

PhloMetric Water Gateway

User Manual

Firmware 0.1.58 · June 2026 · PhloMetric Water Meter System by Competition Software

1. What the Gateway Does

The PhloMetric Water Gateway is the hub of a multi-Node site. It does not decode water meters itself; instead it manages a fleet of PhloMetric Water Meter Nodes over a 433 MHz mesh radio and:

- Collects the default-meter readings every Node pushes
- Archives them to a MySQL database through the Windows ingest service (optional, off by default)
- Sends a consolidated **"By Node" email report** covering every reporting Node
- Lets you administer remote Nodes (query, configure, reboot) over the mesh, even Nodes that have no WiFi of their own

A single standalone Node does not need a Gateway. The Gateway matters when you want one place to watch, archive, and manage a whole site.

2. Getting Started

2.1 First connection

1. Power the Gateway. It broadcasts a WiFi access point named **PhloMetricGateway**.
2. Join it using the WiFi access-point password (factory default `phoa1234`) and browse to **`http://192.168.4.1`**. This is the live dashboard.
3. Configuration lives at **`/setup`**, behind a login using the Setup password (factory default `phoa1234`). Sessions last 24 hours and reset when the Gateway reboots.

The `PhloMetricGateway` access point stays on permanently. Besides being your fallback way in, it serves a second purpose: distant Nodes that cannot reach your house WiFi can join the Gateway's own access point instead.

2.2 Joining your network

The Gateway also connects to your home WiFi as a client, which is how it reaches the internet (for time sync and email) and your database PC. WiFi credentials are set over the USB serial console during installation. Once joined, browse to the address your router assigns.

2.3 Time zone

On `/setup`, the **Time Zone** card holds a POSIX TZ string (US presets for Mountain, Central, Pacific, Eastern, and UTC are listed on the page). It is applied immediately on save, no reboot, and handles daylight-saving transitions automatically. The card shows the Gateway's current local wall-clock so you can confirm it is right. Timestamps sent to the database and the email schedule both use this zone.

2.4 Passwords

The Gateway has two independent passwords, each shipping from the factory as `phoa1234`. Change them on `/setup`, under **Passwords**; every change requires the current value for that password.

- **AP / OTA** secures the `PhloMetricGateway` WiFi access point and over-the-air firmware updates. It must be 8 to 63 characters (a WiFi requirement). Changing it reboots the Gateway and disconnects anything joined to its access point, including far Nodes that associate through it.
- **Setup** gates the `/setup` login. Changing it logs you out, so you sign back in with the new value.

If you forget the Setup password, click **Reset all to default** on the Setup page and enter the current AP/OTA password; both return to `phoa1234` and the Gateway reboots. If the AP/OTA password is also lost, recover over the USB serial console: `setpw setup <new>` sets the login password, and `resetpw` returns both to `phoa1234`.

3. The Dashboard

The front page auto-refreshes every few seconds and shows:

- Firmware version, network link status, and IP address
- **Ingest health**: whether the last push to the database PC succeeded, the queue depth, and totals sent and dropped
- **Client roster**: every Node heard since boot, with its ID, signal strength, link quality, packet count, and last-seen age. Nodes that reach the Gateway only through a relay show `relay` in place of a signal reading.

The roster is rebuilt from live traffic after each reboot, so an empty table right after power-up is normal; Nodes reappear as they check in.

Forgetting a Node

Each roster row carries a checkbox. Tick one or more Nodes and press **Delete selected** (a confirmation lists them first) to drop those Nodes from the Gateway. This clears the Gateway's in-RAM roster entry and the meter data it has cached for them. It is RAM-only housekeeping: a Node that is still transmitting reappears on its next packet, and nothing already written to the database or saved in the email baselines is touched. Use it to clear out Nodes you have retired, or stale test and duplicate entries, without rebooting the Gateway.

4. Managing Nodes over the Mesh

All Node administration is on `/setup`. Every card takes a **target node** number (1 to 254). These commands travel over the 433 MHz mesh, so they work on Nodes with no WiFi, as long as they are in radio range.

Card	What it does
Set Default Meter	Tells a Node which utility meter serial to publish and forward. Valid serials: 0 (clear), 30,000,000 to 89,999,999, or 110,000,000 to 189,999,999.
Set Protocol	Switches a Node between GIF2006B, GIF2014WOSE, and GIF2020OCECNA. The Node saves the setting and reboots.
Ping	Lightweight reachability test.
Clear DB	Wipes the Node's stored meter readings (RAM and flash). Settings survive.
Reboot	Restarts the Node; the standard cure for a Node whose WiFi has wedged.
Query Node Status	One round-trip that returns the Node's default meter, protocol, last reading, decode signal strength, age, and sampling state. Uses a long reply, so it can drop for Nodes at the edge of radio range.
Per-field Queries	Seven buttons (ID, protocol, volume, frequency, RSSI, age, sampling) that each fetch one field with a very short reply. Far more reliable at weak signal. Requires Node firmware 2.11.35 or later; older Nodes simply ignore them.
Pause / Resume Sampling	Halts or restarts a Node's meter-decode radio. The mesh link stays alive while paused. Not persisted: a Node reboot resumes sampling.

Background behavior you will observe

- **Keepalive:** the Gateway pings every known Node once a minute. This keeps far Nodes' receivers locked and keeps the roster's last-seen ages fresh.
- **Relays:** a Node whose direct push goes unacknowledged re-sends the reading through a neighbor. The Gateway unwraps relayed readings, credits the originating Node, and de-duplicates so a reading that arrives both directly and via relay is only recorded once.
- **Polled pull** (optional): the Gateway can actively poll listed edge-of-range Nodes every 5 minutes and record what they report, for Nodes whose own pushes are unreliable. Configured via the `poll_nodes` field of the configuration API.

5. Recording to a Database

The Gateway batches readings, Node roster snapshots, and events, and POSTs them as JSON to the **PhloMetric Water Ingest Service** running on a Windows PC, which writes them into MySQL. The installer, schema script, and ODBC driver are at <https://eheuristics.com/download.html>.

On `/setup`, the **Database Host** card holds:

- **Host IP and port** of the PC running the ingest service (default port 41290)
- **Mesh ID** (informational today; reserved for multi-mesh sites)
- **API token**: optional shared secret sent with every push; leave blank to keep the existing one
- **Record to Database** checkbox: the master switch, **off by default**. Until you check it, no rows are written anywhere. Everything else (roster, emails, mesh commands) works regardless.

Delivery is store-and-forward: readings queue in the Gateway and flush every 5 seconds. If the PC is down, the queue holds the most recent readings and retries; the dashboard's ingest panel shows the last HTTP result and queue depth, so a glance tells you whether data is landing.

6. Email Reports (By Node)

The Gateway emails a consolidated usage report that groups every meter heard, by the Node that heard it. This complements the per-Node emails: each Node can mail its own meter's report, while the Gateway's report covers the whole site.

On `/setup`, the **Email Reports - By Node** card:

- **Interval**: Off, Daily, Weekly (Mondays), or Monthly (1st)
- **Send time**: local wall-clock, default 08:30 so it lands after the per-Node emails
- **Recipients**: up to 16 addresses, managed with Add and Remove
- **Send Now**: emails the current state immediately. A manual send never advances the usage baselines or disturbs the schedule, so the next scheduled report still shows the true interval usage.

Each report shows, per Node and meter: the current reading, usage this interval, signal quality, and last-seen age, plus site totals. New meters show *establishing baseline* on their first report; meters that went silent show *no fresh data this interval* instead of a misleading zero.

Scheduled sends that were missed (for example, the Gateway was powered off at 08:30) are caught up automatically when it next comes online. Email requires internet and a successful time sync; the status line under the card shows both, plus the result of the last attempt.

7. Firmware Updates

1. Browse to `http://<gateway-ip>/update`, choose the supplied `.bin` file, and upload. Or from a command line: `curl -F firmware=@gateway.bin http://<gateway-ip>/update`
2. The Gateway reboots itself when the flash completes.

Unlike the Node, no radio-pause step is needed; the mesh keeps running during the upload. Note that after a Gateway reboot, any far Nodes that join through the `PhloMetricGateway` access point drop off briefly and rejoin on their own.

8. HTTP API Quick Reference

All endpoints are on port 80. `/setup` and the configuration writes require the login session.

Endpoint	Method	Purpose
<code>/</code>	GET	Dashboard (HTML)
<code>/setup</code>	GET	Administration page (HTML, login)
<code>/update</code>	GET/POST	Firmware update form / upload
<code>/api/gw-diag</code>	GET	One-stop diagnostics: radio state, queue depths, keepalive and poll counters, uptime, firmware
<code>/api/clients</code>	GET	Client roster as JSON
<code>/api/clients/delete</code>	POST	<code>{node_id}</code> — forget a Node: clears its roster slot and cached meter data (RAM only)
<code>/api/rxlog</code>	GET	Last 24 received mesh frames, for link debugging
<code>/api/config</code>	GET/POST	Read or write configuration (ingest URL, token, TZ, poll_nodes, record_db)
<code>/api/passwords</code>	POST	Change one password (login plus current value)
<code>/api/passwords/reset</code>	POST	Reset both passwords to the factory default (current AP password)
<code>/api/cmd/set-default-meter</code>	POST	<code>{node_id, meter_id}</code>
<code>/api/cmd/set-protocol</code>	POST	<code>{node_id, protocol}</code> (223, 282, or 290)
<code>/api/cmd/ping</code> <code>/api/cmd/clear-db</code> <code>/api/cmd/reboot</code>	POST	<code>{node_id}</code> housekeeping commands

Endpoint	Method	Purpose
/api/cmd/query-status	POST	{node_id}, full status reply
/api/cmd/get-dm-id ... get-sampling	POST	{node_id}, per-field queries
/api/cmd/set-sampling	POST	{node_id, enabled}
/api/email	GET/POST	Email schedule and status
/api/email/add_recip /api/email/del_recip	POST	Manage recipients
/api/email/send_now	POST	Send a report immediately
/api/email/preview	GET	The live per-(Node, meter) registry with the exact numbers the email uses, for reconciling against the database

A machine-readable specification is published at <https://eheuristics.com/api/gateway.json>.

9. Troubleshooting

A Node is missing from the roster. The roster resets at every Gateway reboot and repopulates from traffic. If a Node stays absent, check its dashboard's GW link readout at its mounting spot; consider relocating either device, or rely on a neighboring Node to relay for it.

Roster shows the Node but readings are not in the database. Check the three gates in order: the **Record to Database** box must be checked, the ingest panel on the dashboard must show a recent successful push (HTTP 200), and the ingest service log on the PC (C:\ProgramData\PHOA\IngestService\service.log) must show rows arriving.

Query Status times out for a far Node. Use the per-field query buttons instead; their short replies survive weak links that drop the full status reply.

Emails are not arriving. The status line must show *online* and a good time sync, which require the Gateway's WiFi client connection to the internet. Check spam for the first report.

Local time on the Time Zone card is wrong. Re-check the POSIX TZ string against the presets listed on the page, save, and confirm the *Now (local)* readout updates. No reboot is needed.

A Node's WiFi is wedged but the mesh still sees it. Send **Reboot** from the housekeeping card; recovery takes about half a minute.

10. Factory Behavior Summary

Setting	Default	Survives reboot
Record to Database	off	Yes
Ingest port	41290	Yes
Time zone	US Mountain	Yes
Email report	Off, 08:30 local	Yes
Email recipients	none (max 16)	Yes
Keepalive ping cycle	every 60 s	fixed
Ingest flush	every 5 s	fixed
Client roster / meter registry	rebuilt from live traffic	No (RAM only)
Login sessions	cleared at boot	No
AP/OTA and Setup passwords	phoa1234 each	Yes