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PRODUCTS AVAILABLE FROM EDTM, INC.

GLASS & AIR SPACE LASER METERS, SOLAR, TINT, & UV METERS
LOW-E DETECTORS, 4 POINT SHEET RESISTANCE METERS, TIN SIDE DETECTORS
SELF-CLEAN COATING DETECTORS, SOLAR GAIN LOW E METERS
INSPECTION EQUIPMENT, SALES KIT ACCESSORIES
CONVENIENT CARRY CASES

AE4600 WARRANTY

The manufacturer warrants all models of the AE4600 to be free from defects in material and workmanship under normal use and service as specified within the operator's manual. The manufacturer shall repair or replace the unit within six (6) months from the original date of shipment after the unit is returned to the manufacturer's factory, prepaid by the user, and the unit is disclosed to the manufacturer's satisfaction, to be thus defective. This warranty shall not apply to any unit that has been repaired or altered other than by the manufacturer. The aforementioned provisions do not extend the original warranty period of the unit which has been repaired or replaced by the manufacturer. Batteries are not covered by warranty.

EDTM, Inc. assumes no liability for the consequential damages of any kind through the use or misuse of the AE4600 product by the purchaser or others. No other obligations or liabilities are expressed or implied. All damage or liability claims will be limited to an amount equal to the sale price of the AE4600, as established by EDTM, Inc.

"THE ENERGY MANAGER FOR WINDOWS"

SOLAR GAIN LOW E COATING DETECTOR

(For Residential Windows)

MODEL #AE4600

Patented

The DIGITAL Solar Gain Low E Detector simultaneously identifies the location of low e coatings on residential windows and also identifies the solar gain performance category of the coating. The three solar gain performance categories (HIGH, MEDIUM, and LOW SOLAR GAIN) are based on the Solar Heat Gain Coefficient (SHGC) value for the window. The three ranges approximate the designations of the Energy Star Rating Program developed by the Department of Energy (DOE) and the Environmental Protection Agency (EPA).

The meter simultaneously uses a patented technology to identify the location of the coating on the windows and a patent pending technology to identify the solar gain performance. The solar gain performance technology uses a reflection principle to identify the solar gain category the window belongs to. Because the technology uses a reflectance principle to calculate the performance type, the meter will not measure coatings that absorb large amounts of solar energy (as opposed to reflecting energy). Therefore the meter can NOT be used for tinted glass or tinted coatings. The glass must be comprised of a clear substrate and the low e coating must be transparent. This represents the most common window produced for the residential market.



FEATURES:

- IDENTIFY HIGH PERFORMANCE "SPECTRAL SELECTIVE" COATINGS
- FIND LOCATION OF LOW E COATINGS IN SEALED WINDOWS
- ESTIMATE APPROXIMATE SHGC VALUE OF WINDOWS
- IDENTIFY TYPES OF LOW E COATINGS
- PERFECT ASSISTANT FOR BUILDING CODE INSPECTORS
- DIFFERENTIATE HARD COAT FROM SOFT COAT LOW E
- GREAT FOR FIELD OR FACTORY USE
- SMALL, PORTABLE CONVENIENT SIZE

THIS PRODUCT MANUFACTURED IN THE USA BY ©EDTM

See back page for additional products and information.

HELPFUL TIPS FOR CONDUCTING MEASUREMENTS

The AE4600 has been calibrated to measure single pieces of glass OR sealed IG windows constructed of 3/32" or 1/8" glass. The glass substrate and/or coating must be transparent. The residential window cannot be tinted, bronzed or reflective.

WHENEVER POSSIBLE, CONDUCT YOUR MEASUREMENTS FROM THE SIDE OF THE WINDOW THAT CONTAINS THE LOW E PANE OF GLASS. This will result in the most accurate results.

To conduct a measurement, hold the meter flat against the glass and push the power button. You must hold the power button down during the entire measurement. Releasing the push-button will cause the meter to shut off. Hold the meter stationary during the entire measurement. Moving the meter during the test will cause inaccurate measurements to occur.

Your hand should be positioned comfortably on the meter itself. NO portion of your hand should come in contact with the glass while taking your measurement. ALSO, do NOT place your hand on the opposite side of the window while taking a measurement. Please see the picture below for proper orientation of your hand during measurements. Do NOT apply excessive force to the push-button switch while holding it in position. Excessive force could cause the entire enclosure to flex inward, possibly affecting the accuracy of your results. This could also cause permanent damage to the calibration of the meter.



Inspect the window you are measuring. If the window is bowing outward or inward, it will cause the meter to rock on the glass. Move to another location on the glass where the meter does not rock. When possible, it is best to position the meter near the center of the glass to avoid any fringing effects from the edges or frame.

Also inspect your window for cleanliness before conducting measurements. The AE4600 uses optical, as well as electrical techniques to conduct its calculations. Both of these techniques can be adversely affected by dirt on the glass. Please clean the glass you are testing or move to a location on the glass that appears to be the cleanest.

The glass or window being tested should be in free air (not resting on a surface). DO NOT place the glass or window on a table top surface when conducting measurements. This may adversely affect the results of your reading. If the glass is sitting on a tabletop, pull the glass off the edge of the table surface so the glass is hanging over the edge. This will provide the free air space behind the glass that is necessary to conduct accurate measurements.

If the window you are testing contains muntin bars, position the meter so the muntin bars are NOT directly behind the meter. This will adversely affect the measurement. The entire meter must be able to fit into an area where there will be nothing except glass behind the meter.

BATTERY REPLACEMENT

The AE4600 is powered by a 9 volt alkaline battery. When the battery voltage is getting too low to operate the meter, the display will flash "LOW BATTERY" on the bottom line of the display. This is a warning that you will want to replace the alkaline battery soon.

Once the battery voltage has become too low to operate the meter, the display will read "REPLACE BATTERY". At this point the meter will no longer take measurements. Remove the old battery and replace it with a new 9 volt battery (ALKALINE ONLY).

MAINTENANCE TIPS

The most important maintenance detail relating to the AE4600 meter is the cleanliness of the sensor area on the back side of the meter. There is a circular lens located in the upper left-hand corner on the back side of the meter. This lens MUST be kept clean to guarantee proper operation of the meter. If the lens is dirty, it can adversely affect the accuracy of your measurements. Use compressed air or a lint-free cloth to clean the lens. Routinely inspect the lens to confirm it is kept clean.

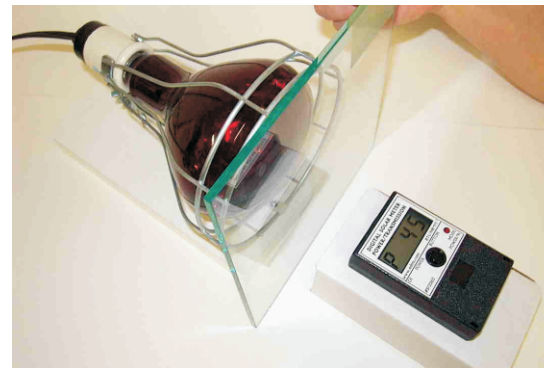
Do not apply labels or drill holes through the back enclosure of the meter. This can affect the calibration of the meter and WILL void the warranty of the product.

DO NOT adjust the screws which hold the enclosure together. Also DO NOT open the enclosure. This will affect the calibration of the product as well, and void the warranty.

MEASURING COATINGS THAT ARE NOT TRANSPARENT

As described throughout this operating manual, the AE4600 meter was designed to measure glass with low e coatings that are transparent (i.e. not tinted, reflective, bronzed etc...). If you are working with coatings or glass that are NOT transparent, EDTM, Inc. DOES offer a product that can assist in identifying the solar gain properties of less transparent coatings.

For windows that are not transparent, the glass and coating absorb a portion of the solar energy. Because of this, a reflective measurement is not appropriate. Therefore it is necessary to measure these samples with a solar transmission technique. EDTM offers the SP2065 Solar Transmission Meter. This meter is designed to allow users to test windows in the field or factory. The solar transmission value of a window near its center, is nearly identical to the (center-of-glass) SHGC value. Therefore, the SP2065 meter can be used to approximate the SHGC value of windows. The SP2065 can be used for ALL types of glass or windows, regardless of thickness or coating type. Some examples of TINTED low e products that should be tested with the SP2065 meter include Pilkington's Solar E and Cardinal's LoE Sun - 145.



MEASURING SOLAR GAIN

The AE4600 is calibrated to test residential windows only. Therefore the lites of glass must be 3/32" or 1/8" thick. For the SOLAR GAIN measurement, the AE4600 has been optimized to measure residential windows with 1/2" air space. If your windows are constructed with approximately 1/2" air space, you can measure the Solar Gain value of the window from a single side. However, if the air space is closer to 3/8", you must take the Solar Gain measurement on the side of the window that contains the low e pane of glass. In northern climates, you will most often find the low e coating on surface 3 (counting from the outside surface in). In southern climates, it is common to find the low e coating on surface 2. **IF YOU ARE UNSURE OF THE AIR SPACE THICKNESS OF YOUR WINDOW, ALWAYS TAKE YOUR READING FROM THE SIDE OF THE WINDOW THAT CONTAINS THE LOW E PANE OF GLASS. THIS WILL RESULT IN THE MOST ACCURATE SOLAR GAIN MEASUREMENTS EVERY TIME.**

To conduct Solar Gain measurements, follow the same directions as shown on Page 2 and 3. Place the meter on the glass and push and hold the power button. The resulting Solar Gain value of the window (High, Medium, or Low) will be displayed on the top line of the display. If the window has NO low e coatings, the meter will indicate "CLEAR GLASS" on the display, and will not indicate a Solar Gain value. It is assumed that if there is no low e coating on the window, it must be a HIGH Solar Gain window.

SOLAR GAIN CATEGORIES FOR VARIOUS LOW E PRODUCTS

Below is a listing of various low e products from a variety of manufacturers for the residential market. These low e coatings have been tested by the AE4600 meter and are considered to be typical transparent low e coatings (not reflective or tinted, etc.). These low e coatings have been grouped into one of the three solar gain categories. By utilizing this list, you will be able to identify various low e coatings from a given manufacturer. If you know who the manufacturer of your low e glass is, in many cases you can use the AE4600 (and the list below) to identify which low e product you are working with, by identifying the solar gain value of the window.

The solar gain category list below is only a partial list that was available at the time the AE4600 meter was introduced. Other low e coatings may be available that can be measured accurately by the AE4600 meter. As new low e coatings are introduced, we will attempt to continually update this list.

HIGH SOLAR GAIN LOW E PRODUCTS

Pyrolytic (hard coat)

{ Pilkington Energy Advantage
PPG Sungate 300
PPG Sungate 500
AFG Comfort E2

MEDIUM SOLAR GAIN LOW E PRODUCTS

Sputter Coat (soft coat)

{ Cardinal Lo E 178
PPG Sungate 100
AFG Titanium - PS
Guardian Performance Plus
AFG Titanium - R

LOW SOLAR GAIN LOW E PRODUCTS

Spectrally Selective
Sputter Coat (soft coat)

{ Cardinal Lo E² 171/172
Guardian Performance Plus II
AFG Titanium - AC
PPG Solarban 60
PPG Solarban 55

HELPFUL TIPS (continued)

If the window you are testing contains muntin bars, position the meter so the muntin bars are NOT directly behind the meter. This will adversely affect the measurement. The entire meter must be able to fit into an area where there will be nothing except glass behind the meter.

The AE4600 meter is designed to operate in most all environments. Do not place extremely bright light sources behind the meter when taking measurements. This could affect the accuracy of your reading. The meter should be capable of working in all daylight conditions. If direct sunlight is too intense, the meter will show an error message on the screen: "EXCESSIVE LIGHT". If this condition occurs, move your measurement to another location where the sun is less intense. If you are testing an installed window in the field, simply move to the other side of the window, or block the direct sunlight from hitting the back side of the meter.

MEASURING LOW E COATING LOCATION

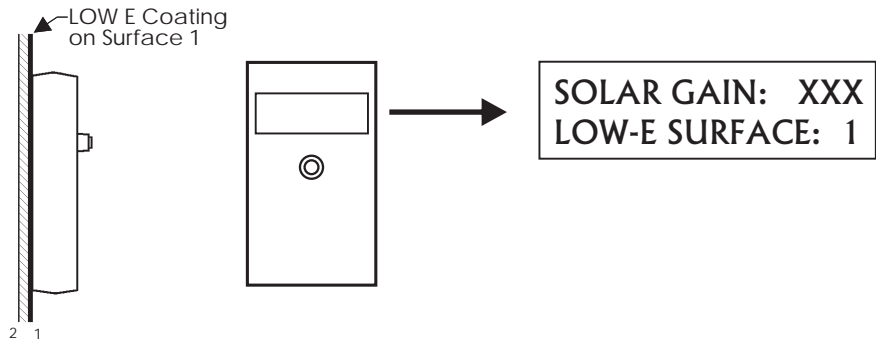
The AE4600 will indicate the location of any low e coatings within a sealed insulating glass (IG) window. The meter is calibrated to test residential windows only, therefore the lites of glass must be 3/32" or 1/8" thick. The allowable air space is 1/2". (If your window has an air space greater than 1/2", you may have to test both sides of the window to obtain an accurate measurement). However, if you are working with windows that contain a soft coat (sputter) low e coating, the LOW E LOCATION measurement will be valid for air spaces up to 3/4". Place the meter against the window as shown. The meter will indicate the presence of any low e coatings by indicating which surface contains the coating. If the window has NO low e coatings, the meter will indicate "CLEAR GLASS" on the display. Page 4 illustrates the various low e readings that can occur.



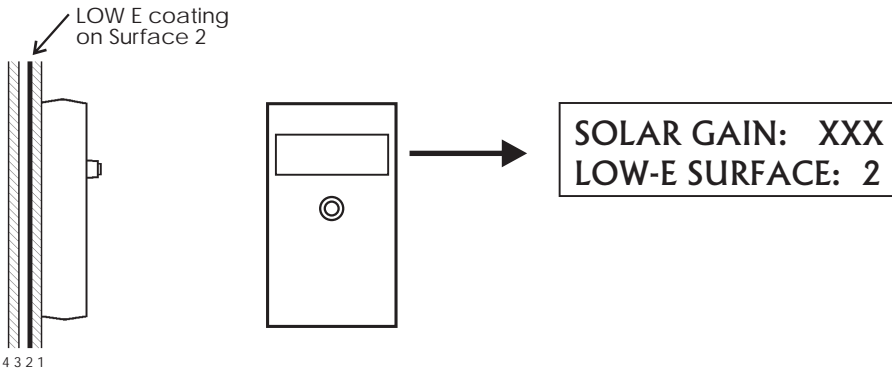
The meter counts surfaces of glass to indicate where the low e coating is located. The surface the meter is touching is ALWAYS Surface 1. The next surface is Surface 2, and so on. If there is a low e coating on the far lite of glass, it is assumed that the coating is located on surface 3. The AE4600 meter cannot differentiate the difference between a coating on surface 3 versus surface 4. Therefore if there is a low e coating on the far surface, the meter will display the message: "LOW E SURF: 3 or 4". If you want to confirm the low e coating is not on surface 4, move to the other side of the window and take a measurement. Testing the other side of the window, surface 4 now becomes surface 1 and the meter will indicate which surface contains the low e coating: surface 1 or surface 2.

In the unlikely event there is more than 1 low e coating in the window, the AE4600 will identify the first low e coating it encounters (closest surface).

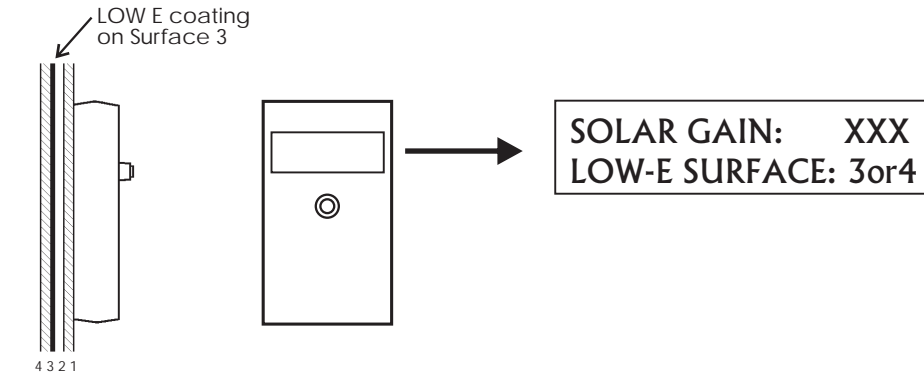
LOW E ON SURFACE 1: (CONTACTING COATING)



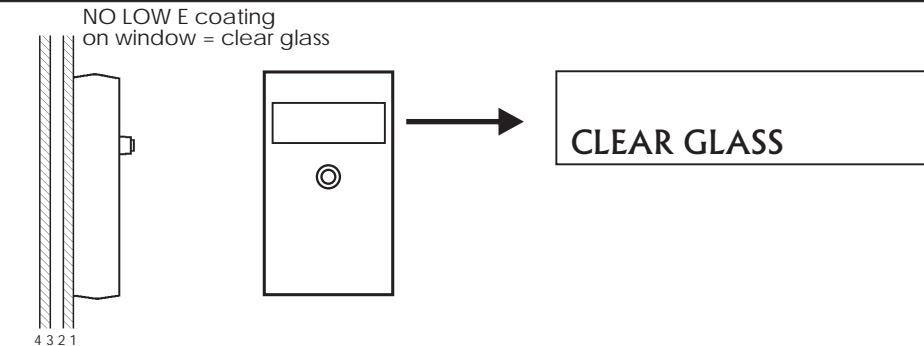
LOW E ON SURFACE 2



LOW E ON SURFACE 3



CLEAR GLASS: (NO LOW E COATING)

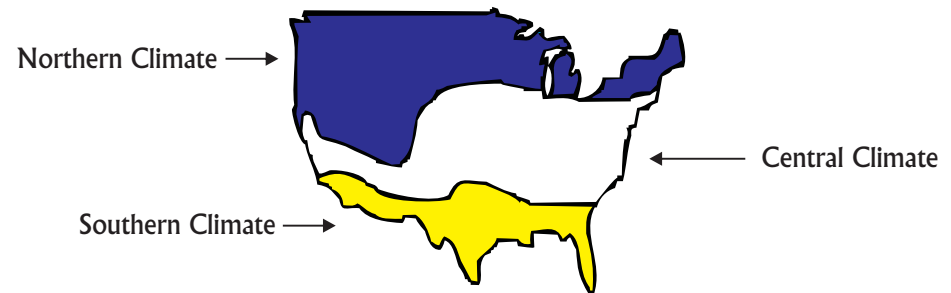


DESCRIPTION OF SOLAR GAIN VALUE

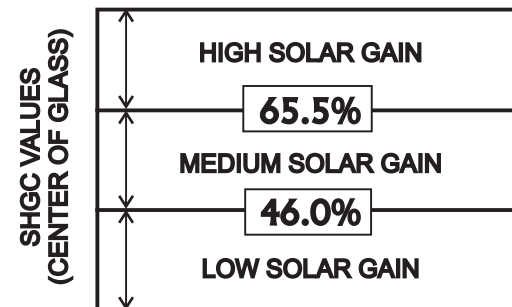
The AE4600 is capable of approximating the (center-of-glass) Solar Heat Gain Coefficient (SHGC) value of residential windows constructed of 3/32" or 1/8" glass. The meter can test single lites of glass as well as sealed IG windows. The glass substrate and/or coating must be transparent. The window cannot be tinted, bronzed or reflective. The AE4600 uses a combination of reflection technology coupled with electrical properties of the glass & coating to calculate the approximate SHGC (center-of-glass) value.

The AE4600 approximates the SHGC of the window by grouping the solar performance of the low e coating products into one of three SOLAR GAIN categories: HIGH, MEDIUM, or LOW Solar Gain. High Solar Gain products are ideal for northern climates where heating costs are the primary concern. It is preferred to allow high amounts of solar energy to pass through the windows (high solar gain) in the winter months to offset the cost of heating a home. Pyrolytic (hard coat) low e coatings fall into this category. Low Solar Gain products (also known as SPECTRAL SELECTIVE COATINGS) are ideal for southern climates where cooling costs are the primary issue. Southern climates prefer a window that blocks as much solar energy as possible, helping to reduce the cooling cost year-round. Medium Solar Gain products are useful for the central portion of the country, where heating and cooling costs are relatively equal.

The Energy Star Rating Program offers a procedure for qualifying performance criteria of windows from various manufacturers. To earn the Energy Star designation, the window manufacturer must have their windows approved by the NFRC. The Energy Star program breaks the country into three distinct climate zones, as shown below.



The AE4600 meter uses the approximate SHGC value of the window to group the product into one of the three Solar Gain categories. The approximate SHGC boundary values for the three Solar Gain categories (as established by EDTM, Inc.) are as follows:



TROUBLE-SHOOTING GUIDE

The AE4600 meter will display error messages for various operating conditions. Some of these errors can be easily corrected in the field and allow you to continue taking readings. However some of the errors may be the result of damage to the meter or an internal malfunction. If the error message persists after performing our recommended corrective action, please contact our customer service department. Various error messages and the corresponding corrective action for each error are detailed below.

ERROR MESSAGE:

"EXCESSIVE LIGHT"

The back side of the meter is being exposed to a light source (sun or artificial) that is too bright. The light is causing errors to occur in the measurement.

CORRECTIVE ACTION:

1. Attempt to block the source of the bright light. If the light is coming from behind you, cup your hand over the right edge of the meter while you are taking the reading. If the light source is on the other side of the window you are testing, move to another location or block the light source.
2. Pointing the AE4600 directly into the sun may result in an "excessive light" condition. If possible, shift your glass sample so the meter is at an angle of approximately 15 to 20 degrees or more away from the sun.

"TEMPERATURE OUT OF RANGE: ###F"

The AE4600 meter is equipped with an internal temperature sensor. If the electronics of the meter reach a temperature that is outside the operating temperature range of the meter (+35 to +110 degrees Fahrenheit), the AE4600 meter will NOT display a reading. The temperature error message will appear and also indicate the current temperature of the electronics in the meter. Leaving your meter in your parked car will cause the electronics to reach extreme temperatures.

FOR COLD TEMPERATURES:

1. Take your meter to a warmer environment (indoors). Periodically test your meter to monitor the temperature of your electronics. The error message and current temperature will continue to show on the display until the temperature of the electronics has reached +35 Degrees Fahrenheit.
2. To avoid this situation in the future, keep the meter in a warmer environment until you are ready to take the readings. During winter months, DO NOT leave your meter stored in your parked vehicle. Store your meter indoors and carry the meter with you to your job site.

FOR HOT TEMPERATURES:

1. Take your meter to a cooler environment (indoors). Periodically test your meter to monitor the temperature of your electronics. The error message and current temperature will continue to show on the display until the temperature of the electronics has dropped below 110 Degrees Fahrenheit.
2. To avoid this situation in the future, keep the meter in a cooler environment until you are ready to take readings. During summer months, or in warmer climates, DO NOT store your meter in your parked vehicle. Temperatures inside parked vehicles can reach ridiculous levels and may cause permanent damage to your meter. Store your meter indoors and carry the meter with you to your job site.

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TROUBLE-SHOOTING GUIDE -CONTINUED

ERROR MESSAGE:

"REFLECTION LOW - EXCESSIVE LIGHT"

This is an internal ambient light condition that can be caused by external bright light sources (sun or extremely bright lights). This is a protective feature guarding the calibration of the meter.

"INTREFL -LOW REPUSHBUTTON " OR

"INTREFL -HIGH REPUSHBUTTON"

This is an internal safeguard to protect the calibration of the AE4600 meter. This is not normally affected by external conditions surrounding the meter. However severe physical abuse of the meter could also result in this error condition.

"MEMORY ERROR"

This is an internal safeguard regulating the correct understanding of the memory of the electronics. Severe damage or physical abuse of the meter could cause this condition to occur.

"LOW BATTERY"

The LOW BATTERY warning will appear on the display when the battery voltage is getting low. You should be able to obtain a couple more readings before the battery is totally dead. However you should replace the battery soon.

"REPLACE BATTERY"

The battery is now dead. The meter will not take any additional readings until the battery is replaced.

CORRECTIVE ACTION:

1. Attempt to block the source of the bright light. If the light is coming from behind you, cup your hand over the right edge of the meter while taking your reading. If the light source is on the other side of the window, move to another location or block the light source if possible.
2. Move your meter to a different location on the window and take another reading. If the condition persists, move to another window and attempt to take a reading. If the error message continues to appear, contact our customer service department.

1. Move your meter to a different location on the window and take another reading. If the condition persists, move to another window and attempt to take a reading. If the error message continues to appear, contact our customer service department. It may be necessary to return the meter to our factory for repair or recalibration.

1. Try taking a new set of readings. Release the power button and push it again. If the error message continues to appear, contact our customer service department. It may be necessary to return the meter to our factory for repair or recalibration.

1. Replace the 9 volt alkaline battery soon.

1. Replace the 9 volt alkaline battery immediately.

SPECIFICATIONS

<u>--POWER SOURCE:</u>	9 volt alkaline battery (NEDA 1604A) only
<u>--PHYSICAL DIMENSIONS:</u>	3.5" x 5.5" x 1.25"
<u>--OPERATING TEMPERATURE:</u>	+35 to +110 degrees Fahrenheit
<u>--STORAGE TEMPERATURE:</u>	0 to +125 degrees Fahrenheit

TROUBLE-SHOOTING GUIDE -CONTINUED

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