



## How to use

1. Disconnect all wires from the winding to be tested. Test each winding in three-phase system separately.
2. Connect the E terminal to ground and insert probe tip in L.
3. Select ON (middle slide switch).
4. Touch test point, and press MEAS, and hold until you get a stable reading.
5. Release MEAS. The reading will remain on the display for approximately in 15 seconds.
6. Select OFF.

## Range select

If the meter is on the 20M $\Omega$  setting and reads OL during the test, select the 2000M $\Omega$  setting and try again. If the meter is on the 2000M $\Omega$  setting and the display reads 19 or less, select 20M $\Omega$  for better resolution.

## Display back-light switch (\*)

Select \* to turn on backlight. Backlight will remain on only when the LCD is on.

## How does it relate to a milliohmmer?

A megger such as the Fieldpiece SMGS measures the insulation resistance between the coil and ground by supplying a very high voltage to break down the insulation and measuring the very low resultant current. The resistance measured is very high. Fifty million ohms is typical. A milliohmmer such as the Fieldpiece AMRI supplies a higher current (50mA) but at a very low voltage. The resistance measured is very low (thousandths of an ohm).

You may be able to determine insulation problems with either a megger or a milliohm meter. The megger will tell you the condition of the insulation between the winding and ground by forcing a small current through it with a high voltage. The milliohm meter will determine if the test current supplied between the ends of the windings takes a "shortcut" at a point where the insulation has failed.

Both measurements can be used to determine the health of the insulation, but in different ways.

## Battery test

1. Slide the middle switch to power on.
2. Press the MEAS button.
3. If the "E" in the display lights, the batteries are near the end of their life and should be replaced immediately.

## The low battery alarm

The low battery alarm "E" is displayed when measuring very low values of resistance (below 500K $\Omega$ ). This is due to the large amount of current power consumed when measuring such small resistances. Replace the batteries if subsequent resistance measurements of high values result in the display "E" appearing.

## Temperature effects

For accurate measurements, when comparing readings over time or when comparing readings to other similar equipment or to the recommended values, the temperatures must be the same. Insulation resistance can change by a factor of two with a change in temperature from 70 deg F to 100 deg F.

Equipment manufacturers publish acceptable limits that vary with temperature.

## Why a DMM often won't work

To test resistance, a DMM supplies low voltage (<1V) to the test points and is capable of delivering only a few milliamps. It's not a high enough voltage to detect high resistance problems that might indicate moisture and other contaminants and it's not enough current to measure real low values of resistance.

## Cleaning

Periodically wipe the case with a damp cloth and detergent. Do not use abrasives or solvents.

## Limited warranty

This meter is warranted against defects in material or workmanship for one year from date of purchase. Fieldpiece will replace or repair the defective unit, at its option, subject to verification of the defect.

This warranty does not apply to defects resulting from abuse, neglect, accident, unauthorized repair, alteration, or unreasonable use of the instrument.

## Refrigeration and A/C systems

A megger can be particularly effective with compressors. Contaminants (moisture, microscopic metal filings, and acids) can get in the refrigerant and destroy the insulation in the windings of the compressor. With a megger, you can see the degradation over time and may be able to replace the compressor before it catastrophically fails and spews contaminants into the refrigeration system, possibly requiring a much more expensive repair.

To insure consistent measurements, the system should be run for at least an hour and shut off. Take the megohmmeter reading immediately. This way temperatures and the exact condition of the refrigerant will be the same from test to test.

## Guidelines

The following are general guidelines. The numbers recommended by the equipment manufacturer may be different, depending on the equipment tested and conditions. Results can vary significantly as the temperature varies.

Reading	Condition	Action
>100M $\Omega$ hm	Excellent	None
50-100M $\Omega$ hm	Some moisture present	Change filter drier
20-50M $\Omega$ hm	Contamination/moisture present	Change filter drier several times Change oil if acid present
0-20M $\Omega$ hm	Severe contamination	Full system clean-up and re-evaluation.

## Obtaining service

Send the meter freight prepaid to Fieldpiece Instruments. For warranty service also send proof of date and location of purchase. For out-of-warranty service send \$40, check or money order. Do not send cash. The meter will be completely repaired or replaced, at the option of Fieldpiece, and returned to you via least cost transportation. Response time is typically 24 hours after receipt of meter.



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