



AT-7000-EUR

Advanced Wire Tracers

AT-7020-EUR
AT-7030-EUR

User Manual





AT-7000-EUR

Advanced Wire Tracer

AT-7020-EUR
AT-7030-EUR

User Manual

English

Limited Warranty and Limitation of Liability

Your Amprobe product will be free from defects in material and workmanship for 1 year from the date of purchase. This warranty does not cover fuses, disposable batteries or damage from accident, neglect, misuse, alteration, contamination, or abnormal conditions of operation or handling. Resellers are not authorized to extend any other warranty on Amprobe's behalf. To obtain service during the warranty period, return the product with proof of purchase to an authorized Amprobe Test Tools Service Center or to an Amprobe dealer or distributor. See Repair Section for details. THIS WARRANTY IS YOUR ONLY REMEDY. ALL OTHER WARRANTIES - WHETHER EXPRESS, IMPLIED OR STATUTORY - INCLUDING IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY, ARE HEREBY DISCLAIMED. MANUFACTURER SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, ARISING FROM ANY CAUSE OR THEORY. Since some states or countries do not allow the exclusion or limitation of an implied warranty or of incidental or consequential damages, this limitation of liability may not apply to you.

Repair

All Amprobe tools returned for warranty or non-warranty repair or for calibration should be accompanied by the following: your name, company's name, address, telephone number, and proof of purchase. Additionally, please include a brief description of the problem or the service requested and include the test leads with the meter. Non-warranty repair or replacement charges should be remitted in the form of a check, a money order, credit card with expiration date, or a purchase order made payable to Amprobe.

In-warranty Repairs and Replacement – All Countries

Please read the warranty statement and check your battery before requesting repair. During the warranty period, any defective test tool can be returned to your Amprobe distributor for an exchange for the same or like product. Please check the "Where to Buy" section on www.Amprobe.com for a list of distributors near you. Additionally, in the United States and Canada, in-warranty repair and replacement units can also be sent to an Amprobe Service Center (see address below).

Non-warranty Repairs and Replacement – United States and Canada

Non-warranty repairs in the United States and Canada should be sent to an Amprobe Service Center. Call Amprobe or inquire at your point of purchase for current repair and replacement rates.

USA:
Amprobe
Everett, WA 98203
Tel: 888-993-5853
Fax: 425-446-6390

Canada:
Amprobe
Mississauga, ON L4Z 1X9
Tel: 905-890-7600
Fax: 905-890-6866

Non-warranty Repairs and Replacement – Europe

European non-warranty units can be replaced by your Amprobe distributor for a nominal charge. Please check the "Where to Buy" section on www.Amprobe.eu for a list of distributors near you.

Amprobe Europe*
Beha-Amprobe
In den Engematten 14
79286 Glottertal, Germany
Tel.: +49 (0) 7684 8009 - 0
www.Amprobe.eu

*(Correspondence only – no repair or replacement available from this address. European customers please contact your distributor.)

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1. PRECAUTIONS AND SAFETY MEASURES

General

For your own safety and to avoid damage to the instrument we suggest you to follow the procedures listed below:

NOTE: Before and during measurements be diligent to follow the instructions.

- Make sure that the electrical instrument is operating properly before use.
- Before attaching any of the conductors, make sure that the voltage present in the conductor is in the range of the instrument.
- Keep the instruments in their carrying case when not in use.
- If the transmitter or receiver will not be used for a long time, remove the batteries to prevent leakage in the instruments.
- Use Amprobe approved cables and accessories only.

Safety precautions

- In many instances, you will be working with dangerous level of voltage and/or current. Therefore, it is important that you avoid direct contact with any uninsulated, voltage/current carrying surfaces. Wear appropriate insulated gloves and protective clothing in hazardous voltage areas where required.
- Do not measure voltage or current in wet or damp or dusty places
- Do not measure in presence of gas, explosive materials or combustibles
- Do not touch the circuit under test if no measurement is being taken
- Do not touch exposed metal parts, unused terminals, circuits and so on
- Do not use the instrument if it seems to be malfunctioning (i.e. if you notice deformations, breaks, leakage of substances, and absence of messages on the display and so on.)

Safety information

The product complies with:

- UL/IEC/EN 61010-1, CAN/CSA C22.2 No. 61010-1, Pollution Degree 2, Measurement category IV 600 V (AT-7000-RE); Category IV 300V MAX (AT-7000-TE)
- IEC/EN 61010-2-033
- IEC/EN 61010-2-032
- IEC/EN 61010-031 (test leads)
- EMC IEC/EN 61326-1

Measurement Category III (CAT III) is applicable to test and measuring circuits connected to the distribution part of the building's low-voltage MAINS installation. This part of the installation is expected to have a minimum of two levels of over-current protective devices between the transformer and possible connecting points

Measurement Category IV (CAT IV) is for circuits that are directly connected to the primary utility power source for a given building or between the building power supply and the main distribution board. Such equipment may include electricity tariff meters and primary over current protection devices.

CENELEC Directives

The instruments conform to CENELEC Low-voltage directive 2006/95/EC and Electromagnetic compatibility directive 2004/108/EC.

1. PRECAUTIONS AND SAFETY MEASURES






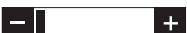
















⚠ ⚠ Warnings: Read Before Using

To avoid possible electric shock or personal injury:

- Use the Meter only as specified in this manual or the protection provided by the instrument might be impaired.
- Avoid working alone so assistance can be rendered.
- Do not use the Meter in wet or damp environments.
- Do not use the Meter if it appears damaged. Inspect the Meter before use. Look for cracks or missing plastic. Pay particular attention to the insulation around the connectors.
- Inspect the test leads before use. Do not use them if insulation is damaged or metal is exposed.
- Check the test leads for continuity. Replace damaged test leads before using the Meter.
- Have the Meter serviced only by qualified service personnel.
- Use extreme caution when working around bare conductors or bus bars. Contact with the conductor could result in electric shock.
- Do not hold the Meter anywhere beyond the tactile barrier.
- Do not apply more than the rated voltage, as marked on the Meter, between the terminals or between any terminal and earth ground.
- Remove test leads from the Meter before opening the Meter case or battery cover.
- Never operate the Meter with the battery cover removed or the case open.
- Never remove the battery cover or open the case of the Meter without first removing the test leads from any circuit.
- Use caution when working with voltages above 30 V ac rms, 42 V ac peak, or 60 V dc. These voltages pose a shock hazard.
- Do not attempt to measure any voltage that might exceed the maximum range of the Meter.
- Use the proper terminals, function, and range for your measurements.
- Do not operate the Meter around explosive gas, vapor, or dust.
- When using probes, keep fingers behind the finger guards.
- When making electrical connections, connect the common test lead before connecting the live test lead; when disconnecting, disconnect the live test lead before disconnecting the common test lead.
- To avoid false readings that can lead to electrical shock and injury, replace the battery as soon as the low battery indicator appears.
- When servicing, use only specified user serviceable replacement parts.
- 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.
- Only use the test lead provided with the Meter or Approved Probe Assembly rated CAT IV 600V or better.
- Do not use HOT STICK to operate the AT-7000-RE Receiver around voltage more than 600V
- The transmitter voltage indication by LED or measurement on the LCD is not sufficient to assure safety. Always verify the voltage presence/absence with approved voltage tester.
- The transmitter can generate dangerous voltages and currents at the output. Do not touch exposed wires or circuitry while be tested to avoid electrical shock!
- In order to avoid electrical shock, the valid safety and national regulations regarding excessive contact voltages must receive utmost attention when working with voltages exceeding 120 V DC or 50 V RMS AC.
- Do not touch exposed circuitry or wires, metal probe tips or other metal parts of test accessories. Always keep hands and fingers behind the probe or finger barriers.
- For products designed to be applied around or removed from uninsulated hazardous live conductors, individual (personal) protective equipment must be used if hazardous live parts of the installation could be accessible.

1. PRECAUTIONS AND SAFETY MEASURES

Symbols used in this product

	Battery status – Displays the remaining battery charge
	Home – Return to home screen when selected
	Help – Enters to the help mode when selected
	Settings – Enters to the settings menu when selected
	Volume– Displays the volume in four levels
	Sensitivity indicator – Displays the sensitivity level from 1 to 10.
	Icon indicating energized system
	Icon indicating de-energized system
	Signal strength indicator – Shows the strength of the signal from 0 to 99
MAN/AUTO	Shows whether the sensitivity adjustment is in Manual or Automatic mode
	Indicates the volume is muted.
	Lock indicates if the Auto sensitivity lock is active (Only in Auto sensitivity mode)
	Application and removal from hazardous live conductors permitted
	Caution! Risk of electric shock.
	Caution! Refer to the explanation in this Manual.
	The equipment is protected by double insulation or reinforced insulation.
	Earth (Ground).
CAT IV	Overvoltage Category Rating
	Alternating Current (AC).
	Direct Current (DC).
	Conforms to relevant North American Safety Standards.
	Complies with European Directives.
	Conforms to relevant Australian standards.
	Do not dispose of this product as unsorted municipal waste. Contact a qualified recycler.

1. PRECAUTIONS AND SAFETY MEASURES

This manual contains information and warnings that must be followed for operating the tester safely and maintaining the tester in a safe operating condition. If the tester is used in a manner not specified by the manufacturer, the protection provided by the tester may be impaired. This tester meets water and dust protection IP40 per IEC60529 Ed 2.1 (2001). Do not use in rainfall! The tester is double insulated for protection per EN61010-1:2010 3rd Ed to CAT IV 600V (AT-7000-RE) and CAT IV 300V (AT-7000-TE).

CAUTION: Do not connect the Transmitter to a separate ground in Electrically Susceptible Patient areas of a health care facility. Make the ground connection first and disconnect it last.

2. KIT COMPONENTS

Your shipping box should include:

	AT-7020-EUR	AT-7030-EUR
AT-7000-RE RECEIVER	1	1
AT-7000-TE TRANSMITTER	1	1
TL-7000-EUR TEST LEAD AND ACCESSORY KIT	1	1
CC-7000-EUR HARD CARRYING CASE	1	1
USER MANUAL	1	1
BR-7000-T LI-ION RECHARGEABLE BATTERY	-	1
BR-7000-EUR WITH 4AA RECHARGEABLE BATTERIES	-	1
SC-7000-EUR SIGNAL CLAMP	-	1
HS-1 MAGNETIC HANGER	-	1
1.5 V AA (IEC R6) BATTERY	10	-



2. KIT COMPONENTS

2.1 AT-7000-RE Receiver

The AT-7000-RE Receiver detects the signal generated by the AT-7000-TE transmitter along wires using either the TIP SENSOR or SMART SENSOR and displays this information on the full color TFT LCD display.

Active tracing using a signal generated by the AT-7000-TE Transmitter

The SMART SENSOR works with a 6 kHz signal generated along energized wires (above 30V AC/DC) and provides an indication of the wire position and direction relative to the receiver. The SMART SENSOR is not designed to work on de-energized systems; for that application the TIP SENSOR should be used in de-energized mode.

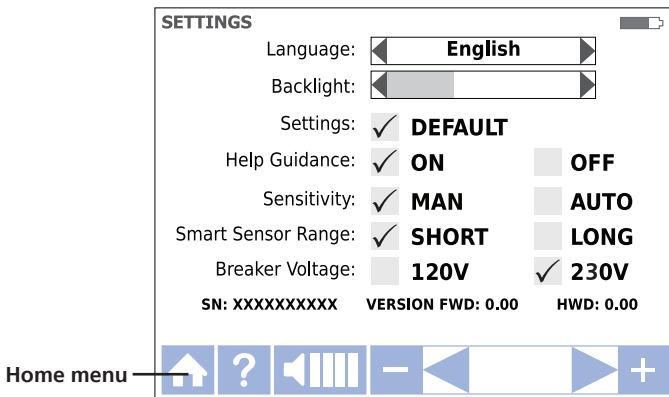
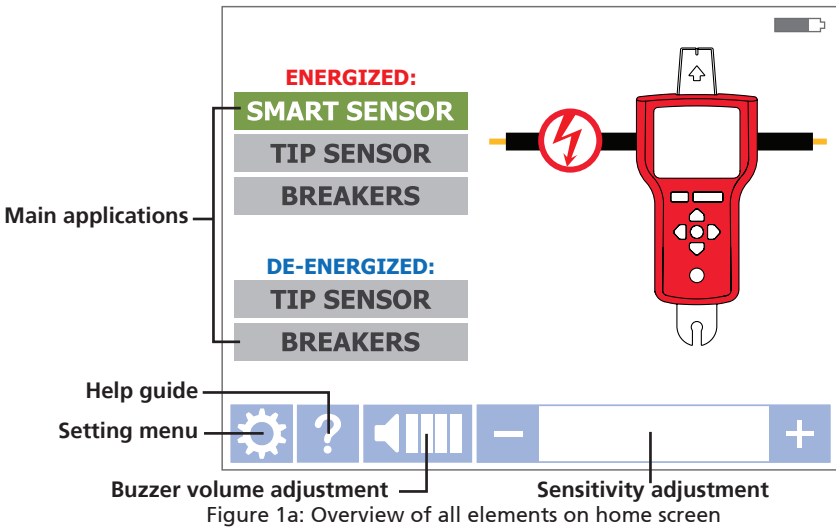
The TIP SENSOR may be used on either energized or de-energized wires and can be used for general tracing, tracing in tight spaces, locating breakers, pinpointing wires in bundles or in junction boxes. The TIP SENSOR mode will pinpoint the wire location with both an audible and visual indication of detected signal strength, but unlike SMART SENSOR mode it will not provide wire direction or orientation.

Note: The receiver will NOT detect signals from the wire through metal conduit or shielded cable. Refer to Special Applications, section 4.4 "Tracing Wires In Metal Conduit" for alternative tracing methods.



Figure 1: Overview of AT-7000-RE Receiver

2. KIT COMPONENTS



Language	Select desired language
Backlight	25%, 50%, 75%, 100%
Setting	DEFAULT <input checked="" type="checkbox"/> : Restore default settings
Help Guidance	ON <input checked="" type="checkbox"/> : Device will guide you through each mode OFF <input checked="" type="checkbox"/> : Device will start without guidance
Sensitivity*	MAN <input checked="" type="checkbox"/> : Manual sensitivity adjustment (+) and (-) keys AUTO <input checked="" type="checkbox"/> : Auto sensitivity adjustment
Smart Sensor Range	SHORT <input checked="" type="checkbox"/> : For wire detection up to 3 feet LONG <input checked="" type="checkbox"/> : For wire detection between 3 and 20 feet
Breaker Voltage	120V <input checked="" type="checkbox"/> : For 110V to 120V systems 230V <input checked="" type="checkbox"/> : For 220V to 240V systems

*Note: The Auto and Manual sensitivity mode can be easily changed by pressing the + and - key at the same time when the receiver is in a tracing mode. When sensitivity mode is set to "Auto" manual adjustment is disabled.

2. KIT COMPONENTS

2.2 AT-7000-TE Transmitter

The AT-7000-TE Transmitter works on energized and de-energized circuits up to 300V AC/DC in Category I-IV electrical environments.

The transmitter will measure the line voltage and display it on the transmitter's color TFT LCD display screen. Based on detected voltage it will automatically switch to either energized mode (30 to 300V AC/DC) or de-energized mode (0 to 30V AC/DC). The energized mode uses a lower transmission frequency (6kHz) than de-energized mode (33 kHz) to reduce signal coupling with nearby metallic objects and improve results. If the circuit is energized the red LED in the upper left corner of the AT-7000-TE transmitter will light. **IMPORTANT! Note that the red LED light will turn on when connected to an energized circuit. Select the correct energized or de-energized mode on the AT-7000-RE receiver when choosing your tracing mode.**

Energized mode: In energized mode the transmitter draws very low current from the energized circuit and generates a 6.25 kHz signal. This is very important feature of the AT-7000-TE, since drawing current does not inject any signal that would harm sensitive equipment connected to the circuit. The signal is also generated in a direct path between the transmitter and the power source, thus NOT placing a signal onto any branches enabling wiring tracing directly back to the breaker panel. Please note that due to this feature, the transmitter has to be connected on the load side of the circuit.

De-energized mode: In de-energized mode the transmitter injects a 32.8 kHz signal onto the circuit. In this mode, since the signal is injected, it will travel through all the circuit branches. It is a high frequency, very low energy signal that will not harm any sensitive equipment

TEST LEADS CONNECTION JACKS

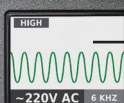
RED LED VOLTAGE INDICATOR

Indicates the transmitter mode
1. Red: Energized circuit mode
2. Amber: Overload
3. OFF: De-energized circuit mode

NOTE: The indication (presence/absence) of voltage could be delayed by a few seconds



COLOR TFT LCD DISPLAY



LOW SIGNAL MODE

For precision applications

PRECISION

LOW

SIGNAL

NORMAL

HIGH

Clamp > 25sec

HIGH SIGNAL MODE

Used for most applications

ON / OFF BUTTON

RUBBER OVERMOLDED ENCLOSURE

BATTERY COMPARTMENT (Back side)

Figure 2: Overview of AT-7000-TE Transmitter

2. KIT COMPONENTS

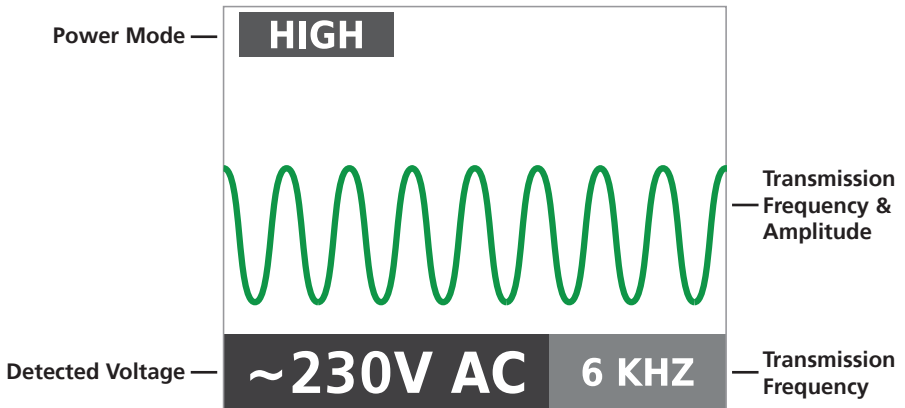


Figure 2a: Overview of AT-7000-TE Transmitter LCD Screen

2.3 TL-7000-EUR Test Lead & Accessory Kit

All AT-7000-EUR kits come with our complete test leads & accessory kit. The kit supports a wide range of standard and specialty applications and contains test leads and adaptors as outlined below:



Accessories included with the product	TL-7000-EUR
Test lead (red) 1.9m (6.4 ft.)	1
Test lead (green) 7.7 m (25 ft.)	1
Test probe set (red and black)	1
Alligator clip set (red, black)	1
Special test lead	1
Optional accessories - not included with the product, need to be purchased separately	TL-7000-25M
25m long green test lead	1

2. KIT COMPONENTS

2.4 SC-7000-EUR Signal Clamp (included with AT-7030-EUR, option for AT-7020-EUR)

The SC-7000-EUR works in circuits up to 600V with max. 400A AC/DC in Category I-IV electrical environments.

The clamp accessory is used for applications when there is no access to the bare conductors. The clamp attachment enables the AT-7000-TE Transmitter to induce a signal through the insulation into either energized or de-energized wires. The signal will travel through the wire in both directions and into all the branches. This transmission method will not damage any sensitive electronic equipment connected to the circuit.



2.5 BR-7000-T Signal Booster Rechargeable Battery Pack (included with AT-7030-EUR, option for AT-7020-EUR)

The BR-7000-T Signal Booster Rechargeable Battery Pack provides increased power to the AT-7000-TE Transmitter, enabling improved wire tracing results in energized, de-energized and clamp modes. This 7.2V, 2.2 Ah Lithium-Ion (Li-Ion) battery pack automatically begins recharging when the transmitter is connected to circuits between 90V - 270V. The outside of the battery features a LED status indicator that shows the remaining battery charge with the push of a button.



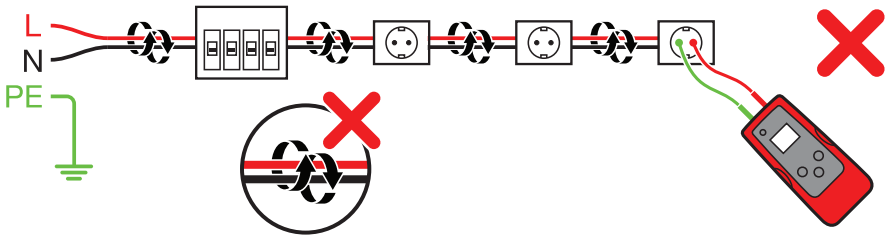
3. MAIN APPLICATIONS

⚠ IMPORTANT NOTICE, PLEASE READ BEFORE YOU START TRACING

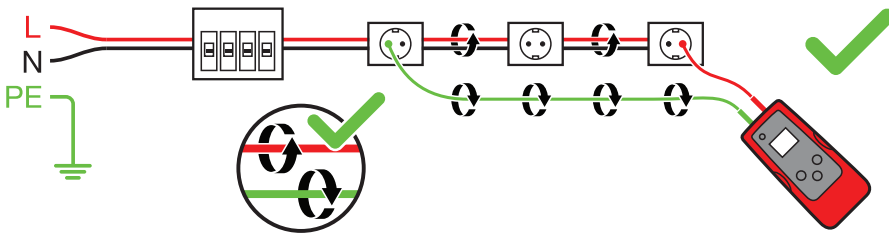
Avoiding signal cancellation problems with a separate ground connection

The signal generated by the transmitter creates an electromagnetic field around the wire. This field is what is detectable by the receiver. The clearer this signal, the easier it is to trace the wire.

If transmitter is connected to two adjacent wires on the same circuit (for example, Line and Neutral wires), the signal travels in one directions through the first wire and then returns (with opposite direction) through the second one. This causes creation of two electromagnetic fields around each wire with opposite direction. These opposing fields will partially or completely cancel each other out, making wire tracing difficult if not impossible.



To avoid the cancellation effect, a separate Neutral connection method should be used. The red test lead of the transmitter should be connected to the Line wire of the circuit you wish to trace and the green test lead to a Neutral wire either directly at the RDC or at the closest connection point to the RCD as it is possible. Please make sure that Line wire and separate Neutral are connected to the same RCD, otherwise the RCD will trip. Proper connection will be indicated by the red LED on a transmitter to light up. If the LED is OFF, make sure the circuit is energized and the red test lead is connected to Line wire, and green to the Neutral. The separate Neutral connection creates the maximum signal strength, because the electromagnetic field created around the Live wire is not being canceled by a signal on the return path flowing along an adjacent wire (Line and Neutral) in the opposite direction, but rather through the separate Neutral circuit. Please note that connecting a test lead to Ground instead of Neutral, will trip the RCD. The ground connection can be used for circuits that are not protected by the RCD.



3.1 Tracing Energized Wires ⚡

SMART SENSOR ⚡

The **SMART SENSOR** enables easier wire tracing by showing the direction and position of the wire and is the recommended method for tracing energized wires (does not work on de-energized circuits, use de-energized TIP SENSOR for that application).

Connecting transmitter test leads

1. Connect green and red test leads to the transmitter (polarity does not matter)
2. Connect red lead to energized Line wire (on the load side of the system). The signal will **ONLY** be transmitted between the outlet to which the transmitter is connected and the source of power (see Figure 3.1a). (refer to section 2.2 for further explanation).
3. Connect green lead to a separate Neutral wire at the RCD or at a connection point as close to the RCD as it is possible.*

***Note:** Please make sure that Line wire and separate Neutral are connected to the same RCD, otherwise the RCD will trip.

Set up the AT-7000-TE Transmitter:

1. Press ON/OFF key to turn on the transmitter.
2. Verify that the test leads are properly connected - the red LED voltage status indicator should be on, indicating that the circuit is energized.
3. Select HIGH signal mode for most applications. Screen will appear as shown in Figure 3.1b.

Note: The LOW signal mode can be used to limit the signal level generated by the transmitter in order to more precisely pinpoint wire location. A lower signal level reduces coupling to neighboring wires and metal objects and helps to avoid misreading due to ghost signals. A lower signal also helps to prevent oversaturating the receiver with a strong signal that covers a large area. The LOW signal mode function is rarely used, only for most demanding precise wire tracing applications.

ATTENTION: The transmitter voltage indication by LED or measurement on the LCD is not sufficient to assure safety. Always verify the voltage presence/absence with approved voltage tester.

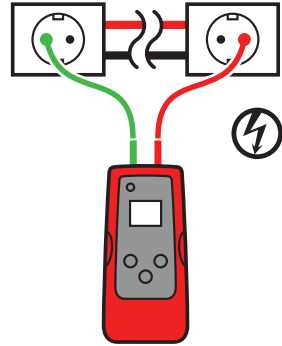


Figure 3.1a
Proper connection with separate ground

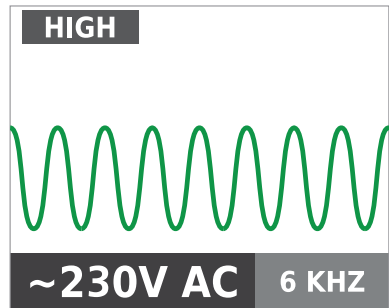


Figure 3.1b
Transmitter screen showing signal in HIGH mode with 6kHz frequency for energized circuit

Using AT-7000-RE Receiver

1. Press 'ON/OFF' push button to turn on the receiver and wait for the home screen (boot up time is around 30 seconds).
2. Select **SMART SENSOR** mode by using the directional arrows to highlight this operating mode and pressing the yellow ENTER button.
3. Hold the receiver with the Smart Sensor on the rear of the unit facing the target area. If the screen flashes a "?" in a red target then no signal is detected. Move the Smart Sensor closer to the target area until the signal is detected and you see a directional arrow. If no signal is detected increase the sensitivity using the "+" button on the receiver. (see Figure 3.1c)*
4. Move the Receiver in direction indicated by the arrow on the screen (see Figure 3.1d)
5. Green target symbol indicates that the Receiver is directly over the wire (see Figure 3.1e). If Receiver will not lock on the wire, decrease sensitivity using the "-" on the keypad or set the transmitter to transmit at LOW signal mode.
6. Press ENTER when complete to return to Home screen.

***Note: For best results, keep the receiver at least 1 m (3 feet) from the transmitter and its test leads to minimize signal interference and improve wire tracing results. Select the "Long" Smart Sensor Range in the Settings Menu if working with wires that are located behind walls, floors or ceilings deeper than 1m (3 feet).**

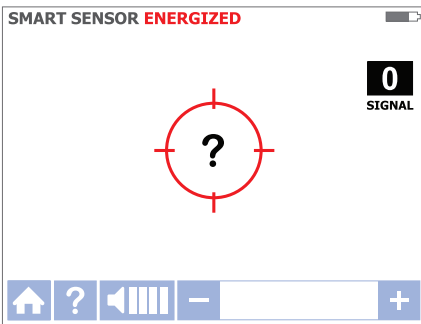


Figure 3.1c
No signal detected

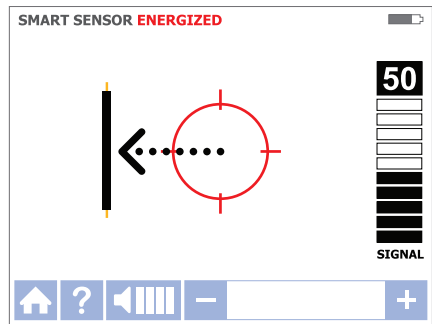


Figure 3.1d
Wire on the left

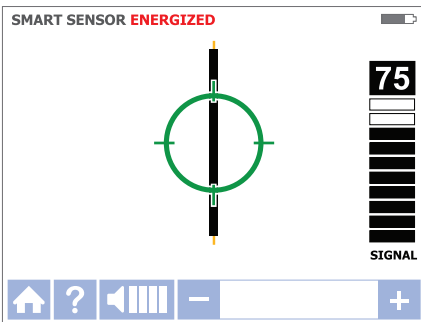


Figure 3.1e
Receiver locked on wire

3. MAIN APPLICATIONS - TIP SENSOR (ENERGIZED)

3.2 Tracing Energized Wires ⚡

TIP SENSOR ⚡

TIP SENSOR mode is used for the following applications: pinpointing a wire in a bundle, tracing in corners and confined spaces such as junction boxes or inside enclosures.

Connecting transmitter test leads

1. Connect green and red test leads to the transmitter (polarity does not matter)
2. Connect red lead to energized Line wire (on the load side of the system).
The signal will ONLY be transmitted between the outlet to which the transmitter is connected and the source of power (see Figure 3.2a).
3. Connect green lead to a separate Neutral wire at the RCD or at a connection point as close to the RCD as it is possible.

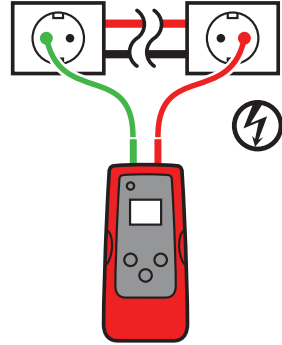


Figure 3.2a
Proper connection with separate ground

***Note:** Please make sure that Line wire and separate Neutral are connected to the same RCD, otherwise the RCD will trip.

Set up the AT-7000-TE Transmitter:

1. Press ON/OFF key to turn on the transmitter.
2. Verify that the test leads are properly connected - the red LED voltage status indicator should be on, indicating that the circuit is energized.
3. Select HIGH signal mode for most applications. Screen will appear as shown in Figure 3.2b.

Note: The LOW signal mode can be used to limit the signal level generated by the transmitter in order to more precisely pinpoint wire location. A lower signal level reduces coupling to neighboring wires and metal objects and helps to avoid misreading due to ghost signals. A lower signal also helps to prevent oversaturating the receiver with a strong signal that covers a large area. The LOW signal mode function is rarely used, only for most demanding precise wire tracing applications.

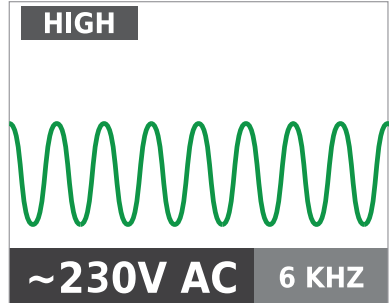


Figure 3.2b

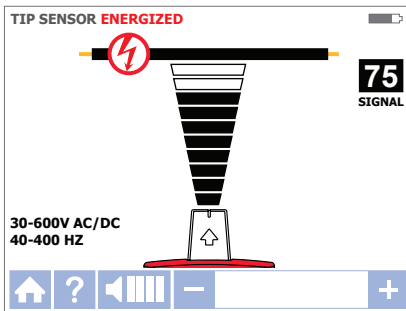
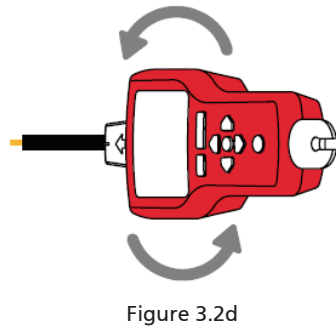
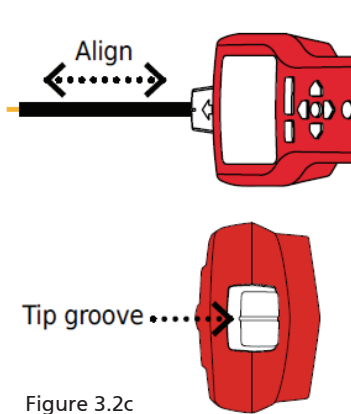
The transmitter voltage indication by LED or measurement on the LCD is not sufficient to assure safety. Always verify the voltage presence/absence with approved voltage tester.

3. MAIN APPLICATIONS - TIP SENSOR (ENERGIZED)

Using AT-7000-RE Receiver

1. Press 'ON/OFF' push button to turn on the receiver and wait for the home screen (boot up time is around 30 seconds).
2. Select Energized **TIP SENSOR** mode by using the directional arrows to highlight this operating mode and pressing the yellow "ENTER" button. Screen as shown in 3.2e will appear.
3. Hold the receiver with the Tip Sensor facing the target area.
4. Scan target area with Tip Sensor to find highest signal level. While tracing, periodically adjust sensitivity to keep signal strength near 75. Increase or decrease sensitivity by pressing + or - on the keypad. If signal is too strong for precise locating, change transmitter to LOW mode.
5. Receiver Positioning: For best results, align groove on tip sensor with wire direction as shown. Signal may be lost if not properly aligned. (see Figure 3.2c)
6. To verify wire direction, periodically rotate receiver 90 degrees. Signal strength will be highest when wire is aligned with Tip Sensor groove. (see Figure 3.2d)
7. Press ENTER when complete to return to Home screen.

Note: For best results, keep the receiver at least 1 m (3 feet) from the transmitter and its test leads to minimize signal interference and improve wire tracing results.



Receiver showing signal detected in Energized TIP SENSOR mode

3. MAIN APPLICATIONS - TIP SENSOR (DE-ENERGIZED)

3.3 Tracing De-energized Wires ⚡

TIP SENSOR ⚡

De-energized TIP SENSOR mode is used for general wire tracing, pinpointing wires in bundles, tracing in tight corners and confined spaces such as junction boxes or inside enclosures.

Connecting transmitter test leads

1. Connect green and red test leads to the transmitter (polarity does not matter)
2. Connect red lead to de-energized Line wire (on the load side of the system). In de-energized mode the signal will be injected to ALL branches of the circuit, not just between the outlet and the breaker as in energized modes.
3. Connect green lead to a separate ground (metal building structure, metal water pipe, or ground wire / Protective Ground (PE) on a separate circuit).

ATTENTION: Due to safety reasons this is only allowed in de-energized circuits. (see figure 3.3a) Do not use a ground wire that runs in parallel to the wire you are going to trace, as it will reduce or cancel tracing signal.

NOTE: If circuit is energized you will trip RCD.

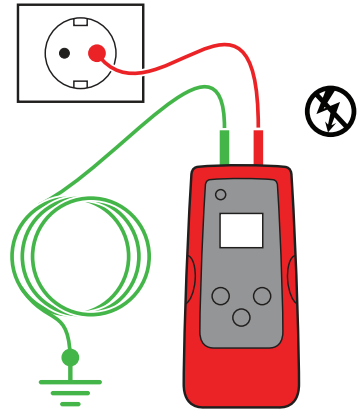


Figure 3.3a
Proper connection with separate ground

Set up the AT-7000-TE Transmitter:

1. Press ON/OFF key to turn on the transmitter.
2. The red LED voltage status indicator should be off, indicating that the circuit is de-energized. If LED is on, disconnect power to the circuit.
3. Select HIGH signal mode for most applications. Screen will appear as shown in Figure 3.3b

Note: The LOW signal mode can be used to limit the signal level generated by the transmitter in order to more precisely pinpoint wire location. A lower signal level reduces coupling to neighboring wires and metal objects and helps to avoid misreading due to ghost signals. A lower signal also helps to prevent oversaturating the receiver with a strong signal that covers a large area. The LOW signal mode function is rarely used, only for most demanding precise wire tracing applications.

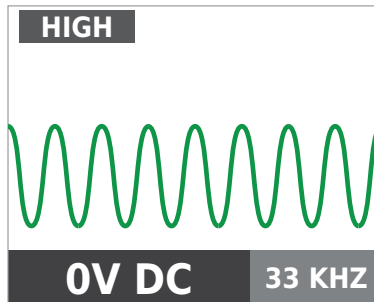


Figure 3.3b

TIP SENSOR ⚡

3. MAIN APPLICATIONS - TIP SENSOR (DE-ENERGIZED)

Using AT-7000-RE Receiver

1. Press 'ON/OFF' push button to turn on the receiver and wait for the home screen (boot up time is around 30 seconds).
2. Select De-Energized TIP SENSOR mode by using the directional arrows to highlight this operating mode and pressing the yellow "ENTER" button. Screen will appear as shown in Figure 3.3c
3. Hold the receiver with the Tip Sensor facing the target area.*
4. Scan target area with Tip Sensor to find highest signal level. While tracing, periodically adjust sensitivity to keep signal strength near 75. Increase or decrease sensitivity by pressing + or – on the keypad. If signal is too strong for precise locating, change transmitter to LOW mode.

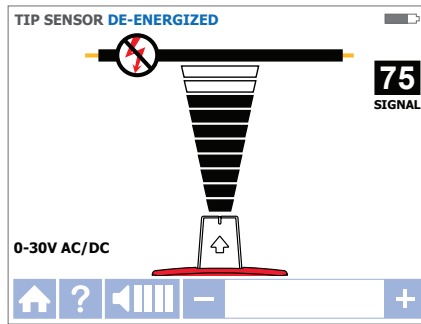


Figure 3.3c

5. Press ENTER when complete to return to Home screen.

***Note:** For best results, keep the receiver at least 1 m (3 feet) from the transmitter and its test leads to minimize signal interference and improve wire tracing results.

De-energized mode uses a different antenna in the Tip Sensor than in energized mode. Specific alignment of the Tip Sensor groove to the wire is not required. De-energized wire tracing results are based only on how close the Tip Sensor is to the wire.

3.4 Identifying Breakers and Fuses ⚡

Energized breaker / fuse locating

BREAKERS ⚡

Connecting transmitter test leads

1. Use red and green test leads either with probe tips or alligator clips.
2. Plug test leads into Transmitter. Polarity is not important.
3. Connect red and green test leads to Line and Neutral wires of the same receptacle or wire (see figure 3.4a).

Note: For breaker locating, a simplified direct connection to Line and Neutral wires can be used because these wires are separated at the breaker panel. There is no risk of signal cancellation effect if wires are at least a few centimeters (inches) away from each other. However the separate Neutral connection as shown in Energized TIP SENSOR mode should be used for superior results specifically if wires need to be traced in addition to breaker/fuse identification.

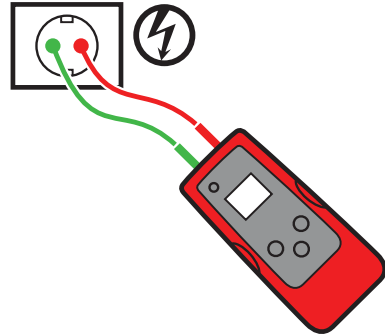


Figure 3.4a

Set up the AT-7000-TE Transmitter:

1. Press ON/OFF key to turn on the transmitter.
2. Verify that the test leads are properly connected - the red LED voltage status indicator should be on, indicating that the circuit is energized.
3. Select HIGH signal mode for breaker/fuse tracing.

Receiver Process Overview

Tracing breakers is a two-step process:

- ① **SCAN** - Scan each breaker/fuse for half second. The receiver will record tracing signal levels.
- ② **LOCATE** - Rescan panel by slowly passing the Tip Sensor over each breaker/fuse. The receiver will indicate the single breaker/fuse with the strongest recorded signal.

ATTENTION: The transmitter voltage indication by LED or measurement on the LCD is not sufficient to assure safety. Always verify the voltage presence/absence with approved voltage tester.

Using AT-7000-RE Receiver

1. Press 'ON/OFF' push button to turn on the receiver and wait for the home screen (boot up time is around 30 seconds).
2. Select Energized **BREAKERS** mode by using the directional arrows to highlight this operating mode and pressing the yellow "ENTER" button.

3. Step 1 - ① **SCAN:**

- a. The unit will automatically start in ① **SCAN** mode as shown in Figure 3.4b.
- b. Scan each breaker/fuse for a half second by touching it with the Tip Sensor. Make sure the groove on the Tip Sensor is parallel to the breaker/fuse lengthwise (See Figure 3.4d)
- c. To assure sufficient time between the scans, wait for active green arrow and audible alert (2-beeps) before moving to the next breaker/fuse.

3. MAIN APPLICATIONS - BREAKERS (ENERGIZED)

- d. Scan each breaker/fuse – the order of scanning does not matter. You can scan each breaker/fuse multiple times. The receiver is recording the highest detected signal.

Usage tip: For best results try to scan at the output of the breaker/fuse.

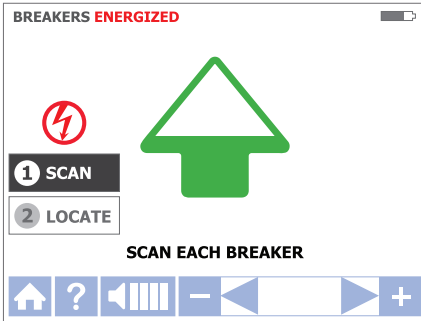


Figure 3.4b
SCAN mode –
receiver scanning breaker/fuse

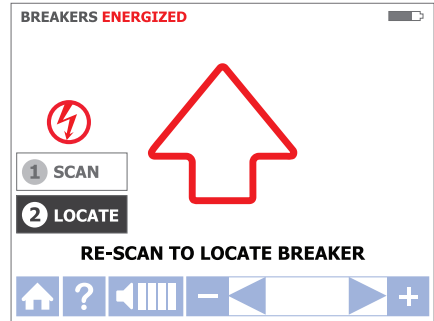


Figure 3.4c
LOCATE mode –
receiver checking breaker/fuse

4. Step 2 - 2 LOCATE

- Select LOCATE mode by using the directional arrows to highlight this operating mode and pressing the yellow “ENTER” button. (See figure 3.4c)
- Rescan each breaker/fuse by touching each with the Tip Sensor for a half second. Active red arrow indicates scanning process (see Figure 3.4c). Make sure the groove on the Tip Sensor is parallel to the breaker lengthwise. (See Figure 3.4d)
Usage Tip: Hold receiver in the same position as during scanning step (step 3.4a-d).
- Rescan all breakers/fuses until solid green arrow and audible alert (continuous beep) indicates that the correct breaker/fuse was found. (See figure 3.4e)
- Press ENTER when complete to return to Home screen.

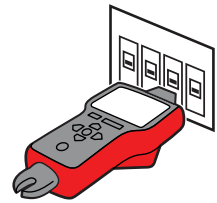


Figure 3.4d

Usage Tip: The accuracy of breaker/fuse identification results can be verified by switching the receiver to Energized TIP SENSOR mode and checking that that the signal level of the breaker identified by the receiver is the highest among all breakers.

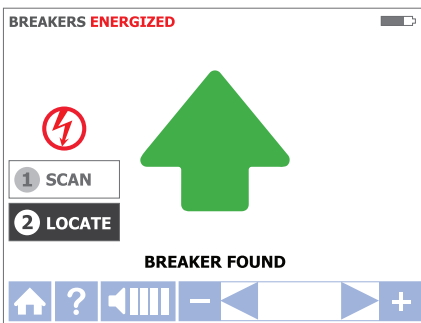


Figure 3.3e
LOCATE mode – receiver identified breaker

Usage tip:

To assure detection accuracy, when the correct breaker/fuse is indicated, continue locating remaining breakers on the panel to verify that signal is not present in any other breaker/fuse.

3. MAIN APPLICATIONS - BREAKERS (DE-ENERGIZED)

3.5 Identifying De-Energized Breakers and Fuses

De-Energized breaker/fuse locating

BREAKERS

Connecting transmitter test leads

1. Use red and green test leads either with probe tips or alligator clips.
2. Plug test leads into Transmitter. Polarity is not important.
3. Connect red and green test leads to Line and Neutral wires of the same receptacle or wire (see figure 3.5a).*

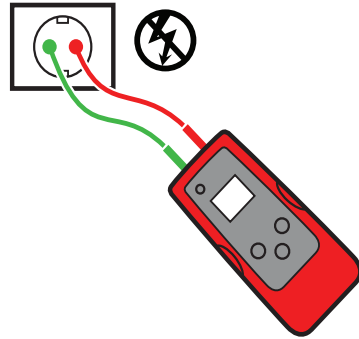


Figure 3.5a

* **Note:** For breaker locating, a simplified direct connection to Hot and Neutral wires can be used because these wires are separated at the breaker panel. There is no risk of signal cancellation effect if wires are at least a few centimeters (inches) away from each other. However the separate Ground connection as shown in De-energized TIP SENSOR should be used for superior results specifically if wires need to be traced in addition to breaker/fuse identification.

Set up the AT-7000-TE Transmitter:

1. Press ON/OFF key to turn on the transmitter.
2. The red LED voltage status indicator should be off, indicating that the circuit is de-energized. If LED is on, disconnect power to the circuit.
3. Select HIGH signal mode for breaker tracing.

Receiver Process Overview

Tracing breakers is a two-step process:

- 1 **SCAN** - Scan each breaker/fuse for half second. The receiver will record tracing signal levels.
- 2 **LOCATE** - Rescan panel by slowly passing the Tip Sensor over each breaker/fuse. The receiver will indicate the single breaker/fuse with the strongest recorded signal.

Using AT-7000-RE Receiver

1. Press 'ON/OFF' push button to turn on the receiver and wait for the home screen (boot up time is around 30 seconds).
2. Select De-Energized **BREAKERS** mode by using the directional arrows to highlight this operating mode and pressing the yellow "ENTER" button.
3. Step 1 - 1 **SCAN**

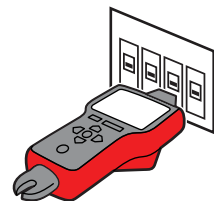


Figure 3.5b

- a) The unit will automatically start in 1 <logo> SCAN mode as shown in Figure 3.5b.
- b) Scan each breaker/fuse for a half second by touching it with the Tip Sensor. Make sure the groove on the Tip Sensor is parallel to the breaker/fuse lengthwise
- c) To assure sufficient time between the scans, wait for active green arrow and audible alert (2-beeps) before moving to the next breaker/fuse.
- d) Scan all breaker/fuse – the order of scanning does not matter. You can scan breaker/fuses multiple times. The receiver is recording the highest detected signal.

3. MAIN APPLICATIONS - BREAKERS (DE-ENERGIZED)

Usage tip: For best result try to scan at the output of the breaker/fuse

4. Step 2 - ② LOCATE

- a) Select LOCATE mode by using the directional arrows to highlight this operating mode and pressing the yellow "ENTER" button
- b) Rescan each breaker/fuse by touching each with the Tip Sensor for a half second. Active red arrow indicates scanning process. Make sure the groove on the Tip Sensor is parallel to the breaker lengthwise. Hint: Hold receiver in the same position as during scanning step (step 3.5a-c).
- c) Rescan all breakers/fuses until solid green arrow and audible alert (continuous beep) indicates that the correct breaker/fuse was found.
- d) Press ENTER when complete to return to Home screen.

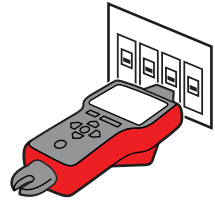


Figure 3.5c

Usage Tip: The accuracy of breaker location can be verified by switching the receiver to De-Energized TIP SENSOR mode, and checking that that the signal level of the breaker identified by the receiver is the highest among all breakers.

3.6 NCV Mode

The NCV (Non-Contact Voltage) mode is used to verify that the wire is energized. This method does not require the use of the transmitter. The receiver will detect an energized cable if the voltage is between 90V and 600V AC and between 40 and 400Hz. No current flow is necessary.

ATTENTION: The voltage indication in NCV mode is not sufficient to assure safety. Always verify the voltage presence/absence with approved voltage tester.

NCV mode operation:

1. Press 'ON/OFF' push button to turn on the receiver and wait for the home screen (boot up time is around 30 seconds).
2. Press 'NCV' push button to select the Non-Contact Voltage mode.
3. Hold the receiver with the Tip Sensor against the wire.
4. For precise pinpointing of Line wire versus Neutral wire, increase or decrease sensitivity by pressing + or - on the keypad.
5. Press ENTER when complete to return to Home screen.

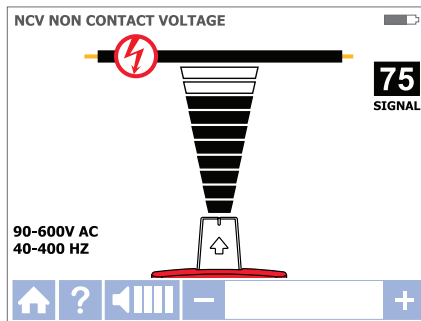


Figure 3.6a

Voltage detection in NCV mode using Tip Sensor

4. SPECIAL APPLICATIONS

4.1 Working with RCD protected circuits

Method 1 – Whenever possible use separate Neutral connection as it is described in Energized SMART and TIP SENSOR modes

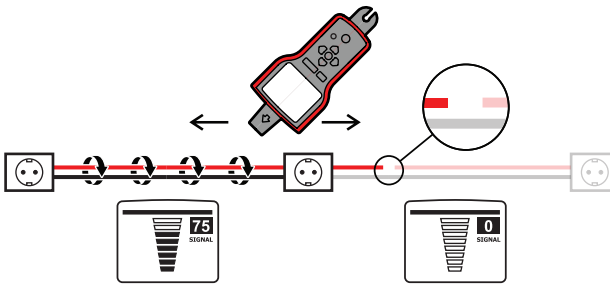
Method 2 – If separate Neutral connection is not practical:

- De-energize the circuit
- Connect a transmitter directly to the wire as described in De-Energized TIP SENSOR mode.
- Perform tracing as described in the desired De-Energized Mode (TIP SENSOR for wire tracing or BREAKER for breaker / fuse identification).

4.2 Finding Breaks/Opens

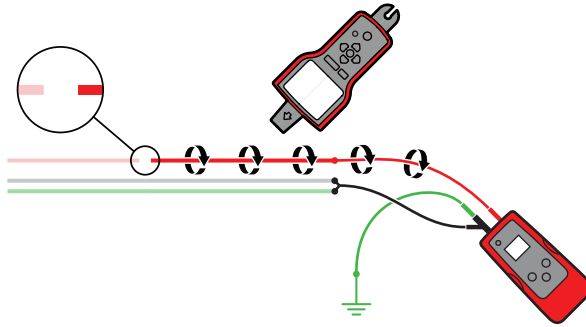
It is possible to pinpoint the exact location where the wire is broken using the de-energized TIP SENSOR mode, even if wire is located behind walls, floors or ceilings:

1. Make sure that wire is de-energized.
2. Use steps described in the De-Energized TIP SENSOR mode to connect the transmitter and perform tracing. (see section 3.3)
3. For best results, ground all the wires that run in parallel using special test lead



The tracing signal generated by the AT-7000-TE transmitter will be conducted along the wire as long as there is continuity in the metal conductor. To find the place of fault, trace the wire until the signal stops. To verify the place of the fault, move transmitter to the other end of the wire and repeat tracing from the opposite end. If signal stops at the exact same location you have found the place of the break.

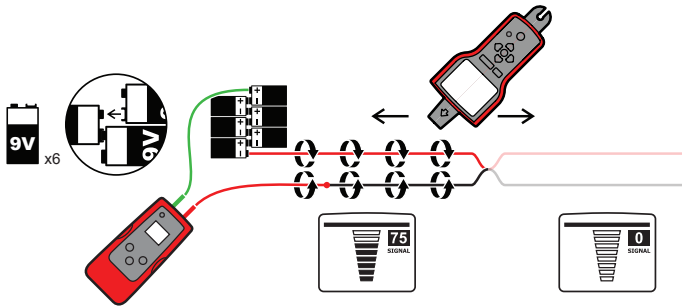
Note: If the place of fault is not found, the open may be a high resistance break (partially open circuit). Such a break would stop higher currents from flowing but will conduct the tracing signal through the break. Such faults will not be detected until the wire is completely open.



4.3 Finding Shorts

Shorted wires will cause a breaker to trip. Disconnect the wires, and make sure the ends of the wires on both sides of the cable are isolated from each other and other wires or loads. Interconnect six (6) 9V batteries in series, by connecting negative “-” contact of one battery to the positive “+” on the other one. The six (6) batteries will create safe 54V DC power source.

Connect the circuit as shown in the illustration below.



Setup the receiver to Energized TIP SENSOR mode. Start tracing the cable until you find the location where the signal stops. To verify the place of the fault, move the transmitter to the other end of the wire and repeat tracing from the opposite end. If the signal stops at the exact same location you have found the place of break.

Note: This method will be affected by signal cancellation effect. Expect a very weak signal.

4. SPECIAL APPLICATIONS

4.4 Tracing Wires in Metal Conduit

The AT-7000-RE receiver will not be able to pick up the signal from the wire through the metal conduit. The metal conduit will completely shield the tracing signal.

Note: The receiver will be able to detect wires in non-metallic conduit. For these applications follow general tracing guidelines.

In order to trace wires in metal conduit:

1. Use either energized or de-energized TIP SENSOR mode (refer to section 3.2 or 3.3 as appropriate)
2. Open junction boxes and use the receiver TIP SENSOR to detect which wire in the junction box is carrying the signal.
3. Move from junction box to junction box to follow the path of the wire.

Note: Applying signal directly to the conduit itself will send signal through all the conduit branches making tracing of one particular conduit path not possible.

For safety always use De-energized TIP SENSOR mode when applying signal directly to the conduit.

4.5 Tracing Non-Metallic Pipes and Conduits

The AT-7000 can indirectly trace plastic conduits and pipes using the following steps:

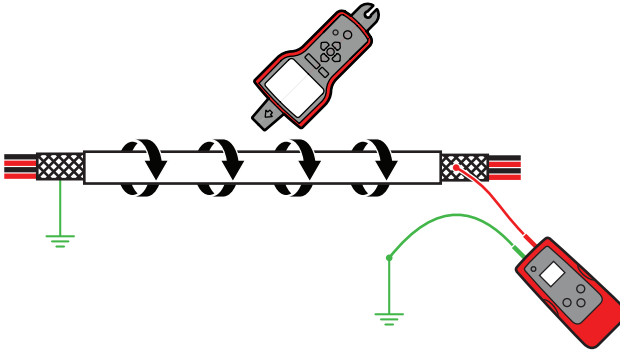
1. Insert conductive fish tape or wire inside the conduit.
2. Connect the AT-7000-TE transmitter red test lead to the fish tape and the green ground wire to a separate ground (see section 3.3 for further set-up instructions).
3. Set the Receiver to De-energized TIP SENSOR mode to trace the conduit (refer to section 3.3).
4. The receiver will pick up the signal conducted by fish tape or wire through the conduit.

4.6 Tracing Shielded Wires

The AT-7000-RE receiver will not be able to pick up the signal from the shielded wire. The shield will completely stop the tracing signal.

In order to trace these types of wires:

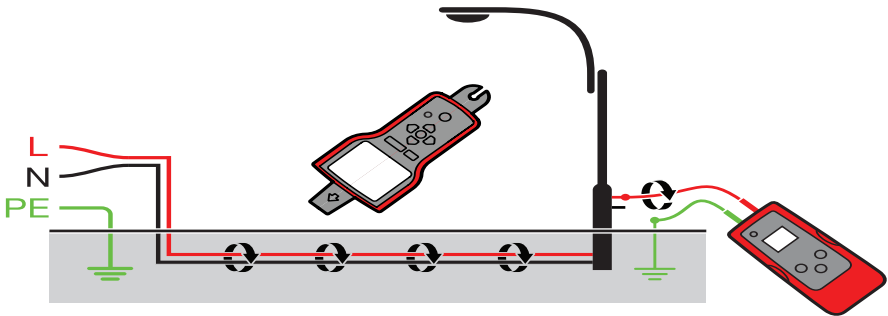
1. Connect the AT-7000-TE transmitter directly to the shield (connect red test lead to the shield and the green test lead to the separate ground). (see section 3.3 for further set-up instructions).
2. Set the receiver to the De-Energized TIP SENSOR mode to trace the wire (refer to section 3.3).
3. For best results disconnect the shield from the ground at the point where transmitter is connected, and leave the other end grounded.



4.7 Tracing Underground Wires

The AT-7000 can trace wires underground, the same way it can locate wires behind walls or floors. Perform tracing as described in Energized SMART SENSOR mode or Energized / De-Energized TIP SENSOR modes.

You can use a hot stick attachment to make tracing more ergonomic and convenient.



4.8 Tracing Low Voltage Wires and Data Cables

The AT-7000 can trace data, audio, and thermostat cables (to trace shielded data cables, refer to section 4.6 "Tracing Shielded Wires").

Trace data, audio, and thermostat cables as follows:

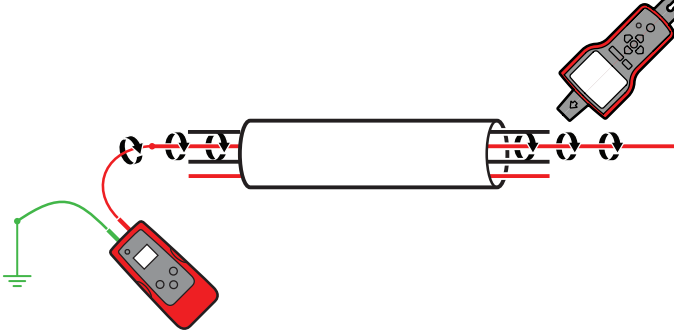
1. Connect the AT-7000-TE transmitter using the separate ground method described in section 3.3 "Tracing De-Energized Wires".
2. Set the AT-7000-RE receiver to De-energized TIP SENSOR mode and trace the wire (see section 3.3 for further detailed set-up instructions).

4. SPECIAL APPLICATIONS

4.9 Sorting Bundled Wires

Identifying a specific wire in a bundle

Connect the AT-7000-TE transmitter using Energized or De-Energized TIP SENSOR mode. If connecting to energized wire, make sure the transmitter is connected on the load side. Select respectively Energized or De-energized TIP SENSOR mode on AT-7000-RE receiver. As far as it is possible pull one wire at the time way from other wires in the bundle and touch it with the TIP sensor. The strongest signal indicates the proper wire in the bundle.

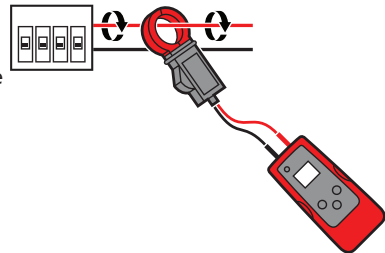


4.10 No Access to Bare Conductors (Signal Clamp)

The clamp accessory is used for applications where there is no access to the bare conductor/ wire to connect transmitter test leads. When clamp is connected to the transmitter, it enables the AT-7000-TE to induce signal to energized or de-energized wire through the insulation. The signal will travel through the wire both directions and it will affect all the branches. This method is safe to use for any sensitive electronic equipment.

Connect the clamp

1. Connect the SC-7000-EUR test leads to the terminals of the transmitter (polarity does not matter).
2. Clamp the SC-7000-EUR Signal Clamp around the conductor. To increase the signal strength wind a few turns of conductor wire around the clamp if possible.



4. SPECIAL APPLICATIONS

Set up the AT-7000-TE Transmitter:

1. Press ON/OFF key to turn on the transmitter.
2. Press HIGH signal mode for 2 seconds to select the CLAMP mode on the transmitter. The clamp mode generates a boosted 6kHz signal in order to provide superior tracing results. The screen on the Transmitter should appear as in Figure 4.10a.

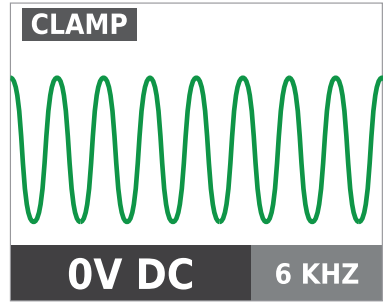


Figure 4.10a
Transmitter in CLAMP mode

Using AT-7000-RE Receiver

1. Press 'ON/OFF' push button to turn on the receiver and wait for the home screen (boot up time is around 30 seconds).
2. Select Energized TIP SENSOR mode by using the directional arrows to highlight this operating mode and pressing the yellow "ENTER" button.
3. Hold the receiver with the Tip Sensor facing the target area.
4. Scan target area with Tip Sensor to find highest signal level. While tracing, periodically adjust sensitivity to keep signal strength near 75. Increase or decrease sensitivity by pressing + or - on the keypad.
5. Receiver Positioning: For best results, align groove on tip sensor with wire direction as shown. Signal may be lost if not properly aligned. (see figure 4.10b)
6. To verify wire direction, periodically rotate receiver 90 degrees. Signal strength will be highest when wire is aligned with Tip Sensor groove. (see figure 4.10c)

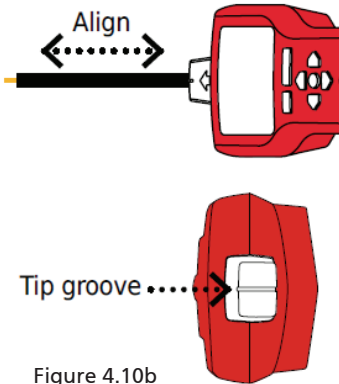


Figure 4.10b

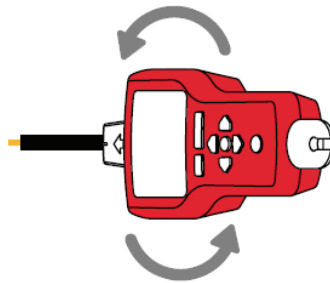


Figure 4.10c

7. PRESS ENTER when complete to return to home screen.

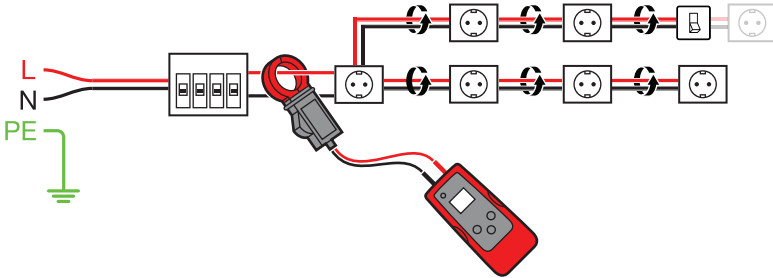
***Note: For best results, keep the receiver at least 1 m (3 feet) from the transmitter and its test leads to minimize signal interference and improve wire tracing results.**

4. SPECIAL APPLICATIONS

4.11 Locating Loads (Signal Clamp)

The clamp accessory can be used to map loads to specific breakers on both energized and de-energized systems. There is no need to disconnect power.

1. Clamp the SC-7000-EUR around the wire at the breaker panel.
2. Set up the transmitter and receiver as described in the previous section 4.10 "No Access to Bare Conductors (Signal Clamp)".
3. Scan face plates of receptacles and wires connecting loads with the Tip Sensor of the AT-7000-RE. If using on a de-energized system you must set the receiver to de-energized TIP SENSOR mode.
4. All the wires, receptacles and loads that have a strong signal as indicated by the AT-7000-RE are connected to the breaker.



4.12 Tracing breakers on systems with Light Dimmers

The light dimmers can produce significant amount of electrical "noise", that consists of multi frequency signal. In some situations the receiver can miss-read this noise, often called a "ghost" signal, as a transmitter generated signal. In such situation, the receiver will provide wrong readings.

When locating breakers or fuses on systems with light dimmers, make sure the dimmer is off (the light switch is off). This will prevent the receiver to indicate a wrong breaker/fuse.

Changing battery for transmitter:

The AT-7000-TE battery compartment was designed to make it easy for the user to change or charge the batteries. Two screws secure the battery door in case the unit is dropped. The 7.2V BR-7000-TE Signal Booster Rechargeable Battery Pack or 6 AA alkaline batteries may be used. The BR-7000-TE battery does not need to be removed from the transmitter compartment to charge. It will begin recharging whenever the AT-7000-TE is plugged into an energized outlet (90V-270V) and turned ON.

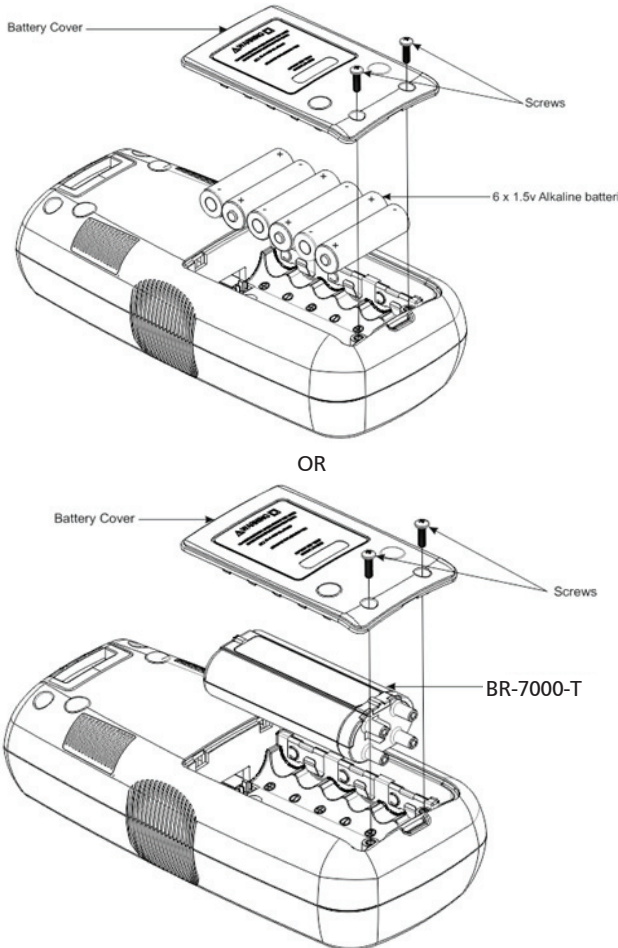


Figure 5.1: Changing transmitter battery

⚠ ⚠ Warning: To avoid shock, injury, or damage to the Transmitter, disconnect test leads before opening case.

5. MAINTENANCE

1. Disconnect all test leads from the Transmitter.”
2. Make sure that the Transmitter is turned off.
3. Use the star screw driver to unscrew the holding screws.
4. Remove the battery cover.
5. Install Batteries.
6. Replace the battery cover and secure it with the provided screw.

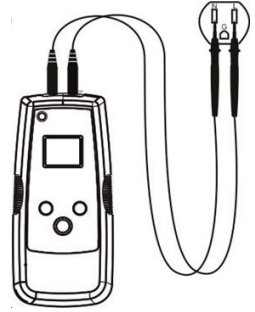


Figure 5.3 Transmitter battery charging

Transmitter battery charging:

The BR-7000 Signal Booster Rechargeable Battery Pack will automatically begin recharging whenever the Transmitter is connected to an energized circuit with voltage between 90-270 Volts AC and it is turned ON. When connected to an energized circuit the Transmitter does not need a battery as the Transmitter uses power from the line.

Changing receiver battery:

The battery compartment on the back of the AT-7000-RE is designed to make changing batteries easy. Four (4) AA 1.5V alkaline or 1.2V rechargeable batteries may be used.

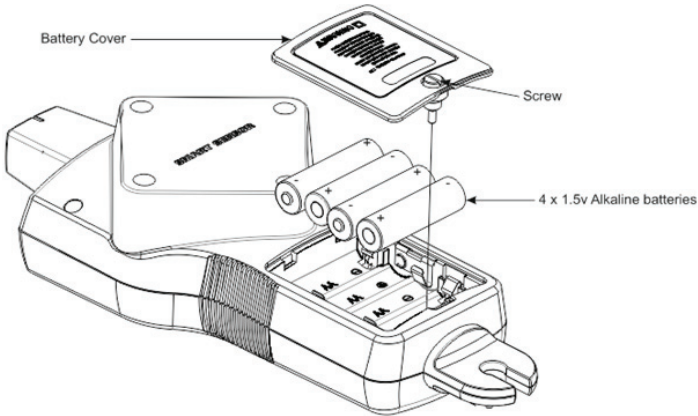


Figure 5.2: Changing receiver battery

1. Make sure that the Receiver is turned off.
2. Use screw driver to unscrew the captive screw.
3. Remove the battery cover.
4. Install batteries.
5. Replace the battery cover and secure it with the provided screw.

Transmitter fuse replacement:

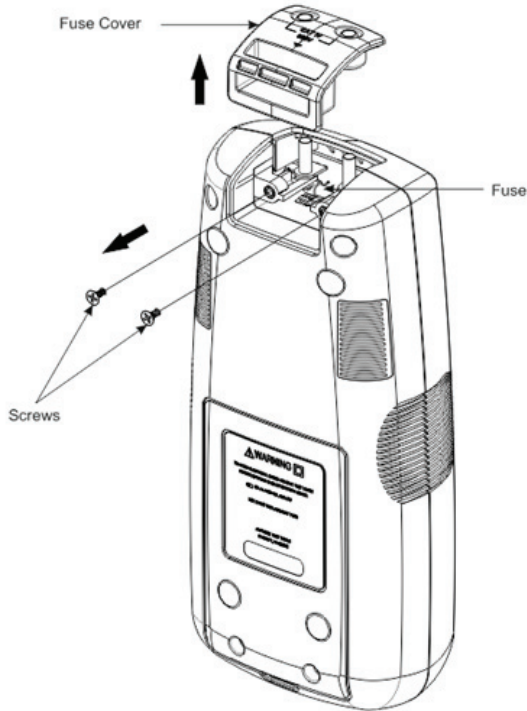


Figure 5.4: Transmitter fuse replacement

⚠ ⚠ Warning: To avoid shock, injury, or damage to the Transmitter, disconnect test leads before opening case.

1. Disconnect all test leads from the Transmitter.
2. Make sure that the transmitter is turned off.
3. Use the star screw driver to unscrew the holding screws.
4. Remove the fuse cover by pulling it upwards as shown in figure 5.4.
5. Remove the fuse from the fuse holder.
6. Insert the new fuse in the fuse holder. 3.15A , 600V MAX, SLOW 5X20MM
7. Insert the fuse cover and secure it with the holding screws and tighten with the Star screw driver.

6. SPECIFICATIONS

	AT-7000-RE	AT-7000-TE	SC-7000-EUR
LCD size	3.5"	1.77"	NA
LCD Dimensions	70mm x 53mm (2.76" x 2.07")	28mm x 35mm (1.1" x 1.38")	NA
LCD Resolution (pixels)	320 x 240	128 x 160	NA
LCD type	TFT	RGB x TFT	NA
Color LCD	Yes	Yes	NA
Backlight	Yes	Yes	NA
mDDR	64 MB	64 MB	NA
FLASH memory	128 MB	128 MB	NA
Audio	95 dB	No	NA
Operating Temperature range	-17.77°C to 49°C (0°F to 120°F)	-17.77°C to 49°C (0°F to 120°F)	-17.77°C to 49°C (0°F to 120°F)
Storage Temperature	-40°C to 65.5°C (-40°F to 150°F)	-40°C to 65.5°C (-40°F to 150°F)	-40°C to 65.5°C (-40°F to 150°F)
Operating Humidity	95% R.H max	95% R.H max	95% R.H max
Operating altitude	2000m	2000m	2000m
Measurement Category	CAT IV 600V	CAT IV 300V	CAT IV 600V
Transient protection	NA	6.00kV (1.2/50uS surge)	NA
Pollution degree	2	2	2
Drop test	1 meter	1 meter	1 meter
Maximum Current	NA	NA	400A AC/DC max
Power Supply	4x AA Alkaline battery	90-270V AC/DC, 40-400 Hz or BR-7000-T: 7.2V; LI-ION Battery or 6x AA Alkaline Battery	NA
Power consumption	4xAA battery: 2W	BR-7000-T battery: 2W 6xAA battery: 2W AC line voltage (Charging state): 10W AC line voltage: 3W	NA
Charging voltage (BR-7000-T)	No	90-270V (±5%)	NA
Charging duration (BR-7000-T)	No	16Hrs	NA

6. SPECIFICATIONS

Booting time	30-sec	20-sec	NA
Non-Rechargeable Battery lifetime	9 Hrs	9 Hrs	NA
Rechargeable Battery lifetime	For AA 1.2V Rechargeable batteries ? Hours	BR-7000-T: 10 Hrs	NA
Leakage current (non-rechargeable)	1.1 to 2.6uA	6 to 14uA	NA
Leakage current (rechargeable)	For AA 1.2V Rechargeable batteries ? uA	1.2 to 4uA	NA
IP Rating	IP52	IP40	IP52
Sampling rate	6.25kHz Signal: 62.5KSPS 32.768kHz: 256KSPS NCV: 62.5 kSPS	6.25kHz Signal: 62.5KSPS 32.768kHz: 256KSPS	NA
Signal Response	Audible beep, bargraph display, numeric display	Numeric display	NA
Response time	Smart mode: 750 mSec Tip Sensor Energized: 300 mSec Tip Sensor De-Energized: 750 mSec NCV: 500 mSec Battery monitoring: 5 Sec	Voltage measurement: 1.5 Sec Battery monitoring: 5 Sec	instantaneous
Voltage Measurement	NA	9-300V, DC to 400Hz Accuracy: (±10%) 9-109V AC/DC (±5%) 110-300V AC/DC Over-range indication: "OL" (>330V)	NA
NCV	90-600V AC Accuracy: (±5%)	NA	NA
LED Indicator	Green Flashing: Signal Detection	Red: Energized OFF: De-Energized Orange: Over voltage	NA
Operating Frequency	Energized: 6.25kHz De-Energized: 32.768kHz	Voltage measurement: 40-400 Hz Energized: 6.25 kHz De-Energized: 32.768 kHz	Energized: 6.25kHz De-Energized: 32.768kHz
Acoustic Indication	1 kZ Piezo Buzzer	NA	NA
Current output (Low) Energized	NA	53 mA rms	NA

6. SPECIFICATIONS

Current output (High) Energized	NA	92 mA rms	NA
Current output (Low) with BR-7000-T Energized	NA	53 mA rms	NA
Current output (High) with BR-7000-T Energized	NA	120 mA rms	NA
Voltage output (Low) De-Energized	NA	60 Vp-p	NA
Voltage output (High) De-Energized	NA	120 Vp-p	NA
Voltage output (Clamp mode) De-Energized	NA	180 Vp-p	1.5 Vp-p
Range Detection (Open air)	<p>Smart mode Pinpointing: Around 5 cm (1.97-in) radius ($\pm 2\%$) Direction indication: Up to 150cm (5 FT) ($\pm 2\%$)</p> <p>TIP Sensor: Energized Pinpointing: Around 5 cm (1.97-in) ($\pm 1\%$) Detection: Up to 670cm (22 FT) ($\pm 1\%$)</p> <p>TIP Sensor: De-Energized Detection: Up to 425cm (14-FT) ($\pm 5\%$)</p> <p>NCV (40-400 Hz) Pinpointing: Around 5cm (1.97-in) radius ($\pm 5\%$) Detection: Up to 120cm (4-FT) ($\pm 5\%$)</p>	NA	NA
Jaw Opening	NA	NA	5.08cm (2-in)
Fuse	NA	3.15A , 600V MAX, SLOW 5X20MM	NA
Dimensions	27.7 5 x 11.25 x 64.83cm (10.92 x 4.43 x 2.55-in)	21.5 9 x 10.16 x 5.59cm (8.5 x 4 x 2.2-in)	208.28 x 81.28 x 42.67mm (8.2 x 3.2 x 1.68-in)
Weight	0.544 kg (1.20 lb)	0.593 kg (1.30 lb)	0.294 kg (0.648 lb)

Visit www.Beha-Amprobe.com for

- **Catalog**
- **Application notes**
- **Product specifications**
- **User manuals**

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