



Electronic Design Service

WELT-010 Wireless Electrical Tester / Analyzer

User Guide

Revision History

The Table below displays the revision history for the chapters in this User Guide

Date	Version	Change Made
September 7, 2022	1.0	Original release

Contact Us

For the most up-to-date information about the Electronic Design Service products, go to the Electronic Design Service website at www.eldesignservice.com.

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About WELT-010 Wireless Electrical Tester / Analyzer

The WELT-010, Bluetooth Low Energy Wireless Electrical Tester/Analyzer is designed to inspect and analyze wiring compliance to electrical code such as voltage drop under different load, find problem with splices, wiring connections and conductor quality based on impedance analysis. Connection and wire impedance is calculated based on voltage drop and real current value which is measured during voltage drop test.

Also, The WELT-010 is able to perform electrical socket wiring connection verification (incorrect wiring), AFCI test (series), 30mA ground test, standard GFCI test, measure AC voltage and current.

All of mentioned parameters directly influence to safety and performance of the electrical system.

WELT-010 use iPhone or iPad as command and display unit that give new flexible functional opportunity.

Main Functions

1. Measuring Voltages (line to neutral, line to ground and neutral to ground)
2. Measuring external RMS current and power.
3. Verifies wires connections on the electrical socket (incorrect wiring).
4. Measuring voltage drop under different load (5A, 10A, 15A and 20A) with measuring of real load current (without trip circuit breakers or blow fuses during tests).
5. Real impedance calculation and indication based on measured load current
6. GFCI test
7. AFCI Series test
8. 30mA ground test

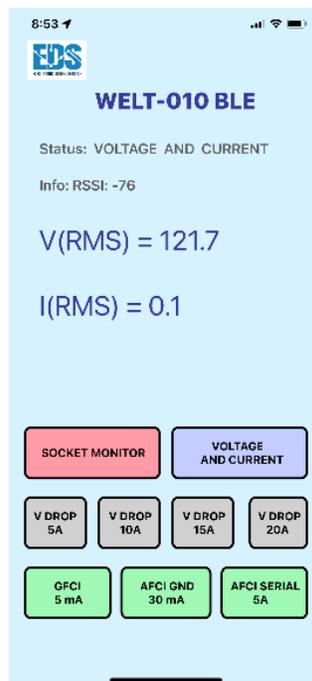


Figure 1 Normal Operation Screen Example

Specifications

Operating Temperature: 32°F – 110°F (0° – 45°C)

Operating Humidity: 0 – 95%, non-condensing

Voltage Measuring Accuracy: ± 1 VRMS

External Current Measuring Accuracy: ± 1 ARMS

External Current Sensor: SCT-013-30 (0 to 30A measuring / 0 to 1V output)

Voltage Drop Measuring Accuracy: ± 0.2

Voltage Drop Load: 22 Ohms (for 5A test), 11 Ohms (for 10A test), 7.3 Ohms (for 15A test), 5.5 Ohms (for 20A test),

Voltage Drop Tests Current Measuring Accuracy: ± 0.3 A

GFCI Test Current: 7.6 mA

AFCI Test Current for 30 mA ground test: 40 mA

AFCI Series Test Current: 6A

AFCI devices proved by test: Siemens QA115AFCP and HOM115CAFI Issue No: DP3640

Battery: 2 x 2AA (1.5V)

Internal Alarm: 91dB

Bluetooth: 2.4-GHz RF Transceiver Compatible with Bluetooth low energy (BLE) 4.2 Specification

Antenna: Integrated Antenna

FCC Compliance: FCC CFR47, Part 15 and ARIB STD-T-66

Pump Control Interface: two pins LED control with 3mA current maximum (Solid State Relay Control)

SPM-010 Application SW: iOS 14.5 or newer version devices

Inside Box

1. WELT-010 device
2. Test Power Cord
3. Current Sensor (optional)
4. 2 x AA size Battery (not included)

Applications and Test Connections



Figure 2 Voltage, Voltage Drop measurements, Socket Monitor, GFCI and AFCI Tests

Note: Voltage and Voltage Drop measurements, Socket Monitor, GFCI and AFCI Tests can be performed with Current sensor disconnected.



Figure 3 Voltage, Current and Power Measurement

The voltage and current measurement adapter cable is not part of package. It can be built by electrician. There is example of adapter cable (see Figure 4).



Figure 4 Adapter Cable Example

Socket Monitoring Hint

Sometime it can be a problem to define reverse connections between Neutral and GND wires during Socket monitoring. In this case WELT-010 indicates reverse possibility between Neutral and GND wires. There is recommendation to avoid this possible ambiguity during inspection especially in new houses where no regular home loads are connected. First of all, we recommend visually checked wire connections on far from electrical panel socket on inspecting branch. If result of inspection is OK, connect some load (bulb for example) to this socket. After that WELT-010 socket monitor will avoid any ambiguity (see Figure 5).

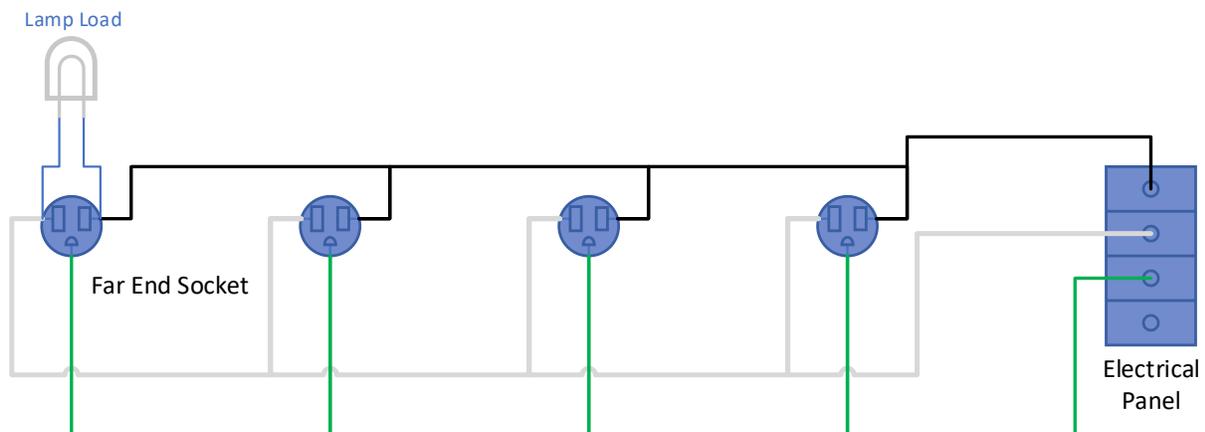


Figure 5 Socket Monitoring Hint

Operation

WELT-010 Batteries Installation and Serial Number Location

The WELT-010 is shipped with uninstalled 2 x AA Batteries.

Serial Number is located on back side label (see Figure 7).

The 2 x AA batteries shall be installed before start of operation:

1. Remove silicon cover (see Figure 6)
2. Open battery cover and install batteries (see Figure 7)
3. Close battery cover and install silicone cover.

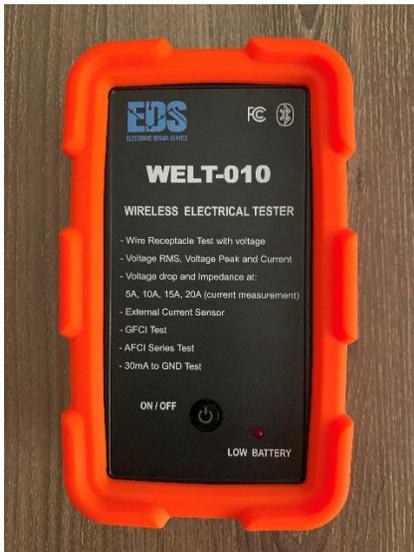


Figure 6 Silicon Cover



Figure 7 Battery Installation and Serial Number Location

WELT-010 Front Panel

There is only one control element at front. It is power ON/OFF button and LOW BATTERY LED indicator.



Figure 8 SPM-010 Front Panel and iPhone Application example

WELT-010 iOS Application Installation and Operation

Installation

Install WELT-010 Application on iPhone or iPad from Apple store (search for WELT). The following notifications will be appeared:

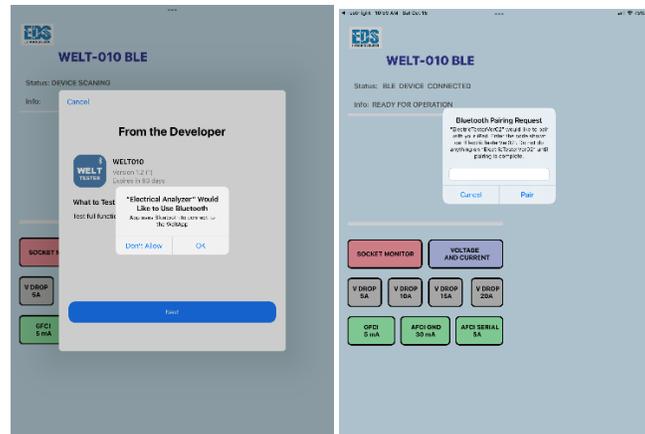


Figure 9 Startup screenshots

Perform the following actions:

- Allow to use Bluetooth (see Figure 9)
- Allow Pairing with WELT-010 (see Figure 9)

Application - Start Operation:

iOS Application Screenshot

The Figure 10 shows iPhone / iPad screenshot with application fields explanation.

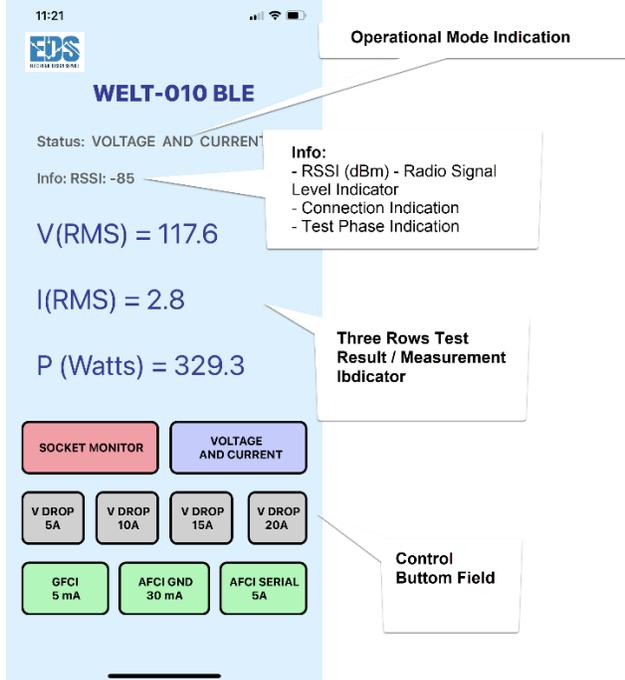


Figure 10 iPhone / iPad Application Screenshot

Application receives data steadily from device if RSSI is more than -91dBm. The location of device shall guaranty that RSSI more than -91dBm for continuous operation. But it is no problem if your smartphone (or iPad) losses communication with device due to out of receiving zone, it will be automatically reconnected when smartphone (or iPad) is coming inside of zone where RSSI more than -91dBm.

Start and Operation Conditions

There are no restrictions to whether WELT-010 unit or the iOS application need to be started first. Push and hold for 2 seconds power button on WELT device. The button LED is indicated of device operation.

Start WELT-010 application on iOS smartphone or iOS tablet.

There are the following operation conditions:

Start operation (see Figure 11):

- a) Scanning device
- b) Ready for Operation

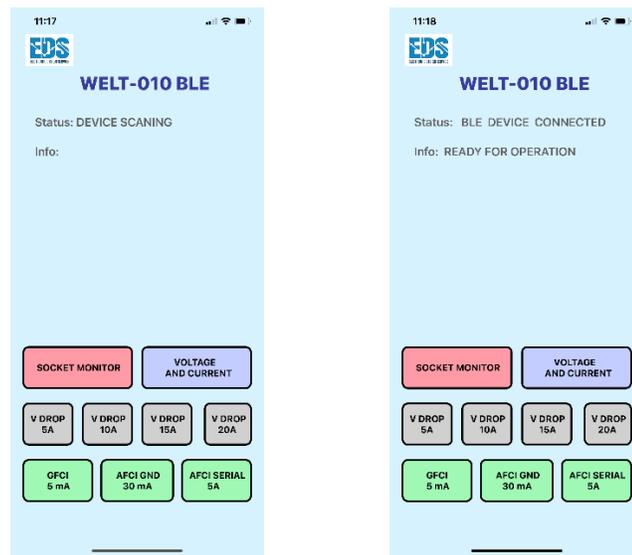


Figure 11 Start Operation Screenshots

Voltage, Current and Power Measurements (see Figure 12):

- a) Start Test
- b) Continuous Test Results (Voltage RMS, Current RMS and Power Watts)

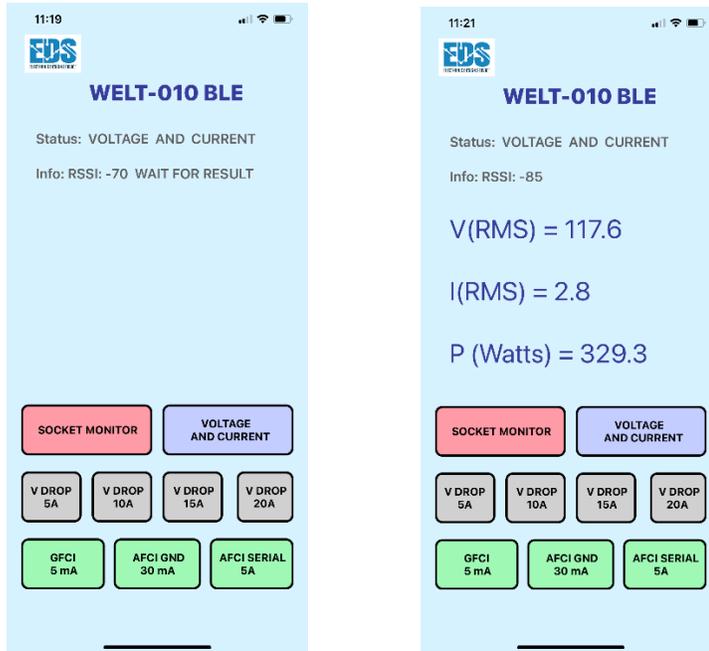
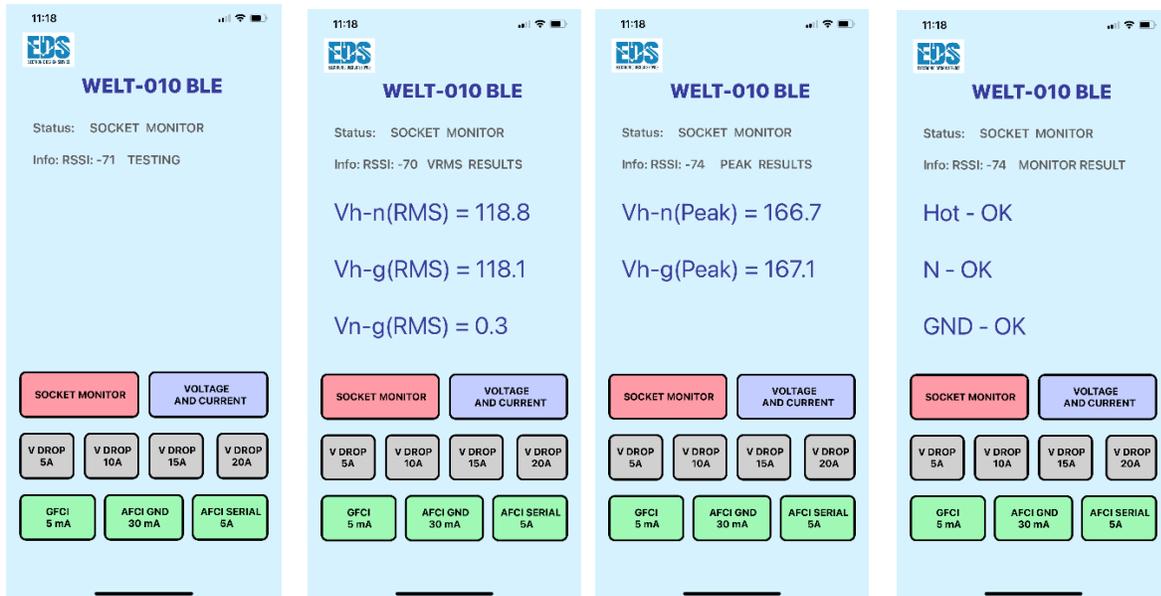


Figure 12 Voltage and Current Measurement Screenshots

Socket Monitor Test operation (see Figure 13):

- Start Testing
- Phase voltage Measurement Results
- Peak Voltage Measurement Results for accuracy defining Neutral and Ground connections
- Test Results.

**Figure 13 Socket Monitor Test Screenshots**

Recommendation about how to solve the GND and Neutral connection ambiguity:

Voltage Drop Test Operation (see)

- a) Start Test
- b) Test results.

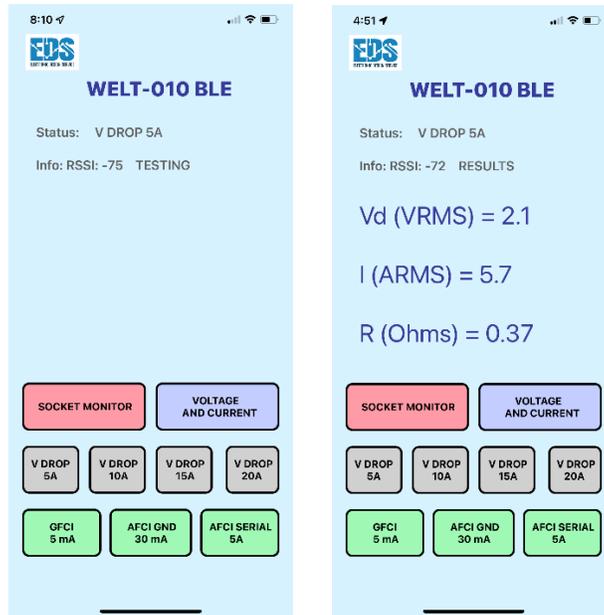


Figure 14 Voltage Drop Test Example screenshot

Note: There is time restriction to use voltage drop test in the range of 1.5 minutes after first application. iOS SW disables voltage drop test buttons for this period of time. This period of time is necessary for load resistors cool down.

GFCI 5mA, AFCI 30mA and AFCI Tests Operation (see Figure 15, Figure 16 and):

- a) Start test.
- b) Voltage indication before load application
- c) Voltage indication after load application and test result

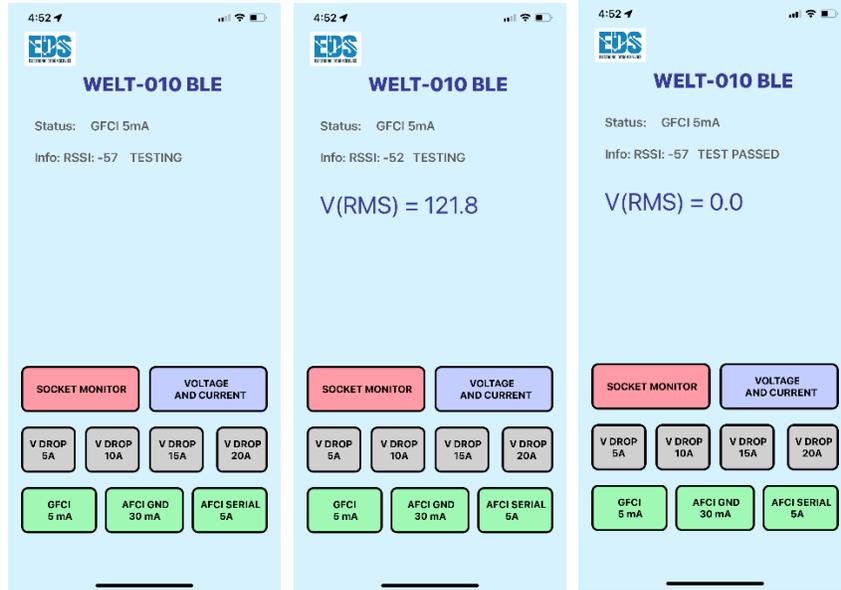


Figure 15 GFCI Test screenshots

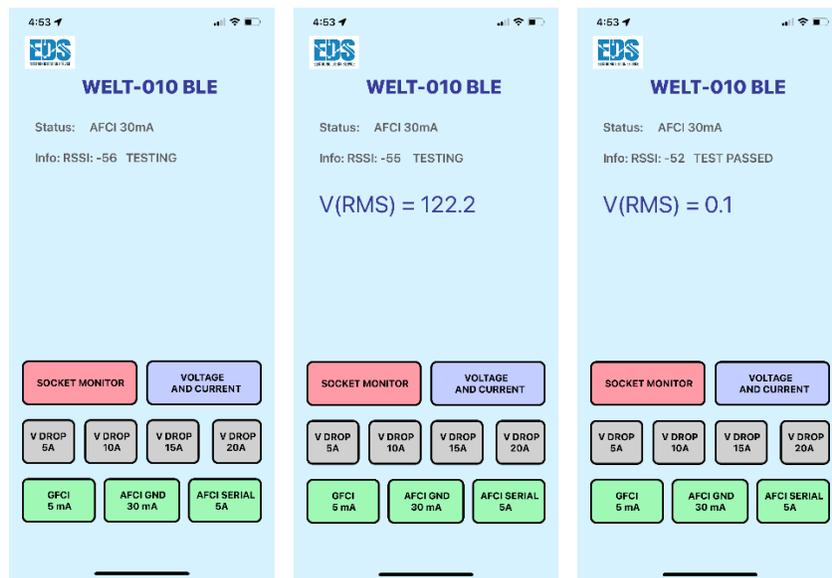


Figure 16 AFCI 30mA Test screenshots

AFCI Series Tests Operation (see Figure 17):

- a) Start test.
- b) Voltage indication before load application
- c) Voltage indication after load application and test result



Figure 17 AFCI Test screenshots

Note: There is time restriction to use AFCI Series test in the range of 2 minutes after first application. iOS SW disables the AFCI Series test button for this period of time. This period of time is necessary for load resistors cool down.

Warranty

When used and maintained in normal use and in accordance with the Installation and Operating Instructions, your WELT-010 product is warranted against original defects in material and workmanship for a full one year from date of purchase (the "Warranty Period"). During the warranty period, WELT-010 will be repaired or replaced at no cost to you, to correct such defects in products found upon examination by EDS to be defective in materials or workmanship.

This warranty does not cover use of the product in improper installation and/or improper maintenance of the product, damage due to misuse, owner's acts or omissions, use outside the country in which the product was initially purchased. This warranty does not cover pick up, delivery, transportation or house calls. However, if you mail your product to EDS for warranty service, cost of shipping will be paid one way. This warranty does not cover products purchased from a party that is not an authorized retailer, dealer, or distributor of EDS products.

Troubleshooting

Connectivity and Common Issues

Bluetooth will not stay connected:

- a) Device out of range. Move iOS device in zone where RSSI is more than -90dBm.

Bluetooth cannot connect:

- a) Assuming the iOS device is within range of the WELT-010. Use "Forget This Device" function in iOS device Setting > Bluetooth>SumpPumpMonitorV010> Forget This Device and turn off and turn on power of WELT-010 device.

Voltage Drop Test does not work:

- a) There is time restriction (1.5 minutes) for using application after first time.
- b) Internal fuses were destroyed if test does not properly work. **Device needs service!**

AFCI Test does not work:

- a) There is time restriction (2 minutes) for using application after first time.
- b) Internal fuses were destroyed if test does not properly work. **Device needs service!**

Device does not perform any function:

- a) Internal fuses were destroyed if test does not properly work. **Device needs service!**

Fault Indications

Low Voltage Indicator

Test could not start due to low input voltage.

Possible reasons:

- Electrical socket is disconnected
- Broken input cable
- Broken Internal Fuse (**device needs service**)

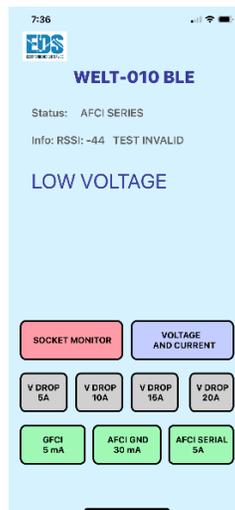


Figure 18 Test could not start due to low input voltage (AFCI example)

Low Current Indicator during 5A Voltage Drop Test

Voltage Drop Test define low current condition (see Figure 19).

Possible reasons:

- Broken internal fuse (**device needs service**). It is possible that other tests such as 15A and 20A tests can operate with 5A and 10A test modes instead of real 15A and 20A load.

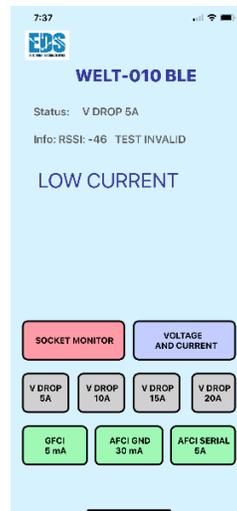


Figure 19 Low Current Indicator

Support

Send us an email to: support@eldesignservice.com or submit a request through our webpage: <https://eldesignservice.com/contacts-html/>