TESCO METERING

OPERATIONS MANUAL

DESKTOP METER TEST STATION

CATALOG NO. DTS-2990

DESKTOP METER TEST STATION OPERATIONS MANUAL

DTS-2990

TESCO METERING

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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.

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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;
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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).
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5. The defective PRODUCT or part is returned in the original packing or packing approved by TESCO

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Introduction

State-of-the-Art Meter Accuracy Testing in an Affordable Desktop Configuration!

1.1

Tired of waiting for access to a production test board? Tired of wasting time going to another building to use test equipment? Need flexibility, state -of-the-art performance, and ease of use? If so, then TESCO's revolutionary 2990 Desktop Meter Test Station (DTS-2990) is the answer to what you need.

The 2990 revolutionizes meter testing by providing full series parallel meter testing in a small, budget-friendly desktop package.

A fully ANSI compliant test board, it offers complete testing of all meters under the widest range of test conditions. It can perform Manual Test, Sequence Testing, PLC Test, and Disconnect Test for meters with a wide array of forms. It has a database for storing and viewing of the test data.

The new waveform generator has all waveforms called out in ANSI C12.20-2015 (pub. 4/2017). All common electromechanical and solid-state meters up to 50 amps can be tested with the 2990 using the single voltage and three isolated current sources.

For more than 110 years customers have trusted TESCO for accuracy and reliability. When you think metering, think TESCO.

DTS- 2990 will be referred as "Instrument" all throughout the 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**.

General Safety Summary

1.3

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.**

1.4

Description of Safety-related Icons

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

1.5

Protective Earth / Grounding

WARNING

To avoid electrical shock or personal injury, do not intentionally or unintentionally interrupt the protective ground conductor inside or outside the Instrument. Interrupting the protective ground conductor is likely to make the Instrument dangerous. Intentional interruption is prohibited

Product Features

1.6.1 Key Features

1.6

- **Precise Measurement Accuracy for Voltage, Current & Power**
  - Simultaneous time and frequency domain measurements
- **Accurate Voltage and Current Setting**
- **Digital Waveform Generator**
  - Voltage Drive: 30-350V RMS, 490V PK (line to neutral)
  - Current Drive: 0.01A to 50A RMS, 75A PK
  - Arbitrary harmonically defined waveforms
  - Automatic Generation of all ANSI C12.20-2016 waveforms
- **True ZERO insertion force socket with automatic closure on meter insertion**
- **Powerful, multi-core, 32-bit processors**
- **Phase Fully adjustable as phase or power factor**
- **Built in, one voltage, three current reference standards traceable back to NIST**
- **Disconnect testing with supplemental power transformer**
- **Demand, time-run, and timed registration test capabilities**

1.6.2 Standard Features

- **GRAPHICAL USER INTERFACE (GUI)**
  Displayed on a 5” 800x480, full color TFT LCD screen
- **ETHERNET CONNECTIVITY**
  100 BaseT with support for: Web Services, Remote Control, Database Access. 7” RJ45 standard (blue) and crossover (red) cables are provided.
- **INTEGRATED CONTROL KEYPAD**
  The keypad is embedded in the front panel.
- **METER FORMS SUPPORT** *(Please inquire for adding any other meter forms)*
  1S-6S, 8S-17S, 25S, 26S, 29S, 32S,35S, 36S, 45S, 46S, 56S, 66S, 76S, 103S, 106S, 109S, 112S, 116S, 125S, 135S, 136S, 145S, 166S
- **TEST MANAGER APPLICATION (TMA) INTEGRATION**
  Computer control software package to enable full control of the board and test data storage via external PC.
- **OPITCAL PICKUP**
  The Instrument comes with an optical pickup (1037-DTS)

1.6.3 Optional Features

- A-Base Test Board Adapter
- 1180 K-Base Test Board Adapter
- Adapter for calibrating the unit
- Diamond Support with Calibration Service
- Stand-alone calibration of the unit
- Wedge (2490) and Mechanical Pickup (2480) for testing mechanical meters

1.7 General Specifications

1.7.1 Input Characteristics

PARAMETERS	DATA
Power Supply	120 VAC, 10A
Supply Frequency	45-65Hz

1.7.2 Dimensions

PARAMETERS	DATA
Height	18.19” (46.20 cm)
Width	15.50” (39.37 cm)
Depth	13.13” (33.35 cm)
Weight	52 lbs (23.58 kg)

1.7.3 Measurements Accuracy

Valid for 50Hz/60Hz and Current of 0.2A to 50A.

PARAMETERS	DATA
Voltage Measurement Accuracy	±0.02%
Current Measurement Accuracy	±0.02%
Power Measurements Accuracy (Watts / VA / VAR)	±0.04%, ±0.02% typical
Energy Measurements Accuracy (WHrs / VAHrs / VARHrs)	±0.04%, ±0.02% typical

1.8 About this Operations Manual

This manual provides complete information for installing and operating the Instrument. This document instructs the user on the following operations of the DTS-2990:

- Installation
- Front Panel Features
- Graphical User Interface (GUI)
- How to set up the machine for remote operation using PC Application
- Instrument Maintenance

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2.1 Introduction

This chapter provides instructions for unpacking and installing the Instrument. Read this chapter before you operate the Instrument. Instructions for cable connections can be found here.

2.2 Unpacking and Inspection

The Instrument is shipped in a container designed to prevent damage during shipping.

Inspect the Instrument carefully for damage, and immediately report any damage to the shipper. A packing list is included in the packaging. When you unpack the Instrument, check for all the standard equipment listed and check the shipping order for any additional items ordered. Report any shortage to the place of purchase to your distributor or directly to TESCO.

2.3 Set up, Airflow and Cooling Considerations

2.3.1 Setup and Placement

The Instrument is suitable for bench top use if there is enough space to allow proper ventilation. Please see suggested placement of the setup.

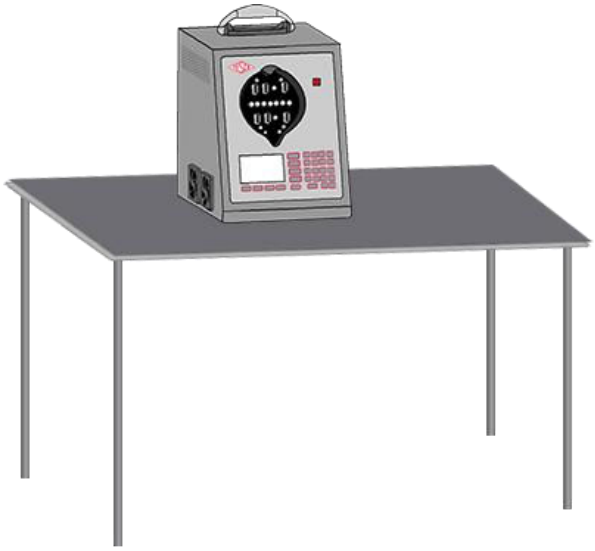


Figure 2.3a Benchtop Suggested Setup

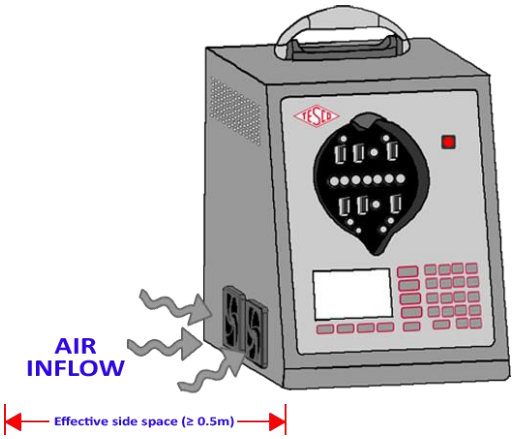
IMPORTANT CONSIDERATIONS:

Since the Instrument is a benchtop device, the table should:

1- Be stable (should not have loosely, shaky joints)
2- Have table legs that are stationary or non-rollers. In case rollers are present, ensure that the rollers are properly locked to avoid unnecessary movements.

2.3.2 Airflow

Take note of the Instrument's airflow as seen in the illustration. This always for a table top, never on a rack. Please allow enough airspace at the side with at least half a meter for an effective airflow.

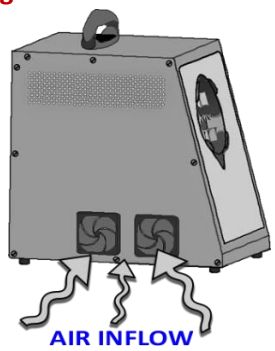


CAUTION

Damage caused by overheating may occur if the area around the air intake is restricted, the intake air is too warm, is interfered, or the air filter becomes clogged.

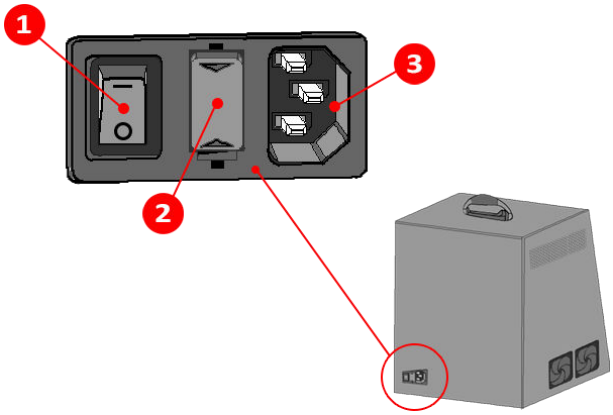
The inlet and exhaust holes must be clear of obstruction. The air entering the instrument must be between 5 °C and 35 °C. Make sure that exhaust from another instrument is not directed into the fan inlet.

Check and clean the air filter every 30 days or more frequently if the Instrument is operated in a dusty environment. Refer to §5.3 for additional info.



2.4 Main Power Supply

The Instrument can be powered by plugging it to a 120V-Single Phase AC line. An AC line power cord is provided.



1- Power Switch
2- 5A Fuse
3- 3-prong Single Phase 120V AC Line

WARNING

The Instrument should only be plugged to an AC outlet with a 90 – 120V voltage range to avoid damaging the Instrument.

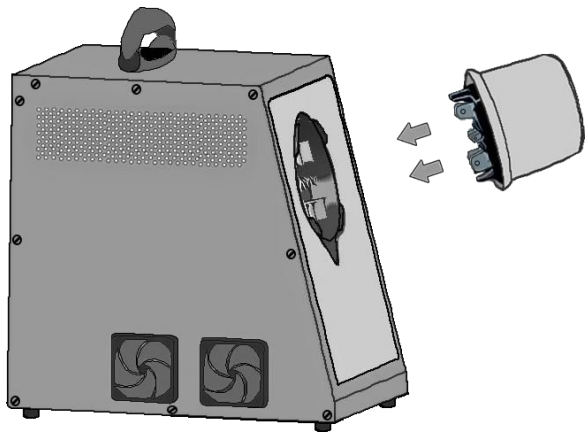
To avoid electrical shock, personal injury, or fire hazard, connect the factory-supplied three-conductor-line power cord to a properly grounded power outlet.

During test operation, a two-conductor adapter or extension cord MUST NOT be used. This will break the protective ground connection and will affect the measurement accuracy of the Instruments.

The power outlets supplying the Instrument system should be controlled by an emergency switch so that power can be switched off if a hazard arises.

2.5 Utility Meter Insertion/Extraction

The electric meter socket requires **zero insertion force** to mount a meter, as well as to dismount it, upon pressing the meter release button.



WARNING

Is instrument the 2990?
When mounting a meter, the Instrument must be switched OFF. In both mounting or dismounting a meter, the Instrument should not be performing a test to avoid electrical shock, personal injury, or fire hazard.

The meter release button* is only operational when the Instrument is powered up. No meter can be dismounted when the Instrument is powered off.

*When the button lights up in glowing red, it can be pressed to dismount a meter.

INSERTION: To load a meter into the socket, ensure meter is oriented properly. Then insert meter into socket, keeping the meter weight fully supported. The device will automatically clamp to the jaws of the meter. When the METER RELEASE indicator turns on, the meter is fully supported. Align optical pickup to meter prior to testing.

EXTRACTION: To remove the meter from the socket, ensure optical pickup is removed from the face of the meter. Support the meter shell then press the METER RELEASE button. Once the METER RELEASE indicator turns off, the meter is safe for removal from the socket.

NOTE: The socket cannot be powered unless a meter is installed, and if the release button is pressed, power to the socket will be shut off.

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3.3.7 SEQUENCE TESTING ..... **Error! Bookmark not defined.**

3.3.8 TIME & USER INFORMATION ..... **Error! Bookmark not defined.**

3.3.9 SYSTEM INFORMATION ..... **Error! Bookmark not defined.**

3.3.10 NETWORK SETUP ..... **Error! Bookmark not defined.**

3.4 Optical Pickup Alignment 26

3.1 Introduction

This chapter is a reference for the functions and locations of the Instrument's front panel features and provides brief descriptions of each feature for quick access. **Please read this information before operating the Instrument.** Front panel operating instructions for the Instrument are provided in this chapter and Remote Operating instructions are in Chapter 4.

3.2 Front Panel Features

Front panel features (including all controls, displays, indicators, and terminals) are shown in Figure 3.2.1a. Each front panel feature is briefly described in Table 3.2.1.

3.2.1 Front Panel Sections

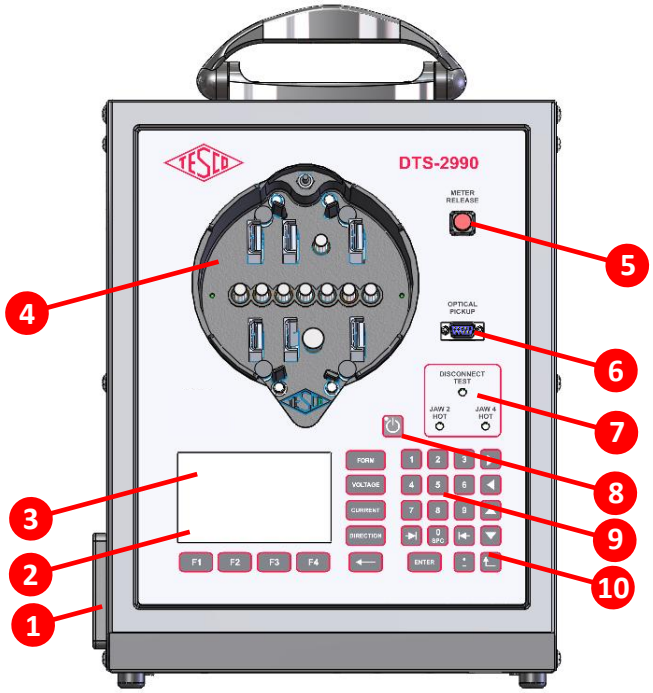


Figure 3.2.1a DTS-2990 Front Panel

NUMBER	DESCRIPTION
1	Air inlet
2	Function keys
3	LCD screen
4	Meter socket
5	Meter release button
6	Optical Pickup port
7	Disconnection Test indicators
8	Power button
9	Keypad
10	Navigation buttons

Table 3.2.1. DTS-2990 Front Panel Sections

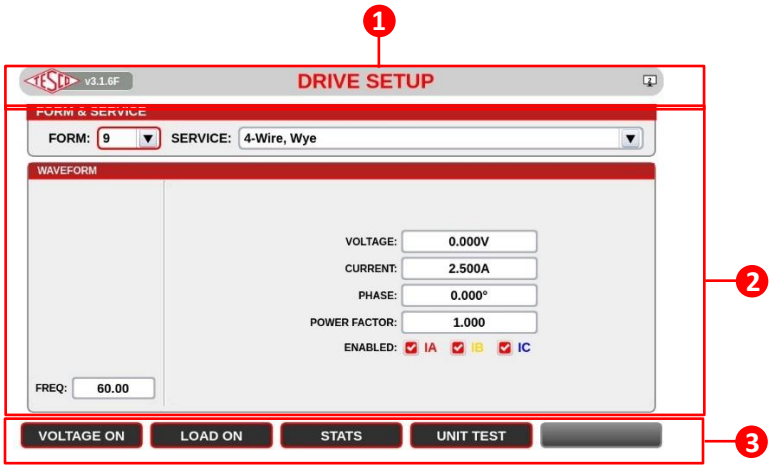
3.2.2 Navigation Keys

Symbol	Description
▲ or ▼	Functions any of the following: • Selects the NEXT or PREVIOUS **MENU** item. • Moves the **SELECTED LINE** UP or DOWN • Select an Item from a dropdown menu
◀ or ▶	Functions any of the following: • Moves the cursor left/right of the current character in text boxes. • Moves the selection left/right of the current selected cell in tables.
⇤ or ⇥	Selects the NEXT or PREVIOUS **TAB** item.
FORM	Press to highlight the form entry list box. A form can be selected from the list by using the UP or DOWN ARROWS or directly entered using the numeric keypad.
VOLTAGE	Press to highlight the voltage entry text box. Any voltage between 30.00 to 480.00 volts can be entered.
CURRENT	Press to highlight the current entry text box. Any current between 0.1 and 50.00 amps can be entered. If the selected form is a transformer rated form then the maximum will be restricted to 20.00 amps.
DIRECTION	Press to highlight the phase entry box. Any phase between -359.9 to 359.9 degrees can be entered. When reverse is selected, it has the effect of adding 180 degrees to the current vector.
←	Deletes the previous character
↑	Returns to the previous screen
F1 F2 F3 F4	Function Keys
⏻	Power button
ENTER	Selects a response

3.3 The Graphical User Interface (GUI)

3.3.1 Graphical User Interface (GUI) Screens

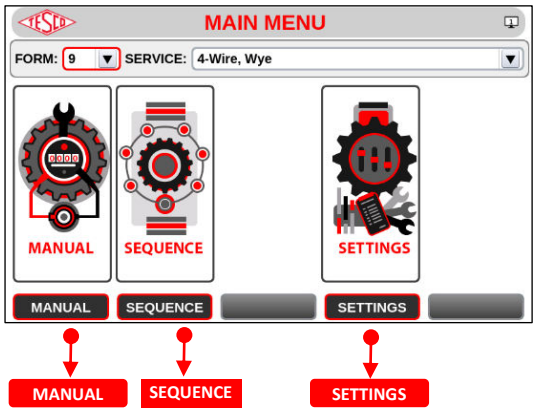
The user interface is divided into four sections. In the screen, any field that is grayed out cannot be changed or accessed by the user.



NUMBER	DESCRIPTION
1	Screen Title
2	Screen Data
3	Function Buttons

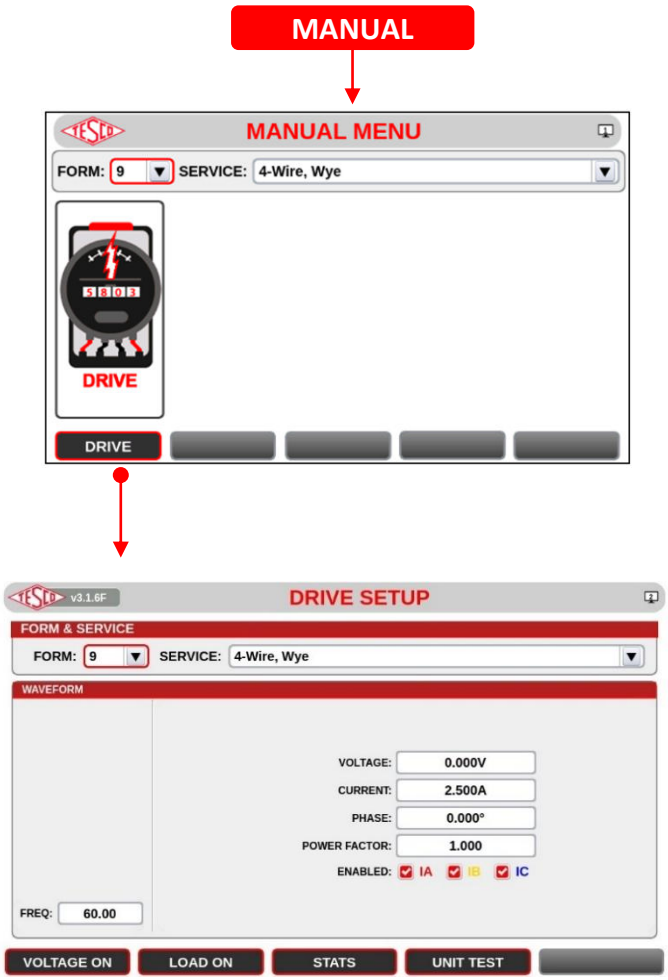
Table 3.3.1. DTS-2990 GUI Sections

3.3.2 MAIN MENU

SCREEN	DESCRIPTION
	**3.3.2.1 MANUAL MENU** The MAIN MENU screen consists of the following function buttons: MANUAL, SEQUENCE, & SETTINGS. Press the arrow keys to navigate through the main menu or directly press the function keys. **KEYPAD & FUNCTION KEYS** MANUAL — Press to perform MANUAL TEST SEQUENCE — Press to perform SEQUENCE TEST SETTINGS — Press to open the SETTINGS screen To return to the previous screen press at any time.

3.3.3 MANUAL TEST

SCREEN	DESCRIPTION



3.3.3.1 MANUAL MENU

KEYPAD & FUNCTION KEYS

DRIVE	Press to open the DRIVE SETUP screen

3.3.3.2 DRIVE SETUP MENU

DRIVE SETUP is for manual setup of the waveform generator. Once manual setup is configured to the desired test, run a single test by pressing the UNIT TEST button.

KEYPAD & FUNCTION KEYS

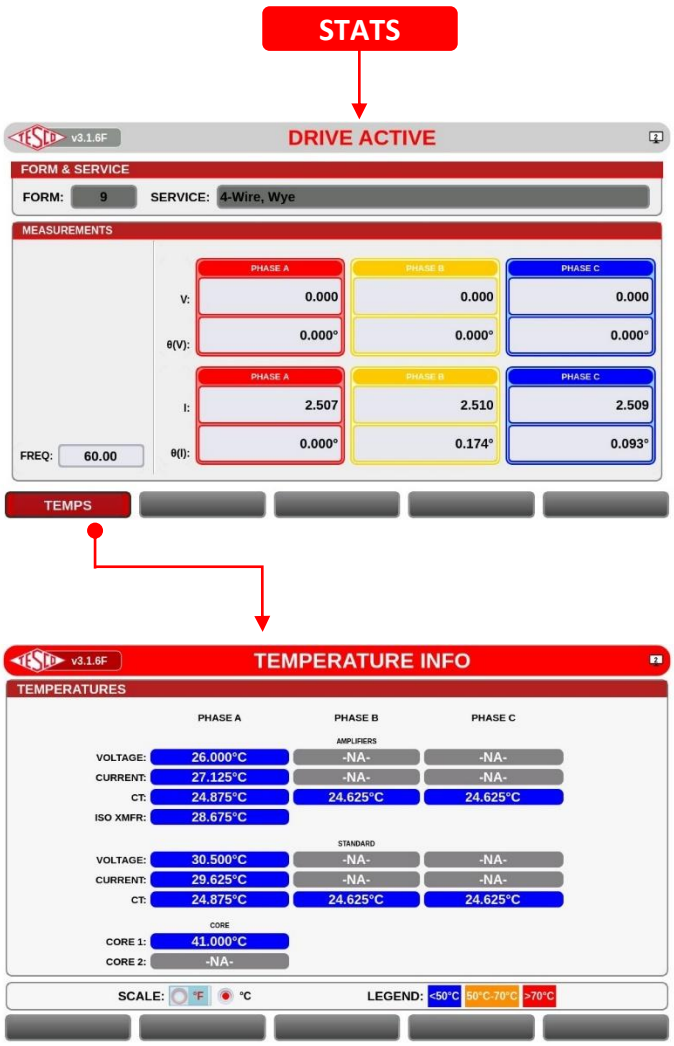
VOLTAGE ON	Press to enable service voltage only to the socket
LOAD ON	Press to enable service voltage & load current to the socket
STATS	Press to display live voltage and current data on DRIVE ACTIVE screen
UNIT TEST	Press to open to the UNIT TEST SETUP screen

DATA (DRIVE SETUP)

FORM	Form number of the meter (auto-populates the default Kh in the Kh field)
SERVICE	Services available for selected meter form
FREQ.	Frequency (Hz) of generated waveform
VOLTAGE	Voltage generated by Instrument
CURRENT	Current generated by Instrument
PHASE	Current phase angle with respect to A phase voltage
POWER FACTOR	The cosine of the phase angle that lies between the voltage and current waveforms

WARNING: *If either VOLTAGE ON or LOAD ON is enabled, the Screen Title will blink in red. This indicates there is potential and ∠ or ≠ current present at the meter terminals.*

SCREEN	DESCRIPTION



3.3.3.3 DRIVE ACTIVE

This screen displays the operational statistics of the test being conducted.

KEYPAD & FUNCTION KEYS

TEMPS	Press to open the TEMPERATURES screen

DATA

FORM	Voltage measured by the Instrument
SERVICE	Services available for the selected meter form
FREQ.	Frequency (Hz) of the generated waveform
VOLTAGE	Voltage measured by Instrument
VOLTAGE PHASE θ(V)	Voltage phase angle with respect to the reference frame
CURRENT	Current measured by the Instrument
CURRENT PHASE θ(I)	Current phase angle with respect to A phase voltage

3.3.3.4 TEMPERATURE DURING TEST

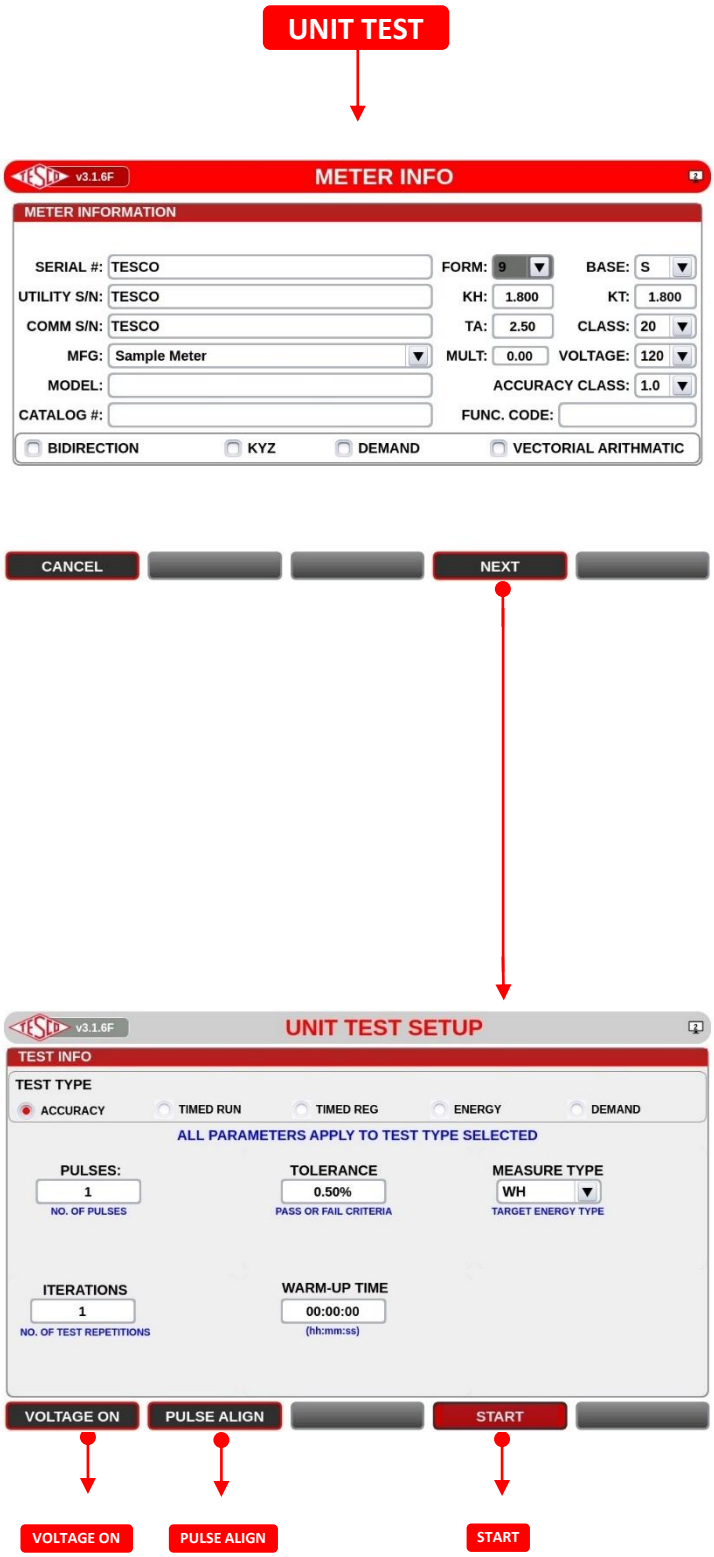
This screen displays temperatures of internal circuit boards.

DATA (TEMPERATURE INFO)

PHASE A	Displays data for PHASE A
PHASE B	Displays data for PHASE B
PHASE C	Displays data for PHASE C
AMPLIFIERS	Displays the information for Amplifiers
STANDARD	Displays the information for Standard
CORE	Displays the information for the core
VOLTAGE	Displays the voltage temperature
CURRENT	Displays the current temperature
CT	Displays the CT temperature
ISO XMFR	Displays the Isolation Transformer temperature
CORE 1	Displays the temperature of core 1
CORE 2	Displays the temperature of core 2
SCALE	Select to display the temperature in °F or °C

3.3.4 UNIT (SINGLE) TEST

SCREEN	DESCRIPTION



3.3.4.1 METER INFORMATION

This screen allows the user to enter new meter information.

NOTE: *Data entry is available only when the meter is inserted in socket.*

KEYPAD & FUNCTION KEYS

CANCEL	Returns to the previous screen
NEXT	Saves changes and proceeds to UNIT TEST SETUP TEST INFO screen

DATA (METER INFO)

SERIAL #	Serial number of the meter
UTILITY S/N	Serial number provided by Utility (if applicable)
COMM S/N	Serial number of communication device (if applicable)
MFG.	Manufacturer's name
MODEL	Model number of the meter
CATALOG	Catalog # of the meter
FORM	Form number of the meter (auto-populates the default Kh in the Kh field)
BASE	Meter base (S, K, A, etc…)
KH	Watt hours per revolution of disk
KT	Watt hours per pulse
TA	Test Amps (RMS of a full load test)
CLASS	Meter class (determines maximum current and auto-populates the default test amps in TA field)
MULT	Multiplier
VOLTAGE	Displays the voltage
ACCURACY CLASS	Accuracy of the meter
FUNC. CODE	Functional code specified by the user
BIDERCTIONAL	Select if meter has bidirectionality functionality
KYZ	Select if meter has KYZ functionality
DEMAND	Select if meter has demand functionality
VECTORIAL ARITHMATIC	Calculation of the vector

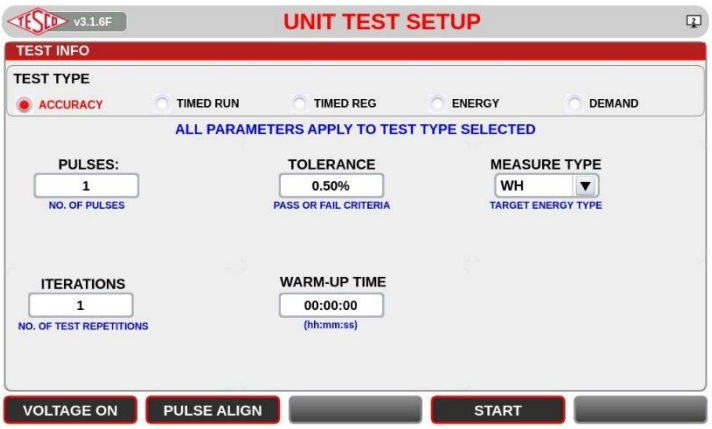
3.3.4.2 UNIT TEST SETUP

This enables the configuration of the desired single test to be conducted.

KEYPAD & FUNCTION KEYS

VOLTAGE ON	Press to enable service voltage to the socket
PULSE ALIGN	Press to align optical pickup. Refer to **§3.4** for additional information on this feature
START	Press to start UNIT TEST

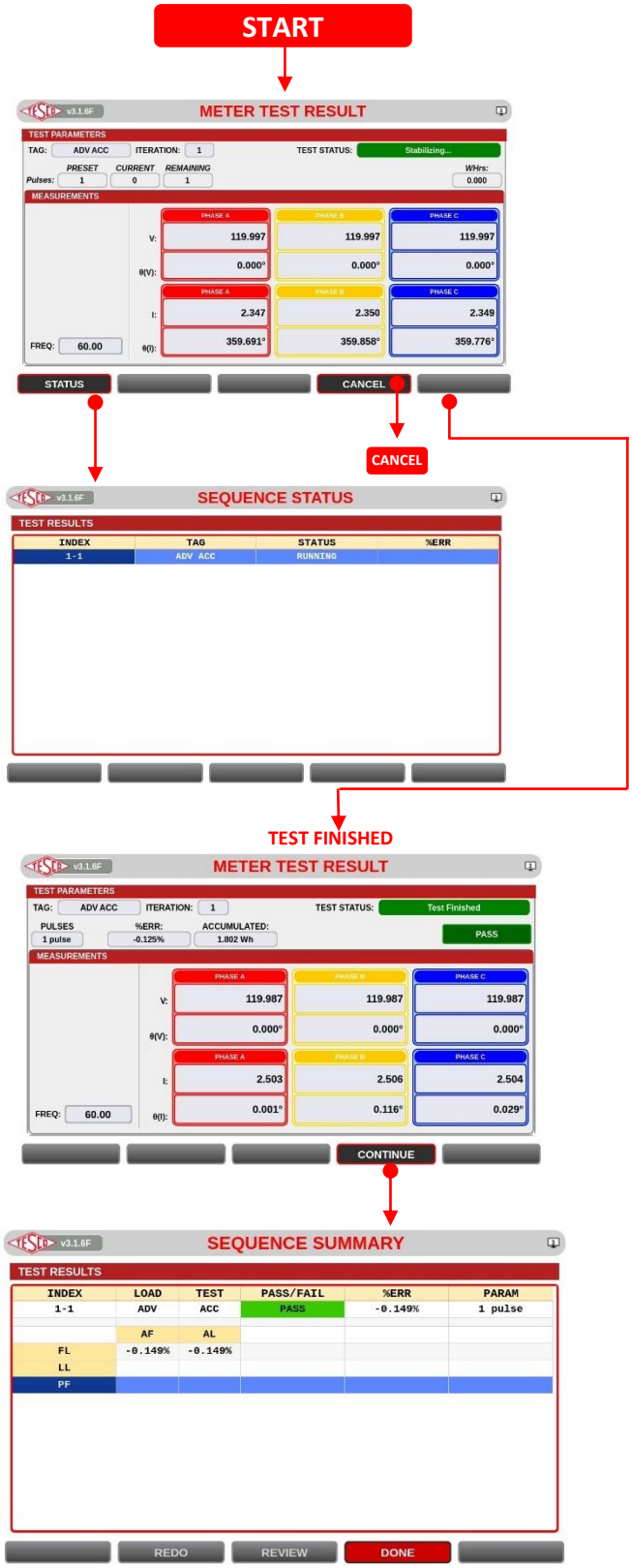
TEST STARTED



DATA (UNIT TEST SETUP)

TEST TYPE	**ACCURACY**	Performs accuracy test
	TIMED RUN	Performs test with a predefined duration
	TIME REG	Prompts the user for the meter's measured register, runs a test for a predefined duration. Then prompts the user for the meter register again and uses that as meter's measured power
	ENERGY	Energy delivery test
	DEMAND	Runs a demand test
PULSES	Number of pulses	
TOLERANCE	Tolerance needed for pass/fail criteria	
MEASURE TYPE	Target energy type	
ITERATIONS	Number of times the test will be repeated	
WARM-UP TIME	Period of time for meter to stabilize prior to test execution	

WARNING: *If either VOLTAGE ON or LOAD ON is enabled, the Screen Title will blink in red. This indicates there is potential and / or / current present at the meter terminals.*



3.3.4.3 UNIT TESTING

This screen shows the user the on-going tests and the results.

NOTE: *Data entry is available only when meter is inserted in socket.*
TEST IN PROGRESS – test results are live actual measured values.
TEST FINISHED – teste results are averaged measured values.

KEYPAD & FUNCTION KEYS

STATUS	Proceeds to test SEQUENCE STATUS
CANCEL	Cancels the TESTING PROCESS
CONTINUE	Continues a completed test
DONE	Closes the test results and returns to UNIT TEST SETUP screen

DATA (SEQUENCE STATUS)

INDEX	Test index (first digit) and iteration index (second digit)
TAG	Alias or brief description of the test
STATUS	Status of the test
%ERR	Percentage error

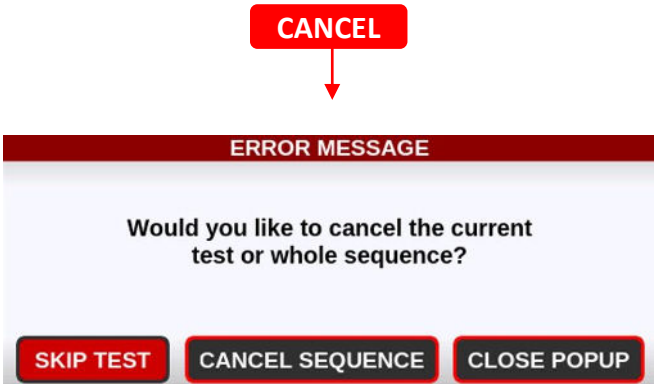
DATA (METER TEST RESULT)

TAG	Alias or brief description of the test
ITERATION	Current repeat of test number
TEST STATUS	The current status of the test
PRESET	Pulse required
CURRENT	Pulse count
REMAINING	Pulse remaining
WHrs	Measured real energy
PULSES	Number of pulses
% ERR	Percentage error
ACCUMULATED	Accumulated Wh
FREQ.	Frequency (Hz) of generated waveform
VOLTAGE	Voltage measured by Instrument
VOLTAGE PHASE θ(V)	Voltage phase angle with respect to reference frame
CURRENT	Current measured by Instrument
CURRENT PHASE θ(I)	Current phase angle with respect to A phase voltage

DATA (SEQUENCE SUMMARY)

INDEX	Test index (first digit) and iteration index (second digit)
LOAD	Load test type (FL/LL/ADV, etc.)
TEST	Meter test type
PASS / FAIL	Shows if the test passed or failed
%ERR	Percentage error
PARAM	Parameters specified depending on test type

WARNING: *If either VOLTAGE ON or LOAD ON is enabled, the Screen Title will blink in red. This indicates there is potential and / or current present at the meter terminals.*



3.3.4.4 CANCEL TEST

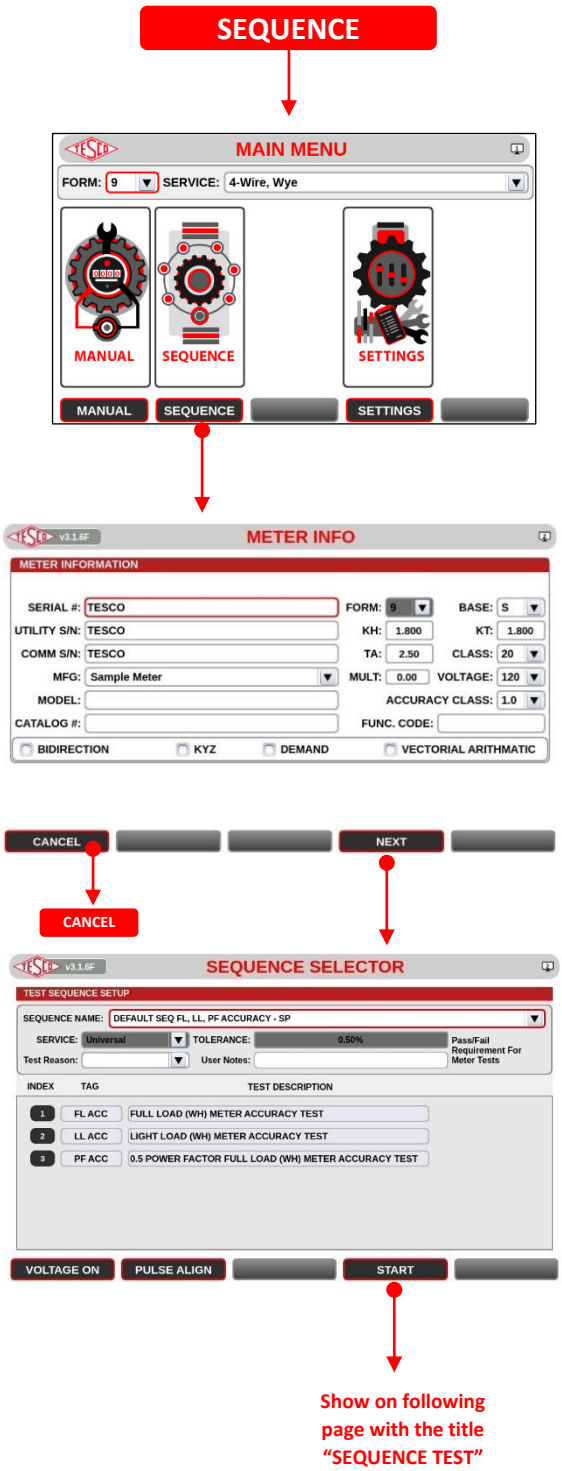
This pop-up will appear if the cancel button is pressed during a test or sequence. Navigate the popup using the arrow keys and the "ENTER" key to select an option.

KEYPAD & FUNCTION KEYS

SKIP TEST	Skips the TEST being performed
CANCEL SEQUENCE	Cancels the SEQUENCE Test
CLOSE POPUP	Closes the POP-UP

3.3.5 SEQUENCE TESTING

SCREEN	DESCRIPTION



3.3.5.1 SEQUENCE SELECTOR

METER INFORMATION

This screen allows the user to enter new meter information.

NOTE: *Data entry is available only when meter is inserted in socket.*

KEYPAD & FUNCTION KEYS

CANCEL	Cancels the TESTING PROCESS
NEXT	Saves the Meter Information and continues to the Sequence Selector Test

DATA (METER INFO)

SERIAL #	Serial number of the meter
UTILITY S/N	Serial number provided by Utility (if applicable)
COMM S/N	Serial number of the communication device (if applicable)
MFG.	Manufacturer's name
MODEL	Model number of the meter
CATALOG	Catalog # of the meter
FORM	Form number of the meter (auto-populates the default Kh in the Kh field)
BASE	Meter base (S, K, A, etc…)
KH	Watt hours per revolution of disk
KT	Watt hours per pulse
TA	Test Amps (RMS of a full load test)
CLASS	Meter class (determines max current and auto-populates the default test amps in TA field)
VOLTAGE	Displays the voltage
MULT	Multiplier
ACCURACY CLASS	Accuracy of the meter
FUNC. CODE	Functional code specified by the user
BIDERCTIONAL	Select if meter has bidirectionality functionality
KYZ	Select if meter has KYZ functionality
DEMAND	Select if meter has demand functionality
VECTORIAL ARITHMATIC	Calculation of the vector

NOTE: *Test results will not be saved if the Meter Serial Number is left blank.*

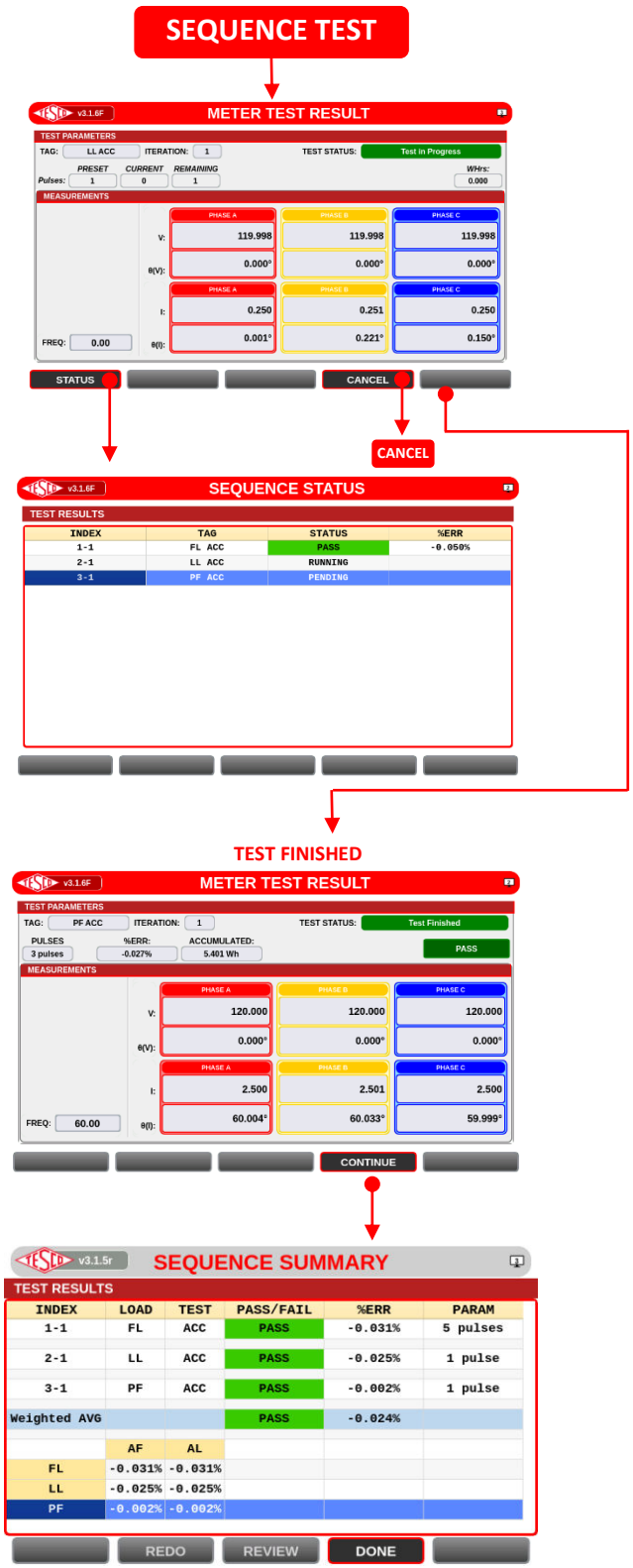
KEYPAD & FUNCTION KEYS

VOLTAGE ON	Press to enable service voltage to the socket
PULSE ALIGN	Press to enter pulse alignment mode and show the number of pulses from the meter
START	Starts the sequence test

DATA (SEQUENCE SELECTOR)

SEQUENCE NAME	Sequences available for selected meter form
SERVICE	Services available for selected meter form
TOLERANCE	Pass/Fail tolerance requirements for Meter Tests
Test Reason	Reason for generating the test
User Notes	User generated notes for the test
TAG	Alias or brief description of the test
TEST DESCRIPTION	Description of the TESTS performed

SCREEN	DESCRIPTION



3.3.5.2 SEQUENCE ACTIVE

This screen shows the live results of the tests.

KEYPAD & FUNCTION KEYS

STATUS	Proceeds to test SEQUENCE STATUS
CANCEL	Cancels the TESTING PROCESS
CONTINUE	Continues a completed test
DONE	Closes the test results and returns to UNIT TEST SETUP screen
REDO	Repeats a test
REVIEW	Reviews the test results

DATA (SEQUENCE STATUS)

INDEX	Test index (first digit) and iteration index (second digit)
TAG	Alias or brief description of the test
STATUS	Status of the test
%ERR	Percentage error formula

DATA (METER TEST RESULT)

TAG	Alias or brief description of the test
ITERATION	Current repeat of test number
TEST STATUS	The current status of the test
PRESET	Pulse required
CURRENT	Pulse count
REMAINING	Pulse remaining
WHrs	Measured real energy
FREQ.	Frequency (Hz) of generated waveform
VOLTAGE	Voltage measured by Instrument
VOLTAGE PHASE θ(V)	Voltage phase angle with respect to reference frame
CURRENT	Current measured by Instrument
CURRENT PHASE θ(I)	Current phase angle with respect to A phase voltage

DATA (SEQUENCE SUMMARY)

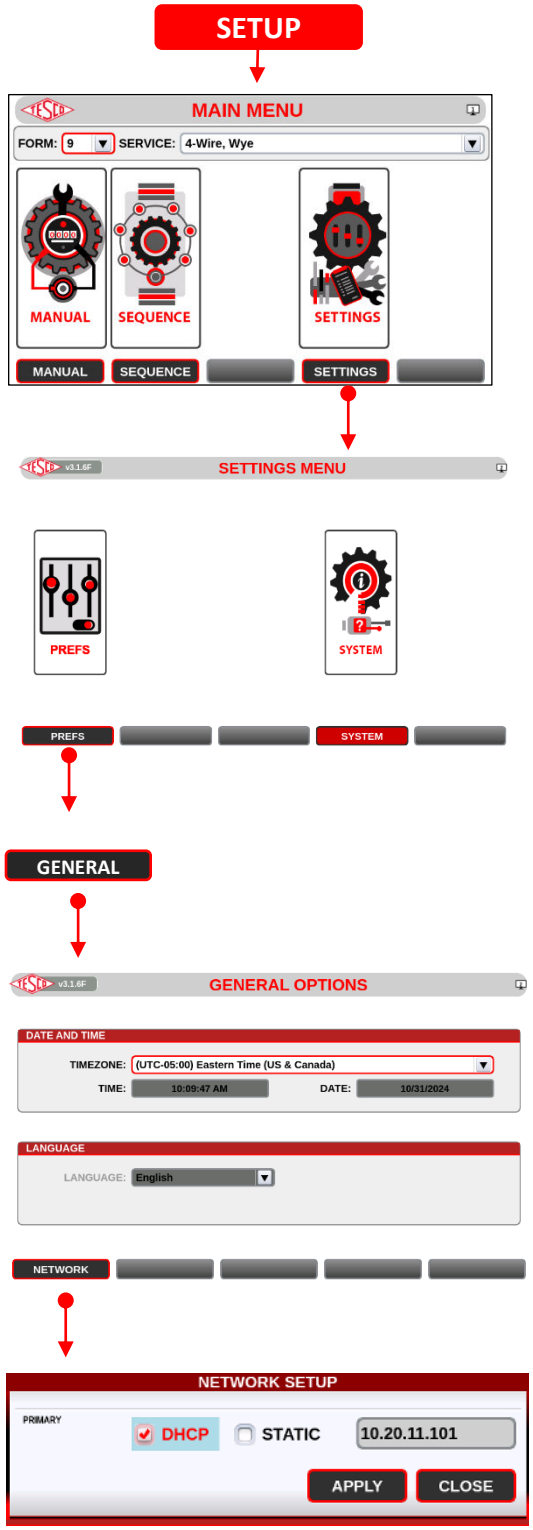
INDEX	Test index (first digit) and iteration index (second digit)
LOAD	Load test type (FL/LL/ADV, etc.)
TEST	Meter test type
PASS / FAIL	Shows if the test passed or failed
%ERR	Percentage error formula
PARAM	Parameters specified depending on test type

WARNING: *If either VOLTAGE ON or LOAD ON is enabled, the Screen Title will blink in red. This indicates there is potential and / or current present at the meter terminals.*

METER TEST RESULT

3.3.6 DATE, TIME, AND NETWORK

SCREEN	DESCRIPTION



3.3.6.1 SETUP MENU

Navigate the SETTINGS menu with the function keys.

KEYPAD & FUNCTION KEYS

SETTINGS	Proceeds to the SETTINGS Menu
PREFS	Proceeds to the GENERAL OPTIONS Menu

3.3.6.2 GENERAL OPTIONS

Navigate the GENERAL OPTIONS menu with the keypad.

KEYPAD & FUNCTION KEYS

NETWORK	Proceeds to the NETWORK Menu

DATA (GENERAL OPTIONS)

TIMEZONE	Select for user specified IP address
TIME	Displays the time
DATE	Displays the date in MM/DD/YYYY format
LANGUAGE	Use this to change the language displayed

3.3.6.3 NETWORK SETUP

Display and edit required network settings.

KEYPAD & FUNCTION KEYS

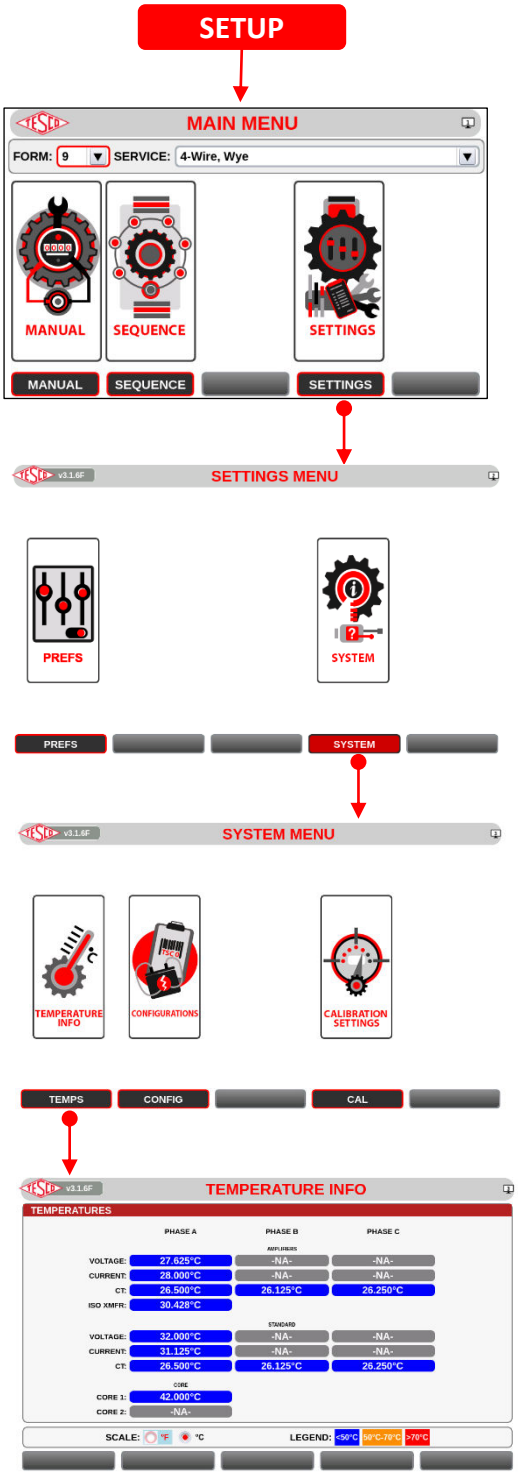
APPLY	Applies network settings
CLOSE	Closes the dialog box and returns to the DATE and TIME

DATA (NETWORK SETUP)

DHCP	Select for network assigned IP address
STATIC IP	Select for user specified IP address

3.3.7 TEMPERATURE, CONFIGURATION, AND CALIBRATION

SCREEN	DESCRIPTION



3.3.7.1 SETUP MENU

Navigate the SETTINGS menu with the function keys.

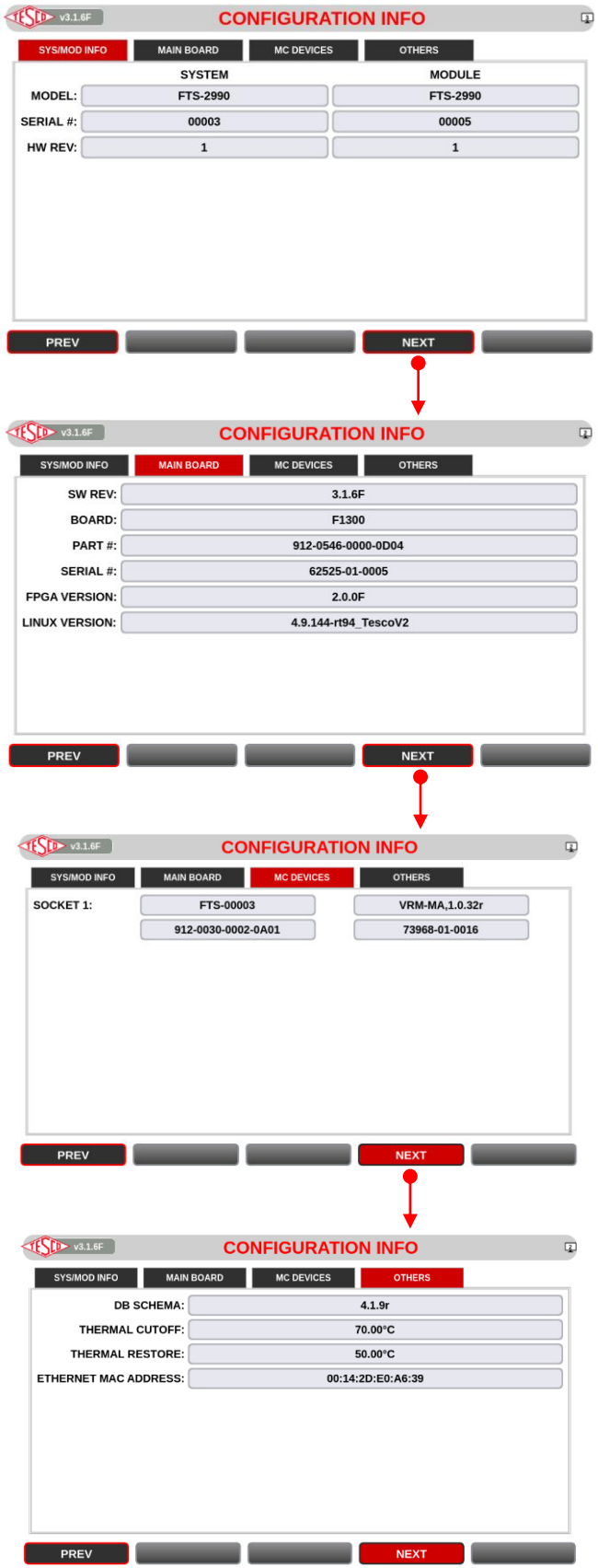
KEYPAD & FUNCTION KEYS

SETTINGS	Proceeds to the SETTINGS Menu
SYSTEM	Proceeds to the SYSTEM Menu
TEMPS	Proceeds to the TEMPS Menu
CONFIG	Proceeds to the CONFIG Menu
CAL	Proceeds to the CAL Menu

3.3.7.2 TEMPERATURE INFO MENU

DATA (TEMPERATURE INFO)

PHASE A	Displays data for PHASE A
PHASE B	Displays data for PHASE B
PHASE C	Displays data for PHASE C
AMPLIFIERS	Displays the information for Amplifiers
STANDARD	Displays the information for Standard
CORE	Displays the information for the core
VOLTAGE	Displays the voltage temperature
CURRENT	Displays the current temperature
CT	Displays the CT temperature
ISO XMFR	Displays the Isolation Transformer temperature
CORE 1	Displays the temperature of core 1
CORE 2	Displays the temperature of core 2
SCALE	Select to display the temperature in °F or °C



3.3.7.3 CONFIGURATION INFO MENU

Navigate the SETTINGS menu with the function keys.

KEYPAD & FUNCTION KEYS

CONFIG	Proceeds to the CONFIG Menu
PREV	Goes back to the SYSTEM Menu
NEXT	Proceeds to the configuration info screens

DATA (SYS/MOD INFO)

SYSTEM	Displays information for the system
MODULE	Displays information for the module
MODEL	Displays the model name
SERIAL #	Displays the serial number
HW REV	Displays the hardware revision

DATA (MAIN BOARD)

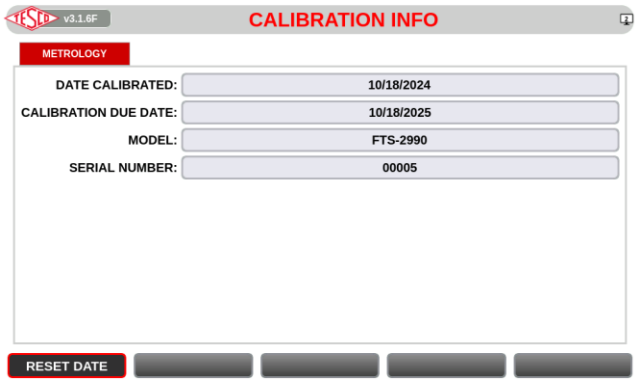
SW REV	Displays the software revision
BOARD	Displays the board model
PART #	Displays the board part identifier
SERIAL #	Displays the serial number
FPGA VERSION	Displays the version of the FPGA
LINUX VERSION	Displays the version of the Linux distribution

DATA (MC DEVICES BOARD)

SOCKET 1	Displays information for the components of the socket

DATA (OTHERS)

DB SCHEMA	Displays the schema of the database
THERMAL CUTOFF	Displays the thermal cutoff temperature in °C
THERMAL RESTORE	Displays the thermal restoration temperature in ° C
ETHERNET MAC ADDRESS	Displays the Ethernet Mac Address



3.3.7.4 CONFIGURATION INFO MENU

Navigate the SETTINGS menu with the function keys.

KEYPAD & FUNCTION KEYS

CAL	Proceeds to the CONFIG Menu
RESET DATE	Resets the calibration date

DATA (METROLOGY)

DATE CALIBRATED	Displays the date the unit was calibrated
CALIBRATION DUE DATE	Displays the due date for the next calibration
MODEL	Displays the model name of the unit
SERIAL NUMBER	Displays the serial number of the unit

3.4 Optical Pickup Alignment

Plug the optical pickup into the OPTICAL PICKUP port. Mount the meter into the socket and attach magnetic optical pickup to optical port of meter. For meter insertion and extraction, refer to section **2.5 Utility Meter Insertion/Extraction.**

To remove the optical pickup, hold it by the body and gently pull away from the meter. There is an indicator light showing that the pickup has power. If alignment is difficult to achieve, the PULSE ALIGN feature is available to assist with alignment.

4.0 REMOTE OPERATIONS

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4.2 Installation 28

4.3 Network Configuration 28

4.4 Functionalities 28

4.4.1 NETWORK VIEW 28

4.4.2 TEST 29

4.4.3 METER DATABASE 29

4.4.4 WAVEFORM SETUP 29

4.4.5 TEST SEQUENCE 30

4.4.6 MANUAL TEST 30

4.1 Introduction

This chapter provides a brief introduction on how to remotely operate the Instrument, conduct test, and manage information using Test Manager Application (TMA). Additional information can be found on certain sections in the TMA Operations Manual.

4.2 Installation

In the installation, only **TMA_Setup.exe** is needed. Please refer to Section **1.2 The Installation** in the TMA Operations Manual for instructions.

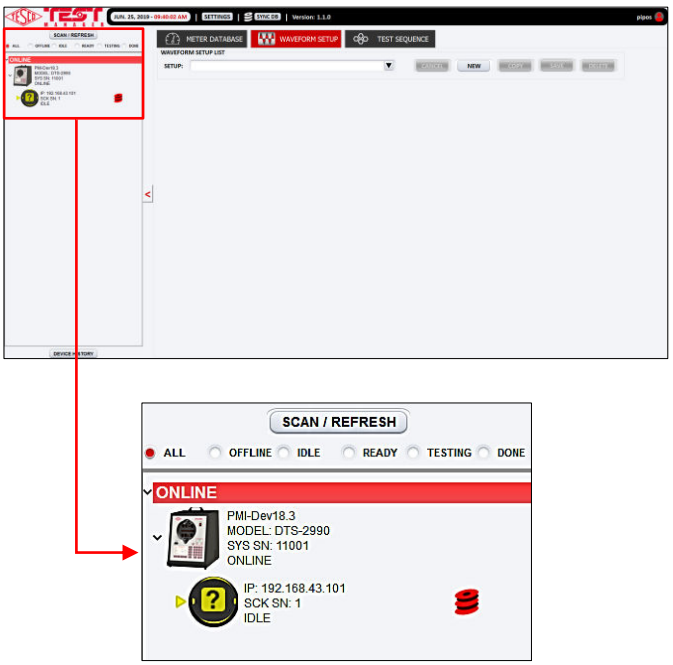
4.3 Network Configuration

Remote access requires establishing the connection between the Instrument and TMA. Please refer to Section **1.3 Configuring the TMA Software** in the TMA Operations Manual for instructions.

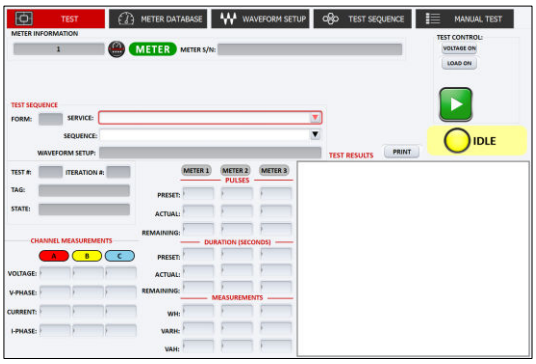
For setting the network connections on the Instrument, refuter to **§3.3.11.**

4.4 Functionalities

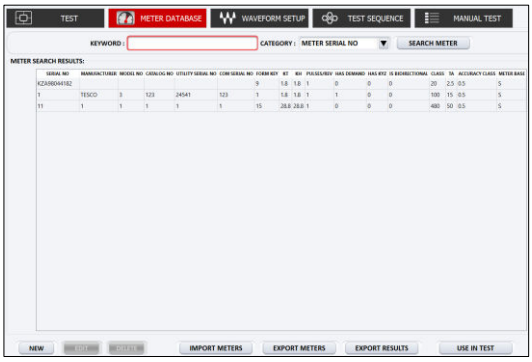
4.4.1 NETWORK VIEW

SCREEN	DESCRIPTION
	**NETWORK VIEW** This provides information on the NextGen devices that are connected to the network. If the list is empty, click **SCAN/REFRESH** to scan the devices connected to the network. Please refer to the TMA Operations Manual section **2.3.3 Network Discovery (NET SCAN)** for more details. Once the list is filled, look for the **DTS-2990** model and check if the device is online or offline. If offline, the device needs to be manually turned on. If online, click the device to enable the **TEST** and **MANUAL TEST** tabs. Navigate to the **METER DATABASE** tab, select a meter information, and click **USE IN TEST** button to proceed with the test. For more details, please refer to the TMA Operations Manual section **2.3.4 View Scan Details** and **2.3.5 Network View Functionality**.

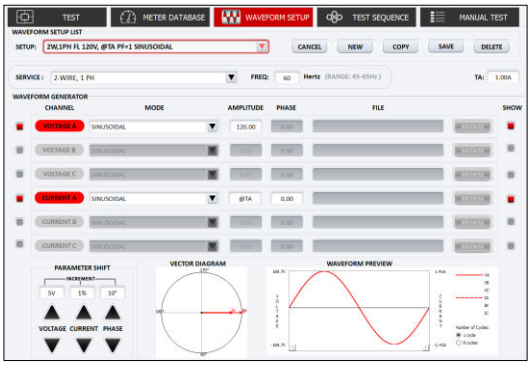
4.4.2 TEST

SCREEN	DESCRIPTION
	**TEST** This is where the test is conducted. Results will also be displayed here as the test is being executed. For more details on the configurations for the test, please refer to the TMA Operations Manual section **2.3.6 TEST**.

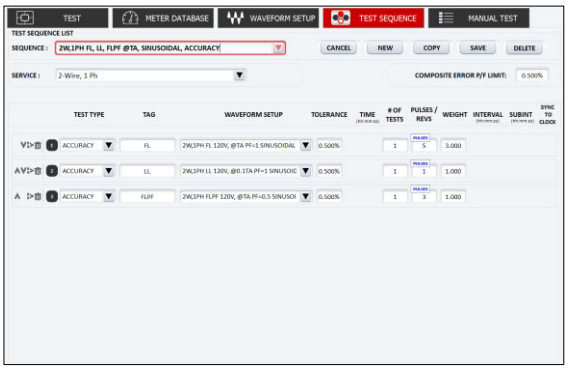
4.4.3 METER DATABASE

SCREEN	DESCRIPTION
	**METER DATABASE** This enables the management of meter information saved in the application database. For more details on meter database configuration, please refer to the TMA Operations Manual section **2.3.7 METER DATABASE TAB**.

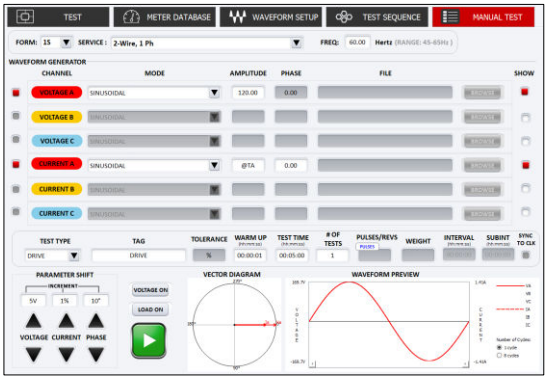
4.4.4 WAVEFORM SETUP

SCREEN	DESCRIPTION
	**WAVEFORM SETUP** This enables the configuration of different types of waveforms. It allows creating, copying, and editing any setup to comply to your specific test requirements. For more details on waveform setup, please refer to the TMA Operations Manual section **2.3.8 WAVEFORM SETUP TAB**.

4.4.5 TEST SEQUENCE

SCREEN	DESCRIPTION
	**TEST SEQUENCE** This is used to configure test sequences. It allows creating, copying, and deleting test sequences, as well as setting up complex test scenarios that can be run on the TEST panel. For more details on test sequence configuration, please refer to the TMA Operations Manual section **2.3.9 TEST SEQUENCE TAB**.

4.4.6 MANUAL TEST

SCREEN	DESCRIPTION
	**MANUAL TEST** This allows the user to adjust all system parameters on the fly and run a single test at a time. It does not use predefined sequences. For more details on conducting a manual test, please refer to the TMA Operations Manual section **2.3.10 MANUAL TEST TAB**.

5.0 MAINTENANCE

5.1 Introduction 32
5.2 Replacing the Fuse 32
5.3 Cleaning the Air Filters 33
5.4 Cleaning the Instrument External Surface 34

5.1 Introduction

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

The topics covered in this chapter include:

- Replacing the Fuse
- Cleaning the Air Filter
- Cleaning the Instrument External Surface

5.2 Replacing the Fuse

The power fuse IS accessible from the Instrument's rear panel. See Figure 5.2.

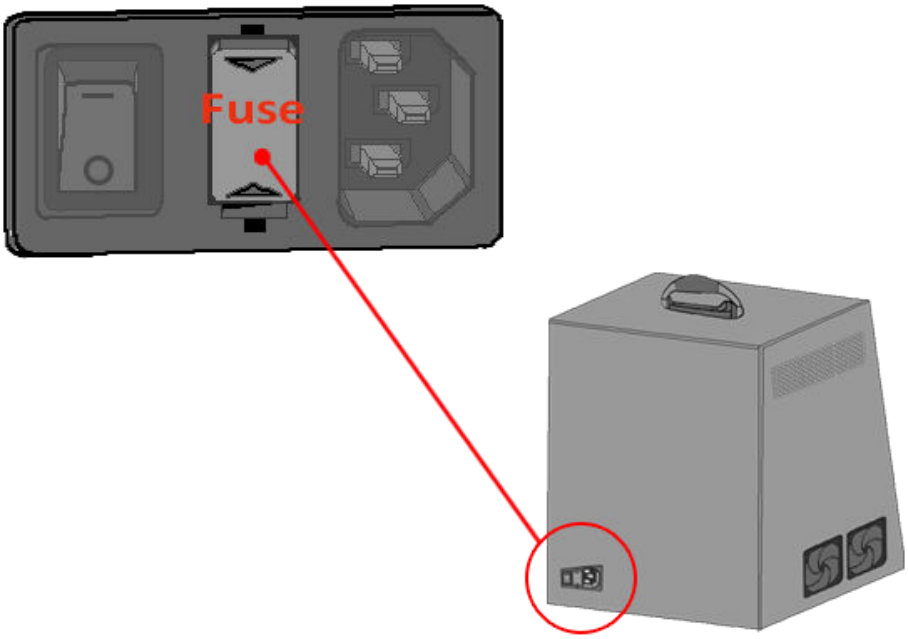


Figure 5.2 DTS-2990 Fuse Location

WARNING

To avoid electrical shock or personal injury, ensure that the Instrument is switched off and disconnected by removing the line power cord from the power input socket before attempting to access the power fuse.

To access & replace the fuse, proceed as follows:

1. Disconnect line power.

2. Using a standard 5mm wide screwdriver, insert it to the slit and pull upwards for both ends until the cap and fuse are disengaged.

3. Pull the fuse holder and replace the defective fuse. Use below the recommended fuse ratings and manufacturer in Table 5.2.

4. Return the fuse holder by pushing down the cap until it completely closes.

Table 5.2. Recommended Fuse Replacement

Description	Voltage	Amperage
AC DC Fuse Cartridge, Glass, Time Delay, 5mm x 20mm	250V	5.0A

5.3 Cleaning the Air Filters

The fan air filters are accessible from the left-side front of DTS-2990. See Figure 5.3a.

CAUTION

Damage caused by overheating may occur if the area around the fan is restricted, the intake air 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.

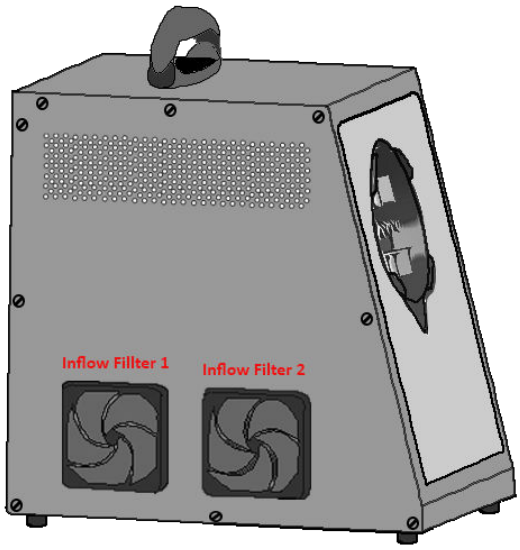


Figure 5.3a DTS-2990 Fan Filter Location

Inflow Filter 1 protects the heating elements of Power Board circuitry compartment from the dust that comes in together with the air inflow.

Inflow Filter 2 protects the equipment's inside electrical parts from the dust that comes in together with the air inflow.

To access and clean the air filters, proceed as follows:

1. Disconnect line power.
2. Remove the filter retainer by holding its two upper corners or two lower corners and pulling it outward until it disengages from the fan guard.
3. Remove the air filter that is in between the Filter Retainer and Fan Guard. See figure 5.3b.
4. Clean the filter by washing it in soapy water. Rinse and dry it thoroughly before reinstalling.
5. Place the filter at the back of the retainer.
6. Reinstall the retainer in the fan guard. The retainer is snapped on the four sides for the fan guard.

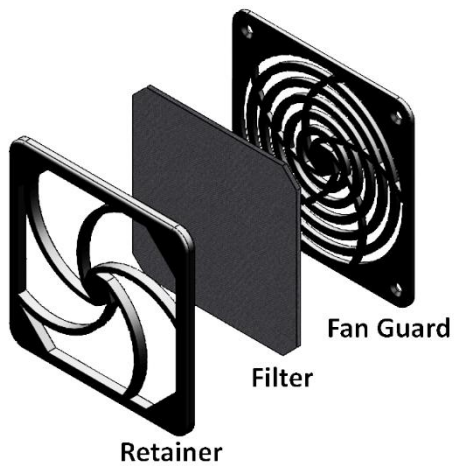


Figure 5.3b: DTS-2990 Fan Filter Assembly

5.4 Cleaning the Instrument External Surface

Clean the exterior of the instrument 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 Instrument.

6.0 CONFIGURATIONS

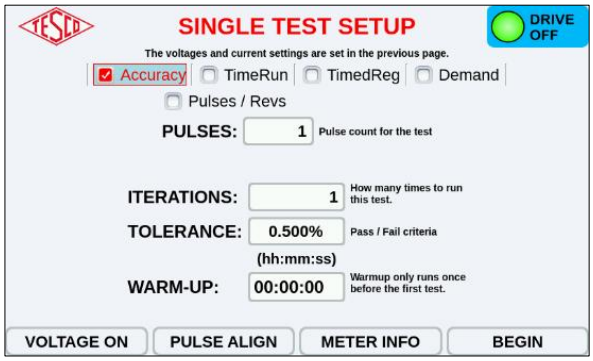
6.1 Single Test **36**

6.2 Sequence Test **36**

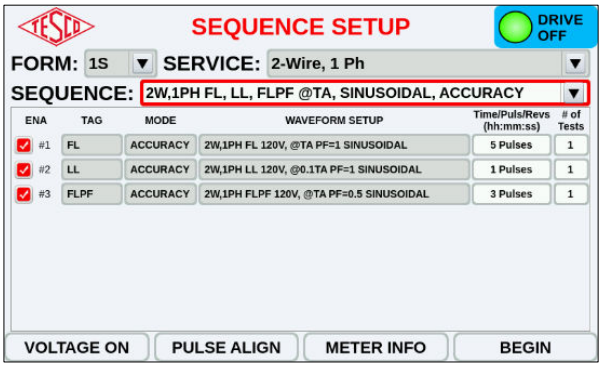
6.3 Disconnect Test **37**

6.4 PLC Test **38**

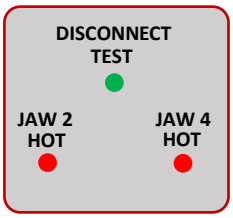
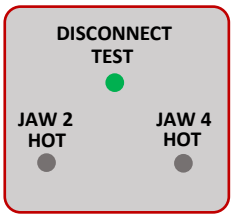
6.1 Single Test

SCREEN	STEPS
	**1.** From the MAIN MENU, press F1 to access MANUAL TEST. **2.** Configure the Drive Setup. Once everything is set, press F4 to access METER INFO. SOCKET. **3.** Enter the meter's details and press F4 to proceed with the SINGLE TEST SETUP. **4.** Configure as desired. Only one test type can be selected per test. **5.** Press F4 to begin the test.

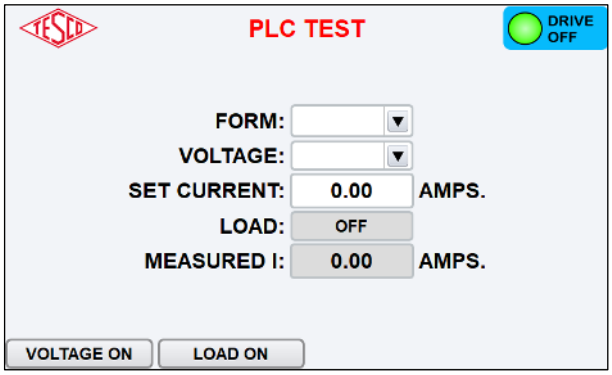
6.2 Sequence Test

SCREEN	STEPS
	**1.** From the MAIN MENU, press F2 to access TEST SELECTION. **2.** Press F1 to open METER INFO SOCKET 1 screen and enter the meter's details. **3.** Press F4 to open SEQUENCE SETUP screen and choose the desired SEQUENCE TEST. **4.** Press F4 to begin with the test and view the live feed for the results.

6.3 Disconnect Test

SCREEN	STEPS
 **Figure 6.3.1-Disconnect test in enabled state.**  **Figure 6.3.2-Successful disconnect test.**	**1.** From the MAIN MENU, press F2 to access TEST SELECTION. **2.** Press F4 to enter DISCONNECT TEST. The green DISCONNECT TEST indicator will turn on. **3.** Press F1 to enable service voltage to socket. **4.** Optional: To set load current, press CURRENT to highlight load current data box and enter desired value. **5.** Optional: Press F2 to enable load current. Note: BACKVOLTAGE will enable automatically. **6.** Once voltage is applied, and the meter service disconnect is closed, the red JAW HOT indicators will turn on. Refer to **Figure 6.3.1**. **NOTE:** For Form 1S, the JAW4 HOT indicator will not turn on. **7.** Open the meter service disconnect. If successful, the JAW HOT indicators, LOAD current and BACKVOLTAGE (if enabled) will all turn off. Refer to **Figure 6.3.2**. **8.** If BACKVOLTAGE is turned on separate from LOAD, it will not turn off automatically if the meter disconnect is opened. BACKVOLTAGE can be turned on while a meter disconnect is opened. If BACKVOLTAGE is on, but the meter disconnect is open, the JAW HOT indicator lights will turn on.

6.4 PLC Test

SCREEN	STEPS
	**1.** From the MAIN MENU, press F2 to access TEST SELECTION. **2.** Press F3 to access PLCT TEST. **3.** Press F1 to enable service voltage only to socket or press F2 to enable both service voltage and current to socket. The results will show once voltage and load are enabled.

7.0 FREQUENTLY ASKED QUESTIONS

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7.1 Introduction

This section aims to answer frequently asked questions when operating the Instrument. Some of these answers refer to certain sections in this manual to provide more information.

7.2 Test

1. **Is it possible to perform multiple types of test simultaneously?**
   Only one type of test can be executed at a time.
2. **How many repetitions can I set for a test?**
   The limit for test repetitions is 99.
3. **What meter forms can be tested?**
   The device can test most, if not all, meter forms. For a complete list of the forms, see section **1.6.2 Standard Features**.

7.3 Software

1. **How can I obtain the firmware update file?**
   You can directly contact TESCO through phone or email. For the contact details, see Section **1.2 Contacting TESCO**.
2. **When should I update the software?**
   Updates are managed by TESCO. For contact details, see section **1.2 Contacting TESCO**.
3. **How frequent are the updates?**
   Updates are managed by TESCO. For contact details, see section **1.2 Contacting TESCO**.

7.4 Hardware

1. **Where/Who can I ask for replacement parts?**
   For repair concerns, please contact TESCO. See section **1.2 Contacting TESCO**.
2. **Are there any tests I can perform to check hardware performance?**
   For maintenance concerns, please contact TESCO. See section **1.2 Contacting TESCO**.

8.0 TROUBLESHOOTING

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8.1 Troubleshooting

1. **No Power-Check.**
   Make sure the power cord is plugged into the outlet. Check the power outlet, fuse, or circuit breaker.

2. **Test won't be able to proceed.**
   Check if correct meter form is selected.

3. **I inserted a meter, but when I try to start a test, the unit prompts me to insert a meter.**
   The meter may not be fully seated. Press the METER RELEASE button, remove the meter, and reinsert the meter into the socket. Make sure you hold the meter in place until the METER RELEASE indicator light turns on.

For more information on troubleshooting, please contact TESCO. See section **1.2 Contacting TESCO** for contact details.