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FLUKE®

1730

Energy Logger

Users Manual

September 2013

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Introduction

The 1730 Energy Logger (the Logger or Product) is a compact device for energy surveys. With a built-in touch screen and USB flash drive support, it is very easy to configure, verify, and download measurement sessions without the need of a computer at the measurement location.

The Logger makes these measurements:

- **Basic Measurements:** Voltage (V), Current (A), Frequency (Hz), Phase rotation indication, 2 dc Channels (supports user-supplied external sensor for other measurements such as temperature, humidity, and air speed)
- **Power:** Active Power (W), Apparent Power (VA), Non-active Power, (var), Power Factor
- **Fundamental Power:** Fundamental Active Power (W), Fundamental Apparent Power (VA), Fundamental Reactive Power (var), DPF (Cos Φ)

- **Energy:** Active Energy (Wh), Apparent Energy (VAh), Non-active Energy (varh)
- **Demand:** Demand (Wh), Maximum Demand (Wh), Energy costs
- **Harmonic Distortion:** Total Harmonic Distortion of Voltage and Current

Fluke Energy Analyze software is included with the Product for a thorough energy analysis and professional report of the measurement results.

How to Contact Fluke

To contact Fluke, use one of these telephone numbers:

- USA: 1-800-760-4523
- Canada: 1-800-36-FLUKE (1-800-363-5853)
- Europe: +31 402-675-200
- Japan: +81-3-6714-3114
- Singapore: +65-6799-5566
- Anywhere in the world: +1-425-446-5500

Or, visit Fluke's website at www.fluke.com.

To register your Product, visit <http://register.fluke.com>.

To view, print, or download the latest manual supplement, visit <http://us.fluke.com/usen/support/manuals>.

Go to www.flukenation.com for more information about real-world applications and software downloads.

Safety Information

A **Warning** identifies hazardous conditions and procedures that are dangerous to the user. A **Caution** identifies conditions and procedures that can cause damage to the Product or the equipment under test.

Warning









To prevent possible electrical shock, fire, or personal injury:



- **Read all safety information before you use the Product.**
- **Use the Product only as specified, or the protection supplied by the Product can be compromised.**
- **Comply with local and national safety codes. Use personal protective equipment (approved rubber gloves, face protection, and flame-resistant clothes) to prevent shock and arc blast injury where hazardous live conductors are exposed.**
- **Examine the case before you use the Product. Look for cracks or missing plastic. Carefully look at the insulation around the terminals.**
- **Replace the mains power cord if the insulation is damaged or if the insulation shows signs of wear.**

- Use Product-approved measurement category (CAT), voltage, and amperage rated accessories (probes, test leads, and adapters) for all measurements.
- Do not use test leads if they are damaged. Examine the test leads for damaged insulation and measure a known voltage.
- Do not use the Product if it is damaged.
- The battery door must be closed and locked before you operate the Product.
- Do not work alone.
- Use this Product indoors only.
- Do not use the Product around explosive gas, vapor, or in damp or wet environments.
- Use only the external mains power supply included with the Product.
- Do not exceed the Measurement Category (CAT) rating of the lowest rated individual component of a Product, probe, or accessory.
- Keep fingers behind the finger guards on the probes.
- Do not use a current measurement as an indication that a circuit is safe to touch. A voltage measurement is necessary to know if a circuit is hazardous.
- Do not touch voltages >30 V ac rms, 42 V ac peak, or 60 V dc.
- Do not apply more than the rated voltage, between the terminals or between each terminal and earth ground.
- Measure a known voltage first to make sure that the Product operates correctly.
- De-energize the circuit or wear personal protective equipment in compliance with local requirements before you apply or remove the flexible current probe.
- Remove all probes, test leads, and accessories before the battery door is opened.

Table 1 is a list of symbols used on the Product or in this manual.

Table 1. Symbols

Symbol	Description
	Risk of Danger. Important information. See manual.
	Hazardous voltage
	Conforms to relevant South Korean EMC standards
	Battery
	Conforms to relevant Australian EMC standards
	Conforms to relevant North American Safety Standards
	Conforms to European Union directives
	Double Insulation
CAT II	Measurement Category II is applicable to test and measuring circuits connected directly to utilization points (socket outlets and similar points) of the low-voltage MAINS installation.

CAT III	Measurement Category III is applicable to test and measuring circuits connected to the distribution part of the building's low-voltage MAINS installation.
CAT IV	Measurement Category IV is applicable to test and measuring circuits connected at the source of the building's low-voltage MAINS installation.
 Li-ion	This product contains a Lithium-ion battery. Do not mix with the solid waste stream. Spent batteries should be disposed of by a qualified recycler or hazardous materials handler per local regulations. Contact your authorized Fluke Service Center for recycling information.
	This product complies with the WEEE Directive (2002/96/EC) marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste. Product Category: With reference to the equipment types in the WEEE Directive Annex I, this product is classed as category 9 "Monitoring and Control Instrumentation" product. Do not dispose of this product as unsorted municipal waste. Go to Fluke's website for recycling information.

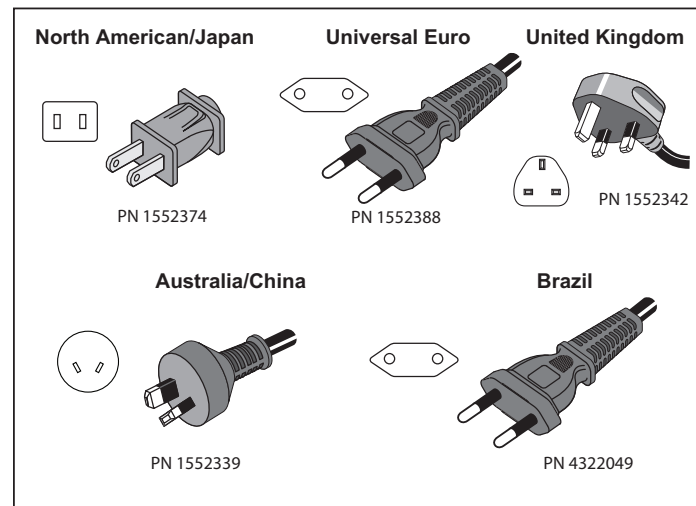
Before You Start

Below is a list of the items included with your purchase. Carefully unpack and inspect each of the items:

- 1730 Energy Logger
- Power Supply
- Voltage Test Lead
- Dolphin Clip, Black
- i1730-flex1500 Thin-Flexi Current Probe, 30.5 cm (12 in) quantity 3
- Color-coded Wire Clips
- Power Cord (see Figure 1)
- Test lead with stackable plugs, 10 cm (3.9 in)
- Test lead with stackable plugs, 2 m (6.6 ft)
- DC Power Cable
- USB Cable A, Mini-USB
- Soft Storage Bag/Case
- Input Connector Decal

The power cord and input connector decal are country-specific and vary according to the order destination. See Figure 1.

- Documentation Info Pack (Quick Reference Card, Safety Information, Battery Pack Safety Information, iFlex Probe Safety Information, i40s-EL Current Clamp Safety Information)
- 4 GB USB Flash Drive (includes Users Manual and PC application software, Fluke Energy Analyze)



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Figure 1. Country-Specific Mains Cords

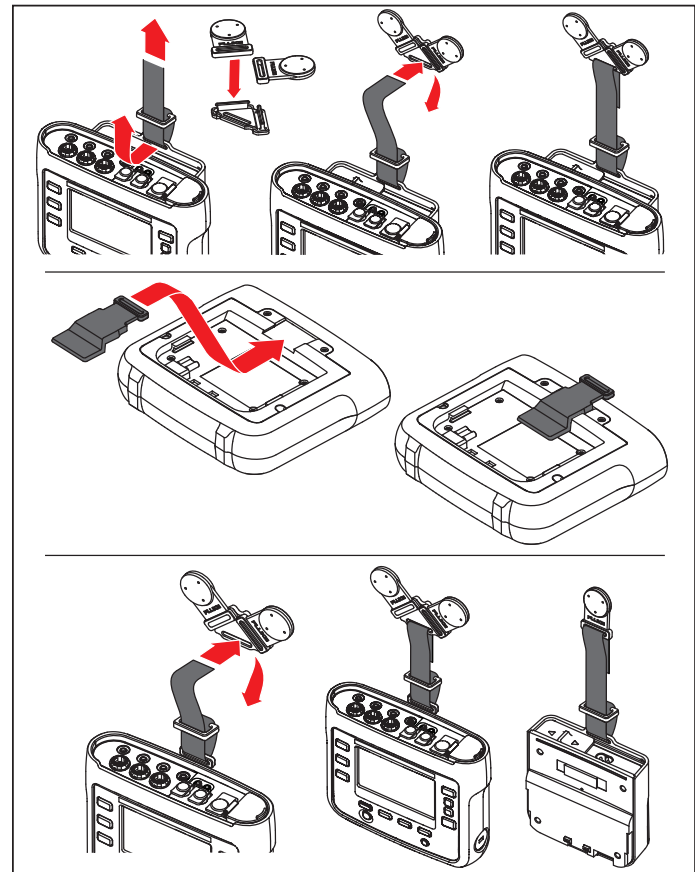
Tilt Stand

The power supply includes a tilt stand. When used, the tilt stand positions the display at a good angle for use on a tabletop surface. To use, attach the power supply to the Logger and open the tilt stand.

Hanger Accessory

The optional hanger accessory shown in Figure 2 is used to:

- Hang the Logger with power supply attached (use two magnets)
- Hang the Logger separately (use two magnets)
- Hang the power supply separately (use one magnet)



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Figure 2. Hanger Accessory

Storage

When not in use, keep the Logger in the protective storage bag/case. The bag/case has sufficient space for the Logger and all the accessories.

If the Logger is stored for an extended period of time or is not in use for a long time, you should charge the battery at least once every six months.

Power Supply

The Logger includes a removable power supply, see Figure 3. The power supply is either attached to the Logger or used externally with a DC power cord. The configuration with the externally connected power supply is preferred in locations where the Logger with the power supply attached is too big to fit in a cabinet between the door and panel.

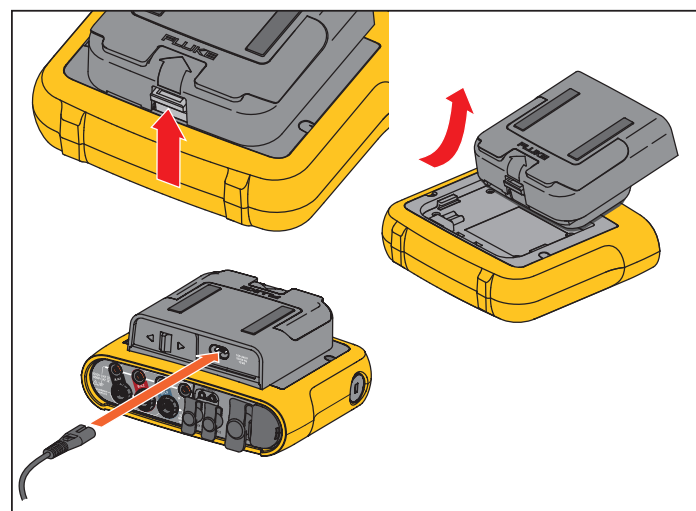
When the power supply is connected with the Logger and connected to line power, it:

- converts line power to dc power and is used directly by the Logger
- automatically turns on the Logger and continuously powers the Logger from the external source (after initial power on, the power button turns on and turns off the Logger)
- recharges the battery

The power cord/measurement line cover slides to select the input source.

⚠⚠ Warning

To prevent possible electrical shock, fire, or personal injury, do not use the power supply if the power cord/measurement line slide-cover is missing.



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Figure 3. Power Supply and Battery

How to Charge Battery

The Logger also operates on an internal rechargeable Lithium-ion battery. After you unpack and inspect the Logger, fully charge the battery before first use. Afterwards, charge the battery when the battery icon on the screen indicates that power is low. The battery automatically charges when the Logger is connected to the mains power. The Logger continues to charge when turned off and connected to mains power.

Note

The battery charge is faster when the Logger is turned off.

To charge the battery:

1. Connect the mains cord to the ac input socket on the power supply.
2. Fit the power supply to the Logger or use the dc power cord to connect the power supply to the Logger.
3. Connect to mains power.

⚠ Caution

To prevent damage to the Product:

- **Do not leave batteries unused for extended periods of time, either in the product or in storage.**
- **When a battery has not been used for six months, check the charge status and charge the battery as appropriate.**
- **Clean battery packs and contacts with a clean, dry cloth.**
- **Battery packs must be charged before use.**
- **After extended storage, it can be necessary to charge and discharge a battery pack to obtain maximum performance.**
- **Dispose properly.**

Note

- *Li-ion batteries keep a charge longer if stored at room temperature.*
- *The clock resets when the battery is completely discharged.*
- *When the Logger shuts off because of low battery, enough battery capacity is available to back up the real-time clock for up to 2 months.*

Accessories

Table 2 is a list of the accessories that are available and sold separately for the Logger. The warranty on included accessories is 1 year.

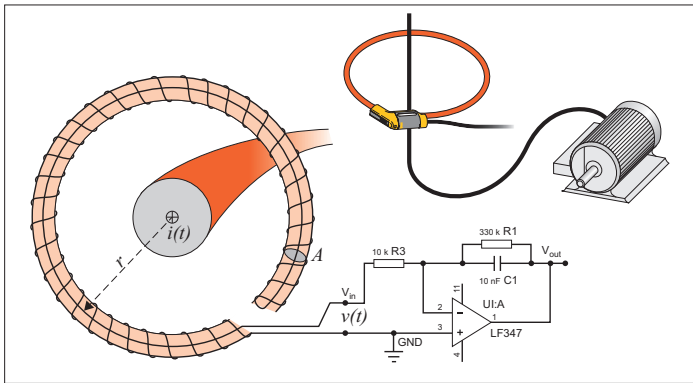
Table 2. Accessories

Description	Part Number
i1730-flex 1500 Thin-Flexi Current Probe (single)	4345324
i1730-flex1500/3PK Set of three Thin-Flexi Current Probes 1500 A 30.5 cm (12 in)	4357406
i1730-flex 3000 Thin-Flexi Current Probe (single)	4345616
i1730-flex3000/3PK Set of three Thin-Flexi Current Probes 3000 A 61 cm (24 in)	4357414
i1730-flex 6000 Thin-Flexi Current Probe (single)	4345625
i1730-flex6000/3PK Set of three Thin-Flexi Current Probes 6000 A 90.5 cm (36 in)	4357423
Fluke-1730 Test Lead, 0.10 m	4344653
Fluke-1730 Test Lead, 2 m	4344675

3PHVL-1730, Voltage Test Lead 3-phase + N,	4344712
i40s-EL Current Clamp, 40 A	4345270
i40s-EL/3PK, Set of three Current Clamps, 40 A	4357438
Fluke-1730-Hanger Kit	4358028
Lithium-ion Battery	4389436
Auxiliary Input Cable	4395217
C1730, Soft Case	4345187

Thin-Flexi Current Probe

The Thin-Flexi Current Probe works on the Rogowski coil (R-coil) principle that is a toroid of wire used to measure an alternating current through a cable encircled by the toroid. See Figure 4.



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Figure 4. R-Coil Operation Principle

The R-coil has many advantages over other types of current transformers:

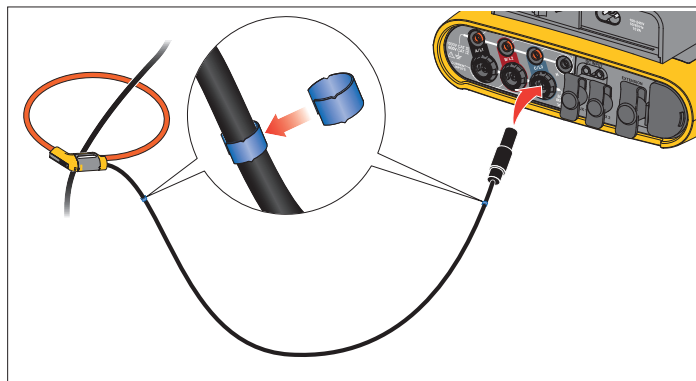
- It is not a closed loop. The second terminal is passed back through the center of the toroid core (commonly a plastic or rubber tube) and connected along the first terminal. This allows the coil to be open-ended, flexible, and able to be wrapped around a live conductor without disturbing it.
- It has an air core rather than an iron core. It has a low inductance and can respond to fast-changing currents.
- Because it has no iron core to saturate, it is highly linear even when subjected to large currents, such as those used in electric power transmission or pulsed-power applications.

A correctly formed R-coil, with equally spaced windings, is largely immune to electromagnetic interference.

Test Leads

Test leads are four-core, flat, test leads that do not tangle and can be installed in tight spaces. On installations where the access to Neutral is out of reach with the three-phase test lead, use the black test lead to extend the Neutral lead.

For single phase measurements use the red and black test leads. See Figure 5.



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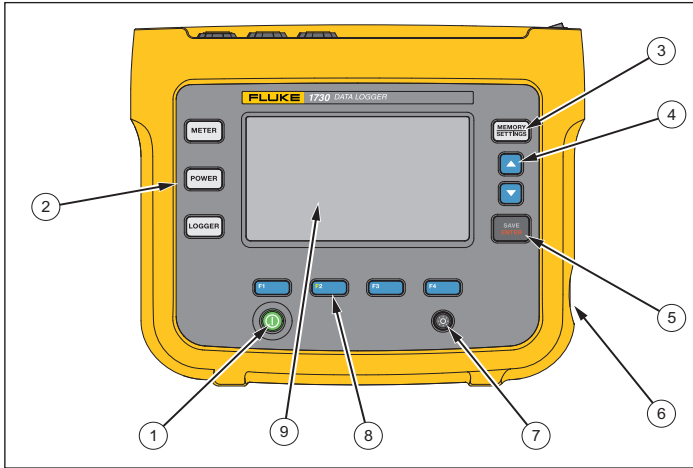
Figure 5. Test Leads with Color Coding

Kensington Lock

A Kensington Security Slot (also called a K-Slot or Kensington lock) is part of a built-in anti-theft system. It is a small, metal-reinforced, oval hole found on the right side of the Logger (see item 6 in Table 3). It is used for attaching a lock-and-cable apparatus. The lock is secured in place with a key or combination lock attached to a plastic-cover metal cable. The end of the cable has a small loop that allows the cable to be looped around a permanent object, such as a cabinet door, to secure it in place. This lock is available from most electronics and computer suppliers.

Navigation and User Interface

See Figure 8 and Table 3 for a list of the front panel controls and their functions. See Figure 7 and Table 4 is a list of the connectors and their functions.



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Figure 6. Front Panel

Table 3. Front Panel

Item	Control	Description
①	①	Power on/off and status
②	METER POWER LOGGER	Meter, Power, or Logger function selection
③	MEMORY SETTINGS	Memory/Setup selection
④	▲ ▼	Cursor control
⑤	SAVE ENTER	Selection control
⑥	Kensington lock	
⑦	☀	Backlight on/off
⑧	F1 F2 F3 F4	Softkey selection
⑨	Touch screen display	

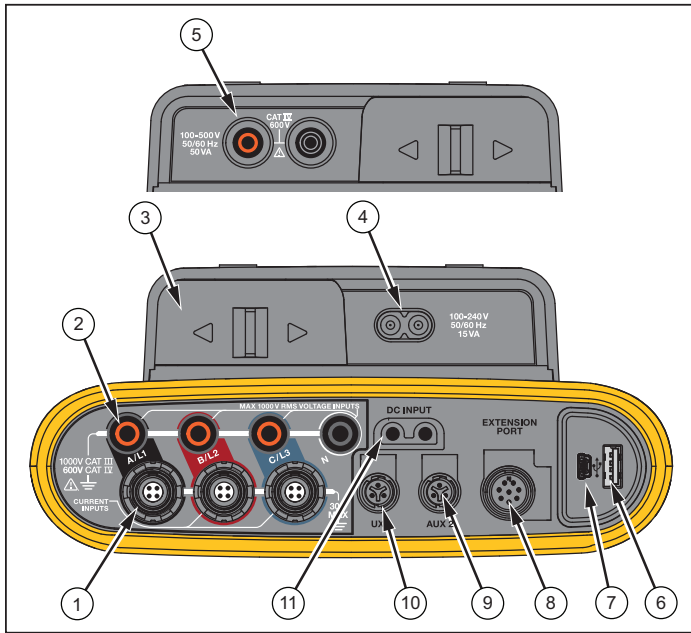


Figure 7. Connector Panel

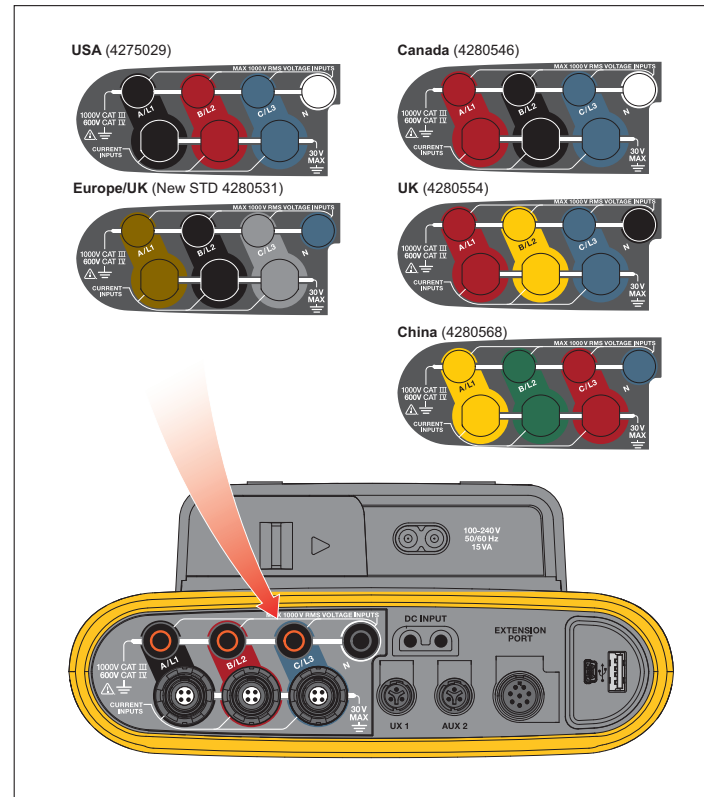
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Table 4. Connector Panel

Item	Description
①	Current measurement inputs (3 phases)
②	Voltage measurement inputs (3 phases)
③	Power Cord/Measurement Line Slide-Cover
④	Power Cord AC Input 100-240 V 50/60 Hz 15 VA
⑤	Measurement line AC Input 100-500 V 50/60 Hz 50 VA
⑥	USB connector
⑦	Mini-USB connector
⑧	Extension Port
⑨	Aux 2 connector
⑩	Aux 1 connector
⑪	DC Power Input

Applying the Connector Panel Decal

Self-adhesive decals are supplied with the Logger. The decals correspond to the wiring color codes used in the USA, Europe and UK, UK (old), Canada, and China. Apply the decal appropriate for your local wiring codes around the current and voltage inputs on the connector panel as shown in Figure 8.



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Figure 8. Decal for Connector Panel


Power ON/OFF

The Logger has several options for power: mains, measurement line, and battery. The front panel LED shows the status. See Table 5 for more information.

Mains Power Source

1. Attach the power supply to the Logger or use the dc power cord to connect the power supply to the Logger.
2. Move the slide-cover on the power supply to access the mains socket and connect the power cord into the Logger.

The Logger automatically turns on and is ready to use in <20 seconds.

3. Push  to turn on and turn off the Logger.

Measurement Line Power Source

1. Attach the Power Supply to the Logger or use the dc power cord to connect the Power Supply with the Logger.
2. Move the slide-cover on the power supply to access the safety sockets and connect these sockets with the voltage input sockets A/L1 and N.

For 3-phase delta systems connect the safety sockets of the power supply with the input sockets A/L1 and B/L2.

Use the short test leads for all applications where the measured voltage does not exceed the rated input voltage of the power supply.

3. Connect the voltage inputs to the test points.

The Logger automatically turns on and is ready to use in <20 seconds.


Caution

To prevent damage to the product, make sure the measured voltage does not exceed the input rating of the power supply.

Warning







To prevent injury, do not touch the metal parts of one test lead when the other is still connected to hazardous voltage.

Power from Battery

The Logger can operate on battery power without a connection to the power supply or dc power cord. Push . The Logger turns on and is ready to use in <20 seconds.

The battery symbol in the status bar and the power LED indicate the battery status.

Table 5. Power/Battery Status

Logger On						Logger OFF		
Power Source	Battery Symbol	Power LED	Estimated Runtime for LCD Hours:Minutes			Power Source	Battery Status	Power LED color
			Off	Brightness low	Brightness high			
Mains		green	NA			Mains	off	OFF
Battery		yellow	5:30	4:50	3:45			
Battery		yellow						
Battery		yellow						
Battery		yellow						
Battery		red	0:18	0:16	0:12			
Logger Status								
not logging		steady						
logging		flashing						

Touch Screen

The touch screen enables you to interact directly with what is on the display. To change parameters, touch a target on the display with a finger. Touch targets are easy to recognize, such as large buttons, items in menus, or keys of the virtual keyboard. The Product can be operated with insulating gloves on (resistive touch).


Brightness Button

The touch screen has a backlight for work in dimly lit spaces. See Table 3 for the location of the Brightness (⚙️) button. Push ⚙️ to adjust the brightness in two levels and to turn on and turn off the display.



The brightness is set to 100 % when the Logger is powered from mains. When powered from battery, the default brightness is set to the power-save level of 30 %. Push ⚙️ to toggle between the two brightness levels.




Push and hold ⚙️ for 3 seconds to turn off the display.
Push ⚙️ to turn on the display.





Calibration

The touch screen is pre-calibrated in the factory. If you notice that the targets do not align with your touch on the display, you can calibrate the display. Calibration of the touch screen is available in the  menu. See page 32 for more information about the touch screen calibration.

Basic Navigation

When an option menu shows on the display, you can use   to move within the menu.

The  button has a dual use. In the Configuration and Setup screens, push  to confirm the selection. In all other screens, push  for 2 seconds to take a screen shot. A beep confirms the action. See *Screen Capture* for more information about how to review, manage, and copy the screen shots.

Along the bottom of the display, a row of labels shows the available functions. Push    or  below the display label to start that function. These labels also work as touch targets.