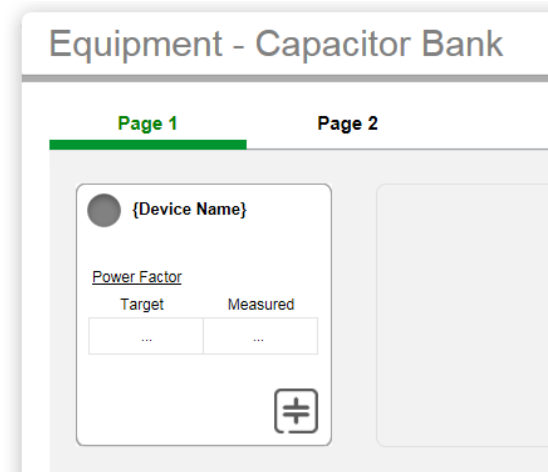


The Equipment page is also a landing page.



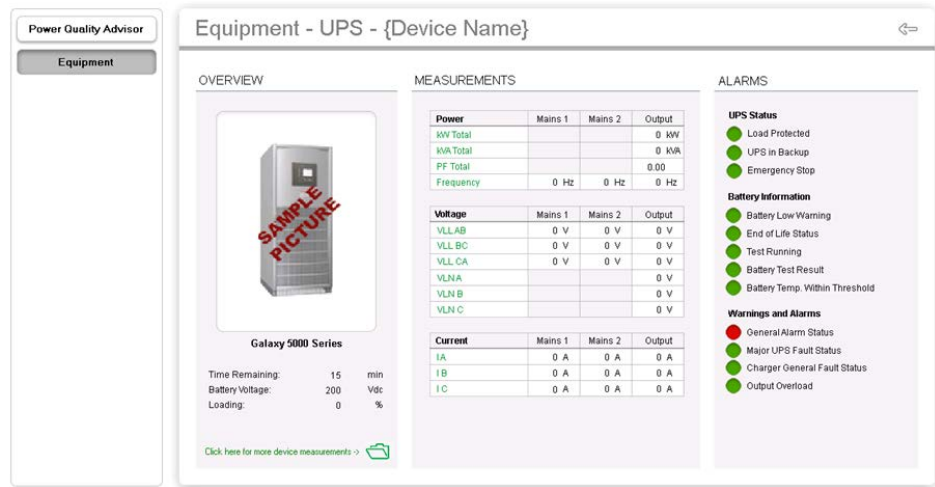
### Equipment Diagram Grouping Pages

When you select an element of the Equipment landing page (e.g. Capacitor Banks), the grouping page opens. A summary entry for each device (e.g. Capacitor Bank) in the system could be configured here.



### Equipment Diagram Detail Pages

When you select an element on the Equipment Grouping Page, the equipment diagram detail page for that device opens.



The following supported devices currently have template pages available:

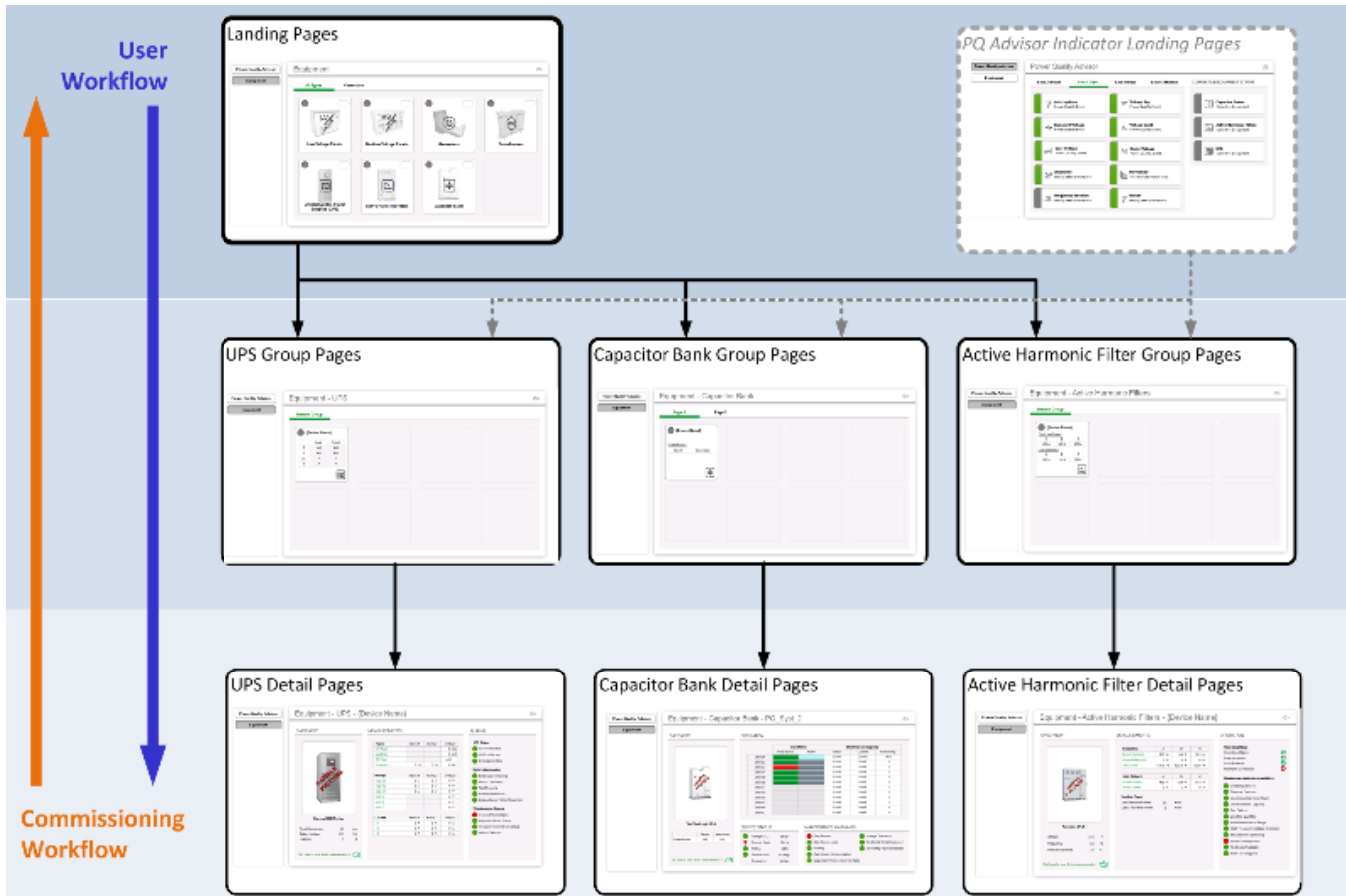
- Capacitor Banks: [VarPlus Logic VL6 and VL12](#)
- Active Harmonic Filters (AHF): [Accusine PCS+/PFV+](#)
- Uninterruptible Power Supplies (UPS): [Galaxy 5000 and 5500](#)

All Equipment Diagrams are installed in the following location:

{root install folder}\config\diagrams\ud\Equipment

## Configuration Workflow

The order of commissioning is the opposite of user workflow. You set up the Detail Pages first. Then you create the buttons for each Detail Page on the Group Pages. The Landing Pages (both Equipment and PQ Advisor Indicator), require no commissioning other than optional customization if required.



## Configure the Framework for the Equipment Diagrams

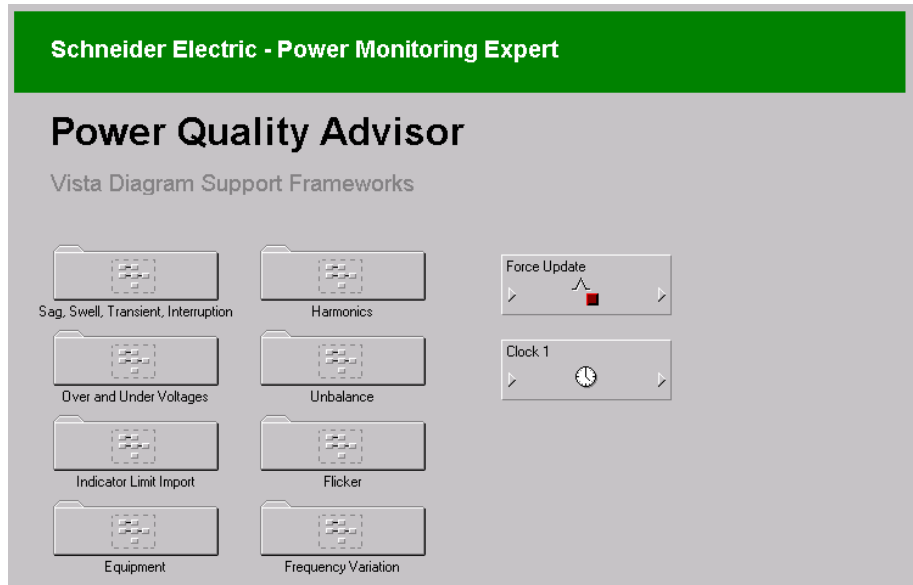
The Equipment Pages require custom configuration of the VIP framework by the deploying Application Engineer in order to display aggregated warning/alarm indicators found on the PQ Advisor Indicator Landing Pages and on the Equipment Landing and Group Pages.

**Note:** The VIP.PQADVISOR service must be set up and running with the Equipment Status Indicator Framework configured in order to commission the Equipment Diagrams.

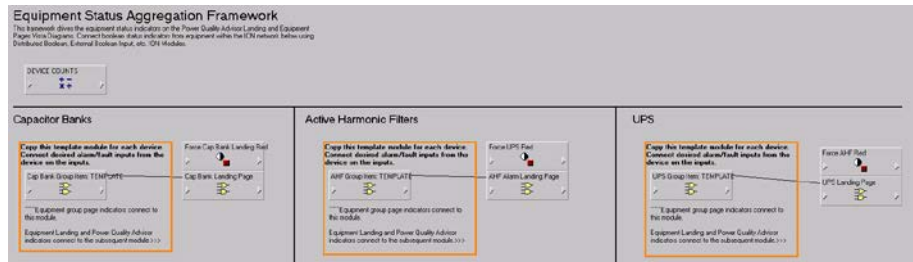
The PQ Advisor Framework contains some template OR Logic modules and simple instructions on configuring the VIP to work with the Equipment Pages:

1. Open the VIP.PQADVISOR framework in Designer.

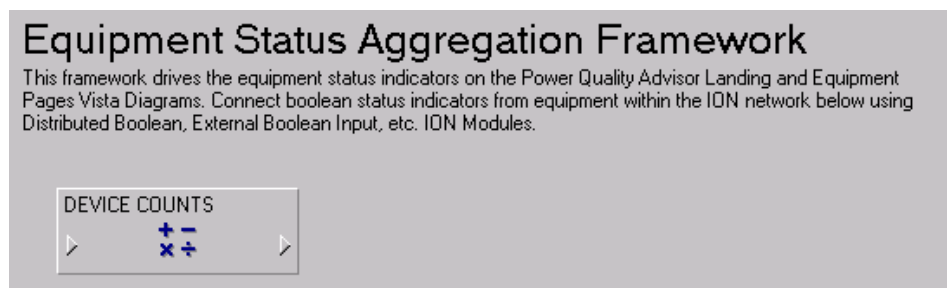
- Open the grouping folder labeled **Equipment**.



The Equipment folder contains the following:



Summary Section:



3. Capacitor Bank Section:

### Capacitor Banks

**Copy this template module for each device. Connect desired alarm/fault inputs from the device on the inputs.**

Cap Bank Group Item: TEMPLATE

Force Cap Bank Landing Red

Cap Bank Landing Page

^^^Equipment group page indicators connect to this module.

Equipment Landing and Power Quality Advisor indicators connect to the subsequent module.>>>

Active Harmonic Filters Section:

### Active Harmonic Filters

**Copy this template module for each device. Connect desired alarm/fault inputs from the device on the inputs.**

AHF Group Item: TEMPLATE

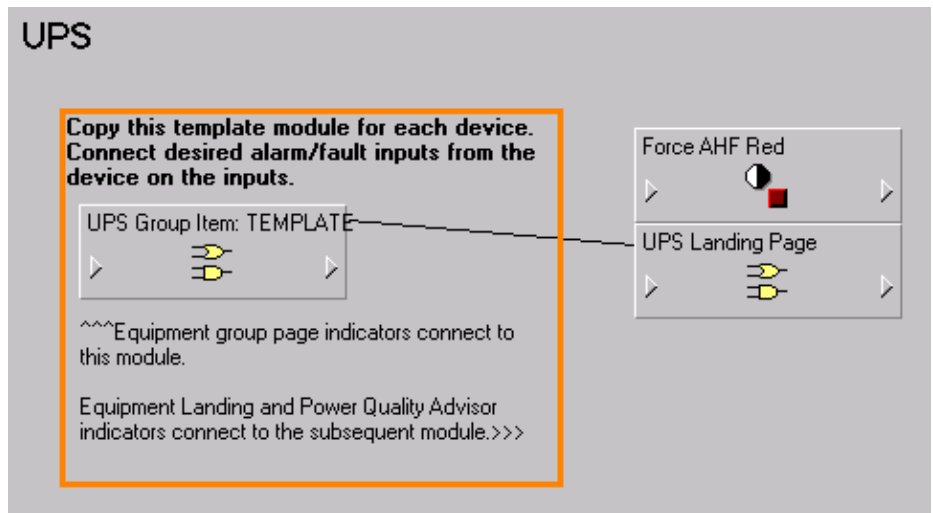
Force UPS Red

AHF Alarm Landing Page

^^^Equipment group page indicators connect to this module.

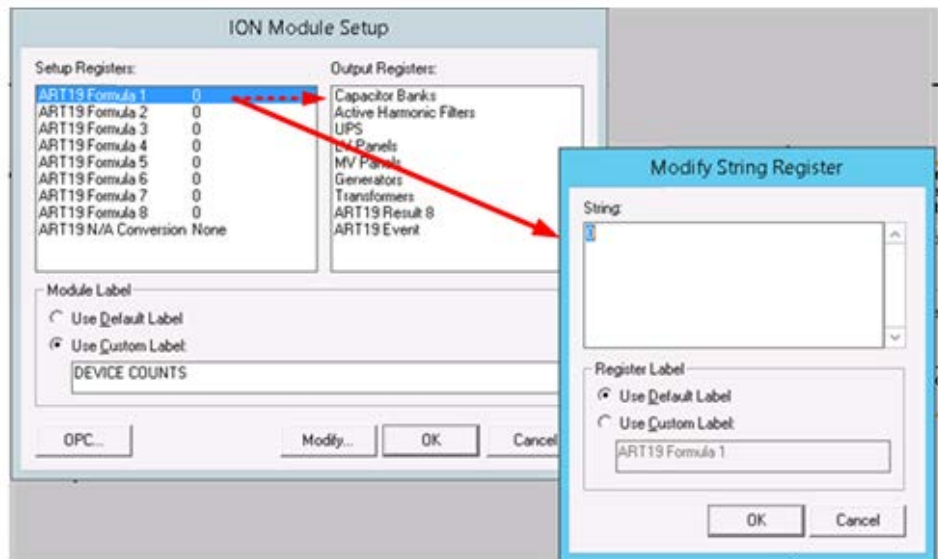
Equipment Landing and Power Quality Advisor indicators connect to the subsequent module.>>>

4. The UPS Section:



### Configure Device Count

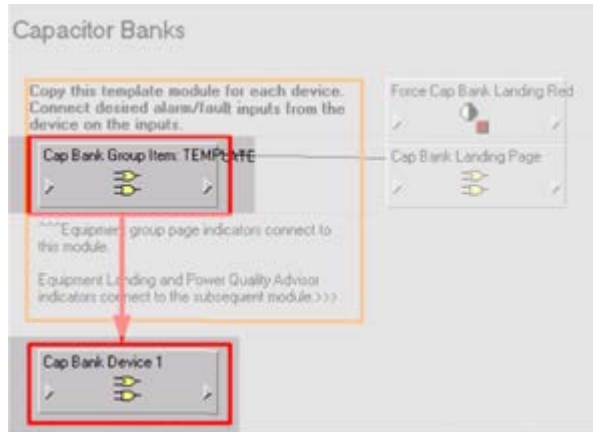
1. Right-click the module labeled **DEVICE COUNTS** to open the ION Module Setup dialog.
2. Double-click any of the 'Formula' Setup Registers to modify their value. The value entered represents the number of devices of corresponding type listed directly to the right in the Output Registers list.



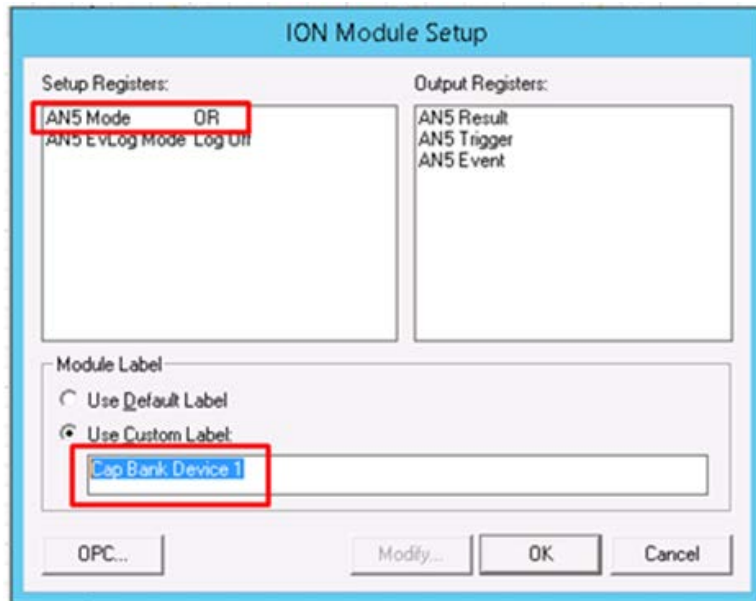
3. Repeat Step 4 until there is a device count number for each of the listed devices.

## Configure Equipment Status

1. Start with the set up of the capacitor bank by duplicating the template module labeled **Cap Bank Group Item: TEMPLATE** (or by creating a new AND/OR module).

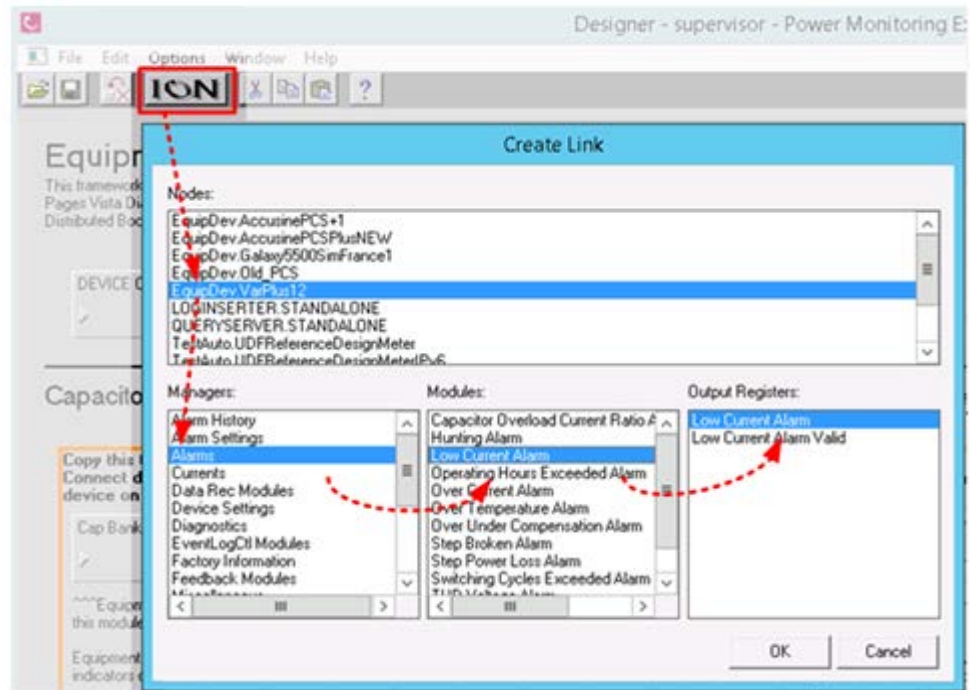


2. Right-click the new module and make the following modifications:
  - a. Set the mode of operation to OR.
  - b. Enter the name of the capacitor bank device in the **Custom Label** field.

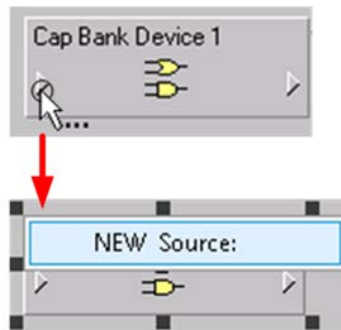


3. Link the input of the new module to a device alarm status output by performing the following steps:
  - a. Click the **ION** button on the toolbar to open the Create Link dialog.
  - b. Click the desired device, **Alarms** under **Managers**, **Low Current Alarm** under **Modules**, and **Low Current Alarm** under **Output Registers**.

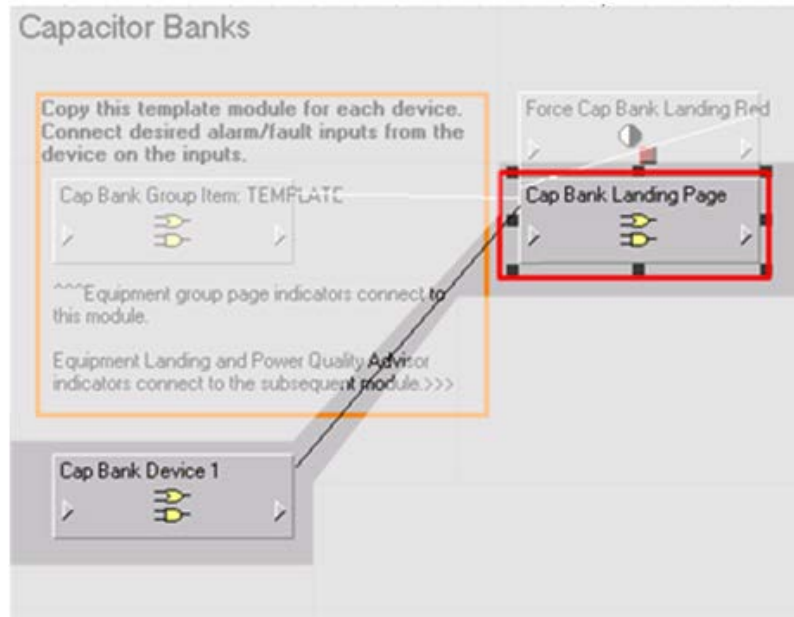
c. Click **OK**.



d. The cursor should now appear with a circle; click the input of the module and select **NEW Source**.



4. Repeat Step 3 until each of the capacitor bank's desired alarm status is connected to the module.  
By doing this, the output of the module outputs a '1' (High) state if any of the connected alarm states are activated.
5. Link the output of the new module to the input of the module labeled **Cap Bank Landing Page**.



6. Repeat Steps 1-5 for each capacitor bank in the system.
7. Remove the link between the output of the template module and the input of the Landing Page module:
  - a. Right-click the input of the Landing Page module.
  - b. In the resulting window select the appropriate input.
  - c. Click the **Unlink** button.
8. Repeat Steps 1-7 for the Active Harmonic Filter and UPS device frameworks until each desired corrective equipment device in the system is connected.
9. **Save** the modified framework.

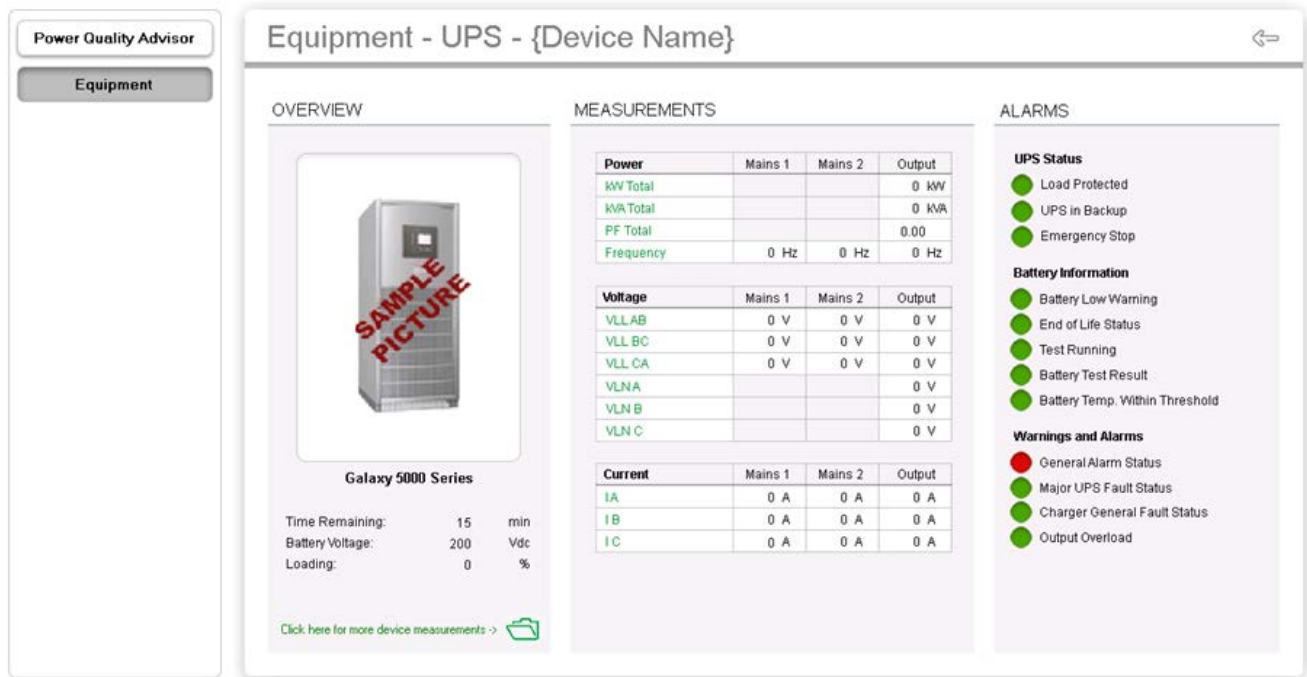
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**Note:** The outputs of the modules configured for the individual devices drive the Equipment Group Page indicators, and the outputs of the Landing Page modules drive the Landing Page Indicators on both the Equipment Pages and PQ Advisor Indicator pages.

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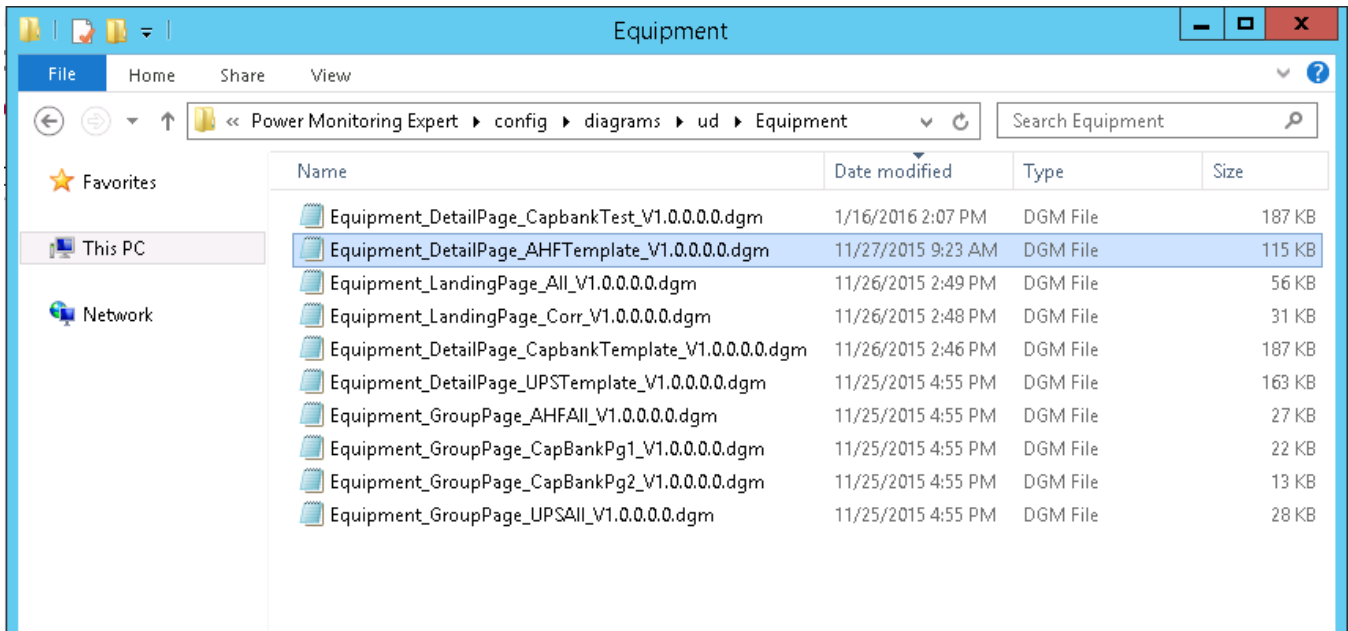
## Configure the Equipment Diagram Detail Pages

Each individual piece of equipment in the system could have its own detail page. These diagrams connect directly to the devices and do not have any interaction with the PQ Advisor VIP service.



To set up any of the detail pages using the provided template diagrams, perform the following steps:

1. In Windows Explorer, open the folder location that contains the DetailPage template for one of the Equipment (UPS, Capacitor bank or Harmonic filter).

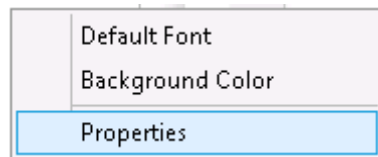


2. Highlight the template that will be used and copy it by pressing **Ctrl+C** and paste it using **Ctrl+V**.

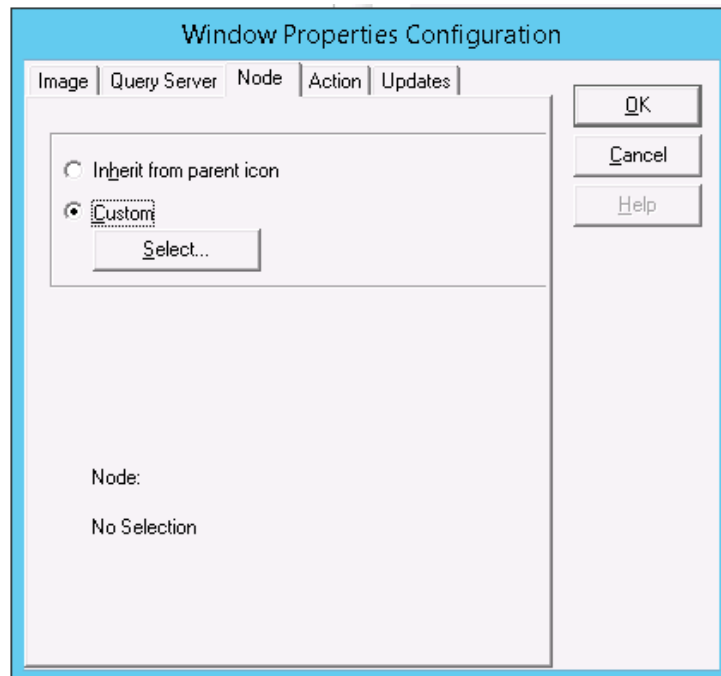
- When the file is pasted, it is enabled for editing. Choose a new name for the diagram file; preferably one that is easily associated with the particular device of interest.

**NOTE:** Take care not to overwrite the original template file by ensuring that the new file has a new and distinct file name.

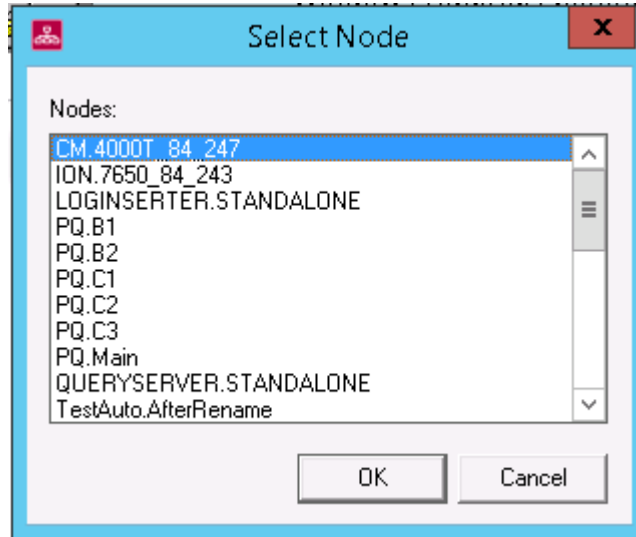
- Open the PME Vista application and ensure that the toolbox is enabled.
- Open the new file that was created in steps 1-4 by selecting **File > Open** and navigating to the containing folder in the dialog.
- When the diagram opens, right-click anywhere on the background and select **Properties** on the menu.



- In the subsequent dialog, select the **Node** tab.



- On the **Node** tab, select **Custom** and then click **Select** to open the Select Node dialog.
- Select the node name of the equipment for which the diagram was created, and click **OK**.



10. Click **OK** on the properties dialog, and click **Save** in Vista.

Provided the correct device was selected as the parent node of the page (that is, that the device mapping is correct), all the fields and indicators on the page should populate and be ready for use.

Verify that the device selected is the correct type for the template being used, and that the device is configured correctly.

Once the page has been linked to the node, there are a few manual steps that should be completed to customize the page:

**1** Equipment - Capacitor Bank - {Device Name}

**2** SAMPLE PICTURE

**3** VarPlus Logic

	Step Status		Step Capacity		
	Operational	Status	Initial	Present	Remaining
Step 01			VAR	VAR	%
Step 02			VAR	VAR	%
Step 03			VAR	VAR	%
Step 04			VAR	VAR	%
Step 05			VAR	VAR	%
Step 06			VAR	VAR	%
Step 07			VAR	VAR	%
Step 08			VAR	VAR	%
Step 09			VAR	VAR	%
Step 10			VAR	VAR	%
Step 11			VAR	VAR	%
Step 12			VAR	VAR	%


**DEVICE STATUS**

- Voltage (L-L): V
- Current (Avg): A
- THDU: %
- Temperature: deg. C
- Frequency: Hz

**MAINTENANCE WARNINGS**

- Step Broken
- Step Power Loss
- Hunting
- Over Under Compensation
- Capacitor Overload Current Ratio
- Voltage Tolerance
- Switching Cycle Exceeded
- Operating Hours Exceeded

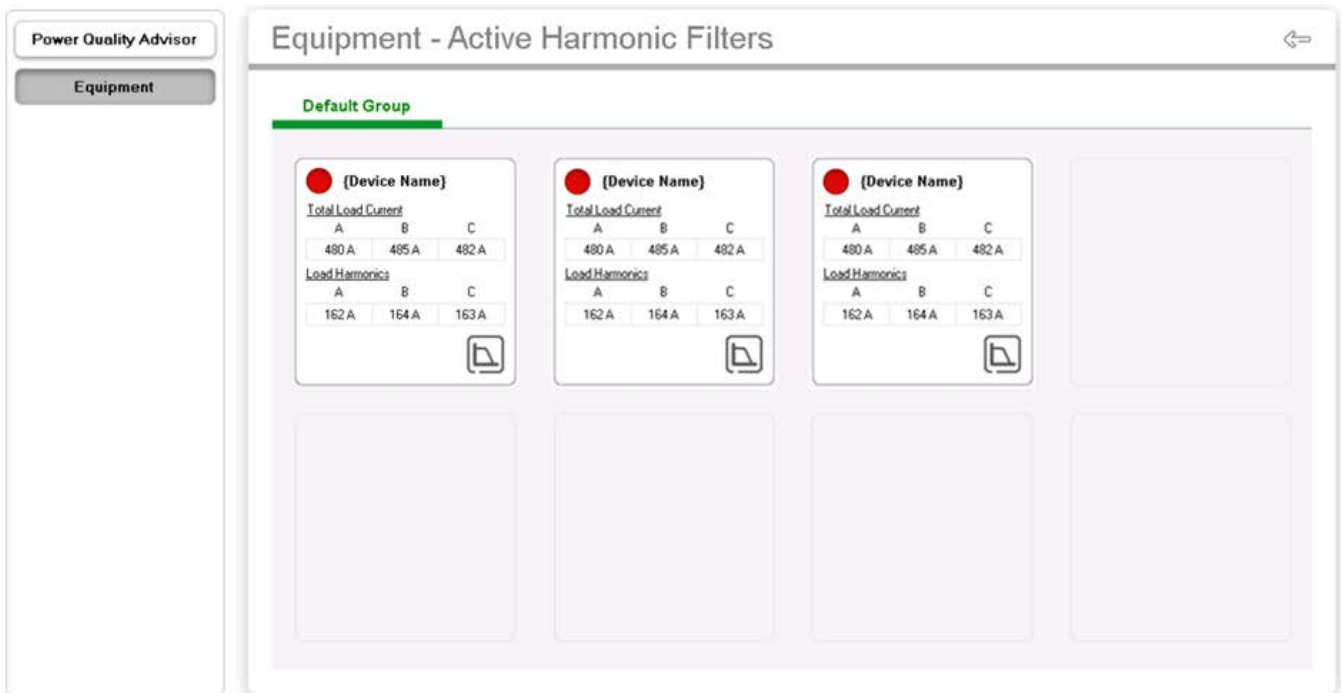
- 11. Customize the page as per the graphic above:
  - a. Update the page header to include the unique name of the device.
  - b. Change the picture of the device from the sample image to a custom image, such as a standard image or an actual picture of the device.
  - c. Update the device model name to be more specific.
- 12. As a final step, click the folder icon in the Overview section to view the default diagram of the device. Verify that the correct default diagram appears, and that the values and status shown match what appears on the detail page.

[Click here for more device measurements ->](#) 

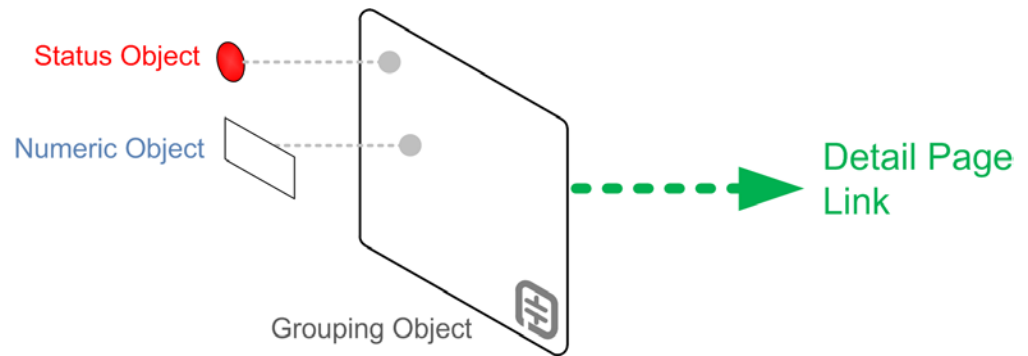
- 13. Repeat step 1-12 for other equipment.

## Configure the Equipment Diagram Group Pages

Group Pages allow for viewing of multiple devices of a particular type from a single location.



This is made possible by creating and customizing "Buttons" that consist of grouping, numeric, text, and status objects arranged to represent a clickable overview of a single device.



## Group Pages Set Up and Scaling

Before the Group Page for a particular device type can be populated, the logical organization of the device grouping must be reviewed, and multiple Group Pages need to be created if necessary.

If there are less than eight devices of the Group Page type, then proceed to the Group Page Buttons Setup and Detail Page Association on page 41. If there are more than eight, more Group Page diagrams will have to be created. These new pages will be linked as tabs from the main device type Group Page.

## Device Scaling

The first step is to determine how many diagrams will be required by counting the number of devices of the type in question. A single Group Page diagram has eight Button positions, so there will need to be a Group Page diagram for each eight devices and portion thereof. For example, if the system contains ten capacitor banks (each with its own Detail Page diagram), then there will need to be two Group Page diagrams; one page with eight buttons, one page with two.

Alternately, a different organizational scheme can be incorporated by creating a Group Page for each logical grouping of devices. For example, a separate Group Page can be created for each production line in a facility, thus allowing the user to conveniently check the active harmonic filters that are present for a production line that is experiencing problems.

Another option is to create Group Pages for different buildings or areas within a facility; in the end it is up to the deploying Application Engineer to determine the solution which makes the most sense for the user's application.

## Group Scaling

Each Group Page has space for six tabs, therefore, if there are more than six Group Pages required for a single device type, they need to be arranged into sub-types on the Landing page level. For example, if there were twelve Group Pages for active harmonic filters, they need to be split into two logical categories and treated separately on the Landing Page level.

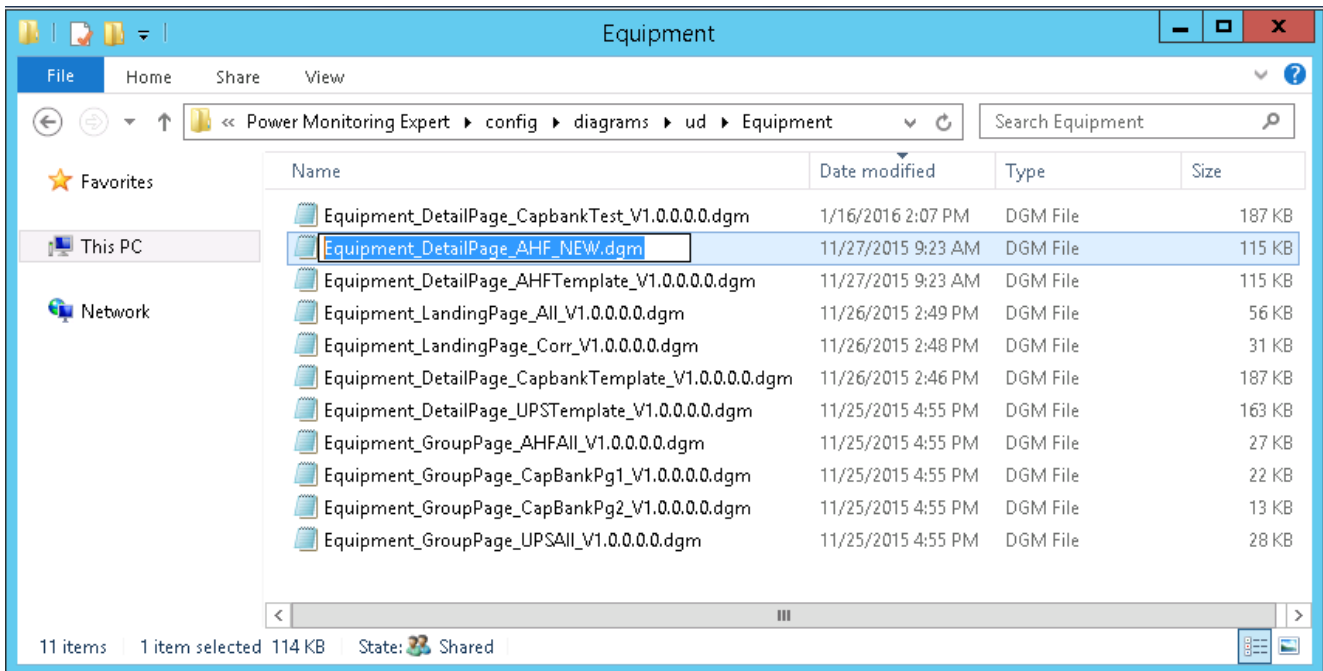
For the purpose of this set up guide, assume that there are only six or less Group Pages required in the steps outlined below.

## Group Page Logical Set Up

With the number of Group Pages required in mind, complete the following preliminary setup steps:

### Set Up the Group Page Files

1. In Windows Explorer, open the folder location that contains the Group Pages.
2. Highlight the template that will be used. Copy it by pressing **Ctrl+C** and paste it using **Ctrl+V**.
3. When the file is pasted, the file name opens for editing.



Choose a new name for the diagram file; preferably one that reflects how the Group Pages will be organized.

Note that the original file (the one that contains the word "All" or "Pg1" in the filename) will be the main Group Page that is linked to/from the Equipment landing page. For example, if one were creating an active harmonic filter Group Page for each floor of a facility the filenames would be as follows:

- a. Equipment\_GroupPage\_\_AHFAll\_V1.0.0.0.0.dgm (default filename for the first floor)
- b. Equipment\_GroupPage\_ AHF\_Floor2\_V1.0.0.0.0.dgm
- c. Equipment\_GroupPage\_\_AHF\_Floor3\_V1.0.0.0.0.dgm

And so on.

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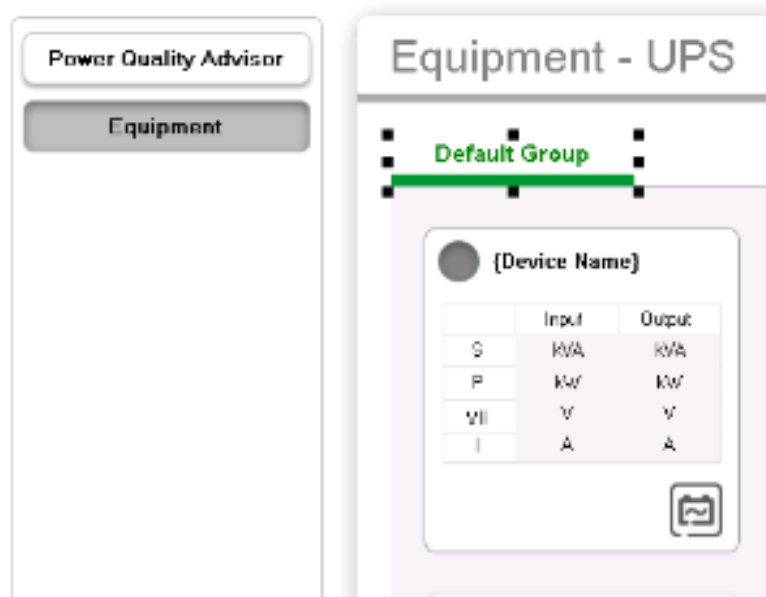
**Note:** Use the most current version of the dgm file available.

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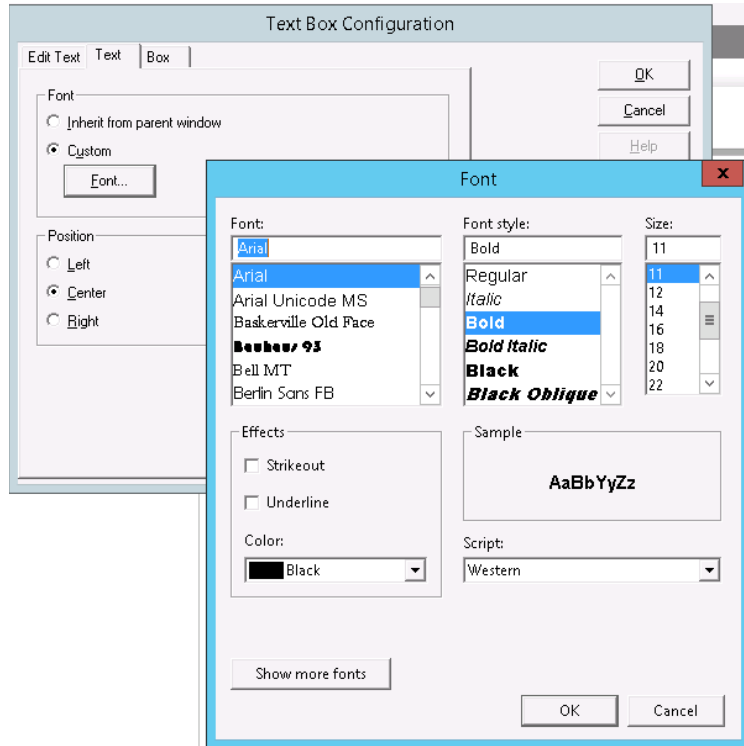
4. Press **Enter** to save the file name.
5. Repeat steps 2-3 until you create all of the required files.

## Set up Tabs in the First Group Page

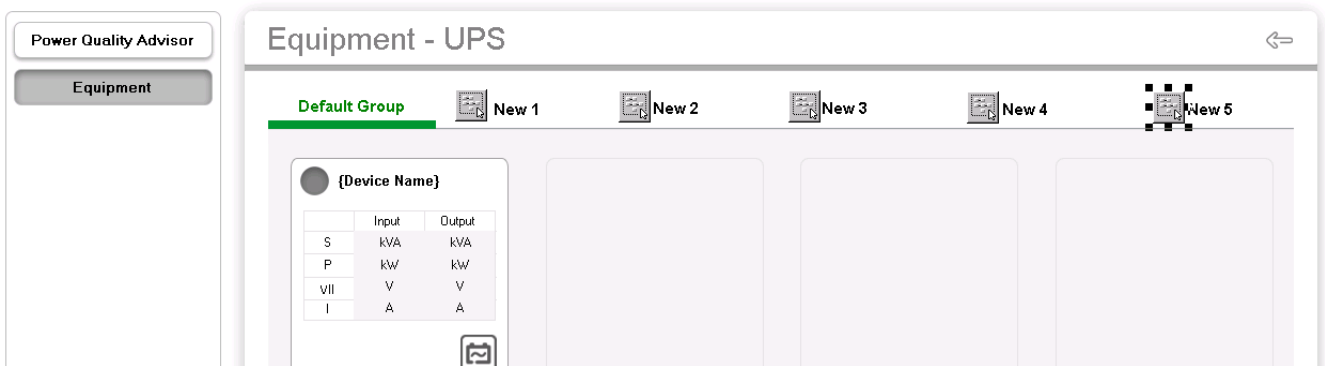
1. Open PME Vista and ensure that the Toolbox is enabled.
2. Open the first logical Group Page file that is to be set up by selecting **File > Open** from the menu bar and navigating to the containing folder in the dialog.
3. Select the tab text (the green text **Default Group** in new installations) and press **Ctrl+C** to copy it.



4. Press **Ctrl+V** to paste up to six text boxes – one for each Group Page.
5. Arrange the text boxes evenly along the tab line in up to five additional "tab" positions.
6. Change the text color for each of the pasted text boxes (but not the original) to black:
  - a. Right-click the text box to open the Text Box Configuration dialog.
  - b. Click the **Text** tab.
  - c. Select **Custom** and click the **Font** button to open the Font dialog.
  - d. Select **Black** from the Color dropdown menu and click **OK**.
  - e. Click **OK** on the configuration dialog to complete the change.

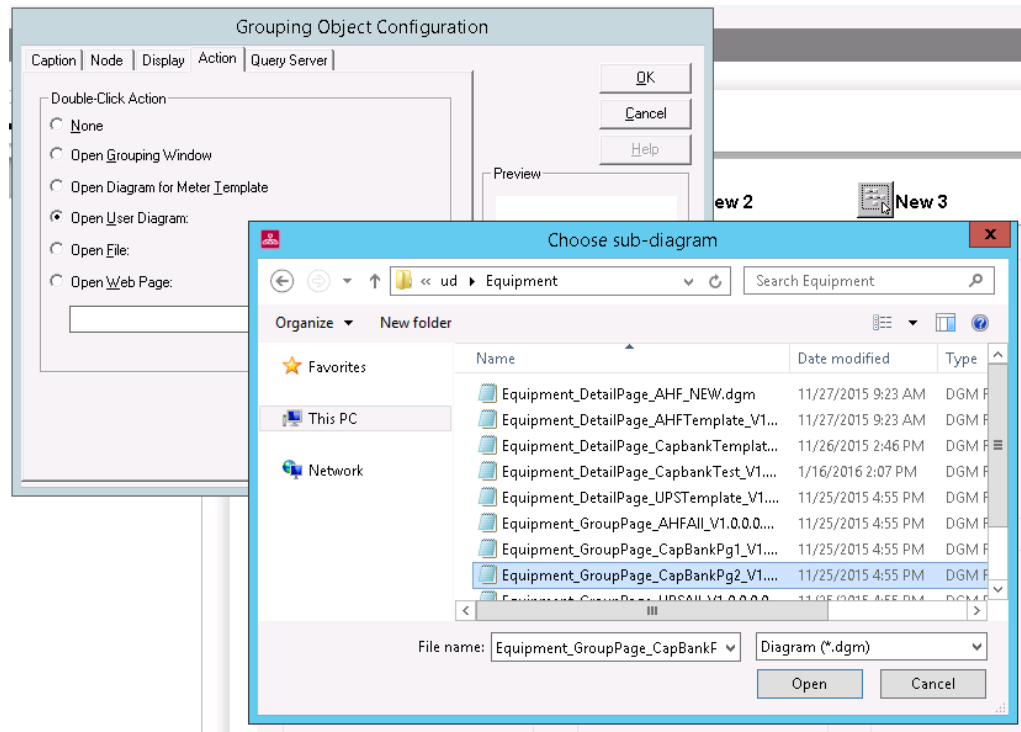


7. Place a new Grouping Object over top of each new text box.

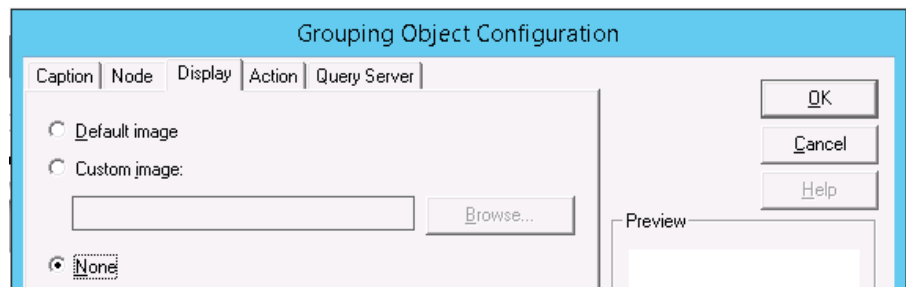


8. Change the shape of each new grouping object by left-clicking the object and dragging the black tabs that appear.  
The objects will be what the user will click to navigate to other tabs; they should therefore cover the text underneath, and should not overlap.
9. Make each new grouping object link to the Group Page diagram referenced by the text underneath it.
  - a. Right-click the grouping to open the Grouping Object Configuration dialog.
  - b. Select the **Action** tab.

- c. Select **Open User Diagram** and click the **Browse** button to open the Choose sub-diagram dialog.



10. Make each new grouping object appear transparent to show the text underneath it.
- Right-click the grouping to open the configuration dialog.
  - Select the **Display** tab.
  - Select **None**.
  - Click **OK** in the configuration dialog to complete the change.



- Hold down the left mouse button and draw a marquee around all of the tab (text box and grouping) objects.
- Press **Ctrl+C** to copy the objects.
- Save and close the diagram.

## Set Up Tabs in Subsequent Group Pages

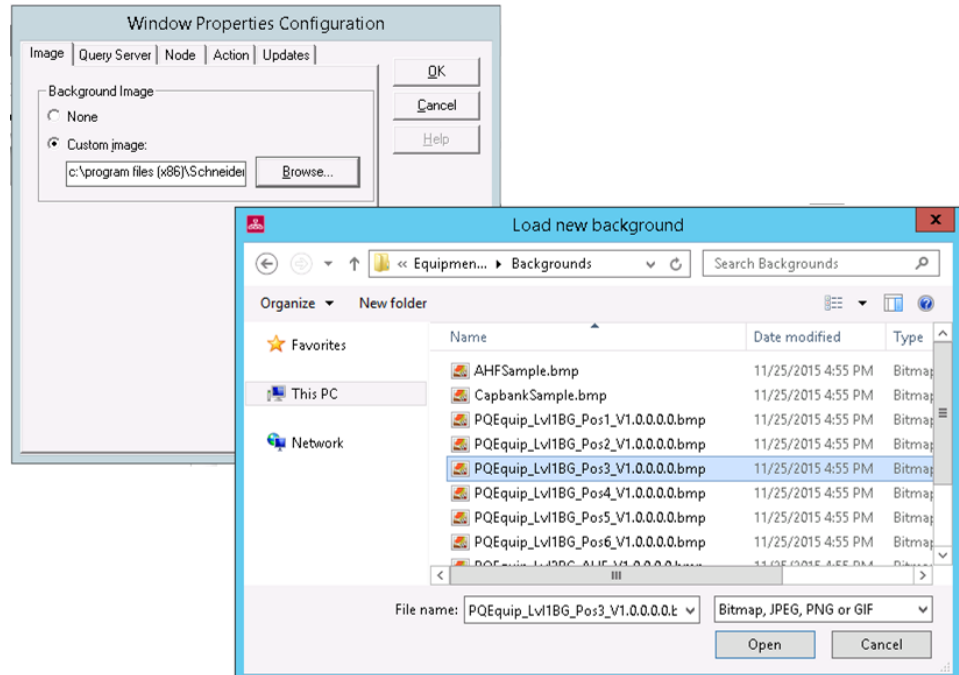
1. Open the next Group Page diagram by selecting **File > Open** from the menu bar and navigating to the containing folder in the dialog.
2. Delete any existing text box objects in the tab area by selecting them and pressing **Delete**.
3. Press **Ctrl+V** to paste the tab objects from the previous Group Page diagram.
4. Change the color of the text in the text box that represents the first Group Page to black (see "Setting up Tabs in the First Group Page", Step 6).
5. Add a new grouping object over top of the text that represents the first Group Page, modify it to be transparent, and link it to the first Group Page diagram file (see "Setting up Tabs in the First Group Page", Steps 8-10 ).
6. Delete the grouping object in the tab area that links to the current Group Page by selecting it and pressing **Delete**.
7. Change the color of the text in the text box that represents the current Group Page to green.
8. Change the background image of the diagram to one that has highlighting on the correct portion of the tab area:
  - a. Right-click any unpopulated space on the diagram area and select **Properties** on the menu.
  - b. Select the **Image** tab in the Configuration dialog.
  - c. Select **Custom Image** and click **Browse**.
  - d. In the resulting, navigate to the following location:  
...\\config\\diagrams\\images\\Equipment\_Diagrams\\Backgrounds
  - e. Select the correct background image.  
Each Equipment diagram background image included in this installation is the same, except for the position of a green highlight in the tab area. The filename of the background image indicates where the green highlight is located. For example, "PQEquip\_Lvl1BG\_Pos2\_V1.0.0.0.0.bmp" has a highlight in the second position from the left, indicated by the "Pos2" text in the filename. Double-click the file to complete the selection.

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**Note:** Use the most current version of the bmp file available.

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- f. Click **OK** to complete the change and to close the configuration dialog.



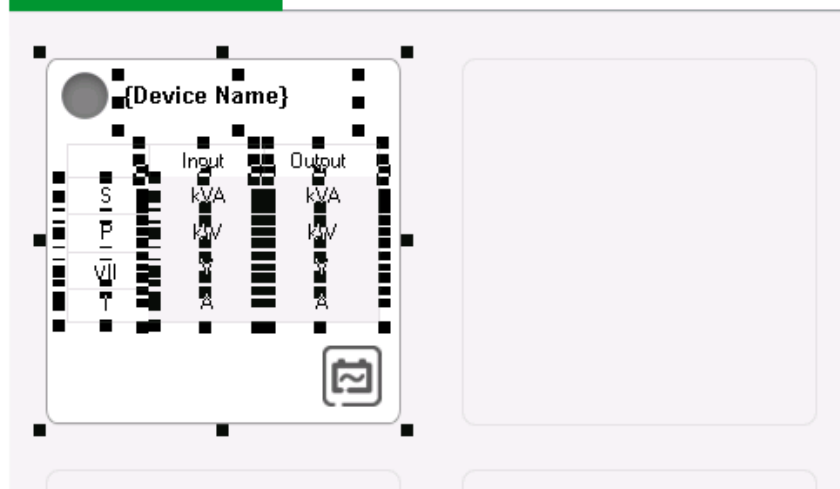
9. Repeat steps 1-8 until all Group Pages have the required tabs.

## Group Page Buttons Set Up and Detail Page Association

The following steps outline how to set up a Group page with custom buttons for each device that has an associated Detail Page:

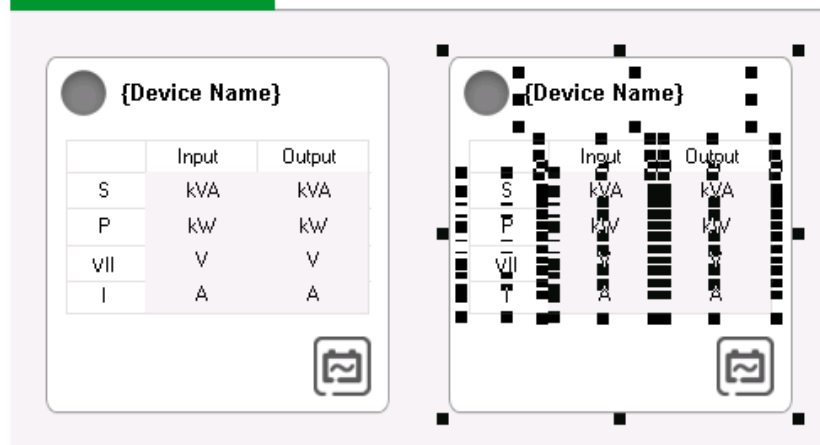
1. Open Vista and ensure the Toolbox is enabled.
2. Open the Group Page file that is to be set up by selecting **File > Open** from the menu bar and navigating to the containing folder in the dialog.
3. Hold down the left mouse button and draw a marquee around the template button in the top left position of the page space, selecting all objects contained within.
4. Press **Ctrl+C** to copy the button items.

### Default Group

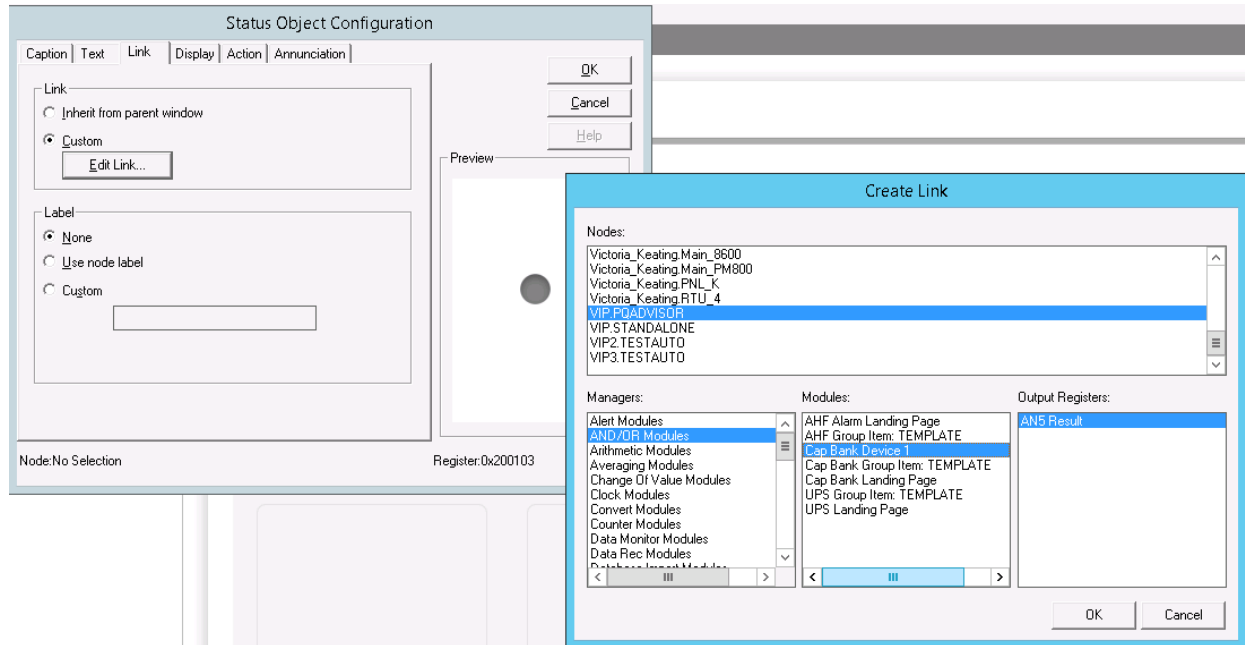


5. Press **Ctrl+V** to paste up to seven additional buttons (for a total of eight on the page); one for each device with a Detail Page.

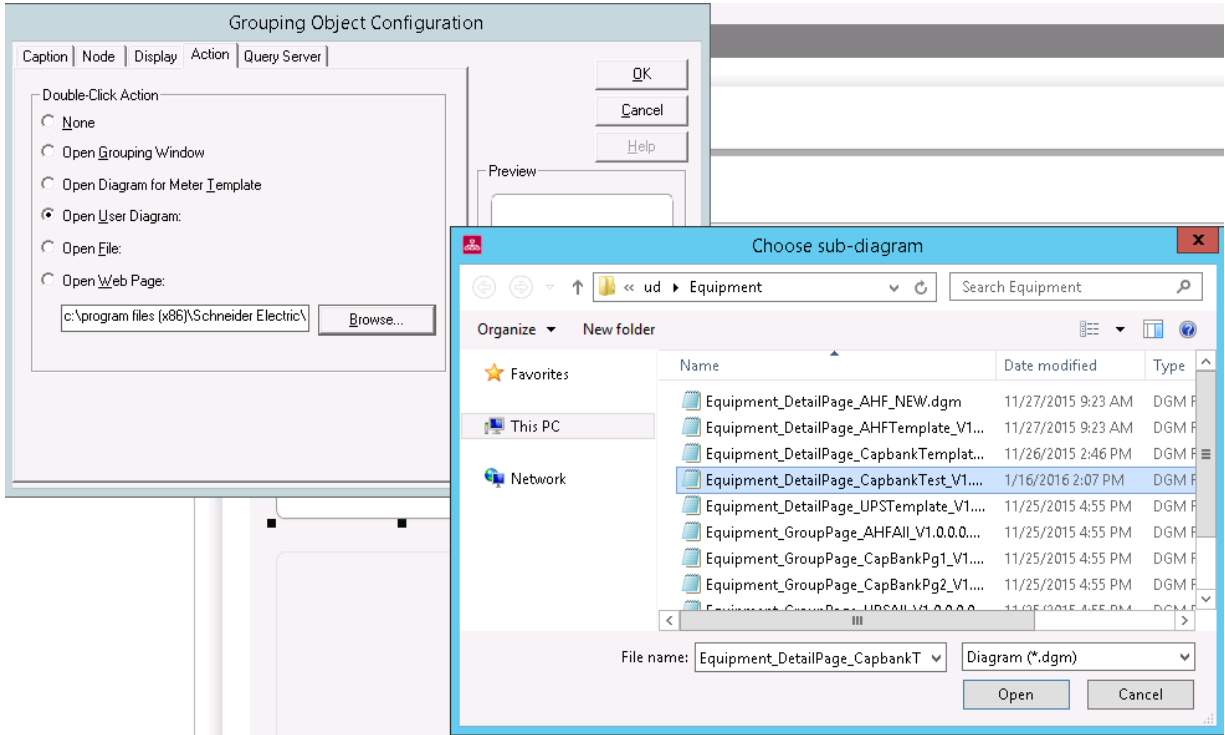
### Default Group



6. Link an indicator (status) object to its corresponding ION module in the PQ Advisor Equipment VIP Framework:
  - a. Right-click the indicator (status) object.
  - b. Navigate to the correct module output by selecting the following in the Create Link dialog:
    - i. Node: VIP.PQADVISOR.
    - ii. Managers: And/OR Modules.
    - iii. Modules: the AND/OR module that was set up for the corresponding device in the Equipment Status Indicator Framework step.
    - iv. Output registers: (module designator) Result.



7. Repeat step 6 for each indicator object on the page.
8. Link the numeric objects within the button to the corresponding outputs on the device.
  - a. Right-click the numeric object.
  - b. Navigate to the correct module output by selecting the following in the 'Create Link' dialog; start by selecting the device in the 'Node' section and navigating to the desired numeric output.
9. Repeat step 8 for each numeric object on the page.
10. Link the button background to the appropriate Detail Page:
  - a. Right-click the button (grouping object) area where there is no other object (such as numeric or indicator).
  - b. Select the **Action** tab on the configuration dialog.
  - c. Select **Open User Diagram** and click **Browse**.
  - d. In the resulting window, navigate to the Detail diagram file.
  - e. Click **OK** on the configuration dialog to complete the change.



11. Repeat step 10 for each button (Grouping Object) on the page.
12. Repeat this process for each (corrective) device type in the system.  
The Group Page should now be configured.
13. Repeat this process for any other Group Page diagrams in the system.

### Group Button Measurement Linking

The measurements displayed on the Group Page buttons are linked to the device measurements by navigating to the appropriate measurement in the numeric object configuration window. To help the deploying Application Engineer, these links are listed in more detail below along with the ION Handle:

See the section called “How to Modify Indicators” in the Appendix called “How to Modify Power Quality Advisor Vista Diagrams” for instructions on how to link to ION Handles.

#### VarPlus Logic Capacitor Bank Button Measurement Display

Button Label	Measurement Label in Device	ION Handle
Power Factor - Target	Target Cos Phi 01	0x8502E01
Power Factor - Measured	Power Factor Total	0x8803701

**Accusine PCS+ Active Harmonic Filter Button Measurement Display**

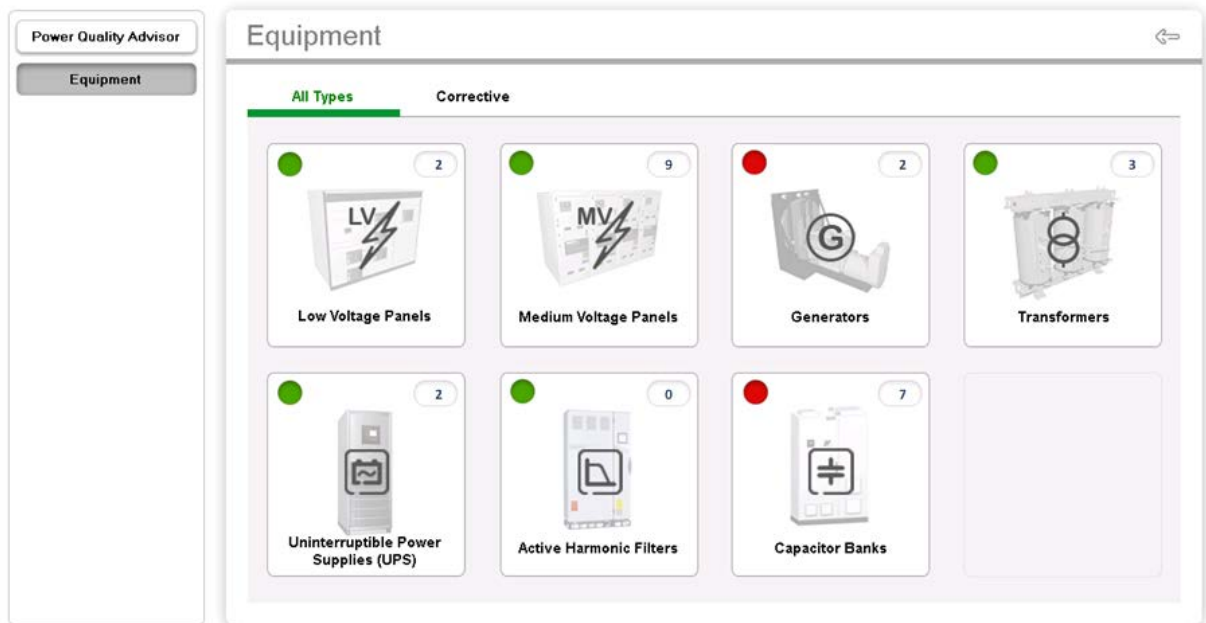
Button Label	Measurement Label in Device	ION Handle
Total Load Current - A	Load Current A Total	0x8100001
Total Load Current - B	Load Current B Total	0x8100002
Total Load Current - C	Load Current C Total	0x8100003
Load Harmonic - A	Load Harmonics Current A	0x810001B
Load Harmonic - B	Load Harmonics Current B	0x810001C
Load Harmonic - C	Load Harmonics Current C	0x810001D

**Galaxy 5500 UPS Button Measurement Display**

Button Label	Manager	Module	Output Register	ION Handle
Time Remaining	Diagnostics2	Backup Time	Battery Time Remaining	0xb300002
Battery Voltage	Voltages	Voltage	Battery DC Voltage	0xc000018
Loading	Power Factors	Power Factor	Total Output Percent Load	0xb200001

## Configure the Equipment Diagram Landing Pages

The Landing Pages are the last to be configured in the Equipment Page setup.



The indicators (Status Objects) on the Landing Pages are linked to the output of the respective Equipment Landing Page ION Module in the Equipment Status Indicator Framework of the VIP.PQADVISOR service.

The Equipment Counts (Numeric Objects) are linked to the 'DEVICE COUNTS' ION Arithmetic Module in the Equipment Status Indicator Framework. The number of devices of each category within the system needs to be entered into the Setup Registers of the module.

Link the button background to the appropriate Group Page:

1. Right-click the button (grouping object) area anywhere that there is no other object (such as numeric or indicator).
2. Select the Action tab on the Configuration dialog.
3. Select Open User Diagram and click Browse.
4. In the resulting window, navigate to the Group diagram file.
5. Click OK on the Configuration dialog to complete the change.
6. Save the diagram.

Customization might be needed under the following circumstances:

- There are more than six Group Pages (i.e. more than 48 devices) for a particular device.
- The customer's application demands multiple Landing Pages with custom groups of device types. An example of this is pre-configured on default Landing Page; there is a tab for all devices and a tab for corrective devices only.

When customization is required, follow the steps in this section for adding additional pages/tabs and additional buttons. Note that the background images used for the Group Pages are the same as those used in the Landing Pages.

## Optional - Create a Power Quality Advisor Tab in the Web Interface

An optional step is to create a tab in the Web Applications interface to view the PQ Advisor Vista diagrams.

DASHBOARDS   DIAGRAMS   TABLES   TRENDS   ALARMS   REPORTS   **PQ ADVISOR**

To do this:

1. Navigate to the following file:
 

```
{root install
folder}\Applications\ApplicationFramework\Framework
.xml
```
2. Right click the file and select **Edit**.
3. Scroll to the place in the file with the following lines:
 

```
</Application>
</Applications>
```
4. Between the two lines shown in step 3 above, copy the following snippet of XML code:

```

    <Application id="3a0163ba-c26d-4b79-a846-9e62961ddced"
    name="Advisor" requiredPrivilege="WebReach.AccessApplication"
    buttonContents="" description="PQAdvisorVistaDiagram_Description"
    displayName="PQ ADVISOR"
    resourcesClassName="UI.ApplicationFramework.Resx.ApplicationFrameworkRe
    sources, ApplicationFramework, Version=1.0.0.0" securityLevel="0">
        <ApplicationSpecificPanelButtons>
        </ApplicationSpecificPanelButtons>
        <Libraries>
            <Library className="LibraryPanelItem3" />
        </Libraries>
        <OptionsButtonControls>
        </OptionsButtonControls>
        <SetupControls>
            <SetupItem SetupControlId="b29ceb39-4cd8-4077-9c7c-
            4c6287ac5b64" />
            <SetupItem SetupControlId="2600efb2-955a-4fef-9895-
            c8e716325656" />
            <SetupItem SetupControlId="63c71c83-3d88-4d2f-a6eb-
            db9a1b0f3989" />
        </SetupControls>
        <Settings>
            <Setting name="Url">/ion/default.aspx?dgm=x-
            pml:/diagrams/ud/PQ_Advisor/PQAdvisor_LandingPage_7d_V1.0.0.0.dgm</Se
            tting>
        </Settings>
    </Application>

```

---

**Note:** Use the most current version of the dgm file available.

---

5. If the Web Application interface is opened, reload the page.
6. Verify the new selection appears and that the PQ Advisor indicator diagrams are loaded when it is selected.

---

**Note:** The System Technical Note titled *How Can I Modify the StruxureWare Power Monitoring Expert Web User Interface and Add Web Content* (<https://exchangecommunity.schneider-electric.com/message/67646#67646>), contains more details on modifying the Web Applications User Interface.

---

# Configure Power Quality Impact Gadgets and Report

The Power Quality Impact Gadgets and Reports associate PQ events with process impact alarms within a given process / production line, and applies a flat rate cost estimate to the duration of the process impact alarm.

The following sections describe the configuration steps to make the Power Quality Impact Gadgets work:

- Acquire Process Impact Signals
- Setup Process Impact Alarms
- Setup Power Quality Groups

## Acquire Process Impact Signals

A process impact alarm is designed to be created on:

- An electrical value (e.g. current, voltage, power, etc.) from a power device. In this way PME detects the process impact independently (for example, based on a current drop).
- A process impact signal from another system or equipment. The process impact signals can be:
  - Hard wired signals from the process. The signal can be from the process PLC, motor VSD, etc. It can be hard wired to a digital input or an analog input of the meter which monitors the corresponding load (requires AI/DI capability on the meter). The signal can also be hard wired to a dedicated PLC, which can then be connected into PME as a Modbus device.
  - OPC tags from the process. PME (working as OPC client) acquires the process impact signals from process SCADA system (working as OPC server) via OPC.

---

**Note:** If signals from multiple processes are connected to a single device (for example, process A and process B signals on a PLC, power meter or OPC connection), then logical devices must be defined to represent each process, in order to be used in the power quality group definition.

---

To acquire the process impact signals (if PME is not detecting the process impact independently), the following tasks may be required to accomplish the work:

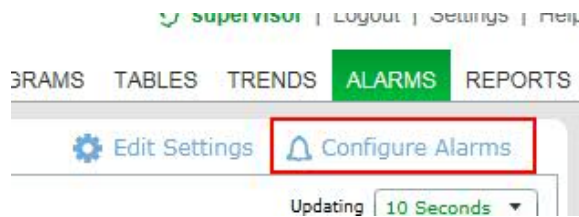
- Using meter I/Os
- Using third-party Modbus device in PME
- Using PME as an OPC client
- Using PME Logical Device

Refer to PME documentation for more information.

## Set Up Process Impact Alarms

Once the process impact signals are connected into the PME system, or PME is set up to detect the process impact independently, process impact alarms need to be set up. To do this:

1. Launch **Alarm Configuration** from **Management Console**, or from the **Alarm** tab in the web interface.



2. Select **Add Alarm Rule**.
3. In the **User Defined** section, Select **Analog Measurement** if the alarm is based on an analog value. Select **Digital Measurement** if the alarm is based on a digital value.
4. Select the **Measurement** that will be used to determine a process impact event (e.g. **Current Avg** if using the current drops to signify the process impact, or **Equipment State** if the process impact signal is mapped to this measurement for the Logical Device created for the process)
5. In the **Alarm Type** field, enter **Process Impact Alarm**.

**Note:** The string “Process Impact Alarm” is the only flag that the Power Quality Impact report and gadgets looks for.

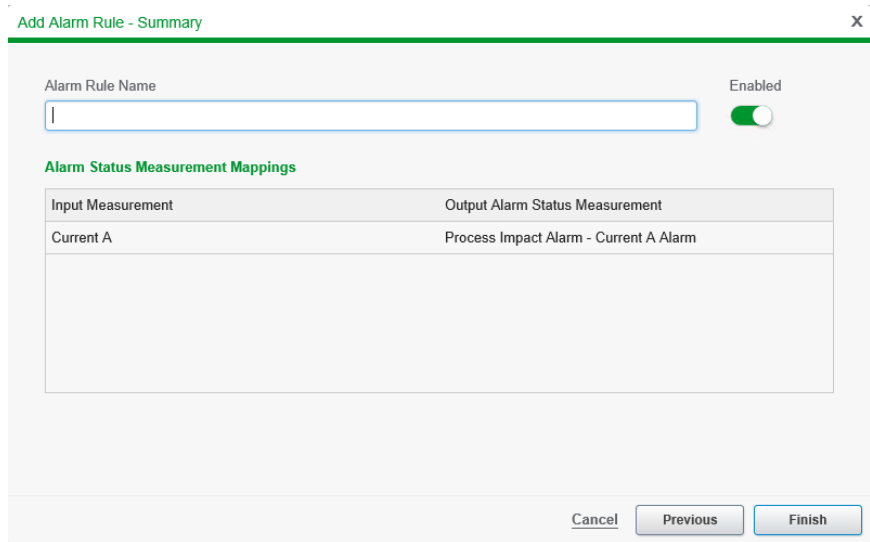
 A screenshot of the 'Add Alarm Rule - Details' dialog box. The title bar says 'Add Alarm Rule - Details' with a close button 'x'. The 'Alarm Type' field contains 'Process Impact Alarm'. Below this are three sections: 'Alarm ON', 'Alarm OFF', and 'Advanced'. 
 

- Alarm ON:** 'When Value is' is set to 'Over', 'Pickup Delay [s]' is 60, and 'Active Condition' is 'On'.
- Alarm OFF:** 'When Value is' is set to 'Under', 'Dropout Delay [s]' is 60, and 'Inactive Condition' is 'Off'.
- Advanced:** 'Priority [0-255]' is set to 1, 'Event' is selected, and 'Polling Interval' is 5 seconds.

 At the bottom, there is a checked box for 'Log Extreme Value' and three buttons: 'Cancel', 'Previous', and 'Next'.

6. Configure the thresholds for when the alarm will go ON and when the alarm will go OFF.

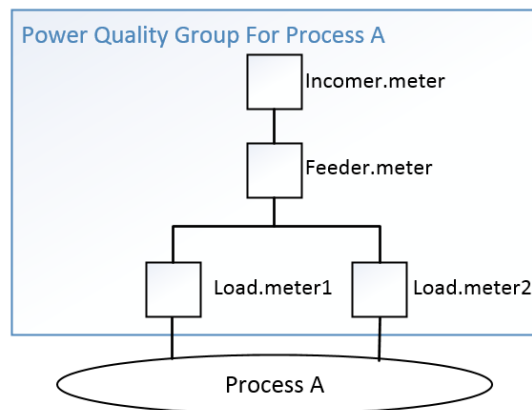
7. Configure the **Pickup Delay** and **Dropout Delay**:  
The alarm will go ON if the threshold has been exceeded for longer, in seconds, than the "Pickup Delay" value.  
The alarm will go OFF if the value is below the threshold for longer, in seconds, than the "Dropout Delay" value.
8. Configure the **Priority**. Use a number less than 64 to prevent the alarm from appearing in the PME Alarm Viewer.
9. Set the **Polling Interval**. The recommendation is **5** seconds.
10. Select the **Source** for the alarm rule. If a Logical Devices is created to represents a process, select the logical device.
11. Give the Alarm rule a name.



12. Click **Finish**.

## Set Up Power Quality Groups

The Power Quality Groups are defined per process (for example, a production line), so that only the power quality events captured by the meter which relate to the particular process are considered in the impact analysis.



Power Quality Groups must be defined or the Power Quality Impact gadgets and Report will not function.

The incomer meters defined in the Power Quality Groups are also used for the Power Factor section of the Power Quality Analysis Report.

## Power Quality Group Definition

Power Quality Group are defined in the `PowerQualityGroups.csv` file which is located under the folder:

```
{root install folder}\Applications\PowerQuality\
```

The format of the comma delimited file is as follows:

```
<Power Quality Group Name>,<Incomer Meter>,<Feeder  
Meter>,<Load Meter>,<Rate>
```

Where:

- **Power Quality Group Name:** the name for the group (target process). It is used for selecting the group in Power Quality Impact gadgets and report.
- **Incomer meter:** the meter monitors the incomer. It typically has the PQ event detection capability. The event it captures will be used in the analysis.
- **Feeder Meter:** the meter between the incomer meter and the load meter (could be multiple). The PQ events it captures can potentially impact the process at its downstream. If a feeder meter does not support PQ event detection, then there is no need to include it in the definition. See the examples in next section.
- **Load Meter:** contains the Process Impact Alarms. The Power Quality Impact Gadgets and Report will not work if the load meters are not defined for the Power Quality Groups. It can be a logical device if the Process Impact Alarm is defined on a logical device. See Setup Process Impact Alarms on page 49 for more information. The load meter typically doesn't have PQ event detection capability.
- **Rate:** The flat hourly rate for the cost impact calculation

---

### Notes:

The file structure only allows one incomer meter, one feeder meter and one load meter per row. If, for a category, more than one meter needs to be included, define them in multiple lines with the same group name.

The file structure allows one rate per group; define it only in the first row of the group.

The PQ events captured by the meters in a Power Quality Group will be clustered before associating with the Process Impact Alarms, so that the same event seen by different meters are counted only once.

Only the PQ events captured by the incomer meter and feeder meter are considered in the analysis. If the load meter supports PQ event detection, and you want to include the events it detects into the analysis, you need to define it as a feeder meter as well. See the examples in next section.

---

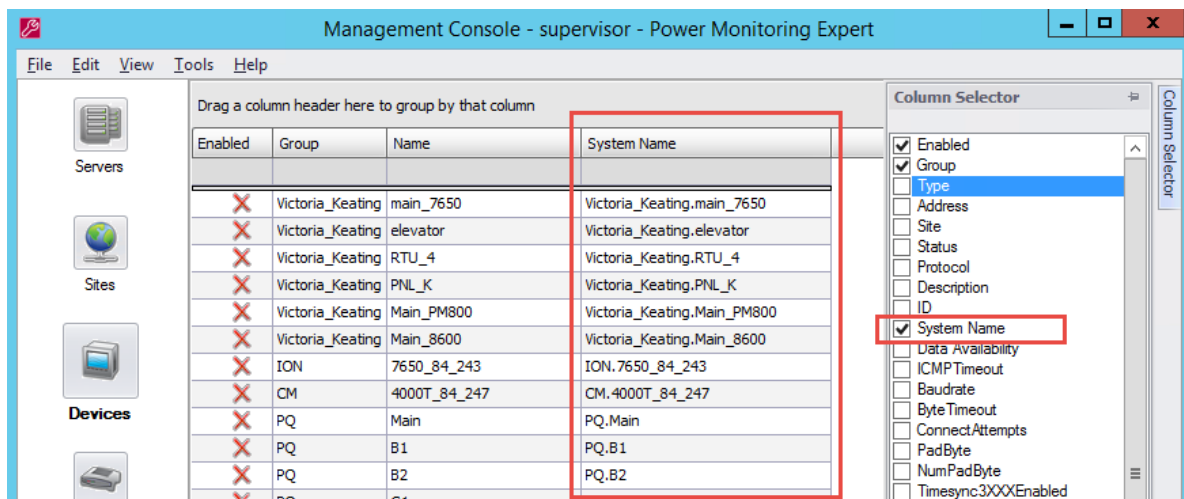
The incomer meters defined are also used by the Power Factor section of the Power Quality Analysis Report to determine the incomer meters in the system. See the examples in next section.

## Edit PowerQualityGroup.csv File

**Note:** Before editing the PowerQualityGroups .csv file, make sure you understand the relationship between the power metering system and the process of the customer's facility.

To edit the PowerQualityGroups .csv file:

1. Identify the **System Name** of a device, go to Management Console, select **System Name** in the Column Selector to add **System Name** to the display:



**Note:**

Only the device system names are acceptable.

2. Edit the file in Excel, Notepad or other text editor. For each Power Quality Group:
  - a. In column B, list all related incomer meters that can detect PQ events for the group. Use multiple rows if there is more than one incomer meter.
  - b. In column C, list all related feeder meters that can detect PQ events for the group. Use multiple rows if there is more than one feeder meter.
  - c. In column D, list all related load meters on which the Process Impact Alarms are configured for the group. Use multiple rows if there is more than one load meter.
  - d. Repeat the group name in column A for each row.
  - e. Specify the rate in column E for only the first row for the group.

3. Repeat step 2 for each Power Quality Group.
4. Save the file and keep the format as .csv.

**Notes:**

The list separators for the .csv are “,” for most regions, and “;” for several European countries. The list separators will be detected from the culture settings and used by the import/export exe.

The rate under culture settings, other than English (en-XX), needs to be enclosed in double quotes. For example, for Spain (es-ES), if the rate 123.456.789,0 is represented, it is input as "123.456.789,0".

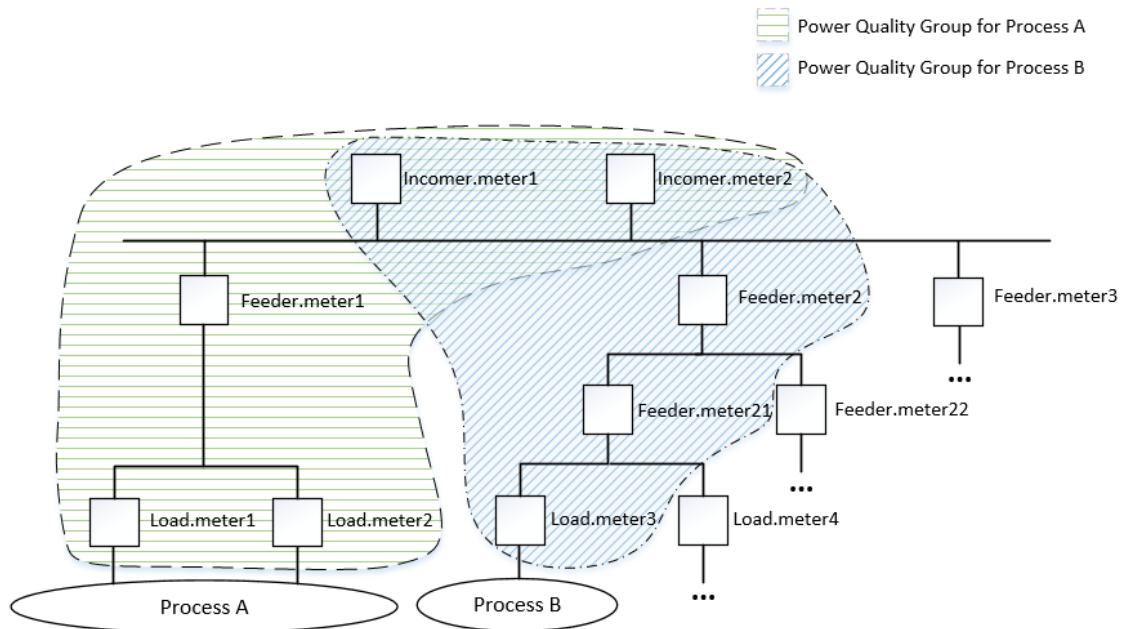
**Example 1:**

Take the metering layout in the image on page 50 as an example, the definition contains the following:

	A	B	C	D	E
1	Process A	Incomer.meter	Feeder.meter	Load.meter1	10000
2	Process A			Load.meter2	

**Example 2:**

In a more complicated example:



The file contains the following:

	A	B	C	D	E
1	Process A	Incomer.meter1	Feeder.meter1	Load.meter1	10000
2	Process A	Incomer.meter2		Load.meter2	
3	Process B	Incomer.meter1	Feeder.meter2	Load.meter3	20000
4	Process B	Incomer.meter2	Feeder.meter21		

**Example 3**

As explained in the previous section, in addition to Example 2, if the feeder meters do not have PQ event detection capability, there is no need to define them. (There is no effect if they are defined.)

	A	B	C	D	E
1	Process A	Incomer.meter1		Load.meter1	10000
2	Process A	Incomer.meter2		Load.meter2	
3	Process B	Incomer.meter1		Load.meter3	20000
4	Process B	Incomer.meter2			

**Example 4**

As explained in the previous section, in addition to Example 3, if the Process Impact Alarm for the “Process A” is defined only under “Load.meter2”, then “Load.meter2” is the only meter that needs to be defined for the “Process A”. (There is no effect if other load meters are included.)

	A	B	C	D	E
1	Process A	Incomer.meter1		Load.meter2	10000
2	Process A	Incomer.meter2			
3	Process B	Incomer.meter1		Load.meter3	20000
4	Process B	Incomer.meter2			

**Example 5**

As explained in the previous section, in addition to Example 4, if the “Load.meter3” can detect sag/swell, and you want the event it captures to be included the analysis, you need to duplicate it as a feeder meter:

	A	B	C	D	E
1	Process A	Incomer.meter1		Load.meter2	10000
2	Process A	Incomer.meter2			
3	Process B	Incomer.meter1	Load.meter3	Load.meter3	20000
4	Process B	Incomer.meter2			

### Example 6

The incomer meters defined in the Power Quality Groups are also used for the Power Factor section of the Power Quality Analysis Report.

If the customer does not require the Power Quality Impact feature, and only wants to enable the Power Factor section of the Power Quality Analysis Report, the file can be created as:

	A	B	C	D	E
1		Incomer.meter1			
2		Incomer.meter2			

## Import / Export Power Quality Group Definition

The tool **PQGroupConfig.exe** is used to import / export the Power Quality Group definition in the `PowerQualityGroups.csv` file. It is located under the folder:

```
{root install folder}\Applications\bin
```

To import the definition, run the command line:

```
PQGroupConfig.exe import "<filepath>\<filename>"
```

```
Administrator: Command Prompt - PQGroupConfig.exe import "C:\Program Fil...
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>cd C:\Program Files (x86)\Schneider Electric\Power Monitoring Expert\Applications\bin

C:\Program Files (x86)\Schneider Electric\Power Monitoring Expert\Applications\bin>PQGroupConfig.exe import "C:\Program Files (x86)\Schneider Electric\Power Monitoring Expert\Applications\PowerQuality\PowerQualityGroups.csv"
Power Quality Groups are already installed in this system. Overwrite? (y/n)
-
```

To export the definition, run the command line:

```
PQGroupConfig.exe export "<filepath>\<filename>"
```

```
Administrator: Command Prompt
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.

C:\Users\Administrator>cd C:\Program Files (x86)\Schneider Electric\Power Monitoring Expert\Applications\bin

C:\Program Files (x86)\Schneider Electric\Power Monitoring Expert\Applications\bin>PQGroupConfig.exe export "C:\Program Files (x86)\Schneider Electric\Power Monitoring Expert\Applications\PowerQuality\PowerQualityGroups2.csv"
Done with export operation.

C:\Program Files (x86)\Schneider Electric\Power Monitoring Expert\Applications\bin>_
```

# Configure Power Factor Impact Gadgets

The Power Factor Impact Gadgets provide a clear visual indication of the impact of poor power factor on your energy bill.

---

**Notes:**

The Power Factor Impact Gadgets only work for billing periods that start on the first day of the month. Billing periods that do not start on the 1st (for example, the 20th) are not supported.

The Viewing Period for the Power Factor Impact Gadget should be set to **This Month or Last Month**. The gadget does not show meaningful information if you set the Viewing Period to another value.

The Aggregation Period for the Power Factor Impact Trend Gadget should be set to **By Month**. The gadget does not show meaningful information if you set the Aggregation Period to another value.

---

The calculated surcharge is based on the rate file defined for the PME Rate Engine. Creating or modifying the rate files requires knowledge of the PME Rate Engine. To learn about the PME Rate Engine, refer to *PME Billing Module Toolkit*: <https://exchangecommunity.schneider-electric.com/docs/DOC-8707>

The following sections describe the configuration steps to make the Power Factor Impact Gadgets work:

- Setup the Power Factor Impact Rate File
- Setup the Incomer Meters in the Hierarchy

## Set Up the Power Factor Impact Rate File

There are four sample rate files based on different calculation methods that are generally used by utilities for power factor rate penalties:

- Power Factor Impact - Active Energy Billing with PF Adjustment Option 1.xml
- Power Factor Impact - Active Energy Billing with PF Adjustment Option 2.xml
- Power Factor Impact - Apparent Energy Billing.xml
- Power Factor Impact - Reactive Energy Billing.xml

The rate file `Power Factor Impact Rate.xml` is active by default. It includes the same calculation as the first sample file. See Appendix C – Power Factor Rate File Calculation on page 78 for the calculations of the sample rate files.

The files are located under the folder:

```
{root install folder}\config\reports\billing  
report\ratelibrary
```

To set up the Power Factor Impact rate file:

1. Consult with the customer to see how the power factor penalties are calculated by the utility provider, including the power factor target under

- which penalty will be charged.
2. Choose the sample file in which the power factor penalty calculation is the closest to customer's utility contract.
  3. Copy the selected rate file to the file name "Power Factor Impact Rate.xml"
  4. modify the file to have the same power factor penalty calculation with customer's utility contract. To learn how to modify the rate files, please refer to the *PME Billing Module Toolkit* as mentioned above.
  5. Set the target to be shown in the gadgets.
    - a. Find PF target value by searching for "<Name>PF\_target</Name>"
    - b. Modify the value for the **Formula** accordingly.

```
<VariableFromFormula>
  <Formula>92</Formula>
  <Name>PF_target</Name>
  <NumberFormatForThisVariable>M2</NumberFormatForThis>
```

6. Save the file.

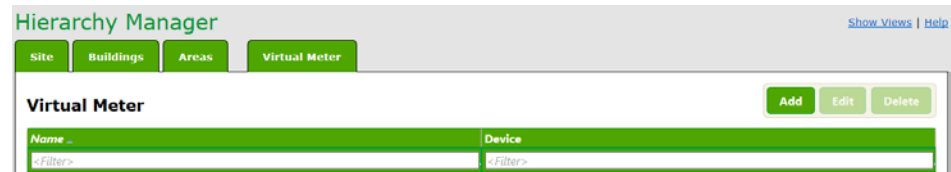
## Set Up the Incomer Meters in the Hierarchy

The PME rate engine only works with a hierarchy node. Therefore, you need to add the meters which are subjected to the penalty to a hierarchy. You can do this with the default hierarchy, a custom hierarchy, or virtual meters.

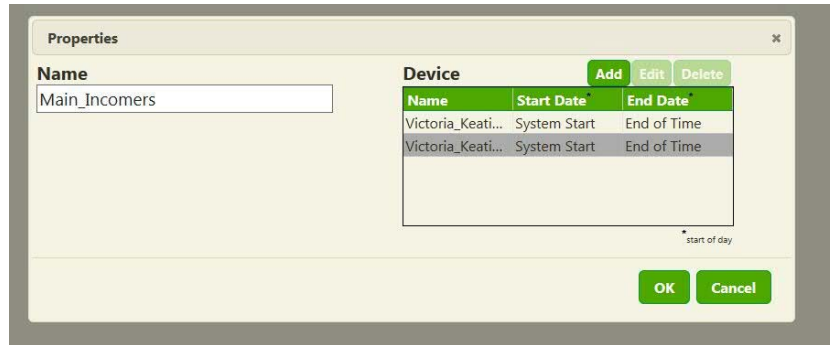
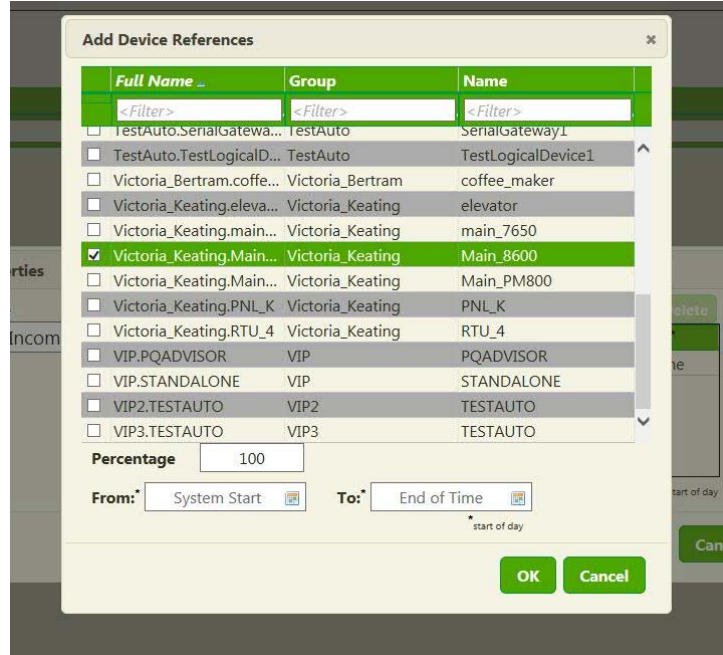
The gadgets only work on a single node. If more than one physical meter needs to be defined (e.g. dual incomer from same utility), add the meters to a single node in the hierarchy, or add meters to a single virtual meter.

For example, to add the dual incomer meters as a virtual meter:

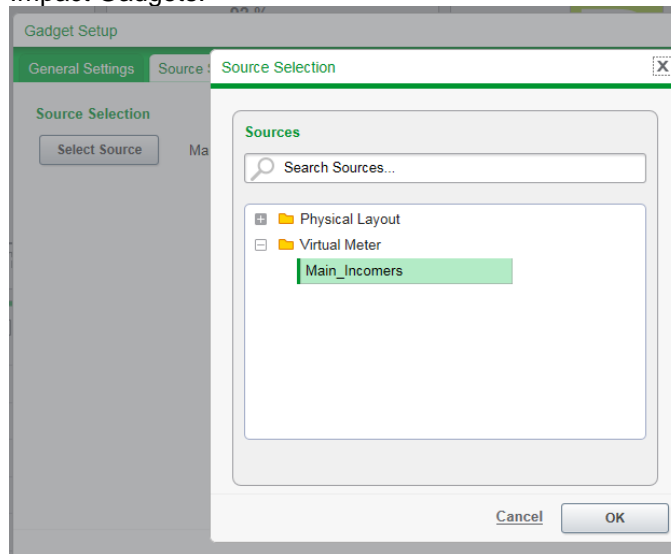
1. Launch **Hierarchy Manager** from **Management Console** or navigate to `http://<ServerName>/hierarchymanager` in a web browser.
2. Click the **Virtual Meter** tab and click **Add**.



3. Choose a name for the virtual meter, for example Main\_Incomers.
4. Click **Add** and select a meter to add to the Virtual Meter. Repeat until all the you add all of the meters that incur PF penalties.



Once the hierarchy node is defined, it can be selected in the Power Factor Impact Gadgets.



# Configure Power Quality Analysis Report

The Power Quality Analysis Report does not need configuration to work, unless you want to include output for the Power Factor section in the report.

The Power Factor section reports the power factor information for the incomer meters in the system. The report retrieves the incomer meter definition from the Power Quality Group definition. See Set Up Power Quality Groups on page 50 for more information on how to define the incomer meters.

Alternatively, the Power Factor section can be toggled off when generating the report.

# Set Up Power Quality Advisor Dashboards and Reports

This section describes best practices when using PQ Advisor dashboards and reports.

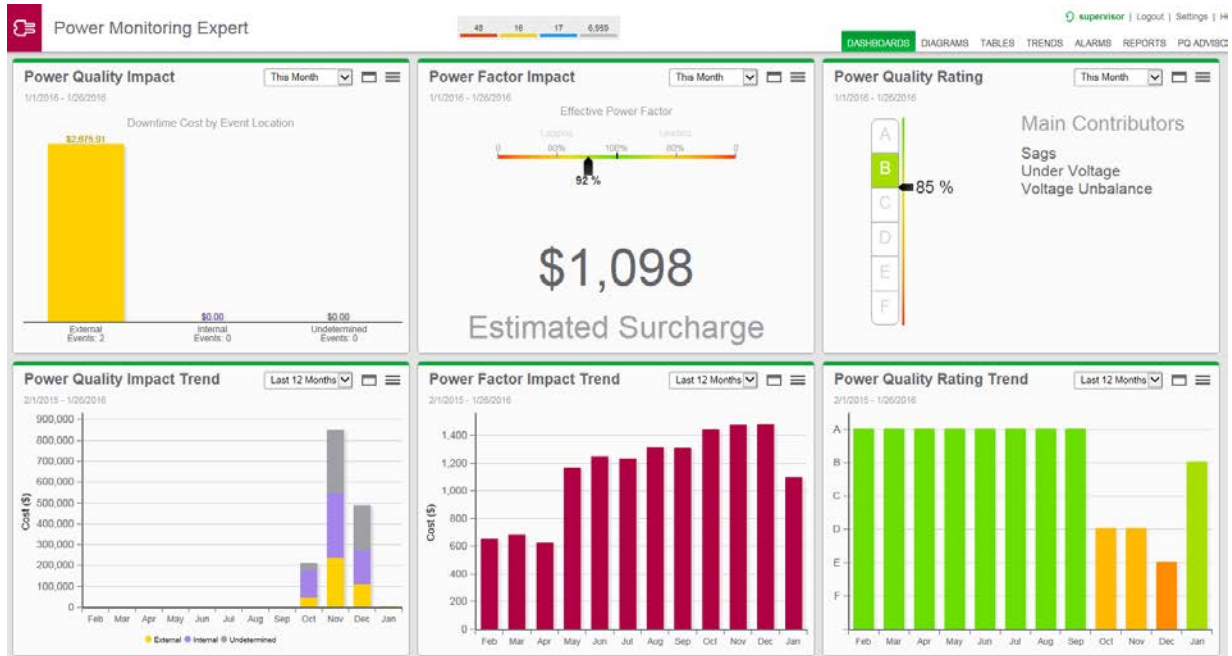
## Set Up Power Quality Advisor Dashboards

PQ Advisor gadgets are grouped into two groups in PME Dashboards:

- Power Quality Overview
  - Power Quality Impact
  - Power Quality Impact Trend
  - Power Factor Impact
  - Power Factor Impact Trend
  - Power Quality Rating
  - Power Quality Rating Trend
- Power Quality Details
  - Power Quality Events Breakdown
  - Power Quality Events Impact
  - Power Quality Events Location

## Set Up Power Quality Overview Dashboards

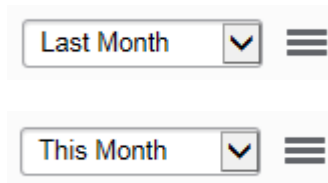
The following image is an example of a Power Quality Overview dashboard.



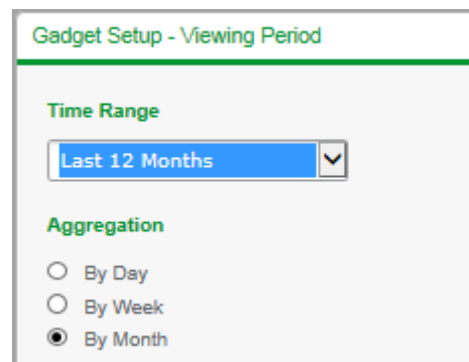
## Gadget Viewing Period

When displaying each gadget with its trending gadget, the aggregation period of each bar in the trending gadget should match the viewing period of the non-trending gadget. Otherwise, they are not comparable.

For example, if the non-trending gadget is set to be monthly,



the corresponding trending gadget should be set to a time range of **Last 12 Months**, and an aggregation of **By Month**.



### Notes:

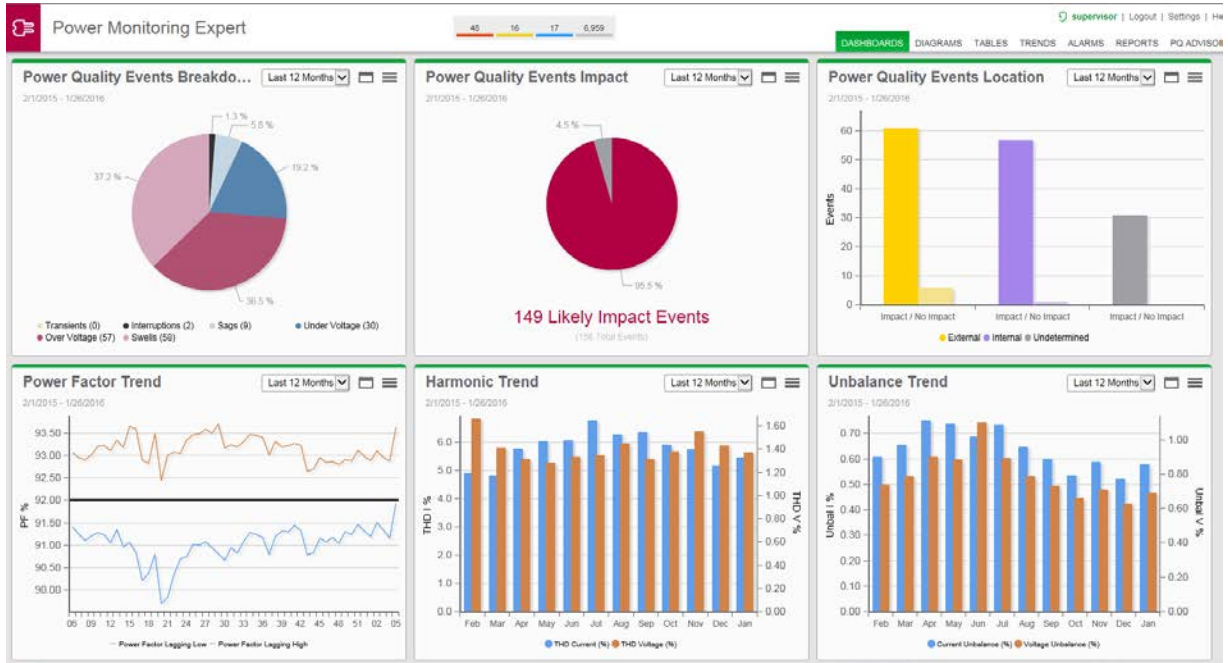
Specifically for the Power Factor Impact Gadgets:

The Viewing Period for the Power Factor Impact Gadget should be set to **This Month** or **Last Month**. The gadget does not show meaningful information if you set the Viewing Period to another value.

The Aggregation Period for the Power Factor Impact Trend Gadget should be set to **By Month**. The gadget does not show meaningful information if you set the Aggregation Period to another value.

## Set Up Power Quality Detail Dashboards

The following image is an example of the Power Quality Detail dashboard. (Three regular Trend charts for Power Factor, Harmonics, and Unbalance are combined in this dashboard.)



## Generate Power Quality Advisor Reports

The following PQ Advisor Reports are available:

- Power Quality Analysis Report
- Power Quality Impact Report

**Note:** When you generate the Power Quality Advisor reports, a reporting period longer than 12 months is not supported. Use multiple yearly reports instead.

# Fine-Tune Power Quality Advisor

Fine-tuning Power Quality Advisor is very important during commissioning to obtain useful power quality views. It depends heavily on customer requirements, power system design, power meters used in the system, and also on the power quality condition of the customer's facility.

This section describes the following fine-tuning procedures:

- Change Device Inclusion and Exclusion for the Analysis
- Change Power Quality Indicator Thresholds
- Disable Unused Power Quality Indicators

## Change Device Inclusion and Exclusion for the Analysis

You can include or exclude certain meters for power quality assessment by PQ Advisor. For example, this capability is useful when you want to include only meters which are critical, or to exclude spare meters, etc. Also, for performance reasons, it is important to exclude unnecessary meters.

You can include or exclude the following Power Quality Event types:

- Interruptions
- Voltage Sags
- Voltage Swells
- Transient Voltage
- Over Voltage
- Under Voltage

And you include or exclude the following Power Quality Disturbance types:

- Voltage Unbalance
- Current Unbalance
- Voltage Harmonics
- Current Harmonics
- Frequency Variation
- Flicker

Each PQ event or disturbance has an inclusion list and an exclusion list, and the following logic applies to both lists:

1. The inclusion list is processed first:
  - a. If the inclusion list is empty, assume that ALL sources in the system are included. This means all sources in the sources table.
  - b. If the inclusion list is not empty, use only sources that exist in the inclusion list. If a source in the inclusion list does not exist in the sources table, do not add it to the list.
2. The exclusion list is processed last:
  - a. From the source list obtained in step 1, remove any source that appears in the exclusion list.

The following features in the PQ Advisor module which are affected by the inclusion and exclusion lists:

- PQ Indicator Diagrams
- PQ Rating Gadget
- PQ Rating Trend Gadget
- Power Quality Events Breakdown Gadget
- Power Quality Events Impact Gadget
- Power Quality Events Location Gadget
- Power Quality Analysis Report – for all sections except the Power Factor section

**Note:**

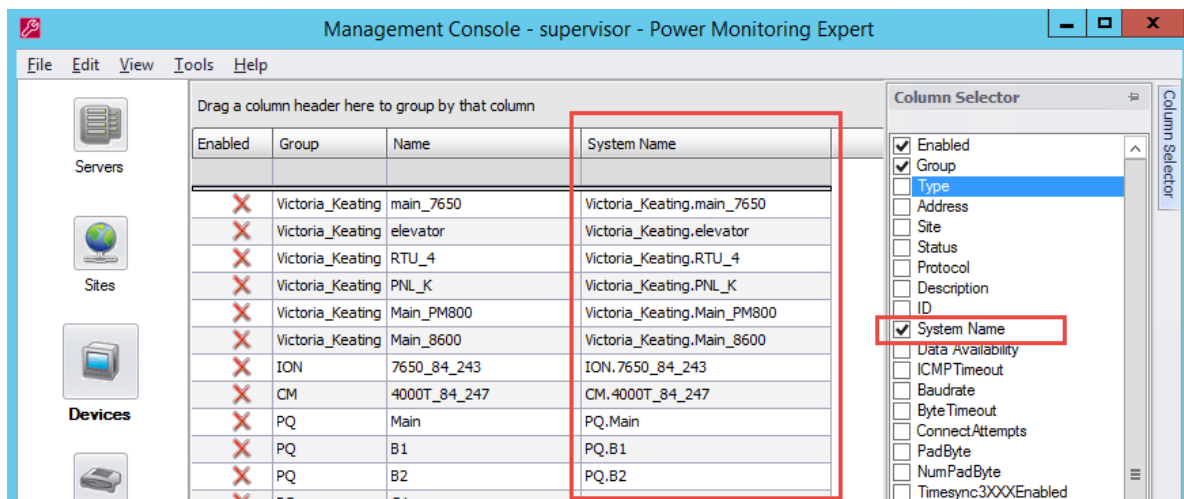
These lists do not define:

- Devices considered by the Power Quality Impact Gadgets and Report.
- Devices considered by the Power Factor Impact Gadgets.
- Devices considered for the Power Factor section of the Power Quality Analysis Report.

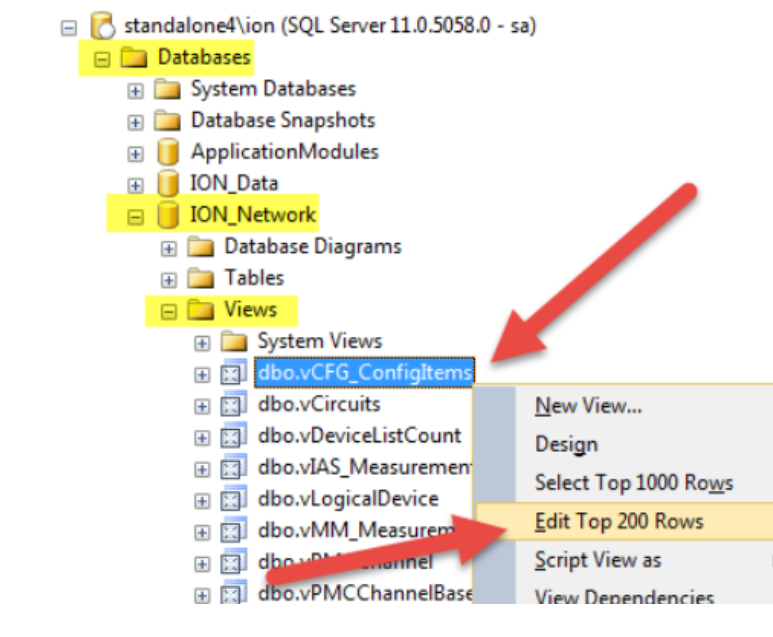
See the configuration sections of the above features for details.

To edit the inclusion and exclusion lists:

1. Identify the **System Name** of the target device. Go to Management Console, show **System Name** column using the Column Selector:



2. Go to SQL Server Management Studio, locate the dbo.vCFG\_ConfigItems view in the ION\_Network database, and right-click and select "Edit Top 200 Rows".

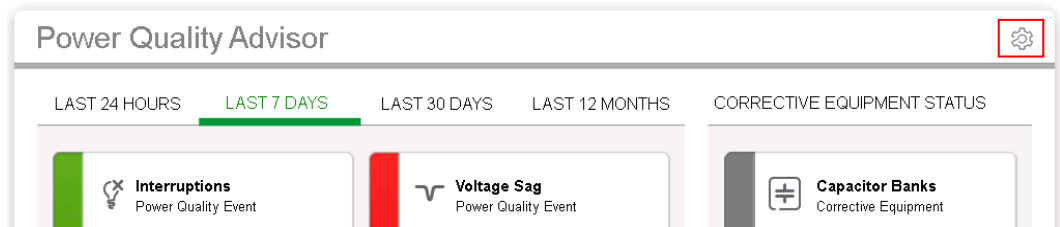


The following variables are the inclusion and exclusion lists:

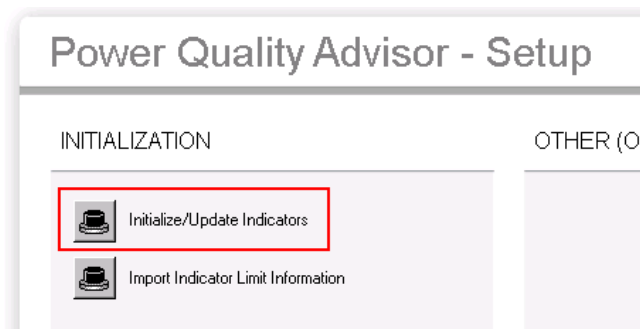
Module	Category	Item	Value	DefaultValue
PQAnalytics	Source Lists	SwellInclusionList		
PQAnalytics	Source Lists	SwellExclusionList		
PQAnalytics	Source Lists	InterruptionInclusionList		
PQAnalytics	Source Lists	InterruptionExclusionList		
PQAnalytics	Source Lists	TransientInclusionList		
PQAnalytics	Source Lists	TransientExclusionList		
PQAnalytics	Source Lists	OvervoltageInclusionList		
PQAnalytics	Source Lists	OvervoltageExclusionList		
PQAnalytics	Source Lists	UndervoltageInclusionList		
PQAnalytics	Source Lists	UndervoltageExclusionList		
PQAnalytics	Source Lists	FrequencyInclusionList		
PQAnalytics	Source Lists	FrequencyExclusionList		
PQAnalytics	Source Lists	HarmonicsVoltageInclusionList		
PQAnalytics	Source Lists	HarmonicsVoltageExclusionList		
PQAnalytics	Source Lists	HarmonicsCurrentInclusionList		
PQAnalytics	Source Lists	HarmonicsCurrentExclusionList		
PQAnalytics	Source Lists	FlickerInclusionList		
PQAnalytics	Source Lists	FlickerExclusionList		
PQAnalytics	Source Lists	UnbalanceVoltageInclusionList		
PQAnalytics	Source Lists	UnbalanceVoltageExclusionList		
PQAnalytics	Source Lists	UnbalanceCurrentInclusionList		
PQAnalytics	Source Lists	UnbalanceCurrentExclusionList		

3. In the **Value** fields, enter the comma delimited list of the devices, for example:  
 PQ.B1 , PQ.B2 , Main.BackupGenerator
4. To apply the changes immediately in the PQ Indicator Diagrams, go to the

PQ Advisor Setup page in Vista:



Click **Initialize/Update Indicators**.



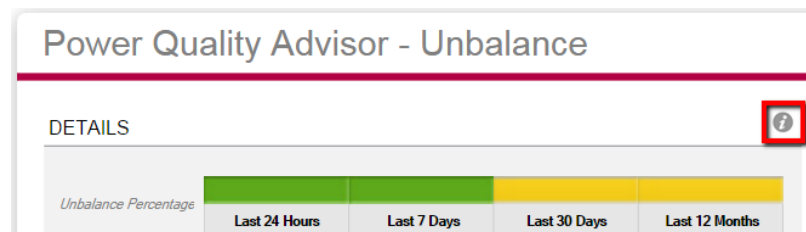
- To apply the changes immediately in the Power Quality Rating Gadgets, force the gadgets to clear their cache by “editing” the gadget, and clicking **Save** (no changes are required).

To exclude all sources for a given category, put a string in the inclusion and exclusion list. For example: “disabled”.

Module	Category	Item	Value
PQAnalytics	Source Lists	FlickerInclusionList	disabled
PQAnalytics	Source Lists	FlickerExclusionList	disabled

## Change Power Quality Indicator Thresholds

The Power Quality Indicator threshold for each indicator is displayed on the information page. (Click the “i” icon.)



### Power Quality Advisor - Unbalance

✕

**INDICATOR INFORMATION**

	Green	Yellow	Red
Voltage and Current Unbalance for all time periods	V Unbal < : 1 %	V Unbal >= : 1 %	V Unbal > : 5 %
	OR	V Unbal <= : 5 %	OR
	I Unbal < : 10 %	I Unbal >= : 10 %	I Unbal > : 40 %
	for >= 95% of the time period	for > 5% of the time period	for > 5% of the time period

The thresholds are used to determine the Power Quality Rating by using a color (green, orange, red) for each Power Quality indicator. Also, only the samples which exceed the threshold are shown in the Detail Report of the PQ Indicator diagrams.

To change the thresholds:

1. Go to SQL Server Management Studio, locate the dbo.vCFG\_ConfigItems view in the ION\_Network database, and right-click to select "Edit Top 200 Rows".

The following variables are the indicator thresholds:

Module	Category	Item	Value	DefaultValue
PQAnalytics	General Settings	Transients/Year - Orange	5	5
PQAnalytics	General Settings	Transients/Year - Red	15	15
PQAnalytics	General Settings	Sags/Year - Orange	5	5
PQAnalytics	General Settings	Sags/Year - Red	15	15
PQAnalytics	General Settings	Swells/Year - Orange	5	5
PQAnalytics	General Settings	Swells/Year - Red	15	15
PQAnalytics	General Settings	Interruptions/Year - Orange	2	2
PQAnalytics	General Settings	Interruptions/Year - Red	5	5
PQAnalytics	General Settings	Overvoltages/Year - Orange	5	5
PQAnalytics	General Settings	Overvoltages/Year - Red	15	15
PQAnalytics	General Settings	Undervoltages/Year - Orange	5	5
PQAnalytics	General Settings	Undervoltages/Year - Red	15	15
PQAnalytics	General Settings	THDU - Orange	5	5
PQAnalytics	General Settings	THDU - Red	8	8
PQAnalytics	General Settings	Voltage Unbalance - Orange	1	1
PQAnalytics	General Settings	Voltage Unbalance - Red	5	5
PQAnalytics	General Settings	Current Unbalance - Orange	10	10
PQAnalytics	General Settings	Current Unbalance - Red	40	40
PQAnalytics	General Settings	Frequency Nominal	60	60
PQAnalytics	General Settings	Frequency Deviation - Orange	1	1
PQAnalytics	General Settings	Frequency Deviation - Red	2	2
PQAnalytics	General Settings	Flicker Pst - Orange	0.9	0.9
PQAnalytics	General Settings	Flicker Pst - Red	1	1
PQAnalytics	General Settings	Flicker Plt - Orange	0.7	0.7
PQAnalytics	General Settings	Flicker Plt - Red	0.8	0.8

The count thresholds specified here are used to determine the colors for a year. They get divided by 365 for **Last 24 Hours**, by 52 for **Last 7 Days**, and so on. The calculation is as follows:

$$\text{Round Up ( (Yearly Service Limit) x (Number of Days / 365) )}$$

For example, for 30 days, where the yearly limit for orange is 5 and the yearly limit for red is 15:

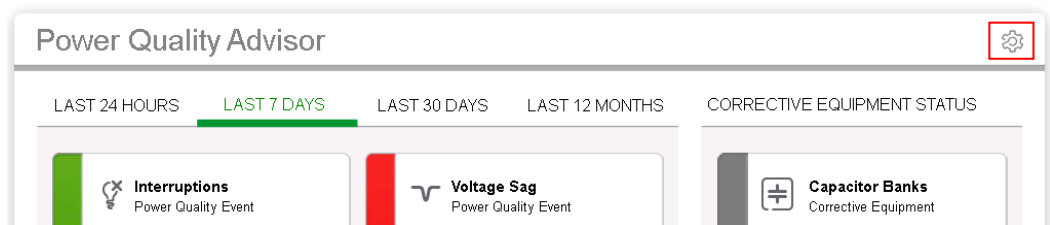
$$\text{Orange limit: } (5 * (30/365)) = 0.41 \text{ which rounds up to 1.}$$

$$\text{Red limit: } (15 * (30/365)) = 1.23 \text{ which rounds up to 2.}$$

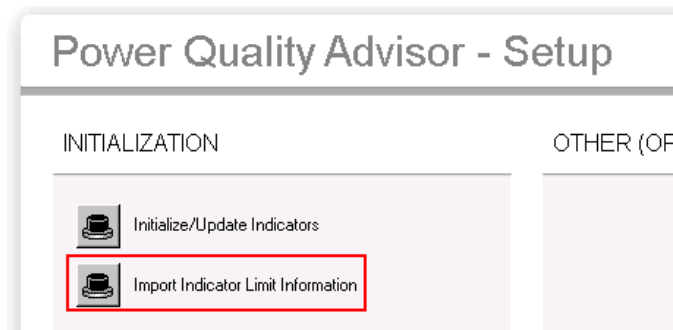
**Note:** The orange limits are  $\geq$ , but the red limits are  $>$ .

Change the thresholds as needed.

- For the PQ Indicator Diagrams to display the updated limit information, go to the PQ Advisor Setting page in Vista:



Click **Import Indicator Limit Information**.



## Disable Unused Power Quality Indicators

When a Power Quality Indicator has no supported device to feed it the required data, disable it by using the procedures in the following sections. See Appendix A – Meter Support List on page 74 for meter support information.

## Disable Flicker, Frequency, Harmonics or Unbalance Indicators

Use the following procedure to disable the Flicker, Frequency, Harmonics, and Unbalance indicators. Flicker is used specifically in this example, but the procedure is the same for the other items.


You can also use the following procedure to disable Overvoltage and Undervoltage. However, note that it will disable both of them simultaneously. If only one needs to be disabled, use the procedure in the next section.

1. To prevent PQ Advisor from requesting Flicker values, add a string “disabled” to the FlickerInclusionList & FlickerExclusionList (no double quotes needed). See Change Device Inclusion and Exclusion for the Analysis on page 63 for detail steps.

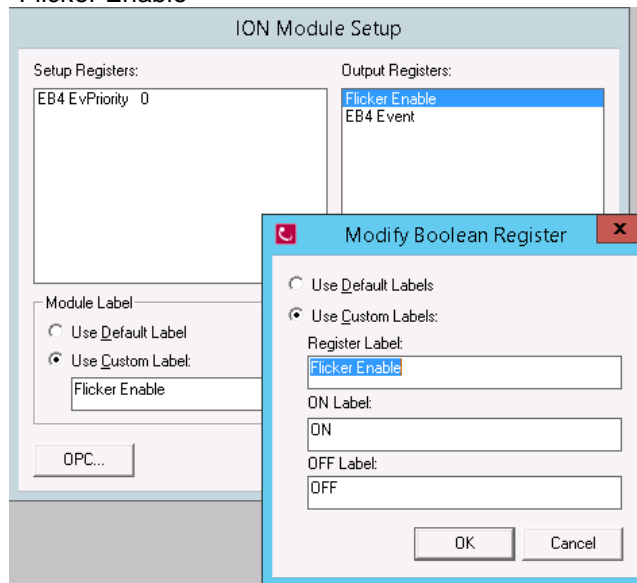
Module	Category	Item	Value
PQAnalytics	Source Lists	FlickerInclusionList	disabled
PQAnalytics	Source Lists	FlickerExclusionList	disabled

2. To prevent the PQ Advisor indicator diagrams from displaying status:
  - a. Edit the PQADVISOR VIP in Designer.
  - b. Open the Flicker folder.



- c. Add a new Ext Bool Module .

- d. Link the switch output register of the new module to the Enable input register on the 4 XML import modules used for Flicker.
      - i. Right click on the newly created Ext Bool Module
      - ii. Change the Module Label and the switch Output Register Label to “Flicker Enable”



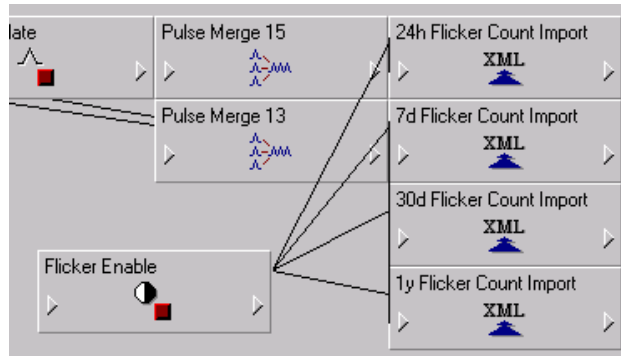
- iii. Select the outputs for the Flicker Enable module and select “Flicker Enable”



- iv. Select the input of the 24hr Flicker Count Import XML module and select "Flicker Enable"



- v. Repeat the previous step for the following:  
 7d Flicker Count Import XML module  
 30d Flicker Count Import XML module  
 1y Flicker Count Import XML module
- vi. The result will look like this:






- 3. Save the VIP and close Designer.  
 Since the Ext Boolean has a default value of "false", the Flicker Count Import modules are disabled upon saving the VIP.
- 4. Check the PQ Advisor Indicator Diagram.  
 The Flicker icon should be grey.



The details should be blank:

Power Quality Advisor - Flicker

DETAILS ?

	Last 24 Hours	Last 7 Days	Last 30 Days	Last 12 Months
Pst Maximum				
Pst Average				
Pft Maximum				
Pft Average				
Detail Report				

## Disable Sag, Swell, Interruptions, Transient or Unbalance Indicators

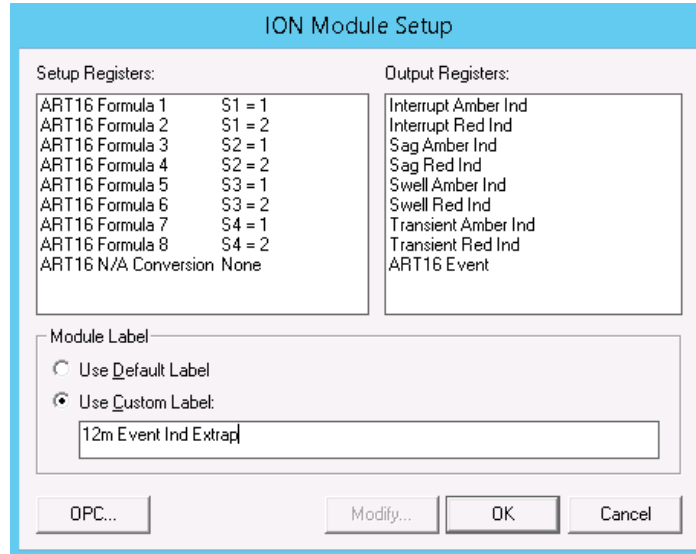
Use the following procedure to disable the Sag, Swell, Interruptions, and Transient indicators, if the devices being used in the installation do not support them. Transients are used specifically in this example, but the procedure is the same for the other items.

You can also use the following procedure to disable either Overvoltage or Undervoltage, if only one needs to be disabled. If both need to be disabled simultaneously, then use the procedure in the previous section.

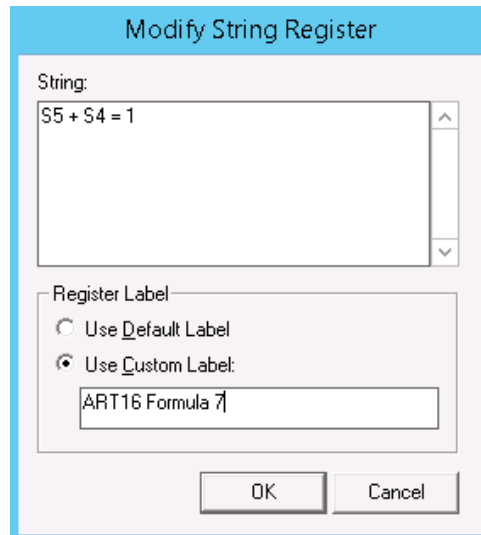
1. To PQ Advisor from requesting Transient values, add the string “disabled” (without the quotes) to the TransientInclusionList and TransientExclusionList. See Change Device Inclusion and Exclusion for the Analysis on page 63 for detailed steps.
2. To prevent the PQ Advisor indicator diagrams from displaying Transient status:
  - a. Edit the PQADVISOR VIP in Designer.
  - b. Open the Sag, Swell Transient, Interruption folder.



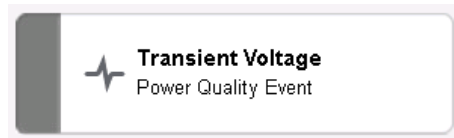
- a. Right click on the 12m Event Ind Extrap module.



- d. Double click on Formula 7 and add “S5 + “ to the beginning of the string. This will cause the output of the equation to be NA because S5 is unassigned and therefore equivalent to NA. If transients need to be added back to the system (e.g. a new meter which supports transients is purchased for the site), then it is easy to remove the string “S5 +” from the setup register string



- e. Repeat step d for Formula 8
- f. Repeat steps c, d and e for:  
 24h Event Ind Extrap module  
 7d Event Ind Extrap module  
 30d Event Ind Extrap module
3. Save the VIP and close Designer.
4. Check the PQ Advisor Indicator Diagram. The Transient Voltage icon should be grey.



The DETAILS page should display zeros:

## Power Quality Advisor - Transient Voltage

DETAILS ?

<i>Number of Events</i>				
	Last 24 Hours	Last 7 Days	Last 30 Days	Last 12 Months
No Impact	0	0	0	0
Likely Impact	0	0	0	0
Internal	0	0	0	0
External	0	0	0	0
Undetermined	0	0	0	0
Detail Report				

## Appendix A – Meter Support List

The meter support list provides detailed information of Power Quality Advisor feature dependencies on meters. Use it for both greenfield and brownfield designs.

PQ Events and Disturbances	Used by	Supported Meters	Supported Meter Template
<b>Interruptions</b>	PQ Advisor Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Events Breakdown Gadget PQ Events Impact Gadget PQ Events Location Gadget PQ Analysis Report PQ Impact Gadget PQ Impact Trend Gadget PQ Impact Report	ION 7350, 7550, 7650, 8600A, 8600B, 8650A, 8650B, 8650C, 8800A, 8800B, 8800C, PM8000, PM870, CM3350, CM4000  <b>DDD Support:</b> ION7550 V350 and newer, ION7650 V350 and newer, ION8650A/B V4.20 and newer, PM8000, CM4000	All default meter template
<b>Voltage Sag</b>	Same as Interruptions	Same as Interruptions	All default meter template
<b>Voltage Swell</b>	Same as Interruptions	Same as Interruptions	All default meter template
<b>Transient Voltage</b>	Same as Interruptions	ION 7650, 8600A, 8650A, 8650B, 8800A, CM4000T  <b>DDD Support:</b> ION7650 V350 and newer, ION8650A/B V4.20 and newer, CM4000T	All default meter template
<b>Over Voltage</b>	Same as Interruptions	ION 7350, 7550, 7650, 8600A, 8600B, 8650A, 8650B, 8650C, 8800A, 8800B, 8800C, PM8000	All default meter template
<b>Under Voltage</b>	Same as Interruptions	ION 7350, 7550, 7650, 8600A, 8600B, 8650A, 8650B, 8650C, 8800A, 8800B, 8800C, PM8000	All default meter template
<b>Voltage Unbalance</b>	PQ Advisor Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Analysis Report	<b>Logged By Default:</b> ION 7330, 7350, 7550, 7650, 8600A, 8600B, 8650A, 8650B, 8800A, 8800B, PM8000, CM3000, CM4000, TesysT, Micrologic 5.0/6.0/7.0 E/P/H (including IFE/IFM) <b>Not Logged By Default:</b> PM800 <sup>1</sup> , PM3250, PM3255, PM5100, PM5300, PM5350, PM5500, EM6400, EM7000, Micrologic 5.2/6.2/5.3/6.3 E	All default meter template
<b>Current Unbalance</b>	PQ Advisor Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Analysis Report	<b>Logged By Default:</b> TesysT, Micrologic 5.0/6.0/7.0 E/P/H (including IFE/IFM) <b>Not Logged By Default:</b> PM800 <sup>1</sup> , CM3000, CM4000, PM3250, PM3255, PM5100, PM5300, PM5350, PM5500, EM6400, EM7000, Micrologic 5.2/6.2/5.3/6.3 A/E	n/a
<b>Voltage Harmonics</b>	PQ Advisor Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Analysis Report	<b>Logged By Default:</b> ION 7330, 7350, 7550, 7650, 8600A, 8600B, 8650A, 8650B, 8800A, 8800B, PM8000, CM3000, CM4000 <b>Not Logged By Default:</b> ION 6200, 7300, 8600C, 8650C, 8800C, PM200, PM700, PM800 <sup>1</sup> , PM1200, PM3250, PM3255, PM5100, PM5300, PM5350, PM5500, EM3460, EM6400, EM7000, Micrologic 5.2/6.2/5.3/6.3 E, Micrologic 5.0/6.0/7.0 H (including IFE/IFM)	All default meter template except PM8000 with IEEE 519 template

<b>Current Harmonics</b>	PQ Advisor Diagrams PQ Analysis Report	<b>Logged By Default:</b> ION 7330, 7350, 7550, 7650, 8600A, 8600B, 8650A, 8650B, 8800A, 8800B, PM8000, CM3000, CM4000 <b>Not Logged By Default:</b> ION 6200, 7300, 8600C, 8650C, 8800C, PM200, PM700, PM800 <sup>1</sup> , PM1200, PM3250, PM3255, PM5100, PM5300, PM5350, PM5500, EM3460, EM6400, EM7000, Micrologic 5.2/6.2/5.3/6.3 E, Micrologic 5.0/6.0/7.0 H (including IFE/IFM)	All default meter template except PM8000 with IEEE 519 template
<b>Frequency Variation</b>	PQ Advisor Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Analysis Report	<b>Logged By Default:</b> ION 7330, 7350, 7550, 7650, 8600A, 8600B, 8650A, 8650B, 8800A, 8800B, PM8000	All default meter template
<b>Flicker</b>	PQ Advisor Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Analysis Report	<b>Logged By Default:</b> ION 7650, 8600A, 8650A, 8800A, 8800B	PQ Framework and EN50160 evaluation enabled

**Note:**

<sup>1</sup> PM800 series is supported except PM810 without PM810LOG.

Detailed information specifically for Power Factor:

	<b>Used by</b>	<b>Supported Meters</b>
<b>Power Factor</b>	Power Factor Impact Gadget Power Factor Impact Trend Gadget	All meters that have measurements required by the calculation of the defined rate structure. For example: <ul style="list-style-type: none"> <li>• Active energy</li> <li>• Reactive energy</li> <li>• Active power</li> <li>• Reactive power</li> </ul>
	PQ Analysis Report	All meters that measures active energy, reactive energy, and power factor

## Appendix B – Measurement Support List

The measurement support list provides detailed information about the supported measurements that are compatible with the Power Quality Advisor module.

**Note:** For each disturbance category, choose only the appropriate/necessary measurements from the supported list to log. Do NOT Log all of them. Not doing so can cause unwanted database growth, and performance issues.

PQ Disturbances	Used by	Supported Measurements	Label Name
Voltage Unbalance	PQ Advisor Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Analysis Report	<b>ION Devices</b> Voltage Unbalance Mean	V unbal mean
		<b>Non-ION Devices</b> Voltage Unbalance L-L Worst Voltage Unbalance L-N Worst	Voltage Unbalance L-L Worst Voltage Unbalance L-N Worst
Current Unbalance	PQ Advisor Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Analysis Report	<b>Non-ION Devices</b> Current Unbalance Worst	Current Unbalance Worst
Voltage Harmonics	PQ Advisor Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Analysis Report	<b>ION Devices</b> Voltage Total Harmonic Distortion on Input V1 <sup>1</sup> Voltage Total Harmonic Distortion on Input V2 <sup>1</sup> Voltage Total Harmonic Distortion on Input V3 <sup>1</sup> Voltage Total Harmonic Distortion Mean on Input V1 Voltage Total Harmonic Distortion Mean on Input V1 Voltage Total Harmonic Distortion Mean on Input V1	V1 Total HD <sup>1</sup> V2 Total HD <sup>1</sup> V3 Total HD <sup>1</sup> V1 THD mean V2 THD mean V3 THD mean
		<b>Non-ION Devices</b> THD Voltage A-B THD Voltage A-N THD Voltage B-C THD Voltage B-N THD Voltage C-A THD Voltage C-N THD Voltage L-L THD Voltage L-N	THD Voltage A-B THD Voltage A-N THD Voltage B-C THD Voltage B-N THD Voltage C-A THD Voltage C-N THD Voltage L-L THD Voltage L-N
Current Harmonics	PQ Advisor Diagrams PQ Analysis Report	<b>ION Devices</b> Current Total Harmonic Distortion Phase A <sup>1</sup> Current Total Harmonic Distortion Phase B <sup>1</sup> Current Total Harmonic Distortion Phase C <sup>1</sup> Current Total Harmonic Distortion Phase A Mean Current Total Harmonic Distortion Phase B Mean Current Total Harmonic Distortion Phase C Mean	I1 Total HD <sup>1</sup> I2 Total HD <sup>1</sup> I3 Total HD <sup>1</sup> I1 THD mean I2 THD mean I3 THD mean

		<b>Non-ION Devices</b> Current Total Harmonic Distortion Phase A Current Total Harmonic Distortion Phase B Current Total Harmonic Distortion Phase C	THD Current A THD Current B THD Current C
<b>Frequency Variation</b>	PQ Advisor Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Analysis Report	<b>ION Devices</b> Frequency Mean	Freq mean
<b>Flicker</b>	PQ Advisor Diagrams PQ Rating Gadget PQ Rating Trend Gadget PQ Analysis Report	<b>ION Devices</b> Voltage Flicker Plt on Input V1 Voltage Flicker Plt on Input V2 Voltage Flicker Plt on Input V3 Voltage Flicker Pst on Input V1 Voltage Flicker Pst on Input V2 Voltage Flicker Pst on Input V3	V1-Flick Plt V2-Flick Plt V3-Flick Plt V1-Flick Pst V2-Flick Pst V3-Flick Pst

**Notes:**

PM8000 is categorized as an ION device.

ION6200 is categorized as a non-ION device.

<sup>1</sup> Use only for ION 6200, 7300, 8600C, 8650C and 8800C. These measurements are NOT logged by default.

## Appendix C – Power Factor Rate File Calculation

This appendix explains the power factor calculations in the default rate files. To learn how to modify the rate files, please refer to the *PME Billing Module Toolkit*: <https://exchangecommunity.schneider-electric.com/docs/DOC-8707>

### Power Factor Impact – Active Energy Billing with PF Adjustment Option 1

The utility charges according to the active energy and adds a surcharge or adjustment for power factor.

$$PF_{cost} = (kWh_{billable} - kWh) \times Rate_{kWh}$$

$$kWh_{billable} = kWh \times \left( \frac{PF_{target}}{PF} \right) \quad (C1)$$

### Power Factor Impact – Active Energy Billing with PF Adjustment Option 2

The utility charges according to the active energy and adds a surcharge or adjustment for power factor.

$$PF_{cost} = (kWh_{billable} - kWh) \times Rate_{kWh}$$

$$kWh_{billable} = kWh \times (1 + PF_{target} - PF)$$

### Power Factor Impact – Apparent Energy Billing.xml

The utility bills all consumed energy, including the reactive energy.

$$PF_{cost} = kVAh \times \left( 1 - \frac{PF}{PF_{target}} \right) \times Rate_{kVAh}$$

### Power Factor Impact – Reactive Energy Billing.xml

$$PF_{cost} = (kVARh - kWh \times \frac{\sqrt{1 - PF_{target}^2}}{PF_{target}}) \times Rate_{kVARh}$$



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