

Table of Contents

Copyright and Statutory Information

Safety Notice

Package Contents

1. Overview

1.1 Product Description

1.2 Features

1.3 Applications

1.4 Items Supplied

2. Safety Information

2.1 General Warnings

2.2 Electrical Safety Ratings

2.3 Environmental Conditions

2.4 Symbol

3. Instrument Description

3.1 Front Panel and Terminals

3.2 Rear Panel

3.3 Status LED Indicators

3.4 Controls and Interfaces

4. Specifications

4.1 Measurement Specifications

4.2 Mechanical Specifications

5. Installation and Setup

- 5.1 Unpacking and Inspection
- 5.2 Required Accessories
- 5.3 Power Supply Connection
- 5.4 App Installation
- 5.5 First-Time BLE Setup
- 5.6 Home Screen Overview
- 5.7 Power-Off Procedure

6. Measurement Operation

- 6.1 Connection Guidelines
 - 6.1.1 Kelvin (4-Wire) Connection (LCR/Resistance)
 - 6.1.2 Three-Phase Motor Connections
- 6.2 Mode Selection
- 6.3 DMM Functions
 - 6.3.1 DC Voltage Measurement
 - 6.3.2 DC Current Measurement (Direct)
 - 6.3.3 Continuity Test
 - 6.3.4 Diode Test
 - 6.3.5 Frequency Measurement
 - 6.3.6 Temperature Measurement (Optional Accessory)
 - 6.3.7 Resistance Measurement
- 6.4 LCR Measurement
 - 6.4.1 Inductance
 - 6.4.2 Capacitance
 - 6.4.3 Resistance
- 6.5 Single-Phase Power Measurement
 - 6.5.1 Single-Phase AC Voltage
 - 6.5.2 Single-Phase AC Current

6.5.3 Single-Phase Power

6.6 Three-Phase Power Measurement

6.6.1 3 Φ AC Voltage

6.6.2 3 Φ AC Current

6.6.3 3 Φ AC Power

6.7 Operation Examples

7. App Interface

7.1 Screen Layout

7.2 Menu and Controls

7.3 Viewing Saved Data

8. Calibration and Settings

8.1 Voltage Calibration

8.2 Current Calibration

8.3 LCR Calibration

8.4 Factory Reset

9. Troubleshooting Guide

10. Maintenance

10.1 Cleaning and Care

10.3 Fuse Information

10.2 Periodic Inspection

10.4 Storage and Transport

11. Warranty and Support

11.1 Warranty Terms

11.2 Technical Support Contact

11.3 Revision Information

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Safety Notice

WARNING

Before using this instrument, read all safety instructions carefully. Incorrect operation may result in electric shock, injury, fire, or product damage.

- Use the instrument only within the rated measurement limits.
- Do not operate the product in environments containing flammable gasses or explosive atmospheres.
- Inspect test leads and accessories before each use. Do not use damaged or deteriorated cables.
- Follow the connection diagrams displayed in the app. Incorrect wiring may cause hazards or inaccurate readings.
- Do not disassemble or modify the product. All servicing must be performed by qualified personnel.

- Disconnect all wiring and power sources before attaching or removing test leads.
- Observe all on-screen warnings and guidance during measurements.

CAUTION

Failure to follow these precautions may lead to incorrect readings, data loss, or reduced instrument life.

NOTE

For stable measurement, operate the instrument within the recommended temperature and humidity range.

Package Contents

- Pi-UVA Main Unit
- Power Bank
- Measurement Test Leads
- CT Clamp
- Quick Start Guide
- Safety and Warranty Information

1. Overview

1.1 Product Description

The Pi-UVA is a versatile wireless test and measurement instrument designed to function as a digital multimeter (DMM), LCR meter, 1 Φ /3 Φ power analyzer, and current clamp meter in a single compact unit. All measurements can be easily monitored in near real time through the Pi-UVA app on your smartphone or tablet.

1.2 Features

- 480V AC/DC safe measurement
- 3-phase motor analysis (with/without neutral)
- Professional 4-wire LCR meter (1 μ H–100H, 1pF–10mF, 1 Ω –10M Ω)
- WiFi/BLE wireless connectivity
- 12-terminal system
- High accuracy: $\pm 1\%$ voltage, $\pm 1.5\%$ current/power
- 1500VDC galvanic isolation for safety
- Real-time data streaming & waveform capture

1.3 Applications

- Motor design & BLDC testing
- Engineering labs & education
- Industrial maintenance & field testing
- Hobbyist circuit analysis
- Portable troubleshooting for technicians

1.4 Items Supplied

Pi-UVA main unit	1
5V Power Bank	1
Banana plug test leads :	
Red	3
Black	1
Quick Start Guide	1
Kelvin probe	1
CT clamps	3

Note: Thermocouple amplifier is sold separately.

2. Safety Information

2.1 General Warnings

WARNING: Failure to follow these instructions may result in electric shock, fire, or damage to the instrument.

- Always inspect test leads for damage before use.
- Never exceed the maximum input ratings specified in Section 2.2
- Remove power from circuits before connecting/disconnecting test leads
- Use only the supplied or manufacturer-approved accessories
- Do not operate in explosive atmospheres
- Keep fingers behind the protective guards on test probes.

2.2 Electrical Safety Ratings

Input Voltage Limits:

F+, F-, L1, L2, L3	Maximum 480V AC/DC between any terminal and S-
S+, S-	Maximum 6V AC/DC
Iin, Iout	Maximum 50V DC (current measurement terminals)
I1, I2, I3 : CT clamp inputs only – do not connect to voltage sources	

Current Measurement Safety:

Direct Current (Iin, Iout)	Maximum 10A, 50V maximum
CT Clamp (I1, I2, I3)	Use only with compatible current transformers
NEVER connect current terminals across a voltage source	

Isolation Warning: The Pi-UVA provides 1500VDC galvanic isolation between the USB power input and measurement terminals. However,

all measurement terminals are at the same potential during measurement. Exercise extreme caution when measuring high-voltage circuits.

2.3 Environmental Conditions

Operating Temperature	0°C to 50°C (32°F to 122°F)
Storage Temperature	-20°C to 60°C (-4°F to 140°F)
Relative Humidity	0% to 80% non-condensing
Altitude	Up to 2000 meters (6562 feet)
Indoor Use Only	Not rated for outdoor or wet environments

2.4 Symbols

⚠ Warning – Risk of electric shock or injury

3. Instrument Description



3.1 Front Panel and Terminals

The Pi-UVA features a **12-terminal front panel** with color-coded banana jacks:

Terminal Functions:

F+	Red	V_FORCE+ (LCR drive/Force+)	6V/500mA
F-	Black	V_FORCE- (LCR drive/Force-)	6V/500mA
S+	Red	V_SENSE+ (Sense+)	6V/500mA
S-	Black	V_SENSE- (Sense-/Reference)	6V/500mA
lin	Red	I+ (Current Input)	50V/10A
lout	Black	I- (Current Output)	50V/10A
L1	Red	L1 (3-Phase Line 1)	480V/15A
L2	Yellow	L2 (3-Phase Line 2)	480V/15A
L3	Blue	L3 (3-Phase Line 3)	480V/15A
I1	Gray	I1 (Current Transformer 1)	CT Input
I2	Gray	I2 (Current Transformer 2)	CT Input
I3	Gray	I3 (Current Transformer 3)	CT Input

3.2 Rear Panel

- USB-C power input port
- **Status LED:** RGB indicator for system status (visible from front edge)

3.3 Status LED Indicators

RGB Status LED Colors:

State/Mode	Color	Pattern	Meaning
Safety States			
INIT	Blue	Breathe	Initializing
SELF_TEST	Blue	Fast Blink	Running tests
SAFE	Green	Solid	Normal operation
WARNING	Yellow	Slow Blink	Warning condition
FAULT	Red	Fast Blink	Fault detected
SHUTDOWN	Red	Double Blink	Emergency shutdown
RECOVERY	Orange	Breathe	Recovering from fault

State/Mode	Color	Pattern	Meaning
Measurement Modes			
DMM DC Voltage	Green	Solid	DC voltage measurement
DMM AC Voltage	Green-Blue	Solid	AC voltage measurement
DMM Current	Yellow	Solid	Current measurement
LCR Meter	Red	Solid	LCR measurement
3-Phase Motor	Blue	Solid	Motor testing
Power Analysis	Light Green	Solid	Power measurement
Communication			
WiFi Connected	+20% brightness	-	WiFi active
BLE Connected	+10% brightness	-	BLE active
Activity	Full brightness	50ms pulse	Data transfer

3.4 Controls and Interfaces

All functions are controlled through the **mobile app interface**. All measurements are viewed on your **mobile device or tablet** via the Pi-UVA mobile app.



4. Specifications

4.1 Measurement Specifications

Measurement	Ranges	Accuracy	Additional Specs
DC Voltage	200mV, 2V, 20V, 200V, 480V	$\pm(0.5\% + 2 \text{ digits})$	Input Impedance: $>10 \text{ M}\Omega$
AC Voltage	200mV, 2V, 20V, 200V, 480V	$\pm(1.5\% + 3 \text{ digits})$	Frequency Range: 45Hz–1kHz
DC Current (Direct)	10mA, 100mA, 1A, 5A, 10A	$\pm(1\% + 2 \text{ digits})$	Max Voltage: 50V
AC Current (CT)	20A, 100A, 200A (selectable)	$\pm(1.5\% + 3 \text{ digits})$	Frequency Range: 50Hz–150kHz
LCR Meter	Inductance: $1\mu\text{H}$ –100H Capacitance: 1pF –10mF Resistance: 1Ω –10M Ω	$\pm 1\%$ at 1kHz, $\pm 5\%$ at other frequencies	Test Frequencies: 100Hz, 120Hz, 1kHz, 10kHz, 100kHz
3-Phase Power	Voltage: 100V–480V AC Current: 10mA–200A (via CT)	Power Accuracy: $\pm 1\%$ Harmonic Accuracy: $\pm 5\%$ for harmonics $>1\%$ of fundamental Frequency: $\pm 0.01\text{Hz}$ Phase Accuracy: $\pm 2^\circ$	Phase Accuracy: $\pm 2^\circ$

4.2 Mechanical Specifications

Dimensions	155mm × 130mm × 36mm
Weight	326g
Enclosure	ABS plastic, IP20 rating
Terminals	4mm banana jacks, 3.5mm audio jacks

5. Installation and Setup

5.1 Unpacking and Inspection

1. Carefully remove all items from the packaging
2. Inspect the Pi-UVA for any physical damage
3. Verify all package contents listed in Section 1.4
4. Check test leads for cuts, cracks, or exposed conductors

5.2 Required Accessories

Smartphone or Tablet	Android 8.0+ with Bluetooth and WiFi
USB Power Bank	5V, 2A minimum output
External CT Clamps	For high-current measurements

5.3 Power Supply Connection



1. Plug the power bank into the USB-C port on the Pi-UVA.
2. The LED on the Pi-UVA will flash Green.
3. Wait for 10 seconds to allow the device to boot fully and establish connectivity.

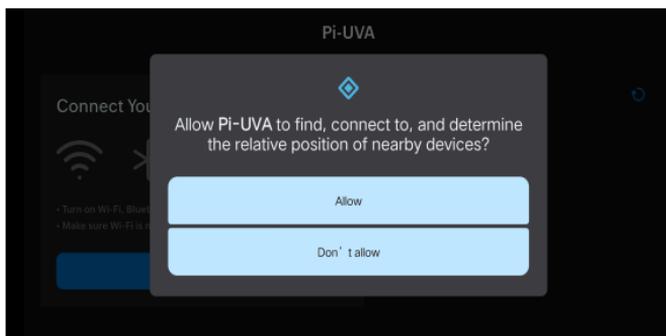
Power Requirements:

Input Voltage	5V DC (4.75V - 5.25V)
Input Current	500mA maximum
Power Source	USB power bank

5.4 App Installation

- On your Android device, open the **Google Play Store**.
- In the search bar, type **“Pi-UVA”** and tap **Install**.
- Once installation is complete, open the **Pi-UVA** app.
- When prompted, tap **Allow** to grant the required permissions.

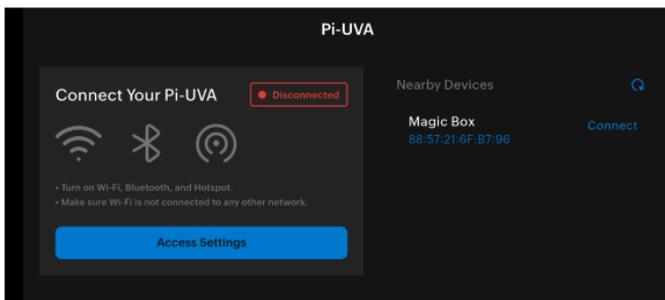
Required for proper operation



5.5 First-Time BLE Setup

1. Ensure the following are **turned ON** in your mobile device:
 - **Wi-Fi**
 - **Bluetooth**
 - **Mobile Hotspot**
2.  *Note: Make sure your phone's Wi-Fi is not connected to any other active network.*
3. The app will automatically search for nearby Pi-UVA devices.

4. Detected devices will appear as “**Pi-UVA-XXXX**” (where XXXX is your device ID).
5. Tap on your device name to connect.

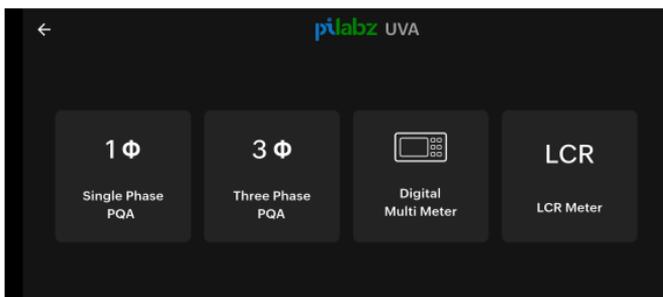


6. When prompted, enter your **Wi-Fi network name and password**.

5.6 Home Screen Overview

Once the Pi-UVA is connected successfully, the **Home Screen** of the app will appear.

You'll see **four instrument cards**, each representing a different measurement module. Tap on the required **instrument card (DMM, LCR, Single-phase, 3-Phase)**



5.7 Power-Off Procedure

1. Disconnect all test leads from the device under test

2. Close the Pi-UVA mobile app
3. Disconnect the power bank
4. The RGB LED will turn off immediately

6. Measurement Operation

6.1 Connection guidelines :

1. Always connect ground/reference leads first, then high-voltage leads
2. Always disconnect high-voltage leads first, then ground leads
3. Ensure all connections are secure before powering the device under test

6.1.1 Kelvin (4-Wire) Connection (LCR/Resistance):

1. Connect F+ and S+ to one end of the component
2. Connect F- and S- to the other end of the component

6.1.2 Three-Phase Motor Connection:

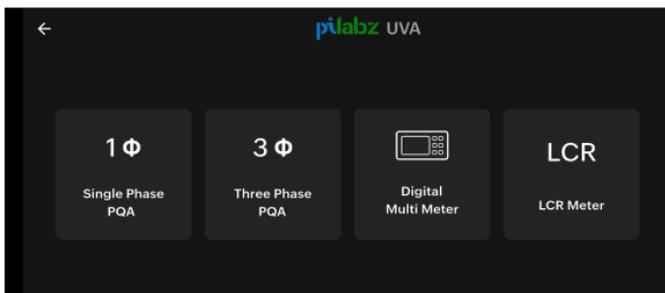
1. Connect L1 to Line 1
2. Connect L2 to Line 2
3. Connect L3 to Line 3
4. Connect I1, I2, I3 to corresponding CT clamps around each line

6.2 Mode Selection

All measurement modes are selected through the mobile app interface:

1. Open the Pi-UVA app
2. Select from available modes:
 - 3-Phase (Motor Analysis)
 - Single-Phase (Power Analysis)

- DMM (Digital Multimeter)
- LCR (Component Measurement)



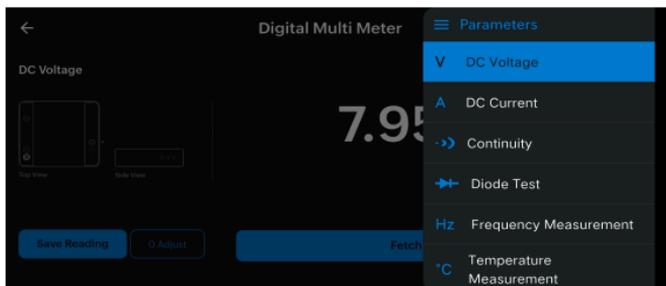
6.3 DMM Functions

6.3.1 DC Voltage Measurement:

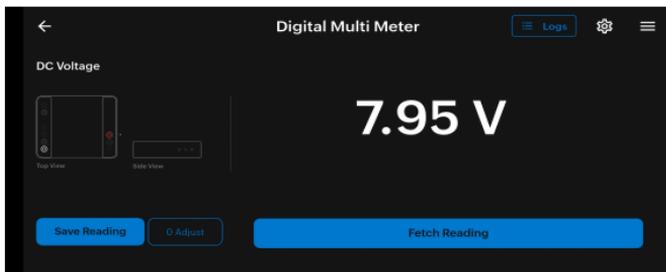
1. Select DMM mode in the app



2. Select DC Voltage function



3. The app will display a highlighted connector diagram showing where to connect the test leads on the Pi-UVA.



4. Connect the provided probes to the Pi-UVA exactly as indicated in the app's connector image.

5. Tap Fetch Reading to start the measurement.

6. The measured DC voltage value will appear on the app screen.

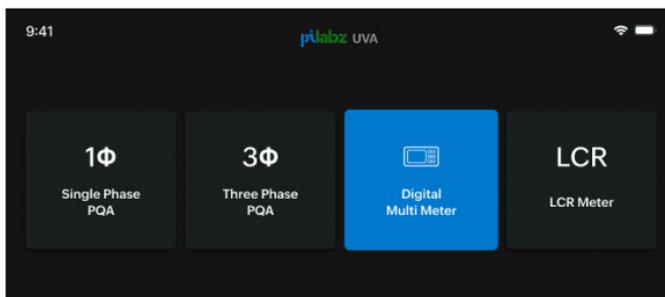
7. To store the measurement, tap on Save Reading.

8. Auto-ranging will select the optimal range (200mV to 480V)

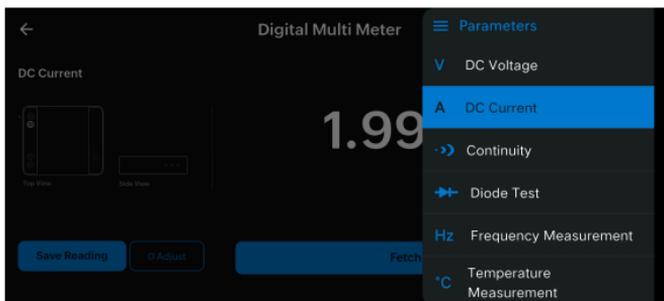
9. Open **Logs** to view your saved measurements.

6.3.2 DC Current Measurement (Direct):

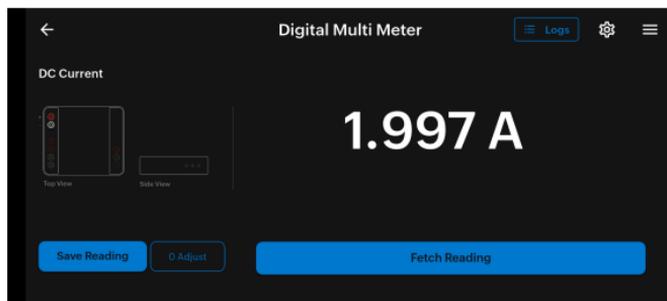
1. Select DMM mode in the app



2. Select DC Current function



3. The app will display a highlighted connector diagram showing the correct current-measurement terminals on the Pi-UVA.



4. Connect the probes to the Pi-UVA exactly as shown in the app's connector image.

5. Ensure the test leads are in series with the load or circuit where current needs to be measured.

6. Tap Fetch Reading to begin the measurement.

7.The measured DC current value will be displayed on the app screen.

8.The app displays current measurement with auto-ranging (10mA to 10A)

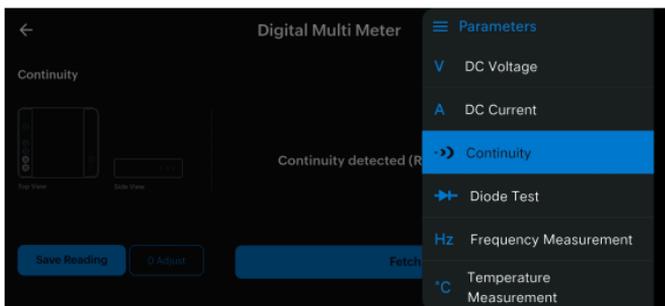
9.To save the recorded value, tap Save Reading.

WARNING: Maximum 50V across lin-lout

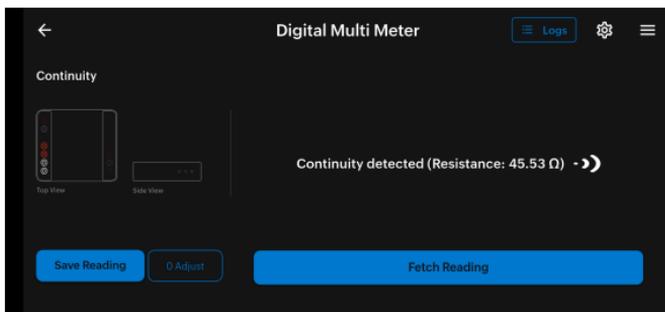
Open **Logs** to view your saved measurements.

6.3.3 Continuity Test

1. Tap on the Continuity option in the DMM module.



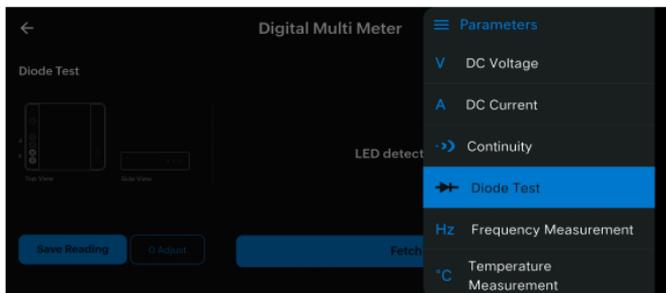
2. The app will display a highlighted connector diagram indicating where to connect the probes on the Pi-UVA.



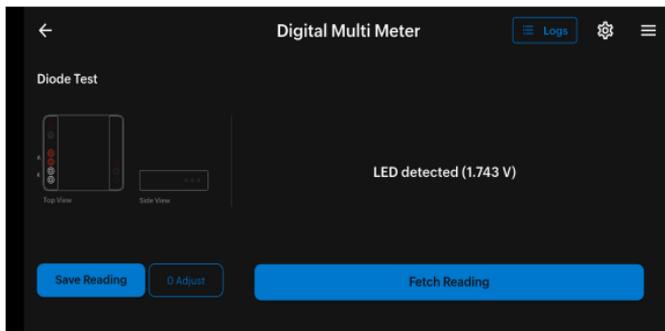
3. Connect the test leads according to the connector image shown in the app.
4. Tap Fetch Reading to start the test.
5. If the circuit is continuous, the app will show a low resistance value and an audible beep may be heard (Continuity detected) (if enabled).
6. Tap Save Reading to store the result.
7. Open **Logs** to view your saved measurements.

6.3.4 Diode Test

1. Select the Diode Test mode from the DMM module



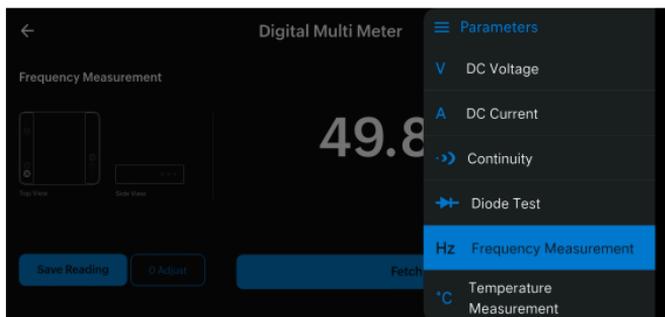
- The app will highlight the required probe connections on the Pi-UVA.



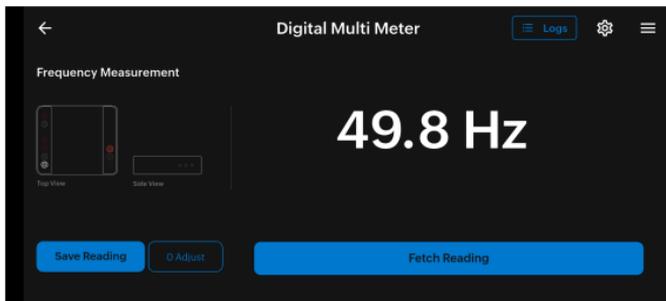
- Connect the probes as shown in the app's connector diagram.
- Tap Fetch Reading to test the diode.
- The forward voltage drop or an open-circuit indication will be displayed on the screen.
- Press Save Reading if you wish to store the test result.
- Open **Logs** to view your saved measurements.

6.3.5 Frequency Measurement

- Tap on Frequency Measurement in the DMM module.



2. A highlighted diagram will appear, showing the correct probe connections on the Pi-UVA.



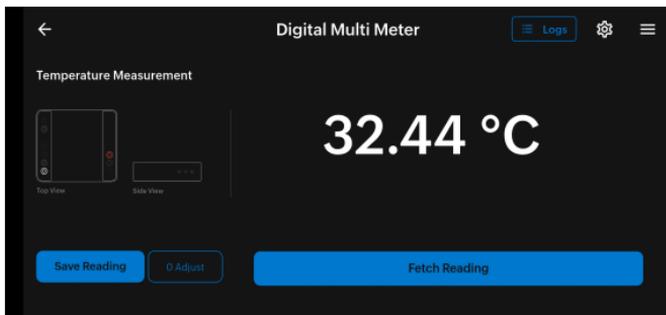
3. Connect the probes to the Pi-UVA exactly as indicated.
4. Tap Fetch Reading to start frequency measurement.
5. The measured frequency value will be shown in real time on the app.
6. To store this value, tap Save Reading.
7. Open **Logs** to view your saved measurements.

6.3.6 Temperature Measurement(Optional Accessory)

1. Select Temperature Measurement from the DMM module.



2. The app will display the required connector for the external temperature sensor (if applicable).

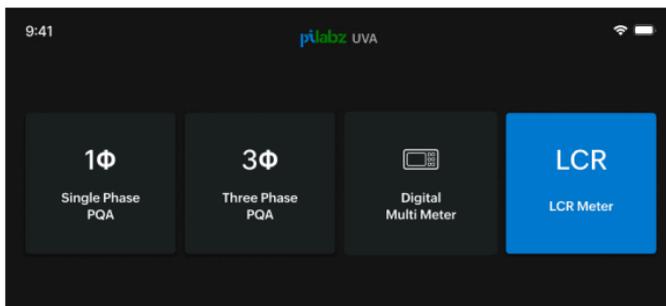


3. Connect the temperature probe to the Pi-UVA as per the app's connector image.
4. Tap Fetch Reading to begin temperature measurement.
5. The measured temperature will appear in °C (or °F if configured).
6. Tap Save Reading to store the measurement.
7. Open **Logs** to view your saved measurements.

6.4 LCR Measurement

4-Wire LCR Measurement:

1. Select **LCR** mode in the app



2. Choose test frequency (100Hz, 1kHz, 10kHz, 100kHz)
3. Connect component using 4-wire Kelvin method (F+, F-, S+, S-) as given in section **6.1.1**

4. The app displays multiple parameters simultaneously:
 - L/C/R: Primary component value
 - Q/D: Quality factor or dissipation factor
 - ESR: Equivalent series resistance
 - Z/θ : Impedance magnitude and phase angle

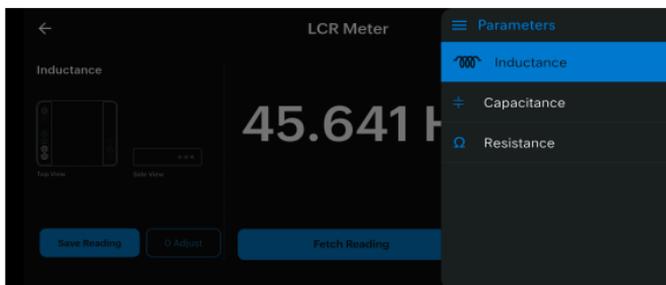
Note: Test frequency selection will be available in a future application update.

Test Signal Levels:

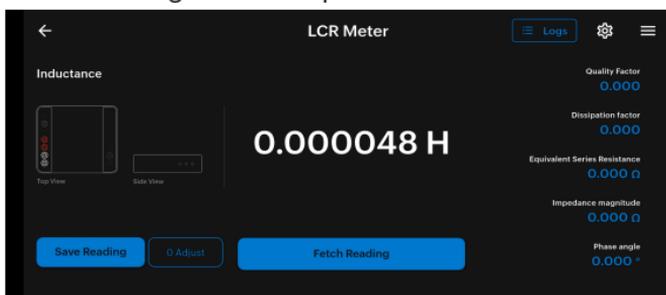
Default	1V RMS
Adjustable	0.1V to 2V RMS (select in LCR settings)

6.4.1 Inductance

1. Tap on the Inductance option in the LCR module.



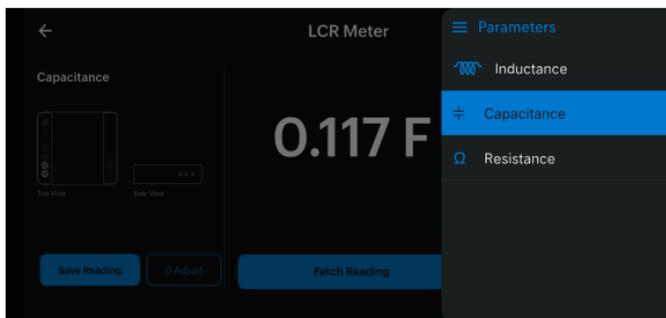
2. The app will display a highlighted connector diagram indicating the correct probe connections on the Pi-UVA.



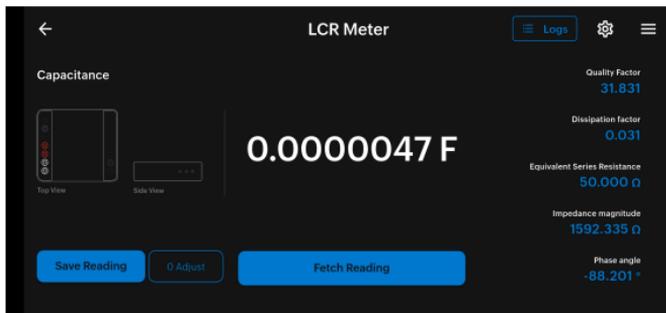
3. Connect the probes exactly as shown in the connector image on the app.
4. Tap Fetch Reading to begin the measurement.
5. The measured inductance value will appear on the main screen of the app.
6. On the right side of the app screen, the following additional parameters will also be displayed:
 - Quality Factor (Q)
 - Dissipation Factor (D)
 - Equivalent Series Resistance (ESR)
 - Impedance Magnitude ($|Z|$)
 - Phase Angle (θ)
7. To save the measurement, tap Save Reading.
8. Open **Logs** to view your saved measurements.

6.4.2 Capacitance

1. Tap on the Capacitance option in the LCR module.



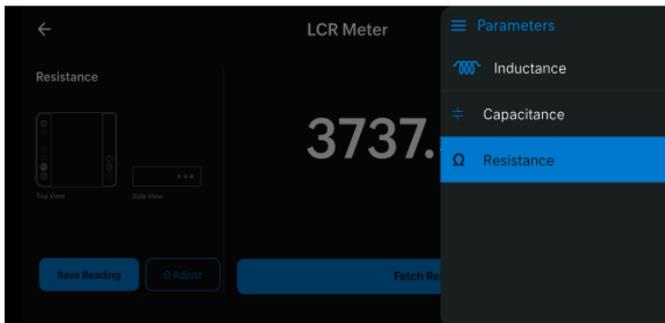
- The app will display a highlighted connector diagram showing where to connect the test probes on the Pi-UVA.



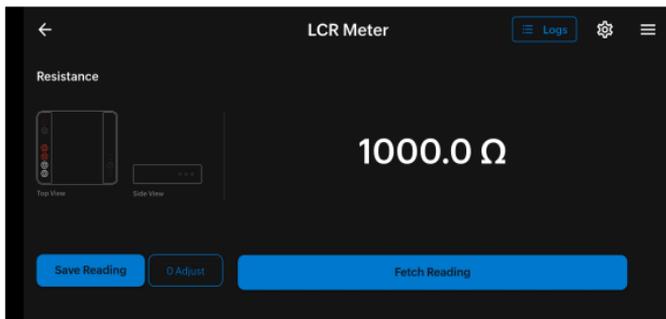
- Connect the probes exactly as indicated in the app's connector image.
- Tap Fetch Reading to start the measurement.
- The measured capacitance value will be displayed prominently on the app screen.
- On the right side of the screen, the app will also show the following additional parameters:
 - Quality Factor (Q)
 - Dissipation Factor (D)
 - Equivalent Series Resistance (ESR)
 - Impedance Magnitude ($|Z|$)
 - Phase Angle (θ)
- To save the measurement, tap Save Reading.
- Open **Logs** to view your saved measurements.

6.4.3 Resistance

1. Tap on the Resistance option in the LCR module.



2. The app will display a highlighted connector diagram indicating the correct probe connections on the Pi-UVA.

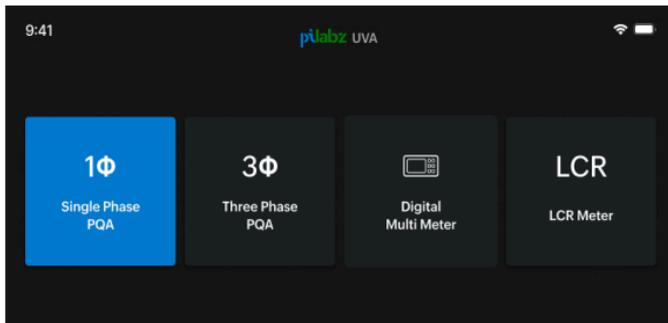


3. Connect the probes exactly as shown in the connector image provided in the app.
4. Tap Fetch Reading to start the measurement.
5. The measured resistance value will appear on the main screen of the app.
6. To save the measurement, tap Save Reading.
7. Open **Logs** to view your saved measurements.

6.5 Single-Phase Power Measurement

Motor Testing Setup:

1. Select **Single-Phase** mode in the app



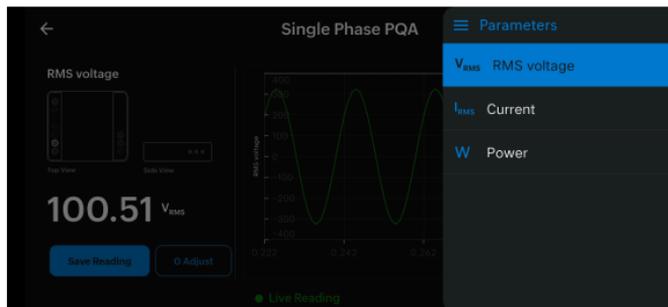
2. Connect voltage lead to (L1)
3. Connect CT clamp to I1
4. The app shows the measured value.

Displayed Parameters:

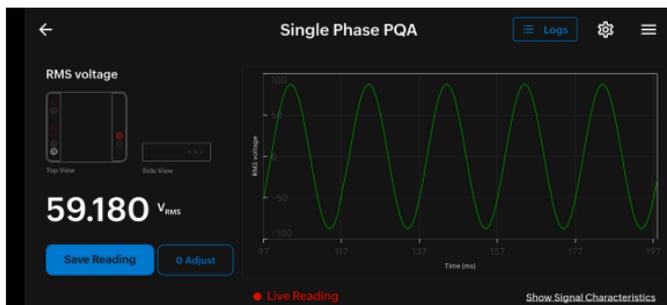
Single-Phase	Voltage, Current, Power, Power Factor
Total	Combined power, efficiency, unbalance
Harmonics	Up to 10th order harmonic analysis
Waveforms	Real-time voltage and current waveforms

6.5.1 Single-Phase AC Voltage

1. Home → **Single-Phase** → **RMS Voltage**.



2. Connect the voltage probes as shown.



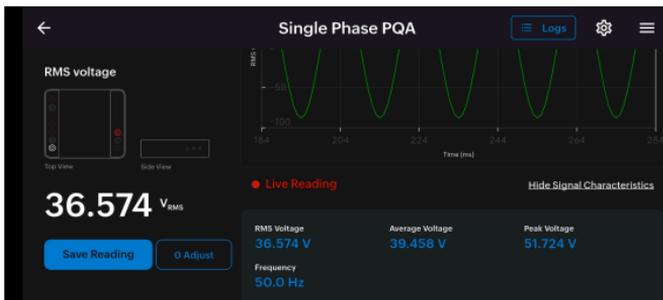
3. Live voltage and graph will appear.

Show Signal Characteristics

Tap **Show Signal Characteristics** to view the detailed values for your measurement.

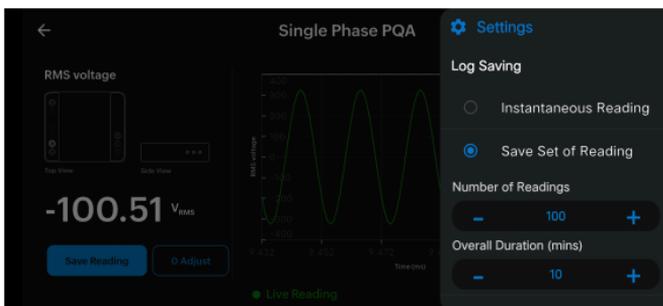
- RMS Voltage

- Peak Voltage
- Average Voltage
- Frequency

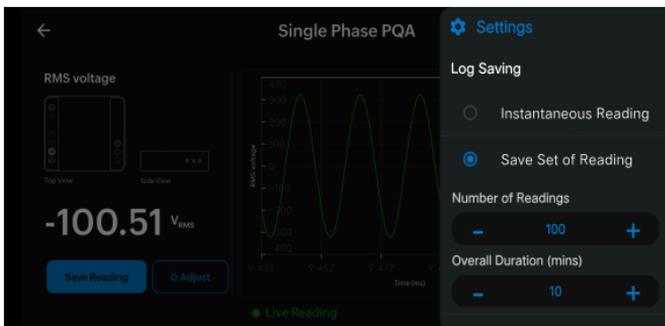


Saving

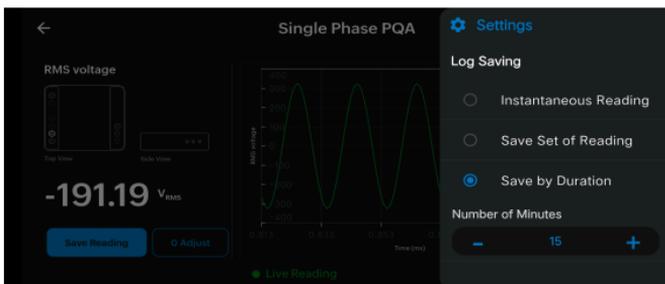
1. Open **Settings** → choose one saving option:
 - Instantaneous Reading



- Save Set of Readings → Enter number of readings + overall duration (min)



- Save by Duration → Enter number of minutes

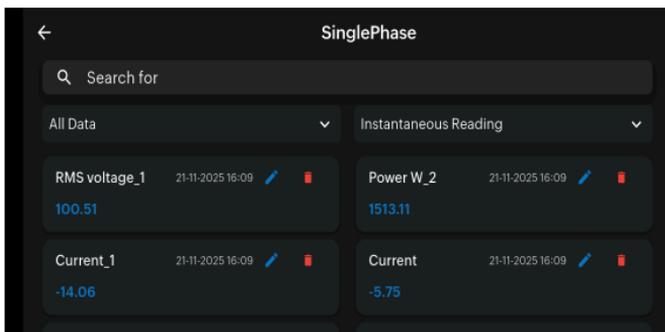


2. Tap **Save Reading** to start recording.

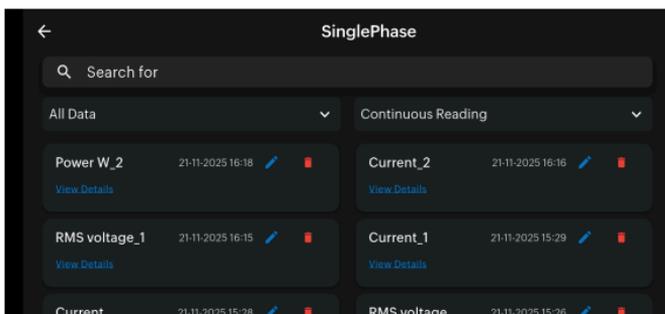
Logs

Open Logs to view your saved measurements. The dropdown provides two options:

- **Instantaneous Reading** – shows readings saved using the Instantaneous option.

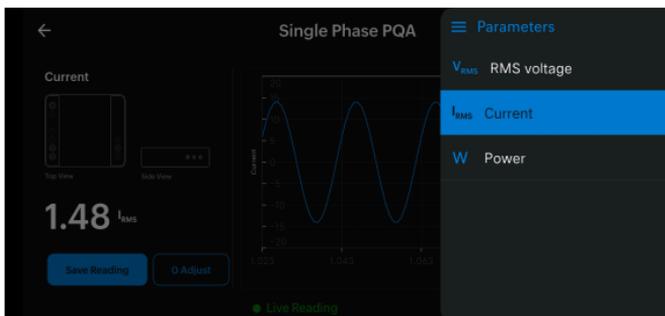


- Continuous Reading** – shows recordings saved using **Save Set of Readings** or **Save by Duration**.

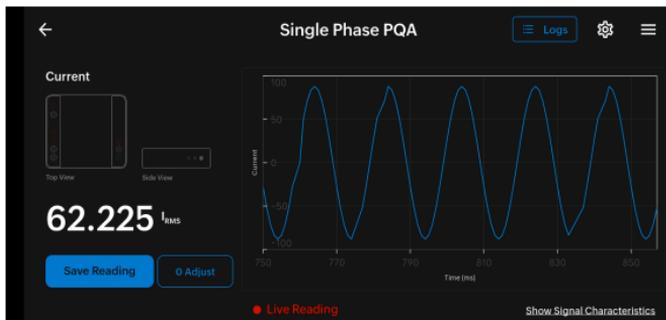


6.5.2 Single-Phase AC Current

- Home → **Single-Phase** → **Current**.



2. Connect CT input as shown .

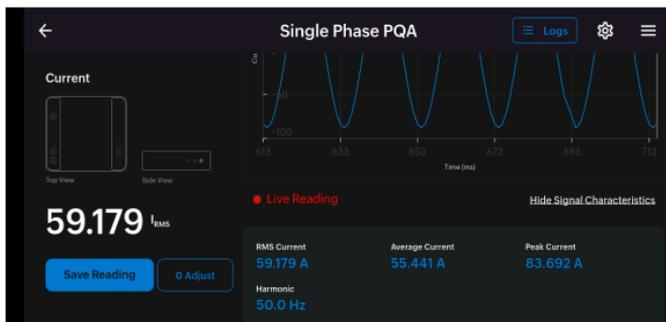


3. Live current and graph will appear.

Show Signal Characteristics

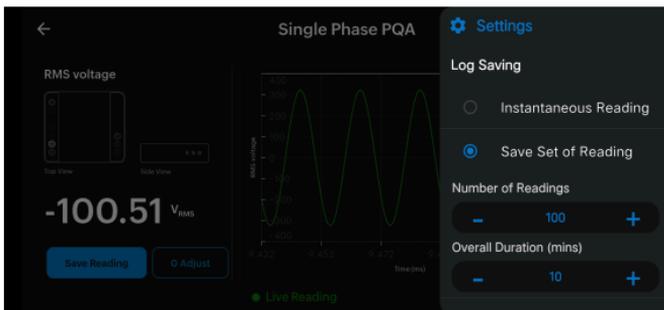
Tap **Show Signal Characteristics** to view the detailed values for your measurement.

- RMS Current
- Average Current
- Peak Current
- Harmonic

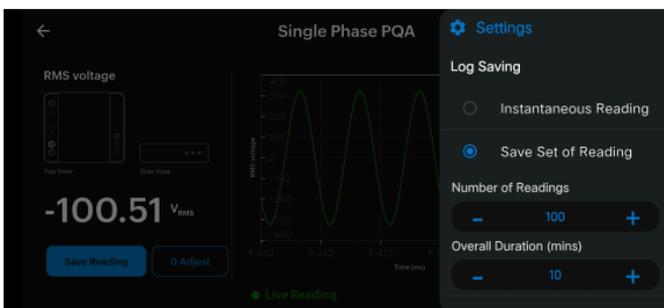


Saving

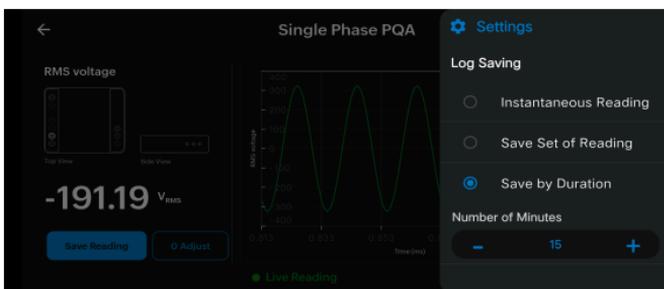
1. Open **Settings** → choose one saving option:
 - Instantaneous Reading



- Save Set of Readings → Enter number of readings + overall duration (min)



- Save by Duration → Enter number of minutes



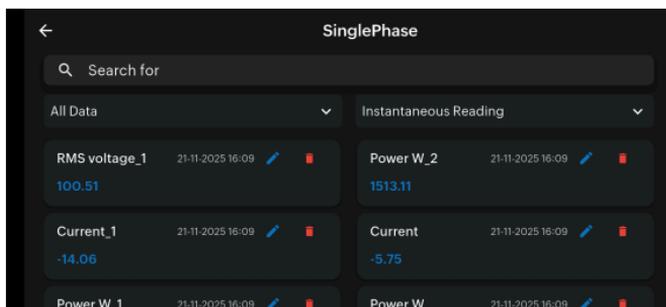
2. Tap **Save Reading** to start recording.

Logs

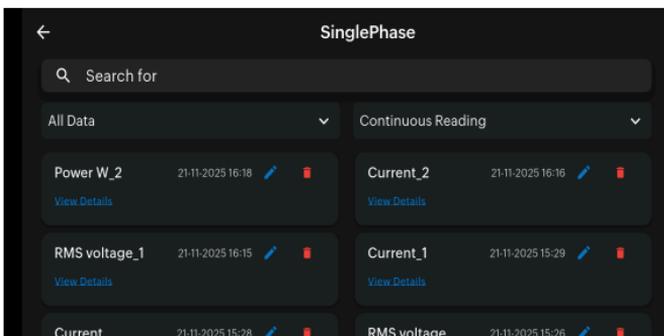
Open **Logs** to view your saved measurements.

The dropdown provides two options:

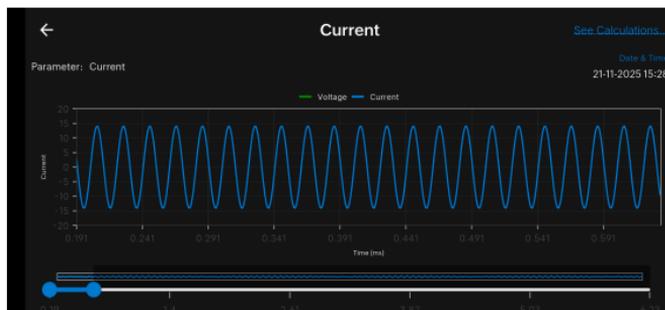
- **Instantaneous Reading** – shows readings saved using the Instantaneous option.



- **Continuous Reading** – shows recordings saved using **Save Set of Readings** or **Save by Duration**.

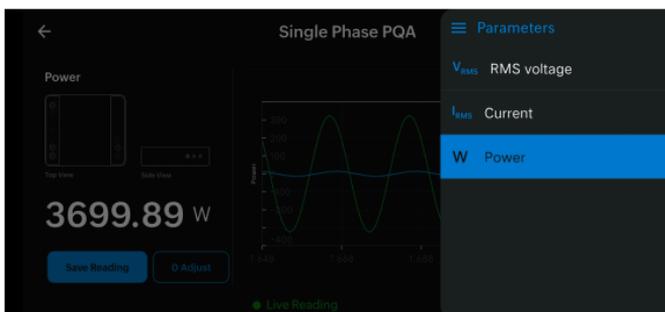


- **View Details** – select *View Details* to see the recorded graph.



6.5.3 Single-Phase Power

1. Home → **Single-Phase** → **Power**.

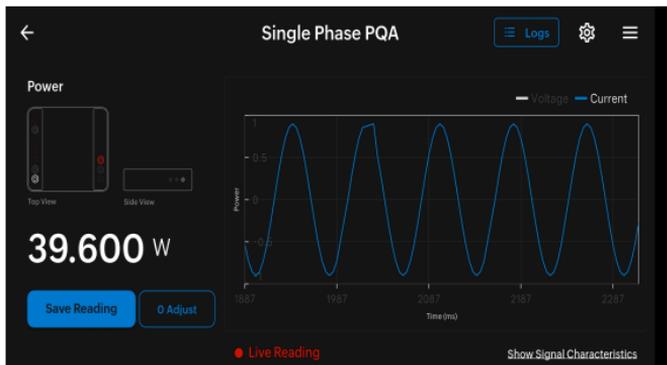
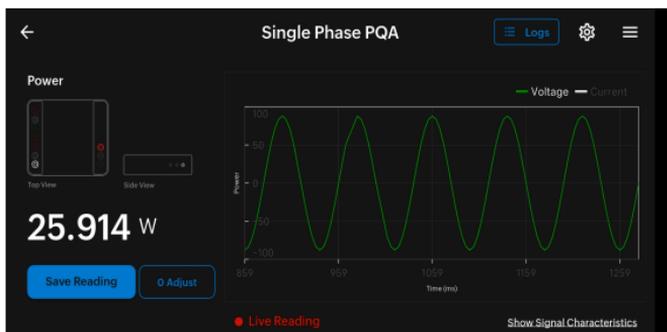


2. Connect voltage + current probes as shown.



3. Live power waveform/graph will appear.

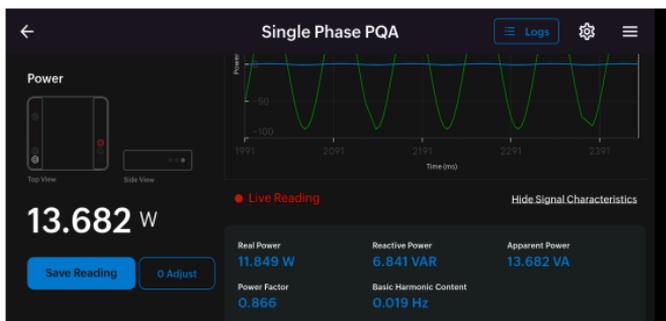
4. Tap Voltage or Current to view the corresponding waveform as a single graph.



Show Signal Characteristics

Tap **Show Signal Characteristics** to view the detailed values for your measurement.

- Real Power (W)
- Reactive Power (VAR)
- Apparent Power (VA)
- Power Factor
- Basic Harmonic Content

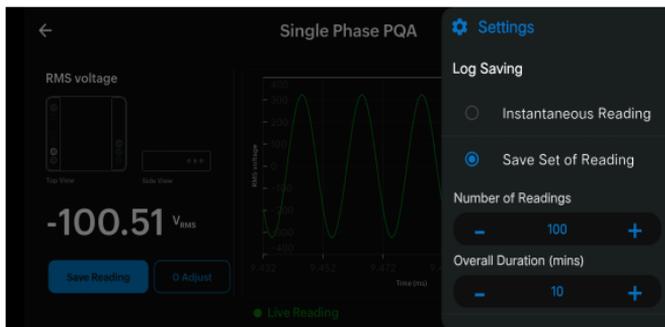


Saving

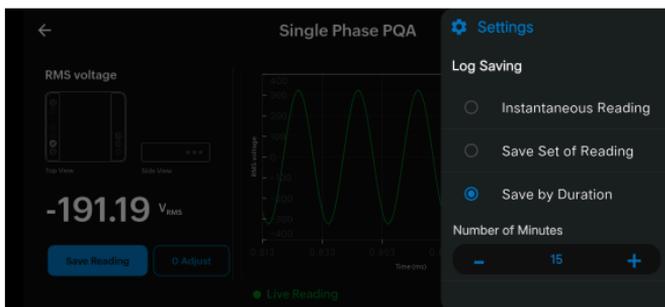
1. Open **Settings** → choose one saving option:
 - Instantaneous Reading



- Save Set of Readings → Enter number of readings + overall duration (min)



- Save by Duration → Enter number of minutes



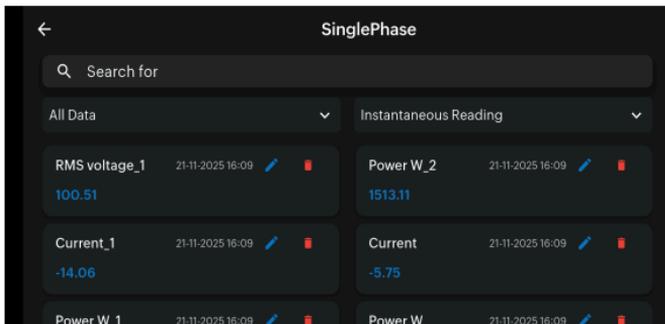
2. Tap **Save Reading** to start recording.

Logs

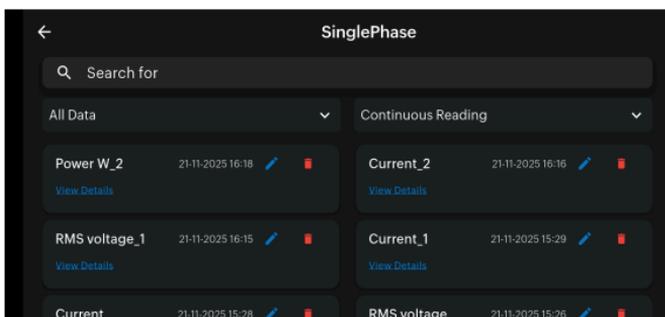
Open **Logs** to view your saved measurements.

The dropdown provides two options:

- **Instantaneous Reading** – shows readings saved using the Instantaneous option.

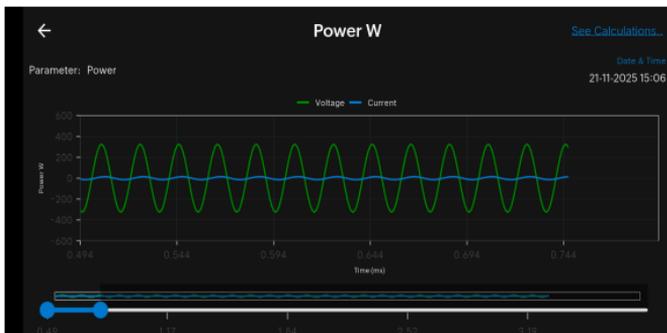


- **Continuous Reading** – shows recordings saved using **Save Set of Readings** or **Save by Duration**.



- **View Details** – select *View Details* to see the recorded graph.

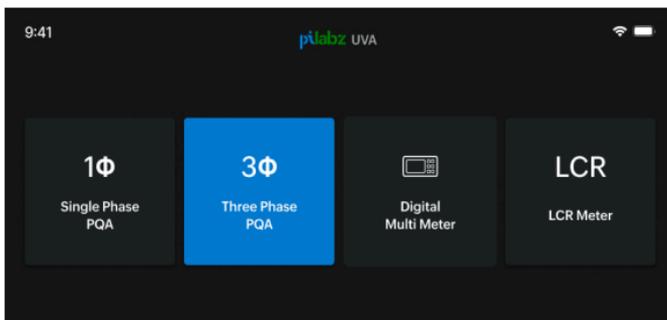




6.6 Three-Phase Power Measurement

Motor Testing Setup:

1. Select 3-Phase mode in the app



2. Connect voltage leads to L1, L2, L3
3. Connect CT clamps to I1, I2, I3 as given in section 6.1.2
4. Clamp CTs around corresponding motor leads
5. Start the motor under test

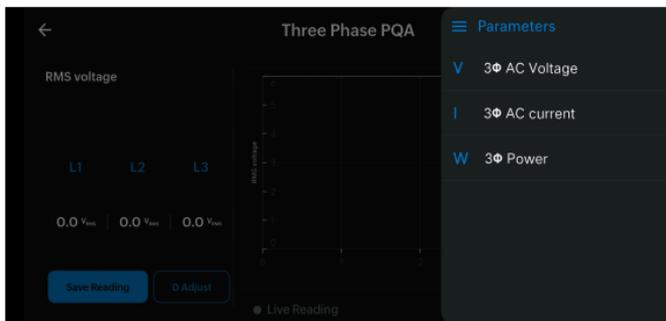
Displayed Parameters:

Per-Phase	Voltage, Current, Power, Power Factor
Total	Combined power, efficiency, unbalance
Harmonics	Up to 10th order harmonic analysis
Waveforms	Real-time voltage and current waveforms
Phase Accuracy	$\pm 2^\circ$ phase measurement accuracy

Three-Phase Module

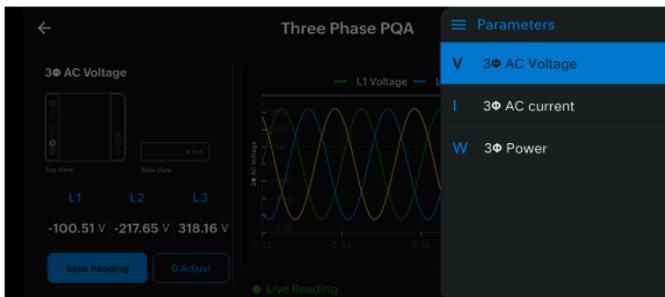
From the Home Screen of the app, tap on the 3-Phase Module. The following parameters will appear:

- 3-Phase AC Voltage
- 3-Phase AC Current
- 3-Phase Power



6.6.1 3Φ AC Voltage

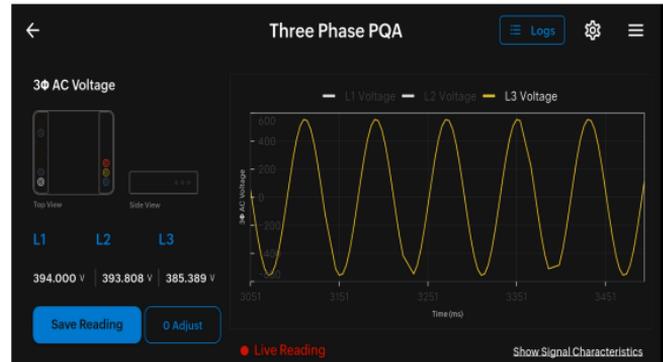
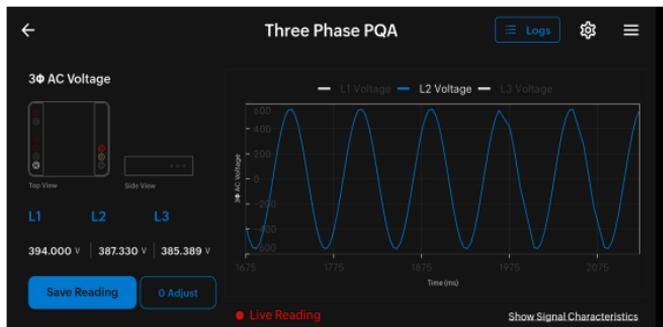
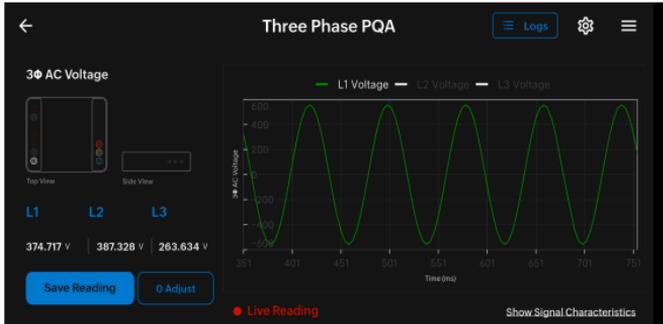
1. From the **Home Screen**, tap **3-Phase** → **3Φ AC Voltage**.



2. Follow the highlighted connector diagram and connect the probes to the Pi-UVA.



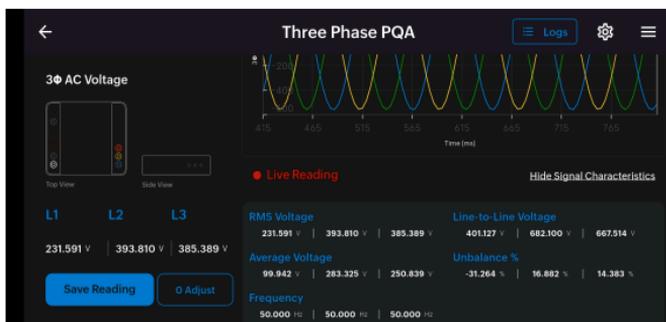
3. Live L1, L2, L3 voltages and graph will appear.
4. Tap L1 Voltage, L2 Voltage, or L3 Voltage to view the corresponding voltage waveform as a single graph.



Show Signal Characteristics

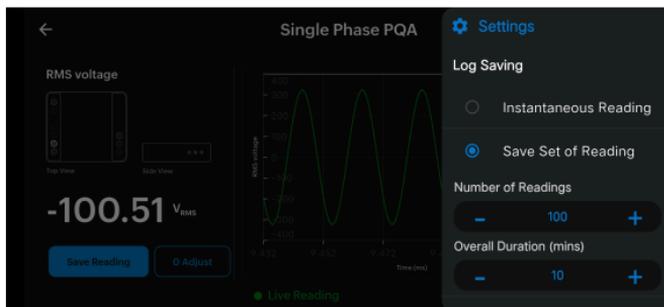
Tap **Show Signal Characteristics** to view the detailed values for your measurement.

- RMS Voltage: L1, L2, L3
- Line-to-Line Voltage: L1–L2, L2–L3, L3–L1
- Average Voltage
- Unbalance %
- Frequency: L1, L2, L3

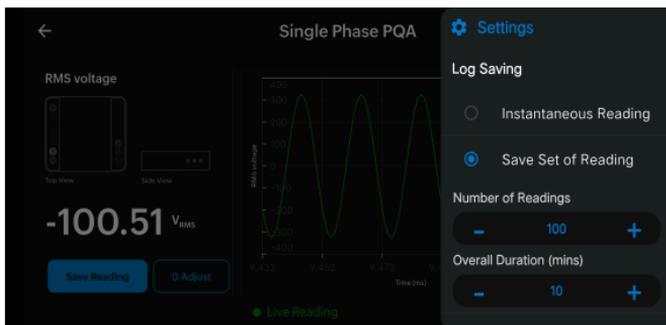


Saving

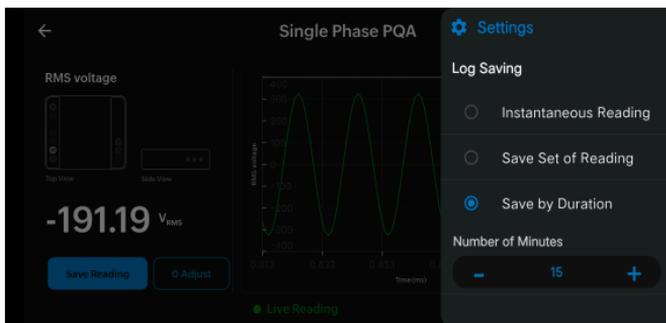
1. Open **Settings** → choose one saving option:
 - Instantaneous Reading



- Save Set of Readings → Enter number of readings + overall duration (min)



- Save by Duration → Enter number of minutes

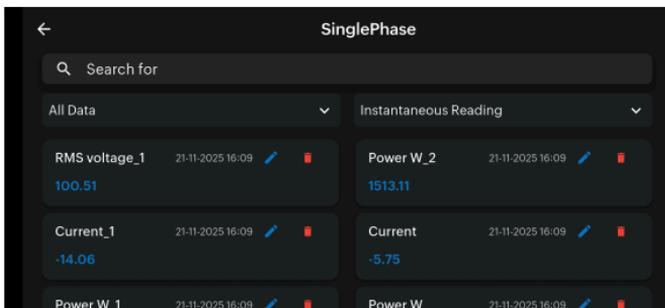


2. Tap **Save Reading** to start recording.

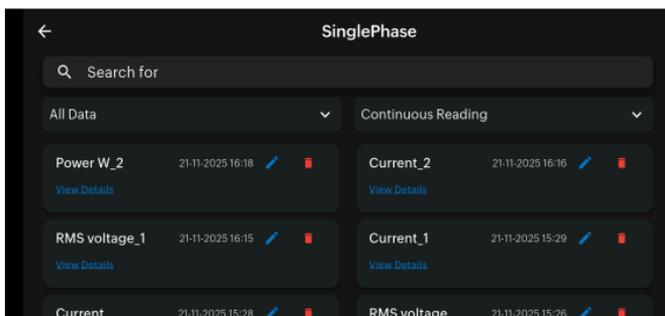
Logs

Open **Logs** to view your saved measurements.
The dropdown provides two options:

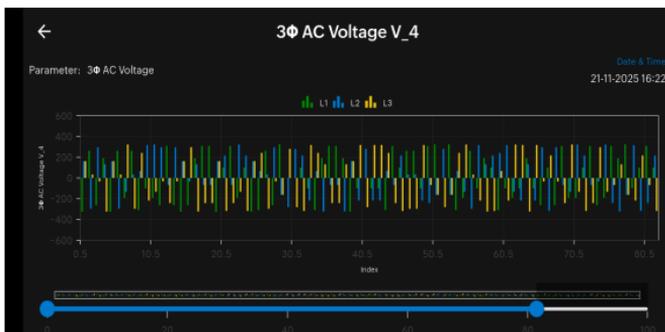
- **Instantaneous Reading** – shows readings saved using the Instantaneous option.



- **Continuous Reading** – shows recordings saved using **Save Set of Readings** or **Save by Duration**.

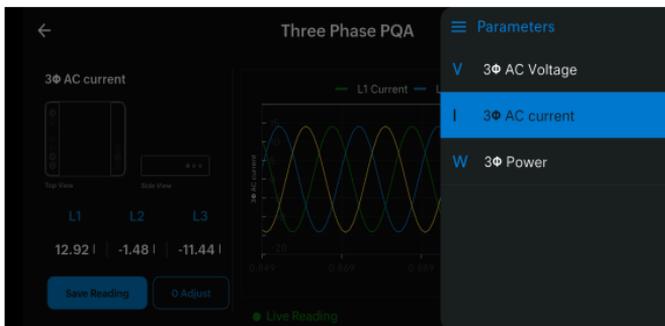


- **View Details** – select *View Details* to see the recorded graph.



6.6.2 3 Φ AC Current

1. Home \rightarrow 3-Phase \rightarrow 3 Φ AC Current.



2. Connect CT inputs as shown in the highlighted diagram.

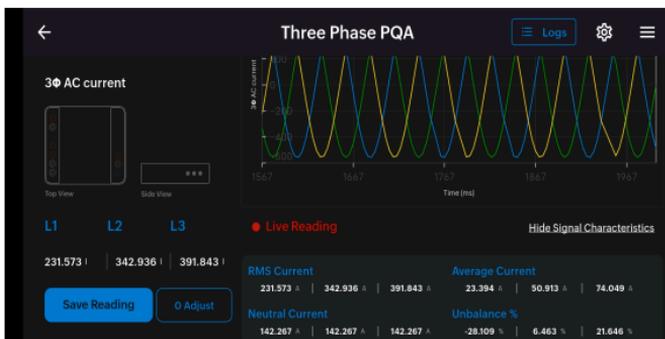


3. Live L1, L2, L3 current and graph will appear.

Show Signal Characteristics

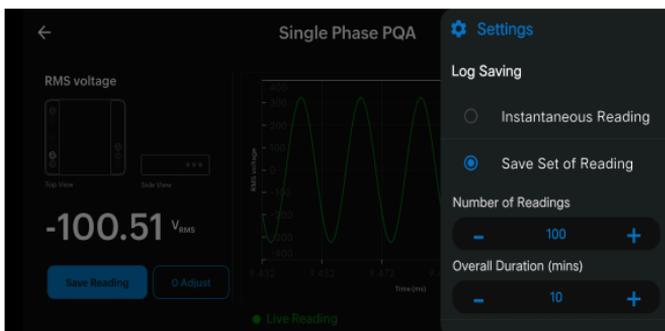
Tap **Show Signal Characteristics** to view the detailed values for your measurement.

- RMS Current: L1, L2, L3
- Average Current
- Neutral Current
- Unbalance %

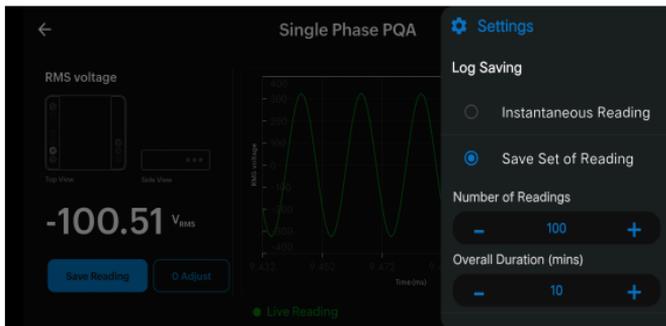


Saving

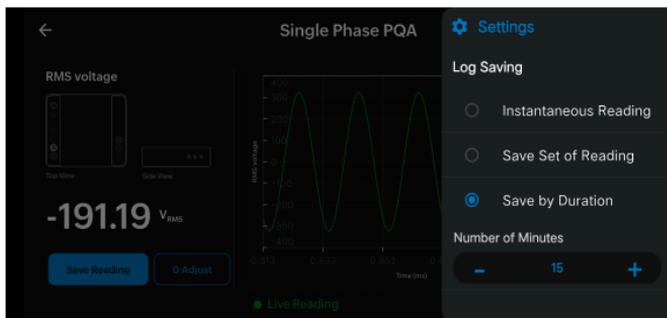
1. Open **Settings** → choose one saving option:
 - Instantaneous Reading



- Save Set of Readings → Enter number of readings + overall duration (min)



- Save by Duration → Enter number of minutes



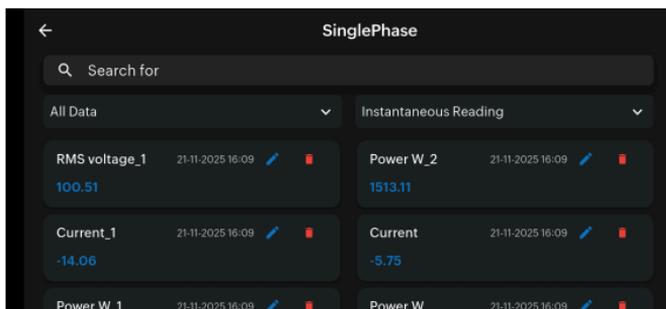
2. Tap **Save Reading** to start recording.

Logs

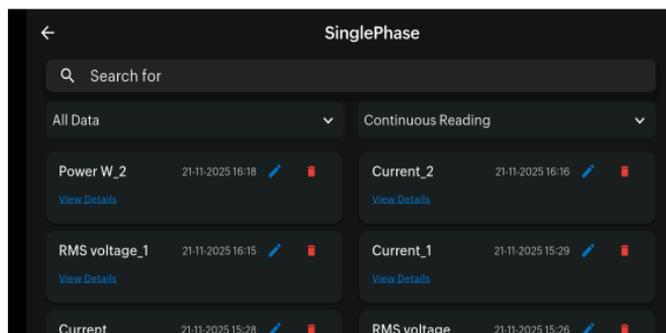
Open **Logs** to view your saved measurements.

The dropdown provides two options:

- **Instantaneous Reading** – shows readings saved using the Instantaneous option.



- **Continuous Reading** – shows recordings saved using **Save Set of Readings** or **Save by Duration**.

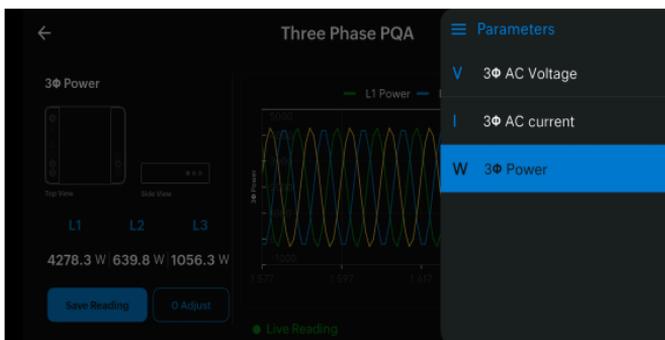


- **View Details** – select *View Details* to see the recorded graph.



6.6.3 3Φ AC Power

1. Home → **3-Phase** → **3Φ Power**.



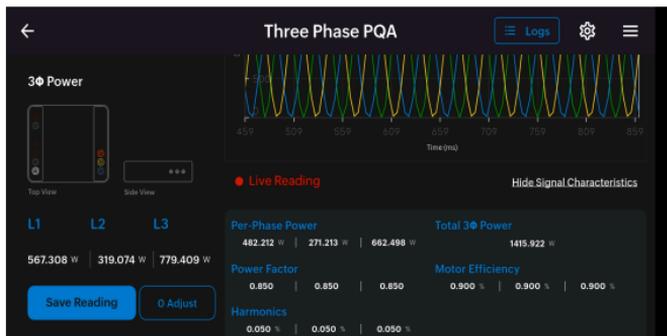


3. Live power graphs will appear.

Show Signal Characteristics

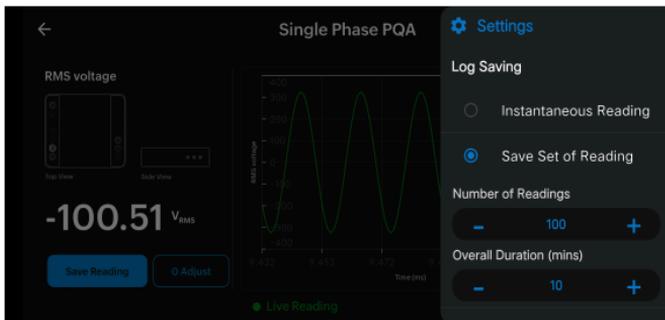
Tap **Show Signal Characteristics** to view the detailed values for your measurement.

- Per-Phase Power (L1, L2, L3)
- Total 3Φ Power
- Power Factor
- Motor Efficiency
- Harmonics (all phases)

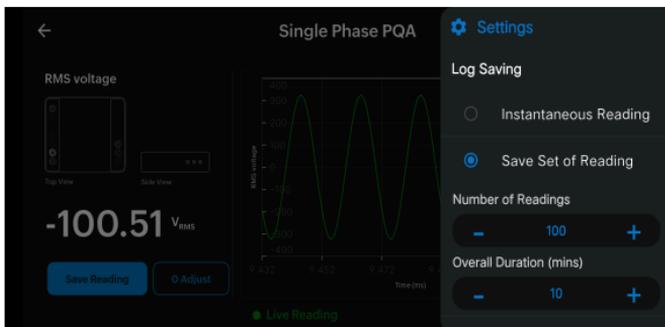


Saving

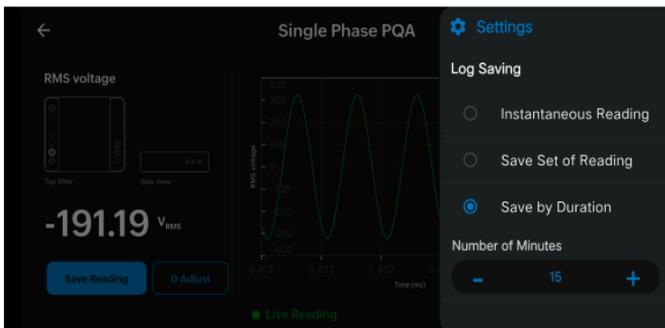
1. Open **Settings** → choose one saving option:
 - Instantaneous Reading



- Save Set of Readings → Enter number of readings + overall duration (min)



- Save by Duration → Enter number of minutes

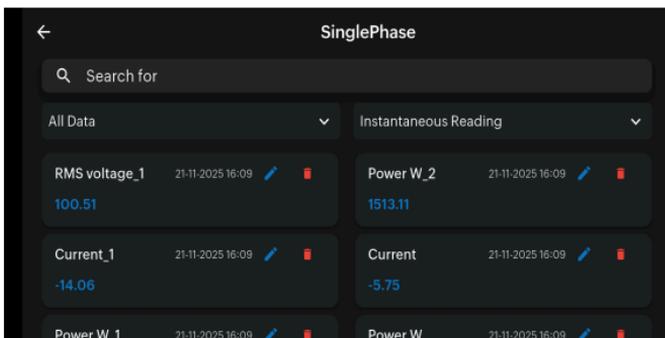


Logs

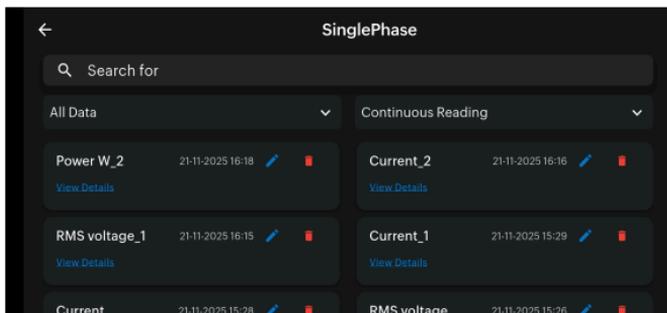
Open **Logs** to view your saved measurements.

The dropdown provides two options:

- **Instantaneous Reading** – shows readings saved using the Instantaneous option.



- **Continuous Reading** – shows recordings saved using **Save Set of Readings** or **Save by Duration**.



- **View Details** – select *View Details* to see the recorded graph.



6.7 Example Operation

Measuring a 10kΩ Resistor with 4-Wire Kelvin:

1. Power on Magic Box and connect to app via WiFi
2. Select **LCR** mode
3. Set test frequency to **1kHz**

4. Connect resistor:

- J2 and J4 to one end of resistor
- J3 and J5 to other end of resistor

5. Read resistance value: Should display **10.00 kΩ ±1%**

3-Phase Motor Analysis:

1. Connect Magic Box to 3-phase motor as described in Section 5.4

2. Select **3-Phase** mode in app

3. Start motor

4. Monitor real-time parameters:

- L1: 230V, 5.2A, 1150W
- L2: 228V, 5.1A, 1125W
- L3: 232V, 5.3A, 1180W
- Total Power: 3455W
- Power Factor: 0.92
- Efficiency: 85%

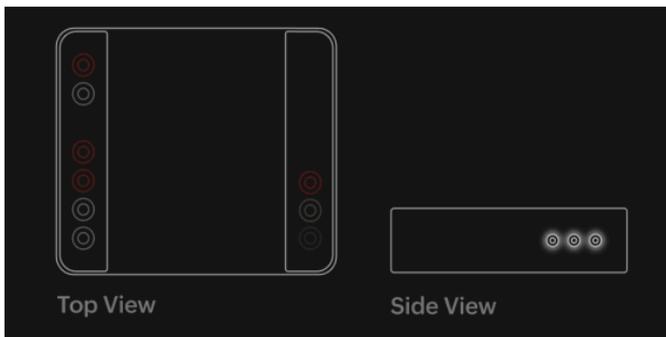
7. App Interface

7.1 Screen Layout

Each instrument screen is divided into **two main sections**:

Left Panel – Connection Guide

- Displays an **illustration of connector points** showing where to connect the probes.
- The image updates automatically based on the parameter selected (e.g., DC Voltage, Resistance, etc.).



Right Panel – Measurement Display

- Shows live readings of the selected parameter.
- Depending on the measurement, it may also display a **real-time graph** and **computed results** (e.g., RMS value, average, etc.).



7.2 Menu and Controls

At the top of the measurement screen, you'll find **three key buttons**:

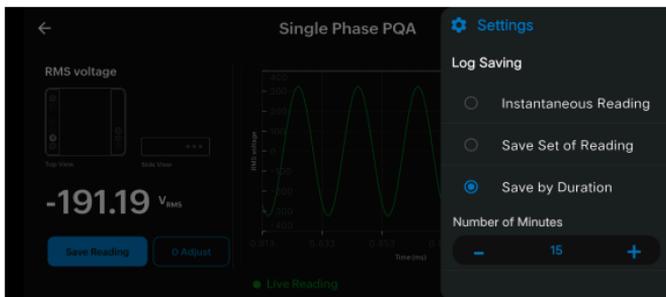


1. Logs

- Opens the **log history**, displaying all previously saved readings.

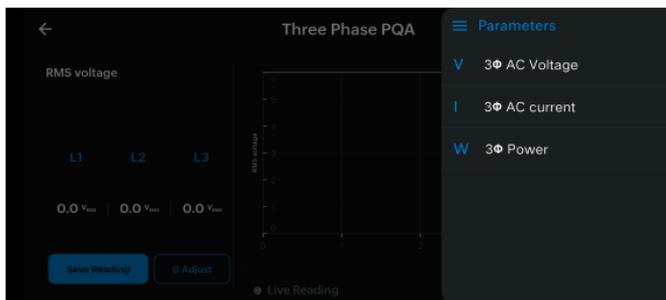
2. Settings (⚙️)

- Allows customization of **save settings**:
 - Instantaneous Reading – Save one-time readings.
 - Continuous Reading
- The selected save mode will be applied when you tap **Save Reading**.



3. Hamburger Menu (☰)

- Opens a list of all available **parameters** for the selected instrument.
- Tap a parameter to switch instantly



Save Reading

Saves the present measurement immediately using the active save mode.

O Adjust

Performs automatic offset calibration to ensure accurate readings.

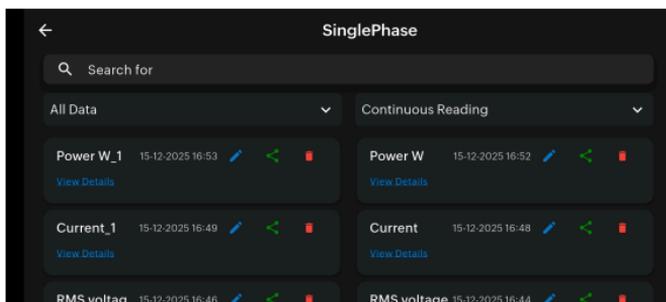
Note : Future update

Show Signal Characteristics

Opens the panel to display computed measurement parameters (e.g., RMS, Average, Peak, etc.).

7.3 Viewing Saved Data

- Go to **Logs** from the main screen to view your saved readings. Each log entry includes:
 - Timestamp
 - Parameter name
 - Measured value
 - Save type (Instant / Interval / Duration)



- **View Details** – select *View Details* to see the recorded graph.



- Selecting the **Share** icon allows the measured data to be exported in CSV format.

8. Calibration and Settings

8.1 Voltage Calibration

User calibration is not supported. The Pi-UVA is factory calibrated and maintains accuracy over the specified temperature range (0°C to 50°C). If you suspect calibration issues, contact technical support for service.

8.2 Current Calibration

Direct Current (Iin, Iout): Factory calibrated with INA253A1 integrated solution. No user calibration available.

8.3 LCR Calibration

LCR measurements utilize automatic open and short compensation algorithms built into the firmware. Calibration is applied dynamically for each supported test frequency without user intervention. This ensures stable and accurate inductance, capacitance, and resistance measurements during normal operation.

9. Troubleshooting Guide

This section outlines common operational problems, probable causes, and recommended corrective actions.

Issue	Symptoms	Checks	Actions
Incorrect Voltage/Current Reading	Readings high/low or unstable	<ul style="list-style-type: none"> - Test lead connections - Correct mode selected - Verify auto-ranging/manual range 	<ul style="list-style-type: none"> - Verify CT orientation/calibration
CT Reading Not Detected	Zero or very low current	<ul style="list-style-type: none"> - CT connected to I1/I2/I3 - Clamp around single conductor - Orientation arrow toward load 	<ul style="list-style-type: none"> - Test with known current source
LCR Mode Not Switching	App shows parameters but values don't change	<ul style="list-style-type: none"> - Verify 4-wire connections (F+S-) - Component not in powered circuit - Test frequency selection 	<ul style="list-style-type: none"> - Check component values within range
Overload/Short Circuit	RGB LED blinking red, "OVERLOAD" message	<ul style="list-style-type: none"> - Verify input limits - Inspect for short circuits 	<ul style="list-style-type: none"> - Disconnect all leads immediately - Power cycle Pi-UVA - Contact support if persists

10. Maintenance

10.1 Cleaning and Care

- **Exterior:** Wipe with soft, dry cloth. For stubborn dirt, use cloth slightly dampened with water. Abrasive cleaners, solvents, or excessive moisture
- **Terminals:** Clean with contact cleaner spray and cotton swab

10.2 Fuse Information

The Pi-UVA is equipped with several internal fuses for protection. Users should understand which fuses are serviceable and which are not.

Resettable Fuse

F15 (500 mA, USB Power Input)

This is an automatically resettable fuse located on the USB input line. It resets on its own once the fault condition is removed.

Non–User-Replaceable Fuses

The following fuses are internal and cannot be replaced by the user:

- **F16, F17, F18, F19** — 500 mA, 6 V protection fuses
These components are surface-mounted and require factory-level service for replacement.

User-Replaceable Fuses

The following fuses can be safely replaced by the user:

- **F1, F2, F3** — 15 A fuse holders
- **F13, F14** — 10 A fuse holders

Only replace these fuses with the same rating and type to maintain safety and performance.

Rating	Fuse NO.	Location / Function	User-Replaceable	Part Number
500 mA (Resettable)	F15	USB power input	No (self-resetting)	MF-MSMF050-2
500 mA, 6 V	F16, F17, F18, F19	Internal protection fuses	No	SMD0805B050TF
15 A	F1, F2, F3	User fuse holders	Yes	MP013388
10 A	F13, F14	User fuse holders	Yes	MP014116

10.3 Periodic Inspection

Monthly Inspection:

- Check test leads for damage or worn insulation
- Verify terminal tightness (should be secure, not loose)
- Clean terminals with contact cleaner if corrosion is visible
- Test basic functions with known voltage source

10.4 Storage and Transport

- **Storage:** Leave at room temperature. Remove from power source, store in dry location
- **Transport:** Handle the Magic Box carefully during transport and keep all test leads, CT clamps, and accessories organized. Avoid any shock, vibration, or dropping of the device to prevent damage.
- **Temperature:** Avoid extreme temperatures during storage/transport

11. Warranty and Support

11.1 Warranty Terms

The Pi-UVA is warranted against defects in materials and workmanship for a period of **12 months** from the date of purchase. This warranty covers:

- **Hardware defects** under normal use
- **Factory calibration accuracy**
- **Manufacturing defects**

Exclusions:

- Damage from misuse, abuse, or accidental damage
- Damage from exceeding specified input limits
- Normal wear and tear of test leads and accessories
- Modifications or repairs by unauthorized personnel

11.2 Technical Support Contact

For technical assistance, calibration services, or warranty claims:

Email: support@pilabz.in

Phone: +91-9962-904035 (Monday-Friday, 9AM-6PM IST)

Website: www.pilabz.in/support

When contacting support, please provide:

- Serial number (found on device label)
- Purchase date and proof of purchase
- Detailed description of the issue
- Photos of any visible damage

11.3 Revision Information

- **Manual Version:** 1.0
- **Device Firmware:** v1.0 Alpha
- **Publication Date:** December 2025
- **App Version:** 1.0 (Android)