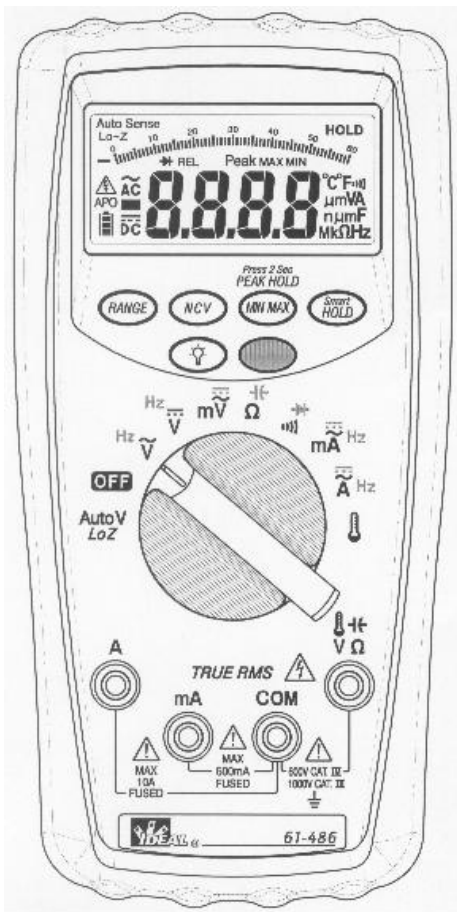


**IDEAL INDUSTRIES, INC. TECHNICAL**  
**MODEL: 61-484**  
**MODEL: 61-486**  
**Multimeters Service Information**

*The Service Information provides the following information:*

- Precautions and safety information
- Specifications
- Basic maintenance (cleaning, replacing the battery and fuses)
- Performance test procedures
- Calibration and calibration adjustment procedures



Form number: TM61480II  
Revision:1. Date: July 2011

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## Introduction



**Warning**

To avoid shock or injury, do not perform the verification tests or calibration procedures described in the manual unless you are qualified to do so.

The information provided in this document is for the use of qualified personnel only.



**Caution**

The 61-484/61-486 contains parts that can be damaged by static discharge. Follow the standard practices for handling static sensitive devices.

For additional information about IDEAL INDUSTRIES, INC. and its products, and services, visit IDEAL INDUSTRIES, INC. web site at:

[www.idealindustries.com](http://www.idealindustries.com)

## Precautions and Safety Information

Use the Meter only as described in the Service Manual. If you do not do so, the protection provided by the Meter may be impaired. Read the "Safety Information" page before servicing this product. In this manual, a **Warning** identifies conditions and actions that pose hazard (s) to the user; a **Caution** identifies conditions and actions that may damage the Meter or the test instruments.

## The Symbols


The symbols used on the Meter and in this manual are explained in Table A.


**Table A. The Symbols**

	Risk of electric shock
	See instruction card
	DC measurement
	Equipment protected by double or enforced insulation
	Battery
	Fuse
	Earth
	AC measurement
	Conforms to EU directives
	Application around and removal from hazardous live conductors is permitted.
	Do not discard this product or throw away

## SAFETY

Review the following safety precautions to avoid injury and prevent damage to this product or products connected to it. To avoid potential hazards, use the product only as specified.

 **CAUTION:** These statements identify conditions or practices that could result in damage to the equipment or other property.

 **WARNING:** These statements identify conditions or practices that could result in personal injury or loss of life. Specific precautions

**Do not operate without covers.** To avoid personal injury, do not apply any voltage or current to the product without covers in place.

**Electric overload.** Never apply a voltage to a connector on the product that is outside the range specified for that connector.

**Avoid electric shock.** To avoid injury or loss of life, do not connect or disconnect probes or test leads while they are connected to a voltage source.








**Do not operate in wet/damp conditions.** To avoid electric shock, do not operate this product in wet or damp conditions.

## SPECIFICATIONS

All specifications are warranted unless noted typical and apply to the **61-484/61-486**.

Stated accuracies are at 23°C±5°C at than 80% relative humidity and without the battery indicator displayed.

### General specifications

Characteristics	Description
Display count	6000
Analog Bar Graph	segment, negative indicated positive implied
Numeric update rate	3 times / sec
Polarity display	Automatic
Over-range display	"OL" is display
Low Battery indicator	 indicated full,  indicated low
Automatic power-off time	20 minutes
Power source	9V NEDA 1604 IEC 6F22, JIS 006P Battery
Maximum input voltage	600V CAT IV between V and COM 1000V CAT III between V and COM
Maximum floating voltage	600V CAT IV between any terminal and earth ground 1000V CAT III between any terminal and earth ground
V connector	V ~, V  , HZ Ω,  ,  ,  , 
Temperature Coefficient	0.15×(Spec. Accuracy) / °C, <18°C or >28°C
Battery Life	180 hours typical (9V Alkaline Battery, 1604A)

### Measurement Characteristics

Accuracy is ±(% reading + number of digits) at 23°C ± 5°C, less than 80% R.H. Temperature coefficient: 0.15 \* (Specified accuracy)/°C, < 18°C, > 28°C

### (1) DC Voltage

Range	Resolution	61-486 Accuracy	61-484 Accuracy
6.000V	0.001V	±(0.08% reading + 2 digits)	±(0.09% reading + 2 digits)
60.00V	0.01V		
600.0V	0.1V		
1000V	1V		

**Input Impedance:** 10MΩ

**Overload Protection:** AC/DC 1000V.

### (2) AC Voltage

Range	Resolution	61-486 Accuracy (Sine Wave)	61-484 Accuracy (Sine Wave)
6.000V	0.001V	±(0.8% reading + 3 digits)	±(1.0% reading + 3 digits)
60.00V	0.01V		
600.0V	0.1V		
1000V	1V		

**Input Impedance:** 10MΩ // less than 100pF

**Frequency Response:** 50 ~ 1kHz (Sine Wave)

**AC Conversion Type:** RMS sensing, RMS indication

**Additional Accuracy by Crest Factor (C.F.):** Add 1.0% for C.F. 1.4 ~ 2.0.

Add 2.5% for C.F. 2.0 ~ 2.5. Add 4.0% for C.F. 2.5 ~ 3.0.

**Max. Crest Factor:** 1.6 for 6000 ~ 5000 digits

2.0 for 5000 ~ 3000 digits

3.0 for 3000 ~ 0 digits

**Overload Protection:** AC/DC 1000V.

### (3) AC+DC Voltage

Range	Resolution	61-486 Accuracy	61-484 Accuracy
6.000V	0.001V	±(2% reading + 5 digits)	±(2.5% reading + 5 digits)
60.00V	0.01V		
600.0V	0.1V		
1000V	1V		

Additional specifications are same as voltage function.

The AC+DC True RMS value might be over selected range since the AC single on DC level. The meter will display "OL" or change the range while (AC value + DC value) > 6500 counts. **Overload Protection:** AC/DC 1000V.

#### (4) DC mV

Range	Resolution	61-486 Accuracy	61-484 Accuracy
60.00mV	0.01mV	±(0.08% reading + 10 digits)	
600.0mV	0.1mV	±(0.08% reading + 2 digits)	±(0.1% reading + 2 digits)

**Input Impedance:** 10MΩ

**Overload Protection:** AC/DC 1000V.

#### (5) AC mV

Range	Resolution	61-486 Accuracy (Sine Wave)	61-484 Accuracy (Sine Wave)
60.00mV	0.01mV	±(1.2% reading + 5 digits)	
600.0mV	0.1mV	±(1.2% reading + 5 digits)	±(1.5% reading + 5 digits)

**Input Impedance:** 10MΩ // less than 100pF

**Frequency Response:** 50 ~ 1k Hz (Sine Wave)

**AC Conversion Type:** RMS sensing, RMS indication **Additional Accuracy by Crest Factor (C.F.):** Same as ACV.

**Max. Crest Factor:** Same as ACV.

**Overload Protection:** AC/DC 1000V.

#### (6) AC+DC mV

Range	Resolution	61-486 Accuracy	61-484 Accuracy
60.00mV	0.01mV	±(2% reading + 10 digits)	
600.0mV	0.1mV	±(2% reading + 10 digits)	±(2.5% reading + 5 digits)

Additional specifications are same as mV function.

The AC+DC True RMS value might be over selected range since the AC single on DC level. The meter will display "OL" or change the range while (AC value + DC value) > 6500 counts. **Overload Protection:** AC/DC 1000V.

#### (7) Lo-Z Voltage (Auto DC & AC Detection)

Range	Resolution	61-486 Accuracy	61-484 Accuracy
600.0V DC & AC	0.1V	±(0.8% reading + 3 digits)	±(1.0% reading + 3 digits)
1000V DC & AC	1V	±(0.8% reading + 3 digits)	±(1.0% reading + 3 digits)

**Input Impedance:** less than 6kΩ

**AC Frequency Response:** 50 ~ 1kHz (Sine Wave) **AC Conversion Type:** RMS sensing, RMS indication **Additional Accuracy by Crest Factor (C.F.):** Same as ACV. **Max. Crest Factor:** Same as ACV.

**Overload Protection:** AC/DC 1000V.

### (8) DC Current

Range	Resolution	61-486 Accuracy	61-484 Accuracy
6.000A	0.001A	±(0.8% reading + 3 digits)	±(1.0% reading + 3 digits)
10.00A	0.01A		

**Maximum measurement time:** 3 minutes at 10A with at least 20 minutes rest time.

**Overload Protection:** AC/DC 11A.

### (9) AC Current

Range	Resolution	61-486 Accuracy (Sine Wave)	61-484 Accuracy (Sine Wave)
6.000A*	0.001A	±(1.2% reading + 3 digits)	±(1.5% reading + 3 digits)
10.00A	0.01A		

**Frequency Response:** 50 ~ 1kHz (Sine Wave)

**AC Conversion Type:** RMS sensing, RMS indication **Additional Accuracy by Crest Factor (C.F.):** Same as ACV.

**Max. Crest Factor:** Same as ACV.

**Maximum measurement time:** 3 minutes at 10A with at least 20 minutes rest time.

**Overload Protection:** AC/DC 11A.

### (10) AC+DC Current

Range	Resolution	61-486 Accuracy	61-484 Accuracy
6.000A	0.001A	±(2% reading + 5 digits)	±(2.5% reading + 5 digits)
10.00A	0.01A		

Additional specifications are same as Ampere function.

The AC+DC True RMS vale might be over selected range since the AC single on DC level. The meter will display "OL" or change the range while (AC value + DC value) > 6500 counts. **Overload Protection:** AC/DC 11A.

### (11) DC mA

Range	Resolution	61-486 Accuracy	61-484 Accuracy
60.00mA	0.01mA	±(0.8% reading + 3 digits)	±(1.0% reading + 3 digits)
600.0mA	0.1mA		

**Maximum measurement time:** 10 minutes at 600mA with at least 20 minutes rest time.

**Overload Protection:** AC/DC 440mA.



### (12) AC mA

Range	Resolution	61-486 Accuracy (Sine Wave)	61-484 Accuracy (Sine Wave)
60.00mA	0.01mA	±(1.2% reading + 3 digits)	±(1.5% reading + 3 digits)
600.0mA	0.1mA		

**Frequency Response:** 50 ~ 1kHz (Sine Wave)

**AC Conversion Type:** RMS sensing, RMS indication **Additional Accuracy by Crest Factor (C.F.):** Same as ACV.

**Max. Crest Factor:** Same as ACV.

**Maximum measurement time:** 10 minutes at 600mA with at least 20 minutes rest time.

**Overload Protection:** AC/DC 440mA.

### (13) AC+DC mA

Range	Resolution	61-486 Accuracy	61-484 Accuracy
60.00mA	0.01mA	±(2% reading + 5 digits)	±(2.5% reading + 5 digits)
600.0mA	0.1mA		

Additional specifications are same as mA function.

The AC+DC True RMS vale might be over selected range since the AC single on DC level. The meter will display "OL" or change the range while (AC value + DC value) > 6500 counts. **Overload Protection:** AC/DC 440mA.

### (14) Resistance

Range	Resolution	Accuracy
600.0Ω	0.1Ω	±(0.8% reading + 5 digits)
6.000kΩ	0.001kΩ	±(0.8% reading + 2 digits)
60.00kΩ	0.01kΩ	
600.0kΩ	0.1kΩ	
6.000MΩ	0.001MΩ	
40.00MΩ *	0.01MΩ	±(1.0% reading + 5 digits)

\* There is a little rolling less than ±50 digits when measuring > 10.00 MΩ.

**Open Circuit Voltage:** Approx. 2.5V for 600.0Ω & 6.000kΩ range.

Approx. 0.6V for others **Maximum Test Current:** Approx. 0.1mA. **Overload Protection:** AC/DC 1000V.

### (15) Continuity

Range	Resolution	Accuracy
600.0Ω	0.1Ω	±(0.8% reading + 5 digits)

**Open Circuit Voltage:** Approx. 2.5V

**Continuity:** Built-in buzzer sounds when measured resistance is less than 30Ω and sounds off when measured resistance is more than 100Ω, Between 30Ω to 100Ω the buzzer maybe sound or off either.

**Continuity Indicator:** 2.7KHz Tone Buzzer **Response Time of Buzzer:** < 500 μsec. **Overload Protection:** AC/DC 1000V.

#### (16) Diode

Range	Resolution	Accuracy
2.000V	0.001V	±(1.5% reading + 2 digits)

**Open Circuit Voltage:** Approx. 2.5V **Maximum Test Current:** Approx. 0.4mA. **Overload Protection:** AC/DC 1000V.

#### (17) Capacitance

Range	Resolution	Accuracy
1.000μF	0.001μF	±(1.2% reading + 2 digits)
10.00μF	0.01μF	
100.0μF	0.1μF	
1.000mF	0.001mF	
10.00mF	0.01mF	

**Response Time:** < 0.7 sec. for 1nF ~ 1mF

< 3 sec. for 1mF ~ 10mF

**Overload Protection:** AC/DC 1000V

#### (18) Frequency

Range	Resolution	Accuracy
100.00Hz	0.01Hz	±(0.1% reading + 2 digits)
1000.0Hz	0.1Hz	
10.000kHz	0.001kHz	
100.00kHz	0.01kHz	

**Maximum Sensitivity:** 1000V rms or 600mA rms or 10A rms

**Minimum Sensitivity:** > 5.0Vp-p (for ACV 1Hz ~ 10kHz)

> 10.0Vp-p (for ACV 10kHz ~ 100kHz)

> 2mAp-p (for AC mA)

> 0.2Ap-p (for ACA)

**Overload Protection:** AC/DC 1000V or 11A

**(19) Temperature (61-486 Only)**

Range	Resolution	Accuracy
-40.0°C ~ 400.0°C	0.1°C	±(1% reading + 10 digits)
-40.0°F ~ 752.0°F	0.1°F	±(1% reading + 18 digits)

- Does not include accuracy of the thermocouple probe.
- Accuracy specification assumes surrounding temperature stable to ±1 °C. For surrounding temperature changes of ±5 °C, rated accuracy applies after 2 hours.
- Overload Protection: AC/DC 1000V.

**(20) Peak Hold (61-486 Only, for Voltage & Ampere Function)**

- Specified accuracy ± 150 digits.

**(21) Thermocouple (61-486 Only)**

- K Type Class II Thermocouple with standard dual banana jack. **Measurement Range:** -40.0°C ~ 200.0°C (-40.0°F ~ 392.0°F) **Accuracy:** ±2.0°C

**(22) Over-range Indication**

- Display "OL" or "-OL"

**(23) Auto Power Off**

- The meter automatically turns the power off after powering up and no operation for 20 ± 5 minutes. To power up, press any button or dial the rotary switch.

**(24) Measuring Rate:**

- Approximate 3 times/sec.

**(25) Fuse:**

- 11A/600V Fast Action Fuse for A Terminal.
- 440mA/1000V Fast Action Fuse for mA Terminal.

**(26) Battery:**

- 9V Battery

**(27) Low Battery**

- **Voltage: 7.0V ± 0.1V**

**(28) Battery life (ALKALINE):**

- Approx. 26 hours with backlight on. Approx. 180 hours with backlight off.

**(29) Overvoltage Category**

- IEC 61010-1 CAT. III 1000V, CAT. IV 600V

**(30) Operating Temperature**

- -10°C ~ 30°C, ≤80%RH
- 30°C ~ 40°C, ≤75%RH
- 40°C ~ 50°C, ≤45%RH

**(31) Storage Temperature**

- -20°C ~ +60°C, 0 ~ 80%RH (No batteries)

**Physical and Environmental Characteristics**

<b>Characteristics</b>	<b>Description</b>
Dimensions (H×W×D)	48mm×94mm×190mm (with holster)
Weight (with battery)	460g (with battery)
<b>Environmental characteristics</b>	<b>Description</b>
Temperature operating	-10 to +50°C
Non-Operating	-20 to +60°C
Humidity (operating)	<80% R.H.
Altitude Operating	2,000M (6560 ft.)
Non-Operating	12,300M (40354 ft.)
Vibration & shock Operating	Random Vibration per MIL-PRF-28800F Class 2
Indoor Use	Indoor Use

**Certifications and compliances**

Safety	IEC 61010-1 600V CAT I V
Input rating	V / Ω: Category III 1000 Volts
	V / Ω: Category I V 600 Volts
Over voltage category	CAT I : The source of the Low-Voltage installation.
	CAT II: The building installation.
	CAT III: The circuits directly connected to Low-Voltage installation.
	CAT IV: The circuits not connected to mains.
Pollution Degree 2	Do not operate in environments where conductive Pollutants may be present.

EC Declaration of Conformity	Meets the intent of Directive 2004/108/EEC for Electromagnetic Compatibility and Low Voltage Directive 2006/95/EEC for specifications as listed in the official Journal of the European Communities: EN 61326 IEC/EN 61010
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## Required Equipment

Required equipment is listed in Table B. If the recommended models are not available, equipment with equivalent specifications may be used.

Repairs or servicing should be performed only by qualified personnel.

**Table B. Required Equipment**

Equipment	Required Characteristics	Recommended Model
Calibrator	<b>AC Voltage:</b> <b>Range:</b> 0 ~ 1000V AC <b>Accuracy:</b> +/- 0.07% <b>Frequency Range:</b> 40 ~ 100kHz <b>Accuracy:</b> +/- 0.01% <b>DC Voltage</b> <b>Range:</b> 0 ~ 1000V DC <b>Accuracy:</b> +/- 0.006% <b>AC Ampere</b> <b>Range:</b> 0 ~ 10A AC <b>AC mA Accuracy:</b> +/- 0.15% <b>AC A Accuracy:</b> +/- 0.21% <b>Frequency Range:</b> 40 ~ 30kHz <b>Accuracy:</b> +/- 0.01% <b>DC Ampere</b> <b>Range:</b> 0 ~ 10A DC <b>DC mA Accuracy:</b> +/- 0.0175% <b>DC A Accuracy:</b> +/- 0.08% <b>Frequency Source</b> <b>Range:</b> 0.1Hz ~ 4MHz <b>Accuracy:</b> +/- 0.003% <b>Resistance</b> <b>Range:</b> 0Ω ~ 40MΩ <b>Accuracy:</b> +/- 0.02% <b>Capacitance</b> <b>Range:</b> 1nF ~ 10mF <b>Accuracy:</b> +/- 0.5% <b>Temperature</b> <b>Range:</b> 0 ~ 1200 °C <b>Accuracy:</b> +/- 0.2%	Fluke 5500 or Wavetek 9100 Calibrator or equipment

## Basic Maintenance

### Warning

To avoid shock, remove the test leads and any input signals before opening the case or replacing the battery.  
Opening the Meter Case


### Caution

To avoid unintentional shock circuit, always place the uncovered Meter assembly on a protective surface.  
When the case of the Meter is open, circuit connections are exposed.

To open the Meter case, do the following:

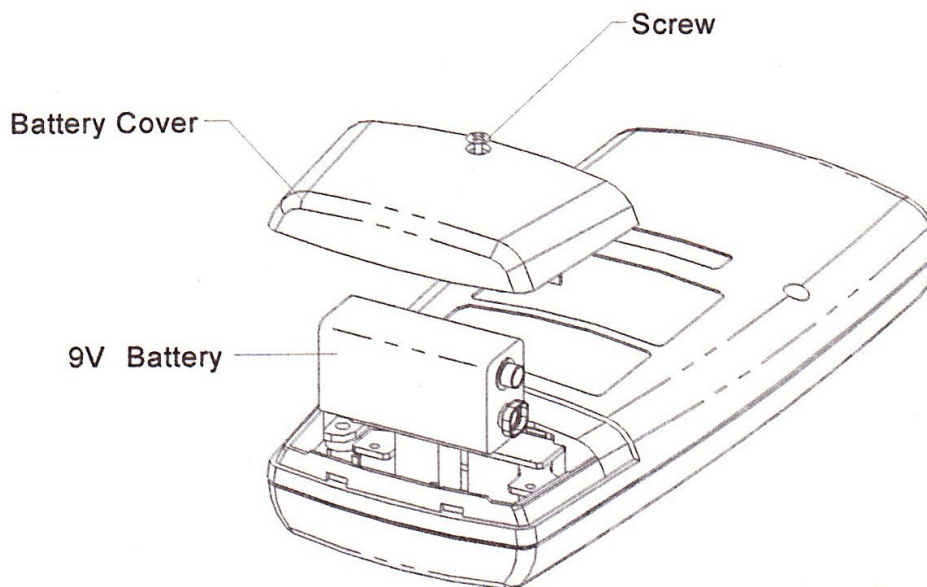
1. Disconnect test leads from any live source, switch off the meter.
2. Remove the back case by using a flat-blade screwdriver to turn the screws counter-clockwise.

## Replacing the Battery

Low battery indication 

The Meter powered by 9V battery.

To replace the battery refer to figure.



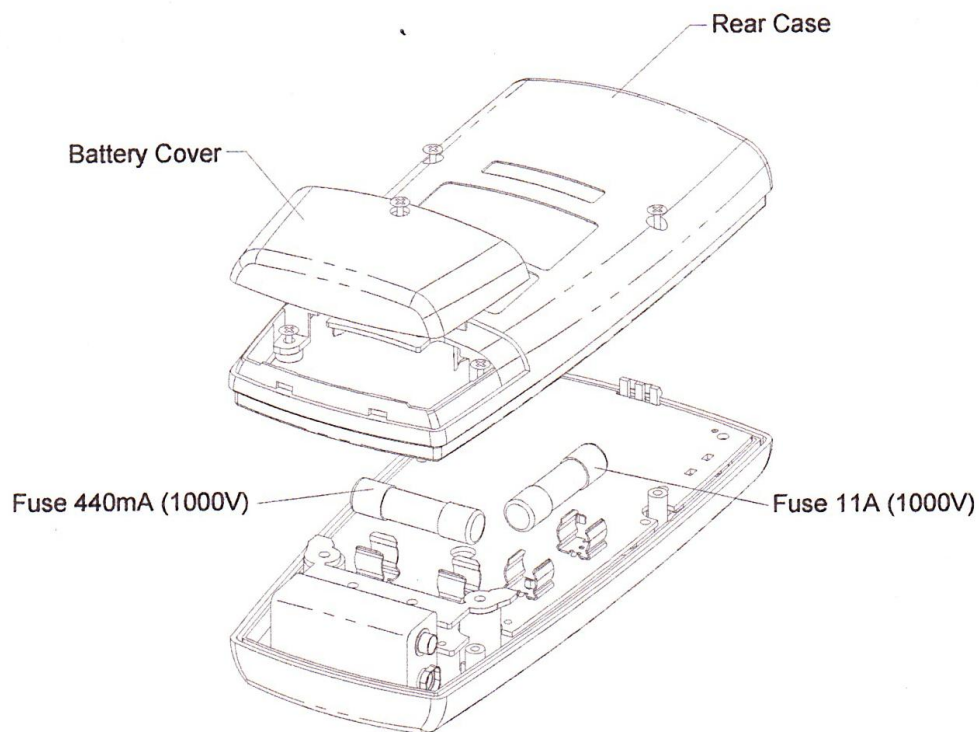
## Testing Fuses

To test the internal fuses of the meter.

1. Turn the rotary switch to the  $\Omega$  position.
2. To test FUSE 71 (Bussmann DMM-B-11A recommended), plug a test lead into V $\Omega$ Hz input terminal, and use the probe to touch the A input terminal. The display should indicate between 0.0 to 0.3 $\Omega$ .
3. To test FUSE 72 (Bussmann DMM-B-44/100 recommended), plug a test lead into V $\Omega$ Hz input terminal, and use the probe to touch the mA input terminal. The display should indicate between 0.0 to 2.5 $\Omega$ .
4. If display reading is higher than the range, replace the fuse.

## Fuse Replacement

Refer to the following figure to replace fuse:



## Performance Tests

The following performance tests verify the complete operability of the Meter and check the accuracy of each Meter function against the Meter's specifications.

Accuracy specifications are valid for a period of one year after calibration, when measured at an operating temperature of 18°C to 28°C and a maximum of 80% relative humidity.

To perform the following tests, it is not necessary to open the case, no adjustments are necessary, merely make the required connections, apply the designated inputs, determine if the reading on the Meter display falls within the acceptable range indicated.

If the Meter fails any of these tests, it needs calibration adjustment or repair.

### Testing the Voltage Function

To verify accuracy in the AC and DC voltage ranges, do the following:

1. Turn on the meter, and turn the rotary switch to the correct position.
2. Connect the Calibrator to the **VΩ** and **COM** inputs on the Meter.
3. Set the Calibrator for the voltage and frequency from step 1 to 20 in Table 1.
4. Compare the reading on the Meter display with the reading shown in Table 1.
5. If the display reading falls outside of the range shown in Table 1, the Meter does not meet specification.

**Table 1 Voltage Test:**

Step	Input	Frequency	Reading
1	5.000V AC	50Hz	4.957V ~ 5.043V
2	5.000V AC	1000Hz	4.957V ~ 5.043V
3	50.00V AC	50Hz	49.57V ~ 50.43V
4	50.00V AC	1000Hz	49.57V ~ 50.43V
5	500.0V AC	50Hz	495.7V ~ 504.3V
6	500.0V AC	1000Hz	495.7V ~ 504.3V
7	900.0V AC	50Hz	890V ~ 910V
8	900.0V AC	1000Hz	890V ~ 910V
9	5.000V DC		4.994V ~ 5.006V
10	50.00V DC		49.94V ~ 50.06V
11	500.0V DC		499.4V ~ 500.6V
12	900V DC		897V ~ 903V
13	50.00mV AC	50Hz	49.35mV ~ 50.65mV



Step	Input	Frequency	Reading
14	50.00mV AC	1000Hz	49.35mV ~ 50.65mV
15	500.0mV AC	50Hz	493.5mV ~ 506.5mV
16	500.0mV AC	1000Hz	493.5mV ~ 506.5mV
17	50.00mV DC		49.86mV ~ 50.14mV
20	500.0mV DC		499.4mV ~ 500.6mV

### Testing the Resistance Function

To verify accuracy in the resistance function, do the following:

1. Turn on the meter, and turn the rotary switch to  $\Omega$  position.
2. Connect the Calibrator to the **V $\Omega$**  and **COM** inputs on the Meter.
3. Set the Calibrator for the voltage and frequency from step 1 to 6 in Table 2.
4. Compare the reading on the Meter display with the reading shown in Table 2.
5. If the display reading falls outside of the range shown in Table 2, the Meter does not meet specification.

**Table 2 Resistance Test:**

Step	Input	Reading
1	500.0 $\Omega$	495.5 $\Omega$ ~ 504.5 $\Omega$
2	5.000K $\Omega$	4.958K $\Omega$ ~ 5.042K $\Omega$
3	50.00K $\Omega$	49.58K $\Omega$ ~ 50.42K $\Omega$
4	500.0K $\Omega$	495.8K $\Omega$ ~ 504.2K $\Omega$
5	5.000M $\Omega$	4.958M $\Omega$ ~ 5.042M $\Omega$
6	36.00M $\Omega$	35.59M $\Omega$ ~ 36.41M $\Omega$

### Testing the Capacitance Function

To verify accuracy in the AC and DC capacitance function, do the following:

1. Turn on the meter, and turn the rotary switch to the capacitance position.
2. Connect the Calibrator to the **V $\Omega$**  and **COM** inputs on the Meter.
3. Set the Calibrator for the voltage and frequency from step 1 to 5 in Table 3.
4. Compare the reading on the Meter display with the reading shown in Table 3.
5. If the display reading falls outside of the range shown in Table 3, the Meter does not meet specification.

**Table 3 Capacitance Test:**

Step	Input	Reading
1	0.900 $\mu$ F	0.887 $\mu$ F ~ 0.913 $\mu$ F
2	9.00 $\mu$ F	8.87 $\mu$ F ~ 9.13 $\mu$ F
3	90.0 $\mu$ F	88.7 $\mu$ F ~ 91.3 $\mu$ F
4	0.900mF	0.887mF ~ 0.913mF
5	9.00mF	8.87mF ~ 9.13mF

### Testing the Diode Function

To verify accuracy in the AC and DC capacitance function, do the following:

1. Turn on the meter, and turn the rotary switch to  $\mu$ F position.
2. Connect the Calibrator to the **V $\Omega$**  and **COM** inputs on the Meter.
3. Set the Calibrator for the voltage from step 1 in Table 4.
4. Compare the reading on the Meter display with the display reading shown in Table 4.
5. Connect a silicon diode to the **V $\Omega$**  and **COM** inputs on the Meter.
6. Compare the reading on the Meter display with the display reading shown in Table 4.
7. If the display reading falls outside of the range shown in Table 4, the Meter does not meet specification.

**Table 4 Diode Test:**

Step	Input	Reading
1	1.800V	1.771V ~ 1.829V
2	Silicon Diode	0.450V ~ 0.650V

### Testing the mA Function

To verify accuracy in the AC and DC mA ranges, do the following:

1. Turn on the meter, and turn the rotary switch to the correct position.
2. Connect the Calibrator to the **mA** and **COM** inputs on the Meter.
3. Set the Calibrator for the voltage and frequency from step 1 to 6 in Table 5.
4. Compare the reading on the Meter display with the reading shown in Table 5.
5. If the display reading falls outside of the range shown in Table 5, the Meter does not meet specification.

**Table 5 mA Test:**

Step	Input	Frequency	Reading
1	50.00mA AC	50Hz	49.37mA ~ 50.63mA
2	50.00mA AC	1000Hz	49.37mA ~ 50.63mA
3	500.0mA AC	50Hz	493.7mA ~ 506.3mA
4	500.0mA AC	1000Hz	493.7mA ~ 506.3mA
5	50.00mA DC		49.57mA ~ 50.43mA
6	500.0mA DC		495.7mA ~ 504.3mA

### Testing the Ampere Function

To verify accuracy in the AC and DC ampere ranges, do the following:

1. Turn on the meter, and turn the rotary switch to the correct position.
2. Connect the Calibrator to the **A** and **COM** inputs on the Meter.
3. Set the Calibrator for the voltage and frequency from step 1 to 20 in Table 6.
4. Compare the reading on the Meter display with the reading shown in Table 6.
5. If the display reading falls outside of the range shown in Table 6, the Meter does not meet specification.
6. Table 6 Ampere Test:

Step	Input	Frequency	Reading
1	5.000A AC	50Hz	4.937A ~ 5.063A
2	5.000A AC	1000Hz	4.937A ~ 5.063A
3	9.00A AC	50Hz	8.86A ~ 9.14A
4	9.00A AC	1000Hz	8.86A ~ 9.14A
5	5.000A DC		4.957A ~ 5.043A
6	9.00A DC		8.90A ~ 9.10A

### Testing the Temperature Function

To verify accuracy in the temperature function, do the following:

1. Turn on the meter, and turn the rotary switch to the temperature position.
2. Connect the Calibrator to the **VΩ** and **COM** inputs on the Meter.
3. Set the Calibrator for the temperature from step 1 to 5 in Table 7.
4. Compare the reading on the Meter display with the reading shown in Table 7.
5. If the display reading falls outside of the range shown in Table 7, the Meter does not meet specification.

**Table 7 Temperature Test:**

<b>Step</b>	<b>Input</b>	<b>Reading</b>
1	-40.0°F	-37.8°F ~ -42.2°F
2	0.0°F	-1.8°F ~ 1.8°F
3	32.0°F	29.9°F ~ 34.1°F
4	350.0°F	344.7°F ~ 355.3°F
5	700.0°F	691.2°F ~ 708.8°F

# Calibration

## Environmental Conditions

Perform calibration at an ambient temperature and relative humidity ( $23^{\circ}\text{C}\pm 2^{\circ}\text{C}$  and  $\text{R.H.}\leq 80\%$ ). Allow the instrument to sit at this temperature for at least 30 minutes.

The Operation of Calibration Procedure Mode

## Activate Calibration Procedure Mode

Press “**Hold**” button while powering up, then press buttons in the following sequence to activate the calibration procedure mode

Range → Backlight → VoltSense → Hold → Blue → Min Max

. (The “Auto” segment will flash while you are in calibration mode. )

## Deactivate Calibration Procedure Mode

Turn the meter off to deactivate calibration procedure mode.

## Set Meter Model mode (61-484 and 61-486 61-486 / 61-484)

After Activate Calibration Procedure Mode, Press the “Min Max” button to select the meter model.

## Standard Function Calibration (Voltage, Ampere, Resistance, Diode, Capacitance)

- Dial the rotary switch and press the “**Blue**” button to select the measurement mode.
- Press the “**Range**” button to select the range which will be calibrated.
- Apply the standard signal indicated in the Calibration Adjustment Point Table to the suitable input terminals.
- Once LCD display to stable, Press the “**Hold**” button to confirm the reading.
- ***If the reading is not within a 10% tolerance of the correct reading when pressing the “Hold” button, the LCD will display “Err”. Press “Hold” button to exit. Meter will need to be returned for repair.***

## Temperature Calibration

- Connect the temperature calibrator to the meter and wait for at 30 minutes
- Apply the standard voltage indicated in the Calibration Adjustment Point Table to the input terminals.
- Once the LCD display is stable, Press the “Hold” button to confirm reading.
- ***If the reading is not within a 10% tolerance of the correct reading when pressing the “Hold” button, the LCD will display “Err”. Press “Hold” button to exit. Meter will need to be returned for repair.***

## Calibration Adjustment Point

**AC and DC Volts Table**

Function	Range	Standard Value	61-486	61-484
DC mV	60.00mV	30.00mV	0	
		55.00mV	0	
	600.0mV	300.0mV	0	0
		550.0mV	0	0
DCV	6.000V	3.000V	0	0
		5.500V	0	0
	60.00V	30.00V	0	0
		55.00V	0	0
	600.0V	300.0V	0	0
		550.0V	0	0
	1000V	950V	0	0
	AC mV	60.00mV	2.00mV, 50Hz	0
10.00mV, 50Hz			0	
55.00mV, 50Hz			0	
600.0mV		20.0mV, 50Hz	0	0
		100.0mV, 50Hz	0	0
		550.0mV, 50Hz	0	0
ACV	6.000V	0.200V, 60Hz	0	0
		1.000V, 60Hz	0	0
		5.000V, 60Hz	0	0
	60.00V	2.00V, 60Hz	0	0
		10.00V, 60Hz	0	0
		50.00V, 60Hz	0	0
	600.0V	20.0V, 60Hz	0	0
		100.0V, 60Hz	0	0
		500.0V, 60Hz	0	0
	1000V	200V, 60Hz	0	0
		500V, 60Hz	0	0
		950V, 60Hz	0	0

### Resistance, Capacitance, Diode, AC & DC Current, Temperature Table

Function	Range	Standard Value	61-486	61-484
Resistor	600.0Ω	500.0Ω	0	0
	6.000kΩ	5.000kΩ	0	0
	60.00kΩ	50.00kΩ	0	0
	600.0kΩ	500.0kΩ	0	0
	6.000MΩ	5.000MΩ	0	0
	40.00MΩ	38.00MΩ	0	0
Capacitor	1.000μF	0.370μF	0	0
	10.00μF	3.70μF	0	0
	100.0μF	37.0μF	0	0
	1.000mF	0.360mF	0	0
	10.00mF	3.60mF	0	0
Diode	2.000V	1.800V	0	0
DC mA	60.00mA	30.00mA	0	0
		55.00mA	0	0
	600.0mA	300.0mA	0	0
		450.0mA	0	0
AC mA	60.00mA	2.00mA, 60Hz	0	0
		10.00mA, 60Hz	0	0
		50.00mA, 60Hz	0	0
	600.0mA	20.0mA, 60Hz	0	0
		100.0mA, 60Hz	0	0
		500.0mA, 60Hz	0	0
DCA	6.000A	3.000A	0	0
		5.500A	0	0
	10.00A	9.500A	0	0
ACA	6.000A	0.200A, 500Hz	0	0
		1.000A, 500Hz	0	0
		5.000A, 500Hz	0	0
	10.00A	2.00A, 60Hz	0	0
		5.00A, 60Hz	0	0
		9.50A, 60Hz	0	0
Temperature	752.0°F	12.209mV	0	
		32.0°F	0	

