# Generator Performance Guide

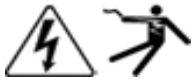
**7EN02-0368-00**
**05/2015**


Schneider Electric

# Safety information

## Important information

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



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

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

**⚠ DANGER**

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

**⚠ WARNING**

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

**⚠ CAUTION**

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

***NOTICE***

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

**Please Note**

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

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

# Safety precautions

Installation, wiring, testing and service must be performed in accordance with all local and national electrical codes.

## ⚠ DANGER

**ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. In the USA, see NFPA 70E.
- Only qualified electrical workers should install this equipment. Such work should be performed only after reading this entire set of instructions.
- NEVER work alone.
- Before performing visual inspections, tests, or maintenance on this equipment, disconnect all sources of electric power. Assume that all circuits are live until they have been completely de-energized, tested, and tagged. Pay particular attention to the design of the power system.
- Consider all sources of power, including the possibility of backfeeding.
- Turn off all power supplying the power meter and the equipment in which it is installed before working on it.
- Always use a properly rated voltage sensing device to confirm that all power is off.
- Before closing all covers and doors, carefully inspect the work area for tools and objects that may have been left inside the equipment.
- Use caution while removing or installing panels so that they do not extend into the energized bus; avoid handling the panels, which could cause personal injury.
- The successful operation of this equipment depends upon proper handling, installation, and operation. Neglecting fundamental installation requirements may lead to personal injury as well as damage to electrical equipment or other property.
- NEVER bypass external fusing.
- The power meter should be installed in a suitable electrical enclosure.

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

## ⚠ WARNING

**UNINTENDED EQUIPMENT OPERATION**

- ION modules and registers must only be configured by personnel with a thorough understanding of ION architecture and the system in which the meters and software are installed.
- Do not use meters or the software for critical control or protection applications where human or equipment safety relies on the operation of the control circuit.
- Do not use an ION meter's digital output for any safety critical application due to possible unexpected change of state during power cycles, power outages, configuration changes or firmware upgrades.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

## ⚠ WARNING

**INACCURATE REPORT RESULTS**

- Do not incorrectly configure the system, this can lead to inaccurate reports and/or data results.
- Do not rely solely on reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Use reports as a supplement to proper workplace practices or equipment maintenance, not as a substitute.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

## ⚠ WARNING

**INACCURATE DATA RESULTS**

Do not install incorrect drivers for the circuit breakers in your system. This can lead to algorithms not functioning correctly and to incomplete or inaccurate reports and/or data results.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

## *NOTICE*

**UNINTENDED OPERATION**

Make sure to enable the logs in the groups section when configuring the device.

**Failure to enable the logs in the groups section will result in the inputs not being available and not appearing in the Generator Performance Tool.**

# Contents

# Generator Performance

You can use the Generator Performance Module to monitor and analyze generator performance. It consists of generator a utility that, when configured, can create reports to help you determine how your generator is performing.

The *Generator Performance Guide* provides information on how to configure your generators in Power Monitoring Expert - Data Center Edition to create reports that you can use to monitor and analyze your data center equipment. This guide also includes information on how to configure Power Monitoring Expert - Data Center Edition supported meters.

The Generator Performance Module consists of the following tools:

- "Generator Performance Configuration Tool" on page 63

After you use these tools to configure your system, you can generate the following reports:

- "Generator Activity Report" on page 77
- "Generator Load Summary Report" on page 99
- "Generator Battery Health Report" on page 92
- "Generator Battery Health Export" on page 96
- "Generator Test Report" on page 105

## About this document

This guide provides information on how to configure Power Monitoring Expert - Data Center Edition to manage and analyze the performance of your system's generators.

This manual is intended for Application Engineers, third-party integrators, and other qualified personnel who are responsible for installing and integrating Power Monitoring Expert - Data Center Edition.

Refer to this manual along with the documentation sets Power Monitoring Expert - Data Center Edition. Where applicable, it will provide reference details when there is additional information that can be found in these document sets.

## Supporting documentation

Refer to the following documentation available with the installation files:

- *Power Monitoring Expert Installation Guide*
- *Power Monitoring Expert Help*
- *Power Monitoring Expert Data Center Edition Installation and Maintenance Guide*
- *Power Monitoring Expert Data Center Edition Design Guide*

# ION Power Meter Configuration

This chapter describes how to complete the following tasks:

1. Add ION power meters to Power Monitoring Expert - Data Center Edition.
2. Deploy a custom framework on an ION power meter using the Designer application of Power Monitoring Expert - Data Center Edition.
3. Configure the framework with site-specific information.

Experience using ION Setup, Designer, and other software is necessary to configure ION power meters. Successful completion of these tasks ensures that:

- The operational states on the generators are associated with the digital inputs on the ION power meters, and that the digital inputs are appropriately labeled and logged in the ION_ Data database.
- The engine data for the generators is associated with the analog inputs on the ION power meters, and that the analog inputs are appropriately labeled and logged in the ION_ Data database.
- The electrical details for the generators are logged and saved in the ION_Data database.

**⚠ WARNING**

**UNINTENDED OPERATION**

- Do not use ION meters for critical control or protection applications where human or equipment safety relies on the operation of the control circuit.
- Refer to the *ION Reference* for more information on ION module operation.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

# Supported ION Power Meters

Power Monitoring Expert - Data Center Edition can use the following ION power meters:

- PM8000, ION7550 and ION7650
- PM800 series power meters
- PM8000 power meters

# Maintenance and Backups

As a good practice, always save a backup of the final framework that is pasted onto the meter. Use Designer to create a copy of the framework from the meter. Save the framework to a location from where the framework can be pasted back to the meter if necessary.

Be sure to save a backup of the meter's framework before deploying and configuring the frameworks.

If a meter needs to be replaced, use the backup copy of the ION meter framework for the new ION meter. For all other installation and configuration steps, you must follow the original commissioning steps as described in the following sections.

Refer to existing Power Monitoring Expert documentation for instructions to backup meter frameworks.

# Related Information

For information about adding ION power meters to Power Monitoring Expert - Data Center Edition, see the Management Console online help or the *StruxureWarePower Monitoring Expert Help*.

For details about configuring Analog or Digital Input modules, refer to *ION Reference*.

# Prerequisites

The following items must be completed before attempting to configure ION power meters to record data from generators and other equipment.

- Power Monitoring Expert - Data Center Edition must be installed and operational.
- All ION power meters must be installed and communicating.
- ION power meters selected to monitor each generator device must have the following available data recorders and inputs:
    - Two available data recorders
    - Three available digital inputs (site specific)
    - Two or more available analog inputs (site specific)

    See "Additional Information about Digital and Analog Inputs" on page 17 for more information.

**⚠ WARNING**

**INACCURATE REPORT RESULTS**

- Do not incorrectly configure the system, this can lead to inaccurate reports and/or data results.
- Do not rely solely on reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Do not add any input to the Generator Data Recorder other than the input statuses listed below.
- Use reports as a supplement to proper workplace practices or equipment maintenance, not as a substitute.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

- Each generator should be physically wired to the appropriate ION power meters so that the following status signals are represented:
    - Start (optional)
    - Running
    - Stopped
- The following generator electrical data must be metered and available for each generator:

| | | | |
|---|---|---|---|
| • Vln a | • Vll ab | • I a | • kW tot |
| • Vln b | • Vll bc | • I b | • kVA tot |
| • Vln c | • Vll ca | • I c | • PF sign tot |
| • Vln avg | • VII avg | • I avg | • Freq |

# Additional Information about Digital and Analog Inputs

## Digital Inputs

Meters used to monitor generators and other equipment must have enough available digital inputs to handle the incoming status signals. The number of required digital inputs depends on how many signals are available and whether they are single state or dual state signals.

Example of single state signals, where signalA represents GEN Running

- When signalA = 1, GEN Running is TRUE
- When signalA = 0, GEN Running is FALSE

Example of dual state signals, where signalA represents GEN Running and GEN Stopped

- When signalA = 1, GEN Running is TRUE
- When signalA = 0, GEN Stopped is TRUE

### Analog Inputs

Meters used to monitor generators must have available analog inputs to handle the incoming generator-specific analog data. The number of required analog inputs depends on how many measurements are being recorded. For example, analog data can include the following:

- Exhaust Gas Temperature left and right
- Engine Coolant Temperature in and out
- Engine Oil Pressure

Generator analog signals can be obtained through the analog inputs or via Modbus Master from the engine controller. Refer to the *PowerLogic ION7550/7650 User Guide* for more information.

# Add ION Devices to the System

Follow these steps to add ION power meters to your system configuration.

Complete these steps to prevent any unwanted database actions when modifying the meter framework.

1. Stop the Log Inserter Service, as follows:
   a. Open the Windows Services panel by clicking:

      **Start > Administrative Tools > Services**

      The path to **Services** may vary depending on the Windows operating system being used.

   b. Right-click **ION Log Inserter Service** and select **Stop**.
2. Open the Management Console.
3. Use the Device window in Management Console to add each ION power meter.

   The Device window includes **Group** and **Name** fields. **Group** is the name under which you want to associate the device you are adding. **Name** identifies the meter that you are adding. The meter name should include a reference to identify which ATS or generator is connected to the meter.

   When a meter has been added it appears in the list of devices in `group.name` format. For example, if you named the group `EPSS`, and identified the meter as `ATS1`, the name in the device list is `EPSS.ATS1`. Similarly, if you used the same group to add a meter identified as `GEN1`, the name in the device list is `EPSS.GEN1`. See the *StruxureWare Power Monitoring Expert User Guide* or online help for information about adding a meter.

After the power meter is added, configure the appropriate frameworks as described in "Deploying Generator Frameworks" on page 19.

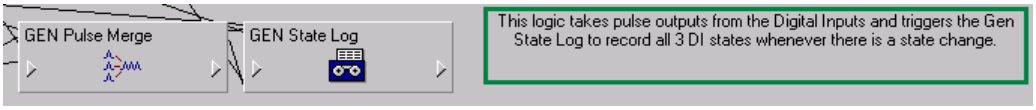
# Deploying Generator Frameworks

## Overview

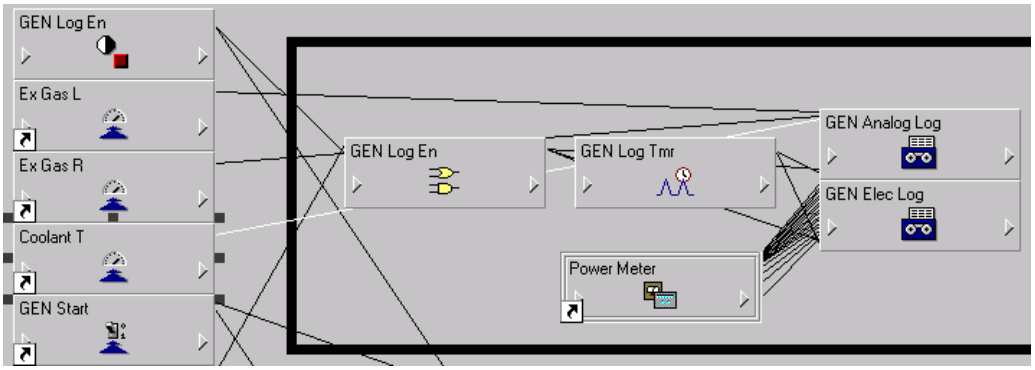
Use Designer to copy and paste the generator framework to the power meter. Repeat this process for every power meter in the system that records generator data for purposes. The generator framework is designed to capture generator status changes when they occur, and then to log generator-specific field data when the generator is active.

This framework is a template that should be adjusted to meet the requirements of your site. GEN Start or GEN Run can be used to initiate logging, and the frequency can be adjusted in the periodic timer.

- The status signals for status events GEN Start, GEN Run, and GEN Stop are recorded in the Gen State Log whenever any one of them changes state.




- The logic is designed to record analog and general electrical data when the generator is running. The data is logged at one minute intervals.




- The external Boolean Gen Log En must be linked to a control object in a Vista diagram and enabled before any data is logged. This allows users to notify the system that they are running a test and to log data accordingly.

## Pasting Generator Frameworks

Before you deploy generator frameworks, you need to be aware of the implications of free pasting and lock pasting modules.

Use free pasting to paste a new module with a different name if a module with the same name already exists. This helps to ensure that existing modules and their functionality are not replaced.

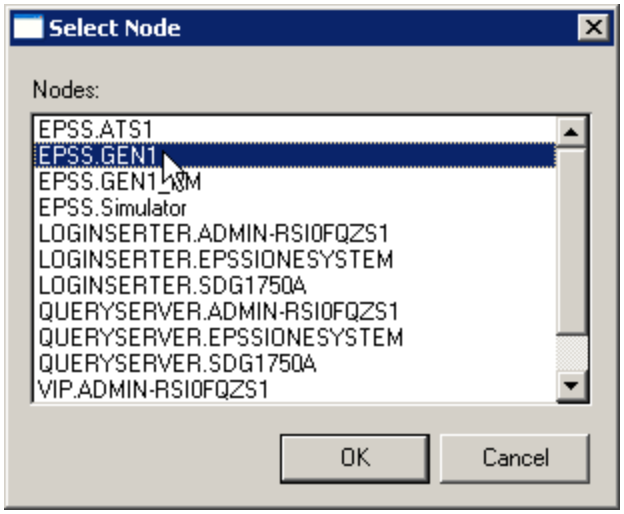
Use lock pasting to overwrite an existing module and its functionality with a new module, while retaining the module name. However, you need to understand what the modules are currently being used for before you lock paste the modules. A lock paste replaces the functionality of those modules.

- If a power meter already uses all modules of a certain type that are a necessary part of the framework, then a lock paste operation is required.
- If all of the available digital or analog input modules are in use, a lock paste of the analog or digital input modules is required to help ensure that the parameter settings are updated

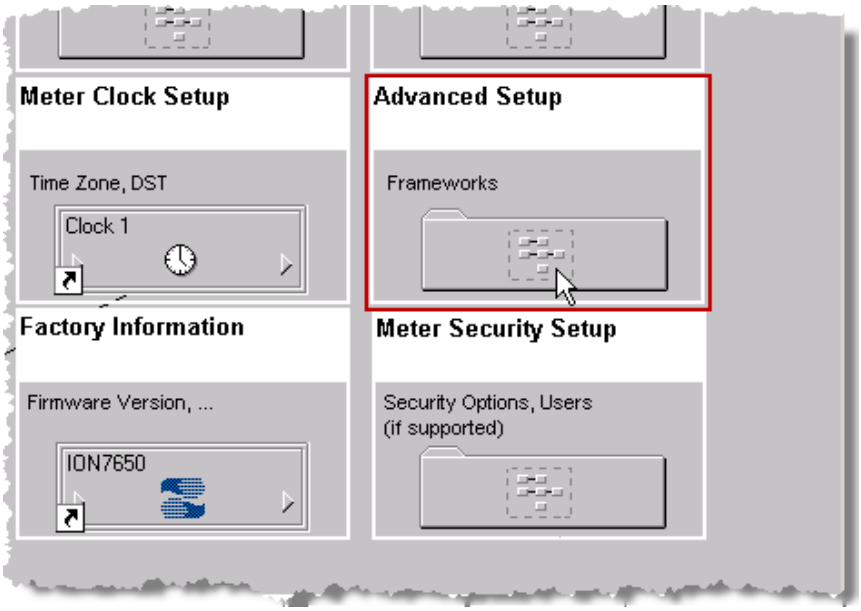
# Copy Generator Framework to ION Power Meter

Use Designer to copy the generator framework to the power meter. Repeat this process for every power meter in the system that records generator data.

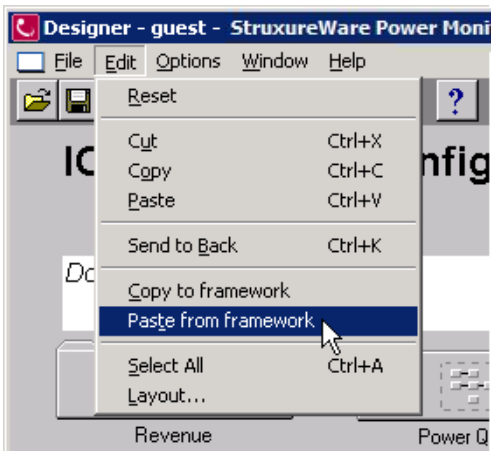
1. In **Management Console** click **Tools > System > Designer**. The Designer login window appears.
2. Enter the login credentials with administrator or supervisor access and click **OK**.
3. Click **File > Open**, select the power meter that has the generator connected to it, and then click **OK** to open the meter's framework.




4. Once the meter's framework is open, navigate to **Advanced Setup** and double-click the **Frameworks** folder to open it.

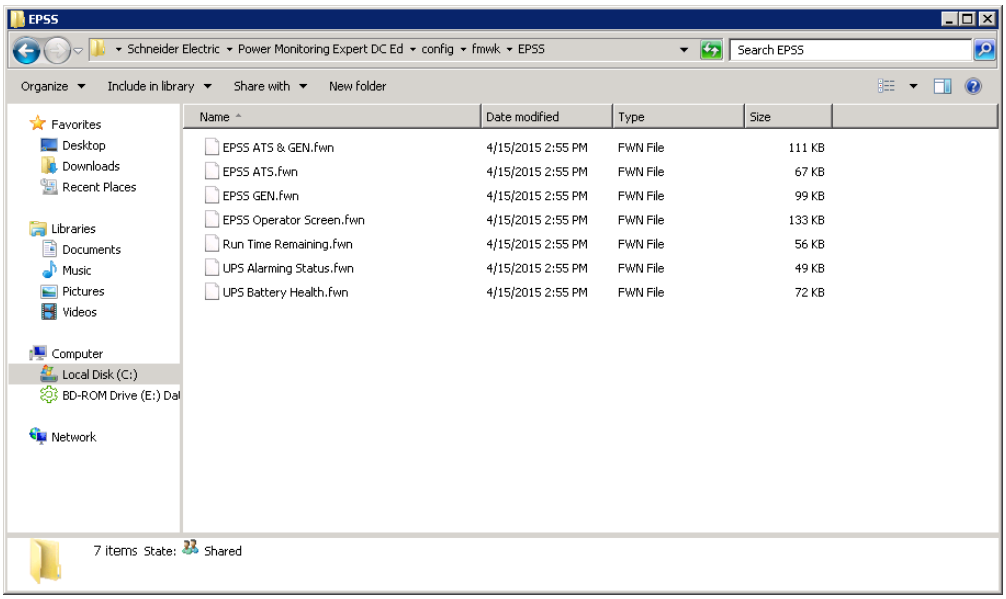



5. Ensure that the Toolbox is open. Select **Options > Show Toolbox**, to open the Toolbox.
6. Select **Edit > Paste from framework** to open the **Paste from framework** window, from which you paste the generator framework to the **Frameworks – SPM Advanced Configuration** folder.



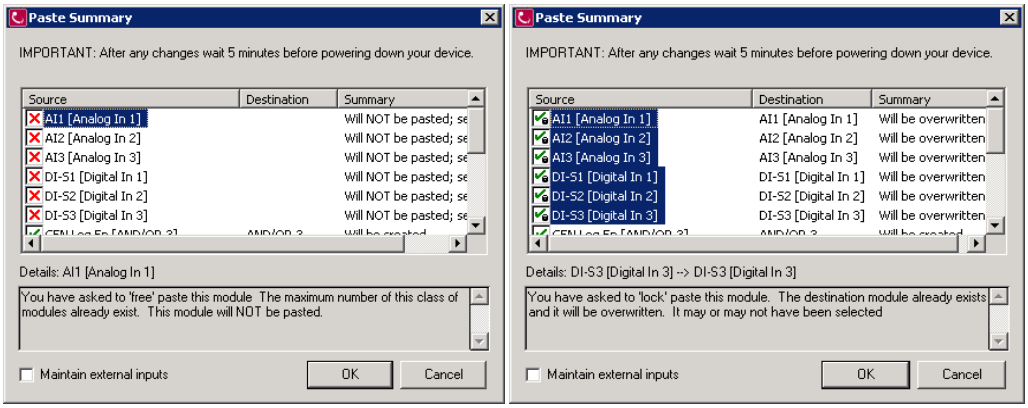

7. Navigate to ...\Program Files (x86)\Schneider Electric\Power Monitoring Expert DC Ed\config\fmwk\EPSS , select the generator framework `.fwn` file, and click **Open**.

   For example, in the following image the generator framework file is `EPSS GEN.fwn`.




8. Press **Shift** and left-click to lock paste all of the Analog Input and Digital Input modules listed in the **Paste Summary** dialog, and free paste all of the remaining modules.

   The lock paste overwrites a module if it already exists on the meter.



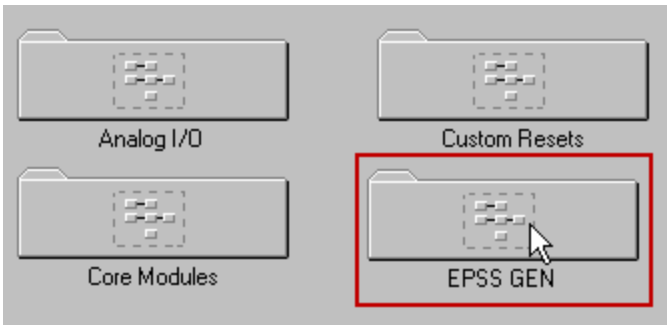

9. Do not select **Maintain external inputs**.

10. Press **OK** to paste the generator framework.

# Configure the Generator Framework

Configure the generator framework with site-specific data. Refer to the *ION Reference* for more information about configuring setup registers.

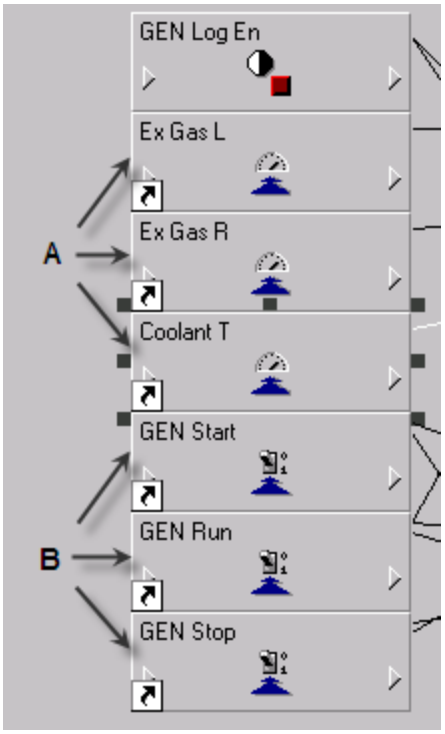
1. After the generator framework has been pasted, double-click the folder **EPSS GEN** to open its node diagram.




The nodes of the generator framework shown below support the three single state status signals: GEN Start, GEN Run, and GEN Stop. These status signals are received by their respective digital input modules GEN Start, GEN Run, and GEN Stop.

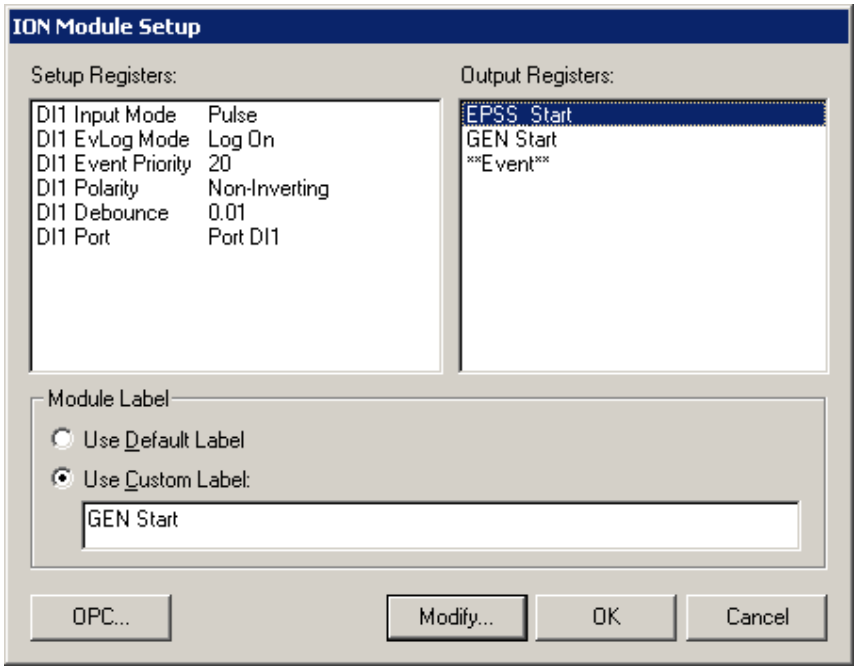
The names of the digital input modules are simply placeholders that are used as examples to identify how the components in the framework should be labeled. You can rename them to match the system being deployed. For example, GEN could be GEN1. The remaining descriptions in this section use these example labels to illustrate the updates made to the framework.

The framework also supports three analog signals. In the following image, these are Ex Gas L (exhaust gas left), Ex Gas R (exhaust gas right), and Coolant T (coolant temperature), and these signals are received by their respective analog input modules: Ex Gas L, Ex Gas R, and Coolant T. These module are examples only and they can be modified to any other parameters that need to be monitored and recorded.




**A**. Analog Input Modules **B**. Digital Input Modules

2. Right-click a Digital Input module to access its setup registers. The following image shows the registers for the digital input module GEN Start. The generator controller hardware that this module interfaces with governs how it needs to be configured.




3. To update a register, select the register and click **Modify**. The **Modify Registers** screen appears.
4. Change the values to the site-specific sources and quantities, and click **OK** to return to the node diagram. For example:
   - The Setup Register *Input Mode* is set to KYZ, which forces a pulse output on both leading and trailing edges of the signal. This causes the data recorder to record the state on each transition of the signal.
   - The Output Register label `EPSS_Start` is the name associated with the signal received by the digital input module GEN Start. The maximum number of characters for the label is 15. Examples of Output Register labels for digital input modules GEN Run and GEN Stop are `EPSS_Run` and `EPSS_Stop`, respectively.

     Make sure that Output Register labels are consistent across the entire system. For example, if you plan to represent the GEN Start state as `EPSS_Start`, then you need to use the same label for all of the generators.

     Make sure that Output Register labels are consistent across the entire system. For example, if you plan to represent the GEN Normal state as `EPSS_Norm`, then you need to use the same label for all of the generators.

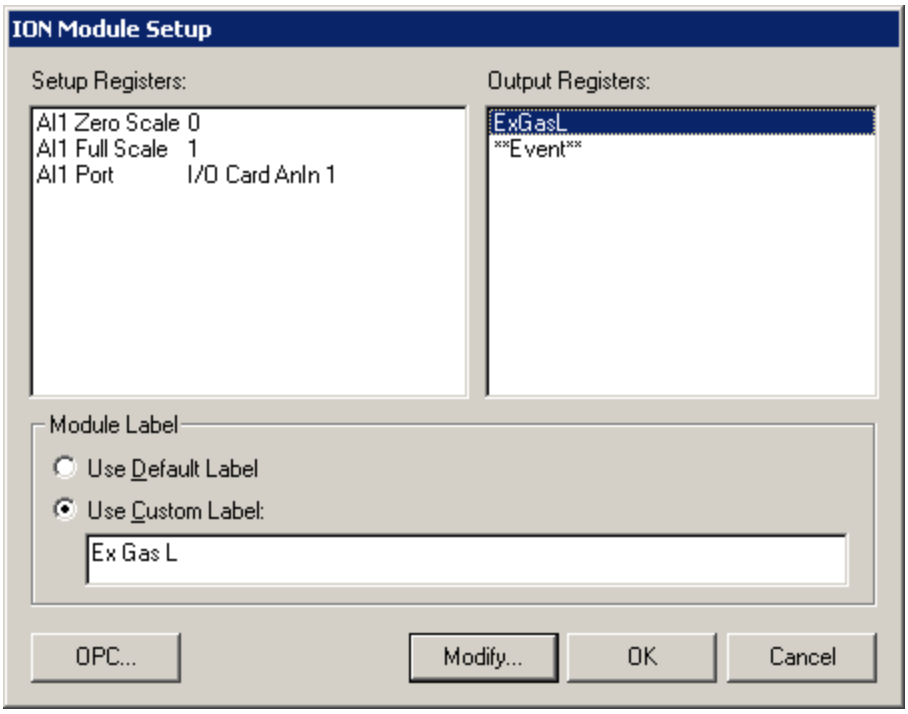
     For systems that use a single meter to record EPSS status measurements for multiple EPSS devices, the Output Register naming convention for digital input modules must be modified from *`quantity`* to *`quantity@source`*.

For example, change `EPSS_Test` to `EPSS_Test@GENxx` where `xx` uniquely identifies the generator device.

The *`quantity@source`* format allows the data it represents to be uniquely identified.

The quantities remain the same (`EPSS_Test`, `EPSS_Emerg`, `EPSS_Norm`) but the source name is now unique (`GENxx`). If this change is not made, data for all generators recorded on the meter cannot be uniquely identified.

5. Right-click an Analog Input module to access its registers. Shown below are the registers for the analog input module Ex Gas L. The generator controller hardware that this module interfaces with governs how it needs to be configured.




- The Output Register label `ExGasL` is the name associated with the signal received by the analog input module Ex Gas L. The maximum number of characters for the label is 15. Examples of Output Register labels for analog input modules Ex Gas R and Coolant T are `ExGasR` and `CoolTemp`, respectively.
- Output Register labels should be consistent across the entire system. For example, if you plan to represent Exhaust Gas Left as `ExGasL` then you need to use the same label for all of the generators.

6. When you have completed all of the necessary site-specific modifications, click **File > Send & Save** from the node diagram to write your changes to the power meter.
7. Restart the ION Log Inserter Service after configuring the generator frameworks.

# Non-ION Power Meter Configuration

This chapter provides information about configuring non-ION power meters for Power Monitoring Expert - Data Center Edition.

**⚠ WARNING**

**UNINTENDED OPERATION**

- Do not use the power meters for critical control or protection applications where human or equipment safety relies on the operation of the control circuit.
- Refer to your meter's technical documentation for more information on its operation.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

## Supported Power Meters

The Power Monitoring Expert - Data Center Edition can use the following non-ION power meters for the Equipment Performance Module:

- PowerLogic Series 800 Power Meters PM850 and PM870. Refer to "Configuring PM800 Series Meters" on page 28.
- Momentum PLC. Refer to "Configuring Momentum PLC" on page 44.
- SER-3200 Power Meter. Refer to "Adding the SER3200 to Management Console" on page 57.

## Prerequisites

The following prerequisites must be completed before attempting to configure a non-ION power meter to record data from generators and other equipment for the :

- Power Monitoring Expert - Data Center Edition is installed and operational.
- All meters must be installed and communicating.
- The following status signals for each ATS are physically wired to the digital inputs on the appropriate meters.
    - Normal
    - Emergency
    - Test
    - Power Outage (optional)

- The following status signals for each generator are physically wired to the digital inputs on the appropriate meters.
    - Start (optional)
    - Run
    - Stop
- The following generator electrical data are metered and available for each generator:
    - Currents: A, B, C, N, Avg
    - Minimum Apparent Power Total
    - Minimum Real Power Total
    - Frequency
    - Real Power Total
    - Apparent Power Total
    - Voltages: A-B, B-C, C-A, L-L Avg, A-N, B-N, C-N, L-N Avg
- The following signals for each generator are physically wired to the analog inputs on the appropriate meters. The number of analog inputs required depends on how many measurements are being recorded. For example, analog data can include the following:
    - Exhaust Gas Temperature left and right
    - Engine Coolant Temperature in and out.
    - Engine Oil Pressure

# Configuring PM800 Series Meters

This chapter describes how to use PowerLogic™ ION Setup to configure meters for the Power Monitoring Expert - Data Center Edition. This chapter does not explain how to add power meters to the system or how to use ION Setup.

- For information about adding meters to the system, refer to the Management Console online help or the Management Console section of the *StruxureWare Power Monitoring Expert User Guide*.
- For information about ION Setup software, refer to ION Setup online Help or the *PowerLogic ION Setup User Guide*.

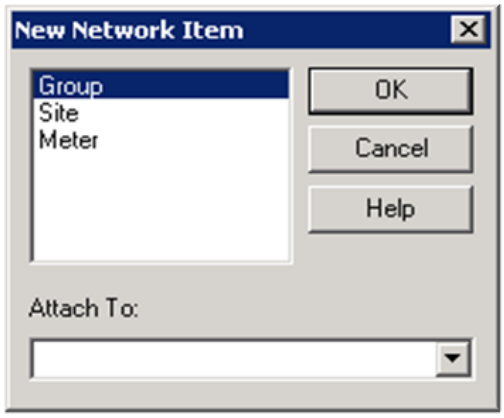
For more information about configuring the PM800 series meters using ION Setup software:

- *Additional Device Support in ION Setup* in the ION Setup online help
- *PowerLogic ION Setup Device Configuration Guide*

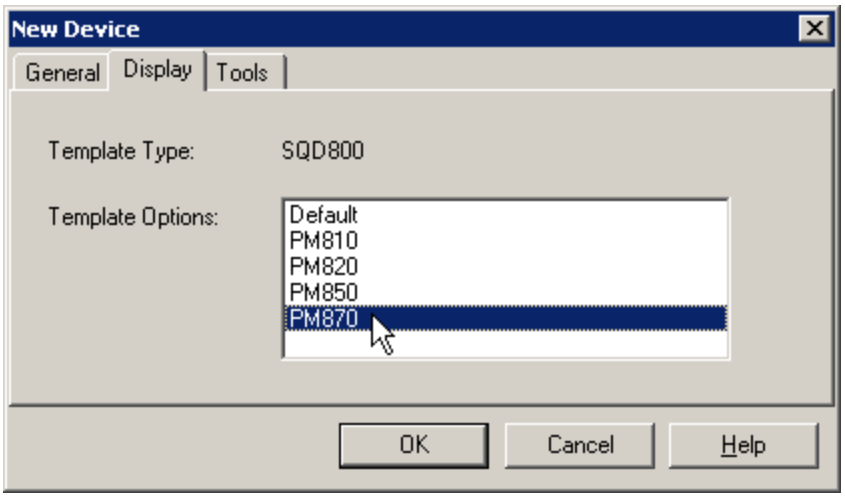
# Add PM800 Series Meters to a Site in ION Setup

Use ION Setup to add PM850 or PM870 meters to the site.

1. In the devices area, right-click and select **Insert Item**. The **New Network Item** screen appears.

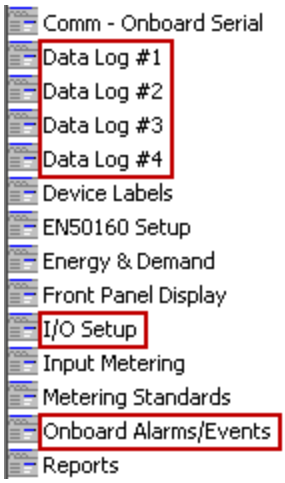



2. Select **Meter** and click **OK**. The **New Device** screen appears.
3. Select the **General** tab
4. In the **Type** list, select **PowerLogic PM800 Series Power Meter**.
5. Select the **Display** tab. In the **Template Options** box, select the type of meter you are adding.




6. Click **OK** to add the meter.
7. In the Network Viewer (left pane), click the meter icon. The setup screens appear in the Content Viewer (right pane).

The following image shows a partial list of the setup screens. Use the **I/O Setup**, **Onboard Alarms/Events**, and **Data Log** setup screens to access the parameters that need to be configured. The remaining topics in this chapter describe the parameter changes that are required.




For more information about adding PM850 or PM870 meters to a site in ION Setup, refer to the following:

- ION Setup online Help
- *PowerLogic ION Setup Device Configuration Guide*, "PM800 series power meter" section
- *PowerLogic ION Setup User Guide*, "Adding and Configuring Devices" section

# Configuring Digital and Analog Inputs

This section describes how to configure the digital and analog inputs for the PM800 meters. The instructions assume that you are using separate PM800 series power meters to record data for generators.

**⚠ WARNING**

**UNINTENDED OPERATION**

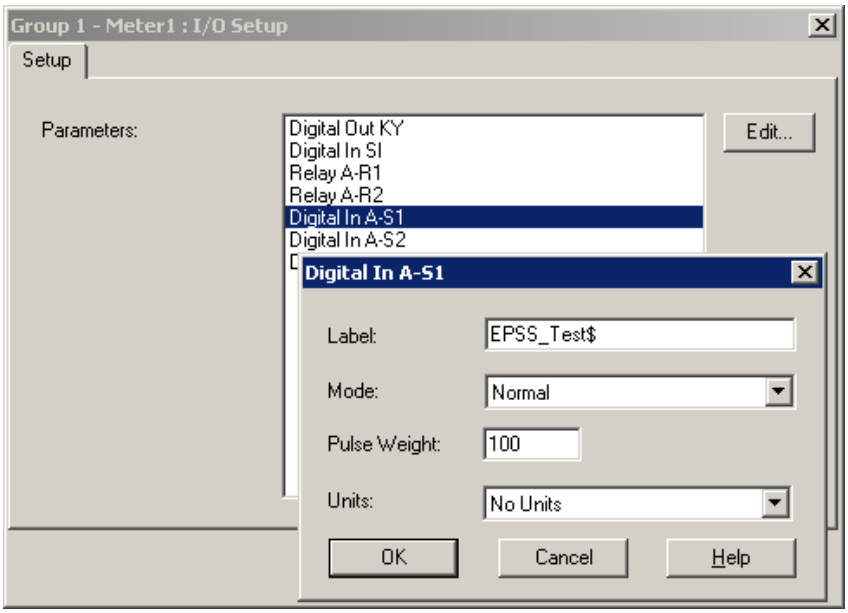
- Do not use the meters for critical control or protection applications where human or equipment safety relies on the operation of the control circuit.
- Refer to your meter's technical documentation for more information on its operation.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

## Configure Digital Inputs

1. In the Content Viewer, double-click **I/O Setup** to access the Digital Inputs for the meter.
2. Select the I/O point that you want to configure and click **Edit**.

   The following image shows **Digital In A-S1** selected.




3. Update the **Label** field with a name that ends with the $ character.

   The $ character activates the translated device dynamic labeling feature. If the $ character is not used, the default label is used.

   - For a generator, examples of labels are `EPSS_Start$`, `EPSS_Run$`, and `EPSS_Stop$`.

4. Set **Mode** to Normal, **Pulse Weight** to a non-zero value, for example 100, and leave **Units** set as No Units.
5. Click **OK** to update the parameters and to close the dialog.
6. Repeat the steps above for each I/O point that you want to configure.
7. Click **Send** to save the changes and send the configuration to the meter.

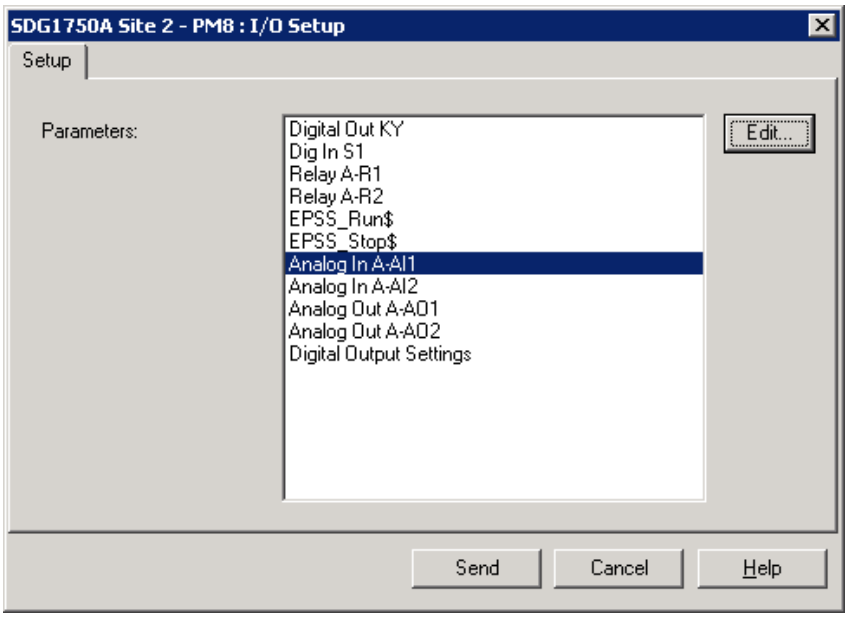
# Configure Analog Inputs

PM800 series power meter Analog Inputs are only available when you install the PM8M2222 Input/Output module on the meter.

Refer to the *Power Meter Input/Output Module PM8M2222, PM8M26, PM8M22 Installation Manual* for more information about installing the input/output module. Obtain this installation manual at www.powerlogic.com. Select the country, and then **Energy and Power Quality Meters** > **PowerLogic Multifunction Power Meters** > **PM800 Series** > **Downloads** > **Tech Publications**.

1. In the Content Viewer, double-click **I/O Setup** to access the Analog Inputs for the meter.
2. Select the I/O point that you want to configure and click **Edit**.

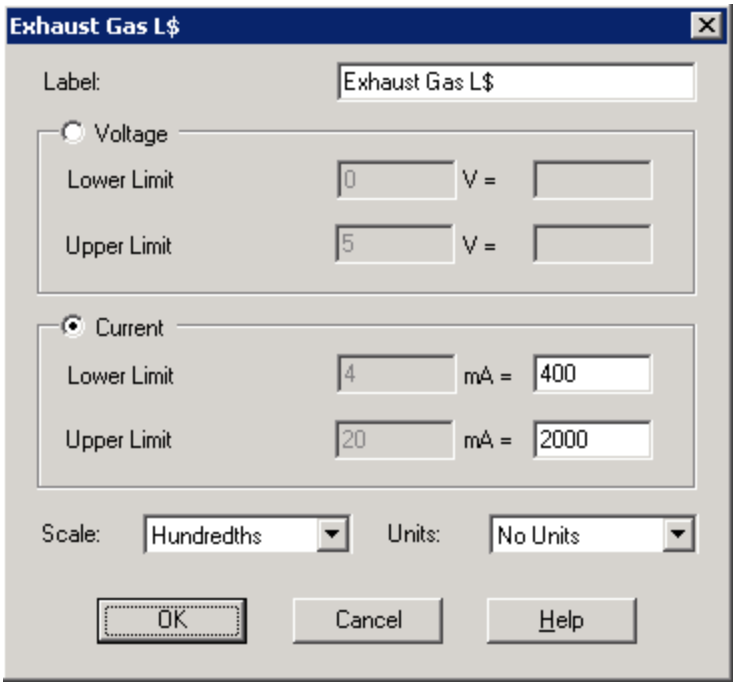
   The following image shows **Analog In A-AI1** selected.




3. Click **Edit** to open the parameter window for the I/O point and update the **Label** field with a name that ends with the $ character.

   For a generator, examples of labels for analog inputs are `Exhaust Gas L$`, `Exhaust Gas R$`, and `Coolant T$`.

   The following image shows the label updated to `Exhaust Gas L$`.




4. Click **OK** to update the parameters and to close the dialog.
5. Repeat the steps above for each I/O point that you want to configure.
6. Click **Send** to save the changes and send the configuration to the meter.

# Configuring Onboard Alarms and Events

For each digital input configured in I/O Setup, you need to configure the alarms to record when the digital input on a generator changes from OFF to ON, and also from ON to OFF.

## Configuring Digital Input Alarms for Generators

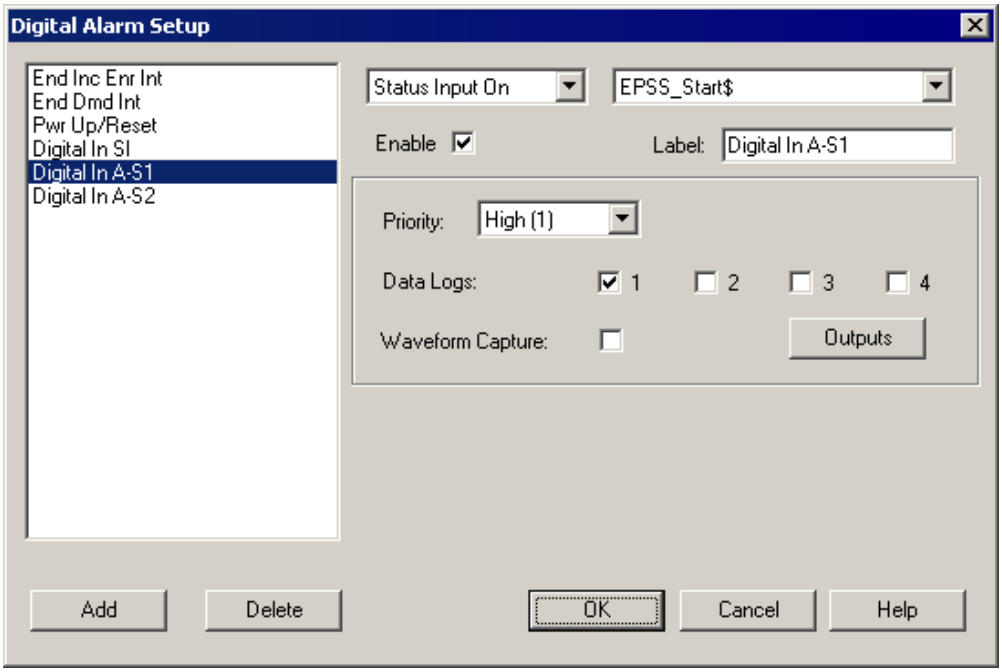
This section assumes that you configured digital inputs **Digital In A-S1** as `EPSS_Start$`, **Digital In A-S2** as `EPSS_Run$`, and **Digital In A-S3** as `EPSS_Stop$`. You must configure an alarm for the digital input change from OFF to ON and from ON to OFF.

### EPSS_Start$: Digital input change from OFF to ON

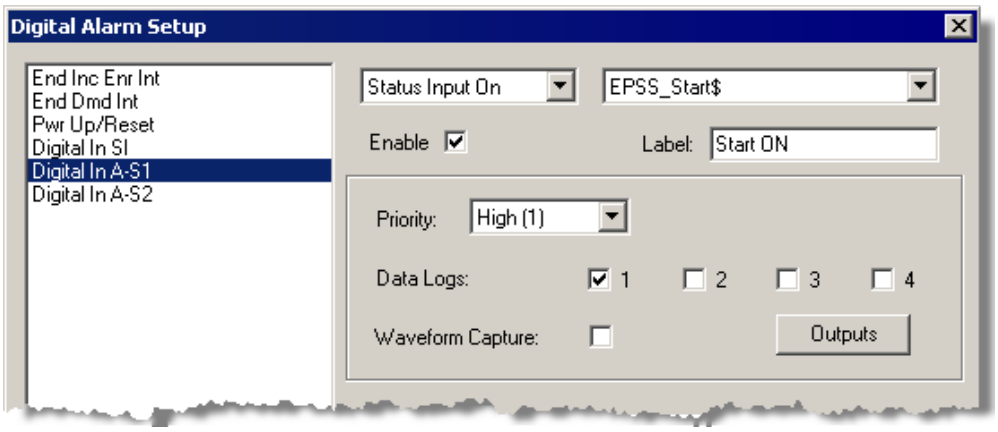
Complete the following steps to configure an alarm when a digital input changes from OFF to ON.

1. In the Content Viewer, double-click **Onboard Alarms/Events** to open the **Setup** dialog.
2. Select **Digital** and click **Edit** to open the **Digital Alarm Setup** dialog.
3. Select one of the Digital Input/Output points.

   The following figure shows the **Digital In A-S1** input selected and its label `EPSS_Start$`




4. Select **Status Input On** from the list to set the alarm when the digital input changes from OFF to ON.
5. Make sure that **Enable** is selected.
6. In the **Label** field, change the digital alarm name from **Digital In A-S1** to **Start ON**.



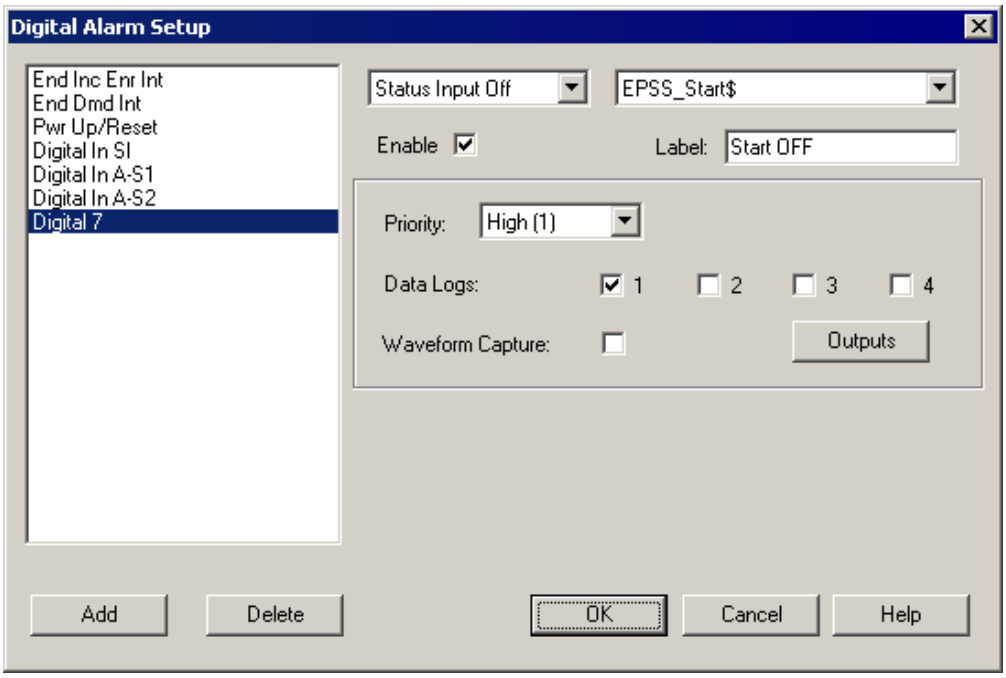

7. Set **Priority** to High(1), and select Data Log 1 as the data log to use. Select **Waveform Capture** if you want to trigger a waveform capture on alarm.

   When the status for `EPSS_Start$` changes to ON, Data Log 1 records all channels currently configured on it.

## EPSS_Start$: Digital input change from ON to OFF

Complete the following steps to configure an alarm when a digital input for `EPSS_Start$` changes from ON to OFF.

1. Click **Add** to add another digital input alarm parameter to the list in the left pane of the **Digital Alarm Setup** dialog. **NOTE:** If the 12 available digital input alarms have been configured, you need to re-configure an existing alarm for the ON to OFF status change.




2. Select **Status Input Off** from the list to set the alarm when the digital input changes from ON to OFF.
3. Select `EPSS_Start$` from the list.

4. Make sure that **Enable** is selected.
5. In the **Label** field, change the digital alarm name to **Start OFF**.
6. Set **Priority** to High(1), and select Data Log 1 as the data log to use. Select **Waveform Capture** if you want to trigger a waveform capture on alarm.
7. Repeat the steps above to configure alarms for digital input changes from OFF to ON and from ON to OFF for all of the applicable I/O points.

   The following table summarizes the configuration of the alarms, assuming that the I/O points are Digital In A-S1, Digital In A-S2, and Digital In A-S3:

| Digital Input Label | Maps to | Alarm Status | Alarm Name |
|---|---|---|---|
| EPSS_Start$ | Digital In A-S1 | Status Input On | Start ON |
| EPSS_Start$ | Digital In A-S1 | Status Input Off | Start OFF |
| EPSS_Run$ | Digital In A-S2 | Status Input On | Run ON |
| EPSS_Run$ | Digital In A-S2 | Status Input Off | Run OFF |
| EPSS_Stop$ | Digital In A-S3 | Status Input On | Stop ON |
| EPSS_Stop$ | Digital In A-S3 | Status Input Off | Stop OFF |

8. Click **OK** to close the dialog.
9. Click **Send** to save the changes and send the configuration to the meter.

## Define a Digital Alarm for a Single Digital Input

If a single digital input is used to record signals indicating when the generator is running, and also when the generator has stopped, you need to define the digital alarm as follows.

1. In the **Digital Alarm Setup** dialog, select the Digital Input/Output point that will be used to record the alarm. For example, if you configured **Digital In A-S1** with a label of `EPSS_Run$`, select this I/O point.
2. Select **Status Input On** from the list to set the alarm when the digital input changes from OFF to ON.
3. Make sure that **Enable** is selected.
4. In the **Label** field, change the digital alarm name from **Digital In A-S1** to **Run ON**.
5. Set **Priority** to High(1), and select Data Log 1 as the data log to use.

## EPSS_Run$: Digital input change from ON to OFF

1. Click **Add** to add another digital input alarm parameter to the list in the left pane of the **Digital Alarm Setup** dialog.
2. Select **Status Input Off** from the list to set the alarm when the digital input changes from ON to OFF.
3. Select `EPSS_Run$` from the list.
4. Make sure that **Enable** is selected.
5. In the **Label** field, change the digital alarm name to **Stop ON**.
6. Set **Priority** to High(1), and select Data Log 1 as the data log to use.
7. Click **OK** to close the dialog.

8. Click **Send** to save the changes and send the configuration to the meter.

As a result of this alarm configuration where `EPSS_Run$` represents both the Running and Stopped states for the generator, when **Run ON** is TRUE, the signal is recorded as "1", and when **Stop ON** is TRUE, the signal is recorded as "0".

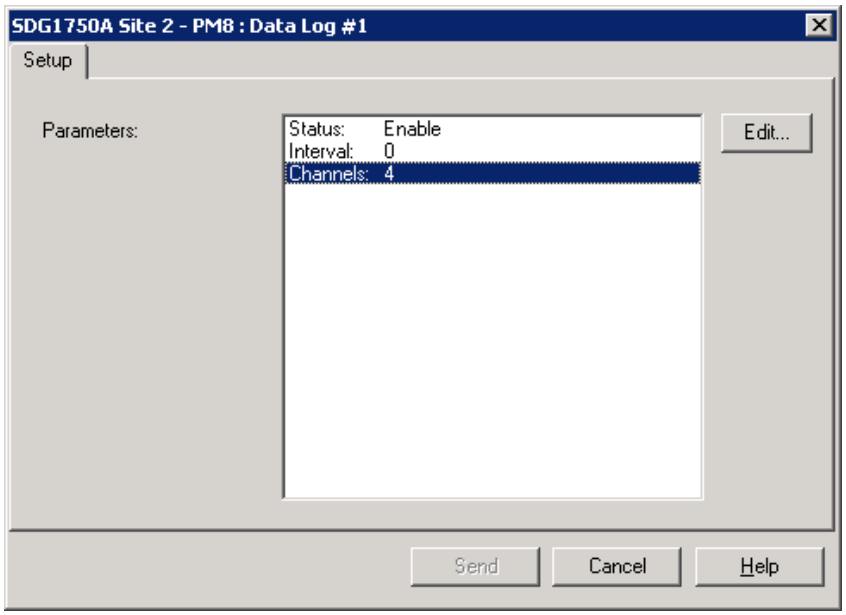
# Defining the Data Log Parameters

This section explains how to define data log parameters for the digital inputs, analog inputs, and load profile data. The instructions assume that you use Data Logs 1 and 2. However, you can use any Data Log that meets your requirements.

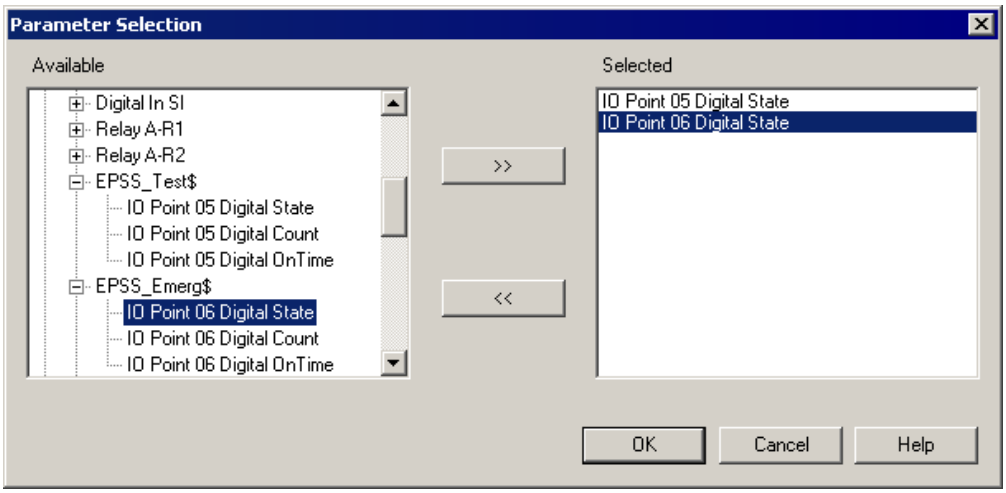
## Define Data Log Parameters for Digital Inputs

Complete the following steps to define the data log parameters for the digital inputs.

1. In the Content Viewer, double-click **Data Log #1** to open the **Setup** dialog for the data log parameters.
2. Set **Status** to Enable and **Interval** to Only On Event. The Only On Event mode appears as 0 in the **Interval** field of the **Setup** dialog.
3. Select **Channels**, click **Edit**. The Parameter Selection dialog appears.




4. In the **Available** box, navigate to **Inputs/Outputs** and select a custom label, such as `EPSS_Emerg$`.
5. Select the **IO Point *xx* Digital State**, where xx is the number of the I/O point present on the meter. Click **>>** to move the parameter to the **Selected** box.




6. Repeat steps 4 - 5 for all I/O points available for the ATS or generator.
7. In the **Available** box, expand **Miscellaneous** and select **Present MilliSeconds**. Click **>>** to move it to the **Selected** column.

   Add all I/O points for a given ATS or generator to the data log to help ensure that all of the states are recorded in the data log when any state changes.

8. Click **OK** to close the dialog.
9. Click **Send** to save the changes and send the configuration to the meter.

# Define Data Log Parameters for Analog Inputs and Load Profile Data

Configure the system to log the analog inputs and load profile data automatically when the generator state changes to Running. When the generator state is Running, the alarm status for digital input `EPSS_Run$` is ON.

Using ION Setup, the process to configure automatic logging is:

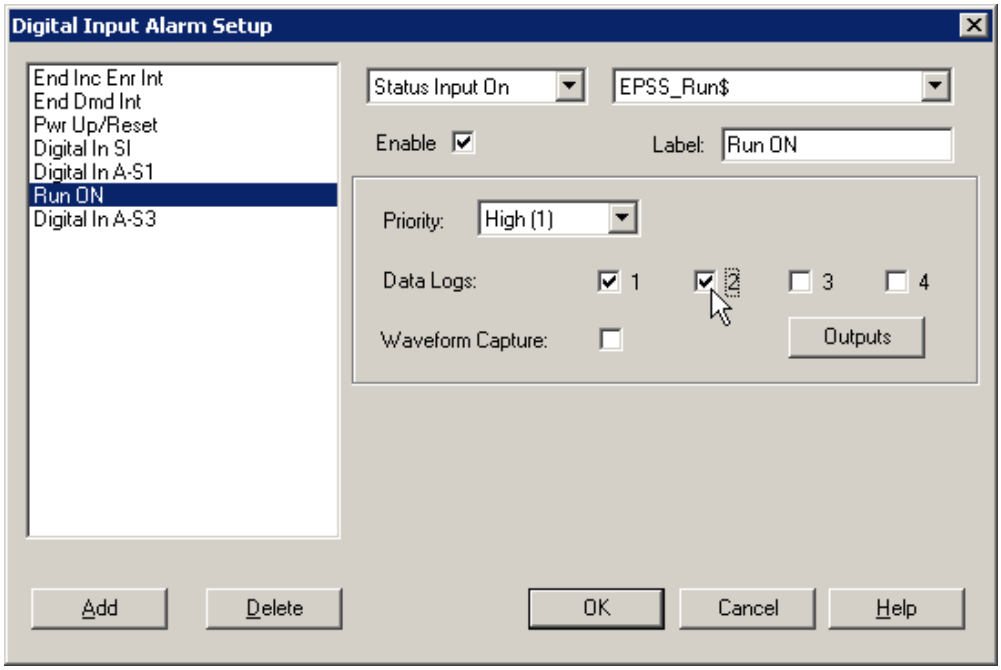
1. Associate Data Log 2 with the digital input alarm **Run ON** that you previously defined for `EPSS_Run$`.
2. Select the parameters for the Analog Input data to be logged in Data Log 2.
3. Select the parameters for the Load Profile data to be logged in Data Log 2.
4. Set the status of Data Log 2 to Auto-Enable.

These steps assume that you use Data Log 2.

## Associate Data Log 2 with the Digital Input Alarm Run ON

1. In the Content Viewer, double-click **Onboard Alarms/Events** to open the **Setup** dialog.
2. Select **Digital** and click **Edit** to open the **Digital Alarm Setup** dialog.
3. Select the digital input alarm **Run ON** that was defined for I/O point `EPSS_Run$`. You previously selected Data Log 1 when you configured this digital input alarm for the generator.

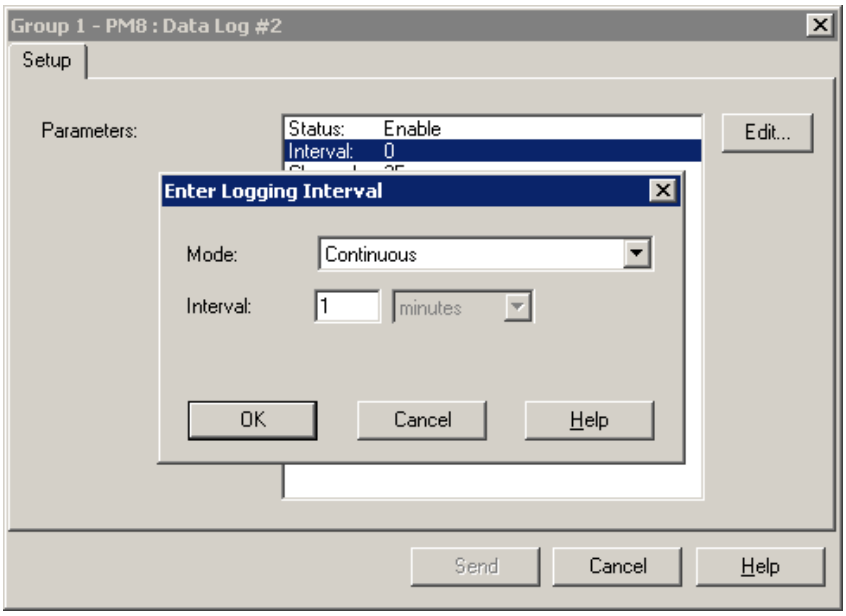
4. In the **Data Logs:** group, select **2**. Now both **1** and **2** are selected.



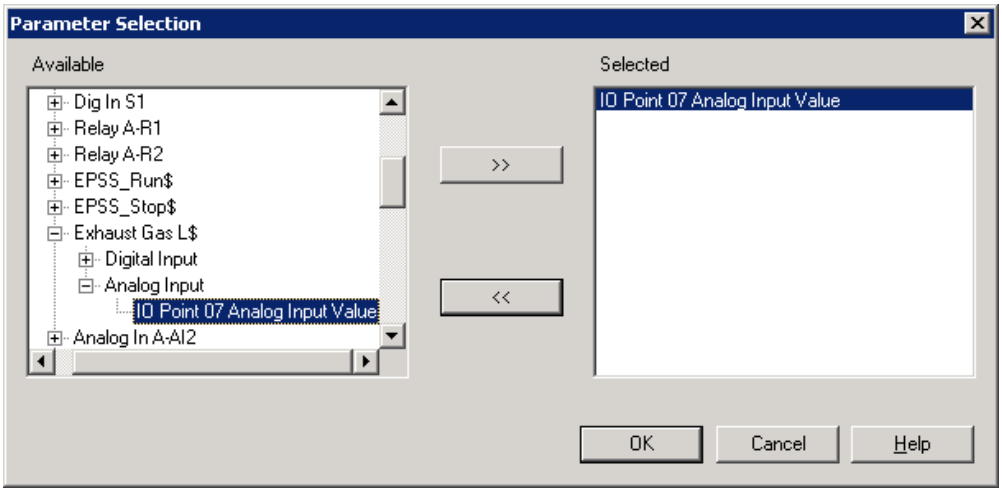

5. Click **OK** to close the dialog.
6. Click **Send** to save the changes and send the configuration to the meter.

## Select Parameters for Analog Input Data to be logged in Data Log 2

1. In the Content Viewer, double-click **Data Log #2** to open the **Setup** dialog for the data log parameters.
2. Select **Interval** and click **Edit** to open the **Enter Logging Interval** dialog. Select **Continuous** from the list in **Mode**, set **Interval** to 1 minute, and click **OK** to close the dialog.




3. Select **Channels**, click **Edit**. The Parameter Selection dialog appears.
4. In the **Available** box, navigate to **Inputs/Outputs** and select a custom label, such as `Exhaust Gas L$`.
5. Under **Analog Input**, select the **IO Point *xx* Analog Input Value**, where xx is the number of the I/O point present on the meter. Click **>>** to move the parameter to the **Selected** box.




6. Repeat steps 4 - 5 for each analog input available for the generator.
7. Click **OK** to close the dialog.
8. Click **Send** to save the changes and send the configuration to the meter.

## Select Parameters for Load Profile Data to be logged in Data Log 2

1. In the **Setup** dialog for Data Log 2, select **Channels** and click **Edit**. The **Parameter Selection** dialog appears.

2. Expand each of the following categories. Within each category select the parameters indicated. For each parameter click **>>** to move it to the **Selected** column:

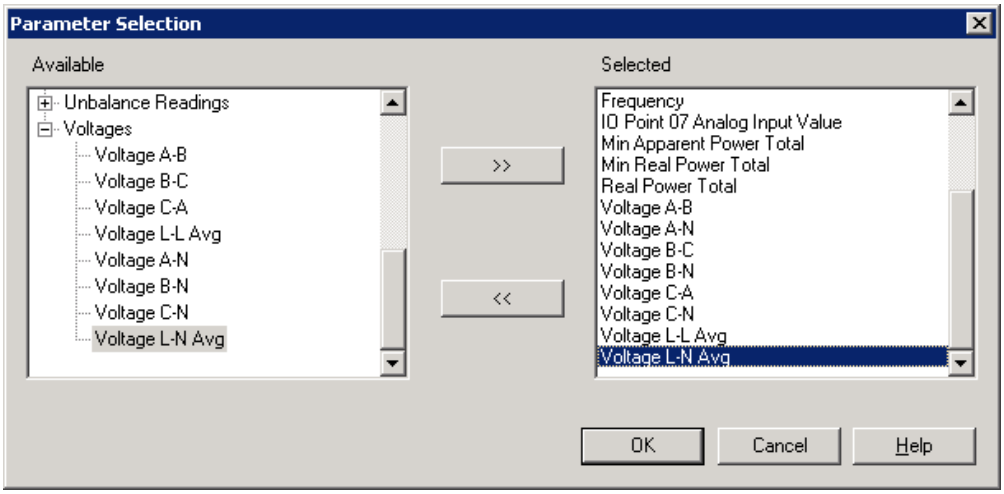
   a. In **Currents**, select Current A, Current B, Current C, Current N, and Current Avg.

   b. In **Minimum Readings**, select Min Apparent Power Total, Min Real Power Total.

   c. In **Miscellaneous**, select Frequency.

   d. In **Powers**, select Real Power Total and Apparent Power Total.

   e. In **Voltages**, select Voltage A-B, Voltage B-C, Voltage C-A, Voltage L-L Avg, Voltage A-N, Voltage B-N, Voltage C-N, and Voltage L-N Avg.

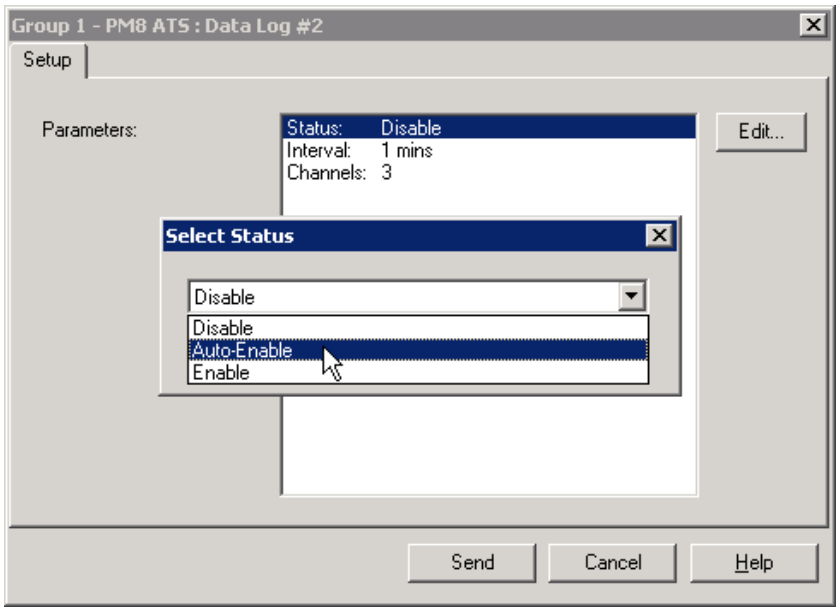



3. Click **OK** to close the dialog.
4. Click **Send** to save the changes and send the configuration to the meter.

## Set the Status of Data Log 2 to Auto-Enable

Auto-Enable is a special mode that allows logging to be triggered when an alarm occurs. Data is recorded in the data log at a defined interval if the logging mode is set to **Continuous**. Logging stops when the alarm ends.

1. In the **Setup** dialog for Data Log 2, select **Status** and click **Edit**. The **Select Status** dialog appears.
2. In the drop-down list, select **Auto-Enable** and click **OK** to close the dialog.




3. Click **Send** to save the changes and send the configuration to the meter.

You can also use Vista to set a Data Log to Auto-Enable. Refer to "Configure Auto-Enable Data Logs for CM4000 and PM800 series" on page 41 for more information.

# Configure Auto-Enable Data Logs for CM4000 and PM800 series

This section explains how to use Vista to configure the data logs for PM800 Series Meters and the CM4000 Series Meters for auto-enable.

Auto-Enable is a special mode that allows logging to be triggered when an alarm occurs. Data is recorded in the data log at a defined interval if the logging mode is set to **Continuous**. Logging stops when the alarm ends. The following instructions assume that you associated Data Log 2 with the digital input alarm **Run ON** for the purpose of logging the analog inputs and load profile data.

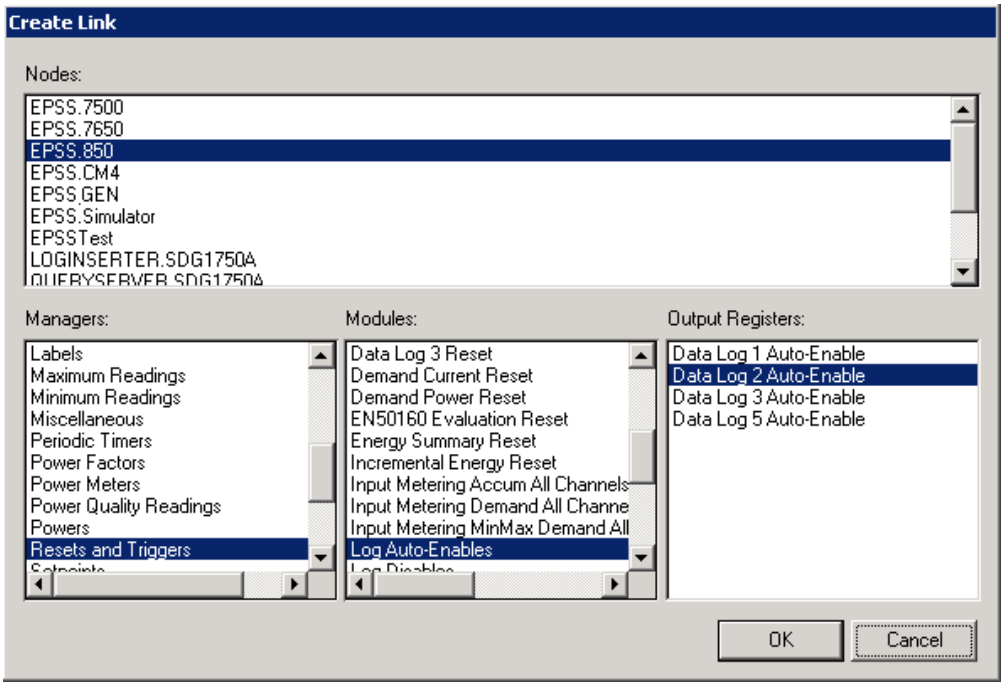
- For PM800 series meters, see "Set the Status of Data Log 2 to Auto-Enable" on page 40.

## Use Vista to Set a Data Log to Auto-Enable

Complete the following steps to use Vista to set the status of Data Log 2 to Auto-Enable.

1. Open Vista and select **File > New** to open an empty workspace.
2. Ensure that the Toolbox is open. If not, select **Options > Show Toolbox**.
3. In the Toolbox, select a **Control Object** and drag it to the workspace.
4. Right-click the control object. The **Control Object Configuration** screen appears.
5. Click the **Link** tab. In the **Link** area, select **Custom**, and then click **Edit Link**. The **Create Link** screen appears.

6. In the **Nodes** list, double-click the meter name. The associated module directories appear in the **Managers** list.



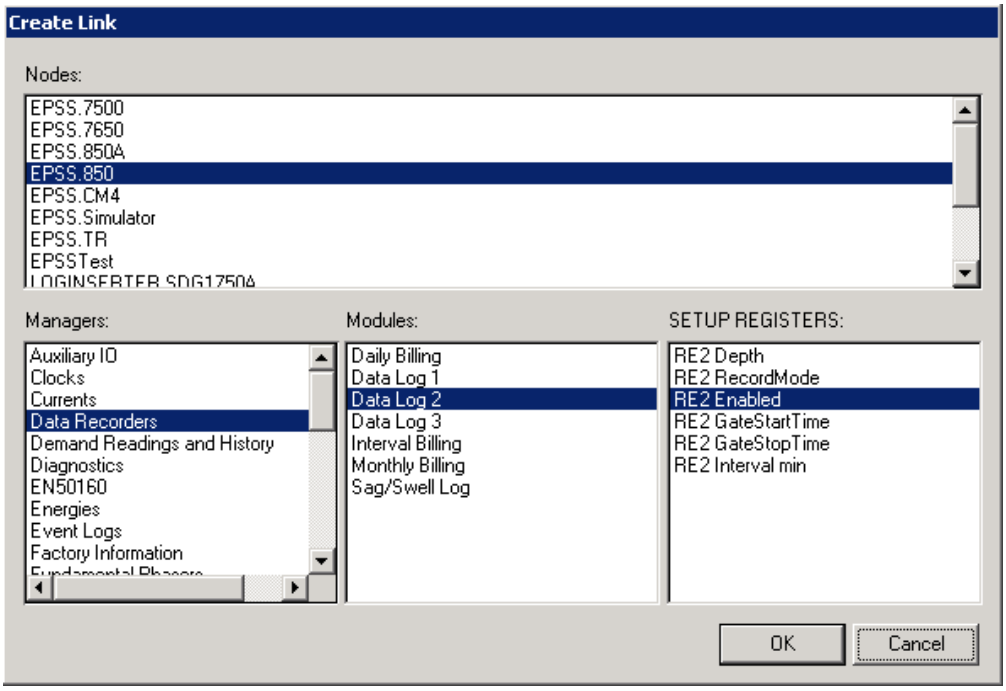

7. In the **Managers** list, double-click **Resets and Triggers**.
8. In the **Modules** list, double-click **Log Auto-Enables**.
9. In the **Output Registers** list, select **Data Log 2 Auto-Enable**.
10. Click **OK** to save the selection and to close the screen.
11. Double-click the control object in the workspace to set Data Log 2 on the meter to Auto-Enable.


# Verify that Data Log 2 has been set to Auto-Enable

You can verify that Data Log 2 has been set to Auto-Enable by adding a numeric object to the workspace and linking it to a setup register for the Data Log.

1. In Vista, ensure that the Toolbox is open. If not, select **Options > Show Toolbox**.
2. In the Toolbox, select a **Numeric Object** and drag it to the workspace.
3. Right-click the numeric object. The **Numeric Object Configuration** screen appears.
4. Click the **Link** tab. In the **Link** area, select **Custom** and press the **Ctrl** key while clicking **Edit Link**. The **Create Link** screen for Setup Registers.

5. In the **Nodes** list, double-click the meter name. The associated module directories appears in the **Managers** list.




6. In the **Managers** list, double-click **Data Recorders**.
7. In the **Modules** list, double-click **Data Log 2**.
8. In the **Setup Registers** list, select **RE2 Enabled**.
9. Click **OK** to save the selection and to close the screen.

When the numeric object displays "Auto," you have confirmation that Data Log 2 has been set successfully to Auto-Enable by the control object.

# Configuring Momentum PLC

This chapter describes how to configure Momentum PLC for the system.

For information about installing and configuring Momentum PLC, see the PLC's documentation at www.powerlogic.com.

**⚠ WARNING**

**UNINTENDED OPERATION**

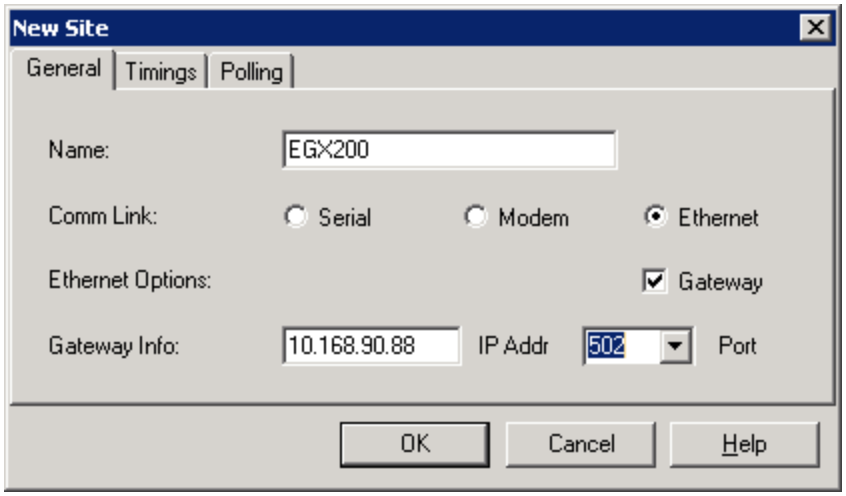
- Do not use the Momentum PLC with either Power Monitoring Expert - Data Center Edition or ION Setup for critical control or protection applications where human or equipment safety relies on the operation of the control circuit.
- Refer to your PLC's technical documentation for more information on its operation.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

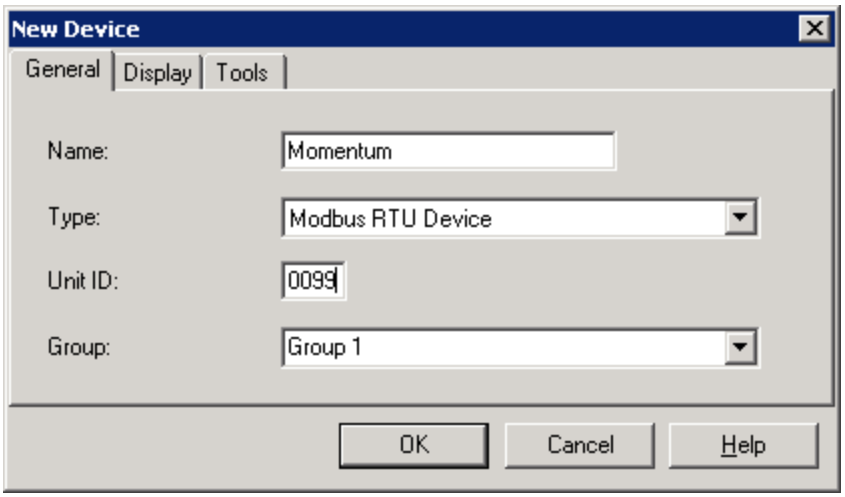
## Add a Momentum PLC to a Site

Use ION Setup to add each Momentum PLC to a site.

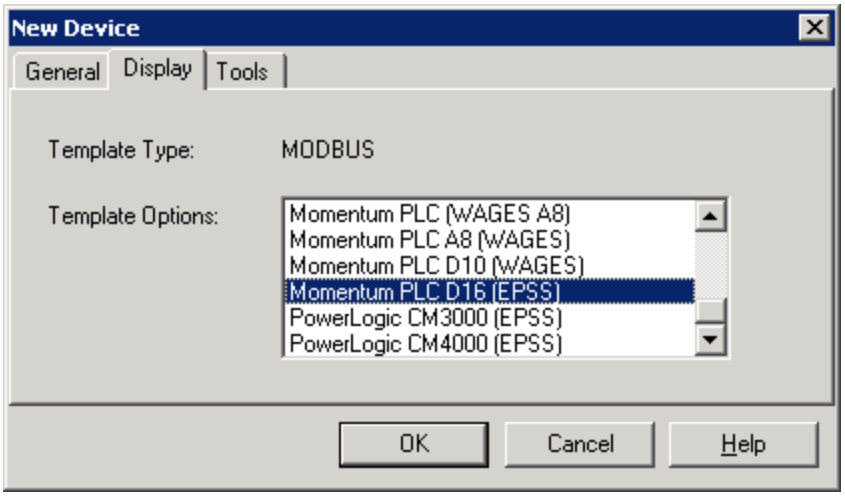
1. In the Network Viewer, right-click the workstation icon and select **Insert Item > Site**. The **New Site** screen appears.
2. Complete the fields to define the new site:
   - **Name** - Add a name to identify the site.
   - **Comm Link** - Select **Ethernet**.
   - **Ethernet Options** - Select **Gateway**.
   - **IP Address** - Enter the IP Address for the device.
   - **Port** - Select 502.



3. Click **OK** to add the site. The new site appears in the Network Viewer.
4. In the Network Viewer right-click the site name and select **Insert Item > Meter**. The **New Device** screen appears.
5. Complete the fields to define the PLC:
   - **Name** - Enter a name to identify the device.
   - **Type** - Select Modbus RTU Device from the dropdown list.
   - **Unit ID** - Enter the unit ID for the device.
   - **Group** - Select a group name from the list or enter a name to define a new group.

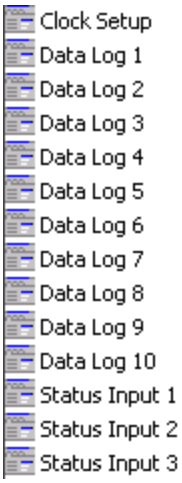



6. Click the **Display** tab and select the **Momentum PLC D16 (EPSS)** template option.




7. Click **OK** to add the PLC to the site.

After a PLC has been added, click its icon in the Network Viewer to display the setup screens in the Content Viewer. The following image shows a partial list of the setup screens.




The remaining topics in this chapter describe how to configure the parameters for the **Clock Setup**, **Data Log** and **Status Input** setup screens.

# Setting the Clock

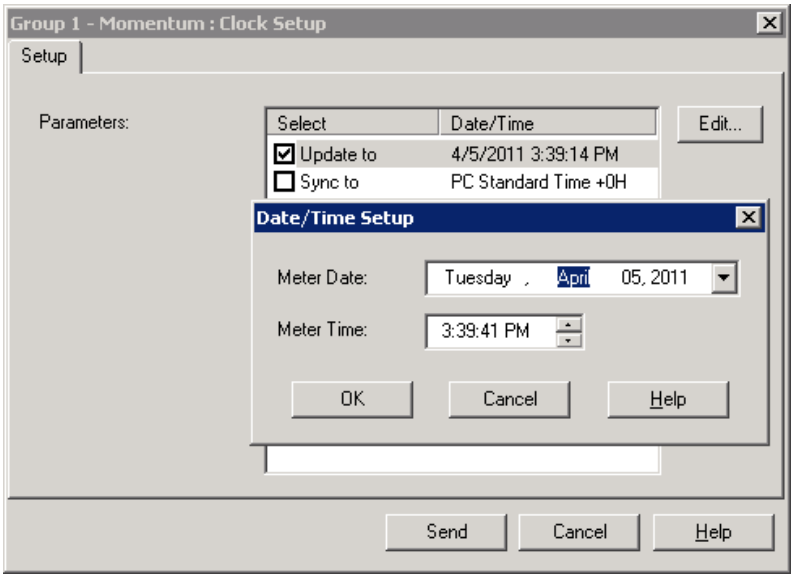
## Set the Date and Time

Follow these steps to set or adjust the date and time for the PLC's clock.

1. In the Content Viewer, double-click **Clock Setup**. The **Clock Setup** screen appears.

   The first time you access this screen, the label under the **Select** column is "Device time" and the **Date/Time** column shows the current time on the PLC.

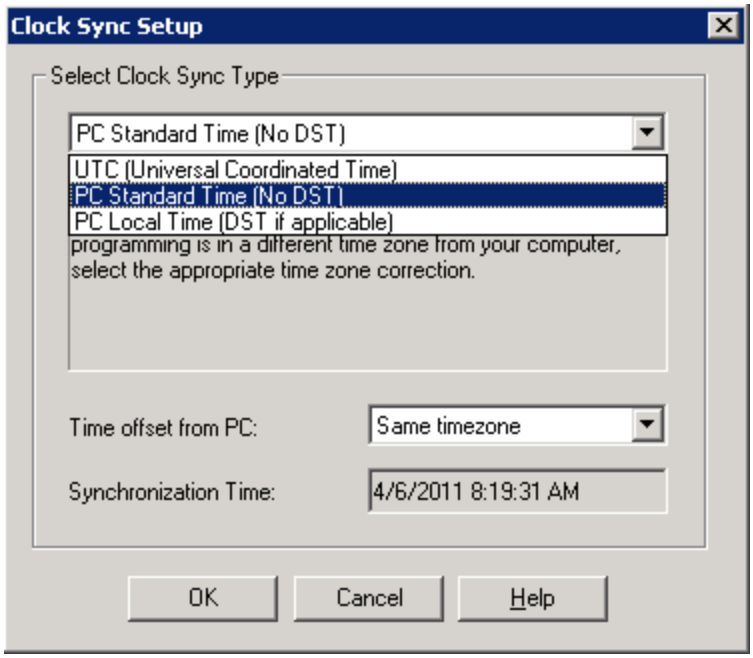
2. Select the Date/Time entry and click **Edit**. The **Date/Time Setup** screen appears.




3. Set the desired date and time in the **Meter Date** and **Meter Time** fields.
4. Click **OK**. The **Date/Time Setup** screen closes.

The "Device time" label changes to "Update to" and is automatically selected. The check mark indicates that the new date and time value will be sent to the PLC when you click **Send**.

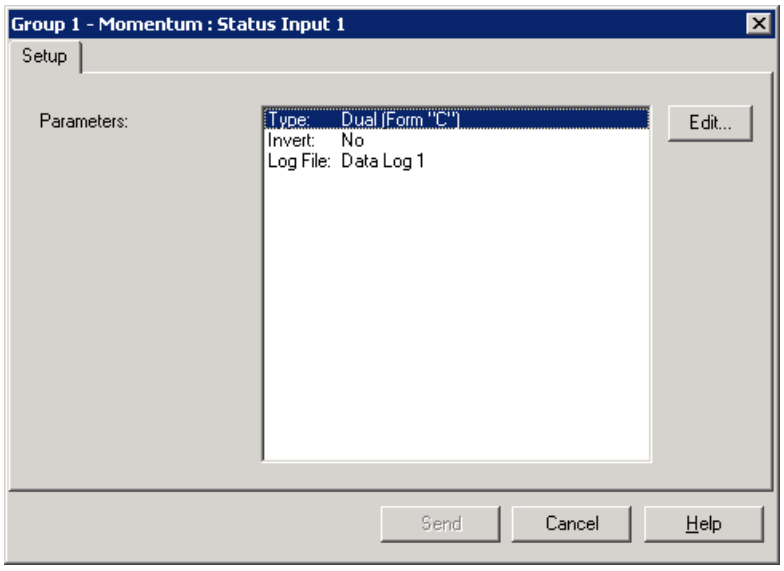
If you clear the check box, the date and time entry reverts to the time currently configured on the PLC.




# Configuring Status Inputs

Follow these steps to configure the status inputs on Momentum PLCs so that data about the states of the generators is recorded.

1. In the Content Viewer, double-click **Status Input 1**. The **Status Input 1** screen appears.



2. In the **Parameters** box, select **Type** and click **Edit**. The **Select Type** screen appears.
3. In the **Type** box, select **Dual(Form "C")** and click **OK**. This parameter generates an event for both the leading and trailing edges of the signal.
4. Select **Invert** and click **Edit**. The **Select Invert** screen appears.
5. In the **Invert** box, select **No** and click **OK**.
6. Select **Log File** and click **Edit**. The **Select Log File** screen appears.
7. In the **Log File** box, select the data log for the status input and click **OK**.
8. Click **Send** to save the changes and send the configuration to the PLC.

Keep track of these status inputs for correct mapping to the generator states through the Generator Test Module . Status inputs for generators, they need to be set to Run and Stop states.

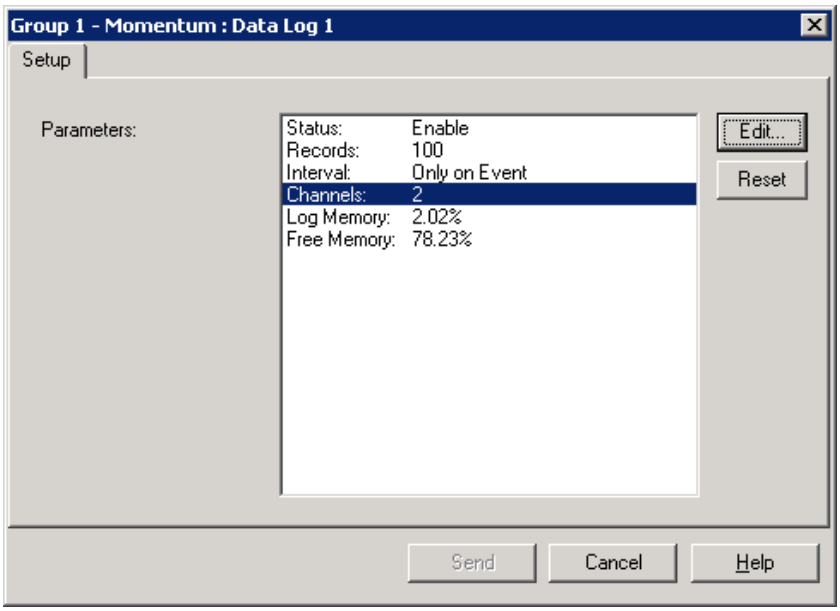
For example, the following table shows the relationship of Status Inputs on the PLC to the settings that are applied through the Generator Test Module .

| Momentum PLC | | Generator Test Module | |
|---|---|---|---|
| **Slot Position** | **Status Inputs** | **EPSS Device** | **State** |
| 1 | Status Input 1 | ATS1 | Test |
| 2 | Status Input 2 | | Normal |
| 3 | Status Input 3 | | Emergency |
| 4 | Status Input 4 | GEN1 | Run |
| 5 | Status Input 5 | | Stop |
| … | … | … | … |

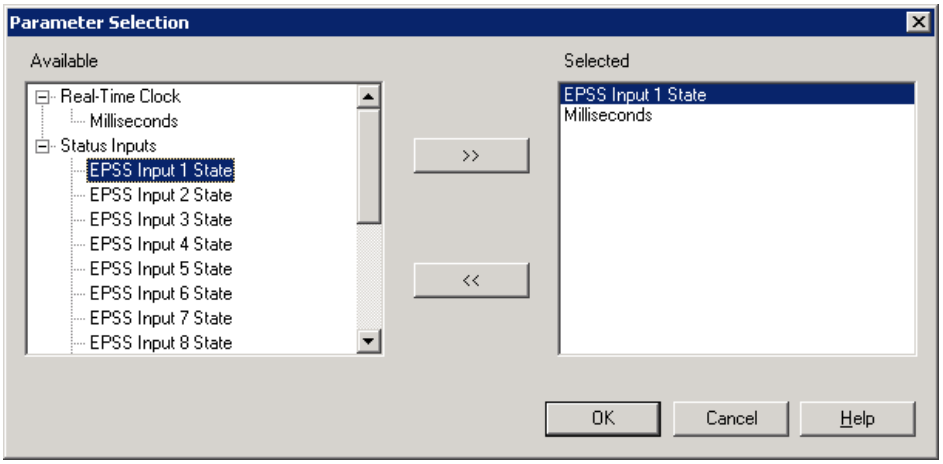
# Defining Data Log Parameters for Status Inputs

Complete these steps to define the data log parameters for the Status Inputs.

1. In the Content Viewer, double-click **Data Log x**, where **x** is the number for the datalog. The **Setup** screen appears.
2. Select the following parameters and click **Edit** to configure them in the Parameter Selection screen:
   - Set **Status** to Enable.
   - Set **Records** to a non-zero value.
   - Set **Interval** to Only On Event.




3. Select **Channels**, click **Edit**.
4. In the **Available** box, navigate to **Status Inputs**.




5. Expand **Status Inputs**, select an EPSS input state, such as **EPSS Input 1 State**, click **>>** to move it to the **Selected** column.
6. Repeat steps 4 and 5 for all status inputs available for the ATSs or generators.
7. Expand **Real-Time Clock**, select **MilliSeconds** and click **>>** to move it to the **Selected** column.
8. Click **OK**.
9. Repeat steps 1 through 8 for all of the Data Logs that you want to configure.
10. Click **Send** to save the changes and send the configuration to the PLC.

# Configuring Digital Outputs

The standard Momentum PLC device driver does not support the configuration of digital outputs. However, you can use the Modbus Device Importer (MDI) to define and configure digital outputs.

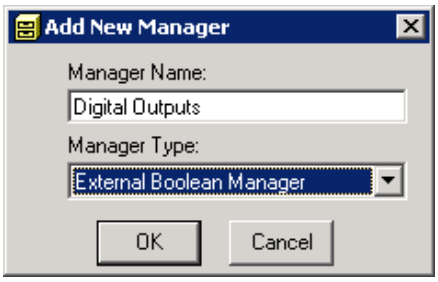
The following information assumes that you already configured an Ethernet Gateway site in Management Console and that you added a device to the site. For more information, see *Setting Up Devices for Ethernet Gateway Communications* in the online help for Management Console or in the *StruxureWare Power Monitoring Expert User Guide*.

## Configure Digital Outputs in MDI

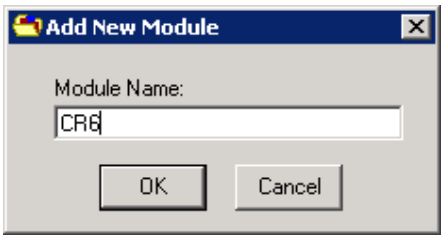
Complete these steps Modbus Device Importer (MDI) to define and configure digital outputs on the PLC.

Before proceeding, make a backup copy of the Momentum PLC map and tree files Momentum_PLC_D16_EPSS.xml and Momentum_PLC_D16_EPSS.ion, respectively. These files are located in the ..\Schneider Electric\system\translators\ folder.

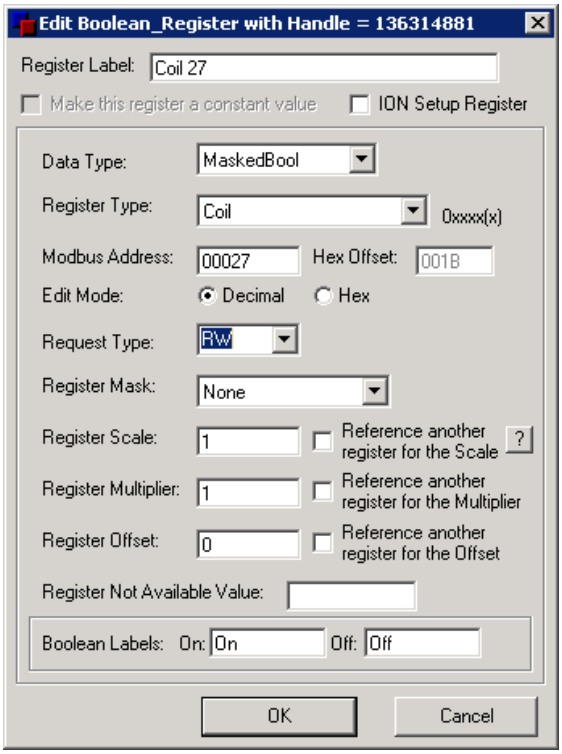
1. In Management Console, select **Tools** > **System** > **Modbus Device Importer**. The MDI main console appears.
2. Open the existing Momentum PLC driver configuration:
   a. Select **File** > **Open** and browse to C:\Program Files (x86)\Schneider Electric\Power Monitoring Expert for Healthcare\system\translators.
   b. Select Momentum_PLC_D16_EPSS.ion.
   c. Click **Open**. The register details appear in MDI.
3. Under **ION Map Information**, right-click Momentum_PLC_D16_EPSS and select **New Manager**. The **Add New Manager** screen appears.




4. In the **Manager Name** box, enter **Digital Outputs**. In the **Manager Type** box, select **External Boolean Manager**. Click **OK**.
5. Under **ION Map Information**, right-click **Digital Outputs** and select **New Module**. The **Add New Module** screen appears.




6. In the **Module Name** box, replace **Ext Bool 1** with the correct name, and click **OK**. In this example, **CR6** is entered.
7. Under **ION Map Information**, right-click **CR6** and select **New Register**. The **Edit Boolean_Register screen** appears.
8. Update the values for **Register Label**, **Register Type**, **Modbus Address**, and **Reset Type** and click **OK**. An example is shown next.




## Use Copy to create other module and register entries

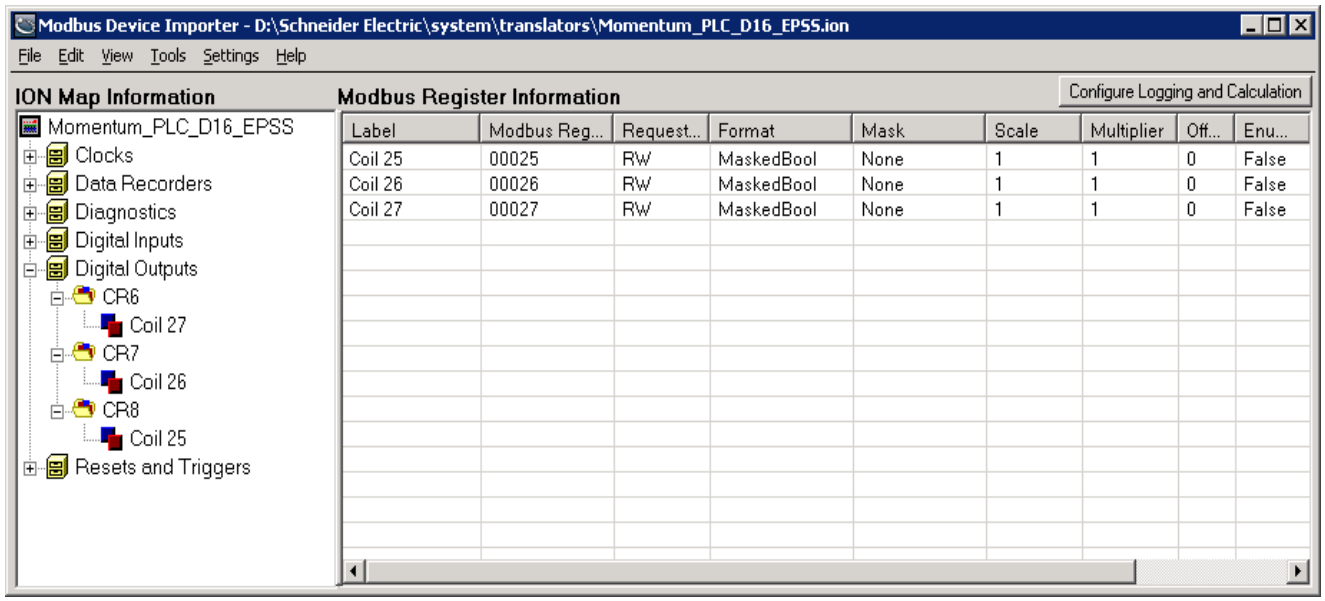
You can create multiple module and register entries by using **Copy** and **Paste** operations.

1. Right-click a module name and select **Copy**.
2. Right-click **Digital Outputs** and select **Paste** to add a copy of the module and registry entries.
3. To change the module name, right-click the module, select **Advanced Properties**, change the name for the module, and click **OK**.
4. To change the register values in the **Modbus Register Information** area:

- **Label** - In the **Label** column, double-click the register name. Change the label and press Enter.
- **Address** - Double-click the Modbus register address. Change the address and press Enter.

5. Repeat steps 1 through 4 above to create and update additional modules.

   The following image shows an example of completed entries in the MDI console.



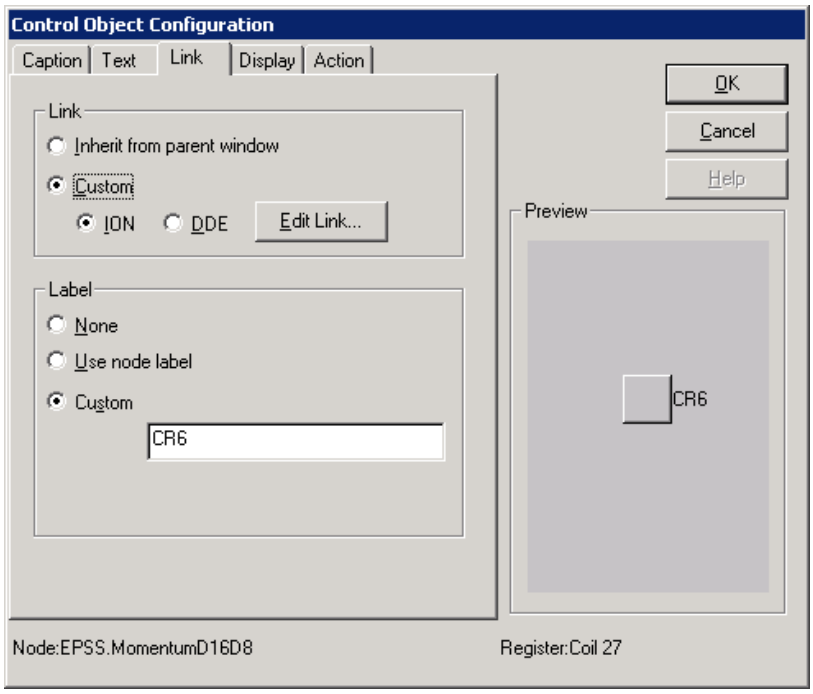

   The Modbus registers shown above may not match your system. Adjust the values to match your particular Modbus map.

6. Select **File** > **Save** to save your changes.
7. Select **Tools** > **Update Device Type** to add the configuration to the Momentum PLC.

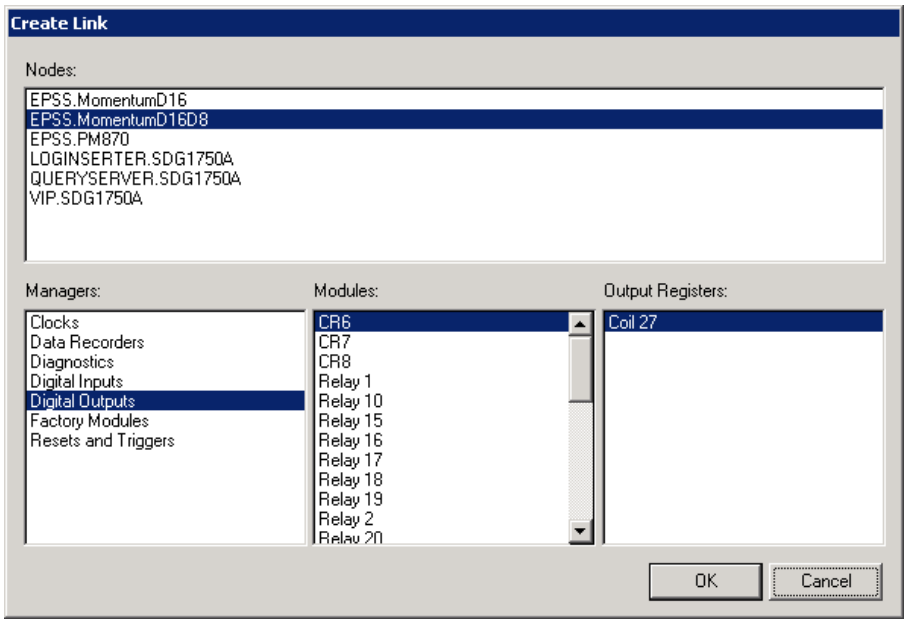
## Create a Control Object and Status Object in Vista

Complete these steps to link a Control Object and a Status Object to an Output Register that you defined in the MDI.

1. Open Vista and select **File** > **New** to open an empty workspace.
2. Ensure that the Toolbox is open by clicking **Options** > **Show Toolbox**.
3. Select a **Control Object** in the Toolbox and drag it to the workspace.
4. Right-click the control object. The **Control Object Configuration** screen appears.
5. Select the **Link** tab.




6. Under **Link**, select **Custom** and **ION**.
7. Under **Label**, select **Custom** and enter a label for the control object.
8. Under **Link**, click **Edit Link**. The **Create Link** screen appears.




a. In the **Nodes** box, double-click the PLC name. The module directories appear in the **Managers** box.

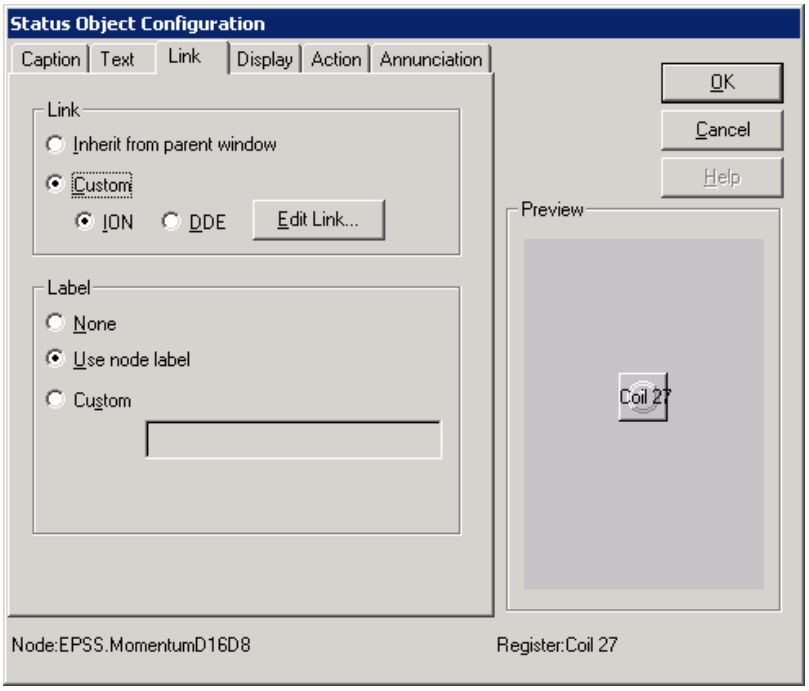
b. In the **Managers** box, double-click **Digital Outputs**

c. In the **Modules** box, double-click **CR6**.

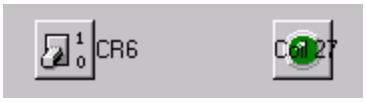
d. In the **Output Registers** box, select **Coil 27**.

e. Click **OK** to save the selection and to close the screen.

9. In the Workspace, select a **Status Object** in the Toolbox and drag it to the workspace.
10. Right-click the status object. The **Status Object Configuration** screen appears.




11. Select the **Link** tab.
12. Under **Link**, select **Custom** and **ION**.
13. Under **Label**, select **Use node label**.
14. Under **Link**, click **Edit Link**. The **Create Link** screen appears.
15. Repeat steps a. through e. above.
16. Save the diagram. The following image is an example of the Vista diagram.




You can now use the Control Object to initiate a state change remotely.

# Configuring SER3200 Meters

The SER3200 power meter can be used with the software to record status changes of the generator contacts in the onboard data logs.

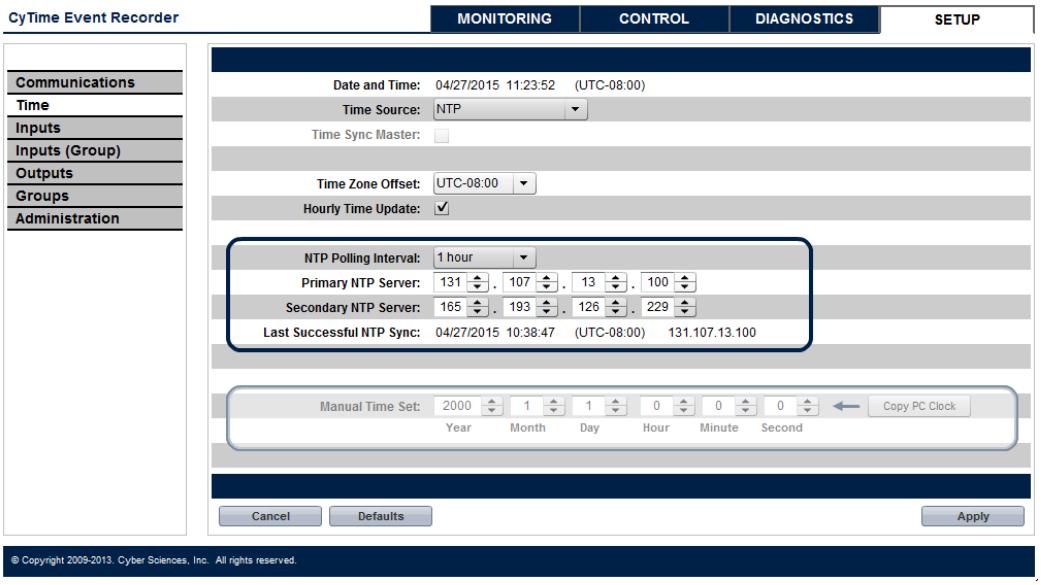
The process to set up the SER3200 with Power Monitoring Expert - Data Center Edition includes these steps:

1. Install hardware and configure device communications and digital inputs.

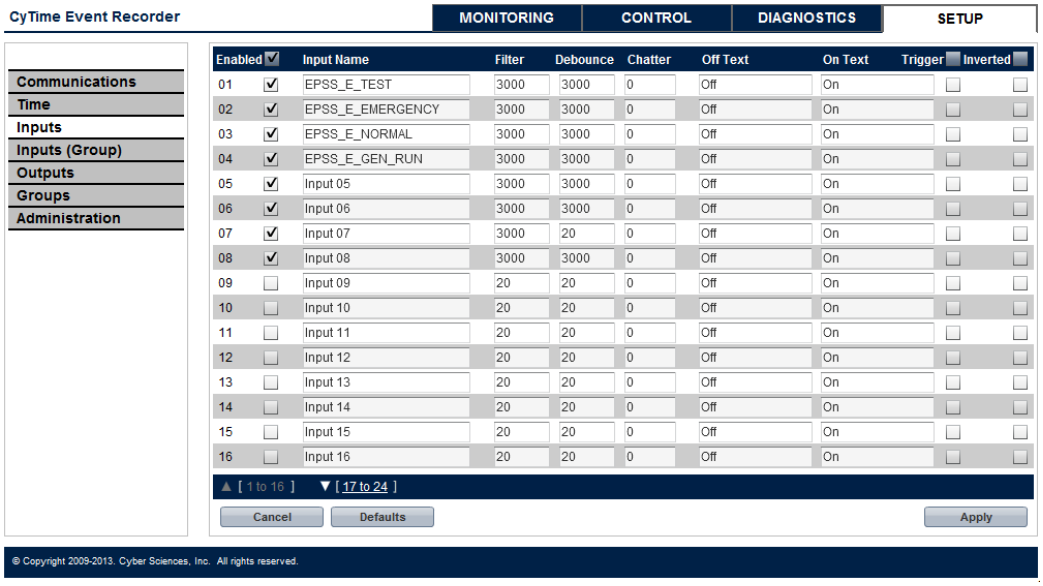
   The SER3200 can be configured using the integral webserver of the device. Enter the IP address of the device in the browser to open the setup page. The default username and password is “admin”. Refer to*SER-3200/SER-2408 Instruction Bulletin: User's Guide* for instructions.

Perform the following steps from the *SER-3200/SER-2408 Instruction Bulletin: User's Guide* before proceeding:

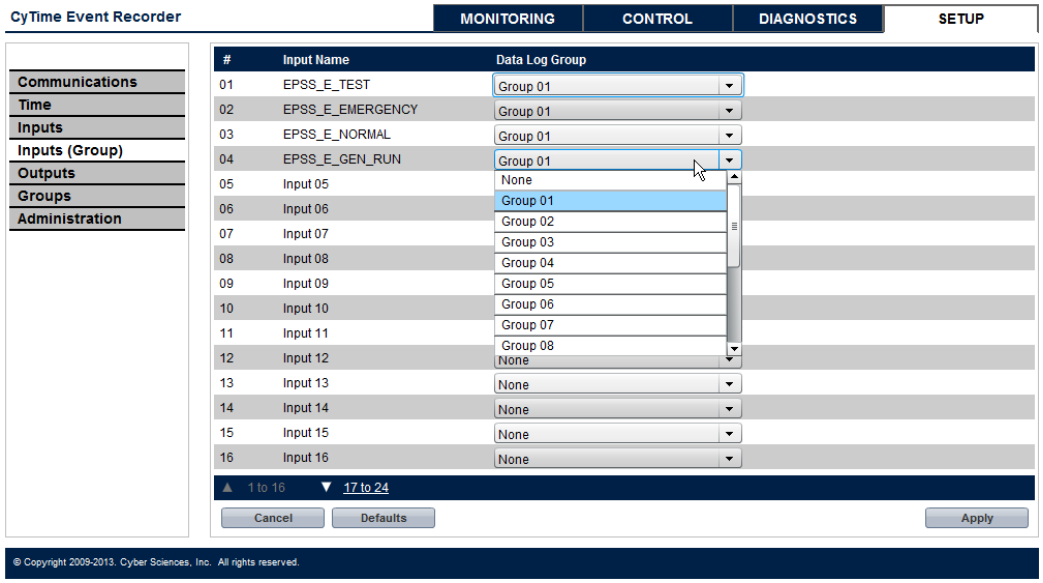
2. In your browser, enter your device IP address and press **Enter**. Log in with **admin/admin** for the Login ID and password.
3. Click **SETUP**, and then click **Time**. Set the time/clock correctly for your location.




4. Click **SETUP**, and then click **Inputs**. Configure all necessary inputs and select the **Enabled** checkbox next to each input. When finished, click **Apply**.




5. Click **SETUP**, and then click **Groups**. Assign a group to each input. When finished, click **Apply**.




6. Make sure that you enable logging for all above groups.

## *NOTICE*

**UNINTENDED OPERATION**

Make sure to enable the logs in the groups section when configuring the device.

**Failure to enable the logs in the groups section will result in the inputs not being available and not appearing in the Generator Performance Tool.**

**NOTE**: For more information on configuring the communications and digital inputs for this device, see the *SER-3200/SER-2408 Instruction Bulletin: User's Guide* located on the Power Monitoring Expert - Data Center Edition DVD.

7. Add the device in Management Console.
8. Open Vista to verify communications.
9. Use the Generator Performance Configuration Tool to assign measurements for generators.

See the following sections for instructions on step 2 - 4.

After you complete the above steps, you can generate the Generator Test Report for data recorded by the SER3200.

**⚠ WARNING**

**UNINTENDED OPERATION**

- Do not use the SER3200 with either or ION Setup for critical control or protection applications where human or equipment safety relies on the operation of the control circuit.
- Refer to your power meter's technical documentation located on the product DVD for more information on its operation.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

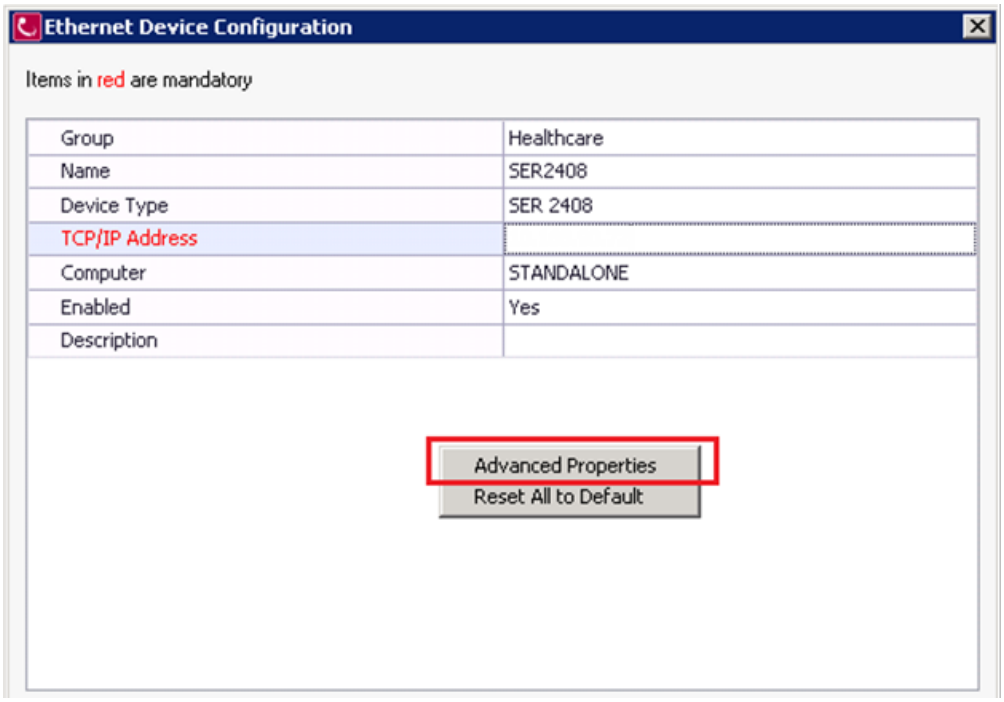
# Adding the SER3200 to Management Console

In Management Console, add the SER3200 as an Ethernet device.

**NOTE**: For proper operation, the device must have the **Unit ID** value set to 1.

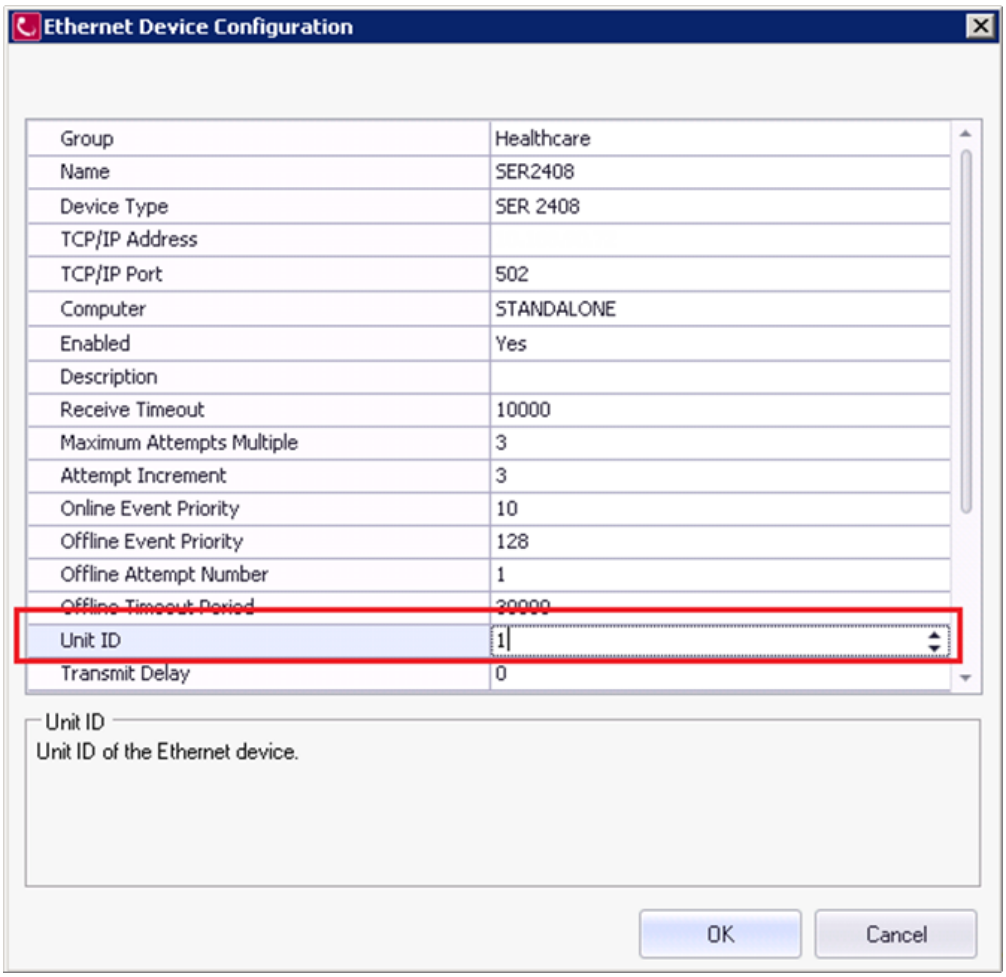
Follow these steps to set the device **Unit ID**:

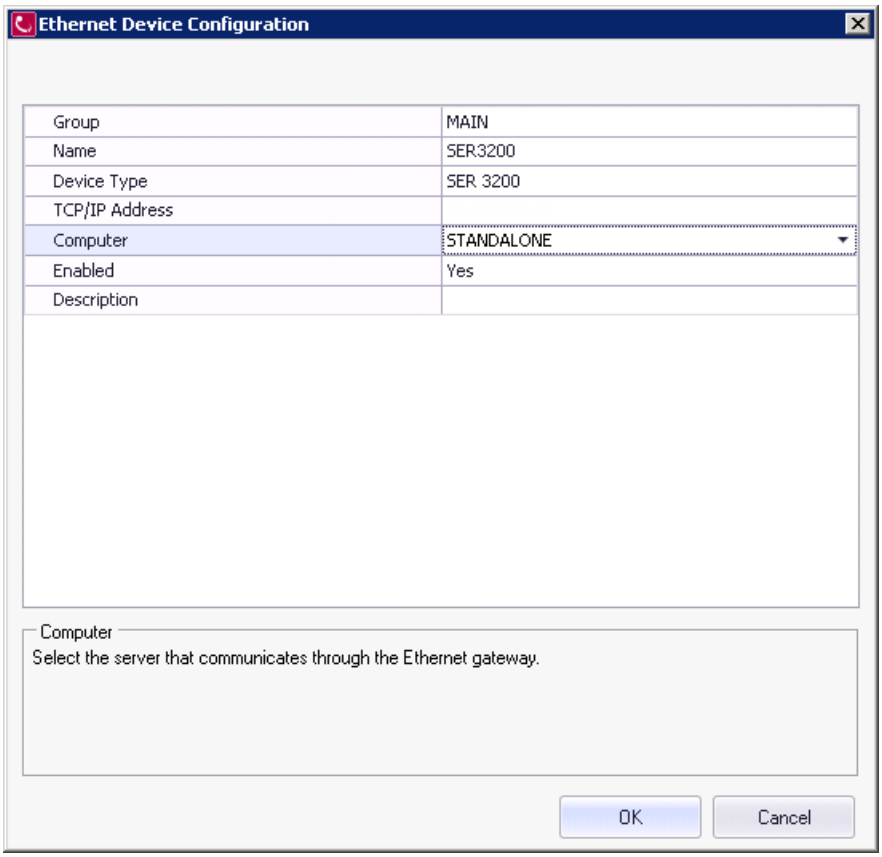
1. As you enter the device details in the Ethernet Device Configuration screen, right-click the screen and click **Advanced**.




The Advanced Properties for the device appear.

2. In the Unit ID field, enter 1.






3. Click **OK**.
4. Verify the device status is "Device Connected" as shown next.

# Verify Device Communications in Vista

After you add the device to Management Console, you can open Vista to view the device's counter, input\output status, and data logs.

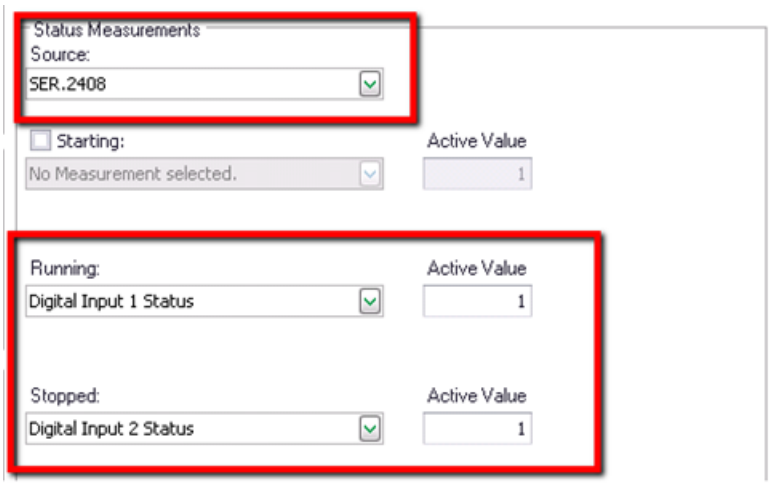
# Assign Measurements for Generators

After device data is logged into the database, you can assign device measurements using the Generator Performance Configuration Tool.

Add the device and select the measurements for the generator as explained in these sections:

- "Define Generators" on page 69

The required status measurements for the SER3200 are “Digital Input Status X” where X = input of the SER3200. On the **Generators** tab, the selected source and measurement are similar to the following example.

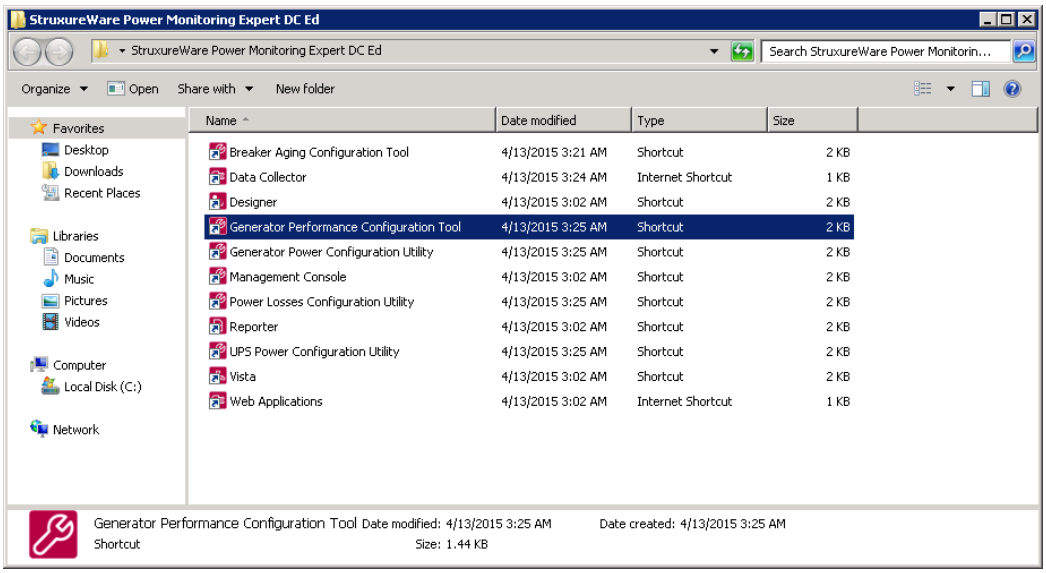


# Generator Performance Configuration Tool

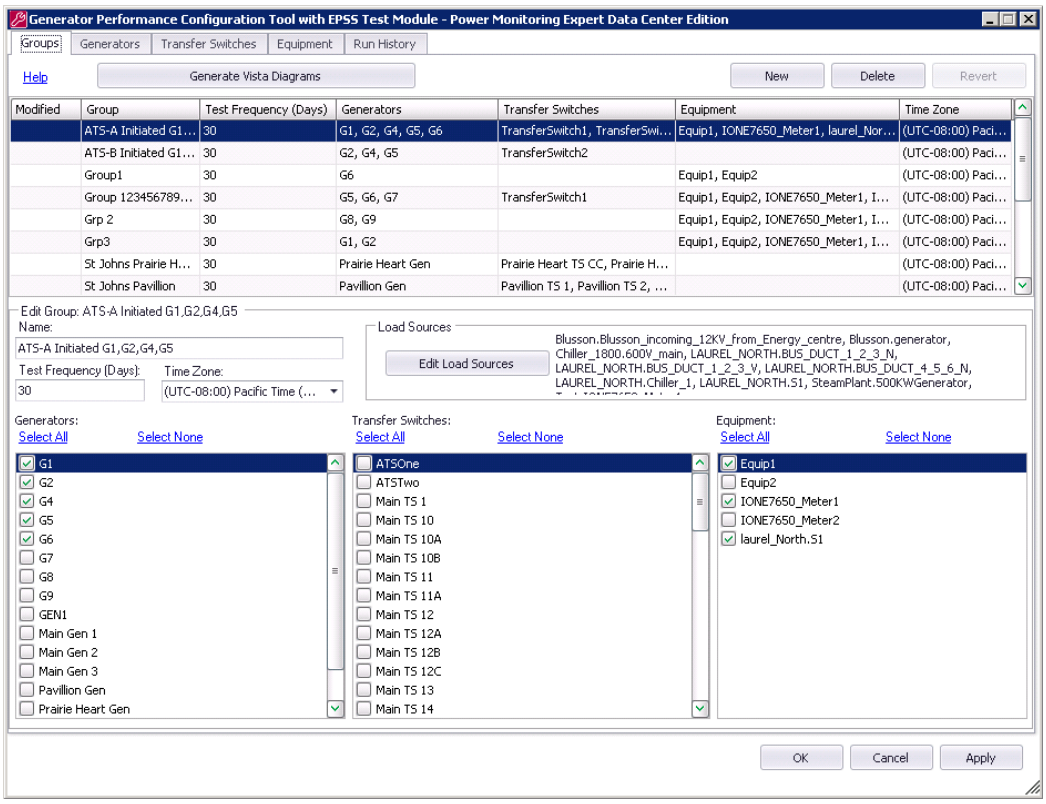
The Generator Performance Configuration Tool is a utility that helps you configure the generators and other equipment for reporting the data and status of the power system. The generator-related reports will not work until the required parameters are set up in the tool.

## Start the Generator Performance Configuration Utility

To start the Generator Performance Configuration Tool, open the StruxureWare Power Monitoring Expert - Data Center Edition folder on the desktop and double-click the Generator Performance Configuration Tool shortcut.




The Generator Performance Configuration Tool window contains these tabs: **Groups**, **Generators**, **Equipment**, and **Run History**. On these tabs, you create the entities and groups for equipment in the system. You also view data for prior test runs. The tabs contain a grid area and an editor area, as shown next. The grid area is empty initially but it will be populated with entries that you create through the editor area. Use the editor area to define the settings for new items, or to update the settings for an item that you select in the grid area.




When you first use the configuration tool, you need to define generators and equipment on the applicable tabs. After you do this, you define the device groups on the **Groups** tab. The device groups are necessary for reporting.

Use the following tabs to configure the tool:

- **Groups** tab - Define and configure all groups.
- **Generators** tab - Define, describe and configure the generators.
- **Transfer Switches** tab - Define, describe and configure the transfer switches.

**NOTE:** Transfer Switches and Active Transfer Switches (ATS) are not typically part of a data center solution; you will not need to configure these for Power Monitoring Expert - Data Center Edition.

- **Equipment** tab - Define, describe and configure the equipment.
- **Run History** tab - Define, describe and configure the run history.

See the following sections for instructions to use each tab:


- "Define Groups" on page 66
- "Define Generators" on page 69
- "Define Equipment" on page 73
- "View Run History" on page 74

Use the following common controls for the tabs:

- **Help** - Click this to view online help for the tab.
- **New** - Creates a new entry in the grid.
- **Delete** - Deletes the selected entry from the grid.
- **Revert** - Returns a modified record to its original values, if **OK** or **Apply** have not been clicked.
- **OK** - Saves all changes and exits the configuration tool.
- **Cancel** - Exits the tool without saving changes.
- **Apply** - Saves all changes and leaves the tool open.

The **Modified** column in the grid area shows the status of the row data:

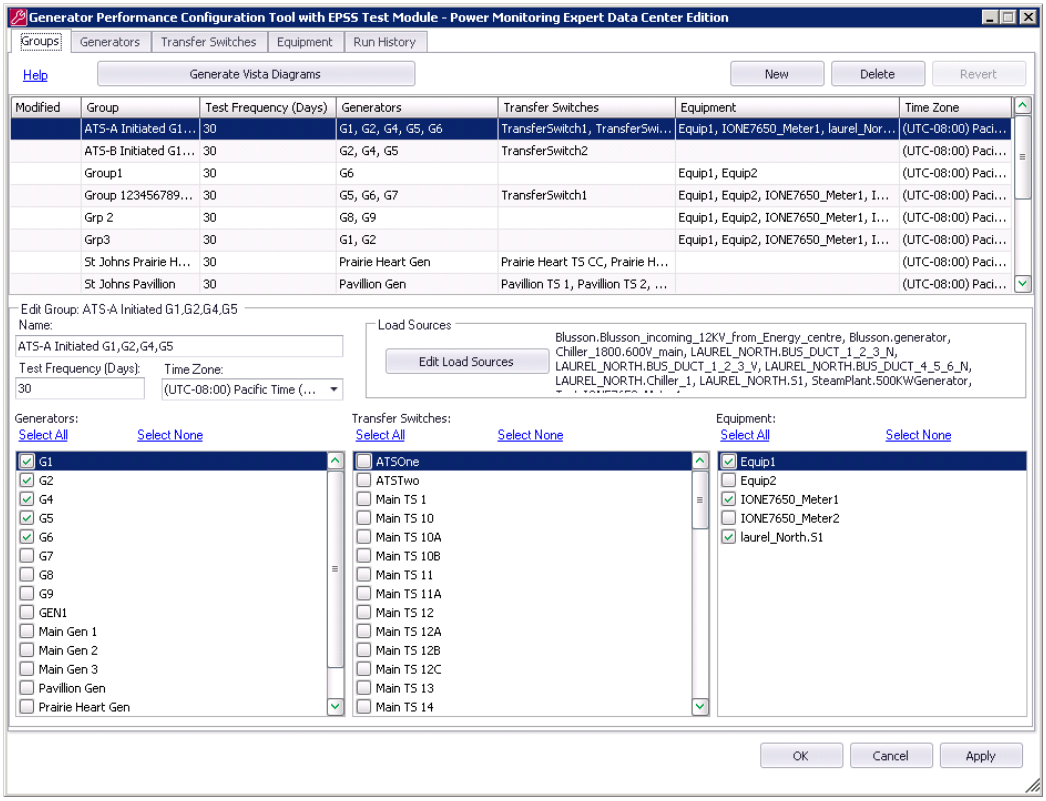
**+** (plus) - a new entry.

***** (asterisk) - a modified entry.

**!** (exclamation mark) - entry needs more information before it can be saved.

# Define Groups

A performance group is a combination of generators and other equipment for reporting. The **Groups** tab must be completed before you can configure and produce any reports.




You can perform the following actions on this tab:

- Click **New** to create a new group for generating reports. A group can contain any device that has been configured on the other tabs. See "Edit Groups" on page 66 for instructions to define the groups.
- Click **Delete** to remove records from the system.
- Click **Revert** (before you click **Apply** or **OK**) if you make changes to a record and want to revert to your initial settings.
- Click the **Edit Load Sources** to associate a group with the electrical loads that the group of generators must carry in a power outage. See "Edit Group Load Sources" on page 68 for instructions.

# Edit Groups

The **Groups** tab displays the device groups defined in the system. The generators and other equipment must be defined on their respective tabs before you can add them to a group.

1. Click **New** to create a group.
2. Complete the following to define the values for a group:
   - **Name** - Enter a unique name to identify the group.

- **Generators** - Select the generators to include in the group.
- **Equipment** - Select the equipment to include in the group.

The **Select All** and **Select None** options let you work easily with large numbers of sources by selecting all check boxes or clearing all check boxes at the same time.

3. Click **Apply** to save the group and remain on the tab.
4. Repeat these steps to create other groups.

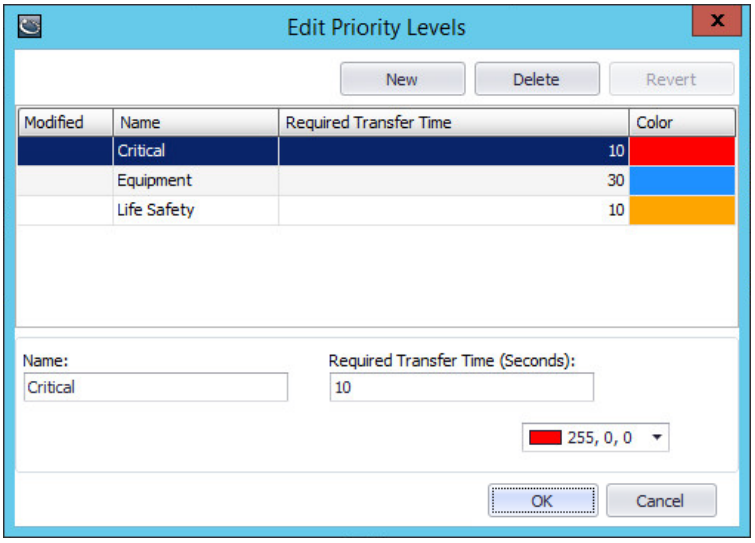
# Edit Group Priority Levels

The **Edit Priority Levels** editor is used to select at least one priority level that you want to apply to the equipment groups. The default priority level names and transfer times are:

- Critical - 10 sec
- Equipment - 30 sec
- Life Safety - 10 sec

You can change any of these names and transfer times and add new priority levels as necessary.

1. Click **Edit Priority Levels**. The **Priority Levels** screen appears.



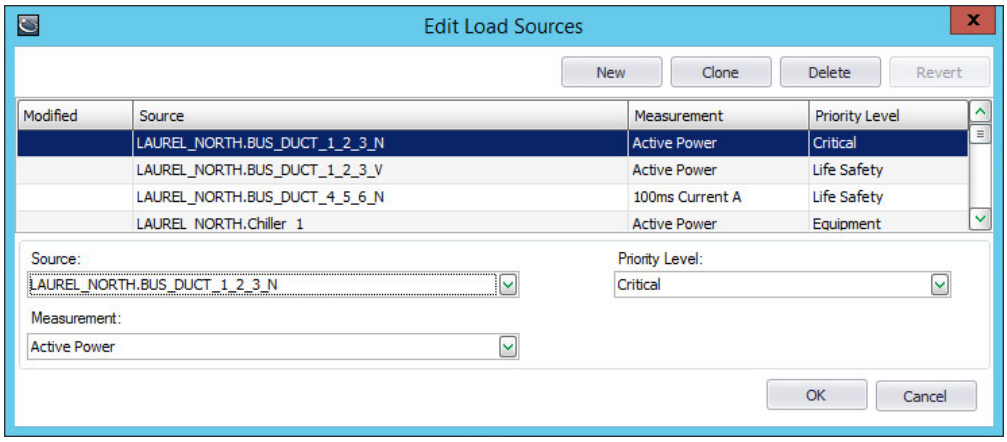

2. Click **New** to add a priority level.
3. Complete the following to define priority levels:
   - **Name** - Enter a unique name to identify the priority level.
   - **Required Transfer Time (Seconds)** - Enter the transfer time in seconds. This time indicates the maximum acceptable time it takes the equipment to move from the **Test** state to the **Emergency** state.
   - **Color** - Click the color box to select a color for the priority level. This color appears on the Generator Capacity Report summary page, where the generator loads are compared.
4. Click **OK** to save the priority level and return to the **Groups** tab.

# Edit Group Load Sources

On the **Edit Load Sources** screen, you can associate an equipment group with the various electrical loads that the equipment must carry during a power outage.

Define the priority levels for the system before you configure load sources. See "Edit Group Priority Levels" on page 67 for instructions.

1. Click **Edit Load Sources**. The **Select Load Sources** screen appears.

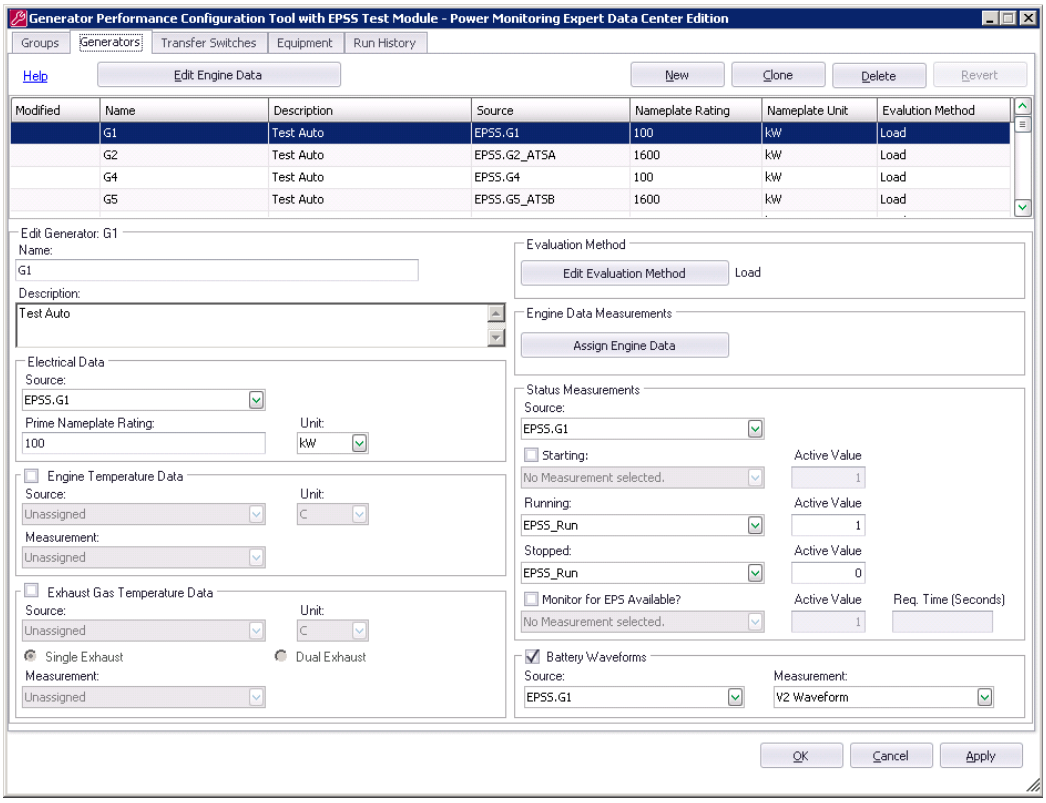



2. Click **New** to add a load source.
3. Complete these fields:
   - **Source** - Select the measurement source.
   - **Measurement** - Select the measurement to monitor.
   - **Priority Level** - Select the priority level to assign to the load source.
4. Click **OK** to save the new load source and return to the **Groups** tab.

   You can use the **Clone** button to associate an equipment group with several sources where the load is logged against the same measurement. The cloned group contains the same measurement and priority level as the original.

# Define Generators

Use the **Generators** tab to create or update entities representing the generators in the power supply system. Complete this tab if you need to produce reports for generators.




You can perform the following actions on this tab:

- Click **New** to define the properties of the generators in the system. See "Edit Generator Properties" on page 69.
- Click **Clone** to define a new generator that is similar to an existing generator. The system copies many details of the existing device into the new entry. You can then enter the unique details of the new device. If you need to define several devices that are similar, this feature can help you define them quickly. See "Clone Generator Properties" on page 70.
- Click **Delete** to remove records from the system.
- Click **Revert** (before you click **Apply** or **OK**) if you make changes to a record and want to revert to your initial settings.

# Edit Generator Properties

The **Edit Generator** area on the tab is used to create a generator entry and to define specific values for it.

1. On the **Generator** tab, click **New**.
2. Complete the following fields to define a generator.

- **Name** - Enter a unique name to identify the generator.
- **Description** - optional. You can add specific information about the generator, such as make and model.
- **Electrical Data**
  - **Source** - Select a source name. The source represents the device that records the electrical data from the generator.
  - **Prime Nameplate Rating** - Enter the maximum power load for the generator. Refer to the generator's nameplate for this value.
  - **Unit** - Select the unit of measurement for the power load.
- **Battery Waveform** - optional. Use this area to if you want to configure and generate the Battery Health Report. To enable the report, check the box and complete these fields:
  - **Source** - Select a source name that is performing the waveform capture. This option is only available for ION 7650 meters.
  - **Measurement** - Select the measurement recording the battery waveform. For a typical configuration, this is the V4 waveform.

    Specific frameworks for the battery voltage waveform must also be configured. See "Generator Battery Health" on page 83 for additional instructions.
- **Status Measurements** - These fields are not required.

3. Click **Apply** to save the changes and remain on the tab.
4. Repeat these steps to define other generators.
5. If you are defining several similar generators, use the **Clone** button. See "Clone Generator Properties" on page 70.

# Clone Generator Properties

You can use the clone feature to copy the properties of an existing generator entity and use those properties as the baseline for multiple generators. The clone feature can help you define several similar generators quickly.

1. On the **Generators** tab, select the generator you want to use as the baseline for another generator.
2. Click **Clone** to create a new generator based on a selected entity. Many fields are copied from the selected generator. The fields which are not copied have an information icon to indicate where you need to enter data, as follows:
   - **Name** - Enter a unique name to identify the generator.
   - **Electrical Data** - **Source** - Select a source name from the dropdown list. The source represents the device that records the electrical data from the generator.
   - **Status Measurements** - **Source** - Select a source name. The source represents the metering device that records the status of a generator.

   For information about other generator properties, see the previous section .
3. Click **Apply** to save the new generator entity.

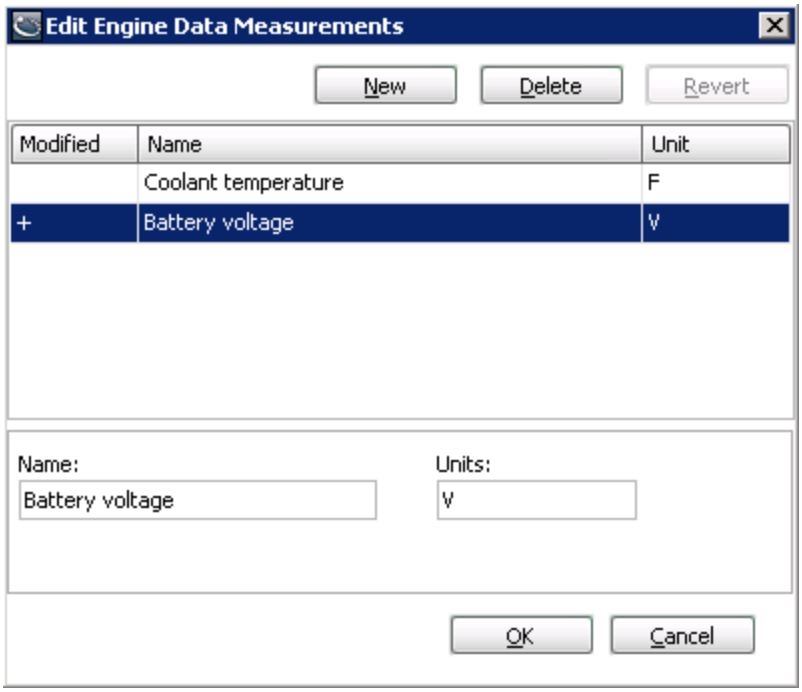
# Edit Engine Data

The **Engine Data Measurements** editor is used to define engine data values and other custom data values for generators. The items being measured, typically analog data, can differ from generator to generator. Battery voltage and coolant temperature are two common measurements.

If you want to use the Smart Device Data Collector to log generator data, add the engine data values you need. These values can also be reported on the Trend Report, Tabular Report, Test Report, and dashboard gadgets.

Follow these steps to add engine data values and other custom data values.

1. Click **Edit Engine Data** to open the **Edit Engine Data Measurements** editor.



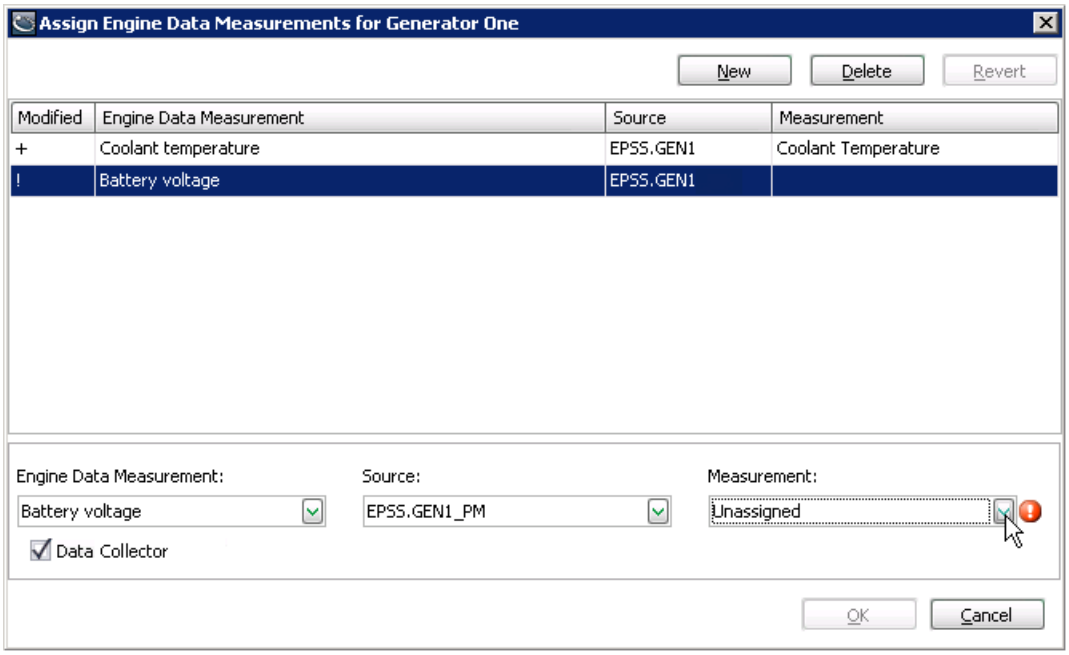

2. Click **New** to enable the input fields.
3. Complete the following to define new data values:
   - **Name** - Enter a name for the data value.
   - **Units** - Enter a unit of measure for the data value.
4. Click **OK** to save the new data value and return to the **Generators** tab.

Next, assign these data values to generator measurements. See "Assign Engine Data" on page 72 for instructions.

# Assign Engine Data

The **Engine Data Measurement** editor is used to associate engine data values with specific generator measurements. See "Edit Engine Data" on page 71 for instructions to define custom engine data values.

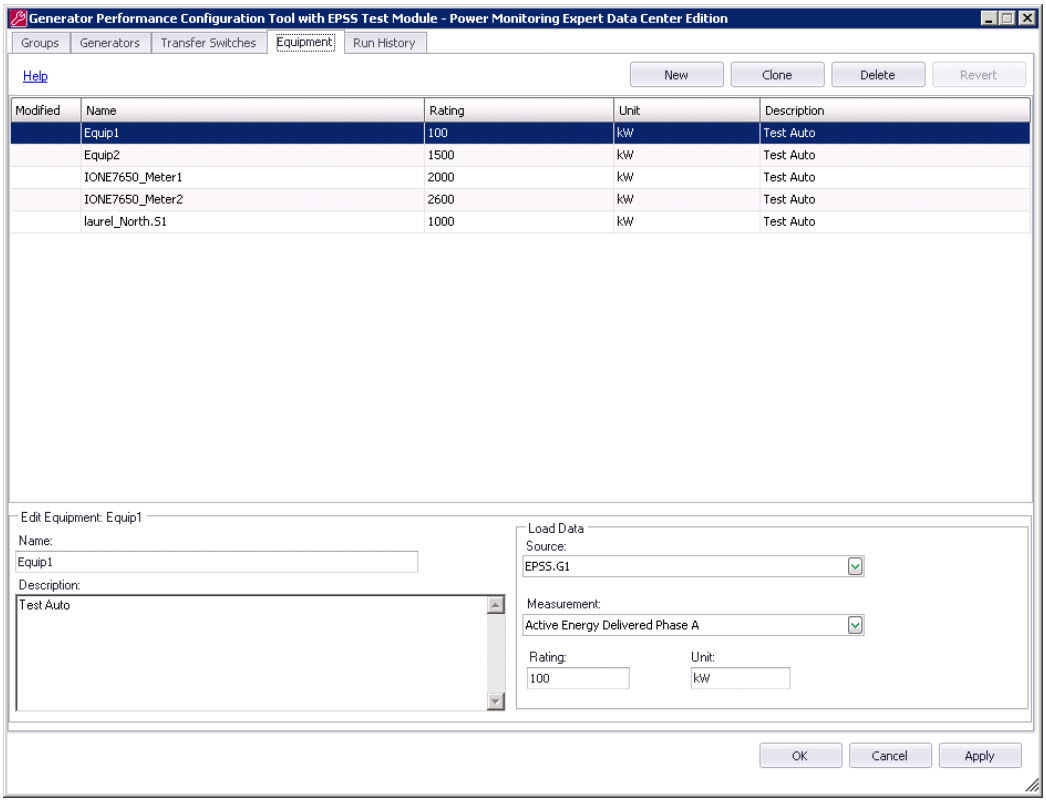
1. Click **Assign Engine Data** to open the **Assign Engine Data Measurement** editor.




2. Click **New**.
3. Complete these fields to associate a data value with a specific measurement:
   - **Engine Data Measurement** - Select the data value. The dropdown list contains all of the data values that were configured on the Edit Engine Data Measurements screen.
   - **Source** - Select the device name that records the generator data.
   - **Measurement** - Select the measurement for the data value.
   - **Data Collector** - Check this option to enable users to enter measurement data through the Smart Device Data Collector web tool. See "Smart Device Data Collector" on page 119. This data can also be included in the Test Report.
4. Click **OK** to save your changes and return to the **Generators** tab.

# Define Equipment

Use the **Equipment** tab to create a logical device with a source measurement and rating. You can add these logical devices to device groups for reporting. Complete this tab if you need to produce reports for equipment capacity.




You can perform the following actions on this tab:

- Click **New** to enter new record for a device. See "Edit Equipment Sources" on page 73 for instructions to define the devices.
- Click **Clone** to copy an existing record and make minor changes. The system copies many details of the existing device into the new entry. You can then enter the unique details of the new device. If you need to define several devices that are similar, this feature can help you define them quickly.
- Click **Delete** to remove records from the system.
- Click **Revert** (before you click **Apply** or **OK**) if you make changes to a record and want to revert to your initial settings.

# Edit Equipment Sources

The **Equipment** tab displays the equipment load sources and measurements defined in the system.

1. Click **New** to create a record.
2. Complete these fields:

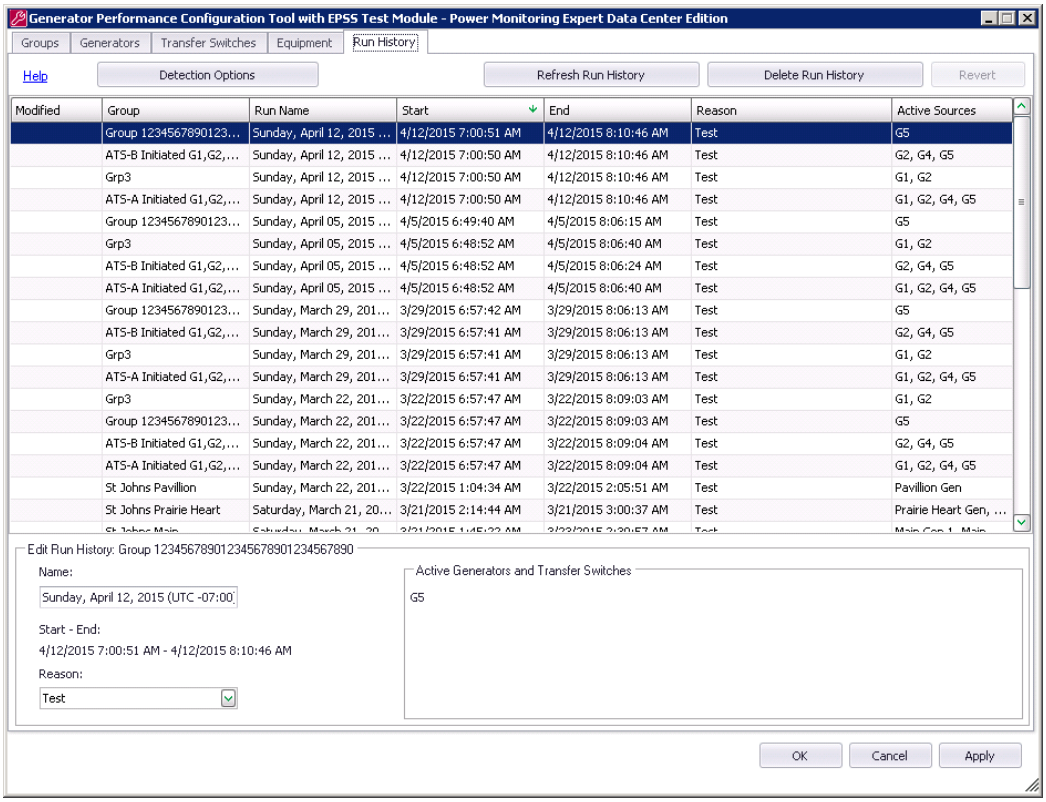
- **Name** - Enter a unique name to identify the record.
- **Description** - Enter additional information about the device. Optional.
- **Source** - Select the load source for the device.
- **Measurement** - Select the measurement for the device.
- **Rating** - Enter the maximum rated load for the device.
- **Unit** - Enter the unit of the measurement.

3. Click **Apply** to save the record and remain on the tab.
4. Repeat these steps to enter additional devices.

# View Run History

Use the **Run History** tab to view or modify run activities that represent the Test, Load Shedding, and Power Outage activities that have occurred in the system. The history indicates when components of the power system have become active, such as when a generator was running. The runs stored in history can be used as input for reports and dashboards.

Because the system stores the history of these activities, you can generate useful reports about the equipment operation. The reports can identify when the system was active, why the system was active, and what devices were active.



The first time the history records are generated on the **Run History** tab, the system may take a long time depending on the amount of history present in the system. When changes occur in the equipment configuration, the run history must be generated again.

For example if you remove a generator from a group, the run history for that group needs to be rebuilt because that generator may have been the reason for the detection of a run. Now that the generator is not part of the group, the system needs to build the run history again to have accurate data.

You can perform the following actions on this tab:

- Click **Detection Options** to modify the criteria of a run event that will cause it to appear on this tab. See "Modify Run Detection Options" on page 75.
- Click **Refresh Run History** to update the tab with the latest run events that have occurred in the system.
- Click **Delete Run History** to remove all run event records from the tab.
- Modify the name and run reason for a run event. See "Modify Run Details" on page 76.

# Modify Run Detection Options

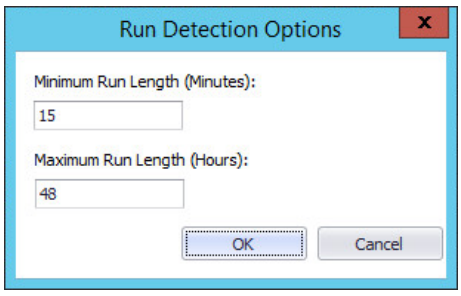
The run detection options can be defined to help guard against bad data in the system. To record actual run activities, you can set the parameters so the system only records runs that fall within the criteria.

The minimum run length value is present to prevent false positives, which may occur during commissioning when the states of the generators are changing quickly and seemingly at random. This may be due to signals being recorded that really do not reflect actual generator activity.

You can set the maximum run length to eliminate "hanging" runs. A hanging run occurs when the stop signal for a generator is not recorded properly. As a result, every week during the test it records a running signal but there is no way for the system to know when it stops. If the system does not see a stop signal, it sets the end of the run to be the start of the run plus the maximum run duration. Therefore you cannot determine how long the generator was actually running.

Complete the following steps to define the run criteria for the system to store runs in history.

1. Click **Detection Options**. The **Run Detection Options** screen appears.




2. Change the values in the minimum and maximum fields.
3. Click **OK** to save the changes and return to the **Run History** tab.

4. Click **Refresh** to update the tab with the run events that match the new detection criteria.

# Modify Run Details

The system defines run data, such as name, start time, end time, reason, and active sources automatically. You can change the name of the run event and the reason for the run.

- The default run name is the start date of the run, such as `June 12 2011`. If a group has multiple runs on the same date, the subsequent runs have the same date with the run number appended, such as `June 12 2011 Run 2` and `June 12 2011 Run 3`.
- The system automatically detects the reason for the run. If the detected reason is incorrect, you can change the reason. For example, the reason appears as Test, but the run is actually Load Shedding.

Other details about the run event cannot be modified directly. If the sources for a run are not correct, you can exclude or include specific sources when generating a report based on this run.

1. Click the run record you want to modify. The run details appear below the grid.
2. In the **Name** field, change the suggested run name as necessary.
3. In the **Reason** list, select the correct reason for the run.
4. Click **OK** to save the changes for the run.

# Generator Activity Report

The **Generator Activity Report** shows the test run hours and other test run data for each generator in the selected group.

**⚠ WARNING**

**INACCURATE REPORT RESULTS**

- Do not incorrectly configure the devices and software. This can lead to inaccurate reports and/or data results.
- Do not rely solely on system reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Use system reports as a supplement to proper workplace practices or equipment maintenance, not as a substitute.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

# Report Prerequisites

In the Generator Performance Configuration Tool, define the following tabs and fields in order to generate the report:

## Generators Tab

- **Name** - The generator entity needs a name.
- **Electrical Data** - Specify the required measurement source, nameplate rating, and unit of measurement.
- **Status Measurements** - The source of the status measurement and the start, run, and stop values must be selected. Configure the meters that provide these measurements.
- **Evaluation Method** - “Load” is default, but this may be changed to accommodate customer requirements.
- For Generator Performance Configuration Tool, see "Define Generators" on page 69.

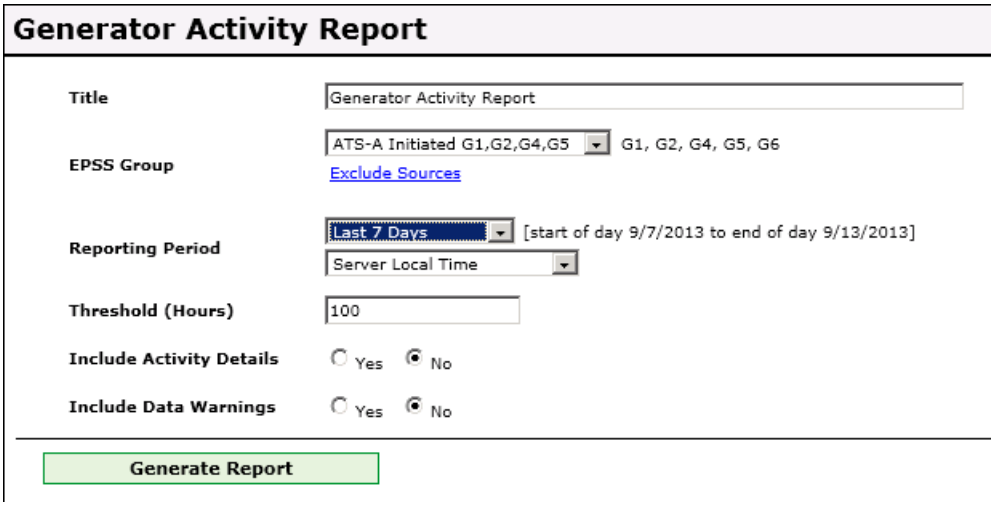
# Configure and Run the Generator Activity Report

Use the Power Monitoring Expert - Data Center Edition Web Application Reports feature to configure and produce the Generator Activity Report.

**NOTE:** Emergency Power Supply System (EPSS) is a North American term used in the healthcare segment. "EPSS Group" refers to the "Groups" defined in the Generator Performance Configuration Utility.

1. In the Reports Library, expand the **Generator Performance** folder and click **Generator Activity Report**.

The report template appears.




2. Complete the fields to define the report.
   - **Title** - Enter a name for the report.
   - **EPSS Group** - Select the group for which the report is intended. When you select a group in the list, the field to the right shows the devices included in the group.
   - **Exclude Sources** - Click this to define the sources to exclude from the report.
     a. In the **Sources Included** area, select sources to exclude and then click **>** to move those sources to the **Sources Excluded** area.
     b. To move all of the sources into the **Sources Excluded** area, click **>>**.
     c. Click **OK** to save the sources and return to the report template. The devices in the group will appear in the **Sources** section of the generated report. Excluded devices will appear as grayed-out entries.
   - **Reporting Period** - Select the date range for the data you want to include. This can be a fixed number of prior days, such as Last 7 Days, or a fixed date range. The initial setting is `Last 7 Days`. In the US, select at least 30 days of load data recorded at 15 minute intervals to satisfy regulations. Also select the type of timestamp to use in the report, either `Server Local Time` or `UTC (Universal Time)`.

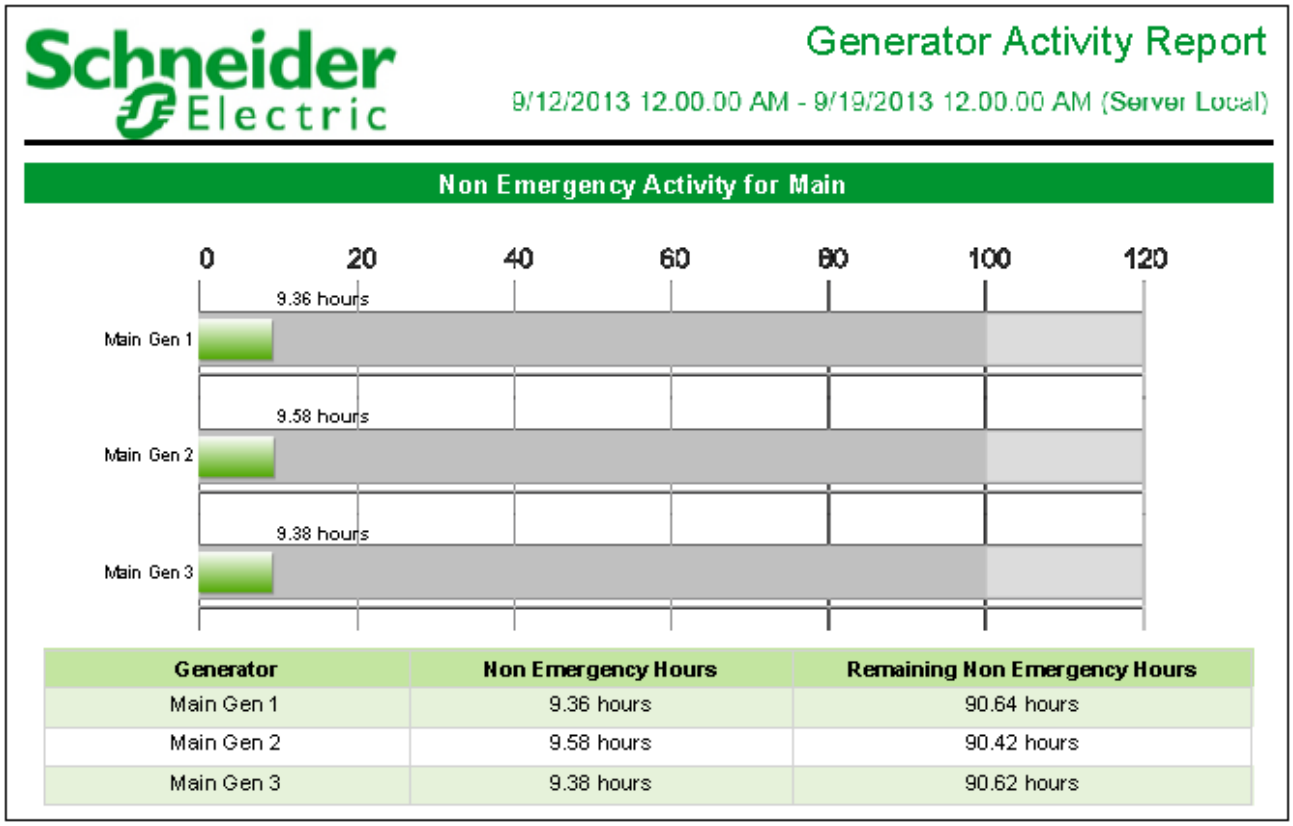
- **Threshold (Hours)** - Enter the maximum number of hours the generators should run in non-emergency use. Enter a value that is in compliance with local authority requirements. For example, in the US, the EPA requires that generators can run no more than 100 hours in non-emergency use.
- **Include Activity Details** - Click **Yes** to include the generator details in the report. Click **No** to exclude this section.
- **Include Data Warnings** - Click **Yes** to include data warnings in the report. If there are none, the section is not included. Click **No** to exclude this section.

3. Click **Generate Report** to produce the report.

# Generator Activity Report Example

## Summary Page

The first page of the report shows the title, company name, group, a bar graph representing the test run hours on each generator, and a table of test run data for each generator.

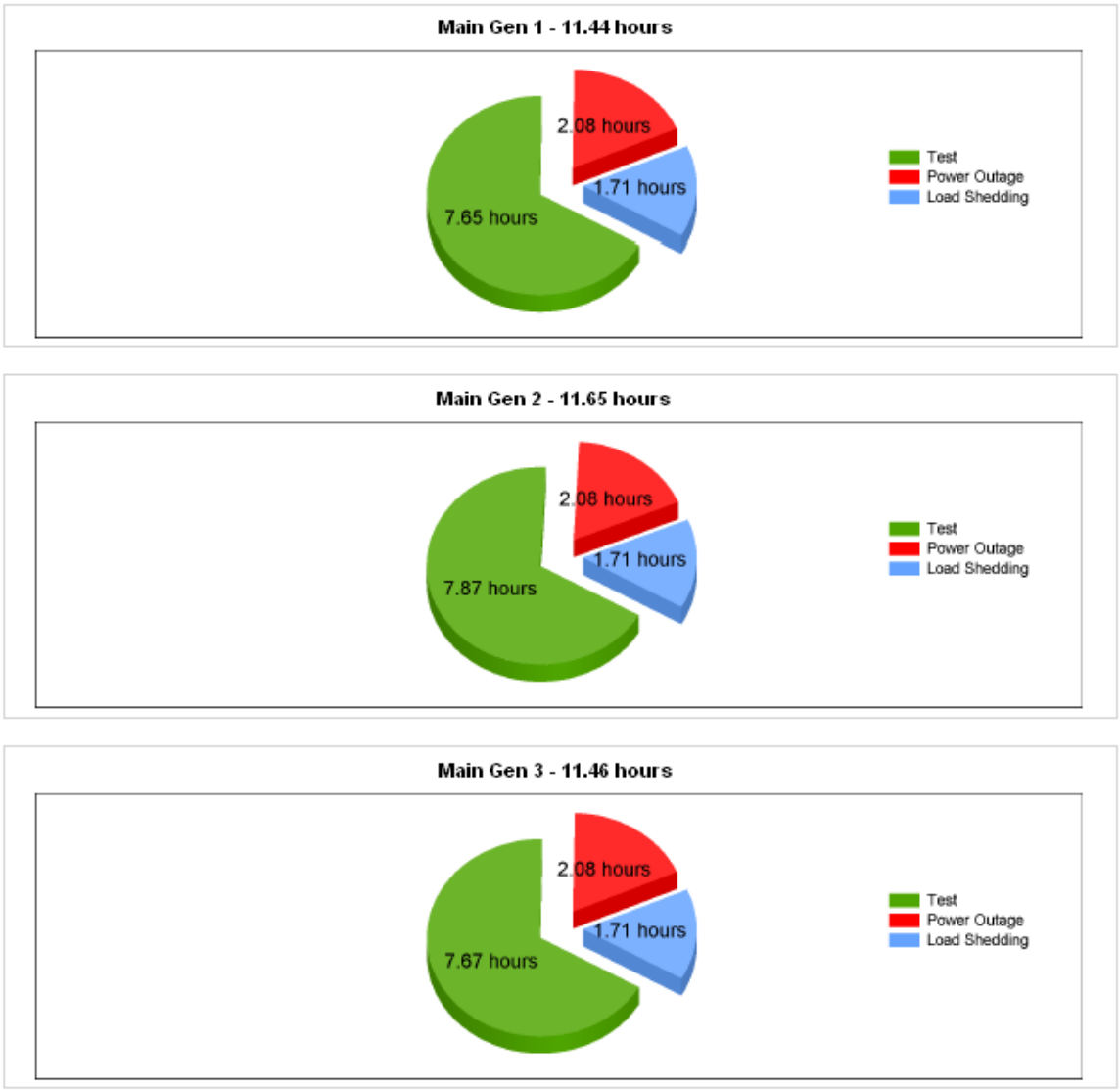



| Generator | Non Emergency Hours | Remaining Non Emergency Hours |
|---|---|---|
| Main Gen 1 | 9.36 hours | 90.64 hours |
| Main Gen 2 | 9.58 hours | 90.42 hours |
| Main Gen 3 | 9.38 hours | 90.62 hours |

## Details Page

The details page shows a pie chart of the type of hours for each generator and the total run time table.

## Generator Activity Details for Main




Schneider Electric

# Generator Activity Report

9/12/2013 12:00:00 AM - 9/19/2013 12:00:00 AM (Server Local)

## Main

| Generator | Start Time | Stop Time | Duration (hours) | Run Reason |
|---|---|---|---|---|
| Main Gen 1 | 9/12/2013 7:00:50 AM | 9/12/2013 8:10:45 AM | 7.65 | Test |
| Main Gen 2 | 9/12/2013 7:00:50 AM | 9/12/2013 8:10:46 AM | 7.87 | Test |
| Main Gen 3 | 9/12/2013 7:00:51 AM | 9/12/2013 8:10:45 AM | 7.67 | Test |

# Generator Battery Health

## Overview

The Generator Battery Health system contains several components that provide the customer with information about the generator battery bank. Specifically, the monitor shows the customer the starting voltage signature, which indicates the battery bank's voltage drop and recovery during and after starting the generator.

The following tasks must be completed to set up the Generator Battery Health system:

- Install and configure the ION7650 meter to the battery bank to be monitored. Refer to the *PowerLogic ION7550 / ION7650 Installation Guide* and *PowerLogic ION7550 / ION7650 User Guide* for more information. Obtain the latest version of these documents from www.schneider-electric.com.

  Note the following:

  - V1 - V3 voltage inputs must have PTs in order to isolate the ground from the system being monitored and the battery.
  - Connect V4 to the positive side of the battery. Input impedence of V4 terminal is 5 Mohm (phase - Vref). For the most up to date specification, contact the local representative.
  - Connect Vref to battery ground.
  - Fusing must be installed according to the meter installation instructions.
  - Perform visual inspection of connections to help ensure there is physical separation between the system connected to V1, V2 and V3, and the battery connected to V4.
  - For other wiring options with PTs, see the *PowerLogic ION7650 Installation Guide.*

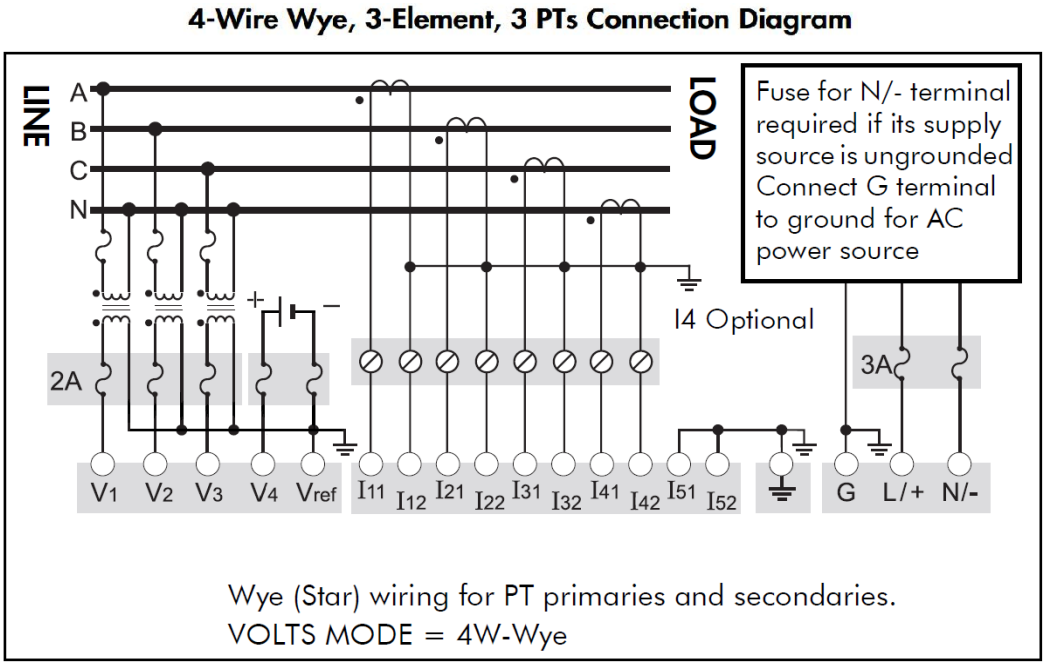
**⚠ DANGER**

**EQUIPMENT ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Treat the battery circuit as energized to the category of the installation.

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

Refer to the following diagram as an example for connections to the meter.

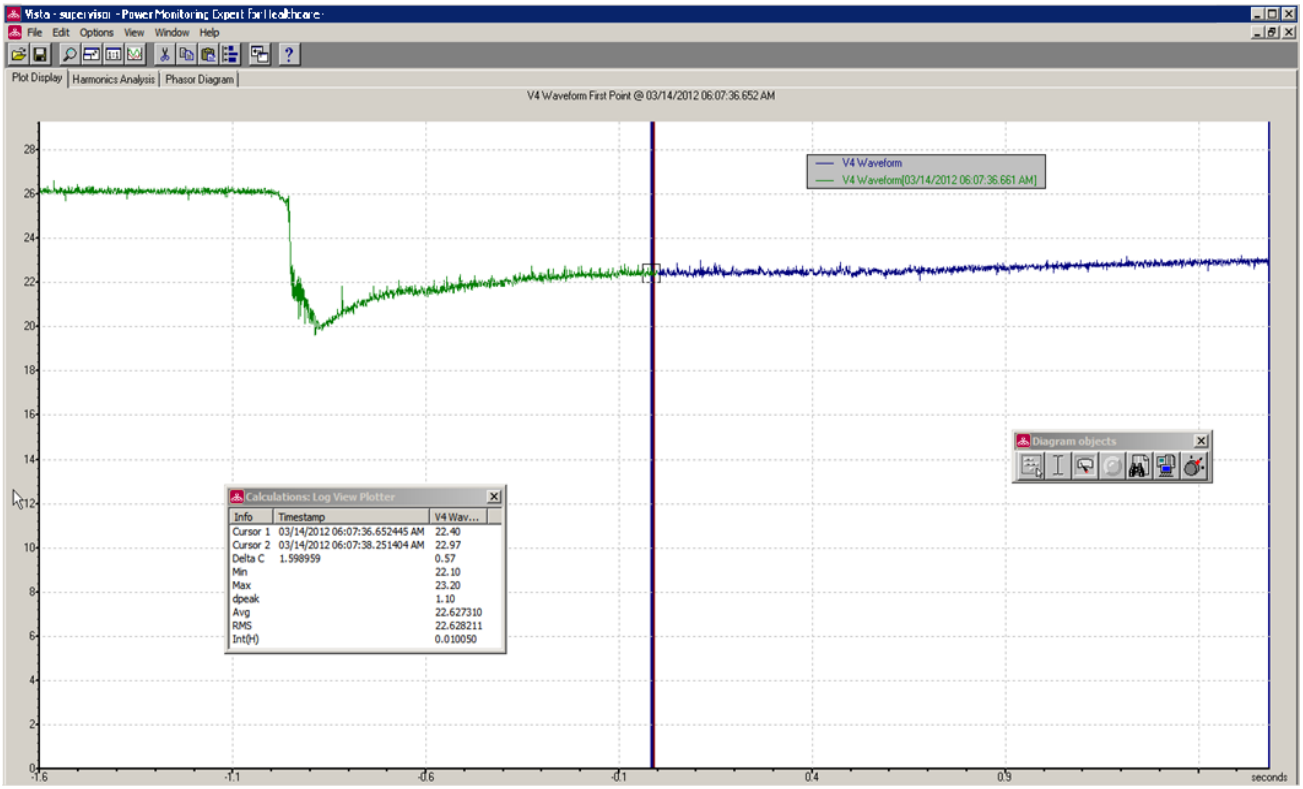



- Configure the Battery Health Framework to capture the battery voltage signature or waveform and deploy the framework to the meter. See the next section for instructions.
- In the Generator Performance Configuration Tool, check the Battery Waveforms option for the generator to be included in the customer's Battery Health report. See "Edit Generator Properties" on page 69 for instructions.
  - Configure the Generator Battery Health Report to display the graph of the voltage signature. The customer can use the report to help understand the battery bank condition. The report can display multiple generators for the same starting date or a single generator on multiple starting dates. See "Configuring and Running the Battery Health Report" on page 93.

This chapter provides instructions for configuring the framework to capture the voltage signature.

# Configure the Battery Health Framework

The Battery Health Framework is designed to capture and record a generator's battery voltage signature at start up. This voltage signature provides some indication of the health of the generator's battery bank. A typical waveform capture of the voltage drop when starting is shown next:



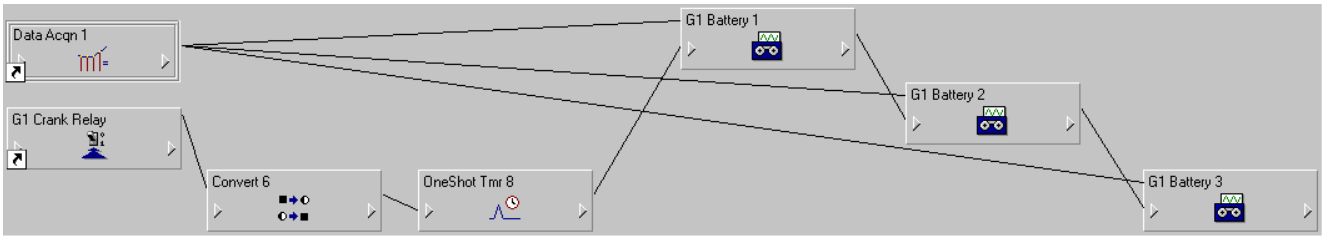

Note the following items about this example:

- This capture shows about 4 - 5 seconds worth of data, accomplished via 3 waveform recorders in series configured at a resolution of 16x96.
- The voltage does not immediately recover to its original value (~26 v) but it begins to ramp up.
- There is about 0.5 seconds of data before the voltage drop to approximately 20 v.

Two options in the framework are possible to capture the waveform, based on how the crank relay signal is triggered - pulse or KYZ.

# Example Framework

The following figure shows the typical modules for the framework.




The types of module used are:

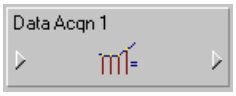
- Data Acquisition

- Digital Input
- Convert
- OneShot Timer
- Waveform Recorder

See the following descriptions for the way each module works in this framework.

Refer to *ION Reference* for details on how each module operates and for setting module parameters.

# Data Acquisition – Data Acqn 1




The V4 signal from the meter goes to the Data Acquisition module.

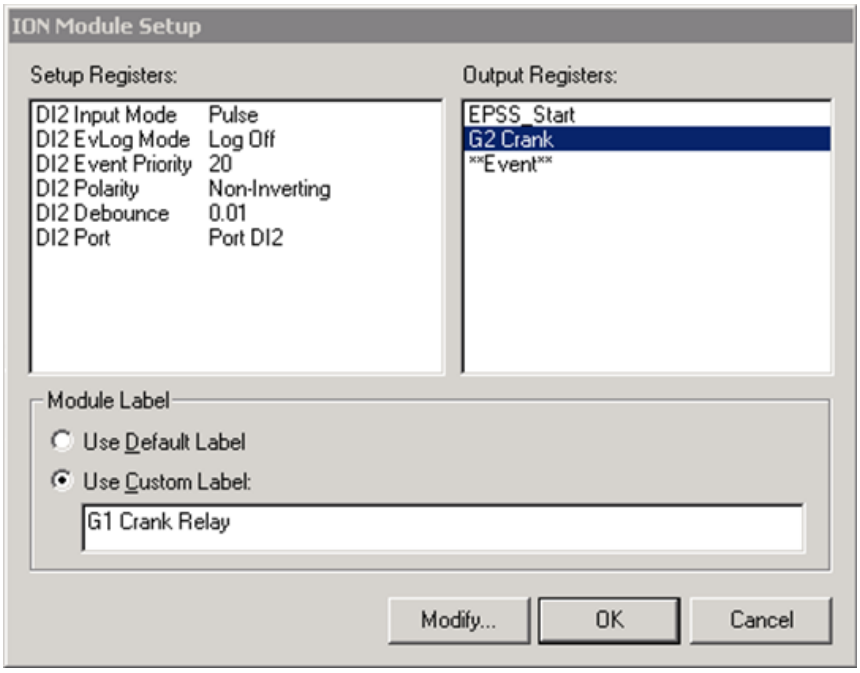
# Digital Input – G1 Crank Relay


This module accepts the Cranking Relay signal from the field. When the signal goes high, the logic to record the battery voltage triggers.

The Input mode can be set to Pulse or KYZ, as explained next.

## Pulse Input Mode

When the Crank Relay signal goes high, a pulse is generated on the Trigger output register, labeled "G1 Crank Relay." The setup registers for the Digital Input module are shown next.



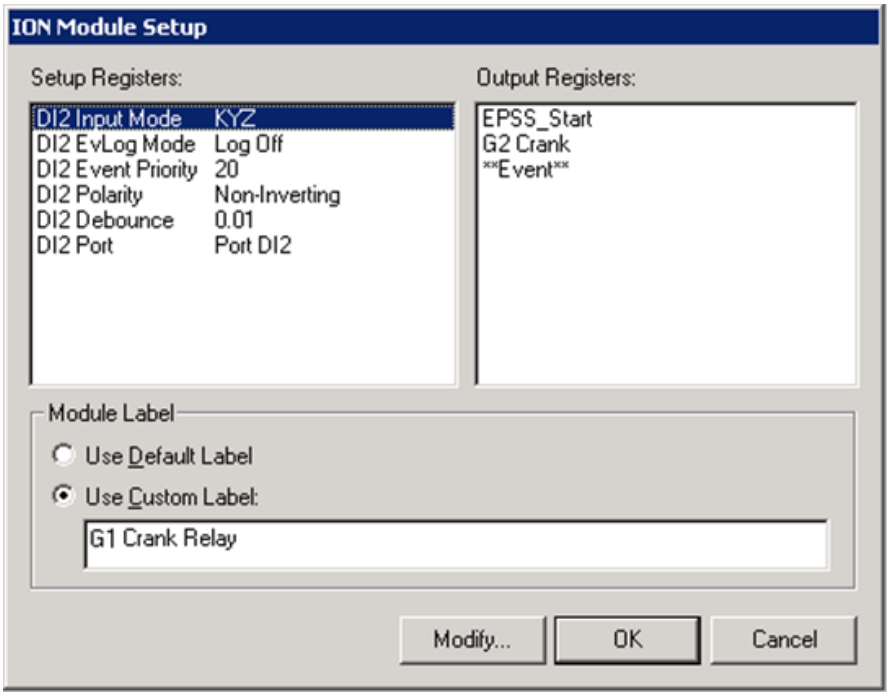

Note that the **Input Mode** value is Pulse. The Trigger output can now be fed into the first Waveform Recorder along with V4 from the Data Acquisition module.

## KYZ Input Mode

If you are using the same Digital Input to handle the Generator Start signal (EPSS_Start) it is probably set to KYZ mode.

Input Mode KYZ means that a pulse is generated on the Trigger output register when the Crank Relay signal goes high AND when it goes low. The Convert module and One Shot Timer module (explained later) prevent triggering the downstream logic twice.

The Crank Relay Module is setup like this:




Note that the Input Mode value is KYZ.

## Convert

The signal from the Digital Input module cannot be fed directly into the One Shot Timer. The Convert module converts the digital signal to analog for the One Shot Timer.


## One-Shot Timer

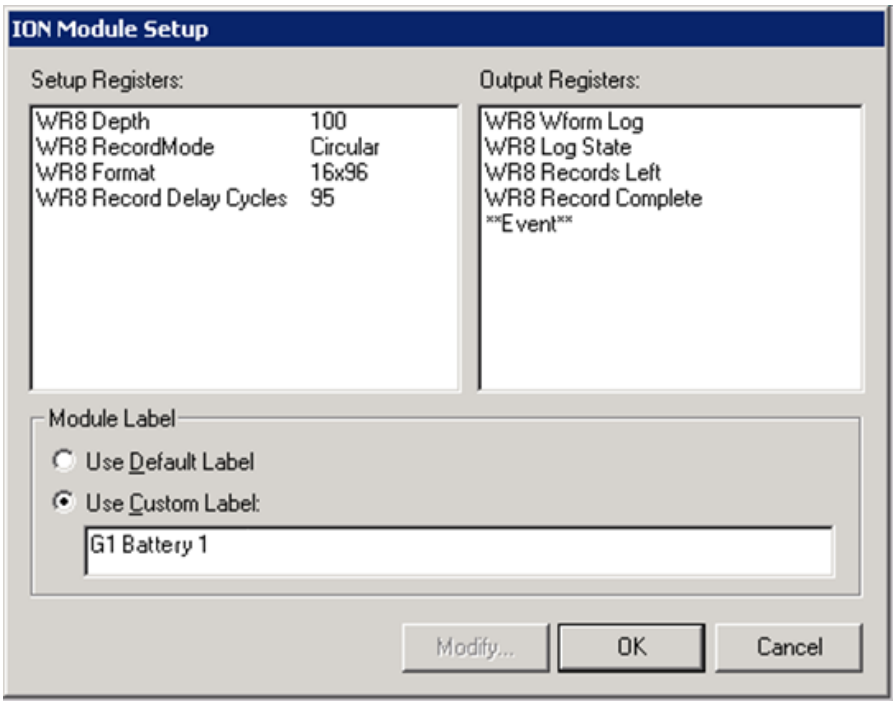
To prevent triggering the downstream logic twice, send the state (EPSS_Start) from the Convert module into the One Shot Timer:


Send the output register into the first Waveform Recorder G1 Battery 1.

# First Waveform Recorder – G1 Battery 1

The Data Acquisition module and G2 Crank Relay module are the inputs to the first Waveform Recorder, labeled “G1 Battery 1.”


These are the setup registers for the module:

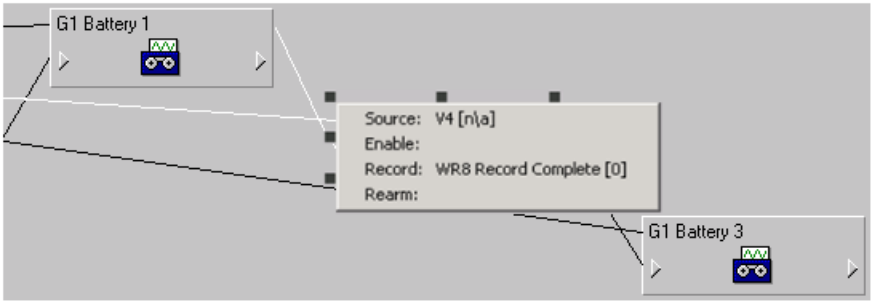



Note the following about the setup registers:

- Depth must be non-zero – 100 is a good number.
- Record Mode should be Circular.
- Format should 16x96. This means 16 samples per cycle and 96 cycles, so at 60 Hz this results in approximately 1.6 seconds worth of data.
- Record Delay Cycles is set to 95 to allow the “window of observation” to move so that only post-event data is captured. Refer to *ION Reference* for more details.

## Second and Third Waveform Recorders

The second Waveform Recorder - G1 Battery 2 - is cascaded with the first to capture another 1.6 seconds of the battery voltage signature. Do this by using the Record Complete output register on G1 Battery 1 as a flag to trigger G1 Battery 2 to start recording.

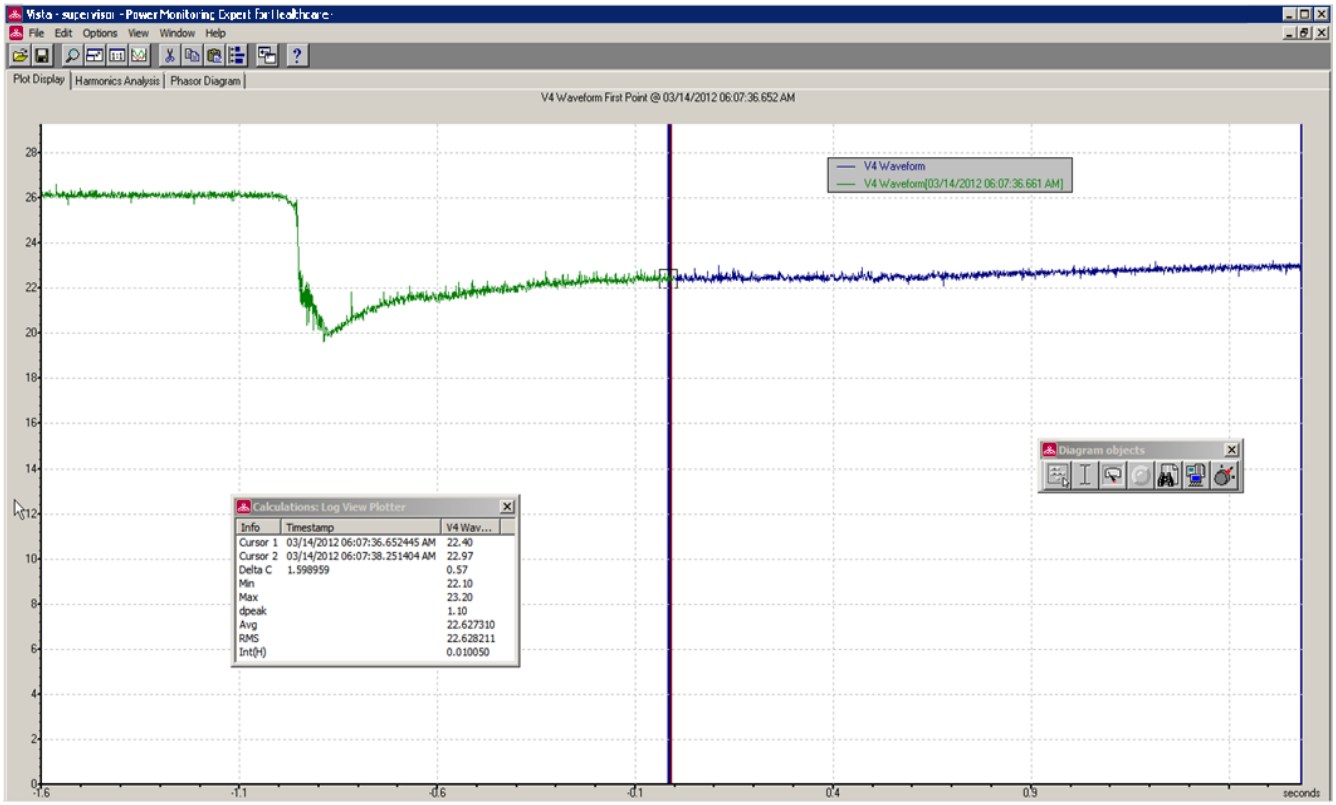



The third Waveform Recorder - G1 Battery 3 - is cascaded with the second recorder to capture the final 1.6 seconds of the battery voltage signature. As above, use the Record Complete output register on G1 Battery 2 as a flag to trigger G1 Battery 3 to start recording.

The Setup Registers should be the same as first waveform recorder with different labels.

# Battery Health Waveform Capture Results

After the framework is complete, in Vista you should see the voltage signature that looks similar to the illustration shown next.




After you obtain this type of result, you can configure the generator in the Generator Performance Configuration Tool and define the Battery Health Report in the Power Monitoring Expert - Data Center Edition Web Applications Reports feature. Refer to these sections for instructions on these tasks.

- "Edit Generator Properties" on page 69.
- "Configuring and Running the Battery Health Report" on page 93.

# Generator Battery Health Report

The **Generator Battery Health Report** shows the captured waveform image of the generator voltage when the generator starts.

The waveform image includes a reference waveform that shows the initial voltage signature when the batteries were first installed and tested. The reference waveform helps compare the current battery condition to their initial condition.

Research has indicated that when a battery begins to fatigue, the waveform for the voltage during start-up changes. The voltage waveform can be captured and stored in the system for ongoing analysis.

By capturing the voltage waveform when the batteries are in a known good condition, subsequent waveforms can be compared to it to identify changes. In the Generator Battery Health report, you can compare waveform images to see the changes over time. Adverse changes in the waveform indicate a degradation of battery condition.

**⚠ WARNING**

**INACCURATE REPORT RESULTS**

- Do not incorrectly configure the devices and software. This can lead to inaccurate reports and/or data results.
- Do not rely solely on system reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Use system reports as a supplement to proper workplace practices or equipment maintenance, not as a substitute.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

## Prerequisites

In the Generator Performance Configuration Tool, define the following tabs and fields in order to generate the report:

### Generators Tab

- **Name** - The generator entity needs a name.
- **Electrical Data** - The measurement source, nameplate rating, and unit of measurement are required.
- **Status Measurements** - The source of the status measurement and the start, run, and stop values must be selected. Configure the meters that provide these measurements.
- **Evaluation Method** - “Load” is default, but this may be changed to accommodate customer requirements.

- **Battery Waveforms** - Select the source and the measurement. Configure the meters that provide these measurements. Also, configure the frameworks as described in "Generator Battery Health" on page 83.
- "Edit Generator Properties" on page 69.

After these required items are defined, the report can be configured and generated, as described next.

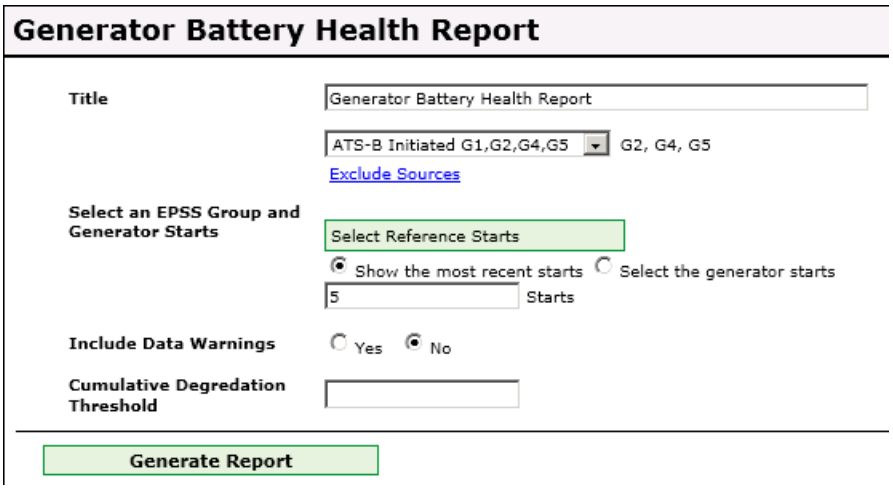
# Configuring and Running the Battery Health Report

Use the Power Monitoring Expert - Data Center Edition Web Application Reports feature to configure and produce the Generator Battery Health Report.

**NOTE:** Emergency Power Supply System (EPSS) is a North American term used in the healthcare segment. "EPSS Group" refers to the "Groups" defined in the Generator Performance Configuration Utility.

1. In the Reports Library, expand the **Generator Performance** folder and click **Generator Battery Health Report**.

The report template appears.




2. Complete the fields to define the report.
   - **Title** - Enter a name for the report.
   - **Select EPSS (Generator) Group** - Select the generator group for which the report is intended. The list shows the groups that include generators that can record the battery voltage waveform via ION 7650 meter. When you select a group in the list, the field to the right shows the devices included in the group.
   - **Exclude Sources** - Click this to define the sources to exclude from the report.
     a. In the **Sources Included** area, select sources to exclude and then click **>** to move those sources to the **Sources Excluded** area.
     b. To move all of the sources into the **Sources Excluded** area, click **>>**.

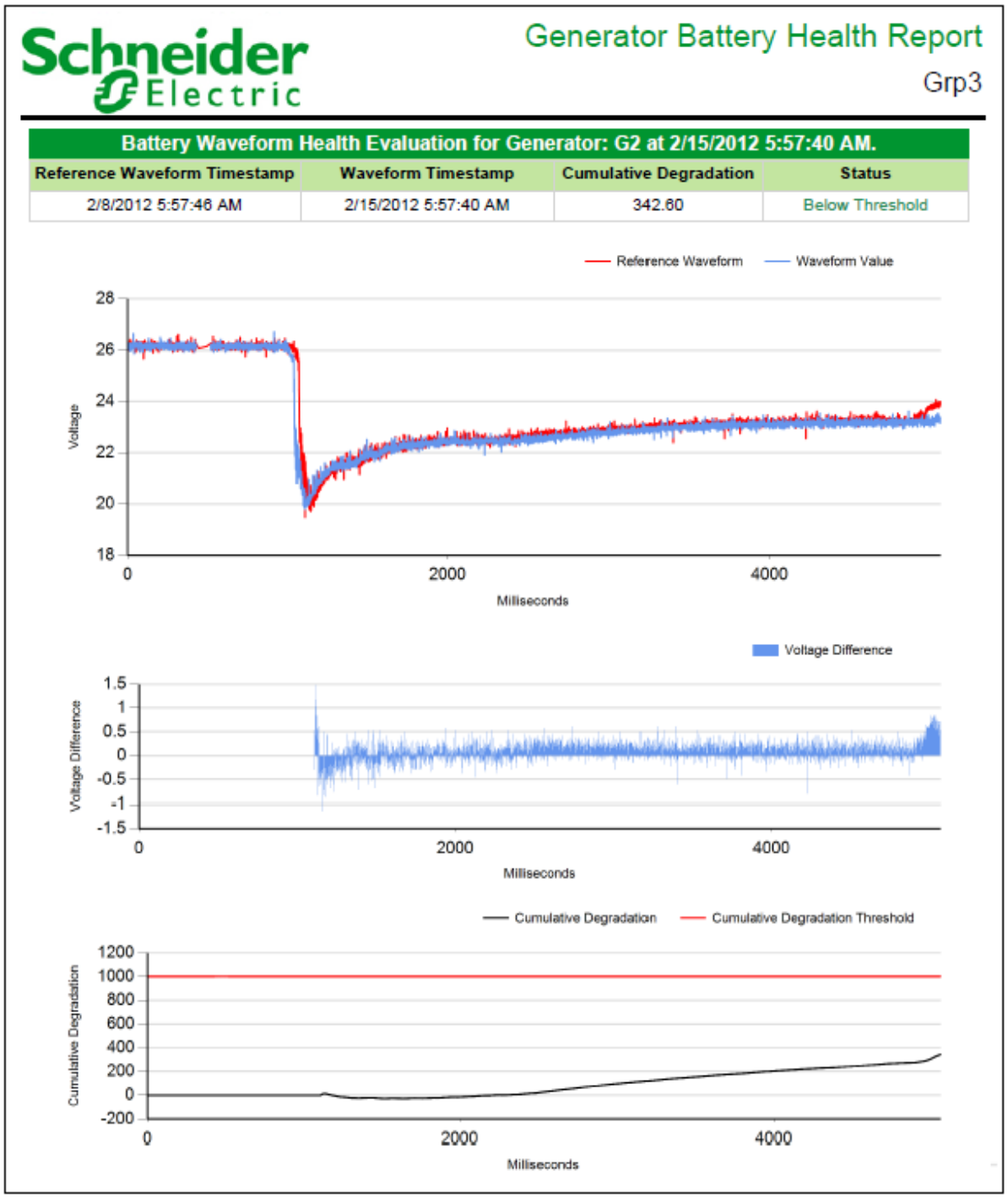
c. Click **OK** to save the sources and return to the report template. The devices in the group will appear in the **Sources** section of the generated report. Excluded devices will appear as grayed-out entries.

- **Select Generator Starts** - Select the option to specify the start records. If you click **Select Reference Starts** you can choose the specific start records by generator and date. For example, you can use this option to compare yesterday's Gen 1 start voltage signature to the Gen 1 start voltage signature from six months prior.
- **Include Data Warnings** - Click **Yes** to include the data warnings in the report. If there are no data warnings, the section is not included in the report. Click **No** to exclude this section.
- **Cumulative Degradation Threshold** - Enter the value that represents the maximum total voltage difference between the reference waveform and the evaluated waveforms. For example, if the waveform is off by 1.0 on each point from the reference, the total degradation is 10. If the threshold value is 8, then the degradation exceeds the threshold.

3. Click **Generate Report** to produce the report.

# Battery Health Report Example

In this example, the starting voltage waveform (blue) is very similar to the reference waveform (red). The drop to 20 VDC is the point at which the generator started. After the start, battery voltage rises to normal state of charge after the start.



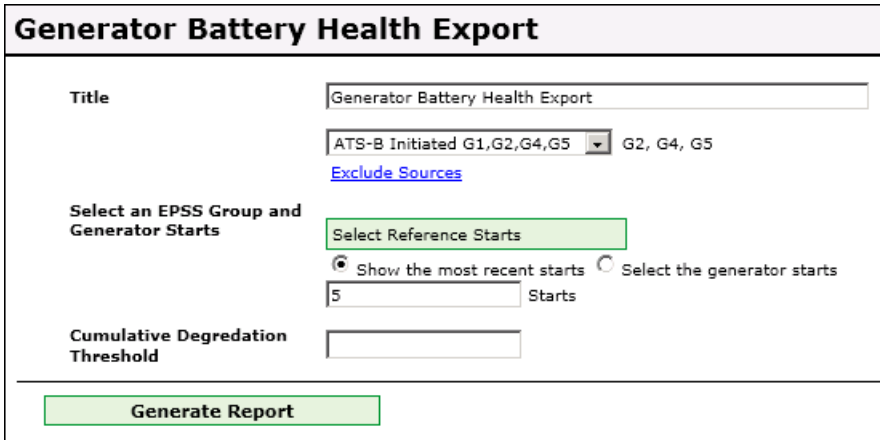
# Generator Battery Health Export

The **Generator Battery Health Export** report is based on the same data as the graphic-based report. The export version provides the raw data in CSV file format. The export file can be imported by other systems, such as Energy Operation.

## Configure and Run the Generator Battery Health Export

Use the Power Monitoring Expert - Data Center Edition Web Application Reports feature to configure and produce the Generator Battery Health Export file.

1. In the Reports Library, expand the **Generator Performance** folder and click **Generator Battery Health Export**. The report template appears.




2. Complete the fields to define the report.
   - **Title** - Enter a name for the export file.
   - When you select a group in the list, the field to the right shows the devices included in the group.
   - **Exclude Sources** - Click this to define the sources to exclude from the report.
     a. In the **Sources Included** area, select sources to exclude and then click **>** to move those sources to the **Sources Excluded** area.
     b. To move all of the sources into the **Sources Excluded** area, click **>>**.
     c. Click **OK** to save the sources and return to the report template. The devices in the group will appear in the **Sources** section of the generated report. Excluded devices will appear as grayed-out entries.
   - **Select Generator Starts** - Select the option to specify the start records. If you click **Select Reference Starts** you can choose the specific start records by generator and date. For example, you can use this option to compare yesterday's Gen 1 start voltage signature to the Gen 1 start voltage signature from six months prior.

- **Cumulative Degradation Threshold** - Enter the value that represents the maximum total voltage difference between the reference waveform and the evaluated waveforms. For example, if the waveform is off by 1.0 on each point from the reference, the total degradation is 10. If the threshold value is 8, then the degradation exceeds the threshold.

3. Click **Generate Report** to produce the report.

# Battery Health Export Example

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | G1 | 2012-02-22T15:06:57 | 733 | 2012-02-29T15:11:02 | 187 | 0 | 1000 | 2839.898804 | 1256 | 2939.623901 | 99.72509766 | 80 | 99.72509766 |
| 2 | 2 | G1 | 2012-02-22T15:06:57 | 733 | 2012-02-29T15:11:02 | 187 | 0 | 1000 | 2839.898804 | 1256 | 2939.623901 | 99.72509766 | 80 | 199.4501953 |
| 3 | 2 | G1 | 2012-02-22T15:06:57 | 733 | 2012-02-29T15:11:02 | 187 | 0 | 1000 | 2839.898804 | 1256 | 2939.623901 | 99.72509766 | 80 | 299.175293 |
| 4 | 2 | G1 | 2012-02-22T15:06:57 | 733 | 2012-02-29T15:11:02 | 187 | 0 | 1000 | 2839.898804 | 1256 | 2939.623901 | 99.72509766 | 80 | 398.9003906 |
| 5 | 2 | G1 | 2012-02-22T15:06:57 | 733 | 2012-02-29T15:11:02 | 187 | 0 | 1000 | 2839.898804 | 1256 | 2939.623901 | 99.72509766 | 80 | 498.6254883 |
| 6 | 2 | G1 | 2012-02-22T15:06:57 | 733 | 2012-02-29T15:11:02 | 187 | 0 | 1000 | 2839.898804 | 1256 | 2939.623901 | 99.72509766 | 80 | 598.3505859 |
| 7 | 2 | G1 | 2012-02-22T15:06:57 | 733 | 2012-02-29T15:11:02 | 187 | 0 | 1000 | 2839.898804 | 1256 | 2939.623901 | 99.72509766 | 80 | 698.0756836 |
| 8 | 2 | G1 | 2012-02-22T15:06:57 | 733 | 2012-02-29T15:11:02 | 187 | 0 | 1000 | 2839.898804 | 1256 | 2939.623901 | 99.72509766 | 80 | 797.8007813 |
| 9 | 2 | G1 | 2012-02-22T15:06:57 | 733 | 2012-02-29T15:11:02 | 187 | 0 | 1000 | 2839.898804 | 1256 | 2939.623901 | 99.72509766 | 80 | 897.5258789 |
| 10 | 2 | G1 | 2012-02-22T15:06:57 | 733 | 2012-02-29T15:11:02 | 187 | 0 | 1000 | 2839.898804 | 1256 | 2939.623901 | 99.72509766 | 80 | 997.2509766 |
| 11 | 2 | G1 | 2012-02-22T15:06:57 | 733 | 2012-02-29T15:11:02 | 187 | 0 | 1000 | 2839.898804 | 1256 | 2939.623901 | 99.72509766 | 80 | 1096.976074 |
| 12 | 2 | G1 | 2012-02-22T15:06:57 | 733 | 2012-02-29T15:11:02 | 187 | 0 | 1000 | 2839.898804 | 1256 | 2939.623901 | 99.72509766 | 80 | 1196.701172 |
| 13 | 2 | G1 | 2012-02-22T15:06:57 | 733 | 2012-02-29T15:11:02 | 187 | 0 | 1000 | 2839.898804 | 1256 | 2939.623901 | 99.72509766 | 80 | 1296.42627 |
| 14 | 2 | G1 | 2012-02-22T15:06:57 | 733 | 2012-02-29T15:11:02 | 187 | 0 | 1000 | 2839.898804 | 1256 | 2939.623901 | 99.72509766 | 80 | 1396.151367 |
| 15 | 2 | G1 | 2012-02-22T15:06:57 | 733 | 2012-02-29T15:11:02 | 187 | 0 | 1000 | 2839.898804 | 1256 | 2939.623901 | 99.72509766 | 80 | 1495.876465 |
| 16 | 2 | G1 | 2012-02-22T15:06:57 | 733 | 2012-02-29T15:11:02 | 187 | 0 | 1000 | 2839.898804 | 1256 | 2939.623901 | 99.72509766 | 80 | 1595.601563 |
| 17 | 2 | G1 | 2012-02-22T15:06:57 | 733 | 2012-02-29T15:11:02 | 187 | 0 | 1000 | 2839.898804 | 1256 | 2939.623901 | 99.72509766 | 80 | 1695.32666 |
| 18 | 2 | G1 | 2012-02-22T15:06:57 | 733 | 2012-02-29T15:11:02 | 187 | 0 | 1000 | 2839.898804 | 1256 | 2939.623901 | 99.72509766 | 80 | 1795.051758 |

# Generator Load Summary Report

The **Generator Load Summary Report** provides a summary graph of electrical data during a generator run. The report includes a load curve, minimum-maximum-average load summary, and other electrical details.

**⚠ WARNING**

**INACCURATE REPORT RESULTS**

- Do not incorrectly configure the devices and software. This can lead to inaccurate reports and/or data results.
- Do not rely solely on system reports to determine if the system is functioning correctly or meeting all applicable standards and requirements.
- Use system reports as a supplement to proper workplace practices or equipment maintenance, not as a substitute.

**Failure to follow these instructions can result in death, serious injury, or equipment damage.**

# Report Prerequisites

In the Generator Performance Configuration Tool, define the following tabs and fields in order to generate the report.

## Generators Tab

- **Name** - The generator entity needs a name.
- **Electrical Data** - The measurement source, nameplate rating, and unit of measurement are required.
- **Status Measurements** - The source of the status measurement and the start, run, and stop values must be selected. Configure the meters that provide these measurements.
- **Evaluation Method** - “Load” is default, but this may be changed to accommodate customer requirements.

See "Define Generators" on page 69 for instructions on the above settings.

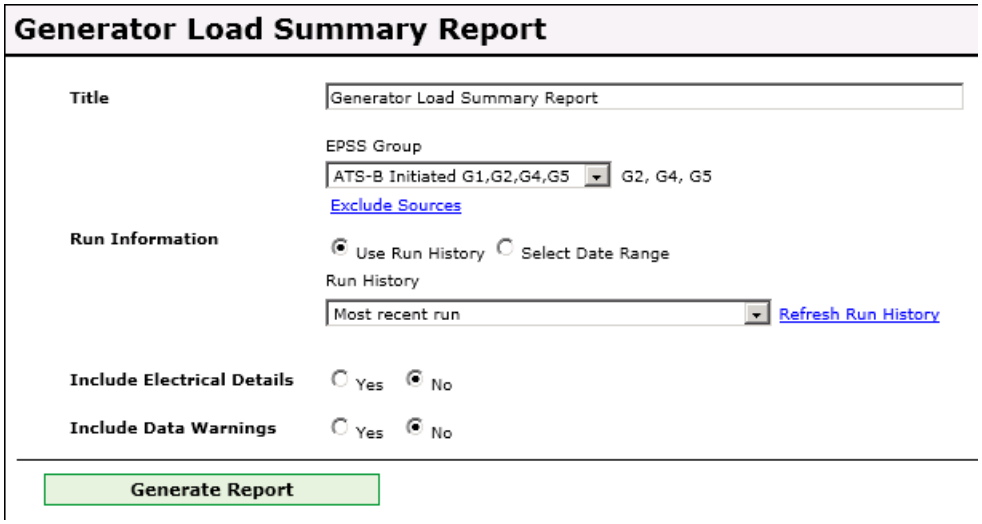
# Configure the Generator Load Summary Report

Use the Power Monitoring Expert - Data Center Edition Web Application Reports feature to configure and produce the Generator Load Summary Report.

**NOTE:** Emergency Power Supply System (EPSS) is a North American term used in the healthcare segment. "EPSS Group" refers to the "Groups" defined in the Generator Performance Configuration Utility.

1. In the Reports Library, expand the Generator Performance folder and click **Generator Load Summary Report**.

The report template appears.

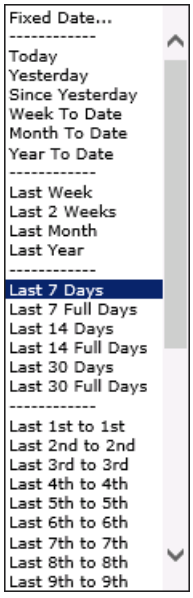



2. Complete the fields to define the report.
   - **Title** - Enter a name for the report.
   - **EPSS Group** - Select the group for which the report is intended. When you select a group in the list, the field to the right shows the devices included in the group.
   - **Exclude Sources** - Click this to define the sources to exclude from the report.
     a. In the **Sources Included** area, select sources to exclude and then click **>** to move those sources to the **Sources Excluded** area.
     b. To move all of the sources into the **Sources Excluded** area, click **>>**.
     c. Click **OK** to save the sources and return to the report template. The devices in the group will appear in the **Sources** section of the generated report. Excluded devices will appear as grayed-out entries.
   - **Use Run History** - Select this if you want to select the most recent run or select other specific runs that are stored in history, and do the following:
     - Click **Refresh Run History** to populate the **Runs** list with the latest run records.

- In the **Runs** list, select `Most recent run` or the specific run record. The date and reason for the run appear below the dropdown list.

  If you select `Most recent run` and define excluded sources, the exclusions are ignored when you generate the report.

- **Select Date Range** - Select this if you want to select the runs according to a date range and run reason, and do the following:
  - Select the **Reporting Period** date range for the runs to include in the report.
  - Select the **Run Reason** for the runs to include in the report.




- **Include Electrical Details** - Click **Yes** to include the electrical details in the report. Click **No** to exclude this section.
- **Include Data Warnings** - Click **Yes** to include data warnings in the report. If there are none, the section is not included. Click **No** to exclude this section.

3. Click **Generate Report** to produce the report.

# Generator Load Summary Report Example

Schneider Electric

## Generator Load Summary Report

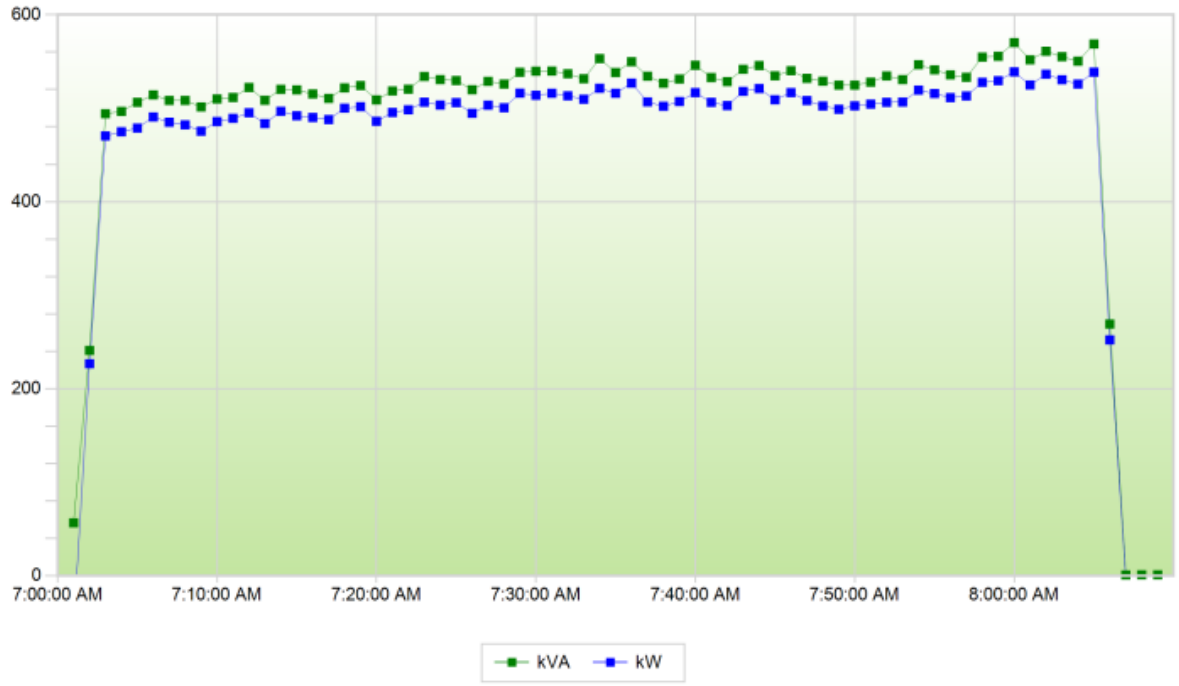
### ATS-B Initiated G1,G2,G4,G5

2/27/2013 8:00:00 AM - 8/28/2013 7:00:00 AM

**G2**

Nameplate Rating 1600 kW

Running 7/29/2013 7:00:37 AM Stopped 7/29/2013 8:09:11 AM




| Measurement | Min | Avg | Max |
|---|---|---|---|
| Active Power [kW] | -54.73 | 467.76 | 538.86 |
| Apparent Power [kVA] | 0.79 | 492.66 | 570.14 |
| Average Voltage Line-to-Line [V] | 12,339.68 | 12,460.74 | 12,633.24 |
| Average Voltage Line-to-Neutral [V] | 7,124.32 | 7,194.22 | 7,293.81 |
| Current Phase Average [A] | 0.05 | 23.12 | 26.65 |
| Frequency [Hz] | 59.88 | 60.01 | 60.02 |
| Load Percentage | -3.42 | 29.24 | 33.68 |
| Power Factor Signed | -96.82 | -94.35 | -73.22 |

Schneider Electric

# Generator Load Summary Report

## ATS-B Initiated G1,G2,G4,G5

2/27/2013 8:00:00 AM - 8/28/2013 7:00:00 AM

## Electrical Details for G2

**Nameplate Rating 1600 kW**

Running 7/29/2013 7:00:37 AM Stopped 7/29/2013 8:09:11 AM

| Timestamp | kW | kVA | Load % | PFS | I avg | VII avg | VIn avg | Frequency |
|---|---|---|---|---|---|---|---|---|
| 7/29/2013 7:01:00 AM | -54.73 | 56.53 | -3.42 | -96.82 | 2.64 | 12,534.83 | 7,236.99 | 59.88 |
| 7/29/2013 7:02:00 AM | 226.71 | 240.88 | 14.17 | -94.12 | 11.49 | 12,494.25 | 7,213.56 | 60.01 |
| 7/29/2013 7:03:00 AM | 470.29 | 494.12 | 29.39 | -95.18 | 23.31 | 12,445.82 | 7,185.60 | 60.01 |
| 7/29/2013 7:04:00 AM | 474.87 | 496.57 | 29.68 | -95.63 | 23.38 | 12,459.60 | 7,193.56 | 60.01 |
| 7/29/2013 7:05:00 AM | 478.81 | 506.26 | 29.93 | -94.58 | 23.88 | 12,434.85 | 7,179.26 | 60.01 |
| 7/29/2013 7:06:00 AM | 490.59 | 514.21 | 30.66 | -95.41 | 24.19 | 12,449.52 | 7,187.74 | 60.01 |
| 7/29/2013 7:07:00 AM | 484.94 | 508.25 | 30.31 | -95.41 | 23.89 | 12,467.79 | 7,198.28 | 60.02 |
| 7/29/2013 7:08:00 AM | 482.31 | 508.36 | 30.14 | -94.88 | 23.90 | 12,451.94 | 7,189.13 | 60.01 |
| 7/29/2013 7:51:00 AM | 504.39 | 527.84 | 31.52 | -95.56 | 24.78 | 12,473.35 | 7,201.50 | 60.01 |
| 7/29/2013 7:52:00 AM | 506.23 | 534.55 | 31.64 | -94.70 | 25.11 | 12,457.29 | 7,192.22 | 60.01 |
| 7/29/2013 7:53:00 AM | 506.58 | 530.68 | 31.66 | -95.46 | 24.88 | 12,480.67 | 7,205.72 | 60.01 |
| 7/29/2013 7:54:00 AM | 519.32 | 546.56 | 32.46 | -95.02 | 25.53 | 12,497.70 | 7,215.55 | 60.01 |
| 7/29/2013 7:55:00 AM | 515.66 | 541.11 | 32.23 | -95.30 | 25.30 | 12,496.31 | 7,214.75 | 60.01 |
| 7/29/2013 7:56:00 AM | 511.40 | 535.62 | 31.96 | -95.48 | 25.10 | 12,490.05 | 7,211.13 | 60.01 |
| 7/29/2013 7:57:00 AM | 513.06 | 533.16 | 32.07 | -96.23 | 24.93 | 12,509.28 | 7,222.24 | 60.01 |
| 7/29/2013 7:58:00 AM | 527.68 | 554.73 | 32.98 | -95.12 | 26.01 | 12,468.06 | 7,198.44 | 60.01 |
| 7/29/2013 7:59:00 AM | 529.43 | 555.54 | 33.09 | -95.30 | 25.93 | 12,500.62 | 7,217.24 | 60.01 |
| 7/29/2013 8:00:00 AM | 538.86 | 570.14 | 33.68 | -94.51 | 26.65 | 12,466.28 | 7,197.41 | 60.01 |
| 7/29/2013 8:01:00 AM | 524.81 | 551.78 | 32.80 | -95.11 | 25.84 | 12,465.62 | 7,197.03 | 60.01 |
| 7/29/2013 8:02:00 AM | 536.41 | 560.83 | 33.53 | -95.64 | 26.28 | 12,462.86 | 7,195.44 | 60.01 |
| 7/29/2013 8:03:00 AM | 530.49 | 555.05 | 33.16 | -95.58 | 25.99 | 12,474.76 | 7,202.31 | 60.01 |
| 7/29/2013 8:04:00 AM | 525.79 | 550.30 | 32.86 | -95.55 | 25.80 | 12,467.89 | 7,198.34 | 60.01 |
| 7/29/2013 8:05:00 AM | 538.57 | 568.77 | 33.66 | -94.69 | 26.28 | 12,633.24 | 7,293.81 | 59.97 |
| 7/29/2013 8:06:00 AM | 252.21 | 269.19 | 15.76 | -93.69 | 12.51 | 12,531.39 | 7,235.00 | 59.95 |
| 7/29/2013 8:07:00 AM | -0.58 | 0.79 | -0.04 | -73.22 | 0.05 | 12,339.68 | 7,124.32 | 59.96 |
| 7/29/2013 8:08:00 AM | -0.60 | 0.81 | -0.04 | -74.03 | 0.05 | 12,339.84 | 7,124.41 | 59.96 |
| 7/29/2013 8:09:00 AM | -0.62 | 0.83 | -0.04 | -74.58 | 0.05 | 12,339.95 | 7,124.47 | 59.96 |

# Generator Test Report

The Generator Test Report shows the run details and overall status for generators and transfer switches in the group. For example, the report shows the transfer time of the lead ATS and indicates whether the transfer time passes or does not pass the test requirements.

# Report Prerequisites

In the Generator Performance Configuration Tool, define the following tabs and fields in order to generate the report.

## Generators Tab

- **Name** - Enter a name for the generator entity.
- **Electrical Data** - Enter the measurement source, nameplate rating, and unit of measurement.
- **Status Measurements** - Enter the source of the status measurement and the start, run, and stop values. Configure the meters that provide these measurements.
- **Evaluation Method** - "Load" is default, but you can change this to accommodate customer requirements.

See "Define Generators" on page 69 for instructions on the above settings.

## Groups Tab

- **Name** - Enter a name for the group entity.
- Select at least one entity from the **Generators**, **Transfer Switches**, or **Equipment** lists. The group can contain entities from each list combined.

See "Define Groups" on page 66 for instructions.

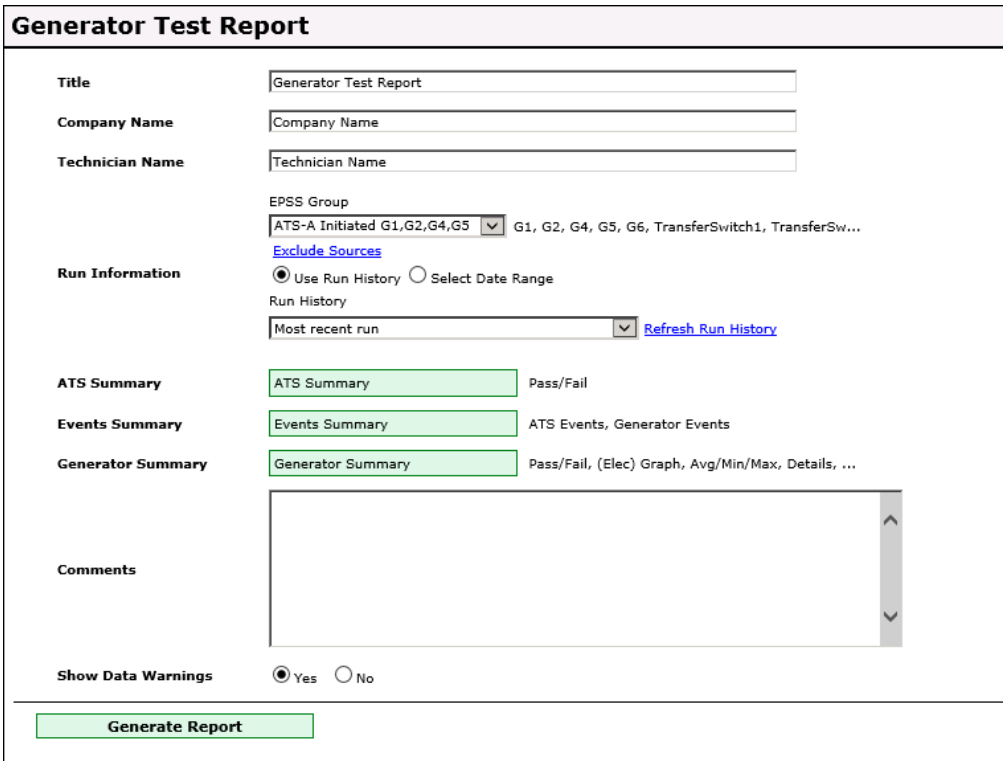
After these required items are defined, the report can be configured and generated, as described next.

# Configure and Run the Test Report

Use the Reports module of Power Monitoring Expert - Data Center Edition to configure and produce the Generator Test Report.

1. In the Reports module, expand the **Generator Performance** folder and click **Generator Test Report**.

The report template appears.




2. Complete the fields to define the report as described in the next sections.

# Enter a Title, Company Name, Technician Name

Enter the appropriate information in the following fields:

- **Title** - Enter a title for the report. For example, you might call the report the Generator Operation Report.
- **Company Name** - Enter the name of your organization.
- **Technician Name** - Enter the name of the person who prepared the report.

# Include Data Warnings

Select the appropriate option to include or exclude the data warnings table.

- **Yes** - Include a table of data warnings in the report. If there are no data warnings, the table is not included in the report.
- **No** - Exclude a table of data warnings from the report.

# Specify Run Information

Complete the following steps to select the report mode, EPSS group, and source exclusions. You can configure the Test report to generate based on detected runs in history or based on runs in a date range and run reason.

1. In the **EPSS Group** list, select the group that the Generator Test Report is intended for. When you select a group in the list, the field to the right shows the devices included in the group.
2. Click **Exclude Sources** to select the devices in the group that you want to exclude from the Generator Test Report.

   The **EPSS Group Exclusion Summary** screen appears. This lets you refine the report so that devices do not appear in the report if they are not available when the test is run.

   - In the **Sources Included** area, select the check boxes for the sources to be excluded. Click **>** to move those sources to the **Sources Excluded** area.
   - To move all of the sources into the **Sources Excluded** area, click **>>**.
   - To move excluded sources back to the **Included Sources** area, select the sources and click **<** or click **<<** to move all sources.
   - Click **OK** to save your selections and return to the report template.

3. Select **Use Run History** if you want to select the most recent run or select other specific runs that are stored in history, and do the following:
   - Click **Refresh Run History** to populate the **Runs** list with the latest run records.
   - In the **Runs** list, select `Most recent run` or the specific run record. The date and reason for the run appear below the dropdown list.

     If you select `Most recent run` and define excluded sources, the exclusions are ignored when you generate the report.

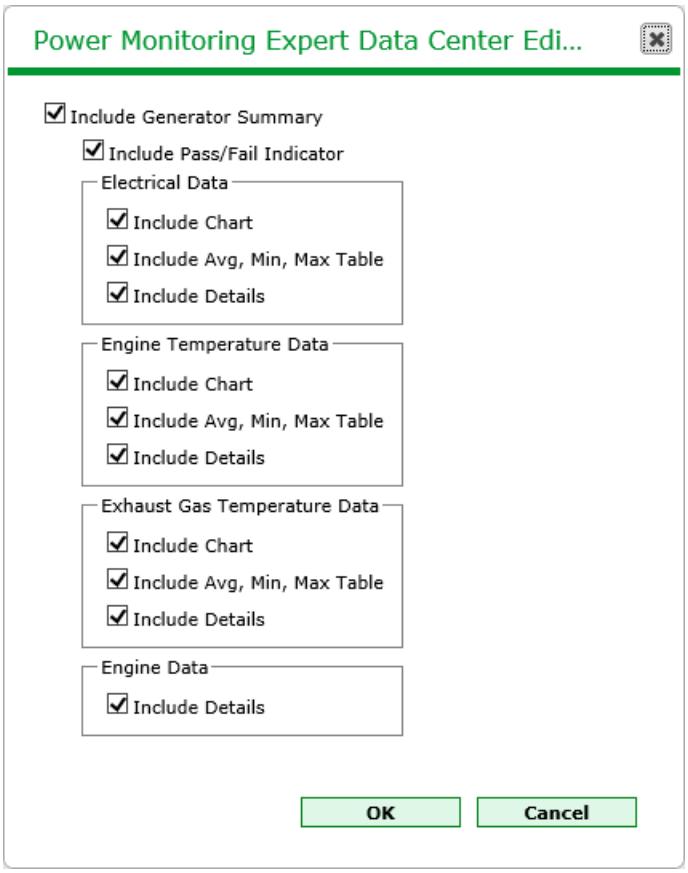
4. Select **Select Date Range** if you want to select the runs according to a date range and run reason, and do the following:
   - Select the **Reporting Period** date range for the runs to include in the report.
   - Select the **Run Reason** for the runs to include in the report.

The devices in the group will appear in the **Sources** section of the Generator Test Report. Devices that you excluded from the report will be gray-shaded.

# Configure the Generator Summary

Complete the following steps to configure the **Generator Summary** section of the Generator Test Report.

1. Click **Generator Summary**.




2. Select the **Include Generator Summary** check box to include the **Generator Summary** section in the Test Report. The remaining options become enabled. Clear this check box to exclude the **Generator Summary** section from the report.
3. Select the **Include Pass/Fail Indicator** check box to include both the pass/fail grade and the test method used to evaluate each generator. The pass/fail grade is based on both the run duration and the minimum specified percentage of the prime nameplate rating. Clear this check box to exclude the pass/fail grade and the test method from the report.
4. Select the options under **Electrical Data** to specify electrical data in the report.
   - **Include Chart** - Select this check box to include a generator chart showing kW Load, kVA Load, and the threshold for the minimum acceptable power load based on the specified load percentage for the run duration.
   - **Include Avg, Min, Max Table** - Select this check box to include a table showing minimum, average, and maximum electrical readings for the longest continuous load at (or above) the specified load percentage. The electrical readings measured are: kW, kVA, Ia, Ib, Ic, In, Vab, Van, Vbc, Vbn, Vca, Vcn.
   - **Include Details** - Select this check box to include a table showing the generator electrical details. The data is organized by time intervals and displays the readings for kW, kVA, load (the percentage of maximum load identified on the generator nameplate), Power Factor (PF), I avg, VLL avg, VLN avg, and Frequency.
5. Select the options under **Engine Temperature Data** to specify engine temperature data in the report.

- **Include Chart** - Select this check box to include a chart showing the engine temperature for the run duration, and a horizontal line identifying the minimum temperature required for the run duration.
- **Include Avg, Min, Max Table** - Select this check box to include a table showing Minimum, Average, and Maximum engine temperature readings for the longest continuous engine temperature equal to or above the minimum acceptable engine temperature.
- **Include Details** - Select this check box to include a table showing the Longest Continuous ET (Engine Temperature) time period, the Minimum ET, Required Run Duration (Min), and Actual Run Duration.

**Note**

The configuration tool does not convert the engine temperature values from one temperature type to another.

6. Select the options under **Exhaust Gas Temperature Data** to specify exhaust gas temperature data in the report.
   - **Include Chart** - Select this check box to include a chart showing the exhaust gas temperature for the run duration, and a horizontal line identifying the minimum temperature required for the run duration.
   - **Include Avg, Min, Max Table** - Select this check box to include a table showing Minimum, Average, and Maximum exhaust gas temperature readings for the longest continuous exhaust gas temperature equal to or above the minimum acceptable exhaust temperature.
   - **Include Details** - Select this check box to include a table showing the Longest Continuous EGT (Exhaust Gas Temperature) time period, the Minimum EGT, Required Run Duration (Min), and Actual Run Duration.
7. Under **Engine Data**, select the **Include Details** check box to include a engine details in the report. Details for each generator include:
   - Generator name.
   - Generator start and stop times by date.
   - A label to show whether the data was automatically or manually collected.
   - A table of measurements, such as battery voltage and coolant temperature. Each measurement includes a timestamp and the corresponding values.
8. Click **OK** to save the changes and return to the Generator Test Report template.

# Configure the Events Summary

Complete the following steps to configure the **Events Summary** section of the Test Report:

1. Click **Events Summary** to open the **Events Summary** screen.
2. Select the **Include Events Summary** check box to include the **Events Summary** section in the report. The other check boxes become enabled. Clear this check box to exclude the **Events Summary** section from the report.

3. Select the **Include Generator Events** check box to include generator events in the report. Clear the check box to exclude generator events from the section.
4. Select the **Include ATS Events** check box to include ATS events in the report. Clear the check box to exclude ATS events from the section.
5. Click **OK** to save your changes and return to the Generator Test Report template.

# Add Comments

In the **Comments** box, enter additional information for the report.

# Generate the Report

Click **Generate Report** to create the report. The layout and content of the report is dependent on the selections you made when you configured the report, and on the contents of the system database.

# Generator Test Report Example

The following images are examples of various sections of an Generator Test Report in the order in which they occur.

## Title Page

The title page of the test report shows the title, company name, group, the name of the person preparing the report, and the test period.

## Sources

The **Sources** section shows the devices in the selected group.

**Sources in Report Group: EPSS Main East**

| Source | Type | Description |
|---|---|---|
| ATS 01 | Transfer Switch | This is a Life Safety Load ATS Device. Refer to EPSS operating procedure before testing this device. |
| ATS 02 | Transfer Switch | This is a Critical Load ATS Device |
| ATS 03 | Transfer Switch | This is a Non-Essential Load ATS Device |
| Gen 01 | Generator | Cummins generator. |

## Events Summary

The **Events Summary** section shows the status of the generators in the group.

**ATS and Generator Events Summary**

| Timestamp | Source Name | Status |
|---|---|---|
| 5/3/2010 1:00:54.24 AM | ATS 01 | Test |
| 5/3/2010 1:00:54.54 AM | Gen 01 | Start |
| 5/3/2010 1:01:03.04 AM | Prairie Heart Gen | Emergency Power Source Available |
| 5/3/2010 1:01:03.34 AM | ATS 01 | Emergency |
| 5/3/2010 1:01:24.24 AM | ATS 02 | Test |
| 5/3/2010 1:01:24.54 AM | ATS 02 | Emergency |
| 5/3/2010 1:01:46.31 AM | ATS 03 | Test |
| 5/3/2010 1:01:46.58 AM | ATS 03 | Emergency |
| 5/3/2010 1:59:18.90 AM | ATS 01 | Normal |
| 5/3/2010 1:59:19.90 AM | ATS 02 | Normal |
| 5/3/2010 1:59:29.89 AM | ATS 03 | Normal |
| 5/3/2010 2:06:21.63 AM | Gen 01 | Stopped |

# Generator Summary

The **Generator Summary** section shows the evaluation method is being used to determine the status of the generator being tested.

**Generator Summary**

Generator: Gen 01 Nameplate: 1000 kW

Start Time: 5/3/2010 1:01:03 AM Stop Time: 5/3/2010 2:06:21 AM

| Evaluation Method | Overall Test Status |
|---|---|
| Load and Exhaust Gas Temperature | PASS |

| Test | Stage | Test Status |
|---|---|---|
| Load | One | PASS |
| Exhaust Gas Temperature | One | PASS |

This example shows the Load Bank evaluation method was used on the generator.

**Generator Summary**

Generator: Gen 01 Nameplate: 1000 kW

Start Time: 5/3/2010 1:01:03 AM Stop Time: 5/3/2010 2:06:21 AM

| Evaluation Method | Overall Test Status |
|---|---|
| Load Bank | FAIL |

| Test | Stage | Test Status |
|---|---|---|
| Load Bank | One | PASS |
| Load Bank | Two | PASS |
| Load Bank | Three | FAIL |

# Generator Load Summary

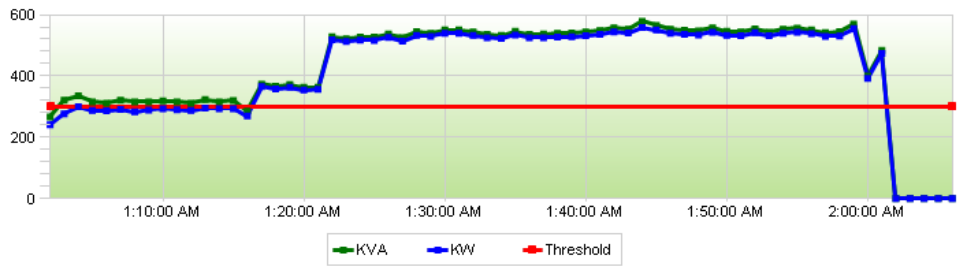
The **Generator Load Summary** section shows a chart of the electrical load data for the generator being tested.

**Generator Load Summary**

Generator: Gen 01 Nameplate: 1000 kW

Start Time: 5/3/2010 1:01:03 AM Stop Time: 5/3/2010 2:06:21 AM

| Longest Continuous Load | Nameplate % | Threshold | Actual Run Duration | Required Run Duration | Test Status |
|---|---|---|---|---|---|
| 5/3/2010 1:17:00 AM - 5/3/2010 2:01:00 AM | 30% | 300 kW | 44.0 min | 30 min | PASS |



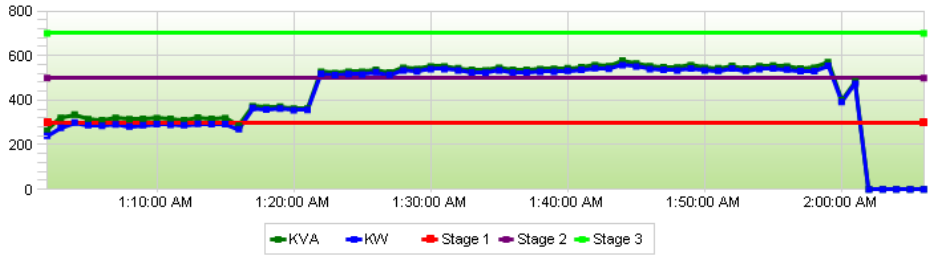
This is an example showing the Load Bank evaluation method was used.

**Generator Load Summary**

Generator: Gen 01 Nameplate: 1000 kW

Start Time: 5/3/2010 1:01:03 AM Stop Time: 5/3/2010 2:06:21 AM

| Longest Continuous Load | Nameplate % | Threshold | Actual Run Duration | Required Run Duration | Test Status |
|---|---|---|---|---|---|
| 5/3/2010 1:17:00 AM - 5/3/2010 1:27:00 AM | 30% | 300 kW | 10.0 min | 10 min | PASS |
| 5/3/2010 1:27:00 AM - 5/3/2010 1:59:00 AM | 50% | 500 kW | 32.0 min | 10 min | PASS |
| No Load Found | 70% | 700 kW | 0.0 min | 10 min | FAIL |




# Longest Continuous Load

This section includes a table summarizing the minimum, average, and maximum electrical readings for the longest continuous load by load bank stages. The following images show data for each stage of the load bank test.

**Min, Avg, Max Readings for the Longest Continuous Load**

Generator: Gen 01 Nameplate: 1000 kW

Start Time: 5/3/2010 1:01:03 AM Stop Time: 5/3/2010 2:06:21 AM

Stage One 1:17:00 AM - 1:27:00 AM

| Measurement | Min | Avg | Max | Units |
|---|---|---|---|---|
| Active Power | 355.00 | 438.90 | 526.00 | kW |
| Apparent Power | 363.00 | 447.90 | 537.00 | kVA |
| Current Phase A | 449.00 | 559.60 | 674.00 | A |
| Current Phase B | 421.00 | 519.70 | 624.00 | A |
| Current Phase C | 434.00 | 531.20 | 632.00 | A |
| Voltage Phases AB | 482.00 | 482.00 | 482.00 | V |
| Voltage Phases AN | 278.00 | 278.00 | 278.00 | V |

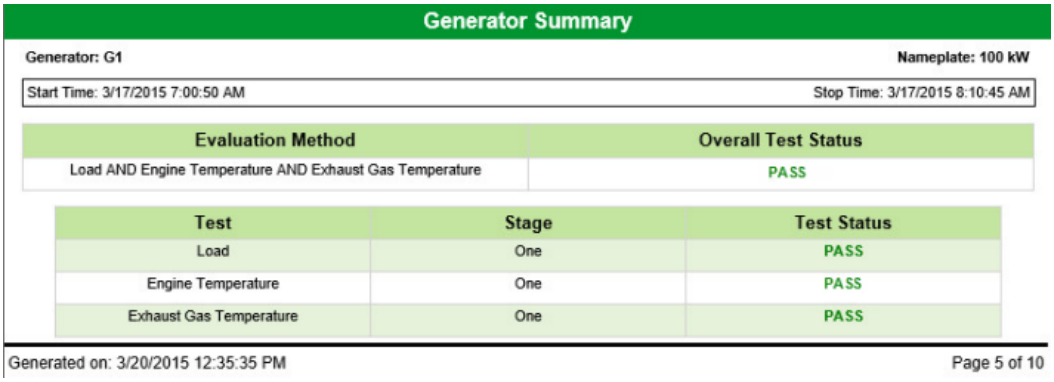
| Stage Two | | | | 1:27:00 AM - 1:59:00 AM |
|---|---|---|---|---|
| **Measurement** | **Min** | **Avg** | **Max** | **Units** |
| Active Power | 514.00 | 535.33 | 558.00 | kW |
| Apparent Power | 525.00 | 547.85 | 578.00 | kVA |
| Current Phase A | 659.00 | 688.82 | 729.00 | A |
| Current Phase B | 608.00 | 633.79 | 666.00 | A |
| Current Phase C | 619.00 | 646.12 | 679.00 | A |
| Voltage Phases AB | 482.00 | 482.00 | 482.00 | V |
| Voltage Phases AN | 278.00 | 278.06 | 279.00 | V |
| Voltage Phases BC | 482.00 | 482.03 | 483.00 | V |
| Voltage Phases BN | 278.00 | 278.03 | 279.00 | V |
| Voltage Phases CA | 482.00 | 482.03 | 483.00 | V |
| Voltage Phases CN | 278.00 | 278.03 | 279.00 | V |

**Stage Three**

No Load Found

# Generator Engine Temperature Summary

This example shows the Load AND Engine Temperature AND Exhaust Gas Temperature evaluation method used on the generator.



**Generator Summary**

**Generator: G1** **Nameplate: 100 kW**

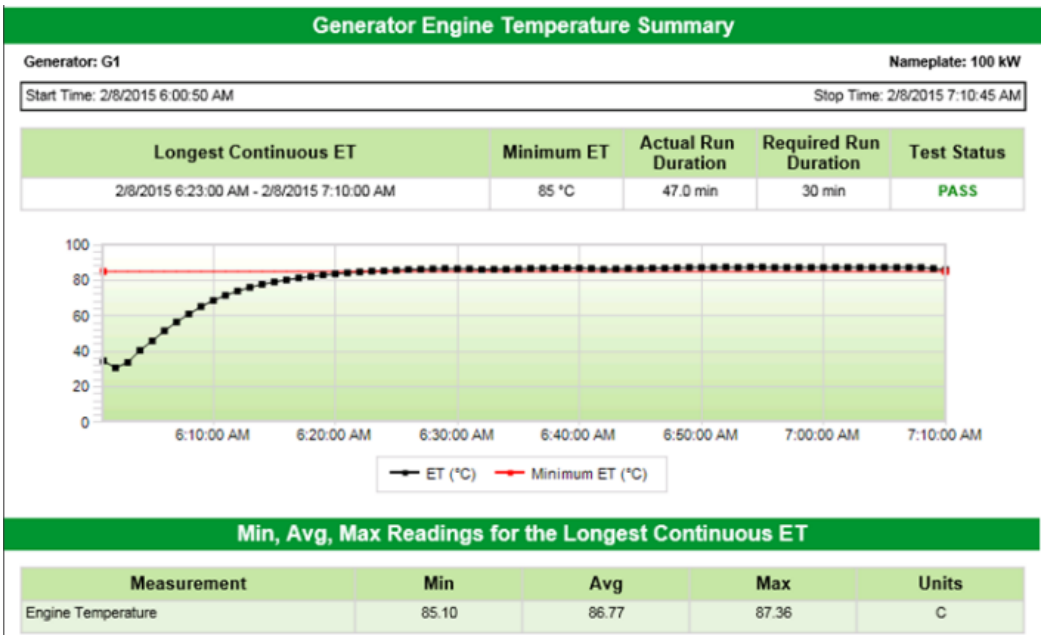
Start Time: 3/17/2015 7:00:50 AM Stop Time: 3/17/2015 8:10:45 AM

| Evaluation Method | Overall Test Status |
|---|---|
| Load AND Engine Temperature AND Exhaust Gas Temperature | PASS |

| Test | Stage | Test Status |
|---|---|---|
| Load | One | PASS |
| Engine Temperature | One | PASS |
| Exhaust Gas Temperature | One | PASS |

Generated on: 3/20/2015 12:35:35 PM Page 5 of 10

This section also includes a chart of the engine temperature readings for the longest continuous load and a table summarizing the minimum, average, and maximum engine temperature readings for the longest continuous load.



**Generator Engine Temperature Summary**

Generator: G1 Nameplate: 100 kW

Start Time: 2/8/2015 6:00:50 AM Stop Time: 2/8/2015 7:10:45 AM

| Longest Continuous ET | Minimum ET | Actual Run Duration | Required Run Duration | Test Status |
|---|---|---|---|---|
| 2/8/2015 6:23:00 AM - 2/8/2015 7:10:00 AM | 85 °C | 47.0 min | 30 min | PASS |

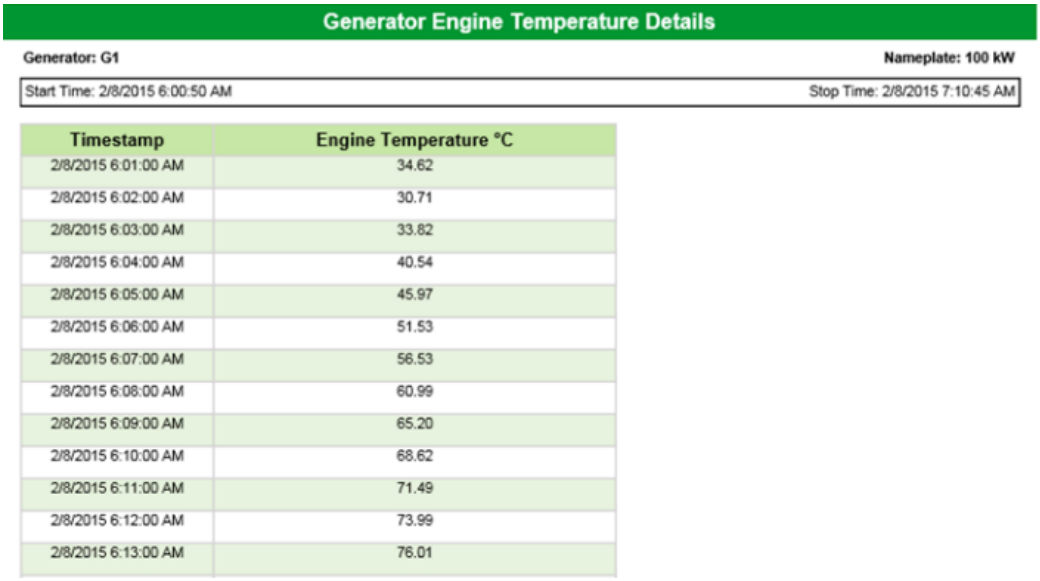


**Min, Avg, Max Readings for the Longest Continuous ET**

| Measurement | Min | Avg | Max | Units |
|---|---|---|---|---|
| Engine Temperature | 85.10 | 86.77 | 87.36 | C |

# Generator Engine Temperature Details

This section shows summarized engine temperature details by time intervals.



**Generator Engine Temperature Details**

Generator: G1 Nameplate: 100 kW

Start Time: 2/8/2015 6:00:50 AM Stop Time: 2/8/2015 7:10:45 AM

| Timestamp | Engine Temperature °C |
|---|---|
| 2/8/2015 6:01:00 AM | 34.62 |
| 2/8/2015 6:02:00 AM | 30.71 |
| 2/8/2015 6:03:00 AM | 33.82 |
| 2/8/2015 6:04:00 AM | 40.54 |
| 2/8/2015 6:05:00 AM | 45.97 |
| 2/8/2015 6:06:00 AM | 51.53 |
| 2/8/2015 6:07:00 AM | 56.53 |
| 2/8/2015 6:08:00 AM | 60.99 |
| 2/8/2015 6:09:00 AM | 65.20 |
| 2/8/2015 6:10:00 AM | 68.62 |
| 2/8/2015 6:11:00 AM | 71.49 |
| 2/8/2015 6:12:00 AM | 73.99 |
| 2/8/2015 6:13:00 AM | 76.01 |

# Generator Exhaust Gas Summary

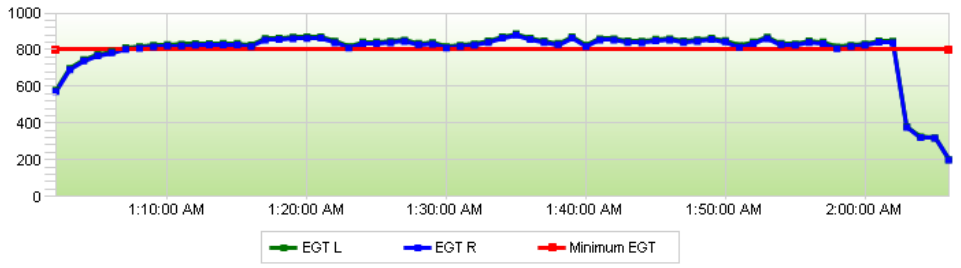
This section shows a chart of the exhaust gas temperature data.

**Generator Exhaust Gas Summary**

Generator: Gen 01 Nameplate: 1000 kW

Start Time: 5/3/2010 1:01:03 AM Stop Time: 5/3/2010 2:06:21 AM

| Longest Continuous EGT | Minimum EGT | Actual Run Duration | Required Run Duration | Test Status |
|---|---|---|---|---|
| 5/3/2010 1:07:00 AM - 5/3/2010 2:02:00 AM | 800 °F | 55.0 min | 30 min | PASS |




**Min, Avg, Max Readings for the Longest Continuous EGT**

| Measurement | Min | Avg | Max | Units |
|---|---|---|---|---|
| Exhaust Gas Temperature Left | 811.03 | 844.38 | 888.80 | F |
| Exhaust Gas Temperature Right | 803.00 | 836.02 | 880.00 | F |

# Generator Exhaust Gas Details

This section shows summarized exhaust gas temperature details by time intervals.

**Generator Exhaust Gas Details**

Generator: Gen 01 Nameplate: 1000 kW

Start Time: 5/3/2010 1:01:03 AM Stop Time: 5/3/2010 2:06:21 AM

| Timestamp | Exhaust Gas Temperature Left °F | Exhaust Gas Temperature Right °F |
|---|---|---|
| 5/3/2010 1:02:00 AM | 578.73 | 573.00 |
| 5/3/2010 1:03:00 AM | 698.92 | 692.00 |
| 5/3/2010 1:04:00 AM | 746.39 | 739.00 |
| 5/3/2010 1:05:00 AM | 774.67 | 767.00 |
| 5/3/2010 1:06:00 AM | 791.84 | 784.00 |
| 5/3/2010 1:07:00 AM | 811.03 | 803.00 |
| 5/3/2010 1:08:00 AM | 817.09 | 809.00 |
| 5/3/2010 1:09:00 AM | 824.16 | 816.00 |

# Generator Electrical Details

This section shows summarized electrical details by time intervals.

**Generator Electrical Details**

Generator: Gen 01 Nameplate: 1000 kW

Start Time: 5/3/2010 1:01:03 AM Stop Time: 5/3/2010 2:06:21 AM

| Timestamp | KW | KVA | Load % | VLLAvg | VLNAvg | Frequency |
|---|---|---|---|---|---|---|
| 5/3/2010 1:02:00 AM | 241.00 | 266.00 | 24.10 | 482.00 | 278.00 | 60.07 |
| 5/3/2010 1:03:00 AM | 276.00 | 321.00 | 27.60 | 481.00 | 278.00 | 60.03 |
| 5/3/2010 1:04:00 AM | 300.00 | 336.00 | 30.00 | 482.00 | 278.00 | 60.08 |
| 5/3/2010 1:05:00 AM | 288.00 | 315.00 | 28.80 | 482.00 | 278.00 | 60.06 |
| 5/3/2010 1:06:00 AM | 286.00 | 311.00 | 28.60 | 482.00 | 278.00 | 60.07 |
| 5/3/2010 1:07:00 AM | 291.00 | 321.00 | 29.10 | 482.00 | 278.00 | 60.07 |
| 5/3/2010 1:08:00 AM | 283.00 | 315.00 | 28.30 | 482.00 | 278.00 | 60.08 |
| 5/3/2010 1:09:00 AM | 289.00 | 316.00 | 28.90 | 482.00 | 278.00 | 60.07 |
| 5/3/2010 1:10:00 AM | 293.00 | 319.00 | 29.30 | 482.00 | 278.00 | 60.07 |
| 5/3/2010 1:11:00 AM | 290.00 | 316.00 | 29.00 | 482.00 | 278.00 | 60.08 |

# Generator Engine Details

This section shows engine parameter details, such as battery voltage and oil pressure readings.

**Generator Engine Details**

Generator: Gen 01 Nameplate: 1000 kW

Start Time: 5/3/2010 1:01:03 AM Stop Time: 5/3/2010 2:06:21 AM

| Measurement | Timestamp | Reading |
|---|---|---|
| Battery Voltage (V) | | |
| | 5/3/2010 1:02:00 AM | 28.02 |
| | 5/3/2010 1:03:00 AM | 28.02 |
| | 5/3/2010 1:04:00 AM | 28.03 |
| | 5/3/2010 1:05:00 AM | 28.00 |
| | 5/3/2010 1:06:00 AM | 27.98 |
| | 5/3/2010 1:07:00 AM | 27.98 |
| Oil Pressure (PSI) | | |
| | 5/3/2010 1:02:00 AM | 84.91 |
| | 5/3/2010 1:03:00 AM | 66.36 |
| | 5/3/2010 1:04:00 AM | 65.05 |
| | 5/3/2010 1:05:00 AM | 65.05 |
| | 5/3/2010 1:06:00 AM | 66.43 |
| | 5/3/2010 1:07:00 AM | 72.86 |
| | 5/3/2010 1:08:00 AM | 65.76 |
| | 5/3/2010 1:09:00 AM | 65.03 |
| | 5/3/2010 1:10:00 AM | 64.93 |

# Smart Device Data Collector

The Smart Device Data Collector is a web tool where you can manage your facility data, including:

- Log standard data for a generator, including battery voltage, coolant temperature, and oil pressure. This feature helps you enter more complete data so reports and analysis are more accurate.
- Log data for custom data values, such as for generator maintenance and cleaning tasks.

Power Monitoring Expert - Data Center Edition includes several reports that display generator data submitted through the Smart Device Data Collector, including Generator Test Report, Tabular Report, and Trending Report. The next section explains how to make sure submitted data appears in the reports and gadgets.

The Smart Device Data Collector cannot be used to log data to Power Monitoring Expert - Data Center Edition until generators have been set up in the Generator Performance Configuration Tool.

# Generator Data Workflow

Data submitted through Smart Device Data Collector can be included in various reports and gadgets:

- Generator related data submitted through Data Collector can be included in the Generator Test Report and show the Run record in the Run History.
- Non-generator data can be included in other reports: Tabular Report and Trending Report.

Follow these steps to configure generators in the Generator Performance Configuration Tool to work with the Smart Device Data Collector tool.

1. Set up the generator meter in Management Console. See the *Power Monitoring Expert User Guide* for instructions to add and configure meters in Management Console.
2. Add the generator entity in the Generator Performance Configuration Tool. See "Define Generators" on page 69 and note the following:
   - The **Starting**, **Running**, and **Stopped** state values for the generator must be defined.
3. On the **Generators** tab, click **Edit Engine Data**. On the Engine Data Measurements screen, add the custom data values you want to log and report on. See "Edit Engine Data" on page 71.
4. Save the new data values and return to the **Generators** tab.
5. Click **Assign Engine Data**. On the Assign Engine Data screen, configure the measurement for each of the data values. See "Assign Engine Data" on page 72 and note the following:
   - **Source** - Select the generator source.

- **Measurement** - Select a measurement with a name that begins with: WAGES External Input 1.
- **Data Collector** - Check this option for the data value.

6. Save the data assignments and return to the **Generators** tab.
7. Verify the generator entities are included in a group on the **Groups** tab. "Edit Groups" on page 66.
8. Login to the Smart Device Data Collector. See "Start the Smart Device Data Collector" on page 120.
9. Enter and submit the generator data. See "Log Generator Data" on page 122.
10. Login to Power Monitoring Expert - Data Center Edition and view the data in reports:
    - Generator Test Report "Generator Test Report" on page 105
    - Tabular Report - See the *Power Monitoring Expert Help* for instructions.
    - Trending Report - See the *Power Monitoring Expert Help* for instructions.

# Start the Smart Device Data Collector

You can use any of these devices to open the Smart Device Data Collector.

- iOS(iPhone/iPad)
- Blackberry
- Android Phone/Tablet
- PC/laptop

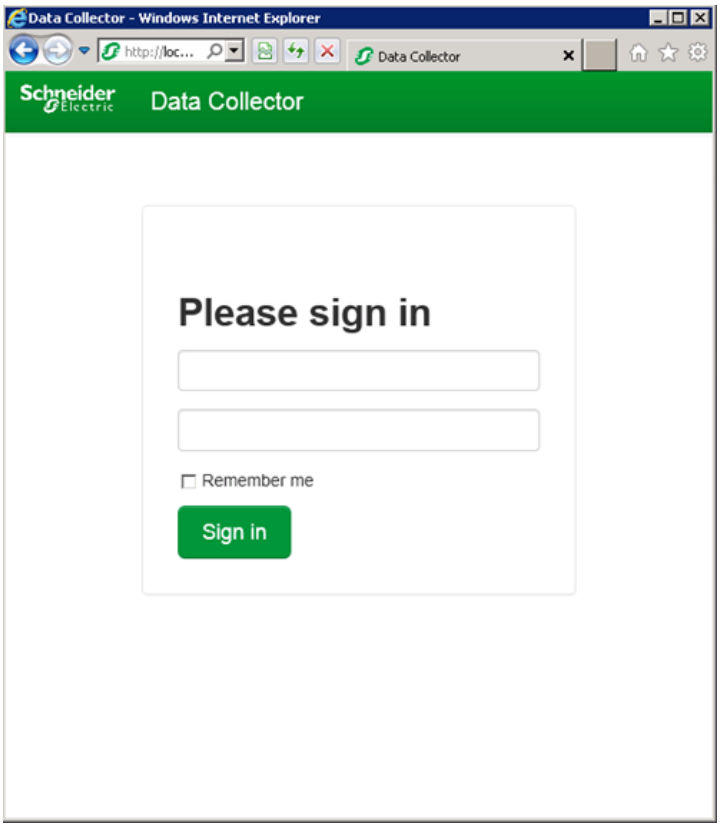
The web tool can be accessed remotely at this URL:

```
http://<server_name>/DataCollector
```

A link to the web tool is also provided in the programs folder **Start** > **All Programs** > **Schneider Electric**:

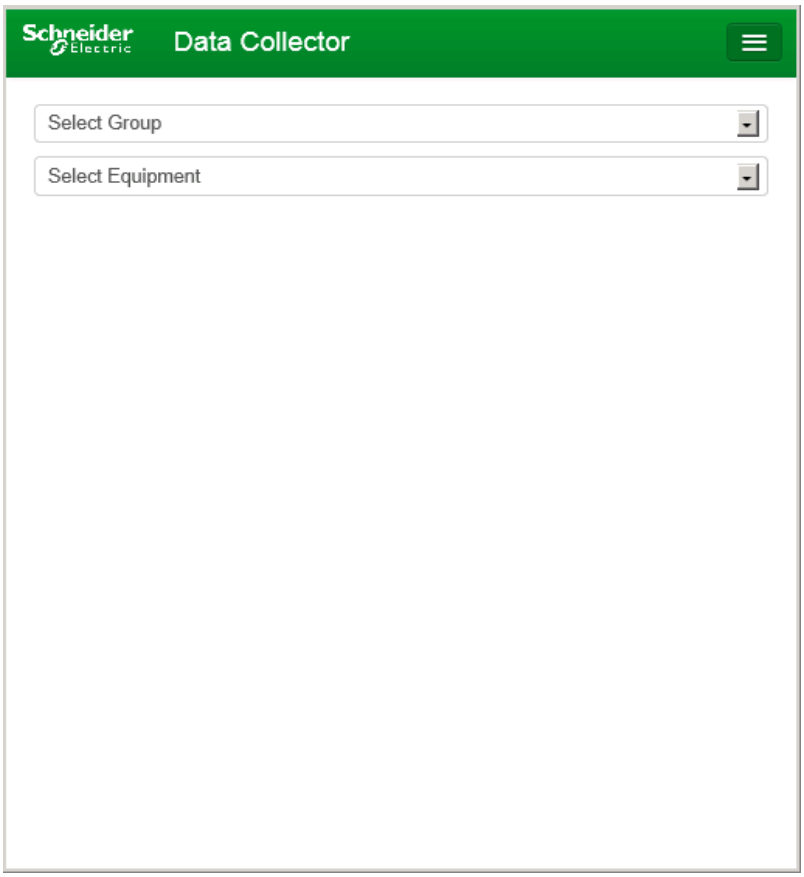
The Smart Device Data Collector uses the same login credentials as Power Monitoring Expert - Data Center Edition. It can only be accessed by users with the Controller, Operator, or Supervisor access level.

1. Go to the URL in a browser or use the shortcut in the programs folder. The sign in screen appears.




2. Enter your login credentials. The main screen appears.

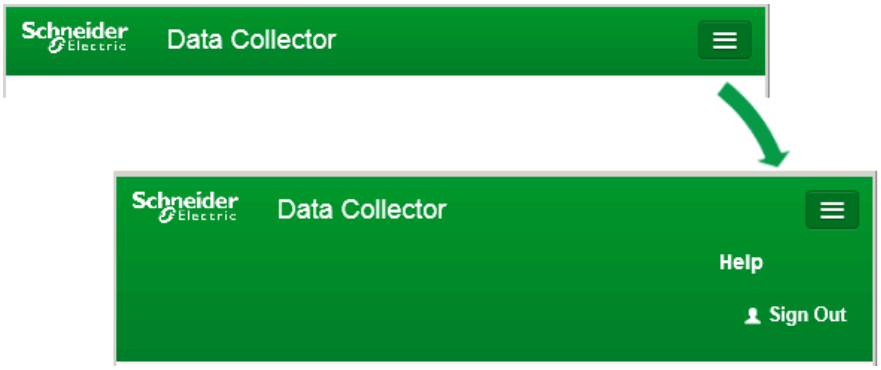
   The main screen contains the **Select Group** box (for generator groups) and the **Select Equipment** box for a device in the selected group.




An error message appears if you do not have the correct access level or you enter the wrong credentials.

The selection boxes are empty if the generators have not enabled the Smart Device Data Collector option in the configuration tool.

To view the online help or sign out of the tool, click the menu button.




# Log Generator Data

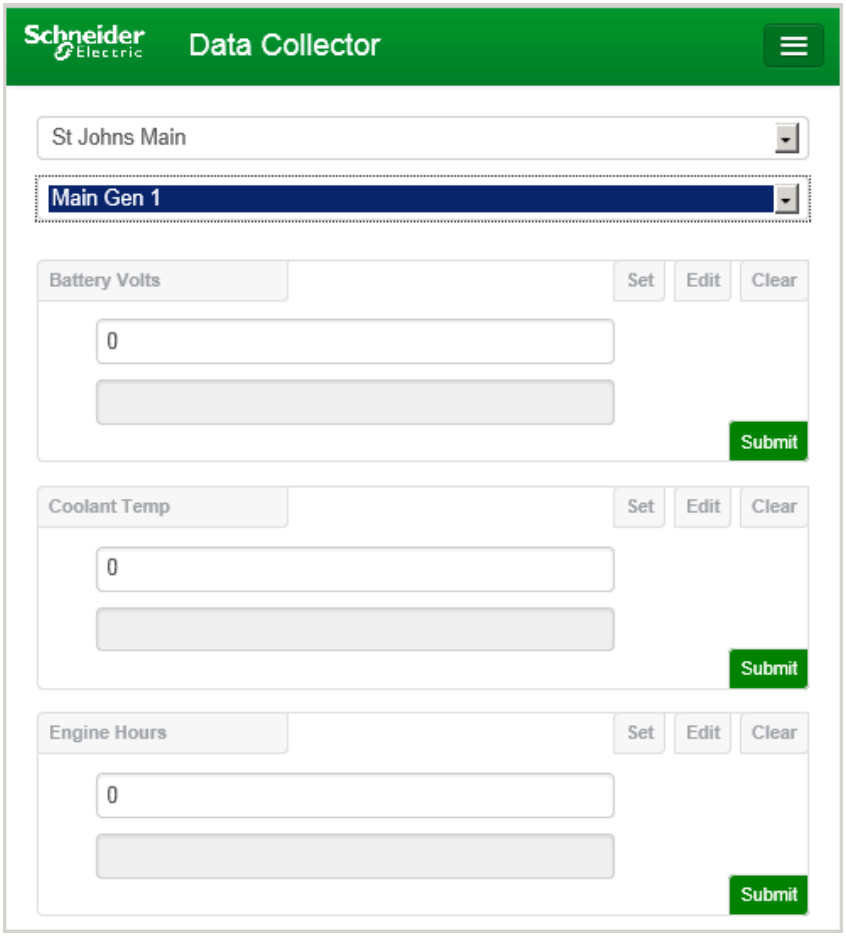
When you need to enter generator data into Power Monitoring Expert - Data Center Edition, you can use the Smart Device Data Collector to submit the data.

In the Generator Performance Configuration Tool, verify the **Data Collector** option is enabled for the generator you want to log data for. See "Assign Engine Data" on page 72 for instructions. The custom data values you create in the configuration tool will appear in the web tool.

Follow these steps to log generator data:

1. In the first two boxes, select the group and specific generator you want to log data for.

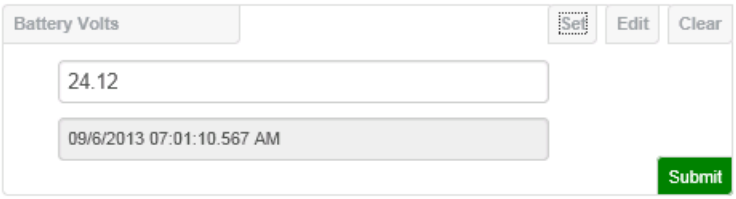
   The custom data value fields, such as **Battery Volts**, for the generator appear.




**NOTE:** The data value fields are the data values added in the configuration tool. For each data value, there is a value entry box and a date box.

2. For each data value, enter the new data in the box.

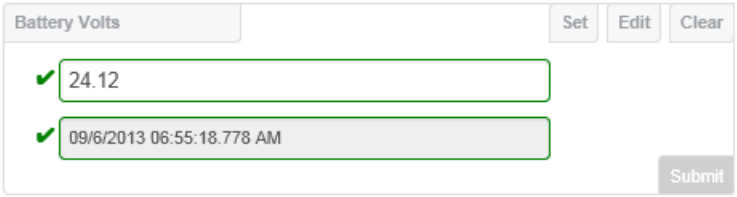

- Click **Set** to set the timestamp for the new data.



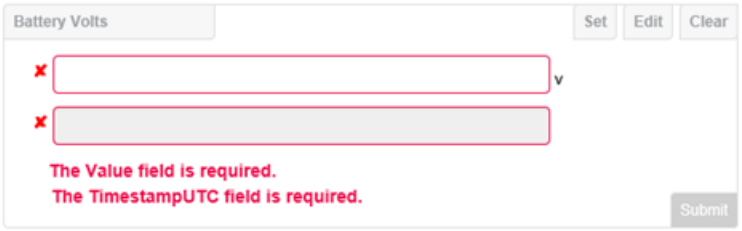

- If you want to edit the timestamp value, click **Edit** and enter the value. All date fields in use the MM/DD/YYYY format.

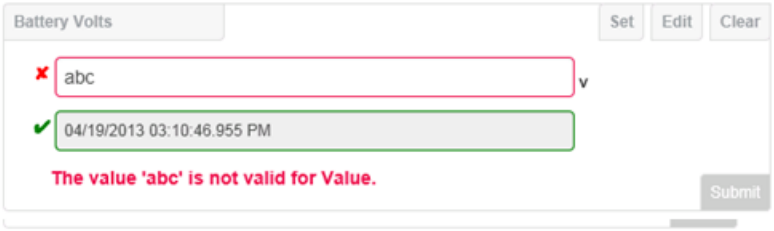

3. Click **Submit** to log the new data.

   When the data has been successfully logged, the field borders turn green and a green check mark appears. The submitted timestamp is in server time. In Power Monitoring Expert - Data Center Edition, the data is logged in UTC.



An error message appears if a field is blank or has data with invalid format, as shown in these examples. Data with the incorrect format or blanks do not get stored in Power Monitoring Expert - Data Center Edition.




4. To edit the data after you click **Submit**, click **Edit** and the fields become editable again.
5. Click **Clear** if you want to clear all the fields.

You can select other groups and devices to submit additional data.

Power Monitoring Expert - Data Center Edition

Generator Performance Guide



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7EN02-0368-00 05/2015