Part No. 5989

LASER®

Digital Multimeter
with Temperature Probe

Instructions

RoHS Compliant

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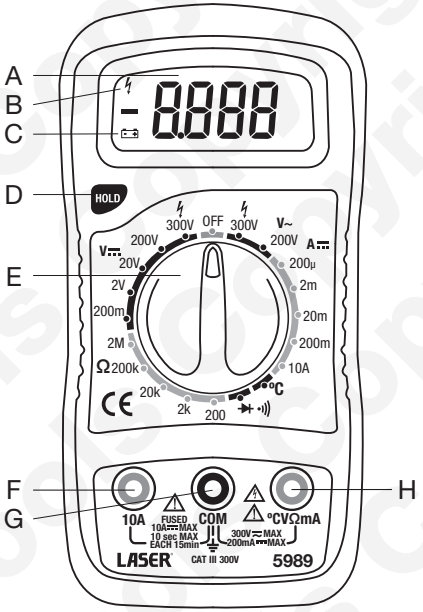
Introduction

The 5989 multimeter features large LCD display with large digital readout. Measures DC voltage and current, AC voltage, resistance, diode and continuity. Also features temperature measurement capability and data hold. Shock-resisting soft grip case with integral stand, suitable for tough workshop conditions.

This multimeter has been designed according to IEC 61010 concerning electronic measuring instruments with a measurement category III (CAT III 300V) and pollution degree 2.

Controls



Ref.	Description
A	Digital Display
B	Danger of Shock Symbol
C	Low Battery Alert Symbol
D	Data Hold Button
E	Function / Range Switch
F	10A Socket (Red Lead)
G	Common Socket (Black Lead)
H	Milliamps/Multifunction Socket (Red Lead)

Instructions

Testing DC Voltage:

1. Remove covers from test probe tips, insert black test lead into COM socket **(G)** and red test lead into °CVΩmA (multifunction) socket **(H)**.
2. Set the Function / Range rotary switch **(E)** to the desired V⎓ range. If the voltage to be measured is not known beforehand, set the range switch to the highest position and then turn it down range by range until the correct figure is obtained.
3. Touch the black test probe tip to the negative side of the circuit. Modern cars have negative earth (ground) electrical systems although some classic cars may still be operating with a positive earth system.
4. Touch the red test probe tip to the positive side of the circuit and read the voltage on the display. If the polarity is reversed, the display will show a (-) minus before the value.
5. Do not measure DC voltages if a motor or component on the circuit is being switched on and off; large voltage surges can occur that may damage the multimeter.

Instructions

Testing DC Current:

1. Remove covers from test probe tips, insert black test lead into COM socket **(G)** and red test lead into °CVΩmA (multifunction) socket **(H)**. If the current to be measured is between 200mA and 10A, connect the red test lead to the 10A socket **(F)** instead.
2. Set the Function / Range rotary switch **(F)** to the desired A⎓ range. If the voltage to be measured is not known beforehand, set the range switch to the highest position and then turn it down range by range until the correct figure is obtained.
3. Remove power from the circuit under test, then open up the circuit at the point where you intend to measure current.
4. Connect test leads in series with the circuit.
5. Apply power to the circuit and read the display.

Testing AC Voltage:

1. Remove covers from test probe tips, insert black test lead into COM socket **(G)** and red test lead into °CVΩmA (multifunction) socket **(H)**.
2. Set the Function / Range rotary switch **(E)** to the desired V~ range. If the voltage to be measured is not known beforehand, set the range switch to the highest position and then turn it down to the lower range until the correct figure is obtained.
3. Touch the red test probe tip to the positive side of the circuit and read the voltage on the display. If the polarity is reversed, the display will show a (-) minus before the value.

(**AC Testing Caution:** Risk of electric shock. The probe tips may not be long enough to contact live parts with a 240V outlet because the contacts are recessed deep in the outlets. **Make sure the probe tips are touching the metal** contacts before assuming that no voltage is present).

Testing Resistance:

1. Remove covers from test probe tips, insert black test lead into COM socket **(G)** and red test lead into °CVΩmA (multifunction) socket **(H)**.
2. Set the Function / Range rotary switch **(E)** to the desired Ω range.
3. Touch the test probes across the circuit or component under test. Components should be disconnected from their circuit so that the circuit does not interfere with the resistance reading.

(**Note:** While measuring resistance of 1MΩ or above, the meter may take a few seconds to stabilise — this is normal for high resistance readings).

(**Caution:** Risk of electric shock. Disconnect power to the unit under test and discharge all capacitors before taking any resistance measurements, If applicable, remove any batteries).

Instructions

Testing a Diode:

1. Remove covers from test probe tips, insert black test lead into COM socket **(G)** and red test lead into ºCVΩmA (multifunction) socket **(H)**.
2. Set the Function / Range rotary switch **(E)** to the ⊣◀ position.
3. Connect the test leads across the diode - red lead to the positive pole (anode) of the diode, black to the negative pole (cathode).
4. Read the forward voltage on the display. The multimeter will show the forward voltage drop between the two test leads. If the diode is reversed, the display shows 1. If both readings display 1, the device has gone open circuit.

(**Caution:** Risk of electric shock. Do not test a diode that has voltage on it.)

Audible Continuity:

1. Remove covers from test probe tips, insert black test lead into COM socket **(G)** and red test lead into ºCVΩmA (multifunction) socket **(H)**.
2. Set the Function / Range rotary switch **(E)** to the •))) position.
3. Touch the test probes to the wire or circuit you wish to check. If the wire or circuit has continuity, the audible signal will sound.

(C**aution:** Risk of electric shock. Never measure continuity on circuits or wires that have voltage on them.)

Measuring Temperture:

Note: Although the multimeter is rated for 0ºC to 1000ºC, the K type thermocouple supplied with the multimeter is only rated to 250ºC. To measure temperatures outwith that range, a higher rated professional thermocouple is required.

1. Set the Function / Range rotary switch **(E)** to the ºC position.
2. Connect the black plug of the K type thermocouple to the into COM socket **(G)** and red plug into into the ºCVΩmA (multifunction) socket **(H)**.
3. Touch the thermocouple probe to the object to be measured and read off the temperature.

(**Caution:** Risk of electric shock. Ensure that the thermocouple has been removed before changing to another function / measurement.)

Instructions

General Specifications:

Polarity:	Auto polarity indication (- on digital display).
Over range indication:	1 on digital display.
Auto zeroing function	
Sampling rate:	3 times per second (approximately).
Operating temperature:	0º - 40ºC
Storage temperature:	-10º - 50ºC
Battery:	Single 9V.
Low battery indication:	(Refer to diagram: symbol C on display.)

DC Voltage (autorange):

Range	Resolution	Accuracy
200mV	100µV	+/- (0.8% + 5)
2V	1mV	+/- (0.8% + 5)
20V	10mV	+/- (0.8% + 5)
200V	100mV	+/- (0.8% + 5)
300V	1V	+/- (1.0% + 5)

Input impedance: 1MΩ

Over Range Indication: If the voltage being measured is greater than 300V, the display may show a value, but the measurement error may be large.

AC Voltage (autorange):

Range	Resolution	Accuracy
200V	100mV	+/- (1.2% + 10)
300V	1V	

Input impedance: approx. 500KΩ
Frequency: 40Hz to 400Hz

Over Range Indication: If the voltage being measured is greater than 300V, the display may show a value, but the measurement error may be large.

DC Current:

Range	Resolution	Accuracy
200µA	0.1µA	+/- (1.0% + 5)
2mA	1µA	
20mA	10µA	
200mA	100µA	+/- (1.2% + 5)
10A	10mA	+/- (2.0% + 5)

Overload protection:

Fuse 1: 250mA / 300V, fast (for the ºCVΩmA multifunction socket protection).

Fuse 2: 10A/300V, fast (for the 10A socket protection).

Maximum allowable input current: 10A (for inputs >2A: do not make current measurements on the 10A scale for longer than 10 seconds in 15 minute intervals).

Over Range Indication: If the current being measured is greater than 10A, the display may show a value, but the measurement error may be large.

Resistance:

Range	Resolution	Accuracy
200Ω	0.1Ω	+/- (1.2% + 5)
2kΩ	1Ω	+/- (1.0% + 5)
20kΩ	10Ω	+/- (1.0% + 5)
200kΩ	0.1kΩ	+/- (1.0% + 5)
2MΩ	1kΩ	+/- (1.2% + 5)

Maximum open circuit voltage: 3.2V

Diode and audible Continuity:

Range	Description
⏩	The approximate forward voltage drop of the diode will be shown on the digital display.
•))	The built-in buzzer will sound if the resistance is less than approximately 50Ω. The buzzer may or may not sound if the resistance is between 50Ω and 120Ω. The buzzer will not sound if the resistance is more than 120Ω.

Temperature:

Range	Resolution	Accuracy
0°C - 1000 °C	1°C	+/- (3.0% + 3)

Note:

See note (above) on range of thermocouple supplied. Accuracy does not include error of thermocouple probe.

Accuracy specification assumes ambient temperature is stable to +/- 1°C. For ambient temperature changes of +/- 5°C, rated accuracy applies I hour after the temperature change.

Over Range Indication: If the temperature being measured is out of the range of 0°C - 1000°C, the display may show a reading, but the measurement error may be large.

Instructions

Replacing the battery

If the ‘low battery alert’ symbol **(C)** appears on the digital display it indicates that the battery should be replaced. To access the battery first peel back and remove the shock-resisting cover. Then remove three screws to release the rear case cover. The 9V battery can then be replaced.

Precautions

- Always refer to instructions before use.
- When using the multimeter please observe all normal safety precautions concerning protection against the dangers of electrical current.
- Do not used the test leads if they are damaged or the insulation or wires are bared in any way.
- Take care when working with voltages above 35V DC or 25V AC rms; these voltages are regarded as a shock hazard.
- Before rotating the Function / Range rotary switch (F) to another function, disconnect the test leads from the circuit under test.
- Do not use the multimeter in a potentially explosive atmosphere or where flammable gases or material are present.
- Do not perform resistance, diode or continuity tests on live circuits. Always discharge filter capacitors in power supplies and disconnect the power when making resistance or diode tests.
- Never apply voltage or current to the multimeter that the exceeds the specified maximum as shown in the tables above.
- Always refit the test probe covers when finished with meter.
- Observe standard workshop safety procedures when using the tester.
- Do not let the tester get wet or use in damp or wet conditions.

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Safety First. Be Protected.

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