



CORROSION MITIGATION INSTRUMENTATION
2828 FM 758, NEW BRAUNFELS, TX 78130 TEL: (830) 253-5621

PRODUCT INSTRUCTIONS

MODEL ELD

ELECTRONIC LEAK DETECTOR

ALWAYS CONNECT CABLES PRIOR TO POWERING ON THE INSTRUMENT

1. LEAK DETECTOR FUNCTION

The Tinker & Rasor Model ELD Leak Detector is an all-purpose electrical inspection instrument that maintains a given inspection voltage despite the electrical load on the circuit. It is recommended for use on non-conductive waterproof membranes as well as on flat surfaces when such surfaces are coated with a highly electrical resistance material, and when the surface beneath the coating is electrically conductive. The Model ELD works equally well on damp or dry surfaces and is especially desirable where humid conditions prevail.

The purpose of this instrument manual is to inform the user on the operation of this instrument and is not meant as an instruction guide to leak detection in general. It is recommended that only knowledgeable and trained operators use this equipment. We suggest ASTM International (www.ASTM.org) for this type of training.

2. INSTRUCTIONS FOR UNPACKING & INSPECTION

1) Open the shipping carton and make note of the various accessories.

Includes:

- (1) Rechargeable Instrument w/ Extra Battery
- (1) Powerpak w/ Cable
- (1) Battery Charger w/ Charging Adapter
- (1) Screwdriver
- (1) Ground Cable w/clamp (150')
- (1) Wand Handle (18")
- (2) Extension Wands (18")
- (1) Equipment Belt (54")
- (1) 24" Wire Brush
- (1) 4" Wire Brush
- (1) 8" Fan Brush
- (1) Backpack Carrying Case w/ Foam Insert
- (1) Certificate of Calibration

NOTE: Additional accessories may ship in separate packaging.

- 2) INSPECTION should be made upon receipt. If damage has occurred during shipment, file a claim with the carrier immediately.
- 3) If it is necessary to contact your supplier or the manufacturer concerning damaged or missing items, be sure to include the serial number, purchase order number, and invoice number of the instrument in question.

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Safety Information for User

Unpacking and Reviewing your Tinker & Rasor Electronic Leak Detector Before Every Use

- Make certain the inside of the case is clear and dry.
- Inspect each component for damage, such as cables, instruments & wand handles.
- Make sure all test electrodes are clean.
- Verify the unit is fully charged.
- Verify that the output voltage is correctly set to the coating manufacturers' recommended inspection voltage.
- If the manufacturer's requirements are not stated, ASTM Standards can be followed.

AND..... **ALWAYS READ THE INSTRUCTIONS THOROUGHLY BEFORE USING ANY TEST EQUIPMENT!**

WARNING! This is a HIGH VOLTAGE device is capable of producing an electrical shock if not properly grounded and/ or operated per the instructions and procedures described in this manual!

DANGER! IF YOU HAVE A PACEMAKER DO NOT USE THIS DEVICE.

If you have a pacemaker, life-critical electronic medical devices or any medical condition affected by High Voltage, DO NOT use this type of equipment. Only trained and responsible personnel should operate high-voltage equipment. Alert all personnel nearby before testing and display warning signs. It is important to realize you are now using a high-voltage, low-energy leak detector. Tinker & Rasor leak detectors, APS & ELD, are designed to generate between 800 to 35,000 volts, pulsating DC. While these voltages are high, the energy emitted is well within US, OSHA guidelines.

<https://www.osap.org/page/GuideOSHA> Rubber or plastic gloves and non-conductive footwear can minimize potential shock. Remember that the shock prevention effectiveness of rubber or plastic gloves and footwear is limited to the condition of their protective surface. Make sure your gloves and footwear are in good condition and have no holes or tears. Most Portable Leak Detectors are limited to finding defects in nonconductive coating materials. Testing should ONLY be conducted clear of personnel not involved in the testing procedure.

Personnel operating Leak Detectors should always be aware of their environment and the safety limitations it imposes. The operator should have an alert assistant, to ensure that all unauthorized personnel are kept clear of the testing area.

DANGER!!! Electronic Leak Detectors create an arc or spark. The use of Electronic Leak Detectors in or around combustible or flammable environments can result in an explosion. When operating in any potentially hazardous area, consult with the plant or site safety officer before proceeding with a leak detection test in any potentially hazardous or suspect area.

CAUTION! DO NOT USE AROUND SENSITIVE ELECTRONICS OR RADIO EQUIPMENT. When "on" but not in use, Tinker & Rasor Pulse Type Electronic Leak Detectors will generate radio frequency emissions that are within the limit defined by the Electromagnetic Compatibility Directive. Due to its method of operation, however, the Leak Detector will generate broadband RF emissions when the unit is generating high voltage or when a spark is produced at the



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electrode. It is therefore recommended that the user does not activate the high voltage within the vicinity of sensitive electronics or radio equipment.

DO NOT SHORTEN THE GROUND CABLE. NEVER TOUCH THE BARE GROUND WIRE WHEN THE DETECTOR IS TURNED ON.

WARNING! USE CAUTION WHEN RAINING. If it is raining, then there is a safety concern for the operator. Surface water on the membrane is usually not conductive enough to transmit voltage, but almost any contaminant will cause water to become more conductive. If water covers the wand handle while connected to the ELD Power Pak, then the operator could become the return path for the high voltage. While the output voltage will cause harm to a healthy person, according to OSHA, your environment must be taken into consideration when operating this type of equipment. For example, if you are standing on top of a flagpole and receive a jolt of high voltage, it will most likely cause you to jump, and you will fall off the flag pole. ***Stay Alert, Stay Aware, and Stay Alive.***

If it isn't raining, but the coating surface is wet, Tinker & Rasor ELD Detector is designed to minimize the effects of damp or wet coatings. In extreme cases, "ghost" leaks might be witnessed, should a continual path of water reach a leak. If this continues, dry the sub straight and continue testing.

It is important to note that all accidents are preventable. Take caution when using Tinker & Rasor leak detectors or any other high-voltage test equipment.

3. CHECK-OUT INSTRUCTIONS

1. Remove all accessories from the shipping carton.
2. Connect high voltage wand by screwing it onto the front of the Power Pak. Connect the Power Pak to the instrument by lining up the wide key of the connector with the mating connector on the front of the instrument. Insert the connector fully into its mate and turn clockwise $\frac{1}{4}$ turn. If the connector does not turn easily, try pushing the cable connector more firmly into the instrument case connector mate. A positive lock will be felt when the cable connector is properly attached to the instrument.
3. Attach the ground cable to the instrument. The cable connector is pushed into its mating connector located on the front of the instrument case, in the lower left corner. Insert and twist clockwise to lock.

NOTE: Never connect or disconnect the ground cable or PowerPak when the instrument is turned on.

4. The Model ELD Leak Detector is now ready to be set for a specific voltage.
5. Remove the dust cover with the supplied screwdriver, to reveal the voltage adjustment knob.
6. Push and HOLD the Power button on the panel of the Instrument case. Then push either the LOW or HIGH button to set the voltage range.



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NOTE: LOW voltage range is 800v to 8,000v, in 100v increments. HIGH voltage range is 3,500v to 35,000v in 100v increments

7. Continue holding the Power button on the panel of the ELD Instrument case and use the screwdriver to adjust the voltage setting, using the digital display for reference.

NOTE: When the Power button on the panel of the Instrument case is held, there is no output from the PowerPak. However, all attachments from the nose of the Power Pak and beyond should always be considered a potential hazard.

8. Once the voltage has been set, as shown by the LCD on the panel of the Instrument Case, the Power button on the panel of the instrument case may be released.
9. Attach the electrode to the high-voltage wand handle assembly and apply to the structure to be inspected. The electrode should always make intimate contact with the surface under inspection.
10. Turn the instrument ON by holding the safety switch handle of the PowerPak firmly against the instrument handle. (Instrument handle has neoprene rubber grip), then press the "ON" button on the PowerPak.

NOTE: The instrument will turn OFF when the safety handle is released.

11. The instrument will "remember" the last HIGH or LOW and voltage setting selected, after being turned OFF and then ON again.
12. The instrument is now ready to use.
13. See the Addendum *Operational Check* at the end of the manual.

4. INTEGRATED VOLTMETER

The Model ELD includes an integrated voltmeter displayed on the front panel of the main instrument.

The LCD of the voltmeter measures and displays the output voltage of the leak detector. This display gives the user the ability to tune the ELD to a specific voltage within the 800v – 8,000v Low range and the 3,500v – 35,000v High range. Voltages increment in 100v steps.

Because the Model ELD includes this integrated peak reading voltmeter, it is not suggested that an external peak reading voltmeter be used with this instrument. Most



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external peak reading voltmeters currently available are not as accurate as the integrated voltmeter of the ELD and will not show accurate results.

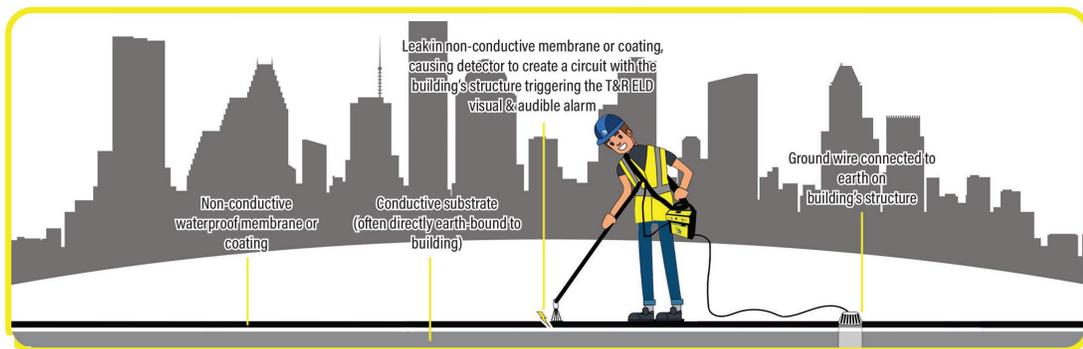
5. ACCURACY & CALIBRATION

The Model ELD voltmeter is accurate to +/- 5% of the output voltage, as shown on the LCD on the instrument panel.

It is recommended that the Model ELD follow an annual calibration cycle to ensure the instrument is in good working order and that the LCD of the integration voltmeter is accurate.

6. OPERATING METHODS

To effectively find leaks on the non-conductive membrane a good ground return system will always provide the best and most reliable membrane inspection. The grounding point must be connected to the roof steel deck. *Caution-conductive membranes such as EPDM cannot be tested with Electronic Leak Detection equipment due to their conductive properties.*



The speed of the electrode's travel along the waterproof membrane should never be excessive, as faulty inspection may result. 1 foot per second is a good guideline to use.

Occasionally a check of the detector's operation should be made, particularly if no leaks are found. This can be accomplished by testing for the spark and signal at the edge of the non-conductive waterproof membrane where the steel deck exists at any metal point that ties into the steel deck or by touching the probe end of the detector to the bare ground wire and noting the length of the spark and the visual and audible signal effectiveness.



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NOTE: Formula taken from NACE International Standard RP0274-04. This standard and others available for free download to members at: www.nace.org

A common practice used in setting inspection voltages in the field is to adjust the output voltage by visual observation. It is the consensus that a spark discharge across a gap distance of at least twice the thickness of the waterproof membrane will give adequate inspection voltage and compensate for any irregularity in waterproof membrane thickness and grounding conditions. If this practice is desired for determining inspection voltage, it should be done while the electrode is in the normal operating position and under actual grounding conditions.

7. ADJUSTING THE SENSITIVITY SWITCH

The Model ELD comes standard with a sensitivity adjustment switch. The switch is located on the Right side of the instrument, as you look at the front.

The 6-position switch is set to factory default at the 1 position, which is turned all the way counterclockwise.

Adjustment is usually not necessary on steel structures. However, on other types of structures, specifically concrete and some lining systems, it may be necessary to adjust the instrument to be more sensitive. Follow the decal around the switch, turning the switch clockwise (as you look at it) will increase sensitivity and counterclockwise to decrease sensitivity.

8. CHARGING THE BATTERY

The Model ELD comes with an internal rechargeable battery. The internal lithium-ion battery provides a full day of use for the Model ELD. It is recommended that the battery be charged after each use.

NOTE: Do not use the Model ELD while the battery is being charged. Significant damage can occur to the battery and charger.

The Green Power LED on the main panel of the ELD will blink when the battery is low. This indicates the battery needs charging.

The battery charger has an LED as well. RED color LED indicates the battery is being charged. GREEN color LED indicates that the battery is fully charged. GREEN color LED also means that the battery is on trickle charge and can be left in this condition. The charger can be used with 110v / 240v AC. It is an auto-sensing charger that can be used throughout the world

9. INSTRUMENT SERVICING INSTRUCTIONS

- A. **Cleaning:** Keep the instrument clean and dry. Clean the instrument case with a soft, damp cloth, then wipe dry. Do not use solvents such as lacquer thinner, methyl ethyl keytone, etc.

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- B. Test Electrode Cleaning:** Keep the test electrode clean for the best test results. Avoid a build-up of sticky residues and other foreign particles on the test electrode to make sure you achieve the best test results. Replace the test electrode as needed with a new test electrode.

KEEP ALL ELECTRICAL CONTACTS CLEAN

- C. Voltage Output Checks**
- a. In the case of LOW output voltage:
 - i. Check the LED indicator for the HIGH or LOW Range selector, to ensure the instrument is in the correct Range.
 - ii. Check the display for voltage output. The voltage displayed is in kilovolts. (22,000volts = 22.0 on display)
 - iii. Check green ON LED. If flashing, this indicated low battery voltage.
 - b. In case of NO output voltage:
 - i. Check green ON LED. If flashing, this indicated low battery voltage.
 - ii. Check ground cable and wand connections. **MAKE SURE EACH SECTION OF THE WAND ASSEMBLY ARE FULLY TWISTED TOGETHER.**

10. FACTORY REPAIRS/ CALIBRATION SERVICE

Model ELD's returned to the factory for repairs should be sent **TRANSPORTATION PREPAID**. In most cases the detector can be repaired and returned the same day it is received at the factory.

WHEN ORDERING PARTS FOR YOUR MODEL ELD OR REQUESTING FURTHER INFORMATION ALWAYS GIVE THE DETECTOR'S SERIAL NUMBER.

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SPECIFICATIONS

Leak Detector Type	Pulse –type DC
Battery Type	Lithium (LiFePO4)
Battery Output	6 volts DC
Battery Charger Voltage Input	110v - 240v A/C Auto Sensing
Battery Charger Output	7.4V, 2A DC
Max. Voltage Output	35,000 volts (35kV)
Min. Voltage Output	800 volts (0.8kV)
Max. Current Output	1.3 mA (0.0013A)
Integrated Peak Voltmeter	
Accuracy	+/- 5% of voltage shown
Calibration Cycle	Recommended Annually



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OPERATIONAL CHECK

Prior to use, the Model ELD Leak Detector should be given an operational check to ensure it is working properly. The Operational Check ensures that the audible and visual alerts are working properly and the instrument has voltage output. The Operational Check is not a calibration check and should not replace the recommendation of annual service.

The instrument should be completely assembled and ready for use in the application in which it is required.

Operational Check

- Ensure the instrument and all components are assembled.
- Visually inspect each cable and connection.
- Squeeze the safety handle on the PowerPak.
- Press and Release the Power button on the top of the PowerPak.
- Note the Power LED on the Powerpak near the Power button. It should be on with a steady glow. A slow blinking of the Power LED indicates a Low Battery condition.
- An audible alert should be noted when the instrument turns On.
- A visual alert on the top of the PowerPak should be seen when the instrument turns On.

On the panel of the ELD instrument:

- Note the LCD Voltage display does not fluctuate and change significantly. A small letter “b” on the display indicates a Low Battery condition.
- Note the Power LED near the Power button remains steady and not flashing. A slow blinking indicates a Low Battery condition.
- Touch the electrode to the bare ground wire. Note the audible and visual alerts. Repeat this step several times.

NOTE: Spark may or may not be seen and heard when using lower voltage outputs on bright sunny days.

- Release the safety handle to turn the instrument Off.
- The Model ELD is now ready to use.

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