

One charge of an electric-scooter charger, read every two seconds

What a single charging session looks like from inside the panel, and why a monthly bill, or even a 30-minute meter block, cannot see most of it.

The charger is a portable electric-scooter charger rated at up to 12 A output, 33–60 V DC, on a 170–270 V AC supply. One Metrion unit read its single-phase supply every two seconds for three and a half hours, from plug-in to well after the charge finished.

Calibration run. We recorded this charge on purpose before calibrating, to get the data to calibrate Metrion against a reference multifunction meter. That calibration is now complete. One charger, one session; no general claim is made from it.

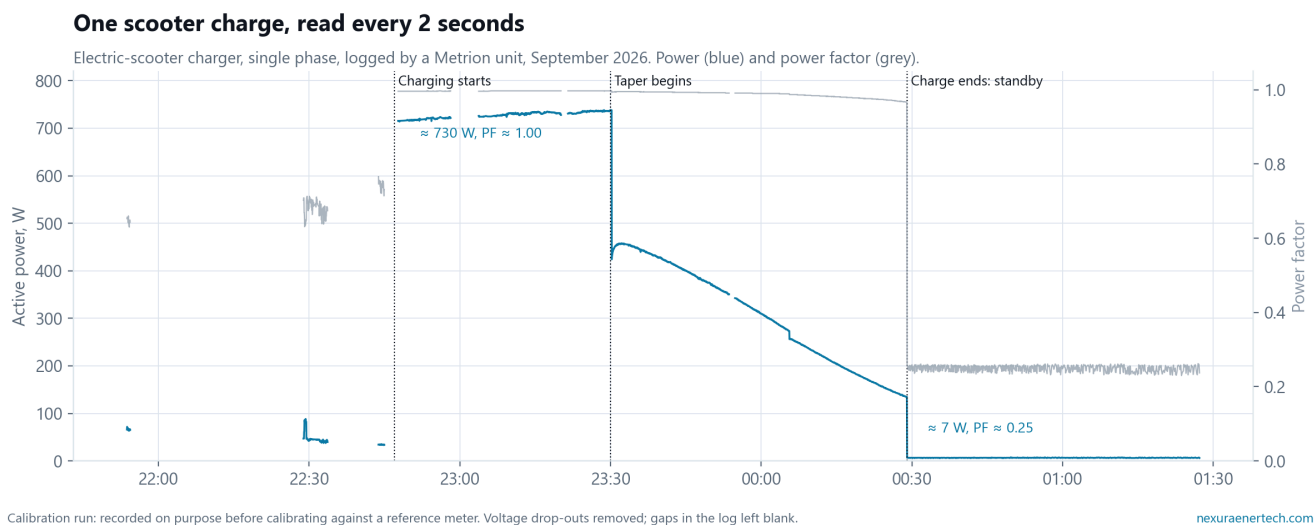


Figure 1. Active power (blue) and power factor (grey), single phase, 21:53 to 01:27, September 2026. Gaps in the log are left blank.

What the log shows

PHASE	TIME	WHAT THE METER SAW
Before charging	21:53 – 22:47	A small load of about 45 W at power factor around 0.7, with gaps in the log
Full-power charging	22:47 – 23:30	About 730 W (≈ 3.05 A at ≈ 241 V), power factor $\approx$ 1.00 , steady for 43 minutes
Taper	23:30 – 00:29	An abrupt step down to about 455 W, then a smooth fall to about 135 W over an hour
Standby	00:29 – 01:27	About 7 W , but at power factor $\approx$ 0.25 , for the 57 minutes the scooter stayed plugged in after charging finished

The charge drew about **0.8 kWh** from the supply: 0.81 kWh when the logger's short drop-outs during charging (about 11 minutes in total) are filled at the steady charging power, 0.72 kWh if they are simply left out. Either way it is computed by integrating the logged power, not read from a billing-grade counter. Measured as a bill would (kWh $\div$ kVAh), the power factor while charging was **0.986**.

LOAD LEVEL	AVERAGE POWER FACTOR	SHARE OF READINGS
Full charge current (500–800 W)	0.996	28%
Heavy (300–500 W)	0.992	22%
Moderate (100–300 W)	0.890	21%
Light (10–100 W)	0.699	8%
Idle / standby (under 10 W)	0.238	22%

Power factor by load level, averaged over readings in each band. Power factor is excellent while the charger works hard and collapses when it idles.

Three things worth noticing

- **Distinct stages.** The charger draws full power for about 43 minutes, then steps down and tapers for an hour. The highest draw sits entirely in the first 45 minutes after plugging in. For anyone charging several vehicles on one connection, that is when they add to demand.
- **Clean while charging, poor when idle.** At full power the charger's power factor is close to 1.00. In standby it falls to about 0.25. Seven watts is negligible on its own, but it shows how a device's power factor depends on what it is doing, which a single monthly average hides.
- **An hour of bay time doing nothing.** The scooter stayed connected for 57 minutes after the charge ended, drawing almost nothing. At home that does not matter. In a shared or fleet charging bay, a charge-complete alert would let the next vehicle start an hour sooner.
- **Detail a bill cannot carry.** The step at 23:30 and the end of charge at 00:29 are obvious at two-second resolution. A 30-minute demand block would blur them into two or three averages, and a monthly bill into nothing at all.

A worked illustration, not a measurement. If 20 vehicles with chargers like this one were all plugged in at the end of a shift, the first 45 minutes would add about $20 \times 0.73 = \mathbf{14.6\ kW}$ at once. Staggering the plug-in times spreads that out. Whether it matters depends on whether that half-hour is already the plant's busiest, which only interval data from the panel can tell you.

Limits of this log

- This was the calibration run. The meter's own energy counter read zero and some voltage readings did not match, which is what the calibration then corrected. The energy figure above is worked out from the logged power, not read from that counter.
- About 9% of samples showed voltage drop-outs and were removed; the logger also had gaps, including one of about 22 minutes before charging began and about 11 minutes in total during charging.
- The meter's clock had not been set, so its timestamps carry a default date; the times of day are correct.
- One phase, one charger, one session.

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