



THE TOOL COMPANY

Digital Automotive Analyser/Insulation Tester - Hybrid Vehicles

OPERATOR INSTRUCTION MANUAL



Model No.

TA320.V2

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.

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1. Introduction

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.

1.1 Intended Use

This digital automotive analyser/insulation tester is designed for testing and diagnosing electrical and insulation systems on hybrid vehicles. It is suitable for checking high-voltage circuits, insulation resistance and related electrical components during vehicle maintenance and fault finding.

1.2 Description

Specially designed for hybrid vehicles and conforms to EN61010 CAT III (1000V) and CAT IV (600V). Unlike other multimeters this unit has an insulation test function that allows testing of the insulation of the high voltage cables and motor generator units found on hybrid vehicles. Can be used as a stand-alone device or linked wirelessly with a USB interface to a PC or laptop enabling results to be graphed, saved or printed. Supplied with high voltage probes, thermocouple soft storage bag and wireless USB cable. The unit also has the usual functions expected on a high quality multimeter including true RMS (Root-Mean-Square) and IP67 waterproof rating.

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Disclaimer: All errors and omissions excluded. 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. See www.sealey.co.uk for the latest information.

Country of origin: China.

2. Safety Symbols



Refer to
instruction
manual



MAX!
1000V



Warning!
Electric shock
hazard



**GENERAL
WARNING!**



**PROTECTED
THROUGHOUT**
BY DOUBLE
INSULATION

3. Safety

! **WARNING!** The warnings, cautions and instructions discussed in this instruction 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.

⊘ **DO NOT** attempt to connect or disconnect any test equipment whilst the ignition is on or the engine is running.

⊘ **DO NOT** use the analyser if damage is suspected. If suspected damage occurs with the device, have it inspected by qualified service personnel before using it again.

⊘ **DO NOT** get the analyser wet or use in damp or wet locations or areas where there is condensation.

⊘ **DO NOT** use the analyser for any purpose other than for which it is designed.

⊘ **DO NOT** allow untrained persons to use analyser.

⊘ **DO NOT** use the analyser when you are tired or under the influence of alcohol, drugs or intoxicating medication.

⊘ **DO NOT** operate in a potentially explosive environment/atmosphere.

- Wear safety eye protection that meets ANSI standards.
- Operate the vehicle to be tested in a well ventilated area. Exhaust gases are poisonous.

If necessary connect the vehicle exhaust to a fume extraction system.

- Place chocks in front of the drive wheels and never leave the vehicle unattended whilst testing is in progress.
- Be extra cautious when working in close proximity to the ignition coil, distributor cap, ignition wires and spark plugs. These components create hazardous voltages when the engine is running.
- Ensure that the handbrake is on and the gearbox is in neutral or 'Park' for automatic transmissions.
- Keep fire extinguishers nearby that are suitable for petrol/chemical/electrical fires.
- Keep the analyser clean and in good condition.
- Remain vigilant when using the code reader on, or near, machinery where there are rotational parts such as belts, pulleys and fans.
- Remove ill fitting clothing. Remove ties, watches, rings, and other loose jewellery, and contain and/or tie back long hair.
- Maintain correct balance and footing. Ensure the floor is not slippery and wear non-slip shoes.
- Keep product surfaces clean and dry.

4. Per IEC1010 Overvoltage Installation

Overvoltage category I

- Equipment of overvoltage category I is equipment for connection to circuits in which measures are taken to limit transient overvoltages to an appropriate low level.



Note – Examples include protected electronic circuits.

Overvoltage category II

- Equipment of overvoltage category II This is energy-consuming equipment to be supplied from the fixed installation.



Note – Examples include household, office, and laboratory appliances.

Overvoltage category III

- Equipment of overvoltage category III is equipment in fixed installations.



Note – Examples include switches in the fixed installation and some equipment for industrial use with a permanent connection to the fixed installation.

Overvoltage category IV

Equipment of overvoltage category IV is for use at the origin of the installation.



Note – Examples include electricity meters and primary overcurrent protection equipment.

5. Specification

Model No.	TA320.V2
Nett Weight:	700g
Tach (rpm):	No
Dwell:	No
AC Voltage:	400mV, 4V, 40V, 400V, 1000V
DC Voltage:	400mV, 4V, 40V, 400V, 1000V
AC Current:	400μA, 4000μA, 40mA, 400mA, 10A
DC Current:	400μA, 4000μA, 40mA, 400mA, 10A
Capacitance:	40nF, 400nF, 4μF, 40μF, 400μF, 4000μF, 40mF
Frequency:	40Hz-10kHz
Duty Cycle:	0.1-99.9%
Pulse Width:	100μs-100ms
Resistance:	400Ω, 4kΩ, 40kΩ, 400kΩ, 4MΩ, 40MΩ
Continuity:	<35Ω
Temperature:	-50 to +1000°C, -58 to +1832°F
IR Temperature:	No
Insulation Test:	125V, 250V, 500V, 1000V
Diode Check:	Yes
Transistor Test:	No
Back Light:	Yes
Bar-Graph Display:	Yes
Display Hold:	Yes
Auto-Ranging:	Yes
Inductive Coupler:	No
PC Interface:	Yes
Digits Height:	20mm
Auto Power Off:	Yes
Low Battery Indicator:	Yes
Batteries (Supplied):	6 x 1.5V AA
Hi-Impact Case:	Yes
Size (L x W x D):	220 x 95 x 56mm
Weight:	700g
PC Compatibility:	Windows 2000, XP, Vista, Win7

Function	Range	Resolution	Accuracy
DC Voltage	400mV	0.01mV	± (0.06% of reading + 4 digits)
	4V	0.0001V	
	40V	0.001V	
	400V	0.01V	
	1000V	0.1V	± (0.1% reading + 5digits)
AC Voltage			50 to 1000Hz
	400mV	0.1mV	± (1.0% of reading + 7 digits)
	4V	0.001V	
	40V	0.01V	± (1.0% of reading + 5 digits)
	400V	0.1V	
	1000V	1V	
AC+DCVoltage	400mV	0.1mV	± (1.0% of reading + 7 digits) (50/60 Hz)
	4V	0.001V	
	40V	0.01V	
	400V	0.1V	
	1000V	1V	
	All AC voltage ranges are specified from 5% of range to 100% of range		
DC Current	400μA	0.01μA	± (1.0% of reading + 3 digits)
	4000μA	0.1μA	
	40mA	0.001mA	
	400mA	0.01mA	
	10A	0.001A	

	(20A: 30 sec max with reduced accuracy)		
AC Current	400μA	0.1μA	± (1.5% of reading + 7 digits) (50 to 1000 Hz)
	4000μA	1μA	
	40mA	0.01mA	
	400mA	0.1mA	
	10A	0.01A	
AC+DCCurrent	400μA	0.01μA	± (1.5% of reading + 7 digits) (50/60 Hz)
	4000μA	0.1μA	
	40mA	0.001mA	
	400mA	0.01mA	
	10A	0.001A	
	(20A: 30 sec max with reduced accuracy)		
	All AC current ranges are specified from 5% of range to 100% of range		



Note – Accuracy is stated at 65oF to 83oF (18oC to 28oC) and less than 75% RH.

- The AC function is calibrated according to a sine wave. For a non-sine wave with a crest factor of less than 3.0, the accuracy generally increases by $\pm (2\% \text{ of reading} + 2\% \text{ of full scale})$.

Function	Range	Resolution	Accuracy
Resistance	400Ω	0.01 Ω	± (0.3% reading + 9 digits)
	4kΩ	0.0001kΩ	± (0.3% of reading + 4 digits)
	40kΩ	0.001kΩ	
	400kΩ	0.01kΩ	
	4MΩ	0.001MΩ	
	40MΩ	0.001MΩ	± (2.0% of reading + 10 digits)

Capacitance	40nF	0.001nF	± (3.5% of reading + 40 digits)
	400nF	0.01nF	± (3.5% of reading + 10 digits)
	4μF	0.0001μF	
	40μF	0.001μF	
	400μF	0.01μF	
	4000μF	0.1μF	± (5% of reading + 10 digits)
	40mF	0.001mF	
Frequency (electronic)	40Hz	0.001Hz	± (0.1% of reading + 1 digit)
	400Hz	0.01Hz	
	4kHz	0.0001kHz	
	40kHz	0.001kHz	
	400kHz	0.01kHz	
	4MHz	0.0001MHz	
	40MHz	0.001MHz	
	100MHz	0.01MHz	Not Specified
	Sensitivity: 0.8V rms min. @ 20% to 80% duty cycle and <100kHz; 5Vrms min @ 20% to 80% duty cycle and > 100kHz.		
Frequency (electrical)	40.00Hz-10KHz	0.01Hz - 0.001KHz	± (0.5% of reading)
	Sensitivity: 2Vrms		
Duty Cycle	0.1 to 99.90%	0.01%	± (1.2% of reading + 2 digits)
	Pulse width: 100 μs to 100 ms, frequency: 5 Hz to 150 kHz		
Temp (type-K)	-50 to 1200°C	0.1°C	± (1.0% of reading + 2.5 °C)
	-58 to 2192°F	0.1°F	± (1.0% of reading + 4.5 °F) (Probe accuracy not included)
4-20mA%	-25 to 125%	0.01%	±50 digits
	0mA=-25%, 4mA=0%, 20mA=100%, 24mA=125%		

Meg OHMS					
Terminal Voltage	Range	Resolution	Accuracy	Test Current	Short circuit current
125V(0%~+10%)	0.125~4.000 MΩ	0.001MΩ	±(2%+10)	1mA @ load125kΩ	≤1mA
	4.001~40.00 MΩ	0.01MΩ	±(2%+10)		
	40.01~400.0 MΩ	0.1MΩ	±(4%+5)		
	400.1~4000 MΩ	1MΩ	±(5%+5)		
250V (0%~+10%)	0.250~4.000 MΩ	0.001MΩ	±(2%+10)	1mA @ load250kΩ	≤1mA
	4.001~40.00 MΩ	0.01MΩ	±(2%+10)		
	40.01~400.0 MΩ	0.1MΩ	±(3%+5)		
	400.1~4000 MΩ	1MΩ	±(4%+5)		
500V(0%~+10%)	0.500~4.000 MΩ	0.001MΩ	±(2%+10)	1mA @ load500kΩ	≤1mA
	4.001~40.00 MΩ	0.01MΩ	±(2%+10)		
	40.01~400.0 MΩ	0.1MΩ	±(2%+5)		
	400.1~4000 MΩ	1MΩ	±(4%+5)		
1000V (0%~+10%)	1.000~4.000 MΩ	0.001MΩ	±(3%+10)	1mA @load1MΩ	≤1mA
	4.001~40.00 MΩ	0.01MΩ	±(2%+10)		
	40.01~400.0 MΩ	0.1MΩ	±(2%+5)		
	400.1~4000 MΩ	1MΩ	±(4%+5)		



Note – Accuracy specifications consist of two elements:

- (% of reading) – This is the accuracy of the measurement circuit.
- (+ digits) – This is the accuracy of the analogue-to-digital converter.

Store capacitance	2000
Enclosure	Double molded, waterproof
Shock (Drop Test)	6.5 feet (2 meters)
Diode Test	Test current of 0.9mA maximum, open circuit voltage 2.8V DC typical
Continuity Check	Audible signal will sound if the resistance is less than 35Ω (approx.), test current <0.35mA
Peak	Captures peaks >1ms
Temperature Sensor	Requires type K thermocouple
Input Impedance	>10MΩ VDC & >9MΩ VAC
AC Response	True rms
AC True RMS:	The term stands for “Root-Mean-Square,” which represents the method of calculation of the voltage or current value. Average responding multimeters are calibrated to read correctly only on sine waves and they will read inaccurately on non-sine wave or distorted signals. True rms meters read Accurately on either type of signal.
ACV Bandwidth	50Hz to 1000Hz
Crest Factor	≤3 at full scale up to 500V, decreasing linearly to ≤1.5 at 1000V
Display	40,000 count backlit liquid crystal with bargraph
Overrange indication	“OL” is displayed
Auto Power Off	15 minutes (approximately) with disable feature
Polarity	Automatic (no indication for positive); Minus (-) sign for negative
Measurement Rate	2 times per second, nominal
Low Battery Indication	“  ” is displayed if battery voltage drops below operating voltage

Battery	6*1.5V AAA batteries
Fuses	MA, μ A ranges; 0.5A/1000V ceramic fast blow A range; 10A/1000V ceramic fast blow
Operating Temperature	41°F to 104°F (5°C to 40°C)
Storage Temperature	-4°F to 140°F (-20°C to 60°C)
Operating Humidity	Max 80% up to 87°F (31°C) decreasing linearly to 50% at 104°F (40°C)
Storage Humidity	<80%
Operating Altitude	7000ft. (2000meters) maximum
Safety	This meter is intended for origin of installation use and protected, against the users, by double insulation per EN61010-1 and IEC61010-1 2nd Edition (2001) to Category IV 600V and Category III 1000V; Pollution Degree 2. The meter also meets UL 61010-1, 2nd Edition (2004), CAN/CSA C22.2 No. 61010-1 2nd Edition (2004), and UL 61010B-2-031, 1st Edition (2003)

6. Electrical Safety Precautions

This meter has been designed for safe use but must be operated with caution. The rules listed below must be carefully followed for safe operation.

1. Never apply voltage or current to the meter that exceeds the specified maximum.

Input Protection Limits	
Function	Maximum Input
V DC or V AC	1000VDC/AC rms
mA AC/DC	500mA 1000V fast acting fuse
A AC/DC	10A 1000V fast acting fuse (20A for 30 seconds max every 15 minutes)
Frequency, Resistance, Capacitance, Duty Cycle, Diode Test, Continuity	1000VDC/AC rms
Temperature	1000VDC/AC rms
Surge Protection: 8kV peak per IEC 61010	

2. Use extreme caution when working with high voltages.

DO NOT measure voltage if the voltage on the "COM" input jack exceeds 1000 V above earth ground.

WARNING! NEVER connect the meter leads across a voltage source while the function switch is in the current, resistance, or diode mode. Doing so can damage the meter.

3. ALWAYS discharge filter capacitors in power supplies and disconnect the power when making resistance or diode tests.

4. ALWAYS turn off the power and disconnect the test leads before opening the covers to replace the fuse or batteries.

5. NEVER operate the meter unless the back cover and the battery and fuse covers are in place and securely fastened.

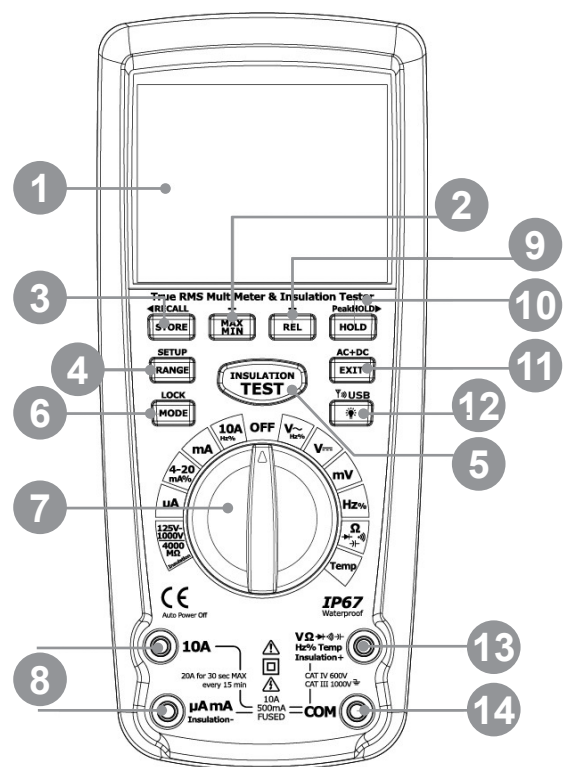


Note – If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

7. Function Controls And Jack

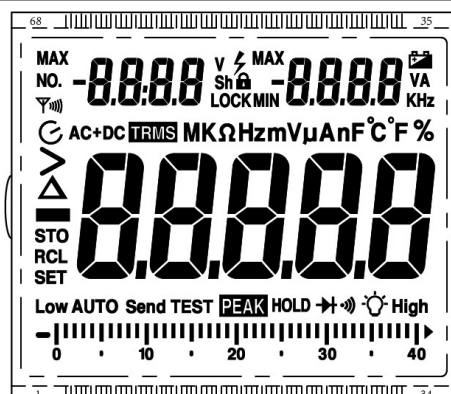
1	40,000 count LCD display
2	MAX/MIN (-) button
3	STORE(<RECALL) button
4	RANGE(SETUP) button
5	INSULATION TEST button
6	MODE button
7	Function switch
8	mA, μ A and 10A input jacks
9	REL(+) button
10	HOLD(PEAKHOLD>) button
11	EXIT(AC+DC) button
12	Backlight and RF button
13	Positive input jack
14	COM input jack

NOTE: Tilt stand and battery compartment are on rear of unit.



8. Symbols And Annunciators

•)))	Continuity
▶	Diode test
⌚	Battery status
n	nano (10 ⁻⁹) (capacitance)
μ	micro (10 ⁻⁶) (amps, cap)
m	milli (10 ⁻³) (volts, amps)
A	Amps
k	kilo (10 ³) (ohms)
F	Farads (capacitance)
M	mega (10 ⁶) (ohms)
Ω	Ohms
Hz	Hertz (frequency)
%	Percent (duty ratio)
AC	Alternating current
DC	Direct current
°F	Degrees Fahrenheit
MAX	Maximum
NO.	Serial number
S	second Left auxiliary display Right auxiliary display
SET	Set up parameter
AC +DC	Alternating current + Direct current
TRMS	True RMS
STO	Store
RCL	Recall
AUTO	Auto Range Timing symbol Backlight bargraph
PEAK	Peak Hold
V	Volts
REL	Relative
AUTO	Autoranging
HOLD	Display hold
°C	Degrees Centigrade
MIN	Minimum
📡	RF transmitter active



9. Operating Instructions

! WARNING! Risk of electrocution. High-voltage circuits, both AC and DC, are very dangerous and should be measured with great care.

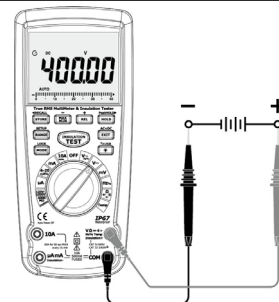
- ALWAYS turn the function switch to the OFF position when the meter is not in use.
- If “OL” appears on the display during a measurement, the value exceeds the range you have selected. Change to a higher range.

Dc voltage measurements

! CAUTION! DO NOT measure DC voltages if a motor on the circuit is being switched ON or OFF. Large voltage surges may occur that can damage the meter.

- Set the function switch to the green VDC position.
- Insert the black test lead banana plug into the negative COM jack. Insert the red test lead banana plug into the positive V jack.
- Touch the black test probe tip to the negative side of the circuit. Touch the red test probe tip to the positive side of the circuit.
- Read the voltage on the display. (**fig.1**)

fig.1



Ac voltage (frequency, duty cycle) measurements

! WARNING! Risk of electrocution. The probe tips may not be long enough to contact the live parts inside some 240V outlets for appliances because the contacts are recessed deep in the outlets. As a result, the reading may show 0 volts when the outlet actually has voltage on it. Make sure the probe tips are touching the metal contacts inside the outlet before assuming that no voltage is present.

! CAUTION! DO NOT measure AC voltages if a motor on the circuit is being switched ON or OFF. Large voltage surges may occur that can damage the meter.

- Set the function switch to the green VAC/Hz/% position.

- Insert the black test lead banana plug into the negative COM jack. Insert the red test lead banana plug into the positive V jack.
- Touch the black test probe tip to the neutral side of the circuit. Touch the red test probe tip to the “hot” side of the circuit.
- Read the voltage on the main display and the frequency on the right auxiliary display.
- Press and hold the MODE button for 2 seconds to indicate “Hz”.
- Read the frequency on the main display. Press the MODE button to indicate “%”.
- Read the % duty cycle on the main display.
- Press EXIT for 2 seconds to enter the AC+DC function. Test DC and AC True RMS. (**fig.2**).

Mv voltage measurements

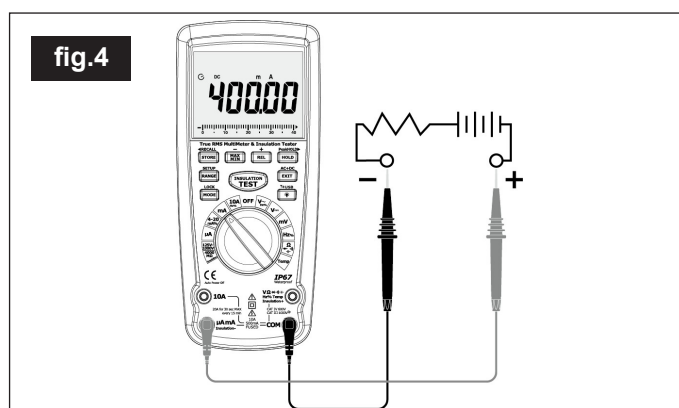
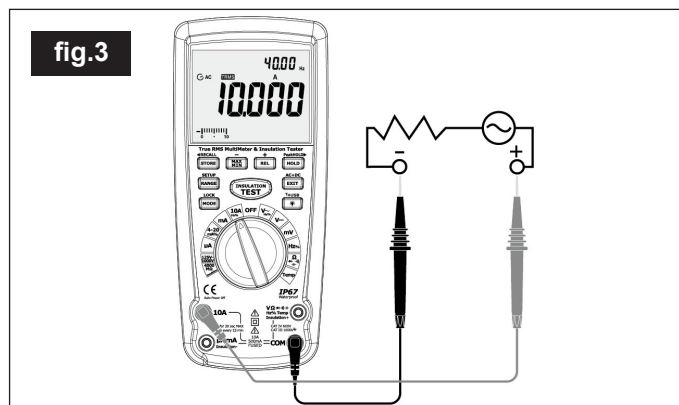
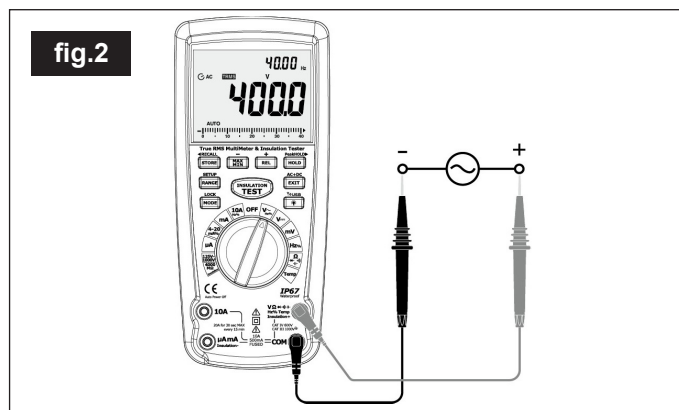
! **CAUTION! DO NOT** measure mV voltages if a motor on the circuit is being switched ON or OFF. Large voltage surges may occur that can damage the meter.

- Set the function switch to the green mV position.
- Press the MODE button to indicate “DC” or “AC”, or, in the AC range, press EXIT for two seconds and choose “AC+DC”.
- Insert the black test lead banana plug into the negative COM jack. Insert the red test lead banana plug into the positive V jack.
- Touch the black test probe tip to the negative side of the circuit. Touch the red test probe tip to the positive side of the circuit.
- Read the mV voltage on the display. (**fig.3**)

Dc current measurements

! **CAUTION! DO NOT** make 20 A current measurements for longer than 30 seconds. Exceeding 30 seconds may cause damage to the meter and/or the test leads.

- Insert the black test lead banana plug into the negative COM jack.
- For current measurements up to 4000 μ A DC, set the function switch to the yellow μ A position and insert the red test lead banana plug into the μ A/mA jack.
- For current measurements up to 400 mA DC, set the function switch to the yellow mA position and insert the red test lead banana plug into the μ A/mA jack.
- For current measurements up to 20 A DC, set the function switch to the yellow 10A/Hz/% position and insert the red test lead banana plug into the 10A jack.
- Press the MODE button to indicate “DC” on the display.



- Remove power from the circuit under test, then open the circuit at the point where you wish to measure current.
- Touch the black test probe tip to the negative side of the circuit. Touch the red test probe tip to the positive side of the circuit.
- Apply power to the circuit.
- Read the current on the display. (**fig.4**)

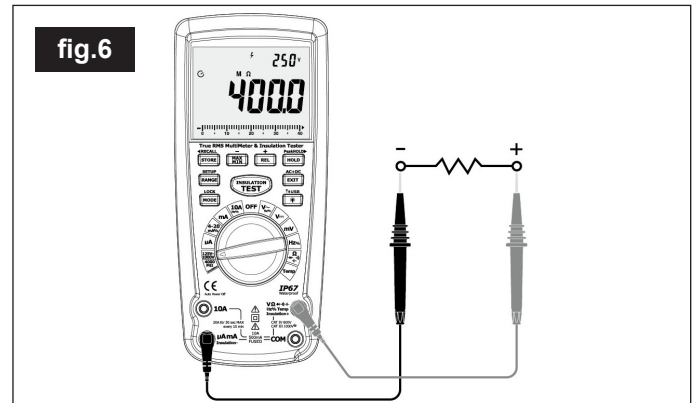
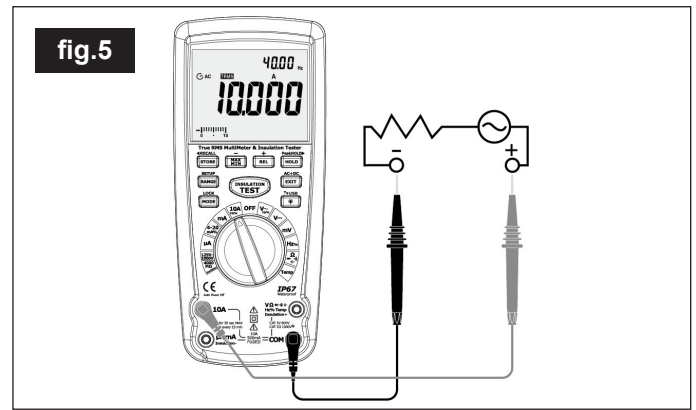
Ac current (frequency, duty cycle) measurements

! **CAUTION! DO NOT** make 20 A current measurements for longer than 30 seconds. Exceeding 30 seconds may cause damage to the meter and/or the test leads.

- Insert the black test lead banana plug into the negative COM jack.
- For current measurements up to 4000 μ A AC, set the function switch to the yellow μ A position and insert the red test lead banana plug into the μ A/mA jack.
- For current measurements up to 400 mA AC, set the function switch to the yellow mA position and insert the red test lead banana plug into the μ A/mA jack.
- For current measurements up to 20 A AC, set the function switch to the yellow 10A/HZ/% position and insert the red test lead banana plug into the 10A jack.
- Press the MODE button to indicate “AC” on the display.
- Remove power from the circuit under test, then open up the circuit at the point where you wish to measure current.
- Touch the black test probe tip to the neutral side of the circuit. Touch the red test probe tip to the “hot” side of the circuit.
- Apply power to the circuit.
- Read the current on the display. In the 10 A AC range, read the frequency on the right auxiliary display.
- Press and hold the MODE button to indicate “Hz”.
- Read the frequency on the display.
- Momentarily press the MODE button again to indicate “%”.
- Read the % duty cycle on the display.
- Press and hold the MODE button to return to current measurement.
- Press EXIT for 2 seconds to enter the AC+DC function. Test DC and AC True RMS. **(fig.5)**

Resistance measurements

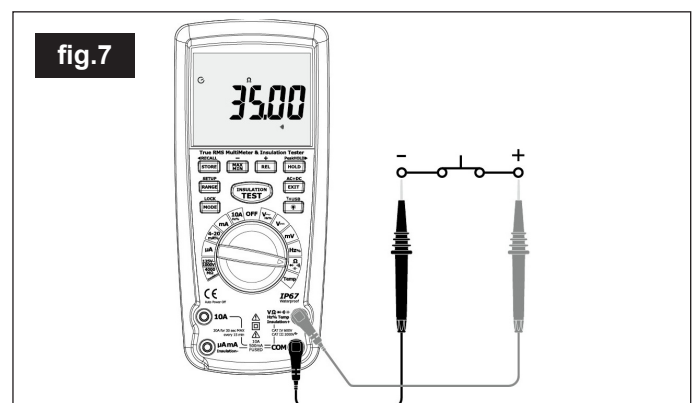
- **! WARNING!** To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any resistance measurements. Remove the batteries and unplug the line cords.
- Set the function switch to the green Ω CAP $\rightarrow$ $\bullet$))) position.
- Insert the black test lead banana plug into the negative COM jack. Insert the red test lead banana plug into the positive Ω jack.
- Press the MODE button to indicate “ Ω ” on the display.
- Touch the test probe tips across the circuit or part under test. It is best to disconnect one side of the part under test so the rest of the circuit will not interfere with the resistance reading.
- Read the resistance on the display. **(fig.6)**



Continuity check

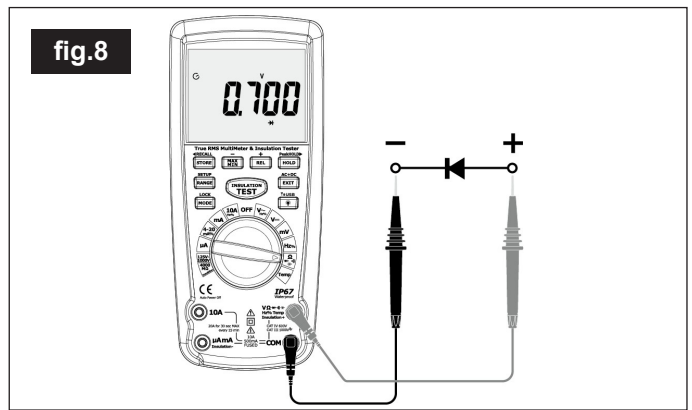
! WARNING! To avoid electric shock, never measure continuity on circuits or wires that have voltage on them.

- Set the function switch to the green Ω CAP $\rightarrow$ $\bullet$))) position.
- Insert the black test lead banana plug into the negative COM jack. Insert the red test lead banana plug into the positive Ω jack.
- Press the MODE button to indicate “ $\bullet$)))” and “ Ω ” on the display.
- Touch the test probe tips to the circuit or wire you wish to check.
- If the resistance is less than approximately 35 Ω , the audible signal will sound. If the circuit is open, the display will indicate “OL”. **(fig.7)**



Diode test

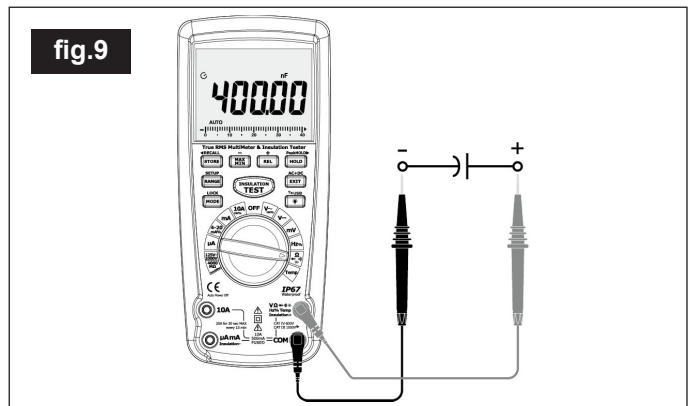
- Set the function switch to the green Ω CAP position.
- Insert the black test lead banana plug into the negative COM jack and the red test lead banana plug into the positive V jack.
- Press the MODE button to indicate “ $\blacktriangleright$ ” and “V” on the display.
- Touch the test probes to the diode under test. Forward voltage will typically indicate 0.400 to 0.700 V. Reverse voltage will indicate “OL”. Shorted devices will indicate near 0 V, and an open device will indicate “OL” in both polarities. (fig.8)



Capacitance measurements

! **WARNING!** To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any capacitance measurements. Remove the batteries and unplug the line cords.

- Set the rotary function switch to the green Ω CAP $\blacktriangleright$ $\bullet$ position.
- Insert the black test lead banana plug into the negative COM jack.
- Insert the red test lead banana plug into the positive V jack.
- Press the MODE button to indicate “F”.
- Touch the test leads to the capacitor to be tested.
- Read the capacitance value on the display. (fig.9)

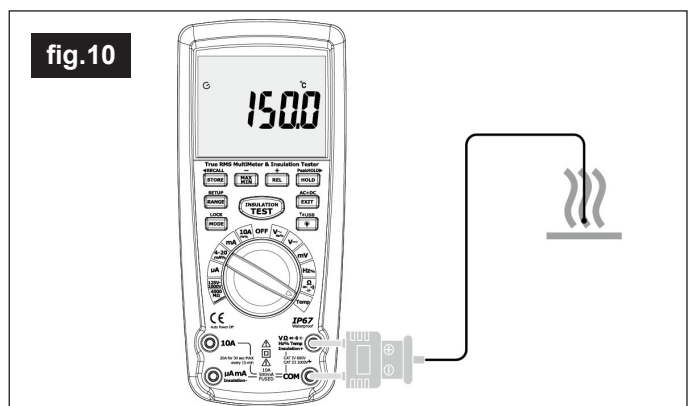


Temperature measurements

- Set the function switch to the green Temp position.
- Insert the temperature probe into the input jacks, making sure to observe the correct polarity.
- Press the MODE button to indicate “°F” or “°C”.
- Touch the temperature probe head to the part whose temperature you wish to measure. Keep the probe touching the part under test until the reading stabilizes (about 30 seconds).
- Read the temperature on the display (fig.10)



Note – The temperature probe is fitted with a Type K mini connector. A mini connector-to-banana connector adaptor is supplied for connection to the input banana jacks.



- Set the rotary function switch to the green Hz/% position.
- Insert the black test lead banana plug into the negative COM jack and the red test lead banana plug into the positive Hz jack.
- Touch the test probe tips to the circuit under test.
- Read the frequency on the display.
- Press the MODE button to indicate “%”.
- Read the % duty cycle on the display.

Frequency (duty cycle) measurements (electronic)

% 4–20 mA measurements

- Set up and connect as described for DC mA measurements.

- Set the rotary function switch to the 4–20 mA% position.
- The meter will display the loop current as a %, with 0 mA = -25%, 4 mA = 0%, 20 mA = 100%, and 24 mA = 125%. (**fig.11**)

Insulation resistance measurements

- **A)** Set the rotary function switch to the insulation position and press the range button to choose one of the voltages displayed in the top-left corner.
- **B)** Connect the two test leads to the device under test.
- **C)** Press and hold the TEST button, or press the LOCK button first and then the TEST button. If the device under test is energised and its voltage (AC/DC) is over 30 V, the meter will not operate and no high-voltage testing will occur. Simultaneously, “>30 V” will be shown on the LCD, the symbol “⚡” will flash, and the buzzer will sound frequently. If the device under test is de-energised or its voltage is lower than 30 V, the meter will enter the normal testing process and apply high voltage. On the primary display, the insulation resistance in MΩ is indicated together with the analogue bar. On the top-right display, the insulation test voltage in V (DC) is indicated, the symbol “⚡” flashes, and the buzzer sounds frequently.
- **D)** Release the TEST button, or press the TEST button while in LOCK mode, to exit LOCK mode and switch off the high voltage. Simultaneously, the resistance value indicated on the primary display will be held, and the top-right display will continue to monitor the insulation voltage of the device under test.
- **E)** Subsequently, discharge the remaining insulation voltage of the device under test through the meter’s internal switch.

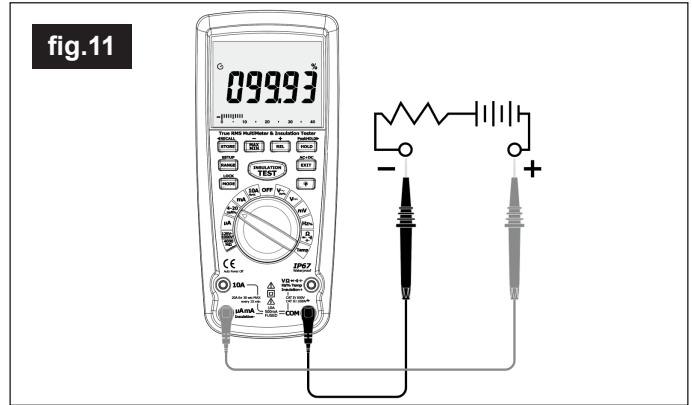


Note – Turning the function switch or pressing the EXIT button will automatically exit the testing mode during the process.

Insulation resistance measurements

This test also applies to other similar equipment that has a line cord. For double-insulated power tools, the megohmmeter lead shown connected to the housing would be connected to a metal part of the tool (e.g. chuck, blade).

fig.11



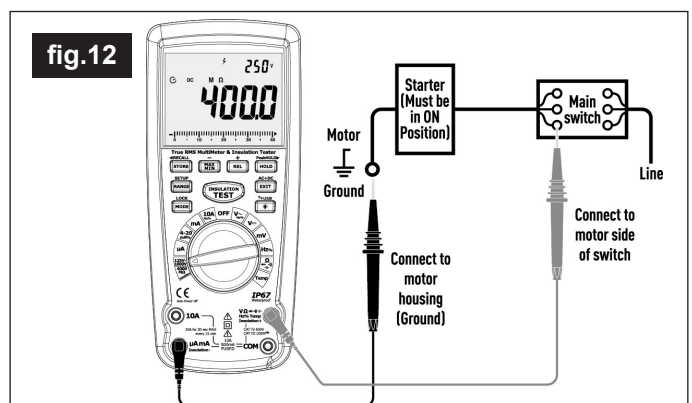
Note – The switch of the device must be in the “ON” position, and the mains power should be disconnected.

Motors

AC: Disconnect the motor from the line by disconnecting the wires at the motor terminals or by opening the main switch. If the main switch is used and the motor also has a starter, then the starter must be held, by some means, in the “ON” position. In the latter case, the measured resistance will include the resistance of the motor, wire, and all other components between the motor and the main switch. If a weakness is indicated, the motor and other components should be checked individually. If the motor is disconnected at the motor terminals, connect one megohmmeter lead to the grounded motor housing and the other lead to one of the motor leads.

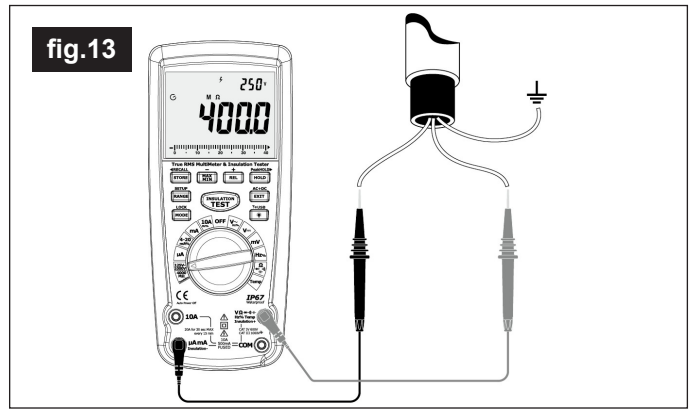
DC: Disconnect the motor from the line. To test the brush rigging, field coils, and armature, connect one megohmmeter lead to the grounded motor housing and the other lead to the brush on the commutator. If the resistance measurement indicates a weakness, raise the brushes off the commutator and separately test the armature, field coils, and brush rigging by connecting one megohmmeter lead to each of them individually, leaving the other connected to the grounded motor housing. The above also applies to DC generators. (**fig.12**)

fig.12



Cables

Disconnect the cable from the line. Also disconnect the opposite end to avoid errors due to leakage from other equipment. Check each conductor to ground and/or lead sheath by connecting one megohmmeter lead to a ground and/or lead sheath and the other megohmmeter lead to each of the conductors in turn. Check the insulation resistance between conductors by connecting the megohmmeter leads to conductors in pairs. (fig.13)



Autorange/manual range selection

When the meter is first turned on, it automatically goes into autoranging. This automatically selects the best range for the measurements being made and is generally the best mode for most measurements. For measurement situations requiring a range to be manually selected, perform the following:

- Press the RANGE key. The “AUTO” display indicator will turn off.
- Press the RANGE key to step through the available ranges until you select the range you want.
- To exit the manual ranging mode and return to autoranging, press EXIT.



Note – Manual ranging does not apply to the temperature functions.

Max/min

- 1. Press the MAX/MIN key to activate the MAX/MIN recording mode. The display icon “MAX” will appear. The meter’s left auxiliary display will display and hold the maximum reading and will update only when a new “max” occurs. The display icon “MIN” will appear. The meter’s right auxiliary display will display and hold the minimum reading and will update only when a new “min” occurs.
2. To exit MAX/MIN mode, press EXIT.

Relative mode

The relative measurement feature allows you to make measurements relative to a stored reference value. A reference voltage, current, etc., can be stored and measurements made in comparison with that value. The displayed value is the difference between the reference value and the measured value.



Note – Relative mode does not operate in the 4–20 mA function.

- 1. Perform the measurement as described in the operating instructions.

- 2. Press the REL button to store the reading on the display, and the “REL” indicator will appear on the display.
- 3. The left auxiliary display shows the difference between the initial value and the current value. The right auxiliary display shows the initial reading. The main display shows the reading after the REL test.
- 4. Press the EXIT button to exit relative mode.

Display backlight

- Press the light button to turn the backlight on. The backlight will automatically turn off after the set time. Press the EXIT button to exit the backlight on mode.

Hold function

- The hold function freezes the reading on the display. Press the HOLD key momentarily to activate or exit the HOLD function.

Peak hold function

- 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. Momentarily press the PEAK button. “PEAK” and “MAX” will be displayed on the left auxiliary display. “MIN” will be displayed on the right auxiliary display. The meter will update the display each time a lower negative peak occurs. Press the EXIT button to exit Peak Hold mode. The Auto Power Off feature will be disabled automatically in this mode.

Data storage

- 1. Set the function switch to the desired measurement function.
- 2. Press the STORE button to access the recording interval time setup function.
- 3. The left auxiliary display indicates 0000 s, which is the recording sample rate. Use the + and - buttons to select the desired sample rate (0 to 255 seconds).

- 4. Set the sample rate to 0000 s for manual recording. In this mode, each press of the STORE button will save one measurement reading.
- 5. Set the sample rate (from 1 to 255 s) for automatic recording. In this mode, pressing the STORE button will start data recording at the programmed sample rate.
- 6. The left auxiliary display indicates the current storage location (0000 to 9999). New measurements will begin storing in the next available location.
- 7. Press and hold the STORE button for 2 seconds to enter RECALL mode, or press EXIT to return to the normal operating mode.

Data storage recall

- 1. Press and hold the STORE button for two seconds (if not already done as instructed in step 7 of the above procedure) to enter the RECALL function.
- 2. The left auxiliary display will show XXXX (current storage location). The right auxiliary display will show XXXX (number of storage locations used).
- 3. Use the + and - buttons to navigate through the storage locations. The value for the selected location is indicated on the main display.
- 4. Press the EXIT button to end the recall session.

Clear all data

- 1. From the OFF position, press and hold the RANGE button while turning the function switch to any ON position.
- 2. Release the RANGE button. The memory has been cleared.

Pc wireless communication

- 1. Install and launch the PC software (refer to the HELP utility contained in the software for more details).
- 2. Press and hold the backlight/USB button for two seconds to enter RF wireless transmit mode.
- 3. The RF icon will appear on the display.
- 4. When communication is established, the RF icon on the display will blink, and the LED indicator on the receiver will blink.
- 5. Once per second, the data will be displayed on the PC screen (plotted on the graph and inserted into the data list).
- 6. Hold the backlight button for two seconds to exit RF wireless transmit mode.

Sending stored data to the pc

- 1. Launch the PC software.
- 2. Press the STORE button for two seconds to enter the data RECALL function.

- 3. Press the HOLD button for two seconds. The RF transmit icon will flash while the stored data is sent to the PC.



Note – Refer to the HELP utility included in the supplied software program for in-depth software instructions.

Setup

- 1. Press and hold the RANGE/SETUP button for two seconds to enter the SET function. The first of five settable functions will appear.
- 2. Press the RANGE button to step through the functions:
 - A. Alarm high-limit buzzer alarm: OFF or value
 - B. Alarm low-limit buzzer alarm: OFF or value
 - C. Auto power-off time: OFF, 10 to 30 sec
 - D. Button beeper: ON/OFF
 - E. Backlight time: OFF, 10 to 30 sec
- 3. Use the +, -, ◀, and ▶ buttons to select and change conditions and digits.
- 4. Press the RANGE/SETUP button until the meter returns to the normal display to exit this mode.

Alarm limits

- 1. Press and hold the SETUP button for two seconds to enter the High Limit function.
- 2. Press the ▶ button to select a digit for adjustment.
- 3. Press the + or – button to adjust the value of the digit.
- 4. Press the ◀ button to turn the alarm OFF.
- 5. Press the SETUP button and repeat the procedure to set the low limit.
- 6. Press the SETUP button to step through the other functions and return to the normal operating mode.
- 7. The meter will “beep” if the measured value is greater than the high limit or lower than the low limit.

AC+DC

In all measurement modes, VAC, mV (AC), 10 A (AC), mA (AC), and μ A (AC), press the EXIT button for 2 seconds to enter AC+DC testing. The precision is the same as for AC measurements. The LCD shows the AC+DC signal. Press the EXIT button to exit.

Low battery indication

- When the battery icon appears on the display, the battery should be replaced.

10. Consumables & Accessories

A wide range of consumables and accessories are available.

Visit www.sealey.co.uk to explore our extensive range.

11. Maintenance

! **WARNING!** To avoid electric shock, disconnect the test leads from any source of voltage before removing the back cover or the battery or fuse covers.

! **WARNING!** To avoid electric shock, **DO NOT** operate your meter until the battery and fuse covers are in place and securely fastened.

This multimeter is designed to provide years of dependable service if the following care instructions are followed:

- Keep the meter dry. If it gets wet, wipe it off.
- Use and store the meter in normal temperatures. Temperature extremes can shorten the life of the electronic parts and distort or melt plastic parts.
- Handle the meter gently and carefully. Dropping it can damage the electronic parts or the case.
- Keep the meter clean. Wipe the case occasionally with a damp cloth.

⊘ **DO NOT** use chemicals, cleaning solvents, or detergents.

- Use only fresh batteries of the recommended size and type. Remove old or weak batteries so they do not leak and damage the unit.
- If the meter is to be stored for a long period of time, the batteries should be removed to prevent damage to the unit.

Battery installation

! **WARNING!** To avoid electric shock, disconnect the test leads from any source of voltage before removing the battery cover.

- Turn the power off and disconnect the test leads from the meter.
- Open the rear battery cover by removing the two screws (B) using a Phillips-head screwdriver.
- Insert the battery into the battery holder, observing the correct polarity.
- Put the battery cover back in place. Secure it with the screws.

! **WARNING!** To avoid electric shock, **DO NOT** operate the meter until the battery cover is in place and securely fastened.



Note – If your meter does not work properly, check the fuses and batteries to make sure that they are still in good condition and properly inserted.

Replacing the fuses

! **WARNING!** To avoid electric shock, disconnect the test leads from any source of voltage before removing the meter cover.

- Disconnect the test leads from the meter.
- Remove the protective rubber holster.
- Remove the battery cover (two “B” screws) and the battery.
- Remove the six “A” screws securing the rear cover.
- Gently remove the old fuse and install the new fuse into the holder.
- Always use a fuse of the proper size and value (0.5 A/1000 V fast-blow for the 400 mA range [SIBA 70-172-40], 10 A/1000 V fast-blow for the 20 A range [SIBA 50-199-06]).
- Replace and secure the rear cover, battery, and battery cover.

! **WARNING!** To avoid electric shock, **DO NOT** operate your meter until the fuse cover is in place and securely fastened.

12. Warranty

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



Please note that guarantee claims must be made via the place of purchase where you may need to provide proof of purchase. All consumable items are under no warranty period. All warranties exclude general wear and tear and misuse, see our terms of business for more details.

13. Aftersales Support

We are committed to supporting our products throughout their lifetime.

- If your product is outside of the warranty period, we offer an extensive range of spare parts along with expert technical advice to help keep your equipment in working order.
- Our technical team is on hand to assist 8.30am-5.00pm Mon-Fri with fault finding, repairs and general product queries.

Telephone 01284 757505

Email: technical@sealey.co.uk



If required, products can also be returned to Sealey or one of our authorised repair agents for inspection, servicing or repair at a reasonable cost.



Product Registration

It's quick and easy to register your warranty online at www.sealey.co.uk. Just log in or create a free MySealey account, then head to the 'My Products' section to fill out the short warranty registration form. If your product is advertised with a free extended warranty upon registration, this will activate your extended warranty.



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.



Jack Sealey (EU) Ltd t/a Sealey Group Farney Street, Carrickmacross, Co. Monaghan, A81 PK68 Ireland
Jack Sealey Ltd t/a Sealey Group Kempson Way, Suffolk Business Park, Bury St Edmunds, Suffolk, IP32 7AR UK
Tel: 01284 757500 • **Email:** sales@sealey.co.uk • **Web:** www.sealey.co.uk