VerifEye™ Series 4100

Compact Power and Energy Meter
Modbus and BACnet
For Use Only With U018 Series Rogowski CTs

Quick Install Guide

U018 Series CT
(sold separately)

⚠ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH

- **WARNING: TO AVOID FIRE, SHOCK OR DEATH,** turn off all sources of power supplying equipment before working on or inside the equipment.
- Follow safe electrical work practices. See NFPA 70E in the USA, CSA Z462 in Canada, or applicable local codes.
- Installation, wiring, testing or service must be performed only by qualified persons in accordance with all applicable local codes.
- Read and understand the instructions before installing the product. Follow the instructions during installation.
- Install the product in an appropriate electrical and fire enclosure per local regulations.
- DO NOT use the product for life or safety applications.
- DO NOT install the product in hazardous or classified locations.
- DO NOT exceed the product's ratings or maximum limits.
- The product may use multiple voltage/power sources.
- Use a properly rated voltage sensing device to confirm that all power is off.
- DO NOT depend on the product for voltage indication.
- Products rated only for basic insulation must be installed on insulated conductors.
- Current transformer secondaries (current mode) must be shorted or connected to a burden at all times.
- Remove all wire scraps and tools, replace all doors, covers and protective devices before powering the equipment.

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

If this product is used in a manner not specified by the manufacturer, the protection provided by the product may be impaired. No responsibility is assumed by the manufacturer for any consequences arising out of the use of this material.

WARNING: LOSS OF CONTROL. Networked devices can interfere with critical control functions. Refer to NEMA ICS 1.1 (latest edition). Safety Guidelines for the Application, Installation, and Maintenance of Solid-State Controls or its equivalent in your country, language, and/or location.

Provide a device to disconnect this product from the supply. Place it in close, easy reach of the product, and mark it as the disconnecting device. The device shall meet IEC 60947-1 and IEC 60947-3 and be suitable for the application. In the US and Canada, disconnecting fuse holders can be used. Provide overcurrent protection for supply conductors with approved current limiting devices suitable to protect the wiring.

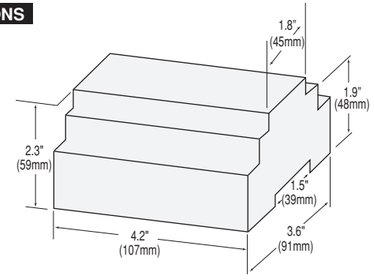
For use in an Installation Category III or II, Pollution Degree 2 or better environment only. See full installation guide for definitions - www.leviton.com

SPECIFICATIONS

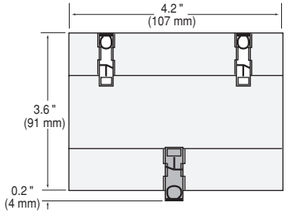
Measurement Accuracy:	
Real Power and Energy	IEC 62053-22 Class 0.5S, ANSI C12.20 0.5%
Input Voltage Characteristics:	
Measured AC Voltage	Minimum 90 V L-N (156 V L-L) for stated accuracy; UL Maximums: 600 V_{L-L} (347 V_{L-N}); CE Maximum: 300 V_{L-N}
Impedance	10.4 kΩ
Frequency Range	45 to 65 Hz
Input Current Characteristics:	
Measurement Input Range	U018 Series Rogowski rope-style CTs only
Control Power:	
AC	5 VA max.; 90 V min. UL Maximums: 600 VL-L (347 VL-N) CE Maximum: 300 V L-N
DC*	3 W max.; UL and CE: 125 to 300 Vdc
Ride Through Time	100 msec at 120Vac
Mechanical Characteristics:	
IP Degree of Protection (IEC 60529)	IP40 front display; IP20 Meter
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)
Rail	T35 (35 mm) DIN Rail per EN50022
Environmental Conditions:	
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.
Metering Category:	
North America	CAT III; for distribution systems up to 347 V_{L-N} /600 Vac_{L-L}
CE	CAT III; for distribution systems up to 300 V_{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)
Agency Approvals:	
US and Canada (cULus)	UL508 (open type device)/CSA 22.2 No. 14-05
Europe (CE)	EN61010-1

** External DC current limiting is required, see fuse recommendations.*

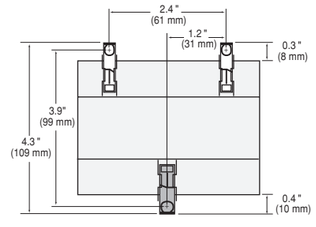
DIMENSIONS



Bottom View
(DIN Mount Configuration)



Bottom View
(Screw Mount Configuration)



PRODUCT IDENTIFICATION

Series 4100-C	Bidirectional metering, BACnet full data set, pulse input, alarm output. For use only with U018 Series Rogowski CTs.
Series 4100-R	Bidirectional metering, Modbus full data set, pulse and alarm outputs. For use only with U018 Series Rogowski CTs.

INSTALLATION

WARNING: TO AVOID FIRE, SHOCK, OR DEATH, disconnect power prior to installation.

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

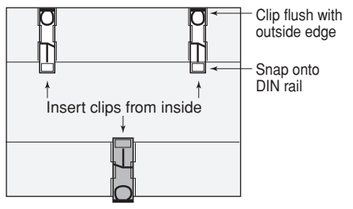
Mount the meter in an appropriate electrical enclosure near equipment to be monitored.

Do not install on the load side of a Variable Frequency Drive (VFD).
For S4100 Series (bidirectional) models, observe correct CT orientation.

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

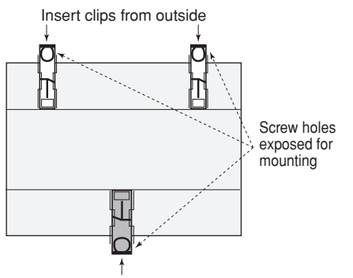
A. DIN Rail Mounting

1. Attach 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 diagram of the underside of the meter.
3. To reduce horizontal shifting across the DIN rail, use two 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 back of the enclosure. See diagram of the underside of the meter.



SUPPORTED SYSTEM TYPES

The meter has a number of different possible system wiring configurations (see Wiring Diagrams, page 9-10). To configure the meter, set the System Type via the User Interface, Modbus register 130. The System Type tells the meter which of its current and voltage inputs are valid, which are to be ignored, and if 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 percent 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 will display as "----" on the User Interface or as QNAN in the Modbus registers.

	CTs		Voltage Connections			System Type		Phase Loss Measurements			Wiring Diagram
Number of wires	Qty	ID	Qty	ID	Type	Modbus Register 130	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

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:

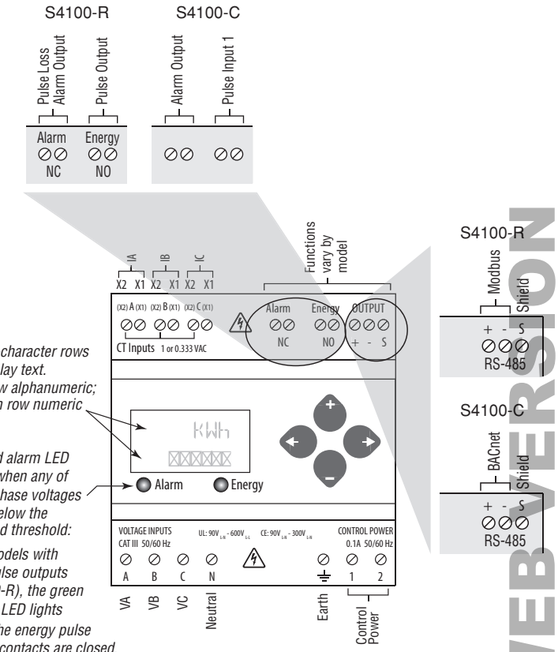
Symbol	Description
	Voltage Disconnect Switch
	Fuse (Installer is responsible fro ensuring compliance with local requirements. No fuses are included with the meter).
	Earth Ground
X1 X2	Current Transducer
	Potential Transformer
	Protection containing a voltage disconnect switch with a fuse or disconnect 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 1V or 0.333V current transducers (CTs).
- DO NOT USE CURRENT OUTPUT (e.g. 5A) CTs ON THIS PRODUCT.
- Failure to follow these instructions can result in overheating and permanent equipment damage.

PRODUCT DIAGRAM



Two 5-character rows of display text. Top row alphanumeric; Bottom row numeric only

The red alarm LED lights when any of the 3 phase voltages drop below the selected threshold:

• On models with two pulse outputs (S4100-R), the green Energy LED lights when the energy pulse output contacts are closed.

• On models with one pulse input (S4100-C), the green Energy LED is not used.

WIRING

⚠ WARNING ⚠

CT terminals are referenced to the meter's neutral and may be at elevated voltages.
TO AVOID DEATH OR SERIOUS PERSONAL INJURY:
- Do not contact meter terminals while the unit is connected
- Do not connect or short other circuits to the CT terminals

CTs are polarity sensitive. On bidirectional applications, Observe correct CT orientation.

1. Squeeze the ribbed sections of the CT connector and pull the rope out of the connector to open.
2. Wrap the rope style CT around the conductor to be monitored.
3. Snap the connector back together securely, ensuring there is no dust or debris in the closure area.
4. Connect the CT output leads to the meter inputs according to the following diagrams. The white wire is the X1 lead.

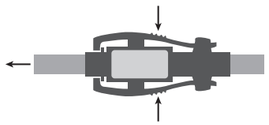


Diagram 1:
1-Phase Line-to-Neutral 2- Wire System 1 CT

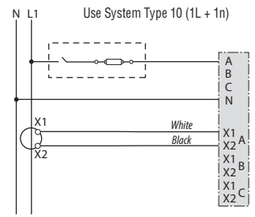


Diagram 2:
1-Phase Line-to-Line 2-Wire System 1 CT

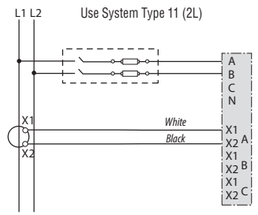


Diagram 3:
1-Phase Direct Voltage Connection 2 CT

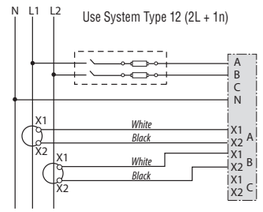


Diagram 4:
3-Phase 3-Wire 3 CT no PT

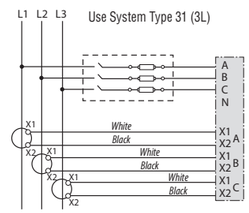


Diagram 5:
3-Phase 4-Wire Wye Direct Voltage Input Connection 3 CT

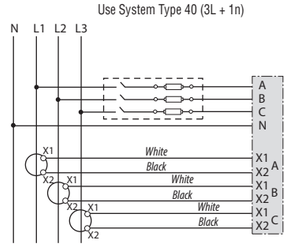
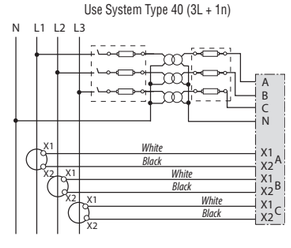
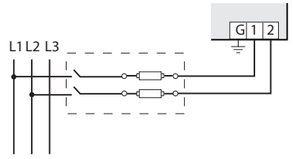


Diagram 6:
3-Phase 4-Wire Wye Connection 3 CT 3 PT



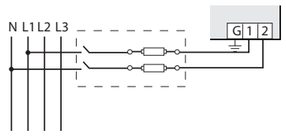
CONTROL POWER

Direct Connect Control Power
(Line to Line)



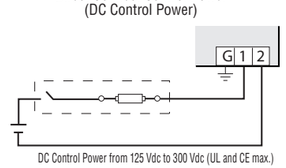
Line to Line from 90 Vac to 600 Vac (UL). In UL installations the lines may be floating (such as a delta). If any lines are tied to an earth (such as a corner grounded delta), see the Line to Neutral installation limits. In CE compliant installations, the lines must be neutral (earth) referenced at less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

Direct Connect Control Power
(Line to Neutral)



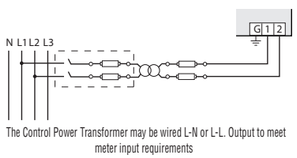
Line to Neutral from 90 Vac to 347 Vac (UL) or 300 Vac (CE)

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

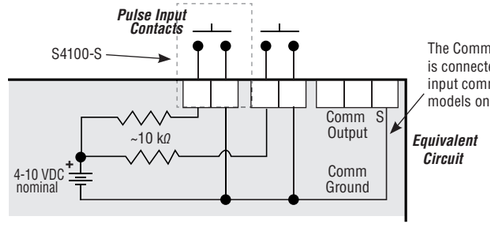


The Control Power Transformer may be wired L-N or L-L. Output to meet meter input requirements

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.
- Use a voltage rating sufficient for the input voltage applied.
- Provide over-current protection and disconnecting means to protect the wiring. For DC installations, provide external circuit protection. Suggested: 0.5 A, time delay fuses rated for DC operation at or above the supply voltage.
- Use the earth connection (G) for electromagnetic compatibility (EMC), not a protective earth ground.

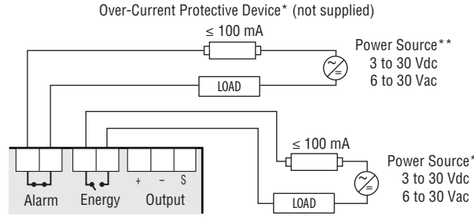
PULSE CONTACT INPUTS (S4100-C)

The S4100-C has one pulse input. This input is isolated from the measured circuits. On models with BACnet communication (S4100-C), they are referenced to the communication signal ground and the comm output shield terminal. Use with contacts that do not require current to remove oxidation.



SOLID STATE PULSE OUTPUTS (S4100-R)

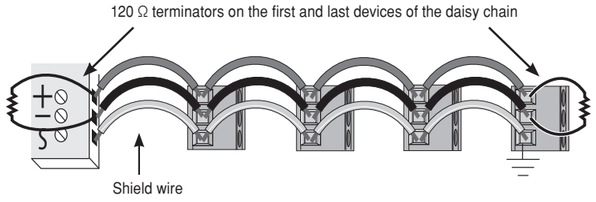
The Series 4100-R has one normally open (N.O.) KY Form A output and one normally closed (N.C.) output. One is dedicated to energy (Wh), and the other to alarm.



The solid state pulse outputs are rated for 30 Vac/dc nom.
Maximum load current is 100 mA at 25 °C. Derate 0.56 mA per °C above 25 °C (e.g. 86 mA@50 °C).
* The over-current protective device must be rated for the short circuit current at the connection point.
** All pulse outputs and communication circuits are only intended to be connected to non-hazardous circuits (SELV or Class 2). Do not connect to hazardous voltages.

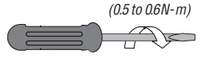
RS-485 COMMUNICATIONS

Daisy-chaining Devices to the Power Meter
The RS-485 slave port allows the power meter to be connected in a daisy chain with up to 63 two-wire devices.
In this bulletin, communications link refers to a chain of devices that are connected by a communications cable.



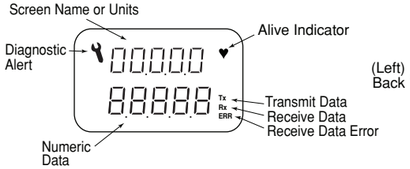
NOTES:
- The terminal's voltage and current ratings are compliant with the requirements of the EIA RS-485 communications standard.
- The RS-485 transceivers are ¼ unit load or less.
- RS-485+ has a 47 kΩ pull-up to +5V, and RS-485- has a 47 kΩ pull-down to Shield (RS-485 signal ground).
- Wire the RS-485 bus as a daisy chain from device to device, without any stubs. Use 120 Ω termination resistors at each end of the bus (not included).
- Shield is not internally connected to Earth Ground.
- Connect Shield to Earth Ground somewhere on the RS-485 bus (only at one point).

For all terminals on Series 4100 meters:
- When tightening terminals, apply the correct torque: 0.37 to 0.44 ft-lb (0.5 to 0.6 N-m).
- Use 14 to 24 gauge (2.1 to 0.2 mm^2) wire.

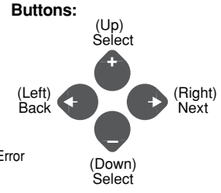


DISPLAY SCREEN DIAGRAM

LCD Screen:



Buttons:



INITIAL SETUP INSTRUCTIONS

Use this section to enter:
- Modbus or BACnet communication parameters
- CT (Current Transducer) input current ranges
- The service type to be monitored

These instructions assume the meter is set to factory defaults. If it has been previously configured, all optional values should be checked. For more options (i.e., potential transformer ratios, etc.) and the full setup instructions, see the full installation guide for the specific model at www.leviton.com.

A. To Navigate to the Setup screens:

1. Press ⊕ or ⊖ repeatedly until SETUP screen appears.
2. Press → to get to the PASSWD 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 Modbus communication parameters (S4100-R models only):

1. Navigate to the S COM (set communications) Setup screen (see section A).
2. Press → to go to the PROTO screen and through the address digits. Use ⊕ or ⊖ to select the Modbus address (default is 001).
3. Press → to accept the value and go to the BAUD screen. Use ⊕ or ⊖ to select the baud rate (default is 19200).
4. Press → to go to the PAR screen. Use ⊕ or ⊖ to select the parity (default is NONE).
5. Press → to go back to the S COM screen.

C. To Enter BACnet communication parameters (S4100-C models only):

1. Navigate to the S BAC (set BACnet) Setup screen (see section A).
2. Press → to go to the MAC screen and through the address digits. Use ⊕ or ⊖ to select the BACnet MAC address (default is 001).
3. Press → to accept the value and go to the KBAUD screen. Use ⊕ or ⊖ to select the baud rate (default is 76.8K).
4. Press → to go to the ID1 screen and through the upper four digits of the Device Instance. Use ⊕ or ⊖ to select the ID digits (default is a pseudo-random number).
5. Press → to accept the value and go to the ID2 screen and through the lower three digits of the Device Instance. Use ⊕ or ⊖ to select the ID digits (default is a pseudo-random number).
6. Press → to accept the value and go back to the S BAC screen.

D. To Enter the CT (Current Transducer) input current ranges:

1. Navigate to the S CT (Set Current Transducer) Setup screen (see section A).
2. Press → to go to the CT SZ screen and through the digits. Use ⊕ or ⊖ to select the CT size in amps (default is 100).
3. Press → to accept the value and go back to the S CT screen.

E. To Enter the service type to be monitored:

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

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	O	O	O	O	O

O = 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。

Z000057-0A

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.

TRADEMARK DISCLAIMER: Use herein of third party trademarks, service marks, trade names, brand names and/or product names are for informational purposes only, are/may be the trademarks of their respective owners; such use is not meant to imply affiliation, sponsorship, or endorsement.

Additional Resources:
For a copy of the full installation guide for this product, visit www.leviton.com.

For technical support, contact Leviton at 800-959-6004, or via email at lestechsupport@leviton.com

WEB VERSION