DIN Ethernet

E71E3 series

User manual

7EN02-0442-00
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Legal Information

Safety information

Important information

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

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

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

⚠⚠DANGER

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

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

⚠WARNING

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

⚠CAUTION

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

NOTICE

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

Please note

Electrical equipment should be installed, operated, serviced and maintained only by qualified personnel. No responsibility is assumed by Veris for any consequences arising out of the use of this material. A qualified person is one who has skills and knowledge related to the construction, installation, and operation of electrical equipment and has received safety training to recognize and avoid the hazards involved.

Notices

FCC PART 15 INFORMATION

This equipment has been tested by the manufacturer 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 residential 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. This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

Modifications to this product without the express authorization of the manufacturer nullify this statement.

About this manual

This manual discusses features of the E71E3 series DIN Ethernet meter and provides installation and configuration instructions.

Throughout the manual, the term “meter / device” refers to all models of the E71E3 series. All differences between the models, such as a feature specific to one model, are indicated with the appropriate model number or description.

This manual does not provide configuration information for advanced features where an expert user would perform advanced configuration. It also does not include instructions on how to incorporate meter data or perform meter configuration using energy management systems or software.

The most up-to-date documentation about your meter is available for download from www.veris.com.

Related documents

Document	Number
E71E3 series instruction sheet	NNZ15352

Table of Contents

Safety precautions

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

⚠⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- This product must be installed inside a suitable fire and electrical enclosure.
- Follow safe electrical work practices. See NFPA 70E in the USA, or applicable local codes.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Do not use this product for life or safety applications.
- Do not install this product in hazardous or classified locations.
- Read, understand and follow the instructions before installing this product.
- Turn off all power supplying equipment before working on or inside the equipment.
- Product may use multiple voltage/power sources. Disconnect ALL sources before servicing.
- Use a properly rated voltage sensing device to confirm that power is off. DO NOT depend on this product for voltage indication.
- Products rated only for basic insulation must be installed on insulated conductors.
- Replace all doors, covers and protective devices before powering the equipment.
- Do not exceed the product's ratings or maximum limits.
- Treat communications and I/O wiring connected to multiple devices as hazardous live until determined otherwise.
- The installer is responsible for conformance to all applicable codes.
- Do not connect current transformers (CTs) to the meter current measurement terminals.
- Only use appropriately insulated Low Voltage Current Transducers (LVCTs) or Rogowski coils.

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

NOTE: See IEC 60950-1 for more information on communications and I/O wiring connected to multiple devices.

⚠WARNING

UNINTENDED OPERATION

Do not use this device for critical control or protection applications where human or equipment safety relies on the operation of the control circuit.

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

⚠WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

- Change default passwords/passcodes to help prevent unauthorized access to device settings and information.
- Disable unused ports/services and default accounts, where possible, to minimize pathways for malicious attacks.
- Place networked devices behind multiple layers of cyber defenses (such as firewalls, network segmentation, and network intrusion detection and protection).
- Use cybersecurity best practices (for example: least privilege, separation of duties) to help prevent unauthorized exposure, loss, modification of data and logs, interruption of services, or unintended operation.

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

Meter overview

Overview of meter functions

The E71E3 series DIN Ethernet meter is electronic with multi-line backlit LCD display. The meter provides accurate 3-phase electrical parameters monitoring with class 0.5 accuracy standard.

The key features of the meters are:

- Bi-directional
- Measurement of active and reactive energy
- Power/current demand, peak demand
- Time-stamped alarms
- Multi Tariffs (up to 4) controlled by internal clock, status inputs or communication
- 2 status inputs and 1 relay output
- Display (current, voltage, and energy measurements)
- Data logging
- Communications via Modbus TCP and BACnet/IP
- Compatible with LVCT or Rogowski Coils

Feature summary

Function		E71E3X	E71E3AX
Measurement input through LVCT		√	—
Measurement input through Rogowski Coil		—	√
Active Energy measurement accuracy class (total and partial kWh)		0.5%	0.5%
Four Quadrant Energy measurements		√	√
Electrical measurements (I, In, V, PQS, PF, Hz, ...)		√	√
Alarms with time stamping		√	√
Data logging		√	√
Multi Tariff	**Controlled by internal clock**	4 tariffs	4 tariffs
	Controlled by status input(s)	4 tariffs	4 tariffs
	Controlled by communications	4 tariffs	4 tariffs
Status inputs	**Programmable (input status, tariff control, input metering, partial reset)**	2 status inputs	2 status inputs
Relay outputs	**Programmable (control mode, behavior mode)**	1 relay output	1 relay output
Communications	**Modbus TCP**	√	√
	BACnet/IP	√	√

Data display and analysis tools

Modbus command interface

Most of the meter's real-time and logged data, as well as basic configuration and setup of meter features, can be accessed and programmed using a Modbus command interface as published in the meter's Modbus register list.

This is an advanced procedure that should only be performed by users with advanced knowledge of Modbus, their meter, and the power system being monitored. For further information on the Modbus command interface, contact Technical Support.

Refer to Modbus register map, page 62 of this user manual for the Modbus mapping information and basic instructions on command interface.

Meter configuration

Meter configuration can be performed through the HMI display (Refer to Configuring via HMI, page 23) or through the meter webpages (Refer to Configuring via webpages, page 30).

Cybersecurity

Overview

This chapter contains information about your product's cybersecurity. Network administrators, system integrators and personnel that commission, maintain or dispose of a device should:

- Apply and maintain the device's security capabilities. See Device security capabilities, page 13 for details.
- Review assumptions about protected environments. See Protected environment assumptions, page 14 for details.
- Address potential risks and mitigation strategies. See Potential risks and compensating controls, page 15 for details.
- Follow recommendations to optimize cybersecurity.

Your device has security capabilities that:

- Allow it to be part of a NERC CIP compliant facility. Go to the North American Electric Reliability Corporation website for information on NERC Reliability Standards.
- Align with cybersecurity standards in the IEC 62443 international standard for business IT systems and Industrial Automation and Control Systems (IACS) products. Go to the International Electrotechnical Commission website for information about the IEC 62443 international standard.

⚠WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

- Change default passwords/passcodes to help prevent unauthorized access to device settings and information.
- Disable unused ports/services and default accounts, where possible, to minimize pathways for malicious attacks.
- Place networked devices behind multiple layers of cyber defenses (such as firewalls, network segmentation, and network intrusion detection and protection).
- Use cybersecurity best practices (for example: least privilege, separation of duties) to help prevent unauthorized exposure, loss, modification of data and logs, interruption of services, or unintended operation.

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

Product defense-in-depth

Use a layered network approach with multiple security and defense controls in your IT and control system to minimize data protection gaps, reduce single-point-of-failure and create a strong cybersecurity posture. The more layers of security in your network, the harder it is to breach defenses, take digital assets or cause disruption.

Device security capabilities

This section describes the security capabilities available with your device.

Information confidentiality

These security capabilities help protect the confidentiality of information through secure protocols that help prevent unauthorized users from reading information in transit.

Physical security

Multiple anti-tamper sealing points are used to help prevent access and leaves evidence of tampering.

Configuration

These security capabilities support the analysis of security events, help protect the device from unauthorized alteration and records configuration changes and user account events:

- Enabling the HMI timeout period in webpages (Refer to Enabling the HMI timeout period, page 33).
- Terminating user account sessions in webages (Refer to Terminating user account sessions, page 42).
- Configuring the IP network services (Refer to Configuring IP network services, page 35).
- Configuring the IP filtering global access and exception list (Refer to Configuring IP filtering, page 36).

User accounts

These security capabilities help enforce authorizations assigned to users, segregation of duties and least privilege:

- User authentication is used to identify and authenticate software processes and devices managing accounts (Refer to User accounts, page 39).
- User account lockout with number of unsuccessful login attempts (Refer to User account lockout policy, page 16).
- Administrators can override user authorizations by deleting their account (Refer to Deleting user account, page 41).

Hardening

These security capabilities help prohibit and restrict the use of unnecessary functions, protocols and/or services:

- Least functionality can be applied to prohibit and restrict the use of unnecessary functions, protocols and/or services.
- Port numbers can be changed from default values to lower the predictability of port use.
- Session termination is used to terminate a session manually by the user who initiated the session (Refer to Terminating user account sessions, page 42).

Protected environment assumptions

- Cybersecurity governance – available and up-to-date guidance on governing the use of information and technology assets in your company.
- Perimeter security – installed devices, and devices that are not in service, are in an access-controlled or monitored location.
- Emergency power – the control system provides the capability to switch to and from an emergency power supply without affecting the existing security state or a documented degraded mode.

- Firmware upgrades – meter upgrades are implemented consistently to the current version of firmware.
- Controls against malware – detection, prevention and recovery controls to help protect against malware are implemented and combined with appropriate user awareness.
- Physical network segmentation – the control system provides the capability to:
  - Physically segment control system networks from non-control system networks.
  - Physically segment critical control system networks from non-critical control system networks.
- Logical isolation of critical networks – the control system provides the capability to logically and physically isolate critical control system networks from non-critical control system networks. For example, using VLANs.
- Independence from non-control system networks – the control system provides network services to control system networks, critical or non-critical, without a connection to non-control system networks.
- Encrypt protocol transmissions over all external connections using an encrypted tunnel, TLS wrapper or a similar solution.
- Zone boundary protection – the control system provides the capability to:
  - Manage connections through managed interfaces consisting of appropriate boundary protection devices, such as: proxies, gateways, routers, firewalls and encrypted tunnels.
  - Use an effective architecture, for example, firewalls protecting application gateways residing in a DMZ.
  - Control system boundary protections at any designated alternate processing sites should provide the same levels of protection as that of the primary site, for example, data centers.
- No public internet connectivity – access from the control system to the internet is not recommended. If a remote site connection is needed, for example, encrypt protocol transmissions.
- Resource availability and redundancy – ability to break the connections between different network segments or use duplicate devices in response to an incident.
- Manage communication loads – the control system provides the capability to manage communication loads to mitigate the effects of information flooding types of DoS (Denial of Service) events.
- Control system backup – available and up-to-date backups for recovery from a control system failure.

Potential risks and compensating controls

Address potential risks using these compensating controls:

Area	Issue	Risk	Compensating controls
Passcode through meter display User accounts	Default settings are often the source of unauthorized access by malicious users.	If you do not change the default password/passcode, unauthorized access can occur.	Change the default password/ passcode to help reduce unauthorized access.
Secure protocols	Ethernert port with Modbus TCP, BACnet/IP, DNS, SNMP, SNTP protocols are unsecure. The device does not have the capability to transmit encrypted data using these protocols.	If a malicious user gained access to your network, they could intercept communications.	For transmitting data over an internal network, physically or logically segment the network. For transmitting data over an external network, encrypt protocol transmissions over all external connections using an encrypted tunnel, TLS wrapper or a similar solution.

Default settings

Area	Setting	Default
Communication protocols	Modbus TCP/IP	Enabled (Read-only)
	BACnet/IP	Enabled (Read-only)
	SNMP	Disabled
	Discovery	Enabled
	HTTPS	Enabled
Configuration	Using webpages	Enabled

User accounts and permissions

Recommendations to optimize cybersecurity in a protected environment:

- Assign users only the essential permissions needed to perform their role (Refer to Edit user account details, page 41).
- Revoke user permissions when no longer needed due to role change, transfer or termination.
- Follow user account management tasks as described by your organization or contact your network administrator.

User account lockout policy

After the 5th consecutive invalid login attempt, the webpage login is locked for 2 minutes. After 2 minutes (expiry), the webpage is unlocked. Alternately you can perform power cycle or soft restart or factory reset to unlock the user account.

NOTE: If you perform factory reset, all user accounts except **Administrator** and **Guest** are deleted and the webpage user account goes back to factory default settings.

Passwords/Passcodes

Recommendations to optimize cybersecurity in a protected environment:

- Document and store passwords/passcodes and user names in a protected location.
- Change the default passwords/passcodes to help reduce unauthorized access (Refer to Changing the display passcode, page 30 and Changing user account password, page 31). Default account settings are often the source of unauthorized access by malicious users.
- Use complex passwords/passcodes or passphrases between 8 and 16 characters with at least 1 number, 1 capital letter and 1 special character.
- Follow user account management tasks as described by your organization or contact your network administrator, for example, maximum password age or history policies.

Default passwords/passcodes and user accounts

Configuration area	User name	Default passcode/password
Meter display passcode	–	Low: 0000 High: 0010
Webpages	Administrator	MAC address which is unique for each meter **NOTE:** Enter the MAC address of the meter without colon in capital letters (For example: if the MAC address of the meter is 00:80:f4:02:14:38, then password is 0080F4021438).
	Guest	guest

Harden the device

Recommendations to optimize cybersecurity in a protected environment:

- Harden the meter according to your company policies and standards.
- Review assumptions about protected environments and address potential risks and mitigation strategies.
- Change the default passwords/passcodes (Refer to Changing the display passcode, page 30 and Changing user account password, page 31).
- Enable the HMI timeout period in webpages (Refer to Enabling the HMI timeout period, page 33).
- Terminate the user account sessions in webages (Refer to Terminating user account sessions, page 42).
- Change the communication protocol ports from their default values. This lowers the predictability of port use.
- Disable communication protocol ports when they are not in use. This reduces the attack surface.

Enabling/Disabling communication protocols and changing port numbers

Configuring IP network services

See Configuring IP network services, page 35 for instructions.

Configuring IP filtering

See Configuring IP filtering, page 36 for instructions.

Configuring SNMP

See Configuring SNMP, page 37 for instructions.

Configuring system log

See Configuring system log, page 38 for instructions.

Configuring advanced Ethernet settings

See Configuring advanced Ethernet settings, page 39 for instructions.

Firmware upgrades

When meter firmware is upgraded - security configuration remains the same until changed, including user names and passwords/passcodes. It is recommended to review security configuration after an upgrade to analyze privileges for new or changed device features and revoke or apply them according to your company policies and standards.

Secure disposal guidelines

Use the *Secure disposal checklist* when disposing a meter to help prevent potential disclosure of data.

Secure disposal checklist

- **Record activities**: Document disposal actions according to your company policies and standards to keep a record of activities.
- **Decommission related rules and sanitize records**:
  - Follow decommission and sanitization tasks as described by your organization or contact your network administrator.
  - Decommission network and security rules, e.g. a firewall rule that could be used to get past the firewall.
  - Perform records tracking sanitization tasks to remove records in related systems, e.g. monitoring SNMP servers.
- **Disposal and reuse**: See Disposal and reuse, page 18 for more information.

Disposal and reuse

Before removing the device from its intended environment, follow the *Secure disposal guidelines* in this document.

Follow device removal tasks described by your organization or contact your network administrator to determine a responsible method of disposal.

Dispose the device according to the legislation of the country. Some regulatory organizations include:

- The United States Environmental Protection Agency (EPA) for guidance on the sustainable management of electronics.
  - The EPA provides an Electronic Product Environmental Assessment Tool (EPEAT) that helps assess the environmental attributes of electronics.
- The European Waste Electrical & Electronic Equipment Directive (WEEE Directive) is the Community directive on Waste Electrical and Electronic Equipment.
- The European Restriction of Hazardous Substances Directive (RoHS) directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

NOTICE
UNAUTHORIZED OR UNINTENDED ACCESS TO CONFIDENTIAL DATA • Store devices that are not in service in an access-controlled or monitored location. • Physically destroy devices that are decommissioned. **Failure to follow these instructions can result in unauthorized or unintended access to sensitive or secure customer data.**

Device disposal

It is recommended that the entire device is physically destroyed. Destroying the device helps prevent potential disclosure of data contained in the device that was not removed.

Device reuse

Store the device in a location that is access controlled or monitored if there is potential for reuse.

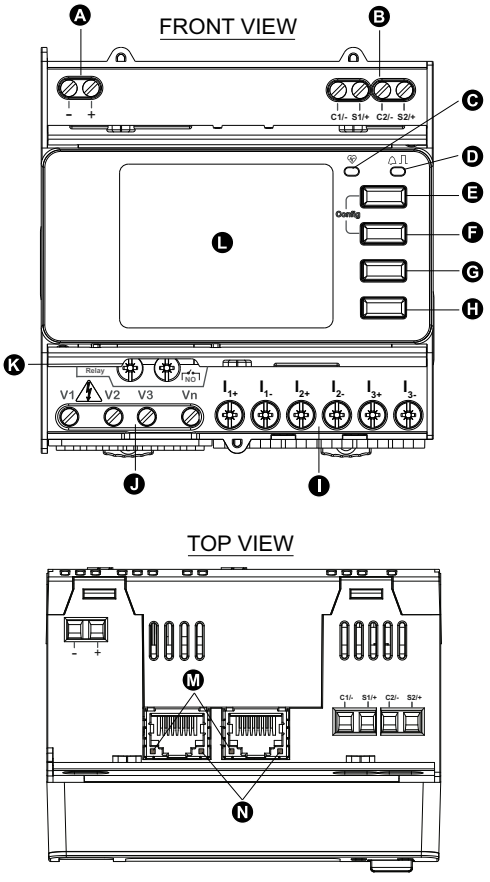
Commissioning

Installation

See your meter's installation sheet that ships in the box with your meter for information related to installation, such as dimensions, mounting and wiring instructions.

NOTE: The current terminals of the meter must be shorted if it is not connected to external LVCS (LVCT / Rogowski coil).

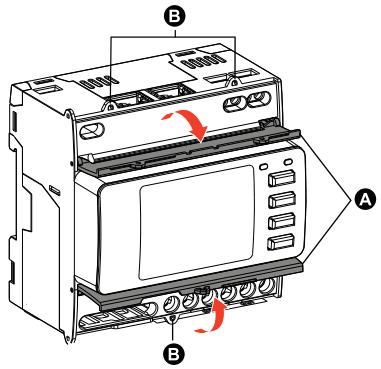
Meter description



A	Control power input
B	Status inputs
C	Operation LED (Green)
D	Alarm / Energy pulse LED (Orange)
E	Cancellation button
F	Confirmation button
G	Up button
H	Down button
I	Current inputs
J	Voltage inputs
K	Relay output
L	Display with white backlight
M	Ethernet port Link/Activity LED (Green)
N	Ethernet port Speed LED (Green) (100 Mbps = Green / 10 Mbps = Off)

Sealable covers

The sealable covers and three sealing points help prevent access to inputs, outputs, current, and voltage connections.



A	Sealable covers
B	Sealing points (three)

LED indicators

Alarm / energy pulse LED

The alarm / energy pulse LED can be configured for alarm notification or energy pulsing.

When configured for alarm notification, this LED flashes (1 s ON and 1 s OFF) when the alarm is active. The LED provides a visual indication of an active alarm condition.

When configured for energy pulsing, this LED flashes at a rate proportional to the amount of energy consumed.

Operation LED

The operation LED blinks at a slow, steady rate to indicate that the meter is operational.

This LED cannot be configured for other purposes.

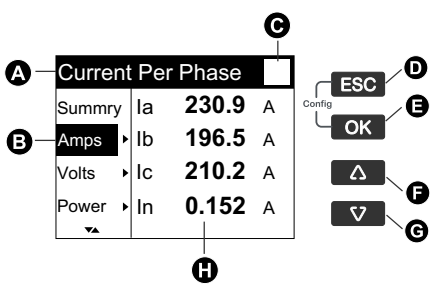
NOTE: The operation LED that remains ON and does not flash indicates a problem with the meter. In this case, restart the meter. If the LED still does not flash, contact Technical Support.

Ethernet communication LEDs

The meter has two LEDs per port for Ethernet communication.

The Link/Activity LED flashes to indicate the meter is communicating through the Ethernet port. The Speed LED is ON when the speed is more than 100 Mbps (Green = 100 Mbps / Off = 10 Mbps).

Display screen overview



A	Screen title
B	List of screens
C	Configuration mode icon ( ) or Error / Alert icon ( ) notification area
D	Cancel and go back to parent screen, Summary screen (display mode) or Setup screen (configuration mode)
E	Select a menu item or confirm an entry
F	Navigate up, select a setting from a list or increase a number in a numeric setting

	G	Navigate down, select a setting from a list or decrease a number in a numeric setting
	H	Values or settings

Status information

The two LEDs on the front panel indicate the current status of the meter: the green operation LED and the orange alarm / energy pulse LED.

The icons in the following table indicate the LED state:

	= OFF	= Flashing	= ON
Operation LED	Diagnostic code error (Refer to Diagnostic codes, page 50)	Meter is operational	Diagnostic code error (Refer to Diagnostic codes, page 50)
Alarm LED	No alarm	Active or inactive unacknowledged alarm	Abnormal behaviour of LED. Contact Technical Support
Energy pulsing LED	Not counting	Energy pulse counting	Over-counting due to incorrect configuration or overload

Backlight and error / alert icon

The backlight (display screen) and error / alert icon on the top right corner of the display screen indicate the meter status.

Backlight	Error / Alert icon	Description
OFF	–	Device not powered ON or device is OFF
ON/Dim	OFF	LCD in power saving mode.
ON/Normal	OFF	Normal working status.
Flashing	Flashing	Alarm / Diagnosis is active.
ON/Dim	Flashing	Alarm / Diagnosis is active for 3 hours, LCD in power saving mode.
Flashing	–	Device physical location (Refer to Enabling the device physical location, page 47). The backlight flashes at a faster rate for 15 s. **NOTE:** • If the backlight flashes due to Alarm/Diagnostic error, the backlight will continue to flash even after 15 s. • Any button press on the meter indicates that the device is identified and the backlight stops flashing.

Configuring

You can configure the meter settings via:

- HMI (Refer to Configuring via HMI, page 23)
- Webpages (Refer to Configuring via webpages, page 30)

Configuring via HMI

Modifying parameters

There are two methods for modifying a parameter, depending on the type of parameter:

- Selecting a value in a list (for example, selecting 1PH2W L-N from a list of available power systems), or
- Modifying a numerical value, digit by digit (for example, entering a value for the date, time or VT primary).

NOTE: Before you modify any parameters, ensure that you are familiar with the HMI functionality and navigation structure of your device in configuration mode.

Selecting a value from a list

1. Use the ▽ or △ button to scroll through the parameter values until you reach the desired value.
2. Press OK to confirm the new parameter value.

Modifying a numerical value

1. Use the ▽ or △ button to modify the selected digit.
2. Press OK to confirm the new parameter value and to shift to the next digit. Modify the next digit, if needed, or press OK.
3. Continue to move through the digits until you reach the last digit then press OK again to confirm the new parameter value.

   If you enter an invalid setting and press OK cursor stays in the field for that parameter until you enter a valid value.

Cancelling an entry

To cancel the current entry, press the ESC button. The change is canceled and the screen reverts to the previous display.

Clock setting

You must reset the time to account for any time change (for example, to switch the time from standard time to daylight savings time).

Clock behavior

You are prompted to set the date and time when the meter is powered up first time. Press ESC to skip this step if you do not want to set the clock (you can enter configuration mode and set the date and time later, if required).

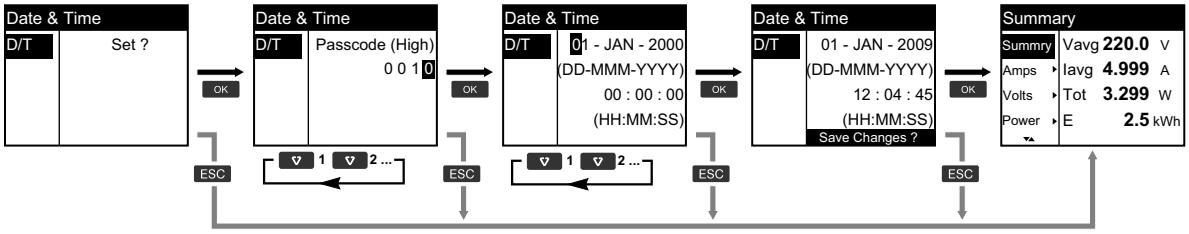
Date/time format

The date is displayed in the following format: DD-MMM-YYYY.

The time is displayed using the 24-hour clock in the following format: hh:mm:ss.

Setting the clock using the display

The following image illustrates how to set the clock when you initially power up the meter or after a power failure. To set the clock during normal operation, refer to the **Configuration mode menu tree** for you meter.



1. Press OK when you are prompted to set the date and time when the meter is powered up.
2. Use the ▽ or △ button to enter the meter **Passcode (High)** (Default is “0010”) and press OK.
3. Use the ▽ or △ button to set the date in **DD-MMM-YYYY** format and time in **HH:MM:SS** format.
4. Press OK to save your changes to the meter.

Configuration mode

Overview

You can configure the meter parameters only in configuration mode.

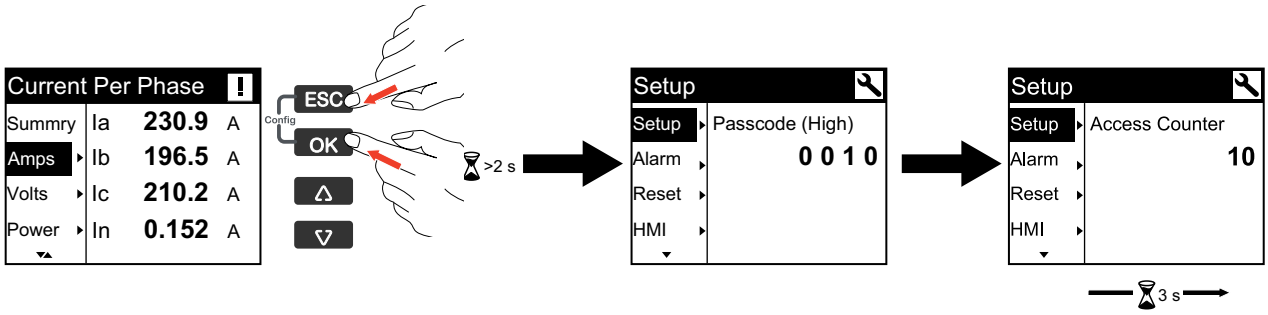
The following parameters can be configured in configuration mode:

- Wiring type
- CT and VT ratio
- Nominal frequency
- Date/Time
- Multi-tariffs
- Communication network settings (partially configured)
- LED settings
- Status inputs
- Relay output
- Demand
- Passcode (High and Low)
- Reset default settings
- Alarms
- Front panel display

Entering configuration mode

1. Press and hold OK and ESC at the same time for 2 seconds.

2. Enter the meter passcode. The **Access Counter** screen displays, indicating the number of times the configuration mode has been accessed.

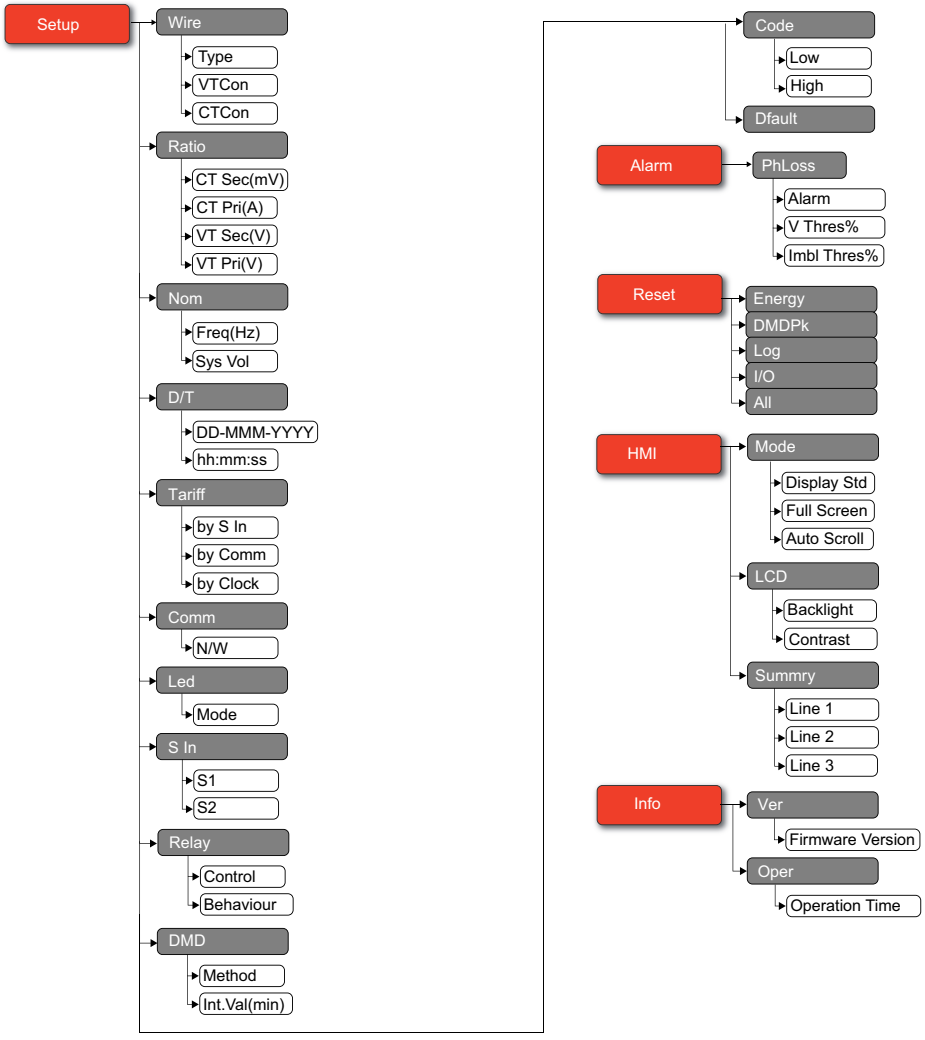


Default configuration mode settings

Menu	Factory settings	
Wire	**Type**: **3PH4W** **VTCon**: **Direct Con** **CTCon**: **I1, I2, I3**	
Ratio	**E71E3X**	**CT Sec**: **1000** **CT Pri**: **100**
	E71E3AX	**CT Sec**: **Rcoil** **CT Pri**: **5000**
Nom	**Freq(Hz)**: **60** **Sys Vol**: **600**	
D/T	**01-JAN-2000** **00:00:00**	
Tariff	**by S In**: **Disable** **by Comm**: **Disable** **by Clock**: **Disable**	
Comm	**N/W** • **Bacnet**: **Enable** • **HTTPs**: **Enable** • **Modbus**: **Enable**	
Led	**Mode**: **OFF**	
S In	**S1 Mode**: **Input Status** **S2 Mode**: **Input Status**	
Relay	**Control**: **Alarm** **Behaviour**: **Normal**	
DMD	**Method**: **Fixed** **Int.Val(min)**: **15**	
Code	**Low**: **0000** **High**: **0010**	

Menu	Factory settings
Alarm	**PhLoss**: **Enable** **V Thres%**: **10** **Imbl Thres%**: **25**
HMI	**Mode** • **DisplayStd**: **IEEE** • **FullScreen**: **Enable** • **AutoScroll**: **Disable** **LCD** • **Backlight**: **4** • **Contrast**: **5**

Configuration mode menu tree



Configuration mode settings

Menu	Sub menu	Parameters		Options	Description
Setup	**Wire**	**Type**		**3PH4W** **1PH4W L-N** **1PH2W L-N** **1PH2W L-L** **1PH3W L-L-N** **3PH3W**	Select the power system type the meter is wired to.
		VTCon		**Direct Con** **Wye(3VT)** **Delta(2VT)**	Select how many voltage transformers (VT) are connected to the electrical power system.
		CTCon		3CT - **I1, I2, I3** 1CT - **I1** 2CT - **I1, I2**	Define how many current transducers (CT) are connected to the meter and which terminals they are connected to.
Setup	**Ratio**	E71E3X	**CT Sec**	**1000** **333**	Select the size of the CT secondary, in Millivolts.
			CT Pri	**1 to 32767**	Enter the size of the CT primary, in Amps.
		E71E3AX	**CT Sec**	**Rcoil**	CT ratio secondary **NOTE:** The CT ratio secondary is read-only.
			CT Pri	**5000**	CT ratio primary **NOTE:** The CT ratio primary is read-only.
		VT Sec		**100** **110** **115** **120**	Select the size of the VT secondary, in Volts.
		VT Pri		**1 to 1000000**	Enter the size of the VT primary, in Volts.
Setup	**Nom**	**Freq(Hz)**		**50** **60**	Select the frequency of the electrical power system, in Hz.
		Sys Vol		**90 to 600**	Select the system voltage.
Setup	**D/T**	**DD-MMM-YYYY**		–	Set the current date using the specified format.
		hh:mm:ss			Set the time using the 24-hour format.
Setup	**Tariff**	**by S In**		**Disable** **1 S In** **2 S In**	The status input is associated with the tariff function. A signal to the status input changes the active tariff. **NOTE:** • If you change **S In** mode to other operation modes (input status, input metering, or energy reset) while multi-tariff control mode is in **S In** control mode, the multi-tariff function is automatically disabled. • If you change multi-tariff control mode to other control modes (communication or internal RTC) while **S In** is configured for multi-tariff function, the **S In** operation mode automatically changes to input status.
		by Comm		**Disable** **Enable**	The active tariff is controlled by communications. In the communication control mode, the tariff switching is triggered by command. Refer to Modbus register map, page 62
		by Clock		**Disable** **Day** **Week**	The tariff switching is triggered by the real-time clock. The configuration includes the selection of schedule mode. Set the time when each tariff period starts, using the 24 hour clock format (00:00 to 23:59). The start time of the next tariff is the end time of the current tariff. For example, T2 start equals the end of T1. Refer to Real-time clock (RTC) control mode, page 52

<table>
<tr><th>Menu</th><th>Sub menu</th><th>Parameters</th><th>Options</th><th>Description</th></tr>
<tr><td>Setup</td><td>Comm</td><td>IP Address
Subnet</td><td>N/W
• Bacnet
• HTTPs
• Modbus</td><td>Enable or disable the network settings (Refer to Configuring IP network services, page 35).
NOTE: The IP Address and Subnet are read-only.</td></tr>
<tr><td>Setup</td><td>Led</td><td>Mode</td><td>OFF
Alarm
Energy
• Channel: ActImpExp, ReaImpExp, AppImpExp
• Pulses per k_h: 0 to 9999999</td><td>Off disables the LED completely.
Alarm sets the LED for alarm notification. When configured for alarming, the LED also flashes (with 1 s ON and 1 s OFF) to indicate the meter has detected an alarm condition.
Energy sets the LED for energy pulsing. When configured for energy pulsing, the LED emits pulses that are then used to determine the accuracy of the meter’s energy measurements. This setting is ignored when the LED mode is set to Alarm.
• Channel: Select which accumulated energy channel to monitor and use for energy pulsing.
• Pulses per kWh: This setting defines how many pulses are sent to the LED for every 1 kWh, 1 kVARh or 1 kVAh accumulated energy.</td></tr>
<tr><td>Setup</td><td>S In</td><td>S1
S2</td><td>Mode
• Input Status
• Tariff Control
• Input Metering
• Partial Reset</td><td>Input status: Use for simple ON/OFF status inputs. The status inputs can be OF or SD signals of a circuit breaker.
Tariff Control: You can control the tariff either through communications, the internal clock or by 1 or 2 tariff inputs. Tariff control through the tariff inputs is performed by applying a proper combination of ON or OFF signal to the inputs. Each combination of ON or OFF signal results in the meter registering the energy in a particular tariff register.
<table>
<tr><th>S2</th><th>S1</th><th>Active tariff</th></tr>
<tr><td>0</td><td>0</td><td>Tariff 1</td></tr>
<tr><td>0</td><td>1</td><td>Tariff 2</td></tr>
<tr><td>1</td><td>0</td><td>Tariff 3</td></tr>
<tr><td>1</td><td>1</td><td>Tariff 4</td></tr>
</table>
NOTE: To select tariff control for S2, the S1 should be set to tariff control mode. If S1 is not set to tariff control mode, the tariff control option will not be available for S2.
Input Metering: You can configure the meter in input metering modes to collect the pulses for WAGES application. To activate this function, set the input metering pulse frequency (pulse/unit). The meter counts the number of pulses and calculates the number of units. Pulse width or pulse stop less than 10 ms is invalid for pulse counting.
Partial Reset: Energy reset function resets energy by tariff. Reset is activated by an ON signal lasting for over 10 ms.</td></tr>
</table>

Menu	Sub menu	Parameters	Options	Description
Setup	**Relay**	**Control**	**External** **Alarm**	External: The relay output is controlled remotely either through software or by a PLC using commands sent through communications. Alarm: The relay output is associated with the alarm system. The meter sends a pulse to the relay output port when the alarm is triggered.
		Behaviour	**Normal** **Timed** • **Time**: **1 to 9999** **Coil Hold**	Normal: This mode applies when control mode is set to External or Alarm. In the event of trigger for External mode, the relay output remains in the closed state until an open command is sent by the computer or PLC. In the event of trigger for Alarm mode, the relay output remains in the closed state until the drop out point is crossed. Timed: The relay output remains ON for the period defined by the On-Time setup register. Coil Hold: This mode applies when control mode is set to External or Alarm. The output turns on when the “energize” command is received and turns off when the “coil hold release” command is received. In the event of a control power loss, the output remembers and returns to the state it was in when control power was lost.
Setup	**DMD**	**Method**	**Sliding** **Rolling** **Fixed**	Sliding: Select an interval from the range 10, 15, 20, 30, 60 minutes. For demand intervals less than 15 minutes, the value is updated every 15 seconds. For demand intervals of 15 minutes and greater, the demand value is updated every 60 seconds. The meter displays the demand value for the last completed interval. Rolling: Select an interval and a subinterval. The subinterval must divide evenly into the interval (for example, three 5-minute (5 x 60 seconds) subintervals for a 15-minute interval). Demand is updated at the end of each subinterval. The meter displays the demand value for the last completed interval. Fixed: Select an interval from 1 to 60 minutes (in 1 minute increments). The meter calculates and updates the demand at the end of each interval. Refer to Demand calculation methods, page 53
		Int.Val(min)	**10** **15** **20** **30** **60**	Select the demand calculation block interval in minutes.
Setup	**Code**	**Low**	**0 to 9999**	Set the low passcode for accessing the alarms and resets.
		High	**10 to 9999**	Set the high passcode for accessing the setup and clock.
Setup	**Dfault**	–	–	Settings are reset to their defaults. **NOTE:** The webpage password resets to default but the HMI passcode does not reset to default.
Alarm	**PhLoss**	**Alarm**	**Enable**	Enabled by default and cannot be disabled
		V Thres%	**1 to 99**	Set the voltage threshold limit
		Imbl Thres%	**1 to 99**	Set the imbalance threshold limit
Reset	**Energy**	–	–	Reset the energy parameters.
	DMDPk	–	–	Reset the peak demand values.
	Log	–	–	Reset the data logged values.
	I/O	–	–	Reset the status input counters, relay counters, and input metering counters.
	All	–	–	Reset all the energy parameters, peak demand values, data logged values and I/O counters.

Menu	Sub menu	Parameters	Options	Description
HMI	Mode	DisplayStd	IEC IEEE	Select IEC or IEEE standard.
		FullScreen	Enable Disable	Enable or disable the full screen mode.
		AutoScroll		Enable or disable the auto scroll mode.
	LCD	Backlight	1 to 7	Increase or decrease the value to adjust the backlight settings.
		Contrast	1 to 9	Increase or decrease the value to adjust the contrast settings.
	Summry	Line1	–	Summary page.
		Line2	–	
		Line3	–	
Info	Ver	Firmware Version	xxx.yyy.zzz	Firmware version in xxx.yyy.zzz format.
	Oper	Operation Time	xxxx Days xx Hrs	Operation time of the meter in xxxx Days xx Hrs format.

Changing the display passcode

NOTICE

LOSS OF ACCESS

Record your device's user and passcode information in a secure location.

Failure to follow these instructions can result in data loss and loss of access to the device.

NOTICE

LOSS OF DATA OR PRODUCT CONFIGURATION

Do not let unauthorized personnel gain physical access to the device.

Failure to follow these instructions can result in data loss and loss of access to the device.

1. Use the ▽ button to navigate to **Code** and press OK button to edit the passcode.
2. Select **Low** or use the ▽ button to select **High** and press OK button to edit the passcode.
3. Use the ▽ or △ button to modify the selected digit.
4. Press OK to confirm the new parameter value and to shift to the next digit. Modify the next digit, if needed, or press OK.
5. Continue to move through the digits until you reach the last digit then press OK again to confirm the new parameter value.

   If you enter an invalid setting and press OK cursor stays in the field for that parameter until you enter a valid value.

Configuring via webpages

Webpages overview

The meter’s Ethernet connection allows you to access the meter so you can view data and perform configuration using a web browser.

NOTE: The recommended browsers to use for viewing the webpages are Microsoft Edge, Google Chrome, Mozilla Firefox, and Apple Safari.

⚠WARNING

INACCURATE DATA RESULTS

- Do not rely solely on data displayed on the display or in software to determine if this device is functioning correctly or complying with all applicable standards.
- Do not use data displayed on the display or in software as a substitute for proper workplace practices or equipment maintenance.

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

Accessing the meter webpages using device IP address

NOTE:

- The webpages are accessed through the meter's Ethernet port so it must be configured properly.
- It is mandatory to change the default password when you access the webpages for the first time. You cannot browse through the webpages without the default password change.
- The password must contain between 8 and 16 characters with at least 1 number, 1 capital letter and 1 special character.

1. Open the web browser and type the IP in the address field based on the following modes and press **Enter**:
   a. DHCP mode (Default): Use the IP address which is automatically assigned.
   b. Other than DHCP mode: Use the default IP [169.254.YY.ZZ] based on the MAC address (first time access) or the IP address set by the user.

      NOTE:

      - YY.ZZ are the last 2 bytes of the meter's MAC address. For example, a meter with MAC address 00-B0-D0-86-BB-F7 (hexadecimal) or 0-176-208-134-187-247 (decimal), set the IP address as 169.254.187.247.
      - For the meter with the MAC address 00-B0-D0-86-02-12 (hexadecimal) or 0-176-208-134-02-18 (decimal), set the IP address as 169.254.2.18.
2. Enter the **User Name** (default: **Administrator**) and **Password** (default: MAC address which is unique for each meter).

   NOTE: Enter the MAC address of the meter without colon in capital letters (For example: if the MAC address of the meter is 00:80:f4:02:14:38, then password is 0080F4021438).
3. Click **Login**.
4. Use the main tabs and sub tabs to select and display the meter's various webpages.

   NOTE: If the user session is inactive for a period of 10 minutes or more, the session gets timed-out and you need to re-login to access the webpages.
5. Click **Logout** to exit the meter webpages.

Changing user account password

NOTE: When you change your user account password, the user sessions get terminated and you need to re-login to access the webpages.

NOTICE
LOSS OF ACCESS Record your device's user and password information in a secure location. **Failure to follow these instructions can result in data loss and loss of access to the device.**

NOTICE
LOSS OF DATA OR PRODUCT CONFIGURATION Do not let unauthorized personnel gain physical access to the device. **Failure to follow these instructions can result in data loss and loss of access to the device.**

1. Click the user account on the top right corner of the webpage.
2. Click **Change Password** button.

   The **Password Modification** window opens.
3. Enter the **Old Password**, new **Password** and **Confirm Password**.

   NOTE: The password must contain between 8 and 16 characters with at least 1 number, 1 capital letter and 1 special character.
4. Click **Apply Changes** to save your new password.

Maintenance tab

Firmware upgrade

NOTE: Meter firmware includes a digital signature which helps ensure authenticity.

1. Click **Maintenance > Upgrade > Firmware**.
2. In the **Firmware Upgrade** section, click **Browse** button.

   The **Choose File Open** dialog box opens.
3. Select the **.sedp** file from the firmware release folder.
4. Click **Upgrade** button.

   The pop-up message **Do you want to apply the firmware upgrade now? The product will be restarted and all users will be disconnected from the application** opens.
5. Click **Yes** to apply the firmware upgrade.

   NOTE: The device will check the firmware compatibility before upgrade. The device will reject the package if all the files in the package are of lower version.

   The firmware upgrade process of the meter can take up to 20 minutes.

   After successful firmware upgrade, the meter restart can take up to 40 s.

   If the firmware upgrade is not successful, the meter displays error message. Try the firmware upgrade process again. If firmware upgrade process fails on multiple attempts, contact Technical Support representative.

Settings tab

Assigning user application name

NOTE: When you change the user application name, the user sessions get terminated and you need to re-login to access the webpages.

1. Click **Settings > General > Identification**.
2. Enter the device name in the **User Application Name** box.
3. Click **Apply Changes** to save your changes to the meter.

Configuring date/time

1. Click **Settings > General > Date/Time**.
2. Enter the **Date** in **yyyy/mm/dd** and **Time** in **hh:mm:ss** format.
3. Click **Apply Changes** to save your changes to the meter.

Enabling the HMI timeout period

You can configure the HMI configuration mode inactive session.

NOTE: If you are inactive for a certain period after entering the settings page in HMI (configuration mode), the screen gets locked automatically and the device will show the default **Summary** page.

1. Click **Settings > General > HMI**.
2. Enter the **HMI Timeout Period** in minutes.
3. Click **Apply Changes** to save your changes to the meter.

Parameter	Values	Description
HMI Timeout Period	**2 to 20** (**Default: 15**)	Enter the HMI configuration mode inactive session in minutes.

Configuring Ethernet (Dual port)

1. Click **Settings > Communication > Ethernet Configuration (Dual Port)**.
2. Modify the parameters as required.

3. Click **Apply Changes**.

   The warning message displays.

   NOTE: Make sure that you read and understand the message. Click **Reboot** to apply the changes or click **No** to retain the existing settings.

Parameter		Values	Description
Ethernet	**MAC Address**	–	A unique media access control address.
	Frame Format	• **Ethernet II** • **802.3** • **Auto**	Used to select the format for data sent over an Ethernet connection.
Ethernet Port 1 Control	**Speed and Mode**	• **10 Mbit/s - Half Duplex** • **10 Mbit/s - Full Duplex** • **100 Mbit/s - Half Duplex** • **100 Mbit/s - Full Duplex** • **Auto-negotiation**	Allows to select different speed and transmission mode. For the auto-negotiation option, the meter automatically negotiates the physical Ethernet connection speed and transmission mode for Ethernet port 1.
Ethernet Port 2 Control	**Speed and Mode**	• **10 Mbit/s - Half Duplex** • **10 Mbit/s - Full Duplex** • **100 Mbit/s - Half Duplex** • **100 Mbit/s - Full Duplex** • **Auto-negotiation**	Allows to select different speed and transmission mode. For the auto-negotiation option, the meter automatically negotiates the physical Ethernet connection speed and transmission mode for Ethernet port 2.
Broadcast Storm Protection	**Enable**	–	Enables the broadcast storm protection.
	Protection Level	• **Highest** • **High** • **Medium high** • **Medium low** • **Low** • **Lowest**	Defines the storm protection level. The meter limits the amount of information it broadcasts or rebroadcasts (based on this setting) to reduce collisions or network traffic. **NOTE:** If the level is changed, you are prompted to restart the device to implement changes.

Configuring IP

NOTE: When the IP is changed, it takes 30 s for communication to restart with the new IP.

1. Click **Settings > Communication > IP Configuration**.
2. Modify the parameters as required.

3. Click **Apply Changes**.

   The warning message displays.

   NOTE: Make sure that you read and understand the message. Click **Reboot** to apply the changes or click **No** to retain the existing settings.

Parameter			Description
IPV4	**Automatic**	• **DHCP** • **BOOTP**	Select the mode for assigning IPv4 parameters. Obtain IPv4 parameters automatically using BOOTP or DHCP. **NOTE:** By default, the meter is set to DHCP mode. You need to access the webpages to change the default DHCP mode to other mode (Refer to Accessing the meter webpages using device IP address, page 31).
	Manual	**IPv4 Address**	Enter the static IP address.
		Subnet Mask	Enter the Ethernet IP subnet mask address of your network.
		Default Gateway	Enter the gateway (router) IP address used for Wide Area Network (WAN) communication.
IPV6		**Enable**	Defines the IPv6 configuration.
		IPv6 Link-local Address	Displays the IP address in IPv6 format. You can use this IP address to open the meter webpages.
DNS	**Obtain DNS Servers Automatically via DHCP/ BOOTP**		Defines the dynamic behavior of the DNS server address configuration. Used to obtain the IP address from the DNS server automatically. **NOTE:** Domain Name System (DNS) is the naming system for computers and devices connected to a local area network (LAN) or the Internet.
	Manual	**Primary DNS Server**	Defines the IPv4 address of the primary DNS server.
		Secondary DNS Server	Defines the IPv4 address of the secondary DNS server. Used to perform a DNS resolution when the resolution fails with the primary DNS server.

Configuring IP network services

1. Click **Settings > Communication > IP Network Services**.
2. Modify the parameters as required.

3. Click **Apply Changes**.

   The warning message displays.

   NOTE: Make sure that you read and understand the message. Click **Yes** to apply the changes or click **No** to retain the existing settings.

Parameter		Values	Description
HTTP/Web	**Port**	**1 to 65534** **(Default: 80)**	Set the port number of the HTTP/Web server.
HTTPS	**Port**	**1 to 65534** **(Default: 443)**	Set the port number of the HTTPS server. **NOTE:** HTTPS is enabled by default.
Modbus TCP	**Enable**	**1 to 65534** **(Default: 502)**	Enable or disable the Modbus/TCP service.
	Port		
Discovery	**Enable**	**1 to 65534** **(Default: 5357)**	Enable or disable the DPWS service.
	Silent Mode		Enable and disable the silent mode and also to set the port number.
	Port		
DNS	**Port**	**1 to 65534** **(Default: 53)**	Set the port number of the DNS server.
BACnet/IP Settings	**Enable**	–	Enable or disable the BACnet/IP communication with the meter. **NOTE:** Check the firewall settings if device is not discovering in BACnet tool.
	Port	**1024 to 65534** **(Default: 47808)**	Set the port number the meter uses for BACnet/IP communication.
	Device ID	**1 to 4194302** **(Default: 123)**	Set the ID of the meter on your BACnet network. The ID must be unique on the network.
	BBMD Enable	–	Enable or disable the registration of a meter as a foreign device.
	BBMD Port	**1024 to 65534** **(Default: 47808)**	Set the port number that is used for communications with the BBMD.
	BBMD IP	–	Set the IP address of the BACnet/IP BBMD device, if use a BBMD on the network. Contact your local network administrator for parameter values.
	BBMD TTL(sec)	**0 to 65534** **(Default: 0)**	Set the duration/time (in seconds) the BBMD keeps an entry for this device in its foreign device table.
SNMP	**Enable**	–	Enable or disable the SNMP service.
	Listening Port	**1 to 65534** **(Default: 161)**	Set the listening and notification ports.
	Notification Port	**1 to 65534** **(Default: 162)**	

Configuring IP filtering

IP filtering activates IP address filtering and assigns designated level of access for IP clients connected to meter.

NOTE: By default, **Enable IP Filtering** option is enabled (read-only access).

1. Click **Settings > Communication > IP Filtering**.
2. In the **IP Filtering Exception List** section, click **Add Exception**.
3. In the **IP Address / Range** box, enter the IP address and select the access from the **Access Level** drop-down list.

4. Click **Add**.
5. Click **Apply Changes** to save your changes to the meter.

Parameter			Description
IP Filtering		**Enable IP Filtering**	Enable IP address filtering and assign the designated level of access.
IP Filtering Global Access List	**Edit IP Filtering Rules**	**IP Address / Range**	The IPv4 or IPv6 address fields are editable, except for the anonymous IP address field, which is indicated by asterisks. **NOTE:** If IP filtering is enabled, anonymous IP addresses can only have read-only or no access; they cannot have full access.
		Access Level • **None** • **Read-Only**	Define the access level for the corresponding IP addresses.
IP Filtering Exception List	**Add IP Filtering Rules**	**IP Address / Range**	Assign list of user-defined IP addresses to connected devices. **NOTE:** The maximum number of allowed IP address is 10.
		Access Level • **None** • **Read-Only** • **Read-Write**	Define the access level for the corresponding IP addresses.

Configuring SNMP

The meter supports SNMP allowing a network administrator to access the meter remotely with an SNMP manager and view the networking status and diagnostics of the meter in the MIB-II format.

NOTE: You can configure the **SNMP** parameters only when you enable the **SNMP** in the **IP Network Services** section (Refer to Configuring IP network services, page 35).

1. Click **Settings > Communication > SNMP**.
2. Modify the parameters as required.

3. Click **Apply Changes** to save your changes to the meter.

Parameter		Description
System Objects	**System Location**	Enter the system location.
	System Contact	Enter the name of SNMP administrator.
	Automatic Configuration of System Name	Selects the system name automatically.
	Manual Configuration of System Name	Enter a descriptive name in **System Name** tab.
Community Names	**Get Community Name**	Enter the community names used for SNMP requests. **NOTE:** It is highly recommended to set a community name that best meets your security guidelines. The community Name must contain between 8 and 16 characters with at least 1 uppercase, 1 lowercase and 1 special character.
	Set Community Name	
	Trap Community Name	
Enabled Traps	**Cold Start Trap**	Generates a trap when the meter is powered ON.
	Warm Start Trap	Generates a trap when SNMP is enabled.
	Link Down Trap	Generates a trap when an Ethernet port communication link is disconnected.
	Link Up Trap	Generates a trap when an Ethernet port communication link is reconnected.
	Authentication Failure Trap	Generates a trap when an SNMP manager is accessing the meter with incorrect authentication.
SNMP Managers	**Manager #1**	Enter the name or IP address of SNMP Manager #1.
	Manager #2	Enter the name or IP address of SNMP Manager #2.

Configuring system log

This page allows the user to set a system log server to receive the various log events on a specific interval.

You can choose the category and severity of events to be received.

NOTE: By default, all the **Security** events will be sent to the server if the service is enabled.

1. Click **Settings > Communication > System Log**.
2. Modify the parameters as required.

3. Click **Apply Changes** to save your changes to the meter.

Parameter		Values	Description
System Log Service	**Enable**	–	Enable or disable the system log service.
System Log Server settings	**System Log server Address**	–	Enter the server name or IP address.
	Connection Mode	**TCP/TLS** **TCP** **UDP**	Select the mode.
	System Log Server Port	**1 to 65534**	Enter the system log server port number.
System Log Export Settings	**Export Interval**	**0 to 3600** **(Default: 60)**	Enter the interval duration for exporting the log data in seconds.
	Export Filters	**Category**: • **Application** • **Security** • **System** • **Other** • **All**	Select the category of the events. **NOTE:** The events with category **Security** are always transferred irrespective of the selection in severity filters.
		Severity: • **Alert** • **Critical** • **Debug** • **Emergency** • **Error** • **Information** • **Notice** • **Warning** • **All**	Select the severity of the event.
System Log Test		–	Test connection

Configuring advanced Ethernet settings

1. Click **Settings > Communication > Advanced Ethernet Settings**.
2. Modify the advanced Ethernet parameters as required.
3. Click **Apply Changes** to save your changes to the meter or click **Default** to retain the factory settings.

Parameter	Values	Description
Time To Live	**1 to 255**	The maximum number of hops (in other words, devices such as routers) that a TCP packet is allowed to pass through before it is discarded.
Enable TCP Keep Alive	–	Enable or disable the TCP keep alive transmissions. If disabled, the keep alive packets do not get sent and the connection remains open until it gets closed.
Time	**1 to 65000**	A timer (in seconds) that detects when a connected device on an idle connection becomes unavailable due to events such as a reboot or shutdown.
ARP Cache Timeout	**1 to 65000**	The length of time (in minutes) that ARP entries are kept in the ARP cache.

User accounts

The meter users are assigned user names and passwords. Each user is assigned with a role to access the webpages by the administrator.

There are two pre-defined user accounts:

- **Administrator** (default password is MAC address which is unique for each meter)

  NOTE: Enter the MAC address of the meter without colon in capital letters (For example: if the MAC address of the meter is 00:80:f4:02:14:38, then password is 0080F4021438).

- **Guest** (default password is **guest**)

⚠WARNING

POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

- Change default passwords at first use to help prevent unauthorized access to device settings, controls, and information.

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

In a continuous effort to encourage users on the awareness about the cybersecurity best practices and the meters more cyber secure in their applications, the users are forced to change the default factory-set password to a complex password.

Roles

Webpages access permissions are based on roles. You must be an administrator to assign user access roles.

User account	Password	Role	Access
Administrator	MAC address which is unique for each meter **NOTE:** Enter the MAC address of the meter without colon in capital letters (For example: if the MAC address of the meter is 00:80: f4:02:14:38, then password is 0080F4021438).	**Administrator**	Full access to all webpages and its features with read/write permission. **NOTE:** During first time login, you are forced to change the default password for system security.
Guest	**guest**	**Guest**	Access only to **Monitoring** tab and **Device Identification** page in the **Diagnostics** tab. **NOTE:** During first time login, you are forced to change the default password for system security.

Adding user accounts for webpages

In addition to the **two default** user accounts, you can create up to **10** user accounts.

NOTE: If the **Username** or **Password** credentials of the **Administrator** user account are lost, you can reset using another **Administrator** user account.

1. Click **Settings > User Management > User Accounts**.
2. In the **User Accounts** section, click **Add User**.

   The **Add User** section opens.
3. Enter the **Username**, **Password** details and assign the user a **Role**.

4. Click **Apply Changes** to save your changes to the meter.

Parameter	Description
Username	Enter a name (1 to 15 characters) for a new user. **NOTE:** Username is case-sensitive and can contain special characters.
Password	Enter a password (8 to 16 characters) for a new user. **NOTE:** The password must contain between 8 and 16 characters with at least 1 number, 1 capital letter and 1 special character.
Confirm Password	Confirm the password.
Role • **Administrator** • **Guest**	Assign a role for the user.

Deleting user account

NOTE: You must have **Administrator** role access to delete the user accounts.

1. Click **Settings > User Management > User Accounts**.
2. In the **User Accounts** section, click icon.
   The **User Deletion** dialog box opens.
3. Click **Yes** to delete the user account.

Edit user account details

NOTE: You must have **Administrator** role access to change the user account password and assign role to the user:

1. **User account password reset:**
   a. Click **Settings > User Management > User Accounts**.
   b. In the **User Accounts** section, click icon.
      The **Edit User** section opens.
   c. Enter the **New Password** and **Confirm Password** details.
      NOTE: The password must contain between 8 and 16 characters with at least 1 number, 1 capital letter and 1 special character.
   d. Click **Apply Changes** to save your changes to the meter.
2. **Assigning user role:**
   NOTE: To assign role to the user, you must also reset the password.
   a. Click **Settings > User Management > User Accounts**.
   b. In the **User Accounts** section, click icon.
      The **Edit User** section opens.
   c. From the drop-down list, assign the **Role** to the user.
   d. Enter the **New Password** and **Confirm Password** details.
      NOTE: The password must contain between 8 and 16 characters with at least 1 number, 1 capital letter and 1 special character.
   e. Click **Apply Changes** to save your changes to the meter.

Terminating user account sessions

NOTE: You must have **Administrator** role access to terminate the user account sessions.

1. Click **Settings > User Management > User Accounts**.
2. In the **User Accounts** section, click  icon.

   The **Terminate User Sessions** dialog box opens with the warning message "**Are you sure you want to terminate sessions ? This will terminate all active sessions for the user**".
3. Read the warning message and click **Yes** to terminate the user account sessions.

Operating

You can view or interpret the meter display data via:

- HMI (Refer to Operating via HMI, page 43)
- Webpages (Refer to Operating via webpages, page 46)

Operating via HMI

Display mode

Overview

The display mode allows you to view or monitor the measured parameters.

Some of the parameters in the display mode are as follows:

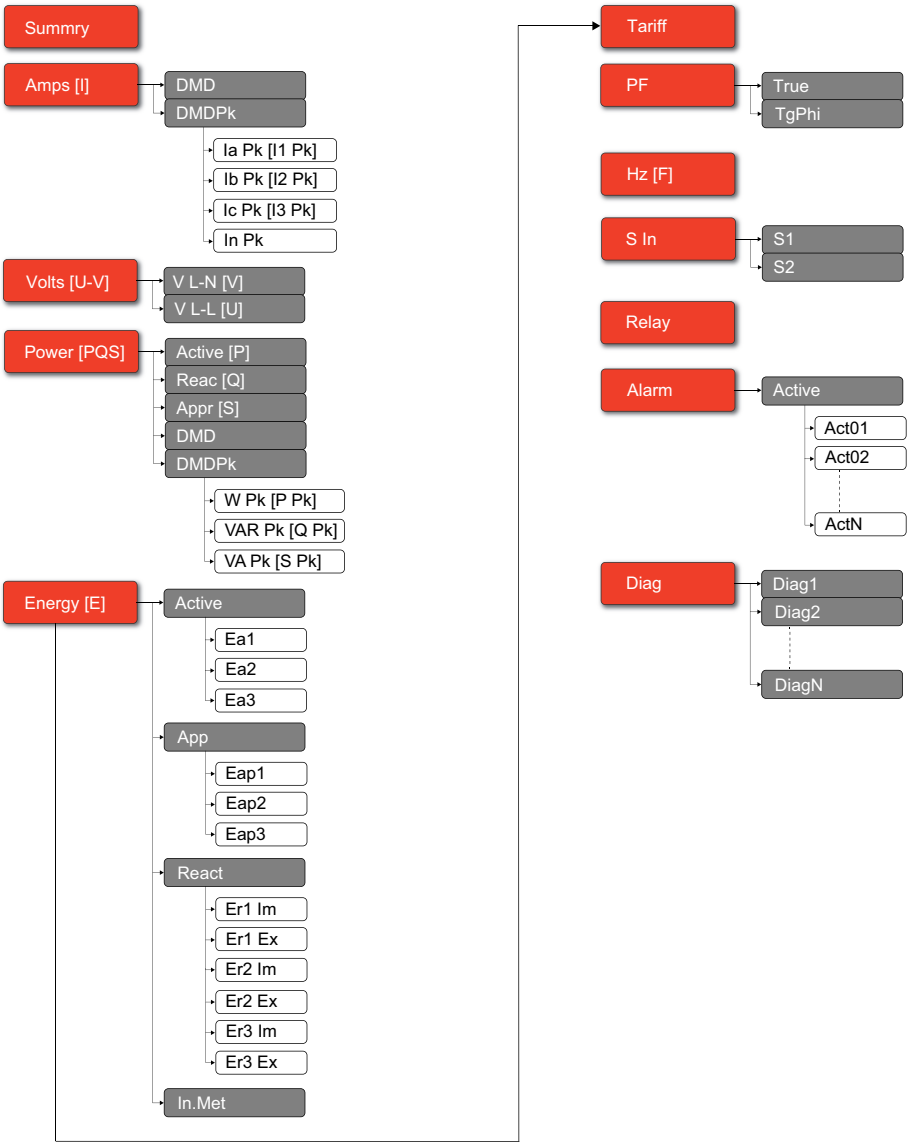
- Summary page
- Current per phase
- Voltage L-N, L-L
- Active, reactive, apparent power and demand
- Active, apparent, reactive energy and input metering
- Tariff
- Power factor
- Frequency
- Status inputs
- Relay status
- Active alarms with timestamps
- Diagnosis

Entering the display mode

- If full screen mode is enabled, press any key to switch from full screen mode to display mode.
- If full screen mode is disabled, press ESC to switch from configuration mode (**Setup** page) to display mode.

Display mode menu tree

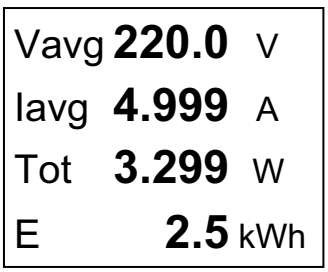
The titles listed are for the HMI mode in IEEE, with the corresponding titles in IEC mode in square brackets [ ].



Full screen mode

Overview

The main title and the sub menu in full screen mode are hidden and the values are expanded to full screen.

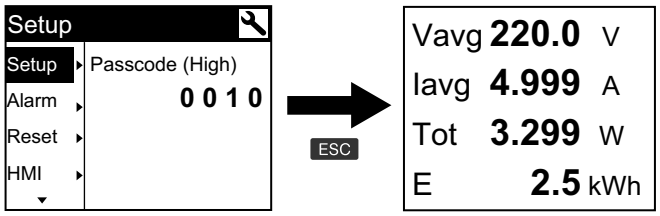


The full screen mode is enabled by default. You can modify full screen enable/disable and auto scroll enable/disable.

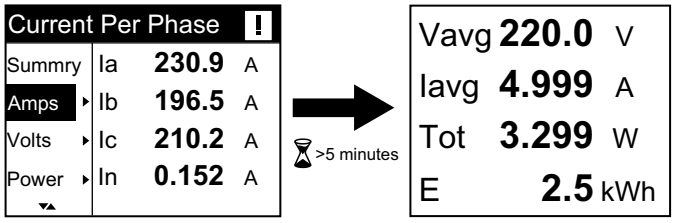
Full screen	Auto scroll	Description
Enable	Disable	Fixed summary page at full screen mode.
Enable	Enable	Auto scrolling pages at full screen mode. The interval between any 2 scrolling pages is the value specified in seconds. Range: 1 to 99 Default: 10
Disable	–	Full screen mode disabled.

Entering the full screen mode

- If full screen mode is enabled, press ESC to switch from configuration mode (**Setup** page) to full screen mode.

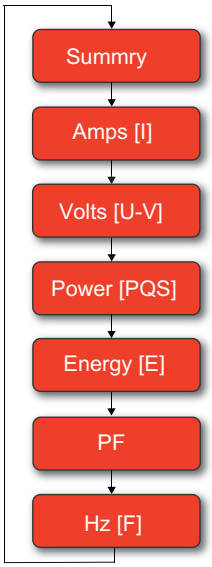


- Display mode automatically switches to full screen mode if there is no key press for five minutes.



Auto scroll mode menu tree

The titles listed are for the HMI mode in IEEE, with the corresponding titles in IEC mode in square brackets [ ].



Operating via webpages

Monitoring tab

Interpreting basic readings data

Click **Monitoring > General Monitoring > Basic Readings**.

Data	Parameters	Description
Basic	**Load Current(A)** **Power** **Power Factor Total** **Voltage(V)** **Frequency(Hz)**	Present basic parameter values.
Demand	**Demand Current (A)** **Demand Power**	Present and peak demand parameters along with date time at peak and date time of the last reset.
Energy	**Energy**	Accumulated energy values along with date time of the last reset.

Interpreting active alarms data

1. Click **Monitoring > General Monitoring > Active Alarms**.
2. Click **Update** button to refresh the active alarms page.

Parameter	Description
Event Type	List of active (unacknowledged) or inactive (acknowledge) alarm events and a description of the event type.

Interpreting inputs/outputs data

Click **Monitoring > General Monitoring > Inputs/Outputs**.

Parameter	Description
Inputs	Current status of the status inputs.
Outputs	Current status of the relay output.

Interpreting data log

The **Data Log** window allows you to view and download the records of the data log parameters (Datalog_1 to Datalog_16) configured via BACnet objects or Modbus TCP register.

1. Click **Monitoring > General Monitoring > Data Log**.
2. From the **Data Log** drop-down list, select the data log parameters (Datalog_1 to Datalog_16).
   a. Click **View** to interpret the last 20 records of the data log parameters along with the **Date/Time** and their **Value**.
   b. Click **Update** to refresh the records of the data log parameters.
   c. Click **Download** to export the data log parameters to **.csv** format.

Diagnostics tab

Viewing device identification details

Click **Diagnostics > General > Device Identification** to view the information about your meter.

Parameter	Description
User Application Name	Device name that is assigned by the user (Refer to Assigning user application name, page 32).
Product Range	Name of the device type.
Product Model	Device model number.
Serial Number	Device serial number.
Firmware Revision	Current firmware version.
Unique Identifier	Combination of MAC address and the time.
MAC Address	Unique MAC address.
IPv4 Address	Addressing scheme to specify the source and destination addresses.
IPv6 Link-local Address	Address used to communicate on the local network.
Manufacture Date	Date when the device was manufactured.

Enabling the device physical location

You need to enable the device physical location feature using the webpages to locate your meter on the panel.

1. Click **Diagnostics > General > Device Identification**.
2. In the **Device Physical Location** section, click **ON** to turn the **Identify Device** toggle key.

   The backlight flashes at a faster rate for 15 s.

   NOTE:

   - If the backlight flashes due to Alarm/Diagnostic error, the backlight will continue to flash even after 15 s.
   - Any button press on the meter indicates that the device is identified and the backlight stops flashing.

Interpreting date and time

Click **Diagnostics > General > Date/Time**.

Parameter	Description
Date (yyyy/mm/dd)	Current date.
Time(hh:mm:ss)	Current time.
Uptime	Run time after the system power-up.

Interpreting Ethernet data

Click **Diagnostics > Communication > Ethernet**.

Ethernet Global Statistics

Parameter	Description
Frames Received OK	Number of frames received.
Frames Transmitted OK	Number of frames transmitted.

Ethernet Global Statistics (Continued)

Parameter	Description
Reception Errors	Number of errors frame during reception.
Transmission Errors	Number of errors frame during transmission.

Ethernet Port 1 Statistics And Ethernet Port 2 Statistics

Parameter	Description
Link Speed	Operational speed (10 Mbps or 100 Mbit/s).
Duplex Mode	Current mode of operation (Full duplex or Half duplex).

Procedure to reset Ethernet global statistics

1. Click **Diagnostics > Communication > Ethernet**.
2. In the **Ethernet Global Statistics** section, click **Reset**.
   Resets the cumulative diagnostic data to 0.

Interpreting IP network services data

Click **Diagnostics > Communication > IP Network Services**.

Modbus TCP Port data

Parameter	Description
Port Status	Status of the connected Ethernet port.
Opened TCP Connections	Number of active connections. **NOTE:** The maximum number of TCP connections supported is 32.
Received Messages	Number of messages received.
Transmitted Messages	Number of messages transmitted.

Modbus TCP Port Connections data

Parameter	Description
Remote IP	Remote IP address.
Remote Port	Remote port number.
Local Port	Local port number.
Transmitted Messages	Number of messages transmitted.
Received Messages	Number of messages received.
Sent Errors	Number of error messages sent.

Procedure to reset Modbus TCP messages

1. Click **Diagnostics > Communication > IP Network Services**.
2. In the **Modbus TCP Port Connections** section, click **Reset**.
   Resets the transmitted messages, received messages, and sent errors to 0.

Interpreting system data

Click **Diagnostics > Communication > System**.

Parameter	Description
CPU	Status of the CPU: • Nominal • Degraded • Out of service
Boot Memory	Healthiness of the boot memory: • Nominal • Degraded • Out of service
EEPROM	Healthiness of EEPROM: • Nominal • Degraded • Out of service
File System	Healthiness of the file system: • Nominal • Degraded • Out of service
Ethernet PHY1	Healthiness of PHY1 hardware: • Nominal • Degraded • Out of service
Ethernet PHY2	Healthiness of PHY2 hardware: • Nominal • Degraded • Out of service
DDR	Healthiness of the execution memory: • Nominal • Degraded • Out of service

Maintenance and troubleshooting

Overview

The meter does not contain any user-serviceable parts. If the meter requires service, contact Technical Support representative.

NOTICE
RISK OF DAMAGE TO THE METER • Do not open the meter case. • Do not attempt to repair any components of the meter. **Failure to follow these instructions can result in equipment damage.**

Do not open the meter. Opening the meter voids the warranty.

LED indicators troubleshooting

Problem	Probable cause	Possible solution
Operation LED remains ON and does not flash	Internal hardware problem	Perform a hard reset: turn off control power to the meter, then re-apply power. If the problem persists, contact Technical Support.
Energy pulsing LED remains ON and does not flash (1 s OFF and 1 s ON)	Overrun state	Over counting due to wrong configuration or overload.

Diagnostic codes

If the combination of the backlight and the error / alert icon indicates an error or an abnormal situation, navigate to the diagnostics screen and find the diagnostics code. If the problem persists after following the instructions in the table, please contact Technical Support.

Diagnostic code	Description	Possible solution
–	LCD display not visible.	Check and adjust LCD contrast / backlight setting.
–	Push buttons do not function.	Restart the meter by powering off and powering on again.
101, 102	Metering stops due to internal error. Total energy consumption is displayed.	Enter the configuration mode and implement **Reset Config**.
201	Metering continues. Mismatch between frequency settings and frequency measurements.	Correct frequency settings according to the nominal frequency of the power system.
202	Metering continues. Mismatch between wiring settings and wiring inputs.	Correct wiring settings according to wiring inputs.
203	Metering continues. Phase sequence reversed.	Check wire connections and correct wiring settings, if needed.
205	Metering continues. Date and time have been reset due to loss of power.	Set date and time.
206	Metering continues. Pulse is missing due to overload on energy pulse output.	Check the energy pulse output settings.
207	Metering continues. Abnormal internal clock function.	Restart the meter by powering off and powering on again then reset the date and time.
301	Internal communication error	Check for proper Ethernet cable connection. If the diagnostic code persists for more than 2 minutes, contact Technical Support.

Diagnostic code	Description	Possible solution
303	IP conflict	Check the duplicate IP in the network and assign unique IP for each meter.
304	IP not set (default IP)	Assign the meter with unique IP.

References

Multi-tariff

Overview

The meter provides multi-tariff energy accumulation. It supports up to 4 tariffs.

The tariff switching has the following 3 types of control modes:

- Status input
- Communication
- Internal real-time clock (RTC)

You can configure the control mode by using the display (all the 3 modes) or by using communication (not for RTC).

The following table presents the available options to change the multi-tariff control modes:

From	To
0 = Disabled	Comm mode, 1 S In mode and 2 S In mode
1 = Comm mode	Disabled
2 = 1 S In mode	2 S In mode
3 = 2 S In mode	1 S In mode
4 = RTC mode	Comm mode

Status input control mode

In the **S In** control mode, the tariff switching is triggered by the change in input status of **S In**.

Communication control mode

The active tariff is controlled by communications. In the communication control mode, the tariff switching is triggered by command (Refer to Modbus register map, page 62).

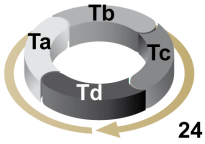
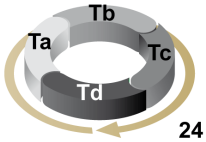
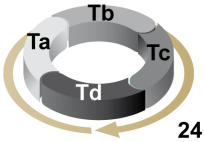
Real-time clock (RTC) control mode

In RTC control mode, the tariff switching is triggered by the real-time clock.

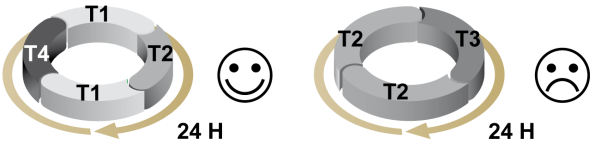
You can configure RTC control mode by using the display. The configuration includes the selection of schedule mode and the setup of 1 or 2 schedulers depending on the schedule modes.

The 2 schedule modes for RTC trigger are:

- **Day mode**: weekdays and weekend share the same peak and peak-off duration and only 1 scheduler should be set.
- **Week mode**: the tariff management of weekdays and weekends are controlled separately, and 2 schedulers should be set.

	Weekdays	Weekend
Day mode		
Week mode		

A scheduler supports a maximum of 4 time segments (Ta, Tb, Tc, and Td) for maximum 4 tariffs (T1, T2, T3, and T4). You can assign Ta, Tb, Tc, or Td to any tariff if any adjacent time segment has a different tariff. A valid scheduler always starts from Ta segment, and skipping time segments is not allowed.



In the setup of a schedule, you should define the tariff switching time for each target tariff. In the application, when the set switching time is reached, the tariff switches automatically.

Demand

Demand calculation methods

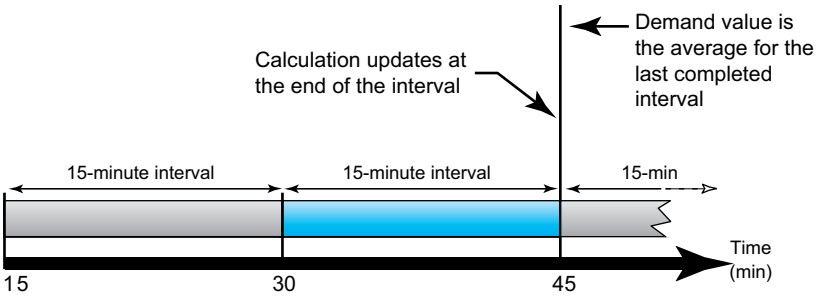
Power demand is the energy accumulated during a specified period divided by the length of the period. Current demand is calculated using arithmetical integration of the current rms values during a time period, divided by the length of the period. How the meter performs this calculation depends on the selected method. To be compatible with electric utility billing practices, the meter provides the block interval power/current demand calculations. The default demand calculation is set to a fixed block with a 15-minute interval.

In the block interval demand method, select a block of time that the meter uses for the demand calculation. You can choose how the meter handles the block of time (interval). 3 different modes are possible:

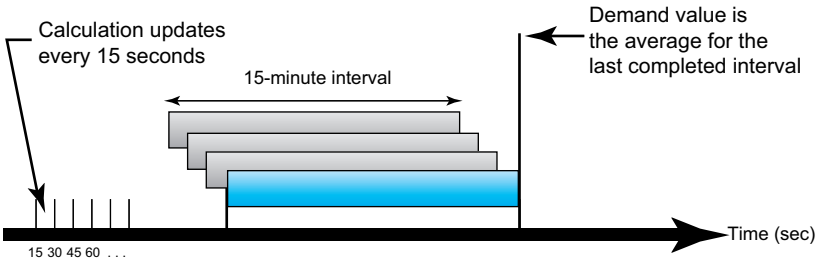
- **Fixed block** - Select an interval from 1 to 60 minutes (in 1 minute increments). The power meter calculates and updates the demand at the end of each interval.
- **Sliding block** - Select an interval from 1 to 60 minutes (in 1 minute increments). For demand intervals less than 15 minutes, the value is updated every 15 seconds. For demand intervals of 15 minutes and greater, the demand value is updated every 60 seconds. The meter displays the demand value for the last completed interval.
- **Rolling block** - Select an interval and a subinterval. The subinterval must divide evenly into the interval (for example, three 5-minute (5 x 60 seconds) subintervals for a 15-minute interval). Demand is updated at the end of each subinterval. The meter displays the demand value for the last completed interval.

The following figures illustrate the 3 ways to calculate demand power using the block method. For illustration purposes, the interval is set to 15 minutes.

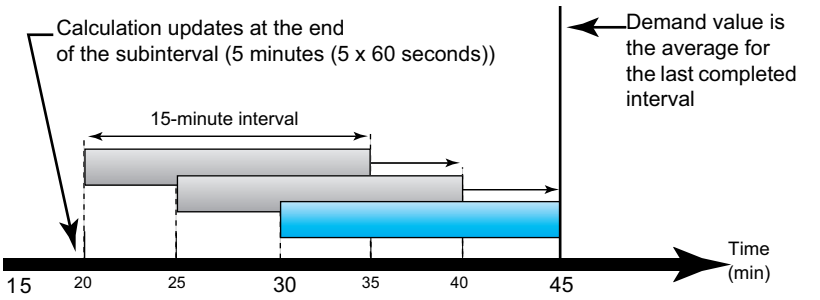
Timed Fixed Block



Timed Sliding Block



Timed Rolling Block



Peak demand

In nonvolatile memory, the meter maintains a maximum operating demand values called peak demand. The peak is the highest value (absolute value) for each of these readings since the last reset.

You can reset peak demand values from the meter display. You should reset peak demand after changes to basic meter setup such as CT ratio or power system configuration.

Power, energy and power factor

Power (PQS)

A typical AC electrical system load has both resistive and reactive (inductive or capacitive) components. Resistive loads consume real power (P) and reactive loads consume reactive power (Q).

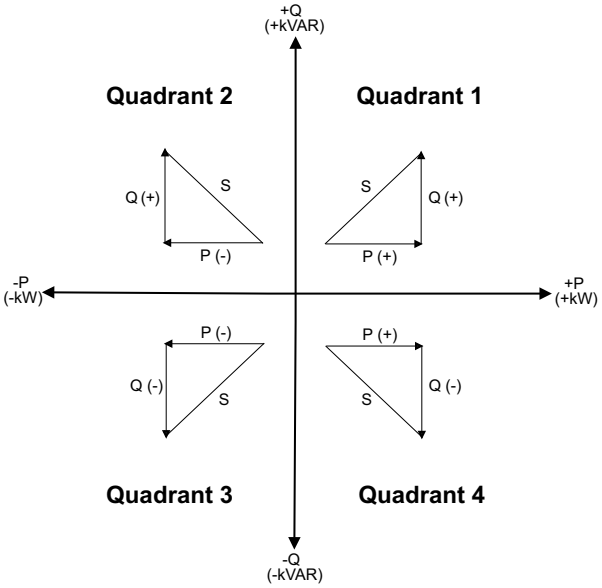
Apparent power (S) is the vector sum of real power (P) and reactive power (Q):

$$S = \sqrt{P^2 + Q^2}$$

Real power is measured in watt (W or kW), reactive power is measured in var (VAR or kVAR) and apparent power is measured in volt-amp (VA or kVA).

Power and the PQ coordinate system

The meter uses the values of real power (P) and reactive power (Q) on the PQ coordinate system to calculate apparent power.



Power flow

Positive power flow P(+) and Q(+) means power is flowing from the power source towards the load. Negative power flow P(-) and Q(-) means power is flowing from the load towards the power source.

Energy delivered (imported) / energy received (exported)

The meter interprets energy delivered (imported) or received (exported) according to the direction of real power (P) flow.

Energy delivered (imported) means positive real power flow (+P) and energy received (exported) means negative real power flow (-P).

Quadrant	Real (P) power flow	Energy delivered (imported) or received (exported)
Quadrant 1	Positive (+)	Energy delivered (imported)
Quadrant 2	Negative (-)	Energy received (exported)
Quadrant 3	Negative (-)	Energy received (exported)
Quadrant 4	Positive (+)	Energy delivered (imported)

Power factor (PF)

Power factor (PF) is the ratio of real power (P) to apparent power (S).

PF is provided as a number between -1 and 1 or as a percentage from -100% to 100%, where the sign is determined by the convention.

$$PF = \frac{P}{S}$$

A purely resistive load has no reactive components, so its power factor is 1 (PF = 1, or unity power factor). Inductive or capacitive loads introduce a reactive power (Q) component to the circuit which causes the PF to become closer to zero.

True PF

True power factor includes harmonic content.

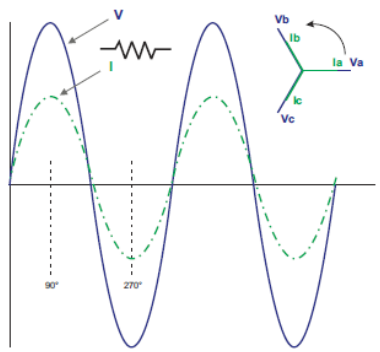
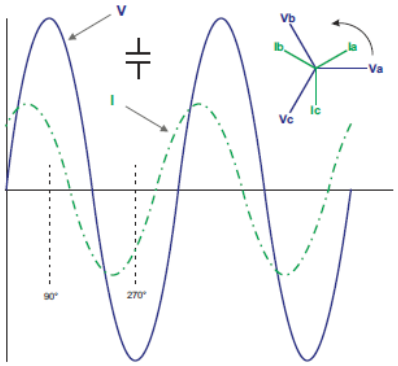
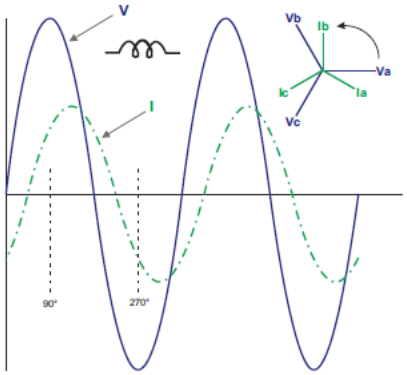
PF lead / lag convention

The meter correlates leading power factor (PF lead) or lagging power factor (PF lag) with whether the current waveform is leading or lagging the voltage waveform.

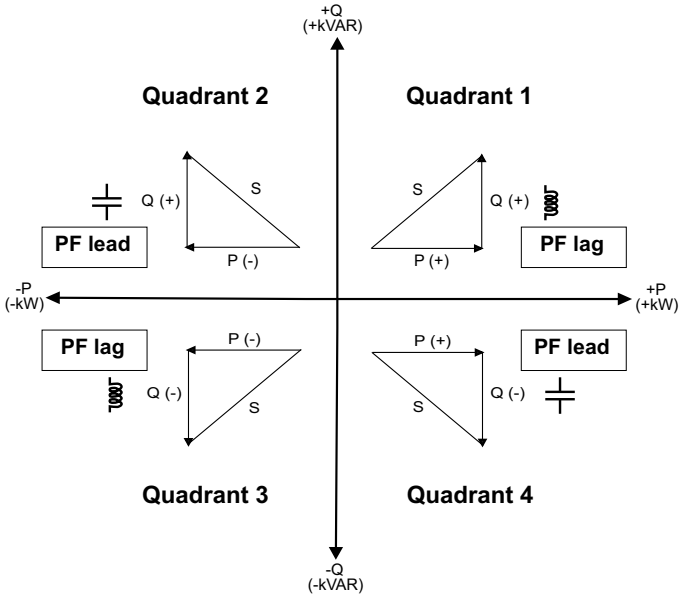
Current phase shift from voltage

For purely resistive loads the current waveform is in phase with the voltage waveform. For capacitive loads, current leads voltage. For inductive loads, current lags voltage.

Current lead / lag and load type

Current and voltage in phase (resistive)	Current leads voltage (capacitive)	Current lags voltage (inductive)
		

Power and PF lead / lag



PF lead / lag summary

NOTE: The lagging or leading distinction does **NOT** equate to a positive or negative value. Rather, lagging corresponds to an inductive load, while leading corresponds to a capacitive load.

Quadrant	Current phase shift	load type	
Quadrant 1	Current lags voltage	Inductive	PF lag
Quadrant 2	Current leads voltage	Capacitive	PF lead
Quadrant 3	Current lags voltage	Inductive	PF lag
Quadrant 4	Current leads voltage	Capacitive	PF lead

PF sign convention

The PF sign can be positive or negative, and is defined by the conventions used by the IEEE or IEC standards.

You can set the PF sign convention by changing the HMI mode to either IEC or IEEE.

PF sign convention: IEC

The PF sign is solely dependent on the direction of real power (P) flow, and is independent of the load being inductive or capacitive.

The PF is positive for normal (positive) real power (P) flow, that is when real power (P) flows into a load, i.e energy is being consumed by the load.

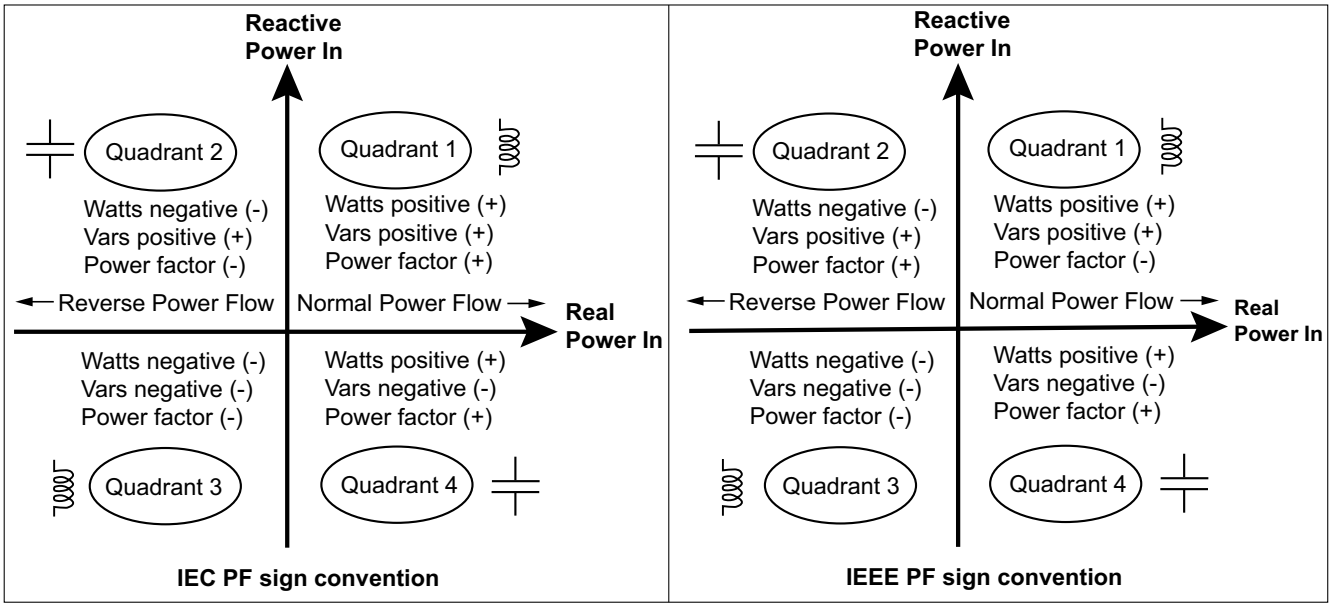
The PF is negative for reverse (negative) real power (P) flow, that is when real power (P) flows out of the load. i.e energy is being generated by the load.

- Quadrant 1 and 4: Positive real power (+kW), the PF sign is positive (+).
- Quadrant 2 and 3: Negative real power (-kW), the PF sign is negative (-).

PF sign convention: IEEE

The PF sign is solely dependent on the nature of the load (that is capacitive or inductive). In this case, it is independent on the direction of real power (P) flow.

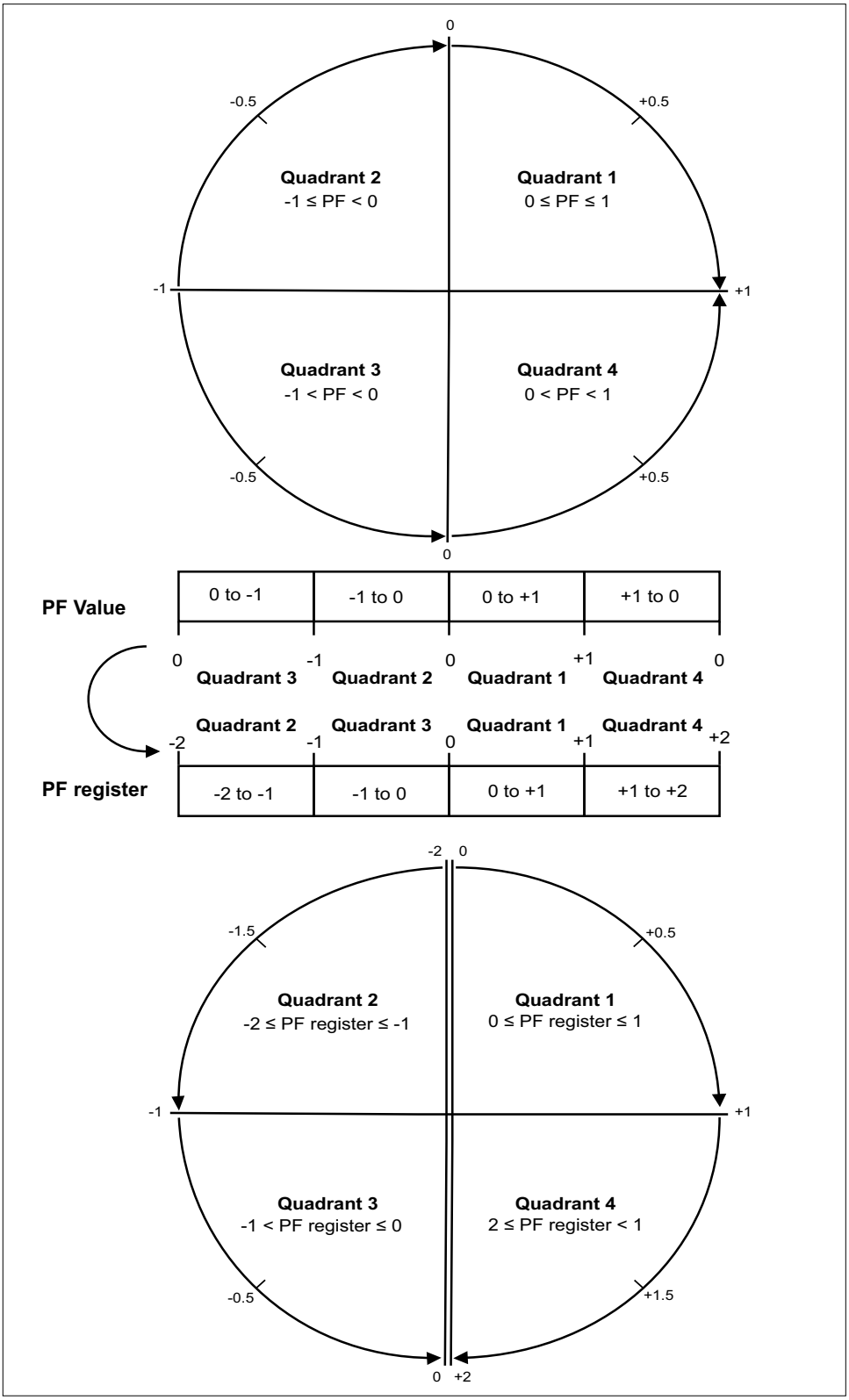
- For a capacitive load (PF leading, quadrant 2 and 4), the PF sign is positive (+).
- For an inductive load (PF lagging, quadrant 1 and 3), the PF sign is negative (-).



Power factor register format

The meter performs a simple algorithm to the PF value then stores it in the PF register.

Each power factor value (PF value) occupies one floating point register for power factor (PF register). The meter and software interpret the PF register for all reporting or data entry fields according to the following diagram:



The PF value is calculated from the PF register value using the following formulae:

Quadrant	PF range	PF register range	PF formula
Quadrant 1	0 to +1	0 to +1	PF value = PF register value
Quadrant 2	-1 to 0	-2 to -1	PF value = (-2) - (PF register value)
Quadrant 3	0 to -1	-1 to 0	PF value = PF register value
Quadrant 4	+1 to 0	+1 to +2	PF value = (+2) - (PF register value)

Data logging

The meter supports data logging feature that records 16 parameters for 36 months with 15-minute interval (default). The data log can be configured via Modbus TCP or BACnet.

By default, the data logging feature is enabled for selected values. You can also configure the meter to record other parameters such as received energy, input metering accumulations and demand values.

Configuration

NOTE: *The configuration settings in the Modbus has impact on the BACnet trend feature configuration and vice versa.*

Configuring parameters via Modbus TCP

You can configure the data log parameters (Parameter 1 to Parameter 16) from the table **Data Log - parameters available to select, page 77** ***(Record items list (1 to 75))*** through Modbus TCP register.

Refer to Modbus register map, page 62 for detailed configuration.

Configuring parameters via BACnet

You can configure the data log parameters (Parameter 1 to Parameter 16) from the table **Analog input objects, page 83** ***(AI1 to AI75)*** through BACnet trend log objects.

Refer to BACnet Trend log objects, page 89 for detailed configuration.

Reading data

Reading logged data via Modbus TCP

You can access or retrieve the logged data or records using file read function code 20 (0x14) in Modbus.

Reading logged data via BACnet

You can access the logged data with corresponding timestamps through the Log_Buffer property of the Trend_Log object using the BACnet ReadRange service. The meter supports “by Position”, “by Sequence Number” and “by Time” modes of the ReadRange service.

Reading logged data via webpage

You can view and download the records of the data log parameters (Datalog_1 to Datalog_16) configured via BACnet trend log objects or Modbus TCP register list through webpage (Refer to Interpreting data log, page 46).

Communications via Modbus TCP

Overview

The Modbus register map features data outputs such as demand calculations, per phase signed W, VA and VAR, import/export Wh and VAh, VARh accumulators by quadrant, and data logging configuration. The meter supports variable CTs and PTs. The meter permits variable scaling of the 16-bit integer registers via the scale registers. The 32-bit floating point registers do not need to be scaled.

Integer registers begin at 001 (0x001). Floats at 257 (0x101). Configuration registers at 129 (0x081). Values not supported in a particular system type configuration report QNAN (0x8000 in Integer Registers, 0xFFC00000 in Floating Point Registers). Register addresses are in PLC style base 1 notation. Subtract 1 from all addresses for the base 0 value used on the Modbus link.

NOTE:

- The maximum response time of the meter is 3 s.
- The difference between two consecutive Write (W) options must be > 3 s.

Supported Modbus commands

Command	Description
0x03	Read Holding Registers
0x04	Read Input Registers
0x06	Preset Single Register
0x10	Preset Multiple Registers
0x11	Report ID
	Return string: • byte0: address • byte1: 0x11 • byte2: #bytes following w/out crc • byte3: ID byte = 247 • byte4: status = 0xFF if the operating system is used; status = 0x00 if the reset system is used. • bytes5+: ID string = “Veris E71E3 series meter - RESET SYSTEM RUNNING RS Version x.y.ztt (x - Major, Y - Minor, z - Quality, tt - Internal)” last 2 bytes: CRC.
0x2B	Read Device Identification, BASIC implementation (0x00, 0x01 and 0x02 data), Conformity Level 1.
	Object values: • 0x01: Veris • 0x02: E71E3X or E71E3AX • 0x03: x.y.ztt (x - Major, Y - Minor, z - Quality, tt - Internal) is the OS version number (reformatted version of the Modbus register #7001, (Firmware Version, Operating System). If register #7001 == 12345, then the 0x03 data would be “V12.345”).

Legend

The following table lists the addresses assigned to each data point. For floating point format variables, each data point appears twice because two 16-bit addresses are required to hold a 32-bit float value. Negative signed integers are 2’s complement.

R/W	R=read only R/W=read from either int or float formats, write only to integer format.
NV	Value is stored in non-volatile memory. The value will still be available if the meter experiences a power loss and reset.

Format	UInt	Unsigned 16-bit integer.
	SInt	Signed 16-bit integer.
	ULong	Unsigned 32-bit integer; Upper 16-bits (MSR) in lowest-numbered / first listed register (001/002 = MSR/LSR).
	SLong	Signed 32-bit integer; Upper 16-bits (MSR) in lowest-numbered / first listed register (001/002 = MSR/LSR).
	Float	32-bit floating point; Upper 16-bits (MSR) in lowest-numbered / first listed register (257/258 = MSR/LSR). Encoding is per IEEE standard 754 single precision.
Units	Lists the physical units that a register holds.	
Scale factor	Some Integer values must be multiplied by a constant scale factor (typically a fraction), to be read correctly. This is done to allow integer numbers to represent fractional numbers.	
Range	Defines the limit of the values that a register can contain.	

Modbus register map

Register	R/W	NV	Data type	Unit	Scale	Description	
Integer Data: Summary of Active Phases							
1	R	NV	SLong	kWh	E	Real Energy: Net (Import - Export)	LSR
2							MSR
3	R	NV	ULong	kWh	E	Real Energy: Quadrants 1&4 Import	LSR
4							MSR
5	R	NV	ULong	kWh	E	Real Energy: Quadrants 2&3 Export	LSR
6							MSR
7	R	NV	ULong	kVARh	E	Reactive Energy-Quadrant 1: Lags Import Real Energy	LSR
8							MSR
9	R	NV	ULong	kVARh	E	Reactive Energy-Quadrant 2: Leads Import Real Energy	LSR
10							MSR
11	R	NV	ULong	kVARh	E	Reactive Energy-Quadrant 3: Lags Export Real Energy	LSR
12							MSR
13	R	NV	ULong	kVARh	E	Reactive Energy-Quadrant 4: Leads Export Real Energy	LSR
14							MSR
15	R	NV	SLong	kVAh	E	Apparent Energy: Net (Import - Export)	LSR
16							MSR
17	R	NV	ULong	kVAh	E	Apparent: Quadrants 1 & 4 Import	LSR
18							MSR
19	R	NV	ULong	kVAh	E	Apparent: Quadrants 2 & 3 Export	LSR
20							MSR
21	R	–	SInt	kW	W	Total Instantaneous Real (P) Power	
22	R	–	SInt	kVAR	W	Total Instantaneous Reactive (Q) Power	
23	R	–	UInt	kVA	W	Total Instantaneous Apparent (S) Power	
24	R	–	SInt	Ratio	0.0001	Total Power Factor (total kW / total kVA)	
25	R	–	UInt	Volt	V	Voltage, L-L (U), average of active phases	
26	R	–	UInt	Volt	V	Voltage, L-N (V), average of active phases	
27	R	–	UInt	Amp	I	Current, average of active phases	
28	R	–	UInt	Hz	–	Nominal Frequency 50, 60 Default: 60	

Register	R/W	NV	Data type	Unit	Scale	Description	
29	R	–	SInt	kW	W	Total Real Power Present Demand	
30	R	–	SInt	kVAR	W	Total Reactive Power Present Demand	
31	R	–	SInt	kVA	W	Total Apparent Power Present Demand	
32	R	NV	SInt	kW	W	Total Real Power Max. Demand Import	Float
33	R	NV	SInt	kVAR	W	Total Reactive Power Max. Demand Import	Float
34	R	NV	SInt	kVA	W	Total Apparent Power Max. Demand Import	Float
35 - 38	R	–	UInt	–	–	(Reserved)	
39	R	NV	ULong	–	–	Input Metering Channel 1	LSR
40							MSR
41	R	NV	ULong	–	–	Input Metering Channel 2	LSR
42							MSR
43	R	NV	ULong	kWh	E	Accumulated Real Energy, Phase A Import	LSR
44							MSR
45	R	NV	ULong	kWh	E	Accumulated Real Energy, Phase B Import	LSR
46							MSR
47	R	NV	ULong	kWh	E	Accumulated Real Energy, Phase C Import	LSR
48							MSR
49	R	NV	ULong	kWh	E	Accumulated Real Energy, Phase A Export	LSR
50							MSR
51	R	NV	ULong	kWh	E	Accumulated Real Energy, Phase B Export	LSR
52							MSR
53	R	NV	ULong	kWh	E	Accumulated Real Energy, Phase C Export	LSR
54							MSR
55	R	NV	ULong	kVARh	E	Accumulated Q1 Reactive Energy, Phase A Import	LSR
56							MSR
57	R	NV	ULong	kVARh	E	Accumulated Q1 Reactive Energy, Phase B Import	LSR
58							MSR
59	R	NV	ULong	kVARh	E	Accumulated Q1 Reactive Energy, Phase C Import	LSR
60							MSR
61	R	NV	ULong	kVARh	E	Accumulated Q2 Reactive Energy, Phase A Import	LSR
62							MSR
63	R	NV	ULong	kVARh	E	Accumulated Q2 Reactive Energy, Phase B Import	LSR
64							MSR
65	R	NV	ULong	kVARh	E	Accumulated Q2 Reactive Energy, Phase C Import	LSR
66							MSR
67	R	NV	ULong	kVARh	E	Accumulated Q3 Reactive Energy, Phase A Export	LSR
68							MSR
69	R	NV	ULong	kVARh	E	Accumulated Q3 Reactive Energy, Phase B Export	LSR
70							MSR
71	R	NV	ULong	kVARh	E	Accumulated Q3 Reactive Energy, Phase C Export	LSR
72							MSR
73	R	NV	ULong	kVARh	E	Accumulated Q4 Reactive Energy, Phase A Export	LSR
74							MSR
75	R	NV	ULong	kVARh	E	Accumulated Q4 Reactive Energy, Phase B Export	LSR
76							MSR

Register	R/W	NV	Data type	Unit	Scale	Description	
77	R	NV	ULong	kVARh	E	Accumulated Q4 Reactive Energy, Phase C Export	LSR
78							MSR
79	R	NV	ULong	kVAh	E	Accumulated Apparent Energy, Phase A Import	LSR
80							MSR
81	R	NV	ULong	kVAh	E	Accumulated Apparent Energy, Phase B Import	LSR
82							MSR
83	R	NV	ULong	kVAh	E	Accumulated Apparent Energy, Phase C Import	LSR
84							MSR
85	R	NV	ULong	kVAh	E	Accumulated Apparent Energy, Phase A Export	LSR
86							MSR
87	R	NV	ULong	kVAh	E	Accumulated Apparent Energy, Phase B Export	LSR
88							MSR
89	R	NV	ULong	kVAh	E	Accumulated Apparent Energy, Phase C Export	LSR
90							MSR
91	R	–	SInt	kW	W	Real Power (P), Phase A	
92	R	–	SInt	kW	W	Real Power (P), Phase B	
93	R	–	SInt	kW	W	Real Power (P), Phase C	
94	R	–	SInt	kVAR	W	Reactive Power (Q), Phase A	
95	R	–	SInt	kVAR	W	Reactive Power (Q), Phase B	
96	R	–	SInt	kVAR	W	Reactive Power (Q), Phase C	
97	R	–	UInt	kVA	W	Apparent Power (S), Phase A	
98	R	–	UInt	kVA	W	Apparent Power (S), Phase B	
99	R	–	UInt	kVA	W	Apparent Power (S), Phase C	
100	R	–	SInt	Ratio	0.0001	Power Factor, Phase A	
101	R	–	SInt	Ratio	0.0001	Power Factor, Phase B	
102	R	–	SInt	Ratio	0.0001	Power Factor, Phase C	
103	R	–	UInt	Volt	V	Phase A-B Line to Line Voltage	
104	R	–	UInt	Volt	V	Phase B-C Line to Line Voltage	
105	R	–	UInt	Volt	V	Phase A-C Line to Line Voltage	
106	R	–	UInt	Volt	V	Phase A-N Line to Neutral Voltage	
107	R	–	UInt	Volt	V	Phase B-N Line to Neutral Voltage	
108	R	–	UInt	Volt	V	Phase C-N Line to Neutral Voltage	
109	R	–	UInt	Amp	I	Current, Phase A	
110	R	–	UInt	Amp	I	Current, Phase B	
111	R	–	UInt	Amp	I	Current, Phase C	
112	R	–	UInt	–	–	(Reserved)	
Configuration							
129	R/W	–	UInt	–	–	30078 (0x757E) - Energy reset 21211 (0x52DB) - Reset all 21212 (0x52DC) - Reset all Peak Demands 16498 (0x4072) - Reset all IO 16640 (0x4100) - Reset data log Read always returns 0.	

Register	R/W	NV	Data type	Unit	Scale	Description
130	R/W	NV	UInt	–	–	0, 1, 2, 3, 11, 13 • 0 = 1PH2WLN • 1 = 1PH2WLL • 2 = 1PH3WLLN • 3 = 3PH3W • 11 = 3PH4W • 13 = 1PH4WLN Default: 11
131	R/W	NV	UInt	Amp	–	E71E3X: CT Ratio - Primary 1 to 32767 Default: 100
						E71E3AX: CT Ratio - Primary 5000 **NOTE:** The CT ratio primary is read-only.
132	R/W	NV	UInt	–	–	E71E3X: CT Ratio - Secondary Interface 1, 3 • 1 = 1000mV • 3 = 333mV Default: 1
						E71E3AX: CT Ratio - Secondary Interface 5 = Rcoil **NOTE:** The CT ratio secondary is read-only.
133	R	NV	UInt	–	–	PT Ratio 1 to 10000 Default: 1
134	R/W	NV	UInt	–	–	System Voltage 90 to 600 Default: 600
135	R	NV	UInt	kW	W	Theoretical Maximum System Power
136	R	–	UInt	–	–	(Reserved)
137	R/W	NV	UInt	–	–	Display Units 0, 1 • 0 = IEC (U, V, P, Q, S) • 1 = IEEE (VLL, VLN, W, VAR, VA) Default: 1
138	R	–	SInt	–	–	Scale Factor I (Current)
139	R	–	SInt	–	–	Scale Factor V (Voltage)
140	R	–	SInt	–	–	Scale Factor W (Power)
141	R	–	SInt	–	–	Scale Factor E (Energy)
142	R/W	NV	UInt	%	–	Phase Loss Voltage Threshold in percent of system voltage 1 to 99 Default: 10
143	R/W	NV	UInt	%	–	Phase Loss Imbalance Threshold in percent 1 to 99 Default: 25

Register	R/W	NV	Data type	Unit	Scale	Description
144/145	R	–	UInt	–	–	(Reserved)
146	R	–	UInt	–	–	Error Bitmap. 1 = Active: • Bit 0: Phase A Voltage out of range • Bit 1: Phase B Voltage out of range • Bit 2: Phase C Voltage out of range • Bit 3: Phase A Current out of range • Bit 4: Phase B Current out of range • Bit 5: Phase C Current out of range • Bit 6: Frequency out of the range of 45 to 65 Hz -OR- insufficient voltage to determine frequency • Bit 7: (Reserved) • Bit 8: Phase Loss A • Bit 9: Phase Loss B • Bit 10: Phase Loss C • Bit 11: Low Power Factor on A with one or more phases having a PF less than 0.5 due to miss-wiring of phases • Bit 12: Low Power Factor on B • Bit 13: Low Power Factor on C • Bit 14: Energy pulse output overrun error • Bit 15: Energy pulse output configuration error Default: 0
147/148	R	–	UInt	–	–	(Reserved)
149	R	NV	UInt	–	–	Number of Subintervals per Demand Interval 1 to 60 Default: 1
150	R	NV	UInt	Seconds	–	Subinterval Length 1 to 3600 Default: 900
151	R	–	UInt	–	–	(Reserved)
152	R	NV	UInt	–	–	Power Up Counter
153/154	R	–	UInt	–	–	(Reserved)
155	R/W	NV	UInt	Day / Month	–	Most Significant Byte (MSB): Day 1-31 (0x01-0x1F) Least Significant Byte (LSB): Month 1-12 (0x01-0x0C)
156	R/W	NV	UInt	Hour / Year	–	MSB: Hour 0-23 (0x00-0x17) LSB: Year 0-99 (0x00-0x63)
157	R/W	NV	UInt	Minutes / Seconds	–	MSB: Seconds 0-59 (0x00-0x3B) LSB: Minutes 0-59 (0x00-0x3B)
158 - 178	R	–	UInt	–	–	(Reserved)
179	R	–	UInt	–	–	Status Input 1_mode: 0, 2, 3, 5 • 0 = Normal (Input Status) • 2 = Multi-tariff Control • 3 = Input Metering • 5 = Partial reset (Energy by Tariff only) Default: 0

Register	R/W	NV	Data type	Unit	Scale	Description
180	R	–	UInt	–	–	Status Input 2_mode: 0, 2, 3, 5 • 0 = Normal (Input Status) • 2 = Multi-tariff Control • 3 = Input Metering • 5 = Partial reset (Energy by Tariff only) Default: 0
181 - 184	R	–	ULong	–	–	Rate 1 Active Energy Import
185 - 188	R	–	ULong	–	–	Rate 2 Active Energy Import
189 - 192	R	–	ULong	–	–	Rate 3 Active Energy Import
193 - 196	R	–	ULong	–	–	Rate 4 Active Energy Import
197	R/W	–	UInt	–	–	Active Tariff (Only modifiable in case of COM Control Mode Enabled): 0, 1 - 4 • 0 = multi-tariff disabled • 1 - 4 = rate 1 to rate 4 Default: 0
198	R/W	–	UInt	–	–	Mode of LED 2, 3, 0xFFFF • 2 = Alarm • 3 = Energy • 0xFFFF = OFF Default: 0xFFFF
199	R/W	–	UInt	–	–	Relay Enable Disable 0, 1 • 1 = De-energize • 0 = Energize Default: 1
200	R/W	–	UInt	–	–	Relay Control mode 0, 2 • 0 = External • 2 = Alarm Default: 2
201	R/W	–	UInt	–	–	Relay Output_Behavior mode 0, 1, 2 • 0 = Normal • 1 = Timed • 2 = Coil Hold Default: 0
202	R	–	UInt	–	–	Relay Status ON/OFF 0, 1 • 0 = ON • 1 = OFF Default: 1
203/204	R	–	ULong	–	–	Relay Counter
205	R/W	–	UInt	Seconds	–	Relay Time config (Timed mode config time) 1 to 9999 Default: 1

Register	R/W	NV	Data type	Unit	Scale	Description
206	R	–	UInt	–	–	Status Input 1_Status: 0, 1 • 0 = OFF • 1 = ON Default: 0
207	R	–	UInt	–	–	Status Input 2_Status: 0, 1 • 0 = OFF • 1 = ON Default: 0
208	R/W	–	UInt	–	–	(Reserved)
209	R	–	UInt	–	–	BACnet enable/disable: 0, 1 • 0 = Disable • 1 = Enable Default: 1
210	R	–	UInt	–	–	HTTPs enable/disable: 0, 1 • 0 = Disable • 1 = Enable Default: 1
211	R	–	UInt	–	–	Modbus enable/disable 0, 1 • 0 = Disable • 1 = Enable Default: 1
212/213	R	–	ULong	–	–	IP Address
214/215	R	–	ULong	–	–	Subnet Address
216	R	–	UInt	–	–	IP Address mode 0, 1, 2 • 0 = DHCP • 1 = BOOTP • 2 = Manual
217	R/W	–	UInt	–	–	Energy Channel LED 3, 6, 9 • 3 = Active • 6 = Reactive • 9 = Apparent Default: 3
218	R/W	–	UInt	–	–	Demand Method 1, 2, 3 • 1 = Sliding • 2 = Fixed • 3 = Rolling Default: 2
219	R/W	–	UInt	–	–	VT Secondary 100, 110, 115, 120 Default: 100

Register	R/W	NV	Data type	Unit	Scale	Description
220	R/W	–	UInt	–	–	VT Connection Type: 0, 1, 2, 3, 11, 13 • 0 = 1PH2WLN • 1 = 1PH2WLL • 2 = 1PH3WLLN • 3 = 3PH3W • 11 = 3PH4W • 13 = 1PH4WLN Default: 11
221	R/W	–	UInt	–	–	Device localization 0, 1 Default: 0
222/223	R	–	ULong	–	–	Energy Reset counter
224	R	–	UInt	–	–	Meter Card OS Major Firmware version 0 to 5
225	R	–	UInt	–	–	Meter Card OS Minor Firmware version 0 to 9
226	R	–	UInt	–	–	Meter Card OS Quality Firmware version 0 to 9
227	R	–	UInt	–	–	Meter Card OS Internal Firmware version 0 to 9
228	R	–	UInt	–	–	Meter Card RS Major Firmware version 0 to 5
229	R	–	UInt	–	–	Meter Card RS Minor Firmware version 0 to 9
230	R	–	UInt	–	–	Meter Card RS Quality Firmware version 0 to 9
231	R	–	UInt	–	–	Com Card OS Major Firmware version 0 to 5
232	R	–	UInt	–	–	Com Card OS Minor Firmware version 0 to 9
233	R	–	UInt	–	–	Com Card OS Quality Firmware version 0 to 9
234	R	–	UInt	–	–	Com Card OS Internal Firmware version 0 to 9
235	R	–	UInt	–	–	MAC address 1
236	R	–	UInt	–	–	MAC address 2
237	R	–	UInt	–	–	MAC address 3
238	R/W	–	UInt	–	–	HMI Timeout Period 2 to 20 Default: 15
239	R	–	UInt	–	–	Product ID 15190, 15191, 15192, 15193 Default: 15190

Register	R/W	NV	Data type	Unit	Scale	Description
240	R/W	–	UInt	Minutes	–	Demand Interval duration 10, 15, 20, 30, 60 Default: 15
241	R/W	–	UInt	Seconds	–	Subinterval duration 1 to 3600 Default: 900 **NOTE:** For Fixed and Sliding block, subinterval duration cannot be edited.
242 - 247	R	–	CHAR	–	–	Serial Number
248	R	–	UInt	–	–	Global Major Firmware version 0 to 5
249	R	–	UInt	–	–	Global Minor Firmware version 0 to 9
250	R	–	UInt	–	–	Global Quality Firmware version 0 to 9
251	R	–	UInt	–	–	Global Internal Firmware version 0 to 9
252	R	–	UInt	–	–	VT Number 0 to 3 Default: 0
253	R/W	–	UInt	–	–	CT Number 1, 2, 3 Default: 3
254	R	–	UInt	–	–	Com Card RS Major Firmware version 0 to 5
255	R	–	UInt	–	–	Com Card RS Minor Firmware version 0 to 9
256	R	–	UInt	–	–	Com Card RS Quality Firmware version 0 to 9
Floating Point Data: Summary of Active Phases						
257/258	R	NV	Float	kWh	–	Accumulated Real Energy: Net (Import - Export)
259/260	R	NV	Float	kWh	–	Real Energy: Quadrants 1&4 Import
261/262	R	–	Float	kWh	–	Real Energy: Quadrants 2&3 Export
263/264	R	–	Float	kVARh	–	Reactive Energy-Quadrant 1: Lags Import Real Energy (IEC) Inductive (IEEE)
265/266	R	–	Float	kVARh	–	Reactive Energy-Quadrant 2: Leads Import Real Energy (IEC) Inductive (IEEE)
267/268	R	–	Float	kVARh	–	Reactive Energy-Quadrant 3: Lags Export Real Energy (IEC) Capacitive (IEEE)
269/270	R	–	Float	kVARh	–	Reactive Energy-Quadrant 4: Leads Export Real Energy (IEC) Capacitive (IEEE)
271/272	R	NV	Float	kVAh	–	Apparent Energy: Net (Import - Export)
273/274	R	NV	Float	kVAh	–	Apparent: Quadrants 1 & 4 Import
275/276	R	NV	Float	kVAh	–	Apparent: Quadrants 2 & 3 Export
277/278	R	–	Float	kW	–	Total Instantaneous Real (P) Power
279/280	R	–	Float	kVAR	–	Total Instantaneous Reactive (Q) Power

Register	R/W	NV	Data type	Unit	Scale	Description
281/282	R	–	Float	kVA	–	Total Instantaneous Apparent (S) Power (vector sum)
283/284	R	–	Float	Ratio	–	Total Power Factor (total kW / total kVA)
285/286	R	–	Float	Volt	–	Voltage, L-L (U), average of active phases
287/288	R	–	Float	Volt	–	Voltage, L-N (V), average of active phases
289/290	R	–	Float	Amp	–	Current, average of active phases
291/292	R	–	Float	Hz	–	Operational Frequency 45.0 to 65.0
293/294	R	–	Float	kW	–	Total Real Power Present Demand
295/296	R	–	Float	kVAR	–	Total Reactive Power Present Demand
297/298	R	–	Float	kVA	–	Total Apparent Power Present Demand
299/300	R	NV	Float	kW	–	Total Real Power Max. Demand Import
301/302	R	NV	Float	kVAR	–	Total Reactive Power Max. Demand Import
303/304	R	NV	Float	kVA	–	Total Apparent Power Max. Demand Import
305 - 312	R	–	Float	–	–	(Reserved)
313/314	R	–	Float	–	1	Input Metering Channel 1
315/316	R	–	Float	–	1	Input Metering Channel 2
Floating Point Data: Per Phase						
317/318	R	–	Float	kWh	–	Accumulated Real Energy, Phase A Import
319/320	R	–	Float	kWh	–	Accumulated Real Energy, Phase B Import
321/322	R	–	Float	kWh	–	Accumulated Real Energy, Phase C Import
323/324	R	–	Float	kWh	–	Accumulated Real Energy, Phase A Export
325/326	R	–	Float	kWh	–	Accumulated Real Energy, Phase B Export
327/328	R	–	Float	kWh	–	Accumulated Real Energy, Phase C Export
329/330	R	–	Float	kVARh	–	Accumulated Q1 Reactive Energy, Phase A
331/332	R	–	Float	kVARh	–	Accumulated Q1 Reactive Energy, Phase B
333/334	R	–	Float	kVARh	–	Accumulated Q1 Reactive Energy, Phase C
335/336	R	–	Float	kVARh	–	Accumulated Q2 Reactive Energy, Phase A
337/338	R	–	Float	kVARh	–	Accumulated Q2 Reactive Energy, Phase B
339/340	R	–	Float	kVARh	–	Accumulated Q2 Reactive Energy, Phase C
341/342	R	–	Float	kVARh	–	Accumulated Q3 Reactive Energy, Phase A
343/344	R	–	Float	kVARh	–	Accumulated Q3 Reactive Energy, Phase B
345/346	R	–	Float	kVARh	–	Accumulated Q3 Reactive Energy, Phase C
347/348	R	–	Float	kVARh	–	Accumulated Q4 Reactive Energy, Phase A
349/350	R	–	Float	kVARh	–	Accumulated Q4 Reactive Energy, Phase B
351/352	R	–	Float	kVARh	–	Accumulated Q4 Reactive Energy, Phase C
353/354	R	–	Float	kVAh	–	Accumulated Apparent Energy, Phase A Import
355/356	R	–	Float	kVAh	–	Accumulated Apparent Energy, Phase B Import
357/358	R	–	Float	kVAh	–	Accumulated Apparent Energy, Phase C Import
359/360	R	–	Float	kVAh	–	Accumulated Apparent Energy, Phase A Export
361/362	R	–	Float	kVAh	–	Accumulated Apparent Energy, Phase B Export
363/364	R	–	Float	kVAh	–	Accumulated Apparent Energy, Phase C Export
365/366	R	–	Float	kW	–	Real Power, Phase A

Register	R/W	NV	Data type	Unit	Scale	Description
367/368	R	–	Float	kW	–	Real Power, Phase B
369/370	R	–	Float	kW	–	Real Power, Phase C
371/372	R	–	Float	kVAR	–	Reactive Power, Phase A
373/374	R	–	Float	kVAR	–	Reactive Power, Phase B
375/376	R	–	Float	kVAR	–	Reactive Power, Phase C
377/378	R	–	Float	kVA	–	Apparent Power, Phase A
379/380	R	–	Float	kVA	–	Apparent Power, Phase B
381/382	R	–	Float	kVA	–	Apparent Power, Phase C
383/384	R	–	Float	Ratio	–	Power Factor, Phase A
385/386	R	–	Float	Ratio	–	Power Factor, Phase B
387/388	R	–	Float	Ratio	–	Power Factor, Phase C
389/390	R	–	Float	Volt	–	Voltage, Phase A-B
391/392	R	–	Float	Volt	–	Voltage, Phase B-C
393/394	R	–	Float	Volt	–	Voltage, Phase A-C
395/396	R	–	Float	Volt	–	Voltage, Phase A-N
397/398	R	–	Float	Volt	–	Voltage, Phase B-N
399/400	R	–	Float	Volt	–	Voltage, Phase C-N
401/402	R	–	Float	Amp	–	Current, Phase A
403/404	R	–	Float	Amp	–	Current, Phase B
405/406	R	–	Float	Amp	–	Current, Phase C
407/408	R	–	Float	–	–	(Reserved)
409/410	R	–	Float	–	–	Rate 1 Active Energy Import
411/412	R	–	Float	–	–	Rate 2 Active Energy Import
413/414	R	–	Float	–	–	Rate 3 Active Energy Import
415/416	R	–	Float	–	–	Rate 4 Active Energy Import
417/418	R/W	–	Float	imp/unit	–	Pulse weight1 (Input Metering Ch1) 1 to 10000 Default: 500
419/420	R/W	–	Float	imp/unit	–	Pulse weight2 (Input Metering Ch2) 1 to 10000 Default: 500
421/422	R/W	–	Float	Imp/K_h	–	Pulse weight3 (Led Pulse weight) 0 to 9999999 Default: 500
423/424	R/W	–	Float	V	–	VT_Primary 1 to 1000000 Default: 100
425/426	R	NV	Float	kW	–	Theoretical Maximum System Power 90 to 34052465 Default: 5196152
427/428	R	–	Float	–	–	Present Load current Phase A
429/430	R	–	Float	–	–	Present Load current Phase B
431/432	R	–	Float	–	–	Present Load current Phase C

Register	R/W	NV	Data type	Unit	Scale	Description
433/434	R	–	Float	–	–	Peak Current Phase A
435/436	R	–	Float	–	–	Peak Current Phase B
437/438	R	–	Float	–	–	Peak Current Phase C
439 – 442	R	–	ULong	–	–	Date time at Peak Current Phase A
443 – 446	R	–	ULong	–	–	Date time at Peak Current Phase B
447 – 450	R	–	ULong	–	–	Date time at Peak Current Phase C
451 – 454	R	–	ULong	–	–	Date time at Peak Real power
455 – 458	R	–	ULong	–	–	Date time at Peak Reactive power
459 – 462	R	–	ULong	–	–	Date time at Peak Apparent power
463 – 466	R	–	ULong	–	–	Last demand reset Date time
467 – 470	R	–	ULong	–	–	Last Energy reset Date time
471/472	R	–	Float	–	–	PT Ratio 1 to 10000 Default: 1
473/474	R	–	Float	–	–	Total Tangent Phi
475 – 494	R	–	UInt	–	–	Meter Name
495 – 514	R	–	UInt	–	–	Meter Model E71E3X, E71E3AX Default: E71E3X
515 – 534	R	–	UInt	–	–	Manufacturer Veris Industries (15190, 15191)
535 – 538	R	–	UInt	–	–	Meter Date of Manufacturer
539 – 543	R	–	UInt	–	–	Hardware Revision Any ASCII String
544/545	R	–	ULong	seconds	–	Meter Operation Timer
546	R/W	–	UInt	–	–	Multi-tariff Control Mode 0, 1, 2, 3, 4 • 0 = Multi-tariff Disable • 1 = By Comm • 2 = 1 S In • 3 = 2 S In • 4 = RTC Default: 0
Data logging						
Parameter 1						
600	R/W	NV	UInt	–	–	Logging Status 0, 1 • 0 = Disabled • 1 = Enabled Default: 1
601	R	NV	ULong	–	–	Allocated File Size Max number of records in file 105120

Register	R/W	NV	Data type	Unit	Scale	Description
603	R	NV	UInt	–	–	Allocated Record Size 6 to 8 Record length in registers(UInt64 - 8 bytes, UInt32 - 6 bytes) Default: 8
604	R/W	NV	UInt	–	–	Record Management Method 0, 1 • 0 = Circular • 1 = Fill and hold Default: 0 Use the Record Management Method registers to select either Fill and hold (Record Management Method = 1) or Circular mode (Record Management Method = 0) for data logging. The default mode is Circular. In Fill and hold mode, the meter records data only until the buffer is full. Data for this time period is kept, but newer energy information is lost. In Circular mode, the meter continues to record energy data if the meter is operating. The buffer can only hold 105120 entries at one time, however, when the number of records exceeds 105120, the oldest entry is deleted to make room for the newest (FIFO).
605	R	NV	UInt	–	–	File Status 0, 200, 210, 220 • 0 = OK • 200 = Internal failure • 210 = Disabled due to config • 220 = Disabled due to Null config Default: 0
606	R	NV	ULong	–	–	Number of records in file 0 to 105120 Default: 1
608	R	NV	ULong	–	–	First Record Sequence Number First record in log 0 to 105120 Default: 1
610	R	NV	ULong	–	–	Last Record Sequence Number Last record in the log 0 to 105120 Default: 1
612	–	–	UInt	–	–	(Reserved)
613	R	NV	DATETIME	–	–	Start Time Default: 01-01-2000 00:00:00
617	R	NV	DATETIME	–	–	Stop Time Default: 01-01-2100 00:00:00
621	–	–	UInt	–	–	(Reserved)
622	R/W	NV	UInt	seconds	–	Interval Control Seconds 10 to 4500 Default: 900 (15 minutes)
623	R	NV	DATETIME	–	–	Date/Time Last clear Date time last clear (All or individual) Default: 01-01-2000 00:00:00

Register	R/W	NV	Data type	Unit	Scale	Description
627	R/W	NV	UInt	–	–	Record Item 1 to 75 Default: 1 Refer to the Table below **Data Log - parameters available to select, page 77**
Parameter 2						
628	R/W	NV	UInt	–	–	Logging Status 0, 1 • 0 = Disabled • 1 = Enabled Default: 1
629	R	NV	ULong	–	–	Allocated File Size Max number of records in file 105120
631	R	NV	UInt	–	–	Allocated Record Size 6 to 8 Record length in registers(UInt64 - 8 bytes, UInt32 - 6 bytes) Default: 8
632	R/W	NV	UInt	–	–	Record Management Method 0, 1 • 0 = Circular • 1 = Fill and hold Default: 0
633	R	NV	UInt	–	–	File Status 0, 200, 210, 220 • 0 = OK • 200 = Internal failure • 210 = Disabled due to config • 220 = Disabled due to Null config Default: 0
634	R	NV	ULong	–	–	Number of records in file 0 to 105120 Default: 1
636	R	NV	ULong	–	–	First Record Sequence Number First record in log 0 to 105120 Default: 1
638	R	NV	ULong	–	–	Last Record Sequence Number Last record in the log 0 to 105120 Default: 1
640	–	–	UInt	–	–	(Reserved)
641	R	NV	DATETIME	–	–	Start Time Default: 01-01-2000 00:00:00
645	R	NV	DATETIME	–	–	Stop Time Default: 01-01-2100 00:00:00
649	–	–	UInt	–	–	(Reserved)

Register	R/W	NV	Data type	Unit	Scale	Description
650	R/W	NV	UInt	seconds	–	Interval Control Seconds 10 to 4500 Default: 900 (15 minutes)
651	R	NV	DATETIME	–	–	Date/Time Last clear Date time last clear (All or individual) Default: 01-01-2000 00:00:00
655	R/W	NV	UInt	–	–	Record Item 1 to 75 Default: 2
Parameter 16						
1020	R/W	NV	UInt	–	–	Logging Status 0, 1 • 0 = Disabled • 1 = Enabled Default: 1
1021	R	NV	ULong	–	–	Allocated File Size Max number of records in file 105120
1023	R	NV	UInt	–	–	Allocated Record Size 6 to 8 Record length in registers(UInt64 - 8 bytes, UInt32 - 6 bytes) Default: 8
1024	R/W	NV	UInt	–	–	Record Management Method 0, 1 • 0 = Circular • 1 = Fill and hold Default: 0
1025	R	NV	UInt	–	–	File Status 0, 200, 210, 220 • 0 = OK • 200 = Internal failure • 210 = Disabled due to config • 220 = Disabled due to Null config Default: 0
1026	R	NV	ULong	–	–	Number of records in file 0 to 105120 Default: 1
1028	R	NV	ULong	–	–	First Record Sequence Number First record in log 0 to 105120 Default: 1
1030	R	NV	ULong	–	–	Last Record Sequence Number Last record in the log 0 to 105120 Default: 1
1032	–	–	UInt	–	–	(Reserved)

Register	R/W	NV	Data type	Unit	Scale	Description
1033	R	NV	DATETIME	–	–	Start Time Default: 01-01-2000 00:00:00
1037	R	NV	DATETIME	–	–	Stop Time Default: 01-01-2100 00:00:00
1041	–	–	UInt	–	–	(Reserved)
1042	R/W	NV	UInt	seconds	–	Interval Control Seconds 10 to 4500 Default: 900 (15 minutes)
1043	R	NV	DATETIME	–	–	Date/Time Last clear Date time last clear (All or individual) Default: 01-01-2000 00:00:00
1047	R/W	NV	UInt	–	–	Record Item 1 to 75 Default: 16

Data Log - parameters available to select

Record item	Parameters
1	KWh_Net (Default)
2	KWh_Import (Default)
3	KWh_Export (Default)
4	KVARh_Q1 (Default)
5	KVARh_Q2 (Default)
6	KVARh_Q3 (Default)
7	KVARh_Q4 (Default)
8	Net_KVAh (Default)
9	KVAh_Import (Default)
10	KVAh_Export (Default)
11	KW_Total (Default)
12	KVAR_Total (Default)
13	KVA_Total (Default)

Data Log - parameters available to select (Continued)

Record item	Parameters
14	PF_Total (Default)
15	Volts_LL_Avg (Default)
16	Volts_LN_Avg (Default)
17	Current Average
18	Frequency
19	KW_Present_Demand
20	KVAR_Present_Demand
21	KVA_Present_Demand
22	KW_Max_Demand_Import
23	KVAR_Max_Demand_Import
24	KVA_Max_Demand_Import
25 – 28	Reserved
29	Input_Metering_Channel_1
30	Input_Metering_Channel_2
31	KWh_Import_A
32	KWh_Import_B
33	KWh_Import_C
34	KWh_Export_A
35	KWh_Export_B
36	KWh_Export_C
37	KVARh_Q1_A
38	KVARh_Q1_B
39	KVARh_Q1_C
40	KVARh_Q2_A
41	KVARh_Q2_B
42	KVARh_Q2_C
43	KVARh_Q3_A
44	KVARh_Q3_B
45	KVARh_Q3_C
46	KVARh_Q4_A
47	KVARh_Q4_B
48	KVARh_Q4_C
49	KVAh_Import_A
50	KVAh_Import_B
51	KVAh_Import_C
52	KVAh_Export_A
53	KVAh_Export_B
54	KVAh_Export_C

Data Log - parameters available to select (Continued)

Record item	Parameters
55	KW_A
56	KW_B
57	KW_C
58	KVAR_A
59	KVAR_B
60	KVAR_C
61	KVA_A
62	KVA_B
63	KVA_C
64	PF_A
65	PF_B
66	PF_C
67	Volts_AB
68	Volts_BC
69	Volts_AC
70	Volts_AN
71	Volts_BN
72	Volts_CN
73	Current_A
74	Current_B
75	Current_C

Communications via BACnet/IP

Overview

The BACnet protocol defines a number of services that are used to communicate between devices and the objects that are acted upon by those services.

The information in this section is intended for users with an advanced understanding of BACnet protocol, their communications network and their power system.

NOTE:

- The maximum response time of the meter is 3 s.
- The difference between two consecutive Write (W) options must be > 3 s.

Supported BACnet components

BACnet component	Description
Protocol version	1
Protocol revision	14
BACnet standardized device profile (Annex L)	BACnet Application Specific Controller (B-ASC)
BACnet Interoperability building blocks (Annex K)	DS-RP-B, DS-RPM-B, DS-WP-B, DM-DDB-B, DM-DOB-B, DM-DCC-B, T-VMT-I-B, DM-TS-B, DM-RD-B
Data link layer options	UDP
Character set	ISO 8859-1 JIS C 6226
Segmentation capability	Segmentation not supported
Device address binding	Static device binding is not supported (No client functionality is included)
Networking options	The meter supports registration as a foreign device

Supported standard object types

Object type	Optional properties supported	Writable properties	Property range restrictions
Device objects	Description Location Local_Time Local_Date	Object_Identifier Location	Object_Identifier – 1 to 4,194,302 Location – (limited to 64 characters)
Analog input objects	Description Reliability	–	–

Object type	Optional properties supported	Writable properties	Property range restrictions
Analog value objects	Description Reliability	Present_Value	AV1: 30078, 21211, 21212 and 16498 AV2: 0, 1, 2, 3, 11, 13 AV3: • E71E3X: 1 to 32767 • E71E3AX: 5000 AV4: • E71E3X: 1, 3 • E71E3AX: 5 AV5: 1 to 10000 AV6: 90 to 600 AV7 and AV16: 0, 1 AV8 and AV9: 1 to 99 AV10: 1 to 60 AV11: 100 to 360000 AV12 and AV13: 0, 2, 3, 5 AV14: 0, 2 AV15 and AV32: 0, 1, 2 AV17 and AV33: 0, 1, 2, 3, 4 AV18: 0xFFFF, 2, 3 AV19: 3, 6, 9 AV20: 0 to 9999999 AV21: 1 to 1000000 AV22: 100, 110, 115, 120 AV23 and AV31: 1, 2, 3 AV24: 10, 15, 20, 30, 60 AV25: 1 to 3600 AV26: 1 to 9999 AV27 and AV28: 1 to 10000 AV29: 50, 60 AV30: 0 to 3
Binary input objects	Description Reliability	–	–
Trend log objects	Description	Log_Enable Start_Time Stop_Time Log_Device_Object_Property Log_Interval Stop_When_Full Record_Count	Start_Time: Sets the Date/Time when data logging will Start (if Log_enable is TRUE). 01-01-2000 00:00:00 to 01-01-2100 23:59:59 Stop_Time: Sets the Date/Time when data Logging will STOP (if still running). 01-01-2000 00:00:00 to 01-01-2100 23:59:59 Log_Device_Object_Property: Present_Value of local objects AI1 through AI75 Log_Interval: Logging period in hundredths of a second. 1000 – 450000 in multiples of 100 Stop_When_Full: 105120

Device objects

Property	R/W	NV	Description
Object_Identifier	R/W	NV	Device<n> n is the 7 digit ID # set from web page. The BACnet Device ID is a decimal number from 1 to 4,194,302 that can be entered or viewed on the web page or through this property. The default value set at the factory is 123
Object_Type	R	NV	Device (8)
Object_Name	R	NV	Veris E71E3 Series Energy Meter - S/N: <serial number>
Vendor_Name	R	NV	Veris Industries, LLC
Vendor_Identifier	R	NV	133
Model_Name	R	NV	E71E3X E71E3AX
Firmware_Revision	R	NV	<Current Revision#> “xyyy”. This is the BACnet processor firmware version in the format <xyyy>, with an implied decimal point between the first two digits (x.yyy).
Application_Software_Version	R	NV	<Current firmware global version#> xxx.yyy.zzz
Location	R/W	NV	<Location> Limted to 64 Characters - Default value is “Installed location not yet identified”.
Description	R	NV	Veris E71E3X DIN Ethernet meter-LVCT-24VDC PS-Veris S/N: <serial number> or Veris E71E3AX DIN Ethernet meter-Rcoil-24VDC PS-Veris S/N: <serial number>
Protocol_Version	R	NV	1 BACnet Protocol Version 1.
Protocol_Revision	R	NV	14 BACnet Protocol Revision 14.
Local_Date	R	–	Date Set via BACnet Time Synchronization only.
Local_Time	R	–	Time Set via BACnet Time Synchronization only.
Segmentation_Supported	R	NV	NO_SEGMENTATION (3) Segmentation is not supported.
Max_APDU_Length_Accepted	R	NV	1476
APDU_Timeout	R	NV	60000
Number_of_APDU_Retries	R	NV	3
System_Status	R	NV	Operational (0)
Protocol_Sevices_Supported	R	NV	0b000000000000101101000000000000000111100000
Protocol_Object_Types_ Supported	R	NV	0b10110000100000000000000000000000000000000000000000-000000
Profile_Name	R	NV	Veris LVCT: 133-E71E3-E71E3X Veris Rcoil: 133-E71E3-E71E3AX

Analog input objects

Object ID	Object name	R/W	Unit	Description
AI1	KWh_Net	R	kWh	Accumulated Real Energy: Net (Import - Export)
AI2	KWh_Import	R	kWh	Real Energy Import
AI3	KWh_Export	R	kWh	Real Energy Export
AI4	KVARh_Q1	R	kVARh	Reactive Energy Quadrant 1
AI5	KVARh_Q2	R	kVARh	Reactive Energy Quadrant 2
AI6	KVARh_Q3	R	kVARh	Reactive Energy Quadrant 3
AI7	KVARh_Q4	R	kVARh	Reactive Energy Quadrant 4
AI8	Net_KVAh	R	kVAh	Apparent Energy: Net (Import - Export)
AI9	KVAh_Import	R	kVAh	Apparent Energy Import
AI10	KVAh_Export	R	kVAh	Apparent Energy Export
AI11	KW_Total	R	kW	Total Instantaneous Real Power
AI12	KVAR_Total	R	kVAR	Total Instantaneous Reactive Power
AI13	KVA_Total	R	kVA	Total Instantaneous Apparent Power
AI14	PF_Total	R	–	Total Power Factor
AI15	Volts_LL_Avg	R	V	Voltage, L-L, Average of Active Phases
AI16	Volts_LN_Avg	R	V	Voltage, L-N, Average of Active Phases
AI17	Current Average	R	A	Current, Average of Active Phases
AI18	Frequency	R	Hz	Frequency
AI19	KW_Present_Demand	R	kW	Total Real Power Present Demand
AI20	KVAR_Present_Demand	R	kVAR	Total Reactive Power Present Demand
AI21	KVA_Present_Demand	R	kVA	Total Apparent Power Present Demand
AI22	KW_Max_Demand_Import	R	kW	Total Real Power Max Demand Import
AI23	KVAR_Max_Demand_Import	R	kVAR	Total Reactive Power Max Demand Import
AI24	KVA_Max_Demand_Import	R	kVA	Total Apparent Power Max Demand Import
AI25 – AI28	Reserved	–	–	(Reserved)
AI29	Input_Metering_Channel_1	R	–	Input Metering Channel 1
AI30	Input_Metering_Channel_2	R	–	Input Metering Channel 2
AI31	KWh_Import_A	R	kWh	Real Energy Import Phase A
AI32	KWh_Import_B	R	kWh	Real Energy Import Phase B
AI33	KWh_Import_C	R	kWh	Real Energy Import Phase C
AI34	KWh_Export_A	R	kWh	Real Energy Export Phase A
AI35	KWh_Export_B	R	kWh	Real Energy Export Phase B
AI36	KWh_Export_C	R	kWh	Real Energy Export Phase C
AI37	KVARh_Q1_A	R	kVARh	Reactive Energy Q1 Phase A
AI38	KVARh_Q1_B	R	kVARh	Reactive Energy Q1 Phase B
AI39	KVARh_Q1_C	R	kVARh	Reactive Energy Q1 Phase C
AI40	KVARh_Q2_A	R	kVARh	Reactive Energy Q2 Phase A
AI41	KVARh_Q2_B	R	kVARh	Reactive Energy Q2 Phase B
AI42	KVARh_Q2_C	R	kVARh	Reactive Energy Q2 Phase C
AI43	KVARh_Q3_A	R	kVARh	Reactive Energy Q3 Phase A

Object ID	Object name	R/W	Unit	Description
AI44	KVARh_Q3_B	R	kVARh	Reactive Energy Q3 Phase B
AI45	KVARh_Q3_C	R	kVARh	Reactive Energy Q3 Phase C
AI46	KVARh_Q4_A	R	kVARh	Reactive Energy Q4 Phase A
AI47	KVARh_Q4_B	R	kVARh	Reactive Energy Q4 Phase B
AI48	KVARh_Q4_C	R	kVARh	Reactive Energy Q4 Phase C
AI49	KVAh_Import_A	R	kVAh	Apparent Energy Import Phase A
AI50	KVAh_Import_B	R	kVAh	Apparent Energy Import Phase B
AI51	KVAh_Import_C	R	kVAh	Apparent Energy Import Phase C
AI52	KVAh_Export_A	R	kVAh	Apparent Energy Export Phase A
AI53	KVAh_Export_B	R	kVAh	Apparent Energy Export Phase B
AI54	KVAh_Export_C	R	kVAh	Apparent Energy Export Phase C
AI55	KW_A	R	kW	Real Power Phase A
AI56	KW_B	R	kW	Real Power Phase B
AI57	KW_C	R	kW	Real Power Phase C
AI58	KVAR_A	R	kVAR	Reactive Power Phase A
AI59	KVAR_B	R	kVAR	Reactive Power Phase B
AI60	KVAR_C	R	kVAR	Reactive Power Phase C
AI61	KVA_A	R	kVA	Apparent Power Phase A
AI62	KVA_B	R	kVA	Apparent Power Phase B
AI63	KVA_C	R	kVA	Apparent Power Phase C
AI64	PF_A	R	–	Power Factor Phase A
AI65	PF_B	R	–	Power Factor Phase B
AI66	PF_C	R	–	Power Factor Phase C
AI67	Volts_AB	R	V	Voltage Phase A-B
AI68	Volts_BC	R	V	Voltage Phase B-C
AI69	Volts_AC	R	V	Voltage Phase A-C
AI70	Volts_AN	R	V	Voltage Phase A-N
AI71	Volts_BN	R	V	Voltage Phase B-N
AI72	Volts_CN	R	V	Voltage Phase C-N
AI73	Current_A	R	A	Current Phase A
AI74	Current_B	R	A	Current Phase B
AI75	Current_C	R	A	Current Phase C
AI76	Max_Power	R	kW	Max Power
AI77	Reserved	–	–	(Reserved)
AI78	Energy_Resets	R	–	Count of Energy Resets
AI79 – AI80	Reserved	–	–	(Reserved)
AI81	Power_Up_Count	R	–	Count of Power Up Cycles
AI82	Reserved	–	–	(Reserved)
AI83	Alarm_Bitmap	R	–	Alarm Bitmap
AI84	S1_Status	R	–	Status Input1 Status
AI85	S2_Status	R	–	Status Input2 Status

Object ID	Object name	R/W	Unit	Description
AI86	Relay_Counter	R	–	Relay Output Counter
AI87	Relay_Status	R	–	Relay Output Status
AI88	Real_Energy_Import_Tariff1	R	kWh	Real Energy Import Tariff1
AI89	Real_Energy_Import_Tariff2	R	kWh	Real Energy Import Tariff2
AI90	Real_Energy_Import_Tariff3	R	kWh	Real Energy Import Tariff3
AI91	Real_Energy_Import_Tariff4	R	kWh	Real Energy Import Tariff4

Analog value objects

Object ID	Object name	R/W	Unit	Range	Description
AV1	Config	R/W	–	30078 (0x757E) - Energy reset 21211 (0x52DB) - Reset all 21212 (0x52DC) - Reset all Peak Demands 16498 (0x4072) - Reset all IO 16640 (0x4100) - Reset data log Read always returns 0.	Configuration
AV2	System_Type	R/W	–	0 = 1PH2WLN 1 = 1PH2WLL 2 = 1PH3WLLN 3 = 3PH3W 11 = 3PH4W 13 = 1PH4WLN Default = 11	System Type
AV3	CT_Ratio_Primary	R/W	A	E71E3X: 1 to 32767 Default: 100	CT Ratio - Primary
				E71E3AX: 5000	CT Ratio - Primary **NOTE:** The CT ratio primary is read-only.
AV4	CT_Ratio_Secondary	R/W	–	E71E3X: 1 (1000mV) 3 (333mV) Default: 1	CT Ratio - Secondary
				E71E3AX: 5 (Rcoil) Default: 5	CT Ratio - Secondary **NOTE:** The CT ratio secondary is read-only.
AV5	PT_Ratio	R	–	1 to 10000 Default = 1	PT Ratio
AV6	System_Voltage	R/W	V	90 to 600 Default = 600	System Voltage
AV7	Display_Units	R/W	–	0 = IEC 1 = IEEE Default = 1	Display Units
AV8	Phase_Loss_Voltage_Threshold	R/W	%	1 to 99 Default = 10	Phase Loss Voltage Threshold

Object ID	Object name	R/W	Unit	Range	Description
AV9	Phase_Loss_Imbalance_ Threshold	R/W	%	1 to 99 Default = 25	Phase Loss Imbalance Threshold
AV10	Subintervals	R	–	1 to 60 Default = 1	Number of Subintervals Per Demand Interval
AV11	Subinterval_Length	R	hundredth of seconds	100 to 360000 Default = 90000	Subinterval Length
AV12	S1_Control_mode	R/W	–	Status Input 1_mode 0 = Normal (Input Status) 2 = Multi-tariff Control 3 = Input Metering 5 = Partial reset (Energy by Tariff only) Default = 0	Status Input1 Control mode
AV13	S2_Control_mode	R/W	–	Status Input 2_mode 0 = Normal (Input Status) 2 = Multi-tariff Control 3 = Input Metering 5 = Partial reset (Energy by Tariff only) Default = 0	Status Input2 Control mode
AV14	Relay_control_mode	R/W	–	Relay Output 0= External 2 = Alarm Default = 2	Relay Output control VT Connection Type mode
AV15	Relay_Behavior_mode	R/W	–	Relay Output_Behavior mode 0= Normal 1= Timed 2 = Coil Hold Default = 0	Relay Output Behavior mode
AV16	Relay_Output_Enable_Disable	R/W	–	Applicable when Relay control mode is selected as External 0= ON 1= OFF Default = 1	Relay Config
AV17	Applicable_Multi_Tariff	R/W	–	Select Active Tariff 0 = Multi Tariff feature is disabled 1 = Tariff 1 active 2 = Tariff 2 active 3 = Tariff 3 active 4 = Tariff 4 active Default = 0	Applicable Multi Tariff
AV18	Mode_of_LED	R/W	–	0xFFFF = OFF 2 = Alarm 3 = Energy Default = 0xFFFF	Mode of LED
AV19	Channel	R/W	–	3 = ActImpExp 6 = ReaImpExp 9 = AppImpExp Default = 3	Channel
AV20	Pulse_weight	R/W	–	0 to 9999999 Default = 500	Pulse weight

Object ID	Object name	R/W	Unit	Range	Description
AV21	PT_Primary	R/W	V	1 to 1000000 Default = 100	PT Primary
AV22	PT_Secondary	R/W	V	100, 110, 115, 120 Default = 100	PT Secondary
AV23	Demand_Method	R/W	–	1 = Sliding 2 = Fixed 3 = Rolling Default = 2	Demand Method
AV24	Demand_Interval_Duration	R/W	Minutes	10, 15, 20, 30, 60 Default = 15	Demand Interval Duration
AV25	Sub_Interval_Duration	R/W	Seconds	1 to 3600 Default = 900	Subinterval Duration **NOTE:** For Fixed and Sliding block, subinterval duration cannot be edited.
AV26	Relay_TimedMode_Time	R/W	Seconds	1 to 9999 Default = 1	Relay Time Mode time
AV27	Input_Metering_Ch1_ PulseWeight	R/W	imp/unit	1 to 10000 Default = 500	Input Metering Ch1 Pulse Weight
AV28	Input_Metering_Ch2_ PulseWeight	R/W	imp/unit	1 to 10000 Default = 500	Input Metering Ch2 Pulse Weight
AV29	Nominal_Frequency	R/W	Hz	50, 60 Default = 60	Nominal Frequency
AV30	VT_Number	R	–	0 to 3 Default = 0	Number of VTs
AV31	CT_Number	R/W	–	1, 2, 3 Default = 3	Number of CTs
AV32	VT_Connection_Type	R/W	–	0, 1, 2 Default = 0	VT Connection Type
AV33	MultiTarrif_Control_Mode	R/W	–	0,1,2,3,4 Default = 0	MultiTarrif Control Mode

Binary input objects

Object ID	Object name	R/W	Description
BI1	Volts_Error_A	R	Voltage Out of Range Phase A • 0 = Inactive • 1 = Active Phase A Input Voltage exceeds meter's measurement range
BI2	Volts_Error_B	R	Voltage Out of Range Phase B • 0 = Inactive • 1 = Active Phase B Input Voltage exceeds meter's measurement range
BI3	Volts_Error_C	R	Voltage Out of Range Phase C • 0 = Inactive • 1 = Active Phase C Input Voltage exceeds meter's measurement range
BI4	Current_Error_A	R	Current Out of Range Phase A • 0 = Inactive

Object ID	Object name	R/W	Description
			• 1 = Active Phase A Current out of range
BI5	Current_Error_B	R	Current Out of Range Phase B • 0 = Inactive • 1 = Active Phase B Current out of range
BI6	Current_Error_C	R	Current Out of Range Phase C • 0 = Inactive • 1 = Active Phase C Current out of range
BI7	Frequency_Error	R	Frequency Error • 0 = Inactive • 1 = Active Frequency out of range
AI8	Reserved	–	(Reserved)
BI9	Phase_Loss_A	R	Phase Loss Phase A • 0 = Inactive • 1 = Active Phase Loss - Phase A voltage dropped below the Phase Loss Threshold set by user
BI10	Phase_Loss_B	R	Phase Loss Phase B • 0 = Inactive • 1 = Active Phase Loss - Phase B voltage dropped below the Phase Loss Threshold set by user
BI11	Phase_Loss_C	R	Phase Loss Phase C • 0 = Inactive • 1 = Active Phase Loss - Phase C voltage dropped below the Phase Loss Threshold set by user
BI12	Power_Factor_A	R	Low Power Factor Phase A • 0 = Inactive • 1 = Active Phase A Power Factor less than 50% (commonly due to mis-wiring of CTs/PTs to meter)
BI13	Power_Factor_B	R	Low Power Factor Phase B • 0 = Inactive • 1 = Active Phase B Power Factor less than 50% (commonly due to mis-wiring of CTs/PTs to meter)
BI14	Power_Factor_C	R	Low Power Factor Phase C • 0 = Inactive • 1 = Active Phase C Power Factor less than 50% (commonly due to mis-wiring of CTs/PTs to meter)
BI15	Energy_OverRun	R	Energy Overrun Error Energy Over Run Error when the energy accumulation is more than the pulses meter can emit
BI16	Energy_Config_Err	R	Energy Configuration Error Energy Configuration Error when the configured pusle weight exceeds the theoretical calculated pulse weight

Trend log objects

Trend_Log properties used	R/W	Units	Description
Object_Name	R	Trend_Log_<n>	Trend Log <n> Where n is 1-16
Description	R	Trend_Log_<n>	Trend Log <n> Where n is 1-16
Log_Enable	R/W	Binary	Set this to TRUE to enable data logging with any of the 16 Trend_Log objects or FALSE to disable logging. The default is TRUE. The value is set to FALSE internally if logging stops for other reasons (i.e. buffer is full).
Start_Time	R/W	Date/Time	Sets the Date/Time when data logging will Start (if Log_enable is TRUE). Set to a Date/Time earlier than the Local_Date/ Local_Time properties of the Device object and Set Log_ Enable TRUE to start logging immediately. Start_Time will be ignored if “wildcard” values are used in any of the fields. Range: 01-01-2000 00:00:00 to 01-01-2100 23:59:59
Stop_Time	R/W	Date/Time	Sets the Date/Time when data Logging will STOP (if still running). Stop_Time will be ignored if “wildcard” values are used in any of the fields. Range: 01-01-2000 00:00:00 to 01-01-2100 23:59:59
Log_Device_Object_Property	R/W	BACnetDeviceObjectPro-pertyReference	Use Log_Device_Object_Property to select the meter parameter to log with each object. Set this property to point to Present_Value property of any of the Analog_Input objects AI1 through AI75 (Refer to Analog input objects, page 83). By default, the Analog_Input objects AI1 to AI16 are set.
Log_Interval	R/W	0.01 s	Use the Log_Interval property to set the data logging time interval, in units of hundredths of a second (0.01 seconds). The default interval is 15 minutes (a value of 90000 in the Log_ Interval property). Range: 1000 to 450000
Stop_When_Full	R/W	Binary	When full, the buffer will wrap and overwrite the oldest data first (unless the Stop_When_Full property is used). Set this to TRUE to stop logging when the buffer is full. Use the Stop_When_Full property to select either Single Shot (Stop_When_Full = TRUE) or Continuous mode (Stop_When_ Full = FALSE) for data logging. The default mode is Continuous. In Single Shot mode, the meter records data only until the buffer is full. Data for this time period is kept, but newer energy information is lost. In Continuous mode, the meter continues to record energy data if the meter is operating. The buffer can only hold 105120 entries at one time, however, when the number of records exceeds 105120, the oldest entry is deleted to make room for the newest.
Buffer_Size	R	105120	Length of Log Data buffer (# of records). The Buffer_Size is fixed.
Record_Count	R/W	Unsigned 32-bit integer	This is an integer count of how many records logged since the Trend_Log objects were last reset. Writing a Zero to this property resets the logs of all objects. This value defaults to Zero, but, by default, logging will start automatically at 15 minute intervals.
Total_Record_Count	R	Unsigned 32-bit integer	This is an integer count of how many records logged since the Trend_Log objects were created (the factory state of the meter). This count is unaffected by resetting the Record Count or by power failures.
Log_Buffer	R	Binary	Contains the data values logged and log buffer status flags info with timestamps.

Specifications

Mechanical characteristics

IP degree of protection	Display: IP40 Meter body: IP20
Display resolution	126 x 94 pixel
Display dimensions	43 x 34.6 mm
Display data update rate	1 s

Electrical characteristics

Control power

DC	12 – 36 V
Burden	< 5 W

Voltage input

Range	90 V L-N to 347 V L-N / 600 V L-L
Frequency	50 Hz / 60 Hz ± 10%
Burden	0.2 VA
Impedance	5 MΩ
Measurement category	III

Current input

LVCT	Scaling: 1 to 32767 A Input range (LVCT output): 0.333 V (0.4 V max) or 1 V nominal (1.1 V max) (CTs must be rated for use with Class 1 voltage inputs)
R-Coil	Use E683 series Rogowski Coils (50 to 5000 A) (CTs must be rated for use with Class 1 voltage inputs)

Status input

Number	2
Type	Type 1 opto-coupler inputs (IEC 61131-2)
Maximum input voltage	40 V DC
Maximum input current	4 mA
Voltage OFF	0 – 5 V DC
Voltage ON	11 – 40 V DC
Nominal voltage	24 V DC
Minimum pulse width	20 ms

Relay output

Number	1
Type	SPST-NO
Maximum output frequency	0.5 Hz (1 s ON / 1 s OFF)

Relay output (Continued)

Response time	10 ms
Maximum load current	5 A at 250 V AC 5 A at 30 V DC

Measurement accuracy

IEC 61557-12:2018	PMD/[SD|SS]/K70/0.5
Active energy	Class 0.5 as per IEC 61557-12
Active power	Class 0.5 as per IEC 61557-12
Reactive energy	Class 2 as per IEC 61557-12
Reactive power	
Apparent energy	Class 0.5 as per IEC 61557-12
Apparent power	
Frequency	
Phase current	
Calculated neutral current	
Voltage	

Operational characteristics

Meter start-up time for communication interface or measurement readings	20 s after power supply is applied

Standards

CE	IEC 61557-12 IEC 61326-1 IEC 61010-1 IEC 61010-2-30
UL	UL 61010-1 UL 61010-2-030
Safety	IEC 61010-1 UL 61010-1 IEC/UL 61010-2-30 CSA C22.2 NO 61010-1-12 CSA C22.2 No. 61010-2-030

Environmental characteristics

Operating temperature	-25 to 70 °C (-13 to 158 °F)
Storage temperature	-40 to 85 °C (-40 to 185 °F)
Humidity range	5% to 95% RH non-condensing
Pollution degree	2
Altitude	≤ 3000 m (9842 ft) above sea level
Electromagnetic environmental class	E2

Mechanical environmental class	M1
Mounting location	For indoor use only

RTC backup battery

Battery backup time	3 years without control power

Veris Industries
12345 SW Leveton Drive
Tualatin, OR 97062 USA

US & Canada: 800-354-8556
International: +1 (503) 598-4564

support@veris.com
www.veris.com

As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.

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