■ DIGITAL MULTIMETER
with Non-Contact Detection

5231

ENGLISH **User Manual**

AEMC® INSTRUMENTS
CHAUVIN ARNOUX GROUP

Catalog #: 2125.64

Model #: 5231

Please fill in the appropriate date as indicated:

Date Received: _____

Date Calibration Due: _____

AEMC® INSTRUMENTS
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CHAPTER 1

INTRODUCTION

⚠ Warning ⚠

This device complies with safety standard IEC-61010-1 (Ed 2–2001) for voltages up to 1000V CAT III or 600V CAT IV, at an altitude below 2000m, indoors, with a pollution level of not more than 2.

Failure to observe the safety instructions may cause an electric shock, fire, explosion, or destruction of the instrument and of the installations.

- Do not use the instrument in an explosive atmosphere or in the presence of flammable gases or fumes.
- Do not use the instrument on networks of which the voltage or category exceeds those mentioned.
- Do not exceed the rated maximum voltages and currents between terminals or with respect to earth/ground.
- Do not use the instrument if it appears to be damaged, incomplete, or not properly closed.
- Before each use, check the condition of the insulation on the leads, housing, and accessories. Any element of which the insulation is deteriorated (even partially) must be set aside for repair or scrapped.
- Use leads and accessories rated for voltages and categories at least equal to those of the instrument.
- Observe the environmental conditions of use.
- Do not modify the instrument and do not replace components with “equivalents”. Repairs and adjustments must be done by approved qualified personnel.
- Replace the battery as soon as the ⊟ symbol appears on the display unit. Disconnect all leads before opening the battery compartment cover.
- Use personal protective equipment when conditions require.
- Keep your hands away from unused terminals of the instrument.
- When handling probes or contact tips, keep your fingers behind the guards.

1.1 International Electrical Symbols

	Signifies that the instrument is protected by double or reinforced insulation.
	This symbol on the instrument indicates a WARNING that the operator must refer to the user manual for instructions before operating the instrument. In this manual, the symbol preceding instructions indicates that if the instructions are not followed, bodily injury, installation/sample and/or product damage may result.
	Compliance with the Low Voltage & Electromagnetic Compatibility European directives (73/23/CEE & 89/336/CEE)
	AC – Alternating current
	AC or DC – Alternating or direct current
	Risk of electric shock. The voltage at the parts marked with this symbol may be dangerous.
	Important instructions to read and understand completely.
	Important information to acknowledge.
	Ground/Earth symbol
	In conformity with WEEE 2002/96/EC

1.2 Definition of Measurement Categories

CAT IV: For measurements performed at the primary electrical supply (<1000V) such as on primary overcurrent protection devices, ripple control units, or meters.

CAT III: For measurements performed in the building installation at the distribution level such as on hardwired equipment in fixed installation and circuit breakers.

CAT II: For measurements performed on circuits directly connected to the electrical distribution system. Examples are measurements on household appliances or portable tools.

1.3 Receiving Your Shipment

Upon receiving your shipment, make sure that the contents are consistent with the packing list. Notify your distributor of any missing items. If the equipment appears to be damaged, file a claim immediately with the carrier and notify your distributor at once, giving a detailed description of any damage. Save the damaged packing container to substantiate your claim.

1.4 Ordering Information

Multimeter Model 5231 ..... **Cat. #2125.64**
Includes set of two 5 ft color-coded leads (red/black) with needle tip {1000V CAT IV 15A), soft carrying case and a user manual.

1.4.1 Accessories

Multifix mounting system ..... **Cat. #5000.44**

1.4.2 Replacement Parts

Soft Carrying Case ..... **Cat. #2121.54**

Lead-Set of 2, 1.5M, color-coded with test probes
(1000V CAT IV 15A) ..... **Cat. #2125.97**

CHAPTER 2

PRODUCT FEATURES

2.1 Description

The Model 5231 is a TRMS digital multimeter, specially designed to combine the various functions and measurements of the following electrical quantities:

- Non-contact detection of presence of network voltage (NCV function)
- AC voltmeter with low input impedance (voltage measurements for electricity and electrical engineering)
- AC/DC voltmeter with high input impedance (voltage measurements for electronics)
- Ohmmeter
- Continuity test with buzzer
- Diode test
- Ammeter (measurement using current clamp-on probe)

2.2 Control Features

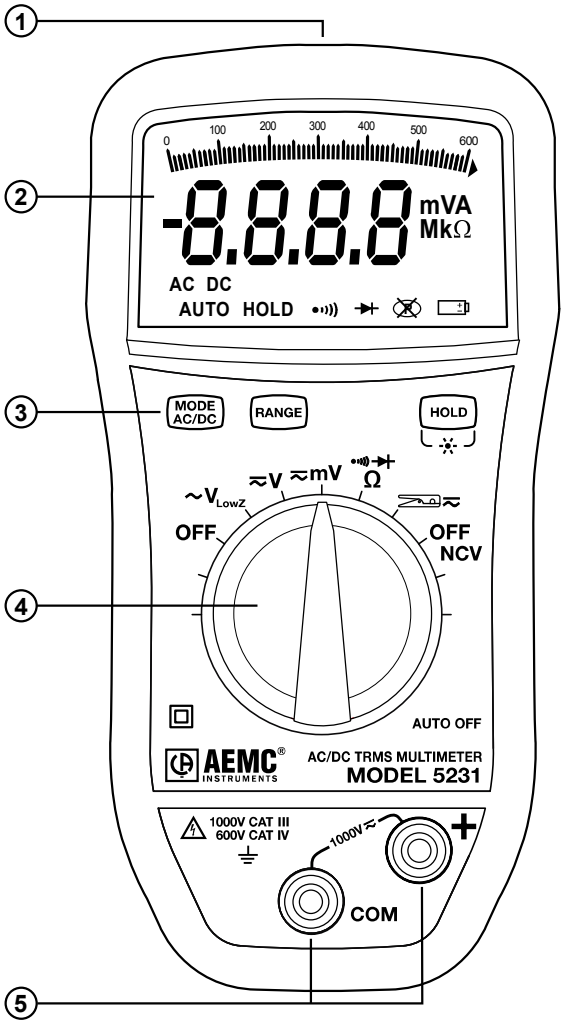

Figure 2-1

1. NCV detection sensor (see § 3.5)
2. Analog and digital display (see § 2.3)
3. Function buttons (see § 2.4)
4. Rotary switch (see § 2.5)
5. Positive (Red) input and COM (Black) input

2.3 Display Features

Icon	Function
AC	Alternating Current
DC	Direct Current
AUTO	The Automatic Range symbol indicates that the instrument will automatically adjust to the correct measurement range when taking the measurement
HOLD	Freezes the display of the measurement
m	Prefix “mili”
V	Voltage
A	Ampere
M	Prefix “Mega”
k	Prefix “kilo”
Ω	Ohm
OL	The Overload symbol is displayed when the signal measured exceeds the range of the device
	Low Battery
	Continuity Beeper Enabled
	Diode Test
	Auto Power OFF function activated

2.4 Button Functions

Button	Function
	• Measurement type selection **NOTE:** The DC mode is activated by default • Activates/Deactivates the Auto-OFF function at start-up (see § 3.3)
	• Allows manual selection of a measurement range (short press) • Returns to Auto-Range mode (long press > 2s) **NOTE:** Continuity and Diode modes are not Auto-ranging
	• Freezes/Unfreezes the display of the measured value (short press) • Activates/Deactivates the display backlight ☀ (long press > 2s)

2.5 Rotary Functions

Range	Function
OFF	Powers down the multimeter
~V_{LowZ}	Low impedance AC voltage measurement
≂V	AC or DC voltage measurement (V)
≂mV	AC or DC voltage measurement (mV)
	Resistance measurement Continuity test Diode test
	Current measurement with AC or DC clamp, ratio 1mV/A
	NCV (Non-contact Voltage) + Partial OFF mode of the multimeter (NCV function active)

CHAPTER 3

OPERATION

3.1 Turning the Multimeter ON

Turn the switch to the appropriate function. All segments of the display will light for a few seconds. The screen corresponding to the chosen function will then appear. The multimeter is now ready for measurements.

3.2 Turning the Multimeter OFF

To turn the meter off manually, turn the switch to **OFF**. If left unused for 15 minutes, the meter will turn off automatically. At 14 minutes, five beeps warn that the meter is about to be turned off. To turn back on, press any button on the unit.

NOTE: The OFF NCV position does not completely turn the multimeter off. It remains active for non-contact detection of the presence of network voltage (NCV).

3.3 Activating/Deactivating Auto-OFF

By default, Auto-OFF is activated and the symbol is displayed.

A long press on the MODE AC/DC button during start-up, while turning the switch to any range, deactivates the Auto-OFF function. The symbol is not displayed.

3.4 Auto and Manual Range Selection

By default, the meter is in auto-range. This is indicated by the **AUTO** symbol on the display. While on, the instrument will automatically adjust to the correct measurement range when taking the measurement.

To change the range selection to Manual, press the RANGE button.

3.5 Non-Contact Voltage (NCV)

- Turn the rotary switch to the **NCV** position.
- Move the Model 5231 (NCV detection sensor) close to the potentially live conductor(s) (presence of phase).

If a network voltage of 90V or greater is present, the back-lighting lights up red, otherwise, it remains off.

3.6 Voltage Measurement

The Model 5231 measures AC voltage at low input impedance ($V_{LOW}Z$), DC and AC voltages.

- Set the switch to $\sim V_{Lowz}$, $\approx V$, or $\approx mV$. When set to $\sim V_{Lowz}$ the device is in AC mode only.
- For $\approx V$ or $\approx mV$, select AC or DC by pressing MODE AC/DC. By default the meter is in DC mode.
- Insert the red lead to the red "+" input jack and the black lead to the black "COM" input jack.
- Connect the test probe tips to the sample under test.

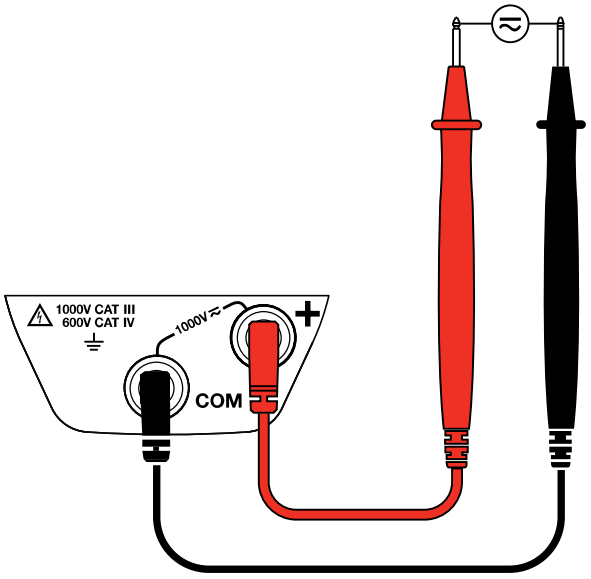

Figure 3-1

3.7 Resistance Measurement

WARNING: When making a resistance measurement, make sure that the power is off (de-energized circuit). It is also important that all capacitors in the measured circuit be fully discharged.

- Turn the rotary switch to the Ω position.
- Insert the red lead to the red “+” input jack and the black lead to the black "COM" input jack.
- Connect the test probe tips to the sample under test.

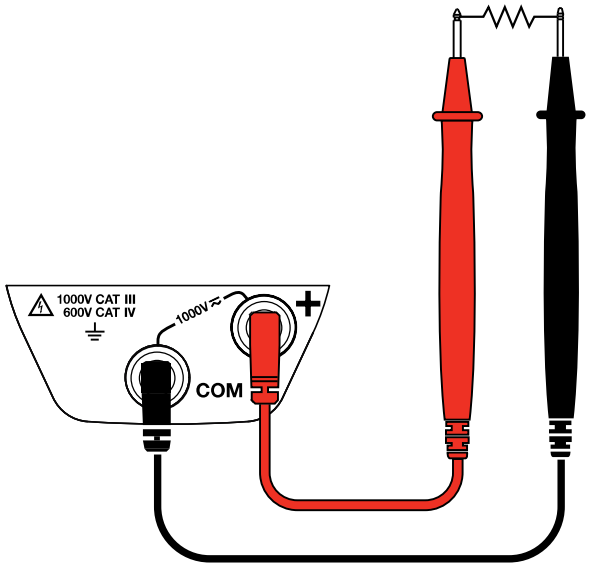

Figure 3-2

3.8 Continuity Test

WARNING: When making a resistance measurement, make sure that the power is off (de-energized circuit).

- Turn the rotary switch to the Ω position.
- Press the MODE AC/DC button. The •)) symbol is displayed.
- Insert the red lead to the red “+” input jack and the black lead to the black "COM" input jack.
- Connect the test probe tips to the sample under test.
- The buzzer sounds when the circuit to be checked is DC or has a resistance of less than 100Ω ± 3Ω.

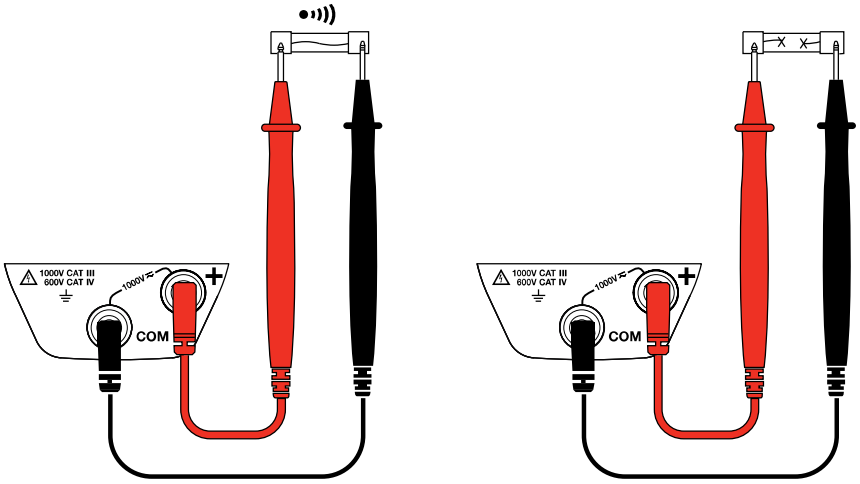

Figure 3-3

3.9 Diode Test

WARNING: When making a diode measurement, make sure that the power is off (de-energized circuit).

- Turn the rotary switch to the Ω position.
- Press the MODE AC/DC button twice. The → symbol is displayed.
- Insert the red lead to the red "+" input jack and the black lead to the black "COM" input jack.
- Connect the test probe tips to the sample under test.

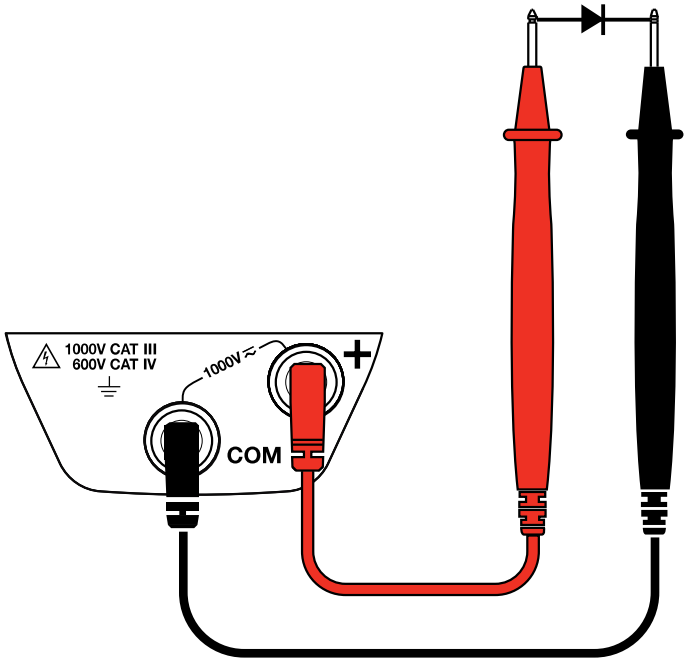

Figure 3-4

3.10 Current Measurement Using a Clamp-on Probe

- Turn the rotary switch to the position.
- Select AC or DC by pressing the MODE AC/DC button. By default the meter is in AC mode. Depending on the selection, the screen displays AC or DC.
- Insert the current probe's red lead to the red "+" input jack and the black lead to the black "COM" input jack.
- Clamp the current probe around the current carrying conductor to be tested. The multimeter will display 1 A of current per mV of voltage measured.

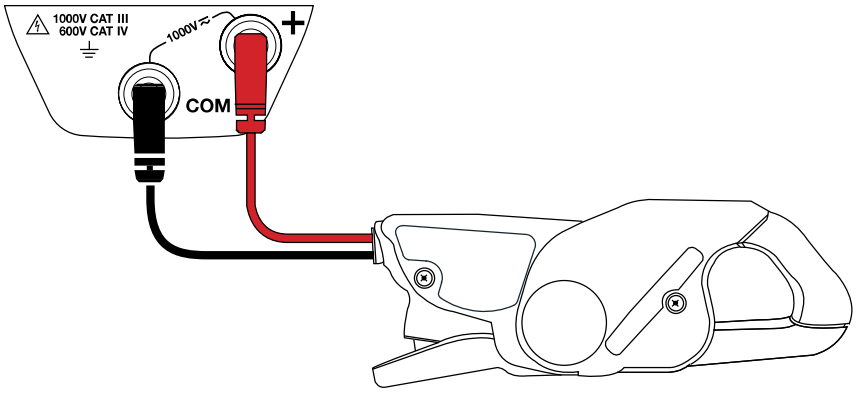

Figure 3-5

MAINTENANCE

4.1 Warning ⚠

- Remove the test leads from any input before opening the case. Do not operate the instrument without a battery case cover.
- To avoid electrical shock, do not attempt to perform any servicing unless you are qualified to do so.
- If the meter is not going to be used for a long period of time, take out the batteries. Do not store the meter in high temperatures or high humidity.
- To avoid electrical shock and/or damage to the instrument, do not get water or other foreign agents into the probe.

4.2 Battery Replacement

- Replace the batteries when the ▭ symbol appears on the display.
- Turn **OFF** the meter and disconnect it from any circuit or input.
- Using a screwdriver, unscrew the four screws of the battery compartment cover on the back of the housing.
- Replace the old battery with one new 9V battery, observing the polarity. To ensure proper contact, insert the battery from the bottom to the top (see illustration).

- Replace the battery compartment cover and tighten the screws.

4.3 Cleaning

- Disconnect all leads from the instrument and set the switch to **OFF**.
- To clean the instrument, wipe the case with a damp cloth and mild detergent. Do not use abrasives or solvents. Dry thoroughly before use.
- Do not get water inside the case. This may lead to electrical shock or damage to the instrument.

CHAPTER 5

SPECIFICATIONS

Reference Conditions: Accuracy given @ 23°C ± 2°C; Relative Humidity 45 to 75%; Supply Voltage 8.5V ± 0.5V

ELECTRICAL					
DC (mV_{DC})	**60mV**			**600mV**	
Resolution	0.01mV			0.1mV	
Accuracy (±)	1% + 12cts			0.6% + 2cts	
Input Impedance	10MΩ				
DC (V_{DC})	**600mV**	**6V**	**60V**	**600V**	**1000V***
Resolution	0.1mV	0.001V	0.01V	0.1V	1V
Accuracy (±)	0.6% + 2cts	0.2% + 2cts			0.2% + 2cts
Input Impedance	10MΩ				
AC ($mV_{AC\ TRMS}$)	**60mV**			**600mV**	
Resolution	0.01mV			0.1mV	
Accuracy (±) 40 to 60Hz	2% + 12cts			2% + 3cts	
Accuracy (±) 60Hz to 1kHz	2.5% + 12cts			2.5% + 3cts	
Input Impedance	10MΩ				
AC ($V_{AC\ TRMS}$)	**6V**	**60V**	**600V**	**1000V**	
Resolution	0.001V	0.01V	0.1V	1V	
Accuracy (±) 40 to 60Hz	2% + 3cts			2.5% + 3cts	
Accuracy (±) 60Hz to 1kHz	2.5% + 3cts			2.5% + 3cts	
Input Impedance	10MΩ				
AC ($V_{AC\ LowZ\ TRMS}$)*	**6V**	**60V**	**600V**	**1000V**	
Resolution	0.001V	0.01V	0.1V	1V	
Accuracy (±) 40 to 60Hz	2% + 10cts				
Input Impedance	270kΩ				

** According to safety rules, 1000V range is limited to 600V.*

**NOTE: A low input impedance serves to eliminate the effects of interference voltages due to the supply network, and makes it possible to measure an AC voltage with a minimum of error.*

ELECTRICAL						
Resistance	**600Ω**	**6kΩ**	**60kΩ**	**600kΩ**	**6MΩ**	**60MΩ**
Resolution	0.1Ω	0.001kΩ	0.01kΩ	0.1kΩ	0.001MΩ	0.01MΩ
Accuracy (±)	2% + 2cts	0.3% + 4cts				0.5% + 20cts
Continuity Test	**600Ω**					
Resolution	0.1Ω					
Measurement Current	< 0.35mA					
Accuracy (±)	Audible signal < 20Ω + 3Ω					
Diode Test	**2.8V**					
Resolution	0.001V					
Open-circuit Voltage	< 2.8V					
Measurement Current	< 0.9mA					
Accuracy (±)	2% + 5cts					
AC/DC Current (with clamp having a ratio of 1mV/1A)						
Range	600A					
Resolution	0.1A					
Accuracy (±)	40Hz to 1kHz; 2.0% + 2cts*					
Power	9V (6LR61) alkaline battery					
Battery Life	> 100 hours					
Auto Power OFF	Automatic shut down after 15 minutes of no use					
ENVIRONMENTAL						
Operating Temp.	32° to 122°F (0° to 50°C)					
Storage Temp.	-4° to 158°F (-20° to 70°C)					
Operating RH	≤ 90% at 104°F (40°C)					
Storage RH	≤ 50% at 140°F (60°C)					
MECHANICAL						
Dimension	6.1 x 2.95 x 2.17" (155 x 75 x 55mm)					
Weight	11 oz (320g) with battery					
Measurement Acquisition	3 times per second					
Bargraph	61 segments, refresh interval 30ms					
SAFETY						
Safety Rating	IEC/EN 61010-1, 1000V CAT III, 600V CAT IV; Pollution Degree 2					
Double Insulated	Yes					
Electro-magnetic Compatibility	EN-61326/A2:2001					
Drop Test	1m (in accordance with standard IEC-68-2-32)					
Case Protection	IP54 as per EN 60529					
CE	Yes					

**Not including current clamp sensor accuracy*

Repair and Calibration

To ensure that your instrument meets factory specifications, we recommend that it be scheduled back to our factory Service Center at one-year intervals for recalibration, or as required by other standards or internal procedures.

For instrument repair and calibration:
You must contact our Service Center for a Customer Service Authorization Number (CSA#). This will ensure that when your instrument arrives, it will be tracked and processed promptly. Please write the CSA# on the outside of the shipping container. If the instrument is returned for calibration, we need to know if you want a standard calibration, or a calibration traceable to N.I.S.T. (Includes calibration certificate plus recorded calibration data).

Ship To:

for repair, standard calibration, and calibration traceable to N.I.S.T. are available.

NOTE: You must obtain a CSA# before returning any instrument.

Technical and Sales Assistance

If you are experiencing any technical problems, or require any assistance with the proper operation or application of your instrument, please call, fax or e-mail our technical support team:

Limited Warranty

The Model 5231 is warranted to the owner for a period of two years from the date of original purchase against defects in manufacture. This limited warranty is given by AEMC®, not by the distributor from whom it was purchased. This warranty is void if the unit has been tampered with, abused or if the defect is related to service not performed by AEMC®.

ranty information is located in our customer service section.

What AEMC® will do:

If a malfunction occurs within the warranty period, you may return the instrument to us for repair, provided you submit a proof of purchase. AEMC® will, at its option, repair or replace the faulty material.

Warranty Repairs

What you must do to return an Instrument for Warranty Repair:

First, request a Customer Service Authorization Number (CSA#) by phone or by fax from our Service Department (see address below), then return the instrument along with the signed CSA Form. Please write the CSA# on the outside of the shipping container. Return the instrument, postage or shipment pre-paid to:

To protect yourself against in-transit loss, we recommend you insure your returned material.

NOTE: You must obtain a CSA# before returning any instrument.

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