

MGM4000 Magnetic Gradiometer — User Operating Guide (Tablet-Powered Version)

1. Introduction

The MGM4000 is a dual-sensor magnetic gradiometer designed for field exploration, archaeology, treasure hunting, UXO detection, and geophysical surveys. It features a vertical tube design with a top-mounted handle and connects directly to a tablet for power, control, GPS integration, and data logging.

Key Features:

- Dual Tri-axial magnetic sensors (0.5 m baseline).
- Tilt correction and heading correction.
- Tablet-powered via USB (no internal battery).
- Tablet-integrated GPS with external chest harness-mounted antenna.
- OLED display shows top, bottom, gradient, and bubble level.
- MGM Tablet App handles logging, heatmaps, and KMZ export.

2. Safety Notes

- Operate away from vehicles, fences, powerlines, and large steel structures.
- Do not drop or strike the unit as the sensors are very sensitive to shocks.
- Keep away from strong permanent magnets.
- Store dry; avoid condensation inside sensor tube.
- Use only approved USB cable and tablet connection.

3. System Overview

- Vertical sensor tube (24" acrylic with sensors at each end)
- Top-mounted handle (round grip with aluminum strap/channel mount).
- Top sensor just below carry handle.
- Bottom is located 0.5 m below top sensor.
- Tilt sensor.
- OLED display with bubble level overlay.
- USB connection to tablet (provides power + data).
- External GPS antenna on chest harness (integrated to tablet).
- TerraXMapper App for survey control, logging, and maps.

OLED Layout;

T: [Top field nT]

B: [Bottom field nT]

G: [Gradient nT]

[Bubble level indicator]

4. Setup & Preparation

- Mount GPS antenna securely to chest harness.
- Connect MGM4000 to tablet via USB cable.
- Open TerraXMapper Tablet App.
- Select correct COM port and confirm connection.
- Tilt calibration: Place tube bottom flat on ground; run site calibration per instructions in the app.
- Compass/heading correction: Rotate vertical tube slowly in a circle at startup.
- Tap Start Recording in app to begin survey logging.

5. Field Operation

A. Basic Walk-Over Survey

- Hold tube vertically with handle at top, bubble centered.
- Walk in straight lines across site (pre-planned grid pattern recommended).
- Keep bottom sensor 3–18" above ground consistently.
- Tablet app logs gradient + GPS, displays heatmap.
- After survey, stop recording in the app.

B. Swing Mode (Like a Detector)

- Hold tube vertically, gently swing vertically-held unit side-to-side at ~3–6" ground clearance.
- Tilt/heading correction stabilizes readings.
- OLED shows gradient, tablet logs anomaly data.
- Strong anomalies appear as spikes on tablet graph/heatmap.

C. GPS Grid Survey

- Mark survey area in app; follow parallel transects.
- Keep bubble centered and chest antenna upright.
- TerraXMapper app integrates GPS with gradient data, generates live heatmap.
- Export CSV or KMZ (Google Earth overlay) from app after survey.

6. Calibration & Maintenance

- Firmware updates: Load new.uf2 to internal computer via USB.
- Inspect cables and connectors regularly for wear and positive connection.

7. Special Functions

- Measurements of anomalies size and distance from known points.
- Special data point eraser function to eliminate erroneous or unwanted data.

7. Troubleshooting

Symptom	Fix
No COM detected	Reseat USB cable, check drivers, select COM port in app
No GPS coordinates	Ensure chest antenna connected, move to open sky
Tilt unstable	Secure unit, recalibrate in app
Excess noise	Move away from metallic objects or EMI sources

8. Practical Use Cases

- Archaeology site mapping (walls, ditches, kilns)
- Treasure cache hunting (large ferrous anomalies)
- UXO clearance surveys
- Environmental hazard detection (buried drums, tanks, pipelines)
- Geological mapping (faults, dikes, magnetite lenses)
- University teaching & training
- Caves/tunnels