

**FLUKE®**

# 1630

## Earth Ground Clamp

### Users Manual

PN 2729710  
October 2006

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# **1630**

## ***Earth Ground Clamp***

### ***Introduction***

The Fluke 1630 Earth Ground Clamp (hereafter called the “the Clamp”) is a hand-held battery-operated clamp that measures the ground resistance of a ground rod without using auxiliary ground rods. The Clamp can be used in multi-grounded systems without disconnecting the ground under test.

The Clamp can be used in the following applications:

- Earth resistance testing of high voltage pylons, buildings, cell phone substations and RF transmitters
- Inspection of lightning protection systems

### ***Standard Accessories***

The following standard accessories are provided with the Clamp:

- 1 9-V alkaline battery (type IEC 6F22, NEDA 1604 installed)
- 1 Resistance test/check loop
- 1 *1630 Users Manual*
- 1 Carrying Case

## Contacting Fluke

To contact Fluke, call one of the following telephone numbers:

USA: 1-888-44-FLUKE

Canada: 1-800-363-FLUKE

Europe: +31 402-675-200

Japan: +81-3-3434-0181

Singapore: +65-738-5655

Anywhere in the world: +1-425-446-5500

USA Service: 1-888-99-FLUKE (1-888-993-5853)

Or, visit Fluke's Web site at [www.fluke.com](http://www.fluke.com)

To register your product, visit [register.fluke.com](http://register.fluke.com)

## Safety Information

### Read First: Safety Information

To ensure safe operation and service of the 1630 Earth Ground Clamp, follow these instructions:









- Read the operating instructions before use and follow all safety instructions.
- Use the Clamp only as specified in the operating instructions, otherwise the Clamp's safety features may not protect you.
- Adhere to local and national safety codes. Individual protective equipment must be used to prevent shock and arc blast injury where hazardous live conductors are exposed.
- Before each use, inspect the Clamp. Look for cracks or missing portions of the Clamp housing or output cable insulation. Also look for loose or weakened components. Pay particular attention to the insulation surrounding the jaws.
- Never use the Clamp on a circuit with voltages higher than 600 V CAT II or 300 V CAT III.



- CAT II equipment is designed to protect against transients from energy-consuming equipment supplied from the fixed installation, such as TVs, PCs, portable tools, and other household appliances.
- CAT III equipment is designed to protect against transients in equipment in fixed-equipment installations, such as distribution panels, feeders and short branch circuits, and lighting systems in large buildings.
- Use extreme caution when working around bare conductors or busbars. Contact with the conductor could result in electric shock.
- Use caution when working with voltages above 60 V dc or 30 V ac. Such voltages pose a shock hazard.

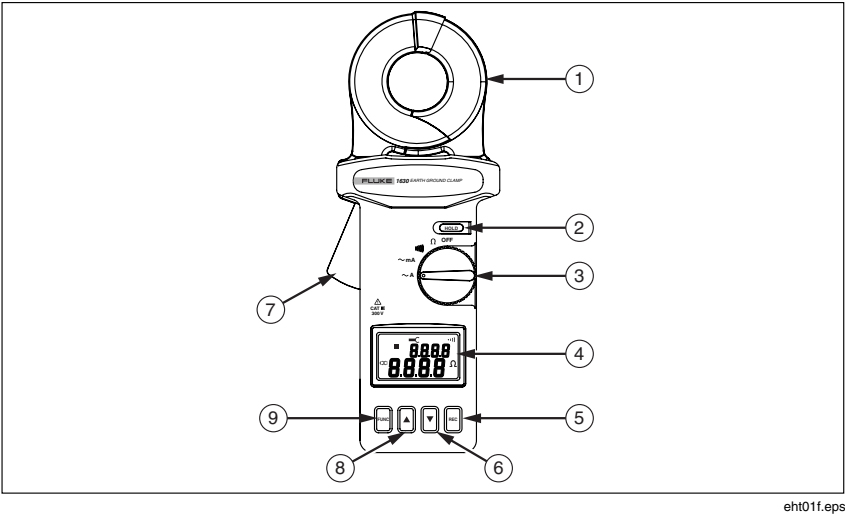
## **Symbols**

The following symbols are found on the Clamp or in this manual.

	May be used on hazardous live conductors
	Risk of danger. Important information. See Users Manual.
	Hazardous voltage. Risk of electric shock.
	Double insulation
	Battery
	Conforms to relevant European Union directives
	Do not dispose of this product as unsorted municipal waste. Contact Fluke or a qualified recycler for disposal.
	Complies with Canadian and US Standards

# Getting Acquainted with the Clamp

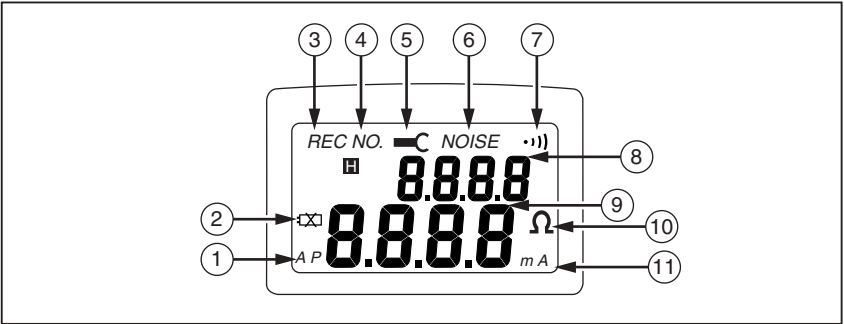
Refer to Figures 1 and 2 and Tables 1 and 2 to become more familiar with the Clamp's features.



**Figure 1. 1630 Earth Ground Clamp Features**

**Table 1. 1630 Earth Ground Clamp Features**

Number	Description
①	Jaws. Used to enclose electrode or ground wire.
②	HOLD button. Press to hold the displayed value.
③	Rotary Switch for power on and function selection.
④	LCD
⑤	REC button. Press to start data logging.
⑥	Down arrow used to decrement value.
⑦	Up arrow used to increment value.
⑧	FUNC button. Press to select HI (high alarm), LO (low alarm), SEC (seconds), or stored memory locations.
⑨	Jaw release.



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**Figure 2. Display Features**

**Table 2. Display Features**

Number	Description
①	Indicates the Clamp will Autopower off in 4 to 6 minutes.
②	Low battery indicator - the batteries are low and need to be changed.  <b>⚠ ⚠ Warning</b>  <b>To avoid false readings, which could lead to possible electric shock or personal injury, replace the batteries as soon as the battery indicator appears.</b>
③	Indicates data logging is in progress.
④	Indicates memory location.
⑤	Indicates the jaw is not closed properly. This symbol appears on the display.
⑥	Indicates noise present in ground electrode or ground rod.
⑦	Indicates the rotary switch is in the alarm function.
⑧	Displays current selected function or current memory location.
⑨	Displays value from 0 to 9999 with decimal point.
⑩	Indicates ohms and alarm functions.
⑪	Indicates current in mA or A.

## Using the Clamp

### Ground Resistance Measurements

To perform ground resistance measurements:

1. Open the jaws and make sure the surfaces fit together properly and are free of dust, dirt, or any foreign substances.
2. Turn the Clamp on by moving the rotary switch to the  $\Omega$  function.

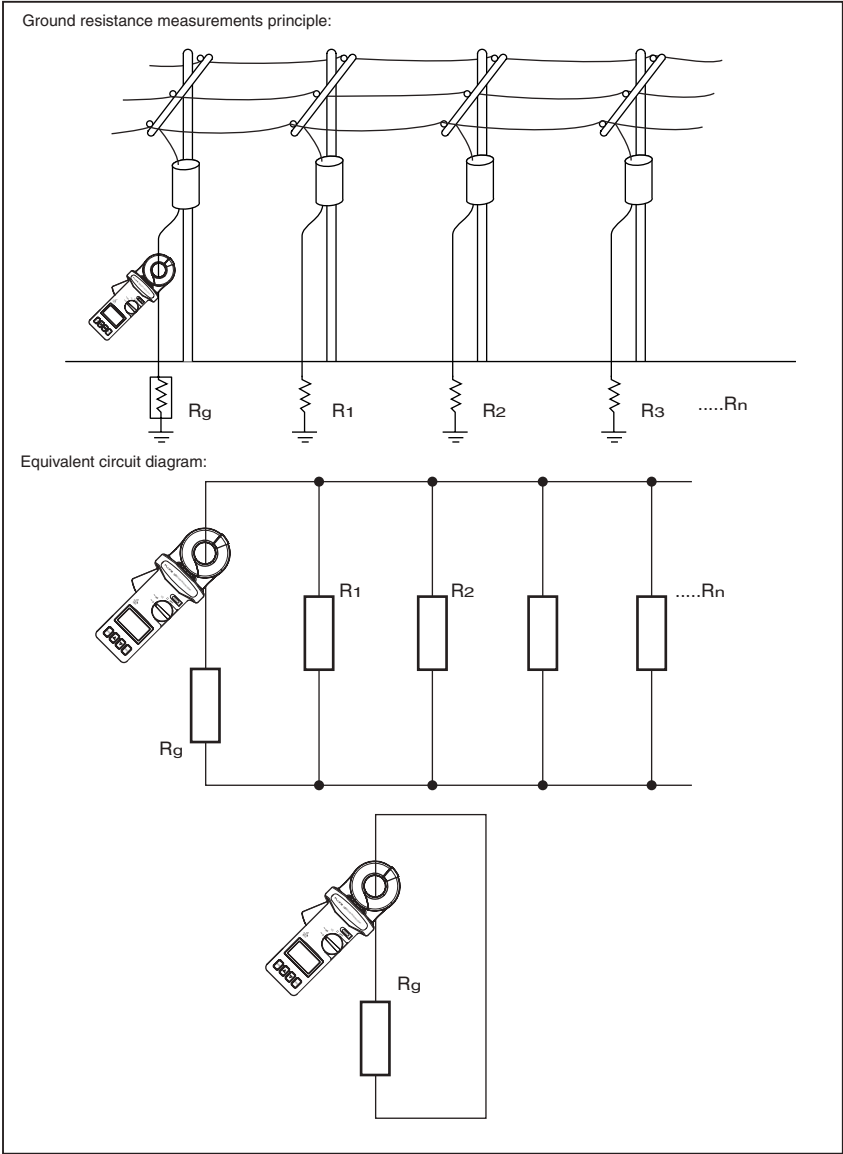
#### *Note*

*Do not attach the Clamp to a conductor or open the jaws now or during self-calibration or calibration will be interrupted.*

3. After power is turned on, the Clamp self-calibrates for better accuracy. Wait for self-calibration to finish before making measurements. During the self-calibration, the display will show **CAL 1**, **CAL 6**, ..., **CAL 2**, **CAL 1**. The Clamp beeps when self-calibration is completed.
4. Attach the Clamp to the electrode or ground rod to be measured.
5. Read the value of  $R_g$  (ground resistance) from the display. Figure 3 illustrates the ground resistance measurement principles.

#### *Note*

- *If self-calibration does not stop, check the jaw surfaces for dust or dirt and power up the Clamp again.*
- *If there is more than 3 A or 30 V in the ground rod, the jaw icon and the word **NOISE** flash on the display and the Clamp beeps. When noise is present the Clamp reading is not valid.*
- *If the jaw assembly is opened during measurement, the jaw icon appears on the display.*



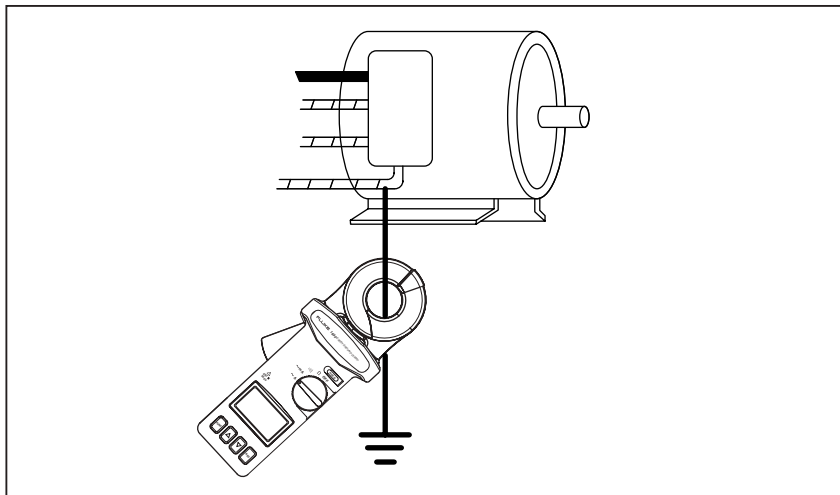
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**Figure 3. Ground Resistance Measurement Principles**

## Ground Leakage Current Measurement

To perform a ground leakage current measurement test:

1. Open the jaws and make sure the surfaces fit together properly and are free of dust, dirt, or any foreign substances.
2. Turn the Clamp on by moving the rotary switch to the  $\sim \text{mA}$  or  $\sim \text{A}$  function.
3. Attach the Clamp to the electrode or ground rod to be measured. Figure 4 shows a connection for a ground leakage current measurement.
4. Read the value of the leakage current on the display.








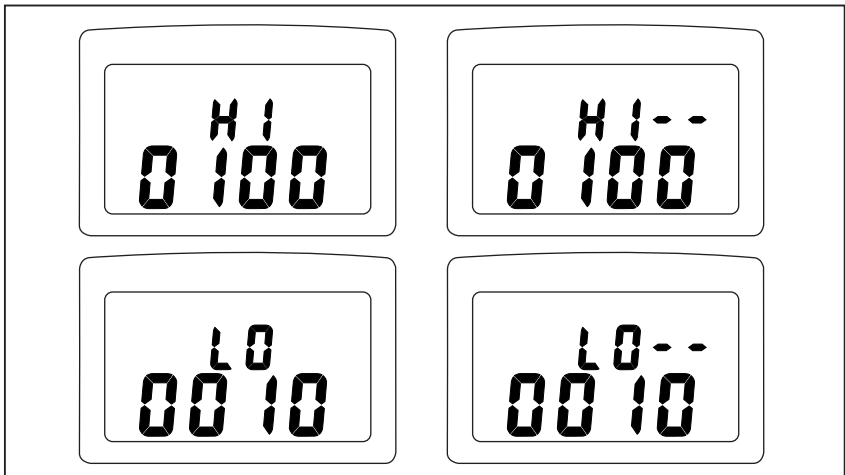
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Figure 4. Ground Leakage Current Measurement

## **Memory and Alarm Functions**

### **Using the High and Low Alarms**

1. Press  to select the HI or LO alarm, although this describes the ohms function high and low alarms can be set in any of the other functions. The current value of High or Low alarm will appear on the display. Figure 5 shows alarm function displays.
2. Press the  or  button to increment/decrement the value by 1  $\Omega$ . The value can be incremented or decremented from 0  $\Omega$  to 1510  $\Omega$  and then OL. Hold down the up or down buttons to quickly increment/decrement to the desired value.
3. When the value is set, press  until you return to the main display.
4. When the rotary switch is set to the  position, the Clamp compares the current value with the high and low values. If the current measurement is larger than the HI value, the Clamp beeps and shows HI-- in the upper display. If the measurement is less than the LO value, the Clamp will beep and LO-- appears in the upper display.






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**Figure 5. Alarm Functions**

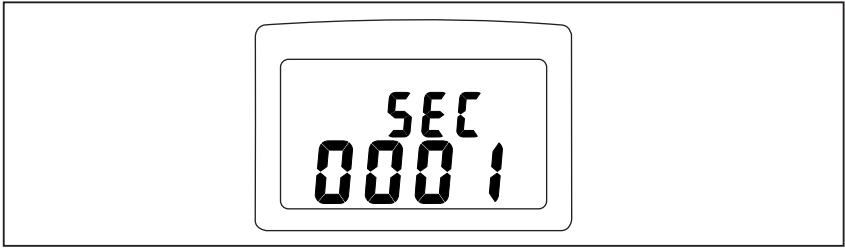
*Note*

- *If the HI value is set at OL, or the LO value is set at 0, the ALARM function will be disabled.*
- *The HI value can't be smaller than the LO value and the LO value can't be larger than the HI value. HI value will be adjusted to the LO value when a rollover occurs. The maximum LO value is the HI value.*
- *If data logging is progressing, the beeper is disabled to save battery power but the display will still show the warning letters HI-- or LO--.*
- *The values of the high and low alarm are stored in memory. They are restored when the Clamp is turned on.*

## **Setting the Sampling Interval**

1. Press the FUNC button until **SEI** appears in the upper display. Figure 6 shows the sampling interval display.
2. The Clamp shows the current sampling interval in seconds.
3. Press  or  to increment/decrement the sampling interval by 1 second. The sampling interval can be incremented or decremented from 0 to 255 seconds. Hold down the up or down buttons to quickly increment/decrement to the desired value.
4. Press  until you return to the main display.







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**Figure 6. Setting the Sampling Interval**




### **Logging Data**

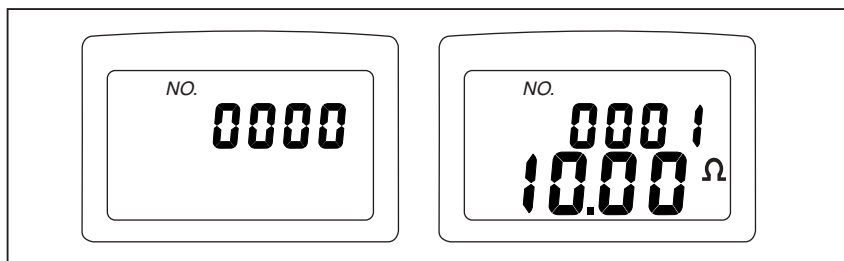
1. Press ; REC appears in the upper display.
2. Data is recorded at the sampling interval you specified. Data logging will stop when memory is full, the Clamp detects a low battery, or you press the  button again.

#### *Note*

*If the sampling interval is set at 0 seconds, only one data point is recorded. To record the next data point press the REC button again. The memory location is also displayed for about 1 second.*

## Reading Data Stored in Memory


1. Press  until NO. appears on the display. The current memory location appears on the upper display and the stored data appears on the lower display. Figure 7 shows the stored data display.
2. Press  or  to go to the next or previous memory location. The memory location rolls over when the first or last record is reached.




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Figure 7. Stored Data Display

## Clearing Memory

To clear the memory press and hold  and then turn the Clamp on. The letters **CL** appear on the display and indicate that memory is cleared.

## Canceling Auto-Power Off

When the Clamp is turned on, the letters **AP** appear on the display and indicate that Auto-Power Off is turned on. To cancel Auto-Power Off, press  and then turn the Clamp on. The letters **AP** will no longer appear on the display.

## Maintenance

### Warning

To avoid possible electric shock or personal injury, repairs or servicing not covered in this manual should be performed only by qualified personnel.

## ***Cleaning the Clamp***

### **⚠ Caution**

**To avoid damaging the Clamp, do not use aromatic hydrocarbons or chlorinated solvents for cleaning. These solutions will react with the plastics used in the Clamp.**

Clean the instrument case with a damp cloth and mild detergent.

## ***Replacing the Battery***

### **⚠ ⚠ Warning**


**To avoid false readings that could lead to possible electric shock or personal injury, replace the batteries as soon as the low battery indicator (+) appears.**

To replace the battery:

1. Turn the rotary switch to OFF.
2. Use a Phillips screw driver to remove the bottom case screws.
3. Lift and remove the bottom case.
4. Remove the old battery.
5. Replace the battery with a new 9-V battery.
6. Install the bottom case and tighten the screws.

## Specifications

### Electrical Specifications

Display.....	9999 digit liquid crystal display with special symbols
Operating Humidity.....	Less than 85% RH
Storage Temperature .....	-20 °C to 60 °C (-4 °F to 140 °F)
Storage Humidity.....	Less than 75% RH
Reference Temperature .....	23 °C ± 5 °C (73 °F ±9 °F)
Temperature Coefficient.....	0.1 % X (specified accuracy)/ °C (< 18 °C or > 28 °C)
Operating Temperature .....	0 °C to +50 °C (+32 °F to +122 °F)
Protective Type .....	IP23 according to IEC 60529/EN 60529
Category Rating .....	300 V CAT III/pollution degree 2 and 600 V CAT II
EMC (Emission) .....	IEC 61000-4-1, IEC 61326-1 class B
EMC (Immunity) .....	IEC 61000-4-2 8 kV (air) criteria B, IEC 61000-4-3 V/m perf. Criteria A
Range Selection .....	Auto
Overload Indication .....	OL
Measurement Frequency .....	3.333 kHz
Power Requirement.....	9 V alkaline (type IEC 6F22, NEDA 1604)
Power Consumption .....	Approx. 40 mA (in $\Omega$ function)
Low Battery Indicator.....	
Maximum Non-destructive Current.....	100 A continuous, 200 A (< 10 sec) 50/60 Hz
Accuracy of Calibration Plate .....	+/- 0.5%
Data Logging Capacity .....	116 records
Data Logging Interval .....	1 to 255 seconds

### General Specification

Conductor Size.....	35 mm (1.38 in) approximately
Dimensions.....	276 mm (L) x 100 mm (W) X 47 mm (H) 10.8 in (L) x 3.9 in (W) x 1.9 in (H)
Weight .....	750 g (1.65 lbs)

## **Ground Loop Resistance**

<b>Range</b>	<b>Accuracy<sup>[1]</sup> (± % of reading + Ω)</b>
0.025 to 0.250 Ω	± 1.5 % + 0.02 Ω
0.250 to 1.000 Ω	± 1.5 % + 0.002 Ω
1.000 to 9.999 Ω	± 1.5 % + 0.01 Ω
10.00 to 50.00 Ω	± 1.5 % + 0.03 Ω
50.00 to 99.99 Ω	± 1.5 % + 0.5 Ω
100.0 to 200.0 Ω	± 3.0 % + 1.0 Ω
200.1 to 400.0 Ω	± 5.0 % + 5.0 Ω
400.0 to 600.0 Ω	± 10.0 % + 10.0 Ω
600.0 to 1500.0 Ω	± 20.0 %
[1] Loop resistance with no inductance, external field < 200 A/m, external electrical field < 1 V/m, conductor centered.	

## **Ground Leakage Current mA**

Autorange 50/60 Hz, True rms, crest factor CF <3.5

<b>Range</b>	<b>Accuracy</b>
0.300 to 1.000 mA	± 2.0 % rdg ± 0.05 mA
1.00 to 10.00 mA	± 2.0 % rdg ± 0.03 mA
10.0 to 100.0 mA	± 2.0 % rdg ± 0.3 mA
100 to 1000 mA	± 2.0 % rdg ± 3.0 mA

## **Ground Leakage Current A**

50/60 Hz, True rms, crest factor CF <3.5

<b>Range</b>	<b>Accuracy</b>
0.200 to 4.000 A	± 2.0 % rdg ± 0.003 A
4.00 to 35.00 A	± 2.0 % rdg ± 0.03 A

