

EXTECH[®]

User Manual

CLT600 Cable Locator and Tracer

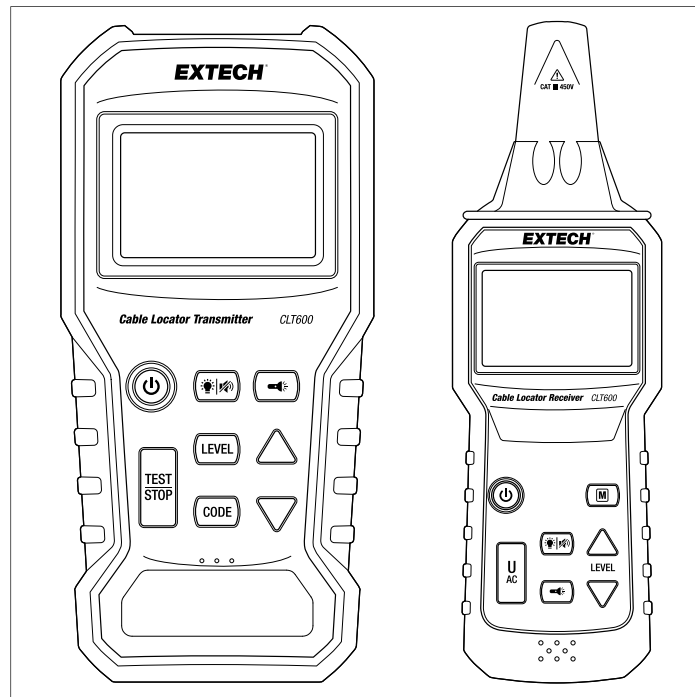


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1 Introduction

Thank you for selecting the Extech CLT600 Cable Locator and Tracer. The system allows you to easily locate cable faults, diagnose and trace cables and circuits, test AC outlet wiring, detect faults in floor heating systems, perform non-contact voltage detection on energized circuits, locate fuses or breakers on panels, and more.

The CLT600 includes a Transmitter that can measure voltage and inject signals through cables or pipes, and a Receiver for tracing the transmitted signals. The Receiver also detects voltage in the non-contact voltage detection mode.

These instruments are shipped fully tested and, with proper use, they will provide years of reliable service. Please visit our website (www.extech.com) for additional information including the latest version of this User Manual and Customer Support.

1.1 Transmitter Features

- Locates and identifies powered and de-energized cables and individual conductors.
- Measures voltage from 12 V ~ 450 V AC / DC using the supplied test leads.
- Transmits high frequency signal through wires or pipes.
- Selectable transmission power level setting (1 ~ 3).
- Selectable transmission signal codes.
- Transmission power level bar graph indicator.

1.2 Receiver Features

- Identifies and traces powered or de-energized wires and cables.
- Traces signal sent from Transmitter.
- Displays the Level setting, Code, and strength of detected signal.
- Bar graph and variable tone indicate detected signal strength.
- Auto and Manual signal detection modes.
- Selectable Sensitivity (8 levels) in Manual mode.
- Non-contact voltage detection.
- Warning display and audible tone when voltage is detected.

1.3 Common Features

- LED Worklights.
- Backlit display.
- Silent mode of operation with button beeper and frequency tone disabled.
- Automatic power off (APO).

1 Introduction

- Battery status indication.

1.4 Supplied Materials


This kit includes the following items.

- Transmitter and Receiver.
- Printed Quick Start.
- Test lead set.
- Alligator clips (2).
- Earth ground rod/spike.
- Batteries (12).
- Socket adapter with North America 3 pin (type B) plug.
- Hard-shell carrying case.

2 Safety

NOTE

These devices have been designed and tested according to CE Safety Requirements for Electronic Measuring Apparatus, EN 61010-1 EN 61326-1 and other safety standards. Follow all warnings to ensure safe operation.

 WARNING
Read the safety notes, below, before using this device.

2.1 Safety Notes

- Read the following safety information carefully before attempting to operate or service these devices.
- Use these devices only as specified in this manual, otherwise the protection provided by these devices may be impaired.
- Rated environmental conditions:
 1. Indoor use only.
 2. Installation Category III 450 V.
 3. Pollution Degree 2.
 4. Altitude up to 2000 m (6562').
 5. Relative Humidity 80% maximum.
 6. Ambient temperature: 32 ~ 104°F (0 ~ 40°C).

2.2 International Safety Symbols



Figure 2.1 Meter is protected throughout by double insulation or reinforced insulation.



Figure 2.2 Warning! Risk of electrical shock.



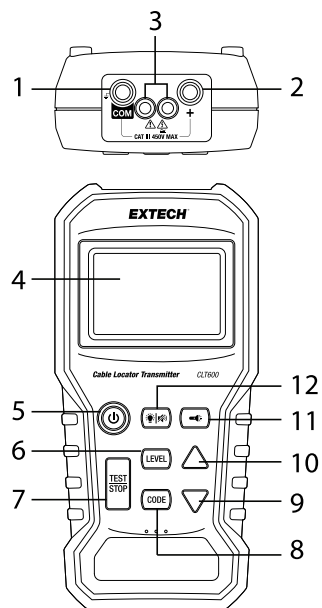
Figure 2.3 Caution! Refer to this manual before using this meter.



Figure 2.4 Earth Ground.

3 Product Description

3.1 Transmitter Description



1. Negative (**COM**) terminal
This is the ground, or common, terminal. Connect the black test lead to this terminal.
2. Positive '+' terminal
Connect the red test lead to this terminal.
3. Worklight
4. LCD Screen
5. Power ON/OFF button
Short press to switch ON or OFF
6. **LEVEL** button
Short press to access the Level selection mode. The 'LEVEL' text will flash on the display. Use the arrow buttons to select from three available signal levels.

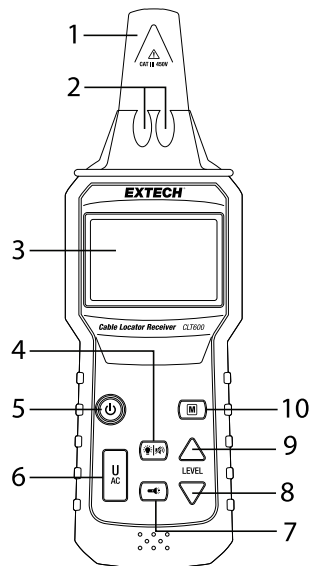
3 Product Description

7. **TEST/STOP** button
Press to send or to stop the transmission signal.
8. **CODE** button
Long press this button to access the Code selection mode. The '**CODE**' text will flash on the display. Use the arrow buttons to scroll through and select an optional code (F, E, H, d, L, C, O, A). This feature is handy in identifying Transmitters when 2 or more CLT600 systems are used.
9. Down arrow button
Short press to increase the signal level in the **LEVEL** mode or to scroll through the codes in the **CODE** selection mode.
10. Up arrow button
Short press to decrease the signal level in the **LEVEL** mode or to scroll through the codes in the **CODE** selection mode.
11. Worklight button
Short press to switch the Worklights ON or OFF.
12. Backlight and Mute button
Short press to switch the LCD backlight ON or OFF. Long press to switch the beeper ON or OFF.

The battery compartment is located on the back of the instrument.

3 Product Description

3.2 Receiver Description



1. Receiver Antenna
Detects and traces a transmitted signal or a voltage source in the non-contact detector mode.
2. Worklights
3. LCD
4. Backlight and Mute button
Short press to switch the LCD backlight ON or OFF. Long press to switch the beeper ON or OFF.
5. Power ON/OFF button
Short press to switch ON or OFF
6. **U_{AC}** button
Short press to access the non-contact voltage detection mode. Press again to return to normal Receiver mode.
7. Worklight button
Short press to switch the Worklights ON or OFF.

3 Product Description

8. Down arrow button
Short press to decrease the sensitivity level in the Manual signal detection mode.
9. Up arrow button
Short press to increase the sensitivity level in the Manual signal detection mode.
10. Manual (**M**) button
Short press to access the Manual signal detection mode. Select from eight sensitivity levels using the **LEVEL** buttons.

The battery compartment is located on the back of the instrument.

3.3 Display Description

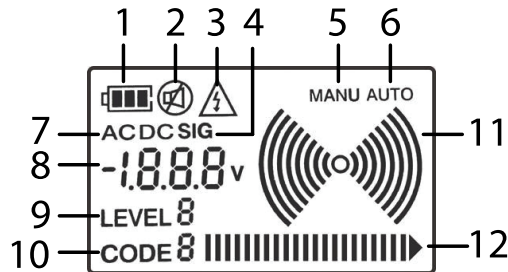


Figure 3.1 Display Description

1. Battery status.
2. Beeper ON/OFF status.
3. Voltage warning.
4. Signal indicator (indicates that the digital display is showing the received signal strength).
5. Manual detection mode.
6. Automatic detection mode.
7. Voltage AC or DC (digital display is showing an AC or DC voltage measurement).
8. Digital display for voltage measurement (Transmitter) or strength of detected signal (Receiver).
9. Transmission strength (Level) selection.
10. Code ID indication.

3 Product Description

11. Signal indicator. Radiating arc graphics appear when Transmitter is sending a signal. On the Receiver, the number of arcs corresponds to the receiver 'sensitivity level'.
12. Bar-graph shows signal level.

4 Transmitter Operating Modes

4.1 Transmitter TEST and TRANSMIT Mode

When the power is on, the Transmitter defaults to the Test mode. In this mode you can measure AC or DC voltage with the test leads. In this mode you can also transmit a signal. Press the **TEST/STOP** button to allow the Transmitter to send a signal. Press the **TEST/STOP** button again to switch the signal OFF.

4.2 Transmitter LEVEL Selection Mode

Press the **LEVEL** button to access the transmission strength selection mode, the '**LEVEL**' symbol text will flash. Use the up/down arrow buttons to select the strength of the transmission signal (level: 1~3). Press the **LEVEL** button again to return to the Test Mode. Select signal level '3' when using the ground spike.

4.3 CODE Selection Mode

Codes can be used to differentiate two or more transmitters that are being used to detect a break in a circuit.

Long press the **CODE** button to access the code selection mode, the '**CODE**' text symbol will flash. Use the up/down arrow buttons to select a code (F, E, H, d, L, C, O, A). Press the **CODE** button again to return to the Test Mode.

5 Receiver Operating Modes

5.1 Automatic Detection Mode

When the power is on, the Receiver defaults to the auto detection mode where it can trace the high frequency transmission signal at the highest sensitivity. The Receiver responds to the detected signal with a variable tone (550 Hz ~ 1.6 kHz) and a bar-graph indication. The stronger the signal, the higher the frequency of the tone and the higher the number of bars in the bar-graph.

The receiver displays **SIG** (Signal) and the numeric value of the received signal strength. The optional transmission identifier Code, sent from the Transmitter, is also displayed.

5.2 Manual Detection Mode

Press the **M** button to access the manual detection mode where you can select the signal sensitivity level (8 steps) using the up/down arrow buttons. Press the **M** button to return to the Auto Detection mode.

5.3 Non-Contact Voltage Detection Mode (U_{AC})

Press the U_{AC} button to access the non-contact voltage detection mode. In this mode you can detect a voltage source without having to make contact with the wiring, circuit, AC power line, or wall outlet.

6 Applications

6.1 Single-pole applications

6.1.1 Locating Opened Wires

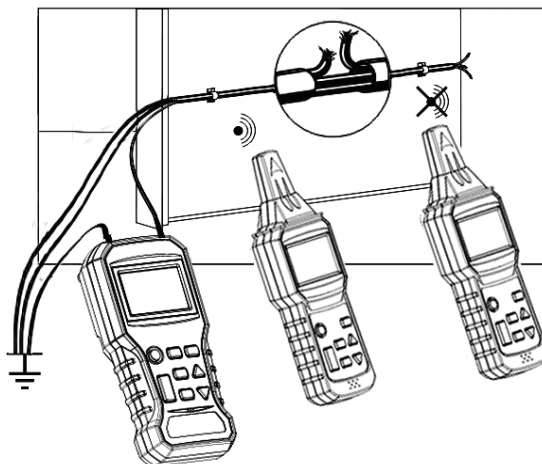



Figure 6.1 Locating opened wires. Diagram shows one transmitter in a fixed location and one Receiver being used in two locations. The Receiver position on the left is detecting a signal, while the Receiver position on the right is not detecting a signal.

1. Connect the red, positive (+) terminal to a single conductor.
2. Connect the black (**COM**) terminal to earth ground. If convenient, use the supplied ground spike for an outdoor earth ground connection.
3. If there are additional conductors in the same conduit or cable, they will also have to be connected to earth ground.
4. The Receiver can now detect the location of the wiring fault.

6.1.2 Locating and Tracing Lines and Receptacles

 WARNING
Do not perform this test on a live circuit.

6 Applications

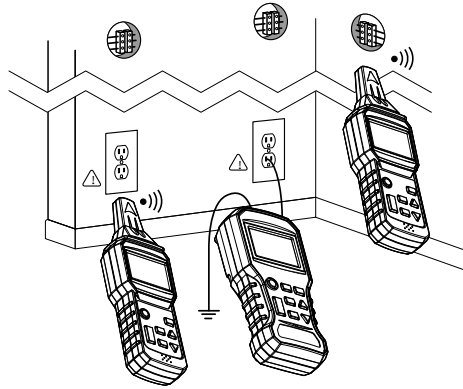


Figure 6.2 Locating and Tracing Lines and Receptacles

1. Connect the red, positive (+) terminal to the live (hot) conductor.
2. Connect the black (**COM**) terminal to earth ground. When working outdoors, you can use the supplied ground spike for an earth ground connection.
3. Note that if the signal carrying cable is near other conductors, in parallel, (cable tray, channel, etc.) or is interlaced or crossed with these conductors, signals may propagate into a cable and create spurious signals that could be detected.

6.2 Two-pole Applications

6.2.1 Tracing Connections

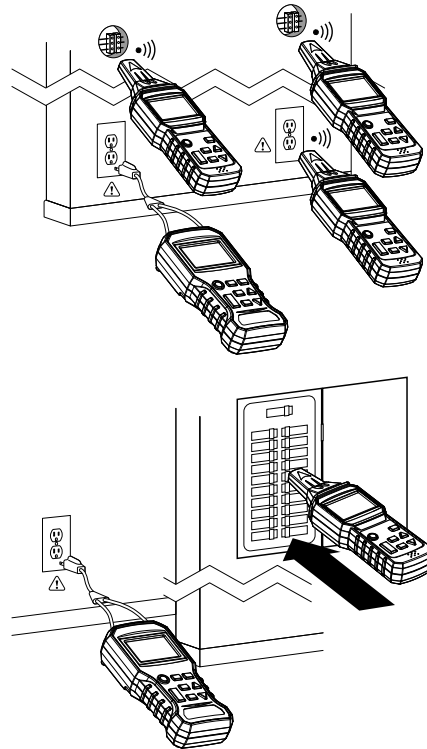


Figure 6.3 Matching connected points in a circuit.

1. Connect the supplied Socket Adaptor to the Transmitter and plug the AC connector into an AC receptacle.
2. The Transmitter can now measure the voltage of the mains and transmit the signal through the mains.
3. The Receiver can then trace the mains and determine if the receptacle is located on the same line, if another receptacle or breaker is connected on the same circuit'.

6.2.2 Broken Line Detection

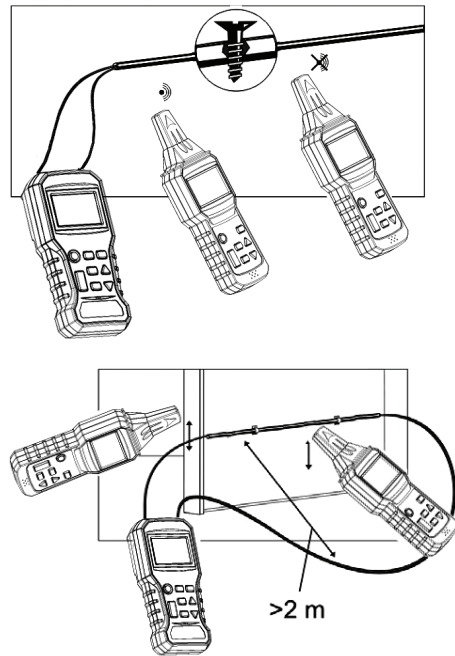



Figure 6.4 Two Examples of Broken Line Detection (the top diagram shows a two-conductor test, while the bottom diagram shows a single-conductor test). Diagrams show one transmitter in a fixed location and one Receiver being used in two locations. On the top diagram, the Receiver position on the left is detecting a signal, while the Receiver position on the right is not detecting a signal.

1. **Method 1:** Connect both terminals of the transmitter, one to each wire, at one end of the line. At the other end of the line, connect the wires together.
2. **Method 2:** Connect both terminals of the transmitter to each end of a single wire in the line.
3. The Receiver can now determine the position of the broken wire in the signal line in the wall or floor.

6.3 Other Applications

6.3.1 Tracing an Underground Circuit

	WARNING
The circuit under test must not be live.	

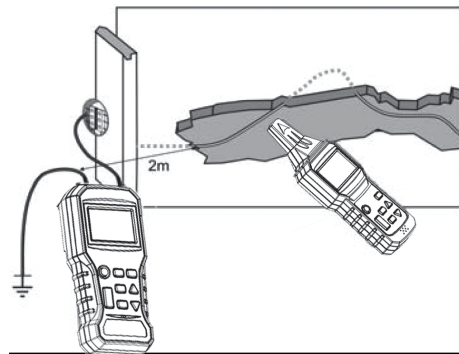


Figure 6.5 Tracing Underground Circuits


1. Connect the Transmitter's positive (+) terminal as shown in the diagram.
2. The Transmitter's **COM** terminal must be correctly connected to earth ground. When working outdoors, you can use the supplied ground spike for an earth ground connection.
3. Use the Auto Detect mode of the Receiver to locate and trace the circuit.
4. The distance between the earth wire and the circuit to be located must be as wide as possible, otherwise the earth connection may interfere with the detection of the circuit line.

6.3.2 Detecting Faults in a Floor Heating System

Refer to the application image in Figure 6.1 earlier in this manual for a visual example.

1. Connect the red, positive (+) terminal to a single conductor.
2. Connect the black (**COM**) terminal to earth ground. When working outdoors, you can use the supplied ground spike for an earth ground connection.
3. If there are additional conductors in the same conduit or cable, they will also have to be connected to earth ground.
4. The Receiver can now detect a broken wire location.

6.3.3 Detecting Faults in a Floor Heating System (using two kits)

 WARNING
The circuit under test must not be live.

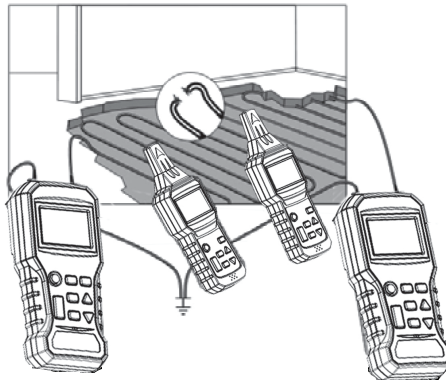


Figure 6.6 Detecting Faults in a Floor Heating System

1. The right end of the circuit is connected to the Transmitter that is sending an 'x' Code signal, and the left side of the circuit is connected to the other Transmitter that is sending a 'y' Code signal (both Transmitters must be earth grounded). The 'x' and 'y' codes used in this example represent the transmission codes that the user can program to identify which transmitter is being detected (see more about Codes in Section 4.1, *Transmitter Operating Modes*).
2. When the line is traced, the place at which the signal, detected by the Receiver, falls off suddenly is the location of the break.

6.3.4 Non-Contact Voltage Detection

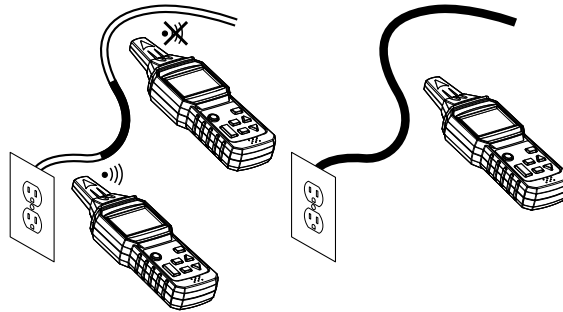


Figure 6.7 Non-Contact Voltage Detection

1. The circuit under test must be live and connected to the mains.
2. Set the Receiver to the U_{AC} mode.
3. Hold the tip of the Receiver close to the source of AC voltage to test.
4. The mains AC voltage detected by the Receiver in the U_{AC} mode only indicates whether or not the circuit is live.
5. While searching for the ends of the supply lines, the lines must be connected separately, one by one.
6. The number of bars on the bar graph and the frequency of the audible tone increases as the strength of the detected signal increases. The closer the sensor is to the source of voltage, the stronger the signal detection.

6 Applications

6.3.5 Using the Ground Spike

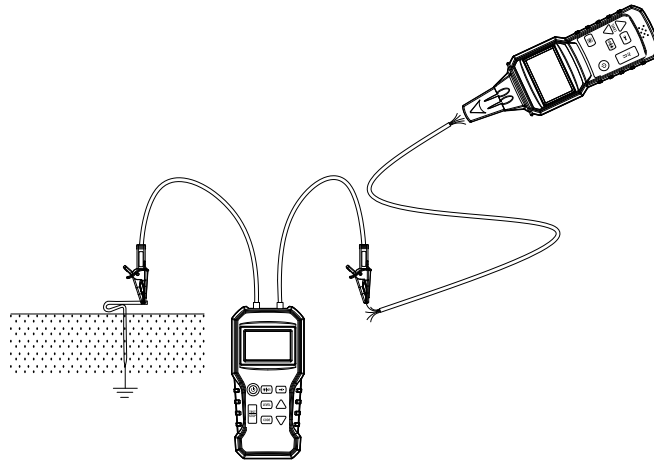


Figure 6.8 Earth Ground Spike

1. Refer to the accompanying diagram.
2. In applications that require an earth ground connection, you can use the supplied ground rod (spike) for convenience.
3. Carefully drive the supplied rod into the ground at the test area.
4. Connect the test leads and set up the test as shown in the application instructions in the accompanying sections.

7 Maintenance

7.1 Battery Replacement (Transmitter)

When the battery symbol appears and flashes on the LCD, replace the batteries as follows:

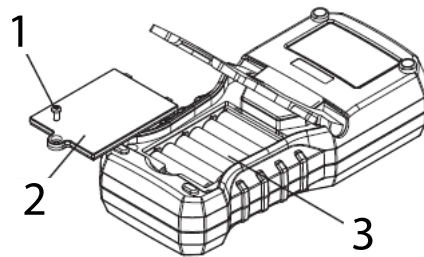


Figure 7.1 Replacing Transmitter Batteries

- Disconnect the test leads from the Transmitter and switch off the Transmitter's power.
- Open the battery compartment by first removing the compartment screw (1) and then removing the cover (2).
- Replace the batteries (1.5 V AAA x 6) observing correct polarity (3).
- Replace the compartment cover securely before operating the Transmitter.

7.2 Battery Replacement (Receiver)

When the battery symbol appears and flashes on the LCD, replace the batteries as follows:

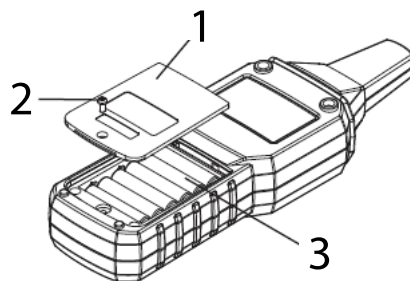


Figure 7.2 Replacing the Receiver's Batteries

- Switch off the Receiver's power.

7 Maintenance

- Open the battery compartment by first removing the compartment screw (2) and then removing the cover (1).
- Replace the batteries (1.5 V AAA x 6) observing correct polarity (3).
- Replace the compartment cover securely before operating the Receiver.

7.3 Cleaning and Storage



WARNING

To avoid electrical shock or damage to the instrument, do not allow water to access the housing.

- Periodically wipe the cases with a damp cloth and mild detergent. Do not use abrasives or solvents.
- If the instruments are not to be used for > 60 days, please remove the batteries and store them separately.

8 Specifications

8.1 Transmitter Specifications

Output signal frequency	125 kHz
Voltage measurement range	12 ~ 450 V AC / DC
Voltage measurement accuracy	± (2% reading + 2 digits)
Display	Backlit LCD with bar graph
Function displays	Transmission signal level, Voltage measurement (AC / DC), Battery level, Mode (Auto/Manual), and signal Code
Power source	1.5 V (AAA) battery x 6
Fuse	690 V / 0.5 A (6.3 x 32 mm)
Operating temperature and humidity	32°F ~ 104°F (0°C ~ 40°C) 80% R.H. Max.
Storage temperature and humidity	14°F ~ 122°F (-10°C ~ 50°C) 80% R.H. Max.
Dimensions	188 (L) x 90 (W) x 47 (D) mm 7.4 (L) x 3.5 (W) x 1.8" (D) inches
Weight	13.7 oz. (389 g) with batteries (approximately)

8.2 Receiver Specifications

Maximum Detection depth (typical)	Level 3: 19.66 in. (50 cm) Level 2: 11.81 in. (30 cm) Level 1: 3.94 in. (10 cm)
Display	Backlit LCD with bar graph
Function displays	Transmitted signal level, Received signal level, Battery level, Mode (Auto/Manual), signal Code
Power source	1.5 V (AAA) battery x 6
Operating temperature and humidity	32°F ~ 104°F (0°C ~ 40°C) 80% R.H. Max.
Storage temperature and humidity	14°F ~ 122°F (-10°C ~ 50°C) 80% R.H. Max.

8 Specifications

Dimensions	247(L) × 78 (W) × 45 (D) mm 9.7 (L) × 3.1 (W) × 1.8 (D) inches
Weight	11.4 oz. (324 g) with batteries (approximately)

8.3 General Specifications

Safety standard compliance	EN 61010-1 CAT III 450 V EN 61326-1
Low battery indication	Battery symbol appears and flashes on the LCD
Work lights	Two (2) LED Work lights on Transmitter and Receiver
Supplied accessories	Printed Quick Start, test leads, alligator clips, socket adapter with North America 3 pin (type B) plug, ground spike, batteries (1.5 V AAA x 12), and hard-shell carrying case.
Optional accessories	This product is supplied with a US adapter test lead set. Adapter leads for Europe (CLT-ADP-EU) and UK (CLT-ADP-UK) are available separately.
Hard-shell case dimensions	41.5 (L) × 29.9 (W) × 9 (H) cm 16.34 (L) × 11.77 (W) × 3.54 (H) inches
Kit weight (includes all supplied materials)	Approx. 5.51 lbs. (2.5 kg)

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