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How to use multimeter free download

If the circuit to be tested is AC but the meter will only measure DC amps (or vice versa), stop. Most multimeters have several jacks used for this purpose.[3] One is usually labeled "COM" or (-), which stands for for common. The scale of resistance has been changed so that each number on the R scale can be read directly. With this understanding, study the R scale. These are values of current that flow only in the most delicate electronic circuits, and are literally thousands (and even millions) of times smaller than values seen in the home and automotive circuits that most homeowners would be interested testing. Set the meter to the highest R x value possible and zero the meter. The maximum value scale should coincide with selector knob ranges. 3 Locate the voltage scales. The + and symbols represent the polarity of probes when set for and testing DC volts. It should be possible to let go of the black probe, as the contacts behind the face of the outlet should grip the probe, much like it does when a plug is inserted. Had the R x 10 scale been selected, 150 would have been 1,500. The only thing you can't test that you'd reasonably want to know is the wattage. Trying to read 5 ohms on the meter while in the R x 100 range would look like 0. It describes the basic parts and functions of a multimeter, including how to measure voltage, current, resistance, and check continuity. When multimeter measures resistance in ohms, it can not measure continuity because resistance and continuity are opposites. Most modern meters have digital readouts. An ammeter is placed in series with the circuit to measure current. Advertisement 1 Set the meter for the highest range provided for AC Volts. This instrument will let you check to see if there is voltage present on a circuit. This represents an infinite amount of resistance, or an "open circuit." It's safe to say there is the no continuity, or path between the black and red probes. Plug the black probe into … This document provides instructions on how to use a multimeter. Is that dangerous? Many meters have additional jacks that are required for current or high-voltage tests. 6 Find the Zero Adjustment knob. The correct mode must be set. 5 Measure the resistance of something like a light bulb that you know is good. A device that has burned out will not show "open" on the meter when testing if your fingers provide an alternate path around the device, like when they are touching the probes.[7] Testing round cartridge type and older style glass automotive fuses will indicate low values of resistance if the fuse is lying on a metal surface when under test. Many functions have multiple ranges, so it's important to have both set correctly, otherwise serious damage to the meter or harm to the operator may result.[2] Some meters have an "Off" position on this selector switch while others have a separate switch to turn the meter off. 7 Test resistance between hands. reading of about 2 milliamps should be indicated since from Ohm's law I = V/R = (9 volts)/(4700 Ω) = .00191 amps = 1.91 mA. Consider a digital meter instead of the older analog types. Set the range of current to the highest value. Digital meters usually offer automatic ranging and easy to read displays. Download Article Download Article A multimeter is an instrument used to check for AC or DC voltages, resistance and continuity of electrical components, and small amounts of current in circuits. If the test leads are not in contact with anything, the needle or pointer of an analog meter will rest at the left-most position. Notice the resistance is reduced. 3 Consider using a "clamp-on" ammeter. Thus, 150 really was 15,000 before. However there are a number of precautions, tricks of the trade that can be used to facilitate … There should be two test leads or probes. 4 Hold the probes at the end of the test leads together. Apply power and adjust range of meter downward to allow accurate reading of pointer on the dial. The meter pointer should move fully to the right. Now, 150 is just 150. This is why when testing resistance, adjust the range so that the readings may be taken from the middle rather than the extreme left or right sides. This is usually found on the back, but is also sometimes on the side of some models. Whenever possible, try to connect at least one probe in such a way that it will not be required to hold both while making tests. This is where the black test lead will be connected. Notice that the resistance is lower still. Set meter to AC volts mode, and try again. Zero the meter again for this range and repeat the step above. In other places, 240 or 380 volts might be expected. This article has been viewed 1,881,860 times. 4 Be wary of any filter capacitors or other elements that require an inrush (surge) current when switched on. 5 Find the battery and fuse compartment. 1 Locate the dial of your multimeter. The meter should indicate a voltage very close to 120 or 240 volts (depending on type outlet tested). This is opposite of the other scales, which have the lowest values on the left and increase going right.[6] 2 Observe the meter indication. The mirror is used to help reduce what's called "parallax viewing error," by lining up the pointer with its reflection before reading the value the pointer is indicating. Most multimeters these days will automatically change their settings if there's any danger in reading a current. Turn the meter on if it has a separate power switch. Insert the meter in series with the circuit such that it completes the circuit. Now I found out which part belongs to where and how it shows me the accurate measurements.This article is to-the-point and helps me as a direct practical guidebook. You can test the amperage and voltage of a current. Observe how the meter did not go as far to the right as before. It's very important that the probes not touch anything other than the device being tested. Press the black probe into one of the straight slots. 4 Test a common electrical outlet. 4 Locate the test leads. If the test leads were installed as suggested, the red lead would be positive as compared to the black test lead. Jesse is also the author of four eBooks on home wiring including "Residential Electrical Troubleshooting" which covers basic electrical troubleshooting in residential homes. Some meters have accessories that include alligator clips or other types of clamps that will assist doing this. Locate the two electrical contact points of the bulb. You need to determine whether or not the circuit is AC or DC by measuring the voltage of the circuit as described in previous steps. Connect the black test lead to the jack marked "Common" or "-". This has the arc-shaped scales visible through the window and a pointer which will indicate the values read from the scale.[1] The arc-shaped marks on the meter dial face may be different colors that indicate each scale, so they will have different values. Squeeze both probes tightly. If not set correctly, the user would mistakenly believe there was no voltage present, which could be a dangerous mistake. Values at the left side are harder to accurately read than those on the right. Hold the probes again. 3 Connect the test leads. This amount of current would likely damage the meter beyond repair. A wider mirror-like surface shaped like the scales might also be present. These are used to connect to whatever device you're planning on testing and measuring. Question What can I test with a multimeter? If you're unable to obtain a zero ohm indication, this may mean the batteries are weak and should be replaced. Using a digital multimeter to measure voltage is a key function, and one that is particularly easy. In the previous step, each number represented a value that was 100 times greater. This is used only in the ohms or resistance range, while the probes are shorted together (touching each other). 8 Make sure your reading is accurate. Many newer multimeters have digital readouts, rather than the analog scale. Likewise, there is often more than one fuse. Set the range (if provided) to R x 100. It is equally important to have the test leads connected to the proper jacks as it is to have the selector switch range and test type (volts, amps, ohms) set. Shut off power to the circuit. Generally, one is black and the other red. It would be much easier at the R x 1 scale instead. Just for reference, a typical 100W/120V light bulb will draw .833 Amps. There may be several Volt scales with different maximum values. Loosely hold a probe in each hand and read the meter. When there is little resistance, there will be a great deal of continuity, and vice versa. If the meter stops working, you either … Quick Guide: To measure voltage (The electric potential between 2 points): Voltage can be measured on any component or object, whether or not it is in a circuit. The other jack or jacks should be labeled "V" (+) and the Omega symbol (an upside down horseshoe) for Volts and Ohms, respectively. The meter must be able to measure the same mode (AC or DC) amps as the voltage in the circuit, otherwise it will indicate 0.[11] Be aware that most multimeters will only measure extremely small amounts of current, in the uA and mA ranges. The range of the meter is important to obtain accurate measurements.[10] If the pointer did not move, it is likely that DC was chosen instead of AC. Retry the zeroing step above again with fresh batteries. The meter indicates the resistance of the metal surface that the fuse is resting upon (providing an alternate path between the red and black probe around the fuse) instead of trying to determine resistance through the fuse. In the US, you might expect 120 volts or even 240 volts. Always remember to "zero" the meter immediately after changing resistance ranges or you'll get a faulty reading. Jesse specializes in all aspects of home and residential wiring, troubleshooting, generator installation, and WiFi thermostats. Ideal for the homeowner, this meter were to be used to measure current through a 4700 ohm resistor across 9 Volts DC.[12] To do this, insert the black probe into the "COM" or "-" jack and insert the red probe into the "A" jack. Insert the red probe into the other straight slot. The function is basically the same, you'll just get a numerical readout. Rotate the selector knob to the lowest range offered that is greater than the voltage indicated (120 or 240).[9] 6 Reinsert the probes as previously. Thanks."..." more Share your story How to use a Multimeter There are a few types of meters, manual and Auto ranging. 7 Try not to hold both. You need a different device for that. Advertisement Add New Question Question What happens if the multimeter is turned to the wrong setting? The scale selected is very important for accurate measurements. Next, insert the red probe in the "V" or "+" jack. Jesse Kuhlman is a Master Electrician and the Owner of Kuhlman Electric based in Massachusetts. The scale is accurate anywhere along its length. This is nice to know when the circuit under test isn't labeled + or, as is usually the case. If new batteries are installed, this should be easy to do a needle that will not go to zero indicates weak batteries that should be replaced. Your meter should be fused. The AC and DC modes are not compatible. Be sure to try both modes if the pointer does not move. Watch the needle move from resting at the left and move quickly to 0 on the right. By doing so, a multimeter can help you achieve a variety of useful tasks, such as measuring ohms, volts, and amps. For this reason, the highest range possible is selected so that the meter circuitry and movement will not be damaged by voltage greater than expected.[8] If the meter were set to the 50 volt range and a common U.S. electrical outlet were to be tested, the 120 volts present could irreparably damage the meter. Co-authors: 55 Updated: February 28, 2025 Views: 1,881,860 Categories: Featured Articles | Electrical Projects Print Send fan mail to authors Thanks to all authors for creating a page that has been read 1,881,860 times. Observe the polarity. This is a small knob usually located near the dial that is labeled "Ohms Adjust," "0 Adj," or something similar. They will be the threaded base and the center of the bottom of the base. This holds the fuse (and possibly a spare), and the battery that supplies power to the meter for resistance tests.[4] The meter may have more than one battery and they may be of different sizes. All must be correct. 6 Try different ranges. Jesse Kuhlman Master Electrician, Kuhlman Electric Jesse Kuhlman is a Master Electrician and the Owner of Kuhlman Electric based in Massachusetts. 5 Remove the probes. It is not linear like the other scales. The voltage scales, unlike the Ohm scales, are linear. Ask a Question Advertisement Thanks Thanks Thanks Advertisement Thanks Helpful 20 Not Helpful 12 Thanks Thanks Advertisement Multimeter. Rotate the knob slowly to move the needle as close to the 0 position on the Ohms scale as possible. The meter should be set to "Off" when stored and not in use. Note that this position is the "short circuit" or "zero ohms" indication for this R x 1 range of this meter. Co-authored by: Master Electrician, Kuhlman Electric This article was co-authored by Jesse Kuhlman. "Multimeters were all confusing for me. Thanks."..." more Share your story Download Article Download Article A multimeter is an instrument used to check for AC or DC voltages, resistance and continuity of electrical components, and small amounts of current in circuits. This allows you to change the function between volts, ohms, and amps, and to change the scale (x1, x10, etc.) of the meter. It is usually the top-most scale and has values that are highest on the left of the dial ("∞" or a sideways "8" for infinity), gradually reducing to 0 on the right. Many times, the voltage to be measured has a value that is unknown. Change the range of the meter to R x 1. A good fuse is required for the meter to function, and fully charged batteries will be required for resistance/continuity tests. 1 uA is .000001 amp and 1 mA is .001 amp. Press the black probe against the threaded base and the red probe against the center tab on the bottom of the base. 2 Insert your test probes. Do not exceed the range of the meter, otherwise it may be damaged. With this in mind, you can make assumptions about continuity based on the resistance values measured.[5] Find the Ohm scale on the dial. Advertisement 1 Make sure you've measured the voltage first. 2 Set the meter to the highest AC or DC Amp range supported. The range chosen by the selector knob determines which voltage scale to read. In any case, always use the higher range measurement protected by the higher fuse rating and be careful. It cannot be placed "across" the circuit the way a voltmeter is used (otherwise the meter will probably be damaged). These determine the ranges of magnitude. Have a helper hold the bulb by the glass only. Every fuse in this case, good or bad, will indicate "good," giving you a faulty analysis. Start high and work downward to the lowest range that can be safely displayed. Advertisement 3 Locate the openings in the case where you'll insert the test leads. Advertisement 1 Set the multimeter to Ohms or Resistance. Locate the "Zero Adjust" knob and rotate it so that the meter indicates "0" (or as close to "0" as possible). The meter may indicate between 110 and as much as 125 volts this time. Then, connect the red test lead to the jack marked with the Omega (Ohm symbol) or letter "R" near it. Blowing the meter fuse is almost certain if the DUT's (device under test) inrush current is many times higher than the fuses rating. Open the portion of the circuit that is to be tested (one lead or the other of the resistor). It will of course be much easier accurately reading 24 volts on a 50 volt scale than on a 250 volt scale, where it might look like it is anywhere between 20 and 30 volts. In the image, it appears as a wide gray strip between the red and black scales. Insert the black probe in the "COM" or "-" jack. 2 Find the selector switch, or knob. You're likely not going to run into any problems. Even if the operating current is low and within the range of the meter fuse, the surge can be many times higher than the operating current, because the empty filter capacitors are almost like a short circuit. Current flows from the positive side to the negative side. It will be used for nearly every measurement taken. Since they are electronic, the built-in software helps them withstand incorrect connection and ranges better than the mechanical meter movement in analog types. Consult the meter manual if you're unsure which jacks should be used. A fuse is provided to help protect the meter movement. Let go of the probes and wet your hands. Minimizing your contact with electrical circuits drastically reduces that chances of sustaining burns or injury.