

GENERAL INFORMATION

The "LR Tester" is a portable electronic analyser designed to the full test of the status of the Early Streamer Emission (ESE) circuit, performing tests on the discharge circuit and on the impulse amplifier of ESE lightning rods made by Cirprotec.

The LR Tester is a portable device which incorporates the last electronic generation, and performs the test of ESE lightning rods by an automatic manner. After connecting the Tester to the Lightning Rod, only must push the activation buttons (element n° 4 of the Diagram 1). The Tester starts then the cycle of tests composed by three phases necessities for:

1. testing the charge circuit of ESE system.
2. testing the discharge circuit of ESE system.
3. testing the integrity of impulse amplifier.

Ones completed these steps, the cycle of test is over and the Tester gives as the result PASS in the case when the device response was correct, and err when some of the obtained values were not correct.

The LR Tester is an equipment designed both to guaranty the integrity of the radius cover of the lightning rods after repetitive impacts and to be an useful instrument for the installation of lightning rods allowing to check the correct installation and connexion of the lightning rod with the cable to the earth terminal.

WORKING PRINCIPLES

The built-in Early Streamer Emission (ESE) circuits allow to enlarge the protection radius which would be supplied by a classical Franklin lightning rod with the same dimensions. Therefore, the actual coverage level depends both on the ESE circuit and the size of the lightning rod. As the dimensions are considered to be inalterable during the time, the LR Tester can analyse the integrity of the lightning rod measuring only the ESE system.

The LR Tester is designed to perform appropriate measures on the ESE circuit, to check the operation of various blocks of ESE system and display an acceptance or error value. Logically, the LR Tester guarantees only the integrity of ESE system and its correct connexion to the earth termination, but not the physical integrity of the lightning rod, so an acceptance result in a lightning rod with physical damages, like divided or doubled lightning rod does not signify that the lightning rod will maintain the covering radius, because this one does not depends only on ESE system, but also on the physical parameters, in order to guaranty the covering radius, therefore a visual inspection of the physical integrity should be necessary.

The LR Tester verifies the correct connection of the lightning rod with the earthing wire, but it does not verify the earthing system installation on the whole, which should be tested its own with an appropriate tester.

INSTRUCTIONS OF OPERATION

See table 1 for an enumeration of the steps to follow.

The test must be carried out with the analyser connected to the lightning rod. When the Tester is used to check an installation, it is necessary to connect one or two poles (any of both) to the rod and the other to the earthing terminal point in order to check the proper connection between both components of the system.

It is also important to check the fixing bolts of the earthing wire and those of the ESE sheltering carcass are properly clamped. If not, it would lead to a bad test measurement.

To start the test cycle, both thumb switches must be pushed simultaneously, using both hands. Keep pushing those thumb switches during the whole verification cycle, until the end of the test. If during the test process incidentally the buttons are left unpressed, please, re-start the whole test cycle again after leaving a prudential 5 seconds time interval (in order to discharge the device) before pushing both thumb switches again.

The test for installed lightning rods should not be carried out under stormy weather conditions since the Early Streamer Emission device might have acquired some charge beforehand which would interfere the measurement. Besides, there is a real risk of lightning strike. If an ESE device test has to be carried out under environments with high electrostatic charge levels, the ESE device has to be removed from the installation and verified in a safe place without external charge presence.

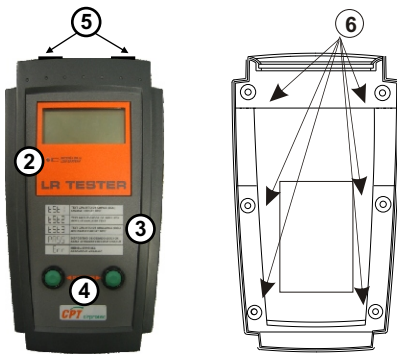
During the verification test cycle neither the lightning rod and ESE device set nor any other part of the installation must be touched since the LR Tester creates voltages up to 2000V which might originate electrical discharges which in turn might be dangerous.



LR Tester

Lightning Rod analyzer

Diagram 1: device description



Front view

Rear view.

- 1: LCD Display.
- 2: Low battery indicator.
Push the two buttons (4) and the indicator will glow if the battery is empty.
- 3: Reference for the Messages in the display.
- 4: Thumb switches for test-cycle activation.
- 5: Connection terminals.
- 6: Lock screws for the carcass- lid on the back.

Table 1: Verification steps

1. Plug the cables supplied with the LR Tester to the output terminals of the analyser.
2. Connect the clamps to the opposite extremes of each cable.
3. Connect the clamps to the lightning rod in the test position, as shown in figure 2.
4. Push both buttons simultaneously in order to start the verification cycle.
5. Wait a few seconds while the device performs the measurements.
6. Read the display indication with the result of the TEST.

Table 2: Messages on the display

- TST1:** The analyser is performing the measures and calculation on the ESE device.
- TST2:** The analyser is performing the measures on the impulse amplifier device.
- TST3:** The analyser is performing the measures and calculations on the discharge device.
- PASS:** The ESE device of the lightning rod is operative and correctly connected.
- Err:** Erroneous measurement. Check the low-battery indicator. If it's lighted, replace the battery with a new one (see diagrams 1 and 3).
- In the contrary case, check the connections of the installation and repeat the checking cycle; if the message still appears on the display, remove the lightning rod and perform the test again with the rod standing alone. If the message still persists, a substitution of the lightning rod is required.

Diagram 3: Battery replacement

Unscrew the bolts and remove the back carcass-lid.

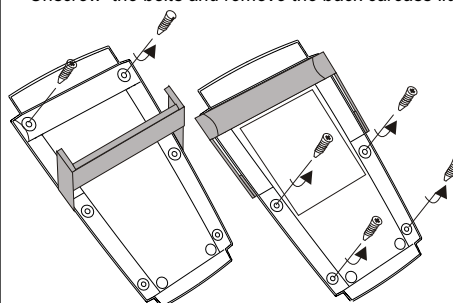


Table 3: Technical features

CONCEPT	VALUE
Code	77 900 015
Maximum output voltage	2000 V.
Measurement range	CPT1, CPT2, CPT3
Test voltage in open circuit	1000 V/s.
Spark-over test over ESE device	1 mA +/- 10%
Type of battery	batteries PP9 9V.
Battery life cycle	1000 tests
Operating Temperature	from -20 °C to + 50°C
Storage Temperature	-40 °C a + 125 °C
Size	239 x 125 x 60 mm.
Weight	710 gr.

Diagram 2: connection to lightning rod

