#61-156
#61-157
#61-158

SureTest® Model ST-1THD & ST-1THDC Instructions

Introduction

The SureTest® family of Circuit/distortion analyzers identify problems common to electrical circuits and harmonic distortion quickly, easily and accurately. They have a patented voltage drop test, which applies a full 15-ampere load without causing interruption to equipment on the circuit. This family also features 64K of memory to store and recall up to 36 hours of testing.

Product Features

- Identifies and Locates
  Loose Wire Connections
  Bad Splices/Receptacles
  High Resistance Grounds
  False (Bootleg) Grounds
  Shared Neutrals
- Verifies
  Proper GFCI Operation
  Dedicated Circuit Presence
  Isolated Ground Presence (with the 61-176 Adapter)
- Measures
  True RMS Line Voltage
  Resistance of Hot and Neutral Conductors
  Ground Impedance
  % Voltage Drop by Conducting an Actual Full 15 Amp Load Test
  % Voltage Drop by Simulating a 20 Amp Load Test
  GFCI Trip Time
  True RMS Neutral-to-Ground Voltage
  Estimated Load on Circuit
  Line Frequency
  Power Consumption Power Factor
  % Total Harmonic Distortion (THD) in the Line Voltage (to the 31st Harmonic)

Product Features

- Measures
  % THD in the Neutral Current (to the 31st Harmonic)
  True RMS Current with the 61-181 Clamp Adapter (ST-1THDC)
- Event Recording
  Captures up to 36 hours of testing
  Min/Max/Avg/Peak Line Voltage
  Resistance in Hot, Neutral, and Ground Conductors
  Min/Max/Avg/Peak Neutral-to-Ground Voltage
  % THD in the Line Voltage and Neutral Current
  % THD per Harmonic up to the 31st Harmonic
  Line Frequency

General Operation

The SureTest Models ST-1THD and ST-1THDC Circuit/Distortion Analyzers take only seconds to test each outlet and circuit under a full load. The ST-1THD features two easy to use operating menus. The Wiring Menu gives access to measurements of line voltage, voltage drop at a full 15 amperes and 20 amperes, ground-to-neutral voltage, resistance of the hot a neutral conductor, ground impedance. A ground fault circuit interrupter (GFCI) test is also performed that will disrupt the electrical supply if a functional GFCI is present.

The Wave Form Menu gives access to measurements of % line voltage total harmonic distortion (THD), line voltage harmonics to the 31st harmonic, % neutral current THD, neutral current harmonics to the 31st harmonic and line frequency.

In addition to these two programming menus, the ST-1THDC features a third menu when used with the #61-181 Amp Clamp Adapter. The Clamp Adapter Menu gives access to measurements of True RMS current, THD, and harmonics to the 31st harmonic.

Any discrepancies from a normal reading indicate that a problem has been detected in the circuit.

For use in 3-prong (grounded) outlets, inset the ST-1THD into the receptacle with the ground pin extended. For use in 2-prong (non-grounded) outlets, leave the ground pin retracted. In non-grounded (2-prong) outlets many of the tests will be non-functional due to an absence of ground.

⚠ WARNING

Do not use on outputs from UPS systems, light dimmers or square wave generating equipment.

Insert the unit into the receptacle; observe test results and then move on to the next receptacle. Allow at least 20 seconds between insertions. Repeatedly inserting the SureTest into a receptacle will exceed its ability to dissipate heat within the unit, resulting in fluctuating readings or damage to the unit.

Wiring Verification

The St-1THD will test the wiring of a receptacle to identify if errors are present. Error messages will be displayed for polarity reversal, no ground, and false ground conditions.

"E_rP" on the LED display indicates that the hot and neutral wires are reversed.

"E_nG" on the LED display indicates that no ground is present. The ST-1THD will not perform any of the tests involving the ground circuit if a no ground condition is detected.

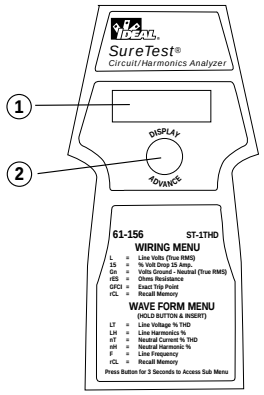
"E_FG" on the LED display indicates a false ground condition. False ground is defined as a short between the ground and neutral wires very close to the receptacle. A false ground may also be indicated if the receptacle is within 15 feet of the neutral-ground bonding point at the panel, or if conduit is being used as the ground conductor.

Specifications

Case Construction:	GE Cycolac plastic molded
Operating Range:	
All measurements except	
voltage drop, FG, drop, FG,	
conductor resistances:	80-300 Volts AC @ 50-60 Hz
Voltage drop, False	
Ground & Conductor	
Resistances:	80-150 Volts
Harmonic Display:	Odd, 3 - 15 + Bal. To 31
All Measurements:	True R.M.S.

Specifications (continued)

Crest Factor:	Peak / True R.M.S.
Memory Hold/Recall:	36 Hours
Power Use:	2 Watts continuous, 1800 W peak
Digital Display:	Seven segment L.E.D., 3"
Accuracy, Display:	1% of full scale +/- 1 digit
Operating Temp:	0º C to 50º C
Storage Temp:	-20º C to +65º C
Dimensions:	7" X 3" X 1.5"
Weight:	7 ounces
#61-181 Amp Clamp	
Adapter:	3 to 500 Amps, Jaw opening -1.3 inches



① LED Display
② Display Advance Button

Test Procedures

The programming menus feature a simple single button operation to advance between various measurements. The programming set the measurements in a series of menu and submenu options to make navigation through the menu structure easier.

Outlet Circuit Testing

Unless a wiring error exists, the ST-1THD will show "Out" in the LED display. This indicates that the unit is calibrating itself prior to testing. After this calibration is performed, the ST-1THD automatically enters into the outlet circuit testing programming menu. The LED display cycles between the menu heading, and the measurement every four seconds. Press and hold the display advance button for one second to move to the menu. To enter the submenu, press the display advance button for three seconds. To navigate from measurement to measurement within the submenu, press the display advance button. While in the submenu, pressing and holding the display advance button for three seconds brings the unit back to the menu structure.

1. Insert the ST-1THD into the receptacle
2. The LED display shows “Out” indicating self-calibration of the unit
3. The LED display cycles between “L_”, indicating that True RMS Line Voltage is being measured, and the Line Voltage measurement every four seconds.
4. Press and hold the display advance button for three seconds to access the Line Voltage submenu.
5. The LED display alternates between “Hi”, indicating that the highest line voltage is being measured, and the measurement every four seconds
6. Press the display advance button for one second to move to the next test within the Line Voltage submenu.
7. Press and hold the display advance button for three seconds to return to the main menu.

Menu Structure for Outlet Circuit Testing

Display	Submenu Menu	Display	Measurement
L-	Line Voltage		True RMS Line Voltage
		Hi=	Highest Line Voltage
		Lo=	Lowest Line Voltage
		A=	Average Line Voltage
		P=	Peak Line Voltage
15=	Voltage Drop		% Voltage Drop at 15 Ampere Load
		20=	% Voltage Drop at 20 Ampere Load
Gn=	Ground-to-Neutral Voltage		TRMS Ground-to-Neutral Voltage
		Hi=	Highest Ground-to-Neutral Voltage
		Lo=	Lowest Ground-to-Neutral Voltage
		A=	Average Ground-to-Neutral Voltage
		P=	Peak Ground-to-Neutral Voltage
		ELL=	Estimated Load on Circuit
		Ld=	Load (Watts)
		PF=	Power Factor of Load
rES=	Resistance		
		rn=	Neutral Conductor Resistance
		rH=	Hot Conductor Resistance
		rG=	Ground Impedance
GFCI=	GFCI Trip time		
		Countdown	
		of Trip Time	Testing GFCI Time to Trip
rCL=	Recall Memory		
		Blinking rCL	SureTest is Recording Data
		Sto	Recording Completed

Line Voltage Menu
- Menu Heading - "L-"
- Measurement at Menu Heading - True RMS Line Voltage
- Submenu - yes
  "Hi=" - Highest Line Voltage
  "Lo=" - Lowest Line Voltage
  "A=" - Average Line Voltage
  "P=" - Peak Line Voltage

The submenu values are the highest, lowest, average and peak values taken since the SureTest was plugged in.

Voltage Drop Menu
- Menu Heading - "Gn-"
- Measurement at Menu Heading - % Voltage Drop under a full 15 Amp Load
- Submenu - yes
  "20=" - Voltage Drop under 20 Amp Load

The test results for the 20 Amp load test are simulated based on an actual 15 Amp load.

Ground-to-Neutral Voltage Menu
Ground-to-neutral voltage results from current flowing in the neutral conductor from other equipment on the circuit. High ground-to-neutral voltage indicates that the circuit may be loaded near its capacity or the neutral conductor may be shared or carrying harmonic distortion. A reading of less than 2 volts usually indicates a usable outlet. An excessive ground-to-neutral voltage may result in inconsistent or intermittent equipment performance

This test can also be used to verify a dedicated circuit. A measurement greater than 0.1 volts indicates that the receptacle under test is not on a dedicated circuit.

- Menu Heading - "Gn-"
- Measurement at Menu Heading - True RMS Voltage, Ground-to-Neutral
- Submenu - yes
  "Hi=" - Highest Ground-to-Neutral Voltage
  "Lo=" - Lowest Ground-to-Neutral Voltage
  "A=" - Average Ground-to-Neutral Voltage
  "P=" - Peak Ground-to-Neutral Voltage
  "ELL=" - Estimated Load on Circuit
  "Ld=" - Load (Watts)
  "PF=" - Power Factor of Load

The submenu values are the highest, lowest, average and peak values taken since the SureTest was plugged in.

After the display is advanced to "Ld" in the submenu, it will cycle between the load and power factor measurements. Pressing the display button will not advance the unit through the programming sequence. After these measurements are taken, the unit must be removed from the receptacle and re-inserted.

Resistance Menu
- Menu Heading - "rES-"
- Measurement at Menu Heading - None
- Submenu - yes
  "rn=" - Resistance of Neutral Conductor
  "rH=" - Resistance of Hot Conductor
  "rG=" - Ground Impedance

The St-1THD checks ground impedance by pulsing 15 amperes from hot-to-ground to ensure that the resistance is less than 1 Ohm.

GFCI Menu
The ST-1D applies 6mA to ground through a fixed resistor to trip the GFCI. A functional GFCI will disconnect the power. The reset may be at the outlet or at the panel.

WARNING
When testing 3-wire outlets, do not proceed with the GFCI test if the Wiring Indicator lights indicate a "No Ground" condition exists. Repair the ground circuit first.

GFCI Menu (continued)
- Menu Heading - “GFC=”
- Measurement at Menu Heading - None
- Submenu - No

Pressing the display advance button for three seconds will activate the GFCI test. The ST-1THD applies 6mA to ground through a fixed resistor to trip the GFCI. A functional GFCI will disconnect the power. The reset may be at the outlet or at the panel. The tester will display the calculated time to trip, apply the current and count up to the calculated time.

- If the GFCI is functioning properly, the circuit will disconnect, and the LED display on the ST-1THD will go out. When the circuit is reset, and power is returned, the LED display will show the actual time to trip.
- If the GFCI fails to trip, the LED display will show "bAd", which indicates that the GFCI may be installed incorrectly, or the GFCI may be defective.

⚠ WARNING
In order to test GFCI's in a 2-wire system (no ground wire), the #61-175 ground continuity adapter must be used. Connect the ground lead on the adapter to a ground, such as a metal water or gas pipe.

Recall Memory Menu (Event Recording)
Stored data can be viewed from the Recall Memory menu. Pressing the display advance button for three seconds enters the submenu. The submenu is identified by a blinking “rCL” on the LED display. Once in the submenu, pressing the display advance button gives access to the stored values from memory. These values are accessed through the outlet circuit testing menu. While stored values are being displayed, the LED will blink to differentiate these values from the “live” values being captured in standard testing mode. Navigating through the outlet circuit testing menu while in recall memory mode is identical to navigation through the menu in standard operation.

While the ST-1THD is in operation, the unit will analyze and store data on the various measurements. These values can be permanently stored into the memory from the Recall Memory submenu. Pressing the display advance button for three seconds when a blinking “rCL” is shown on the display will store all of the data into memory, overwriting any previous data in memory.

It is important to note that pressing the blinking "rCL" to exit viewing recorded data stores new data into permanent memory. If you wish to maintain the stored data, but want to return to standard operation mode, unplug the SureTest and re-insert it into the receptacle. The SureTest will return to operation mode.

- Menu Heading - “rCL-”
- Measurement at Menu Heading - None
- Submenu - yes
  Blinking “rCL” - Allows access to stored values from memory
  “Sto” - Stores values into memory

Harmonic Wave Form Testing
To access the harmonic wave form programming menu, press the display advance button and insert the ST-1THD into the receptacle. "HAr" will be shown on the LED display . The LED display cycles between the menu heading, and the measurement every four seconds. Press and hold the display advance button for one second to move to the menu. To enter the submenu, press the display advance button for three seconds. To navigate from measurement to measurement within the submenu, press the display advance button. While in the submenu, pressing and holding the display advance button for three seconds brings the unit back to the menu structure.

1. Press the display advance button and insert the ST-1THD into the receptacle
2. The LED display shows “HAr” indicating self-calibration of the unit
3. The LED display cycles between “Lt_”, indicating that % Line Voltage Total Harmonic Distortion (THD) is being measured, and the THD measurement every four seconds.
4. Press and hold the display advance button for three seconds to access the Line Voltage submenu.
5. The LED display alternates between “Hi”, indicating that the highest distortion is being measured, and the measurement every four seconds
6. Press the display advance button for one second to move to the next test within the % Line Voltage THD submenu.
7. Press and hold the display advance button for three seconds to return to the main menu.

Menu Structure for Wiring Harmonic Distortion Testing

Display	Menu	Submenu Display	Measurement
Lt-	% Line Voltage THD		Line Voltage THD
		Hi=	Highest Line Voltage THD
		Lo=	Lowest Line Voltage THD
		A=	Average Line Voltage THD
		LC=	Crest Factor
LH-	Line Voltage Harmonics		
		h3=	%THD at 3rd Harmonic
		h5=...h15=	% THD for each odd numbered Harmonic through the 15th Harmonic
		bAL=	Total of the remaining % THD from 17th Harmonic to 31st Harmonic
nt-	% Neutral Current THD		Neutral Current THD
		Hi=	Highest Neutral Current THD
		Lo=	Lowest Neutral Current THD
		A=	Average Neutral Current THD
		nC=	Crest Factor
nH-	Neutral Current Harmonics		
		h3=	%THD at 3rd Harmonic
		h5=Öh15=	Hot Conductor Resistance
		bAL=	Total of the remaining % THD from 17th Harmonic to 31st Harmonic
Frequency Value			Line Frequency
rCL=	Recall Memory		
		Blinking rCL	SureTest is Recording Data
		Sto	Recording Completed

% Line Voltage THD Menu

- Menu Heading - “LT-”
- Measurement at Menu Heading - % Line Voltage THD
- Submenu - yes
  “HI=” - Highest % THD
  “Lo=” - Lowest % THD
  “A=” - Average % THD
  “LC=” - Crest factor of the line voltage

The submenu values are the highest, lowest, and average values taken since the SureTest was plugged in.

Line Voltage Harmonics Menu

- Menu Heading - “LH-”
- Measurement at Menu Heading - None
- Submenu - yes
  “h3=” - % THD at 3rd harmonic
  “h5=” - % THD at 5th harmonic
  “h7=”...”h15” - % THD is given for every odd harmonic to the 15th harmonic
  “bAL=” - Total of the remaining %THD from the 17th to 31st harmonic

% Neutral Current THD Menu

- Menu Heading - “nt-”
- Measurement at Menu Heading - % Neutral Current THD
- Submenu - yes
  “Hi=” - Highest % THD
  “Lo=” - Lowest % THD
  “A=” - Average % THD
  “nC=” - Crest factor of the neutral current

Neutral Current Harmonics Menu

- Menu Heading - “nC-”
- Measurement at Menu Heading - None
- Submenu - yes
  “h3=” - % THD at 3rd harmonic
  “h5=” - % THD at 5th harmonic
  “h7=”...”h15” - % THD is given for every odd harmonic to the 15th harmonic
  “bAL=” - Total of the remaining %THD from the 17th to 31st harmonic

Line Frequency
Within this menu selection, the ST-1THD displays the line frequency of the current. There is no submenu for this menu selection.

Recall Memory Menu (Event Recording)
Stored data can be viewed from the Recall Memory menu. Pressing the display advance button for three seconds enters the submenu. The submenu is identified by a blinking “rCL” on the LED display. Once in the submenu, pressing the display advance button gives access to the stored values from memory. These values are accessed through the outlet circuit testing menu. While stored values are being displayed, the LED will blink to differentiate these values from the "live" values being captured in standard testing mode. Navigating through the outlet circuit testing menu while in recall memory mode is identical to navigation through the menu in standard operation.

While the ST-1THD is in operation, the unit will analyze and store data on the various measurements. These values can be permanently stored into the memory from the Recall Memory submenu. Pressing the display advance button for three seconds when a blinking “rCL” is shown on the display will store all of the data into memory, overwriting any previous data in memory.

It is important to note that pressing the blinking “rCL” to exit viewing recorded data stores new data into permanent memory. If you wish to maintain the stored data, but want to return to standard operation mode, unplug the SureTest and re-insert it into the receptacle. The SureTest will return to operation mode.

- Menu Heading - “rCL”
- Measurement at Menu Heading - None
- Submenu - yes
  Blinking “rCL” - Allows access to stored values from memory
  “Sto” - Stores values into memory

Testing with the #61-181 Clamp Adapter
These tests can only be accessed by using the #61-181 amp clamp adapter with the model ST-1THDC. Power must be supplied to the unit by an extension cord or battery pack to test the unit with the clamp adapter.

When the adapter is plugged into the ST-1THDC, the LED display will show “Ct” indicating that the adapter is correctly plugged into the unit. The ST-1THDC will then automatically enter into the current probe programming menu. The LED display cycles between the menu heading, and the measurement every four seconds. Press the display advance button for one second to move to the menu. To enter the submenu, press the display advance button for three seconds. To navigate from measurement to measurement within the submenu, press the display advance button. While in the submenu, pressing and holding the display advance button for three seconds brings the unit back to the menu structure.

1. Insert the #61-181 adapter into the ST-1THDC
2. The LED display shows “Ct” indicating recognition of the adapter
3. The LED display cycles between “cA”, indicating that True RMS current is being measured through the amp clamp adapter, and the current measurement every four seconds.
4. Press and hold the display advance button for three seconds to access the Current submenu.
5. The LED display alternates between “Hi”, indicating that the highest current is being measured, and the measurement every four seconds
6. Press the display advance button for one second to move to the next test within the Current submenu.
7. Press and hold the display advance button for three seconds to return to the main menu.

Menu Structure for Current Probe Menu Testing (ST-1THDC Only)

Display	Menu	Submenu Display	Measurement
cA-	Current		Current
		Hi=	Highest Current
		Lo=	Lowest Current
		A=	Average Current
ct-	% Current THD		% Current THD
		Hi=	Highest Current THD
		Lo=	Lowest Current THD
		A=	Average Current THD
		P=	Peak Current THD
cH-	Current Harmonics		
		h3=	%THD at 3rd Harmonic
		H5=...H15=	% THD for each odd numbered Harmonic through the 15th Harmonic
		bAL=	Total of the remaining % THD from 17th Harmonic to 31st Harmonic

Optional Accessories

#61-175 Ground Continuity Adapter
This adapter allows the operator to verify that a cabinet or equipment chassis has been properly connected to the power system ground. Plugging into the #61-175 adapter will isolate the SureTest from the power source ground. The LED display of the ST-1THD will read "E-nG". If the equipment is properly grounded, then touching the alligator clip from the ground continuity adapter to the cabinet or equipment chassis should return the circuit to a Normal condition.

WARNING
This is a static test and will not confirm the current carrying capacity

With the ST-1D, this adapter can be used to check the ground impedance of a cabinet or equipment chasis. See section 3.4 for test instructions.

This adapter can also be used to test GFCI receptacles on 2-wire circuits. Connect the ground lead on the adapter to a ground, such as a metal water or gas pipe, prior to GFCI testing.

#61-176 Isolated Ground Adapter
This adapter allows the operator to verify that a receptacle is completely isolated from the other grounds between the receptacle and the entry panel.

WARNING
The receptacle should be tested for proper grounding prior to testing for ground insulation.

Test the ground impedance of the receptacle and make a note of the results. See the section on outlet circuit testing for details. Remove the SureTest from the receptacle and plug it into the #61-176 adapter. Clip the ground wire to the metal outlet, center receptacle screw, or the metal outlet box. Re-insert the ST-1THD into the receptacle and retest for ground impedance. Make a note of the result.

If the two resistance readings are the same, then the receptacle is not isolated. If the receptacle is isolated, the reading with the #61-176 will be lower. A reading of half when the adapter is used is common, because a parallel ground path has been introduced by attaching the ground wire to the grounding point of the receptacle.

#61-177 Extension Cord
The ST-1THD is supplied with an extension cord to make testing easier on hard-to-reach outlets. Replacement extension cords can be purchased from your authorized IDEAL distributor.

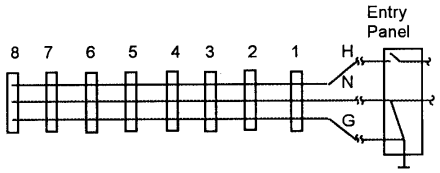
#61-179 CARRYING CASE
The ST-1THD is supplied with a lightweight carrying case to protect the units and store the instruction sheet and accessories. Replacement cases can be purchased from your authorized IDEAL distributor.

#61-181 500AAC Clamp Adapter

This adapter can only be used with the ST-1THDC. This adapter is used for True RMS current measurements up to 500-amperes. #61-158 Circuit/Harmonics Analyzer kit includes both the #61-157 Circuit/Harmonics Analyzer and the #61-181 500AAC Clamp Adapter in one convenient package.

Troubleshooting

Locating Loose (High Resistance) Connectors and Splices



Loose connections, splices and bad connections can be isolated by using the SureTest to test receptacles in sequence along the branch circuit.

For example if the voltage drop at receptacle 5 is unacceptable, checking the other receptacles in the branch can help isolate the problem. If receptacles 1 through 4 and 6 through 8 check out OK, than further investigation should take place at the connection to receptacle 5. The additional resistance could be due to a loose connection/splice. If receptacles 6 through 8 are also unacceptable, chances are that the problem is in either the hot or neutral conductor in the wall between receptacles 4 and 5.

If all of the branch receptacles have unacceptable voltage drops, the problem is most likely in the circuit between the panel and the first receptacle or at the panel. If all branches are in high resistance, the problem may be in the circuit from the meter, or from the transformer to the service entrance.

Using the SureTest will help identify problem areas for further investigation of the receptacles and/or branch circuit.

Troubleshooting Tips

Problem	Possible Causes/Solutions
High/Low Line Voltage	• Too much load on branch - also causing excessive voltage drop • Poor connection at receptacle • Supply voltage too high/low
	• Clean and tighten receptacle connections • Consult power company
High Voltage Drop (5% recommended by NEC)	• Too much load on branch • Too many outlets on branch • Diameter of wire too small
	• Check and tighten connection at receptacle • Clean any corroded wires • Replace outlet, switch • Replace circuit breaker
High Ground-to-Neutral Voltage (Greater than 2 Volts)	• Current flowing in the neutral conductor • Locate/repair source • Install surge suppression
High Ground Impedance (Greater than 1 Ohm)	• Loose ground connection
	• Check and tighten ground connections • Clean any corroded wires
Failure of GFCI Test (GFCI will not trip)	• GFCI may be installed incorrectly • GFCI may be defective
	• Check for proper connections • Replace outlet

Other SureTest Models from IDEAL

SureTest Circuit Analyzers

SureTest® Selection Guide	61-150 ST-1	61-151 ST-1P+	61-152 ST-1D	61-153 ST-1D
Identifies and Locates				
Loose Wire Connections	•	•	•	•
Bad Splices/Receptacles	•	•	•	•
High Resistance Grounds	•	•	•	•
False (Bootleg) Grounds		•	•	•
Shared Neutrals			•	•
Indicates				
Proper Wiring in 3-Wire Receptacles	•	•	•	•
Min/Max Line Voltage	•		•	•
Pass/Fail Voltage Drop	•		•	•
Pass/Fail Ground Impedance		•		
Pass/Fail Neutral-to-Ground Voltage		•		
Verifies				
Dedicated Circuit Presence			•	•
Isolated Ground Presence (with #61-176 Adapter)		•	•	•
Proper GFCI Operation	•	•	•	•
Measures				
Line Voltage		•	•	•
Ground Impedance (Ohms)			•	•
% Voltage Drop under 15 ampere load		•	•	•
% Voltage Drop under 20 ampere load			•	•
GFCI Trip Time		•	•	•
Neutral-to-Ground Voltage			•	•
Estimated Load on Circuit (Amps)			•	•
Additional Features				
220 VAC Operation				•

SureTest Circuit/Harmonics Analyzers

SureTest® Selection Guide	61-156 ST-1THD	61-157 ST-1THDC	61-158 ST-1THDC
Identifies and Locates			
Loose Wire Connections	•	•	•
Bad Splices/Receptacles	•	•	•
High Resistance Grounds	•	•	•
False (Bootleg) Grounds	•	•	•
Shared Neutrals	•	•	•
Verifies			
Dedicated Circuit Presence	•	•	•
Isolated Ground Presence (with #61-176 Adapter)	•	•	
Proper GFCI Operation	•	•	•
Measures			
Line Voltage	•	•	•
Ground Impedance (Ohms)	•	•	•
% Voltage Drop under 15 ampere load	•	•	•
% Voltage Drop under 20 ampere load	•	•	•
GFCI Trip Time	•	•	•
Neutral-to-Ground Voltage	•	•	•
Estimated Load on Circuit (Amps)	•	•	•
True RMS Measurements (Voltage)	•	•	•
True RMS Measurements (Current) (with #61-181 Adapter)		•	•
Line Frequency	•	•	•
Power Consumption (Watts)	•	•	•
Distortion to 31st Harmonic	•	•	•
Additional Features			
220 VAC Operation			
For use with #61-181 500AAC Adaptor		•	•
Included with #61-181 500AAC Adaptor			•
Event recording	•	•	•

Warranty limited solely to repair or replacement; no warranty of merchantability, fitness for a particular purpose or consequential damages.

IDEAL INDUSTRIES, INC.
Sycamore, IL 60178, U.S.A.
800-435-0705 Customer Assistance
www.idealindustries.com
ND 2292-1 Made in U.S.A.