THE EASTERN SPECIALTY COMPANY

OPERATIONS MANUAL

METER QUALIFICATION BOARD

PRODUCT:

DMS – 2199

MQB

METER QUALIFICATION BOARD OPERATIONS MANUAL

DMS-2199 & MQB

THE EASTERN SPECIALTY COMPANY

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LIMITED WARRANTY & LIMITATION OF LIABILITY[A1]

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;
2. Is operated in accordance with instructions, if any, supplied by TESCO;
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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1.1 Introduction

A New Generation of Single-Phase Meter Boards bring reimagined possibilities to your fingertips!

TESCO's 2199 Desktop Meter Qualification Board can generate any voltage and load conditions the meter may encounter in the field. Apply non-sinusoidal voltages with complex load waveforms and perform disconnect tests and reconnect tests without having to worry about being able to drive the meter's switches.

Aside from a desktop version, the Meter Qualification Boards can be banked together to provide any number of sockets required. Disconnect testing is a standard on all TESCO MQBs and each socket position is designed to accommodate any meter form requested.

To make things easier, an optional software is included, and it allows the user to program test scripts that permit users to run extended, predefined test protocols.

Both the DTS–2199 and MQB will be referred to as "Instrument" all throughout the operational manual.

1.2 Contacting TESCO

To contact TESCO, call one of the following telephone numbers:

- Technical Support: 215.785.2338
- Calibration/Repair: 215.785.2338

Visit our website at www.tescometering.com or send an email to support@tescometering.com.

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

1.3 General Safety Summary

This manual contains information and warnings that must be observed to ensure safe operation and to 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, or dusty conditions, or if exposed to explosive gas.**
- **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.

1.6 Product Features

1.6.1 Key Features

- **Accurate Voltage and Current Setting**
- **Digital Waveform Generator**

  - Voltage Drive:
    - DMS-2199: 30-480V RMS, 680V PK
    - MQB: 60-480V RMS, 680V PK
  - Current Drive:
    - DMS-2199: 0.01A to 50A RMS, 75A PK
    - MQB: 0.001A 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**
- **Disconnect testing with supplemental power transformer**
- **Power Line Carrier Communication Testing**

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
- **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

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support@tescometering.com

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	DMS-2199	MQB
Height	18.19" (46.20 cm)	Vary by product
Width	15.50" (39.37 cm)	Vary by product
Depth	13.13" (33.35 cm)	Vary by product
Weight	52 lbs (23.58 kg)	Vary by product

1.7.3 Measurements Accuracy

Valid for 50Hz/60Hz and Current of 0.2A to 50A.[A3]

PARAMETERS	DMS-2199	MQB
Voltage Measurement Accuracy	±0.02%	±1.0%
Current Measurement Accuracy	±0.02%	±1.0 %

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 DMS-2199 and MQB products:

- 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 Setup, 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. The Instrument can be rack-mounted as well. Please see suggested placement per setup.

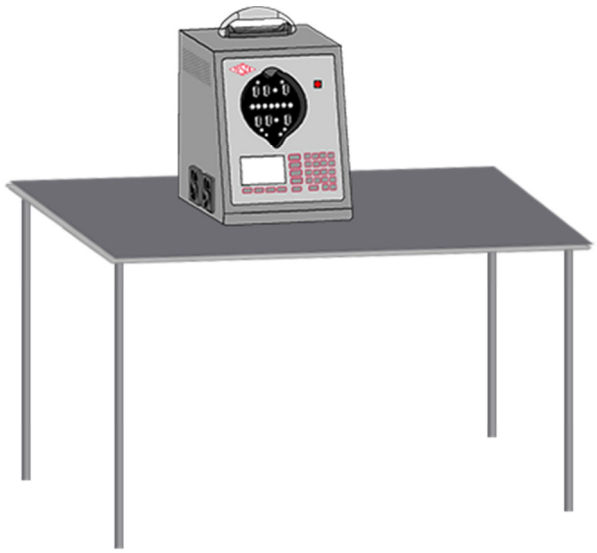


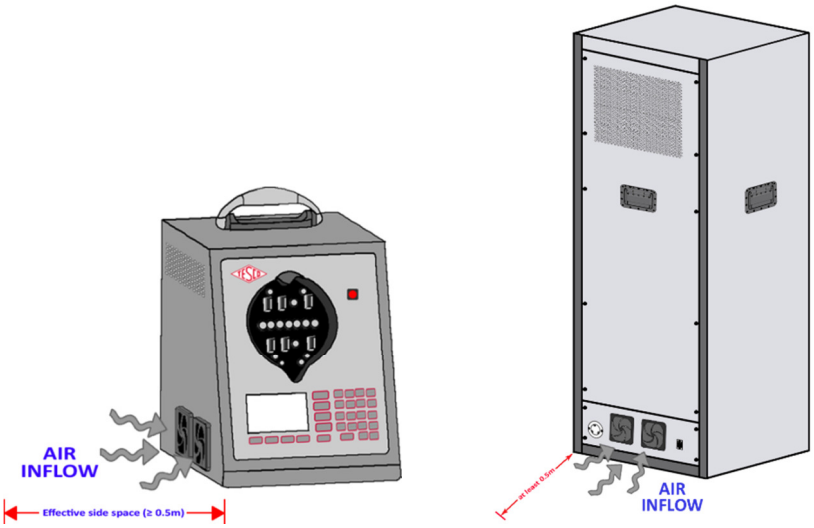
Figure 2.3a Benchtop Suggested Setup

IMPORTANT CONSIDERATIONS:

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

1- Be stable (not shakey or doesn't have loosely 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 is applicable for benchtop setup for the DTS-2199 and the regular setup for the MQB. Please allow enough airspace on the side with at least half a meter for an effective airflow.

CAUTION

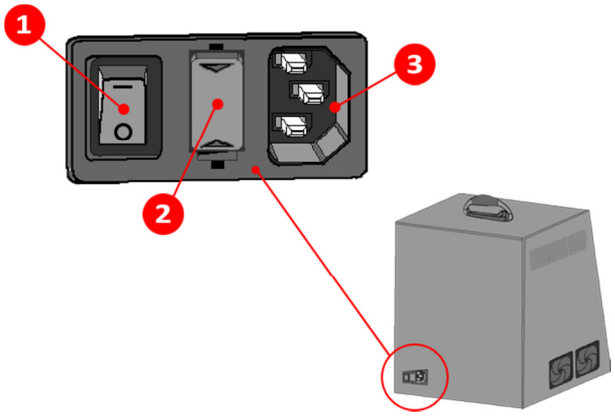
Damage caused by overheating may occur if the area around the air intake is restricted, too warm, or interfered, or if the air filter becomes clogged.

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 device 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.

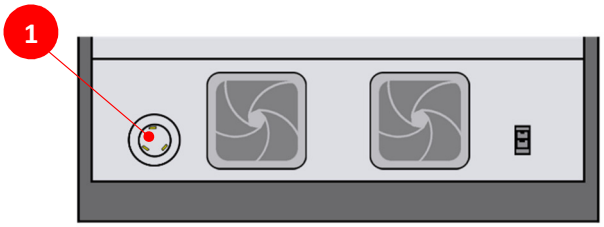
2.4 Main Power Supply

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



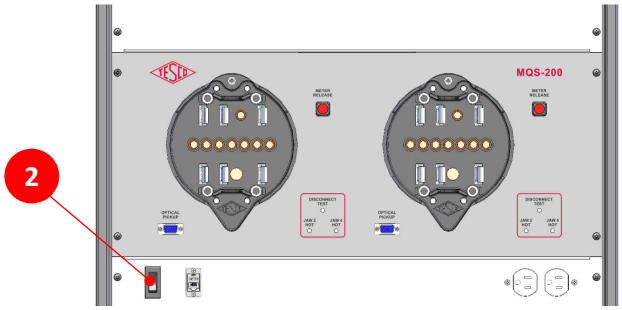
1- Power Switch
2- 5A Fuse in L1 & L2 individually
3- 3-prong Single Phase 120V AC Line

DTS-2199 Rear Panel



1- Power Inlet Port
2- Power Switch

MQB-12 Rear Panel



MQB-12 Front Panel

WARNING

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

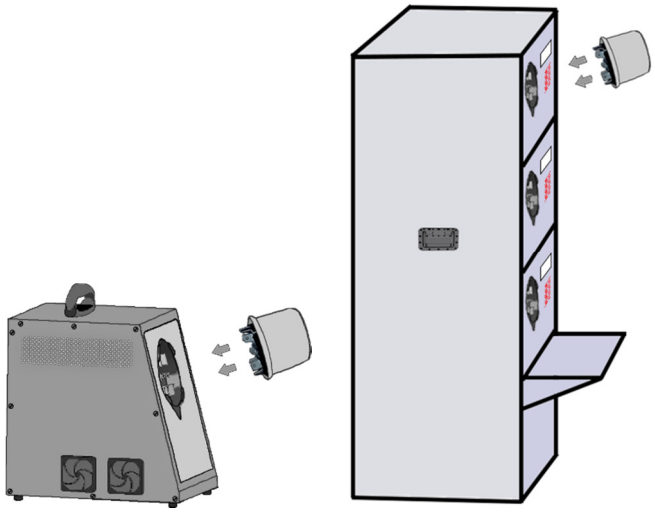
To avoid electrical shock, personal injury, or fire hazard, connect the factory-supplied three-conductor-line power cord to a properly grounded power outlet.

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 Instrument.

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 Consideration

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

When mounting a meter, the Instrument must be switched OFF – or not performing a test – to avoid electrical shock, personal injury, or fire hazard.

When dismounting a meter, the Instrument should not be performing any 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.

2.6 Meter Insertion/Extraction

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.

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.

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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 for DMS-2199 and Figure 3.2.2a for MQB-12. Each front panel feature is briefly described in Table 3.2.1 and Table 3.2.2.

3.2.1 DMS-2199 / MQB Front Panel

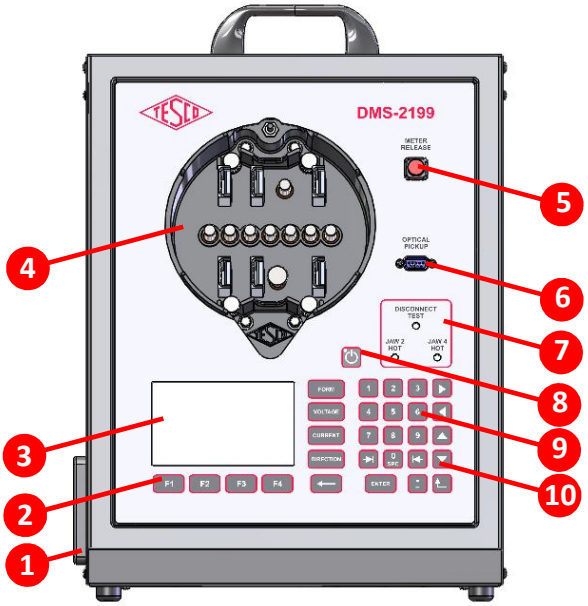


Figure 3.2.1a DMS-2199 Front Panel

NUMBER	DESCRIPTION
1	Air outflow
2	Function keys (not available on slave units)
3	TFT LCD Screen. 5" 800x480, full color TFT LCD screen (not available on slave units)
4	Meter Socket
5	Meter release button
6	Optical Pickup port
7	Disconnection Test Display
8	Power button
9	Alphanumeric membrane keyboard (not available on slave units)
10	Navigation buttons (not available on slave units)

Table 3.2.1. DMS-2199 Front Panel Sections

3.2.2 MQB Full Front Panel

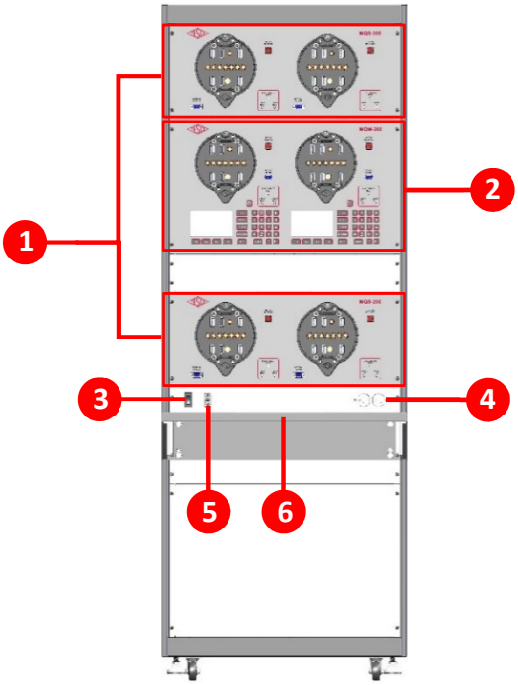


Figure 3.2.2a MQB-12 Front Panel

NUMBER	DESCRIPTION
1	Slave (MQS)
2	Master (MQM)
3	Power Switch
4	Duplex Utility Receptacle
5	RJ45 Network Port
6	Table Top

Table 3.2.2. MQB-12 Front Panel Sections

NOTE: This is the front panel of MQB-12, one of the many customizations available for this device. It has 1 master and 2 slaves, thus having the model number of "12". The model number changes based on the number of masters and slaves installed.

3.2.3 DMS-2199 / MQB Navigation Keys

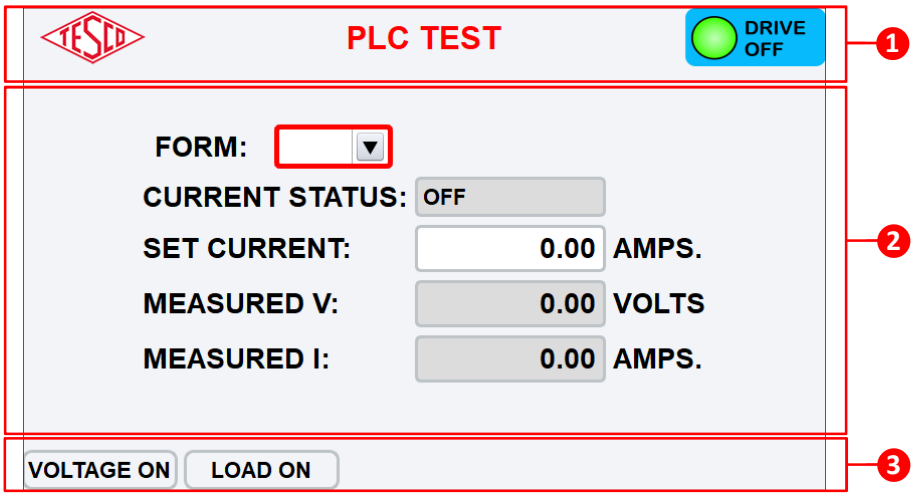
Symbol	Description
▼ or ▼	Functions any of the following: • Selects the NEXT or PREVIOUS **MENU** item. • Moves the **SELECTED LINE** UP or DOWN • Select an Item from a dropdown menu
◀ or ▼	Functions any of the following: • Moves the cursor left/right of the current character in text boxes. • Moves the 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 enter it 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 the maximum will be restricted to 20.00 amps.
DIRECTION	Pressing the direction allows the user to quickly change the direction of energy flow. 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
	Selects a response

3.3 The Graphical User Interface (GUI)

3.3.1 Graphical User Interface (GUI) Screens

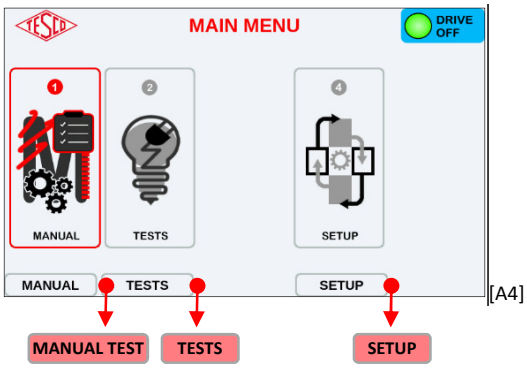
The user interface is divided into three sections.



NUMBER	DESCRIPTION
1	Screen Title
2	Screen Data
3	Function Buttons

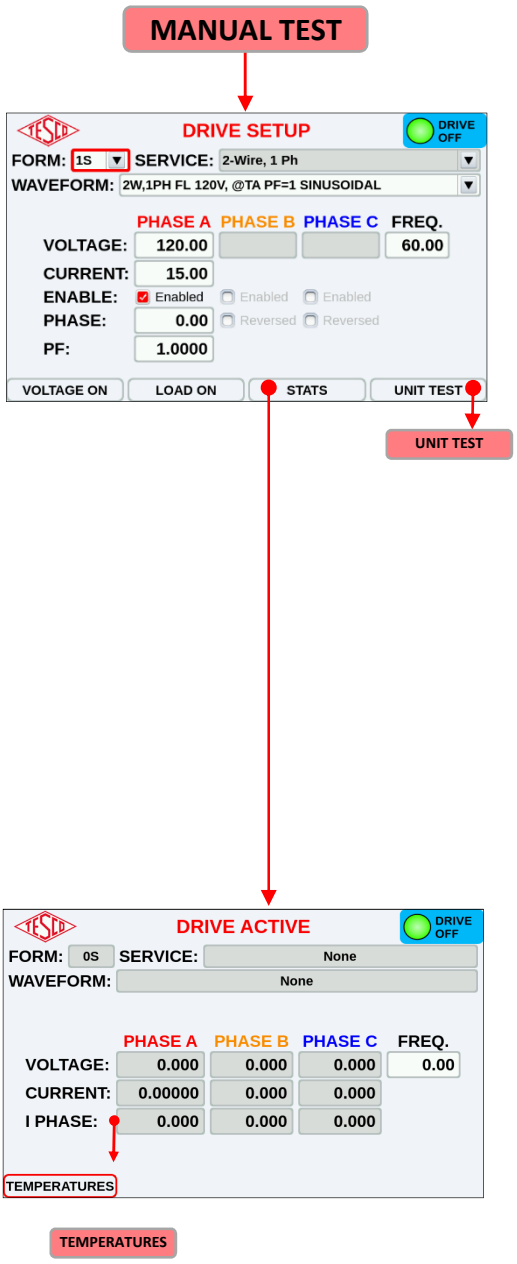
Table 3.3.1. DMS-2199 & MQB GUI Sections

3.3.2 MAIN MENU

SCREEN	DESCRIPTION
 [A4]	**3.3.2.1 MAIN MENU** The MAIN MENU screen consists of the following function buttons: MANUAL, TESTS, & SETUP. Press arrow keys to navigate through the main menu or directly press the function keys. **KEYPAD & FUNCTION KEYS:** F1 MANUAL — Press to open the DRIVE SETUP screen F2 TESTS — Press to open the TEST SELECTION screen F4 SETUP — Press to open the SETUP MENU screen To return to the previous screen press at any time.

3.3.3 MANUAL TEST

SCREEN	DESCRIPTION



3.3.3.1 DRIVE SETUP

DRIVE SETUP is for manual setup of the waveform generator. Once manual setup is configured to desired test, run a single test by pressing the UNIT TEST F4 button.

NOTE: *Master and slave must operate together using the same form and test conditions.*

KEYPAD & FUNCTION KEYS

F1	VOLTAGE ON	Press to enable service voltage only to the socket.
F2	LOAD ON	Press to enable service voltage & load current to the socket.
F3	STATS	Press to display live voltage and current data on DRIVE ACTIVE screen.
F4	UNIT TEST	Press to open to the METER INFO screen.

DATA

VOLTAGE	Service voltage seen by device under test (DUT)
V PHASE	Voltage phase angle with respect to reference frame
CURRENT	Current passing thru meter
I PHASE	Current phase angle with respect to A phase voltage

WARNING: *If either VOLTAGE ON or LOAD ON is enabled, the* DRIVE OFF *indicator will change to* DRIVE ACTIVE*. This indicates there is potential and or/ current present at the meter terminals.*

3.3.3.2 DRIVE ACTIVE

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

FUNCTION KEYS

TEMPERATURES	Press to open the TEMPERATURES screen

DATA

VOLTAGE	Service voltage seen by device under test (DUT)
V PHASE	Voltage phase angle with respect to reference frame
CURRENT	Current passing thru meter
I PHASE	Current phase angle with respect to A phase voltage

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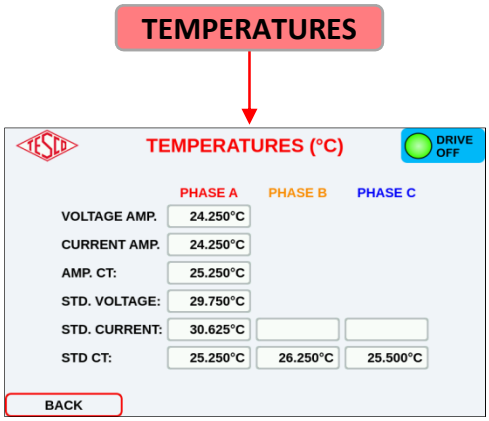
SCREEN	DESCRIPTION

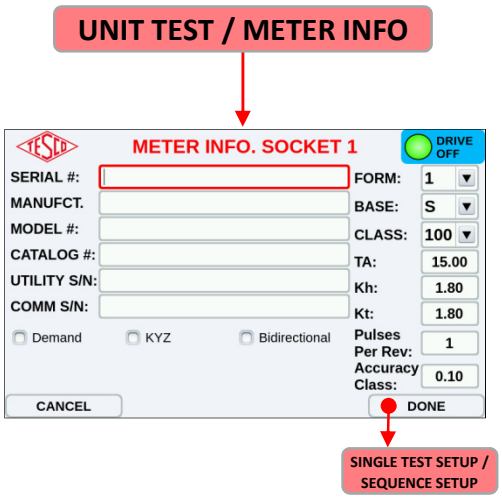


3.3.3.3 TEMPERATURES

This screen displays temperatures of internal circuit boards.

FUNCTION KEYS

BACK	Press to return to the DRIVE ACTIVE screen



3.3.3.4 METER INFO SOCKET

This screen allows the user to create a new meter info.
NOTE: *Data entry is available only when meter is inserted in socket.*

FUNCTION KEYS

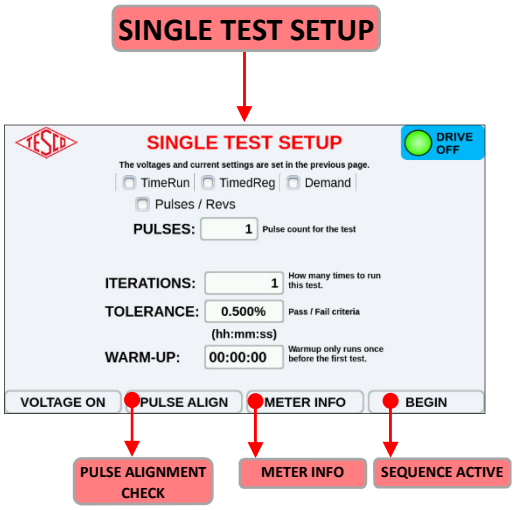
CANCEL	Returns to the TEST SELECTION screen.
DONE	Saves changes and proceeds to the either of the following: - SEQUENCE SETUP (from SEQUENCE TESTING) - SINGLE TEST SETUP (from UNIT TEST)

DATA

SERIAL #	Serial number of the meter
MANUFCT.	Manufacturer's name
MODEL #	Model number of the meter
CATALOG #	Catalog number of the socket
UTILITY S/N	Serial number of utility
COMM S/N	Serial number of COMM device
FORM	Form number of the meter
BASE	Meter base (S, K, A, etc…)
CLASS	Meter class indicates the maximum current the meter can handle and determines the default TA
TA	Test Amps (RMS of a full load test)
Kh	Watt hours per revolution of disk
Kt	Watt hours per pulse
Pulses Per Rev	Number of pulses in every revolution of the disk. Integer >= 1
Accuracy Class	Accuracy of the meter

3.3.4 SINGLE TEST SETUP

SCREEN	DESCRIPTION



3.3.4.1 SINGLE TEST SETUP

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

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
METER INFO	Press to return to the METER INFO screen
BEGIN	Press to open the SEQUENCE ACTIVE screen

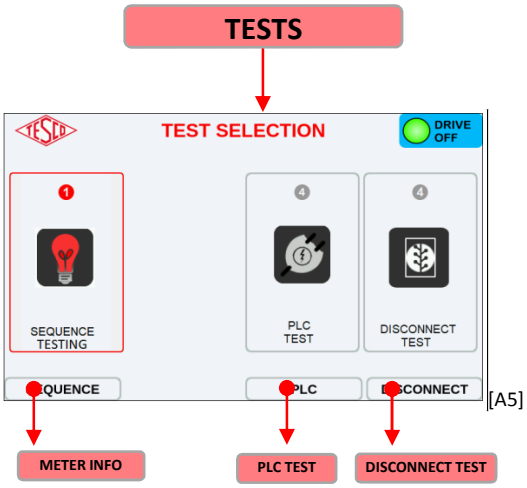
DATA

TEST TYPE	**TimeRun**	Performs test with a predefined duration
	TimedReg	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.
	Demand	Runs a demand test
PULSES/REVS	Enables counting of pulses	
ITERATIONS	Number of times the test will be repeated	
TOLERANCE	Tolerance needed for pass/fail criteria	
WARM-UP	Period of time for meter to stabilize prior to test execution	

***WARNING:** If either VOLTAGE ON or LOAD ON is enabled, the* DRIVE OFF *indicator will change to* DRIVE ACTIVE*. This indicates there is potential and or/ current present at the meter terminals.*

3.3.5 TEST SELECTION

SCREEN	DESCRIPTION



[A5]

3.3.5.1 TESTS

The TEST SELECTION screen consists of the following function buttons: MANUAL, TESTS, & SETUP. Press arrow keys to navigate through the main menu or directly press the function keys.

KEYPAD & FUNCTION KEYS:

F1	**SEQUENCE**	Press to open METER INFO screen. Refer to **§3.3.3.4** for additional info.
F3	**PLC**	Press to open the PLC TEST screen
F4	**DISCONNECT**	Press to open the DISCONNECT TEST screen

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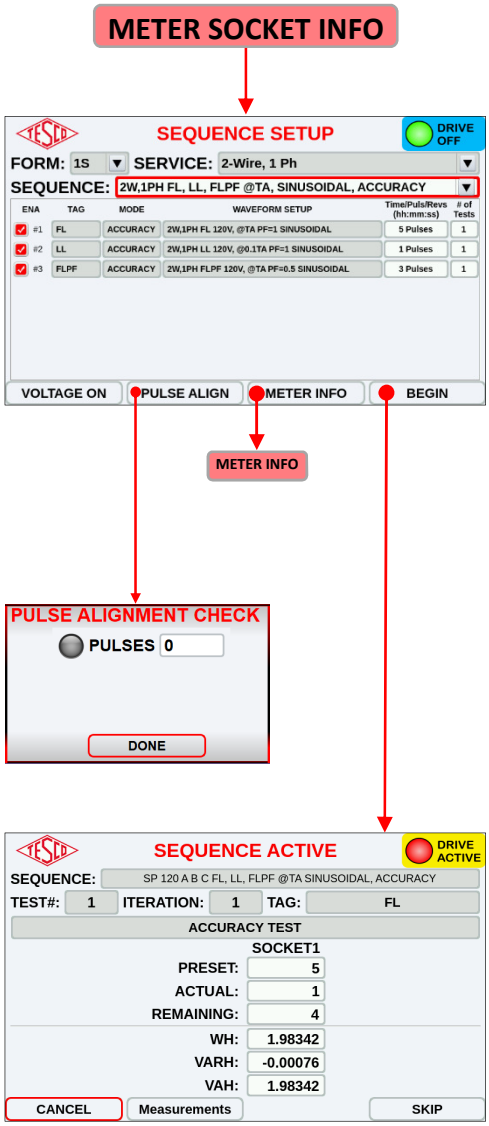
3.3.6 SEQUENCE TESTING

SCREEN	DESCRIPTION



3.3.6.1 SEQUENCE SETUP

This enables the selection of the desired sequence to be conducted for the test.

KEYPAD & FUNCTION KEYS

VOLTAGE ON	Press to enable service voltage to the socket.
PULSE ALIGN	Press to enter pulse alignment mode show the number of pulses from the meter.
METER INFO	Press to return to the METER INFO screen.
BEGIN	Starts the sequence test.

DATA

FORM	Form of the meter
SERVICE	Services available for selected meter form
SEQUENCE	Sequences available for selected meter form
Time/Puls/Revs	Input time, pulses, or revolutions for selected test type
# of Tests	Number of times the test will be repeated

3.3.6.2 PULSE ALIGNMENT CHECK

This feature is used to align the optical probe without running a meter test.

FUNCTION KEYS

DONE	Press to return to the previous screen.

3.3.6.3 SEQUENCE ACTIVE

This screen shows the results while the test is being executed. The test will end once the predefined iteration reaches zero.

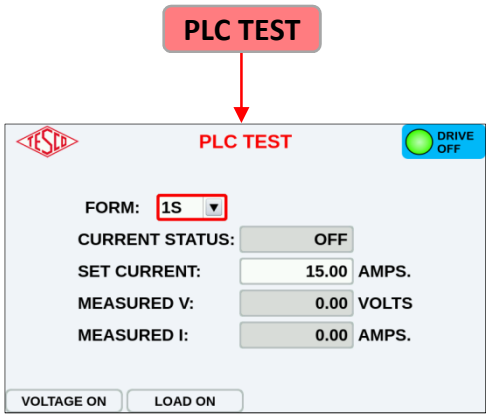
KEYPAD & FUNCTION KEYS

CANCEL	Press to cancel the test process
MEASUREMENTS	Press to open the test sequence measurements
SKIP	Press to skip the ongoing test and proceed to the next test in the sequence

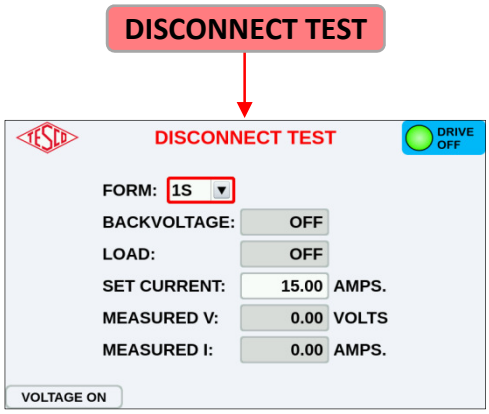
DATA

SEQUENCE	Services available for selected meter form
TEST #	Test sequence number
ITERATION	Number of times the whole test sequence is repeated
TAG	Alias or brief description of the test
PRESET	Number of times the individual test is repeated
ACTUAL	Number of the ongoing test repetition
REMAINING	Number of the remaining test repetition
WH	Measured real energy
VARH	Measured reactive energy
VAH	Measured apparent energy

3.3.7 PLC TEST

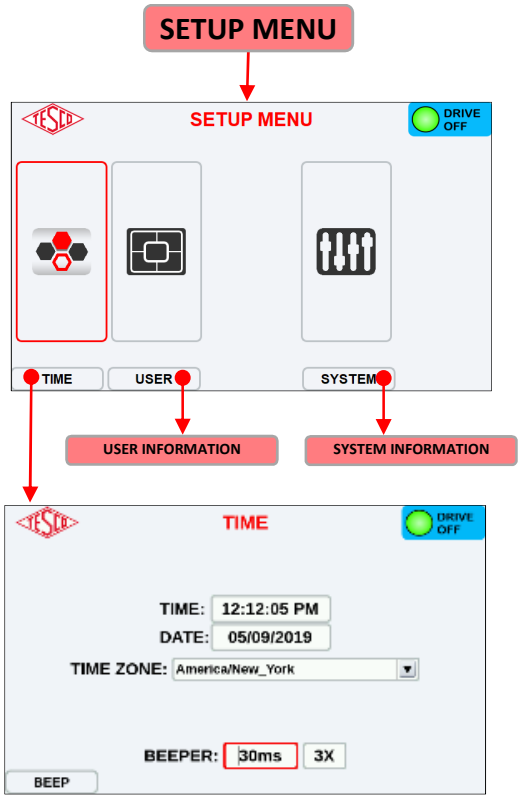
SCREEN	DESCRIPTION
	**3.3.7.1 PLC TEST** PLC or Power Line Carrier test is for testing wired communication systems such as TWACS, etc. **KEYPAD & FUNCTION KEYS** **VOLTAGE ON** – Press to enable service voltage only to socket **LOAD ON** – Press to enable service voltage and load current to socket When power is enabled, the control buttons adjust accordingly **VOLTAGE OFF** – Press to disable voltage and current to socket **LOAD OFF** – Press to disable current only to socket Service voltage will remain enabled **DATA** **FORM** – Form number of the meter **CURRENT STATUS** – Displays either of the following status: • OFF – no current is flowing • ON – current is flowing **SET CURRENT** – Current set by the user **MEASURED V** – Measured voltage **MEASURED I** – Measured current

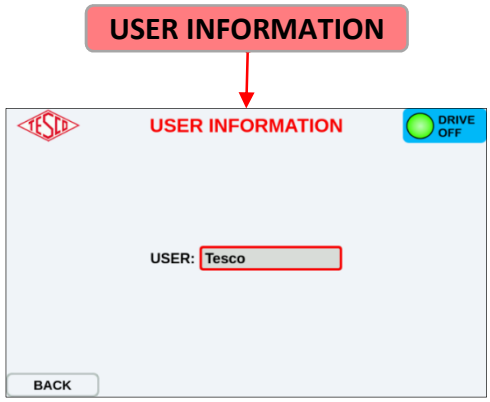
3.3.8 DISCONNECT TEST

SCREEN	DESCRIPTION
	**3.3.8.1 DISCONNECT TEST** Disconnect testing is used for testing meters with built-in disconnect contacts. This is typically performed on form 1S, 2S, and 12S meters. **KEYPAD & FUNCTION KEYS** **VOLTAGE ON** – Enables voltage, back voltage, and current **ENABLE BV.** – Enables back voltage **LOAD ON** – Applies back voltage and current to the socket When the buttons are turned on, the user can also switch them off: **VOLTAGE OFF** – Disables voltage, back voltage, and current **LOAD OFF** – Disables current only. Voltage remains enabled. **DATA** **FORM** – Form number of the meter **BACKVOLTAGE** – Back voltage of the meter **LOAD** – Load of the meter **SET CURRENT** – Current set by the user **MEASURED V** – Measured voltage **MEASURED I** – Measured current

3.3.9 TIME & USER INFORMATION

SCREEN	DESCRIPTION





3.3.9.1 SETUP MENU

The SETUP MENU screen consists of the following function buttons: TIME, USER, & SYSTEM. Press arrow keys to navigate through the main menu or directly press the function keys.

KEYPAD & FUNCTION KEYS:

F1	**TIME**	Press TIME to open the TIME screen
F2	**USER**	Press USER to open the USER INFORMATION screen
F4	**SYSTEM**	Press SYSTEM to open the SYSTEM INFORMATION screen

3.3.9.2 TIME

FUNCTION KEYS

BEEP	Press to enable the configured audible signal

DATA

TIME	Enter local time here
DATE	Date, MM/DD/YYYY format
TIME ZONE	Enter local time zone here
BEEPER	Duration and repetition of audible signal The beeper will sound with every pulse detected by the optical pickup

3.3.9.3 USER INFORMATION

The default user name is “Tesco.” This can only be updated through TMA software.

KEYPAD & FUNCTION KEYS:

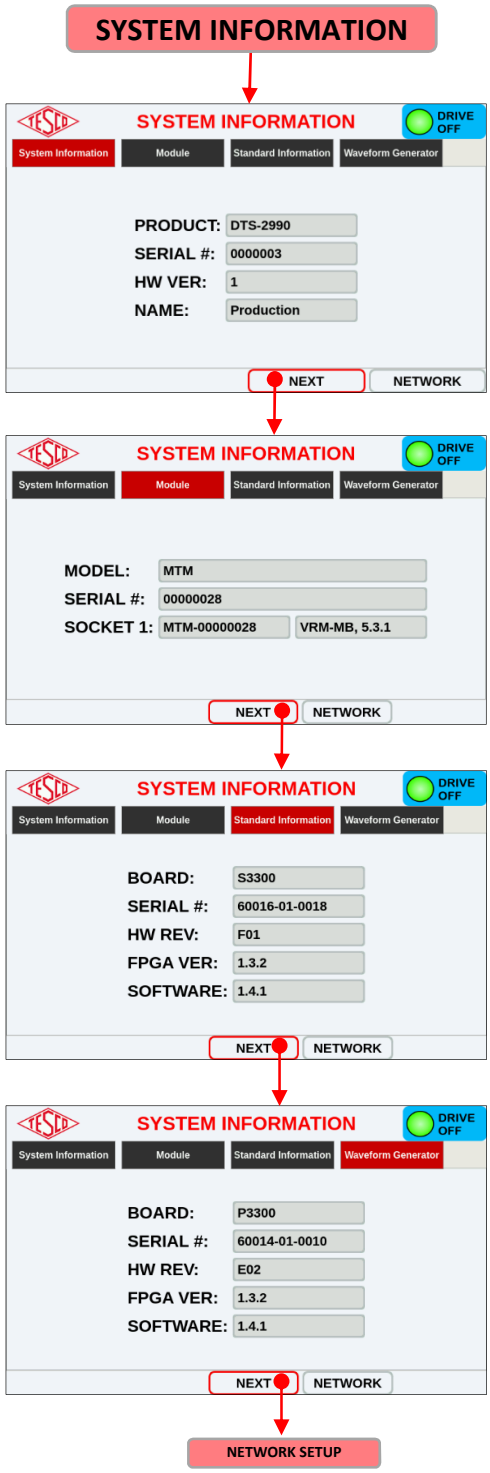
BACK	Press to return to the previous screen

DATA

USER	Name of the user of the device

3.3.10 SYSTEM INFORMATION

SCREEN	DESCRIPTION



3.3.10.1 SYSTEM INFORMATION

SYSTEM INFORMATION displays information about the hardware configurations, firmware revision levels, and network configuration.

SYSTEM INFORMATION TAB

KEYPAD &FUNCTION KEYS

NEXT	Press to open MODULE tab
NETWORK	Press to open the NETWORK SETUP dialog box

DATA

PRODUCT	Displays the product name of the system
SERIAL	Displays the serial number of the system
HW VER	Show the hardware version of the system
NAME	Displays the name of the system. Can be updated by the user through TMA

MODULE TAB

KEYPAD &FUNCTION KEYS

NEXT	Press to open the STANDARD INFORMATION tab
NETWORK	Press to open the NETWORK SETUP dialog box

DATA

MODEL	Displays the model name of the master
SERIAL #	Displays the serial number of the master
SOCKET 1	Displays the serial number of the top socket
SOCKET 2	Displays the serial number of the middle socket (if applicable)
SOCKET 3	Displays the serial number of the bottom socket (if applicable)
HW/SW	Displays the HW/SW version of the VRM board

STANDARD INFORMATION TAB

KEYPAD &FUNCTION KEYS

NEXT	Proceeds to the WAVEFORM GENERATOR tab.
NETWORK	Press to open the NETWORK SETUP dialog box

DATA

BOARD	Displays the physical board type
SERIAL #	Displays the serial number of the board
HW REV	Displays the HW rev of the board
FPGA VER	Displays the FPGA binary version
SOFTWARE	Displays the application SW version

WAVEFORM GENERATOR TAB

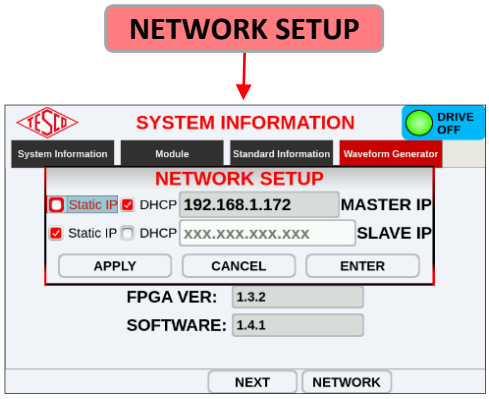
KEYPAD &FUNCTION KEYS

NETWORK	Press to open the NETWORK SETUP dialog box

DATA

BOARD	Displays the physical board type
SERIAL #	Displays the serial number of the board
HW REV	Displays the HW rev of the board
FPGA VER	Displays the FPGA binary version
SOFTWARE	Displays the application SW version

3.3.11 NETWORK SETUP

SCREEN	DESCRIPTION
	**3.3.11.1 NETWORK SETUP** Display and edit required network settings. **KEYPAD & FUNCTION KEYS** **APPLY** — Press to save desired configuration and close network dialogue box. **CANCEL** — Press to return to previous screen. **ENTER** — Press to enter current parameter without closing dialogue box. **DATA** **STATIC IP** — Select for user specified IP address **DHCP** — Select for network assigned IP address

3.4 Optical Pickup Alignment

After the meter is successfully inserted into socket, attach magnetic optical pickup to optical port of meter. To remove, hold optical pickup by the body and gently pull away from the meter. If alignment is difficult to achieve, the PULSE ALIGN feature is available to assist with alignment.

4.0 REMOTE OPERATIONS

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4.4.4 WAVEFORM SETUP 25

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4.4.6 MANUAL TEST 26

4.1 Introduction

This chapter provides instructions on how to remotely operate DMS-2199, conduct test, and manage information using Test Manager Application (TMA).

4.2 Installation

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

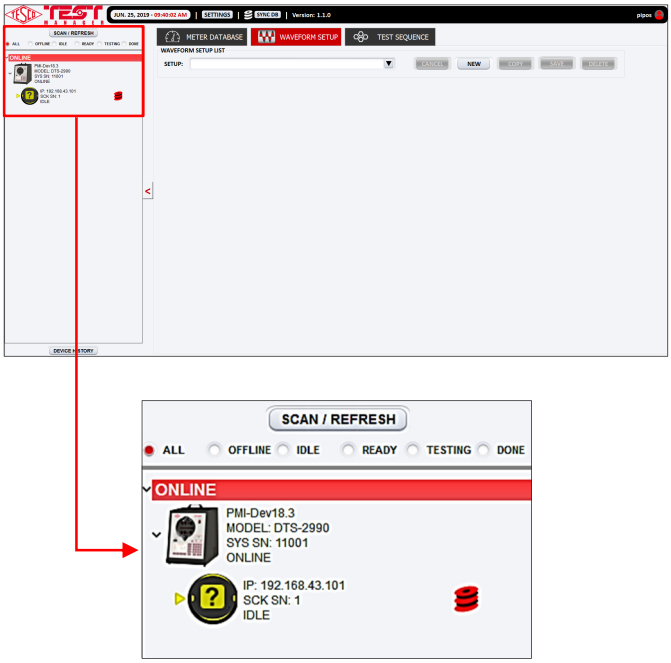
4.3 Network Configuration

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

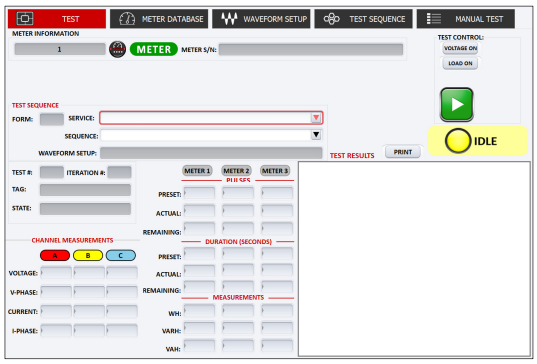
For setting the network connections on the Instrument, refuter to **§3.3.11.**

4.4 Functionalities[A6]

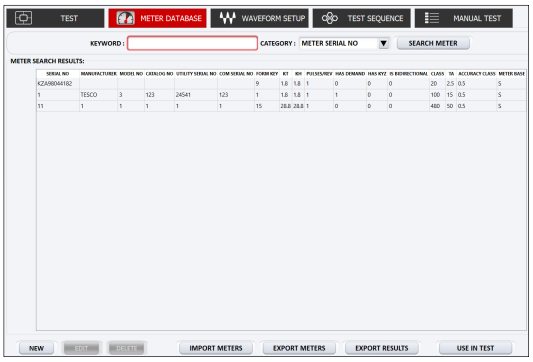
4.4.1 NETWORK VIEW

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 **DMS-2199** 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**.

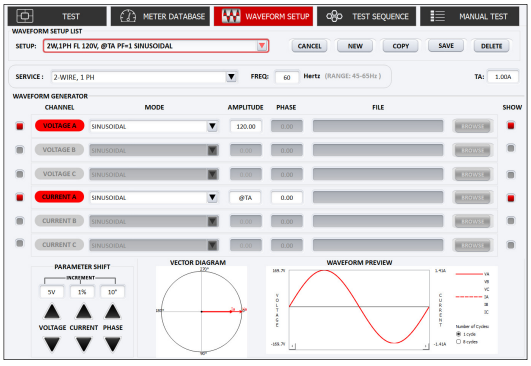
4.4.2 TEST

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**.

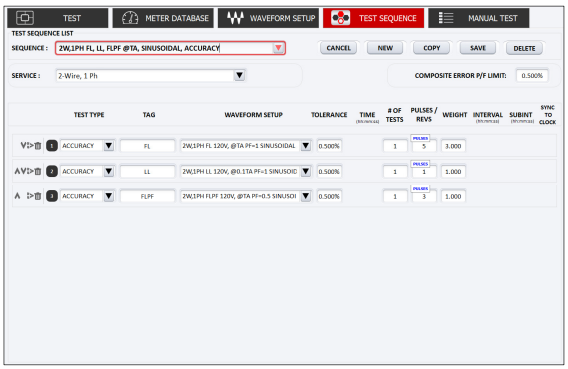
4.4.3 METER DATABASE

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**.

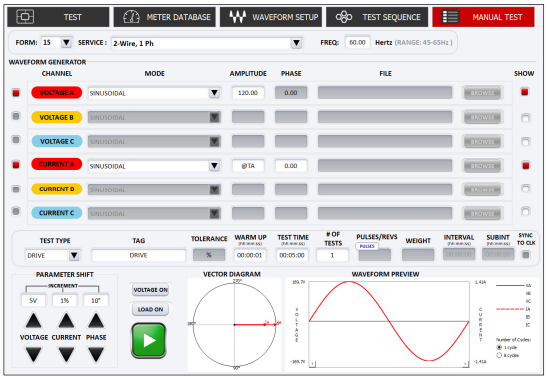
4.4.4 WAVEFORM SETUP

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**.

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5.0 MAINTENANCE

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5.2 Replacing the Fuse 28

5.3 Cleaning the Air Filters 29

5.4 Cleaning the Instrument External Surface 30

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 fuses are accessible from equipment's rear panel. See Figure 5.2[A7].

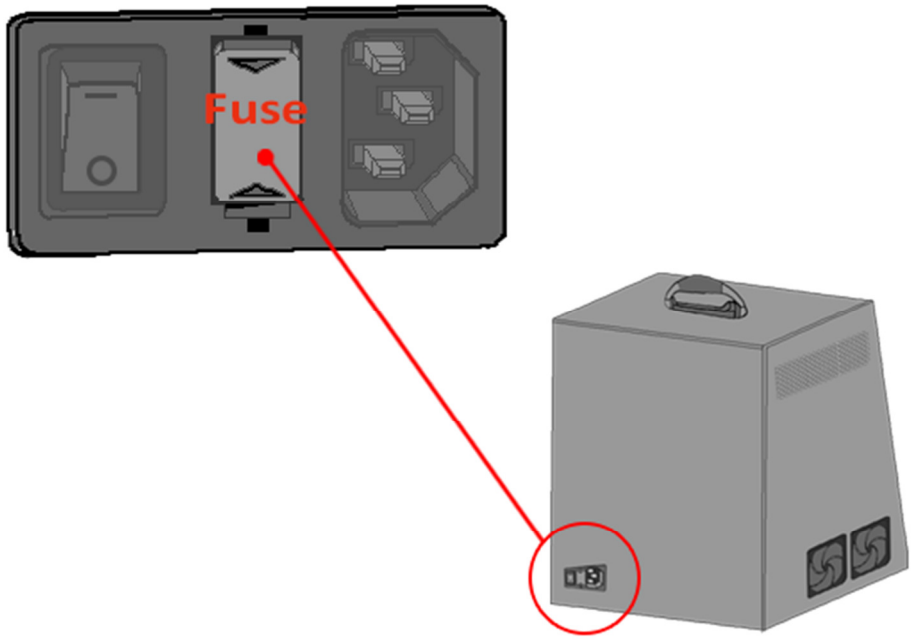

Figure 5.2 DMS-2199 Fuse Location

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 fuses, 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 fuses. 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.

Description	Voltage	Amperage
(2x) AC DC Fuse Cartridge, Glass, Time Delay, 5mm x 20mm	250V	5.0A

Table 5.2. Recommended Fuse Replacement

5.3 Cleaning the Air Filters[A8]

The fan air filters are accessible from the left-side front of DMS-2199. 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 is 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.

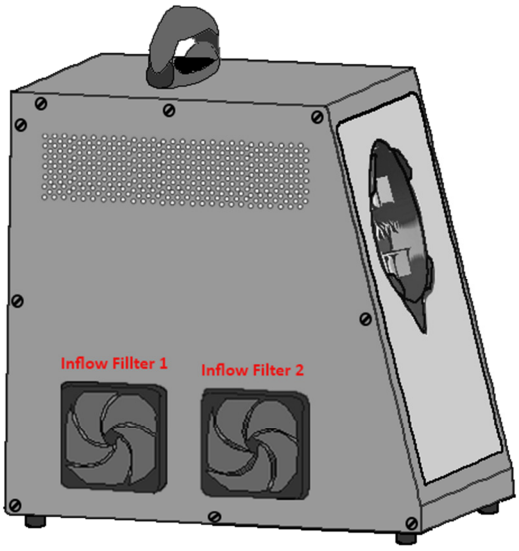

Figure 5.3a DMS-2199 Fan Filter Location

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.

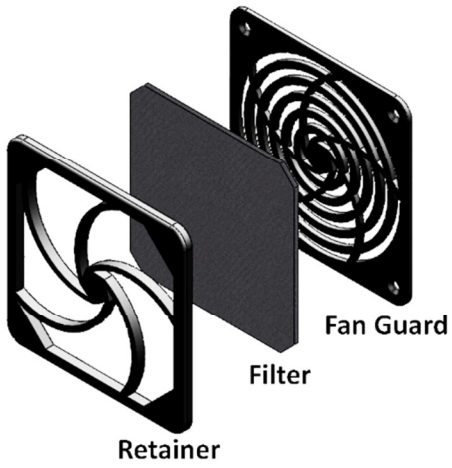

Figure 5.3b: DMS-2199 Fan Filter Assembly

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 32

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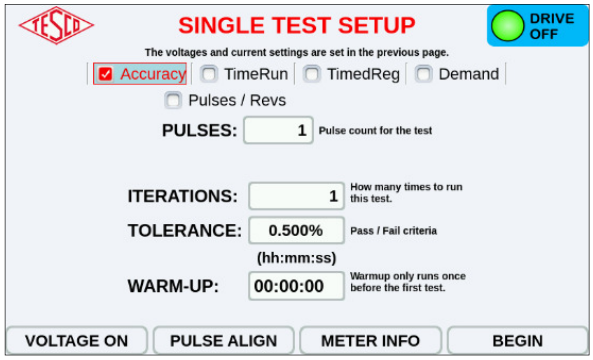
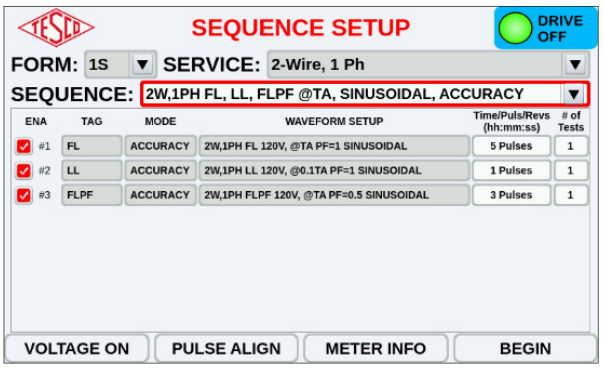
6.4 PLC Test 33

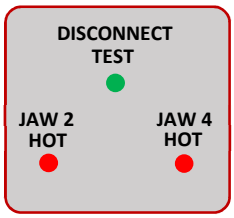
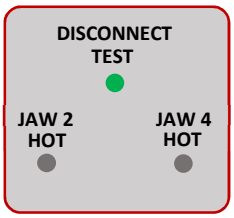
6.1 Single Test

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.

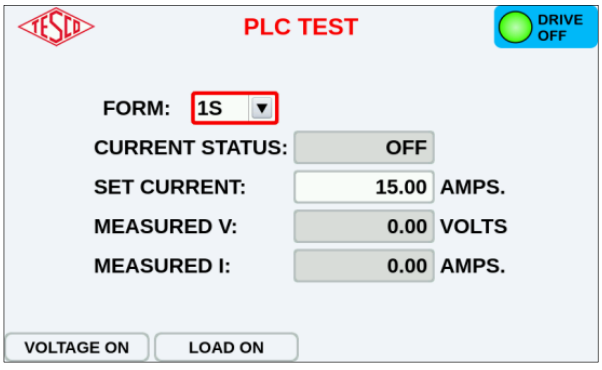
6.2 Sequence Test

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.**	a. From the MAIN MENU, press F2 to access TEST SELECTION. b. Press F4 to enter DISCONNECT TEST. c. Press F1 to enable service voltage to socket. d. Optional: To set load current, press CURRENT to highlight load current data box and enter desired value. e. Optional: Press F2 to enable load current. Note: BACKVOLTAGE will enable automatically. f. Now the DTS-2990 is ready to perform a disconnect test. Refer to **Figure 6.3.11**. g. Perform disconnect test. If successful, jaw indicators, load current, and back voltage (if enabled) will turn off. Refer to **Figure 6.3.2**.

6.4 PLC Test

SCREEN	STEPS
	a. From the MAIN MENU, press F2 to access TEST SELECTION. b. Press F3 to access PLCT TEST. c. 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.

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7.0 FREQUENTLY ASKED QUESTIONS

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7.4 Hardware 35

7.1 Introduction[A9]

This section aims to answer frequently asked questions when operating the Instrument and Product. Some of these answers refer to certain sections of 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**, page 4.
4. **What is the minimum and maximum load that the Instrument is capable of handling?**
   ADD TEXT HERE
5. **In SEQUENCE TEST, how many sequences can I set?**
   ADD TEXT HERE

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**, page 2.
2. **When should I update the software?**
   ADD TEXT HERE
3. **Are the updates free or paid?**
   ADD TEXT HERE

7.4 Hardware

1. **Where/Who can I ask for replacement parts?**
   ADD TEXT HERE
2. **Are there any tests I can perform to check hardware performance?**
   ADD TEXT HERE

8.0 TROUBLESHOOTING

8.1 Troubleshooting 37

8.1 Troubleshooting[A10]

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.