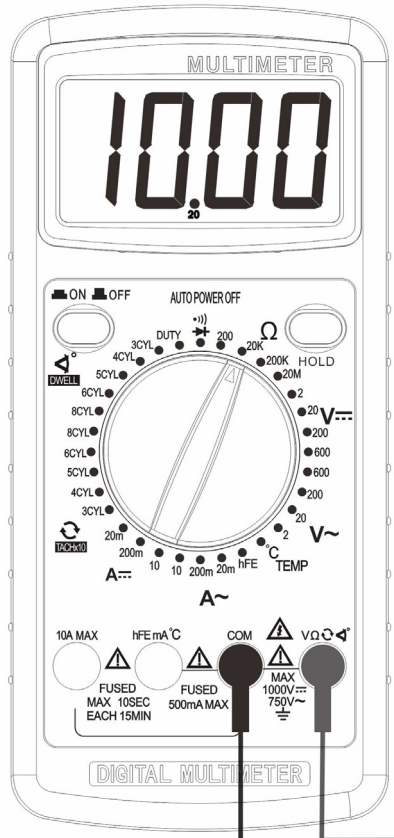


DURATOOL



Model: D03145

**Multimeter with
Automotive Ranges**

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WHAT'S INCLUDED?

- One multimeter
- One pair of test leads
- One multifunction adaptor
- One user manual


IMPORTANT SAFETY INFORMATION

Please read these instructions carefully before use and retain for future reference.

- When using electrical appliances basic safety precautions should always be followed.
- Do not operate the meter if the test leads are damaged in any way. Damaged leads should be replaced.
- Do not exceed the input limits shown in the table (right).
- To avoid damage to the meter do not apply more than 500V between any terminal and earth ground.
- Disconnect the test leads from the circuit under test before changing test ranges.
- Use caution when working above 60V DC or 25V AC rms, as such voltages pose a shock hazard.
- This meter is designed for indoor use only.
- Replace the battery as soon as the low battery indicator appears.
- Turn the meter off when it is not in use and remove the battery when not in use for a long period of time.
- Do not store the meter in a place of direct sunlight, high temperature or high humidity.

Function Range	Input Terminals	Maximum Input
DCV 2~600V	VΩ COM	600V DC
ACV 2~600V		
OHM	VΩ COM	250V DC/AC
Diode		
DCA 200mA	mA COM	200mA DC/AC
ACA 200mA		
DCA 10A	10A COM	10A DC/AC
ACA 10A		

GENERAL SPECIFICATION

Display	3½ digit LCD
Measurement Rate	2-3/sec
Overrange Indication	"1" will be displayed
Polarity Indication	Automatic negative
Low Battery Indication	"  " displayed
Overload Protection	Full range
Operating Temperature	0°C to 40°C, 0 to 75% RH
Storage Temperature	-10°C to 50°C, 0 to 75% RH
Battery Type	One 9V battery IEC 6F22, NEDA 1604
Dimensions	176 x 88 x 38mm (L x W x H)
Weight	310g (including battery)

ELECTRICAL SPECIFICATION

- Accuracy is given \pm (% of reading + number of least significant digits) for one year, at $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ RH<75%.

DC VOLTAGE

Range	Resolution	Accuracy
200mV	0.1mV	\pm (0.5% + 3 digits)
2V	1mV	\pm (0.8% + 2 digits)
20V	10mV	
200V	0.1V	
600V	1V	\pm (1.0% + 2 digits)

- Input impedance: 10M Ω .

AC VOLTAGE

Range	Resolution	Accuracy
2V	1mV	\pm (0.8% + 3 digits)
20V	10mV	
200V	0.1V	
600V	1V	\pm (1.2% + 3 digits)

- Input impedance: 10M Ω .
- Frequency range: 40 ~ 400Hz.

DC CURRENT

Range	Resolution	Accuracy
2mA	1 μA	\pm (1.8% + 2 digits)
20mA	10 μA	\pm (1.8% + 2 digits)
200mA	0.1mA	\pm (2.0% + 2 digits)
10A	10mA	\pm (2.0% + 10 digits)

- Measuring voltage drop: 200mV.

AC CURRENT

Range	Resolution	Accuracy
2mA	1 μA	\pm (2.0% + 3 digits)
20mA	10 μA	\pm (2.0% + 3 digits)
200mA	0.1mA	\pm (2.0% + 5 digits)
10A	10mA	\pm (2.5% + 10 digits)

- Measuring voltage drop: 200mV.
- Frequency range: 40 ~ 400Hz.

TEMPERATURE

Range	Resolution	Accuracy
-40 $^{\circ}\text{C}$ ~ 400 $^{\circ}\text{C}$	1 $^{\circ}\text{C}$	\pm (1.0% + 4)
400 $^{\circ}\text{C}$ ~ 1000 $^{\circ}\text{C}$		\pm (1.5% + 15)

- With K-type thermocouple.

OHM

Range	Resolution	Accuracy
200Ω	0.1Ω	± (1.0% ± 10)
2kΩ	1Ω	± (1.0% ± 4)
20kΩ	10Ω	
200kΩ	100Ω	
2MΩ	1kΩ	
20MΩ	10kΩ	± (1.0% ± 10)

DWELL ANGLE

Range	Scope (°)	Resolution	Accuracy
4 CYL	0 ~ 90	0.1°	± (2.0% ± 5)
6 CYL	0 ~ 60		
8 CYL	0 ~ 45		

TACHO

Range	Scope (°)	Resolution	Accuracy
4 CYL	20,000 PRM	10 x RPM	± (1.5% ± 5)
6 CYL			
8 CYL			

AC & DC VOLTAGE MEASUREMENT

- Set the function range switch at the required position.
- Connect the black test lead to the "COM" terminal and the red test lead to the "VΩ" input terminal.
- Connect the test leads to the measuring point and the polarity of the red lead connection will be indicated at the same time as the voltage, on the LCD.
- If the voltage to be tested is unknown, set the Function Range switch to the highest range.

Note: When only figure "1" is displayed, overrange is being indicated and the function range switch should be set to a higher range.

WARNING: Do not attempt to measure voltage above 1000V as there is a danger of damaging the internal circuitry.

AC & DC CURRENT MEASUREMENT

- Connect the black test lead to the "COM" terminal and the red test lead to the "mA" terminal for a maximum of 0.2A.
- Set the function range switch at the required position.
- Connect the test leads to the measuring points and read the display value. The polarity at the red test lead connection will be indicated at the same time as the current.

- If the current range is unknown beforehand, set the function range to the highest range and then reduce it until the desired range is obtained.

Note: When only figure "1" is displayed, overrange is being indicated and the function range switch should be set to a higher range.

RESISTANCE MEASUREMENT

- Connect the black test lead to the "COM" terminal and the red test lead to the "VΩ" input terminal.
- Set the function range switch to the "Ω" range.
- Connect the test leads across the resistance under measurement and read the display value. The polarity of the red test lead is positive.

Note: When the input is not connected i.e. at an open circuit, the figure "1" will be displayed for the overrange condition.

If the resistance value being measured exceeds the maximum value of the range selected, an overrange indication "1" will be displayed and the function range switch should be set to a higher range.

TEMPERATURE MEASUREMENT

- Set the function range switch to the "TEMP" position.
- Connect the black plug of the thermocouple to the "COM" and the red plug to the "mA" input terminal. The polarity of the red test lead is positive.
- Place the working end on, or inside, the object being tested.
- The value of the temperature is shown on the display in "°C".
- The testing temperature is displayed automatically when the thermocouple is put into the testing terminals.
- The surrounding temperature is shown when the circuit of the sensor is cut off.
- The limit temperature measured by the thermocouple, given together with the instrument, is 250°C.

DIODE & CONTINUITY TEST

- Set the function range switch to the "→|→»" position.
- Connect the black test lead to the "COM" terminal and the red test lead to the "VΩ" input terminal. The polarity of the red test lead is positive.
- This range has an "Audible Continuity Test" function. The built-in buzzer sounds if the resistance between two probes is less than $30 \pm 20\Omega$.
- Connect the test leads across the diode and read the display value.

TRANSISTOR hFE TEST (W/MULTIFUNCTION ADAPTOR)

- Set the function range switch to the "hFE" position.
- Set the multi-function adaptor and insert it into the "COM" and "mA" terminal. Be sure to connect "-" to "COM" and "+" to "mA".
- Ensure that the transistor is "NPN" or "PNP" type.
- Ensure that the transistor is inserted correctly into the E.B.C connector.
- The LCD will show the approximate transistor hFE value.

MEASURING DWELL ANGLE

- Connect the black test lead to the "COM" jack and the red test lead to the "VΩ" jack.
- Set the rotary switch to the desired "DWELL" range, according to the cylinders of the motor to be measured.

- Connect the black test lead to the iron bars or the negative pole of the battery and the red test lead to the distributor terminal of the ignition coil.
- Start the motor to set it in idle-speed, then read the value of the dwell angle on the LCD.

TESTING DUTY CYCLE

- Connect the black test lead to the "COM" jack and the red test lead to the "VΩ" jack.
- Set the rotary switch to the "DUTY" position.
- Connect the test leads to the circuit to be measured.
- Read the measurement on the LCD.

MEASURING TACHO

- Connect the black test lead to the "COM" jack and the red test lead to the "VΩ" jack.
- Set the rotary switch to the desired "TACH x 10" range, according to the cylinders of the motor to be measured.
- Connect the black test lead to the iron bars of the negative pole of the battery and the red test lead to the distributor terminal of the ignition coil.
- Start the motor, read the display, divide the displayed value by the number of cylinders, and the result is the turning speed (tacho).

BATTERY & FUSE REPLACEMENT

- Battery and fuse replacement should only be done after the test leads have been disconnected and the power is off.
- Using a screwdriver, loosen the screws and remove the case bottom.
- Remove the old battery and replace it with a new one of the same specification (9V battery IEC 6F22, NEDA 1604).
- Similarly, when replacing the fuse do so with the same specification:
 - Fuse 1: 0.5A/600V, dimensions 5 x 20mm,
 - Fuse 2: 10A/600V, dimensions 5 x 20mm.
- Replace the case bottom and reinstall the three screws. Never operate the meter unless the case bottom is fully closed.



INFORMATION ON WASTE DISPOSAL FOR CONSUMERS OF ELECTRICAL & ELECTRONIC EQUIPMENT.

When this product has reached the end of its life it must be treated as Waste Electrical & Electronic Equipment (WEEE). Any WEEE marked products must not be mixed with general household waste, but kept separate for the treatment, recovery and recycling of the materials used. Contact your local authority for details of recycling schemes in your area.



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