Internal resistance: the number that predicts failure first

Capacity fades slowly and then suddenly. Internal resistance rises early and predictably. In a standby string, the resistance trend finds the weak block months before a discharge test would fail it.

WHAT THE NUMBER MEANS

Internal resistance is the opposition to current inside the cell: grid corrosion, plate sulphation, electrolyte dry-out and connection resistance all add to it. A rising value means the cell converts less of its stored energy into useful current and more into heat.

Absolute values are not comparable between sizes or manufacturers. The useful signal is the change against that cell's own commissioning baseline.

HOW TO TREND IT

Check	When	What it catches
Acceptance test	Commissioning	Weak or mismatched cells
Impedance / conductance	Annually	Drift, dry-out, corrosion
Full capacity test	Every 3–5 years	True remaining runtime

Impedance and conductance are relative methods: fast, safe on a live string, but only meaningful as a trend. The discharge test remains the authoritative measurement.

READING THE DRIFT

Change vs baseline	Reading
< 20 %	Normal ageing, keep trending
20–30 %	Watch: retest in 3 months, plan replacement
> 30 %	Replace. Runtime is already compromised

> **Replace the string, not the jar**
> A new block in series with aged ones takes the charge profile of the weakest cell in the loop. It overcharges while the old cells undercharge, and fails within months. One weak jar means the whole string is at end of life.

WHAT PUSHES RESISTANCE UP FASTER

- Cabinet temperature above 25 °C: every 10 °C roughly halves float life
- Charger ripple above about 2 % RMS, which heats the cell silently
- Chronic undercharge, which sulphates the negative plate
- Loose or corroded terminal connections, which read as cell resistance

DO THIS BEFORE YOU BLAME THE BATTERY

Check torque on every inter-cell connection and measure at the post, not at the lug. A loose connection can double the measured value and sends good blocks to scrap. Record the reading, the instrument and the temperature together, or the trend is meaningless.

Applying this to a real project?

Send us the load profile, site temperature and required autonomy. We reply with a sized string, the series that fits and an FOB price, normally within one working day.

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