FLUKE®

1630
Earth Ground Clamp

Calibration Information

Introduction

This document provides the following information for the 1630 Earth Ground Clamp (hereafter referred to as the Clamp or UUT):

- Safety information
- Symbols
- Specifications
- Maintenance
- Performance Tests
- Calibration Adjustments
- Product Warranty Statement

For complete operating instructions, refer to the *1630 Instruction Sheet*.

Contacting Fluke

For warranty service, contact Fluke as follows:

USA: 1-888-99-FLUKE (1-888-993-5853)
Canada: 1-800-36-FLUKE (1-800-363-5853)
Europe: +31 402-675-200
Japan: +81-3-3434-0181
Singapore: +65-738-5655
Anywhere in the world: +1-425-446-5500

Or, visit Fluke's Web site at www.fluke.com.

To register your product, go to register.fluke.com.

October 2007

Safety Information

⚠⚠ Safety Information

To avoid possible electric shock or personal injury and ensure safe operation and service of the 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 Instrument's safety features may be impaired.**
- **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 Instrument 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

Table 1 describes the symbols that appear on the Clamp or in this document.

Table 1. Symbols

Symbol	Explanation
	Application to or removal from hazardous, live conductors is permitted.
	Risk of danger. Important information.
	Hazardous voltage. Risk of electric shock.
	Double insulated.
	Battery or battery compartment. Low battery when shown on display.
	Conforms to requirements of European Union.
	Do not dispose of this product as unsorted municipal waste. Go to Fluke's website for recycling information.
	*Canadian Standards Association.* Complies with Canadian and US Standards.

Specifications

General Specifications

Conductor Size..... 33 mm (1.3 in) approximately
Dimensions (L x W x H)..... 276 mm x 100 mm x 47 mm (10.8 in x 3.9 in x 1.9 in)
Weight..... 750 g (1.65 lb)

Electrical Specifications

Display..... LCD
Operating Humidity..... Less than 85 % RH
Storage Temperature..... -20 °C to 60 °C (-4 °F to 140 °F)
Storage Humidity..... < 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..... IP30 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 6 LR 61, NEDA 1604A)
Power Consumption..... Approx. 40 mA (in Ω function)
Maximum Non-Destructive Current..... 100 A continuous, 200 A (< 10 sec) 50/60 Hz
Accuracy of Calibration Plate..... ± 0.1 %
Data Logging Capacity..... 116 records
Data Logging Interval..... 1 to 255 seconds

Ground Loop Resistance

Range	Accuracy [1] (± % of reading + Ω)
0.025 to 0.250 Ω	± 1.5 % + 0.02 Ω
0.250 to 1.000 Ω	± 1.5 % + 0.05 Ω
1.000 to 9.999 Ω	± 1.5 % + 0.1 Ω
10.00 to 50.00 Ω	± 1.5 % + 0.3 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 %

Note
[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

Range	Accuracy
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

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

Range	Accuracy
0.200 to 4.000 A	± 2.0 % rdg ± 0.03 A
4.00 to 35.00 A	± 2.0 % rdg ± 0.03 A

Maintenance

⚠⚠Warning

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

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 screwdriver 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-volt battery.
6. Install the bottom case and tighten the screws.

Performance Tests

⚠⚠Warning

To avoid possible electric shock, ensure the Clamp is completely assembled before performing any test procedures. Only qualified personnel should perform these tests.

The following performance tests verify the complete operation of the Clamp and check the accuracy of each function against its specifications. Before performing any of the following tests, check the battery and replace if necessary.

The recommended calibration interval is 12 months. In the performance tests, the Clamp is referred to as the unit under test (UUT). If the UUT fails any performance test, contact Fluke Service for repair. See *Contacting Fluke*.

Required Equipment

Table 2 lists the required equipment to complete the performance tests. If the recommended models are unavailable, use equipment with equivalent specifications.

Table 2. Required Equipment

Equipment	Minimum Required Characteristics	Recommended Model
Calibrator	AC current: • Range 9 mA to 10 A • Accuracy ac mA ± 1.25 % • Accuracy Amps ± 0.15 % • Frequency 60 Hz	Fluke 5520A High Performance Multi-Product Calibrator or Fluke 5500A Multi-Product Calibrator
Precision Decade Resistance Box	Accuracy, 1 Ω to 1100 Ω: ± 0.475 %	Yokogawa 2793 or equivalent
Magnet wire coil	3 turns, 14-gauge film-coated copper wire, 6-in. diameter	---
1-loop copper wire coil	1 turn, 14-gauge copper wire, 6-in. diameter	---

Testing the LCD

Use the following procedure to test the LCD:

1. Push down and hold FUNC while turning on the Clamp.
2. Compare the LCD with the example in Figure 1.
3. Check all display segments for clarity and contrast.

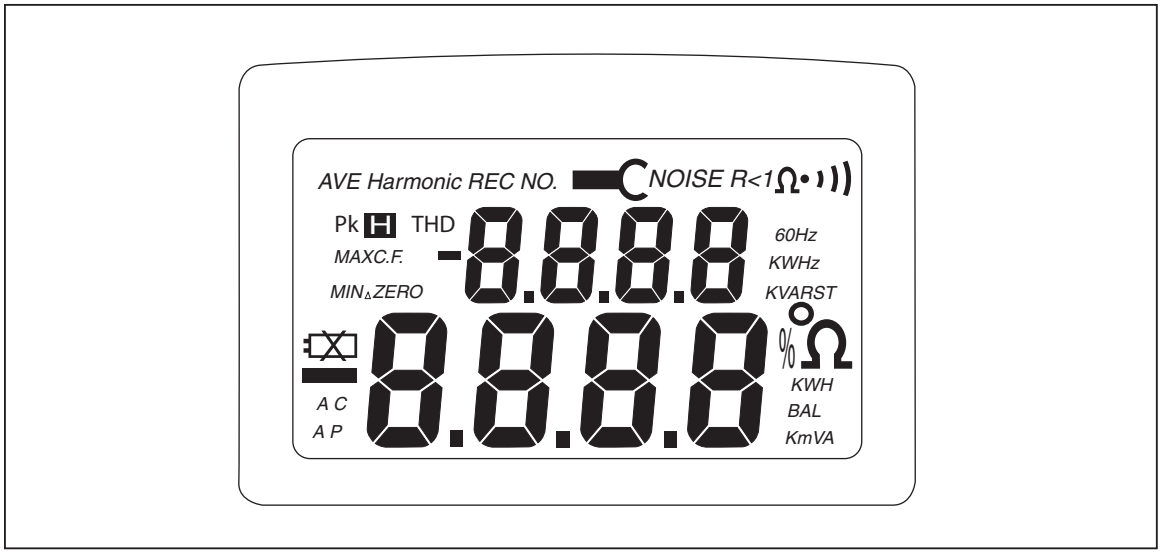

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Figure 1. LCD Test

Accuracy Tests

Accuracy specifications are valid for one year after calibration when measured at an operating temperature of 18 °C to 28 °C. Allow the UUT to stabilize at room temperature before performing the accuracy tests.

To verify the accuracy of the UUT functions, complete the following steps:

1. Connect a 6-inch diameter loop of wire across the output terminals of the decade resistor box.
2. Turn the UUT rotary switch from OFF to Ω and verify the UUT displays CAL 7, 6, 5…CAL 1 and a single beep is heard.
3. Set the decade box for the Applied Value in Table 3, steps 1-4, and clamp the UUT around the wire loop at the output terminals.
4. Compare the displayed reading with Display Reading Limits.
5. Continue accuracy tests for the other functions listed in Table 3. If any display readings fall outside of the Display Reading Limits in Table 3, the UUT requires calibration adjustment or repair. See *Contacting Fluke*.

Table 3. 1630 Accuracy Tests

Step	UUT Function	Source	Applied Value	Display Reading Limits/Instruction
1	Ω	Decade Resistance Box and 6-in. diameter wire loop	1 Ω	0.935 to 1.065
2			9 Ω	8.765 to 9.235
3			12 Ω	11.52 to 12.48
4			90 Ω	88.15 to 91.85
5			110 Ω	105.7 to 114.3
6			200 Ω	193.0 to 207.0
7			400 Ω	375.0 to 425.0
8			600 Ω	530.0 to 670.0
9			1100 Ω	880.0 to 1320.0
10	~ mA	Calibrator and 6-in. diameter wire loop	0.3 mA, 60 Hz	0.244 to 0.356
11			0.9 mA, 60 Hz	0.832 to 0.968
12			1.1 mA, 60 Hz	1.05 to 1.15
13			9 mA, 60 Hz	8.79 to 9.21
14			11.0 mA, 60 Hz	10.5 to 11.5
15			90 mA, 60 Hz	87.9 to 92.1
16			110 mA, 60 Hz	105 to 115
17			900 mA, 60 Hz	879 to 921
18	~ A		0.3 A, 60 Hz	0.264 to 0.336
19			3 A, 60 Hz	2.910 to 3.090
20			4.2 A, 60 Hz	4.09 to 4.31
21		Calibrator and 3 turns of copper magnet wire, 6-in. diameter	10 A, 60 Hz	29.37 to 30.63

Table 3. 1630 Accuracy Tests (cont.)

Step	UUT Function	Source	Applied Value	Display Reading Limits/Instruction
22	Continuity			Press FUNC and set the HI alarm to 40 Ω
23				Press FUNC to return to measurement function
24		Decade Resistance Box and 6-in. diameter wire loop	50 Ω	Clamp Beeps and Display shows HI__
25				Press FUNC and set the LO alarm to 30 Ω
26				Press FUNC to return to measurement function
27			10 Ω	Clamp Beeps and Display shows LO__
28				Press FUNC until SEC is shown on display. Press the ▲ and ▼ to check if value can be incremented.
29	Ω	Decade Resistance Box and 6-in. diameter wire loop	10 Ω, 20 Ω, 30 Ω, 40 Ω, 50 Ω	Press REC to record each value when display reading is stable.
30				Press FUNC until No. and 0000 are shown on the display. Press ▲ and ▼ to check if recorded values are displayed.
31				Turn the power off. Hold REC and then turn the power on. The display will show CL to indicate that memory is cleared.
32				Turn power off. Hold FUNC, then turn power on. When a beep sound is heard, release FUNC. The AP symbol will not appear on the lower left corner of the display. Auto-Power-Off is disabled.
33		Decade Resistance Box and 6-in. diameter wire loop	10 Ω	Press (HOLD) when the display reading is stable. Press (HOLD) to hold the reading. Open the jaw and clamp on nothing. The reading should still show 10 Ω with “Harmonic” shown on the display.
34	~ A			Turn the power off then on. The AP (Auto-Power-Off) symbol should be in the left hand bottom corner of the display. Wait 4 to 5 minutes. The UUT should turn itself off.

Calibration Adjustment

To prepare the UUT for calibration, remove the back case and complete the following steps:

1. Remove the battery compartment by sliding a small, flathead screwdriver down between the tabs and pca and lifting the compartment out.
2. Remove the bottom black shield to access the calibration potentiometers underneath this shield. See Figure 2.

To enter calibration adjustment mode:

1. Press HOLD, FUNC, and ▼ simultaneously while turning the UUT power on.
2. Continue to hold the buttons down until you hear a beep. "Harmonic" displays on the LCD when the buttons are released.

The UUT is now in the calibration adjustment mode. Refer to Figure 2 for adjustment locations and complete the adjustments as instructed in Table 4. If the UUT fails to meet any expected results, contact Fluke Service for repair. See *Contacting Fluke*.

Table 4. Calibration Adjustment Steps

Step	Action	Meter Function	Source	Applied Value	Adjust	Expected Result/Instruction
1	Enter Cal Mode					Harmonic displays
2	Adjust	~ A		None	VR11	15 to 16 digits displayed
3	Adjust	Ω		None	VR2	Rotate VR2 for minimum value
4	Adjust	Ω		None	VR1	Adjust VR1 for 150 digits on display
5	Check	Ω	Decade Resistance and 6-in. wire loop	1 kΩ		Reading should increase to 250 (± 10) digits
6	Check	Ω		5 Ω		Reading should be 18.00 to 22.00
7	Enter Normal Measurement Mode		Remove unit from wire loop			Turn unit Off and then On
8	Adjust	Ω	Decade Resistance and 6-in. wire loop	5 Ω	VR10	5.000 Ω to ± 0.005
9	Adjust	Ω		50 Ω	VR3	50.00 Ω + 0.00, - 0.05
10	Adjust	Ω		20 Ω	VR11	19.90 to 20.00
11	Check	Ω				Repeat Steps 8, 9, and 10 until expected results are met.
12	Adjust	~ mA	Calibrator and 6-in. wire loop	90 mA / 60 Hz	VR20	89.90 to 90.00
Before proceeding to Step 13, reassemble the UUT by replacing the shield, battery compartment, and back case.						

Table 4. Calibration Adjustment Steps (cont.)

Step	Action	Meter Function	Source	Applied Value	Adjust	Expected Result/Instruction
13	Enter Cal Mode					Harmonic displays
14		~ A	Calibrator and 6-in. wire loop	1 A / 60 Hz		Press (HOLD) once when reading is stable.[1]
15		~ A		3 A / 60 Hz		Press (HOLD) once when reading is stable.[1]
16		~ A		10 A / 60 Hz		Press (HOLD) once when reading is stable.[1]
17		~ A	Calibrator and 3 turns copper magnet wire, 6-in. diameter	30 A / 60 Hz		Press (HOLD) once when reading is stable.[1]

Note
[1] Disregard reading accuracy during these calibration steps.

The calibration adjustment is now complete.

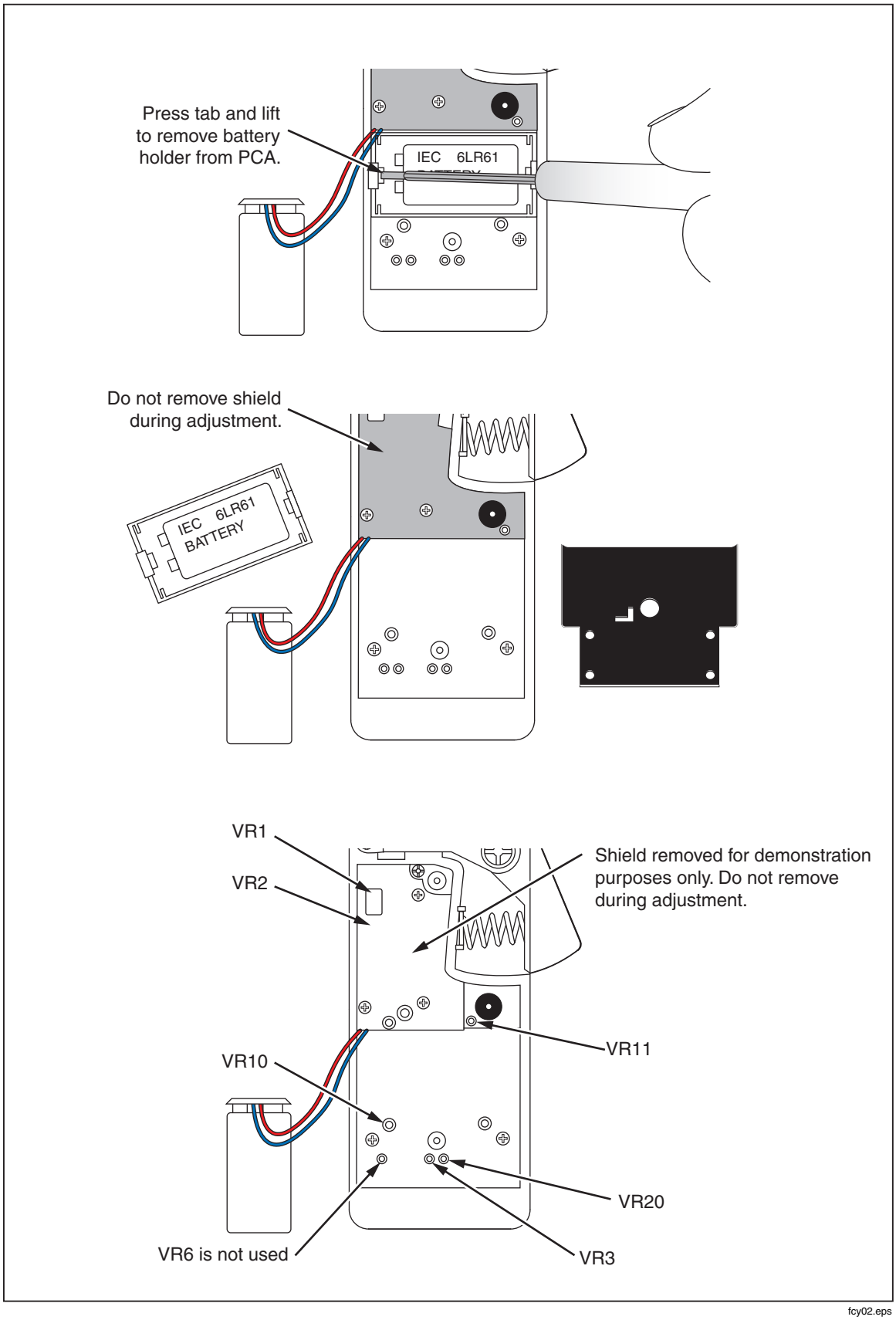

Figure 2. Disassembly and Adjustment Locations

Limited Warranty and Limitation of Liability

Each Fluke product is warranted to be free from defects in material and workmanship under normal use and service. The warranty period is one year and begins on the date of shipment. Parts, product repairs, and services are warranted for 90 days. This warranty extends only to the original buyer or end-user customer of a Fluke authorized reseller, and does not apply to fuses, disposable batteries, or to any product which, in Fluke's opinion, has been misused, altered, neglected, contaminated, or damaged by accident or abnormal conditions of operation or handling. Fluke warrants that software will operate substantially in accordance with its functional specifications for 90 days and that it has been properly recorded on non-defective media. Fluke does not warrant that software will be error free or operate without interruption.

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Fluke's warranty obligation is limited, at Fluke's option, to refund of the purchase price, free of charge repair, or replacement of a defective product which is returned to a Fluke authorized service center within the warranty period.

To obtain warranty service, contact your nearest Fluke authorized service center to obtain return authorization information, then send the product to that service center, with a description of the difficulty, postage and insurance prepaid (FOB Destination). Fluke assumes no risk for damage in transit. Following warranty repair, the product will be returned to Buyer, transportation prepaid (FOB Destination). If Fluke determines that failure was caused by neglect, misuse, contamination, alteration, accident, or abnormal condition of operation or handling, including overvoltage failures caused by use outside the product's specified rating, or normal wear and tear of mechanical components, Fluke will provide an estimate of repair costs and obtain authorization before commencing the work. Following repair, the product will be returned to the Buyer transportation prepaid and the Buyer will be billed for the repair and return transportation charges (FOB Shipping Point).

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