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.

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 bare 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.

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>TERMINAL</th>
<th>INPUT LIMIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC/AC Volts, 1 Ohm/Continuity/Diode, CAP., IR-TEMP. Adaptor, Type-K TEMP., Hz, % Duty, Ms Dwelle, RPM</td>
<td>V-Ω-RPM</td>
<td>600Volts AC DC</td>
</tr>
<tr>
<td>AC/DC</td>
<td>μA / mA</td>
<td>400mA DC/AC</td>
</tr>
<tr>
<td>AC/DC20A</td>
<td>20A</td>
<td>*20A DC/AC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 20 Amp measurement for 30 seconds maximum.

1 Ohms cannot 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: 40μF, 400μF, 4μF, 40μF, 40μF, 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: <300 Continuity Buzzer 2kHz
- Temperature: -20 to +760°C, -4 to +1640°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

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Original Language Version
4. MAIN METER FEATURES

Symbols surrounding main display identify functions

Bar graph best displays rapidly changing input

Function buttons

Rotary selector switch

Terminals for test leads

Red test lead is used to measure Amps, Volts, Ohms, TEMP, Hz, RPM, CAP, ms & dwell

The black test lead is used in the Common (COM) terminal for all tests

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.

### 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.

<table>
<thead>
<tr>
<th>DIODE</th>
<th>( - to + )</th>
<th>Reverse probes (+ to -)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GOOD</td>
<td>0.4 to 0.9V</td>
<td>Over Limit (OL)</td>
</tr>
<tr>
<td></td>
<td>Over Limit (OL)</td>
<td>0.4 to 0.9V</td>
</tr>
<tr>
<td>BAD</td>
<td>1.0 to 3.0V</td>
<td>Over Limit (OL)</td>
</tr>
<tr>
<td></td>
<td>0.4 to 0.9V</td>
<td>Over Limit (OL)</td>
</tr>
<tr>
<td></td>
<td>0.000V</td>
<td>0.000V</td>
</tr>
</tbody>
</table>

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.
(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 (six presets)

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

6.5.1. Select the Audible Continuity “six preset” 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.

- **(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 temperatures. 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 (Dwell)

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.

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.
6.12. RPM and ×10RPM (See fig.9)

6.12.1. Using the rotary switch, select either the RPM range or the ×10RPM range (1,000 to 12,000 RPM) and multiply the displayed reading by ten to get actual RPM.

6.12.2. Press STROKc / dIS button to select through RPM for 4-stroke, RPM 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

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response rate</td>
<td>0.5 seconds approx.</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>32°F to 122°F (0°C to 50°C)</td>
</tr>
<tr>
<td>Operating Humidity</td>
<td>Max 80% RH.</td>
</tr>
<tr>
<td>Power Supply</td>
<td>9V battery (PP3)</td>
</tr>
<tr>
<td>Weight</td>
<td>182g</td>
</tr>
<tr>
<td>Size</td>
<td>164 x 50 x 40mm</td>
</tr>
<tr>
<td>IR Thermometer range</td>
<td>-30 to 550°C (-22°F to 1022°F)</td>
</tr>
<tr>
<td>IR Thermometer output</td>
<td>1mV = 1°C or 1°F</td>
</tr>
<tr>
<td>IR Thermometer accuracy</td>
<td>± 2% of reading or 4°F whichever is greater.</td>
</tr>
<tr>
<td>Emissivity</td>
<td>0.95 fixed value</td>
</tr>
<tr>
<td>Field of view</td>
<td>D/S Approx. 8.1 (D = distance &amp; S = spot) Has</td>
</tr>
<tr>
<td></td>
<td>90% encircled energy at focal point.</td>
</tr>
<tr>
<td>Laser Power</td>
<td>Less than 1mW</td>
</tr>
<tr>
<td>Spectral response</td>
<td>6 to 14 µm (wavelength)</td>
</tr>
</tbody>
</table>

### General Instrument Specification

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

### Electrical Specifications

#### Dwell Angle

<table>
<thead>
<tr>
<th>Cylinder</th>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>4CYL</td>
<td>0 ~ 90.0º</td>
<td>0.1º</td>
<td>±2% of rdg ± 4dgt</td>
</tr>
<tr>
<td>5CYL</td>
<td>0 ~ 72.0º</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6CYL</td>
<td>0 ~ 60.0º</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8CYL</td>
<td>0 ~ 45.0º</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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%.

#### Frequency

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
<th>Sensitivity</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.000kHz</td>
<td>1Hz</td>
<td>&gt;5V RMS</td>
<td>±1.5% of rdg ± 3dgt</td>
</tr>
<tr>
<td>40.00kHz</td>
<td>10Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400.0kHz</td>
<td>100Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.000MHz</td>
<td>1000Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40.00MHz</td>
<td>1kHz</td>
<td>&gt;15V RMS</td>
<td>±2.0% of rdg ± 4dgt</td>
</tr>
</tbody>
</table>

#### RPM (Tach)

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>RPM4</td>
<td>1 RPM</td>
<td>±2% of rdg ± 4dgt</td>
</tr>
<tr>
<td>1000 ~ 12000 RPM (x10 RPM)</td>
<td>10RPM</td>
<td></td>
</tr>
<tr>
<td>RPM 2/DIS</td>
<td>1 RPM</td>
<td></td>
</tr>
<tr>
<td>1000 ~ 6000 RPM (x10 RPM)</td>
<td>10RPM</td>
<td></td>
</tr>
</tbody>
</table>

**Effect Reading**: >600RPM

#### DC Voltage

<table>
<thead>
<tr>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>400.0mV</td>
<td>0.1mV</td>
<td>±0.5% of rdg ± 3dgt</td>
</tr>
<tr>
<td>4.000V</td>
<td>1mV</td>
<td>±1.5% of rdg ± 2dgt</td>
</tr>
<tr>
<td>40.00V</td>
<td>10mV</td>
<td></td>
</tr>
<tr>
<td>400.0V</td>
<td>100mV</td>
<td></td>
</tr>
<tr>
<td>600V</td>
<td>1V</td>
<td>±1.8% of rdg ± 2dgt</td>
</tr>
</tbody>
</table>

**Input Impedance**: 10MΩ
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.

8.3. **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. **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.