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HHM290
TrueRMS Supermeter®
**For immediate technical or application assistance:**

**USA and Canada:**

<table>
<thead>
<tr>
<th>Country</th>
<th>Address</th>
<th>Tel</th>
<th>Fax</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>One Omega Drive, Box 4047</td>
<td>(203) 359-7700</td>
<td>(203) 359-1660</td>
<td><a href="mailto:info@omega.com">info@omega.com</a></td>
</tr>
<tr>
<td>Canada</td>
<td>976 Bergar</td>
<td>(514) 856-6868</td>
<td>(514) 856-0025</td>
<td><a href="mailto:info@omega.ca">info@omega.ca</a></td>
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**Mexico**

<table>
<thead>
<tr>
<th>Tel</th>
<th>Fax</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>(001) 203-359-7803</td>
<td></td>
<td><a href="mailto:espanol@omega.com">espanol@omega.com</a></td>
</tr>
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</table>

**Servicing Europe:**

<table>
<thead>
<tr>
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<th>Address</th>
<th>Tel</th>
<th>Fax</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benelux</td>
<td>Postbus 8034, 1180 LA Amstelveen, The Netherlands</td>
<td>+31 (0) 20 3472121</td>
<td>+31 (0) 20 643463</td>
<td><a href="mailto:info@omega.com">info@omega.com</a></td>
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<tr>
<td>Czech Republic</td>
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<td>+420 (069) 6311199</td>
<td>+420 (069) 6311114</td>
<td><a href="mailto:info@omega.com">info@omega.com</a></td>
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<tr>
<td>Denmark</td>
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<td>+33 (0) 130 699 120</td>
<td></td>
<td><a href="mailto:info@omega.com">info@omega.com</a></td>
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<tr>
<td>Germany/Austria</td>
<td>Dammertstrasse 26, D-75392 Döckendorf, Germany</td>
<td>+49 (0)7056 9396-20</td>
<td>+49 (0)7056 9396-29</td>
<td><a href="mailto:info@omega.com">info@omega.com</a></td>
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<tr>
<td>United Kingdom</td>
<td>One Omega Drive, River Bend Technology Centre</td>
<td>+44 (0) 161 777 6661</td>
<td></td>
<td><a href="mailto:info@omega.com">info@omega.com</a></td>
</tr>
</tbody>
</table>

**it is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification. The information contained in this document is believed to be correct but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice. WARNING: These products are not designed for use in, and should not be used for, patient-connected application.**
RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR WARRANTY RETURNS, please have the following information available BEFORE contacting OMEGA:
1. Purchase Order number under which the product was PURCHASED.
2. Model and serial number of the product under warranty.
3. Repair instructions and/or specific problems relative to the product.

FOR NON-WARRANTY REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:
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2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

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SAFETY INFORMATION

• Do Not use the meter if the meter or the test leads look damaged, or if you suspect that the meter is not operating properly.
• This meter is not recommended for high voltage industrial use. For example, it is not recommended for 440 VAC or 600 VAC industrial power mains measurement. The unit is intended for use as follows:
  - Low energy circuits up to 1000 VDC or 750 VAC.
  - High energy circuits up to 250 VAC or VDC.
• Accidental misuse by connection across a high voltage, high energy power source when the meter is set up for current (mA) measurement may be very hazardous.

• Do Not Operate the meter with the two test leads and the thermocouple probe connected at the same time. Unplug the test leads from the meter before making thermocouple temperature measurement. Unplug the thermocouple probe from the meter before making other types of measurements.
• Use caution when working above 60 VDC or 30 VAC. Such voltages pose a shock hazard.
• Turn off power to the circuit under test before cutting, unsoldering, or breaking the circuit. Small amounts of current can be dangerous.
• When using the test leads, keep your fingers behind the finger guards.
• Measuring voltages which exceeds the limits of this multimeter may damage the meter and expose the operator to a shock hazard. Always recognize the voltage limits as stated in this manual and on the meter.

• If the equipment is used in a manner not specified in this manual, the protection provided by the equipment may be impaired.
• Do Not Operate the meter in flammable or explosive environments.
• Protect the meter from moisture.
• Operate the meter with the two test leads provided.
• Do Not Operate the meter when the Battery Door is open.

PATENT NOTICE:
U.S. Patent No. 6,095,682; 6,123,453; B1: 5,368,392; 5,524,984; 5,727,880; 5,465,838; 5,823,678; 5,823,679
European Patent No. 064408 Other Patents Pending.

ACCESSORIES

<table>
<thead>
<tr>
<th>Model No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>HHM290-SC</td>
<td>Soft Carrying Case</td>
</tr>
<tr>
<td>HHM-TL</td>
<td>Replacement Test Leads</td>
</tr>
<tr>
<td>CS520-Adapter-110V</td>
<td>110 VAC Adapter, 9 VDC @ 200mA</td>
</tr>
<tr>
<td>CS520-Adapter-220V</td>
<td>220 VAC Adapter, 9 VDC @ 200mA</td>
</tr>
</tbody>
</table>

6.0,695,682; 6,123,453; B1: 5,368,392; 5,524,984; 5,727,880; 5,465,838; 5,823,678; 5,823,679 European Patent No. 064408 Other Patents Pending.
CAUTION

• USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER THAN THOSE SPECIFIED HERE MAY RESULT IN HAZARDOUS LASER RADIATION EXPOSURE.
• DO NOT LOOK AT THE LASER BEAM COMING OUT OF THE LENS OR VIEW DIRECTLY WITH OPTICAL INSTRUMENTS. EYE DAMAGE CAN RESULT.
• USE EXTREME CAUTION WHEN OPERATING THE LASER SIGHTING.
• NEVER POINT THE LASER BEAM AT A PERSON.
• DO NOT ATTEMPT TO OPEN THE MULTI-METER OR LASER SIGHTING THERE ARE NO USER-SERVICEABLE PARTS.
• DO NOT OPEN BATTERIES, DISPOSE OF IN FIRE, HEAT ABOVE 100°C (212°F), EXPOSE CONTENTS TO WATER, RECHARGE, PUT IN BACKWARDS, MIX WITH USED OR OTHER BATTERY TYPES. IT MAY EXPLODE OR LEAK AND CAUSE PERSONAL INJURY.
• DO NOT USE THE METER NEAR ANY DEVICE THAT GENERATES STRONG ELECTROMAGNETIC RADIATION. IT MAY CAUSE TEMPORARY ERROR IN READING.

WARRANTY / DISCLAIMER
OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 13 months from date of purchase. OMEGA’s Warranty adds an additional one (1) month grace period to the normal one (1) year product warranty to cover handling and shipping time. This ensures that OMEGA’s customers receive maximum coverage on defective products. It must be returned to the factory for evaluation. OMEGA’s Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. OMEGA’s WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interlocking, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having being damaged as a result of excessive corrosion; or current, heat moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA’s control. Components which wear are not warranted, including but not limited to contact points, fuses, and fuses. OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT THAT OF TITLE AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

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MAINTENANCE

WARNING
Remove test leads before changing battery or fuse or performing any servicing.

Battery Replacement
Power is supplied by 6 pcs 1.5V (AA size) battery (UM-3 R6). The "≈" appears on the LCD display when replacement is needed. To replace the battery, remove the two screws from the back of the meter and lift off the battery case. Remove the battery from battery contacts.

Fuse Replacement
If no current measurements are possible, check for a blown overload protection fuse. There are two fuses; F1 for the "mA" jack and F2 for the "10A" jack. For access to fuses, remove the two screws from the back of the meter and lift off the battery case. Replace F1 only with the original type 10A/600V, fast acting fuse. Replace F2 only with the original type 0.5A/250V, fast acting ceramic fuse.

Cleaning
Periodically wipe the case with a damp cloth and detergent, do not use abrasives or solvents. Clean the front lens by blowing off loose particles or using a damp, soft, clean cloth.
OPERATION
Before taking any measurements, read the Safety Information Section. Always examine the instrument for damage, contamination (excessive dirt, grease, etc.) and defects. Examine the test leads for cracked or frayed insulation. If any abnormal conditions exist do not attempt to make any measurements. For normal operation when changing ranges through OFF range, please wait for one second.

FUNCTIONS OF BUTTONS

**Button (Double Duty)**
Pressing this button will toggle between AC and DC current measurement. In infrared temperature measurement “IR” mode, pressing this button decreases the Emissivity value of the target.

**IEC Symbols**

<table>
<thead>
<tr>
<th>Description</th>
<th>IEC Symbol</th>
</tr>
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<tbody>
<tr>
<td>Caution-Risk of Electric shock</td>
<td><img src="electric_shock.png" alt="" /></td>
</tr>
<tr>
<td>Caution-Refer to Accompanying documents</td>
<td><img src="warning.png" alt="" /></td>
</tr>
<tr>
<td>Direct Current</td>
<td><img src="dc.png" alt="" /></td>
</tr>
<tr>
<td>Alternating Current</td>
<td><img src="ac.png" alt="" /></td>
</tr>
<tr>
<td>Earth (Ground) Terminal</td>
<td><img src="ground.png" alt="" /></td>
</tr>
<tr>
<td>Equipment protected throughout by Double Insulation</td>
<td><img src="double_insulation.png" alt="" /></td>
</tr>
<tr>
<td>Laser Symbol</td>
<td><img src="laser_symbol.png" alt="" /></td>
</tr>
</tbody>
</table>

**How to specify the target emissivity**

1. Set the Function switch to T/C.
2. Plug in a K type surface thermocouple probe to the meter.
3. Measure the target temperature using the surface probe.
4. Unplug the surface probe from the meter.
5. Set the Function switch to IR.
6. Aim at the target, Press & hold the button to turn on the laser beam for positioning.
7. Adjust the Emissivity button until the meter reads the same temperature measured via the thermocouple probe. Read the New Emissivity setting.

Measurement Considerations

1. **Theory of Measurement**
   Every object emits infrared energy in accordance with its temperature. By measuring the amount of this radiant energy, it is possible to determine the temperature of the emitting object.
2. **About Infrared**
   Infrared radiation is a form of light (electromagnetic radiation), and the property that it passes easily through air while it is easily absorbed by solid matter. With an emission thermometer which operates by detecting infrared radiation accurate measurement is possible, irrespective of the air temperature or the measurement distance.
3. **Emission Thermometer Structure**
   Infrared radiation which has been emitted from the object is focused upon an infrared radiation sensor, via an optical system. This includes a lens which is transparent to infrared radiation and 5.3µm cut off filter. The output signal from the infrared radiation sensor is input to an electronic circuit along with the output signal from a standard temperature sensor (Thermopile).

**Substance Thermal Emissivity**

<table>
<thead>
<tr>
<th>Substance</th>
<th>Thermal Emissivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt</td>
<td>0.90 to 0.98</td>
</tr>
<tr>
<td>Concrete</td>
<td>0.94</td>
</tr>
<tr>
<td>Cement</td>
<td>0.96</td>
</tr>
<tr>
<td>Sand</td>
<td>0.90</td>
</tr>
<tr>
<td>Ice</td>
<td>0.96 to 0.98</td>
</tr>
<tr>
<td>Snow</td>
<td>0.85 to 0.95</td>
</tr>
<tr>
<td>Glass</td>
<td>0.90 to 0.95</td>
</tr>
<tr>
<td>Ceramic</td>
<td>0.90 to 0.94</td>
</tr>
<tr>
<td>Marble</td>
<td>0.94</td>
</tr>
<tr>
<td>Plastic</td>
<td>0.80 to 0.90</td>
</tr>
<tr>
<td>Mortar</td>
<td>0.89 to 0.91</td>
</tr>
<tr>
<td>Brick (red)</td>
<td>0.93 to 0.96</td>
</tr>
<tr>
<td>Cloth (black)</td>
<td>0.98</td>
</tr>
<tr>
<td>Human skin</td>
<td>0.98</td>
</tr>
<tr>
<td>Carbon</td>
<td>0.75 to 0.80</td>
</tr>
<tr>
<td>Charcoal (powder)</td>
<td>0.96</td>
</tr>
<tr>
<td>Lacquer</td>
<td>0.80 to 0.95</td>
</tr>
<tr>
<td>Ice (mat)</td>
<td>0.97</td>
</tr>
<tr>
<td>Rubber (black)</td>
<td>0.94</td>
</tr>
<tr>
<td>Snow (black)</td>
<td>0.85 to 0.95</td>
</tr>
<tr>
<td>Glass (black)</td>
<td>0.90</td>
</tr>
<tr>
<td>Ice (black)</td>
<td>0.70 to 0.94</td>
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<tr>
<td>Brass</td>
<td>0.79 to 0.82</td>
</tr>
<tr>
<td>Copper</td>
<td>0.78</td>
</tr>
<tr>
<td>Iron</td>
<td>0.78 to 0.82</td>
</tr>
<tr>
<td>Textiles</td>
<td>0.90</td>
</tr>
</tbody>
</table>

4. Emissivity

All objects emit invisible infrared energy. The amount of energy emitted is proportional to the object's temperature and its ability to emit infrared energy. This ability, called emissivity, is based upon the material that the object is made of and its surface finish. Emissivity ranges from 0.10 to 1.00 for a very reflective object to 1.00 for a black body. Factory set emissivity value of 0.95, which cover 95% of typical applications.

5. The surface to be measured is covered by frost or other material, clean it to expose the surface.
6. If the surface to be measured is highly reflective, apply masking tape or matt finish black paint to the surface.
7. If the meter seems to be giving incorrect readings check the front lens. There may be condensation or debris obstructing the lens; clean them in instructions in the maintenance section.
**Button (Double Duty)**

Press [Button] to select the Manual Range mode and turn off the "AUTO" annunciator.

In the Manual Range mode. Each time you press [Button], the range (and the input range annunciator) increments, and a new value is displayed. To exit the Manual Range mode and return to autoranging, press and hold down [Button] for 2 seconds. The "AUTO" annunciator turns back on.

In infrared temperature measurement "IR" mode, pressing this button increases the Emissivity value of the target.

**Button**

In thermocouple temperature "T/C" mode, pressing this button scrolls thru T1, T2, and (T1-T2) temperature readings.

**Button**

Press to enter the MAX MIN AVG Recording mode (manual range only). The "REC", "APO" annunciator turns on and the APO mode. Meter do not take records when the display reads overrange (+/- OL).

Press the [Button] key to cycle through the maximum (MAX), minimum (MIN), average (AVG) and present readings. Press and hold down the [Button] for 2 seconds to exit and erase recorded reading.

**Button**

Pressing this button toggles the temperature display between Degrees Celsius(°C) or Degrees Fahrenheit(°F).

**Button**

Press [Button] to toggle on and off of display backlight. The backlight will switch-off automatically after 30 seconds.

**Button**

Press & hold to turn on the laser beam. Release the button to turn off the laser beam. When the laser beam is on, a laser icon appears on the display.

There is a switch in front of the laser aperture select between laser Dot or laser Circle.

---

**INFRARED ELECTRICAL**

**Temperature Range:** -20°C to 550°C / -4°F to 1022°F  
**Display Resolution:** 1°C / 1°F  
**Accuracy:** ±2% of reading or 3°F, whichever is greater, at 72°F ambient and Emissivity of 0.95 or greater  
**Temperature Coefficient:** ±0.2% of reading or ±0.36°F/0.2°C, per °F/°C change in ambient temperature whichever is greater, above 82°F/28°C or below 64.4°F/18°C ambient temperatures  
**Response Time:** 1.5 seconds  
**Spectral Response:** 6 to 14µm nominal  
**Emissivity:** 0.10 to 1.00 by step of 0.01  
**Detection Element:** Thermopile  
**Optical Lens:** Fresnel Lens  
**Field of View:** 100mmØ at 1000mm (2.5”Ø at 25")

---

**K-type thermocouple ELECTRICAL**

**Temperature Scale:** Celsius or Fahrenheit user-selectable  
**Measurement Range:**  
  - **Thermocouple Range**  
    - **K-TYPE** 200°C to 1372°C, -328°F to 1999°F  
  - **Auto range:** 0.1°C/1°C, 0.1°F/1°F  
  - **Accuracy:** Accuracy is specified for operating temperatures over the range of 18°C to 28°C (64°F to 82°F) for 1 year, not including thermocouple error: ±(0.1%rdg + 1°C) on -60°C to 1372°C ±(0.1%rdg + 2°C) on -60°C to -200°C ±(0.1%rdg + 2°F) on -76°F to 2501°F ±(0.1%rdg + 4°C) on -76°F to -328°F  
**Temperature Coefficient:** ±0.3% of reading or ±0.36°F/0.2°C, whichever is greater, change in accuracy per °F/°C change in ambient operating temperature above 82°F/28°C or below 64.4°F/18°C.  
**Input Protection:** 24V ac or 24V ac rms maximum input voltage on any combination of input pins.  
**Input Connector:** Accepts standard miniature thermocouple connectors (flat blades spaced 7.9mm, center to center), SMP type.

---

**Press [Button] to enter the Relative mode, zero the display, and store the displayed reading as a reference value. The relative mode annunciator "REL" is displayed.**

**Press [Button] again to exit the relative mode.**

**Press [Button] to enter the Data Hold mode, the "HOLD" annunciator is displayed. When HOLD mode is selected, the meter hold the present readings and stops all further measurements. Pressing the [REL] key again to cancel HOLD mode causing meter to resume taking measurements.**
Note: Unplug any thermocouple probes from the thermocouple input sockets before making any other types of measurements.

Voltage Measurements
1. Connect the red test lead to the "V+" jack and the black test lead to the "COM" jack of the multimeter.
2. For AC measurement, set the Function switch to "V" position. For AC measurement, set the Function switch to "V" position.
3. Connect the other end of the test lead to the device or circuit being measured.

Current Measurements
1. Set the Function switch anywhere from 430µA to 10A depending on the range.
2. In the 10A position, connect test leads to "A" and "COM" jacks.
3. In lower ranges, connect test lead to "mA" & "COM" jacks.
4. For AC measurement, press the "ACA" button, and an AC icon will appear on the display.
5. Connect the multimeter in Series with the circuit being measured.

Resistance & Continuity Measurements
1. Set the Function switch to the resistance position.
2. Remove power from the device or circuit under test.
3. Connect the test lead to the "V+ & "COM" jacks.
4. The beeper sounds once, if the resistance being measured is less than 30 Ohms.

CONTINUITY
Audible indication: <30Ω
Overload protection: 500VDC or AC rms

DIODE TEST
Accuracy: ±(3.0%rdg + 3dgts)
Resolution: 100µV
Test current: 1.0 ± 0.6mA
Test voltage: ±3.5V

LOGIC TEST
Threshold: Logic Hi(+) (2.8 ± 0.8V)
Logic Lo(-) (0.8 ± 0.5V)
Frequency response: 20MHz
Detectable pulse width: 25ns
Pulse limits: ±30% & ±70% duty
Overload protection: 500VDC or AC rms

FREQUENCY
Ranges: 100Hz, 1000Hz, 10KHz, 100KHz, 500KHz
Resolution: 0.01Hz (under 100Hz)
Accuracy: ±0.1% rdg + 3dgts
Sensitivity: 1Vrms min
Overload protection: 500VDC or AC rms

CAPACITANCE
Ranges: 4.3pF, 43pF, 430pF, 4.3nF, 43nF, 430nF, 4.3µF, 43µF, 430µF
Resolution: 0.1pF
Accuracy: ±5.0%rdg + 10dgts
Test frequency: 4.3nF, 43nF ranges 1KHz
430nF, 4.3µF ranges 270Hz
43µF range 27Hz

INDUCTANCE
Ranges: 4.3mH, 43mH, 430mH, 4.3H, 43H
Resolution: 0.1µH
Accuracy: ±(5.0%rdg + 10dgts) on 4.3mH range
±(5.0%rdg + 10dgts) on 43mH to 43H ranges
Test frequency: 4.3mH, 43mH ranges 1KHz
430mH, 4.3H ranges 270Hz
43H range 27Hz
Test conditions: quality factor > 5 in 27Hz

LASER SIGHTING
Laser sighting: 12 point Laser circle
Wavelength(Color): 650-670nm(RED)
Operating distance: 2 to 25 feet
Maximum Optical Power output: <5mW at 75°F ambient temperature
Class IIa Laser Product
Safety Classification: Class 3A
FDA Classification: Complies with 21 CFR Chapter 1, Subchapter J
Infrared (Non-Contact) Temperature Measurements

1. Set the Function switch to “IR” position.
2. Press the \( \text{or } \text{ buttons to set the Emissivity of the target.}
3. Aim at the target. Press & hold the \( \text{ button to turn on the laser beam. There is a switch in front of the laser beam aperture which projects either Laser Dot or Laser Circle. The laser dot indicates the center of the optical field of view. The laser circle indicates the perimeter of the field of view. There is a } 0.63 \text{ inches offset between the laser aperture and the center of the optical field of view. The laser beam only turns on when the button is pressed & held. Releasing the button turns off the laser beam.}
4. The target must be larger than the optical field of view of the multimeter (Spot Size).
5. Read the temperature.

Frequency Measurements

1. Set the Function switch to the “Hz” position.
2. Connect the test leads from the point of measurement to the “V” & “COM” jacks of the meter.
3. Read the frequency.

Note: Unplug the test leads from the multimeter before making any type of thermocouple temperature measurements.

Thermocouple Temperature Measurements

1. Set the Function switch to “T/C” position.
2. The multimeter can accept up to two K type thermocouple inputs.
3. Plug in the thermocouple probe(s) to the mating built-in connector(s) in the meter.
4. The temperature is displayed in either Degree Celsius (°C) or Degree Fahrenheit (°F). To change the temperature Engineering unit, press the \( \text{ button.
5. Press the \( \text{ button to display } T_1, T_2, \text{ or } T_1-T_2.

DC CURRENT
Ranges: 430µA, 4.3mA, 43mA, 430mA, 10A
Resolution: 10µA
Accuracy: ±(0.5%rdg + 1dig) on 430µA to 430mA ranges
\( ±(1.0%rdg + 2digts) \) on 10A range

Overload protection: 1000VDC or 750VAC rms

DC VOLTS
Ranges: 430mV(manual), 4.3V, 43V, 430V, 1000V
Resolution: 10mV
Accuracy: ±(0.25%rdg + 1digit)

Frequency Measurements

1. Set the Function switch to the “Hz” position.
2. Connect the test leads from the point of measurement to the “V” & “COM” jacks of the meter.
3. Read the frequency.

Note: Unplug the test leads from the multimeter before making any type of thermocouple temperature measurements.

Thermocouple Temperature Measurements

1. Set the Function switch to “T/C” position.
2. The multimeter can accept up to two K type thermocouple inputs.
3. Plug in the thermocouple probe(s) to the mating built-in connector(s) in the meter.
4. The temperature is displayed in either Degree Celsius (°C) or Degree Fahrenheit (°F). To change the temperature Engineering unit, press the “n” button.
5. Press the “a” button to display T1, T2, or T1-T2.

AC CURRENT (50Hz-2KHz)
Ranges: 400mV(manual), 4.0V, 40V, 400V, 750V
Resolution: 10mV
Accuracy: ±% of reading+no. of digits

Frequency Measurements

1. Set the Function switch to the “Hz” position.
2. Connect the test leads from the point of measurement to the “V” & “COM” jacks of the meter.
3. Read the frequency.

Note: Unplug the test leads from the multimeter before making any type of thermocouple temperature measurements.

Thermocouple Temperature Measurements

1. Set the Function switch to “T/C” position.
2. The multimeter can accept up to two K type thermocouple inputs.
3. Plug in the thermocouple probe(s) to the mating built-in connector(s) in the meter.
4. The temperature is displayed in either Degree Celsius (°C) or Degree Fahrenheit (°F). To change the temperature Engineering unit, press the “n” button.
5. Press the “a” button to display T1, T2, or T1-T2.
Note: Unplug the test leads and thermocouple probes from the multimeter before making any capacitance or inductance measurement.

**Capacitance Measurements**

Do not apply external voltage to the Cx Lx sockets. Make sure that the capacitor is fully discharged, otherwise damage to the meter may result.

1. Set the Function switch to the desired capacitance range (µF to nF).
2. Insert the capacitor leads into the Cx Lx sockets.
3. Read the capacitance value.

**Diode Tests**

1. Connect the red test lead to the "V+" jack and the black test lead to the "COM" jack.
2. Set the Function/Range switch to the "\x" position.
3. Turn off power to the circuit under test.
4. Touch probes to the diode. A forward-voltage drop is about 0.6V (typical for a silicon diode).
5. Reverse probes. If the diode is good, OL is displayed. If the diode is shorted, "0.000" or another number is displayed.
6. If the diode is open, OL is displayed, in both directions.
7. If the junction is measured in a circuit and a low reading is obtained with both lead connections, the junction may be shunted by a resistance of less than 1KΩ. In this case the diode must be disconnected from the circuit for accurate testing.

**Inductance Measurements**

1. Set the Function switch to the desired inductance range (mH to H).
2. Insert the inductor leads into the Cx Lx sockets.
3. Read the inductance value.

**Logic Measurements**

1. Set the Function/Range switch to the Logic position.
2. Connect the red test lead to the "V+" jack and the black test lead to the common bus of the logic circuit.
3. Connect the red test lead to the test point and the black lead to the "COM" jack.
4. A "1" on the display indicates TTL logic high and a "0" indicates a TTL logic low. Both indicators are on when the point of measurement is logging high and low.

**SPECIFICATIONS**

- **Display:** Backlit liquid crystal display (LCD) with a maximum digital reading of 43000 counts. Includes an Analog Bar Graph of 40 counts.
- **Display Resolution:**
  - Range: 0-4.3 → .0001
  - 0-43 → .001
  - 0-430 → .1
  - 0-4300 → 1
- **Polarity:** Automatic, positive implied, negative polarity indication.
- **Overrange:** "OL" or "-OL" is displayed.
- **Low battery indication:** The "\x" is displayed when the battery voltage drops below the operating level.
- **Measurement rate:** 2/sec, nominal; 1/sec, temperature. 20/sec, Analog display.
- **Operating Environment:** 0°C to 40°C at <70% relative humidity.
- **Storage Temperature:** -20°C to 60°C, 0 to 80% R.H. with battery removed from meter.
- **Accuracy:** Stated accuracy at 23°C ± 5°C, <75% relative humidity.
- **Safety:** According to EN61010-1 protection class II overvoltage category (CAT II 600V) pollution degree 2.
- **Auto Power off:** 30minutes after rotary switch and push button no changes. (except MAX/MIN function)
- **Power:** 6 pos. 1.5V (AA size).
- **DC Adaptor:** (DC 9min. - 12Vmax. (LOAD 50mA min.) Use a certified (CE, VDE) current limited adapter.
- **Battery life:** 100 hours typical.

**Dimensions:**

- 202mm (H) x 100mm (W) x 50mm (D).
- **Weight:** Approx. 18.5 oz. (525g) including battery.
- **Accessories:** The unit comes with a protective Rubber Boot, a pair of test leads, 6 AA size Batteries, One Spare fuse, Type K Beaded wire thermocouple, and the instruction manual.
- **Tripod Mount:** 1/4" - 20 UNC.