

PigeonGrid Scanner - Commissioning & User Manual

For the mobile PigeonGrid BLE / GPS / LTE-M scanner

PigeonGrid
Know Every Flight.

1. Quick start

The PigeonGrid Scanner is normally delivered fully configured, with SIM card installed and ready for use. No WiFi network, phone or separate app is required for daily operation.

Important before first use

Fully charge the scanner before its first deployment. Then place it in the agreed position in the transport vehicle and make sure it is not completely shielded by metal.

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1. Fully charge the scanner through the charging port using the intended charging cable.
2. Mount the scanner securely and keep it dry in the transport vehicle, as centrally as possible relative to the rings to be scanned.
3. Switch on the scanner. BLE scanning, GPS/GNSS and the mobile connection start automatically when an active cycle begins.
4. When operating on battery, wait until the next hourly point around minute :50. After switch-on, the scanner may first align itself to this fixed schedule.
5. After the active cycle, check in PigeonGrid that the scanner has sent a current status, position and any ring observations.

No WiFi required

No WiFi required

Normal operational data is sent through the built-in SIM card and LTE-M. WiFi is only used for service/installation and, on fixed power, may be used for firmware updates.

What does the scanner do automatically?

- Scans via Bluetooth for active PigeonGrid rings.
- Determines the scanner position via GNSS/GPS and GLONASS.
- Connects to the mobile network independently.
- Sends ring observations, scanner status, battery status and diagnostics to PigeonGrid.
- Periodically checks whether new firmware is available.
- On battery power, returns to deep sleep after each cycle to save energy.

2. Battery operation

The mobile scanner is designed for long periods of autonomous operation. Instead of staying online continuously, it follows a fixed hourly rhythm on battery power. This saves both battery and mobile data.

Fixed cycle around minute :50

Before :50 Sleep mode - very low consumption	Around :50 Scanner wakes - BLE + GPS + LTE-M start	During wake Minimum about 2 min - GPS max. about 3 min - absolute limit about 5 min	Afterwards Send data - modem/GNSS off - sleep until next :50
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This is normal

Outside the active window, the scanner does not need to remain continuously "Online". In PigeonGrid it may be shown as Sleep mode. This means the power-saving function is working correctly.

What determines the wake duration?

- The scanner remains active for at least about 2 minutes to provide enough opportunity for ring scanning.
- If GPS does not yet have a usable fix, the cycle may last longer; GPS waiting time is limited.
- When new ring observations are received, the scanner waits briefly to include additional observations.
- With temporarily poor mobile coverage, sending may take longer, but the normal cycle has an absolute time limit to protect the battery.

After charging or disconnecting USB

When the scanner was started on USB/fixed power and is then disconnected, production firmware automatically recognises that it must continue on battery. It aligns itself to the next fixed :50 point.

Expected battery life

The scanner is designed for several days of autonomous use. With the larger production battery, the target is about 8 days per charge. Actual duration depends on mobile coverage, GPS reception, temperature, the number of ring observations and the time required by the modem to connect.

3. Placement, charging and status

Placement in the transport vehicle

- Place the scanner centrally relative to the rings it must be able to detect.
- Mount it securely so it cannot move or fall while driving.
- Do not place it in a fully closed metal cabinet; metal weakens Bluetooth, GPS and LTE-M.
- Keep the scanner and connectors dry. Do not treat the housing as waterproof unless this is explicitly stated for the supplied model.
- Avoid prolonged extreme heat, for example directly behind glass in full sun.

Charging

Use the intended charging port and a suitable USB power supply. Fully charge the scanner before transport. Preferably do not store it for long periods completely discharged.

Battery percentage is an estimate

Li-ion voltage is not a perfectly linear fuel gauge. The displayed percentage is intended as a practical indication.

For planning, measured real-world operating time is the leading indicator.

Status in PigeonGrid

Status	Meaning	Action
Online	Scanner is awake and has made recent contact.	No action.
Sleep mode	Normal power saving between two hourly cycles.	No action.
Wake window	The next heartbeat/data is expected around this time.	Wait a few minutes.
Offline	No expected heartbeat was received after the wake window.	Check battery, coverage and placement.

RESET and installation mode

Do not press RESET three times quickly

Three quick RESET actions intentionally open installation mode. This is intended for installation/service, not normal daily use.

If a restart is needed, press RESET once and then wait at least 10 seconds. Change Device ID, PigeonGrid key, APN or SIM settings only in consultation with the supplier.

4. Troubleshooting

Most irregularities are related to battery, mobile coverage, GPS reception or the fixed hourly schedule. Check the points below before changing the configuration.

Problem	Check	Action
No new data	Was the scanner just switched on? Is it still before the next :50?	Wait until :50 plus a few minutes.
Scanner stays offline	Enough battery? LTE-M coverage? Scanner not fully enclosed by metal?	Charge/reposition; then press RESET once.
No GPS fix	Indoors, under metal or with poor sky view GPS may be delayed.	Move to a better position; the last valid position may remain visible.
Ring not detected	Is the ring active in PigeonGrid and within Bluetooth range?	Check ring registration and scanner placement.
Setup WiFi visible after RESET	RESET may have been pressed quickly several times.	Do not reset again; wait or contact the supplier.
Battery drains faster	Poor mobile coverage/GPS can extend active time.	Check coverage and compare use over several days.

When to contact support?

- The scanner misses several scheduled hourly cycles in succession while the battery is sufficiently charged.
- The scanner becomes unusually warm or the battery/housing shows damage.
- The SIM or mobile connection repeatedly fails in locations where coverage is normally available.
- A firmware update or installation mode is required.
- The scanner must be linked to another customer, unit or PigeonGrid configuration.

Support

In case of faults, contact the supplier. Always state the Scanner ID (for example PGS-0002) and, if visible, the firmware version and the time of the last successful connection.

5. System overview and management

What is in the system?

ESP32 / LILYGO T-SIM7000G	Control, Bluetooth scanning and power management.
SIM7000G + SIM card	LTE-M mobile data connection without phone or local WiFi.
GNSS / GPS + GLONASS	Determines scanner position and reports satellite status.
Bluetooth Low Energy	Detects active PigeonGrid rings near the scanner.
Li-ion battery	Powers the scanner during autonomous mobile use.
PigeonGrid Scan server/API	Receives observations, status, location, battery and firmware data.
OTA firmware management	Enables remote maintenance and firmware updates.

Management and mobile data

The scanner uses a managed SIM and server connection. The user does not need to maintain a data bundle, APN or server settings. Depending on the agreed service, annual management includes mobile data, server/API, website management, storage and processing, firmware/software updates, licences and technical management. Actual mobile data use is measured per scanner unit.

Privacy and use

The scanner collects technical scanner data, the scanner location and observations of rings that are active for scanning within the PigeonGrid system. Use the system only for the agreed purpose and in accordance with the organisation/supplier arrangements.

Firmware

Production version for this manual: final-4.1.0, build 443. Later firmware may improve functions, power management or diagnostics without changing the basic user operation.