# Power & Energy Loggers PEL 100 Series

Models PEL 102, PEL 103 & PEL 105

All You Need For Power & Energy Logging

# Compact Economical Simple To Use

- Simple to use, single-, dual- (split-phase) and three-phase (Y, Δ) power and energy loggers
- Works on 50, 60 and 400Hz networks
- Designed to work in 1000V CAT III and 600V CAT IV environments
- Power measurements: VA, W and var
- Energy measurements: VAh, Wh (source, load) and varh (4 quadrants)
- Time of use costs recorded
- DataView® software for data storage, real-time display, analysis and report generation with supplied pre-defined or custom templates
- Minimal setup required
- Ethernet compatible
- Bluetooth Class 1 wireless communication up to 300 ft away, line of site
- USB and Ethernet communication also built in
- Satisfies the recommendations of NEC 220.87

# **PEL 105 Also Includes:**

- Waterproof (IP67 rating) designed for outdoor use
- Wi-Fi communication
- Powered from phase inputs up to 1000 Vac
- DC voltage measurements from 10V to 1000Vpc
- Selectable storage rates of 1 sec or 200 mS
- Pole mountable
- Waterproof flexible current sensors
- Current measurement up to 10,000Aac (sensor dependent)

Our products are backed by over 130 years of experience in test and measurement equipment, and encompass the latest international standards for quality and safety.

**Technical Hotline: (800) 343-1391** 

www.aemc.com

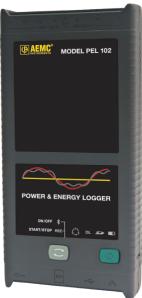


For PEL 105:

# **POWER & ENERGY LOGGERS**

### **MODELS PEL 102, PEL 103 & PEL 105**

Monitor your power & energy usage and costs locally or from anywhere in the world!

















#### **▼ FEATURES**

For: PEL 102 **PEL 103** 

- Simple to use, single-, dual- (split-phase) and three-phase (Y,  $\Delta$ ) power & energy loggers
- Designed to work in many distribution panels (PEL 102 and PEL 103)
- 1000V CAT III and 600V CAT IV (PEL 102) and PEL 103) / 1000V CAT IV (PEL 105)
- Power measurements: VA, W and var
- Energy measurements: VAh, Wh (source, load) and varh (quadrant indication)
- Updated features in DataView® software for configuring real-time communication with a PC and report generation with pre-defined or user defined templates
- Wi-Fi communication (PEL 105)

- USB, LAN, Ethernet and Bluetooth (Class 1 wireless communication, up to 300 ft away)
- Minimal programming required
- PEL 103 & PEL 105 can be configured from front panel, all models can be configured through the DataView® control panel or the FREE Android™ App
- Satisfies the recommendations of NEC Code 220.87
- AC/DC Current Probe, Model J93, is available for measuring current up to 5000Apc & 3500Aac
- Power adapter allows the PEL 102 and PEL 103 to be powered from a phase measurement input
- Provides all the necessary functions for power and energy data logging for 50Hz, 60Hz, 400Hz and DC distribution systems
- Automatic recognition of the connected current sensors/probes
- PEL 105 can be powered directly from AC phase measurement

DESCRIPTION CATALOG NO.
Power & Energy Logger Model PEL 102 (no LCD w/3 MA193-10-BK Sensors)
Power & Energy Logger Model PEL 103 (with LCD w/3 MA193-10-BK Sensors)
Power & Energy Logger Model PEL 105 w/o Sensors (Waterproof IP67)
Power & Energy Logger Model PEL 105 w/4 196A-24-BK (AmpFlex® - Waterproof IP67)
Power & Energy Logger Model PEL 102 (no LCD or Sensors)
Power & Energy Logger Model PEL 103 (with LCD, no Sensors)
Other current probes are available (see page 11)

#### **▼APPLICATIONS**

- Measure efficiency, find areas for potential savings
- Track sub-billing occupants for energy costs
- Assign energy costs to departments or operations within a department
- Track peak demand periods and find opportunities for surcharge reductions
- Determine present capacity and circumvent unnecessary electrical expansion costs
- Monitor stray voltages and neutral current
- Verify the reliability and operation of electrical machinery
- Improve response time to solve power related problems
- Track energy availability and reliability of supply
- Reduce field service time at sub-stations
- Baseline studies for system upgrades in high-rise and office buildings
- Remote configurations, monitoring and event loading

#### **Great For Outdoor Use... Waterproof PEL 105**



Optional accessory brackets allow the PEL 105 to be pole mounted.

#### **▼PRODUCTS INCLUDE**

#### **PEL 102 & PEL 103** =

Small classic tool bag, 5 ft USB cable, four black voltage leads and alligator clips, US power cord, 12 color-coded input ID markers, MultiFix mounting system, safety card for the PEL sensor compliance sheet,SD-card with USB SD-card reader, quick start user guide and USB stick



supplied with DataView® software and user manual.



**PEL 105** =

(included with Cat #2137.59 only), battery, 12 colorcoded input ID markers, SDcard (8GB), USB SD-card reader, quick start user quide, and a USB stick supplied with DataView® software and user manual. **PEL 105** without sensors Cat. #2137.57



Optional sensors, MA193-10-BK (Cat. #2140.48), are only included with:

Cat. #2137.51 (PEL 102) Cat. #2137.52 (PEL 103)

#### **▼OPTIONAL ACCESSORIES**



Cable Reeling Box for Organizing Leads Less Than 10 ft. Cat. #5000.77



Pole Mounting Kit Cat. #2137.82

Strapping not included



PEL 100 Series

## **ADDITIONAL FEATURES: PEL 102, PEL 103 & PEL 105**



- Configure measurements and recordings
- Display data in real-time
- For use on any device with an Android platform

Android is a trademark of Google Inc. The Android robot is reproduced or modified from work ted and shared by Google and used according to terms described in the Creative Comm

#### **▼ POWER ADAPTER For Use** With PEL 102 & PEL 103

Power adapter connected to the PEL 103



Powers from phase to neutral (110 to 277VAC) or phase to phase (110 to 480VAC)



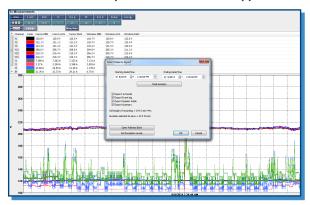
Power to Phase adapter accessory Cat. #2137.90

#### **▼ HALL EFFECT AC/DC CURRENT PROBE**

Measures DC current up to 5000A

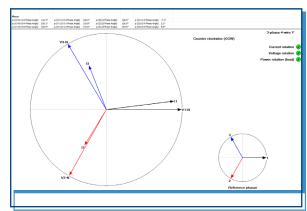


THE PEL 103 & PEL 105 have the ability to be configured directly from the front panel, DataView<sup>®</sup> control panel or the Android App.

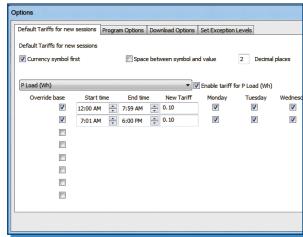


Export User Selectable1 Sec or 200mS Data:

Ability to create DataViewe reports from 1 sec data, as well as aggregate data



Phasor Diagram Screen: Shows actual and reference diagrams and indicates whether voltage, current and/or power phase orientations are as expected



Time of Use Selection: Ability to program up to 8 different tariffs for energy cost based on day of week and time of day

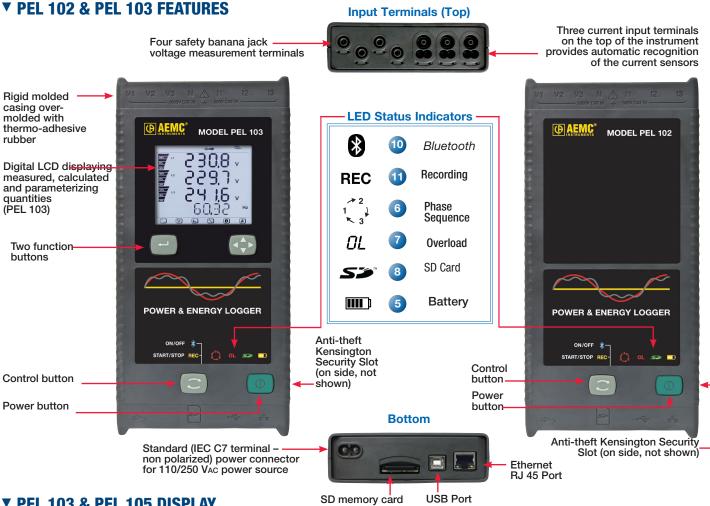


► SPECIFICATIONS	SPECIFICATIONS MODELS PEL 102 / PEL 103 / PEL 105							
GENERAL								
Sampling Frequency	128 samples per cycle; 50/60Hz (16 samples/cycle 400Hz)							
Data Storage Rate		1 per second (200ms also available on PEL 1	05)					
Demand Period Storage Rate	User selec	table (1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 and	60 minutes)					
Recorded Parameters	V, I	, W, VA, var, PF, Tan, Wh, VAh, varh, THD (V	and I),					
(Single- and Poly-Phase)	Individual harmor	nics (from 1 through 50 per phase); Crest Fac	tor (CF), Cos f / DPF					
Event Log	Tracks and records status changes and error messages along with recorded data							
Front Panel Indicator LEDs	Bluetooth active, recording in progress, phase connection reversal, overload, battery charging and SD Card status							
Storage Capacity	SD card included / SD cards up to 32 GB formatted FAT32 are supported							
Inputs Voltage	PEL 102/103: 4 inpu	t channels; PEL 105: 5 input channels via 4m	nm safety banana jacks					
Current	PEL 102/103: 3 current input channels ; PEL 105: 4 input channels via custom 4 pin jacks that accept AEMC° probes and sensors							
ELECTRICAL								
VOLTAGE MEASUREMENT	PEL 102/103 RANGE	PEL 105 RANGE	RESOLUTION/ACCURACY*					
50/60Hz	42.5 to 69Hz	42.5 to 69Hz	±0.1Hz					
Single-Phase RMS Voltages	10 to 1000Vrms	10 to 1000Vrms	0.1V/±0.2% Rdg ± 0.2V					
Phase-to-Phase RMS Voltages	17 to 1700Vrms	17 to 1000Vrms	0.1 to 1V/±0.2% Rdg ± 0.4V					
400Hz	340 to 460Hz	340 to 460Hz	_					
Single-Phase RMS Voltages	10 to 600Vrms	10 to 600Vrms	0.1V/±1% Rdg ± 1V					
Phase-to-Phase RMS Voltages	17 to 1200Vrms	17 to 600V	0.1 to 1V/±1% Rdg ± 1V					
DC	100 to 1000V	10 to 1000V	$0.1V/\pm 1\%$ Rdg $\pm$ 3V (typical)					
PT Ratios	Programmable from 50 to 650,000V	-	0.01 to 0.1V					
CURRENT MEASUREMENT	A193***	196A***	0.01 to 0.11					
Nominal range for current probes supplied with kit. See chart on pg 11 for other probes	200mA to 3000Arms	200mA to 10,000A	-					
CT Ratios	Proc	grammable from 1:1 to 25,000:1 (probe depe	endent)					
POWER MEASUREMENTS	RANGE	RESOLUTION						
Active Power (P)* E= 10 <sup>18</sup>	-2 to 2GW	0.001W	±0.5% Rdg ± 0.005% Pnom					
Reactive Power (Q)*	-2 to 2Gvar	0.001var	±1% Rdg ± 0.01% Qnom					
Apparent Power (S)*	0 to 2GVA	0.001VA	±0.5% Rdg ± 0.005% Snom					
Power Factor	-1 to +1							
Tangent $\phi$ (active/reactive power ratio)	-3.2 to +3.2	0.001	± 0.05 ± 0.02					
ENERGY MEASUREMENTS	-3.2 to +3.2	0.001	± 0.02					
	0 to 4 v 10" 45 vib	1Wh	. 0 E% Ddc					
Active Energy (EP)	0 to 4 x 10"; 4Ewh		±0.5% Rdg					
Reactive Energy (EQ)	0 to 4 x 10"; 4Evarh	1varh	±2% Rdg					
Apparent Energy (ES)	0 to 4 x 10°; 4EVAh 1Vah ±0.5% Rdg							
THD	± 655%							
Individual Harmonics		1 to 50 displayed in percentage; 1 to 7 at 400	JHZ					
External Supply	PEL 100/100	110V/250V (10%) @ 50/60Hz; 400Hz	PEL 102 10011 10001					
Power From Phase Measurement		tional Power to Phase Adapter Cat #2137.90						
Back-Up Power Source/Charge Time	Recharg	geable 8.4V NiMH battery pack / Approximate	ely 5 hours					
Battery Life		30 minutes minimum, 60 minutes typical						
MECHANICAL								
Communication Ports	USB 2.0, Ethernet (RJ45), Wireless Bluetooth Class 1 **/ PEL 105 only: Wi-Fi							
Dimension/Weight	PEL 102/103: 10.08 x 4.92 x 1.46" (256 x 125 x 37mm) / 2.20lbs (1kg); PEL 105: 10.6 x 7.1 x 9.65" (270 x 180 x 245mm) / 8.8lbs (4kg)							
Case	-	r over-molded, polycarbonate UL94 V1 rated	· · · · · · · · · · · · · · · · · · ·					
Mounting/Security	PEL 102/103: Kensington and	ti-theft system / Embedded magnets on back	side, keyhole slot on back side					
DISPLAY								
Display Type	PEL 102/103: 2.63 x 2.16" (67 x 55mm), four line, monochrome, backlit LCD with adjustable brightness & contrast PEL 105: 4.2 x 3.3" (107 x 84mm), four line, monochrome, backlit LCD with adjustable brightness & contrast							
ENVIRONMENTAL / SAFETY								
Operating Temperature/Relative Humidity	PEL 102/103: 50° to 122°F (10° to 50°C) / 45 to 75%RH; PEL 105: -4° to 122°F (-20° to 50°C) / 45 to 75%RH							
Storage Temperature	PEL 102/103: -4° to 122°F (-20° to 50°C) with batteries; -4° to 158°F (-20° to 70°C without batteries) PEL 105: -40° to 95°F (-40° to 35°C from 0 to 95%HR); -40° to 158°F (-40° to 70°C from 0 to 75%HR)							
		7.	<u> </u>					
Safety Rating / CE Rating	PEL 102/103: Complies with IEC 61010 PEL	i-1:Ed3, and IEC 61010-2-030:Ed1 for 1000V 105: 1000V CAT IV, Pollution Degree 4 (close						

<sup>\*</sup> Maximum value is current probe dependent. \*\* Computers with Class II Bluetooth will restrict range to 40 ft. Computers without Bluetooth will require a Class I or Class II Bluetooth radio adapter.

<sup>\*\*\*</sup> Maximum current reduced by a factor of 2 for 400Hz fundamental frequency.



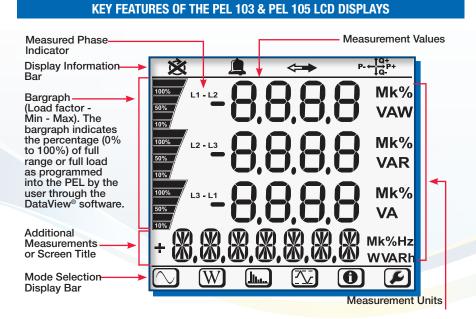


#### **▼ PEL 103 & PEL 105 DISPLAY**

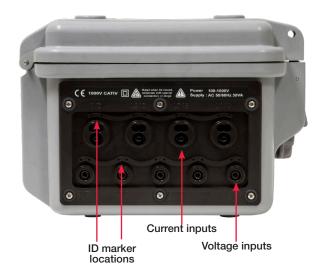
Information & Mode Selection **Display Bar Indicators:** 

-1 3	Dai maicators.
ICON	DESCRIPTION
这	Phase Sequence reversal indicator or missing phase (displayed in 3-Phase distribution systems)
<b>⇐</b>	ON - data available for recording OFF - non-display indicates possible internal problem
P- ← †Q+ ↓Q-	Power Quadrant Indication
	Measurement Mode (Real Time values)
W	Power and Energy Mode
	Harmonics Mode
	Min/Max Mode
1	Information Mode
F	Configuration Mode

(Terminal cover caps not shown)



#### **▼ PEL 105 BUSINESS END**



#### **▼ PEL 105 FRONT PANEL**

1. USB port

2. Ethernet port

3. Power input

4. External Power Indicator 14. Input terminals (not

5. Battery LED

6. Phase Sequence Error Indicator

7. Overload LED

8. SD Card LED

9. Wi-Fi LED

10. Bluetooth LED

11. Recording LED

12. Control button

13. Power button

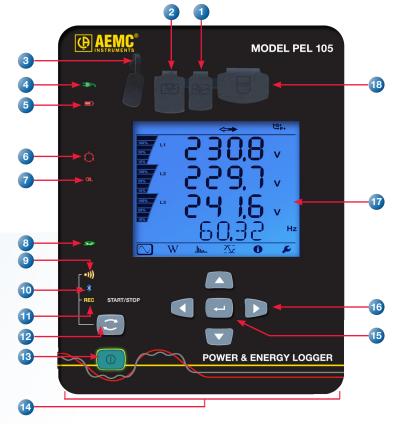
shown)

15. Enter button

16. Navigation buttons: Up, Down, Left & Right

17 LCD screen

18. SD Card slot



#### **▼ PEL 105 LED FEATURES**

LED STAT	US IND	ICATORS CONTROL OF THE PROPERTY OF THE PROPERT
	4	External Power: When ON, indicates the instrument is currently running on AC external power. When OFF, indicates the instrument is running on battery or voltage terminal input power
	5	<b>Battery:</b> Glows steady yellow when the battery is actively charging. Glows yellow and blinks once per second when the battery is recovering from a full discharge. Glows red and blinks twice per second when the battery is low and there is no auxiliary power connected. When OFF, indicates the battery is fully charged.
1 1 3	6	Phase Sequence: Phase sequence reversal indicator or missing phase blinks when the phase sequence (rotation) may be incorrect (displayed in 3-Phase distribution systems).
ÐL	7	Overload: Blinks when at least one input is overloaded, or when current inputs are mismatched.
<i>5</i> ∌™	8	SD Card: Glows steady green when the SD card is present, recognized, and unlocked. Glows steady red when the SD card is (1) not present, (2) locked, or (3) present but not recognized. Glows red and blinks when the SD card is initializing. Blinks alternately red and green once per second when the SD card is full. Blinks dark orange once per second to indicate the SD card will be full before the end of the in-progress or pending recording.
<u>÷</u>	9	<b>Wi-Fi:</b> Glows steady when Wi-Fi is enabled but not currently transmitting. Blinks when Wi-Fi is enabled and transmitting. When OFF, Wi-Fi is disabled.
8	10	Bluetooth: Glows steady when <i>Bluetooth</i> is enabled but not currently transmitting. Blinks when <i>Bluetooth</i> is enabled and transmitting. When OFF, <i>Bluetooth</i> is disabled.
REC	1	Recording: Blinks twice every 5 seconds when recording. Blinks once every 5 seconds when not recording.
	13	Power Button: Glows green when the instrument is running on voltage terminal input power, and blinks once per second when line voltage power is disabled.

#### ▼PEL 102 & PEL 103 MOUNTING



Models PEL 102 and PEL 103 can be mounted on a door or other object using the MultiFix mounting attachment, included.



Models PEL 102 and PEL 103 are equipped with four powerful magnets for mounting the instrument on a metallic surface.

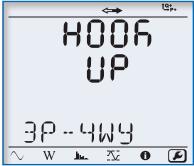


Models PEL 102 and PEL 103 easily mount in a panel with the cover in place.

Compact side view of Models PEL 102 & PEL 103

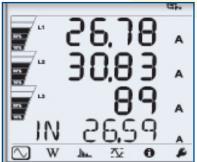
#### **▼LARGE FUNCTIONAL DISPLAYS**

#### **Configuration Mode**



Hook up, voltage and current ratios and aggregation period can be configured from the front panel of the PEL 103 and PEL 105.

#### **Measurement Mode**



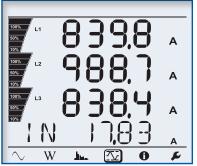
Real-time updates are displayed for voltage, current, power, frequency, power factor and tangent.



The backlit display on the Model PEL 103 can be read in dark areas showing the real-time measurements.

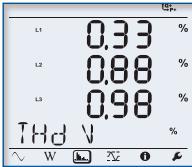
#### $\Delta$

#### **Max Mode**



Max values for voltage, current (including neutral current), power and harmonics.

#### **Harmonic Mode**



Total Harmonic Distortion (THD) can be displayed by phase or phase to phase. Neutral current THD can also be displayed.

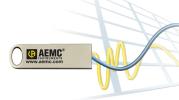


#### **Power Mode**



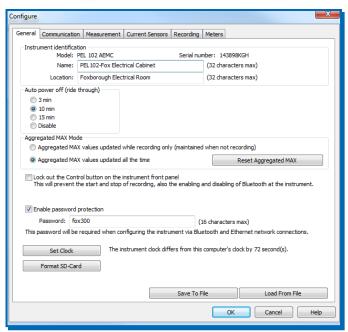
Real, apparent or reactive energy can be displayed along with it's associated energy quadrant.



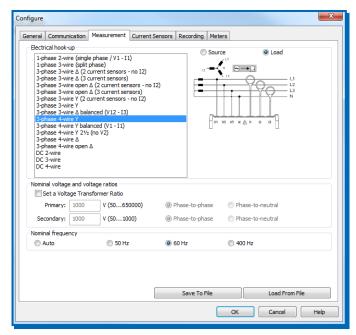


# **Data**View®

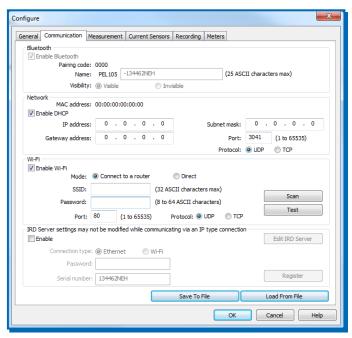
# PEL 100 Series Data Analysis & Reporting Software



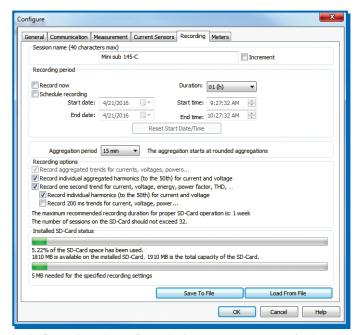
Basic information regarding Auto Power Off, instrument name and location, display brightness and contrast (Model PEL 103 and PEL 105), setting of the real-time clock and SD-card formatting is easily accomplished from the General tab.



The Measurement tab specifies the electrical distribution system, voltage ratios, nominal frequency and current probe options and ratios.



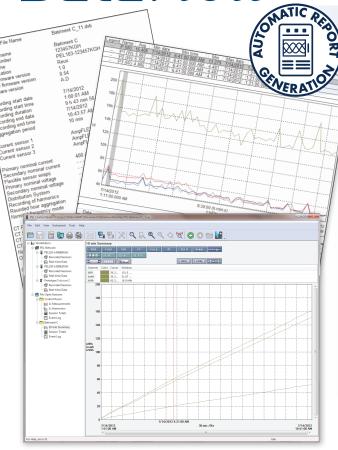
The Communication tab provides information about the various communication mediums supported by the instrument with clear and easy setup of all functions from one dialog box.



In the Recording tab, configure the instrument to measure (and record) over a user selectable recording period from a few hours to a month or longer. Select demand intervals from one to sixty minutes and view available memory for data storage.



Data View 8



DataView® software provides a convenient way to configure and control power and energy tests from a computer. Through the use of clear and easy-to-use tabbed dialog boxes, all PEL 100 series functions can be configured and tests can be initiated.

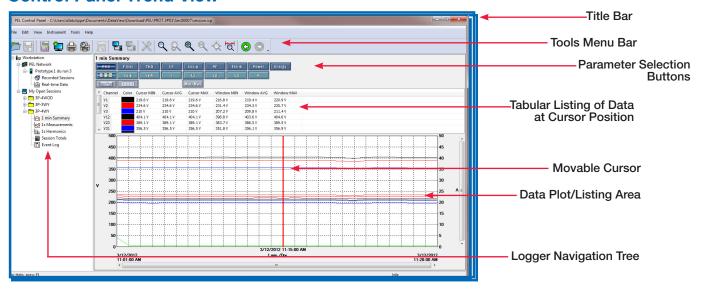
#### Configure all functions of the PEL

- Display and analyze real-time data on your PC
- Configure functions and parameters from your PC
- Customize views, templates and reports to your exact needs
- Create and store a complete library of configurations that can be uploaded as needed
- Zoom in and out and pan through sections of the graph to analyze the data
- Download, display and analyze recorded data
- Display waveforms, trend graphs, harmonic spectrums, text summaries, transients, event logs and stored alarms
- Print reports using standard or custom templates you design
- Free updates are available on our website www.aemc.com

Reports can be displayed on a PC and printed. Each report includes all test results in a tabular and graphic format, as well as operator and test site information. Comments typed by the operator will also be included.

### ▼ TYPICAL DATAVIEW® FUNCTIONAL, DIGITAL & GRAPHICAL DISPLAYS

#### **Control Panel Trend View**



In the PEL Control Panel you will find all the necessary tools and selection buttons to review recorded data as trend plots or tabular lists. Also logger selection, when multiple loggers are detected, is accomplished in the Control Panel.



For Use With the PEL 100 Series

SENSOR TYPE	CI	JRRENT RANGE	ACCURACY (TYPICAL)	TYPICAL ERROR ON $\Phi$ AT 50/60HZ	MAX CONDUCTOR SIZE	USED WITH MODEL	CATALOG # AND Description
MiniFlex <sup>®</sup> MA193 *  ( € □  10" or 14" Sensor		00mA to 3000Aac	±1%	0°	2.75" (70mm)	PEL 102 PEL 103 PEL 105	MiniFlex® Sensor 10" MA193-10-BK Cat #2140.48 MiniFlex® Sensor 14" MA193-14-BK Cat #2140.50
MR193 ( € □ Battery operated		1 to 1000Aac 1 to 1300Abc	±2.5%	-0.80°	1.6" (41mm)	PEL 102 PEL 103 PEL 105	AC Current Probe MR193-BK Cat #2140.28
SR193 (€ □		1 to 1200Aac	±0.3%	+0.2°	2.05" (52mm)	PEL 102 PEL 103 PEL 105	AC Current Probe SR193-BK Cat #2140.33
AmpFlex° 193 * ( € □  24" or 36" Sensor	200mA to 12,000Aac		±1%	0°	7.64" (190mm) or 11.46" (290mm)	PEL 102 PEL 103 PEL 105	AmpFlex® Sensor 24" 193-24-BK Cat #2140.34 AmpFlex® Sensor 36" 193-36-BK Cat #2140.35
MN93 ( E 🗆	0.5 to 240Aac		±1%	+0.8°	0.78" (20mm)	PEL 102 PEL 103 PEL 105	AC Current Probe MN93-BK Cat #2140.32
MN193 (€ □	100A	10mA to 120Aac	±1%	+0.75°	0.78"	PEL 102 PEL 103 PEL 105	AC Current Probe MN193-BK Cat #2140.36
	5A	5mA to 6Aac	±1%	+1.7°	(20mm)		
SL261 ** (€ □	100A	5 to 100Aac/dc	±4%	±0.5°	0.46" (11.8mm)	PEL 102 PEL 103 PEL 105	AC/DC Current Probe SL261 Cat #1201.51
Battery operated	10A	50mA to 10Aac/dc	±3%	±1°			
J93  ( E   Battery operated	50 to 3500Aac 50 to 5000Adc		±1%	±1°	2.83" (72mm) Busbar: 5 x 1.69" (127 x 43mm)	PEL 102 PEL 103 PEL 105	AC/DC Current Probe J93-BK Cat #2140.49
196A-24 ( E  Waterproof 24" Sensor	200mA to 10,000A		±2%	0°	7.64" (190mm)	PEL 105	AmpFlex® Sensor 24" 196A-24-BK <b>Cat #2140.75</b>

<sup>\*</sup> Maximum current reduced by a factor of 2 for 400Hz fundamental frequency. **Note:** Refer to the instrument's user manual for complete specifications.











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