

DATA LOGGER MODEL L452



ENGLISH

User Manual

 **AEMC**[®]
INSTRUMENTS
CHAUVIN ARNOUX GROUP

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Statement of Compliance

Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments certifies that this instrument has been calibrated using standards and instruments traceable to international standards.

We guarantee that at the time of shipping your instrument has met its published specifications.

An NIST traceable certificate may be requested at the time of purchase, or obtained by returning the instrument to our repair and calibration facility, for a nominal charge.

The recommended calibration interval for this instrument is 12 months and begins on the date of receipt by the customer.

For recalibration, please use our calibration services. Refer to our repair and calibration section at .

Serial #: _____

Catalog #: 2153.51

Model #: L452

Please fill in the appropriate date as indicated:

Date Received: _____

Date Calibration Due: _____



Chauvin Arnoux®, Inc.
d.b.a AEMC® Instruments














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Before using your Data Logger Model L452 for the first time, please take a moment to review the following.

	Signifies that the instrument is protected by double or reinforced insulation.
	CAUTION - Risk of Danger! Indicates a WARNING that the operator must refer to the User Manual for instructions before operating the instrument in all cases where this symbol is marked.
	Risk of electric shock. The voltage at the parts marked with this symbol may be dangerous.
	Bluetooth enabled.
	Ground/Earth.
	Important instructions to read and understand completely.
	Important information to acknowledge.
	Battery.
	Fuse.
	USB socket.
	Compliance with the Low Voltage & Electromagnetic Compatibility European directives (73/23/CEE & 89/336/CEE)
	In the European Union, this product is subject to a separate collection system for recycling electrical and electronic components in accordance with directive WEEE 2002/96/EC.
	The product has been declared recyclable.

Definition of Measurement Categories (CAT)

- CAT IV Measurements taken at the source of low-voltage installations.
Example: power feeders, counters and protection devices.
- CAT III Measurements taken on building installations.
Example: distribution panel, circuit-breakers, machines or fixed industrial devices.
- CAT II Measurements taken on circuits directly connected to low-voltage installations.
Example: power supply to domestic electrical appliances and portable tools.

PRECAUTIONS FOR USE

These warnings are provided to ensure the safety of personnel. Please read and comply with these precautions.

- Do not use this instrument in an explosive atmosphere or in the presence of flammable gases.
- Observe the maximum voltages and intensities assigned between terminals and ground/earth.
- Do not use the instrument if it appears damaged, incomplete, or improperly closed.
- Before each use, check the condition of the insulation of cables, case, and accessories. Anything which appears damaged (even partially) must be reported for repair or scrapping.
- Use only leads and accessories that meet instrument specifications.
- Observe the environmental specifications for the use of this instrument, as specified in § 7 of this User Manual.
- Do not modify the instrument. Use only original replacement parts. Repairs or adjustments must be performed by authorized personnel.
- Replace the batteries when they can no longer hold a charge. Disconnect all cables from the instrument before opening the access door to the batteries, as explained in § 8.1.3.
- Use protective equipment as required by the environment in which you are operating this instrument.
- When handling probes, probe tips, current sensors, signal conditioners, and alligator clips, keep fingers behind the guard.

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1. INTRODUCTION

1.1 Receiving Your Shipment

Upon receiving your shipment, make sure that the contents are consistent with the packing list. Notify your distributor of any missing items. If the equipment appears to be damaged, file a claim immediately with the carrier and notify your distributor at once, giving a detailed description of any damage. Save the damaged packing container to substantiate your claim.

1.2 Ordering Information

Data Logger Model L452..... **Cat. #2153.51**

Includes Data Logger Model L452, 6 ft USB cable, US 120V Wall-to-USB plug, 6-pin screw terminal block, 2 AA rechargeable NiMH batteries, quick start guide, and a USB stick containing DataView® software and a user manual.

1.2.1 Accessories

Multifix (Universal Mounting System)..... **Cat. #5000.44**

Small Carrying Pouch..... **Cat. #2154.71**

Hard Carrying Case..... **Cat. #2118.09**

Wall Mount Holster (gray)..... **Cat. #2138.61**

1.2.2 Replacement Parts

Cable – Replacement 6 ft USB..... **Cat. #2138.66**

Adapter – Replacement US Wall-to-USB plug **Cat. #2153.78**

Screw Terminal Block (6-pin)..... **Cat. #2153.77**

DataView® Software Updates are Available at www.aemc.com

2. PRODUCT FEATURES

The AEMC Data Logger Model L452 is a two-channel data logger. The instrument is Bluetooth-enabled and records DC voltage, DC current, pulse count, and event input. Typical applications include process control and measurement, utility metering, and environmental monitoring.



Figure 1. Data Logger Model L452

2.1 Model L452 Features

The Model L452 combines the functionality of three earlier Simple Logger II products: the Model L322 (4 to 20mA logger), Model L432 (user-selectable $\pm 100\text{mV}$, $\pm 1\text{V}$, and $\pm 10\text{V}$ logger), and Model L404 (event logger). Voltage and current measurements can be sampled from 200ms to 1 minute; sampled quantities can be averaged (mean value) from 200ms to 1 hour and recorded.

Primary features include:

- **Multiple data input types.** The Model L452 can log DC voltage, DC current, pulse count, or event data, using either one or two inputs. Measurements can be performed directly on the instrument through a variety of sources, such as sensors. This data can be stored in the instrument's 32MB internal memory.
- **User interface.** You can set up the instrument and view measurement data through the front panel LCD screen and input buttons. The L452 features an on-board interface for navigating measurement data and selecting configuration options.
- **DataView support.** The instrument connects to a computer using either Bluetooth or USB. Once connected, recorded data can be downloaded, analyzed, and formatted into reports using DataView's Data Logger Control Panel. This Control Panel also enables you to change settings on the instrument, view real-time measurements, schedule recording sessions, and perform other configuration tasks.

The Model L452 includes two modes of operation:

- **Local mode** provides setup and measurement data display through the instrument's LCD screen. In Local mode, you can select configuration settings, start and stop a data recording session on the instrument, and view measurement data.
- **Remote mode** controls the L452 from "outside." You can connect the instrument directly to a computer and then work with it through the DataView Data Logger Control Panel (see § 6). Remote mode can be enabled automatically (when the instrument is actively communicating with the computer) or manually by selecting an option in the Control Panel.

Working environments for the Model L452 include factory floors, utilities, and any area being monitored for environmental or process trends. Users of the Model L452 include utility personnel, factory technicians, environmental monitors, and others. Typical applications include process measurement, utility metering, monitoring a battery's charge, and any application involving phenomena recorded over a period of time.

2.2 Electrical Power

The instrument can operate on two sources of power:

- USB cable connected to an external power source, such as a computer
- Two internal 1.2V AA rechargeable NiMH batteries

You must insert the batteries into the instrument before use, even when operating on USB power. Consult § 8.1.3, “Installing and Replacing the Batteries,” for instructions about how to do this.

2.3 Using the Model L452 User Interface

Before using the Model L452 for the first time, you should take a few minutes to familiarize yourself with the instrument’s user interface. This consists primarily of a set of screens that appear on the L452’s LCD, and the buttons used to navigate these screens, select options, and enter configuration information. These buttons and screens operate in combination to enable you to view displayed data, select the configurable parameters, and modify these parameters. The functions performed by the buttons depend on what operational mode (navigation, selection, or edit) the L452 is currently in:

- **Navigation mode** is the default state for the user interface. In navigation mode the Up ▲, Down ▼, Left ◀, and Right ▶ buttons are used to navigate through the columns and rows of screens.
- **Selection mode** is initiated by pressing the Enter ↵ button while in navigation mode in any configuration screen. In selection mode the buttons are used to select a configuration parameter, or an individual value within a multi-value parameter. The selected user-editable option appears in blinking reversed text (light on dark background).
- **Edit mode** is started by pressing the ↵ button in selection mode. In edit mode buttons are used to change the value of the currently selected configurable parameter. When in edit mode, editable fields appear in solid (non-blinking) reversed text.

2.3.1 Model L452 Screens

The screens that appear on the instrument’s 128 x 64 graphical LCD serve as the primary interface through which you interact with the instrument locally. These screens, in conjunction with the buttons on the front panel, provide the features and functionality that enable the Model L452 to operate as a standalone instrument.

Screens are organized into six categories:

- **Measurement data** screens display the measurement data (including minimum and maximum values) for the two input channels.
- **Recording** screens start, stop, schedule, and configure recording sessions.
- **Channel 1 configuration** and **Channel 2 configuration** screens set a variety of parameters for each channel on the instrument, including input type, measurement units, scaling, alarms, and related information. (Note that input type must be the same for both channels.)
- **Instrument configuration** screens set general parameters and perform tasks on the instrument, such as setting the display language, erasing memory, resetting the configuration to default settings, setting date/time, and modifying Bluetooth settings.
- **Instrument information** screens are display-only and show current instrument information.

These screens are described in detail in Appendix A. An example of a Model L452 screen is shown in Figure 2:

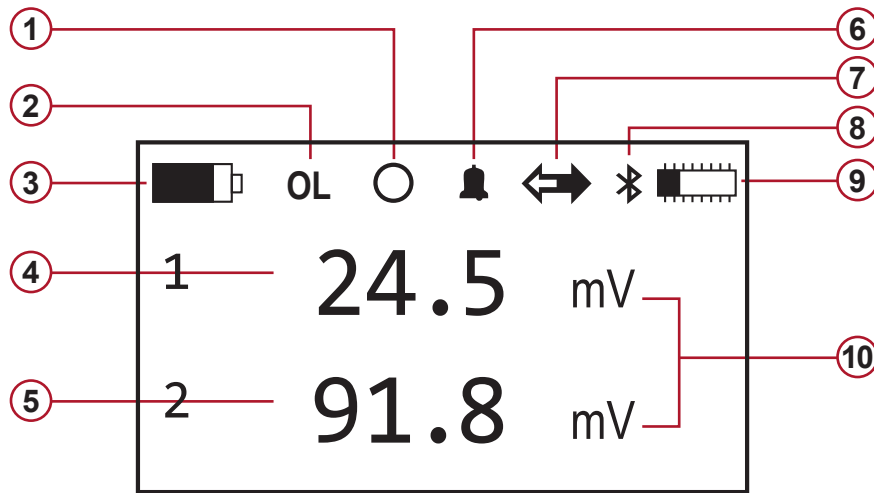


Figure 2

Item	Description
1	<p>Recording ○ indicates the current status of recording activity on the instrument.</p> <ul style="list-style-type: none"> - An empty (unfilled) circle (shown above) indicates a recording is scheduled but has not yet started. - A filled circle ● indicates a recording is currently in progress. - If no circle appears, a recording is neither scheduled nor in progress.
2	<p>Overload OL indicates that the input is out of range for the selected input type and cannot be displayed.</p>
3	<p>Battery ■ indicates how much electric charge remains in the Model L452's two batteries. The filled portion of the icon corresponds to the percentage of remaining power. When the batteries are charging, the filled portion repeatedly moves from the completely discharged level to the completely full level.</p>
4	Measurement data for Channel 1.
5	Measurement data for Channel 2.
6	<p>Alarm 🔔 indicates at least one channel is in an alarm condition.</p>
7	<p>Remote mode ↔ indicates that Remote mode is enabled. When this icon is displayed, all configuration screens are disabled; only the measurement data screens remain operational. This symbol does not appear when the instrument is in Local mode.</p>
8	<p>Bluetooth 📶 when displayed indicates Bluetooth is enabled and available. This icon flashes when Bluetooth communication is active between the instrument and a computer.</p>
9	<p>Memory ■ indicates how much available memory remains in the instrument for storing recording sessions. The filled portion of the icon corresponds to the percentage of memory used. No fill indicates memory is empty; completely solid indicates memory is full.</p>
10	Units of measurement.

2.3.2 Front Panel Buttons

The Model L452 interface also includes a set of buttons:

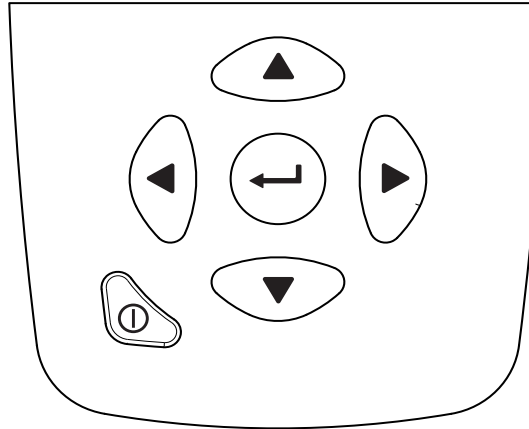










Figure 3

These buttons, in conjunction with the LCD, provide the built-in ability to configure the instrument and view measurement data, without requiring a computer connection.

Button	Description
	<p>Left and Right: These buttons move from one category/column of screens to the next. Pressing ► while viewing any measurement data screen displays the top-level recording screen. Pressing ◀ while any recording screen is displayed returns you to the top-level measurement data screen. This functionality is “circular” – pressing ◀ while a measurement data screen is displayed navigates to the top-level instrument information screen; pressing ► while an instrument information screen is displayed goes to the top-level measurement data screen.</p> <ul style="list-style-type: none"> - In selection mode, ◀ and ► move within multi-part input fields such as Recording Duration. - In edit mode, ◀ and ► are individually inactive in option selection fields, and active in text and numeric entry fields. - Pressing both buttons simultaneously terminates the editing session without saving any changes and returns to navigation mode.
	<p>Up and Down: These buttons navigate through the individual screens in a category. Pressing ▼ while in the top-level measurement data screen (Channels 1 & 2 Measurement Data) displays the Channel 1 Measurement and Min/Max Data screen; pressing it again displays the Channel 2 Measurement and Min/Max Data screen, and so on. This functionality is “circular” - pressing ▼ while a bottom-level screen is displayed returns you to the top-level screen in that column.</p> <ul style="list-style-type: none"> - In selection mode ▲ and ▼ navigate to user-editable fields on the screen; as you do, the currently selected field blinks in reversed text. - In edit mode ▲ and ▼ either (1) cycle through the available options for the field, or (2) enter text characters in text-editable fields such as Bluetooth Name.
	<p>Enter: This button, when pressed at a user-configurable screen, enables you to select and change displayed settings. (Pressing ← at an information-only screen has no effect.)</p> <ul style="list-style-type: none"> - Pressing ← once initiates selection mode. This causes the first user-configurable field in the screen to be highlighted in blinking reversed (light on dark) text. You can then use ▲ and ▼ to navigate to other user-editable fields on the screen; as you do, the currently selected field blinks. - Pressing ← a second time while positioned on a blinking field initiates edit mode. This enables you to change the settings for that field. The selected field stops blinking but remains highlighted in reversed text. You can then use ▲ and ▼ to cycle through the available options for the field, or enter text characters in text-editable fields. - When the desired option is displayed (or text entry is complete), pressing ← a third time ends the editing session, saves the configuration changes, and returns to navigation mode.
























Power: In Local mode, pressing the Power  button for longer than two seconds either turns ON the instrument when it is OFF or turns OFF the instrument when it is ON.


- When the instrument is OFF, a short press of  displays a graphic that indicates how much power remains in the instrument's batteries.
- When the instrument is ON, a short press of this button acts as a "home" button. No matter where you are in the screen interface, a short press of  cancels the operation and returns you to the Channels 1 & 2 Measurement Data screen. In addition, if the instrument is ON but in screen saver mode (the display is blank), a short press of this button displays the Channels 1 & 2 Measurement Data screen.
- In Remote mode, a short press of  has no effect. Holding down this button for approximately two seconds displays a message informing you that you are in Remote mode. To turn OFF the instrument, continue to hold down  while the Remote Mode message is displayed; after approximately two seconds the L452 will turn OFF.

2.3.3 Entering Text

There are two screens (Units and Bluetooth Name) in which you are prompted to enter text. To do this, you must enter edit mode and then use the navigation buttons to move through the fields in these screens and enter text. The steps for doing this are as follows:


1. With an editable screen displayed, press the Enter  button once. This initiates selection mode. The first character of the editable field will blink.
2. Press  again to enter edit mode. The first character of the editable field will appear in solid reversed text.
3. To change the selected character, use the Up  or Down  button. If the selected character is a number, pressing  increases that number by one and pressing  decreases it by one. If the character is a letter, pressing  or  displays the next or previous letter respectively. If the character is a non-alphanumerical character (punctuation mark, blank space, and so on) pressing  or  cycles through the list of all available characters.

For example, suppose that the selected language is English and the first character of the field is blank. Holding down  cycles through (1) punctuation marks, (2) the numbers 0 through 9, (3) uppercase letters, (4) lowercase letters, and (5) mathematical symbols. Continuing to hold down  displays a blank space, after which the cycle repeats. Holding down  performs the same cycle in reverse.
4. When the desired character appears, press  to move to the next character in the field. You can now use  or  to change the highlighted character.
5. If you need to modify a previous entry, press  to return to the character to be changed.
6. When entering numerical data in fields that allow for decimal values (such as the screens for setting low and high scaling), you can move the decimal point by pressing the  and  buttons. For example, pressing  when the right-most character is highlighted moves the decimal point to the left. Similarly, pressing  when the left-most character is highlighted moves the decimal point to the right.

When you have finished entering text, press  to save your changes, exit edit mode, and return to navigation mode.

3. CONFIGURATION

Before you can use the Model L452 for the first time, you must set the appropriate configuration variables on the instrument. Some of these settings apply to the entire instrument (such as the instrument date and time), while others affect a specific input channel.

 Note that configuration can also be performed via the DataView Data Logger Control Panel (see § 6). Configuration changes made through the Control Panel will overwrite previous changes made through the instrument's front panel interface, and vice versa. Note also that configuration through the instrument's interface is disabled when the Model L452 is in Remote mode.


In addition, you can review instrument settings. These include parameters that have been configured through the instrument interface, as well as settings configured through the Control Panel. You can also review display-only settings, such as the instrument's serial number.

3.1 Instrument Configuration

The following instrument configuration parameters can be set through the front panel interface:

- Language
- Date and time
- Enabling/disabling Bluetooth
- Bluetooth name
- Enabling/disabling Bluetooth visibility

All these options are set through the instrument configuration screens. The top level screen in this set is the Language and Date/Time Format screen. This is the starting point for all instrument configuration operations. To display this screen, proceed as follows:

1. If the Model L452 is turned OFF, turn it ON by pressing the Power  button and holding it down until the message POWER ON appears on the LCD. (This takes approximately two seconds.) The Channel 1 & 2 Measurement Data screen then appears.

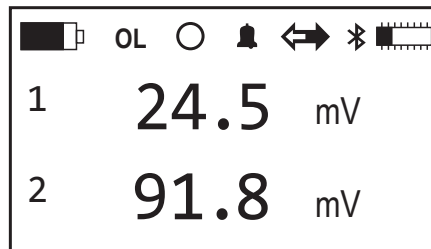




Figure 4. Channel 1 & 2 Measurement Data Screen

This is the “Home” screen for the user interface, and serves as the starting point for navigating to other screens. If the instrument is already ON and a different screen is displayed, a short press of Power  returns to the Channel 1 & 2 Measurement Data screen.

2. With the Channel 1 & 2 Measurement Data screen displayed, press the Right  button four times to display the Language and Date/Time Format screen.

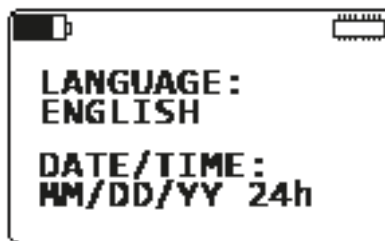




Figure 5. Language and Date/Time Format screen

You are now at the top-level instrument configuration screen, and can press the  and  buttons to display other instrument configuration screens. Some of this information can be changed, while other information is read-only.

3.1.1 Choosing the Language for the Interface

Text on user interface screens can be displayed in English, French, Spanish, Italian, and German. To select a language, do the following:

1. With the Language and Date/Time Format screen (Figure 5) displayed, press the Enter \leftarrow button. This initiates selection mode; the setting under the Language field will change to blinking reversed text.
2. Press \leftarrow again to enter edit mode. The Language setting now appears in solid reversed (light on dark) text.
3. Use the \blacktriangle or \blacktriangledown button to cycle through the available languages. Choices are English, Español, Italiano, Deutsch, and Français.
4. When the desired language choice is displayed, press \leftarrow . The text on all screens now appears in the selected language.

3.1.2 Setting the Instrument Date and Time

The Model L452 interface enables you to set or change the instrument's date and time. You can also choose the format in which date and time information is displayed. To do this:

1. With the Language and Date/Time Format screen displayed, press \leftarrow . This initiates selection mode; the setting under the Language field will change to blinking reversed text.
2. Press \blacktriangledown . The setting under Date/Time appears in blinking reversed text.
3. Press \leftarrow to initiate edit mode.
4. Press \blacktriangle or \blacktriangledown to cycle through the available options for date and time format. Choices are:

MM/DD/YY AM/PM. The date will appear in month/day/year format, and the time will appear in AM/PM format. For example, with this setting December 25, 2015 at 3:00 PM will appear as: 12/25/15 3:00 PM.

MM/DD/YY 24h. The date will appear in month/day/year format, and the time will appear in 24-hour (military) format. For example, with this setting December 25, 2015 at 3:00 PM will appear as: 12/25/15 15:00:00.

DD/MM/YY AM/PM. The date will appear in day/month/year format, and the time will appear in AM/PM format. For example, with this setting December 25, 2015 at 3:00 PM will appear as: 25/12/15 3:00 PM.

DD/MM/YY 24h. The date will appear in day/month/year format, and the time will appear in 24-hour (military) format. With this setting December 25, 2015 at 3:00 PM will appear as: 25/12/15 15:00:00.

5. After you make your selection, press \leftarrow to save it. All fields on the Language and Date/Time Format screen should now appear in regular text.
6. Press \blacktriangledown three times. The Date and Time screen now appears.

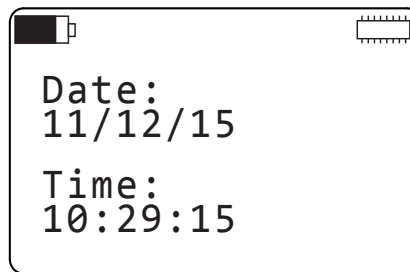


Figure 6. Date and Time Screen

Note that in Figure 6, the date and time appear in MM/DD/YY 24h format, as selected in step 4 of this procedure.

7. Press \leftarrow once to initiate selection mode. The first number in the Date field (which in MM/DD/YY format is the month, and in DD/MM/YY format is the day) will blink.
8. To change this number, press \leftarrow to initiate edit mode. Then use the \blacktriangle and \blacktriangledown buttons to increase/decrease this number until the correct value is displayed.
9. To change the other two settings in the Date field, press \blacktriangleright to navigate to the number you want to set. Then press \blacktriangle or \blacktriangledown to change the setting. You can also use \blacktriangleleft to navigate back to a previous number.
10. To change the Time field, press \blacktriangleright while the last number in the Date field is selected. This highlights the first number in the Time field.

Alternatively, if you are not in edit mode (for example, you have opened the Date and Time screen and only want to change the time while leaving the date unchanged), press \leftarrow to initiate selection mode. Then while the first number in the Date field is blinking, press \blacktriangledown . The first number in the Time field will blink; press \leftarrow to initiate edit mode.

11. Change the numbers in the Time field, using the buttons as explained in the steps above.
12. When you have finished setting the Date and Time values, press **←** to save your changes and leave edit mode.

3.1.3 Enabling and Configuring Bluetooth

The Model L452 can be connected to a computer running DataView. Once connected, you can use DataView's Data Logger Control Panel to view real-time data measured by the instrument, configure settings, start a recording session, and download recorded data for distribution and analysis. There are two ways to establish this connection. One is by using a USB cable to directly connect the Model L452 to the computer (see § 6.3.1). The other is through Bluetooth, a protocol designed to allow devices to communicate wirelessly.

Connecting to a computer with Bluetooth involves three general tasks:

1. Enable and configure Bluetooth on the computer. The steps for doing this depend on the type of computer you are using, and whether it has built-in Bluetooth capability or requires a USB-to-Bluetooth adapter. Consult the documentation that comes with your computer for information about how to enable and configure Bluetooth.
2. Enable and configure Bluetooth on the Model L452.
3. Pair and connect the instrument to the computer using Bluetooth. This is done on the computer, and is described in § 6.3.2.

The instrument's Bluetooth range under ideal conditions can be up to 100 meters (approximately 328 feet) line-of-sight, although outside interference, different adapter types, and other factors can reduce this range. The data transmission rate is 115 kbits/s. Note that disabling Bluetooth when the L452 does not need to communicate with a computer (for example, during a long recording session) decreases power consumption and lengthens the life of the instrument's batteries.

To enable and configure Bluetooth on the Model L452, do the following:

1. With the Language and Date/Time Format screen displayed, press **▼** four times. This displays the Bluetooth Enabled/Visibility screen:

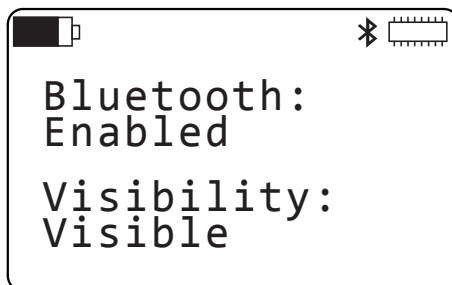


Figure 7. Bluetooth Enabled/Visibility screen

2. To change the Bluetooth setting, press **←** once to initiate selection mode. Then press **←** a second time to initiate edit mode.
3. Use the **▲** or **▼** button to toggle through the two options Enabled and Disabled. When the desired option is displayed, press **←** to save the selection and leave edit mode. When the Enabled option is selected, the Bluetooth icon **⌘** appears in the icon bar.
4. To change the Visibility setting, press **←** to initiate selection mode. Then press **▼** to select the Visibility field. Press **←** to initiate edit mode, then use **▲** or **▼** to toggle through the two options Visible and Invisible.

Typically, you will initially set this option to Visible so the Model L452 will appear in your computer's list of Bluetooth devices available for pairing. After you pair the instrument on the computer, you can then change this field to Invisible to avoid it showing up in the list of available devices for other computers within range of the Bluetooth transmitter. This prevents other computers from gaining unauthorized access to the instrument via Bluetooth.

When the correct option is selected, press **←** to save the setting and leave edit mode.

5. You can now change the Bluetooth name. This is the name by which the instrument will appear in the computer's list of available Bluetooth devices. By default, this name is "L452-" followed by the instrument's serial number. To change this, press **▼** at the Bluetooth Enabled/Visibility screen. This displays the Bluetooth Name screen.

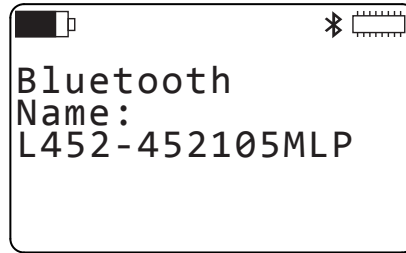


Figure 8. Bluetooth Name screen

6. The Bluetooth name consists of two parts. The first part is "L452-" and cannot be changed. The second part is editable. To change this, press **←** once to initiate selection mode; the first character in the editable part of the Bluetooth name blinks. Press **←** a second time to initiate edit mode, and change the character using **▲** or **▼**.
7. You can now change other characters in the Bluetooth name. Press **▶** to highlight the next character and use the **▲** and **▼** buttons to make your change. You can also press **◀** to navigate back to a previous character.
8. When you are finished editing the name, press **←** to save your changes.

The instrument can now be paired and connected to the computer via Bluetooth (see § 6.3.2).

3.2 Channel Configuration

In addition to general instrument settings, you can also set parameters for channel 1 and channel 2. Each channel has its own set of configuration screens; the screens for one channel are essentially identical to the screens for the other. These screens allow you to:

- Enable and disable the channel. When disabled, measurements are neither recorded nor displayed for the channel.
- Select the type of input. This can be analog (voltage or current), pulse, or event. **Note that both channels must have the same input type.**
- Define measurement units. These units are used when displaying measurement data.
- Define scaling. This establishes the relationship between input and measurement units.
- Enable and define alarm triggers. This determines whether or not (and under what circumstances) the L452 reports an alarm condition.
- Define how pulse input equates to measurement units.
- Define the circumstances under which the Model L452 reports an event.

The following sections explain how to perform these tasks. The starting point for these procedures is either the Channel 1 Enable/Disable screen or the Channel 2 Enable/Disable screen, depending on which channel you want to configure. These are the top-level screens for configuring channel 1 and channel 2 respectively. To display these screens:

1. Display the Channel 1 & 2 Measurement Data screen. This screen appears when you first turn ON the L452. If the instrument is already ON but is displaying a different screen, a short press of the Power **ⓘ** button returns you to this screen.
2. Press **▶** twice to display the Channel 1 Enable/Disable screen, or three times to display the Channel 2 Enable/Disable screen.

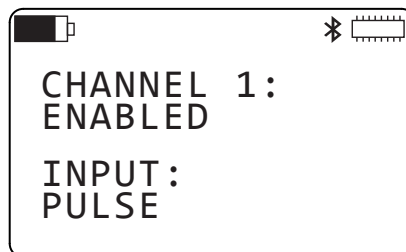


Figure 9. Channel 1 Enable/Disable screen

In the following sections, we describe configuring channel 1. However, these instructions apply equally to configuring channel 2.

3.2.1 Enabling and Disabling Channels

The first field shown in Figure 9 enables and disables the channel. By default, both channels are enabled. To change this setting, do the following:

1. At the Channel Enable/Disable screen, press **←** once to initiate selection mode. The setting under Channel will blink.
2. Press **←** a second time to initiate edit mode.
3. Use **▲** and **▼** to toggle between the options Enabled and Disabled. When the correct option is displayed, press **←** to save the setting.

When a channel is disabled, it does not display or record measurement data.

Note that both channels cannot be disabled at the same time. If channel 1 is disabled, and you disable channel 2, channel 1 will automatically become enabled. This prevents running a recording session with both channels erroneously disabled.

3.2.2 Selecting the Input Type

The second field shown in Figure 9 defines the input type for the two channels. This input type applies to both channels, and needs to match the output type of the sensor, signal conditioner, or probe connected to this channel. The following input types are supported:

- Voltage ($\pm 100\text{mV}$, $\pm 1\text{V}$, and $\pm 10\text{V}$)
- Current (4 to 20mA)
- Pulse
- Event

Voltage and current input types are collectively known as **analog** input.

3.2.2.1 Analog

Voltage and current input can be scaled to user-selected measurement units. For example, if a mass flow meter outputs 4mA at 0 sccm and 20mA at 100 sccm, you can specify the following:

- Input type: 4 to 20mA
- Units: sccm (see § 3.2.3)
- Low scaling: display a measurement of 0 sccm when the input is 4mA (§ 3.2.4)
- High scaling: display a measurement of 100 sccm when the input is 20mA (§ 3.2.4)

Sampling period, storage period, and other user-configurable parameters associated with recording and displaying data, can be set for both voltage and current input as explained in § 5.

3.2.2.2 Pulse Count

You can define the “equivalence” setting for a pulse – in other words, the actual displayed measurement value that each pulse represents (see § 3.2.6).

3.2.2.3 Event

Event input can range from -10V to +10V, sampled 16 times per second. An event is defined as a transition between a sample that measures higher than 1V and an adjacent sample (either preceding or following) that measures 1V or lower.

To select the channel’s input type:

1. At the Channel Enable/Disable screen, press **←** once to initiate selection mode. The setting under Channel will blink.
2. Press **▼** to highlight the input setting.
3. Press **←** to initiate edit mode.

4. Use ▲ and ▼ to cycle through the available input type options: ±100 mV, ±1 V, ±10 V, 4-20 mA, Event, and Pulse.
5. When the correct input type is selected, press ← to save the setting.

Note that both channels must have the same input type; you cannot select one input type for one channel and a different type for the second. For instance, if you select Pulse for channel 1 and then select Event for channel 2, the input type setting for channel 1 will automatically be changed to Event to match channel 2.

3.2.3 Defining Units

If the input type is set to analog (voltage or current) or pulse, you can specify the units to which the input measurements will be converted for display. The following steps explain how to do this:

1. At the Channel Enable/Disable screen, press ▼. This displays the Units screen. (This screen does not appear if the input type is set to Event.)

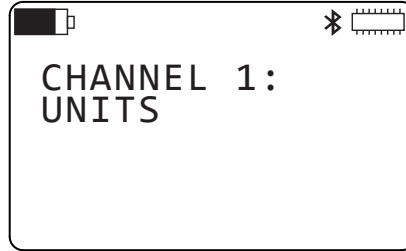


Figure 10. Units screen

2. Press ← once to enter selection mode, then press ← a second time to begin edit mode.
3. Enter the units, using the buttons as explained in § 2.3.3. These units can be anything you choose. The maximum length of the unit name is four characters.
4. When you have finished entering the units, press ← to save the setting.

Note that if you do not specify a unit, the following defaults will be used, depending on input type:

- mV for ±100mV input
- V for ±1V and ±10V input
- mA for 4-20mA input
- Wh for pulse input

3.2.4 Selecting Low and High Scaling Factors

As noted previously, the analog input received by each channel can be “scaled” to its defined units. To do this, you must define both the low scale (the measurement value when the input is at a pre-set low value) and high scale (the measurement value when the input is at maximum). This enables the L452 to correctly interpret the input it receives from the connected probe or sensor and then display measurement data in the selected units.

Scaling determines the accuracy of the instrument’s displayed measurements. Different sensors and probes have different scaling requirements; consult the specifications that come with your sensor/probe to set the scaling correctly on the L452.

For example, suppose a temperature probe measures a range from -40 to 80°C. At -40°C, the probe’s current output is 4mA, and at 80°C the output is 20mA. To ensure the L452 displays data from this probe correctly, you must scale 4mA input received from the probe to display a reading of -40°C, and scale 20mA input to 80°C. This scaling is then used to convert the input to the displayed temperature readings. To do this:

1. At the Channel Enable/Disable screen, press ▼ twice. This displays the Scale Low screen. (This screen does not appear if the input type is set to either Pulse or Event.)

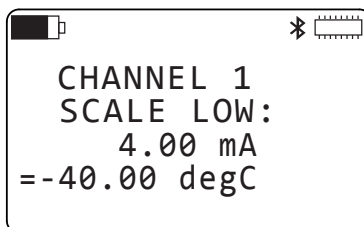


Figure 11. Scale Low screen

2. This screen displays the low input value, as determined by the input type. For example, if the input type is set to 4-20 mA, the displayed value is 4.00 mA, as shown in Figure 11. Below this field is the value to which the input setting will scale. This is expressed in the measurement units defined in the Units screen. To change this setting, press \leftarrow once to enter selection mode, then press \leftarrow a second time to begin edit mode.
3. Enter the low scale measurement value, using the buttons as explained in § 2.3.3. Allowable values are floating point numbers in the range of +/- 0.999 to 999.9; these values must not fall outside the range defined by the selected input. The value can be a negative number.

In Figure 11 we have set the low scale measurement value to “-40.00 degC.” This means that when channel 1 receives 4mA input from the probe, the LCD will display this data as “-40 degC.”

4. When you have finished entering the low scale measurement value, press \leftarrow to save the setting and exit edit mode.
5. You must now set the high scale value. In our example, we will scale 20mA input to a measurement value of 80°C. To do this, with the Scale Low screen displayed press ∇ once. This displays the Scale High screen.

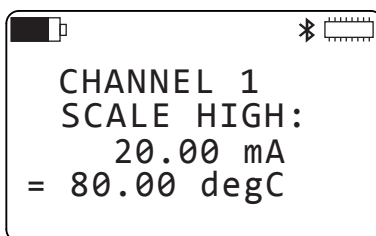


Figure 12. Scale High screen


6. This screen functions similarly to the Scale Low screen except (as the name suggests) it defines what the measurement value should be when the input reaches its maximum value. Note that the measurement value entered in the Scale Low screen can be higher than the value entered in the Scale High screen. This is useful in cases where a rising input voltage or current corresponds with a decreasing measurement value.

In Figure 12 we have set the high scale value to “80.00 degC.” This means that when channel 1 receives 20mA input from the probe, the LCD will display this data as “80 degC.”

7. When you have finished entering the high scaling value, press \leftarrow to save the setting.

Note that by default, scaling is one-to-one. In other words, one input unit equals one measurement unit. Also note that neither scaling screen is displayed if the input type is set to Pulse or Event.

3.2.5 Enabling and Defining Alarm Triggers

When enabled, an alarm is triggered when the measurement on either channel meets a user-defined criterion such as exceeding or falling below a certain value. When this happens, the Alarm icon  appears in the icon bar at the top of the LCD.

To enable and define an alarm, do the following:

1. At the Channel Enable/Disable screen, press \blacktriangledown four times. This displays the Alarm Trigger screen. (This screen does not appear if the input type is set to Pulse or Event.)

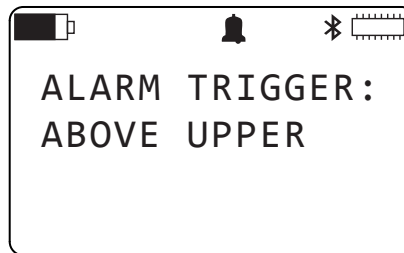




Figure 13. Alarm Trigger screen

2. Press \leftarrow to enable selection mode, and then press \leftarrow again to begin edit mode. You can now set the Alarm Trigger field. Options are:

Disabled. When disabled, alarm detection is not active for this channel.

Outside Limits: The alarm is triggered when the measurement falls outside the range defined by the upper and lower limits settings (see below). The Alarm icon  is displayed if the measurement falls either below the lower limit or rises above the upper limit.

Within Limits: The alarm is triggered when the measurement falls within the range defined by the upper and lower limits settings. The Alarm icon  is displayed if the measurement is both above the lower limit and below the upper limit.

Below Lower: The alarm is triggered when the measurement falls below the lower limit setting.

Above Upper: The alarm is triggered when the measurement exceeds the upper limit setting.

3. Use \blacktriangle or \blacktriangledown to cycle through the options. When the correct option is displayed, press \leftarrow to save the selection.
4. You can now set the upper and/or lower limits that will trigger the alarm. Do this by pressing \blacktriangledown at the Alarm Trigger screen. This displays the Upper and Lower Limits screen.

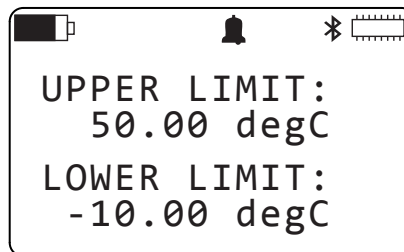


Figure 14. Upper and Lower Limits screen

If the trigger you selected in step 3 is Above Upper, the Lower Limit field is inactive because it is irrelevant for defining the alarm condition. Similarly, if the trigger is Below Lower the Upper Limit field is inactive. The steps below assume that both the Upper Limit and Lower Limit fields are active.

5. To change the upper limit setting, press \leftarrow to initiate selection mode, then press \leftarrow a second time to begin edit mode. Set the upper limit, using the instrument's buttons as described in § 2.3.3. When finished, press \leftarrow to save the change and leave edit mode.
6. To change the lower limit, press \leftarrow to initiate selection mode. Then press \blacktriangledown to select the lower limit value.
7. Press \leftarrow to begin edit mode, and enter the lower limit value. Note that if both limits are used (in other words, the trigger is set to either Outside Limits or Within Limits), the lower limit cannot be higher than the upper limit.
8. When you have finished setting the lower limit, press \leftarrow to save your change.

3.2.6 Defining Equivalence (Pulse Input Only)

Similar to analog input, pulse input can be “mapped” to measurement units. To do this, you must define the relationship between one pulse and the measurement units you have selected:

1. At the Channel Enable/Disable screen, press ▼ twice. This displays the Equivalence screen. (This screen only appears when the input type is set to Pulse.)

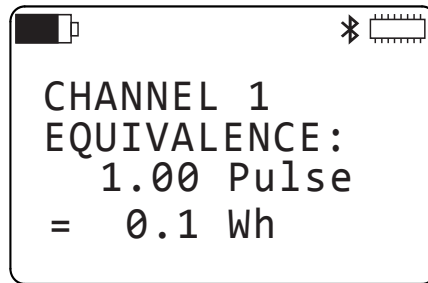


Figure 15. Equivalence screen

2. Press ← to initiate selection mode, then press ← again to begin edit mode. Then type in the measurement value that each pulse represents, using the buttons as described in § 2.3.3. Allowable values for the pulse equivalence are positive floating point numbers in the range of .0001 to 9999. For example, in the preceding illustration we have defined one pulse as being equivalent to 0.1Wh.
3. When you have finished entering the equivalent measurement value of one pulse, press ← to save your changes.

Note that by default, one pulse equals one Wh.

3.2.7 Selecting Event Trigger (Event Input Only)

Event input consists of data that indicates whether or not an event (a transition between low and high states) has taken place. You can enable event input by selecting Event in the Channel Enable/Disable screen (see Figure 9). An event can be either *rising* or *falling*:

- A rising event is triggered when input transitions from a low state (input equals 1V or less) to a high state (input exceeds 1V).
- A falling event is triggered when input transitions from high to low.

To define which type of event you want the L452 to report, do the following:

1. At the Channel Enable/Disable screen, press ▼. This displays the Event Trigger screen. (This screen only appears when the input type is set to Event.)

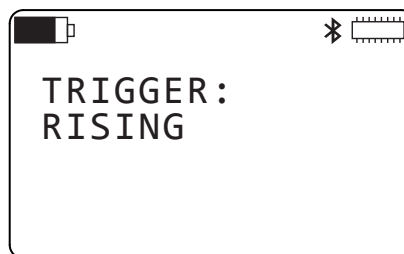


Figure 16. Event Trigger screen

2. Press ← to initiate selection mode, then press ← again to begin edit mode. Press ▲ or ▼ to toggle between the available options Rising and Falling.
3. When you have finished selecting the event trigger type, press ← to save your changes.

3.3 Restoring Configuration to the Original Settings

You can override all configuration changes and restore parameters back to their original factory default settings. This resets all configuration modifications other than the instrument's date and time. This also applies to any changes made through the DataView Data Logger Control Panel. This process also resets the minimum and maximum values on the instrument back to zero.

Note that this does not affect any recorded data stored in the instrument. Erasing memory requires a separate procedure, as explained in § 8.1.1.

To reset the configuration parameters to their original settings, follow the steps below:

1. With the Language and Date/Time Format screen (Figure 5) displayed, press ▼ twice. This displays the Configuration Reset screen.

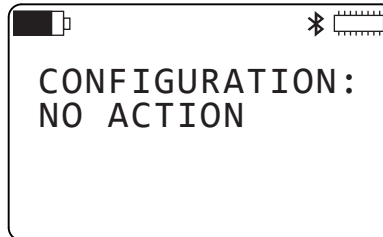


Figure 17. Configuration Reset screen

2. Press ← to initiate selection mode and then press ← a second time to begin edit mode.
3. Press ▲ or ▼ to display the option Reset. With this option displayed, press ←.
4. A message appears asking you to confirm the reset. To exit this message without resetting the configuration, press the ◀ and ▶ buttons simultaneously. This returns you to the Configuration Reset screen, without taking any further action. Alternately, a short press of ⓘ returns to the Channel 1 & 2 Measurement Data screen (see Figure 4).

To confirm the reset, press ←. All configuration parameters other than time and date are restored to their original settings. After a short pause, during which the screen will briefly appear blank and then display the Model/Serial Number/Firmware screen (see Figure 18) for several seconds, you are returned to the Channel 1 & 2 Measurement Data screen.

3.4 Viewing Instrument Information

You can at any time view current instrument information, including:

- Model and serial number
- Firmware revision currently running on the instrument
- Instrument name and location
- Number of recording sessions currently stored in memory
- Amount of available memory
- Default name for the next recording session

The user interface includes a set of instrument information screens for viewing these settings. To view the top-level instrument information screen, display the Channel 1 & 2 Measurement Data screen (Figure 4). Then either press ◀ once or ▶ five times. The Model/Serial Number/Firmware screen appears:

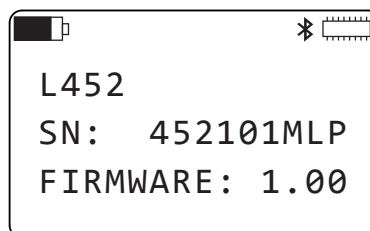


Figure 18. Model/Serial Number/Firmware screen

This screen is the starting point for viewing instrument information. Note that instrument information screens remain accessible in Local mode when a recording is active. They are, however, inaccessible in Remote mode. Note also that when viewing instrument information screens, the ← button is disabled, preventing you from entering either selection or edit mode.

3.4.1 Model, Serial Number, and Firmware Revision

As shown in Figure 18, this screen displays three fields of data:

- Model of the instrument. This is always L452 and cannot be changed.
- Serial number of instrument: This is a factory setting and cannot be changed.
- Firmware revision currently running on the instrument. You can download the latest firmware, as instructed in § 8.1.2. When you do, this number is updated. You cannot change the firmware number directly via this screen, however.

3.4.2 Name and Location Screen

This screen displays the instrument's name and location. To view this screen, go to the Model/Serial Number/Firmware screen and press ▼.

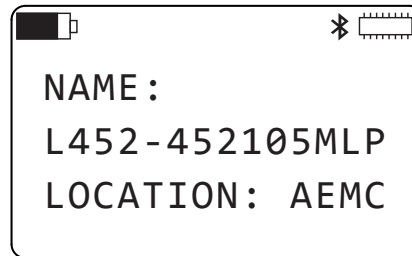


Figure 19. Name and Location screen

This screen displays two fields:

- **Name** is the name by which the instrument will be identified. This can be up to 32 characters long. By default, this is "L452" followed by the instrument's serial number. You can change this name via the DataView Data Logger Control Panel (see § 6). However, you cannot change this name through the Model L452 interface.
- **Location** identifies where the instrument is located. This can be up to 32 characters long. This is entered through the Data Logger Control Panel and cannot be modified through the Model L452 interface.

3.4.3 Recording Session Screen

This screen displays the number of recording sessions (if any) currently stored in memory. It also shows the amount of free memory left for storing additional recording sessions. To view this screen, display the Model/Serial Number/Firmware screen and press ▼ twice.

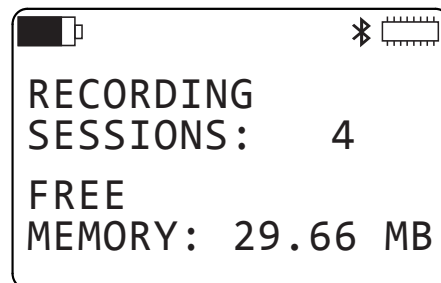


Figure 20. Recording Sessions screen

Note that this screen appears even if no sessions are currently stored in the instrument's memory. In this case, Free Memory will be 31.88 MB.

3.4.4 Recording Name Screen

Each recording session has a name, which the instrument assigns by default. When configuring a recording through the Control Panel, you can change the default recording name and assign the recording any name you choose. When configuring a recording session through the instrument's interface, you cannot change the session name; the name assigned by the instrument is the only session name available.

To view the name for the next recording session, display the Model/Serial Number/Firmware screen and press ▼ three times:

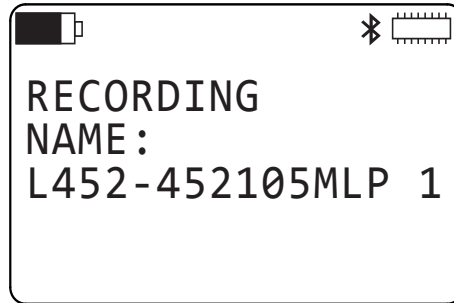


Figure 21. Recording Name screen

By default, the recording name consists of the instrument name and a numerical suffix that represents the session number (the number of sessions currently stored in memory plus one). For example, in Figure 21 this number is 1, indicating that no sessions are currently stored in the instrument's memory.

As noted above, the recording name can be changed via the DataView Data Logger Control Panel. When the Control Panel starts or schedules a recording session, the name given to that session becomes the default name until (1) the Control Panel starts or schedules a recording under a different name, or (2) the user resets the configuration on the instrument (see § 3.3).

4. CONNECTING TO INPUTS & VIEWING MEASUREMENTS

4.1 Connecting Probes, Signal Conditioners, and Sensors

After you have finished configuring the instrument, you are now ready to connect sensors or probes to the instrument and start taking measurements. The Model L452 works with a wide variety of measurement probes, signal conditioners, sensors, and devices that output data as voltage ($\pm 100\text{mV}$, $\pm 1\text{V}$, or $\pm 10\text{V}$), current (4 to 20mA), pulses, or events.

There is a removable six-pin terminal strip that can accept input from two separate sources. Each input has a set of three screw terminals. Each set has an unlabeled common screw used by all types of measurement input. Of the remaining two screws, one is used for 4-20mA input, while the other is used for voltage, pulse, and event input.



Figure 22. Measurement inputs

For example, to connect input 1 to a probe that produces mA output, connect one lead to the screw labeled mA (second from the left in Figure 22) and the other lead to the unlabeled common screw (third from the left). To connect input 1 to a probe or device that produces voltage, pulse, or event measurements, connect one lead to the screw labeled $\square\square$ V (far left) and one to the same common screw used for the mA probe. Connecting a probe to input 2 is a similar process.

To connect a sensor or probe, do the following:

1. Local the six-pin terminal strip.



Figure 23. Terminal strip (upper right)

2. Insert the terminal strip into the connector socket at the top of the instrument.
3. Insert the sensor, signal conditioner, or probe leads into the terminal strip. Consult Figure 22 for an illustration of how to properly connect the leads for each type of probe/sensor. Fasten each lead by tightening the terminal screw with a screwdriver.



Figure 24. Inserting a lead into the terminal strip

4. Connect the second probe, signal conditioner, or sensor (if used).

With the probe(s) attached, you are now ready to view data measurements, as explained below.

4.2 Viewing Measurement Data

The interface includes three screens for displaying measurement data. The first screen shows the active measurements for both channel 1 and channel 2. The next two screens are channel-specific; they show measurement and min/max data for channel 1 and channel 2 respectively. For all these screens, when the measured input of an analog channel exceeds 110% of the selected input range for that channel, the screen displays “OL” instead of a numeric value, and the Overload **OL** icon appears in the icon bar.

As noted earlier in this User Manual, the top-level measurement data screen (Channels 1 & 2 Measurement Data) also serves as the Home screen. This is the screen that appears when you first turn ON the instrument. The data displayed depends on the selected input type for these channels. To view the channels-specific screens, display the Channels 1 & 2 Measurement Data screen and then press ▼ once (for channel 1) or twice (for channel 2).

4.2.1 Analog Measurement Data

The following illustration shows the Channels 1 & 2 Measurement Data screen with an analog input type (voltage or current):

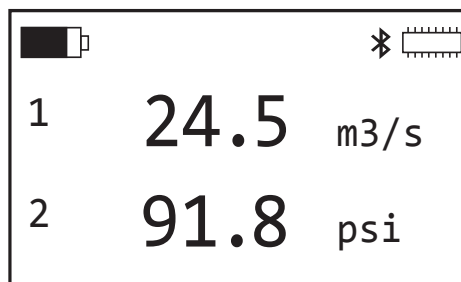


Figure 25: Channels 1 & 2 Measurement Data screen (analog input)

The first line of data in the screen (labeled 1) displays measurement data for channel 1, and the second (labeled 2) shows measurement data for channel 2. The format of the data displayed for each line is dependent upon the configuration of the respective channel. For example, in Figure 25 the measurement units for channel 1 is “m3/s” (representing cubic meters per second) and the measurement units for channel 2 is psi.

The second and third measurement data screens display measurements and (for analog input) minimum/maximum data for channel 1 and channel 2 respectively. These screens function identically for both channel 1 and channel 2. The following shows an example of the channel 1 screen for analog input.

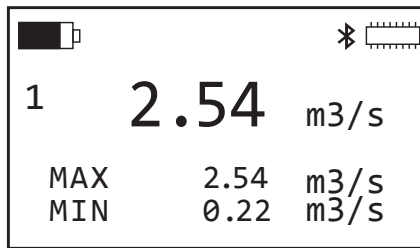


Figure 26. Channel 1 Measurement and Min/Max Data screen (analog input)

For analog input types, the displayed data is the averaged value of the samples over the previous storage period. (Note that this is derived differently from the measurement data shown in Figure 25, which samples and displays measurements once per second.)

This screen also displays the session's minimum and maximum measurement values of the storage-period-averaged values. The session minimum and/or maximum values are reset:

- at the start of a recording
- when the input type is changed
- when the storage period and/or sample period are changed
- when the instrument is turned on

You can also reset the minimum/maximum through the Min/Max setting in the Memory and Min/Max screen. To do this:

1. At the Language and Date/Time Format screen (Figure 5), press ▼. This displays the Memory and Min/Max screen.

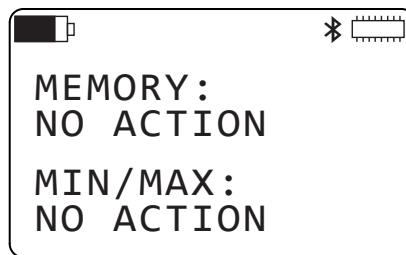


Figure 27. Memory and Min/Max screen

2. Press ← to initiate selection mode, then press ▼ to select the Min/Max setting.
3. Press ← to begin edit mode, and press ▲ or ▼ to toggle between the choices No Action and Reset. When Reset is displayed, press ← again to save the selection.
4. A screen appears asking you to confirm the reset action. If you do not want to reset the minimum and maximum values at this time, press ◀ and ▶ simultaneously. This returns you to the Memory and Min/Max screen without taking further action. To confirm the reset, press ←.

Note that minimum and maximum are based on measurement values rather than input values. This is to accommodate situations in which there is inverse scaling (higher input value corresponds to lower measurement value).

For analog input, the measured value is corrected using calibration data, scaled using user-configurable scaling parameters, and displayed as a floating point value along with the user-configurable units (shown on the right of the screen). Analog values are measured and updated every second.

4.2.2 Pulse Count Measurement Data

Pulse input is displayed in the Channels 1 & 2 Measurement Data screen as a running total number of pulses measured over a recording session (or since the last min/max reset), multiplied by their equivalence factor, and displayed with the user configurable units:

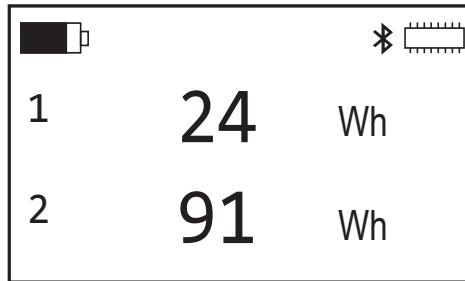


Figure 28. Channels 1 & 2 Measurement Data screen (pulse input)

For pulse input, the Channel Max Data screens appear (for example) as follows:

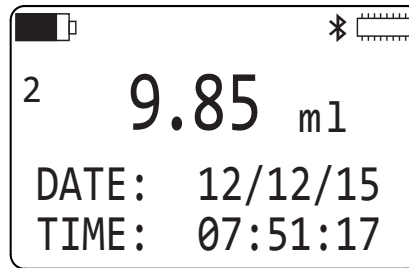


Figure 29. Channel 2 Max Data screen (pulse input)

The screen displays the maximum amount of units that have been measured during a storage period since the last min/max reset, and the date and time of the storage period with the maximum value.

4.2.3 Event Measurement Data

For event input, the Channels 1 & 2 Measurement Data screen appears (for example) as follows:

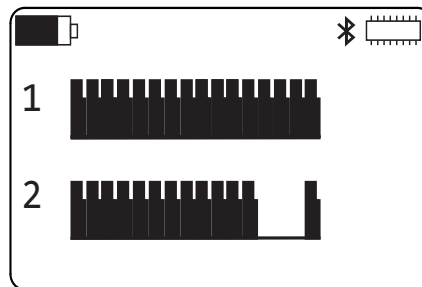



Figure 30. Channels 1 & 2 Measurement Data screen (event input)

An event can be defined as a transition from high (the input voltage exceeds 1V) to low (input voltage equals 1V or less). It can also be defined as a transition from low to high. The instrument checks the input 16 times per second; the results of the last one second are displayed at any given moment. If the input exceeds 1V (high), the icon  appears for that measurement. If the input is 1V or less (low), a flat line appears instead.

For example, in Figure 30 the channel 1 input voltage exceeded 1V for all 16 measurements of the one-second displayed period; therefore no event occurred on channel 1 during this time. On channel 2, input voltage transitioned from exceeding 1V for the 12th measurement to equal to or less than 1V for the 13th measurement; the input signal transitioned back to exceeding 1V for the 16th measurement. When configuring Channel 2, we selected Falling as the event trigger (see § 3.2.7). So in this instance, the transition from above 1V to below 1V defines when the event took place; the subsequent transition from below 1V to above 1V is not considered an event.

An example of how the Channel 1 Measurement Data screen appears for event input is shown below:

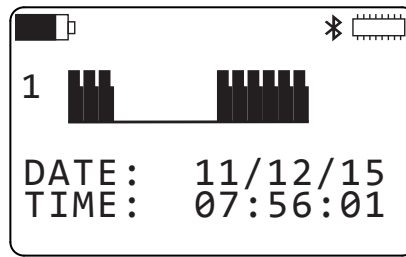



Figure 31: Channel 1 Measurement Data screen (event input)

This screen displays a visual representation of the last event, along with its date and time. Event data is reset when any of the following occurs:

- input type change
- instrument configuration reset
- turning OFF the instrument via the  button
- removing the batteries

Note that if no event has occurred during the last reset, the screen shows a straight line in place of the event graphic. In this case the date and time define when the input type was set to Event.

5. RECORDING DATA

In addition to displaying measurement data, the Model L452 can also record measurement data and store the results in the instrument's onboard memory. Each recording session has a user-defined start date/time and duration, or an immediate start and duration. A session can record data from one or both input channels. The session can then be downloaded to a computer running DataView with the Data Logger Control Panel for further viewing, analysis, and distribution. Note that DataView is required to view the results of a recording session; you cannot display a recording session on the LCD screen.

5.1 Recording Session Overview

During each recording session, if the sample period and storage period are different, the average of the values sampled during each storage period is saved in memory. The minimum and maximum sampled values for each storage period are also saved, along with the date and time they occurred. If the sampling and storage periods are equal, no minimum/maximum values or related data are saved. As a result, for a given storage period a recording requires five times more memory if the sampling period and storage period differ, compared to a recording where the sample and storage periods are the same. So to make more efficient use of memory, you should set the sample and storage periods to the same length, unless the storage period is more than five times longer than the sample period.

Up to 1024 recording sessions can be stored in the Model L452. The recording memory is considered full when the available space is fully utilized, or when it contains 1024 sessions. Recording sessions can be downloaded via the DataView Data Logger Control Panel. The Control Panel can also erase the instrument's recording memory. In addition, you can erase recording memory via the instrument's LCD and button interface (see § 8.1.1).

The memory required for a recording session is largely determined by the duration of the recording as well as the sample and storage periods. For example, a two-channel recording with a 200ms storage period will fill the instrument's memory in approximately 19 days. Conversely, a two-channel recording with a one minute sample period and one hour storage period would theoretically require over a year to fill the memory. When the instrument is used without an external power source, the duration of a recording will be limited by the amount of charge in the internal batteries.

Note that you can only record on enabled channels. To ensure that the channel(s) you want to record are enabled, check each channel's Enable/Disable screen (see Figure 9). If a channel you want to record is disabled (or conversely, a channel you don't want to record is enabled), follow the instructions in § 3.2.1.

5.2 Recording Screens

The user interface includes a set of screens for controlling and configuring a recording session. These screens enable you to:

- Specify the sample and storage periods to be used during the recording session
- Start a recording session immediately
- Schedule a recording for a future time
- Set a length of time for the recording to run
- Schedule start/stop dates and times for the recording
- Stop an in-progress recording
- Cancel a scheduled recording

The starting point for working with recordings is the Recording and Duration Screen. This is the top-level screen for all recording-related activities. To see this screen, display the Channel 1 & 2 Measurement Data screen and press ►:

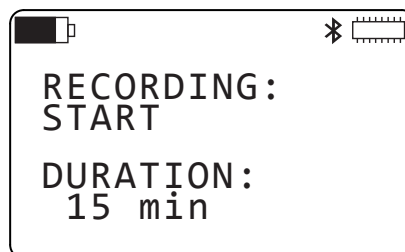


Figure 32: Recording and Duration screen

The options available in the Recording field depend on the current recording status:

- If no recording is active or scheduled, the options Start and Schedule are available.
- If a recording is in progress, the only option available is Stop.
- If a recording is scheduled but not yet active, the only option available is Cancel. Once the scheduled recording begins, the Cancel option is replaced by the Stop option.

Note also that when a recording is scheduled or active, this is the only recording screen for which selection mode is active. In this case, the Recording field is the only field that can be selected, as explained below.

5.3 Configuring a Recording Session

Before starting or scheduling a recording session, you need to set a number of configuration options. With the Recording and Duration screen displayed, press ▼ to display the Sample Period and Storage Period screen.

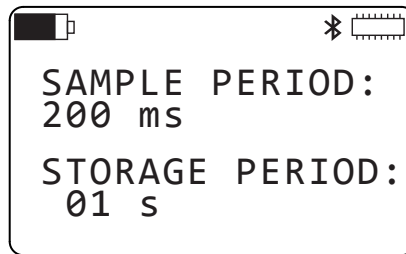


Figure 33. Sample Period and Storage Period screen

This screen (which is read-only when the input type is set to Event) consists of two fields. The first is Sample Period. The Model L452 will sample analog input at the rate defined by this field. Allowable values are 200ms, 400ms, 600ms, or 800ms; 1 to 60 seconds; or 1 minute. You can also define a sample period for pulse input; this sample period is used for recording pulse counts minimums and maximums (see below). Allowable values are the same as for analog input. For event input, the sample period is automatically set to 62.5ms and cannot be changed.

The second field on this screen is Storage Period. This defines the rate at which analog and pulse input sampled values are displayed and/or recorded. For analog input, the sampled values are averaged over the storage period. When there are multiple samples in a storage period the minimum and maximum sample values during each storage period are also recorded with the date and time of their occurrence. For event input, the storage period is automatically set to 1s. For other input types, possible storage period values are 200ms, 400ms, 600ms, 800ms; from 1 to 59 seconds; or from 1 to 60 minute(s).

For example, to set the sample period to 1 second and storage period to 1 minute, navigate to this screen and proceed as follows:

1. Press ← once to enter selection mode. The numbers or units in the Sample Period field will blink.
2. If the units part of the field is not already selected, press ► to navigate to it. Then press ← to enter edit mode. The units value should appear in solid reversed text.
3. Use the ▲ and/or ▼ buttons to cycle through options until “s” is displayed.
4. Press ◀ to go to the numeric part of the Sample Period field. The digit on the right should be highlighted. Hold down the ▼ button until 01 is displayed.
5. Press ← to save the sample period setting and leave edit mode. Then press ← again to re-enter selection mode, and press the ▼ button to navigate to the Storage Period field.
6. Press ← to re-enter edit mode, and use the ▲, ▼, ◀, and ► buttons to change the displayed value to 01 min. Note that the storage period must be greater than or equal to the sample period; and must also be evenly divisible by the sample period.
7. Press ← to save the storage period setting. For event input, both the sample period (62.5ms, or 16 times per second) and storage period (one second) are pre-set and cannot be changed.

In addition to recording sessions, the sample and storage periods are also used to generate the minimum and maximum values displayed in the measurement data screens (see § 4). Also note that the sample period affects power consumption and how long the instrument can run on batteries. The shorter the sample period, the shorter the instrument can operate on battery power.

In addition to the preceding steps, before you start or schedule a recording you should ensure that there is sufficient available free memory to store the recording session. If the Memory icon indicates there is little or no free memory left (it appears as follows when full: ■■■■) you will need to erase memory, as instructed by § 8.1.1, before you can start another recording. The Recording Sessions screen (Figure 20) shows both the number of recording sessions currently stored, and the amount of free memory remaining to store additional sessions.

5.4 Starting a Recording Session

You can start a configured recording session immediately, or schedule one for a later date and time. To start a recording immediately:

1. Complete the Sample Period and Storage Period screen as instructed in § 5.3 above.
2. At the Sample Period and Storage Period screen press ▲ once. This returns you to the Recording and Duration screen (Figure 32). Note the Duration field on this screen. This specifies how long the recording session will run. By default (assuming no session has been already scheduled), this is 15 minutes. In addition, the Duration setting cannot be shorter than the Storage Period setting (see § 5.3). To change this duration setting, press ← to initiate selection mode, and press ▼ to select the Duration field. Then press ← to start edit mode, and use the buttons to enter a duration period.

For example, to change the duration from 15 minutes to 3 days, select the “1” in “15 min” and press ← to begin edit mode. Use ▼ to change this to a zero, then press ► to highlight the number “5.” Press ▼ twice to change this to “3.” Finally, press ► to select the units, and use the ▲ and ▼ buttons to cycle through available choices. These include s (seconds), min, hours, days, and weeks. Select “days” and press ← to save your change. (Alternately, instead of the Duration field you can use the Stop Date and Stop Time screen to determine how long the recording session will run, as described in § 5.5 below.)

3. To start the recording, press ← to select the Recording field, and then press ← a second time to start edit mode. Then press ← a third time. The recording session starts immediately, using the configuration settings you have specified. The recording session will end when the time interval defined by the Duration field comes to an end.

The name under which this recording session will be stored in the instrument’s memory is the name displayed in the Recording Name screen (see § 3.4.4).

When a recording is active, the Recording icon ● appears in the icon bar at the top of the screen. This icon appears as a solid circle. If you attempt to turn OFF the L452 by pressing ⓪ while a recording is in progress, the message RECORDING ACTIVE appears on the screen.



Figure 34. RECORDING ACTIVE message

The ⓪ button is otherwise disabled while a recording is in progress.

When the recording session is finished, it is stored in memory. The Recording Sessions screen (Figure 20) is incremented to reflect the addition of this session to the recording count on the instrument. The Free Memory field in the Recording Sessions screen is also updated to reflect the amount of memory consumed by the recording. In addition, the Recording Name screen (Figure 21) increments the default name for the next recording session. You can now download the session to a computer and view it through the DataView Data Logger Control Panel (see § 6).

5.5 Scheduling a Recording Session

Instead of instructing the Model L452 to start recording immediately, you can schedule a recording for a future date and time. Note that you can only schedule one recording at a time; to schedule a new recording (1) the active recording must run to completion, or (2) you must cancel the earlier recording.

To schedule a recording, do the following:

1. Complete the Sample Period and Storage Period screen as instructed in § 5.3.
2. With the Sample Period and Storage Period screen displayed, press ▼ to display the Start Date/Time screen.

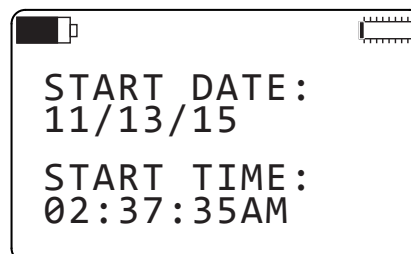


Figure 35. Start Date/Time

- Note that the start date and time are formatted in accordance with the settings you entered into the Language and Date/Time Format screen (see § 3.1.2). Press **←** to begin selection mode, and then press **←** a second time to start edit mode. The first number under Start Date will be highlighted. Use the **▲** and **▼** buttons to increase or decrease the number, and the **▶** and **◀** buttons to move from one field to the next. Note that when you press **▶** when the last number in the Start Date field is selected, the selection will move to the first number in the Start Time field. This enables you to edit both the date and time in a single editing session. When you have finished entering the start date and time, press **←** to save your changes.
- You now have two options for defining when the recording session ends. One is by setting the Duration field in the Recording and Duration screen (see Figure 32). The other is through the Stop Date/Time screen.
To set the Duration field, press **▲** twice to return to the Recording and Duration screen. Then complete the Duration field, as described in Step 2 of § 5.4.

To set the time and date for when the recording stops, press **▼** at the Start Date/Time screen. This displays the Stop Date/Time screen.

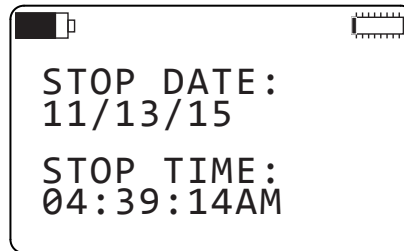



Figure 36. Stop Date/Time screen

- By default, the settings on this screen reflect the Duration setting. For example, if the Duration field is set to 24 hours, the stop date and time will be set to 24 hours after the start date and time. To change this, press **←** to start selection mode, and then press **←** again to initiate edit mode. Then use the buttons to select and change settings, similar to setting the start date and time fields as described in step 3.
When you have finished entering the stop date and time, press **←** to save your changes. The Duration field in the Recording and Duration screen will be updated to reflect the duration defined by your start date/time and stop date/time. For instance, if you enter a stop time 8 hours later than the start time, the Duration field will be set to 8 hours.
- If it is not already displayed, navigate to the Recording and Duration screen. Press **←** to select the Recording field, and then press **←** again to initiate edit mode. Then use the **▲** and **▼** buttons to cycle through the options. When Schedule appears, press **←** to select it.

When a recording is scheduled, the Recording icon  appears in the icon bar at the top of the screen. This icon appears as an empty circle. You can turn OFF the Model L452 with a scheduled recording pending. When the start date and time occurs, the instrument will turn itself back ON for the duration of the recording, after which it will automatically turn OFF.

5.6 Stopping or Cancelling a Recording Session

As noted previously, you cannot start or schedule a recording session if (1) a recording is active, or (2) another scheduled recording is pending. In either case, you will need to stop or cancel the recording before you can start or schedule another.

To stop an active recording or cancel a scheduled one, display the Recording and Duration screen. If a recording is active, the only option available on this screen will be Stop:

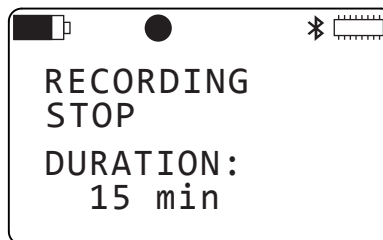


Figure 37. Recording and Duration screen (recording active)

If a recording is scheduled, the only option available on this screen will be Cancel:



Figure 38. Recording and Duration screen (recording scheduled)

In either case, press the \leftarrow button to enter selection mode, then press \leftarrow again to start edit mode. Then press \leftarrow a third time. The recording will be immediately stopped or canceled, depending on the selection. The Recording icon disappears, indicating no recording is currently active or scheduled. In addition, the remaining recording-related screens will become active, enabling you to start or schedule a new recording.



See § 8.1.1 for instructions on erasing recordings from the instrument's memory.

6. DATAVIEW®



For detailed information on using DataView, refer to the Help system within the software.

AEMC's DataView software enables a computer to connect to and interact with a variety of AEMC instruments, including the Data Logger Model L452. As its name implies, a primary purpose of DataView is to view data that has been recorded by the instrument and displayed on the computer.

With DataView, you can:

- Connect the Model L452 to a computer. This connection can be either through a USB cable, or wirelessly through Bluetooth.
- Display and analyze real-time data on the computer via a frames style interface.
- Download previously recorded data from the instrument. You need DataView to view recording sessions, since these sessions cannot be viewed through the instrument's interface.
- Start, schedule, stop, and cancel a recording session.
- Configure instrument and channel-specific settings.
- Generate reports for viewing and printing the data, using standard templates or ones you customize to your requirements.

DataView includes a core set of features used by all instruments. These features are designed for viewing recorded data; and for opening, creating, and saving DataView reports. DataView also includes components called Control Panels for interacting with the instrument. A Control Panel lets you connect to the instrument, view real-time measurements, download data, and configure the instrument's settings from the computer. Each AEMC product family has its own dedicated Control Panel; you select the one(s) you need during DataView installation.

For example, DataView includes the Data Logger Control Panel specifically designed for working with Data Logger instruments, including the Model L452. The Control Panel provides all the features available in the Model L452 user interface, as well as additional features not found in the Model L452, such as viewing recorded sessions, changing the instrument's name and location, and others.

6.1 Installing DataView

When you purchase the Model L452, the product package includes a USB thumb drive containing DataView program files. To begin installation:

1. Insert the DataView thumb drive into an available USB port on your computer. If Autorun is enabled, an AutoPlay window appears on your screen. Click "Open folder to view files" to display the DataView folder. If Autorun is not enabled or allowed, use Windows Explorer to locate and open the USB drive labeled "DataView."
2. When the DataView folder is open, find the file Setup.exe located in the root directory of the USB drive, and double-click it to run the installation program.
3. The DataView setup screen appears.

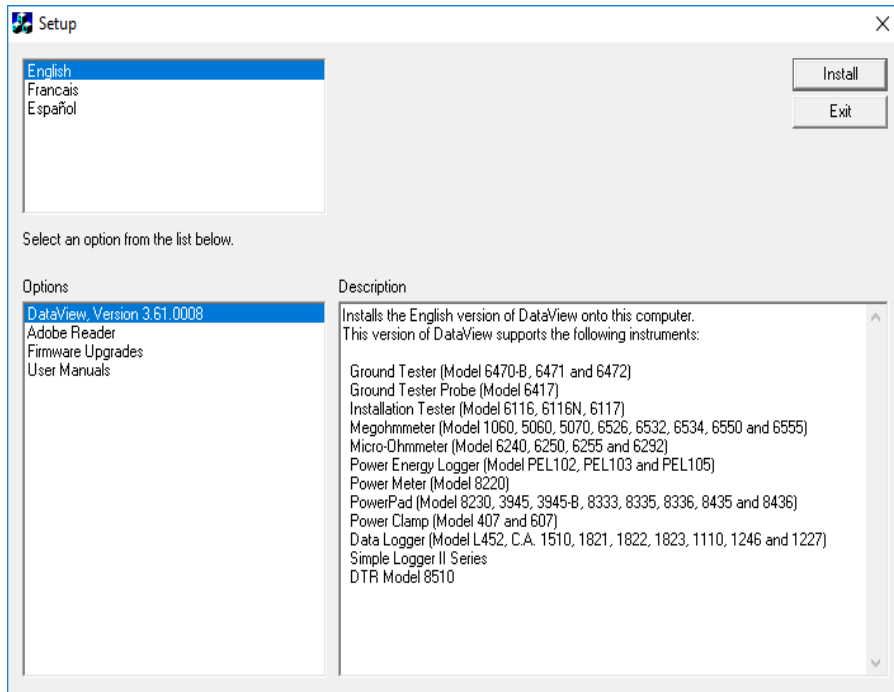


Figure 39. DataView Setup screen

In the upper left corner of the screen, choose the language version of the Setup interface. (All Setup screens and dialogs will immediately appear in the selected language.)

In the lower left corner are the available installation options. In addition to the DataView software, you can select “Adobe Reader.” This links to the Adobe web site where you can download the latest version of Reader. This program is required to view DataView .pdf documents. The option Firmware Upgrades links to the website where you can check for new firmware updates for the L452 (see § 8.1.2). Finally, User Manuals displays a list of .pdf files contained in the USB drive that accompanies DataView. (DataView also comes with a Help system that is installed with the program files.)

To install DataView, select DataView in the Options list and click Install.

4. After a few moments a screen appears asking you whether or not you want to allow the DataView Setup program to make changes to your computer. Click OK.
5. Select the language version of DataView you want to install (English, French, or Spanish) then click Next. (By default, the language selected in step 3 is highlighted.)

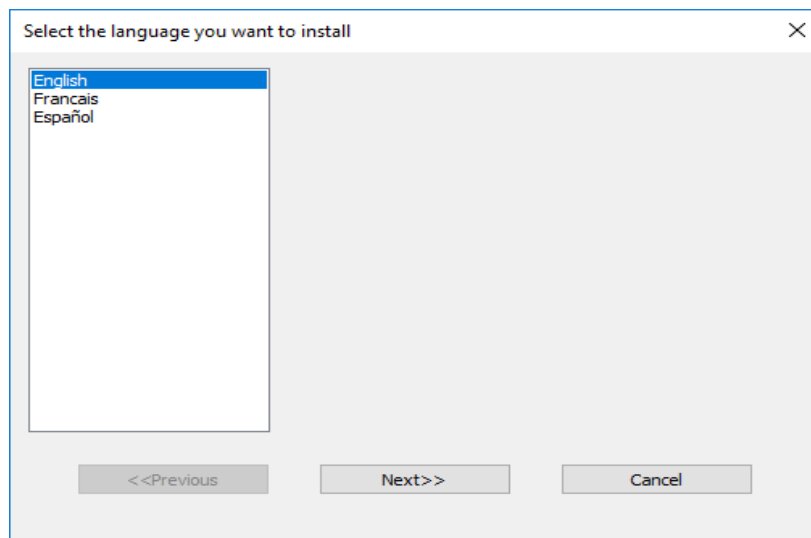


Figure 40. InstallShield Welcome screen

- You are now prompted to select the software you want to install.

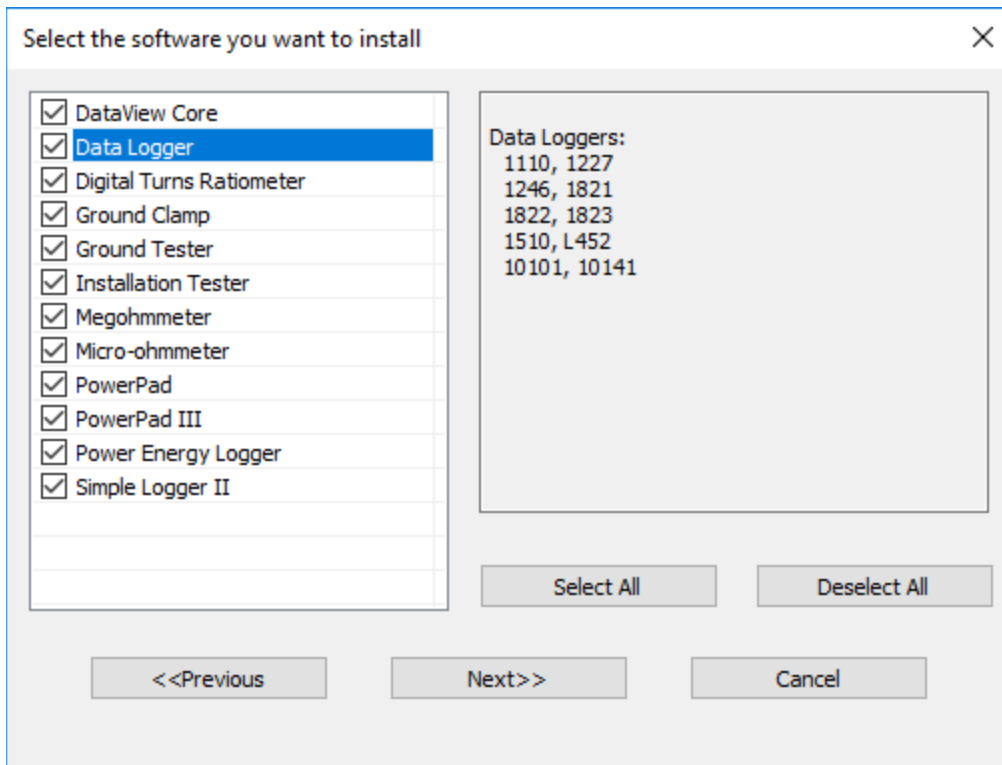


Figure 41. Select Features screen

Each AEMC product family has its own specially designed Control Panel. By default all available Control Panels are selected (a check mark next to the Control Panel indicates it is selected). Control Panels take up disk space on the computer; so unless you have other types of AEMC instruments, we recommend that you select Data Logger and deselect the rest. You should also check the option DataView Core, which is a requirement if you plan to create DataView reports.

After you finish selecting and deselecting Control Panels and/or DataView Core, click Next.

- The Setup program now informs you that it is ready to install DataView. If you want to review any of your previous selections, click the Previous button to return to earlier screens. Otherwise, click Install to begin installation.
- The InstallShield program installs the selected software. If an earlier version of the software is already installed on your computer, for each selected program the InstallShield program will:
 - Ask you to confirm the installation of the program. Click Next.
 - Display a status bar indicating the progress of the installation.
 - Inform you when the program is installed. Click Finish to install the next selected program.

If the software is not installed (or if the installed software is the same version as the selected software), the software is installed without requesting confirmation.

When all programs are installed, a message appears informing you of this. Click Finish to return to the Setup screen.

- You can now select additional Setup options to install (see step 3 above). When finished, click Exit.
- The DataView folder now appears on your computer desktop, within which is the the Data Logger Control Panel icon, along with icon(s) for any other Control Panels selected during installation.

6.2 The Data Logger Control Panel

Clicking the DataView icon opens the core DataView program. Clicking the Data Logger Control Panel icon opens the Data Logger Control Panel:

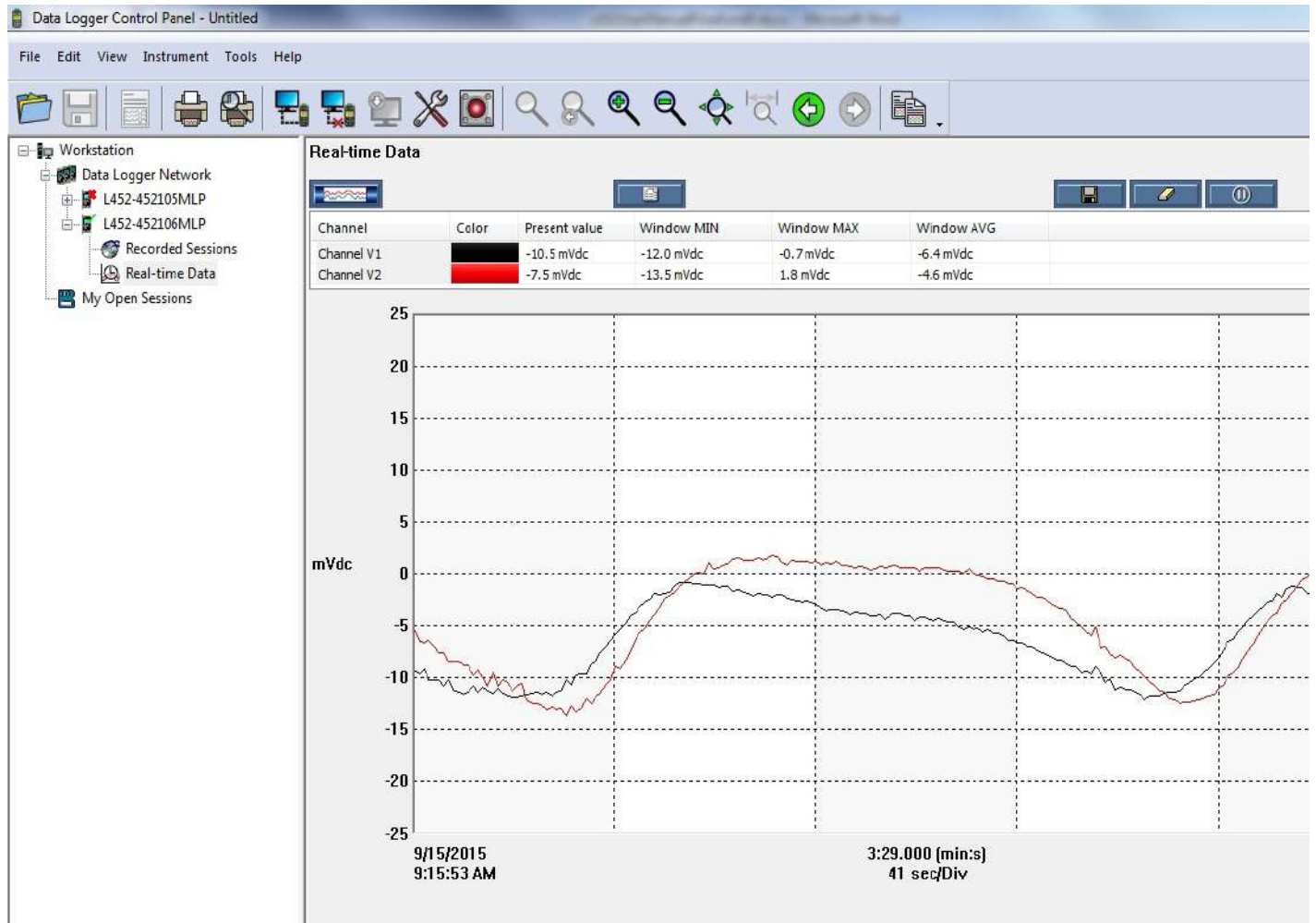


Figure 42. Data Logger Control Panel (instrument connected)

In general, core DataView features are for creating, viewing, editing, and storing DataView reports; while the Control Panel is for connecting to, configuring, viewing real-time measurements, and downloading data from the Model L452. You can access all DataView features through either the DataView icon or the Control Panel icon. For users who interact with a single type of AEMC instrument, we recommend primarily using the Control Panel. However, there are situations where using the core DataView icon may be more convenient for some users, such as when viewing multiple archived reports from different AEMC product families.

For further information about DataView and its capabilities, or for information about using the Data Logger Control Panel, consult the Help system that comes with the product. Access this Help by clicking the option Help in the Control Panel's menu bar at the top of the screen.

6.3 Connecting the Model L452 to the Computer

Before you can use the Data Logger Control Panel to communicate with your Model L452, you must establish a connection between the instrument and the computer running DataView. There are two types of connections available:

- Direct physical connection between the instrument and the computer, through a USB cable
- Bluetooth wireless connection

To begin, ensure that you have installed DataView, and selected the Data Logger Control Panel during the installation process. Also ensure that the required communication and connection drivers are installed on your computer. These drivers are installed as part of the DataView installation process.

6.3.1 USB Connection

USB is typically used for connecting a single local instrument. When you purchase the Model L452, a USB cable comes as part of the product package. To begin the connection process:

1. Plug one end of the cable into the instrument, and the other end into an available USB port on the computer. The instrument will automatically turn ON. If this is the first time this instrument has been connected to this computer, the drivers will be installed. Wait for driver installation to finish before proceeding to the next step.
2. With the Model L452 connected, open the Data Logger Control Panel (see Figure 42).
3. In the menu bar at the top of the screen, select Help. In the drop-down menu that appears, click the option Help Topics. This opens the Data Logger Control Panel Help system.
4. Use the Contents window in the Help system to locate and open the topic "Connecting to an Instrument." This topic provides instructions explaining how to connect your Model L452 to the computer.

After the instrument is successfully connected, consult the Data Logger Control Panel Help system for instructions about viewing real-time data on the instrument, downloading and viewing recorded sessions, creating DataView reports from the downloaded data, and configuring the instrument through the Control Panel.

6.3.2 Bluetooth Connection

Bluetooth is a standard for wirelessly connecting devices over short distances. This is especially useful for connecting multiple local instruments to a computer, since unlike USB it does not require a physical connection port for each instrument. The Model L452 includes built-in Bluetooth capability.

To use Bluetooth to connect to a computer, Bluetooth must be enabled on the instrument, as explained in § 3.1.3. Your computer must also be Bluetooth-enabled. Some computers have Bluetooth connectivity built in, while others require a Bluetooth-USB adapter. When this adapter is plugged into a USB port and configured with the appropriate driver, the computer can communicate via Bluetooth.

When the computer is Bluetooth-ready, you can connect to the Model L452 as follows:

1. Open the Bluetooth Devices dialog on your computer to pair the instrument with your computer. Different operating systems have different steps for opening this dialog, so consult your computer's documentation for instructions.
2. Once the dialog is displayed, click Add a Device. A dialog box appears listing the locally available Bluetooth devices. There may be several devices of varying types listed, depending on the location of your computer.

Find the L452 instrument, which will appear listed by its Bluetooth name as displayed in the L452's Bluetooth Name screen (see Figure 8). If the name does not appear, check the Bluetooth Enabled/Visibility screen (Figure 7) on the L452 to ensure the Visibility field is set to Visible. If the name is visible, click it. You are prompted to enter a pairing code, which for L452 instruments is always 0000.
3. After you enter the code, click Next. A screen appears informing you that the instrument has been successfully connected with the computer. Click Close to exit the screen.
4. To complete the connection, open the Data Logger Control Panel. In the menu bar at the top of the screen, select Help. In the drop-down menu that appears, click the option Help Topics. This opens the Data Logger Control Panel Help system.
5. Use the Contents window in the Help system to locate and open the topic "Connecting to an Instrument." This topic provides instructions explaining how to connect your Model L452 to the computer.

After the L452 is successfully connected, consult the Data Logger Control Panel Help system for instructions about viewing real-time data, downloading and viewing recorded sessions, creating DataView reports from the downloaded data, and configuring the instrument through the Control Panel.

7. SPECIFICATIONS

7.1 Reference Conditions

Influencing Parameters	Reference values
Temperature	20 ± 3 °C
Relative humidity	45 to 55%RH
Internal supply voltage	2.4 ± 0.2V
External supply voltage	110 to 240V 50/60Hz
Electric field	< 1V/m
Magnetic field	< 40A/m

7.2 Electrical

7.2.1 Input Types


Input type	Measurement Range	Resolution	Accuracy	Input Impedance	Max Sample Rate	Sample Period
DC voltage	±100mV	0.1mV	±(0.5% + 1 cts)	1MΩ	5 samples/second	200, 400, 600, or 800ms; or from 1 to 60 seconds
	±1V	1mV	±(0.5% + 1 cts)	1MΩ	5 samples/second	200, 400, 600, or 800ms; or from 1 to 60 seconds
	±10V	10mV	±(0.5% + 1 cts)	1MΩ	5 samples/second	200, 400, 600, or 800ms; or from 1 to 60 seconds
DC current	4 to 20mA	0.01mA	±(0.25% + 5cts)	100Ω	5 samples/second	200, 400, 600, or 800ms; or from 1 to 60 seconds
Pulse*	±10V	n/a	n/a	n/a	100 samples/second	200, 400, 600, or 800ms; or from 1 to 60 seconds
Event	±10V	n/a	n/a	1MΩ	16 samples/second	n/a

*The L452 accepts pulse input from Dry-Contact, Normally Open, and Normally Closed contacts. Typically, a pulse is defined as a change from the “normal” state that lasts at least 30ms, followed by a return to normal that lasts at least 30ms. Note that using Normally Closed sensors can significantly reduce the battery charge life compared to using Normally Open inputs. Output voltage for the pulse input: 3.3V (with 1MΩ pull-up resistor).

7.2.2 Power Supply

Parameter	Value												
Power source	<ul style="list-style-type: none"> External power supply (110 to 240V, 50/60Hz), via a USB cable Rechargeable batteries (2 x 1.2V 2400mAh NiMH) 												
Maximum	2.5W (running on USB power while charging)												
Consumption / Life (with Bluetooth deactivated)	<table border="1"> <thead> <tr> <th>Sampling rate:</th> <th>200ms</th> <th>400ms</th> <th>60s</th> </tr> </thead> <tbody> <tr> <td>Screen lit:</td> <td>6mA / 18 days</td> <td>5mA / 21 days</td> <td>4mA / 27 days</td> </tr> <tr> <td>Screen off:</td> <td>3mA / 36 days</td> <td>2mA / 54 days</td> <td>0.4mA / 270 days</td> </tr> </tbody> </table>	Sampling rate:	200ms	400ms	60s	Screen lit:	6mA / 18 days	5mA / 21 days	4mA / 27 days	Screen off:	3mA / 36 days	2mA / 54 days	0.4mA / 270 days
	Sampling rate:	200ms	400ms	60s									
	Screen lit:	6mA / 18 days	5mA / 21 days	4mA / 27 days									
Screen off:	3mA / 36 days	2mA / 54 days	0.4mA / 270 days										
Pulse output voltage	3.3V												
Electromagnetic compatibility	Immunity complies with IEC 61326-1:Ed1 and IEC 61326-2-2:Ed1, emissions complies with IEC 61326-1:Ed1 and IEC 61326-2-2:Ed1 for class A equipment												

When the instrument is off (and not on standby), pressing the Power  button displays the remaining capacity of the batteries.

To save the batteries, the instrument switches to standby at the end of 20 minutes with no key press. This does not prevent the instrument from continuing to make measurements. Simply press the Power  button to switch it back to full on.

7.3 Recording and Data Storage

- Data storage: 32MB internal memory (up to 1024 recording sessions, 16M samples)
- Recording mode: Start/Stop (ends when memory is full or when the recording stop time is reached, whichever comes first)

7.4 Communication

Bluetooth 2.1, Class 1

- Range: 100m (328 ft) line-of-sight
- Default pairing code: 0000
- Nominal output power: +15dBm
- Nominal sensitivity: -82dBm
- Rate: 115Kbits/s

USB 2.0

7.5 Mechanical

Parameter	Value
Weight (with batteries)	Approximately 200g (7oz)
Dimensions	65.5mm (2.58") wide by 32.4mm (1.28") thick by 125mm (4.92") in length (137.5mm [5.41"] with screw terminal connector installed)
LCD	128 by 64 pixels
Inputs	6-pin screw terminal strip providing two separate input channels
Drop test	Per IEC 61010

7.6 Environmental

Parameter	Value
Temperature	Operating temperature: 0 to 50°C (32 to 122°F) Storage temperature: with battery -20 to 50°C (-4 to 122°F), without battery: -20 to 65°C (32 to 149°F)
Humidity	Operating humidity: 10 to 85% (at temperature 0 to 40°C [32 to 104°F]), 10 to 50% (at temperature 40 to 50°C [104 to 122°F]) Storage humidity: <ul style="list-style-type: none">- With battery: 0 to 90% (at temperature -20 to 40°C [-4 to 104°F]), 0 to 50% (at temperature 40 to 50°C [104 to 122°F])- Without battery: 0 to 90% (at temperature -20 to 40°C [-4 to 104°F]), 0 to 50% (at temperature 40 to 65°C [104 to 149°F])
Altitude	Operating altitude: 0 to 2000m (0 to 6562 ft) Storage altitude: 0 to 10000m (0 to 32800 ft)

7.7 Safety

- Ingress protection: IP40 per IEC 60 529
IK 04 per IEC 50102
- Electrical safety: IEC 61010

8. MAINTENANCE AND TROUBLESHOOTING

The Data Logger Model L452 is designed for easy and trouble-free use. There are, however, a few simple maintenance tasks you should perform periodically to ensure optimal operation. In addition, your L452 may exhibit unexpected behavior that requires troubleshooting.

This chapter explains procedures you can perform to maintain the L452 and troubleshoot issues you may encounter.

8.1 Model L452 Maintenance

There are a number of routine maintenance tasks you will need to perform to ensure your Model L452 operates normally. These include:

- Erasing the instrument's memory
- Upgrading to the latest firmware revision
- Replacing the instrument's batteries
- Cleaning the instrument

The following sections explain how to perform these tasks.

8.1.1 Erasing Memory

The L452 comes with approximately 32MB of memory for storing recording sessions. The Memory icon in the top right corner of the LCD provides a rough estimate of how much of this memory has been used, and how much remains free and available for future recording sessions. When the Memory icon appears filled in ■■■ this indicates there is little or no free memory left in the instrument. Memory is full when either (1) the stored recording sessions consume all available memory, or (2) there are 1024 recording sessions stored in the instrument. The Recording Sessions screen (Figure 20) shows both the number of recording sessions currently stored in memory, and the amount of free memory remaining for additional sessions. When memory is full, you cannot start a recording session.

Note that the memory erase process removes all stored recording sessions. You cannot selectively erase some sessions while saving others on the instrument. If you need to save one or more recording sessions, you must download them to a computer using the DataView Data Logger Control Panel (see § 6).

You can clear memory through either the Data Logger Control Panel, or via the Model L452 user interface. To use the instrument's interface to clear memory, do the following:

1. At the Channel 1 & 2 Measurement Data screen (Figure 4), press ► four times to display the Language and Date/Time Format screen (Figure 5). This is the top-level screen for instrument configuration.
2. Press ▼. This displays the Memory and Min/Max screen.

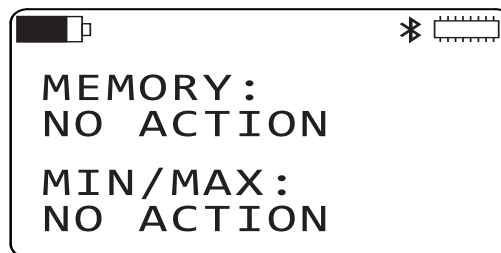


Figure 43. Memory and Min/Max screen

3. Press ← to initiate selection mode, then press ← again to begin edit mode.
4. Use the ▲ and ▼ buttons to toggle between the choices No Action and Erase. When Erase is displayed, press ← to accept the selection.
5. A screen appears asking you to confirm the memory erasure. If you do not want to erase the memory at this time, press ◀ and ▶ simultaneously. This returns you to the Memory and Min/Max screen without taking further action. To confirm the memory erasure, press ←.
6. The L452 begins erasing the memory. During this process, a progress screen appears displaying the amount of memory that has been erased, and the amount that remains to be erased.

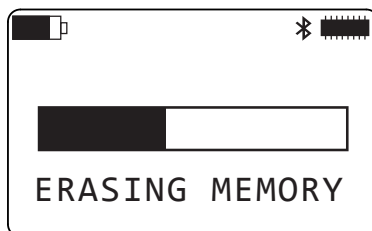



Figure 44. Erasing Memory screen

During this procedure, all buttons (including Power $\text{\textcircled{P}}$) are disabled. When memory has been erased, the Memory and Min/Max screen returns. The Memory icon will again show full memory available  and the Free Memory field in the Recording Sessions screen will be 31.88MB (see § 3.4.3).

8.1.2 Upgrading to the Latest Firmware


Periodically AEMC® may update the firmware that runs on the Model 452. This firmware controls the features and functionality of the instrument.

We recommend checking for firmware upgrades on a regular basis, to ensure your instrument has the most current version. The easiest way to do this is from the Data Logger Control Panel. The Help menu in the Control Panel includes the option Update. When you click this option, the Control Panel automatically checks to ensure you have the latest version of the firmware, and displays a message informing you whether or not your firmware is up to date.

8.1.3 Installing and Replacing the Batteries

The Model L452 can operate on two sources of power:

- USB cable connected to an external power source, such as a computer
- Two internal 1.2V AA 2400mAh NiMH batteries

You must insert the batteries into the instrument before use, even if you plan to run the instrument on USB power. When operating on battery power, the Battery  icon indicates how much electric charge remains in the batteries. The solid fill portion of the icon corresponds to the percentage of remaining power. You can charge the battery by plugging the USB cable into the instrument and connecting it to a computer or the USB-compatible wall adapter that comes as part of the standard Model L452 product package. When the battery is charging, the solid fill portion of the icon repeatedly moves from the completely discharged level to the completely full level.

There may be times when you need to change the batteries in the instrument. For example, you may want to charge the batteries in a separate external charger, and replace them with fresh batteries. You may also need to replace batteries that can no longer hold a charge. When replacing batteries, always replace both at the same time.

 Disconnect all sensors, probes, USB cable, or other connections before opening the rear cover to change the batteries. Also be sure the Model L452 is turned OFF before changing the batteries, otherwise you may lose recorded data.

Only use NiMH batteries. Using any other batteries may damage the instrument.

To install or replace the batteries, do the following:

1. Holding the instrument firmly, slide the back cover to the right.
2. Lift the back cover off the instrument.
3. If the instrument does not already have batteries installed, skip this step and go to step 4 below. If you are replacing existing batteries, remove them now.
4. Insert the two fresh batteries, ensuring the positive and negative ends are properly aligned.
5. Replace the back cover by aligning the tabs in the cover with the corresponding slots in the instrument body, and then sliding the cover to the left until it locks in place.

Note that if the Model L452 is stored without the batteries installed, its internal clock will need to be reset. See § 3.1.2 for instructions about how to set the instrument's date and time.

8.1.4 Cleaning the Instrument

The Model L452 should be cleaned periodically. This keeps the LCD clear and easily viewable, and also prevents dirt and grease buildup around the instrument's front panel buttons and input terminals.





Before cleaning, disconnect all input(s) to prevent possible electric shock.

The body of the instrument should be cleaned with a damp and soapy cloth. Do not submerge the instrument in water. Do not use solvent.


8.2 Troubleshooting the Model L452


This section describes how to correct several potential issues you may encounter while operating the L452. These include:

- The Model L452 does not turn ON when you press the Power  button.
- The instrument turns ON but does not function.
- The Overload **OL** icon appears in the instrument's icon bar.
- You cannot configure through the instrument's interface.
- You cannot set up or start a recording session on the instrument.
- Recording sessions end before the specified end date and time.
- You cannot connect to a computer.
- The instrument does not turn OFF when you press .


The following sections explain some of the possible causes for these issues and how you can address them. If you perform these troubleshooting actions but the issue still persists, or if you encounter a problem not covered in this section, please contact AEMC Technical Support.


8.2.1 L452 Does Not Turn ON

To turn ON the Model L452, press  for at least two seconds, until the words POWER ON appear in the LCD. After a short power-up sequence, the Channels 1 & 2 Measurement Data screen appears on the instrument's LCD.

If pressing  does not turn ON the instrument, ensure that you are holding down this button the required two seconds. If you do so and the instrument still does not turn ON, the batteries may need to be charged. Plug the USB cable into a computer or the USB power adapter that is included as part of the L452 product package.

If after charging the batteries fail to maintain power, replace them as described in § 8.1.3.

If you are running the instrument on power supplied by the USB cable, unplug the cable and remove the batteries. (This resets the instrument.) Then replace the batteries, plug in the USB cable, and press .

Note that after 20 minutes of inactivity, the LCD screen will go blank. (This is a screen saver feature.) While in this state, the instrument may appear to be OFF. A short press of  restores the display.

8.2.2 L452 Turns ON But Does Not Function

If the Model L452 has been stored in a cold and damp environment, condensation may form inside the instrument. This condensation can short the circuitry, preventing the instrument from operating normally. In this case, turn OFF the Model L452 and place it in a warm, dry environment for several hours. Then turn the instrument ON and try navigating through the screen interface to determine whether or not it has been restored to normal function.

If the instrument is operating on USB power, reset the instrument by unplugging the cable and removing the batteries. Replace the batteries, plug in the USB cable, turn ON the instrument, and then attempt to navigate the screens.

8.2.3 Overload (OL) Icon is Displayed

The Overload **OL** icon in the icon bar indicates that the input is out of range for the selected input type and cannot be displayed. To correct this, go to the Channel Enable/Disable screen (Figure 9) and ensure that the selected input type matches the output from the connected probe. If not, change the input type to the appropriate setting. (See also § 3.2.2.)



If the Overload icon continues to flash no matter which setting you choose, the connected probe or sensor may be unsupported for use with the Model L452. Replace the probe or sensor with one that generates a compatible output for the input type selected on the instrument.

8.2.4 Cannot Configure the L452

Several conditions may cause some or all of the configuration options to appear disabled, or function in unexpected ways. For example, when the instrument is in Remote mode and under the control of the Data Logger Control Panel, none of the configuration options is enabled; you cannot change or view any configuration setting from the instrument interface. The only screens that operate are ones that display measurement data.

Remote mode is initiated when the instrument is connected to the computer. It can also be set through the “Lock out instrument front panel configuration” option in the DataView Data Logger Control Panel. When this option is selected, the instrument remains in Remote mode even when it is disconnected from the computer.

To leave Remote mode and return local control, ensure the “Lock out instrument front panel configuration” option is deselected. The DataView Data Logger Control Panel Help explains how to do this. Then disconnect the instrument from the Data Logger Control Panel.



Another option (not recommended due to potential loss of data) is to turn OFF the instrument. To do this, press and hold down . After approximately two seconds, the words REMOTE MODE appear on the screen. Continue to hold down  until the words POWER OFF appear. Release the button; the instrument is now turned OFF. When you turn it back ON, it will be in Local mode.

Similarly, most configuration options are unavailable when the instrument is actively recording data, or when a recording session is scheduled. In either case, the only active configuration option is to stop the recording (if one is active) or cancel the recording (if one is scheduled). Stopping or canceling the recording, as instructed in § 5.6, returns the configuration options to full functionality.

If some configuration screens are active, while others are inactive (or don't appear at all), you may have the wrong input type selected. Input settings can affect which configuration screens are available. For example, if you select Pulse as the input type, the configuration screens for configuring alarm triggers do not appear. If a configuration screen that you expect to be available does not display, check the input type to ensure it is set correctly, and if not change it as required. Bear in mind that both channels must have the same input type; changing the input type for one channel automatically sets the other channel to the same input type. (See also § 3.2.2.)

8.2.5 Cannot Configure a Recording Session

If you attempt to start or schedule a recording but cannot do so, the Model L452 may be in Remote mode. As mentioned earlier, all configuration options are disabled on the Model L452 while the instrument is in Remote mode. § 8.2.4 explains how to leave Remote mode and return local control to the instrument.

In addition, the options for setting up and starting/scheduling a recording are disabled when a recording is already in progress or scheduled. Check to see whether or not the Recording icon appears in the icon bar. If the  icon appears a recording is in progress; if the  icon appears a recording is scheduled. To enable recording features, stop or cancel the recording per the instructions in § 5.6.


8.2.6 Recording Sessions Do Not Start

Recording sessions are stored in memory. When you configure a recording session, the instrument automatically checks to ensure there is sufficient space in its memory to store the session's expected data. If not, the recording session does not start. To free up memory for the recording session, follow the instructions contained in § 8.1.1. Note that this process erases the entire instrument memory; you cannot selectively erase some recording sessions while leaving others. Any sessions you want to save need to be downloaded to a computer.

Another condition that could prevent a recording session from starting is if the start and/or end times and dates are configured incorrectly, such as a stop date/time that has already passed. If the instrument has sufficient memory for the recording but it still will not start, check the recording's start and stop times/dates to ensure they are configured properly.

See § 5 for information about configuring a recording session.

8.2.7 Recording Sessions End Prematurely

If a recording session terminates before its scheduled stop time, a likely cause is that the instrument's memory has become full. When this happens, the Memory icon  appears filled. To free up memory, follow the instructions contained in § 8.1.1.

In addition, a recording session terminates, and the instrument turns OFF, if the voltage in the instrument's batteries falls below 2.1V. If this happens, recharge the batteries.



8.2.8 Cannot Connect to a Computer




If you cannot connect the Model L452 to the computer via Bluetooth, ensure that Bluetooth is enabled on the instrument, as instructed by § 3.1.3. If Bluetooth is enabled but you cannot connect the instrument via the Data Logger Control Panel – for example, the L452 does not appear as available when you attempt to connect with it – the instrument may not be paired with the computer. Different computers and operating systems have different processes for pairing Bluetooth devices; consult the documentation that comes with your computer for instructions about how to do this.

Battery voltage also affects Bluetooth availability. If battery voltage falls below 2.2V, the Bluetooth radio in the Model L452 turns OFF and the Bluetooth icon disappears from the LCD. The instrument will otherwise continue to function normally. Verify that Bluetooth is enabled. If it is, and the Bluetooth icon is not displayed, the battery voltage has fallen below 2.2V at some point. Note that the voltage may recover somewhat and rise slightly above 2.2V after the Bluetooth radio is disabled. However, you must charge the batteries to full voltage to restore full Bluetooth functionality.

Finally, check whether or not the instrument is already connected to DataView. The Control Panel only allows one connection per instrument. For example, if you have already established a connection to the instrument via USB, you will not be able to create a second connection via Bluetooth. This is true even if the instrument is not actively connected to and communicating with the computer.

8.2.9 Cannot Turn OFF the Model L452

Turning OFF the Model L452 requires pressing and holding down  for two seconds. A press shorter than two seconds does not turn off the instrument; instead it displays the Channel 1 & 2 Measurement Data screen. If pressing  does not turn OFF the instrument, be sure you are holding down the button for the required two seconds.

Remote mode has an effect on how the  button functions. If you press and hold down  while in Remote mode, after two seconds the message REMOTE MODE appears on the screen. To turn OFF the instrument, you must continue to hold down  for an additional two seconds until the words POWER OFF appear.

In addition, you cannot turn OFF the L452 if a recording session is active. Note that you can turn OFF the Model L452 if a recording is scheduled but not currently in progress. However, if the instrument is OFF when the recording's start date and time is reached, the Model L452 will automatically turn back ON and begin the recording.

If after you perform the preceding checks the instrument still does not turn OFF, unplug the USB cable (if connected) and remove the batteries. (This should only be done as a final step since it could result in loss of data.)

APPENDIX A. USER INTERFACE SCREENS

As explained in § 2.3.1, the primary interface for working with the L452 consists of configuration and display screens. These screens appear in the instrument's front-panel LCD. The instrument's buttons enable you to navigate these screens, select options, and enter information.

Screens are grouped into six categories:

- **Measurement Data** screens display data currently being measured on Channel 1 and/or Channel 2.
- **Recording** screens configure, start, schedule, stop, and cancel a recording session.
- **Channel 1 Configuration** screens enables/disables Channel 1 and determines what data is recorded by the channel and how it is displayed.
- **Channel 2 Configuration** screens are identical to Channel 1 Configuration screens, except they apply to the instrument's Channel 2.
- **Instrument Configuration** screens configure general instrument settings.
- **Instrument Information** screens display read-only settings on the instrument.

Each category has a "top level" screen; this is the first screen that appears when you move to the category. The following table is a graphical representation for how these categories and screens are organized.

Measurement Data	Recording	Channel 1 Configuration	Channel 2 Configuration	Instrument Configuration	Instrument Information
Channels 1 & 2 Measurement Data (Home screen)	Start/Stop/Schedule/Cancel a Recording, and Set Duration	Enabled/Disabled and Input Type	Enabled/Disabled and Input Type	Language and Date/Time Format	Model Number, Serial Number, and Firmware Revision
Channel 1 Measurement and Min/Max Data	Sample Period and Storage Period	*Units	*Units	Memory Erase and Min/Max Reset	Instrument Name and Location
Channel 2 Measurement and Min/Max Data	Start Date and Time	**Low Scaling	**Low Scaling	Configuration Reset	Recording Sessions
	Stop Date and Time	**High Scaling	**High Scaling	Date and Time	Recording Name
		**Alarm Trigger	**Alarm Trigger	Bluetooth Enable/Disable and Visibility	
		**Upper Limit and Lower Limit	**Upper Limit and Lower Limit	Bluetooth Name	
		Equivalence (Pulse Input Only)	Equivalence (Pulse Input Only)		
		Trigger (Event Input Only)	Trigger (Event Input Only)		
*Not displayed when input is set to Event.					
**Not displayed when input is set to Event or Pulse.					

As noted above, several of these screens are conditional and only appear when certain input types are selected. For instance, scaling screens only appear for analog input (voltage and current); the Equivalence screen only appears when the input type is Pulse; and so on.

Pressing the ► or ◀ button while in navigation mode moves from one category of screens to the next. These buttons work from any screen in a category. For example, pressing ► from any of the three Measurement Data screens displays the top-level Recording screen. The categories are "cyclical," pressing ► at an Instrument Information screen moves to the top-level screen in Measurement Data, while pressing ◀ in a Measurement Data screen displays the top-level Instrument Information screen. The ▲ and ▼ buttons let you navigate the screens within each category. These are also cyclical; pressing ▲ in a category's top-level screen displays the bottom level screen in that category, while pressing ▼ at the bottom-level screen displays the category's top-level screen.

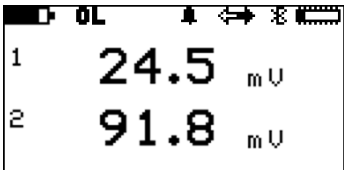
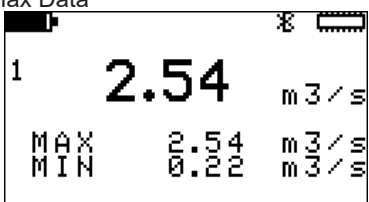
For example, when you first turn ON the L452, the first screen that appears is the top-level Measurement Data screen displaying measurement data for both channels 1 and 2. This is the instrument's Home screen. Suppose you want to view the minimum and maximum data for channel 2. Referring to the preceding table, we see that this is two levels "below" the Channel 1 & 2 Measurement Data screen. So to navigate to this screen, press ▼ twice. Now suppose you want to reset the minimum/maximum values. As shown in the preceding table, this screen is in the Instrument Configuration category. To navigate to this category, press ► four times. This displays the top-level Instrument Configuration screen (Language and Date/Time Format). Then press ▼ to display the Memory Erase and Min/Max Reset screen.

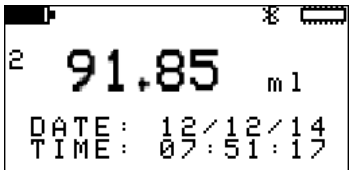
The following sections list the screens for each category.

A.1 Measurement Data Screens

These screens display measurement data and minimum/maximum values for data currently being measured. For instructions about viewing measurement data, see § 4.

Use the ▲ and ▼ buttons to navigate through these screens. Note that pressing ► from any of these screens displays the top-level Recording screen (see § A.2) while pressing ◀ displays the top-level Instrument Information screen (see § A.5).

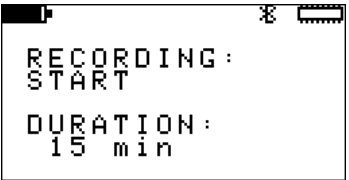
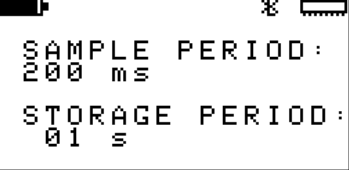
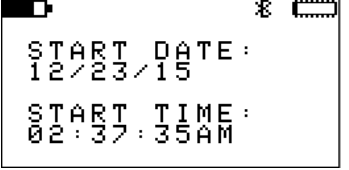
Measurement Data Screen	Description	Comments
Channels 1 & 2 Measurement Data (Home screen)  (Analog input shown)	Measurement data currently being measured on both channels 1 and 2.	This is the first screen displayed when you turn ON the L452 and the instrument completes its power-up sequence. You can return to this screen from any other screen by giving ⓪ a short press. Pressing ▼ displays the Channel 1 Measurement and Min/Max Data screen. Pressing ▲ displays the Channel 2 Measurement and Min/Max Data screen.
Channel 1 Measurement and Min/Max Data  (Analog input shown)	For analog input: The average sample value measured by channel 1 over the last completed storage period, and the minimum and maximum values since the last min/max reset. For pulse input: the maximum number of units that have been measured on channel 1 during a storage period since the last min/max reset, and the date and time of the storage period with the maximum value. For event input: an image of the last completed second in which an event occurred on channel 1, and the date and time for the event.	The minimum/maximum values are not displayed when the input type is set to Event. The minimum value is not displayed when the input type is set to Pulse. Pressing ▼ displays the Channel 2 Measurement and Min/Max Data screen. Pressing ▲ displays the Channels 1 & 2 Measurement Data (Home) screen.

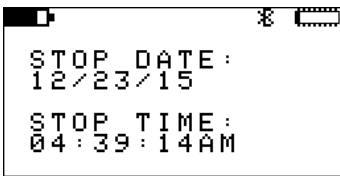
<p>Channel 2 Measurement and Min/Max Data</p>  <p>(Pulse input shown)</p>	<p>For analog input: The average sample value measured by channel 2 over the last completed storage period, and the minimum and maximum values since the last min/max reset.</p> <p>For pulse input: the maximum number of units that have been measured on channel 2 during a storage period since the last min/max reset, and the date and time of the storage period with the maximum value.</p> <p>For event input: an image of the last completed second in which an event occurred on channel 2, and the date and time for the event.</p>	<p>The minimum/maximum values are not displayed when the input type is set to Event.</p> <p>The minimum value is not displayed when the input type is set to Pulse.</p> <p>Pressing ▼ displays the Channels 1 & 2 Measurement Data screen. Pressing ▲ displays the Channel 1 Measurement and Min/Max Data screen.</p>
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A.2 Recording Screens

These screens configure and run a data recording session. This recorded data can then be downloaded to a computer running the Data-View Data Logger Control Panel for further display and analysis. These screens are not available in Remote mode. For instructions about how to set up and run a recording session, see § 5.

Pressing ► from any of these screens displays the top-level Channel 1 Configuration screen (see § A.3) while pressing ◀ displays the top-level Measurement Data screen (see § A.1).

Recording Screen	Description	Comments
<p>Start/Stop/Schedule/Cancel a Recording, and Set Duration</p>  <p>(Screen shown as it appears when no recording is currently in progress or scheduled)</p>	<p>Start a recording immediately, schedule a future recording, set the duration for a recording, stop an active recording, cancel a scheduled recording.</p>	<p>This screen is conditional. If a recording is in progress, the only available option is Stop. If a recording is scheduled, the only available option is Cancel.</p> <p>Changing the Duration setting overrides any previously set Stop Date/Time setting.</p> <p>Pressing ▼ displays the Sample Period and Storage Period screen. Pressing ▲ displays the Stop Date and Time screen.</p>
<p>Sample Period and Storage Period</p> 	<p>Sets the sample and storage periods for the recording session.</p>	<p>This screen is disabled if a recording is active or one has been scheduled.</p> <p>For Event input, this screen is display-only. The Sample Period field is set to 62.5ms and the Storage Period field is set to 1s.</p> <p>Pressing ▼ displays the Start Date and Time screen. Pressing ▲ displays the Start/Stop/Schedule/Cancel a Recording, and Set Duration screen.</p>
<p>Start Date and Time</p> 	<p>Sets the start date and time for a scheduled recording session.</p>	<p>This screen is disabled if a recording is active or one has been scheduled.</p> <p>Pressing ▼ displays the Stop Date and Time screen. Pressing ▲ displays the Sample Period and Storage Period screen.</p>

<p>Stop Date and Time</p> 	<p>Sets the stop date and time for a scheduled recording session.</p>	<p>This screen is disabled if a recording is active or one has been scheduled.</p> <p>If you set this after you set the Duration (see above), the Stop Date and Time settings adjust the Duration setting.</p> <p>Pressing ▼ displays the Start/Stop/Schedule/Cancel a Recording, and Set Duration screen. Pressing ▲ displays the Start Date and Time screen.</p>
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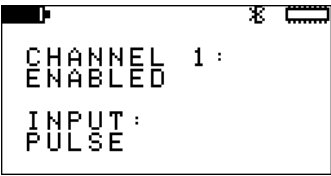
A.3 Channel 1 and Channel 2 Configuration Screens

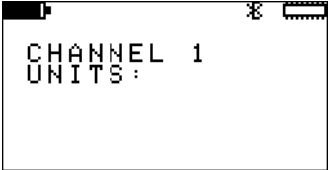

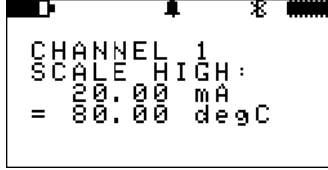

These screens configure Channel 1 and Channel 2. Each channel has a separate category for its screens; these screens are essentially identical for both categories. These screens are not available in Remote mode. For instructions about how to configure channels, see § 3.2.

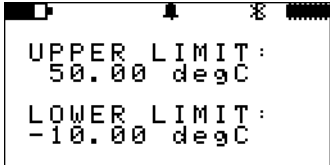
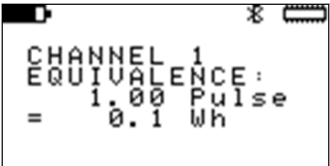

Note that:

- Pressing ► from any Channel 1 Configuration screen displays the top-level Channel 2 Configuration screen, while pressing ◀ from a Channel 1 Configuration displays the top-level Recording screen (see § A.2).
- Pressing ► from any Channel 2 Configuration screen displays the top-level Instrument Configuration screen (see § A.4), while pressing ◀ from a Channel 2 Configuration displays the top-level Channel 1 Configuration screen.

The following table shows the screens for Channel 1.

Channel 1 Configuration Screen	Description	Comments
<p>Enabled/Disabled and Input Type</p> 	<p>Enables and disables data measurement on channel 1, and sets the input type for both channels.</p>	<p>A channel must be enabled to include it in a recording session or to display measurement data.</p> <p>At least one channel must be enabled at all times. For example, if you disable channel 1 and then disable channel 2, channel 1 will automatically become enabled.</p> <p>The selected input type must be compatible with the sensor/probe attached to channel 1. Otherwise, an overload condition may result.</p> <p>The input type applies to both channels. If you set the input type one channel, the other channel is automatically set to the same input type.</p> <p>Pressing ▼ displays the following:</p> <ul style="list-style-type: none"> - Units screen (if the input type is set to analog [voltage/current] or Pulse) - Trigger screen (if the input type is set to Event) <p>Pressing ▲ displays the following:</p> <ul style="list-style-type: none"> - Upper Limit and Lower Limit screen (if the input type is set to analog) - Equivalence screen (if the input type is set to Pulse) - Trigger screen (if the input type is set to Event)

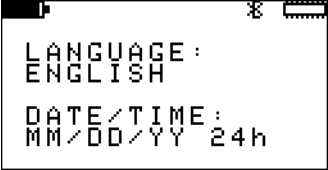
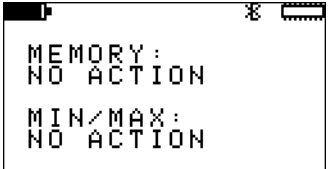
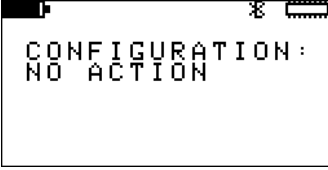
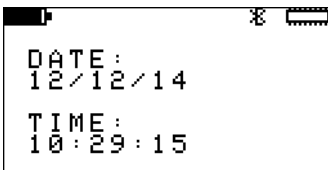
<p>Units</p> 	<p>Defines the units in which the measured input data will be displayed.</p>	<p>Units can be anything you choose, up to a maximum length of four characters.</p> <p>This screen is only available for analog (voltage and current) and pulse input. It does not appear when the input type is set to Event.</p> <p>Pressing ▼ displays the following:</p> <ul style="list-style-type: none"> - Low Scaling screen (if the input type is set to analog) - Equivalence screen (if the input type is set to Pulse) <p>Pressing ▲ displays the Enabled/Disabled and Input Type screen.</p>
<p>Low Scaling</p> 	<p>Defines the displayed reading when the input is at a pre-set low value.</p>	<p>This screen is only available for analog input.</p> <p>Pressing ▼ displays the High Scaling screen.</p> <p>Pressing ▲ displays the Units screen.</p>
<p>High Scaling</p> 	<p>Defines the displayed reading when the input is at its maximum value.</p>	<p>This screen is only available for analog input.</p> <p>Pressing ▼ displays the Alarm Trigger screen.</p> <p>Pressing ▲ displays the Low Scaling screen.</p>
<p>Alarm Trigger</p> 	<p>Enables and disables alarms and defines the type of alarm trigger.</p>	<p>Allowable values are Above Upper, Below Lower, Within Limits, Outside Limits, and Disabled.</p> <p>This screen is only available for analog input.</p> <p>Pressing ▼ displays the Upper Limit and Lower Limit screen. Pressing ▲ displays the High Scaling screen.</p>

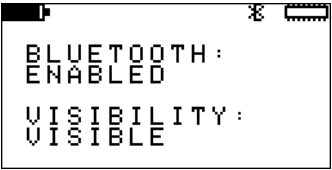
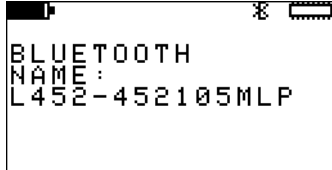
<p>Upper Limit and Lower Limit</p> 	<p>Defines the upper limit and lower limit for the alarm trigger.</p>	<p>How this information is used depends on the alarm trigger setting. For example, if the upper limit is set to 50°C and the alarm trigger is set to Above Upper, an alarm is triggered when the measurement exceeds 50°C. If the alarm trigger is set to Within Limits, an alarm is triggered when the measurement falls within the range defined by the Upper Limit and Lower Limit fields.</p> <p>If the Alarm Trigger field is set to Within Limits or Outside Limits, both the Upper Limit and Lower Limit fields are active. If the alarm trigger is Above Upper, only the Upper Limit field is active. If the alarm trigger is Below Lower, only the Lower Limit field is active.</p> <p>If both fields are active, the Upper Limit field must be set to a value higher than the Lower Limit field. If you enter an Upper Limit lower than the current Lower Limit setting, the Lower Limit field automatically resets to the Upper Limit value. Conversely, if you enter a Lower Limit higher than the Upper Limit, the Upper Limit is automatically adjusted to match the Lower Limit.</p> <p>This screen is only available for analog input.</p> <p>Pressing ▼ displays the Enabled/Disabled and Input Type screen. Pressing ▲ displays the Alarm Trigger screen.</p>
<p>Equivalence</p> 	<p>Defines the relationship between one pulse and the selected measurement unit.</p>	<p>This screen is only available for pulse input.</p> <p>Pressing ▼ displays the Enabled/Disabled and Input Type screen. Pressing ▲ displays the Units screen.</p>
<p>Trigger</p> 	<p>Defines whether an event occurs when the input goes from low to high (rising) or when it goes from high to low (falling).</p>	<p>This screen is only available for event input.</p> <p>Pressing either ▲ or ▼ displays the Enabled/Disabled and Input Type screen.</p>

A.4 Instrument Configuration Screens

These screens configure general settings that apply to the instrument. These screens are not available in Remote mode. For instructions about setting instrument configuration settings, see § 3.

Pressing ► from any of these screens displays the top-level Instrument Information screen (see § A.5) while pressing ◀ displays the top-level Channel 2 Configuration Information screen (see § A.3).

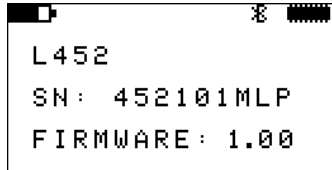
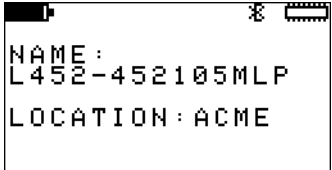
Instrument Configuration Screen	Description	Comments
Language and Date/Time Format 	Sets the language in which the text in the user interface appears, and defines the date and time formats.	Available language options are English, Español, Italiano, Deutsch, and Français. Available date/time formats are MM/DD/YY AM/PM, MM/DD/YY 24h, DD/MM/YY AM/PM, and DD/MM/YY 24h. Pressing ▼ displays the Memory Erase and Min/Max Reset screen. Pressing ▲ displays the Bluetooth Name screen.
Memory Erase and Min/Max Reset 	Erases recording memory, and resets the minimum and maximum values to zero.	Erasing memory ensures that sufficient space is available for storing recording sessions (see also § 8.1.1). The Memory option erases all the contents of memory; you cannot selectively erase some recording sessions while leaving others intact. To save a recording session, you must download it to a computer running DataView. Pressing ▼ displays the Configuration Reset screen. Pressing ▲ displays the Language and Date/Time Format screen.
Configuration Reset 	Restores configuration settings in the instrument to their original “out of the box” default settings.	This process resets all configuration modifications and information input except for date/time information. Pressing ▼ displays the Date and Time screen. Pressing ▲ displays the Memory Erase and Min/Max Reset screen.
Date and Time 	Sets the instrument date and time	The date and time will appear in the format defined by the Language and Date/Time Format screen (see above). Pressing ▼ displays the Bluetooth Enable/Disable and Visibility screen. Pressing ▲ displays the Configuration Reset screen.

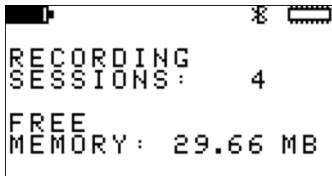
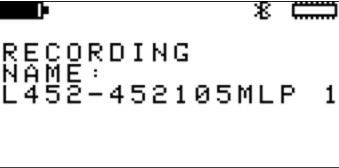
<p>Bluetooth Enable/Disable and Visibility</p> 	<p>Enables and disables Bluetooth in the instrument, and determines whether or not the instrument is visible to other local Bluetooth devices.</p>	<p>Bluetooth must be enabled to communicate with a computer wirelessly.</p> <p>You can choose to make the L452 “invisible” to local Bluetooth devices to limit access from unauthorized computers.</p> <p>Disabling Bluetooth when the L452 does not need to communicate with a computer (for example, during a long recording session) decreases power consumption and lengthens the life of the instrument’s batteries.</p> <p>Pressing ▼ displays the Bluetooth Name screen. Pressing ▲ displays the Date and Time screen.</p>
<p>Bluetooth Name</p> 	<p>Defines the Bluetooth name of the L452.</p>	<p>This is the name under which the L452 will appear in the computer’s list of available Bluetooth devices.</p> <p>The Bluetooth name consists of two parts. The first part is “L452-“ and cannot be changed. The second part is editable.</p> <p>Pressing ▼ displays the Language and Date/Time Format screen. Pressing ▲ displays the Bluetooth Enable/Disable and Visibility screen.</p>

A.5 Instrument Information Screens

These screens display general information that applies to the instrument. They are display-only and cannot be modified through the L452 user interface (although some of these settings can be changed through the DataView Data Logger Control Panel). These screens are not available in Remote mode. For instructions about viewing instrument information, see § 3.4.

Pressing ► from any of these screens displays the top-level Measurement Data screen (see § A.1) while pressing ◀ displays the top-level Instrument Configuration screen (see § A.4).

Instrument Information Screen	Description	Comments
<p>Model Number, Serial Number, and Firmware Revision</p> 	<p>Instrument model and serial numbers, and the revision number of the installed firmware.</p>	<p>Check the firmware revision against the firmware revision available in AEMC’s downloads web page to ensure you are running the latest firmware in the instrument (see also § 8.1.2).</p> <p>Pressing ▼ displays the Instrument Name and Location screen. Pressing ▲ displays the Recording Name screen.</p>
<p>Instrument Name and Location</p> 	<p>The name of the instrument and the name of its current location.</p>	<p>By default, the instrument name is the model number followed by the serial number.</p> <p>The instrument name and location can be set in the DataView Data Logger Control Panel.</p> <p>Pressing ▼ displays the Recording Sessions screen. Pressing ▲ displays the Model Number, Serial Number, and Firmware Revision screen.</p>

<p>Recording Sessions</p>  <p>RECORDING SESSIONS: 4 FREE MEMORY: 29.66 MB</p>	<p>Displays the number of recording sessions (if any) currently stored in memory, and the amount of free memory left for storing additional recording sessions.</p>	<p>This screen appears even if no sessions are currently stored in the instrument's memory. In this case, Free Memory will be 31.88 MB.</p> <p>Pressing ▼ displays the Recording Name screen. Pressing ▲ displays the Instrument Name and Location screen.</p>
<p>Recording Name</p>  <p>RECORDING NAME: L452-452105MLP 1</p>	<p>The name that will be given to the next recording session stored in memory.</p>	<p>By default, the recording name consists of the instrument name and a numerical suffix that represents the session number (the number of sessions currently stored in the instrument plus one).</p> <p>The recording name can be changed via the DataView Data Logger Control Panel.</p> <p>Pressing ▼ displays the Model Number, Serial Number, and Firmware Revision screen. Pressing ▲ displays the Recording Sessions screen.</p>

REPAIR AND CALIBRATION

To ensure that your instrument meets factory specifications, we recommend that it be scheduled back to our factory Service Center at one-year intervals for recalibration, or as required by other standards or internal procedures.

For instrument repair and calibration:

You must contact our Service Center for a Customer Service Authorization Number (CSA#). This will ensure that when your instrument arrives, it will be tracked and processed promptly. Please write the CSA# on the outside of the shipping container. If the instrument is returned for calibration, we need to know if you want a standard calibration, or a calibration traceable to N.I.S.T. (Includes calibration certificate plus recorded calibration data).

Ship To: Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
15 Faraday Drive • Dover, NH 03820 USA
Phone: (800) 945-2362 (Ext. 360)
(603) 749-6434 (Ext. 360)
Fax: (603) 742-2346 or (603) 749-6309
E-mail: repair@aemc.com

(Or contact your authorized distributor)

Costs for repair, standard calibration, and calibration traceable to N.I.S.T. are available.

NOTE: You must obtain a CSA# before returning any instrument.

TECHNICAL AND SALES ASSISTANCE

If you are experiencing any technical problems, or require any assistance with the proper operation or application of your instrument, please call, fax or e-mail our technical support team:

LIMITED WARRANTY

The Model L452 is warranted to the owner for a period of two years from the date of original purchase against defects in manufacture. This limited warranty is given by AEMC® Instruments, not by the distributor from whom it was purchased. This warranty is void if the unit has been tampered with, abused or if the defect is related to service not performed by AEMC® Instruments.

Full warranty coverage and product registration is available on our website at:

Please print the online Warranty Coverage Information for your records.

What AEMC® Instruments will do:

If a malfunction occurs within the warranty period, you may return the instrument to us for repair, provided we have your warranty registration information on file or a proof of purchase. AEMC® Instruments will, at its option, repair or replace the faulty material.

WARRANTY REPAIRS

What you must do to return an Instrument for Warranty Repair:

First, request a Customer Service Authorization Number (CSA#) by phone or by fax from our Service Department (see address below), then return the instrument along with the signed CSA Form. Please write the CSA# on the outside of the shipping container. Return the instrument, postage or shipment pre-paid to:

Ship To:

Caution: To protect yourself against in-transit loss, we recommend you insure your returned material.

NOTE: You must obtain a CSA# before returning any instrument.



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