

# Megohmmeter

## Model 1060



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## Featured Product:

# Megohmmeter Model 1060

## Part 1: Taking and Storing a Measurement

A EMC's Megohmmeter Model 1060 is a portable instrument housed in a rugged casing. This instrument is designed to check the safety of electrical installations and equipment.

With the Model 1060, you can:

- Quickly measure insulation resistance, using a wide range of test voltages
- Perform timed tests, with the instrument automatically calculating the Polarization Index (PI) and Dielectric Absorption Ratio (DAR)
- Check continuity and capacitance
- Store test results in the instrument for later display and analysis
- Connect to a computer and display timed test results in real-time
- Download test data to a computer and generate reports for further analysis

...and many other tasks.

These are just a few of the Model 1060's capabilities. For details on all its features and functionality, consult the documentation that comes with the instrument.



In Part 1 of this two-part article, we explain some of the basic functions of the Model 1060. We begin by describing how to set up the instrument for testing. We then demonstrate two commonly used methods for testing insulation resistance: the manual "spot reading" test, and the timed resistance test. Along the way, we describe how to store results in the instrument. We also show how to display Polarization Index and Dielectric Absorption Ratio values, both of which are automatically calculated by the instrument.

In Part 2 of this series, we will discuss using the Model 1060 with DataView, AEMC's data analysis software. This will include instructions for using DataView to connect your computer to the Model 1060, configuring the instrument from the DataView Megohmmeter Control Panel, running a test and viewing results in real time, downloading tests stored in the instrument, and generating reports from this data.

## Safety

Before we begin, let's pause a moment to talk about safety. Before performing any insulation resistance test, be sure to observe all safety instructions specified in the documentation that comes with your test instrument. Insulation resistance testing involves the application of high DC voltages. Therefore carefully preparing the system under test, and the instrument used to conduct the test, is crucial to your safety and helps prevent damage to your wiring and machinery, and personal injury to you and others.

For more information on this topic, as well as insulation testing basics in general, please see our video "[Understanding Insulation Resistance Testing](#)," available on the AEMC YouTube channel.

## Setting the Date and Time

Our first task is to ensure the instrument's time and date information is correctly configured. An accurate clock is essential for analyzing test results to identify trends over time.

1. Turn the instrument's Rotary selector switch to SET-UP. After a few moments the message PUSH btn appears on the LCD, indicating the instrument is in configuration mode.

2. Press the V/TIME button to display the current time. The hours setting blinks, indicating it is in edit mode. Use the Up and Down buttons to change the time if necessary. To activate the Down button, press the yellow 2<sup>nd</sup> key to display the 2<sup>nd</sup> symbol on the LCD. While this symbol is displayed, buttons perform the functions shown in yellow. For example, in 2<sup>nd</sup> mode the Up button becomes the Down button; pressing it decreases the displayed value. To leave 2<sup>nd</sup> mode, press the yellow 2<sup>nd</sup> button.



3. When finished setting the hours, press the Right button to edit the minutes setting.
4. Press V/TIME to display the current date, and use the Up, Down, and Right Buttons to select settings and make changes.
5. When finished setting the date, press V/TIME to select the format in which the time and date are displayed. Options are USA and European formats. Use the Up button to make the selection, and press V/TIME to return to the PUSH btn screen.

## Manual “Spot Reading” Measurement

The first type of test we’ll examine is often called the Spot Reading measurement. This is relatively straightforward: simply connect the megohmmeter leads across the insulation to be tested, apply test voltage for a fixed period of time (typically a few seconds or so), then take a resistance reading. Spot testing is suitable for a system with small or negligible capacitance effect, for example a short wiring run.

1. With the instrument OFF, connect the leads to the terminals and the insulation to be tested. Then turn the instrument rotary selector switch to a test voltage setting. In general, the higher the resistance to be measured, the higher the test voltage. In cases where the resistance is unknown, it's good practice to start with the lowest voltage, and gradually increase until the measurement results are consistent. As another rule of thumb, we recommend testing at twice the system voltage, as long as the system voltage does not exceed 1000 volts. In our example, we will start with the 250 volt setting.
2. After a few moments a voltage reading appears on the screen. This is the external voltage present in the test specimen. As a safety feature, if during testing external voltage exceeds 25 volts, a warning symbol appears and the instrument immediately stops the test.
3. To measure resistance, press the START/STOP button. The voltage reading changes to display the test voltage. At the top of the screen an analog meter displays the measurement visually. After a few seconds, the resistance reading appears in the main display. Also note the flashing symbol, alerting you that the test voltage is higher than 120 volts.



4. The reading will continue until you press START/STOP a second time. The analog meter disappears, and the final resistance measurement and test voltage are displayed.

5. You can now save the test results in the instrument’s memory. With the test displayed, press the MEM button. At the top of the display is a meter indicating how much instrument memory is free for storing tests. In our example, all memory is free.
  
6. In the middle of the display is the Object and Test numbers, with the Test number blinking. An object can be thought of as a “box” of test results. Up to 99 objects can be stored in memory, and each object can store up to 99 tests. The displayed numbers are derived by incrementing the Object and Test combination of the most recent test stored in memory. In our example no tests are in memory, so by default the test will be stored as Test 1 in Object 1.



To change this setting, use the Up, Down, and Right buttons to select and change the Object and Test fields. Then press MEM to store the measurement.

*Note that a single Spot Reading test is of limited value. But the results become meaningful when a series of tests, all featuring the same test voltage and duration, are performed over time and the results compared. This comparison can help predict a potential insulation failure in time to take preventive action.*

## Timed Resistance Test

Now we’ll demonstrate a more complex insulation resistance measurement method known as the timed resistance test. This involves configuring the test to run for a defined period of time. Timed resistance tests on large rotating electrical machinery, especially systems with high operating voltage, require high insulation resistance ranges and a very constant test voltage. This test is also useful for measuring the insulation resistance in transformer windings and cable insulation. Since this test provides meaningful results within a single 10-minute duration, it is relatively independent of temperature.

By recording measurements at certain intervals during the timed test, the Model 1060 can automatically calculate and display values such as the Polarization Index and the Dielectric Absorption Ratio.

To configure and run a timed test:

1. Turn the rotary selector switch to SET-UP.
2. Press the yellow 2nd button, then press the Clock button. This displays how long the test will run, in minutes and seconds.
3. Use the Up, Down, and Right buttons to change these settings. In our example, we will set the test duration to 10 minutes.
4. In a real-world test, you can configure additional parameters such as data storage rate, alarms, and variables that determine how Dielectric Absorption Ratio is calculated. These are described in the Model 1060 user manual. For the sake of simplicity we will leave these at their default settings.
5. Connect the instrument to the test specimen, as instructed by the Model 1060 user manual. In our demonstration, we will connect to a short wiring run.
6. Turn the rotary selector switch to the desired voltage setting. As with our manual test, we will run our first test at 250 volts.
7. Press the yellow 2nd button, then press the clock button. The clock symbol now appears on the LCD.
8. Press the START/STOP button. After a few seconds the resistance reading appears on the screen.
9. The test will run for the duration of the time configured through SET-UP. As the test runs, the LCD displays how much time remains before test completion.

When the test is finished, the last instantaneous resistance measurement appears on the screen. You can cycle through all measurements taken during this test by pressing the yellow 2nd button and then pressing the R(t) button. This displays the first measurement recorded during the test, along with the time it was taken. Use the Up and Down buttons to scroll through test results. The interval between each saved sample is programmed in the SET-UP menu. In our demonstration, we are using the default interval of 5 seconds.



- Note the blinking clock symbol, indicating you are viewing incremental test results. To leave this mode, press the 2nd button and then press R(t).

## Polarization Index (PI) and Dielectric Absorption Ratio (DAR)

We can now view the Polarization Index and Dielectric Absorption Ratio values. These are commonly called PI and DAR respectively.

The R-DAR-PI button lets you cycle through the resistance, PI, DAR, and capacitance values. For instance, to display the Dielectric Absorption Ratio, press R-DAR-PI after the test measurement is complete. The instrument automatically calculates DAR by dividing the 1 minute measurement by the 30 second measurement. Although DAR is no longer commonly used with newer insulation systems that require longer than one minute of stress before breakdown, it still may have applicability when testing older insulation materials.

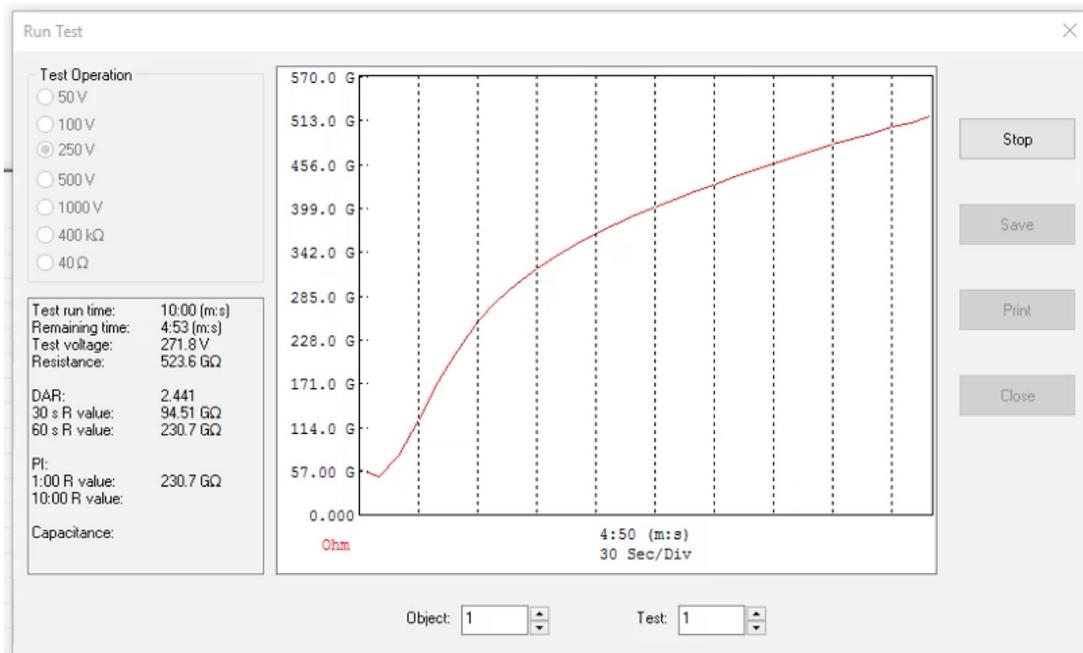


With the Dielectric Absorption Ratio displayed, press R-DAR-PI to display the Polarization Index. This value is derived by dividing the 10 minute resistance measurement by the 1 minute measurement.

Polarization Index and Dielectric Absorption Ratio are useful on long cables, or when monitoring the aging of insulation on electrical machines. Measurements of this type can be initially affected by interfering currents from capacitive charges and dielectric absorption. After test voltages have been applied for several minutes, these influences eventually cancel out each other. So to ensure accuracy, measurements should be performed over an extended period, typically 10 minutes or more.

## DataView

An important feature of the Model 1060 is its ability to be configured and operated from a computer running DataView software. Once connected, you can set up and start a test, and view measurement results graphically in real time.



This provides an easy-to-understand view of your test results, to help determine whether or not they indicate a possible problem. DataView also enables you to download tests stored in the instrument, generate reports from this data, and perform numerous other tasks including instrument configuration.

## Conclusion

This concludes Part 1 of our quick introduction to the Megohmmeter Model 1060. In Part 2 of this two-part series, we explain in detail how to use DataView with the Model 1060. For more information about this and all other AEMC products, please visit our web site. And be sure to check our YouTube channel for instructional videos about other topics in electronics.

# Loop Alarm for Clamp-On Ground Testers

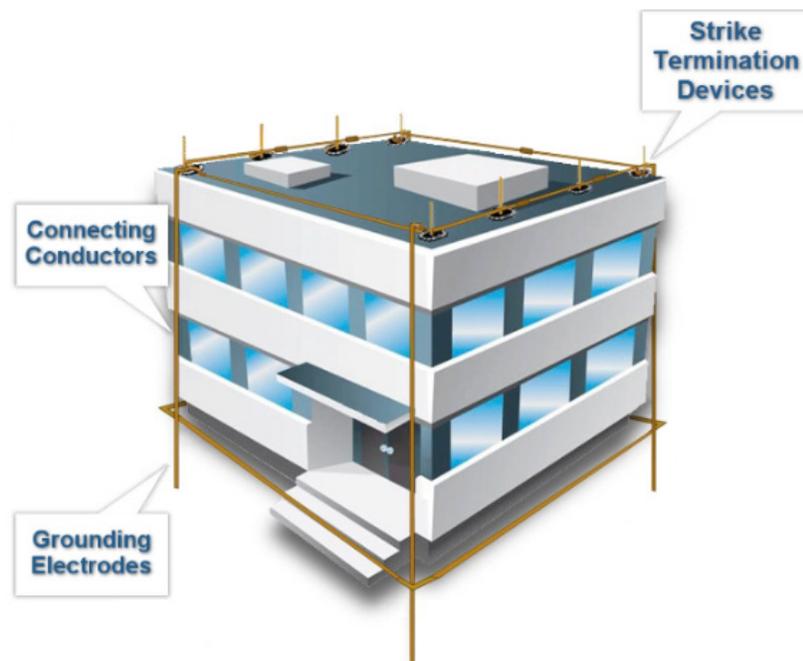
## Models 6416 & 6417

EMC's Clamp-on Ground Resistance Testers Models 6416 and 6417 measure grounding electrode system resistance without the use of auxiliary electrodes. These instruments enable you to

- check the integrity of a grounding electrode system
- measure leakage current into the grounding system
- determine ground voltage as an indicator of a potential unsafe condition
- measure resistance, impedance, inductance, current, and voltage
- determine the bonding integrity of the grounding system
- and store test results for later review and analysis

An important feature of these instruments is loop detection. This is a condition in which the instrument's transmitted signal injected at the measurement point loops through a local conductor, rather than the earth. This can invalidate grounding system impedance measurements.

For example, consider the lightning arrestor system below. This consists of a series of strike termination devices connected to a grid or grounding ring, typically with grounding electrodes at the corners of the structure.



When you clamp the instrument around an individual grounding electrode below the grid or ring, the test current induced by the instrument passes through earth and back to the instrument by way of the other grounding electrodes. This produces a valid measurement. If instead the clamp is placed around a connecting conductor; the induced current loops through the path provided by the conductors instead of the earth. In this instance, the measurement will reflect the impedance of the conductor loop, not the earth. This latter measurement is valid only for ensuring that the metal elements of the grounding system are bonded together.

To alert the user to the potential presence of a loop measurement, the Models 6416 and 6417 display a LOOP alarm when the measured impedance falls below a pre-defined threshold. To demonstrate this unique AEMC feature, we'll first measure the impedance of a typical utility pole ground wire, which as shown in the illustration to the right is around 20 ohms.



**Normal Measurement**

Next, we'll create an electrical loop by attaching a jumper lead to the grounding cable, above and below the instrument. This reduces the impedance to below the alarm threshold. The display now alternates between the measured value and the word LOOP (see below), alerting you of the possibility that you may be measuring the impedance through the loop created by the conductors, rather than through earth.

On the Model 6416, LOOP detection is always enabled, with a pre-set threshold of 1 ohm. On the Model 6417, you can change this setting through the DataView Ground Clamp-On Control Panel. To do this:

1. Turn the instrument ON and check that the Bluetooth enabled indicator appears on the LCD. If not, turn the rotary selector switch to SET-UP and press the HOLD key. Also ensure that the instrument is paired with your computer.
2. Open the Control Panel and connect to the instrument. Consult the Control Panel Help system if you need guidance for making this connection.
3. With the instrument connected, select Instrument in the menu bar and click Configure. The Instrument Configuration dialog box opens. This is the main interface for configuring the Model 6417 through the Control Panel.
4. The dialog box includes the Loop Alarm section. This includes a check box for enabling and disabling the loop alarm feature. Checking this option activates the Threshold field, allowing you to change the default setting of 1 ohm. Allowable values range from 0.1 to 199 ohms.
5. After you complete this field, click Write to Instrument to send the configuration to the Model 6417.



**Loop alarm displayed**

This concludes our quick demonstration for using loop detection with the Models 6416 and 6417. For more information about these instruments, please visit our web site.

## Customer Support Tip:

# New DataView Simple Logger II Control Panel

DataView 3.52 introduces a new dedicated Control Panel for Simple Logger II instruments. This Control Panel supports the following models:

Model	Catalog #
CL601	2126.01
L101	2126.02
L102	2126.03
L261	2126.05
L264	2126.23
L562	2126.35
AL834	2126.14
ML912	2126.37
ML914	2126.40
L481	2126.25
L642	2126.08

In addition, the Simple Logger II Control Panel supports the following discontinued instruments:

- Model L111
- Model L104
- Model L564
- Model L322
- Model L432
- Model L404
- Model L702

In the previous version of DataView, Simple Logger II instruments were supported by the Data Logger Control Panel. This Control Panel will continue to support Data Logger instruments such as the Model L452.

To install the Simple Logger II Control Panel, select the Simple Logger II checkbox in the Select Features window of the DataView Install program. After DataView is installed, the Simple Logger II icon  appears in the DataView folder on your desktop; click this icon to open the Simple Logger II Control Panel.

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# Configuring and Running a Recording on the PowerPad® III Model 8336

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The PowerPad® III Model 8336 is a three-phase power quality analyzer that is easy-to-use, compact and shock resistant. It enables technicians and engineers to measure and carry out diagnostics and power quality work on one-, two- or three- phase networks. Five voltage and four current inputs are provided. It is IEC 61000-4-30 Class B and safety rated to 600V CAT IV.

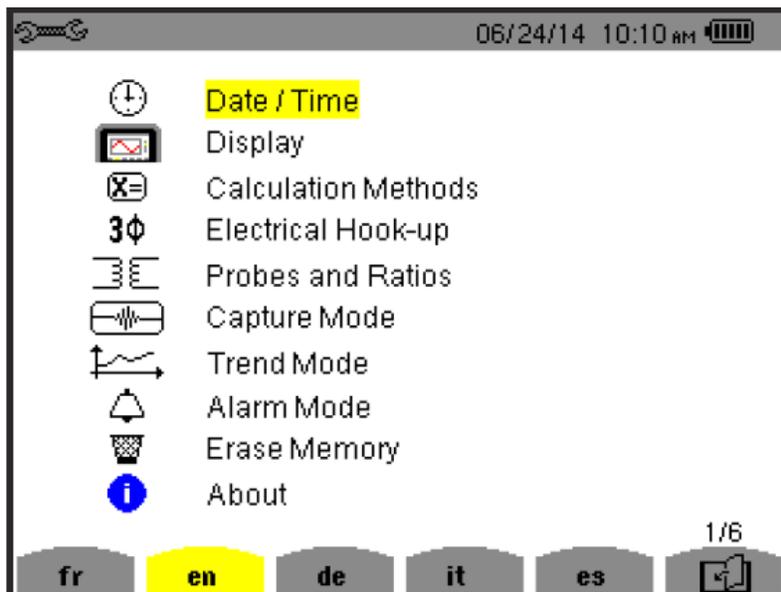
Model 8336 key features include:

- Designed for use in the field with direct access to configuration and measurement data.
- Four voltage and four current measurement channels.
- Automatic current sensor recognition.
- Large color screen.
- Identify and record up to 210 transient measurements.
- Configure and detect up to 40 different alarms and store up to 10,000 alarm events

In this article, we explain the three basic steps for setting up, running, and viewing a recording on the instrument. We assume the instrument is powered ON and connected to the distribution system under test. For instructions how to do this, consult the instrument's User Manual.

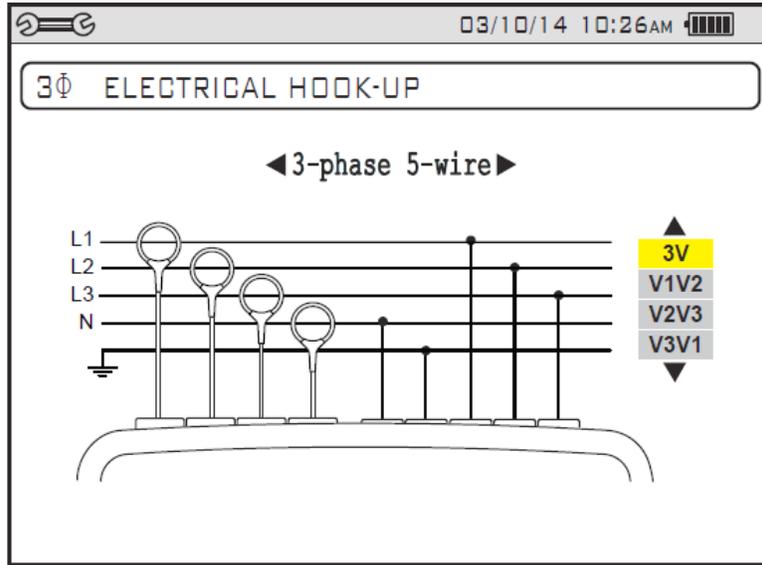
## Step 1: Configuring the Instrument

1. Press the  button to display the Configuration Options screen:

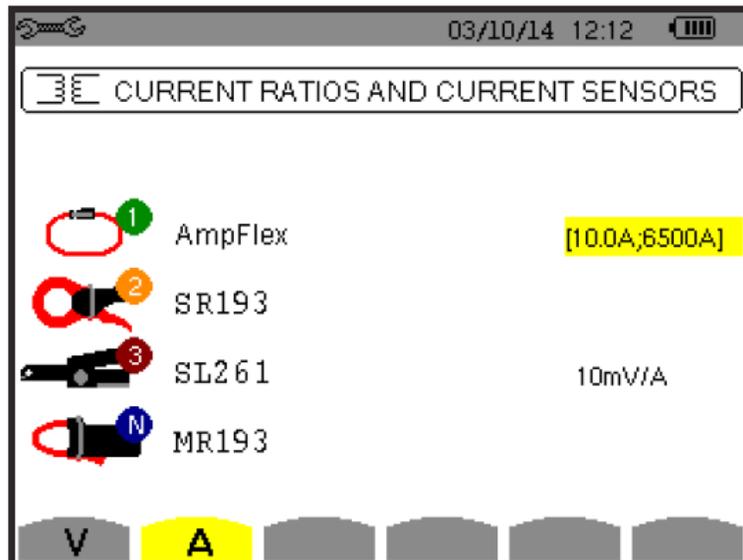


2. By default, the Date/Time option is selected; if not use the arrow buttons to highlight it. Then press the  button to display the Date/Time screen.
3. Check the displayed date and time. If it differs from the current date and time, press  to select the settings. Then use the arrow buttons to change the date and/or time. When finished, press .
4. The Date/Time screen also lets you select the date and time formats. To change these, use the arrow and  buttons to highlight, select, and change the settings, as explained in step 3. When finished, press  to return to the Configuration Options screen.
5. Use the arrows to navigate to and highlight Electrical Hook-up, then press .

- Use the arrows to select the hookup type (for example 3-phase 5-wire), then press .

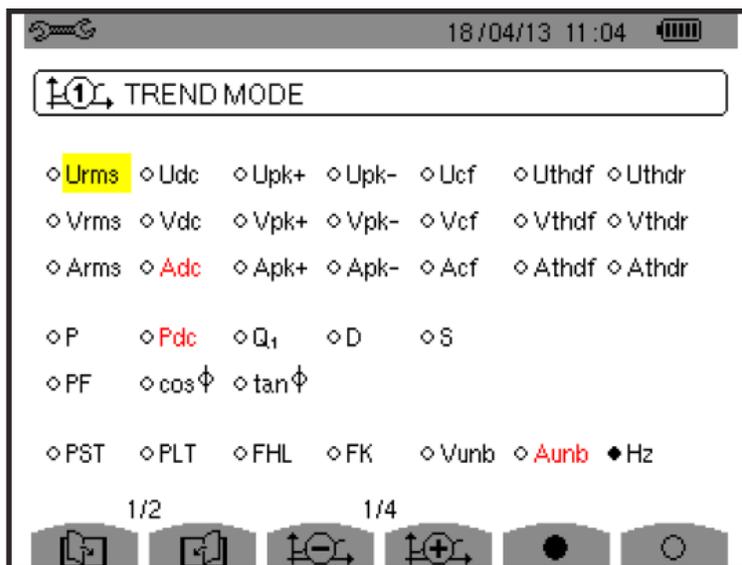


- You are returned to the Configuration Options screen. Use the arrows to navigate to Probes and Ratios, and press .



- Press the first yellow function button on the left (under the  icon) to display the Voltage Ratios screen. The Ratio Set-up field is highlighted by default. Press .
- Press the Up and Down arrows to select how the voltage ratios should be applied. When you have made your selection, press .

10. Press the Up and Down arrows to highlight the displayed voltage ratios. Spend a few moments adjusting the voltage ratios and observing how the measurement reacts. For example, set a voltage ratio, then press  and observe the RMS measurements at the top of the display.
11. Press  to return to the Configuration Options screen, then select Trend Mode and press .

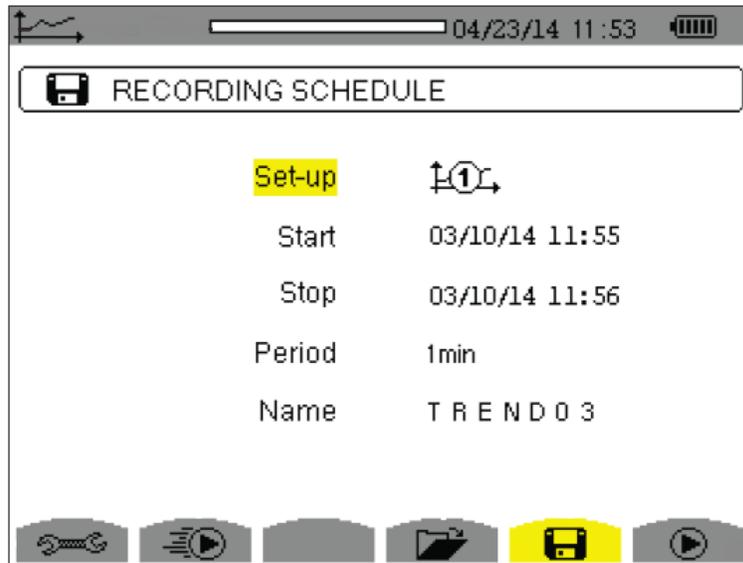


This display shows all of the available quantities the instrument can record during a recording session. A red filled diamond to the left of each quantity signifies that the quantity is selected to be included in the recording. If the parameter itself is red, it is an indication that it is not available due to the setup selected or missing current probe.

12. Use the arrows to navigate through the displayed quantities. Select or deselect a quantity to record by pressing .

## Step 2: Setting Up a Recording

1. At the Configuration Options screen, press .
  - If there are no recordings stored in the instrument, the Recording Schedule screen appears.
  - If there are recordings in the instrument, the Recording List screen is displayed. In this case, press the yellow function button under the  icon to display the Recording Schedule screen.



This screen displays five input fields:

- Setup identifies the configuration preset, 1 through 4.
  - Start defines the time and date when the recording starts. This must be later than the current date and time.
  - Stop specifies when the recording ends. This must be later than the start date and time.
  - Period is the time over which the measurements averaged.
  - Name allows you to name the test. This can be 8 characters long.
2. Use the arrow and  buttons to highlight, select, and edit the Start and Stop fields. For our demonstration, we will set Start for 5 minutes past the current time, and Stop 5 minutes past the start time. We will also set the Period to 1s, and give the recording the name TREND03.
  3. Press the last yellow function button on the right (under the  icon) to write the settings to the instrument.

When the recording is active, the message Recording in Progress appears on the screen.

## Step 3: Viewing Recordings Stored in the Instrument

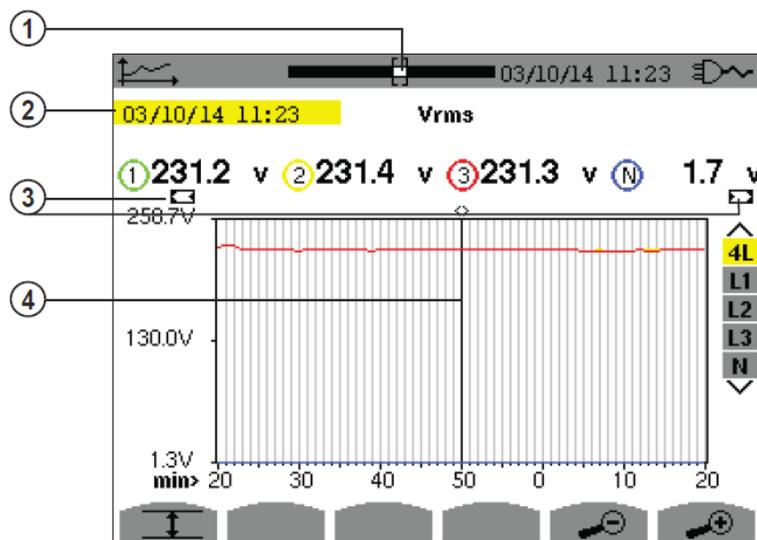
When your recording is finished, you can view it in the instrument’s recording list. To do this:

- At Recording Schedule screen, press the yellow function button under the  icon.
- For all other displayed screens, press the  button.

If more than one recording is stored, use the arrows to select the desired recording, then press  to open it.

The function button icons at the bottom of the screen now represent different recorded measurements. For example, pressing  cycles through the pages in the recording. Each press of  displays the next set of measurements.

When you find a measurement of interest, use the corresponding yellow function button to select it and view the data. The displayed screen will vary depending on the selected measurement type. For example, the illustration below displays a trend graph:



1. Position of the window view currently displayed.
2. Date and time of the current position of the cursor.
3. Indicator signifying that the screen is a partial view of the trend graph (in other words, the recording contains screens before and/or after the displayed screen).
4. Cursor. Use the Left and Right arrows to move the cursor along the graph. The Up and Down arrows change the selection of the line being displayed in the graph, as indicated by the 4L, L1, L2, L3, N icons on the right.

For more information about the Model 8336 and other members of the PowerPad® III family of power quality instruments, please visit our Web site.

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