

## Models PEL 102 &amp; PEL 103

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



Visit the PEL 100 Series website for more information on software, specifications and more!

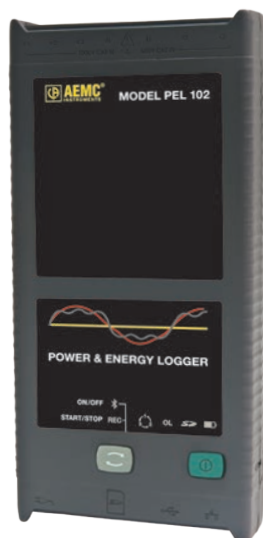
## SPECIFICATIONS

| MODELS                                       |         | PEL 102 & PEL 103   |               |                           |
|--|---------|---|---------------|---------------------------|
| GENERAL                                      |         |   |               |                           |
| Sampling Frequency                           |         | 128 samples per cycle; 50/60Hz (16 samples/cycle 400Hz)   |               |                           |
| Data Storage Rate                            |         | 1 per second  |               |                           |
| Demand Period Storage Rate                   |         | User selectable (1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30 and 60 minutes)   |               |                           |
| Recorded Parameters (Single- and Poly-Phase) |         | V, I, W, VA, var, PF, Tan, Wh, VAh, VARh, THD (V and I), Individual harmonics (from 1 through 50 per phase); Crest Factor (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                             |         | 2GB SD card (included) is used for storage. SD cards (up to 2GB); SDHC cards (4 to 32GB) formatted FAT32 are supported                      |               |                           |
| INPUTS                                       | Voltage | 3 voltage input channels via 4mm safety banana jacks  |               |                           |
|  | Current | 3 current input channels via custom 4 pin jacks that accept AEMC® probes and sensors  |               |                           |
| ELECTRICAL                                   |         |   |               |                           |
| VOLTAGE MEASUREMENT                          |         | RANGE   | RESOLUTION    | * ACCURACY (% of Reading) |
|  | 50/60Hz | 42.5 to 69Hz  | —             | ±0.1Hz                    |
| Single-Phase RMS Voltages                    |         | 10 to 1000Vrms  | 0.1V          | ±0.2% Rdg ± 0.2V          |
| Phase-to-Phase RMS Voltages                  |         | 17 to 1700Vrms  | 0.1 to 1V     | ±0.2% Rdg ± 0.4V          |
|  | 400Hz   | 340 to 460Hz  | —             | —                         |
| Single-Phase RMS Voltages                    |         | 10 to 600Vrms   | 0.1V          | ±1% Rdg ± 1V              |
| Phase-to-Phase RMS Voltages                  |         | 17 to 1200Vrms  | 0.1 to 1V     | ±1% Rdg ± 1V              |
|  | DC      | 100 to 1000V  | 0.1V          | ±1% Rdg ± 3V (typical)    |
| PT Ratios                                    |         | Programmable from 50V to 65,0000V   | 0.01V to 0.1V | —                         |
| CURRENT MEASUREMENT                          |         |   |               |                           |
| Current Probe: MiniFlex® Sensor MA193***     |         | 200mA to 100Arms  | 1 to 100mA    | ±1.2% ± 50mA              |
|  |         | 0.8A to 400Arms   | 10 to 100mA   | ±1.2% ± 0.2A              |
|  |         | 4A to 2000Arms  | 0.1 to 1A     | ±1.2% ± 1A                |
|  |         | 20A to 10,000Arms   | 0.1 to 10A    | ±1.2%                     |
| CT Ratios                                    |         | Programmable from 1:1 to 25,000:1 (probe dependent)   |               |                           |
| POWER MEASUREMENTS                           |         |   |               |                           |
| Active Power (P)*                            |         | -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  | 0.001         | ± 0.05                    |
| Tangent ϕ (active/reactive power ratio)      |         | -3.2 to +3.2  | 0.001         | ± 0.02                    |
| ENERGY MEASUREMENTS                          |         |   |               |                           |
| Active Energy (EP)                           |         | 0 to 4 x 10 <sup>18</sup>   | 1Wh           | ±0.5% Rdg                 |
| Reactive Energy (EQ)                         |         | 0 to 4 x 10 <sup>18</sup>   | 1varh         | ±2% Rdg                   |
| Apparent Energy (ES)                         |         | 0 to 4 x 10 <sup>18</sup>   | 1VAh          | ±0.5% Rdg                 |
| THD  |         | ± 655%  |               |                           |
| Individual Harmonics                         |         | 1 to 50 displayed in percentage; 1 to 7 at 400Hz  |               |                           |
| External Supply                              |         | 110V/250V (10%) @ 50/60Hz; 400Hz  |               |                           |
| Back-Up Power Source/Charge Time             |         | Rechargeable 8.4V NiMH battery pack / Approximately 5 hours   |               |                           |
| Battery Life                                 |         | 30 minutes minimum, 60 minutes typical  |               |                           |
| MECHANICAL                                   |         |   |               |                           |
| Communication Ports                          |         | USB 2.0, Ethernet (RJ45), Wireless Bluetooth Class 1 **   |               |                           |
| Dimension/Weight                             |         | 10.08 x 4.92 x 1.46" (256 x 125 x 37mm) / <1kg  |               |                           |
| Case/Index of Protection                     |         | Double insulated, rubber over-molded, polycarbonate UL94 V1 rated / IP54 non operating  |               |                           |
| Mounting/Security                            |         | Embedded magnets on back side, keyhole slot on back side / Kensington anti-theft system   |               |                           |
| DISPLAY                                      |         |   |               |                           |
| Display Type for Model PEL 103               |         | 2.63 x 2.16" (67 x 55mm), four line, monochrome, backlit LCD with adjustable brightness and contrast  |               |                           |
| ENVIRONMENTAL / SAFETY                       |         |   |               |                           |
| Operating Temperature/Relative Humidity      |         | 50° to 122°F (10° to 50°C) / up to 85%  |               |                           |
| Storage Temperature                          |         | -4° to 122°F (-20° to 50°C) with batteries; -4° to 158°F (-20° to 70°C without batteries)   |               |                           |
| Safety Rating/CE Rating                      |         | Complies with IEC 61010-1:Ed3, and IEC 61010-2-030:Ed1 for 1000V CAT III / 600V CAT IV, Pollution Degree 2 / Yes                            |               |                           |

\* 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.

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



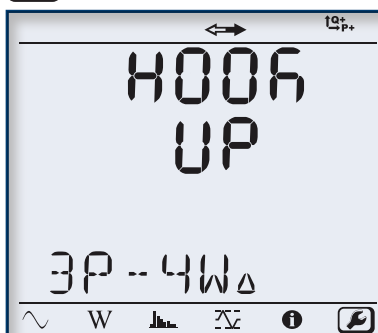
## FEATURES

- Simple to use, single-, dual (split-phase) and three-phase (Y,  $\Delta$ ) power & energy loggers
- Designed to work in 1000V CAT III and 600V CAT IV environments and fits in many distribution panels
- Power measurements: VA, W and var
- Energy measurements: VAh, Wh (source, load) and VARh (4 quadrants)
- DataView® software for configuring real-time communication with a PC and report generation with pre-defined or user defined templates
- Ethernet compatible
- Minimal programming required
- Displays stored measurements display or via Bluetooth (Class 1 - communicates up to 300 ft) to a PC or the Android™ based mobile application
- Satisfies the requirements of NEC Code 220.87
- Measures AC/DC (current probe dependent)

## Models PEL 102 & PEL 103

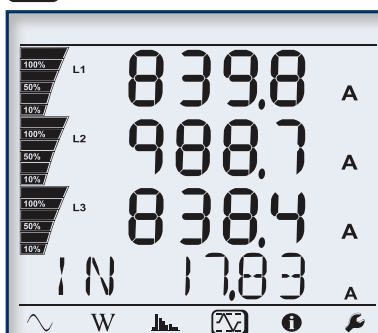
### Large Functional Displays

#### Information Mode



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

#### Max Mode



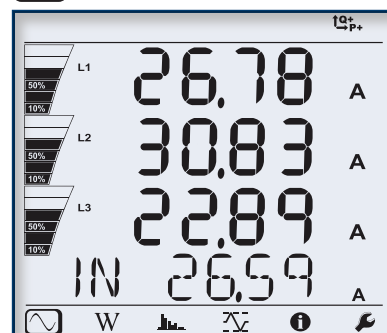
Max values for voltage, current (including neutral current), power and harmonics.

#### Android™ App Available!



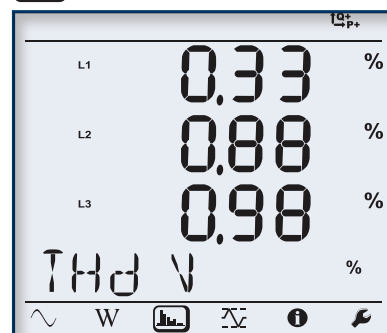
- Configure Measurements and Recordings
- Display Data in Real-Time
- For Use on any Device with an Android Platform

#### Measurement Mode



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

#### Harmonic Mode



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

## PRODUCT INCLUDES

### PEL 102 & PEL 103 Kit




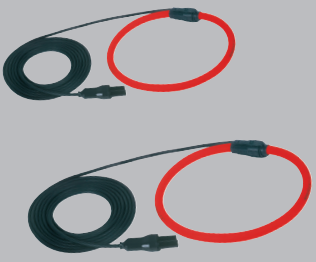


Small classic tool bag, three MiniFlex® MA193-10-BK sensors, 5 ft USB cable, four black test leads and alligator clips, power cord, 12 color-coded ID markers, Multifix mounting system, safety card, sensor compliance sheet, 2GB SD-Card with USB-SD-Card reader, quick start user guide, and USB stick supplied with DataView® software and user manual.





## CATALOG NO. DESCRIPTION

|         |  |
|---------|--|
| 2137.51 | Power & Energy Logger Model PEL 102 (no LCD w/3 MA193-10-BK Sensors)   |
| 2137.52 | Power & Energy Logger Model PEL 103 (with LCD w/3 MA193-10-BK Sensors) |
| 2137.61 | Power & Energy Logger Model PEL 102 (no LCD or Sensors)                |
| 2137.62 | Power & Energy Logger Model PEL 103 (with LCD, no Sensors)             |



| SENSOR TYPE   | CURRENT RANGE  |                             | ACCURACY (TYPICAL) | TYPICAL ERROR ON $\Phi$ AT 50/60HZ | MAX CONDUCTOR SIZE                    | USED WITH MODEL                    | LIMITED RANGE IF USED WITH MODEL |
|---|--|-----------------------------|--------------------|------------------------------------|---------------------------------------|------------------------------------|----------------------------------|
| <b>MiniFlex® MA193 *</b><br>                   | 100mA to 3000A <sub>AC</sub>                         |                             | ±1%                | 0°                                 | 2.75" (70mm)                          | PEL 102<br>PEL 103<br>8333<br>8336 | 8220<br>8230<br>8435             |
| <b>MR193</b><br><br>Battery operated           | 1 to 1000A <sub>AC</sub><br>1 to 1300A <sub>DC</sub> |                             | ±2.5%              | -0.80°                             | 1.6" (41mm)                           | PEL 102<br>PEL 103<br>8333<br>8336 | 8220<br>8230<br>8435             |
| <b>SR193</b><br>                               | 1 to 1200A <sub>AC</sub>                             |                             | ±0.3%              | +0.2°                              | 2.05" (52mm)                          | PEL 102<br>PEL 103<br>8333<br>8336 | 8220<br>8230<br>8435             |
| <b>AmpFlex® 193 *</b><br><br>24" or 36" sensor | 100mA to 12,000A <sub>AC</sub>                       |                             | ±1%                | 0°                                 | 7.64" (190mm)<br>or<br>11.46" (290mm) | PEL 102<br>PEL 103<br>8333<br>8336 | 8220<br>8230<br>8435             |
| <b>MN93</b><br>                              | 0.5 to 240A <sub>AC</sub>                            |                             | ±1%                | +0.8°                              | 0.78" (20mm)                          | PEL 102<br>PEL 103<br>8333<br>8336 | 8220<br>8230<br>8435             |
| <b>MN193</b><br>                             | <b>100A</b>  | 200mA to 120A <sub>AC</sub> | ±1%                | +0.75°                             | 0.78" (20mm)                          | PEL 102<br>PEL 103<br>8333<br>8336 | 8220<br>8230<br>8435             |
|   | <b>5A</b>  | 5mA to 6A <sub>AC</sub>     | ±1%                | +1.7°                              |                                       |                                    |                                  |

| SENSOR TYPE  | CURRENT RANGE  |                              | ACCURACY (TYPICAL) | TYPICAL ERROR ON $\Phi$ AT 50/60HZ | MAX CONDUCTOR SIZE                                    | USED WITH MODEL                            | LIMITED RANGE IF USED WITH MODEL |
|--|--|------------------------------|--------------------|------------------------------------|---|--|----------------------------------|
| <b>SL261 **</b><br><br>Battery operated | <b>100A</b>  | 5 to 100A <sub>AC/DC</sub>   | ±4%                | ±0.5°                              | 0.46" (11.8mm)  | PEL 102<br>PEL 103<br>8333<br>8336         | 8220<br>8230<br>8435             |
|  | <b>10A</b>   | 50mA to 10A <sub>AC/DC</sub> | ±3%                | ±1°                                |   |  |                                  |
| <b>J93</b><br><br>Battery operated      | 50 to 3500A <sub>AC</sub><br>50 to 5000A <sub>DC</sub> |                              | ±1%                | ±1°                                | 2.83" (72mm)<br><br>Busbar:<br>5 x 1.69" (127 x 43mm) | PEL 102<br>PEL 103<br>8333<br>8336<br>8435 | N/A                              |

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

Note: Refer to the power meter's product user manual for complete specifications.

\*\* AC/DC Current Probe BNC Adapter for Model SL261 only  
Catalog #2140.40



| CATALOG NO. | DESCRIPTION                            |
|-------------|--|
| 1201.51     | AC/DC Current Probe Model SL261 (BNC)  |
| 2140.28     | AC Current Probe Model MR193-BK        |
| 2140.32     | AC Current Probe Model MN93-BK         |
| 2140.33     | AC Current Probe Model SR193-BK        |
| 2140.34     | AmpFlex® Sensor 24" Model 193-24-BK    |
| 2140.35     | AmpFlex® Sensor 36" Model 193-36-BK    |
| 2140.36     | AC Current Probe Model MN193-BK        |
| 2140.48     | MiniFlex® Sensor 10" Model MA193-10-BK |
| 2140.49     | AC/DC Current Probe Model J93-BK       |



# DataView®

## Data Analysis and Reporting Software for the PEL 100 Series



**Configure Instrument**

General Communication Measurement Recording Meters

Instrument identification

Model: PEL 103 AEMC

Serial number: PROTO#005

Name: Control Room C (32 characters max)

Location: Foxborough, MA (32 characters max)

Auto power off

☐ 3 min

☐ 10 min

☐ 15 min

☒ Disable

LCD

Contrast: [Slider]

Normal mode brightness: [Slider]

Stand-by mode brightness: [Slider]

☐ Lock out the Control button on the instrument front panel.

This will prevent the start and stop of recording, also the enabling and disabling of Bluetooth at the instrument.

Set Clock The instrument clock differs from this computer's clock by 22171 second(s).

Format SD-Card

OK Cancel Help

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

**Configure Instrument**

General Communication Measurement Recording Meters

Bluetooth

☒ Enable Bluetooth

Pairing code: 0000

Name: PEL 103 (32 ASCII characters max)

Visibility: ☒ Visible ☐ Invisible

USB

Name: PEL 103 (PROT. 3 01)

Network

MAC address: 00:0B:3C:32:2E:FE

☐ Enable DHCP

IP address: 10 . 1 . 10 . 40

UDP port number: 3041 (1 to 65535)

Bluetooth / Network password

☒ Enable password protection

Password: 0000 (16 characters max)

This password will be required when configuring the instrument via Bluetooth and Ethernet network connections.

OK Cancel Help

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.

**Configure Instrument**

General Communication Measurement Recording Meters

Distribution system

3-phase 3-wire open Δ (12 missing)

3-phase 3-wire open Δ

3-phase 3-wire Y (12 missing)

3-phase 3-wire Y

3-phase 3-wire Δ balanced

3-phase 4-wire Y

3-phase 4-wire Y balanced

3-phase 4-wire Y 2%

3-phase 4-wire Δ

3-phase 4-wire open Δ

Nominal voltage and voltage ratios

☒ Set a Voltage Transformer Ratio

Primary: 100 V (50...650000) ☐ Phase-to-phase ☒ Phase-to-neutral

Secondary: 100 V (50...650000) ☐ Phase-to-phase ☒ Phase-to-neutral

Nominal frequency

☒ Auto ☐ 50 Hz ☐ 60 Hz ☐ 400 Hz

Current measurement

AmpFLEX / MiniFLEX

Range: ☒ 100 A ☐ 400 A ☐ 2000 A ☐ 10000 A

Number of primary wraps: 1 (1, 2 or 3)

Multiple primary wraps will increase the sensitivity of the AmpFLEX/MiniFLEX, however the nominal current will be divided by the number of primary wraps.

For example, with 2 primary wraps for a 2000 A range, the nominal current will be 1000 A instead of 2000 A.

M93A clamp (5 A)

☒ An external CT is used

Primary: 10000 A (5...25000)

Secondary: 5 A

5 A adapter box

☒ An external CT is used

Primary: 10000 A (5...25000)

Secondary: 5 A

Current sensor with BNC adapter

Nominal current: 1000 A (1...25000)

Output voltage: 1 V

Sensor output voltage must not exceed 1.7 V peak

OK Cancel Help

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

**Configure Instrument**

General Communication Measurement Recording Meters

Session

Name: Main distribution box (40 characters max)

Recording period

☒ Record now ☐ Schedule recording

Duration: 8 hours

Start date: 6/19/2012 Start time: 12:05:54 PM

End date: 6/19/2012 End time: 8:05:54 PM

Reset Start Date/Time

Trends demand interval

Period: 1 min The aggregation starts at rounded hours

Recording options

☒ Record one second trends

☒ Record current and voltage harmonics

Longest possible recording is 47 days because of the limitation of file size (4 GB in FAT32), regardless of available memory.

Caution: Recording harmonics will consume a considerable amount of storage space and will greatly increase download and analysis time (see help for more information).

Installed SD-Card status

Longest possible recording on the installed SD-Card is 18 days.

1.07% of the SD-Card space has been used.

1998 MB is available on the installed SD-Card.

1919 MB is the total capacity of the SD-Card.

OK Cancel Help

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.

# DataView®



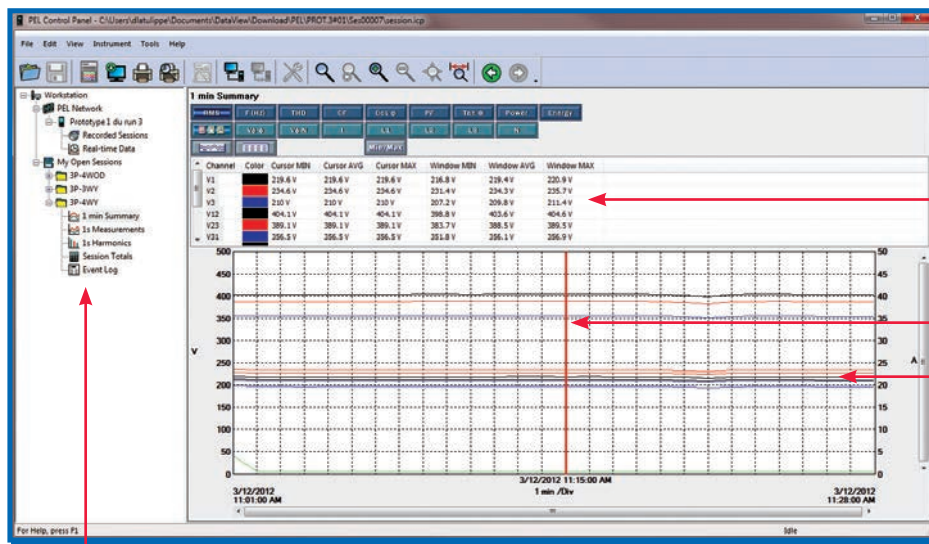
DataView® software provides a convenient way to configure and control power and energy tests from a computer. Through the use of clear and easy-to-use tabbed dialog boxes, all PEL 100 series functions can be configured and tests can be initiated.

## 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](http://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.