Fieldpiece®

Digital Megohmmeter



OPERATOR'S MANUAL

Model SMG5

Important Notice

This is not a consumer product. Only qualified personnel trained in service and installation of A/C and/or refrigeration equipment shall use this product.

Read and understand this operator's manual in its entirety before using your tool to prevent injury or damage to you or equipment.

DO NOT measure when compressor motor is in a vacuum.

To avoid electrical shock, remove test leads before opening case or battery cover.

DO NOT operate with battery cover open.

Remove power from circuit under test.

DO NOT touch test lead tips, test points, or terminals when pressing **MEAS**.

Scan for more languages.

Fieldpiece Americas

Fieldpiece Europe

Safety Information

1. Connect the E terminal to ground using the alligator clip (included).
2. Use one hand to conduct test.
3. Make sure to turn meter **OFF** to avoid accidentally pressing **MEAS** and creating a 1000V voltage source. If the switch is **ON** and **MEAS** is depressed, 1000V will appear on the terminals.
4. **DO NOT** use the instrument in an explosive atmosphere or in the presence of inflammable gas or smoke.
5. **DO NOT** use the instrument on systems with a rated voltage higher than those listed in this manual.
6. **DO NOT** use if the cable insulation, the instrument and/or it's accessories appear damaged.
7. **DO NOT** modify the instrument, or replace components using equivalent parts. See Obtaining Service for repair information.
8. Respect the environmental conditions of use.
9. Use personal protection equipment (PPE) when conditions require it.

Quick Start

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**.

What's Included

(1) Megohmmeter
(2) Probe Tips
(1) Ground Lead with Detachable Tip
(1) Alligator Probe Tip
(1) Carrying Case
(4) AAA Batteries
(1) Operator's manual
(1) Year limited warranty

Description

The SMG5 Megohmmeter (Megger) is a compact standalone meter designed for checking HVAC compressor insulation. The SMG5 provides a 1000V voltage source, monitors current, and displays the resistance between the test points. Maximum current output is <1mA. It can be used to determine the condition of insulation from winding to ground in a motor, compressor, or transformer. To extend battery life, it automatically turns itself off in 15 seconds.

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 lower values of resistance.

- **1000VDC stresses insulation to measure up to 2000Mohms**
- **Backlit LCD display**
- **Auto-off to extend battery life**
- **Case, alligator clip, leads with removable tips**

Applications

The SMG5 can be used to determine the condition of insulation from winding to ground in a motor, compressor, or transformer. Disconnect the windings and measure the resistance between the windings and ground through the insulation. Determine what a "good" reading is by comparing your reading to values supplied by the manufacturer of the equipment or from your own experience. Make sure that all measurements are compared to readings at the same temperature. Insulation resistance can vary dramatically with temperature.

Megohm readings can work best when the same equipment is measured over time.

Decreasing insulation resistance levels can forecast failure before catastrophic failure.

Range Select

If the meter is on the **20MΩ** setting and reads OL during the test, select the **2000MΩ** setting and try again. If the meter is on the **2000MΩ** setting and the display reads 19 or less, select **20MΩ** for better resolution. The range selected will be displayed on the bottom of the LCD.

Display Backlight Switch (☼)

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

Battery Test

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

Low Battery Indicator (🔋)

The low battery indicator " 🔋 " is displayed when measuring very low values of resistance (below 500KΩ). 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 " 🔋 " 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°F to 100°F.

Equipment manufacturers publish acceptable limits that vary with temperature.

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
>100Mohm	Excellent	None
50-100Mohm	Some moisture present	Change filter drier
20-50Mohm	Contamination / moisture present	Change filter drier several times. Change oil if acid present.
0-20Mohm	Severe contamination	Full system clean-up and re-evaluation.

How Does it Relate to a Milliohmmeter?

A megger such as the Fieldpiece SMG5 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 milliohmmeter such as the Fieldpiece AMR1 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 though 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.

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.

Certifications and Module IDs

CE

UKCA
UK Conformity Assessed

Specifications

Display: 3 1/2" digit liquid crystal display (LCD) with maximum reading of 1999.
Overrange: (OL) or (-OL) is displayed.
Low Battery Indication: The " " is displayed when the battery voltage drops below the operating level.
Measurement Rate: 2.5 times per second, nominal.
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.
Auto Power Off: 15 seconds approx.
Standby Consume Current: <10µA
Battery: 4 pcs 1.5V (AAA size) UM-4 R03.
Battery Life: 4 hours (continuity) typical with alkaline battery (@20MΩ range test 10MΩ resistor).
Dimensions: 170mm(H) x 44mm(W) x 40mm(D).
Electrical Range: 20MΩ,2000MΩ.
Resolution: 10KΩ on 20MΩ range. 1MΩ on 2000MΩ range.
Accuracy: 20MΩ range: ±(2%rdg + 2dgts), 2000MΩ range: <500MΩ ±(4%rdg + 2dgts), >500MΩ ±(5%rdg + 2dgts)
Rated Voltage: DC-DC converter to 1000VDC
Accuracy Temperature: 23°C ± 5°C less than 70%RH
Temperature Coefficient: 0.1X (specified accuracy)/°C (<18°C or >28°C)
Weight: 0.35 lbs / 160 g

Limited Warranty

This product is warranted against defects in material and workmanship for one year from date of purchase from an authorized Fieldpiece dealer. 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.

Any implied warranties arising from the sale of a Fieldpiece product, including but not limited to implied warranties of merchantability and fitness for a particular purpose, are limited to the above. Fieldpiece shall not be liable for loss of use of the instrument or other incidental or consequential damages, expenses, or economic loss, or for any claim of such damage, expenses, or economic loss.

State and country laws vary. The above limitations or exclusions may not apply to you.

Obtaining Service

Visit **www.fieldpiece.com/rma** for the latest information on how to obtain service.

For customers outside the U.S., warranty for products should be handled through local distributors.

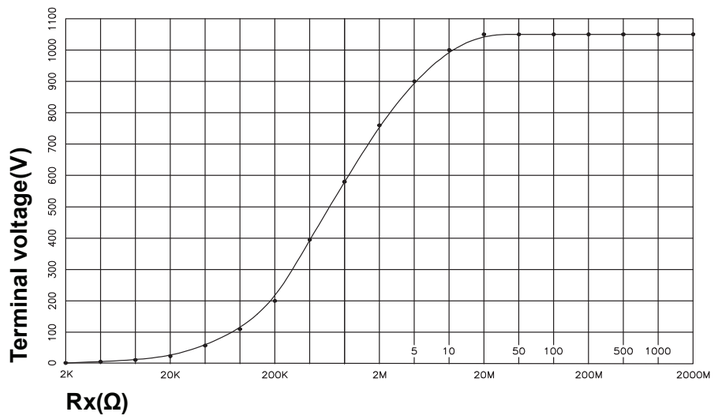
Visit **www.fieldpiece-europe.com/store-locator**.

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International Electrical Symbols

	DANGEROUS VOLTAGE		SEE EXPLANATION IN MANUAL
	AC-ALTERNATING CURRENT		DOUBLE INSULATION (Protection Class II)
	DC-DIRECT CURRENT		GROUND

Insulation Resistance Measurement Terminal Voltage



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