

Aim: Measurement of earth resistance.

Objective: Measurement of earth resistance by three electrode method.

Apparatus Required:

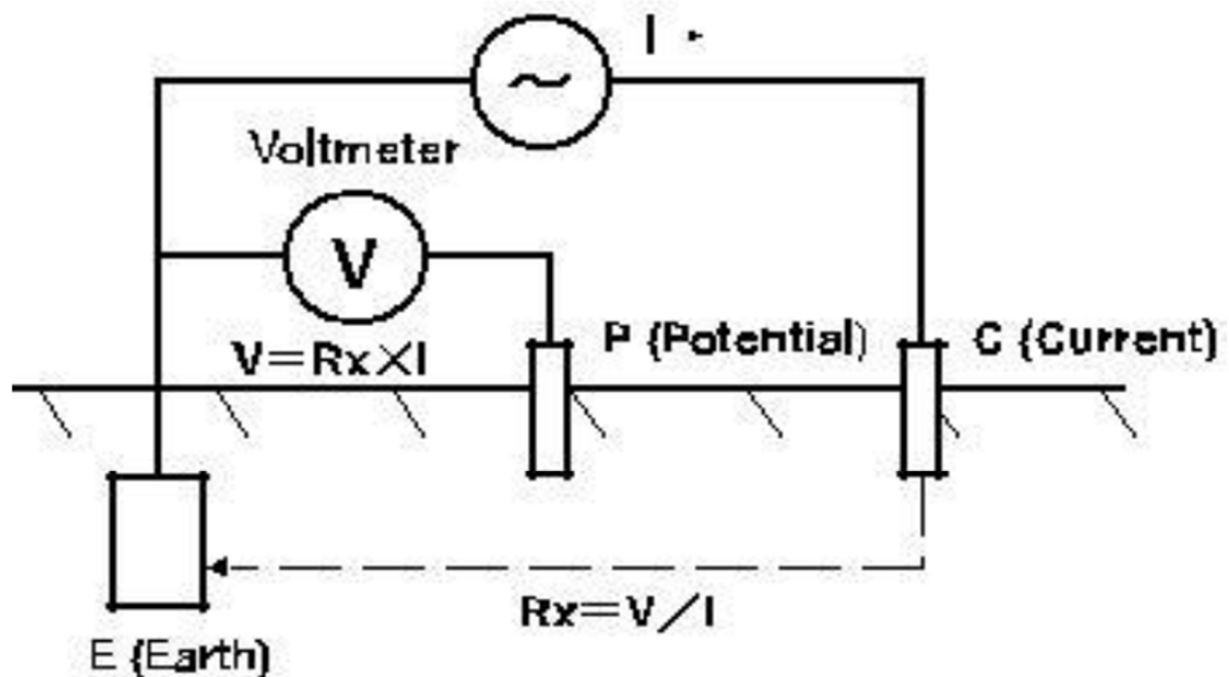
Serial Number	Instrument Name	Specifications	Quantity	Maker's Name
1	Earth resistance testing kit	—	1	Nanin Bokun Instrument Equipment Co. LTD.
1 a.	Earth tester (Model:AR-4105A)	2Ω-0.5 ~ 1.99Ω 20Ω-2 ~19.99Ω 200Ω-20~199.9Ω	1	Nanin Bokun Instrument Equipment Co. LTD.
1 b.	Connecting leads (with crocodile clips)	Red, yellow, green colour codes	3	Nanin Bokun Instrument Equipment Co. LTD.
1 c.	Auxiliary earth spikes	—	2	Nanin Bokun Instrument Equipment Co. LTD.
2	Earth electrode	—	2	Nanin Bokun Instrument Equipment Co. LTD.
3	Metering tape	30 meters	1	FMI LTD.

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Theory:

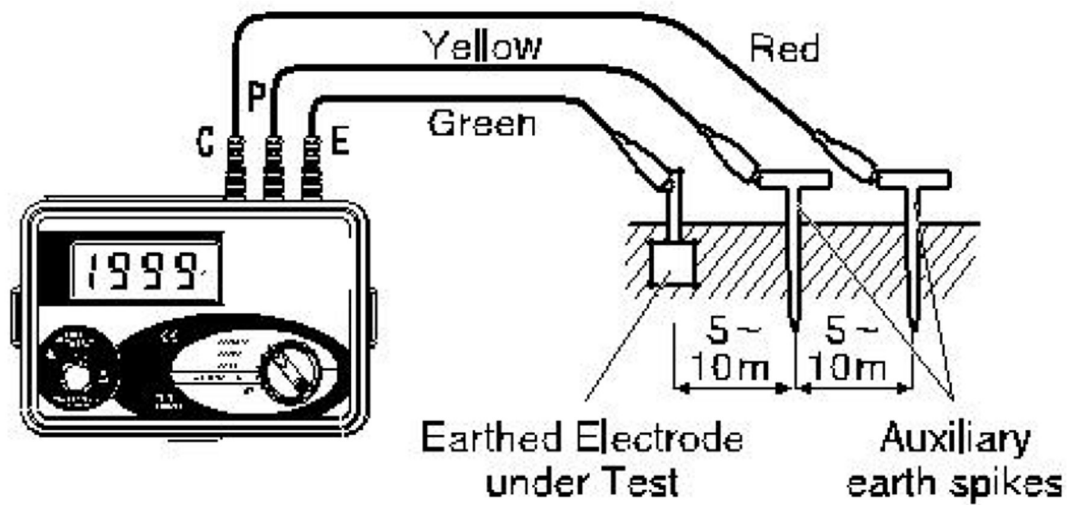
This instrument makes earth resistance measurement with fall-of-potential method, which is a method to obtain earth resistance value R_x by applying AC constant current I between the measurement object E (earth electrode) and C (current electrode), and finding out the potential difference V between E and P (potential electrode).

$$R_x = \frac{V}{I}$$



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KDheraj Reddy *Siddhant Gupta* *Tushin Kanak* *Souradepta Pal* *Houstar Sangol* *D. Senapati* *Aman Kumar* *Jyoti Sarma*

Original Circuit:



Observation Table:

Serial Number	Distance from Earth Electrode (in meters)	Earth Resistance (Ω)
1	0.9	0.8
2	1.9	1.0
3	2.9	1.58
4	3.9	1.59
5	4.9	1.56
6	5.9	1.61
7	6.9	10
8	7.9	15
9	8.9	19
10	9.9	26

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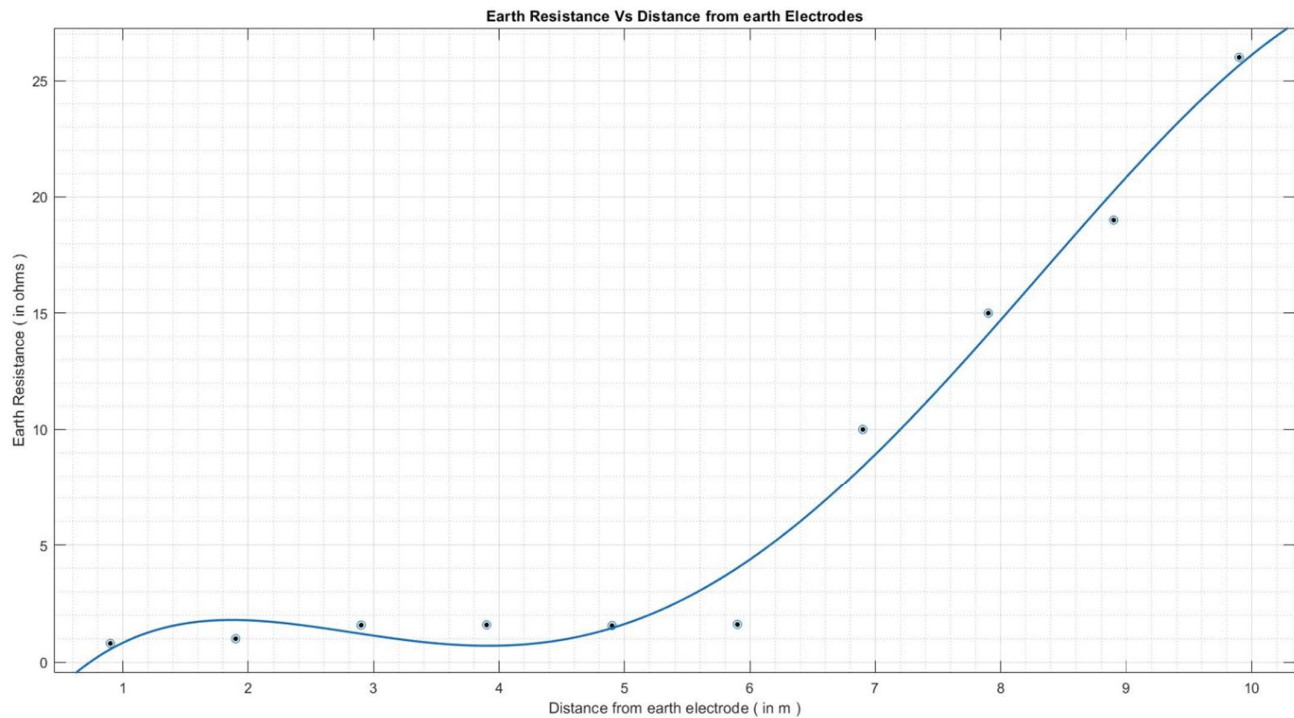
Houstar Sangal

Dipenabati

Aman Kumar

Yashika Samanta

Graph:



Calculations:

From the graph we find the value of earth resistance remain almost constant from 2.9m to 5.9m. Thus, earth resistance offered by the earth electrode is approximately equal to 1.58Ω .

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Conclusion:

- The measured earth resistance readings are better on a rainy day than a sunny day due to the moisture in the soil.
- The earth resistance value should not exceed 5 ohms in practice (according to Indian Electricity Earthing Standards).
- The measured earth resistance increases with the increase in distance from the earth electrode until it becomes constant. However, when we move closer to the current electrode, the value of earth resistance increases again. This is because the electric field lines are concentrated at the earth and current electrodes and become almost constant around the midway point between the two electrodes, provided that they are sufficiently far apart from each other and their effective resistance areas do not overlap.

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