



Single-Point Grounding for Truck Scales

In the past, I've discussed the importance of single-point grounding systems for indoor scales. The same principles apply to outdoor truck scales.

As a general rule, always strive for single-point grounding using the ground rod system from the existing AC power source. Driving a separate ground rod at the scale establishes a second earth ground that rarely shares the same zero reference as the existing earth ground for the AC power system. This difference in electrical potential invites ground-loop current flow between the multiple grounds. For serial communication like RS-232, which depends on a stable zero reference, these current flows create havoc with data lines.

Even worse, a separate earth ground system at the scale can actually invite lightning damage!

- A powerline surge in the utility company's lines should immediately be shunted to the main ground rod. If a separate ground rod exists at the scale with a lower potential, the surge may bypass the main ground and travel out to the scale ground, possibly damaging scale equipment or load cells en route.
- Lightning striking the ground near the scale location may instantly raise the zero potential of the scale's ground rod, while leaving the main ground rod less affected. That surge will now take the path to the lower-potential ground—through the scale wiring and back to the main ground rod, possibly damaging the indicator en route.

Test Existing Ground System

I believe the best earth ground for a truck scale is a single-point system using the main earth ground rod from the incoming AC power system—assuming it's an acceptable ground. This earth ground should be a double ground rod system of two 5/8" x 8' copper rods driven 8' deep at the service entrance into the building. The local utility company can test the resistance of the existing ground rods with a clamp-on megohmmeter ground tester that measures zero resistance. If that test determines that the grounding system is not adequate (more than 3Ω), the utility company can suggest methods to improve the system. It's crucial that the scale owner authorize and make the recommended improvements to get an adequate earth ground.

Bury Conductor to Ground Rod

A separate ground wire conductor must extend uninterrupted from the main ground rod or service panel ground lug to the scale frame. This ground wire conductor must be

bare copper 10-gauge wire or larger. Bury the bare ground wire conductor from the main earth ground connection in its own trench to either the scale frame, or to a transient protection device within the junction box.

If using a transient protector within the junction box as shown in the illustration at right, tie its ground to the ground lug on the junction box, then connect that to the scale frame with 10-gauge wire. That completes the connection so the entire scale is grounded at a single point.

Load Cells and Peripherals

Any peripheral electronic equipment attached to the truck scale system must also be grounded directly back to the main ground system.

The ground terminal lug at the AC power outlet used to power the equipment is an acceptable ground connection.

An integral part of any truck scale lightning protection is a system of braided copper grounding straps on each load cell mount. These straps are designed to channel power transients on the deck around—rather than through—the load cell to ground.

Combine a system of top-notch AC and DC transient protectors with this single-point grounding and I feel you've covered all your bases. No system will prevent damage from a direct lightning hit on a truck scale, but this one gives you the best protection from nearby strikes—without causing interference problems from extra ground rods.

Doc

