

User Manual

FarmDefender™ Depth — rock detection, all systems

Version	v3.0
Revised	2026-08-15
Applies to	All FarmDefender Depth systems (FD-45D, FD-60D, FD-84D)

FarmDefender™ Depth — User Manual

Document version: 3.0 (revised 2026-08-15) **System serial:** <SERIAL> (e.g. FD-84D-26-0001)

First time? If you haven't installed the system yet, start with the Install Guide for your machine — there is a separate one per bar width. This manual assumes the system is mounted, wired, and has booted at least once.

Quick reference

Question	Answer
Does the system need attention while seeding?	No — it's fully autonomous.
How do I know it's working?	Solid green LED on the ECU + active dashboard.
What if it stops working mid-field?	Note the time, finish your pass, then check the dashboard.
Where does the data go?	Local SSD first, then synced to FarmIQ via Starlink.
Who do I call?	(406) 271-6400 or support@farmtech.us

Daily routine

Before you head to the field

- 1. Visual check** — walk the toolbar. Cameras still aimed at the ground? Cables intact? No obvious damage from the last run?
- 2. Lens check** — wipe each camera lens with a soft microfiber cloth if there's mud or dust on it. **Do not** use solvents or abrasive cloths; the lens is glass with a coating.
- 3. Power on tractor** — implement-light circuit goes hot, system boots automatically.
- 4. Connect to dashboard** (optional, recommended for first run of the day):
 - Phone/laptop -> Starlink WiFi
 - Browser -> <http://farmdefender-depth.local:8080/>
 - Verify every camera dot is green, **GPS FIX**, and **CAPTURE ENABLED** once you're in the field
- 1. Drive.** That's it.

During seeding

The system runs autonomously. Nothing required at the cab.

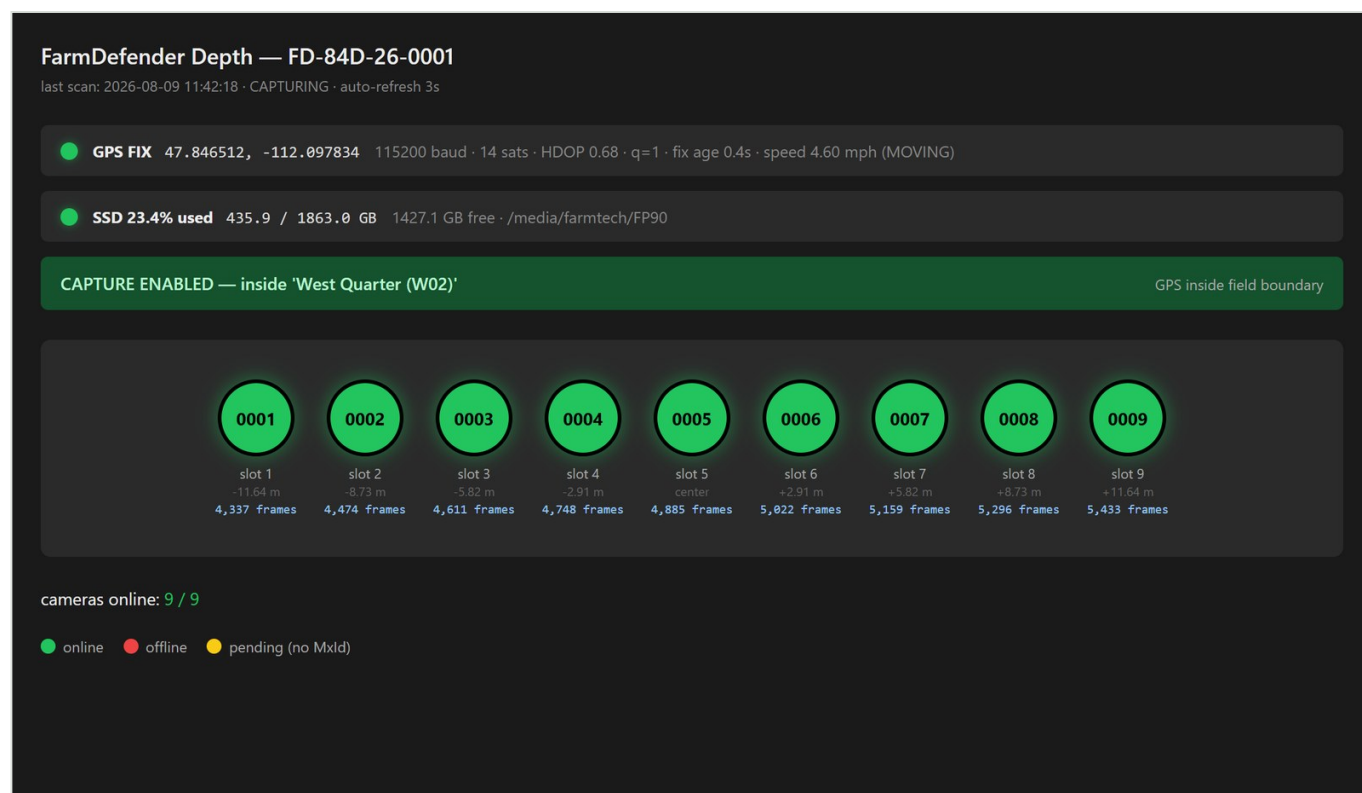
If you want to check status mid-run, you can pull up the dashboard from your phone over Starlink WiFi at any time. Most folks check once at the start of a field and don't think about it again.

End of day

- **Power down** — turn off the tractor implement-light circuit (turning off the ignition is sufficient on most tractors).
- **The SSD has all of today's data.** It survives power-off cleanly; no shutdown procedure required.
- **Sync** — when you're back in range of cell or home WiFi (Starlink also works), the system uploads any data not yet pushed to FarmIQ.

Reading the dashboard

The dashboard is served from the central ECU at <http://farmdefender-depth.local:8080/>. It auto-refreshes every few seconds; leave it open in the cab if you like.



The ECU dashboard mid-capture: GPS fix, storage, the capture gate, and one dot per camera with its live frame count.

Top to bottom:

Row	What it tells you
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Row	What it tells you
GPS	Green = GPS FIX with live position, satellite count, and ground speed. Yellow = connected but no fix yet (needs sky view). Red = receiver not responding.
SSD	Storage used on the 2 TB drive. Green under 70%, yellow to 90%, red above. A typical day burns 50-100 GB depending on how much you drove.
Capture gate	Green CAPTURE ENABLED means you're inside a field boundary and frames are being saved. Red CAPTURE DISABLED outside your boundaries — road travel doesn't fill the drive.
Camera row	One dot per camera, laid out like the bar (numbered left to right) with its bar position and a live frame counter. Green = capturing (counter climbing), red = not responding, yellow = registered but never seen. Tap a dot to view that camera's latest frame.
cameras online	The count that matters at a glance — both numbers matching while seeding. Your count depends on your system: 5 on a 45' bar, 6 on a 60', 9 on an 84' at the standard mount height.

Rock detection itself happens after upload — the ECU captures frames; the FarmTech pipeline finds the rocks and posts them to your **Rock Map** on FarmIQ (see the Rock Map User Guide).

Maintenance

Daily (during seeding season)

- **Wipe camera lenses** if dusty/muddy. 2-second job per camera, soft microfiber.

Weekly

- **Visual inspection** of all cable runs along the boom. Look for:
 - Chafing where the cable touches the bar
 - Zip-ties that loosened or broke
 - Pigtails near connectors that might have flexed too much
- **Check the ECU enclosure** — Pelican case latches still snapped, no water visible through the lid.

After every fold/unfold cycle

- **Inspect the wing uplinks** (U1 + U2) where they cross the fold hinge. Make sure they aren't binding, kinking, or pinched.

End of season

- **Power off** the system fully (disconnect from implement plug or turn off tractor master).
- **Pull the 2 TB SSD** if you want to mail it back for retraining (we provide a return label).

- Or leave it in if you've already synced everything via Starlink.
- **Inspect every connector** for corrosion. Apply dielectric grease to anything that's gotten wet.
- **Cover or store the cameras** — they're IP65, but covering helps with sun fade and bird droppings during storage.
- **Disconnect the implement plug** if the tractor is going to be parked for months.

Pre-season (next year)

- **Reverse the storage steps:** uncover, reconnect, power up.
 - **Run a 5-minute test capture** while parked to verify everything still works.
 - **Software updates** — we push improvements to the ECU remotely over Starlink; nothing for you to do beyond leaving it powered with sky view now and then.
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Troubleshooting

"One camera dot is red on the dashboard"

1. Note which camera (C1 is leftmost, counting up to the right).
2. Walk to that camera. Check the cable from the camera back to its wing switch (or to the ECU for C5).
3. Unplug + replug both ends of the bridge cable for that camera. Listen for the wedgelock click.
4. Wait 30 seconds. If the dot goes green: solved.
5. If still red: try swapping that bridge cable with a known-good one (e.g., temporarily move E1 to E2's slot). If the problem follows the cable, the cable is bad — call us.
6. If the problem stays at the position, the camera is bad — call us.

"All cameras are red, GPS is red, dashboard is unreachable"

System isn't booting or has lost power.

1. Check the tractor's implement-light circuit (key on?).
2. Check the inline fuse on the 12 V side — if it's blown, replace with a 10 A blade fuse.
3. Check that both DT-2 input plugs at the converters are seated.
4. If still no boot, call us.

"GPS won't get a lock"

1. Verify the antenna has clear sky view. Indoors / in a shed it won't lock.
2. Check the SMA connector at the ECU is finger-tight (don't crank it).
3. Check the 3 m antenna coax for damage along its run.
4. Call us if the issue persists outdoors with sky view for >5 minutes.

"Storage is at 95% — what do I do?"

1. The system **rotates** old data automatically once Starlink confirms upload to FarmIQ. So 95% usually means you've been out of Starlink range for a while.
2. Park where the Starlink Mini can see sky. Wait an hour. Storage should drop.
3. If storage doesn't drop, your Starlink isn't connecting — check the Starlink router/antenna.
4. Worst case, call us — we can fly out a swap SSD overnight.

"Starlink shows offline"

1. Check the Starlink antenna has sky view + isn't blocked by a building / tree.
 2. Verify Starlink router has power (its own LED).
 3. Check the FD-PWR-SL cable from the converter to the Starlink router.
 4. Walk through the Starlink app's troubleshooting if the FarmDefender side seems fine — usually it's a Starlink network issue, not a FarmDefender one.
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Support

Phone: (406) 271-6400 **Email:** support@farmtech.us **Your rock maps:** log in at <https://farmiq.ai> -> FarmDefender -> Rock Map (see the Rock Map User Guide)

Remote support

If you give us permission, we can remote into your ECU over Starlink and diagnose without you having to do anything. Just call and say "you can remote in" — we'll handle the rest.

Reporting an issue

When calling or emailing, please include:

- **System serial** (FD-<width>D-<YY>-<####> from the build record card)
- **What happened** + when (date + approximate time)
- **What's red on the dashboard** (if anything)
- **What you've tried** (if anything)

A quick screenshot of the dashboard is worth a thousand words.

Warranty

- **1 year** on FarmTech-supplied hardware (cameras, ECU, switches, cables, mounts) from ship date.
- **Year-1 Starlink service** included; service transfers to your account afterward.
- **AI model** retrained on your fields at the end of season 1 — included.

Damage from impact, water ingress beyond IP65 rating, or modifications void warranty. Wear items (zip-ties, split-loom, cleaning cloths) are not warrantied.

What's NOT supported (yet)

- **Over-the-air firmware updates** — Year 1 we update via remote SSH; Year 2+ we'll have proper OTA.
 - **In-app rock picker bookings** — works on phone via FarmIQ portal but the standalone app is in beta. Use the web portal for now.
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Appendix A: Hardware reference

For the curious or for deep diagnostics:

- **Cameras:** sealed stereo-depth AI cameras with active IR illumination, 97° HFOV, IP65 aluminum housings
- **Compute:** FarmTech central ECU (64-bit embedded Linux)
- **Storage:** 2 TB solid-state drive
- **GPS:** GPS + BeiDou receiver with SBAS corrections (single-band L1)
- **Network switches:** 5-port industrial PoE switches (12-48 V wide-range input) — one in the ECU plus one per wing
- **Power:** 2x 480 W 12V->48V DC-DC converters, 10 A primary fuse on 12 V side
- **Connectivity:** Starlink Mini (Year 1 included)
- **Safety:** Class 1 IR laser dot projector on each camera (per IEC 60825-1) — eye-safe at all viewing distances. **Don't stare directly into the camera lens at close range.**

For the full BOM, schematics, and cable schedule, contact FarmTech.

Appendix B: Compliance

- **FCC:** the central ECU contains FCC ID **2ABCB-RPI5**. IC: **20953-RPI5**.
- **IP rating:** Cameras and wing switch boxes IP65; central ECU enclosed in IP67-rated Pelican 1200.

- **Operating temperature:** -20°C to +60°C (-4°F to +140°F). Outside this range we don't guarantee operation.
 - **Storage temperature:** -40°C to +80°C.
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