ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE)
TEST SYSTEM OPERATIONS MANUAL

TESCO METERING

Revision: 2.1

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 defects 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 in 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. Introduction

1.1 Introduction

TESCO's Electric Vehicle Supply Equipment (EVSE) Test System is a comprehensive testing solution designed to ensure the accuracy, safety, and protocol compliance of EV chargers. The system includes the EVSE Tester, which verifies AC Level 1 and Level 2 chargers up to 80 amps. To test energy delivery accuracy in accordance with NIST HB44 provisions, the system may be paired with either the Programmable Load (PL4150 or PL4000) or a Man-in-the-Middle (MitM) Cable. The Proximity and Pilot Control signal exchanges are fully verified for compliance with protocol requirements. The EVSE's GFCI can also be tested by applying a programmable line-earth fault current up to 200mA.

1.2 Contacting TESCO

For Technical Support or Calibration/Repair, please call 215.228.0500.
You can also send an email to **support@tescometering.com** with any questions.
To view, print, or download the latest manual supplement, visit tescometering.com.

1.3 General Safety Summary

This manual contains information and warnings that must be observed to ensure safe operation and to keep all EVSE Equipment 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**, including PPE guidelines.

WARNING 

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

1.3.1 General Safety and Device Condition

- All devices—T4350, PL4150, and PL4000—must not be switched ON if they are damaged or suspected to be faulty.
- If the equipment is used in a manner not specified in this manual, the protection provided by the EVSE devices (T4350, PL4150, PL4000, MitM cable) may be impaired.
- Whenever it is likely that safety protection has been impaired, the devices must be made inoperative and secured against any unintended operation. Inform qualified maintenance or repair personnel.
- Safety protection is likely to be impaired if, for example, the EVSE Equipment (T4350, PL4150, PL4000, MitM) displays visible damage or fails to operate normally.

1.3.2 Environmental Conditions

- Do not operate the device in wet, condensing, dusty, or explosive gas conditions.
- If the Programmable Load Equipment (PL4150, PL4000) gets wet, wait until the unit is completely dry before operation. Droplets of water on the lid could splash inside the frame, and water from the outside of the unit could touch the Staubli pins.

1.3.3 Thermal and Physical Handling Precautions

- NEVER TOUCH the Programmable Load Equipment (PL4150, PL4000) during or shortly after operation. The frame can get extremely hot. Only the grill handle can be touched after a completed test finishes the cool down.
- Always ensure that all EVSE equipment, including the PL4150, is safely secured to your vehicle. It is a good idea to check during each new day of testing that the unit is still properly secured and nothing came loose.
- Always ensure that the PL4150 lid is closed before moving your vehicle.
- The lid of the PL4150 must be open during testing; it has a built-in sensor that will not let the T4350 run if the lid is not open.

1,3,4 Device-Specific Operation Checks

- The PL4150 has an E-Stop on the front panel. It needs to be connected, or it will not run.
- Check pins of the MitM cable often to ensure there are no broken pins.

1.4 Product Features

1.4.1 Key Features - T4350

High-accuracy, fully isolated AC and DC measurement capabilities for testing EV chargers up to 80A AC and 650A DC, with transactional-mode energy accuracy compatible with NIST Handbook 44 provisions.

The T4350 supports:

- ✓ AC Level 1 and 2 testing (CCS1, Tesla)
- ✓ DC fast charging standards (up to 1000VDC)
- ✓ Configurable load via Programmable Load or Man-in-the-Middle (MitM) Cable
- ✓ Integrated measurement of voltage, current, power, and energy (AC/DC)
- ✓ ±0.05% reading accuracy on voltage and current

1.4.2 Key Features – PL4150

The PL4150 is a load box that can test many different types of EV chargers up to 150kW. The unit is used with the T4350. The load box is charger-agnostic It will work with any charger that the T4350 can operate with (CCS!, CCS2, NACS, CHAdeMo, GBT, etc.)

- ✓ Auto Interface
- ✓ Auto Cool-off
- ✓ Temperature, Humidity and Fan Speed Sensors
- ✓ Safety Sensors
- ✓ NEMA 3R Waterproof Rating

1.4.3 Key Features – PL4000

The TESCO PL4000 is a rugged, portable AC programmable load box designed for precise testing of electric vehicle chargers up to 14kW. Compatible with TESCO's T4350 EVSE Tester, it supports validation of CCS1 (J1772) and NACS single-phase charging systems.

- ✓ **AC Charger Testing up to 14kW**
- ✓ **Auto-Detect Functionality**
- ✓ **Auto Cool-Off Sequence**
- ✓ **Built-In Safety Sensors**
- ✓ **Supports Key Charger Ranges**
- ✓ **Rugged & Portable Design**

1.4.3 Key Features – MitM Cable

The TESCO MiTM Cable is a specialized interface cable designed for real-time, precision testing of AC and DC EV chargers. Used with the T4350 EVSE Test System, it enables man-in-the-middle configuration by connecting a Staubli interface to an EVSE adapter, allowing seamless monitoring and validation of CCS1 and NACS charging systems in real-world scenarios.

- ✓ Allows direct insertion between EVSE and EV for real-time data capture.
- ✓ Internal MCU
- ✓ Integrated Thermistors
- ✓ Staubli & EVSE Interface
- ✓ Protective Terminal Cap
- ✓ Multiple Configurations Available

1.4.4 Standard Features – T4350

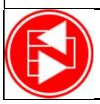
	**GRAPHICAL USER INTERFACE** 6” Super high contrast. olor display with bonded glass optical filter/protector.
	**ETHERNET** 100 BaseT with support for: Web Services, Remote Control, Database Access.
	**USB PORTS** 2X USB 2.0 Type A (peripherals such as keyboard, mouse, memory stick, barcode scanner. 1X USB 2.0 Type B (connection to PC) Pulse Pickup/Optical Communications/Pulse In/Pulse Out Connector DB9M.
	**GPS (GLOBAL POSITIONING SYSTEM)** Integrated GPS system provides location information for automatic determination of test site and database access.
	**GFCI (GROUND FAULT CIRCUIT INTERRUPTER)** Provision is provided to test the GFCI functionality the EVSE (0 – 200ma).
	**RS232** Legacy port for specialized test configurations.
	**INTERNAL BATTERY** 99.6WHr Li-Ion removeable battery, no power from site needed even in load box mode. Battery slips into the system for easy replacement/swap out. Greater than eight hours continuous operation on a single charge.
	**PL INTERFACE** Provides communications and power to a Programmable Load (PL400, PL4150).

1.4.5 Standard Features – PL4150

	**Single Phase AC 1** Voltage: 120V, 208V, 240V Current: OA – 80A
	**Three-Phase AC Chargers** **Voltage: 400Vline to line | Current: OA – 32A per phase** Provides appropriate load current required up to 50A.
	**DC chargers for 400V battery technology** Voltage: 350V – 420V. 360V nominal Current 20A – 350A. Up to 375A for a short time
	**DC chargers for 800V battery technology** Voltage: 700V – 800V. 720V nominal Current 10A – 175A
	**PROGRAMMABLE LOAD CURRENT MODES** Capable of handling different testing modes: No Load (NL), Starting Load (SL), Light Load (LL) & Full Load (FL).

	**EV COMMUNICATION PROTOCOL** **AC**: Control Pilot + Proximity Detection **DC**: Power Line Communication (PLC) protocol; used for high-level communication in CCS1 and Tesla DC fast charging systems.

1.4.6 Standard Features – PL4000

	**AC LEVEL 1** Provides appropriate load current required up to 32A
	**AC LEVEL 2** Provides appropriate load current required up to 50A.
	**PROGRAMMABLE LOAD CURRENT MODES** Capable in handling different testing modes: No Load (NL), Starting Load (SL), Light Load (LL) & Full Load (FL).
	**EV COMMUNICATION PROTOCOL** **AC**: Control Pilot + Proximity Detection

1.4.7 Standard Features – MitM Cable

	**Interface Type** Staubli interface on one end; CCS1 or NACS EVSE adapter on the other, enabling seamless man-in-the-middle integration.
	**Communication** Internal MCU allows direct communication with T4350 EVSE Test System for synchronized data capture.
	**Compatibility** Designed for use with both AC and DC Charging systems, available configurations include: MM-CCS1-AC80 (AC, 80A) MM-CCS1-DC-350 (DC, 350A) MM-NACS-DC-350 (DC, 350A)
	**Safety & Protection** Integrated thermistors monitor internal temperature; testing is automatically halted if abnormal conditions are detected. Staubli terminals include protective caps.

1.5 General Specifications

1.5.1 Measurement Capabilities – T4350

PARAMETERS	DATA
Voltage	AC – Up to 3 channels 60VAC to 650 VAC isolated DC – One channel 60 to 1000VDC isolated
Current	AC – Up to 3 channels 0.2 to 80 Amps fully isolated DC – One channel 20 to 650 Amps fully isolated
Power	Measures Active energy, reactive energy, and Apparent energy
Harmonics	Harmonics to the 50th

1.5.2 Measurement Capabilities – PL4150

PARAMETERS	DATA
Single Phase AC Charger	**Voltage** – 120V, 208V, 240V **Current** – 0A – 80V
3-Phase AC chargers	**Voltage** – 400V line to line **Current** – 0A – 32A per phase
DC Chargers for 400V battery technology	**Voltage** – 350V – 420V. 360V nominal **Current** – 20A – 350A. Up 375A for a short time
DC Chargers for 800V battery technology	**Voltage** – 700V – 800V. 720V nominal **Current** – 10A – 175A

1.5.3 Measurement Capabilities – PL4000 (SUPPORTS AC TESTING ONLY)

PARAMETERS	DATA
Voltage	AC – 29A at 120V chargers (~3.5kW) 50A at 208V chargers (~10.5kW) 58A at 240V chargers (~14kW)

1.5.4 Measurement Capabilities – MitM Cable

PARAMETERS	DATA
Voltage	AC – 240V AC DC – 1000V DC
Current	AC – 80A DC – 350A sustained, 650A < 5 min
Power	AC – 0-19.2kW DC – 0 – 350kW sustained (650kW for < 5 min)

1.5.5 Measurement Accuracy – T4350

PARAMETERS	DATA
AC Voltage	± 0.05% of reading
AC Current	± 0.05% of reading ± 0.005 Amp
AC Phase	±0.01 degrees
AC INSTRUMENT, WHrs	±0.08% of reading ± 0.002 Wh
DC Voltage	± 0.05% of reading
DC Current	(20A to 650A), ± 0.05% of reading ± 0.01 Amp

INSTRUMENT, WHrs	(20A to 650A), 0.05% of reading ± 0.01 Wh

1.5.6 Measurement Accuracy – PL4150

Not Applicable

1.5.7 Measurement Accuracy – PL4000

Not Applicable

1.5.8 Measurement Accuracy – MitM Cable

Not Applicable

1.5.9 Physical – T4350

PARAMETERS	DATA
Display	6" Super high contrast, 1000nit color display with bonded glass optical filter/protector
I/O	Ethernet 2X USB 2.0 Type A (peripherals such as keyboard, mouse, memory stick, barcode scanner) 1X USB 2.0 Type B (connection to PC) Pulse pickups/optical communications/Pulse In/ Pulse Out Connector DB9M
Power	99.6WHr Battery, no power from site needed even in load box mode Battery slips into system for easy replacement/swap out Greater than eight hours continuous operation on a single charge
AUX Power	15VDC, Rapid charging using AC or 12V power
GPS	Integrated GPS locator

1.5.10 Physical – PL4150

PARAMETERS	DATA
Cooling Sensors	Auto cool off Temperature, Humidity, and Fan speed sensors
Safety Sensors	E-STOP: Detects that the lid is open/closed and will prompt the user to open it before a test begins Voltage sensors Will monitor that the BUS voltage does not exceed maximum capabilities
Cabling	Conduit with Stabuli termination (7ft) to be used with T4000 or T4350 DC, + DC -, L1, L2, L3, L4, and PE Batt, digital GND, and Comms E-STOP with M12 header (16ft) to in case of emergencies

LEDs	**Green LED** – to indicate power **Yellow/Amber LED** – to indicate Comms with T4000 / T4350 **Red LED** – to indicate unit is running and dissipating power
Breakers	**2 breakers for AC lines**
Waterproof Lid	**Waterproof lid with sensor** **Closed when not in use**

1.5.11 Physical – PL4000

PARAMETERS	DATA
Cooling Sensors	Auto cool-off Temperature, Humidity, and Fan Speed Sensors
Cabling	Conduit with Stabli termination (7ft) to be used with a T4000 or T4350 L1, L2 and PE VBatt, digital GND, and Comms
LEDs	**Green LED** – indicates power **Yellow/Amber LED** – to indicate Comms with T4000 and T4350 **Red LED** – indicates unit is running and dissipating power
Breakers	The unit has AC breakers and DC breaks (if used in special cases with DC chargers)

1.5.12 Physical – MitM Cable

PARAMETERS	DATA
DC Cables	MM-CCS1-DC-350: DC 350A Cable, CCS1 Adapte **Interface 1:** CCS1 (DC+, DC-, GND, CP) **Interface 2:** TESCO Staubli interface (DC+, DC-, GND, CP, VMain, RS-485) MM-NACS-DC-350: DC 350A Cable, NACS Adapter **Interface 1:** NACS (DC+, DC-, GND, CP, PP) **Interface 2:** TESCO Staubli interface (DC+, DC-, GND, CP, VMain, RS-485)
AC Cable	MM-CCS1-AC-80: AC 80A Cable, CCS1 Adapter **Interface 1:** CCS1 (L1, L2, GND, CP, PP) **Interface 2:** TESCO Staubli interface (L1, L2, GND, CP, VMain, RS-485)

1.5.13 Dimensions - T4350

PARAMETERS T4350	DATA
Length	21.2” (53.84 cm)
Width	16” (40.64 cm)
Height	10.6” (26.92 cm)
Weight	≈44 lbs. (≈19.95 kg)

1.5.14 Dimensions – PL4150

PARAMETERS (PL4150)	DATA
Length	28” (71.12 cm)
Width	43.2” (109.73 cm)
Height	40.5” (102.87 cm)
Weight	≈350 lbs. (≈158.75 kg)

1.5.15 Dimensions – PL4000

PARAMETERS (PL4000)	DATA
Length	15” (38.1 cm)
Width	15” (38.1 cm)
Height	12” (30.48 cm)
Weight	≈44 lbs. (≈19.95 kg)

1.5.16 Dimensions – MitM Cable

PARAMETERS (MitM Cable)	DATA
Length	78” (198.12 cm)
DC Cable Weight	21 lbs.
AC Cable Weight	6 lbs.

1.5.17 Environment – T4350

PARAMETERS	DATA
Operating Temp (Min / Max)	-4°F to 122°F (-20°C to 50°C)
Storing Temp (Min / Max)	-22°F to 140°F (-30°C to 60°C)

1.5.18 Environment – PL4150

PARAMETERS	DATA
Operating Temp (Min / Max)	-4°F to 122°F (-20°C to 50°C)
Storing Temp (Min / Max)	-22°F to 140°F (-30°C to 60°C)

1.5.19 Environment – PL4000

PARAMETERS	DATA
Operating Temp (Min / Max)	-4°F to 122°F (-20°C to 50°C)
Storing Temp (Min / Max)	-22°F to 140°F (-30°C to 60°C)

1.5.20 Environment – MitM Cable

PARAMETERS	DATA
Operating Temp (Min / Max)	-4°F to 122°F (-20°C to 50°C)
Storing Temp (Min / Max)	-22°F to 140°F (-30°C to 60°C)

1.6 About this Operations Manual

This manual provides complete information for setting up and operating the T4000. This document instructs the user on the following operations of the T4000:

- ✓ Setup and Installation
- ✓ Front, Side, and Rear Panel Features
- ✓ Graphical User Interface (GUI)
- ✓ Operating Procedures
- ✓ Instrument Maintenance

2 System Preparation and Power Requirements

2.1 Introduction

This chapter provides instructions for unpacking and installing the T4350, PL4150, PL4000, and the MitM Cable. Please read this section before operating the equipment. Instructions for cable connections and setup procedures included.

2.2 Unpacking and Inspection

The instruments are shipped in a container designed to prevent damage during shipping.
Inspect the instruments carefully for damage and immediately report any damage to the shipper. A packing list is included in the packaging. When you unpack the instruments, 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 for all Devices

2.3.1 Setup and Placement for all Devices

The instruments are designed to be used sitting on the ground, as long as there is sufficient space to allow adequate ventilation. The instruments can be vertically oriented as well. Please see suggested placement per setup.

Figure 2.3a Suggested EVSE Test System Setup sitting on the ground.

Diagram is showing PL4000.

PL4150 would typically be placed in the back of a truck and will need as much space that is physically possible to accommodate ventilation.

Figure 2.3b Suggested Vertical Oriented Setup with the PL4000. This application does not apply to the PL4150.

2.3.2 Airflow for all Devices

WARNING

Note of the instrument's airflow as indicated in the illustration below. Both the PL4150 and PL4000 air outflow can be extremely hot particularly when testing at higher load current or power. Please allow back space of at least 2 meters for both Programable Loaders (PL4150 and PL4000) air outflow.

PL4000 T4350 PL4150

2.3.3 Cooling considerations for all Devices

CAUTION

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

Cooling is managed by automatic internal fans and temperature sensors located in the PL4150 and PL4000. The airflow direction is marked on the equipment, with air entering through the intake vents and exiting through exhaust fans. **Proper airflow is crucial.**

2.4 Main & Auxiliary Power Supply

The TESCO EVSE Test System includes multiple components, each with its own power requirements and configurations. This section outlines the main and auxiliary power supply details for the T4350, PL4150, PL4000, and the Man-in-the-Middle (MitM) Cable.

2.4.1 Main & Auxiliary Power Supply T4350

The T4350 can be powered by its internal rechargeable battery or auxiliary AC line. The battery is capable of up to 8 hours of continuous operation. The battery charge status icon can be seen in the top right corner of the EVSE Tester's LCD screen.
Fully charging the battery may require up to 5 hours and may be done with the unit on or off.
The auxiliary power source is protected by a 6A fuse in L1 & L2 individually. An AC line power cord is provided.

WARNING

To avoid electrical shock, personal injury, or fire hazard, connect the factory supplied power cord to a properly grounded AC power outlet to charge the unit when not being used with an EVSE charger.
Do not charge the unit when it is connected to an EVSE charger.

2.4.2 Main & Auxiliary Power Supply PL4150

The TESCO PL4150 150kW Programmable Load Box derives its main and auxiliary power through a dedicated conduit with Staubli termination, designed for use with the T4350 EVSE Test System. This conduit includes connections for DC+, DC−, L1, L2, L3, L4, PE (protective earth) for main power, as well as battery voltage (VBatt), digital ground (GND), and communication lines for auxiliary functions.

2.4.3 Main & Auxiliary Power Supply PL4000

The TESCO PL4000 Programmable AC Load Box receives its main and auxiliary power through a dedicated conduit with Staubli termination, designed for integration with TESCO's T4350 EVSE Test System. This conduit includes connections for L1, L2, and PE (protective earth) for main power, as well as battery voltage (VBatt), digital ground (GND), and communication lines for auxiliary functions.

2.4.4 Main & Auxiliary Power Supply MitM Cable

The TESCO Man-in-the-Middle (MiTM) Cable is an interface cable designed for use with the T4350 EVSE Test System. It serves as a critical conduit for both power and communication, enabling in-line, real-time monitoring and data capture during EVSE testing. The MiTM Cable features a Staubli connector on one end and a CCS1 or NACS EVSE adapter on the other.

Note: While the MiTM Cable does not generate power on its own, it plays a key role in transmitting main and auxiliary power signals between the test system and EVSE, enabling accurate, real-time performance analysis under load.

3 Functionality

3.1 Introduction

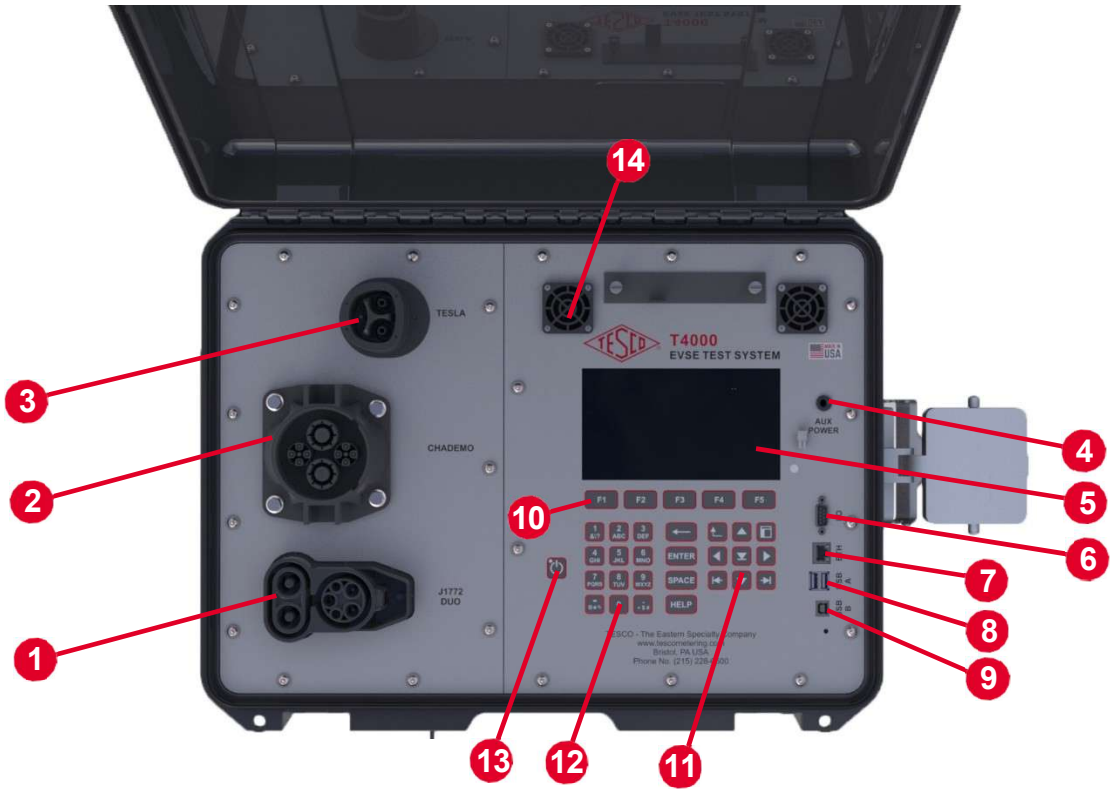
This chapter serves as a detailed reference for understanding the key functions, features, and interface layouts of the components within the EVSE Testing System. It includes descriptions of the physical controls, indicators, ports, and panel layouts for the TESCO T4350 EVSE Tester, PL4150 DC Load, PL4000 AC Load, and the Man-in-the-Middle (MitM) Cable. This section is intended to help users quickly identify device features, become familiar with each product's physical and operational interface, and understand the role each component plays within a testing configuration.

Users should refer to this chapter prior to performing any test procedures, particularly if they are working with a new device configuration or unfamiliar with a specific system component. Accurate understanding of each unit's layout and controls is essential for proper test setup, execution, and troubleshooting.

3.2 Panel Features

The T4350 front and side panels include all primary user interfaces and connection points required for EVSE testing. From standardized EV charging ports to communication interfaces and power connectors, each component is clearly labeled and easily accessible to support streamlined setup, test execution, and data transfer.

3.2.1 T4350 Front Panel



#	NAME
1	J1772 DUO port
2	CHADEMO port
3	TESLA port
4	Auxiliary Power
5	7", 1024x600, high brightness, daylight readable LCD
6	RS232 Com Port
7	Ethernet Com Port
8	USB A Port
9	USB B Port
10	Function Keys
11	Navigation Keys
12	Alphanumeric Keys
13	Power Button
14	Airflow Inlet

Table 3.2.1. T4150 Front Panel Sections

T4350 Side Panel View

#	NAME
1	AC Connectors
2	DC Connectors

Table 3.2.1 T4350 Side Panel Sections

3.2.2 PL4150 Panel Overview

#	NAME
1	Hood: Always needs to be open during operation
2	Lead Sensor: Detects whether the hood is open or closed
3	Locks
4	Indication Lights Green: Power Yellow: Communication Red: Load On
5	Emergency Stop: E-Stop
6	Staubi Cable Connection
7	(2) AC Breakers

Table 3.2.2. PL4150 Panel Sections

3.2.3 PL4000 Panel Overview

PL4000 Front Panel

#	NAME
1	Power Status Indicator
2	Communication Status Indicator
3	Load Status Indicator
4	Left Fan for Load Heaters (Big Fan 1)
5	CombiTac Connector
6	Strap Handle
7	CombiTac Conduit Holder
8	Right Fan for Load Heaters (Big Fan 2)
9	Fan for Variable Load (VL) Controller (Small Fan)

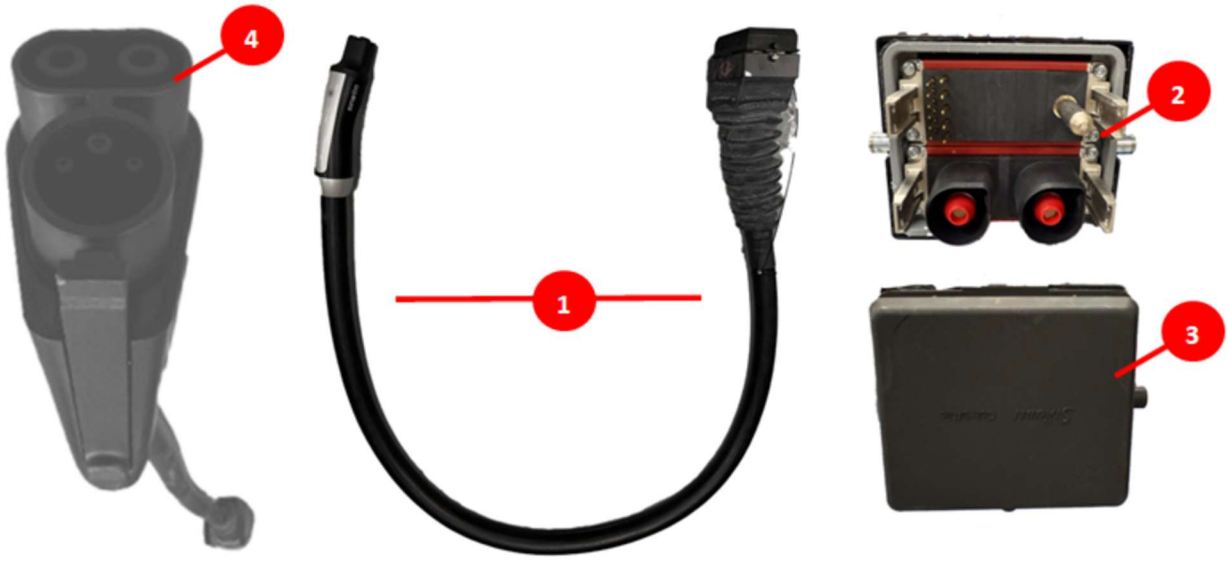
Table 3.2.3. PL4000 Front Panel Sections

PL4000 Rear Panel

#	NAME
1	DC Circuit Breaker
2	AC Circuit Breaker
3	Air Exhaust of Variable Load
4	Left Exhaust for Load Heaters (Big Fan 1)
5	Right Exhaust for Load Heaters (Big Fan 2)

Table 3.2.3. PL4000 Rear Panel Sections

3.2.4 MitM Cable



#	NAME
1	MitM Cable
2	DC Connector
3	DC Connector Cap
4	Combined Charging System - CCS1

3.2.4 MitM Cable Sections

3.3 T4350 User Interface & Operation

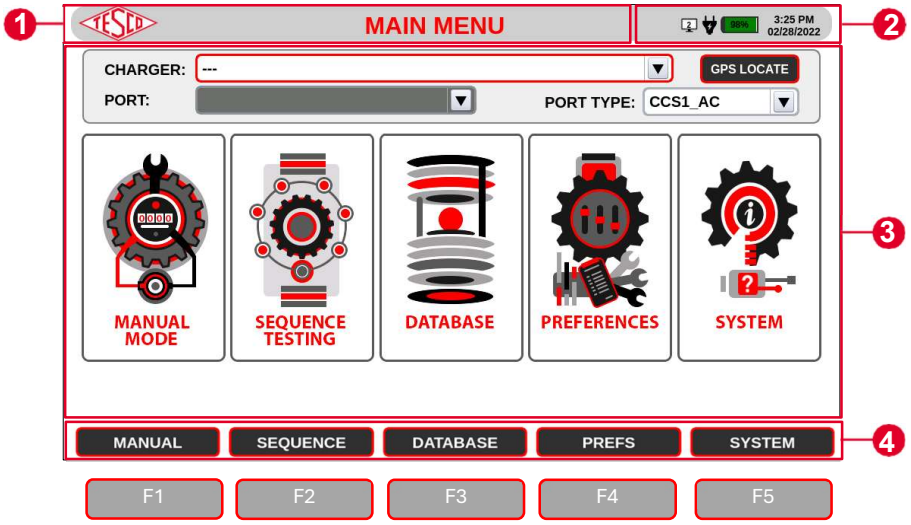
This section provides an overview of how to navigate and interact with the T4350 tester using the device's console and function keys. It outlines the basic button functions to help users operate the system smoothly and efficiently.

3.3.1 T4350 Console Navigation Keys

SYMBOL	DESCRIPTION
	Selects the NEXT or PREVIOUS menu item Moves the **SELECTED LINE** UP or DOWN Selects an Item from a dropdown menu
	Moves the cursor left/right of the current character in text boxes. Moves the selection left/right of the current selected cell in tables.
	Selects the NEXT or PREVIOUS **TAB** item.
	Moves the focus from one section of the screen to another
	Deletes the previous character.
	Returns to the previous screen.
	Function keys
	Power button. Hold down to turn the device on until the LED lights up and wait for a few seconds for the screen to load.
	Selects a response.
	Proceeds to next space
	Provides context-sensitive help

3.3.2 Screen Layout & Navigation

The T4350 user interface is divided into four main sections: Screen Title, Status Bar, Screen Data, and Function Buttons. Each is designed to provide a clear and intuitive testing experience. Fields or buttons that appear **grayed out** on the screen are **not accessible** and cannot be modified by the user.

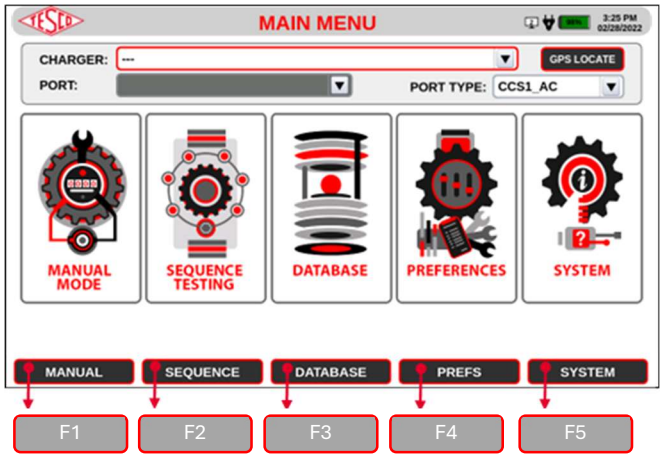


NUMBER	DESCRIPTION
1	Screen Title
2	Status Bar
3	Screen Data
4	Function Buttons

Table 3.3.2. EVSE Tester GUI Sections

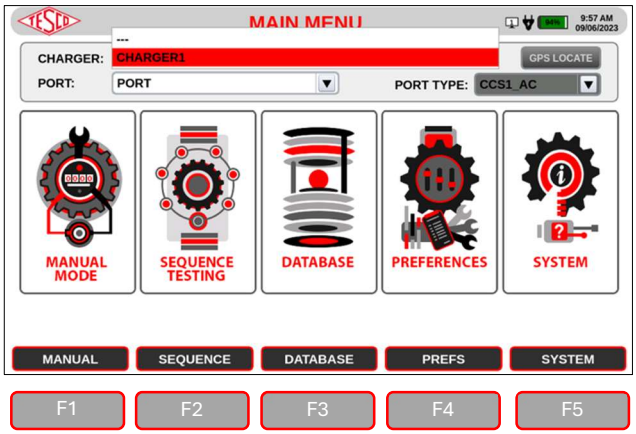
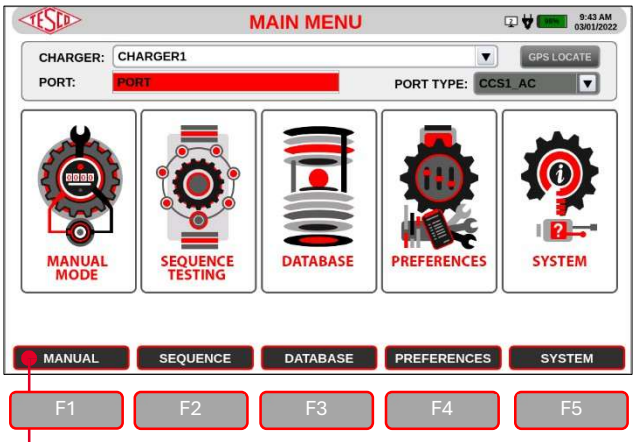
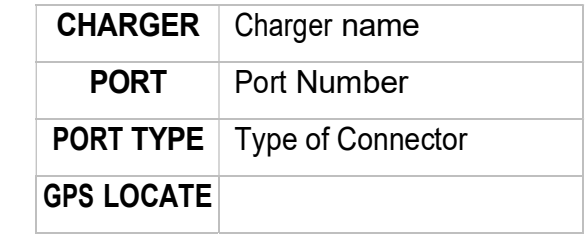
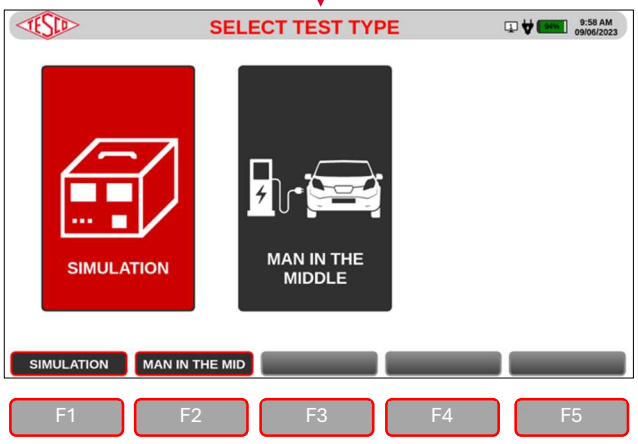
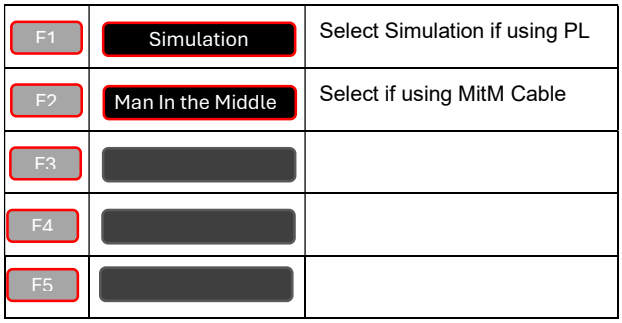
3.3.3 MAIN MENU

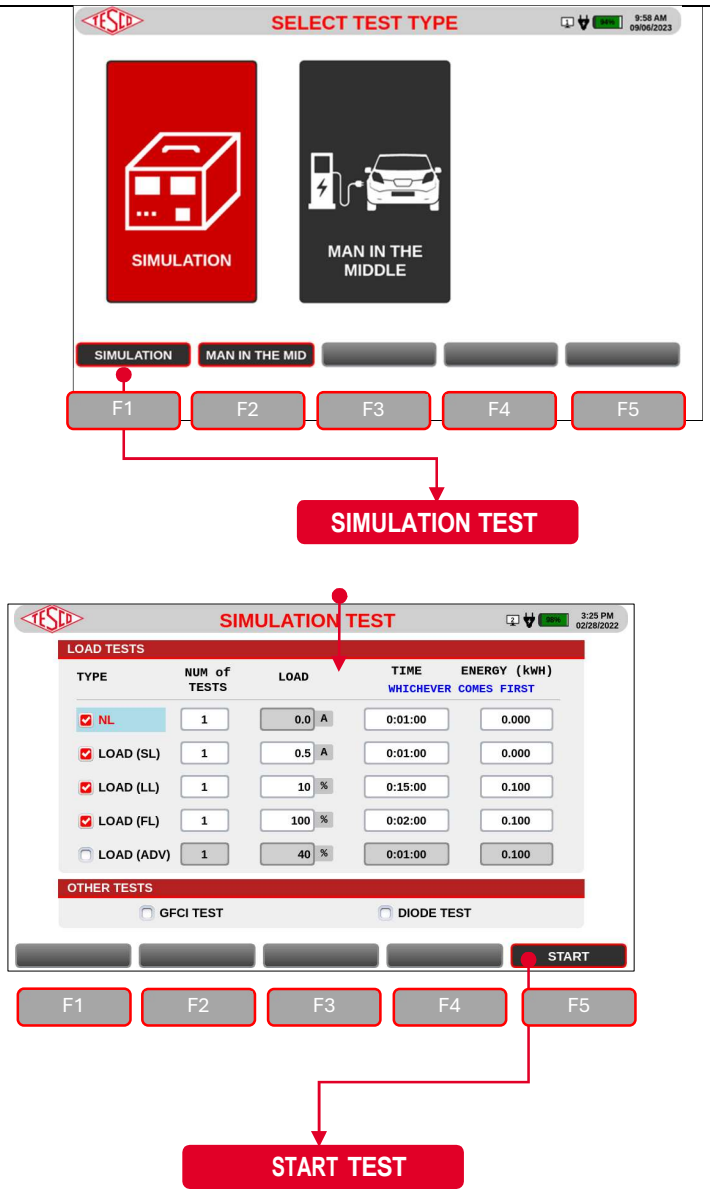
This section introduces the main menu of the EVSE Tester, outlining the available options and how to begin navigating through the system's core functions.

SCREEN	DESCRIPTION
	**MAIN MENU** The main menu contains the primary functions of the EVSE Tester. Press a function key to access a menu item. **FUNCTION KEYS**

F1	Manual Mode	Perform a manual test
F2	Sequence Testing	Perform a sequence test
F3	Database	View information on: + EVSE + Test Results + Test Sequences
F4	Preferences	View & change settings
F5	System	View System Information

3.3.4 Manual Testing

SCREEN	DESCRIPTION
	**CHARGER INFORMATION** Before proceeding to Manual Testing, select the necessary charger details first. **INPUT FIELD:**
	
	**SELECT TEST TYPE FUNCTION KEYS** 



SIMULATION TEST

NL - No current flowing
SL – 0.5A – 2.9A
LL – 5% - 15% of the EVSE Max Current

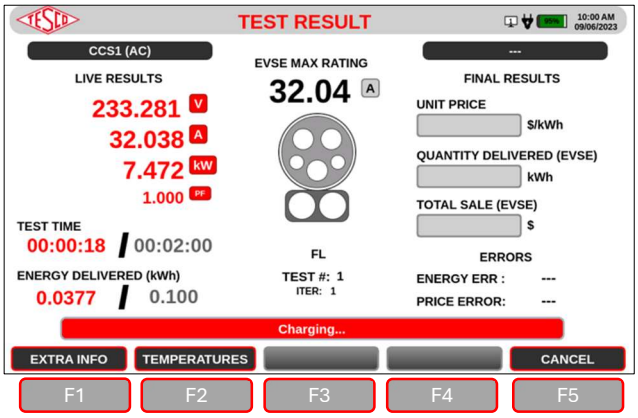
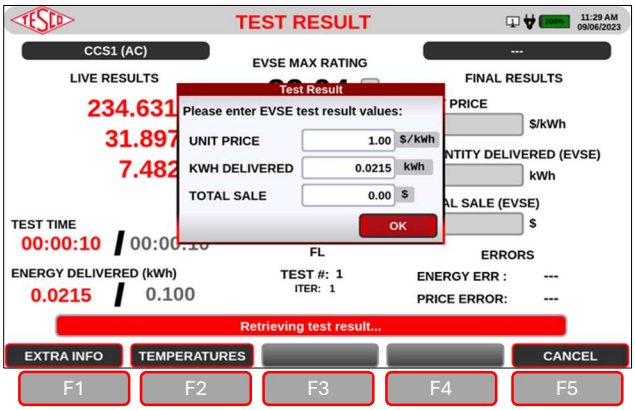
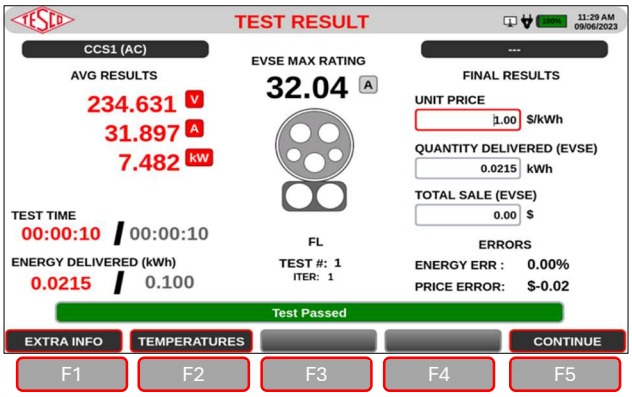
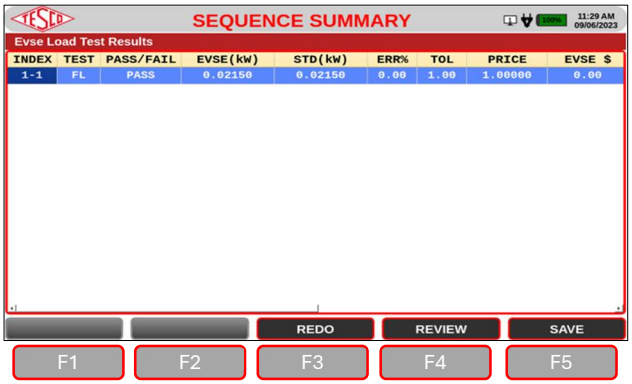
Rating
FL - 85% - 100% of the EVSE Max Current

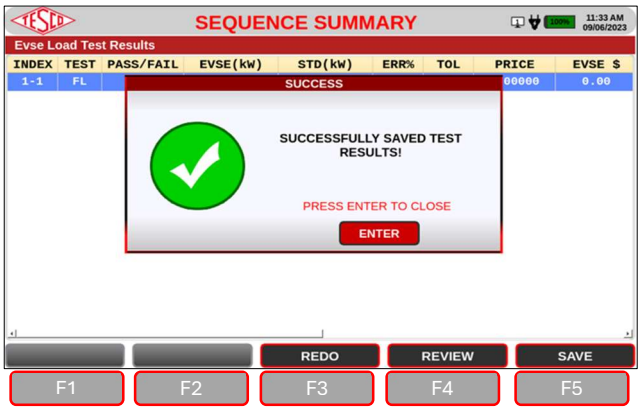
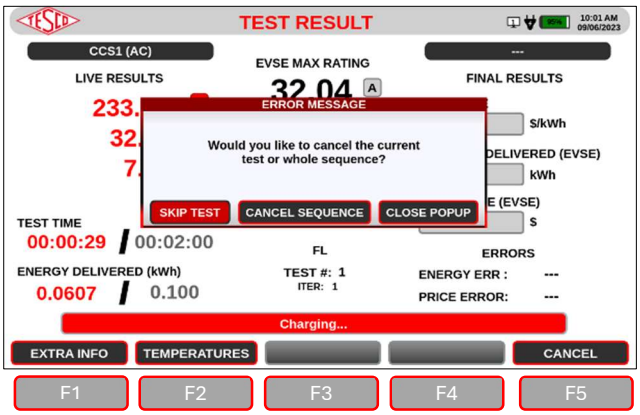
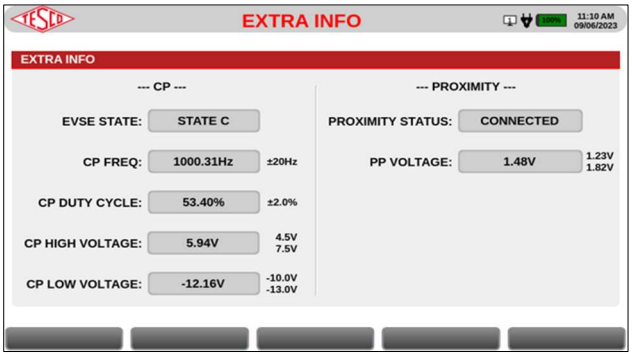
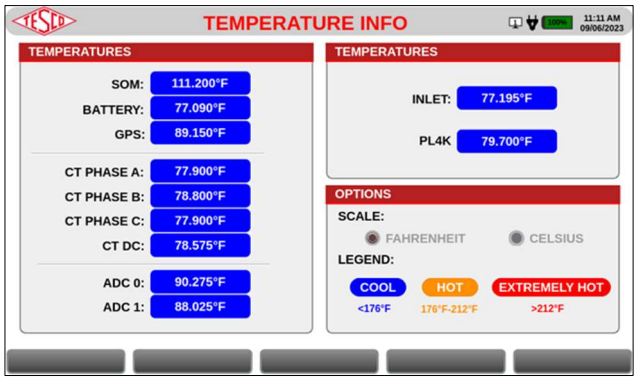
Rating
ADV – 1% - 100% of the EVSE Max

Current Rating
GFCI TEST
DIODE TEST

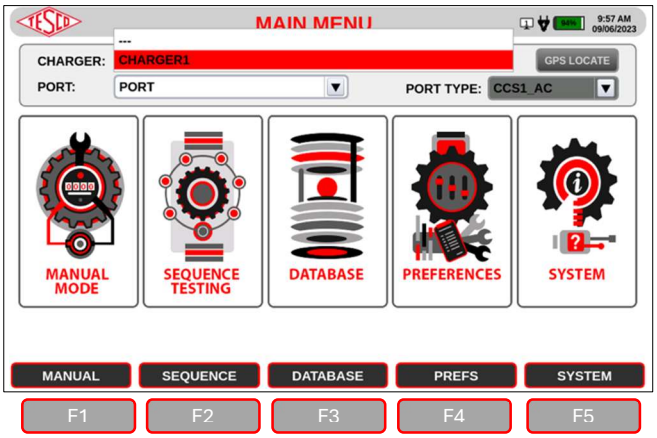
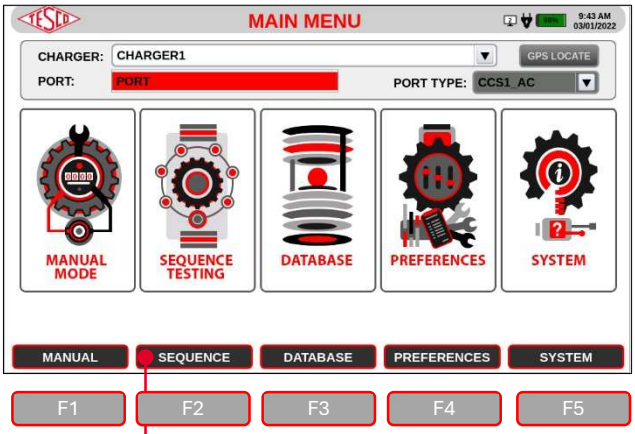
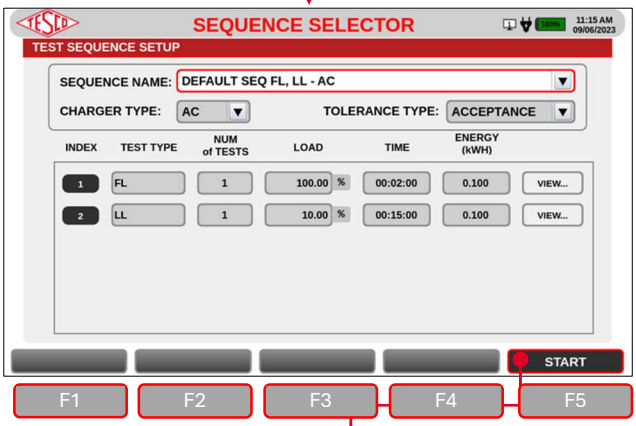
Note

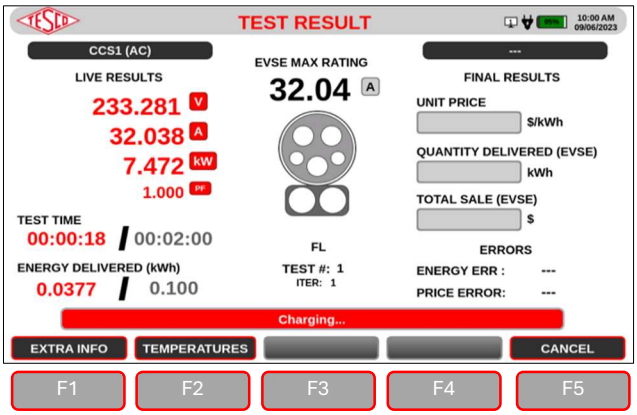
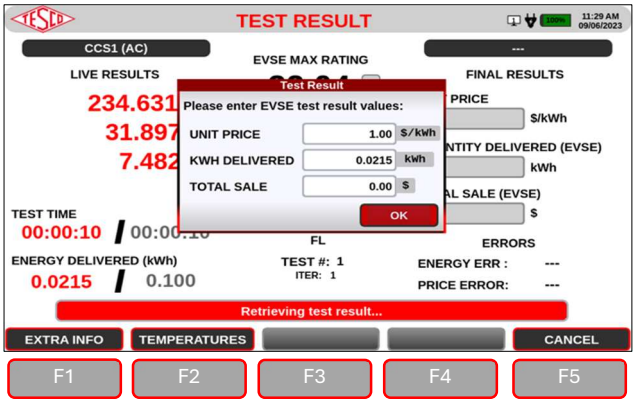
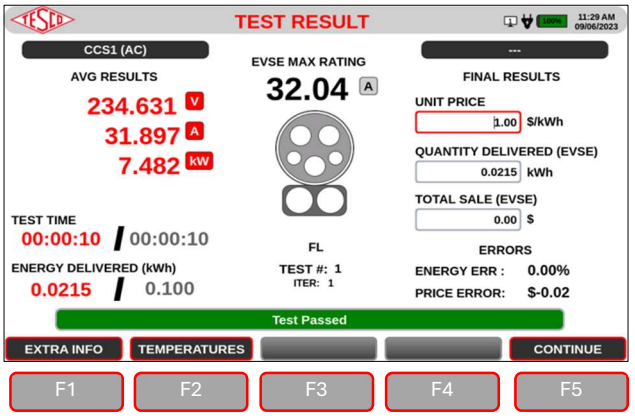
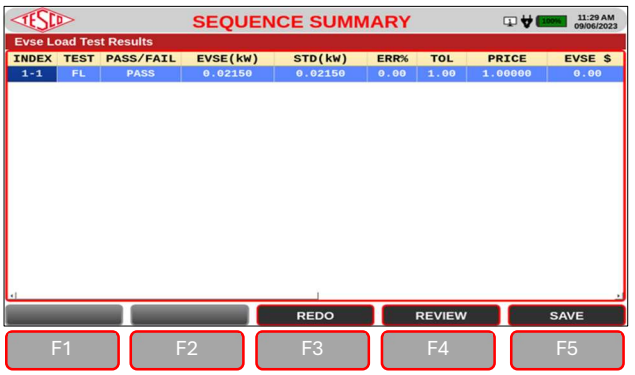
Users have the option to set either a timeout duration or a target energy level. Entering a value of zero indicates no timeout or no target energy will be set. If both values are provided, the test will end when either the timeout is reached or the target energy level is achieved, whichever occurs first.

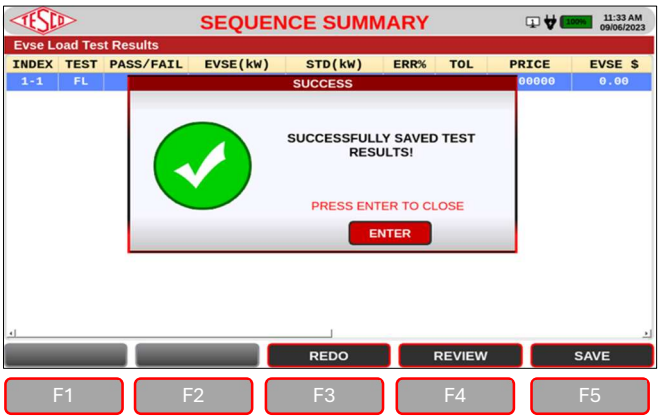
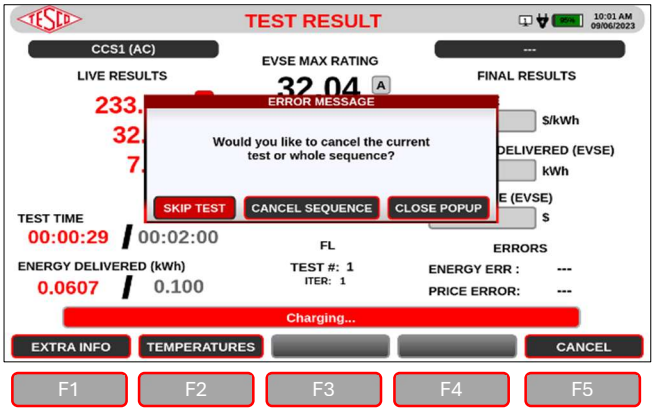
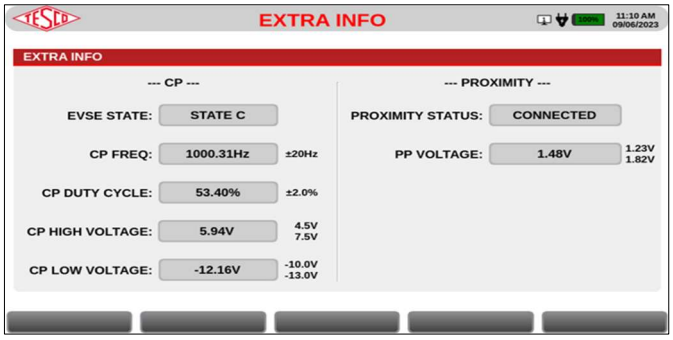
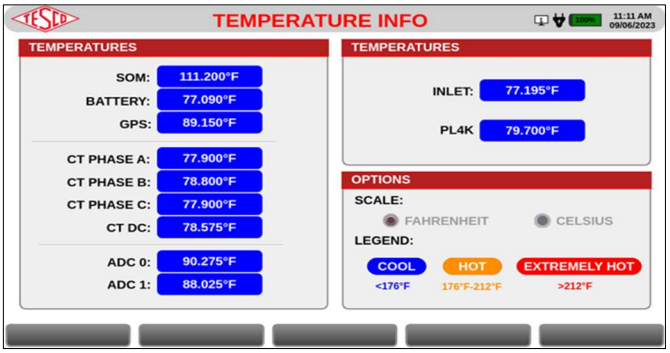
SCREEN	DESCRIPTION
	Once **START TEST** has been **pressed**, the test result page will then be displayed.
	Once the test is complete, a **Test Result** popup box will appear, allowing the user to enter the test result values from the EVSE charger.
	**Upon entering the result values, the final results will be displayed.** Press 'Continue' to advance to the next test. If this is the final test, you will be directed to the Sequence Summary Page.
	Users have the option to either redo a specific test by pressing F3 REDO, view additional test results with F4 REVIEW, or save the test result using F5 SAVE.

SCREEN	DESCRIPTION
	If you press F5 SAVE, A popup screen will notify you that you have successfully saved the test results.
	***OTHER INFORMATION:*** If you were to press CANCEL, a popup screen will ask you to confirm if you would like to SKIP TEST, skip the test and proceed to the next test in the sequence, CANCEL SEQUENCE, cancel the whole sequence or simply CLOSE POPUP which will close the message and continue testing.
	While a test is in progress, a user can press F1 EXTRA INFO to access Control Pilot (CP) & Proximity information.
	Additionally, pressing F2 TEMPERATURES allows them to view the temperatures of various components.

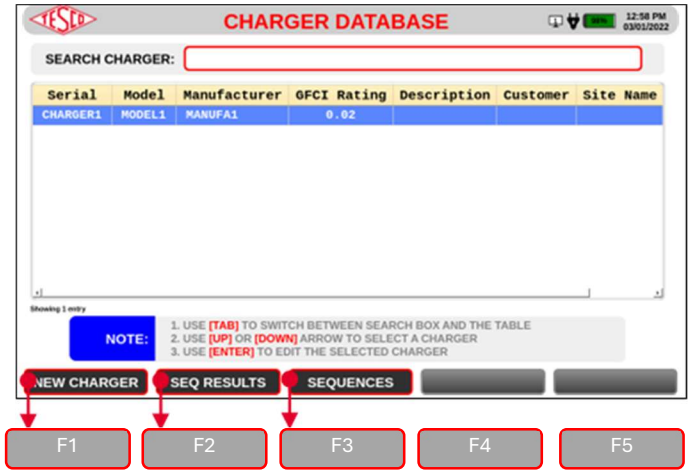
3.3.5 Sequence Testing

SCREEN	DESCRIPTION
	**CHARGER INFORMATION** Before proceeding to Sequence Testing, **select the necessary charger details first.** **INPUT FIELD:** **CHARGER** – Charger name **PORT** – Port Number **PORT TYPE** – Type of Connector **GPS LOCATE**
	Press F2 SEQUENCE. This will bring up the Sequence Selector page,
	Place the cursor in the Sequence Selector field. Click the dropdown arrow. Select the appropriate sequence name from the Sequence Name list.
	Press 'START TEST', and the Test Result Page will then be displayed.

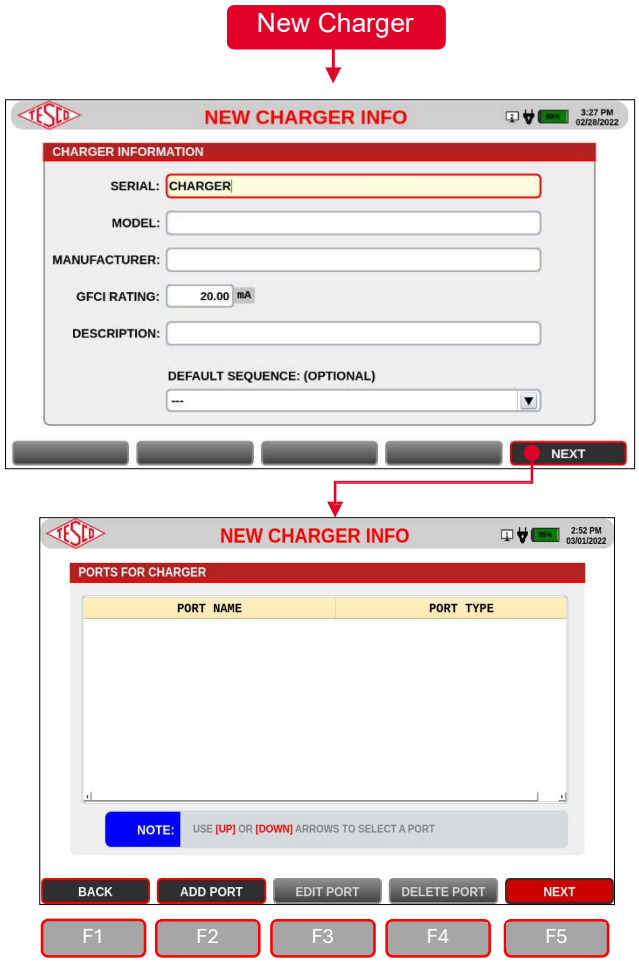
SCREEN	DESCRIPTION
	Once **START** is clicked, the test result page will then be displayed.
	Once the test is complete, a **Test Result** popup box will appear, allowing the user to enter the test result values from the EVSE charger.
	Upon entering the result values, the final results will be displayed. Press 'Continue' to advance to the next test. If this is the final test, you will be directed to the Sequence Summary Page.
	Users have the option to either redo a specific test by pressing F3 REDO, view additional test results with F4 REVIEW, or save the test result using F5 SAVE.

SCREEN	DESCRIPTION
	If you press F5 SAVE, A popup screen will notify you that you have successfully saved the test results.
	OTHER INFORMATION:
	If you were to press F5 CANCEL, a popup screen will ask you to confirm if you would like to SKIP TEST, skip the test and proceed to the next test in the sequence, CANCEL SEQUENCE, cancel the whole sequence or simply CLOSE POPUP which will close the message and continue testing.
	While a test is in progress, a user can press F1 EXTRA INFO to access Control Pilot (CP) & Proximity information.
	Additionally, pressing F2 TEMPERATURES allows them to view the temperatures of various components. **Note:** During sequence testing, multiple test steps (typically two or three) may be configured. These tests will execute automatically in succession until the entire sequence is complete.

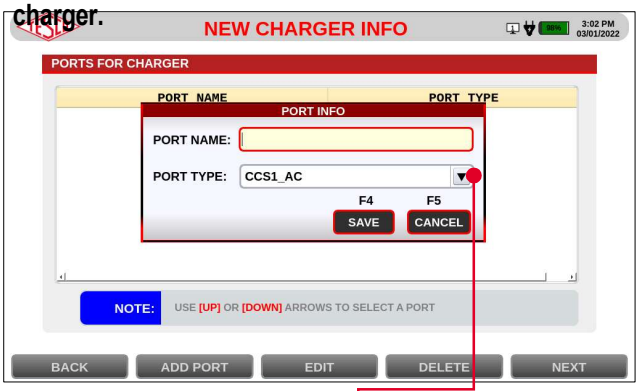
3.3.6 Database

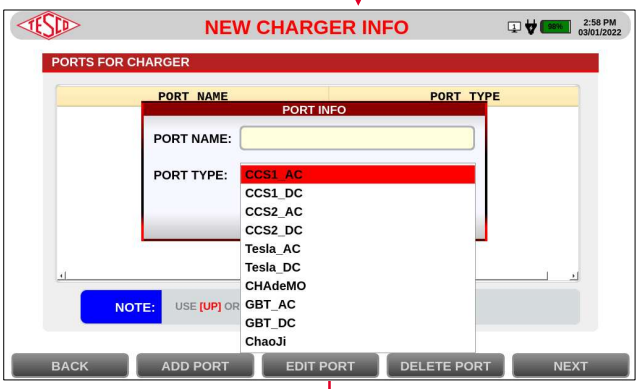
SCREEN	DESCRIPTION
	**Charger Database.** The Database screen displays a comprehensive list of configured EVSE (Electric Vehicle Supply Equipment) chargers. This centralized view allows users to browse, select, and manage charger entries used during test operations. It serves as the foundation for organizing charger-specific data essential to system functionality and reporting. **Select:** **F1 New Charger** **F2 Sequence Results** **F3 Sequences**

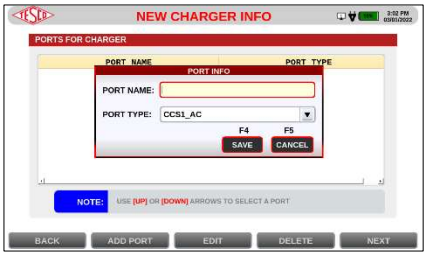
3.3.61 New Charger Information

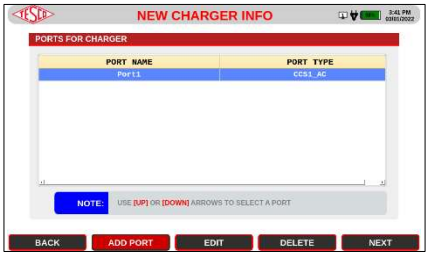
SCREEN	
	**New Charger:** This screen enables users to create a new EVSE charger profile or edit an existing one. Each entry includes key information such as **Serial Number**, **Model Type**, **Manufacturer**, **GFC Rating**, **Description**, and **Default Sequence**. Once saved, the information is stored in the database and used to support consistent and accurate testing procedures. Press NEXT. NEW CHARGER INFO Screen will pop up. Function keys are: F1 **BACK** Return to the previous screen. F2 **ADD PORT** Adds new port F3 **EDIT PORT** Edit Port F4 **DELETE PORT** Delete Port F5 **NEXT** Proceeds to the next screen.

ADD PORT









This popup allows the user to input information for a new port to be assigned to the selected charger.

You will name your PORT
Use the up/down arrow to select the port type:
I.e., CCS1_AC, CCS1_DC, etc.

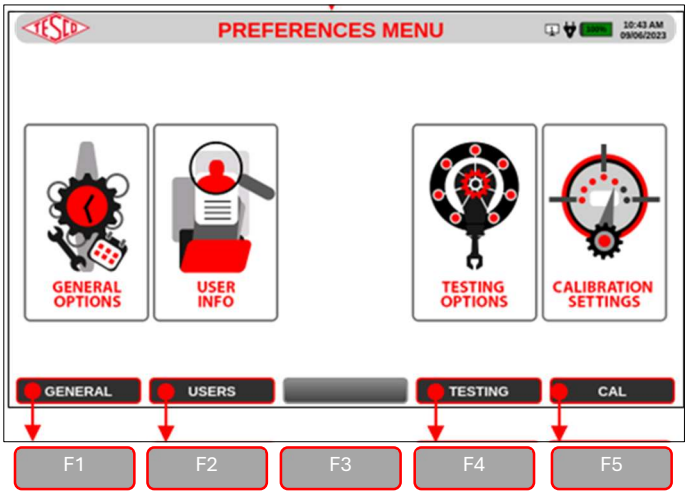
Once added, the port wil l appear in the main port list and will be available for selection during test procedures.

Function Keys

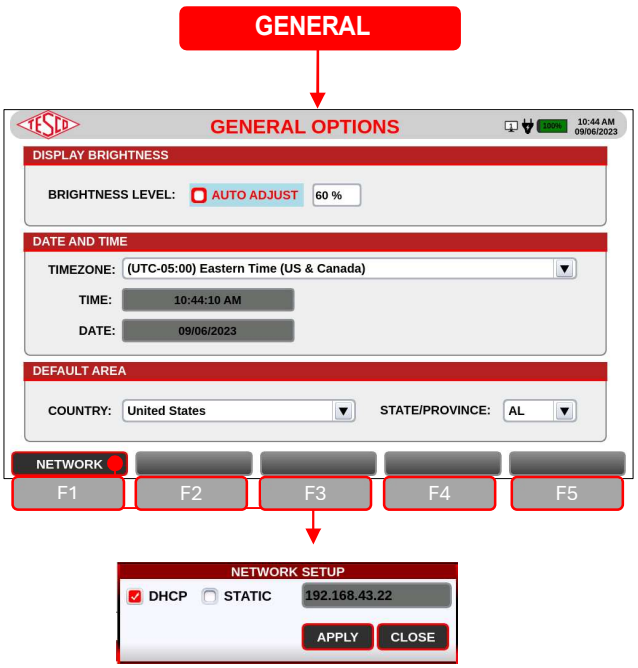
F4 SAVE

F5 CANCEL

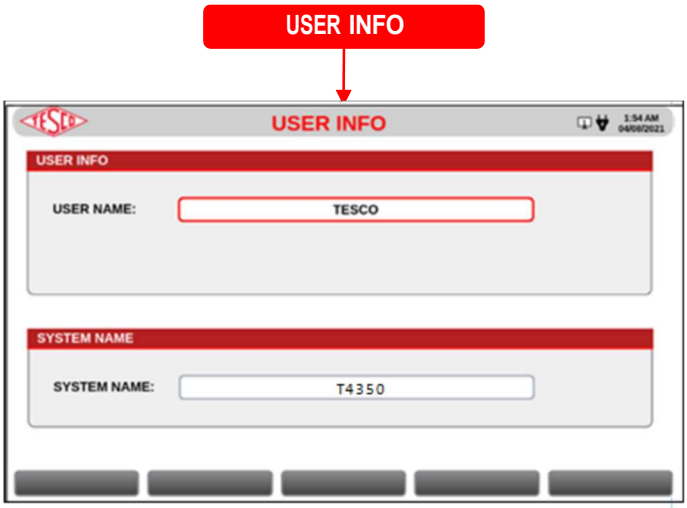
3.3.7 Preferences Menu

SCREEN	DESCRIPTION
	**FUNCTION KEYS** F1 GENERAL: View/edit general options F2 User Info: View/edit user options F3 ------- F4 TESTING OPTIONS: View/edit testing options F5 CALIBRATION SETTINGS: View and Set Calibration Notifications

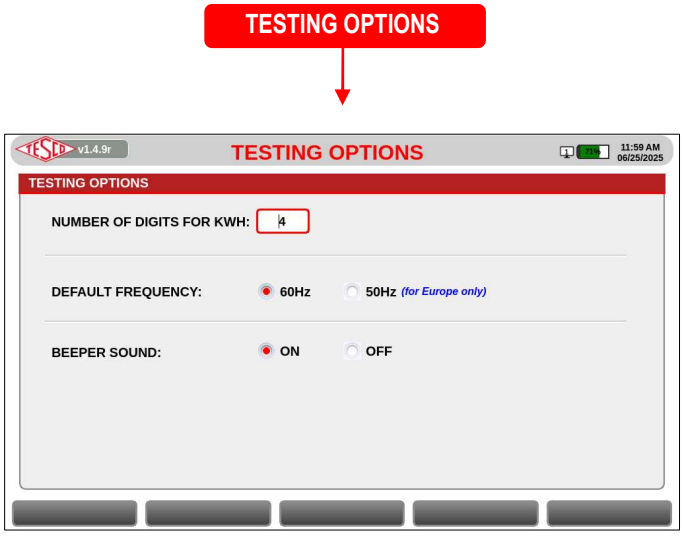
3.3.8 General Options

SCREEN	DESCRIPTION
	**General Options.** This screen provides access to basic system settings such as brightness level, date and time, and country/state configuration. Any changes made on this screen are automatically saved as they are entered, allowing for quick and efficient updates to system preferences. **Press F1 for Network Options.** This screen will allow the user to configure network connectivity settings. Users can choose to automatically acquire an IP address via DHCP or manually enter a static IP address and related network values. These settings are essential for proper communication and remote operation of the EVSE test system. Function Keys • Apply the IP address (be sure to apply address before pressing CLOSE) • Close to **SAVE**

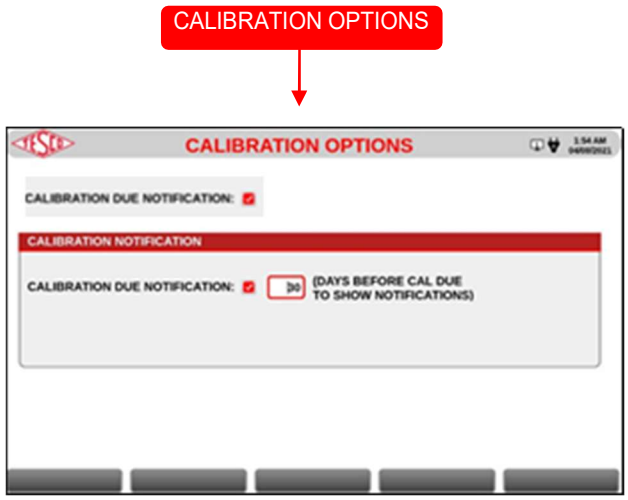
3.3.8.1 User Information

SCREEN	DESCRIPTION
	View and change username and system name. Changes will be automatically saved upon input. To exit from this screen, press the key. This will bring you back to the previous screen.

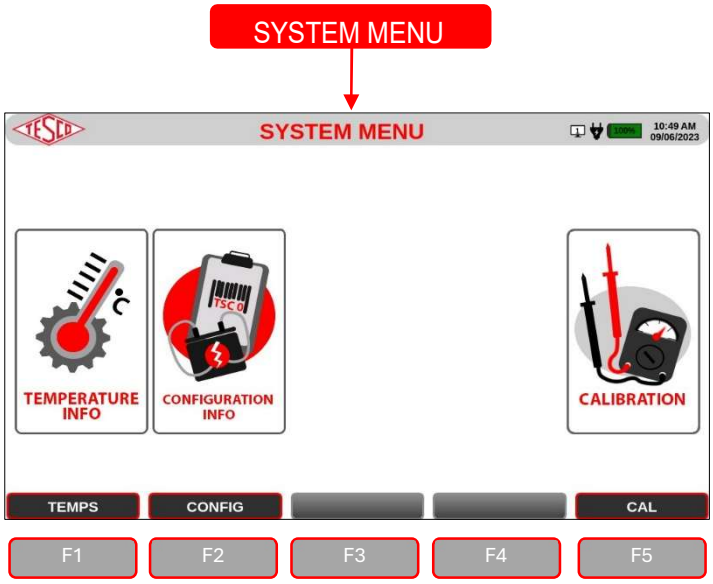
3.3.8.2 Testing Options

SCREEN	DESCRIPTION
	**Testing Options** This screen allows the user to configure key testing preferences: • **kWh Display Precision**: Select the number of digits to display for energy (kWh) readings. • **Default Frequency**: Choose between **60 Hz** (standard) and **50 Hz** (for European applications). • **Beeper Sound**: Enable or disable the audible beep based on user preference. All selections are saved automatically and applied to subsequent test operations. To exit from this screen, press the key. This will bring you back to the previous screen.

3.3.8.3 Calibration Options

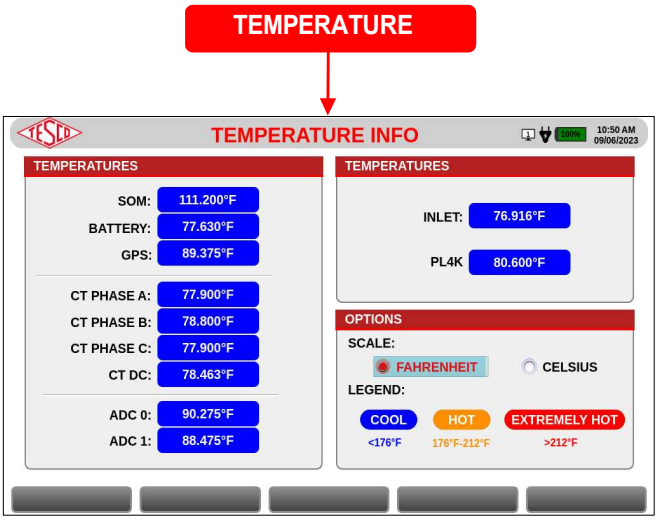
SCREEN	DESCRIPTION
	**Calibration Options** This screen allows users to enable calibration due notifications. • **Calibration Due Notification**: • Use the **Enter** key to check or uncheck this box. When enabled, an additional field will appear. • **Days Before CAL Due to Show Notifications**: Enter the number of days prior to the calibration due date when you would like a notification to appear. • Once the value is entered, press the **Up Arrow** key to exit and return to the previous screen. All changes are saved automatically.

3.3.9 Systems Menu

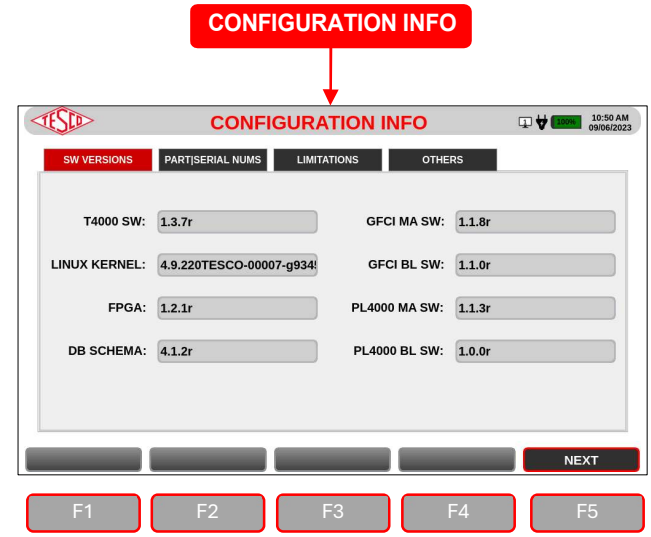
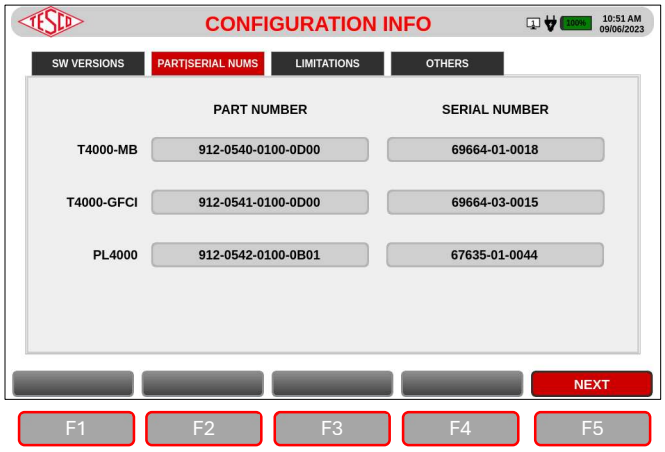
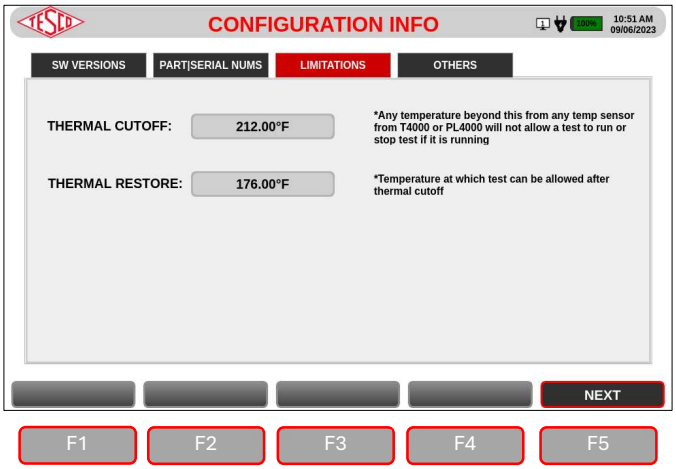
SCREEN	DESCRIPTION
	The System Menu provides access to key system configuration information. The user can select from the following options: F1 **TEMPS** – Displays the internal temperature of the device in real time. F2 **CONFIG** – View current configuration settings, including system parameters. F3 -- F4 -- F5 **CAL** – Access calibration information and perform calibration-related functions.

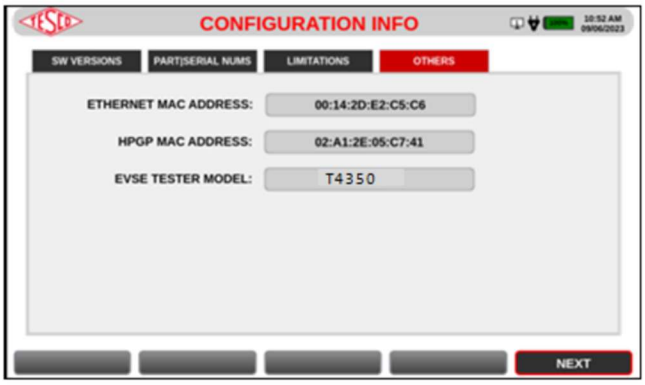
3.3.9.1 Temperature Information

SCREEN	DESCRIPTION

	The **TEMPS** screen displays the real-time internal temperature of the device. This information is view-only and cannot be modified by the user.
	
	• **Default Unit**: Fahrenheit
	• **Temperature Legend**:
	  ○ **Blue** – Cool (< 178°F)
	  ○ **Yellow** – Hot (179°F to 212°F)
	  ○ **Red** – Extremely Hot (> 212°F)
	
	This screen is intended for monitoring purposes only. To exit and return to the **System Menu**, press the **Up Arrow** key.

3.3.9.2 Configuration Information

SCREEN	DESCRIPTION
	**Configuration Information** The **CONFIG** screen presents important system data across four tabs located at the top of the display. These tabs are **read-only** and intended for reference only. **Tabs include:** • **SW Version** – Displays the currently installed software version. Simply press F5 to go to the NEXT Tab.
	• **Part/Serial Number** – Provides the device's part number and unique serial number. Simply press F5 to go to the NEXT Tab.
	• **Limitations** – Shows the device's thermal operating limits. This includes temperature thresholds critical to proper function and system protection. Simply press F5 to go to the NEXT Tab.



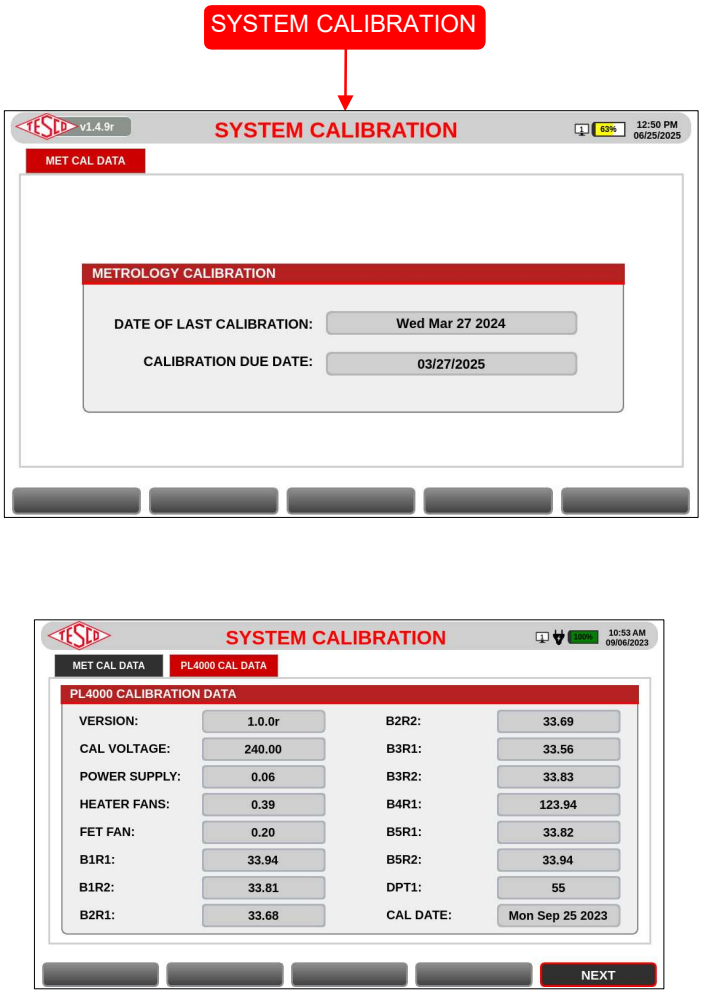
F1 F2 F3 F4 F5

Other – contains Ethernet/HPGP MAC Address Information and the Model of your EVSE Tester.

*You will need to press the **UP Arrow**  to exit from Configuration Info Menu.

Selecting next will bring you back to the first tab.

3.3.10 Calibration Screen

SCREEN	DESCRIPTION
	System **Calibration** The System Calibration screen is a **read-only** section designed to display metrology calibration data for reference purposes only. • **MET CAL Data Tab** – Shows the date of the last calibration performed on the device and the next calibration due date, if applicable. This information helps ensure the system remains within valid calibration intervals. • **PLEASE NOTE: PL4000 CAL Data Tab** – If a **PL4000 Programmable Load Box** is connected, a second tab will appear displaying the PL4000's calibration data.
	Press **Up Arrow** key  to exit to previous screen.

4 Device Configuration

4.1 Introduction

Section 4 is dedicated to help users visualize how the T4350 and its components are arranged in real-world testing environments. By presenting sample test scenarios and equipment setups first, users can become familiar with how the system should look and function before beginning the actual procedures. Following these visual examples, detailed instructions are provided for using the T4350 with TESCO's PL4150 and PL4000 Programmable Load Emulators, as well as Man-in-the-Middle (MitM) Cables.

Refer to Section 1.3 General Safety Instructions and adhere to any applicable safety protocols from your organization before using.

FOUR YOUR INFORMATION REGARDING POWER-UP AND POWER-DOWN PROCEDURES:

Connection and Power-Up

The instrument's connector employs a "make first, break last" system where upon insertion, the ground connection is established first before making power connection and maintain ground until after power connections are broken. This system helps ensure a safer connection.

Sequence of Test Connection and Power-Up with Programmable Loaders.

1. Connect the Staubli Cable of the Programmable loader (PL4150 or PL4000) to the LOAD & CONTROL connector of the Tester.
2. Connect the Coupler of EVSE to the J1772 connector of the Tester.
3. To Power ON, press the POWER button for at least 3 seconds.

Power-Down and Sequence of Disconnection

WARNING

T4350 should be turned off properly before the connectors are disconnected.

1. To turn off T4350, return to Main Menu and press the power button for at least 3 seconds.
2. A dialog box appears to confirm shutdown.
3. Disconnect the Coupler of EVSE from the CCS1/ChaDemo/Tesla inlet of Tester.
4. Disconnect the CombiTac from PL4150/PL4000 from the LOAD & CONTROL inlet of tester.

4.2 DC Fast Charger Accuracy Testing with the T4350 & PL4150

This section provides a visual example of a typical test setup for verifying DC Fast Charger (DCFC) accuracy using the T4350 and PL4150. It is followed by step-by-step instructions for configuring the equipment and running the test. Reviewing the setup scenario first will help users better understand how the components are arranged and interact during the testing process.

4.2.1 Test Scenario 1: DC Fast Charger Accuracy Test

The image below captures a live field deployment of a **DC Fast Charger (DCFC) accuracy test** using TESCO's advanced EVSE test equipment.

The **PL4150 Programmable Load** (mounted in the utility truck bed) is responsible for drawing precise, programmable electrical loads from the charger under test.

The **T4350 EVSE Tester** (unit on the portable stand) is used to control the test process, monitor real-time data, and capture performance metrics.

A public **DC Fast Charging station** is connected via Staubli cables to the TESCO equipment, enabling controlled load testing and verification of charger energy delivery.

This setup ensures **NIST Handbook 44-aligned** test procedures and validates **revenue-grade accuracy** of the EVSE in real-world conditions.

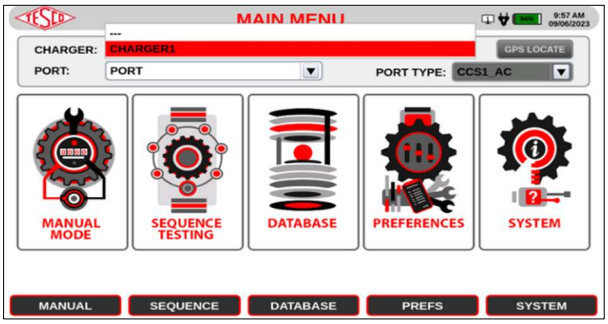
Accuracy Test with T4350 & PL4150 1

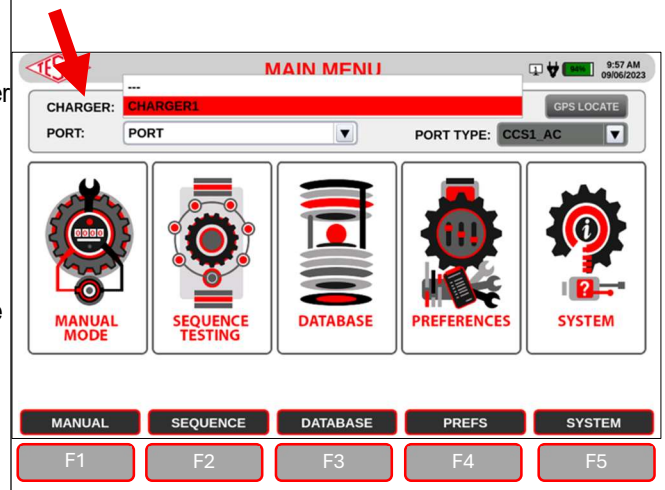
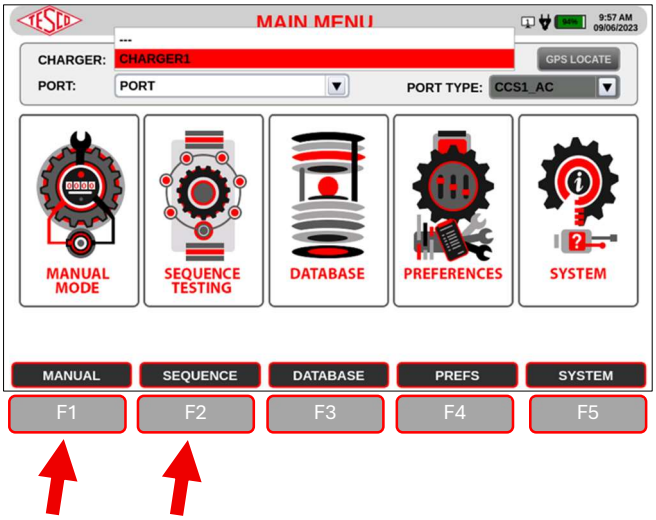
4.2.2 Using T4350 with PL4150

The following steps outline the standard configuration process when preparing the T4350 for testing with the PL4150 Programmable Load Box. This setup ensures proper communication and functionality between the test equipment and the charger under evaluation.

STEP	VISUAL
Step One: **Important:** The Emergency Stop (E-Stop) cable must be securely connected to the PL4150 in order for the system to operate. This is a self-contained safety cable designed to enable or disable system power. If the E-Stop cable is not connected, the system will not initiate testing or power up for safety reasons.	

STEP	VISUAL
Step 2: **Staubli Cable Connection:** The Staubli cable is shipped pre-connected to the PL4150. To complete the setup, the user must release the opposite end of the Staubli cable from its secured position in the parking station (located on the opposite side of the unit). Once released, insert the connector into the Staubli inlet on the T4350. Push the locking mechanism firmly into place to ensure a secure and proper connection.	  

STEP	VISUAL
Step Three: **Powering On the T4350:** To power on the T4350, press and hold the power button for approximately three seconds. The TESCO logo will appear on the screen, indicating that the system is booting. During startup, you may hear a series of clicking sounds as internal components initialize. Once the boot-up process is complete, the MAIN MENU screen will be displayed, confirming the unit is ready for operation.	 
Step Four: **Verify Connectivity Status:** After connecting the Staubli cable and powering on the T4350, communication between the T4350 and the PL4150 will begin during the system startup. You can verify this activity by observing the LED indicators on the front panel of the PL4150: • Green – Power is on • Yellow – Communication (COMM) is active • Red – Load is engaged These indicators confirm proper connectivity and system status as the T4350 completes its boot-up sequence.	

STEP	VISUAL
Step Five: **Charger Selection:** From the MAIN MENU, use the dropdown list to select the charger you are testing. • If the charger you need is not listed, refer to **Section 5.4.3** for instructions on how to add a new charger profile. • If you are conducting a test using a **Temporary Charger**, indicated by a selection of "---" in the dropdown, be sure to manually verify that the **Port Type** selected matches the physical connector type on the charger being tested.	
Step Six: **Running a Test – Manual or Sequence Mode:** Once the charger is selected, you can initiate testing using either MANUAL (F1) mode or SEQUENCE (F2) mode, depending on your testing requirements. • For instructions on running a test in **MANUAL mode, refer to Section 3.3.4.** • For step-by-step guidance on using **SEQUENCE mode, refer to Section 3.3.5.** Choose the mode that best fits your workflow and testing objectives.	

Power-Down and Sequence of Disconnection

WARNING

T4350 should be turned off properly before the connectors are disconnected.

1. To turn off T4350, return to Main Menu and press the power button for at least 3 seconds.
2. A dialog box appears to confirm shutdown.
3. Disconnect the Coupler of EVSE from the CCS1/ChaDemo/Tesla inlet of Tester.
4. Disconnect the CombiTac from PL4150/PL4000 from the LOAD & CONTROL inlet of tester.

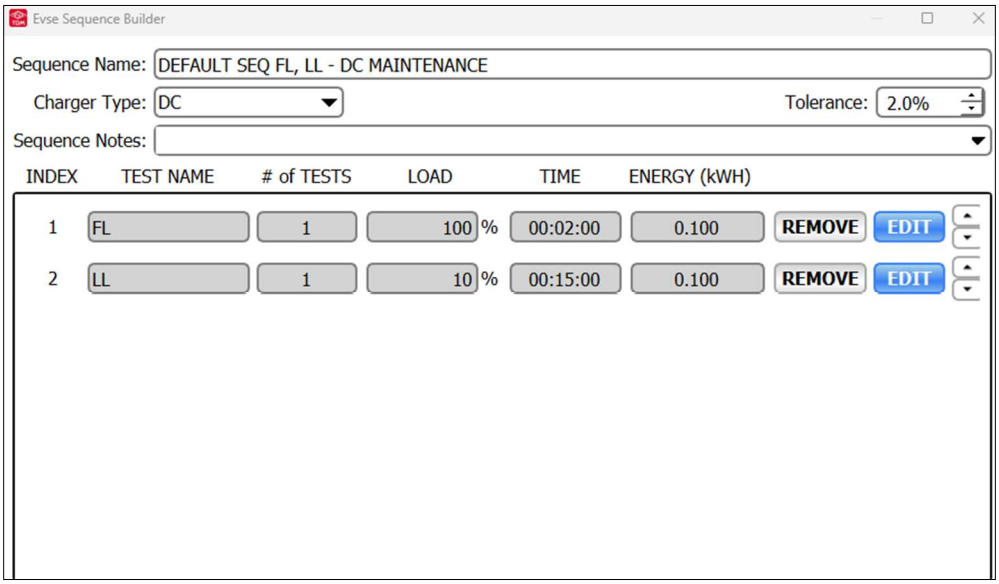
4.2.2.1 Sample Test Sequence in TESCO Device Manager (in TDM)

Sample Test Sequence – DC Maintenance

The example shown demonstrates a default test sequence titled **"DEFAULT SEQ FL, LL – DC MAINTENANCE"** configured for **DC Charger Type** with a **2.0% tolerance**. This sequence includes two test steps:

1. **Full Load (FL)** – Runs at 100% load for 2 minutes, measuring 0.100 kWh of energy.
2. **Light Load (LL)** – Runs at 10% load for 15 minutes, also measuring 0.100 kWh.

Each test can be edited or removed using the corresponding buttons. This setup provides a consistent method for verifying charger performance under both full and reduced load conditions.



4.3 AC Charger Testing: Visual Setups (Level 1 & 2) and Step-by-Step Instructions for T4350 with PL4000

This section provides two sample test scenarios—one for a **Level 1** and one for a **Level 2** AC charging station—to help users visualize how the T4350 and PL4000 should be arranged in the field. These visual examples serve as a reference for proper setup prior to beginning the test procedure. After reviewing the scenarios, users can follow the detailed step-by-step instructions for configuring the equipment and running a test using either Manual or Sequence mode.

4.3.1 Test Scenario 2: AC Level 2 Charger

This procedure verifies the performance of **AC Level 2 charging stations**, which deliver 240 V at up to 80 A (commonly 30–50 A) via the J1772 connector

The T4350 EVSE Tester, paired with the PL4000, performs a series of load tests that align with NIST Handbook 44 standards.

The test sequence includes:

- **No Load (NL)**
- **Starting Load (SL, ~0.5 A)**
- **Light Load (LL, 5–15% of max current)**
- **Full Load (FL, 85–100% of max current)**

During testing, the system validates the **Control Pilot (CP) and Proximity signaling**, ensures **GFCI functionality**, and measures energy delivery accuracy in transactional mode. This comprehensive procedure guarantees compliance and accurate billing integrity for commercial AC Level 2 EV charging installations.

AC Level 2 with T4350 & PL4000 1

Test Scenario 2: AC Level 1 Charger

This procedure verifies the performance of **AC Level 1 charging stations**, which deliver 120 VAC up to 80 A (typically 12–16 A on residential outlets) using a standard J1772 connector. The T4350 EVSE Tester, when paired with the PL4000 Programmable Load Emulator, executes a series of load tests that align with NIST Handbook 44 standards.

Standard Test Sequence:

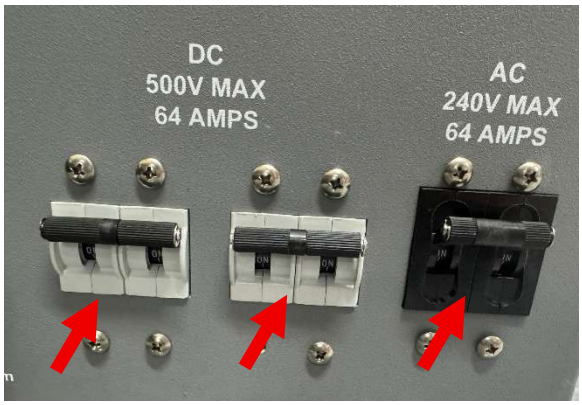
- **No Load (NL)**
- **Starting Load (SL, approximately 0.5 A)**
- **Light Load (LL, 5–15% of max current)**
- **Full Load (FL, 85–100% of max current)**

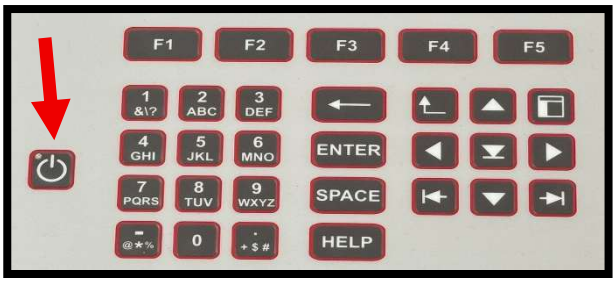
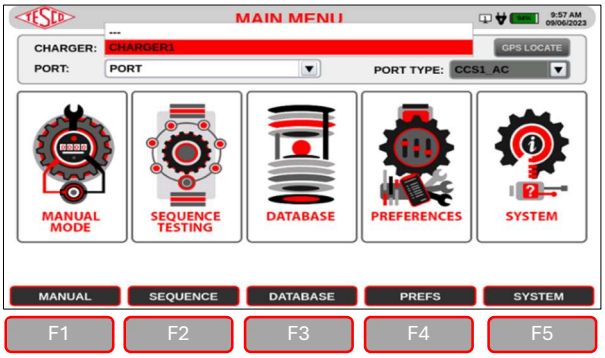
Throughout the testing process, the system:

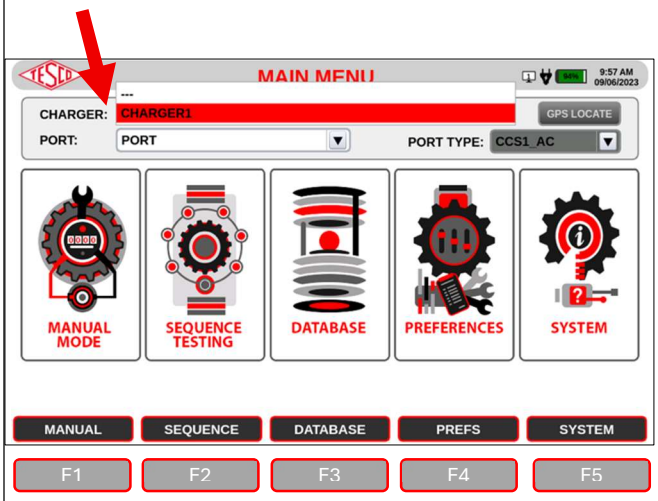
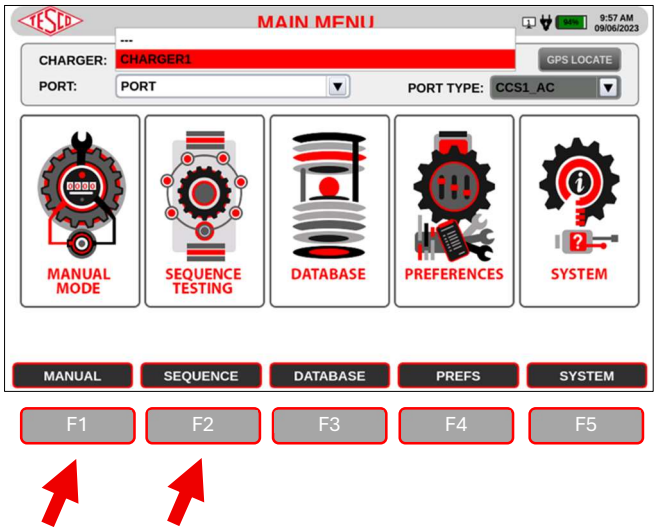
1. Validates **Control Pilot (CP)** and **Proximity signaling**.
2. Confirms **GFCI functionality** (up to 200 mA fault current).
3. Measures **energy delivery accuracy** under transactional conditions.

By following this comprehensive procedure, accuracy and compliance are ensured for residential-grade AC Level 1 charging stations—critical to consumer billing integrity and safety

4.3.3 Using T4350 with PL4000

STEP	VISUAL
Step One: **Confirm Breaker Positions** Ensure that the AC/DC breakers on the PL4000 are in the upright (ON) position. This is required for the unit to operate and safely initiate load testing.	
Step Two: **Connect the PL4000 to the T4350** Begin by connecting the Staubli cable from the PL4000 to the Staubli inlet on the T4350. This connection allows the T4350 to communicate with and control the PL4000 during testing operations.	

STEP	VISUAL
Step Three: **Power On the T4350** Once the Staubli connection is made, press and hold the T4350's power button for approximately three seconds. The screen will display the TESCO logo as the system begins its startup process. Once fully booted, the **MAIN MENU** screen will appear.	 
Step Four: **Verify Connectivity** After the T4350 has powered on, verify that the PL4000 is communicating properly by checking the LED indicators on the side of the PL4000: • Green – Power is present • Yellow – Communication (COMM) with the T4350 is active • Red – Load is engaged (this will activate only during a test) These LEDs confirm the system is powered, connected, and ready for AC load testing operations.	

STEP	VISUAL
Step Five: **Charger Selection:** From the MAIN MENU, use the dropdown list to select the charger you are testing. • If the charger you need is not listed, refer to **Section 5.4.3** for instructions on how to add a new charger profile. • If you are conducting a test using a **Temporary Charger**, indicated by a selection of "---" in the dropdown, be sure to manually verify that the **Port Type** selected matches the physical connector type on the charger being tested.	
Step Six: **Running a Test – Manual or Sequence Mode:** Once the charger is selected, you can initiate testing using either MANUAL (F1) mode or SEQUENCE (F2) mode, depending on your testing requirements. • For instructions on running a test in **MANUAL mode, refer to Section 3.3.4.** • For step-by-step guidance on using **SEQUENCE mode, refer to Section 3.3.5.** Choose the mode that best fits your workflow and testing objectives.	

Power-Down and Sequence of Disconnection

WARNING

T4350 should be turned off properly before the connectors are disconnected.

1. To turn off T4350, return to Main Menu and press the power button for at least 3 seconds.
2. A dialog box appears to confirm shutdown.
3. Disconnect the Coupler of EVSE from the CCS1/ChaDemo/Tesla inlet of Tester.
4. Disconnect the CombiTac from PL4150/PL4000 from the LOAD & CONTROL inlet of tester.

4.3.4 Sample Test Sequence in TESCO Device Manager (TDM)

The screenshot below displays a sample AC acceptance test sequence used with the T4350 and PL4000 for validating AC Level 1 or Level 2 chargers.

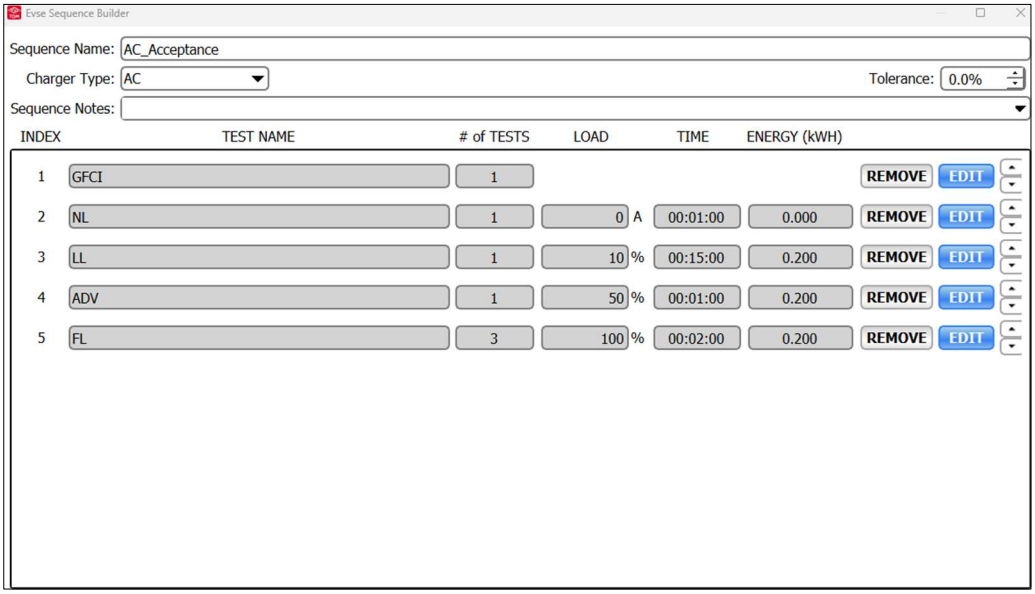
This sequence is configured under the “AC_Acceptance” profile and includes a series of standardized load tests to ensure compliance, safety, and accuracy.

Test Steps:

1. **GFCI Test**
   - Confirms Ground Fault Circuit Interrupter functionality.
2. **No Load (NL)**
   - Measures baseline conditions with 0 A load for 1 minute.
3. **Light Load (LL)**
   - Applies 10% load for 15 minutes to measure low-current delivery accuracy (0.200 kWh expected).
4. **Advanced Load (ADV)**
   - Applies 50% load for 1 minute (0.200 kWh expected), often used for mid-range accuracy validation.
5. **Full Load (FL)**
   - Executes 3 cycles at 100% load for 2 minutes each, measuring 0.200 kWh per cycle to confirm sustained full-load performance.

Tolerance: Set to 0.0%, indicating a strict accuracy requirement for each stage of the test.

This sequence ensures comprehensive verification of electrical performance, GFCI response, and kWh measurement accuracy across a range of load conditions.



4.4 DCFC & ACFC Testing Setups with T4350 and MitM Cable

This section includes two sample test scenarios—**DC Fast Charging (DCFC)** and **AC Level 1 or 2 Charging (ACFC)**—to visually demonstrate how the equipment should be arranged in the field using the **T4350** with a **Man-in-the-Middle (MitM) Cable**.

These visual setups help users familiarize themselves with the proper connections and flow:

- **DCFC Test Scenario:** A DC Fast Charger connected through a MitM Cable to the T4350, while the **EV itself acts as the load**—no external load emulator required.
- **ACFC Test Scenario:** An AC Level 1 or 2 charger connected through the same MitM configuration, again using the EV as the load.

Following the visual examples, step-by-step instructions guide users through powering on the T4350, confirming connectivity, selecting the correct charger profile, and executing the test in either **Manual** or **Sequence** mode. This approach ensures precise, real-time energy measurement and compliance verification while the EV is actively charging.

4.4.1 Test Scenarios 1: DCFC with Electric Vehicle (EV)

This image illustrates a typical test setup for verifying the accuracy of a **DC Fast Charger (DCFC)** using TESCO's **T4350 EVSE Tester** and a **Man-in-the-Middle (MitM) Cable**.

The MitM Cable is connected between the DC charger and the Electric Vehicle (EV), allowing the T4350 to non-invasively monitor and measure real-time energy transfer during an active charging session.

In this configuration, the **EV functions as the load**, while the T4350 captures key performance metrics—such as energy (kWh), voltage, current, and communication signaling—without disrupting the charging process. This method supports **in-service accuracy verification** and ensures compliance with **NIST Handbook 44** requirements.

DCFC Accuracy Test with T4350 & MITM 1

4.4.2 Test Scenario 2: ACFC with Electric Vehicle (EV)

This test scenario demonstrates how to verify the accuracy of an **AC Charging Station (ACFC)** while an **Electric Vehicle (EV)** is actively charging. Using the **T4350 EVSE Tester** paired with a **Man-in-the-Middle (MitM) Cable**, the EV serves as the load—eliminating the need for external load emulators such as the PL4000 or PL4150.

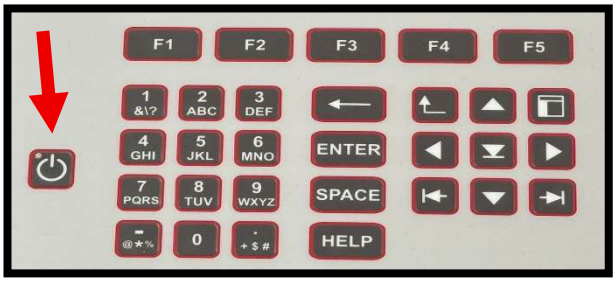
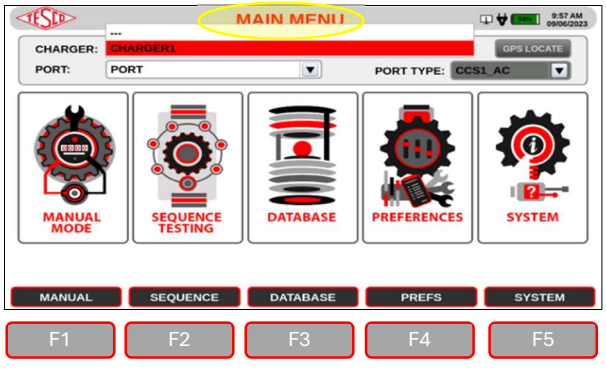
The **MitM Cable** is placed between the AC charger and the vehicle, routing all electrical transfer through the T4350, which transparently measures real-time energy delivery, voltage, current, and communication signals. This non-invasive, in-service configuration enables compliance with **NIST Handbook 44**—delivering traceable, revenue-grade accuracy for both AC and DC EV charging systems.

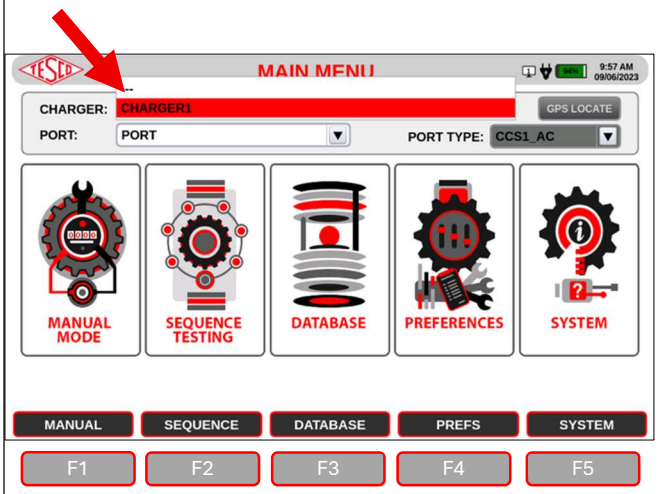
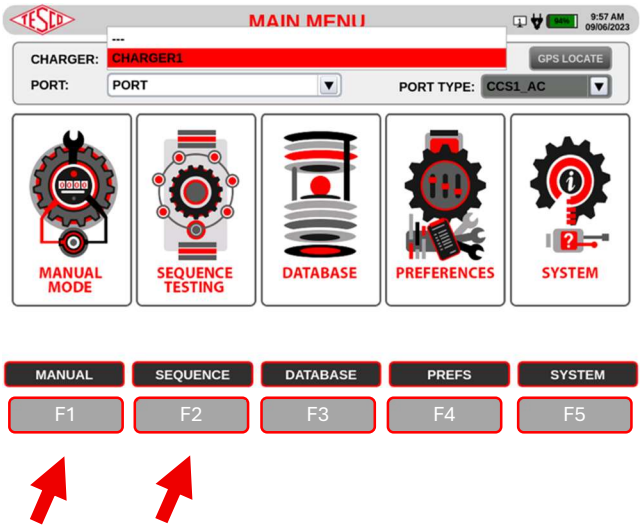
While we don't have a photo of the setup using the ACFC, the concept is the same as with the DCFC: the ACFC connects to the TESCO T4350, and the T4350-via the MitM Cable is connected to the Electric Vehicle.

4.4.3 Test Procedure: Using T4350 with MitM Cable for EV Charger Testing

The following steps outline the procedure for setting up and performing an accuracy test on an Electric Vehicle (EV) charging station using the T4350 EVSE Tester and a Man-in-the-Middle (MitM) Cable.

In this configuration, the EV serves as the load, and the T4350 monitors all energy transfer between the charger and the vehicle in real time. These steps ensure proper equipment setup, charger selection, and test execution in accordance with industry accuracy and compliance standards.

STEP	VISUAL
Step One: Connect the MitM cable: Attach the **Staubli end** of the MitM cable to the **Staubli inlet** on the T4350. The other end connects between the EVSE (T4350) and the Electric Vehicle (EV) —intercepting all energy and communication signals.	
Step Two: **Power On the T4350** Press and hold the Power button for approximately three seconds. Wait for the TESCO logo to appear and for the system to fully boot to the Main Menu screen.	 

STEP	VISUAL
Step Three: **Select Charger Profile** From the dropdown list on the **MAIN MENU**, select the charger you are testing. • If the charger isn't listed, refer to **Section 5.4.3** to add a new charger entry. • If testing a **Temporary Charger** (shown as "---"), confirm that the selected **Port Type** matches the actual connector at the charger under test.	
Step Four: **Choose how you want to execute the test:** • MANUAL mode (F1) — used to perform single-step tests with user-controlled initiation. See Section **3.3.4** for guidance. • SEQUENCE mode (F2) — run a predefined series of tests automatically. Refer to Section **3.3.5** for sequence setup details.	

4.4.4 Sample Test Sequence – DC MitM Cable

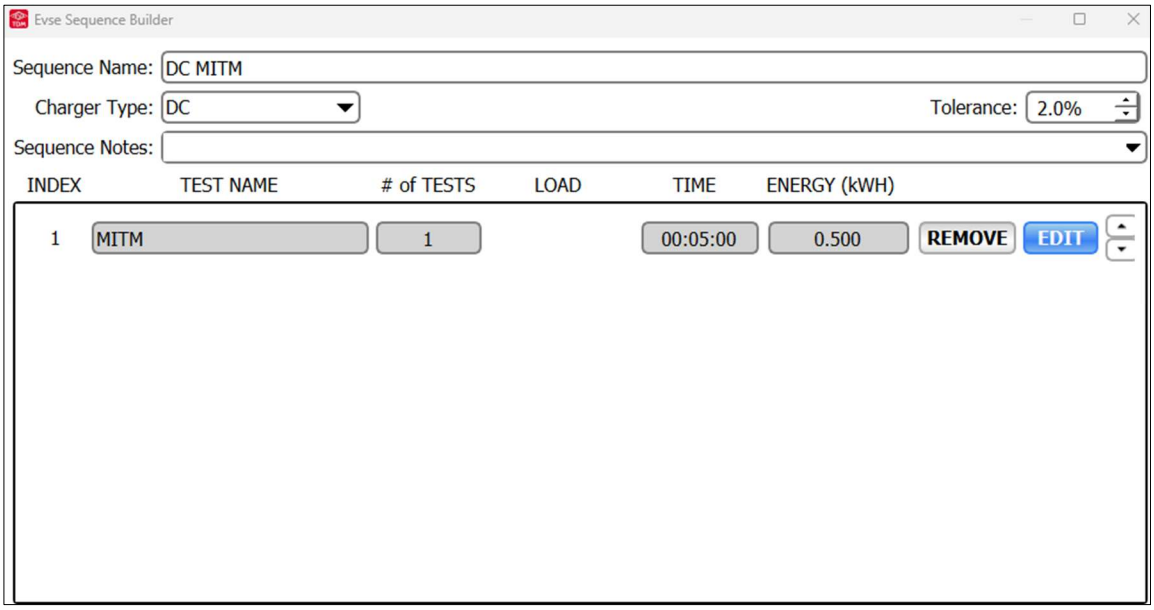
The screenshot below displays a simplified test sequence titled **“DC MITM”**, created for verifying the accuracy of a **DC Fast Charger** using the **T4350 EVSE Tester** and a **Man-in-the-Middle (MitM) Cable**.

This sequence is designed for a single test pass with real-time monitoring of energy flow to an Electric Vehicle (EV).

Test Parameters:

- **Charger Type:** DC
- **Test Name:** MITM
- **Number of Tests:** 1
- **Load:** Not defined (EV acts as the load)
- **Duration:** 5 minutes
- **Expected Energy:** 0.500 kWh
- **Tolerance:** ±2.0%

This sequence is typically used in live, in-service testing scenarios where the EV remains connected, and the tester transparently captures energy data as it passes between the charger and the vehicle. It allows utility providers, service teams, and regulators to confirm revenue-grade accuracy under normal charging conditions.



5 TESCO Device Manager (TDM) Software

5.1 INTRODUCTION

Welcome to TESCO Device Manager (TDM), your complete data management solution. TDM is designed to streamline data management for your TESCO devices, making it easier than ever to extract, organize, and analyze essential metering information. Whether you're handling meter data, performing remote device operations, or generating reports, TDM ensures a seamless and efficient experience.

What Can TDM Do for You?

With TDM, you can:

✓ Manage Data with Ease – Extract data from multiple TESCO devices simultaneously.

✓ Import and Organize – Quickly import meter, site, and charger information from CSV files.

✓ Export Test Results:

→ Generate PDF reports with custom branding, unit conversions, and chart/graph color adjustments.

→ Export results in CSV format for easy data analysis.

→ Create custom exports using SQL queries and regular expressions.

✓ Update Multiple Devices at Once - save time by updating multiple TESCO units simultaneously.

✓ Remote Control Meter Test Boards – manage test boards through secure network communication.

For over a century, TESCO has been a trusted name in metering, delivering accuracy and reliability. With TDM, managing your devices has never been easier.

5.2 Installation

To download Tesco Device Manager (TDM) click here: https://www.tescometering.com/software/tdm/ or go to: tescometering.com, click resources, download TDM, scroll to the bottom and click on Download TDM Here.

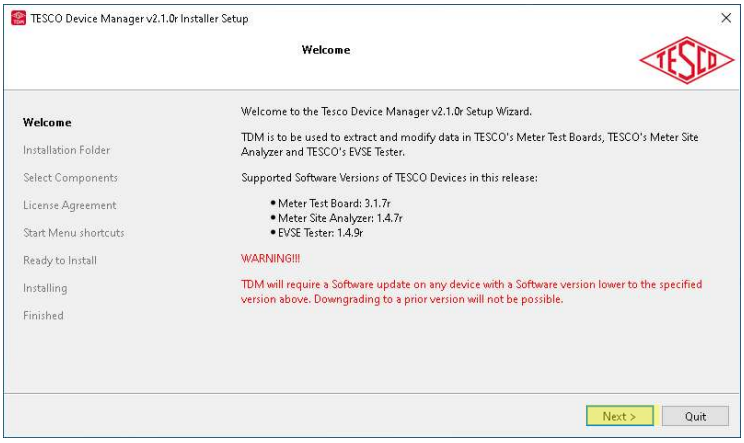
After downloading you can start installing, by running TescoDeviceManager_Setup.exe.

An installation wizard will pop up to guide you in the installation process.

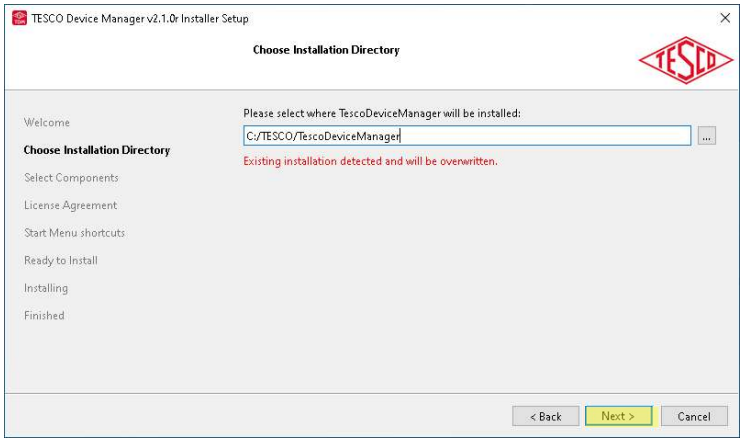
Note:

- **The installer will only run on Windows 8, 10 & 11.**
- **Administrative rights are not required to install the application.**

5.2.1 Installation Steps

SCREEN	DESCRIPTION
STEP 1: Welcome screen 	The software version of the TESCO Device Manager application that is about to be installed is indicated on this screen, along with the software versions of the TESCO Devices that this version TDM supports. Press "Next >" to proceed with the installation. **Choices Are: Extract All/Run/Cancel** Select: **EXTRACT ALL**

STEP 2: Installation Directory



The default installation directory of the application is:

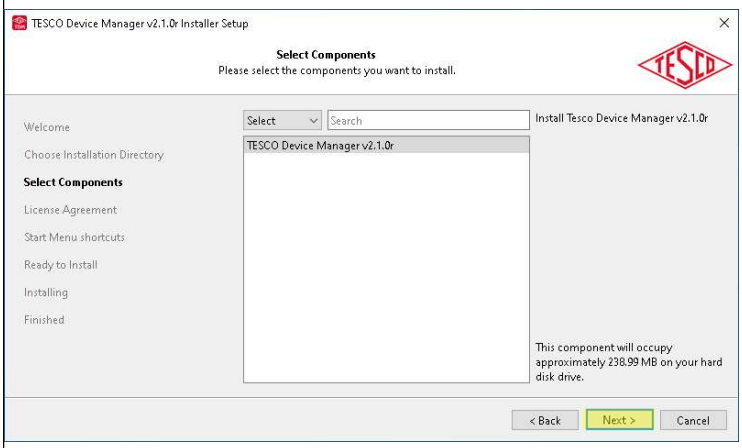
C:\TESCO\TescoDeviceManager

The user can change the installation folder by clicking the ellipsis button and browsing the desired directory. Press

Note: When installing a new version, be sure it uses the same path as the current one to ensure that it will overwrite it.

"Next >" to continue with the installation.

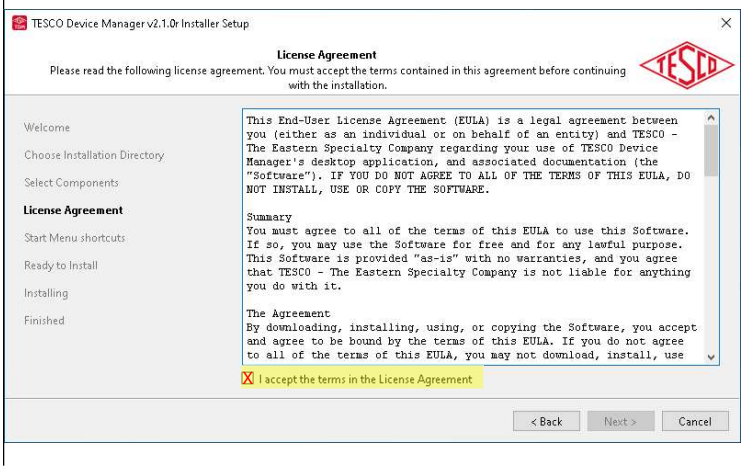
STEP 3: Selection of Application Components



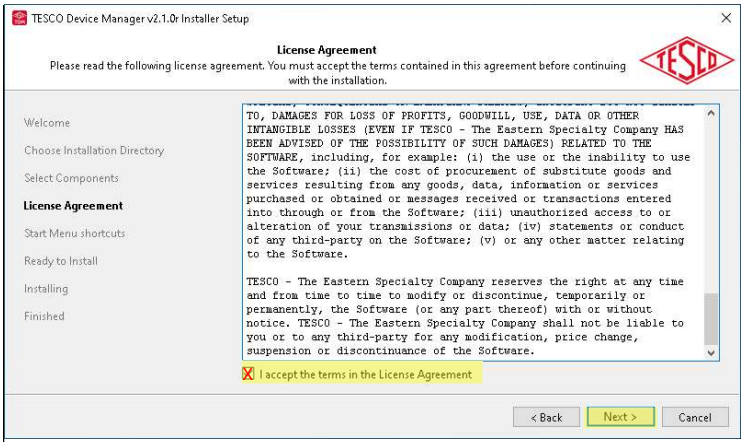
The information on the required disk space to install the application is provided.

Press "Next >" to continue with the installation.

STEP 4: License Agreement

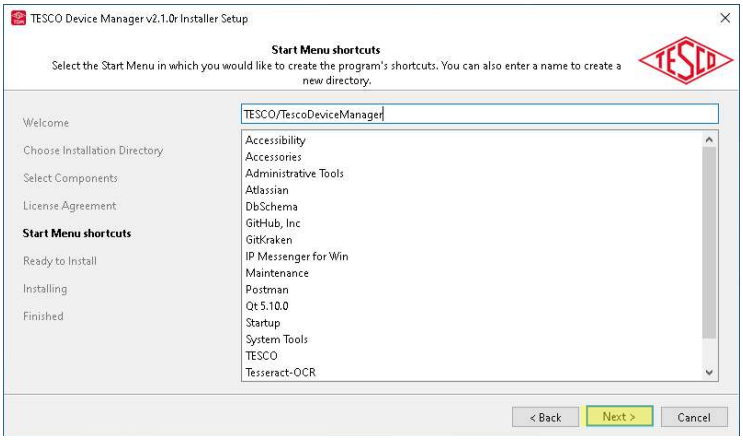


This screen contains the license agreement in using TESCO Device Manager.



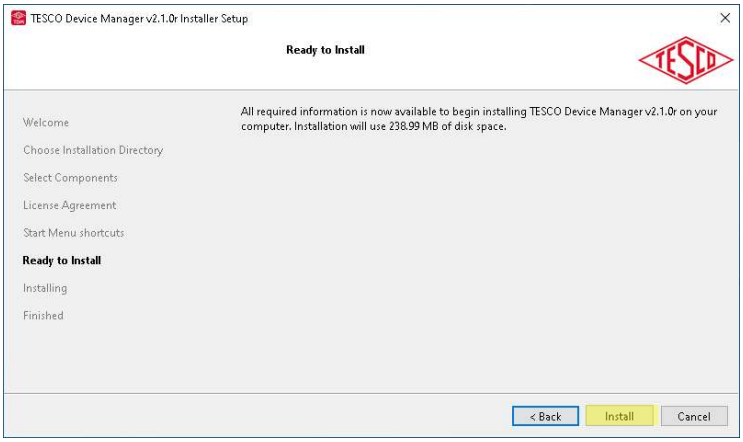
By accepting the terms, the installation process can continue. Press “Next >” to proceed to the next step.

STEP 5: Start Menu Shortcut

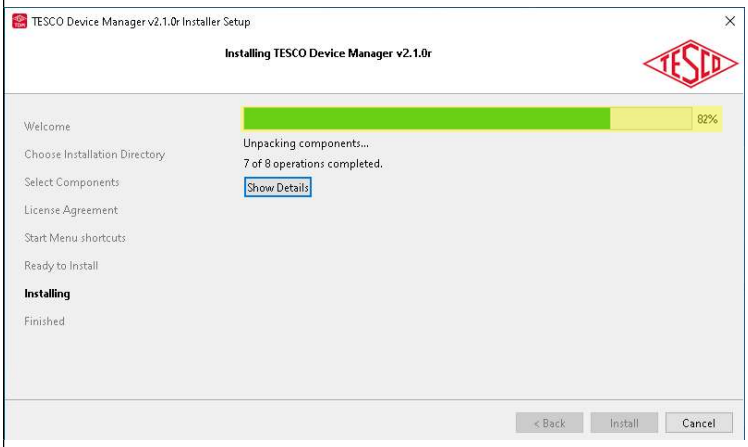
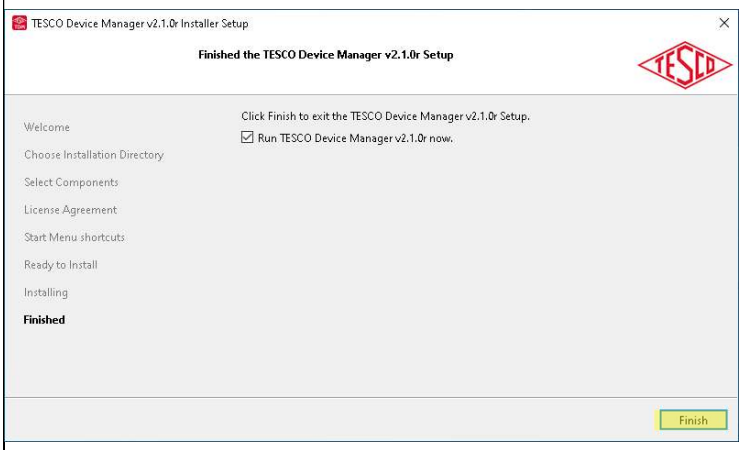


In this screen, you may change the Start Menu shortcut location for TDM.

STEP 6: Begin Installaiton



Press “Install” to confirm and start the actual installation process.

STEP 7: Installation in Progress 	This screen shows the progress of the installation process.
STEP 8: Successful Installation 	If no errors are encountered during the installation process, this step will show up and indicate that the installation is successful. Press “Finish” to successfully end the installation. Note: The application is now ready to be used and does not require a computer restart.

Once the installation is complete, launch the software by double clicking the TDM icon to access the login screen.

Simply press 'Enter' to log in.

5.3 USER INTERFACE

The main user interface includes:

- Toolbar at the top
- Side navigation menu for easy access to features,
- Workspace area where you can efficiently perform tasks

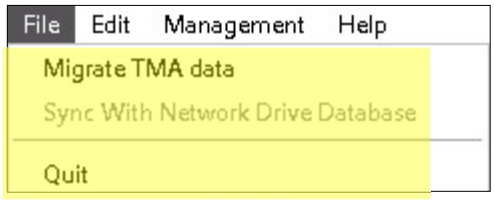
The Toolbar is broken down into four sections:

1. File:
    a. Migrate TMA
    b. Sync with Network Database
    c. Quit
2. Edit
3. Management
4. Help

For those currently using TESCO's TMA software, please start here. Other users skip to 4.1.2/EDIT.

5.3.1 Menu Bar

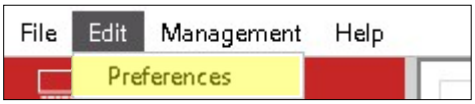
5.3.1.1 File



Under File menu, we have 3 items:

1. Migrate TMA data
    - This is a one-way operation which copies the data from older database versions (i.e., Test Management Application) to TDM.
    - This will not apply to most EVSE End-users.
2. Sync with Network database
    - This is a two-way operation which will make both TDM and Network databases up to date with each other. All new records in TDM will be copied over to the Network database and all new records in the Network database will be copied over to TDM. "New records" also include records that have been marked as "dirty".
3. Quit
    - Close the application.

5.3.1.2 Edit



Edit has one item under it titled Preferences. Under Preferences there are five different tabs (General, Database, Report, User Interface and Others) that will enable the end user to customize TDM so it is exactly the way they want it to be.

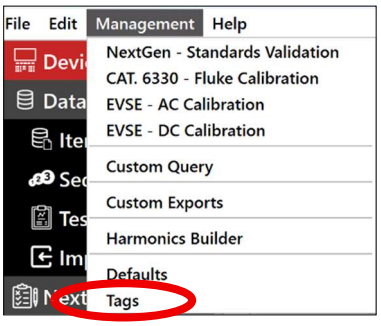
Section 5.4.11, Setting Up Preferences will walk you through that process.

5.3.1.3 Management

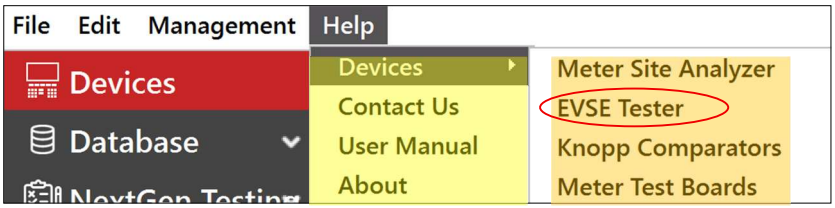
The **Management** menu contains tools and configuration options that support various TESCO products. Most of these options—such as calibration routines and custom export utilities—are product-specific and **not applicable** to standard EVSE testing.

For users of the EVSE Testing System, the **only relevant menu item is "Tags."**

- **Tags**
  The Tags feature allows users to assign descriptive labels to test records for better organization and retrieval. Tags can be used to sort and filter data by location, project, tester, or other user-defined criteria. This helps streamline data analysis and reporting within the EVSE testing workflow. Please refer to section 5.4.13 TAGS for complete setup.



5.3.1.4 Help



Under Help menu are four items:

1. **Devices**

   Under devices, you will find a submenu listing TESCO's device types. By clicking on one, you will be directed to the product page on TESCO's website.

2. **Contact Us**

   Not sure how to contact TESCO? Click here to get the details.

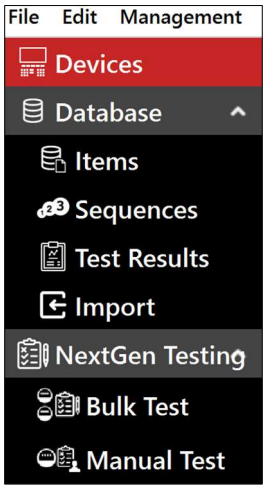
3. **User Manual**

   Access the TDM user manual for the most current version.

4. **About**

   Selecting this menu item opens a popup with details on TESCO device software versions supported by TDM, along with a button to view the license agreement accepted during installation.

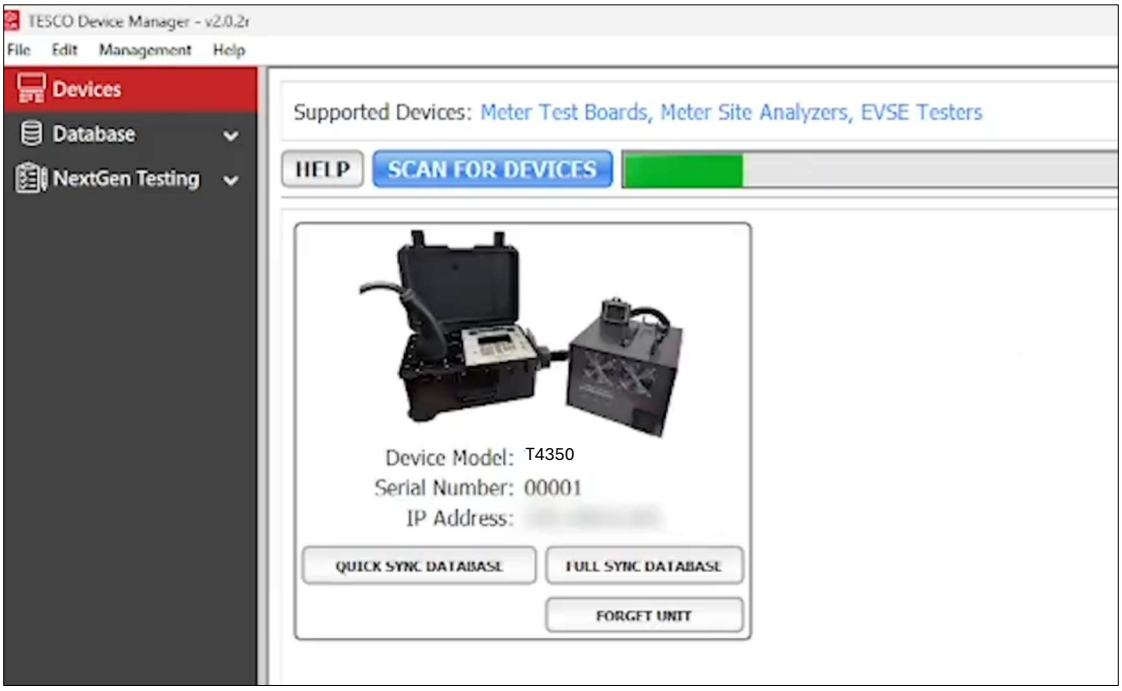
5.4 Side Navigation Bar



TDM's side navigation bar has three main items, "**Devices**", "**Database**" and "**NextGen Testing**". "NextGen Testing" can be shown/hidden depending on the supported device types that were selected under Edit/Preferences/Supported Devices from the toolbar. Most likely EVSE End-users will not see this.

5.4.1 Devices

All supported devices that TDM was able to detect/scan on the list of subnets/IP addresses set by the user will be found here. Your desktop might look like this:

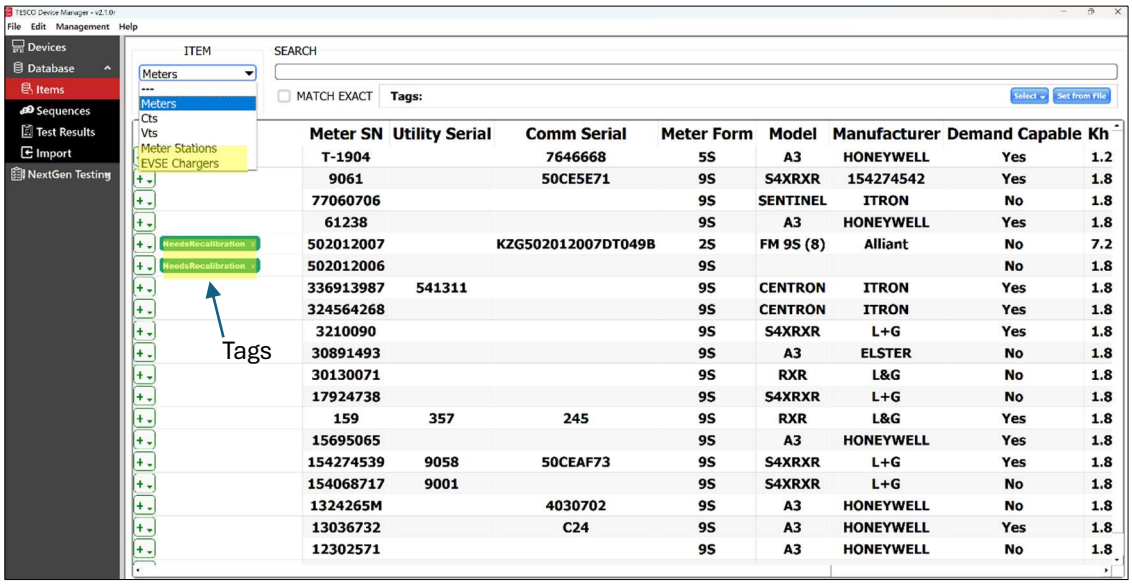


5.4.2 Database

Database has four submenus: **Items, Sequences, Test Results** and **Import.**

5.4.2.1 Items

End users will add/edit to manage the Item records.



Meter SN	Utility Serial	Comm Serial	Meter Form	Model	Manufacturer	Demand Capable	Kh
T-1904		7646668	5S	A3	HONEYWELL	Yes	1.2
9061		50CE5E71	9S	S4XRXR	154274542	Yes	1.8
77060706			9S	SENTINEL	ITRON	No	1.8
61238			9S	A3	HONEYWELL	Yes	1.8
502012007		KZG502012007DT049B	2S	FM 9S (8)	Alliant	No	7.2
502012006			9S			No	1.8
336913987	541311		9S	CENTRON	ITRON	Yes	1.8
324564268			9S	CENTRON	ITRON	Yes	1.8
3210090			9S	S4XRXR	L+G	Yes	1.8
30891493			9S	A3	ELSTER	No	1.8
30130071			9S	RXR	L&G	No	1.8
17924738			9S	S4XRXR	L+G	No	1.8
159	357	245	9S	RXR	L&G	Yes	1.8
15695065			9S	A3	HONEYWELL	Yes	1.8
154274539	9058	50CEAF73	9S	S4XRXR	L+G	Yes	1.8
154068717	9001		9S	S4XRXR	L+G	No	1.8
1324265M		4030702	9S	A3	HONEYWELL	No	1.8
13036732		C24	9S	A3	HONEYWELL	Yes	1.8
12302571			9S	A3	HONEYWELL	No	1.8

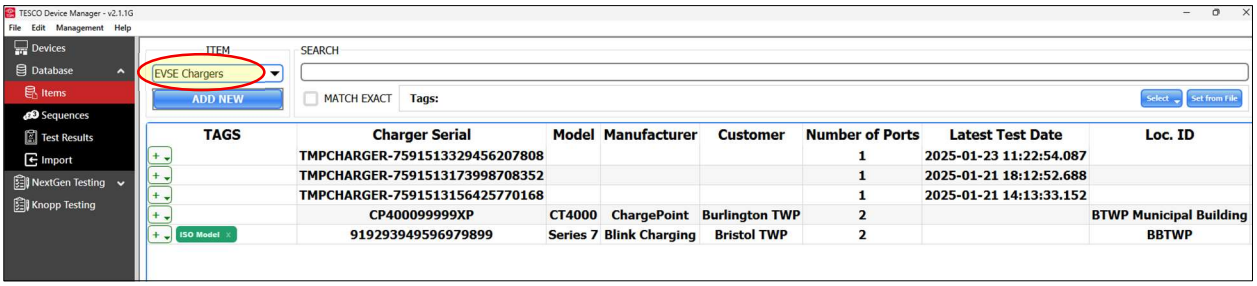
From this screen items can be:

- Added on the fly
- Imported from a CSV file
- Edited
- Searched by a specific word or a “tag”
- Edited, deleted, viewed (test results), or exported. Right click to edit, delete, view results (which brings you to test results for the item that is selected) and custom export. Please note a custom export needs to be set up under Management/Custom Exports on the toolbar before you can perform this task.

1. Item record type that applies to EVSE is: **EVSE Chargers**,

Important Note:

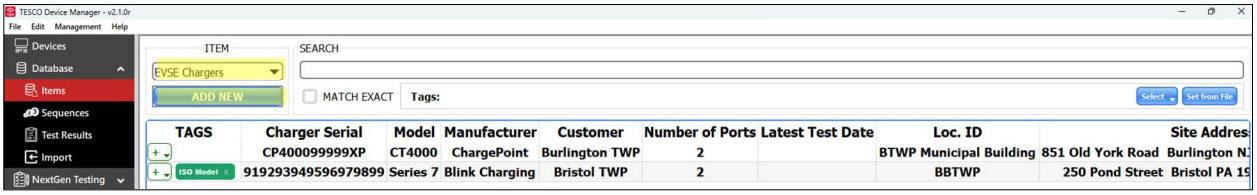
- Each item must have a unique ID. Duplicate IDs are not allowed.
    - **EVSE Charger**: Identified by **Charger Serial**



TAGS	Charger Serial	Model	Manufacturer	Customer	Number of Ports	Latest Test Date	Loc. ID
	TMPCHARGER-7591513329456207808				1	2025-01-23 11:22:54.087	
	TMPCHARGER-7591513173998708352				1	2025-01-21 18:12:52.688	
	TMPCHARGER-7591513156425770168				1	2025-01-21 14:13:33.152	
	CP400099999XP	CT4000	ChargePoint	Burlington TWP	2		BTWP Municipal Building
	91929394959697899	Series 7	Blink Charging	Bristol TWP	2		BBTWP

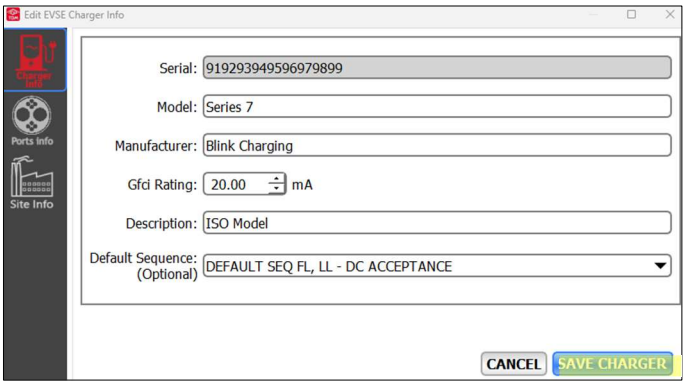
5.4.3 Add EVSE Charger

To add an EVSE Charger: From Item drop down select **EVSE Chargers**. Click **ADD NEW**. A new record will pop up for you to **input your EVSE Charger information.**



Setting Up EVSE Chargers. When setting up a charger, there are three main components, each represented by a corresponding screen in the system:

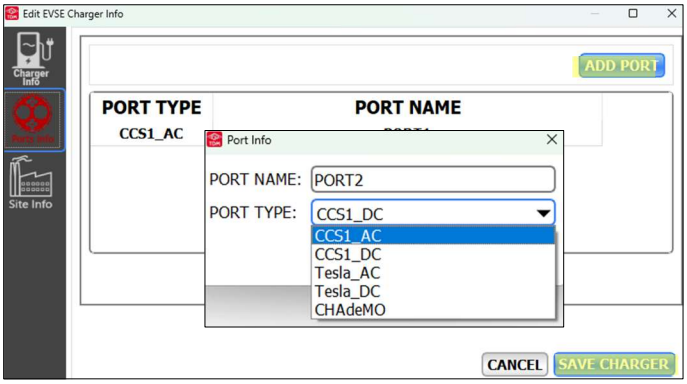
- **Charger Information**
- **Ports Information**
- **Site Information**



Charger Info Setup:

- **Identification:** Serial Number, Model Number, Manufacturer
- **Specifications:** Gfci Rating (mA)
- **Description:** Open text field
- **Default Sequence (optional). Choose from:**
  - Default SEQ FL, LL - AC Acceptance
  - Default SEQ FL, LL - AC Maintenance
  - Default SEQ FL, LL - DC Acceptance
  - Default SEQ FL, LL - DC Maintenance

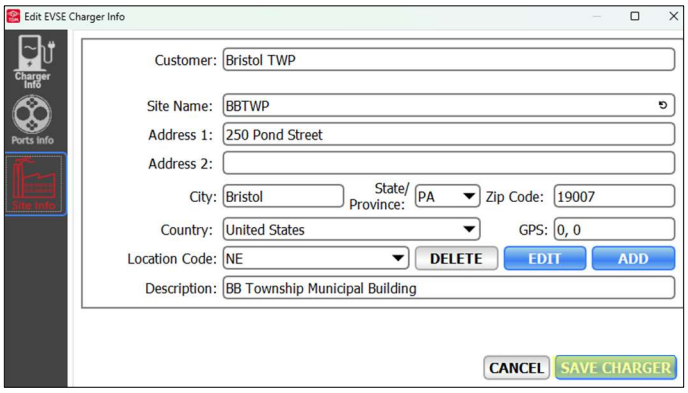
SAVE CHARGER



Port(s) Info Setup: Click Add Port

- **Port Name:** Can be user defined, or system default will name Port 1, Port 2, etc.
- **Port Type:**
  - CCS1_AC
  - CCS1_DC
  - Tesla_AC
  - Tesla_DC
  - CHAdeMO

SAVE CHARGER



Site Info Setup:

- **Customer Name**
- **Site Name**
- **Address/City/State/Zip/Country**
- **GPS:** Coordinates
- **Location Code:** User defined; can add on the fly
- **Description:** Open Form

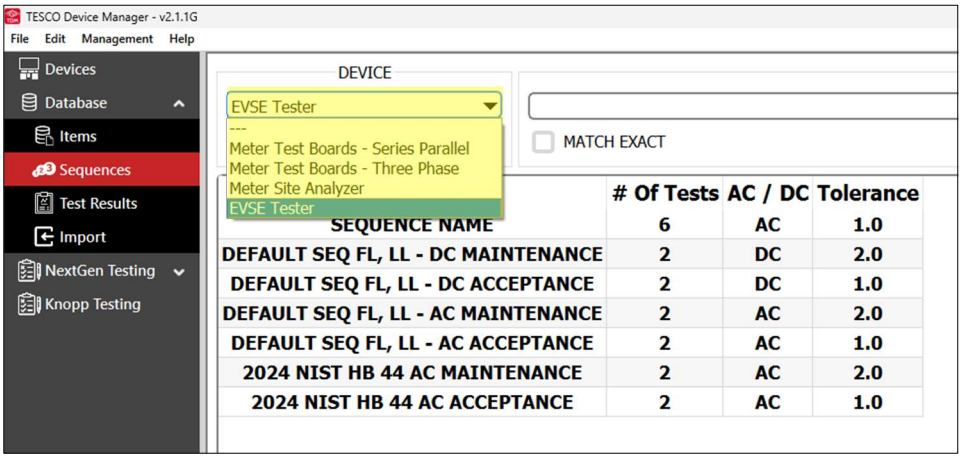
SAVE CHARGER

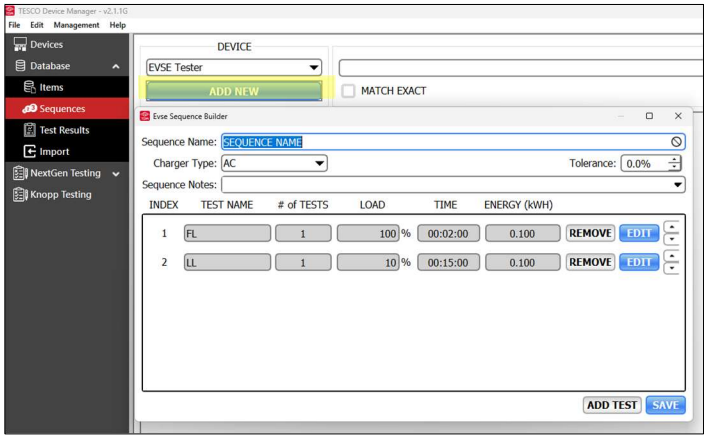
1. **Sequences:** The **Sequence Section** allows users to manage test sequences for different equipment types. These sequences define structured test procedures to ensure accurate and reliable metering results.

Devices/Equipment Using Sequences:

- **EVSE Tester**

Users can create, edit, and manage sequence records to match testing requirements for various metering and EVSE applications.





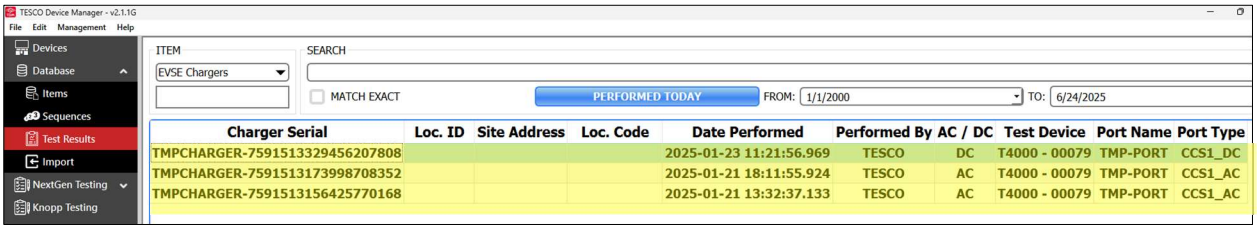
Add New Sequence Builder:

- **Sequence Name**
- **Charger Type: AC/DC**
- **Tolerance %.** Pass/Fail Requirements
- **Sequence Notes.** Free form entry
- **INDEX Tag |Description**
  - Test Name: Full Load/Light Load
  - # of Tests
  - Load (Percentage)
  - Time/Duration of Test
  - Energy in kWH
  - Can Edit or Remove

SAVE

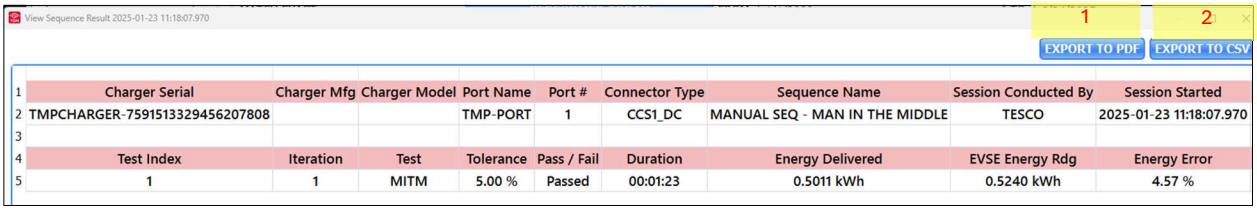
2. Test Results

Users can view and export test results for EVSE Chargers

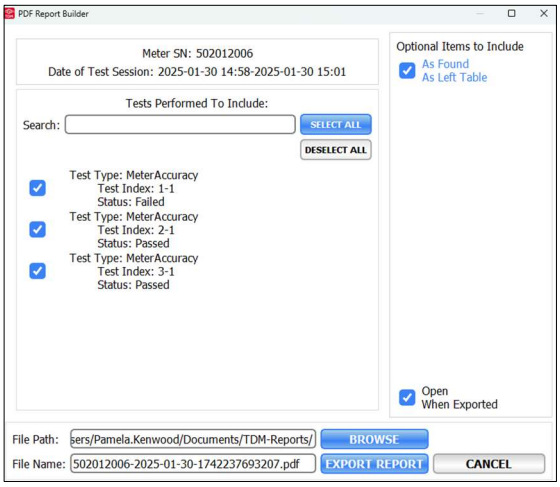


Double Click a popup screen will show the results.

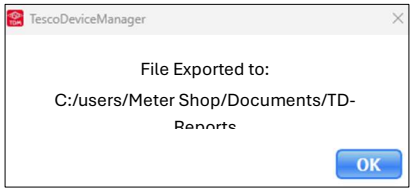
From here you have two choices: **EXPORT TO PDF or EXPORT TO CSV** – it will be saved automatically in the default path that is set in the system **(refer to section 5.4.8 for complete export instructions).**



EXPORT TO PDF



EXPORT TO CSV



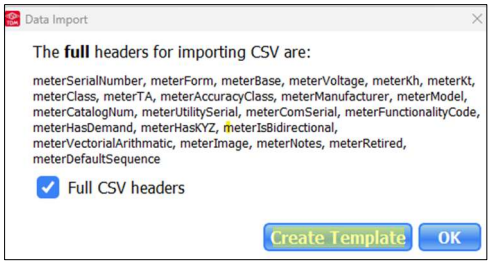
3. Import (Refer to Section 5.4.12 for complete import instructions).

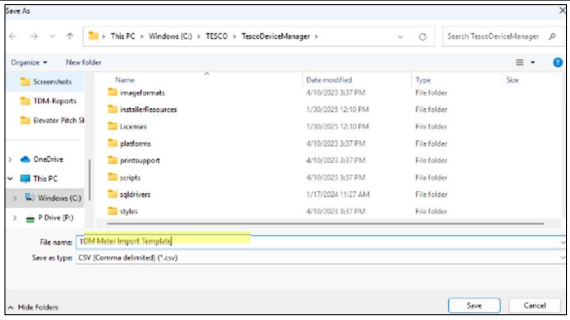
End users can import a CSV file to create **item records** for:

- Meters
- Meter Stations
- EVSE Chargers

To ensure accurate data mapping, the system can generate a CSV template to use, or you can choose to select a file. *Be sure that the template headers in your file match those of the CSV Template.

Use drop-down menu to pick item types to import, **click GENERATE CSV TEMPLATE** – a pop up will appear identifying headers for import. **Click Create Template**. Another popup will appear for end-user to choose path for file to be saved.



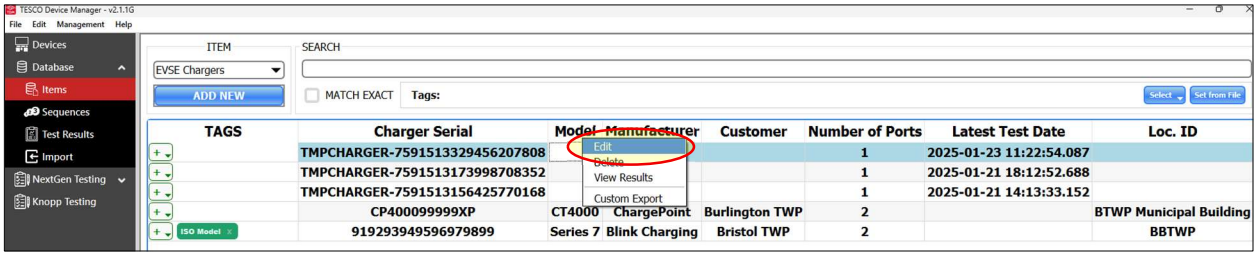


5.4.4 Edit Items

To edit an existing item:

- Either **double-click** the item, or
- **Right-click** the item and select **"Edit"** from the context menu.

This will open the editing popup, where you can modify item details and save your changes.

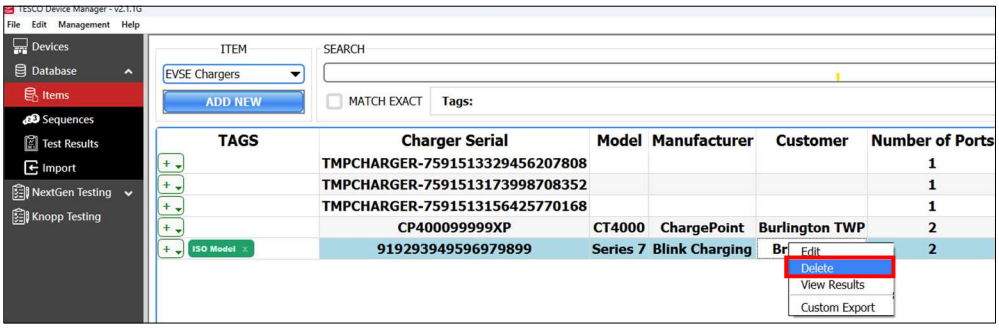


5.4.5 Deleting Items

To delete an Item.

- **Right-click** the item and select **"Delete"** from the context menu.

⚠ **Note**: Deleted items cannot be recovered. Ensure accuracy before confirming deletion.

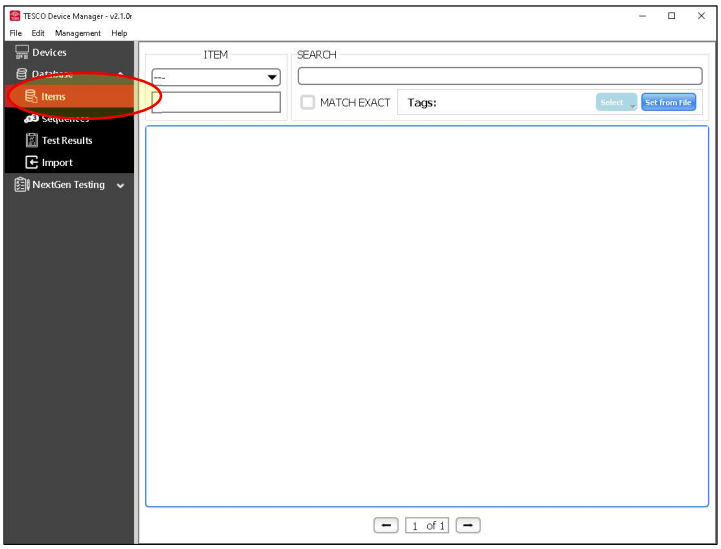


5.4. 6 View Results

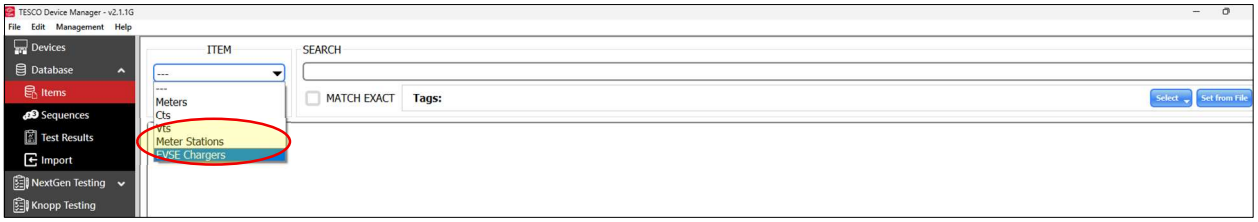
To make sure that TDM has all the latest records from a device, do a **Quick Sync** (refer to **section 7** for details/instructions) first on the Devices page with the test device.

To view a test result for a specific item:

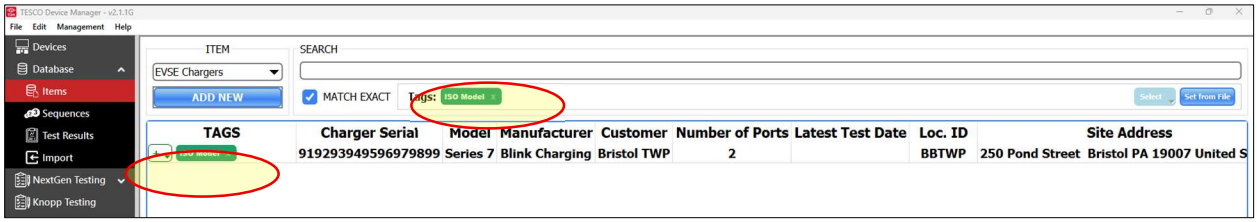
1. Navigate to Database -> Items page.



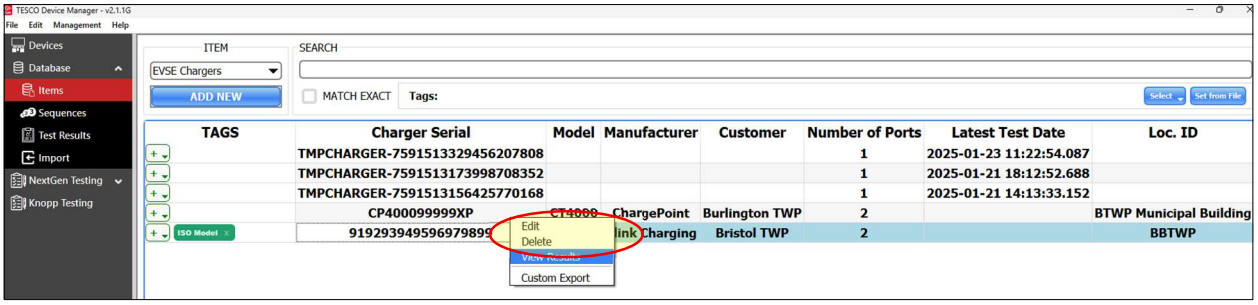
2. Select the item's record type (EVSE Charger) on the dropdown at the upper left corner of the page. In this example, we are going to view a Meter's test result.



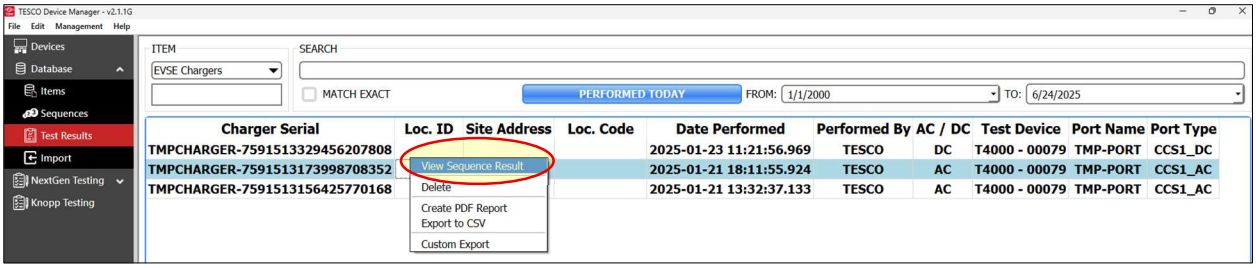
3. Look for the item associated with the results that you want to view. You may filter the item by entering a text on the search bar or by applying tags.



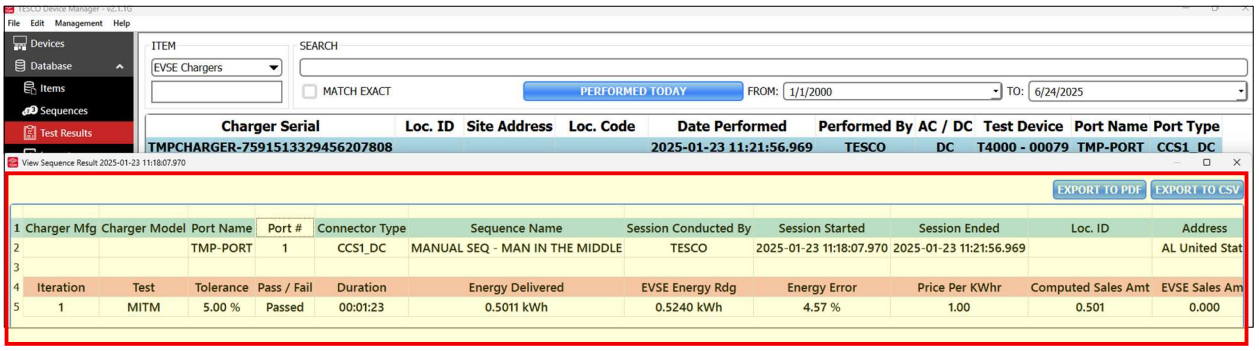
4. Right click on the item then click "View Results" on the context menu.



5. Right click on a result you wish to view then click “View Sequence Result” on the context menu to open the View Test Result popup. This can also be done by double clicking on a result on the table.

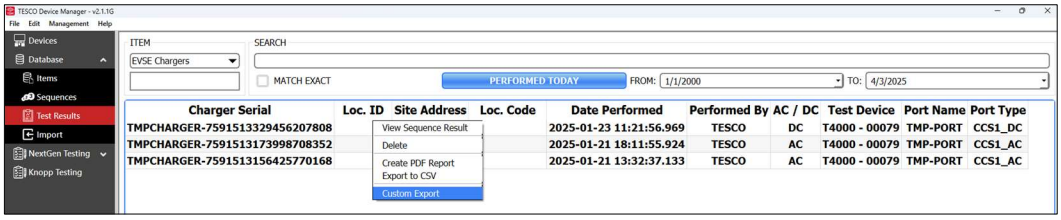


6. Test Result details will be shown on the View Test result popup



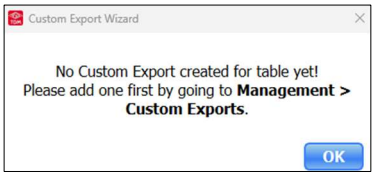
5.4.7 Custom Export

To run a custom export on the selected items, right click on one of the selected/highlighted items and then click “Custom Export” on the context menu.



NOTE: Custom export scripts are categorized on which item/result type the script would be run. An error would be shown if a custom export script is run against an unsupported category.

IMPORTANT NOTE: If no custom export script has been created for the selected table, TDM will display the message: **"No Custom Export created for table yet! Please add one first by going to Management > Custom Reports."**



To resolve this, navigate to **Management > Custom Reports** and create or assign an export script for the relevant item or result type.

5.4.8 Exporting Results

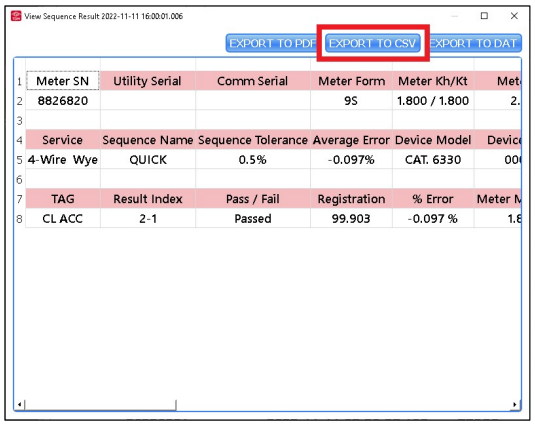
TDM supports exporting test results from connected TESCO devices in a variety of formats, including **CSV**, **PDF**, and **Custom Export** formats. These exports can be used for reporting, archiving, or integrating with other systems.

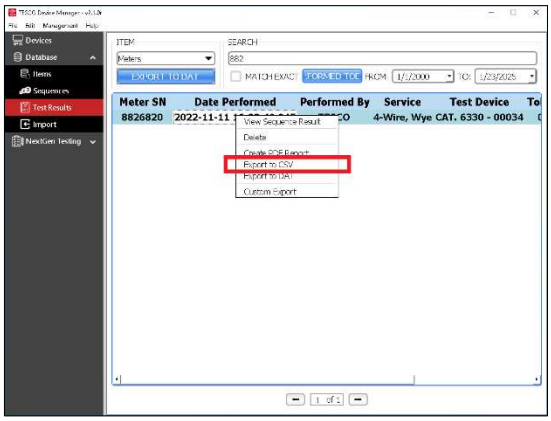
5.4.9 Exporting to CSV

TDM allows users to export test results in a **CSV format** that is designed for readability and ease of use. Unlike a standard flat-file CSV with a single header row, TDM's CSV format mirrors the layout of the **View Test Result** popup for consistency.

There are two ways to perform a CSV export:

- From the **View Test Result** popup, click the **"Export to CSV"** button.
- From the **Test Results** page, right-click one or more test results and select **"Export to CSV"** from the context menu.



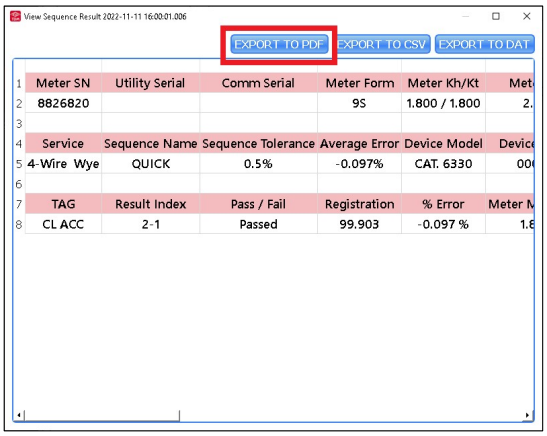


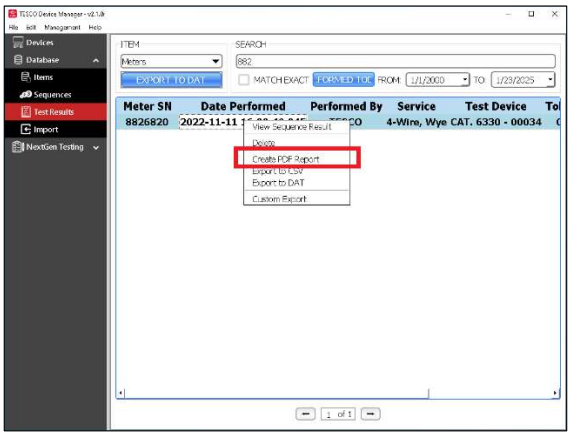
When exporting multiple test results at once, the files will be saved to the directory specified in the **Export Path** under the **Report** tab in the **Preferences** popup. To access this setting, go to **Edit > Preferences**.

5.4.10 Exporting to PDF

PDF exports can also be generated in two ways:

- From the **View Test Result** popup by clicking the **“Export to PDF”** button.
- From the **Test Results** page by right-clicking one or more test results and selecting **“Create PDF Report”**.





If only one test result is selected, the **PDF Report Builder** will appear, allowing you to:

- Choose which test results from the session to include.
- Specify the file name.
- Select the save location for the PDF report.

To customize the appearance and layout of PDF reports, go to the **Report** tab in the **Preferences** popup (found under **Edit > Preferences**).

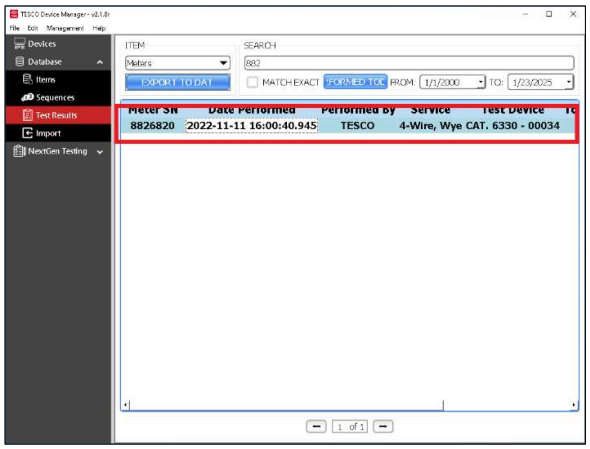
When exporting multiple test results, the files will be saved to the path defined in the **Export Path** setting in **Preferences**.

5.4.11 Custom Export

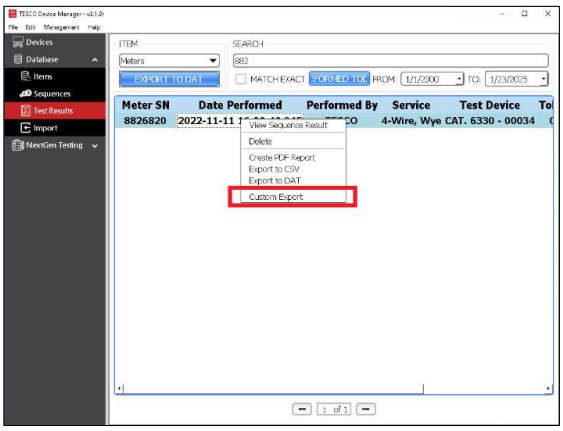
TDM also supports Custom Export scripts, which can be used to format data according to specific internal or third-party requirements.

To perform a custom export:

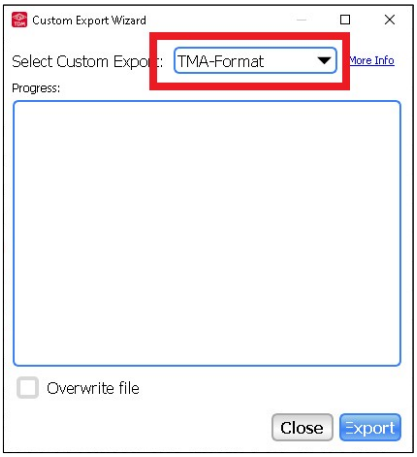
1. Select or highlight the test results to be exported.



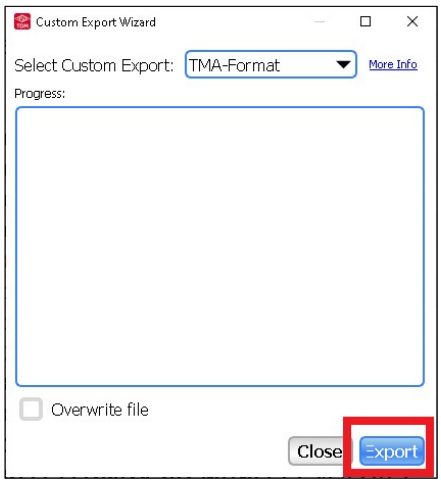
2. Right-click and choose **“Custom Export”** from the context menu. This opens the **Custom Export Wizard**.

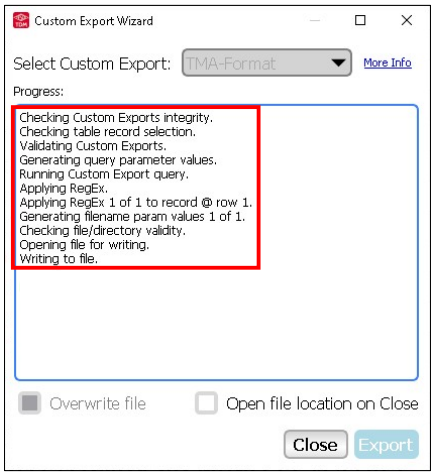


3. In the wizard, select the desired script from the dropdown list.

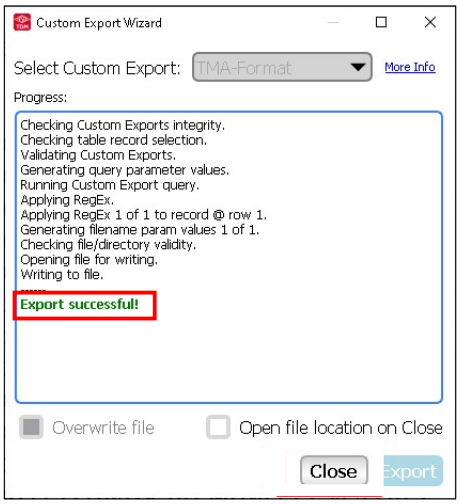


4. Click **Export** to run the script.



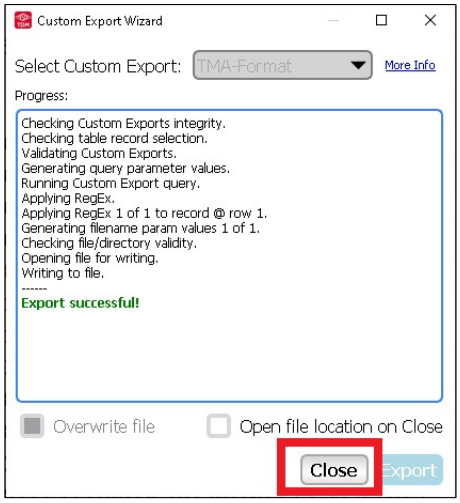


5. Once complete, a green confirmation message will appear stating “Export Successful” along with an option to open the export folder will be shown.



6. The resulting file will be saved to the path defined in the **Export Path** under **Preferences**.

7. Click **Close** to exit the wizard.



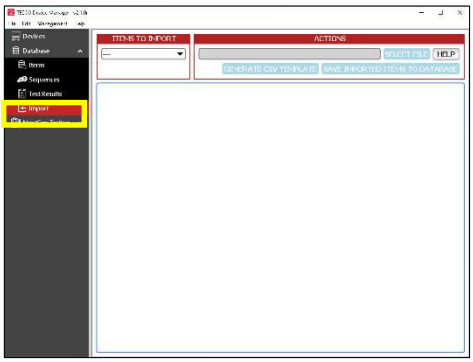
Note: Custom export scripts are grouped by item or result type. If a script is applied to an unsupported item, an error message will be displayed.

5.4.12 Importing Items into TDM

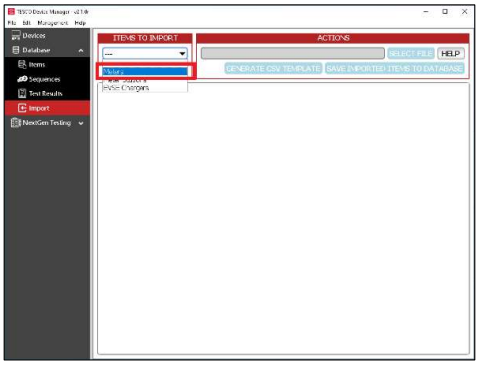
TDM allows users to create item records by importing data from a formatted CSV file. This process is useful for loading multiple records at once, such as Meters, Meter Stations, or EVSE Chargers.

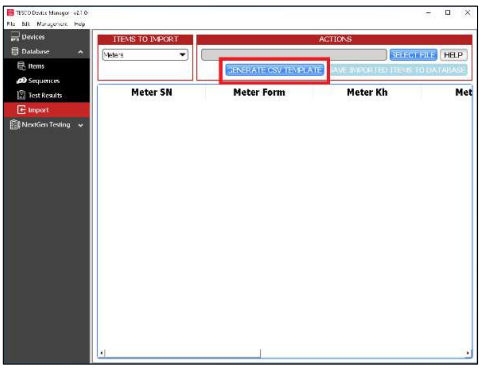
Follow the steps below to complete the import:

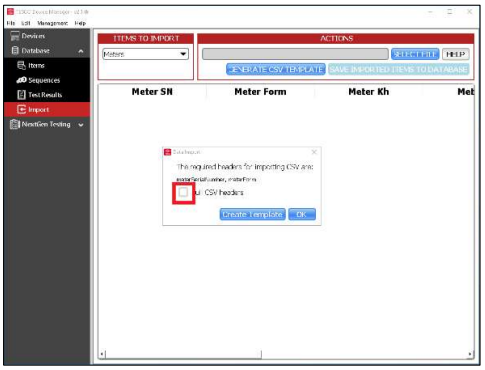
1. From the **Database** menu, select **Import** to open the import screen.

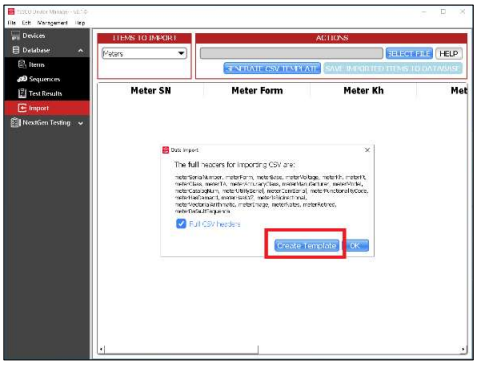


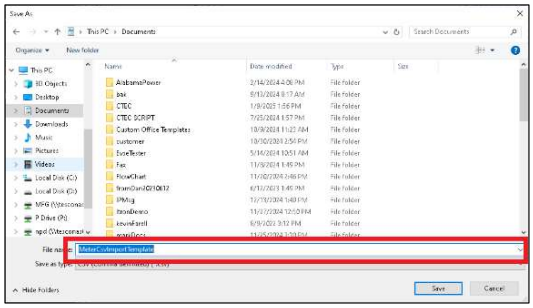
2. Select the type of items to import. The available items to import are Meters, Meter Stations, and EVSE Chargers. After an item type has been set, the “GENERATE CSV TEMPLATE” button will be enabled. Users may now use this feature to create a csv file template as basis or fill this file with item data. For this example, we are going to import meters.

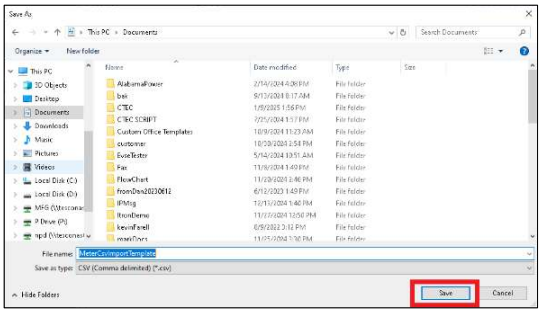




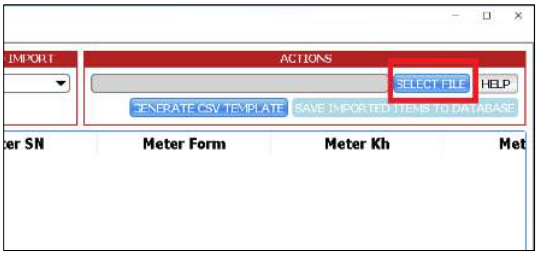


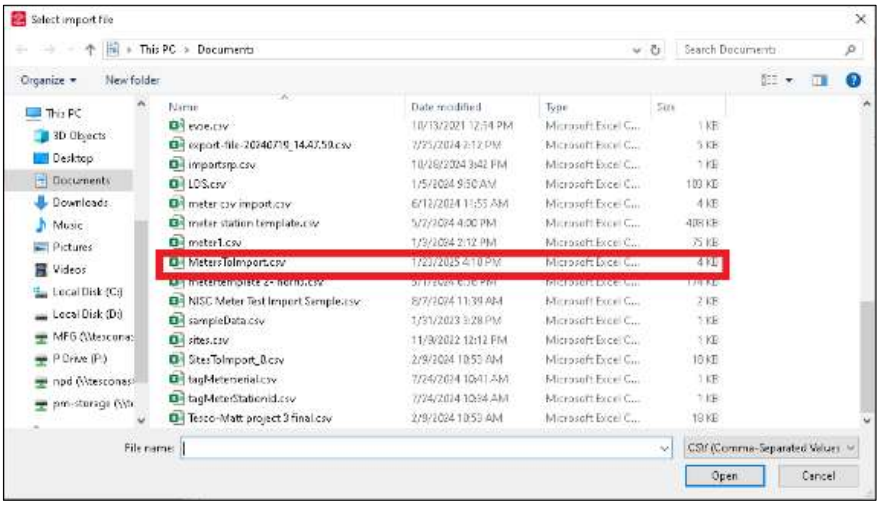


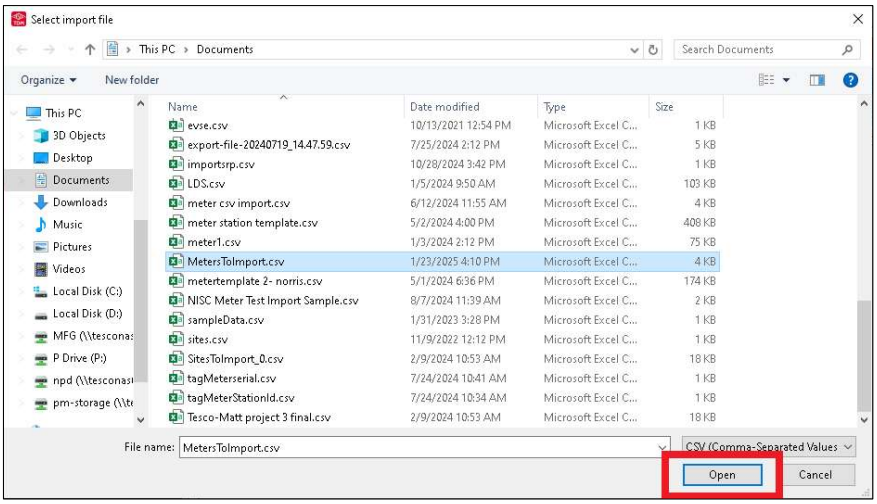




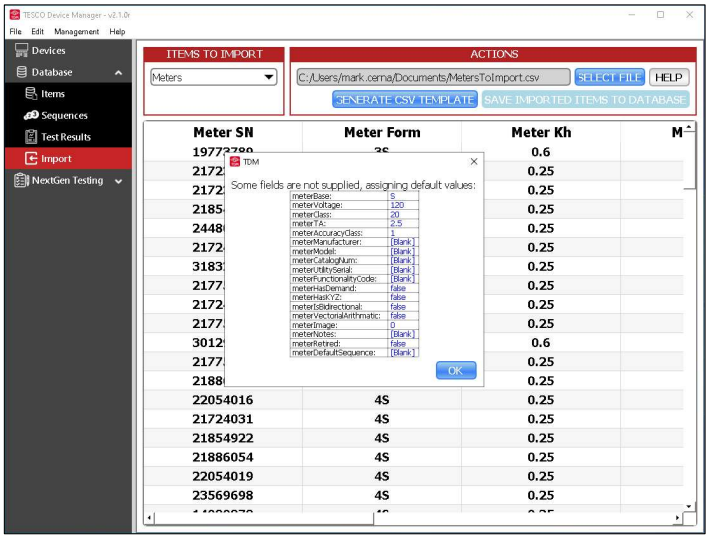
3. Click “SELECT FILE” to browse and locate the csv file to be imported.

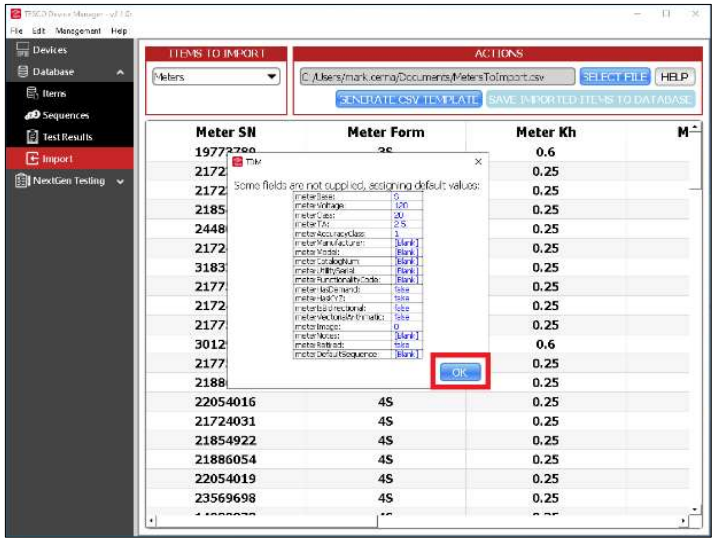




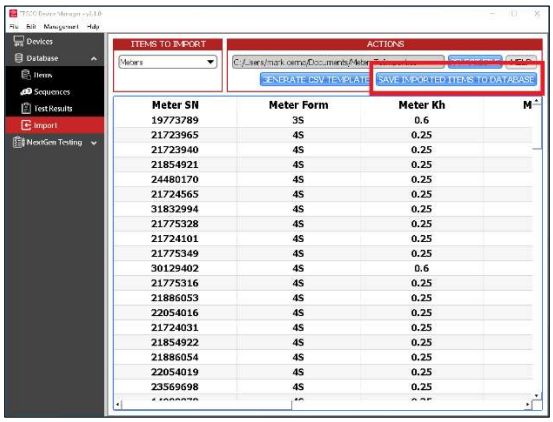


4. Once TDM finishes parsing the CSV file, a preview of the records to be imported will be displayed. A popup may appear with a warning if any fields are missing or left blank. TDM will automatically assign default values such as blanks, zeros, or “false” to those fields. Click “OK” to close the popup.

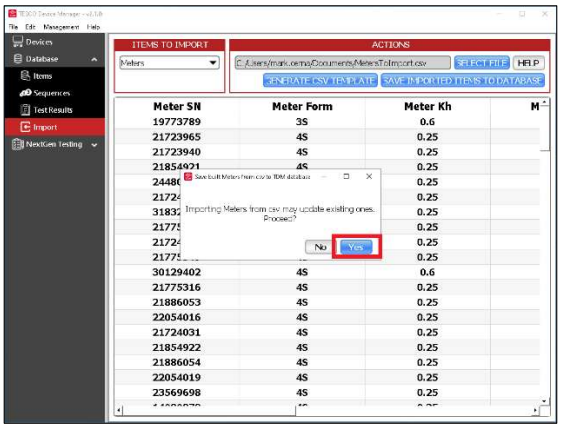




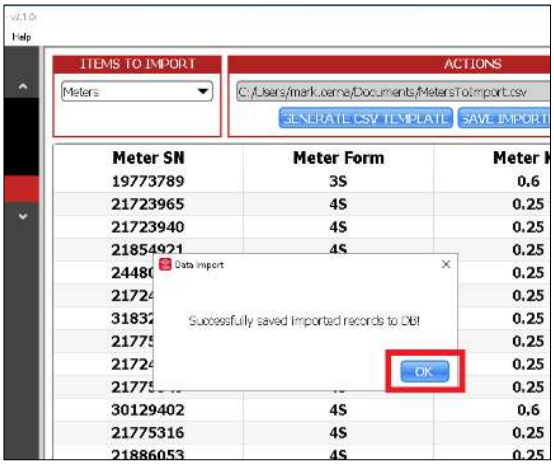
5. To proceed with saving this data into the database, click “SAVE IMPORTED ITEMS TO DATABASE”



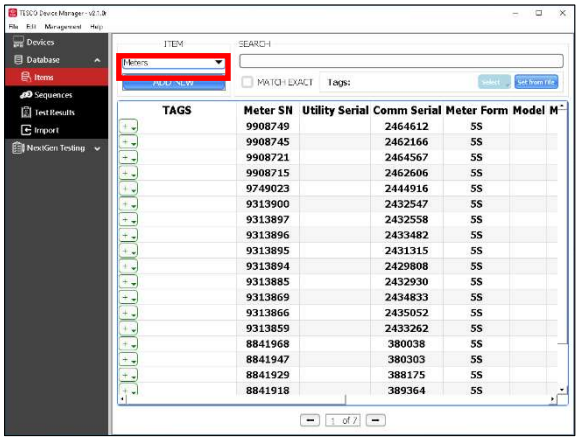
6. TDM will prompt you to confirm if any existing items with matching IDs should be overwritten with the new data.
   Click **Yes** to confirm and continue.



7. Once the import is complete, TDM will notify the end user that the import was successful. Click **OK** to close the popup.



8. Navigate to **Database** in the TDM side menu and click to expand the submenu. Then select **Items**. Locate and select the item type you imported (e.g., **Meters**). The imported records will now be visible in the list.



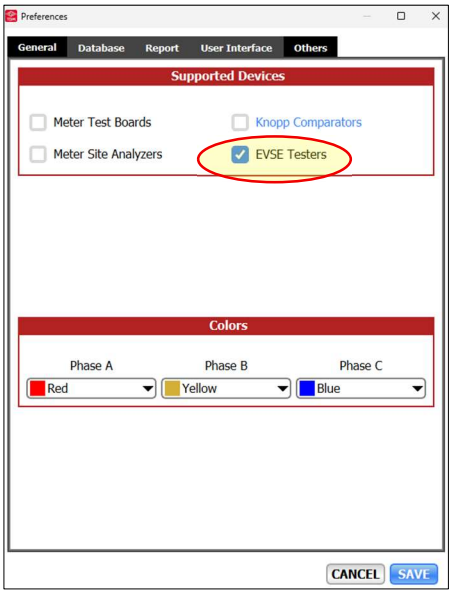
5.4.13 Setting Up Preferences

The *Preferences* section of TDM allows users to tailor the software environment to meet their specific needs and workflow requirements. From selecting the devices you'll be working with—such as test boards, site analyzers, or EVSE testers—to customize the visual elements of charts, diagrams, and graphs, this area provides flexibility to align TDM with your operational standards.

Here, users can define critical settings such as backup locations for the TDM database, default directories for saving reports, and even the structure and nomenclature of reporting fields. Customization options also extend to reporting capabilities, ensuring that the data output from TDM matches the format and style preferred by your organization.

By configuring these preferences, users can enhance efficiency, maintain consistency, and create a more intuitive and user-friendly experience within the TDM platform.

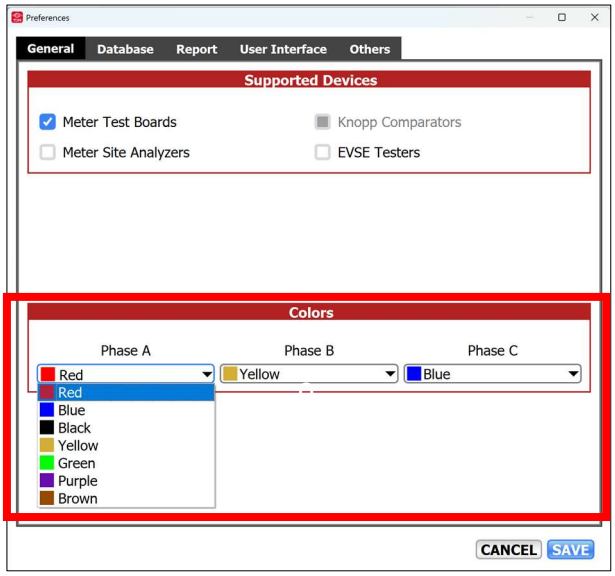
5.4.13.1 Setting Supported Devices



On the **General Tab** you choose two settings: supported devices & color scheme for reporting purposes.

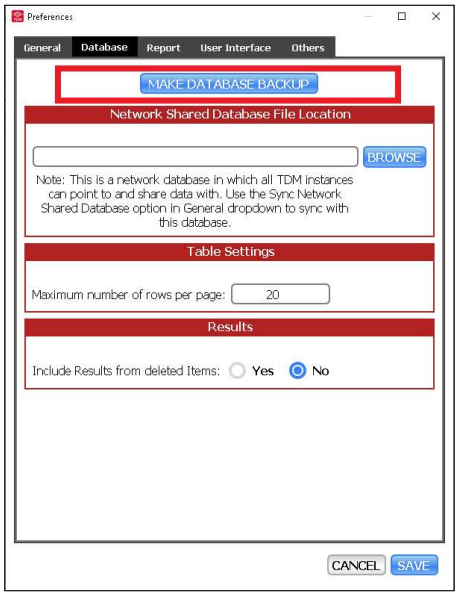
The first setting allows users to select the supported device types they plan to use within TDM—such as Meter Test Boards, Meter Site Analyzers, or Knopp Comparators. Enabling a device type prompts the system to recognize and communicate with that equipment, unlocking all relevant features for testing and data collection. Disabling a device type will hide and deactivate any associated tools or functions to streamline the interface.

5.4.13.2 Setting Colors for Charts/Diagrams/Graphs



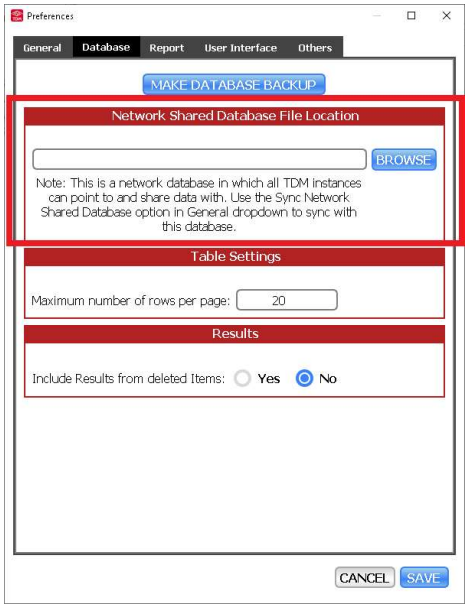
The second setting customizes the colors used in charts and diagrams, including Phasor diagrams and waveform setup previews. This allows you to create visually distinct and easy-to-read representations of your data, helping you quickly analyze patterns and insights.

5.4.13.3 Backing up TDM's Database



This option allows users to create a secure backup copy of TDM's database, helping to preserve data integrity and prevent loss in the event of system failure or unexpected issues.

5.4.13.4 Creating and Syncing with a database on a Network folder



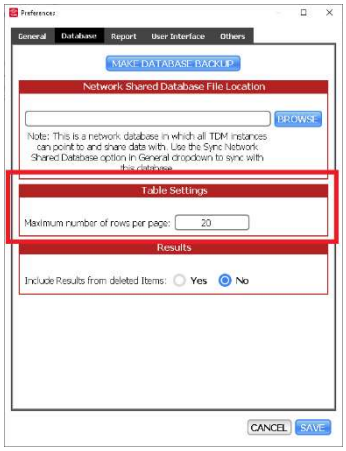
Network Shared Database File Location allows users to specify the path to a shared folder on a network drive, enabling TDM to access and store its database in a centralized location. If a database does not already exist at the specified path, TDM will automatically create one.

This feature is designed to support collaboration by allowing multiple TDM users to connect to the same network database. When all instances of TDM are pointed to this shared location, users can maintain a consistent and up-to-date dataset across systems.

To enable this functionality, the selected path must be located on a shared network drive accessible to all intended users. Once configured, the option to **Sync with Network Drive Database** becomes available under the *File* menu on the toolbar. This allows users to share their local data by pushing it to the shared network database—ideal for updating the centralized repository with new data pulled from field devices.

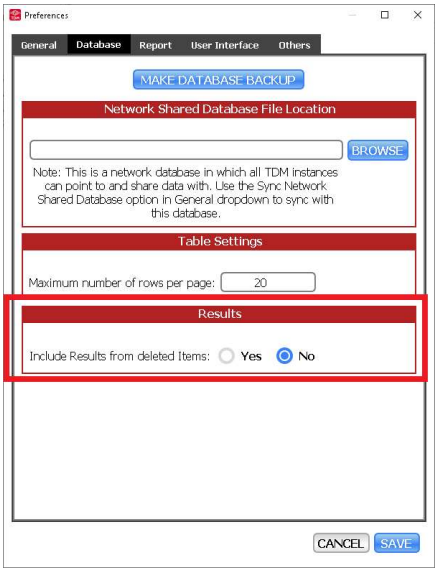
Note: Use the *Sync Network Shared Database* option in the *General* dropdown to ensure your local TDM instance stays in sync with the shared network database.

5.4.13.5 Changing the number of rows shown at a time on the tables in TDM



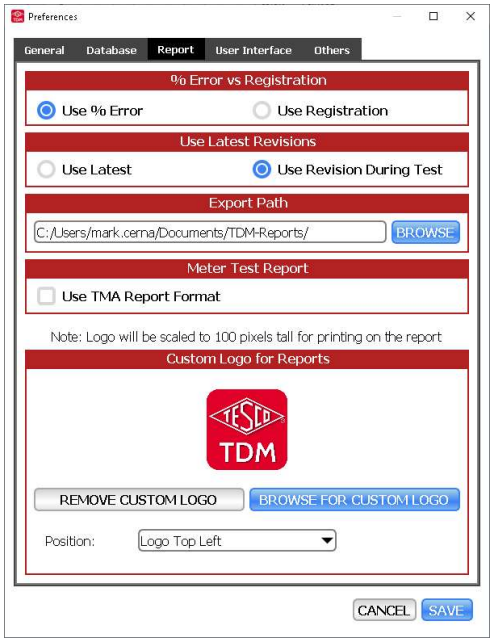
This setting allows users to define the number of rows displayed in TDM tables, primarily affecting tables on the Database page and sync popup tables.

5.4.13.6 Showing results from deleted Items



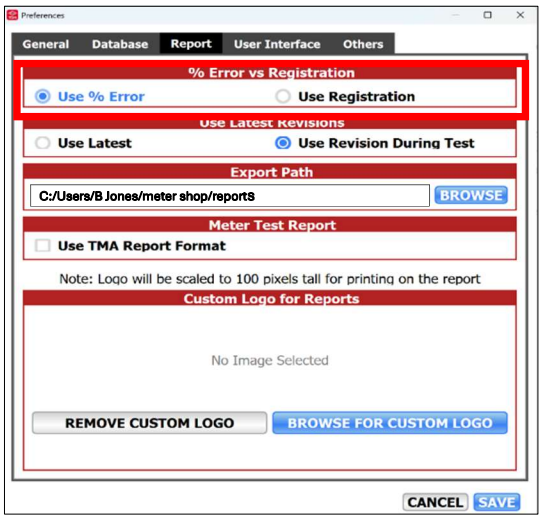
This setting allows users to include or exclude test results associated with deleted items—such as Meters, Meter Stations, or EVSE Chargers—from the database results table. When set to **Yes**, results from previously deleted items (including Meter Sequence Results, Meter Station Sequence Results, and EVSE Sequence Results) will continue to appear in the results display. When set to **No**, these results will be hidden from view.

5.4.13.7 Setting Report preferences



The **Report** tab allows users to tailor the appearance and content of test reports generated by TDM. These settings control formatting, data references, export preferences, and branding. **Please note changes made in this tab will only apply to reports generated after the changes are saved.**

5.4.13.8 Use % Error vs Use Registration

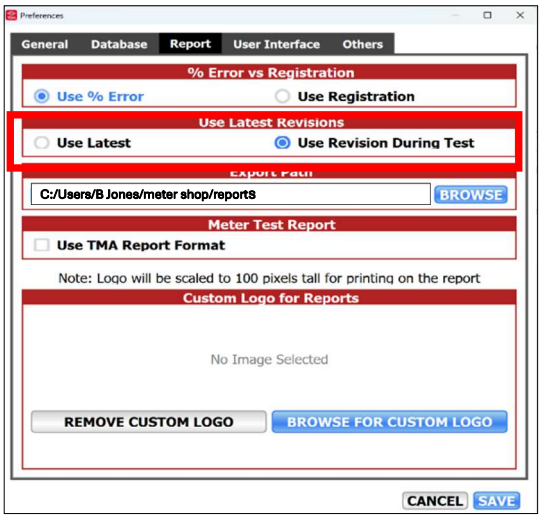


This setting determines how measurement results are displayed in the final calibration report. Users can choose between two display formats:

- **Use % Error**: This is the default and most commonly used format. It displays the measurement result as a percentage error, calculated using the difference between the reference value and the DUT (Device Under Test) value. This format is recommended for most testing scenarios and aligns with standard accuracy reporting methods used in compliance testing.
- **Use Registration**: This option displays the DUT's actual registered value (such as pulse count or energy reading) instead of calculating a percentage error. It is typically used when comparing energy registration or pulse-based devices and may be required in specific testing protocols.

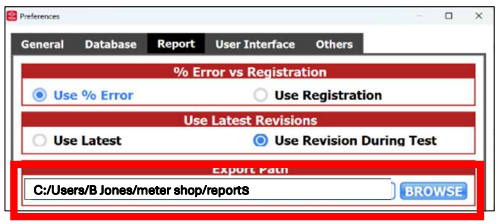
Recommendation: Unless your calibration process specifically requires registration values, it is recommended to use **% Error** for consistency, traceability, and reporting clarity.

5.4.13.9 Use Latest Revisions



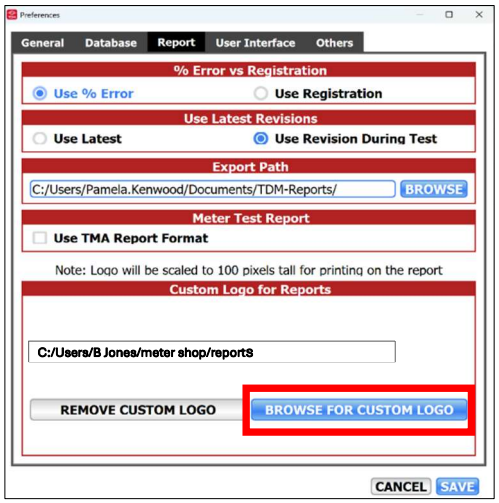
By default, TDM will use the Revision during test. However, users may discover that they must make some corrections on the item records. By selecting “Use Latest” after making the changes, TDM will use the updated information in exporting the reports.

5.4.13.10 Export Path



The Export Path field specifies the folder location where all calibration reports will be saved. Users can modify this path by clicking the “Browse” button and selecting a preferred directory.

5.4.13.11 Custom Logo for Reports



TDM allows users to personalize their calibration reports by adding a company logo. To upload a logo, click **“Browse for Custom Logo”** and select an image file in one of the supported formats: .jpg, .jpeg, .bmp, or .png. The selected image will be scaled to a height of 100 pixels for optimal placement on the report.
Note: You can remove or update the logo at any time using the **“Remove Custom Logo”** or **“Browse for Custom Logo”** options.

5.4.14 Setting TESCO Devices with TDM

This section explains how to configure TESCO devices for use with TDM (TESCO Device Manager), the software platform that enables streamlined device setup, communication, and test control.

5.4.14.1 Setting up a device’s network connection

TESCO Device Manager (TDM) communicates with TESCO devices over a network connection. Depending on your organization's IT environment and security requirements, there are two supported methods for establishing this connection:

1. **Through a Router, Switch, or Ethernet Wall Jack**
   Connect the TESCO device to your network using a standard Ethernet cable. This allows the device to operate within your organization's network infrastructure, making it accessible to TDM from any authorized workstation on the same network.

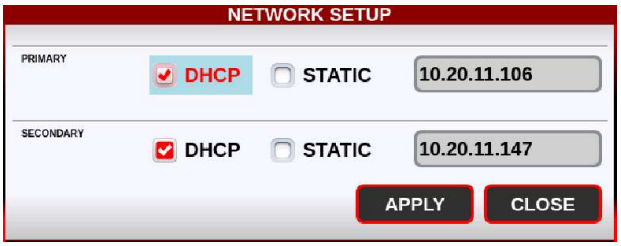
2. **Peer-to-Peer (Ad-Hoc) Connection**
   For standalone setups or restricted network environments, you can connect the TESCO device directly to a laptop or PC using an Ethernet cable. This creates a direct point-to-point connection without requiring additional networking equipment.

Note: Configuration steps for each method, including IP address setup and scanning options, are detailed below

5.4.14.2 Through a router/switch/ethernet wall jack

To connect a TESCO device to TDM over your organization's network:

1. Use an Ethernet cable to connect the TESCO device (such as a meter test board, meter site analyzer, or EVSE tester) to an available router, network switch, or Ethernet wall jack.
2. On the TESCO device, navigate to its **Network Settings** to locate the current IP address:
   a. For **Meter Test Boards**:
      Navigate to SETTINGS → PREFS → GENERAL → NETWORK
      Some models may display two IP addresses; if so, note the **primary address**.



   b. For **Meter Site Analyzers and EVSE Testers**:
      Navigate to PREFS → GENERAL → NETWORK.

Optional: You may choose to assign a **static IP address** to the TESCO device. To do so, check the **"STATIC"** option and enter the desired IP address manually.

⚠️ ***Important*: If using a static IP, consult with your IT team to ensure the address does not conflict with other devices on the network.**

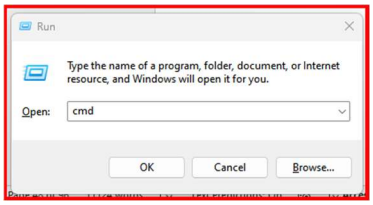
5.4.14.3 Peer-to-Peer/Ad-Hoc

A peer-to-peer (or "ad-hoc") connection allows you to connect a TESCO device directly to a PC or laptop using an Ethernet cable, without requiring a router or switch. This method is ideal for standalone setups or when working outside of a corporate network.

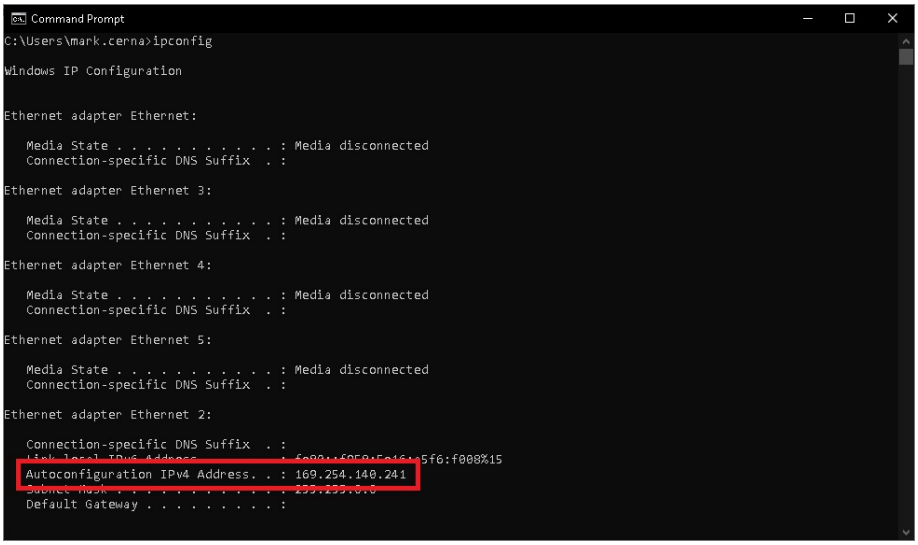
Step-By-Step Instructions:

1. **Connect the Devices**
   Using an Ethernet cable, connect the **TESCO device** (e.g., **Meter Test Board**, **Meter Site Analyzer**, or **EVSE Tester**) directly to a Windows laptop or PC.
2. **Check the Computer's Auto-IP Address**
   On your PC:
   a. Press **Windows + R** to open the **Run** dialog.

   b. Type **cmd** and press **Enter** to launch the Command Prompt.



   c. In the Command Prompt, type **ipconfig** and press **Enter**.
   d. Locate the **Autoconfiguration IPv4 Address** (typically starts with 169.254.x.x).
   Example: *169.254.140.241* — this is your PC's address on the ad-hoc network.



3. **Configure the TESCO Device's Network Settings**
   On the **TESCO device**, you will assign a compatible static IP address that is in the same range but not identical to the PC's.

- If your PC address is 169.254.140.241, set the TESCO device to 169.254.140.242.

⚠️ Do not use the same IP address as your PC. Acceptable range: 169.254.140.0 – 169.254.140.255 (excluding the PC's IP).

Accessing Network Settings on TESCO Devices:

- **For EVSE Testers**: Navigate to PREFS → GENERAL → NETWORK

- Set the mode to **STATIC**
- Enter the selected IP address
- Click **APPLY**, then **CLOSE**

4. **Optional: Confirm the Connection**
   Back on your PC, you can confirm the devices are communicating:

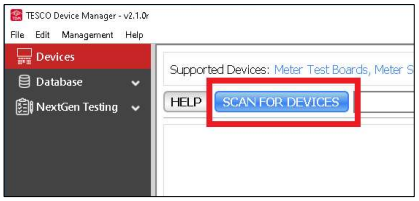
- Open the Command Prompt.
- Type ping followed by the IP address you assigned to the TESCO device (e.g., ping 169.254.140.242) and press **Enter**.

- If the setup is correct, you should receive a reply, indicating that the connection is active.

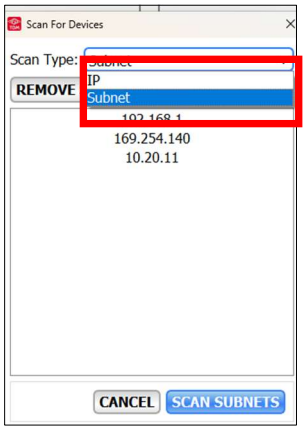
```
C:\Users\mark.cerna>ping 10.20.11.200

Pinging 10.20.11.200 with 32 bytes of data:
Reply from 10.20.11.200: bytes=32 time=1ms TTL=64
Reply from 10.20.11.200: bytes=32 time=1ms TTL=64
Reply from 10.20.11.200: bytes=32 time=1ms TTL=64
Reply from 10.20.11.200: bytes=32 time=1ms TTL=64

Ping statistics for 10.20.11.200:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms
```

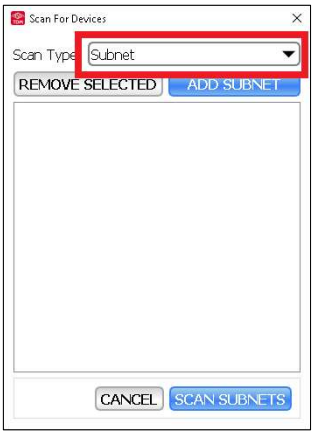
5.4.14.4 Adding a subnet to the scan list and performing a network scan

1. In TDM, click **“Devices”** from the side menu, then select **“Scan for Devices”** to open the device scan window.

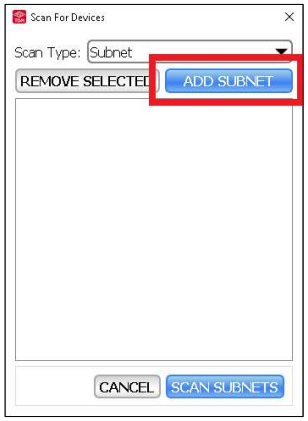


2. In the **Scan for Devices** popup window, select **“Subnet”** from the scan type dropdown menu.

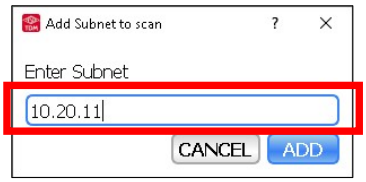




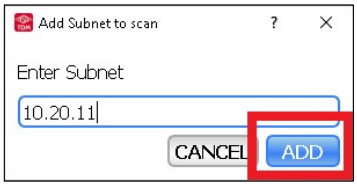
3. Click “**ADD SUBNET**” button.



4. In the **Add Subnet** popup, enter the first three groups of numbers from the TESCO device's IP address (left to right). For example, if the TESCO device has an IP address of "10.20.11.242", you will need to enter "10.20.11".

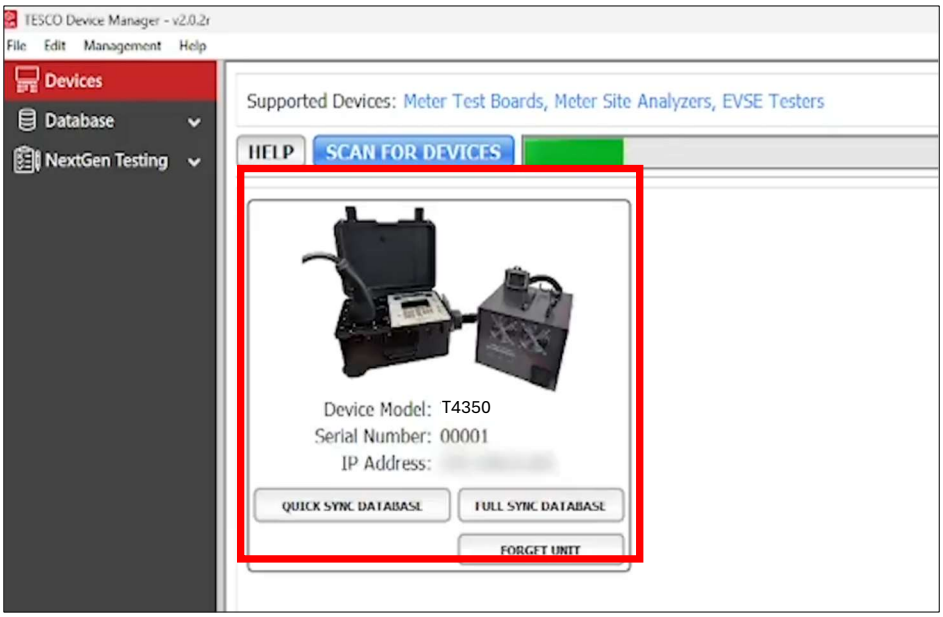


5. Click **"Add"** to save the subnet to the list.



6. Click "**SCAN SUBNETS**" to begin scanning the specified network range.

7. Any detected TESCO devices will be listed on the **Devices** page.



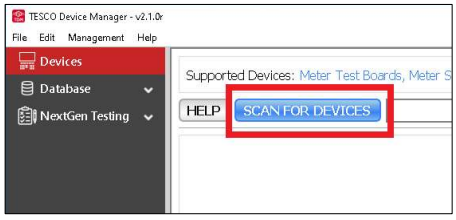
Tip: Scanning by subnet is ideal for finding multiple devices on a shared network without needing to know individual IP addresses.

5.4.14.5 Adding an IP address to the scan list and performing a network scan

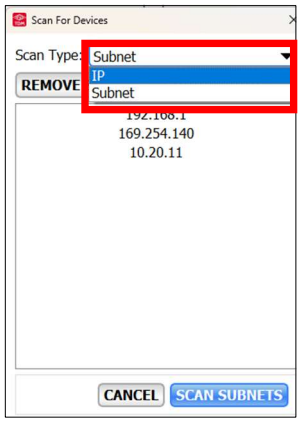
This option allows you to scan for a specific TESCO device when you know its exact IP address. It's useful when working with static IP assignments or when scanning a broad subnet is not necessary.

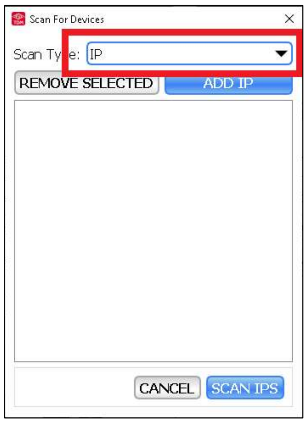
Step-by-Step Instructions:

1. In TDM, click **"Devices"** from the side menu, then select **"Scan for Devices"** to open the scan window.



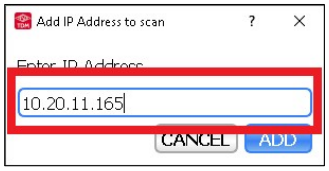
2. In the **Scan for Devices** popup, choose **“IP”** from the scan type dropdown menu.



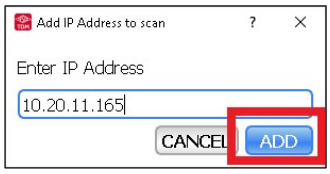


3. Click the **“Add IP”** button.

4. In the **Add IP Address to Scan** popup, enter the full IP address of the TESCO device.

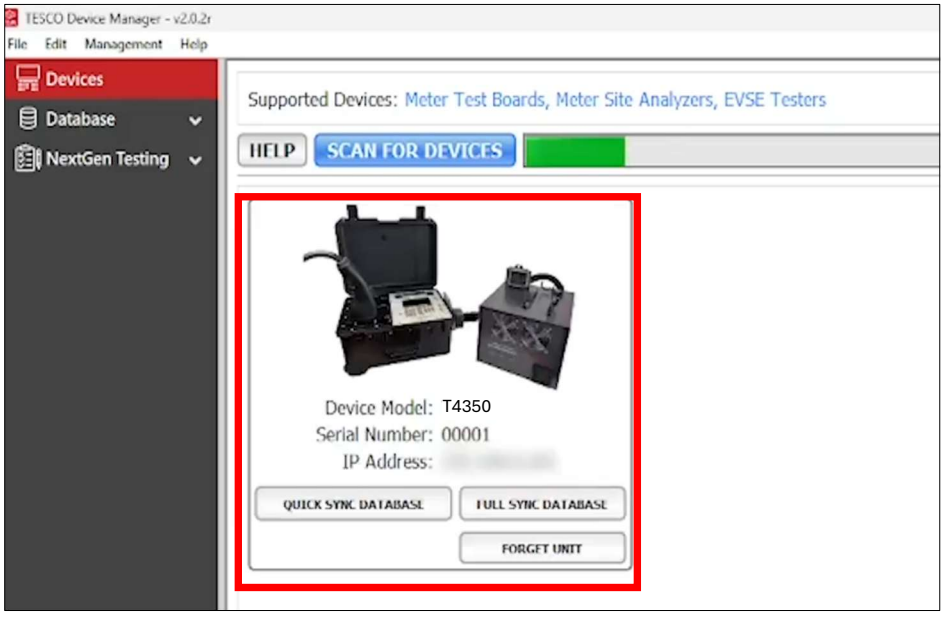


5. Click **“Add”** to close the popup and save the IP address to the scan list.



6. Click **“Scan IPs”** to begin scanning the specified address.

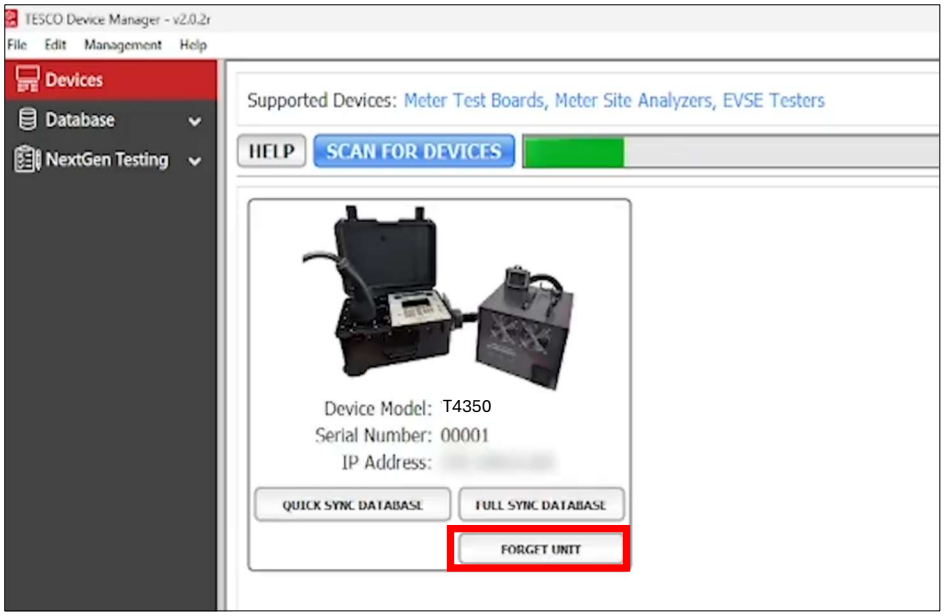
7. Any discovered TESCO devices will appear on the **Devices** page.



Scanning by IP *is* ideal when you're connecting to a **single known device** — especially when you already know the exact IP address.

5.4.14.6 Removing/Forgetting a device

If a device is no longer in use or needs to be removed from the TDM device list, you can manually delete it using the **Forget Unit** option.



Step-by-Step Instructions:

1. Navigate to the **Devices** page in TDM.
2. Locate the device you wish to remove.
3. Click the **"FORGET UNIT"** button on that device's cell.

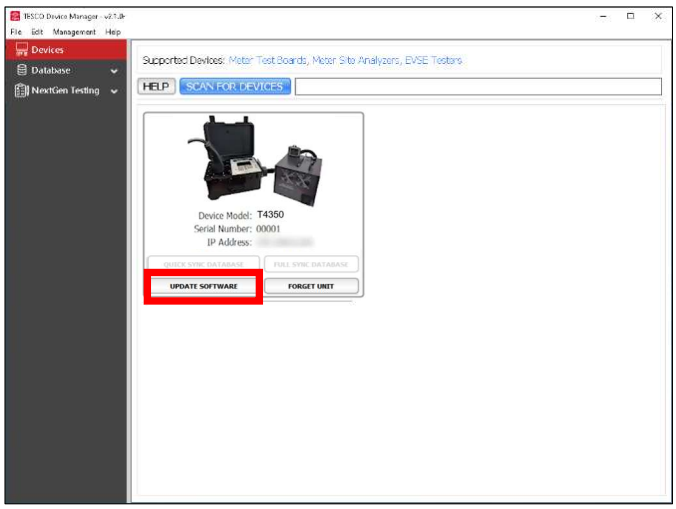
Once selected, the device will be removed from the visible list and will no longer appear in future scans unless re-added.

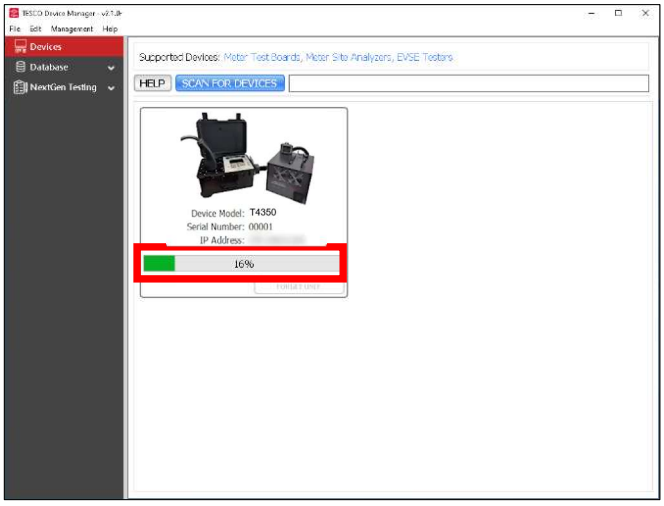
Note: This action only removes the device from the current view in TDM. It does not affect the device itself or its network settings.

5.4.14.7 Performing Software update on a device

⚠️ **WARNING**: Ensure the device's network connection is stable before starting a software update. Interruptions during the update process may result in incomplete installation or device communication issues.

TDM allows users to update the software on supported TESCO devices when a newer version is available. **This option is only visible if the device is running outdated software**.





Step-by-Step Instructions:

1. On the **Devices** page, locate the TESCO device you wish to update.
2. If the device is eligible for an update, an **"UPDATE SOFTWARE"** button will appear on its device cell.
3. Click **"UPDATE SOFTWARE"** to begin the update process.

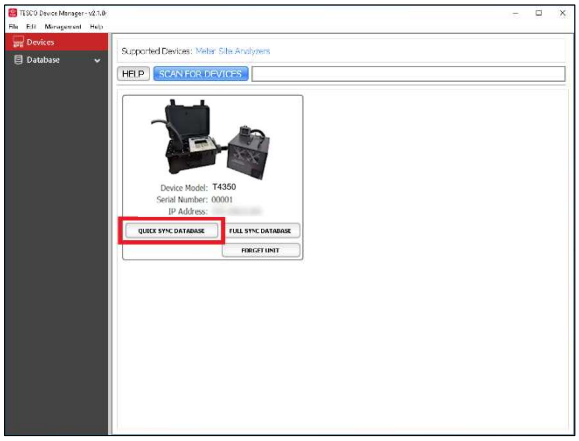
During the update, the device's screen may go blank (white or black) and restart automatically. This is normal behavior.

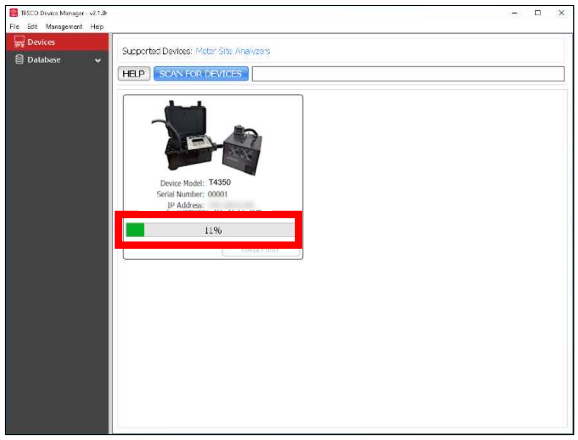
4. A progress bar will appear on the device cell in TDM, showing the update status in real time.
5. Once the update is complete, the device will automatically reboot and return to its normal operating state.

Note: Do not disconnect power or network cables while the update is in progress.

5.4.14.8 PULLING RECORDS FROM A DEVICE TO TDM (Quick Sync)

Clicking the **“Quick Sync Database”** button on the device cell initiates a one-way transfer of data from the connected device to your local TDM installation. This process updates the local database stored on your computer with the latest records from the device.





Step-by-Step Instructions:

1. On the **Devices** page, locate the device from which you want to pull records.
2. Click the **“QUICK SYNC DATABASE”** button on the device cell.

A progress bar will appear, indicating the status of the synchronization process. Once complete, the retrieved records will be available in the local TDM database for review or export.

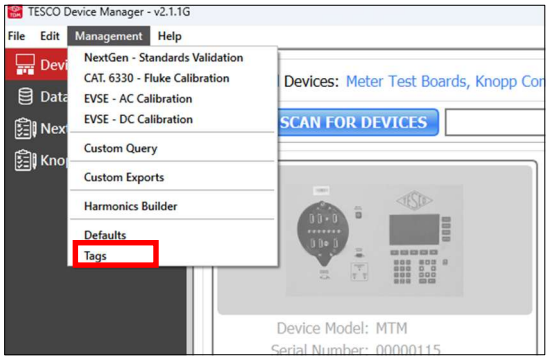
Note: This action does not remove or alter records on the device itself. It simply ensures that your local copy of the database reflects the most current data available.

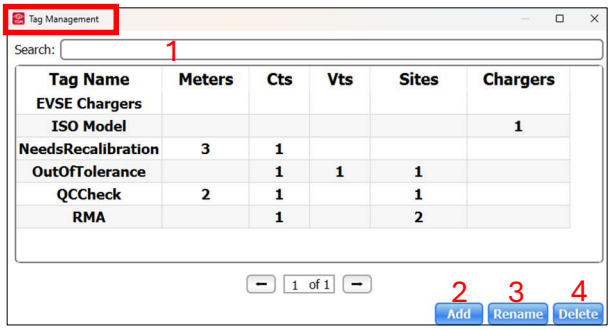
5.4.15 Tags

Tags provide a flexible way to organize and categorize records in TDM, such as Meters, CTs, VTs, Sites, and Chargers. Tags can be managed centrally and applied to items for sorting, filtering, and reference.

5.4.15.1 Managing tags

To manage tags, click **Tags** under the **Management** menu from the toolbar. This will open the Tag Management popup, displaying all available tags for supported item types.





Available options include:

1. **Search**: Use the search bar to filter tags by keyword.
2. **Add a Tag**: Click the **Add** button in the lower-right corner to create a new tag.
3. **Rename a Tag**: Select a tag and click **Rename** to update its name.
4. **Delete a Tag**: Select a tag and click **Delete** to remove it from the system.

Note: Tag names must be unique and cannot be reused after deletion.

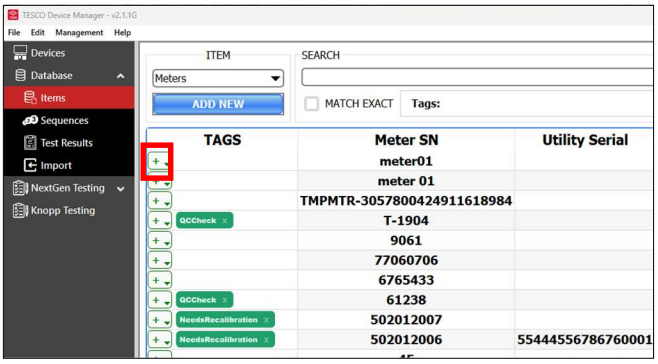
5.4.15.2 Using tags

Currently, tags can be applied and managed on the **Database > Items** page found on the sidebar menu.

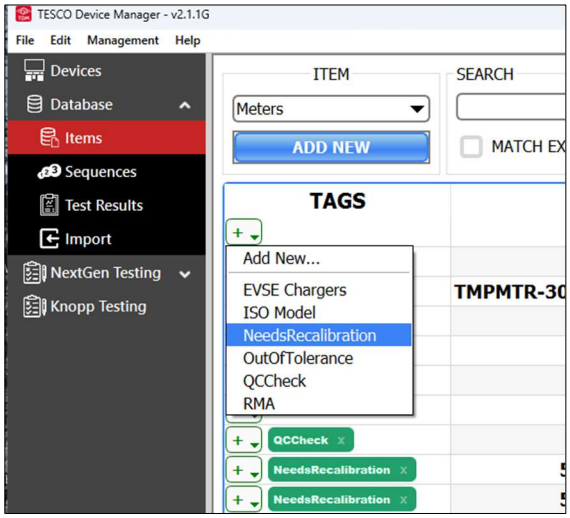
5.4.15.3 Assigning a tag to an item

To assign an existing tag to an item:

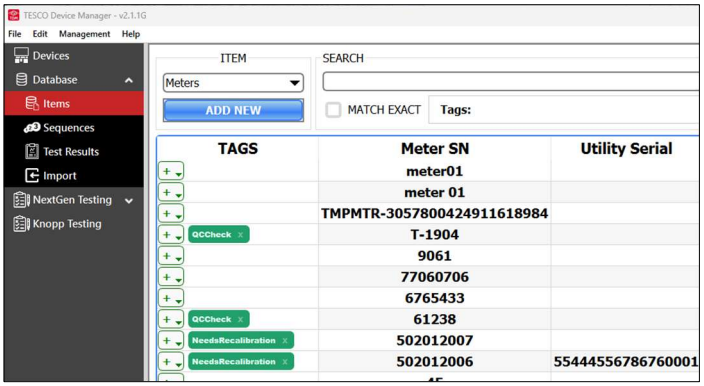
- Click the **“+”** button on the leftmost side of the item’s row.



- Select a tag from the list.



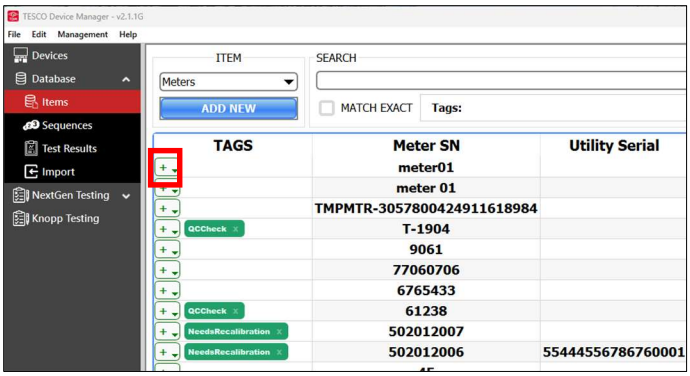
- A green tag widget will appear in the **Tags** column for that item.



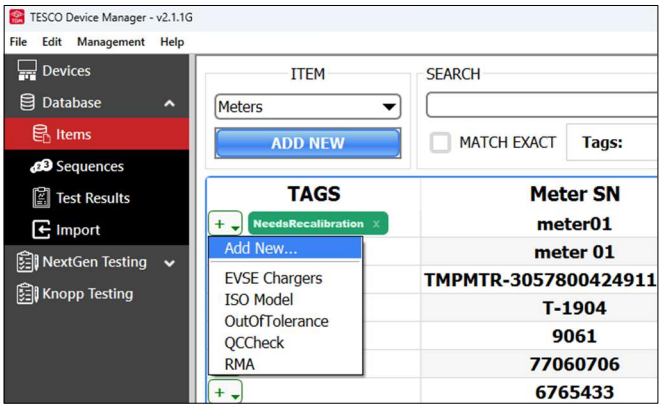
5.4.15.4 Creating a tag and assigning it to an item

To create and assign a new tag in one step:

- Click the **“+”** button on the leftmost side of the item’s row

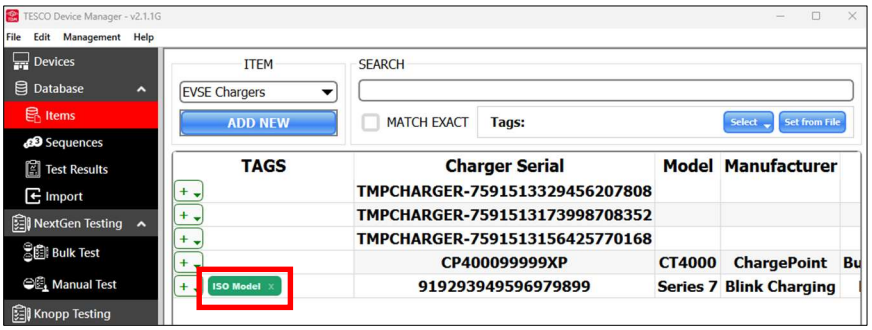


- Select **Add New**.



- Enter the tag name and click **OK**

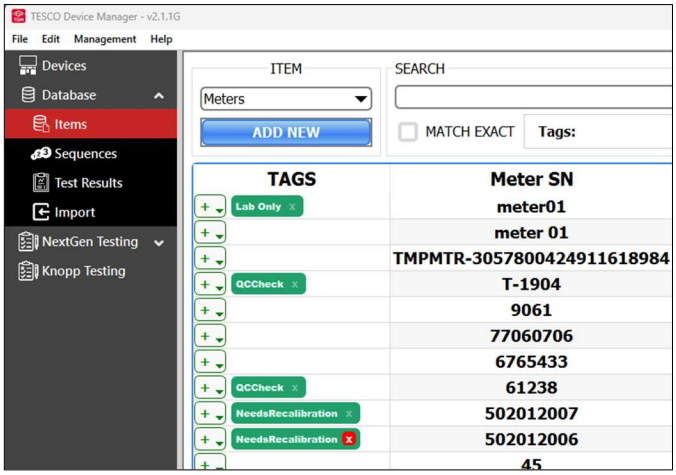
- A green tag widget will be added to the **TAGS** column for that item.



5.4.15.5 Removing a tag from an item

To remove a tag from an item:

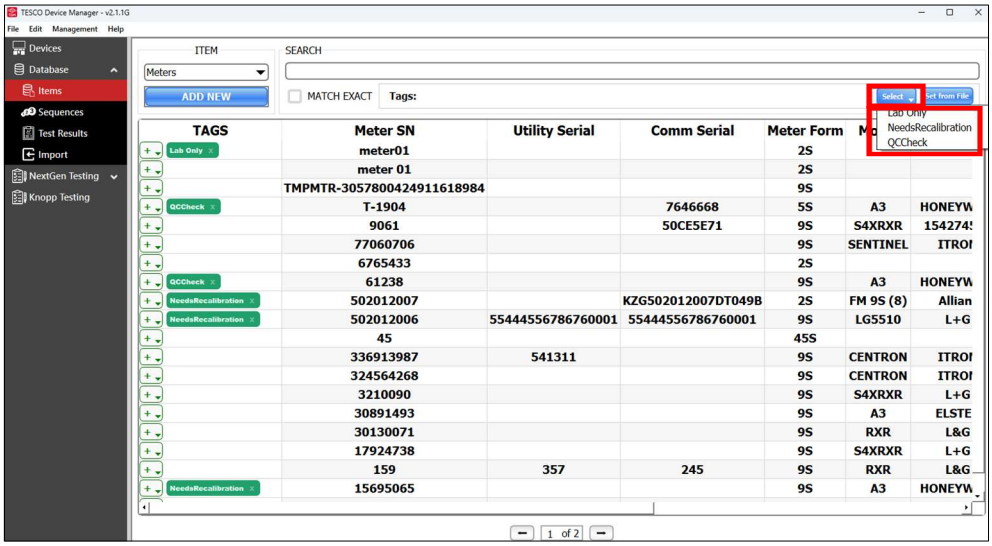
- Click the **"×"** icon next to the tag in the **Tags** column.
- The tag will be removed from that specific item.

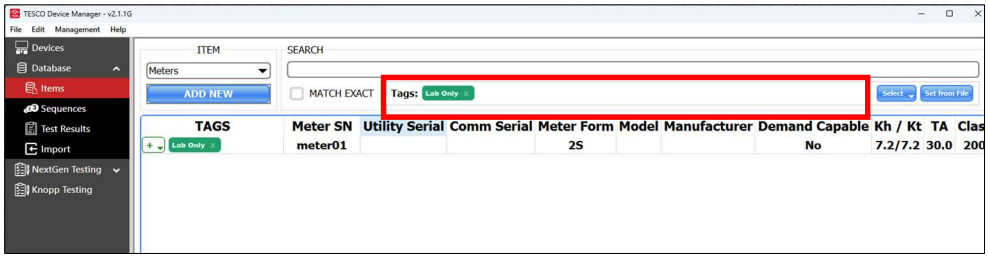


5.4.15.6 Filter items using tags

To filter the item list using tags:

- Click **Select** under the **Search** section and choose a tag.
- A green tag widget will appear in the tag filter list, and the table will refresh based on the selected filters.





To remove a tag filter:

- Click the **“×”** icon next to the tag in the **Search** section.

- The table will refresh automatically based on the remaining filters.

6 Maintenance

6.1 Introduction

Most of the maintenance will be handled by the technical team from TESCO. The user can, however, perform the basic maintenance routine of cleaning the EVSE Test System's external surface. Regular maintenance is critical to ensure the reliability and longevity of the T4350, PL4150, PL4000, and MitM Cable. This section outlines basic care, cleaning procedures, and part servicing information

6.2 Cleaning the Instrument External Surface

Clean the exterior of the EVSE Test System using a soft cloth slightly dampened with either water or a non-abrasive mild cleaning solution that is not harmful to plastics. Ensure the equipment is powered off and unplugged before cleaning.

CAUTION

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

6.3 Repair / Parts Replacement / Recalibration

For the EVSE Test System's repair, parts replacement, and recalibration, directly contact TESCO through phone or email. See section **1.2 Contacting TESCO** for contact details. TESCO recommends recalibration on an annual basis. Further details can be found on the Calibration Certificate provided with your Site Analyzer.

6.4 Cable Care – Man-in-the-Middle (MitM)

Protect the Pins: Always Keep the Cap On
To ensure proper functionality and prevent damage, always keep the protective cap securely in place when the MitM Cable is not in use. Exposed or damaged pins can compromise communication and functionality. Bent or broken pins will require replacement of the entire unit.

7 Appendices

7.1 Changelog

This section provides a detailed record of manual revisions, including software updates, procedural adjustments, and any other relevant information you may want to track.

Date	Author	Log
1/17/2025	TL	Updated to keep up with TDM version 2.1.0r

7.2 Technical Support

Technical Support Contact Information:
For any technical issues, questions about TDM, you can reach TESCO through the following:

- **Phone (Technical Support):** +1 (215) 228-0500

This is TESCO's main support line.

Hours of operation are Monday – Friday, 7:00 AM – 6:00 PM (Eastern Standard Time).

- **Email:** support@tescometering.com

Email is great for non-urgent inquiries or to send a detailed description of an issue (even screenshots). TESCO's support team monitors this address and typically responds within one business day.

When contacting support, always provide the following information to ensure efficient assistance:

- **The current firmware or software version, if known**
- **A concise description of the issue, including any error codes and/or system behavior.**

Thank you for your patronage, we look forward to working with you!

-The TESCO Team