

SIEMENS



Application Guide

# WLTS Hand-Held Test Set

WL Low Voltage Circuit Breakers

## Introduction

The WLTS hand-held test unit is the perfect companion for service personnel and users of Siemens type WL circuit breakers. It will verify many trip unit functions and, in most cases, removes the need for primary injection testing.

The WLTS can perform the following functions:

- Verify the continuity of the air-core current sensors and the energy transducers in each phase of the circuit breaker.
- Verify connections to external air-core neutral current sensors in 4-wire residual applications and iron-core ground CTs (current transformers) in MDGF or other directly ground-sensed applications.
- Verify the connection from the electronic trip unit and the tripping solenoid.
- Verify that of each of the main overcurrent protective functions (long-time, short-time, instantaneous, and optional ground-fault and neutral overcurrent) will trip the circuit breaker.
- Help verify communications to an external master by simulating currents in each of the phases.

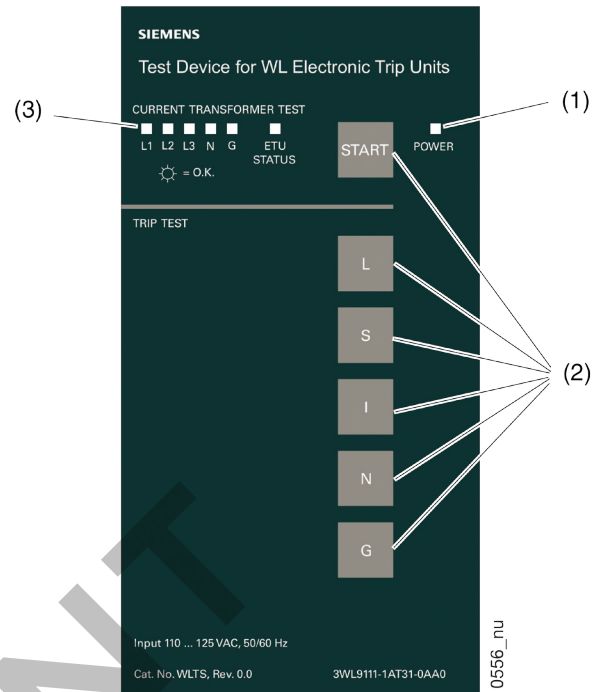
By design, the WLTS provides a minimally invasive solution for circuit breaker testing, allowing maximum up-time. It allows the operator to quickly determine the health of the entire trip system, and quickly return the circuit breaker to service.

The WLTS is the preferred test tool to verify compliance of the entire trip system of the WL circuit breaker, including the trip unit, rating plug, trip coil, current sensors, and all associated wiring.

The WLTS has additional functionality that is beneficial during startup and commissioning activities.

- The WLTS can be utilized as a temporary power supply to provide control power for the WL family of trip units facilitating the programming of the trip unit during startup and commissioning. The WLTS will supply power only to the trip unit and display and not any other connected modules.
- If the circuit breaker includes a COM15 or COM16, the WLTS can instruct the trip unit to pass along dummy load data to the communications network, so that communications between the WL circuit breaker and the SCADA system can be verified.

## • Orientation



- (1) Power indicator
- (2) Buttons to initiate tests
- (3) LEDs to indicate sensor / CT continuity and status

## Functional Testing

### Preparing to test

| <b>⚠ DANGER</b> |  |
|-----------------|--|
|                 | <p><b>Hazardous Voltage.</b><br/>Will cause death or serious injury.<br/>Qualified personnel only.</p> <p>Disconnect and lock off all power before working on this equipment.</p> <ul style="list-style-type: none"> <li>• Always work on de-energized equipment.</li> <li>• Always de-energize before performing any tests, maintenance, or repair.</li> <li>• Follow safety related work practices, as described in NFPA 70E, at all times.</li> </ul> |

| <b>NOTICE</b>  |  |
|--|--|
| <p>Erroneous test results may occur when the trip unit is powered by either:</p> <ul style="list-style-type: none"> <li>• Load current</li> <li>• External 24 vdc control power</li> </ul> <p>All testing should be conducted with the primary bus de-energized, and external 24 vdc control power disconnected or turned off.</p> |  |

<sup>1</sup> Modified Differential Ground Fault System

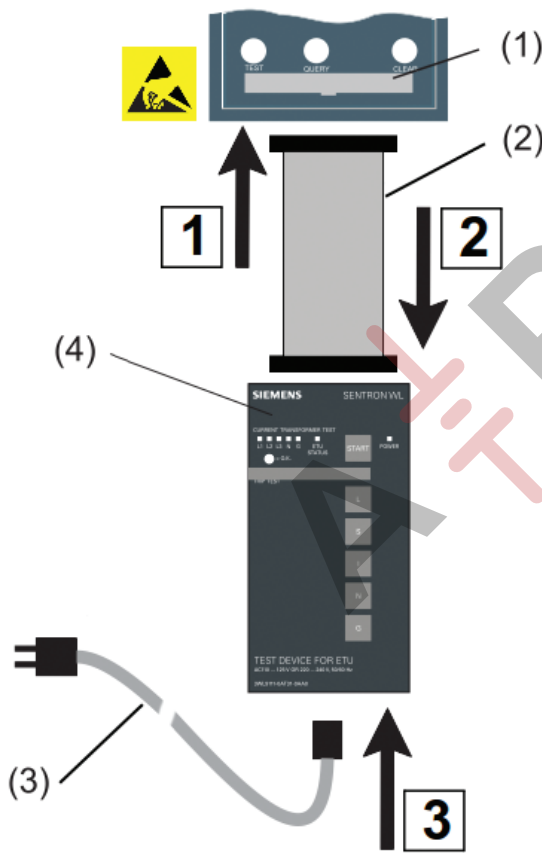
- Remove the trip unit cover (Catalog number WLTS55 or WLTS76), if present, and the cover over the X25 test port.



- Record the settings of the trip unit and set long time pickup ( $I_{r}$ ) to 1.0 x  $I_n$ .

**Connecting to the trip unit**

- Plug the ribbon cable into the test port
- Plug the ribbon cable into the tester
- Plug in the power cord



- ETU test port
- Ribbon cable
- Tester power cord

After applying power to the WLTS, it will begin to communicate with the trip unit and verify that critical subsystems are operational. Once all checks have been successfully completed, the "ETU STATUS" LED will turn on, and remain lit until a function button is pressed. A flashing "ETU STATUS" LED is indication of an error. A full list of the error codes is found in Table 1.

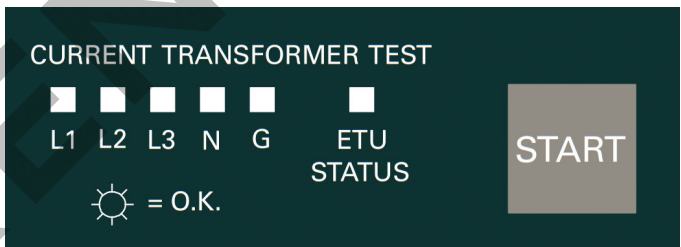
**Table 1**

| Indicator | Definition   |
|-----------|--|
| 1x        | WLTS in need of repair   |
| 2x        | Trip unit needs replacement <sup>1</sup>   |
| 3x        | <ul style="list-style-type: none"> <li>■ Trip unit externally powered</li> <li>■ WLTS connected while powered</li> </ul>   |
| 4x        | <ul style="list-style-type: none"> <li>■ Parameter conflict</li> <li>■ Current sensor not connected</li> <li>■ Incorrect rating plug</li> <li>■ Missing rating plug</li> </ul> |
| 5x        | Tripping solenoid not connected  |

The start-up tests can be repeated at any time by holding down the "START" button for three seconds.

**Testing the current and energy sensors**

To test the current sensors and energy transducers, press the "START" button.




A lit-up LED confirms the proper operation of the corresponding sensor/transducer. If an LED flashes, the corresponding sensor/converter is not present, not properly connected, or is in need of replacement.

Whether a flashing N- or G-LED is due to a non-conforming current sensor depends the position of the draw-out circuit breaker when tested and the ground fault scheme being used. In the draw out position, external sensors are not connected and both N- and G-LEDs will flash. A circuit breaker used in a 3-wire residual GF scheme will always show flashing N- and G-LEDs because there are no external sensors connected, regardless of the position. A circuit breaker used in a 4-wire residual GF scheme will show a flashing G-LED because there is no iron-core G CT connected. A circuit breaker used in an MDGF GF scheme may show a flashing N-LED depending on whether a neutral current sensor is in use.

<sup>2</sup>The "ETU STATUS" LED may blink twice when the trip unit is powered by an external power supply. This is not an error. It is recommended that the trip unit be tested without external control power.

## Testing the tripping function

|   |  |
|---|--|
|  | <b>⚠ DANGER</b>  |
|   | <b>Hazardous Voltage.</b><br><b>Will cause death or serious injury.</b><br>Qualified personnel only.<br>Disconnect and lock off all power before working on this equipment. <ul style="list-style-type: none"><li>• Always work on de-energized equipment.</li><li>• Always de-energize before performing any tests, maintenance, or repair.</li><li>• Follow safety related work practices, as described in NFPA 70E, at all times.</li></ul> |

|   |
|---|
| <b>NOTICE</b>   |
| Erroneous test results may occur when the trip unit is powered by either: <ul style="list-style-type: none"><li>• Load current</li><li>• External 24 vdc control power</li></ul> All testing should be conducted with the primary bus de-energized, and external 24 vdc control power disconnected or turned off. |

### Long-time delayed tripping test

The long-time delay tripping function and the trip unit circuitry can be tested using the test device.

1. Charge the circuit breaker
2. Close the circuit breaker
3. Press the [L] button

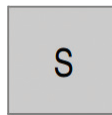


The circuit breaker will trip after the set long-time delay time, plus approximately two seconds processing time, has elapsed. When the test device successfully completes the test, the "ETU STATUS" LED will light up continuously green. If the test is not successful, the tester will indicate that by flashing the LED. Flashing codes are listed in Table 1.

### Short-time delayed tripping test

The short-time delay tripping function and the trip unit circuitry can be tested using the test device.

1. Charge the circuit breaker
2. Close the circuit breaker
3. Press the [S] button

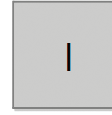


The circuit breaker will trip after the set short-time delay time, plus approximately two seconds processing time, has elapsed. When the test device successfully completes the test, the "ETU STATUS" LED will light up continuously green. If the test is not successful, the tester will indicate that by flashing the LED. Flashing codes are listed in Table 1.

## Instantaneous tripping test

The instantaneous tripping function and the trip unit circuitry can be tested using the test device.

1. Charge the circuit breaker
2. Close the circuit breaker
3. Press the [I] button

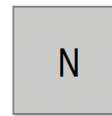


The circuit breaker will trip after approximately two seconds processing has elapsed. When the test device successfully completes the test, the "ETU STATUS" LED will light up continuously green. If the test is not successful, the tester will indicate that by flashing the LED. Flashing codes are listed in Table 1.

### Neutral conductor tripping test

The long-time delay tripping function for the neutral conductor and the trip unit circuitry for ETU types 727-776 can be tested using the test device. The current sensor for the neutral conductor must be attached and the "Neutral conductor protection" function must be switched on.

1. Charge the circuit breaker
2. Close the circuit breaker
3. Press the [N] button



The circuit breaker will trip after the set long-time delay time plus approximately two seconds processing time, has elapsed. When the test device successfully completes the test, the "ETU STATUS" LED will light up continuously green. If the test is not successful, the tester will indicate that by flashing the LED. Flashing codes are listed in Table 1.

### Ground-fault tripping test

The ground-fault tripping function and the trip unit circuitry of ETU types 745-746 with an installed ground-fault protection module (with tripping function WLGM48 or WLGM76) can be tested using the test device. The current sensor for the neutral conductor and/or the iron-core ground-fault sensor must be attached.

1. Charge the circuit breaker
2. Close the circuit breaker
3. Press the [G] button



The circuit breaker will trip after the set ground-fault tripping delay time, plus approximately two seconds processing time, has elapsed. When the test device successfully completes the test, the "ETU STATUS" LED will light up continuously green. If the test is not successful, the tester will indicate that by flashing the LED. Flashing codes are listed in Table 1.

## Additional Functions

The WLTS has two additional functions to assist in testing and commissioning: activating the trip unit for setting parameters and testing the metering display.

### Activation the trip unit

To activate the trip unit, press the "N" and "G" buttons simultaneously.



The trip unit will remain activated until another button on the handheld test device is depressed.

With this function, the "T.U.-Error"-LED can be checked if the status test indicates that the trip unit must be replaced. Activating the trip unit can allow additional diagnostic steps to be performed.

This function activates the ETU and display only and does not power the metering module or any connected CubicleBUS modules.

### Testing the measured value display

This function applies signals to the trip unit inputs which simulate load currents in each of the phases for 30s. The simulated load current is displayed as a single-phase current on the display of the trip unit, and the measured value of the current is also transmitted via the communication interface to the connected **CubicleBUS** modules and the connected Modbus / PROFIBUS-DP networks.

Currents will be displayed on the trip unit only if the trip unit is equipped with an integrated display (WLETU745 with WLLCD748, WLETU748 with WLLCD748, WLETU776). Current values will be available to be communicated when a communication interface is installed.



1. Connect 24 V dc to power the trip unit.
2. Press the [I] and [N] buttons simultaneously

The simulated load current will be present on the first phase for 30 seconds before switching to the next phase. The cycle runs in the order L1, L2, L3, N, G). The test cycle is completed when signals for all phases have been output.

When a trip unit with the MeteringPLUS option (WLMETERP) is tested without applying 24V dc, no simulated values will appear on the display. In order to see and communicate the simulated load currents, 24V dc must be present and power up the trip unit and communications module.

### Sample Test Report

See the following page for a sample test report.

### Technical Support

For technical support, please contact the Technical Support Hotline at 1- 800-333-7421, or submit a request through Online Support Request: <http://support.automation.siemens.com/US>

## Siemens WL Low Voltage Circuit Breaker Test Report

|             |  |                 |            |
|-------------|--|-----------------|------------|
| Customer:   |  | Location:       |            |
| Substation: |  | Feeder/Cubicle: | Unique ID: |

### Nameplate Data

|                       |   |                       |  |                   |  |
|-----------------------|---|-----------------------|--|-------------------|--|
| Catalog Number:       |   | Fixed/DO:             |  | Frame Amps:       |  |
| Breaker ID            |   | Frame Size:           |  | Rating Plug:      |  |
| Charging Motor Volts: |   | 1st Shunt Trip Volts: |  | Close Coil Volts: |  |
| 2nd Shunt Trip Volts: |   | UVR Volts:            |  | Reset Coil Volts: |  |
| ETU Type:             | ETU 745 <input type="checkbox"/> ETU 748 <input type="checkbox"/> ETU 776 <input type="checkbox"/> GF A/T? <input type="checkbox"/> GF A? <input type="checkbox"/> Display    Y <input type="checkbox"/> N <input type="checkbox"/> |                       |  |                   |  |

### Trip Unit Settings

|                  | As Found   | As Left |                  | As Found | As Left |
|------------------|--|---------|------------------|----------|---------|
| Long Time PU     |  |         | Long Time Delay  |          |         |
| Short Time PU    |  |         | Short Time Delay |          |         |
| Instantaneous PU |  |         | Neutral PU       |          |         |
| Ground Fault PU  |  |         | GF Delay         |          |         |
| GF Mode          | Direct <input type="checkbox"/> Sum <input type="checkbox"/> |         | Ground Alarm PU  |          |         |

|             |  |   |   |              |  |
|-------------|--|---|---|--------------|--|
| Environment | Indoor <input type="checkbox"/> Outdoor <input type="checkbox"/> | Clean <input type="checkbox"/> Dirty <input type="checkbox"/> | Dry <input type="checkbox"/> Damp <input type="checkbox"/> Wet <input type="checkbox"/> | Temp (deg C) |  |
|-------------|--|---|---|--------------|--|

### Inspection

| Main Contact Condition / Alignment      |  | Control Wiring          |  | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Code Legend</th> </tr> </thead> <tbody> <tr><td>A = Like New Condition</td></tr> <tr><td>B = Good Condition</td></tr> <tr><td>C = Poor Condition Requires Correction</td></tr> <tr><td>D = Corrections Made -or- Part Replaced</td></tr> <tr><td>E = Unacceptable Condition. Do Not Use!</td></tr> <tr><td>R = Reconditioned</td></tr> <tr><td>NA = Not Applicable</td></tr> </tbody> </table> | Code Legend | A = Like New Condition | B = Good Condition | C = Poor Condition Requires Correction | D = Corrections Made -or- Part Replaced | E = Unacceptable Condition. Do Not Use! | R = Reconditioned | NA = Not Applicable |
|---|--|-------------------------|--|--|-------------|------------------------|--------------------|--|---|---|-------------------|---------------------|
| Code Legend                             |  |                         |  |  |             |                        |                    |  |   |   |                   |                     |
| A = Like New Condition                  |  |                         |  |  |             |                        |                    |  |   |   |                   |                     |
| B = Good Condition                      |  |                         |  |  |             |                        |                    |  |   |   |                   |                     |
| C = Poor Condition Requires Correction  |  |                         |  |  |             |                        |                    |  |   |   |                   |                     |
| D = Corrections Made -or- Part Replaced |  |                         |  |  |             |                        |                    |  |   |   |                   |                     |
| E = Unacceptable Condition. Do Not Use! |  |                         |  |  |             |                        |                    |  |   |   |                   |                     |
| R = Reconditioned                       |  |                         |  |  |             |                        |                    |  |   |   |                   |                     |
| NA = Not Applicable                     |  |                         |  |  |             |                        |                    |  |   |   |                   |                     |
| Arcing Contact Condition / Alignment    |  | Primary Finger Clusters |  |  |             |                        |                    |  |   |   |                   |                     |
| Arc Chute Condition                     |  | Frame Condition         |  |  |             |                        |                    |  |   |   |                   |                     |
| Open / Close Indicator                  |  | Breaker Cleanliness     |  |  |             |                        |                    |  |   |   |                   |                     |
| Ready-to-Close Indicator                |  | Manual Close / Trip     |  |  |             |                        |                    |  |   |   |                   |                     |
| Lubrication                             |  | Electric Close / Trip   |  |  |             |                        |                    |  |   |   |                   |                     |
| Mechanical Condition                    |  | Manual Charging         |  |  |             |                        |                    |  |   |   |                   |                     |
| Insulation                              |  | Motor Charging          |  |  |             |                        |                    |  |   |   |                   |                     |
| Sliding Disconnects                     |  | Racking & DO Mechanism  |  |  |             |                        |                    |  |   |   |                   |                     |

### Electrical Tests

Sensor Tests:    L1: Pass  Fail     L2: Pass  Fail     L3: Pass  Fail     N: N/A  Pass  Fail     G: N/A  Pass  Fail

Trip Test:        L: Pass  Fail     S: Pass  Fail     I: Pass  Fail     N: N/A  Pass  Fail     G: N/A  Pass  Fail

ETU Status LED    Steady  Flashing

Note: The tests above were performed with the Siemens Hand-Held Test Set (WLTS)

### Conclusion

|  |   |   |
|--|---|---|
| Satisfactory for Continued Service: <input type="checkbox"/> | Requires Repair: <input type="checkbox"/> | Repairs Made During Maintenance: <input type="checkbox"/> |
|--|---|---|

Comments:

|        |            |       |  |
|--------|------------|-------|--|
| Job #: | Tested By: | Date: |  |
|--------|------------|-------|--|

Notes:

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