SIEMENS

User Manual

SEM3™ - Embedded Micro Metering Module™

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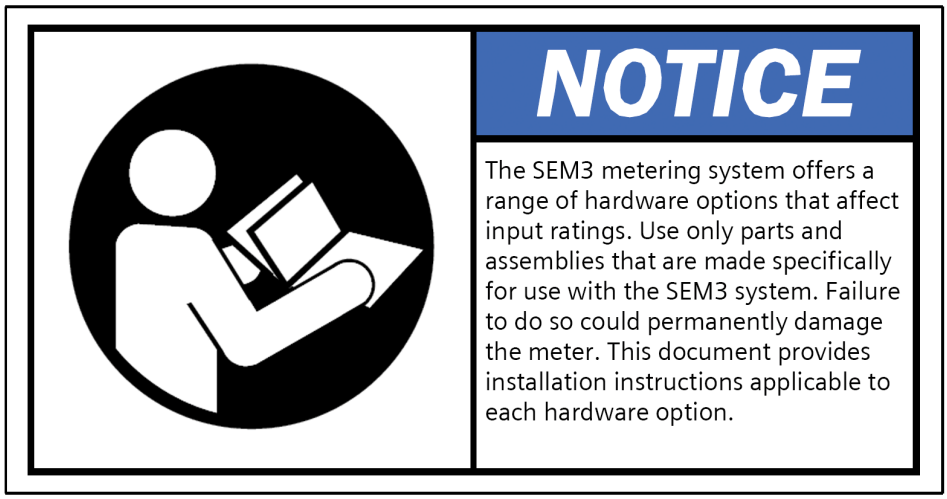
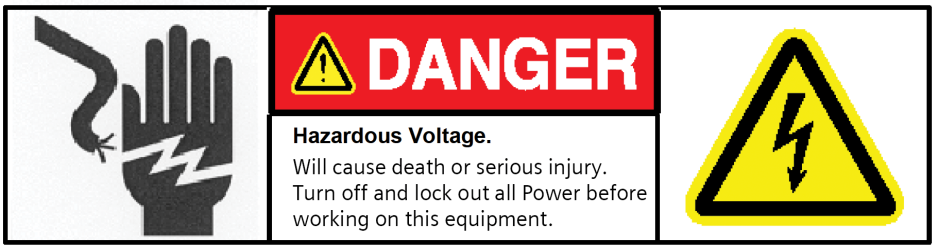
SEM3™ - Embedded Micro Metering Module™





The use of unauthorized parts in the repair of the equipment or tampering by unqualified personnel will result in dangerous conditions that can cause death, serious injury or property damage.

IMPORTANT

The information contained herein is general in nature and not intended for specific application purposes. It does not relieve the user of responsibility to use sound practices in application, installation, operation, and maintenance of the equipment purchased. Siemens reserves the right to make changes at any time without notice or obligations. Should a conflict arise between the general information contained in this publication and the contents of drawings or supplementary material or both, the latter shall take precedence.

QUALIFIED PERSONNEL

For the purposes of this manual and product labels, "qualified personnel" is one who has skills and knowledge related to the construction and operation of the electrical equipment and installations and has received safety training to recognize and avoid the hazards involved. In addition, s/he has the following qualifications:

(a) **is trained** and authorized to energize, de-energize, clear, ground, and tag circuits and equipment in accordance with established safety practices.

(b) **is trained** in the proper care and use of protective gear equipment such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety procedures

(c) **is trained** in rendering first aid.

SUMMARY

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the local the sales office.

THE CONTENTS OF THIS USER MANUAL SHALL NOT BECOME PART OF OR MODIFY ANY PRIOR OR EXISTING AGREEMENT, COMMITMENT OR RELATIONSHIP.
THE SALES CONTRACT CONTAINS ALL OBLIGATIONS OF SIEMENS INDUSTRY, INC. THE WARRANTY CONTAINED IN THE CONTRACT BETWEEN THE PARTIES IS THE SOLE WARRANTY OF SIEMENS INDUSTRY, INC.

Notices

DANGER

This symbol indicates the presence of dangerous voltage within and outside the product enclosure that will cause death or serious injury if proper precautions are not followed.

CAUTION

This symbol alerts the user to the presence of hazards that may cause minor or moderate injury to persons, damage to property or damage to the device itself, if proper precautions are not followed.

Installation Considerations

Environmental ratings: Temperature to 14°F to 149°F (-10°C to 65°C). Measurement Category III (CAT III), Mains Supply Voltage Fluctuations up to 10% less than nominal low range the mains supply and 10% more than nominal high range of mains power supply.

CAT III is for circuits which can be connected to the mains installation of a building. Energy is limited by circuit breakers to less than 110 000 VA with the current not exceeding 11 000 A.

Installation and maintenance of the SEM3 metering system should only be performed by qualified, competent personnel that have appropriate training and experience with high voltage and current devices. The meter must be installed in accordance with all local and national electrical codes.

DANGER

Failure to observe the following instructions will cause death or serious injury.

- During normal operation of the SEM3 meter, hazardous voltages are present on its voltage leads, and throughout the connected potential transformer (PT), digital (status) input, control power and external I/O circuits. PT circuits are capable of generating lethal voltages and currents with their primary circuit energized. Follow standard safety precautions while performing any installation or service work (i.e. removing PT fuses).

- The voltage leads to the meter should not be user-accessible after installation.

- Do not use digital output devices for primary protection functions. These include applications where the devices perform energy limiting functions or provide protection of people from injury. Do not use the SEM3 in situations where failure of the devices can cause injury or death, or cause sufficient energy to be released that can start a fire. The meter can be used for energy management functions.

- Do not HIPOT/Dielectric test the digital (status) inputs, digital outputs, or communications terminals. Refer to the label on the SEM3 meter for the maximum voltage level the device can withstand.

- The SEM3 metering system offers a range of hardware options that affect input ratings. Use only parts and assemblies that are made specifically for use with the SEM3 system. Failure to do so could permanently damage the meter. This document provides installation instructions applicable to each hardware option.

FCC Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Standards Compliance

- **Approvals and certifications**

  – **Accuracy**
    - ANSI C12.1
    - ANSI C12.20/0.5

  – **Safety/Construction**
    - CSA C22.2 No. 1010-1 Safety Requirements for Electrical Equipment for Measurement
    - UL916 Energy Management Equipment
    - UL61010-1 (IEC 61010-1) Test and Measurement Equipment

  – **Approvals/Certification**
    - New York State PSC(Public Service Commission) approved Meter
    - ANSI C12.20 certification done through NRTL (Nationally Recognized Test Lab)
    - BTL Certified (BACnet Test Laboratories)
    - CTEP Certified (California Type Evaluation Program) by CDFA (California Department of Food and Agriculture), a division of Measurement Standards, CA

– **Electromagnetic Compatibility**
  - IEC 61000-4-2 Electrostatic Discharge (B)
  - IEC 61000-4-3 Radiated Immunity (A)
  - IEC 61000-4-4 Electric Fast Transient (B)
  - IEC 61000-4-5 Surge Immunity (B)
  - IEC 61000-4-6 Conducted Immunity
  - FCC Part 15 subpart B, Class A Digital Device, Radiated Emissions

– Environmental Conditions
  - Altitude up to 3000 meters
  - Maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C
  - Pollution Degree 3

Made by Siemens Industry, Inc.

SEM3™ - Embedded Micro Metering Module™

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Introduction

This manual discusses features of the SEM3 metering system and provides configuration instructions.

By the time you are ready to use this guide, your meter should be installed, most basic setup should have been performed, and communications/basic operation should have been verified. If the unit is not yet installed and operational, refer to the Installation Manual available on line at *www.usa.siemens.com/SEM3*.

This chapter provides an overview of SEM3 meters, and summarizes many of their key features.

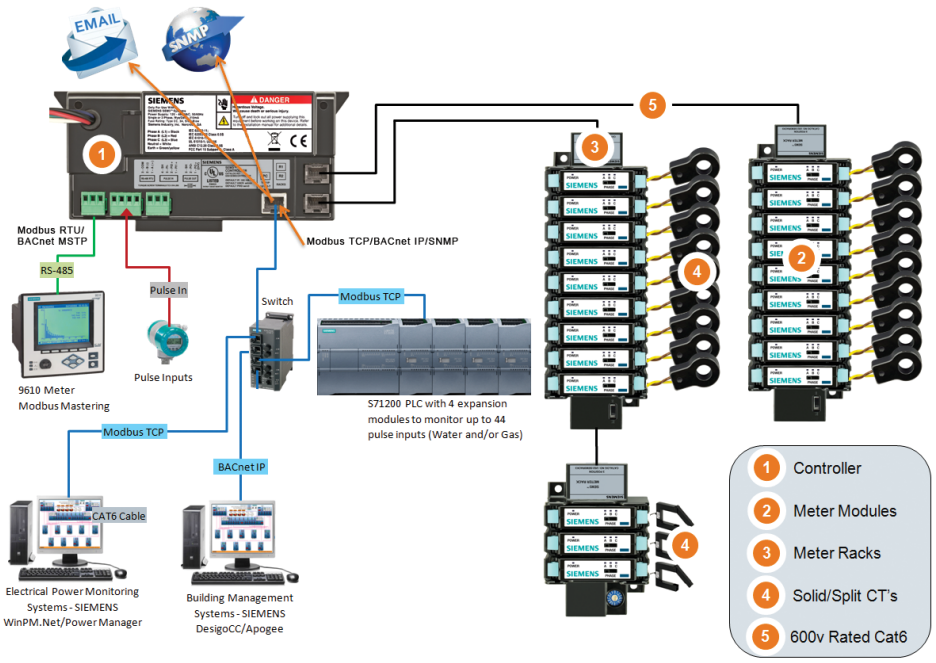
SEM3™ - Embedded Micro Metering Module™

The SEM3 system is designed to measure the current, voltage, and energy consumption of up to 45 circuits.[1)]

The SEM3 consists of a controller, racks, cables, meter modules and current transformers (CTs) that can be tailored to the application. The CTs are available in solid core & split core versions and are to be mounted along the termination points of each breaker pole being metered. The conductor passes through the appropriate current sensor before terminating at the breaker. Each CT is terminated into a meter module that in turn is mounted in a rack. The racks get power from and communicate back to the controller through special cables that are part of the SEM3 product line.

The SEM3 has the ability to communicate Modbus RTU via RS485, Modbus TCP, BACnet IP, SNMP via Ethernet port to outside systems.

The controller web pages are also used to configure the SEM3 system to the application. Systems info, CT ratio setting and alarms as well as configuring the meter modules into 1, 2, or 3 pole meters are all accomplished through embedded and easy to use web pages. See the SEM3 User Manual for more application specific information at *www.usa.siemens.com/SEM3*.



1) Some applications will allow for more than 45 poles in one enclosure by adding a second controller. Two controllers can monitor up to 90 poles.

SEM3™ - Embedded Micro Metering Module™ (cont'd.)

The SEM3 system is made up of the following components and options:

1. **Controller** – The controller is used to communicate the metered values to outside systems by way of a web page interface, Modbus RTU or Modbus TCP. One controller can manage up to 45 meter modules. The controller also has the system digital inputs for receiving pulse inputs from other metering devices as well as a digital output for the combined KWh output of the system being metered.

2. **Meter Modules** – There are two choices or the meter modules that are differentiated by accuracy specification. The accuracies are 1% for the standard accuracy modules and 0.2% for the high accuracy modules. The accuracy is tested in accordance to ANSI C12.20/0.5.

3. **Meter Racks** – The meter modules are designed to snap into the rack assemblies. The rack assemblies are sized by how many modules will fit into each and come in 3, 6, 9, 15 and 21 module configurations.

4. **CT or Current Transformers** – The SEM3 systems have solid core CTs or split core CTs for use with the system in the following maximum amperage ranges 50, 125, 250, 400, 600, 800, 1200, 1600, and 2000 amps. These are maximum amperage ranges for normal usage but will measure accurately down to 1% of the maximum range.

5. **Communication Cables** – The communication cables are designed like CAT 5 cables but are insulated for use in systems up to 600 volts. The cables are for two way communication from the controller to the rack/meter modules.

Ordering information

Controller	Catalog number
Main Controller	US2:SEM3CONTROLLER
Meter Modules	
Meter - Standard Accuracy 1% with Pulse Output	US2:SEM3PLAMETER
Meter - High Accuracy 0.2% with Pulse Output	US2:SEM3PHAMETER
Meter Racks	
Meter Rack 3 Position	US2:SEM3RACK3
Meter Rack 6 Position	US2:SEM3RACK6
Meter Rack 9 Position	US2:SEM3RACK9
Meter Rack 15 Position	US2:SEM3RACK15
Meter Rack 21 Position	US2:SEM3RACK21
Cables	
Controller to Rack Cable - 6 Inch	US2:SEM3CAB6INCH
Controller to Rack Cable - 12 Inch	US2:SEM3CAB12INCH
Controller to Rack Cable - 24 Inch	US2:SEM3CAB24INCH
Controller to Rack Cable - 36 Inch	US2:SEM3CAB36INCH
Controller to Rack Cable - 5 Foot	US2:SEM3CAB5FT
Controller to Rack Cable - 10 Foot	US2:SEM3CAB10FT
Controller to Rack Cable - 20 Foot	US2:SEM3CAB20FT
Solid Core CTs	
Solid Core CT 50:0.1	US2:SEM3SCCT50
Solid Core CT 125:0.1	US2:SEM3SCCT125
Solid Core CT 250:0.1	US2:SEM3SCCT250
Solid Core CT 400:0.1	US2:SEM3SCCT400
Solid Core CT 600:0.1	US2:SEM3SCCT600
Solid Core CT 800:0.1	US2:SEM3SCCT800
Solid Core CT 1200:0.1	US2:SEM3SCCT1200
Solid Core CT 1600:0.1	US2:SEM3SCCT1600①
Solid Core CT 2000:0.1	US2:SEM3SCCT2000①
Split Core CTs	
Split Core CT 50:0.1	7KT1280-5MA00
Split Core CT 125:0.1	7KT1280-5MA01
Split Core CT 250:0.1	7KT1280-5MA02
Split Core CT 400:0.1	7KT1280-5MA03
Split Core CT 600:0.1	7KT1280-5MA04
Split Core CT 800:0.1	7KT1280-5MA05
Split Core CT 1200:0.1	7KT1280-5MA06
Split Core CT 1600:0.1	7KT1280-5MA07
Split Core CT 2000:0.1	7KT1280-5MA08






① 1600 and 2000 Amp solidcore current transformers are square and do not have mounting holes.

SEM3 in an Energy Management System

You can use SEM3 meters as standalone devices, but their extensive capabilities are fully realized when used with WinPM. Net software as part of an enterprise energy management (EEM) system or Powermanager software for standalone sub billing reports.

EEM systems give energy suppliers, service providers, and large industrial and commercial energy consumers the tools to meet all the challenges and opportunities of the new energy environment. EEM systems use real-time information and control to directly address a broad range of requirements throughout the power delivery chain and across an entire enterprise. These systems offer an integrated solution to managing new billing structures, distributed generation, energy purchasing, energy cost control, operational and efficiency.

Applications that include the meter typically require additional equipment. Display and analysis software tools are almost always used to manage, interpret and distribute the data measured by a meter. There are usually a variety of tools used, and often these tools are connected using different communications standards and protocols. In many cases, a meter must also provide control capabilities and device-level data sharing.

Meter Features
Your meter includes an impressive array of standard features. The following is an overview of those features.

Measured Parameters
SEM3 meters provide fully bi-directional, 4-quadrant, revenue-accurate or revenue-certified energy metering. The following is a selection of some parameters measured by these meters.

Energy
The meters provide all common active, reactive and apparent energy parameters: kWh, kVARh, and kVAh.

Energy registers can be logged automatically on a programmed schedule by a supervisory system such as WinPM.Net.

All energy parameters represent the total for all three phases. Energy readings are true RMS. Beyond this value, readings roll over to zero (0).

Real Time Values
SEM3 meter modules provide real time values, including true RMS, per phase and total for:

- Voltage and current
- Active power (kW) and reactive power (kVAR)
- Apparent power (kVA)
- Power factor and frequency

Supported Protocols
You can integrate the meter into various industry standard networks. Data that the meter measures can be made available to other devices using Modbus RTU, or Modbus/TCP. A digital pulse output is also available. The controller's pulse output is the total kWh for all the single phase meters whose "Accumulate Energy Enable" has been enabled in the Branch Meter Configuration Web Page. You can also configure the meter to import data from other devices (i.e. water, gas, etc.) on these networks using digital pulse inputs. With these advanced communications functions, SEM3 system can be integrated in most existing power monitoring systems.

Communications Options
The Controller includes a standard MODBUS RTU/RS-485, MODBUS TCP, BACnet IP, SNMP, SMTP, and digital pulse Input/Output.

RS-485 Connections
RS-485 connections are made via the captured-wire connectors on the side of the controller module. Up to 32 devices can be connected on a single RS-485 bus. Each SEM3 controller counts as one device. Meters below the controller are defined by registers within the controller. Use a good quality shielded twisted pair cable for each RS-485 bus. The overall length of the RS-485 cable connecting all devices cannot exceed 4000 ft. (1219 m). The RS-485 bus can be configured in straight-line or loop topologies.

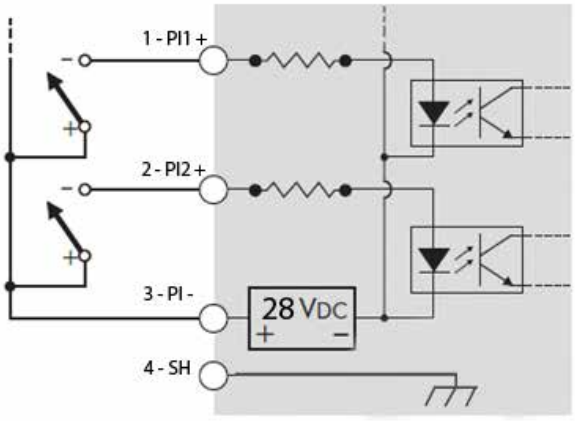
Digital I/O Options
SEM3 has two digital pulse inputs built into the controller. These inputs can be used for, but are not limited to, bringing water and gas measurements into the supervisory system. The digital pulse inputs are self-excited digital inputs capable of detecting a pulse rate of 5 pulses/second. They can be used for monitoring external contacts or pulse counting applications. These inputs use a current sensing technique to monitor contact status by providing an internal 28 VDC (±4 VDC) supply supply for self-excitation.

The SEM3 utilizes the Siemens S7 1200 PLC for expanded I/O requirements.

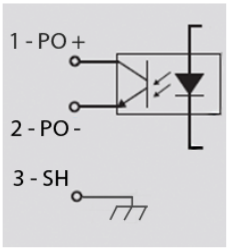
The digital pulse output can be configured as a KY or KYZ pulse output. External 24 VDC is required. The output can be configured to show total system kWh for all the meter modules monitored by the controller. Individual meters can be included or excluded from this total calculation.

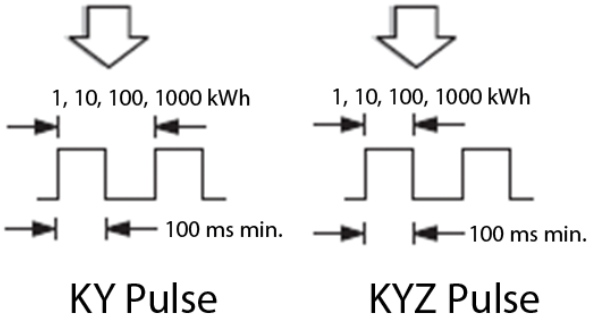
Upgrading Your Meter
For firmware upgrades, refer to the upgrade bulletin.

SEM3 in an Energy Management System
(cont'd.)

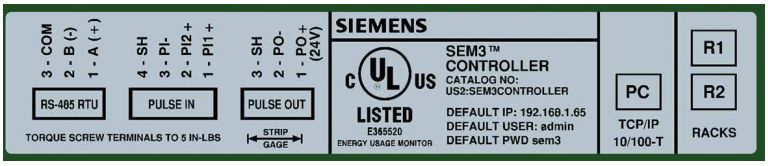


Digital Pulse Input	
Type	Self-Excited (internal 28 VDC)
Application	Dry contact sensing
Wire	16 to 28 AWG (1.3 to 0.1 mm^2)
Min. Pulse Width	100 ms
Isolation to Ground	3750 VAC

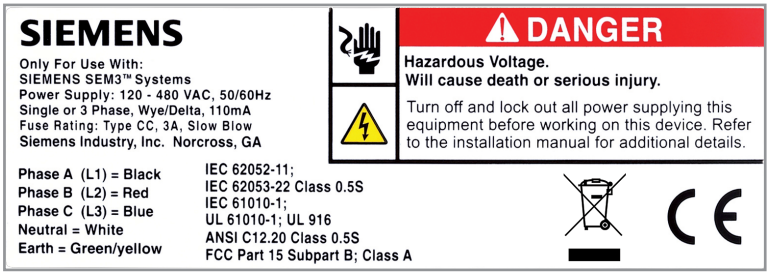




Digital Pulse Output	
Type	Form A/C
Wire	16 to 28 AWG (1.3 to 0.1 mm^2)
Signal Type	Continuous or Pulse
Max. Load Voltage	30 VDC
Max. Load Current	150 mA
Isolation	Optically Isolated; max. 5000 V RMS isolation (UL-E91231)



Controller Terminal Label



Controller Label

Controller phase wiring considerations

Ratings

Power Supply: 120-480 Vac

Frequency: 60 Hz

Systems: Single or three phase systems (Wye or Delta)

Power consumption: 110 mA

Fuse protection: Type CC, 3 A, Time-Delay

Voltage inputs

The controller has five leads that are color coded and labeled to the appropriate phases and ground connection. All phase (ungrounded) connections should be protected by a 3 amp fuse or circuit breaker that is appropriate for the applied voltage and available short circuit rating.

(*Example:* a type CC fuse rated at 3 amp (Time-Delay) and good for application on up to a 200 kAIC system at 480 volts).

The SEM3 metering system may be direct connected to any AC system that has a line to line voltage less than or equal to 480 Vac and Line to neutral or ground voltage less than 277 volts. Greater than 480 Vac, but less than or equal to 600 Vac systems will require PT between the Controller and the supply voltage.

See the user manual for more information on setting the meter system for use on 600 Vac systems.

The Voltage leads are as follows

For three phase four wire systems – phase A (line 1) is black in color, phase B (line 2) is red in color, phase C (line 3) is blue in color, neutral is white in color and equipment ground is green (with a yellow stripe) in color.

Where applicable, "connect 14 AWG min., 600 V min. insulated wiring for Line voltages and Neutral to the appropriate locations in the breaker panel, in accordance with all national and local electrical codes".

For three phase three wire systems – phase A (line 1) is black in color, phase B (line 2) is red in color, phase C (line 3) is blue in color, neutral is white in color is to be removed or tied out of the way and equipment ground is green (with a yellow stripe) in color.

For single phase three wire systems – phase A (line 1) is black in color, phase B (line 2) is red in color, phase C (line 3) is blue in color is to be discarded or tied out of the way, neutral is white in color and equipment ground is green (with a yellow stripe) in color.

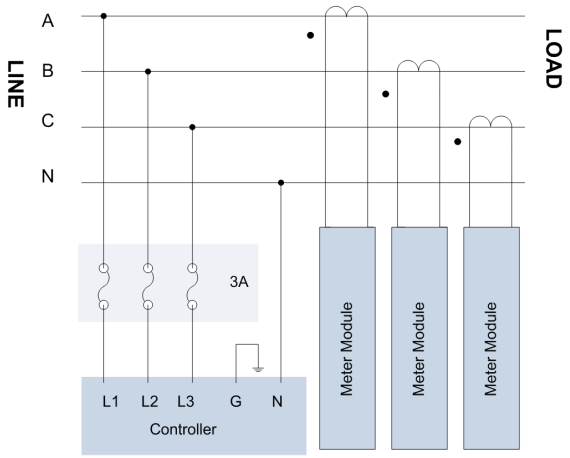
See the user manual for information on setting the system parameters.

Note: *Wiring from the controller to the racks, wiring to and from the digital inputs and output are considered Class 2 wiring. Care should be taken to keep these wires and cable separated from power cables per standard requirements. 5)*

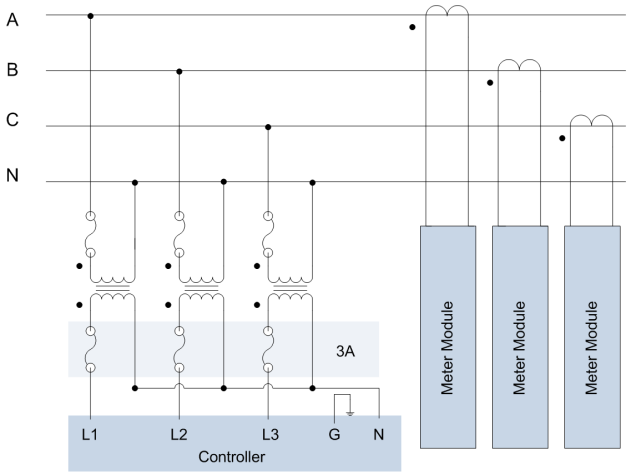
Note: *Connector torque rating for wiring terminals is 5 IN-LBS*

Controller phase wiring considerations (cont'd.)

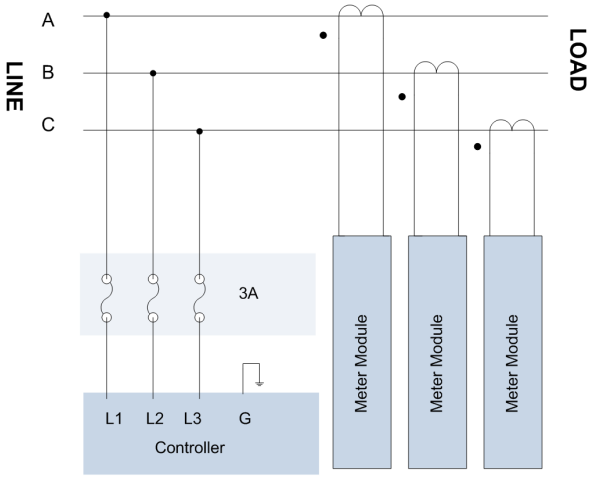
480Y / 277
3Ø 4W



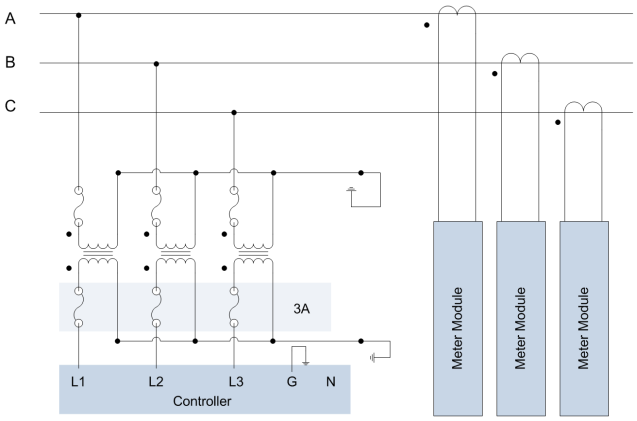
600Y / 347
3Ø 4W



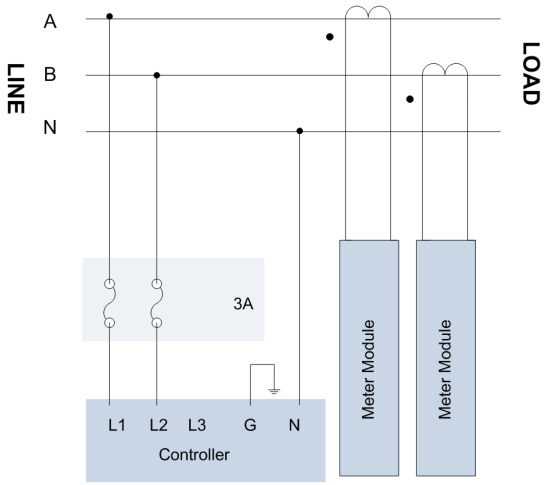
480A
3Ø 3W



600Δ
3Ø 3W



240 / 120
1Ø 3W



Line to neutral / Line to line (V) – Wye systems will show line to neutral voltage and delta systems will be Line to Line.

Potential transformer setting

Primary – If a PT is used then the primary voltage should be picked from the drop down. If no PT is used the default setting is 120 v.

Secondary voltage is set to 120 v.

Save – Data changes must be saved before leaving this page or it will be lost.

Reset – Resets to factory defaults.

General bus wiring considerations

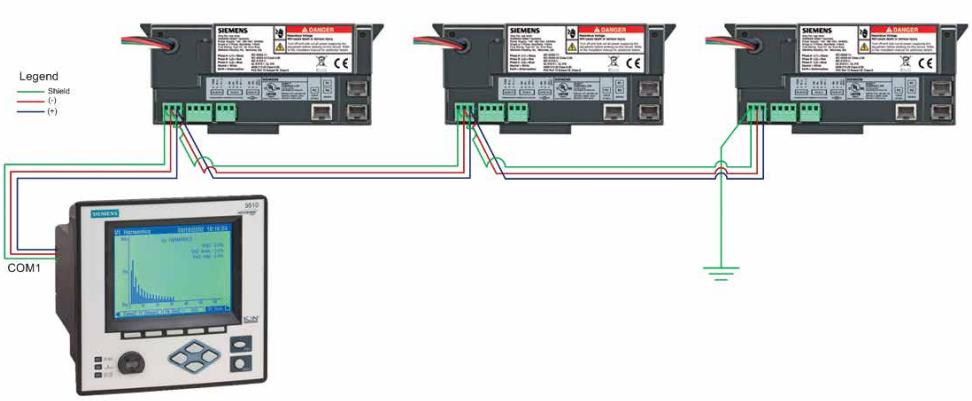
Devices connected on the bus, including the meter, converter(s) and other instrumentation, must be wired as follows:

- Connect the shield of each segment of the cable to ground at one end only.
- Isolate cables as much as possible from sources of electrical noise.

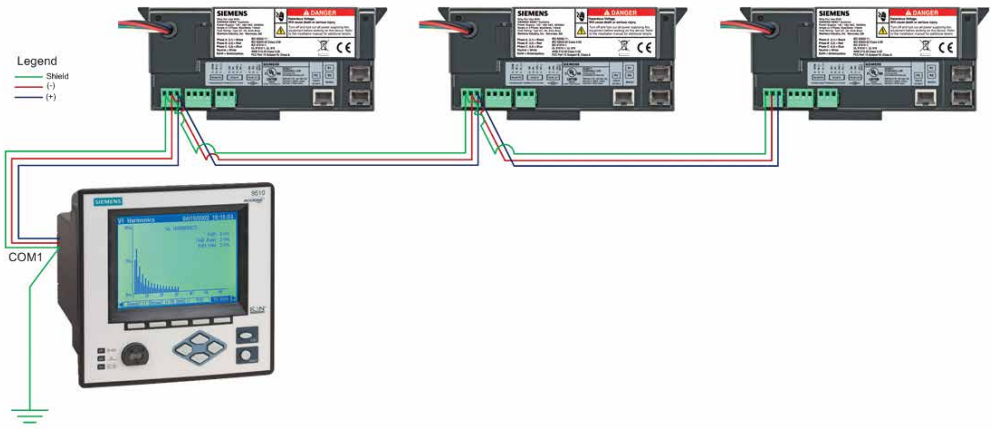
- Use an intermediate terminal strip to connect each device to the bus. This allows for easy removal of a device for servicing if necessary.

- Install a ¼ Watt termination resistor (RT) between the (+) and (-) terminals of the device at each end point of a straight-line bus. The resistor should match the nominal impedance of the RS-485 cable, which is typically 120 ohms (consult the manufacturer's documentation for the cable's impedance value).

RS-485 Connection Methods to Avoid
Any device connection that causes a branch in the main RS-485 bus should be avoided. This includes star and tee (T) methods. These wiring methods cause signal reflections that may result in interference. No more than two cables should be connected at any connection point on the RS-485 bus. This includes connection points on instruments, converters, and terminal strips. Following these guidelines ensures that both star and tee connections are avoided.



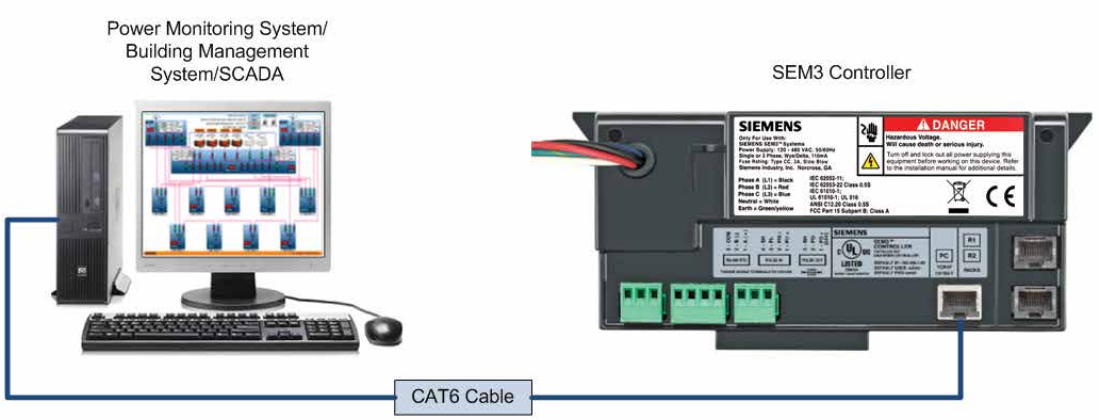
Serial Connection Wiring Grounding to Controller



Serial Connection Wiring Grounding to 9610 Meter

General bus wiring considerations (cont'd.)

Ethernet Connections



Ethernet Connection Wiring

There is an Ethernet port standard on the SEM3 controller module 10/100BASE-T port with an RJ45 modular connector.

The Ethernet port is capable of data rates up to 100 Mbps and supports Modbus/TCP and BACnet IP protocol.

Note: You may add up to (4) simultaneous Modbus TCP connections.

Ethernet communications setup

Using the Modbus RTU Protocol
SEM3 meters can act as Modbus Slave devices, making any real time data available through the Modicon Modbus RTU protocol. Modbus Master devices connected to the meter can access (read) this data or write data to your meter's registers, making device configuration changes and initiating control actions.

The Factory Modbus Slave Configuration
The meter makes data available to Modbus Master devices using pre-configured Modbus Slave modules. These modules are linked to other modules in the meter that provide the energy, power and demand data. Once a communications channel is configured to use Modbus RTU protocol, the data is available to Modbus Master devices.

Using the Modbus/TCP Protocol
Modbus/TCP is the open Modbus protocol variant (formerly called MBAP). It defines the packet structure and connection port (port 502) for the industry standard TCP/IP protocol. The structure of Modbus/TCP is very similar to the Modbus RTU packet except that it has an extra six-byte header and does not use the cyclic redundancy check (CRC). Modbus/TCP retains the Modbus RTU limit of 256 bytes to a packet.

Modbus TCP Communications
You can communicate to the meter using Modbus TCP Connect to socket 502.

Refer to page 106 for more information on TCP.

Configuring hardware

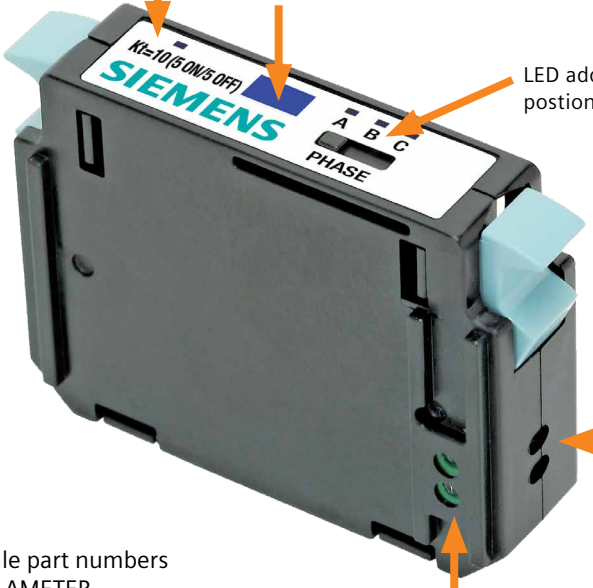
There are a few steps in configuring the components of the SEM3 metering system.

Current Transformer (CT) – There is no setting on the CT for the system. The CT configuration is available on SEM3 web pages. The CTs for use in the SEM3 system are 100 mA output and are self protecting/ shorting so shorting blocks are not required. Note for multi-pole meters CTs are required to have the same rating for all poles. CTs come standard with 6 foot leads that may be trimmed for neat installation or extended if required. CT wire length can retain accuracy up to 500 feet using 18 AWG twisted pair wire (UL 1015, 600v).

Meter Modules – These instructions are for both levels of accuracy modules. Each meter module is a single phase meter and must be connected to the appropriately sized SEM3 system CT. The meter module should easily fit into the rack assembly and have audible clicking when locked into position. The Meter Rack has the meter module address to the controller hard coded in the hardware. Note that meter modules must be mounted contiguously in the meter racks to be configured for multi-pole circuit breakers. Gaps in the rack will not allow multi-pole meters to be configured as multi-pole meters. Each module must have the phase dip switch on the top of the module set to the phase that the CT is metering phase A, B, or C (Line 1, 2, or 3 respectively). Note - Once the meter module is placed into the meter rack and energized the phase position will be indicated by a different color LED for each position. Colors are orange for phase A (line 1), yellow for phase B (line 2), green for phase C (line 3). LED are adjacent to the phase numbers. The power indication LED also indicates communications by flashing. CT sizing for each meter module will be done through the controller web page configuration.

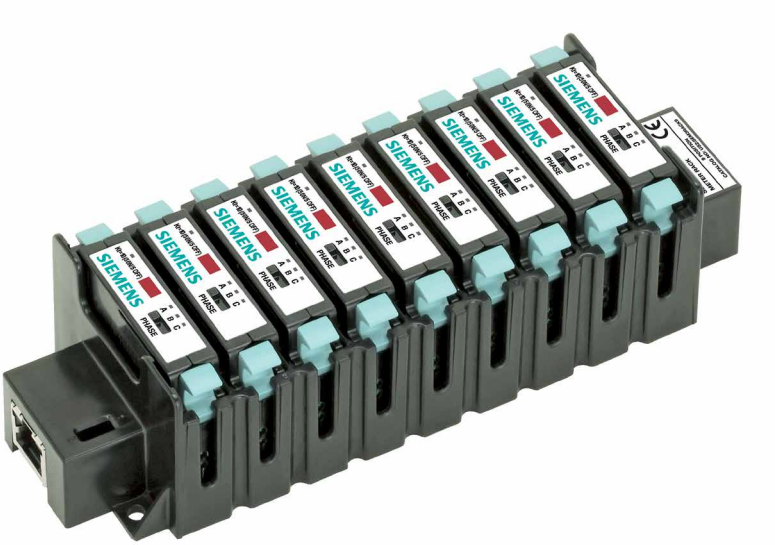
Solid Core

Split Core



Configuring hardware (cont'd.)

Meter Racks – The meter module racks have the addresses for the module to controller communications hard coded into them. The 9, 15 and 21 module racks have a two position dip switch for setting one of two address ranges for each. The 3 and 6 module racks have a rotary switch to allow it to be configured for multiple address ranges. The tables on the next two pages show the ranges.



3 and 9 position racks shown for demonstration

Configuring hardware (cont'd.)

Meter Module Internal Addresses – Dip and rotary switches on the racks are used to assign the unique addresses for the meter module. Table 1 indicates rack addresses for Left setting on 9, 15 and 21 module racks and setting 0-7 on 3 meter module rack, 0-3 on 6 meter module rack. Table 2 indicates addresses for right setting on 9, 15, and 21 module racks and 8-F on 3 meter module rack, 4-7 on 6 meter module rack.

Table 1

<table>
<tr><th>Single Phase Monitor Modbus Addresses</th><th>21 Position Rack Modbus Addresses</th><th>15 Position Rack Modbus Addresses</th><th>9 Position Rack Modbus Addresses</th><th>6 Position Rack Rotary Switch Setting①</th><th>6 Position Rack Modbus Addresses</th><th>3 Position Rack Rotary Switch Setting</th><th>3 Position Rack Modbus Addresses</th></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1</td><td rowspan="8">0 (8)</td><td>1</td><td rowspan="4">0</td><td>1</td></tr>
<tr><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td></tr>
<tr><td>4</td><td>4</td><td>4</td><td>4</td><td>4</td><td></td></tr>
<tr><td>5</td><td>5</td><td>5</td><td>5</td><td>5</td><td rowspan="4">1</td><td>5</td></tr>
<tr><td>6</td><td>6</td><td>6</td><td>6</td><td>6</td><td>6</td></tr>
<tr><td>7</td><td>7</td><td>7</td><td>7</td><td></td><td></td><td>7</td></tr>
<tr><td>8</td><td>8</td><td>8</td><td>8</td><td></td><td></td><td></td><td></td></tr>
<tr><td>9</td><td>9</td><td>9</td><td>9</td><td rowspan="7">1 (9)</td><td>9</td><td rowspan="4">2</td><td>9</td></tr>
<tr><td>10</td><td>10</td><td>10</td><td rowspan="23">Open Address Space</td><td>10</td><td>10</td></tr>
<tr><td>11</td><td>11</td><td>11</td><td>11</td><td>11</td></tr>
<tr><td>12</td><td>12</td><td>12</td><td>12</td><td></td></tr>
<tr><td>13</td><td>13</td><td>13</td><td>13</td><td rowspan="3">3</td><td>13</td></tr>
<tr><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td></tr>
<tr><td>15</td><td>15</td><td>15</td><td></td><td></td><td>15</td></tr>
<tr><td>16</td><td>16</td><td rowspan="16">Open Address space</td><td></td><td></td><td></td><td></td></tr>
<tr><td>17</td><td>17</td><td rowspan="5">2</td><td>17</td><td rowspan="3">4</td><td>17</td></tr>
<tr><td>18</td><td>18</td><td>18</td><td>18</td></tr>
<tr><td>19</td><td>19</td><td>19</td><td>19</td></tr>
<tr><td>20</td><td>20</td><td>20</td><td></td><td></td></tr>
<tr><td>21</td><td>21</td><td>21</td><td rowspan="3">5</td><td>21</td></tr>
<tr><td>22</td><td rowspan="10">Open Address Space</td><td>22</td><td>22</td></tr>
<tr><td>23</td><td></td><td></td><td>23</td></tr>
<tr><td>24</td><td></td><td></td><td></td></tr>
<tr><td>25</td><td rowspan="6">3</td><td>25</td><td rowspan="3">6</td><td>25</td></tr>
<tr><td>26</td><td>26</td><td>26</td></tr>
<tr><td>27</td><td>27</td><td>27</td></tr>
<tr><td>28</td><td>28</td><td></td><td></td></tr>
<tr><td>29</td><td>29</td><td rowspan="3">7</td><td>29</td></tr>
<tr><td>30</td><td>30</td><td>30</td></tr>
<tr><td>31</td><td></td><td></td><td></td><td></td><td>31</td></tr>
<tr><td>32</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

① *Limited availability of 6 Pos racks and contact sales for availability.*

Configuring hardware (cont'd.)

Table 2

Single Phase Monitor Modbus Addresses	21 Position Rack Modbus Addresses	15 Position Rack Modbus Addresses	9 Position Rack Modbus Addresses	6 Position Rack Rotary Switch Setting	6 Position Rack Modbus Addresses	3 Position Rack Rotary Switch Setting	3 Position Rack Modbus Addresses
33	33	33	33	4	33	8	33
34	34	34	34		34		34
35	35	35	35		35		35
36	36	36	36		36		
37	37	37	37		37	9	37
38	38	38	38		38		38
39	39	39	39				39
40	40	40	40				
41	41	41	41	5	41	A	41
42	42	42	Open Address Space		42		42
43	43	43			43		43
44	44	44			44		
45	45	45			45	B	45
46	46	46			46		46
47	47	47					47
48	48	Open Address space					
49	49			6	49	C	49
50	50				50		50
51	51				51		51
52	52				52		
53	53				53	D	53
54	Open Address Space				54		54
55							55
56							
57				7	57	E	57
58					58		58
59					59		59
60					60		
61					61	F	61
62					62		62
63							63

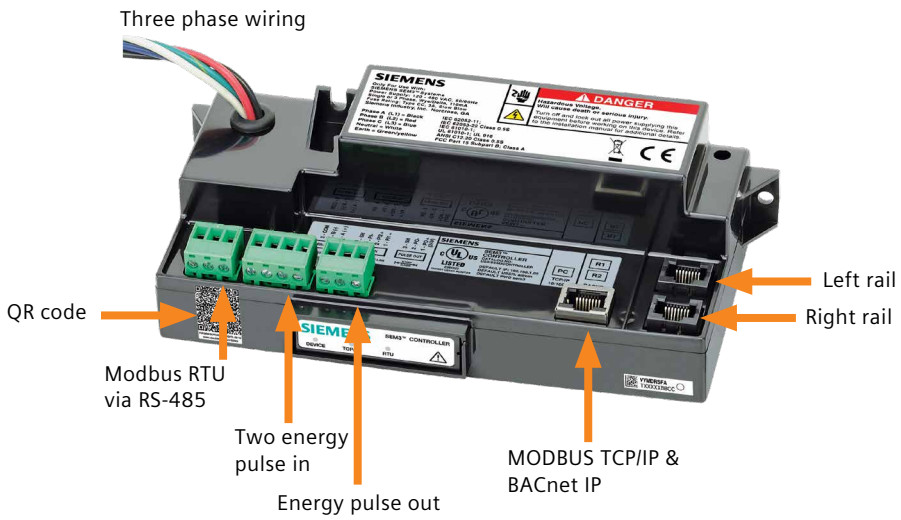
The 3 and 6 module rack can be used as an extension to any of the other racks or pairs of racks. Settings must be such that no address is used more than once. Duplication of addresses will return an error on setup and it could damage meter module.

Establishing connection with SEM3 system

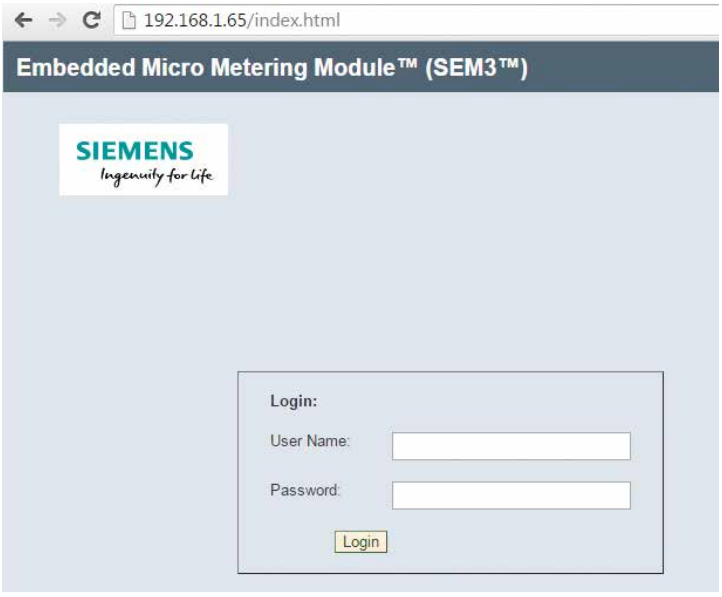
Controller – The controller functions as the set up interface for the system. System settings, CT ratios, PT ratios, Alarm settings, communications settings and passwords are all set using the web page interface of the controller. See installation instructions for mounting and dimensional information. Installation instruction can be found on line at ***www.usa.siemens.com/SEM3***.

To start – Connect the Controller to a PC using the Ethernet / Modbus TCP port. See figure on page 7.

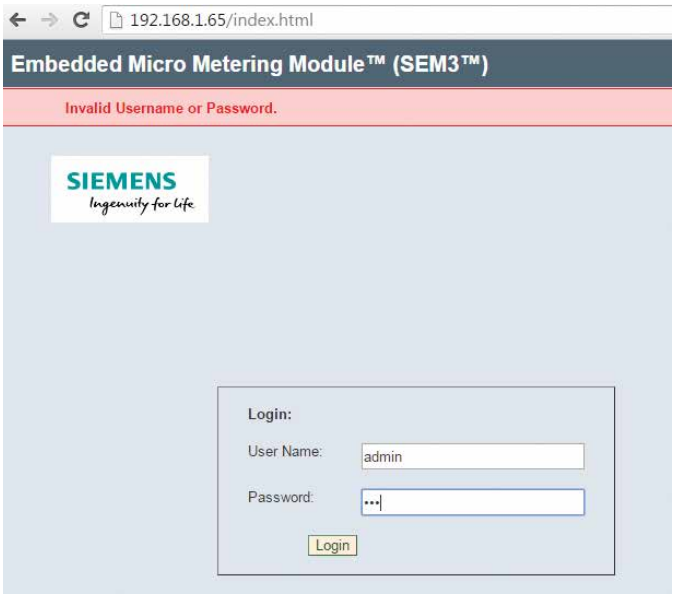
Open an internet browser and navigate to IP address 192.168.1.65. Default user name is **admin** Default password is **sem3**. User name and password can be set to user preference and are case sensitive. Default login brings user in at Supervisor level so that all screens can be seen and modified. It is recommended that user accounts and password be set as soon as possible. How to set user accounts is documented later in this manual.



Log in Page –



Menu Login Page



Menu Login Page Invalid UP

Settings

System Settings

The user can navigate to the System Settings page by hovering or clicking the mouse on the “Settings” navigation link.

A drop down menu will appear which will show “System Settings” as a selection. Clicking on this selection will show the relevant webpage.

Navigating to System Settings Page

The system settings page provides the following:

a. A screen is provided for user configuration of several system parameters and the ability to save the system configuration values in the SEM3 device.

b. The page shows the navigation bar in the top of the page.

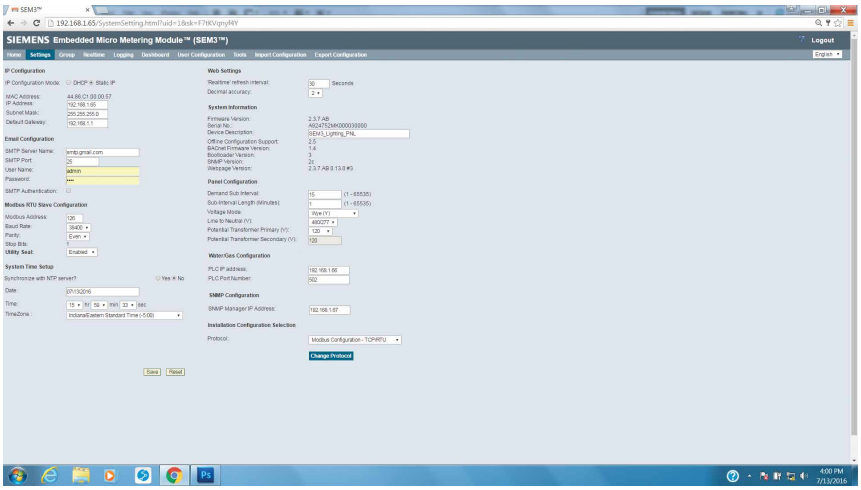
c. The logout link identified by a Logout text on the top right corner.

d. There is a help link identified by a question mark (?) on the left of the Logout text.

e. The drop down menu for different translated languages is provided underneath the logout text.

Logout NOTE: *Highly recommend to use the Logout button instead of simply closing the browser session.*

There are several subsections on this webpage which involve significant configuration. These subsections are detailed below.



System Settings Page

Settings (cont'd.)

IP Configuration
This section allows the user to configure the IP settings for the SEM3 controller. The TCP/IP connection is used for connecting to the SEM3 controller through a web browser, connection for Modbus TCP/IP as well as BACnet over IP. By default the "Static IP" option is selected. Additionally this section also shows the following information.

DHCP
The user can select "DHCP" option to set the SEM3 controller to be connected in a network with DHCP services enabled. After any other configuration values have been entered, the user can click on the Save button to save the configuration for the DHCP mode.

On successful selection of DHCP mode, controller will reboot. Once rebooted, DHCP service starts and the application will retrieve IP information (IP address, gateway IP address and subnet mask) and will write it in the diagnostic data file in SD card.

Static IP
The user can select "Static IP" option to configure the IP address, Subnet mask and default gateway of the SEM3 controller. After the configuration values have been entered, the user can click on the Save button to save the configuration. At any point, the user can return to the last saved configuration by clicking on the "Reset" button.

When the user clicks on the Save button, the webpage provides a feedback response message "The settings are saved. You have chosen to modify the IP address hence the network connection will be lost and please reconnect with the following URL. ***http://<new SEM3 URL>/index.html***".

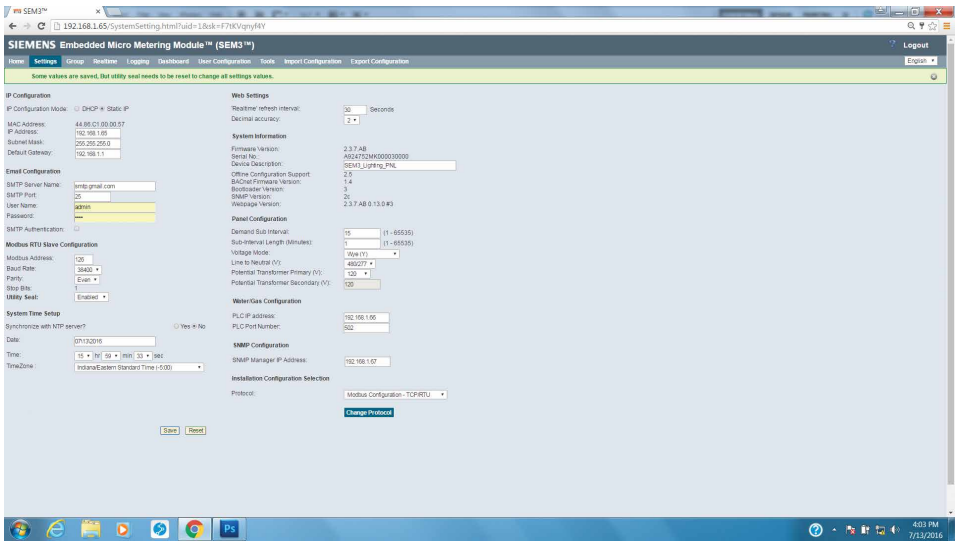
Parameter	Default value
IP Configuration Mode	Static IP
MAC address	[Not user configurable]
IP Address	192.168.1.65
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1

IP Configuration Subsection in System Settings

SEM3™ Note

The file "sem3_diagnostic_data.txt" located in the root directory of the SD card contains the basic diagnostic data related to the SEM3 controller.

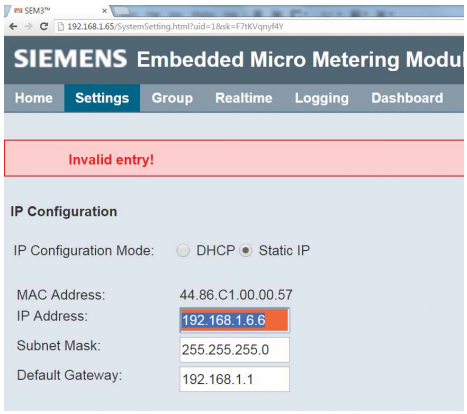
IP Configuration Subsection in System Settings



IP Configuration Save Message

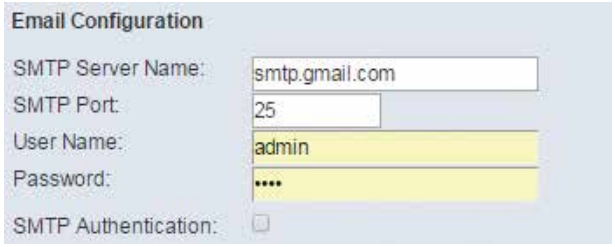
Settings (cont'd.)

The user needs to wait for about 2 minutes and be able to re-connect to the new SEM3 URL. Entering incorrect information of any of the user input field will trigger the webpage to respond with an error message.



Incorrect User Input Error Message

Email Configuration
The Email configuration section allows user to enter the SMTP server information which will receive the emails from the connected SEM3 controller.



Email Configuration

Email Configuration Parameters	Values
SMTP Server Name	IP address of the host machine, where the email server is located. Please refer to the SMTP server-client setup section.
SMTP Port	SMTP port for the incoming emails.
Default	25
User name	admin
Password	Admin
SMTP authentication	Unchecked.

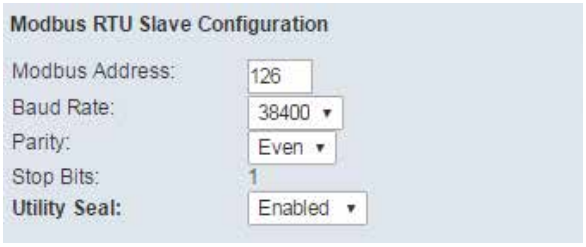
Email Configuration Parameters

The implemented SMTP stack only supports PLAIN SMTP authentication. The SMTP server client used for testing purposes (XAMPP Mercury) does not support PLAIN authentication. So the user name and password sections are not applicable if the authentication is not checked.

Settings (cont'd.)

Modbus RTU Slave Configuration
The Modbus RTU Slave configuration allows user to configure the Modbus relevant information for the SEM3 controller acting as a Modbus slave device in the Modbus RTU communication.

The following parameters are configured.



Modbus RTU Slave Configuration

Modbus RTU Slave configuration parameters	Values
Modbus Address	Modbus address of the slave device Configurable; In the range of 1 – 247. Default: 126
Baud Rate	Baud rate of the Modbus communication Configurable. - 9600 - 19200 - 38400 Default: 38400
Parity	Parity bits for the Modbus communication Configurable. - Even - Odd - None Default: Even
Stop Bits	Stop bits for the Modbus communication Fixed; 1

Modbus RTU Slave Configuration

Utility Seal
The Utility Seal section allows user to configure the setting of Utility seal. This feature if enabled will prevent the access to specific Modbus registers which are normally set as read/write registers.

After the user selects Enable from the drop down menu and clicks on Save configuration, the system responds with a message "Some values are saved, but utility seal needs to be reset to change all settings values".

The user can choose to disable the Utility seal by selecting Disabled from the drop down menu and clicking on "Save" configuration button.

When the utility seal is selected to be enabled from the System settings page, the event is recorded in the Event logging page as a valid event. The disabling of utility seal is also recorded as an event.

The following Modbus registers are prevented write access when Utility seal is enabled.

Utility Seal Configuration

Modbus register map category	Modbus Registers
BCMC System Registers	Demand Sub-Intervals
	Sub-Interval Length
	Voltage Mode
	System Voltage
	Potential Transformer Primary
	Potential Transformer Secondary
	Global Resets
	System Time
	Accumulate Energy Enable
	Breaker Rating
Communication Configuration Settings Registers	Time Synchronization
	Time Server Addressing Option
	Time Server IP Address
	Time Server Domain Name

Utility Seal Covered Modbus Registers

Settings (cont'd.)

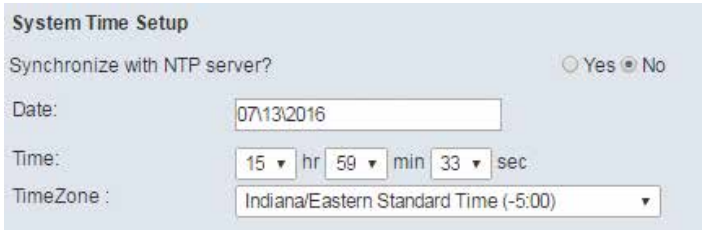
System Time Setup
The System time setup section allows user to configure the system time for the SEM3 controller. It is recommended that the user perform the correct selection of date and time when the system is first powered on.

In this section, the user can choose to synchronize with an NTP server or not. If the user decides to not synchronize with an available NTP server, the system time information can be manually entered by the user. The Date user field allows user to select a specific date from a drop down calendar. The time user field allows user to enter the system time in 24 hour format. The timezone user field allows user to select a specific time zone with respect to the GMT.

If the user decides to synchronize with an NTP server, the user has to enter the relevant information for the NTP server.

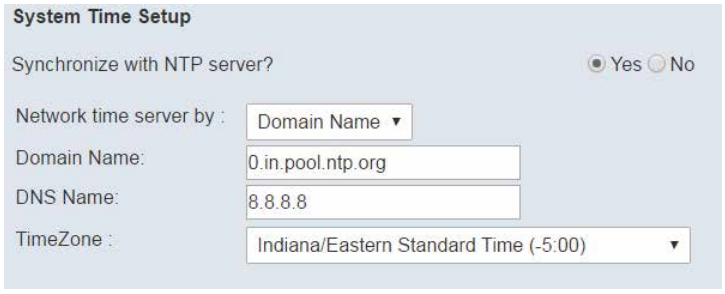
For communicating with an NTP server through IP address, the NTP server IP address must be entered in the xxx.xxx.xxx.xxx format. The user can select a specific time zone to offset the selected time with respect to the GMT.

For communicating with an NTP server through domain name, the NTP server fully qualified domain name must be entered. The fully qualified name shall be limited to 80 alphanumeric characters (dot and dash allowed). If the user enters a fully qualified domain name for the NTP server then the user shall enter the DNS server address as well. The limitation of testing using domain name NTP server is listed under the known issues section.



System Time Configuration

NTP Server with IP address



NTP Server with Domain Name Address

Settings (cont'd.)

Web Settings
The Web Settings section allows user to configure the settings related to real time page data display.

After the user makes the changes, in order for the selection to be saved, the user has to click on **"Save"** button.

Web Settings Configuration

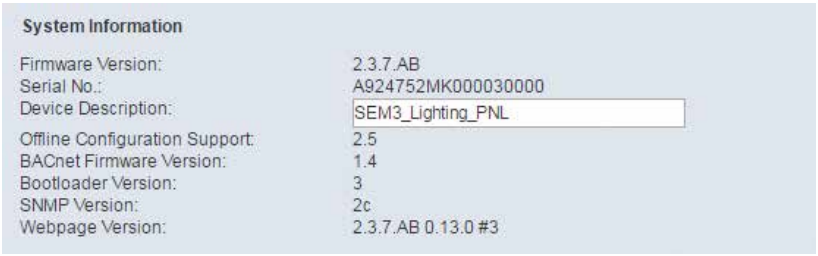
Web Settings parameters	Values
'Real Time' refresh interval	Web page refresh rate for the Real Time page. Configurable In the range of 10 – 900 Default value: 30
Decimal Accuracy	Decimal resolution for the values on the Real Time page. Configurable - 0 - 1 - 2 - 3 - 4 Default value: 2

Web Settings Configuration

System Information
The System information section is location for the end user to note the current system software configuration. The user has a field to enter a desired device description to help locate the physical attribute to the SEM3 controller.

By default, the device description field is empty. The rest of the fields are information populated by the system when the page gets loaded correctly.

The following information are listed in this section.



System Information

System Information	Values
Firmware version	This lists the latest embedded firmware version currently deployed within the SEM3 controller.
Serial No.	Serial number of the connected SEM3 controller.
Device Description	User entered device description.
Default: Blank	
Offline Configuration Support	The latest offline configuration tool which supports the webpages.
BACnet firmware version	The latest BACnet firmware version implemented within the SEM3 controller.
Bootloader Version	The latest bootloader version implemented within the SEM3 controller.
SNMP version	The latest SNMP firmware version implemented within the SEM3 controller.
Webpage version	The latest webpage version implemented within the SEM3 controller.

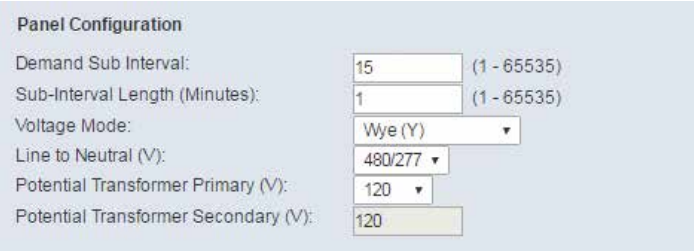
System Information

Settings (cont'd.)

Panel Configuration
Panel configuration section allows user to enter the configuration related to the physical electrical attributes of the panel.

There are no changes to the configuration as previously conducted in SEM3 Phase 1 software. The following parameters are available for configuration in this section. If the user chooses to make any changes, the updated configuration is saved after the user clicks on "Save" configuration button.

If there are configured meter modules in 3 – Pole selection in the Multi-Pole configuration page and the user changes the Voltage mode from Wye, Delta to Single Phase 3 Wire, the system will respond with a message "Meter reconfiguration in Multi-Pole configuration page is required".



Panel Configuration

Panel Configuration	Values
Demand Sub interval	Demand calculation sub – intervals Configurable; In the range of 1 – 65535 Default: 15
Sub – Interval Length	Sub – Interval duration length in minutes Configurable; In the range of 1 – 65535 Default: 1 minute
Voltage mode	Voltage mode of the system Configurable - Wye - Delta - Single Phase 3W Default: Wye
Line to Neutral voltage	Line to Neutral voltage or Line to Line voltage Configurable Default: 208/120
Potential Transformer Primary voltage	Primary Potential Transformer voltage value Configurable. Default: 120
	The user has an option to enter the value as "Other" and enter a non-standard voltage value.
Potential Transformer Secondary voltage	Secondary Potential Transformer voltage value Fixed, 120

Panel Configuration

Settings (cont'd.)

Water/Gas Configuration
The Water and Gas configuration section is for user to enter the S71200 PLC IP address and port number. Any change in the default value needs to be saved by clicking on the "Save" button.

The PLC IP address must be entered in the xxx.xxx.xxx.xxx format. The port address has to be entered with a valid range between 1 – 9999.

Water/Gas Configuration

SNMP Configuration
The SNMP configuration section is for user to enter the valid SNMP manager IP address. This is the IP address of the external SNMP manager expecting information from the SNMP client (SEM3 controller).

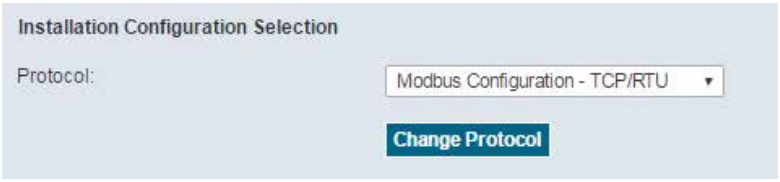
The SNMP manager IP address must be entered in the xxx.xxx.xxx.xxx format.

SNMP Configuration

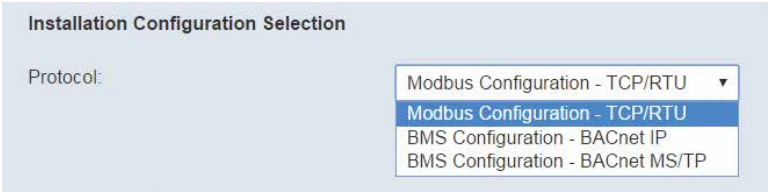
Installation Configuration Selection
The Installation Configuration Selection section allows user to select one of the 3 currently available base protocol/configurations.

By default the Modbus Configuration – TCP/RTU is selected. If the user intends to change the protocol, one of the remaining protocols can be selected from the drop down menu. The user has to click on Change Protocol to successfully engage the new selection.

After the user clicks on the change protocol button to change the currently selected protocol, the system responds with a message "Protocol change successfully, System will be restarted in 2 minutes..." After the system reboots, the login page is automatically displayed. At this time the user can login with previously configured credentials or default credentials and login to the system. The new configuration/ protocols will be in place. Based on the selected protocols, some of the features are disabled and the navigation link will be modified accordingly.



Installation Configuration Selection



Additional Available Protocols

Global settings

Global settings will be applied across all the meters in the system. Each meter can be customized in the Branch meter configuration screen. The alarms are for the meters and not meter modules. Individual phase alarms can only be set for single pole meters. Alarm delays are time settings where the meter is in alarm condition before the alarm flag is set. This is to prevent momentary conditions sending alarm flags.

Current setpoints are a percentage of the CT rating and not the breaker rating. For example- a 20 amp breaker may have a 50 amp CT applied. For a 80% alarm on the 20 amp breaker the calculation would be - breaker rating (20 amp) X desired alarm level (80%) / CT rating (50 amps) = alarm setting (32%).

These settings should be set first. Settings saved will overwrite all other settings. This should be completed prior to branch meter configuration.

Global Settings

- *Under Voltage Alarm Setpoint:* The percent below nominal value deemed unacceptable for the voltage to drop below.
- *Under Voltage Alarm Time Delay:* The time required for the under voltage alarm to enable once the voltage has fallen below the setpoint.
- *Over Voltage Alarm Setpoint:* The percent above nominal value deemed unacceptable for the voltage to rise above.
- *Over Voltage Alarm Time Delay:* The time required for the over voltage alarm to enable once the voltage has risen above the setpoint.
- *Global Over KW Demand Alarm Setpoint:* The kilowatt demand deemed unacceptable.
- *Global Over KW Demand Alarm Time Delay:* The time required for the over kw demand alarm to enable once the kW demand has risen above the setpoint.
- *Global Phase Current Loss Alarm Enable:* Enable or disable a phase current loss alarm.
- *Global Phase Current Loss Alarm Time Delay:* The time required for the phase current loss alarm to enable once current is lost.
- *Over Current Warning Setpoint:* The percent below the maximum value deemed unacceptable for the current to rise to. (As a percentage of the CT rating.)
- *Over Current Warning Time Delay:* The time required for the over current warning to enable once the current has risen above the warning setpoint.
- *Over Current Alarm Setpoint:* The percent below the maximum value deemed unacceptable for the current to rise to.
- *Over Current Alarm Time Delay:* The time required for the over current alarm to enable once the current has risen above the alarm setpoint.

Pulse Inputs – The SEM3 controller has (2) pulse inputs available. The Pulse input module is a highly accurate energy pulser often used for receiving the pulse inputs from the water, air, gas, and steam meters. There are two types of pulse input options are available:

- **Form A (KY)** contacts are single-pole, single throw, normally open contacts. They have two terminals, which are open when the energizing force (magnet or relay solenoid) is NOT present. When the energizing force is present the contact will close.
- **Form C (KYZ)** contacts are single-pole, double throw contacts. They have three terminals, a Common, a Normally Open and a Normally Closed. When the energizing force is NOT present the Common terminal is connected to the Normally Closed terminal. When energized, the Common terminal disconnects from the Normally Closed terminal and connects to the Normally Open terminal.

The Form A has a Common and a Normally Closed terminal and would be used on a standard Closed Loop. The Form C would function with an Open Loop.

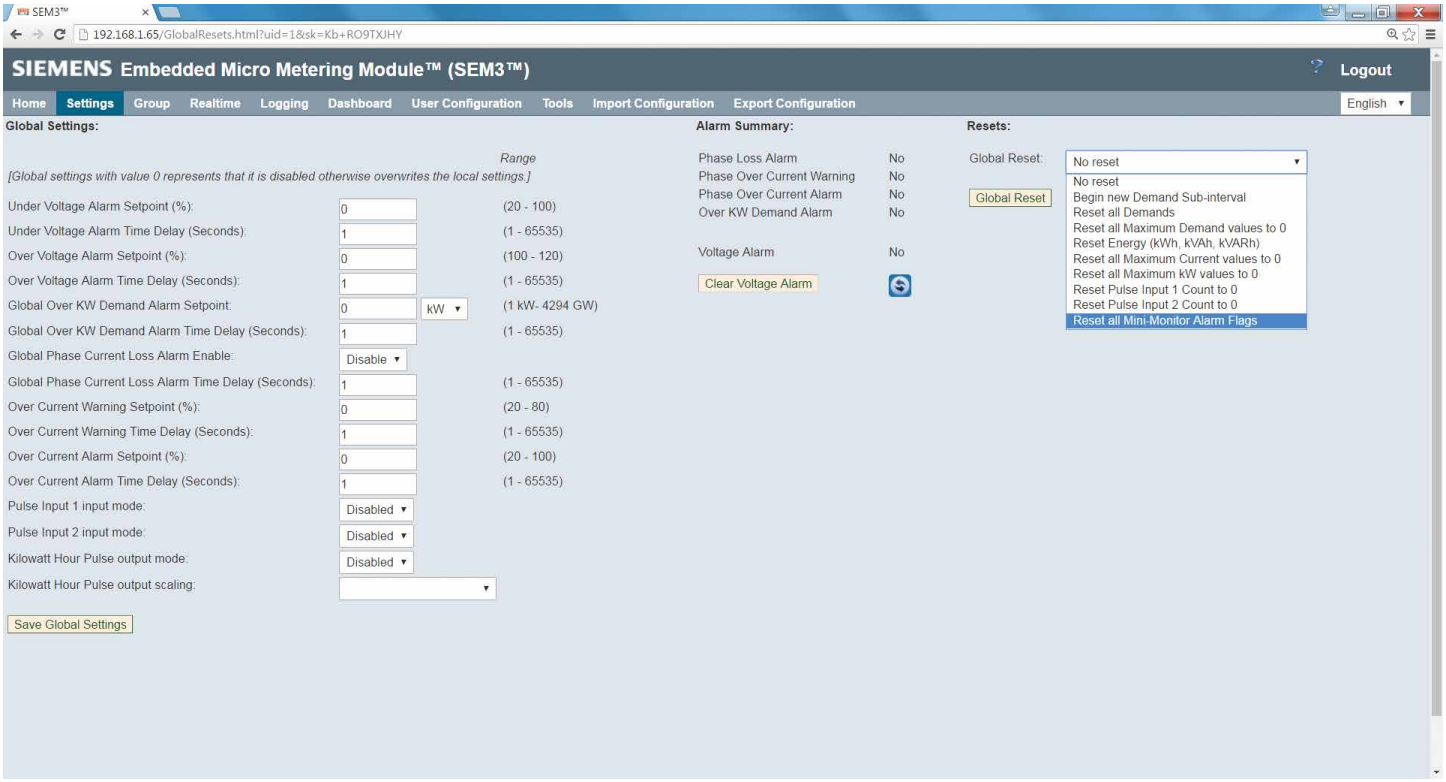
Global settings (cont'd.)

kWh Pulse Output – The kWh Pulse output module is a highly accurate energy pulse output often used for sending kWh pulse outputs to third party systems.

Alarm Summary – Will show values when any meter is in an alarm condition and allows the supervisor and controller level operators to view and clear alarms.

Global Reset – Resets can be accomplished by supervisory or controller level users. Reset values available from the pull down are:

- No reset
- Begin new demand subinterval
- Reset all demands
- Reset all Maximum demands values to 0
- Reset Energy (kWh, kVah, kvarh)
- Reset all maximum kW values to 0
- Reset pulse input 1 count to 0
- Reset pulse input 2 count to 0
- Reset all Mini-Monitor alarm flags



Global Settings and Reset Registers

Gobal settings (cont'd.)

Global Alarm Settings
There are several parameters which are configured under the Global Alarm parameter settings.

The user can set the necessary parameter values and click "Save Global Settings" to save the values. If any of the user input field is outside the expected range, the webpage responds with a error message. Nominal voltage is 120 V. Nominal current is the amperage of the measured branch CT rating. If the setpoint values are 0, the alarms are disabled.

By default the alarm setpoints are set to 0, meaning the alarms are disabled. Once the settings are properly set, the user can save the settings.

Global Alarm Parameters	Description
Under Voltage Alarm Setpoint (%)	Value below the percentage of the nominal voltage value that is deemed unacceptable for user. [20 – 100 %]
Under Voltage Alarm Time Delay (Seconds)	This is the time configured by the user for the under voltage alarm to enable once the voltage has fallen below the setpoint. [1 – 65535 seconds]
Over Voltage Alarm Setpoint (%)	Value above the percentage of the nominal voltage value that is deemed unacceptable for user. [100 – 120 %]
Over Voltage Alarm Time Delay (Seconds)	This is the time configured by the user for the over voltage alarm to enable once the voltage has risen above the setpoint. [1 – 65535 seconds]
Global Over KW Demand Alarm Setpoint (kW)	Value above the present kW demand that is deemed unacceptable for user. [1 kW – 4294 GW]
Global Over KW Demand Alarm Time Delay (Seconds)	This is the time configured by the user for the over kW demand alarm to enable once the present kW demand value has risen above the setpoint. [1 – 65535 seconds]
Global Phase Current Loss Alarm Enable	This is a configuration to enable or disable the phase current loss alarm.
Global Phase Current Loss Alarm Time Delay (Seconds)	This is the time configured by user for the phase current loss alarm to enable once the phase current is lost. [1 – 65535 seconds]
Over Current Warning Setpoint (%)	Value above the percentage of the nominal current value that is deemed unacceptable for user. (warning alarm) [20 – 80%]
Over Current Warning Time Delay (Seconds)	This is the time configured by the user for the over current warning to enable once the current has risen above the setpoint. [1 – 65535 seconds]
Over Current Alarm Setpoint (%)	Value above the percentage of the nominal current value that is deemed unacceptable for user. (Actual alarm) [20 – 100 %]
Over Current Alarm Time Delay (Seconds)	This is the time configured by the user for the over current alarm to enable once the current has risen above the setpoint. [1 – 65535 seconds]
Pulse Input 1 input mode	Pulse input 1 input mode [Disabled, Form A or Form C]
Pulse Input 2 input mode	Pulse input 2 input mode [Disabled, Form A or Form C]
KiloWatt Hour Pulse Output mode	kWh pulse output mode [Disabled, KY, KYZ]
KiloWatt Hour Pulse Output scaling	kWh pulse output scaling [1 Pulse every kWh, 1 Pulse every 10 kWh, 1 Pulse every 100 kWh, 1 Pulse every 1000 kWh]

Global Alarm Parameter Settings

Gobal settings (cont'd.)

Global Alarm Summary
In the Alarm summary section, the alarms for the entire system is displayed as a snapshot of the system.

The following alarms are displayed.

Global Alarm Summary	Description
Phase Loss Alarm	Phase loss alarm in case of any branches with no current. [Yes or No]
Phase Over Current Warning	Phase Over current warning in case of any branches have load current higher than the warning setpoint. [Yes or No]
Phase Over Current Alarm	Phase Over current alarm in case of any branches have load current higher than the alarm setpoint. [Yes or No]
Over KW Demand Alarm	Over kW demand alarm in case of any branches have present kW demand higher than the alarm setpoint. [Yes or No]
Voltage Alarm	Voltage alarm showing if the voltage is higher or lower than the over voltage or under voltage alarm setpoints. [Under, No or Over]
Clear Voltage Alarm	If the Voltage alarm is set to either Under or Over, the button "Clear Voltage Alarm" is enabled for the user to clear the voltage alarm.
Refresh button	The refresh button allows the user to get the latest alarm summary.

Global Alarm Summary Settings

Global Resets
In the Global Reset section, the user can reset a number of alarms, demands and energy values.

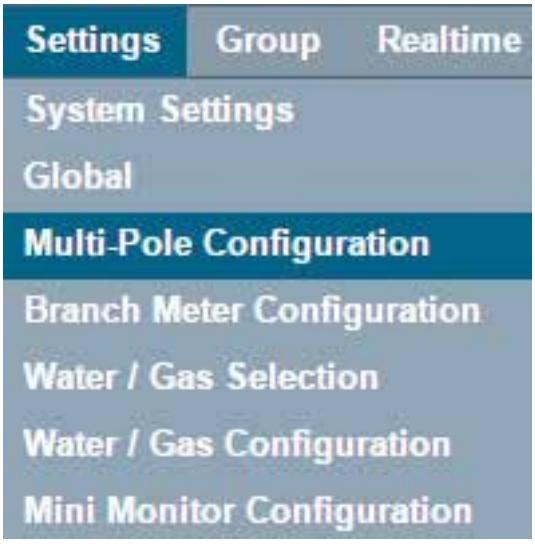
By default, the "No Reset" option is selected. The following parameters are allowed to be reset through the Global resets section. The user has to select Global Reset to activate the reset operation.

Global Resets	Description
No Reset	Default selection. No resets selected.
Begin new Demand Sub-Interval	Allows the user to begin new Demand sub-interval.
Reset all Demands	Allows the user to reset all demands.
Reset all Maximum Demand values to 0	Allows the user to reset all maximum demand values to 0.
Reset Energy (kWh, kVAh, kVARh)	Allows the user to reset all energy values. The energy values can be reset if the Utility seal is not selected to be enabled.
Reset all Maximum Current values to 0	Allows the user to reset all maximum current values to 0.
Reset all Maximum kW values to 0	Allows the user to reset all maximum kW values to 0
Reset Pulse input 1 Count to 0	Allows the user to reset the pulse input 1 count to 0.
Reset Pulse input 2 Count to 0	Allows the user to reset the pulse input 2 count to 0.
Reset all Mini-Monitor Alarm Flags	Allows the user to reset all meter module alarm flags

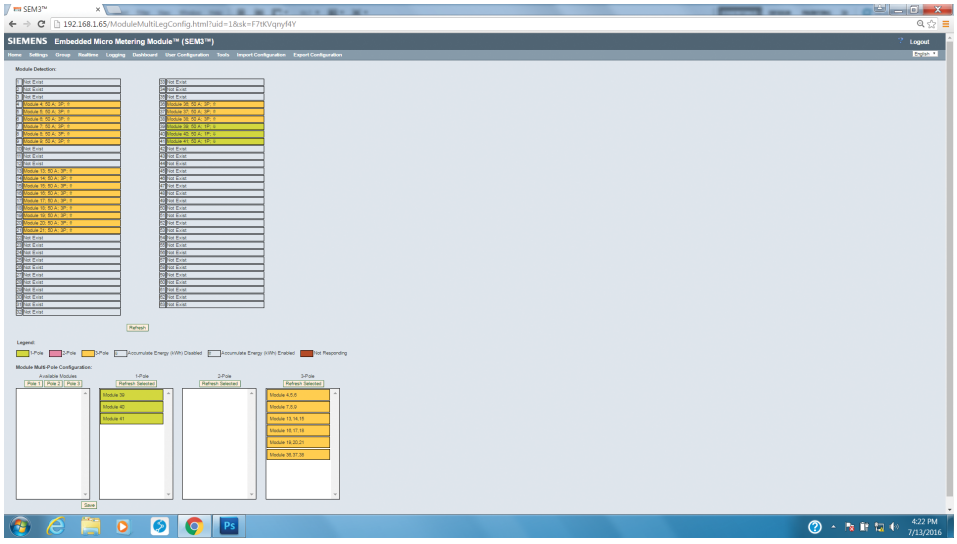
Global Resets Settings

Multi-Pole Configuration

The user can navigate to the Multi-Pole Configuration page by hovering or clicking the mouse on the “Settings” navigation link.



Navigation to Multi-Pole Configuration Page



Navigation to Multi-Pole Configuration Page

A drop down menu will appear which will show “Multi-Pole Configuration” as a selection. Clicking on this selection will show the relevant webpage.

The multi-pole configuration page provides the following:

a. A screen is provided for user to configure available meter modules as a single or multi phase meter modules.
b. The page shows the navigation bar in the top of the page.
c. The logout link identified by a Logout text on the top right corner.
d. There is a help link identified by a question mark (?) on the left of the Logout text.
e. The drop down menu for different translated languages is provided underneath the logout text.

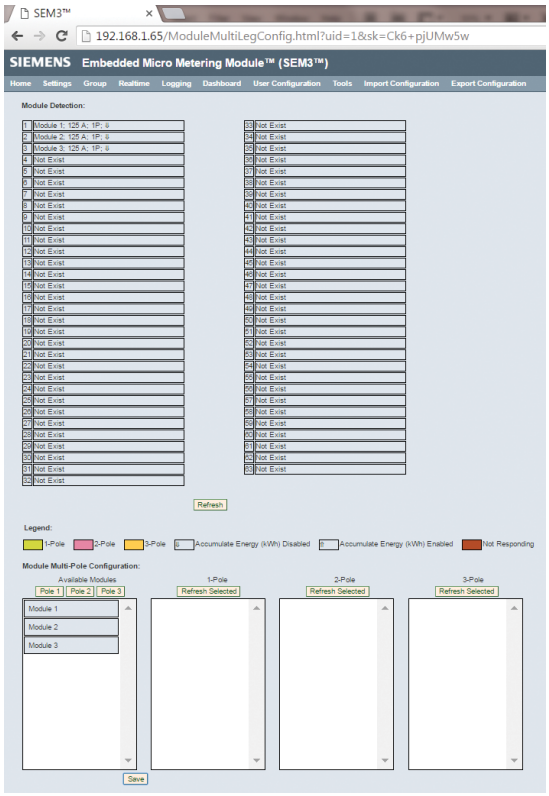
In this page the user can view the available meter modules presently connected with SEM3 controller. These include configured, unconfigured, unresponsive or unfilled modules. Along with the Module grid number, the module number, CT rating, pole type and accumulate energy enable option is displayed. The configured modules are color coded to represent the pole type with a legend provided underneath the system overview. The user can get a current list of modules in the system overview (“Module Detection”) section by clicking on the “Refresh” button.

The global settings should be configured prior to any branch meter configurations. These settings when saved will overwrite all other settings previously configured for individual branch meters.

The various subsections of the page are described in the sections below.

Multi-Pole Configuration (cont'd.)

Configuration of Modules
The user can select one or multiple modules from the "Available Modules" list and click the button "Pole 1", "Pole 2" or "Pole 3" to move the modules into appropriate pole selection. The user can click on "Save" button to save the configuration.



Operations to Save Meter Configuration

To save all meter modules as 1-Pole, the user has to select the concerned meter modules by using the mouse. After the selection, the user has to select Pole 1. This will move all the selected meter modules to the 1-Pole selection column.

Similar selections can be performed for 2-Pole or 3-Pole.

Saved Meter Configuration

Multi-Pole Configuration (cont'd.)

If the meters have been already configured as 1-Pole, 2-Pole or 3-Pole, the user can configure them back as Available meters. The user needs to select the concerned meter modules using the mouse and click on "Refresh Selected". This moves the selected meters to Available meter columns.

Once the meters have been moved to the Available meter columns, the user can reconfigure the meters to other pole columns.

If the System Voltage mode is set to "Single Phase 3W", and the user decides to configure a 3-Pole selection, the system provides a message " Voltage mode reconfiguration in System Settings Page is required".

3-Pole Configuration with Voltage Mode Set to Single Phase 3W

Branch meter configuration

Once the meter modules are configured as meters the Branch Meter Configuration screen will be populated with the configured meters. This screen will allow the meters to be named, enable or disable the meter to be counted in the overall system energy equation, Set the CT ratio and have individual alarms that override the global alarms.

Select a meter from the chart. The meter information will show up below the chart. Selecting the meter name field will allow for the meter to be named according to the customer requirements. Names may be up to 36 characters in length.

Meter accumulated energy enabled allows the user to set whether this meter is to be counted in the overall meter system energy calculation. The overall system energy is a total of all the meters in the system and can be read via Modbus or tied to the digital pulse output.

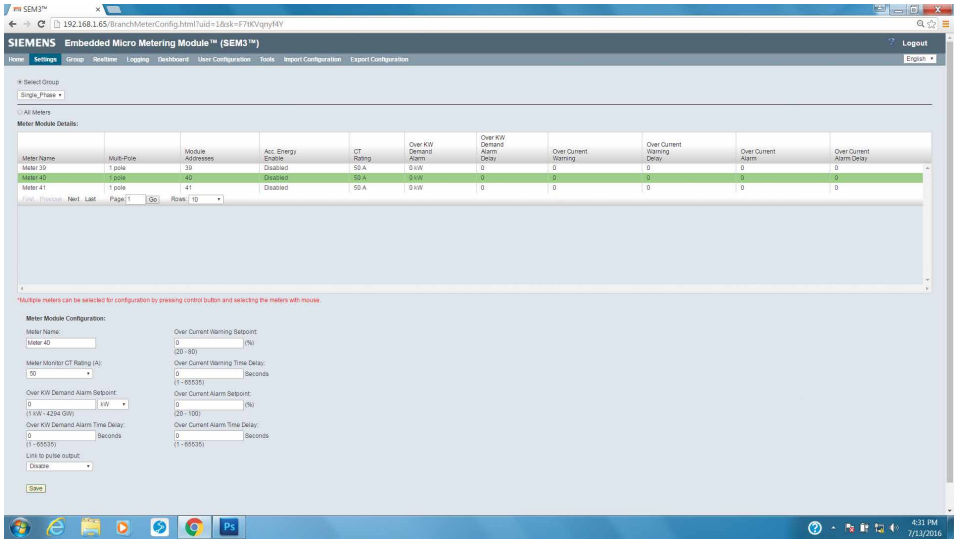
CT rating will be the rating of the CT used for this meter. Note on multi-pole meters all the poles are required to have the same size CT. Mixed CT rating on a given meter are not allowed. CT ratings can be picked from the drop down menu and are 50, 125, 250, 400, 600, 800, 1200, 1600 and 2000 amps.

Alarms for the individual meters can also be set on this screen. These setting will override the global setting.

Save changes before leaving this screen.

* *These setting should be altered after the global settings have been selected.*

Any changes saved here will overwrite global settings, however any changes to global settings will overwrite all specific branch settings.



Branch Meter Configuration

Change Basic Attributes of a Branch

1. Select a meter from the "Meter Module Details" table (meter name should be highlighted in yellow).

2. Make edits:

   - *Meter Name:* Delete current name from text entry field and enter preferred name in its place.
   - *Meter Monitor Accumulate:* From the drop-down menu, select enable or disable.

   Note: When enabled, this will compute individual statistics and add it to the cumulative "Total" statistics located on the real time page at the top.

   - *Breaker Rating:* From the drop-down menu, select to correct breaker rating for the branch.

3. Click "Save" button.

Set Specific Branch Warnings and Alarms

1. Select a meter from the "Meter Module Details" table (meter name should be highlighted in yellow).

2. Set warnings and alarms by entering numbers in the text entry field taking note of the ranges to the right and the units of each setting.

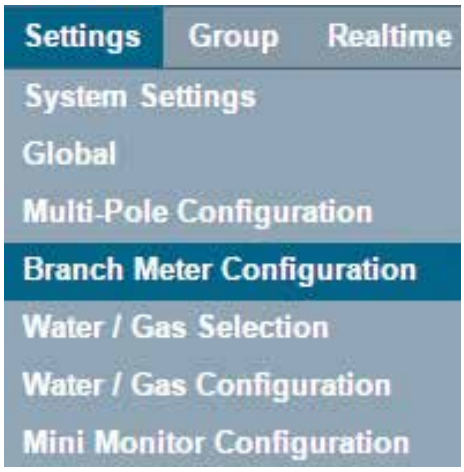
   Note: "Over KW Demand Alarm Setpoint" has an additional drop-down menu that changes the units.

3. Click "Save" button.

   Note: The table may not show all meters. To see additional meters use the scroll bar on the side of the table, or a scroll wheel on a mouse when the pointer is overlaying the table data.

Branch meter configuration (cont'd.)

The user can navigate to the Branch Meter Configuration page by hovering or clicking the mouse on the "Settings" navigation link.



Navigation to Branch Meter Configuration Page

A drop down menu will appear which will show "Branch Meter Configuration" as a selection. Clicking on this selection will show the relevant webpage.

The branch meter configuration page provides the following:

a. A screen is provided for user to configure connected and communicating meter modules either as stand alone meters or part of grouped meters. The users can configure the settings of several parameters for individual meters as well as multiple meters.

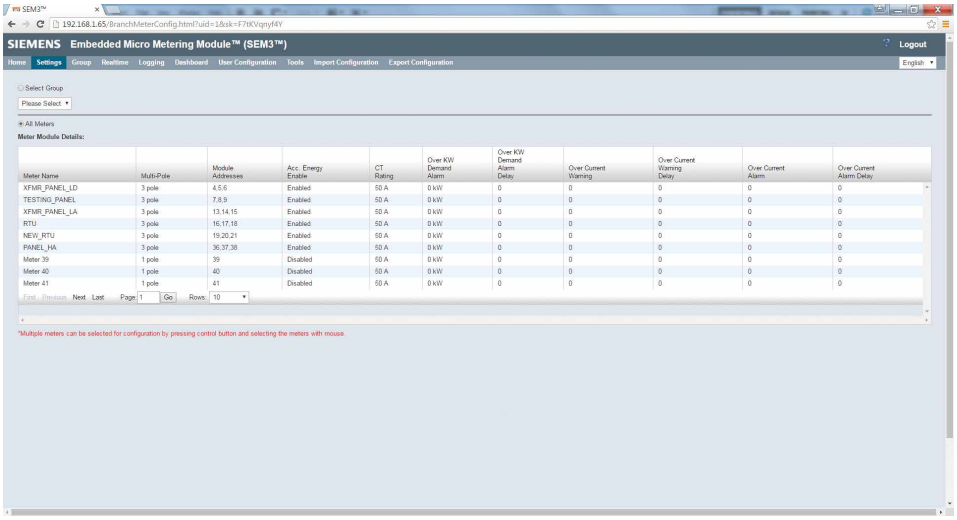
b. The page shows the navigation bar in the top of the page.

c. The logout link identified by a Logout text on the top right corner.

d. There is a help link identified by a question mark (?) on the left of the Logout text.

e. The drop down menu for different translated languages is provided underneath the logout text.

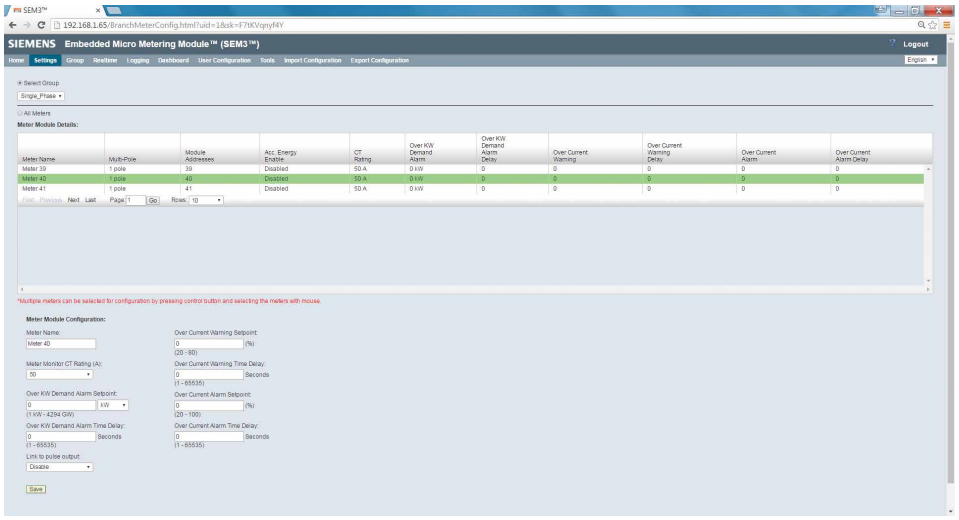
In this page the user can view the connected and communicating meter modules presently connected with SEM3 controller. By default the "All meters" option is selected. By default, the table shows all the meters which are not part of a configured group. This allows the user to perform individual meter module configuration. If the user wants to configure a meter part of a group, the Selection for "Select Group" needs to be chosen.



Branch Meter Configuration Page

Branch meter configuration (cont'd.)

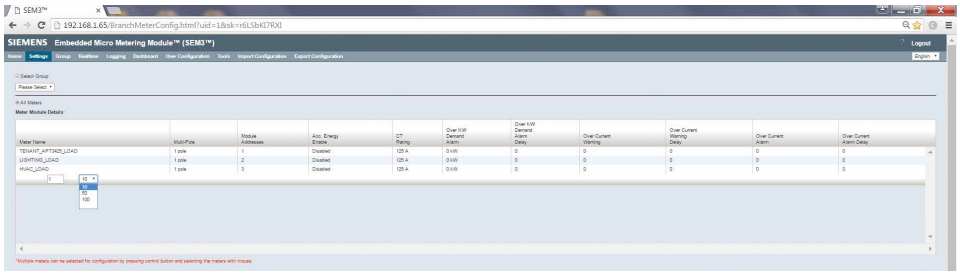
Individual Meter Module Configuration
The user can perform individual meter module configuration by selecting the concerned meter module by using the mouse. The user can change the configuration values and click save to enable the configuration changes with the meter modules. The table to the right shows the parameters that can be changed in the meter module configuration page. When the user clicks save after making a change and if all the values are within the correct ranges, the system responds with a message "Record saved successfully". In case if the values of the parameters are entered incorrectly, the system responds with a message "Invalid value. Verify the range".



Individual Meter Module Configuration

The meter module listing by default will show the currently connected meter modules or 10 meter modules which ever is the lowest number. At the bottom of the listing, there are navigation links to help the user move to other pages.

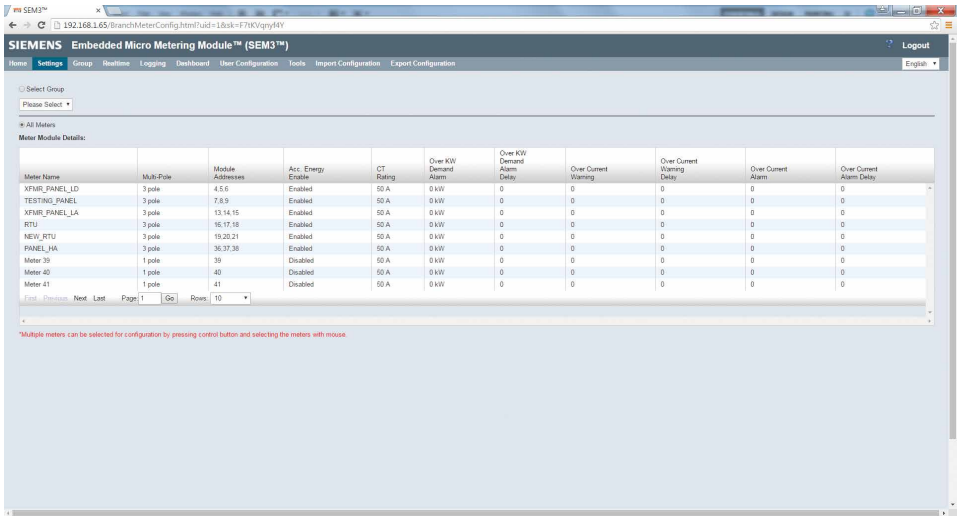
The user can navigate Next page by clicking on Next button. The user can navigate to Last page by clicking on Last button. If there are more than 10 meter modules connected, the meter modules are displayed in different pages, which can be accessed by typing a page number and clicking on "Go" button.



Navigation to Other Pages in the Meter Module Listing

Also the user can configure the number of rows shown in the first page. By default only 10 lines or meter modules are displayed. The user has an option to change the number of rows to "Show all".

If the user selects to "Show all" in the Rows selection, all the connected meters are displayed. There is a navigation scroll bar showing the current position in the table. The bottom navigation bar showing Next, Last, Page and Rows selection disappears.



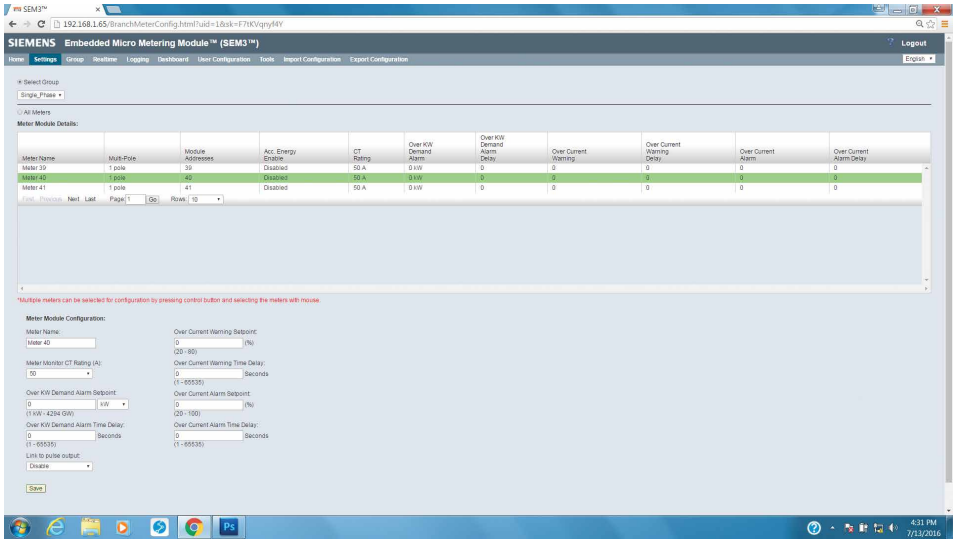
Display of All Connected Meter Modules

Branch meter configuration (cont'd.)

Grouped Meter Module Configuration
On the meter module configuration page, the user can configure meters which are part of a group. To select the corresponding groups, the user has to select "Select Groups". The drop down menu below the selection, shows all the configured groups. The user needs to select the appropriate group to see the meters which are configured as part of that group.

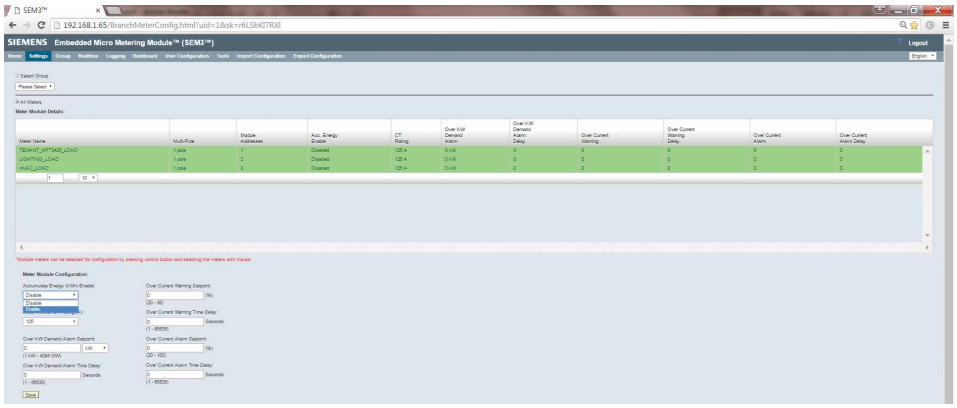
Once the concerned group is selected by the user, the corresponding meters part of the group are displayed. The user can now select a specific meter to show the parameters and make the appropriate changes.

Note: A maximum of 8 Groups can be configured.



Selection of Groups in Meter Module Configuration Page

The user can select individual meter or multiple meters to make modifications. These selections are possible when the values are displayed under All meters or Groups. The user can select multiple meters by pressing Ctrl button and selecting the concerned meters. The parameters available for selection remain the same (except for the meter name) as the individual or group selection under which the multiple selection is performed.



Selection of Multiple Meters from a Group

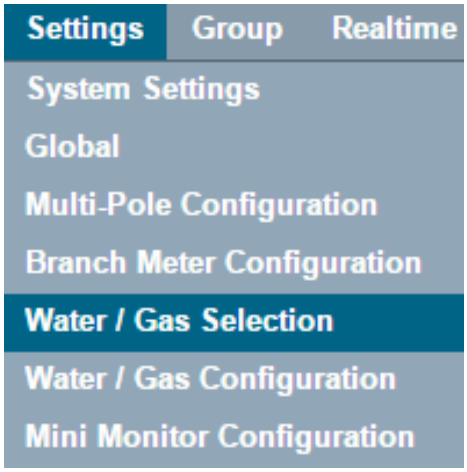
The table to the right shows the parameters which are configurable for the individual or grouped meter module configuration.

Meter Module configuration parameters	Individual Meter Module Configuration	Grouped Meter Module Configuration
Meter Name	X (not available for multiple meter selection)	X (not available for multiple meter selection)
Accumulate Energy Enable	X	
Meter Monitor CT Rating	X	
Over KW Demand Alarm Setpoint	X	X
Over KW Demand Alarm Time Delay	X	X
Over Current Warning Setpoint	X	X
Over Current Warning Time Delay	X	X
Over Current Alarm Setpoint	X	X
Over Current Alarm Time Delay	X	X
Link to Pulse ouput		X

Meter Module Configuration Parameters

Water / Gas Selections

The water and gas meter selection and configuration is handled by two separate web pages within the SEM3 web pages. The user can navigate to the Water and Gas meter selection page by hovering or clicking the mouse on the “Settings” navigation link.



Selection of Water/Gas Selection

A drop down menu will appear which will show “Water/Gas Selection” as a selection. Clicking on this selection will show the relevant webpage.

The Water/Gas Selection page provides the following:

a. A configuration screen that allows user to select PLC pulse outputs as valid gas or water meters. A save button is provided for the user to save the configuration.

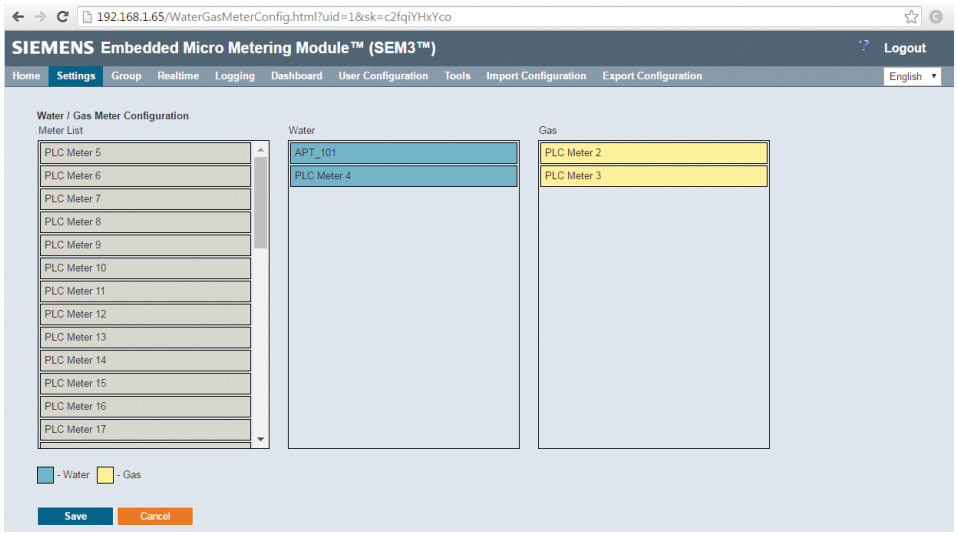
b. The page shows the navigation bar in the top of the page.

c. The logout link identified by a Logout text on the top right corner.

d. There is a help link identified by a question mark (?) on the left of the Logout text.

e. The drop down menu for different translated languages is provided underneath the logout text.

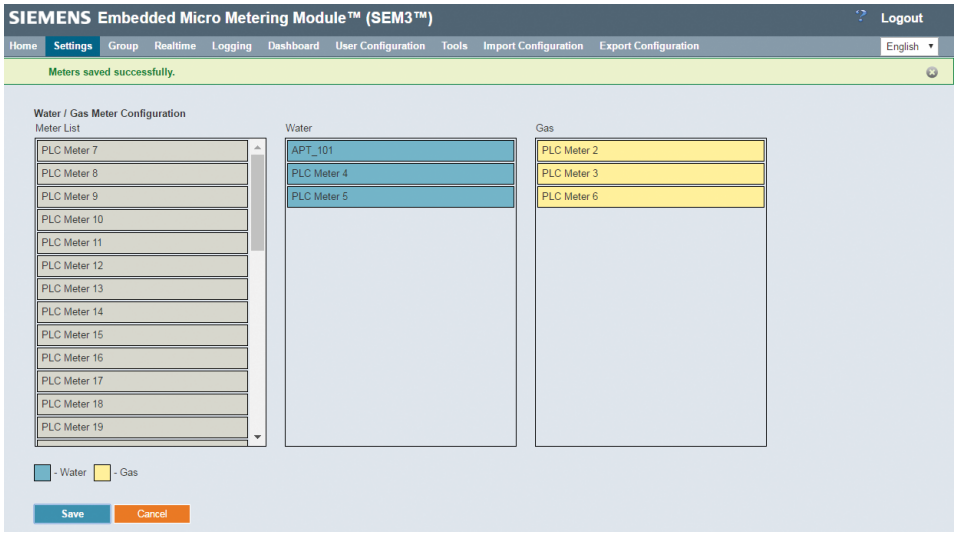
There is a list of available PLC meters tagged “Meter List” and two columns for Water and Gas meters.



Water/Gas Selection Page

Water / Gas Selections (cont'd.)

Save of Water / Gas Meter Selection
A total of 44 PLC meter values are available to be configured as Water or Gas meters pulse counts. To save a potential PLC meter value as a Water or Gas meter pulse count, the user can drag and drop multiple PLC meters as water or gas meters. Clicking on the save button will save the configuration.



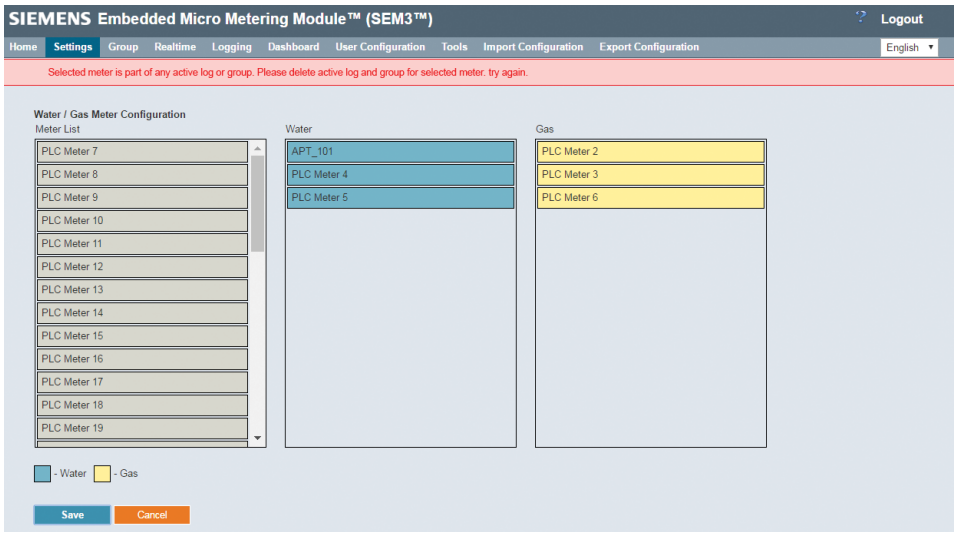
Response message for Save configuration

SEM3™ Note

A maximum of 44 PLC meter values are available to be configured as water or gas configuration.

User can configure any combination of the PLC meters as Water or Gas meters. The real time data will be displayed in the real time page as long as the PLC meters are physically available.

The user cannot unselect a configured water or gas meter that is already a part of a group or log (data or alarm). If the user tries to move the corresponding water or gas meters to available "Meter List", a response message will display "Selected meter is part of any active log or group. Please delete active log and group for selected meter, try again".



Response for Unselecting a Meter Part of Group or Log

Water / Gas Selections (cont'd.)

Water / Gas Configuration
The user can navigate to the Water and Gas Meter configuration page by hovering or clicking the mouse on the "Settings" navigation link.

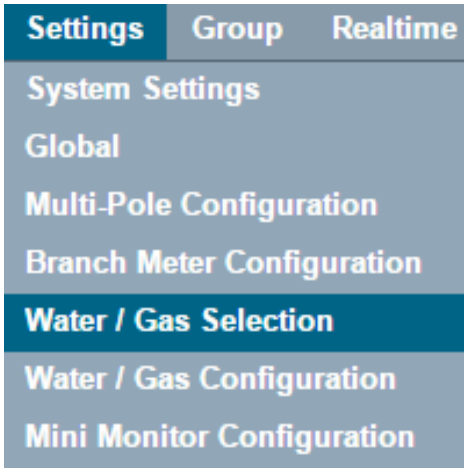
A drop down menu will appear which will show "Water/Gas Configuration" as a selection. Clicking on this selection will show the relevant webpage.

The Water/Gas Configuration page provides the following:

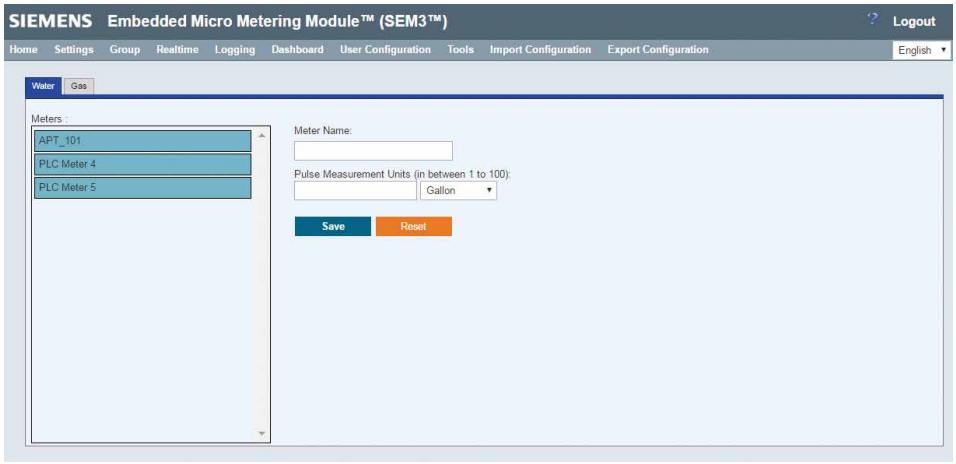
a. A configuration screen that allows user to assign a previously selected valid gas or water meters a name and a translation for the pulse counts. A save button is provided for the user to save the configuration. A reset button is provided for the user to revert the assignment and translation.
b. The page shows the navigation bar in the top of the page.
c. The logout link identified by a Logout text on the top right corner.
d. There is a help link identified by a question mark (?) on the left of the Logout text.
e. The drop down menu for different translated languages is provided underneath the logout text.

The user can configure the previously selected water/gas meters by clicking on the button for respective meters (water or gas) and clicking on the populated meters. By default, the Water meters are shown with no meters selected.
If the user clicks on one of the available PLC meters selected as water meters, the corresponding names and pulse measurement units can be changed. The pulse measurement units range from 1 to 100 units. The user can also assign a particular unit for the measurement.

For example if the user selects for Water meter 1 as 5 pulse measurement units in Gallons. For every pulse count received by the controller the Real Time page will be updated by 5 Gallons for Water meter 1.



Selection of Water/Gas configuration

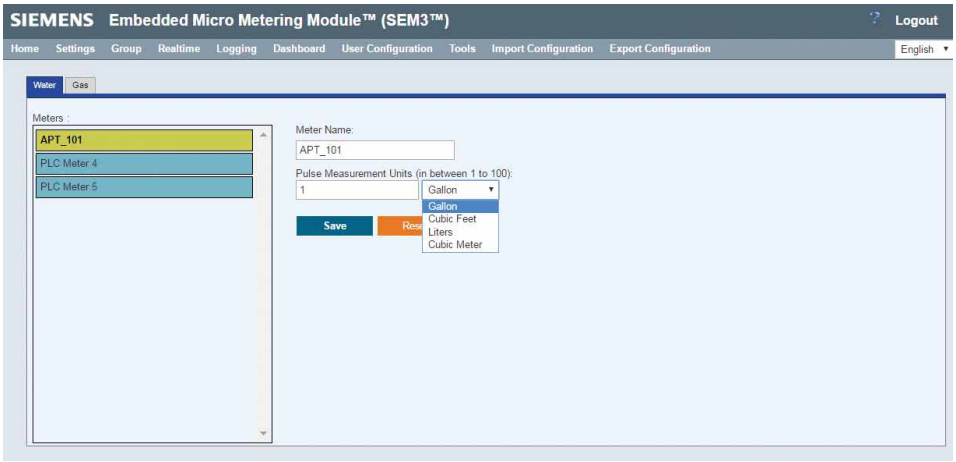


Water/Gas Configuration Page

Water / Gas Configuration

For water meters the following are available unit conversions:

a. Gallon,
b. Cubic Feet,
c. Liters or
d. Cubic Meters

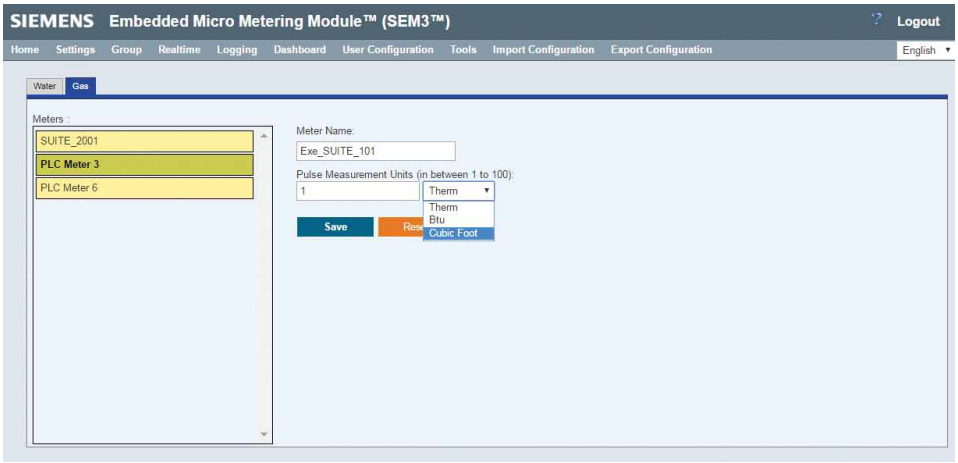


Water Meter Configuration Options

For gas meters the following are available unit conversions:

a. Therm
b. Btu or
c. Cubic Foot

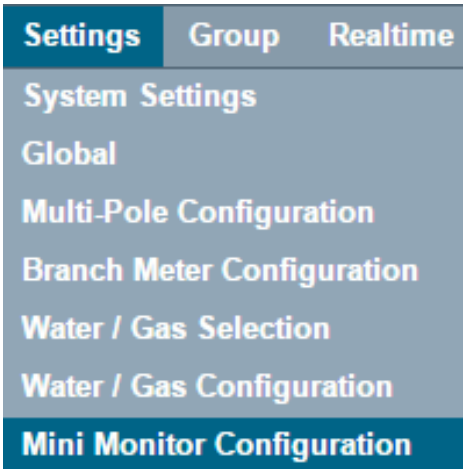
After making the necessary changes for the water or gas meters the user can click “Save” to save the configurations. If any time while make changes on a particular meter, the user wants to revert back to the saved configuration, clicking the “Reset” button will clear the entries. If the user does not enter a valid entry, the webpage provides a response by highlighting the concerned entries for either the name or the pulse units. The meter name cannot be left vacant. Also the pulse units need to be within the specified ranges.



Gas Meter Configuration Options

Mini Monitor Configuration

The user can navigate to the Mini-monitor configuration page by hovering or clicking the mouse on the “Settings” navigation link.



Navigating to Mini Monitor Configuration

A drop down menu will appear which will show “Mini Monitor Configuration” as a selection. Clicking on this selection will show the relevant webpage.

The mini monitor configuration page provides the following:

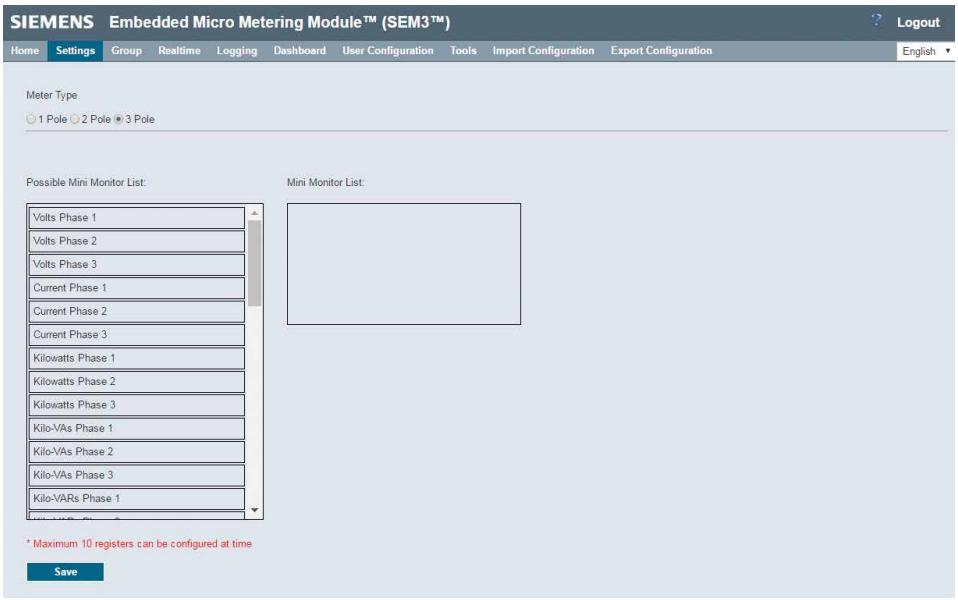
a. A configuration screen that allows user to configure data points for a selected meter type from a Possible Mini monitor List to be included in the mini monitor grouped block called as the Mini Monitor List. A save button is provided for the user to save the configuration.

b. The page shows the navigation bar in the top of the page.

c. The logout link identified by a Logout text on the top right corner.

d. There is a help link identified by a question mark (?) on the left of the Logout text.

e. The drop down menu for different translated languages is provided.



Mini Monitor Configuration Page

A list of configurable data points per meter pole configuration is available which can be grouped as mini monitors. This simplifies the data access of meters through Modbus by grouping selected meter data points. There are 10 Modbus registers (physical addresses) reserved for each meter in each phase configuration to be populated with selected meter data points.

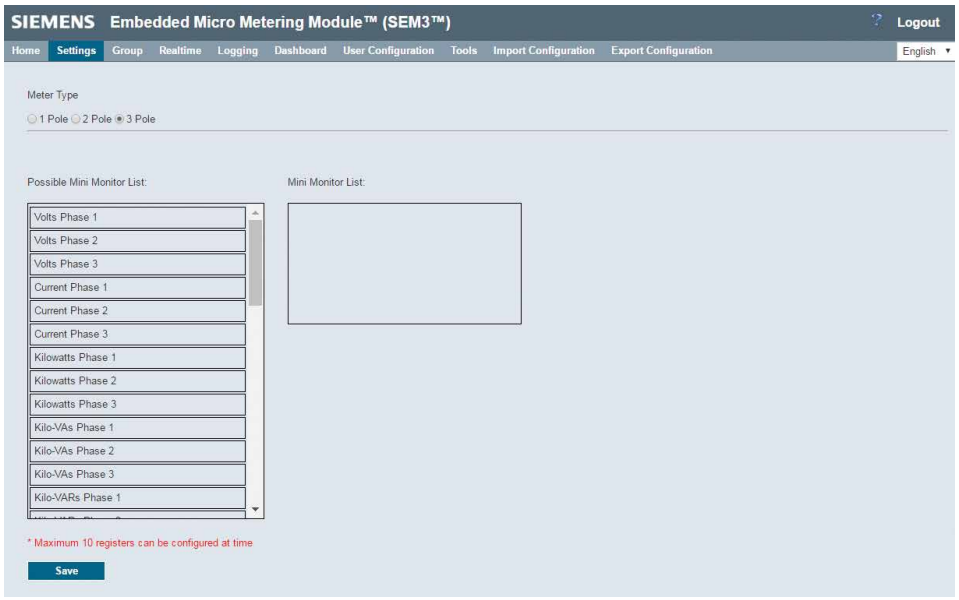
By default no meter data points are configured as mini monitor. If an external HMI device is connected to the SEM3 controller, the data values for the mini monitor in the HMI will be populated only after the mini monitor configuration is completed on this page.

Mini Monitor Configuration (cont'd.)

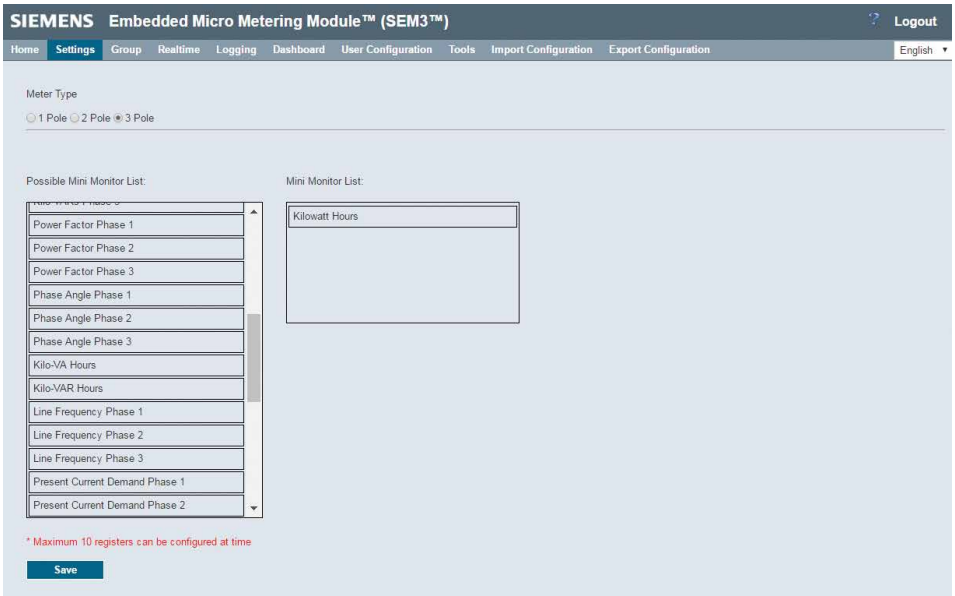
Configure Mini Monitor for Multi-Phase Meters

The mini monitor configuration can be performed for 1-pole, 2-pole or 3-pole meters. By default the 1-Pole configuration is selected.

The user selects the required Pole configuration by selecting the appropriate check box for Pole configuration. Based on the selection, data points will be populated in the "Possible Mini Monitor List". User can drag and drop the required data points in the "Mini Monitor List".



Mini Monitor Configuration Step 1

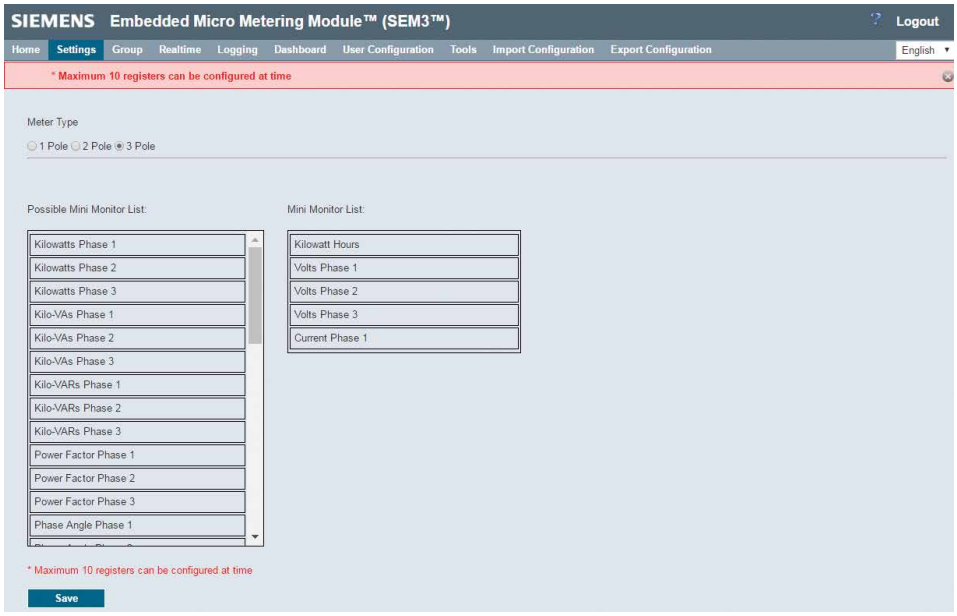


Mini Monitor Configuration Step 2

Mini Monitor Configuration (cont'd.)

The user shall select any combination of registers which combine to populate the 10 Modbus registers.

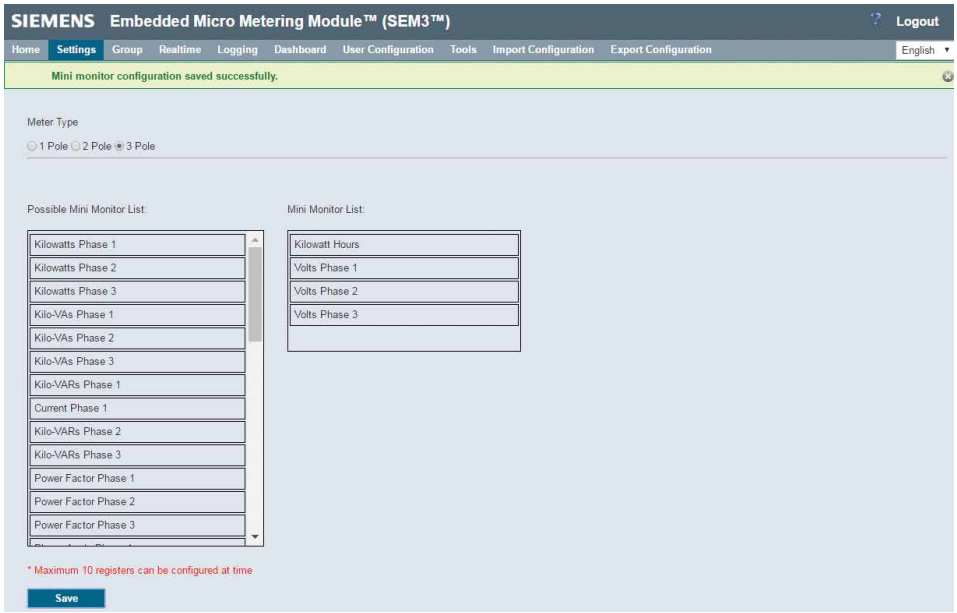
If the user selects the number of data points which exceeds the 10 Modbus registers, the webpage provides an error message "* Maximum 10 registers can be configured at time".



Mini Monitor Configuration Error Response

After the correct selection of number of data points, the user shall click on "Save". After the configuration is saved, the webpage provides a feedback message "Mini Monitor configuration saved successfully".

The web pages will refresh after the successful save response. In the Mini Monitor List, after the webpage refreshes, the order in which the data points will be arranged in the Modbus Map will be seen. The final listing is determined by the order in which the data points have been designed in the original Modbus address map as a part of the firmware.



Mini Monitor Save Success Response

Mini Monitor Configuration (cont'd.)

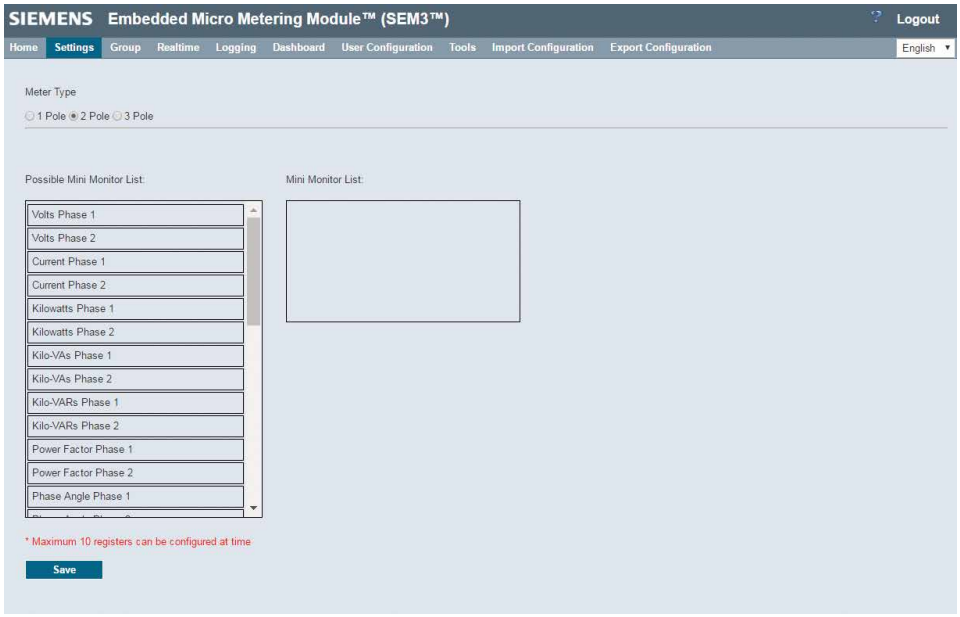
One Pole Mini Monitor Configuration
In the one pole selection, the following data points are available for the user to configure.

Data	Reg. size	Format	Selectable as mini monitor data point
Single-Phase Monitor Data Registers			
Volts	2	Float-32	X
Current	2	Float-32	X
Kilowatts	2	Float-32	X
Kilo-VAs	2	Float-32	X
Kilo-VARs	2	Float-32	X
Power Factor	2	Float-32	X
Phase Angle	2	Float-32	X
Kilowatt Hours	2	Float-32	X
Kilo-VA Hours	2	Float-32	X
Kilo-VAR Hours	2	Float-32	X
Line Frequency	2	Float-32	X
Present Current Demand	2	Float-32	X
Maximum Current Demand	2	Float-32	
Maximum Current	2	Float-32	
Present Kilowatt Demand	2	Float-32	X
Average Kilowatts Demand	2	Float-32	X
Maximum Kilowatt Demand	2	Float-32	
Maximum Total Kilowatts	2	Float-32	
Average Volts	2	Float-32	X
Over KW Demand Alarm Setpoint	2	Uint-32	
Over KW Demand Alarm Time Delay	1	Uint-16	
Over Current Pre-Alarm (Warning) Setpoint	1	Uint-16	
Over Current Pre-Alarm (Warning) Time Delay	1	Uint-16	
Over Current Alarm Setpoint	1	Uint-16	
Over Current Alarm Time Delay	1	Uint-16	
Active Alarms	1	Bit Field	X
Double Precision Energy Registers			
Kilowatt Hours	4	Float-64	X
Kilowatt Hours Exported	4	Float-64	X
Kilowatt Hours Imported	4	Float-64	X
Kilo VA Hours	4	Float-64	X
Kilo VAR Hours	4	Float-64	X
Single Phase Monitor Diagnostic Registers			
Breaker Rating	1	Uint-16	X
Phase Selected	1	Uint-16	X
Delta Temp (from 22° C)	2	Float-32	X
Modbus Address	1	Uint-16	X
Device Serial Number	16	Char-32	
Firmware Version Number	4	Char-8	

One Pole Meter Mini Monitor Data Points

Mini Monitor Configuration (cont'd.)

Two Pole Mini Monitor Configuration
When the user selects 2 Pole, the corresponding data for 2 Pole is populated in the "Possible Mini Monitor List".



Two Pole Selection

In the two pole selection, the following data points are available for the user to configure.

Data	Reg. size	Format	Selectable as mini monitor data point
Dual-Phase Monitor Data Registers			
Volts Phase 1	2	Float-32	X
Volts Phase 2	2	Float-32	X
Current Phase 1	2	Float-32	X
Current Phase 2	2	Float-32	X
Kilowatts Phase 1	2	Float-32	X
Kilowatts Phase 2	2	Float-32	X
Kilo-VAs Phase 1	2	Float-32	X
Kilo-VAs Phase 2	2	Float-32	X
Kilo-VARs Phase 1	2	Float-32	X
Kilo-VARs Phase 2	2	Float-32	X
Power Factor Phase 1	2	Float-32	X
Power Factor Phase 2	2	Float-32	X
Phase Angle Phase 1	2	Float-32	X
Phase Angle Phase 2	2	Float-32	X
Kilowatt Hours	2	Float-32	X
Kilo-VA Hours	2	Float-32	X
Kilo-VAR Hours	2	Float-32	X
Line Frequency Phase 1	2	Float-32	X
Line Frequency Phase 2	2	Float-32	X
Present Current Demand Phase 1	2	Float-32	X
Present Current Demand Phase 2	2	Float-32	X
Maximum Current Demand Phase 1	2	Float-32	
Maximum Current Demand Phase 2	2	Float-32	

Continued on next page

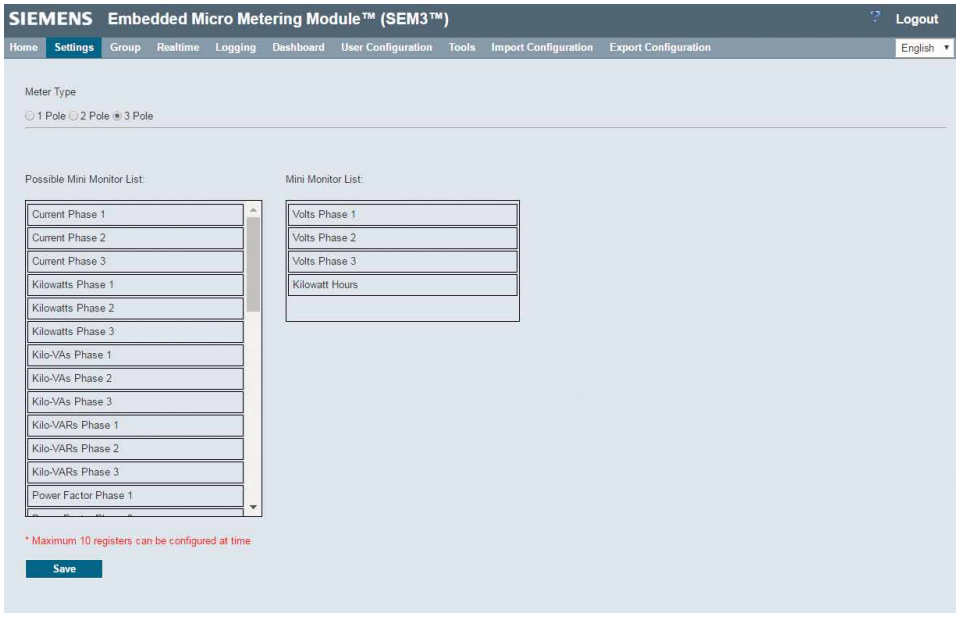
Mini Monitor Configuration (cont'd.)

Data	Reg. size	Format	Selectable as mini monitor data point
Dual-Phase Monitor Data Registers			
Maximum Current Phase 1	2	Float-32	
Maximum Current Phase 2	2	Float-32	
Present Kilowatt Total Demand	2	Float-32	X
Average Kilowatts Total Demand	2	Float-32	X
Maximum Total Kilowatts Demand	2	Float-32	
Maximum Total Kilowatts	2	Float-32	
Total Monitor Kilowatts	2	Float-32	X
Total Monitor Power Factor	2	Float-32	X
Average Current of 2 phases	2	Float-32	X
Average Volts	2	Float-32	
Total Monitor Current	2	Float-32	X
Total Monitor Kilo-VARs	2	Float-32	X
Total Monitor Kilo-VAs	2	Float-32	X
Over KW Demand Alarm Setpoint	2	Uint-32	
Over KW Demand Alarm Time Delay	1	Uint-16	
Over Current Pre-Alarm (Warning) Setpoint	1	Uint-16	
Over Current Pre-Alarm (Warning) Time Delay	1	Uint-16	
Over Current Alarm Setpoint	1	Uint-16	
Over Current Alarm Time Delay	1	Uint-16	
Active Alarms	1	Bit Field	X
Double Precision Energy Registers			
Kilowatt Hours	4	Float-64	X
Kilowatt Hours Exported	4	Float-64	X
Kilowatt Hours Imported	4	Float-64	X
Kilo VA Hours	4	Float-64	X
Kilo VAR Hours	4	Float-64	X

Two Pole Meter Mini Monitor Data Points

Mini Monitor Configuration (cont'd.)

Three Pole Mini Monitor Configuration
When the user selects 3 Pole, the corresponding data for 3 Pole is populated in the "Possible Mini Monitor List".



Three Pole Selection

In the three pole selection, the following data points are available for the user to configure.

Data	Reg. size	Format	Selectable as mini monitor data point
Three-Phase Monitor Data Registers			
Volts Phase 1	2	Float-32	X
Volts Phase 2	2	Float-32	X
Volts Phase 3	2	Float-32	X
Current Phase 1	2	Float-32	X
Current Phase 2	2	Float-32	X
Current Phase 3	2	Float-32	X
Kilowatts Phase 1	2	Float-32	X
Kilowatts Phase 2	2	Float-32	X
Kilowatts Phase 3	2	Float-32	X
Kilo-VAs Phase 1	2	Float-32	X
Kilo-VAs Phase 2	2	Float-32	X
Kilo-VAs Phase 3	2	Float-32	X
Kilo-VARs Phase 1	2	Float-32	X
Kilo-VARs Phase 2	2	Float-32	X
Kilo-VARs Phase 3	2	Float-32	X
Power Factor Phase 1	2	Float-32	X
Power Factor Phase 2	2	Float-32	X
Power Factor Phase 3	2	Float-32	X
Phase Angle Phase 1	2	Float-32	X
Phase Angle Phase 2	2	Float-32	X
Phase Angle Phase 3	2	Float-32	X
Kilowatt Hours	2	Float-32	X
Kilo-VA Hours	2	Float-32	X
Kilo-VAR Hours	2	Float-32	X

Continued on next page

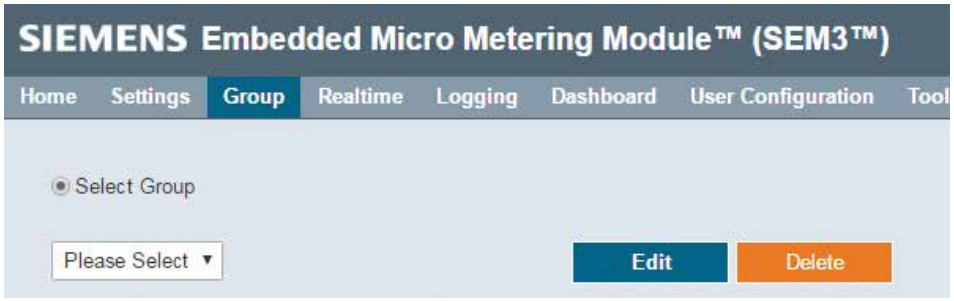
Mini Monitor Configuration (cont'd.)

Data	Reg. size	Format	Selectable as mini monitor data point
Three-Phase Monitor Data Registers			
Line Frequency Phase 1	2	Float-32	X
Line Frequency Phase 2	2	Float-32	X
Line Frequency Phase 3	2	Float-32	X
Present Current Demand Phase 1	2	Float-32	X
Present Current Demand Phase 2	2	Float-32	X
Present Current Demand Phase 3	2	Float-32	X
Maximum Current Demand Phase 1	2	Float-32	
Maximum Current Demand Phase 2	2	Float-32	
Maximum Current Demand Phase 3	2	Float-32	
Maximum Current Phase 1	2	Float-32	
Maximum Current Phase 2	2	Float-32	
Maximum Current Phase 3	2	Float-32	
Present Kilowatt Total Demand	2	Float-32	X
Average Kilowatts Total Demand	2	Float-32	X
Maximum Total Kilowatts Demand	2	Float-32	
Maximum Total Kilowatts	2	Float-32	
Total Monitor Kilowatts	2	Float-32	X
Total Monitor Power Factor	2	Float-32	X
Average Current of 3 phases	2	Float-32	X
Average Volts	2	Float-32	
Total Monitor Current	2	Float-32	X
Total Monitor Kilo-VARs	2	Float-32	X
Total Monitor Kilo-VAs	2	Float-32	X
Over KW Demand Alarm Setpoint	2	Uint-32	
Over KW Demand Alarm Time Delay	1	Uint-16	
Over Current Pre-Alarm (Warning) Setpoint	1	Uint-16	
Over Current Pre-Alarm (Warning) Time Delay	1	Uint-16	
Over Current Alarm Setpoint	1	Uint-16	
Over Current Alarm Time Delay	1	Uint-16	
Active Alarms	1	Bit Field	X
Double Precision Energy Registers			
Kilowatt Hours	4	Float-64	X
Kilowatt Hours Exported	4	Float-64	X
Kilowatt Hours Imported	4	Float-64	X
Kilo VA Hours	4	Float-64	X
Kilo VAR Hours	4	Float-64	X

Three Pole Meter Mini Monitor Data Points

Group

Multiple Circuits Totalized and Alarmed
The user can navigate to the Group page by clicking on the “Group” navigation link.



Navigation to Group Page

The group page provides the following:

a. A configuration screen that allows user to select meters (energy, gas and water) to be part of a group for totalized display of values and alarms based on the location where the meters are installed. A save button is provided for the user to save the configuration. The user can modify or delete previously created groups.

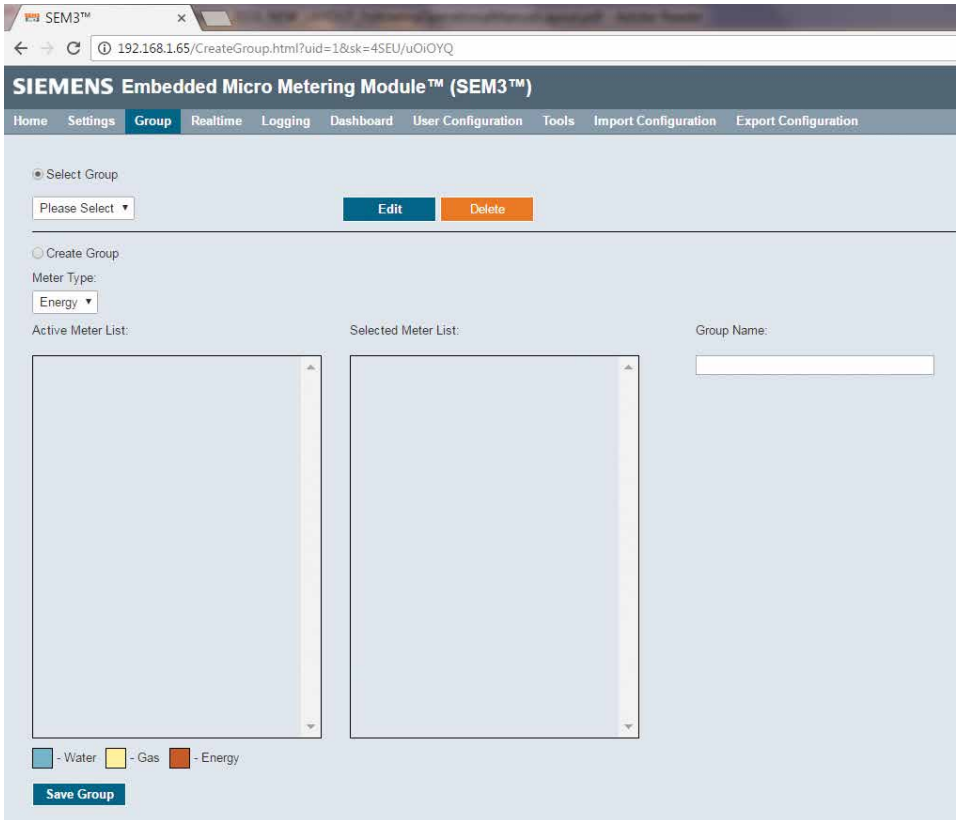
b. The page shows the navigation bar in the top of the page.

c. The logout link identified by a Logout text on the top right corner.

d. There is a help link identified by a question mark (?) on the left of the Logout text.

e. The drop down menu for different translated languages is provided underneath the logout text.

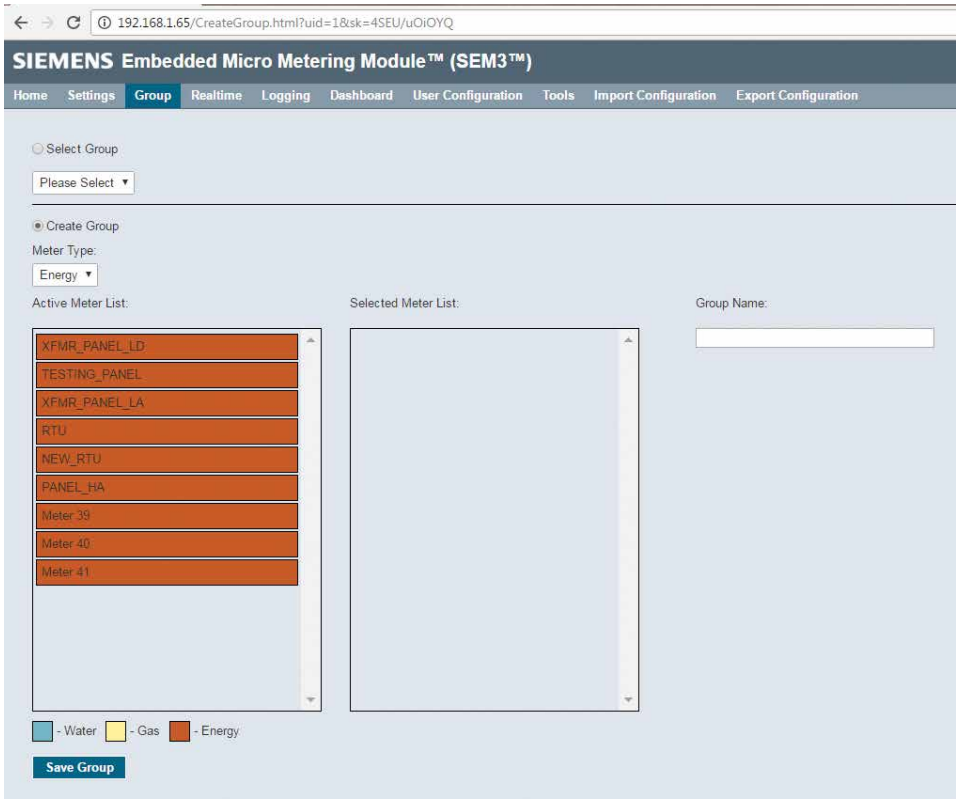
By default, the “Select Group” option is selected.



Group Selection

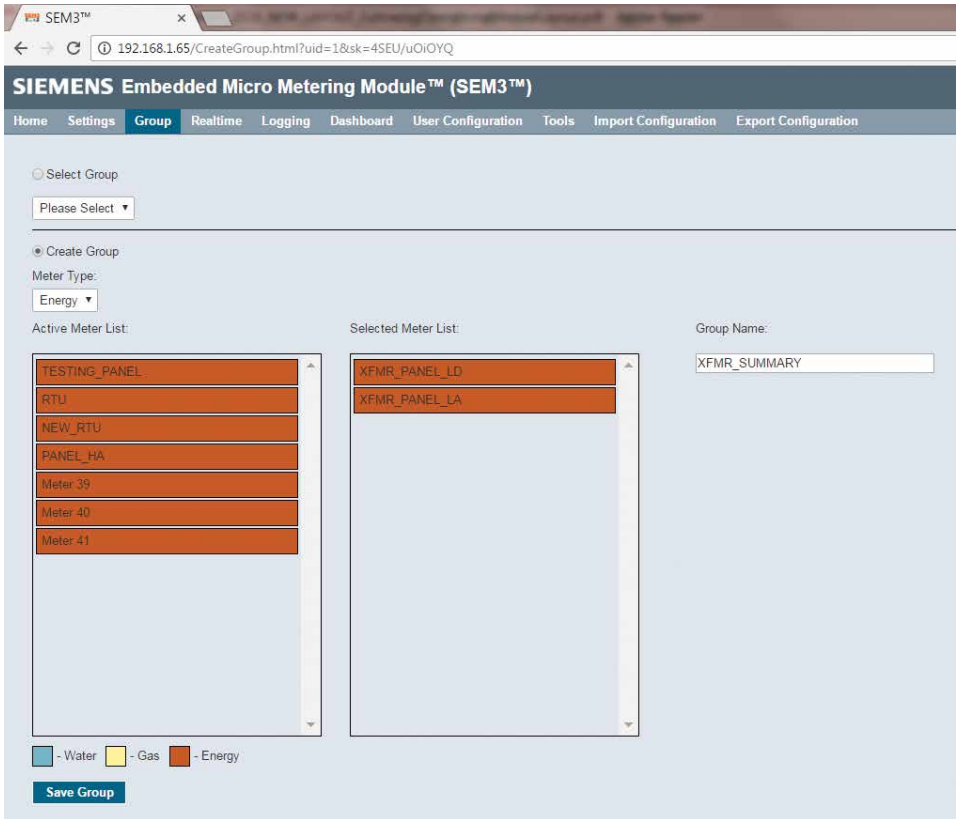
Group (cont'd.)

Create Group
To create a group, the user needs to click on the "Create Group" radio button. By default "Energy" meters are selected in the drop down menu under "Meter Type". Selection of "Create Group" will populate all configured meter modules in the "Active Meter List". The available but not configured meter modules are not shown under the "Active Meter List".



Create Group

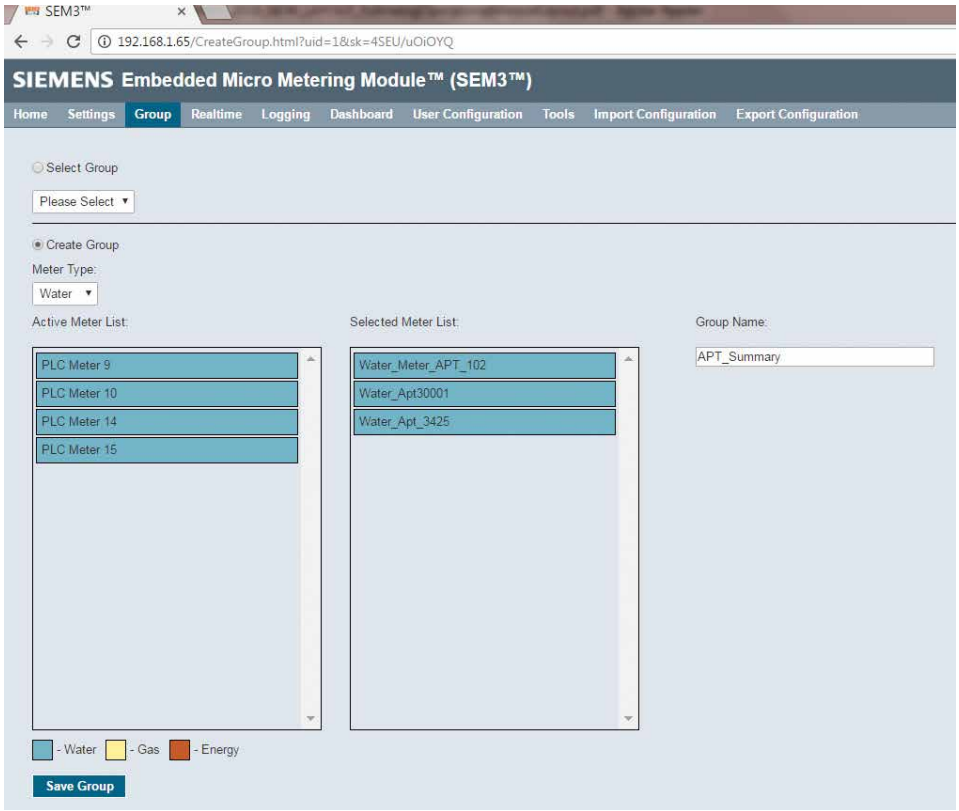
The user can drag and drop several meters from "Active Meter List" to "Selected Meter List". The user can associate a name with the group in the user field "Group Name". If the user does not enter a valid name or leaves the field blank and attempts to save the group by clicking "Save Group", the webpage responds with highlighting the "Group Name". The user needs to enter a correct name to save the group.



Creation of Group with No Name

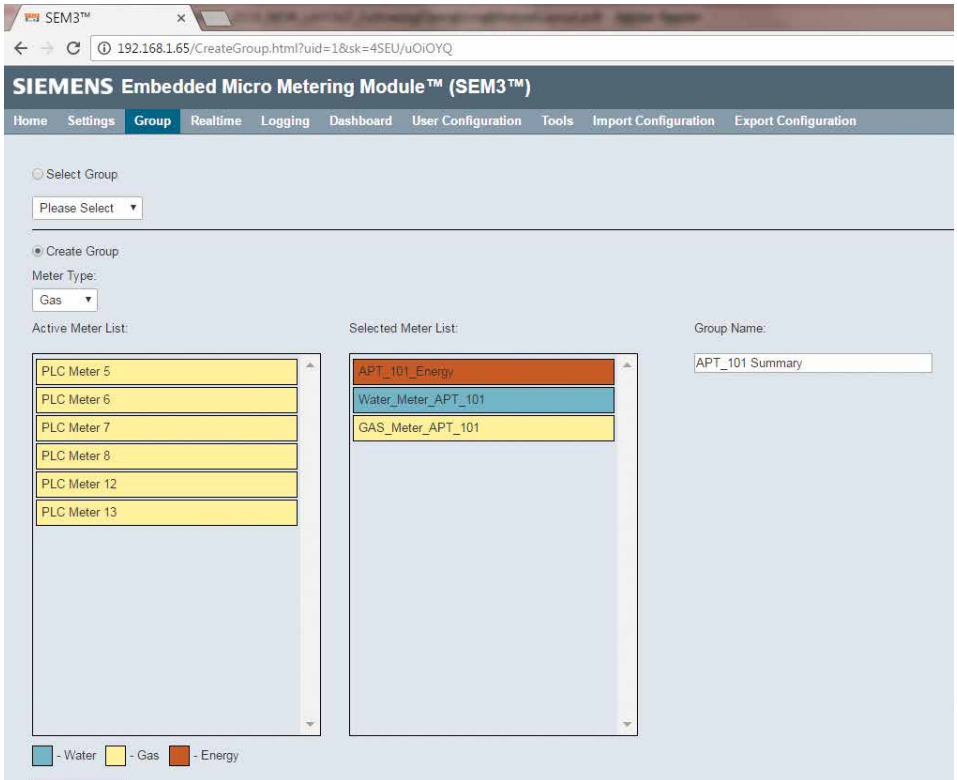
Group (cont'd.)

The user may want to add Water or Gas meters to the group as well. For this the user needs to select "Water" or "Gas" from the drop down menu under Meter type. This will populate the available water or gas meters depending on the selection.



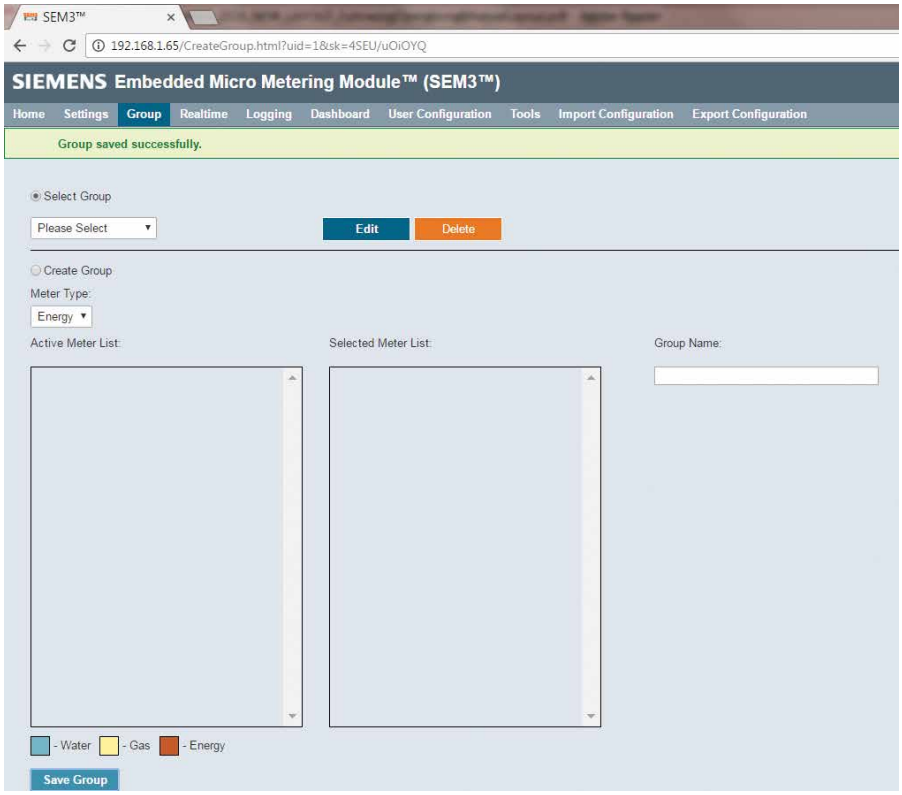
Water Meter Selection in Group

The user can drag and drop several meter from "Active Meter List" to "Selected Meter List" for water and gas meters depending on the installation. After the selections are complete, the user needs to enter a correct name and click on "Save Group" to complete the creation of Group. The webpage provides a feedback on the successful saving of group.



Group Save Operation

Group (cont'd.)



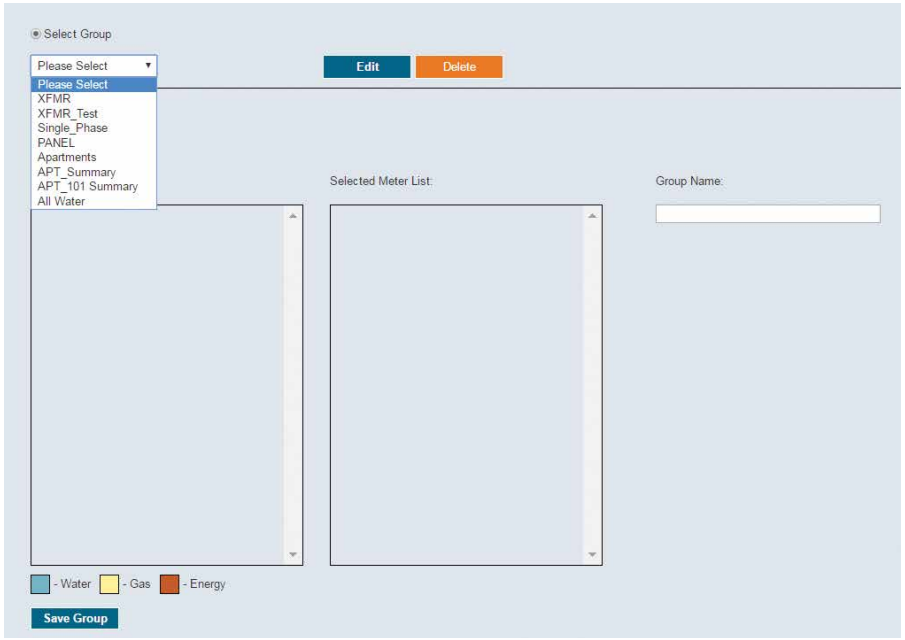
Group Save Success Complete

The created groups are located in the drop-down menu under the "Select Group".

SEM3™ Note

At one time, user can configure a maximum of 8 groups of meters (energy, water and gas).

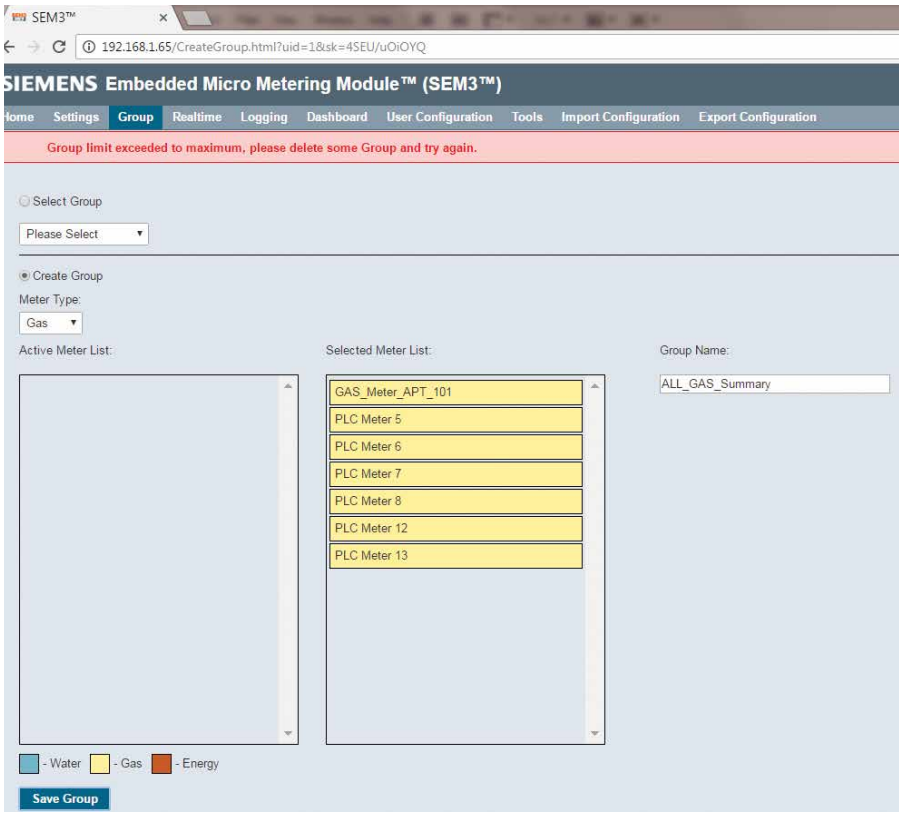
The group name has to be unique.



Configuring Max Number of Groups

Group (cont'd.)

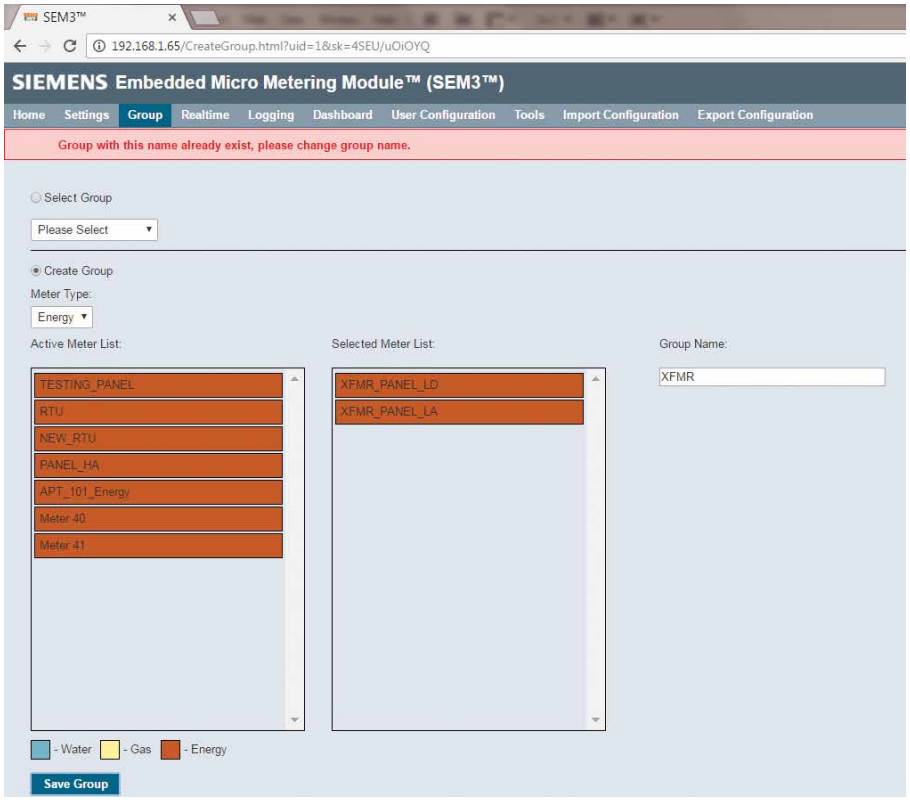
If however the user creates more than the maximum allowed number of groups, the webpage returns an error message when the 9th group is created and saved. The error message says that "Group Limit exceeded to maximum, please delete some group and try again".



Response for Configuring Groups More Than Allowed

The user can delete one of the previously created groups and create the new one.

The user has to create a unique name for the each group. If the user creates a group name with a name currently associated with previous groups, the webpage responds with a message "Group with this name already exist, please change group name".



Response for Configuring Same Group Name

Group (cont'd.)

Modify Previously Created Group
In the group page, a previously created group can also be modified. The user needs to click on "Select Group". From the drop down menu, the concerned group can be selected.

Edit Group
If the user intends to edit the selected group, clicking on "Edit" button will populate the active meters, selected meters and group name for editing purposes.

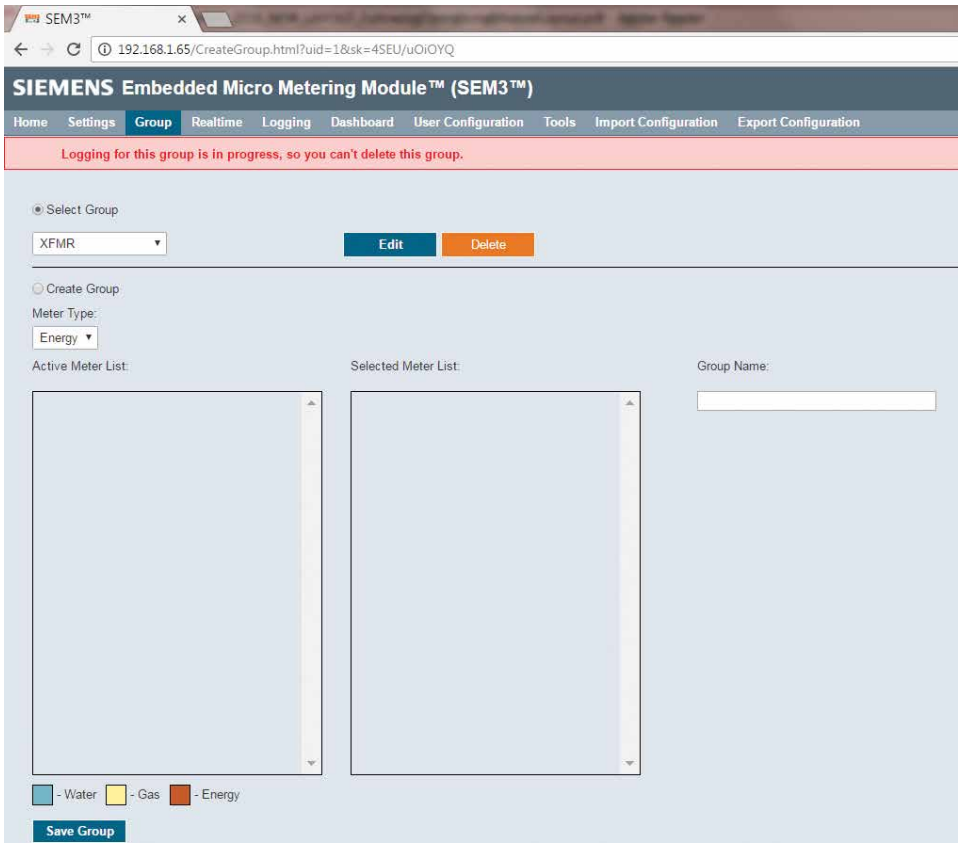
After the editing the group, the user needs to click on "Save Group" to save the new changes.

Delete Group
If the user wants to delete the selected group, clicking on "Delete" button will delete the group. A follow-up message appears requesting confirmation of the action.

If the user intends to delete the group, the user needs to click on "Yes". A webpage response confirming the delete is returned.

If the user does not intend to delete the group, the user needs to click on "No". No additional response occurs.

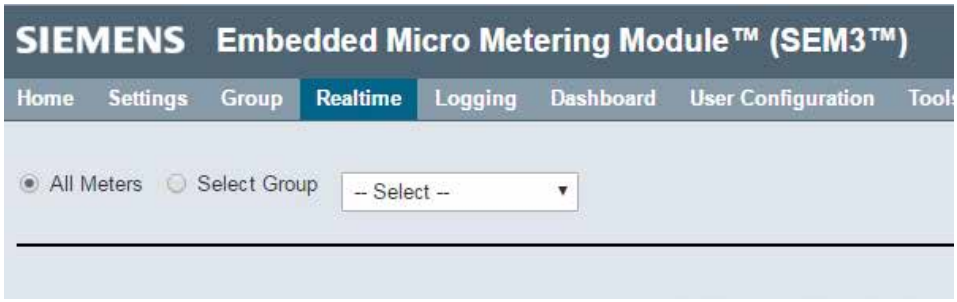
Additionally if a group is previously enabled for group logging, the user cannot delete the group until the logging is disabled. If the user tries to delete a group involved in active logging, the webpage responds with an error message "Logging for this group is in progress, so you can't delete this group".



Response for Deleting a Group Involved in Active Logging

Real Time

Real Time
The user can navigate to the real time page by clicking on the navigation bar link for “Real Time”.



Navigation to Real Time Page

The real time page provides the following:

a. A display screen that allows user to view specific parameter values for all connected and communicating meters. The user can see the parameter values of all meters which are part of specific groups. The summary of system energy usage is shown in this page as well.

b. The page shows the navigation bar in the top of the page.

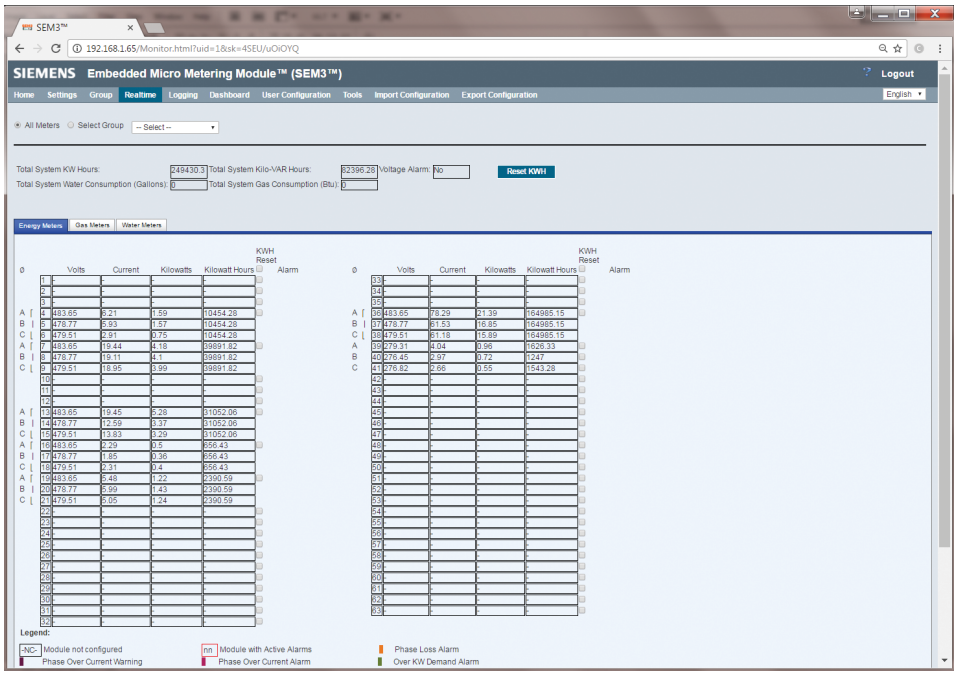
c. The logout link identified by a Logout text on the top right corner.

d. There is a help link identified by a question mark (?) on the left of the Logout text.

e. The drop down menu for different translated languages is provided underneath the logout text.

By default the “All Meters” option is chosen. The real time update/refresh time period is defined by the ‘Real Time’ refresh interval under Web Settings in the System Settings page. The time period is defined as a parameter in seconds with a range between 10 – 900 seconds. Additionally the resolution of the meter value decimal points is defined by the Decimal accuracy under Web Settings in the System Settings page. The decimal accuracy is configurable parameter with a value between 0 – 4.

The real time page shows the constantly updated information for all configured and responding modules. The real time page shows several basic information for all meters by default and if chosen for grouped meters.



Real Time Page

Real Time (cont'd.)

System Energy Usage Summary
At the top section, the system energy usage summary parameters are displayed for ease of viewing. The following table details the information that are shown.

Adjacent to the summary of energy usage values, there is a user input button to Reset kWh. This button is used to clear the kWh accumulation values for selected meters. Underneath the summary of energy usage values, a grid of table listing shows specific relevant information for energy meters, gas meters and water meters. The user can navigate between the different types of meters by clicking on the corresponding buttons. The active table is highlighted to show the relevant meter type.

System Energy Usage summary parameters	Values
Total System kilo Watt Hours	Summation of all meter module kWh values which are set to accumulate energy.
Total System kilo – VAR hours	Summation of all meter module kVARh values which are set to accumulate energy
Voltage Alarm	Set to "No" for no active voltage alarm.
Set to "Under" for under voltage alarm.	
Set to "Over" for over voltage alarm.	
Total System Water consumption	Summation of all configured water meter consumption values in Gallons
Total System Gas consumption	Summation of all configured gas meter consumption values in Btu

System Energy Usage Consumption Summary

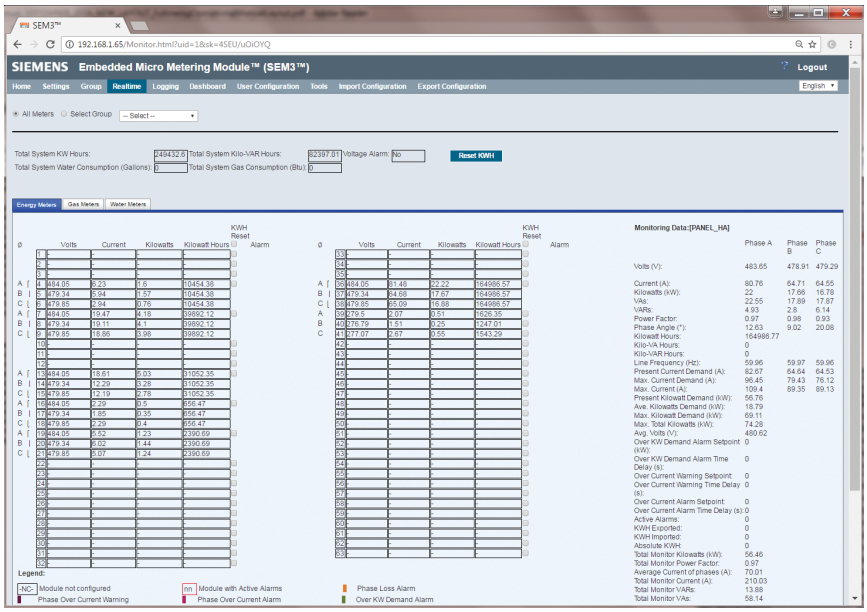
Energy Meter Consumption
A summary of the basic parameters of the energy meters connected to the system controller is shown under the energy meter consumption grid. If the meters are connected to the controller but have not been configured in the Meter module configuration page, the values are displayed as –NC-. For the Energy Meters, the following information shown are in the table.

Energy Meter consumption summary parameters	Values
Volts	Line Voltage (Line to neutral for single phase/ Line to Line for multi-phase meter configurations) in volts
Current	Current in amperes
Kilowatts	Kilowatts in kW
Kilowatt Hours	Kilowatt hours in kWh
Phase configuration of meters	For multi-phase configuration, there is a visual diagram showing the multiple meters which are part of the multi-phase.
Phase selection	Meter module phase selection as per the physical selection by the user (A, B or C)
kWh reset check box	A check box for allowing user input to reset the kWh for specific or multiple meter modules.
Alarms	This location shows the color coded alarm boxes to signify the presence of specific alarms. - Phase loss alarm - Phase over current warning - Phase over current alarm - Over kW demand alarm

Energy Meter Consumption Summary Parameters

Real Time (cont'd.)

When the individual meter module grid is selected by the user an additional expanded view of meter module parameters are displayed on the right side of the page.



Real Time Page Expanded View

The parameters which are viewable in the expanded view are shown in the table to the right.

The clearing of alarms are discussed in a section below. The clearing of the kWh values are discussed in a section below.

Energy Meter consumption parameters	Values
Volts	Line Voltage (Line to neutral for single phase/ Line to Line for multi-phase meter configurations) in volts
Current	Current in amperes
Kilowatts	Kilowatts in kW
Volt-Amperes	Volt-Amperes in VA
Volt-Amperes reactive	Volt-Amperes reactive in var.
Power factor	Power factor displayed as a value between -1 to 1.
Phase angle	Phase angle in degrees (º)
Kilowatt Hours	Kilowatt hours in kWh
Kilo-VA hours	Kilo volt-amperes in kVAh
Kilo-VAR hours	Kilo volt-ampere reactive in kVARh
Line frequency	Line frequency in Hz
Present Current Demand	Present current demand in amperes
Max current demand	Maximum current demand in amperes
Max current	Maximum current in amperes
Present Kilowatt Demand	Present kilowatt demand in kW
Ave. Kilowatt Demand	Average kilowatt demand in kW
Max. Kilowatt Demand	Maximum kilowatt demand in kW
Max. Total Kilowatts	Maximum total kilowatts in kW
Avg. Volts	Average voltage in volts
Over kW Demand Alarm Setpoint	Over kW Demand alarm setpoint in kW
Over kW Demand Alarm Time Delay	Over kW Demand alarm time delay in seconds
Over Current warning setpoint	Over current warning setpoint in %
Over Current warning time delay	Over current warning time delay in seconds
Over Current alarm setpoint	Over current alarm setpoint in %

Continued on next page

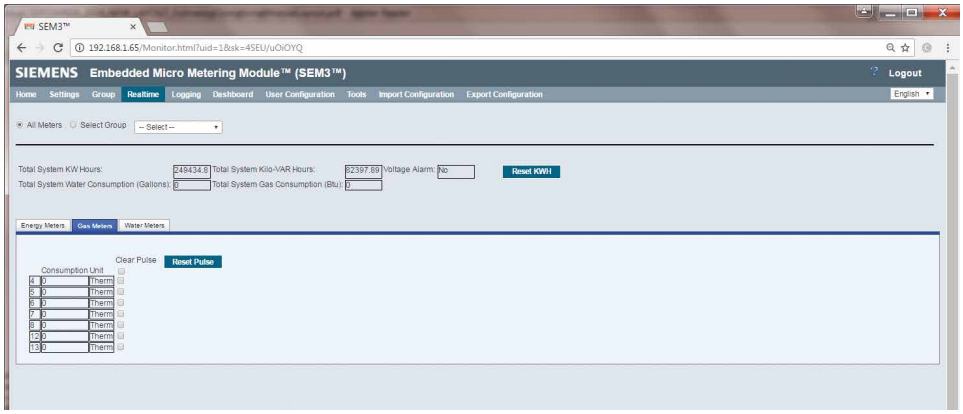
Real Time (cont'd.)

Energy Meter consumption parameters	Values
Over Current alarm time delay	Over current alarm time delay in seconds
Active alarms	Active alarms in bit field values
kWh exported	Exported energy values in kWh
kWh imported	Imported energy values in kWh
Absolute kWh	Absolute kWh values (summation of the absolute values of the kWh exported and imported)
Total Monitor kilowatts	Total monitor kilowatts in kW
Total Monitor Power factor	Total monitor power factor
Average current of phases	Average current of phases in amperes
Total monitor current	Total monitor current in amperes
Total monitor VARs	Total monitor volt-ampere reactive in var
Total monitor VAs	Total monitor volt-ampere in va
Alarm data	Shows the individual alarm per phase for the meter module for the following alarms. - Phase loss alarm - Phase over current warning - Phase over current alarm - Over kW demand alarm

Energy Meter Expanded View Parameters

Gas Meter Consumption
If the user clicks on the navigation link for Gas meters, the configured Gas Meters are displayed. The grid shows the consumption of the configured gas meters in configured units. The configuration of the gas meters is performed in the water/gas meter selection page. The units are configured in the Water/Gas configuration page.

Next to the configured meter display there is a check box for clearing the pulse counts. The resetting of the pulse counts is discussed in a section below.

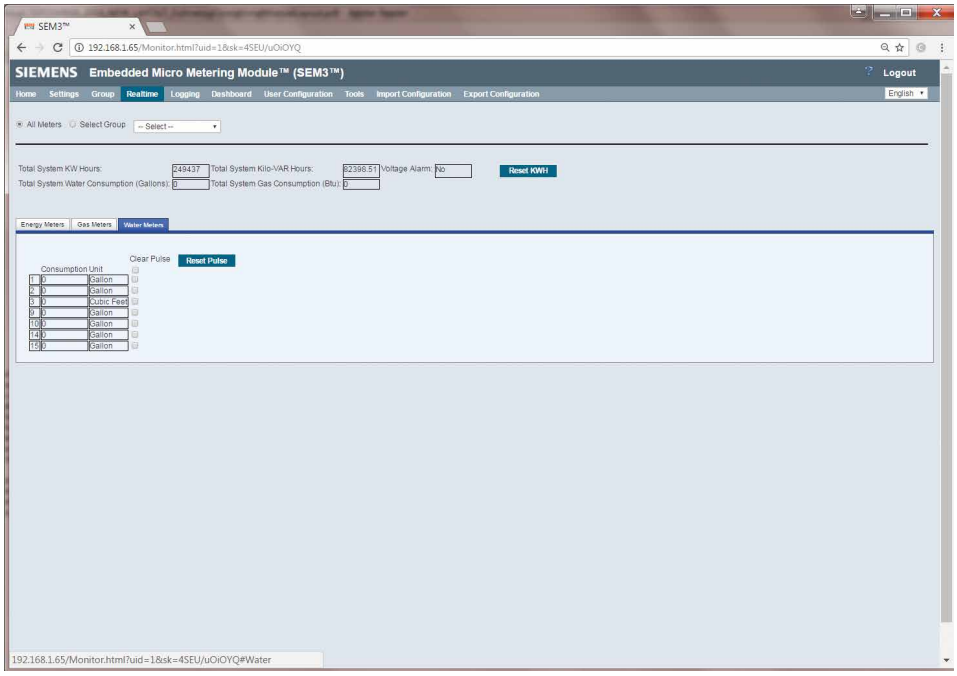


Gas Meter Real Time Page

Real Time (cont'd.)

Water Meter Consumption
If the user clicks on the navigation link for Water meters, the configured Water meters are displayed. The grid shows the consumption of the configured water meters in configured units. The configuration of the water meters is performed in the water/gas meter selection page. The units are configured in the water/gas configuration page.

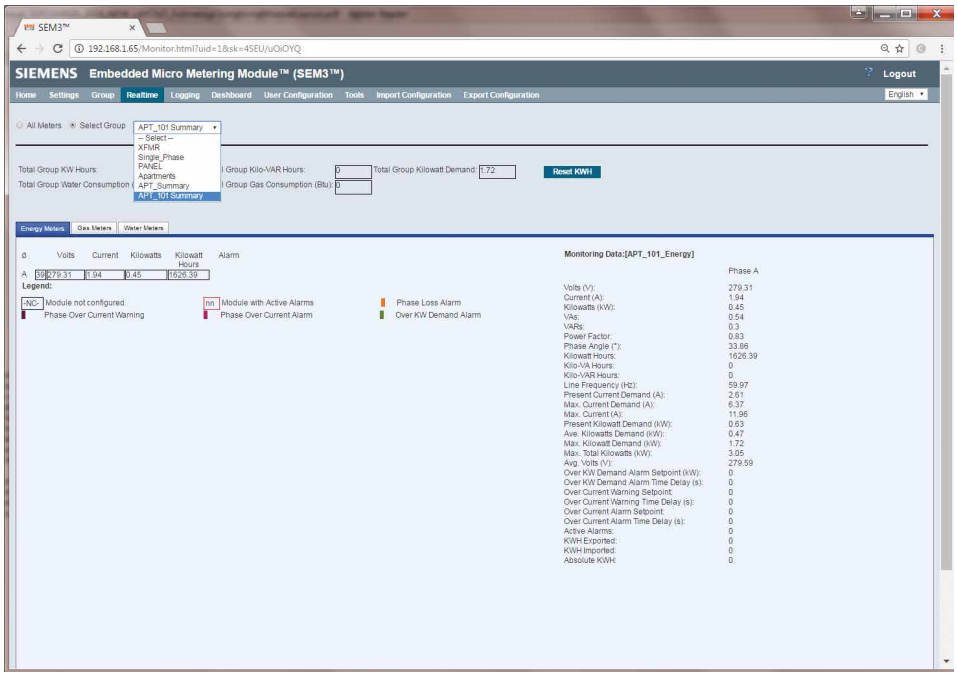
Next to the configured meter display there is a check box for clearing the pulse counts. The resetting of the pulse counts is discussed in a section below.



Water Meter Real Time page

Group Meter Data
The real time page display shows the information for all meters by default. If the user wants to see the relevant information for a particular grouped meter the following steps are to be followed.

The user needs to select "Select Group" as the selection on the top of the page. After the group selection, the user has to select an active group from the drop down menu. If no groups are available, the user can not invoke a display for a group.

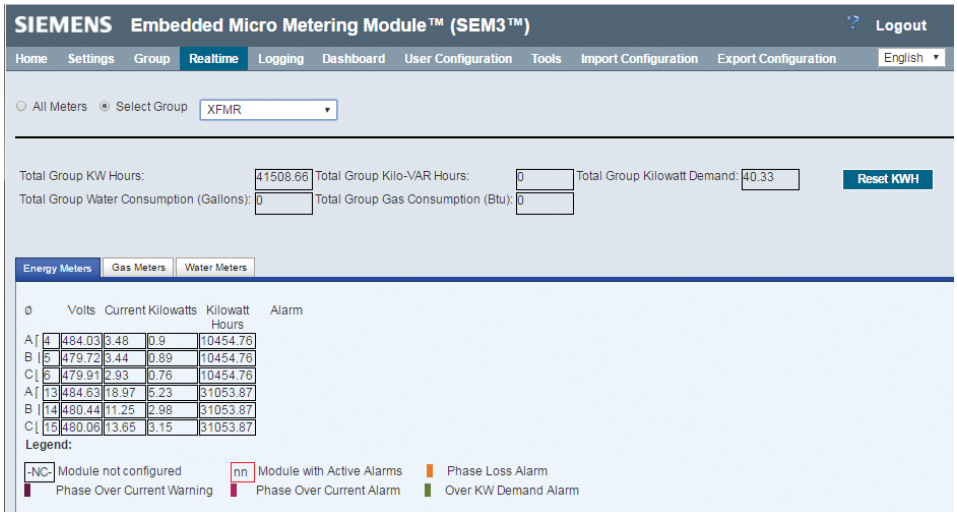


Selection of Group Meter Display in Real Time Page

Real Time (cont'd.)

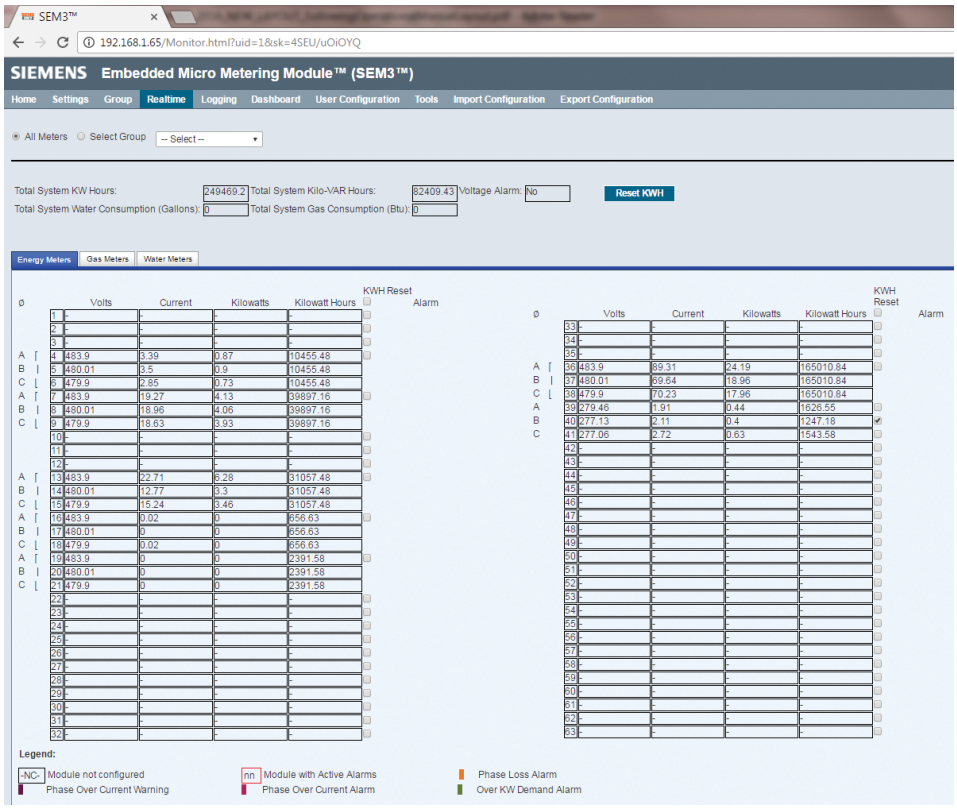
Once the user selects a valid group, the corresponding meters which are part of the configured group are displayed. The display parameters are similar to the individual meters. The main difference is that in group meter display, the reset kilowatt hour feature applies to all the meters in the group.

Similarly under the group data display feature, the user can navigate to the Gas meters or Water meters to view the display of data from the configured meters which are part of the concerned group.



Group Meter Real Time Page

Clearing of kWh
The user can clear the kWh reading values in Supervisor mode. To clear the kWh reading for individual meter, the user needs to select the checkbox for the particular meter module.



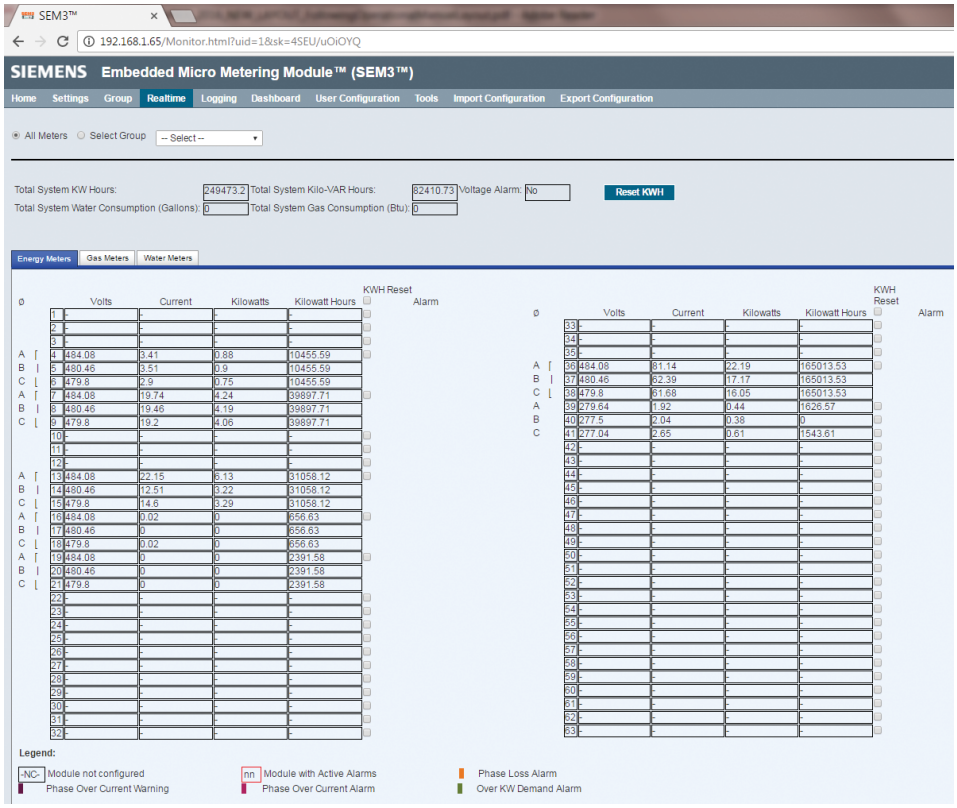
Clearing Individual Meter kWh

Real Time (cont'd.)

The user needs to click on Reset kWh to clear the kWh reading for the corresponding meter.

If the user intends to clear all the kWh values for all connected meters, the check box under neath the KWH reset can be checked, which will automatically put check boxes on all the meters of the corresponding column. The user can choose to check the check box for the neighboring column as well. Once all the meters which need to have their kWh reset, have been selected, the user can reset the kWh by clicking on the Reset KWH button.

In case of a group meter data, as previously described, clicking on Reset KWH will reset the energy calculated by the corresponding meter modules part of the group.

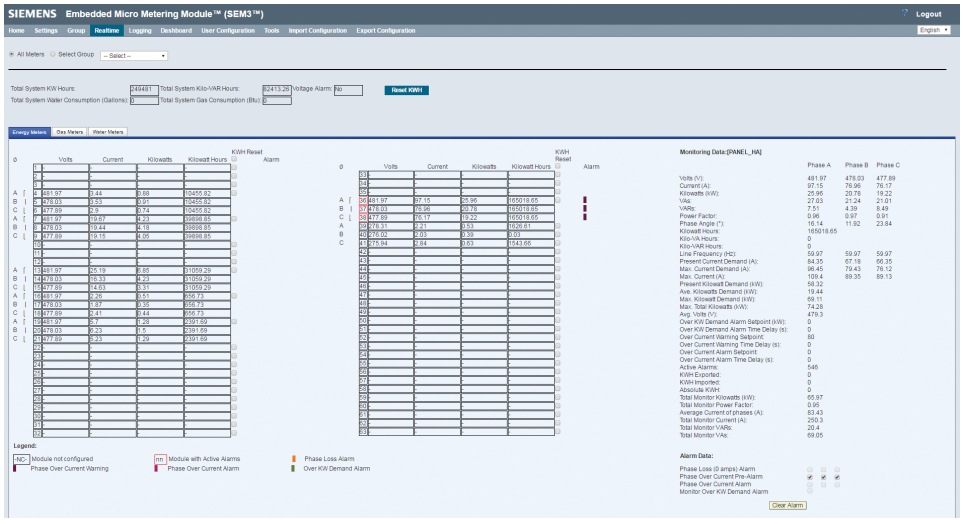


Cleared kWh in Real Time Page

Clearing of Alarm Data

The alarm data is shown as part of the expanded view of the meter modules. In this case the user can get a summary of the alarm conditions present for the concerned meter.

The user can get a snapshot of alarm conditions currently seen by the respective meter. If the user wants to acknowledge the alarms, he can do so by clicking on the Clear Alarm button. Clicking on clear alarm button clears the current registered alarms for the meter.



Alarm Conditions in Expanded View

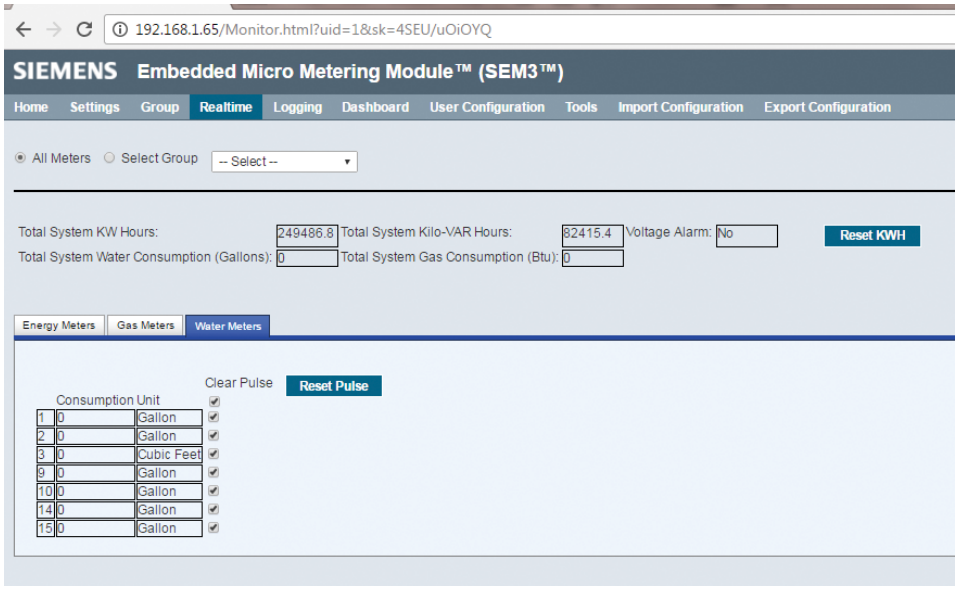
Real Time (cont'd.)

Resetting of Water and Gas Pulses
The user can also reset the water and gas pulses registered with the controller. On the gas or water meter consumption summary page check boxes are present next to the meter details. If the user chooses to select individual meters for resetting of pulses, the corresponding check box needs to be selected. After selecting the particular check box, the user needs to click on "Reset Pulse" button to clear the pulses for the respective meter.

The user can get a snapshot of alarm conditions currently seen by the respective meter. If the user wants to acknowledge the alarms, he can do so by clicking on the Clear Alarm button. Clicking on clear alarm button clears the current registered alarms for the meter.

Resetting of Water and Gas Pulses
The user can also reset the water and gas pulses registered with the controller. On the gas or water meter consumption summary page check boxes are present next to the meter details. If the user chooses to select individual meters for resetting of pulses, the corresponding check box needs to be selected. After selecting the particular check box, the user needs to click on "Reset Pulse" button to clear the pulses for the respective meter.

If the user chooses to reset the pulses of all meters, check box underneath Clear pulse needs to be checked. This will cause all check boxes to be populated. After this the user needs to click on Reset Pulse button to clear all the pulses. If the command is sent successfully, the system responds with a message "Pulse reset successfully" and the page refreshes to show the pulses cleared.

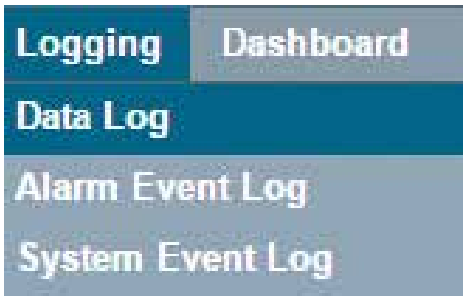


Clearing of Water Meter Pulses

Logging

The logging features enable the ability for the user to create logs of data related to individual meters and also groups of meters. The logs can be tailored to the specific requirements of the users pertaining to the parameters logged , the periodicity of the logs, how long the log needs to be active and also configuring the logs to be emailed to specific users. The group logs are arranged with color coding to highlight a group name and log name.

Data Log
The user can navigate to the Data Logging page by hovering or clicking the mouse on the "Logging" navigation link.



Navigating to Data Logging page

A drop down menu will appear which will show "Data Log" as a selection. Clicking on this selection will show the relevant webpage.

The data log page provides the following:

a. The page allows user to log metering data based on various configuration. User will be able to configure maximum 16 data logs based on particular application.

b. The page shows the navigation bar in the top of the page.

c. The logout link identified by a Logout text on the top right corner.

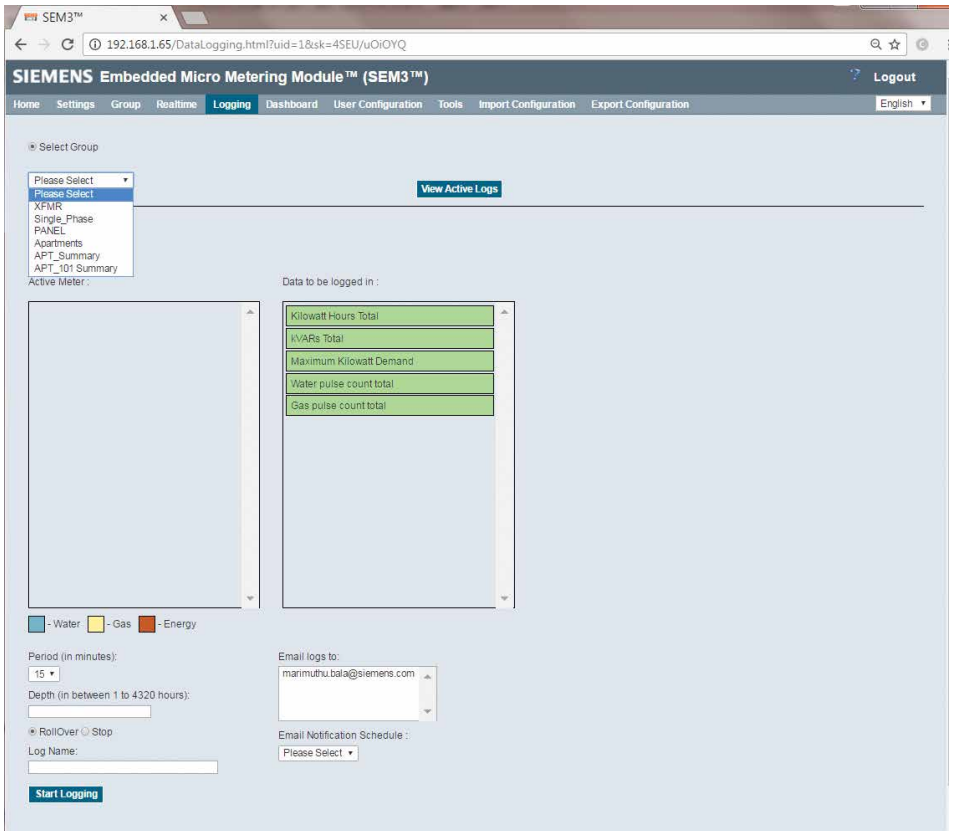
d. There is a help link identified by a question mark (?) on the left of the Logout text.

e. The drop down menu for different translated languages is provided.

Once data log is enabled, the SEM3 controller periodically writes the values of specific data points to files on the SDIO card. User can download and delete data logs if required. The data log files are stored under the DataLog directory in the SD card.

By default the Select Group radio button is selected. A drop down menu is available for the user to select previously created Groups.

Creating Group Data Log
To create a group data log, the user has to ensure the radio button next to Select Group is selected. From the drop down menu, the user can select previously created groups. Selecting a particular group causes the individual meters which are part of the group to be populated in the Active meter column.



Selection of Group in Data Log Configuration

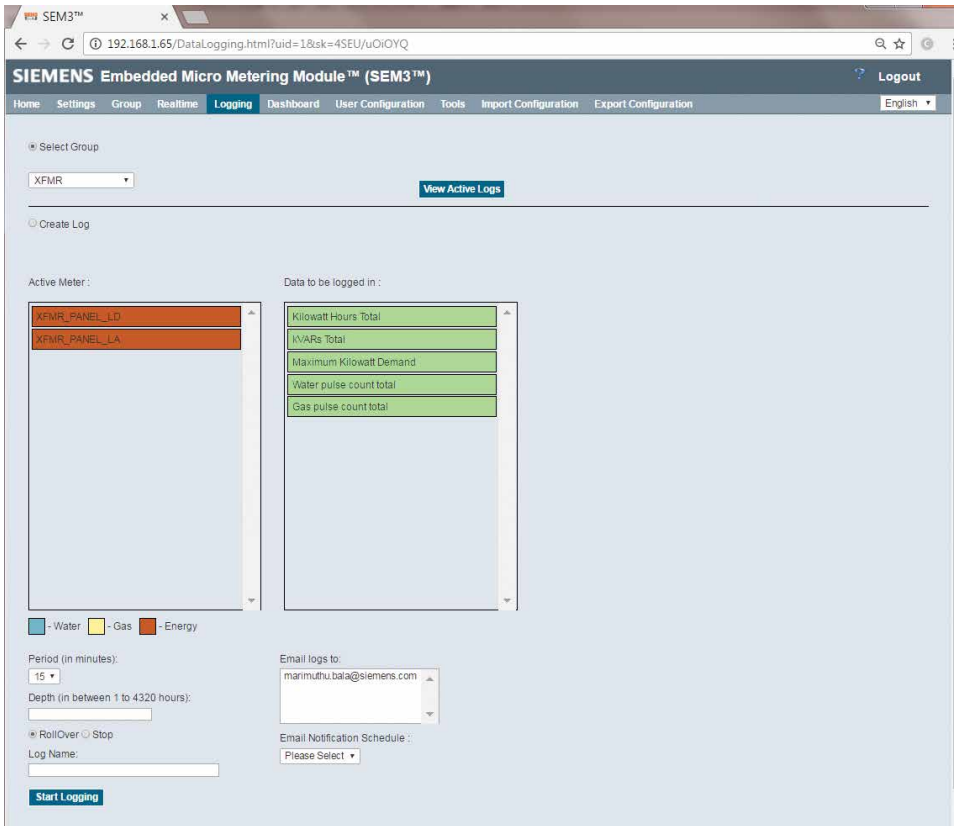
Logging (cont'd.)

Group Data Log Parameters	Values
Data to be logged in	Fixed - Kilowatt Hours Total, - kVARs Total, - Maximum Kilowatt Demand, - Water pulse count total, - Gas pulse count total.
Period (in minutes)	Interval during which log will be captured. Configurable - 1, - 5, - 10, - 15, - 20, - 30, - 60. Default: 15 minutes
Depth (in between 1 to 4320 hours)	How much time [in hours] or elements [in lines] will the log capture. User input field. Default: blank
End of period effect	Radio button selection of Rollover or Stop. If rollover is selected, the log will start capturing information from the first line, after the depth criteria (hours/lines) is met. If stop is selected, the log will stop capturing information after the depth criteria (hours/lines) is met. Default: Rollover
Log Name	User input field. Default: blank
Email Logs to (Optional)	Email address to whom the notification logs are to be sent. Configurable selection of email address of configured users for the SEM3 controller with valid emails. Default: No selection.
Email Notification Schedule (Optional)	Configurable - Every Day, - Every Week, - Every Month. Default: No selection.
Schedule Notification time/day/date (Optional)	Once the Email notification schedule is selected, the schedule notification time is accordingly populated. By default: not shown. If user selects Every day as the schedule, the Daily schedule notification time shows 00 – 23 hours. If user selects Every Week as the schedule, the Weekly schedule notification day shows Sunday – Saturday. If user selects Every Month as the schedule, the Monthly schedule notification date shows 01 – 30 days. The last day (30 day) selection will cause the data to be sent on the last day for the month.

Group Data log points

Logging (cont'd.)

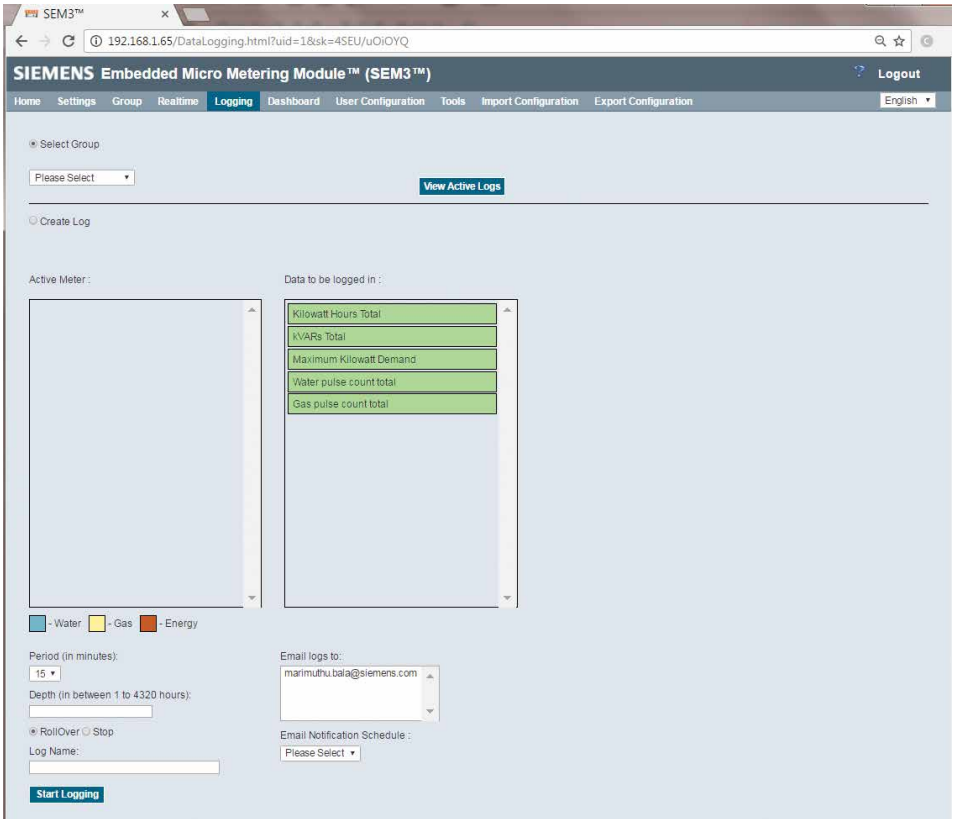
The user can further choose the period, depth, end of period effect, log name, email address to send the logs to, email notification schedule and time for the data log. The user can save the configuration to complete the creation of the Group data log by clicking on "Start Logging" button. After the SEM3 controller successfully saves the information, the message from the system returns "Log saved successfully".



Group Data Log Configuration

Viewing Active Data Logs

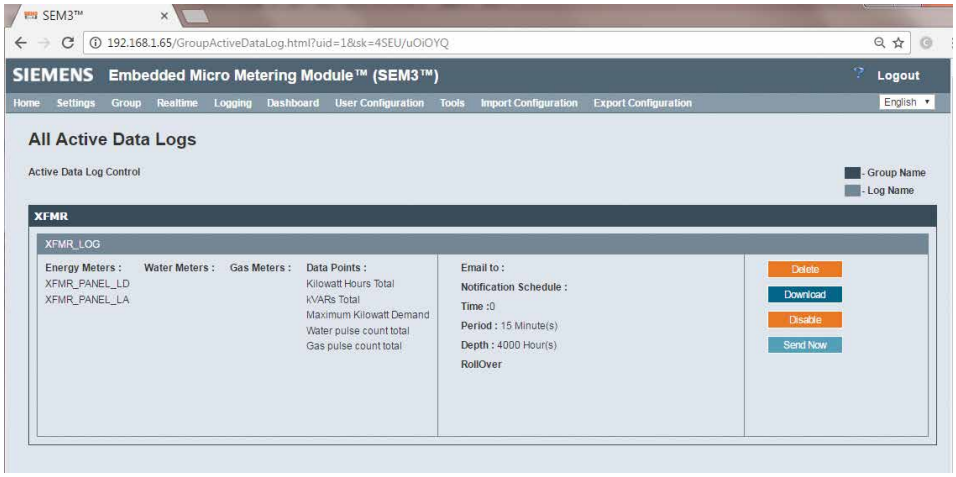
The user can view the Active group Data logs by clicking on View Active Logs if the radio selection button is set for Select Group.



View Active Group Logs

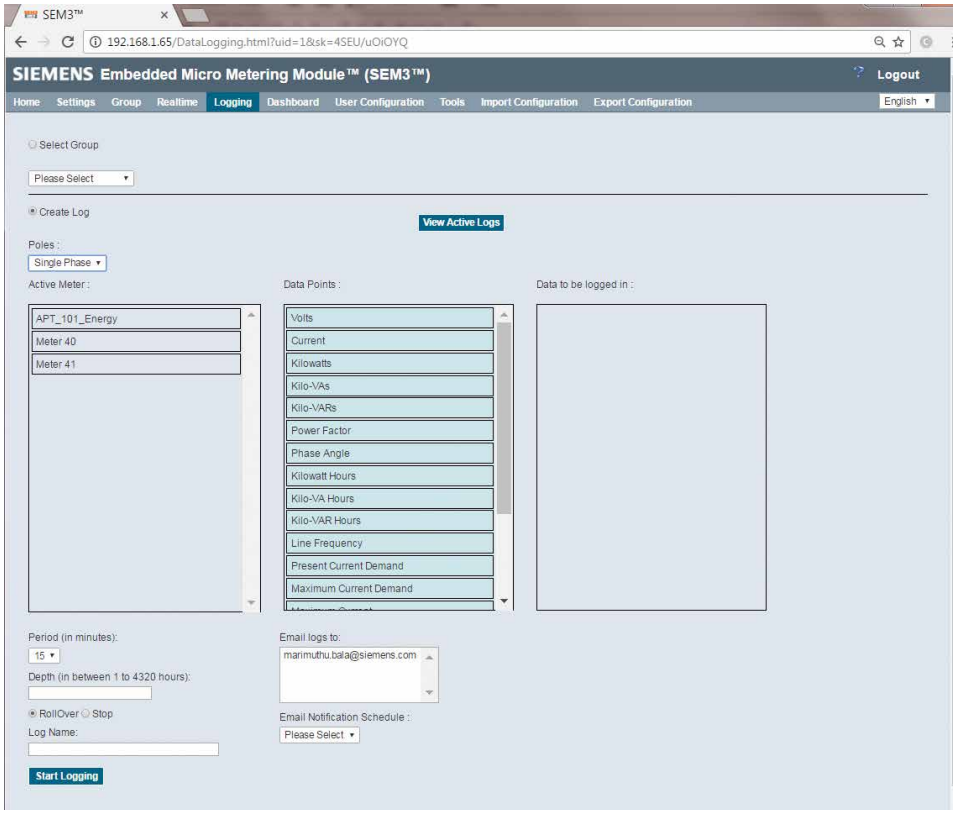
Logging (cont'd.)

The Active Group Data logs page shows the active logs for the configured groups. The user has the option to Delete a log, Download a log as a csv file to connected computer, Disable the log, Send the log to the configured user immediately. The group name and log name are highlighted by separate colors.



Active Group Data Logs

Creating an Individual Meter Data Logs
To create an individual meter data log, the user has to ensure the radio button next to Create Log is selected. From the drop down menu, the user can select either Single/ Two/Three Phase meters. Selecting a phase causes the individual meters which are configured as the respective phases to be populated in the active meter column.



Individual Meter Data Log Configuration

Logging (cont'd.)

Individual Meter Data Log Parameters	Values
Data to be logged in	User configurable. See table below.
Period (in minutes)	Interval during which log will be captured. Configurable [1, 5, 10, 15, 20, 30, 60]. Default: 15 minutes
Depth (in between 1 to 4320 hours)	How much time [in hours] or elements [in lines] will the log capture. User input field. Default: blank
End of period effect	Radio button selection of Rollover or Stop. If rollover is selected, the log will start capturing information from the first line, after the depth criteria (hours/lines) is met. If stop is selected, the log will stop capturing information after the depth criteria (hours/lines) is met. Default: Rollover
Log Name	User input field. Default: blank
Email Logs to (Optional)	Email address to whom the notification logs are to be sent. Configurable selection of email address of configured users for the SEM3 controller with valid emails. Default: No selection.
Email Notification Schedule (Optional)	Configurable [Every Day, Every Week, Every Month]. Default: No selection.
Schedule Notification time/day/date (Optional)	Once the Email notification schedule is selected, the schedule notification time is accordingly populated. By default: not shown. If user selects Every day as the schedule, the Daily schedule notification time shows 00 – 23 hours. If user selects Every Week as the schedule, the Weekly schedule notification day shows Sunday – Saturday. If user selects Every Month as the schedule, the Monthly schedule notification date shows 01 – 30 days. The last day (30 day) selection will cause the data to be sent on the last day for the month.

Individual Meter Data Log Points

Logging (cont'd.)

The user can further choose the data log parameters, period, depth, end of period effect, log name, email address to send the logs to, email notification schedule and time for the data log. The user can save the configuration to complete the creation of the Individual meter data log by clicking on "Start Logging" button. After the SEM3 controller successfully saves the information, the message from the system returns "Log saved successfully".

Single Phase	Two Phase	Three Phase
Volts	Volts Phase 1	Volts Phase 1
	Volts Phase 2	Volts Phase 2
		Volts Phase 3
Current	Current Phase 1	Current Phase 1
	Current Phase 2	Current Phase 2
		Current Phase 3
Kilowatts	Kilowatts Phase 1	Kilowatts Phase 1
	Kilowatts Phase 2	Kilowatts Phase 2
		Kilowatts Phase 3
Kilo-VAs	Kilo-VAs Phase 1	Kilo-VAs Phase 1
	Kilo-VAs Phase 2	Kilo-VAs Phase 2
		Kilo-VAs Phase 3
Kilo-VARs	Kilo-VARs Phase 1	Kilo-VARs Phase 1
	Kilo-VARs Phase 2	Kilo-VARs Phase 2
		Kilo-VARs Phase 3
Power Factor	Power Factor Phase 1	Power Factor Phase 1
	Power Factor Phase 2	Power Factor Phase 2
		Power Factor Phase 3
Phase Angle	Phase Angle Phase 1	Phase Angle Phase 1
	Phase Angle Phase 2	Phase Angle Phase 2
		Phase Angle Phase 3
Kilowatt Hours	Kilowatt Hours	Kilowatt Hours
Kilo-VA Hours	Kilo-VA Hours	Kilo-VA Hours
Kilo-VAR Hours	Kilo-VAR Hours	Kilo-VAR Hours
Line Frequency	Line Frequency Phase 1	Line Frequency Phase 1
	Line Frequency Phase 2	Line Frequency Phase 2
		Line Frequency Phase 3
Present Current Demand	Present Current Demand Phase 1	Present Current Demand Phase 1
	Present Current Demand Phase 2	Present Current Demand Phase 2
		Present Current Demand Phase 3
Maximum Current Demand	Maximum Current Demand Phase 1	Maximum Current Demand Phase 1
	Maximum Current Demand Phase 2	Maximum Current Demand Phase 2
		Maximum Current Demand Phase 3
Maximum Current	Maximum Current Phase 1	Maximum Current Phase 1
	Maximum Current Phase 2	Maximum Current Phase 2
		Maximum Current Phase 3
Present Kilowatt Demand	Present Kilowatt Total Demand	Present Kilowatt Total Demand
Average Kilowatt Demand	Average Kilowatts Total Demand	Average Kilowatts Total Demand
Maximum Kilowatt Demand	Maximum Total Kilowatts Demand	Maximum Total Kilowatts Demand
Maximum Total Kilowatts	Maximum Total Kilowatts	Maximum Total Kilowatts

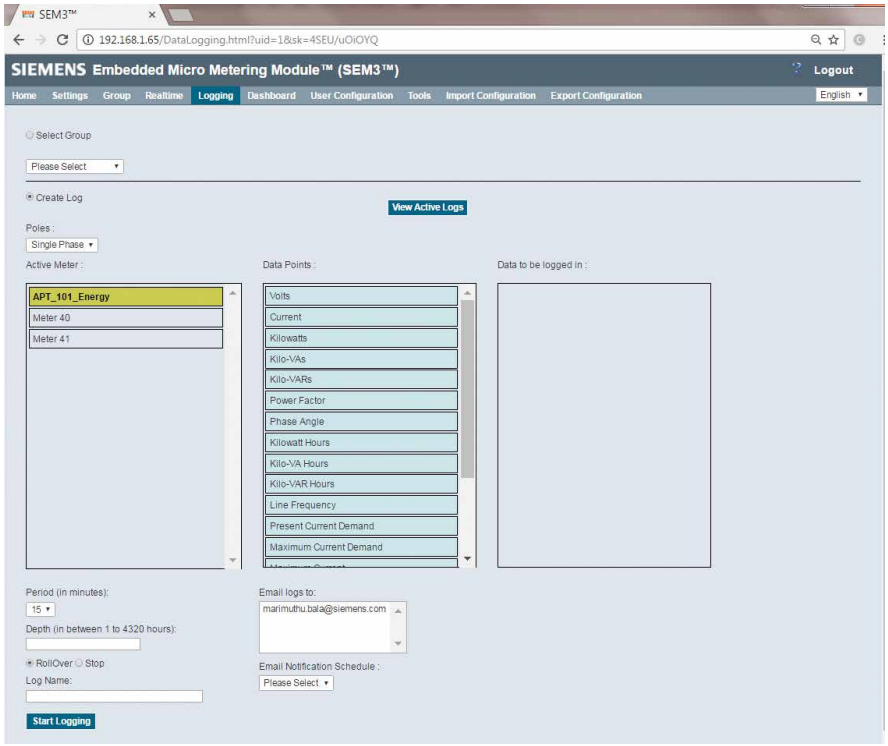
Logging (cont'd.)

Single Phase	Two Phase	Three Phase
Average Volts	Average Volts	Average Volts
	Total Monitor Kilowatts	Total Monitor Kilowatts
	Total Monitor Power Factor	Total Monitor Power Factor
	Average Current of 2 phases	Average Current of 3 phases
	Total Monitor current	Total Monitor current
	Total Monitor Kilo-VARs	Total Monitor Kilo-VARs
	Total Monitor Kilo-VAs	Total Monitor Kilo-VAs

Parameters Available for Individual Meter Data Log Configuration

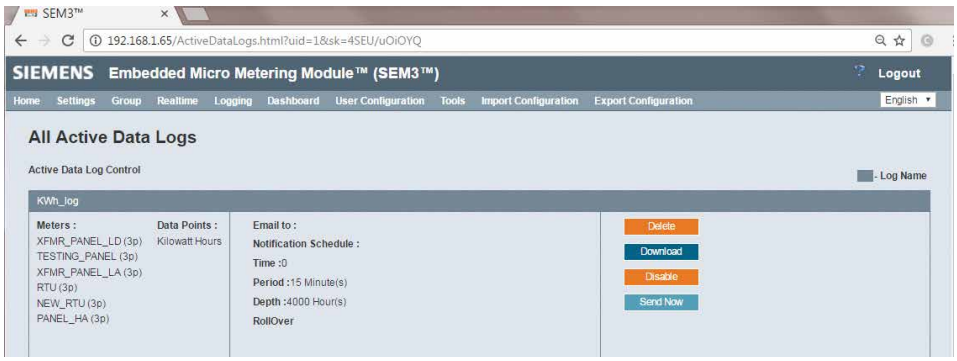
Viewing Active Individual Meter Data Logs

The user can view the Active Individual Data logs by clicking on View Active Logs if the radio selection button is set for Create Log.



View Active Individual Meter Data Logs

The Active Individual Data logs page shows the active logs for the configured meters. The user has the option to Delete a log, Download a log as a csv file to connected computer, Disable the log, send the log to the configured user immediately.

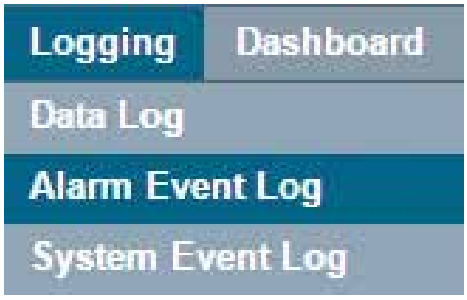


Active Individual Meter Data Logs

SEM3™ Note
At one time, user can configure a maximum of 16 data logs.
The data log name has to be unique.

Logging (cont'd.)

Alarm Event Log
The user can navigate to the Alarm Logging page by hovering or clicking the mouse on the "Logging" navigation link.



Navigating to Alarm Logging page

A drop down menu will appear which will show "Alarm Event Log" as a selection. Clicking on this selection will show the relevant webpage.

The alarm event log page provides the following:

a. The page allows user to log alarms based on various configuration. User will be able to configure maximum 8 alarm event logs based on particular application.

b. The page shows the navigation bar in the top of the page.

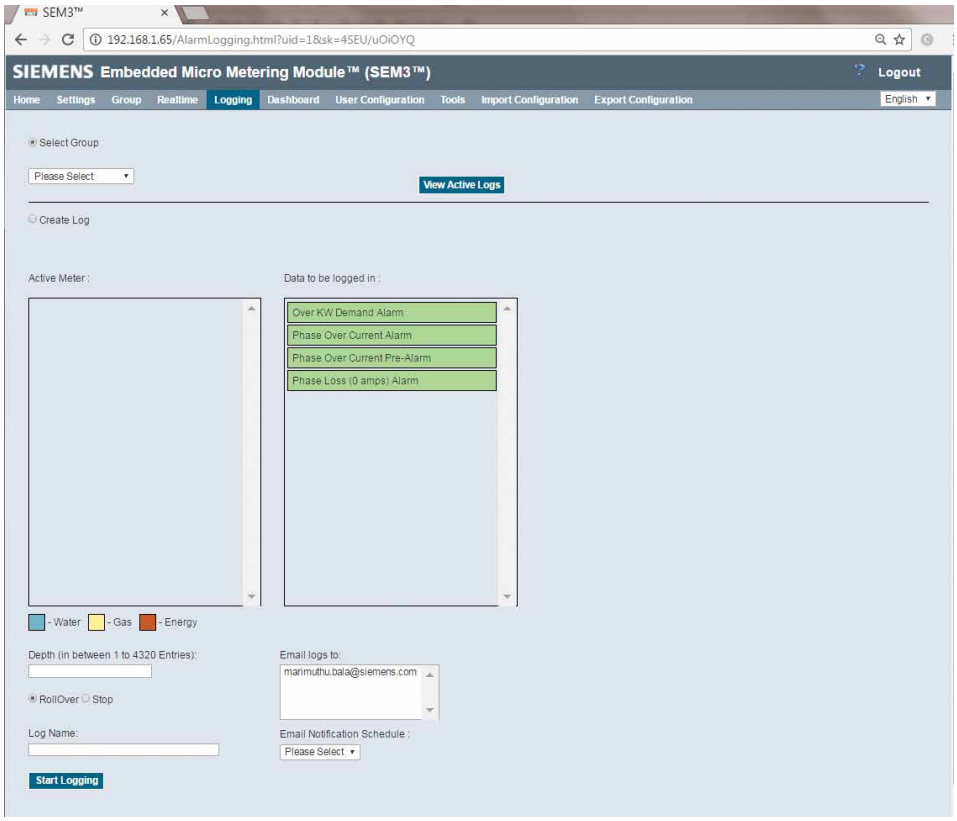
c. The logout link identified by a Logout text on the top right corner.

d. There is a help link identified by a question mark (?) on the left of the Logout text.

e. The drop down menu for different translated languages is provided.

Once alarm log is enabled, the SEM3 controller writes the values of alarm data points when they occur to files on the SDIO card. User can download and delete alarm logs if required. The alarm log files are stored under the AlarmLog directory in the SD card.

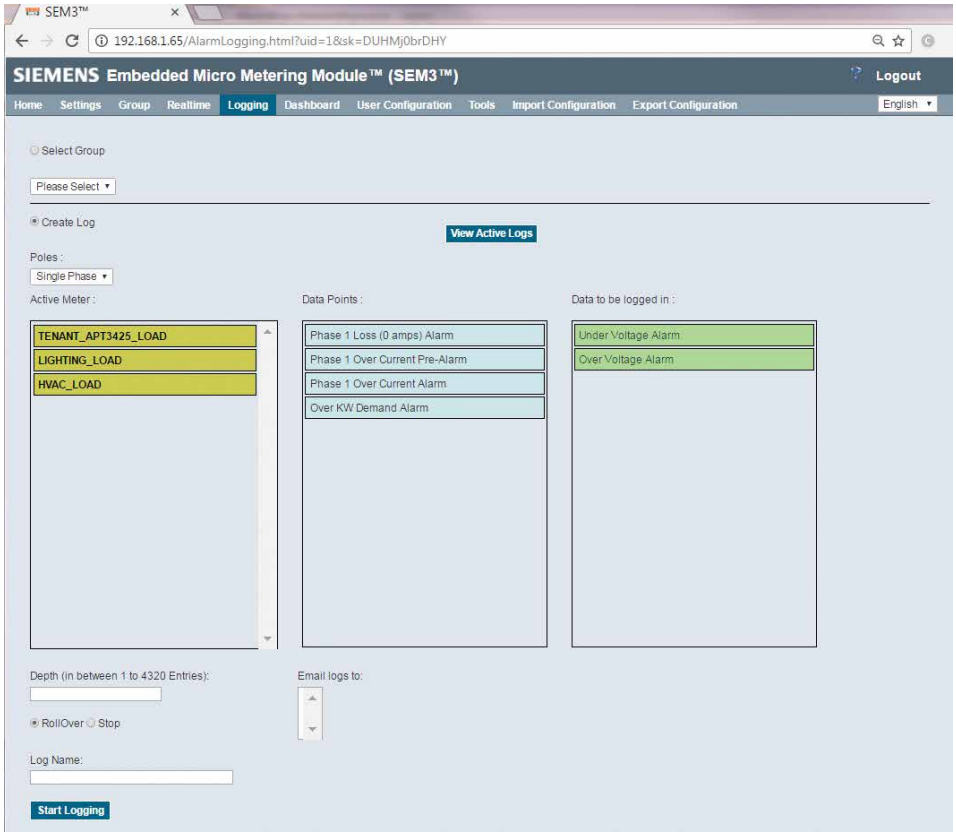
By default the Select Group radio button is selected. A drop down menu is available for the user to select previously created Groups.



Alarm Log Page

Logging (cont'd.)

Creating Group Alarm Event Log
To create a group alarm event log, the user has to ensure the radio button next to Select Group is selected. From the drop down menu, the user can select previously created groups. Selecting a particular group causes the individual meters which are part of the group to be populated in the Active meter column. This activity is similar to the figure shown in the Data log section.



Alarm Event Log Details

Logging (cont'd.)

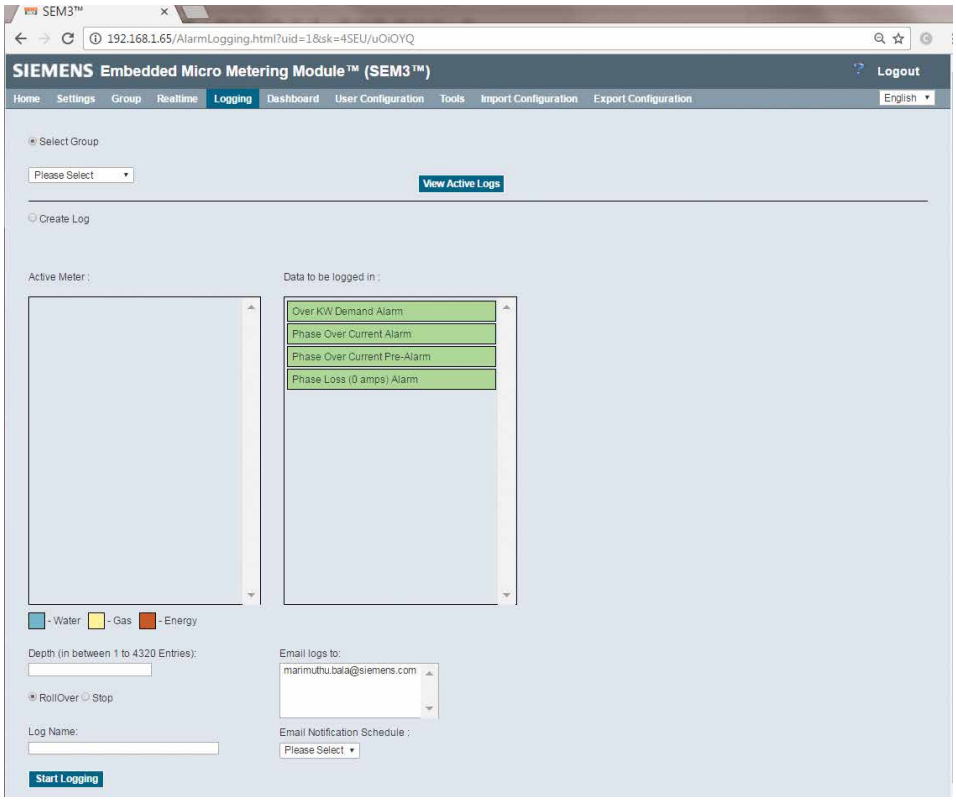
The user can further choose the depth, end of depth effect, log name, email address to send the logs to, email notification schedule and time for the alarm event log. The user can save the configuration to complete the creation of the Group alarm event log by clicking on "Start Logging" button. After the SEM3 controller successfully saves the information, the message from the system returns "Log saved successfully".

Group Alarm Log Parameters	Values
Data to be logged in	Fixed - Over KW Demand Alarm, - Phase Over Current Alarm, - Phase Over Current Pre-Alarm (Warning), - Phase Loss (0 amps) Alarm
Depth (in between 1 to 4320 lines)	How much lines/events/elements [in lines] will the log capture. User input field. Default: blank
End of period effect	Radio button selection of Rollover or Stop. If rollover is selected, the log will start capturing information from the first line, after the depth criteria (lines) is met. If stop is selected, the log will stop capturing information after the depth criteria (lines) is met. Default: Rollover
Log Name	User input field. Default: blank
Email Logs to (Optional)	Email address to whom the notification logs are to be sent. Configurable selection of email address of configured users for the SEM3 controller with valid emails. Default: No selection.
Email Notification Schedule (Optional)	Configurable - Every Day, - Every Week, - Every Month. Default: No selection.
Schedule Notification time/day/date (Optional)	Once the Email notification schedule is selected, the schedule notification time is accordingly populated. By default: not shown. If user selects Every day as the schedule, the Daily schedule notification time shows 00 – 23 hours. If user selects Every Week as the schedule, the Weekly schedule notification day shows Sunday – Saturday. If user selects Every Month as the schedule, the Monthly schedule notification date shows 01 – 30 days. The last day (30 day) selection will cause the data to be sent on the last day for the month.

Group Alarm Event Log Points

Logging (cont'd.)

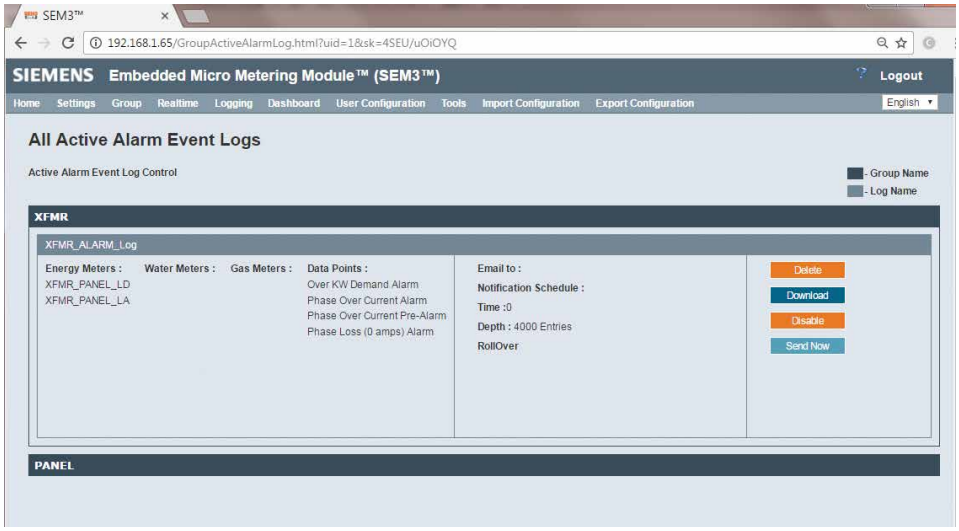
Viewing Active Group Alarm Event Logs
The user can view the Active group alarm event logs by clicking on View Active Logs if the radio selection button is set for Select Group.



View Active Group Alarm Event Logs

The Active Group alarm event logs page shows the active logs for the configured groups. The user has the option to Delete a log, Download a log as a csv file to connected computer, Disable the log, Send the log to the configured user immediately. The group name and log name are highlighted by separate colors.

On the active alarm event log page, the earliest created log is displayed on top with its details shown. If the user intends to view other logs, they can click on the other log names (either group names or log names) to see the details.

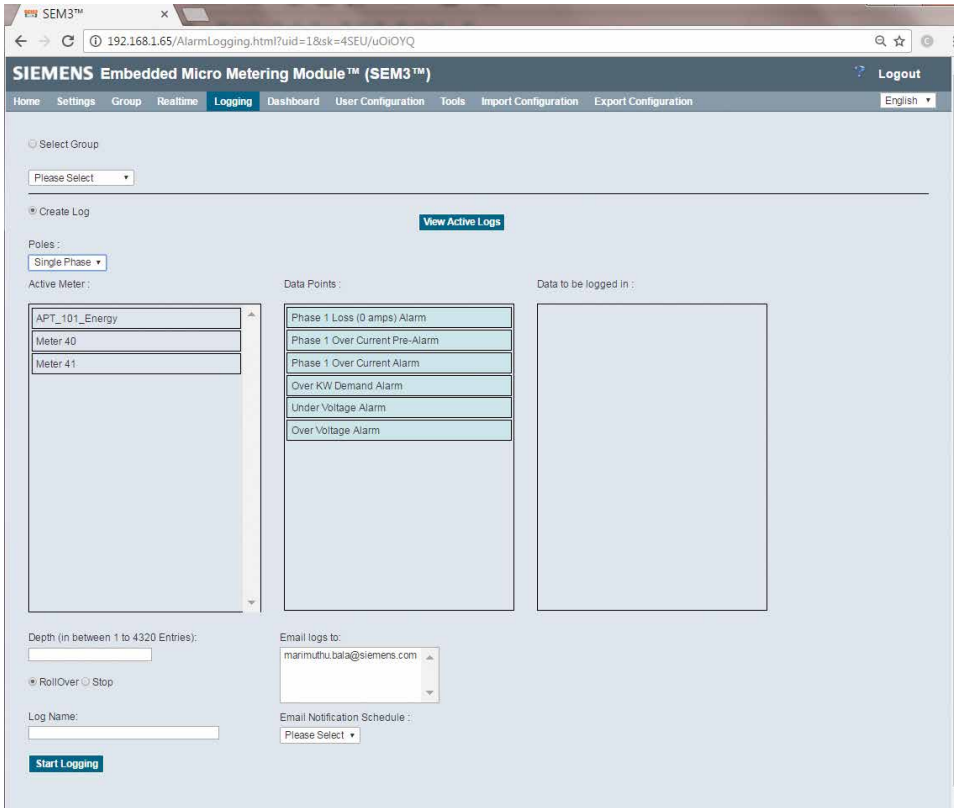


All Active Group Alarm Event Logs

Logging (cont'd.)

Creating an Individual Meter Alarm Event Log

To create an individual meter alarm event log, the user has to ensure the radio button next to Create Log is selected. From the drop down menu, the user can select either Single/Two/Three Phase meters. Selecting a phase causes the individual meters which are configured as the respective phases to be populated in the active meter column.



Individual Meter Alarm Event Log Configuration

Logging (cont'd.)

Individual Meter Data Log Parameters	Values
Data to be logged in	User configurable. See table below.
Depth (in between 1 to 4320 lines)	How many elements [in lines] will the log capture.
User input field. Default: blank	
End of period effect	Radio button selection of Rollover or Stop. If rollover is selected, the log will start capturing information from the first line, after the depth criteria (hours/lines) is met. If stop is selected, the log will stop capturing information after the depth criteria (hours/lines) is met. Default: Rollover
Log Name	User input field. Default: blank
Email Logs to (Optional)	Email address to whom the notification logs are to be sent.
Configurable selection of email address of configured users for the SEM3 controller with valid emails. Default: No selection.	
Email Notification Schedule (Optional)	Configurable Every Day, Every Week, Every Month. Default: No selection.
Schedule Notification time/day/date (Optional)	Once the Email notification schedule is selected, the schedule notification time is accordingly populated. By default: not shown. If user selects Every day as the schedule, the Daily schedule notification time shows 00 – 23 hours. If user selects Every Week as the schedule, the Weekly schedule notification day shows Sunday – Saturday. If user selects Every Month as the schedule, the Monthly schedule notification date shows 01 – 30 days. The last day (30 day) selection will cause the data to be sent on the last day for the month.

Individual Meter Alarm Event Log Points

Logging (cont'd.)

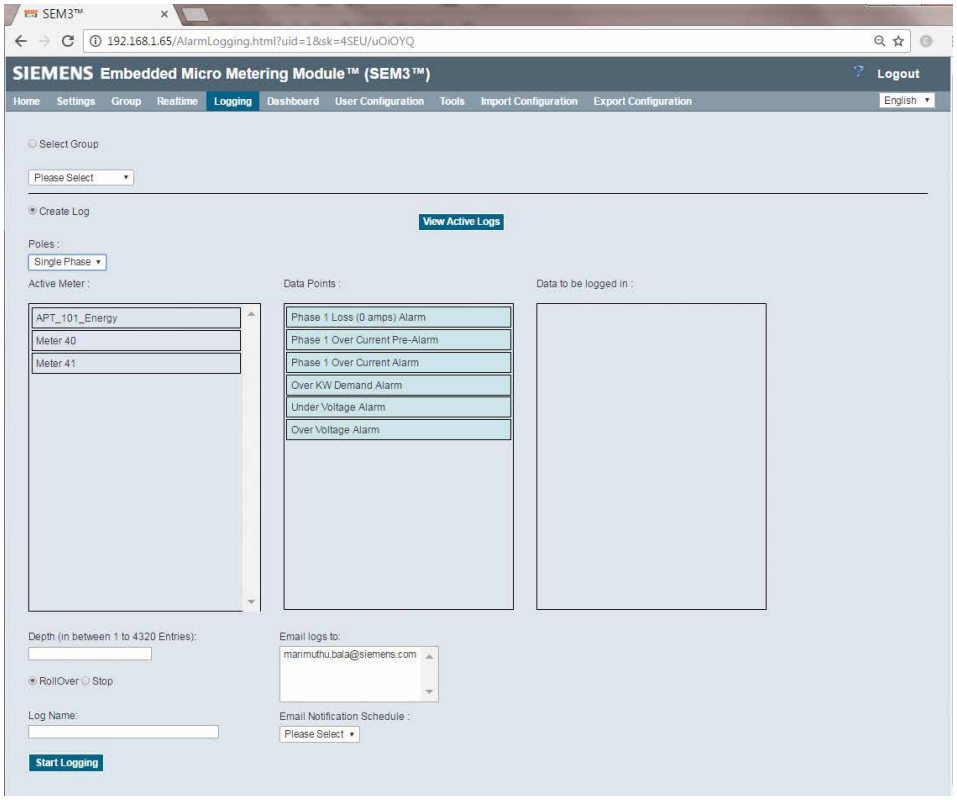
The user can further choose the event log parameters, depth, end of period effect, log name, email address to send the logs to, email notification schedule and time for the data log. The user can save the configuration to complete the creation of the Individual meter alarm event log by clicking on "Start Logging" button. After the SEM3 controller successfully saves the information, the message from the system returns "Log saved successfully".

Single Phase	Two Phase	Three Phase
Phase 1 Loss (0 amps) Alarm	Phase 1 Loss (0 amps) Alarm	Phase 1 Loss (0 amps) Alarm
	Phase 2 Loss (0 amps) Alarm	Phase 2 Loss (0 amps) Alarm
		Phase 3 Loss (0 amps) Alarm
Phase 1 Over Current Pre-Alarm (Warning)	Phase 1 Over Current Pre-Alarm (Warning)	Phase 1 Over Current Pre-Alarm (Warning)
	Phase 2 Over Current Pre-Alarm (Warning)	Phase 2 Over Current Pre-Alarm (Warning)
		Phase 3 Over Current Pre-Alarm (Warning)
Phase 1 Over Current Alarm	Phase 1 Over Current Alarm	Phase 1 Over Current Alarm
	Phase 2 Over Current Alarm	Phase 2 Over Current Alarm
		Phase 3 Over Current Alarm
Over KW Demand Alarm	Over KW Demand Alarm	Over KW Demand Alarm
Under Voltage Alarm	Under Voltage Alarm	Under Voltage Alarm
Over Voltage Alarm	Over Voltage Alarm	Over Voltage Alarm

Parameters Available for Individual Meter Alarm Event Log Configuration

Viewing Active Individual Alarm Event Logs

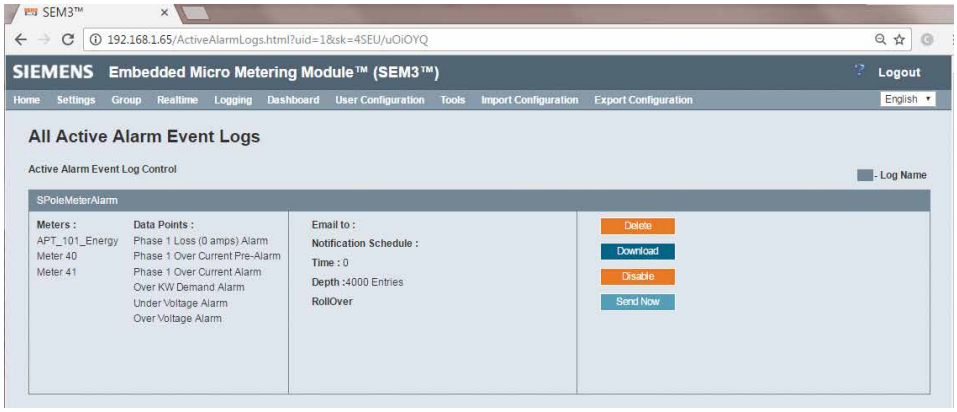
The user can view the Active Individual Alarm Event logs by clicking on View Active Logs if the radio selection button is set for Create Log.



View Active Individual Meter Alarm Logs

Logging (cont'd.)

The Active Individual Data logs page shows the active logs for the configured meters. The user has the option to Delete a log, Download a log as a csv file to connected computer, Disable the log, send the log to the configured user immediately.

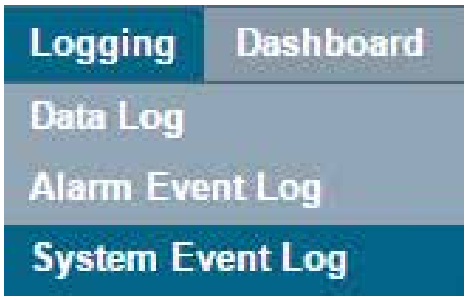


Active Individual Meter Alarm Log

SEM3™ Note
At one time, user can configure a maximum of 8 alarm logs.
The alarm event log name has to be unique.

System Event Log

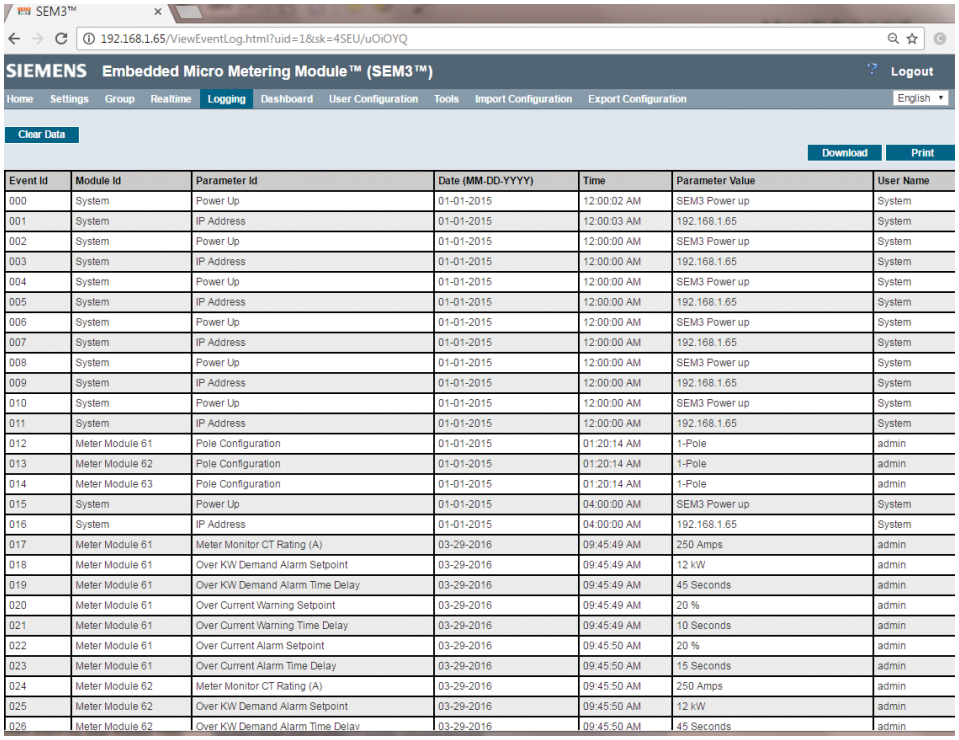
The user can navigate to the System Event Logging page by hovering or clicking the mouse on the "Logging" navigation link.



Navigating to the System Event Logging Page

Logging (cont'd.)

A drop down menu will appear which will show "System Event Log" as a selection. Clicking on this selection will show the relevant webpage.



Event Id	Module Id	Parameter Id	Date (MM-DD-YYYY)	Time	Parameter Value	User Name
000	System	Power Up	01-01-2015	12:00:02 AM	SEM3 Power up	System
001	System	IP Address	01-01-2015	12:00:03 AM	192.168.1.65	System
002	System	Power Up	01-01-2015	12:00:00 AM	SEM3 Power up	System
003	System	IP Address	01-01-2015	12:00:00 AM	192.168.1.65	System
004	System	Power Up	01-01-2015	12:00:00 AM	SEM3 Power up	System
005	System	IP Address	01-01-2015	12:00:00 AM	192.168.1.65	System
006	System	Power Up	01-01-2015	12:00:00 AM	SEM3 Power up	System
007	System	IP Address	01-01-2015	12:00:00 AM	192.168.1.65	System
008	System	Power Up	01-01-2015	12:00:00 AM	SEM3 Power up	System
009	System	IP Address	01-01-2015	12:00:00 AM	192.168.1.65	System
010	System	Power Up	01-01-2015	12:00:00 AM	SEM3 Power up	System
011	System	IP Address	01-01-2015	12:00:00 AM	192.168.1.65	System
012	Meter Module 61	Pole Configuration	01-01-2015	01:20:14 AM	1-Pole	admin
013	Meter Module 62	Pole Configuration	01-01-2015	01:20:14 AM	1-Pole	admin
014	Meter Module 63	Pole Configuration	01-01-2015	01:20:14 AM	1-Pole	admin
015	System	Power Up	01-01-2015	04:00:00 AM	SEM3 Power up	System
016	System	IP Address	01-01-2015	04:00:00 AM	192.168.1.65	System
017	Meter Module 61	Meter Monitor CT Rating (A)	03-29-2016	09:45:49 AM	250 Amps	admin
018	Meter Module 61	Over KW Demand Alarm Setpoint	03-29-2016	09:45:49 AM	12 kW	admin
019	Meter Module 61	Over KW Demand Alarm Time Delay	03-29-2016	09:45:49 AM	45 Seconds	admin
020	Meter Module 61	Over Current Warning Setpoint	03-29-2016	09:45:49 AM	20 %	admin
021	Meter Module 61	Over Current Warning Time Delay	03-29-2016	09:45:49 AM	10 Seconds	admin
022	Meter Module 61	Over Current Alarm Setpoint	03-29-2016	09:45:50 AM	20 %	admin
023	Meter Module 61	Over Current Alarm Time Delay	03-29-2016	09:45:50 AM	15 Seconds	admin
024	Meter Module 62	Meter Monitor CT Rating (A)	03-29-2016	09:45:50 AM	250 Amps	admin
025	Meter Module 62	Over KW Demand Alarm Setpoint	03-29-2016	09:45:50 AM	12 kW	admin
026	Meter Module 62	Over KW Demand Alarm Time Delay	03-29-2016	09:45:50 AM	45 Seconds	admin

System Event Log Page

The system event log page provides the following:

a. The page allows user to view events captured for various configuration. User will able to Clear the recorded data, Download the recorded data to a machine/laptop in csv format, print the recorded data. The latest recorded event is highlighted in yellow.

b. The page shows the navigation bar in the top of the page.

c. The logout link identified by a Logout text on the top right corner.

d. There is a help link identified by a question mark (?) on the left of the Logout text.

e. The drop down menu for different translated languages is provided.

The system event log file is stored under the EventLog directory in the SD card.

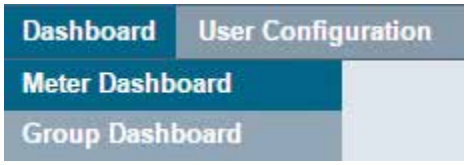
The system event log page displays 1000 events and the event recording rollovers to overwrite the oldest record. The highlighted line allows the distinction to show the latest recorded event.

Event Log Parameters (recorded on change)
IP Address
Subnet Mask
Default Gateway
Modbus Address
Baud Rate
Parity
Voltage Mode
Line to Line/Neutral voltage
Potential Transformer Primary
Firmware upgrade
Controller power up
Installation configuration selection
Offline configuration import
Utility Seal enable/disable
Meter module specific events such as CT ratio, Accumulate Energy Enable
Meter module configuration change from single/dual/three phase to other phases
Incorrect phase and incorrect CT polarity acknowledgement
All global reset events
Meter module kWh reset event

Event Log Parameters

Dashboard

The SEM3 Phase 2 feature pages where the user can viewing historical trending of various parameters. These parameters and graphs are available under the Meter dashboard and Group dashboards. The meter dashboard shows the relevant information for individual meters and the group dashboard shows the information for grouped meters.



Navigating to the Meter Dashboard Page

Meter Dashboard
The user can navigate to the Meter Dashboard page by hovering or clicking the mouse on the "Dashboard" navigation link.

A drop down menu will appear which will show "Meter Dashboard" as a selection. Clicking on this selection will show the relevant webpage.

Meter Dashboard Page

Dashboard (cont'd.)

The meter dashboard page provides the following:

a. The page allows user to view the trending of various data points for individual meters. User will be able to configure maximum 4 data points to be displayed in trending graphs.

b. The page shows the navigation bar in the top of the page.

c. The logout link identified by a Logout text on the top right corner.

d. There is a help link identified by a question mark (?) on the left of the Logout text.

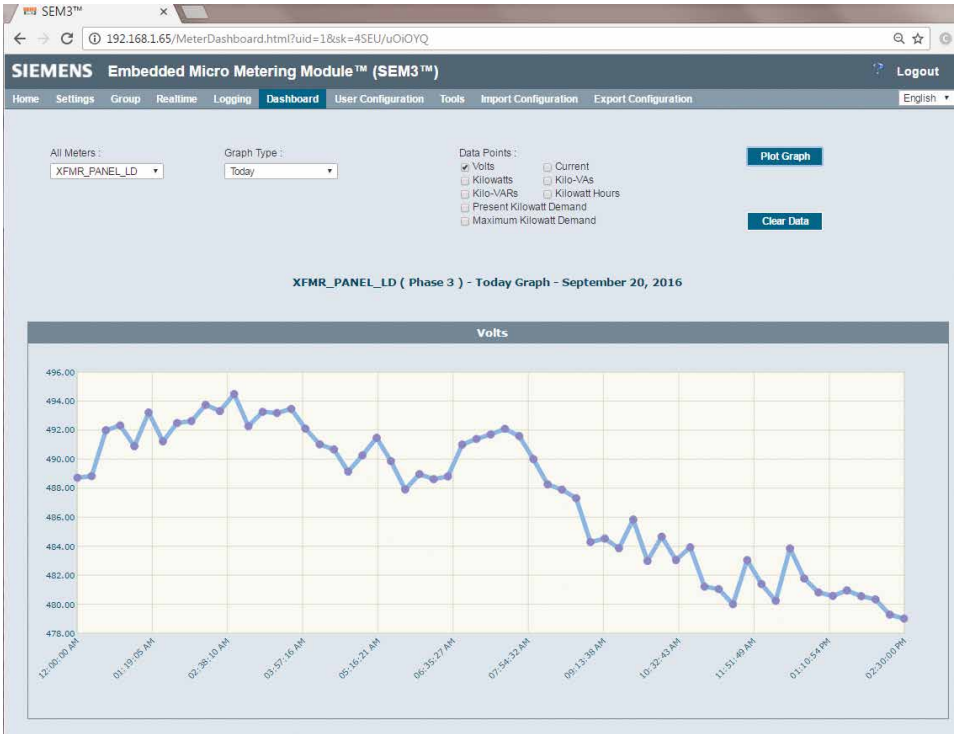
e. The drop down menu for different translated languages is provided.

The user can select individual meters from the "All meters" drop down menu. The graph type allows the user to pick between Today, Yesterday, Day to Day, Week to Week, Month to Month and Year to Year comparison. After the user selects the data points by clicking the appropriate check boxes for the data points, the graphs can be plotted by clicking on "Plot Graph". The user can also clear the past data by clicking on "Clear Data" button.

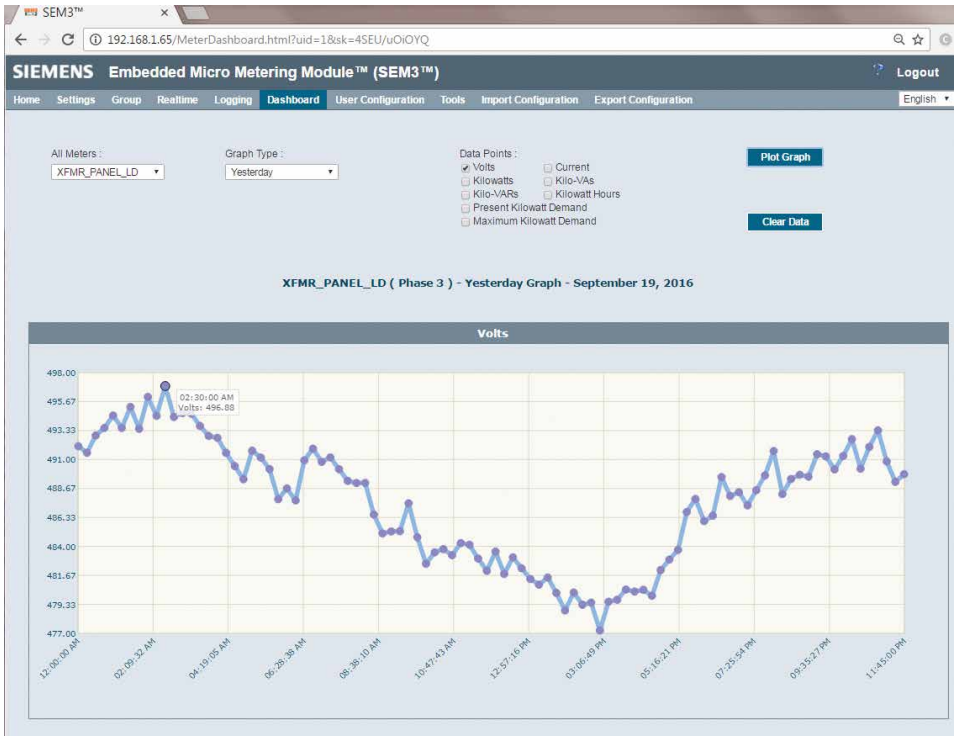
By default no data points are selected. The All meters drop down menu shows the meter selection corresponding to the closest to meter 1. The Graph type menu shows Today as the selection.

If the user selects Graph type as Today, selects a parameter and clicks on Plot Graph, the corresponding data is graphed from 12.00 am till the current time at every 15 minute interval.

If the user selects Graph type as Yesterday, selects a parameter and clicks on Plot Graph, the corresponding data is graphed from 12.00 am to 11.59 pm of the previous day at every 15 minute interval.



Trending Data for Today



Trending Data for Yesterday

Dashboard (cont'd.)

The trending data parameters available for meter dashboard for various Graph types selection are shown in the table to the right.

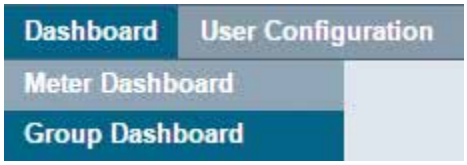
If the user selects Day to Day/Week to Week/Month to Month/Year to Year as Graph type, data point selection changes to kilowatt Hours. For the day to day selection, on selection of kWh, a bar chart comparison is shown for the last 7 days including the today. For the week to week selection, on selection of kWh, a bar chart comparison is shown for last 4 weeks including the current week. For the month to month selection, on selection of kWh, a bar chart comparison is shown for the last 6 months including the current month. For the year to year selection, on selection of kWh, a bar chart comparison is shown for last 3 years including the current year.

If the user does not select any data points for display, the system responds with a message "Please select data points". If the user selects more than 4 data points for displaying the graphs, the system responds with a message "You have selected more than 4 Data points".

Trending data parameters	Today	Yesterday	Day to Day	Week to Week	Month to Month	Year to Year
Volts	X	X				
Current	X	X				
Kilowatts	X	X				
Kilo-VAs	X	X				
Kilo-VARs	X	X				
Kilowatt Hours	X	X	X	X	X	X
Present Kilowatt Demand	X	X				
Maximum Kilowatt Demand	X	X				

Trending Data Parameters for Meter Dashboard for Various Graph Types

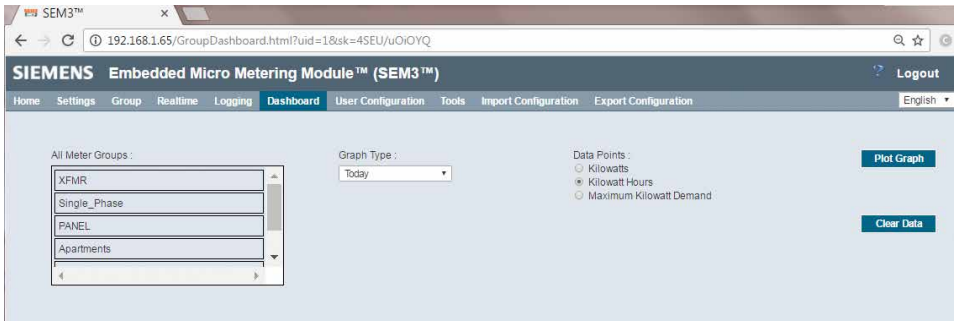
Group Dashboard
The user can navigate to the Group Dashboard page by hovering or clicking the mouse on the "Dashboard" navigation link.



Navigating to Group Dashboard Page

Dashboard (cont'd.)

A drop down menu will appear which will show "Group Dashboard" as a selection. Clicking on this selection will show the relevant webpage.



Group Dashboard Page

The group dashboard page provides the following:

a. The page allows user to view the trending of various data points for grouped meters.

b. The page shows the navigation bar in the top of the page.

c. The logout link identified by a Logout text on the top right corner.

d. There is a help link identified by a question mark (?) on the left of the Logout text.

e. The drop down menu for different translated languages is provided.

The user can select a single or multiple grouped meters from the "All meters Groups" drop down menu. If no groups have been created, the group listing is empty. User can choose a maximum of 4 groups to display the trending data on the same graph. The graph type allows the user to pick between Today, Yesterday, Day to Day, Week to Week, Month to Month and Year to Year comparison. After the user selects the data points, the graphs can be plotted by clicking on "Plot Graph". The user can also clear the past data by clicking on "Clear Data" button.

The trending data parameters available for group dashboard for different graph type selections are shown in the table to the right.

The display of graphs and error messages are similar to the response seen in meter dashboard.

Trending data parameters	Today	Yesterday	Day to Day	Week to Week	Month to Month	Year to Year
Kilowatts	X	X				
Kilowatt Hours	X	X	X	X	X	X
Maximum Kilowatt Demand	X	X	X	X	X	X

Trending Data Parameters for Group Dashboard for Various Graph Types

User Configuration

User Profile
The user can navigate to the User Profile page by hovering or clicking the mouse on the “User Configuration” navigation link.

Navigation to the User Profile Page

A drop down menu will appear which will show “User Profile” as a selection. Clicking on this selection will show the relevant webpage.

The user profile page provides the following:

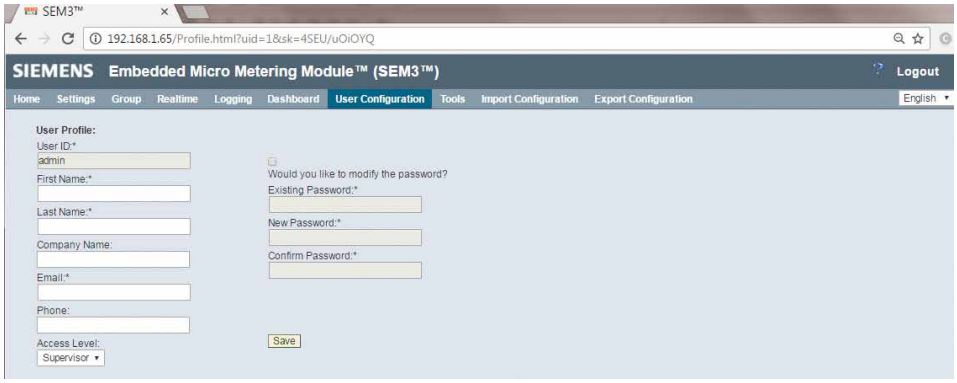
a. The page allows user to enter information relevant to the connected current user. User will able to update the password. The user can save the latest information by clicking on Save button.

b. The page shows the navigation bar in the top of the page.

c. The logout link identified by a Logout text on the top right corner.

d. There is a help link identified by a question mark (?) on the left of the Logout text.

e. The drop down menu for different translated languages is provided.



User Profile Page

The table to the right shows the parameters which are to be entered in the User profile page.

User Profile parameters	Values
User ID	Not configurable
First Name	User first name, Mandatory field
Last Name	User last name, Mandatory field
Company Name	User Company name
Email	User email address, Mandatory field
Phone	User phone number
Access Level	User Access level, Not configurable
Modify Password	Checkbox to allow user to modify password
Existing Password	User Existing Password, Mandatory field
New Password	User New Password, Mandatory field
Confirm Password	User New Password confirmation, Mandatory field

User Profile Parameters

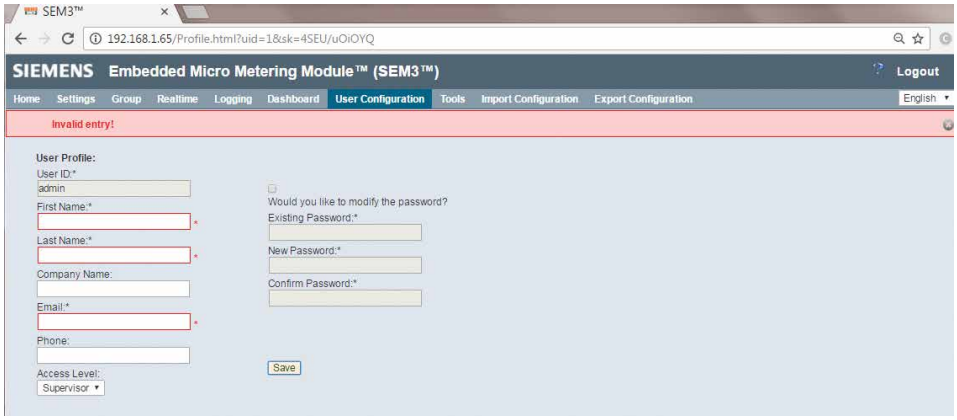
User Configuration (cont'd.)

If the user does not enter the mandatory fields and tries to save the information, the system provides a response message showing the missing fields.

Also if the user decides to modify the password and does not enter valid passwords, the System responds with a message "Passwords fields cannot be blank".

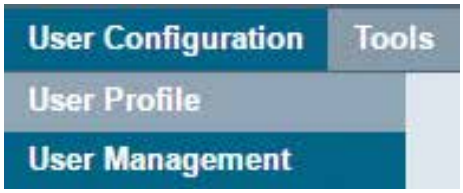
After all the relevant fields entered by the user, the user can save the information by clicking on Save button. The system responds with a message "User profile has been saved".

The user profile can be configured with correct email credentials for the SEM3 controller to send the email correctly to a connected SMTP server. In case, a XAMPP Mercury email client is used for email purposes, the user profile on the SEM3 controller has to be configured with the email address specified as <user>@ localhost.com; where <user> is the user account configured in Mozilla Thunderbird during the SMTP server-client setup as defined in section 4.10.



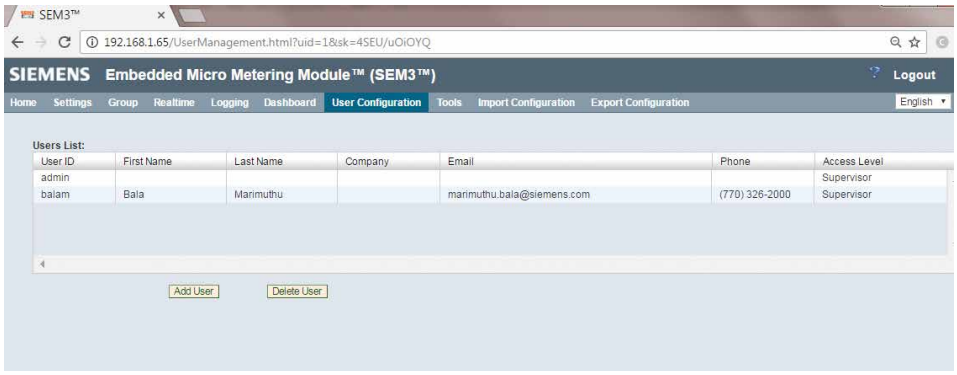
Response Message for Missing Required Information

User Management
The user can navigate to the User Management page by hovering or clicking the mouse on the "User Configuration" navigation link.



Navigation to User Management Page

A drop down menu will appear which will show "User Management" as a selection. Clicking on this selection will show the relevant webpage.



User Management Page

User Configuration (cont'd.)

The user management page provides the following:

a. The page allows user to enter information relevant to all users. User will able to update the password. The user can save the latest information by clicking on Save button.

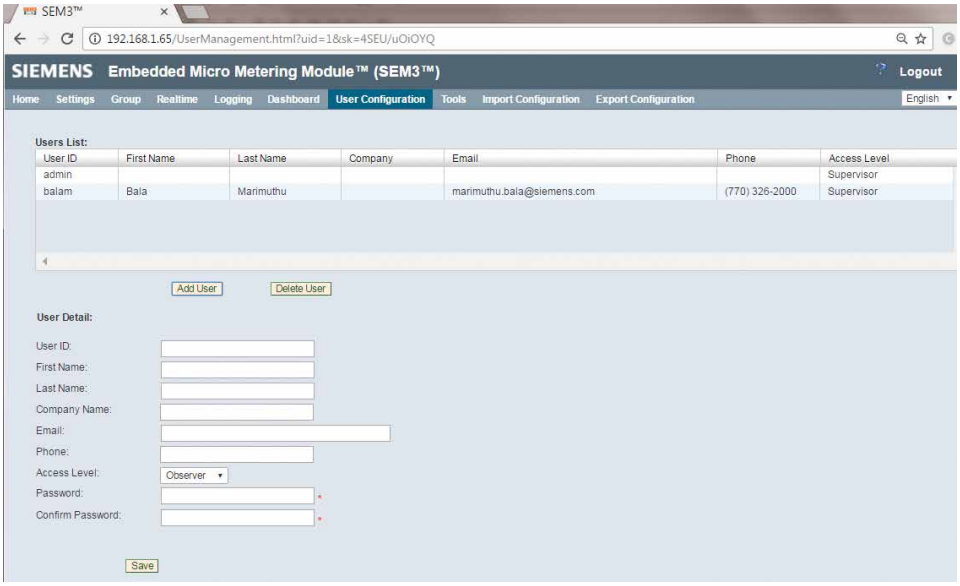
b. The page shows the navigation bar in the top of the page.

c. The logout link identified by a Logout text on the top right corner.

d. There is a help link identified by a question mark (?) on the left of the Logout text.

e. The drop down menu for different translated languages is provided.

Only the supervisor user can access this webpage. The supervisor user cannot delete its own account listing. The supervisor user cannot change its own user id. The supervisor user can add new user accounts by clicking on Add User button. When the Add user button is clicked, an expanded user details block is shown. In this block the Supervisor user can enter some relevant information for a new user.



Add User Fields

The following are the user fields available for update in the user management webpage.

After all the relevant information has been entered, the Supervisor user can save a user informat

A total of 4 users can be created at a time. If the Supervisor attempts to create more than 4 users, the system responds with an error message "Maximum users already created, please delete some user(s) and try again.

The supervisor can delete a user different than itself.

The user profile can be configured with correct email credentials for the SEM3 controller to send the email correctly to a connected SMTP server. In case a XAMPP Mercury email client is used for email purposes, the user profile on the SEM3 controller has to be configured with the email address specified as <user>@ localhost.com; where <user> is the user account configured in Mozilla Thunderbird during the SMTP server-client setup as defined in section 4.10.

User Management Add user parameters	Values
User ID	New User id, Mandatory field Minimum of 4 characters and not exceeding 10 characters
First Name	New User first name, Mandatory field
Last Name	User last name, Mandatory field
Company Name	User Company name
Email	User email address, Mandatory field
Phone	User phone number
Access Level	User Access level, Configurable - Observer - Controller - Supervisor Default: Observer
Password	New User Password, Mandatory field
Confirm Password	New User Password confirmation, Mandatory field

User Management Add User Parameters

SEM3™ Note
At one time, user can configure a maximum of 4 users including the admin account.

Tools

Diagnostics
The user can navigate to the Diagnostics page by hovering or clicking the mouse on the “Tools” navigation link.

Navigation to Diagnostics Page

A drop down menu will appear which will show “Diagnostics” as a selection. Clicking on this selection will show the relevant webpage.

The diagnostics page provides the following:

a. The user can download the Full Modbus map and also the mini monitor Modbus map. By clicking on individual meter, the user can view the Modbus map of individual meter module.

b. The page allows user to view the CT or phase angle misalignment of the configured meter modules. The user can acknowledge the incorrect installment of the CTs or meter module phase selection.

c. Also the user can upload the latest firmware/webpages and reset the controller.

d. The page shows the navigation bar in the top of the page.

e. The logout link identified by a Logout text on the top right corner.

f. There is a help link identified by a question mark (?) on the left of the Logout text.

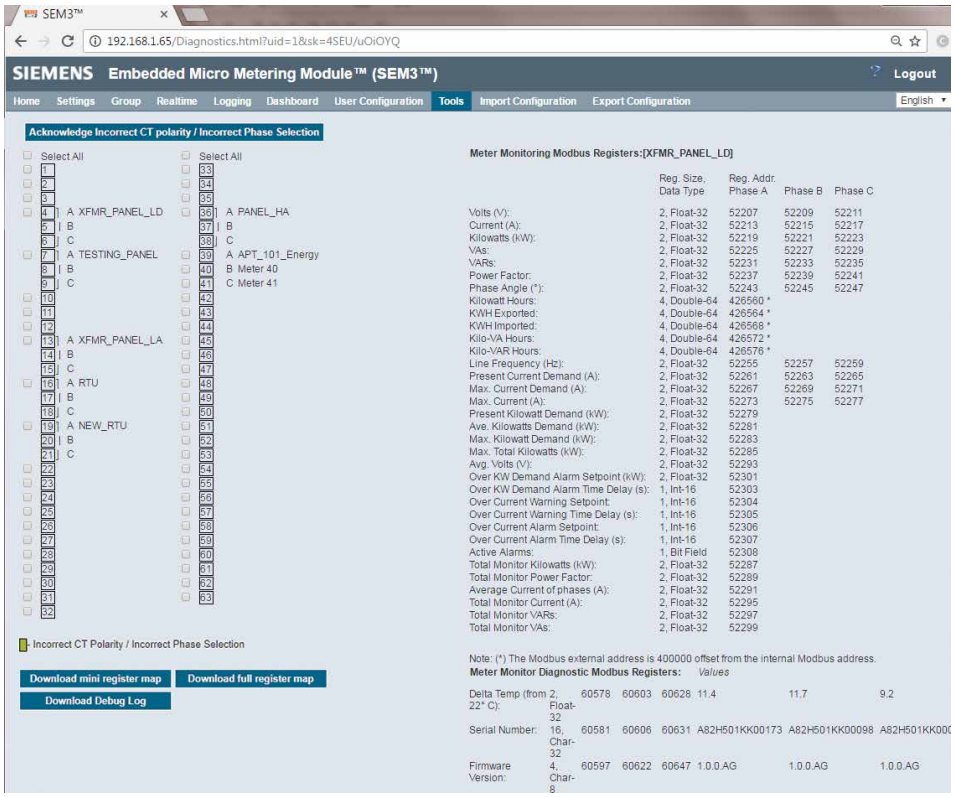
g. The drop down menu for different translated languages is provided.

By default, the CT polarity acknowledgement option is available.

Diagnostics Page

Tools (cont'd.)

Modbus Map
The user can download the complete Modbus map of registers from the SEM3 controller by clicking on "Download full register map" button. Also the user can download the mini monitor register map by clicking on "Download mini register map" button. Both of these activities result in csv file being downloaded to the connected computer/machine. Additionally for individual meter module, the user can click on a grid of a meter module and view the expanded view of the Modbus registers for the corresponding meter module. The display also shows the Meter module diagnostic Modbus registers (Delta temperature from 22ºC, Serial number and Firmware versions).



Meter Module Expanded Information

Acknowledgement of Incorrect Installation
The diagnostics page also allows the user to view the incorrect CT polarity or incorrect CT phase angle indications. The legend at the bottom of the grid shows the colors associated with the incorrect indications.

The user can also clear the incorrect CT polarity or incorrect CT phase angle indications. The clearing is performed by selecting either the CT Phase angle or the CT polarity radio button. Selecting either of these changes the user action button to either Clear CT Phase angle indication or Clear CT polarity Indication.

By default, the CT Polarity button is selected. If the user wants to clear the CT polarity for an individual meter, the user needs to select the corresponding meter and click on the "Clear CT polarity indication" button. The system responds with a message "Cleared CT Polarity Indication". The webpage refreshes and the indication for the concerned meter is no longer present for the current power cycle of the controller.

If the user wants to clear the CT phase angle for an individual meter, the user needs to select the radio button for the CT Phase angle. The user can select corresponding meter and click on the "Clear CT phase angle indication" button.

The system responds with a message "Cleared Phase angle Indication".

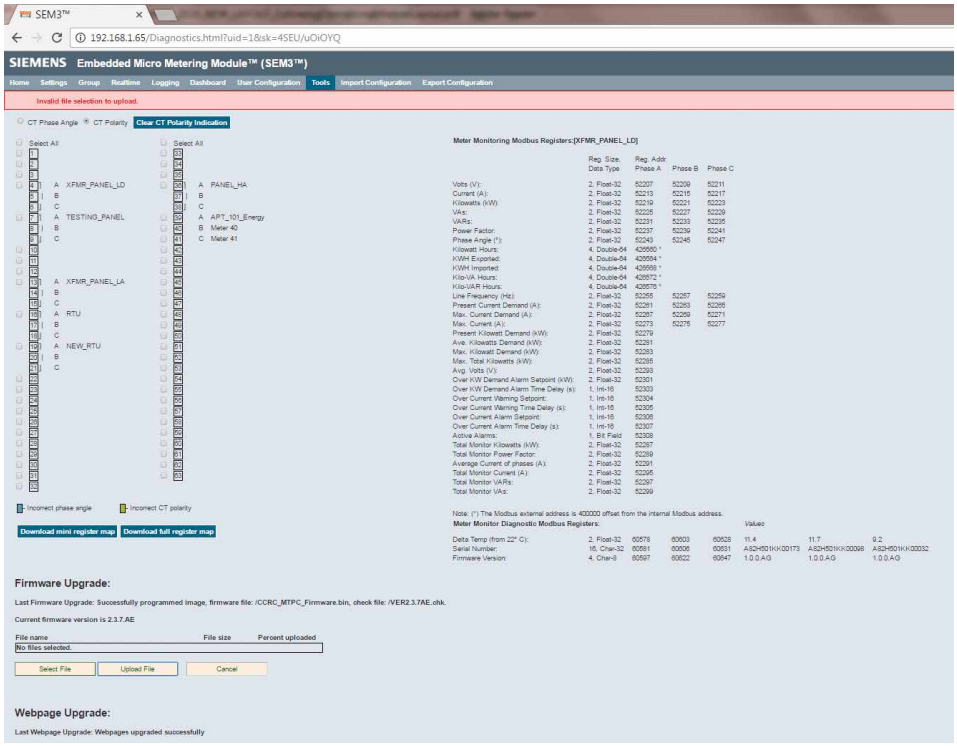
The webpage undergoes an automatic refresh and the indication for the concerned meter is no longer present for the current power cycle of the controller.

The user can also select multiple meters by selecting the corresponding check boxes. The user can also select all the meters in a particular column by selecting the check box "Select All". Once the meters have been appropriately selected, the user can click on the Clear operation button to clear the respective indications.

Tools (cont'd.)

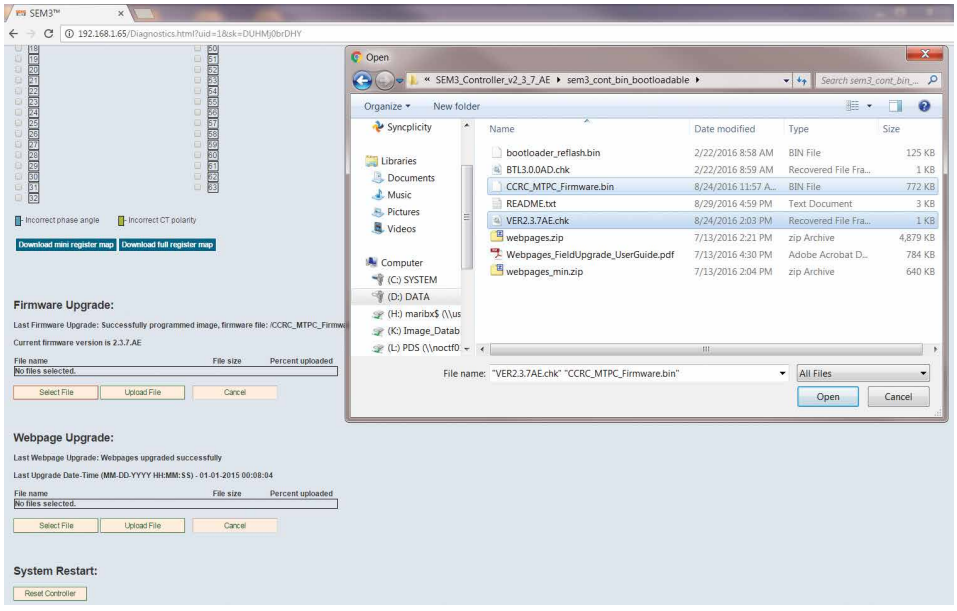
Firmware Upgrade
The diagnostic page allows user to upgrade the firmware of the controller. The user can select a firmware application binary file and a corresponding check file (used for decryption in the controller) to upgrade the firmware of the controller.

If the user fails to select any file and clicks upload file, the system responds with a message "Invalid file selection to upload".



Response Message for Upload Selection with No Valid Firmware Files

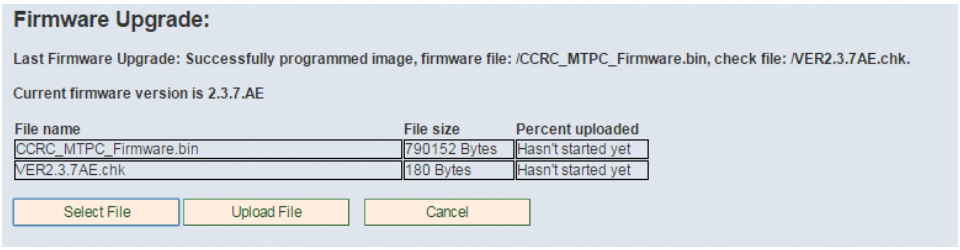
The user can click on the "Select File" button to select the correct files. A new window opens up which shows an windows explorer window for the user to browse and select files for upgrade. If the user selects non binary and check file, the system responds with error message "Please select .bin or .chk file".



Selection of Firmware Files

Tools (cont'd.)

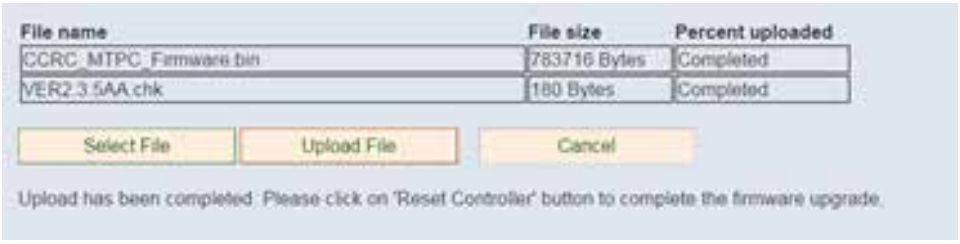
Once the correct files have been selected, the user can click on "Open" button on the windows explorer file to complete the selection the files.



Completion of Selection of Files

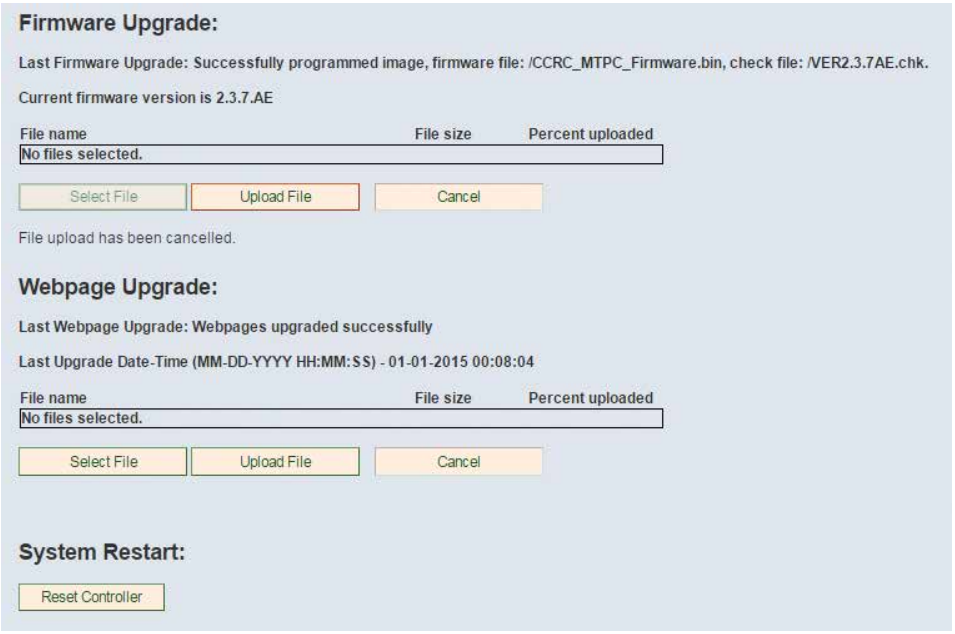
After the selection is complete the user can click on "Upload File" button to upload the selected files. During the upload process, the percentage uploaded shows a increasing values of percentage.

After the upload is complete, the message asks the user to click on "Reset Controller" button to complete the firmware upgrade process. When the user clicks on the "Reset Controller" button, the system responds with a message "The controller will restart in 2 minutes. Please stand by." The system reboots and after upgrading the firmware, the login page reappears.



Completion of Upload Files

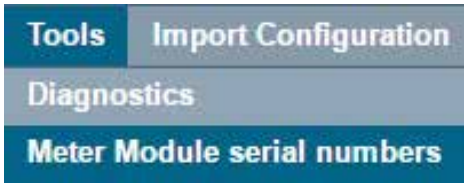
Webpage Upgrade
The diagnostics page also gives user an option to upgrade the controller webpages.



Firmware and Webpage Upgrade Options

Tools (cont'd.)

Meter Module Serial Numbers
The user can navigate to the Meter Module Serial Number page by hovering or clicking the mouse on the "Tools" navigation link.



Navigation to Meter Module Serial Number Page

A drop down menu will appear which will show "Meter Module Serial Numbers" as a selection. Clicking on this selection will show the relevant webpage.

The meter module serial number page provides the following:

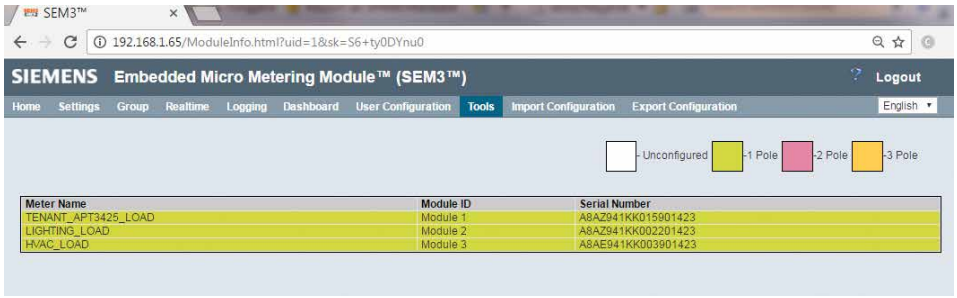
a. A screen that displays available meter modules (configured or otherwise) with the labels/meter names, Module Ids and serial numbers of the meter modules. A color coded visual display of the multi-phase configuration of the configured meter modules is provided.

b. The page shows the navigation bar in the top of the page.

c. The logout link identified by a Logout text on the top right corner.

d. There is a help link identified by a question mark (?) on the left of the Logout text.

e. The drop down menu for different translated languages is provided underneath the logout text.



Meter Module Serial Number Page

Import Configuration

The user can navigate to the Import configuration page by clicking on the “Import Configuration” navigation link.

Navigating to the Import Configuration Page

The import configuration page provides the following:

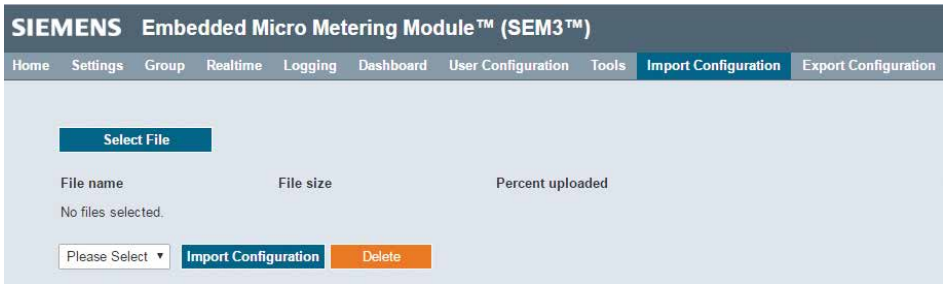
a. A page that allows user to select a specific offline created configuration file to be uploaded to the connected SEM3 controller. The user can select one of many such offline configured files uploaded to the SEM3 controller to be imported for configuration purposes. The user can also delete previously uploaded configuration files.

b. The page shows the navigation bar in the top of the page.

c. The logout link identified by a Logout text on the top right corner.

d. There is a help link identified by a question mark (?) on the left of the Logout text.

e. The drop down menu for different translated languages is provided underneath the logout text.



Import Configuration Page

Import Configuration (cont'd.)

By default, no files are selected as configuration files. The availability of the configuration files in the SEM3 controller allows the user to revert back to a previously configured base configuration. This is particularly useful if there are several configuration changes made and the user wants to fall back on a known configuration.

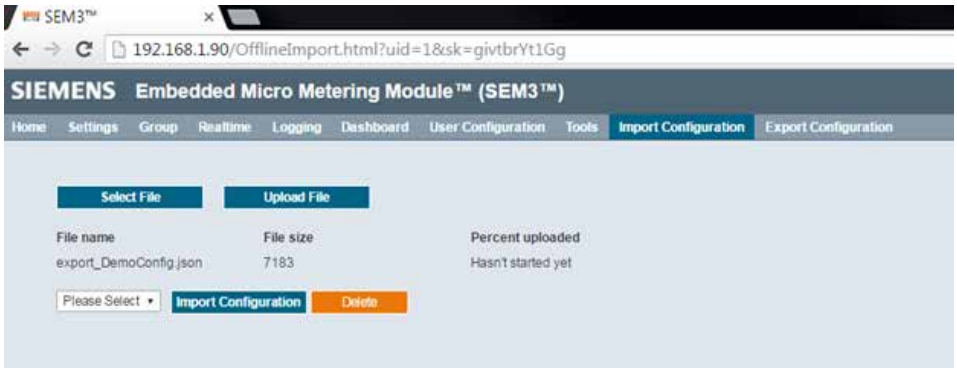
The selection of file is dependent of several conditions.

a. Only a Java Script Object Notation (json) extension file can be uploaded to the connected SEM3 controller. Non-json file extensions when uploaded will result in an error message from the system as "Please select .json file".

b. The json file can only have a maximum of 30 characters. If a json file with file name exceeding 30 characters is selected, the system will result in an error message as "File name should not be exceed 30 charactors".

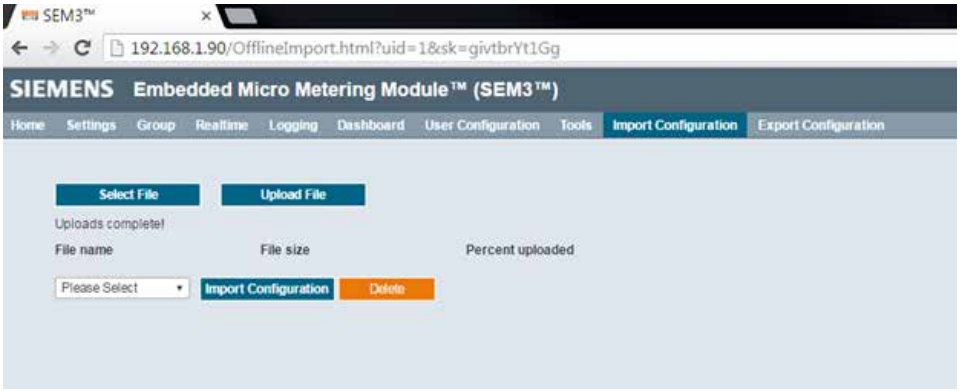
c. The selected json file cannot contain spaces. If the selected file has these characters, the system will result in an error message as "Selected file contains space, please remove space from file name and retry".

If a correct file is selected for upload to the SEM3 controller, a new button called "Upload file" appears allowing user to upload the selected file.



Correct Selection of Offline Configured File

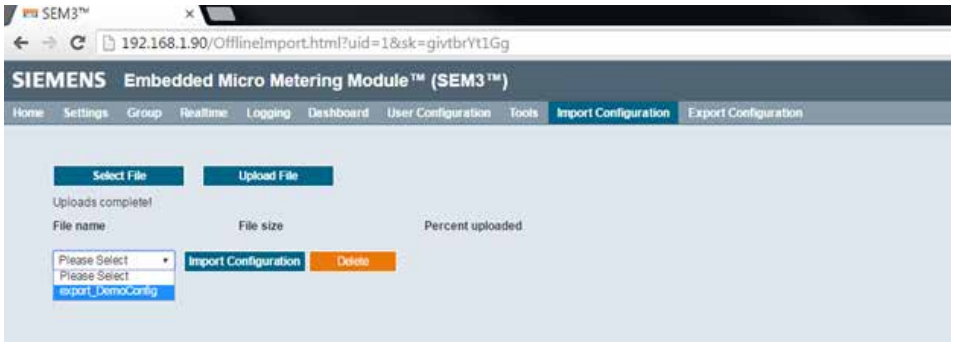
The user can upload the selected file by clicking on the Upload file button. After successful upload the file is removed from the file name listing and the user gets a successful file upload message "Uploads complete".



Successful Upload of Offline Configured File

Import Configuration (cont'd.)

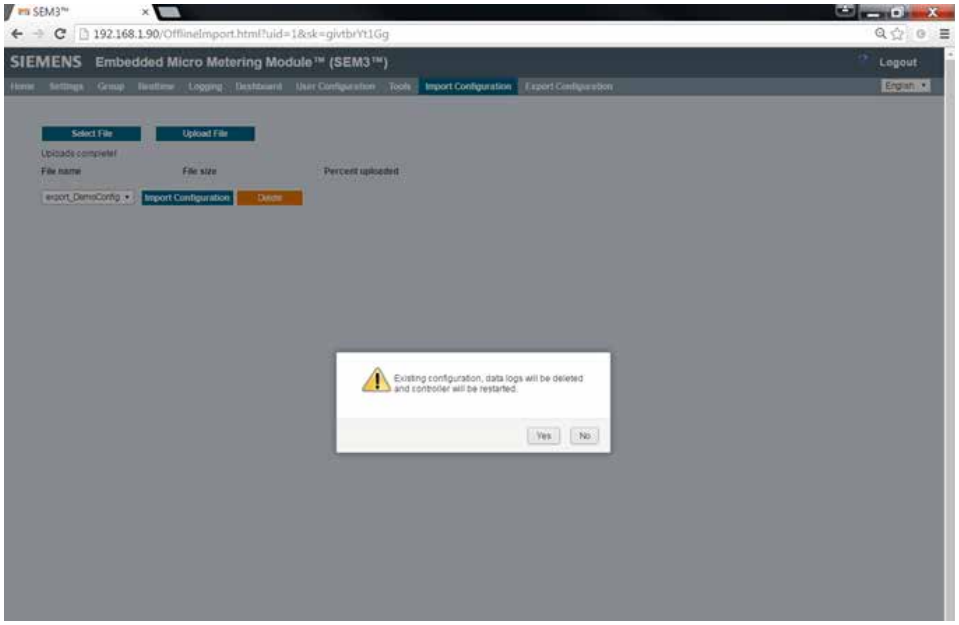
The successfully uploaded file now appears under the drop down menu for import configuration.



Import Offline Configured File

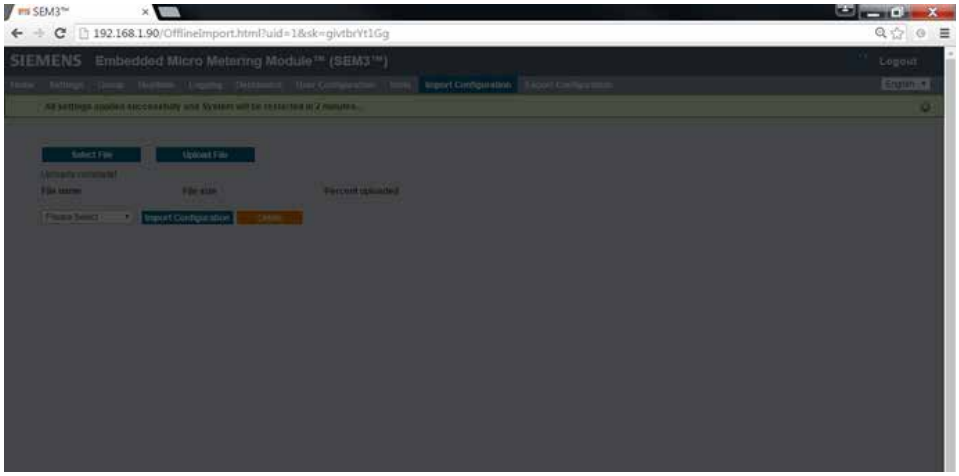
After the user selects one of the many uploaded offline configuration file, the concerned file can be deleted by clicking on the Delete button. After the deletion of the configuration file, the system responds with a message "Configuration file deleted successfully."

The user can import the configuration from an uploaded offline configuration file, by selecting the file and clicking on "Import configuration" button. This will force the system to replace the existing configuration, data logs and the controller will be reset. The user has to acknowledge this operation by clicking "Yes" on the ensuing dialog window. If the user does not want to replace existing configuration, clicking on "No" will stop the import process. At this time, the user can decide to delete the uploaded files or retain them for future references.



Confirmation for User to Import Configuration

If the user decides to proceed with the import operation, the system will replace the existing configuration and data files and provide a confirmation message "All settings applied successfully and system will be restarted in 2 minutes..." After the system reboots, the login page is automatically displayed. At this time the user can login with previously configured credentials or default credentials and login to the system.



Successful Import of Configuration

Export Configuration

The export configuration page provides the following:

a. A page that allows user to export the configuration file as a json file from the connected SEM3 controller. The configuration file is downloaded to the Downloads folder of the user laptop as a file name “export.json”.

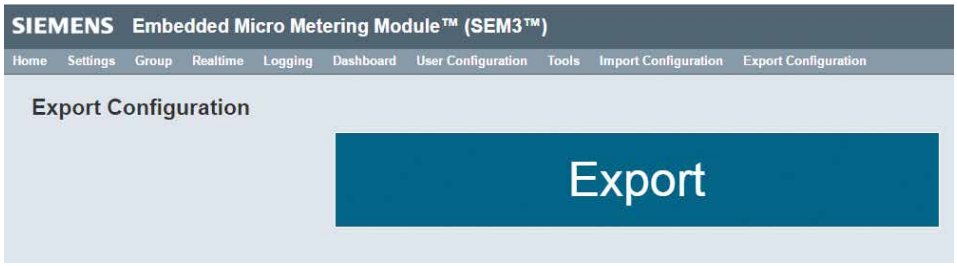
b. The page shows the navigation bar in the top of the page.

c. The logout link identified by a Logout text on the top right corner.

d. There is a help link identified by a question mark (?) on the left of the Logout text.

e. The drop down menu for different translated languages is provided underneath the logout text.

When the user clicks the “Export” button, the current configuration of the connected SEM3 controller is downloaded to the machine/laptop user downloads folder as “export.json” file. The user can navigate to the “Downloads” folder to view, save or delete the concerned configuration file.



Export Configuration Page

Communications Protocol

BACnet
The SEM3 Phase 2 Feature set includes implementation for BACnet IP. The following table provides a summary of the product listing information referenced in the BACnet Testing Lab product listing document in the Reference document section.

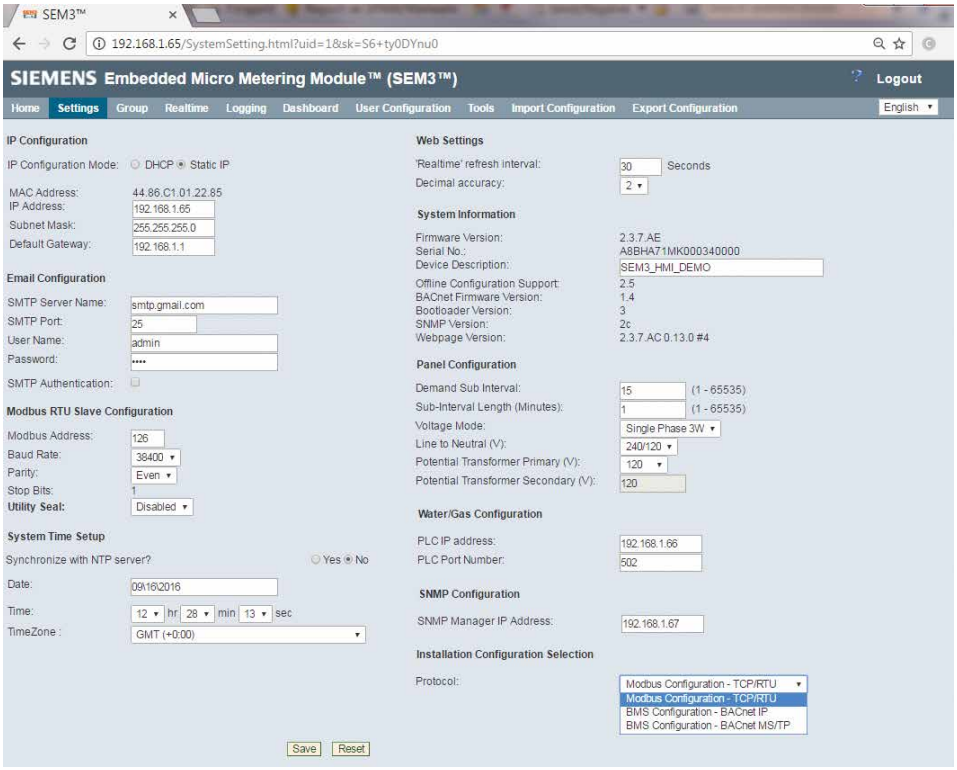
The following sections show the selections available for the implementation of the protocol (BACnet IP). External third party BACnet explorer tools can be used to establish connection with the SEM3 controller. One such tool is the CAS BACnet explorer, the section 4.12, shows the method to connect to a connected BACnet device and explore the objects.

BACnet parameters	Values
BACnet protocol Revision	Revision 14
BACnet software version	1.4
Vendor Id	313
BACnet Standardized Device Profile	BACnet Smart Sensor (B-SS)
BACnet Interoperability building blocks supported	Data Sharing: ReadProperty – B (DS-RP-B) Data Sharing: WriteProperty – B (DS-WP-B) Alarm and Event Notification Internal – B (AE-N-I-B) Alarm and Event Notification Acknowledgement – B (AE-ACK-B) Alarm and Event Notification Information – B (AE-INFO-B) Device and Network Management: Dynamic Device Binding – A (DM-DDB-A) Device and Network Management: Dynamic Device Binding – B (DM-DDB-B) Device and Network Management: Dynamic Object Binding – B (DM-DOB-B)
Object Type Supported	Analog Input, Binary Input, Device and Notification Class
Data Link Layer Options	BACnet IP (Annex J) – Register as Foreign Device
Character Set Support	ISO 10646 (UTF – 8)

BACnet Parameters for SEM3

BACnet IP
The BACnet application is not active in the SEM3 controller by default. In order for the BACnet IP protocol to be active, the user has to change the protocol appropriately in the system settings page.

The user needs to navigate to the System settings page under the Settings link on the navigation bar. In the System settings page, the user has to locate the "Installation Configuration Selection" section. Using the drop down menu, the user has to select, "BMS Configuration – BACnet IP".



Change Protocol to BACnet IP

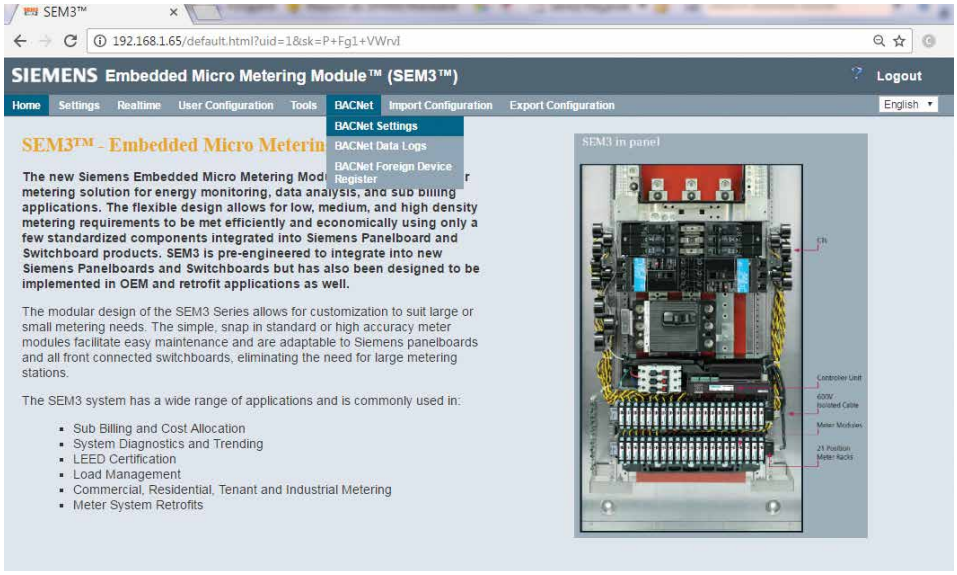
Communications Protocol (cont'd.)

Once the selection is made, the user needs to click on "Change Protocol" button. Once the selection is made, the system sends a message "Protocol change successfully, System will be restarted in 2 minutes..". After the system reboots, the login page reappears.

The user needs to login again and the new BACnet IP enabled system is functional. The navigation tab is reconfigured to match the correct implementation with BACnet protocol.

Navigation Link with BACnet IP

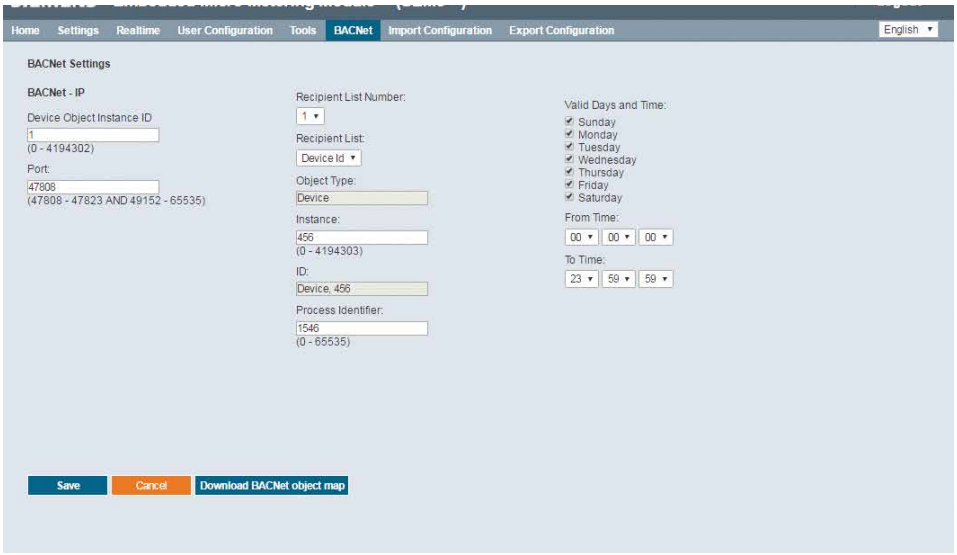
BACnet Settings
The user can navigate to the BACnet Settings page by hovering or clicking the mouse on the "BACnet" navigation link.



Navigating to BACnet Settings Page (BACnet IP)

Communications Protocol (cont'd.)

A drop down menu will appear which will show "BACnet Settings" as a selection. Clicking on this selection will show the relevant webpage.



BACnet Settings Page (BACnet IP)

The BACnet Settings page provides the following:

a. The page allows user to configure several BACnet IP settings parameters. The user can save the changed parameters. The user can download BACnet object map.

b. The page shows the navigation bar in the top of the page.

c. The logout link identified by a Logout text on the top right corner.

d. There is a help link identified by a question mark (?) on the left of the Logout text.

e. The drop down menu for different translated languages is provided.

The following parameters are configurable in the BACnet IP settings page.

BACnet Settings Parameters	Values	
Device Object Instance ID	Configure the unique Device object Instance ID. This will be the identifier of the device in a network. Range 0 – 4194302 Default: 1	
Port	Configure the device port. Range 47808 – 47823 and 49152 – 65535 Default: 47808	
Recipient List Number	Configure the parameters for a specific recipient list identified by a number. Recipient is a external entity BACnet device which is in the same network as SEM3 and is expecting notifications from SEM3. Currently maximum 5 Recipients can be configured.	
Recipient List	Configure a recipient either as Device Id or Address	
Recipient List configured as Device Id	**Parameters**	**Values**
	Object type	Not configurable, Default: Device
	Instance	Configure the Recipient device object instance ID. Range 0 – 4194302 Default: 456
	ID	Not configurable, Default: Device, <Instance Id value>
	Process Identifier	Configure the handle of a process within the recipient device that is to receive the event notification. Range 0 - 65535

Communications Protocol (cont'd.)

The user can configure BACnet device object instance ID and port to uniquely identify the SEM3 device in the network. At present time, the user can configure a maximum of 5 recipients to receive notifications from the SEM3 device. The recipient can be configured using a device id or an address. Once the user selects either device id or address as the method, there are other parameters which need to be configured as detailed in the table 'BACnet IP Settings Parameters'.

The user can save the changes by clicking on "Save" button. In case where the user updates the Device object Instance ID and Port and saves the system will reboot to save the new parameters. This causes the system to respond with a message "BACnet settings saved successfully, system will be restarted in 2 minutes." The system reboots and the user needs to re-login into the system. After navigating to the BACnet settings page, the user can verify that the settings are saved.

For changes on the recipient list column, there is no system reboot. The system only responds with message "BACnet Settings saved successfully". While making changes, the user can revert back to the last saved settings by simply clicking on the "Cancel" button. This replaces the last saved settings information.

The user can also download the currently configured BACnet object data map. The data map can be downloaded as a csv format file which shows the following parameters.

BACnet Settings Parameters	Values	
Recipient List configured as Address	**Parameters**	**Values**
	Network Number	Configure the recipient device network number. Range 0 - 65535
	IP Address	Configure the recipient device IP address.
	Port Number	Configure the recipient device port. Range 47808 – 47823 and 49152 – 65535 Default: 47808
	Process Identifier	Configure the handle of a process within the recipient device that is to receive the event notification. Range 0 - 65535
Valid Days and Time	Configure which days (Sunday – Saturday) and between what time will the device notifications be available for the specific recipient. If any alarm events are triggered between "From Time" and "To Time" for selected days, the respective recipient will be notified with EventNotification property.	

BACnet IP Settings Parameters

Downloaded BACnet Object Data map parameters	Values
Meter Id	Number of the meter. Range 1 – 45
Phase	Configured phase of the meter number Single, Two or Three phase Default: Single phase
Mapped AI Datapoint 0	Mapped Analog Input Datapoint 0
AI_ID0	Analog Input ID 0 numbered reference
Mapped AI Datapoint 1	Mapped Analog Input Datapoint 1
AI_ID1	Analog Input ID 1 numbered reference
Mapped AI Datapoint 2	Mapped Analog Input Datapoint 2
AI_ID2	Analog Input ID numbered reference
Mapped AI Datapoint 3	Mapped Analog Input Datapoint 3
AI_ID3	Analog Input ID 3 numbered reference
Mapped AI Datapoint 4	Mapped Analog Input Datapoint 4
AI_ID4	Analog Input ID 4 numbered reference
Mapped BI Datapoint 0	Mapped Binary Input Datapoint 0
BI_ID0	Binary Input ID 0 numbered reference
Mapped BI Datapoint 1	Mapped Binary Input Datapoint 1
BI_ID1	Binary Input ID 1 numbered reference
Mapped BI Datapoint 2	Mapped Binary Input Datapoint 2
BI_ID2	Binary Input ID 2 numbered reference
Mapped BI Datapoint 3	Mapped Binary Input Datapoint 3
BI_ID3	Binary Input ID 3 numbered reference

Downloaded BACnet Object Data Map

Communications Protocol (cont'd.)

The first 45 meters are supported (Meter Id 1 – 45). The values of the selected data points will be shown as zero (0) if the respective meter is not connected and configured. The csv file shows the mapping of the analog parameter denoted by name under the Mapped AI Datapoint n, where n ranges from 0 – 4, to an analog input node ID number reference. The csv file also shows the mapping of the binary parameter denoted by name under the Mapped BI Datapoint m, where m ranges from 0 – 3 to a binary input node ID number reference.

For example if Mapped AI Datapoint 0 is Volts and AI_ID0 is 0 correspond to the Meter Id 1, then Meter Id 1 volts are displayed as values under the node analog input 0.

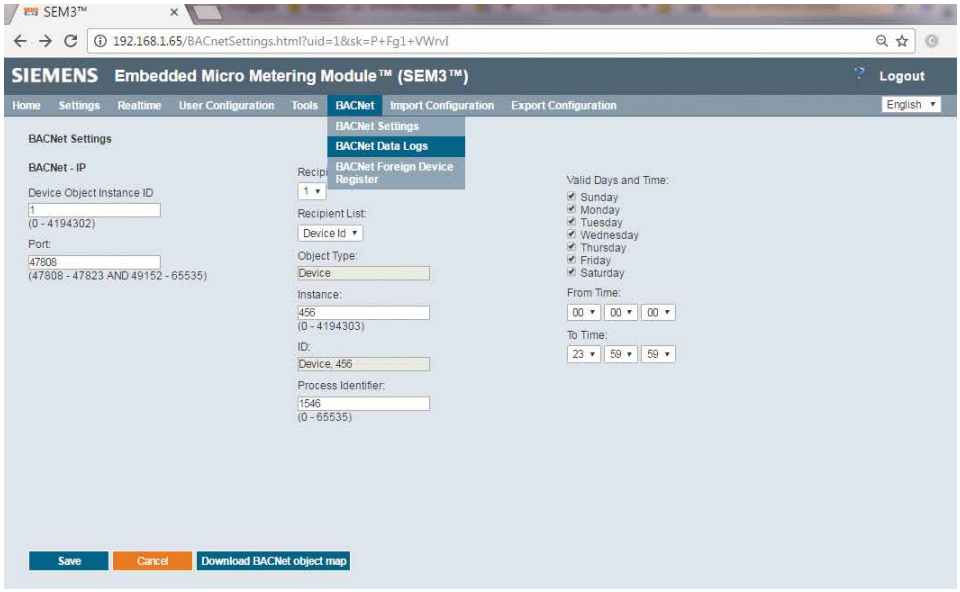
The meters for which the BACnet object mappings are not configured continue to show-up in the object map csv file, with the default configuration values. The only exception is that the phase information is removed for these meters, when the user saves the configuration for other meters. If the user configures all the meters for the object mapping, then the csv file will reflect the correct configuration information for all the meters.

In addition to these data points, there are 2 fixed global binary data points mapped which are also not configurable.

Binary Data point	Binary Object Name	Binary Object ID
Global Under Voltage Alarm	BI-181	180
Global Over Voltage Alarm	BI-182	181

Fixed Global Alarm Binary Data Points

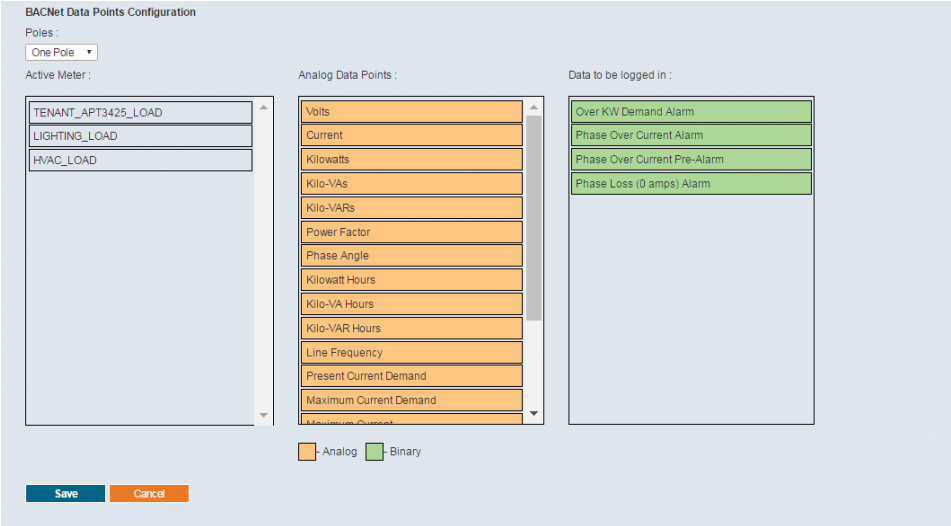
BACnet IP Data Logs
The user can navigate to the BACnet Data Logs page by hovering or clicking the mouse on the "BACnet" navigation link.



Navigating to the BACnet Data Logs Page (BACnet IP)

Communications Protocol (cont'd.)

A drop down menu will appear which will show "BACnet Data Logs" as a selection. Clicking on this selection will show the relevant webpage.



BACnet Data Logs Page (BACnet IP)

The BACnet Data Logs page provides the following:

a. The page allows user to configure Data points as BACnet objects. The user can save the configured data points.

b. The page shows the navigation bar in the top of the page.

c. The logout link identified by a Logout text on the top right corner.

d. There is a help link identified by a question mark (?) on the left of the Logout text.

e. The drop down menu for different translated languages is provided.

By default, the pole selection is One Pole. The active meters as part of One Pole are shown in the active meter column. The "Data to be logged in" shows the binary data points. The binary data points are fixed to 4 data points, which are listed in the table "Default BACnet Data Points". There are 5 default analog data points which are listed in the table "Default BACnet Data Points" which can be configurable to other analog data points listed in the table "BACnet Configurable Data Points". When the user selects a particular meter from the Active meter, the default selected analog data points are shown under the "Data to be logged in" column as shown in the image, "Selecting of Analog Data Points."

Data point type	Single Phase	Two Phase	Three Phase
Analog	Volts	Volts Phase 1	Volts Phase 1
		Volts Phase 2	Volts Phase 2
			Volts Phase 3
Analog	Current	Current Phase 1	Current Phase 1
		Current Phase 2	Current Phase 2
			Current Phase 3
Analog	Kilowatts	Kilowatts Phase 1	Kilowatts Phase 1
		Kilowatts Phase 2	Kilowatts Phase 2
			Kilowatts Phase 3
Analog	Kilo-VAs	Kilo-VAs Phase 1	Kilo-VAs Phase 1
		Kilo-VAs Phase 2	Kilo-VAs Phase 2
			Kilo-VAs Phase 3
Analog	Kilo-VARs	Kilo-VARs Phase 1	Kilo-VARs Phase 1
		Kilo-VARs Phase 2	Kilo-VARs Phase 2
			Kilo-VARs Phase 3
Binary	Over KW Demand Alarm	Over KW Demand Alarm	Over KW Demand Alarm
Binary	Phase Over Current Alarm	Phase Over Current Alarm	Phase Over Current Alarm
Binary	Phase Over Current Pre-Alarm (Warning)	Phase Over Current Pre-Alarm (Warning)	Phase Over Current Pre-Alarm (Warning)
Binary	Phase Loss (0 amps) Alarm	Phase Loss (0 amps) Alarm	Phase Loss (0 amps) Alarm

Default BACnet Data Points

Communications Protocol (cont'd.)

The following table shows the configurable analog data points available for the user.

Single Phase	Two Phase	Three Phase
Volts	Volts Phase 1	Volts Phase 1
	Volts Phase 2	Volts Phase 2
		Volts Phase 3
Current	Current Phase 1	Current Phase 1
	Current Phase 2	Current Phase 2
		Current Phase 3
Kilowatts	Kilowatts Phase 1	Kilowatts Phase 1
	Kilowatts Phase 2	Kilowatts Phase 2
		Kilowatts Phase 3
Kilo-VAs	Kilo-VAs Phase 1	Kilo-VAs Phase 1
	Kilo-VAs Phase 2	Kilo-VAs Phase 2
		Kilo-VAs Phase 3
Kilo-VARs	Kilo-VARs Phase 1	Kilo-VARs Phase 1
	Kilo-VARs Phase 2	Kilo-VARs Phase 2
		Kilo-VARs Phase 3
Power Factor	Power Factor Phase 1	Power Factor Phase 1
	Power Factor Phase 2	Power Factor Phase 2
		Power Factor Phase 3
Phase Angle	Phase Angle Phase 1	Phase Angle Phase 1
	Phase Angle Phase 2	Phase Angle Phase 2
		Phase Angle Phase 3
KiloWatt Hours	KiloWatt Hours	KiloWatt Hours
KiloVA Hours	KiloVA Hours	KiloVA Hours
KiloVAR Hours	KiloVAR Hours	KiloVAR Hours
Line Frequency	Line Frequency Phase 1	Line Frequency Phase 1
	Line Frequency Phase 2	Line Frequency Phase 2
		Line Frequency Phase 3
Present Current Demand	Present Current Demand Phase 1	Present Current Demand Phase 1
	Present Current Demand Phase 2	Present Current Demand Phase 2
		Present Current Demand Phase 3
Maximum Current Demand	Maximum Current Demand Phase 1	Maximum Current Demand Phase 1
	Maximum Current Demand Phase 2	Maximum Current Demand Phase 2
		Maximum Current Demand Phase 3
Maximum Current	Maximum Current Phase 1	Maximum Current Phase 1
	Maximum Current Phase 2	Maximum Current Phase 2
		Maximum Current Phase 3
Present Kilowatt Demand	Present Kilowatt Total Demand	Present Kilowatt Total Demand
Average Kilowatts Demand	Average Kilowatts Total Demand	Average Kilowatts Total Demand
Maximum Kilowatts Demand	Maximum Kilowatts Total Demand	Maximum Kilowatts Total Demand

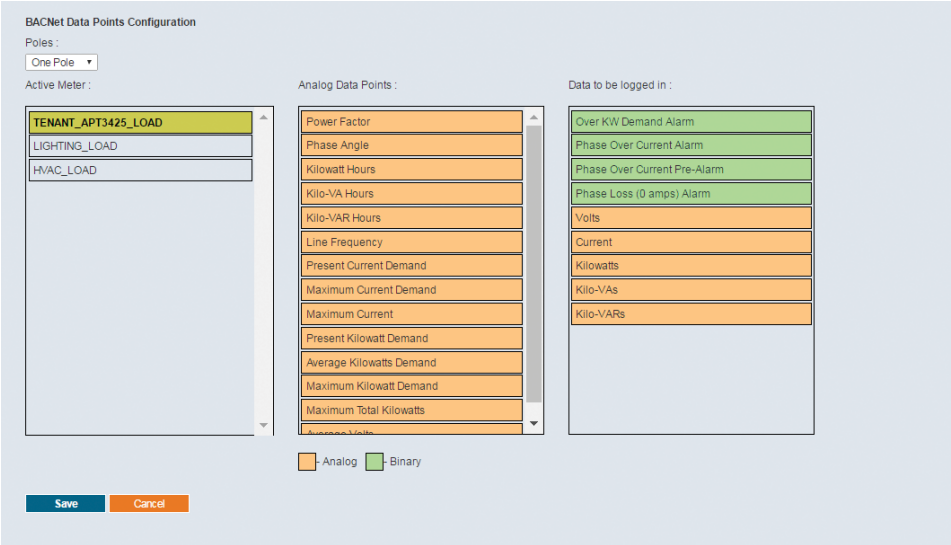
Continued on next page

Communications Protocol (cont'd.)

Single Phase	Two Phase	Three Phase
Maximum Total Kilowatts	Maximum Total Kilowatts	Maximum Total Kilowatts
	Total Monitor Kilowatts	Total Monitor Kilowatts
	Total Monitor Power Factor	Total Monitor Power Factor
	Average Current of 2 Phases	Average Current of 3 Phases
Average Volts	Average Volts	Average Volts
	Total Monitor Current	Total Monitor Current
	Total Monitor Kilo-VARs	Total Monitor Kilo-VARs
	Total Monitor Kilo-VAs	Total Monitor Kilo-VAs

BACnet Configurable Data Points

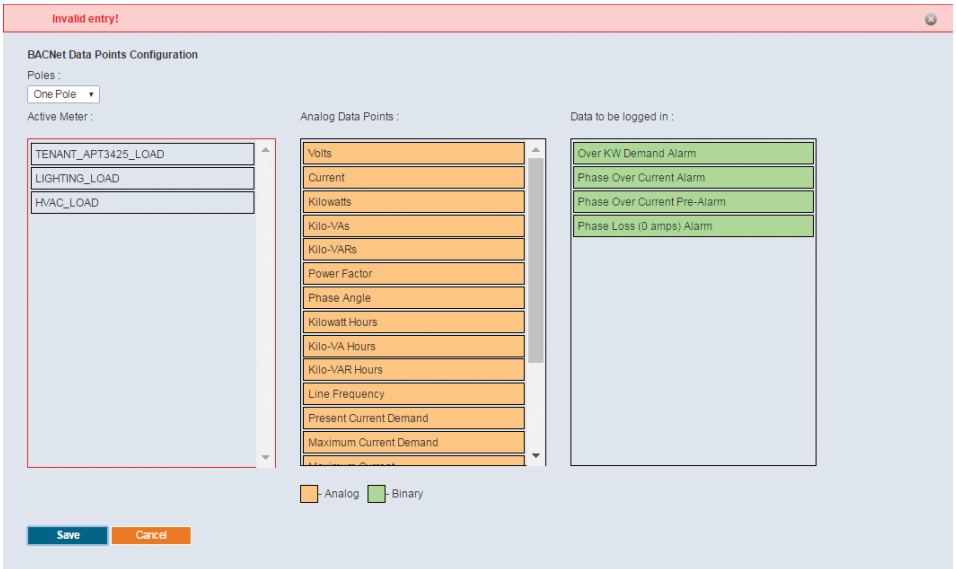
Selecting Data Points as BACnet Objects
The user is allowed to pick the analog elements which will be configured as BACnet objects. The user starts with selecting the corresponding Pole selection (One, Two or Three) to show the available active meters for that particular pole selection. Once the active meter list is populated, the user can select individual meter or multiple meters and drag and drop the required Analog Data points from the available "Analog Data points" Column to the "Data to be logged in" column. The analog and binary data points are color coded to show the difference. Once the user has made the selections for different pole selections, the user needs to click on "Save" button to save the selection. The system responds with message "Log saved successfully".



Selecting of Analog Data Points

The user is able to select only 5 analog elements to be saved as BACnet objects. If additional elements are selected to be configured as BACnet objects, the system responds with a message "Maximum 5 Analog Data Points are allowed".

If the user does not select any meters from the Active meter list and attempts to click save, the system responds with a message "Invalid entry" and highlights the Active meter column as an area where the user has to make selection.



Incorrect Selection of Active Meters

Communications Protocol (cont'd.)

BACnet Foreign Device Register
The SEM3 system also supports a feature called Foreign Device Registration (FDR). This feature allows the SEM3 device to send its broadcast message to a BACnet IP Broadcast Management Device (BBMD). The BBMD will send any received broadcast messages to all other BBMDs in the network or other devices registered as under FDR.

The user can navigate to the BACnet Foreign Device Register page by hovering or clicking the mouse on the "BACnet" navigation link.

A drop down menu will appear which will show "BACnet Foreign Device Register" as a selection. Clicking on this selection will show the relevant webpage.

The BACnet Foreign Device Register page provides the following:

a. The page allows user to configure SEM3 as BACnet Foreign Device. The user can save the registration information.

b. The page shows the navigation bar in the top of the page.

c. The logout link identified by a Logout text on the top right corner.

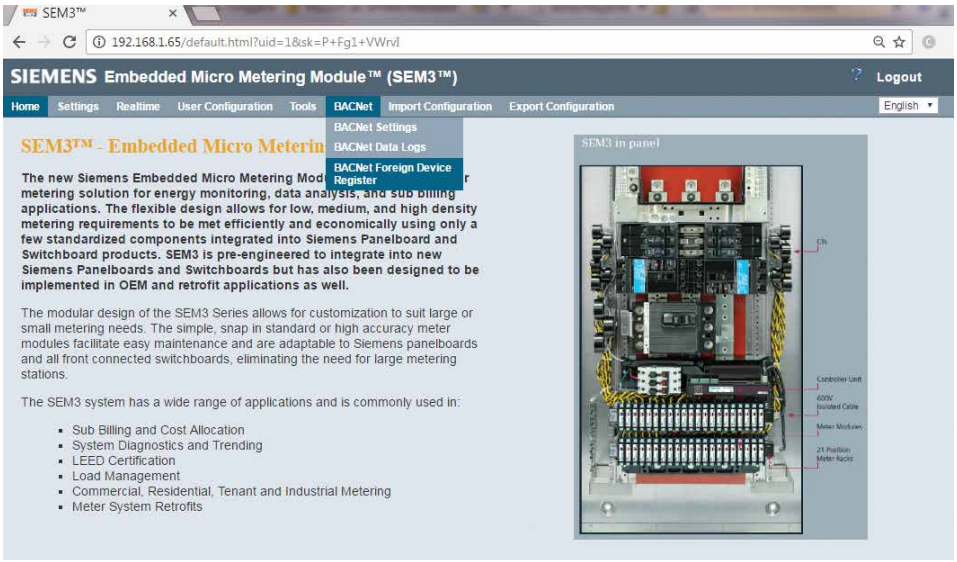
d. There is a help link identified by a question mark (?) on the left of the Logout text.

e. The drop down menu for different translated languages is provided.

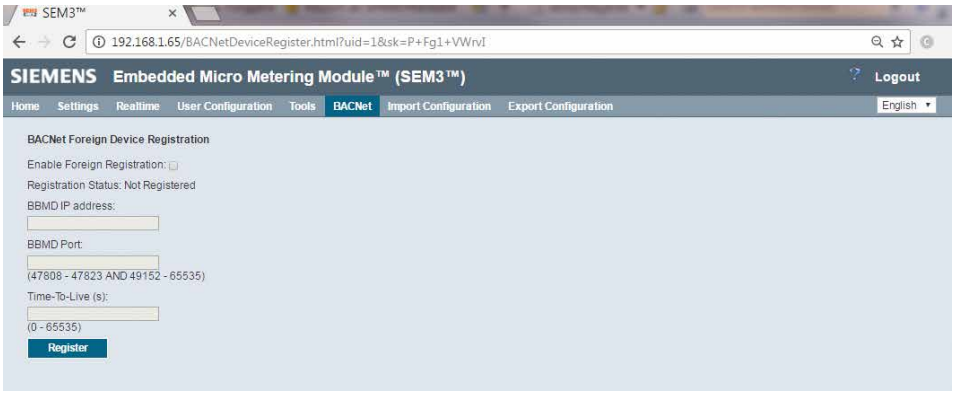
By default, registration information is displayed. This displays the present status of the registration. If the device has not been previously configured, the registration status shows "Not Registered". The other parameters are greyed out.

If the user intends to register the SEM3 as a foreign device, the check box next to "Enable Foreign Registration" needs to be checked. This will enable the user to enter the information for the relevant parameters as shown in the table to the right.

After the user clicks on the "Register" button, the system responds with a message "Foreign Device Enabled Successfully. System will be restarted in 2 minutes." The system reboots and the user has to re-login to the system.



Navigating to BACnet Foreign Device Register Page



BACnet Foreign Device Register Page

BACnet Foreign Device Registration Parameters	Values
BBMD IP address	BACnet/IP Broadcast Management Device (BBMD) IP address: IP address of Internet gateway device for network where BBMD resides. This value is not the internal network address of BBMD unless device is directly visible from network where SEM3 is connected.
BBMD Port	BBMD Port address Range 47808 – 47823 and 49152 – 65535
Time-To-Live	Time period in seconds within which a foreign device must re-register with a BBMD. Range 0 – 65535.

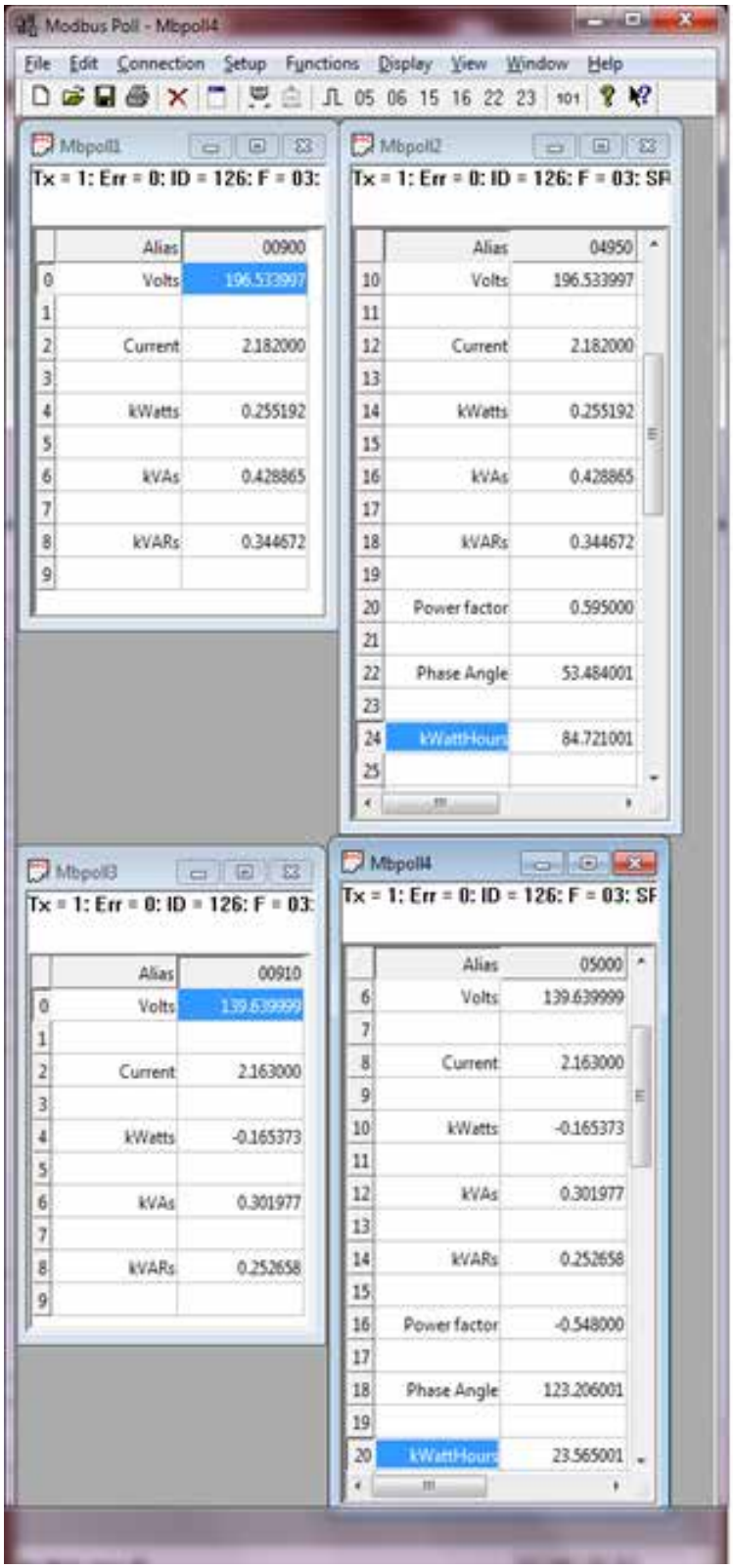
BACnet Foreign Device Registration Parameters

Communications Protocol (cont'd.)

Modbus TCP / IP Connection Enhancement

As a part of the SEM3 system, a user can request Modbus access through external tools such as Modbus Poll and establish maximum 4 connections to the SEM3 controller. The user does not have to make any configuration or changes in the webpages to activate this feature. This feature is available by default.

Using Modbus Poll the user can establish connections to the SEM3 controller and read specific Modbus registers.



Concurrent Modbus Connections to the SEM3 Controller

Communications Protocol (cont'd.)

System Time Setup and NTP Time Synchronization
The SEM3 controller has features to enable the recording of system time. The system time can be stored from the user input through the System settings page. The system time will be stored every 15 minutes the controller is operational. So the last stored system date and time will be used when the controller powers up after a power cycle.

The user can also use Network Time protocol (NTP) servers to establish connection with the SEM3 controller. The network time server information can be entered through the system settings page as well. The details are located in the System Time Setup section under System Settings section.

SNMP Support
The SEM3 controller is designed to respond as a Simple Network Management Protocol client version 2c. The client stack is designed using the software stack derived from DMH software Inc. When the Modbus Configuration – TCP/RTU is selected, the SNMP Agent or client is active. The SNMP client is not active when the Building Management system configurations are selected.

The SEM3 controller webpages only allow the user to configure the IP address of the SNMP manager. There are no other configuration related access for the user. The SNMP manager configuration is stored from the user input through the System settings page. The details are located in the SNMP configuration section under the System Settings section.

An Internet Assigned Numbers Authority (IANA) ID of 339 has been assigned to Siemens and has been used in the implementation of the SNMP protocol with the SEM3 controller.

The following datapoints have been configured as ouput registers available for export through the SNMP protocol.

Single Phase	Two Phase	Three Phase
Volts	Volts Phase 1	Volts Phase 1
	Volts Phase 2	Volts Phase 2
		Volts Phase 3
Current	Current Phase 1	Current Phase 1
	Current Phase 2	Current Phase 2
		Current Phase 3
Kilowatts	Kilowatts Phase 1	Kilowatts Phase 1
	Kilowatts Phase 2	Kilowatts Phase 2
		Kilowatts Phase 3
Kilo-VAs	Kilo-VAs Phase 1	Kilo-VAs Phase 1
	Kilo-VAs Phase 2	Kilo-VAs Phase 2
		Kilo-VAs Phase 3
Kilo-VARs	Kilo-VARs Phase 1	Kilo-VARs Phase 1
	Kilo-VARs Phase 2	Kilo-VARs Phase 2
		Kilo-VARs Phase 3
Power Factor	Power Factor Phase 1	Power Factor Phase 1
	Power Factor Phase 2	Power Factor Phase 2
		Power Factor Phase 3
Phase Angle	Phase Angle Phase 1	Phase Angle Phase 1
	Phase Angle Phase 2	Phase Angle Phase 2
		Phase Angle Phase 3
KiloWatt Hours	KiloWatt Hours	KiloWatt Hours
KiloVA Hours	KiloVA Hours	KiloVA Hours
KiloVAR Hours	KiloVAR Hours	KiloVAR Hours

(continued on next page)

Communications Protocol (cont'd.)

Single Phase	Two Phase	Three Phase
Line Frequency	Line Frequency Phase 1	Line Frequency Phase 1
	Line Frequency Phase 2	Line Frequency Phase 2
		Line Frequency Phase 3
Present Current Demand	Present Current Demand Phase 1	Present Current Demand Phase 1
	Present Current Demand Phase 2	Present Current Demand Phase 2
		Present Current Demand Phase 3
Maximum Current Demand	Maximum Current Demand Phase 1	Maximum Current Demand Phase 1
	Maximum Current Demand Phase 2	Maximum Current Demand Phase 2
		Maximum Current Demand Phase 3
Maximum Current	Maximum Current Phase 1	Maximum Current Phase 1
	Maximum Current Phase 2	Maximum Current Phase 2
		Maximum Current Phase 3
Present Kilowatt Demand	Present Kilowatt Total Demand	Present Kilowatt Total Demand
Average Kilowatts Demand	Average Kilowatts Total Demand	Average Kilowatts Total Demand
Maximum Kilowatts Demand	Maximum Kilowatts Total Demand	Maximum Kilowatts Total Demand
Maximum Total Kilowatts	Maximum Total Kilowatts	Maximum Total Kilowatts
	Total Monitor Kilowatts	Total Monitor Kilowatts
	Total Monitor Power Factor	Total Monitor Power Factor
	Average Current of 2 Phases	Average Current of 3 Phases
Average Volts	Average Volts	Average Volts
	Total Monitor Current	Total Monitor Current
	Total Monitor Kilo-VARs	Total Monitor Kilo-VARs
	Total Monitor Kilo-VAs	Total Monitor Kilo-VAs

SNMP Agent Data Points

The SNMP Agent or client is also able to generate traps for following alarms.

Single Phase	Two Phase	Three Phase
Over kW Demand Alarm	Over kW Demand Alarm	Over kW Demand Alarm
Phase over current alarm	Phase 1 over current alarm	Phase 1 over current alarm
	Phase 2 over current alarm	Phase 2 over current alarm
		Phase 3 over current alarm
Phase over current pre-alarm (Warning)	Phase 1 over current pre-alarm (Warning)	Phase 1 over current pre-alarm (Warning)
	Phase 2 over current pre-alarm (Warning)	Phase 2 over current pre-alarm (Warning)
		Phase 3 over current pre-alarm (Warning)
Phase Loss alarm	Phase 1 Loss alarm	Phase 1 Loss alarm
	Phase 2 Loss alarm	Phase 2 Loss alarm
		Phase 3 Loss alarm
Under Voltage alarm	Under Voltage alarm	Under Voltage alarm
Over Voltage alarm	Over Voltage alarm	Over Voltage alarm

SNMP Agent Trap Data Points

Email

SMTP and Emailing of Logs
In the SEM3 system, the configured Data and Alarm logs can be emailed to specific users who have been configured in the embedded web server. The emails can be sent immediately to the configured user by clicking on Send Now button in the Active Data and Active Alarm Logs pages. The emails can also be configured to be sent periodically by configuring the day and time when the logs are expected to be emailed.

SMTP Configuration
The SMTP configuration involves two components.

a. Email configuration
b. User configuration

The email configuration from the SEM3 controller is possible if the correct settings saved in the System Settings web page. The details are located in the Email configuration section under System Settings section.

The user configuration is setup in the User profile or user management section. In this section, the user details are created. The email address created in the user profile needs to match the user email address created for the SMTP server.

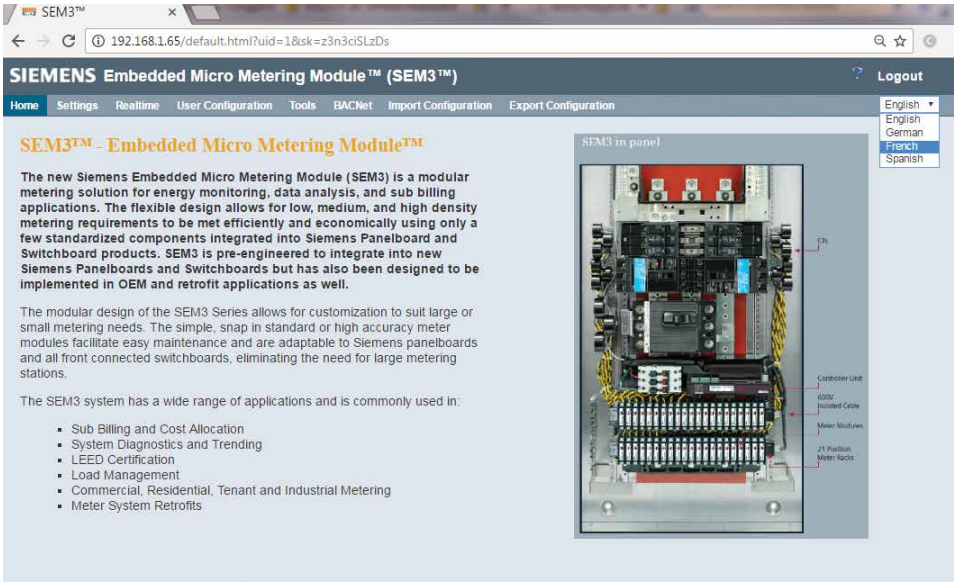
Emailing of Logs
The logs are emailed to an email server which has been configured as a designated email recipient.

Miscellaneous

Multilingual Web Pages
The user can navigate to the Multi-lingual web pages for each of the embedded web page by clicking on the corresponding language from the drop down menu on the right hand side corner of the webpage.

The navigable pages can be translated to the following languages.

- English,
- German,
- French and
- Spanish.



Navigating to Multiple Languages

Site / Installation Configuration Selection
The System settings page allows user to select specific installation configuration/ Protocols. The System settings section shows additional details on the user selection process.

The protocols currently selectable are the following.

a. Modbus Configuration – TCP/RTU

b. Building Management System (BMS) – BACnet IP

By default the Modbus Configuration – TCP/RTU is selected. If the user wishes to change the protocol to others, the corresponding protocol needs to be selected and the user needs to click on “Change Protocol” button.

Once the protocol change is underway, some of the features of the SEM3 phase 2 are disabled based on the protocol selection.

Available Features	Modbus Configuration – TCP/RTU	BMS – BACnet IP
Logging	X	
DHCP	X	
Dashboard	X	
Modbus TCP	X	X
Modbus RTU	X	
SNMP	X	
Gas and water meters	X	X
Modbus TCP sockets	X	
BACnet IP		X
BACnet MS/TP		

Available Protocols in Various Configuration

Troubleshooting

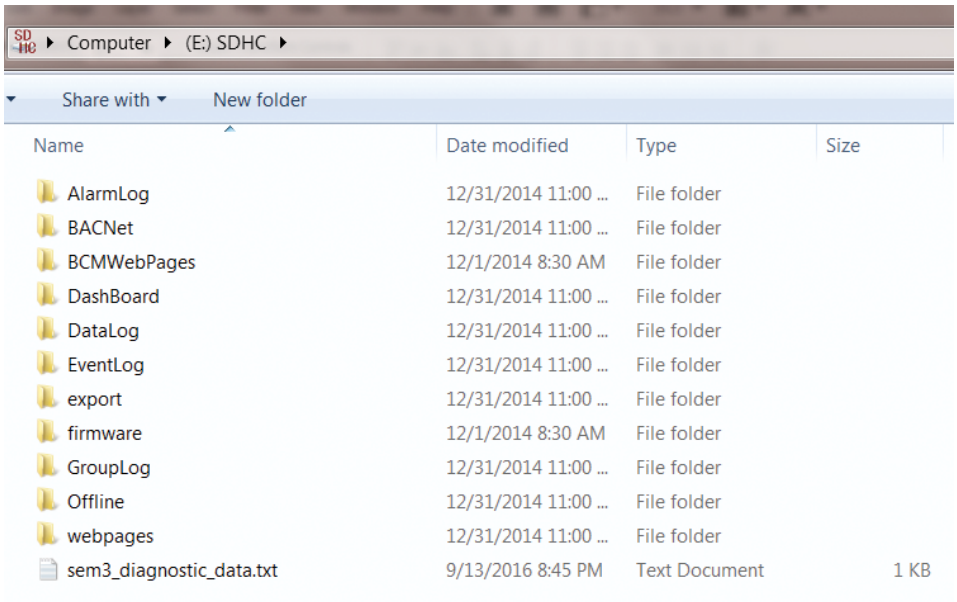
Clearing Browser Cache

To clear browser cache in Chrome following steps need to be followed.

1. Navigate to Chrome -> Settings
2. Click on “Show Advanced settings”
3. Under Privacy section, Click on “Clear browsing data”.
4. Check the box next to “Empty the cache”.
5. Click on “Clear browsing data”.

Directory Structure in SD Card

The SD card present with the SEM3 controller records several information within its directory structure.



Explorer View of the SD Card Directory Structure

Troubleshooting (cont'd.)

Diagnostic Data

The diagnostic data is recorded in the root directory of the SD card within the file named as **sem3_diagnostic_data.txt**.

This file contains the following information.

Diagnostic Field	Default Information
IP Address	192.168.1.65
Subnet Mask	255.255.255.0
Gateway	192.168.1.1
Modbus Slave Address	125
Modbus Baud Rate	38400
Modbus Parity	Even
MAC address	MAC address of controller

Diagnostic Data Stored in the SD Card

Troubleshooting (cont'd.)

Alarm Log, Data Log and Group Log

There are several logging relevant directories which contain the respective logs such as Alarm Logs, Data Logs, and Group Logs. Each of these log directories contains the comma separated value format spreadsheets containing the logs from respective features. Each of these log files contain the date/time stamp, meter name information and the individual parameters that are deemed to be logged by the user.

Event Log

This directory contains a comma separated value format file containing the event logs recorded for the SEM3 controller. The file contains the following parameters

BACnet

This directory contains the BACnet object map as well as the BACnet data logs from the SEM3 controller.

Dashboard

This directory contains the Group and individual Data meter dashboard information for display of the trends over day, months and year.

BCM Webpages

This directory contains the SEM3 controller embedded web pages and the related framework to support the inherent Java script files/ style sheets, images and webpage files.

Export

This directory contains the exported configuration from the current SEM3 controller. This file is a JavaScript Object Notation file format.

Event Log parameter	Description	Values (recorded only on update of value)
Event Id	Event Id number ranging from 0 – 999, rolls over when 999 is reached.	0 – 999
Module Id	System or individual meter module Id number	System / Meter Module Id X, where X is the module number
Parameter Id	Identifies the individual parameters which are logged.	Power up, IP address, Subnet Mask, Default Gateway, Modbus Address, Baud Rate, Parity, Voltage Mode, Line to Line/Neutral voltage, Potential Transformer Primary, firmware upgrade, Installation configuration selection/change, Offline configuration import, Utility Seal enable/disable, Meter module specific events (CT, enable/ disable Accumulation of energy), clearing of kWH, incorrect phase and CT polarity acknowledgement.
Date	Date in MM-DD-YYYY format	
Time	Time in 12 hr format showing hr:min:sec AM/PM	
Parameter Value	Updated value of the parameter	
User name	Logged user which caused the change in the parameter.	

Event Log Listing

Firmware

This directory contains the information related to the firmware loaded in the controller. The firmware diagnostic file **sem3_fw_update_res.txt** contains the diagnostic text message which appears on the Diagnostic page detailing the last firmware upgrade. If firmware is updated successfully the message shows "Successfully programmed image, firmware f**ile:/ <firmware file name>, check file: <check file name>**.

The used directory shows the firmware and check files previously used to upgrade the controller.

Offline

This directory contains the offline configuration imported for the concerned SEM3 controller.

Troubleshooting (cont'd.)

User Input Field Requirements

The following table summarizes the user input fields in the SEM3 Phase 2 web pages.

User Field #	User Field Tag	Webpage name/ HTML Link	Max Char. Length	Min. Value	Default Value	Max. Value	Type of characters allowed	Notes
1	User Name	Login/ index.html	10	NA	admin	NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#)	White space not allowed. Dot sign not allowed.
2	Password	Login/ index.html	10	NA	sem3	NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#)	White space not allowed. Dot sign not allowed.
3	IP Address	System Settings/ SystemSetting.html	15	0.0.0.0	192.168.1.65	255.255.255.255	Numbers (0-9), Dot sign (.)	Alphabets not allowed. Other special characters not allowed.
4	Subnet Mask	System Settings/ SystemSetting.html	15	0.0.0.0	255.255.255.0	255.255.255.255	Numbers (0-9), Dot sign (.)	Alphabets not allowed. Other special characters not allowed.
5	Default Gateway	System Settings/ SystemSetting.html	15	0.0.0.0	192.168.1.1	255.255.255.255	Numbers (0-9), Dot sign (.)	Alphabets not allowed. Other special characters not allowed.
6	SMTP Server Name	System Settings/ SystemSetting.html	63	NA	smtp.gmail.com	NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#) Dot sign (.)	White space not allowed.
7	SMTP Port	System Settings/ SystemSetting.html	5	1	25	65535	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
8	User Name	System Settings/ SystemSetting.html	63	NA	admin	NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#)	White space not allowed. Dot sign not allowed.
9	Password	System Settings/ SystemSetting.html	63	NA	sem3	NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#)	White space not allowed. Dot sign not allowed.
10	Time Domain Name	System Settings/ SystemSetting.html	63	NA		NA	Alphanumeric (A-Z, a-z, 0-9), Hyphen/Dash sign (-), Dot sign(.)	White space not allowed.

Troubleshooting (cont'd.)

User Field #	User Field Tag	Webpage name/ HTML Link	Max Char. Length	Min. Value	Default Value	Max. Value	Type of characters allowed	Notes
11	DNS Name	System Settings/ SystemSetting.html	15	Minimum valid IP address		Maximum valid IP address	Numbers (0-9), Dot sign (.)	Alphabets not allowed. Other special characters not allowed. White space not allowed.
12	Modbus Address	System Settings/ SystemSetting.html	3	1	126	247	Numbers (0-9)	Alphabets not allowed.Other special characters not allowed.
13	Real Time refresh interval	System Settings/ SystemSetting.html	3	10	30	900	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
14	Device Information	System Settings/ SystemSetting.html	63	NA		NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#), Dot sign (.), comma(,), White space in between the name.	No trailing or leading white space.
15	Demand Sub Interval	System Settings/ SystemSetting.html	5	1	15	65535	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
16	Sub-Interval Length (Minutes)	System Settings/ SystemSetting.html	5	1	1	65535	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
17	PLC IP address	System Settings/ SystemSetting.html	15	0.0.0.0	192.168.1.65	255.255.255.255	Numbers (0-9). Dot sign (.)	Alphabets not allowed. Other special characters not allowed.
18	PLC Port Number	System Settings/ SystemSetting.html	4	1	502	65535	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
19	SNMP Manager IP address	System Settings/ SystemSetting.html	15	0.0.0.0	192.168.1.65	255.255.255.255	Numbers (0-9). Dot sign (.)	Alphabets not allowed. Other special characters not allowed.
20	Under Voltage Alarm Setpoint (%)	Global / GlobalResets.html	3	20	0	100	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
21	Under Voltage Alarm Time Delay (Seconds)	Global / GlobalResets.html	5	1	1	65535	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
22	Over Voltage Alarm Setpoint (%)	Global / GlobalResets.html	3	100	0	120	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
23	Over Voltage Alarm Time Delay (Seconds)	Global / GlobalResets.html	5	1	1	65535	Numbers (0-9)	Alphabets not allowed, Other special characters not allowed.

Troubleshooting (cont'd.)

User Field #	User Field Tag	Webpage name/ HTML Link	Max Char. Length	Min. Value	Default Value	Max. Value	Type of characters allowed	Notes
24	Global Over KW Demand Alarm Setpoint (kW)	Global / GlobalResets.html	4	0	0	9999	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
25	Global Over KW Demand Alarm Time Delay (Seconds)	Global / GlobalResets.html	5	1	1	65535	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
26	Global Phase Current Loss Alarm Time Delay (Seconds)	Global / GlobalResets.html	5	1	1	65535	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
27	Over Current Warning Setpoint (%)	Global / GlobalResets.html	2	20	0	80	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
28	Over Current Warning Time Delay (Seconds)	Global / GlobalResets.html	5	1	1	65535	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
29	Over Current Alarm Setpoint (%)	Global / GlobalResets.html	3	20	0	100	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
30	Over Current Alarm Time Delay (Seconds)	Global / GlobalResets.html	5	1	1	65535	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
31	Meter Name	Branch Meter Configuration/ BranchMeterConfig. html	19	NA	Meter X	NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#), Dot sign (.), White space in between the name.	No trailing or leading white space.
32	Over KW Demand Alarm Setpoint	Branch Meter Configuration/ BranchMeterConfig. html	4	0	0	9999	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
33	Over KW Demand Alarm Time Delay	Branch Meter Configuration/ BranchMeterConfig. html	5	1	1	65535	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
34	Over Current Warning Setpoint (%)	Branch Meter Configuration/ BranchMeterConfig. html	2	20	0	80	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
35	Over Current Warning Time Delay (Seconds)	Branch Meter Configuration/ BranchMeterConfig. html	5	1	1	65535	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
36	Over Current Alarm Setpoint (%)	Branch Meter Configuration/ BranchMeterConfig. html	3	20	0	100	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.

Troubleshooting (cont'd.)

User Field #	User Field Tag	Webpage name/ HTML Link	Max Char. Length	Min. Value	Default Value	Max. Value	Type of characters allowed	Notes
37	Over Current Alarm Time Delay (Seconds)	Branch Meter Configuration/ BranchMeterConfig. html	5	1	1	65535	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
38	Meter Name	Water / Gas Configuration/ MeterConfig.html	19	NA	<None>	NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#), Dot sign (.), White space in between the name.	No trailing or leading white space.
39	Pulse Measurement Units (in between 1 to 100)	Water / Gas Configuration/ MeterConfig.html	3	1	1	100	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
40	Group Name	Group/ CreateGroup.html	19	NA		NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#), White space in between the name.	No trailing or leading white space.
41	Depth (in between 1 to 4320 hours)	Data Logging/ DataLogging.html	4	1		4320	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
42	Log Name	Data Logging/ DataLogging.html	19	NA		NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#), Dot sign (.), White space in between the name.	No trailing or leading white space.
43	Depth (in between 1 to 4320 hours)	Alarm Event Log/ AlarmLogging.html	4	1		4320	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
44	Log Name	Alarm Event Log/ AlarmLogging.html	19	NA		NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#), Dot sign (.), White space in between the name.	No trailing or leading white space.
45	First Name	User Profile/ Profile. html	20	NA		NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#), Dot sign (.), White space in between the name.	No trailing or leading white space.

Troubleshooting (cont'd.)

User Field #	User Field Tag	Webpage name/ HTML Link	Max Char. Length	Min. Value	Default Value	Max. Value	Type of characters allowed	Notes
46	Last Name	User Profile/ Profile.html	20	NA		NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#), Dot sign (.), White space in between the name.	No trailing or leading white space.
47	Company Name	User Profile/ Profile.html	20	NA		NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#), Dot sign (.), White space in between the name.	No trailing or leading white space.
48	Email	User Profile/ Profile.html	50	NA		NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Dot sign (.)	White space not allowed.
49	Phone	User Profile/ Profile.html	10	NA		NA	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
50	Existing Password	User Profile/ Profile.html	10	NA		NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#)	White space not allowed. Dot sign not allowed.
51	New Password	User Profile/ Profile.html	10	NA		NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#)	White space not allowed. Dot sign not allowed.
52	Confirm Password	User Profile/ Profile.html	10	NA		NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#)	White space not allowed. Dot sign not allowed.
53	User ID	User Management/ UserManagement.html	10	NA		NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#)	White space not allowed. Dot sign not allowed.
54	First Name	User Management/ UserManagement.html	20	NA		NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#), Dot sign (.), White space in between the name.	No trailing or leading white space.

Troubleshooting (cont'd.)

User Field #	User Field Tag	Webpage name/ HTML Link	Max Char. Length	Min. Value	Default Value	Max. Value	Type of characters allowed	Notes
55	Last Name	User Management/ UserManagement. html	20	NA		NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#), Dot sign (.), White space in between the name.	No trailing or leading white space.
56	Company Name	User Management/ UserManagement. html	20	NA		NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#), Dot sign (.), White space in between the name.	No trailing or leading white space.
57	Email	User Management/ UserManagement. html	49	NA		NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Dot sign (.)	White space not allowed.
58	Phone	User Management/ UserManagement. html	10	NA		NA	Numbers (0-9)	Alphabets not allowed. Other special characters not allowed.
59	Password	User Management/ UserManagement. html	10	NA		NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#)	White space not allowed. Dot sign not allowed.
60	Confirm Password	User Management/ UserManagement. html	10	NA		NA	Alphanumeric (A-Z, a-z, 0-9), At sign (@), Hyphen/Dash sign (-), Underscore (_), Pound/Hashtag (#)	White space not allowed. Dot sign not allowed.

User Input Field Requirements

Note: As a comparison, please note a typical Windows file system does not allow following characters to be included in the file name: \ / : * ? " < > |

Troubleshooting (cont'd.)

Webpage Access by User Denomination

The SEM3 system web pages access is restricted based on the user access level.

Web pages / Actions	Supervisor	Controller	Observer
Login Page	X	X	X
Home Page	X	X	X
System Settings Page	X		
Change IP Configuration	X		
Change Email configuration	X		
Change Modbus RTU Slave Configuration	X		
Change Utility Seal selection	X		
Change System Time setup selection	X		
Change Web settings	X		
Change Panel Configuration	X		
Read/Modify System Information	X		
Change Water/Gas communication configuration	X		
Change SNMP communication configuration	X		
Change Installation Configuration/ Protocol selection	X		
Global Settings Page	X		
Change Global configuration settings	X		
View Global Alarm Summary	X		
Clear Global Voltage Alarm	X		
Perform Global Resets (Energy, Demands, Alarms etc.)	X		
Multi-Pole Configuration Page	X		
Configure Meter Modules as multi-pole selection	X		
Branch Meter Configuration Page	X		
Configure Meter Module Parameter	X		
Configure Grouped Meter Parameter	X		
Water and Gas Meter Selection Page	X		
Water and Gas Meter Configuration Page	X		
Mini Monitor Configuration Page	X		
Group Page	X		
Create and Save new Group	X		
Edit previously created group	X		
Delete previously created group	X		
Real Time Page	X	X	X
Viewing of Grouped Meter data	X	X	X
Clearing of kWh	X	X	
Clearing of Active Alarms	X	X	
Resetting of Water and Gas Pulses	X	X	

Troubleshooting (cont'd.)

Web pages / Actions	Supervisor	Controller	Observer
Data Log Page	X		
Create Meter Logs/ Group Meter Logs	X		
View Meter/Group Meter Active Logs	X		
Initiate Start Log Action	X		
Alarm Event Log	X		
Create Meter Logs/ Group Meter Logs	X		
View Meter/Group Meter Active Logs	X		
Initiate Start Log Action	X		
System Event Log Page	X	X	X
Download the Event Log	X	X	X
Print the Event Log	X	X	X
Clear System Event Log	X		
Meter Dashboard	X	X	X
Clear Dashboard	X		
Group Dashboard	X	X	X
Clear Dashboard	X		
User Profile Page	X	X	X
Modify information in the user profile (including change password)	X	X	X
User Management Page	X		
Add/Modify/Delete Users	X		
Diagnostic Page	X		
Clear CT Phase Angle Indication	X		
Clear CT Polarity Indication	X		
Download mini register map	X		
Download full register map	X		
View Detailed Modbus information per meter module	X		
Upgrade Controller Firmware	X		
Meter Module Serial Numbers Page	X	X	X
Import Configuration	X		
Export Configuration	X	X	X
BACnet IP Settings Page	X		
Modify BACnet IP Settings	X		
Download BACnet Object map	X		
BACnet IP Data Logs	X		
BACnet IP Foreign Device Registration	X		

Webpage Access by User Level

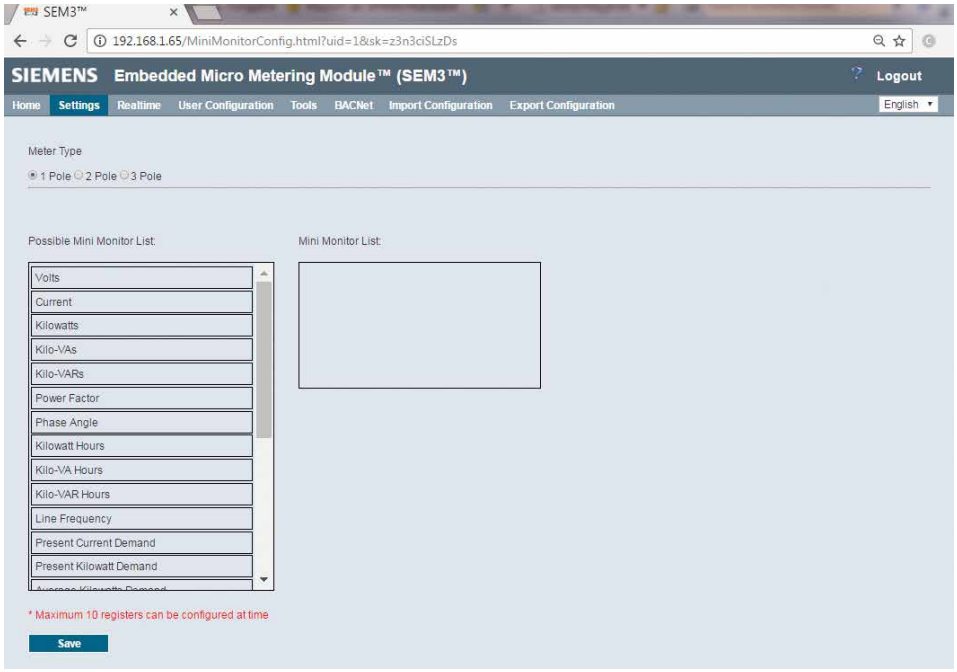
Note: In above table, "X" means that the corresponding user access level has access.

Troubleshooting (cont'd.)

Order of Mini Monitor Data Points in Modbus Map after Configuration

The 'Mini Monitor List' box will display the Modbus map after the Modbus configuration is saved and the webpage is refreshed.

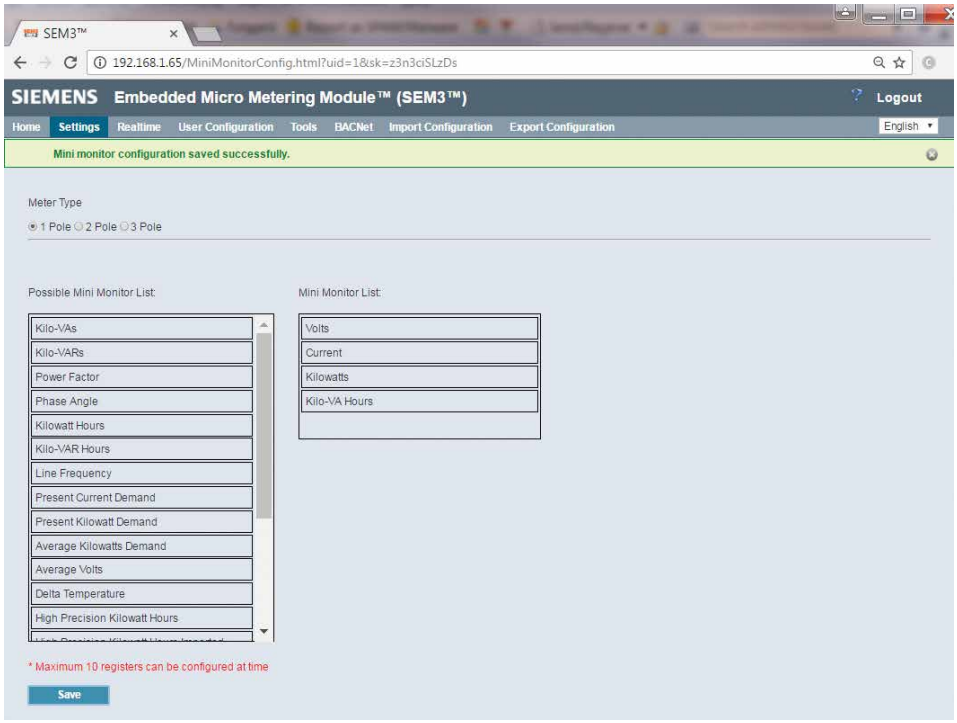
For example if the user selects the data points in the order as shown below and clicks on the save button to save the configuration.



Mini Monitor List Before Save Operation

After this operation, the configuration will be saved and the webpage will be refreshed to show the order of the 'Mini Monitor List'.

The order of the data points on the list is dependent on the orders the data points were listed in the available Modbus map designed in the firmware.



Mini Monitor List After Save Operation

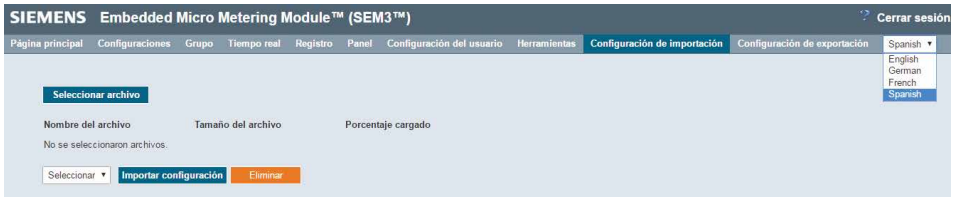
Troubleshooting (cont'd.)

Menus on the Webpage in Multi-languages

Following screens show the view of the menus for the different languages.

Menu - German

Menu - French



Menu - Spanish

Modbus Information

SEM3 Modbus Alarm Registers

Single-Phase Monitor Alarms						
Modbus Address External	Monitor ID	Reg. Size	Format	Access	Default	Description
40001	Single-Phase Monitor 1 Alarm Flags	1	Bit Field	RW	0x0000	Alarm Active bits: (write 1 to alarm bit to clear alarm) 0x0001 - Phase Loss (0 amps) Alarm bit 0x0002 - Phase Over Current Pre-Alarm bit 0x0004 - Phase Over Current Alarm bit 0x1000 - Monitor Over KW Demand Alarm bit
40002	Single-Phase Monitor 2 Alarm Flags	1	Bit Field	RW	0x0000	
40003	Single-Phase Monitor 3 Alarm Flags	1	Bit Field	RW	0x0000	
40004	Single-Phase Monitor 4 Alarm Flags	1	Bit Field	RW	0x0000	
40005	Single-Phase Monitor 5 Alarm Flags	1	Bit Field	RW	0x0000	
40006	Single-Phase Monitor 6 Alarm Flags	1	Bit Field	RW	0x0000	
40007	Single-Phase Monitor 7 Alarm Flags	1	Bit Field	RW	0x0000	
40008	Single-Phase Monitor 8 Alarm Flags	1	Bit Field	RW	0x0000	
40009	Single-Phase Monitor 9 Alarm Flags	1	Bit Field	RW	0x0000	
40010	Single-Phase Monitor 10 Alarm Flags	1	Bit Field	RW	0x0000	
40011	Single-Phase Monitor 11 Alarm Flags	1	Bit Field	RW	0x0000	
40012	Single-Phase Monitor 12 Alarm Flags	1	Bit Field	RW	0x0000	
40013	Single-Phase Monitor 13 Alarm Flags	1	Bit Field	RW	0x0000	
40014	Single-Phase Monitor 14 Alarm Flags	1	Bit Field	RW	0x0000	
40015	Single-Phase Monitor 15 Alarm Flags	1	Bit Field	RW	0x0000	
40016	Single-Phase Monitor 16 Alarm Flags	1	Bit Field	RW	0x0000	
40017	Single-Phase Monitor 17 Alarm Flags	1	Bit Field	RW	0x0000	
40018	Single-Phase Monitor 18 Alarm Flags	1	Bit Field	RW	0x0000	
40019	Single-Phase Monitor 19 Alarm Flags	1	Bit Field	RW	0x0000	
40020	Single-Phase Monitor 20 Alarm Flags	1	Bit Field	RW	0x0000	
40021	Single-Phase Monitor 21 Alarm Flags	1	Bit Field	RW	0x0000	
40022	Single-Phase Monitor 22 Alarm Flags	1	Bit Field	RW	0x0000	
40023	Single-Phase Monitor 23 Alarm Flags	1	Bit Field	RW	0x0000	
40024	Single-Phase Monitor 24 Alarm Flags	1	Bit Field	RW	0x0000	
40025	Single-Phase Monitor 25 Alarm Flags	1	Bit Field	RW	0x0000	
40026	Single-Phase Monitor 26 Alarm Flags	1	Bit Field	RW	0x0000	
40027	Single-Phase Monitor 27 Alarm Flags	1	Bit Field	RW	0x0000	
40028	Single-Phase Monitor 28 Alarm Flags	1	Bit Field	RW	0x0000	
40029	Single-Phase Monitor 29 Alarm Flags	1	Bit Field	RW	0x0000	
40030	Single-Phase Monitor 30 Alarm Flags	1	Bit Field	RW	0x0000	
40031	Single-Phase Monitor 31 Alarm Flags	1	Bit Field	RW	0x0000	
40032	Single-Phase Monitor 32 Alarm Flags	1	Bit Field	RW	0x0000	
40033	Single-Phase Monitor 33 Alarm Flags	1	Bit Field	RW	0x0000	
40034	Single-Phase Monitor 34 Alarm Flags	1	Bit Field	RW	0x0000	
40035	Single-Phase Monitor 35 Alarm Flags	1	Bit Field	RW	0x0000	
40036	Single-Phase Monitor 36 Alarm Flags	1	Bit Field	RW	0x0000	
40037	Single-Phase Monitor 37 Alarm Flags	1	Bit Field	RW	0x0000	
40038	Single-Phase Monitor 38 Alarm Flags	1	Bit Field	RW	0x0000	
40039	Single-Phase Monitor 39 Alarm Flags	1	Bit Field	RW	0x0000	

Modbus Information (cont'd.)

SEM3 Modbus Alarm Registers (cont'd.)

Single-Phase Monitor Alarms (cont'd.)						
Modbus Address External	Monitor ID	Reg. Size	Format	Access	Default	Description
40040	Single-Phase Monitor 40 Alarm Flags	1	Bit Field	RW	0x0000	
40041	Single-Phase Monitor 41 Alarm Flags	1	Bit Field	RW	0x0000	
40042	Single-Phase Monitor 42 Alarm Flags	1	Bit Field	RW	0x0000	
40043	Single-Phase Monitor 43 Alarm Flags	1	Bit Field	RW	0x0000	
40044	Single-Phase Monitor 44 Alarm Flags	1	Bit Field	RW	0x0000	
40045	Single-Phase Monitor 45 Alarm Flags	1	Bit Field	RW	0x0000	
40046	Single-Phase Monitor 46 Alarm Flags	1	Bit Field	RW	0x0000	
40047	Single-Phase Monitor 47 Alarm Flags	1	Bit Field	RW	0x0000	
40048	Single-Phase Monitor 48 Alarm Flags	1	Bit Field	RW	0x0000	
40049	Single-Phase Monitor 49 Alarm Flags	1	Bit Field	RW	0x0000	
40050	Single-Phase Monitor 50 Alarm Flags	1	Bit Field	RW	0x0000	
40051	Single-Phase Monitor 51 Alarm Flags	1	Bit Field	RW	0x0000	
40052	Single-Phase Monitor 52 Alarm Flags	1	Bit Field	RW	0x0000	
40053	Single-Phase Monitor 53 Alarm Flags	1	Bit Field	RW	0x0000	
40054	Single-Phase Monitor 54 Alarm Flags	1	Bit Field	RW	0x0000	
40055	Single-Phase Monitor 55 Alarm Flags	1	Bit Field	RW	0x0000	
40056	Single-Phase Monitor 56 Alarm Flags	1	Bit Field	RW	0x0000	
40057	Single-Phase Monitor 57 Alarm Flags	1	Bit Field	RW	0x0000	
40058	Single-Phase Monitor 58 Alarm Flags	1	Bit Field	RW	0x0000	
40059	Single-Phase Monitor 59 Alarm Flags	1	Bit Field	RW	0x0000	
40060	Single-Phase Monitor 60 Alarm Flags	1	Bit Field	RW	0x0000	
40061	Single-Phase Monitor 61 Alarm Flags	1	Bit Field	RW	0x0000	
40062	Single-Phase Monitor 62 Alarm Flags	1	Bit Field	RW	0x0000	
40063	Single-Phase Monitor 63 Alarm Flags	1	Bit Field	RW	0x0000	
Total Registers		63				

Dual-Phase Monitor Alarms						
Modbus Address External	Monitor ID	Reg. Size	Format	Access	Default	Description
40101	Dual-Phase Monitor 1 Alarm Flags	1	Bit Field	RW	0x0000	Alarm Active bits: (write 1 to alarm bit to clear alarm) 0x0001 - Phase 1 Loss (0 amps) Alarm bit 0x0002 - Phase 1 Over Current Pre-Alarm bit 0x0004 - Phase 1 Over Current Alarm bit 0x0010 - Phase 2 Loss (0 amps) Alarm bit 0x0020 - Phase 2 Over Current Pre-Alarm bit 0x0040 - Phase 2 Over Current Alarm bit 0x1000 - Monitor Over KW Demand Alarm bit
40102	Dual-Phase Monitor 2 Alarm Flags	1	Bit Field	RW	0x0000	
40103	Dual-Phase Monitor 3 Alarm Flags	1	Bit Field	RW	0x0000	
40104	Dual-Phase Monitor 4 Alarm Flags	1	Bit Field	RW	0x0000	
40105	Dual-Phase Monitor 5 Alarm Flags	1	Bit Field	RW	0x0000	
40106	Dual-Phase Monitor 6 Alarm Flags	1	Bit Field	RW	0x0000	
40107	Dual-Phase Monitor 7 Alarm Flags	1	Bit Field	RW	0x0000	
40108	Dual-Phase Monitor 8 Alarm Flags	1	Bit Field	RW	0x0000	
40109	Dual-Phase Monitor 9 Alarm Flags	1	Bit Field	RW	0x0000	
40110	Dual-Phase Monitor 10 Alarm Flags	1	Bit Field	RW	0x0000	

Modbus Information (cont'd.)

SEM3 Modbus Alarm Registers (cont'd.)

Dual-Phase Monitor alarms (cont'd.)						
Modbus Address External	Monitor ID	Reg. Size	Format	Access	Default	Description
40111	Dual-Phase Monitor 11 Alarm Flags	1	Bit Field	RW	0x0000	
40112	Dual-Phase Monitor 12 Alarm Flags	1	Bit Field	RW	0x0000	
40113	Dual-Phase Monitor 13 Alarm Flags	1	Bit Field	RW	0x0000	
40114	Dual-Phase Monitor 14 Alarm Flags	1	Bit Field	RW	0x0000	
40115	Dual-Phase Monitor 15 Alarm Flags	1	Bit Field	RW	0x0000	
40116	Dual-Phase Monitor 16 Alarm Flags	1	Bit Field	RW	0x0000	
40117	Dual-Phase Monitor 17 Alarm Flags	1	Bit Field	RW	0x0000	
40118	Dual-Phase Monitor 18 Alarm Flags	1	Bit Field	RW	0x0000	
40119	Dual-Phase Monitor 19 Alarm Flags	1	Bit Field	RW	0x0000	
40120	Dual-Phase Monitor 20 Alarm Flags	1	Bit Field	RW	0x0000	
40121	Dual-Phase Monitor 21 Alarm Flags	1	Bit Field	RW	0x0000	
40122	Dual-Phase Monitor 22 Alarm Flags	1	Bit Field	RW	0x0000	
40123	Dual-Phase Monitor 23 Alarm Flags	1	Bit Field	RW	0x0000	
40124	Dual-Phase Monitor 24 Alarm Flags	1	Bit Field	RW	0x0000	
40125	Dual-Phase Monitor 25 Alarm Flags	1	Bit Field	RW	0x0000	
40126	Dual-Phase Monitor 26 Alarm Flags	1	Bit Field	RW	0x0000	
40127	Dual-Phase Monitor 27 Alarm Flags	1	Bit Field	RW	0x0000	
40128	Dual-Phase Monitor 28 Alarm Flags	1	Bit Field	RW	0x0000	
40129	Dual-Phase Monitor 29 Alarm Flags	1	Bit Field	RW	0x0000	
40130	Dual-Phase Monitor 30 Alarm Flags	1	Bit Field	RW	0x0000	
40131	Dual-Phase Monitor 31 Alarm Flags	1	Bit Field	RW	0x0000	
40132	Dual-Phase Monitor 32 Alarm Flags	1	Bit Field	RW	0x0000	
40133	Dual-Phase Monitor 33 Alarm Flags	1	Bit Field	RW	0x0000	
40134	Dual-Phase Monitor 34 Alarm Flags	1	Bit Field	RW	0x0000	
40135	Dual-Phase Monitor 35 Alarm Flags	1	Bit Field	RW	0x0000	
40136	Dual-Phase Monitor 36 Alarm Flags	1	Bit Field	RW	0x0000	
40137	Dual-Phase Monitor 37 Alarm Flags	1	Bit Field	RW	0x0000	
40138	Dual-Phase Monitor 38 Alarm Flags	1	Bit Field	RW	0x0000	
40139	Dual-Phase Monitor 39 Alarm Flags	1	Bit Field	RW	0x0000	
40140	Dual-Phase Monitor 40 Alarm Flags	1	Bit Field	RW	0x0000	
40141	Dual-Phase Monitor 41 Alarm Flags	1	Bit Field	RW	0x0000	
40142	Dual-Phase Monitor 42 Alarm Flags	1	Bit Field	RW	0x0000	
40143	Dual-Phase Monitor 43 Alarm Flags	1	Bit Field	RW	0x0000	
40144	Dual-Phase Monitor 44 Alarm Flags	1	Bit Field	RW	0x0000	
40145	Dual-Phase Monitor 45 Alarm Flags	1	Bit Field	RW	0x0000	
40146	Dual-Phase Monitor 46 Alarm Flags	1	Bit Field	RW	0x0000	
40147	Dual-Phase Monitor 47 Alarm Flags	1	Bit Field	RW	0x0000	
40148	Dual-Phase Monitor 48 Alarm Flags	1	Bit Field	RW	0x0000	
40149	Dual-Phase Monitor 49 Alarm Flags	1	Bit Field	RW	0x0000	

Modbus Information (cont'd.)

SEM3 Modbus Alarm Registers (cont'd.)

Dual-Phase Monitor alarms (cont'd.)						
Modbus Address External	Monitor ID	Reg. Size	Format	Access	Default	Description
40150	Dual-Phase Monitor 50 Alarm Flags	1	Bit Field	RW	0x0000	
40151	Dual-Phase Monitor 51 Alarm Flags	1	Bit Field	RW	0x0000	
40152	Dual-Phase Monitor 52 Alarm Flags	1	Bit Field	RW	0x0000	
40153	Dual-Phase Monitor 53 Alarm Flags	1	Bit Field	RW	0x0000	
40154	Dual-Phase Monitor 54 Alarm Flags	1	Bit Field	RW	0x0000	
40155	Dual-Phase Monitor 55 Alarm Flags	1	Bit Field	RW	0x0000	
40156	Dual-Phase Monitor 56 Alarm Flags	1	Bit Field	RW	0x0000	
40157	Dual-Phase Monitor 57 Alarm Flags	1	Bit Field	RW	0x0000	
40158	Dual-Phase Monitor 58 Alarm Flags	1	Bit Field	RW	0x0000	
40159	Dual-Phase Monitor 59 Alarm Flags	1	Bit Field	RW	0x0000	
40160	Dual-Phase Monitor 60 Alarm Flags	1	Bit Field	RW	0x0000	
40161	Dual-Phase Monitor 61 Alarm Flags	1	Bit Field	RW	0x0000	
40162	Dual-Phase Monitor 62 Alarm Flags	1	Bit Field	RW	0x0000	
Total Registers		62				

Three-Phase Monitor Alarms						
Modbus Address External	Monitor ID	Reg. Size	Format	Access	Default	Description
40201	Three-Phase Monitor 1 Alarm Flags	1	Bit Field	RW	0x0000	Alarm Active bits: (write 1 to alarm bit to clear alarm) 0x0001 - Phase 1 Loss (0 amps) Alarm bit 0x0002 - Phase 1 Over Current Pre-Alarm bit 0x0004 - Phase 1 Over Current Alarm bit 0x0010 - Phase 2 Loss (0 amps) Alarm bit 0x0020 - Phase 2 Over Current Pre-Alarm bit 0x0040 - Phase 2 Over Current Alarm bit 0x0100 - Phase 3 Loss (0 amps) Alarm bit 0x0200 - Phase 3 Over Current Pre-Alarm bit 0x0400 - Phase 3 Over Current Alarm bit 0x1000 - Monitor Over KW Demand Alarm bit
40202	Three-Phase Monitor 2 Alarm Flags	1	Bit Field	RW	0x0000	
40203	Three-Phase Monitor 3 Alarm Flags	1	Bit Field	RW	0x0000	
40204	Three-Phase Monitor 4 Alarm Flags	1	Bit Field	RW	0x0000	
40205	Three-Phase Monitor 5 Alarm Flags	1	Bit Field	RW	0x0000	
40206	Three-Phase Monitor 6 Alarm Flags	1	Bit Field	RW	0x0000	
40207	Three-Phase Monitor 7 Alarm Flags	1	Bit Field	RW	0x0000	
40208	Three-Phase Monitor 8 Alarm Flags	1	Bit Field	RW	0x0000	
40209	Three-Phase Monitor 9 Alarm Flags	1	Bit Field	RW	0x0000	
40210	Three-Phase Monitor 10 Alarm Flags	1	Bit Field	RW	0x0000	
40211	Three-Phase Monitor 11 Alarm Flags	1	Bit Field	RW	0x0000	
40212	Three-Phase Monitor 12 Alarm Flags	1	Bit Field	RW	0x0000	
40213	Three-Phase Monitor 13 Alarm Flags	1	Bit Field	RW	0x0000	
40214	Three-Phase Monitor 14 Alarm Flags	1	Bit Field	RW	0x0000	
40215	Three-Phase Monitor 15 Alarm Flags	1	Bit Field	RW	0x0000	
40216	Three-Phase Monitor 16 Alarm Flags	1	Bit Field	RW	0x0000	
40217	Three-Phase Monitor 17 Alarm Flags	1	Bit Field	RW	0x0000	
40218	Three-Phase Monitor 18 Alarm Flags	1	Bit Field	RW	0x0000	
40219	Three-Phase Monitor 19 Alarm Flags	1	Bit Field	RW	0x0000	
40220	Three-Phase Monitor 20 Alarm Flags	1	Bit Field	RW	0x0000	
40221	Three-Phase Monitor 21 Alarm Flags	1	Bit Field	RW	0x0000	

Modbus Information (cont'd.)

SEM3 Modbus Alarm Registers (cont'd.)

Three-Phase Monitor Alarms (cont'd.)						
Modbus Address External	Monitor ID	Reg. Size	Format	Access	Default	Description
40222	Three-Phase Monitor 22 Alarm Flags	1	Bit Field	RW	0x0000	
40223	Three-Phase Monitor 23 Alarm Flags	1	Bit Field	RW	0x0000	
40224	Three-Phase Monitor 24 Alarm Flags	1	Bit Field	RW	0x0000	
40225	Three-Phase Monitor 25 Alarm Flags	1	Bit Field	RW	0x0000	
40226	Three-Phase Monitor 26 Alarm Flags	1	Bit Field	RW	0x0000	
40227	Three-Phase Monitor 27 Alarm Flags	1	Bit Field	RW	0x0000	
40228	Three-Phase Monitor 28 Alarm Flags	1	Bit Field	RW	0x0000	
40229	Three-Phase Monitor 29 Alarm Flags	1	Bit Field	RW	0x0000	
40230	Three-Phase Monitor 30 Alarm Flags	1	Bit Field	RW	0x0000	
40231	Three-Phase Monitor 31 Alarm Flags	1	Bit Field	RW	0x0000	
40232	Three-Phase Monitor 32 Alarm Flags	1	Bit Field	RW	0x0000	
40233	Three-Phase Monitor 33 Alarm Flags	1	Bit Field	RW	0x0000	
40234	Three-Phase Monitor 34 Alarm Flags	1	Bit Field	RW	0x0000	
40235	Three-Phase Monitor 35 Alarm Flags	1	Bit Field	RW	0x0000	
40236	Three-Phase Monitor 36 Alarm Flags	1	Bit Field	RW	0x0000	
40237	Three-Phase Monitor 37 Alarm Flags	1	Bit Field	RW	0x0000	
40238	Three-Phase Monitor 38 Alarm Flags	1	Bit Field	RW	0x0000	
40239	Three-Phase Monitor 39 Alarm Flags	1	Bit Field	RW	0x0000	
40240	Three-Phase Monitor 40 Alarm Flags	1	Bit Field	RW	0x0000	
40241	Three-Phase Monitor 41 Alarm Flags	1	Bit Field	RW	0x0000	
40242	Three-Phase Monitor 42 Alarm Flags	1	Bit Field	RW	0x0000	
40243	Three-Phase Monitor 43 Alarm Flags	1	Bit Field	RW	0x0000	
40244	Three-Phase Monitor 44 Alarm Flags	1	Bit Field	RW	0x0000	
40245	Three-Phase Monitor 45 Alarm Flags	1	Bit Field	RW	0x0000	
40246	Three-Phase Monitor 46 Alarm Flags	1	Bit Field	RW	0x0000	
40247	Three-Phase Monitor 47 Alarm Flags	1	Bit Field	RW	0x0000	
40248	Three-Phase Monitor 48 Alarm Flags	1	Bit Field	RW	0x0000	
40249	Three-Phase Monitor 49 Alarm Flags	1	Bit Field	RW	0x0000	
40250	Three-Phase Monitor 50 Alarm Flags	1	Bit Field	RW	0x0000	
40251	Three-Phase Monitor 51 Alarm Flags	1	Bit Field	RW	0x0000	
40252	Three-Phase Monitor 52 Alarm Flags	1	Bit Field	RW	0x0000	
40253	Three-Phase Monitor 53 Alarm Flags	1	Bit Field	RW	0x0000	
40254	Three-Phase Monitor 54 Alarm Flags	1	Bit Field	RW	0x0000	
40255	Three-Phase Monitor 55 Alarm Flags	1	Bit Field	RW	0x0000	
40256	Three-Phase Monitor 56 Alarm Flags	1	Bit Field	RW	0x0000	
40257	Three-Phase Monitor 57 Alarm Flags	1	Bit Field	RW	0x0000	
40258	Three-Phase Monitor 58 Alarm Flags	1	Bit Field	RW	0x0000	
40259	Three-Phase Monitor 59 Alarm Flags	1	Bit Field	RW	0x0000	

Modbus Information (cont'd.)

SEM3 Modbus Alarm Registers (cont'd.)

Three-Phase Monitor Alarms (cont'd.)						
Modbus Address External	Monitor ID	Reg. Size	Format	Access	Default	Description
40260	Three-Phase Monitor 60 Alarm Flags	1	Bit Field	RW	0x0000	
40261	Three-Phase Monitor 61 Alarm Flags	1	Bit Field	RW	0x0000	
Total Registers		61				

Mini-Monitor Data Registers

Modbus Address External	Single-Phase Mini-Monitors	Reg. Count
40301	Single-Phase Mini-Monitor 1 base address	10
40311	Single-Phase Mini-Monitor 2 base address	10
40321	Single-Phase Mini-Monitor 3 base address	10
40331	Single-Phase Mini-Monitor 4 base address	10
40341	Single-Phase Mini-Monitor 5 base address	10
40351	Single-Phase Mini-Monitor 6 base address	10
40361	Single-Phase Mini-Monitor 7 base address	10
40371	Single-Phase Mini-Monitor 8 base address	10
40381	Single-Phase Mini-Monitor 9 base address	10
40391	Single-Phase Mini-Monitor 10 base address	10
40401	Single-Phase Mini-Monitor 11 base address	10
40411	Single-Phase Mini-Monitor 12 base address	10
40421	Single-Phase Mini-Monitor 13 base address	10
40431	Single-Phase Mini-Monitor 14 base address	10
40441	Single-Phase Mini-Monitor 15 base address	10
40451	Single-Phase Mini-Monitor 16 base address	10
40461	Single-Phase Mini-Monitor 17 base address	10
40471	Single-Phase Mini-Monitor 18 base address	10
40481	Single-Phase Mini-Monitor 19 base address	10
40491	Single-Phase Mini-Monitor 20 base address	10
40501	Single-Phase Mini-Monitor 21 base address	10

Modbus Information (cont'd.)

Mini-Monitor Data Registers (cont'd.)

Modbus Address External	Single-Phase Mini-Monitors (cont'd.)	Reg. Count
40511	Single-Phase Mini-Monitor 22 base address	10
40521	Single-Phase Mini-Monitor 23 base address	10
40531	Single-Phase Mini-Monitor 24 base address	10
40541	Single-Phase Mini-Monitor 25 base address	10
40551	Single-Phase Mini-Monitor 26 base address	10
40561	Single-Phase Mini-Monitor 27 base address	10
40571	Single-Phase Mini-Monitor 28 base address	10
40581	Single-Phase Mini-Monitor 29 base address	10
40591	Single-Phase Mini-Monitor 30 base address	10
40601	Single-Phase Mini-Monitor 31 base address	10
40611	Single-Phase Mini-Monitor 32 base address	10
40621	Single-Phase Mini-Monitor 33 base address	10
40631	Single-Phase Mini-Monitor 34 base address	10
40641	Single-Phase Mini-Monitor 35 base address	10
40651	Single-Phase Mini-Monitor 36 base address	10
40661	Single-Phase Mini-Monitor 37 base address	10
40671	Single-Phase Mini-Monitor 38 base address	10
40681	Single-Phase Mini-Monitor 39 base address	10
40691	Single-Phase Mini-Monitor 40 base address	10
40701	Single-Phase Mini-Monitor 41 base address	10
40711	Single-Phase Mini-Monitor 42 base address	10
40721	Single-Phase Mini-Monitor 43 base address	10
40731	Single-Phase Mini-Monitor 44 base address	10
40741	Single-Phase Mini-Monitor 45 base address	10
40751	Single-Phase Mini-Monitor 46 base address	10
40761	Single-Phase Mini-Monitor 47 base address	10
40771	Single-Phase Mini-Monitor 48 base address	10
40781	Single-Phase Mini-Monitor 49 base address	10
40791	Single-Phase Mini-Monitor 50 base address	10
40801	Single-Phase Mini-Monitor 51 base address	10
40811	Single-Phase Mini-Monitor 52 base address	10
40821	Single-Phase Mini-Monitor 53 base address	10
40831	Single-Phase Mini-Monitor 54 base address	10
40841	Single-Phase Mini-Monitor 55 base address	10
40851	Single-Phase Mini-Monitor 56 base address	10
40861	Single-Phase Mini-Monitor 57 base address	10
40871	Single-Phase Mini-Monitor 58 base address	10
40881	Single-Phase Mini-Monitor 59 base address	10
40891	Single-Phase Mini-Monitor 60 base address	10

Modbus Information (cont'd.)

Mini-Monitor Data Registers (cont'd.)

Modbus Address External	Single-Phase Mini-Monitors (cont'd.)	Reg. Count
40901	Single-Phase Mini-Monitor 61 base address	10
40911	Single-Phase Mini-Monitor 62 base address	10
40921	Single-Phase Mini-Monitor 63 base address	10
40931	Dual-Phase Mini-Monitor 1 base address	10
40941	Dual-Phase Mini-Monitor 2 base address	10
40951	Dual-Phase Mini-Monitor 3 base address	10
40961	Dual-Phase Mini-Monitor 4 base address	10
40971	Dual-Phase Mini-Monitor 5 base address	10
40981	Dual-Phase Mini-Monitor 6 base address	10
40991	Dual-Phase Mini-Monitor 7 base address	10
41001	Dual-Phase Mini-Monitor 8 base address	10
41011	Dual-Phase Mini-Monitor 9 base address	10
41021	Dual-Phase Mini-Monitor 10 base address	10
41031	Dual-Phase Mini-Monitor 11 base address	10
41041	Dual-Phase Mini-Monitor 12 base address	10
41051	Dual-Phase Mini-Monitor 13 base address	10
41061	Dual-Phase Mini-Monitor 14 base address	10
41071	Dual-Phase Mini-Monitor 15 base address	10
41081	Dual-Phase Mini-Monitor 16 base address	10
41091	Dual-Phase Mini-Monitor 17 base address	10
41101	Dual-Phase Mini-Monitor 18 base address	10
41111	Dual-Phase Mini-Monitor 19 base address	10
41121	Dual-Phase Mini-Monitor 20 base address	10
41131	Dual-Phase Mini-Monitor 21 base address	10
41141	Dual-Phase Mini-Monitor 22 base address	10
41151	Dual-Phase Mini-Monitor 23 base address	10
41161	Dual-Phase Mini-Monitor 24 base address	10
41171	Dual-Phase Mini-Monitor 25 base address	10
41181	Dual-Phase Mini-Monitor 26 base address	10
41191	Dual-Phase Mini-Monitor 27 base address	10
41201	Dual-Phase Mini-Monitor 28 base address	10
41211	Dual-Phase Mini-Monitor 29 base address	10
41221	Dual-Phase Mini-Monitor 30 base address	10
41231	Dual-Phase Mini-Monitor 31 base address	10
41241	Dual-Phase Mini-Monitor 32 base address	10
41251	Dual-Phase Mini-Monitor 33 base address	10
41261	Dual-Phase Mini-Monitor 34 base address	10
41271	Dual-Phase Mini-Monitor 35 base address	10
41281	Dual-Phase Mini-Monitor 36 base address	10

Modbus Information (cont'd.)

Mini-Monitor Data Registers (cont'd.)

Modbus Address External	Single-Phase Mini-Monitors (cont'd.)	Reg. Count
41291	Dual-Phase Mini-Monitor 37 base address	10
41301	Dual-Phase Mini-Monitor 38 base address	10
41311	Dual-Phase Mini-Monitor 39 base address	10
41321	Dual-Phase Mini-Monitor 40 base address	10
41331	Dual-Phase Mini-Monitor 41 base address	10
41341	Dual-Phase Mini-Monitor 42 base address	10
41351	Dual-Phase Mini-Monitor 43 base address	10
41361	Dual-Phase Mini-Monitor 44 base address	10
41371	Dual-Phase Mini-Monitor 45 base address	10
41381	Dual-Phase Mini-Monitor 46 base address	10
41391	Dual-Phase Mini-Monitor 47 base address	10
41401	Dual-Phase Mini-Monitor 48 base address	10
41411	Dual-Phase Mini-Monitor 49 base address	10
41421	Dual-Phase Mini-Monitor 50 base address	10
41431	Dual-Phase Mini-Monitor 51 base address	10
41441	Dual-Phase Mini-Monitor 52 base address	10
41451	Dual-Phase Mini-Monitor 53 base address	10
41461	Dual-Phase Mini-Monitor 54 base address	10
41471	Dual-Phase Mini-Monitor 55 base address	10
41481	Dual-Phase Mini-Monitor 56 base address	10
41491	Dual-Phase Mini-Monitor 57 base address	10
41501	Dual-Phase Mini-Monitor 58 base address	10
41511	Dual-Phase Mini-Monitor 59 base address	10
41521	Dual-Phase Mini-Monitor 60 base address	10
41531	Dual-Phase Mini-Monitor 61 base address	10
41541	Dual-Phase Mini-Monitor 62 base address	10
41551	Three-Phase Mini-Monitor 1 base address	10
41561	Three-Phase Mini-Monitor 2 base address	10
41571	Three-Phase Mini-Monitor 3 base address	10
41581	Three-Phase Mini-Monitor 4 base address	10
41591	Three-Phase Mini-Monitor 5 base address	10
41601	Three-Phase Mini-Monitor 6 base address	10
41611	Three-Phase Mini-Monitor 7 base address	10
41621	Three-Phase Mini-Monitor 8 base address	10
41631	Three-Phase Mini-Monitor 9 base address	10
41641	Three-Phase Mini-Monitor 10 base address	10
41651	Three-Phase Mini-Monitor 11 base address	10
41661	Three-Phase Mini-Monitor 12 base address	10
41671	Three-Phase Mini-Monitor 13 base address	10

Modbus Information (cont'd.)

Mini-Monitor Data Registers (cont'd.)

Modbus Address External	Single-Phase Mini-Monitors (cont'd.)	Reg. Count
41681	Three-Phase Mini-Monitor 14 base address	10
41691	Three-Phase Mini-Monitor 15 base address	10
41701	Three-Phase Mini-Monitor 16 base address	10
41711	Three-Phase Mini-Monitor 17 base address	10
41721	Three-Phase Mini-Monitor 18 base address	10
41731	Three-Phase Mini-Monitor 19 base address	10
41741	Three-Phase Mini-Monitor 20 base address	10
41751	Three-Phase Mini-Monitor 21 base address	10
41761	Three-Phase Mini-Monitor 22 base address	10
41771	Three-Phase Mini-Monitor 23 base address	10
41781	Three-Phase Mini-Monitor 24 base address	10
41791	Three-Phase Mini-Monitor 25 base address	10
41801	Three-Phase Mini-Monitor 26 base address	10
41811	Three-Phase Mini-Monitor 27 base address	10
41821	Three-Phase Mini-Monitor 28 base address	10
41831	Three-Phase Mini-Monitor 29 base address	10
41841	Three-Phase Mini-Monitor 30 base address	10
41851	Three-Phase Mini-Monitor 31 base address	10
41861	Three-Phase Mini-Monitor 32 base address	10
41871	Three-Phase Mini-Monitor 33 base address	10
41881	Three-Phase Mini-Monitor 34 base address	10
41891	Three-Phase Mini-Monitor 35 base address	10
41901	Three-Phase Mini-Monitor 36 base address	10
41911	Three-Phase Mini-Monitor 37 base address	10
41921	Three-Phase Mini-Monitor 38 base address	10
41931	Three-Phase Mini-Monitor 39 base address	10
41941	Three-Phase Mini-Monitor 40 base address	10
41951	Three-Phase Mini-Monitor 41 base address	10
41961	Three-Phase Mini-Monitor 42 base address	10
41971	Three-Phase Mini-Monitor 43 base address	10
41981	Three-Phase Mini-Monitor 44 base address	10
41991	Three-Phase Mini-Monitor 45 base address	10
42001	Three-Phase Mini-Monitor 46 base address	10
42011	Three-Phase Mini-Monitor 47 base address	10
42021	Three-Phase Mini-Monitor 48 base address	10
42031	Three-Phase Mini-Monitor 49 base address	10
42041	Three-Phase Mini-Monitor 50 base address	10
42051	Three-Phase Mini-Monitor 51 base address	10
42061	Three-Phase Mini-Monitor 52 base address	10

Modbus Information (cont'd.)

Mini-Monitor Data Registers (cont'd.)

Modbus Address External	Single-Phase Mini-Monitors (cont'd.)	Reg. Count
42071	Three-Phase Mini-Monitor 53 base address	10
42081	Three-Phase Mini-Monitor 54 base address	10
42091	Three-Phase Mini-Monitor 55 base address	10
42101	Three-Phase Mini-Monitor 56 base address	10
42111	Three-Phase Mini-Monitor 57 base address	10
42121	Three-Phase Mini-Monitor 58 base address	10
42131	Three-Phase Mini-Monitor 59 base address	10
42141	Three-Phase Mini-Monitor 60 base address	10
42151	Three-Phase Mini-Monitor 61 base address	10
	Total Registers	**1860**

Modbus Information (cont'd.)

SEM3 Monitor Data Registers

Single-Phase Monitor Data Registers								
Address Offsets	Data	Reg. Size	Format	Access	Range	Default	Resolution	Description
Base	Volts	2	Float-32	RO	-	-	0.001 Volts	Each Single Phase Monitor contains these 28 data items in the order listed.
Base+2	Current	2	Float-32	RO	-	-	0.001 Amps	
Base+4	Kilowatts	2	Float-32	RO	-	-	0.001 Kilowatt	
Base+6	Kilo-VAs	2	Float-32	RO	-	-	0.001 VA	
Base+8	Kilo-VARs	2	Float-32	RO	-	-	0.001 VAR	
Base+10	Power Factor	2	Float-32	RO	-	-	0.001	
Base+12	Phase Angle	2	Float-32	RO	-	-	0.001°	
Base+14	Kilowatt Hours	2	Float-32	RO	-	-	0.001 Kilowatt hour	
Base+16	Kilo-VA Hours	2	Float-32	RO	-	-	0.001 Kilo-VA hour	
Base+18	Kilo-VAR Hours	2	Float-32	RO	-	-	0.001 Kilo-VAR hour	
Base+20	Line Frequency	2	Float-32	RO	-	-	0.1 Hz	
Base+22	Present Current Demand	2	Float-32	RO	-	-	0.001 Amps	
Base+24	Maximum Current Demand	2	Float-32	RO	-	-	0.001 Amps	
Base+26	Maximum Current	2	Float-32	RO	-	-	0.001 Amps	
Base+28	Present Kilowatt Demand	2	Float-32	RO	-	-	0.001 Kilowatt	
Base+30	Average Kilowatts Demand	2	Float-32	RO	-	-	0.001 Kilowatt	
Base+32	Maximum Kilowatt Demand	2	Float-32	RO	-	-	0.001 Kilowatt	
Base+34	Maximum Total Kilowatts	2	Float-32	RO	-	-	0.001 Kilowatt	
Base+36	Average Volts	2	Float-32	RO	-	-	0.001 Volts	
Base+38	Over KW Demand Alarm Setpoint	2	Uint-32	RW	0, 1-4294967295	0	Setpoint value, 0 disables alarm	
Base+40	Over KW Demand Alarm Time Delay	1	Uint-16	RW	1-65535	1 sec.	Alarm delay in seconds	
Base+41	Over Current Pre-Alarm Setpoint	1	Uint-16	RW	0, 50%-80%	0	Setpoint value, 0 disables alarm	
Base+42	Over Current Pre-Alarm Time Delay	1	Uint-16	RW	1-65535	1 sec.	Alarm delay in seconds	
Base+43	Over Current Alarm Setpoint	1	Uint-16	RW	0, 70%-100%	0	Setpoint value, 0 disables alarm	
Base+44	Over Current Alarm Time Delay	1	Uint-16	RW	1-65535	1 sec.	Alarm delay in seconds	

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

Single-Phase Monitor Data Registers (cont'd.)								
Address Offsets	Data	Reg. Size	Format	Access	Range	Default	Resolution	Description
Base+45	Active Alarms	1	Bit Field	RW	-	0x0000	Alarm Active bits: (write 1 to alarm bit to clear alarm) 0x0001 - Phase Loss (0 amps) Alarm bit 0x0002 - Phase Over Current Pre-Alarm bit 0x0004 - Phase Over Current Alarm bit 0x1000 - Monitor Over KW Demand Alarm bit	

Modbus Address External	Single-Phase Monitors	Reg. Count
42201	Single-Phase Monitor 1 base address	46
42247	Single-Phase Monitor 2 base address	46
42293	Single-Phase Monitor 3 base address	46
42339	Single-Phase Monitor 4 base address	46
42385	Single-Phase Monitor 5 base address	46
42431	Single-Phase Monitor 6 base address	46
42477	Single-Phase Monitor 7 base address	46
42523	Single-Phase Monitor 8 base address	46
42569	Single-Phase Monitor 9 base address	46
42615	Single-Phase Monitor 10 base address	46
42661	Single-Phase Monitor 11 base address	46
42707	Single-Phase Monitor 12 base address	46
42753	Single-Phase Monitor 13 base address	46
42799	Single-Phase Monitor 14 base address	46
42845	Single-Phase Monitor 15 base address	46
42891	Single-Phase Monitor 16 base address	46
42937	Single-Phase Monitor 17 base address	46
42983	Single-Phase Monitor 18 base address	46
43029	Single-Phase Monitor 19 base address	46
43075	Single-Phase Monitor 20 base address	46
43121	Single-Phase Monitor 21 base address	46
43167	Single-Phase Monitor 22 base address	46
43213	Single-Phase Monitor 23 base address	46
43259	Single-Phase Monitor 24 base address	46
43305	Single-Phase Monitor 25 base address	46
43351	Single-Phase Monitor 26 base address	46
43397	Single-Phase Monitor 27 base address	46
43443	Single-Phase Monitor 28 base address	46

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

Modbus Address External	Single-Phase Monitors (cont'd.)	Reg. Count
43489	Single-Phase Monitor 29 base address	46
43535	Single-Phase Monitor 30 base address	46
43581	Single-Phase Monitor 31 base address	46
43627	Single-Phase Monitor 32 base address	46
43673	Single-Phase Monitor 33 base address	46
43719	Single-Phase Monitor 34 base address	46
43765	Single-Phase Monitor 35 base address	46
43811	Single-Phase Monitor 36 base address	46
43857	Single-Phase Monitor 37 base address	46
43903	Single-Phase Monitor 38 base address	46
43949	Single-Phase Monitor 39 base address	46
43995	Single-Phase Monitor 40 base address	46
44041	Single-Phase Monitor 41 base address	46
44087	Single-Phase Monitor 42 base address	46
44133	Single-Phase Monitor 43 base address	46
44179	Single-Phase Monitor 44 base address	46
44225	Single-Phase Monitor 45 base address	46
44271	Single-Phase Monitor 46 base address	46
44317	Single-Phase Monitor 47 base address	46
44363	Single-Phase Monitor 48 base address	46
44409	Single-Phase Monitor 49 base address	46
44455	Single-Phase Monitor 50 base address	46
44501	Single-Phase Monitor 51 base address	46
44547	Single-Phase Monitor 52 base address	46
44593	Single-Phase Monitor 53 base address	46
44639	Single-Phase Monitor 54 base address	46
44685	Single-Phase Monitor 55 base address	46
44731	Single-Phase Monitor 56 base address	46
44777	Single-Phase Monitor 57 base address	46
44823	Single-Phase Monitor 58 base address	46
44869	Single-Phase Monitor 59 base address	46
44915	Single-Phase Monitor 60 base address	46
44961	Single-Phase Monitor 61 base address	46
45007	Single-Phase Monitor 62 base address	46
45053	Single-Phase Monitor 63 base address	46
	Total Registers	2898

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

Dual-Phase Monitor Data Registers								
Address Offsets	Data	Reg. Size	Format	Access	Range	Default	Resolution	Description
Base	Volts Phase 1	2	Float-32	RO	-	-	0.001 Volts	Each Dual Phase Monitor contains these 47 data items in the order listed.
Base+2	Volts Phase 2	2	Float-32	RO	-	-	0.001 Volts	
Base+4	Current Phase 1	2	Float-32	RO	-	-	0.001 Amps	
Base+6	Current Phase 2	2	Float-32	RO	-	-	0.001 Amps	
Base+8	Kilowatts Phase 1	2	Float-32	RO	-	-	0.001 Kilowatt	
Base+10	Kilowatts Phase 2	2	Float-32	RO	-	-	0.001 Kilowatt	
Base+12	Kilo-VAs Phase 1	2	Float-32	RO	-	-	0.001 VA	
Base+14	Kilo-VAs Phase 2	2	Float-32	RO	-	-	0.001 VA	
Base+16	Kilo-VARs Phase 1	2	Float-32	RO	-	-	0.001 VAR	
Base+18	Kilo-VARs Phase 2	2	Float-32	RO	-	-	0.001 VAR	
Base+20	Power Factor Phase 1	2	Float-32	RO	-	-	0.001	
Base+22	Power Factor Phase 2	2	Float-32	RO	-	-	0.001	
Base+24	Phase Angle Phase 1	2	Float-32	RO	-	-	0.001°	
Base+26	Phase Angle Phase 2	2	Float-32	RO	-	-	0.001°	
Base+28	Kilowatt Hours	2	Float-32	RO	-	-	0.001 Kilowatt hour	
Base+30	Kilo-VA Hours	2	Float-32	RO	-	-	0.001 Kilo-VA hour	
Base+32	Kilo-VAR Hours	2	Float-32	RO	-	-	0.001 Kilo-VAR hour	
Base+34	Line Frequency Phase 1	2	Float-32	RO	-	-	0.1 Hz	
Base+36	Line Frequency Phase 2	2	Float-32	RO	-	-	0.1 Hz	
Base+38	Present Current Demand Phase 1	2	Float-32	RO	-	-	0.001 Amps	
Base+40	Present Current Demand Phase 2	2	Float-32	RO	-	-	0.001 Amps	
Base+42	Maximum Current Demand Phase 1	2	Float-32	RO	-	-	0.001 Amps	
Base+44	Maximum Current Demand Phase 2	2	Float-32	RO	-	-	0.001 Amps	
Base+46	Maximum Current Phase 1	2	Float-32	RO	-	-	0.001 Amps	
Base+48	Maximum Current Phase 2	2	Float-32	RO	-	-	0.001 Amps	
Base+50	Present Kilowatt Total Demand	2	Float-32	RO	-	-	0.001 Kilowatt	
Base+52	Average Kilowatts Total Demand	2	Float-32	RO	-	-	0.001 Kilowatt	
Base+54	Maximum Total Kilowatts Demand	2	Float-32	RO	-	-	0.001 Kilowatt	
Base+56	Maximum Total Kilowatts	2	Float-32	RO	-	-	0.001 Kilowatt	
Base+58	Total Monitor Kilowatts	2	Float-32	RO	-	-	0.001 Kilowatt	
Base+60	Total Monitor Power Factor	2	Float-32	RO	-	-	0.001	
Base+62	Average Current of 2 phases	2	Float-32	RO	-	-	0.001 Amps	
Base+64	Average Volts	2	Float-32	RO	-	-	0.001 Volts	
Base+66	Total Monitor Current	2	Float-32	RO	-	-	0.001 Amps	
Base+68	Total Monitor Kilo-VARs	2	Float-32	RO	-	-	0.001 VAR	

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

Dual-Phase Monitor Data Registers (cont'd.)								
Address Offsets	Data	Reg. Size	Format	Access	Range	Default	Resolution	Description
Base+70	Total Monitor Kilo-VAs	2	Float-32	RO	-	-	0.001 VA	
Base+72	Over KW Demand Alarm Setpoint	2	Uint-32	RW	0, 1-4294967295	0	Setpoint value, 0 disables alarm	
Base+74	Over KW Demand Alarm Time Delay	1	Uint-16	RW	1-65535	1 sec.	Alarm delay in seconds	
Base+75	Over Current Pre-Alarm Setpoint	1	Uint-16	RW	0, 50%-80%	0	Setpoint value, 0 disables alarm	
Base+76	Over Current Pre-Alarm Time Delay	1	Uint-16	RW	1-65535	1 sec.	Alarm delay in seconds	
Base+77	Over Current Alarm Setpoint	1	Uint-16	RW	0, 70%-100%	0	Setpoint value, 0 disables alarm	
Base+78	Over Current Alarm Time Delay	1	Uint-16	RW	1-65535	1 sec.	Alarm delay in seconds	
Base+79	Active Alarms	1	Bit Field	RW	-	0x0000	Alarm Active bits: (write 1 to alarm bit to clear alarm) 0x0001 - Phase 1 Loss (0 amps) Alarm bit 0x0002 - Phase 1 Over Current Pre-Alarm bit 0x0004 - Phase 1 Over Current Alarm bit 0x0010 - Phase 2 Loss (0 amps) Alarm bit 0x0020 - Phase 2 Over Current Pre-Alarm bit 0x0040 - Phase 2 Over Current Alarm bit 0x1000 - Monitor Over KW Demand Alarm bit	

Modbus Address External	Dual-Phase Monitors	Reg. Count
45701	Dual-Phase Monitor 1 base address	80
45781	Dual-Phase Monitor 2 base address	80
45861	Dual-Phase Monitor 3 base address	80
45941	Dual-Phase Monitor 4 base address	80
46021	Dual-Phase Monitor 5 base address	80
46101	Dual-Phase Monitor 6 base address	80
46181	Dual-Phase Monitor 7 base address	80
46261	Dual-Phase Monitor 8 base address	80
46341	Dual-Phase Monitor 9 base address	80
46421	Dual-Phase Monitor 10 base address	80
46501	Dual-Phase Monitor 11 base address	80
46581	Dual-Phase Monitor 12 base address	80

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

Modbus Address External	Dual-Phase Monitors (cont'd.)	Reg. Count
46661	Dual-Phase Monitor 13 base address	80
46741	Dual-Phase Monitor 14 base address	80
46821	Dual-Phase Monitor 15 base address	80
46901	Dual-Phase Monitor 16 base address	80
46981	Dual-Phase Monitor 17 base address	80
47061	Dual-Phase Monitor 18 base address	80
47141	Dual-Phase Monitor 19 base address	80
47221	Dual-Phase Monitor 20 base address	80
47301	Dual-Phase Monitor 21 base address	80
47381	Dual-Phase Monitor 22 base address	80
47461	Dual-Phase Monitor 23 base address	80
47541	Dual-Phase Monitor 24 base address	80
47621	Dual-Phase Monitor 25 base address	80
47701	Dual-Phase Monitor 26 base address	80
47781	Dual-Phase Monitor 27 base address	80
47861	Dual-Phase Monitor 28 base address	80
47941	Dual-Phase Monitor 29 base address	80
48021	Dual-Phase Monitor 30 base address	80
48101	Dual-Phase Monitor 31 base address	80
48181	Dual-Phase Monitor 32 base address	80
48261	Dual-Phase Monitor 33 base address	80
48341	Dual-Phase Monitor 34 base address	80
48421	Dual-Phase Monitor 35 base address	80
48501	Dual-Phase Monitor 36 base address	80
48581	Dual-Phase Monitor 37 base address	80
48661	Dual-Phase Monitor 38 base address	80
48741	Dual-Phase Monitor 39 base address	80
48821	Dual-Phase Monitor 40 base address	80
48901	Dual-Phase Monitor 41 base address	80
48981	Dual-Phase Monitor 42 base address	80
49061	Dual-Phase Monitor 43 base address	80
49141	Dual-Phase Monitor 44 base address	80
49221	Dual-Phase Monitor 45 base address	80
49301	Dual-Phase Monitor 46 base address	80
49381	Dual-Phase Monitor 47 base address	80
49461	Dual-Phase Monitor 48 base address	80
49541	Dual-Phase Monitor 49 base address	80
49621	Dual-Phase Monitor 50 base address	80
49701	Dual-Phase Monitor 51 base address	80
49781	Dual-Phase Monitor 52 base address	80
49861	Dual-Phase Monitor 53 base address	80

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

Modbus Address External	Dual-Phase Monitors (cont'd.)	Reg. Count
49941	Dual-Phase Monitor 54 base address	80
50021	Dual-Phase Monitor 55 base address	80
50101	Dual-Phase Monitor 56 base address	80
50181	Dual-Phase Monitor 57 base address	80
50261	Dual-Phase Monitor 58 base address	80
50341	Dual-Phase Monitor 59 base address	80
50421	Dual-Phase Monitor 60 base address	80
50501	Dual-Phase Monitor 61 base address	80
50581	Dual-Phase Monitor 62 base address	80
	Total Registers	4960

Three-Phase Monitor Data Registers								
Address Offsets	Data	Reg. Size	Format	Access	Range	Default	Resolution	Description
Base	Volts Phase 1	2	Float-32	RO	-	-	0.001 Volts	Each Three Phase Monitor contains these 60 data items in the order listed.
Base+2	Volts Phase 2	2	Float-32	RO	-	-	0.001 Volts	
Base+4	Volts Phase 3	2	Float-32	RO	-	-	0.001 Volts	
Base+6	Current Phase 1	2	Float-32	RO	-	-	0.001 Amps	
Base+8	Current Phase 2	2	Float-32	RO	-	-	0.001 Amps	
Base+10	Current Phase 3	2	Float-32	RO	-	-	0.001 Amps	
Base+12	Kilowatts Phase 1	2	Float-32	RO	-	-	0.001 Kilowatt	
Base+14	Kilowatts Phase 2	2	Float-32	RO	-	-	0.001 Kilowatt	
Base+16	Kilowatts Phase 3	2	Float-32	RO	-	-	0.001 Kilowatt	
Base+18	Kilo-VAs Phase 1	2	Float-32	RO	-	-	0.001 VA	
Base+20	Kilo-VAs Phase 2	2	Float-32	RO	-	-	0.001 VA	
Base+22	Kilo-VAs Phase 3	2	Float-32	RO	-	-	0.001 VA	
Base+24	Kilo-VARs Phase 1	2	Float-32	RO	-	-	0.001 VAR	
Base+26	Kilo-VARs Phase 2	2	Float-32	RO	-	-	0.001 VAR	
Base+28	Kilo-VARs Phase 3	2	Float-32	RO	-	-	0.001 VAR	
Base+30	Power Factor Phase 1	2	Float-32	RO	-	-	0.001	
Base+32	Power Factor Phase 2	2	Float-32	RO	-	-	0.001	
Base+34	Power Factor Phase 3	2	Float-32	RO	-	-	0.001	
Base+36	Phase Angle Phase 1	2	Float-32	RO	-	-	0.001°	
Base+38	Phase Angle Phase 2	2	Float-32	RO	-	-	0.001°	
Base+40	Phase Angle Phase 3	2	Float-32	RO	-	-	0.001°	
Base+42	Kilowatt Hours	2	Float-32	RO	-	-	0.001 Kilowatt hour	
Base+44	Kilo-VA Hours	2	Float-32	RO	-	-	0.001 Kilo-VA hour	
Base+46	Kilo-VAR Hours	2	Float-32	RO	-	-	0.001 Kilo-VAR hour	

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

Three-Phase Monitor Data Registers (cont'd.)								
Address Offsets	Data	Reg. Size	Format	Access	Range	Default	Resolution	Description
Base+48	Line Frequency Phase 1	2	Float-32	RO	-	-	0.1 Hz	
Base+50	Line Frequency Phase 2	2	Float-32	RO	-	-	0.1 Hz	
Base+52	Line Frequency Phase 3	2	Float-32	RO	-	-	0.1 Hz	
Base+54	Present Current Demand Phase 1	2	Float-32	RO	-	-	0.001 Amps	
Base+56	Present Current Demand Phase 2	2	Float-32	RO	-	-	0.001 Amps	
Base+58	Present Current Demand Phase 3	2	Float-32	RO	-	-	0.001 Amps	
Base+60	Maximum Current Demand Phase 1	2	Float-32	RO	-	-	0.001 Amps	
Base+62	Maximum Current Demand Phase 2	2	Float-32	RO	-	-	0.001 Amps	
Base+64	Maximum Current Demand Phase 3	2	Float-32	RO	-	-	0.001 Amps	
Base+66	Maximum Current Phase 1	2	Float-32	RO	-	-	0.001 Amps	
Base+68	Maximum Current Phase 2	2	Float-32	RO	-	-	0.001 Amps	
Base+70	Maximum Current Phase 3	2	Float-32	RO	-	-	0.001 Amps	
Base+72	Present Kilowatt Total Demand	2	Float-32	RO	-	-	0.001 Kilowatt	
Base+74	Average Kilowatts Total Demand	2	Float-32	RO	-	-	0.001 Kilowatt	
Base+76	Maximum Total Kilowatts Demand	2	Float-32	RO	-	-	0.001 Kilowatt	
Base+78	Maximum Total Kilowatts	2	Float-32	RO	-	-	0.001 Kilowatt	
Base+80	Total Monitor Kilowatts	2	Float-32	RO	-	-	0.001 Kilowatt	
Base+82	Total Monitor Power Factor	2	Float-32	RO	-	-	0.001	
Base+84	Average Current of 3 phases	2	Float-32	RO	-	-	0.001 Amps	
Base+86	Average Volts	2	Float-32	RO	-	-	0.001 Volts	
Base+88	Total Monitor Current	2	Float-32	RO	-	-	0.001 Amps	
Base+90	Total Monitor Kilo-VARs	2	Float-32	RO	-	-	0.001 VAR	
Base+92	Total Monitor Kilo-VAs	2	Float-32	RO	-	-	0.001 VA	
Base+94	Over KW Demand Alarm Setpoint	2	Uint-32	RW	0, 1-4294967295	0	Setpoint value, 0 disables alarm	
Base+96	Over KW Demand Alarm Time Delay	1	Uint-16	RW	1-65535	1 sec.	Alarm delay in seconds	
Base+97	Over Current Pre-Alarm Setpoint	1	Uint-16	RW	0, 50%-80%	0	Setpoint value, 0 disables alarm	
Base+98	Over Current Pre-Alarm Time Delay	1	Uint-16	RW	1-65535	1 sec.	Alarm delay in seconds	
Base+99	Over Current Alarm Setpoint	1	Uint-16	RW	0, 70%-100%	0	Setpoint value, 0 disables alarm	
Base+100	Over Current Alarm Time Delay	1	Uint-16	RW	1-65535	1 sec.	Alarm delay in seconds	

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

Three-Phase Monitor Data Registers (cont'd.)								
Address Offsets	Data	Reg. Size	Format	Access	Range	Default	Resolution	Description
Base+101	Active Alarms	1	Bit Field	RW	-	0x0000	Alarm Active bits: (write 1 to alarm bit to clear alarm) 0x0001 - Phase 1 Loss (0 amps) Alarm bit 0x0002 - Phase 1 Over Current Pre-Alarm bit 0x0004 - Phase 1 Over Current Alarm bit 0x0010 - Phase 2 Loss (0 amps) Alarm bit 0x0020 - Phase 2 Over Current Pre-Alarm bit 0x0040 - Phase 2 Over Current Alarm bit 0x0100 - Phase 3 Loss (0 amps) Alarm bit 0x0200 - Phase 3 Over Current Pre-Alarm bit 0x0400 - Phase 3 Over Current Alarm bit 0x1000 - Monitor Over KW Demand Alarm bit	

Modbus Address External	Three-Phase Monitors	Reg. Count
51901	Three-Phase Monitor 1 base address	102
52003	Three-Phase Monitor 2 base address	102
52105	Three-Phase Monitor 3 base address	102
52207	Three-Phase Monitor 4 base address	102
52309	Three-Phase Monitor 5 base address	102
52411	Three-Phase Monitor 6 base address	102
52513	Three-Phase Monitor 7 base address	102
52615	Three-Phase Monitor 8 base address	102
52717	Three-Phase Monitor 9 base address	102
52819	Three-Phase Monitor 10 base address	102
52921	Three-Phase Monitor 11 base address	102
53023	Three-Phase Monitor 12 base address	102
53125	Three-Phase Monitor 13 base address	102
53227	Three-Phase Monitor 14 base address	102
53329	Three-Phase Monitor 15 base address	102

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

Modbus Address External	Three-Phase Monitors (cont'd.)	Reg. Count
53431	Three-Phase Monitor 16 base address	102
53533	Three-Phase Monitor 17 base address	102
53635	Three-Phase Monitor 18 base address	102
53737	Three-Phase Monitor 19 base address	102
53839	Three-Phase Monitor 20 base address	102
53941	Three-Phase Monitor 21 base address	102
54043	Three-Phase Monitor 22 base address	102
54145	Three-Phase Monitor 23 base address	102
54247	Three-Phase Monitor 24 base address	102
54349	Three-Phase Monitor 25 base address	102
54451	Three-Phase Monitor 26 base address	102
54553	Three-Phase Monitor 27 base address	102
54655	Three-Phase Monitor 28 base address	102
54757	Three-Phase Monitor 29 base address	102
54859	Three-Phase Monitor 30 base address	102
54961	Three-Phase Monitor 31 base address	102
55063	Three-Phase Monitor 32 base address	102
55165	Three-Phase Monitor 33 base address	102
55267	Three-Phase Monitor 34 base address	102
55369	Three-Phase Monitor 35 base address	102
55471	Three-Phase Monitor 36 base address	102
55573	Three-Phase Monitor 37 base address	102
55675	Three-Phase Monitor 38 base address	102
55777	Three-Phase Monitor 39 base address	102
55879	Three-Phase Monitor 40 base address	102
55981	Three-Phase Monitor 41 base address	102
56083	Three-Phase Monitor 42 base address	102
56185	Three-Phase Monitor 43 base address	102
56287	Three-Phase Monitor 44 base address	102
56389	Three-Phase Monitor 45 base address	102
56491	Three-Phase Monitor 46 base address	102
56593	Three-Phase Monitor 47 base address	102
56695	Three-Phase Monitor 48 base address	102
56797	Three-Phase Monitor 49 base address	102
56899	Three-Phase Monitor 50 base address	102
57001	Three-Phase Monitor 51 base address	102
57103	Three-Phase Monitor 52 base address	102
57205	Three-Phase Monitor 53 base address	102
57307	Three-Phase Monitor 54 base address	102

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

Modbus Address External	Three-Phase Monitors (cont'd.)	Reg. Count
57409	Three-Phase Monitor 55 base address	102
57511	Three-Phase Monitor 56 base address	102
57613	Three-Phase Monitor 57 base address	102
57715	Three-Phase Monitor 58 base address	102
57817	Three-Phase Monitor 59 base address	102
57919	Three-Phase Monitor 60 base address	102
58021	Three-Phase Monitor 61 base address	102
	Total Registers	6222

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

SEM3 System Data Registers						
Modbus Address External	Data	Reg. Size	Format	Access	Default	Description
59901	Total System Kilowatt Hours	2	Float-32	RO	-	Total Kilowatt Hours for the entire system
59903	Total System Kilo-VAR Hours	2	Float-32	RO	-	Total Kilo-VAR Hours for the entire system
59905	Pulse Input 0 Count	2	Uint-32	RO	-	Total number of pulses received by Pulse Input 0
59907	Pulse Input 1 Count	2	Uint-32	RO	-	Total number of pulses received by Pulse Input 1
59909	Global Mini-Monitor Alarm Flags	1	Bit Field	RO	-	Alarm Active bits: (set when any Mini-Monitor sets the equivalent alarm bit) 0x0001 - Phase Loss (0 amps) Alarm bit 0x0002 - Phase Over Current Pre-Alarm bit 0x0004 - Phase Over Current Alarm bit 0x1000 - Monitor Over KW Demand Alarm bit
Note: These registers are cleared by writing to the System Settings Global Resets register						
	Total Registers	9				

SEM3 System Registers						
Modbus Address External	Data	Reg. Size	Format	Access	Default	Description
60001	Firmware Version	4	ASCII	RO	-	Version number of SEM3 firmware (set in firmware)
60005	Serial Number	16	ASCII	RO	-	SEM3 Serial Number (programmed at factory)
60021	User Text	32	ASCII	RW	0x20	Area available to the user for descriptive information (default ASCII spaces)
60053	Demand Sub-Intervals	1	Uint-16	RW	15	Number of Demand Sub-Intervals for: - Present KW Demand - Max KW Demand - Present Current Demand - Max Current Demand
60054	Sub-Interval Length	1	Uint-16	RW	1	Length of each Demand Sub-Interval in minutes
60055	Voltage Mode	1	Enum	RW	0	Type of transformer providing voltage signal
60056	System Voltage	1	Uint-16	RW	120 L-N	Line to Neutral voltage
60057	Potential Transformer Primary	1	Uint-16	RW	120	Rated voltage of potential transformer primary
60058	Potential Transformer Secondary	1	Uint-16	RW	120	Rated voltage of potential transformer secondary
60059	Under Voltage Alarm Setpoint	1	Uint-16	RW	0	Setpoint value, 0 disables
60060	Under Voltage Alarm Time Delay	1	Uint-16	RW	1	Delay in seconds
60061	Over Voltage Alarm Setpoint	1	Uint-16	RW	0	Setpoint value, 0 disables
60062	Over Voltage Alarm Time Delay	1	Uint-16	RW	1	Delay in seconds

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

SEM3 System Registers (cont'd.)						
Modbus Address External	Data	Data	Format	Access	Default	Description
60063	Voltage Alarms	1	Bit Field	RW	0x0000	Voltage Alarm Bits: (write 1 to alarm bit to clear alarm) 0x0001 - Under Voltage Alarm bit 0x0002 - Over Voltage Alarm bit
60064	Global Over KW Demand Alarm Setpoint	2	Uint-32	RW	0	Global setpoint value, 0 disables (a write to this register overwrites local monitor settings)
60066	Global Over KW Demand Alarm Time Delay	1	Uint-16	RW	1	Global alarm delay in seconds (a write to this register overwrites local monitor settings)
60067	Global Phase Current Loss Alarm Enable	1	Enum	RW	0	Global alarm disable/enable (a write to this register overwrites local monitor setting)
60068	Global Phase Current Loss Alarm Time Delay	1	Uint-16	RW	1	Global alarm delay in seconds (a write to this register overwrites local monitor settings)
60069	Global Phase Over Current Pre-Alarm Setpoint	1	Uint-16	RW	0	Global setpoint value, 0 disables (a write to this register overwrites local monitor settings)
60070	Global Phase Over Current Pre-Alarm Time Delay	1	Uint-16	RW	1	Global alarm delay in seconds (a write to this register overwrites local monitor settings)
60071	Global Phase Over Current Alarm Setpoint	1	Uint-16	RW	0	Global setpoint value, 0 disables (a write to this register overwrites local monitor settings)
60072	Global Phase Over Current Alarm Time Delay	1	Uint-16	RW	1	Global alarm delay in seconds (a write to this register overwrites local monitor settings)
60073	Global Resets	1	Bit Field	WO	0x0000	Global Reset bits: (write 1 to reset) 0x0001 = Begin new Demand Interval 0x0002 = Reset all Demands 0x0004 = Reset all Maximum Demand values to zero 0x0008 = Reset all Energy values to zero (KWH, KVAH, KVARH) 0x0010 = Reset all Maximum Current values to zero 0x0020 = Reset all Maximum Kilowatt values to zero 0x0040 = Reset Pulse Input 1 Count to zero 0x0080 = Reset Pulse Input 2 Count to zero 0x0100 = Reset all Mini-Monitor Alarm Flags
60074	Pulse Input 1	1	Enum	RW	0	0-Disabled 1-Form A 2-Form C
60075	Pulse Input 2	1	Enum	RW	0	
60076	Kilowatt Hour Pulse Output Mode	1	Enum	RW	0	
60077	Kilowatt Hour Pulse Scaling	1	Enum	RW	10	1 = 1 pulse every kilowatt hour 10 = 1 pulse every 10 kilowatt hours 100 = 1 pulse every 100 kilowatt hours 1000 = 1 pulse every 1000 kilowatt hours
60078	System Time: seconds	2	Uint-32	RW	0	Seconds since Coordinated Universal Time (UTC) Epoch
60080	Single-Phase Monitor 1 Accumulate Energy enable	1	Enum	RW	0	Accumulate Monitor Energy enable/disable (KWh, KVARh)

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

SEM3 System Registers (cont'd.)						
Modbus Address External	Data	Data	Format	Access	Default	Description
60081	Single-Phase Monitor 2 Accumulate Energy enable	1	Enum	RW	0	
60082	Single-Phase Monitor 3 Accumulate Energy enable	1	Enum	RW	0	
60083	Single-Phase Monitor 4 Accumulate Energy enable	1	Enum	RW	0	
60084	Single-Phase Monitor 5 Accumulate Energy enable	1	Enum	RW	0	
60085	Single-Phase Monitor 6 Accumulate Energy enable	1	Enum	RW	0	
60086	Single-Phase Monitor 7 Accumulate Energy enable	1	Enum	RW	0	
60087	Single-Phase Monitor 8 Accumulate Energy enable	1	Enum	RW	0	
60088	Single-Phase Monitor 9 Accumulate Energy enable	1	Enum	RW	0	
60089	Single-Phase Monitor 10 Accumulate Energy enable	1	Enum	RW	0	
60090	Single-Phase Monitor 11 Accumulate Energy enable	1	Enum	RW	0	
60091	Single-Phase Monitor 12 Accumulate Energy enable	1	Enum	RW	0	
60092	Single-Phase Monitor 13 Accumulate Energy enable	1	Enum	RW	0	
60093	Single-Phase Monitor 14 Accumulate Energy enable	1	Enum	RW	0	
60094	Single-Phase Monitor 15 Accumulate Energy enable	1	Enum	RW	0	

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

SEM3 System Registers (cont'd.)						
Modbus Address External	Data	Data	Format	Access	Default	Description
60095	Single-Phase Monitor 16 Accumulate Energy enable	1	Enum	RW	0	
60096	Single-Phase Monitor 17 Accumulate Energy enable	1	Enum	RW	0	
60097	Single-Phase Monitor 18 Accumulate Energy enable	1	Enum	RW	0	
60098	Single-Phase Monitor 19 Accumulate Energy enable	1	Enum	RW	0	
60099	Single-Phase Monitor 20 Accumulate Energy enable	1	Enum	RW	0	
60100	Single-Phase Monitor 21 Accumulate Energy enable	1	Enum	RW	0	
60101	Single-Phase Monitor 22 Accumulate Energy enable	1	Enum	RW	0	
60102	Single-Phase Monitor 23 Accumulate Energy enable	1	Enum	RW	0	
60103	Single-Phase Monitor 24 Accumulate Energy enable	1	Enum	RW	0	
60104	Single-Phase Monitor 25 Accumulate Energy enable	1	Enum	RW	0	
60105	Single-Phase Monitor 26 Accumulate Energy enable	1	Enum	RW	0	
60106	Single-Phase Monitor 27 Accumulate Energy enable	1	Enum	RW	0	
60107	Single-Phase Monitor 28 Accumulate Energy enable	1	Enum	RW	0	
60108	Single-Phase Monitor 29 Accumulate Energy enable	1	Enum	RW	0	

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

SEM3 System Registers (cont'd.)						
Modbus Address External	Data	Data	Format	Access	Default	Description
60109	Single-Phase Monitor 30 Accumulate Energy enable	1	Enum	RW	0	
60110	Single-Phase Monitor 31 Accumulate Energy enable	1	Enum	RW	0	
60111	Single-Phase Monitor 32 Accumulate Energy enable	1	Enum	RW	0	
60112	Single-Phase Monitor 33 Accumulate Energy enable	1	Enum	RW	0	
60113	Single-Phase Monitor 34 Accumulate Energy enable	1	Enum	RW	0	
60114	Single-Phase Monitor 35 Accumulate Energy enable	1	Enum	RW	0	
60115	Single-Phase Monitor 36 Accumulate Energy enable	1	Enum	RW	0	
60116	Single-Phase Monitor 37 Accumulate Energy enable	1	Enum	RW	0	
60117	Single-Phase Monitor 38 Accumulate Energy enable	1	Enum	RW	0	
60118	Single-Phase Monitor 39 Accumulate Energy enable	1	Enum	RW	0	
60119	Single-Phase Monitor 40 Accumulate Energy enable	1	Enum	RW	0	
60120	Single-Phase Monitor 41 Accumulate Energy enable	1	Enum	RW	0	
60121	Single-Phase Monitor 42 Accumulate Energy enable	1	Enum	RW	0	
60122	Single-Phase Monitor 43 Accumulate Energy enable	1	Enum	RW	0	

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

SEM3 System Registers (cont'd.)						
Modbus Address External	Data	Data	Format	Access	Default	Description
60123	Single-Phase Monitor 44 Accumulate Energy enable	1	Enum	RW	0	
60124	Single-Phase Monitor 45 Accumulate Energy enable	1	Enum	RW	0	
60125	Single-Phase Monitor 46 Accumulate Energy enable	1	Enum	RW	0	
60126	Single-Phase Monitor 47 Accumulate Energy enable	1	Enum	RW	0	
60127	Single-Phase Monitor 48 Accumulate Energy enable	1	Enum	RW	0	
60128	Single-Phase Monitor 49 Accumulate Energy enable	1	Enum	RW	0	
60129	Single-Phase Monitor 50 Accumulate Energy enable	1	Enum	RW	0	
60130	Single-Phase Monitor 51 Accumulate Energy enable	1	Enum	RW	0	
60131	Single-Phase Monitor 52 Accumulate Energy enable	1	Enum	RW	0	
60132	Single-Phase Monitor 53 Accumulate Energy enable	1	Enum	RW	0	
60133	Single-Phase Monitor 54 Accumulate Energy enable	1	Enum	RW	0	
60134	Single-Phase Monitor 55 Accumulate Energy enable	1	Enum	RW	0	
60135	Single-Phase Monitor 56 Accumulate Energy enable	1	Enum	RW	0	
60136	Single-Phase Monitor 57 Accumulate Energy enable	1	Enum	RW	0	

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

SEM3 System Registers (cont'd.)						
Modbus Address External	Data	Data	Format	Access	Default	Description
60137	Single-Phase Monitor 58 Accumulate Energy enable	1	Enum	RW	0	
60138	Single-Phase Monitor 59 Accumulate Energy enable	1	Enum	RW	0	
60139	Single-Phase Monitor 60 Accumulate Energy enable	1	Enum	RW	0	
60140	Single-Phase Monitor 61 Accumulate Energy enable	1	Enum	RW	0	
60141	Single-Phase Monitor 62 Accumulate Energy enable	1	Enum	RW	0	
60142	Single-Phase Monitor 63 Accumulate Energy enable	1	Enum	RW	0	
60143	Single-Phase Monitor 1 Breaker Rating	1	Enum	RW	0	Breaker Rating in amps 0 indicates no Breaker installed at this location
60144	Single-Phase Monitor 2 Breaker Rating	1	Enum	RW	0	
60145	Single-Phase Monitor 3 Breaker Rating	1	Enum	RW	0	
60146	Single-Phase Monitor 4 Breaker Rating	1	Enum	RW	0	
60147	Single-Phase Monitor 5 Breaker Rating	1	Enum	RW	0	
60148	Single-Phase Monitor 6 Breaker Rating	1	Enum	RW	0	
60149	Single-Phase Monitor 7 Breaker Rating	1	Enum	RW	0	
60150	Single-Phase Monitor 8 Breaker Rating	1	Enum	RW	0	
60151	Single-Phase Monitor 9 Breaker Rating	1	Enum	RW	0	
60152	Single-Phase Monitor 10 Breaker Rating	1	Enum	RW	0	
60153	Single-Phase Monitor 11 Breaker Rating	1	Enum	RW	0	

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

SEM3 System Registers (cont'd.)						
Modbus Address External	Data	Data	Format	Access	Default	Description
60154	Single-Phase Monitor 12 Breaker Rating	1	Enum	RW	0	Breaker Rating in amps 0 indicates no Breaker installed at this location
60155	Single-Phase Monitor 13 Breaker Rating	1	Enum	RW	0	
60156	Single-Phase Monitor 14 Breaker Rating	1	Enum	RW	0	
60157	Single-Phase Monitor 15 Breaker Rating	1	Enum	RW	0	
60158	Single-Phase Monitor 16 Breaker Rating	1	Enum	RW	0	
60159	Single-Phase Monitor 17 Breaker Rating	1	Enum	RW	0	
60160	Single-Phase Monitor 18 Breaker Rating	1	Enum	RW	0	
60161	Single-Phase Monitor 19 Breaker Rating	1	Enum	RW	0	
60162	Single-Phase Monitor 20 Breaker Rating	1	Enum	RW	0	
60163	Single-Phase Monitor 21 Breaker Rating	1	Enum	RW	0	
60164	Single-Phase Monitor 22 Breaker Rating	1	Enum	RW	0	
60165	Single-Phase Monitor 23 Breaker Rating	1	Enum	RW	0	
60166	Single-Phase Monitor 24 Breaker Rating	1	Enum	RW	0	
60167	Single-Phase Monitor 25 Breaker Rating	1	Enum	RW	0	
60168	Single-Phase Monitor 26 Breaker Rating	1	Enum	RW	0	
60169	Single-Phase Monitor 27 Breaker Rating	1	Enum	RW	0	
60170	Single-Phase Monitor 28 Breaker Rating	1	Enum	RW	0	
60171	Single-Phase Monitor 29 Breaker Rating	1	Enum	RW	0	

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

SEM3 System Registers (cont'd.)						
Modbus Address External	Data	Data	Format	Access	Default	Description
60172	Single-Phase Monitor 30 Breaker Rating	1	Enum	RW	0	Breaker Rating in amps 0 indicates no Breaker installed at this location
60173	Single-Phase Monitor 31 Breaker Rating	1	Enum	RW	0	
60174	Single-Phase Monitor 32 Breaker Rating	1	Enum	RW	0	
60175	Single-Phase Monitor 33 Breaker Rating	1	Enum	RW	0	
60176	Single-Phase Monitor 34 Breaker Rating	1	Enum	RW	0	
60177	Single-Phase Monitor 35 Breaker Rating	1	Enum	RW	0	
60178	Single-Phase Monitor 36 Breaker Rating	1	Enum	RW	0	
60179	Single-Phase Monitor 37 Breaker Rating	1	Enum	RW	0	
60180	Single-Phase Monitor 38 Breaker Rating	1	Enum	RW	0	
60181	Single-Phase Monitor 39 Breaker Rating	1	Enum	RW	0	
60182	Single-Phase Monitor 40 Breaker Rating	1	Enum	RW	0	
60183	Single-Phase Monitor 41 Breaker Rating	1	Enum	RW	0	
60184	Single-Phase Monitor 42 Breaker Rating	1	Enum	RW	0	
60185	Single-Phase Monitor 43 Breaker Rating	1	Enum	RW	0	
60186	Single-Phase Monitor 44 Breaker Rating	1	Enum	RW	0	
60187	Single-Phase Monitor 45 Breaker Rating	1	Enum	RW	0	
60188	Single-Phase Monitor 46 Breaker Rating	1	Enum	RW	0	
60189	Single-Phase Monitor 47 Breaker Rating	1	Enum	RW	0	

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

SEM3 System Registers (cont'd.)						
Modbus Address External	Data	Data	Format	Access	Default	Description
60190	Single-Phase Monitor 48 Breaker Rating	1	Enum	RW	0	Breaker Rating in amps 0 indicates no Breaker installed at this location
60191	Single-Phase Monitor 49 Breaker Rating	1	Enum	RW	0	
60192	Single-Phase Monitor 50 Breaker Rating	1	Enum	RW	0	
60193	Single-Phase Monitor 51 Breaker Rating	1	Enum	RW	0	
60194	Single-Phase Monitor 52 Breaker Rating	1	Enum	RW	0	
60195	Single-Phase Monitor 53 Breaker Rating	1	Enum	RW	0	
60196	Single-Phase Monitor 54 Breaker Rating	1	Enum	RW	0	
60197	Single-Phase Monitor 55 Breaker Rating	1	Enum	RW	0	
60198	Single-Phase Monitor 56 Breaker Rating	1	Enum	RW	0	
60199	Single-Phase Monitor 57 Breaker Rating	1	Enum	RW	0	
60200	Single-Phase Monitor 58 Breaker Rating	1	Enum	RW	0	
60201	Single-Phase Monitor 59 Breaker Rating	1	Enum	RW	0	
60202	Single-Phase Monitor 60 Breaker Rating	1	Enum	RW	0	
60203	Single-Phase Monitor 61 Breaker Rating	1	Enum	RW	0	
60204	Single-Phase Monitor 62 Breaker Rating	1	Enum	RW	0	
60205	Single-Phase Monitor 63 Breaker Rating	1	Enum	RW	0	
	Total Registers	201				

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

SEM3 Multi-Monitor Communication Status Registers						
Modbus Address External	Data	Reg. Size	Format	Access	Default	Description
60301	Monitor 1 status (bit set = communicating) Monitor 2 status (bit set = communicating) Monitor 3 status (bit set = communicating) Monitor 4 status (bit set = communicating) Monitor 5 status (bit set = communicating) Monitor 6 status (bit set = communicating) Monitor 7 status (bit set = communicating) Monitor 8 status (bit set = communicating) Monitor 9 status (bit set = communicating) Monitor 10 status (bit set = communicating) Monitor 11 status (bit set = communicating) Monitor 12 status (bit set = communicating) Monitor 13 status (bit set = communicating) Monitor 14 status (bit set = communicating) Monitor 15 status (bit set = communicating) Monitor 16 status (bit set = communicating)	1	Bit Field	RO	-	0x0001 - Monitor 1 installed 0x0002 - Monitor 2 installed 0x0004 - Monitor 3 installed 0x0008 - Monitor 4 installed 0x0010 - Monitor 5 installed 0x0020 - Monitor 6 installed 0x0040 - Monitor 7 installed 0x0080 - Monitor 8 installed 0x0100 - Monitor 9 installed 0x0200 - Monitor 10 installed 0x0400 - Monitor 11 installed 0x0800 - Monitor 12 installed 0x1000 - Monitor 13 installed 0x2000 - Monitor 14 installed 0x4000 - Monitor 15 installed 0x8000 - Monitor 16 installed
60302	Monitor 17 status (bit set = communicating) Monitor 18 status (bit set = communicating) Monitor 19 status (bit set = communicating) Monitor 20 status (bit set = communicating) Monitor 21 status (bit set = communicating) Monitor 22 status (bit set = communicating) Monitor 23 status (bit set = communicating) Monitor 24 status (bit set = communicating) Monitor 25 status (bit set = communicating) Monitor 26 status (bit set = communicating) Monitor 27 status (bit set = communicating) Monitor 28 status (bit set = communicating) Monitor 29 status (bit set = communicating) Monitor 30 status (bit set = communicating) Monitor 31 status (bit set = communicating) Monitor 32 status (bit set = communicating)	1	Bit Field	RO	-	0x0001 - Monitor 17 installed 0x0002 - Monitor 18 installed 0x0004 - Monitor 19 installed 0x0008 - Monitor 20 installed 0x0010 - Monitor 21 installed 0x0020 - Monitor 22 installed 0x0040 - Monitor 23 installed 0x0080 - Monitor 24 installed 0x0100 - Monitor 25 installed 0x0200 - Monitor 26 installed 0x0400 - Monitor 27 installed 0x0800 - Monitor 28 installed 0x1000 - Monitor 29 installed 0x2000 - Monitor 30 installed 0x4000 - Monitor 31 installed 0x8000 - Monitor 32 installed
60303	Monitor 33 status (bit set = communicating) Monitor 34 status (bit set = communicating) Monitor 35 status (bit set = communicating) Monitor 36 status (bit set = communicating) Monitor 37 status (bit set = communicating) Monitor 38 status (bit set = communicating) Monitor 39 status (bit set = communicating) Monitor 40 status (bit set = communicating) Monitor 41 status (bit set = communicating) Monitor 42 status (bit set = communicating) Monitor 43 status (bit set = communicating) Monitor 44 status (bit set = communicating) Monitor 45 status (bit set = communicating) Monitor 46 status (bit set = communicating) Monitor 47 status (bit set = communicating) Monitor 48 status (bit set = communicating)	1	Bit Field	RO	-	0x0001 - Monitor 33 installed 0x0002 - Monitor 34 installed 0x0004 - Monitor 35 installed 0x0008 - Monitor 36 installed 0x0010 - Monitor 37 installed 0x0020 - Monitor 38 installed 0x0040 - Monitor 39 installed 0x0080 - Monitor 40 installed 0x0100 - Monitor 41 installed 0x0200 - Monitor 42 installed 0x0400 - Monitor 43 installed 0x0800 - Monitor 44 installed 0x1000 - Monitor 45 installed 0x2000 - Monitor 46 installed 0x4000 - Monitor 47 installed 0x8000 - Monitor 48 installed
60304	Monitor 49 status (bit set = communicating) Monitor 50 status (bit set = communicating) Monitor 51 status (bit set = communicating) Monitor 52 status (bit set = communicating) Monitor 53 status (bit set = communicating) Monitor 54 status (bit set = communicating) Monitor 55 status (bit set = communicating) Monitor 56 status (bit set = communicating) Monitor 57 status (bit set = communicating) Monitor 58 status (bit set = communicating) Monitor 59 status (bit set = communicating) Monitor 60 status (bit set = communicating) Monitor 61 status (bit set = communicating) Monitor 62 status (bit set = communicating) Monitor 63 status (bit set = communicating)	1	Bit Field	RO	-	0x0001 - Monitor 49 installed 0x0002 - Monitor 50 installed 0x0004 - Monitor 51 installed 0x0008 - Monitor 52 installed 0x0010 - Monitor 53 installed 0x0020 - Monitor 54 installed 0x0040 - Monitor 55 installed 0x0080 - Monitor 56 installed 0x0100 - Monitor 57 installed 0x0200 - Monitor 58 installed 0x0400 - Monitor 59 installed 0x0800 - Monitor 60 installed 0x1000 - Monitor 61 installed 0x2000 - Monitor 62 installed 0x4000 - Monitor 63 installed
	Total Registers	4				

Modbus Information (cont'd.)

SEM3 Monitor Data Registers (cont'd.)

Communication Configuration Settings Registers						
Modbus Addres External	Data	Reg. Size	Format	Access	Default	Description
60401	SEM3 Modbus Address	1	Uint-16	RW	126	Modbus address used to communicate with Modbus RTU Master (RS485)
60402	SEM3 Modbus RTU Baud Rate	1	Enum	RW	5=38400	Selected baud rate used to communicate with Modbus RTU Master (RS485)
60403	SEM3 Modbus RTU Parity	1	Enum	RW	0=Even	Selected parity used to communicate with Modbus RTU Master (RS485)
60404	Web content refresh rate	1	Uint-16	RW	30	Content refresh rate for 'Real Time' web page, units in seconds.
60405	IP Mode	1	Uint-16	RW	1	IP Configuraiton mode.
60406	IP Type	1	Uint-16	RW	0	IP Type: IPV4 or IPV6
60407	IP Address Word 1	1	Uint-16	RW	192	For IPV4, one octect is stored per wor For IPV6, two octects are stored per word"
60408	IP Address Word 2	1	Uint-16	RW	168	
60409	IP Address Word 3	1	Uint-16	RW	1	
60410	IP Address Word 4	1	Uint-16	RW	65	
60411	IP Address Word 5	1	Uint-16	RW	0	
60412	IP Address Word 6	1	Uint-16	RW	0	
60413	IP Address Word 7	1	Uint-16	RW	0	
60414	IP Address Word 8	1	Uint-16	RW	0	
60415	Subnet Mask Word 1	1	Uint-16	RW	255	For IPV4, one octect is stored per word For IPV6, two octects are stored per word
60416	Subnet Mask Word 2	1	Uint-16	RW	255	
60417	Subnet Mask Word 3	1	Uint-16	RW	255	
60418	Subnet Mask Word 4	1	Uint-16	RW	0	
60419	Subnet Mask Word 5	1	Uint-16	RW	0	
60420	Subnet Mask Word 6	1	Uint-16	RW	0	
60421	Subnet Mask Word 7	1	Uint-16	RW	0	
60422	Subnet Mask Word 8	1	Uint-16	RW	0	
60423	Gateway Word 1	1	Uint-16	RW	192	For IPV4, one octect is stored per word For IPV6, two octects are stored per word
60424	Gateway Word 2	1	Uint-16	RW	168	
60425	Gateway Word 3	1	Uint-16	RW	1	
60426	Gateway Word 4	1	Uint-16	RW	1	
60427	Gateway Word 5	1	Uint-16	RW	0	
60428	Gateway Word 6	1	Uint-16	RW	0	
60429	Gateway Word 7	1	Uint-16	RW	0	
60430	Gateway Word 8	1	Uint-16	RW	0	
	Total Registers	30				

Modbus Information (cont'd.)

Double Precision Energy Registers

Address Offsets		Data	"Reg. Size"	Format	Access
Base		Kilowatt Hours	4	Float-64	RO
Base+4		Kilowatt Hours Exported	4	Float-64	RO
Base+8		Kilowatt Hours Inported	4	Float-64	RO
Base+12		Kilo VA Hours	4	Float-64	RO
Base+16		Kilo VAR Hours	4	Float-64	RO
"Modbus Address External"	"Modbus Address Internal"	Single-Phase Mini-Monitors	"Reg. Count"		
424000	24000	Single-Phase Monitor 1 Energy base address	20		
424020	24020	Single-Phase Monitor 2 Energy base address	20		
424040	24040	Single-Phase Monitor 3 Energy base address	20		
424060	24060	Single-Phase Monitor 4 Energy base address	20		
424080	24080	Single-Phase Monitor 5 Energy base address	20		
424100	24100	Single-Phase Monitor 6 Energy base address	20		
424120	24120	Single-Phase Monitor 7 Energy base address	20		
424140	24140	Single-Phase Monitor 8 Energy base address	20		
424160	24160	Single-Phase Monitor 9 Energy base address	20		
424180	24180	Single-Phase Monitor 10 Energy base address	20		
424200	24200	Single-Phase Monitor 11 Energy base address	20		
424220	24220	Single-Phase Monitor 12 Energy base address	20		
424240	24240	Single-Phase Monitor 13 Energy base address	20		
424260	24260	Single-Phase Monitor 14 Energy base address	20		
424280	24280	Single-Phase Monitor 15 Energy base address	20		
424300	24300	Single-Phase Monitor 16 Energy base address	20		
424320	24320	Single-Phase Monitor 17 Energy base address	20		
424340	24340	Single-Phase Monitor 18 Energy base address	20		
424360	24360	Single-Phase Monitor 19 Energy base address	20		
424380	24380	Single-Phase Monitor 20 Energy base address	20		
424400	24400	Single-Phase Monitor 21 Energy base address	20		
424420	24420	Single-Phase Monitor 22 Energy base address	20		
424440	24440	Single-Phase Monitor 23 Energy base address	20		
424460	24460	Single-Phase Monitor 24 Energy base address	20		
424480	24480	Single-Phase Monitor 25 Energy base address	20		
424500	24500	Single-Phase Monitor 26 Energy base address	20		
424520	24520	Single-Phase Monitor 27 Energy base address	20		
424540	24540	Single-Phase Monitor 28 Energy base address	20		
424560	24560	Single-Phase Monitor 29 Energy base address	20		
424580	24580	Single-Phase Monitor 30 Energy base address	20		
424600	24600	Single-Phase Monitor 31 Energy base address	20		
424620	24620	Single-Phase Monitor 32 Energy base address	20		
424640	24640	Single-Phase Monitor 33 Energy base address	20		
424660	24660	Single-Phase Monitor 34 Energy base address	20		
424680	24680	Single-Phase Monitor 35 Energy base address	20		
424700	24700	Single-Phase Monitor 36 Energy base address	20		

Modbus Information (cont'd.)

Double Precision Energy Registers (cont'd.)

"Modbus Address External"	"Modbus Address Internal"	Single-Phase Mini-Monitors	"Reg. Count"
424720	24720	Single-Phase Monitor 37 Energy base address	20
424740	24740	Single-Phase Monitor 38 Energy base address	20
424760	24760	Single-Phase Monitor 39 Energy base address	20
424780	24780	Single-Phase Monitor 40 Energy base address	20
424800	24800	Single-Phase Monitor 41 Energy base address	20
424820	24820	Single-Phase Monitor 42 Energy base address	20
424840	24840	Single-Phase Monitor 43 Energy base address	20
424860	24860	Single-Phase Monitor 44 Energy base address	20
424880	24880	Single-Phase Monitor 45 Energy base address	20
424900	24900	Single-Phase Monitor 46 Energy base address	20
424920	24920	Single-Phase Monitor 47 Energy base address	20
424940	24940	Single-Phase Monitor 48 Energy base address	20
424960	24960	Single-Phase Monitor 49 Energy base address	20
424980	24980	Single-Phase Monitor 50 Energy base address	20
425000	25000	Single-Phase Monitor 51 Energy base address	20
425020	25020	Single-Phase Monitor 52 Energy base address	20
425040	25040	Single-Phase Monitor 53 Energy base address	20
425060	25060	Single-Phase Monitor 54 Energy base address	20
425080	25080	Single-Phase Monitor 55 Energy base address	20
425100	25100	Single-Phase Monitor 56 Energy base address	20
425120	25120	Single-Phase Monitor 57 Energy base address	20
425140	25140	Single-Phase Monitor 58 Energy base address	20
425160	25160	Single-Phase Monitor 59 Energy base address	20
425180	25180	Single-Phase Monitor 60 Energy base address	20
425200	25200	Single-Phase Monitor 61 Energy base address	20
425220	25220	Single-Phase Monitor 62 Energy base address	20
425240	25240	Single-Phase Monitor 63 Energy base address	20
425260	25260	Two Phase-Phase Monitor 1 Energy base address	20
425280	25280	Two Phase-Phase Monitor 2 Energy base address	20
425300	25300	Two Phase-Phase Monitor 3 Energy base address	20
425320	25320	Two Phase-Phase Monitor 4 Energy base address	20
425340	25340	Two Phase-Phase Monitor 5 Energy base address	20
425360	25360	Two Phase-Phase Monitor 6 Energy base address	20
425380	25380	Two Phase-Phase Monitor 7 Energy base address	20
425400	25400	Two Phase-Phase Monitor 8 Energy base address	20
425420	25420	Two Phase-Phase Monitor 9 Energy base address	20
425440	25440	Two Phase-Phase Monitor 10 Energy base address	20
425460	25460	Two Phase-Phase Monitor 11 Energy base address	20
425480	25480	Two Phase-Phase Monitor 12 Energy base address	20
425500	25500	Two Phase-Phase Monitor 13 Energy base address	20
425520	25520	Two Phase-Phase Monitor 14 Energy base address	20
425540	25540	Two Phase-Phase Monitor 15 Energy base address	20
425560	25560	Two Phase-Phase Monitor 16 Energy base address	20

Modbus Information (cont'd.)

Double Precision Energy Registers (cont'd.)

"Modbus Address External"	"Modbus Address Internal"	Single-Phase Mini-Monitors	"Reg. Count"
425580	25580	Two Phase-Phase Monitor 17 Energy base address	20
425600	25600	Two Phase-Phase Monitor 18 Energy base address	20
425620	25620	Two Phase-Phase Monitor 19 Energy base address	20
425640	25640	Two Phase-Phase Monitor 20 Energy base address	20
425660	25660	Two Phase-Phase Monitor 21 Energy base address	20
425680	25680	Two Phase-Phase Monitor 22 Energy base address	20
425700	25700	Two Phase-Phase Monitor 23 Energy base address	20
425720	25720	Two Phase-Phase Monitor 24 Energy base address	20
425740	25740	Two Phase-Phase Monitor 25 Energy base address	20
425760	25760	Two Phase-Phase Monitor 26 Energy base address	20
425780	25780	Two Phase-Phase Monitor 27 Energy base address	20
425800	25800	Two Phase-Phase Monitor 28 Energy base address	20
425820	25820	Two Phase-Phase Monitor 29 Energy base address	20
425840	25840	Two Phase-Phase Monitor 30 Energy base address	20
425860	25860	Two Phase-Phase Monitor 31 Energy base address	20
425880	25880	Two Phase-Phase Monitor 32 Energy base address	20
425900	25900	Two Phase-Phase Monitor 33 Energy base address	20
425920	25920	Two Phase-Phase Monitor 34 Energy base address	20
425940	25940	Two Phase-Phase Monitor 35 Energy base address	20
425960	25960	Two Phase-Phase Monitor 36 Energy base address	20
425980	25980	Two Phase-Phase Monitor 37 Energy base address	20
426000	26000	Two Phase-Phase Monitor 38 Energy base address	20
426020	26020	Two Phase-Phase Monitor 39 Energy base address	20
426040	26040	Two Phase-Phase Monitor 40 Energy base address	20
426060	26060	Two Phase-Phase Monitor 41 Energy base address	20
426080	26080	Two Phase-Phase Monitor 42 Energy base address	20
426100	26100	Two Phase-Phase Monitor 43 Energy base address	20
426120	26120	Two Phase-Phase Monitor 44 Energy base address	20
426140	26140	Two Phase-Phase Monitor 45 Energy base address	20
426160	26160	Two Phase-Phase Monitor 46 Energy base address	20
426180	26180	Two Phase-Phase Monitor 47 Energy base address	20
426200	26200	Two Phase-Phase Monitor 48 Energy base address	20
426220	26220	Two Phase-Phase Monitor 49 Energy base address	20
426240	26240	Two Phase-Phase Monitor 50 Energy base address	20
426260	26260	Two Phase-Phase Monitor 51 Energy base address	20
426280	26280	Two Phase-Phase Monitor 52 Energy base address	20
426300	26300	Two Phase-Phase Monitor 53 Energy base address	20
426320	26320	Two Phase-Phase Monitor 54 Energy base address	20
426340	26340	Two Phase-Phase Monitor 55 Energy base address	20
426360	26360	Two Phase-Phase Monitor 56 Energy base address	20
426380	26380	Two Phase-Phase Monitor 57 Energy base address	20
426400	26400	Two Phase-Phase Monitor 58 Energy base address	20
426420	26420	Two Phase-Phase Monitor 59 Energy base address	20

Modbus Information (cont'd.)

Double Precision Energy Registers (cont'd.)

"Modbus Address External"	"Modbus Address Internal"	Single-Phase Mini-Monitors	"Reg. Count"
426440	26440	Two Phase-Phase Monitor 60 Energy base address	20
426460	26460	Two Phase-Phase Monitor 61 Energy base address	20
426480	26480	Two Phase-Phase Monitor 62 Energy base address	20
426500	26500	Three Phase-Phase Monitor 1 Energy base address	20
426520	26520	Three Phase-Phase Monitor 2 Energy base address	20
426540	26540	Three Phase-Phase Monitor 3 Energy base address	20
426560	26560	Three Phase-Phase Monitor 4 Energy base address	20
426580	26580	Three Phase-Phase Monitor 5 Energy base address	20
426600	26600	Three Phase-Phase Monitor 6 Energy base address	20
426620	26620	Three Phase-Phase Monitor 7 Energy base address	20
426640	26640	Three Phase-Phase Monitor 8 Energy base address	20
426660	26660	Three Phase-Phase Monitor 9 Energy base address	20
426680	26680	Three Phase-Phase Monitor 10 Energy base address	20
426700	26700	Three Phase-Phase Monitor 11 Energy base address	20
426720	26720	Three Phase-Phase Monitor 12 Energy base address	20
426740	26740	Three Phase-Phase Monitor 13 Energy base address	20
426760	26760	Three Phase-Phase Monitor 14 Energy base address	20
426780	26780	Three Phase-Phase Monitor 15 Energy base address	20
426800	26800	Three Phase-Phase Monitor 16 Energy base address	20
426820	26820	Three Phase-Phase Monitor 17 Energy base address	20
426840	26840	Three Phase-Phase Monitor 18 Energy base address	20
426860	26860	Three Phase-Phase Monitor 19 Energy base address	20
426880	26880	Three Phase-Phase Monitor 20 Energy base address	20
426900	26900	Three Phase-Phase Monitor 21 Energy base address	20
426920	26920	Three Phase-Phase Monitor 22 Energy base address	20
426940	26940	Three Phase-Phase Monitor 23 Energy base address	20
426960	26960	Three Phase-Phase Monitor 24 Energy base address	20
426980	26980	Three Phase-Phase Monitor 25 Energy base address	20
427000	27000	Three Phase-Phase Monitor 26 Energy base address	20
427020	27020	Three Phase-Phase Monitor 27 Energy base address	20
427040	27040	Three Phase-Phase Monitor 28 Energy base address	20
427060	27060	Three Phase-Phase Monitor 29 Energy base address	20
427080	27080	Three Phase-Phase Monitor 30 Energy base address	20
427100	27100	Three Phase-Phase Monitor 31 Energy base address	20
427120	27120	Three Phase-Phase Monitor 32 Energy base address	20
427140	27140	Three Phase-Phase Monitor 33 Energy base address	20
427160	27160	Three Phase-Phase Monitor 34 Energy base address	20
427180	27180	Three Phase-Phase Monitor 35 Energy base address	20
427200	27200	Three Phase-Phase Monitor 36 Energy base address	20
427220	27220	Three Phase-Phase Monitor 37 Energy base address	20
427240	27240	Three Phase-Phase Monitor 38 Energy base address	20
427260	27260	Three Phase-Phase Monitor 39 Energy base address	20
427280	27280	Three Phase-Phase Monitor 40 Energy base address	20

Modbus Information (cont'd.)

Double Precision Energy Registers (cont'd.)

"Modbus Address External"	"Modbus Address Internal"	Single-Phase Mini-Monitors	"Reg. Count"
427300	27300	Three Phase-Phase Monitor 41 Energy base address	20
427320	27320	Three Phase-Phase Monitor 42 Energy base address	20
427340	27340	Three Phase-Phase Monitor 43 Energy base address	20
427360	27360	Three Phase-Phase Monitor 44 Energy base address	20
427380	27380	Three Phase-Phase Monitor 45 Energy base address	20
427400	27400	Three Phase-Phase Monitor 46 Energy base address	20
427420	27420	Three Phase-Phase Monitor 47 Energy base address	20
427440	27440	Three Phase-Phase Monitor 48 Energy base address	20
427460	27460	Three Phase-Phase Monitor 49 Energy base address	20
427480	27480	Three Phase-Phase Monitor 50 Energy base address	20
427500	27500	Three Phase-Phase Monitor 51 Energy base address	20
427520	27520	Three Phase-Phase Monitor 52 Energy base address	20
427540	27540	Three Phase-Phase Monitor 53 Energy base address	20
427560	27560	Three Phase-Phase Monitor 54 Energy base address	20
427580	27580	Three Phase-Phase Monitor 55 Energy base address	20
427600	27600	Three Phase-Phase Monitor 56 Energy base address	20
427620	27620	Three Phase-Phase Monitor 57 Energy base address	20
427640	27640	Three Phase-Phase Monitor 58 Energy base address	20
427660	27660	Three Phase-Phase Monitor 59 Energy base address	20
427680	27680	Three Phase-Phase Monitor 60 Energy base address	20
427700	27700	Three Phase-Phase Monitor 61 Energy base address	20
		Total Registers	3720

Acronyms and Abbreviations

Acronyms	Definitions
CPU	Central Processing Unit
DHCP	Dynamic Host Configuration Protocol
kWh	Kilo Watt Hours
MS/TP	Master-slave / token-passing
NA	Not applicable
PLC	Programmable Logic Controller
RAM	Random Access Memory
RFC	Request for Comment
SEM3™	Siemens Embedded Micro Metering Module™
SMTP	Simple Mail Transfer Protocol
SNMP	Simple Network Management Protocol
SSL	Secure Socket Layer
TLS	Description
TCP/IP	Transmission Control Protocol / Internet Protocol

Notes

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