U018 Series (sold separately)

E50F2A, E50F5A

Compact Power and Energy Meters With LON TP/FT-10 Communication For Use Only With U018 Series Rope CTs

Product Overview

The E50FxA DIN Rail Power Meter provides a solution for measuring energy data with a single device. Inputs include pulse, control power, CT, and 3-phase voltage. The E50FxA supports multiple output options, including solid state phase loss alarm relay contacts (E50F2A only), LON, and data logging (E50F5A only). The LCD screen on the faceplate allows instant output viewing. These meters include built-in CT integrators and CT power supplies. The E50F2A and E50F5A work only with Veris U018 series rope style CTs.

The meter is housed in a plastic enclosure suitable for installation on T35 DIN rail according to EN50022. The E50 can be mounted with any orientation over the entire ambient temperature range, either on a DIN rail or in a panel. The meter is not sensitive to CT orientation to reduce installation errors.

Product Identification

Model	Description
E50F2A	LON output, 1 pulse input , alarm output
E50F5A	LON output, data logging, 2 pulse inputs

Specifications

MEASUREMENT ACCURACY	
Real Power and Energy	IEC 62053-22 Class 0.5S, ANSI C12.20 0.5%
Reactive Power and Energy	IEC 62053-23 Class 2, 2%
Current	0.4% (+0.015% per °C deviation from 25°C) from 5% to 100% of range; 0.8% (+0.015% per °C deviation from 25°C) from 1% to 5% of range
Voltage	0.4% (+0.015% per °C deviation from 25°C) from 90 V_{L-N} to 600 VAC_{L-L}
Sample Rate	2520 samples per second
Data Update Rate	1 sec
Type of Measurement	True RMS up to 1260 Hz (21st harmonic at 60 Hz); One to three phase AC system
INPUT VOLTAGE CHARACTERISTICS	
Measured AC Voltage	Minimum 90 V_{L-N} (156 V_{L-L}) for stated accuracy; UL Maximums: 600 V_{L-L} (347 V_{L-N}); CE Maximum: 300 V_{L-N}
Metering Over-Range	+20%
Impedance	2.5 MΩ_{L-N} /5 MΩ_{L-L}
Frequency Range	45 to 65 Hz
INPUT CURRENT CHARACTERISTICS	
CT Scaling	20A to 5000A
Measurement Input Range	U018 series rope style CTs only (CTs must be rated for connection to Class 1 voltage inputs)

c UL us LISTED CE RoHS Compliant LONMARK 3.4

⚠⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- 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.
- Read, understand and follow the instructions before installing this product.
- Turn off all power supplying equipment before working on or inside the equipment.
- Any covers that may be displaced during the installation must be reinstalled before powering the unit.
- Use a properly rated voltage sensing device to confirm power is off. DO NOT DEPEND ON THIS PRODUCT FOR VOLTAGE INDICATION

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

A qualified person is one who has skills and knowledge related to the construction and operation of this electrical equipment and the installation, and has received safety training to recognize and avoid the hazards involved. NEC2009 Article 100

No responsibility is assumed by Veris Industries for any consequences arising out of the use of this material.

Control system design must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to acheive a safe state during and after a path failure. Examples of critical control functions are emergency stop and over-travel stop.

⚠ WARNING

LOSS OF CONTROL

- Assure that the system will reach a safe state during and after a control path failure.
- Separate or redundant control paths must be provided for critical control functions.
- Test the effect of transmission delays or failures of communication links.[1]
- Each implementation of equipment using communication links must be individually and thoroughly tested for proper operation before placing it in service.

Failure to follow these instructions may cause injury, death or equipment damage.

[1]For additional information about anticipated transmission delays or failures of the link, refer to NEMA ICS 1.1 (latest edition). *Safety Guidelins for the Application, Installation, and Maintenance of Solid-State Control* or its equivalent in your specific country, language, and/or location.

NOTICE

- This product is not intended for life or safety applications.
- Do not install this product in hazardous or classified locations.
- The installer is responsible for conformance to all applicable codes.
- Mount this product inside a suitable fire and electrical enclosure.

FCC PART 15 INFORMATION

NOTE: This equipment has been tested by the manufacturer and found to comply with the limits for a class B 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:

(1) This device may not cause harmful interference, and
(2) 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.

For use in a Pollution Degree 2 or better environment only. A Pollution Degree 2 environment must control conductive pollution and the possibility of condensation or high humidity. Consider the enclosure, the correct use of ventilation, thermal properties of the equipment, and the relationship with the environment. Installation category: CAT II or CAT III. Provide a disconnect device to disconnect the meter from the supply source. Place this device in close proximity to the equipment and within easy reach of the operator, and mark it as the disconnecting device. The disconnecting device shall meet the relevant requirements of IEC 60947-1 and IEC 60947-3 and shall be suitable for the application. In the US and Canada, disconnecting fuse holders can be used. Provide overcurrent protection and disconecting device for supply conductors with approved current limiting devices suitable for protecting the wiring. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the device may be impaired.

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Specifications (cont.)

CONTROL POWER	
AC	5 VA max.; 90 V min.; UL Maximum: 600 V_{L-L} (347 V_{L-N}); CE Maximum: 300 V_{L-N}
DC*	3 W max.; UL and CE: 125 to 300 VDC
Ride Through Time	100 msec at 120 VAC
INPUT	
Pulse	Solid-State or mechanical contacts (current less than 1 mA)
Minimum Pulse Width	20 msec
OUTPUT	
Alarm Contacts (E50F2A only)	N.C., static output; (30 VAC/DC, 100 mA max. @ 25°C, derate 0.56 mA per °C above 25°C)
Communication Port	2-wire, LON TP/FT-10
MECHANICAL CHARACTERISTICS	
Weight	0.62 lb (0.28 kg)
IP Degree of Protection (IEC 60529)	IP40 front display; IP20 Meter
Display Characteristics	Back-lit blue LCD
Terminal Block Screw Torque	0.37 ft-lb (0.5 N·m) nominal/0.44 ft-lb (0.6 N·m) max.
Terminal Block Wire Size	24 to 14 AWG (0.2 to 2.1 mm2)
Mounting Rail	T35 (35mm) DIN Rail per EN50022
OPERATING ENVIRONMENT	
Operating Temperature	-30° to 70°C (-22° to 158°F)
Storage Temperature	-40° to 85°C (-40° to 185°F)
Humidity Range	<95% RH (non-condensing)
Altitude of Operation	3 km max.
COMPLIANCE INFORMATION	
US and Canada	CAT III, Pollution degree 2; for distribution systems up to 347V_{L-N} /600VAC_{L-L}
CE	CAT III, Pollution degree 2; for distribution systems up to 300V_{L-N}
Dielectric Withstand	Per UL 508, EN61010
Conducted and Radiated Emissions	FCC part 15 Class B, EN55011/EN61000 Class B (residential and light industrial)
Conducted and Radiated Immunity	EN61000 Class A (heavy industrial)
Agencies: US and Canada (cULus)	UL508 (open type device)/CSA 22.2 No. 14-05

** External DC current limiting is required. See fuse recommendations.*

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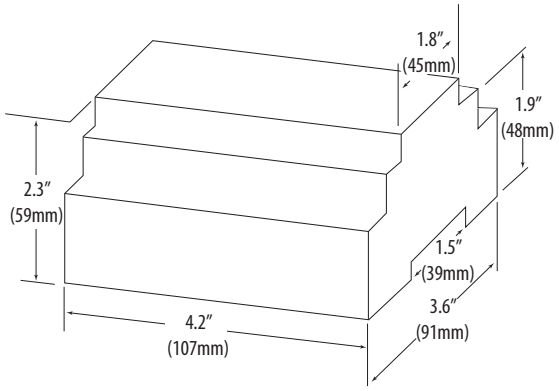
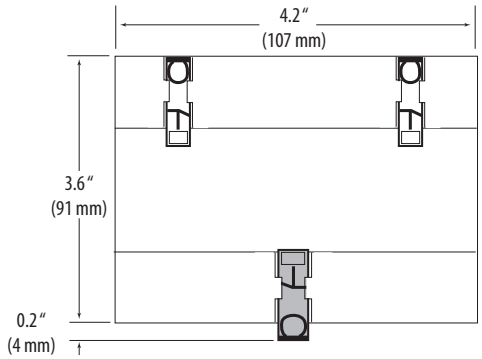
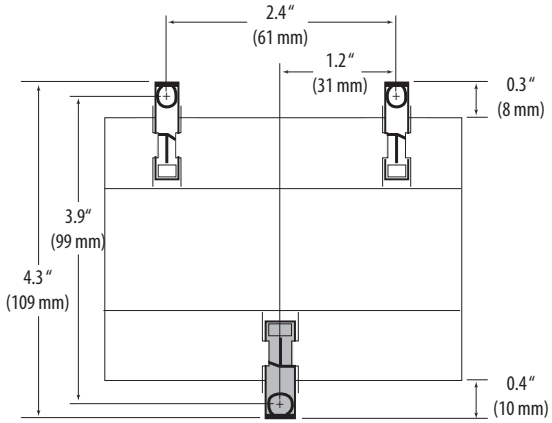
Dimensions



Bottom View (DIN Mount Option)



Bottom View (Screw Mount Option)



Data Outputs

Full Data Set (FDS)

Power (kW)
Energy (kWh)
Configurable for CT & PT ratios, system type, and passwords
Diagnostic alerts
Current: 3-phase average
Volts: 3-phase average
Current: by phase
Volts: by phase Line-Line and Line-Neutral
Power: Real, Reactive, and Apparent 3-phase total and per phase
Power Factor: 3-phase average and per phase
Frequency
Power Demand: Most Recent and Peak
Demand Configuration: Fixed, Rolling Block, and External Sync
Real Time Clock: user configurable

Data Logging (E50F5A only, includes all FDS outputs plus)

3 user configurable log buffers: each buffer holds 5760 32-bit entries
(User configures which 3 data points are stored in these buffers)
User configurable logging interval
(When configured for a 15 minute interval, each buffer holds 60 days of data)
Continuous and Single Shot logging modes: user selectable
Auto write pause: read logs without disabling the meter's data logging mode

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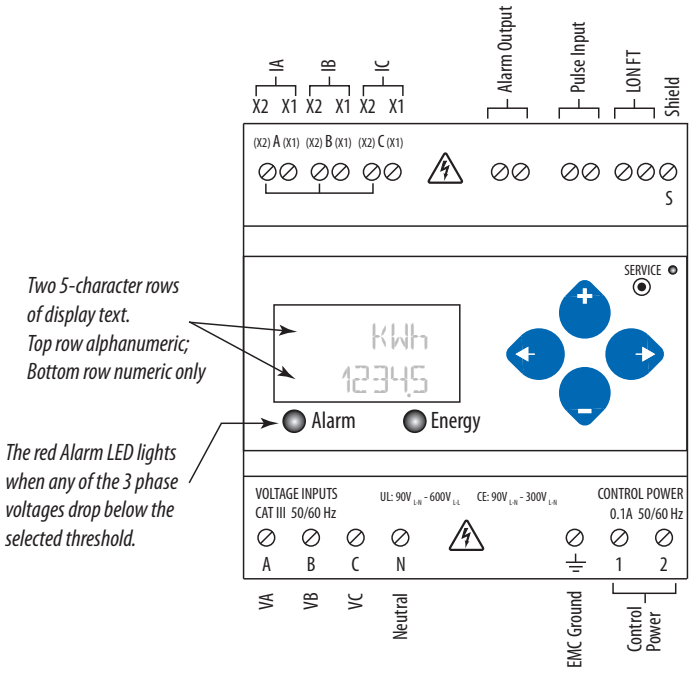
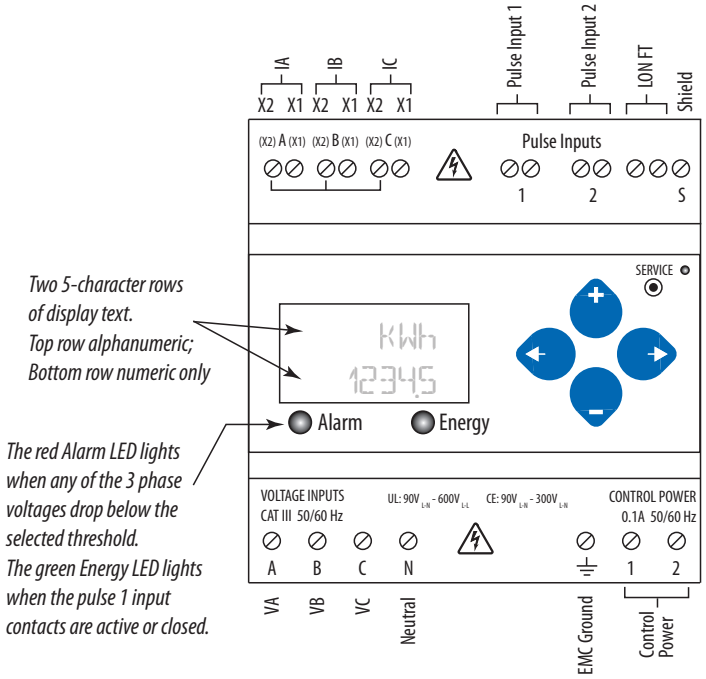
Product Diagrams

E50F2A

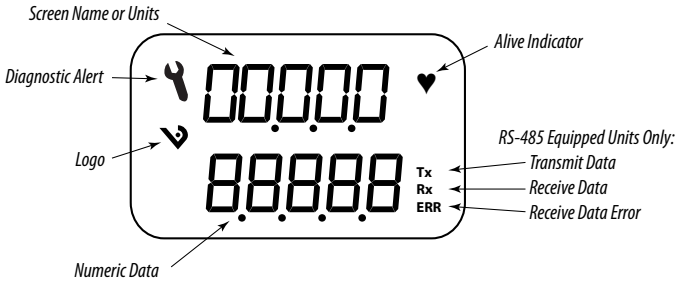


E50F5A

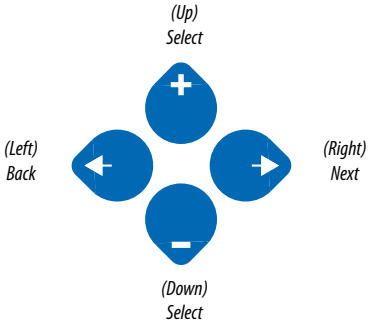


Display Screen Diagram

LCD Screen:



Buttons:



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Installation

Disconnect power prior to installation.

Reinstall any covers that are displaced during the installation before powering the unit.

Mount the meter in an appropriate electrical enclosure near equipment to be monitored.

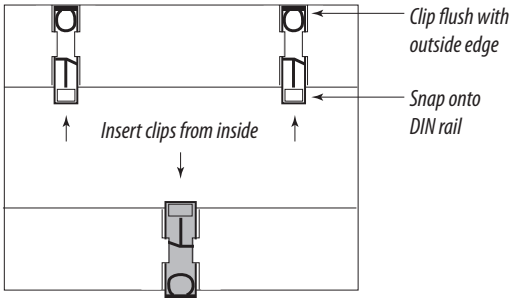
Do not install on the load side of a Variable Frequency Drive (VFD), aka Variable Speed Drive (VSD) or Adjustable Frequency Drive (AFD).

Observe correct CT orientation.

The meter can be mounted in two ways: on standard 35 mm DIN rail or screw-mounted to the interior surface of the enclosure.

A. DIN Rail Mounting

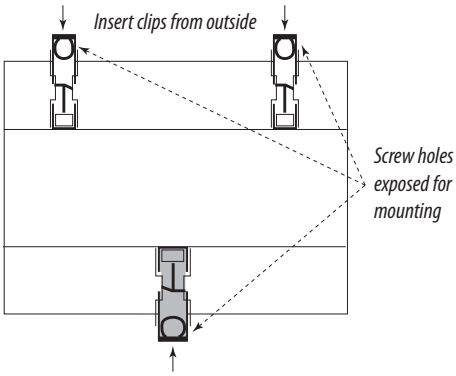
1. Attach the mounting clips to the underside of the housing by sliding them into the slots from the inside. The stopping pegs must face the housing, and the outside edge of the clip must be flush with the outside edge of the housing.
2. Snap the clips onto the DIN rail. See the diagram of the underside of the housing (below).



3. To reduce horizontal shifting across the DIN rail, use two Veris AV02 end stop clips.

B. Screw Mounting

1. Attach the mounting clips to the underside of the housing by sliding them into the slots from the outside. The stopping pegs must face the housing, and the screw hole must be exposed on the outside of the housing.
2. Use three #8 screws (not supplied) to mount the meter to the inside of the enclosure. See the diagram of the underside of the housing (below).



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Supported System Types

The meter has a number of different possible system wiring configurations (see Wiring Diagrams section). To configure the meter, set the System Type via the User Interface, LON variable cpSystemType. The System Type tells the meter which of its current and voltage inputs are valid, which are to be ignored, and whether neutral is connected. Setting the correct System Type prevents unwanted energy accumulation on unused inputs, selects the formula to calculate the Theoretical Maximum System Power, and determines which phase loss algorithm is to be used. The phase loss algorithm is configured as a percentage of the Line-to-Line System Voltage (except when in System Type 10) and also calculates the expected Line to Neutral voltages for system types that have Neutral (12 & 40).

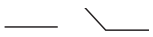
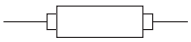
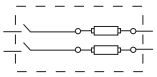
Values that are not valid in a particular System Type display as "----" on the User Interface or as QNAN in the LON variables.

	CTs		Voltage Connections			System Type		Phase Loss Measurements			Wiring Diagram
Number of wires	Qty	ID	Qty	ID	Type	LON variable cpSystemType	User Interface: SETUP>S SYS	VLL	VLN	Balance	Diagram number
Single-Phase Wiring											
2	1	A	2	A, N	L-N	10	1L + 1n		AN		1
2	1	A	2	A, B	L-L	11	2L	AB			2
3	2	A, B	3	A, B, N	L-L with N	12	2L + 1n	AB	AN, BN	AN-BN	3
Three-Phase Wiring											
3	3	A, B, C	3	A, B, C	Delta	31	3L	AB, BC, CA		AB-BC-CA	4
4	3	A, B, C	4	A, B, C, N	Grounded Wye	40	3L + 1n	AB, BC, CA	AN, BN, CN	AN-BN-CN & AB-BC-CA	5, 6

Wiring Symbols

To avoid distortion, use parallel wires for control power and voltage inputs.

The following symbols are used in the wiring diagrams on the following pages.

Symbol	Description
	Voltage Disconnect Switch
	Fuse (installer is responsible for ensuring compliance with local requirements. No fuses are included with the meter.)
	Earth ground
	Current Transducer
	Potential Transformer
	Protection containing a voltage disconnect switch with a fuse or disconnect circuit breaker. The protection device must be rated for the available short-circuit current at the connection point.

NOTICE

RISK OF EQUIPMENT DAMAGE

- This product is designed only for use with U018 series current transducers (CTs).
- DO NOT USE CURRENT OUTPUT (e.g. 5A) CTs ON THIS PRODUCT.

Failure to follow these instructions can result in equipment damage.

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Wiring

⚠ WARNING

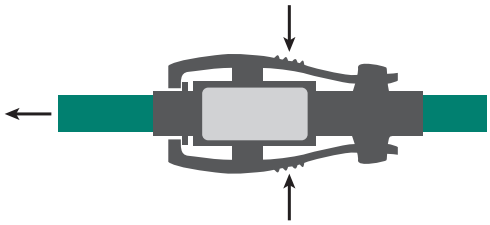
RISK OF ELECTRIC SHOCK OR PERMANENT EQUIPMENT DAMAGE

CT negative terminals are referenced to the meter's neutral and may be at elevated voltages

- Do not contact meter terminals while the unit is connected
- Do not connect or short other circuits to the CT terminals

Failure to follow these instructions may cause injury, death or equipment damage.

1. Connect the CT output leads to the E50FxA meter inputs according to the following diagrams. The white wire is the X1 lead.
2. Squeeze the ribbed sections of the CT connector and pull the rope out of the connector to open.



3. Wrap the rope style CT around the conductor to be monitored.
4. Snap the connector back together securely, ensuring there is no dust or debris in the closure area.

Diagram 1: 1-Phase Line-to-Neutral 2- Wire System 1 CT

Use System Type 10 (1L + 1n)

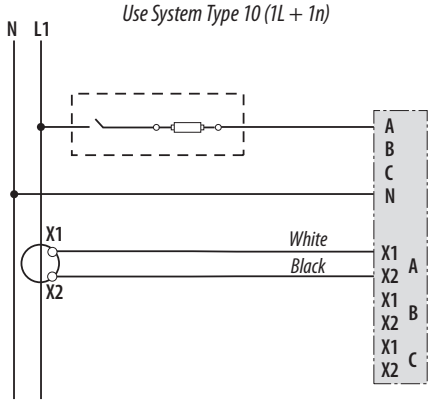


Diagram 2: 1-Phase Line-to-Line 2-Wire System 1 CT

Use System Type 11 (2L)

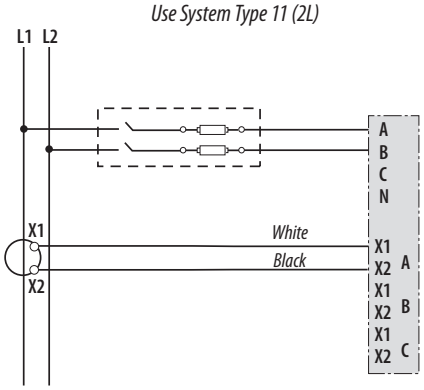


Diagram 3: 1-Phase Direct Voltage Connection 2 CT

Use System Type 12 (2L + 1n)

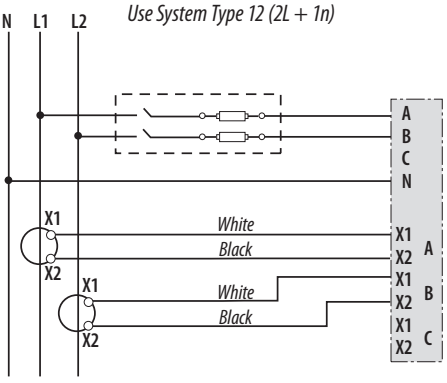
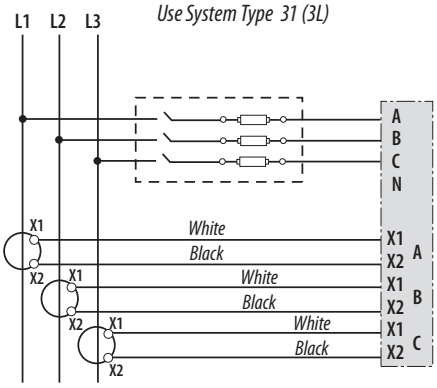


Diagram 4: 3-Phase 3-Wire 3 CT no PT

Use System Type 31 (3L)



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Wiring (cont.)

Diagram 5: 3-Phase 4-Wire Wye Direct Voltage Input Connection 3 CT

Use System Type 40 (3L + 1n)

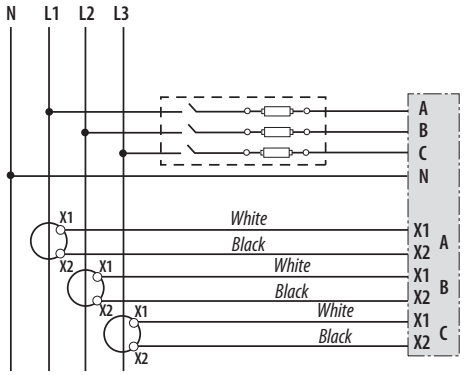
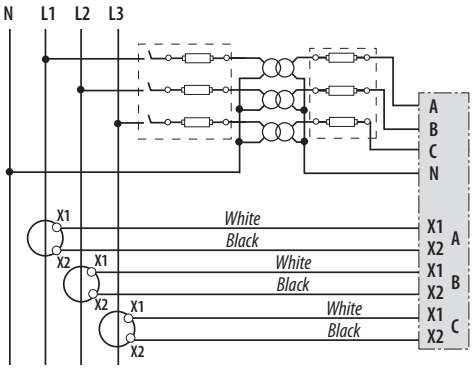


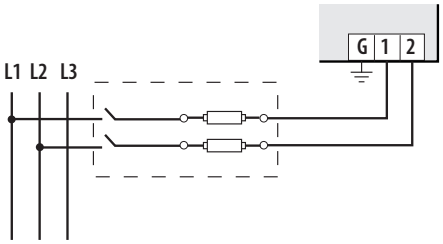
Diagram 6: 3-Phase 4-Wire Wye Connection 3 CT 3 PT

Use System Type 40 (3L + 1n)



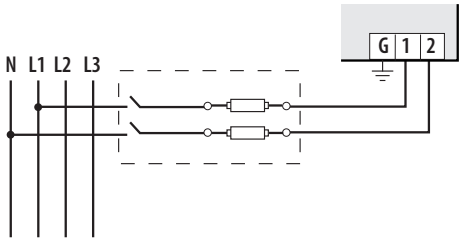
Control Power

Direct Connect Control Power (Line to Line)



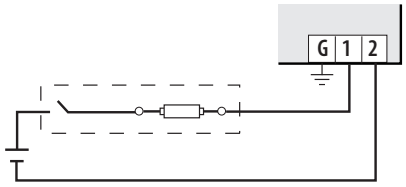
Line to Line from 90 VAC to 600 VAC (UL). In UL installations the lines may be floating (such as a delta). If any lines are tied to an earth (such as a corner grounded delta), see the Line to Neutral installation limits. In CE compliant installations, the lines must be neutral (earth) referenced at less than 300 VAC_{L-N}

Direct Connect Control Power (Line to Neutral)



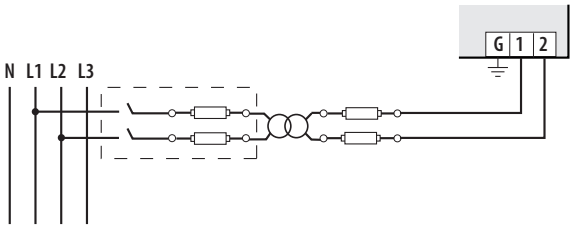
Line to Neutral from 90 VAC to 347 VAC (UL) or 300 VAC (CE)

Direct Connect Control Power (DC Control Power)



DC Control Power from 125 VDC to 300 VDC (UL and CE max.)

Control Power Transformer (CPT) Connection



The Control Power Transformer may be wired L-N or L-L. Output to meet meter input requirements

Fuse Recommendations

Keep the fuses close to the power source (obey local and national code requirements).

For selecting fuses and circuit breakers, use the following criteria:

- Select current interrupt capacity based on the installation category and fault current capability.
- Select over-current protection with a time delay.
- Select a voltage rating sufficient for the input voltage applied.
- Provide overcurrent protection and disconnecting means to protect the wiring. For AC installations, use Veris AH02, AH03, AH04, or equivalent. For DC installations, provide external circuit protection. Suggested: 0.5 A, time delay fuses.
- The earth connection (G) is required for electromagnetic compatibility (EMC) and is not a protective earth ground.

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Quick Setup Instructions

These instructions assume the meter is set to factory defaults. If it has been previously configured, check all optional values.

A. To Navigate to the Setup screens:

1. Press ⊕ or ⊖ repeatedly until SETUP screen appears.
2. Press → to get to the PASWD screen.
3. Press → to move through the digits. Use the ⊕ or ⊖ buttons to enter your password (the default is 00000).
4. Press → to move to the first Setup screen (S CT)
5. Use ⊕ or ⊖ to select the parameter screen you want to set.
6. After you set the parameters you want, use ⊕ or ⊖ to select the next Setup screen or ← to exit the Setup screens (return to SETUP).

B. To Enter the CT (Current Transducer) output voltage and CT size ranges:

1. Press → to go to the CT SZ screen and through the digits. Use ⊕ or ⊖ to select the CT size in amps (default is 100). accept the value and
2. Press → to accept the value and go back to the S CT screen.

C. To Enter the service type to be monitored:

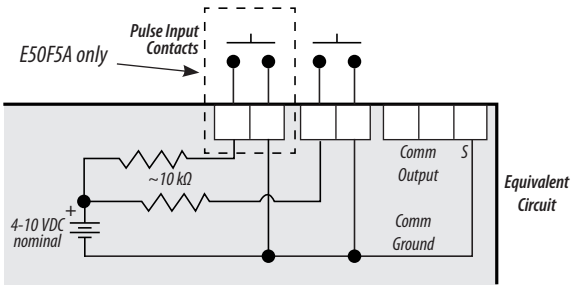
1. Navigate to the S SYS (Set System) Setup screen (see section A above).
2. Press → to go to the SYSTM screen. Use ⊕ or ⊖ to select the configuration (see wiring diagrams - default is 3L-4N).

Press → to go back to the S SYS screen.

For full setup instructions, see the configuration instructions on the following pages.

Pulse Contact Inputs

The E50F5A has two inputs with pulse accumulators for solid state or mechanical contacts in other sensors, such as water or gas flow meters. The E50F2A has one pulse input. These inputs are isolated from the measured circuits. The communication signals, including the shield terminal, are AC-coupled. Use with contacts that do not require current to remove oxidation.



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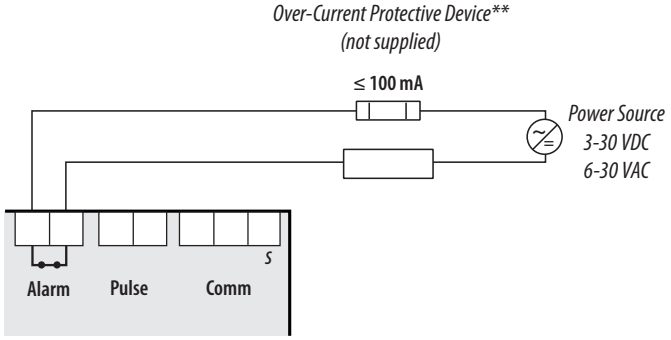
Solid State Output

The E50F2A has one normally closed (N.C.) alarm output.* See the Setup section for configuration information.



The solid state pulse outputs are rated for 30 VAC/DC nom.

The maximum load current is 100 mA at 25°C. Derate 0.56 mA per °C above 25°C.

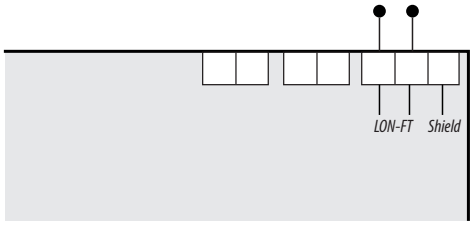
* While the relay used for the Phase Loss contact is normally closed (contacts are closed when the meter is not powered), closure indicates the presence of an alarm; either loss of phase, when the meter is powered, or loss of power when the meter is not. The contacts are open when the meter is powered and no phase loss alarm conditions are present.

** The over-current protective device must be rated for the short circuit current at the connection point.

All pulse inputs/outputs and communication circuits are only intended to be connected to non-hazardous circuits (SELV or Class 2). Do not connect to hazardous voltages.

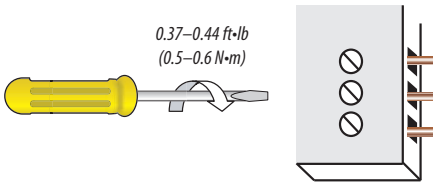
Lon TP/FT-10 Communications

- Use this meter in either Free Topology or Bus Topology LonWorks network configurations.
- Twisted pair connections to the meter are not polarity sensitive.
- Attach the meter at any point in a Free Topology configuration, but the total network cable length must be less than 500 meters.
- Free Topology configurations require one terminator (Echelon TP/FT-10 Free Topology Terminator or equivalent), which can be attached at any point in the network.
- In Bus Topology configurations, connect loads sequentially (in a daisy chain), except for stubs, which must be less than 3 meters in length. The total network cable length must be less than 2700 meters.
- Bus Topology configurations require two terminators (Echelon TP/FT -10 Free Topology Terminator or equivalent, one at at each end of the network.
- The Shield connection is not internally connected to the ground connection on the meter.



For all terminals:

- When tightening terminals, apply the correct torque: 0.37 to 0.44 ft·lb (0.5-0.6 N·m).
- Use 14-24 gauge (2.1-0.2 mm^2) wire.



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User Interface (UI) Menu Abbreviations Defined

The user can set the display mode to either IEC or IEEE notation in the SETUP menu.

Main Menu		
IEC	IEEE	Description
D	D	Demand
MAX	M	Maximum Demand
P	W	Present Real Power
Q	VAR	Present Reactive Power
S	VA	Present Apparent Power
A	A	Amps
UAB, UBC, UAC	VAB, VBC, VAC	Voltage Line to Line
V	VLN	Voltage Line to Neutral
PF	PF	Power Factor
U	VLL	Voltage Line to Line
HZ	HZ	Frequency
KSh	KVAh	Accumulated Apparent Energy
KQh	KVARh	Accumulated Reactive Energy
KPh	KWh	Accumulated Real Energy
PLOSS	PLOSS	Phase Loss
LOWPF	LOWPF	Low Power Factor Error

Main Menu		
IEC	IEEE	Description
F ERR	F ERR	Frequency Error
I OVR	I OVR	Over Current
V OVR	V OVR	Over Voltage
PULSE	PULSE	kWh Pulse Output Overrun (configuration error)
_PHASE	_PHASE	Summary Data for 1, 2, or 3 active phases
ALERT	ALERT	Diagnostic Alert Status
INFO	INFO	Unit Information
MODEL	MODEL	Model Number
OS	OS	Operating System
RS	RS	Reset System
SN	SN	Serial Number
RESET	RESET	Reset Data
PASWD	PASWD	Enter Reset or Setup Password
ENERG	ENERG	Reset Energy Accumulators
DEMND	DEMND	Reset Demand Maximums

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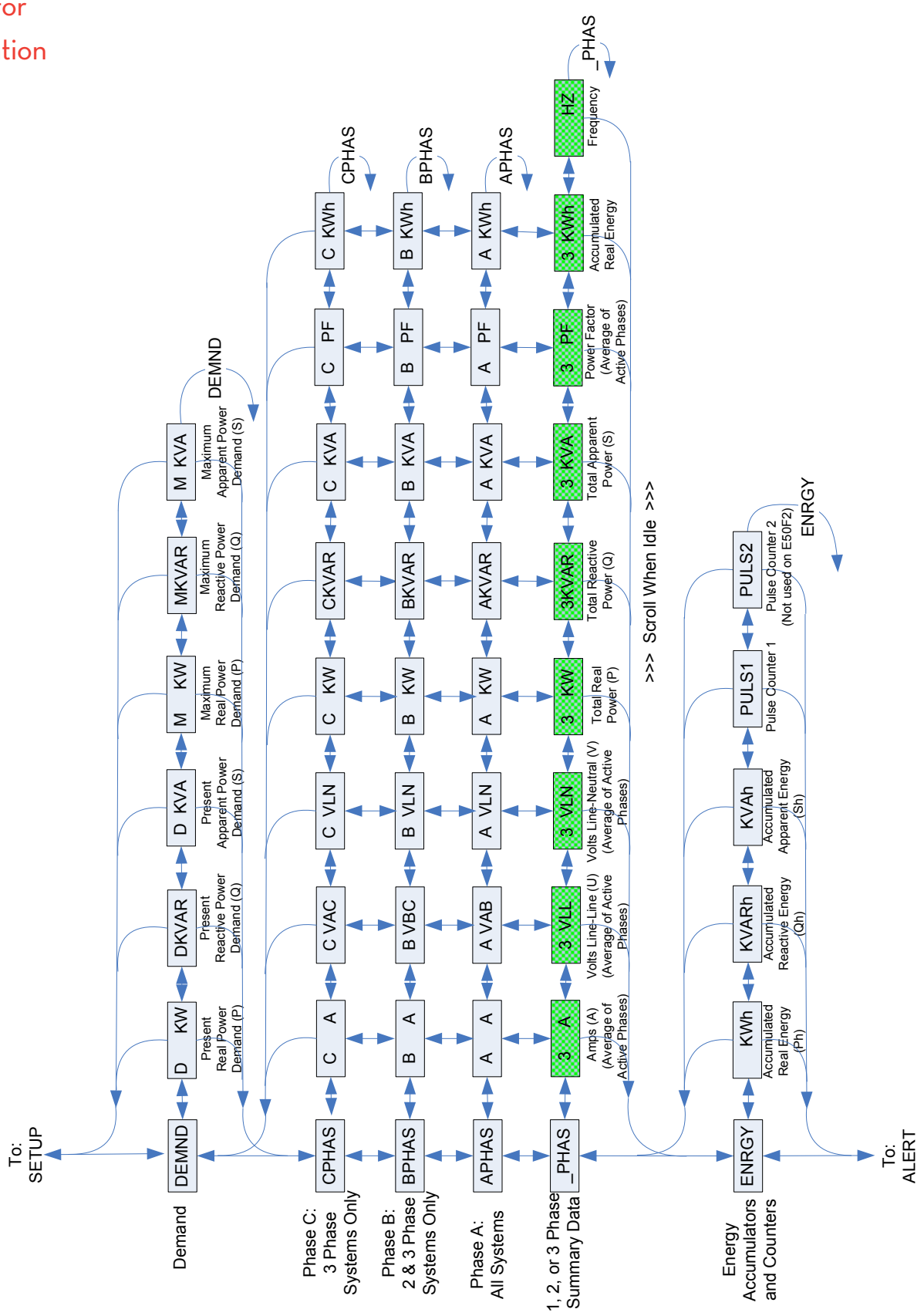
User Interface for Data Configuration



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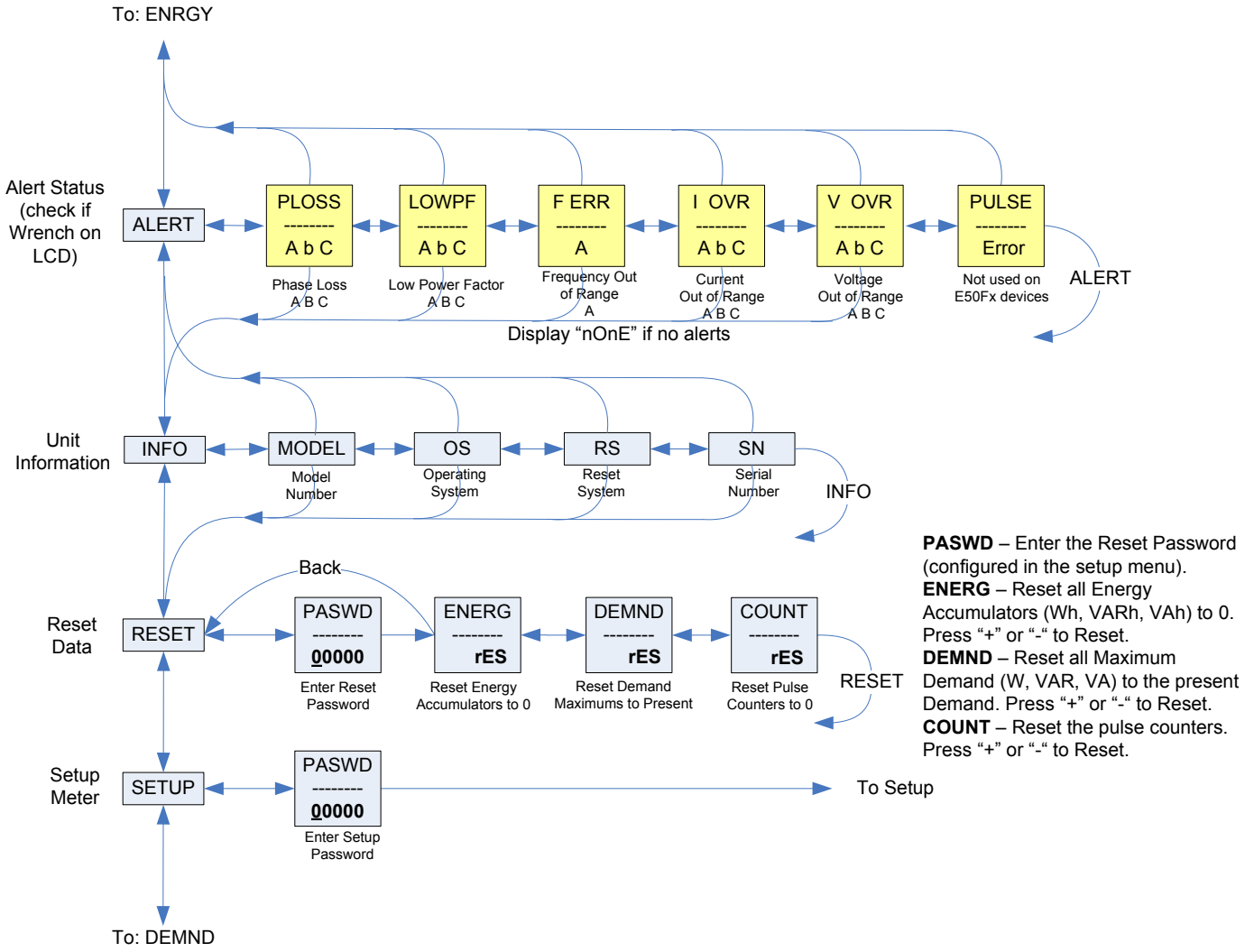
Alert/Reset Information



PASWD – Enter the Reset Password (configured in the setup menu).
ENERG – Reset all Energy Accumulators (Wh, VARh, VAh) to 0. Press "+" or "-" to Reset.
DEMND – Reset all Maximum Demand (W, VAR, VA) to the present Demand. Press "+" or "-" to Reset.
COUNT – Reset the pulse counters. Press "+" or "-" to Reset.

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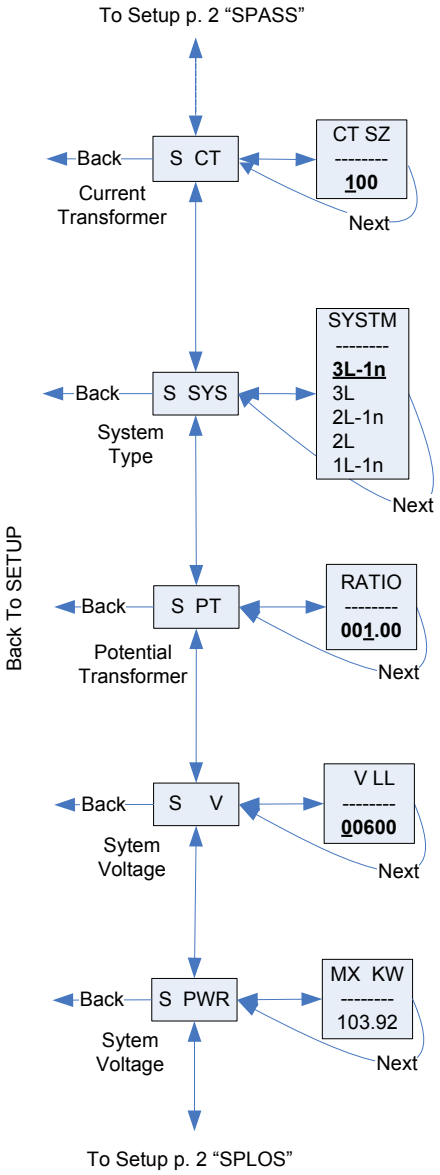
UI for Setup



Set Current Transducer:
CT SZ - CT Size: in Amps. Maximum is 32000 Amps.

Set System Configuration:
SYSTM: **+** or **–** to step through the following System Type options:

System	Reg 130	CTs	Description
3L-1n	40	3	Wye Three Phase: A, B, & C with Neutral (Default).
3L	31	3	Delta Three Phase: A, B & C; no Neutral
2L-1n	12	2	Single Split Phase: A & B with Neutral
2L	11	1	Single Phase: A & B; no Neutral
1L-1n	10	1	Single Phase: A to Neutral

Set Potential Transfomer Ratio:
RATIO – Potential transformer step down is RATIO:1. Default is 1:1 (No PT installed). See Wiring Diagrams section. Set this value before setting the system voltage to establish the proper range of System Voltage values.

Set System Voltage:
V LL – The nominal Line to Line Voltage for the system. This is used by the meter to calculate the theoretical maximum system power, and as the reference voltage for setting the Phase Loss threshold. Maximum is 32000 Volts. For system type 1+N (10), this is a Line to Neutral Voltage, indicated by "V LN". Note: the meter will reject settings that are not within the meter's operating range when divided by the PT ratio.

System Power:
MX KW – The theoretical Maximum System Power is calculated by the meter from the System Voltage, CT size, and System Type. Power Factor is assumed to be unity. The value of System Power is used to determine which combinations of pulse weight and duration are valid and will keep up with the maximum power the meter will see. This value is read only.

Default values are in **Bold**

† When leaving this parameter screen using the right button ( ), the display will briefly indicate "SAvEd)" to confirm that any changes made have been accepted.

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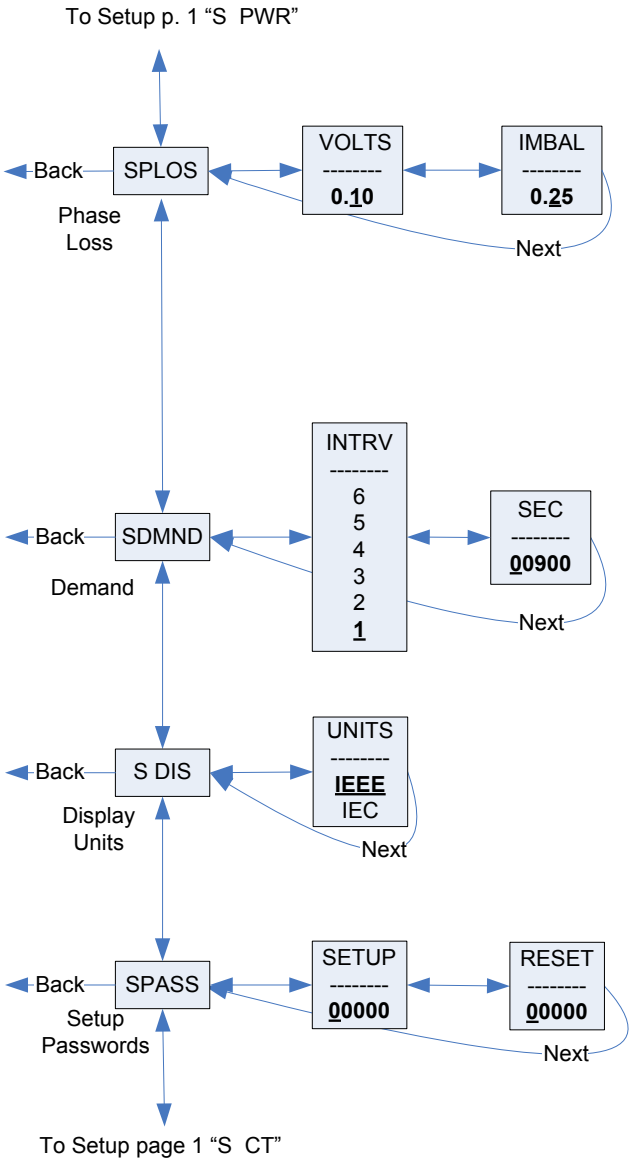
UI for Setup (cont.)



Set Phase Loss:
VOLTS - Phase Loss Voltage: Phase Loss Voltage Threshold in percent of system voltage. Any phase (as configured by the System Type) whose level drops below this threshold triggers a Phase Loss alert. For example, with the system type set to 40 (3L+N) and the System voltage set to 480V L-L, the L-N voltage for each phase is 277V. When this threshold is set to 10%, if any phase drops to less than 10% of 277V (less than 27.7V), or if any L-L voltage drops to less than 10% of 480V (less than 48V), the corresponding phase loss alarm activates.
IMBAL - Phase Loss Imbalance: Phase Loss Imbalance Threshold in percent is the fractional difference in Line to Line voltages above which Phase Loss Alarm is on. For a 3-phase Y(3+N) system (type 40), both Line to Neutral and Line to Line voltages are tested. In a 3-phase delta system (type 31), only the Line to Line voltages are examined. In a single split-phase (2+N) system (type 12), only the Line to Neutral voltages are compared. For system types 1+N (10) and 2 (11), imbalance is not tested.

Set Demand Interval:
INTRV - The number of Sub-Intervals (1 to 6) in a Demand Interval. Default is 1 (block demand).
SEC - Sub-Interval length in seconds. Default is 900 (15 minutes). Set to 0 for external sync-to-comms.

Set Display Units: +/- to switch between:
IEEE – VLL VLN W VAR VA Units.
IEC – U V P Q S Units.

Set Passwords:
SETUP - The Password to enter the SETUP menu.
RESET - The Password to enter the RESET menu.

† When leaving this parameter screen using the right button ( ), the display will briefly indicate "SAvEd)" to confirm that any changes made have been accepted.

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Resources Available for Downloading

The following resources are available at the Veris website, www.veris.com under Design Resources -> Protocol Info -> LonWorks.

Plugin

The E50 LNS plugin offers the simplest method to configure the E50FxA meter. The plugin displays all of the configuration options and installs the Veris Resource File Set and device template. The LNS Network Operating System and a plugin Director (to launch the plugin, such as LonMaker) are both required to run the plugin.

Device Interface Files

The E50 device interface files (.XIF, .XFB in binary form) are required to properly commission a device. Creating a device template from these files allows the network to correctly name the network variables and configuration properties. Download and save the device interface files to C:\LonWorks\import\Veris Industries\. Alternatively, the E50 LNS Plugin installs these files automatically (no need to download the files separately).

Resource File Set

All of the meter's network variables (except nvoLoggedData) use standard network variable types (SNVTs). However, the configuration properties to set the meter installation details (CT size, system type, system voltage, etc.) are user-defined configuration properties (UCPTs). The Veris website includes a manufacturer-scoped resource file set to recognize these types, but they are not necessarily required. Commissioning and configuring options are explained below, and the need for the resource files depends on the situation and user preference. The E50 LNS Plugin automatically installs the Veris Resource File Set (no need to download these files separately). Note: If using resource files, install them before importing the device template into a network.

Using the LNS Plugin

The following instructions are written for the Veris E50 LNS Plugin using LonMaker. If using a different integration tool, replace the specific steps that have actions in LonMaker with equivalent procedures for the integration tool in use (see documentation for the tool).

Installation Instructions

1. Download the "Veris E50 LNS Plugin Vx.x Installer.zip file from the Veris website, found under Design Resources->Protocol Info->LonWorks.
2. Extract all files from the zip.
3. Double click the setup.exe file to start the installer. If installing on Windows 7 or Windows Vista, when the User Access Control dialog appears, click "Allow" to give the installer administrative privileges.
4. Install the Microsoft .NET Framework 2.0 (or above) at this point. Follow the prompts, and then the plugin installer will begin.
5. Click Next and select a folder to install the plugin to. It is recommended to keep the default of LonWorks\apps\Veris Industries\Veris E50 LNS Plugin\ based on guidelines from Echelon documentation, but changing the installation path is allowed.
6. Click Next twice to confirm the installation, then click close when installation is complete.

Installation Details

The Veris E50 LNS Plugin Installer both installs and registers the plugin, while also copying support files to default locations. Device resource files are placed in the "[local drive]\LonWorks\Types\User\Veris Industries\E50Meters\" folder. These resource files are automatically added to the LNS Resource File Catalog. Any existing resource files for the E50 meters are removed from the catalog and the computer. The device template (VerisE50.XIF and VerisE50.XFB) and application image (VerisE50.APB and VerisE50.NXE) files are copied to the "[local drive]\LonWorks\import\Veris Industries\" folder. When the plugin is registered with a network for the first time, if the E50 device template has not already been imported, the plugin automatically adds it to the network under the template name "VerisE50."

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Using the LNS Plugin (cont.)

Registration Instructions

The plugin installer registered the plugin globally, but as a system level plugin, it must be registered separately for each network that requires it. Registration can be accomplished either while opening a network or after a network is opened. Instructions here are for the latter method.

1. Open the LonMaker network where the plugin is to be registered.
2. Select the LonMaker menu (on the toolbar in Visio 2003; under the Add-ins toolbar in Visio 2010). From the drop-down list, select "Plugins," and then "Register Plugins. . ."
3. Select the "Veris E50 Device Plug-in" entry from the plugin list and press the "Register" button.
4. Press the "Okay" button.

Device Creation Instructions

Creating an E50 device in LonMaker is no different than creating any other device.

1. Drag a "Device" from the LonMaker Basic Shapes stencil or other stencil to the drawing. This opens the new device wizard.
2. Click the "Commission device" checkbox unless the network is being created OffNet ("Engineered" mode), or if there is any other reason to delay commissioning.
3. From the Device Template section, choose the "VerisE50" template from the drop-down list (the plugin added the template to the network when registering).
4. Finish customizing using the wizard prompts and press "Finish".
5. If commissioning was selected, press the service pin on the meter.

Device Configuration Instructions

The plugin has two tabs useful for configuring the device. The "Meter Setup" tab includes details related to the installation (CT size, system type, system voltage, etc.), and other settings related to the demand interval and alarm configuration. The second tab for configuration of the device is the "Propagation Settings" tab, which includes configuration properties that control propagation (heartbeat, throttle, etc.). Settings can be written to both the database and the device if the device is online (or soft offline), commissioned, and the LonMaker mode is OnNet. Otherwise the settings can only be written to the database. There is some behavior to be noted if changes are made while the device is soft offline. Please read the "Important Information When Configuring While Soft Offline" section below.

1. Right click on the E50 device and select "configure" from the context menu. This brings up the "Meter Setup" tab of the plugin.
2. To get the current setting from the meter or the database, press the "GET PRESENT SETTINGS" button. If the configuration properties on the device do not match the database, a prompt appears to choose which values to load.
3. Make the necessary changes to the Installation Details and Other Settings. Note that the Demand Subinterval Length is also the logging interval for E50F5 meters, so it can be configured at this point (see the "Configuring the Data Log" section below for a description of the meter's data logging capabilities).
4. Press "APPLY SETTINGS." If the device is online (or soft offline), commissioned, and the LonMaker mode is OnNet, the configuration property settings are applied to both the network database and the device. If, however, the above conditions are not met, the configuration property settings are only written to the database. A dialog box appears when the write is finished, stating where the values were written to. If values were not written to the device (database only), the device must be resynchronized to the database at a later time. See the "Configuration Property Resynchronization" section below.
5. Switch to the "Propagation Settings" tab of the plugin (tab control is at the top of the plugin).
6. To get the current setting from the meter or the database, press the "GET PRESENT SETTINGS" button. If the configuration properties on the device do not match the database, a prompt will appear to choose which values to load.

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Using the LNS Plugin (cont.)

7. Make the necessary changes to the propagation settings and press "APPLY SETTINGS." If the device is online (or soft offline), commissioned, and the LonMaker mode is OnNet, the configuration property settings are applied to both the network database and the device. If, however, the above conditions are not met, the configuration property settings are written to the database only. A dialog box appears when the write is finished, stating where the values were written to. If values were not written to the device (database only), the device must be resynchronized to the database at a later time. See the "Configuration Property Resynchronization" section below.

Saving/Loading Configuration Templates

Values on the "Meter Setup" and "Propagation Settings" tabs can be saved separately to template (.xml) files for easy recovery at a later time or for use with another E50 device. When either of these tabs is selected, a "Template" menu appears highlighted in yellow on the menu bar.

Save to Template (.xml) File

1. Select "Template"->"Save To Template". If all the values are filled in and are acceptable values for an E50 (range checking is done here), a "Save As" file window appears.
2. Navigate to the desired folder and create a name in the "File Name" field (or select an existing .xml file).
3. Press the "Save" button.

Load From Template (.xml) File

1. Select "Template"->"Load From Template".
2. Navigate to the folder where the .xml file exists and select the file.
3. Press the "Open" button.

Formatting Power Correctly

LonMark Resource Files before version 13.04 set the default format in the U.S. for network variables of the type SNVT_power_f as units of Btu/hr. This formatting results in power values being reported about 3.4 times higher than they actually are in Watts. The plugin always displays correct values in Watts, however, since it uses raw values, not formatted values.

There are a few ways to resolve this formatting issue, described below. Upgrading the LonMark Resource Files is the least tedious method, but may require checking the rest of the network to verify that no issues have been introduced by the other changes LonMark has made to the resource files.

Update the LonMark Resource Files

1. Uninstall the current LonMark Resource Files by opening the "Add or Remove Programs" dialog in Windows, selecting the "LonMark Resource Files 13.xx" and pressing "Remove."
2. In a web browser, navigate to www.LonMark.org, "Technical Resources" (from the menu bar at top) ->"Resource Files"->"Start SNVT/SCPT Download…"
3. Follow the prompts to complete the resource file installation.
4. Power values are now formatted in Watts.

Manually Update the Power Network Variables

1. In LonMaker, right click on the E50 device and select "Plugins"-> "Echelon AppDevice Browse".
2. Right click on the row for a power network variable and select "Change Format" from the context menu (can alternatively press Ctrl+A when the line is selected).
3. From the "Select Network Variable Format" dialog, select SNVT_power_f#SI (not #US) and press OK.
4. Repeat steps 2 and 3 for each power network variable.
5. If any of the power network variables are bound (as opposed to polled), repeat steps 2 and 3 for the input network variables of other devices the meter is bound to. The format of the input network variable on the other end determines the format that device receives, not the formatting of the E50 meter's output network variable.

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Using the LNS Plugin (cont.)

Important Information When Configuring While Soft Offline

When a device is commissioned but is soft offline (green crosshatch in LonMaker), application code does not execute. The device only processes network management commands. The device can be successfully configured soft offline, though. The configuration property values are physically stored on the device, and processed and applied when the device is brought online. This does mean, though, that setup values on the screen of the device do not reflect new values applied using the plugin while soft offline until the meter is brought online.

Configuration Property Resynchronization

If the device was configured using the plugin and values were saved to only the database for any reason (OffNet, device not commissioned, etc.), the configuration properties in the database must be downloaded to the device at some point. If the device has not yet been commissioned, this synchronization can be performed while commissioning the device. Otherwise follow the second procedure.

Synchronization While Commissioning

1. Right-click on the device in LonMaker and select "Commissioning"-> "Commission. . ." from the context menu.
2. For the "Source of CP Values", select "LNS database." Press "Finish" to complete commissioning.

Synchronization While Device is Commissioned and Online

1. Right-click on the device in LonMaker, and select "Commissioning"-> "Resync CPs. . ." from the context menu.
2. Select "Download current values to device" as the operation.
3. Press the "OK" button.

Viewing Meter Values

If the device is online and the network is attached, present values from the meter such as power and energy can be viewed using the plugin by right-clicking on the device and selecting "Browse. . ." from the context menu. The plugin loads with the "Network Variables" tab selected. Four buttons on the left alternate among viewing the instantaneous, demand, energy, and status pages. Polling defaults to every 5 seconds, but only the values shown on the screen at any one time are polled (no polling while on the "METER SETUP" and "PROPAGATION SETTING" tabs), and with a small delay between values to keep the network load to a maximum of about 10 packets per second during each poll. The polling rate can also be changed using the drop-down list on the left.

Restarting Polling

Polling status is shown in the bottom right corner of the plugin. Polling is disabled in the following cases:

- LonMaker Management Mode is OffNet.
- Device is not commissioned.
- Device is not Online.
- Device is not responsive or fails tests.
- An exception occurs while polling device values.

After resolving the issue, restart polling in one of two ways:

1. Close the plugin and reopen it. The condition of the device and network are tested, and polling begins if everything is normal.
2. From the menu bar, select File ->"Attempt Polling Restart." The condition of the device and network are retested, and polling begins if everything is normal.

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Using the LNS Plugin (cont.)

Resetting Maximum Demand, Energy, Pulse Counter(s), and the Log

Demand, Energy, and Pulse Counter(s) can only be reset while the device is commissioned and online.

Resetting Maximum Demand

1. If the plugin is not open, right-click on it and select "Browse…" from the context menu. If it is already open, click on the "Network Variables" tab.
2. Press the "DEMAND" button on the left.
3. Press the "RESET MAXIMUM DEMAND" button to reset to the present demand.

Resetting Energy Accumulators

1. If the plugin is not open, right click on it and select "Browse…" from the context menu. If it is already open, click on the "Network Variables" tab.
2. Press the "ENERGY" button on the left.
3. Press the "RESET ENERGY ACCUMULATORS" button to reset accumulators to zero.

Resetting Pulse Counter(s)

1. If the plugin is not open, right click on it and select "Browse…" from the context menu. If it is already open, click on the "Network Variables" tab.
2. Press the "ENERGY" button on the left.
3. Press the "RESET PULSE COUNTER(S)" button to reset counter(s) to zero.

Resetting the Log (E50F5A only)

1. If the plugin is not open, right click on it and select "Plugins"-> "Veris E50 Download Log" from the context menu. If it is already open, click on the "Data Logging" tab.
2. Expand the "LOG INFO" section.
3. Press the "RESET LOG" button to clear all entries.

Setting the Meter Time

The real time clock on an E50 meter does not have battery backup. The time resets to the millennium (January 1st, 2000) whenever the meter is power cycled, but it can automatically synchronize to a network time source if set up properly. Otherwise the meter time can easily be manually set to a computer's time or to a custom time using the plugin (while the device is commissioned and online).

Setting up Automatic Syncronization to Network Time Source

1. Locate a network time source with an output network variable of type SNVT_time_stamp.
2. If a NodeObject functional block for the meter has not already been created, drag the "Functional Block" shape from the LonMaker Basic Shapes stencil onto the drawing. If it already exists, skip to step 5.
3. From the popup dialog, select the meter from the Device section, and in the Functional Block section choose "NodeObject" from the Name drop-down list.
4. Press Finish to create the functional block.
5. If the functional block does not have the input network variable nviTimeSet showing, drag the "Input Network Variable" shape onto the NodeObject functional block.
6. In the popup dialog, select "nviTimeSet" and press "OK."
7. Create a binding between the output network variable of the time source to nviTimeSet on the meter by dragging the "Connector" shape onto the drawing and connect it between the two network variables.

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Using the LNS Plugin (cont.)

Manually Setting the Meter Time Using the Plugin

1. If the plugin is not open, right-click on it and select "Browse. . ." from the context menu. If it is already open, click on the "Network Variables" tab.
2. Press the "STATUS" button on the left.
3. To set the meter time from the computer's time, press the "SYNC TO PC TIME" button.
4. To set the meter time to a custom time, modify the custom time (field below the current time) and press the "SET TO CUSTOM [TIME]" button.

Configuring the Data Log (E50F5A only)

The E50F5A meter includes a data logging feature that holds 5760 time stamped records for 3 meter parameters. The logging interval is fixed to the demand subinterval length, which can be anywhere between 10 seconds and 9 hours. The default logging interval is 15 minutes (900 seconds), which allows for 60 days of data stored in the log. This data can be downloaded to a CSV file on a computer using the plugin.

The log can be set up in either Single Shot Mode or Continuous Mode (default is Continuous Mode). In Single Shot Mode, the meter records data until the buffer is full. When the buffer is full, the meter stops recording new readings and retains the 5760 records it has already saved. In Continuous Mode, the meter continues to record data as long as it is operating. The log buffer can only hold 5760 records at a time, however, so once the meter reaches 5760 records the oldest is deleted each time a new record is saved. Once full, therefore, the buffer will always hold the most recent 5760 records.

Setting up the log

1. If the plugin is not open, right-click on it and select "Plugins"-> "Veris E50 Download Log" from the context menu. If it is already open, click on the "Data Logging" tab.
2. If the device is not online, has not been commissioned, or the LonMaker Management Mode is OffNet, the "Data Logging" tab will not be visible. To show this tab, click the "Help" menu and select Advanced->"Force Toggle Logging Visible."
3. Expand the "LOG SETUP" section using the arrows on the right side of the header.
4. To get the current setting from the meter or the database, press the "GET PRESENT SETTINGS" button. If the configuration properties on the device do not match the database, a prompt appears to choose which values to load. The database may contain zeros for the points to log when a device is first created, since the E50 device template does not contain defaults for these configuration properties (to prevent defaults from the device template conflicting with factory defaults stored on the device). When first configuring logging, if the device is online (or soft offline), choose to get values from the device.
5. Select the three points to log (drop-down lists give log point indices corresponding to the Configuration Property table of this guide, the names of the network variables the data points correspond to, and descriptions of each).
6. Choose to enable or disable the log, and which logging mode to use (continuous or single shot).
7. When finished making changes, press the "APPLY SETTINGS" button. If the device is online (or soft offline), commissioned, and the LonMaker mode is OnNet, the configuration property settings are applied to both the network database and the device. If, however, the above conditions are not met, the configuration property settings are written to the database only. A dialog box appears when the write is finished, stating where the values were written to. If values were not written to the device (database only), the device must be resynchronized to the database at a later time. See the "Configuration Property Resynchronization" section below.
8. If the logging interval (Demand Subinterval Length) was not set to the right value while configuring the meter using the "METER SETUP" tab ("Device Configuration Instructions" section above), perform the following steps. Otherwise the log has been successfully configured.
9. Switch to the "METER SETUP" tab of the log.
10. Press the "GET PRESENT SETTINGS" button to get all of the current settings.
11. Under the "OTHER SETTINGS" section, change the demand subinterval length to the desired logging interval (keeping in mind that demand is also affected).

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Using the LNS Plugin (cont.)

12. Press "APPLY SETTINGS". If the device is online (or soft offline), commissioned, and the LonMaker mode is OnNet, the configuration property settings are applied to both the network database and the device. If, however, the above conditions are not met, the configuration property settings are written to the database only. A dialog box appears when the write is finished, stating where the values were written to. If values were not written to the device (database only), the device must be resynchronized to the database at a later time. See the "Configuration Property Resynchronization" section below.

Downloading the Data Log (E50F5A only)

Records from an E50F5A's log can be downloaded to a new CSV file or appended to an existing log file. Appending to an existing file saves time by just adding the records that have been created since the file was last updated. If appending to an existing file, an unaltered CSV file from a previous download must be used, and the headers must match the points that the meter is currently logging.

Download to a New Log File

1. Verify the meter is commissioned and online, and the LonMaker Management Mode is OnNet.
2. If the plugin is not open, right-click on it and select "Plugins"-> "Veris E50 Download Log" from the context menu. If it is already open, click on the "Data Logging" tab.
3. On the left side of the "DOWNLOAD LOG" section, select "Create A New Log File."
4. Press the "Choose Path" button, choose a destination folder, and press "OK."
5. Enter a name for the log file in the "File Name" text box. If a unique file name is desired, check the "Append Date/Time to File Name" checkbox.
6. To get all the records in the log, select the "Entire Log" option. To get only a specific amount of the newest records, select the "Fixed Amount of latest entries" option and enter the desired amount in the textbox. The log can hold 5760 records, but both options stop downloading when they reach unwritten records. For example, when 250 demand subintervals have passed since the log has been reset, 250 of the 5760 possible log records hold data. The remaining 5510 records are blank. Selecting "Entire Log" downloads the 250 records with data. Selecting "Fixed Amount of latest entries" and putting 100 in the textbox downloads 100 entries. Selecting "Fixed Amount of latest entries" and putting 400 in the textbox only downloads 250 records, since the amount requested is limited to the amount of records in the log with data.
7. Press the "BEGIN DOWNLOAD" button to start downloading the log with the parameters set above.

Append All New Records to an Existing Log File

1. Verify the meter is commissioned and online, and the LonMaker Management Mode is OnNet.
2. If the plugin is not open, right-click on it and select "Plugins"-> "Veris E50 Download Log" from the context menu. If it is already open, click on the "Data Logging" tab.
3. On the right side of the "DOWNLOAD LOG" section, select "Append All New Records To An Existing Log File".
4. Press the "Choose File" button, select the file to append to, and press "Open".
5. Press the "BEGIN DOWNLOAD" button to start downloading the log with the parameters set above.

Log Download Network Bandwidth Control (E50F5A only)

To control the network bandwidth consumed by the downloading process, use cpLoggedData, configurable on the "PROPAGATION SETTINGS" tab. The default is a 0.1 second throttle, which amounts to a maximum of 20 packets per second (10 Acknowledged packets sent, 10 acknowledgments received). The full log download takes approximately 15 minutes at this speed. If the throttle is changed to 0.2 seconds, 10 packets are sent per second, but the download will take approximately 22 minutes. If 20 packets per second is not an issue for the network, using the default 0.1 second throttle is recommended. Note: avoid using the "Network Variable" tab and collapse the "LOG INFO" section of the "DATA LOGGING" tab while downloading the log if controlling bandwidth usage is a priority).

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Configuring and Commissioning Without the Plugin

This section covers working with an E50 device when the plugin cannot be used (LNS not used or no plugin director/launcher).It is not possible for this document to detail the full instructions for configuring and commissioning an E50 device using each and every network integration tool or controller. The purpose of this section is merely to provide guidelines and clarify the options available for configuration.

Using Resource Files

If manufacturer scoped resource files can be used, download the Veris E50 Resource File Set at www.veris.com, under Design Resources -> Protocol -> LonWorks. These files aid in configuration by enabling the configuration properties to be named and formatted correctly.

Creating the Device Template

The device interface (.XIF/.XFB) files must be used for the network variables to be correctly named. A device template created from the device itself will only have NV indices rather than NV names. Download the device interface files at www.veris.com, under Design Resources -> Protocol -> LonWorks. Once downloaded, extract the .XIF and .XFB files from the zip and create a device template from either of them.

Configuring the Device

All of the user-defined configuration properties are implemented as configuration network variables so that they can be set as either configuration properties or as input network variables. This allows the E50 device to be configured by either a network integration tool (using either method) or by peer devices such as controllers (using the input network variables). The base types for all of the configuration properties are also either SNVT_count or SNVT_state, so they may have the correct names and formats without the resource files installed. If the names, types, and formats are not available, the configuration property table in this document has both the base SNVT type and the user defined configuration property type (UCPT) index that the device template references. These are given in the Configuration Property table as the name LonMaker reports, “UCP_Type_1” for user defined type 1.

Formatting Power Correctly

LonMark Resource Files before version 13.04 default to formatting SNVT_power_f network variables in units of Btu/hr in the U.S. This formatting results in power values being reported about 3.4 times higher than they actually are in Watts. Be sure that the formatting for power values is in Watts. If LNS is used, changing the format of these power network variables to SNVT_power_f#SI resolves the issue. If any other devices have input network variables bound to the E50’s power output network variables, the formatting of the input network variables on these devices must also be changed. Installing the latest LonMark Resource Files (if upgradable for the integration tool/ controller) also resolves the issue when using LNS. They can be found at www.LonMark.org under “Technical Resources”-> “Resource Files”.

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Network Variables

NV Name	NV Num.	Function Block	Type	Units	Log Point Index	Propagation Control		Description
						Configuration Property Name	Control Type	
ENERGY								
nvoRealEnergy	97	TotalRealEnergy	SNVT_elec_wh_f	Wh	257	cpAllEnergy	Throttle	Real Energy Consumption (floating point value)
nvoRealEnergyInt	47	Meter	SNVT_elec_kwh_l	kWh, Scaled	1	cpAllEnergy	Throttle	Real Energy Consumption (integer value)
nvoReactEnergy	45	Meter	SNVT_elec_wh_f	VARh	311	cpAllEnergy	Throttle	Reactive Energy Consumption (floating point value)
nvoRctEnergyInt	48	Meter	SNVT_elec_kwh_l	kVARh, Scaled	29	cpAllEnergy	Throttle	Reactive Energy Consumption (integer value)
nvoAppEnergy	46	Meter	SNVT_elec_wh_f	Vah	309	cpAllEnergy	Throttle	Apparent Energy Consumption (floating point value)
nvoAppEnergyInt	49	Meter	SNVT_elec_kwh_l	kVAh, Scaled	27	cpAllEnergy	Throttle	Apparent Energy Consumption (integer value)
nvoRealEnergyPhA	50	Meter	SNVT_elec_wh_f	Wh	341	cpAllEnergy	Throttle	Real Energy Consumption, Phase A (floating point value)
nvoRealEnergyPhB	51	Meter	SNVT_elec_wh_f	Wh	343	cpAllEnergy	Throttle	Real Energy Consumption, Phase B (floating point value)
nvoRealEnergyPhC	52	Meter	SNVT_elec_wh_f	Wh	345	cpAllEnergy	Throttle	Real Energy Consumption, Phase C (floating point value)
nvoRlEnrgyPhAInt	53	Meter	SNVT_elec_kwh_l	kWh, Scaled	47	cpAllEnergy	Throttle	Real Energy Consumption, Phase A (integer value)
nvoRlEnrgyPhBInt	54	Meter	SNVT_elec_kwh_l	kWh, Scaled	49	cpAllEnergy	Throttle	Real Energy Consumption, Phase B (integer value)
nvoRlEnrgyPhCInt	55	Meter	SNVT_elec_kwh_l	kWh, Scaled	51	cpAllEnergy	Throttle	Real Energy Consumption, Phase C (integer value)
nviEnergyReset	34	Meter	SNVT_switch	-	-	-	-	Clears all energy accumulators to 0. To reset, set the state field to 1 and the value field to greater than 0.
nvoEnrgyResetCnt	93	Meter	SNVT_count		-	cpEnrgyResetCnt	Heartbeat	Count of energy accumulator resets.
nvoIntEnrgScale	95	Meter	SNVT_count_inc	-4 0.0001 -3 0.001 -2 0.01 -1 0.1 0 1.0 1 10.0 2 100.0 3 1000.0 4 10000.0	- - - - - - - - -	None	-	Scale factor for integer energy network variables. This value is an integer between -4 and 4. Multiply integer energy values by 10 to the power of this variable. For example, if this variable returns -2, multiply integer energy accumulators by 10^{-2} (0.01). Only recalculated when meter configuration is changed, so this value may be read infrequently.
POWER								
nvoRealPower	98	TotalRealPower	SNVT_power_f	W	261	cpAllPower	Throttle	Total Instantaneous Real Power
nvoReactivePower	56	Meter	SNVT_power_f	VAR	263	cpAllPower	Throttle	Total Instantaneous Reactive Power
nvoApparentPower	57	Meter	SNVT_power_f	VA	265	cpAllPower	Throttle	Total Instantaneous Apparent Power
nvoRealPowerPhA	58	Meter	SNVT_power_f	W	275	cpAllPower	Throttle	Real Power, Phase A
nvoRealPowerPhB	59	Meter	SNVT_power_f	W	277	cpAllPower	Throttle	Real Power, Phase B
nvoRealPowerPhC	60	Meter	SNVT_power_f	W	279	cpAllPower	Throttle	Real Power, Phase C
nvoReactPowerPhA	61	Meter	SNVT_power_f	VAR	319	cpAllPower	Throttle	Reactive Power, Phase A
nvoReactPowerPhB	62	Meter	SNVT_power_f	VAR	321	cpAllPower	Throttle	Reactive Power, Phase B
nvoReactPowerPhC	63	Meter	SNVT_power_f	VAR	323	cpAllPower	Throttle	Reactive Power, Phase C
nvoAppPowerPhA	64	Meter	SNVT_power_f	VA	313	cpAllPower	Throttle	Apparent Power, Phase A
nvoAppPowerPhB	65	Meter	SNVT_power_f	VA	315	cpAllPower	Throttle	Apparent Power, Phase B
nvoAppPowerPhC	66	Meter	SNVT_power_f	VA	317	cpAllPower	Throttle	Apparent Power, Phase C

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Network Variables (cont.)

NV Name	NV Num.	Function Block	Type	Units	Log Point Index	Propagation Control		Description
						Configuration Property Name	Control Type	
DEMAND								
nvoPresRealDmnd	67	Meter	SNVT_power_f	W	325	None	-	Total Real Power Present Demand
nvoPresReactDmnd	68	Meter	SNVT_power_f	VAR	327	None	-	Total Reactive Power Present Demand
nvoPresAppDmnd	69	Meter	SNVT_power_f	VA	329	None	-	Total Apparent Power Present Demand
nvoMaxRealDmnd	70	Meter	SNVT_power_f	W	331	None	-	Total Real Power Max Demand
nvoMaxReactDmnd	71	Meter	SNVT_power_f	VAR	333	None	-	Total Reactive Power Max Demand
nvoMaxAppDmnd	72	Meter	SNVT_power_f	VA	335	None	-	Total Apparent Power Max Demand
nviDemSubintRes	35	Meter	SNVT_power_f	-	-	-	-	Demand Sub-interval Reset. Begins a new sub-interval calculation cycle. Takes effect at the end of the next 1 second calculation cycle. To Reset, set the state field to 1 and the value field to greater than 0. Reset no more frequently than every 10 seconds.
nviMaxDemReset	36	Meter	SNVT_power_f	-	-	-	-	Maximum Demand Reset. Resets maximum demand values to the present demand. To reset, set the state field to 1 and the value field to greater than 0. Reset no more frequently than every 10 seconds.
VOLTAGE								
nvoAvgLLVoltage	73	Meter	SNVT_volt_f	Volt	269	cpAllVoltage	Throttle	Average Line to Line Voltage
nvoAvgLNVoltage	74	Meter	SNVT_volt_f	Volt	271	cpAllVoltage	Throttle	Average Line to Neutral Voltage
nvoLLVoltageAB	75	Meter	SNVT_volt_f	Volt	287	cpAllVoltage	Throttle	Line to Line Voltage, Phase A-B
nvoLLVoltageBC	76	Meter	SNVT_volt_f	Volt	289	cpAllVoltage	Throttle	Line to Line Voltage, Phase B-C
nvoLLVoltageAC	77	Meter	SNVT_volt_f	Volt	291	cpAllVoltage	Throttle	Line to Line Voltage, Phase A-C
nvoLNVoltagePhA	78	Meter	SNVT_volt_f	Volt	293	cpAllVoltage	Throttle	Line to Neutral Voltage, Phase A
nvoLNVoltagePhB	79	Meter	SNVT_volt_f	Volt	295	cpAllVoltage	Throttle	Line to Neutral Voltage, Phase B
nvoLNVoltagePhC	80	Meter	SNVT_volt_f	Volt	297	cpAllVoltage	Throttle	Line to Neutral Voltage, Phase C
CURRENT								
nvoAvgCurrent	81	Meter	SNVT_amp_f	Amp	273	cpAllCurrent	Throttle	Average Current
nvoCurrentPhA	82	Meter	SNVT_amp_f	Amp	299	cpAllCurrent	Throttle	Current, Phase A
nvoCurrentPhB	83	Meter	SNVT_amp_f	Amp	301	cpAllCurrent	Throttle	Current, Phase B
nvoCurrentPhC	84	Meter	SNVT_amp_f	Amp	303	cpAllCurrent	Throttle	Current, Phase C
POWER FACTOR								
nvoAvgPwrFactor	85	Meter	SNVT_pwr_fact_f	-	267	cpAllPwrFactor	Throttle	Total Power Factor (Total kW / Total kVA)
nvoPwrFactorPhA	86	Meter	SNVT_pwr_fact_f	-	281	cpAllPwrFactor	Throttle	Power Factor, Phase A
nvoPwrFactorPhB	87	Meter	SNVT_pwr_fact_f	-	283	cpAllPwrFactor	Throttle	Power Factor, Phase B
nvoPwrFactorPhC	88	Meter	SNVT_pwr_fact_f	-	285	cpAllPwrFactor	Throttle	Power Factor, Phase C
FREQUENCY								
nvoFrequency	89	Meter	SNVT_freq_f	Hz	307	cpFrequency	Throttle	Frequency (derived from Phase A)

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Network Variables (cont.)

NV Name	NV Num.	Function Block	Type	Units	Log Point Index	Propagation Control		Description
						Configuration Property Name	Control Type	
PULSE COUNTERS								
nvoPulseCount1	37	Meter	SNVT_count_32	-	43	cpPulseCount1	Min Delta	Pulse Counter 1 (enabled on E50F2A and E50F5A)
nvoPulseCount2	38	Meter	SNVT_count_32	-	45	cpPulseCount2	Min Delta	Pulse Counter 2 (enabled on E50F5A only)
nviPulseCntReset	33	Meter	SNVT_switch	-	-	-	-	Clear the pulse counter(s). To reset, set the state field to 1 and the value field to greater than 0.
DIAGNOSTICS								
nvoAlert	96	Meter	SNVT_state	-	-	cpAlert	Heartbeat	Diagnostic Alert 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: Internal data bus communication problem 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 mis-wiring of phases Bit 12: Low Power Factor on B Bit 13: Low Power Factor on C Bit 14: Not used Bit 15: Not used
nvoStartupCount	94	Meter	SNVT_count	-	-	cpStartupCount	Heartbeat	Power Up Counter.
nvoMeterTime	90	Meter	SNVT_time_stamp	-	-	None	-	Meter Time.
nviTimeSet	7	NodeObject	SNVT_time_stamp	-	-	-	-	Set the Meter Time. Meter time does not have battery backup and will therefore reset to the millennium when power is lost to the meter. This input is polled on startup, and time is restored if this input is bound to a time source.
nvoMaxSysPower	92	Meter	SNVT_power_f	W	-	None	-	Theoretical Maximum System Power. This value is the theoretical maximum power the meter expects to see, based on the System Type, CT size, and System Voltage. It is updated whenever of these values change.
nvoFullFwVersion	91	Meter	SNVT_str_asc	-	-	None	Polled	Reset System, Operating System, and Gateway revision numbers in an ascii string (e.g. "RSx.yyy OSx.yyy Gateway x.yyy")

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Network Variables (cont.)

NV Name	NV Num.	Function Block	Type	Units	Log Point Index	Propagation Control		Description
						Configuration Property Name	Control Type	
LOGGING (E50F5 ONLY)								
nvoLoggedData	39	Meter	UNVT_ vdlLogDataResponse	-	-	cpLoggedData	Throttle	Logged Data response to a log request. Contains two log values. If manually requesting log data (without using the LNS plugin), this network variable must be monitored (rather than polled).
nvoLogStatus	44	Meter	SNVT_state	-	-	None	-	Logging Status. Bit 0: Log Buffer Full – Set to 1 when one single shot mode has filled the log buffer. In this condition, nvoLogEntries continues to increment. This bit clears to 0 when logging restarts. Bit 1: Log Buffer Read Collision 1 – Set to 1 if the meter tried to save log data while the user was reading the log. On the first collision, the meter holds the data until the next sub-interval and then writes the saved data to the log as well as the data for that interval. This bit is cleared to 0 on the first demand interval with no collision. Bit 2: Log Buffer Read Collision 2 – Set to 1 on the 2nd attempt to save log data while the user is reading the log. At this point the meter ignores the read condition and does a double write, first of the values saved from the previous cycle, and then the present values. If the read condition is not removed the meter continues to write the log data as it normally would. This bit is cleared to 0 on the first demand interval with no collision. Bit 3: Logging Reset – The log has been reset during the previous demand sub-interval. Bit 4: Time until the next log write cannot be determined. Bit 5: RTC Changed – The real time clock has been changed during the current demand subinterval. Bit 6: RTC Reset – The real time clock has been reset to the year 2000 and needs to be reinitialized. Bit 7: Log Request Shift - The meter waited for a log write to occur before getting the requested log data to avoid a collision. Therefore the indices of the returned data are incremented by 1, and future request should also be incremented.
nvoLogNewestTime	40	Meter	SNVT_time_stamp	-	-	None	-	Date and time of the newest entry in the log.
nvoLogOverflwCnt	43	Meter	SNVT_count	-	-	None	-	Log buffer Wrap / Missed Log Counter. In Continuous mode, this counter increments each time the internal circular log buffer wraps and overwrites old data. The total number of logged entries since the last log reset is: (nvoLogOverflwCnt * 5760) + nvoLogEntries. In Single Shot mode, this counter is the number of log entries lost due to the buffer being full.
nvoLogEntries	41	Meter	SNVT_count	-	-	None	-	Number of logged entries since the log buffer wrapped or was reset. In Single Shot mode, this is the total number of valid entries in the buffer. Any entries beyond this will read back as QNaN (0x8000).
nvoLogDays	42	Meter	SNVT_count	-	-	None	-	Maximum Number of days that can be logged following a log reset until the buffer is full (Single Shot mode) or overwrites old data (Continuous).

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Network Variables (cont.)

NV Name	NV Num.	Function Block	Type	Units	Log Point Index	Propagation Control		Description
						Configuration Property Name	Control Type	
nviLogRequestLen	32	Meter	SNVT_count	-	-	-	-	Number of Records retrieved for a log request. May be between 1 and 125 records.
nviRequestSample	30	Meter	SNVT_count	-	-	-	-	Request records from the log starting at the record specified here (between 8000 and 13759). Log entries will be returned through nvoLoggedData.
nviLogReset	31	Meter	SNVT_switch	-	-	-	-	Reset the log. To reset, set the state field to 1 and the value field to greater than 0.

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Configuration Properties

CP Name	Type	NV Num.	R/W	Applies To	Range	Default Value	Description
INFORMATION							
cpMeterModel	SCPTpartNumber	-	R	"Meter" Function Block	-	-	Meter Manufacturer and Model, stored as an ASCII string (e.g. "Veris Industries E50F2A").
cpSerialNumber	SCPTserialNumber	-	R	"Meter" Function Block	-	-	Meter Serial Number.
cpDevMajVer	SCPTdevMajVer	-	R	"NodeObject" Function Block	-	-	Firmware Major Version (Gateway). See nvoFullFwRevision for RS, OS firmware revisions.
cpDevMinVer	SCPTdevMinVer	-	R	"NodeObject" Function Block	-	-	Firmware Minor Version (Gateway). See nvoFullFwRevision for RS, OS firmware revisions.
INSTALLATION DETAILS							
cpSystemType	UCPTsystemType (UCP_Type_3 w/o resource files) (SNVT_count ref.)	12	R/W	"Meter" Function Block	10, 11, 12, 31, 40	40	System Type (see installation instructions for more detail). 10 Single Phase: A + N 11 Single Phase: A + B 12 Single Split Phase: A + B + N 31 3 Phase Delta, A + B + C, no N 40 3 Phase Wye, A + B + C + N Note: Only the indicated phases are monitored for phase loss.
cpDisplayUnits	UCPTdisplayUnits (UCP_Type_4 w/o resource files) (SNVT_count ref.)	13	R/W	"Meter" Function Block	0, 1	1 (IEEE)	Screen Display Units 0 = IEC (U, V, P, Q, S) 1 = IEEE (VLL, VLN, W, VAR, VA)
cpCtPriRatio	UCPTctPriRatio (UCP_Type_5 w/o resource files) (SNVT_count ref.)	14	R/W	"Meter" Function Block	20 - 5000(A)	100(A)	CT Ratio – Primary (from CT rating)
cpPtRatio	UCPTptRatio (UCP_Type_7 w/o resource files) (SNVT_count ref.)	16	R/W	"Meter" Function Block	1 – 32000 (scaled 0.01-320.00)	100 (scaled 1:1)	PT Ratio. This value is scaled by 100 (200 = PT ratio of 2:1). Set to 100 (1.00:1) for no PT.
cpSystemVoltage	UCPTsysVoltage (UCP_Type_8 w/o resource files) (SNVT_count ref.)	17	R/W	"Meter" Function Block	82 - 32000 (VL-L)	600(VL-L)	System Voltage. This voltage is line to line unless the system type is 10, where it is line to neutral. The meter refuses voltages that are outside of the range of 82-660 volts when divided by the PT Ratio (above).
cpPhaseLossVolt	UCPTphLossVolt (UCP_Type_9 w/o resource files) (SNVT_count ref.)	18	R/W	"Meter" Function Block	1 - 99 (%)	10(%)	Phase Loss Voltage Threshold in percent of system voltage. Any phase (as configured by nviSystemType) whose level drops below this threshold triggers a Phase Loss alert. For example, with the system type set to 40 (3L+N) and the System voltage set to 480V L-L, the L-N voltage for each phase should be 277V. When this threshold is set to 10%, if any phase drops to less than 10% of 277V (less than 27.7V), or if any L-L voltage drops to less than 10% of 480V (less than 48V), the corresponding phase loss alarm bit in nvoAlert is set to 1.

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Configuration Properties (cont.)

CP Name	Type	NV Num.	R/W	Applies To	Range	Default Value	Description
cpPhaseLossImbal	UCPTphLossImbal (UCP_Type_10 w/o resource files) (SNVT_count ref.)	19	R/W	"Meter" Function Block	1 - 99 (%)	25(%)	Phase Loss Imbalance Threshold in percent. For a 3-phase Y(3+N) system (type 40), both Line to Neutral and Line to Line voltages are tested. In a 3-phase delta system (type 31), only the Line to Line voltages are examined. In a single split-phase (2+N) system (type 12), just the Line to Neutral voltages are compared.
cpDemSubintLen	UCPTDemSubintLen (UCP_Type_11 w/o resource files) (SNVT_count ref.)	20	R/W	"Meter" Function Block	0, 10 - 32767 (seconds)	900 (seconds)	Sub-Interval Length in seconds. For sync-to-comms, set this to 0 and use nviDemSubintRes to externally restart the sub-interval.
cpDemSubintCnt	UCPTDemSubintCnt (UCP_Type_1 w/o resource files) (SNVT_count ref.)	21	R/W	"Meter" Function Block	1 - 6	1	Number of Sub-Intervals per Demand Interval. Sets the number of sub-intervals that make a single demand interval. For block demand, set this to 1.
PROPAGATION CONTROL							
cpMaxNvSntPerSec	UCPTnvUpdtLimit (UCP_Type_2 w/o resource files) (SNVT_count)	29	R/W	"Meter" Function Block	0 - 65535	10	Limits the total number of updates sent out per second for network variables in the following categories: Energy, Power, Voltage, Current, Power Factor, Frequency, Pulse Counters, Startup Count, and Alerts. If more than the number of updates specified is queued to be sent out in any 1 second period, the excess updates are delayed until the next second to reduce network traffic. This configuration property is provided to give rough burst control. The number of packets sent per second will vary based on the connection types (ACK, UNACK, etc.) and updates from other network variables that are not controlled by this configuration property.
cpAllEnergy	SCPTminSndT	1	R/W	All energy output network variables	0 - 1 hour, 49 minutes, 13 seconds, 500ms (6553.5 seconds)	15 seconds	Throttle for all energy output network variables. After propagation of a network variable, updates to the same network variable are blocked for the time set by this configuration property. The configuration property is shared, but each energy output network variable has its own independent throttle counter that resets to the value specified by this CP after it has been propagated.
cpAllPower	SCPTminSndT	2	R/W	All power output network variables	0 - 1 hour, 49 minutes, 13 seconds, 500ms (6553.5 seconds)	15 seconds	Throttle for all power output network variables. After propagation of a network variable, updates to the same network variable are blocked for the time set by this configuration property. The configuration property is shared, but each power output network variable has its own independent throttle counter that resets to the value specified by this CP after it has been propagated.
cpAllVoltage	SCPTminSndT	3	R/W	All voltage output network variables	0 - 1 hour, 49 minutes, 13 seconds, 500ms (6553.5 seconds)	15 seconds	Throttle for all voltage output network variables. After propagation of a network variable, updates to the same network variable are blocked for the time set by this configuration property. The configuration property is shared, but each voltage output network variable has its own independent throttle counter that resets to the value specified by this CP after it has been propagated.

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Configuration Properties (cont.)

CP Name	Type	NV Num.	R/W	Applies To	Range	Default Value	Description
cpAllCurrent	SCPTminSndT	4	R/W	All current output network variables	0 - 1 hour, 49 minutes, 13 seconds, 500ms (6553.5 seconds)	15 seconds	Throttle for all current output network variables. After propagation of a network variable, updates to the same network variable are blocked for the time set by this configuration property. The configuration property is shared, but each current output network variable has its own independent throttle counter that resets to the value specified by this CP after it has been propagated.
cpAllPowerFactor	SCPTminSndT	5	R/W	All power factor network variables	0 - 1 hour, 49 minutes, 13 seconds, 500ms (6553.5 seconds)	15 seconds	Throttle for all power factor output network variables. After propagation of a network variable, updates to the same network variable are blocked for the time set by this configuration property. The configuration property is shared, but each power factor output network variable has its own independent throttle counter that resets to the value specified by this CP after it has been propagated.
cpFrequency	SCPTminSndT	28	R/W	nvoFrequency	0 - 1 hour, 49 minutes, 13 seconds, 500ms (6553.5 seconds)	15 seconds	Throttle for nvoFrequency. After propagation, updates to the network variable are blocked for the time set by this configuration property.
cpAlert	SCPTmaxSendTime	22	R/W	nvoAlert	0 - 6553.4 seconds (0-65534 raw)	900 seconds (9000 raw)	Heartbeat for nvoAlert. If the network variable has not changed after the time interval specified here (and therefore has not been propagated), the value will be propagated and the heartbeat counter restarted.
cpStartupCount	SCPTmaxSendTime	10	R/W	nvoStartupCount	0 - 6553.4 seconds (0-65534 raw)	900 seconds (9000 raw)	Heartbeat for nvoStartupCount. If the network variable has not changed after the time interval specified here (and therefore has not been propagated), the value will be propagated and the heartbeat counter restarted.
cpEnrgyResetCnt	SCPTmaxSendTime	11	R/W	nvoEnrgyResetCnt	0 - 6553.4 seconds (0-65534 raw)	900 seconds (9000 raw)	Heartbeat for nvoEnrgyResetCnt. If the network variable has not changed after the time interval specified here (and therefore has not been propagated), the value will be propagated and the heartbeat counter restarted.
cpPulseCount	SCPTsndDelta	0	R/W	nvoPulseCount1, nvoPulseCount2	0 -4294967295 counts	0 (send any change)	Number of counts that nvoPulseCount1 or nvoPulseCount2 must change by to cause propagation of the respective network variable.

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Configuration Properties (cont.)

CP Name	Type	NV Num.	R/W	Applies To	Range	Default Value	Description
LOGGING (E50F5 ONLY)							
cpLoggingPoint1	UCPTlogPoint1 (UCP_Type_13 w/o resource files) (SNVT_count ref.)	23	R/W	"Meter" Function Block	See description	nvoRealEnergy (257)	Set to the index of the network variable to log. Indices are provided as a column in the network variable table above.
cpLoggingPoint2	UCPTlogPoint2 (UCP_Type_14 w/o resource files) (SNVT_count ref.)	24	R/W	"Meter" Function Block	See description	nvoReactEnergy (311)	Set to the index of the network variable to log. Indices are provided as a column in the network variable table above.
cpLoggingPoint3	UCPTlogPoint3 (UCP_Type_15 w/o resource files) (SNVT_count ref.)	25	R/W	"Meter" Function Block	See description	nvoPresRealDmnd (325)	Set to the index of the network variable to log. Indices are provided as a column in the network variable table above.
cpLoggedData	SCPTminSendTime	27	R/W	nvoLoggedData	0 - 0.3 seconds (0 - 3 raw)	0.1 seconds (1 raw)	Throttle for log download. Defaults to 100ms (20 packets per second for log download using Acknowledged service). Any change from this value will affect the speed of log download (i.e. 200 msec will use half of the packets per second but cause the length of the log download to double).
cpLogConfig	UCPTlogConfig (UCP_Type_12 w/o resource files) (SNVT_state ref.)	26	R/W	"Meter" Function Block	See description	Bit 0: 0 (Continuous log buffer mode) Bit 1: 0 (Logging Enabled)	Logging Configuration. Bit 0: Clear to 0 for continuous (circular, overwriting old date when full) log buffer mode. Set to 1 for single shot logging mode (stops when log is full). Bit 1: Clear to 0 to enable logging. Set to 1 to halt logging.

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Troubleshooting

Problem	Cause	Solution
The maintenance wrench icon appears in the power meter display.	There is a problem with the inputs to the power meter.	See the Alert sub-menu or the Diagnostic Alert Modbus Register 146.
The display is blank after applying control power to the meter.	The meter is not receiving adequate power.	Verify that the meter control power are receiving the required voltage. Verify that the heart icon is blinking. Check the fuse.
Values from power network variables appear 3.4 times higher than expected.	LonMark resource files of versions lower than 13.04 have the default format in the U.S. for SNVT_power_f variables in Btu/hr.	See the section on "Formatting Power Correctly."
The data displayed is inaccurate.	Incorrect setup values	Verify the values entered for power meter setup parameters (CT and PT ratings, system type, etc.).
	Incorrect voltage inputs	Check power meter voltage input terminals to verify adequate voltage.
	Power meter is wired improperly.	Check all CTs and PTs to verify correct connection to the same service, PT polarity, and adequate powering. See the Wiring Diagrams section for more information.

China RoHS Compliance Information (EFUP Table)

部件名称	产品中有毒有害物质或元素的名称及含量Substances					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯(PBB)	多溴二苯醚(PBDE)
电子线路板	X	0	0	0	0	0

0 = 表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下.

X = 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T11363-2006标准规定的限量要求.

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