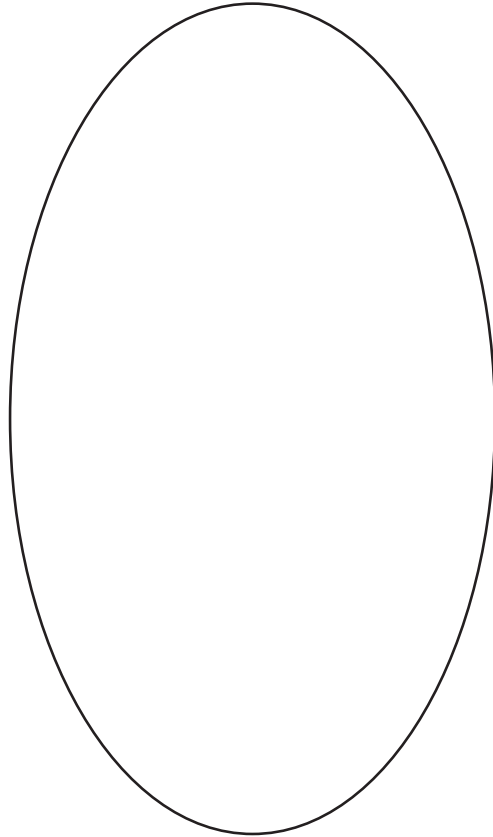


DURATOOL



MODEL: D03131

3½ DIGITAL MULTIMETER

CONTENTS

Page Number	Details
3	Important Safety Information
3	What's Included
4	Introduction - Front Panel & Display Screen
5	Display Messages
5	Buttons
6	Power-up Options
7	Automatic Power-Off
7	Hold Function
7	Relative Measurement
7	Insulation Test Lock
7	Storing Test Data
8	Reading Test Data
8	Delete Data
9	Compare Function
9	Timer Function
9	Max/Min/Avg
9	DAR & PI
10	Making Basic Measurements - Measuring DC Voltage - Measuring AC Voltage - Measuring Resistance
10	Insulation Test
11	Replacing the Battery
11	Specifications
12	Accuracy

IMPORTANT SAFETY INFORMATION

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

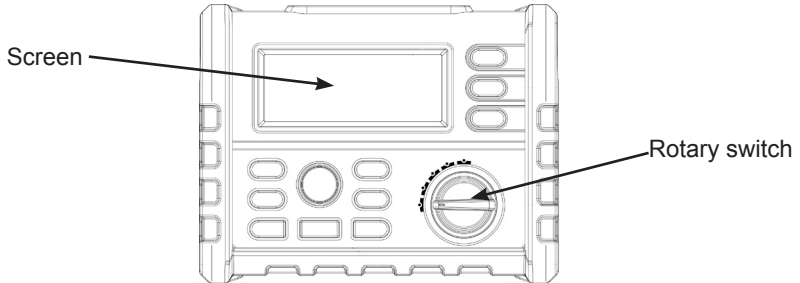
- When using electrical appliances basic safety precautions should always be followed.
- Use the Meter only as specified in this manual, or the protection provided may be impaired.
- Do not operate the Meter or use test leads if they appear damaged, or if the Meter is not operating properly.
- There are no user-serviceable parts in this product. Refer servicing to qualified personnel.
- Always use the proper terminal, switch position and range for measurements before connecting the Meter to the circuit under test.
- Verify the Meter's operation by measuring a known voltage.
- Do not apply more than the rated voltage as marked on the Meter, between the terminals or between any terminal and earth ground.
- Use caution with voltages above 30V AC RMS, 42V AC peak or 60 V DC. These voltages pose a shock hazard.
- Replace the battery as soon as the low battery indicator appears.
- Disconnect the circuit power and discharge all high voltage capacitors before testing resistance, continuity, diodes or capacitance.
- Do not use the Meter around explosive gas or vapour.
- When using the test leads, keep your fingers behind the finger guards
- Remove test leads from the Meter before opening the Meter case or battery door.
- Never operate the Meter with the cover removed or the battery door open.
- Use only the replacement fuse specified or the protection may be impaired.

WHAT'S INCLUDED

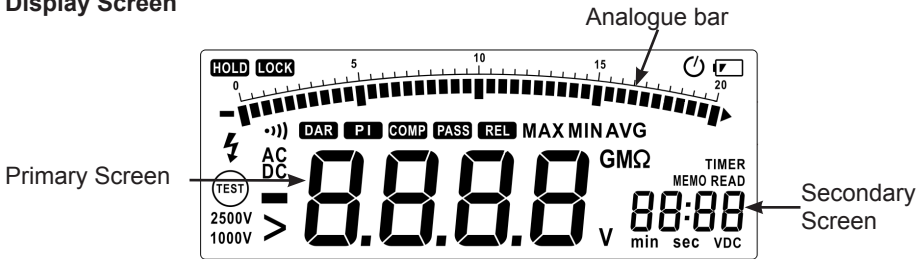
Item	Quantity
Test Leads	2
Clips	2
Battery AA LR6	6
User Manual	1

INTRODUCTION

Front Panel



Display Screen



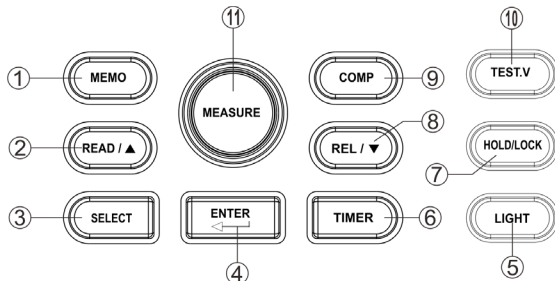
Indicator	Description
	Low battery indicator. Replace the battery as soon as the indicator appears.
LOCK	Indicates a test lock will be applied next time you press the TEST button on the Meter.
HOLD	Prevents the Meter from updating the display.
COMP	Compare function is selected.
PASS	When the measured value is between the upper limited and lower limited value.
REL	Relative function is selected.
DAR	In insulation test mode, display the DAR value.
PI	In insulation test mode, display the PI value.
TIMER	Timer function is selected.
MEMO	Store function is selected.
READ	View memory data. When the data is invalid the display will read ---
DC	DC voltage function is selected.
AC	AC voltage function is selected.
VDC	In insulation test mode, test voltage unit.
	When the measurement value is lower than 0.

>	In insulation test mode, it indicates the measure value overflow.
⚡	Unsafe voltage warning. Indicates greater than 20V.
🔊	Continuity test function is selected.
🕒	Auto power off function is selected.
TEST	Insulation test indicator.
2500V 1000V	Source voltage rating for insulation test.
min sec	Timer unit.
G M Ω V	Measure unit.
MAX MIN AVG	Display the Max, Min and Average value.

DISPLAY MESSAGES



Indicator	Description
batt	Appears on primary display, indicating the battery is too low for reliable operation. Replace the battery.
bat	Appears on auxiliary display, indicating that the battery is too low to perform the insulation test.
P r E S	Preset value.
POFF	Auto power off function is disabled.
LIVE	In insulation mode, it indicates that the Meter has detected the voltage on the input terminals.
DISC	In insulation mode, it indicates that the Meter performs the auto discharge function. Do not touch any input terminals in this mode.
SAVE	Store measuring data.
dEL n:	Delete the selected data.
dEL ALL	Delete all memorised data.
COMP Hi	The upper limited value.
COMP Lo	The lower limited value.
---- COMP	The limited value is invalid.
🔊 OFF	Beep function disabled.

BUTTONS




Button	Description
1	Active store function. Store the measuring data to the memory.
2	Active read function. To view the data store in memory, change the cursor position.
3	1. In DCV, ACV, continuity mode press the button to view the max value, min value, average value, upper limited value, lower limited value and relative value. 2. In Insulation mode press to view the max value, min value, average value, upper limited value, lower limited value, preset timer, DAR and PI.
4	Confirm button.
5	Back light on/off.
6	Activate the timer function.
7	Activate the hold function in DCV, ACV or Continuity, or the lock function in Insulation.
8	Activate the REL function in DCV, ACV or Continuity and change the cursor position.
9	Activate the compare function.
10	Select one test output voltage for insulation test.
11	Activate the Insulation test.

ROTARY SWITCH

Position	Function
OFF	Turn off the Meter power
 V	DC Voltage 0.1V ~ 1000V
~V	AC Voltage 0.1V ~750V
	Ohm and continuity 0.01Ω ~ 200.0Ω
Insulation	Insulation test 0.01MΩ ~ 10.00GΩ, test output voltage 50V (default) 100V, 250V, 500V, 1000V. The test output voltage will be saved.

INPUT TERMINAL

Terminal	Description
HI  VΩ	Input/output positive terminal
COM	Common terminal except insulation measure
LO	Common terminal in insulation measure

POWER-UP OPTIONS

- Holding a button down while turning the Meter on activates a power-up option. Power-up options allow you to use additional features and functions of the Meter.
- To select a power-up option, hold down the appropriate button indicated while turning the Meter from OFF to any switch position. Power-up options are cancelled

when the Meter is turned off.

Button	Function
SELECT	Disables automatic power-off function. Display shows PoFF until the button is released.
ENTER	Disable the “beep” function.

AUTOMATIC POWER-OFF (SLEEP MODE)

- The Meter has automatic power-off function (sleep mode), which conserves battery power if there is no function change or button press for ten minutes.
- The Meter comes out of Sleep mode when a key is pressed or when the rotary switch is changed.
- To disable Sleep mode, hold down the SELECT button while turning the Meter on.
- Sleep mode is always disabled in the ‘Insulation Test’ mode, or if the auto power-off feature has been disabled by pressing SELECT when turning the Meter on.

HOLD FUNCTION

- Press the HOLD button to freeze the displayed value. Press again to release the display.

RELATIVE MEASUREMENT

- Show the difference between the actual value and the relative base.
- Press the REL button to enter relative measurement and the Meter will record the initial value when pressing the key.
- Displayed value = Actual value - Initial value.
- Press the REL button again to exit relative measurement.
- Press the SELECT button to view Initial value, when the Initial value is invalid the display will read ----.



INSULATION TEST LOCK

- In Insulation test mode, press the TEST button to perform an insulation test until the button is released. When the button is released, the screen will display the “Hold” sign.
- Press the LOCK button, then the screen will display the “Lock” sign.
- Press the TEST button and the Meter will perform an insulation test until you press the TEST button again.
- Lock function is invalid when the timer function is selected.

STORING TEST DATA

- Press the MEMO button so that the meter enters HOLD status automatically.
- The LCD screen will display “MEMO” and the memory code on the secondary display.
- Press Δ/∇ button to change the code, press enter to save the data in the preferred memory code and the screen will display “SAVE”.

- The data is stored successfully when the buzzer sounds.
- The meter can save 20 sets of data in memory locations from 00 to 19.



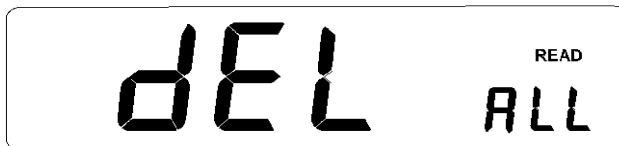
READING TEST DATA

- Press the READ button to display the data in memory.
- Press Δ/∇ to change the code and read the data accordingly.



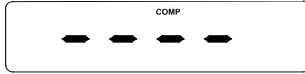
DELETE DATA

- In READ mode, press ENTER and the meter will display dEL n.
- Press ENTER again to delete the selected data and press READ to delete all of the data.
- The Meter will beep once the data is deleted.
- Press another button to quit the current status.



COMPARE FUNCTION

- When Compare function is selected, the Meter beeps and won't display "PASS", when the measuring data is higher than the upper limited value or lower than the lower limited value.
- Pressing the COMP button will activate the Compare function and the Meter will display "COMP" (see image right).



- When the preset upper limited value is lower than the lower limited value, COMP function is invalid and the Meter will display " - - - " (see image left).
- Press COMP to view the upper and lower limited value.
- The Meter displays "COMP" and either "HI" or "LO" on the secondary screen (see image right).



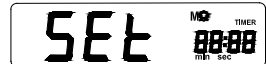
TIMER FUNCTION

- The Timer function can only be activated in the Insulation test.

- Enable the Timer function by pressing TIMER.
- The lock function will be invalid and the Meter will start the Insulation test when pressing the MEASURE button. When the time is due, the test is stopped.
- In 'Timer' mode, the current voltage and time is shown on the secondary display.
- The Meter will display the test voltage when it is under the insulation test.
- To check the time, press Δ .
- Press SELECT to check the preset time.

- The LCD screen displays "TIMER" and "PRES" is shown on the primary display, while the secondary display shows the preset time.

- Press ENTER and the Meter displays "SET" (see right).
- The time can be adjusted by pressing the Δ/∇ .
- Press ENTER again to confirm the adjustment.



MAX/MIN/AVG

- In 'Test' mode, press the SELECT button to view max, min and average value.
- In 'Hold' mode, press the SELECT button to review max, min and average value.

DAR & PI

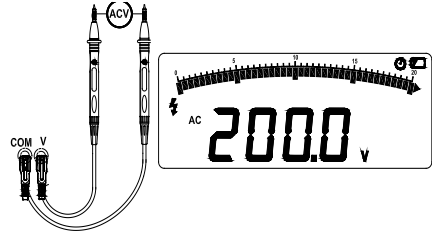
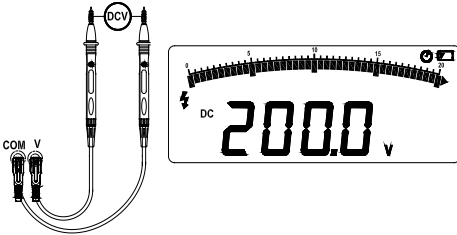
- Sometimes an insulation part with obvious drawbacks e.g. the insulation part is broken through under high voltage, is nevertheless good with absorption ratio.
- Therefore, absorption ratio cannot be used to discover local insulation drawbacks, other than dampness and contamination.

- R10 Min = Resistance value measured 10 minutes after applying the test voltage.
- DAR (absorbing ratio) = $\frac{R60 \text{ Sec}}{R15 \text{ Sec}}$ • R1 Min = R60 Sec = Resistance value measured 10 minutes after applying the test voltage.
- PI (polarization index) = $\frac{R10 \text{ Min}}{R1 \text{ Min}}$ • R15 Sec = Resistance value measured 10 minutes after applying the test voltage.

- After performing the insulation test, press SELECT to view DAR or PI.
- If DAR or PI are invalid, the meter will display “- - - -”.

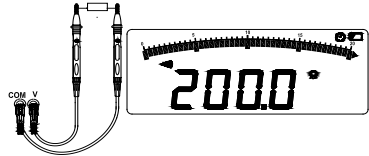
MAKING BASIC MEASUREMENTS

Measuring DC Voltage	Measuring AC Voltage
<ul style="list-style-type: none"> • Switch the rotary switch to the $\overline{\text{V}}$ position. • Input terminals and test leads, connecting as shown below. • Then connect the test leads to the circuit. 	<ul style="list-style-type: none"> • Switch the rotary switch to the $\sim\text{V}$ position. • Input terminals and test leads, connecting as shown below. • Then connect the test leads to the circuit.




Measuring Resistance

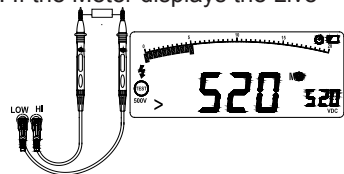
- To avoid possible damage to the Meter or to the equipment under test, disconnect the circuit power and discharge all high voltage capacitors before testing for continuity.
- Switch the rotary switch to the \rightarrow position.
- Input terminals and test leads, connecting as shown (right).
- The continuity test features a beep that sounds as long as the circuit is complete.
- The beep sounds when a short ($<3 \Omega$).



INSULATION TEST

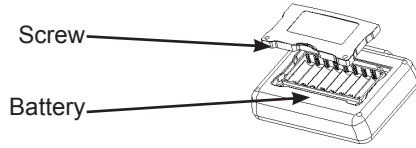
Warning: When testing voltage output, do not rotate the rotary switch to prevent damage to the Meter.

- Insulation tests should only be performed on dead circuits. Check the test leads before testing.
- Switch the rotary switch to the “Insulation” position.
- If the Meter displays , please replace the battery.
- Insert the test leads to the High and Low terminals. If the Meter displays the Live indicator, power off the Live circuit as the Meter cannot measure on a live circuit.
- Press the TEST.V button to select output voltage.
- In insulation measuring the screen alternates between on or off.
- The primary screen displays the resistance value and the secondary screen displays the output voltage.
- Release the TEST button and the Meter will display “DISC”.
- The secondary screen displays “0 VDC” when the voltage discharge has finished.
- Disconnect the test leads from the circuit.



REPLACING THE BATTERY

- To avoid false readings, which could lead to possible electric shock or personal injury, replace the batteries as soon as the low battery indicator appears.
- Turn the rotary switch to OFF and remove the test leads from the terminals.



SPECIFICATIONS

- When the input terminals are Hi and Lo, the overload protective voltage is 600V.
- When the input terminals are V and COM, the overload protective voltage is 1200V under the voltage test.
- In other test modes, the overload protective voltage is 250V.
- Batteries: Six AA batteries (NEDA 15A or IEC LR6).
- 1000 hours of Meter use.

Insulation Measurement Range	0.01MΩ to 10.00GΩ
Insulation Test Voltages	50V, 100V, 250V, 500V, 1000V
Insulation Source Voltage	+20%, -0%
Insulation short-circuit test current	1.8mA nominal
Insulation test automatic discharge time	Capacitance = 1μF or less, Discharge time <1 second.
Insulation Live Circuit Detection	Inhibit test if terminal voltage > 20V prior to initialisation of test.
Insulation Maximum Capacitive Load	Operable with up to 1μF load
Storage Temperature	-40°C to 60°C
Operating Temperature	0°C to 40°C
Storage Altitude	12000m
Operating Altitude	2000m 1000V CAT III, 3000m 1000V II
Temperature Coefficient	0.05 X (specified accuracy) per °C for temperatures <18°C or > 28°C.
Relative Humidity	40%~75% (40%~60% when insulation test >1GΩ)
Size	180x140x65mm (LxWxH)
Weight	Approx 900g (not including battery)

ACCURACY

DCV		
Range	Resolution	Accuracy
200V	0.1V	± (0.5% + 5)
1000V	1V	± (0.5% + 5)

ACV		
Range	Resolution	Accuracy
200V	0.1V	± (1.5% + 5)
750V	1V	± (1.5% + 5)

Resistance		
Range	Resolution	Accuracy
20Ω	0.01Ω	± (1% + 5)
200Ω	0.1Ω	± (1% + 5)

Insulation				
Output Voltage	Range	Resolution	Test Current	Accuracy
50V (0~20%)	0~20MΩ	0.01MΩ	1mA@50K	± (3%rdg + 5dgt)
	20~50MΩ	0.1MΩ		
100V (0~20%)	0~20MΩ	0.01MΩ	1mA@100K	± (3%rdg + 5dgt)
	20~100MΩ	0.1MΩ		
250V (0~20%)	0~20MΩ	0.01MΩ	1mA@250K	± (3%rdg + 5dgt)
	20~200MΩ	0.1MΩ		
	200~250MΩ	1MΩ		
500V (0~20%)	0~20MΩ	0.01MΩ	1mA@500K	± (3%rdg + 5dgt)
	20~200MΩ	0.1MΩ		
	200~500MΩ	1MΩ		
1000V (0~20%)	0~200MΩ	0.1MΩ	1mA@1000K	± (3%rdg + 5dgt)
	200~1000MΩ	1MΩ		
	1.00~5.00GΩ	0.01GΩ		± (5%rdg + 0.1GΩ)
	5.00~10.00GΩ	0.01GΩ		± (10%rdg + 0.2GΩ)



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 & Electronics 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.



Do not dispose of batteries with general household waste. At the end of their lives they must be recycled. The batteries can be returned to any waste battery collection point, which are provided by most battery retailers. Alternatively, your local authority will be able to advise you of the waste battery collection facilities available in your area.

