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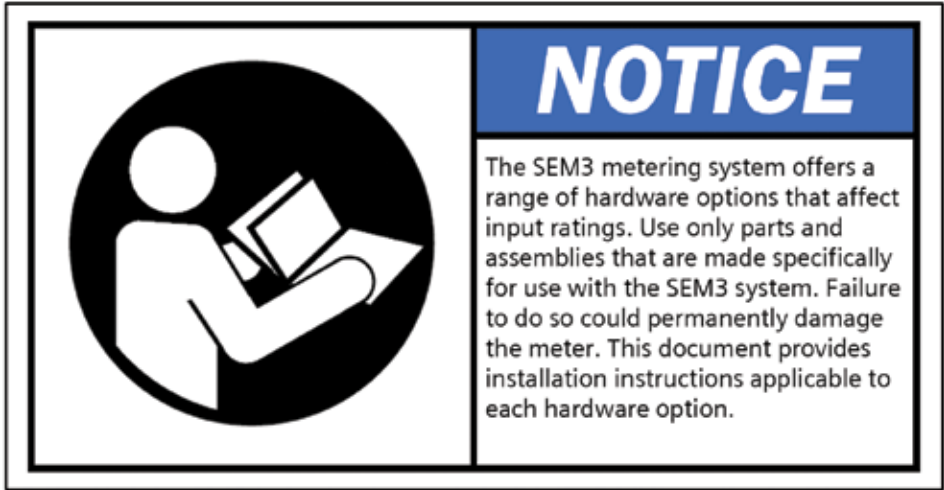


SEM 3™ - Embedded Micro Metering Module™

User Manual

Answers for infrastructure and cities.

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.



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 C12.20/0.2
- **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
- **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.

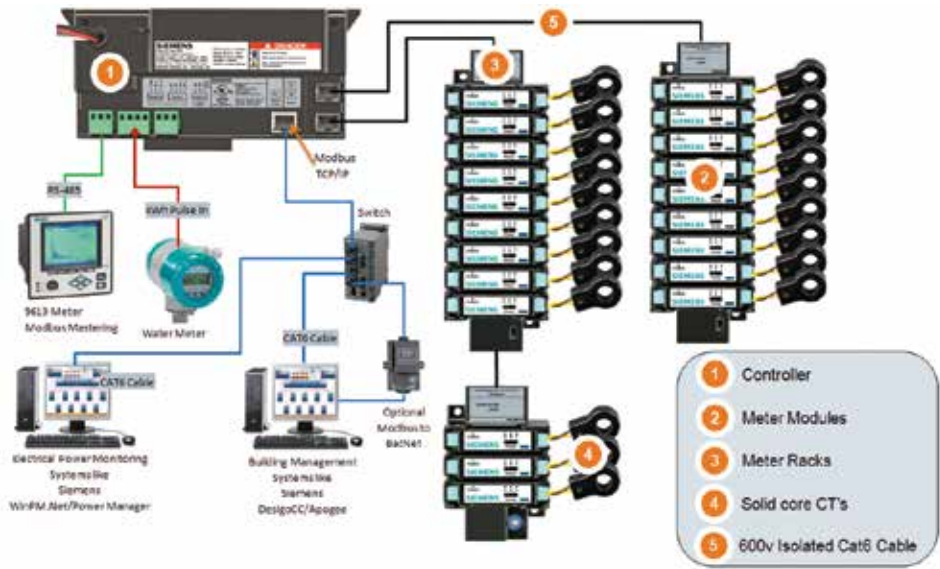
SEM3™ - Embedded Micro Metering Module™

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 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 or Modbus TCP via and Ethernet port to outside systems. Real time values may also be viewed from the controller web pages.

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.



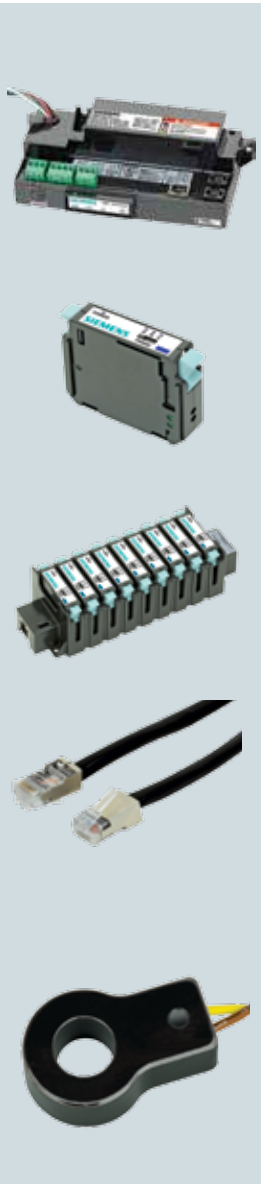
SEM3™ - Embedded Micro Metering Module™ (cont'd.)

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 for 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 C12.20/0.2.
- 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, 9, 15 and 21 module configurations.
- 4. CT or current transformers** – The SEM3 systems have solid core CTs for use with the system in the following maximum amperage ranges 50, 125, 250, 400, 600, 800 and 1200 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%	US2:SEM3LAMETER
Meter - High Accuracy .2%	US2:SEM3HAMETER
Meter Racks	
Meter Rack 3 Position	US2:SEM3RACK3
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
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



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 in an Enterprise 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.

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 realtime 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, standard MODBUS TCP/100BaseT Ethernet, 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.

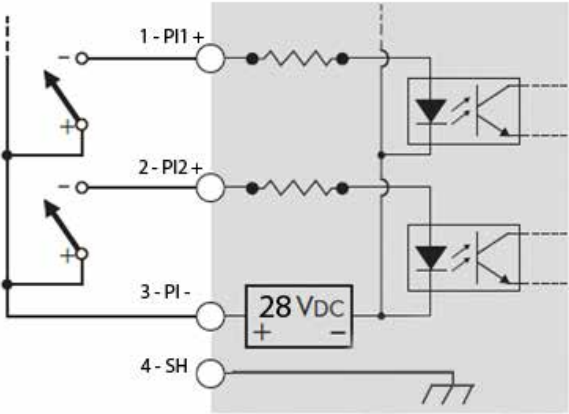
The SEM3 utilizes the Siemens S7 1200 PLC for expanded I/O requirements.

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.

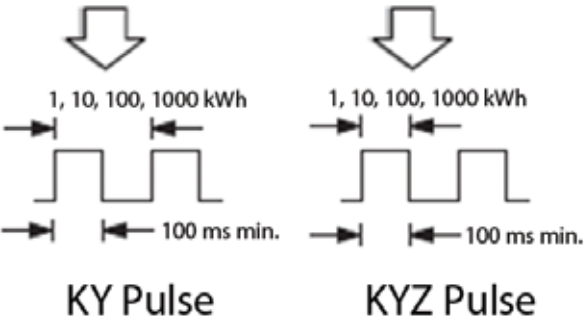
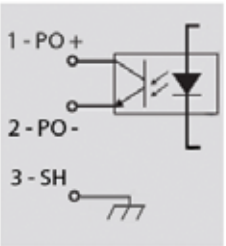
Upgrading your meter

For firmware upgrades, refer to the upgrade bulletin.

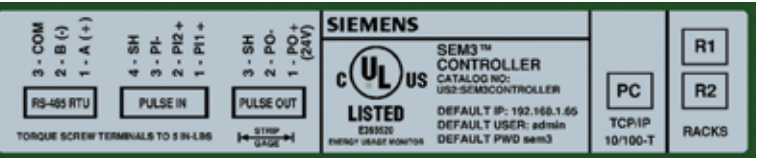
SEM3 in an Enterprise Energy Management System (cont'd.)



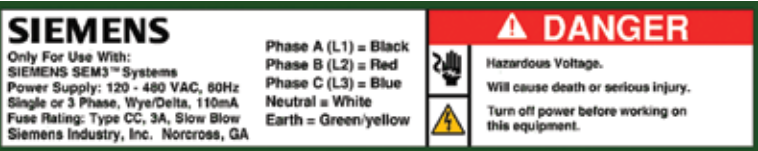
Digital Pulse Input	
Type	Self-Excited (internal 28 VDC)
Application	Dry contact sensing
Wire	16 to 28 AWG (1.3 to 0.1 mm ²)
Min. Pulse Width	100 ms
Isolation to Ground	3750 VAC



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



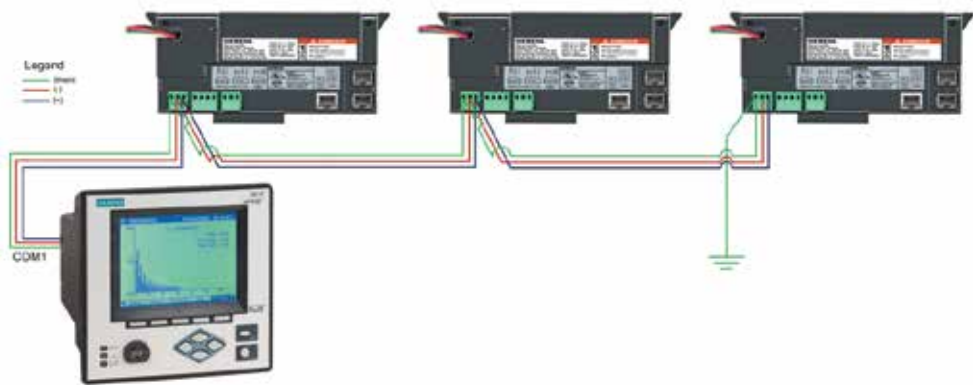
Controller Label

General bus wiring considerations

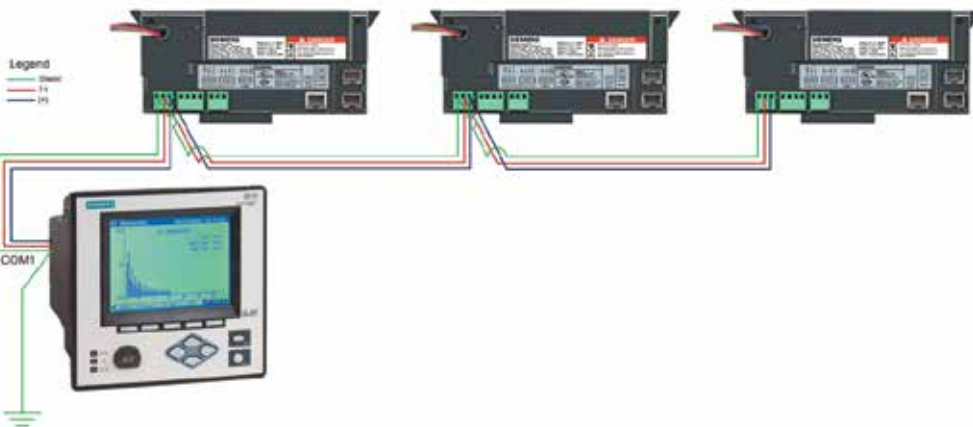
Devices connected on the bus, including the meter, converter(s) and other instrumentation, must be wired as follows:

- 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.



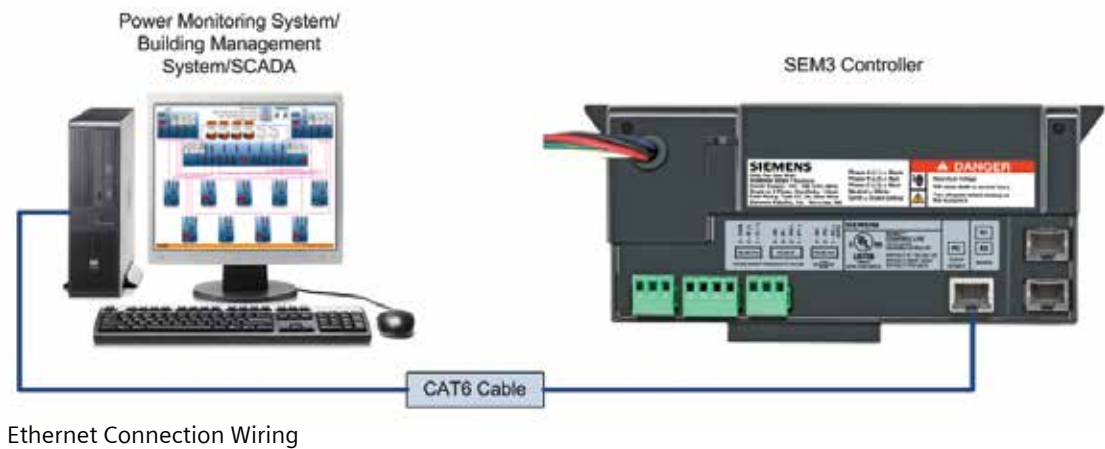
Serial Connection Wiring grounding to Controller



Serial Connection Wiring grounding to 9610 Meter

General bus wiring considerations (cont'd.)

Ethernet connections



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

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

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

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.

Connect to TCP Service Port 7701 for Modbus RTU communications over Ethernet.

Set the COM port to the Modbus RTU protocol.

Communications Port
Measured data is linked to the Modbus Slave module's input.

Modbus Slave module outputs data in Modbus format.

As the data available through the Modbus Slave modules is in a specific format, knowledge of the Modbus protocol and an understanding of the settings used in the meter are required to interpret the data provided.

Using the Modbus/TCP Protocol
Modbus/TCP is the newest 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 can be used to communicate with the meter as a slave. It can also be used with the meter as a Modbus Gateway. See "The Meter as Modbus Gateway" on page 115 for more information.

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

Configuring the metering system

There are a few steps in configuring the components of the SEM3 metering system. Refer to the Installation Manual on mounting of the SEM3 components, available online at: www.usa.siemens.com/SEM3.

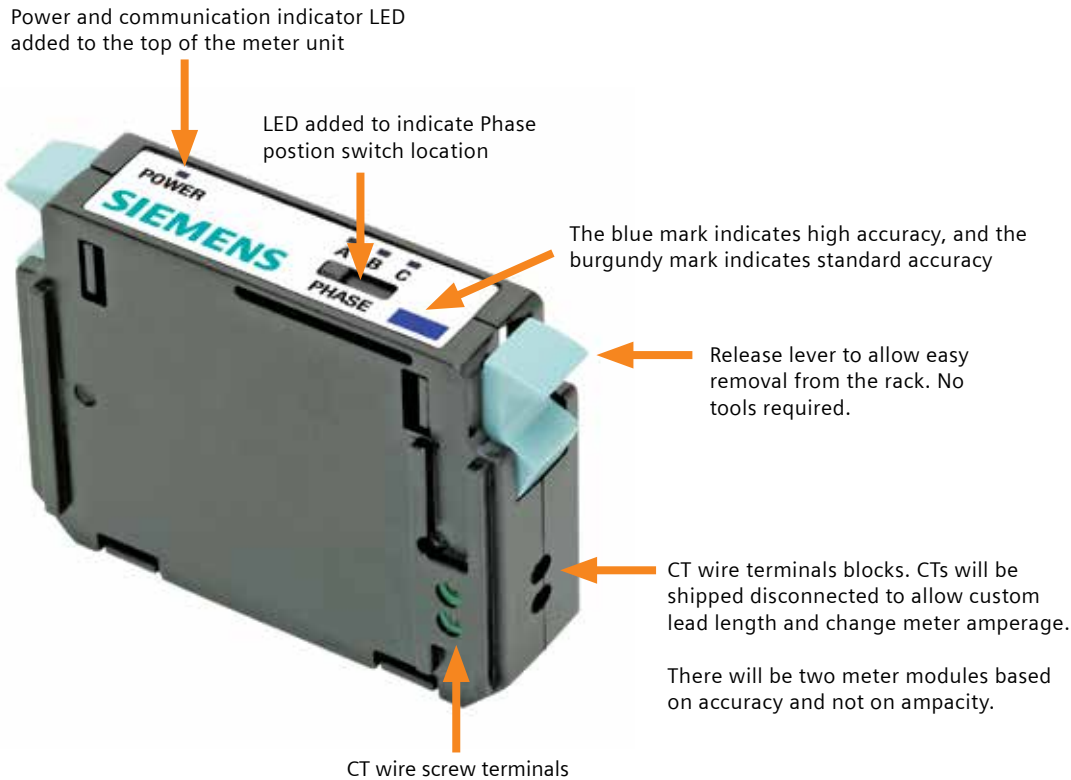
Current Transformer (CT) – There is no setting on the CT for the system. The CT configuration is available on SEM3 web pages. The CTs for use in the SEM3 system are 100 mA output and are self protecting/ shorting so shorting blocks are not required. Note for multi-pole meters CTs are required to have 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 100 feet using 18 AWG twisted pair wire.

Meter Modules – This instruction 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



Configuring the metering system (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 module rack has a rotary switch to allow it to be configured for multiple address ranges. The chart below shows the ranges available for each rack.



3 and 9 position racks shown for demonstration

Configuring the metering system (cont'd.)

Meter module internal addresses – Dip and rotary switches on the racks are used to assign the unique addresses for the meter module. The left chart indicates rack addresses for Left setting on 9, 15 and 21 module racks and setting 0-7 on 3 module rack. Right chart indicates addresses for right setting on 9, 15, and 21 module racks and 8-F on 3 module rack.

9, 15 and 21 Position Rack Dip Switch Setting	Single Phase Monitor Modbus Addresses	21 Position Rack Modbus Addresses	15 Position Rack Modbus Addresses	9 Position Rack Modbus Addresses	3 Position Rack Rotary Switch Setting	3 Position Rack Modbus Addresses	
Left (1)	1	1	1	1	0	1	
	2	2	2	2		2	
	3	3	3	3			3
	4	4	4	4			
	5	5	5	5	1	5	
	6	6	6	6		6	
	7	7	7	7		7	
	8	8	8	8			
	9	9	9	9	2	9	
	10	10	10	Open Address Space		10	
	11	11	11			11	
	12	12	12				
	13	13	13		3	13	
	14	14	14			14	
	15	15	15			15	
	16	16	Open Address space				
	17	17					
	18	18			4	17	
	19	19				18	
	20	20				19	
	21	21					
		Open Address Space			5	21	
						22	
						23	
			6		25		
					26		
					27		
			7		29		
				30			
		31					

Configuring the metering system (cont'd.)

9, 15 and 21 Position Rack Dip Switch Setting	Single Phase Monitor Modbus Addresses	21 Position Rack Modbus Addresses	15 Position Rack Modbus Addresses	9 Position Rack Modbus Addresses	3 Position Rack Rotary Switch Setting	3 Position Rack Modbus Addresses
Right (2)	33	33	33	33	8	33
	34	34	34	34		34
	35	35	35	35		35
	36	36	36	36		
	37	37	37	37	9	37
	38	38	38	38		38
	39	39	39	39		39
	40	40	40	40		
	41	41	41	41	A	41
	42	42	42	Open Address Space		42
	43	43	43			43
	44	44	44			
	45	45	45		B	45
	46	46	46			46
	47	47	47			47
	48	48	Open Address space			
	49	49			C	49
	50	50				50
	51	51				51
	52	52				
	53	53			D	53
54	Open Address Space	54				
55		55				
56						
57		57				
58		E	58			
59			59			
60						
61		F	61			
62			62			
63			63			

The 3 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.

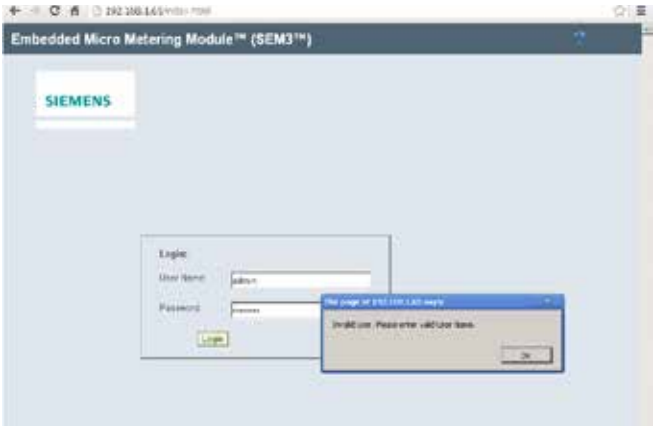
Configuring the metering system (cont'd.)

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.

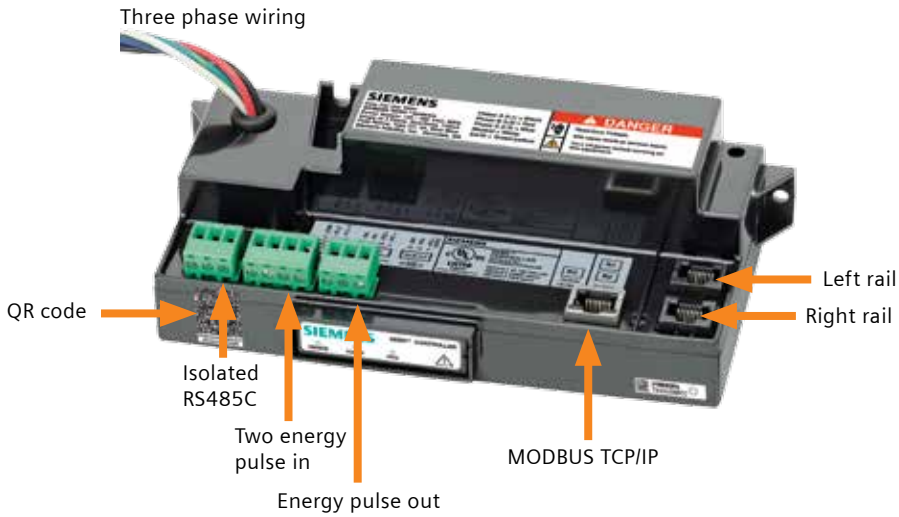
To start – Connect the Controller to a PC using the Ethernet / Modbus TCP port. See figure on page 7.

Open Explorer or Chrome and type out the 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 –



Invalid login will result in an error message



Configuring the metering system (cont'd.)

After logging onto the controller tabs at the top of the web page become visible. The tabs allow for quick and easy navigation through the system web pages to set and maintain the system. The pages are:

- **System settings** – For setting of IP and serial parameters, refresh rates, demand intervals and has factory information such as firmware edition and serial number of the controller.
- **Global** – For setting and clearing of global alarms and enable / disabling I/O.
- **Multi-pole configuration** – For configuring of meter modules into meters.

- **Branch meter configuration** – This page allows the configured meters to be customized with naming and individual alarms that over ride the global alarms. This is also where the meter is included or excluded in the total system accumulated energy. This value can be seen in a Modbus register or sent out via the pulse output.
- **Real time** – This page shows all the configured meter alarms and if a meter is chosen will show the real time values for that one meter. Individual meter alarms may also be cleared from this page.
- **User profile** – Page allows individual users to modify their information such as passwords.

- **User management** – allows supervisor level to control access to the system pages and what can be seen and modified.
- **Diagnostics** – Shows the entire configured meters and when a meter is picked shows the Modbus registers used for that meter. This information can be printed and used for easy inclusion into an EEM such as WinPM.Net.

Each screen is gone through in detail in these documents.

System settings

Modifiable by Supervisor level.

The following may be set from this page:

- IP configuration
- RTU slave configuration
- Real time refresh interval
- Device description
- Panel configurations to include
 - Demand sub interval
 - Sub Interval length
 - Voltage Mode
 - Line to Neutral / Line to Line voltage
 - Potential Transformer (PT) Primary voltage
- Save
- Reset

Data available from this page –

- Firmware version –
- Serial number of the controller –

IP configuration mode – Static IP is the default. Default IP address from the factory is 192.168.1.65.

- Configure IP settings for controller.
- Select “Static IP” to configure settings manually.
- Used for Modbus TCP/IP communication. **Note:** Modbus port is 502.



Serial communication settings

Modbus RTU slave configuration – The default address is 99 but can be set to any address between 1-999.

Baud rate – Pick the baud rate from the drop down menu.

Parity – Pick Odd or Even from the drop down menu.

Configuring the metering system (cont'd.)

Web settings

Real time refresh interval – This is to set the refresh rate for real time monitoring via the web page internal of the system controller. Default is 30 seconds

- Set refresh rate for “Realtime” page by entering a number in the text entry field page.
- Range: 10 to 900

System information – This area of the web page is for reference and contains the device description (user definable up to 30 characters), firmware version and serial number of the controller.

- “Device ID”, “Serial Number,” and “Firmware Version” are all useful for troubleshooting and customer support (these should be written down).
- A device description can be entered in order to differentiate between multiple controllers (32 characters max.)

Panel configurations

Demand sub-intervals – for all demand calculations shall be the same and have a range of 1 to 65535 sub-intervals. The default setting is 900 sub-intervals.

Demand sub-interval length – for all demand calculations shall be the same and have a range of 10 to 65535 minutes. The default setting is 10 minutes.

Sub-interval demand calculation:

During a sub-interval period, the sub-interval demand is calculated as follows:

- Each time new phase samples are acquired, the phase samples are averaged.
- The new average is added to the accumulating sum of the averages.
- When the sub-interval period ends, the accumulated sum is divided by the number of samples taken during the sub-interval and a new sub-interval period begins.

PHsmp: phase sample

(Kilowatts or Current)

SPcnt: number of samples during the sub-interval period

SI_{dmd}: calculated demand for a sub-interval

$$SI_{dmd} = \frac{\sum_{n=1}^{n=SI_{cnt}} PH_{smp}}{SI_{cnt}}$$

Present demand calculation:

The present demand is calculated as follows:

- Each time a demand sub-interval calculation is completed, the sub-interval demand is added to the accumulating sum of the sub-interval demands.
- The accumulated sum is divided by the demand sub-intervals.
- When the number of sub-intervals reaches selected number of demand sub-intervals, the process is repeated.

SI_{dmd}: calculated demand for a sub-interval

D_{si}: demand sub-intervals

P_{dmd}: calculated present demand

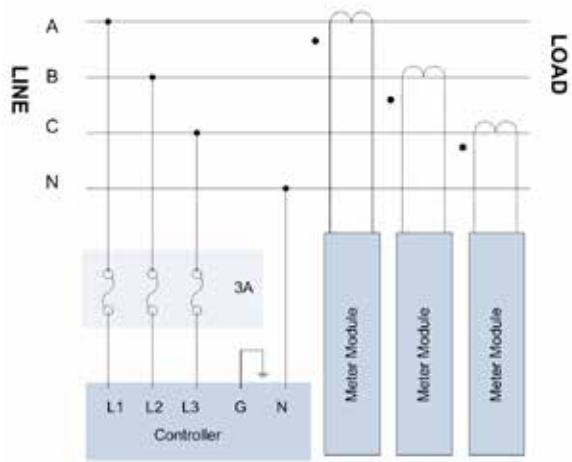
$$P_{dmd} = \frac{\sum_{n=1}^{n=D_{si}} SI_{dmd}}{D_{si}}$$

Voltage mode

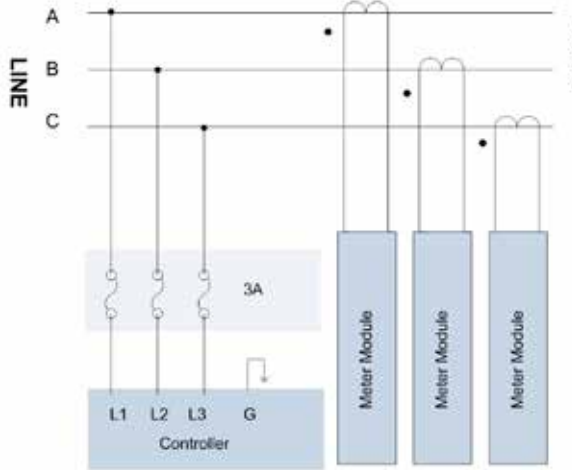
– The SEM3 metering system may be used on Delta, Wye and single phase systems. Below are diagrams for the allow systems and their corresponding voltage mode Choices from the drop down are Wye or Delta. Note – Single phase 3 wire systems would use Wye.

Configuring the metering system (cont'd.)

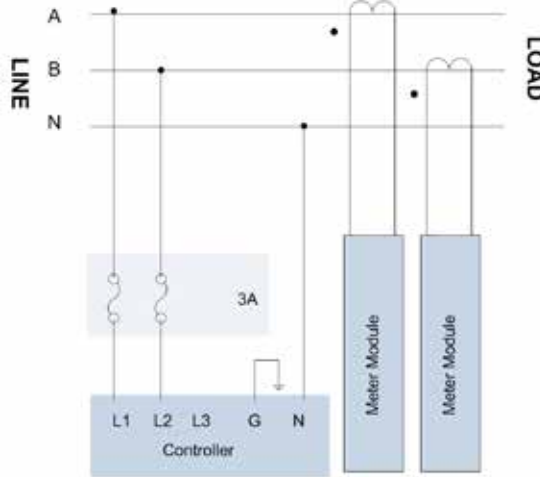
480Y / 277
3Ø 4W



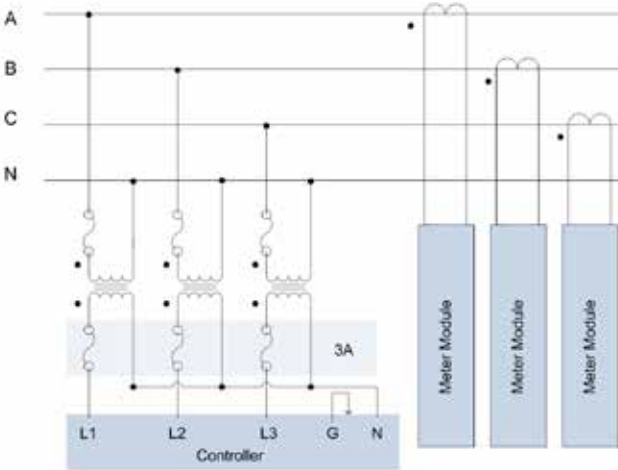
480A
3Ø 3W



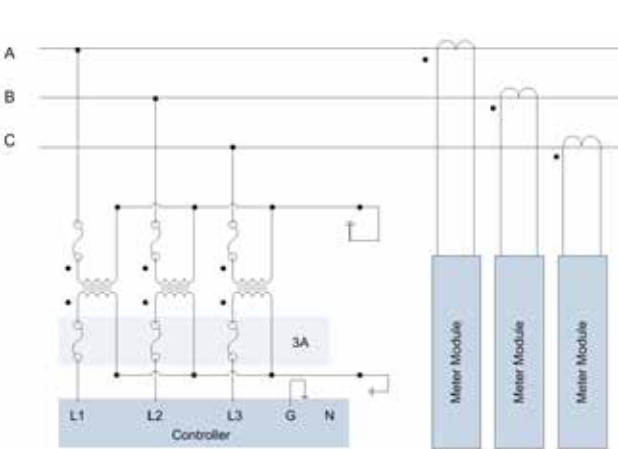
240 / 120
1Ø 3W



600Y / 347
3Ø 4W



600Δ
3Ø 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.

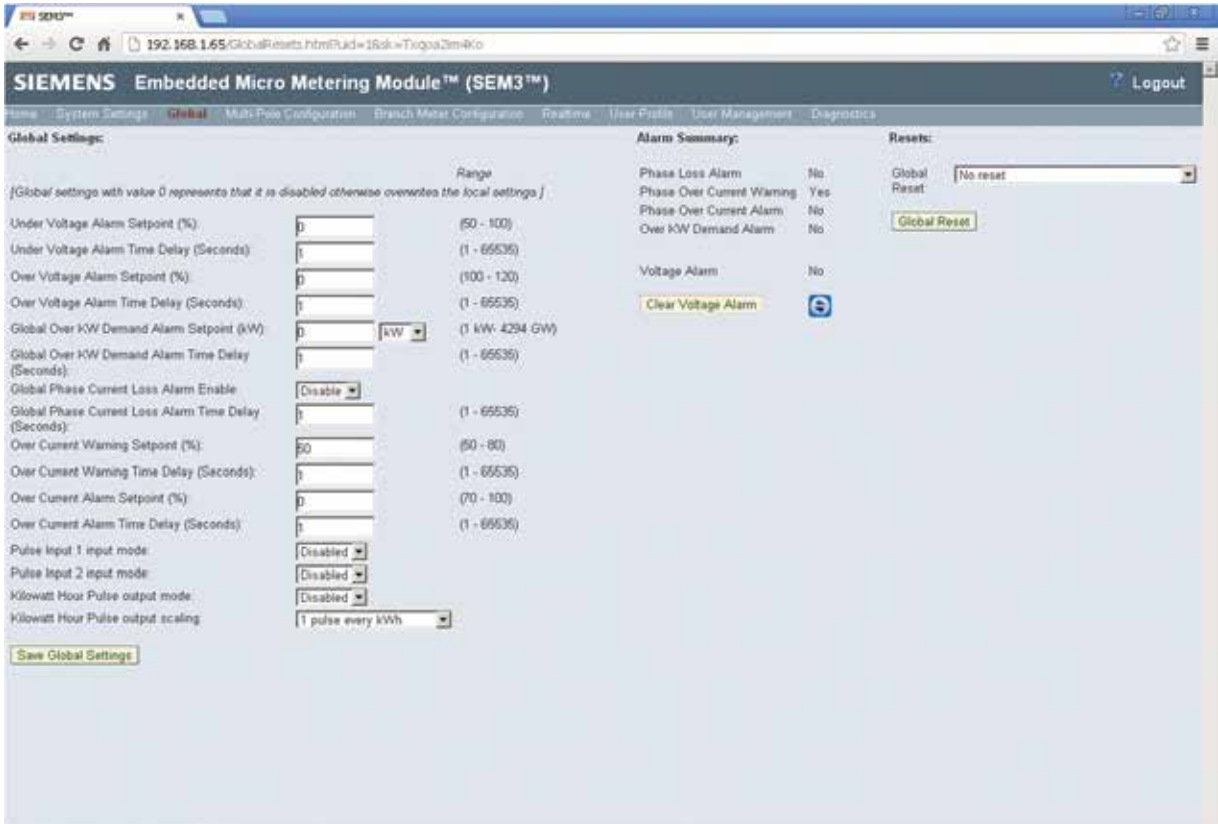
Global settings

May be seen by Observer, Controller and Supervisor. Controller may clear alarms. Supervisor only can change settings other than clearing alarms.

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.
- **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.

Global settings (cont'd.)

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.

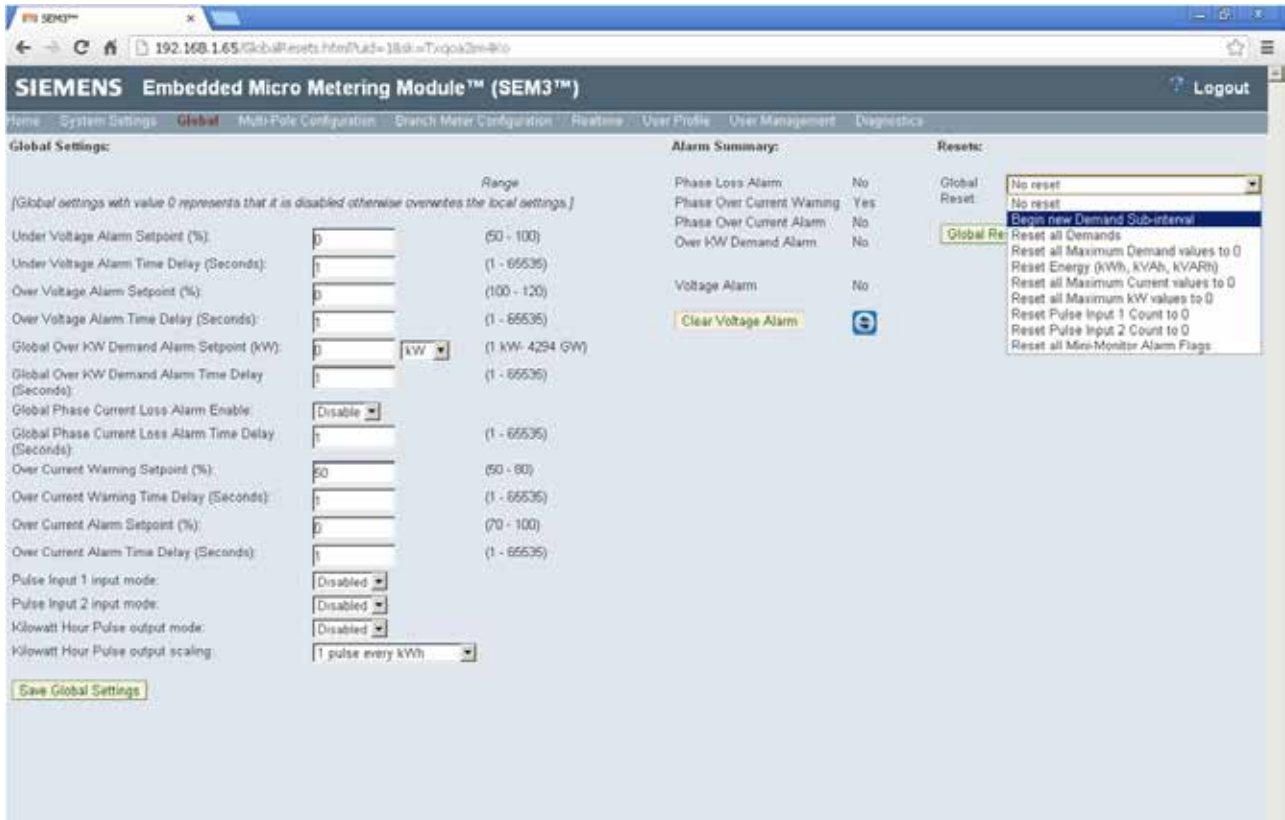
The Form A has a Common and a Normally Closed terminal and would be used on a standard Closed Loop. The Form C would function with an Open Loop.

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.

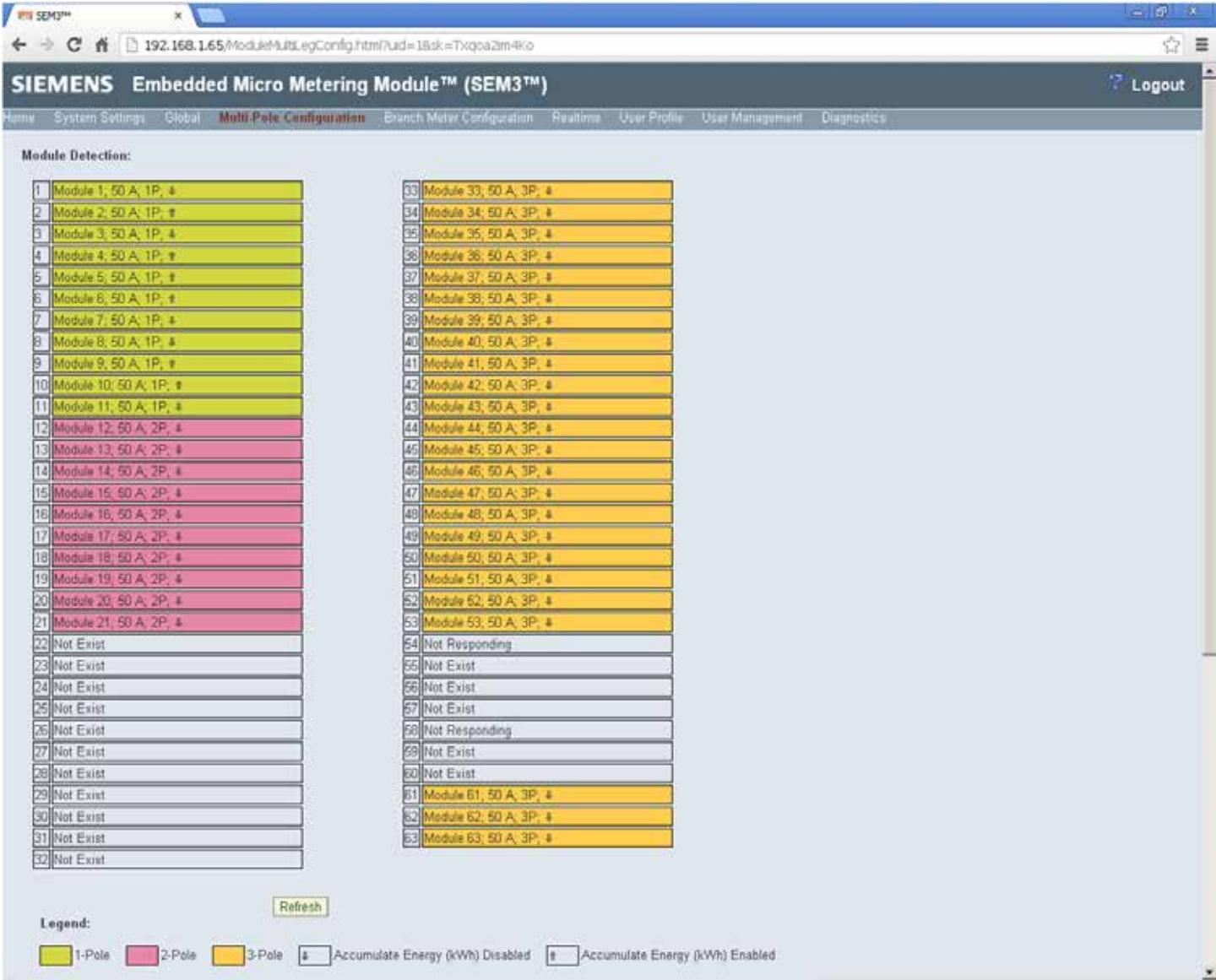
Global reset – Resets can be accomplished by supervisory or controller level users. Reset values available from the pull down are:

- 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



Multi-pole configuration

May be seen by Observer and controller and modified by supervisor only.



Multi-pole configuration (cont'd.)

Each Meter module can be a single phase meter or be grouped into multi-pole meters. Meters modules must be mounted contiguously for multi-pole configurations to be allowed. The upper part of the multi-pole configuration sheet shows the meter modules available and after the modules are configured are color coded to give a quick view of the multi-pole configuration. The Refresh button in the middle of the page will refresh the upper chart to indicate the configurations.

The multi-pole configuration is a drag and drop operation. The box on the far left shows the available modules to be configured as 1 , 2, or 3 pole meters. Click and hold on the module and drag to the appropriate configuration box and release. Only the first module in sequence is picked. The subsequent modules will automatically follow when dropped in to the box. Modules may be changed if required to other configuration. It is recommended that when changes are made that the modules be dropped back in the available modules box first and then re-positioned.

Save changes before leaving this screen.

Module list

- The "Module Detection" list contains configured modules, unconfigured modules, unresponsive modules, and unfilled grid space.

Note: A module may become unresponsive due to a breaker not providing feedback or being moved to different grid space after being updated on the list.

- The module name, breaker rating, and pole type are located next to the grid number the module is located at.

Note: Module name and grid location may not correspond to breaker nomenclature

- Configured modules will be colored (use the legend below to determine configuration type), whereas unconfigured modules will remain transparent until configured using the tool below.

Note: Unconfigured modules will not update data on the "Realtime" page.

- Use the "Refresh" button to get the current list of configured modules.

Configuring an unconfigured module

- Drag the module from the "Available Modules" list into the proper category.

Note: When configuring 2 and 3 pole modules, drag the lead module wanted (i.e. dragging module 1 into a 3-pole configuration will cause modules 1,2,3 to become configured into a 3-pole set).

- Click the "Save" button.

Note: More than one module may be configured at a time.

Reconfiguring a configured module

- Drag the module from the current configuration list into the available modules list.

Note: When making modules available from 2 and 3 pole configurations, all poles configured will return to the available module list (i.e. if modules 1, 2, and 3 are configured in a 3-pole setup, when returned to available modules all will become available to reconfigure).

- Follow the instructions for configuring and unconfigured module.

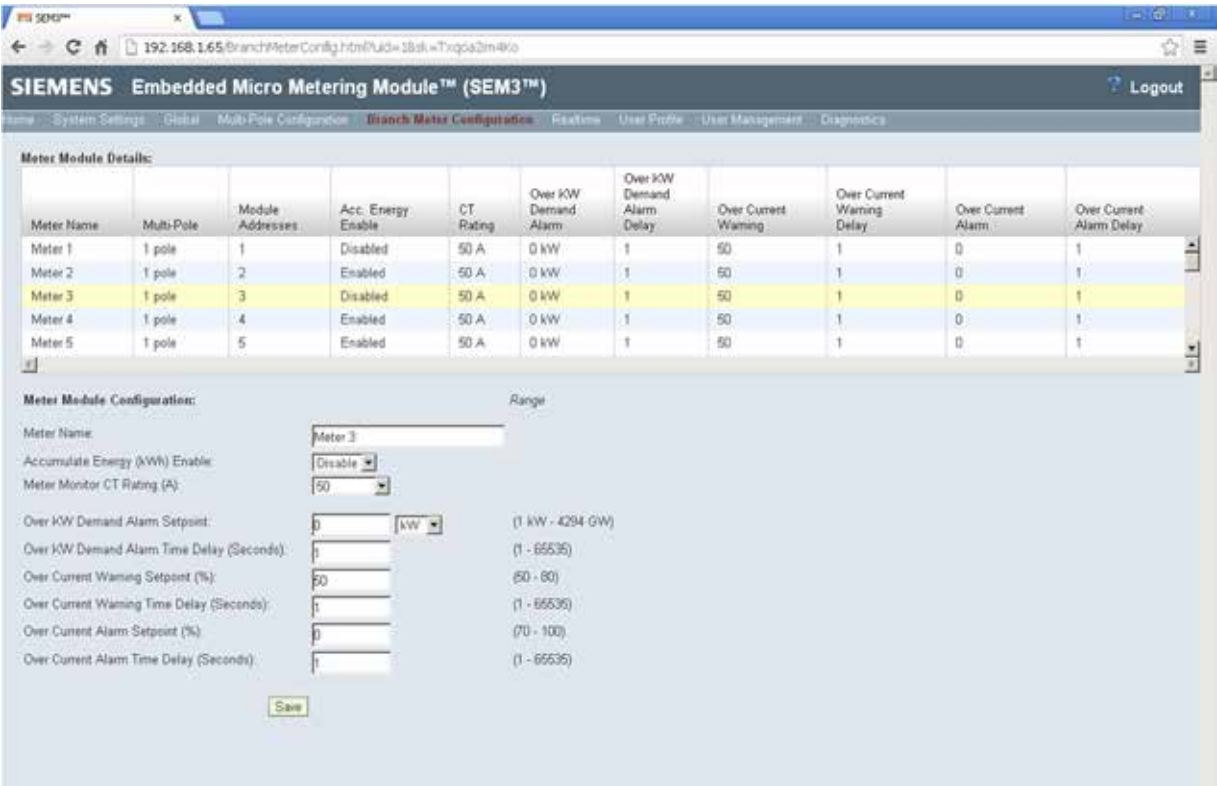
Note: More than one module may be reconfigured at a time.

Branch meter configuration

This page may be seen by observer and controller but modified by supervisor only.

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 and 1200 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.

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 Realtime page at the top.

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

3. Click “Save” button.

Branch meter configuration (cont’d.)

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.

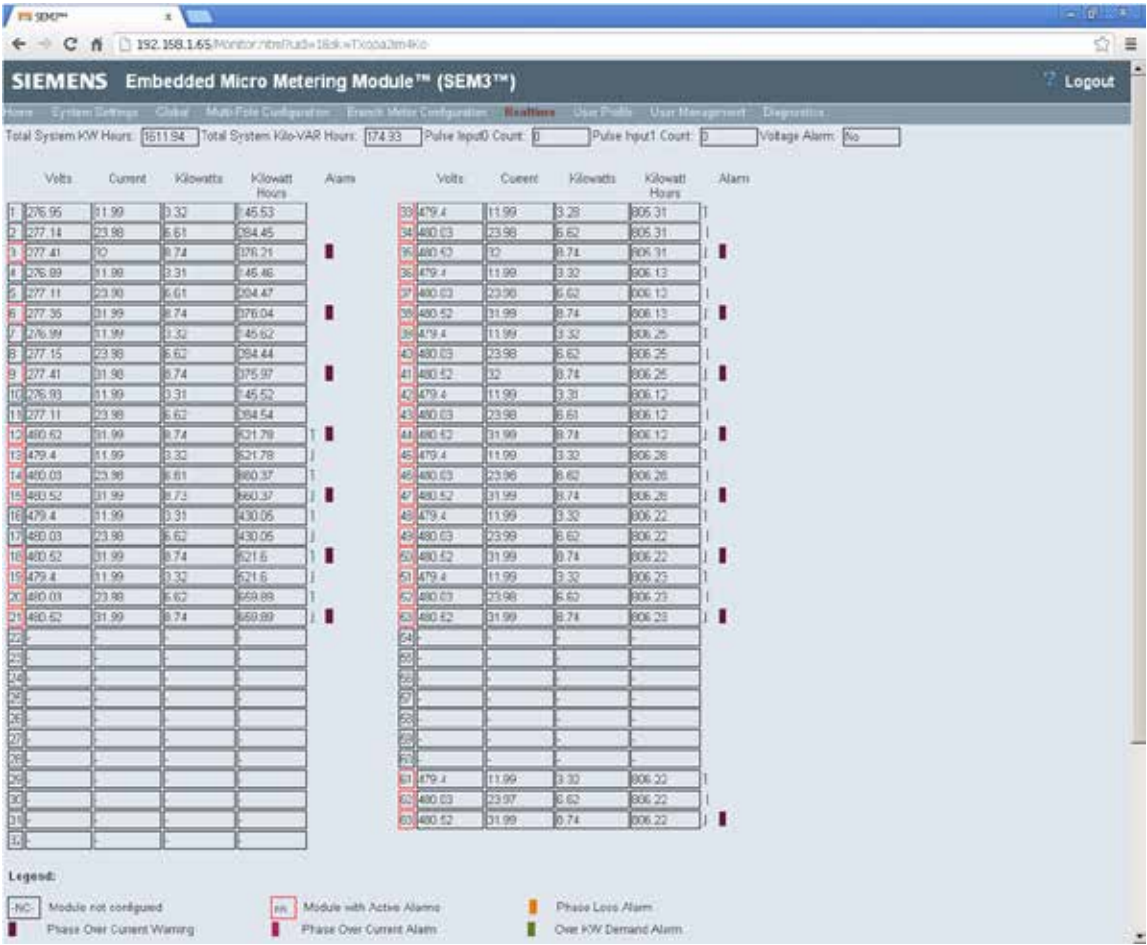
3. Click “Save” button.

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.

Real time – This page is accessible by all users but the content is restricted based on the access level. ‘Supervisor’ or ‘Controller’ user can view and acknowledge the alarms where as the ‘Observer’ user can monitor the usage.

This screen gives an overview or select values for meters configured. For multi-pole meters the values shown in the chart are shown per phase. Multi-pole configurations are indicated by brackets just to the right of the meter lines. Active alarms are indicated by colored block to the right of each meter line.

Selection of a meter line gives a more detailed view of the selected meter real time values and are shown to the right of the grid. Multi-pole meters will show the all phases in this view.



If proper permissions are given to the user individual alarms may be cleared from this page by selecting the alarm in the lower right corner and hitting the clear button.

This page contains constantly updated information for all configured and responding modules. The “Total” stats (as set in the branch meter configuration

page) are displayed at the top of the page. Basic stats for all modules are displayed in the table along with any alarms that are active for a particular module.

Detailed stats

1. Click a grid number on the list to display detailed information about that particular module.

2. A table with more detailed information should appear to the right.

Note: Modules set in multi-pole configurations will display detailed information together (i.e. if module 1, 2, and 3 are set in a 3-pole configuration, they will display detailed information under phase A, B, and C respectively).

Branch meter configuration (cont'd.)

Clearing Alarm Data

- 1. Click a grid number on the list with an active alarm.

Note: Refer to the legend below for alarm designation and information.

- 2. Alarm options will appear to the right below the detailed information.

- 3. Select the alarm options to clear.

Note: The first column of alarms represent the phase A in a multi-pole configuration, the second column represents the phase B, and the third column represents phase C.

- 4. Click "Clear Alarm" button.



User Management – This page is accessible to ‘Supervisor’ user who can manage users’ accounts that includes adding, removing and modifying the users. There are three levels of User Access available:

User access

- Supervisor: Access to all pages with administrator rights. Has the ability to see all data and modify setting and clear alarms and add or modify user settings
- Controller: Access to “Home,” “Realtime,” and “User Profile” pages with alarm

acknowledgement. Has the ability to see all data and to clear alarms. Controller cannot see or modify user management.

- Observer: Access to “Home,” “Realtime,” and “User Profile” pages. Has the ability to see data but is not allowed to modify or clear alarms.

Update profile

- 1. Make appropriate changes in the white text entry fields.
- 2. Click the “Save” button at the bottom.

User profile

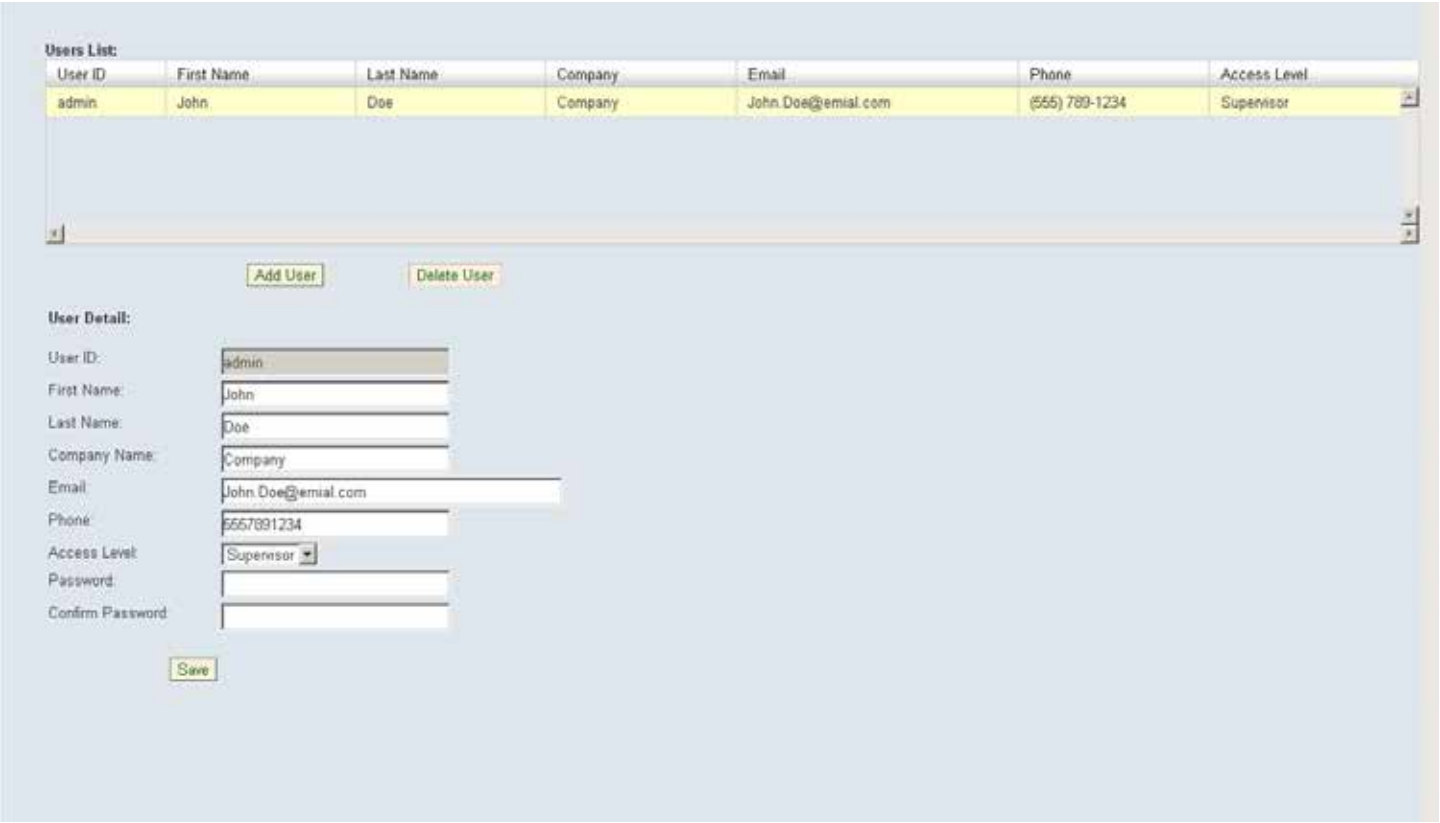
This page is accessible to all users. Users can modify their details except the ‘User ID’ and ‘Access Level’. User ID and Access Level are set by the Supervisor only from the User management screen.

Change password

- 1. Check the box labeled “Would you like to modify the password?”
- 2. Enter your current password, a new password, and retype the new password for confirmation.
- 3. Click the “Save” button at the bottom.

Note: User access level changes and password resets must be completed by a supervisor.

Branch meter configuration (cont'd.)



Diagnostics – This page is accessible to ‘Supervisor’ user.

The SEM3 metering system can work with supervisory systems such as WinPM Net, Power manager and other SCADA or Building management systems that use Modbus protocol. The Modbus registers for this product are such that configuration using the controller web interface is not absolutely necessary, but by doing so valuable time can be saved.

By configuring the meters using the controller the configured meters are shown on the grid to the left of this page. Meter names assigned earlier will be shown on this grid. Selection of a meter line will open up register information for that meter on the right side of the page. This information may be printed from this page to facilitate implementation in a supervisory system by giving the values and appropriate Modbus registers. Meter must be picked individually to see this information.

Checking register addresses

- 1. Click the grid number of the module you would like to read.
- 2. All register addresses along with data type and size will appear on the right hand side of the screen.

Note: The grid number currently being viewed will have a bold outline.

Branch meter configuration (cont'd.)

Two Pole meter example

SEM3™

192.168.1.65/Diagnostics.html?uid=18&sk=Txqoa2m4ko

Logout

HomeSystem SettingsGlobalMulti-Pole ConfigurationBranch Meter ConfigurationRealtimeUser ProfileUser ManagementDiagnostics

1A Meter 1

2B Meter 2

3C Meter 3

4A Meter 4

5B Meter 5

6C Meter 6

7A Meter 7

8B Meter 8

9C Meter 9

10A Meter 10

11B Meter 11

12C Meter 12

13A

14B Meter 14

15C

16A Meter 16

17B

18C Meter 18

19A

20B Meter 20

21C

22

23

24

25

26

27

28

29

30

31

32

33A Meter 33

34B

35C

36A Meter 36

37B

38C

39A Meter 39

40B

41C

42A Meter 42

43B

44C

45A Meter 45

46B

47C

48A Meter 48

49B

50C

51A Meter 51

52B

53C

54

55

56

57

58

59

60

61A Meter 61

62B

63C

Meter Monitoring Modbus Registers: [Meter 12]

	Reg. Size	Reg. Addr.	Phase A	Phase B
	Data Type			
Volts (V):	2, Float-32	46581	46583	
Current (A):	2, Float-32	46586	46587	
Kilowatts (kW):	2, Float-32	46589	46591	
VA's:	2, Float-32	46593	46595	
VAR's:	2, Float-32	46597	46599	
Power Factor:	2, Float-32	46601	46603	
Phase Angle (°):	2, Float-32	46606	46607	
Kilowatt Hours:	2, Float-32	46609		
Kilo-VA Hours:	2, Float-32	46611		
Kilo-VAR Hours:	2, Float-32	46613		
Line Frequency (Hz):	2, Float-32	46615	46617	
Present Current Demand (A):	2, Float-32	46619	46621	
Max. Current Demand (A):	2, Float-32	46623	46625	
Max. Current (A):	2, Float-32	46627	46629	
Present Kilowatt Demand (kW):	2, Float-32	46631		
Ave. Kilowatts Demand (kW):	2, Float-32	46633		
Max. Kilowatt Demand (kW):	2, Float-32	46636		
Max. Total Kilowatts (kW):	2, Float-32	46637		
Avg. Volts (V):	2, Float-32	46645		
Over kW Demand Alarm Setpoint (kW):	2, Float-32	46653		
Over kW Demand Alarm Time Delay (s):	1, Int-16	46656		
Over Current Warning Setpoint:	1, Int-16	46656		
Over Current Warning Time Delay (s):	1, Int-16	46657		
Over Current Alarm Setpoint:	1, Int-16	46658		
Over Current Alarm Time Delay (s):	1, Int-16	46659		
Active Alarms:	1, Bit Field	46660		
Total Monitor Kilowatts (kW):	2, Float-32	46639		
Total Monitor Power Factor:	2, Float-32	46641		
Average Current of phases (A):	2, Float-32	46643		
Total Monitor Current (A):	2, Float-32	46647		
Total Monitor VARs:	2, Float-32	46649		
Total Monitor VAs:	2, Float-32	46651		

Branch meter configuration (cont'd.)

Three Pole meter example

SEM3™

192.168.1.65/Diagnostics.html?uid=18&sk=Txqoa2m4ko

Logout

HomeSystem SettingsGlobalMulti-Pole ConfigurationBranch Meter ConfigurationRealtimeUser ProfileUser ManagementDiagnostics

1A Meter 1

2B Meter 2

3C Meter 3

4A Meter 4

5B Meter 5

6C Meter 6

7A Meter 7

8B Meter 8

9C Meter 9

10A Meter 10

11B Meter 11

12C Meter 12

13A

14B Meter 14

15C

16A Meter 16

17B

18C Meter 18

19A

20B Meter 20

21C

22

23

24

25

26

27

28

29

30

31

32

33A Meter 33

34B

35C

36A Meter 36

37B

38C

39A Meter 39

40B

41C

42A Meter 42

43B

44C

45A Meter 45

46B

47C

48A Meter 48

49B

50C

51A Meter 51

52B

53C

54

55

56

57

58

59

60

61A Meter 61

62B

63C

Meter Monitoring Modbus Registers: [Meter 36]

	Reg. Size	Reg. Addr.	Phase A	Phase B	Phase C
	Data Type				
Volts (V):	2, Float-32	55471	55473	55475	
Current (A):	2, Float-32	55477	55479	55481	
Kilowatts (kW):	2, Float-32	55483	55485	55487	
VA's:	2, Float-32	55489	55491	55493	
VAR's:	2, Float-32	55496	55497	55499	
Power Factor:	2, Float-32	55501	55503	55505	
Phase Angle (°):	2, Float-32	55507	55509	55511	
Kilowatt Hours:	2, Float-32	55513			
Kilo-VA Hours:	2, Float-32	55515			
Kilo-VAR Hours:	2, Float-32	55517			
Line Frequency (Hz):	2, Float-32	55519	55521	55523	
Present Current Demand (A):	2, Float-32	55525	55527	55529	
Max. Current Demand (A):	2, Float-32	55531	55533	55535	
Max. Current (A):	2, Float-32	55537	55539	55541	
Present Kilowatt Demand (kW):	2, Float-32	55543			
Ave. Kilowatts Demand (kW):	2, Float-32	55545			
Max. Kilowatt Demand (kW):	2, Float-32	55547			
Max. Total Kilowatts (kW):	2, Float-32	55549			
Avg. Volts (V):	2, Float-32	55557			
Over kW Demand Alarm Setpoint (kW):	2, Float-32	55565			
Over kW Demand Alarm Time Delay (s):	1, Int-16	55567			
Over Current Warning Setpoint:	1, Int-16	55568			
Over Current Warning Time Delay (s):	1, Int-16	55569			
Over Current Alarm Setpoint:	1, Int-16	55570			
Over Current Alarm Time Delay (s):	1, Int-16	55571			
Active Alarms:	1, Bit Field	55572			
Total Monitor Kilowatts (kW):	2, Float-32	55551			
Total Monitor Power Factor:	2, Float-32	55553			
Average Current of phases (A):	2, Float-32	55555			
Total Monitor Current (A):	2, Float-32	55559			
Total Monitor VARs:	2, Float-32	55561			
Total Monitor VAs:	2, Float-32	55563			

Meter Monitor Diagnostic Modbus Registers:

					Values
Delta Temp (from 22° C):	2, Float-32	61378	61403	61428	43.9
Serial Number:	16, Char-32	61381	61406	61431	A82H501K3-001641306A82H501K3-001241306A82H501K3-001341306
Firmware Version:	4, Char-8	61397	61422	61447	1.0.0.AG1.0.0.AG1.0.0.AG

Meter module information is also available in the lower right hand corner of the diagnostic page. Each module has a register for the internal temperature of the module for trouble shooting. In addition the serial number of each of the meter modules incorporated into the highlighted meter are shown as well as their firmware version.

Meter Monitor Diagnostic Modbus Registers:		Values				
Delta Temp (from 22° C):	2, Float-32	61378	61403	61428	4	3.9
Serial Number:	16, Char-32	61381	61406	61431	A82H501K3-001641306A82H501K3-001241306A82H501K3-001341306	
Firmware Version:	4, Char-8	61397	61422	61447	1.0.0.AG	1.0.0.AG

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

Address Offsets	Data	Reg. Size	Format	Access	Default	Description
Base	Kilowatt Hours	2	Float-32	RO	-	Each Mini-Monitor contains these 5 data items in the order listed
Base+2	Average Kilowatts Total Demand	2	Float-32	RO	-	
Base+4	Maximum Total Kilowatts	2	Float-32	RO	-	
Base+6	Average Volts	2	Float-32	RO	-	
Base+8	Total Monitor Current	2	Float-32	RO	-	
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	Breaker Rating in amps 0 indicates no Breaker installed at this location
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	
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 Address 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 ‘Realtime’ 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				

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