

INCLUDED WITH SHIPMENT



1x Bolt Recorder



1x 3 Channel
Boxless Flex CT



1x USB Cable



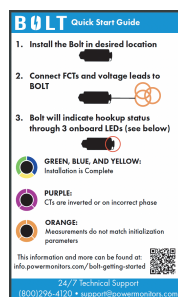
1x Voltage Cable



1x Mounting Bracket



1x Soft Case



1x Quick Start
Guide Card



1x Lanyard

| | | |
|---------------|---------------------------|---|
| INPUTS | AC Voltage | 0 to 600 V RMS continuous per phase |
| | AC Current Sample Rate | 0 to 5000 A RMS 15,360 samples / second 265 samples / cycle |

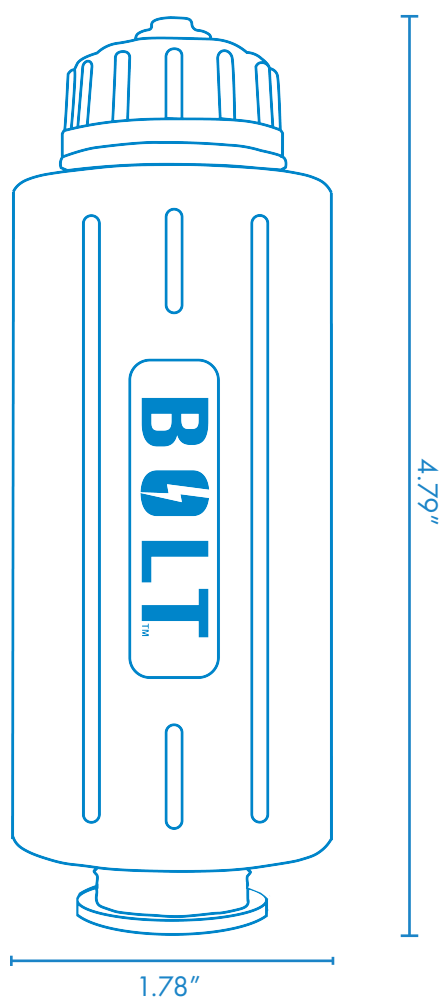
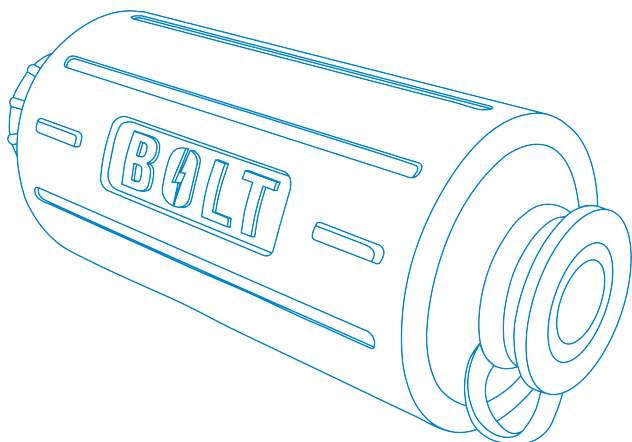
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|-----------------|---------|------------|
| CHANNELS | Voltage | 3 channels |
| | Current | 3 channels |

| | | |
|--|-----------------|-------------------|
| MEASURED QUANTITIES PER CYCLE | RMS Voltage | Volts |
| | RMS Current | Amps |
| | Real Power | Watts |
| | Apparent Power | VA |
| | Reactive Power | VARs |
| | Phase Angle | Degrees |
| | Power Factor | Watts / VA |
| | Displacement PF | cos (phase angle) |
| | Power Usage | kWh, kVARh, kVah |

| | | |
|-----------------|-----------------|------------------------------|
| ACCURACY | Voltage | 0.33% of full scale |
| | Current | 1.0% of full scale w/o probe |
| | Power | 1.0% of full scale w/o probe |
| | Phase Angle | 1.0° w/o probe |
| | Power Factor | ±0.02 w/o probe |
| | Displacement PF | ±0.02 w/o probe |

| | | |
|------------------|----------|-------------------------|
| HARMONICS | Voltage | to the 51 st |
| | Current | to the 51 st |
| | Measures | Magnitude, phase, THD |

| | |
|---------------------------------|---|
| POWER FAIL OPERATION | Super capacitor ride through for recording |
|---------------------------------|---|



| | | |
|---|---|---|
| TIME SYNCHRONIZATION | User-configurable SNTP time synchronization through Wi-Fi | |
| COMMUNICATIONS | Standard Options | Wi-Fi, Bluetooth Low Energy, USB |
| INFORMATION STORAGE | Data Storage | 128 MB onboard storage, unlimited cloud storage |
| RECORD SETTINGS | Interval Graphs | 1 cycle to 4 hour interval, user selected, stop-when-full or wrap-around memory modes |
| | Significant Change | 1 V to 8 V in 1 V steps |
| | Flicker Settings | User-defined, or conform to IEEE 1453/IEC 61000-4-15, and IEEE Std. 141 |
| | Waveform Capture | Voltage and current threshold, periodic capture, waveshape, event cross triggers |
| POWER SUPPLY REQUIREMENTS | Voltage | 60-600 VAC Channel 1 to Common (47-63-HZ) |
| | Power Consumption | 3 Watts max 5 VA max at 600 V |
| ENVIRONMENTAL | Operating Temp | -20°F to +135°F |
| | Humidity | Less than or equal to 85% |
| | Shock | 60 Hz to 2 kHz, acceleration 25 G |
| | Vibration | 10 Hz to 60 Hz, amplitude 1.8 mm |
| PHYSICAL DIMENSIONS | Max Altitude | 2.0 km (6560 ft), derated about 2.0 km |
| | Size | 1.78" x 4.79" |
| SAFETY | Weight | less than 1 lb |
| | Case | NEMA 4X |
| SAFETY Designed to IEC 61010 -1, 600 V CAT III | | |

SEEKER™



ONE SIZE FITS ALL PQ SOLUTION

FEATURES & BENEFITS:

Cloud-based Recording:

The Seeker continuously streams PQ data to cloud-based PQ Canvass. Use a web browser to analyze the latest data instantly, without downloading.

Control Options:

Use the internal dual Form C relays to control distributed generation or other equipment through SCADA or automatically based on measured values. Two isolated digital inputs provide status or other equipment monitoring.

Communication Options:

The Seeker includes Wi-Fi, Bluetooth, LTE cell modem, USB, and Ethernet communication options.

SCADA Compatibility:

A full DNP interface over Wi-Fi, cell or Ethernet exposes all PQ measurements and I/O control functions.

Easy To Install:

The Seeker's small weatherproof enclosure contains the AC power supply, wireless communications, relays, and PQ monitor. No external enclosure, power supply, or communications device is needed.

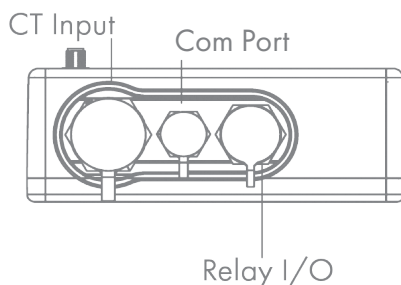
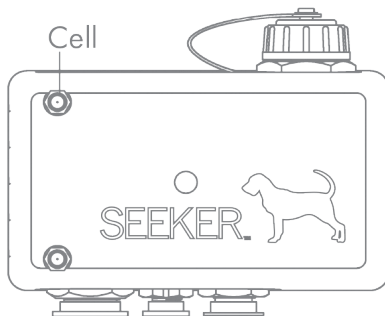
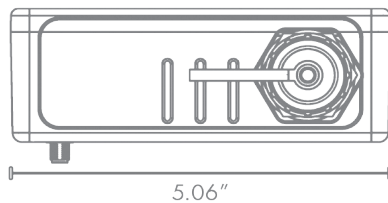
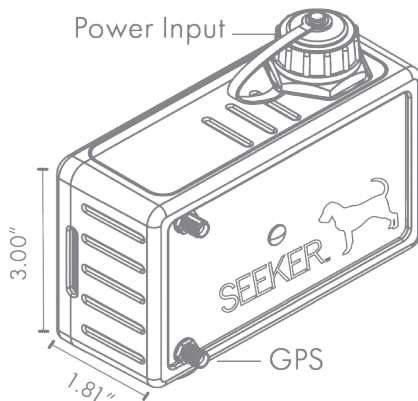
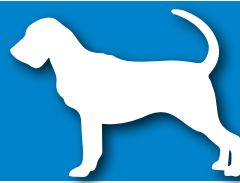
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| INPUTS | AC Voltage | 0 to 600 V RMS continuous per phase |
| | AC Current Sample Rate | 0 to 5000 A RMS 250 kHz voltage and current (4166 samples/ cycle) |

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|----------|---------|------------|
| CHANNELS | Voltage | 4 channels |
| | Current | 4 channels |

| | | |
|-------------------------------------|-----------------|-------------------|
| MEASURED QUANTITIES PER CYCLE | RMS Voltage | Volts |
| | RMS Current | Amps |
| | Real Power | Watts |
| | Apparent Power | VA's |
| | Reactive Power | VAR's |
| | Phase Angle | Degrees |
| | Power Factor | Watts/VA |
| | Displacement PF | cos (phase angle) |
| | Power Usage | kWh, kVARh, kVAh |

| | | |
|----------|-----------------|---------------------------------|
| ACCURACY | Voltage | 0.33% of full scale |
| | Current | 1.0% of full scale w/o probe |
| | Power | 1.0% of full scale w/o probe |
| | Phase Angle | 1.0° w/o probe |
| | Power Factor | ±0.02 w/o probe |
| | Displacement PF | ±0.02 w/o probe |

| | |
|-------------------------|--|
| POWER FAIL OPERATION | Super capacitor ride through power for notifications. |
|-------------------------|--|



| | | |
|------------------|----------|-----------------------|
| HARMONICS | Voltage | to the 51st |
| | Current | to the 51st |
| | Measures | Magnitude, phase, THD |

| | |
|---------------|--|
| SAFETY | Designed to IEC 61010-1, 600 V CAT III |
|---------------|--|

| | |
|-----------------------------|---|
| TIME SYNCHRONIZATION | User-configurable SNTP time synchronization through Ethernet or cell modem. High resolution timestamping with optional GPS. |
|-----------------------------|---|

| | | |
|-----------------------|------------------|---|
| COMMUNICATIONS | Standard Options | Wi-Fi, Bluetooth LTE Cell Modem, Ethernet USB |
|-----------------------|------------------|---|

| | | |
|----------------------------|--------------|---|
| INFORMATION STORAGE | Data Storage | 144 MB onboard storage, unlimited cloud storage |
|----------------------------|--------------|---|

| | | |
|------------------------|--|--|
| RECORD SETTINGS | Interval Graphs | 1 cycle to 4 hour interval, user selected, stop-when-full or wrap-around memory modes |
| | Significant Change Flicker Settings | 1 V to 8 V in 1 V steps User-defined, or conform to IEEE 1453/ IEC 61000-4-15, and IEEE Std. 141 |
| | Waveform Capture | Voltage and current threshold, periodic capture, waveshape, event cross triggers |

| | | |
|----------------------|--|---|
| RELAY OUTPUTS | Output Type | Dry Contact Form C (1 normally open, 1 normally closed) |
| | Number of Outputs | 2 Independent Relays |
| | Max Switching Voltage Max Switching Current | 120V 4 amps |

| | | |
|-----------------------|-----------------------|----------------|
| DIGITAL INPUTS | Input Type | High Impedance |
| | Number of Inputs | 2 |
| | Min Sense Voltage | 60V |
| | Nominal Sense Voltage | 120V |
| | Max Sense Voltage | 150V |

| | | |
|----------------------------------|-------------------|---|
| POWER SUPPLY REQUIREMENTS | Voltage | 60-600 VAC Channel 1 to Common (47-63 Hz) |
| | Power Consumption | 5 Watts max, 15 VA max at 600 V |

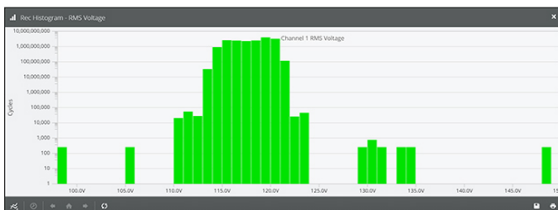
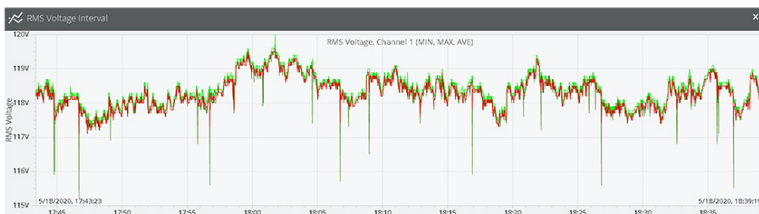
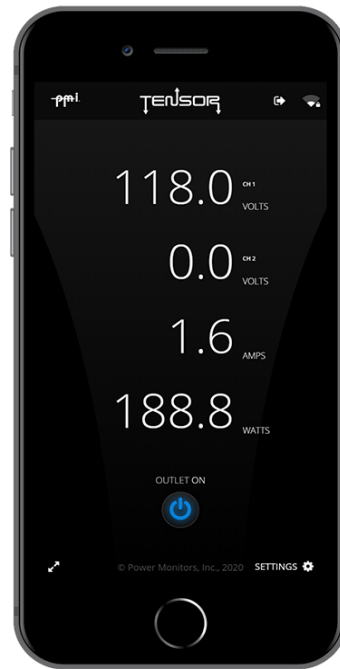
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|----------------------|----------------|--|
| ENVIRONMENTAL | Operating Temp | -20° F to +135° F |
| | Humidity | Less than or equal to 85% |
| | Shock | 60 Hz to 2 kHz, acceleration 25 G |
| | Vibration | 10 Hz to 60 Hz, amplitude 1.8 mm |
| | Max Altitude | 2.0 km (6560 ft), derated above 2.0 km |

| | | |
|----------------------------|--------|-----------------------------|
| PHYSICAL DIMENSIONS | Size | 5.06" L x 3.00" W x 1.81" H |
| | Weight | less than 1 lb |
| | Case | NEMA 4X |

TENSOR

The Tensor includes either WiFi or LTE connectivity, remote access to real-time and historical data, and receptacle power control. Identify voltage and equipment problems, track power usage, and control loads from your web browser.

- Adjustable voltage, current and power thresholds
- Instant e-mail & SMS alerts
- Cloud based data collection and analytics
- Wireless monitoring and smart plug control
- Advanced power quality: transient capture, harmonics, flicker, and ITIC triggering



TENSOR Specifications

| | | | | | | |
|-------------------------|--|--|------------------------------|---|---|--|
| INPUTS | AC Voltage | 0 to 140 V RMS 0-75 V RMS neutral-ground | SAFETY | 150 V CAT II, UL Listed, UL 60730-1/ CSA E60730-1, Indoor use only, Max load 1875VA | | |
| | AC Current | 0 to 70 A RMS (15 amps continuous) | | COMMUNICATIONS | Cell Modem or WiFi | |
| | Sample Rate | 256 samples/cycle | | INFORMATION STORAGE | Data Storage 64 MB in device, unlimited with PQ Canvass cloud storage | |
| CHANNELS | Voltage | 2 channels | RECORD SETTINGS | Interval Graphs | 1 cycle to 4 hour interval, user selected, stop-when-full or wrap- around memory modes | |
| | Current | 1 channels | | | | Significant Change Flicker Settings |
| BASIC MEASUREMENTS | RMS Voltage | Volts | | Waveform Capture | Voltage and current threshold, periodic capture, waveshape, event cross triggers | |
| | RMS Current | Amps | | | | |
| | Real Power | Watts | | | | |
| | Apparent Power | VAs | | | | |
| | Reactive Power | VARs | | | | |
| Power Usage | kWh, kVARh, kVAh | CBEMA/ITIC | | Triggered event capture | | |
| ADVANCED POWER | Phase Angle | | | | Degrees | |
| | Power Factor | | Watts/VA | | | |
| | Displacement PF | cos (phase angle) | | | | |
| ACCURACY | Voltage | 0.33% of full scale | POWER SUPPLY REQUIREMENTS | Voltage | 70-140 VAC Line to Neutral (47-63 Hz) | |
| | Current | 1.0% of full scale | | Power Consumption | 4 Watts max | |
| | Power | 1.0% of full scale | | ENVIRONMENTAL PHYSICAL DIMENSIONS | Operating Temp | -20° F to +135° F |
| | Phase Angle | 1.0° | | | Size | 4.9" L x 2.7" W x 1.25" H |
| | Power Factor | ±0.02 | | | Weight | 8oz |
| | Displacement PF | ±0.02 | | | | |
| POWER FAIL OPERATION | The recorder can operate without any input voltage for up to 5 minutes. | | | | | |
| HARMONICS | Voltage | to the 51st | | | | |
| | Current | to the 51st | | | | |
| | Measures | Magnitude, phase, THD | | | | |



Revolution®



Cell Revolution®

REVOLUTION® WIRELESS POWER QUALITY RECORDERS 600V/5000A MAX

FEATURES & BENEFITS:

Reduce fleet and labor costs with this small, rugged, lightweight recorder. Continuously view, analyze and retrieve data. The Cell Revolution allows you to retrieve data wirelessly from anywhere you have an internet connection. The included ProVision software lets you monitor real-time current, flicker, voltage, power and more from your desktop, or use a laptop, the PMI Field PC, or a PDA to monitor data from the field.

600V CAT IV: Allows use in a wide range of monitoring environments

Pocket-size: Can be installed inside meter bases, transformers, and panels

Bluetooth® 2.0, Cell Phone Modem (optional) & Wi-Fi connection (optional): Stay safe with wireless data behind closed panel covers

USB 2.0, built in Ethernet Networking (Optional): For permanent installations

High sampling rate:

Captures high speed transients up to 5000V and 1 MHz.

UL listed: Increased user safety

Large memory capacity: Longer recording time and very high resolution wave capture.

New Features: E-mail & text alerts, network time sync.

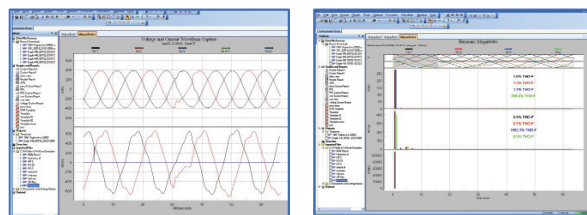
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|--|--------------------------------------|---|---|
| | INPUTS | AC Voltage | 0 to 600 RMS continuous per phase (±5 kV peak transients) |
| | | AC Current | 0 to 5000 amps |
| | | Sample Rate | 1 MHz Voltage (16666 samples/cycle) 250 kHz current (4166 samples/cycle) |
| | CHANNELS | Voltage | 4 channels |
| | | Current | 4 channels |
| | MEASURED QUANTITIES PER CYCLE | RMS Voltage | Volts |
| | | RMS Current | Amps |
| | | Real Power | Watts |
| | | Apparent Power | VA's |
| | | Reactive Power | VAR's |
| | | Phase Angle | Degrees |
| | | Power Factor | Watts/VA |
| | | Displacement PF | cos (phase angle) |
| | | Power Usage | kWh, kVARh, kVAh |
| | | | |
| | ACCURACY | Voltage | 0.33% of full scale |
| | | Current | 1.0% of full scale w/o probe |
| | | Power | 1.0% of full scale w/o probe |
| | | Phase Angle | 1.0° w/o probe |
| | | Power Factor | ±0.02 w/o probe |
| | | Displacement PF | ±0.02 w/o probe |
| | POWER FAIL OPERATION | The recorder can operate without any input voltage for up to 30 minutes. This allows it to record down to 0 volts on all channels during power outages. | |

| | | |
|----------------------------------|-------------------------------------|---|
| HARMONICS | Voltage | to the 51st |
| | Current | to the 51st |
| | Measures | Magnitude, phase, THD |
| COMMUNICATIONS | Standard Options | Bluetooth® 2.0 Wireless, USB 2.0 Mobile Phone, Wi-Fi |
| INFORMATION STORAGE | Data Storage | 16 MB (Standard); 128 MB, 512MB or 1 GB (Optional) |
| | Significant Change | 1000 records |
| | Flicker | 1000 records |
| RECORD SETTINGS | Interval Graphs | 1 cycle to 4 hour interval, user selected, stop-when-full or wrap-around memory modes |
| | Significant Change | 1V to 8V in 1V steps |
| | Flicker Settings | User-defined, or conform to IEEE 1453/ IEC 61000-4-15, and IEEE Std. 141 |
| | Waveform Capture | Voltage and current threshold, periodic capture, waveshape, event cross triggers |
| | Transient Capture | Peak voltage threshold |
| POWER SUPPLY REQUIREMENTS | Voltage | 60-600VAC Channel 1 to Common (47-63Hz) |
| | Power Consumption | 5 Watts max, 15 VA max at 600V |
| ENVIRONMENTAL | Operating Temp | -20°F to +135° F |
| | Humidity | Less than or equal to 85% |
| | Shock | 60 Hz to 2 kHz, acceleration 25G |
| | Vibration | 10Hz to 60Hz, amplitude 1.8mm |
| | Max Altitude | 2.0km (6560 ft), derated above 2.0km |
| PHYSICAL DIMENSIONS | Size | 4.8" L x 3.35" W x 1.84" H |
| | Weight | less than 1 lb |
| | Case | NEMA 4X |
| SAFETY | IEC 61010-1, 600V CAT IV, UL listed | |

PROVISION SOFTWARE

ProVision® is the latest generation of PMI's popular, power quality analytical software for PCs. Virtually everything about ProVision's graphical user interface (GUI) has been redesigned—so it's not only easier to use, but also more flexible in the way it helps you to manage and report power quality data.

With ProVision's wireless communications features you can remotely initialize, schedule, download and manage multiple PQ recorders from within a single GUI. All recorder settings are viewable and configurable in real-time on your laptop or desktop PC. Once PQ data is downloaded to your computer, ProVision® gives you unprecedented control over the way it's viewed, managed and reported. You determine the way you want the software to search for and access your files. You choose your own scale, colors and font styles for viewing and printing. You can even insert your company logo to give reports and presentations a truly custom look.



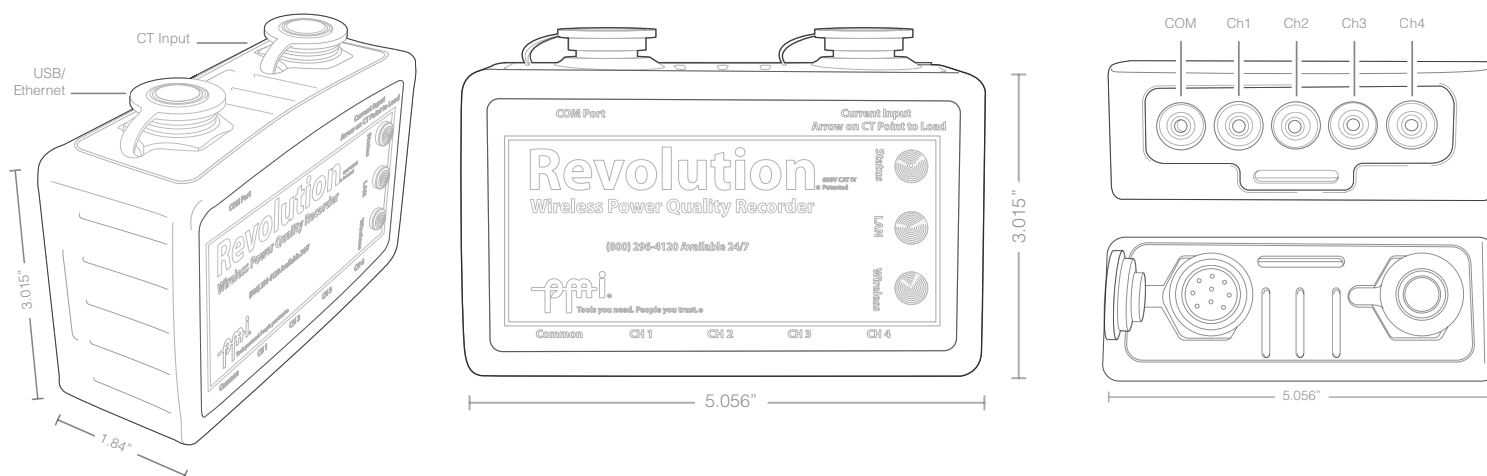
WANT EVEN MORE FLEXIBILITY?

With ProVision® you can create and print your own standard and custom reports, or if you prefer, send PMI your data in digital form and our exclusive, Custom Report Service will prepare and print professional looking reports to meet your unique needs.

ProVision® transforms real-time and stored PQ data into an array of colorful charts and graphs that make it easy to track long-term trends and identify problems during triggered events:

- Event Change
 - Interval
 - Single Cycle Voltage Histogram
 - Significant Change
 - Power Outage
 - Flicker
 - Abnormal/Loose Neutral
- Voltage, Current & Power:
- Interval Graph
 - Out of Limits
 - Histogram Graph
 - Daily Profile Graph

ProVision



ATOM



FEATURES & BENEFITS

Cloud-Based Recording:

Use the Atom for instant alerts from environmental problems and combine with cloud-based PQ Canvass to track trends and verify compliance.

Communication Options:

The Atom uses Bluetooth communications. Connect the Atom to your iOS device to adjust Atom settings, view live readings, transfer stored data, and configure thresholds.

Wireless Monitoring:

Pair an Atom with a Seeker, Tensor, or cell phone to upload stored environmental data to PQ Canvass, enabling long-term tracking and instant email/SMS alerts. Use a Tensor or Seeker as a hub for many Atoms to monitor multiple zones.

TEMPERATURE

-20 C to 60 C

PRESSURE

500 - 1100 hPa

HUMIDITY

10 - 95% RH

SOLAR FLUX

100 - 100,000 lux

ENVIRONMENTAL RATING

IP68

COMMUNICATION

Wireless BLE 5.0 Radio
Sensor data read every minute

POWER SUPPLY

10 year battery life

PHYSICAL DIMENSIONS

Weight: 2 ounces

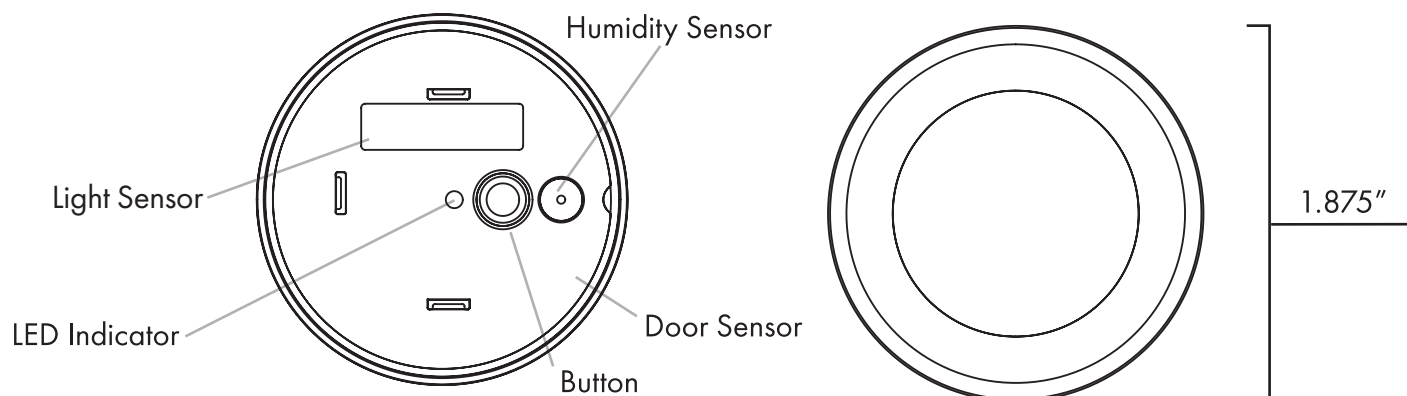
MAGNETIC REED SWITCH

Door Closure Detection

INFORMATION STORAGE

1 year of on-board memory

ACCELERATION DROP VIBRATION DETECTION





GUARDIAN



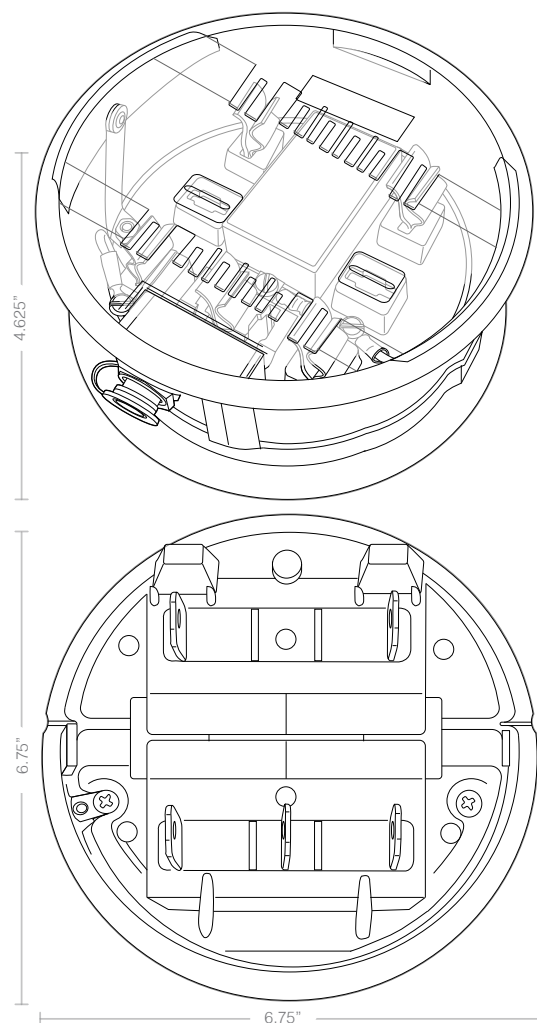
iVS-2SX+



iVS-3S

| | | | | |
|--------------------------------------|--------------------|---------------------------------------|------------------------------|---|
| INPUTS | AC Voltage | 0 to 150 volts continuous per channel | 0 to 140 VAC RMS continuous | 0 to 600 VAC continuous |
| | AC Current | 200 amps RMS | 200 amps RMS | 200 amps RMS (Forms 12S, 14S, 15S, 16S, 17S) 25 amps (Forms 6S, 8S, 9S) |
| | Sample Rate | 256 samples/cycle/channel | 128 samples/cycle/channel | 128 samples/cycle/channel |
| CHANNELS | Voltage | 2 channels | 2 channels | 2 or 3 channels, depending on form |
| | Current | 2 channels | 2 channels | 2 or 3 channels, depending on form |
| MEASURED QUANTITIES PER CYCLE | RMS Voltage | Volts | Volts | Volts |
| | RMS Current | Amps | Amps | Amps |
| | Real Power | Watts | Watts (Optional) | Watts |
| | Apparent Power | VA's | VA's | VA's |
| | Reactive Power | VARs | VARs (Optional) | VARs |
| | Phase Angle | Degrees | Degrees (Optional) | Degrees |
| | Power Factor | Watts/VA | Watts/VA (Optional) | Watts/VA |
| | Displacement PF | cos (phase angle) | cos (phase angle) (Optional) | cos (phase angle) |
| | Power Usage | kWh, kVARh, kVAh | kWh, kVARh, kVAh (Optional) | kWh, kVARh, kVAh |
| ACCURACY | Voltage | 0.33% of full scale | 0.33% of full scale | 0.33% of full scale |
| | Current | 1.0% of full scale | 1.0% of full scale | 1.0% of full scale |
| | Power | 1.0% of full scale | 1.0% of full scale | 1.0% of full scale |
| | Phase Angle | 1.0° | 1.0° | 1.0° |
| | Power Factor | ±0.02 | ±0.02 | ±0.02 |
| | Displacement PF | ±0.02 | ±0.02 | ±0.02 |
| HARMONICS | Voltage | to the 51st | to the 31st (Optional) | to the 31st |
| | Current | to the 51st | to the 31st (Optional) | to the 31st |
| | Measures | magnitude, phase, THD | magnitude, THD | magnitude, THD |
| COMMUNICATIONS | Type | Bluetooth® Wireless, USB | RS232 port | RS232 port |
| | Remote | Cell modem option | n/a | n/a |
| | Data Rate | | 4,800 to 28,800 baud | 4,800 to 38,000 baud |
| INFORMATION STORAGE | Interval | 6.9 MB | 2.1 MB | 2.1 MB |
| | Graphs | | | |
| | Significant Change | 1000 records | 1000 records | 1000 records |
| | Flicker | 1000 records | 1000 records | 1000 records |
| | Waveform | 1.7 MB | 384 KB (Optional) | 384 KB |
| | Capture | | | |

| | | GUARDIAN | iVS-2SX+ | iVS-3S |
|-----------------------------|--|--|--|---|
| RECORD SETTINGS | Interval Graphs | 1 second to 4 hour interval user selected, stop-when-full, or wrap around memory modes | 1 second to 4 hour interval user selected, stop-when-full, or wrap around memory modes | User selected, stop-when-full, or wrap around memory modes Significant Change |
| | Significant Change | 1V to 8V in 1V steps | 1V to 8V in 1V steps | 1V to 8V in 1V steps |
| | Flicker Settings | User-defined, or conform to IEEE 1453/ IEC 61000-4-15, and IEEE Std. 141. | User-defined, or conform to IEEE Std. 141. | User-defined, or conform to IEEE Std. 141. |
| | Waveform Capture | Voltage and current threshold, periodic capture | (Optional) voltage and current threshold | Voltage and current threshold |
| POWER SUPPLY | Power Consumption | Less than 2.5 watts | Less than 2.5 watts | Less than 2.5 watts |
| | Operating Temp | -20°F to +135° F | -20°F to +135° F | -20°F to +135° F |
| | Shock | 60 Hz to 2kHz, Acceleration 25G | 60 Hz to 2kHz, Acceleration 25G | 60 Hz to 2kHz, Acceleration 25G |
| PHYSICAL DIMENSION | Vibration | 10 Hz to 60 Hz, Amplitude 1.8 mm | 10 Hz to 60 Hz, Amplitude 1.8 mm | 10 Hz to 60 Hz, Amplitude 1.8 mm |
| | Size | 4.625" x 6.75" | 4.625" x 6.75" | 4.625" x 6.75" |
| | Weight | 3.6 lbs | 3.6 lbs | 3.6 lbs |
| POWER FAIL OPERATION | Can operate without any input voltage for up to 30 minutes. This allows it to record down to 0 volts on all channels during power outages. | | | |



GUARDIAN

- 2 channels of AC voltage from 0-150 continuous per phase
- 2 channels 200 amps RMS current
- 256 samples/cycle/channel sampling rate
- Voltage and current harmonics to the 51st
- Measures all power functions
- Captures waveforms
- Bluetooth® wireless, USB, cell phone modem (optional) communications
- Up to 6.9 MB memory

iVS-2SX+

- A budget oriented single-phase meter socket power quality recorder.
- 2 channels AC voltage from 0-140 continuous per phase
- 2 channels up to 200 amps RMS current
- 128 samples/cycle/channel sampling rate
- Harmonics and waveform capture (optional) to the 31st
- Measures real, reactive, and apparent power
- Up to 2.1 MB memory

iVS-3S

- The only ten function three-phase meter socket power quality recorder available today.
- 2 or 3 channels AC voltage from 0-600 VAC
- 2 or 3 channels 200 amps RMS current (Forms 12S, 14S, 15S, 16S and 17S), or 25 amps (Forms 6S, 8S, and 9S)
- 128 samples/cycle/channel sampling rate
- Voltage and current harmonics to the 31st
- Captures waveforms
- Measures all power functions
- Up to 2.1 MB memory



GUARDIAN® METER SOCKET RECORDER

FEATURES & BENEFITS:

The Guardian power analyzer is designed for use in a 200A residential meter base with the existing revenue meter. In addition to RMS voltage and current in the 2SX+, the Guardian comes standard with the ability to measure and monitor power factor, demand, phase angle, and harmonics to the 51st, in an all-weather, self-contained unit.

Cell Modem or WiFi (Optional):

Stream your data immediately to the cloud for instant access with your web browser or connect to the Guardian directly with ProVision for live readings or to download recordings. Use WiFi to connect locally with a laptop or tablet.

Large Memory Capacity:

Record power and harmonics at high resolution to meet IEEE 519-2014 requirements with up to 1 GB of onboard memory. Capture more PQ problems with enhanced waveform triggering and extended memory.

New Features:

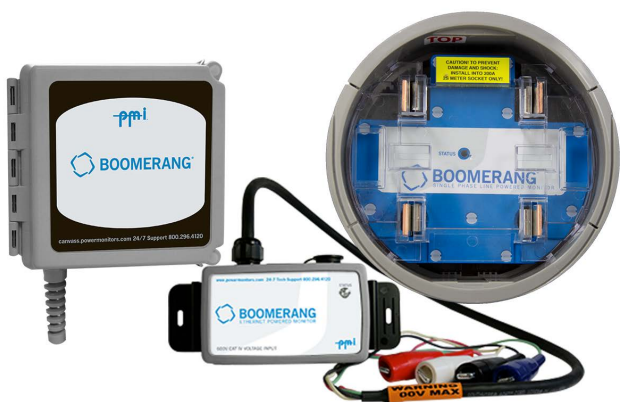
E-mail & text alerts, network time sync, WiFi, Cell Modem, CBEMA / ITIC recording, enhanced waveform capture, and PQ Canvass.



GUARDIAN

| | | |
|-------------------------------|-----------------|-----------------------------|
| INPUTS | AC Voltage | 0 to 150 VAC per channel |
| | AC Current | 200 amps RMS |
| | Sample Rate | 256 samples/cycle/channel |
| CHANNELS | Voltage | 2 channels |
| | Current | 2 channels |
| MEASURED QUANTITIES PER CYCLE | RMS Voltage | Volts |
| | RMS Current | Amps |
| | Real Power | Watts |
| | Apparent Power | VA |
| | Reactive Power | VARs |
| | Phase Angle | Degrees |
| | Power Factor | Watts/VA |
| | Displacement PF | cos (phase angle) |
| | Power Usage | kWh, kVARh, kVAh |
| ACCURACY | Voltage | 0.33% of full scale |
| | Current | 1.0% of full scale |
| | Power | 1.0% of full scale |
| | Phase Angle | 1.0° |
| | Power Factor | ±0.02 |
| | Displacement PF | ±0.02 |
| HARMONICS | Voltage | to the 51st |
| | Current | to the 51st |
| | Measures | Magnitude, phase, THD |
| COMMUNICATIONS | Standard | USB 2.0 |
| | Options | WiFi or Internal Cell Modem |

| | | |
|----------------------|---|---|
| INFORMATION STORAGE | Data Storage | 16 MB (Standard), 128 MB, 512 MB, or 1 GB (optional) |
| | Significant Change | 1000 records |
| | Flicker | 1000 records |
| RECORD SETTINGS | Interval | 1 cycle to 4 hour interval user selected, stop-when-full, or wrap around memory modes |
| | Graphs | 1 V to 8 V in 1V steps |
| | Significant Change | 1 V to 8 V in 1V steps |
| | Flicker Settings | User-defined, or conform to IEEE 1453/IEC 61000-4-15, and IEEE Std. 141 |
| POWER SUPPLY | Waveform Capture | Voltage and current threshold, periodic capture, waveshape, event cross-triggers |
| | Power Consumption | Less than 5 Watts |
| ENVIRONMENTAL | Operating Temp | -20°F to +135°F |
| | Shock | 60 Hz to 2 kHz, acceleration 25 G |
| PHYSICAL DIMENSION | Vibration | 10 Hz to 60 Hz, amplitude 1.8 mm |
| | Weight | 2.1 lbs |
| | Size | 4.625" x 6.75" |
| POWER FAIL OPERATION | Super capacitor ride through power for notifications. | |



BOOMERANG

The Boomerang is a single-phase voltage monitor with an integrated cell phone modem. Available in a Form 2S meter socket adapter, or standalone box configuration, the Boomerang works with the Canvass web-based data analysis software to provide a complete voltage picture.

The Boomerang collects RMS voltage data on a one second basis. Every 30 minutes, most recent 1800 one-second RMS values are sent to the PMI data center, for storage in the Canvass database. With this system, all data collection is performed continuously by the Canvass database – no data is stored in the Boomerang, and no recording download operation is required by the user. The data is always available via Canvass, automatically. As soon as the Boomerang is installed, it links with Canvass – no user setup is required at all. The latest realtime readings are always available via the Canvass interface.

SPECIFICATIONS:

| | |
|---------------------|-----------------------------------|
| Measured Quantities | 1 second RMS voltage frequency |
| Input range | 80-300V RMS |
| Accuracy | 0.50% |
| Resolution | 0.1V |
| Communication | GSM cell modem (AT&T) |
| Temperature range | -22F to 130F |

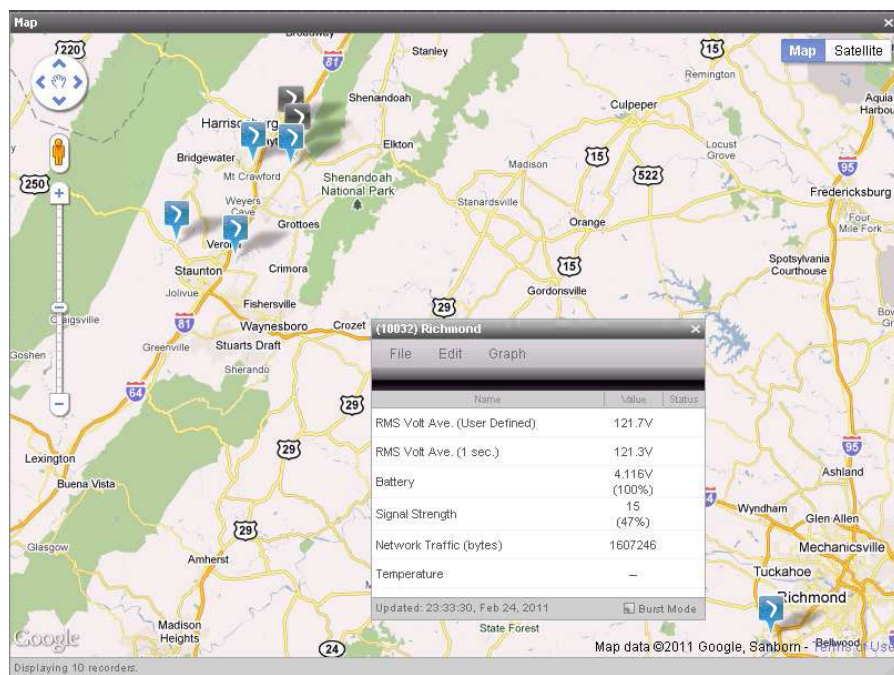
COMPLETELY PROGRAMMABLE

The Boomerang can also be programmed to send e-mail or SMS text message alerts, based on programmable voltage thresholds, or power outages. These alerts are also stored in the Canvass database, for analysis later.

In addition to the Canvass data link, the Boomerang also includes a DNP3 TCP link. This can be set up to work with a SCADA system. The DNP3 interface includes analog points for RMS voltage, frequency, and modem signal strength, and fully configurable event thresholds for voltage triggers. Events can be polled, or reported via unsolicited report by exception.

CANVASS WEB SOFTWARE

The Canvass system includes a database in the PMI data center, and web-based data analysis software. All Boomerang data is available any time, all from a web browser. To get started, load <http://canvass.powermonitors.com> in a browser.



After logging in, a map of Boomerangs will be displayed. Active Boomerangs are displayed in blue, inactive ones in grey. A Boomerang in an alert condition (due to voltage threshold exceedance) are shown in orange. Click on a Boomerang to display its status window.

The Boomerang status window shows the latest real-time readings. Two RMS types are shown: the one-second RMS value, and a user-defined average voltage (e.g. a 5 minute average voltage). In addition, status information such as internal battery voltage, modem signal strength, and total cell network traffic are displayed.

The menus in the status window are used for graphing and device setup.

GRAPH OPTIONS

Under Graph, there are three graph types displayed: Stripchart, Histogram, and Daily Profile.

These graphs are all generated from the data in the Canvass database, using the one-second RMS voltage information.

Choosing "Stripchart" will generate a new window, as shown in Figure 3. The default stripchart graphs the last four hours of data, using 1 second RMS values.

STRIPCHART

The stripchart start and stop times can be changed to several built-in values (e.g. the last week, last month, etc.) or adjusted to any custom date range. The graph can include all data ever recorded by the Boomerang – there's no limit to the size of the graph, and since Boomerang is continuously sending data to the database, there's no gaps in the data, or start or stop time in a recording.

Figure 1. After logging into <http://canvass.powermonitors.com>, click on a boomerang to display its status window.



Figure 2. Graph options for displaying RMS voltage data.

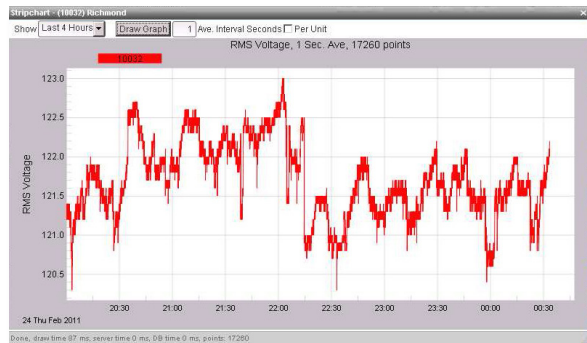


Figure 3. Stripchart display

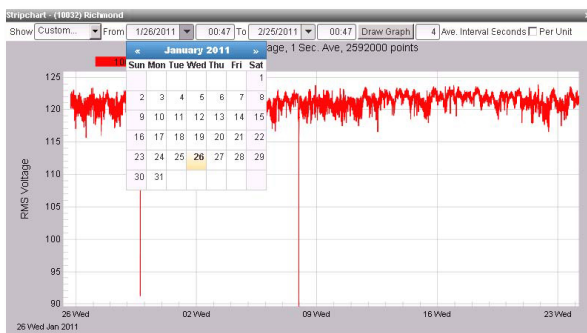


Figure 4. Stripchart start and stop times can be adjusted.

All the graph types also feature an adjustable averaging interval. By default, the graphs use the raw one second RMS voltage values. This interval is adjustable for each graph. For example, a 5 minute interval may be used, to smooth out sags, if long-term average voltage is desired. Just enter the averaging interval in the input field at the top of the graph, and click "Draw Graph" to redraw the plot.

FULL ZOOM CONTROL

Full zoom controls are also available. Just click in the graph, hold down the left mouse button, and draw a zoom window on the graph (just like ProVision and Winscan). The graph will zoom to the desired extent. Some of the hotkeys utilized in ProVision also work with Canvass:

U Undo a zoom level.

Z Undo all zoom.

And here is a new one:

O Double the current time span.

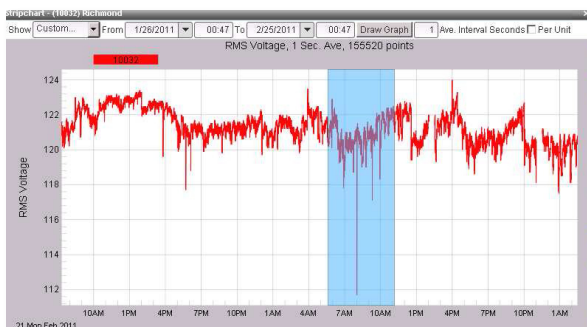


Figure 5. Full zoom control

The "T" hotkey toggles the Boomerang list on the right side. This pulls up a list of all Boomerangs in the group. Click Off or On displays or hides other Boomerang traces on the graph. This makes it very easy to compare voltages at different locations, and find correlations across a distribution system.

HISTOGRAM

The Histogram graph displays the number of seconds the voltage was at each voltage level (shown in Figure 7).

Adjustable parameters include a log plot, interval average size, and how many days to include in the histogram. As with the stripchart, the T hotkey toggles the Boomerang list, allowing the selection of multiple Boomerangs, but it also can display statistics from the histogram. The "Stats" checkbox determines whether the Boomerang list or stats list is displayed. The "Weekdays" checkbox enables just weekdays only (no weekends), or all days of the week.

DAILY PROFILE GRAPH

The Daily Profile graph show the "average" 24 hour period, for the selected timestamp. Below, a 30 day profile is shown. Each 15 minute block in the 24 hour period is average across all days, and these 15 minute blocks are graphed, to show the typical daily trend. As with the Histogram graph, the timestamp, averaging interval, and weekdays-only parameters are adjustable.

STANDARD DEVIATION

The "Std. Deviation" checkbox enables the graphical display of the standard deviation for each 15 minute block. This is shown as shaded bars, and indicates how much the voltage varied within that block. In the graph on the right, the voltage varied the most between 9am and 5pm, which is also the period with the lowest average voltage.



Figure 6. The 'T' hot key toggles the Boomerang list.

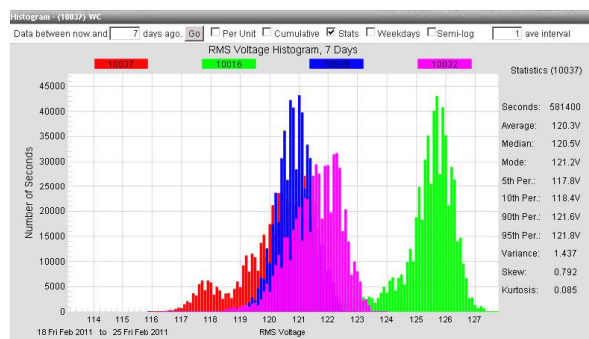


Figure 7. Histogram display

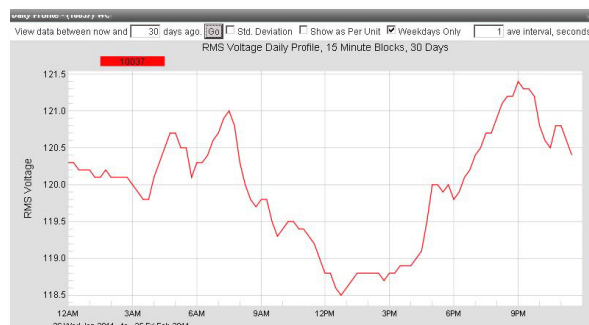


Figure 8. Daily profile graph

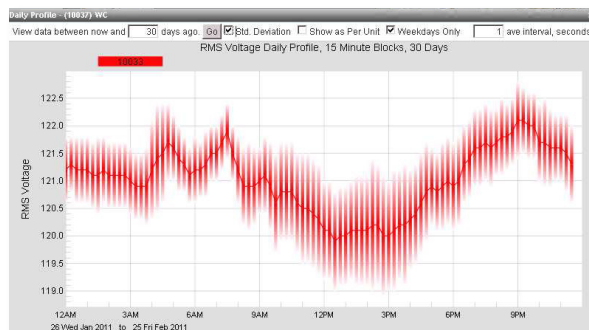


Figure 9. Standard Deviation

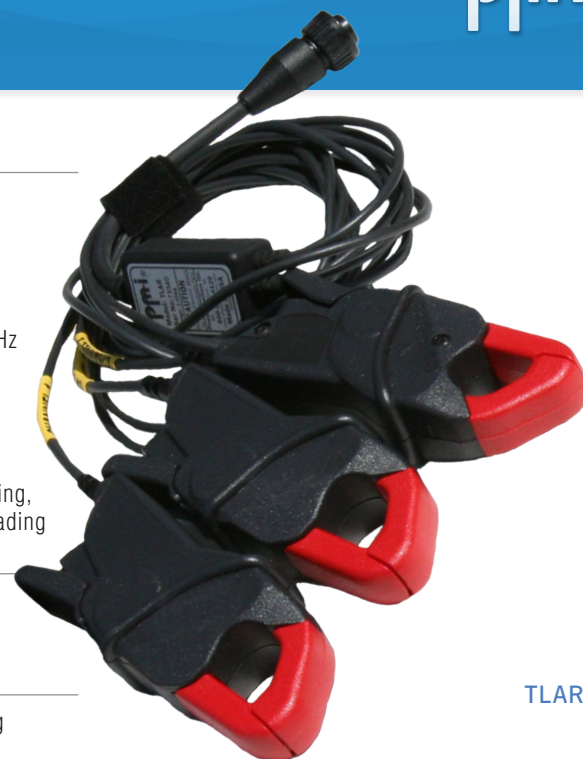
ULTRA SLIM FLEX CTs

| | | |
|----------------------------------|--|---|
| ELECTRICAL SPECIFICATIONS | Switchable Ranges | 1 to 100A, 1 to 1000A, 1 to 5000A |
| | Operating Limit | 1 to 5000A |
| | Controls | Range is chosen from the recorder, PC, or PDA software. |
| | Power Source | Power is supplied by connection to PMI recorder. No external battery or other power source is required. |
| | Linearity | ±0.05% |
| | Phase Shift | ≤ ±0.5% at 50 to 60 Hz |
| | Frequency Range | 8Hz to 10kHz |
| | Crest Factor (mid range) | 100A and 1000A scale: 3.0 5000A scale: 1.6 |
| | Position Sensitivity | ±1.5% 1 in from connector |
| PMI RECORDER CAPABILITY | iVS-3/600E may require firmware upgrade. | |
| MECHANICAL MATERIALS | Sensor Jacket | Polyurethane UL94V0 |
| | Connector | FR Polypropylene UL94V0 |
| | Cable Jacket | Polyurethane UL94V0 |
| ENVIRONMENTAL | Operating Temperature | -20 to 135° F (-29 to 57° C) |
| | Altitude Operating | 0 to 2000m, derated above 2000m |
| | Case Protection | Sensor and Module IP65 per IEC 529 |
| PHYSICAL DIMENSIONS | Min. Bending Radius | 1 in (25.4 mm) |
| | Sensor Diameter | .310 in (7.9 mm) |
| | Connector Diameter | 1.07 in max (27.2 mm) |
| | Sensor Output Cable Length | 48 in (1.2 m) |
| ACCURACY | ± 1% of full scale | |
| WORKING VOLTAGE | Sensor | 600V AC to earth |
| | Module | 600V AC to earth |
| SAFETY | Double Insulated | |
| | Sensor | 600V CAT IV |
| | Module | 600V CAT III |
| | Pollution Degree 2 | |



Ultra Slim Flex CTs

| | | TLAR | TLARS |
|----------------------------------|--|--|--|
| ELECTRICAL SPECIFICATIONS | Current Ranges | 20A, 200A AC | 20A, 200A AC |
| | Operating Limit | 200A Continuous | 200A Continuous |
| | Frequency Range | 40 to 10kHz | 40 to 10kHz |
| | Working Voltage | 600 VAC max | 600 VAC max |
| | Influence of conductor position in jaw | 0.5% of reading at 50/60Hz | 0.5% of reading at 50/60Hz |
| | Influence of adjacent conductor | 1.50% | 1.50% |
| | Influence of frequency | 40Hz to 1kHz: 3% of reading, 1kHz to 10kHz: 12% of reading | 40Hz to 1kHz: 3% of reading, 1kHz to 10kHz: 12% of reading |
| PHASE SHIFT | 1-20A | ≤ 3 degrees | ≤ 3 degrees |
| | 20-80A | ≤ 2 degrees | ≤ 2 degrees |
| | 80-200A | ≤2.5 degrees | ≤2.5 degrees |
| ACCURACY | 20A scale | 1 to 20 A: 1.5% of reading ±0.1A | 1 to 20 A: 1.5% of reading ±0.1A |
| | 200A scale | 1.5% of reading ±0.5A | 1.5% of reading ±0.5A |
| SAFETY | Rating | UL 61010B-1 | IEC 61010-1 |
| | | IEC 61010-1 | IEC 61010-1 |
| | | 600V CAT III | 600V CAT III |
| PMI RECORDER CAPABILITY | 10A range only with iVS-3/600E and ViPs with SNs lower than 61000, otherwise adjustable 20A/200A range | | |
| ENVIRONMENTAL | Operating Temp | 14 to 131° F -10 to 55° C | 14 to 131° F -10 to 55° C |
| | Operating Relative Humidity | 10-35° C 85% RH | 10-35° C 85% RH |
| | Case Protection | Probes - IP40, Enclosure - IP65 | Probes - IP40, Enclosure - IP65 |
| PHYSICAL DIMENSIONS | Maximum Conductor Size | 0.78 in (20 mm), bus bar 20 x 5 mm | 0.59 in (15 mm) |
| | Probes | 5.47 x 2.00 x 1.18 in (139 x 51 x 30 mm) | 5 x 1.67 x 0.93 in bus bar 15 x 17 mm |
| | Enclosure | 2.36 x 1.38 x 0.67 in | 2.36 x 1.38 x 0.67 in |
| | Weight | TLAR+200/3 -0.75 lb TLAR+200/4 -1.00 lb | TLAR+200/3 -0.75 lb TLAR+200/4 -1.00 lb |
| | Probe Leads | 4 ft, 600V rating | 4 ft, 600V rating |
| | Output Cable | 9 in, 600V rating | 9 in, 600V rating |
| | | | |



TLAR



TLARS

