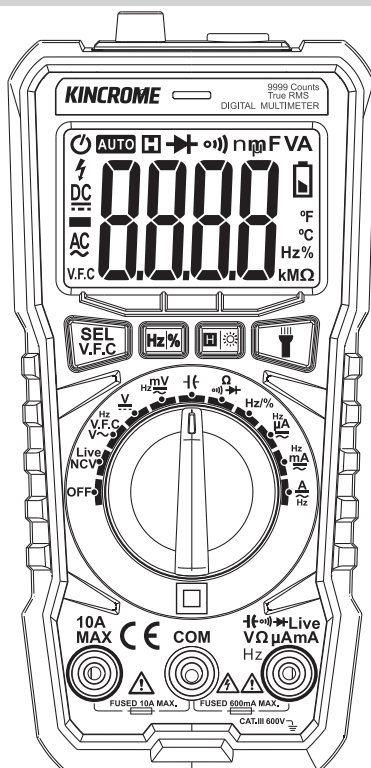


KINCROME

MANUAL/ AUTO RANGE MULTIMETER



K8610

ED1 June 2023

General Safety Warnings

K8610



WARNING This operating manual contains important safety information, read carefully & understand all information before operating.
Save this manual for future use.

This Kincrome Digital Multimeter is designed in accordance with IEC61010-1 (Safety Standard promulgated by the International Electro technical Commission). Please read safety precautions before using them.

1. Do not use to measure AC or DC voltages above 600V.
2. When measuring the voltages above 36V DC or 25V AC it is necessary to check whether the probe contacts the test point reliably, connects correctly, and insulates well, so as to avoid electric shock.
3. When changing functions and ranges of the multimeter, remove the probe from the test point.
4. Read this manual to ensure you have chosen the correct range and operation for the test being performed to avoid injury or damage to the device. Although the Digital Multimeter features full range protection, please consider your safety at all times when operating with any voltage.
5. When measuring current, do not input current exceeding 10A.
6. Safety symbols illustration: " " there is dangerous voltage, " " electrical grounding, " " double insulation, " "The operator must refer to the instruction manual, " " low device battery.

The Meter measures or tests the following:

AC/DC voltage, DC current, resistance, diodes, Capacitance, Voltage frequency, carry out on-off tests, zero-line judgment, non-contact voltage detection and the true effective value of AC.

It is a tool with excellent performance; the ideal tool for laboratories, factories, radio enthusiasts and when carrying out home improvements.

Symbols

The rating plate on your tool may show symbols. These represent important information about the product or instructions on its use.

	Volts		Class II Tool, Double Insulated
	Direct Current		Fuse
	Alternating Current		Conforms to European Union directives
	Direct Current and Alternating Current		Read the instruction manual before use. Failure to follow the warnings and instructions may result in electric shock, fire and/or serious injury.
	WARNING!		Battery (Low battery when shown on display)
	High Voltage, Risk of electric shock		Symbol for Diode
	Earth		Symbol for Capacitance
	Resistance/ohms		Buzzer / Audible tone
	Symbol for the scientific prefix micro-, which indicates one millionth of a unit of measure. (10^{-6} or 0.000001)	COM	Common (return) terminal for all measurements/ Negative/ Black
	Symbol for the scientific prefix milli-, which indicates one thousandth of a unit of measure. (10^{-3} or 0.001)		Back light
	Symbol for the scientific prefix nano-, which indicates one billionth of a unit of measure. (10^{-9} or 0.000000001)		LED Worklight
	Symbol for the scientific prefix kilo-, which indicates one thousand of a unit of measure. (10^3 or 1000)		DATA Hold
	Mega is a unit prefix in metric systems of units denoting a factor of one million (10^6 or 1000000)		

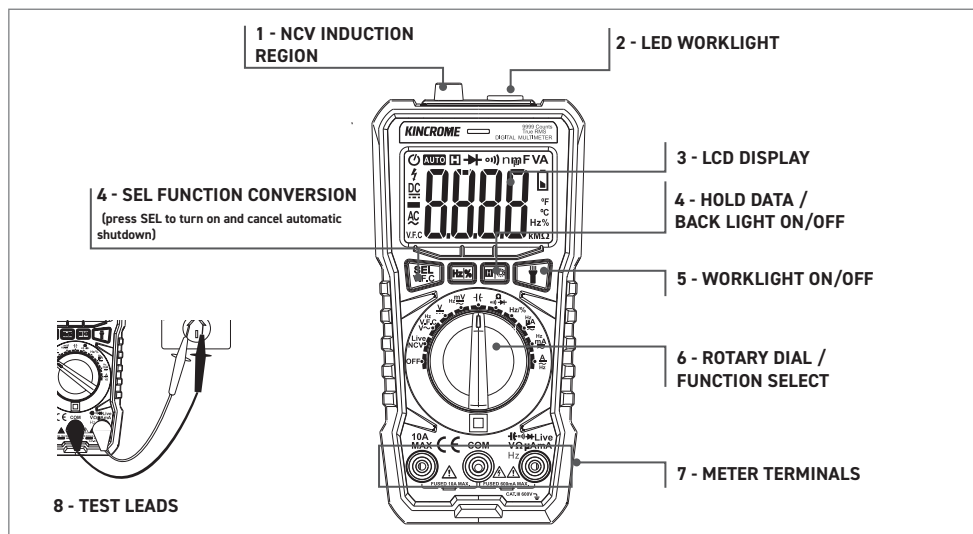
General Safety Instructions

K8610

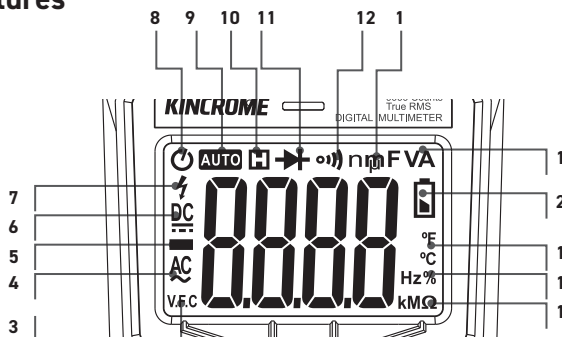
- a) **Use the Meter only as specified in this manual**, or the protection provided by the Meter might be impaired.
 - b) **Do not use the Meter in wet environments.**
 - c) **Inspect the Meter before using it.** Do not use the Meter if it appears damaged.
 - d) **Inspect the test leads before use.** Do not use them if insulation is damaged or metal is exposed. Check the test leads for continuity. Replace damaged test leads before using the Meter.
 - e) **Verify the Meter's operation by measuring a known voltage before and after using it.** Do not use the Meter if it operates abnormally. Protection may be impaired. If in doubt, have the Meter serviced.
 - f) **Whenever it is likely that safety protection has been impaired**, make the Meter inoperative and secure it against any unintended operation.
 - g) **Have the Meter serviced only by qualified service personnel.**
 - h) **Do not apply more than the rated voltage, as marked on the Meter**, between the terminals or between any terminal and earth ground.
 - i) **Remove test leads from the Meter before opening the case.**
 - j) **Never remove the cover or open the case of the Meter without first removing it from the main power source.**
 - k) Never operate the Meter with the cover removed or the case open.
 - l) Use caution when working with voltages above 30 V AC rms, 42 V AC peak, or 42 V DC.
These voltages pose a shock hazard.
 - m) **Use only the replacement fuses specified by the manual.**
 - n) **Use the proper terminals, function and range for your measurements.**
 - o) **Do not operate the Meter around explosive gas, vapor or dust.**
 - p) **When using probes, keep your fingers behind the finger guards.**
 - q) **When making electrical connections, connect the common test lead before connecting the live test lead. When disconnecting, disconnect the live test lead before disconnecting the common test lead.**
 - r) **Disconnect circuit power and discharge all high voltage capacitors before testing resistance, continuity, diodes, or capacitance.**
 - s) **Before measuring current, check the Meter's fuses and turn OFF power to the circuit before connecting the Meter to the circuit**
 - t) **When servicing the Meter**, use only specified replacement parts.
- 1) **Work Area**
 - a. **Keep the work area clean and well lit.** Cluttered benches and dark areas increase the risks of electric shock, fire, and injury to persons.
 - b. **Keep bystanders, children, and visitors away while operating the tool.** Distractions are able to result in the loss of control of the tool.
 - c. **Keep children and bystanders away while operating any powered products.** Distractions may result in electrical shock.
 - 2) **Personal Safety**
 - a. **Stay alert. Watch what you are doing and use common sense when operating the tool.** Do not use the tool while tired or under the influence of drugs, alcohol, or medication. A moment of inattention while operating the tool increases the risk of injury to persons.
 - b. **Dress properly. Do not wear loose clothing or jewellery.** Contain long hair. Keep hair, clothing, and jewellery away from live parts.
 - c. **Do not overreach. Keep proper footing and balance at all times.** Proper footing and balance enables better control of the tool in unexpected situations.
 - d. **Always wear eye protection.** Wear approved safety eye protection.
 - 3) **Service**
 - a. **Tool service must be performed only by qualified repair personnel.**
 - b. **When servicing a tool, use only identical replacement parts. Use only authorized parts.**

Know Your Product

K8610



LCD Display features



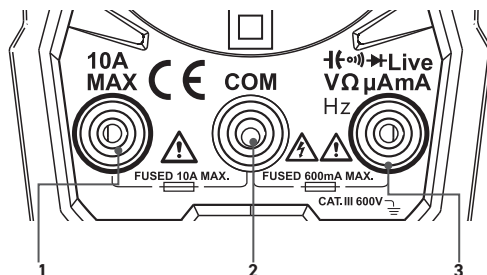
No.	Symbol	Meaning
1	μF mV V μA mA k Ω Hz	Measurement units
2		Low battery warning. Replace battery
3	V.F.C	The Meter function is set to Variable Frequency Voltage Measurement
4		Alternating current
5		Negative readings
6		Direct current

No.	Symbol	Meaning
7		Unsafe voltage. Voltage >30 V, or voltage overload (OL)
8		The Meter function is set to Auto shut down enabled
9	AUTO	The Meter function is set to Auto ranging
10	H	Display hold enabled. Display freezes present reading
11		The Meter function is set to Diode Test
12		The Meter function is set to Continuity

Know Your Product (cont)

K8610

METER TERMINALS



No.	Meaning
1	Input terminal for measuring ac and dc current to 10 A.
2	Common (return) terminal for all measurements.
3	Input terminal for measuring voltage, continuity, resistance, capacitance, frequency and testing diodes.



WARNING!

When connecting the test leads to the circuit or device, connect the common (COM) test lead before connecting the live lead; when removing the test leads, remove the live lead before removing the common test lead.



WARNING

To avoid electric shock, injury, or damage to the Meter, disconnect circuit power and discharge all high-voltage capacitors before testing resistance, continuity, diodes, or capacitance.

Specifications

DC voltage	0.01mV–600V ±(0.5%+2)
AC voltage	0.01mV–600V ±(1.0%+3)
DC current	1μA–10A ±(1.0%+2)
AC current	0.01μA–10A ±(1.0%+5)
Resistance measurement	0.1Ω–100MΩ ±(0.8%+2)
Capacitance measurement	1nF–100000μF ±(3.0%+10)
Frequency measurement	10–10MHz ±(0.1%+3)
Maximum display	9999

Input impedance	10MΩ
Sampling rate	Approx. 3 per sec
Display size	49x31mm
Product power supply	Two 1.5V AAA batteries (included)
Working temperature	0°C to 40°C
Working humidity	<80%
Storage temperature	-20°C to 60°C (not including battery)
Test Leads	1KV CATIII 600V IV (Max. 10A)
Product net weight	About 200g (including battery)
Battery Type	2 x AAA 1.5V
Automatic Shutdown	15 mins
Sampling	10MΩ

Accuracy: (reading a%+the lowest effective digit) to ensure the accuracy of environmental temperature: (23±5)°C, relative humidity less than 75%, the calibration guarantee period is one year from the manufacture date.

Trouble Shooting

K8610

If your instrument does not work properly, the following methods can help you quickly solve general problems, if the failure is still not eliminated, please contact Kincrome Customer Service.

Symptom	Remedy
Display not working	Battery polarity reversed
	Battery not connected
	Battery is flat, replace batteries
	Meter in sleep mode, turn the rotary dial to the off position and then back to the required function
Low battery symbol display	Battery is flat, replace batteries
Current not displayed	Fuse has blown, replace fuse
Incorrect Resistance Displayed	Poor connection between test specimen and test probe.

Operation

DATA HOLD MODE

⚠ WARNING! To avoid electric shock, do not use the data HOLD mode to determine if a circuit is live.
Unstable or noisy readings will not be captured.

In the data HOLD mode, the Meter holds the reading on the display until it detects a new stable reading. Then the Meter beeps, and displays the new reading.

1. To activate the data hold mode quickly, simply press . Upon activation, you will hear an audible beep, and the LCD display will display a visual  indicator confirming that the data hold mode is now enabled.
2. To resume normal operation, you have two options. Either press  once more, or turn the rotary dial /function select back to its original position. Either action will restore the device to its regular mode of operation.

DISPLAY BACK LIGHT

Press and hold  upon activation, you will hear an audible beep, and the LCD display back light will illuminate.

Note: The back light automatically turns off after approx. 30 seconds.

LED WORK LIGHT

To activate the work light mode quickly, simply press . Upon activation, you will hear an audible beep, and the LED work light will illuminate.

Note: The LED work light will only turn on when the Rotary dial is rotated away from the off position

AUTO RANGING MODES

The digital multi-meter offers a Auto range mode for your convenience.

The digital multi-meter automatically selects the range that provides the best resolution for accurate measurements.

The LCD Display will display  to show this feature is active.

LIVE NON-CONTACT VOLTAGE (NCV) TEST

A non-contact voltage tester or detector is an electrical tester that helps to detect the presence of voltage.

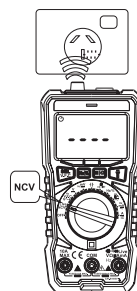
Voltage presence is useful information to have when troubleshooting or working on a failed circuit under test. The first tool you'll reach for is a non-contact voltage detector.

To activate NCV Mode

1. Turn the rotary dial /function select to the  (Non-contact Voltage) position (LCD displays 'ACV' in the unmeasured state).
2. The top of the multimeter device features an NCV detector. Whenever the device is within range of AC voltage the instrument will emit an uninterrupted tone, depending on voltage. The LCD display will display different segments on the NCV icon according to the strength of the signal.

Caution:

- a) When measuring NCV non-contact voltage, please unplug the test leads to avoid electric shock.
- b) Even if there is no indication, the voltage may still exist. Do not rely on non-contact voltage to determine whether there is a voltage in the conductor. Detection operation may be affected by factors such as insertion design, insulation thickness and other factors.
- c) Disturbance from external environment (such as camera flash, motor, etc.) may cause NCV alarm by mistake.



Operation (cont.)

ZERO LINE/FIRE LINE MEASUREMENT (LIVE)

Please follow these specific operations:

Turn the range switch to the 'Live/NCV' position. The screen will display 'ACV' when in an unmeasured state.

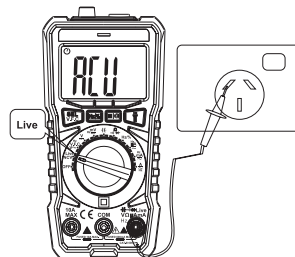
Insert the red test leads into the '1000V Live/NCV' jack (a single pen insertion is sufficient).

Place the tip of the red test leads onto the zero line.

Alternatively, you can place the tip of the red test leads onto the Fire Line. If using the Fire Line, the instrument will emit a continuous sound, the panel indicator will flash, and the screen will display '- - -'.

If using the Zero Line, the instrument will emit an intermittent sound, the panel indicator will flash, and the screen will display '- '.

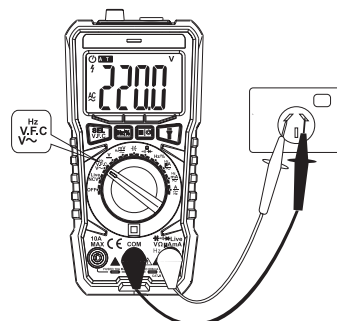
Note: This function is suitable for signals with a frequency range of 50Hz-1 KHz.



VAC (~) MODE

Range	Resolution	Accuracy
*99.99mV	10μV	± 1.2%reading ± 3digit
**999.9mV	100μV	
9.999V	1mV	± 1.0%reading ± 3digit
99.99V	10mV	
600V	1V	

Input impedance: ~ Range >100MΩ, ~ Range >1GΩ, other ranges input impedance is 10MΩ.
 */** There will be unstable digital display in the leads circuit of the range, it will be stable after loading (≤1 digit).
 Overload protection: 600V DC or AC RMS.
 Input impedance: 100MΩ; Overload protection: 600V DC or AC RMS.
 The frequency response of standard sinusoidal and triangular wave is 40 Hz-1 KHz; the frequency response of other waveforms is 40 Hz-200 Hz.



VARIABLE FREQUENCY VOLTAGE (V.F.C)

Range	Resolution	Accuracy
600V	0.1V	± 1.2%reading ± 5digit

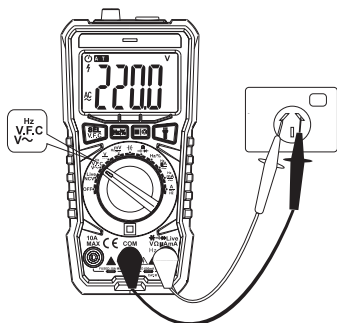
Input impedance: 100MΩ; Overload protection: 600V DC or AC RMS.
 The frequency response of standard sinusoidal and triangular wave is 40 Hz-1 KHz; the frequency response of other waveforms is 40 Hz-200 Hz.

Please follow these steps for the specific operation:

1. Insert the black leads into the 'COM' jack and the red leads into the '1000V Live/NCV' jack.
2. Set the range switch to the appropriate $\sim$ range and select AC voltage measurement mode. If required, press and hold the 'V.F.C' key for more than 2 seconds to switch to V.F.C measurement mode. Use the 'Hz/%' key to measure frequency and duty ratio.

Note:

- a. There may be some residual readings in each range prior to testing, but this does not affect the measurement accuracy.
- b. Ensure that the input voltage does not exceed 600V RMS. Exceeding this limit may damage the instrument circuit.
- c. Exercise caution when measuring high voltage circuits to avoid electric shock.
- d. After completing all measurement operations, disconnect the test leads from the circuit being tested.



Operation (cont.)

VDC (V) MODE

Range	Resolution	Accuracy
*99.99mV	10μV	± 0.5%reading ± 2digit
**999.9mV	100μV	
9.999V	1mV	
99.99V	10mV	
600V	1V	± 0.8%reading ± 2digit

Input impedance: * Range > 100MΩ, ** Range > 1GΩ, other ranges input impedance is 10MΩ.
 */**There will be unstable digital display in the leads circuit of the range, it will be stable after loading (≤1 digit). Overload protection: 600V DC or AC RMS.

To perform the specific operation, follow these steps:

1. Insert the black leads into the 'COM' jack and the red leads into the $\frac{V}{\Omega}$ jack.
2. Adjust the range switch to the appropriate 'V' range and set the display to DC voltage measurement mode.

Note:

- a. Input voltage must not exceed 600VDC or 600VAC, if exceeded, there is a danger of damaging the instrument circuit.
- b. When measuring high voltage circuits, special attention should be paid to avoiding electric shock.

After completing all measurement operations, disconnect the test leads from the circuit under test.

CAPACITANCE MODE

Range	Resolution	Accuracy
9.999nF	1pF	± 5%reading ± 10digit
99.99nF	10pF	
999.9nF	0.1nF	
9.999μF	1nF	
99.99μF	10nF	± 3%reading ± 10digit
999.9μF	100nF	
9.999mF	1μF	
99.99mF	10μF	± 3.5%reading ± 10digit

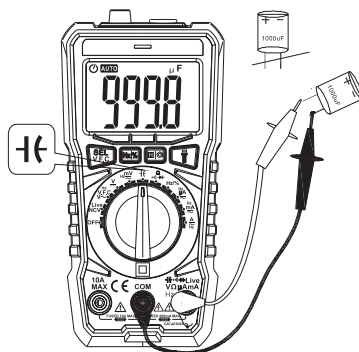
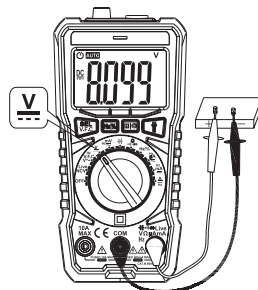
Overload protection: 250V DC or AC RMS.

Please follow these steps for the specific operation:

1. Insert the black leads into the 'COM' jack and the red leads into the $\frac{V}{\Omega}$ jack.
2. Set the range switch to the 'C' position and connect the test leads to both ends of the capacitor being tested. Read the measurement results from the display.

Note:

- a. When measuring capacitance with values like 9.999nF and 99.99nF, the display may show a residual reading, which represents the distributed capacitance of the leads. This reading is accurate and can be subtracted from the measurement.
- b. When measuring and verifying leakage or breakdown capacitance with a large capacitance setting, some values may be displayed and appear unstable. When measuring large capacitance, it is normal for the reading to take several seconds to stabilize.
- c. Before testing the capacitance capacity, ensure that the capacitor is sufficiently discharged to prevent damage to the fuse and the instrument.
- d. Conversion units: 1F = 1000mF, 1mF = 1000μF, 1μF = 1000nF, 1nF = 1000pF.



Operation (cont.)

DIODE AND CONTINUITY TEST

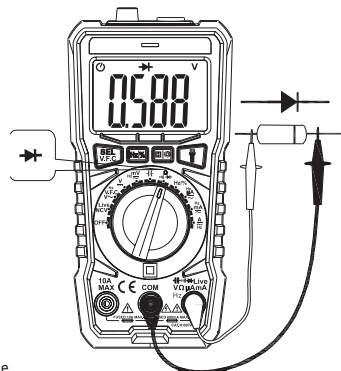
Range	Resolution	Accuracy
	The buzzer sounds continuously. The resistance of two points is less than $(50+20)\Omega$.	The open circuit voltage is approximately 1V. Press the SEL key to switch between the two available ranges.
	Diode forward voltage drop	The forward DC current measures 1 mA, while the open circuit voltage registers approximately 3.2V.

Please follow these specific operations:

1. Insert the black leads into the 'COM' jack and the red leads into the 'VΩmA Hz' jack (note that the red leads is marked as +).

2. Turn the range switch to the 'Ω' position and connect the leads in parallel to two points of the circuit under test. If the built-in buzzer continuously sounds and the on-off indicator lights up, it indicates that the resistance between the two points is less than $(50+20)$ ohms.

3. Press the SEL button to select the diode measurement mode. Connect the leads to the diode to be measured. The reading displayed will be the approximate value of the forward voltage drop of the diode, specifically for a silicon PN junction. Typically, a value around 500-800mV is considered normal. If the measured diode is open-circuit or has a reverse polarity, the LCD display will show 'OL'.



DUTY RATIO

Please follow these specific operations:

Insert the test pen or shielded cable into the 'COM' and 'VΩmA Hz' jack.

Switch the range switch to the 'Hz' position and connect the pen or cable to the signal source or the load being tested.

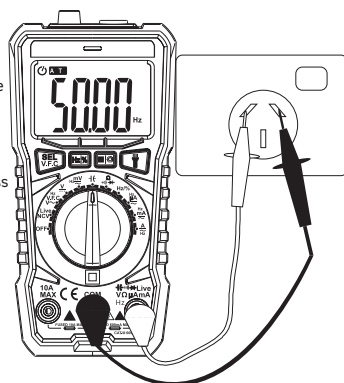
Note:

- In the 'HZ/%' mode, when the input value exceeds 10V, readings can still be obtained but may be outside the acceptable tolerance range.
- If measuring a voltage greater than 10V RMS, please switch to the 'ACV' position and press the 'HZ/%' key to display the frequency.
- When measuring small voltage signals, using shielded cables is recommended for accurate measurements.
- Exercise caution when measuring high voltage circuits to avoid the risk of electric shock.
- In the 'HZ/%' position, avoid inputting voltages exceeding 250V DC or AC RMS to prevent damage to the instrument.

FREQUENCY MEASUREMENT

Range	Resolution	Accuracy
9.999Hz-9.999MHz	HZ/%	$\pm 0.1\% \text{reading} \pm 5 \text{digit}$
9.999Hz-9.999KHz	V/A	

Input sensitivity: 9.999 Hz-9.9 MHz input frequency voltage range: 100mV to 10V RMS; Overload protection: 250VDC or AC RMS.



Operation (cont.)

K8610

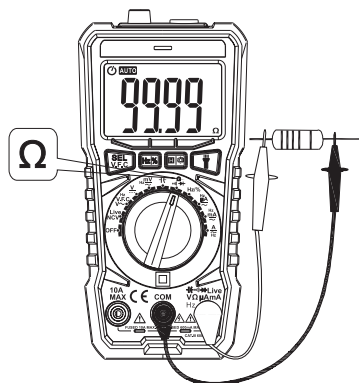
9.999 Hz-9.999KHz input frequency voltage range: 100mV to 600V RMS

RESISTANCE

Range	Resolution	Accuracy
999.9Ω	0.1Ω	± 0.8%reading ± 5digit
9.999kΩ	1Ω	
99.99kΩ	10Ω	
999.9kΩ	100Ω	
9.999MΩ	1kΩ	
99.99MΩ	10kΩ	± 3.0%reading ± 5digit
Open circuit voltage: less than 3V; Overload protection: 250V DC or 250V AC RMS.		

Please follow these specific operations:

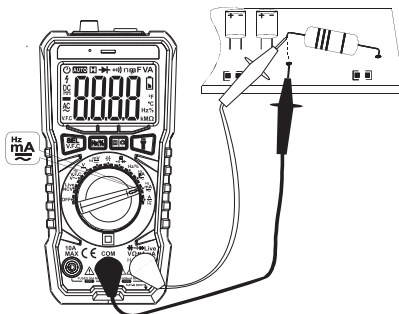
1. Insert the black pen into the 'COM' jack and the red pen into the 'Ω-VOLtA' jack.
2. Set the range switch to the 'Ω' position.
3. Connect the pen in parallel to the resistance being measured. Read the measurement results from the display.



MEASURING CURRENT μA & mA

DC/— μA & mA

Range	Resolution	Accuracy
999.9μA	0.01μA	± 1%reading ± 2digit
9999μA	0.1μA	
99.99mA	10μA	
600mA	100μA	± 2%reading ± 2digit
Maximum measured voltage drop 600mV; Overload protection: 600mA instant ceramic fuse.		



AC/~ μA & mA

Range	Resolution	Accuracy
999.9μA	0.01μA	± 1%reading ± 2digit
9999μA	0.1μA	
99.99mA	10μA	
600mA	100μA	± 2%reading ± 2digit
Maximum measured voltage drop 600mV; Overload protection: 600mA instant ceramic fuse.		

Please follow these specific operations:

Insert the black test leads into the 'COM' jack and the red test leads into the 'mA-VOLtA' jack.

Turn the rotary dial/function select to the corresponding position. Connect the instrument in series with the circuit to be tested. The measured current value and the current polarity at the red test leads point will be displayed on the screen simultaneously.

Note:

- a. Before connecting the instrument in series with the circuit to be tested, make sure to turn off the power supply in the return circuit.
- b. The maximum input current is 600mA (depending on the red test leads's position). Exceeding this current limit will damage the device's fuse. Avoid connecting the test leads in parallel to any circuit while measuring current, as it can damage the fuse and the instrument.
- c. After completing all measurement operations, first switch off the power supply of the circuit being tested, and then disconnect the connection between the test pen and the circuit. This step is especially important when measuring large currents.

Operation (cont)

K8610

d. Do not connect more than 36V DC or 25V AC voltage between the current jack and the 'COM' jack.

MEASURING CURRENT 10A

DC/ $\approx$ 10A

Range	Resolution	Accuracy
10A	1mA	3%reading $\pm$ 2digit

AC/ $\sim$ 10A

Range	Resolution	Accuracy
10A	1mA	3%reading $\pm$ 2digit

Please follow these specific operations:

1. Insert the black test leads into the 'COM' jack and the red test leads into the '10A Jack'.

2. Set the range switch to the ' $\frac{1}{2}$ ' position that corresponds to the desired measurement range, and then connect the instrument in series with the circuit to be tested.

Make sure to turn off the power supply in the circuit before connecting the instrument in series.

Once the instrument is connected, the measured current value and the polarity of the red test leads will be displayed simultaneously on the screen.

Note:

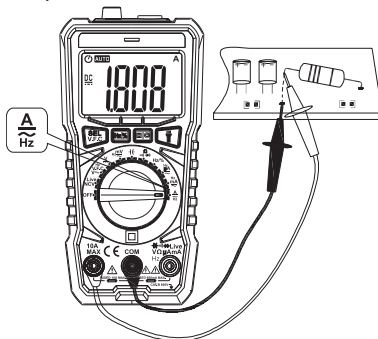
a. Before connecting the instrument in series, always remember to turn off the power supply in the circuit being tested.

b. Avoid exceeding the maximum input current, as it may damage the device's fuse. Ensure the red test leads is inserted in the appropriate location. When measuring current, do not connect the test leads in parallel to any circuit, as it can damage the fuse and the instrument.

c. When the test leads is inserted into the current input port, refrain from connecting the leads needle in parallel to any circuit, as it can damage the fuse and instrument.

d. After completing all measurement operations, turn off the power supply of the circuit under test. Then, disconnect the test leads from the circuit under test. This step is particularly important when measuring large currents.

e. Make sure not to connect a voltage higher than 36VDC or 25VAC between the current jack and the 'COM' jack.



FUSE REPLACEMENT

Fuse rarely needs replacement and is often caused as a result of operators error. To replace the fuses, remove the testing leads from the power source, open the battery cover and replace the damaged one with a new fuse of the specified rating. Reinstall the battery cover and lock the cover.

SPARE PARTS

Part No	Description	Quantity
K8640-1	Test Leads	8
K8640-2	Fuse	1
* Please Note: Kincrome reserve the right to change spare parts at any time without notice.		

Notes:

K8610

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are approximately 20 lines visible. The paper appears to be a standard notebook page or a sheet of stationery.

OFFICE CONTACT DETAILS



Phone: 1300 657 528



Email: enquiries@kincrome.com.au



Website: www.kincrome.com.au

WARRANTY

1 YEAR WARRANTY

1 YEAR WARRANTY

Our goods and services come with guarantees that cannot be excluded under the Australian Consumer Law. For major failures with the service, you are entitled: -to cancel your service contract with us; and -to a refund for the unpaid portion, or to compensation for its reduced value. You are also entitled to choose a refund or replacement for major failures with goods. If a failure with the goods or a service does not amount to a major failure, you are entitled to have the failure rectified in a reasonable time. If this is not done you are entitled to a refund for the goods and to cancel the contract for the service and obtain a refund of any unpaid portion. You are also entitled to be compensated for any other reasonably foreseeable loss or damage from a failure in the goods or service'. Kincome Australia Pty Ltd of 3 Lakeview Drive, Carribean Park, Scoresby, Victoria (Tel 1300 657 528) also provides the Kincome Lifetime Guarantee and 12-Month Warranty (Kincrome Express Warranties) in respect of some of its products. If a product is covered by a Kincome Express Warranty and it has materials or workmanship defects (other than defects caused by abnormal or non warranted use) which are covered under the terms of the relevant Kincome Express Warranty, you can, at your cost, send the product to the above address for repair or replacement. Your rights under a Kincome Express Warranty are in addition to any other rights you have under the Australian Consumer Law or other applicable laws. For further details and terms please check our product guide, visit www.kincrome.com.au or call us. Every effort is made to ensure advertised stock is available, but due to factors beyond the control of Kincome Australia Pty. Ltd, not all products advertised in this catalogue may be available at all stores. Kincome Australia Pty. Ltd. reserves the right to correct printing errors. All sizes shown are approximate only. Accessories shown do not come with the product unless otherwise specified. Due to printing process, colours in this catalogue may vary slightly to actual item. E & O. E. © Copyright 2022. Reproduction in whole or in part is prohibited without written approval.