SIEMENS
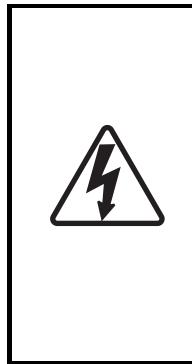
9300 Series Power Meter

User's Guide

⚠ DANGER

Electrical equipment contains hazardous voltages and high speed moving parts.

Can cause death, serious injury or property damage.

See safety instruction contained herein. Restrict use to qualified personnel.

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 is familiar with the installation, construction, or operation of the equipment and 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 INSTRUCTION MANUAL SHALL NOT BECOME PART OF OR MODIFY ANY PRIOR OR EXISTING AGREEMENT, COMMITMENT OR RELATIONSHIP. THE SALES CONTRACT CONTAINS ALL OBLIGATIONS OF SIEMENS ENERGY & AUTOMATION, INC. THE WARRANTY CONTAINED IN THE CONTRACT BETWEEN THE PARTIES IS THE SOLE WARRANTY OF SIEMENS ENERGY & AUTOMATION, INC.

ACCESS, ISGS, Isolated Multi-Drop, S7-I/O, SBwin, SAMMS-LV, SAMMS-MV,SEAbus,SIEServe, Static Trip III, Wisdom, and WinPM are trademark, Sensitrip and Sentron are registered trademarks of Siemens Energy & Automation, Inc. SIEMENS is a registered trademark and Windows is a trademark of Microsoft Corporation. ION is a registered trademark of Power Measurement. All other product names mentioned herein are used for identification purposes only and may be the trademarks or registered trademarks of their respective companies.

Notices

Danger

This symbol indicates the presence of dangerous voltage within and outside the product enclosure that may constitute a risk of electric shock, serious injury or death to persons 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.

Note

This symbol directs the user's attention to important installation, operating and maintenance instructions.

Installation Considerations

Installation and maintenance of the 9300 Series meter should only be performed by qualified, competent personnel that have appropriate training and experience with high voltage and current devices. The meter must be installed in accordance with all Local and National Electrical Codes.

⚠ DANGER

Failure to observe the following instructions may result in severe injury or death.

◆ During normal operation of the 9300 Series meter, hazardous voltages are present on its terminal strips, and throughout the connected potential transformer (PT), current transformer (CT), digital (status) input, control power and external I/O circuits. PT and CT secondary 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, shorting CT secondaries, etc).

◆ The terminal strips on the meter base 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 9300 Series 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 secondary protection functions.

◆ Do not HIPOT/Dielectric test the digital (status) inputs, digital outputs, or communications terminals. Refer to the label on the 9300 Series meter for the maximum voltage level the device can withstand.

⚠ CAUTION

Observe the following instructions, or permanent damage to the meter may occur.

◆ The 9300 Series meter offers a range of hardware options that affect input ratings. The 9300 Series meter's serial number label lists all equipped options. Applying current levels incompatible with the current inputs will permanently damage the meter. This document provides installation instructions applicable to each hardware option.

◆ The 9300 Series meter's chassis ground must be properly connected to the switchgear earth ground for the noise and surge protection circuitry to function correctly. Failure to do so will void the warranty.

◆ Terminal screw torque: Barrier-type (current, voltage, and relay terminal screws: 1.35 Nm (1.00 ft-lbf) max. Captured-wire type (digital inputs/outputs, communications, power supply: 0.90 Nm (0.66 ft.lbf) max.

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. The Ringer Equivalence Number (REN) for the 9300 Series optional internal modem is 0.6. Connection to the 9300 Series internal modem should be made via an FCC Part 68 compliant telephone cord (not supplied). The 9300 Series cannot be used on a public coin phone service or party line services.

Network Compatibility Notice for the Internal Modem

The internal modem in meters equipped with this option is compatible with the telephone systems of most countries in the world, with the exception of Australia and New Zealand. Use in some countries may require modification of the internal modem's initialization strings. If problems using the modem on your phone system occur, please contact Siemens Customer Service

Standards Compliance

CSA: Certified to CAN/   Certified to   CE: approved
CSA C22.2 No.1010-1   UL 3111

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1 Introduction

The 9300 Series intelligent metering and control devices are typically used in enterprise energy management systems such as feeder monitoring and submetering, and offer unmatched value, functionality, and ease of use. These meters interface to WinPM.Net software or other automation systems for fast information sharing and analysis. The 9300 meter is an ideal analog meter replacement with a multitude of power and energy measurements, analog and digital I/O, communication ports, and industry-standard protocols. The 9330 meter adds on-board data storage, alarms, and an optional modem. The 9350 meter is further augmented by more sophisticated power quality analysis and a call-back-on-alarm feature.

In This Chapter

9300 Series Meters

The 9300 Series meters are intelligent metering and control devices suited to a wide range of applications. The meters can be used as stand-alone devices, but their extensive capabilities are fully realized when used 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 efficiency, and power quality and reliability.

ION® technology uniquely delivers the benefits of enterprise energy management through an efficient, economical, and scalable architecture using web-enabled software and intelligent metering and control devices. ACCESS systems place intelligence everywhere its needed, delivering information and control to everyone that needs it, wherever they are. This gives all parties the necessary information to make the best energy decisions, and the control to act on them. Systems can span widely dispersed geographic locations and multiple points within each site. A single, shared system delivers a broad range of functionality that can satisfy the needs of many different groups within an enterprise, while integrating seamlessly with existing systems.

WinPM.Net™ is a powerful web-ready software suite that can process, analyze, store, and share information from across your entire organization. Its compatibility and flexibility means you can introduce individual components, at a pace you decide, while maintaining your original investments. You can access information and alarms from any workstation, pager, PDA, or cell phone locally or around the world, in the format you require. You can also perform coordinated load and equipment control functions, either manually or automatically. ACCESS software collects data automatically from ACCESS meters and third-party devices, so you can manage a single site or a global network of devices. ACCESS software and hardware products reduce cost of installation and ownership by leverage existing corporate networks and popular networking technologies, including serial, wireless, modem, Ethernet and Internet links.

A wide selection of ACCESS intelligent metering and control devices are available, with choices to meet the specific needs of various key points within an enterprise. Devices offer a range of high accuracy metering, power quality and reliability analysis, data and event logging, alarming, control and communications.

This manual discusses the use of all 9300 Series meters. Throughout the manual, the term "meter" generally refers to all meter models. All differences between the models, such as a feature specific to one model, are indicated with the appropriate model number.

The 9300 Series meters can be used effectively in numerous supply side and demand side operations. Some common meter applications are:

◆ Revenue Metering

◆ Substation Automation

◆ Replacement of Analog Transducers

◆ Commercial/Industrial Metering

◆ Demand Monitoring

◆ Genset Applications

◆ Universal Metering (9330 and 9350)

◆ Utility Sub-Metering (9330 and 9350)

These are just a few of the many possibilities. Contact Siemens Customer Service if you would like assistance with your application.

The ACCESS Meter in an Enterprise Energy Management System

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 or logged 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.

The meter can adapt to many situations. Advanced communications allow data to be shared simultaneously across multiple networks, built-in I/O provides monitoring and control capabilities, and a variety of display and analysis tools can be used to monitor your power system.

Power System Connections
Phase voltage and phase current from Wye, Delta or single-phase power systems.

Internet Connectivity
- MeterM@il
- WebMeter

Protocols
- ION
- Modbus RTU
- DNP V3.00
- Profibus (9300)

Data Analysis Tools
- WinPM.Net Software
- 3rd-Party tools

I / O
- Energy Pulses
- Breaker Closures
- Digital Signals
- Analog Transducers

Corporate Network

Communications
- RS-485
- Optical Infrared
- 10 Base-T Ethernet
- 33.6 kbps internal modem
- Profibus port (9300)

On-Site Data Display
- Remote Modular Display
Remote Data Display
- Vista
- WebReach

Data Display and Analysis Tools

Not only does the meter's front panel allow meter configuration and data display, but the meter also integrates seamlessly with display and analysis software available from Siemens. WinPM.Net software is the network and device configuration software that also lets you analyze and monitor your system and produce reports for any department in an organization. Furthermore, you can use data acquired by the meter in a variety of third-party systems. ACCESS software is designed to make use of all the available advanced capabilities.

The Front Panel

Local monitoring and standalone applications are facilitated by the meter's front panel interface. The front panel combines real-time display features as well as device configuration functions.

The Remote Modular Display

The Remote Modular Display (RMD) can be added to an existing 9300 Series-TRAN (Transducer) model to facilitate local monitoring and standalone applications. The 9300 Series Basic Model provides an integrated front panel display.

Both the front panel and RMD combine real-time display features with limited device configuration functions. When used in combination with an WinPM.Net system, the display provides an interface for field personnel.

WebMeter® Embedded Web Server Feature

An on-board web server combined with an Ethernet port provides quick and easy access to real-time energy and basic power quality information without special software: this is WebMeter functionality. The built-in web pages display a range of energy and basic power quality information through the web-enabled device; these pages even support basic meter configuration tasks.

MeterM@il® Internal E-Mail Server Feature

Configure the meter to automatically email high-priority alarm notifications or scheduled system-status update messages to anyone, anywhere within the facility or around the world. Specify the type of event that triggers an email alert, such as power quality disturbances or logged data at any pre-determined interval, and have your ACCESS software administrator program the meter to respond with a MeterM@il message when these events occur. MeterM@il messages can be received like any email message over a workstation, cell phone, pager, or PDA.

XML Compatibility

The meters can exchange information using industry-standard XML format. This simple machine-readable format supports easy integration with custom reporting, spreadsheet, database, and other applications.

WinPM.Net Software

The complete WinPM.Net software package enables the meter to be part of a fully networked information system with other meters and local and wide-area computer networks. WinPM.Net is recommended for all power monitoring systems where advanced analysis and control capabilities are required.

WinPM.Net provides tools for managing your power monitoring network, logging data, analyzing real-time and logged data, generating power system reports, and creating custom functionality at the meter level.

WinPM.Net also offers two ways to remotely view information through a web browser: WebReach and Microsoft Terminal Services.

◆ WebReach only requires an URL to display a meter's real-time data and select views of historical and waveform data from a web browser; there is no client machine configuration. WebReach is a data display application; there is no control functionality available through it.

◆ Microsoft Terminal Services enable full WinPM.Net functionality, including control features. Some client machine configuration is required.

ION Setup™ Software

ION Setup is a meter configuration tool designed specifically to configure and test meters. ION Setup offers an intuitive graphical interface for performing basic meter setup, installing templates into meters, viewing real-time and reset accumulated values, verifying meter calibration and measurements, and setting up advanced security.

Communications Protocols

The 9300 Series meter can be integrated into various industry-standard networks. Data that is measured by the unit can be made available to other devices using ACCESS, Modbus, and DNP V3.00 (9330 and 9350) protocols. The 9300 meter also has the option available to communicate using the Profibus protocol. You can also configure the meter to import data from devices on these networks. With these advanced communications functions, the power of the meter can be utilized in most existing power monitoring systems. Any data display and analysis software that works with Modbus or DNP devices will also function with the 9300 Series meter.

The standard meter has one infrared port and one or two RS-485 communications ports (the 9300 has one, the 9330 and 9350 have two). These ports are capable of data rates up to 19,200 bps. The infrared port on the front panel is compatible with an ANSI C12.13 Type II magnetic optical communications coupler. It can be used to communicate real-time measurements via ACCESS, Modbus, or DNP protocols. The RS-485 and infrared ports can communicate simultaneously. Ordering options can include a 10Base-T Ethernet port, a 33.6 kbps internal modem, and a Profibus port, depending on the model type of your 9300 Series meter.

Digital and Analog I/O Options

The 9300 Series meter offers a variety of analog and digital I/O combinations. I/O connections to the meter are made via captured-wire terminals on the meter. The analog I/O option can be specified for any 9300 Series meter, allowing you to monitor a wide range of conditions, such as flow rates, device cycles (RPM), fuel levels, oil pressures and transformer temperatures. You can output energy pulses to an RTU or perform equipment control operations.

Digital Outputs

All 9300 Series meters have four programmable digital output ports. These are suitable for pulsing or controlling relays. The Infrared Data Port and/or a rear panel LED can also be used for energy pulsing.

Status Inputs

Four optically isolated digital inputs on the 9330 and 9350 meters can monitor status, count transducer pulses, breaker trips and pulses from any external "volts free" dry contact.

Analog Inputs/Outputs

Any meter in the 9300 Series can be equipped with an optional analog I/O card featuring:

◆ 4 analog inputs accepting 0–1mA or 0–20mA, (scalable to 4-20mA)

◆ 4 analog outputs accepting 0–1mA or 0–20mA, (scalable to 4-20mA)

📖 **NOTE**

When equipped with analog I/O, TRAN base units cannot be ordered with a remote display (RMD).

REB Option

Adding the Relay Expansion Board (REB) option can enhance the functionality of the onboard digital outputs. The REB option includes a four-position Grayhill module rack and a 100-240VAC to 5VDC power supply. Grayhill modules are ordered separately.

The Meter is Factory-Configured and Ready to Operate

Although the 9300 Series meter is fully customizable, it is shipped from the factory with many functions pre-configured. Once installation and basic setup are performed, all of the basic measurements and energy calculations are ready to operate, right out of the box. Many users will find that the factory configuration will serve their purposes without performing any additional configuration.

Meter Firmware Revision History

9300 Models

Firmware Version	Release Date	Firmware Enhancements
V250	June 2000	Rev B Hardware Initial Release Improved communications performance Four Calibration Pulsers added Harmonic update times improved
V265	March 2001	Analog I/O supported New Calibration procedure
V271	July 2002	Adds Web Server capabilities when combined with ETH73V272 firmware

9330 Models

Firmware Version	Release Date	Firmware Enhancements
V250	June 2000	Rev B Hardware Initial Release Improved communications performance Adds 4 Calibration Pulser modules to template Harmonic update times improved
V265	March 2001	Analog I/O supported. New Calibration procedure
V271	July 2002	Adds Web Server capabilities when combined with ETH73V272 firmware
V272	September 2002	Maintenance Release
V273	September 2002	Maintenance Release

9350 Models

Firmware Version	Release Date	Firmware Enhancements
V265	March 2001	Analog I/O supported New Calibration procedure
V271	July 2002	Adds Web Server capabilities when combined with ETH73V272 firmware, MeterM@il (data logs) and alerts.
V272	September 2002	Maintenance Release
V273	September 2002	Maintenance Release
V274	November 2002	Maintenance Release

Ethernet Card Firmware Revision History

Firmware Version	Release Date	Firmware Enhancements
V102	June 2000	Maintenance release (support for Rev B hardware)
V270	September 2001	MeterM@il support added (with 9330V270 firmware) Modbus TCP support added
V272	July 2002	Adds Web Server capabilities when combined with 9300 Series V271 firmware, MeterM@il (data logs) for the 9330 and 9350, and alerts for the 9350

Using this Guide

This User's Guide is directed at three types of user: the typical user or operator, the system administrator, and the advanced user. You might not fit into any of these groups directly, or perhaps you are both an operator and an administrator. These classifications are intended to make this guide easier to navigate with respect to which information is appropriate to your needs.

Typical User or Operator

Most users simply want to display the data provided by the factory-configured meter. These users want fast access to data through the front panel, ACCESS software, or a third-party protocol such as Modbus or DNP.

System Administrator or Manager

Some users need to make minor adjustments so that their meters "fit" their power systems: data recording intervals, demand sub-intervals and other parameters may need to be set before the meter's setup is complete. These users will use the front panel, or ACCESS software to change settings in the device's operating software. (WinPM.Net is highly recommended.)

Advanced User or Systems Integrator

Advanced users may want to make use of the flexibility and power provided by the device's operating software. These users will need to become familiar with the ION Architecture, and the ACCESS software tools used to customize the device's operation.

Before You Can Use this Guide

By the time you are ready to use this guide, your meter should be installed, 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 *9300 Series Installation Guide* shipped with the meter.

Getting More Information

Additional information is available from Siemens. Check our web site at www.sea.siemens.com, contact your local Siemens representative, or contact Siemens directly (contact information is provided on the first page of this document). Documents that are related to the installation, operation and application of the meter are as follows:

Installation Guide

This brief instructional manual is shipped with each meter. It details the mounting, wiring and basic setup of the device.

ION Programmer's Reference

This online reference contains detailed descriptions of all of the modules in each ACCESS meter.

WinPM.Net Getting Started Guide

This guide explains the installation and configuration of the WinPM.Net software suite.

Online WinPM.Net Help

Each WinPM.Net software component has an in-depth online help system.

Application Notes

Online application notes offer detailed, high-level descriptions of real-world situations, where Siemens's ACCESS devices and ACCESS software provide beneficial solutions.

2 Using The Front Panel

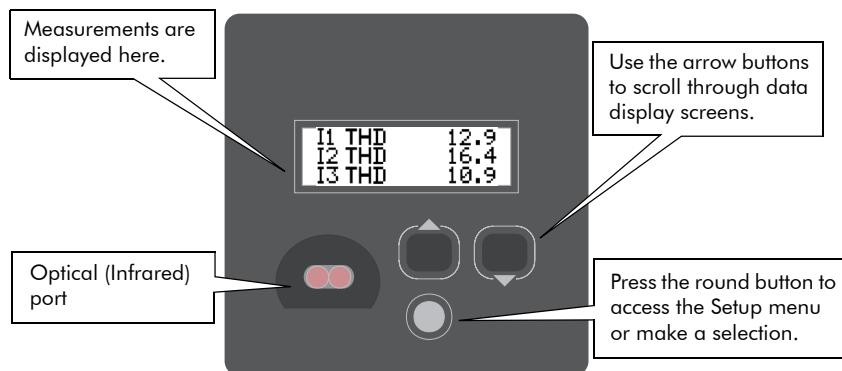The meter's front panel is used for both display and configuration purposes. The liquid crystal display (LCD) screen and the numerous selection, navigation, and configuration buttons allow quick access to basic meter configuration provided by special setup screens. The front panel also provides access to the settings of many other meter functions, such as customizing the type of data the meter displays.

In This Chapter

Displaying Data with the Front Panel

The front panel provides a detailed graphics and text display for the meter. The front panel is configured at the factory with eight displays showing some of the more commonly used power system values measured by the device (refer to "Default Front Panel Display Screens"). A Remote Modular Display (RMD) can be added to an existing TRAN meter to provide a front panel display.

Measurements are displayed here.

Use the arrow buttons to scroll through data display screens.

```
I1 THD    12.9
I2 THD    16.4
I3 THD    10.9
```

Optical (Infrared) port

Press the round button to access the Setup menu or make a selection.

Button Functions

Press the Up/Down arrow buttons to scroll through the data display screens. You do not require password authorization to view these screens. The round button, when pressed, provides access to the Setup menu. Use the front panel's three buttons to navigate this menu, and enter settings into the meter. For more information on setting up the meter using the front panel, refer to "Configuring the Meter with the Front Panel" on page 27.

Front Panel Display Resolution

When displaying numeric values, the front panel display screen can show up to nine digits of resolution. This nine digit resolution is available when the display screen is set to display one parameter. Any multi-parameter screen displays up to five digits of resolution.

If you require more digit resolution than is available, use ACCESS software to display data. If a value is too large to be displayed on your display screen (i.e. greater than 99,999 on a two parameter screen), the front panel uses an abbreviated engineering notation with standard metric prefixes to indicate the magnitude of the reading. The following table provides some examples:

Front Panel Display	Value
124K0	124,000
124M0	124,000,000
1G240	1, 240, 000, 000

Numeric values are displayed in base units; voltages are displayed in volts, while current is displayed in amps. The following values, however, are displayed in kilo units rather than base units since kilo is the most frequently used value range:

◆ kW

◆ kVA

◆ kVAR

When viewing these parameters with the front panel, remember that the values are already multiplied by 1000. For example, the reading below indicates 120,000 kilowatts, *not* 120,000 watts.

kW total	120K0

INVLD and N/A Messages

If the front panel is unable to read a numeric or status value from the meter, it will display either INVLD or N/A in place of the value. INVLD indicates that the value received cannot be displayed because it is too large (above 9G999). N/A appears if the register is not available.

Default Front Panel Display Screens

The meter's eight default data displays are as follows:

Display 1 (kWh net)
Net Energy

```
kWh net
     1475.35
```

Display 5 (Power)
Total Power (true, reactive, and apparent), Power Factor.

```
kWtot          187
kVAR tot        62
kVA tot        197
PF sign tot  -94.9
```
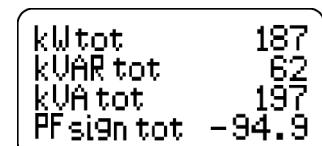
Display 2 (kWh swd / mx)
Present Interval and Maximum Sliding Window Demand

```
kW swd      459
kW swd mx   700
```
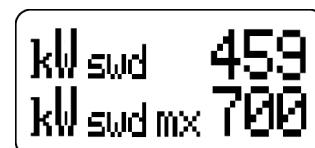
Display 6 (Frequency)
Frequency

```
Freq
     59.99
```
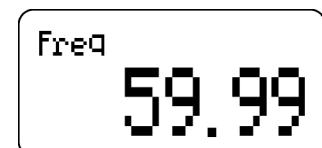
Display 3 (Volts)
Per-phase and average line-to-line voltage

```
Vll ab       607
Vll bc       601
Vll ca       601
Vll avg      603
```
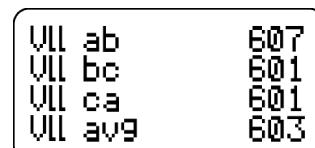
Display 7 (V-THD)
Per-phase Voltage Total Harmonic Distortion

```
V1 THD       1.1
V2 THD       1.0
V3 THD       1.3
```
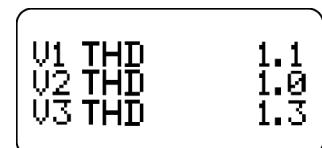
Display 4 (Amps)
Per-phase and
average current

```
I a          177
I b          184
I c          210
I avg        190
```

Display 8 (I-THD)
Per-phase Current
Total Harmonic Distortion

```
I1 THD    12.9
I2 THD    16.4
I3 THD    10.9
```

✎ **NOTE**

Your default data display screens will differ if the meter is in Fixed mode (refer to "Display Mode" on page 34), or if your meter has custom displays.

Configuring the Meter with the Front Panel

The front panel provides meter setup capability at the meter's installed location. All of the meter's setup registers can be configured moving through menus on the front panel's screen (ION module links cannot be modified using the front panel). The front panel also provides quick access to parameter reset for common cumulative parameters.

The Front Panel's Setup Menus

To access the front panel's device configuration functions, press the round button. The Setup menu appears listing the meter's front panel setup options:

Setup Option	Description
Clear Functions	Resets Min/Max, Sliding Window Demand, Energy, Thermal Demand, Peak Demand Registers, Harmonics Min/Max, Status Counters, Manual Waveform Capture, and Disturbance Counts.
Quick Setup	Changes settings in the Communications, Power Meter, and Sag/Swell modules.
Adv Meter Setup	Provides access to all the modules in the meter.
Display Setup	Customizes the appearance of the display screen.
Screen Setup	Customizes the style and values appearing on the display screens.
Nameplate Info	Displays information about the device.
Security	Allows you to modify your password. See "Front Panel Password Security" on page 28.
Diagnostics	Screens to aid in troubleshooting; refer to "Diagnostic Menu" on page 35.

Accessing the Setup Menus

The three buttons are used to navigate the on-screen menus and edit setup registers. While the device is displaying data, the Up/Down buttons scroll through the different display screens. Press the round button at this time to access the Setup menu.

Navigating Menus

Each menu has a title displayed at the top of the display screen and menu items displayed below the title. Use the arrow buttons to scroll through the menu items. To select an item that is highlighted, press the round button. To return to the previous screen, select RETURN. Return to the data display screens by repeatedly selecting RETURN.

Editing Registers

To edit the value of a register, navigate the registers using the arrow keys until the register you want is highlighted, then press the round button. The register appears in one of two ways: as a number, or as an option selected from a menu. Once you have entered the password (if required), a YES or NO verification screen appears showing the new value of the register. Select YES to change the value of the setup register; select NO to return to the previous screen without changing the value.

Numeric Registers

Use the arrow buttons to change the value of the digit above the ▲ cursor. Change the position of the cursor by holding down an arrow key for about one second. Holding the up arrow button moves the cursor left one position, and holding the right arrow button moves the cursor right one position. Once you have the value you want, press the round button.

Enumerated Registers

Some registers are displayed as a menu of options. The current value of the register will be displayed in the list with an asterix (*) on either side of it. Use the arrow buttons to highlight the setting you want, and press the round button.

Front Panel Password Security

The password is required when you make a change to a register through the front panel. Once you have entered a valid password, you can make multiple register changes. The password is factory set at '00000' (5 zeros). Press the round button when you have entered the correct front panel password. If you need to change the password, refer to the section "Security Menu" on page 35.

Clear Functions Menu

The CLEAR FUNCTIONS menu allows you to reset cumulative parameters. To access the Clear Functions screen, press the round button while the meter is displaying data; scroll down the Setup menu and select CLEAR FUNCTIONS.

Peak Demand Reset

The following Demand parameters are reset when you select PEAK DMD RSET:

◆ Maximum and Minimum Rolling (Sliding Window) Demand (kW, kVAR, kVA)

◆ Maximum and Minimum Thermal Demand (kW, kVAR, kVA)

Min/Max Reset

The minimum and the maximum values for each the following parameters are reset when you select MNMX RSET:

◆ Phase and average Current   ◆ Frequency

◆ Line-to-line voltages   ◆ PF lead and PF lag

◆ Line-to-neutral voltages   ◆ Total kW, kVAR, kVA

Sliding Window Demand Reset

These Sliding Window Demand values are reset when SWDEMAND RSET is selected:

◆ Average Current (I avg) SWD

◆ kW SWD

◆ kVAR SWD

◆ kVA SWD

Thermal Demand Reset

The following Thermal Demand parameters are reset when TDEMAND RSET is selected:

◆ Average Current TD

◆ kW TD

◆ kVAR TD

◆ kVA TD

Manual Waveform Trigger

Select this menu item to capture your per-phase current and voltage waveforms.

Harmonics Min/Max Reset

The following Harmonics Parameters are reset when HARM MNMX RSET is selected:

◆ Current Total HD (Ia, Ib, Ic)

◆ Voltage Total HD (Va, Vb, Vc)

Energy Reset

The following energy parameters are reset when ENERGY RSET is selected:

◆ kWh import, export, total and net

◆ kVAh

◆ kVARh import, export, total and net

Status Counters

Each of the four Status Counters that monitor the number of times each Status input changes are reset when S COUNT RSET is selected.

Disturbance Counter Reset

Resets the counter in the Sag / Swell module that keeps track of how many Sags or Swells are detected by the meter.

Quick Setup Menu

Select QUICK SETUP from the Setup menu to access to the Power Meter module and the Communications module settings. These settings are all configured when the meter is initially put into service — typically you will not need to change these settings once the meter is operational.

Comm 1, Comm 2, and Infrared Comm Menus

The setup registers for the three serial Communication modules are as follows:

Register	Default Value	Description
CM1 Unit ID	Factory Set [1]	The communications ID for COM 1
CM1 Baud Rate	9600	The baud rate of the COM 1 port
CM1 Protocol	ION	The communications protocol for COM 1
CM2 Unit ID	Factory Set [1]	The communications ID for COM 2
CM2 Baud Rate	9600	The baud rate of the COM 2 port
CM2 Protocol	ION	The communications protocol for COM 2
IR1 Unit ID	Factory Set [1]	The communications ID for the Infrared port
IR1 Baud Rate	9600	The baud rate of the Infrared port
IR1 Protocol	ION	The communications protocol for the Infrared port

[1] The factory set Unit ID is based on the serial number of the meter.

Refer to the online *ION Programmer's Reference* for details on each Communications module's additional registers and their default settings.

Profibus Comm Menu (9300)

In addition to the existing communications ports available on the 9300 meter, the 9300-Profibus option is equipped with a Profibus port capable of operating at baud rates up to 12 Mbps. You must configure the 9300-Profibus before the meter can provide power system data to the Profibus network.

The Comm 4 Profibus Communications module has one setting: *PB Address*. The default value of this register is 126. Use the front panel to configure this setting to a unique *PB Address* on your Profibus network.

Ethernet Menu

The Ethernet module controls the meter's optional 10Base-T port. Configuring the Ethernet module registers incorrectly can cause network disruptions. The following settings can be accessed through the Ethernet Menu:

Setup Register	Function
IP Address	Sets the IP Address for the meter
Subnet Mask	Used if subnetting applies to your network – see your network administrator
Gateway	Used in multiple network configurations – see your network administrator
SMTP Server [1]	Sets the IP Address for the SMTP Mail Server that is configured to forward mail from the meter to the final destination
SMTP Connection Timeout [1]	Sets the minimum time that the meter waits for a connection to an SMTP server
Webserver Config Access	Enables configuration of meter with a web browser

[1] Settings available for 9330 and 9350 meters with MeterM@il.

Typically your network administrator will provide you with the appropriate IP address for the meter. The *Subnet Mask* and *Gateway* settings are required if you have communications between multiple Ethernet networks, and if subnetting is implemented. The *SMTP Server* and *SMTP Connection Timeout* settings are required for MeterM@il (9330 and 9350 meters). *Webserver Config Access* allows you to enable/disable configuration of your meter with a web browser.

Power Meter Menu

Select POWER METER from the Quick Setup menu to access the following settings:

Register	Default Value	Description
PM1 Volts Mode	4W-WYE	The power system's configuration – WYE, DELTA, etc.
PM1 PT Prim	347	The Potential Transformer's primary winding voltage rating.
PM1 PT Sec	347	The Potential Transformer's secondary winding voltage rating.
PM1 CT Prim	5	The Current Transformer's primary winding current rating.
PM1 CT Sec	5	The Current Transformer's secondary winding current rating.
PM1 V1 Polarity	NORMAL	The polarity of the Potential Transformer on V1.
PM1 V2 Polarity	NORMAL	The polarity of the Potential Transformer on V2.
PM1 V3 Polarity	NORMAL	The polarity of the Potential Transformer on V3.
PM1 I1 Polarity	NORMAL	The polarity of the Current Transformer on I1.
PM1 I2 Polarity	NORMAL	The polarity of the Current Transformer on I2.
PM1 I3 Polarity	NORMAL	The polarity of the Current Transformer on I3.

The remaining Power Meter module setup options and their default values are given in the online *ION Programmer's Reference*. In most cases you can leave them at their default settings and the meter will function properly.

Sag/Swell Module Settings (9350)

You must set the Sag/Swell module's *Nom Volts* setup register to a voltage that represents the nominal voltage for your power system (for example, 120). If the Sag/Swell module's *Nom Volts* setup register is set to zero, all Sag/Swell module functions are disabled.

⚠ **CAUTION**

The *Nom Volts* setup register MUST be set to your primary power system voltage, or the Power Quality features of the 9350 meter will not properly function.

Register	Default	Description
Swell Lim [1]	106	The limit a monitored voltage must exceed in order for the meter to classify it as an overvoltage condition.
Sag Lim [1]	88	The limit a monitored voltage must fall below in order for the meter to classify it as an undervoltage condition.
Nom Volts [2]	0	The primary power system voltage (line-to-line voltage for Delta systems, and line-to-neutral voltage for Wye systems).

[1] The ANSI C84.1 1989 standard recommends a temporary overvoltage limit of 106% for Range B voltage levels, and a temporary undervoltage limit of 88% for load voltages and 92% for the service entrance.

[2] The primary power system voltage is sometimes different than the PT Primary setup register value; i.e. when the PT Primary is used to indicate winding ratio rather than primary voltage.

Advanced Meter Setup Menu

The Advanced Meter Setup menu provides access to the setup registers of every ION module in the meter. To access this menu screen, select ADV METER SETUP from the Setup menu. Follow this procedure to access a setup register:

1. From the Feature Manager screen, select the module's type.

2. Select the module you want to configure from the list of available modules.

3. From the list of the module's setup registers, select the one you want to configure.

4. Edit the value of the register (see "Editing Registers" on page 3–28).

You may be prompted to enter your password (see "Front Panel Password Security" on page 3–28). Select YES to the next prompt to change the value of the register. Select NO if you want to leave the screen without making any changes.

Refer to the online *ION Programmer's Reference* for complete details on each setup register's function.

Display Setup Menu

When you select DISPLAY SETUP from the Setup menu, you get these settings:

Display Setup Option	Default	Description
AutoScroll	0 s (Disabled)	Time between automatic display screen advance.
Contrast	mid	The display screen's contrast level.
Backlight Time	1800 seconds	Time before display screen backlight automatically turns off.
Update Rate	4 s	Period between data display refreshes.
Display Mode	Programmable	Custom or Factory configured display screen option.

Auto Scroll

Auto Scroll activates each of the enabled display screens in sequence. By default, the Auto Scroll is disabled. Use the arrow buttons to specify the number of seconds that each screen is displayed before it flips to the next display screen, then press the round button to set the value. Any screens that have been disabled will not appear when Auto Scroll is enabled. Set the numeric value to zero (the default value) to disable auto scrolling.

Contrast

To change the contrast of the front panel's display, select CONTRAST. Press an arrow button once, and the display screen's contrast slowly changes. Press an arrow button to stop the process. Press the round button when you are satisfied with the contrast level.

✎ NOTE

Contrast can be adjusted from any screen by holding down the round button for more than ten seconds. Release the round button when the contrast is at a suitable level.

Backlight Timeout

This setting changes the amount of time the front panel's backlight stays on when the front panel is idle. The backlight has a limited lifespan; to prolong it, you should only have back-lighting on when you are actively using the front panel. Select BACKLIGHT TIMEOUT, then use the front panel's buttons to change the amount of time in seconds that the backlight stays on after a button is pressed.

Update Rate

The update rate specifies how frequently data on the display screen is refreshed. You may find the values are being updated too frequently, or that the data shown on screen lags too far behind the actual values. The default update rate is four seconds; use the front panel's buttons to change the update rate to suit your needs.

Display Mode

There are two display modes: PROGRAMMABLE MODE and FIXED MODE. The default is programmable mode, which provides eight data display screens which can be configured to meet your requirements (see "Custom Front Panel Displays"). Fixed Mode displays four screens, each with large characters in the display, easily visible from a distance. The four fixed mode screens display Average Volts, Average Amps, kW total, and PF total. You cannot customize the fixed mode displays.

Screen Setup Menu

The SCREEN SETUP menu screen allows you to change the data displayed on the eight display screens. From the SELECT SETUP menu, select SCREEN SETUP. The list of display titles appear that correspond to each of the eight display screens (see "Default Front Panel Display Screens"). The screen number with an asterix (*) beside it indicates the active display (the screen displayed before you entered SELECT SETUP). Select the screen you want to change, and press the round button. Two settings appear, VALUES and STYLE, that allow you to specify which measurements to display.

Style = One Parameter

```
 kWh net
     1475.35
```

Style

The STYLE setting defines the number of parameters on each screen. This setting has five options for each display screen: ONE PARAMETER, TWO PARAMETER, THREE PARAMETER, FOUR PARAMETER, and DISABLED. Select the number of values you want to display (the fewer values you select for display, the larger the measurement will appear on the display screen).

Style = Four Parameter

```
 kW tot          187
 kVAR tot         62
 kVA tot         197
 PF sign tot   -94.9
```

If you select a large style (for example, one value) for a display screen that is already set to display more than one value, the front panel warns you with a message, and displays only the first value — the links to the undisplayable values are severed and have to be reprogrammed.

Values

The VALUES setting specifies which of the device's measurements are displayed on each display screen. When you change the value displayed on a screen, you are presented with a complete list of the meter's measurements. Using the lists of modules provided, select the values you want to have displayed on that display screen.

The number of VALUES you can select is a function of the STYLE setting. You cannot select more values than the style is set to display.

Nameplate Info Menu

Select NAMEPLATE INFO to display information about the various options of the device, such as:

- manufacturer
- meter type and class
- service type
- voltage and current input ratings
- auxiliary power
- operating frequency
- transformer ratios
- meter firmware revision
- digital output information

- approvals
- serial number
- accuracy rating
- acceptable operating temperature
- battery life
- configured demand settings
- three custom text lines written into the meter's Factory module

Security Menu

When any changes are made to the meter via the front panel, the meter prompts for a user password. The password prevents unauthorized tampering with your meter's configuration. Depending on site security, you may want to modify the user password from the default to protect your configuration. The default password is 00000 and can be set to a maximum numeric value of 60000.

New Password
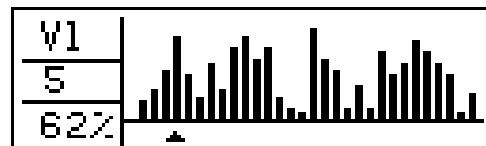**00000**

Changing the User Password

1. Select SECURITY from the Setup menu.

2. You will see that the screen displays 00000. Enter the current password. If you have not previously changed your password, the default is 00000.

3. Choose MODIFY PASSWORD to alter your password (the FACTORY USE ONLY option is for factory purposes and is not accessible).

4. Enter your new numeric password.

5. Select YES to accept your new password. You will be returned to the Setup menu.

Diagnostic Menu

The DIAGNOSTIC menu is accessed from the Setup menu; you can view per-phase voltage and current harmonics screens, verify communications, verify the digital I/O, and check the meter's local time.

Harmonics Diagnostics

Select HARMONICS from the Diagnostics menu to view per-phase voltage and current harmonics to the 31st harmonic. The following is an example of a harmonics display:
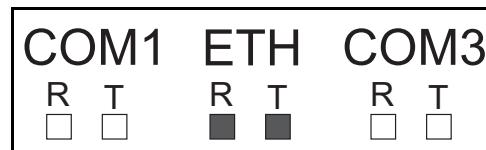
```
┌──────┬─────────────────────────────┐
│  V1  │                             │
├──────┤     ▁▄▂▅▃▆▂▇▅▃  ▄▂▆▃▅▇▄▂    │
│  5   │  ▁▃▄▂▅▇▆▃▅▇▂▄▃▆▇▅▃▄▂▆▃▅▇▄▂   │
├──────┤                             │
│ 62%  │        ▲                    │
└──────┴─────────────────────────────┘
```

Press and hold the up and down buttons to move the cursor to the harmonic of interest. The percentage of the fundamental is also displayed.

Communications Diagnostics

The Communications diagnostic screen has a different screens according to the communications options on your meter.

◆ The RS-485 diagnostic screen shows three boxes labelled COM 1, COM 2 (ETH if the meter has the optional Ethernet card) and COM 3. The following screen is an example of Ethernet (COM 2) communication:

```
┌─────────────────────────────────────┐
│  COM1    ETH    COM3                 │
│  R  T    R  T    R  T                │
│  □  □    ■  ■    □  □                │
└─────────────────────────────────────┘
```

COM 1 and COM 2 refer to the communications ports on the back panel of the meter. As there are is no COM2 port on the 9300 meter, the COM2 box never appears active. The COM 3 box verifies communication through the Infrared port on the front panel (IR1).

◆ The Ethernet diagnostic screen displays text similar to what you see in the table below - each label appears with a value next to it. The table explains the meaning of each possible value.

Label	Possible Values	Description
ETH73 Version	see description	Displays the Ethernet meter's firmware version (e.g. v270)
ETH73 in UPG	YES, NO	YES means the meter is currently being upgraded
ETH73 Setup	N/A, Rec'd	N/A means the Setup/options on the meter have not been transmitted Rec'd means the Setup/options have been received
EtherGate	YES, NO	YES means EtherGate is supported (9330 and 9350) NO means EtherGate is not supported (9300)

◆ The Ethernet Connection diagnostic screen displays text similar to what you see in the table below - each label appears with a value next to it. The table explains the meaning of each possible value.

Label	Possible Values	Description
# Power Ups	see description	Displays the number of times the Ethernet card has power cycled
Connection	N/A, ION, Modbus	The type of Ethernet connection: ◆ N/A indicates no connection ◆ ION indicates ION over Ethernet ◆ Modbus indicates either Modbus RTU over Ethernet or Modbus TCP
# WEB Reqs	see description	Displays the number of received WEB Page requests
# MeterM@il	see description	Displays the number MeterM@ils sent

I/O Diagnostics

The I/O diagnostics mode verifies the operation of the digital inputs/outputs you may have connected to the device and, if you ordered the analog I/O option, allows you to monitor the Analog Input or Analog Output ports on your meter. analog inputs/outputs. The following diagnostic screens are available:

◆ Digital Ins – This screen displays the four digital input values as seen at the low level.

◆ Digital Outs – This screen displays the four digital input values as seen at the low level.

◆ Analog Ins – This screen displays the four analog inputs's values as seen at each Analog Input module's output register.

◆ Analog Outs – This screen displays the four analog outputs's values as seen at each Analog Output module's output register.

Troubleshooting Diagnostics

There are three troubleshooting diagnostic screens available. They are as follows:

◆ kiloWatts – This screen shows per-phase and total kiloWatts.

◆ Volts – This screens shows line to neutral and average volts.

◆ Power Factor – This screen shows signed per-phase and total power factor.

Date/Time Screen

For the 9330 and 9350 meters, this screen displays the time and date from the device's internal clock.

For the 9300 meter, this screen displays the time passed sent during a time sync. The 9300 meter does not increment its internal clock while the meter is powered-down.

Custom Front Panel Displays

Custom front panel displays can be created showing any data the meter measures or calculates. Each display screen can be configured to display any measurements you require. You can also adjust the size of the characters in each screen so you can easily read the device's display from farther away.

There are only eight display screens available for configuration. Since all eight of the front panel's screen displays are factory-configured, an existing display must be changed if you want a custom display. Refer to "Default Front Panel Display Screens" on page 25 and/or "Display Configuration" on page 50 for details on the eight default display screens.

The technical note *Custom Front Panel Displays* has complete details for personalizing your meter's display screens.

Before Customizing the Front Panel

In order for the customized screens to be displayed in the front panel's display, the meter's *Display Mode* must be properly set. Ensure that the Display Options module's *Display Mode* setup register is set to PROGRAMMABLE. This is the default setting. If it is required, you can use the meter's front panel or ACCESS software to set this register.

Customizing Displays Using the Front Panel

The SCREEN SETUP menu screen allows you to change the data displayed on the eight display screens using the front panel (see "Screen Setup Menu" on page 34).

Customizing Displays Using Designer

The front panel display of the 9300 Series is controlled by the Display modules and Display Options modules. Refer to the *ION Programmer's Reference* for detailed descriptions of the Display module and the Display Options module. Refer to "ION Enterprise: Designer" on page 83 for details on using Designer.

Display Module

A Display module controls which values are displayed on a display screen, and how these values are presented. Up to four parameters can be linked to a Display module — these parameters appear on the display screen when the module is activated.

Links to a Display module can be made using Designer or the front panel. Each Display module has one setup register, *Display Type*, which sets the number of parameters that the display screen will show.
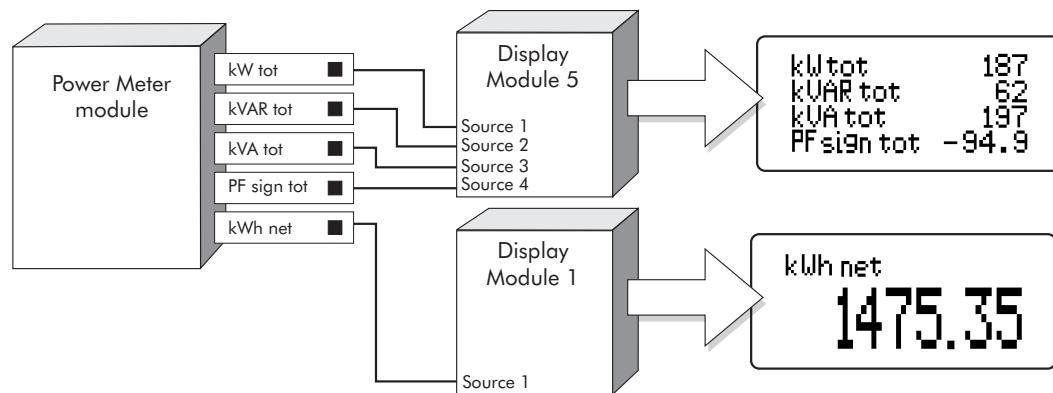
The *Display Type* setup register has five options: ONE PARAMETER, TWO PARAMETER, THREE PARAMETER, FOUR PARAMETER, AND DISABLED. The number of inputs for the Display module should match the *Display Type* setup register.

If you select a *Display Type* with more parameters than are currently linked to the Display module, the display screen will show any unavailable inputs as N/A. If a Display Type is selected which has fewer parameters than are linked to the module, the Display module will only display the *Display Type* number, and will break any links to parameters that it cannot display.

For example, if you have a display screen with four parameters, and you select a *Display Type* of *One Parameter*, the first parameter is displayed and the other three links to the ION Display module are severed.

Display Options Module

The Display Options module controls data display settings such as backlight timeout, automatic display scrolling, parameter update rate, and display mode. Settings in the Display Options modules are global, and affect all of the front panel display screens. Refer to "Display Configuration" on page 50 for the Display Options module's default setup register settings.

3   Default Meter Functionality

The information provided in this chapter corresponds to factory-configured ACCESS devices. If you have a custom framework, some of the default settings may differ for your configuration.

In This Chapter

Default Meter Functionality

To learn more about the ION modules in your meter, refer to the *ION Device Templates* at www.pwrm.com. *ION Device Templates* list all of the ION modules available in the current version of your meter, and the total number of each module. *ION Device Templates* also show the ranges or options available for each module's setup registers.

Basic Setup

Basic configuration of the meter is provided by the Power Meter module. The Power Meter module is the main connection between the power system measurements and all other ION modules in the device. This module reports the values for all voltage, current and power measurements.

The Power Meter module's setup registers describe details of the power system being monitored. Many of the Power Meter module's setup registers are configured when the meter is initially put into service, although the device will not operate properly until Volts mode and PT and CT ratios are set. Some registers may need to be changed to refine the device's operation.

The functions of the setup registers in the Power Meter module are as follows:

Setup Register	Function	Defaults
Volts Mode [1]	The power system's configuration – WYE, DELTA, Single, etc	4W-WYE
PT Prim [1]	The Potential Transformer's primary winding rating for V1, V2 and V3	120
PT Sec [1]	The Potential Transformer's secondary winding rating for V1, V2 and V3	120
CT Prim [1]	The Current Transformer's primary winding rating for I1, I2 and I3	5
CT Sec [1]	The Current Transformer's secondary winding rating for I1, I2 and I3	5
Vn Polarity	The polarity of the Potential Transformer on Vn	Normal
In Polarity	The polarity of the Current Transformer on In	Normal
Phase Order	The expected rotation of the voltage phases (ABC or ACB)	ABC
Phase Lbls	The phase label format assigned to the outputs (ABC, RST, XYZ, RYB, RWB or 123)	ABC

[1] The registers are typically set when the device is commissioned. Changing the values of these registers while the device is in service is not recommended.

Once basic setup is performed (i.e. the PT/CT and Volts Mode settings), the meter operates properly. Typically there is no need to make further changes to the Power Meter module's setup registers.

Communications Setup

Communication settings are typically configured when the ACCESS meter is initially put into service. Each communications port on a meter is controlled by a single Communications module. The modules' setup registers define the parameters used for each port, so parameters do vary according to the type of communications channel selected (i.e. RS-232, RS-485, Modem, Infrared, Ethernet).

Module Name	Settings
Comm 1	COM1 RS-485 port and internal modem [1]
Comm 2 [2]	COM2 RS-485 port or EtherGate [3] port
Infrared Comm	COM3 Optical port
Ethernet Comm	10Base-T Ethernet port
Profibus Comm [4]	Profibus Communications port

[1] For 9330 / 9350 meters with an optional modem, COM1 is hardwired for ModemGate.
[2] COM2 is not available for the 9300 meter.
[3] For 9330 / 9350 meters with an optional Ethernet card, COM2 is hardwired for EtherGate.
4 Available for the 9300 meter.

A communications channel must be configured before you can use ACCESS software (i.e. Vista or Designer). Altering the settings of the channel that is in use causes a loss of communications with the meter. Refer to the online *ION Programmer's Referenc*e for complete details on all the Communications module setup registers.

Communications Module	Setup Register	Description	Default
Comm 1 Comm 2 Infrared Comm	Baud Rate	Sets the communications speed, in bits/second for the serial port	9600
	RTS Delay	Sets the RTS Delay for the serial communications port	0
	Unit ID	Sets the Unit ID of the communications port	Unit ID is based on the serial number [1]
	Protocol	Sets the communications protocol for the communications port	ION
Comm 1	Modem Init [2]	Sets the modem's initialization string	AT&F
Ethernet	IP Address	Sets the IP Address of the meter	None
	Subnet Mask	Sets the Subnet Mask setting for the Ethernet Port	None
	Gateway	Sets the Ethernet Gateway setting for the Ethernet Port	None
	SMTP Server [3]	Sets the IP Address for the SMTP Mail Server that is configured to forward mail from the meter to the final destination	None
	SMTP Connection Timeout [3]	Sets the time that the meter will wait when establishing a connection to an SMTP Server	None
Profibus Comm	PB Address	Sets the Profibus Address	126

[1] The factory set Unit ID for this port is based on the serial number of the meter. For example: Serial number: PA-0009A263-10; Unit ID: 9263.
[2] Setting for the 9330 and 9350 meters.

3   MeterM@il settings for 9330 and 9350 meters.

Modem Initialization String

The setup register labeled *ModemInit* is available for 9330 and 9350 meters with internal modems, and defines the initialization string for the internal modem (by default, the modem is factory configured to answer on one ring). You should not require changes to the *ModemInit* string for normal operation. If you require advanced modem functionality, you can customize the *ModemInit* register with a string up to 47 characters long.

⚠ CAUTION

The ModemInit string is automatically sent to the internal modem when the ModemInit setup register is changed, when the meter is powered up, or when the baud rate of the modem's Communications module is changed.

Communications Protocols

By default, all COM ports are configured to use the ACCESS protocol. If you want to make use of Modbus RTU, DNP 3.00, or GPS configurations, you need to configure *Protocol* setup register the Communications module that controls the port you want to use.

✎ NOTE

The Factory Protocol is reserved for the use by Siemens Customer Service.

Power Quality Setup (9350)

For the 9350 meter, power quality parameters can be set up using the Sag/Swell module. The Sag/Swell module monitors applicable phase voltages for temporary undervoltages and overvoltages (i.e. CBEMA Type 2 and Type 3 disturbances).

Once a disturbance is detected, magnitude and duration data is captured by the Sag/Swell module, and is passed to a data recording framework.

Sag/Swell Module Settings

Setup Register	Function	Default
Swell Lim	The magnitude above which a voltage deviation is considered a swell	106
Sag Lim	The magnitude below which a voltage deviation is considered a sag	88
Nom Volts	The nominal power system voltage	0 [1]
EvPriority	The priority assigned to Sag/Swell module events (0 to 255; 255 is highest)	200

[1] The primary power system voltage is sometimes different than the PT Primary setup register value; i.e. when the PT Primary is used to indicate winding ratio rather than primary voltage.

Nom Volts must be set to enable Power Quality functions. Most applications are served by the default values entered into the module's registers, but if you want to fine-tune Sag/Swell detection, try adjusting the *Swell Lim* and *Sag Lim* values.

✎ **NOTE**

If the Sag/Swell module's *Nom Volts* setup register is set to zero, all Power Quality functions of the 9350 meter are disabled. That is why Nom Volts is typically set when the meter is put into service. If *Nom Volts* has not been set, enter a value for your power system's nominal voltage (for example, 120, 277 or 347).

Data Logging Setup

The data recording frameworks contain Data Recorder modules, Waveform Recorder modules, and Periodic Timer modules. Data Recorder and Waveform Recorder modules are responsible for logging the power system data. The Periodic Timer modules control the recording frequency of the recorder modules to which they are linked.

Default Logging Capacity

The following table summarizes the default recording depths and recording intervals of the various Data recorders and Waveform recorders in the meter.

Log	Depth	Interval
Historic Log	930	900 seconds (15 minutes)
Waveform recording (waveform recorders)	3	Triggered on demand
Report Generator Log (EgyDmd Log)	930	900 seconds (15 minutes)
Sag/Swell Log (9350 only)	100	Triggered on demand
Event Log (Event Log Controller module)	50	Triggered on demand

Procedures for changing the logging depth and the frequency of logging are discussed in the following sections: "Changing the Frequency of Logging" on page 47 and "Changing the Log Depths" on page 47.

Default Logging Configuration

The standard configuration of the meter includes data recorders that log various power system data such as energy and demand, or the average power system quantity used over a period of time (Historic Mean Log). The 9350 also logs sags and swells in voltage.

Revenue Logging

For the revenue meter option, Data Recorder #1 is locked, so channels must be specified prior to the meter being sealed. Refer to RMICAN Ordering Sheet on our website for your particular meter.

For compatibility with the UTS MV-90 billing software, Data Recorder #1 must be configured as a 16-channel recorder.

Historical Data Logging

One Data Recorder module, the Historic Mean Log, logs the following output register values by default:

Hist Mean Log	
Vll avg mean	Vln avg mean
I avg mean	kW tot mean
kVAR tot mean	kVA tot mean
PF sign mean	Freq mean
V unbal mean	I unbal mean
V1 THD mean	V2 THD mean
V3 THD mean	I1 THD mean
I2 THD mean	I3 THD mean

WinPM.Net Reporting

One recorder is configured to provide power system data for the Reporter software. This recorder is labeled *Egy Dmd Log*. If any input links to this module are changed, Reporter will not be able to create reports from the device's logs. If you use the Reporter software, do not change the parameters that are logged in the *Egy Dmd Log*.

Sag/Swell Logging (9350 only)

The meter logs the following output register values:

Sag/Swell Log	
SS1 DistDur	SS1 DistV1Min
SS1 DistV1Max	SS1 DistV2Min
SS1 DistV2Max	SS1 DistV3Min
SS1 DistV3Max	SS1 DistNominal

Changing the Frequency of Logging

The two Periodic Timer modules that control the frequency of different data recording are as follows:

◆ "EgyDmd Log" Trg controls the frequency of logging for the Energy and Demand Log (this log is used for generating reports using Reporter).

◆ "Hist Log Trg" controls the frequency of Historic Data logging.

Change the value in the *Period* setup register to change the frequency of data logging (Period values are specified in seconds). Do not change the *Sync Mode* setup register.

Changing the Log Depths

Change the value in the *Depth* setup register to increase the number of records stored in the recorder. The *RecordMode* setup register controls how the Data Recorder will overwrite old records; refer to the Data Recorder module description in the online *ION Programmer's Reference* before changing this setup register.

Changing Waveform Recording

The Waveform Recorder modules do not require changes to their default settings. If you want to change the format of the recorded waveforms, refer to the Waveform Recorder module description in the online *ION Programmer's Reference*.

Changing the Parameters that are Logged

The meter's factory configuration logs a comprehensive set of energy, power and harmonics parameters. You cannot change which parameters are logged by configuring a setup register. Adding or deleting a log's parameters is an advanced procedure, as it requires changes to the links between modules.

The software "Using Designer software" section of Using WinPM.Net describes adding and deleting links between modules. Once you are comfortable editing module links, change logged parameters by linking the output registers you want logged to the inputs of an ION Data Recorder module.

Setpoint Configuration (9330 and 9350)

Setpoints provide extensive control, secondary protection and analysis capabilities by allowing you to initiate an action in response to a specific condition. Some possible applications for the Setpoint module include: demand control, power quality monitoring, fault detection, activating alarms, and gated logging functions.

For the 9330 and 9350 meters, the Setpoint modules monitor certain 'over' and 'under' conditions for sliding window demand, current, voltage and power factor.

Module Label	Description
Over kW swd	Monitors over conditions for kW swd on the SD1 Sliding Window Demand module
Under VII avg	Monitors under conditions on the VII avg output for the Power Meter module
Over I avg	Monitors over conditions on the I avg output for the Power Meter module
Under PF sign	Monitors under conditions on the PF sign tot output for the Power Meter module

Setpoint Module Settings

There is no need to change any of the Setpoint modules' setup registers for normal operation of the meter.

Setup Register	Function	Default			
		Over kW swd	Under VII avg	Over I avg	Under PF sign
High Limit	The limit that a source input must exceed for an over condition to start	1,000,000,000	0	1,000,000,000	0
Low Limit	The limit that a source input must exceed for an under condition to start	1,000,000,000	0	1,000,000,000	0
SusUntlON	Amount of time an input must be out of range for an over/under condition to start	0	0	0	0
SusUntlOFF	Amount of time an input must be back in range for an over/under condition to end	0	0	0	0
Input Mode	This register specifies how the value of the source input is interpreted	Signed	Signed	Signed	Absolute
Eval Mode	Determines how the High Limit and Low Limit setup registers are interpreted	GreaterThan	LessThan	GreaterThan	LessThan
EvPriority	The priority assigned to a Setpoint event (0 to 255; 255 is highest)	128	128	128	128

Fine Tuning Over Condition Monitoring

If you want to fine-tune over condition monitoring, the only setup registers you should change are *SusUntlON* and *SusUntlOFF*.

SusUntlON determines how long the modules wait after an over condition is detected before reporting it. This gives the monitored value a short period to correct itself before the event is registered with the module, so that very brief over conditions are ignored. Similarly, *SusUntlOFF* is the amount of time a normal value must be present before the module considers normal operation to be restored. Both *SusUntlON* and *SusUntlOFF* values are entered in seconds (the default value for both is 30 seconds).

Refer to the online *ION Programmer's Reference* for more information about the Relative Setpoint module.

Meter Clock Configuration

The Clock module controls the meter's internal clock which provides timestamps for data logged by the device. The clock needs to be configured properly to ensure that logged data has accurate timestamp information. The Clock module also receives the time synchronization signals sent to it by the workstation running ION software, updating the device's clock when required.

The setup registers in the Clock module specify timezone and Daylight Savings Time (DST) parameters and time synchronization functions.

Setup Register	Function	Default
TZ Offset	The timezone the device is in, relative to Greenwich Mean Time	0
DST Start	Date and time when DST begins	0
DST End	Date and time when DST ends	86,400
DST Offset	The amount of time the clock is changed when DST begins or ends	0
Time Sync Source	The communications port that receives time sync signals	COM1
Time Sync Type	The type of time sync signal (Local or Universal time)	UTC
Clock Source	Specifies the clock's time synchronization signal source (line frequency, communications signals, or internal crystal)	Internal

📝 **NOTE**

When modifying setup registers of the Clock module, use the Format option to convert between UNIX and conventional time. Refer to the description of the Clock module in the online *ION Programmer's Reference* for more details.

Refer to the technical note *Time Synchronization and Timekeeping* for further details on using the meter's time synchronization functions.

Display Configuration

The meter's front panel display is controlled by two types of ION modules: the Display Options module and Display modules. Display modules determine the form and content of each display screen, and the Display Options module controls options such as decimal format, daylight savings time display, and backlight timeout.

There are eight display screens which are all factory-configured. (An existing display must be changed if you want a custom display.) The default displays are as follows:

Display Number	Display Title	Parameters shown
Display #1	kWh net	kWh net
Display #2	kWh swd / mx	kWh swd, kWh swd mx
Display #3	Volts	Va, Vb, Vc
Display #4	Amps	Ia, Ib, Ic
Display #5	Power	kW tot, kVAR tot, kVA tot, PF sign tot
Display #6	Frequency	Freq
Display #7	V-THD	V1 Total HD, V2 Total HD, V3 Total HD
Display #8	I-THD	I1 Total HD, I2 Total HD, I3 Total HD

Display Options Module Settings

The Display Options module contains setup registers that hold data display settings such as contrast level and backlight timeout. Settings in the Display Options modules are global, and affect the entire set of front panel display screens.

Setup Register	Function	Default
Autoscroll	Sets the number seconds that each screen is displayed before it flips to the next display screen. Set to DISABLED to turn-off AutoScroll.	Disabled
Backlight Timeout	Sets the time that the front panel's backlight stays on after the last press of a front panel button.	1,800
Display Update Time	Sets the period between data display refreshes	4
Display Mode	Sets the display to show the four fixed mode display screens, or the eight programmable display screens.	Programmable

Display Module Settings

The Display module's setup registers determine the format that the *Source* data will take on the front panel display. Depending on the display screen type, you can use up to four *Source* links to a single Display module. Display modules have the following setup registers:

Setup Register	Function
Screen Type	Determines the display format (see table below)

The number of parameters you can have linked to the *Source* inputs depends on the value of the *Screen Type* setup register. The supported options for the setup register and the number of allowable *Source* inputs for each *Screen Type* setting are described below.

Screen Type Setting	Max Source inputs	Display Description
One Parameter	1	Displays one to four values. The fewer the values, the larger the values appear on the display screen.
Two Parameter	2	
Three Parameter	3	
Four Parameter	4	

Changing the Parameters that are Displayed

The meter's default display configuration shows a comprehensive set of parameters. Changing these parameters requires that you alter the links between various ION modules. Complete details on configuring the front panel displays are provided in the *Custom Front Panel Displays* technical note.

Demand Setup

The demand modules (both Thermal Demand modules and Sliding Window Demand modules) are configured to calculate the average current demand and kW, kVAR and kVA demand. The setup registers in the demand modules define time intervals for demand calculations, setting the sensitivity of the module's operation.

Sliding Window Demand Module Settings

Sliding Window Demand is often referred to as Rolling Block Demand. To compute sliding window demand values, the Sliding Window Demand module uses the sliding window averaging (or rolling interval) technique which divides the demand interval into sub-intervals. The demand is measured electronically based on the average load level over the most recent set of sub-intervals. This method offers better response time than fixed interval methods.

Setup Register	Function	Default
Sub Intvl	The time, in seconds, in the sliding window demand sub-interval	900
#SubIntvls	The number of sub-intervals in the sliding window	1
Pred Resp	The speed of Predicted Demand calculations; use higher values for faster prediction (70 to 99 recommended)	70

Thermal Demand Module Settings

The Thermal Demand module calculates thermal demand over a specified length of time. It uses a method which is equivalent to thermal averaging. For thermal averaging, the traditional demand indicator responds to heating of a thermal element in a Watt-Hour meter. You can adjust the Thermal Demand module's calculation to mimic this technique by changing the *Time Const* and *Interval* setup parameters.

Setup Register	Function	Default
Interval	The time, in seconds, in the thermal demand interval	900
Time Const	The sensitivity to changes in the source signal; higher values provide faster response time (common values are 63 and 90)	90

Factory Information

The Factory module displays firmware version, serial number and other device information in read-only setup registers (read-only registers can be viewed but not changed).

Factory Module Settings

The device information provided is as follows:

Setup Register	Description
Device Type	A device type identifier ("7300" for the 9300)
Compliance	A statement of whether the device is ION compliant or not
Options	Shows model number of meter
Revision	The meter's firmware version
Serial Num	The meter's serial number
ION Version	The ION version supported by the device
Template	The name of the factory default template (framework) installed on the device
Nom Freq	The expected frequency of the power system being monitored

The Factory module also contains numerous read-only setup registers that hold the calibration constants used at the factory.

How to TAG Your Meter

Three setup registers are provided for you to enter your company name and other text information you want stored in the device. These configurable setup registers are as follows:

◆ *Owner* - This is a text register for storing user information (e.g. company name); it can be up to 255 characters in length.

◆ *Tag 1* - This is a text register for storing user information (e.g. device location); it can be up to 15 characters in length.

◆ *Tag 2* - This is a text register for storing user information (e.g. device number or identifier); it can be up to 15 characters in length.

Third Party Protocols

Modbus and DNP modules are factory configured and do not require basic configuration changes. Changing the factory configuration is an advanced setup procedure that requires an understanding of the protocol, as well as an understanding of the meter's internal operation.

Refer to the technical notes *DNP 3.0 and ION Technology* and *Modbus and ION Technology* for the appropriate list of protocol parameters available.

🖎 NOTE

The meter can also be configured to receive data through Modbus or DNP 3.0, though there is no factory-configured framework for receiving data through these protocols. An 9300 Series meter can receive data if the meter writes to hard-coded registers.

For details on configuring your network for receiving data via Modbus or DNP 3.0, refer to the DNP Slave Import module descriptions in *ION Programmer's Reference* and the 9300 Series Modbus protocol documents, as well as the technical notes *DNP 3.0 and ION Technology* and *Modbus and ION Technology*.

Communications Protocol Configuration

In order to use the factory Modbus or DNP configuration you must first configure the communications channel you want to use. By default all communications ports are configured to use the ACCESS protocol. Choose the 3rd-party protocol you want from the list of available protocols in the Communications module's Protocol setup register.

🖎 NOTE

Modbus RTU is available on each of the meter's communications ports, and multiple ports can communicate using Modbus simultaneously. Only a single port can use the DNP 3.00 protocol at any one time.

The meter is factory configured to provide advanced interoperability support. The meter is readily incorporated into third party power monitoring systems. This section describes how to communicate with the meter via Modbus RTU, Profibus, and DNP 3.0 protocols.

Using the Modbus RTU Protocol

The meter can make any real-time data available through the Modbus RTU protocol. Modbus Master devices connected to the 9300 can access this data. Modbus Master devices can also write data into 9300's module registers, making device configuration changes or initializing control actions.

Factory Modbus Configuration for the 9300 Series Meter

The 9300 Series meter makes data available to Modbus devices using four Modbus Slave modules. These modules are linked to other modules in the meter that provide energy, power and demand data. Once a communications channel is configured to use Modbus RTU protocol (refer to "Communications Setup" in Chapter 3), the data is available to Modbus Master devices.
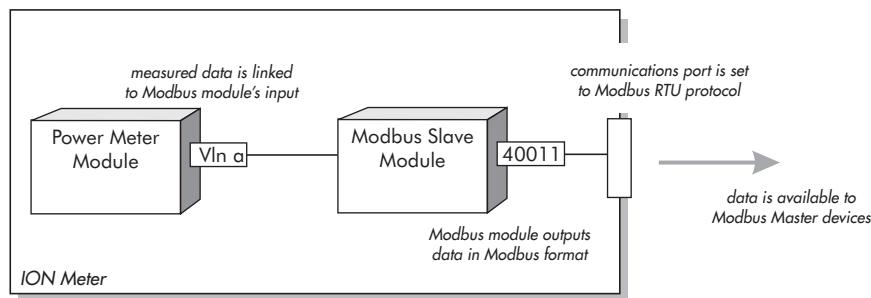
As the data available through the Modbus Slave modules is in a specific format, knowledge of the Modbus protocol and an understanding of the settings used in the meter are required to interpret the data provided.

Changing the Modbus Configuration

If the factory Modbus configuration does not suit your needs, the existing Modbus Slave modules can be relinked to other parameters that you want to access through Modbus. There are ten Modbus Slave modules available in the 9300 Series meter, so you can create more modules to make other parameters available to Modbus Master devices.

If your Modbus Master device requires data in a format different than that provided by the factory Modbus configuration, you can edit the setup registers in the Modbus Slave modules. These setup registers specify the Modbus format, scaling and base address settings. Refer to the *ION Programmer's Reference* for complete details on Modbus Slave module functionality.

📝 Note

Refer to the *Modbus 7300 Series* protocol document for complete details on the Modbus implementation in the 9300 Series of meters.

Modbus Slave Module Settings

The settings in the Modbus Slave module setup registers are shown in the tables below. Refer to the Modbus Slave module description in the *ION Programmer's Reference* for complete details of each setup register's function and options.

Refer to the *Modicon Modbus Protocol* document for additional details on the Modbus implementation in the 9300 Series meter.

Modbus Slave Module #1

Setup Register	Setting
Format	unsigned 16-bit
Base Address	40011
Scaling	YES
In Zero	0
In Full	6553
Out Zero	0
Out Full	65530

Modbus Slave Module #2

Setup Register	Setting
Format	signed 32-bit
Base Address	40027
Scaling	YES
In Zero	-214748364
In Full	214748364
Out Zero	-2147483640
Out Full	2147483640

Modbus Slave Module #3

Setup Register	Setting
Format	signed 32-bit
Base Address	40059
Scaling	YES
In Zero	-214748364
In Full	214748364
Out Zero	-2147483640
Out Full	2147483640

Modbus Slave Module #4

Setup Register	Setting
Format	signed 32-bit M10K
Base Address	40089
Scaling	NO

Modbus Slave Module Parameter Mapping

The following tables show which measurements are provided by each of the four Modbus Slave modules. The source for each measurement is shown ("Source ION Module") so that you can easily delete parameters if you want to access different data. Note that the Modbus Register remains the same if you link a different parameter into one of the Modbus Slave module inputs (i.e. any value you link to Modbus Slave module #1, Source Input #1 will use Modbus Register 40011).

Modbus Slave Module #1 Links

Measurement	Label	Source ION Module	Modbus Module and Input Number	Modbus Register
L-N Voltage Phase A	Vln a	Power Meter	Modbus Slave #1 – Source Input #1	40011
L-N Voltage Phase B	Vln b	Power Meter	Modbus Slave #1 – Source Input #2	40012
L-N Voltage Phase C	Vln c	Power Meter	Modbus Slave #1 – Source Input #3	40013
Average L-N Voltage	Vln avg	Power Meter	Modbus Slave #1 – Source Input #4	40014
L-L Voltage AB	Vll ab	Power Meter	Modbus Slave #1 – Source Input #5	40015
L-L Voltage BC	Vll bc	Power Meter	Modbus Slave #1 – Source Input #6	40016
L-L Voltage CA	Vll ca	Power Meter	Modbus Slave #1 – Source Input #7	40017

Measurement	Label	Source ION Module	Modbus Module and Input Number	Modbus Register
Average L-L Voltage	Vll avg	Power Meter	Modbus Slave #1 – Source Input #8	40018
Phase A Current	I a	Power Meter	Modbus Slave #1 – Source Input #9	40019
Phase B Current	I b	Power Meter	Modbus Slave #1 – Source Input #10	40020
Phase C Current	I c	Power Meter	Modbus Slave #1 – Source Input #11	40021
Average Current	I avg	Power Meter	Modbus Slave #1 – Source Input #12	40022
Voltage Unbalance	V unbal	Power Meter	Modbus Slave #1 – Source Input #13	40023
Current Unbalance	I unbal	Power Meter	Modbus Slave #1 – Source Input #14	40024
Line Frequency	Freq	Power Meter	Modbus Slave #1 – Source Input #15	40025
L-N Voltage Phase A	Vln a	Power Meter	Modbus Slave #1 – Source Input #1	40011

Modbus Slave Module #2 Links

Measurement	Label	Source ION Module	Modbus Module and Input Number	Modbus Register
Phase A kW	kW a	Power Meter	Modbus Slave #2 – Source Input #1	40027-40028
Phase B kW	kW b	Power Meter	Modbus Slave #2 – Source Input #2	40029-40030
Phase C kW	kW c	Power Meter	Modbus Slave #2 – Source Input #3	40031-40032
Total kW	kW tot	Power Meter	Modbus Slave #2 – Source Input #4	40033-40034
Phase A kVAR	kVAR a	Power Meter	Modbus Slave #2 – Source Input #5	40035-40036
Phase B kVAR	kVAR b	Power Meter	Modbus Slave #2 – Source Input #6	40037-40038
Phase C kVAR	kVAR c	Power Meter	Modbus Slave #2 – Source Input #7	40039-40040
Total kVAR	kVAR tot	Power Meter	Modbus Slave #2 – Source Input #8	40041-40042
Phase A kVA	kVA a	Power Meter	Modbus Slave #2 – Source Input #9	40043-40044
Phase B kVA	kVA b	Power Meter	Modbus Slave #2 – Source Input #10	40045-40046
Phase V kVA	kVA c	Power Meter	Modbus Slave #2 – Source Input #11	40047-40048
Total kVA	kVA tot	Power Meter	Modbus Slave #2 – Source Input #12	40049-40050
Phase A signed PF	PF sign a	Power Meter	Modbus Slave #2 – Source Input #13	40051-40052
Phase B signed PF	PF sign b	Power Meter	Modbus Slave #2 – Source Input #14	40053-40054
Phase C signed PF	PF sign c	Power Meter	Modbus Slave #2 – Source Input #15	40055-40056

Modbus Slave Module #3 Links

Measurement	Label	Source ION Module	Modbus Module and Input Number	Modbus Register
kW Thermal Dmd	kW td	Thermal Demand	Modbus Slave #3 – Source Input #1	40059-40060
kVAR Thermal Dmd	kVAR td	Thermal Demand	Modbus Slave #3 – Source Input #2	40061-40062
kVA Thermal Dmd	kVA td	Thermal Demand	Modbus Slave #3 – Source Input #3	40063-40064
Max kW Th Dmd	kW td mx	Maximum	Modbus Slave #3 – Source Input #4	40065-40066

Measurement	Label	Source ION Module	Modbus Module and Input Number	Modbus Register
Max kVAR Th Dmd	kVAR td mx	Maximum	Modbus Slave #3 – Source Input #5	40067-40068
Max kVA Th Dmd	kVA td mx	Maximum	Modbus Slave #3 – Source Input #6	40069-40070
Max Avg L-N Voltage	Vln avg mx	Maximum	Modbus Slave #3 – Source Input #7	40071-40072
Max Average Current	I avg mx	Maximum	Modbus Slave #3 – Source Input #8	40073-40074
Maximum Total kW	kW tot mx	Maximum	Modbus Slave #3 – Source Input #9	40075-40076
Maximum Total kVAR	kVAR tot mx	Maximum	Modbus Slave #3 – Source Input #10	40077-40078
Maximum Total kVA	kVA tot mx	Maximum	Modbus Slave #3 – Source Input #11	40079-40080
Maximum Frequency	Freq mx	Maximum	Modbus Slave #3 – Source Input #12	40081-40082
Min Avg L-N Voltage	Vln avg mn	Minimum	Modbus Slave #3 – Source Input #13	40083-40084
Min Average Current	I avg mn	Minimum	Modbus Slave #3 – Source Input #14	40085-40086
Minimum Frequency	Freq mn	Minimum	Modbus Slave #3 – Source Input #15	40087-40088

Modbus Slave Module #4 Links

Measurement	Label	Source ION Module	Modbus Module and Input Number	Modbus Register
Imported kWh	kWh imp	Integrator	Modbus Slave #4 – Source Input #1	40089-40090
Exported kWh	kWh exp	Integrator	Modbus Slave #4 – Source Input #2	40091-40092
Total kWh	kWh tot	Integrator	Modbus Slave #4 – Source Input #3	40093-40094
Net kWh	kWh net	Integrator	Modbus Slave #4 – Source Input #4	40095-40096
Imported kVARh	kVARh imp	Integrator	Modbus Slave #4 – Source Input #5	40097-40098
Exported kVARh	kVARh exp	Integrator	Modbus Slave #4 – Source Input #6	40099-40100
Total kVARh	kVARh tot	Integrator	Modbus Slave #4 – Source Input #7	40101-40102
Net kVARh	kVARh net	Integrator	Modbus Slave #4 – Source Input #8	40103-40104
Total kVAh	kVAh	Integrator	Modbus Slave #4 – Source Input #9	40105-40106
Max Phase A Voltage THD	V1 THD max	Maximum	Modbus Slave #4 – Source Input #10	40107-40108
Max Phase B Voltage THD	V2 THD max	Maximum	Modbus Slave #4 – Source Input #11	40109-40110
Max Phase C Voltage THD	V3 THD max	Maximum	Modbus Slave #4 – Source Input #12	40111-40112
Max Phase A Current THD	I1 THD max	Maximum	Modbus Slave #4 – Source Input #13	40113-40114
Max Phase B Current THD	I2 THD max	Maximum	Modbus Slave #4 – Source Input #14	40115-40116
Max Phase C Current THD	I3 THD max	Maximum	Modbus Slave #4 – Source Input #15	40117-40118

Importing Data using Modbus RTU

It is possible to bring data into the 9300 Series meter using Modbus. Various ION registers can be written by Modbus Master devices by correlating the Modbus register number with the address of the ION register you want to write. When a Modbus register is written with a value, the corresponding ION register will be written, provided the Modbus RTU protocol is active on the communications channel that connects the Modbus Master to the 9300 Series meter.

You can use the Modbus RTU protocol to write values into ION external numeric, pulse and Boolean modules, allowing you to enable, disable and reset meter functions. You can also use Modbus to change setup register values in various ION modules to configure the meter's operation.

All of the information required to write to ION registers through Modbus is available in *9300 & 9330 Modicon Modbus Protocol*, available on the Technical Documentation CD, or by request from Siemens.

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). Some of the newest ION firmware now supports Modbus/TCP for direct communications with the meter.

Modbus/TCP retains the Modbus RTU limit of 256 bytes to a packet. It is suggested that higher through-put is possible if this limitation is removed. This variant is called Enhanced Modbus/TCP but, so far, few devices have moved to support it.

Another variant, that has yet to gain popularity, is from the Semiconductor Equipment and Materials International (SEMI) trade association. The Generic Sensor-Bus Sub-Committee created the Sensor/Actuator Network Standard (SEMI E54-0997).

Modbus TCP Communications

You can now communicate to the meter via Modicon® Modbus TCP (formerly called MBAP). Your meter must have the optional Ethernet port. Connect to socket **502**.
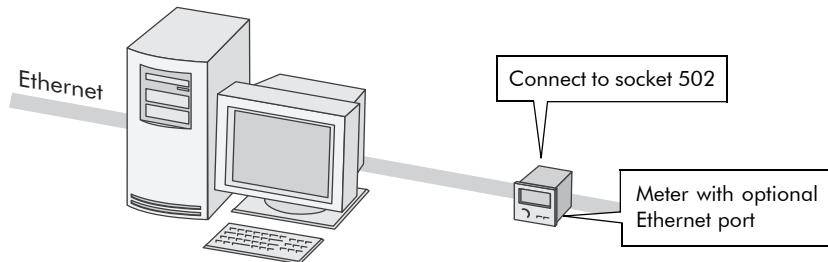
Be aware that you cannot form an EtherGate connection to the Modbus TCP network.

Using the DNP 3.0 Protocol

The Distributed Network Protocol Version 3.00 (DNP 3.0) is an open protocol used in the electric utility industry for communications and interoperability among substation computers, RTUs, IEDs, and Master Stations. The 9300 can be integrated into a DNP network using the DNP Slave Import, Export and Options modules.

✎ NOTE

Complete DNP documentation is available through the DNP User's Group (on the web at www.dnp.org). This documentation describes DNP 3.0 Transport Functions, the Application Layer Protocol, the Data Object Library, Data Link Layer Protocol Description, and the Subset Definitions.

Factory DNP 3.0 Configuration for the 9330 and 9350

The meter's factory configuration makes various parameters available through DNP 3.0. There is no factory-configured functionality for importing DNP 3.0 data into the meter. ION modules are linked to DNP Slave Export modules which convert the ION data into the appropriate DNP objects. These objects are available through the meter's communications port that is configured to use the DNP 3.0 protocol. The DNP Options module sets global options for all of the DNP Slave Export modules.
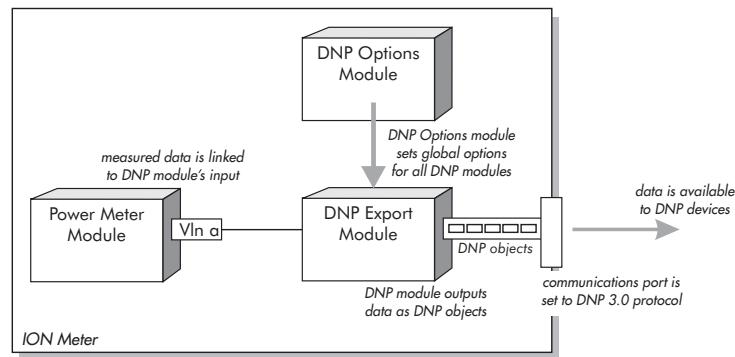
Changing the DNP Configuration

If the factory DNP configuration does not suit your needs, the existing DNP Slave Export modules can be relinked to other parameters that you want to access through DNP. Alternately you can add additional DNP Slave Export modules and link the desired ION parameters to them. There are 16 DNP Slave Export modules available on the 9330 and 9350; of these, 14 are used by the factory configuration.

✎ NOTE

Only one port per 9330 or 9350 can be used with DNP 3.0.

If your DNP network requires data in a format different than that provided by the factory DNP configuration, you can edit the setup registers in the DNP Slave Export modules and the DNP Options module. Do not make any changes to the DNP Options module's setup registers unless you understand the effects each change will cause. Refer to the *ION Programmer's Reference* for complete details on DNP Slave Export and DNP Slave Options module function.

As DNP 3.0 is a very complex protocol, an in-depth understanding of DNP 3.0 is required to interpret the settings in the DNP Options module and the DNP Slave Export modules. It is beyond the scope of this meter's User's Guide to describe DNP; consult the DNP User's Group or other resources to learn more about the protocol.

DNP Slave Export Module Settings

The 14 factory-configured DNP Slave Export modules are configured as shown in the following table.

Setup Register	Setting
BasePoint	Varies – each analog input or binary counter has a different BasePoint
StaticObj	11 modules are Analog Input; three are Binary Counter
EventObj	Disable Event Objects
Deadband	0
FrozStaObj	Disable Frozen Static Objects
FrozEvtObj	Disable Frozen Event Objects
EventClass	Class 1
Scaling	OFF (excluding Unbalx10 and Freqx10 which are ON)
IONZero	0
IONFull	0 (1000 for Unbalx10 and 100 for Freqx10)
DNPZero	0
DNPFull	0 (10000 for Unbalx10 and 1000 for Freqx10)

Some setup register settings vary for different modules. Specifically, *BasePoint* differs for each module within a group (Analog Input and Binary Counter are groups), and *StaticObj* is set to Analog Input for the 11 analog input points and Binary Counter for the three binary counter points. (*StatObj* defines the type of DNP object the module provides when the Master polls it.)

In addition, Scaling is OFF for all but two modules. The only modules that apply scaling are the Analog Input points that provide Voltage and Current Unbalance data (labeled Unbalx10) and Frequency data (Labeled Freqx10). These modules apply x10 scaling.

DNP Options Module Settings

The DNP Options module provides global settings that affect all DNP Slave Export and DNP Slave Import modules. The default settings in this module are shown in the following table.

Setup Register	Setting	Function
BinInStatic	Single-bit Binary Input	Variant for Binary Input Static objects
BinInEvents	Binary Input Change w/o time	Variant for Binary Input Event objects
BinInEvDepth	100	Maximum number of Binary Input Events that can be stored
BinCntStatic	16-bit Binary Counter w/o flag	Variant for Binary Counter Static objects
FrzCntStatic	16-bit Frozen Counter w/o flag	Variant for Frozen Counter Static objects
FrzCntEvents	16-bit Frozen Counter Event w/o time	Variant for Frozen Counter Event objects
FrzCntEvDepth	100	Max number of Frozen Counter Events that can be stored
CntChangeEvents	16-bit Counter Change Event w/o time	Variant for Counter Change Event objects
CntChangeEvDepth	100	Max number of Counter Change Events that can be stored
AIStatic	16-bit Analog Input w/o flag	Variant for Analog Input Static objects
FrzAIStatic	16-bit Frozen Analog Input w/o flag	Variant for Frozen Analog Input Static objects
FrzAIEvents	16-bit Frozen Analog Event w/o time	Variant for Frozen Analog Input Event objects
FrzAIEvDepth	100	Max number of Frozen Analog Input Events that can be stored
AIChangeEvents	16-bit Analog Input Change Event w/o time	Variant for Analog Input Change Event objects
AIChangeEvDepth	200	Max number of Analog Input Change Events that can be stored
AOStatic	16-bit Analog Output Status	Variant for Analog Output Block objects
SelectTimeout	10	Select Before Operate timeout period (in seconds)
TimeSynchPeriod	86400	Time (in seconds) between IED requests for time syncs
ALFragSize	2048	Max application layer message size (in octets) that IED can send
DLAck	Never	When device requests data link layer acknowledgements
DLTimeout	2	How long the data link layer waits for acknowledgement from Master
DLNumRetries	0	How many times a data link layer packet is re-sent after failing

Importing Data using DNP 3.0

Data can be imported into the 9330 and 9350 from a DNP Master device. DNP Slave Import modules are used to take a DNP analog or binary output object and map it into an ION numeric or Boolean register. Refer to the *ION Programmer's Reference* for detailed module descriptions.

Using the Profibus Protocol

Those 9300 meters ordered with the optional Profibus port are suitable to provide many real-time power system measurements to a Profibus network. Profibus Master devices connected to the 9300-Profibus can access this data. Refer to the *9300 & 9330 Profibus Protocol Document* for complete details on the Profibus implementation in the 9300.

Factory Profibus Configuration for the 9300

The 9300-Profibus makes data available to Profibus devices using 12 Profibus Slave Export modules. These modules are linked to other modules in the 9300 that provide energy, power and demand data through the Profibus Commun-ications module. As the data available through the Profibus Slave Export modules is in a specific format, knowledge of the Profibus protocol and an understanding of the settings used in the 9300 are required to interpret the data provided.

Changing the Profibus Configuration

If the factory Profibus configuration does not suit your needs, link the unused parameters in the existing Profibus Slave Export modules. If you require more changes, you will have to relink these modules to other parameters.

Profibus Slave Export Module Parameter Mapping

The following tables detail the measurements provided by 12 Profibus modules. The "Source ION Module" is shown so that you can easily unlink parameters if you want to access different data. To change scaling refer to the Profibus Slave Export module description in the *ION Programmer's Reference*.

Profibus Slave Export Module 1 (Scaling x10)

Source ION Module	Measurement	ION Label
Power Meter	Volts line to neutral A	Vln a
Power Meter	Volts line to neutral B	Vln b
Power Meter	Volts line to neutral C	Vln c
Power Meter	Volts l-n average	Vln avg
Maximum #4	Vln avg Maximum	Vln mx
Maximum #31	kVAR Tot Th. Dmd max	kVAR td mx

Profibus Slave Export Module 2 (Scaling x10)

Source ION Module	Measurement	ION Label
Power Meter	Volts line to line AB	Vll ab
Power Meter	Volts line to line BC	Vll bc
Power Meter	Volts line to line CA	Vll ca
Power Meter	Volts l-l average	Vll avg
Maximum #8	Vll avg MAX	Vll avg mx
Maximum #32	kVA Tot Th. Dmd MAX	kVA td mx

Profibus Slave Export Module 3 (Scaling x10)

Source ION Module	Measurement	ION Label
Power Meter	Current Phase A	I a
Power Meter	Current Phase B	I b
Power Meter	Current Phase C	I c
Power Meter	Average Current	I avg
Maximum #13	Max. Average Current	I avg mx
Minimum #13	Min. Average Current	I avg mn

Profibus Slave Export Module 4 (Scaling x10)

Source ION Module	Measurement	ION Label
Power Meter	kW phase A	kW a
Power Meter	kW phase B	kW b
Power Meter	kW phase C	kW c
Power Meter	kW Total	kW tot
Thermal Demand #1	kW Total Th.Demand	kW td
Maximum #30	kW Total Th. Dem. Max	kW td mx

Profibus Slave Export Module 5 (Scaling x10)

Source ION Module	Measurement	ION Label
Power Meter	kVAR phase A	kVAR a
Power Meter	kVAR phase B	kVAR b
Power Meter	kVAR phase C	kVAR c
Power Meter	kVAR Total	kVAR tot
Th. Demand #2	kVAR Total Th. Demand	kVAR td
Maximum #31	kVAR Tot Th. Dmd max	kVAR td mx

Profibus Slave Export Module 6 (Scaling x10)

Source ION Module	Measurement	ION Label
Power Meter	kVA phase A	kVA a
Power Meter	kVA phase B	kVA b
Power Meter	kVA phase C	kVA c
Power Meter	kVA Total	kVA tot
Th. Demand #3	kVA Total Th. Demand	kVA td
Maximum #32	kVA Tot Th. Dmd MAX	kVA td mx

Profibus Slave Export Module 7 (Scaling x10)

Source ION Module	Measurement	ION Label
Power Meter	Power Factor phase A	PF a
Power Meter	Power Factor phase B	PF b
Power Meter	Power Factor phase C	PF c
Power Meter	Power Factor Total	PF sign tot
Minimum #22	Power Factor Lead min	PF lead mn
Minimum #23	Power Factor Lag min	PF lag mn

Profibus Slave Export Module 8 (Scaling x100)

Source ION Module	Measurement	ION Label
Power Meter	Volts unbalanced	V unbal
Power Meter	Current unbalanced	C unbal
Power Meter	Line Frequency	Freq
Maximum #21	Line Frequency max	Freq mx
Minimum #21	Line Frequency min	Freq mn
---	Not used	---

Profibus Slave Export Module 9 (No Scaling)

Source ION Module	Measurement	ION Label
Integrator #3	kW hour Total	kWh tot
Integrator #7	kVAR hour Total	kVARh tot
Integrator #9	kVA hour	kVAh tot
---	Not used	---
---	Not used	---
---	Not used	---

Profibus Slave Export Module 10 (No Scaling)

Source ION Module	Measurement	ION Label
Integrator #1	kW hour Import	kWh imp
Integrator #2	kW hour Export	kWh exp
Integrator #4	kW hour Net	kWh net
Integrator #5	kVAR hour Import	kVARh imp
Integrator #6	kVAR hour Export	kVARh exp
Integrator #8	kVAR hour Net	kVARh net

Profibus Slave Export Module 11 (Scaling x10)

Source ION Module	Measurement	ION Label
S W Demand #1	kW Sliding Demand	kW swd
S W Demand #1	kW Predicted Demand	kW swd pred
Maximum #27	kW Sliding Demand max	kW swd mx
Minimum #27	kW Sliding Demand min	kw swd mn
---	Not used	---
---	Not used	---

Profibus Slave Export Module 12 (Scaling x100)

Source ION Module	Measurement	ION Label
Power Meter	kVA phase A	kVA a
Power Meter	kVA phase B	kVA b
Power Meter	kVA phase C	kVA c
Power Meter	kVA Total	kVA tot
Thermal Demand #3	kVA Total Th. Demand	kVA td
Maximum #32	kVA Tot Th. Dmd MAX	kVA td mx

Restoring the Factory Configuration

If you have made changes to the default functionality and want to return to the factory configuration, you can e-initialize the factory configuration in the meter through Designer. The basic setup of the device can be retained, so the meter does not need to be taken out of service for a long period of time.

✎ **NOTE**

If you restore the factory configuration, all custom features you created are lost.

To restore the factory configuration:

1. Display the meter's main Configuration screen in Designer.

2. Choose Select All from the Edit menu, then press Delete on your keyboard.

    The confirmation dialog box appears explaining that some modules will not be deleted (core modules cannot be deleted — scroll down in the dialog to see that various standard modules will be deleted).

3. Click OK on the confirmation dialog box.

    After a brief wait the modules are deleted, and the main meter Configuration screen is blank except for the Frameworks folder in the Advanced Setup area. (The Frameworks folder contains the folder of Core modules which cannot be deleted.)

4. Choose Select All from the Edit menu to select the Frameworks folder. This selects all subfolders and modules within the folder.

5. Choose Paste from Framework in the Edit menu, and select the appropriate .fwn file from the folder \WinPM.Net\config\fmwk\nd\ and click OK.

    Ensure that the chosen .fwn file includes the following in the filename:

    ◆ The model name of the meter you are restoring (i.e. 7300, 7330 or 7350)

    ◆ The base firmware version (e.g. v250, v265, etc.)

    For example, if you are restoring an 9300 with a V252 firmware version, you could select the file "7300_v250_FAC-4WYE_V2.1.0.0.0.fwn". Although this file was designed for V250, the framework is also used for V252, because v250 is the base firmware version upon which v252 is built. (For details about framework files, contact Customer Service.)

6. Click Open. The Paste Summary window appears.

7. Click on the first module, scroll down to the last module, hold the Shift key and click on the last module. This selects all of the modules.

8. While holding the Shift key, click on the check box to the left of the module name so you see a lock icon with a green checkmark.

9. Check "Maintain external inputs" and click OK on the confirmation dialog box.

    A message appears indicating that Designer is pasting modules. All modules are selected when the paste is complete. Click anywhere in the background of the node diagram to deselect all of the modules.

10. Click the Power Meter shortcut in the Basic Configuration area to select it. Once selected, click Reset in the Designer toolbar, or select Reset from the Edit menu. This reverts the Power Meter to the settings it had before you deleted any modules (retaining the basic setup you previously had).

11. Choose Send & Save from the File menu. The factory configuration is now restored (any custom functionality you created is removed).

4   Using ACCESS Software

ACCESS software encompasses a variety of programs that enhance the functionality and usability of your ACCESS devices. ACCESS software can collect data via serial, wireless, modem, or Ethernet links, so you can manage a single site or global network of devices. WinPM.Net is a software suit with applications for displaying data, configuring ACCESS meters, and much more. ION Setup is a stand-alone program that greatly simplifies meter configuration.

This chapter recognizes the various ACCESS software programs available to you, providing instructions on each program's use. Details on where to find more in depth information on a program's operation are included in that program's introduction.

In This Chapter

WinPM.Net Software

WinPM.Net software offers control capabilities and comprehensive power quality and reliability analysis. It is a powerful software suite that can process, analyze, store, and share data across your entire enterprise. The fully networked client-server information system allows you to access data from any workstation, locally or around the world, in the format you need. With WinPM.Net you can manage an intelligent ACCESS metering network, monitoring and controlling individual devices, analyzing data, and deciding on new courses of action.

WinPM.Net software has four main components, each with their own user interfaces. These applications are the Management Console, Vista, Designer, and Reporter.

If you require more information on WinPM.Net software than is presented here, refer to the online *WinPM.Net Help* or the *WinPM.Net Getting Started Guide*.

Software Security

The software security system limits how you can use ACCESS software to view meter data and send configuration changes to ACCESS meters. A valid user account and password are required to log on to any ACCESS software application. Each access level, or authority, that is specified for a user account defines the types of operations available in each application, so you may not necessarily be allowed to view or configure meter information if your authority is too low.

WinPM.Net provides two default software security settings: guest and supervisor. Both of these default security settings use 0 (zero) for the password, and enable the highest level of authority which allows complete control of the system.

✎ NOTE

Since both the software and the meter use password security, you may need to enter the software password, meter password, or both depending on the function you are performing.

WinPM.Net: Management Console

The Management Console is responsible for building your network. You build your power-monitoring network to reflect the way your physical communications network is wired so that WinPM.Net software can communicate with your devices. The network is created using servers, sites, devices, and modems. These network components must be configured in the Management Console before you can use the other WinPM.Net applications.
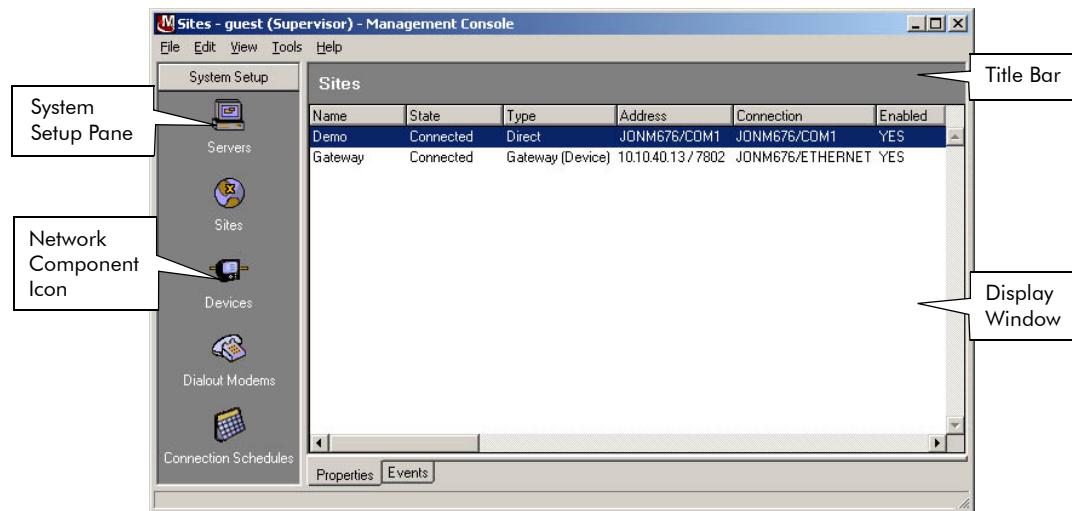
The following is a brief description of each network component. To learn how to configure these components, refer to the "Configuring Communications" section of this chapter.

Servers

A server is a computer in an WinPM.Net system running administrative software that controls access to the network and its resources, such as ION devices, and provides resources to computers functioning as workstations on the network. A server runs service components that create communication and software links between ACCESS systems components, and it creates links into the ACCESS database, too.

Computers with primary and secondary WinPM.Net installations are servers, as they have the communication software (services) installed. A primary server contains all software components and the database; a secondary server contains software but references the primary server for program files and database information. Both server types connect directly to ACCESS devices via serial, Ethernet, or modem links, but there can be only one primary server on a network. When you install WinPM.Net, the Primary Server must be installed before any Secondary server or Client computers.

Sites

A site in an WinPM.Net system contains one or more intelligent devices that share a common communications link. There are three different types of sites, based on the type of communications medium each uses. The site types are as follows:

◆ Direct (Serial) Site - a direct-connected RS-232 or RS-485 network

◆ Modem Site - a remote serial site connected by a modem

◆ Ethernet Gateway Site - a gateway that transfers data between an Ethernet device and an RS-485 chain of connected devices

✎ NOTE

You are not required to create a site for an Ethernet Device, unless you intend to use the device as an Ethernet Gateway Site.

Depending on the site type, devices belonging to a site may be at different physical locations.

Devices

Devices refer to intelligent devices (basic energy meters, multi-function monitoring/analysis/control devices, intelligent relays, etc.) that can be connected to an WinPM.Net network serially, via Ethernet, or through a gateway.

Serial Devices belong to Direct Sites or Modem Sites, so they communicate using modem, RS-232, or RS-485 connections. Before these types of devices can be added to the network, they require the prior configuration of a Direct Site or Modem Site.

Ethernet Devices are those that are directly connected to an Ethernet network. You are not required to create a site for an Ethernet Device, unless you intend to use the device as an Ethernet Gateway Site. Furthermore, you can manually connect and disconnect your Ethernet Devices from the Management Console.

Dialout Modems

A Dialout Modem is the modem that a server computer uses to communicate with a remote modem at a Modem Site.

Connection Schedules

Connection schedules are programmed routines for a server to regularly connect to and disconnect from Modem Sites and their associated ACCESS (or other) devices. If so desired, you can also create connection schedules from Direct Sites and Ethernet Devices/Ethernet Gateway Sites.

Configuring Communications

Before you can talk to the devices on your network, you need to configure communications within the Management Console. Essentially, this means adding one or more sites and then adding the devices associated with each site. If you create a modem site, then you also need to add and configure a dialout modem. There may be instances where you want to add a new server (either another computer or third-party gateway); the computer running the WinPM.Net software is considered a server and is listed in the Server section.

Adding a new Server, Site, Device or Dialout Modem

1. Click the appropriate network component icon (Servers, Sites, Devices, Dialout Modems) in the System Setup pane. The title bar reflects your selection.

2. Right-click in the display window, select New and the type of Server, Site, Device. If you are configuring a modem you only have one New option.

3. Configure the item using the drop-down list boxes and manually entering values where required.

4. Right click in the Properties dialog box to access Advanced Properties. You can use the drop-down list boxes or manually enter new values as required.

5. Click OK when you are done.

The process of adding network components to the Management Console is the same for each component — the difference lies in how you configure the components. When the Properties dialog appears for the component you added, the fields for which you are required to provide information are highlighted in red. For example, the illustration below shows the required fields when adding a new Ethernet device:

Although Group has a drop down list box, you are not restricted to the values in the list. If you want to create a new group, simply type its name in the value field. Other drop down list boxes restrict you to the values in the list.
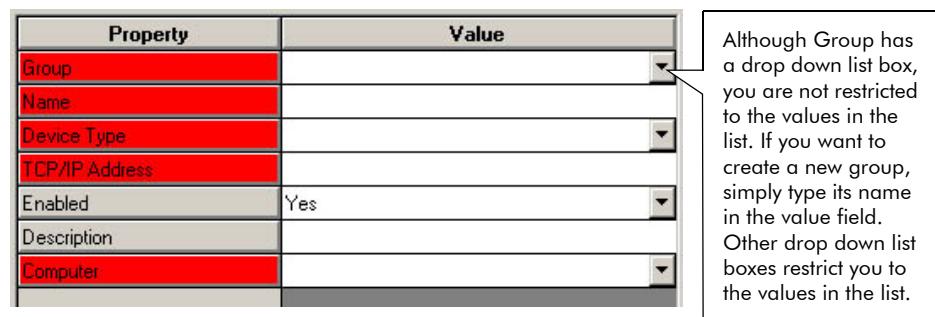
The Properties dialog has different required fields depending on which component you are adding:

◆ For a **Direct Site** you specify the serial port (COM1, COM2, etc.) on the server computer where the serial device (or network of serial devices) is connected. You must specify the server computer that communicates with the direct site.

◆ For a **Modem Site** you provide information about the modem at the (remote) modem site: baud rate, modem telephone number, etc. You also specify the server computer that communicates with the modem site.

◆ For an **Ethernet Gateway Site**, you specify the Ethernet device acting as the gateway and the TCP/IP port to which the serial device, or network of serial devices, is connected. Before you can add an Ethernet Gateway Site, an Ethernet Device must be added and configured first.

◆ For a **Serial Device** you provide the device type, the unit ID, and the site to which the meter is connected. Before you can add serial devices, a Serial or Modem Site must be added and configured first.

◆ For an **Ethernet Device** you specify the type of meter, the meter's IP address, and the server computer that communicates with the Ethernet device.

◆ For a **Dialout Modem**, you provide the modem type, the computer that communicates over the modem channel, and the serial port used on the computer.

◆ For a **Computer** (Server) you specify the machine's computer name.

◆ For a **3rd-Party Gateway** (Server), you specify the name of the network host, the IP address of the gateway device, and the computer that communicates through the Ethernet gate

Complete details on working with the Management Console are available in the *WinPM.Net Getting Started* guide, or the online *WinPM.Net Help*.

WinPM.Net: Vista

Vista is a display, analysis, and control application. It is the main user interface to the WinPM.Net system. Vista presents a graphical view of your power system, allowing you to view real-time data from power meters or historical data from the WinPM.Net database. It simplifies the tasks of managing your power system and transcends a number of physical device boundaries, so you can retrieve, store, and display data from any device in your system through a unified interface. Vista reports on the status of your power system components, informing you of alarm conditions and providing you with control capabilities for initiating intelligent device functions or actuating field machinery.

Displaying Data with Vista

A standard set of Vista User Diagrams display real-time and logged data for various power system parameters. Interactive objects are provided on the diagrams that allow operators with appropriate authority to enable and disable logging functions and reset cumulative parameters.

A network diagram uses links to default user diagrams to display data from each device in your system. When you generate a network diagram, Vista automatically locates all devices in your system and displays them.

Generating a network diagram in Vista

1. Select Generate Network Diagram from the File menu.

    The Network Diagram initially looks like this:
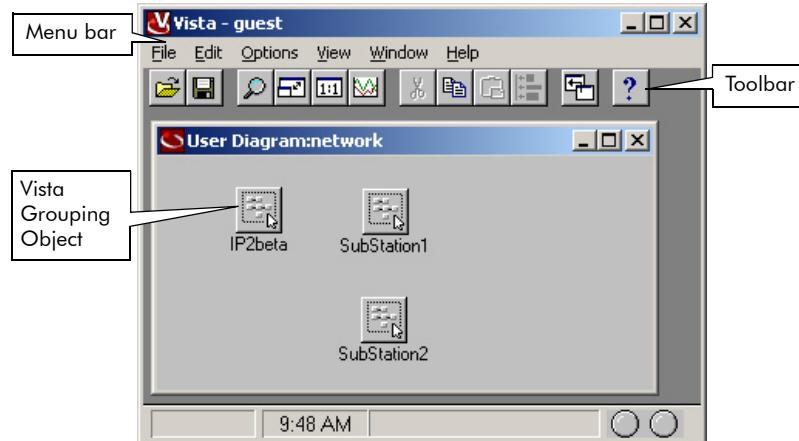
2. Click the appropriate grouping object. These are labelled according to the device's "Group" value in the Management Console.

📝 NOTE

If you have Show Toolbox selected in the Options menu, you must double-click diagram objects and icons instead of single clicking them.

This opens a new window showing all of the installed meters. Each meter appears with an icon that represents its type and a label reflecting the name you configured in the Management Console.

Meter icons (representing configured devices in the Management Console)
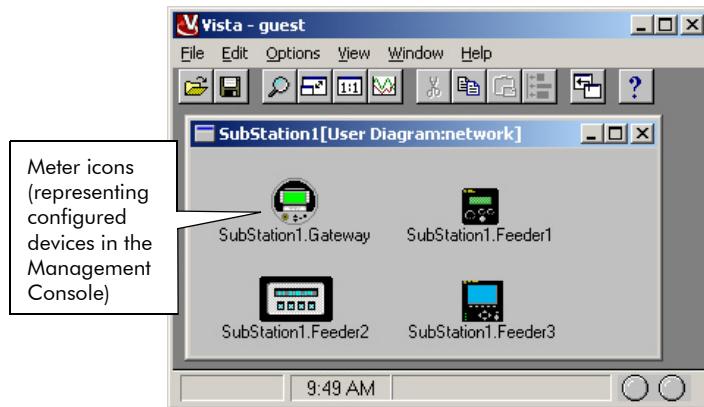
3.   Click a meter icon to open its main default diagram.

Each meter has a set of default diagrams that show the results of various real-time measurements and calculations that are being performed. Links to data, waveform, and event logs are also provided (if the meter supports logging).

You should now be able to navigate through the various diagrams and view real-time and logged data.

Displaying Data if the Software is not Fully Configured

If WinPM.Net has been installed and configured using the recommended guidelines in the *WinPM.Net Getting Started* guide, the standard Vista user diagrams automatically display real-time data from your meter.

If you are unable to display data from your meter in Vista, contact your WinPM.Net software administrator, or refer to the *WinPM.Net Getting Started* guide before continuing with this User's Guide.

Vista Diagram Elements

Each Vista diagram shows the name of the meter, the time on the meter's clock, and the type of meter. The main diagrams also provide buttons that let you jump to other diagrams. Jump to another diagram by clicking any of the buttons near the top right-hand corner (as illustrated in the Volts/Amps diagram below).
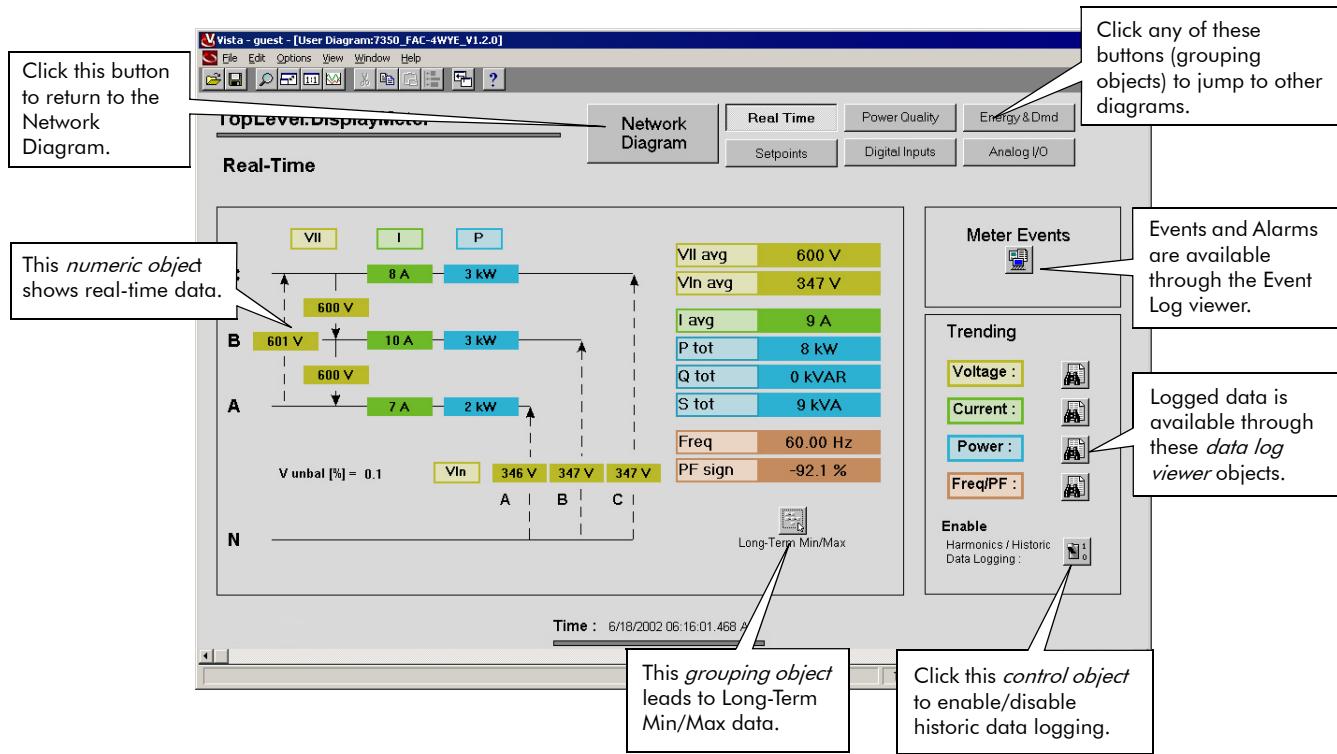
- ◆ Most measurements appear on-screen in Vista *numeric objects*.

- ◆ Some ON/OFF quantities, such as the status of a setpoint, may appear as *status objects*.

- ◆ To view another screen or diagram, click on a *grouping object*. Grouping objects may be in the form of buttons, folders, meter icons, etc.

  To return to the previous diagram, use the ⊞ button on the Vista toolbar, or use the File > Up One Level menu item.

- ◆ Level 3 WinPM.Net authority is required to use *control objects*.

- ◆ Logged data (such as snapshot, interval and waveform data) can be accessed by clicking the associated the *data log viewer* icon, which looks like this ⊞

- ◆ To view a record of events and alarms for the active user diagram, click ⊞ — the *event log viewer* icon.

- ◆ To view records of high-priority events and alarms for your entire system, select the *global event log viewer* from the View pull-down menu.

Summary of Data Provided in Vista

The standard set of Vista diagrams included with WinPM.Net display a variety of data measured by the factory-configured meter. Some of the diagrams include grouping windows that display additional data. The following section summarizes the data, and interactive control functions provided.

Real-Time Measurements

The Real-Time diagram includes a simple power system illustration that shows various real-time parameters. The diagram also includes links to a min/max parameter display. The measurements you see in Vista depend on the *Volts Mode* setting in your Power Meter module; here are some you may see:

◆ Line-to-neutral voltages, line-to-line voltages, average L-N and L-L voltages and voltage unbalance level

◆ Phase currents and average current, or total current

◆ Phase kW, total kW, kVAR and kVA

◆ Frequency and signed power factor

◆ Min/max display of each of the above parameters

◆ All logged meter events

◆ Trend logs of voltage, current, power, frequency and power factor

Long-term Min/Max

Double-click the Long-term Min/Max object to see a Vista grouping window showing min/max values for line-to-line and line-to-neutral voltages, voltage unbalance, phase currents, power values (kVA, kVAR and kW), frequency, and power factor. Level 3 WinPM.Net authority is required to reset the min/max values.

To return to the real-time diagram, use the ⊞ button on the Vista toolbar; or use the **File** pulldown and select **Up One Level**.

Min/max values are valid from the time the meter was powered up, or valid from the time the last reset was performed.

Historic Data Logging Enable

The Log Server must be running to view historical data. Historic data logging is enabled by default. Level 3 WinPM.Net authority is required to use the enable control object. The control object indicates the logging enable status: the switch is in the up position (1) when logging is enabled, and down (0) when logging is disabled.

Power Quality Data

The Power Quality diagram shows voltage disturbance and harmonics details. The voltage disturbance display counts sag/swell and transient events, and provides links to a sequence-of-events log and a CBEMA plot. The diagram includes a trigger for manual waveform recording, and control objects for enabling/disabling power quality event recording.

The harmonics measurement display shows total harmonic distortion for each phase of voltage and current. Links to harmonics min/max and harmonics trending displays are provided, and a control object is included for enabling/ disabling harmonics logging

Voltage Disturbance Counter Reset

◆ Level 3 WinPM.Net authority is required to reset the power quality event counter, the manual waveform trigger, and the control objects.

Disturbance Details

◆ The Log Server must be running to view the CBEMA plot or sequence-of-events data.

Long-term Min/Max

◆ Double-click the Long-term Min/Max object to see a Vista grouping window showing min/max values for phase voltage and current THD.

◆ Level 3 WinPM.Net authority is required to reset the min/max values.

Harmonics Measurements

◆ Total Harmonics Distortion (THD) is displayed as a percentage of the fundamental.

◆ Harmonics Trending

◆ The Log Server must be running to view the logged harmonics data.

◆ Harmonics data logging is enabled by default.

◆ Level 3 WinPM.Net authority is required to use the control object.

The control object indicates the logging enable status: the switch is in the up position (1) when logging is enabled, and down (0) when logging is disabled.

Setpoints

The Setpoints diagram uses setpoints to monitor kW demand, over current and under average voltage and power factor levels. Vista annunciates warnings if any of the values exceed specified limits. Users with Level 3 WinPM.Net authority can define the setpoint limits.

◆ Monitoring of kW demand, phase current and voltage unbalance conditions, with annunciation when user-specified upper limit is exceeded

◆ Real-time display of kW demand, phase current and voltage unbalance

Over kW Sliding Window Demand Monitoring

Over kW demand monitoring is disabled by default. Level 3 WinPM.Net authority is required to enable this monitoring. The status will read NOT AVAILABLE when monitoring is disabled.

Energy & Dmd

Energy & Demand Calculations

The Energy & Demand diagram shows the real-time sliding window demand for kW, kVA and kVAR, and the real-time energy values kWh net, kVARh net and kVAh. Peak demand is displayed for kW, kVAR and kVA, and a link to a demand profile trend is provided. Control objects for enabling/disabling demand logging and resetting energy and demand values are also included.

◆ Real-time and peak kW, kVAR and kVA sliding window demand

◆ Real-time net kWh, net kVARh and kVAh energy values

◆ Trend log of all of the above parameters, plus power factor lead and lag, imported, exported and net energy

Demand, Energy and Peak Demand Reset

Level 3 WinPM.Net authority is required to reset these values.

Demand Profile Trending

The Log Server must be running to view the energy and demand log. Energy and demand logging is enabled by default. Level 3 WinPM.Net authority is required to use the enable control object. The control object indicates the logging enable status: the switch is in the up position (1) when logging is enabled, and down (0) when logging is disabled.

Over Average Current Monitoring

Over current monitoring is disabled by default. Level 3 WinPM.Net authority is required to enable this monitoring. Each status reads "Not Available" when monitoring is disabled.

Under Average Voltage Line-to-Line Monitoring

Over voltage monitoring is disabled by default. Level 3 WinPM.Net authority is required to enable this monitoring. The status reads "Not Available" when monitoring is disabled.

Under Power Factor Monitoring

Under power factor monitoring is disabled by default. Level 3 WinPM.Net authority is required to enable this monitoring. The status reads "Not Available" when monitoring is disabled.

Digital Inputs

Digital Inputs

The Digital Inputs diagram monitors the four status inputs on the 9300. The status of each input (ON or OFF), and the number of times the status has changed is displayed. The status change counter can be reset.

◆ Monitoring of the 9300 meter's four on-board status inputs

◆ Status change counter for each input

Status

The 9300 meter's status inputs are de-energized when the meter is powered-up, so each status will initially be OFF.

Reset

Level 3 WinPM.Net authority is required to reset the status counter.

Customizing the Vista Interface

Standard Vista diagrams show much of the data that the factory-configured meter measures and calculates. However, the factory-configured meter can provide additional data that is not presented by default with these display tools. This data can be added to the standard Vista diagrams by placing addition diagram objects on them; or, you can create new user diagrams to display any additional data you want.

Vista cannot be used to customize data displays on the ACCESS meters themselves.

✎ NOTE

Level 5 ACCESS software authority (Supervisor) is required to create and configure new Vista diagrams. If you do not have Level 5 password authority, contact your ACCESS software administrator for assistance.

Diagram Objects in a User Diagram

Diagram objects provide the interface to ION registers in your network, and to DDE values from other applications. Each diagram object displays a single piece of information from somewhere in your power-monitoring network; for example, a single numeric object displays numeric data from a single source.

If your account has permission to edit user diagrams, the following diagram objects are represented by icons in a floating toolbox.

If this toolbox is not available in Vista, yet you have the proper permissions to edit user diagrams, you must select Options > Show Toolbox from the Vista menu. A check mark next to the option indicates that it has been selected.

To place a diagram object, simply click, drag and drop the object you want from the toolbox onto the current Vista display window. Once you have added the diagram object, right-click the icon to specify the actions you want it to perform.

Complete details on configuring diagram objects and creating Vista User Diagrams are in the online *WinPM.Net Help*.

Custom Appearance of a User Diagram

You can customize the appearance and configuration of any window within a user diagram. You can alter a window's font or background color, or configure window properties such as background image, real-time and logged data links, double-click action, and stale data settings.

To make one or more of these changes, right-click anywhere in the background of a user diagram. A menu appears with three selections:

```
Default Font
Background Color

Properties
```
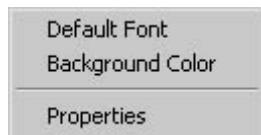
Choosing Default Font or Background Color allows you to customize the area implied by the selection. Choosing Properties brings up the Window Properties Configuration box, which offers five groups of options: Image, Log Server, Node, Action and Stale Data. Complete details on these options are found in the online *WinPM.Net Help*.

WinPM.Net: Designer

Designer is an application for advanced users who know the nature of ION architecture, specifically the nature of frameworks. A framework is a number of ION modules arranged (linked) to perform a specific function or number of functions. Designer allows you to customize current frameworks by adding, deleting, or re-linking ION modules, and it allows you to create entirely new frameworks. Although it can be used to perform basic setup, such as changing an ION module's setup register, it is recommended that you only use Designer for framework customization and creation.

📝 NOTE

In most cases, you will be able to achieve the functionality you want by changing the settings in an existing module's setup registers. For this operation it is recommended that you use ION Setup.

Basics of ION Architecture

Before you begin altering the meter's operation, it is advisable to familiarize yourself with the basics of how the device operates. Understanding the basics of the ION architecture will help you understand how to make different types of configuration changes.

The ION architecture applies the principles of object-oriented software design to the creation of functionality inside your devices. The object-oriented structure allows you to connect different discrete objects (called ION modules) in different ways to define how information is accessed, transferred, and manipulated inside the device and across the power monitoring network.

Each ACCESS device contains a number of ION modules that perform specific functions. The ION modules are linked together to create frameworks or framework templates, defining multiple operations and logical pathways for power system information. The basic structure of an ION module is the same for each module type, making it easy to use new features once the basics are understood.

ION Modules

The ION module is the basic building block of the ACCESS device's operating software. A module can be considered as a "function box": it receives data from its inputs, makes decisions based on the settings in its setup registers, and then makes data available at its output registers. All functionality provided by an ACCESS device can be considered in terms of its modules and the linkages between them.
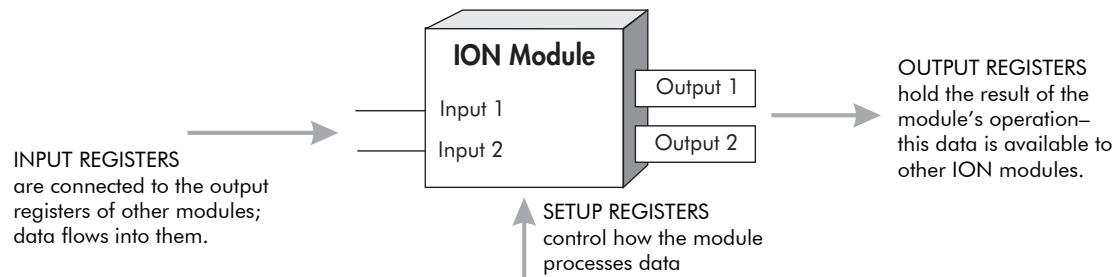
Modules are linked together to create powerful functions. For example, the framework below consists of four modules that, when combined, trigger a waveform recording in response to an over-voltage condition.
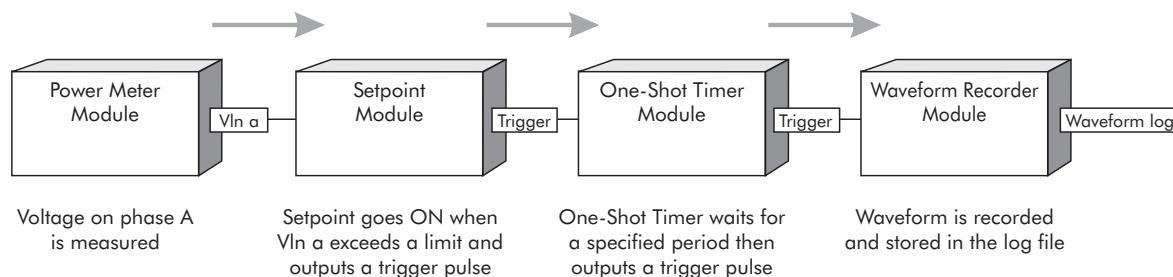
Module Linking Restrictions

The maximum number of modules that can be linked in a row is 25. This is referred to as the framework's *depth*. Modules that branch off or branch into the chain do not affect the depth, and there is no restriction on the number of branches you can have in a framework.

Another restriction concerns "circular" linking of modules. You cannot link a module's output register to its own input or to the input of any module that precedes it in the chain. This protects you from creating infinite loops that can waste system resources.

The one exception to this rule is the Feedback module, which makes circular linkages possible (refer to the *ION Programmer's Reference*).

Sequence of ION Module Execution

ION modules always execute in the order of the data flow (in the example below, from 1 to 4). This logical execution order is maintained even if you created the framework from back to front.
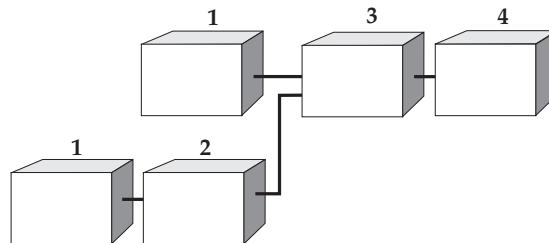
ION modules may execute simultaneously if they do not depend on each other for data (such as both ION modules labelled 1). Conversely, ION module 3 will not execute until both ION modules 1 and ION module 2 have executed.

ION Registers

Each module has one or more output registers, and most modules have Setup registers. (A module's inputs are links to the output registers on other modules.) There are different types of registers, each classified by the type of data they accept. When you want to change a module's configuration, you must supply the type of data that is appropriate for the register you are configuring. The configuration tools prevent you from entering the wrong type of data into a register, but they do not prevent you from entering the wrong value.

The 'NOT AVAILABLE' Value

An ION module that requires a link to one or more of its inputs, but has no such links created, does not contain any values in its output registers. Instead, its output registers are set to NOT AVAILABLE. In addition, if a module has an input that is invalid (for example, a line-to-neutral measurement for a 3-wire Delta system) its output register is also set to NOT AVAILABLE. The NOT AVAILABLE value helps to distinguish between cases where a register contains a value like 0 or OFF, and cases where there is actually no value stored.

📝 NOTE

The NOT AVAILABLE value appears in Vista objects that are linked to ION modules with output registers that are NOT AVAILABLE. The front panel of the meter displays values that are NOT AVAILABLE as dashes (–).

If the inputs of a module are NOT AVAILABLE, its output registers are also NOT AVAILABLE. The NOT AVAILABLE value propagates through all linked modules. (The NOT AVAILABLE value propagates through linked Arithmetic modules differently - refer to the ION Arithmetic module description in the *ION Programmer's Reference*.)

ION Configuration Changes and Module Security

When you make configuration changes to an ACCESS device you are either changing a value in a module's setup register (basic configuration) or you are changing the linkage between two or more modules (advanced customization).

Certain parts of the meter's operating software are protected against deletion and tampering, specifically core ION modules, fixed module links, persistent ION modules, and locked ION modules. Visit Power Measurement's web site (www.pwrm.com) for a complete listing of these module types for your meter.

Core Modules

Core ION modules are fundamental to basic device or software node operation. You cannot create or delete core modules, and in some cases, you cannot configure them. Those ION modules classed as Core modules are the same in every device or software node, though not all devices and software nodes support all the Core modules. The following are examples of Core Modules: Power Meter module, Communications module, Display Options module, and the Factory Module.

Fixed Module Links

Several of the linkages between core modules are fixed; they are required for the basic operation of the device. A fixed link cannot be removed. A core module with fixed links can still be linked to other modules.

Persistent Modules

Persistent ION modules are similar to Core modules, as they are core to the operation of the device and cannot be created or deleted. These ION modules are protected, because they are factory-configured to provide important external control functions. Many External Pulse modules are Persistent ION modules.

⚠ **CAUTION**

Persistent modules can be overwritten in Designer. When pasting a default framework onto a meter, use lock-paste on the Persistent modules. Do not free-paste. A list of Persistent modules is available on the Library page of Siemens's web site, under "ION Device Templates".

Locked Modules

Locked modules provide security for revenue meters. This type of module security only applies to ACCESS meters with the revenue-lock enabled (RM) order option. Furthermore, there are varying degrees to locked module security: Fully Locked, Writable Locked, and Front Panel Locked. Fully Locked security is designed to protect the revenue related functions within the meter; they cannot be modified in any way. (Fully Locked modules have their values written via internal meter methods, as the meter makes calculations based on its voltage and current inputs.) Writable Locked security allows you to trigger or change the state of the ION module, but you cannot delete it, link to it, or change its label. Front Panel Locked security prevents registers from being altered remotely via software; you must use the ACCESS meter's front panel to make any modifications to these registers.

📝 **NOTE**

Depending on the meter family, there may be different types of module security. *Rev_write_state_lookup* means the module cannot be modified in any way, and *Rev_destroy_lookup* means the module cannot be deleted.

Designer's Main Configuration Screen

If the software has been properly configured, the main screen of the meter's node diagram appears each time that you open a meter in Designer. If the ACCESS software has not yet been configured, refer to the *Getting Started Guide*, or contact your network administrator. The different types of device functions are grouped together on the Designer screen, so you can quickly access the types of settings you want to change.

ION modules appear on the main Designer screen, grouped by the functions they perform. Right-click a module to access its Setup registers.

Folder icons indicate that additional ION modules are available. Double-click on the folder to view them.

Status Bar
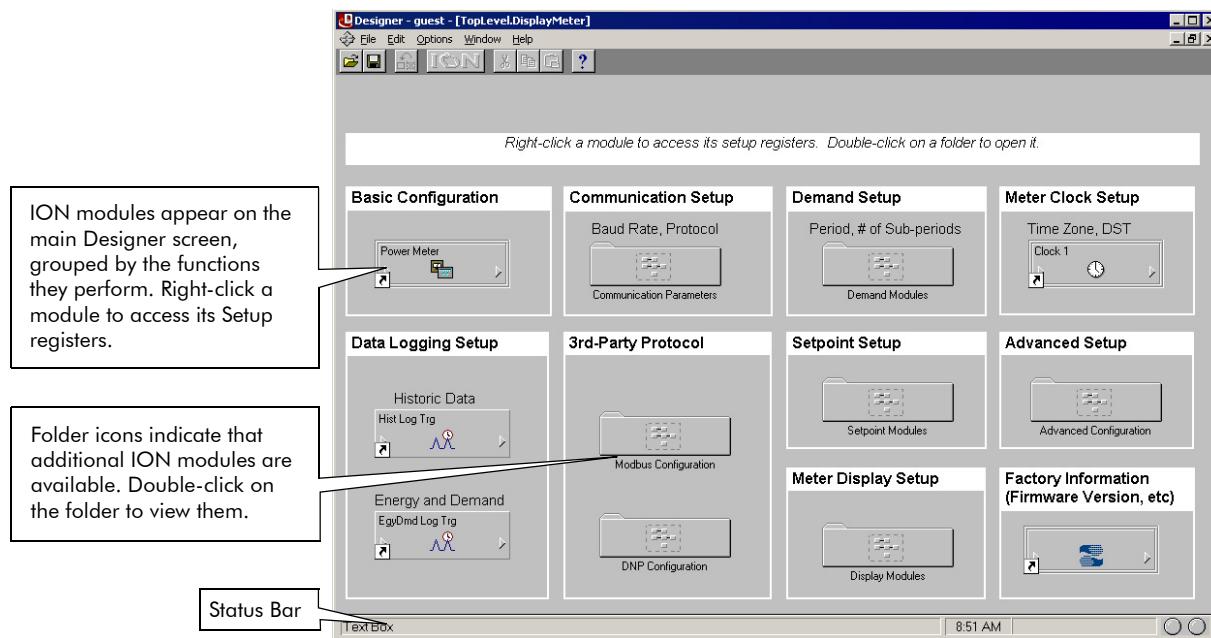
Once you have logged on to Designer and opened the meter's node diagram, you can begin configuring ION modules. Designer displays two types of objects on the main configuration screen: ION modules and grouping objects (also called folders).

A folder in Designer indicates that additional modules are available. Double-click on a folder to access the modules contained inside it. In some cases a folder will contain additional folders — continue double-clicking on the folders until you reach the appropriate ION module.

Viewing Real-time Data in Designer

You can view the real-time values of output registers in Designer. This is useful when you are linking these outputs to other modules. However, it is recommended that you use Vista as your main data display application.

To view real-time data of output registers:

1. Click Options > Show Toolbox on the Designer menu.

2. Find the ION module you want, press the Shift key and click the output register. The following example shows how the real-time data for the output is displayed:
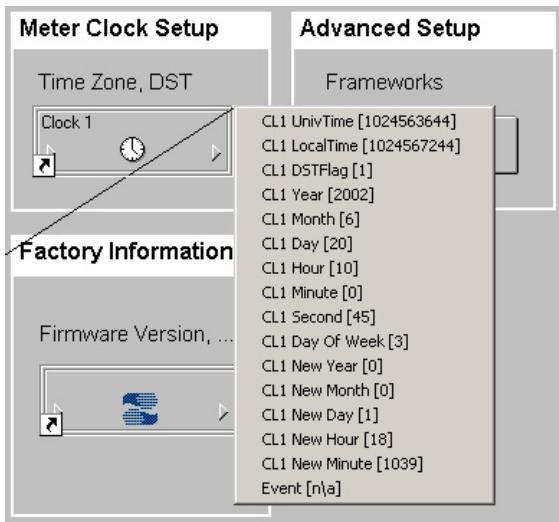
Changing Setup Registers with Designer

If you are familiar with the nature of ION architecture and comfortable using Designer, you can use the application to modify ION modules' setup registers.

📝 NOTE

It is recommended that you use the Setup Assistant in the ION Setup software to configure an ION module's setup registers. The Setup Assistant is a user interface that provides access to the setup registers for a meter. (Refer to the ION Setup section for more details.)

To configure ION module setup registers with Designer:

1. Right-click near the module's center. The ION Module Setup dialog box appears, showing a list of setup registers available for configuration:

The list of available Setup registers appears here. Select a Setup register, then click **Modify...** (or double click on the Setup register name).
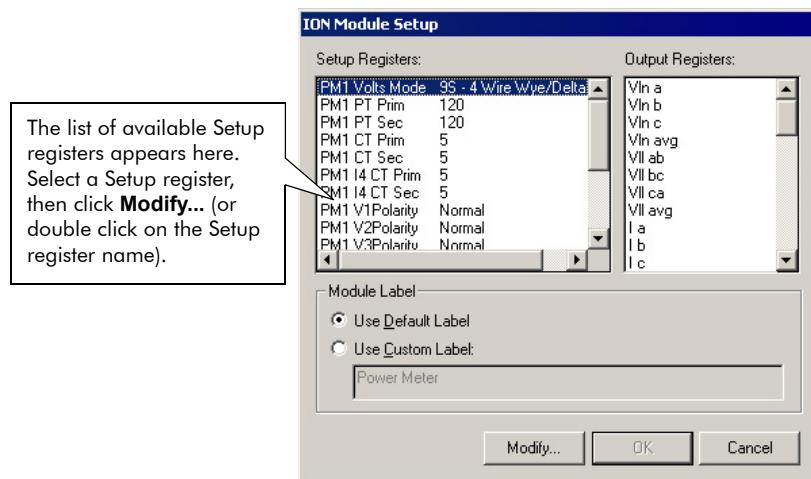
2. Highlight the Setup register you want to configure, and click **Modify...**. A Modify Register dialog box appears.

A drop down list of option appears when you click on the arrow because this setup register is of the enumerated type.
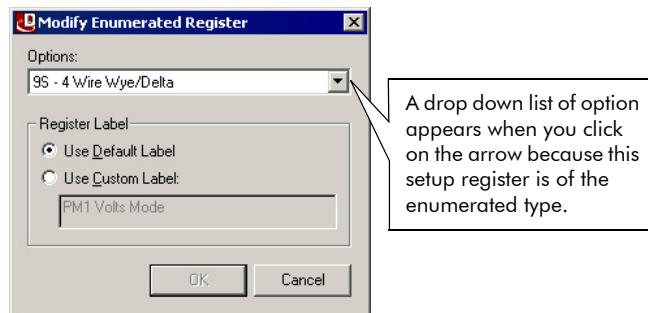
Make the change to the register's setting here. As there are different types of data held in setup registers, there are different Modify Register dialog boxes. The Modify Register dialog box may require that you choose an option from a list or enter a numeric value.

A format option is available when modifying Numeric Bounded setup registers. Clicking **Format** causes a "Formatted Numeric Value" window to appear:
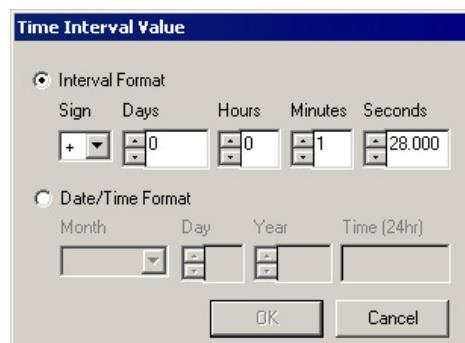
Use the **Interval Format** area if the setting you are changing requires intervals. Use the **Date/Time Format** area if the setting you are changing requires specific dates (such as those needed used in the Clock module). Click OK when you have the desired setting for the time interval or date.

3. Click **OK** when you are satisfied with your configuration changes.

Complete details about the Setup registers of every ION module are provided in the *ION Programmer's Reference*. Details about the Setup Areas on the main screen of the node diagram can be found in the Default Functionality chapter.

Customizing Frameworks in Designer

To create custom functions, ION modules are linked together and then configured. Linking ION modules is relatively straightforward: output registers on one module are linked to the input registers of subsequent modules. Data flows from the output register on the first module to the input registers on a second module. Each module that receives data makes decisions and processes the data based on its setup registers' settings. Once the data has been processed, a module makes the data available at its output registers. These output registers can then be linked to the inputs of other modules, and so on.

Most ION modules perform simple, discrete functions. The combination of modules linked together creates a more powerful functionality. Multiple modules linked together can be referred to as a framework. Since a device's operation can be separated into the specific, smaller functions performed by the modules, creating specialized functionality is simple if you understand the operation of the component pieces.

⚠ CAUTION

The meter is factory-configured for optimal operation. You should not make any changes to its operating software unless you are familiar with the ION architecture, you know specifically what you want to accomplish, and you understand the effects of the changes you intend to make.

If you need to customize your meter's operation, you will need to create new ION modules, configure their settings, and in some cases link them to other modules. Designer provides a graphical view of your meter's internal operation, making these tasks simple. If you require more information on Designer than is presented in these pages, refer to the *ION Programmer's Reference* or online *WinPM.Net Help* for complete usage details.
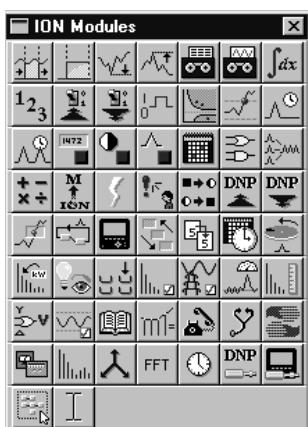
Each ION module available to a
meter appears in the toolbox.

Creating New Modules

To add a module, locate its icon in the Designer toolbox, press and hold the left
mouse button over the icon, and drag it onto the node diagram. Once you release
the mouse button, the module becomes part of the diagram and is ready to be
configured and linked.

Choosing the Module

The Designer toolbox displays icons for all the meter's available module types. If
the toolbox is not displayed, choose Show Toolbox from the Options menu to make
it appear.

As you drag the mouse over the icons in the toolbox, the status bar at the bottom
of the Designer window displays the module type.

Creating the Module

Follow these steps to create an ION module in the meter:

1. On the ION Modules toolbox, press the mouse button down on top of the icon
   of the module you want to create, and drag it onto the node diagram. As you
   drag the icon, the cursor changes shape to indicate you are placing an object.

2. Release the mouse button to place the module in the diagram. When you release
   the mouse button, Designer places a *pending* module icon into the diagram
   (pending modules appear with a dashed outline).

3. Once you have configured the node to your liking, choose Send & Save from the
   File menu to download the configuration to the node. The dashed outline is
   replaced with a solid outline, indicating that your changes have been saved.

   After a Send & Save, ION modules that are offline (or inactive) appear with a red
   border. This can mean that the ION module's setup is incomplete. Refer to the
   online *WinPM.Net Help* for more details.

The web site has information about the setup register defaults a module contains
when it is initially created, as well as the ranges or options each setup register
supports.

Deleting Modules

To delete a module, select it by clicking its icon, then press the Delete key. Use
caution when deleting modules – any dependant modules will be affected.
Designer informs you of dependant modules if they exist on the same node.

Linking Modules

Module linking involves clicking on one module's output register symbol,
choosing the output register you want to link, then clicking the input of a second
module and selecting the input to link to. This operation can be performed in
reverse – you can start with one module's input and link to another module's
output register if desired.

You can link modules that reside on different nodes, provided that you are linking between software nodes, or from a meter to a software node. You cannot link modules between meters. The following section describes how to link modules that reside on the same node. Refer to the *ION Programmer's Reference* or the online *WinPM.Net Help* for instructions if you want to link modules that reside on different nodes.

Follow the steps below to link modules on the meter:

1. Click on the ▷ symbol on the right side of the module icon to list a module's output registers. (To list the module's setup registers, hold the CTRL key while clicking on the ▷ symbol.) In most cases, a pop-up menu appears and lists the available registers. If the module has many registers, a dialog box appears instead.

Accessing module outputs
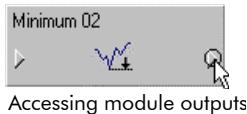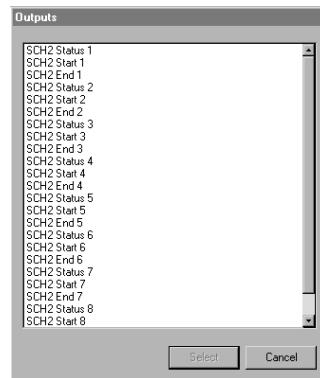
2. Click on the register you want to select. In the case of the dialog box, double-click on an output register, or choose the register and click Select.

3. Drag the cursor towards the module to which you want to link; the cursor changes and a dotted line follows it across the node diagram. This indicates you are in the process of creating a link. The dotted line also shows where the connecting line will appear in the node diagram once the link is made.

   If you link to a module that is in a different window than the original module (either in a different node diagram or grouping window), the dotted line disappears, but the cursor still indicates that a link is in progress.

The cursor looks like this when a linking operation is in progress:
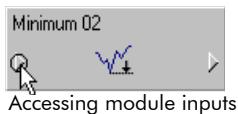
4. Click on the module icon's left ▷ symbol to display the module's inputs. In most cases, a pop-up menu appears and lists the module's inputs. (If there are a large number of inputs, a dialog box similar to the More Output Registers dialog box appears instead.) Inputs that are a different class than the selected output register are grayed out to indicate that you cannot select them.

   If the input is already linked, the register label it is linked to is displayed beside the input. If you select the input, the existing link is overwritten.

Accessing module inputs

5. Choose the input you want from the pop-up or dialog box.

   If the two modules are in the same window, the dotted line remains on the screen to show the link between the modules.

6. Save the changes you made to the node. When you save the line changes from a dotted line to a thin black line to indicate that the link is now programmed on the node.

The linking procedure described in the preceding steps can also be performed in reverse order. You can select a module's input first and then link it to another module's output register.

Editing Existing Frameworks

If you are comfortable with the ACCESS software and the meter's configuration, you can make changes to the existing frameworks to customize operation. Any edits you make to the existing frameworks alter the device's operation — be sure you understand what effect your changes will have before proceeding.

Checking an Output Register's "Owner"

Using Designer, right-click a module's output register to view its linkages, referred to as "owners". A dialog box appears showing all of the inputs that are linked to that output register. With this information you can determine what changes will result to the framework by deleting the links to the parameter. Note that links to inputs on other nodes are not shown in this dialog box.

⚠ CAUTION

Viewing owners by right-clicking a module's output register will only show you module linkages on the same node. Any links to modules on different nodes will not be shown. If links to modules on other nodes may exist, always check the links at a module's inputs.

Deleting the Link at a Module's Input

You can also check the links at a module's input. Using Designer, right-click on the input symbol on a module to view a dialog box listing each of the inputs and the output registers they are linked to. You can unlink inputs from within this dialog box as well.

Replacing a Link

You do not need to unlink a module's input before linking a different output register to it. If you link an output register to an input that is already linked, the existing link is overwritten.

WinPM.Net: Reporter

Reporter is a database reporting application. It lets you define, generate, and manage comprehensive reports based on the data in your database. Reporter retrieves data from the Relational Database Management System (RDBMS), and processes it into a finished report in Microsoft Excel format. There are a number of pre-configured reports available, including Power Quality, Load Profile, Energy and Demand, and EN50160 reports. You can also generate custom reports that incorporate virtually any data stored in the RDBMS and perform further analysis using Excel's advanced mathematical and graphical functions.

After you've designed custom reports and configured the Excel workbooks, reports are updated automatically, either in response to a power system event, or following a specified schedule. You can also configure reports to automatically email selected recipients after updating.

📝 NOTE

The Report View Manager, a component of the Reporter, can be used on its own to create custom database views for use with other third party reporting packages. Advanced knowledge of database operation may be required to use the Report View Manager with third-party applications. Refer to the online *WinPM.Net Help* for details on the Report View Manager.

Pre-configured Reports

When you start Reporter, the main Reporter screen appears with a list of pre-configured reports. The most commonly accessed reports are the Energy and Demand report, the Load Profile report, and the Power Quality report. There are also 2 reports related to the European EN50160 power quality standards.

Time of Use Schedule used for Energy and Demand reports. This is not to be confused with the Time of Use Module
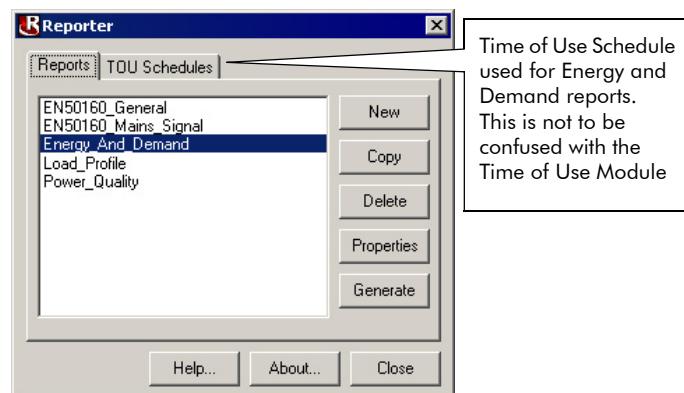
Energy and Demand

This report is designed to generate and display details about energy consumption and peak demand levels over a given time period. It uses a Time of Use Schedule (TOU) to reference the metered data against an energy provider's tariff schedule.

The first step in creating an Energy and Demand report is to preconfigure the TOU schedule that will be applied to the metered data. If you do not require a time of use schedule, you can create a mock schedule with only one time period defined. Use the EgyDmd Log as a query item.

Load Profile

This report generates a graphical representation of demand, or load levels, over a given time frame. The profile is a characterization of peak loads that can be used to determine and limit demand peaks which could lead to financial penalties for energy consumers, or could signal a need for additional generation or the introduction of load control programs for energy suppliers.

The Load Profile report also uses the EgyDmd Log as a query item, but it does not use a TOU schedule.

Power Quality

This report summarizes the number and severity of sags and swells over a given time range, and graphically represents the waveform captures of each individual event for further analysis.

The Power Quality report is slightly different than the other two report types - mainly in its requirements for different data log sources. The Power Quality report requires a combination of the Sag/Swell Log and Waveform Log.

EN50160

EN50160 is a general power quality standard used by energy suppliers and energy consumers in European countries. The report is a summary of the multiple pass/fail results of the evaluation methods outlined in the standard.

The following logs are used for the EN50160_General report:

◆ EN50160 Vlt Dp1 to EN50160 Vlt Dp5

◆ EN50160 Ovrvlt1 to EN50160 Ovrvlt3

◆ EN50160 Frq/Mg, EN50160 Flicker, EN50160 Intrp, EN50160 Hrm Vlt, EN50160 Ihm Vlt, and EN50160 Vunbal

All fourteen of the above logs must be added to each EN50160_General report.

EN50160 MSignal is the log used for the EN50160_Mains_Signal report.

🖹 NOTE

The 73xx Series meters do not support EN50160 compliance. Although you see them as viable selections in Reporter, the 73xx Series meters do not have the logs needed to create EN50160 reports.

Report Creation and Generation

These steps are used for creating all report types. Be sure to know which log(s) you use for the report you are creating.

📝 NOTE

If you are creating an Energy and Demand report, complete the steps under "Creating a Time of Use Schedule" (following "Creating a Report") before you procede with creating your report.

Creating a Report

1. Start Reporter.

2. Select the report type you want and click Copy.

   The pre-configured reports include some basic programing to simplify the customization process. It is recommended that you create a copy prior to making changes, leaving the default report unmodified.

3. Click the Properties button (while your copy is selected). The Report Properties dialog box appears.

   On the General tab, it is recommended that you change the default report name to distinguish it from other reports you may create.

4. Click New from within the Database Queries section. The Database Query Properties dialog box appears.

5. Select your DSN (Data Source Name). This is the name of your database file or archive.

6. Select the appropriate Log file(s) for the report. Click OK to close the Database Query Properties dialog box.

7. Click on the Distribution tab and select the appropriate checkbox.

   You may need to provide more information, such as a destination folder or email address, depending on your distribution method.

8. Make any changes you require on the Advanced tab and write any information you desire on the Notes tab.

9. Save your new report template.

Generating the Report

1. Select your report from the list.

2. Click Generate.

The Report Generator extracts the requested information from the database, applies the TOU (if required), and displays the report in Microsoft Excel. Larger reports with many queries may take a few minutes to complete.

📝 NOTE

If you selected the checkbox for Interactive Date Range on the Advanced tab, you are prompted to select the date range within the Interactive Date Range screen.

Creating a Time of Use Schedule

1. Start Reporter and select the TOU tab.

2. Select the Sample file, then click copy to duplicate it.

    All of the pre-configured samples include some basic programing to simplify customization. It is generally best to create a copy of the samples before making changes, and leave the sample in its default state.

> ✎ **NOTE**
>
> Be aware that the NEW button creates a completely new report or TOU schedule with no default configuration. Use this option to create completely customized reports.

3. Select your new copy and click Properties to configure it.

    Examples of the changes you may want to make to the TOU schedule are as follows:

    ◆ Rename the TOU Schedule using the appropriate field.

    ◆ Modify On Peak and Off Peak charges using the appropriate field.

    ◆ Add a 'Shoulder Period' which is often called a 'Partial Peak' (see below).

    ◆ Change the Holidays to an appropriate country (see below).

4. Save the new TOU configuration when configuration is complete.

Adding a Shoulder Period

1. Highlight the Off Peak period by left clicking on it, select New.

2. Rename your new tariff period (i.e. Partial Peak).

3. Modify the time period by left clicking the plus sign, selecting the time period and changing the time within the left window.

4. You will also have to modify the time period within the On Peak and/or Off Peak intervals to ensure that there is no overlap (i.e. if your new 'Partial Peak' period is between 6:00 and 8:00 PM, then you will have to change your 'Off Peak' period to 8:00 PM to End Of Day).

Changing Which Days are Holidays

1. Select the Off Peak period.

2. Left-click 'All Day, Canada Holidays' and select a different country from the window on the left.

3. Add or remove holiday dates as required.

> ⚠ **CAUTION**
>
> Double check to make certain that there are no gaps and no overlapping date or time ranges.
> The TOU schedule should not be confused with the Time of Use Module used by billing applications.

Once you have completed configuring the TOU schedule, you are ready to create the actual Energy and Demand report.

ION Setup Software

ION Setup is a software solution that allows basic configuration and control capabilities for your power monitoring devices. ION Setup can also display real-time and diagnostic data for your networked devices.

When starting ION Setup, you have the option to enter network mode or single device mode at the logon screen. Network mode allows you to add multiple sites and meters to your network, organize your meters into logical groups, and configure each site and meter individually. The single device mode, however, allows you to connect to only one meter and make changes to its configuration or view its data.

Refer to the documentation on you ION Setup CD or visit the Siemens website for complete details on ION Setup.

Configuring Communications

With ION Setup, you first create one or more communication sites: the site defines the communication method. You then add devices to a site, followed by grouping the devices in a logical manner according to your needs (e.g. by common function or physical location).
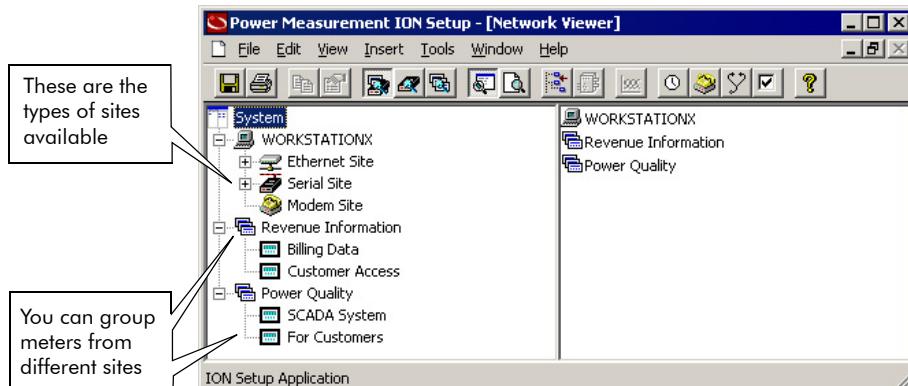
📝 NOTE

You must be logged on to ION Setup in network mode in order to add a site, group, or device.

Sites, Groups, and Meters

You can create a network of items within ION Setup so that the next time you want to upgrade a meter's firmware or make any configuration changes, the meter is easy to find and your communication setup is ready.

Sites refers to a communication method. For example, you need separate sites for Ethernet, Serial or Modem types of communication. A site can have many connected devices. You can also have one meter that is connected to two or more sites provided that the meter has the capability.

A group is an optional feature that lets you define a logical grouping of meters. For example, you can have a group of meters for power quality monitoring, or you can have a group of meters defined by location. Groups are always attached to the System icon. Devices within each group are attached to both the group and a communications site (sites are connected to the workstation).

You can add a meter to a communication site or a group. When you add a meter to a group, it is automatically attached to the appropriate communication site. However, when you delete a meter from a group, the meter remains attached to the communication site.

Adding a Site, Group or Meter

1. Close any open windows to return to the Network Viewer screen. Do one of the following:

    ◆ From the toolbar, click the Insert An Item button, or

    ◆ From the Insert menu, choose Item, or

    ◆ Right-click anywhere on the screen to display the shortcut menu, and then click Insert Item.

    The New Network Item dialog box appears (see illustration in step 2).

2. Click the item (Group, Site or Meter) that you want to add. In the **Attach To:** box, select where you want to attach the item.
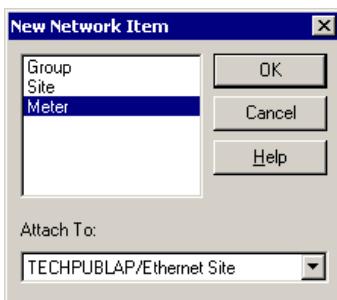
3. Click OK. A dialog box for the appropriate item appears. Depending on the item, there may be multiple tabs each with numerous options for configuration:

◆ When you add a new site, the dialog displays three tabs: General, Timings, and Polling. If you are adding a modem or gateway site, there is a fourth tab labelled Remote Info.
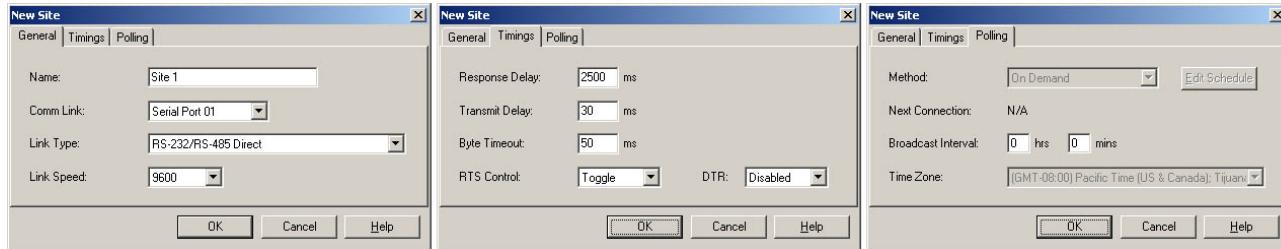
◆ When you add a new group, the dialog box has only one tab labelled General. On this tab, you can change the name of your newly created group.

◆ When you add a new meter, the dialog box displays three tabs: General, Display, and Tools.
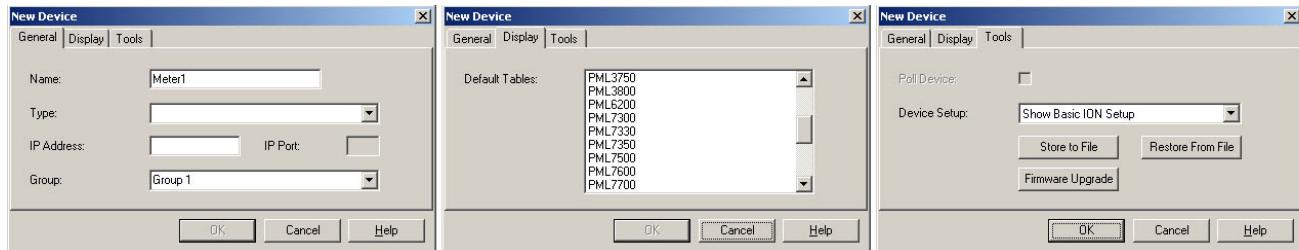
Basic Meter Configuration

The Setup Assistant is a user interface that contains relevant instructions to help guide you through common setup requirements for your ACCESS meter. After you have added a device to ION Setup in network mode, or connected using single device mode, the Setup Assistant appears in the right pane. Double-click the Setup Assistant to access the setup dialog box.
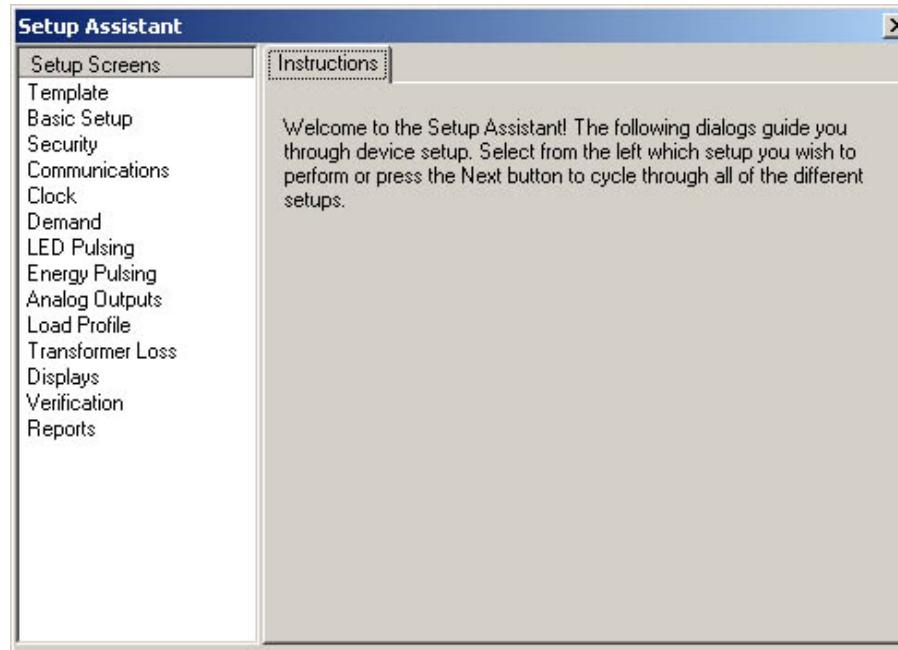
The Setup Assistant is accessible in both single device mode and network mode.

The Setup Screens on the left let you access different setup tabs on the right. It is from these setup tabs that you can configure a meter's setup registers.

Changing a setup register

1. Highlight the Setup Screen you want and select the desired tab where applicable.

Important notices may be included in the description box. Read them carefully before proceeding with your configuration changes.
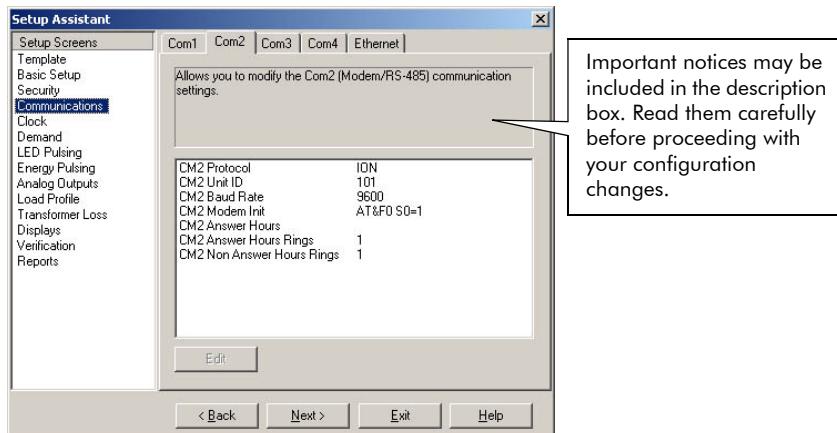
2. Highlight the setup register you want to edit in the register window.

CM2 Protocol	ION
CM2 Unit ID	101
CM2 Baud Rate	9600
CM2 Modem Init	AT&F0 S0=1
CM2 Answer Hours	
CM2 Answer Hours Rings	1
CM2 Non Answer Hours Rings	1
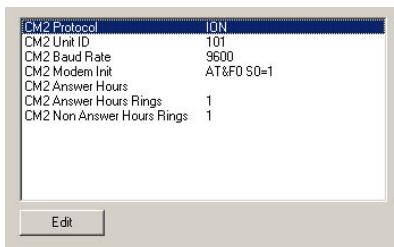
Edit

3. Click the Edit button.

(A window may appear, asking for the meter's password. This only occurs for meter's with advanced meter security. Type the meter's password and click OK.)

A window appears where you can edit the register value.

Select CM2 Protocol

ION

ION
Modbus RTU
Modbus Master
DNP V3.00
GPS:Truetime/Datum
GPS:Arbiter
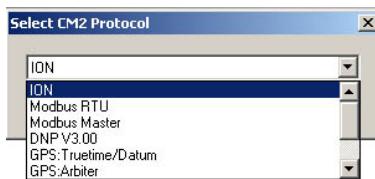
Depending on the register class, you either select a value from a drop-down list or enter the new value manually in the field provided.

4. Make your selection from the drop-down list or enter a new value. Click OK. The setup register changes immediately.

Displaying Data with ION Setup

You can use ION Setup to display real-time or diagnostic data from any meter that you have added to the software.

Displaying real-time data

1. Select Data Screens from the View menu (or click [icon] on the toolbar).

2. Click the device icon from which you want to view real-time data.

3. Double-click the icon for the screen you want to display (the screens in the right pane of the ION Setup window).

4. Click the desired tab to display its contents if there is more than one tab in the display screen.

EthernetSite - EthernetDevice : RealTime

Volts, Amps and Power | Energy

5/30/2002 9:37:01 AM	Total	Phase A	Phase B	Phase C
Volts L-N	119.857	119.894	119.821	119.855
Volts L-L	207.598	207.663	207.537	207.594
Amps	4.328	3.744	4.994	4.246
kW	1.434	0.422	0.550	0.463
kVAR	0.603	0.154	0.236	0.212
kVA	1.556	0.449	0.598	0.509
Power Factor	92.137 LAG	93.917 LAG	91.863 LAG	90.890 LAG
Frequency	60.000			

Displaying diagnostics data

1. Select a site or device icon from the left pane.

2. Select Diagnostics from the Tools menu (or click [icon] on the toolbar).

   The Communication tab displays information about the meter's communication status, message information, message timing, and packet frames. Clicking the Reset button sets all values to zero.
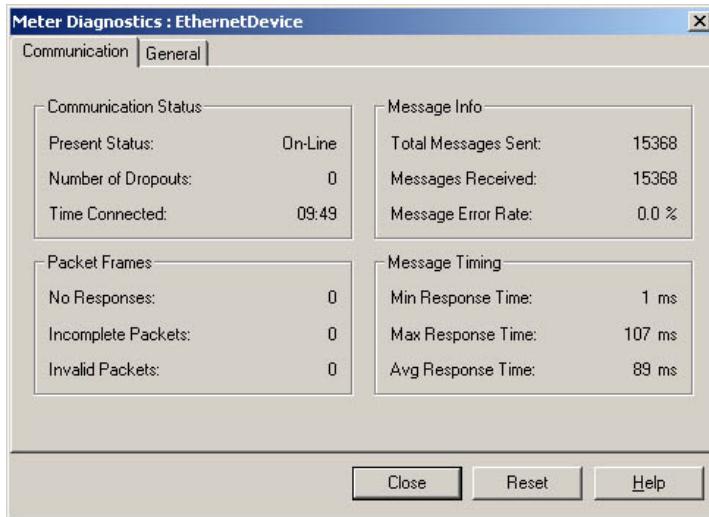
   The General tab display information about the meter, such as the meter type, the firmware version, serial number, communications, and available memory.
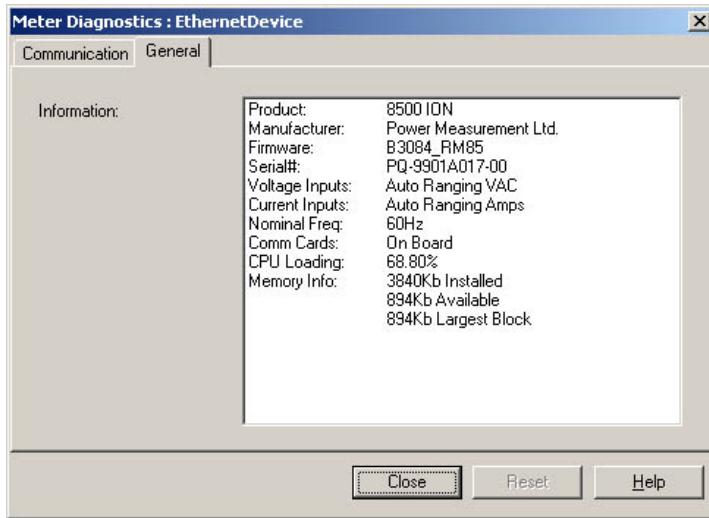
5   Features and Applications

The 9300 Series meters offer a range of capabilities for enterprise energy management applications such as feeder monitoring and submetering. Comprehensive analog and digital I/O, multiple communication ports, industry-standard protocols, and precision time synchronization compliment the meters' ability to integrate with your energy management and SCADA systems.

In This Chapter

Communications

This section describes the meter communications media types and communications applications. The diagram below shows the 9300 Series meter communication ports with a brief description of how each port is used.

COM 3:
Optical serial connection

All 9300 Series meters provide COM 3, an optical (infrared) port. The optical port (located on the front of the meter) is used for serial communications, and supports these protocols: ION, Modbus RTU, or DNP (9330 / 9350). The port can also be used for energy pulsing.

The meter's internal modem communicates to the server computer over the telephone network.

Ethernet connection

All 9300 Series meters support the optional Ethernet card. An Ethernet connection supports ION, Modbus RTU, or Modbus/TCP protocols.
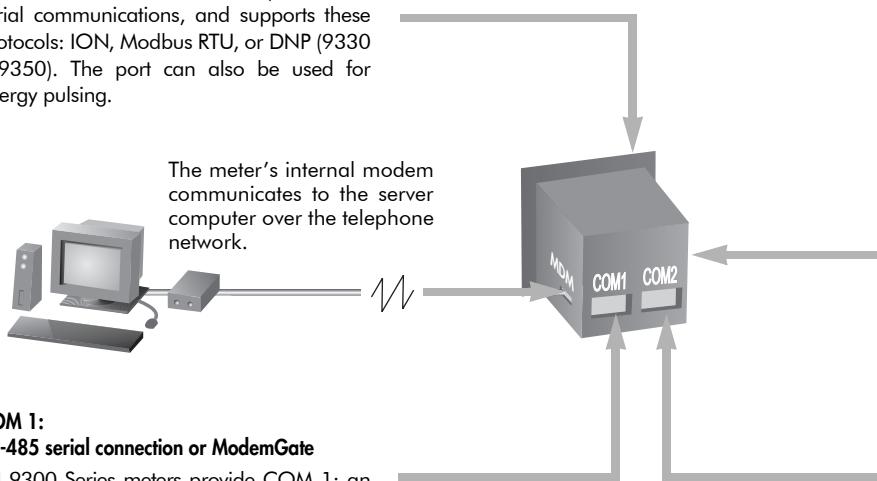
COM 1:
RS-485 serial connection or ModemGate

All 9300 Series meters provide COM 1: an RS-485 serial communications port that supports these protocols: ION, Modbus RTU, or DNP (9330 / 9350).

9330 and 9350 meters with an internal modem can use the ModemGate protocol on COM 1, allowing the meter's internal modem to communicate with the meter, the WinPM.Net server computer, and any devices that are wired to the meter's COM 1 port.

COM 2:
RS-485 serial connection or EtherGate

The 9330 or 9350 meter provides COM 2. If your meter has an Ethernet card, then COM 2 functions as an Ethernet gateway (EtherGate) — EtherGate transfers data directly between an Ethernet network and any devices that are wired to the meter's COM 2 port. If there is no Ethernet card, then COM 2 functions as a serial communications RS-485 port, and supports ION, Modbus RTU, or DNP protocols.

The 9300 Series meter has numerous communication possibilities depending on your ordering preferences. However, not all communications options are available to each model. The standard meter has two or three serial communication ports: an RS-485 port on COM 1, another RS-485 port on COM 2, and an Infrared port on COM 3. Optional ports can include an internal modem, a 10 Base-T Ethernet communication port, or a Profibus port. The table outlines the communication (COM) ports for each 9300 Series meter. Information regarding Profibus — available only on the 9300 meter - can be found in its sections.

	COM 1	COM 2	COM 3	Ethernet	EtherGate	Modem	ModemGate
9300	●		●	●			
9330	●	●	●	●	●	●	●
9350	●	●	●	●	●	●	●

RS-485 Connections

Refer to the "Hardware Reference" chapter for the 9300 Series RS-485 specifications. The communication card is designed with optical coupling that provides full isolation between the RS-485 communication lines and the meter internal circuitry. This circuitry provides protection from common mode voltages and incorrect connections. All inputs pass the ANSI/IEEE C37.90-1989 surge withstand and fast transient tests.

The communications terminal strip on the rear of the meter shows two communication ports: COM 1 and COM 2. (The COM 2 port is not available on the 9300.) Up to 32 devices can be connected on a single RS-485 bus. Use a good quality shielded twisted pair cable for each RS-485 bus, AWG 22 (0.5 mm^2) or larger. The overall length of the RS-485 cable connecting all devices cannot exceed 4000 ft. (1219 m). The RS-485 bus may be configured in straight-line or loop topologies.

Straight Line Topology
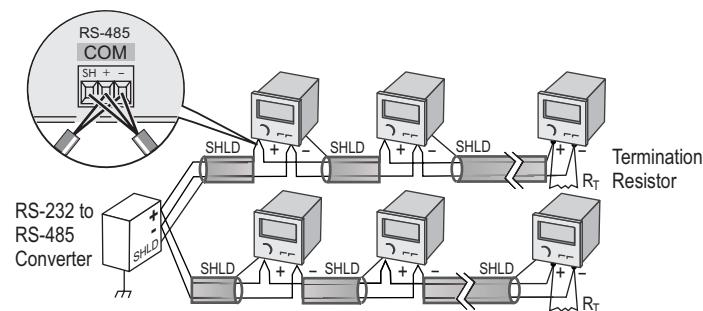
Loop Topology
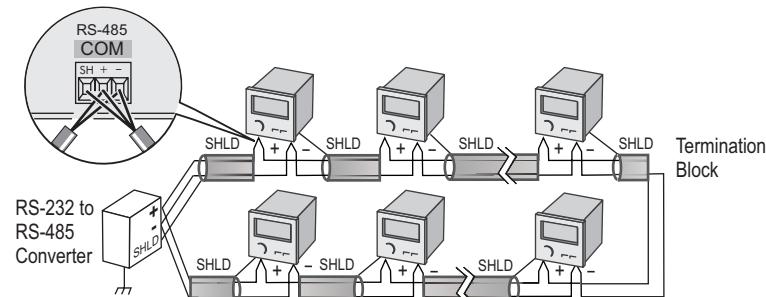
General Bus Wiring Considerations

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

◆ The shield of each segment of the RS-485 cable must be connected 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 (typically 120 ohms – consult the manufacturer's documentation for the cable's impedance value).

⚠ **CAUTION**

Do not connect ground to the shield at both ends of a segment. Doing so allows ground loop currents to flow in the shield, passing noise into the communications cable.

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 cause interference. **At any connection point on the RS-485 bus, no more than two cables should be connected**. This includes connection points on instruments, converters, and terminal strips. Following this guideline ensures that both star and tee connections are avoided.

Avoid
3-way "Star"
connection point

Avoid
3-way "T"
connection point
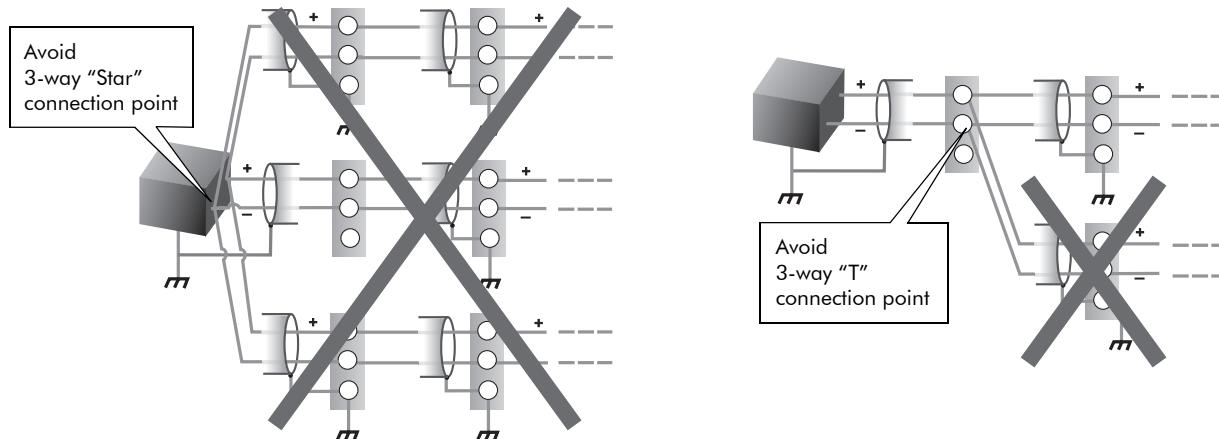
Optical Port Connections

Refer to the "Hardware Reference" chapter for the optical port specifications.

The optical (infrared) port on the meter's front panel is compatible with an ANSI C12.13 Type II magnetic optical communications coupler. The optical magnetic coupler is purchased separately. Contact your supplier for a list of recommended opto-couplers.

The optical port can communicate real-time measurements to a laptop or similar device via ION, Modbus RTU, or DNP 3.0 (9330 and 9350). The port can also be used for infrared energy pulsing.

Meter Setup for Optical Port Communications

To communicate real-time measurements through the infrared port, you must configure the Infrared Comm communications module. The *Baud Rate, Unit ID,* and *Protocol* setup registers must properly match your system and can be set using the meter's front panel or ACCESS software. Once you have completed the device's configuration, connect the Type II compatible optical magnetic coupler to the front panel. (The optical magnetic coupler is purchased separately.)

Configuring the Infrared Comm Module through the Front Panel

1. From the SELECT SETUP menu, choose QUICK SETUP > INFRARED COMM > IR1 PROTOCOL > INFRARED I/O.

2. Configure the INFRARED COMM communications module *Baud Rate, Unit ID,* and *Protocol* setup registers to match your communications system.

Configuring the Infrared Comm Module with Designer

In order to configure the Infrared Comm communications module with Designer, you must use the Management Console to:

◆ Add the meter (that will be used for optical port communications) to your WinPM.Net system.

◆ Add a direct (serial) site with the RtsCts disabled.

◆ Launch Designer and configure the Infrared Comm communications module settings.

Adding a Meter and Direct (Serial) Site to your WinPM.Net Network

In the Management Console, add the meter that you will use for optical communications and a direct site to your WinPM.Net network. Describe how your serial device is wired and other communications information on the options screens.

On the Direct Site Options screen:

◆ Select the server computer that will communicate with the serial device.

◆ Select the server computer serial port where the optical coupler is connected.

◆ Disable RtsCts.
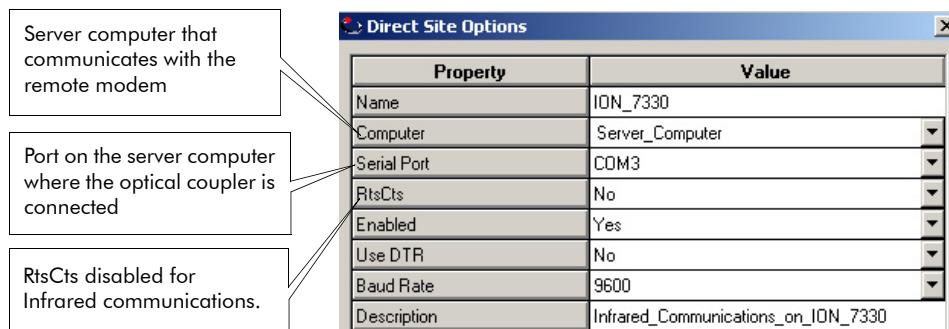
Server computer that communicates with the remote modem

Port on the server computer where the optical coupler is connected

RtsCts disabled for Infrared communications.

Property	Value
Name	ION_7330
Computer	Server_Computer
Serial Port	COM3
RtsCts	No
Enabled	Yes
Use DTR	No
Baud Rate	9600
Description	Infrared_Communications_on_ION_7330

Configuring the Infrared Comm Communications Module in Designer

Launch Designer and configure the Infrared Comm communications module *Baud Rate, Unit ID,* and *Protocol* setup registers to match your communications system.

Optical Port Setup for Energy Pulsing

To configure the optical (infrared) port for energy pulsing, you must set the Infrared Comm communications module *Protocol* register to INFRARED I/O. Use the meter's front panel or ACCESS software to set the IR pulsing.

Setting the IR Pulsing using the Front Panel

1. From the SELECT SETUP menu, choose QUICK SETUP > INFRARED COMM > IR1 PROTOCOL > INFRARED I/O.

2. Choose SELECT SETUP > ADV METER SETUP > CALIBRATION PULSER MODULES.

3. Select the module you wish to use for pulsing (kWh Pulse, for example).

4. Choose the *Port* setup register from the menu provided, then select IR LED.

Setting the IR Pulsing using Designer

1. Set the Infrared Comm communications module's *Protocol* setup register to INFRARED I/O.

2. **Send and Save** the configuration change to the device.

3. Set the *Port* setting of any Pulser module to IR LED.

4. Send and Save.

📝 NOTE

In order to use the optical port for energy pulsing, it cannot be used for communications at the same time.

Ethernet Connections

Refer to the "Hardware Reference" chapter for the Ethernet port specifications.
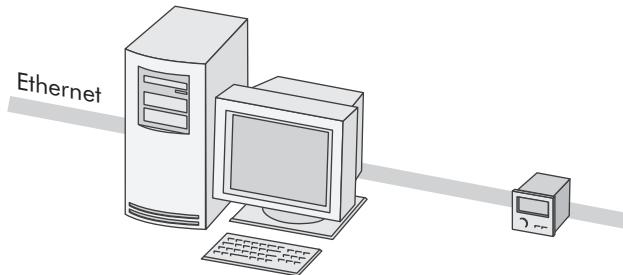
10Base-T Ethernet connections are made via the RJ45 modular port on the left side of the unit. Use high quality Category 3 or 5 UTP (CAT 5 unshielded twisted pair recommended) cable with a male RJ45 modular connector for connection to the 10Base-T port. The meter's optional 10Base-T Ethernet port is capable of data rates up to 10Mbps, and supports ION, Modbus RTU, and Modbus/TCP protocols.

The meter supports a single connection at a time to one of these three IP Service Ports: ION, Modbus/TCP, or Modbus RTU. WebMeter is accessible at the same time, as are connections to Ethergate and MeterM@il as long as these features are available on your meter.

Meter Setup for Ethernet Communications

To enable communications through the meter's Ethernet port, you must configure the Ethernet communications module. The *IP Address*, *Subnet Mask, Gateway*, *SMTP Server* and *SMTP Connection Timeout* setup registers must properly match your system and can be set through the meter's front panel, or with Designer software.

Configuring the Ethernet Module through the Front Panel

1. From the SELECT SETUP menu, choose QUICK SETUP > ETHERNET.

2. Configure the ETHERNET communications module *IP Address*, *Subnet Mask, Gateway, SMTP Server* and *SMTP Connection Timeout* setup registers to match your communications system.

Configuring the Ethernet Module via Designer

After you have wired your meter to the Ethernet network and performed basic setup, add the meter to your WinPM.Net network using the Management Console. (It is not necessary/possible to add an Ethernet site.)

Adding an Ethernet Device to your WinPM.Net Network

In the Management Console, the Ethernet Device Options screen appears when you add an Ethernet device (meter). Use this screen to describe your meter Ethernet address and other communications information. Be sure to include:

◆ The server computer that will communicate with the Ethernet device.

◆ The Ethernet device TCP/IP address.
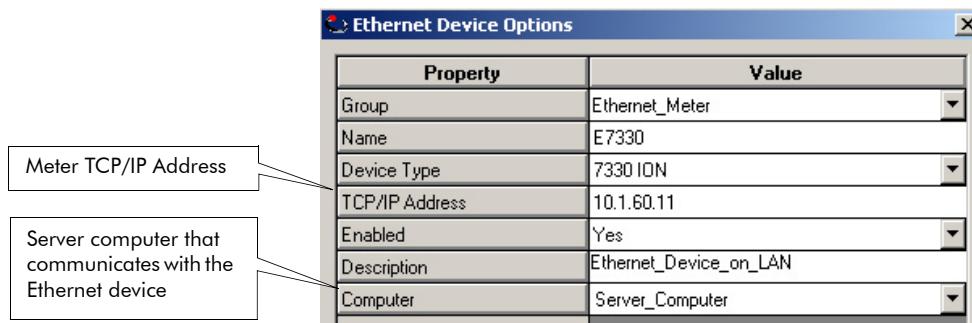
Configuring the Ethernet Communications Module in Designer

To enable communications through the Ethernet port, you must configure the Ethernet communications module. Launch Designer and configure the *IP Address*, *Subnet Mask, Gateway, SMTP Server* and *SMTP Connection Timeout* registers to match your system.

The EtherGate Protocol

EtherGate is a powerful communications tool that lets you communicate *to* a meter and *through* a meter simultaneously. When a meter installed on the Ethernet network has EtherGate enabled, a master device (such as a workstation running ION Enterprise software) can communicate to the meter, as well as through the meter to a serial network of devices wired to the meter's COM 2 port.

EtherGate is only available for the 9330 and 9350 meters, and it is only configurable on the COM 2 port. (Port 7802 is used for EtherGate communications.)

9330 or 9350 with Ethernet Port

Ethernet

Workstation with WinPM.Net is located on the Ethernet LAN

EtherGate connections do not connect a workstation with WinPM.Net (or other master device) to COM 2

Each device on the RS-485 loop must have a unique Unit ID and operate at the same baud rate.
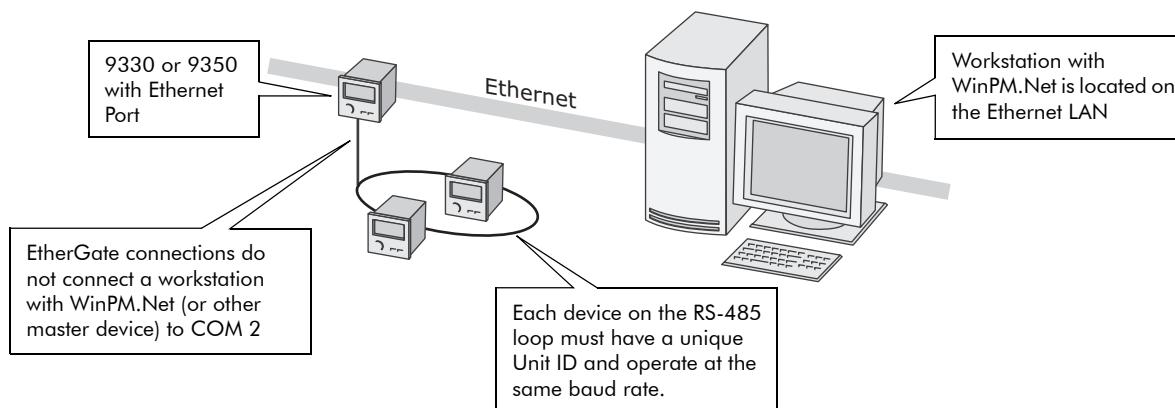
Once you have the chain of serial devices installed, use Designer or the meter's front panel to change the COM 1 or COM 2 *Protocol* setting to **EtherGate**. The transfer of data between protocols is then handled automatically.

The Devices list in the Management Console appears as follows:

The devices that reside on the RS-485 loop connected to the 9350.

The 9350 appears in the Devices list, because it must be configured as an Ethernet device before you can configure it as an Ethernet Gateway Site.

The Gateway Site - set the IP Service Port to 7802 for COM 2. The number following the IP Service Port number is the device's unique Unit ID.

From the Type heading in the Sites window, you can see the 9350 has been configured as an Ethernet Gateway Site.

Refer to the *EtherGate* technical note for complete details on configuring your meter for EtherGate.

Internal Modem Connections

This option is only available on the 9330 and 9350 meters.

Refer to the "Hardware Reference" chapter for internal modem specifications.
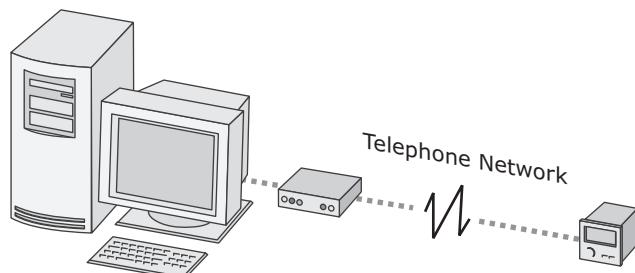
Connection to the internal modem is made via the RJ-11 jack, or two captured wire connectors, located on the right side of the meter. Connect the meter to the telephone network with an FCC Part 68 compliant telephone cord (that has two male RJ-11 plugs). If you have the captured wire connector option, connect the meter to the telephone system with the (bare wire to RJ-11) cable provided. If you have the CTR-21 compliant internal modem option, you may also require an adaptor to interface with your regional telephone jack.

The meter with an internal modem uses the modem to communicate to a master device (e.g. server computer with WinPM.Net software) over the telephone network.

Meter Setup for Modem Communications

To enable communications through the meter's internal modem, you must configure the Comm 1 Communications module. The *Baud Rate, Unit ID*, and *Protocol* setup registers must properly match your system, and the initialization string for the internal modem must be set up using the *ModemInit* register.

ModemInit Setup Register

The *ModemInit* string register defines the initialization string for the internal modem, with a maximum of 47 characters.

Edit the *ModemInit* register and enter the initialization string desired. The string is sent to the modem as soon as you download the COM 1 module. Note that the string is also sent to the modem whenever the meter is powered up, or whenever the baud rate in the Comm 1 Communications module is changed.

Any changes to the *Modem Init* or *Baud Rate* setup registers while the modem is online will cause the modem to disconnect from the phone line.

Modem Initialization String Examples

The modem supports various commands in the initialization string. The examples below are for use when the modem is used to receive incoming calls.

1. Enter the following string to force the modem to use the 1200 bps Bell 212A quick-connect (this ensures the modem will answer incoming calls and connect within nine seconds):

   AT&F0 +MS=69,0,1200,1200 \N0 S0=1

2. This string will set the modem back to its default state of connecting with the fastest possible baud rate between modems:

   AT&F0 S0=1

For any initialization string, it is recommended that the &F0 be at the beginning of the string.

After the meter is installed, and the internal modem is connected to the telephone network, the Comm 1 module can be configured; use the meter's front panel or with Designer software. To learn how to connect the internal modem to the telephone network, consult your meter's *Basic Setup and Installation Instructions*.

✎ NOTE

To learn what AT Commands are compatible with your meter, consult the technical note *Modem AT Commands.*

Configuring the Comm 1 Module through the Front Panel

1. From the SELECT SETUP menu, choose QUICK SETUP > COMM 1.

2. Configure the COMM 1 communications module *Baud Rate, Unit ID,* and *Protocol* setup registers to match your communications system.

3. Configure the initialization string for the internal modem using the *ModemInit* register. Refer to "ModemInit Setup Register" on page 113.

Configuring the Comm 1 Module via Designer

Before you can configure the Comm 1 module in Designer you must add the meter (with the internal modem) and a modem site to your WinPM.Net network.

Adding a Meter and a Modem Site to your WinPM.Net Network

In the Management Console, add the meter with the internal modem, and a modem site to your WinPM.Net network. Describe how your remote modem is wired and other communications information on the options screens.

On the Modem Site Options screen, be sure to include:

◆ The server computer that will communicate with the remote modem.

   Either before or after adding the Modem Site, you must add a dialout modem to the server computer. The server computer dialout modem communicates to the modem at the modem site. Refer to the *WinPM.Net Getting Started* guide to learn how to add a dialout modem.

◆ The remote modem telephone number.

Remote modem telephone number

Server computer that communicates with the remote modem. Ensure that the server computer dialout modem is configured.

Modem Site Options

Property	Value
Name	Remote_Modem_Site
Phone Number	250-652-7100
Enabled	Yes
Computer	Server_Computer
Baud Rate	9600
Description	Feeder_A_with_Internal_Modem

Configuring the Comm 1 Communications Module in Designer

Launch Designer, and configure the Comm 1 communications module *Baud Rate, Unit ID,* and *Protocol* setup registers to match your communications system. Configure the initialization string for the internal modem using the *ModemInit* register. Refer to "ModemInit Setup Register" on page 113.

The ModemGate Protocol

The ModemGate feature creates a communications connection between the telephone network and an RS-485 serial network of devices (loop or straight-line topology). When you specify the protocol for the meter's COM 1 port as MODEMGATE, all data received by the meter's internal modem is automatically transferred to the serial network.

ModemGate is only available for the 9330 and 9350 meters, and it is only configurable on the COM 1 port.

Workstation with WinPM.Net and modem

Telephone Network

Meter with an internal modem. The serial network is connected to COM 1.

Each device on the RS-485 loop, including the gateway meter's internal modem, must have a unique Unit ID number.
All serial devices must operate at the same baud rate as the gateway meter.
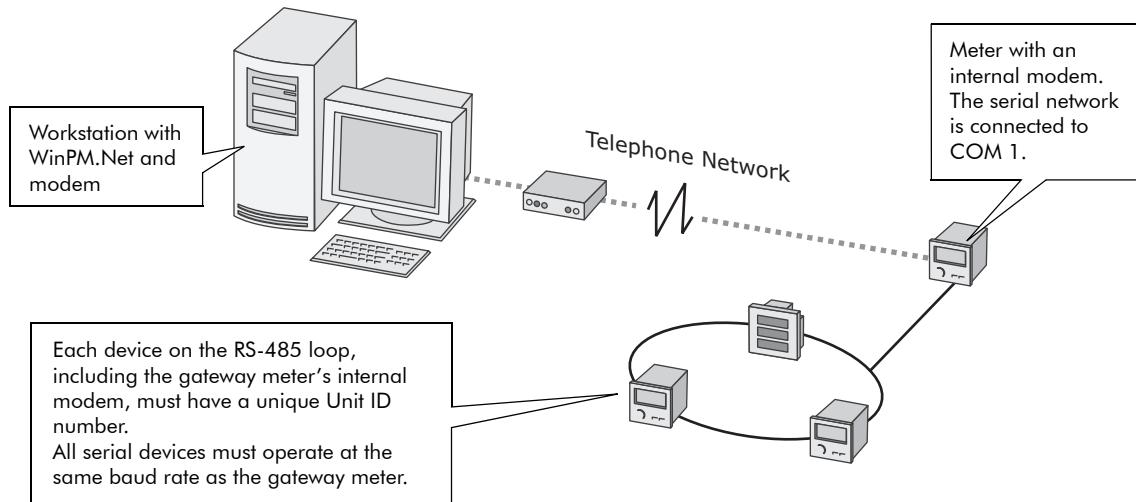
Wire an RS-485 connection between one or more meters and COM 1 of the
9330 or 9350 meter according to the wiring guidelines presented in the *Installation
and Basic Setup Guide.*

The 9350 with in-
ternal modem

The RS-485 device network
connected to the meter with
the internal modem.
The same RS-485 serial
protocol must be selected
for connections to multiple
devices along the same bus.

The Modem Site
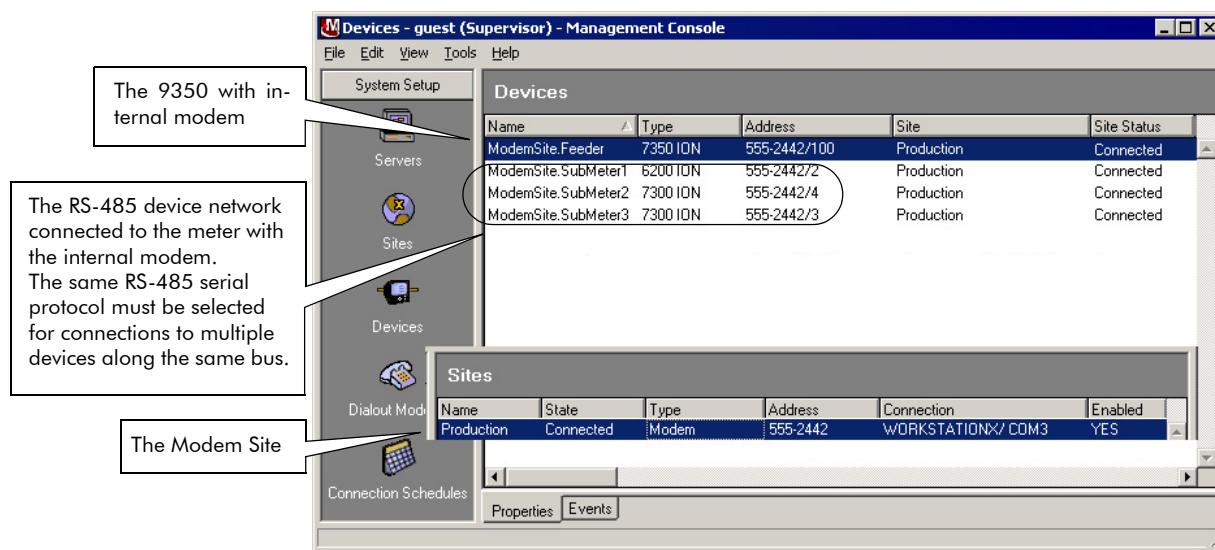
Refer to the *ModemGate* technical note for complete details on configuring your
meter for ModemGate.

Profibus Connections (9300)

📝 **NOTE**

The Profibus Master file (.GSD file) is included on a floppy disk with the meter. This file must be installed
on your Profibus Masters before the meter can communicate with the Profibus network.

The optional Profibus port on the meter is capable of operating baud rates up to 12
Mbps. Profibus Connections to the meter are made via the nine-pin connector on
the rear of the unit. Plug your Profibus connector from the network into this
connector.

**Profibus Female Connector
(located on meter)**
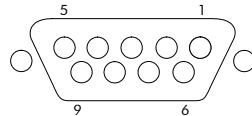
Pin Number	Profibus Function
1	N/A
2	N/A
3	B-line
4	RTS
5	Isolated GND
6	Isolated Vcc
7	N/A
8	A-line
9	N/A

Internet Connectivity

ACCESS meters provide Internet connectivity so you can receive meter emails, view realtime data, and configure your system through a web browser from anywhere in the world. Your ACCESS meter provides the following internet connectivity options:

◆ MeterM@il® feature (receive data logs and email alerts from the meter)

◆ WebMeter® feature (onboard web server allows you to view real-time data and configure the meter through a web browser)

◆ WebReach (view WinPM.Net system information through a web browser)

WebMeter and MeterM@il

The WebMeter feature provides real-time data display and system configuration of a meter over the Internet. The MeterM@il feature lets meters automatically transmit data by email to anyone, anytime, anywhere.

All 9300 Series meters provide WebMeter capability. 9330 and 9350 meters also support MeterM@il. The table below illustrates the features supported by different 9300 Series meters. The following sections provide WebMeter and MeterM@il details.

	WebMeter	Datalog Email	Email Alerts
9300	●		
9330	●	●	
9350	●	●	●

✎ **NOTE**

To enable WebMeter and MeterM@il features, the meter must have firmware v271 or later and an Ethernet card with firmware ETH73v271 or later. Firmware can be downloaded from www.sea.siemens.com. Refer to the technical note *Upgrading ION Device Firmware* to learn how to upgrade device firmware.

ACCESS WebMeter Feature

WebMeter-enabled meters have an on-board web server. Built-in web pages display certain energy and basic power quality information and also support basic meter configuration tasks. A meter with the WebMeter feature can be connected to your corporate Ethernet network like any other network device, and you can access it with a standard web browser like Internet Explorer.

Refer to the technical note *WebMeter Internal Web Server Feature* to learn how to:

◆ view your WebMeter data on the Internet

◆ configure your WebMeter-enabled meter

◆ set up your network for the WebMeter feature

◆ enable/disable web browser configuration of the meter (for 9300 Series meters, web browser configuration of the meter is enabled by default)

ACCESS MeterM@il Feature (9330 and 9350)

The MeterM@il feature allows your meter to send data logs as email attachments to a workstation, pager, cell phone, or PDA. In addition to the log export function, your meter can send email alerts.

Refer to the technical note *ACCESS MeterM@il Internal Email Server Feature* to learn how to:

◆ view MeterM@il data

◆ set up your network for the MeterM@il feature

◆ configure your meter to use the MeterM@il feature

    ◆ set up the meter for your SMTP Server

    ◆ set up the MeterM@il feature to send alerts

    ◆ set up the MeterM@il feature to send data logs

WebReach

WebReach allows you to remotely view WinPM.Net information through a web browser. WebReach requires a simple URL and no client machine configuration so you have the flexibility to view your data from a web browser anywhere in the world. With WebReach, you can view real-time data and select views of historical/waveform data. Currently, no configuration or control functions are available through WebReach. Refer to the online *WinPM.Net Help* for more details on WebReach.

Telnet and Hyperterminal

You can access certain Ethernet settings and statistics through a telnet application such as Microsoft Telnet. Similarly, you can use Windows HyperTerminal to access certain meter module settings. Use the following guidelines to determine which application you should use to access your meter:

◆ If your meter is connected to an Ethernet network, use a telnet application such as Microsoft Telnet.

◆ If your meter is connected serially or through a modem to your workstation, use a terminal application such as Windows HyperTerminal.

You can access certain Power Meter module and Factory module settings from both a Telnet session and HyperTerminal session. Both sessions also let you configure Factory module setup registers for Current Probe Input applications. Additionally, a Telnet session lets you view ethernet statistics and access certain Ethernet communications module settings.

Refer to the technical note *Telnet and HyperTerminal Access* for the appropriate application's menu options and connection instructions.

Digital and Analog I/O

Digital and analog I/O ports on ION meters let you bring a variety of data into a common system, thereby simplifying data gathering. The 9300 Series offers numerous digital and analog I/O combinations.

All series meters provide four digital (relay) output ports, one infrared data port, and one configurable LED output. The digital outputs are used as status outputs or for relay control. The infrared port can be used as a communications port, or it can be configured as a digital output for energy pulsing applications. The LED (L1) is used for energy pulsing. The 9330 and the 9350 meters also provide four digital (status) inputs. These optically isolated digital inputs can monitor status, count transducer pulses, breaker trips and pulses from any external "volts free" dry contact.

✎ NOTE

The LED (L1) is preconfigured for kWh pulsing, but it can be easily reconfigured to perform kVAh pulsing, kVARh pulsing or any other digital output function.

There is also an analog I/O option - four analog inputs and four analog outputs - that can be specified for any 9300 Series meter. These allow you to monitor a wide range of conditions, such as device cycles (RPM), flow rates, fuel levels, oil pressures and transformer temperatures. You can output energy pulses to an RTU or perform equipment control operations.

An optional external relay board (the REB option) is available with four external relays that connect to the onboard digital outputs. Several different types of digital output devices are available for use with the external relay board; refer to www.sea.siemens.com for the External I/O Output Device Part Summary.

Refer to the technical note *Digital and Analog I/O* for more information regarding digital and analog inputs and outputs than is provided in this User's Guide.

Specifying a Port In an ION Module

The Digital Output, Digital Input (9330 and 9350), Analog Output, Analog Input, Pulser, and Calibration Pulser modules have *Port* setup registers that allow you to specify which port handles the outgoing or incoming signals. To assign a port to one of these modules, simply modify the *Port* setup register by picking a port from the enumerated list. This can be done with both Designer and ION Setup.

Be aware that the enumerated list only displays those ports that are not yet assigned to another module. For example, the meter's default configuration has port L1 assigned to Calibration Pulser module "kWh imp LED." If you create a new Calibration module and modify its *Port* setup register, port L1 does not appear in the list of available ports. To make a port available, you must locate the module controlling it and set the module's *Port* setup register to NOT USED (or delete the module entirely). The port now appears in the list of available ports.

✎ **NOTE**

The IR LED capability is not available until you set the IR1 PROTOCOL register in the IR Comm module to INFRARED I/O.

The following table describes the ports that can be configured (in the Digital Output, Pulser, Digital Input, Analog Input, Analog Output, and Calibration Pulser modules) to handle outgoing or incoming signals.

All 9300 Series meters (9300, 9330 and 9350) have these digital output ports and optional analog input/output ports	
Output Port Names	**Description**
Port D1	Digital Output port 1
Port D2	Digital Output port 2
Port D3	Digital Output port 3
Port D4	Digital Output port 4
L1	LED Output
IR LED	Infrared LED Output
Port AO1	Analog Output port 1
Port AO2	Analog Output port 2
Port AO3	Analog Output port 3
Port AO4	Analog Output port 4
Input Port Names	**Description**
Port AI1	Analog Input port 1
Port AI2	Analog Input port 2
Port AI3	Analog Input port 3
Port AI4	Analog Input port 4
9330 and 9350 meters also include the following digital (status) input ports	
Input Port Names	**Description**
Port S1	Status Input port 1
Port S2	Status Input port 2
Port S3	Status Input port 3
Port S4	Status Input port 4

Using the Onboard Digital Outputs

The four digital output ports are located on the rear of the meter. ION Digital Output, Calibration Pulser, or Pulser modules control the function of the digital output ports. These modules define the characteristics of outgoing signals and can act as intermediaries between the hardware port and the other modules in the meter. Digital Output ports can be used to control relays or send status signals.

You configure Digital Output, Calibration Pulser, and Pulser modules by specifying to which hardware port they send signals. You are also responsible for the settings that define the type of pulses the modules send. Once you have configured the modules, they can be controlled by other ION modules that provide trigger outputs.

The following table summarizes the settings for these modules.

ION Module	Setup Registers	Available Settings	Default	Description
Calibration Pulser Module	Port	D1 to D4 or NOT USED	NOT USED	Specifies the output hardware channel
	Pulse Width	numeric	0.05	Pulse Width, in seconds
	Kt	0.01 to 1 x 109	1.8 Wh	Specifies Watts per pulse
	Output Mode	Pulse, KYZ	Pulse	Sets the type of output
	Int Mode	Forward, Reverse, Absolute, Net	Forward	Specifies the integration
Digital Output Module	Port	As above	NOT USED	See above
	Pulse Width	numeric	0	Pulse Width, in seconds (set to 0 for continuous pulse)
	Polarity	Fixed at NON-INVERTING	NON-Inverting	Specifies non-inverted pulse
	EvLog Mode	LOG ON or LOG OFF	LOG OFF	Specifies to store state changes in the Event Log
Pulser Module	Port	As above	NOT USED	See above
	PulseWidth	numeric	1	Pulse width, in seconds
	OutputMode	PULSE or KYZ	PULSE	Specifies full pulse or KYZ
	Polarity	Fixed at NON-INVERTING	NON-Inverting	Specifies non-inverted pulse

🖎 NOTE

Remember that if the port you want to use does not appear in the *Port* setup register's list, then that port is in use by another module. You must edit the *Port* setup register of the module using the port, setting it to NOT USED, if you want the port to be available to other modules.

Energy Pulsing

Five Calibration Pulser modules are preconfigured at the factory for energy pulsing applications. One of these modules is programmed to send kWh pulses to the LED on the back of the meter. The remaining four (configured for imported/exported kWh and kVARh pulsing) can be configured to send energy pulses to any digital output port. Edit the appropriate Calibration Pulser or Pulser module's *Port* setup register, and set it to the port you want to send the signal through (D1, D2, D3 or D4, or IR1).

LED Energy Pulsing

The LED port (L1) controls the LED on the back of the meter. This port is used for kWh pulsing by default; LED 1 on the back of the meter pulses every 1.8 Wh. If you wish to configure the LED for other energy pulsing applications (i.e. kVAh, kVARh), you must first disable the default kWh pulsing. Use the front panel to disable kWh pulsing as follows:

1. From the SELECT SETUP menu, choose ADV METER SETUP > CALIBRATION PULSER MODULES > KWH IMP LED, and highlight the *Port* setup register and press the round button.

2. From the list of available ports, select NOT USED.

These steps remove control of the L1 LED from the kWh IMP LED module. You can also disable the kWh pulsing using Designer. Select the kWh imp LED Calibration Pulser module and disable L1 by setting the *Port* setup register to NOT USED.

Configuring Other Energy Pulsing Applications

Now that you have the L1 port free to assign a pulse to, you can assign other Pulser, Digital Output, or Calibration Pulser modules to it. Using the front panel, assign a Pulser module as follows:

1. From SELECT SETUP choose ADV METER SETUP, then select the new module type and the module you wish to use for pulsing the LED.

2. Scroll down and select the *Port* (e.g. PU2) setup register, then choose L1.

You can also configure LED energy pulsing from Designer. Select the Digital Output, Pulser, or Calibration Pulser module you wish to use and set its *Port* setup register to L1.

Using the Relay Expansion Board (REB Option)

The REB option (Relay Expansion Board) allows for custom digital output applications using specific Grayhill relay units. The REB option provides four slots where you can plug Grayhill digital output hardware modules. There are nine Grayhill hardware modules of varying functionality available. The relays are purchased separately.

As with onboard digital outputs, the Pulser, Calibration Pulser, and Digital Output modules can be used to control the functions of the external relays. Set the module's *Port* setup register to the digital output port (D1 to D4) that the relay is connected to.

Using the Onboard Digital Inputs

The 9330 and the 9350 meters' four onboard digital (status) inputs can be used for monitoring external contacts or pulse counting applications. These inputs can be used for dry contact sensing, but they cannot be used for voltage sensing applications.

The function of each digital input is controlled by the Digital Input modules S1 through S4. These modules are preconfigured at the factory, together with four Counter modules for counting status changes, and an External Pulse module for resetting the Counter modules.

The four Digital Input modules are factory configured as follows (refer to the online *ION Programmer's Reference* for complete details on module function):

Setup Register	Factory Setting
Input Mode	Pulse (complete pulse as opposed to KYZ transition pulse)
Event Log Mode	Log Off (status changes are not logged)
Polarity	Inverting (hardware signal is inverted)
Debounce	0.010 (mechanical contact bounce, in seconds)
Port	S1 to S4 (specifies which hardware port the module controls)

Once you have connected the status inputs to the field equipment they are going to monitor, check the meter's Digital Input modules to ensure they are configured appropriately.

Using the Optional Analog Inputs

The four optional Analog Input ports allow you to monitor a wide range of conditions, such as device cycles (RPM), flow rates, fuel levels, oil pressures and transformer temperatures. Both types of Analog Inputs (either 0-20mA or 0-1mA) are suitable for monitoring DC signals from transducers in your system. Analog Input modules control the analog input ports.

You use Designer to create and configure Analog Input modules. Set the Analog Input module's *Port* setup register to the appropriate analog input port on the rear of the meter. Link the Analog Input module's *ScaledValu* output to another module or framework for analysis.

✎ **NOTE**

Your meter's default template may already have a framework of pre-configured Analog Input and Analog Output modules.

The settings for Analog Input modules are as follows:

Setup Registers	Available Settings	Creation Default	Description
Port	Not Used I/O Exp AI1 to I/O Exp AI4	Not Used	The input hardware channel
Full Scale	-1×10^9 to 1×10^9	1	Defines what value appears in the ScaledValu output register when the highest possible value from the hardware is applied
Zero Scale [1]	-1×10^9 to 1×10^9	0	Defines what value appears in the ScaledValu output register when the lowest possible value from the hardware is applied

[1] An arbitrary input value can be treated as the Zero Scale (i.e. a 4-20mA input is capable of generating a 0 to X output).

Using the Optional Analog Outputs

The four optional Analog Output ports can output energy pulses to an RTU or perform equipment control operations. Both types of Analog Output (either 0-20mA or 0-1mA) can deliver a continuous DC signal. Analog Output modules control these hardware ports.

You use ION Designer to create and configure these ION modules. Create an Analog Output module for each output port you are going to use, and link their *Source* input to a value you want to reflect through the analog outputs. Alter the setup registers as required:

Setup Registers	Available Settings	Creation Default	Description
Port	Not Used I/O AO1 to I/O AO4 inclusive	Not Used	The output hardware channel
Full Scale	-1×10^9 to 1×10^9	1	Defines what value appears in the ScaledValu output register when the highest possible value from the hardware is applied
Zero Scale	-1×10^9 to 1×10^9	0	Defines what value appears in the ScaledValu output register when the lowest possible value from the hardware is applied

Setting Zero Scale for 4 to 20mA Outputs

If you want your 9300 meter's 0 to 20 mA analog output ports to operate as 4 to 20 mA outputs (i.e. delivers a 4 mA current with a zero *Source* input value to the Analog Output module), use the following formula:

Zero Scale = - 0.25 * Full Scale

For example, with a *Full Scale* value of 100, your *Zero Scale* setting would be -25.

Data and Event Logging

The meter includes powerful data logging (9330 and 9350 meters only) and event recording capabilities. Data and event logs recorded by the meter are prioritized and stored onboard. Data is retrieved periodically by the WinPM.Net software Log Server (or other third party application).

If you use WinPM.Net software, all retrieved data from your system is stored in an ODBC-compliant database. The information in the database can be viewed and analyzed using WinPM.Net software applications such as Vista (for viewing), or Reporter (for organizing and presenting data).

Data Logging (9330 and 9350)

The standard configuration of the meter includes data recorders that log various power system data such as energy and demand, or the average power system quantity used over a period of time (Historic Mean Log). The 9350 also logs sags and swells in voltage.

Reporting

The Data Recorder module labeled EGY DMD LOG is configured to provide power system data for Reporter software to create reports from the device's logs. If any input links to this module are changed, Reporter will not be able to create reports. If you use the Reporter software, do not change the parameters that are logged in the Egy Dmd Log.

Revenue Logging

For the revenue meter option, Data Recorder #1 is locked, so channels must be specified prior to the meter being sealed. Refer to RMICAN Ordering Sheet on our website for your particular meter.

📝 NOTE

For compatibility with the UTS MV-90 billing software, Data Recorder #1 must be configured as a 16-channel recorder.

To learn more about the data recorder modules in your meter, refer to *ION Device Templates* at www.sea.siemens.com. ION Device Templates located at www.sea.siemens.com lists all of the ION modules available in the current version of your meter, and the total number of each module. ION Device Templates also shows the ranges or options available for each module's setup registers.

Changing Parameters that are Logged

The factory-configured meter logs a comprehensive set of parameters. Adding or deleting log parameters is an advanced procedure that requires changing links between modules using Designer software.

Once you are comfortable editing module links, change logged parameters by linking the output registers you want logged to the inputs of an ION Data Recorder module.

Event Logging

Events produced by the various ION modules in the meter are prioritized and grouped to facilitate custom logging. Each event has a priority group number assigned to it, based on its type and severity.

ION Event Priority Groups

Some event groups are preset with a Priority Number as shown in the table below. You can also define your own priority number for some modules. Priority numbers from 128-191 appear in the global even log viewer in WinPM.Net software. Priority numbers from 192-255 are logged, initiate a beep and cause the window to flash. You can customize these responses to display messages or perform *netsend* messages, for example.

The Event Log Controller module allows you to set a priority cutoff for event logging. Any events with a priority number greater than the cutoff value are logged, and events with lower priorities are discarded. Refer to the individual module descriptions and the Event Log Controller module description in the online *ION Programmer's Reference* for more details.

Event Group	Description	Priority Number
Reset	Module reset or resynchronized	5
Setup Change	Module setup changes	10
Input Register Change	Inputs of certain modules change value	15
I/O State Change	I/O state changes (i.e. relay closes)	20
Information	Module produces important user information	25
Warning	Module produces a warning	30
Failure	A failure has occurred	255

External ION Events

Some events are not produced by a specific module; they are generated internally by the meter. These events and their associated priority levels are as follows:.

Event Group	Description	Priority Number
Warning	Factory initialize performed	30
	Firmware upgrade performed	
	Memory upgrade performed	
	Device power-up	
	Device power-down	
Failure	Communications fail to allocate required memory	255

Logging and Recording Capacity

Data and Event Logging (9330 and 9350)

The standard memory capacity for both meters is 304 kilobytes of non-volatile memory. This is enough memory to log 16 parameters every 15 minutes for 30 days. However, by default the meter is set for a log depth of 930, which is enough for 9 days. Use the following equation to help determine different variations on this example:

each record consumes = ((number of parameters * 6) + 8)

Waveform Recording (9350)

The meter can simultaneously capture events on all channels to a maximum of 48 cycles each. To calculate the waveform memory usage use the following formula:

waveform memory usage = (2*(number of samples per cycle) + 10)*(number of cycles in waveform) + 30

See the following table.

Format	Memory Usage	Page Usage
16 x 22	1024 x M[1]	1 x M
16 x 48	2048 x M	2 x M
16 x 72	3072 x M	3 x M
16 x 96	4096 x M	4 x M
32 x 12	1024 x M	1 x M
32 x 26	2048 x M	2 x M
32 x 40	3072 x M	3 x M
32 x 54	4096 x M	4 x M
64 x 14	2048 x M	2 x M
64 x 28	4096 x M	4 x M
128 x 14	4096 x M	4 x M

[1] M = Recorder depth

📝 NOTE

Round up to the next kilobyte (1024 bytes) after each of the above calculations.

Time Synchronization

Time synchronization lets you synchronize the internal clocks of all networked meters and devices. Once synchronized, all data logs have timestamps that are relative to a uniform time base. This allows you to achieve precise sequence-of-events and power quality analyses. To synchronize clocks, use ACCESS software to broadcast time signals across the network.

Refer to the technical note *Time Synchronization and Timekeeping* for more information on implementing time synchronization for your system.

Enabling or Customizing Time Synchronization

1. Launch the Management Console.

2. From the System Setup Pane, select Sites or Devices.

    Select Sites if you want to customize a particular serial, modem, or Ethernet Gateway site.

    Select Devices if you want to customize an individual Ethernet device.

3. Right-click in the main window and select Properties.

4. Right-click inside the display window and select Advanced Properties.

The fields for enabling or customizing time synchronization are shown below.

These fields appear in the Devices Advanced Properties screen for Ethernet devices. Serial devices are configured via the Serial Site advanced properties.

Use these fields on the Site Advanced Properties screen to enable time synchronization or set custom intervals for any device in any Serial Site or Ethernet Gateway Site.
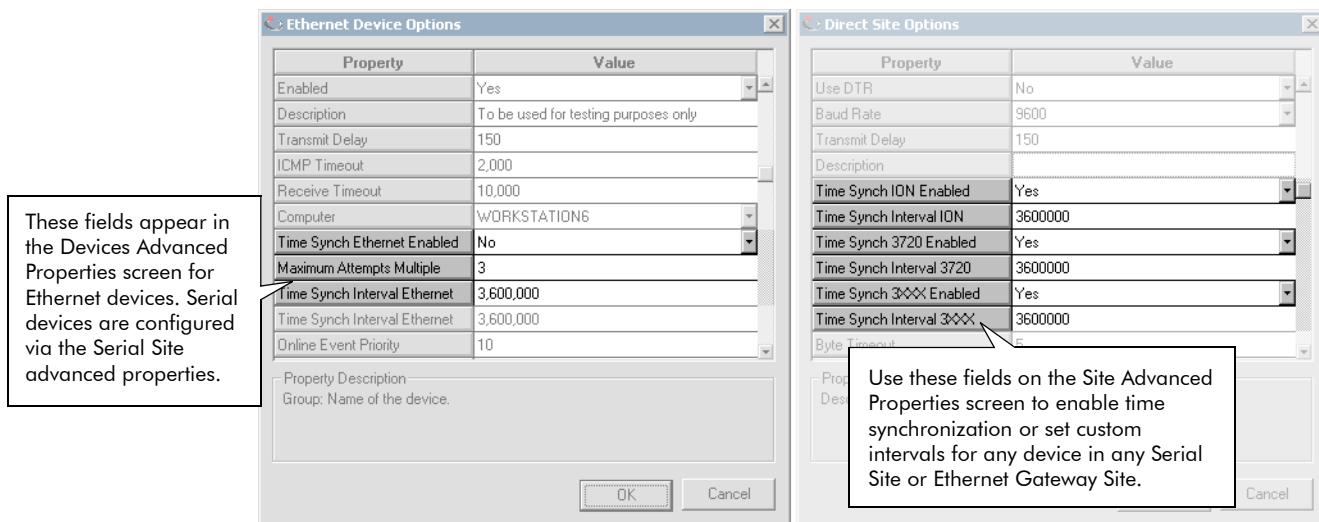
The Property Description area explains the purpose for each field. The default time synchronization interval of 3,600 seconds (displayed in milliseconds) is acceptable for most ION installations.

🖎 NOTE

You need appropriate permissions to configure the meters on your network. Refer to the technical note *ION Security* for details on software and meter security.

Meter Security

The meter's security settings allow you to configure the meter through the front panel, with ACCESS software, or with the optional embedded web server.

Standard meter security

Anytime you make configuration changes to your meter, either through the front panel or with ION software, you must enter a password.

Anti-tamper sealing

Your revenue meter can be protected by anti-tamper sealing.

Software security

ACCESS software security brings access-level security to the meter. With ACCESS software, you can configure multiple users with different passwords and specify access rights. For example, one user may have view-only rights, while another user may have meter configuration rights. ACCESS software security only applies to users who are accessing the meter via ION software.

For more information on meter security, refer to the *ION Security* technical note in Appendix A.

Standard Meter Security

Standard meter security lets you configure the meter through the front panel or with communications software using a meter password.

This section describes password security options available from the front panel of the meter. Step-by-step instructions are given to help you enter, or change the meter password and disable (enable) the password security check on the front panel of the meter.

Entering the Password through the Front Panel

The first time you make a change to any setting you are presented with the Password display. The factory configured password is zero (0). The password prevents unauthorized tampering with your meter's configuration. Depending on site security, you may want to modify the user password from the default to protect your configuration. The default password is "00000" and can be set to a maximum numeric value of 60000.
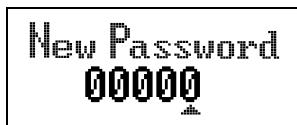
New Password
00000

Changing the Meter Password

1. Select SECURITY from the Setup menu.

2. You will see that the screen displays 00000. Enter the current password. If you have not previously changed your password, the default is 00000.

3. Choose MODIFY PASSWORD to alter your password (the FACTORY USE ONLY option is for factory purposes and is not accessible).

4. Enter your new numeric password.

    ◆ To change the value of the highlighted digit use the **Up** and **Down** arrow buttons.

    ◆ To change the position of the cursor one space to the *left*, hold the **Up** arrow button for about one second.

    ◆ To change the position of the cursor one space to the *right*, hold the **Down** arrow button for about one second.

5. Select YES to accept your new password. You will be returned to the Setup menu.

Residual Current Calculation (I4)

The Power Meter module provides an output register labeled "I4" which holds the residual current value, derived from the three phase current measurements. As such, I4 represents the ground fault current, or the current flow in the neutral or ground conductor.

This quantity is only available when the meter's *Volts Mode* is set to 4-WIRE WYE. If the Power Meter module is set to any other *Volts Mode*, the I4 output will read NOT AVAILABLE.

Alerting

The purpose of an ION alert system is to send an email or to contact a modem, fax, pager, or software in the event of a user-specified condition. These conditions can be changes in relays or power quality problems including surges, sags, swells and outages. With ION alarm notification, you can automatically advise key people of problems allowing quick remedial action, or notify ACCESS software so logs can be uploaded from the site that initiated the alert.

The Alert module sends an alert whenever its *Trigger* input is pulsed. You can connect this input to any module that produces a pulse output. You can use modules that monitor alarm conditions such as changes in relay status and power quality problems. For example, you can connect the *Trigger* input to the output of a Setpoint module, thereby allowing the Alert module to send an alert when the setpoint condition is reached.

The Alert module delivers these types of alerts:

◆ Numeric Pager

◆ Alphanumeric Pager

◆ PEGASYS (for alerts to PEGASYS software)

◆ ION Alert (for alerts to WinPM.Net software)

◆ ASCII

◆ Email

Selection between modes is made with the Alert module *Alert Type* setup register.

The Alert module requires access to either a modem (a dedicated modem or a modem handling a loop of meters) or Ethernet (for the Alert module email capabilities).

Alerting is briefly described in the following section. For detailed information about alerting, including how to build a framework to send alerts, refer to the Alert module description in the online *ION Programmer's Reference.*

Alerting ION Software via the Alarm Server

> ✎ **NOTE**
>
> For detailed information about sending alerts to WinPM.Net software via the Alarm Server, refer to the WinPM.Net online help.

The Alarm Server can run on any ACCESS software Primary or Secondary server. The server computer should have a dedicated phone line and modem. Modems at remote sites are programmed to dial the server's phone number when a priority event occurs. The Alarm Server monitors the phone line and waits for the remote sites to annunciate events. The most common use of the Alarm Server is to handle Remote Site Event Notification.

Remote Site Event Notification

Server or LAN

Alarm Server.exe

Connection Manager

Dedicated Alarm Server Modem

Any Dialout Modem

Modem Site

1. Remote Site informs the Alarm Server that a priority message exists

2. Server computer receives the alarm

3. Communication Services contact the modem site and retrieve priority messages
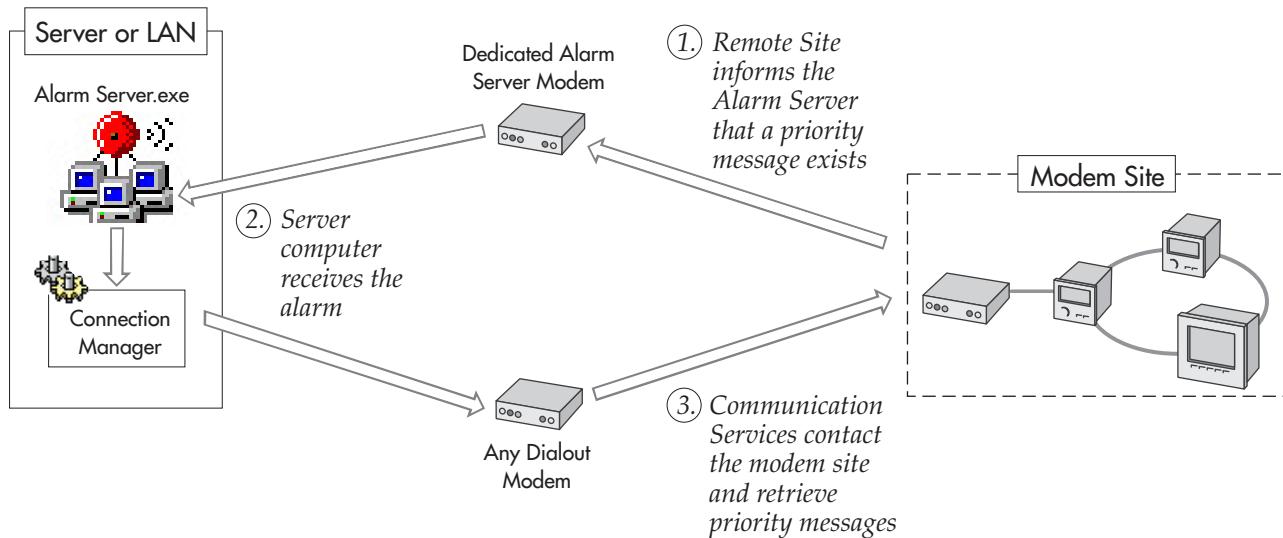
The Alarm Server uses a series of command line arguments to specify the actions it takes when a priority event is reported. These commands must be entered on the computer that is running the Alarm Server utility. Typically the Alarm Server is configured to launch the Connection Manager, which dials up the remote site and retrieves the logs from the devices. The Alarm Server can also be configured to launch other applications. A series of parameter switches are added to the command line to pass information about the event to the application that is launched.

Configuring the Alarm Server

The Alarm Server should have a dedicated phone line, modem, and COM port to avoid conflicts with other ACCESS software components.

The modem used by the Alarm Server is **not** configured with the Management Console– only dialout modems are configured in the Management Console. The Alarm Server's executable, alarmsrv.exe, is typically located in \\Siemens\WinPM.Net\SYSTEM\bin. You can run the Alarm Server in a console window, or you can define a shortcut icon that includes all of the command line arguments required.

Alarm Server Command Line Arguments

Refer to the WinPM.Net online help for a list of command lines that the Alarm Server supports.

Alerting via an Alphanumeric Pager

> ✎ **NOTE**
>
> For detailed information about building a framework for alerting via an alphanumeric pager, refer to the Alert module description in the online *ION Programmer's Reference.*

If an alphanumeric pager is specified as the destination address in the Alert module, then an alphanumeric paging service, such as BC Tel Mobility, receives a message from the ION meter.

Once the modem at the paging service is contacted, the ION meter transmits the following information:

◆ Pager identification number

◆ Local time (year, month, date, hours, minutes, seconds)

◆ Remote site identification

◆ Priority of the alarm

◆ Alert message, with text strings and realtime measured values

To include a module's *Source* input in the message, reference the message string by using the form %Vn, where n is the *Source* input number. In the following *Message* register setting, the kWtot value is %V1. The string includes *Source* input 1 which would be the kWtot register from the Power Meter module.

The destination register contains your modem access number for the paging service provider and is what is dialed out first. The *Pager Num* register is the pager access number that is provided by your paging company.

Alerting via a Numeric Pager

> ✎ **NOTE**
>
> For detailed information about building a framework for alerting via a numeric pager, refer to the Alert module description in the online *ION Programmer's Reference.*

If a numeric pager is specified as the destination address in the Alert module, then a numeric paging service receives a message from the ION meter. Due to the inherent limitations in numeric paging, the ION meter can only send a string of digits to the paging service. The Alert module then waits a specified time, determined by the number of commas inserted after the phone number in the *Pager Num* setup register. Finally, the Alert module dials the message digital string.

There are two important factors to consider when setting up the Alert module for numeric paging. First, be sure to specify a string of digits that is meaningful to you, such as a coded message. Second, be aware that there is no way to assure that a message has been successfully transmitted. Instead, there may be a busy signal or an answering machine may take the call. The number of commas you add to your dial string is an estimate of how long the modem at the remote site waits before it transmits numbers.

> ✎ **NOTE**
>
> In the following destination-setting example: 1-250-555-666,,,,,999#, the pager number is 1-250-555-666 and the message string that displays on the pager is 999. You may need to insert 9,,, before the destination number if the line you are using is not a direct line. In this case the destination number is 9,,1-250-555-666,,999#

Alerting via Email (9330 and 9350)

> ✎ **NOTE**
>
> For detailed information about setting up your network and building a framework for meter email (MeterM@il) alerts, refer to the technical note *ION MeterM@il.*

If email is specified as the destination address in the Alert module then an email message is sent to any address you specify. You can only set one email address per Alert module. If you want to send an alert to more than one email address you need to create a group — be sure your email server is configured to send email to groups via SMTP (Simple Message Transport Protocol).

Follow the steps below to send email alerts from your meter. Note that your meter must support emailing (with a correctly configured SMTP server):

1. Create an Alert module.

2. Configure these Alert module setup registers as indicated:

   ◆ *Message* – type in the text of the alert to be emailed.

   ◆ *Destination* – type in the destination email address.

   ◆ *Type* – select Email.

   ◆ *Com Port* – select Ethernet.

   ◆ *Location* – type in a custom string; this is optional, and appears in the email.

   ◆ *Email From* – type in an address that you want the email to appear from. This may be required as some SMTP servers only accept emails from valid addresses.

3. Create an ION module that will produce a pulse on its *Trigger* output when the exceptional event occurs (for example, a Setpoint module pulses its *Trigger* output when the setpoint condition is reached).

4. Link the Alert module's *Trigger* input to the *Trigger* output of the module created in step 3.

5. Send and save. When the *Trigger* input is pulsed, the Alert module establishes communications with the SMTP mail server, and emails the alert message.

6   Revenue Metering

This chapter provides an overview of the 9300 Series revenue meters.

In This Chapter

9300 Series Revenue Meters

The fundamental functions of a revenue meter are to provide measurements that are within industry-accepted limits for accuracy over a defined range of operating conditions and to provide adequate protection against unauthorized alteration of these measured quantities. International and national standards define industry-accepted accuracy limits. National and utility-based standards regulate protection against unauthorized alteration of measured quantities.

Revenue Meter Models

Two revenue meter models are available; each model is designated by the certification it holds.

Model	Certification Achievement	Current Inputs	Revenue Metering Security Systems
RMICAN (unsealed)	Canadian Revenue Metering Standards	Rated for 0.1 Amps to 10 Amps AC	Enabled
RMANSI (unsealed)	Complies with the accuracy requirements of the ANSI C12.16 Revenue Metering Standard	Rated for 0.1 Amps to 10 Amps AC	Enabled

Revenue Meter Options

The RMSEAL option provides a factory installed anti-tamper mechanical seal on the base unit. This option is only available with the RMICAN meter model.

Differences between Standard and Revenue Models

The revenue meter differs from the standard (non-revenue) meter – additional modules for revenue calculations and new energy output register labels have been added to the revenue meter firmware.

Revenue Meter Energy Register Labels

The revenue and non-revenue meters differ in how they label energy flow: standard (non-revenue) meters use the terms "imported" and "exported" energy, whereas the revenue meters use the terms "delivered" and "received" energy.
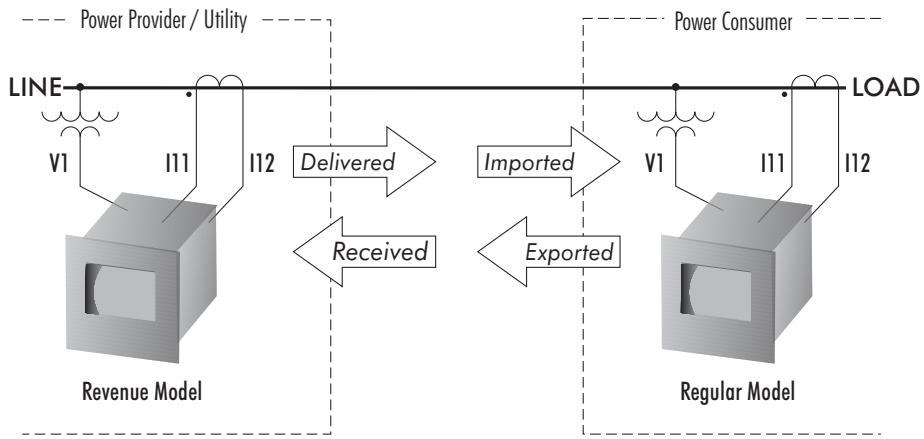
The revenue meter's energy output register labels follow the revenue metering terminology; the energy labels for kVAh, kVARh and kWh are different from the non-revenue devices as follows:

◆ imp is del   ◆ tot is del+rec

◆ exp is rec   ◆ net is del-rec

For example, the meter's output register *kVARh tot* will be *kVARh del+rec* in the revenue meter model.

Additional Revenue Metering Modules

There are additional modules incorporated into the template of the revenue meter. Some of these modules are used in the calculation and logging of both V^2h and I^2h (used for transformer and line loss compensation).

Security Mechanisms

To meet Government regulations and Utility security requirements, the revenue meter incorporates three types of security systems:

◆ a traditional anti-tamper mechanical seal on the meter base unit

◆ a password-based security system that permits password protected minimum/maximum resets (for example, Sliding Window Demand reset)

◆ a hardware-based security system that prevents modification of revenue quantities after the meter is sealed

Anti-Tamper Seals

The revenue meter incorporates one or two sealing cans through which traditional lead/wire seals can be inserted. When utilized, these lead/wire seals effectively prevent unauthorized personnel from gaining access to meter internals. These seals are provided with the meter, and are installed as follows:

1. Place the sealing can over one of the rear panel corner holes and insert the screw into the hole through the sealing can.

2. Insert the ball bearing into the sealing can over the head of the screw. Install the wire through the two holes in the sealing can.
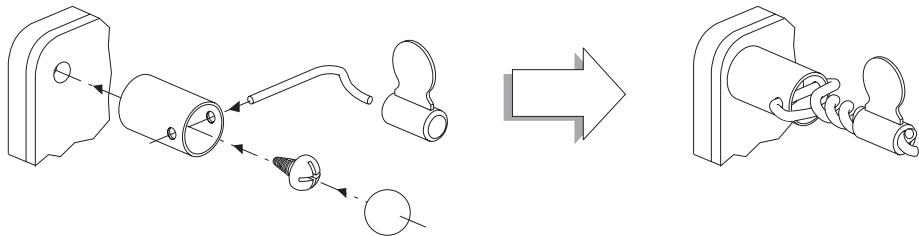
3. Twist the wire and crimp the lead-sealing tab onto the wire.

Password Protected Min/Max Register Resets

The meter front panel incorporates a password that must be entered in order to reset any of the minimum/maximum register values. The password must therefore be used to reset peak demand register values.

Hardware-based Security

The revenue meter is equipped with a comprehensive security system that provides protection against unauthorized alteration or tampering of revenue-related quantities. This security system locks all revenue-related ION modules, ION links and ION setup-registers. Basic meter configuration parameters including volts mode (service-type), PT ratio, and CT ratio are locked. These locks are automatically enabled (at the factory) for all sealed revenue meters. Typical values that are protected include:

◆ kWh, kVARh, kVAh delivered, received, del-rec, del+rec

◆ kW, kVAR, kVA Thermal and Sliding Window demand min and max values

◆ Digital Outputs controlling the energy pulsing applications

◆ All Power system settings, including PT an CT ratios

A two-pin jumper block is used to enable and disable the hardware security as described in the next section.

Configuring the Revenue Meter

When enabled, the revenue meter security system prevents unauthorized alteration of revenue-related quantities. By default, all revenue meters are shipped from the factory with the security system enabled. You can temporarily disable the security to configure your revenue meter. This is done by removing the meter's back plate, and placing a jumper into the meter.

Before Disassembling the Meter

Before attempting to remove the back plate of the revenue meter, ensure that the device is protected against static-electric discharge. To prevent damage to the unit, wear an anti-static wrist strap at all times.

⚠ **DANGER**

During normal operation of the 7350 ION, hazardous voltages are present which can cause severe injury or death. These voltages are present on the terminal strips of the device and throughout the connected potential transformer (PT), current transformer (CT), status input, relay, and control power circuits. Installation and servicing should be performed only by qualified, properly trained personnel.

1. Open all PT fuses (or direct voltage input fuses) and close all CT shorting blocks.

2. Turn off all power to the revenue meter and disconnect the Line and Neutral (or DC power) wires from the Supply Power inputs to the unit.

3. Disconnect all other wiring (or power off all other circuits) that may present potentially hazardous voltage levels to the unit, such as connections to the relay outputs.

4. Ensure that all cables still connected to the revenue meter are **NOT** live.

Inserting the Key

In order to configure the revenue meter, ensure that adequate safety precautions have been exercised as above.

⚠ **CAUTION**

The components inside the 7350 ION-RM are extremely sensitive to electro-static discharge. To prevent damage to the unit, wear an anti-static wrist strap at all times when working inside the unit. Failure to use proper equipment during servicing will void the 7350 ION-RM warranty.

1. Remove the thumbscrews and retainer bars from the unit.

2. Remove the anti-tamper wire seal and four screws on the rear panel.

3. Slide out the rear plate of the device to reveal the unit's circuit board panels.

4. Locate the two-pin jumper header labeled "J1" on the communications card.
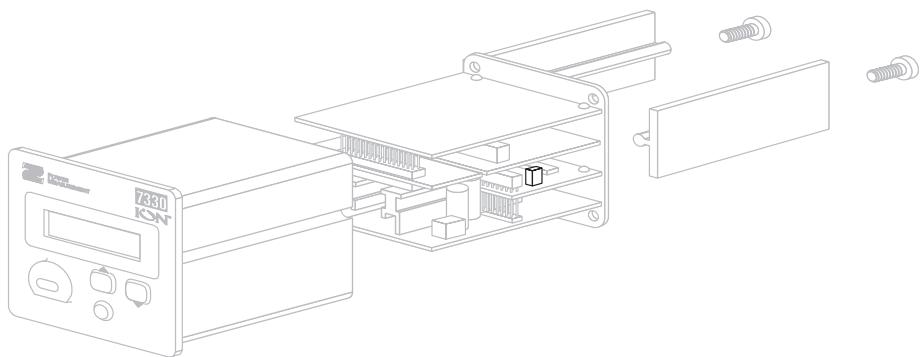
5.	Place the jumper block on to the J1 two-pin header (this disables the hardware based security). Slide the rear plate back into the device and replace the four screws onto the real panel. Apply Control power to the revenue meter.

6.	Configure the meter (e.g. Volts mode, PT and CT ratios, Pulse outputs).

7.	Remove control power from the revenue meter.

8.	Slide the rear plate out and remove the jumper block from the two-pin header to re-enable the hardware-based security.

9.	Replace the rear plate and re-apply the anti-tamper seals.

CT & PT Selection

Consult your local Revenue Metering authorities to obtain standards for CT and PT selection for revenue metering applications in your region.

7

Hardware Reference

This chapter is intended to provide quick, at-a-glance, technical specifications for the more common hardware features of the 9300 Series meter. Not all specifications are included. All specifications are subject to change without notice. For the most recent information see the *9300 Series Meter Datasheet*.

In This Chapter

Standard Model

Rear View ot Meter

Current Inputs
see page 156

Digital Ports
see page 153

Communications
see page 145

V+ (Max. 30V)

Relays

Voltage Inputs
see page 155

Power Supply
see page 155

General Specifications

Environmental Conditions

To operate properly and effectively, environmental conditions should fall within the guidelines listed below.

Environmental Condition	Acceptable Range
Operating Temperature	Base Unit: -20°C (-4°F) to 60°C (140°F)
Storage Temperature	-30°C (-22°F) to +85°C (185°F)
Relative Humidity	5% to 95% RH non-condensing
Altitude	Less than 2,000m (6,100ft) above sea level

Unit Dimensions

Basic Model Dimensions

96mm (3.78")
96mm (3.78")
86 mm (3.39")
162.2 mm (6.39")

Ethernet Port Location

72.8 mm (2.87")
16.8 mm (0.66")
14.2 mm (0.56")
57.4 mm (2.26")
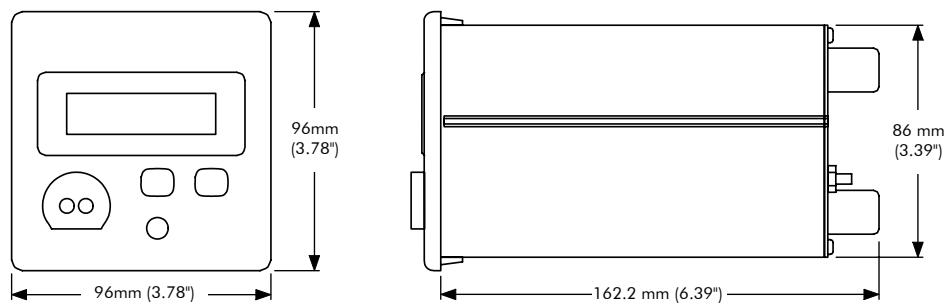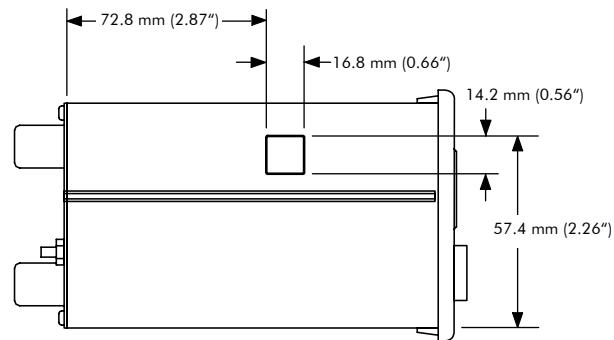
Internal Modem Port Location

14.3 mm (0.56")
13.4 mm (0.53")
30.8 mm (1.21")
33.8 mm (1.33")
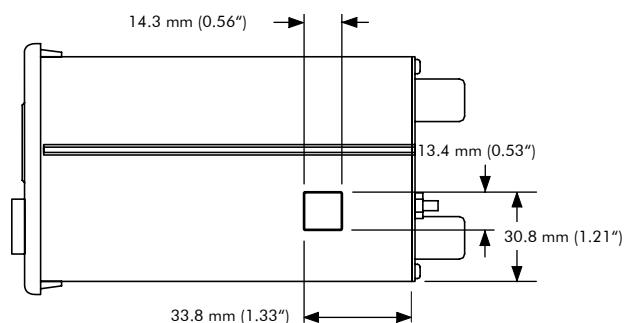
Communications Specifications

Rear View of Meter
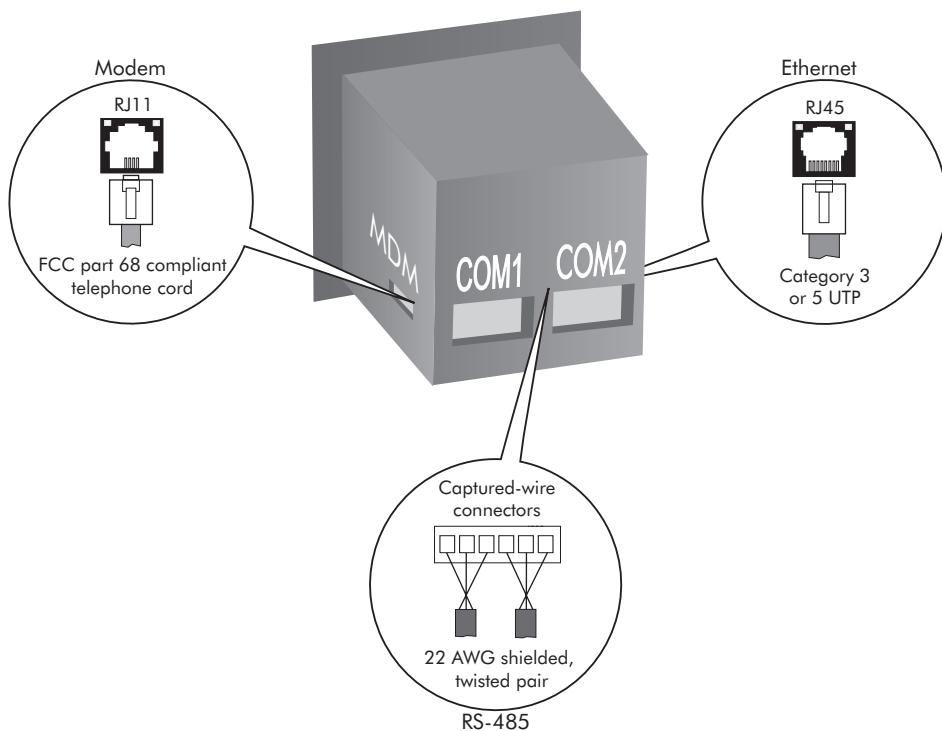
NOTE

The Profibus meter option on the 9300 meter does not use a COM port.

The following table indicates which COM ports are available for each model.

Model	COM1	COM2	COM3	Ethernet	EtherGate	Modem	ModemGate
9300	●		●	●			
9330	●	●	●	●	●	●	●
9350	●	●	●	●	●	●	●

Co-existing Hardware Options on the Meter

These are the hardware ordering options that can (and cannot) exist together on the same meter.

	Profibus	Ethernet	Modem	Digital Inputs	Digital Outputs	Analog I/O
Profibus		No	Yes	No	Yes	No
Ethernet	No		Yes	Yes	Yes	No
Modem	Yes	Yes		Yes	Yes	Yes
Digital Inputs	No	Yes	Yes		Yes	Yes
Analog I/O	No	No	Yes	Yes	Yes	

COM1 Port

COM1 is used for RS-485 communications. If you have the ModemGate option on your meter, COM1 will automatically be set to ModemGate, not RS-485.

📓 **NOTE**

The internal modem option is hardwired to COM1. If you are using ModemGate, then any meter with an internal modem that will reside on the serial loop must connect to the serial loop using COM2. If COM1 is used, then the two modems (gated meter internal modem and serially looped meter internal modem) conflict during communication.

RS-485 Connections

RS-485 connections are made via the captured-wire connectors on the rear of the meter. Devices can be connected in series using RS-485 (see diagram to the left). Be sure not to ground the wires at both ends.

The specifications for RS-485 communications are as follows:

Specification	Value
Baud Rates	Up to 19,200 bps (default is 9,600 bps)
Duplex	Half
Supported Protocols	ION (default), Modbus RTU, DNP 3.0, EtherGate (COM2), ModemGate (COM1), and Factory
Isolation	Optical isolation from all other inputs and outputs

Connections

Specification	Description
Cable Type	Good quality shielded twisted pair cable, AWG 22 or larger.
Max. Cable Length	4,000 ft. (1,219 m) [1]
Max. number of devices per bus	32

[1] The lengths of all (+ and –) cable segments must be counted including those that connect devices to terminal blocks.

Terminal connections on the meter are marked as follows:

Marking	Terminal Function
SH	RS-485 Shield (electrically connected to chassis ground)
+	RS-485 Data Plus
-	RS-485 Data Minus

COM 2 Port

COM 2 is used for RS-485 communications and can be configured as an EtherGate.

RS-485 Connections

The specifications for RS-485 communications on COM 2 are the same as those for COM 1.

📝 **NOTE**

On 9330 and 9350 meters with the Ethernet card, COM2 is hardwired for EtherGate only, and cannot be used for serial communication.

COM 3 Port

COM 3 is reserved for the optical (infrared) port.

Infrared Connection

Specifications for the optical port are as follows:

Specification	Value
Baud Rate	Up to 19,200 bps (default is 9,600 bps)
Duplex	Half
Operating Distance	less than 1 meter (3 feet) [1]
Optical Range	±15° (minimum), ±30° (maximum)
Supported Protocols	ION, Modbus RTU, DNP 3.0, FACTORY (default is ION)
Compatibility	ANSI C12.13 Type II magnetic optical communications coupler

[1] No physical connection is required to use the infrared port. Any device with an IRDA-compliant port that is positioned within the operating distance and optical range specified above can receive data.

Ethernet Port

10Base-T Ethernet connections are made via the RJ45 modular port on the left side of the unit.

RJ45

Pin 1: Transmit Data +
Pin 2: Transmit Data -
Pin 3: Receive Data +
Pin 6: Receive Data -
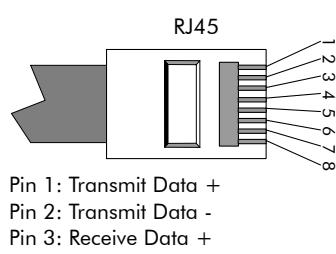
Specification	Description
Cable Type	High quality Category 3 or 5 UTP (CAT 5 unshielded twisted pair recommended) cable
Cable Ends	Male RJ45 modular connector for connection to the 10Base-T port

Specifications for the Ethernet ports are as follows:

Specification	Value
Type (10 Base-T)	IEEE 802.3 10Base-T for 10 Mbps base band CSMA/CD LANs
Data Rate	10 Mbps
Supported Protocols	ION, Modbus RTU [1], Modbus/TCP [1]
Isolation	Transformer isolated to 1,500 VAC RMS

[1] The unit ID for Modbus RTU and Modbus/TCP over Ethernet is 100.

IP Service Ports

Connect to the following TCP/IP Service Ports for communications over Ethernet.

Protocol	TCP/IP Port
ION	7700
Modbus RTU	7701
Modbus/TCP	502
EtherGate [1]	7802

[1] EtherGate communications are available only through COM2. This feature is available only on 9330 and 9350 meters.

Profibus Port

This option is offered exclusively on the 9300 meter.

Profibus female connector.

LEDs (DE and PWR)

PROFIBUS

DE
PWR

D4 D3 D2 D1 C   SH + –   SH + –
DIGITAL PORTS   COM1   COM2

📝 NOTE

The Profibus Master file (.GSD file) is included on a floppy disk with the meter. This file must be installed on your Profibus Masters before the meter can communicate with the Profibus network.

The optional Profibus port on the meter is capable of operating baud rates up to 12 Mbps. Profibus Connections to the meter are made via the nine-pin connector on the rear of the unit. Plug your Profibus connector from the network into this connector.

Pin Number	Profibus Function
1	N/A
2	N/A
3	B-line
4	RTS
5	Isolated GND
6	Isolated Vcc
7	N/A
8	A-line
9	N/A

Profibus Female Connector (located on meter)

Internal Modem

RJ11

Pin 3: Ring
Pin 4: Tip

Connection to the internal modem is made via the RJ-11 jack, or two captured wire connectors, located on the right side of the meter. Connect the meter to the telephone network with an FCC Part 68 compliant telephone cord (that has two male RJ-11 plugs).

If you have the captured wire connector option, connect the meter to the telephone system with the (bare wire to RJ-11) cable provided. If you have the CTR-21 compliant internal modem option, you may also require an adaptor to interface with your regional telephone jack.

Specification	Value
Baud Rate	300 to 33,600 bps [1]
Error Correction	V.42 LAPM, MNP 2-4, MNP 10
Data Compression	V.42 bis/MNP 5
Interface	RJ11 (Tip & Ring)
Government Approvals	FCC Modem: FCC P68 (USA), Industry Canada CS-03 (CAN) CE Modem: CTR-21 (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, UK)

[1] The baud rate used between connected modems is independent of the baud rate used for communication between the modem and the 9300 Series meter.
Higher data rates can be achieved if data compression is enabled in the modem.

LEDs

All LEDs are found on the backplate of the meter, except the two Ethernet LEDs, which are found on the left side (if you are facing front of meter).

LED	Color	Function
L1	Red	Pulses once for every 1.8 Wh of energy measured
L2	Red	Blinks slowly to indicate CPU operation. It blinks rapidly to indicate communications through one of its serial ports [1]
Ethernet LINK	Yellow [2]	Remains on while an Ethernet carrier is present; if this LED is off, the Ethernet connection cannot be established
Ethernet ACTIVITY	Yellow [2]	Blinks to indicate Ethernet traffic
Profibus DE	Yellow	Indicates communications between the Profibus Master and the meter have been established
Profibus PWR	Red	Shows that the meter is powered

[1] If the L2 LED does not blink once the meter is installed, contact Siemens Customer Service.

[2] One or both of the Ethernet LED colors may differ from the standard yellow.

I/O Connections

Use a wire size that is appropriate for your application and complies with local electrical codes.

Digital Outputs

The meter provides four digital output ports that are suitable for controlling external relays. The digital outputs can deliver a continuous signal or pulse.

Description	Specification
Output Type	Form A Solid State
Outputs	D1, D2, D3, D4
Wire	28 to 16 AWG (0.1 to 1.3 mm^2)
Connector Type	Captured wire
Signal Type	Continuous or pulse
Max. Load Voltage	30 V
Max. Forward Current	80 mA
Isolation	Optical
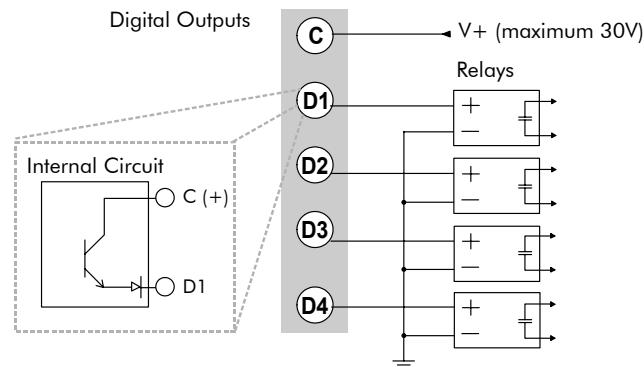
⚠ CAUTION

Only use Siemens approved external relays with the meter digital outputs. Contact Siemens for complete information regarding relay specifications and applications.

Digital Inputs

The meter supports four digital inputs. These can be used for monitoring the condition of an external contact, or for pulse counting applications.

Description	Specification
Input Type	Self-excited (internal 30 VDC supply)
Inputs	S1, S2, S3, S4
Application	Dry contact sensing, or with external excitation.
Wire	28 to 16 AWG (0.1 to 1.3 mm^2)
Connector Type	Captured wire
Max. Pulse Width	25 pulses per second
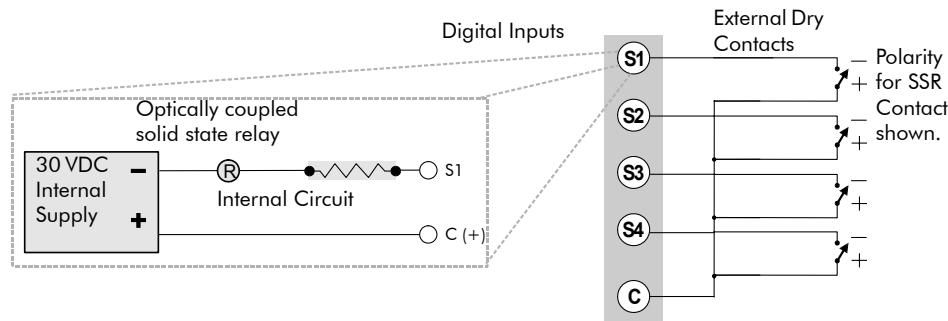
Analog Inputs

Two types of analog input ports are available when you order a meter (refer to your meter's label to determine what type you ordered):

Specification	0-20 mA (scalable to 4-20 mA) Option	0-1 mA Option
Input Impedance	25 Ω	475 Ω
Maximum Source Impedance	500 Ω	10 kΩ
Accuracy	±0.3% of full-scale	
Inputs	AI1, AI2, AI3, AI4	
Connectors	Phoenix captured-wire	
Update Rate	1 Hz	
Channel to Channel Isolation	None	
Max. Common Mode Voltage	30 V	
Standards Compliance	IEC 61000-4-4 fast transient test with capacitive clamp (4 kVp-p@2.5 kHz for 1 min)	
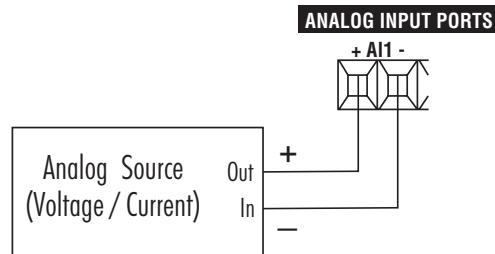
Analog Outputs

This ordering option provides four analog outputs. Two varieties are available:

Specification	0-20 mA (scalable to 4-20 mA) Option	0-1 mA Option
Max. Load Drive Capability	500 Ω	10 kΩ
Accuracy	±0.3% of full-scale	
Outputs	A1, A2, A3, A4	
Connectors	Phoenix captured-wire	
Channel to Channel Isolation	None	
Max. Common Mode Voltage	30 V	
Standards Compliance	IEC 61000-4-4 fast transient test with capacitive clamp (4 kVp-p@2.5 kHz for 1 min)	

NOTE

There is one common terminal for all of the Analog Outputs.

Electrical Specifications

Power Supply

Specification	Description
Supply Voltage	Standard AC: 95 - 240 VAC (+/- 10%), 47-440 Hz Standard DC:120 - 310 VDC (+/- 10%) Option: 20 - 60 VDC (+/- 10%)
Supply Current	Standard: 0.2 Amp (12W) [1] Option: 0.6 Amp (12W) [1]
Connector Type	Captured wire
Wire Type	AWG 16 to AWG 14
Protection	2A slow blow fuse

[1] If a standard display unit is used.

Voltage Inputs

Specification	Value
Operating Range	3 phase: 50 to 347 Volts RMS (L-N) and 87 to 600 Volts RMS (L-L) Single phase: 50 to 300 Volts RMS (L-N) and 100 to 600 Volts RMS (L-L)
Steady-State Rating	0 to 347 Volts RMS
Overload Rating	1,500 VAC RMS (continuous) and 3,250 VAC RMS (one second, non-recurring)
Input Impedance	>2 MΩ
Phase Voltage Connector Type	Ring or spade
Phase Voltage Wire Type	AWG 14 to 12 wire
Phase Voltage Sense Lead Protection	Use breakers or fuses at their source

⚠ **CAUTION**

Phasing and polarity of the AC voltage inputs and their relationship is critical to the correct operation of the unit.

Potential Transformers

Specification	Description
Use of PTs	Required for all systems with voltage levels greater than those above
Secondary Rating	50 to 347 VAC +25% is required

⚠ CAUTION

In cases where PTs are required, the secondaries should be fused.

Current Inputs

Specification	Value
Overload	20 Amps continuous, 500 Amps for 1 second, non-recurring
Burden	0.0625 VA @ 10 Amps
Phase Current Wire Type	AWG 14 to 12 wire
Starting Current	2 mA

Current Transformers

Specification	Value
Primary Rating	Equal to the current rating of the power feed protection device
Burden Rating	>3 VA [1]
Secondary Rating	5 Amp nominal, 10 Amp full-scale

[1] The CT burden rating must exceed the combined burden of the meter, plus cabling, plus any other connected devices.

Options and Retrofits

Terminal Cover

This option ensures that the terminal strips on the meter's base are not accessible after installation.

⚡ DANGER

During normal operation of the meter, hazardous voltages are present which can cause severe injury or death. Only qualified, properly trained personnel should perform installation and servicing.

1. Turn off all power to the meter.

2. Open all PT fuses (or direct voltage input fuses). Close all CT shorting blocks.

3. Ensure that all cables still connected to the meter are **NOT** live.

4. Unscrew the four corner screws (T10 TORX) from the rear of the unit.

5. Screw in the four spacers (stand-offs).

6. Fasten the Terminal Strip Cover with the four screws (T10 TORX) and washers supplied.

⚠ CAUTION

The spacers have a maximum torque rating of 1.35 Nm. Do not over tighten the screws.

7. Close the PT fuses (or direct voltage input fuses), and open the CT shorting blocks.

8. Turn on power to the meter and verify the correct operation of the unit.

Installation Diagram
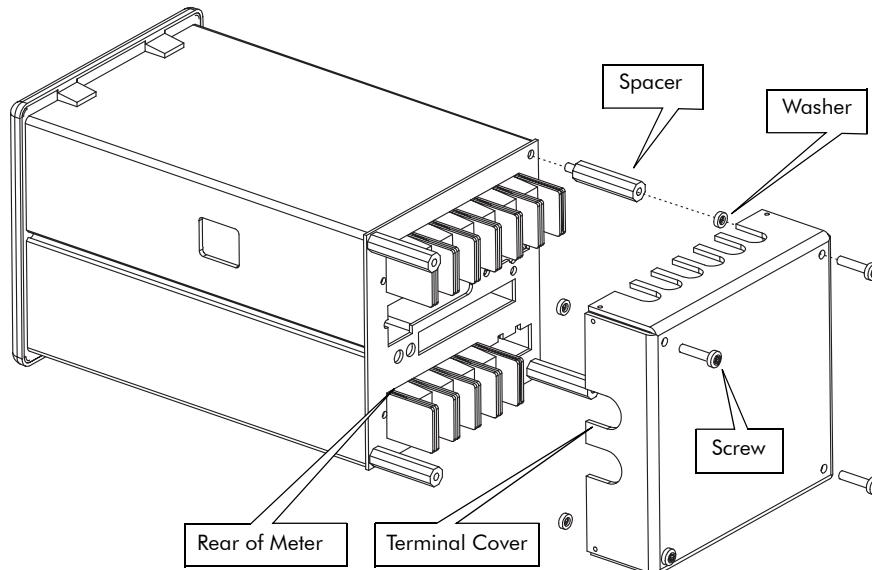
Remote Modular Display

The remote modular display (RMD) connects to the TRAN meter as shown:
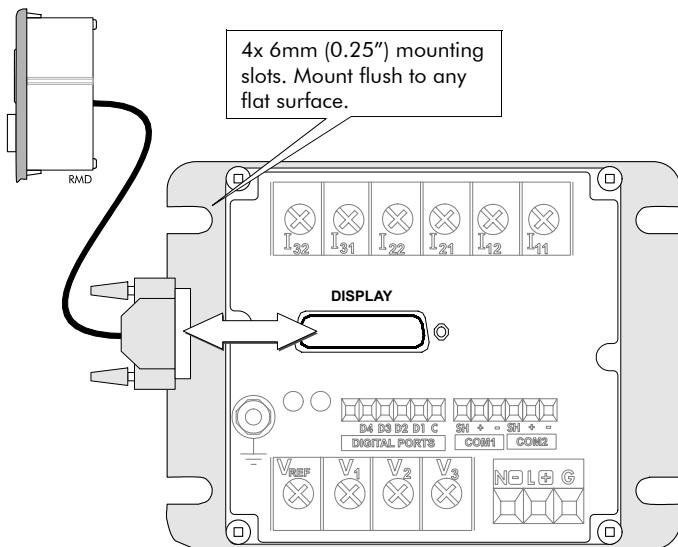
Specification	Description
Connector Type	DB25
Wire Type	1.8 m cable [1]

[1] Only use cable supplied by Siemens to connect the remote display unit.

RMD Dimensions
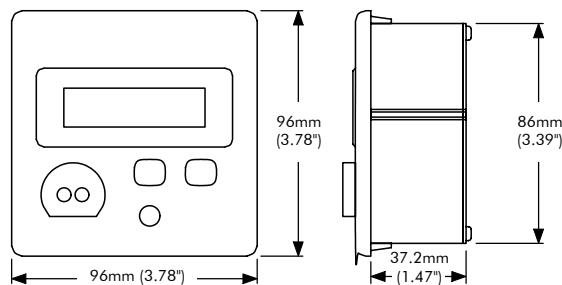
Switchboard Case

The meter is available in the switchboard-case ordering/retrofit option. Switchboard meters can be plugged into the S1 (General Electric) or the FT21 (ABB) switchboard case.

Installation Instructions

⚠ CAUTION

Installation and maintenance of the switchboard meter should only be performed by qualified personnel who have appropriate training and experience with high voltage and high current devices.
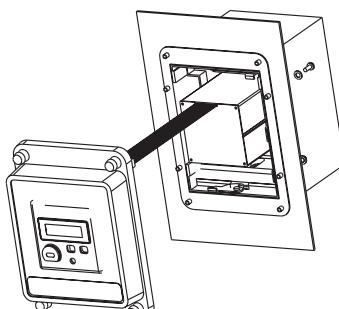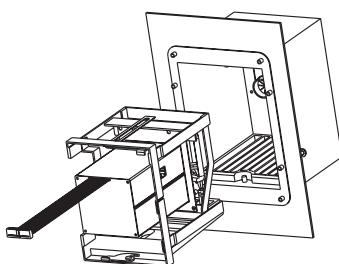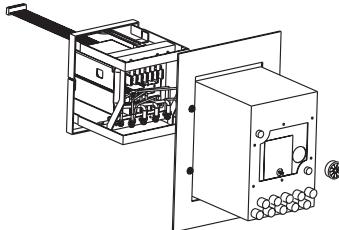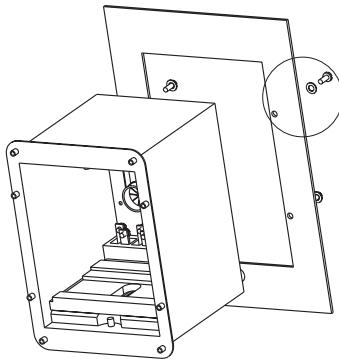
If the switchboard case is included with your meter, draw the meter chassis out of the case to facilitate its installation into the mounting hole. Installing and setting up the switchboard meter is summarized in the following steps.

1.   Review the unit's dimensions and prepare a mounting hole for the switchboard case. If you are retrofitting your switchboard meter into an existing case, you may have to drill or punch a 29mm (1.13") round hole in the back of the case to accommodate communications, I/O, and/or auxiliary power wiring.

✎ NOTE

For retrofitting S1 style switchboard cases, a pre-drilled backplate is included. To use it, remove the backplate from the old switchboard case and replace it with the supplied backplate.

2.   Place the supplied 29mm (1.13") nylon bushing into the drilled hole if desired. Refer to "Unit Dimensions" on page 161.

3.   Place the switchboard case into the prepared mounting hole. Attach the mounting screws.

4.   Wire the phase voltages and currents to the terminal posts on the rear of the case.

5.   Read the warning label on the green captured-wire plug.

6.   Connect any communications, I/O, and/or auxiliary power wiring to the meter.

     ◆ For the P24 power supply option, ensure that the auxiliary power cable is powered off.

     ◆ Pass all wiring through the switchboard case using the round hole in back.

     ◆ Connect the communications and I/O wiring to the meter; for the P24 power supply option, also connect the auxiliary power cable to the meter's power supply terminals.

     ◆ Slide the meter chassis into position while feeding the excess wiring through the hole in the rear of the switchboard case, making sure none of the wires are pinched.

     ◆ Secure the meter by locking the two chassis levers into position.

     ◆ Wire any external communications and I/O; for the P24 power supply option, connect the other end of the auxiliary power cable to an external dedicated 20 to 60VDC source that is powered down.

7.   Connect the ribbon cable to the back of the display on the case cover.

8.   Energize the meter as follows:

     ◆ For the P24 power supply option, power up the auxiliary power (20 to 60VDC) source.

◆ For the standard option, the meter is powered up when the voltage inputs are applied in the next step.

9. Apply the current and voltage inputs:

◆ For S1 style switchboard meters, insert the connection plug into the slot at the bottom of the meter.

◆ For FT21 style switchboard meters, push the shorting switches up.

10. Place the case cover into position and tighten the thumbscrew(s).

11. Perform basic setup and verify the meter's operation: refer to the meter's *Installation and Basic Setup Instructions* manual for details.

Suggested Mounting Hole Dimensions

S1 Case HoleFT21 Case Hole
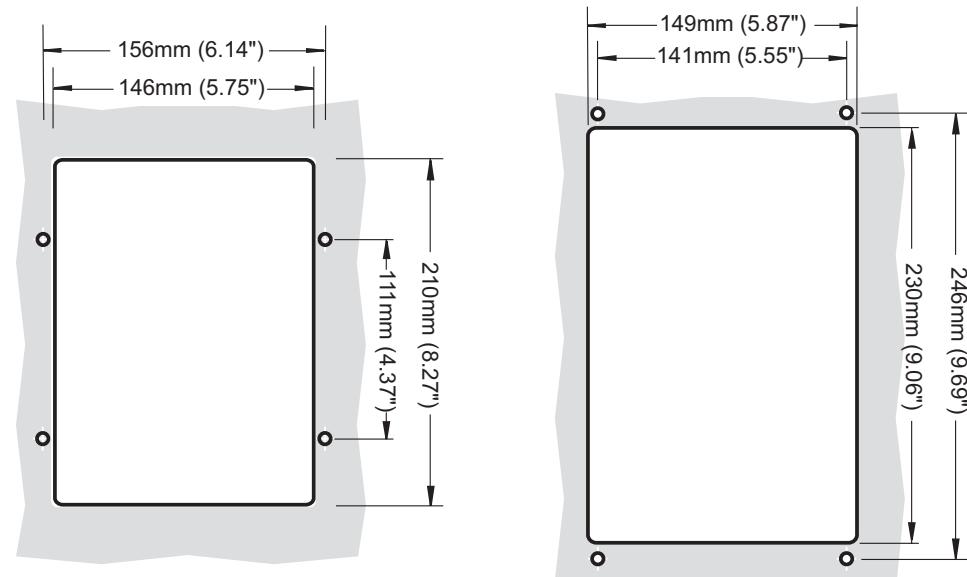
Unit Dimensions

S1 Case
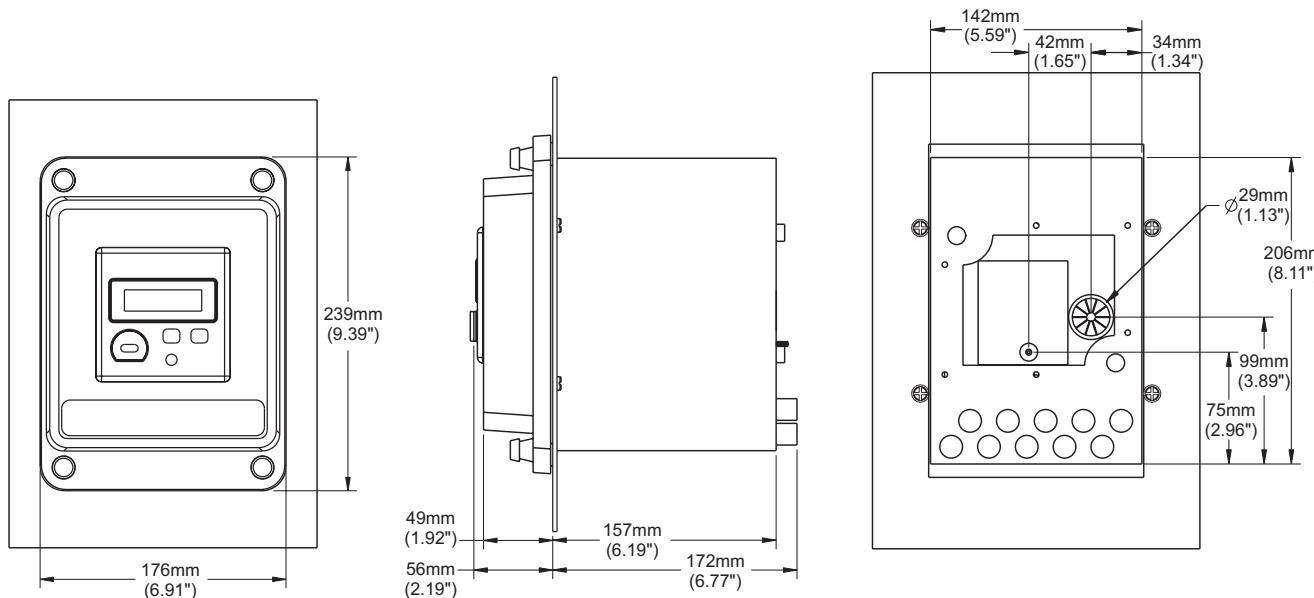
FT21 Case
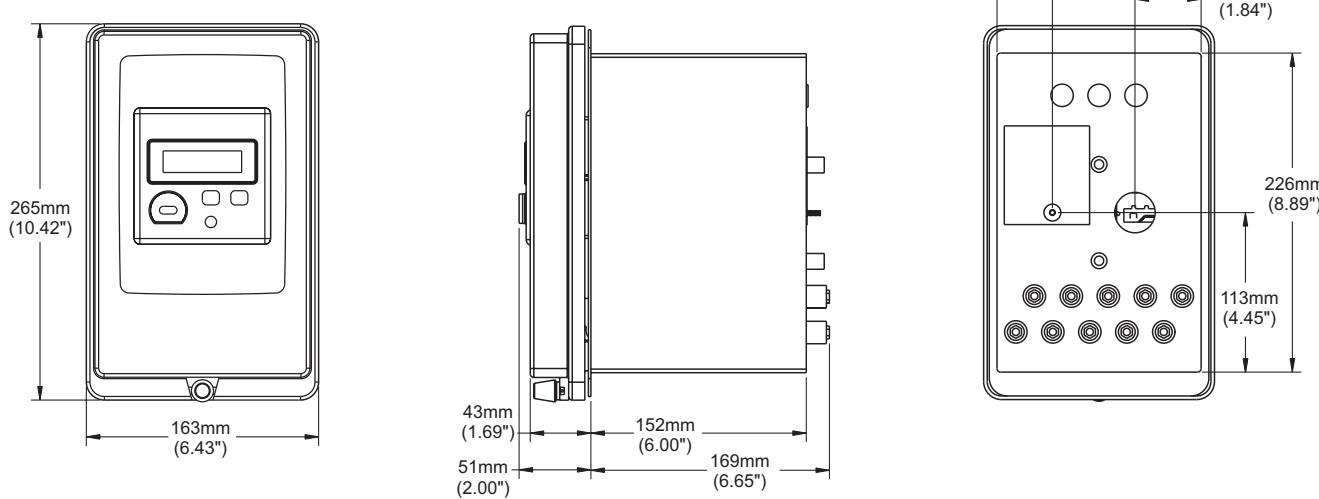
The arrows in the diagram below indicate where the grounding posts are located (on the back of the switchboard meter):
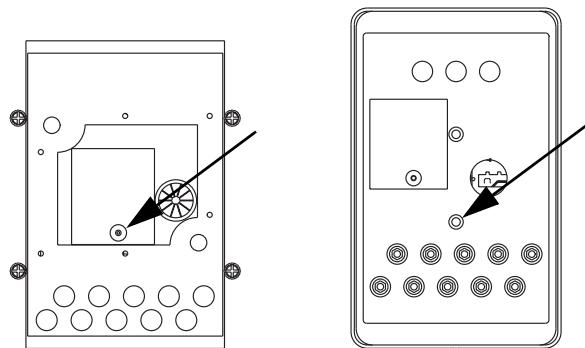
P24 Power Supply Option

1.   Connect the auxiliary power cable to the meter's power supply terminals.

2.   Connect the other end of the cable to an external dedicated 20 to 60VDC source that is powered down.

3.   Energize the meter by powering up the dedicated 20 to 60VDC source.

Relay Expansion Board (Grayhill Rack)

The optional relay extension board allows for custom digital output applications using specific Grayhill modules. This option includes a 4-position Grayhill module rack and one of two power supplies:

◆ a 100-240 VAC/110-370 VDC to 5 VDC power supply

◆ a 20-60 VDC to 5 VDC power supply
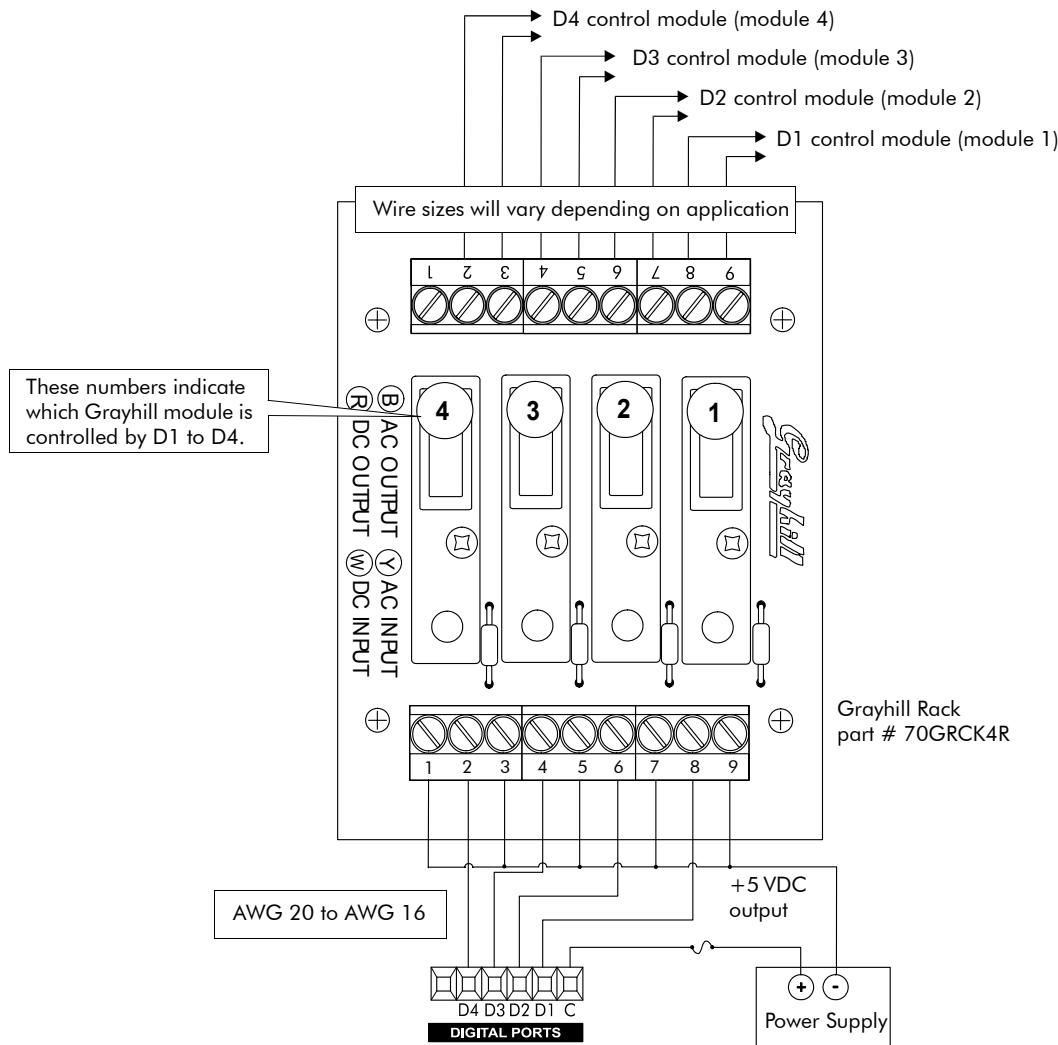
The meter's digital outputs can be wired directly (without the use of the Grayhill rack), as long as the external power supply you use does not exceed 30 VDC/80 mA.

Wiring for Modules with Manual Override

The following wiring scheme must be used when the relay extension board contains Grayhill modules with the manual override feature.
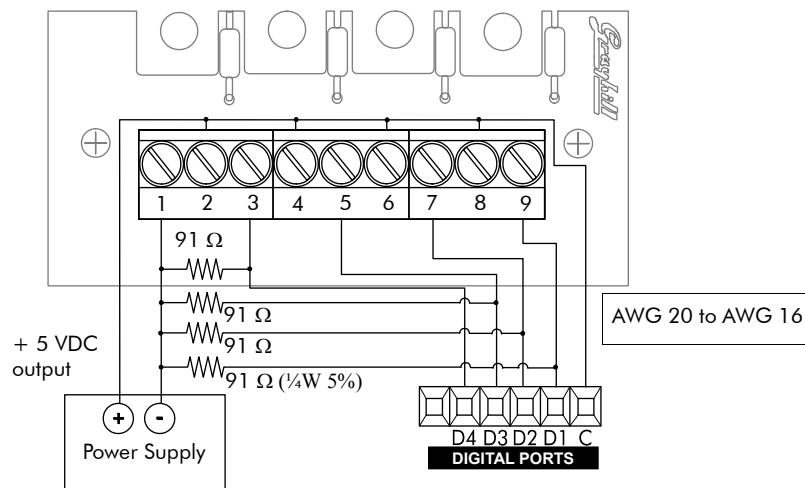
⚠ **DANGER**

In this configuration, the outputs of the Grayhill modules with manual override will switch state on power up.

Analog I/O

The following diagram shows the additional connections required for the analog I/O ordering option.
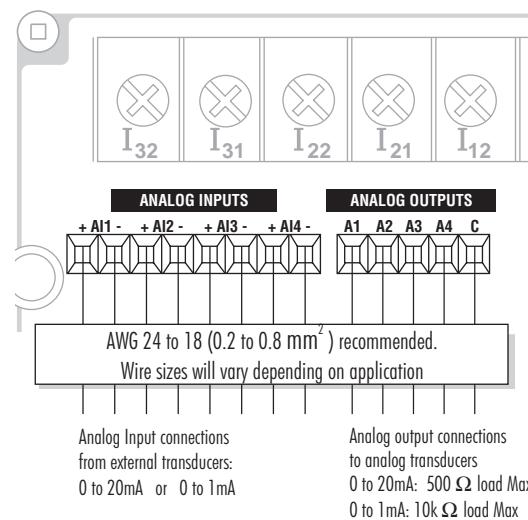
TRAN Model

The 9300 TRAN is a meter with no display. All specifications are the same as for standard 9330, except the following.

Unit Dimensions

TRAN Model Dimensions

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