

## COURSE DESCRIPTION

---

# EcoStruxure Power Monitoring Expert (PME)

## 9.x Advanced Programming

### Overview

This advanced programming course focuses on system and device level customization using the *Designer* interface in PME software. Students will learn the architecture of the ION meter along with using the *Designer* interface to examine the default frameworks. Students will be guided through a series of lab activities to creating custom applications for equipment monitoring, alarming and logging. Students will learn to program the *Virtual ION Processor (VIP)* for special applications such as data aggregation and event driven reporting. Students will then have the opportunity to create a custom virtual meter framework by aggregating multiple meters in the VIP and displaying the real-time and historical information from that newly created meter in the Vista application. Students will learn the differences between the default meter templates and firmware versions that can be pushed to devices and be able to describe each. At the end of the course, students will have created frameworks for integrating the several types of WAGES devices available, program frameworks that will perform process and control applications, and implement more advanced power quality functionality within ION meters.

### Duration

4 Days (M-W 8am-4pm / Th 8am-1:30pm). *Please book departing flights for 4pm or later on the last day of class.*

### Who should attend

This course is designed for anyone who works with an PME system and has reasonable knowledge of the default functions of ION meters and PME software. This course may be appropriate for meter/instrumentation technicians, system engineers and system integrators who need to learn how to get the most out of their PME software and associated meters.

### Prerequisites

- Working knowledge of PME software, especially experience using *Vista*
- Working knowledge of the default capabilities of ION meters
- General computer skills and basic working experience with Microsoft Windows
- Completion of a PME Fundamentals or Overview course is recommended

## Students will be able to

- ❑ Describe ION architecture and ION module properties
- ❑ Examine configuration of meters installed in a PME system
- ❑ Understand the procedure to backup and restore a meter template
- ❑ Construct programs to perform custom calculations
- ❑ Describe how Designer and Vista work together
- ❑ Build programs for logging and alarming
- ❑ Construct programs for Advanced WAGES metering
- ❑ Build programs to read Modbus registers from one device to an ION meter
- ❑ Program applications inside of ION meters to monitor processes and control functions
- ❑ Understand the ION Reference document and how to use it
- ❑ Learn best practices for programming in Designer
- ❑ Understand the ION Reference document and how to use it

## Agenda

### Day 1

#### Course Introduction

- ❑ Student and Instructor introductions and overview of course logistics
- ❑ Overview of course topics and agenda

#### Describe ION architecture and ION module properties

- ❑ Describe the ION module concept including setup and output registers
- ❑ Describe functions of core ION meter modules
- ❑ Use *PME Reference* and *ION Device Template Reference* documents

#### Explore navigation inside of the PME Designer interface

- ❑ Use *Designer* to open a meter node
- ❑ Use *Designer* to view input and output registers
- ❑ Use *Designer* to explore notes made inside of templates
- ❑ Use *Designer* to make links to different modules

#### Backup and Restore ION meters

- ❑ Understand the files that need to be saved
- ❑ Describe the different file types in *Designer*

- Backup and restore a meter's program using ION Setup
- Backup programs in Designer

## Day 2

### **Construct Vista Screens that work with Designer Programs**

- Use *Designer* and *Vista* to see how registers link together
- Use Designer to create programs that can be controlled in Vista
- Link to setup registers in Designer from Vista for control

### **Create and understand the Counter Module**

- Design a program that counts pulses being sent from Vista
- Display totalized values inside of Vista
- Discuss other uses for counter Modules

### **Understand the Clock and Periodic Timer Module**

- Add a clock module to the system and view its outputs in Vista
- Create Periodic timers in designer analyze its behavior
- Explore the different outputs from the modules
- Discuss possible applications for these modules

### **Utilize and understand the functionality of the Arithmetic Module**

- Create a framework to perform basic math operations
- Modify the framework to understand advanced syntax in the Arithmetic module

### **Build programs to operate at a scheduled time**

- Understand the use of the Scheduling module
- Examine the differences between the scheduling module and clock module

## Day 3

### **Program a framework for load shedding**

- Understand the inputs and outputs of the program
- Add functionality to override the automatic control of the framework
- Build Vista screens to test, troubleshoot, and validate programs functionality

### **Modify existing programs to perform a different action**

- Use existing load shedding framework and modify it to turn on and off capacitor banks
- Discuss similarities between the two frameworks

- Understand best practices and what could be changed when programming in the future
- Discuss best practices and uses for module
- Build a Framework for power calculations from multiple meters

#### **Use the meter to calculate production line energy usage**

- Simulate production count through a digital input on a meter
- Program modules to calculate total energy per object and output values to the database
- Examine other uses for similar programs

#### **Create a framework for recording data to the SQL database**

- Observe how data flows through the PME system to the database
- Build frameworks for logging data in the system
- Display logged data in Vista
- Understand the Windows Services that are involved with data logging
- Display logged data in Vista

## **Day 4**

#### **Create custom alarms in Designer using the Set Point Module**

- Program custom Alarms in PME using the Set point module
- Create alarms for values that fall outside of a band range
- Display Alarms in Vista using the Global Events view
- View alarms in the web client
- Add custom alarms in the system using the web client
- Discuss how to modify and customize alarming
- Discuss alarm management and best practices

#### **Design and build your own Virtual Meter**

- Apply programming "Best Practices" when building custom applications
- Build a program in the VIP that takes the input from multiple meters and creates a virtual meter
- Design a Vista page to display the output from this newly created virtual meter
- Expand the frameworks capability using modules and skills learned throughout the week to perform more advanced calculations
- Discuss possible applications for this newly created virtual meter

#### **Course Summary**

- Answer any remaining questions
- Outline available resources for education going forward