User Manual
ENGLISH

AEMC® INSTRUMENTS
CHAUVIN ARNOUX GROUP

Digital Transformer Ratiometer

DTR® Model 8511

TRANSFORMER RATIOMETERS

Measure Up
WITH AEMC INSTRUMENTS®

Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
15 Faraday Drive • Dover, NH 03820 USA
Phone: (603) 749-6434 or (800) 343-1391

Statement of Compliance

Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments certifies that this instrument has been calibrated using standards and instruments traceable to international standards.

We guarantee that at the time of shipping your instrument has met the instrument's published specifications.

An NIST traceable certificate may be requested at the time of purchase, or obtained by returning the instrument to our repair and calibration facility, for a charge.

The recommended calibration interval for this instrument is 12 months and begins on the date of receipt by the customer. For recalibration, please use our calibration services. Refer to our repair and calibration section at www.aemc.com/calibration.

Serial #: _____

Catalog #: **2136.55**

Model #: **DTR® 8511**

Please fill in the appropriate date as indicated:

Date Received: _____

Date Calibration Due: _____

AEMC® INSTRUMENTS
CHAUVIN ARNOUX GROUP

Chauvin Arnoux®, Inc.
d.b.a AEMC® Instruments
www.aemc.com

TABLE OF CONTENTS

1. INTRODUCTION

Thank you for purchasing an AEMC® Instruments **Digital Transformer Ratiometer DTR® Model 8511.**

For the best results from your instrument and for your safety, you must read the enclosed operating instructions carefully and comply with the precautions for use. Only qualified and trained operators should use this product.

1.1 INTERNATIONAL ELECTRICAL SYMBOLS

	Signifies that the instrument is protected by double or reinforced insulation.
	**CAUTION - Risk of Danger!** Indicates a **WARNING**. Whenever this symbol is present, the operator must refer to the user manual before operation.
	Indicates a risk of electric shock. The voltage at the parts marked with this symbol may be dangerous.
	Ground/Earth
	Battery
	Fuse
	USB socket
	Indicates Important information to acknowledge.
	This product complies with the Low Voltage & Electromagnetic Compatibility European directives.
	In the European Union, this product is subject to a separate collection system for recycling electrical and electronic components in accordance with directive WEEE 2012/19/EU.

Table 1

1.2 DEFINITION OF MEASUREMENT CATEGORIES (CAT)

CAT IV: Corresponds to measurements performed at primary electrical supply (< 1000 V).

Example: primary overcurrent protection devices, ripple control units, and meters.

CAT III: Corresponds to measurements performed in the building installation at the distribution level.

Example: hardwired equipment in fixed installation and circuit breakers.

CAT II: Corresponds to measurements performed on circuits directly connected to the electrical distribution system.

Example: measurements on household appliances and portable tools.

1.3 PRECAUTIONS FOR USE ⚠

This instrument complies with safety standard IEC 61010-2-030.

WARNING: This product can expose you to chemicals, including Bisphenol A, Styrene, Acrylonitrile, 1,3-Butadiene, Ethylbenzene, Nickel, Carbon, and Lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. For more information, visit www.P65Warnings.ca.gov.

Carefully read and understand all required precautions when using this instrument. Failure to comply with these safety instructions can create a risk of electric shock, fire, and explosion; resulting in destruction of the instrument, injury to the user, and damage to the facility. If the instrument is used other than as specified in this manual, the protection provided by the instrument may be impaired.

- This instrument is protected from accidental voltages of not more than 50 V with respect to earth. The guaranteed level of protection of this equipment may be compromised if used in a manner not specified by the manufacturer.
- Read the instruction manual completely and follow all safety information before attempting to use or service this instrument.
- The Digital Transformer Ratiometer DTR® 8511 is designed for use on **de-energized (dead)** transformers only. Make sure the test sample is completely disconnected from AC power and is fully discharged.
- Only qualified personnel should use the DTR® 8511.

WARNING: Always make sure the circuit is fully discharged before attaching any test cables.

- The DTR® 8511 must not be used in a manner in which any of its components (including test cables) are relied upon to provide protection from electric shock. No high voltage insulation/protection is provided by any component of the DTR® 8511.
- Do not touch, adjust, or reposition test cables while the DTR® 8511 is conducting a test.
- Use caution on any apparatus: potentially high voltages and currents may be present and pose a shock hazard.
- Safety is the responsibility of the user.
- Never open the instrument while it is connected to AC power or when test cables are connected to transformers, equipment, circuits, etc.

NOTE: Before using the instrument for the first time, it is recommended to fully charge the battery by leaving it connected to the charger for **10 hours**. This initial charge helps condition the battery and extend its overall service life (see § 8.2 Charging the Batteries).

1.4 RECEIVING YOUR SHIPMENT

Upon receiving your shipment, make sure that the contents are consistent with the packing list. Notify your distributor of any missing items. If the equipment appears to be damaged, file a claim immediately with the carrier and notify your distributor at once, giving a detailed description of any damage. Save the damaged packing container to substantiate your claim.

1.5 PRODUCT PACKAGING

PRODUCT PACKAGING

Digital Transformer Ratiometer DTR® 8511
Cat. #2136.55

Set of (2) 15 ft Leads w/ (4) Alligator Clips
Cat. #2136.77

Extra Large Classic Tool Bag
Cat. #2133.73

USB Type-C Wall Power Adapter
Cat. #5100.25

Cable - 6 ft USB Type-C 3.1 PD to Type-C
Cat. #5100.28

Cable - 10 ft USB Type-A to Type-C
Cat. #5100.27

AC Power Adapter w/Cord
Cat. #5100.26

(1) USB Drive (DataView® and User Manual)

Quick Start Guide Model 8511

Also Included:

(1) Statement of Compliance Sheet

(6) internal rechargeable AA NiMH batteries

1.6 ORDERING INFORMATION

Digital Transformer Ratiometer DTR® 8511 ..... **Cat. #2136.55**

Includes (6) internal rechargeable AA NiMH batteries, extra large carrying bag, set of (2) 15 ft test leads (primary and secondary) with four alligator clips (red/black), 6 ft USB Type-C to Type-C cable, USB Type-C wall power adapter, 10 ft USB Type-A to Type-C cable, AC power adapter w/cord and USB drive with DataView® software and user manual.

1.6.1 Accessories

Bag - Extra Large Carrying Bag w/Rubber Bottom (Replacement for Model 8345, OX9000 series & PEL 115) may be used with Models 3945/3945-B, 6240, 6250, 6255, 6471, 6472, 6505, 5050, 5060, 5070, 83333, 8335, 8336, 8436, 8510, 8511, PEL 105 ..... **Cat. #2133.76**

Leads - Set of 2, 30 ft for DTR® Models 8500, 8510, & 8511 Replacement for Cat #2118.47 ..... **Cat. #2136.76**

1.6.2 Replacement Parts

Bag – Extra Large Classic Tool Bag (18x9x12”) (Replacement for Models 3945/3945-B, 6240, 6250, 6471, 6505, 5050, 5060, 5070, 8333, 8335, 8336,8510, 8511, PEL 105, & PEL 115) ..... **Cat. #2133.73**

Leads - Set of 2 (Replacement), 15 ft for DTR® Models 8500, 8510, & 8511 Replacement for Cat #2118.48 ..... **Cat. #2136.77**

Clip - Safety Alligator - Black (1000 V, CAT IV, 15 A, UL V2)..... **Cat. #5000.99**

Clip - Safety Alligator - Red (1000 V, CAT IV, 15 A, UL V2)..... **Cat. #5100.00**

Adapter - USB Type-C Wall Power Adapter ..... **Cat. #5100.25**

Adapter - Replacement AC Power Adapter w/cord for DTR® 8511.... **Cat. #5100.26**

Cable - 10 ft Type-A to Type-C USB 2.0 Full Speed (12 Mbps) ..... **Cat. #5100.27**

Cable - 6 ft USB Type-C 3.1 PD to Type-C USB 2.0 Full Speed (12 Mbps) ..... **Cat. #5100.28**

Order Accessories and Replacement Parts Directly Online
Check our storefront at www.aemc.com/store for availability.

2. PRODUCT FEATURES

2.1 DESCRIPTION

The DTR® 8511 is an easy-to-use Digital Transformer Ratiometer capable of measuring ratios on single phase transformers with high precision. It is a lightweight, rugged, portable instrument designed for on-site testing of transformers (power, VT/PT, and CT).

A typical application of the DTR® 8511 is checking transformer ratio winding values prior to installation by comparing nameplate values to actual values for ratio accuracy reasons.

Operation of the DTR® 8511 is fully automatic. No user calibration, range selection, hand cranking or tedious balancing is required.

During each Ratio test cycle, the DTR® 8511 automatically checks for:

- Reversal of H and X leads

During each Continuity test cycle, the DTR® 8511 automatically checks for:

- Open H lead
- Open X lead

Upon completion of a test cycle, the DTR® 8511 displays:

- **Turns Ratio:** The ratio of the primary to secondary voltage at the transformer terminals due to test current.
- **Excitation Current:** The RMS excitation current in the H winding due to test excitation during negligible loading of the associated X winding.
- **Deviation:** If Nameplate is enabled, indicates the deviation value from nameplate ratio in %. If Nameplate is disabled deviation displays as **N/A**.

The user can also save Nameplate voltages and compare the results as the data is being gathered. The data can later be downloaded to a PC and analyzed using the DataView® software application which is included with the product.

DataView® allows full control of the instrument. If the DTR® 8511 is connected to a PC through an isolated USB interface, data can be downloaded to the PC and analyzed using the DTR® Control Panel software.

The instrument supports the ability to upload firmware updates via USB Flash Upload (see § 8.3 Updating the Firmware).

The firmware will support the following languages:

- US English
- Traditional French
- German
- Italian
- Portuguese
- Spanish

The instrument is powered by:

- The (6) internal rechargeable AA NiMH batteries, for running tests in the field.
- The external USB power via the included AC/DC USB-C wall power adapter. This adapter can accept between 100 V_{AC} to 240 V_{AC}.
- The 12.0 V_{DC} input connector via an external AC power adapter with barrel connector, used for when the batteries are depleted.

NOTE: Testing can only run if the batteries have enough power, or the 12 V_{DC} AC power adapter is plugged in.

NOTE: When running tests from the Control Panel, all testing is disabled when connected to USB only. In this scenario, the below screen will display:

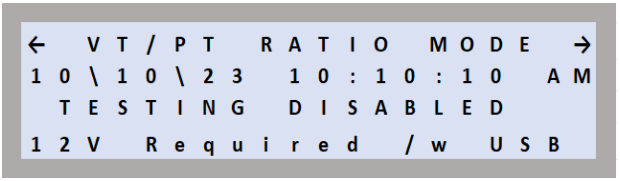


Figure 2

You must connect the supplied 12 V_{DC} AC power adapter to proceed with testing.

NOTE: The DTR® 8511 utilizes an advanced, low-voltage, step-down measurement technique in which the primary side windings are subjected to test current. This results in greater operator safety and the ability to test a wider array of transformer types and sizes.

2.2 FEATURES

2.2.1 Main Features

- Removable leads
- IP 53 rated (cover closed)
- Ratio measurements up to 8000.0:1 VT/PT or 1000.0:1 CT
- 12 V_{DC} power operation via external 100 V_{AC} to 240 V_{AC} to 12 V_{DC} 4.3 A power adapter with standard barrel connector
- Programmable nameplate ratios
- Deviation calculations (when Nameplate is enabled)
- Remote control via the included DataView® software
- Lead reversal detection
- Continuity testing
- Open Primary detection
- Open Secondary connection
- 9,801 storage locations
- Fully charge battery life to run 500 VT/PT tests
- Auto power off (configurable)
- CE approved

2.2.2 Model Features

- Output (H): (1) 5-pin connector for signal injection (H) compatible with test leads for DTR® 8510.
- Input (X): (1) 3-pin connector for signal sense (X) compatible with test leads for DTR® 8510.
- Large (6) button rubber keypad: Up, Down, Left, Right, Enter and Test
- Excitation Current Measurements (C)
- Ratio Deviation Measurements (D)
- H/X Lead Reversal Check
- Internal Transformer Library (P,S)
- Safety: IEC 61010-2-030, CE
- Fixed Output Voltages (VT/PT) 30 V_{AC}
- Fixed Output Voltages (CT) 5 V_{AC}
- Fixed Test Frequency (64 Hz)
- Test Current (2 A max)
- Numbered of Stored Tests (99 objects, 99 tests)
- Run tests while charging batteries (via 12 V_{DC} input only)
- Isolated USB Type-C 2.1 port (for charging and communication)
- 12 V_{DC} input using a standard barrel connection (11 x 5.5) mm
- Internal Memory for Data Storage
- 4-line Alphanumeric Display (4 x 20)
- Backlight
- (6) internal rechargeable AA NiMH batteries
- Auto Power OFF
- Audible tone for start and end of test
- Rugged molded IP53 case with locking latches and gasket in cover.
- Power Switch incorporates LED indication of battery charge status.
- Low battery indication. Instrument displays LOW BATTERY if test is started when batteries are low.
- Flash upload capability.

2.3 INSIDE COVER LABEL

The inside cover label provides information such as safety rating, VT/PT and CT measurement ranges and connection types, battery specifications, a Display Legend for the Main screen and Power Switch LED indicator definitions.

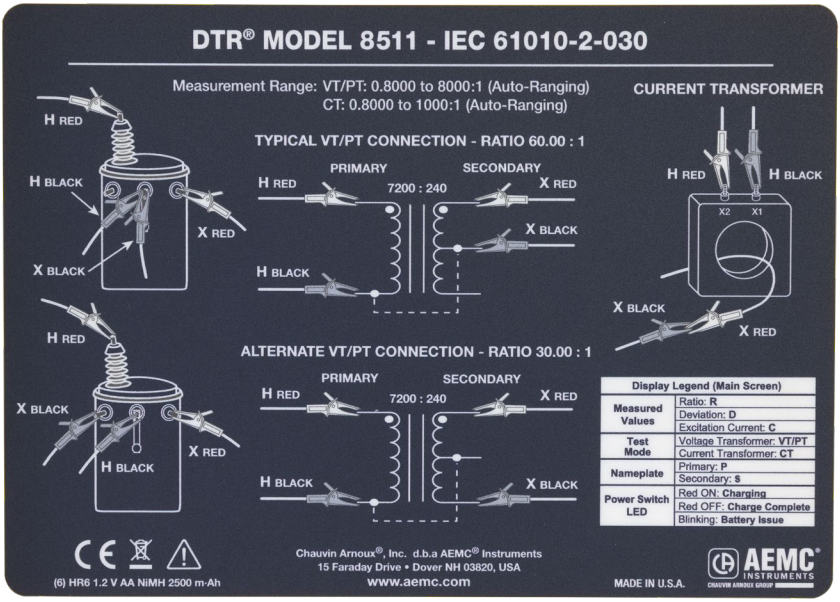


Figure 3

2.4 CONTROL FEATURES

Figure 4

1	**IP53 Rated Case:** Rugged molded IP53 case with locking latches and gasket in cover to ensure tight seal when cover is closed.

Figure 5

2	**Display:** The LCD is 5 x 8 character resolution with 4 lines, each allowing 20 characters (4 x 20 character resolution). The LCD functions as the user interface (UI) to the instrument. **Backlight:** To conserve power, the backlight is OFF when the instrument is turned on and powered up. Enable the backlight by pressing any button. It will turn OFF automatically if after 3 minutes no buttons have been pressed. **Audible Tone:** A single audible tone (beep) will sound when the instrument is turned on, is at the start of a test, is at the end of a test and if an error occurs. **NOTE:** The audible tone cannot be disabled.
3	**USB (Type C) Connection:** Allows connection to the instrument direct to a PC running the Control Panel software. The connection can also be used to charge the batteries from the supplied wall charger or a USB-C port on a PC. **NOTE:** All types of testing are disabled if only the USB-C is connected. Even when the batteries are fully charged. To run a test remotely while the USB-C is present the supplied 12 V_{DC} AC power adapter must also be connected. Tests can be run in real time from the Control Panel software if the instrument is being powered by a 12 V_{DC} AC power adapter.
4	**Measurement Signal Output (H) 5-pin Connector:** The H leads will connect at this point for the injection of the test signal. A 30 V(VT) or 5 V(CT) sine wave at a fixed frequency (64 Hz) is injected into the equipment under test (EUT). Voltage (VT/PT) or Current (CT) test is configured prior to performing the tests.
5	**Measurement Input (X) 3-pin Connector:** The X leads will connect at this point which is where the signal from the primary side of the transformer is returned to be measured and compared to the signal being sent.
6	**12 V_{DC} Input Connector:** Used to charge batteries and power the instrument when batteries are depleted via an external AC power adapter with barrel connector.

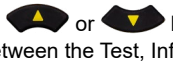
7	**Power Button:** A momentary contact switch that turns the instrument **ON (wake)** or **OFF (sleep).** To turn instrument ON press Power button  for >2 s. To turn instrument OFF press Power button  for >2 s. **NOTE:** The **red LED** embedded in the power button indicates **battery charge mode** and does not indicate instrument ON/OFF status. **NOTE:** When the instrument is powered **OFF**, there is still minimal battery usage as the instrument always remains in sleep mode. **Red LED Indications in Power Button:** **- LED Solid:** Batteries are charging. - **1 s Blinking:** There is a problem with the battery charger. - **OFF:** Batteries are charged. - **Flashing Rapidly:** Battery(s) missing or one or more are installed reversed. **Low Battery Indication:** LOW BATTERY will display if a test is run when batteries are too low to complete test.
8	**Enter**  **Button:** The large enter button allows you to easily navigate through the menu system. It allows the selection and display of choices one level below (if there is a level) in the program flow.
9	**Navigation Buttons:** These large buttons allow you to easily navigate through the User Interface (UI) menu system. **Left and Right:** Pressing the  button will navigate left or right through the menu system. The Left and Right buttons are also used to select the next and previous items within a selected group, to display or change values for certain fields like date and time, or for choosing options like YES or NO for example in Nameplate Setup (YES to Enable or NO to Disable Nameplate). **Up and Down:** Pressing the  button will navigate up or down through the menu system between the Test, Information, Configuration and Memory Recall screens. The up and down buttons are also used in certain screens to cycle through options or set increments and other values. **Return (ESC) Command:** Pressing and releasing the  buttons simultaneously functions as a return (ESC) command returning up one level (if there is a level) in the UI flow. This (ESC) command does not work while on a Test Result screen, Error Message screen or Test Canceled screen. To exit these screens, press the Enter  button. Performing the return (ESC) command () multiple times: results in returning to the Top Level Menu.
10	**Test Button:** The large test button allows for you to easily press to start or stop a test. **NOTE:** To initiate a test, the instrument must be on a Test screen or a Test Result screen.

Table 2

2.5 CABLE IDENTIFICATION

The Primary (H) cable has a 5-pin connector and the Secondary (X) cable has a 3-pin connector. Due to their different pin configurations, the cables cannot be incorrectly inserted into the DTR® 8511 terminals.

NOTE: Even though the cables cannot be incorrectly inserted into the DTR® 8511 terminals, the cables can be incorrectly connected to the transformer.

2.5.1 Primary (H) Cable

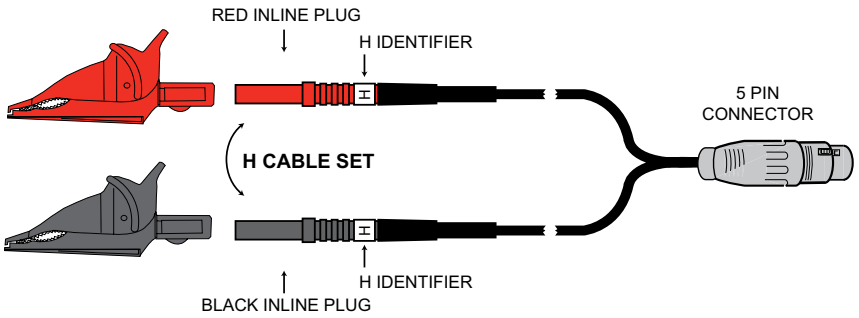


Figure 6

2.5.2 Secondary (X) Cable

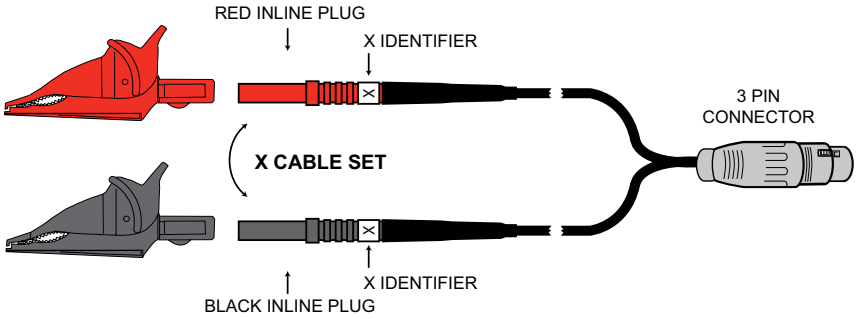


Figure 7

3. SPECIFICATIONS

3.1 REFERENCE CONDITIONS

Parameter	Reference Conditions
Ambient Temperature	(73.4 ± 9) °F (23 ± -12.78) °C
Relative Humidity	(10 to 85) % RH @ 35 ºC
Current	No DC component
PT/VT Mode	Output current ≤150 mA
CT Mode	Output current ≤50 mA
Magnetic Field	0 A/m
Electric Field	0 V/m

Table 3

3.2 ELECTRICAL SPECIFICATIONS

The following tables define the DTR® 8511 basic operational electrical specifications.

Range	VT 0.8:1 to 8000:1 CT 0.8:1 to 1000:1
Number of Inputs	1
Test Voltage Range	30 V @ 64 Hz
Test Current	(0 to 2) A @ 64 Hz
Measurement Method	In accordance with IEEE Std. C57.12.90™
Communication	USB Type-A to Type-C USB 2.1
Memory	16 MB
Primary Power Supply *(charging only)*	USB Type-C w/ power adapter or PC
AC Power Supply *(supplied)*	12 V_{DC} 4.3 A
IP Rating	IP53 cover closed

Table 4

Ratio Specifications (VT/PT)

Ratio Range	Test Voltage	Accuracy
0.8000 to 9.9999	30 VAC	0.2 %
10.000 to 999.99	30 VAC	0.1 %
1000.0 to 4999.9	30 VAC	0.2 %
5000 to 8000	30 VAC	0.25 %

Table 5

Ratio Specifications (CT)

Ratio Range	Test Current	Accuracy
0.8 to 1000	(0 to 2000) mA	0.5 %

Table 6

Current Specifications @ 64 Hz

Test Current	Accuracy
0 to 2000 mA	+/- (2 % of Reading + 2 mA)

Table 7

For Ratios within (0.8 to 8000)

Quantity	Label	Unit	Measurement Range
Excitation Frequency	F	Hz	64 Hz

Table 8

Resolution

See § 5.2.4 Units and Digits, for data.

Influences

Influence Quantity	Influence Range	Influenced Quantity	Influences		
			MIN	Typical	MAX
Temperature	(-10 to +50) °C (14 to 122) °F	I	-	-	0.3 %/10 °C+ 1 D
		Time	-	-	20 ppm / °C 68 ppm / °F
Relative Humidity	(10 to 85) % HR	I	-	-	1 % + 2 D
Power Supply	-	I	-	-	0.1 % + 2 D
AC 50/60 Hz Common Mode Rejection	(0 to 1000) VAC	I	140 dB(1)	0.5 dB	1 dB
Frequency	64 Hz	I	-		

Table 9

3.3 MECHANICAL SPECIFICATIONS

Dimensions: (9.89 x 13.49 x 6.0) in (251 x 343 x 152) mm

Weight: 7.1 lbs (3.2 kg)

Leads: 15 ft (4.6 m) with large color-coded industrial alligator clips in carrying bag.

Drop: IEC 60068-2-32 - Falls: 1 m in the most severe position without permanent mechanical damage and functional deterioration.

Operating Position: Horizontal

Vibration: Sinusoidal vibration testing, IEC 60068-2-6

Shock: IEC 60068-2-27

Enclosure: Rigid molded IP53 (cover closed), locking latches and gasket in cover.

Index of Protection: Provided by enclosures: IEC 60529

3.4 ENVIRONMENTAL SPECIFICATIONS

3.4.1 Temperature and Relative Humidity

1 =	**Reference Temperature:** (68 to 78.8) °F (20 to 26) °C from (45 to 75) % RH
2 =	**Operating Temperature:** (14 to 108.5) °F (-10 to 42.5) °C from (10 to 85) % RH (14 to 122) °F (-10 to 50) °C from (10 to 75) % RH
3 =	**Storage Temperature:** (-4 to 95) °F (-20 to 35) °C from (0 to 95) % RH (-4 to 140) °F (-20 to 60) °C from (0 to 75) % RH

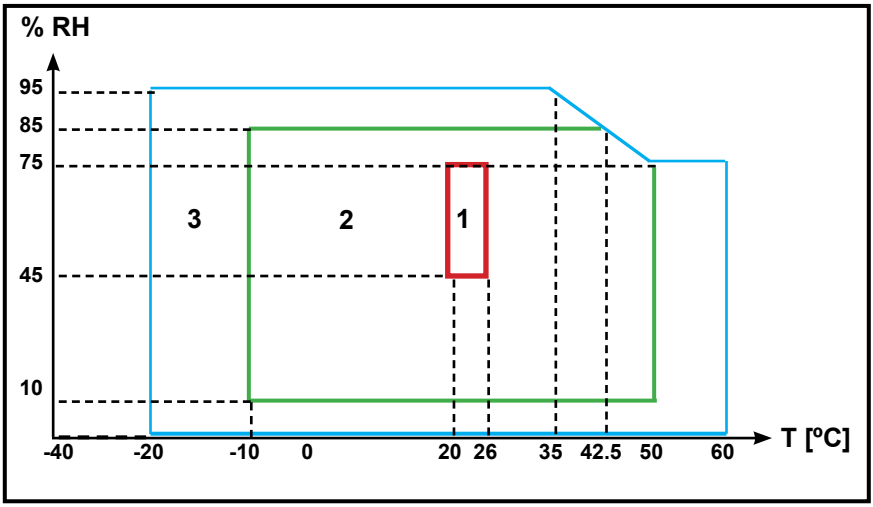


Figure 8

Indoor or Outdoor use, in dry locations only.

Altitude: Operation: sea level to 6550 ft (1996 m)
Storage: sea level to 32,000 ft (9753 m)

Degree of Pollution: The instrument conforms to Pollution Degree 2 as described in IEC 60947-1.

3.5 SAFETY SPECIFICATIONS

Electrical Safety

The DTR® 8511 complies with safety rating IEC 61010-2-030, is CE approved and double insulated.

3.6 ELECTROMAGNETIC COMPATIBILITY

Emissions and Immunity in an industrial setting compliant with IEC 61326-1.

4. DISPLAY FUNCTIONS

4.1 THE MENU SYSTEM

The User Interface (UI) menu system is designed in a tiered manor with a Top Level Menu consisting of the Test, Information, Configuration and Memory Recall menus. The UI also consists of 2nd Level Menus and 3rd Level Menu (options). A menu can also be referred to as a screen.

Reference flow charts (see Figures 74-77) for further details on the layout of the Test screen, Information screen, Configuration screen and Memory Recall screen.

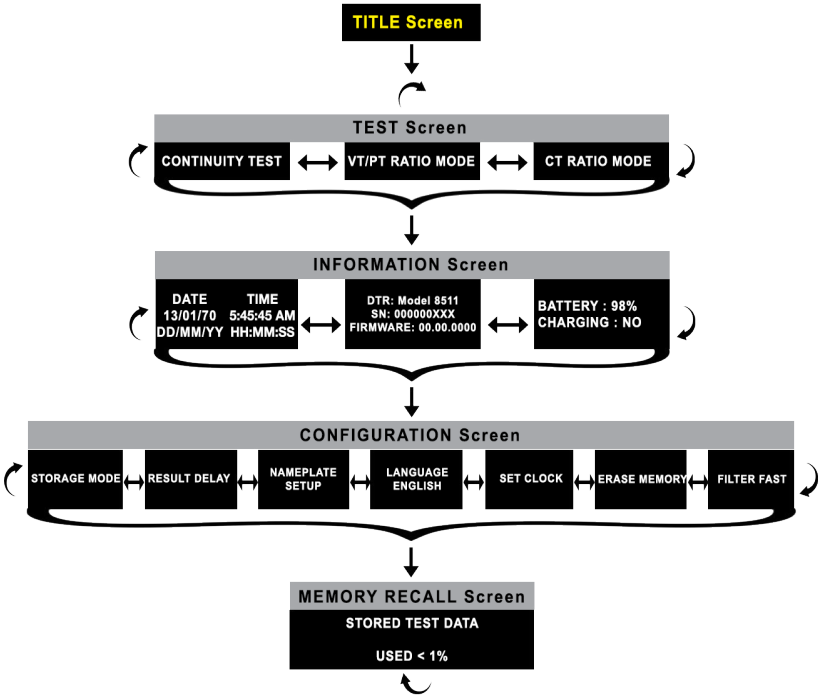


Figure 9

4.1.1 Title Screen

The Title screen is only visible at power up of the instrument. It is from here that you will enter the menu system.

The Title screen remains displayed until either the Enter , or any of the navigation buttons (, , , or) are pressed to proceed to the Test screen, or two minutes have lapsed with no button presses at which time the instrument will automatically proceed to the Test screen.

The Title screen displays the Company Name, Date and Time, and Battery Charge Status in % (see Figure 10).

The Title screen will not appear again until the next power up of the instrument.

The Title screen Name defaults to AEMC INSTRUMENTS. The first line of the Title screen can be custom configured at the factory per request made at time of purchase, to display a custom name up to 20 ACSII characters. The user cannot configure the Name on the Title screen.

NOTE: The battery charge status will not display on the Title screen while the battery is charging (see Figure 11).

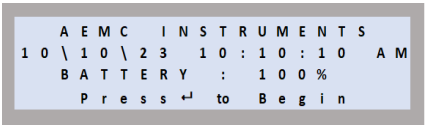


Figure 10

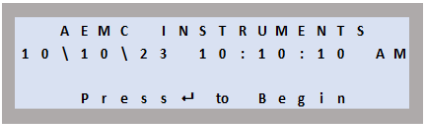


Figure 11

4.1.2 Navigating the Menu System

The user can navigate around the UI menu system by pressing the Up, Down, Left, or Right navigation buttons.

- **Vertical Navigation:** Pressing the or button will navigate up or down a menu level. For example it allows to navigate between the Test, Information, Configuration and Memory Recall screens (see Figure 9). These buttons are also used to select the next and previous items within a selected group and to display or change values for certain fields like date and time.
- **Horizontal Navigation:** Pressing the or button will navigate left or right within a menu level. It allows to select the next and previous items within a selected group, to display or change values for certain fields like date and time, or for choosing options like *YES to Enable* or *NO to Disable* Nameplate in Nameplate Setup.
- Return (ESC) Command: Pressing and releasing the and buttons simultaneously functions as a return (ESC) command to return up one level (if there is a level) in the UI flow. **NOTE:** To exit a Test Result screen, an Error Message screen or a Test Canceled screen you must press .
- Performing the return (ESC) command ( ) multiple times: Ultimately results in returning to the Top Level Menu (VT/PT Ratio Mode test screen).
- **Enter Button:**
  - Pressing the button from the Title screen allows you to navigate to the Top Level Menu (Test screen).
  - Pressing allows you to cycle through options such as language types, date formats or filter types and to make selections such as enabling or disabling a nameplate.
  - Pressing also allows you to exit from Test Result screens, Error Message screens and Test Canceled screens.

- **Test Button** 

: Pressing the **TEST** button will start or stop (cancel) a test.
- **Power Button**  : **Red LED** Indications located within power button.
  - If LED is:
    - **Solid:** Batteries are charging
    - **1 s Blinking:** There is a problem with the battery charging
    - **OFF:** Batteries are partially or fully charged
    - **Flashing rapidly:** Battery missing or installed reversed
- **Low Battery Indication:** LOW BATTERY will display if test is run when batteries are low.

4.1.3 Top Level Menu

The user can continuously cycle through the Top Level Menu by pressing either the  or  navigation button.

- Test screen
- Information screen
- Configuration screen
- Memory Recall screen

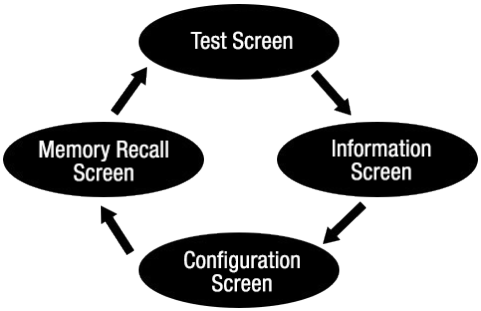


Figure 12

4.1.3.1 Test Screen

NOTE: Instrument must be on a Test screen or a Test Result screen to start a test.

Each Test screen displays:

- Test Type (VT/PT, CT or Continuity)
- Date and time set in the instrument
- Storage Mode [Auto SAVE, NO SAVE or MAN (manual)]
- [(LOW) if battery is too low to run a test]

The VT/PT and CT Test screens also display:

- Present Nameplate values (if Nameplate enabled)
- Filter Type [(Fast (FAST), Normal (NORM) or Slow (SLOW)]

NOTE: In VT/PT and CT Test screens, if Nameplate is not enabled then the primary (P) and secondary (S) values will not be displayed.

From the Title screen press  or  to navigate to the Top Level Menu.

Use  to navigate horizontally and  or  to navigate vertically through the menu system.

4.1.3.1.1 VT/PT Ratio Mode (Nameplate Enabled - Deviation Available)

Allows the selection of VT/PT test type.

- Navigate to the VT/PT Ratio Mode Test screen.

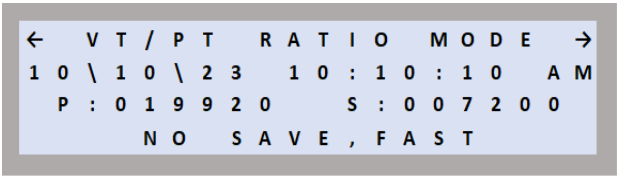


Figure 13

- Press 

to **Start** test. The TEST IN PROGRESS screen will display and a single audible tone (BEEP) will sound signaling a test is in progress.

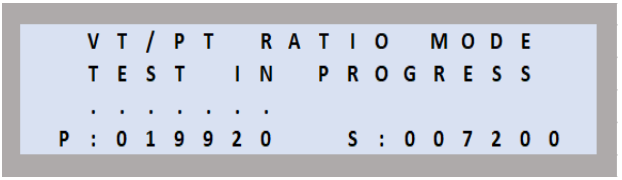


Figure 14

- Press 

again to **Cancel** test. The TEST CANCELED screen will display and a double audible tone (BEEP) will sound signaling test canceled.

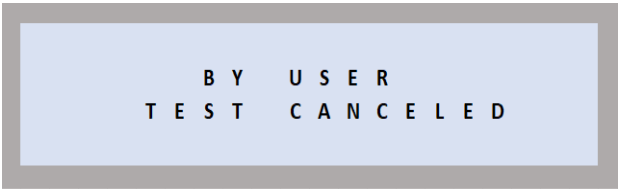


Figure 15

- Press  exit screen and return to Top Level Menu.

<OR IF TEST COMPLETES>

- The TEST RESULT screen will display. In this example Storage Mode **NO SAVE** was selected.

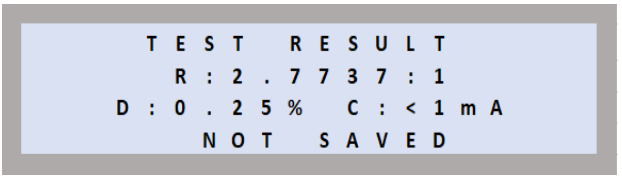


Figure 16

■ Press ↵ to return to Top Level Menu.

<OR IF AUTO SAVE IS SELECTED>

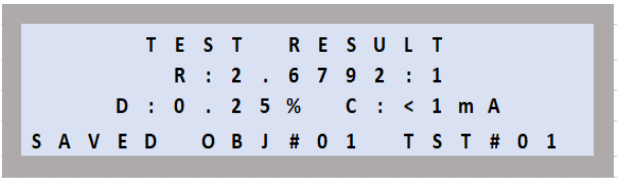


Figure 17

<OR IF MANUAL MODE IS SELECTED>

■ The MANUAL MODE OPTION SAVE TEST? screen will display.

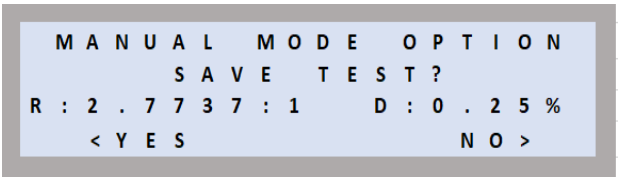


Figure 18

■ To select **NO**: Press ▶ to return to Top Level Menu.

■ To select **YES:** Press ◀ to continue with Saving Data. If memory is available, the SELECT MEMORY screen will display AVAILABLE showing an available memory location.

Figure 19

■ Press ↵ to complete Saving Data operation OR change memory OBJ and TST locations.

■ The cursor will blink under the OBJ digit. To change the suggested memory location use ◀ or ▶ to select digit and ▲ or ▼ to edit digit.

■ Next use ▶ to navigate to TST digit. Use ◀ or ▶ to select digit and ▲ or ▼ to edit digit.

NOTE: If the storage memory OBJ# and TST# combination has already been used, NOT AVAILABLE will display**.**

■ When ready, press  to complete Saving Data operation.

NOTE: Expect short delay as data is being saved to EEPROM (electrically erasable programmable read-only memory).

■ The SAVED screen will display.

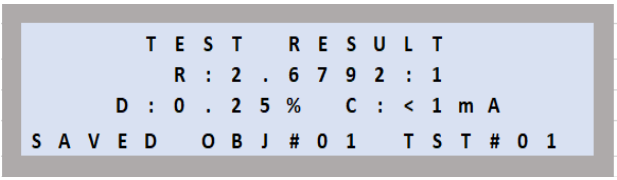


Figure 20

■ Press  to return to Top Level Menu.

4.1.3.1.2 CT Ratio Mode

Allows the selection of CT Test Type.

■ Navigate to the CT Ratio Mode Test screen.

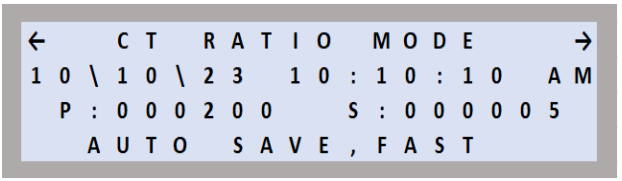


Figure 21

■ Press 

to **Start** test. The TEST IN PROGRESS screen will display and a single audible tone (BEEP) will sound signaling a test is in progress.

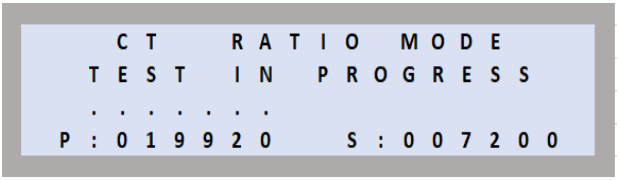


Figure 22

■ Press 

to **Cancel** test. The TEST CANCELED screen will display and a double audible tone (BEEP) will sound signaling the test has been canceled.

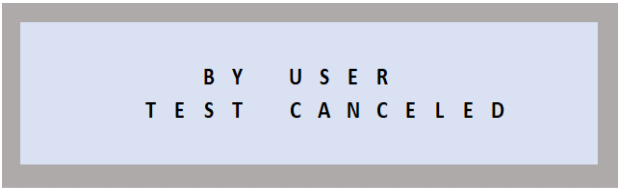


Figure 23

- Press ↵ to exit screen and return to Top Level Menu.

➤OR IF TEST COMPLETES➤

- The TEST RESULT screen will display. In this example Storage Mode **NO SAVE** was selected.

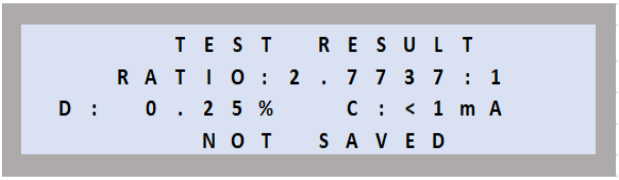


Figure 24

- Press ↵ to return to Top Level Menu.

➤OR IF AUTO SAVE IS SELECTED➤

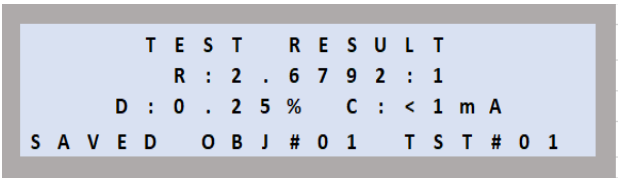


Figure 25

➤OR IF MANUAL SAVE IS SELECTED➤

- The MANUAL MODE OPTION SAVE TEST? screen will display.

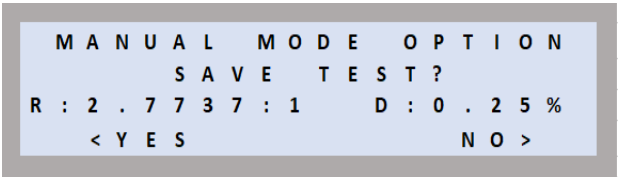


Figure 26

- To select **NO**: Press ▶ to return to Top Level Menu.
- To select **YES:** Press ◀ to continue with Saving Data. If memory is available, the SELECT MEMORY screen will display AVAILABLE showing an available memory location.

Figure 27

- Press ↵ to complete Saving Data operation OR change memory OBJ and TST locations.
- The cursor will blink under the OBJ digit. To change the suggested memory location use ◄ or ► to select digit and ▲ or ▼ to edit digit.
- Next use ► to navigate to TST digit. Use ◄ or ► to select digit and ▲ or ▼ to edit digit.

NOTE: If the storage memory OBJ# and TST# combination has already been used, NOT AVAILABLE will display**.**

- When ready, press ↵ to complete Saving Data operation.

NOTE: Expect short delay as data is being saved to EEPROM (electrically erasable programmable read-only memory).

- The SAVED screen will display.

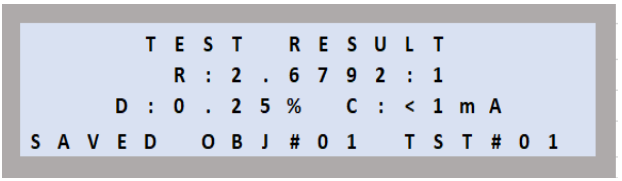


Figure 28

- **Press** ↵ to return to Top Level Menu.

4.1.3.1.3 Continuity Test

Allows the selection of Continuity Test Type.

- Navigate to the Continuity Test screen.

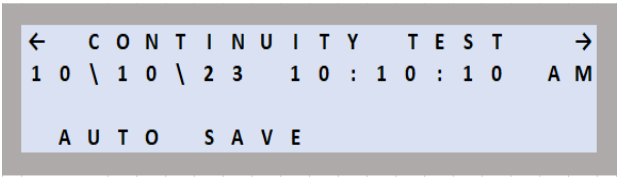


Figure 29

■ Press TEST to **Start**.

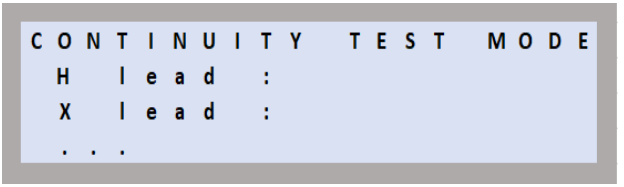


Figure 30

■ Press TEST again to **Cancel**.

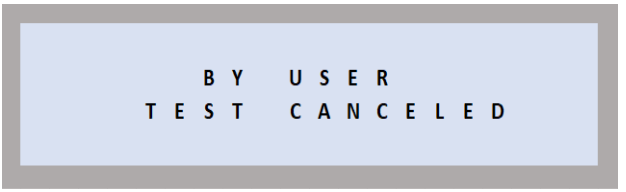


Figure 31

NOTE: A double audible tone (BEEP) will sound signaling that the test has been canceled**.**

■ Press ↵ to return to Top Level Menu.

<OR IF TEST COMPLETES>

■ The CONTINUITY RESULT screen will display. In this example Storage Mode **NO SAVE** was selected.

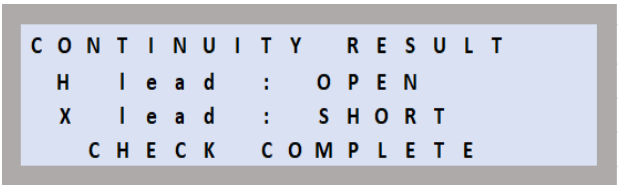


Figure 32

■ Press ↵ to return to Top Level Menu.

<OR if AUTO SAVE IS SELECTED>

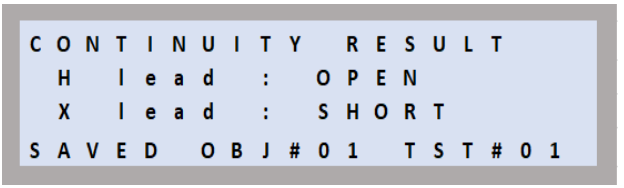


Figure 33

<OR if MANUAL SAVE IS SELECTED>

- The MANUAL MODE OPTION SAVE TEST? screen will display.

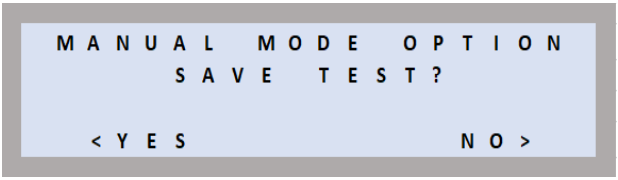


Figure 34

- To select **NO**: Press ▶ to display the Test Result screen then press ↵ to return to Top Level Menu (Test screen)**.**
- To select **YES:** Press ◀ to continue with Saving Data. If memory is available, the SELECT MEMORY screen will display AVAILABLE showing an available memory location.

Figure 35

- Press ↵ to complete Saving Data operation OR change memory OBJ and TST locations.

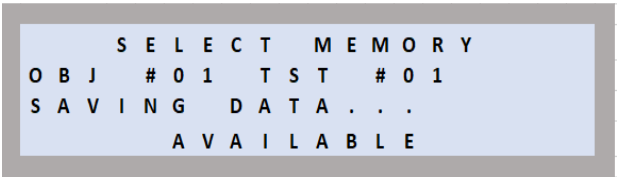


Figure 36

- The cursor will blink under the OBJ digit. To change the suggested memory location use ◀ or ▶ to select digit and ▲ or ▼ to edit digit.
- Next use ▶ to navigate to **TST** digit. Use ◀ or ▶ to select digit and ▲ or ▼ to edit digit.

NOTE: If the storage memory OBJ# and TST# combination has already been used, NOT AVAILABLE will display**.**

- When ready, press ↵ to complete Saving Data operation.

NOTE: Expect short delay as data is being saved to EEPROM (electrically erasable programmable read-only memory).

- The SAVED screen will display.

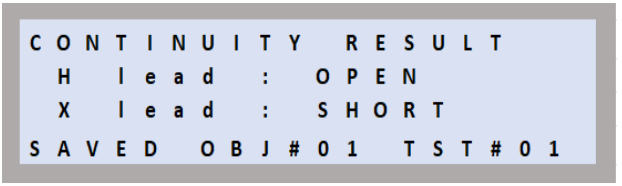


Figure 37

- Press TEST to run next test.
- Press ↵ to exit screen back to Top Level Menu.

4.1.3.2 Information Screen

Displays information about the instrument. Use ◄ and ► to cycle through information options.

- Instrument ID
- Battery Status
- Date and Time

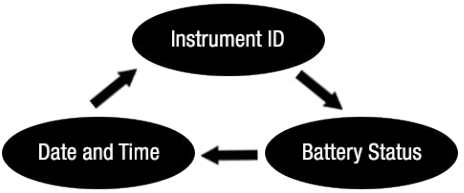


Figure 38

4.1.3.2.1 Instrument ID

Provides Model Name, Serial Number and Firmware Revision.

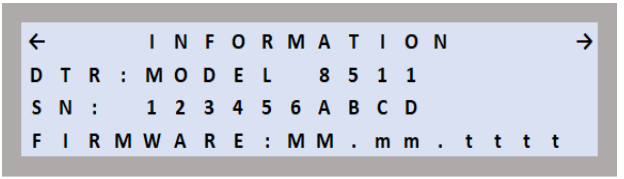


Figure 39

4.1.3.2.2 Battery Status - Normal Mode

Provides Battery percent charged (0 % to 100 %) and Charging status (YES or NO).

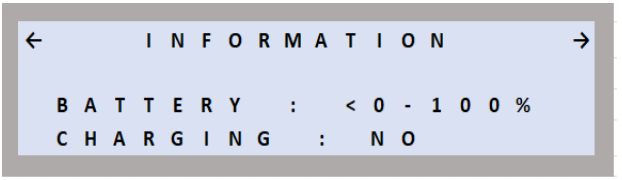


Figure 40

OR

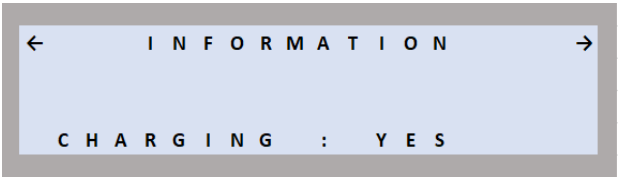


Figure 41

OR

4.1.3.2.3 Date/Time

Provides the Date-Format and Time-Format.

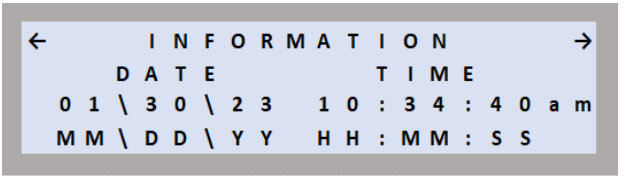


Figure 42

4.1.3.3 Configuration Screen

Allows to set various configuration parameters of the instrument. Use  and  to cycle through configuration parameter options.

- Select Language
- Set Clock
- Erase Memory
- Select Filter
- Select Storage Mode
- Result Delay Time
- Nameplate Setup

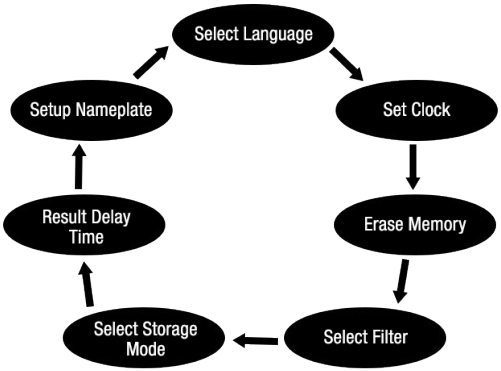


Figure 43

Configuration Parameter and Value Options		
Parameter	**Value Options**	
Select Language	English, Francais, Deutsh, Italiano, Espanol, Portugues	
Set Clock	Date Format Options: MM/DD/YY, DD/MM/YY, YY/MM/DD Time Format Options: 24 HOUR, 12 HOUR AM or PM: Displays only if Time Format is set to 12 HOUR. At SET DATE screen press  , use  or  to set date values and  to navigate between date fields. The date is always entered into YYYY/MM/DD format. Press  to accept. At SET TIME screen press  , use  or  to set values and use  to navigate between fields. Press  to accept. This returns you to the default SET DATE 06/15/23 screen which will not reflect the modified date. All other screens will reflect new date and new date format.	
Select Filter	Normal, Slow, Fast	
Select Storage Mode	Manual Save, Auto Save, No Save	
Result Delay Time	Press  to modify increment: (01, 02, 03, 04, 05, 06, 07, 08, 09, 10) min.	
Nameplate Setup	Enable (Yes or No) If Nameplate is enabled Deviation is available and will display as a D with a % value. If Nameplate is not enabled, Deviation is not available and will display as N/A.	
Nameplate Values	#1: 19920:7200 #2: 19920:4800 #3: 19920:2400 #4: 19920:2160 #5: 19920:120 #6: 7200:2400	#7: 7200:2160 #8: 7200:120 #9: 2400:120 #10: 2160:120 Custom - Allows to create custom nameplates

Table 10

4.1.3.3.1 Select Language

Language options are:

- English (Default)
- Francais
- Deutsh
- Italiano
- Espanol
- Portugues

■ Use , , or to navigate to the Configuration Language top screen.

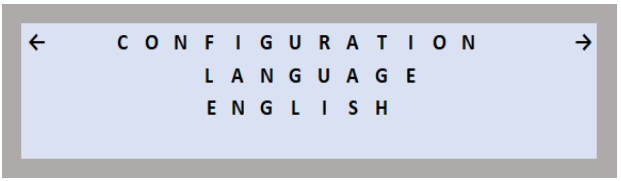


Figure 44

■ Continuously press to cycle through other language options. Stopping on desired language will select that language. The instrument will immediately change over to selected language.

NOTE: Use or to navigate to next or previous configuration parameter or use return (ESC) command ( ) to return to Top Level Menu.

4.1.3.3.2 Set Clock

Allows user to first select date and time formats, then proceed to set the date and time. Date/Time cannot be set when a test is active.

■ Use , , or to navigate to the Configuration Set Clock screen.

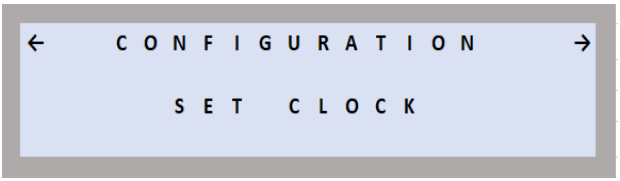


Figure 45

- Continuously press  to cycle through the three Date Format options. Stopping on desired date format will select that format.

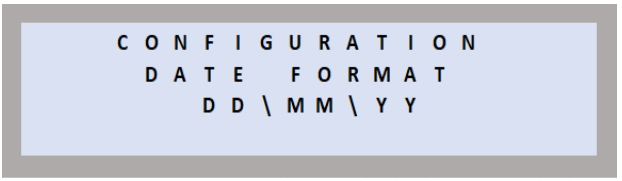


Figure 46

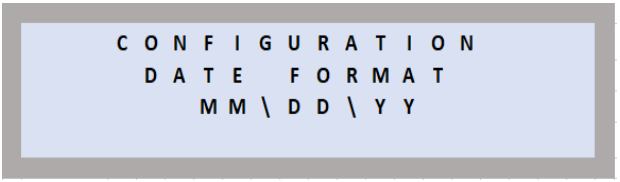


Figure 47

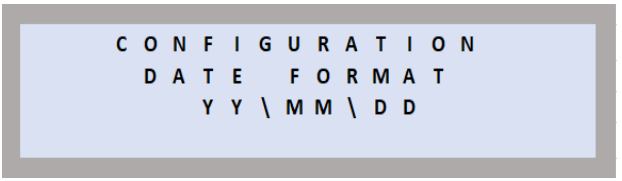


Figure 48

- Press  to navigate to the Configuration Time Format screen.
- Continuously press  to toggle between 24 HOUR and 12 HOUR options. Stopping on desired time format will select that format. Otherwise, Time Format will default to 12 HOUR.

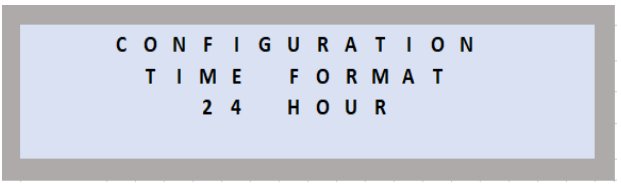


Figure 49

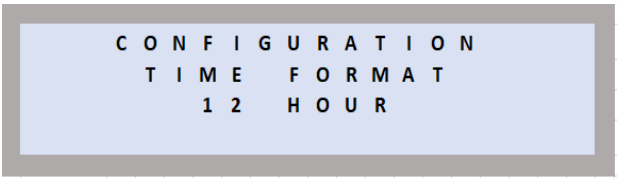


Figure 50

- When ready, press ▼ to navigate to the Configuration Set Date default screen.

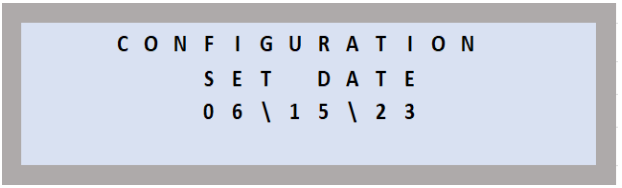


Figure 51

- Press ↵ to activate the Set Date entry screen. Regardless of which date format you previously selected, the date on this screen is entered into YYYY/MM/DD format.

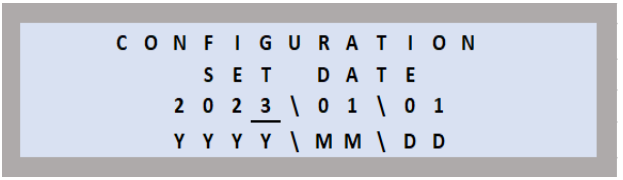


Figure 52

- Use ◄ and ► to move between the year, month and day fields. The cursor will blink beneath the selected digit. Use ▲ and ▼ to edit the digit.
- When ready press ↵ to accept date settings.
- The program accepts the date settings and returns you to the Configuration Set Date (**06/15/23**) default screen. The date on this screen (see Figure 51) is always 06/15/23. The newly set date will not show on this screen, but will be reflected on all other dated screens, such as the Title screen and Test screens.
- When ready, press ▼ to navigate to the Configuration Set Time screen.

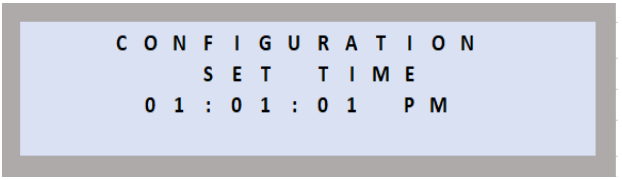


Figure 53

- Press  to activate the Time entry screen. The time is entered into HH:MM:SS format.

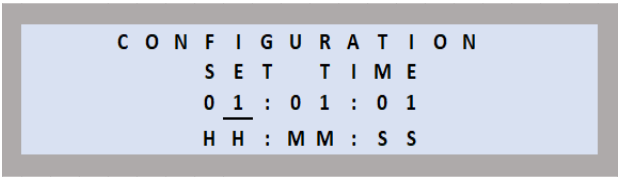


Figure 54

- Use  and  to move between the hour, minutes and seconds fields. The cursor will blink beneath the selected digit. Use  and  to edit the digit.
- When ready, press  to accept time settings.
- The program accepts the time settings and returns you to the Configuration Set Time screen. The newly set time will be reflected on this screen.

NOTE: Use  or  to navigate to next or previous configuration parameter or use return (ESC) command () to return to Top Level Menu.

4.1.3.3.3 Erase Memory

Allows deletion of all the stored measurement records.

- Use  ,  ,  or  to navigate to the Configuration Erase Memory top screen.

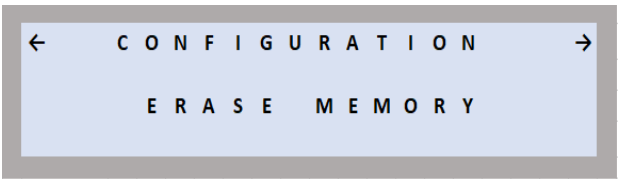


Figure 55

- Press  to navigate to the Erase Memory Continue? screen.

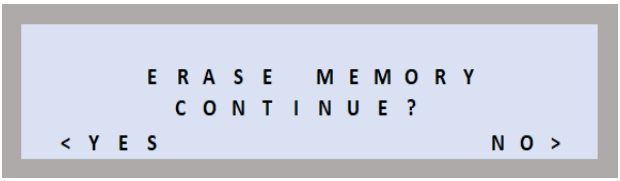


Figure 56

- To select **YES:** Press and the ERASING MEMORY PLEASE WAIT screen will display to confirm memory is being erased.

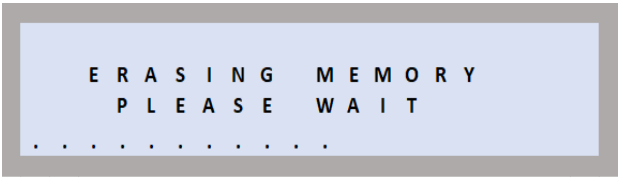


Figure 57

- To select **NO:** Press to return to the Configuration Erase Memory top screen.

NOTE: When the Erase Memory operation completes, the program automatically returns to the Erase Memory Top Level Menu (Figure 55).

NOTE: Use or to navigate to next or previous configuration parameter or use return (ESC) command ( ) to return to Top Level Menu.

4.1.3.3.4 Select Filter

The selectable filter speed on the DTR® 8511 (SLOW, NORMAL and FAST) affects the number of samples acquired during a measurement cycle, but only results in a modest change in total reading time.

The **SLOW** filter collects the highest number of samples, followed by the **NORMAL** filter and then the **FAST** filter, which collects the smallest number of samples.

Despite this variation, the actual measurement time between modes is minimal:

The **SLOW** filter typically completes a reading just (1 to 2) seconds faster than the **NORMAL**.

The **NORMAL** filter typically completes a reading just (1 to 2) seconds faster than the **FAST** filter.

This modest time increase is due to the higher sample count required by slower filters, which extends the acquisition period before the instrument reaches its stability threshold and finalizes the reading.

- Use , , or to navigate to the Configuration Filter top screen.

■ Continuously press  to cycle through the Filter screens. Stopping on desired Filter screen will select that filter.

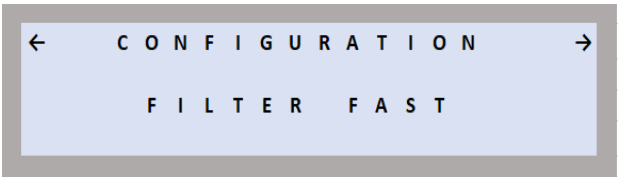


Figure 58

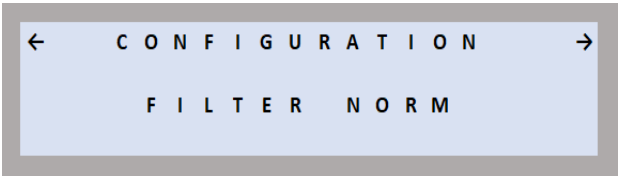


Figure 59

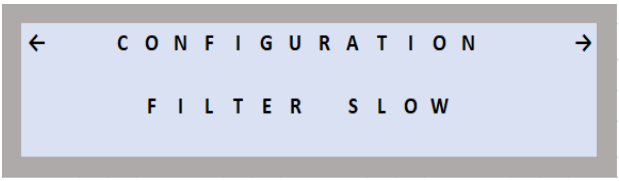


Figure 60

NOTE: Use  or  to navigate to next or previous configuration parameter or use return (ESC) command () to return to Top Level Menu.

4.1.3.3.5 Select Storage Mode:

Allows the selection of the data storage mode. The factory default is Manual Save. There are three options for the storage of tests defined below.

1. **MANUAL:** The user is given the choice to save the results. Defaults to next available location and is user selectable.
2. **AUTO SAVE:** Stores the test results in the next available memory location.
3. **NO SAVE:** Does not store the results.

■ Use  ,  or  to navigate to the Configuration Storage Mode top screen.

■ Continuously press  to cycle through the three Storage Mode screens. Stopping on desired Storage Mode screen will select that mode.

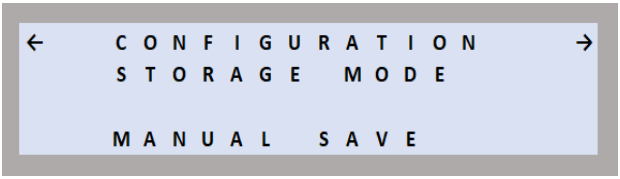


Figure 61

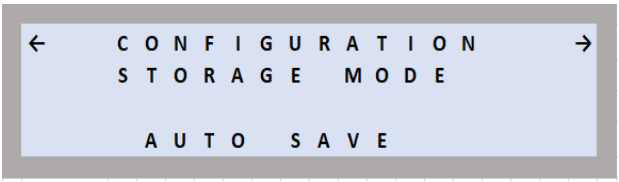


Figure 62

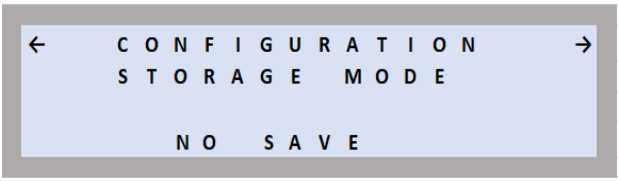


Figure 63

NOTE: Use  or  to navigate to next or previous configuration parameter or use return (ESC) command () to return to Top Level Menu.

4.1.3.3.6 Result Delay Time

Allows you to set the amount of time in minutes that a displayed result is shown before returning to the Top Level Menu. Display time is adjustable between (1 to 10) min.

■ Use  ,  or  to navigate to the Configuration Result Delay top screen.

- Continuously press  to cycle through increments (1, 2, 3, 4, 5, 6, 7, 8, 9 and 10) min. Stopping on desired result delay time increment selects that increment.

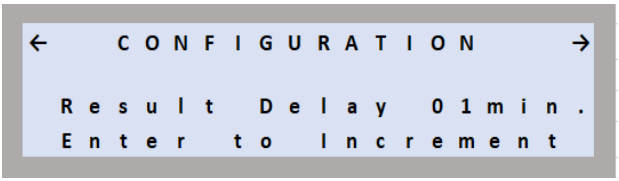


Figure 64

NOTE: Use  or to navigate to next or previous configuration parameter or use return (ESC) command () to return to Top Level Menu.

4.1.3.3.7 Setup Nameplate

Allows selection and editing of present Nameplate voltages or ratios. Predefined ratios can only be edited through DataView®. Factory default is Disable. Nameplate must be enabled for Deviation to be available.

NOTE: If Nameplate is not enabled then the Primary (P) and Secondary (S) values will not be displayed.

- Use  , ,  or  to navigate to the Configuration Nameplate Setup screen.

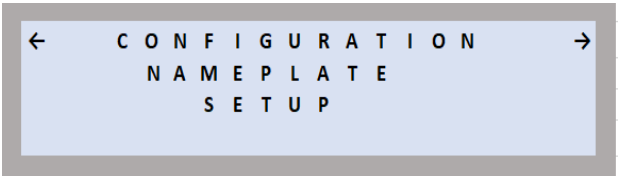


Figure 65

- Press  to navigate to Nameplate Enable screen.

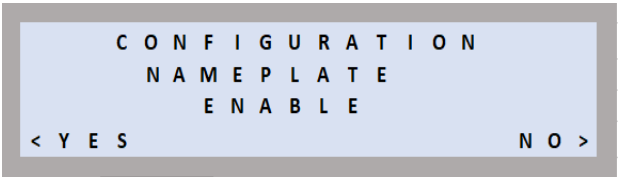


Figure 66

- To not enable Nameplate (**NO):** Press  to return to the Configuration Nameplate Setup screen. Note that Deviation will not be available.

- To enable Nameplate (**YES):** Press  and the NAMEPLATE SELECT screen will display. This will allow you to choose between the List or Custom screens and Deviation will be available.

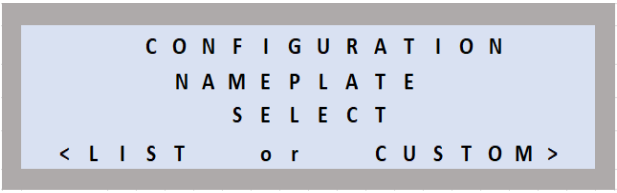


Figure 67

The List option will allow you to select from 10 set nameplate values plus one set custom option (see Figure 68).

- Press  to select the List option.
- Use  and  to cycle through set nameplates (1 through 10) plus one set custom nameplate.
- Stop on desired nameplate option and press  to accept and return to the Configuration Nameplate Setup screen.

<LIST>

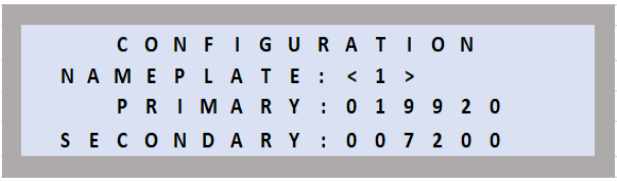


Figure 68

- The Custom option will allow you to set a custom ratio. From the Nameplate Select screen (see Figure 69) press  to select the **Custom** option.
- **Setting Primary and Secondary custom ratio values:** The cursor will blink beneath the first Primary digit (see Figure 69). Use  and  to edit digit. Then use  or  to cycle through fields and set values for remaining Primary and Secondary digit fields.

<CUSTOM>

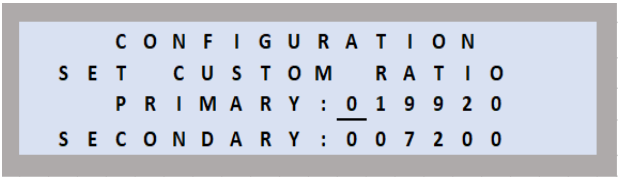


Figure 69

- When ready, press to accept settings and return to the Configuration Nameplate Setup screen (see Figure 65).

NOTE: Use or to navigate to next or previous configuration parameter or use return (ESC) command ( ) to return to Top Level Menu.

4.1.3.4 Memory Recall Screen

Allows stored data to be searched and displayed. Displays the amount, in percentage, of used memory slots. The actual used memory slot percentage would be shown where [0 - 100 %] is located in the below example (Figure 70).

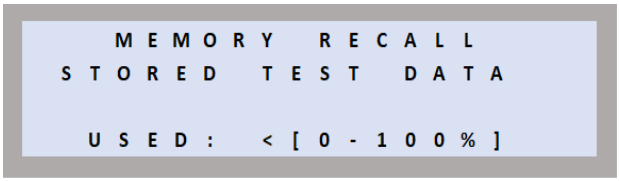


Figure 70

- Press to proceed to the Memory Recall OBJ#/TST# search screen.
- Use and to cycle through OBJ # and TST # fields. Stop on desired field and use and to set desired OBJ# and TST# values for search.
- If saved data is found for search parameters, DATA FOUND will display.

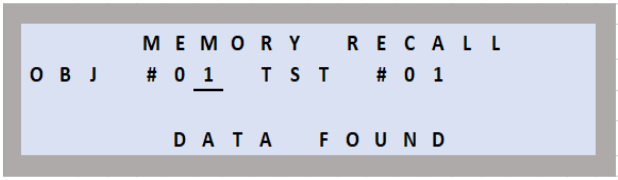


Figure 71

NOTE: If data is not available for the entered OBJ# and TST# search parameters, NO DATA FOUND will display.

■ If **DATA FOUND**, when ready press  to display available data.

■ Use  or  to scroll line by line through recalled data.

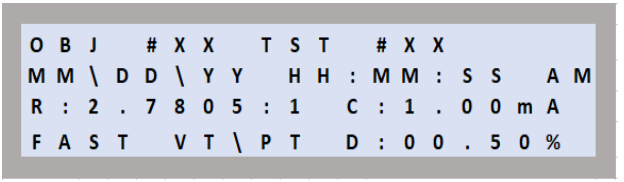


Figure 72

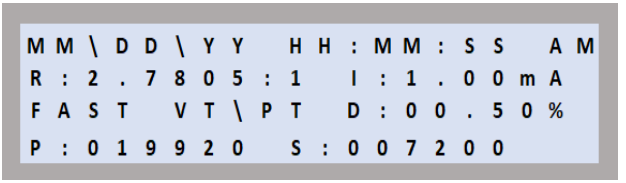


Figure 73

■ Press  to return to the Memory Recall OBJ#/TST# search screen.

NOTE: Use return (ESC) command () to return to Memory Recall top screen or use return (ESC) command () twice to return to Top Level Menu.

4.1.4 Menu System Flow Charts

To use the instrument efficiently, it is important to understand the program flow. The following charts (Figures 74-77) highlight the flow of the Test, Information, Configuration and Memory Recall top level, 2nd Level and 3rd Level Menu (options).

4.1.4.1 Test Screen

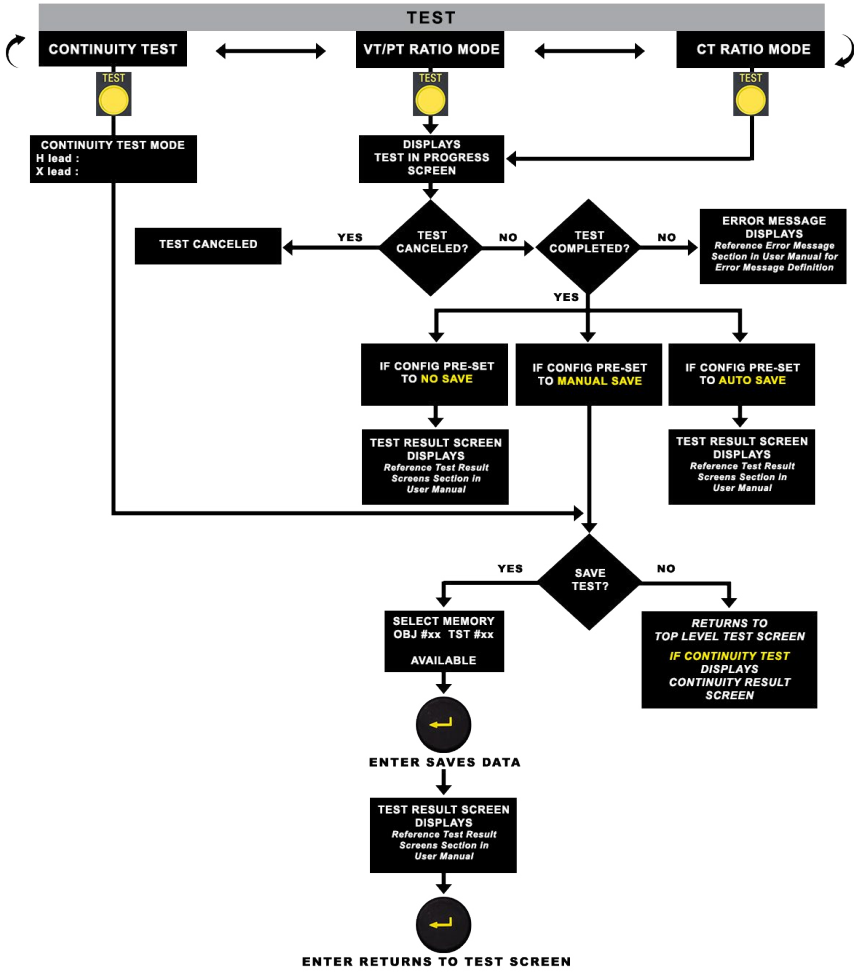


Figure 74

4.1.4.2 Information Screen

Figure 75

4.1.4.3 Configuration Screen

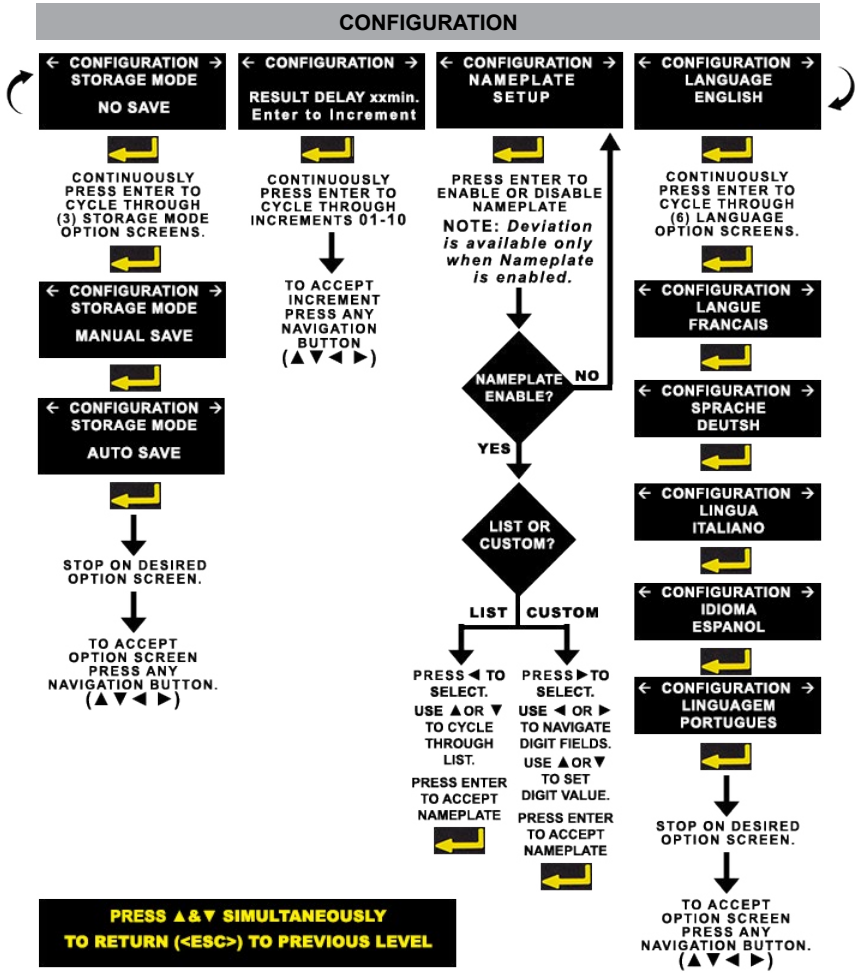


Figure 76-a

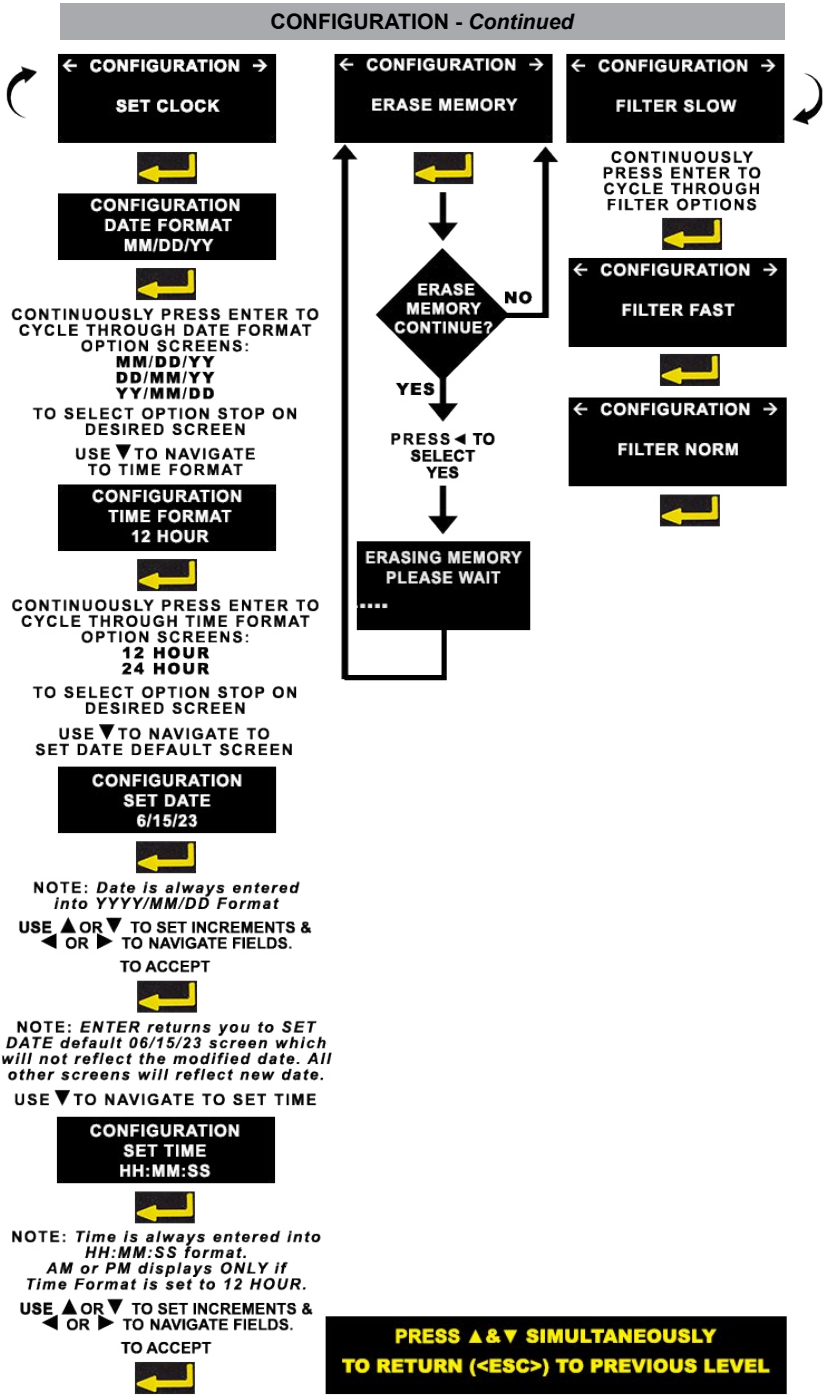

CONFIGURATION - Continued
← CONFIGURATION →
SET CLOCK
CONFIGURATION
DATE FORMAT
MM/DD/YY
CONTINUOUSLY PRESS ENTER TO CYCLE THROUGH DATE FORMAT OPTION SCREENS:
MM/DD/YY
DD/MM/YY
YY/MM/DD
TO SELECT OPTION STOP ON DESIRED SCREEN
USE ▼ TO NAVIGATE TO TIME FORMAT
CONFIGURATION
TIME FORMAT
12 HOUR
CONTINUOUSLY PRESS ENTER TO CYCLE THROUGH TIME FORMAT OPTION SCREENS:
12 HOUR
24 HOUR
TO SELECT OPTION STOP ON DESIRED SCREEN
USE ▼ TO NAVIGATE TO SET DATE DEFAULT SCREEN
CONFIGURATION
SET DATE
6/15/23
NOTE: Date is always entered into YYYY/MM/DD Format
USE ▲ OR ▼ TO SET INCREMENTS & ◄ OR ► TO NAVIGATE FIELDS.
TO ACCEPT
NOTE: ENTER returns you to SET DATE default 06/15/23 screen which will not reflect the modified date. All other screens will reflect new date.
USE ▼ TO NAVIGATE TO SET TIME
CONFIGURATION
SET TIME
HH:MM:SS
NOTE: Time is always entered into HH:MM:SS format.
AM or PM displays ONLY if Time Format is set to 12 HOUR.
USE ▲ OR ▼ TO SET INCREMENTS & ◄ OR ► TO NAVIGATE FIELDS.
TO ACCEPT
← CONFIGURATION →
ERASE MEMORY
ERASE MEMORY CONTINUE?
NO
YES
PRESS ◄ TO SELECT YES
ERASING MEMORY
PLEASE WAIT
....
← CONFIGURATION →
FILTER SLOW
CONTINUOUSLY PRESS ENTER TO CYCLE THROUGH FILTER OPTIONS
← CONFIGURATION →
FILTER FAST
← CONFIGURATION →
FILTER NORM
PRESS ▲&▼ SIMULTANEOUSLY
TO RETURN (<ESC>) TO PREVIOUS LEVEL

Figure 76-b

4.1.4.4 Memory Recall Screen

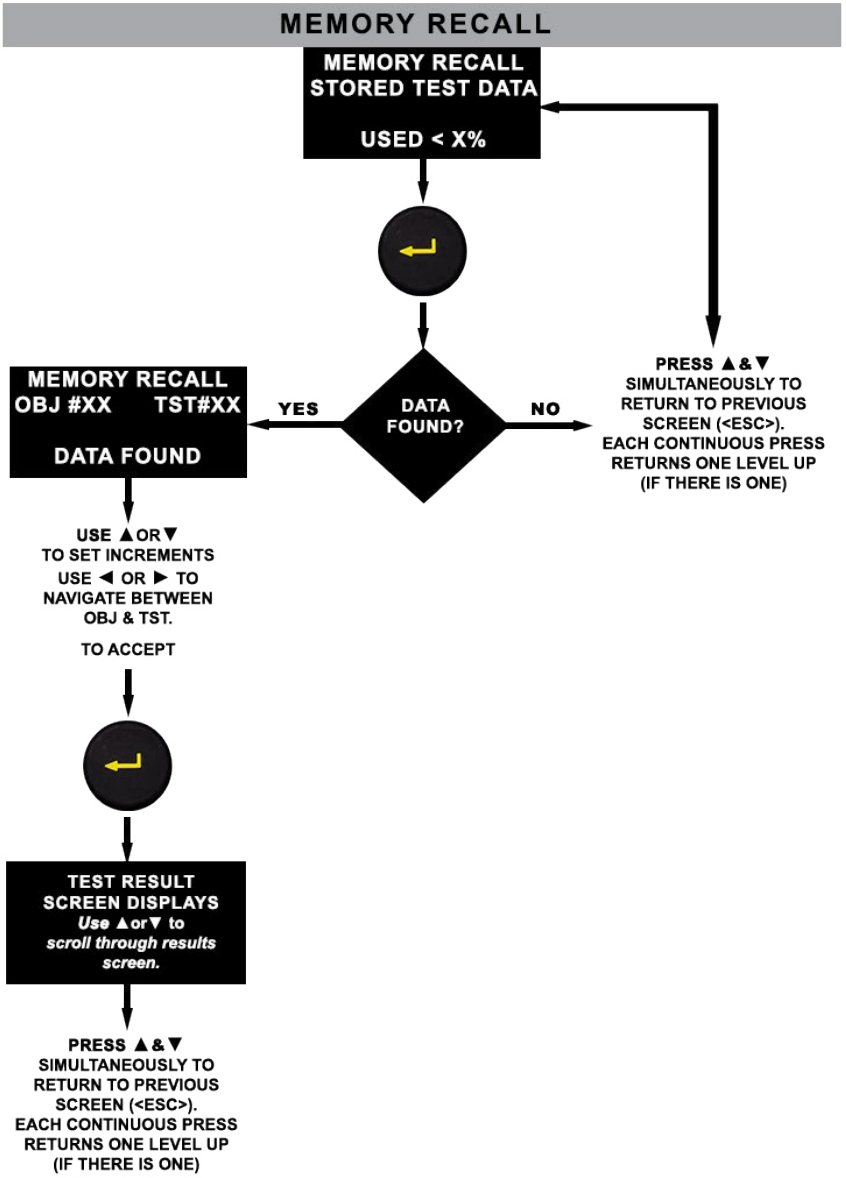


Figure 77

4.2 TEST RESULT SCREENS

The display of test results can vary depending on the test type and the save mode. Ratio results can be saved.

NOTE: Press Enter ↵ to exit a Test Result screen.

NOTE: If Nameplate is not enabled, Deviation (D) will show N/A in place of a percent value.

No Save Mode

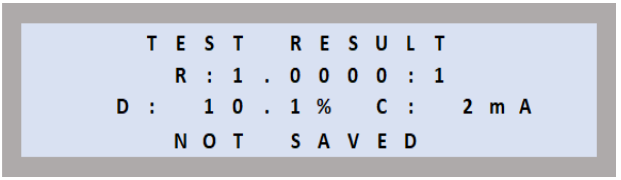


Figure 78

No Save Mode - No Deviation (Nameplate Disabled)

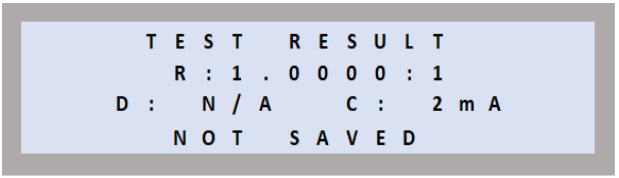


Figure 79

Auto Save Mode

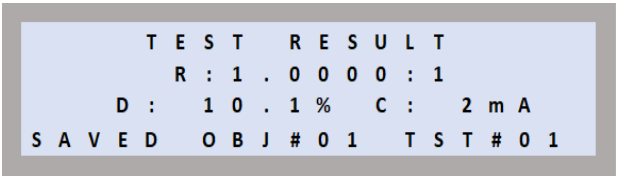


Figure 80

Auto Save Mode - No Deviation (Nameplate Disabled)

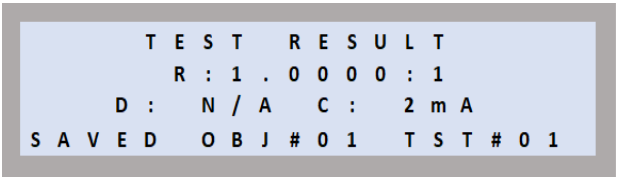


Figure 81

Manual Save Mode

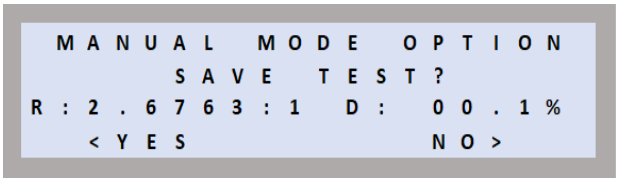


Figure 82

Manual Save Mode - No Deviation (Nameplate Disabled)

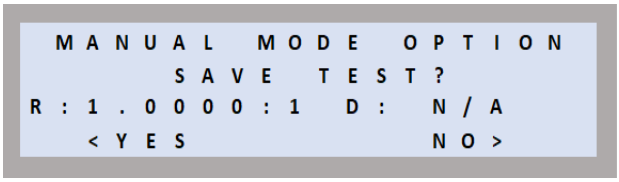
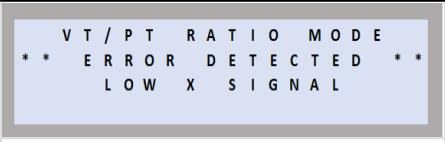
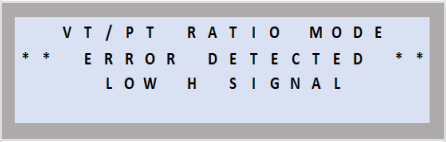
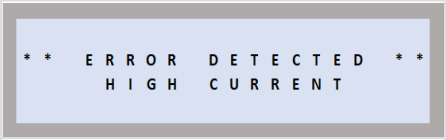
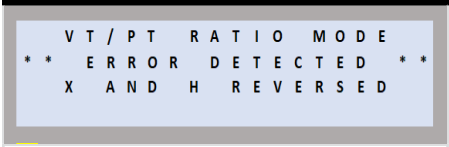
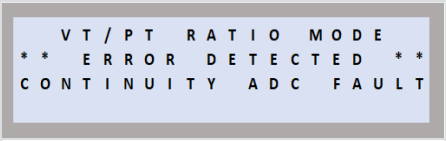
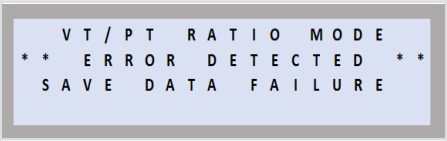
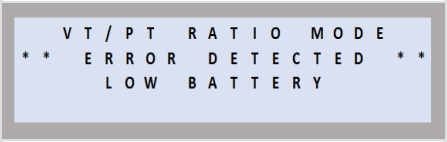
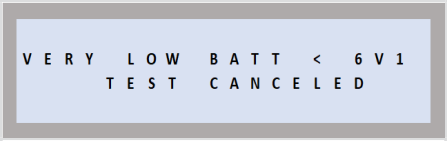
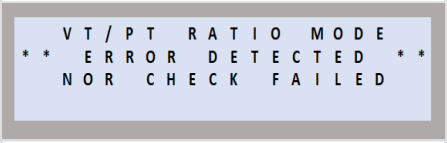
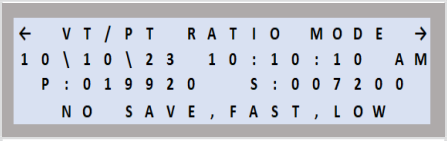


Figure 83

4.3 ERROR MESSAGES

NOTE: Press Enter to exit an Error Message screen.

Error Screen Message	Reason for Error	Resolution
 *Figure 84*	**LOW X SIGNAL** Typically due to X leads issue. Displays if the X lead is open. Displays if measured ratio is 20 % over max limits.	Verify that cables are not damaged or incorrectly connected to transformer.
 *Figure 85*	**LOW H SIGNAL** Displays if H voltage is lower than expected limit. Can also indicate that the X and H leads are reversed at transformer.	Verify that cables are not damaged or incorrectly connected to transformer.
 *Figure 86*	**HIGH CURRENT** Displays if current is too high during test measuring transformer.	Verify that cables are not damaged or incorrectly connected to transformer.

Error Screen Message	Reason for Error	Resolution
 ***Figure 87***	**X AND H REVERSED** Displays if the X and H leads are connected reversed at transformer. Can also indicate H voltage is lower than expected limit.	Verify that cables are not damaged or incorrectly connected to transformer.
 ***Figure 88***	**CONTINUITY ADC FAULT** Displays if ADC failed to complete conversion.	HW failure return instrument for repair. See § 8.4 Repair & Calibration for return instructions.
 ***Figure 89***	**SAVE DATA FAILURE** Displays if unable to save test data due to an EEPROM issue.	HW failure return instrument for repair. See § 8.4 Repair & Calibration for return instructions.
 ***Figure 90***	**LOW BATTERY** Displays if battery is too low to run test. Under this condition the test will not run.	Charge the batteries. See § 8.2.2 Battery Charging Options.
 ***Figure 91***	**VERY LOW BATT < 6V1 TEST CANCELED** Displays if there is an over current situation or if batteries are too low to execute test. This condition may be due to improper cabling or test setup.	Charge the batteries. See § 8.2.2 Battery Charging Options.
 ***Figure 92***	**NOR CHECK FAILED** Indicates that EEPROM is faulty or incompatible.	HW failure return instrument for repair. See § 8.4 Repair & Calibration for return instructions.
 ***Figure 93***	**NO SAVE, FAST, LOW** LOW = Low Battery WARNING.	Charge the batteries. See § 8.2.2 Battery Charging Options.

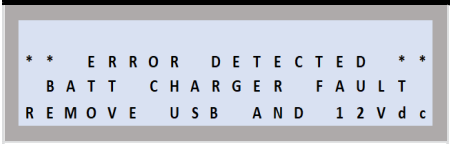
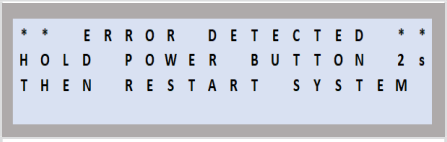
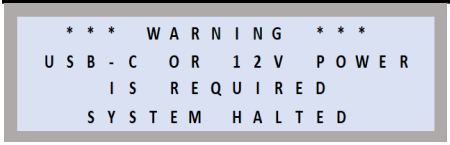
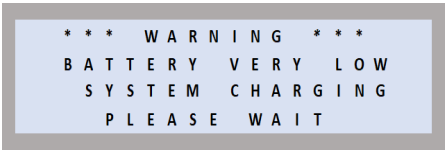
Error Screen Message	Reason for Error	Resolution
 ***Figure 94***	**BATT CHARGER FAULT** Displays if battery charger detected a fault. **REMOVE USB AND 12 Vdc** Displays if battery charger detected a fault.	Restart if error persist. Check that batteries are inserted correctly. If batteries are inserted correctly, batteries should be replaced. See § 8.4 Repair & Calibration for return instructions.
 ***Figure 95***	**RESTART SYSTEM** Displays in rare case of a battery charging failure.	**Restart charger hardware:** Remove all external power. Then hold down power button for >2 s. After instrument enters sleep-mode, wake-up with power button press of >2 s. If this is not successful contact AEMC® Instruments Technical Support (see § 8.5).

Table 11

4.4 BATTERY WARNING MESSAGES

Warning Screen Message	Reason for Warning	Resolution
 *Figure 96*	Warning will display if battery voltage has dropped below 6.0 V and user attempted to turn instrument ON without first connecting external power. **NOTE:** An instrument powered off for an extended period of time could be subject to a voltage drop.	User must connect external power via either the USB-C cable or 12 V_{DC} AC power adapter. Instrument will then proceed to **System Charging** warning screen (Figure 97).
 *Figure 97* **NOTE:** **. . .WARNING. . .** will flash if frequency is at a rate of 1 Hz.	This warning screen will display when external power is present and instrument wakes. At this point the instrument halts normal operation and tries to recover the batteries by applying a trickle charge.	User should WAIT and allow system to charge. When the battery voltage returns to a level that allows for normal charging operations, the instrument then returns to normal charging operational mode.

If Instrument <u>does not</u> return to normal charging mode within 5 minutes:
The batteries require replacement. External power **<u>must</u>** now be removed and the instrument shut down.

If Instrument <u>does</u> return to normal charging mode within 5 minutes:
Instrument will return to Top Level VT/PT Test screen.
It is strongly recommended that the power remains present for the full charge cycle to complete before being unplugged. The charge indicater (power button backlight) turns off indicating the charge cycle has completed. This could take up to 10 hours.

Table 12

4.5 BATTERY ERRORS MESSAGES

BATTERY ERRORS		
Error Condition	**Error Screen Message**	**Reason for Error**
Battery Charger Fault	BATT CHARGER FAULT	Battery charger detected an issue
Battery Fault	LOW BATTERY FAULT NEEDS REPLACEMENT or PLUG IN CHARGER REMOVE USB and 12 VDC	Batteries are low and not charging If charger is already plugged in If charger is not plugged in Battery charger detected a fault. May indicate the orientation of battery insertion is incorrect.

Table 13

Battery Fault message may come up when batteries are below 6.0 V. You will need to plug in either the 12 VDC AC power adapter or USB-C power to get the instrument to turn on.

If the NEEDS REPLACEMENT message shown below is displayed and the instrument is unresponsive:

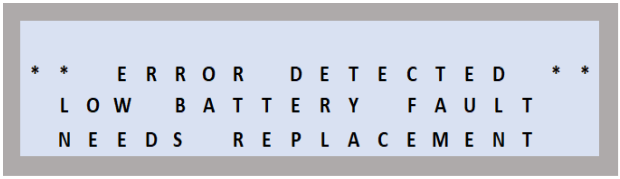


Figure 98

1. Please wait 5 minutes while the instrument tries to charge the batteries.
2. After the 5 minute waiting period, unplug power supplies.
3. Turn instrument OFF (hold power button down for >2 s).
4. Turn instrument ON (hold power button down for >2 s).
5. If instrument turns on, continue with step 6, if instrument does not turn on batteries need to be replaced. Contact AEMC® Instruments Technical Support. See § 8.5 for contact information.
6. Plug in 12 VDC AC power adapter or USB-C power source.
7. Let batteries continue the full charge cycle of 10 h.

NOTE: In order for the instrument to accurately track and display the battery charge status, the NiMH batteries used by this instrument must complete the 10 h battery charge cycle.

5. OPERATION

5.1 DATA MEASUREMENT

5.1.1 Voltage (VT/PT)

- Test voltage is fixed at 30 V @ 64 Hz.

5.1.2 Current (CT)

- Test voltage is fixed at 5 V @ 64 Hz.
- Test current is supplied up to 2 A @ 64 Hz.

5.1.3 Continuity

- Test voltage is 1.2 V_{DC}

The Continuity Test function of the DTR® 8511 serves as a useful means of identifying whether the windings of a transformer, Primary (H) or Secondary (X), are open-circuit or closed-circuit.

First, the instrument checks for Primary (H) connections. Even if it is found OPEN, the test continues to check the Secondary (X) connections. If the Primary winding (H) or Secondary winding (X) or both were found to be OPEN, the instrument will display the appropriate message. Pressing the TEST button again will start a new Continuity test.

Transformers with winding arrangement multiple, parallel paths (e.g., Delta type) may get a continuity reading of SHORT even if one of those windings passes the continuity test.

- Continuity checks for the continuity in the cables and transformer winding. It does not check for X and H reversed polarity.
- If the continuity for the Primary connections is within specified limits, the display shows SHORT (equivalent to a Closed Switch).
- If the continuity for the Primary connections is outside the specified limits, the display reads OPEN (equivalent to an Open Switch).

5.2 MEASURING DATA

5.2.1 Measured Quantities

- Ratio
- Excitation current
- Date/Time of test

5.2.2 Calculated Quantities

Ratio Deviation (displayed if Nameplate is enabled) compares selected nameplate expected ratio values to measured ratio value to determine the percentage of deviation from the expected ratio.

5.2.3 Stored Quantities

At the end of each test the measurement results can be stored. The stored measurement data is:

- Ratio or Continuity

- Excitation current
- Test type
- Date/Time stamp
- Deviation, if Nameplate is enabled
  - Selected Nameplate values
- Continuity results, if selected
  - Primary winding
  - Secondary winding

5.2.4 Units and Digits

The following table defines displayed resolution as specified by the defined ranges. The purpose of this table is for **display**, not for measurement.

	AVAILABLE RANGES (FOR DISPLAYING)			
	Label	**Ratio Range**	**Units**	**Resolution**
***Ratio**	**R**	0.8000 to 9.9999	Measurement to 1	0.0001
		10.000 to 99.999	Measurement to 1	0.001
		100.00 to 999.99	Measurement to 1	0.01
		1000.0 to 8000.0	Measurement to 1	0.1
Test Current	**C**	1 to 2000	mA	**1 mA
				***>2 A
Nameplate (P and S)	**P / S**	V(VT) or A(CT)	1 - 999999: 1 - 999999	1
Deviation	**D**	%	+/- 0.00 - 9.99	0.01
		%	+/- 10.0 - 99.9	00.1
		%	+/- 100 - 999	****001
Battery	**%**	0 to 100	%	1 %

Table 14

*Ratios greater than max+10 % and less than max+20 % will show a message Out of Range. Ratios greater than max+20 % will cause an error condition.

**Display shows <1 mA when below 1 mA

***Display shows >2 A when above 2000 mA

****Display shows > % when above 999 %

5.2.5 Recorded Data

The instrument stores the acquired data to an internal memory. The Control Panel software can be used to run tests, erase memory, configure tests, configure custom nameplate values, and download and print the recorded data.

5.2.6 Buzzer

A single audible tone (beep) will sound when the instrument is turned on, is at the start of a test, is at the end of a test and if an error occurs.

5.3 POWER UP INSTRUMENT

The instrument can only go into a deep sleep state to preserve the battery when the 12 VDC AC power adapter and USB cable are disconnected, and the instrument is running on batteries.

If the instrument is in OFF state (deep sleep state) you must press the power button to wake up the instrument.

NOTE: Plugging in the power sources, USB cable or 12 VDC AC power adapter, will **NOT** wake the unit. This conserves power while the instrument is in deep sleep state.

NOTE: If the batteries are depleted, the instrument will then need to be powered by the USB cable or 12 VDC AC power adapter.

NOTE: If the batteries are insufficiently charged and the instrument is not externally powered:

- When running on batteries only, and the batteries are low, the power button red LED will blink ON for 1 s and OFF for 1 s.
- The instrument cannot be used for testing under these circumstances.
- The batteries must be charged before use (see § 8.2 Charging the Batteries) or an external power source (USB or 12 VDC AC power adapter must be connected.

To turn the instrument OFF press and hold power button for >2 s.

WARNING: The DTR® 8511 is designed for use on de-energized (dead) transformers ONLY. Make sure the test sample is completely disconnected from AC power and is fully discharged.

5.4 RUNNING A TEST FROM THE INSTRUMENT

5.4.1 Canceling a Test

Note that a test can be canceled at any time by pressing the **TEST** button during the operation. The BY USER TEST CANCELED screen will display.

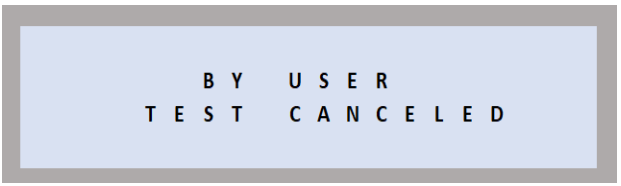


Figure 99

Press to exit a Test Canceled screen.

NOTE: The instrument must be on the VT/PT Test screen to start a VT/PT test.

5.4.2 VT/PT Test

WARNING: It is important to make sure the Primary (H) and Secondary (X) cables are connected properly BEFORE running the test. This is especially true for the high turn-ratio transformers since dangerous high voltage may appear on the DTR® 8511 terminals.

In this section, an example of running a VT/PT Ratio test using the following configuration is shown.

- Batteries fully charged
- No USB connection
- Set Date/Time: 10/10/23 10:10:10 AM
- Set/recall nameplate values: Primary Voltage:19920; Secondary Voltage: 7200

NOTE: Nameplate selection is optional and only needs to be enabled to display Deviation.

- Select Type: VT/PT
- Storage Mode: Manual
- Set Filter: Fast

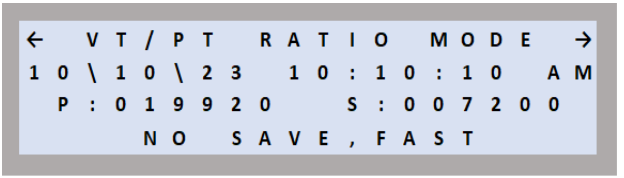


Figure 100

Typical Connection - Ratio 2.767:1

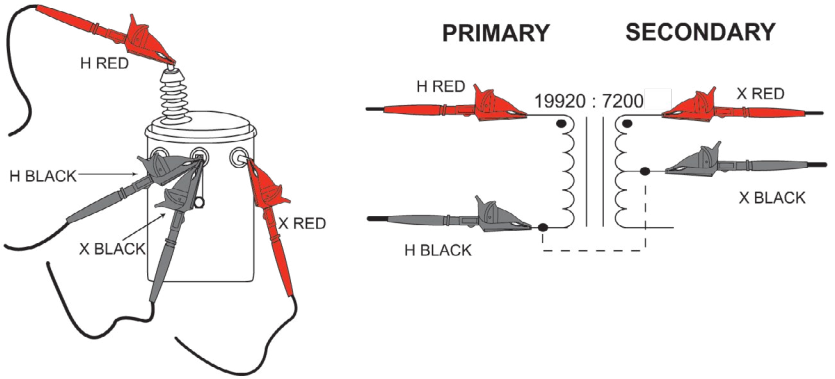


Figure 101

Alternate Connection - Ratio 1.383:1

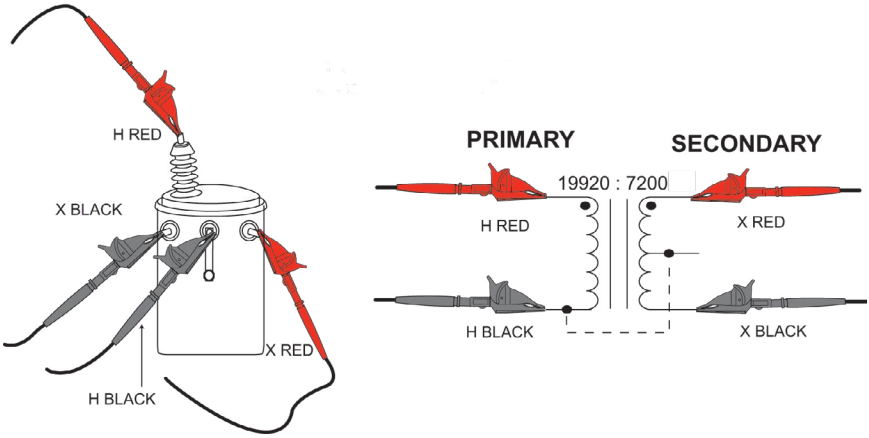


Figure 102

5.4.2.1 VT/PT Test and Saving Screens

1. Connect the Primary (H) and Secondary (X) cables to the appropriate connectors on the DTR® 8511 and the transformer under test (see Figures 99 & 100).
2. Press the **TEST** button. The VT/PT test will run the ratio test. The display will appear as shown below.

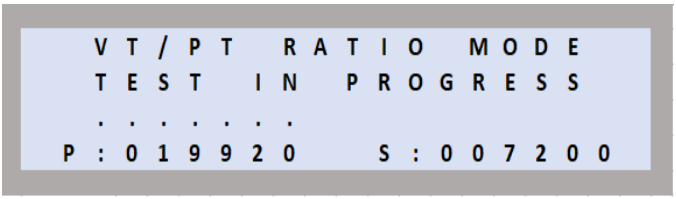


Figure 103

NOTE: During the Ratio test, the instrument will check if X and H are reversed, short (excessive current) before conducting ratio test.

3. In this example, if the test has successfully finished, the display will appear as shown below.

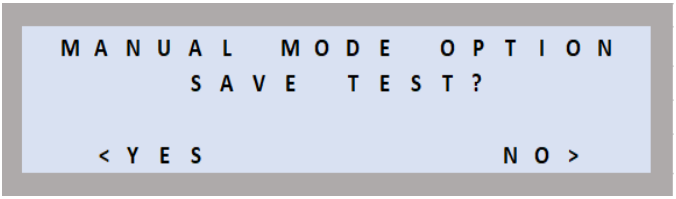


Figure 104

4. If the X and H are reversed, the instrument will display the below error message and terminate the test.

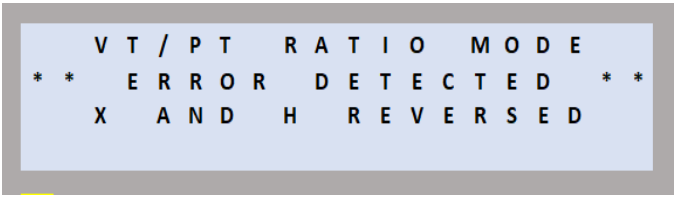


Figure 105

5. If the H lead is open, then the instrument will display the below error message and terminate the test.

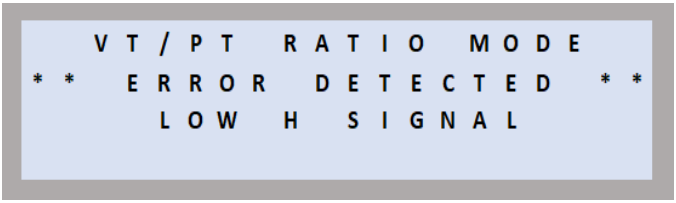


Figure 106

6. If the X lead is open, then the instrument will display the below error message and terminate the test.

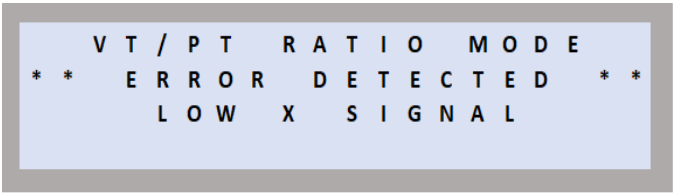


Figure 107

5.4.3 CT Test

5.4.3.1 CT Test and Saving Screens

In this section, an example of running a test with the instrument using the following configuration is shown:

- Batteries fully charged
- No USB connection
- Set Date/Time: 10/10/23 10:10:10 AM
- Set/recall nameplate values: Primary Voltage: 200; Secondary Voltage: 5
- Select Type: CT Test
- Storage Mode: Manual
- Set Filter: Fast

NOTE: Instrument must be on the CT Test screen to START a CT test.

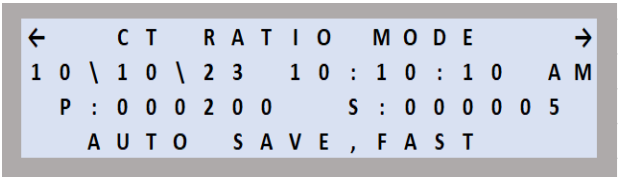


Figure 108

1. Connect the Primary (H) cable to the appropriate connectors on the DTR® 8511 and the transformer under test. Connect the Secondary (X) cable as a loop through the current transformer hole as shown below.

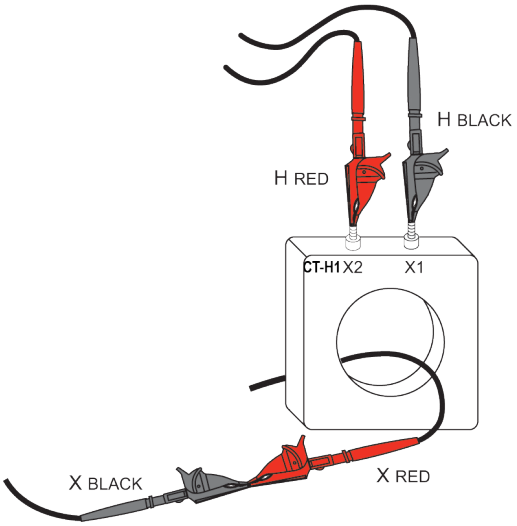


Figure 109

2. Press the **TEST** button. The display will appear as shown below.

   During the Ratio test, the instrument will check for X and H reversed polarity, short (excessive current) before conducting Ratio test.

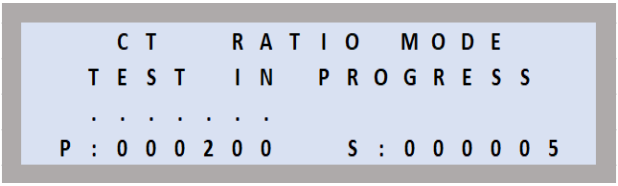


Figure 110

3. In this example, if the test has successfully finished, the display will appear as shown below.

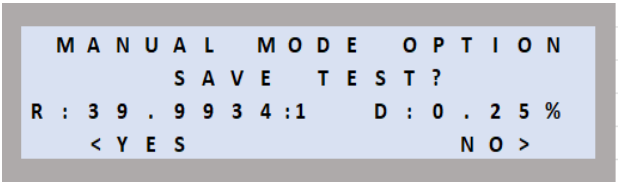


Figure 111

- The CT test ramps up the voltage in steps. At the end of the test, it ramps down the voltage.
- There are certain low mass, low ratio CT's for which the DTR® 8511 may not be able to provide correct ratio. The error message will be **HIGH EXCITATION CURRENT**.

As in VT/PT, the CT test may be run as many times as needed by pressing the **TEST** button.

Also as in VT/PT, the measurement records can be saved in Manual or Auto mode.

The instrument retains selection for CT test until the configuration is changed. Powering the instrument down and turning it back on will not change the Test Type.

5.4.4 Continuity Test

In this section, an example of running a Continuity test using the following configuration is shown.

- Batteries fully charged
- No USB connection
- Set Date/Time: 10/10/23 10:10:10 AM
- Select Type: Continuity Test
- Storage Mode: Manual

NOTE: Instrument must be on the Continuity Test screen to START a Continuity test.

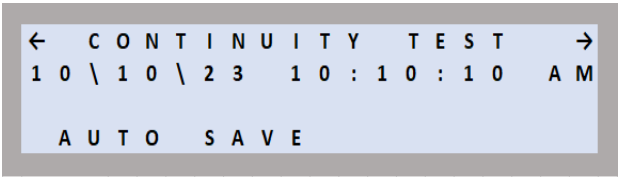


Figure 112

5.5 INSTRUMENT USER INTERFACE (UI)

The instrument indicates measured quantities and status using the 4-line alphanumeric display on the front panel of the instrument. This display, in conjunction with six control buttons, provides the features and functionality that enable the instrument to operate as a standalone device.

Optional control can be attained by using the included DataView® software which interfaces with the instrument through USB. This will allow remote operation with an enhanced interface for configuration, viewing of measurements and running tests remotely.

When the instrument is connected to a 12 V_{DC} AC power adapter or USB, the display is ON. Sleep mode will be enabled when operating on batteries if no button presses are detected within a user settable time of 5, 15 or 30 minutes and via the Control Panel software, the user can disable sleep mode.

The instrument can be operated from the 12 V_{DC} AC power adapter while batteries are charging.

NOTE: The running of tests is not allowed when connected to the PC and the 12 V_{DC} AC power adapter is not connected.

5.6 RUNNING TESTS FROM THE CONTROL PANEL

NOTE: Testing is disabled if only USB-C is connected. To run a test remotely while connected to USB the 12 V_{DC} AC power adapter must also be connected. Even when the batteries are fully charged.

5.6.1 Configuration Settings for Running VT/PT, CT and Continuity Tests

In this section are examples of running VT/PT, CT and Continuity tests from the Control Panel software using the configurations shown in the table below.

Test Type	Set Date/Time	Set Recall Nameplate Values	Select Type	Set Filter	Set Storage Mode
VT/PT	10/10/23 10:10:10 AM	Primary Voltage: 19920 Secondary Voltage: 7200	VT/PT	Fast	Auto Save
CT	10/10/23 10:10:10 AM	Primary Current: 200 Secondary Current: 5	CT	Fast	Auto Save
Continuity	10/10/23 10:10:10 AM	Primary Voltage: 19920 Secondary Voltage: 7200	Continuity	–	Auto Save
For Typical Connection: *VT/PT see Figure 101 & Figure 102, CT see Figure 109*					

Table 15

5.7 TIPS FOR MAKING PRECISE RATIO MEASUREMENTS

The DTR® Model 8511 is designed for step-down transformers. It sources low voltage on the primary. It starts with a fraction of the final source voltage and checks the secondary voltage.

If it exceeds the primary by a pre-determined value, the safety feature stops the measurement. The recommended procedure is to reverse the leads in these circumstances so that the primary of the transformer is connected to the H cables and the secondary of the transformer is connected to the X cables.

WARNING: It is important to check that the H cables are connected to the primary side and the X cables are connected to the secondary side of the transformer before the test begins.

Always verify the integrity of the cable connections and reposition the clips as necessary for robust and low-resistance connections. Inspect the transformer terminals for dielectric coatings, fungus, dirt or corrosion.

- Running a continuity test before the ratio test will provide a useful way to check windings and connections.
- When testing polyphase transformers, keep in mind that in some cases, the measured ratios must be multiplied or divided by √3. See § 6.2 Polyphase Connections for polyphase connection diagrams and associated ratio equations.

5.8 RATIO TEST - 1:1

A simple test can be conducted to test functionality of the DTR® 8511.

1. Connect the HRED to XRED cable and separately connect the HBLACK to XBLACK. This connection simulates a 1:1 transformer.
2. Run VT/PT test.

In this connection mode, the test results should yield a ratio nearly equal to 1.0000. If it does not, the DTR® 8511 may require repair or re-calibration.

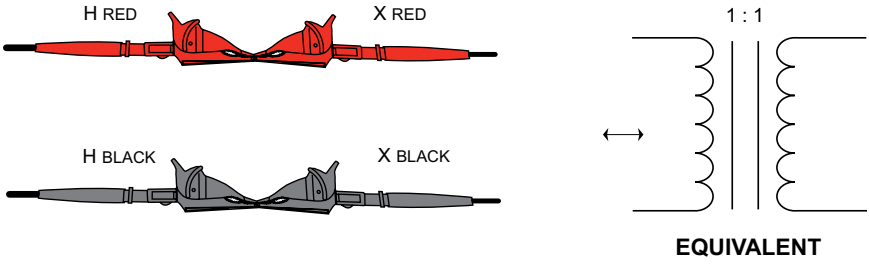


Figure 113

6. CONNECTIONS

6.1 CONNECTION DIAGRAMS

Make sure that the HRED lead is always connected such that it does not short to the XRED or XBLACK lead directly or through earth ground.

In the diagrams below, the top three are good connections but the bottom two should be avoided.

Measurements - OK

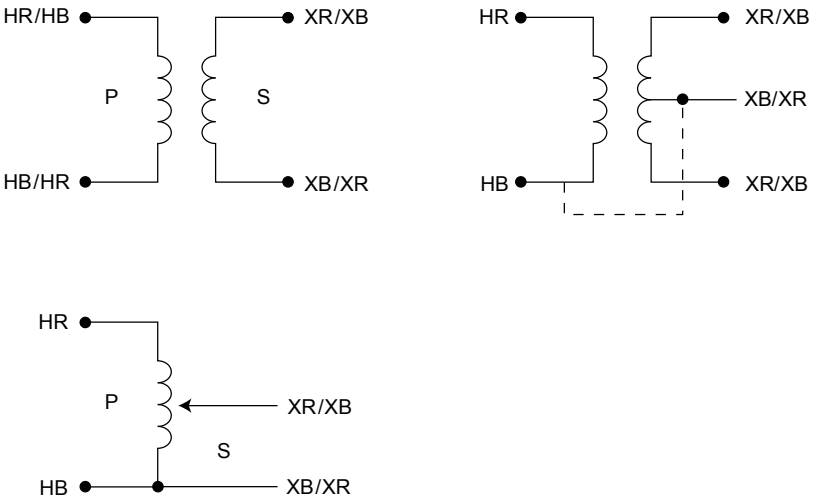


Figure 114

Measurements - NOT OK

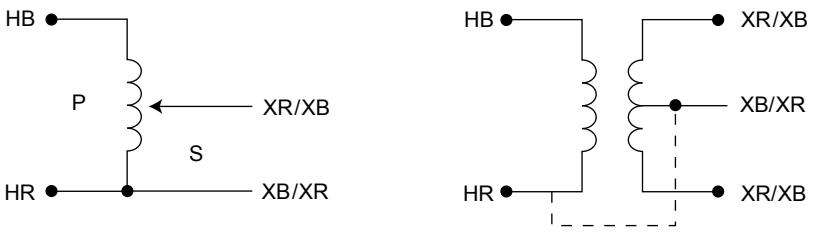


Figure 115

6.2 POLYPHASE CONNECTIONS

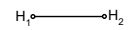
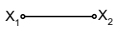
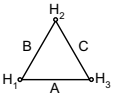
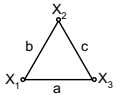
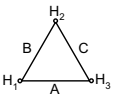
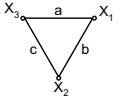
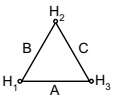
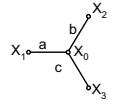
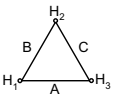
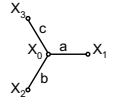
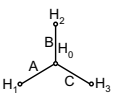
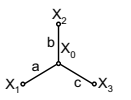
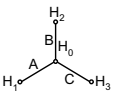
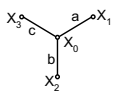
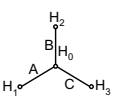
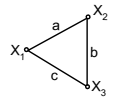
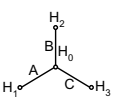
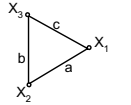
REF NO.	- TRANSFORMER - HIGH VOLTAGE WINDING	- TRANSFORMER - LOW VOLTAGE WINDING	XFMR TYPE	PHASE	HIGH VOLTAGE WINDING	LOW VOLTAGE WINDING	TURNS RATIO
1			1 Ø STD	1 Ø	$H_1 - H_2$	$X_1 - X_2$	$\frac{V_H}{V_X}$
2			Δ - Δ STD	A B C	$H_1 - H_3$ (A) $H_2 - H_1$ (B) $H_3 - H_2$ (C)	$X_1 - X_3$ (a) $X_2 - X_1$ (b) $X_3 - X_2$ (c)	$\frac{V_H}{V_X}$
3			Δ - Δ REV	A B C	$H_1 - H_3$ (A) $H_2 - H_1$ (B) $H_3 - H_2$ (C)	$X_1 - X_3$ (a) $X_2 - X_1$ (b) $X_3 - X_2$ (c)	$\frac{V_H}{V_X}$
4			Δ - Y STD	A B C	$H_1 - H_3$ (A) $H_2 - H_1$ (B) $H_3 - H_2$ (C)	$X_1 - X_0$ (a) $X_2 - X_0$ (b) $X_3 - X_0$ (c)	$\frac{V_H \cdot \sqrt{3}}{V_X}$
5			Δ - Y REV	A B C	$H_1 - H_3$ (A) $H_2 - H_1$ (B) $H_3 - H_2$ (C)	$X_1 - X_0$ (a) $X_2 - X_0$ (b) $X_3 - X_0$ (c)	$\frac{V_H \cdot \sqrt{3}}{V_X}$
6			Y - Y STD	A B C	$H_1 - H_0$ (A) $H_2 - H_0$ (B) $H_3 - H_0$ (C)	$X_1 - X_0$ (a) $X_2 - X_0$ (b) $X_3 - X_0$ (c)	$\frac{V_H}{V_X}$
7			Y - Y REV	A B C	$H_1 - H_0$ (A) $H_2 - H_0$ (B) $H_3 - H_0$ (C)	$X_1 - X_0$ (a) $X_2 - X_0$ (b) $X_3 - X_0$ (c)	$\frac{V_H}{V_X}$
8			Y - Δ STD	A B C	$H_1 - H_0$ (A) $H_2 - H_0$ (B) $H_3 - H_0$ (C)	$X_1 - X_2$ (a) $X_2 - X_3$ (b) $X_3 - X_1$ (c)	$\frac{V_H}{V_X \cdot \sqrt{3}}$
9			Y - Δ REV	A B C	$H_1 - H_0$ (A) $H_2 - H_0$ (B) $H_3 - H_0$ (C)	$X_1 - X_2$ (a) $X_2 - X_3$ (b) $X_3 - X_1$ (c)	$\frac{V_H}{V_X \cdot \sqrt{3}}$

Figure 116

7. DATAVIEW® & DTR® CONTROL PANEL

DataView® enables a computer to connect to and interact with a variety of AEMC® Instruments devices, including the DTR® 8511. As its name implies, the primary purpose of DataView is to view data that has been recorded by the instrument and display it as a report.

With DataView, you can:

- Connect the instrument to a computer. This connection is through USB cable.
- Display and analyze real-time data on the computer via a frames style interface.
- Download previously recorded data from the instrument.
- Configure a wide variety of instrument settings.
- Perform instrument maintenance such as erasing its content.
- Generate reports for viewing and printing data, using standard or customizable templates.

DataView includes a core set of features used by all instruments. These features are designed for viewing data, and for opening, creating, and saving reports. DataView also includes components called **Control Panels** for interacting with the instrument. A Control Panel allows you to connect to the instrument, download data, and configure the instrument's settings. Each AEMC® Instruments product family has its own dedicated Control Panel; you select the Control Panel(s) you need during DataView installation.

For example, DataView includes the DTR Control Panel specifically designed for working with DTR instruments. The DTR Control Panel provides all the features available in the instrument's user interface, as well as many additional features.

7.1 INSTALLING DATAVIEW®

DO NOT CONNECT THE INSTRUMENT TO THE PC BEFORE INSTALLING THE SOFTWARE AND DRIVERS.

NOTE: When installing, the user must have Administrative access rights during the installation. The users access rights can be changed after the installation is complete. DataView® must be reinstalled for each user in a multi-user system.

1. Insert the DataView USB drive into an available USB port on your computer.
2. When the USB folder is open, find the file **Setup.exe** located in the root directory of the USB drive, and double-click it to run the **installation** program.

3. The **DataView® Installer screen** appears.

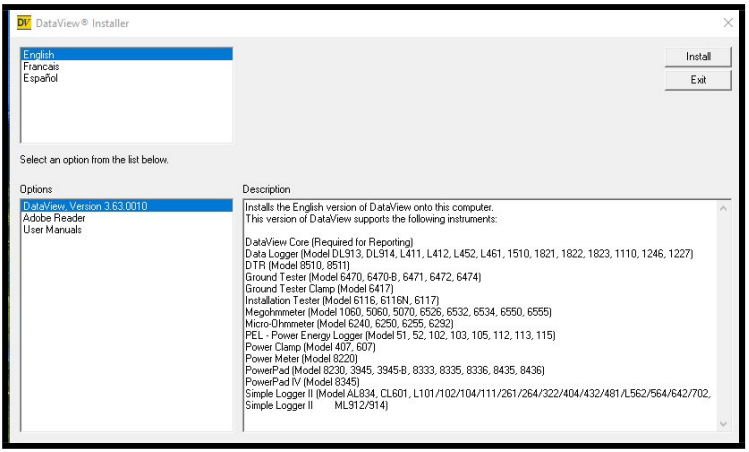


Figure 117

In the upper left corner of the screen, choose the **language version** of the Setup interface. All Setup screens and dialogs will then immediately appear in the selected language.

4. In the lower left corner are the available installation options. In addition to the DataView software, you can select **Adobe Reader**. This links to the Adobe web site where you can download the latest version of Reader. This program is required to view DataView .pdf documents.

   If you select **User Manuals** and **click** Show, a list of .pdf files contained in the USB drive that accompanies DataView will display. You can then **click** Open to view a manual or **click** Return to return to the previous screen.

5. To install DataView, select **DataView** in the Options list and click **Install**.

6. You are now prompted to select the software you want to install.

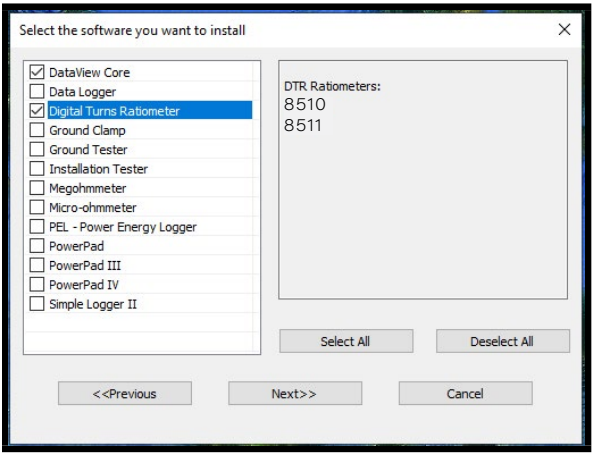


Figure 118

Each AEMC® Instruments product family has its own specially designed Control Panel. If you are performing a **complete** install, by default all available Control Panels are selected (a check mark next to the Control Panel indicates it is selected). Control Panels take up disk space on the computer; so unless you have other types of AEMC® Instruments devices, we recommend that you select **DTR** and deselect the rest. You should also check the option **DataView Core**, which is a requirement if you plan to create DataView reports.

7. After you finish selecting and deselecting Control Panels and/or DataView Core, click **Next**.
8. The Setup program now informs you that it is ready to install DataView. If you want to review any of your previous selections, click the **Previous** button to return to earlier screens. Otherwise, click **Install** to begin installation.
9. The InstallShield program installs the selected software.
10. When all programs are installed, a message appears informing you of this. Click **Finish** to return to the Setup screen
11. You can now select additional Setup options to install. When finished, click **Exit**.
12. The DataView folder now appears on your PC desktop, within which is the DTR Control Panel icon  and the icon(s) for any other Control Panel(s) you have installed.

You can now open the DTR Control Panel and connect your DTR® 8511 to the computer.

7.2 DTR® CONTROL PANEL

All All DTR® models will interact with a PC through the DTR® Control Panel. This Control Panel is designed to support the new DTR® 8511 and the older DTR® Model 8510.

Clicking the **DataView icon** in the DataView folder on your desktop opens the core DataView program. Clicking the **DTR Control Panel icon** opens the DTR Control Panel:

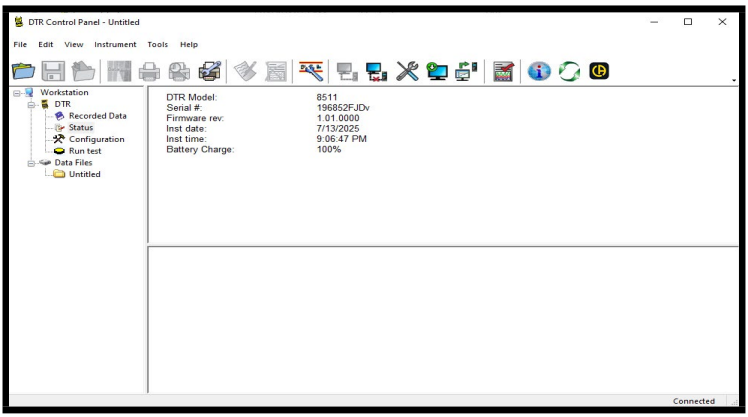


Figure 119

In general, DataView Core features are for creating, viewing, editing, and storing DataView reports; while the DTR Control Panel is for connecting to, configuring, viewing measurements on, and downloading data from the instrument.

You can access all DataView features through either the DataView icon or the Control Panel icon. For users who interact with DTR instruments, we recommend primarily using the DTR Control Panel. However, there are situations where using the core DataView icon may be more convenient for some users, such as when viewing multiple archived reports from different AEMC® Instruments product families.

For further information about using the DTR Control Panel, consult the Help system that comes with the product. Access this Help by **clicking** the option **Help** in the DTR Control Panel's menu bar at the top of the screen.

7.2.1 Connecting to Computer Via Control Panel

Before you can use the DTR® Control Panel to communicate with your DTR® 8511, you must establish a connection between the instrument and the computer.

To begin, ensure that you have installed DataView with the DTR Control Panel. Also ensure that the required communication and connection drivers are installed on your computer. These drivers are installed as part of the DataView installation process.

1. **Connect** the USB cable to the instrument and computer.
2. **Double click** on the DataView Folder on your 

desktop to open folder.
3. **Double click** on DTR.
4. The DTR Control Panel will open.
5. The DTR Control Panel Connection window will open.

Figure 120

6. When ready, **click** OK. The Control Panel will open to the DTR Model 8511 status screen.

8. MAINTENANCE

WARNING: Unauthorized work or part replacement with equivalents may seriously compromise safety and instrument performance.

AEMC® Instruments will not be held responsible for any accident, incident, or malfunction following a repair performed by any other than its service center or an AEMC® Instruments approved repair center.

WARNING: To avoid electrical shock, do not perform any service other than what is contained within the operating instructions in this manual.

8.1 CLEANING

WARNING: To prevent electrical shock, before cleaning disconnect all inputs and disconnect the instrument from any source of electricity.

- Turn the instrument OFF.
- Do not submerge in water or allow water into the case.
- Use a soft cloth lightly moistened with soapy water
- Wipe with a damp cloth.
- Dry with a dry cloth.
- Never use alcohol, solvents or hydrocarbons.

8.2 CHARGING THE BATTERIES

NOTE: Before using the instrument for the first time, it is recommended to fully charge the battery by leaving it connected to the charger for **10 hours**. This initial charge helps condition the battery and extend its overall service life.

Please note that during charging, the instrument does not continuously update the displayed battery percentage. To see the most accurate reading, disconnect the charger and allow the unit to rest for a few minutes. This pause lets the battery stabilize, ensuring the displayed percentage more closely matches the true state of charge.

8.2.1 Battery Type and General Information

The DTR® 8511 includes (6) internal rechargeable AA NiMH batteries. The rated capacity of each battery is 2500 mAh according to ANSI C18.2M, Part 1. The operating voltage is 1.0 V_{DC} to 1.35 V_{DC} with a nominal voltage of 1.2 V_{DC} at 20 °C.

It is not recommended for customers to replace the batteries as the assembly process of the instrument is complicated. The batteries can be replaced when the instrument is sent to the manufacturer for service or calibration (see § 8.4 Repair and Calibration).

The battery remaining charge percentage will be displayed after disconnecting the instrument from the charging supply. A red LED, embedded in the power button on the front panel of the instrument, will turn on while the instrument is being charged and will turn off when the instrument is partially or fully charged.

8.2.2 Battery Charging Options

It is recommended that the user begin a charge cycle at 15 % battery life. There are two methods to charge the batteries of the DTR® 8511.

1. Plug in the supplied 12 V_{DC} AC power adapter with barrel connector.
2. Plug in a USB-C connector from a PC or USB power supply.

Red LED Status in Power Button Indicates Charge Mode		
Red LED Status	**Charge Mode**	
Solid	Batteries are charging.	
1 s Blinking	There is a problem with the battery charger.	
OFF	Batteries are charged.	
Flashing Rapidly	Battery(s) missing or one or more are installed reversed.	
LOW BATTERY *will display if test is run when batteries are low.*		

Table 16

When an external power supply is connected to the instrument, the charging circuit will evaluate the batteries to determine if they should be charged.

Charging will be complete under either of these conditions:

1. The battery voltage reaches a determined charge level.
2. The battery has been charging for 10 h (as a safety feature to protect the batteries and the hardware).

NOTE: Charging begins when the battery is at 96 % or lower.

8.2.3 Battery Charge Times

The table below shows the estimated time required for the battery to reach a full charge, based on its current percentage. For example, if the battery is at 40 %, the table indicates approximately how long it will take to reach 100 % under normal charging conditions.

Starting Charge Status	Reach Full (100 %) Charge Status	Target Charge Status	Reach Target Charge Status
75 %	2.5 h	**(0 to 25) %**	2.5 h
50 %	5 h	**(0 to 50) %**	5 h
25 %	7.5 h	**(0 to 75) %**	7 h
0 %	10 h	**(0 to 100) %**	10 h

Table 17

8.2.4 Battery Charge Percentage

The battery percentage is calculated based on a full-scale value of 1.2 VDC (100 % charge) per cell and a minimum scale value of 1.0 VDC (0 % charge) per cell.

When the battery level drops to 10 % the instrument will no longer be able to perform a test. The batteries need to be charged to at least 14 % or to override this, connect the supplied external 12 VDC power adapter.

8.2.5 Battery Charging Error

In the rare case of a charging error the processor may disable the charging hardware which causes the power button **red** LED indicator to turn OFF.

If the batteries are not charging properly the DTR® 8511 will direct the user on how to restart the charger hardware in an attempt to correct the error condition.

1. The below ERROR DETECTED message will display instructing the user to remove or disconnect the USB and 12 VDC power sources.

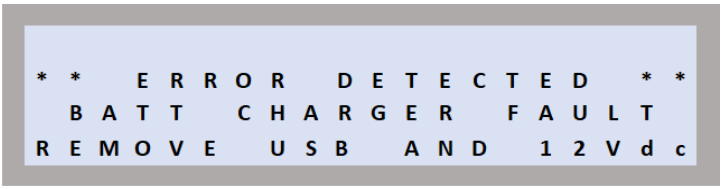


Figure 121

If the instrument powers down after Step 1 and cannot power up, please go to Step 3.

2. If the instrument remains powered after completion of Step 1, the HOLD POWER BUTTON 2 s THEN RESTART SYSTEM message will display. This message is instructing the user to power the instrument OFF by holding down the power button for 2 s, then to restart the system by again holding down the power button for 2 s. If the instrument does not power up, please go to Step 3.

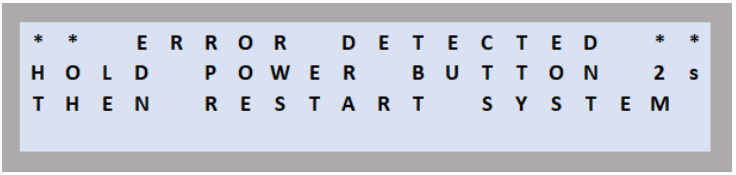


Figure 122

3. If the above process was not successful AEMC® Technical Support should be contacted for further instructions. See § 8.5 for contact information.

8.3 UPDATING THE FIRMWARE (USB FLASH UPLOAD)

The DTR® 8511 firmware controls the features and functionality of the instrument. AEMC® Instruments provides firmware updates free of charge to download through our DataView® DTR Control Panel software.

The instrument supports the ability to upload firmware via USB. The transfer is initiated via an update utility program or from the DTR® Control Panel software directly. After the upload has completed, the instrument resets and subsequently resumes normal operations. The instrument time could be reset by this process. Memory is maintained so no loss of data should occur but it is always best to download the memory before updating the firmware.

To update the firmware, your PC must be running DataView with the DTR Control Panel (V2.9.16216 or later).

1. Power ON the instrument using external power, to ensure the instrument remains ON throughout the update procedure. Also ensure that the battery is at least 50 % charged. Do not perform an update with the instrument running on battery power, or with low battery charge. If the instrument turns OFF while firmware updating is in progress, it could become inoperative. External power with a sufficiently charged battery for backup helps minimize the risk of power interruptions during updating.
2. Connect the DTR instrument to the PC using the USB cable.
3. Launch the DTR Control Panel.
4. Click Instrument in the menu bar and select Add an Instrument, then connect the instrument using the Add an Instrument Wizard. (Press F1 if you need assistance.)
5. By default, the DTR Control Panel automatically checks the connected instrument's firmware. If it is out of date, the Firmware Update dialog box appears, listing the instrument and any others running out-of-date firmware. Click Update (or Select All to update multiple instruments). This displays the Firmware Upgrade dialog box listing the latest firmware revisions for the DTR DSP and microprocessor; proceed as instructed in Step 6.

If the DTR Control Panel option Check automatically for new firmware for connected instruments upon start of program has been previously de-selected, the automatic firmware check does not occur. In this case, click Instrument in the menu bar. This includes the option Firmware Upgrade. If the selected instrument is running the latest firmware, this option is grayed out and inactive. If the instrument is not running the latest firmware, click Firmware Upgrade to display the Firmware Upgrade dialog box.

6. Click the Start button to begin the update. During this process, status bars display the progress of the DSP and microprocessor firmware updates. (Note that if only one of these requires updating, only its status bar appears.)
7. When the firmware update is complete, click the Close button to exit.

8.4 REPAIR AND CALIBRATION

To ensure that your instrument meets factory specifications, we recommend that the instrument be sent back to our factory Service Center at one-year intervals for recalibration or as required by other standards or internal procedures.

For instrument repair and calibration:

You must contact our Service Center for a Customer Service Authorization Number (CSA#). Send an email to repair@aemc.com requesting a CSA#, you will be provided a CSA Form and other required paperwork along with the next steps to complete the request. Then return the instrument along with the signed CSA Form. This will ensure that when your instrument arrives, it will be tracked and processed promptly. Please write the CSA# on the outside of the shipping container. If the instrument is returned for calibration, we need to know if you want a standard calibration or a calibration traceable to N.I.S.T. (includes calibration certificate plus recorded calibration data).

Ship To: Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
15 Faraday Drive ▪ Dover, NH 03820 USA
Phone: (800) 945-2362 (Ext. 360) / (603) 749-6434 (Ext. 360)
E-mail: repair@aemc.com

(Or contact your authorized distributor.)

Contact us for the costs for repair, standard calibration, and calibration traceable to N.I.S.T.

NOTE: You must obtain a CSA# before returning any instrument.

8.5 TECHNICAL SUPPORT

If you are experiencing any technical problems or require any assistance with the proper operation or application of your instrument, please call or e-mail our technical support team:

Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
Phone: (800) 343-1391 (Ext. 351)
E-mail: techsupport@aemc.com ▪ www.aemc.com

8.6 LIMITED WARRANTY

The instrument is warrantied to the owner for a period of two years from the date of original purchase against defects in manufacture. This limited warranty is given by AEMC® Instruments, not by the distributor from whom it was purchased. This warranty is void if the instrument has been tampered with, abused, or if the defect is related to service not performed by AEMC® Instruments.

Full warranty coverage and product registration is available on our website at www.aemc.com/warranty.html.

Please print the online Warranty Coverage Information for your records.

What AEMC® Instruments will do:

If a malfunction occurs within the warranty period, you may return the instrument to us for repair, provided we have your warranty registration information on file or a proof of purchase. AEMC® Instruments will repair or replace the faulty material at our discretion.

REGISTER ONLINE AT: www.aemc.com/warranty.html

8.6.1 Warranty Repairs

What you must do to return an Instrument for Warranty Repair:

First, send an email to repair@aemc.com requesting a Customer Service Authorization Number (CSA#) from our Service Department. You will be provided a CSA Form and other required paperwork along with the next steps to complete the request. Then return the instrument along with the signed CSA Form. Please write the CSA# on the outside of the shipping container. Return the instrument, postage or shipment pre-paid to:

Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments
15 Faraday Drive, Dover, NH 03820 USA
Phone: (800) 945-2362 (Ext. 360)
(603) 749-6434 (Ext. 360)
E-mail: repair@aemc.com

Caution: To protect yourself against in-transit loss, we recommend that you insure your returned material.

NOTE: You must obtain a CSA# before returning any instrument.

9. DOCUMENTATION

9.1 APPLICABLE STANDARDS

IEC 60529	Degrees of protection provided by enclosures (IP Code)
IEC 60068-2-6	Sinusoidal Vibration Testing
IEC 60068-2-27	Test Ea and guidance: Shock
IEC 60068-2-31	Test Ec: Rough handling shocks, primarily for equipment-type specimens
IEC 61010-2-030	Safety requirements for electrical equipment for measurement, control, and laboratory use Part 2-030: Particular requirements for equipment having testing or measuring circuits.
IEC 61326-1	Electrical equipment for measurement, control and laboratory use - EMC requirements – Part 1: General requirements
IEC 61960-4	Secondary cells and batteries containing alkaline or other non-acid electrolytes

Table 18

9.2 CERTIFICATIONS

The DTR® 8511 complies with LVD and CEM directives. It is CE approved.

Certifications include:

- CE
- RoHS 2 ANNEX III
- CEM
- REACH
- Prop 65
- IP 53 (Closed)
- IP 40 (Open)

9.3 TERM DEFINITIONS

Deviation: The difference in percentage between the expected result and the actual result. Values are calculated from the Nameplate value entered and the actual measurement. Ratios below the expected result are shown with a (-) negative deviation.

Excitation Current: The amount of current the DTR® 8511 provides to the Primary (H) side to perform the test.

Ratio: The ratio between the Primary and Secondary side of a transformer. Expressed in Turns with a colon separator. Referenced to a turn of 1 such that a five hundred to one ratio is expressed as 500.00:1.

9.4 ABBREVIATIONS

DTR®	Digital Transformer Ratiometer
---	unavailable parameter based on user configuration
C	measured excitation current
CP	control panel
CT	current transformer
D	deviation of measurement from expected results based on the nameplate value selected
EMC	electromagnetic compatibility
EEPROM	electrically erasable programmable read-only memory
EUT	equipment under test
LVD	low voltage directive
N/A	unavailable value based on user configuration
P	primary nameplate value
PC	personal computer
PD	power delivery
R	ratio
S	secondary nameplate value
UI	user interface
VT/PT	voltage transformer/potential transformer

Table 19

CHAUVIN ARNOUX GROUP

AEMC® INSTRUMENTS
CHAUVIN ARNOUX GROUP

10/25
99-MAN 100583 v00

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