I. Overview

UT593/UT595 is a multifunction digital safety testing instrument, designed with combination of large-scale integrated analog & digital circuits and micro-processor chip. It can safely measure RCD, line/phase impedance, continuity, insulation resistance, DC and AC voltage, phase sequence, featuring versatile functionality, higher accuracy, stable performance and wide range of use. The instrument is especially useful to measure RCD, insulation and earth connections for various equipments, and an ideal tool for testing, inspection and maintenance badly needed for various electronic devices and RCDs.

II. Safety Information

The Tester is designed, manufactured and tested according to IEC61010 safety standard. The manual include safety information related to safe use of the Tester. Please strictly follow the safety items and read the following instructions before use.

Warning:
- Please read and understand the manual before using the Tester.
- Use the Tester as specified in the manual and keep it for future reference.
- Please note that measure during tests might cause personal injury or damage to the Tester.
- If the Tester warns users to use the Tester properly, please refer to the manual for details.

Information:
- Do not measure around any inflammables, sparks may cause potential explosion.
- Do not operate the Tester if its surface is wet or the operator’s hands are wet.
- Do not measure with the battery cover opened.
- Do not measure around any inflammables, spark may cause potential explosion.
- Do not measure with the battery cover opened.

Caution:
- Make sure all test leads are firmly secured to input terminals of the Tester.

III. Electrical Symbols

Warning:
- If no test leads are used to test power supply before test.
- Before the test starts, the Tester will automatically display the voltage between two input terminals if this voltage is >30V, and TEST button will be inhibited.

Information:
- Make sure the test circuits are de-energized before measurement. Do not measure input terminals if this voltage is ≤7V.

To measure insulation resistance:
- 1) Disconnect totally the tested circuits and keep them completely separated from the power supply before test.
- 2) Insert red lead or specific TEST-marked test lead into red input terminal and black test lead to black terminal.
- 3) Do not short-circuit two test leads under high-voltage output status or measure insulation resistance after the high-voltage has already been output.

To ensure an accurate test, please perform the following items before testing:
- Do not test on live objects.
- Before the test starts, the Tester will automatically display the voltage between two input terminals if this voltage is >30V, and TEST button will be inhibited.

Understanding F1-F4 Buttons:
- F1: Long press F1 for about 2 seconds to turn on/off the back light; short press to turn on/off 20Ω compare function and LCD will show buzzer indicator, the buzzer will sound if the measured resistance is ≤20Ω.
- F2: Press to turn on/off TEST LOCKED function. When it is necessary to take a long-time measurement, press F2 to enable the function, the buzzer indicator and LCD will show buzzer indicator, the buzzer will show “Buzzer and backlight Test lock ZERO Invalid”.
- F3: Press to turn on/off Test lock function. When it is necessary to take a long-time measurement, press F2 to enable the function, the buzzer indicator shows on LCD, the buzzer will sound if the measured resistance is ≤20Ω.
- F4: Press to turn on/off TEST LOCKED function. When it is necessary to take a long-time measurement, press F2 to enable the function, the buzzer indicator shows on LCD, the buzzer will sound if the measured resistance is ≤20Ω.

To measure voltage/frequency:
- 1) Set the rotary switch to Volts position and select proper test voltage, then press TEST button to start.
- 2) Insert red lead or specific TEST-marked test lead into red input terminal and black test lead to black terminal.
- 3) Set the rotary switch to Hz position and select proper test frequency, then press TEST button to start.
- 4) Turn the rotary switch to other functions.

To ensure an accurate test, please perform the following items before testing:
- Do not test on live objects.
- Before the test starts, the Tester will automatically display the voltage between two input terminals if this voltage is >30V, and TEST button will be inhibited.

Understanding F1-F4 Buttons:
- F1: Long press F1 for about 2 seconds to turn on/off the back light; short press to turn on/off 20Ω compare function and LCD will show buzzer indicator, the buzzer will sound if the measured resistance is ≤20Ω.
- F2: Press to turn on/off TEST LOCKED function. When it is necessary to take a long-time measurement, press F2 to enable the function, the buzzer indicator shows on LCD, the buzzer will sound if the measured resistance is ≤20Ω.
- F3: Press to turn on/off Test lock function. When it is necessary to take a long-time measurement, press F2 to enable the function, the buzzer indicator shows on LCD, the buzzer will sound if the measured resistance is ≤20Ω.
- F4: Press to turn on/off TEST LOCKED function. When it is necessary to take a long-time measurement, press F2 to enable the function, the buzzer indicator shows on LCD, the buzzer will sound if the measured resistance is ≤20Ω.

X. Measuring Voltage/Frequency (See Figure 5)

To measure insulation resistance:
- 1) Disconnect totally the tested circuits and keep them completely separated from the power supply before test.
- 2) Insert red lead or specific TEST-marked test lead into red input terminal and black test lead to black terminal.
- 3) Do not short-circuit two test leads under high-voltage output status or measure insulation resistance after the high-voltage has already been output.

To ensure an accurate test, please perform the following items before testing:
- Do not test on live objects.
- Before the test starts, the Tester will automatically display the voltage between two input terminals if this voltage is >30V, and TEST button will be inhibited.
- Do not measure with the battery cover opened.
- Do not short-circuit two test leads under high-voltage output status or measure insulation resistance after the high-voltage has already been output.

To ensure an accurate test, please perform the following items before testing:
- Do not test on live objects.
- Before the test starts, the Tester will automatically display the voltage between two input terminals if this voltage is >30V, and TEST button will be inhibited.

Understanding F1-F4 Buttons:
- F1: Long press F1 for about 2 seconds to turn on/off the back light; short press to turn on/off 20Ω compare function and LCD will show buzzer indicator, the buzzer will sound if the measured resistance is ≤20Ω.
- F2: Press to turn on/off TEST LOCKED function. When it is necessary to take a long-time measurement, press F2 to enable the function, the buzzer indicator shows on LCD, the buzzer will sound if the measured resistance is ≤20Ω.
- F3: Press to turn on/off Test lock function. When it is necessary to take a long-time measurement, press F2 to enable the function, the buzzer indicator shows on LCD, the buzzer will sound if the measured resistance is ≤20Ω.
- F4: Press to turn on/off TEST LOCKED function. When it is necessary to take a long-time measurement, press F2 to enable the function, the buzzer indicator shows on LCD, the buzzer will sound if the measured resistance is ≤20Ω.
XI. Measuring Loop Impedance/Prospective Fault Current

Understanding F1-F4 Buttons:
- F2, F3, F4: all are invalid; TEST button is invalid too.

(3) Then connect three test leads into three-phase AC system (black to L1, green to L2, red to L3). Refer to Figure 6 for details. After that, the Tester will indicate the phase sequence and open phase result on LCD.

XI. Detecting Phase Sequence (See Figure 6)

To detect phase sequence:
(1) Turn the rotary switch to AUTO position.
(2) Insert three connectors of one-plug test leads or three separate test leads into three input terminals of the Tester (red to red, green to green, black to black).
(3) If the correct phase sequence of the power system is supplied, the icons on the lower left part of LCD will flash simultaneously.
- L-PE and N-PE icons on the lower left part of LCD will flash simultaneously.
- Please take extreme caution when making the measurement, for it is performed under high-voltage status.

XII. Measuring Line Impedance/Prospective Short Current (See Figure 7, 8)

To measure line impedance/prospective short current:
(1) Insert three connectors of one-plug test leads or three separate test leads into three input terminals of the Tester (red to red, green to green, black to black). Refer to Figure 6 for details.
(2) Press TEST button to start.

Understanding F1-F4 Buttons:
- F1, F2, F3, F4: all are invalid; TEST button is invalid too.

Caution
- Please make sure the AC power source is properly grounded. If the socket is unable to be powered normally or de-energized, L-PE and L-N icons on lower left part of LCD will flash simultaneously.
- Ensure the socket is properly grounded. If the socket has bad grounding or isn’t grounded, L-PE and L-N icons on lower left part of LCD will flash simultaneously.
- Ensure the neutral terminal of the socket is firmly connected. If the neutral terminal is badly or not connected, L-PE and L-N icons on lower left part of LCD will flash simultaneously.
- Ensure live and neutral terminals of the power socket are not reversely connected when testing loop impedance/prospective fault current, otherwise L-PE, L-N and N-PE icons on lower left part of LCD will flash simultaneously.
- Please take extra caution when making the measurement, for it is performed under high-voltage status.

XIII. Taking Regular RCD Tests (See Figure 7)

To take regular RCD test:
(1) Ensure live and neutral terminals of the power socket are not reversely connected.
- L-PE, L-N and N-PE icons on lower left part of LCD will flash simultaneously.
(2) Ensure the neutral terminal of the socket is firmly connected. If the neutral terminal is reversely connected, L-PE, L-N and N-PE icons on lower left part of LCD will flash simultaneously.
(3) Please take extra caution when testing RCD trip current, for it is performed under high-voltage status.

Tips:
- The leakage current will be different depending on the selected current multiplier. Refer to the following table for detailed relationship.

<table>
<thead>
<tr>
<th>Current Multiplier</th>
<th>Leakage Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30mA</td>
</tr>
<tr>
<td>5</td>
<td>150mA</td>
</tr>
<tr>
<td>10</td>
<td>300mA</td>
</tr>
<tr>
<td>20</td>
<td>600mA</td>
</tr>
</tbody>
</table>

Caution
- Please make sure the AC power source is properly grounded. If the socket is unable to be powered normally or de-energized, L-PE and L-N icons on lower left part of LCD will flash simultaneously.
- Ensure the socket is properly grounded. If the socket has bad grounding or isn’t grounded, L-PE and L-N icons on lower left part of LCD will flash simultaneously.
- Ensure the neutral terminal of the socket is firmly connected. If the neutral terminal is reversely connected, L-PE, L-N and N-PE icons on lower left part of LCD will flash simultaneously.
- Please take extreme caution when testing RCD trip current, for it is performed under high-voltage status.

XIV. Taking Auto RCD Tests (See Figure 7)

To test RCD automatically:
(1) Insert three connectors of one-plug test leads into three input terminals of the Tester (red to red, green to green, black to black). Refer to Figure 6 for details.
(2) Press TEST button to start.

Tips:
- Auto RCD Test is designed to measure trip times in one test just by pressing one pressure button.
- The Tester will display all RCD measurements before proceeding into next test.
All these test data will be saved in the Tester: pressing F3 can review all the data. RCD measurements are taken in the following order:
- UT593: 1.121*I n, 2*I n, 3*I n, 5*I n, 10*I n
- UT595: 1.121*I n, 2*I n, 5*I n, 10*I n, 20*I n

Understanding F1-F4 Buttons:
- F1, F2, F3, F4: all are invalid; TEST button is invalid too.

F1: Long press F1 for 2 seconds to turn on the backlight.
F2: Press to toggle between RCD types and Timer mode.
F3: Under this mode, press down TEST button and the Tester will countdown from 30s to 0s before enabling RCD test.
F4: Press to select RCD rated leakage test current, refer to rated options in the following table for detailed relationship.

<table>
<thead>
<tr>
<th>Leakage Test Current</th>
<th>Test Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>30mA</td>
<td>30mA</td>
</tr>
<tr>
<td>150mA</td>
<td>150mA</td>
</tr>
<tr>
<td>300mA</td>
<td>300mA</td>
</tr>
<tr>
<td>600mA</td>
<td>600mA</td>
</tr>
<tr>
<td>1200mA</td>
<td>1200mA</td>
</tr>
</tbody>
</table>

Caution
- Please make sure the AC power source is properly grounded. If the socket is unable to be powered normally or de-energized, L-PE and L-N icons on lower left part of LCD will flash simultaneously.
- Ensure the socket is properly grounded. If the socket has bad grounding or isn’t grounded, L-PE and L-N icons on lower left part of LCD will flash simultaneously.
- Ensure the neutral terminal of the socket is firmly connected. If the neutral terminal is reversely connected, L-PE, L-N and N-PE icons on lower left part of LCD will flash simultaneously.
- Please take extreme caution when testing RCD trip current, for it is performed under high-voltage status.

XV. Taking Regular RCD Tests (See Figure 7)

To take regular RCD test:
(1) Press down TEST button and the Tester will countdown from 30s to 0s before enabling RCD test.
(2) Set the rotary switch to OFF position. Refer to Figure 8 for details.
(3) Press to toggle between RCD types and Timer mode.
F3: Under this mode, press down TEST button and the Tester will countdown from 30s to 0s before enabling RCD test.
F4: Press to select RCD rated leakage test current, refer to rated options in the following table for detailed relationship.

Caution
- Please make sure the AC power source is properly grounded. If the socket is unable to be powered normally or de-energized, L-PE and L-N icons on lower left part of LCD will flash simultaneously.
- Ensure the socket is properly grounded. If the socket has bad grounding or isn’t grounded, L-PE and L-N icons on lower left part of LCD will flash simultaneously.
- Ensure the neutral terminal of the socket is firmly connected. If the neutral terminal is reversely connected, L-PE, L-N and N-PE icons on lower left part of LCD will flash simultaneously.
- Please take extreme caution when testing RCD trip current, for it is performed under high-voltage status.

XVI. Measuring RCD Trip Current (See Figure 7)

To measure trip current:
(1) Connect the Tester with the power source.
(2) Insert three connectors of one-plug test leads into three input terminals of the Tester (red to red, green to green, black to black). Refer to Figure 7 for details.
(3) Press to plug into domestic 220V socket.
(4) Press TEST button to start.

Tips:
- The leakage current will be different depending on the selected waveform. Refer to the following table for detailed relationship.

<table>
<thead>
<tr>
<th>Waveform</th>
<th>Leakage Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Half Wave</td>
<td>30mA, 150mA, 300mA, 600mA, 1200mA</td>
</tr>
<tr>
<td>Full Wave</td>
<td>30mA, 150mA, 300mA, 600mA, 1200mA</td>
</tr>
</tbody>
</table>

Caution
- Please make sure the AC power source is properly grounded. If the socket is unable to be powered normally or de-energized, L-PE and L-N icons on lower left part of LCD will flash simultaneously.
- Ensure the socket is properly grounded. If the socket has bad grounding or isn’t grounded, L-PE and L-N icons on lower left part of LCD will flash simultaneously.
- Ensure the neutral terminal of the socket is firmly connected. If the neutral terminal is reversely connected, L-PE, L-N and N-PE icons on lower left part of LCD will flash simultaneously.
- Please take extra caution when testing RCD trip current, for it is performed under high-voltage status.

Danger
- To avoid electric shock, remove all test leads from the Tester before replacing the battery.
- Do not measure with the battery cover opened.

Danger
- Do not use old and new batteries for use.
- When low battery indicator is shown on LCD, please replace the battery timely.

To replace the battery, follow steps as below:
1. Power off the Tester (set the rotary switch to OFF) and remove away the test leads.
2. Unscrew the battery cover, remove the battery cover and replace the batteries with four new batteries.
3. Screw up the battery and tighten up the screws.

XVIII. Maintenance & Repair

Cleaning the Casing:
- Clean the Tester with soft cloth or sponge dampened with little water.
- To avoid damage to the Tester, do not submerge it into the water.

Repair:
- If the Tester becomes necessary to calibrate or repair the Tester, please have it serviced by qualified professional personnel or designated service center.