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Southwire™

TOOLS & EQUIPMENT

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Contents Made in China

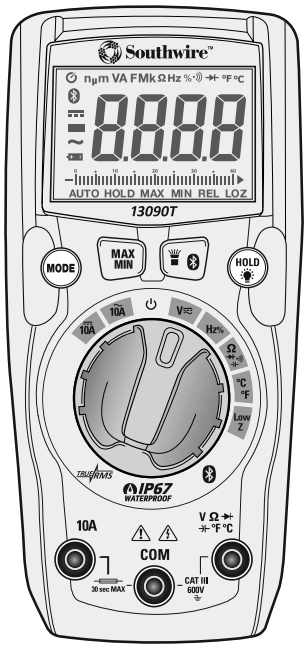
Product distributed by Southwire Company, LLC
One Southwire Drive, Carrollton, GA 30119

3/16 Rev. 0
13090T manual

Southwire™

TOOLS & EQUIPMENT

Operating Instructions
13090T True RMS Multimeter with MApp™ Mobile App



Bluetooth™

IP67 WATERPROOF

CAT III 600V UL61010-1 SAFETY RATED

C UL US LISTED
TESTING EQUIPMENT
E361819

Instrucciones completas de operación están disponibles en español en la página de exhibición del producto en SouthwireTools.com.

• actual manual size 4.25”W X 5.6875”H

Introduction

The Southwire 13090T wirelessly transmits data to the MApp™ mobile app via Bluetooth® technology allowing you to view, save, organize and share datalogs and take measurements from a safe distance. Visit nextgenmeters.southwiretools.com for mobile app download information. Functions include AC/DC voltage and current, resistance, continuity, capacitance, frequency, duty cycle, temperature, and diode test. True RMS readings provide accurate AC measurements and a Low Z setting eliminates false readings caused by “ghost” voltages. The 13090T also offers the added convenience of a built-in LED flashlight. This meter is fully tested and calibrated and, with proper use, will provide many years of reliable service.

⚠WARNINGS

- Read, understand and follow Safety Rules and Operating Instructions in this manual before using this meter.
- The meter’s safety features may not protect the user if not used in accordance with the manufacturer’s instructions.
- Ensure that the test leads are fully seated in the input jacks and keep fingers away from the metal probe tips when taking measurements.
- Before changing functions using the selector switch, always disconnect the test leads from the circuit under test.
- Use only UL listed test leads with the proper safety category rating.
- Comply with all applicable safety codes. Use approved personal protective equipment when working near live electrical circuits - particularly with regard to arc-flash potential.
- Use caution on live circuits. Voltages above 30 V AC rms, 42 V AC peak, or 60 V DC pose a shock hazard.
- Do not use if the meter or test leads appear damaged.
- Verify operation before using meter by measuring a known live voltage.
- Do not use the meter in wet or damp environments or during electrical storms.
- Do not use the meter near explosive vapors, dust or gasses.
- Do not use the meter if it operates incorrectly. Protection may be compromised.
- Do not operate meter while Low Battery warning is on. Replace batteries immediately.
- When replacing the battery or fuses, be sure to secure the battery compartment door firmly to maintain the waterproof and dust proof integrity of the meter. Loose or overtightened screws, or an improperly seated o-ring may compromise the meter's water and dust ingress protection.
- Do not apply voltage or current that exceeds the meter’s maximum rated input limits.

REGISTER YOUR PRODUCT

Register your product purchase at **www.southwiretools.com**. At Southwire, we are dedicated to providing you with the best customer experience. By following a few quick steps to register, you can experience quicker service, more efficient support, and receive information on our future products. Simply provide your model number, serial number, and just a few pieces of information about yourself – it is that quick and easy.

LIMITED WARRANTY AND LIMITATION OF LIABILITY ON SOUTHWIRE METERS & TESTERS

Southwire Company, LLC warrants this product to be free from defects in material and workmanship for two years from the date of purchase. This warranty does not cover fuses, disposable batteries, or damage arising from an accident, neglect, misapplication, contamination, modification, improper maintenance or repair, operation outside of specifications, or abnormal handling of the product. Southwire's sole liability, and the purchaser's exclusive remedy, for any breach of this warranty is expressly limited to Southwire's repair or replacement of the product. Whether Southwire repairs or replaces the product will be a determination that Southwire makes at its sole discretion.

SOUTHWIRE MAKES NO WARRANTY THAT THE PRODUCT WILL BE MERCHANTABLE OR FIT FOR ANY PARTICULAR PURPOSE. SOUTHWIRE MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED, OTHER THAN THE WARRANTY SPECIFICALLY SET FORTH HEREIN. SOUTHWIRE WILL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL, INDIRECT, SPECIAL, OR PUNITIVE DAMAGES FOR ANY BREACH OF THIS WARRANTY.

This warranty is void if this product is used for rental purposes. No product reseller is authorized to extend any other warranty on Southwire's behalf relating to this product, and no such reseller warranty will be binding on Southwire. If you have a warranty claim, or if the product needs to be serviced during or after the warranty period set forth above, please contact the Customer Service Department at 855-SWTOOLS (855-798-6657). The sender is responsible for all shipping, freight, insurance, and packaging costs associated with sending a product to Southwire. Southwire will not be responsible for lost or damaged products returned pursuant to this warranty.

All products returned to Southwire under this warranty should be mailed to:

Southwire Company, LLC
Attention: Tool Warranty Return
840 Old Bremen Road
Carrollton, GA 30117

Input Limits

Function	Maximum Input
Voltage AC or DC	600V AC RMS/600V DC
Low Z	300V AC RMS/300V DC
Current AC or DC	10A 600V fast acting fuse (30 seconds max. every 15 minutes on 10A range)
Resistance, Continuity, Diode Test, Capacitance, Frequency, Duty Cycle	600V AC RMS/600V DC
Temperature	300V AC RMS/300V DC

General Specifications

Insulation	Class 2, Double insulation
Enclosure	Double Molded, IP67 (waterproof and dust tight with plugs or test leads inserted into input jacks)
Diode Test	Test current 1.5mA max., open circuit voltage 3V typical
Continuity Test	Audible signal if the resistance is approx. 50Ω or less
Low Battery Indication	"  " is displayed
Display	4000 count LCD display
Over Range Indication	"OL" is displayed
Polarity	Minus symbol "-" is displayed for negative polarity
Measurement Rate	2 readings per second, nominal
Auto Power Off	After approx. 15 minutes of inactivity
Input Impedance	10MΩ AC/DC Voltage
Low Z	Approx. 3kΩ input impedance
AC Response	True RMS
AC Bandwidth	50 to 60Hz
Batteries	Three "AAA" 1.5V batteries
Fuse	10A/600V (5 x 20mm) fast blow
Operating Environment	32°F to 104°F (0°C to 40°C), < 70% relative humidity
Storage Environment	14°F to 140°F (-10°C to 60°C) < 80% relative humidity
Operating Altitude	2000 meters maximum
Dimensions/ Weight	5.8" x 2.7" x 2.0"/0.70lb) (147 x 68 x 50mm/318g)
Safety	Complies with UL 61010-1 v.3 for measurement Category III 600V, Polution Degree 2

International Safety Symbols

⚠	Potential danger. Indicates the user must refer to the manual for important safety information
⚡	Indicates hazardous voltages may be present
▣	Equipment is protected by double or reinforced insulation
MAX 600V	Indicates the terminal(s) so marked must not be connected to a circuit where the voltage with respect to earth ground exceeds the maximum safety rating of the meter

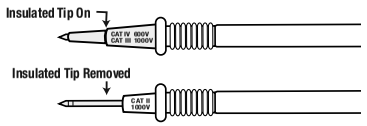
Safety Category Ratings

Category Rating	Brief Description	Typical Applications
CAT II	Single phase receptacles and connected loads	- Household appliances, power tools - Outlets more than 30ft (10m) from a CAT III source - Outlets more than 60ft (20m) from a CAT IV source
CAT III	Three phase circuits and single phase lighting circuits in commercial buildings	- Equipment in fixed installations such as 3-phase motors, switchgear and distribution panels - Lighting circuits in commercial buildings - Feeder lines in industrial plants - Any device or branch circuit that is close to a CAT III source

The measurement category (CAT) rating and voltage rating is determined by a combination of the meter, test probes and any accessories connected to the meter and test probes. The combination rating is the LOWEST of any individual component.

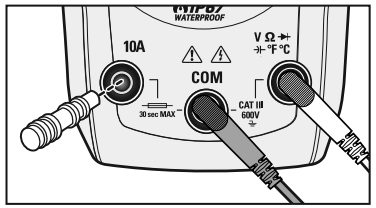
Test Leads

⚠**WARNING:** Operation is limited to CAT II applications when the insulated tips are removed from one or both test probes. Refer to Input Limits section in this manual for maximum voltage ratings.



IP67 Rating

NOTE: Meter is waterproof and dust tight with supplied plugs or test leads inserted into input jacks.



Specifications cont.

Function	Range	Resolution	Accuracy ± (% of reading + digits)
Frequency	9.999Hz	0.001Hz	±(1.0% +5 digits)
	99.99Hz	0.01Hz	
	999.9Hz	0.1Hz	
	9.999kHz	1Hz	
	99.99kHz	10Hz	
	999.9kHz	100Hz	±(1.2% +5 digits)
	9.999MHz	1kHz	

Input Protection: 600V AC RMS or 600V DC
Sensitivity: >8V RMS

Function	Range	Resolution	Accuracy ± (% of reading + digits)
Duty Cycle	1.0% to 99.9%	0.1%	±(1.2% +2 digits)

Input Protection: 600V AC RMS or 600V DC
Pulse Width: 0.1 to 100mS
Frequency Range: 5Hz to 10kHz
Sensitivity: >8V RMS

Function	Range	Resolution	Accuracy ± (% of reading + digits)
Temperature	0°F to 1400°F	0.1ºF	±(2.0% +9ºF)
	-18°C to 760°C	0.1ºC	±(2.0% +5ºC)

Input Protection: 300V AC RMS or 300V DC

Specifications cont.

Function	Range	Resolution	Accuracy ± (% of reading + digits)
AC Current	4.000A	1mA	±(2.5% +3 digits)
	10.00A	10mA	

All AC current ranges are specified 5% to 100% of range
Overload Protection: 10A/600V Fuse
AC Response: 50 to 60Hz

Function	Range	Resolution	Accuracy ± (% of reading + digits)
DC Current	4.000A	1mA	±(2.0% +3 digits)
	10.00A	10mA	

Overload Protection: 10A/600V Fuse

Function	Range	Resolution	Accuracy ± (% of reading + digits)
Resistance	400.0Ω	0.1Ω	±(1.5% +5 digits)
	4.000kΩ	1Ω	
	40.00kΩ	10Ω	
	400.0kΩ	100Ω	
	4.000MΩ	1kΩ	±(2.0% +10 digits)
	40.00MΩ	10kΩ	

Input Protection: 600V AC RMS or 600V DC

Function	Range	Resolution	Accuracy ± (% of reading + digits)
Capacitance	40.00nF	10pF	±(5.0% +35 digits)
	400.0nF	100pF	±(3.0% +5 digits)
	4.000µF	0.001µF	
	40.00µF	0.01µF	
	400.0µF	0.1µF	
	4000µF	1µF	±(5% +5.0 digits)

Input Protection: 600V AC RMS or 600V DC

FCC ID: 2AENI-13090T / IC: 20144-13090T

FCC Statement

Warning: Changes or modifications to this unit not expressly approved by the Southwire Co. could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

The device must not be co-located or operating in conjunction with any other antenna or transmitter.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

IC Statement

This device complies with RSS247 of Industry Canada. This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Radiation Exposure Statement: This product complies with the Canadian portable RF exposure limit set forth for an uncontrolled environment and is safe for its intended operation as described in this manual. Further RF exposure reduction can be achieved if the product is kept as far as possible from the user's body.

Complies with IDA Standards DA107392

Déclaration de conformité d'Industrie Canada

Leprésent appareil est conforme aux CNR d'Industrie Canada applicable aux appareils radio Exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, meme si le brouillage est susceptible d'en compromettre le fonctionnement."

Déclaration d'exposition aux radiations : Ce produit est conforme aux limites d'exposition pour les appareils portables RF pour le Canada établies pour un environnement non contrôlé. Le produit est sûr pour un fonctionnement comme décrit dans ce manuel. La réduction aux expositions RF peut être augmentée si l'appareil peut être conservé aussi loin que possible du corps de l'utilisateur.

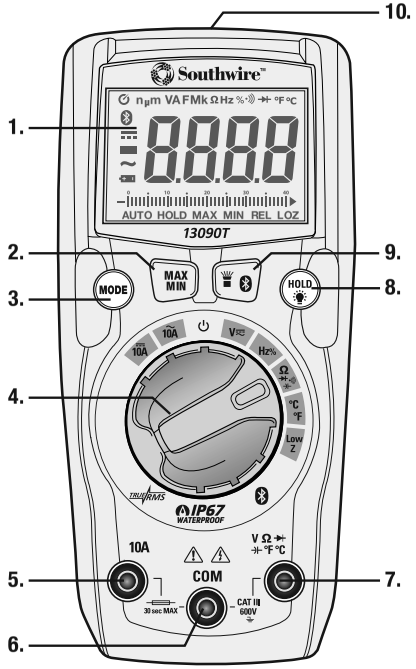
Maintenance

This Multimeter is designed to provide years of dependable service, if the following care instructions are performed:

1. KEEP THE METER DRY. If it gets wet, wipe it off.
2. USE AND STORE THE METER IN NORMAL TEMPERATURES. Temperature extremes can shorten the life of the electronic parts and distort or melt plastic parts.
3. HANDLE THE METER GENTLY AND CAREFULLY. Dropping it can damage the electronic parts or the case.
4. KEEP THE METER CLEAN. Wipe the case occasionally with a damp cloth. DO NOT use chemicals, cleaning solvents, or detergents.
5. USE ONLY FRESH BATTERIES OF THE RECOMMENDED SIZE AND TYPE. Remove old or weak batteries so they do not leak and damage the unit.
6. IF THE METER IS TO BE STORED FOR A LONG PERIOD OF TIME, the batteries should be removed to prevent damage to the unit.

Meter Description

1. LCD display
2. MAX/MIN button
3. MODE button
4. Rotary function switch
5. 10A input jack
6. COM input jack
7. V/Ω/⇥/⇉⊢/°F °C input jack
8. HOLD Backlight button
9. Flashlight/Bluetooth® button
10. Flashlight



Specifications

Accuracy is given at 65°F to 83°F (18°C to 28°C), less than 70% relative humidity

Function	Range	Resolution	Accuracy ± (% of reading + digits)
AC Voltage	4.000V	1mV	±(1.0% +5 digits)
	40.00V	10mV	±(1.2% +5 digits)
	400.0V	0.1V	±(1.5% +5 digits)
	600V	1V	

All AC voltage ranges are specified from 5% of range to 100% of range
Input Protection: 600V AC RMS or 600V DC
Input Impedance: 10MΩ
AC Response: 50 to 60Hz

Function	Range	Resolution	Accuracy ± (% of reading + digits)
Low Z AC Voltage	4.000V	1mV	±(1.5% +5 digits)
	40.00V	10mV	
	400.0V	0.1V	

All AC voltage ranges are specified from 5% of range to 100% of range
Input Protection: 300V AC RMS or 300V DC
Input Impedance: approx. 3kΩ
AC Response: 50 to 60Hz

Function	Range	Resolution	Accuracy ± (% of reading + digits)
DC Voltage	400.0mV	0.1mV	±(1.0% + 8 digits)
	4.000V	1mV	±(1.0% + 3 digits)
	40.00V	10mV	
	400.0V	0.1V	
	600V	1V	±(1.2% + 3 digits)

Input Protection: 600V RMS or 600V DC
Input Impedance: 10MΩ

Function	Range	Resolution	Accuracy ± (% of reading + digits)
Low Z DC Voltage	400.0mV	0.1mV	±(1.5% + 5 digits)
	4.000V	1mV	
	40.00V	10mV	
	400.0V	0.1V	

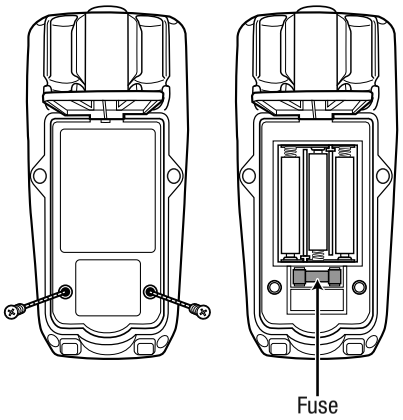
Input Protection: 300V AC RMS or 300V DC
Input Impedance: approx. 3kΩ

Operation cont.

Fuse Replacement

⚠WARNINGS: To avoid electric shock, remove the test leads from the meter before removing the battery/fuse cover.

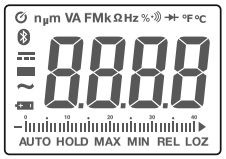
1. Lift up the tilt stand.
2. Loosen the Phillips screws on the battery/fuse cover.
3. Remove the battery/fuse cover.
4. Gently remove fuse and install new fuse into the holder.
5. Always use a UL recognized fuse of the proper size and value: 10A/600V (5 x 20mm) fast blow.
6. Install the battery cover and tighten the screws



⚠WARNING: To avoid electric shock, do not operate meter until the battery/fuse cover is securely fastened to the meter.

⚠WARNING: When replacing the battery or fuses, be sure to secure the battery compartment door firmly to maintain the waterproof and dust proof integrity of the meter. Loose or overtightened screws, or an improperly seated o-ring may compromise the meter's water and dust ingress protection.

Symbols Used on LCD Display



V	Volts
A	Amperes
~	Alternating current
⎓	Direct current
–	Minus sign
Hz	Hertz (frequency)
%	Percent (duty cycle)
Ω	Ohms
•))	Continuity
⇻	Diode test
F	Farads (capacitance)
°F	Degrees Fahrenheit
°C	Degrees Celsius
n	nano (10^{-9})
µ	micro (10^{-6})
m	milli (10^{-3})
k	kilo (10^{3})
M	mega (10^{6})
OL	Overload
◷	Auto Power Off
▭	Low battery
AUTO	Autoranging
HOLD	Display hold
LOZ	Low Z (Impedance)
MAX/MIN	Maximum/Minimum
ᛒ	Bluetooth®

Operation

MODE BUTTON
Used to select AC or DC voltage, Frequency or Duty Cycle, Ohms, Diode Test, Continuity or Capacitance, and °F or °C.

MAX/MIN Button

1. Momentarily press the MAX/MIN button to activate the MAX/MIN mode. “MAX” will appear on the LCD display and the meter will display and hold the highest reading. The meter will update the reading when a higher “max” occurs.
2. Momentarily press the MAX/MIN button again to view the lowest reading. “MIN” will appear on the LCD display and the meter will display and hold the lowest reading. The meter will update the reading when a lower “min” occurs.
3. Press and hold the MAX/MIN button to end MAX/MIN and return to normal operation.

NOTE: MAX/MIN does not work on Frequency, Duty Cycle, Diode Test, Continuity and Capacitance.

FLASHLIGHT / Bluetooth® Button
Momentarily press the button to turn the flashlight on and off.

Bluetooth® technology allows readings to be displayed and stored on mobile devices. To activate Bluetooth® function, press and hold the button until the “ ” symbol appears on the LCD display. Bluetooth® should be disabled when not connected to a mobile device in order to conserve battery power. To turn off Bluetooth® function, press and hold the button until the “ ” symbol no longer appears on the display.

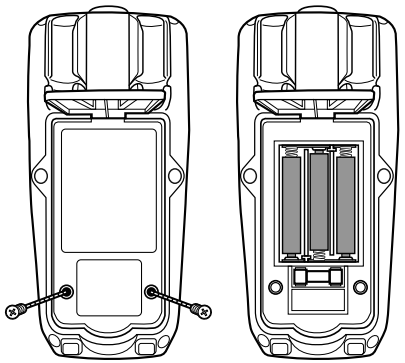
Visit nextgenmeters.southwiretools.com for mobile app download information.

Operation cont.

Battery Replacement

⚠WARNINGS: To avoid electric shock, remove the test leads from the meter before removing the battery/fuse cover.

1. Lift up the tilt stand.
2. Loosen the Phillips screws on the battery/ fuse cover.
3. Remove the battery/fuse cover.
4. Replace the batteries with three AAA batteries.
5. Observe proper polarity as shown inside battery compartment.
6. Install the battery cover and tighten the screws.

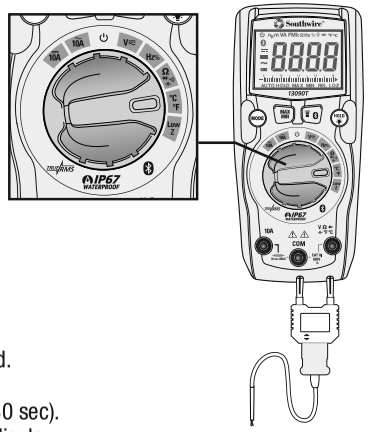


⚠WARNING: To avoid electric shock, do not operate the meter until the battery/fuse cover is securely fastened to the meter.

⚠WARNING: When replacing the battery or fuses, be sure to secure the battery compartment door firmly to maintain the waterproof and dust proof integrity of the meter. Loose or overtightened screws, or an improperly seated o-ring may compromise the meter's water and dust ingress protection.

Temperature Measurements

⚠WARNINGS: Do not touch the temperature probe to live circuits.



1. Set the rotary function switch to the **°F °C** position.
2. Press the MODE button to select readings in **°F** or **°C**.
3. Connect the Temperature Probe to the Banana Plug Adapter. Note the – and + markings on the adapter. Connect the adapter to the meter, making sure the – side goes into the **COM** input jack and the + side goes into the **°F °C** input jack.
4. Touch the tip of the Temperature Probe to the object being measured. Keep the probe touching the object until the reading stabilizes (about 30 sec).
5. Read the temperature on the LCD display.

HOLD/Backlight button

To freeze the reading on the display, momentarily press the **HOLD** button. "HOLD" will appear on the LCD display while the reading is being held. Momentarily press the **HOLD** button again to return to normal operation.

The backlight illuminates the LCD display when the ambient light is too low to view the displayed readings. To turn on, press the **HOLD** button until the backlight turns on. To turn off, press the **HOLD** button until the backlight turns off.

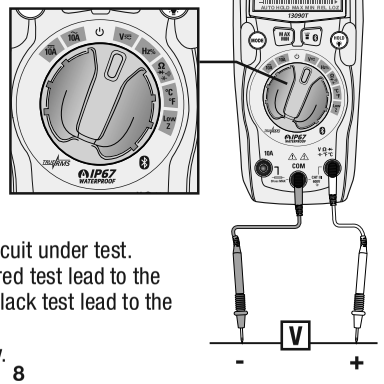
Auto Power Off

To conserve battery power, the meter automatically turns off after approximately 15 minutes. To disable Auto Power Off, set the rotary function switch to the Off ⏻ position. Press and hold the **MODE** button while setting the rotary function switch to the desired function.

Release the **MODE** button when the symbol no longer appears on the LCD display. Auto Power Off can be restored by turning the meter off. As soon as the meter is turned back on, the symbol will reappear indicating Auto Power Off is active.

AC/DC Voltage Measurements

⚠WARNING: Observe all safety precautions when working on live voltages.



1. Set the rotary function switch to the **V** position.
2. Press the MODE button to select AC or DC voltage. The AC "~" or DC " ⎓ " symbol will appear on the LCD display.
3. Insert the black test lead into the **COM** input jack and the red test lead into the **V** input jack.
4. Touch the test lead probes to the circuit under test. If measuring DC voltage, touch the red test lead to the positive side of the circuit and the black test lead to the negative side of the circuit.
5. Read the voltage on the LCD display.

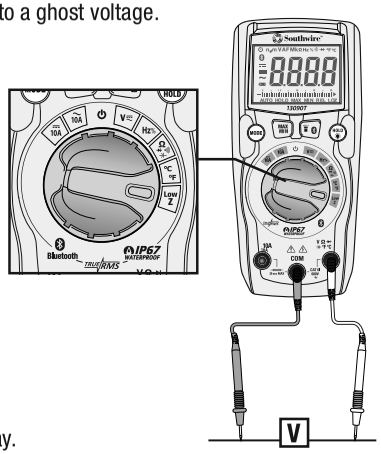
Operation

Low Z AC/DC Voltage

⚠WARNING: Observe all safety precautions when working on live voltages. Do not connect to circuits that exceed 300V when the meter is set to Low Z. Do not use Low Z when testing circuits that could be harmed by this function's low input impedance.

Low Z is used to check for "ghost" voltage. Ghost voltages are present when non-powered wires are in close proximity to powered wires. Capacitive coupling makes it appear that non-powered wires are connected to a real source of voltage. The Low Z setting places a load on the circuit, which greatly reduces the voltage reading when connected to a ghost voltage.

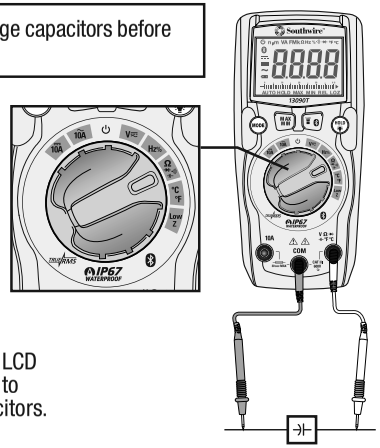
1. Set the rotary function switch to the **Low Z** position.
2. Press the **MODE** button to select AC or DC voltage. The AC "~" or DC "⎓" symbol will appear on the LCD display.
3. Insert the black test lead into the **COM** input jack and the red test lead into the **V** input jack.
4. Touch the test leads to the circuit under test. If measuring DC voltage, touch the red test lead to the positive side of the circuit and the black test lead to the negative side of the circuit.
5. Read the voltage on the LCD display.



Operation cont.

Capacitance Measurements

⚠WARNING: Safely discharge capacitors before taking capacitance measurements.



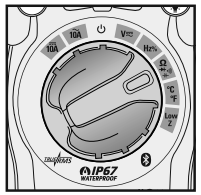
1. Set the rotary function switch to the Ω position
2. Insert the black test lead into the **COM** input jack and the red test lead into the **Ω** input jack.
3. Press the **MODE** button until the "**nF**" symbol appears on the LCD display.
4. Touch the test lead probes to the capacitor under test.
5. Read the capacitance value on the LCD display. It may take up to a minute to get a stable reading on large capacitors.

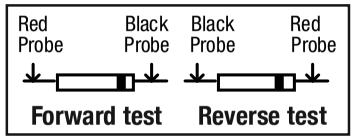
Operation cont.

Diode Test

⚠WARNING: Never test diodes in a live circuit

1. Set the rotary function switch to the Ω position.
2. Press the MODE button until the "⊣" symbol appears on the LCD display.
3. Insert the black test lead into the **COM** input jack and the red test lead into the **Ω** input jack.
4. Touch the test lead probes to the diode under test.
5. Forward voltage will indicate 0.4 to 0.7 on the display. Reverse voltage will indicate "**OL**". Shorted devices will indicate near 0 and an open device will indicate "**OL**" in both polarities.

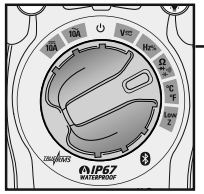


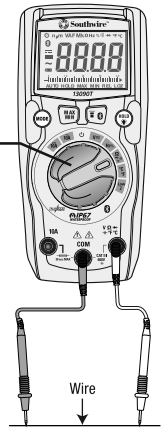


Continuity

⚠WARNING: Never test continuity on a live circuit.

1. Set the rotary function switch to the Ω position.
2. Press the **MODE** button until the "•))" symbol appears on the LCD display.
3. Insert the black test lead into the **COM** input jack and the red test lead into the **Ω** input jack.
4. Touch the test lead probes to the device or wire under test.
5. A beeper will sound if the resistance is approximately 50Ω or less and the resistance value will be shown on the LCD display.



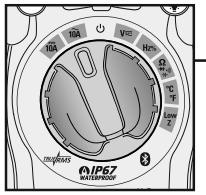


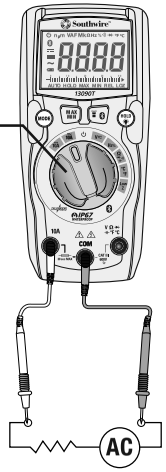
Operation cont.

AC Current Measurements

⚠WARNING: Observe all safety precautions when working on live circuits. Do not measure current on circuits that exceed 600V. Measurements in the 10A range should be limited to 30 seconds maximum every 15 minutes.

1. Set the rotary function switch to the 10A position.
2. Insert the black test lead into the **COM** input jack and the red test lead into the **10A** input jack.
3. Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
4. Touch the test lead probes in series with the circuit being measured.
5. Apply power to the circuit.
6. Read the current on the LCD display.

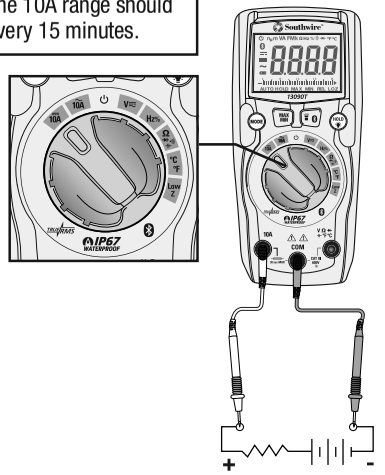




Operation cont.

DC Current Measurements

⚠WARNING: Observe all safety precautions when working on live circuits. Do not measure current on circuits that exceed 600V. Measurements in the 10A range should be limited to 30 seconds maximum every 15 minutes.

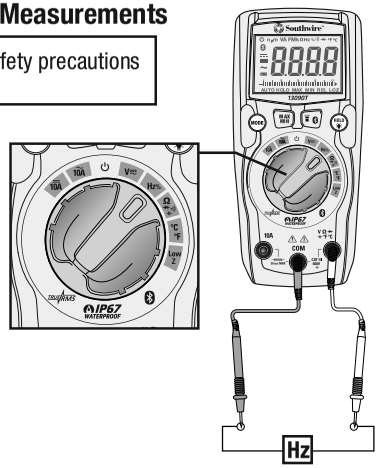


1. Set the rotary function switch to the **10A** position.
2. Insert the black test lead into the **COM** input jack and the red test lead into the **10A** input jack.
3. Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
4. Touch the test lead probes in series with the circuit being measured. Touch the red probe to the positive side of the circuit and touch the black probe to the negative side of the circuit.
5. Apply power to the circuit.
6. Read the current on the LCD display.

Operation cont.

Frequency and % Duty Cycle Measurements

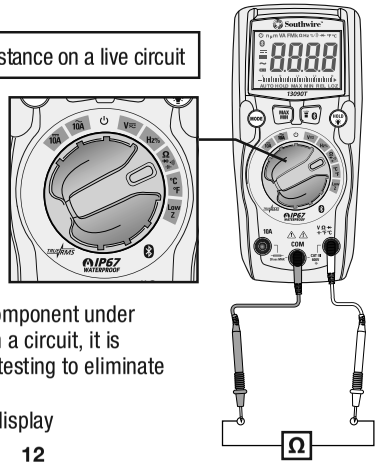
⚠WARNING: Observe all safety precautions when working on live voltages.



1. Set the rotary function switch to the **HZ %** position.
2. Press the MODE button to select frequency or **%** duty cycle. The "**Hz**" or "**%**" symbol will appear on the LCD display.
3. Insert the black test lead into the **COM** input jack and the red test lead into the **V** input jack.
4. Touch the test lead probes to the circuit under test.
5. Read the frequency or **%** duty cycle on the LCD display.

Resistance Measurements

⚠WARNING: Never test resistance on a live circuit



1. Set the rotary function switch to the **Ω** position.
2. Press the **MOD**E button until the "**Ω**" symbol appears on the LCD display.
3. Insert the black test lead into the **COM** input jack and the red test lead into the **Ω** input jack.
4. Touch the test lead probes to the component under test. If the component is installed in a circuit, it is best to disconnect one side before testing to eliminate interference with other devices.
5. Read the resistance in on the LCD display