

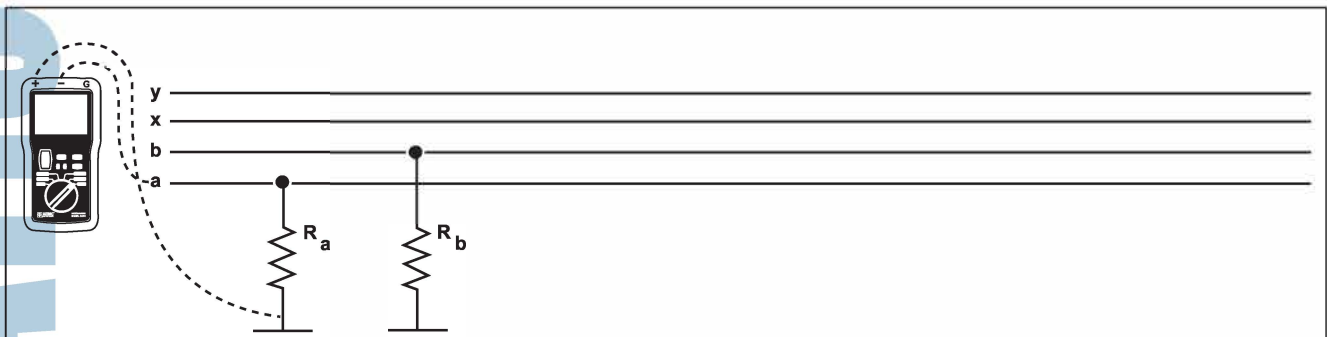
Understanding Insulation Measurements on Telephone Cables

Insulation resistance measurement is a non-destructive measurement method when carried out under normal test conditions. It is accomplished by applying a DC voltage lower than that used for a dielectric test, and the purpose is to produce a result in k Ω , M Ω or G Ω . This resistance value expresses the quality of insulation between two conductive elements and gives a good indication as to the risk of leakage currents flowing.

Insulation measurements are carried out on new cables (not yet installed) at 250V or 500V, then at 50V or 100V for line fault reading on cables already in service. Measurements can be made between pairs of lines and the shield connected to the ground, or between the metal shield and ground.

Measuring Insulation Between a Telephone Pair & Shield Connected to Ground:

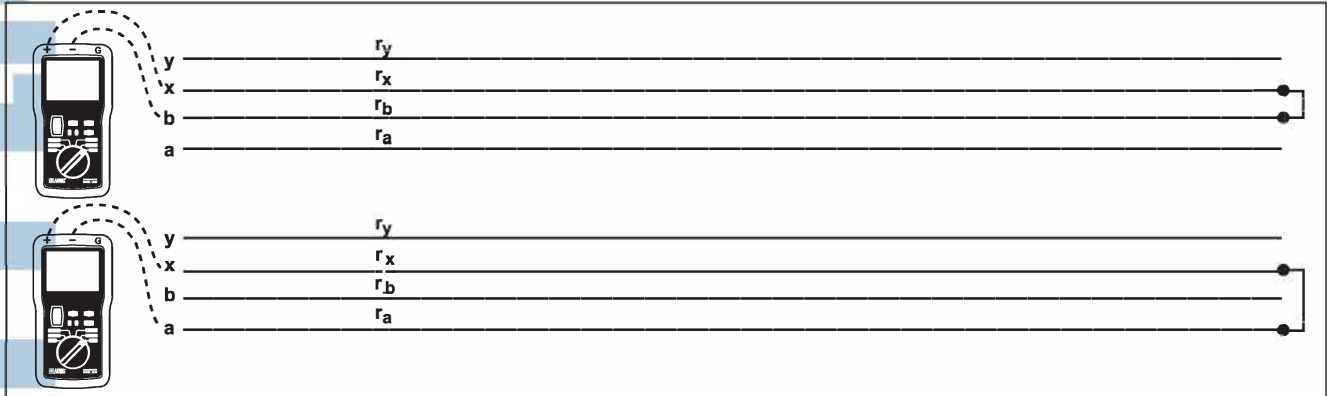
1. Check to be sure that there are no AC or DC voltages between the wire pair and ground.
2. Measure the insulation between each conductor and ground (R_a then R_b) at 50V or 100V on installed cables:



The results of the resistance measurement should be within $\pm 20\%$ of each other. Additionally the insulation resistance of each leg should be $>50\text{M}\Omega$ to $100\text{M}\Omega$.

Measuring Resistance Imbalance Between Two Conductors of a Pair:

1. Connect the wires to one end, measure " r_a " then " r_b " (in relation to any common wire) then calculate the Δr (imbalance).



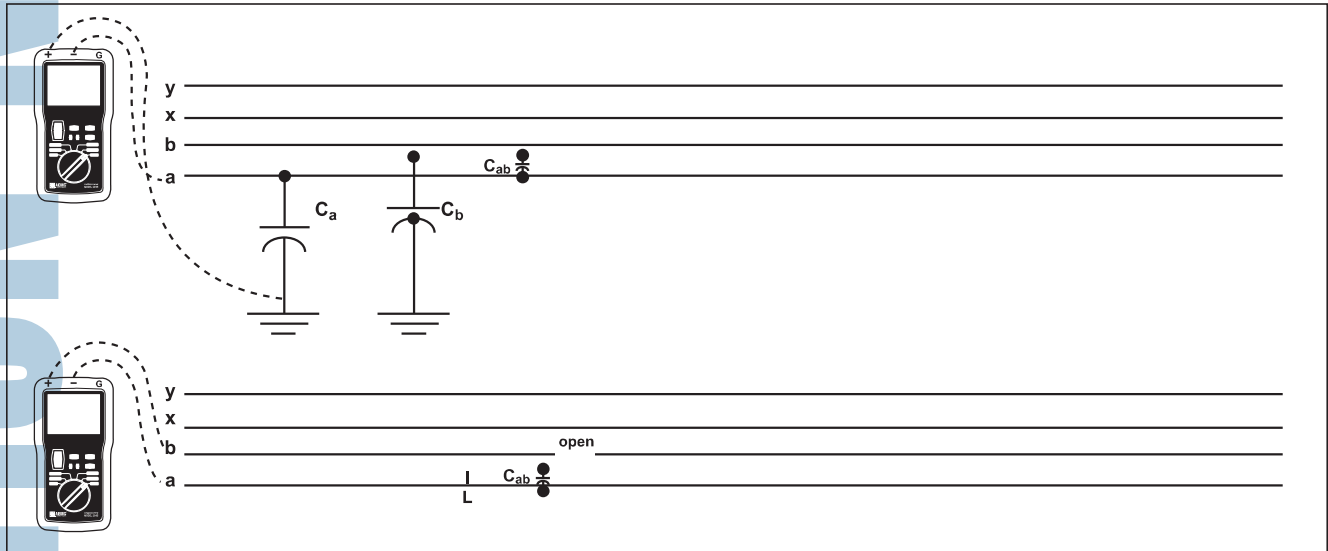
Δr should be $< 3\Omega$

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Measuring Capacitance Between Two Conductors of a Pair and Each Conductor in Relation to the Ground:

1. Measure the capacitance (C_{ab}) between wires "a" and "b" to determine the length of the line being tested (generally 50nF per km). It will also determine opens.
2. Measure the capacitance (C) between "a" or "b" and ground to determine the imbalance. The capacitance for each line should be equal.



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Contact Us

United States & Canada:

Chauvin Arnoux®, Inc.
d.b.a. AEMC® Instruments
200 Foxborough Blvd.
Foxborough, MA 02035 USA
(508) 698-2115 • Fax (508) 698-2118
www.aemc.com

Customer Support – for placing an order, obtaining price & delivery:
customerservice@aemc.com

Sales Department – for general sales information:
sales@aemc.com

Repair and Calibration Service – for information on repair & calibration, obtaining a user manual:
repair@aemc.com

Technical and Product Application Support – for technical and application support:
techinfo@aemc.com

Webmaster – for information regarding www.aemc.com:
webmaster@aemc.com

South America, Australia & New Zealand:

Chauvin Arnoux®, Inc.
d.b.a. AEMC® Instruments
15 Faraday Drive
Dover, NH 03820 USA
(978) 526-7667 • Fax (978) 526-7605
export@aemc.com

All other countries:

Chauvin Arnoux
190, rue Championnet
75876 Paris Cedex 18, France
33 1 44 85 45 28 • Fax 33 1 46 27 73 89
info@chauvin-arnoux.com