INSTRUCTION MANUAL

MT795

POWER QUALITY & ENERGY ANALYSER

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1. PRODUCT INTRODUCTION

The **MT795 Three-Phase Power Quality and Energy Analyser** is a compact, high-performance device designed for advanced power quality analysis and energy diagnostics. It can momentarily quantify energy losses and measure a wide range of parameters, including **voltage, current, frequency, power, energy, flicker, harmonics, and interharmonics**.

Ideal for both **three-phase and single-phase distribution systems**, the MT795 helps users locate, predict, prevent, and troubleshoot power quality issues efficiently.

Featuring a **120x90 pixel built-in touch screen**, it enables easy configuration, real-time verification, and data downloads, **without requiring a computer on-site**. The device also supports **Wi-Fi connectivity**, allowing users to **view graphs and generate reports wirelessly**.

It can measure and analyse a wide range of parameters, including:

- Voltage
- Current
- Frequency
- Power
- Energy
- Flicker
- Transients
- Harmonics and interharmonics
- Oscilloscope waveforms and phasors
- Voltage sags and surges
- Three-phase imbalance

2. PRODUCT FEATURES

- Powered by a **64-bit quad-core Cortex-A53 CPU** running Android, featuring an **8-inch high-definition IPS TFT display** (1024 × 768 pixels) with touch screen functionality, offering a superior user experience compared to similar products on the market.
- Built-in **GPS + BeiDou (BD) module** for accurate global real-time clock synchronization.
- Integrated **16 GB NAND flash storage**, with approximately **10 GB** of usable capacity available.
- Supports **Wi-Fi connectivity** for convenient online upgrades, ensuring the instrument remains up-to-date with the latest features.
- Each interface between the measuring end and the system is protected by **3000V isolation**, enhancing safety and reliability.
- Supports SD cards up to **256 GB**; the instrument comes with a **64 GB SD card** pre-installed for ample data storage.
- Equipped with **Type-C USB** communication interface.

Standards and Certifications:

- **IEC 61000-4-30 Class A** – Power quality measurement
- **IEC 61000-4-15** – Flicker measurement
- **IEC 61000-4-7** – Harmonic measurement
- **EN 50160** – Power quality standards for public electricity supply
- **EN 61326 (2005-12)** – Electromagnetic compatibility
- **UKCA Marking**
- **CE Marking**
- **UL and cUL certification**
- **ANSI C12.1** – Specifications for watt-hour meters
- **ANSI C12.20 (Class 0.2)** and **IEC 62053-22 (Class 0.2S)** – Accuracy standards

3. SECURITY INFORMATION (PLEASE READ FIRST)

3.1. Environmental Conditions for Use

Operating Temperature	-10 to 40°C/14 to 104°F; 40 to 50°C/104 to 122°F (Battery operation only)
Storage Temperature	-20 to 60°C/-4 to 140°F
Humidity	10 to 30°C/50 to 86°F: 95% Relative humidity, no condensation. 30 to 40°C/86 to 104°F: 75% Relative humidity, no condensation. 40 to 50°C/104 to 122°F: 45% Relative humidity, no condensation.
Maximum Working Altitude	CAT IV 600V, CAT III 1000V, up to 2000m (6,666 ft) above sea level; CAT III 600V, CAT II 1000V, up to 3000m (10,000 feet) above sea level; Maximum storage height is 12,000m (40,000 ft).
EMC	Comply with EN 61326 (2005-12) radiation and anti-interference standards

3.2. Power Supply

- **AC Power Supply**: Operates using city electricity via an **AC 100–240V adapter** (equipped with a country-specific plug).
- **DC Input:** The power adapter supports an input voltage range of **12–15V DC**.

Rated for: **600V CAT IV / 1000V CAT III,** Pollution Degree 2

- Important Note: Always use the analyzer and its accessories according to the instructions in the user manual. Failure to do so may compromise the safety and protection features of the device and its accessories.

3.3. International Symbols

WARNING The term **"Warning"** indicates a situation or behavior that may pose a **hazard or danger to the user**.

ATTENTION The term **"Attention"** refers to conditions or actions that may cause **damage to the analyser**.

⚠	See the instructions in the manual
⏚	Grounding Communication
∼	AC
⎓	DC
MH25771	Safety Certification
c us	Safety Certification
CE	European Compliance
	Current Clamp

	Double Insulation (Protection Grade)
Li-ion	Recycling Information
N10140	Comply with Relevant Australian Standards
	Do not use it directly on a dangerously charged conductor.
	RoHS
	Waste disposal information
	Do not dispose of this product as unsorted municipal waste.

3.4. WARNING

⚠ **To avoid electric shock or fire:**

- Read the **entire manual** before using the analyzer and its accessories.
- Carefully follow **all instructions** provided.
- **Do not work alone.**
- **Do not use** the product near explosive gases, vapors, or in **humid environments**.
- Use the product **only as specified**. Improper use may compromise the protective features of the analyser.
- Use only **insulated current probes**, **test leads**, **and adapters** provided with or specified for the analyser.
- Always hold the probe **behind the finger guard** during use.
- **Inspect** the analyser, voltage probes, test leads, and accessories for any signs of physical damage **before use**. Replace any damaged components immediately.
- Check for **cracks or missing plastic parts**, especially around the insulation near connectors.
- Verify that the analyser is functioning properly by testing a **known voltage source**.
- Remove all **unused probes, test leads, and accessories** before operation.
- **Connect the power adapter to the AC outlet first**, then plug it into the analyser.
- **Avoid contact with high voltage:** Voltage > AC RMS (RMS) 30V, AC peak 42V or DC 60V.
- The **ground input** is for grounding the analyser only. **No voltage** should be applied to this terminal.
- **Do not exceed the rated voltage** indicated on the voltage probe or current clamp.
- Use only probes, test leads, and adapters that match the **correct measurement category (CAT), voltage, and current ratings**.

- **Do not exceed the lowest-rated** measurement category (CAT) of any component (product, probe, or accessory) in the setup.
- **Comply with local and national safety regulations**. In environments with hazardous flexible current probes, **disconnect power from the equipment under test** or wear **appropriate protective clothing**.
- **Do not use exposed metal BNC or banana plug connectors.**
- **Do not insert metal objects into any connector.**
- Only use the **official power adapter** supplied with the analyser.
- Before use, verify that the **voltage range selected on the analyser** matches the **local mains voltage and frequency**.
- For analyser power adapters, use only **AC line adapters or power cords** that comply with local **safety standards**.
- Always **disconnect the input signal** before cleaning the device.

3.5. ⚠ Current Voltage Banana Connector Input to Ground Input Voltage

The input ports A (L1), B (L2), C (L3), and N are rated for:

- **1000V CAT III**
- **600V CAT IV**

Relative to ground

3.6. ⚠ Maximum Voltage of the Current BNC Input Port (Refer to Label)

- Input ports **A (L1), B (L2), C (L3)**, and **N** to ground: **42V peak.**
- This voltage rating refers to the **"Working Voltage"**.
- Applicable for **AC sinusoidal waveforms** measured as **VAC RMS (50–60 Hz)**.
- For **DC applications**, the voltage is denoted as

Measurement Categories:

- **CAT IV (600V)** – Refers to installations at the utility level, such as high-voltage overhead lines or underground service connections.
- **CAT III (1000V)** – Refers to distribution-level installations inside buildings, including fixed equipment and circuit wiring.

Safety Notes:

- Always follow proper **safety protocols**—these categories are designed to protect users in the event of **unexpected power surges**.
- If **safety measures fail**, or if the analyser is **not used as instructed by the manufacturer**, the device's protective features may be compromised.
- Before use, **inspect all test leads** for mechanical damage. Replace any damaged leads immediately.
- If the analyser or any of its accessories **malfunctions or fails**, **do not use the device**. Return it to an authorized service center for repair.

3.7. SAFE USE OF LITHIUM ION BATTERY PACK

3.7.1. Recommendations for Safe Storage of Battery Packs

- **Do not store** the battery pack near sources of heat, fire, or in direct sunlight.
- **Keep the battery pack in its original packaging** until ready for use.
- If not in use, **remove the battery pack from the device** whenever possible.
- For long-term storage, **fully charge** the battery pack before storing to prevent battery failure.
- After prolonged storage, the battery pack may require **several charge/discharge cycles** to restore optimal performance.
- **Keep the battery pack out of reach of children and animals.**
- **Seek immediate medical attention** if the battery or any part of it is swallowed.

3.7.2. Recommendations for Safe Use of Battery Packs

- **Recharge the battery pack before use** using only the **approved power adapter**.
- Refer to the **user manual and safety instruction**s for proper charging procedures.
- **Do not leave the battery charging for extended periods** when not in use.
- The battery performs best at **normal room temperature (20°C ± 5°C / 68°F ± 9°F)**.
- **Keep the battery away from heat sources, fire, and direct sunlight.**
- Avoid subjecting the battery pack to **severe impact or mechanical shock**.
- **Keep the battery clean and dry**; use a dry, clean cloth to wipe any dirty contacts.
- Always use the **designated charger** provided with the equipment.
- **Do not use batteries** not specifically recommended for the product.
- When inserting the battery into the device or charger, **ensure correct orientation and placement**.
- **Do not short-circuit the battery pack**. Avoid placing it near metal objects (e.g., coins, paper clips, pens) that could contact the terminals.
- **Do not use** batteries or chargers that are **visibly damaged**.
- Batteries may contain **hazardous chemicals** that can lead to combustion or explosion. If exposed to any battery leakage:
  - **Rinse the affected area with water**
  - **Seek medical attention immediately**
  - **Do not reuse the product until it has been inspected and repaired**
- **Do not attempt to open, modify, or repair the battery pack.**
- **Never disassemble, crush, or puncture** the battery.
- Use the battery pack **only for its intended purpose**.
- **Retain the original product documentation** for future reference.

3.7.3. Recommendations for Safe Transportation of Battery Packs

- The battery pack must be **adequately protected** against **short circuits, mechanical damage**, and **exposure** during transit.
- Follow the guidelines set by the **International Air Transport Association (IATA)** for the safe transport of lithium-ion batteries.
- Comply with all **local and national regulations** governing the transportation of batteries, whether by mail or other means.
- When shipping by mail, **no more than three battery packs** may be included per package.
- Each package must be **clearly labeled** with the following:
  - **This package contains lithium-ion batteries (not containing lithium metal).**

3.7.4. Recommendations for Safe Disposal of Battery Packs

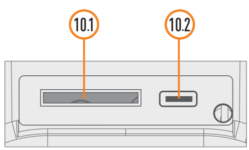
- **Dispose of failed or expired battery packs** in accordance with **local laws and environmental regulations**.
- **Do not dispose of batteries** in general household or municipal waste bins.
- For safe handling before disposal:
  - **Discharge the battery** completely.
  - **Cover the battery terminals** with **insulating material** such as electrical tape to prevent short circuits.

4. MEASURING FUNCTIONS

The analyser supports the following measurement functions:
- **Oscilloscope** (Waveform and Phasor)
- **Voltage/Current/Frequency**
- **Power and Electric Energy**
- **Harmonics and Interharmonics Analysis**
- **Unbalance Detection**
- **Inrush Current Capture**
- **Flicker Measurement**
- **Transient Analysis**
- **Voltage Dips (Sags) and Swells**
- **Data Recording (Logger) and Viewing**
- **Screenshot Capture**
- **Wave Recording**

5. DESCRIPTION
5.1. Panel Description

1 - TFT Display
2 - Lanyard Hole
3 - Oscilloscope Waveform Button
4 - Menu Button
5 - Logger Button
6 - Return Button
7 - Power Button
8 - F1 Function Button
9 - F2 Function Button
10 - Interface and Cover
  10.1 - SD Card Slot
  10.2 - Type-C Communication Interface
11 - F3 Function Button
12 - F4 Function Button
13 - F5 Function Button
14 - Backlight Button
15 - Direction & Confirm Button
16 - Save Screen Button
17 - Memory Button
18 - Setup Button

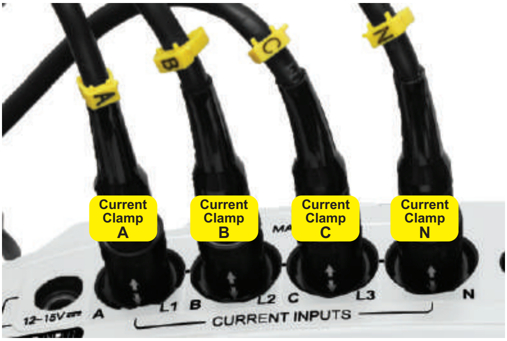


19 - Voltage Measurement Input Port: N
20 - Voltage Measurement Input Port: C
21 - Voltage Measurement Input Port: B
22 - Voltage Measurement Input Port: A
23 - Voltage Measurement Input Port: GND
24 - Current Clamp N Measurement Input Interface
25 - Current Clamp C Measurement Input Interface
26 - Current Clamp B Measurement Input Interface
27 - Current Clamp A Measurement Input Interface
28 - DC12~15V, 2.4A Charger Jack
29 - Battery Slot Switch
30 - Battery Cover
31 - Tilt Stand

5.2. Current Clamp Connection and Disconnection Method – Operation Guide

Current Clamp Insertion Method

Insert the A, B, C, and N current clamps into their corresponding ports labeled A, B, C, and N.



Current Clamp Extraction Method

Grip the arrow-marked area of the current clamp with your fingers and gently pull it outward to disconnect.

6. WIRING COMBINATION DESCRIPTION

10+NEUTRAL	Single-phase band neutral line
10 SPLIT PHASE	Split-phase
10 IT NO NEUTRAL	Single phase, with two phase voltage, no neutral line
30 WYE	Three phase four wire system, Y shape
30 DELTA	Three-phase three-wire triangular (Delta)
30 IT	Three-phase Y-shaped, no neutral line
30 HIGH LEG	Four-wire three-phase triangular (Delta). with center tap high pressure phase foot
30 OPEN LEG	Open triangle (Delta) three-wire with two transformer windings
2-ELEMENT	Three-phase three-wire system, L2 / B phase sensorless (2 watt power meter method)
2½-ELEMENT	Three-phase four-wire system, L2 / B phase without voltage sensor

7. MEASUREMENT MODE DESCRIPTION

Scope	4 groups of voltage waveforms, 4 groups of current waveforms, RMS voltage (Vrmsl. fundamental voltage (Vfund). Effective current (Arms). fundamental current (A fund). cursor voltage (V@ cursor). cursor current (A@ cursor). phase angle.
Volts/Amps/Hertz	Interphase RMS voltage (Vrms). Phase to neutral line RMS voltage (Vrms). Peak voltage (Vpeakl. Voltage peak coefficient. RMS current (Arms). Peak current (Apeak), Current peak coefficient. Frequency (Hz).
Dips and Swells	Half-cycle RMS Vrms (Vrms½). Half-cycle RMS current (Arms½). Programmable threshold level Pinst for event detection.
Harmonics DC, 1 ... 50	Harmonic voltage, Total harmonic distortion (THO). Harmonic current. K coefficient current. Power harmonics, Power total harmonic distortion, Power K coefficient. Inter-harmonic wave voltage, Inter-harmonic wave current. Effective value voltage (Vrmsl. Effective value current (Arms) (Relative to fundamental or total effective value).
Power and Energy	RMS voltage (Vrms). RMS current (Arms). Full power (Wfulll. Fundamental power (Wfund). Complete VA, Fundamental VA, Harmonics VA, Unbalanced VA, Var, Power factor (PF). DPF. CosQ, Efficiency factor, kWh forward, kWh reverse.
Unbalance	Negative voltage percentage (Vneg%). Zero voltage percentage (Vzero%). Negative current percentage (Aneg%). Zero current percentage (Azero%). Fundamental voltage (Vfund). Fundamental current (Afundl. Voltage phase angle, Current phase angle.
Inrush	Inrush current. Inrush duration, Half cycle RMS current (ARMS½). Half cycle RMS voltage (Vrms½).
Flicker	Pst (1-minutel. Pst. Plt. Pinst. Half-cycle RMS voltage (Vrms ½). Half-cycle RMS current (Arms ½l. Frequency (Hz).
Transients	Transient waveform 4x voltage, 4x current. Flip-flop: Half-cycle RMS voltage (Vrms½). Half-cycle RMS current (Arms½). Pinst.
Logger	Custom selection of up to 150 sets of power quality parameters for simultaneous four-phase measurement.
Wave Recording	Record the 4 x Voltage waveform and 4 x Current waveform for a maximum duration of 3 minutes.

8. CONNECTION INSTRUCTIONS BEFORE INSTRUMENT MEASUREMENT

8.1. Before each measurement, ensure the following settings are reviewed and configured:

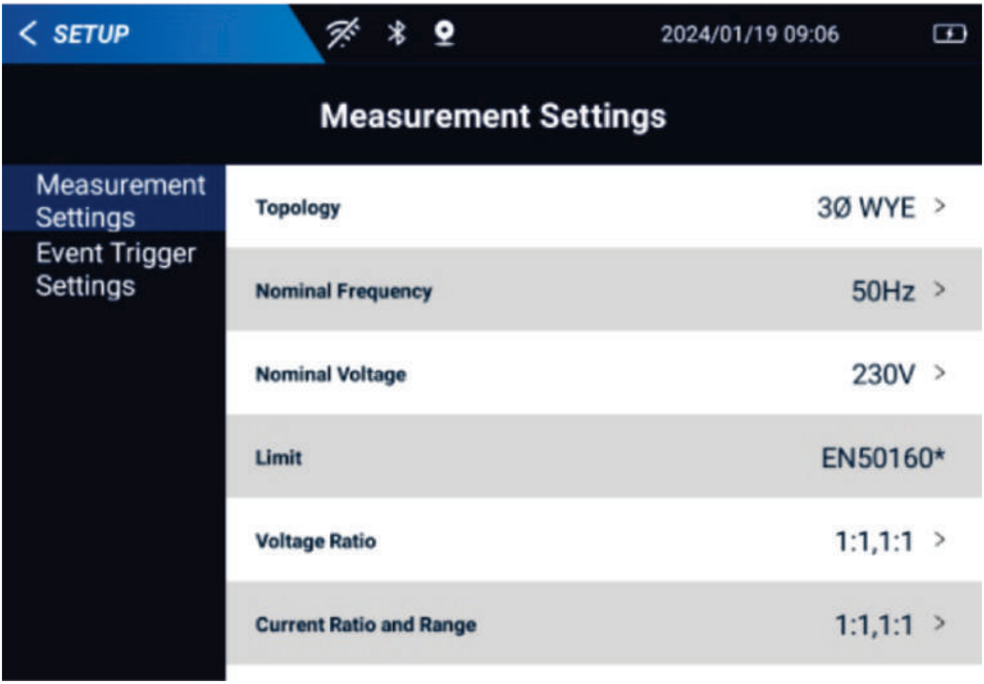
- **Define calculation parameters.**
- **Select the power grid type**, ranging from single-phase to three-phase four-wire, and choose the appropriate connection method (e.g., two-wattmeter or standard).
- **Set the current sensor ratio** according to the type of current sensor connected.
- **Configure the voltage and current ratios.**
- **Set the trigger level** (for Transient mode).
- **Specify the values to be recorded** (for Trend mode).
- **Define the alarm threshold.**

8.2. Measurement Setup Guide for Three-Phase system

1. Configure the Measurement Topology

On the main interface:

- Click **"SETUP"**, then **"Measurement Settings"**, and select **"Topology"**.
- Choose the appropriate wiring method, as illustrated in the following figure.



2. Connect the Current Clamps

- Begin by placing the current clamps on the conductors for phases **A (L1), B (L2), C (L3)**, and **N (neutral)**.
- Each clamp is marked with an arrow to indicate the correct signal polarity—ensure the arrow is **pointing in the direction of current flow**.
- Ensure each clamp is **securely and fully closed** around its corresponding conductor for accurate measurement.

3. Complete the Voltage Connections

- **Start with the ground (GND) connection**.
- Then connect the **neutral (N)**, followed by phases **A (L1), B (L2)**, and **C (L3)** in that sequence.
- Always ensure the **ground wire is securely connected to the input port**, and **verify all connections** for accurate and reliable measurement results.

4. Single-Phase Measurement Setup

- For single-phase measurements, use the **current input port A (L1)**.
- Connect the **ground**, **neutral (N)**, and **phase A (L1)** to the corresponding voltage input ports.
- **Phase A (L1)** serves as the **reference phase** for all measurements.

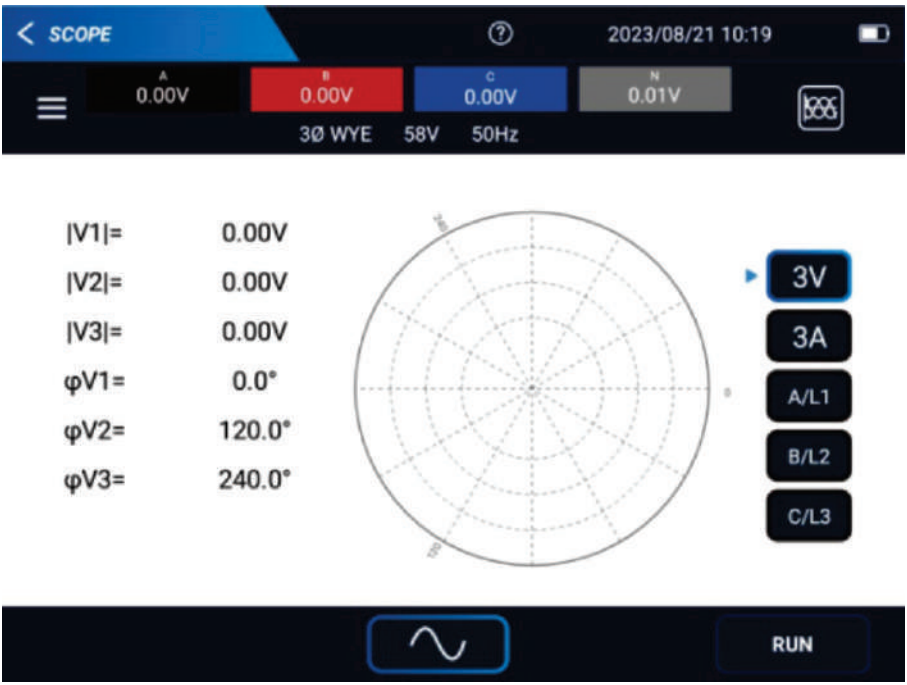
5. System Setup

Before starting any measurement:

- **Configure the analyser** with the appropriate **line voltage**, **frequency**, and **wiring configuration** for the power system being measured.
- For detailed guidance, refer to the **General Settings** section provided below.

6. Verify Connections Using Oscilloscope and Phasor Display

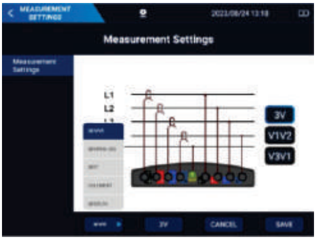
- The oscilloscope waveform and phasor diagram can be used to verify that the voltage leads and current clamps are connected correctly.
- In the vector diagram (see figure below), when viewed clockwise, the phase voltages and currents A (L1), B (L2), and C (L3) should appear in sequence.
- Click "SCOPE", then "" to enter the oscilloscope loss diagram, as shown below.



7. Final Steps to Complete a Measurement

To finalize the measurement setup, follow these steps:

1. Select the **electrical connection mode**, as shown in Figure 1 below.
2. **Set the sensor ratio** and select the **frequency** (refer to the figure below).
3. On the main interface, click **“Setup”**, then **“Measurement Settings”** to open the configuration screen (see the following figure).

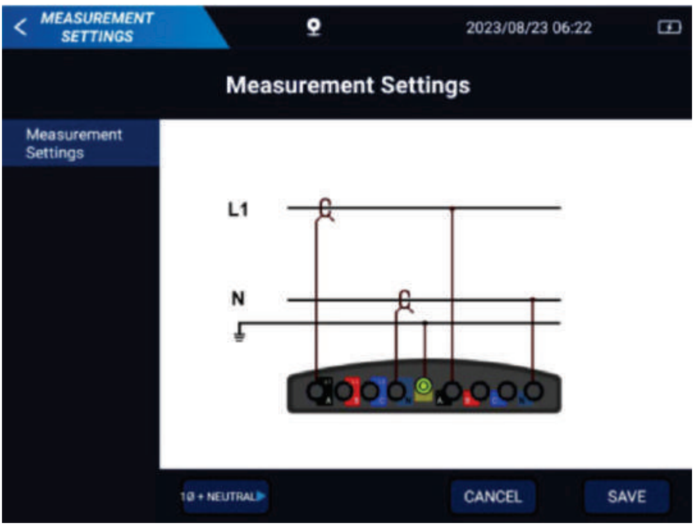


8.3. Electrical Connection Mode Selection

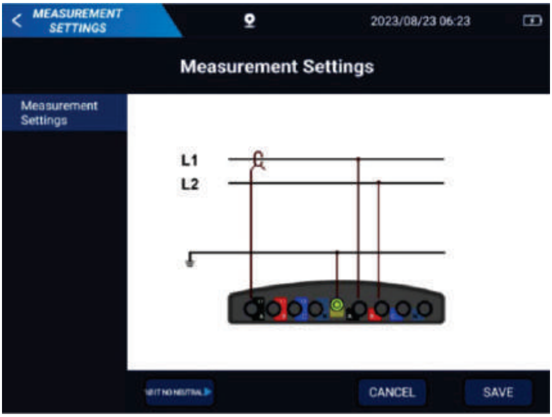
The electrical connection mode can be adjusted to match the configuration of the system under test. To change the mode, go to the main interface and select:

“SETUP” → “**Measurement Settings”** → **“Topology”,** as shown in the figures below.

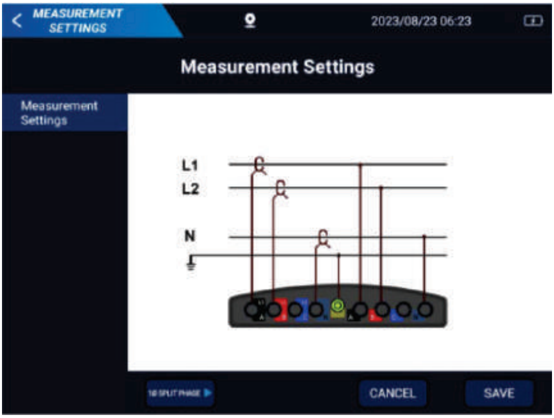
1. **1Ø+NEUTRAL (Single phase with neutral lines)**



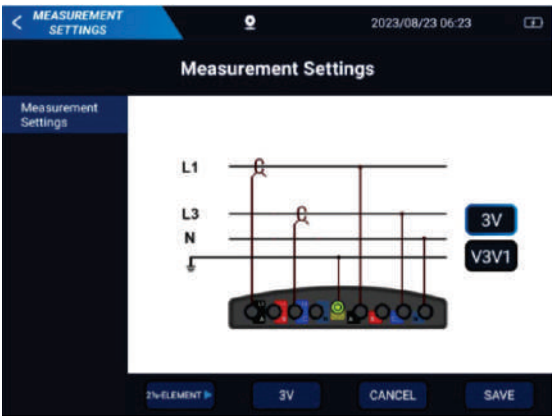
2. **1Ø IT NO NEUTRAL** (Single phase, with two phase voltage, no neutral line).



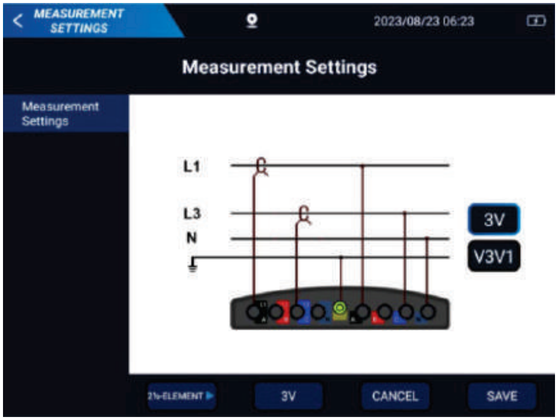
3. **1Ø SPLIT PHASE**



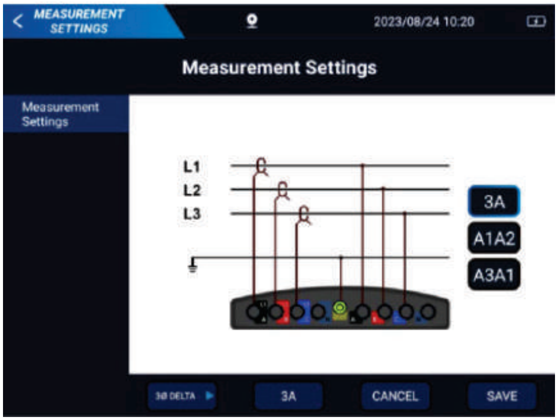
4. **2½-ELEMENT** (Three phase four wire system, L2 B phase no voltage sensor).



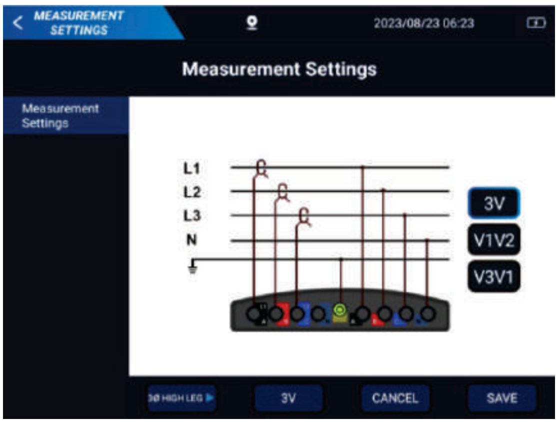
5. **2-ELEMENT** (Three-phase, three-wire,L2 B phase current sensor (2-watt power meter method)).



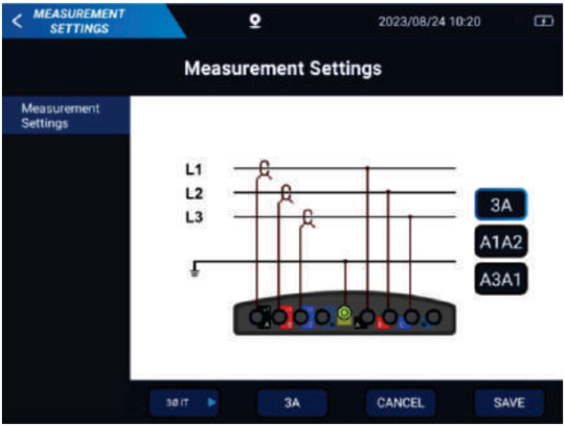
6. **3Ø DELTA** (Three phase three wire Delta).



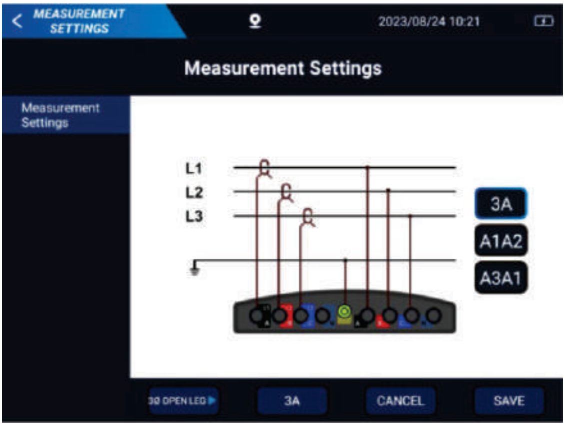
7. **3Ø HIGH LEG** (Four wire system, three phase Delta, with center tap high pressure phase pin).



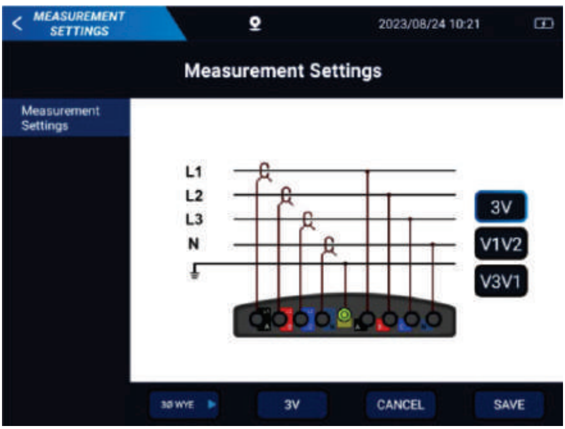
8. **3Ø IT** (Three-phase Y shape, no neutral line).



9. **3Ø OPEN LEG** (Three-wire open Delta system with two transformer windings).



10. **3Ø WYE** (Three phase four wire system, Y shape).



9. Operation Guidance

9.1.Starting Up

- Press and hold the **power button** for approximately 3 seconds to start the device. The instrument will load the company's startup interface.
- After the animation interface is displayed, the device will automatically enter the **main measurement screen**, as shown in the figure below.
- On the main interface, **tap the corresponding measurement icon** on the screen to enter the desired measurement interface.

9. 2.Oscilloscope Measurement

9.2.1. Overview of Oscilloscope Waveform and Phasor Display

- The **Oscilloscope (Scope) mode** displays the **voltage and current waveforms** of the power system under test, as well as **phasor (vector)** diagrams for visualizing phase relationships.
- In addition, the interface shows key measurement values, including:
  - **Phase voltage RMS (Effective Value)**
  - **Fundamental Voltage Value**
  - **Voltage at Cursor Position**
  - **Phase current RMS (Effective Value)**
  - **Fundamental current value**
  - **Current at Cursor Position**
  - **Frequency**
  - **Phase angle between Voltage and Current**

Description of Interface Elements

1. **Oscilloscope Mode Options** – Choose between three display modes:
   - **RMS** (True Effective Value)
   - **THD** (Total Harmonic Distortion)
   - **CF** (Crest Factor)
2. **Instantaneous Value Cursor** – Use the **left** and **right** buttons on the panel to move the cursor across the waveform.
3. **Phasor Display Switch** – Tap to switch from waveform view to the phasor (vector) diagram.

4. **Instantaneous Value Display** – Shows the instantaneous value where the waveform intersects with the cursor.
5. **Voltage Range Limit Indicator** – Displays the set voltage range limit.
   - These limits can be configured in the settings.
   - If the **alarm** and **record** options are enabled, the system will log any limit exceedance.
6. **Menu** – Opens additional configuration and viewing options.
7. **True RMS Value Display** – Shows the real-time true RMS voltage. The RMS displayed above represents the effective voltage.
8. **Exit Icon** – Tap to exit to the main interface. A pop-up prompt will appear for confirmation.
9. **Back Button** – Returns to the previous interface level.

Introduction to Oscilloscope Mode

1. The **Oscilloscope Waveform screen** updates rapidly to display real-time voltage and current waveforms.

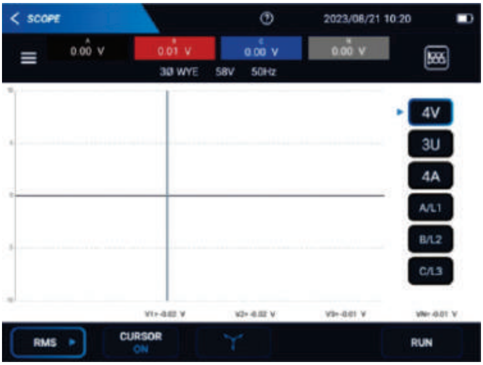
2. The top of the screen displays relevant RMS values for voltage and current:
   - Typically RMS of 10–12 cycles or 150–180 cycles.
   - Four waveform cycles are shown on the display.
   - **Channel A (L1)** is used as the reference channel.

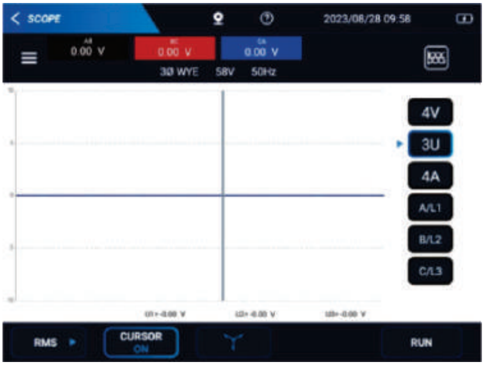
3. When the cursor is activated, the voltage or current value at the cursor position is displayed at the top of the screen.

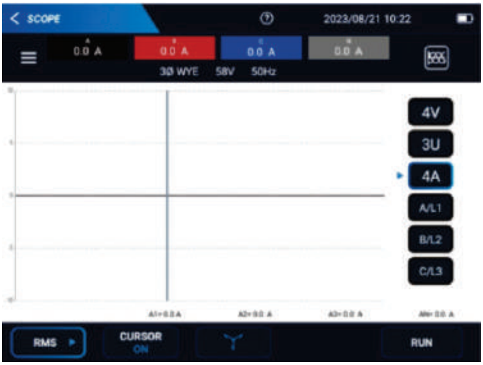
4. To ensure optimal visibility, the waveform display range is pre-adjusted based on:
   - **Nominal Voltage (Vnom)**
   - **Current range (A range)**

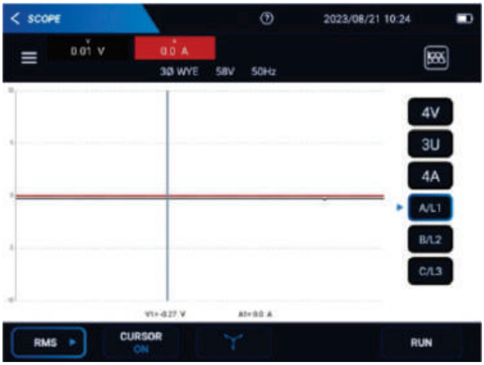
9.2.2. Oscilloscope Waveform

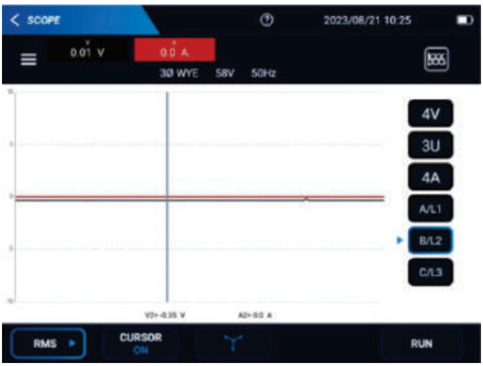
1. **3Ø WYE Wiring mode-oscilloscope RMS mode**



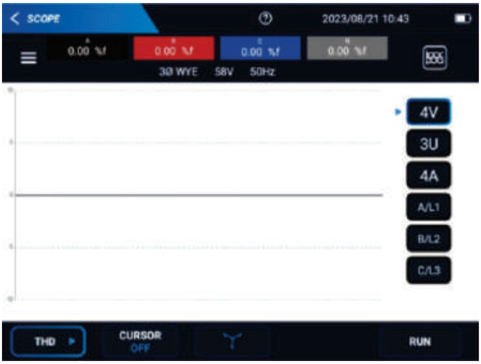


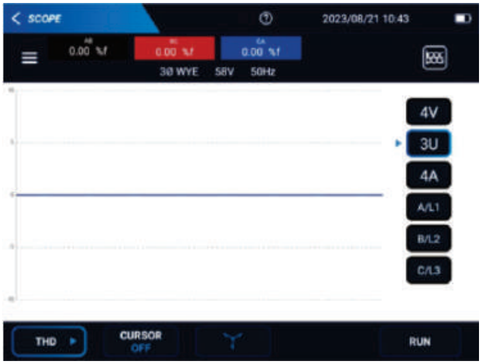


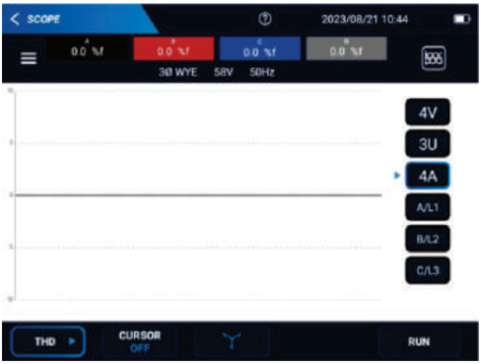


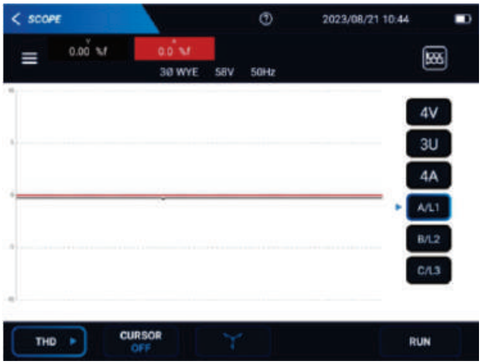


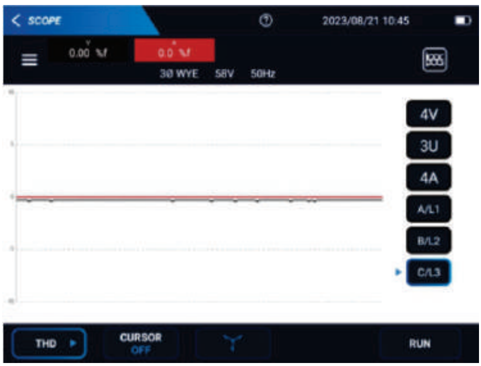
2.**3Ø WYE Connection mode-oscilloscope THD mode**



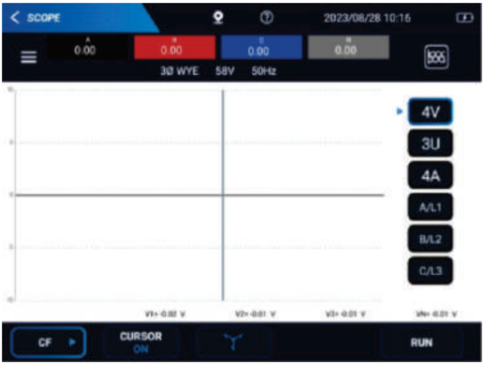


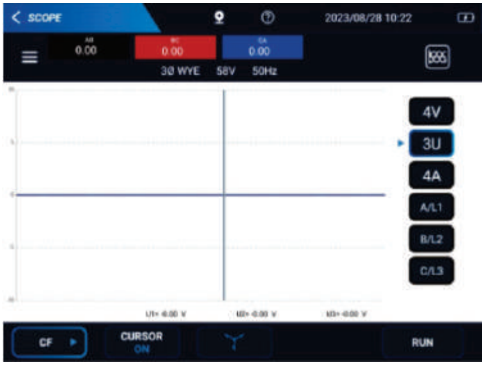


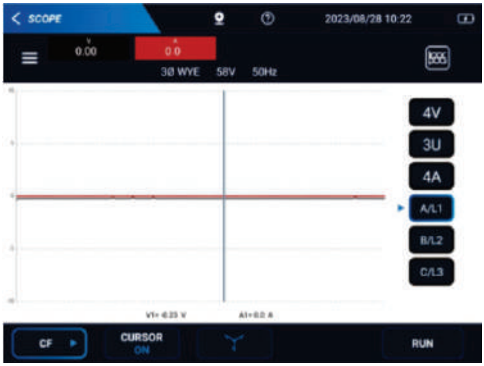




3.3Ø WYE Wiring mode-oscilloscope CF mode



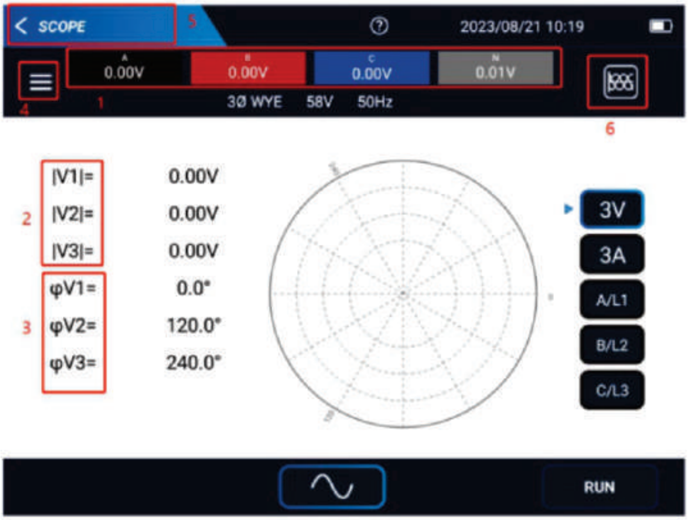




9.2.3. Oscilloscope Phasor Diagram

Phasor Interface

The phasor interface displays the vector relationships between voltage and current, as shown in the figure below:



Interface Specification:

The **phasor screen** visualizes the phase relationships between voltages and currents using a vector diagram.

- The vector for the **reference channel A (L1)** points in the **horizontal positive direction**.
- Additional displayed values include:
  - **Fundamental phase voltage and/or current**
  - **Frequency**
  - **Phase angle**
  - **RMS (effective) voltage and/or current, shown at the top of the screen**

Description of Interface Elements

- **Key Point 1** (diagram above) - Displays the **RMS voltage values** for each phase.
- **Key Point 2** (diagram above) - Shows the **modulus of the fundamental voltages**: |V1|, |V2|, |V3|.
- **Key Point 3** (diagram above) - Displays the **phase angle**, indicating whether it is **leading** or **lagging**.
- **Key Point 4** (diagram above) - Tap to open the **MENU**.
- **Key Point 5** (diagram above) - **Back Button**: Returns to the **previous screen.**
- **Key Point 6** (diagram above) - **Exit Button**: Tap to exit to the **main interface**; a **confirmation prompt** will appear.

3Ø WYE Connection Mode – Oscilloscope Phasor Display

The measurement interface for this connection mode is shown below:

9.3. Voltage/Current/Frequency Measurement

Displays key electrical parameters including:

- **Phase RMS voltage (Vrms)**
- **(Vrms)Peak voltage (Vpeak)**
- **RMS current (Arms)**
- **Current crest factor (CF A)**
- **Phase-to-neutral RMS voltage**
- **Voltage crest factor (CF V)**
- **Peak current (Apeak)**
- **Frequency (Hz)**

9.3.1. Interface Description

1. Measurement Interface Overview

- Upon entering the interface, the **left side** by default displays the voltage measurement parameters.
- A **vertical bar of sub-menus** on the **right side** allows you to switch measurement modes (see **Label 1** in the figure on page 26).
- When a specific measurement sub-menu is selected, the parameter values on the **left** will update accordingly.
- Use the **Up, Down, Left, and Right** buttons on the meter to move the cursor and select a sub-menu.
- **Click the Run icon** or **press F5** on the panel to start displaying real-time data (see last figure on page 26).
- **Click the Hold icon** or **press F5** again to pause data updates (**Label 5** in the figure above).

2. Measurement Functions (Left Side of Screen)

(Refer to Label 3 in the figure above.)

- **RMS** - Displays the true RMS value for both AC and DC.
- **DC** - Shows DC voltage.
- **Peak+ (V)** - Indicates the peak voltage.
- **CF (Crest Factor)** - Measures the waveform distortion.

3. Additional Interface Features

- **Click the icon in Figure 6** to return to the main interface (a confirmation prompt will appear).
- **Label 7** shows the measured **frequency value**.
- **Click position 8** to open the **MENU**.
- **Click position 9** to return to the **previous interface level**.

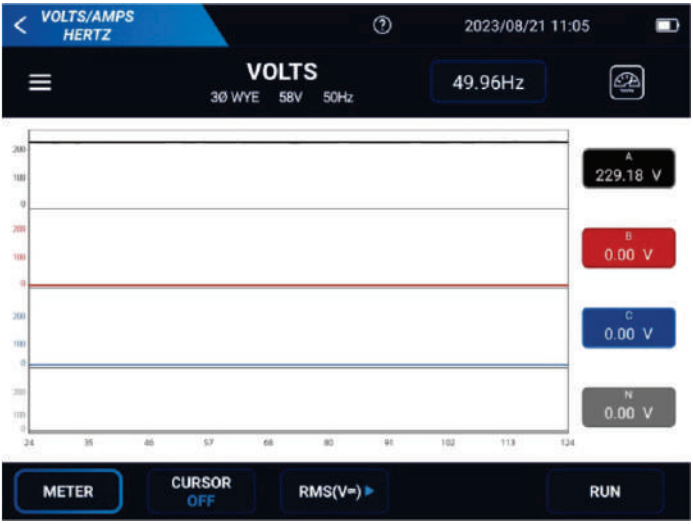
4. Trend Chart Function

- In the **Voltage / Current / Frequency** interface, click the **"Trend"** icon or press the **F1 button** on the panel to enter the **Trend Chart interface** (see **Label 4** in the figure above).

In the Trend Chart interface:

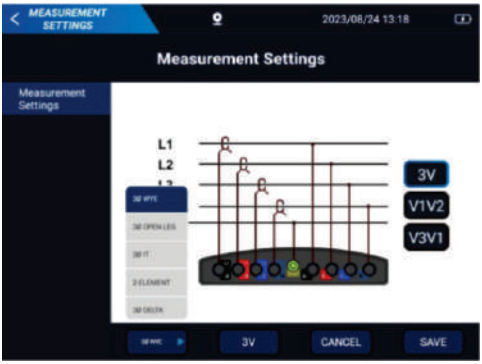
- Click **"Meter"** to return to the metering interface.
- Click the " RMS[V–] ▶ " menu to open a list of measurement options. You can select functions such as **VRMS**, **CF**, etc.
- Press **Run** to display **real-time trend chart data**.
- On the final screen (page 29), press **Hold** to **pause the trend chart**.

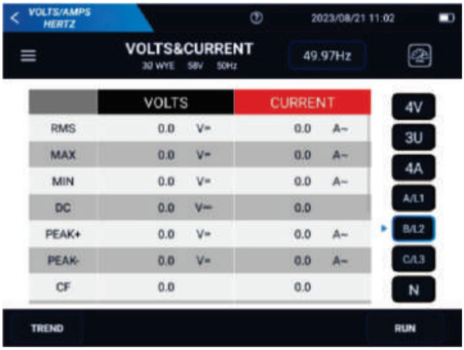
Diagram Trend Chart interface

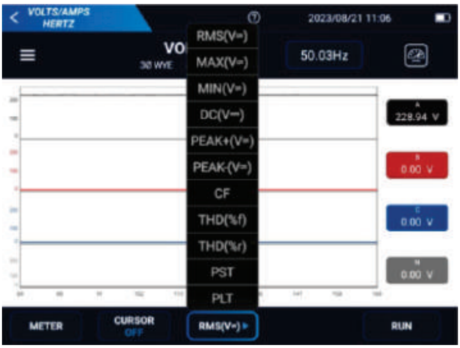


9.3.2. 3Ø WYE Connection Mode, Voltage, Current, Frequency

The options on the right side of the measurement screen are as follows:







9.4. Power & Electrical Energy Measurement

9.4.1. Measurement Content Overview

The analyzer provides detailed power and energy measurements, including:

- **RMS Voltage (Vrms)**
- **Harmonic Apparent Power (Vaharm)**
- **Fundamental Apparent Power (Vafund)**
- **Harmonic Apparent Power (Vaharm)**
- **Displacement Power Factor (DPF)**
- **Unbalanced Apparent Power (Vaunbal)**
- **Forward Active Energy (kWh forward)**
- **Reverse Active Energy (kWh reverse)**
- **RMS Current (Arms)**
- **Total Power (Wfull)**
- **Total Apparent Power (VA)**
- **Fundamental Power (Wfund)**
- **Power Factor (PF)**
- **Efficiency Factor**
- **Cosф (CosQ)**

9.4.2. Energy Usage Display

The analyser also provides **energy usage analysis**:

- For power calculations, you can select between **fundamental frequency** or **full-spectrum** mode.
  - **Fundamental frequency power** calculates using only the voltage and current at the base frequency (e.g., 50 Hz or 60 Hz).
  - **Full-spectrum power** includes all frequency components using **True RMS voltage and current**, providing a more comprehensive analysis.

9.4.3.Measurement Methods

Power can be measured using two methods: the **Unified Method** and the **Classic Method**. These can be selected via the **Function Preference (Function Pref)** menu.

1. Unified Method

- This method uses an algorithm developed by the **Polytechnic University of Valencia** and complies with the IEEE 1149 standard.
- It provides measurements for:
  - Active Power (kW)
  - Apparent Power (kVA)
  - Reactive Power (kvar)
  - Harmonic Power Component (kVA Harm)
  - Unbalanced Power (kVA Unb)

2. Classic Approach

- This approach follows the calculation principles defined in the IEEE 1459 standard.
- It can be selected through the **Function Preference** menu.
- To clearly indicate that the classical method uses an **arithmetic summation** technique for power calculation, a **"Σ" (Sigma)** symbol is appended to the power parameters (e.g., **VaΣ**).

9.4.4. Power Measurements Overview:

The analyser supports various types of power measurements, as described below:

- **Active Power (W, kW)**: Typically measured by an energy meter; applicable across the full frequency range.
- **Apparent Power (VA, kVA)**: Represents the total power in the system; calculated over the full frequency range.
- **Reactive Power (var, kvar)**: Based on the fundamental frequency component only.
- **Harmonic power (VA or kVA Harm)**: Represents the **non-fundamental frequency** power contributions.
- **Unbalanced Power (VA Unb, kVA Unb)**: Refers to the unbalanced portion of the effective apparent power.
- **Fundamental Active Power (Wfund, kWfund)**: Calculated using the fundamental frequency components.

Power Factor Terms

- **Cos Ø (Displacement Power Factor)**: The cosine of the phase angle between the fundamental voltage and current.
- **DPF (Displacement Power Factor)**: Calculated as: **DPF = Fundamental Active Power (Wfund) / Fundamental Apparent Power (Vafund)**

PF vs. Cos Ø

- **PF (Power Factor)**: The ratio of **total active power (P)** to **total apparent power (S)**: **PF = P / S**
- **Cos Ø**: The ratio of the **fundamental active power (P1)** to the **fundamental apparent power (S1)**: **Cos Ø = P1 / S1**

Three-Phase WYE Configuration

- 3Ø WYE: A **three-phase, four-wire (Y-shaped)** system. The corresponding power measurement interface is shown below:

9.4.5. Energy Measurements:

The analyser supports a variety of energy measurement types, including:

- **Active Energy (Wh, kWh)**
- **Apparent Energy (VAh, kVAh)**
- **Reactive Energy (varh, kvarh)**
- **Positive Energy (Wh, kWh forw)**: Represents energy consumption
- **Reverse Energy (Wh, kWh Rev)**: represents enery return or export

Three-Phase WYE Configuration

- **3Ø WYE**: A three-phase, four-wire (Y-shaped) system:

The energy measurement interface for this configuration is shown below:

When the **RUN** button is pressed, energy measurement begins. The **timer in the upper left corner** will start counting, as illustrated in the following figure.

9.5. Record & View

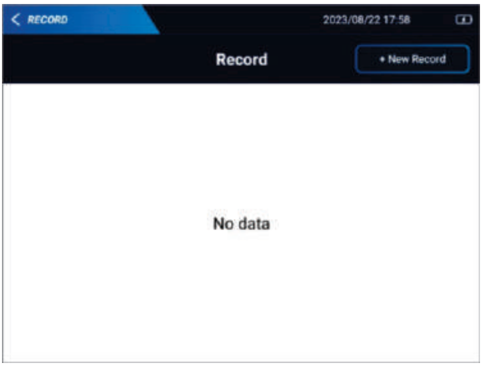
9.5.1. Overview of the Recorder (Logger)

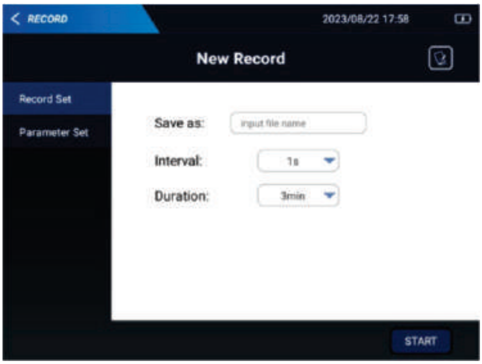
- The **Logger** function enables the device to record multiple measurement readings with high resolution.
- Readings are captured at **adjustable time intervals**. At the end of each interval, the **minimum, maximum, and average values** are stored before moving to the next interval.
- This process repeats continuously for the duration of the observation period.

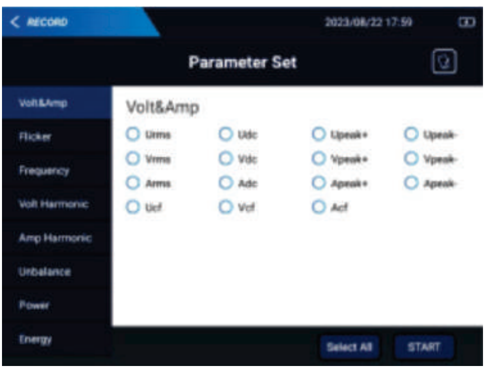
9.5.2. Accessing and Using the Recorder (Logger)

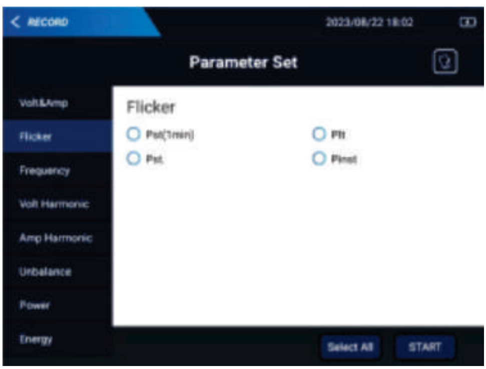
1. On the **main interface**, select **"Record View"**, then click "**+ New Record"** in the upper-right corner to create a new recording session.
2. Click **"Record Set"** on the left to configure:
    - **File name**
    - **Interval duration**
    - **Recording duration**
3. Click **"Parameter Set"** on the left to choose which parameters to record. For example, in the **Voltage & Current** mode, you can select parameters like **Urms**, **Vrms**, etc.
4. **Note**: When multiple parameter groups are selected, only the parameters from the **last selected functional module** will be recorded.

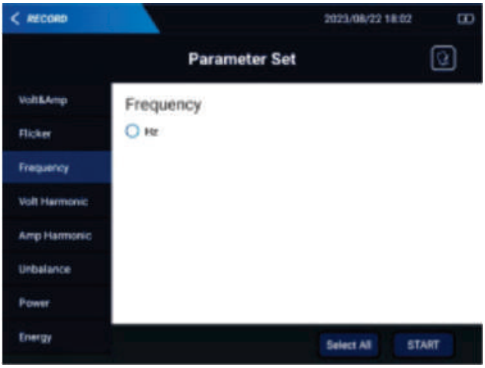
5. After configuring all settings, click the **"START"** button in the bottom-right corner to begin recording.

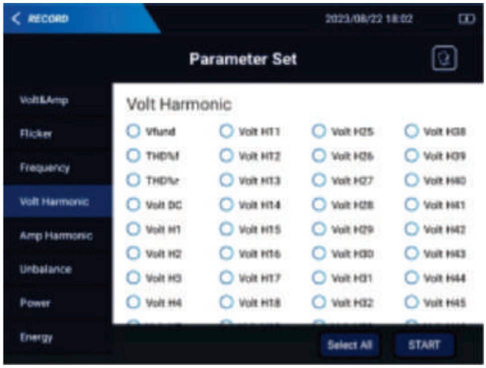


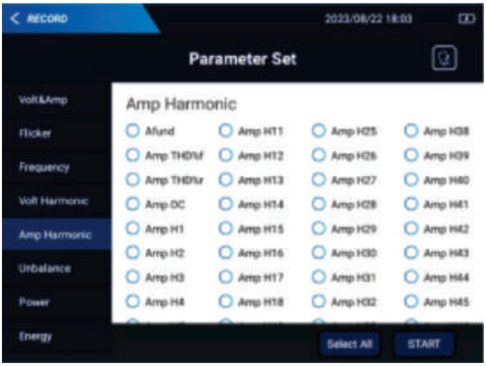


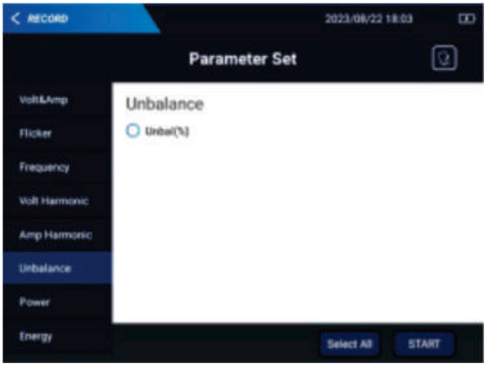


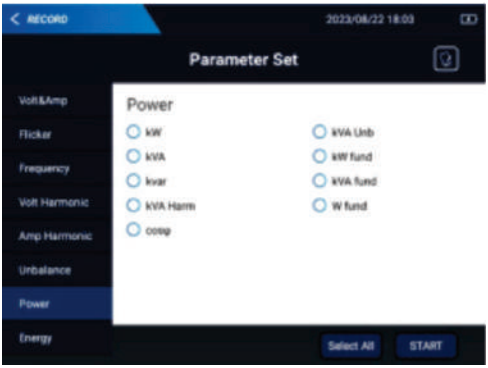


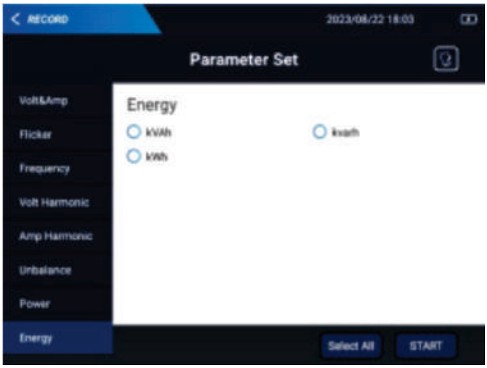




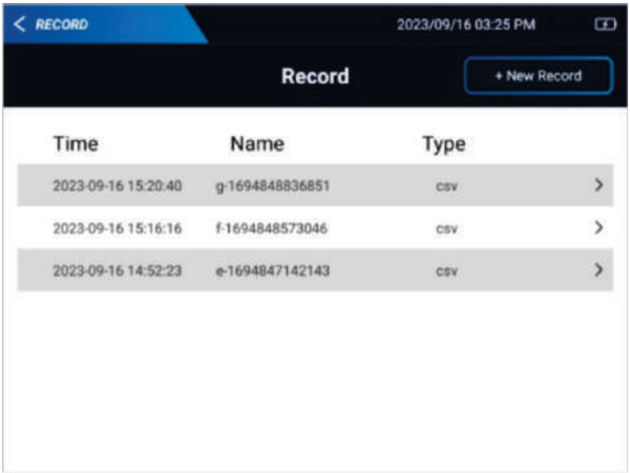




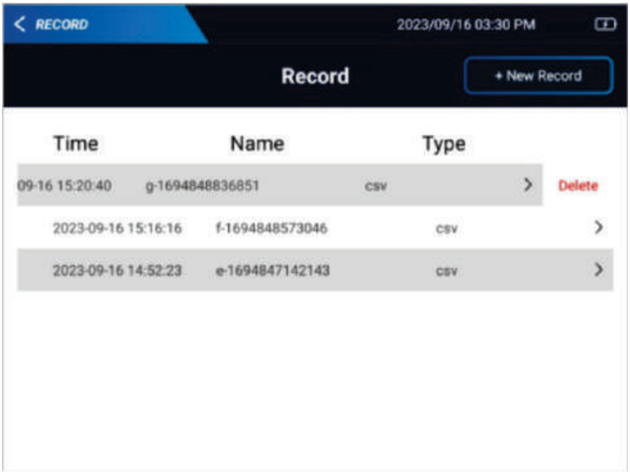




6. Once recording is complete, click the **“RECORD”** icon in the upper-left corner to return to the records list.
   Then, click on a record file name to **view the recorded data**.



7. To delete a record:
    - Swipe left on the desired record file.
    - A **"Delete"** option will appear—tap it to remove the selected file.



9.6. Harmonic Measurement

9.6.1. Harmonic Mode Overview

- **Harmonic Mode** displays detailed data on:
    - **Harmonic voltage (Vrms)**
    - **Harmonic current (Arms)** - relative to the fundamental or total RMS value
    - **Harmonic power**
    - **Total Harmonic Distortion (THD)**
    - **K-Factor** (a coefficient indicating harmonic current stress)
- This mode is used to evaluate harmonic currents generated by non-linear loads and to analyse issues caused by harmonic distortion, such as:
    - **Neutral line overload**
    - **Motor overheating**
    - **Conductor overheating**
    - **Equipment malfunctions**

9.6.2. Introduction to Harmonics

- The system can **measure and record up to 50 harmonic order**, including **inter-harmonics**.
- Additional measurable data includes:
    - **DC component**
    - **THD (Total Harmonic Distortion)**
    - **K-Factor**

What Are Harmonics?

- Harmonics are **periodic distortions** of voltage, current, or power waveforms from a pure sine wave.
    - These distorted waveforms are composed of multiple sine waves with different **frequencies** and **amplitudes**.
    - The analyser measures the **cumulative impact** of these harmonic components on the overall signal.
    - **A percentage of the fundamental frequency**
    - **A percentage of all harmonics (RMS)**
    - Or as an **absolute RMS value**

Harmonic data Display Formats:

- **Bar charts**
- **Metering screens**
- **Trend charts**

Common Sources of Harmonics:

- **Nonlinear loads**, such as:
    - Computer switching power supplies
    - Televisions
    - Motor drives with variable speed control

Potential Impacts of Harmonics:

- **Overheating** of transformers, conductors, and motors
- **Reduced system efficiency**
- **Increased electrical losses**

9.6.3. Harmonic Bar Chart Description

- The **harmonic bar chart** visually displays the **percentage contribution of each harmonic component** to the total signal.
- In an **ideal, undistorted waveform**, the **first harmonic (fundamental)** would appear at **100%**, while all higher-order harmonics would be at **0%**.

  Note: In real-world conditions, some level of distortion is always present, resulting in non-zero values for higher-order harmonics.
- As **higher-frequency components** are introduced, the waveform deviates from a pure sine wave. This **distortion** is quantified using the **Total Harmonic Distortion (THD)** percentage.
- The DC component and the K-Factor can also be displayed on the bar chart interface:
  - **DC Component**: Represents any constant offset in the waveform.
  - **K-Factor**: Indicates the level of stress placed on electrical equipment, especially transformers, by harmonic currents.
- The K-Factor is:
  - Displayed on the **meter head** of the screen.
  - Used to evaluate **transformer loading** under non-linear conditions.
  - **Higher-order harmonics** have a **greater impact** on the K-Factor than lower-order harmonics, increasing potential transformer losses.

9.6.4. Bar Graph Interface of Harmonics

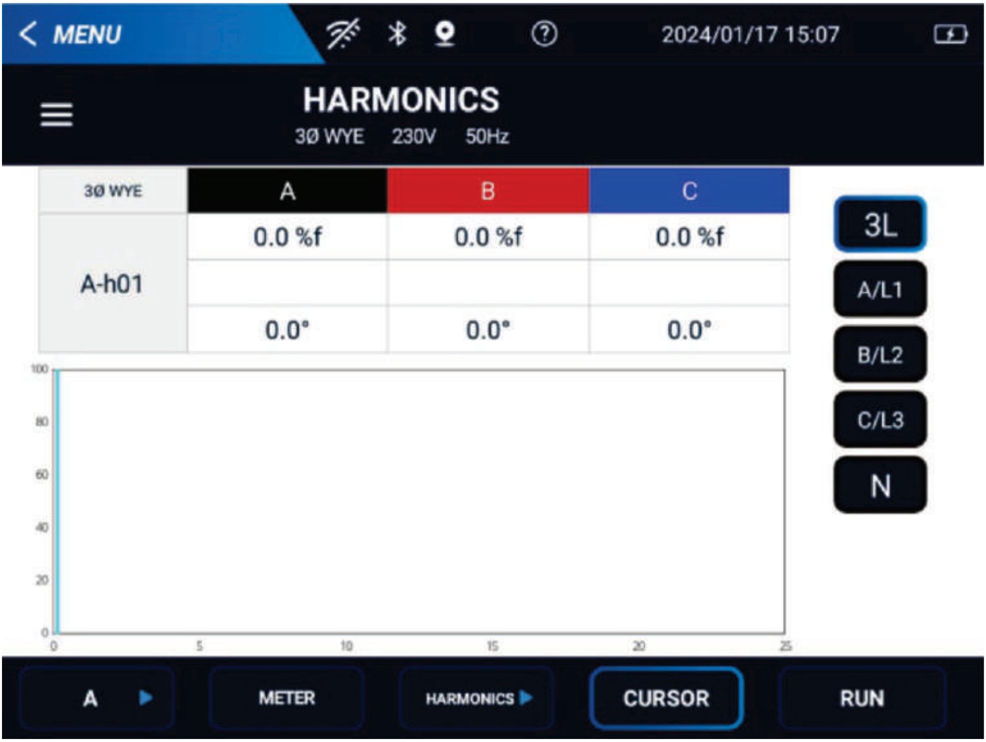
1. 3Ø WYE harmonic bar chart

- The **3Ø WYE harmonic bar chart** visually represents the harmonic content of a **three-phase four-wire (Y-shaped)** power system.
- Each bar indicates the **relative magnitude** of individual harmonic orders (up to the 50th) for each phase.
- The chart helps identify harmonic imbalances, high-frequency distortions, and their potential impact on system performance.
- This view is essential for diagnosing harmonic-related issues such as:
  - Overheating in transformers and conductors
  - Malfunctions in sensitive equipment
  - Reduced power quality

Description:

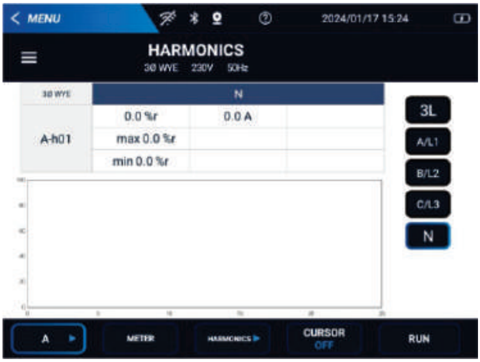
V-h01	Harmonic serial number
%f	Harmonic level, reference is fundamental RMS value
%r	Harmonic level, reference is the total RMS value
V	The RMS phase volta~e correspond in~ to the harmonic
----°	Voltage phase angle
Max-Min	Corresponding to the maximum and minimum level of harmonics, when the harmonic sequence number changes or the user presses the confirmation key, the maximum and minimum values are reset.
THD	Total harmonic distortion
Vd	Distortion voltage RMS value

2.3Ø **WYE-A (Current) harmonic bar chart**

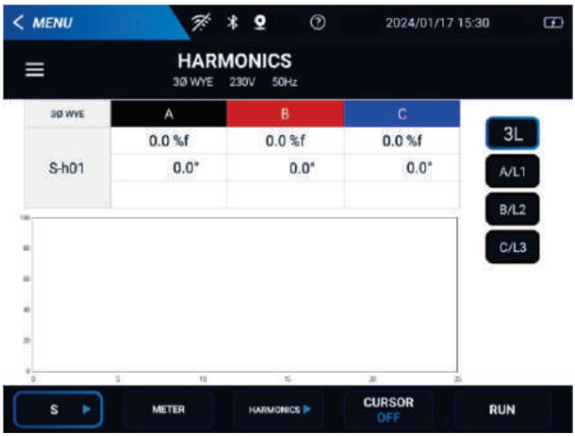


Description:

A-h01	Harmonic serial number
%f	Harmonic level, reference is fundamental RMS value
%r	Harmonic level, reference is total RMS value
A	RMS value corresponding to harmonic current
----°	Current phase angle
Max-Min	Corresponding to the maximum and minimum level of harmonics, when the harmonic sequence number changes or the user presses the confirmation key, the maximum and minimum values are reset
THO	Total harmonic distortion
Ad	Distortion current RMS value
A	The current RMS value corresponding to the harmonic
K	K coefficient. which is used to measure current and power, is a number that quantifies the potential loss of transformer due to harmonic current

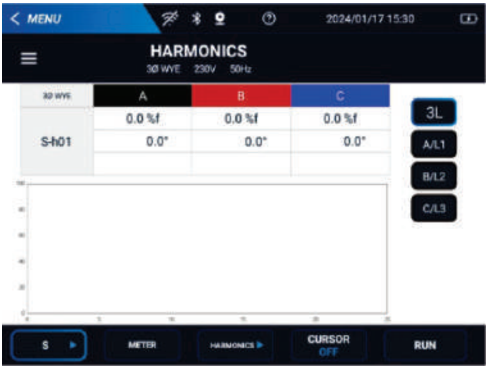


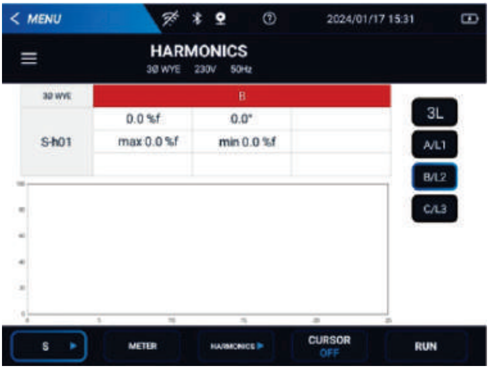
3.**3Ø WYE -S(apparent power) harmonic bar chart**



Description:

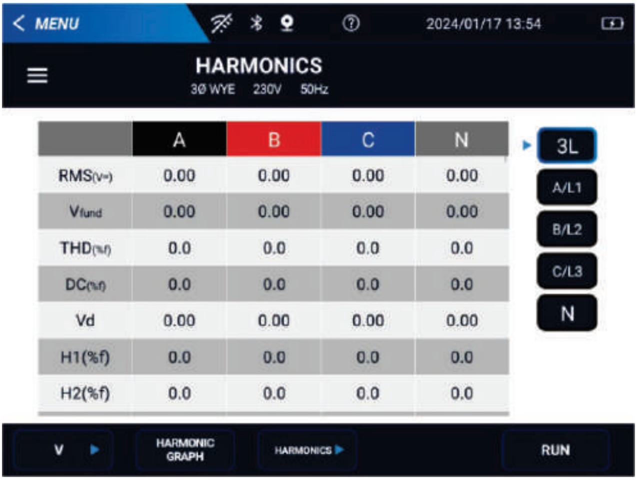
S-h01	Harmonic serial number
%f	Harmonic level, reference is fundamental RMS value
%r	Harmonic level, reference is the total RMS value
----°	The phase shift of voltage harmonics relative to the corresponding order current harmonics.
Max-Min	Corresponding to the maximum and minimum level of harmonics, when the harmonic sequence number changes or the user presses the confirmation key, the maximum and minimum values are reset





4. **3Ø WYE Harmonic Meter List-Voltage Mode**

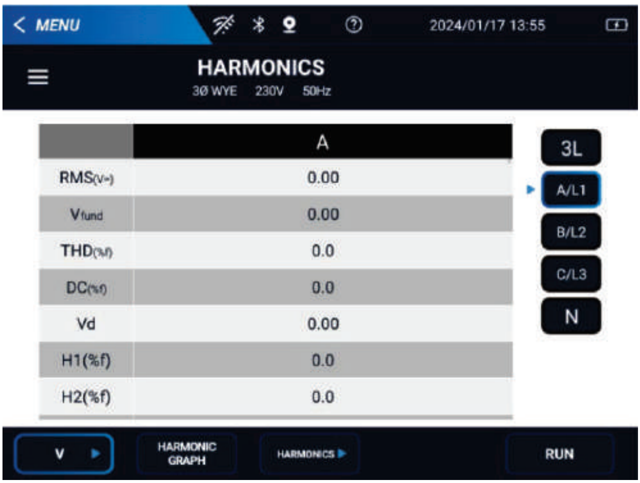
- **3Ø WYE Voltage meter measurement interface-3L mode (total 50th harmonics)**:



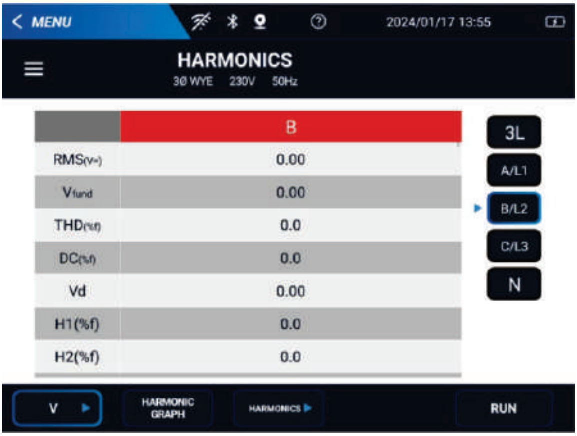
Description:

RMS	Corresponds to the phase volta~e RMS value of harmonics
Vfund	Fundamental voltage
+000 °	The phase shift relative to the fundamental wave
THO	Total harmonic distortion
%f	Harmonic level, reference is fundamental RMS value
%r	Harmonic level, reference is the total RMS value.
H1 [% f]	Where 1 represents the first harmonic
DC	DC component

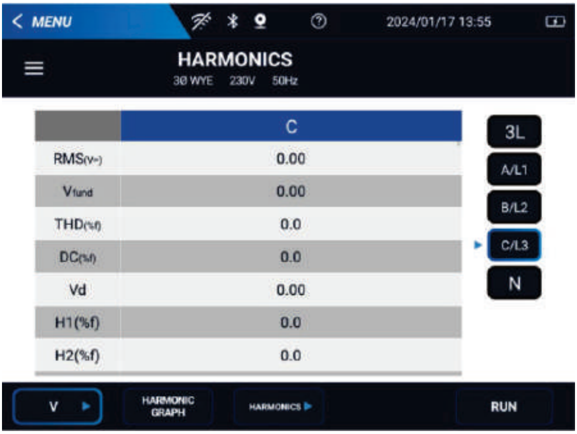
- **3Ø WYE Voltage meter Measurement Interface-L1 Mode**



- **3Ø WYE Voltage meter Measurement Interface-L2 Mode**



- **3Ø WYE Voltage meter Measurement Interface-L3 Mode**

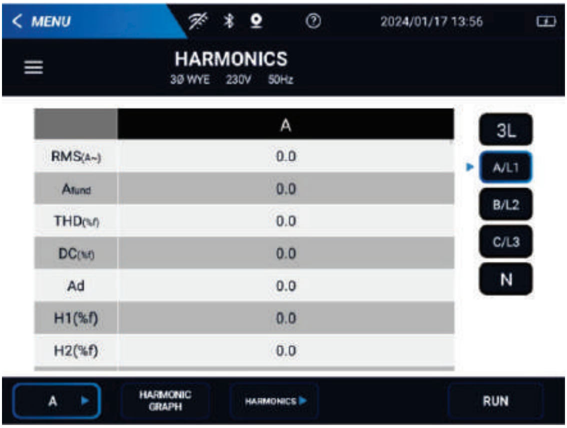


- **3Ø WYE Voltage meter Measurement Interface-N Mode**

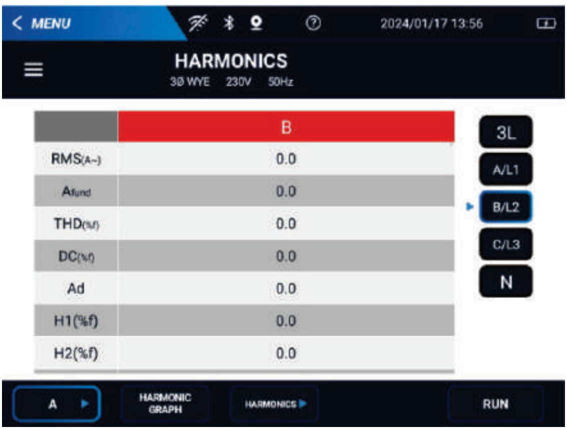
5. **3Ø WYE harmonic metering list diagram-current mode**

- **3Ø WYE Current meter measurement interface-3L mode**

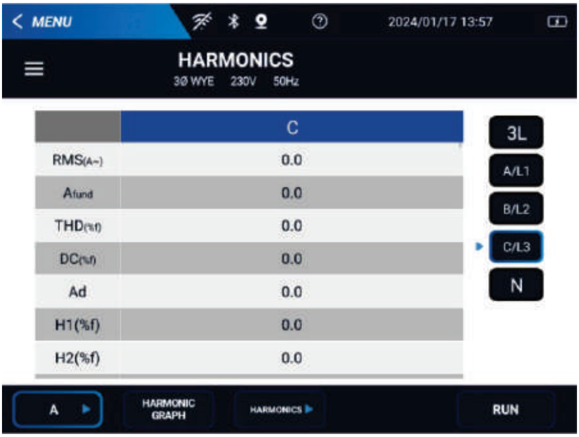
- **3Ø WYE Current meter measurement interface-L1 mode**



- **3Ø WYE current meter measurement interface-L2 mode**



- **3Ø WYE Current meter measurement interface-L3 mode**

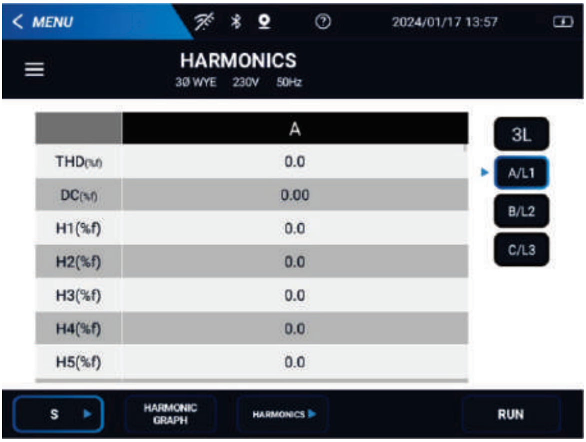


- **3Ø WYE Current meter measurement interface-N mode**

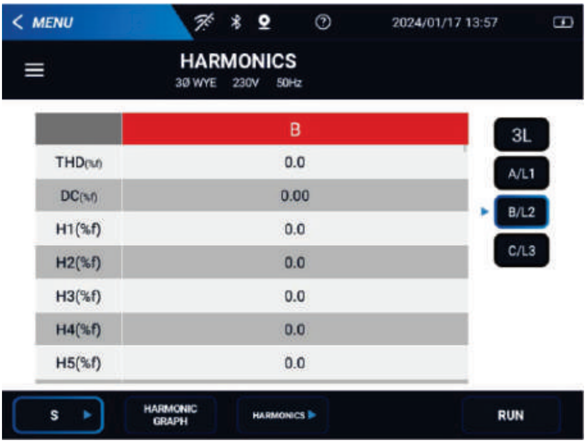
6. Table diagram of 3Ø WYE harmonic metering-apparent power S mode

- **3Ø WYE Apparent power-meter measurement interface-3L mode**

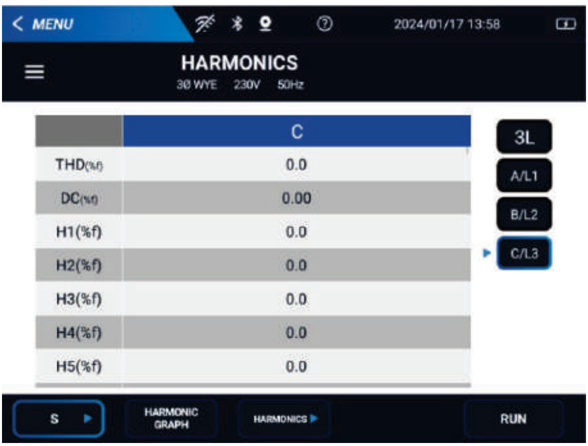
- **3Ø WYE Apparent power-meter measurement interface-L1 mode**



- **3Ø WYE Apparent power-meter measurement interface-L2 mode**



- **3Ø WYE Apparent power-meter measurement interface-L3 mode**



9.7. Interharmonic
9.7.1. Introduction

- With the increasing use of **nonlinear devices**, such as power electronic components, in modern power systems, **harmonic pollution** of the grid has become a significant issue.
- **Harmonics** typically refer to frequency components that are integer multiples of the power system's fundamental frequency (e.g., 50 Hz or 60 Hz). In contrast, **interharmonics** are components whose frequencies are **not integer multiples** of the fundamental frequency.

Causes of Interharmonics

- Interharmonics are often generated by:
    - **Large voltage fluctuations**
    - **Impulsive nonlinear loads**

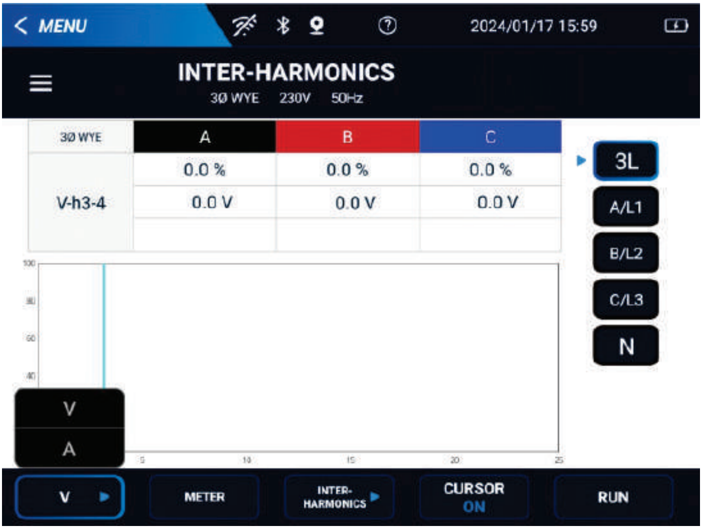
- **Common sources include:**
    - **Arc welding equipment**
    - **Resistance welding machines**
    - **Variable frequency drives (VFDs)**
    - **Synchronous and series-controlled drives**
    - **Induction motors**
    - **Power carrier signals**, (a form of interharmonics)

Effects and Risks of Interharmonics

- **Interharmonics can:**
    - **Amplify voltage flicker**
    - **Interfere with audio-visual equipment**, such as causing flicker on TV screens
    - **Induce vibrations** and cause **irregular performance in induction motors**
    - **Reduce the effectiveness** of passive filter circuits (e.g., those using capacitors, inductors, and resistors)

- **In severe cases, interharmonics may:**
    - **Overload or damage filters**
    - **Prevent filters from functioning properly**
    - Cause d**istortion effects comparable to—or worse than—integer harmonics**

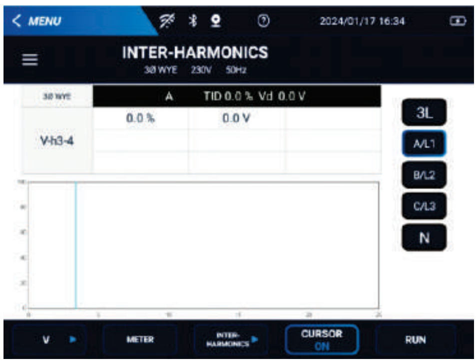
9.7.2. Interharmonic Voltage Bar Graph Interface



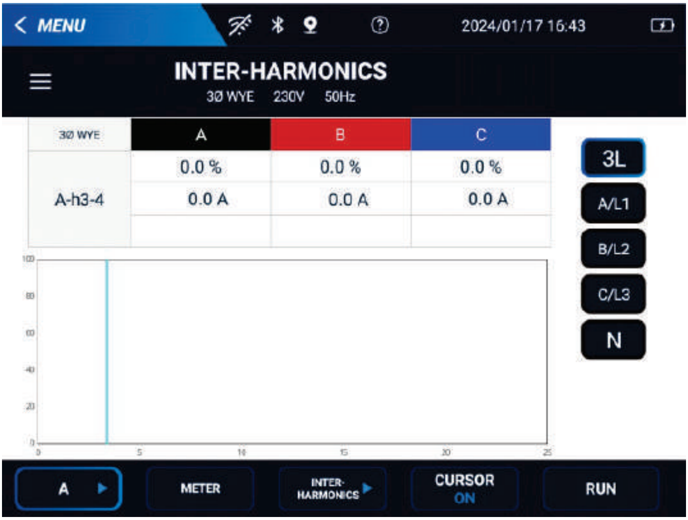
Description:

V-h3-4	Indicates the serial number of interharmonics within the range of 3 to 4 times the fundamental frequency. For example, if the fundamental frequency is 50 Hz, this corresponds to interharmonics in the frequency range of 150 Hz to 200 Hz.
%	Represents the percentage ratio of the interharmonic voltage relative to the fundamental voltage.
V	Indicates the absolute voltage value of the interharmonic component.

3QWYE-V Interharmonic voltage bar graph interface



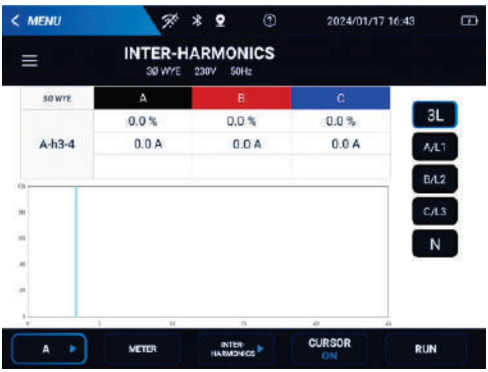
9.7.3. Interharmonic Current Bar Graph Interface

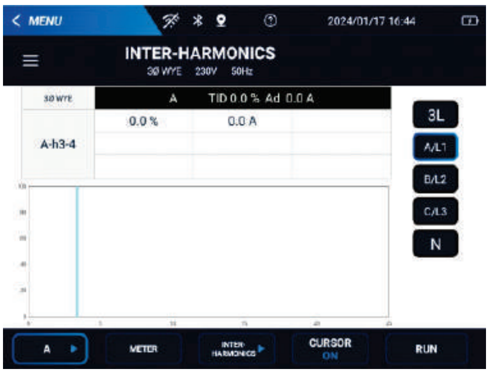


Description:

A-h3-4	The serial number of interharmonics represents the frequency of interharmonics between 3 and 4 times the fundamental frequency, for example, when the fundamental frequency is 50Hz, it represents the frequency of interharmonics within the range of 150Hz to 200Hz
%	The ratio of the value of interharmonic to the fundamental current represents the percentage value of interharmonic current at the cursor position when the cursor is opened
A	The representative is the current value of the interharmonics, and when the cursor is opened, it is the current value of the interharmonics at the cursor position

3QWYE-A Inter-harmonic current bar graph interface

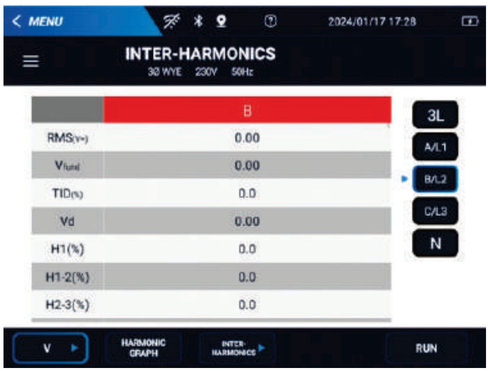




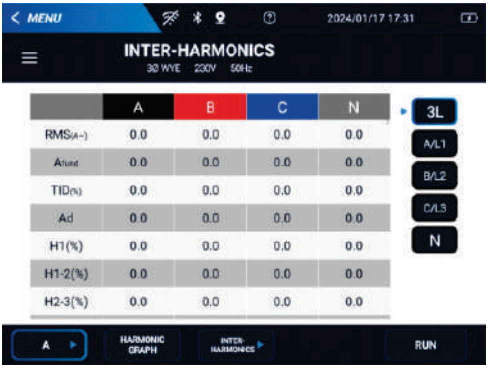
9.7.4. Interharmonic Voltage Table Graph Interface

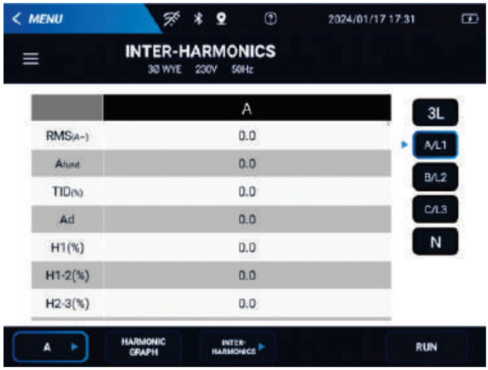
Description:

RMS	The true effectiveness of voltage
Vfund	Fundamental voltage value
TID(%)	The percentage ratio of interharmonics to fundamental waves (total interharmonic percentage ratio)
Hl-2 (%)	The percentage ratio of the interharmonic sequence number between 1 and 2 times the fundamental frequency, for example, when the fundamental frequency is 50Hz, it represents that the interharmonic frequency is within the range of 50Hz to 1 OD Hz
%	The ratio of the value of interharmonics to the fundamental voltage represents the current value of interharmonics at the cursor position when the cursor is opened
V	Represents the voltage value of interharmonics, which is the voltage value of interharmonics at the cursor position when the cursor is opened



9.7.5. Interharmonic Current Table Graph Interface





9.8. Inrush Current

9.8.1. Brief Introduction

- The analyser can capture **inrush currents**, which are impulse currents that occur when a high-load or low-impedance load is applied to the line.
- Typically, once the load reaches its normal operating condition, the current stabilizes over time. For example, the starting current of an induction motor can be up to ten times higher than its normal operating current.
- **Inrush Current** is recorded in a single-event mode, capturing current and voltage trends when a current event (trigger condition) occurs.
- An inrush event is triggered when the current waveform exceeds a user-defined limit.
- The **inrush trend chart** will gradually appear on the right side of the screen as data is recorded.
- **Pre-trigger data** allows the user to analyse system behavior just before the inrush event occurs.

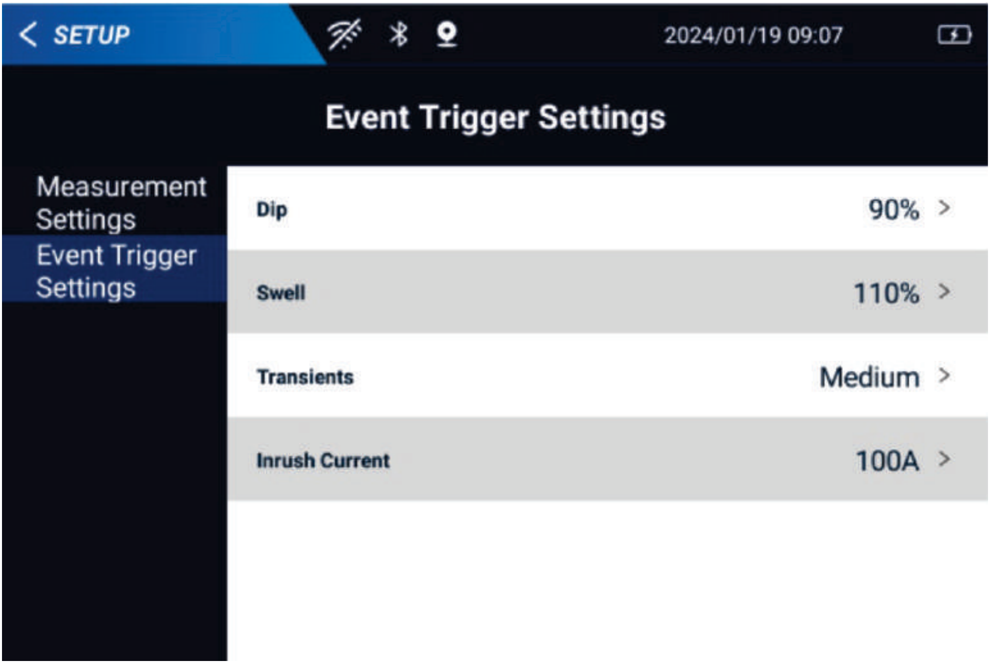
9.8.2. Settings Before Inrush Current Measurement

- Use the arrow keys in the start menu to configure the following trigger parameters:
  - **Expected Inrush Time**
  - **Nominal Current**
  - **Threshold**
  - **Lag**
- The **maximum current** value setting determines the vertical scale of the current display window.

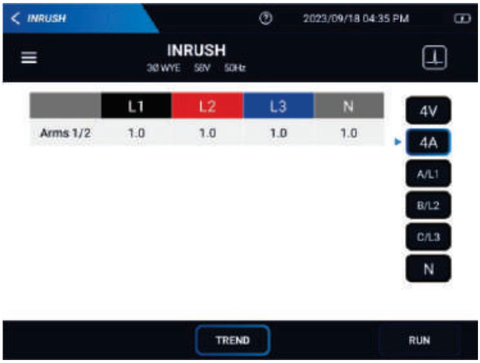
1. Settings before inrush current measurement

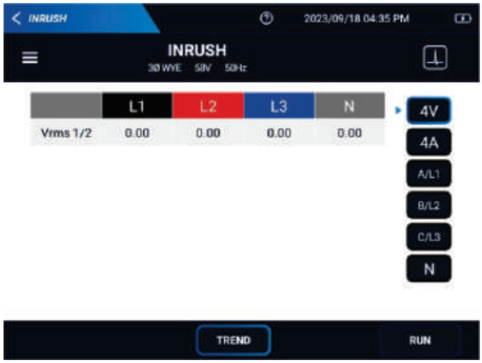
- Use the arrow keys in the start menu to adjust the trigger limit: Expected inrush time, Nominal current, Threshold and Lag.

- The maximum current determines the vertical height of the current display window.
- The threshold is the current value that triggers the inrush trend chart recording.
- The screen header displays the valid RMS values for all phases during the inrush event.
- When the cursor is active, it can display the RMS value corresponding to its position on the trend chart.
- The **Meter screen** shows:
  - Half-cycle RMS voltage (**Vrms½**)
  - Half-cycle RMS current (**Arms½**)
- The **time setting** should exceed the expected inrush duration to ensure the entire event is captured. This duration can be set between **1 and 45 minutes**.
- An **inrush current event** is triggered when the half-cycle RMS current (**Arms½**) of any phase exceeds the defined threshold.
- The event ends when the **half-cycle RMS current** of the phase falls below the threshold minus the configured **lag value**.
- The **Trend screen** displays markers indicating the start and end of the inrush event, along with corresponding time readings.
- **The inrush value** is the RMS value recorded between these markers and is measured synchronously across all phases.



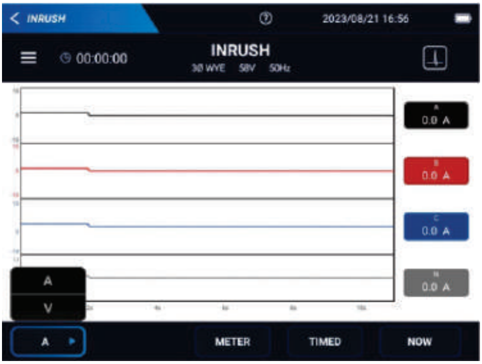
2.The meter list of 3-phase 5-wire inrush current is as follows:

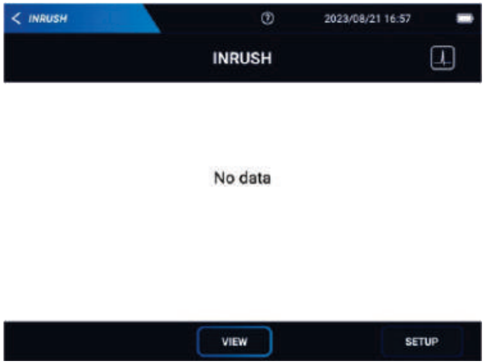




3. 3QWYE wiring mode, inrush current waveform mode:

- **Inrush current mode**





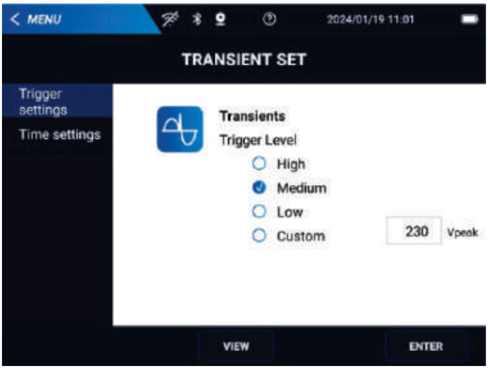
- **Inrush voltage mode**

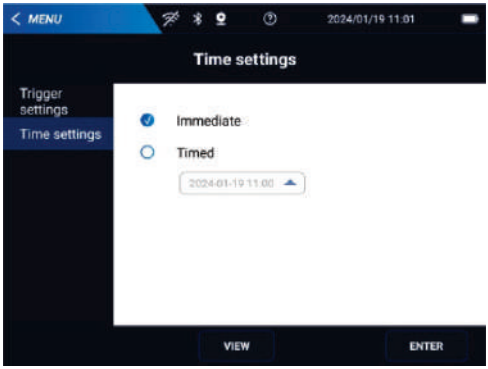
9.9. Transient

9.9.1. Brief Introduction to Transient

- The analyser is capable of capturing high-resolution waveforms under various interference conditions.
- It provides detailed **transient diagrams** of voltage and current waveforms at the precise moment interference occurs. This enables users to observe events such as **voltage dips**, **inrush currents**, **interruptions**, and other **transient disturbances**.
- In **Transient mode**, the analyser uses specially configured input circuitry to detect and capture signals with amplitudes of up to **6 kilovolts**.
- A **transient** is a fast, high-energy peak superimposed on a voltage or current waveform. Due to their high energy, transients can interfere with or even damage sensitive electronic equipment.
- The **Transient screen** resembles an oscilloscope display, with enhanced vertical scaling to make peak voltage signals—superimposed on the standard 50/60 Hz sine wave—easier to observe.
- Whenever the **voltage** or **RMS current** exceeds the user-defined threshold, the analyser captures the corresponding waveform. A maximum of **9,999 events** can be recorded. The **sampling rate** for transient detection is **200 kS/s** (kilosamples per second).
- The Transients function also includes a metering mode, which displays:
  - Half-cycle RMS voltage
  - Half-cycle RMS current (Arms½)
  - Frequency
- Additionally, a detailed event list is provided for reviewing all captured transient occurrences.

9.9.2. The transient settings are as follows:

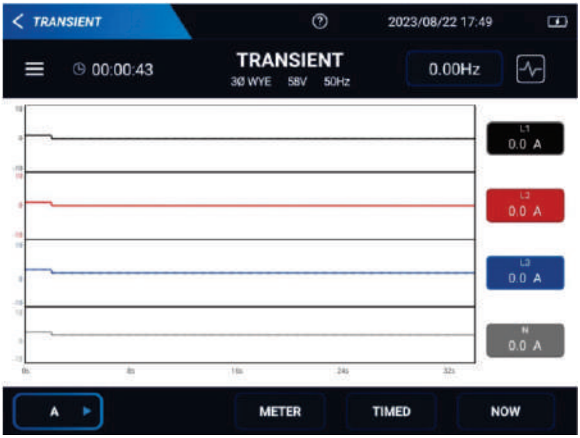




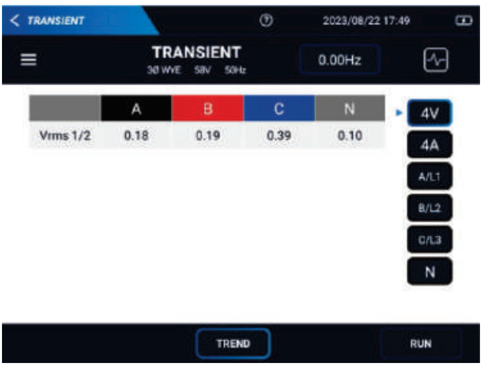
9.9.3. The Transient Waveform Shows

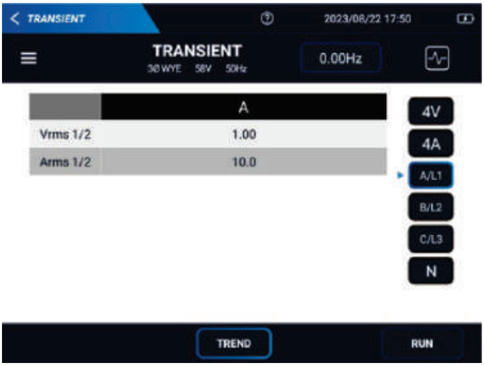
- **Transient voltage mode**

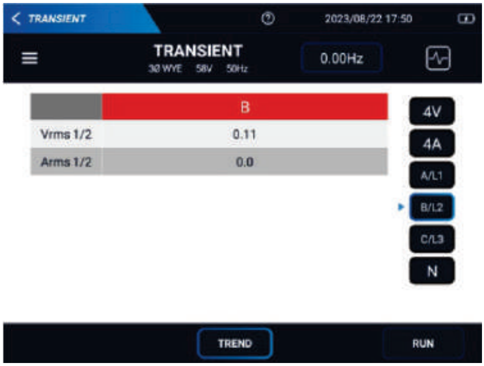
- **Transient current mode**



- **Transient meter mode**







9.10. Flicker

9.10.1. Brief Introduction

- This function quantifies fluctuations in lamp brightness caused by variations in power supply voltage. The measurement algorithm complies with the **EN61000-4-15** standard and is based on a perceptual model of the **human eye–brain sensory system**.
- The analyser converts the duration and amplitude of voltage changes into a **"discomfort factor"**, representing the flicker experienced by a standard 60W incandescent bulb. A higher flicker reading indicates a brightness fluctuation that most people would find uncomfortable or disturbing.
- Since voltage fluctuations are often small, the measurement is optimized for bulbs operating at **120V/60Hz** or **230V/50Hz**
- Flicker is characterized per phase and is represented by various parameters displayed on the **Metering screen**.
- The **Trend Chart** screen provides a visual representation of changes in all parameters shown on the Metering screen, allowing users to track flicker behavior over time.

9.10.2 Flicker Features

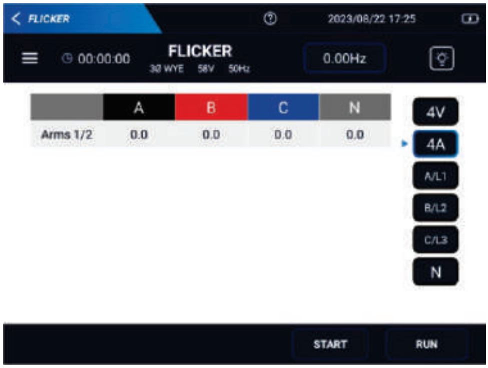
Flicker features include the following key measurements:

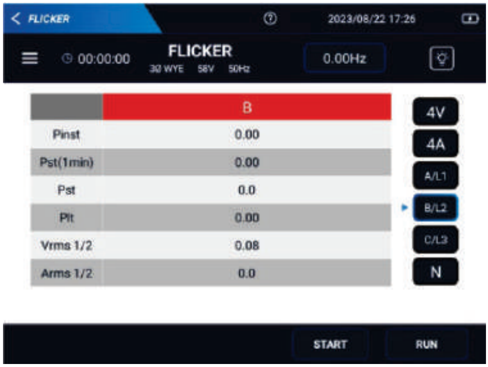
- **Instantaneous Flicker (Pinst)**
- **Short-Term Severity (Pst)** – Tested over:
  - **1 minute** (for fast feedback)
  - **10 minutes** (standard measurement period)
- **Long-Term Severity (Plt)** – Tested over **2 hours**

In addition to flicker severity, the analyzer also measures the following parameters:

- **Half-cycle RMS voltage (Vrms½)**
- **Half-cycle RMS current (Arms½)**
- **Frequency**

9.10.3. 3Q WYE meter list mode



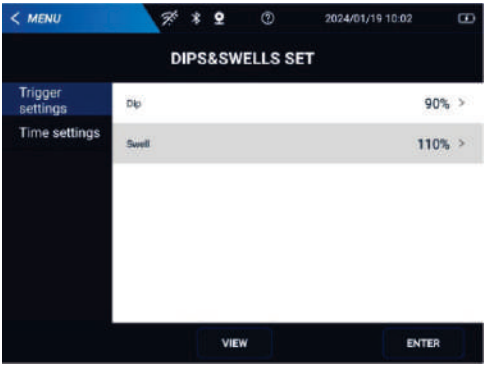


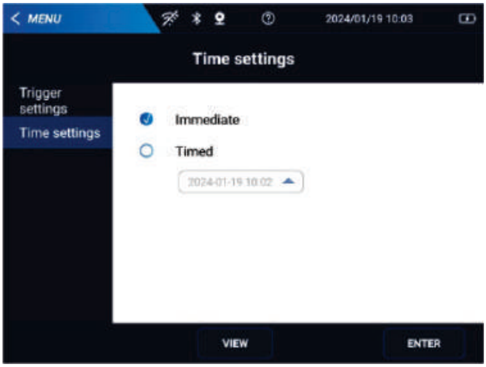
9.11. Dips and Swells

9.11.1. Brief Introduction

- The **Dips & Swells** function records voltage sags, surges, disturbances, rapid voltage changes, and spikes.
- Dips and swells are defined as **rapid deviations from the nominal voltage**. According to **EN61000-4-30**, these variations can range from 10 to 100 times the normal voltage and can last from **half a cycle to several seconds**.
- The analyser allows users to select either a **nominal reference voltage** or an **adjustable reference voltage**. The adjustable reference uses filtered measurements with a **one-minute time constant**.
- A **dip (sag)** occurs when voltage decreases rapidly, while a **swell** occurs during a rapid voltage increase.
- In a **three-phase system**, a dip is triggered when the voltage in one or more phases falls below the sag threshold. The dip ends when the voltage in all phases rises above the sag **threshold plus the defined lag**.
- The trigger conditions for both dips and swells are defined by **threshold** and **lag** values. These events are characterized by their **duration**, **magnitude**, and **time of occurrence**.

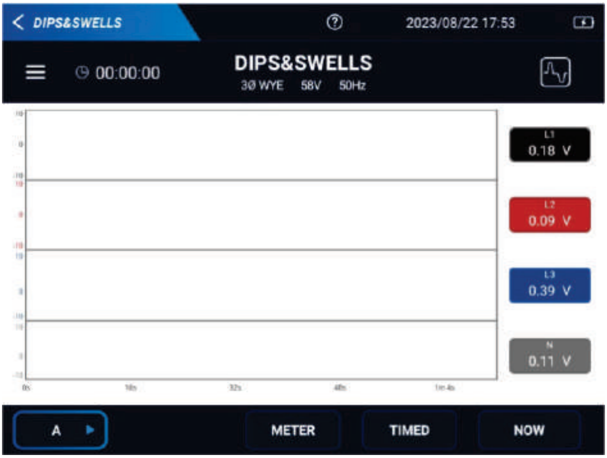
9.11.2. Waveform Settings



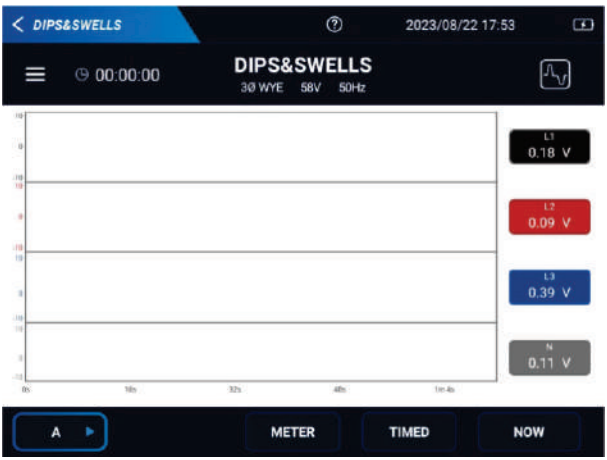


1. Waveform:

- **Dips & Swells current mode:**



- **Dips & Swells voltage mode:**



2. Dips & Swells Meter list:

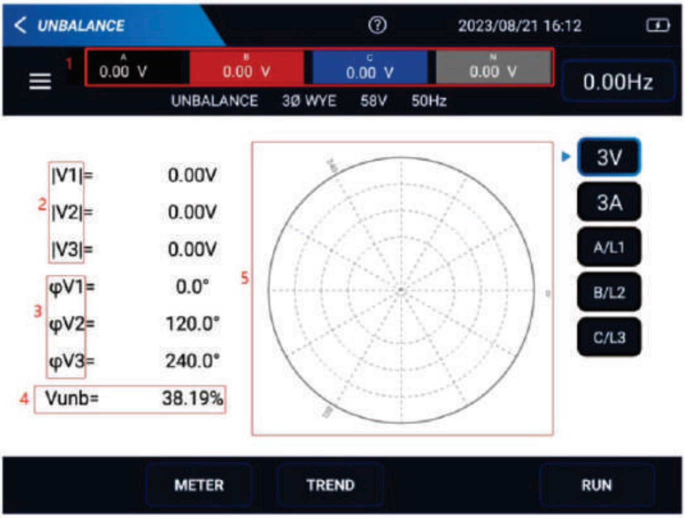
9.12. Unbalanced

9.12.1. Brief Introduction

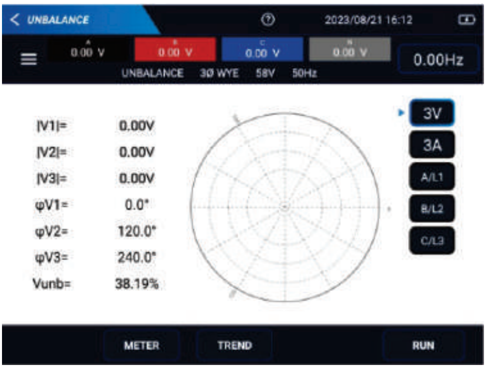
- The **Unbalance** function displays the phase relationship between voltage and current. Measurements are based on the **fundamental frequency component** using the **symmetrical component method**.
- In a balanced three-phase power system, the **phase angle** between voltages (or currents) should ideally be **120°** apart.
- The Unbalance mode provides the following views:
  - **Metering screen**
  - **Trend chart display**
  - **Phasor diagram**

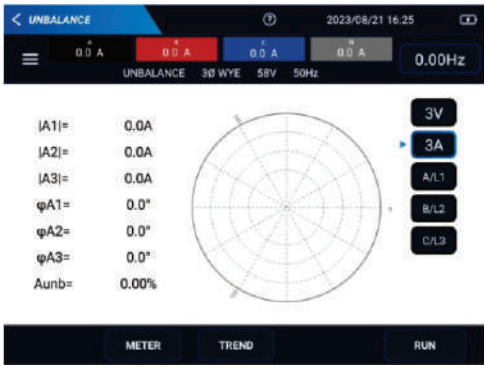
Display Description:

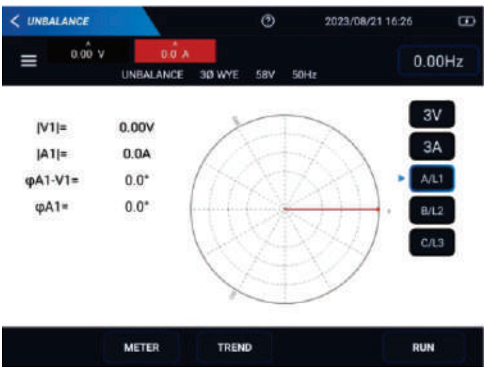
1. **Vrms** – RMS effective voltage value
2. **Vfund** – Fundamental voltage
3. **Voltage Phase Angles** – Phases L1 to L3
4. **Unbalance Value** – Quantitative measurement of imbalance
5. **Phasor Diagram** – Graphical representation of phase relationships

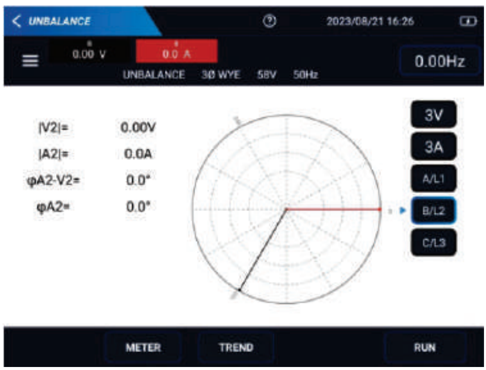


9.12.2. 3Ø WYE Vector Graph

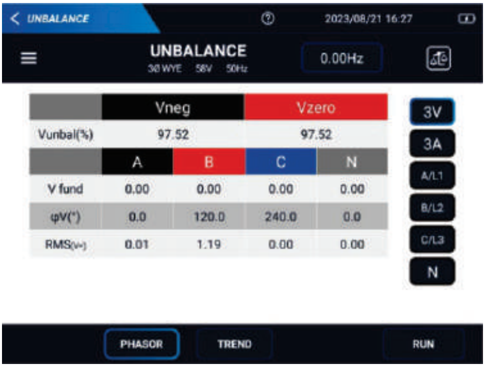


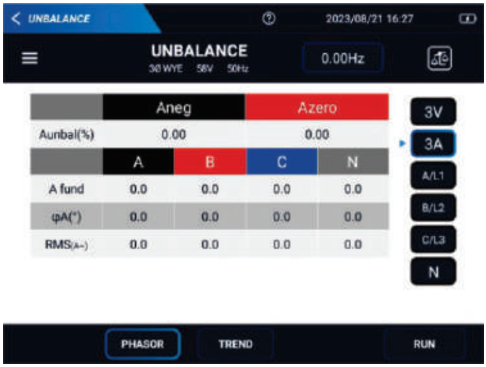


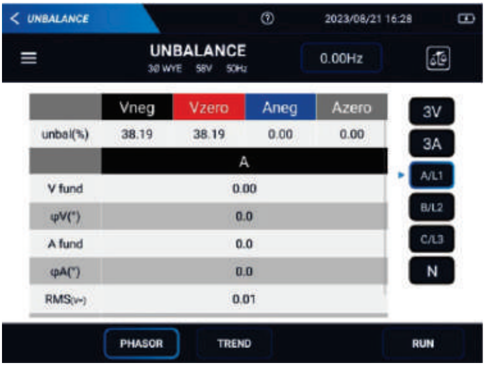


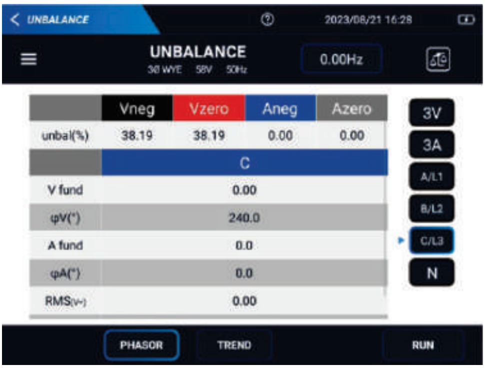


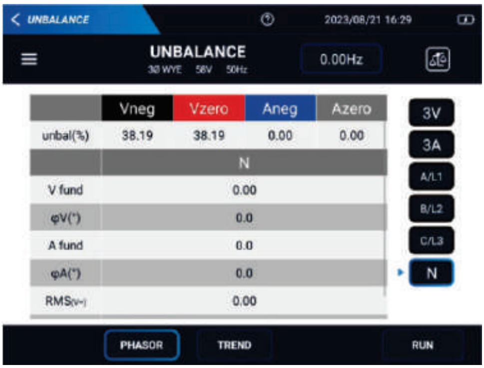
9.12.3. 3Ø WYE Meter List of Figure











9.13. Gallery

- Press the **"SAVE SCREEN"** button on the instrument to capture and save a screenshot of the current display to the memory card.
- Saved screenshots can be viewed later in the **"Gallery"** section.
- This feature allows users to effectively review and analyse the performance of the power grid based on visual data.

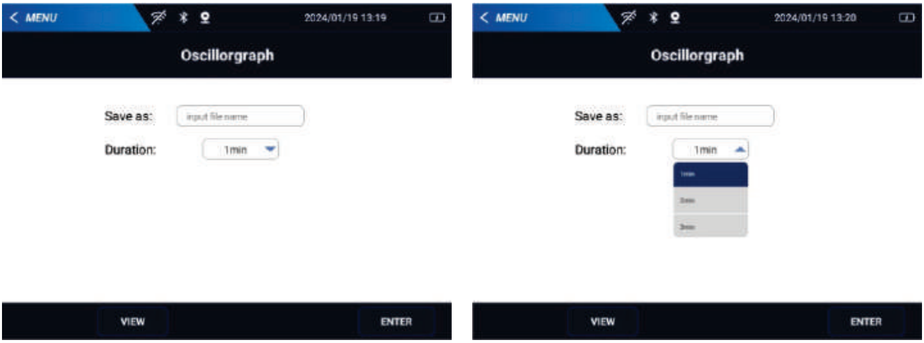
9.14. Wave Recording

Introduction:

The **Wave Recording** function captures abnormal voltage and current waveforms in the power grid. This feature is designed to assist users in diagnosing issues and conducting post-event data analysis.

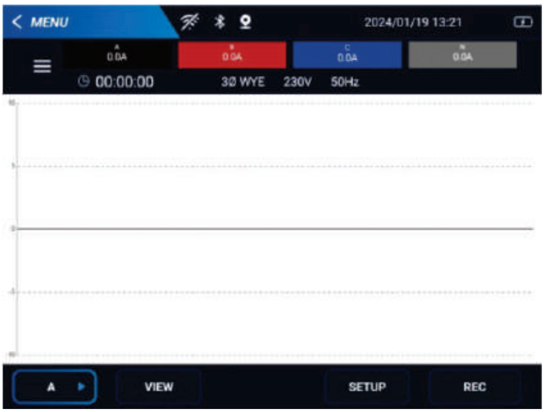
9.14.1. Recording Settings

Set the name and duration of the record, as shown in the following figure:



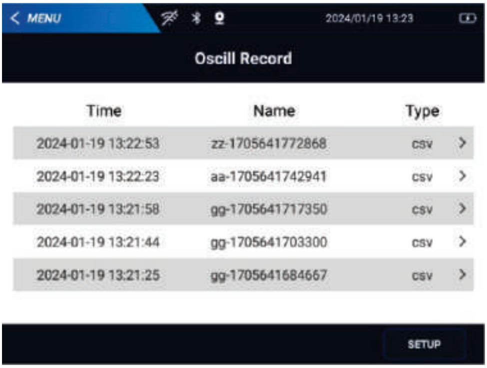
9.14.2. Recording Voltage

9.14.3. Recording Current



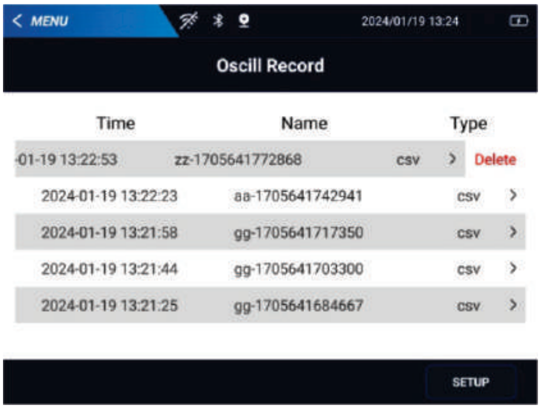
9.14.4. View Waveform Recording

To view a recorded waveform, click on the desired record file in the "Wave Recording" section. The selected file will open, as illustrated in the following figure:

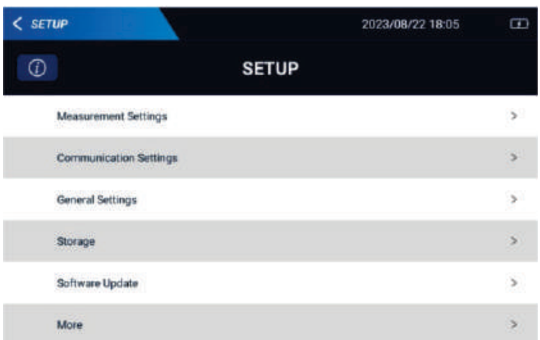


9.14.5. Delete Recorded Waveforms

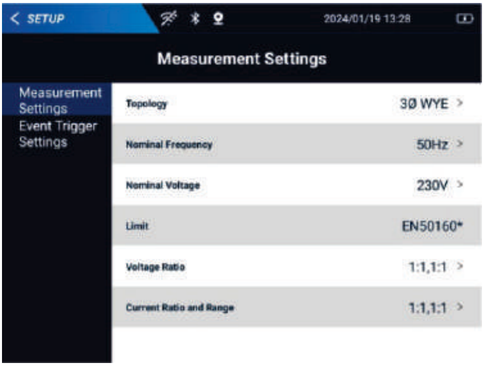
To delete a recorded waveform file, locate the file you wish to remove and swipe from **right to left** on it. A **"Delete"** option will appear on the interface—tap **"Delete"** to confirm and remove the file.

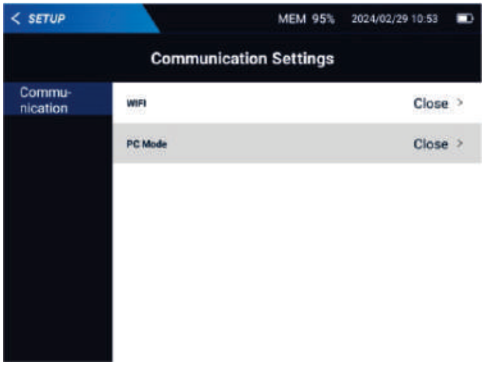


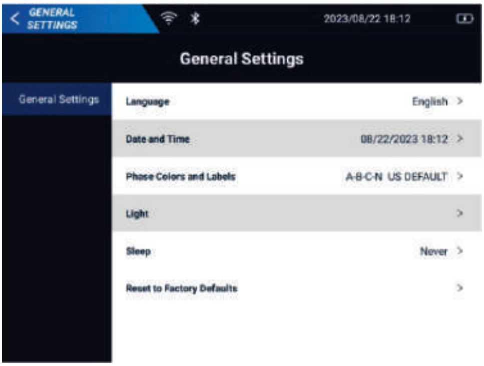
9.15. User Settings

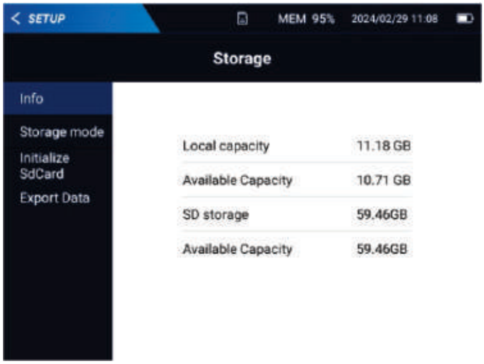


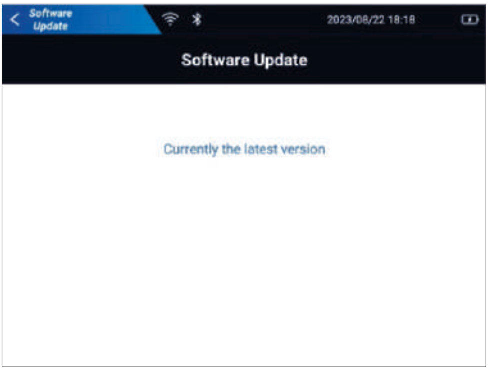
In the User Settings interface, users can configure relevant functions and preferences, as illustrated in the following figure.











10. Maintenance and Service

- If any abnormalities occur during the use of this product, **do not attempt to disassemble the instrument**, as it may contain **high voltage** components.
- Please contact our **authorized after-sales service center** for assistance..

11. Accessories

Standard Accessories:

- Trolley case
- Lithium battery, battery cell 18650 Lithium battery 2 series 2 parallel configuration (7.4V 5200mAH x 2pcs)
- Pen type test probes (CAT III 1000V x 5pcs)
- Crocodile clips (CAT III 1000V x 5pcs)
- Voltage input test cable (flat 4-plugs, CAT III 1000V)
- Single voltage input test line (CAT III 1000V)
- Magnetic Absorption Test Heads:
  - Green x 1 (346U)
  - Black x 1
  - Red x 3
- Hanging strap
- Instruction manual
- USB cable (Type-C, 90cm)
- Packaging accessories: SD card (64G, Class10)
- Power adapter: 15V/2.4A DC with US/EU/UK/AU interchangeable plugs
- Flexible coil (3000A)
  - Perimeter: 535mm
  - inner diameter: 150mm
  - Quantity: 4 pcs

Optional Accessories

- MTCA60-4 Flexible current probes (6000A):
  - Perimeter: 880 mm
  - Inner diameter: 250 mm
  - Quantity: 4 pcs

- MTCA100-4 Flexible current probes (10000A):
  - Perimeter: 880 mm
  - Inner diameter: 250 mm
  - Quantity: 4 pcs 4pcs

12. PRODUCT PERFORMANCE INDEX
12.1. Voltage/Current/Frequency

Function		Measuring Range	Resolution	Precision
RMS Voltage (Vrms) (AC+DC)		1...1000V phase to neutral	0.1V	±0.1 % of nominal voltage[1]
Peak Voltage (Vpk)		1...1400Vpk	1V	5% of nominal voltage
Half Cycle RMS Voltage (Vrms½)		1...1000V Phase to neutral line	0.1V	±0.2% of nominal voltage
Fundamental Voltage (Vfund)		1...1000V Phase to neutral line	0.1V	±0.1 % of nominal voltage
Voltage Peak Coefficient (CF)		1.0...>2.8 0.01	±5%	
Effective Current (Arms) (AC only)	ZRC150	5...3000A (AC only)	0.1A	±0.5% ±5 counts[2]
	SRC250	10...6000A (AC only)	1A	
	SRC250-50mV	20...10000A (AC only)	1A	
Peak Current (Apk)	ZRC150	4200 Apk	1 Arms	±5%
	SRC250	8400 Apk		
	SRC250-50mV	14000 Apk		
Current Peak Coefficient (CF)		1...10	0.01	±5%
Arms½	ZRC150	5...3000A (AC only)	0.1A	± 1% ± 10 counts
	SRC250	10...6000A (AC only)	1A	
	SRC250-50mV	20...10000A (AC only)	1A	
Fundamental Current (Afund)	ZRC150	5...3000A (AC only)	0.1A	
	SRC250	10...6000A (AC only)	1A	±0.5% ±5 counts
	SRC250-50mV	20...10000A (AC only)	1A	
Frequency (Hz)		42 .5 to 57 .5Hz/51 to 69Hz	0.001 Hz	±0.01 Hz

(1) The nominal voltage is in the range of 100V to 690V: Also known as Udin.
(2) ±0.5% ±5 counts: Accuracy of the flexible coil near the center.

12.2. Power

Function		Measuring Range	Resolution	Precision
Power (VA, Var)	ZRC150	Max 600MW	0.01kW	± 1% ±10 counts
	SRC250	Max 1200MW		
	SRC250-50mV	Max 2000MW		
The Power Factor (Cos 0/DPF)		0...1	0.001	±0.1% at nominal load condition

12.3. Electricity

Function	Measuring Range Precision	
Power (VA, Var)	Depends on clamp scaling and nominal voltage	± 1% ± 10 counts
Energy Loss	Depends on clamp scaling and nominal voltage	± 1%±10 counts, Excluding line resistance accuracy

12.4. Harmonic

Function	Measuring Range	Resolution	Precision
Harmonic order (n)	DC, 1..50 grouping: Harmonics are grouped according to IEC61000-4-7		
Voltage %f	0.0...100.0%	0.1%	±0.1% ±n X 0.1%
Voltage %r	0.0...100.0%	0.1%	±0.1% ±n X 0.4%
Absolute Voltage	0.0...1000V	0.1V	±5%(4)
Total Harmonic Distortion of Voltage (THD)	0.0...100.0%	0.1%	±2.5%
Current %f	0.0...100.0%	0.1%	±0.1% ±n X 0.1%
Current %r	0.0...100.0%	0.1%	±0.1% ±n X 0.4%
Absolute Current	3.0...3000A	0.1A	±5% ±5 counts
Total Harmonic of Distortion Current (THD)	0.0...100.0%	0.1%	±2.5%
Power %for %r	0.0...100.0%	0.1%	±n X 2%
The Absolute Power	Depends on clamp scaling and nominal voltage		±5% ±n x 2% ± 10 counts
Total Harmonic Distortion of Power (THD)	0.0...100.0%	0.1%	±5%
Phase	-360° ... 0°	1°	±n X 1 °

(4) The nominal voltage is in the range of 1 DOV to 690V; Also known as Udin.

12.5. Interharmonic Order

Function	Measuring Range	Resolution	Precision
Interharmonic order (n)	1...50 Grouping: Interharmonic subgroups according to IEC 61000-4-7		
Voltage	100%/1000V	0.1%/0.1mV	>1% nominal voltage[2]: of reading ±2.5% <1% nominal voltage[1]: ±0.025 nominal voltage[2]
Current	100%	0.1A (ZRC150, AC Only) 1A (SRC250\ SRC250-50mV, AC Only)	>3% nominal Current: of reading ±2.5% <3% nominal Current: Nominal Current ±0.15%

(1) AC voltage resolution reaches 0.01 V, DC voltage reaches 0.1 V.
(2) The nominal voltage is in the range of 1 DOV to 690V; Also known as Udin.
(3) ±0.5% ±5 counts: Accuracy of the flexible coil near the center.

12.6. Flicker

Function	Measuring Range	Resolution	Precision
Plt. Pst. Pst (1 minute), Pin st	0.00...20.00	0.01	±5%

12.7. Unbalanced

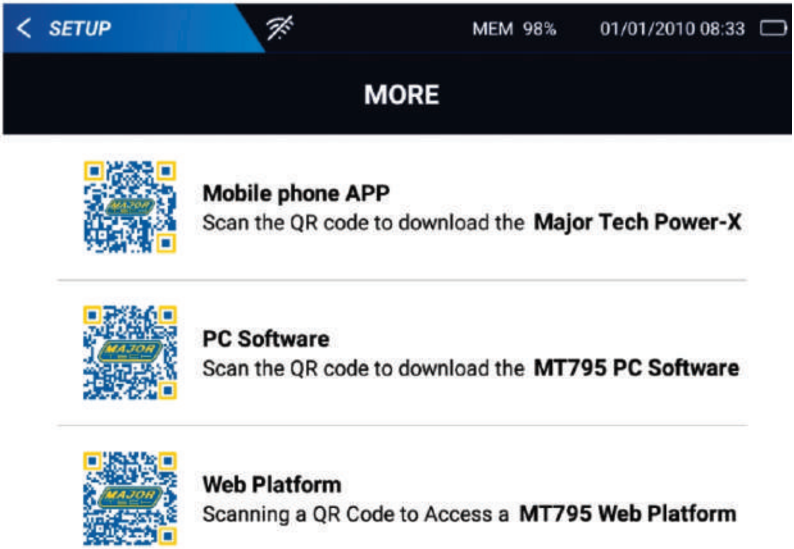
Function	Measuring Range	Resolution	Precision
Voltage%	0.0...20.0%	0.1 %	±0.1 %
Current%	0.0...20.0%	0.1 %	± 1 %

12.8. Trend Chart Record

Function	Measuring Range
Methods	Automatically record the minimum, maximum and average values relative to time for all three phase and neutral line readings displayed simultaneously.
Sampling	Continuous sampling of 5 readings per second per channel. up to 100/120readings per second per channel for half cycle values and PINST.
Recording Time	1 hour up to a maximum of 1 year, user optional (default setting is 7 days).
The Average Time	1 second to 2 hours, user selectable (Default is 1 second). 10 minutes when using monitoring mode.
Memory	Data storage on SD card (built-in 64GB, maximum expandable to 256GB).
The Event	Listed in the event list. including 50/60 wave cycles and 7.5 second half-cycle voltage RMS and current trend charts.

13. Mobile App & Software

Major Tech offer three distinct types of software for the MT795: PC software, mobile app software, and web platform software. Each is an independent program designed for a specific purpose.



13.1. Mobile Phone APP

The mobile app supports basic data viewing and analysis. It does not connect directly to the meter, instead, it retrieves data from a cloud server that receives uploads from the MT795 via a network interface. This setup allows you to monitor and analyse data remotely. While the cloud may display readings a few seconds behind the meter itself, the app's main purpose is remote access, if you were physically at the meter, you would simply read the display in real time.

- Scan the **"Mobile App"** QR code above to download the **Major Tech Power-X** app.
- Select **"Power-X"** to install the application on your mobile device.

Mobile phone APP

Scan the QR code to download the **Major Tech Power-X**

13.2. PC Software

1. It supports USB connection to a PC for real-time acquisition and analysis of measurement data.
2. It also allows downloading and analysing data stored on the MT795 by connecting to it via USB. Therefore, it is intended for use while physically near the meter.

- Scan the **"PC Software" QR code** above to download the **Power Quality Analysis Software**.
- Click the **download icon** next to "Power Quality Analysis Software" to begin the download, as shown in the figure below.

PC Software
Scan the QR code to download the **MT795 PC Software**

13.3. Web Platform Software

1.Users can access the software through a PC browser.
2. It does not connect directly to the MT795. Instead, it retrieves data from a cloud server, which receives uploads from the MT795 via a network interface.
As a result, it can be used remotely, without needing to be near the MT795.
The platform offers advanced data viewing and power quality analysis, including evaluation of whether power quality meets relevant standards.

- Scan the **"WEB Platform Software" QR code** above to download the **PC browser Power Quality Analysis Software**.
- Click the **download icon** next to "Web Platform Software" to begin the download, as shown in the figure below.

Web Platform
Scanning a QR Code to Access a **MT795 Web Platform**

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