Di-LOG
...measurably better

operating manual

DL9308/9

TRUE RMS AUTORANGING
DIGITAL MULTIMETER

EN
61010-1
CAT III
1000V

CE

This manual contains information that must be followed for operating the meter safely and maintaining the meter in a safe operating condition. If this meter is not used in the manner specified, the protection provided may be impaired.

⚠ **Warning!** Warns of potential danger, refer to the instruction manual to avoid personal injury or damage to the meter.

⚠ **Caution!** Dangerous voltage. Danger of electrical shock.

Continuous double or reinforced insulation complies with IEC536, class II.

CE Symbol of conformity, confirms conformity with relevant EU directives. The meter complies with EMC directives (89/336/EEC). Specifically standards EN 50081-1 and EN 50082-1 as well as the Low Voltage Directive (73/23/EEC) described in the standard EN 61010-1.

The meter has been designed in accordance with the safety regulations for electronic measuring instruments, EN 61010-1, IEC 61010.

Voltages above 75V DC or 50V AC may constitute a serious shock hazard.

Before using the meter check for physical damage to the casing in particular around the connectors. If the case is damaged do not use the meter.

Check the test leads for damaged insulation or exposed metal. Check the leads for continuity. Replace damaged leads with identical model or specification before using the meter.

Where applicable use GS38 approved leads (not supplied) these are available from Di-Log. When using test leads keep fingers behind the finger guards.

Do not apply more than the rated voltage, as marked on the meter between the terminals or between any terminal and ground.

Before making a measurement ensure that the rotary switch is set to the appropriate range. Do not turn the rotary switch whilst making a measurement.

Use the appropriate terminals, function and range for your measurements. If the value to be measured is not known use the maximum measurement position and reduce the range step by step until a satisfactory reading is obtained.

Do not use or store the meter in an environment of high temperature, humidity, fumes, vapour, gaseous, inflammable and strong magnetic field. The performance and safety of the use may be compromised in such circumstances.

Disconnect circuit power and discharge all high voltage capacitors before testing resistance, continuity, diodes, capacitance or current.

Before measuring current check the meters fuses and turn off power to the circuit before connecting the meter to the circuit.

Replace the battery as soon as the low battery indicator appears. If the battery is low the meter may give false readings.

Turn the meter power off when not in use,. Remove the battery if the meter is in use for a long period. Constantly check the battery as it may have leaked. A leaking battery will damage the meter.

The meter may only be opened by a qualified service technician for calibration and repair.

Input Limits

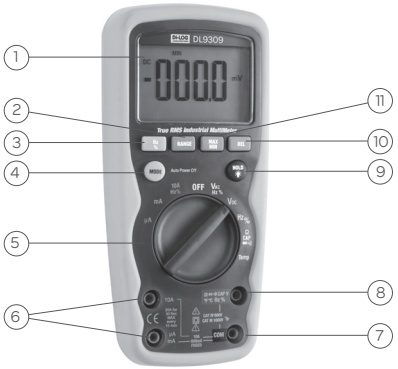
Never apply voltage or current to the meter that exceeds the specified maximum:

Function	Maximum
V DC or V AC	1000VDC/AC rms
mA DC/AC	500mA 1000V fast acting fuse
A DC/AC	10A 1000V fast acting fuse (20A for 30 seconds max every 15 minutes)
Frequency, Resistance, Capacitance, Diode test, Continuity	1000VDC/AC rms
Temperature	1000VDC/AC rms
Surge Protection: 8kV peak per IEC 61010	

1. **Use extreme caution** when working with high voltages.
2. **Do not** measure voltage if the voltage on the "COM" input jack exceeds 600V above earth ground.
3. **Never** connect the meter leads across a voltage source while the function switch is in the current, resistance, or diode mode. Doing so can damage the meter.
4. **Always** discharge filter capacitors in power supplies and disconnect the power when making resistance or diode tests.

5. **Always** turn off the power and disconnect the test leads before opening the covers to replace the fuse or batteries.
6. **Never** operate the meter unless the back cover and the battery and fuse covers are in place and fastened securely.
7. If the equipment is used in a manner not specified, the protection provided by the equipment may be impaired.

Controls and Inputs



1. 6,000 count LCD display
2. RANGE button
3. Hz and % button
4. Mode button
5. Function switch
6. mA, µA and 10A input terminal
7. COM input terminal
8. Positive input terminal
9. HOLD and Backlight button
10. RELATIVE button
11. MAX/MIN button

Note:
Tilt stand and battery compartment are on rear of unit.

◷	Auto power off
•)))	Continuity
⊣◀	Diode test
	Battery status
n	nano (10^{-9}) (capacitance)
µ	micro (10^{-6}) (amps, cap)
m	milli (10^{-3}) (volts, amps)
A	Amps
k	kilo (10^{3}) (ohms)
F	Farads (capacitance)
M	mega (10^{6}) (ohms)
Ω	Ohms
Hz	Hertz (frequency)
%	Percent (duty ratio)
AC	Alternating current
DC	Direct current
°F	Degrees Fahrenheit
MAX	Maximum
V	Volts
REL	Relative
AUTO	Autoranging
HOLD	Display hold
°C	Degrees Centigrade
MIN	Minimum

⚠ Warning:

RISK OF ELECTROCUTION. HIGH-VOLTAGE CIRCUITS, BOTH AC AND DC, ARE VERY DANGEROUS AND SHOULD BE MEASURED WITH GREAT CARE.

1. **Always** turn the function switch to the OFF position when the meter is not in use.
2. If "**OL**" appears in the display during a measurement, the value exceeds the range you have selected. Change to a higher range.

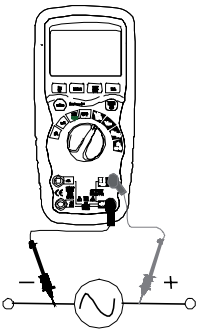
⚠ **Caution:**

DO NOT MEASURE DC VOLTAGES IF A MOTOR ON THE CIRCUIT IS BEING SWITCHED ON OR OFF. LARGE VOLTAGE SURGES MAY OCCUR THAT CAN DAMAGE THE METER.

1. Set the function switch to the VDC position.
2. Insert the black test lead banana plug into the negative COM terminal. Insert the red test lead banana plug into the positive V terminal.
3. Touch the black test probe tip to the negative side of the circuit.
4. Touch the red test probe tip to the positive side of the circuit. Read the voltage in the display.

⚠ Warning:

RISK OF ELECTROCUTION. THE PROBE TIPS MAY NOT BE LONG ENOUGH TO CONTACT THE LIVE PARTS INSIDE SOME 240V OUTLETS FOR APPLIANCES BECAUSE THE CONTACTS ARE RECESSED DEEP IN THE OUTLETS. AS A RESULT, THE READING MAY SHOW 0 VOLTS WHEN THE OUTLET ACTUALLY HAS VOLTAGE ON IT. MAKE SURE THE PROBE TIPS ARE TOUCHING THE METAL CONTACTS INSIDE THE OUTLET BEFORE ASSUMING THAT NO VOLTAGE IS PRESENT.



AC Voltage Measurements

⚠ Caution:

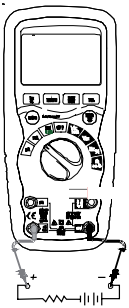
DO NOT MEASURE AC VOLTAGES IF A MOTOR ON THE CIRCUIT IS BEING SWITCHED ON OR OFF. LARGE VOLTAGE SURGES MAY OCCUR THAT CAN DAMAGE THE METER.

1. Set the function switch to the VAC/Hz/% position.
2. Insert the black test lead banana plug into the negative COM terminal. Insert red test lead banana plug into the positive V terminal.
3. Touch the black test probe tip to the neutral side of the circuit. Touch the red test probe tip to the "hot" side of the circuit.
4. Read the voltage in the display.
5. Press the HZ/% button to indicate "Hz".
6. Read the frequency in the display.
7. Press the Hz/% button again to indicate "%".
8. Read the % of duty cycle in the display.

⚠ Caution:

DO NOT MAKE 20A CURRENT MEASUREMENTS FOR LONGER THAN 30 SECONDS. EXCEEDING 30 SECONDS MAY CAUSE DAMAGE TO THE METER AND/OR THE TEST LEADS.

1. Insert the black test lead banana plug into the negative COM terminal.
2. For current measurements up to 6000µA DC, set the function switch to the µA position and insert the red test lead banana plug into the µA/mA terminal.
3. For current measurements up to 600mA DC, set the function switch to the mA position and insert the red test lead banana plug into the µA/mA terminal.
4. For current measurements up to 20A DC, set the function switch to the yellow 10A/HZ/% position and insert the red test lead banana plug into the 10A terminal.
5. Press the MODE button to indicate "DC" on the display.



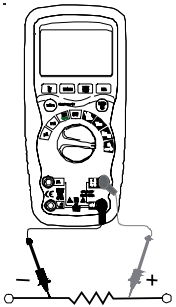
6. Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
7. Connect the black test probe tip to the negative side of the circuit.

   Connectthe red test probe tip to the positive side of the circuit.
8. Apply power to the circuit.
9. Read the current in the display.

⚠ Caution:

DO NOT MAKE 20A CURRENT MEASUREMENTS FOR LONGER THAN 30 SECONDS. EXCEEDING 30 SECONDS MAY CAUSE DAMAGE TO THE METER AND/OR THE TEST LEADS.

1. Insert the black test lead banana plug into the negative COM terminal.
2. For current measurements up to 6000µA AC, set the function switch to the µA position and insert the red test lead banana plug into the µA/mA terminal.
3. For current measurements up to 600mA AC, set the function switch to the mA position and insert the red test lead banana plug into the µA/mA terminal.
4. For current measurements up to 20A AC, set the function switch to the 10A/HZ/% position and insert the red test lead banana plug into the 10A terminal.
5. Press the MODE button to indicate "AC" on the display.



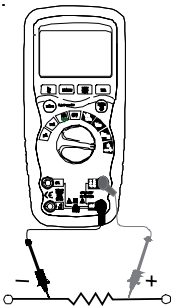
6. Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
7. Connect the black test probe tip to the neutral side of the circuit.

   Connect the red test probe tip to the "hot" side of the circuit.
9. Apply power to the circuit.
10. Read the current in the display.
11. Press the Hz/% button to indicate "Hz".
12. Read the frequency in the display.
13. Press the Hz/% button again to indicate "%".
14. Read the % duty cycle in the display.
15. Press the Hz/% button to return to current measurement.

⚠ Warning:

TO AVOID ELECTRIC SHOCK, DISCONNECT POWER TO THE UNIT UNDER TEST AND DISCHARGE ALL CAPACITORS BEFORE TAKING ANY RESISTANCE MEASUREMENTS. REMOVE THE BATTERIES AND UNPLUG THE LINE CORDS.

1. Set the function switch to the green Ω CAP ⏭ position.
2. Insert the black test lead banana plug into the negative COM terminal.
3. Insert the red test lead banana plug into the positive Ω terminal.
4. Press the MODE button to indicate "Ω" on the display.
5. Connect the test probe tips across the circuit or part under test. It is best to disconnect one side of the part under test so the rest of the circuit will not interfere with the resistance reading.
6. Read the resistance in the display.

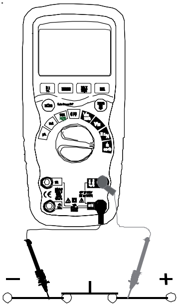


Continuity Check

Warning:

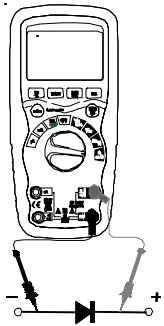
TO AVOID ELECTRIC SHOCK, NEVER MEASURE CONTINUITY ON CIRCUITS OR WIRES THAT HAVE VOLTAGE ON THEM.

1. Set the function switch to the green Ω CAP ⯈| position.
2. Insert the black lead banana plug into the negative COM terminal.
3. Insert the red test lead banana plug into the positive Ω terminal.
4. Press the MODE button to indicate "•)))" and "Ω" on the display
5. Connect the test probe tips to the circuit or wire you wish to check.
6. If the resistance is less than approximately 35Ω, the audible signal will sound. If the circuit is open, the display will indicate "OL".



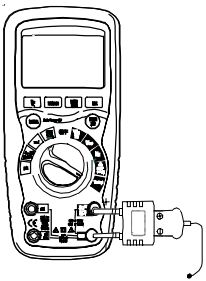
Diode Test

1. Set the function switch to the green Ω CAP position.
2. Insert the black test lead banana plug into the negative COM terminal and the red test lead banana plug into the positive V terminal.
3. Press the MODE button to indicate and V on the display.
4. Touch the test probes to the diode under test. Forward voltage will typically indicate 0.400 to 0.700V. Reverse voltage will indicate "OL". Shorted devices will indicate near 0V and an open device will indicate "OL" in both polarities.



1. Set the function switch to the Temp position.
2. Insert the Temperature Probe into the input terminals, making sure to observe the correct polarity.
3. Press the MODE button to indicate °F or °C
4. Touch the Temperature Probe head to the part whose temperature you wish to measure. Keep the probe touching the part under test until the reading stabilizes (about 30 seconds).
5. Read the temperature in the display.

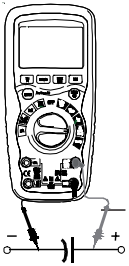
Note:
The temperature probe is fitted with a type K mini connector. A mini connector to banana connector adaptor is supplied for connection to the input banana terminals.



⚠ Warning:

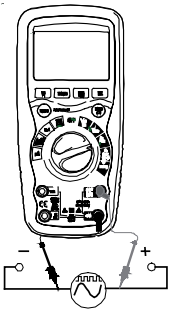
TO AVOID ELECTRIC SHOCK, DISCONNECT POWER TO THE UNIT UNDER TEST AND DISCHARGE ALL CAPACITORS BEFORE TAKING ANY CAPACITANCE MEASUREMENTS. REMOVE THE BATTERIES AND UNPLUG THE LINE CORDS.

1. Set the rotary function switch to the green Ω CAP position.
2. Insert the black test lead banana plug into the negative COM terminal.
3. Insert the red test lead banana plug into the positive V terminal.
4. Press the MODE button to indicate "nF" on the display.
5. Connect the test leads to the capacitor to be tested.
6. The test may take up to 3 minutes or more for large capacitors to charge. Wait until the readings settle before ending the test.
7. Read the capacitance value in the display.



Frequency/duty cycle measurements (electronic)

1. Set the rotary function switch to the green "Hz %" position.
2. Press the Hz/% button to indicate "Hz" in the display.
3. Insert the black lead banana plug into the negative COM terminal and the red test lead banana plug into the positive Hz terminal.
4. Touch the test probe tips to the circuit under test.
5. Read the frequency on the display.
6. Press the Hz/% button again to indicate "%" on the display.
7. Read the % of duty cycle on the display.



Autoranging/manual range selection

When the meter is first turned on, it automatically goes into Autoranging. This automatically selects the best range for the measurements being made and is generally the best mode for most measurements. For measurement situations requiring that a range be manually selected, perform the following:

1. Press the RANGE key. The "AUTO" display indicator will turn off.
2. Press the RANGE key to step through the available ranges until you select the range you want.
3. To exit the Manual Ranging mode and return to Autoranging, press and hold the RANGE key for 2 seconds.

Note:

Manual ranging does not apply for the Capacitance and Frequency functions.

Autoranging/manual range selection

Note:
When using the MAX/MIN function in Autoranging mode, the meter will "lock" into the range that is displayed on the LCD when MAX/MIN is activated. If a MAX/Min reading exceeds that range, an "OL" will be displayed. Select the desired range BEFORE entering MAX/MIN mode.

1. Press the MAX/MIN key to activate the MAX/MIN recording mode. The display icon "MAX" will appear. The meter will display and hold the maximum reading and will update only when a new "max" occurs.
2. Press the MAX/MIN key again and the display icon "MIN" will appear. The meter will display and hold the minimum reading and will update only when a new "min" occurs.
3. To exit MAX/MIN mode press and hold the MAX/MIN key for 2 seconds.

Autoranging/manual range selection

The relative measurement feature allows you to make measurements relative to a stored reference value. A reference voltage, current, etc. can be stored and measurements made in comparison to that value. The displayed value is the difference between the reference value and the measured value.

1. Perform the measurement as described in the operating instructions.
2. Press the REL button to store the reading in the display and the "REL" indicator will appear on the display.
3. The display will now indicate the difference between the stored value and the measured value.
4. Press the REL button to exit the relative mode.

Note:

The Relative function does not operate in the Frequency function.

Display Backlight

Press the HOLD key for >1 second to turn the display backlight function on or off. The backlight will automatically turn off after 10 seconds.

Hold

The hold function freezes the reading in the display. Press the **HOLD** key momentarily to activate or to exit the **HOLD** function.

Auto Power Off

The auto off feature will turn the meter off after 15 minutes. To disable the auto power off feature, hold down the MODE button and turn the meter on.

Low Battery Indication

The icon will appear in the lower left conner of the display when the battery voltage becomes low. Replace the battery when this appears.

⚠ **Warning:**

TO AVOID ELECTRIC SHOCK, DISCONNECT THE TEST LEADS FROM ANY SOURCE OF VOLTAGE BEFORE REMOVING THE BACK COVER OR THE BATTERY OR FUSE COVERS.

⚠ **Warning:**

TO AVOID ELECTRIC SHOCK, DO NOT OPERATE YOUR METER UNTIL THE BATTERY AND FUSE COVERS ARE IN PLACE AND FASTENED SECURELY.

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.

Battery Installation

⚠ Warning:

TO AVOID ELECTRIC SHOCK, DISCONNECT THE TEST LEADS FROM ANY SOURCE OF VOLTAGE BEFORE REMOVING THE BATTERY COVER.

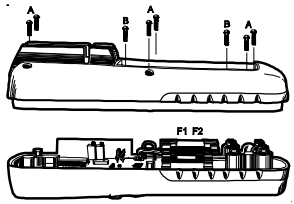
1. Turn power off and disconnect the test leads from the meter.
2. Open the rear battery cover by removing two screws (B) using a Phillips head screwdriver.
3. Insert the battery into battery holder, observing the correct polarity.
4. Put the battery cover back in place. Secure with the screws.

⚠ Warning:

TO AVOID ELECTRIC SHOCK, DO NOT OPERATE THE METER UNTIL THE BATTERY COVER IS IN PLACE AND FASTENED SECURELY.

Note:

If your meter does not work properly, check the fuses and batteries to make sure that they are still good and that they are properly inserted.



Replacing the Fuses

⚠ Warning:

TO AVOID ELECTRIC SHOCK, DISCONNECT THE TEST LEADS FROM ANY SOURCE OF VOLTAGE BEFORE REMOVING THE FUSE COVER.

1. Disconnect the test leads from the meter.
2. Remove the protective rubber holster.
3. Remove the battery cover (two "B" screws) and the battery.
4. Remove the six "A" screws securing the rear cover.
5. Gently remove the old fuse and install the new fuse into the holder.
6. Always use a fuse of the proper size and value (0.8A/1000V fast blow for the 600mA range [SIBA 70-172-40], 10A/1000V fast blow for the 20A range [SIBA 50-199-06]).
7. Replace and secure the rear cover, battery and battery cover.

⚠ Warning:

TO AVOID ELECTRIC SHOCK, DO NOT OPERATE YOUR METER UNTIL THE FUSE COVER IS IN PLACE AND FASTENED SECURELY.

DC Voltage

Function	Range	Resolution	Accuracy
DC Voltage	600mV	0.1mV	±(0.09% reading + 2 digits)
	6V	0.001V	
	60V	0.01V	
	600V	0.1V	
	1000V	1V	±(0.15% reading + 2 digits)
AC Voltage			50 to 60Hz 40Hz to 1KHz
	6V	0.001V	±(1.0% reading + 3 dgts) ±(2.0% reading + 3 dgts)
	60V	0.01V	
	600V	0.1V	
	1000V	1V	±(1.2% reading + 3 dgts) ±(2.5% reading + 3 dgts)
	All AC voltage ranges are specified from 5% of range to 100% of range)		
DC Current	600μA	0.1μA	±(1.0% reading + 3 digits)
	6000μA	1μA	
	60mA	0.01mA	
	600mA	0.1mA	
	6A	0.001A	±(1.5% reading + 3 digits)
	10A	0.01A	
	(20A: 30 sec max with reduced accuracy)		
AC Current	40Hz to 1kHz		
	600μA	0.1μA	±(1.5% reading + 3 digits)
	6000μA	1μA	
	60mA	0.01mA	
	600mA	0.1mA	
	6A	0.001A	±(2.0% reading + 3 digits)
	10A	0.01A	
	(20A: 30 sec max with reduced accuracy)		
	All AC voltage ranges are specified from 5% of range to 100% of range		

Note:

Accuracy is stated at 6˚F to 83˚F (18˚C to 28˚C) and less than 75% RH.

DC Voltage

Function	Range	Resolution	Accuracy
Resistance	600Ω	0.1Ω	±(0.3% reading + 4 digits)
	6kΩ	0.001kΩ	
	60kΩ	0.01kΩ	
	600kΩ	0.1kΩ	
	6MΩ	0.001MΩ	
	60MΩ	0.01MΩ	±(0.5% reading + 20 digits)
Capacitance	60nF	0.01nF	±(3.5% reading + 4 digits)
	600nF	0.1nF	
	6μF	0.001μF	
	60μF	0.01μF	
	600μF	0.1μF	
	1000μF	1μF	±(5% reading + 5 digits)
Frequency			±(0.1% reading + 1 digits)
(electronic)	9.999Hz	0.001Hz	
	99.99Hz	0.01Hz	
	999.9Hz	0.1Hz	
	9.999kHz	0.001kHz	
	99.99kHz	0.01kHz	
	999.9kHz	0.1kHz	
	9.999MHz	0.001MHz	
	40MHz	.01MHz	
Sensitivity: 0.8V rms min. @ 20% to 80% duty cycle and <100kHz; 5Vrms min @ 20% to 80% duty cycle and >100kHz.			
Frequency	10.00-400Hz	0.01Hz	±(0.5% reading)
(electrical)	Sensitivity: 15Vrms		
Duty Cycle	0.1 to 99.9%	0.1%	±(1.2% reading + 2 digits)
	Pulse width: 100μs - 100ms, Frequency: 5Hz to 150kHz		
Temp	-50 to 1382°F	1°F	±(3.0% reading + 5°C /9°F digits)
(type-K)	-45 to 750°C	1°C	(probe accuracy not included)

Note:

Accuracy specifications consist of two elements:

- (% reading) – This is the accuracy of the measurement circuit.
- (+ digits) – This is the accuracy of the analog to digital converter.

Features

Enclosure	Double molded, waterproof
Shock (Drop Test)	2 meters
Diode Test	Test current of 0.9mA maximum, open circuit voltage 2.8V DC typical
Continuity Check	Audible signal will sound if the resistance is less than 100Ω (approx.), test current <0.35mA
Temperature Sensor	Requires type K thermocouple
Input Impedance	>10MΩ VDC & >10MΩ VAC
AC Response	True rms
AC True RMS:	The term stands for "Root-Mean-Square," which represents the method of calculation of the voltage or current value. Average responding multimeters are calibrated to read correctly only on sine waves and they will read inaccurately on non-sine wave or distorted signals. True rms meters read accurately on either type of signal.
ACV Bandwidth	40Hz to 1000Hz
Crest Factor	≤3 at full scale up to 500V, decreasing linearly to ≤1.5 at 1000V
Display	6,000 count backlit liquid crystal with bargraph
Overrange indication	"OL" is displayed
Auto Power Off	15 minutes (approximately) with disable feature

Features

Polarity	Automatic (no indication for positive); Minus (-) sign for negative
Measurement Rate	2 times per second, nominal
Low Battery Indication	" " is displayed if battery voltage drops below operating voltage
Battery	One 9 volt (NEDA 1604) battery
Fuses	mA, µA ranges; 0.8A/1000V ceramic fast blow. A range; 10A/1000V ceramic fast blow
Operating Temperature	41°F to 104°F (5°C to 40°C)
Storage Temperature	-4°F to 140°F (-20°C to 60°C)
Operating Humidity	Max 80% up to 87°F (31°C) decreasing linearly to 50% at 104°F (40°C)
Storage Humidity	<80%
Operating Altitude	2000meters maximum.
Weight	342g includes holster.
Size	187 x 81 x 50mm (includes holster)
Safety	This meter is intended for origin of installation use and protected, against the users, by double insulation per EN61010-1 and IEC61010-1 2nd Edition (2001) to Category IV 600V and Category III 1000V; Pollution Degree 2. The meter also meets UL 61010-1, 2nd Edition (2004), CAN/CSA C22.2 No. 61010-1 2nd Edition (2004), and UL 61010B-2-031, 1st Edition (2003)

Notes

24 Month Warranty

Di-Log instruments are subject to stringent quality controls. If in the course of normal daily use a fault occurs we will provide a 24 month warranty (only valid with invoice).

Faults in manufacture and materials defect will be rectified by us free of charge, provided the instrument has not been tampered with and returned to us unopened.

Damage due to dropping abuse or misuse is not covered by the warranty.

Outside the warranty period we offer a full repair and re-calibration service.

Maintenance

WARNING Do not attempt to repair or service your meter unless you are qualified to do so and have the relevant calibration, performance test and service information. To avoid electrical shock or damage to the meter do not get water inside the case.

Periodically wipe the case with a damp cloth and mild detergent. Do not use chemical solvent.

Clean the input terminals with cotton bud, as dirt or moisture in the terminals can affect readings.

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