

A SELECTION FROM THE VAST RANGE OF

Clarke[®]

QUALITY PRODUCTS



AIR COMPRESSORS

From DIY to industrial. Plus air tools, spray guns and accessories.

GENERATORS

Prime duty or emergency standby for business, home and leisure.

POWER WASHERS

Hot and cold, electric and engine driven - we have what you need.

WELDERS

Mig, Arc, TIG and Laser. From DIY to auto/industrial.

METALWORKING

Drills, grinders and saws for DIY and professional use.

WOODWORKING

Saws, sanders, planes, mortisers and dust extraction.

HYDRAULICS

Cranes, body repair kits, transmission jacks for all types of workshop use.

WATER PUMPS

Submersible, electric and engine driven for DIY, agriculture and industry.

POWER TOOLS

Angle grinders, cordless drill sets, saws and sanders.

STARTER/CHARGERS

All sizes for car & commercial use.

Clarke INTERNATIONAL

For spare parts and servicing, please contact your nearest dealer, or Clarke International on

020 - 8988 - 7400

e-mail: Parts@clarkeinternational.com e-mail: Service@clarkeinternational.com

Clarke[™]

DIGITAL MULTIMETER

MODEL CDM-45

Part No.4500065

OPERATING INSTRUCTIONS



0404

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DIGITAL MULTIMETER

MODEL CDM-45

Part No.4500065

OPERATING INSTRUCTIONS



0404

GENERAL CHARACTERISTICS

Maximum Display	: 1999 counts (3½ digits) with auto polarity indication and eng. unit.
Measuring Method system.	: Dual-Slope integration A-D convertor system.
Overrange Indication	: Figure "1" displayed on the LCD.
Max. common mode voltage	: 500V dc/ac rms.
Temp. for guaranteed accuracy	: 23°C to ± 5°C.
Temperature Ranges	: Operating 0°C to 40°C, 32°F to 104°F. : Storage -10°C to 50°C, 14°F to 122°F.
Power Supply	: 1x 9V battery (NEDA 1604, 6F22 type or equiv).
Low Battery Indication	: - + On left of display.
Dimensions incl. Holster	: 201L x 100W x 55H mm.
Weight	: 478g (incl. 9 volt battery & holster).
Accessories	: Operating manual, set of test leads. Holster,

The Meter may be hung on a wall, or supported as shown, depending upon which support is used.



The probes may be located as shown, allowing easy one hand operation.



PARTS & SERVICE CONTACTS

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2

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Temperature Measurement

1. Set the Function switch to °C position and the LCD display will show ambient temperature.
2. Insert the 'K' type thermocouple into the TEMP socket and contact the object to be measured with the thermocouple probe. Read the display.

WARNING. To avoid an electric shock, ensure the thermocouple has been removed before changing to another function.

Frequency Measurement

1. Connect the BLACK test lead to the COM jack and the RED test lead to the VΩ Hz jack
2. Set the Function switch to 20kHz and connect test leads across the source or load under measurement.

NOTE:

1. *Reading is possible above 10V rms, but accuracy is not guaranteed.*
2. *in a noisy environment, it is preferable to use shielded cable to measure small signals.*

MAINTENANCE

Battery and/or fuse replacement should only be done after the test leads have been disconnected.

Battery and Fuse Replacement

Note the condition of the 9-volt battery using the procedure described above. If the battery needs to be replaced, unscrew the four screws and remove the back cover. Replace the spent battery with one of the same type (**NEDA.1604, 6F22 or equiv**). The same procedure is used to replace the fuses. Ensure replacements are of the same size and value as the original.

Fuse : F200mA / 250V (quick acting)

Replacement Parts.

- | | |
|----------------------|------------------|
| 1. Test Leads (pair) | Part No. HYTL060 |
| 2. Holster (Size A) | Part No. HYHT60 |

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Temperature Measurement

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WARNING. To avoid an electric shock, ensure the thermocouple has been removed before changing to another function.

Frequency Measurement

1. Connect the BLACK test lead to the COM jack and the RED test lead to the VΩ Hz jack
2. Set the Function switch to 20kHz and connect test leads across the source or load under measurement.

NOTE:

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- | | |
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| 1. Test Leads (pair) | Part No. HYTL060 |
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Note:

1. *If the resistance value being measured exceeds the maximum value of the range selected, an over-range indication will be displayed("1"). Select a higher range.*


For resistance of approx. 1 Megohm and above, the meter may take a few seconds to become stable. This is normal for high resistance readings.

2. *When the input is not connected, i.e. an open circuit, the figure '1' will be displayed for an over-range condition.*
3. *When testing in-circuit resistance, ensure all power has been removed and all capacitors are fully discharged.*
4. *When using the 200Megohm range, the display is 10 counts. These counts must be subtracted from the reading.... eg. when measuring a 100MΩ resistance, the reading will display 101.0. The correct measuring result is 101.0 - 1.0 = 100MΩ*

Diode Measurement

1. Connect the BLACK test lead to the COM jack and the RED test lead to the V/Ω jack. *(Note: The polarity of the RED test lead is "+").*
2. Set the FUNCTION switch to the  position and connect the test leads across the diode under test, red lead to the anode, black to the cathode. Display shows the approx. forward voltage drop of the diode.

Continuity Test.

1. Connect the BLACK test lead to the COM jack and the RED test lead to the V/Ω jack. *(Note: The polarity of the RED test lead is "+").*
2. Set the FUNCTION switch to the  position and Connect the test leads to two points of circuit, if the resistance is lower than approx. 70Ω, the buzzer sounds.

Transistor hFE Test

1. Set the FUNCTION switch to the hFE range.
2. Determine whether the transistor is NPN or PNP and locate the Emitter, Base and Collector leads. Insert the leads into the proper holes in the socket on the front panel.
3. Display will read approx. hFE value at the test condition/Base Current 10µA VCE 3.2V


Note:

1. *If the resistance value being measured exceeds the maximum value of the range selected, an over-range indication will be displayed("1"). Select a higher range.*


For resistance of approx. 1 Megohm and above, the meter may take a few seconds to become stable. This is normal for high resistance readings.

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3. Display will read approx. hFE value at the test condition/Base Current 10µA VCE 3.2V

INTRODUCTION

Thank you for purchasing this Clarke Multi-Range Digital Multimeter.

This instrument is a compact, rugged, battery operated hand held 3½ digit, digital multimeter. It is designed to measure AC and DC voltage, AC and DC current, Resistance, Diode, Capacitance and for testing Transistors, Continuity, and Thermocouple temperature.

The dual-slope A-D converter uses C-MOS technology for auto zeroing, polarity selection and over-range indication.

It is an ideal instrument for use in the field, laboratories, workshops, and for hobby and home applications.

GUARANTEE

This product is guaranteed against faults in manufacture for 12 months from purchase date. Please keep your receipt as proof of purchase.

This guarantee is invalid if the product has been abused or tampered with in any way, or not used for the purpose for which it is intended.

The reason for return must be clearly stated.

This guarantee does not affect your statutory rights.

FEATURES

- Push button ON/OFF power switch.
- Auto Power OFF after approx 40 min.
- Single 32 position rotary switch for FUNCTION and RANGE selection.
- Auto over-range indication, with "1" being displayed on the LCD.
- Automatic reverse polarity indication on DC ranges.
- All ranges (except 10A current ranges) fully protected.
- DC Voltage measurement 200mV to 1,000V.
- AC Voltage measurement 2mV to 700V rms.
- DC current measurement 20µA to 10A.
- AC current measurement 200µA to 10A rms.
- Resistance measurement 200Ω to 200MΩ.
- Diode testing with 1mA fixed current.
- Transistor hFE test with 10µA
- Temperature measurement.
- Frequency measurement.
- Holster with 2 position stand, and test lead holders to ease the taking of readings whilst holding the meter.

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- AC current measurement 200µA to 10A rms.
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- Diode testing with 1mA fixed current.
- Transistor hFE test with 10µA
- Temperature measurement.
- Frequency measurement.
- Holster with 2 position stand, and test lead holders to ease the taking of readings whilst holding the meter.

SAFETY PRECAUTIONS

Read this information before using the meter, taking special care regarding any WARNING or IMPORTANT notices. The following safe practices and proper operating procedures should be followed when using any multimeter:

- Inspect the test leads for insulation damage or exposed metal. Damaged leads should be replaced.
- Select the proper function and range for your measurement.
- Avoid severe shocks and do not drop the multimeter.
- Do not allow the meter to be used if it is damaged or if its safety is impaired
- WARNING: To AVOID ELECTRIC SHOCK, USE CAUTION WHEN WORKING ABOVE 40V DC OR 25V AC RMS. SUCH VOLTAGES POSE A SHOCK HAZARD.
- Electrically disconnect the live, or hot test lead before disconnecting the common test lead.
- Follow all equipment safety procedures. Disconnect the input power and discharge all high-voltage capacitors through a protective impedance before testing in Ω and $\frac{V}{\Omega}$ with the multimeter.
- Avoid working alone.
- When making a current measurement, turn the power off before connecting the multimeter in the circuit. Overloading a current shunt will cause excessive heat.
- When measuring transformer secondary or motor winding current, check the multimeter fuses first.
- When testing circuits take extra care not to touch any bare metal including the ends of the test probes.
- The use of makeshift fuses and the short-circuiting of fuse holders is prohibited.
- Whenever it is likely that the protection has been impaired, the meter shall be made inoperative and be secured against any unintended operation.
- Never attempt to measure a voltage or current higher than the maximum rating of the meter.
- Never perform resistance measurements on a live circuit.

4

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- Never perform resistance measurements on a live circuit.

4

DC Current Measurement

WARNING. Do not attempt to measure a current in excess of 10 Amps

1. Connect the BLACK test lead to the COM jack and the RED test lead to the mA jack for a maximum of 2A. For inputs greater than 10A, move the red test lead to the 10A jack.
2. Set the FUNCTION switch to the A $\overline{=}$ range to be used and connect the test leads in series with the load under measurement. Reverse polarity is indicated by a “-” sign being displayed in front of the reading.

Note:

1. *If the current range is not known beforehand, set the FUNCTION switch to a high range and work down.*
2. *When only the figure “1” is displayed over range is being indicated and the FUNCTION switch must be set to a higher range.*
3. *The maximum input current is 2A, or 10A depending on the jack used. Excessive current will blow the fuse which must be replaced. The 10A range is not protected by a fuse. The fuse rating should be 2A and no more to prevent damage to the internal circuitry. The maximum terminal voltage drop is 200mV.*

AC Current measurement

WARNING. Do not attempt to measure a current in excess of 10 Amps

1. Connect the BLACK test lead to the COM jack and the RED test lead to the mA jack for a maximum of 2A. For a maximum of 10A, move the RED test lead to the 10A jack.
2. Set the FUNCTION switch to the A~ range to be used and connect the test lead in series with the load to be measured.

Note: See DC Current Note 1 - 3

Resistance Measurement

IMPORTANT. When checking in-circuit resistance, ensure the circuit under test has all power removed and that all capacitors are fully discharged.

1. Connect the BLACK test lead to the COM jack and the RED test lead to the V/ Ω jack. Note: *the polarity of the RED test lead is “+”.*
2. Set the FUNCTION switch to the range to be used and connect the test leads across the resistance to be measured.

9

DC Current Measurement

WARNING. Do not attempt to measure a current in excess of 10 Amps

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Note:

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2. *When only the figure “1” is displayed over range is being indicated and the FUNCTION switch must be set to a higher range.*
3. *The maximum input current is 2A, or 10A depending on the jack used. Excessive current will blow the fuse which must be replaced. The 10A range is not protected by a fuse. The fuse rating should be 2A and no more to prevent damage to the internal circuitry. The maximum terminal voltage drop is 200mV.*

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Note: See DC Current Note 1 - 3

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1. Connect the BLACK test lead to the COM jack and the RED test lead to the V/ Ω jack. Note: *the polarity of the RED test lead is “+”.*
2. Set the FUNCTION switch to the range to be used and connect the test leads across the resistance to be measured.

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OPERATION

1. Check the 9-volt battery by setting the ON-OFF switch to ON, if the battery is weak, a $\left[\pm \right]$ sign will appear on the display. If this does not appear on the display, proceed as below. See MAINTENANCE if the battery has to be replaced.
2. The mark, or symbol, Δ next to the test lead jacks, is a warning that the input voltage or current should not exceed the indicated values, to prevent damage to internal circuitry.
3. The function switch should be set to the range which you want to test before operation.

DC Voltage Measurement

WARNING. Use extreme caution measuring high voltages, and do not attempt to measure voltages greater than 1000 Volts, as this can damage internal circuitry.

1. Connect the BLACK test lead to the COM jack and the RED test lead to the V/ Ω jack.
2. Set FUNCTION switch to V $\overline{\text{---}}$ range to be used and connect test leads across source or load. Reverse polarity is indicated by a “—” sign being displayed in front of the reading.

Note:

1. **If voltage range is not known beforehand, set the FUNCTION switch to a high range and work down.**
2. **When only the figure “1” is displayed, over-range is being indicated, and the FUNCTION switch must be set to a higher range.**

AC Voltage Measurement

WARNING. Use extreme caution measuring high voltages, and do not attempt to measure voltages greater than 700 Volts RMS, as this can damage internal circuitry.

1. Connect the BLACK test lead to the COM jack and the RED test lead to the V/ Ω jack.
2. Set the FUNCTION switch to the V~ range to be used and connect the test leads across the source or load under measurement.

Notes: See DC Voltage measurement Note 1,2.

8

OPERATION

1. Check the 9-volt battery by setting the ON-OFF switch to ON, if the battery is weak, a $\left[\pm \right]$ sign will appear on the display. If this does not appear on the display, proceed as below. See MAINTENANCE if the battery has to be replaced.
2. The mark, or symbol, Δ next to the test lead jacks, is a warning that the input voltage or current should not exceed the indicated values, to prevent damage to internal circuitry.
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Note:

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2. **When only the figure “1” is displayed, over-range is being indicated, and the FUNCTION switch must be set to a higher range.**

AC Voltage Measurement

WARNING. Use extreme caution measuring high voltages, and do not attempt to measure voltages greater than 700 Volts RMS, as this can damage internal circuitry.

1. Connect the BLACK test lead to the COM jack and the RED test lead to the V/ Ω jack.
2. Set the FUNCTION switch to the V~ range to be used and connect the test leads across the source or load under measurement.

Notes: See DC Voltage measurement Note 1,2.

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SPECIFICATIONS

Accuracies are \pm (% reading \pm the number indicated in the respective chart, added or deducted from the digit, or right hand column of the reading)

DC Voltage

Range	Accuracy	Resolution
200mV	$\pm 0.5\%$ of rdg ± 1 digit	100 μ V
2V		1mV
20V		10mV
200V		0.1V
1000V	± 0.8 of rdg ± 2 digit	1V

Input Impedance: 10M ohms on all ranges.

Overload Protection: 220V RMS on 200mV range and 1000V DC or peak AC all others

AC Voltage

Range	Accuracy	Resolution
2mV	$\pm 1.2\%$ of rdg ± 3 digits	100 μ A
2V	$\pm 0.8\%$ of rdg ± 3 digits	1mV
20V		10mV
200V		0.1V
700V	$\pm 1.2\%$ of rdg ± 3 digits	1V

Input Impedance: 10M ohms on all ranges.

Frequency Range: 40Hz to 400 Hz

Overload Protection: 700V RMS or 1000V peak continuous on AC ranges, except 200mV AC range (15 sec. max. above 300V RMS).

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SPECIFICATIONS

Accuracies are \pm (% reading \pm the number indicated in the respective chart, added or deducted from the digit, or right hand column of the reading)

DC Voltage

Range	Accuracy	Resolution
200mV	$\pm 0.5\%$ of rdg ± 1 digit	100 μ V
2V		1mV
20V		10mV
200V		0.1V
1000V	± 0.8 of rdg ± 2 digit	1V

Input Impedance: 10M ohms on all ranges.

Overload Protection: 220V RMS on 200mV range and 1000V DC or peak AC all others

AC Voltage

Range	Accuracy	Resolution
2mV	$\pm 1.2\%$ of rdg ± 3 digits	100 μ A
2V	$\pm 0.8\%$ of rdg ± 3 digits	1mV
20V		10mV
200V		0.1V
700V	$\pm 1.2\%$ of rdg ± 3 digits	1V

Input Impedance: 10M ohms on all ranges.

Frequency Range: 40Hz to 400 Hz

Overload Protection: 700V RMS or 1000V peak continuous on AC ranges, except 200mV AC range (15 sec. max. above 300V RMS).

5

DC Current

Range	Accuracy	Resolution
2mA 20mA	$\pm 0.8\%$ of rdg ± 1 digit	1 μ A 10 μ A
200mA	$\pm 1.5\%$ of rdg ± 1 digit	0.1mA
10A	$\pm 2\%$ of rdg ± 5 digits	10mA

Overload Protection: 20mA/250V fuse
Max. Input Current: 10A

AC Current

Range	Accuracy	Resolution
20mA	$\pm 1\%$ of rdg ± 3 digits	10 μ A
200mA	$\pm 1.8\%$ of rdg ± 3 digits	0.1mA
10A	$\pm 3\%$ of rdg ± 7 digits	10mA

Overload Protection: 20mA/250V fuse
Frequency Range: 40Hz to 400Hz.
Max. Input Current: 10A
Indication: Average. (RMS of sine wave)

Frequency

Range	Accuracy	Resolution
20kHz	$\pm 1.5\%$ of rdg ± 5 digits	10 μ A

Sensitivity: 200mV rms. Input, no more than 10V rms

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DC Current

Range	Accuracy	Resolution
2mA 20mA	$\pm 0.8\%$ of rdg ± 1 digit	1 μ A 10 μ A
200mA	$\pm 1.5\%$ of rdg ± 1 digit	0.1mA
10A	$\pm 2\%$ of rdg ± 5 digits	10mA

Overload Protection: 20mA/250V fuse
Max. Input Current: 10A

AC Current

Range	Accuracy	Resolution
20mA	$\pm 1\%$ of rdg ± 3 digits	10 μ A
200mA	$\pm 1.8\%$ of rdg ± 3 digits	0.1mA
10A	$\pm 3\%$ of rdg ± 7 digits	10mA

Overload Protection: 20mA/250V fuse
Frequency Range: 40Hz to 400Hz.
Max. Input Current: 10A
Indication: Average. (RMS of sine wave)

Frequency

Range	Accuracy	Resolution
20kHz	$\pm 1.5\%$ of rdg ± 5 digits	10 μ A

Sensitivity: 200mV rms. Input, no more than 10V rms

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Resistance

Range	Accuracy	Resolution
200 Ω	$\pm 0.8\%$ of rdg ± 3 digits	0.1 Ω
2K Ω 20K Ω 200K Ω 2M Ω	$\pm 0.8\%$ of rdg ± 1 digit	1 Ω 10 Ω 100 Ω 1K Ω
20M Ω	$\pm 1\%$ of rdg ± 2 digits	10K Ω
200M Ω	$\pm 5\%$ of rdg-10 dig ± 10 dig	100K Ω

Overload Protection: 220V DC/RMS. AC on all ranges
Open Circuit Voltage: Lower than 700mV

Capacitance

Range	Accuracy	Resolution
2nF 20nF 200nF	$\pm 4\%$ of rdg ± 3 digits	1 μ F 10 μ F 0.1nF
2 μ F 20 μ F		1nF 10nF

Thermocouple Temperature

Range	Temp. Range	Accuracy	Res.
-20 $^{\circ}$ C to 1000 $^{\circ}$ C	-20 $^{\circ}$ C - 0 $^{\circ}$ C	$\pm 5\%$ of rdg ± 4 digits	1 $^{\circ}$ C
	0 $^{\circ}$ C - 400 $^{\circ}$ C	$\pm 1\%$ of rdg ± 3 digits	1 $^{\circ}$ C
	400 $^{\circ}$ C - 1000 $^{\circ}$ C	$\pm 2\%$ of rdg	1 $^{\circ}$ C

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Resistance

Range	Accuracy	Resolution
200 Ω	$\pm 0.8\%$ of rdg ± 3 digits	0.1 Ω
2K Ω 20K Ω 200K Ω 2M Ω	$\pm 0.8\%$ of rdg ± 1 digit	1 Ω 10 Ω 100 Ω 1K Ω
20M Ω	$\pm 1\%$ of rdg ± 2 digits	10K Ω
200M Ω	$\pm 5\%$ of rdg-10 dig ± 10 dig	100K Ω

Overload Protection: 220V DC/RMS. AC on all ranges
Open Circuit Voltage: Lower than 700mV

Capacitance

Range	Accuracy	Resolution
2nF 20nF 200nF	$\pm 4\%$ of rdg ± 3 digits	1 μ F 10 μ F 0.1nF
2 μ F 20 μ F		1nF 10nF

Thermocouple Temperature

Range	Temp. Range	Accuracy	Res.
-20 $^{\circ}$ C to 1000 $^{\circ}$ C	-20 $^{\circ}$ C - 0 $^{\circ}$ C	$\pm 5\%$ of rdg ± 4 digits	1 $^{\circ}$ C
	0 $^{\circ}$ C - 400 $^{\circ}$ C	$\pm 1\%$ of rdg ± 3 digits	1 $^{\circ}$ C
	400 $^{\circ}$ C - 1000 $^{\circ}$ C	$\pm 2\%$ of rdg	1 $^{\circ}$ C

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