



# DIGITAL AUTOMOTIVE ANALYSER 15 FUNCTION WITH INDUCTIVE COUPLER/INFRARED TEMPERATURE PROBE

MODEL NO: **TA304**

Thank you for purchasing a Sealey product. Manufactured to a high standard, this product will, if used according to these instructions, and properly maintained, give you years of trouble free performance.

**IMPORTANT:** PLEASE READ THESE INSTRUCTIONS CAREFULLY. NOTE THE SAFE OPERATIONAL REQUIREMENTS, WARNINGS & CAUTIONS. USE THE PRODUCT CORRECTLY AND WITH CARE FOR THE PURPOSE FOR WHICH IT IS INTENDED. FAILURE TO DO SO MAY CAUSE DAMAGE AND/OR PERSONAL INJURY AND WILL INVALIDATE THE WARRANTY. KEEP THESE INSTRUCTIONS SAFE FOR FUTURE USE.



Refer to  
instructions



Electrical shock  
hazard



Warning

## 1. SAFETY

### 1.1. PERSONAL PRECAUTIONS

- ✓ When using this multimeter, please observe all normal safety rules concerning:  
Protection against the dangers of electrical current.  
Protection of the meter against misuse.
- ✓ Full compliance with safety standards can only be guaranteed if used with the test leads supplied. If necessary, they must be replaced with genuine Sealey leads with the same electronic ratings. Failure to do so will invalidate the warranty.
- ✗ **DO NOT** use leads if damaged or if the wire is bared in any way.
- ✗ **DO NOT** use the meter if it has been damaged.

### 1.2. GENERAL SAFETY INSTRUCTIONS

- WARNING! USE EXTREME CAUTION** when working with high voltages.
- ✓ Familiarise yourself with the application and limitations of the multimeter as well as the potential hazards. **IF IN ANY DOUBT CONSULT A QUALIFIED ELECTRICIAN.**
- ✓ Before commencing testing, follow instructions below and select the correct input sockets, function and range on the multimeter.
- ✓ When the meter is connected to a circuit, **DO NOT** touch any unused meter terminals.
- ✓ When the magnitude of the value to be measured is unknown beforehand, set the range selector to the highest value available.
- ✓ Before rotating the range selector to change functions, disconnect test probes from the circuit under test.
- WARNING! Never perform resistance, transistor, diode or continuity measurements on live circuits.**
- ✓ Always take care when working with voltages above 35V DC or 25V AC rms. These voltages are considered a shock hazard.
- ✓ Always keep fingers behind the probe barriers whilst measuring and **DO NOT** use when hands are wet.
- ✗ **DO NOT** touch the test leads, tips or the circuit being tested.
- ✓ Choose the proper range and function for the required measurement. **DO NOT** try voltage or current measurements that may exceed the ratings marked on the Function/Range switch.
- ✓ When testing for the presence of a voltage or current, make sure the meter is functioning correctly. Take a reading of a known voltage or current before accepting a zero reading.
- ✗ **DO NOT** test voltages above 600V AC or DC - the circuitry of the multimeter will be destroyed.
- WARNING! NEVER** connect the multimeter to a voltage source / live circuit when the rotary switch is set to any other function apart from Voltage testing.
- WARNING!** Voltage checks on electrical outlets can be difficult and misleading because of the uncertainty of connection to the recessed electrical contacts. Other means should be used to ensure that the terminals are not "live".
- ✓ Avoid damaging the meter when testing voltage. Disconnect the test leads from the test points before changing functions.
- ✗ **DO NOT** attempt a voltage measurement with the test leads in the 20A or the mA terminal.
- ✓ **ALWAYS** discharge filter capacitors in power supplies and disconnect the power when making resistance or diode tests.
- ✗ **DO NOT** use the multimeter in a potentially explosive atmosphere or where flammable material is present.
- ✓ **ONLY** operate the multimeter when the back cover is in place and fastened securely.
- ✓ If any abnormal readings are observed, the multimeter must be checked out by an authorised technician.
- ✓ **ALWAYS** turn off the multimeter and disconnect the test leads, before opening the back cover to replace the fuse or battery.
- ✓ When not in use, store the multimeter carefully in a safe, dry, childproof location out of direct sunlight. If storing for a long period of time, remove the battery. Storage temperature range: -15°C to 50°C.

**Note:** The warnings, cautions and instructions referred to in this manual cannot cover all possible conditions and situations that may occur. It must be understood that common sense and caution are factors which cannot be built into this product, but must be applied by the operator.

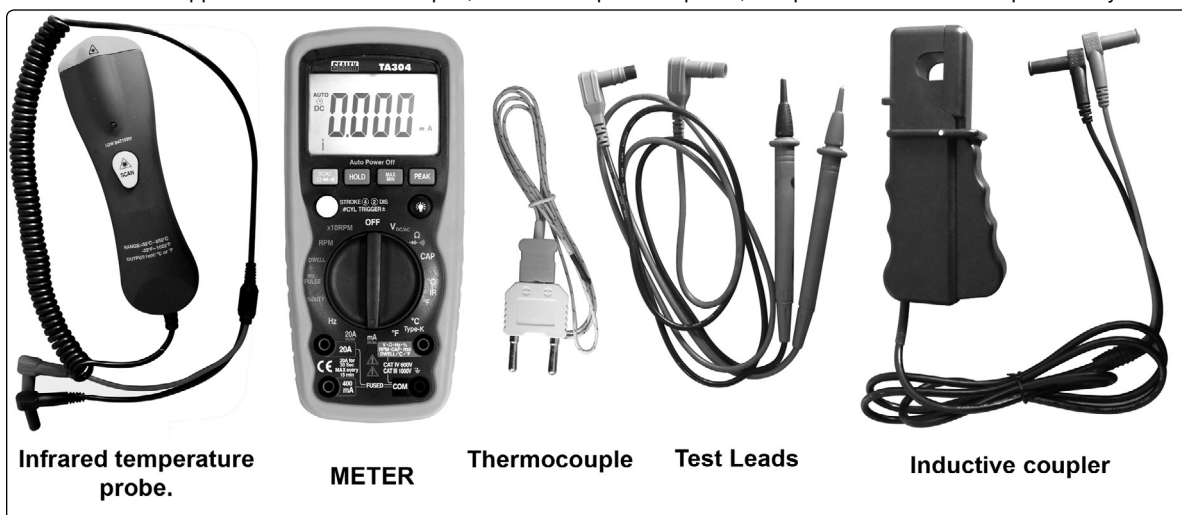
- WARNING!** Engines produce carbon monoxide which is odourless and causes slower reaction time which could lead to serious injury. An engine which is operating should be in a well ventilated area, or the vehicle's exhaust should be connected to an adequate fume removal system.
- ✓ When working on a vehicle which is being tested or repaired ensure that the handbrake is on and the front wheels are chocked to avoid the vehicle moving and causing injury.
- ✓ Wear suitable eye protection when testing or repairing a vehicle.
- ✓ When measuring current, connect the meter in series with the load.
- ✓ Disconnect the live test lead before disconnecting the common test lead.
- ✓ The mA and the 20A terminals are protected by fuses. To avoid possible injury or damage, use only in circuits limited to 400mA or 20A for 30 seconds.

- ✓ To maintain the accuracy of the meter, replace the discharged battery immediately when the symbol 'BAT' appears on the meter display.
- ✓ Avoid measurement errors from outside interference. Keep the meter away from spark plug and coil wires.
- ✓ The user shall ensure that test probes are correctly selected in order to prevent danger. Probes shall be selected to ensure that adequate barriers guard against inadvertent hand contact with live conductors under test and that probes have minimal exposed probe tips. Where there is a risk of the probe tip short circuiting with other live conductors under test, it is recommended that the exposed tip length shall not exceed 4mm.
- ✓ **Exceeding the electrical limits of this meter is dangerous and will expose you to serious or possibly fatal injury. Carefully read and understand the specification limits of this meter together with the warnings and cautions in this safety section. DO NOT EXCEED THE LIMITS SHOWN IN THE TABLE BELOW.**

FUNCTION	TERMINAL	INPUT LIMIT
DC/AC Volts, 1 Ohm/Continuity/Diode, CAP., IR-TEMP. Adaptor, Type-K TEMP., Hz, % Duty, Ms Dwell, RPM	V-Q-RPM	600VoltsAC DC
AC/DC	µA / mA	400mA DC/AC
AC/DC20A	20A	*20A DC/AC
* 20 Amp measurement for 30 seconds maximum.		
1 Ohms can not be measured if voltage is present, ohms can be measured only in a non-powered circuit. However, the meter is protected to 600 volts.		

## 2. INTRODUCTION

Includes new generation, 15-function, auto-ranging automotive diagnostic multimeter with IR thermometer attachment. Combination digital/bar-graph display gives accurate indication of component outputs. Large, easy to read high contrast display with bright, white backlight. Workshop-tough, durable bi-composite case with integral stand and auto power shut-off. High speed processing circuitry reads standard automotive parameters including duty cycle and pulse width making this tool ideal for testing fuel injection systems. Features auto-ranging, and data hold functions with overload protection on all ranges. Includes relative functions including Min/Max and Peak Hold. Supplied with Inductive Coupler, Infrared temperature probe, test probes and thermocouple in carry case.



## 3. SPECIFICATION

**SPECIFICATION:**..... **Model No: TA304**

Tach (RPM): ..... 2-10cyl, 4-Stroke 600-4000 (x1)rpm, 600-12000 (x10)rpm

Dwell: ..... 4/5/6/8cyl

AC Voltage: .....400mV, 4V, 40, 400V, 700V

DC Voltage: .....400mV, 4V, 40, 400V, 1000V

AC Current: ..... 400µA, 4000µA, 40mA, 400mA, 4A, 20A

DC Current: ..... 400µA, 4000µA, 40mA, 400mA, 4A, 20A

Capacitance: ..... 40nF, 400nF, 4µF, 40µF, 400µF, 4mF, 40mF

Frequency: ..... 0.001Hz-9.99MHz

Duty Cycle: ..... 0.1-99.9%

Pulse Width: .....0.1-10ms

Resistance: ..... 400Ω, 4kΩ, 40kΩ, 400kΩ, 4MΩ, 40MΩ

Continuity: ..... <30Ω Continuity Buzzer 2kHz

Temperature: .....-20 to +760°C, -4 to +1400°F

IR Temperature: .....-20 to +280°C, -4 to +536°F

Diode Check: ..... Yes

Back Light: ..... Yes

Bar Graph Display: .....N/A

Display Hold: ..... Yes

Auto Ranging: ..... Yes

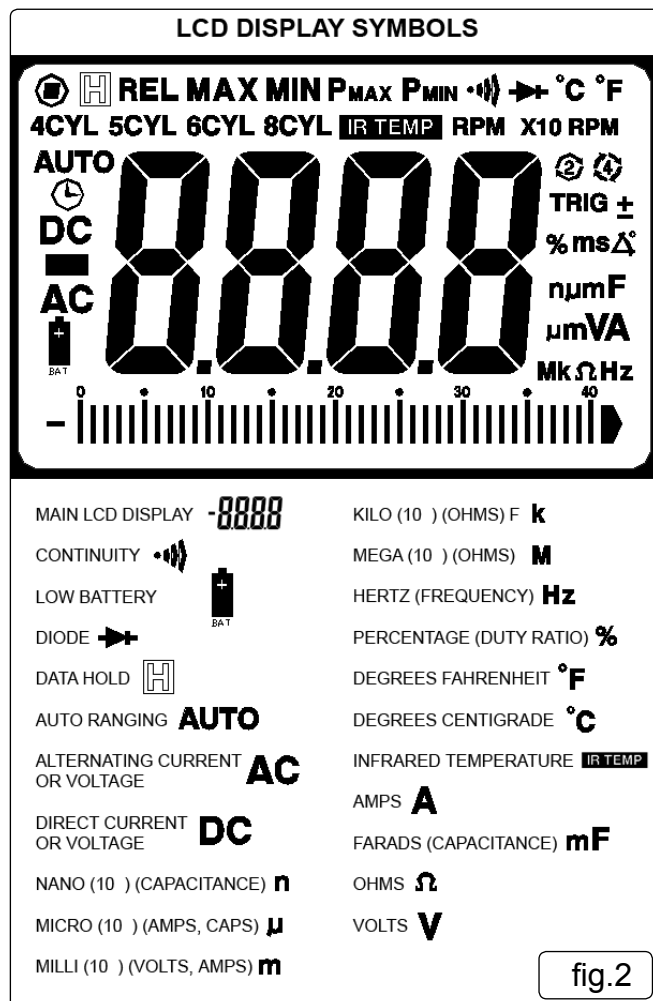
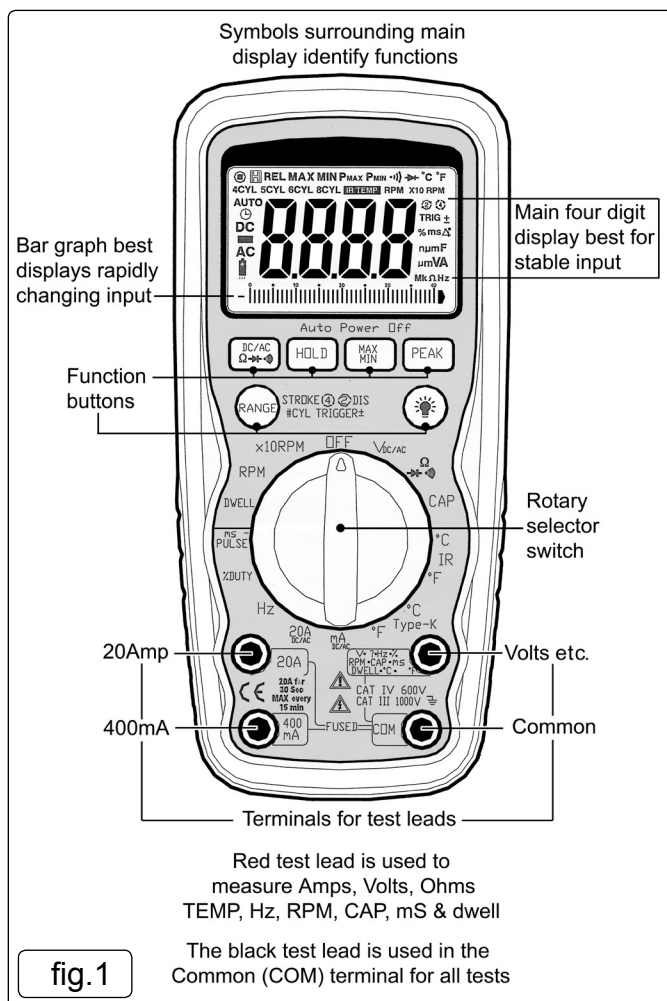
Inductive Coupler: ..... Yes

Digits Height: .....20mm

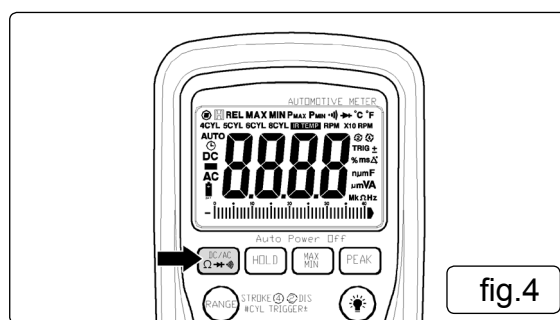
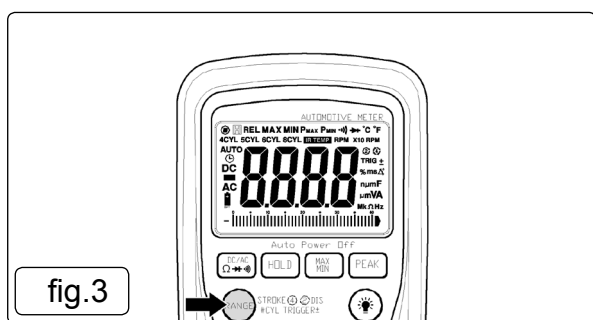
Auto Power Off: ..... Yes

Low Battery Indicator: ..... Yes  
 Batteries (supplied): ..... 9V (PP3)  
 Hi-Impact Case: ..... Yes  
 Size (L x W x D): ..... 182 x 82 x 55mm  
 Weight: ..... 360g

#### 4. MAIN METER FEATURES



#### 5. PUSH BUTTON FUNCTIONS



##### 5.1. MANUAL RANGE & Stroke 4/2(DIS), Hz, %, ms +, CYL Button

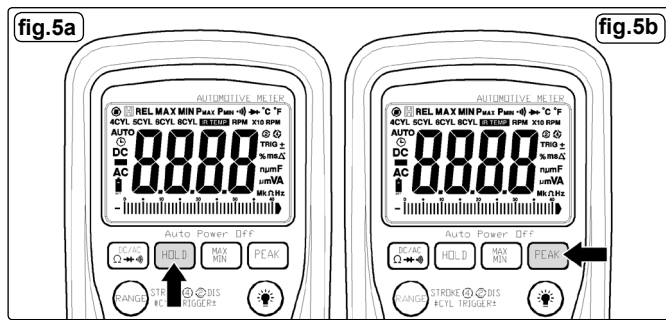
Press to this button to select; *STROKE 4, 2DIS, Hz, %, ms+, CYL range & V/A Resistance manual Range*

##### 5.1.1. MANUAL RANGING

The meter turns on in the autoranging mode. Press the Range button to go to manual ranging. The display icon "AUTO" will appear. Each press of the range button will step to the next range as indicated by the units and decimal point location. Press and hold the Range button for two seconds to return to autoranging.

##### 5.2. MODE BUTTON

Press the mode push button to select the following functions;  
*DC/AC Voltage, DC/AC Current Resistance, Diode, Continuity & Capacitance*



### 5.3. DATA HOLD (fig.5a)

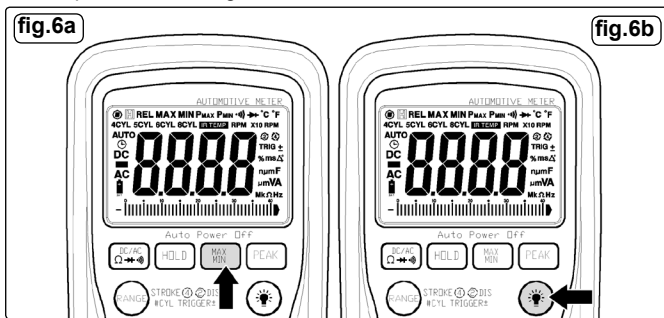
The Data Hold function allows the meter to “freeze” a measurement for later reference.

- 5.3.1. Press the DATA HOLD button to “freeze” the reading on the display. The “HOLD” symbol will appear in the display.
- 5.3.2. Press the DATA HOLD button again to return to normal operation.

### 5.4. PEAK HOLD (fig.5b)

The Peak Hold function captures the peak AC or DC voltage or current. The meter can capture negative or positive peaks as fast as 1 millisecond in duration.

- 5.4.1. Turn the function switch to the A or V position.
- 5.4.2. Press and Hold the PEAK button until “CAL” appears in the display. This procedure will zero the range selected & return the meter to manual ranging.
- 5.4.3. Press the PEAK button, Pmax will display.
- 5.4.4. The display will update each time a higher positive peak occurs.
- 5.4.5. Press the PEAK button again, Pmin will display. The display will now update and indicate the lowest negative peak.
- 5.4.6. To return to normal operation, press and hold the PEAK button until the Pmin or Pmax indicator switches off. **Note:** If the Function switch position is changed after a calibration the Peak Hold calibration must be repeated for the new function selected.



### 5.5. MAX/MIN BUTTON (fig.6a)

- 5.5.1. Press the MAX/MIN button to activate the MAX/MIN recording mode. The display icon “MAX or MIN” will appear. The meter will go to manual ranging & display and hold the maximum or minimum reading and will update only when a new “max or min” occurs.
- 5.5.2. Press the MAX/MIN key and a blinking “MAX MIN” will appear. The meter will display the present reading, but will continue to update and store the max and min readings. To exit MAX/MIN mode press and hold the MAX/MIN key for 2 seconds.

### 5.6. BACKLIGHT BUTTON (fig.6b)

- 5.6.1. Press the BACKLIGHT button to turn the backlighting ON.
- 5.6.2. Press the BACKLIGHT button again to turn the backlighting OFF.

## 6. METER FUNCTIONS

### 6.1. VOLTAGE (V)

- 6.1.1. Select the **Volts “V”** range with the rotary switch.
- 6.1.2. The meter will automatically select the best voltage (V) range.
- 6.1.3. Select DCV or ACV with the **MODE** button.
- 6.1.4. Insert Black lead in **COM** terminal.
- 6.1.5. Insert Red lead in **V-Ω-RPM** terminal
- 6.1.6. Touch the Black probe to ground or to the negative (-) circuit.
- 6.1.7. Touch the Red probe to the circuit coming from the power source.

▲ **IMPORTANT: Voltage must be measured in parallel (Red probe measuring circuit from power source).**

□ **WARNING: When measuring voltage, be sure the Red test lead is in the terminal marked “V”. If the test lead is in an Amp (A) or Milliampere (mA) terminal, you may be injured or the meter damaged.**

### 6.2. RESISTANCE (Ω)

- ▲ **IMPORTANT:** If you are testing an application that has capacitors in the circuit, be sure to turn the power OFF on the test circuit and discharge all capacitors. Accurate measurement is not possible if external or residual voltage is present.
- 6.2.1. Select the **Resistance “Ω”** range with the rotary switch.
- 6.2.2. Select the **Resistance “Ω”** function with the Mode button. Please note, the unit defaults to resistance.
- 6.2.3. Insert Black lead in **COM** terminal.
- 6.2.4. Insert Red lead in **V-Ω-RPM** terminal
- 6.2.5. Touch the test lead probes across the resistor to be tested.

### 6.3. DIODE CHECK (→|←)

- ▲ **IMPORTANT: Turn the power OFF to the test circuit**
- 6.3.1. Select the Diode Check “→|←” function with the rotary switch and mode button.
- 6.3.2. Insert Black lead in **COM** terminal.
- 6.3.3. Insert Red lead in **V-Ω-RPM** terminal

- 6.3.4. Touch the Black test probe to the negative (-) side of the diode.  
 6.3.5. Touch the Red test probe to the positive (+) side of the diode.  
 6.3.6. Reverse the probes: Black to the positive (+) side and Red to the negative (-) side.  
**Note:** A "good" diode will read low in one direction and high in the other direction when the probes are reversed (or vice versa).  
 A defective diode will have the same reading in both directions or read between 1.0 to 3.0 V. in both directions

DIODE	(- to +)	Reverse probes (+ to -)
GOOD	0.4 to 0.9V	Over Limit (OL)
	Over Limit (OL)	0.4 to 0.9V
BAD	Over Limit (OL)	1.0 to 3.0V
	1.0 to 3.0V	Over Limit (OL)
	0.4 to 0.9V	0.4 to 0.9V
	Over Limit (OL)	Over Limit (OL)
	0.000V	0.000V

#### 6.4. CAPACITANCE (CAP)

▲ **IMPORTANT: Turn the power OFF to the test circuit**

- 6.4.1. Select the Capacitance "CAP" function with the rotary switch and mode button.  
 6.4.2. Insert Black lead in COM terminal.  
 6.4.3. Insert Red lead in V-Ω-RPM terminal.

**CAUTION: When checking in-circuit capacitance, be sure that the circuit has all power removed and all capacitors are fully discharged.**

- 6.4.4. Touch the test lead probes across the capacitance circuit to be tested.  
 6.4.5. Read the measured value from the LCD display.

**Note:** (a) The bar graph is disabled in capacitance measurement mode.

However, since the measurement time of 4mF and 40mF modes is quite long (3.75s and 7.5s respectively, to be precise,) the bar graph is used to display the time rest to accomplish the measurement.

(b) In order to obtain an accurate reading, a capacitor must be discharged before measurement begins. The meter has a built-in discharge mode to automatically discharge the capacitor. In discharge mode, the LCD displays "DIS.C"

(c) Discharging through the chip is quite slow. We recommend the user to discharge the capacitor with some other apparatus.

#### 6.5. AUDIBLE CONTINUITY (●))))))

▲ **IMPORTANT: Turn the power OFF on the test circuit**

- 6.5.1. Select the Audible Continuity "●))))))" function with the rotary switch and mode button.  
 6.5.2. Insert Black lead in COM terminal.  
 6.5.3. Insert Red lead in V-Ω-RPM terminal.  
 6.5.4. Connect one test probe to each end of the circuit to be tested.  
 6.5.5. If the circuit is complete, the meter will beep continuously.  
 6.5.6. If the circuit is open, there is no beep and the display shows OL (over limit).

#### 6.6. AC or DC Current (A)

▲ **IMPORTANT: All current measured flows through the meter.**

**It is important that you DO NOT:**

(A) Measure current greater than 600 Volts AC or DC, with respect to ground.

(B) DO NOT Exceed 30 seconds when measuring continuous current between 1A-20A. Allow five minutes for cool down before continuing.

- 6.6.1. Select the "20A" or "mA" range with the rotary switch.  
 6.6.2. Press the Mode button to select AC or DC.  
 6.6.3. Insert the black lead into the COM terminal.  
 6.6.4. Insert the red lead into the 20A or mA terminal (select 20A if you are unsure of the current draw).

▲ **IMPORTANT: Turn OFF all power to the circuit or disconnect the circuit from the power source.**

- 6.6.5. Connect the Red probe to the side of the circuit closest to the power source.  
 6.6.6. Connect the Black probe to the side of the circuit to ground.  
 6.6.7. Turn the power ON and test.

**Note: Current must always be measured with the meter test probes connected in series, as described.**

#### 6.7. TEMPERATURE (°C/°F)

**IMPORTANT: To avoid heat damage to the meter, keep it away from sources of very high temperature. The life of the Thermocouple Probe is also reduced when subjected to very high temperatures. Probe operating range is -58° to 482 °F.**

- 6.7.1. Select the Temperature °C or °F function with the rotary switch.  
 6.7.2. Insert the thermocouple probe connector into the K-type thermocouple adapter. Insert the adapter into the front of the meter with the negative pin in the COM terminal socket. Touch the end of the thermocouple temperature sensor to the area or surface of the object to be measured.

#### 6.8. FREQUENCY(Hz)

- 6.8.1. Select the "Hz" Frequency function with the rotary switch.  
 6.8.2. Insert the black lead into the COM terminal.  
 6.8.3. Insert the red lead into the V-Ω-RPM terminal.  
 6.8.4. Connect the Black test probe to ground.  
 6.8.5. Connect the Red test probe to the "signal out" wire of the sensor to be tested.

#### 6.9. Dwell angle (∠°)

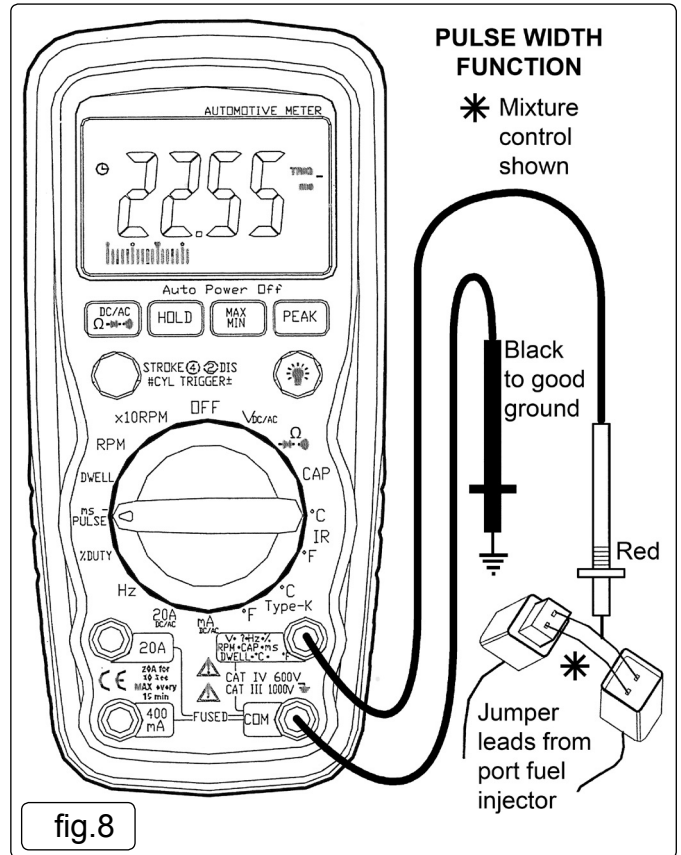
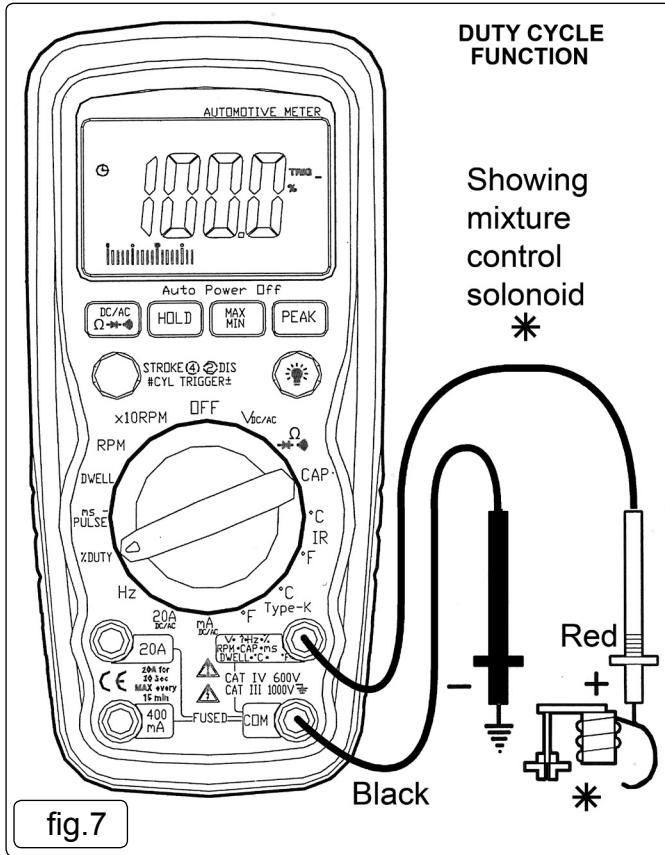
- 6.9.1. Select the "DWELL" function with the rotary switch.  
 6.9.2. Insert the Black lead into the COM terminal.  
 6.9.3. Insert the Red lead in V-Ω-RPM terminal.  
 6.9.4. Connect the Black test probe to ground.  
 6.9.5. Connect the Red test probe to the wire that connects to the breaker points (see fig.7).

#### 6.10. Duty Cycle (%)



- 6.10.1. Select the "% Duty Cycle" function with the rotary switch.
- 6.10.2. Insert the black lead into the **COM** terminal.
- 6.10.3. Insert the red lead into the **V-Ω-RPM** terminal.
- 6.10.4. Connect the Black test probe to ground.
- 6.10.5. Connect the Red test probe to the signal wire circuit.

**NOTE:** The illustration for a mixture control solenoid is shown with the metering rod in the closed position. The meter will display the percentage of time the plunger is in the closed position during one duty cycle.



**6.11. ms-PULSE (Pulse Width) & ms- PERIOD (Period)**

6.11.1. Pulse Width is the length of time an actuator is energized. For example, fuel injectors are activated by an electronic pulse from the Engine Control Module (ECM). This pulse generates a magnetic field that pulls the injector nozzle valve open. The pulse ends and the injector nozzle is closed. This open to close time is the Pulse Width and is measured in milliseconds (ms). The most common automotive application for measuring pulse width is on fuel injectors. You can also measure the pulse width of the fuel mixture control solenoid and the idle air control motor.

**This exercise shows how to measure Pulse Width (mS) on Port Fuel injectors. (See fig.8)**

- 6.11.2. Select the "mS-Pulse" function with the rotary switch .
- 6.11.3. Press the Trigger± button for 2 seconds until the negative (-) trigger slope is displayed on the upper left side of the display.

**NOTE:** The applied time for most fuel injectors is displayed on the negative (-) slope.

- 6.11.4. Insert the black lead into the **COM** terminal.
- 6.11.5. Insert the red lead into the **V-Ω-RPM** terminal.
- 6.11.6. Connect jumper wires between the fuel injector and the harness connector.
- 6.11.7. Touch the Black test probe to a good ground at the fuel injector or the negative (-) vehicle battery post.
- 6.11.8. Touch the Red test probe to the fuel injector solenoid driver input on the jumper cable.
- 6.11.9. Start the engine. A pulse width in milliseconds should be read.

**NOTE:** Initially, the unit will read "OL", then readings will descend and stabilize to the actual pulse width. If "OL" remains, re-check your connections.

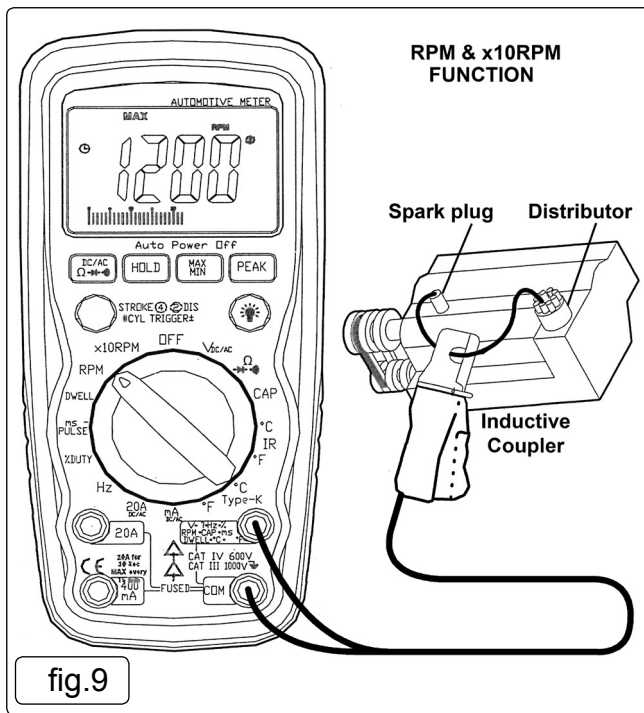


fig.9

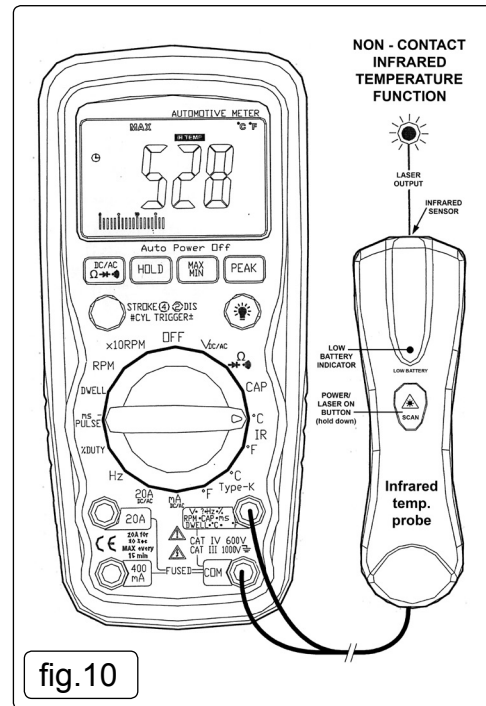


fig.10

**6.12. RPM and x10RPM (See fig.9)**

- 6.12.1. Using the rotary switch, select either the **RPM** range or the **x10RPM** range (1,000 to 12,000 RPM) and multiply the displayed reading by ten to get actual RPM.
- 6.12.2. Press **STROKE / DIS** button to select through **RPM 4** for 4-stroke, **RPM 2** for 2-stroke and **DIS** ignitions.
- 6.12.3. Connect the inductive coupler leads to the meter.
- 6.12.4. Insert the black lead into the **COM** terminal.
- 6.12.5. Insert the red lead into the **V-Ω-RPM** terminal.
- 6.12.6. Open the inductive coupler and place it onto a spark plug wire. If no reading is received, unhook the clamp, turn it over and connect again.

**NOTES:**

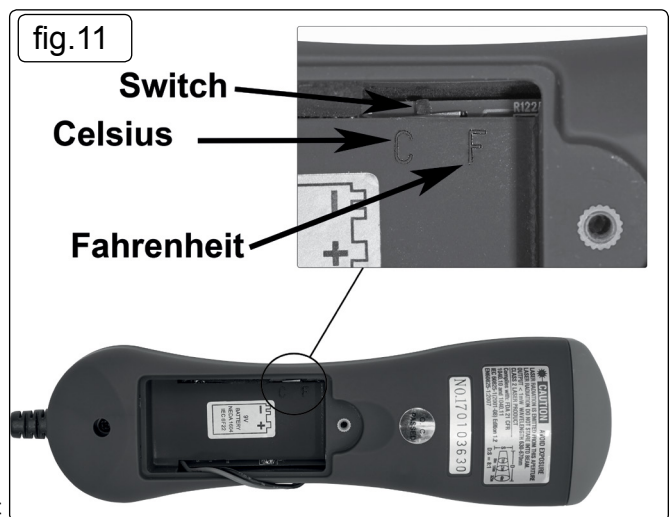
- 6.12.7. Position the inductive coupler as far away from the distributor and the exhaust manifold as possible.
- 6.12.8. Position the inductive coupler to within six inches of the spark plug or move it to another plug wire if no reading or an erratic reading is received.
- 6.12.9. **RPM 4** : For RPM of 4-stroke engines which have 1 ignition on every 4 engine strokes
- 6.12.10. **RPM 2** : For RPM of DIS ( Distributorless Ignition System) & 2-stroke engines which Have 1 ignition on every 2 engine strokes  
PLEASE NOTE - THE RPM INDUCTIVE COUPLER HAS AN ADJUSTABLE SENSITIVITY SWITCH THAT CAN ALSO BE USED TO CORRECT AN UNSTABLE READING.

**6.13. INFRARED TEMPERATURE PROBE INTRODUCTION LASER SAFETY (fig.11)**

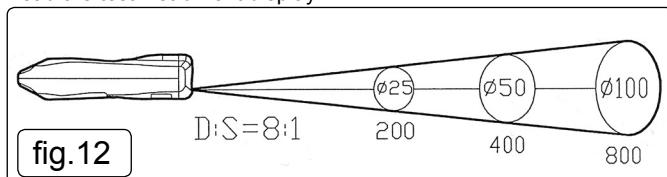
- ✓ Use extreme caution when the laser beam is turned on.
- ✗ DO NOT let the beam enter your eye, another person's eye or the eye of an animal.
- ✗ DO NOT let the beam strike your eye from a reflective surface.

- 6.13.1. The Infrared Temperature Probe is a non-contact temperature measurement accessory for use with a test instrument capable of measuring DC volts in the millivolt range (200mv/400mv/600mv/2v/4v/6v range). The probe has a temperature range of -30°C to 550°C (-22°F to 1022°F), with a basic accuracy of 2% of reading, and an output of 1 mv DC per °C or °F. Temperature is measured by pointing the probe at the surface to be measured, and reading the temperature on the test instrument display. Celsius or Fahrenheit is selected by moving the selector situated in the battery box (see fig.11).
- 6.13.2. **Compatibility**  
The probe is compatible with the automotive meter's InfraRed Temperature (°C or °F) ranges that have a minimum of 1 MΩ input impedance and accept safety shrouded, standard diameter 0.16 in. (4 mm) banana plugs.
- 6.13.3. **Field of View**  
The meter's field of view is 8:1, meaning that if the meter is 8 inches from the target, the diameter of the object under test must be at least 1 inch. Other distances are shown below in the field of view diagram. Refer to the chart printed on the meter for more information. Make sure that the target is larger than the unit's spot size. The smaller the target, the closer you should be to it. When accuracy is critical, make sure the target is at least twice as large as the spot size.
- 6.13.4. **Operation**  
To take a measurement, perform the following steps:

- 6.13.5. Insert the black lead into the **COM** terminal and the red lead into the **V-Ω-RPM** terminal.
- 6.13.6. Select InfraRed Temperature (°C-IR-°F) on the test instrument.



- 6.13.7. Press and hold down the probe laser button to turn on the laser.
- 6.13.8. Point the tip of the probe as close as possible to the object being measured without touching the object.
- 6.13.9. Read the test instrument display.



**Note: Infrared measurement considerations.**

Holding the laser unit in your hand, direct the laser/infrared probe toward the object whose temperature is to be measured bearing in mind the field of view requirements shown in fig.12. The meter automatically compensates for temperature deviations due to the ambient temperature. If a higher temperature is to be measured after taking a low temperature measurement, it is advisable to wait several minutes between the measurements for the infrared sensor to cool. Keep in mind that it may take up to 30 minutes to adjust to wide ambient temperature differences.

INFRARED TEMPERATURE PROBE SPECIFICATION	
Response rate	0.5 seconds approx.
Operating temperature	32°F to 122°F (0°C to 50°C)
Operating Humidity	Max 80% RH.
Power Supply	9V battery (PP3)
Weight	182g
Size	164 x 50 x 40mm
IR Thermometer range	-30 to 550°C (-22°F to 1022°F)
IR Thermometer output	1mV = 1°C or 1°F
IR Thermometer accuracy	± 2% of reading or 4°F whichever is greater. Note: accuracy is specified for the following ambient temperature range: 64 to 82°F (18 to 28°C)
Emissivity	0.95 fixed value
Field of view	D/S Approx. 8.1 (D = distance & S = spot) Has 90% encircled energy at focal point.
Laser Power	Less than 1mW
Spectral response	6 to 14 $\mu$ m (wavelength)

GENERAL INSTRUMENT SPECIFICATION	
Instrument complies with	IEC 1010-1 EN61010-1
Insulation	Class 2, Double Insulation
Overvoltage category	CATIII1000V/CATIV600V
Display	4000 counts LCD display with function indication
Polarity	Automatic, (-) negative polarity indication.
Overrange	"OL" marks indication
Low battery indication	"BAT" is displayed when the battery voltage drops below the operating level
Measurement rate	2 times per second, nominal
Auto power off	Meter automatically shuts down after approx. 30 seconds of inactivity
Operating environment	0°C to 50°C (32°F to 122°F) at < 70% relative humidity.
Storage temperature	-20°C to 60°C (-4°F to 140°F) at < 80% relative humidity.
For inside use, max height	2000m
Pollution degree	2
Power	One 9V battery (PP3)
Dimensions	182 x 82 x 55mm
Weight	360g

## 7. ELECTRICAL SPECIFICATIONS

DWELL ANGLE			
Cylinder	Range	Resolution	Accuracy
4CYL	0 ~ 90.0°	0.1°	±2% of rdg ± 4dgts
5CYL	0 ~ 72.0°		
6CYL	0 ~ 60.0°		
8CYL	0 ~ 45.0°		

**Electrical Specification (ACCURACY).** Accuracy is given as ± ([% of reading] + [number of least significant digits]) at 18°C to 28°C (65°F to 83°F), with relative humidity up to 70%.

RPM (Tach)			
Range		Resolution	Accuracy
RPM4	600 ~ 4000 RPM	1 RPM	±2% of rdg ± 4dgts
	1000 ~ 12000 RPM. (x10 RPM)	10RPM	
RPM 2/DIS	300 ~ 4000 RPM	1 RPM	
	1000 ~ 6000 RPM. (x10 RPM)	10RPM	
Effect Reading: >600RPM			

FREQUENCY			
Range	Resolution	Sensitivity	Accuracy
4.000kHz	1Hz	>5V RMS	±1.5% of rdg ± 3dgts
40.00kHz	10Hz		
400.0kHz	100Hz		
4.000MHz	1000Hz	>15V RMS	±2.0% of rdg ± 4dgts
40.00MHz	1kHz		

DC VOLTAGE		
Range	Resolution	Accuracy
400.0mV	0.1mV	±0.5% of rdg ± 3dgts
4.000V	1mV	±1.5% of rdg ± 2dgts
40.00V	10mV	
400.0V	100mV	
600V	1V	±1.8% of rdg ± 2dgts
Input Impedance: 10M $\Omega$		



AC VOLTAGE		
Range	Resolution	Accuracy
400.0mV	0.1mV	±1.5% of rdg ± 5dgt
4.000V	1mV	±1.0% of rdg ± 3dgt
40.00V	10mV	±1.5% of rdg ± 3dgt
400.0V	100mV	
600V	1V	±2.0% of rdg ± 4dgt
Input Impedance: 10MΩ / Frequency Range 50 to 60Hz		

RESISTANCE		
Range	Resolution	Accuracy
400.0Ω	0.1Ω	±1.2% of rdg ± 4dgt
4.000kΩ	1Ω	±1.0% of rdg ± 2dgt
40.00kΩ	10Ω	±1.2% of rdg ± 2dgt
400.0kΩ	100Ω	
4.000MΩ	1kΩ	
40.00MΩ	10kΩ	±2.0% of rdg ± 3dgt

CAPACITANCE		
Range	Resolution	Accuracy
4.000nF	1pF	±5.0% of rdg ± 50dgt
40.00nF	1pF	±5.0% of rdg ± 7dgt
400.0nF	0.1nF	±3.0% of rdg ± 5dgt
4.000uF	1nF	
40.00uF	10nF	
400.0uF	0.1uF	
4.000mF	0.001mF	±10% of rdg ± 10dgt
40.00mF	10.00mF	

AUDIBLE CONTINUITY TEST	
Audible threshold:	< 35Ω
Test Current:	< 1mA DC typical

DC CURRENT		
Range	Resolution	Accuracy
40.00mA	10uA	±1.5% of rdg ± 3dgt
400.0mA	100uA	
20A	10mA	±2.5% of rdg ± 5dgt

Overload Protection: 0.5A / 250V and 20A / 250V Fuse  
Maximum Input: 400mA DC or 400mA AC RMS on uA / mA ranges,  
20A DC or AC RMS on 20A range.

AC CURRENT		
Range	Resolution	Accuracy
40.00mA	10uA	±1.8% of rdg ± 5dgt
400.0mA	100uA	
20A	10mA	±3.0% of rdg ± 7dgt

Overload Protection: 0.5A / 250V and 20A / 250V Fuse  
Frequency Range: 50 to 60Hz  
Maximum Input: 400mA DC or 400mA AC RMS on uA / mA ranges,  
20A DC or AC RMS on 20A range.

TYPE K TEMPERATURE		
Range	Resolution	Accuracy
-30°C ~ 1000°C	1.0°C	± 3 % of rdg ± 5°C/8°F (Meter only)
-22°F ~ 1832°F	1.0°F	

PULSE WIDTH		
Range	Resolution	Accuracy
1.0 ~ 20.0ms	0.1ms	± 2% of rdg ± 20dgt

DIODE TEST		
Test Current	Resolution	Accuracy
1.0mA typical	1mV	±5% of rdg ± 15 dgt
Open circuit voltage: 3.0V DC typical		

DUTY CYCLE		
Range	Resolution	Accuracy
0.5% ~ 99.0%	0.1%	± 2% of rdg ± 5dgt

Pulse width: >100us, <100ms  
Frequency width: 5Hz ~ 100kHz  
Sensitivity: >5V RMS

## 8. MAINTENANCE

- WARNING! DO NOT** attempt to repair or service the analyser unless you are qualified to do so and have the relevant calibration, performance test, and service information. To avoid electrical shock or damage to the meter do not get water inside the case.
- 8.1. Periodically wipe the case with a damp cloth and mild detergent. **DO NOT** use solvents.
- 8.2. Turn the analyser off when not in use and remove the battery if stored for a long period of time.
  - × **DO NOT** store the analyser in a place of high humidity or high temperature.
- 8.3. **REPLACING THE BATTERY**
  - WARNING!** To avoid electric shock, disconnect the test leads from the analyser before removing the battery cover.
  - 8.3.1. When the battery becomes exhausted or drops below the operating voltage, the battery symbol will be appear in the left hand side of the display.
  - 8.3.2. Open the battery cover by loosening the two screws using a small cross head screwdriver.
  - 8.3.3. Remove the old battery and insert the new one, observing the correct polarity.
  - 8.3.4. Replace the battery cover and secure with the two screws.
  - WARNING!** To avoid electric shock, **DO NOT** operate the analyser until the battery cover is secured in place.
- 8.4. **REPLACING THE FUSES**
  - WARNING!** To avoid electric shock, disconnect the test leads from the analyser before accessing the fuses.
  - 8.4.1. Open the rear cover by loosening the six screws using a small cross head screwdriver. Gently ease the rear cover off.
  - 8.4.2. Remove the old fuse from its holder by gently pulling it out. Take care not to touch any other internal parts of the analyser.
  - 8.4.3. Install the new fuse into its holder by gently pushing it in.
    - Note:** Always use a fuse of the correct size and value.
    - Fuse Ratings:**  
20A/250V, 6.3 x 32mm fast acting ceramic type for the 20A range.  
0.5A/250V, 5 x 20mm fast acting ceramic type for the 400mA range.
  - 8.4.4. Replace the rear cover and secure with the six screws.
  - WARNING!** To avoid electric shock, **DO NOT** use the analyser until it has been fully re-assembled.



#### ENVIRONMENT PROTECTION

Recycle unwanted materials instead of disposing of them as waste. All tools, accessories and packaging should be sorted, taken to a recycling centre and disposed of in a manner which is compatible with the environment. When the product becomes completely unserviceable and requires disposal, drain any fluids (if applicable) into approved containers and dispose of the product and fluids according to local regulations.



#### WEEE REGULATIONS

Dispose of this product at the end of its working life in compliance with the EU Directive on Waste Electrical and Electronic Equipment (WEEE). When the product is no longer required, it must be disposed of in an environmentally protective way. Contact your local solid waste authority for recycling information.



#### BATTERY REMOVAL SEE SECTION 8.4

Under the Waste Batteries and Accumulators Regulations 2009, Jack Sealey Ltd are required to inform potential purchasers of products containing batteries (as defined within these regulations), that they are registered with Valpak's registered compliance scheme. Jack Sealey Ltd Batteries Producer Registration Number (BPRN) is BPRN00705.

**Note:** It is our policy to continually improve products and as such we reserve the right to alter data, specifications and component parts without prior notice.

**Important:** No Liability is accepted for incorrect use of this product.

**Warranty:** Guarantee is 12 months from purchase date, proof of which is required for any claim.

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