TESCO METERING

OPERATIONS MANUAL

Three Phase Voltage Synthesizer

CATALOG NO. 6440

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Operations Manual

CATALOG NO. 6440

TESCO METERING

Revision: 2.0.0

TESCO – The Eastern Specialty Company

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LIMITED WARRANTY & LIMITATION OF LIABILITY

TESCO warrants to the original purchaser that it will correct all defects in material and/or workmanship in the Instrument, test equipment or software covered by this warranty (herein called **"PRODUCT"**), provided that TESCO is notified of such defect within the warranty period (set forth below) in accordance with paragraph four of this warranty.

WARRANTY PERIOD. The warranty period shall begin on the date of shipment of the PRODUCT or the date of the issuance of this warranty certificate, whichever is later. If no warranty period is specified below and signed by an authorized DISTRIBUTOR of TESCO, the warranty period shall be one (1) year. In no event shall this warranty remain in effect for more than the stated warranty period plus two (2) months after the date of shipment. TESCO's sole obligation and the purchaser's sole remedy under this warranty is limited to repair or replacement, at TESCO's option, free of charge, F.O.B. TESCO's factory at Bristol, PA of any workmanship and/or part which in TESCO's sole judgment displays evidence of defect. On-site warranty repairs will be made when in TESCO's judgment the PRODUCT cannot practically be shipped to TESCO's factory. Any modifications, additions or upgrades made to the PRODUCT or control software after this warranty becomes effective shall not extend the term of this warranty.

COVERAGE. The warranty set forth above shall be applicable only if the PRODUCT:

1. Is used for the specific purpose for which it was intended;
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3. Has not been modified, neglected, altered, tampered with, vandalized, abused or misused, or subjected to accident, fire, flood or other casualties;
4. Has not been repaired by unauthorized persons;
5. Has not had its serial number altered, defaced or removed;
6. Has not been connected, installed or adjusted other than in accordance with the instructions, if any, furnished by TESCO.

The warranty set forth herein DOES NOT APPLY to defects resulting from ordinary wear, tear and usage, or any cause, similar or dissimilar, not resulting solely from defective material and/or workmanship.

The warranty set forth herein shall NOT be effective unless:

1. Notice of defect is given to TESCO by phone, fax, email, or mail as soon as the defect is discovered.
2. Notice of defect contains the following information: PRODUCT serial number, PRODUCT model number, date of original installation, and an accurate and complete description of the defect including the exact circumstances leading to the defect.
3. The defective PRODUCT or part is returned only upon authorization from TESCO as evidenced by the issuing of a Return Merchandise Authorization (RMA) number, and that the transportation charges are prepaid (except that TESCO may, at its option, appoint a qualified DISTRIBUTOR to make field inspections of the PRODUCT for which purpose the purchaser shall permit such DISTRIBUTOR to enter upon its premises and examine the PRODUCT).
4. The Return Merchandise Authorization (RMA) number is written on the shipping label and all paperwork defective PRODUCT or part.
5. The defective PRODUCT or part is returned in the original packing or packing approved by TESCO

TESCO is not responsible for drayage charges, damages, or labor costs incurred in conjunction with failure, removal, or reinstallation of any PRODUCT, all of which shall be at the purchaser's expense. TESCO is not responsible for special, incidental, or consequential damages, whether resulting from breach of warranty, negligence, or any other reason.

TESCO manufactured parts will be available for a minimum period of at least two years after the manufacture of a PRODUCT has been discontinued.

TESCO will provide original purchaser during the warranty period, unlimited telephone consulting time for the purpose of PRODUCT trouble shooting/servicing and for the first thirty (30) days of the warranty period, unlimited telephone consulting time for the purpose of PRODUCT/software application.

THE WARRANTY CONTAINED HEREIN IS IN LIEU OF ALL OTHER WARRANTIES AND TESCO MAKES NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OR CONDITION, DESIGN, MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR ANY OTHER MATTER.

No other warranty, express or implied, is authorized by TESCO, and no DISTRIBUTOR of TESCO or any other person has any authority to amend, extend, modify, enlarge, or otherwise alter the foregoing warranty and disclaimers in any way whatsoever, except as provided for in an Extended Limited PRODUCT warranty agreement.

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1.0 INTRODUCTION

1.1 Introduction

A Compact and Versatile Voltage Source for Everyday Site Testing

The Three-Phase Voltage Synthesizer is designed for technicians who require a portable, isolated, and selectable three phase voltage source. It delivers synthesized test voltages for meters that require a variety of load conditions and voltage configurations, all within a small, lightweight package built for site testing applications.

As one of the most versatile site testing tools available, the Voltage Synthesizer provides flexibility and control for meter testing environments where an isolated voltage source is required. Its portable design makes it easy to transport and deploy in the field without sacrificing performance.

The Voltage Synthesizer is ideal for customers who own the 6330, as well as those who need an isolated voltage source for any meter testing application.

Since 1904, customers have trusted TESCO for accuracy and reliability. When you think metering, think TESCO.

Catalog Number 6440 will be referred to as “Voltage Synthesizer” throughout this operational manual.

1.2 Contacting TESCO

For Technical Support or Calibration/Repair, please call 215.228.0500.

You can also send an email to **support@tescometering.com** with any questions.

To view, print, or download the latest manual supplement, visit **tescometering.com**.

1.3 General Safety Summary

This manual contains information and warnings that must be observed to ensure safe operation and keep the Instrument in a safe condition. Operation or service in conditions or in a manner other than specified could compromise safety. For the correct and safe use of this device, it is essential that both operating and service personnel follow accepted safety procedures in addition to the safety precautions specified.

In this manual, a **WARNING** identifies conditions and actions that pose hazard(s) to the user, while a **CAUTION** identifies conditions and actions that may damage the Instrument or the test equipment.

WARNING 

To avoid electrical shock, personal injury, or fire hazard:

- **The device must not be switched ON if it is damaged or suspected to be faulty.**
- **Do not operate the device in wet, condensing, dusty, or explosive gas conditions.**
- **If the equipment is used in a manner not specified in this manual, the protection provided by the Instrument may be impaired**
- **Whenever it is likely that safety protection has been impaired, the device must be made inoperative and be secured against any unintended operation. Inform qualified maintenance or repair personnel.**
- **Safety protection is likely to be impaired if, for example, the Instrument displays visible damage or fails to operate normally.**
- **Use of any fuse other than specified may cause damage.**
- **Defeating any safety devices may result in electric shock and potential death.**

1.4 Description of Safety-related Icons

ICONS	DESCRIPTION
	Risk of danger. Important information. See manual.
	Hazardous voltage. Risk of electrical shock.

1.5 Product Features

The Voltage Synthesizer is built to deliver a stable, selectable, and fully isolated three phase voltage source for a wide range of metering applications. It provides true three phase output with up to 100 VA per phase (L-N) and supports common voltage configurations used throughout the metering industry.

Designed with Class D technology for improved efficiency and performance, the unit maintains low total harmonic distortion and consistent voltage accuracy. Its rugged, water-resistant enclosure and straightforward rotary voltage selection make it dependable and easy to operate in field environments.

1.5.1 Key Features

Voltage Drive: 69-480V, 830V Peak
Current Drive: None

1.5.2 Standard Features

- Unit provides True Three Phase with an isolated voltage output of 100 VA per phase (L-N).
- Easy rotary switch select for supplying common voltage used in the metering industry.
    - 69/120V WYE
    - 120/208 WYE
    - 120/240V DELTA
    - 277/480V WYE
    - 240/480 Delta
- Uses Class D technology providing better efficiency, performance and reliability.
- Rugged durable and water-resistant case

1.5.3 Standard Unit (what's in the box)

These are the standard items included in the package:

- 6440 Synthesizer
- Voltage Cable Set
- Power Cords (2)

1.5.4 Optional Accessories

- THD-100 Handheld
- 2 ft. HDMI Cable
- Diamond Level Support

1.6 General Specifications

The following specifications apply to the 6440 Voltage Synthesizer. These values reflect product performance characteristics and its verified mechanical and electrical design parameters.

1.6.1 Input Characteristics

PARAMETERS	DATA
Supply Frequency	50/60Hz
Voltage Input Range	85 – 305 VAC
Power	~350W

1.6.2 Mechanical

PARAMETERS	DATA
Case Dimension (LxWxH)	18.2” x 13.9” x 6.7”
Weight	25 lbs. (11.4 kg)
Operating Temperature	-10F to 140F

1.6.3 Accuracy

PARAMETERS	DATA
Voltage Setting Accuracy	± 0.5% up to 100VA
Total Harmonic Distortion	<3%

1.7 About this Operations Manual

This manual provides complete information for setting up and operating the Voltage Synthesizer. This document instructs the user on the following operations of the CAT. 6440:

- Setup
- Front Panel Features
- How to perform tests
- Maintenance

2.0 INSTALLATION

2.1 Introduction

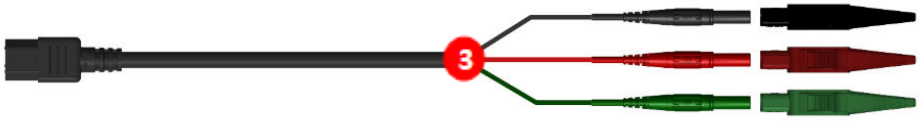
This chapter provides instructions for unpacking and the proper setup for the Voltage Synthesizer. Read this chapter before you operate the Voltage Synthesizer. Instructions for cable connections can be found here.

2.2 Unpacking and Inspection

The Voltage Synthesizer is shipped in a container designed to prevent damage during shipping. A packing slip can be found in the package. Inspect the package carefully for damage and immediately report any damage to your distributor or directly to TESCO. A packing list consists of (1) 6440 Main unit (2) Power Cord, Standard (3) Power Cord, Field Test (4) Voltage Cable Set of choice (5) Test Clip of Choice (6) Handheld (Optional Accessory)

Figure 2.2.1a 6440 Main Unit

2.2.1b Power Cord Standard



2.2.1c Power Cord, Field Test

STANDARD ACCESSORIES

4

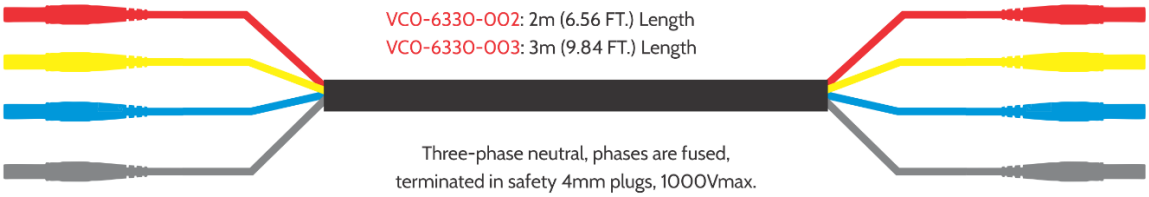


Figure 2.2.1d Voltage Cable Set

5

VT0-6330-001: Test Clips, 4mm socket to Dolphin, CAT 111/1000V, pack of 4: black, red yellow, blue.

VT0-6330-002: Test Clips, 4mm socket to XCHL EZ-Hook, pack of 4: black, red yellow, blue.

VT0-6330-003: Test Clips, 4mm socket to Crocodile, CAT 111/1000V, pack of 4: black, red yellow, blue

Figure 2.2.1e Test Clip Options

OPTIONAL ACCESSORIES

6

Figure 2.2.1f Handheld (Optional)

2.3 Set-up and Cooling Considerations

Place the Voltage Synthesizer on a stable, flat surface that allows adequate airflow around all sides of the unit. Ensure that the input power connection and voltage output terminals are accessible and that there is sufficient space to safely route the voltage cable set and power cords.

Position the Voltage Synthesizer away from moisture, excessive dust, and high heat sources. Maintain proper clearance around the enclosure to support safe and reliable operation.

2.3.1 Set-up and Placement

The 6440 Voltage Synthesizer is a portable unit that is easy to use and movable at a meter substation or inside a meter shop. The long power cords allow for the placement for a Voltage Synthesizer to be as close or as far from the site as possible.

GENERAL SET UP CHECKLIST

1. **Ensure Proper Orientation.** Make sure to lay the equipment flat when using it in the field.
2. **Ensure Proper Cooling and Ventilation.** Ensure the cable bay compartment is free from any obstruction for the unit to get cooling and proper ventilation. Blower fans force air from right side of the case to the left.
3. **Inspect Wiring.** Ensure the power cords and voltage cable sets are plugged in properly.

2.3.2 Running the Test

The unit can be operated in three basic steps:

1. Wiring

- Plug in one of the two included power cords. The unit can be powered with the standard 120V plug OR powered via site voltage from 85-305 VAC. Refer to figure 2.4.1 and 2.4.2
- Connect the voltage cable sets into ports VA, VB, VC and Neutral ports. At the other end of the cable, connect to device under test (DUT).

2. Testing

On the face panel as shown in Figure 3.2.1 make the following steps:

- Press POWER; confirm green LED ON.
- Allow ~20 s for startup and audible beep.
- Set desired voltage via rotary selector.

Press AMPLIFIER; verify red LED is steady ON (output enabled).

WARNING

3. **A flashing red indicator with an audible alarm indicates a fault condition. Press AMPLIFIER (OFF) to de-energize output immediately. Identify and correct the fault before re-energizing.**

4. Finishing the test

   Press AMPLIFIER (OFF) to disable output. Press POWER to switch off the unit. Confirm all outputs are de-energized. Disconnect the power supply and all test leads from the DUT.

2.4 Main Power Supply

The Voltage Synthesizer gets power from an AC power source. The unit has an input range of 85 to 305 VAC. The unit is factory supplied with two power cords that allow connections to a site meter **test switch** and to a standard AC source in a meter shop.

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Figure 2.4.1 Power the 6440 unit at the meter shop using a 120VAC / 240VAC source using a standard power cord (Nema 5-15 plug). The supplied cord is about 10 feet long (3 meters).

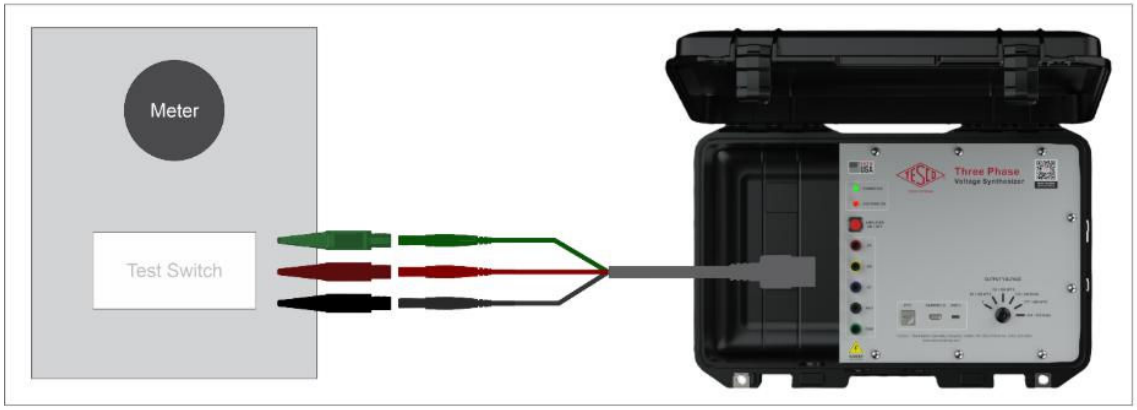


Figure 2.4.2 Power the 6440 unit at a meter site test switch using the field test power cord. The cord length is about 10 feet. Red is L1, Black is L2 or Neu, Green is Earth GND. Make sure to connect 6440 at the line side of the test switch.

2.5 Use Case. A Complete Intertie Meter Testing Solution

When used together, the TESCO 6440 and TESCO 6330 Meter Site Analyzer provide a complete solution for intertie meter testing, commissioning, and site verification. This is shown in Figure 2.5.1

6440 Three-Phase Voltage Synthesizer

- Provides an isolated voltage source that powers the meter and test switch
- Operates from a standard 120 VAC wall outlet using the supplied power cord
- Can also be powered directly from the site using the field power cord
- Generates programmable three-phase voltage from 69V to 480V AC

6330 Meter Site Analyzer

- Measures voltage, current, phase angle, burden, harmonics, and meter accuracy
- Performs complete site verification and meter testing
- Provides programmable test current from 0 to 5 amps

Combined Solution

- Simulates real-world service conditions
- Supports intertie testing, commissioning, and troubleshooting
- Enables complete meter and site verification in the field

Figure 2.5.1 Photo of the 6330 Inclusion with the 6440.

3.0 FUNCTIONALITY

3.1 Introduction

This chapter explains the basic functions and features of Voltage Synthesizer equipment.

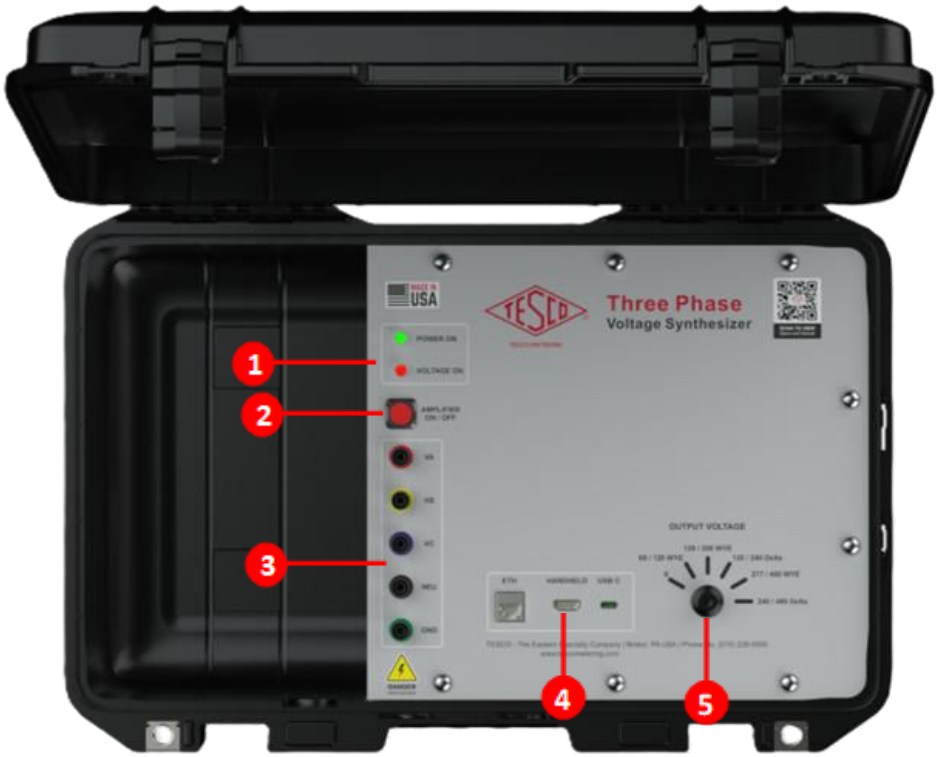
Please read this information before operating. Front panel operating instructions for the Voltage Synthesizer are provided in this chapter.

3.2 Panel Features

Front panel features such as LED indicators, button and switches and side panel sections (terminals) are shown in Figure 3.2.1 and Figure 3.2.2 respectively.

3.2.1 Front Panel

In this section, the user interacts with the face panel



NUMBER	DESCRIPTION	Function
1	LED Indicators	• Green LED indicates Power On • Red LED indicates Voltage Amplifier On
2	Amplifier Button	• Allows user to turn amplifier ON
3	Voltage Output Ports	• Ports for voltage cable set out to Device Under Test
4	Input / Output (IO)	• Comms, external devices and test report
5	Rotary Switch	• Allows user to set desired voltage output

Table 3.2.1a 6440 Front Panel Sections

3.2.2 Side Panel

The side panel holds the Power Entry Module (PEM) and the equipment ventilation (exhausts). In this panel, the user can plug in the supplied power cords, service fuses and turn the unit ON. The panel has caution and warning label markings for user safety.

WARNING

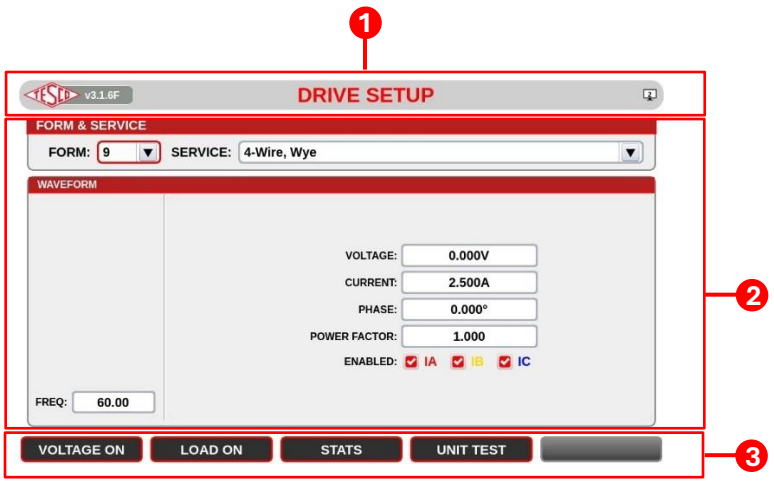
Make sure to disconnect the power cord before replacing fuses. Recommended fuse is 5X20 mm, Slow Blow Ceramic, 10A 600VAC.

3.3 The Graphical User Interface (GUI)

The GUI (graphical user interface) is like other Next Gen units with slight difference in keypad layout and testing functions. It features both touchscreen and keypad navigation, allows meter form selection, barcode scanning capability, test configuration options, and displays real-time testing results including phase angles, watt-hours, and pass/fail status.

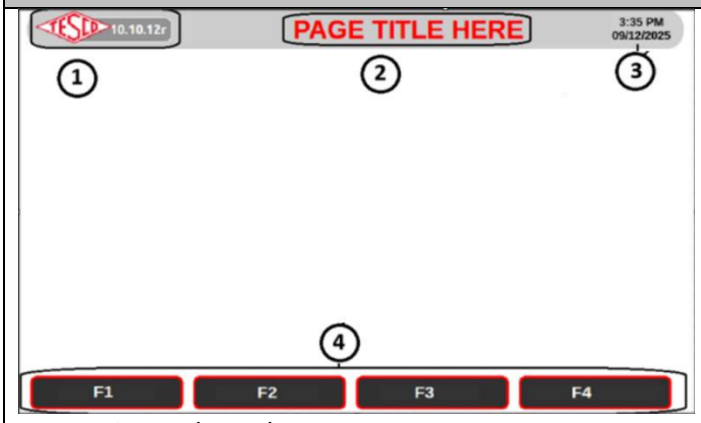
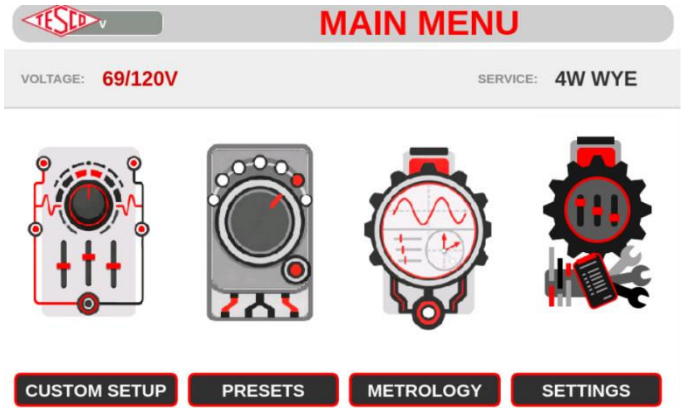
3.3.1 Graphical User Interface (GUI) Screens

The user interface is divided into three sections. In the screen, any field that is grayed out cannot be changed or accessed by the user.

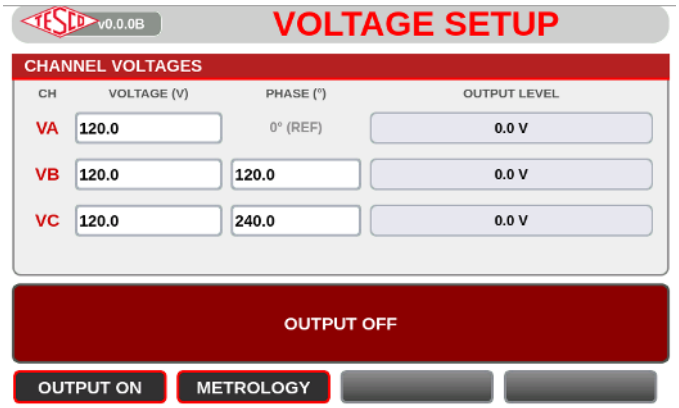


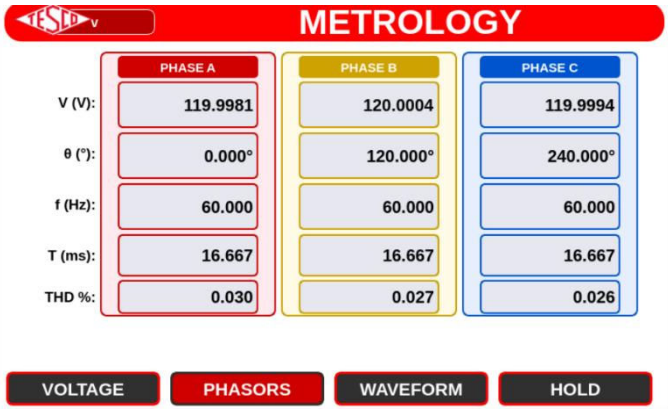
NUMBER	DESCRIPTION
1	Screen Title
2	Screen Data
3	Function Buttons

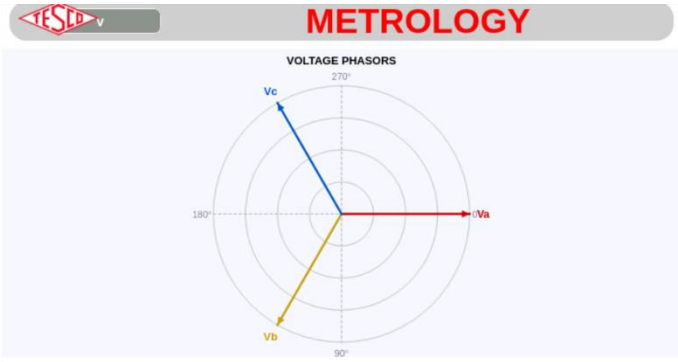
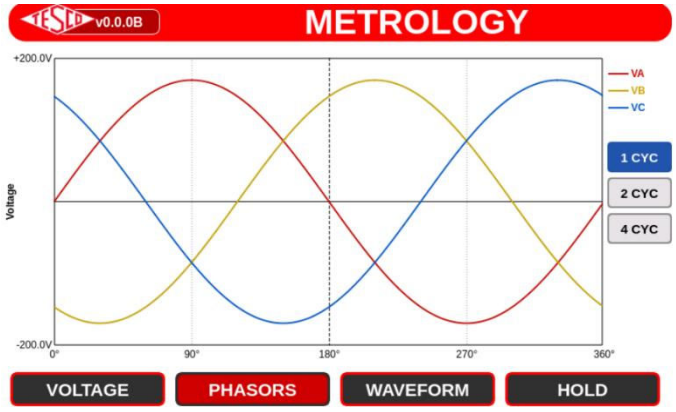
Table 3.3.1. 6440 GUI Sections

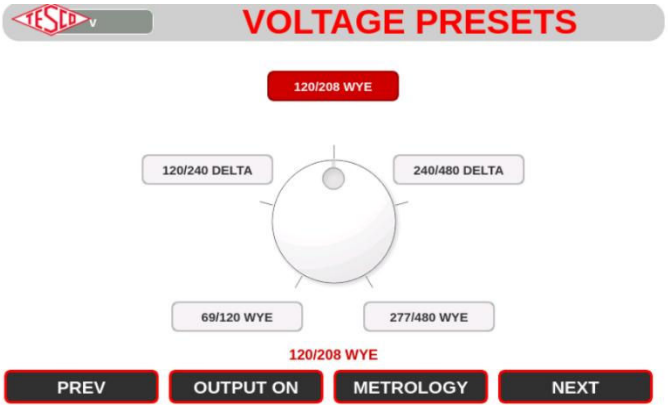
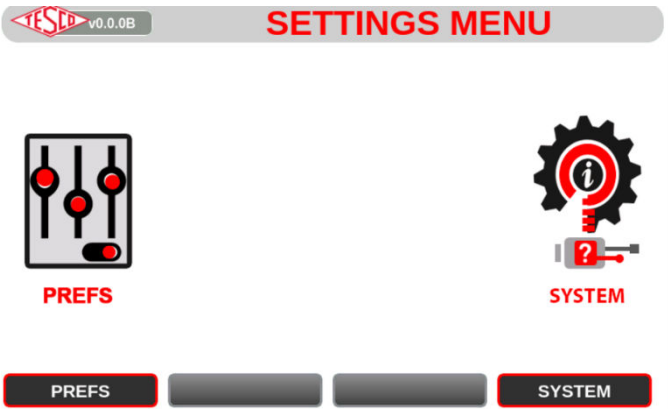
SCREEN	DESCRIPTION
 **Function Keys (Bottom):** **(4) Function Keys (F1 – F4):** Soft keys for user actions. Their functions vary depending on the screen context and are labeled dynamically on the display.  **Action Buttons:** **If you select CUSTOM SETUP button see next page.** **If you select PRESETS button see section 3.3.2.7** **If you select METROLOGY button see next page** **If you select SETTINGS button see section 3.3.2.7**	***3.3.2.1 MAIN MENU SCREEN ICON AND BAR OVERVIEW*** **(1) Left Panel: Reserved area for additional information, Software version.** **(2) Page Title: Displays the title of the current screen, helping users quickly identify the function or mode they are in.** **(3) Time and Date Info** ***3.3.2.2 MAIN MENU SCREEN OVERVIEW*** • **Voltage / Service Status Bar:** Displays the voltage and service currently selected by the hardware output voltage selector. • **Red Voltage Warning:** If voltage is currently ON/applied, the voltage display turns red to warn the user that output voltage is active. • **CUSTOM SETUP:** Opens the custom voltage setup page, where the user can manually configure voltage settings instead of using a preset. • **PRESETS:** Opens the preset voltage selection page, allowing the user to quickly choose from common voltage configurations. • **METROLOGY:** Opens the metrology data page, where the user can view measurement information such as waveforms, phasors, and other live electrical data. • **SETTINGS:** Opens the settings page for system configuration, preferences, and device setup options.

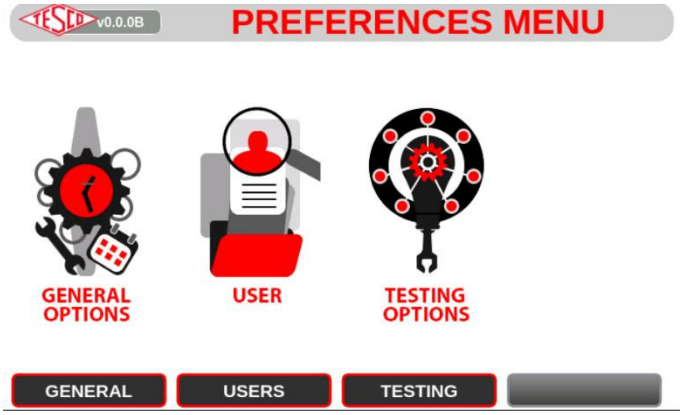
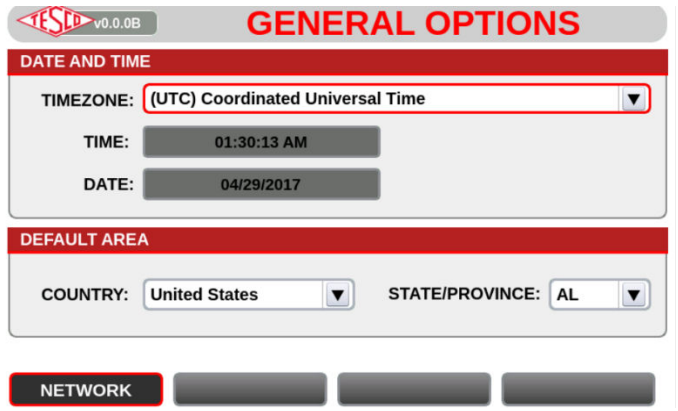
SCREEN	DESCRIPTION

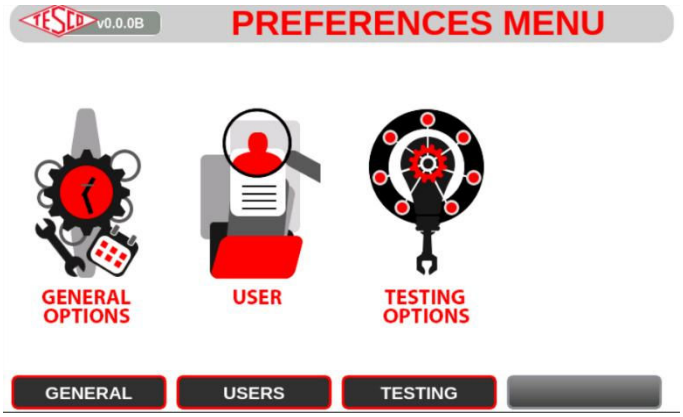
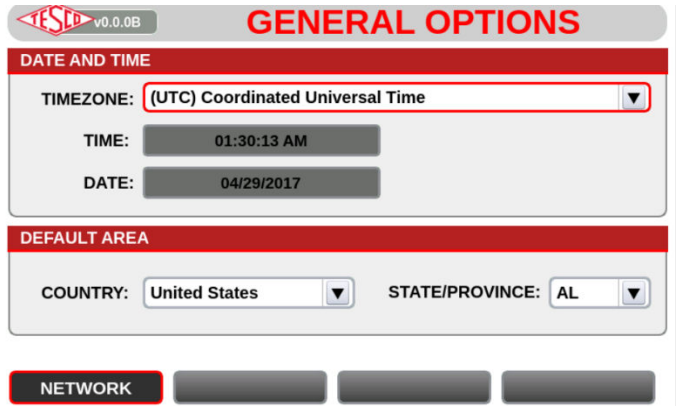
Action Buttons:
 
 	
If you select OUTPUT ON / OUTPUT OFF button Turn one off the Voltage.
If you select METROLOGY button, see Next page
	### *3.3.2.3 Voltage Setup Screen Overview*
	CHANNEL VOLTAGES: Displays the voltage setup for each phase/channel: **VA, VB,** and **VC.**
	• **VOLTAGE (V):** Allows the user to enter the desired voltage for each channel. In this example, VA, VB, and VC are set to 120.0 V.
	• **PHASE (°): Allows the user to set the phase angle for each channel.**
	  • **VA** is fixed as 0° **(REF)** and is used as the reference phase.
	  • **VB** is set to **120.0°.**
	  • **VC** is set to **240.0°.**
	• **OUTPUT LEVEL:** Shows the actual voltage output level currently being generated for each channel.
	  • When output is **OFF,** each channel shows **0.0 V.**
	  • When output is **ON,** the output level shows the active output voltage for each channel.
	• **Output Status Bar/Button:** The large status bar/button shows whether voltage output is currently active.
	  • **OUTPUT OFF** is shown in red when no voltage is being output.
	  • **OUTPUT ON** is shown in green when voltage output is active**.**
	• **OUTPUT ON / OUTPUT OFF Button**: Turns the voltage output on or off. The button changes depending on the current state.
	• **METROLOGY:** Opens the metrology page where the user can view live measurement data, including waveforms, phasors, and output-related electrical information.

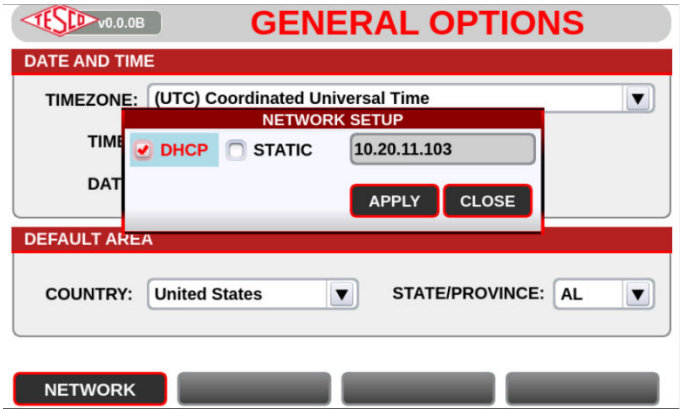
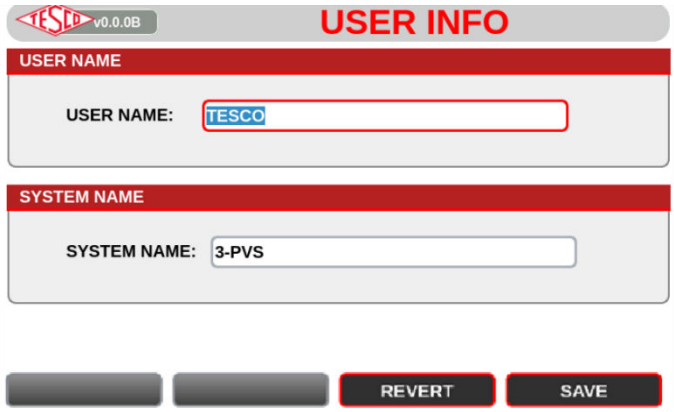
 **Action Buttons:** **If you select VOLTAGE button see this page.** **If you select PHASORS button see next page.** **If you select WAVEFORM button see section 3.3.2.6** **If you select HOLD button Holds the UI lock.**	### *3.3.2.4 Voltage View* The **Voltage** view displays live measured values for each output phase. Here's what you can see: • **Phase A / Phase B / Phase C:** Shows the measured data for each voltage channel. • **V (V):** Displays the live measured voltage for each phase. • **θ (°):** Displays the phase angle for each phase. Phase A is normally used as the reference at **0.000°**. • **f (Hz):** Displays the measured frequency of the output voltage. • **T (ms):** Displays the waveform period in milliseconds. At 60 Hz, this is typically about **16.667 ms**. • **THD %:** Displays total harmonic distortion, which shows how clean or distorted the voltage waveform is. This view is mainly used to confirm that each phase is producing the correct voltage, phase angle, frequency, and waveform quality. This view is mainly used to confirm that each phase is producing the correct voltage, phase angle, frequency, and waveform quality

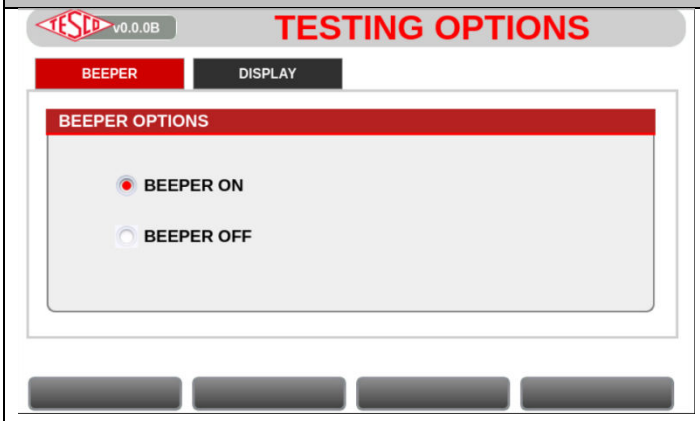
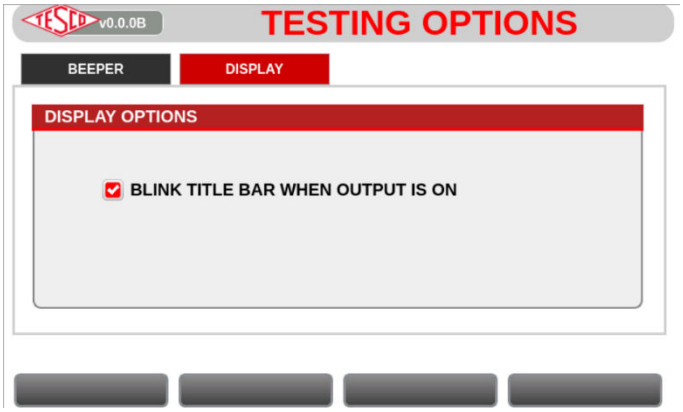
SCREEN	DESCRIPTION
 **Action Buttons:** **If you select VOLTAGE button see previous page.** **If you select PHASORS button see this page.** **If you select WAVEFORM button see section 3.3.2.6** **If you select HOLD button Holds the UI lock.**	*3.3.2.5 Phasors View* **The Phasors view displays the phase relationship between the voltage channels. Here's what you can see:** **• Voltage Phasors: Displays a graphical phase-angle view of the three output voltages.** **• VA / VB / VC: Each arrow represents one phase.** **• The arrow direction shows the phase angle.** **• The arrow length represents the voltage magnitude.** **• This view helps confirm that the phase rotation and phase spacing are correct, such as a normal three-phase setup with phases around 0°, 120°, and 240°.** **This view is mainly used to confirm that each phase is producing the correct voltage, phase angle, frequency, and waveform quality.**
 **Action Buttons:** **If you select VOLTAGE button see section 3.3.2.4** **If you select PHASORS button see previous page.** **If you select WAVEFORM button see this page.** **If you select HOLD button Holds the UI lock.**	*3.3.2.6 Testing Screen* The **Waveform** view displays the live voltage waveform for each phase. Here's what you can see: • **VOLTAGE:** Opens the live numeric voltage measurement view. • **PHASORS:** Opens the phase-angle/vector display. • **WAVEFORM:** Opens the waveform graph display. • **1 CYC / 2 CYC / 4 CYC:** Changes how many waveform cycles are shown on the graph. • **HOLD:** Freezes the current metrology display so the user can review the values without them changing. This view is mainly used to verify waveform shape, stability, phase timing, and output quality.

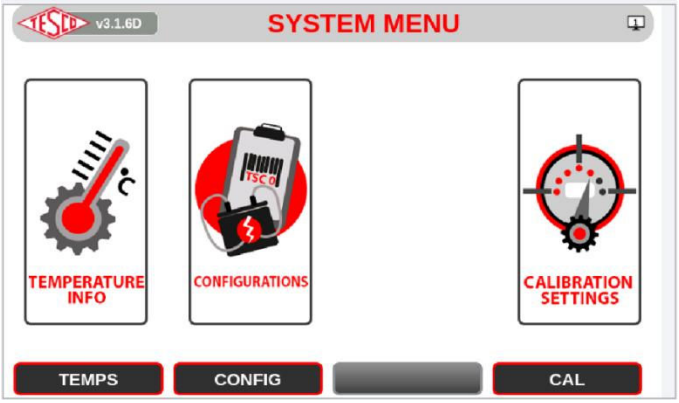
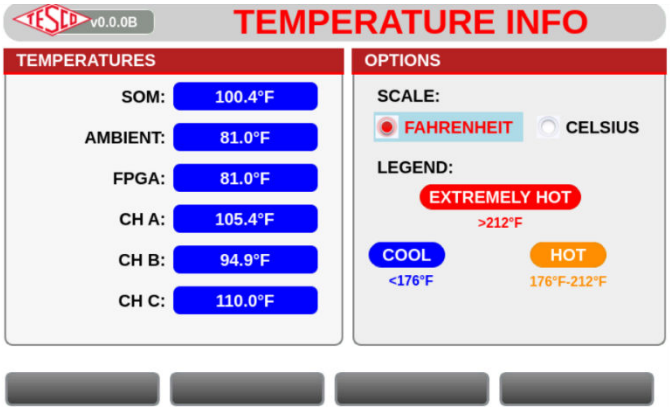
SCREEN	DESCRIPTION
 **PREV / NEXT: Moves through the available voltage preset options.** **• OUTPUT ON: Turns on the voltage output using the selected preset.** **• METROLOGY: Opens the metrology page to view live output measurements, including voltage values, phasors, and waveforms. button see section 3.3.2.4**	*3.3.2.7 Status Screen* **The Voltage Presets screen allows the user to quickly select a common output voltage configuration instead of manually entering custom voltage and phase values. This page represents the available preset positions from the voltage selection control.** **Here's what you can see:** **• Preset Selector: Displays the available voltage presets around the selector dial. The user can move between preset options using the screen controls.** **• Selected Preset: The currently selected preset is shown in red. In this example, 120/208 WYE is selected.** **• Available Presets: Shows the standard voltage/service options available for quick setup, including:** **• 120/208 WYE** **• 120/240 DELTA** **• 240/480 DELTA** **• 69/120 WYE** **• 277/480 WYE** **• Selected Preset Display: The selected voltage preset is also shown below the selector so the user can confirm the active selection before turning output on.**
 **If you select PREFS then see next Page** **If SYSTEM then see section 3.3.2.15**	*3.3.2.8 Settings Menu* This is the **Settings Menu** screen. Here, you can adjust system preferences or access system information. • **PREFS**: Takes you to the preferences settings where you can adjust the user interface, test configurations, and other system preferences. • **SYSTEM**: Provides access to system-level settings, including device information, version details, and system diagnostics. You can switch between the two options by selecting either **PREFS** or **SYSTEM**, depending on what you need to configure.

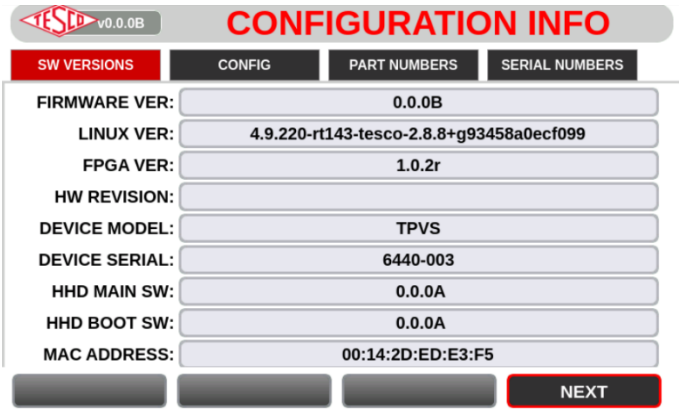
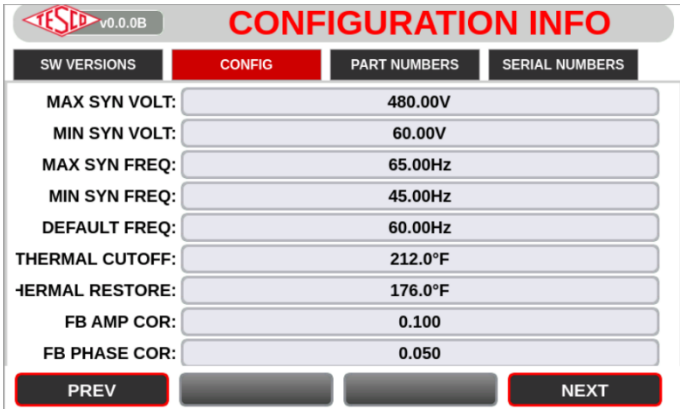
SCREEN	DESCRIPTION
 **If you select GENERAL button see next page** **USERS button see section 3.3.2.10** **TESTING button see section 3.3.2.12** **CAL button see section 3.3.2.13**	*3.3.2.9 Preferences Menu* This is the **Preferences Menu** screen. From here, you can adjust various settings that control how the system operates: • **GENERAL OPTIONS**: Accesses general configuration settings that impact overall system behavior. • **USER**: Manages user profiles and permissions. • **TESTING OPTIONS**: Allows you to configure settings specific to the tests being conducted, such as timing and accuracy thresholds. • **CALIBRATION**: Provides options for calibrating the device to ensure accurate test results. Each button navigates to its respective submenu for further adjustments.
 **Action Buttons:** **If you select NETWORK button see next page.** **AP Setup: Opens Access Point setup options for managing device-hosted wireless access point settings**	*3.3.2.10 General Options* This is the **General Options** screen where you can configure basic settings related to the system's date, time, language, and network settings. • **Timezone:** Allows you to select the appropriate time zone from the dropdown menu. • **Time and Date:** Displays the current system time and date. These can be adjusted as needed. • **Language:** Lets you select the language for the user interface from the dropdown. • **Network Button:** Opens the network settings to configure DHCP or static IP addresses. When clicked, a pop-up window appears where you can choose between DHCP and static IP for network configuration. This screen helps you customize the system's time, date, and language to match your preferences.

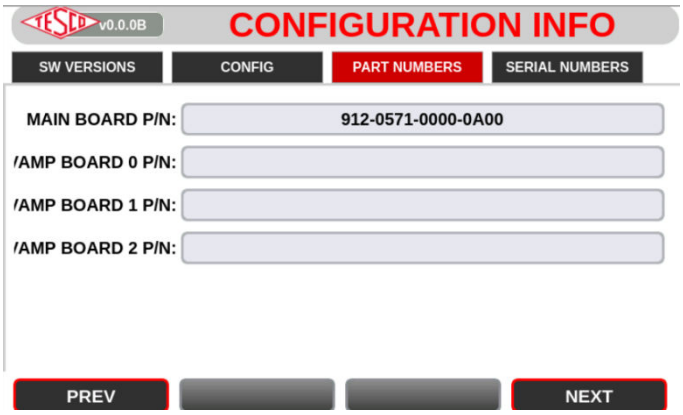
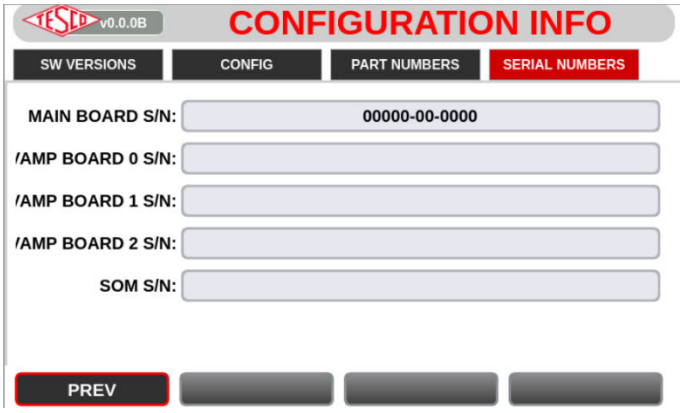
SCREEN	DESCRIPTION
 **If you select GENERAL button see next page** **USERS button see section 3.3.2.10** **TESTING button see section 3.3.2.12** **CAL button see section 3.3.2.13**	*3.3.2.9 Preferences Menu* This is the **Preferences Menu** screen. From here, you can adjust various settings that control how the system operates: • **GENERAL OPTIONS**: Accesses general configuration settings that impact overall system behavior. • **USER**: Manages user profiles and permissions. • **TESTING OPTIONS**: Allows you to configure settings specific to the tests being conducted, such as timing and accuracy thresholds. • **CALIBRATION**: Provides options for calibrating the device to ensure accurate test results. Each button navigates to its respective submenu for further adjustments.
 **Action Buttons:** **If you select NETWORK button, see next page.** **AP Setup: Opens Access Point setup options for managing device-hosted wireless access point settings**	*3.3.2.10 General Options* This is the **General Options** screen where you can configure basic settings related to the system's date, time, language, and network settings. • **Timezone:** Allows you to select the appropriate time zone from the dropdown menu. • **Time and Date:** Displays the current system time and date. These can be adjusted as needed. • **Language:** Lets you select the language for the user interface from the dropdown. • **Network Button:** Opens the network settings to configure DHCP or static IP addresses. When clicked, a pop-up window appears where you can choose between DHCP and static IP for network configuration. This screen helps you customize the system's time, date, and language to match your preferences.

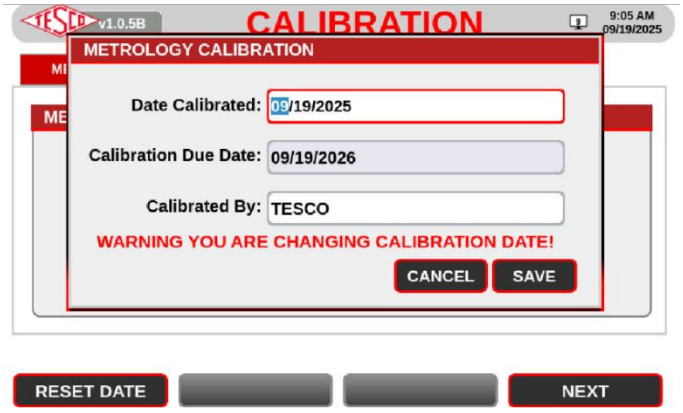
SCREEN	DESCRIPTION
 **Action Buttons:** **Apply: Saves and applies all current network configuration settings.** **Close: Exits the setup window without applying changes.**	*3.3.2.11 Network Setup* This screen, accessed from the **General Options** menu, allows the user to configure the device's primary network connection. **Primary Network Options:** • **DHCP:** When enabled, the device automatically obtains its IP address from the network's DHCP server. • **Static:** When selected, the user can manually enter a fixed IP address (e.g., *10.20.11.104*). **Notes:** • Using DHCP is recommended for most users to simplify setup and ensure compatibility with the network. • Static IP mode is useful when the device must always use the same IP address for consistent access or integration into larger systems.
 **Action Buttons (Bottom):** **REVERT: Cancels changes and restores the previous saved values.** **SAVE: Saves the updated user and system information.**	*3.3.2.12 User Info Page* This screen allows the user to input or update key information related to the device configuration. 1. **User Name:** Identifies the user of the device. This field can be updated to match the current operator or account (e.g., *TESCO-NEW*). 2. **System Name:** Represents the system or setup in use. This field is typically used to identify the device or environment (e.g., *Turbo Tester*). **Note Section:** Displays a reminder that *any unsaved changes will be discarded* if not saved.

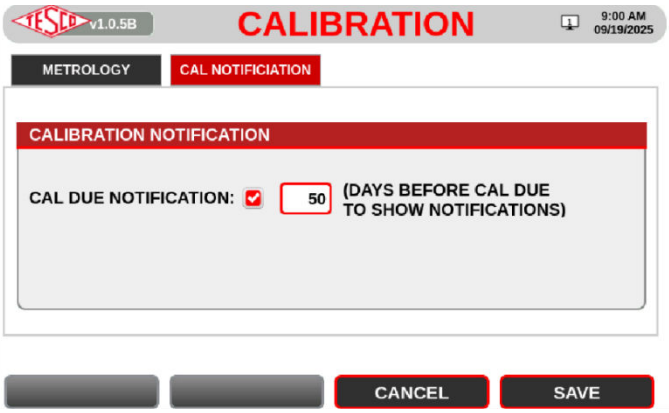
SCREEN	DESCRIPTION
 **Action Buttons (Bottom):** • **IF something is different:** Save and cancel will appear	*3.3.2.13 Testing Options Screen* This screen allows configuration of behavior • **Beeper Sound:** Enables or disables the beeper that provides audible feedback during tests (*ON/OFF*).
 **Action Buttons (Bottom):** • **CANCEL: Discards any unsaved changes and restores the previous settings.** • **SAVE: Saves the current notification settings.**	*3.3.2.14 Testing Options Screen* This tab allows configuration of user notifications and prompts during testing. **Notification Settings:** • **Title Flashing:** Toggles the flashing of the screen title bar to visually indicate test events or alerts (*ON/OFF*).

SCREEN	DESCRIPTION
 **If you select TEMPS button see next page** **CONFIG button see section 3.3.2.17** **CAL button see section 3.3.2.21**	*3.3.2.15 System Menu* **System Menu** This screen allows you to access various system-level options: 1. **Temperature Info**: View temperature-related data for different components. 2. **Configurations**: Access configuration information about the system, including model and hardware details. 3. **Calibration Settings**: Review and adjust settings related to the calibration of the system. At the bottom of the screen: • **TEMPS**: Shortcut to the Temperature Info section. • **CONFIG**: Shortcut to the Configurations section. • **CAL**: Shortcut to the Calibration Settings section
 **Notes:** • **This updated layout expands beyond just Phase A data, showing temperatures for multiple key components and CT phases (A, B, and C).** • **The scale and legend provide clear context for interpreting safe vs. unsafe operating temperatures.**	*3.3.2.16 Temperature Info Screen* **The Temperature Info screen displays real-time temperature readings for key system components and allows the user to choose how temperature values are shown.** **Temperature Readings:** **• SOM: Displays the System-on-Module temperature.** **• AMBIENT: Displays the internal ambient temperature.** **• FPGA: Displays the FPGA temperature.** **• CH A: Displays the temperature for voltage/current channel A.** **• CH B: Displays the temperature for voltage/current channel B.** **• CH C: Displays the temperature for voltage/current channel C.** **The temperature values are color-coded to help the user quickly identify whether the system is operating in a normal, hot, or extremely hot temperature range.**

SCREEN	DESCRIPTION
 **View all tabs sections 3.3.2.17-3.3.2.20** **Navigation Buttons:** **NEXT: Moves to the next configuration tab.**	***3.3.2.17 Configuration Screen: SW Versions Page*** The Configuration Info screen displays system configuration, software version, hardware identification, and device information. This page is mainly used to verify what firmware, software, hardware, and serial information is loaded on the unit. Tabs: • SW VERSIONS: Displays software, firmware, Linux, FPGA, and device version information. • CONFIG: Displays configuration information for the unit. • PART NUMBERS: Displays the part numbers for installed hardware components. • SERIAL NUMBERS: Displays the serial numbers for installed hardware components. SW Versions Page: • FIRMWARE VER: Displays the firmware version currently installed on the unit. • LINUX VER: Displays the Linux kernel/version running on the device. • FPGA VER: Displays the FPGA firmware version. • HW REVISION: Displays the hardware revision of the unit, if available. • DEVICE MODEL: Displays the device model. In this example, the model is TPVS. • DEVICE SERIAL: Displays the unit serial number. • HHD MAIN SW: Displays the handheld main software version. • HHD BOOT SW: Displays the handheld bootloader software version. • MAC ADDRESS: Displays the network MAC address assigned to the unit.
 **You can switch between different sections of configuration using the tabs (Main Board, MC Devices, Others), and navigate through the pages with the Prev and Next buttons.** **Navigation Buttons:** • **PREV: Returns to the Versions tab.** • **NEXT: Advances to the Limitations tab.**	***3.3.2.18 Configuration Info – Config. Screen Overview*** The **Config** tab displays the operating limits and default system configuration values programmed into the TPVS unit. This page is mainly used for verification and troubleshooting so the user can confirm the unit's voltage, frequency, temperature, and feedback correction settings. **Config Values:** • **MAX SYN VOLT:** Displays the maximum synthesized output voltage the unit is configured to allow. • **MIN SYN VOLT:** Displays the minimum synthesized output voltage the unit is configured to allow. • **MAX SYN FREQ:** Displays the maximum allowed synthesized frequency. • **MIN SYN FREQ:** Displays the minimum allowed synthesized frequency. • **DEFAULT FREQ:** Displays the default output frequency used by the system. In this example, the default frequency is **60.00Hz**. • **THERMAL CUTOFF:** Displays the temperature limit where the system considers the unit too hot and may restrict or stop operation. • **THERMAL RESTORE:** Displays the temperature level the unit must cool down to before normal operation can be restored. • **FB AMP COR:** Displays the feedback amplitude correction value used by the system. • **FB PHASE COR:** Displays the feedback phase correction value used by the system.

SCREEN	DESCRIPTION
 **This tab shows all connected MC devices, and you can move to other sections using the Prev and Next buttons, or switch tabs (Main Board, Others, etc.).**	*3.3.2.19 Configuration Info – Part Numbers Screen Overview* The **Part Numbers** tab displays the part numbers for the major hardware boards installed in the TPVS unit. This information is used for service, troubleshooting, hardware verification, and confirming the correct board assemblies are installed. **Part Number Fields:** • **MAIN BOARD P/N:** Displays the part number for the main control board installed in the unit. • **AMP BOARD 0 P/N:** Displays the part number for amplifier board 0, if available. • **AMP BOARD 1 P/N:** Displays the part number for amplifier board 1, if available. • **AMP BOARD 2 P/N:** Displays the part number for amplifier board 2, if available. If a field is blank, the part number is not currently available, not programmed, or not being reported by the system.
 **Navigation Buttons:** • **PREV: Returns to the Limitations tab**	*3.3.2.20 Configuration Info – Serial Numbers Screen Overview* The **Serial** Numbers tab displays the serial numbers for the major hardware boards installed in the TPVS unit. This information is used to identify specific installed components for service records, troubleshooting, warranty tracking, and hardware verification. **Serial Number Fields:** • **MAIN BOARD S/N:** Displays the serial number for the main control board installed in the unit. • **AMP BOARD 0 S/N:** Displays the serial number for amplifier board 0, if available. • **AMP BOARD 1 S/N:** Displays the serial number for amplifier board 1, if available. • **AMP BOARD 2 S/N:** Displays the serial number for amplifier board 2, if available. If a field is blank, the serial number is not currently available, not programmed, or not being reported by the system.

SCREEN	DESCRIPTION
 **Action Buttons (Bottom):** • **RESET DATE: Allows the user to reset calibration dates.** • **NEXT: Proceeds to the next calibration tab (Cal Notification).**	*3.3.2.21 Calibration Screen (Metrology Tab)* This screen provides calibration information for the system and allows management of calibration records. **Metrology Tab (Current View):** • **Date Calibrated:** Displays the date when the system was last calibrated (e.g., 08/21/2025). • **Calibration Due Date:** Shows the next scheduled calibration date (e.g., 08/21/2026). • **Calibration Tech:** Identifies the technician who performed the calibration (e.g., IG). **Tab Navigation:** • **Metrology:** Displays calibration record details (dates, technician). • **Cal Notification:** Opens configuration for calibration reminders and notifications (see next page).
 **Action Buttons:** • **CANCEL: Exits the window without saving changes.** • **SAVE: Triggers the confirmation warning before changes are applied.**	*3.3.2.22 Calibration Screen (Reset Popup)* This popup window allows the user to adjust and update calibration details. **Fields:** • **Date Calibrated:** Editable field showing the most recent calibration date. • **Calibration Due Date:** Editable field showing the next scheduled calibration date. • **Calibrated By:** Field identifying the entity or technician who performed the calibration (e.g., *TESCO*). **Warnings:** • A red message is displayed: *"WARNING YOU ARE CHANGING CALIBRATION DATE!"* • If **Save** is clicked, an additional confirmation warning appears: ○ *"ARE YOU SURE YOU WANT TO CHANGE CALIBRATION DATE!"* ○ The user must select **YES** to confirm or **NO** to cancel. • This ensures users understand that changing calibration dates without an actual calibration event will result in **incorrect or misleading records**.

SCREEN	DESCRIPTION
 **Button States:** ○ **Default (unchanged): Only the PREV button is active (returns to the Metrology tab).** ○ **Changed: If values are modified, the CANCEL and SAVE buttons become active.** ○ **CANCEL: Discards changes and restores previous settings.** ○ **SAVE: Saves the updated notification settings.**	*3.3.2.23 Calibration Screen (Metrology Tab)* This tab allows configuration of calibration reminder notifications. **Calibration Notification:** • **Cal Due Notification:** Checkbox to enable or disable calibration reminders. • **Days Before Calibration Due:** Field to set the number of days before the calibration due date when notifications should appear. ○ Example: *30 days* or *50 days.* This screen ensures that calibration reminders are issued in advance, helping maintain proper calibration schedules.

4.0 MAINTENANCE

4.1 Introduction

This chapter explains how to perform the routine user maintenance required to keep the Instrument in optimal operating condition.

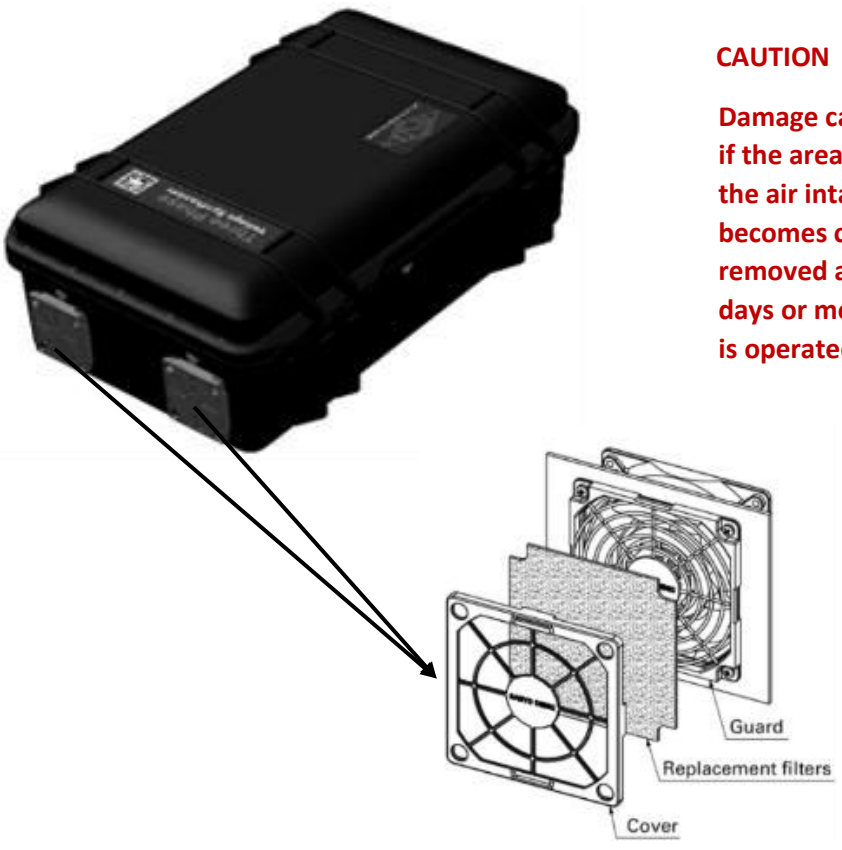
Most of the maintenance will be handled by the technical team from TESCO. The user can, however, perform the basic maintenance routine of cleaning the meter Voltage Synthesizer's external surface.

4.2 Cleaning the Equipment

The Voltage Synthesizer should be kept clean to ensure proper operation and long-term reliability. If dust, debris, or surface contamination is present, wipe the exterior enclosure with clean, dry cloth. Do not use solvents or excessive moisture when cleaning the unit.

4.2.1 Cleaning the Air Filters

The air filters are removable by snapping off the cover as shown in Figure 4.2.1. Clean the dust filter by air cleaning the product.



CAUTION

Damage caused by overheating may occur if the area around the fan is restricted, the air intake is too warm, or the air filter becomes clogged. The air filter must be removed and cleaned at least every 30 days or more frequently if the Instrument is operated in a dusty environment

Figure 4.2.1a Fan Filter Install/Removal

4.2.2 Cleaning the Instrument External Surface(s)

Clean the exterior of the Voltage Synthesizer using a soft cloth slightly dampened with either water or a non-abrasive mild cleaning solution that is not harmful to plastics.

CAUTION

Do not use hydrocarbons or chlorinated solvents for cleaning. They can damage the plastic materials used in the Voltage Synthesizer.

4.3 Repair/Parts Replacement/Recalibration

For equipment repair, parts replacement, and recalibration, directly contact TESCO through phone or email. See section **1.2 Contacting TESCO** for contact details. TESCO recommends recalibration once every three years. Further details can be found on the Calibration Certificate provided with your Voltage Synthesizer.

Figure 4.3.1a QR Code to 6440 Webpage.