HIOKI

3245-60

SOLAR HiTESTER

Instruction Manual

EN

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(3245-61)

Warranty
Warranty malfunctions occurring under conditions of normal use in conformity with the Instruction Manual and Product Precautionary Markings will be repaired free of charge. This warranty is valid for a period of three (3) years from the date of purchase. Please contact the distributor from which you purchased the product for further information on warranty provisions.

Introduction

Thank you for purchasing the HIOKI "3245-60 SOLAR HiTESTER". To obtain maximum performance from the product, please read this manual first, and keep it handy for future reference.

Initial Inspection

When you receive the product, inspect it carefully to ensure that no damage occurred during shipping. If damage is evident, or if it fails to operate according to the specifications, contact your dealer.

Preliminary Checks

- Before using the product the first time, verify that it operates normally to ensure that the no damage occurred during storage or shipping. If you find any damage, contact your dealer.
- The main battery discharges naturally and may be discharged when the unit is purchased or if left unused for long periods. If this occurs, charge the battery for longer than usual.

Maintenance and Service

- To clean the product, wipe it gently with a soft cloth moistened with water or mild detergent. Never use solvents such as benzene, alcohol, acetone, ether, ketones, thinners or gasoline, as they can deform and discolor the case.
- If the instrument seems to be malfunctioning, e.g. it cannot start, contact your Hioki distributor or reseller without charging the battery. When sending it back, pack it so that it will not sustain damage during shipping, including a description of existing damage. We do not take any responsibility for damage incurred during shipping.

Safety

Follow these precautions to ensure safe operation and to obtain the full benefits of the various functions.

DANGER

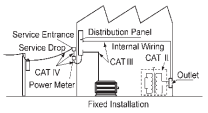
This instrument is designed to comply with IEC 61010 Safety Standards, and has been thoroughly tested for safety prior to shipment. However, mishandling during use could result in injury or death, as well as damage to the instrument. Using the instrument in a way not described in this manual may negate the provided safety features. Be certain that you understand the instructions and precautions in the manual before use. We disclaim any responsibility for accidents or injuries not resulting directly from instrument defects.

Measurement categories

This product complies with CAT IV (300 V), CAT III (600 V), CAT II (600 V) safety requirements.
To ensure safe operation of measurement products, IEC 61010 establishes safety standards for various electrical environments, categorized as CAT II to CAT IV, and called measurement categories.

CAT II: Primary electrical circuits in equipment connected to an AC electrical outlet by a power cord (portable tools, household appliances, etc.), CAT II covers directly measuring electrical outlet receptacles.

CAT III: Primary electrical circuits of heavy equipment (fixed installations) connected directly to the distribution panel, and feeders from the distribution panel to outlets.



CAT IV: The circuit from the service drop to the service entrance, and to the power meter and primary overcurrent protection device (distribution panel).

Using a measurement instrument in an environment designated with a higher-numbered category than that for which the instrument is rated could result in a severe accident, and must be carefully avoided. Use of a measurement instrument that is not CAT-rated in CAT II to CAT IV measurement applications could result in a severe accident, and must be carefully avoided.

Safety Symbol

⚠	In the manual, the ⚠ symbol indicates particularly important information that the user should read before using the product. The ⚠ symbol printed on the product indicates that the user should refer to a corresponding topic in the manual (marked with the ⚠ symbol) before using the relevant function.
⊡	Indicates a double-insulated device.
~	Indicates AC (Alternating Current).
⎓	Indicates DC (Direct Current).

Symbols for Various Standards

CE	This symbol indicates that the product conforms to regulations set out by the EC Directive.
	WEEE marking: This symbol indicates that the electrical and electronic appliance is put on the EU market after August 13, 2005, and producers of the Member States are required to display it on the appliance under Article 11.2 of Directive 2002/96/EC (WEEE).

The following symbols in this manual indicate the relative importance of cautions and warnings.

DANGER Indicates that incorrect operation presents an extreme hazard that could result in serious injury or death to the user.

WARNING Indicates that incorrect operation presents a significant hazard that could result in serious injury or death to the user.

CAUTION Indicates that incorrect operation presents a possibility of injury to the user or damage to the product.

NOTE Advisory items related to performance or correct operation of the product.

Usage Notes

This manual contains information and warnings essential for safe operation of the product and for maintaining it in safe operating condition. Before using the product, be sure to carefully read the following safety notes.

WARNING

To avoid electric shock when measuring live lines, wear appropriate protective gear, such as insulated rubber gloves, boots and a safety helmet.

CAUTION

- Do not store or use the product where it could be exposed to direct sunlight, high temperature or humidity, or condensation. Under such conditions, the product may be damaged and insulation may deteriorate so that it no longer meets specifications.
- This product is not designed to be entirely water- or dust-proof. To avoid damage, do not use it in a wet or dusty environment.
- To avoid damage to the product, protect it from vibration or shock during transport and handling, and be especially careful to avoid dropping.

CAUTION

- If the protective functions of the product are damaged, either remove it from service or mark it clearly so that others do not use it inadvertently.
- The solar battery and the liquid crystal display are made of glass. In order to avoid damage to the product or injury to the user, do not strike, drop, or apply excess pressure to them.

NOTE

- Accurate measurement may be impossible in the presence of strong magnetic fields, such as near transformers and high-current conductors, or in the presence of strong electromagnetic fields such as near radio transmitters.
- When not in use, store the unit in a well-lit location rather than in a container such as a toolbox.
- To avoid battery depletion, turn the Function Selector OFF after use (the Auto Power Save feature consumes a small amount of current).
- The 🔋 indicator appears (flashes) when backup battery voltage becomes low. Replace the batteries as soon as possible.
- The 🔋 indicator appears (flashes) when backup battery voltage becomes low. Replace the batteries as soon as possible.
- To avoid corrosion from battery leakage, remove the batteries from the product if it is to be stored for a long time.
- Batteries are not included in the basic price of the 3245-60. (For testing purposes, a battery is inserted into the product, but if this should be exhausted it is not replaced free of charge.)

Specifications

General

Measurement Method	Dual integration
AC Measurement System	Average rectifying measurement
Function	DC voltage (DCV), AC voltage(ACV), Resistance (Ω), Continuity check(), Light check
Additional Function	Auto Range function, Manual Range function, Hold function, Auto Power Save function (APS), Overflow Warning function, Battery-Life Warning function
Display	TN type LCD, 1/4 duty, dynamic drive
Range Switching	Auto-range, manual range
Sampling Rate	2.5 S/s
Power Supply	Main battery: Rechargeable lithium battery Backup battery: Coin-shaped lithium battery, CR2032 (3VDC) × 1
Battery-Life Warning	Main battery exhausted: 🔋 lights (accuracy assured) Backup battery exhausted: 🔋 flashes (accuracy not assured)
Dimensions	Approx. 60W ×135H ×23D mm (without protrusions) (2.36"W × 5.31"H × 0.91"D) Cable length:Approx. 520 mm (20.47")
Mass	Approx.140 g (4.9 oz.) (including batteries)
Operating Environment	up to 2000 m (6562-ft.) ASL,Indoors, Pollution Degree 2
Operating Temperature & Humidity	0 to 40°C (32 to 104°F), at 80%RH or less (non-condensating)
Storage Temperature & Humidity	-20 to 50°C (-4 to 122°F), at 70%RH or less (non-condensating)
Accessories	Instruction Manual, carrying case, Coin-shaped lithium battery (CR2032) x1 (supplied with this product for monitor), Sleeves (red and black 1 piece for each)

General

Applicable Standards	Safety EN61010 EMC EN61326

Electrical Characteristics

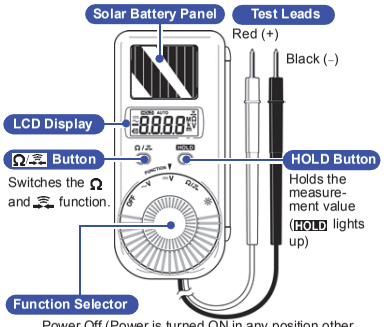
Temperature Characteristic	Measurement accuracy x 0.1 /°C (except 23°C±5°C)
Noise Suppression (50/60Hz)	NMRR:40dB or better(DCV) CMRR:100dB or better(DCV), 60dB or better(ACV)
Operating time and charging time	8 hours when charged for 3 hours at about 50,000 lx (DCV)
Backup battery life	Approx. 150 hours (DCV, continuous)
Dielectric strength	5550 Vrms sin (50/60Hz for one minute), between input and case
Maximum input Voltage	600 VDC/ 600 Vrms (sin) or 3×10^6VHz
Maximum rated voltage to earth	When sleeve is installed : CAT IV(300 V), CAT III (600 V) When sleeve is uninstalled: CAT II (600 V) (Anticipated Transient Overvoltage: 6000 V)
Rated Power	15 mVA

Accuracy (Accuracy guaranteed for one year at 23±5°C (73±9°F), 80%RH or less.) Battery low display 🔋 is not flash.

	Range	Accuracy	Notes
DC Voltage Measurement (**DCV**)	420.0 mV 4.200 V 42.00 V 420.0 V 600 V	±1.3%rdg.±4dgt.	100 MΩ or more Approx.11 MΩ Approx.10 MΩ Approx.10 MΩ Approx.10 MΩ
AC Voltage Measurement (**ACV**)	4.200 V 42.00 V 420.0 V 600 V	±2.3%rdg.±8dgt. (50 to 500 Hz)	Approx. 11 MΩ Approx. 10 MΩ Approx. 10 MΩ Approx. 10 MΩ
Resistance Measurement (Ω)	420.0 Ω 4.200 kΩ 42.00 kΩ 420.0 kΩ 4.200 MΩ 42.00 MΩ	±2.0%rdg.±4dgt. ±2.0%rdg.±4dgt. ±2.0%rdg.±4dgt. ±2.0%rdg.±4dgt. ±5.0%rdg.±4dgt. ±10.0%rdg.±4dgt.	3.4V or less. 0.7 V typ. 0.5 V typ. 0.5 V typ. 0.5 V typ. 0.5 V typ.
Continuity Check ()	420.0Ω	±2.0%rdg.±4dgt.	3.4V or less Threshold level (buzzer sounds) : 50Ω±40Ω
Light check	4200		"1000" is displayed at approx. 50,000lx

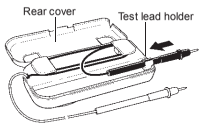
Overload protection is 600V DC/AC rms (sine wave) or 3×10^6 VHz (for 1 min.) for all functions and ranges.
dgt.: resolution (The smallest displayable unit, i.e., the input value that causes the digital display to show a "1".)
rdg.: reading value (The value currently being measured and indicated on the measuring product)

Parts Names



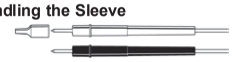
Using the Test Lead Holder

Use the test lead holder to secure the test lead probe in place.



1. Open the rear cover.
2. Unwind the extra lead.
3. Insert the test lead probe into the test lead holder.
4. Shut the rear cover.

Handling the Sleeve



⚠DANGER

Removable sleeves are attached to the metal pins at the ends of the test leads. To prevent a short circuit accident, be sure to use the test leads with the sleeves attached when performing measurements in the CAT III and CAT IV measurement categories. Remove the sleeves from the test leads when performing measurements in the CAT II measurement category.
For details on measurement categories, see "Measurement categories" in the instruction manual.

⚠CAUTION

- The tips of the metal pins are sharp, so take care not to injure yourself.
- When performing measurements with the sleeves attached, be careful to avoid damaging the sleeves.
- If the sleeves are inadvertently removed during measurement, be especially careful in handling the test leads to avoid electric shock.

Functions

Auto Range Function (⏦ V/ ⎓ V/Ω)	The Autoranging function automatically selects the optimum measurement range. (" AUTO" lights up)
Manual Range Function (⏦ V/ ⎓ V/Ω)	Turn on the power while pressing the **HOLD** button and then press the Ω/⦁))) button to select the range. ("AUTO" is turned off)) The Manual ranging function is active until the 3245-60 is turned off.
Hold Function (All measurement)	Press the **HOLD** button to hold the measurement value. (HOLD lights up) To cancel the hold mode: Press the **HOLD** button again, or turn the Function Selector.
Auto Power Save Function (All measurement)	Approximately 30 minutes after completing final operation, the measurement product automatically enters Power Save mode. Exiting the Power Save state: turn off the power once. The auto power save function cannot be canceled.
Overflow Display Function (⏦ V/ ⎓ V/ Ω /⦁))))	When the input exceeds the measurement range, "OF" is displayed.

Measurement Procedures

⚠DANGER

Observe the following precautions to avoid electric shock.
- **Always verify the appropriate setting of the Function Selector before connecting the test leads.**
- **Disconnect the test leads from the measurement object before switching the Function Selector.**

⚠DANGER

- **Never apply voltage to test leads when the Resistance or Continuity Check functions are selected. Doing so may damage the product and result in personal injury. To avoid electrical accidents, remove power from the circuit before measuring.**

Pre-Operation inspection

To avoid the possibility of electric shock or incorrect measurement, check the following items before using the instrument.
If the operation check reveals any abnormalities, stop the check immediately and do not use the instrument.

⚠WARNING

To prevent an electric shock accident, confirm that the white portion (insulation layer) inside the cable is not exposed. If a color inside the cable is exposed, do not use the cable. Contact your dealer for repair.

- For voltage measurement, short the test leads and check that 0 V is displayed.
- For Measuring Resistance or Continuity Check, short the test leads and check that 0 Ω is displayed.
- Measure a test item with a known value (battery, AC supply, resistor, etc.) to confirm that the known value can be displayed.

NOTE

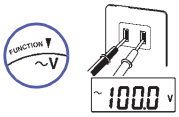
Periodic calibration and inspecton is necessary in order to ensure that this instrument operates according to its product specifications.

Voltage Measurement

⚠DANGER

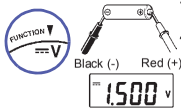
- **The maximum input voltage is 600 V DC/ 600 Vrms(sin) or 3x10⁶ V•Hz. Attempting to measure voltage in excess of the maximum input could destroy the product and result in personal injury or death.**
- **To avoid electrical shock, be careful to avoid shorting live lines with the test leads.**
- **For safety, test lead connections must always be made at the secondary side of a circuit breaker.**
- **The maximum rated voltage between input terminals and ground is CAT IV (300 V), CAT III (600 V), CAT II (600 V. Attempting to measure voltages exceeding CAT IV (300 V), CAT III (600 V), CAT II (600 V) with respect to ground could damage the product and result in personal injury.**

AC Voltage Measurement



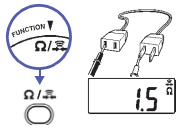
1. Move the Function Selector to the ⏦V position.
2. Connect the test leads to the measurement object, and read the indicated value. When measuring AC voltage, the polarity of leads can be ignored.

DC Voltage Measurement



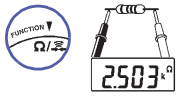
1. Move the Function Selector to the ⎓V position.
2. Connect the test leads to the measurement object, and read the indicated value. Connecting the leads of negative and positive side oppositely, "-" is displayed.

Continuity Check



1. Move the Function Selector to the Ω/⦁))) position and press the Ω/⦁))) button. (⦁))) lights up)
2. Connect the test leads to the measurement object. When the continuity is established, the beeping sounds.

Resistance Measurement



1. Move the Function Selector to the Ω/⦁))) position.
2. Connect the test leads to the measurement object, and read the indicated value.

Recharging and Replacing the Batteries

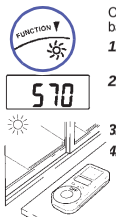
Recharging the Main Battery

⚠CAUTION

- Do not charge the unit outdoors where it will be exposed to direct sunlight, or place on the dashboard of automobiles. If the unit gets hot, the case may be disfigured or the unit damaged.
- You cannot charge the main battery when power is on. When charging, power the unit off.
- If the solar battery panel is soiled, you cannot charge the battery.

NOTE

- If the B mark lights, the internal main battery (rechargeable battery) is exhausted. If this occurs, the internal backup battery is used as a power source.
- If you charge the main battery according to the Instruction Manual and battery life is shorter than usual, the battery may be deteriorated. Please have the main battery replaced at the place where you purchased the unit.



Check the amount of light and charge the battery.

1. Move the Function Selector to the ☼ position
2. Place the 3245-60 with the solar battery panel facing the light, such as, near a window, but avoid direct sunlight.
3. Read the indicated value.
4. Turn off the power to charge. The main battery cannot be charged while the power is on. For charging time, refer to the table below.

Approximate charging and operating time

Display	Charging time	Operating time (approx.) *1	Illuminance (approx.)
1000 or more	5 hours	10 hours	50,000 lx or more
	3 hours	8 hours	
	1 hours	3 hours	
500	5 hours	5 hours	25,000 lx
100	10 hours	2 hours	5,000 lx
10	10 hours	10 minutes	1,000 lx

*1:Operating time is typical for DCV.

Replacing the Backup Battery and Disposing of the Main Battery

⚠WARNING

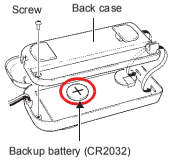
- **To avoid electric shock when replacing the batteries, first disconnect the test leads from the object to be measured.**
- **Before replacing the batteries, make sure that the Function Selector is OFF.**
- **Be sure to insert them with the correct polarity. Otherwise, poor performance or damage from battery leakage could result.**
- **Replace batteries only with the specified type. (Coin-shaped lithium battery CR2032)**
  If other battery is used, they may explode.
- **After replacing the batteries, replace the cover and screws before using the product.**
- **Battery may explode if mistreated. Do not short-circuit, recharge, disassemble or dispose of in fire.**
- **Handle and dispose of batteries in accordance with local regulations.**
- **Keep batteries away from children to prevent accidental swallowing.**
- **When disposing of this product, remove the main battery (lithium batery) and dispose of battery and product in accordance with local regulations.**

NOTE

- Make sure you use the unit with the backup battery installed. If the backup battery is not installed, the unit will not function properly.
- If the B mark flashes, the back up battery is exhausted. Replace the backup battery. In this case, the internal main battery is exhausted and must be charged in a well-lit place.

Replacing the Backup Battery

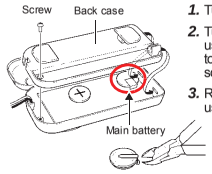
Necessary tool:
Precision Phillips screwdriver, Coin-shaped lithium battery (CR2032)



1. Turn OFF the power.
2. Turn the 3245-60 over and use a Phillips screwdriver to remove the one retaining screw from the back case.
3. Replace the CR2032 battery. Make sure the polarity is correct.
4. Mount the back case and tighten the retaining screw. After replacing, charge the main battery.

Disposing of the Main Battery

Necessary tool:
Precision Phillips screwdriver, wire cutter



1. Turn OFF the power.
2. Turn the 3245-60 over and use a Phillips screwdriver to remove the one retaining screw from the back case.
3. Remove the main battery using the wire cutter.

CALIFORNIA, USA ONLY
This product contains a CR Coin Lithium Battery which contains Perchlorate Material - special handling may apply.