



**Cambridge Instruments
& Engg. Co.**

EST. 1963 · HOWRAH, INDIA

TECHNICAL CATALOGUE · EARTH TESTER · METAL BODY

CIE/222M

3-terminal and 4-terminal hand-driven earth tester

Earth resistance and soil resistivity, in the field

Direct measurement of the resistance of earth in power circuits, telecommunications, railway electrification, domestic and industrial electrical installations, lightning protection installations and various other electrical systems. The tester performs equally well in terrain where the conductivity of the soil is low, for example in mountainous areas, and in places where powerful stray earth currents exist. The four-terminal instrument is specially designed for straightforward, approximate soil investigation of the kind needed in agricultural and geological research and in the planning of large civil engineering projects such as tunnels, drainage, sewerage schemes and tube railways.



CIE/222M · ILLUSTRATIVE IMAGE

01 HIGHLIGHTS

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|---|---|
| ✓ Silent generator with collapsible handle | ✓ Centrifugal clutch (governor) for constant output voltage |
| ✓ Chuck nut locking arrangement prevents anti-clockwise rotation | ✓ Wide anti-parallax mirror scale |
| ✓ Anti-magnetic aluminium body with protected metallic flap over the scale window | ✓ Accurate, reliable and quick response |
| ✓ Accuracy conforms to IS 9223:1979 | ✓ Long life and strength against vibration and impact |
| ✓ Available in 3-terminal and 4-terminal types | ✓ Single range, or multi-range with range selector switch |

02 TYPICAL APPLICATIONS

- Earth resistance measurement for power circuits and lightning protection systems
- Telecommunications and railway electrification earthing checks
- Domestic and industrial electrical installation earthing
- 4-terminal type: soil resistivity surveys for civil engineering projects (tunnels, drainage, sewerage)

03 PRINCIPLE AND CONSTRUCTION

PRINCIPLE

Test current is generated by a smooth and noiseless hand-driven A.C. generator. A high-grade centrifugal governor holds the voltage constant for accurate measurement, so variation in crank speed does not affect the reading.

CONSTRUCTION

Housed in a sturdy, elegant case of anti-magnetic cast aluminium with a metallic carrying handle. The instrument is dust-free: rubber shoes hold the surface and give it stability, and a protected metallic flap covers the glass window of the scale. The collapsible generator handle folds back flush into the casing when the tester is not in use.

04 SALIENT FEATURES

Immune to stray currents

Measuring accuracy is not affected by stray alternating current or by the back e.m.f. of earth electrolysis.

Centrifugal governor

Holds the voltage constant, so variation in crank speed does not affect the reading.

3-terminal or 4-terminal

Three terminals for earth resistance. Four terminals for earth resistance and specific soil resistivity.

Other resistance measurement

The instrument can also be used for measuring non-inductive or non-capacitive resistance.

05 PERFORMANCE AND TEST SPECIFICATION

Standard	IS 9223:1979
Types	3-terminal (earth resistance); 4-terminal (earth resistance and specific soil resistivity)
Generator speed	160 r.p.m.
Ranges	Single range from 0–1 Ω to 0–10,000 Ω (any one range); multi-range with range selector switch; any other range on specific requirement
Scale length	80 mm (approx.)
Accuracy	$\pm 5\%$ (as per IS 9223:1979)
High voltage test	2 kV A.C. (r.m.s.) for 1 minute between the electrical circuit and the containing case
Insulation resistance of the instrument	Better than 25 M Ω at 500 V D.C. between the electrical circuit and the containing case

06 CONSTRUCTION AND PHYSICAL SPECIFICATION

Generator	Hand-driven A.C. generator with centrifugal governor
Body	Anti-magnetic cast aluminium case with metallic carrying handle and protected metallic flap over the scale window
Weight	2.5 kg (approx.)
Dimensions	110 × 128 × 190 mm (approx.)

07 SINGLE RANGE OPTIONS

RANGE BAND	SELECTION
0–1 Ω to 0–5 Ω	Any range within this band
0–10 Ω to 0–100 Ω	Any range within this band
0–200 Ω to 0–10,000 Ω	Any range within this band

A single-range instrument has **one** range: choose any one range from 0–1 Ω up to 0–10,000 Ω within the three bands above, in either the 3-terminal or the 4-terminal type.

08 DUAL RANGE OPTIONS

CONFIGURATION	FULL-SCALE RANGES (Ω)
Dual range	0–1 / 10 0–2 / 10 0–3 / 30 0–10 / 100

09 TRIPLE, FOUR AND FIVE RANGE OPTIONS

CONFIGURATION	FULL-SCALE RANGES (Ω)
Triple range	0–1 / 10 / 100 0–2 / 10 / 100 0–2 / 20 / 200 0–3 / 30 / 300 0–10 / 100 / 1000
Four range	0–1 / 10 / 100 / 1000 0–2 / 10 / 100 / 1000 0–10 / 100 / 1000 / 10,000
Five range	0–1 / 10 / 100 / 1000 / 10,000 0–2 / 10 / 100 / 1000 / 10,000

Multi-range instruments are provided with a range selector switch, to be chosen from 0–1 Ω to 10,000 Ω . Any other range can be manufactured against specific requirements.

10 3-TERMINAL AND 4-TERMINAL TYPES

	3-TERMINAL TYPE	4-TERMINAL TYPE
Measures	Earth resistance	Earth resistance and specific soil resistivity
Typical use	Earth resistance of power circuits, telecommunications, railway electrification, installations and lightning protection systems	As the 3-terminal type, plus soil investigation for agricultural and geological research and civil engineering projects
Test kit (optional)	2 M.S. spikes (45 cm length), 3 rolls of flexible wire on spool (10 m, 20 m, 30 m), 1 hammer, all in one carrying bag	4 M.S. spikes (45 cm length), 4 rolls of flexible wire on spool (10 m, 20 m, 20 m, 30 m), 1 hammer, all in one carrying bag
Ranges	All ranges listed in this catalogue	All ranges listed in this catalogue

11 OPTIONAL ACCESSORIES (AT EXTRA COST)

- Testing kit for the 3-terminal or the 4-terminal type (contents in the table above)
- Carrying case for earth tester

12 HOW TO ORDER

To order, quote the **model**, the **terminal type** and the **range**, for example

CIE/222M, 4-terminal, 0-1 / 10 / 100 Ω. Any range not listed can be manufactured against specific requirements.