

Weatherproofing Tips

Weatherproofing Tips

Even a good IP65-rated enclosure can leak if improperly assembled. (IP65 is the practical minimum for a sheltered outdoor enclosure; choose IP66/IP67 for direct weather exposure — see the canonical IP-selection guidance on *Choosing an Outdoor Enclosure*.) These tips cover the details that matter in practice.

Cable Gland Selection and Installation

Cable glands are the most common failure point. The gland must match the cable diameter - a PG7 gland seals cables 3 - 6.5mm in diameter; a PG9 gland seals 4 - 8mm. If you are buying metric M-series glands instead, note that an M-gland threads into a hole of its *nominal* diameter (an M12 gland needs a ~12mm hole, not 16mm); pick one sizing convention site-wide and stick to it (see *Cable Glands and Penetrations* for the metric-to-cable-OD table). Using a gland that is too large for the cable leaves a gap that water will find.

1. Choose the correct gland size for each cable.
2. Thread the gland body into the hole from the outside. Wrap the threads with PTFE (plumber's) tape — use PTFE tape rather than a thread-sealant compound or liquid thread locker on gland threads.
3. Tighten to firm hand-tight + a quarter turn. Over-tightening cracks plastic enclosures.
4. Route the cable and tighten the gland compression nut until the rubber seal grips the cable firmly. You should not be able to pull the cable through the gland by hand.
5. Apply a small bead of silicone sealant around the outside of the gland where it meets the enclosure wall.

Drip Loops

Water can wick along cables by capillary action and enter glands even when properly tightened. A drip loop prevents this: route the cable so it makes a downward U-shape before rising back up to the gland. Gravity pulls water off the bottom of the loop rather than letting it travel into the enclosure.

Lid Gaskets

Inspect the lid gasket every time you open the enclosure. Gaskets compress and deform over time, especially with temperature cycling. Signs of gasket failure: visible cracks, flat spots, or moisture inside a previously dry enclosure. Replace gaskets with EPDM foam tape (available at hardware stores) cut to size.

Desiccant

Even a perfectly sealed enclosure will have moisture inside from assembly in humid air. Desiccant absorbs this residual moisture and any that enters during maintenance. Use silica gel packs or indicating silica gel (blue when dry, pink when saturated). Replace annually or when the indicating colour changes.

Two ways to avoid ongoing desiccant costs. **Loose indicating silica gel beads** (not sealed inside a plug-in unit) can be oven-regenerated at about 120°C (250°F) for 2 - 3 hours — do not exceed ~125°C. **Plug-in rechargeable units** such as the Eva-Dry E-333 have a built-in heating element and are regenerated by plugging the unit into a wall outlet for 10 - 12 hours when the indicator beads change colour — never bake an Eva-Dry (or any plug-in unit with a plastic housing and electronics) in an oven.

UV Protection

Most plastics degrade in UV light. Standard ABS and polycarbonate enclosures rated for outdoor use include UV stabilisers. Generic cheap enclosures often do not. A coat of UV-resistant paint or clear coat extends the life of any outdoor plastic enclosure significantly.

Antenna Feedline Entry

The antenna coax is the most challenging cable to seal because the connector end is large. Options:

- **PG9 cable gland:** Fits most small coax (RG174, RG316). The connector must be attached after routing the cable through the gland, or the gland must be large enough to pass the assembled connector.
- **N-connector bulkhead:** Mount an N-Female bulkhead connector in the enclosure wall. Run coax from the antenna to the bulkhead outside, and a short pigtail from the bulkhead to the node inside. The bulkhead connector provides a weatherproof sealed interface. This is the cleanest approach for permanent installations.
- **SMA bulkhead:** Same concept for SMA connector systems. Inexpensive — typically a few dollars from RF parts suppliers.

Condensation Prevention

Rapid temperature changes cause moisture to condense on cold surfaces inside the enclosure. Techniques to reduce condensation:

- Mount the enclosure in a shaded location or paint it white/light grey to reduce solar heating and temperature swings. This is the right choice for hot/sunny deployments (a black box can hit 70 - 80°C internally in full sun — see *Thermal Management*). The opposite advice applies only to extreme-cold, unheated deployments, where a darker enclosure adds a few degrees of solar warmth (see *Cold Weather Operation*); do not use a dark/black enclosure anywhere that sees direct summer sun.
- Use a breathable IP-rated vent plug (available from Roxtec and others) - these allow pressure equalisation without moisture ingress, eliminating the pressure differential that drives condensation
- Maintain desiccant in good condition

Annual Maintenance Checklist

- Inspect and replace desiccant
- Check lid gasket for cracking or deformation
- Inspect cable glands for cracking and retighten if loose
- Check all wire connections for corrosion
- Inspect antenna connector and coax for water intrusion or green corrosion
- Verify solar panel surface is clean (dirt reduces output)
- Check mounting hardware for rust or loosening

Revision #3

Created 2026-05-03 03:07:54 UTC by Mesh America Admin

Updated 2026-06-08 23:28:56 UTC by Mesh America Admin