

Model 510L Functional Specifications

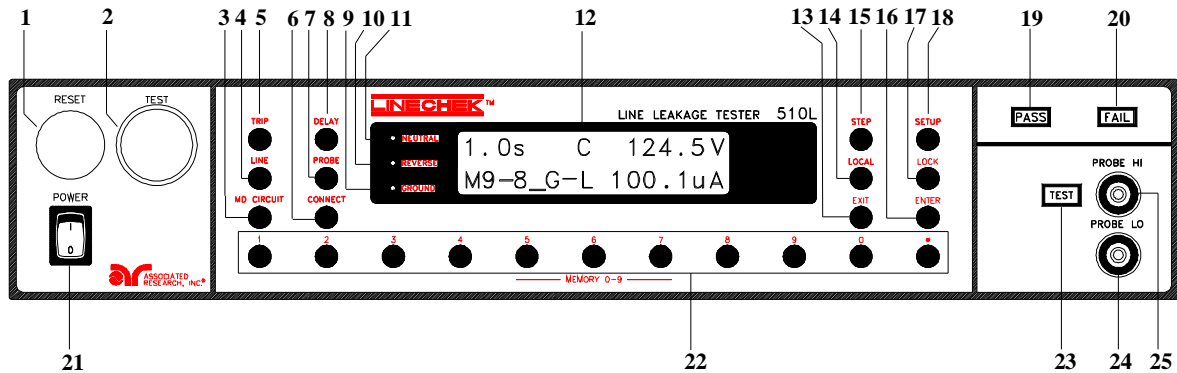
510L INPUT	
Voltage	115/230 VAC \pm 15%, Single Phase, User selection
Frequency	50/60 Hz \pm 5%,
Fuse	2 A 250 V Slo-Blo
DUT POWER	
Voltage	30 - 300 VAC Single Phase Unbalanced (One Hot or Line conductor and One Neutral)
Current	30 AAC max continuous
Voltage Display	Range: 30.0 - 300.0 VAC Full Scale Resolution: 0.1 V Accuracy: \pm (1% of reading + 0.2 V)
Short Circuit Protection	32 AAC, Response Time < 600 ms
LEAKAGE CURRENT	
Current Display True RMS Responding	Range 1: 0.0 μ A - 999.9 μ A Resolution: 0.1 μ A/step Range 2: 1000 μ A - 6000 μ A Resolution: 1 μ A/step Accuracy: DC to 100 kHz \pm (1.5% of reading + 3 counts) >100 kHz to 1 MHz \pm 5% of reading, (10.0 μ A – 6000 μ A)
Measuring Device	A UL 544 Non Patient B UL 544 Patient C IEC 601-1, UL 2601, EN 60601-1 D UL 1563 E IEC 1010, UL 3101, IEC 950, UL 1950
MD A - D components	Accuracy: Resistance \pm 1% Capacitance \pm 5%
MD E components	Accuracy: Resistance \pm 0.1% Capacitance \pm 1%
MD Voltage Limit	Maximum 20 V peak or 20 VDC

HI-Limit / LO-Limit	Range: 0 - 6000 μ A (0 = Off) Resolution: 1 μ A Accuracy: Same as Leakage Current Display Accuracy
Delay Timer	Range: 0, 1.0 - 999.9 sec (0 = Constant) Resolution: 0.1 sec/step Accuracy: \pm (0.1% + 0.1 sec)
GENERAL SPECIFICATIONS	
PLC Remote Control	Input - Test, Reset, Execute memory # 1, # 2 and # 3 Output - Pass, Fail, Test-in-Process, and Reset
Memory	Allows storage of up to 10 groups of different test programs and 8 step/each memory.
Security	Programmable password lockout capability to avoid unauthorized access to test set-up program.
LCD Contrast Setting	9 ranges set by the numeric keys on the front panel.
Buzzer Volume Setting	10 ranges set by the numeric keys on the front panel.
Calibration	Software and adjustments are made through front panel.
Mechanical	Bench or rack mount with tilt up front feet.
Dimension	(W x H x D) 17 x 4 x 16.5 in. (432 x 102 x 419 mm)
Weight	15.9 lbs (7.2 Kgs)

KEY FEATURES & BENEFITS SUMMARY: MODEL 510L

FEATURES	BENEFITS
Provides 8 of the most common safety tests	No need to manually set up the test or to switch test leads around.
The 5 most common measuring devices are built-in and can be selected through software control	A versatile tester that can be set-up to meet multiple specifications without the need for complicated external connections, or the need for separate instruments.
Fully complies with the latest European Norms	Complies with the latest EN such as the Low Voltage Directive and Medical Directive.
Programmable security password system	Avoids tampering with settings by only allowing authorized personnel with a user programmable security password to change test parameters.
Front panel calibration	All calibration is done through a simple user interface from the front panel. No need to open the instrument.
PLC, RS-232 or GPIB Control	Provides flexibility for semi-automatic or automatic operation with a choice of communication protocols which provides the capability for easy test data storage.
Microprocessor control with software menuing	Microprocessor control allows for many advanced features such as automatic testing, memories and software control.
External measurement circuit	One external measurement circuit is provided for measurement of other devices.
Separate current trip points for each test	Each test can have a separate trip point for failure analysis.
50 Memories for test storage	Storage of test set-ups so parameters only need to be entered once then memorized.
Complete with software driver	National Instruments LabVIEW® software driver is provided for automated applications to ease the testing process.
Ranges from DC to 1 MHz	Complies with even the 1 MHz specification for IEC testing.

FRONT PANEL CONTROLS



1. **RESET BUTTON:** This is a momentary contact switch. If a failure condition occurs during a test you will need to reset the system to shut off the alarm and to signal the system that you are aware of a failure condition before you can proceed to the next test or change any of the set-up parameters. This switch also serves as an abort signal to stop any test in progress controlled by the LINECHEK.
2. **TEST SWITCH:** This is a momentary contact switch. Press the green button to activate the leakage test which is set up in the memory location shown on the display. The switch will also illuminate to indicate a pass condition at the end of the test.
3. **MD CIRCUIT:** Use this key to select the Measuring Device (MD) circuit A through F to simulate different body impedances. This setting will vary depending upon the standard to which the product is being tested. The LINECHEK has 5 internal MD circuits A-E which are shown below and 1 external measuring device which can be added if a new requirement is needed.

MD = A
UL 544 MEDICAL EQUIPMENT
Non patient equipment.

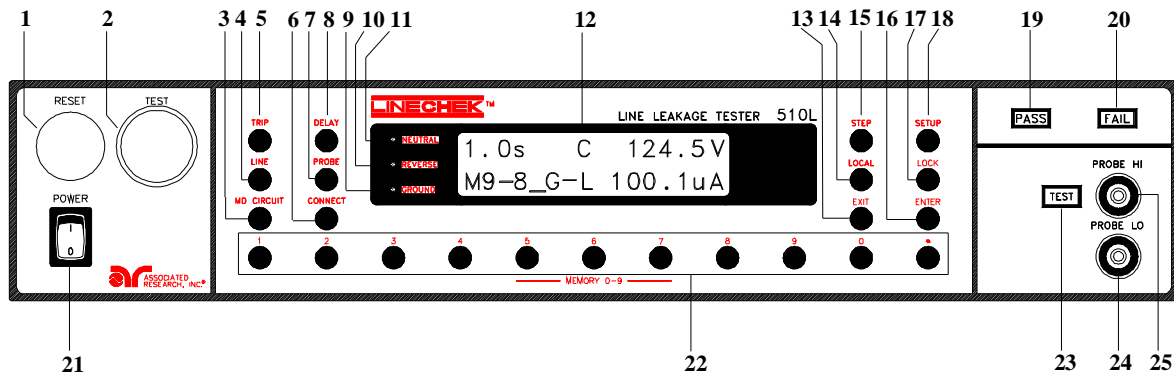
MD = B
UL 544 MEDICAL EQUIPMENT
Patient care equipment.

MD = C
IEC 601-1, UL 2601, EN 60601-1,
MEDICAL EQUIPMENT

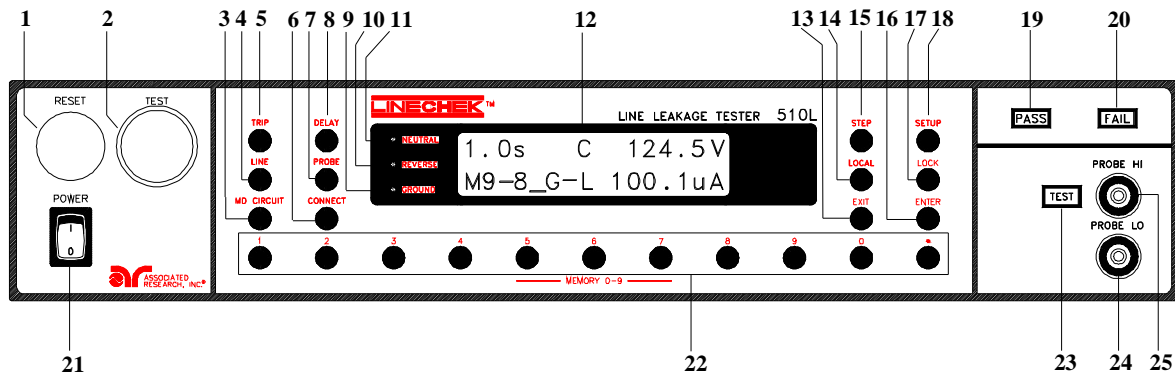
MD = D
UL 1563 Electric Spas,
Equipment Assemblies and
Associated Equipment

MD = E
IEC 1010, UL 3101, IEC 950, UL 1950, EN 60950 LABORATORY EQUIPMENT,
INFORMATION TECHNOLOGY

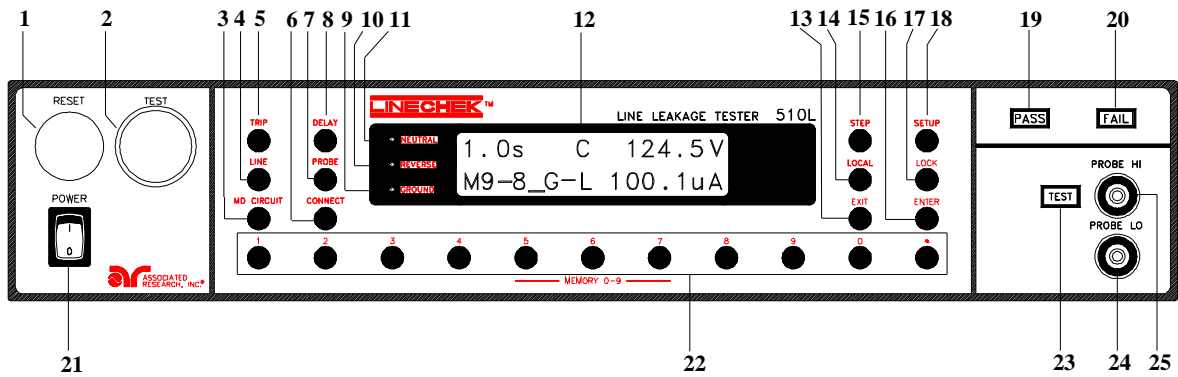
4. **LINE:** Use this key to activate the NEUTRAL, REVERSE, and GROUND relays to set up the steps within each memory for the single fault and normal conditions.
5. **TRIP:** Use this key to set the trip current level for each step.



6. **CONNECT:** Use this key to sequence one step to the next step. The display will indicate M1-1_. The underbar indicates that step 1 is connected to step 2.
7. **PROBE:** Use this key to select the location of the MD circuit for the type of test being performed. G-L indicates the MD is connected to measure the leakage current in the earth ground conductor in the line cord back to the system neutral, an EARTH LEAKAGE TEST. P_H-L indicates the MD is connected between the PROBE-HIGH (P_H) terminal # 25 on the instrument which should be connected to the ENCLOSURE of the DUT through the system neutral, an ENCLOSURE LEAKAGE TEST. P_H-P_L indicates the MD is connected between the P_H and the PROBE-LO (P_L) terminal # 24 on the instrument which allow the operator to connect the MD between APPLIED PARTS.
8. **DELAY:** Use this key to program the delay time for making the leakage measurement for each step.
9. **GROUND LED:** This indicator will illuminate when the ground conductor to the DUT is open. This is one of the single fault conditions which is simulated during the leakage test.
10. **REVERSE LED:** This indicator will illuminate when the input power polarity to the DUT is reversed.
11. **NEUTRAL LED:** This indicator will illuminate when the neutral conductor to the DUT is opened. This is one of the single fault conditions which is simulated during the leakage test.
12. **LCD DISPLAY:** The 2x16 character display indicates the following test functions during a test; Probe Connections, Measuring Device Selection, Delay Time, Memory, Step Location, Input Voltage to DUT, and Leakage Current Reading. The display will also indicate various set up parameters.
13. **EXIT:** Use this key to exit any menu or to clear an unwanted entry in a parameter field.
14. **LOCAL:** Use this key when you wish to switch between remote and local operation of the instrument.

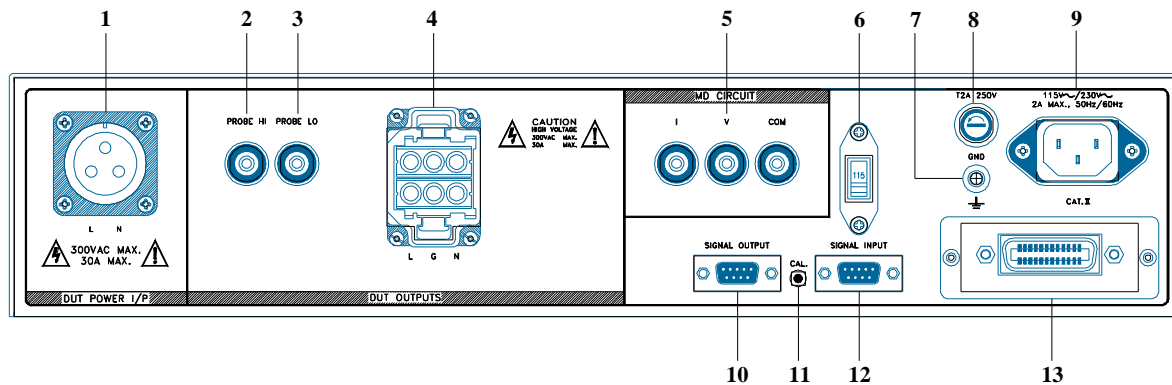


- 15. **STEP:** Use this key to select one of the 8 locations contained within each memory. The step button will cycle through the steps as indicated on the display in the Set Screen. M1-1, M1-2, M1-3, etc.
- 16. **SETUP:** Use this key to enter the setup menu. View or change the PLC Remote status, display contrast, alarm volume, GPIB address, Fail Stop setting, Single Step, and Memory Lock function.
- 17. **LOCK:** Use this key to select key lockout mode. A password may be used when setup (Please refer to sections General Setup and System Setup).
- 18. **ENTER / REVIEW KEY:** Use this key as an ENTER key to accept numeric data for parameter settings. Or use this key as a REVIEW key to recall up to 16 connected test results after a test has been completed.
- 19. **PASS INDICATOR:** This LED indicator lights at the end of a test if a failure has not occurred.
- 20. **FAIL INDICATOR:** This LED indicator lights at the end of a test if a failure has occurred during the test. Press the Reset button to clear the failure.
- 21. **POWER SWITCH:** Rocker-style switch with international ON (I) and OFF (O) markings.
- 22. **DATA ENTRY KEYS:** Use these keys to input numeric parameters followed by the ENTER key. Also used to recall test parameters stored in memory 0-9.
- 23. **TEST LED:** This indicator will illuminate when the DUT has voltage applied to it, and the Line Leakage test is active.
- 24. **PROBE LO:** This connector is an input to one side of the MD which is activated by pressing the PROBE button # 7, when the display indicates P_H-P_L for performing Applied Part leakage measurements.

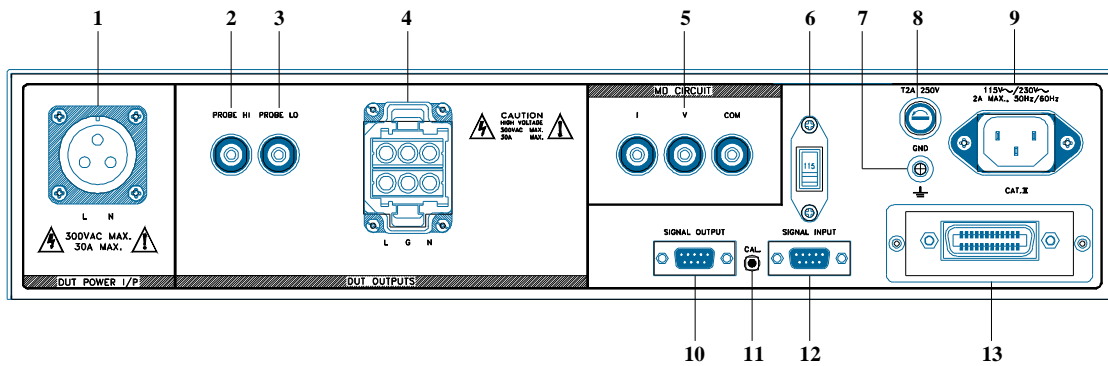


25. PROBE HI: This terminal is an input to one side of the MD which is activated by pressing the PROBE button # 7, when the display indicates either P_H-L or P_H-P_L for performing Enclosure leakage or Applied Part leakage measurements. When doing an Enclosure Leakage test the lead from the Probe HI terminal should be connected to the enclosure. When performing an Applied Part test the lead should be connected to the applied part.

REAR PANEL CONTROLS



1. **DUT POWER INPUT TERMINAL:** This connector is the LINE and NEUTRAL input power connections. An external single phase unbalanced AC power supply with a single Hot or Line conductor should be connected here, to supply power to the DUT while performing the leakage test. This input is rated for 0-300 volts, 30 A maximum.
2. **PROBE HI:** This terminal is an input to one side of the MD which is activated by pressing the PROBE button #7, when the display indicates either P_{H-L} or P_{H-P_L} for performing Enclosure leakage or Applied Part leakage. This terminal and the PROBE HI terminal # 25 on the front panel are connected in parallel during the Line Leakage test. When the external link is active this terminal is isolated from the line leakage test circuits.
3. **PROBE LO:** This terminal is an input to one side of the MD which is activated by pressing the PROBE button #7, when the display indicates P_{H-P_L} for performing Applied Part leakage measurements. This terminal and the PROBE LO terminal # 24 on the front panel are connected in parallel during the Line Leakage test. When the external link is active this terminal is isolated from the line leakage test circuits.
4. **DUT OUTPUT TERMINAL:** This output terminal is where the LINE, NEUTRAL and GND power connections from the adapter box is plugged into the LINECHECK. Line power is supplied to the DUT during the leakage test through this terminal. This output is rated for 0-300 volts, 30 A maximum.
5. **EXTERNAL MEASURING DEVICE CONNECTORS:** These connectors allow the operator to connect an external Measuring Device circuit to the LINECHECK. These terminals are activated when the display indicates MD=F. The external measuring device may allow the operator to test to a different standard, which calls for a different measuring device, or to easily change the measuring device if the standard requirements change.



6. **INPUT POWER SWITCH:** Line voltage selection is set by the position of this switch. In the down position it is set for 110-120 volt operation, in the up position it is set for 220-240 volt operation.
7. **CHASSIS GROUND (EARTH) TERMINAL:** This terminal should be connected to a good earth ground before operation.
8. **FUSE RECEPTACLE:** To change the fuse unplug the power (mains) cord and turn the fuse receptacle counter-clockwise. The fuse compartment will be exposed. Please replace the fuse with one of the proper rating.
9. **INPUT POWER RECEPTACLE:** Standard IEC 320 connector for connection to a standard NEMA style line power (mains) cord.
10. **REMOTE SIGNAL OUTPUT:** 9-Pin D subminiature female connector for monitoring PASS, FAIL, and PROCESSING output relay signals.
11. **CALIBRATION ENABLE KEY:** This key is used during power up to enable the calibration routines.
12. **REMOTE SIGNAL INPUT:** 9-Pin D subminiature male connector for remote control of test and reset functions as well as program memory selection 1, 2, or 3.
13. **GPIB:** Standard connector for interconnection to the GPIB interface. Optional RS-232 interface can be substituted for this interface.