KL-OSIRIS USER GUIDE

UG-KL-OSIRIS-2V0 – JUNE 2026

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INTRODUCTION

KL-Osiris is a desktop application for reading and visualizing data from SenseID smart sensor tags. It supports multiple reader technologies (RAIN RFID, BLE, NFC) and provides real-time charting, data persistence, and forwarding to external systems via MQTT, NATS, or raw TCP/UDP sockets.

KEY CAPABILITIES

- Real-time inventory of SenseID sensor tags
- Live multi-series chart, WebGL-accelerated for large datasets
- Automatic reader discovery (mDNS, serial, PC/SC)
- Local SQLite persistence with PNG, CSV and Parquet export
- Live forwarding to MQTT, NATS or raw TCP/UDP endpoints
- Cross-platform (Windows, macOS, Linux), with light and dark themes

INSTALLATION

WINDOWS

Run the installer (`KL-Osiris-Setup.exe`) and follow the on-screen instructions. A desktop shortcut will be created automatically.

MACOS

Extract the application bundle and run the `osiris` executable.

LINUX

Extract the tarball and run the install script:

```
tar xzf KL-Osiris-linux-*.tar.gz
cd KL-Osiris
sudo ./install.sh
```

DATA LOCATION

Application data (configuration, database, logs) is stored in:

Platform	Path
Windows	`%LOCALAPPDATA%\Kliskatek\osiris\`
macOS	`~/Library/Application Support/Kliskatek/osiris/`
Linux	`~/.local/share/Kliskatek/osiris/`

GETTING STARTED

The minimum path from launch to live data is six steps. Once you have done it once, the application remembers the last connection and persists every reading to the local database, so subsequent sessions are even shorter — you only need to press **Play**.

1. **Launch KL-Osiris.** On Windows, use the Start menu shortcut or the desktop icon created by the installer. On macOS, double-click the app bundle. On Linux, run `osiris` from a terminal or your application launcher.
2. **Wait for the Reader Connection dialog.** It opens automatically when there is no reader connected yet. If you close it by accident, the empty reader info area on the top-right of the Reader Bar will re-open it on click.
3. **Pick a reader.** Click any entry under *Discovered Readers* if your device shows up; otherwise fill the *Manual Connection* fields below (see Connecting a Reader for details).
4. **Click Connect.** A spinner appears while the driver negotiates with the reader. On success the dialog switches to the connected view with the reader's identity card; on failure an error banner explains why.
5. **Press the Play button** at the left of the Reader Bar to start the inventory loop. The button turns red while inventory is running.
6. **Watch tags populate the Tag List.** Click any row to open the chart and details for that tag.

MAIN INTERFACE

The KL-Osiris window is organised around a single live workspace. There are no separate views or pages — everything you need (reader control, tag inventory, sensor readings and historical chart) is visible at the same time so you can keep an eye on the whole acquisition at a glance.

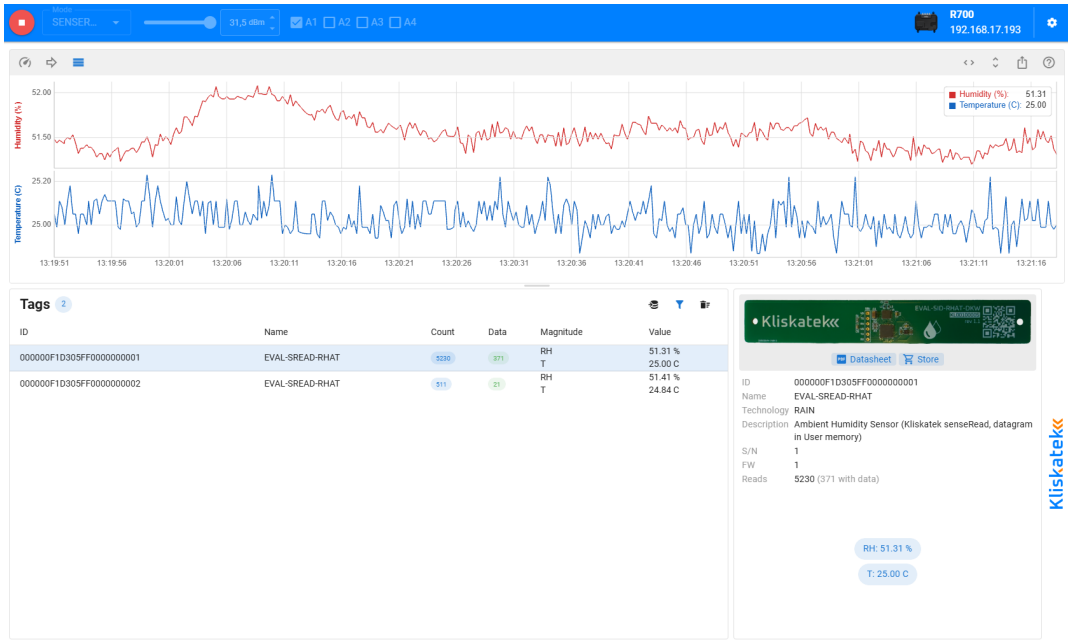


Figure 1: Interface layout

The window is divided into the following areas:

Area	Description
Reader Bar (top)	Inventory start/stop, mode selector, TX power, antenna selection, reader info, and settings entry-point.
Chart (center)	Real-time, WebGL-accelerated visualization of the sensor data carried by the currently selected tag.
Tag List (bottom-left)	Live table of every tag detected during the current session, with its identifier, name, read count and the latest decoded values.
Tag Details (bottom-right)	Product image, metadata (technology, S/N, FW) and decoded sensor values for the selected tag.
Status Icons (bottom-right corner)	Subtle indicators that light up when data forwarding is active (database persistence, MQTT, NATS, raw socket).

The boundary between the chart and the tag list is a draggable divider: drag it up or down to resize, or **double-click** it to collapse the chart entirely (useful when you want to see more tags at once) and double-click again to restore it. The Chart and Tag Details panels are only shown when a tag is selected in the Tag List; clicking an already-selected tag deselects it and gives the Tag List the full width.

CONNECTING A READER

The Reader Connection dialog is the entry point for every acquisition. KL-Osiris opens it automatically on startup if no reader is connected, and from then on you can re-open it at any time by clicking on the reader info area (top-right of the Reader Bar). The dialog lists every reader the discovery service has found on the host, lets you connect to one of them with a single click, and accepts manual entries when the reader is not auto-discoverable (e.g. it lives on a different subnet).

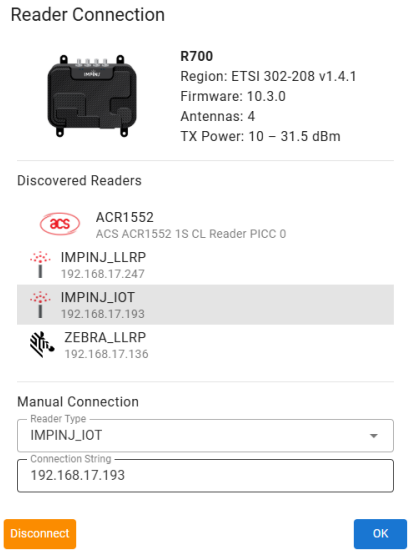


Figure 2: Reader dialog

AUTO-DISCOVERY

A background scanner runs continuously while the application is open and feeds the **Discovered Readers** list. Three discovery mechanisms are used in parallel, one per family:

- **Network readers** (Impinj Speedway / R420 / R220 / R120, Impinj R700, Zebra FX9600 / FX7500): discovered via mDNS broadcasts on the local network.
- **Serial readers** (NordicID Sampo / Stix, Phychips RED4S, Kliskatek BLE Reader): discovered by monitoring USB/serial port enumeration. Plugging the reader in while KL-Osiris is open will make it appear in the list within a couple of seconds.
- **NFC readers** (ACS ACR1552): discovered via the PC/SC service. The Windows / macOS system smart card service must be running.

Click any entry to populate the manual fields below; then press **Connect**.

MANUAL CONNECTION

If the reader is on a different network, behind a router, or otherwise invisible to the auto-discovery, fill in the lower half of the dialog manually:

1. Select the **Reader Type** from the dropdown — see Supported Readers for the full list of driver IDs.
2. Enter the **Connection String**: an IPv4 address for network readers (e.g. `192.168.1.100`), or a serial port name for USB devices (e.g. `COM3` on Windows, `/dev/ttyUSB0` on Linux).
3. Click **Connect**.

If the connection fails, an error banner appears under the Reader Bar with the underlying cause (timeout, authentication, unreachable host, etc.).

READER DETAILS

Once the connection is established, the upper portion of the dialog is replaced by a summary card with the reader's full identity:

- Reader **model** and a product image.
- **Region** (regulatory band, e.g. EU, FCC).
- **Firmware** version reported by the device.
- **Antenna count** — determines whether the antenna toggles appear in the Reader Bar.
- **TX power range** — the minimum and maximum dBm values accepted by the device; the Reader Bar slider is clamped to this interval.

Click **Disconnect** to release the reader, or **OK** to close the dialog and keep the connection alive.

READER CONTROLS

Once a reader is connected, the Reader Bar becomes the main control panel. From left to right it exposes the inventory toggle, the mode selector (when applicable), the transmit power, and the antenna selection. Controls that don't apply to the current reader are hidden automatically — for example, the antenna toggles disappear on single-antenna readers and the TX power slider is hidden on NFC readers, which transmit at a fixed level.

Figure 3: Reader bar

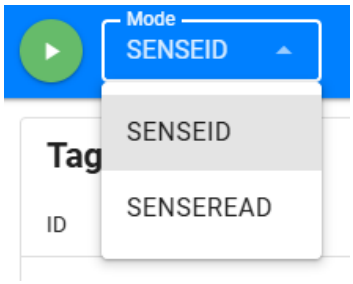
Control	Description
Play / **Stop** button	Starts or stops the inventory loop. While running, the button turns red and shows a stop icon; click again to halt.
Mode selector	Chooses the reader's operating mode (see Reader modes below). Hidden when only one mode is supported.
TX Power slider + input	Adjusts the transmit power in dBm. Use the slider for coarse changes or type a value directly. The arrows step in 0.5 dB increments.
Antenna checkboxes	Enables or disables each physical antenna port. Useful when the reader has multiple antennas pointing at different areas. Shown only for multi-antenna readers.

A few constraints apply:

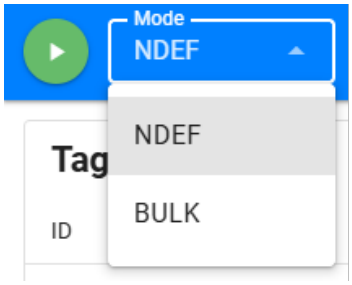
- **TX Power, antenna configuration and mode can only be changed while inventory is stopped.** All of them are disabled (greyed out) while the inventory is running, because changing them mid-acquisition would invalidate the data.
- The TX power value is **clamped to the reader's supported range** (e.g. 10 dBm to 32.5 dBm on Impinj Speedway). Values outside that range are rejected on save.
- The antenna configuration must enable at least one antenna; deselecting all of them is silently ignored.

READER MODES

Some readers support multiple operating modes. The available options depend on the technology of the connected reader, so the dropdown content changes per family — RAIN readers expose Gen2 inventory modes, NFC readers expose tag-memory access modes. The selector itself is only shown when more than one mode is available; on single-mode readers (e.g. the Kliskatek BLE reader) it is hidden.



RAIN readers — SENSEID / SENSEREAD



NFC readers — NDEF / BULK

Figure 4: Mode selector content depends on the connected reader

Mode	Available on	Purpose
SENSEID	RAIN (IMPINJ_IOT, IMPINJ_LLRP, ZEBRA_LLRP, NURAPY, REDRCP) and BLE (KLSBLELCR)	Read SenseID tags whose sensor data is encoded in the EPC.
SENSEREAD	RAIN (IMPINJ_IOT, IMPINJ_LLRP, ZEBRA_LLRP, NURAPY, REDRCP)	Read Kliskatek senseRead and Farsens tags whose sensor data lives in User memory.
NDEF	NFC (ACR1552)	Read NDEF records from NFC sensor tags.
BULK	NFC (ACR1552)	Download the on-board sensor log from NFC tags.

The two RAIN modes differ in *where the sensor data is stored on the tag*, so they require different reader configurations:

SENSEID — data in the EPC. The default mode for standard SenseID tags (RHAT, AT, MGF, CTN families). The whole sensor payload is packed into the EPC, so the reader only needs to run a plain Gen2 inventory and every read carries a fresh sample. This is the fastest mode and the one to pick whenever the connected tags are the regular SenseID line.

SENSEREAD — data in User memory. Some tag families do not fit their payload in the EPC and instead expose a sensor datagram in the tag's User memory. KL-Osiris supports two such families under this single mode:

- **Kliskatek senseRead** tags — based on the R100 / Rocky100 silicon, identified by the SenseID PEN header and a dedicated family marker byte (the EVAL-SREAD-* family).
- **Farsens** tags — identified by the Farsens PEN header, with the sensor data laid out per the Farsens datagram spec.

In both cases the reader is configured to run an inventory *with an embedded Read on the USER bank* for every tag, so each Gen2 round returns the EPC and the latest sensor frame in a single transaction. Because the tag refreshes that User-memory buffer asynchronously, some rounds return a stale or empty datagram — the Tag List therefore exposes two counters: the total **Count** (every Gen2 read) and a separate **Data** count (only the

reads that returned a valid sensor sample). The ratio between the two is a direct measure of how fast the tag is producing fresh samples.

NDEF and BULK — NFC tag-memory access. On the NFC reader the choice is not between Gen2 strategies but between two ways of reading the NFC tag's memory. **NDEF** streams the NDEF records the tag publishes on every tap, which is the right mode for live point-of-interaction readings. **BULK** dumps the historical sensor log that some NFC tags accumulate internally, which is the right mode when you want to recover the data captured by a tag that has been logging away from any reader.

TAG LIST

The Tag List is the live inventory: every tag the reader has reported since the inventory started (or since the list was last cleared) appears here, with its identifier and the latest decoded sensor values. Each row updates in place as new reads come in; the **Count** column rolls up the number of times the tag has been seen and is a quick indicator of read rate per tag. In **SENSEREAD** mode a second counter appears next to it, **Data**, which only goes up when the read returned a valid sensor sample — typically a fraction of *Count*, because the reader hits the tag faster than its sensor refreshes the User-memory datagram. The difference between the two is the most direct way to see whether your senseRead tag is producing data fast enough for your application.

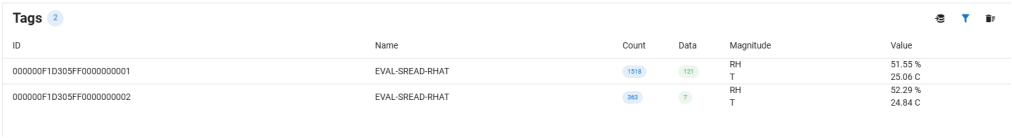


Figure 5: Tag list

The table has the following columns:

Column	Description
ID	Tag unique identifier (EPC for RAIN, MAC for BLE, UID for NFC)
Name	Product name (e.g. "EVAL-SID-RHAT")
Count	Total number of reads (every Gen2 round, regardless of whether the User-memory datagram was valid).
Data	Shown only in SENSEREAD mode: number of reads that returned a valid sensor sample. Typically a fraction of *Count* — the reader hits the tag faster than its sensor refreshes the User-memory datagram, so most reads carry stale data.
Magnitude	Sensor measurement names
Value	Latest sensor values with units

ACTIONS

- **Click a row** to select the tag and show its chart and details
- **Drag rows** to manually reorder tags
- **Filter button** (funnel icon): Toggle between showing all tags or only SenseID products
- **Database button** (import icon): Open the Load from Database dialog
- **Clear button** (sweep icon): Clear all tags from the list

SORTING

Click column headers to sort by that column — ascending on the first click, descending on the second. Manual drag-and-drop reordering overrides column sorting; to go back to column-based sort, click any header again.

TAG DETAILS

Selecting a tag in the Tag List opens the Tag Details panel on the right. It is the place to consult the tag's identity card and its latest decoded reading at a glance. When a known SenseID product is selected, the panel also surfaces direct links to its datasheet and the Kliskatek store page so you can jump from a live measurement to its reference documentation without leaving the app.

The panel shows:

- A **product image** (for recognised SenseID products) — useful for confirming which physical tag you are looking at.
- **Datasheet** and **Store** buttons, shown only when those URLs are known for the product. They open the corresponding page in the system default browser.
- Tag **ID**, **name**, **technology** (RAIN / BLE / NFC) and a short product description.
- **Serial number** and **firmware version**, when reported by the tag.
- **Read count** — the same value shown in the Tag List, plus a secondary count of valid-data reads when the reader runs in SENSEREAD mode (see Reader modes).
- **Live sensor values** rendered as prominent chips (e.g. *T: 23.45 ℃*, *RH: 44.1 %*). The chip text scales automatically with the available panel height — drag the divider to make them larger or smaller.

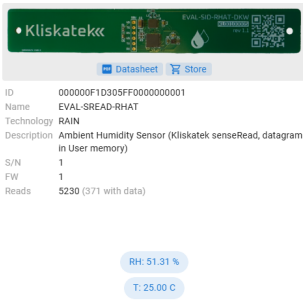


Figure 6: Tag details

CHART

The Chart panel shows the historical time-series of every magnitude carried by the selected tag — temperature, humidity, acceleration axes, capacitance, etc. The renderer is built on top of WebGL via the `regl` library, so it stays smooth even with tens of thousands of points and several concurrent series. Each magnitude is a separate series; clicking a series in the legend toggles its visibility without dropping its underlying data, so you can isolate a single curve without losing the rest.

By default all series share a single vertical axis (overlay mode). For tags that carry magnitudes with very different scales — say temperature in ℃ and capacitance in pF — you can switch to split view from the toolbar to give each series its own vertical axis, stacked vertically.

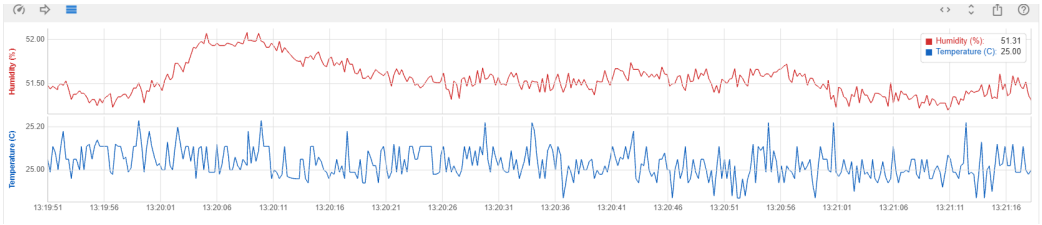


Figure 7: Chart

TOOLBAR

Button	Description
Stats (speedometer)	Show/hide statistics overlay (min, max, mean, std dev)
Auto-scroll (arrow)	Keep the chart scrolled to the latest data
Split/Overlay (layers)	Toggle between overlay (all series on one Y-axis) and split view (separate Y-axis per series)
X Cursors (vertical lines)	Enable draggable vertical cursors for time measurement
Y Cursors (horizontal lines)	Enable draggable horizontal cursors for value measurement (overlay mode only)
Export (download)	Export chart data (PNG, CSV, or Parquet)
Help (question mark)	Show chart navigation shortcuts

NAVIGATION

Action	Effect
Scroll wheel	Zoom in/out
Drag	Zoom to selection (rubber-band zoom)
Shift + drag or **Middle-click drag**	Pan
Double-click plot area	Fit all data
Double-click X axis	Fit X axis only
Double-click Y axis	Fit Y axis only
Click legend item	Toggle series visibility
Left/Right arrow keys	Pan X axis
Up/Down arrow keys	Zoom X axis
+ / **-** keys	Zoom Y axis

GAP COMPRESSION

When you stop the inventory and resume it later, or load multiple runs from the database, the resulting time axis would otherwise contain large empty gaps that compress every interesting curve into a thin strip. To avoid this, KL-Osiris automatically compresses any time gap longer than 60 seconds — the chart still reflects the real timestamps in tooltips and cursors, but those long pauses are visually shrunk so the data from the runs you actually care about fills the plotting area.

DATA EXPORT

The Export menu in the chart toolbar saves the data currently visible (or stored, in the case of CSV and Parquet) to disk. The three available formats target different downstream uses:

Format	Description
PNG	A screenshot of the current chart view at its native resolution, including axes, legend and any active cursors. Best for slides and reports.
CSV	Comma-separated values with one row per timestamp, one column per series. Universally readable by spreadsheets, Python (`pandas.read_csv`) and most scientific tools.
Parquet	Columnar, compressed binary format with explicit types. Faster to load and much smaller for long acquisitions; recommended for downstream analysis pipelines. Requires the optional pandas dependency.

Each option opens a native save dialog so you can pick the destination folder and file name. The exports always cover the **full data buffer** of the selected tag, not just the visible time window — the chart's zoom level only affects the PNG preview, not the underlying CSV/Parquet content.

LOADING DATA FROM DATABASE

When persistent storage is enabled in Settings, every tag reading is recorded into a local SQLite database. The **Load from Database** dialog lets you bring past readings back into the live workspace — useful for reviewing a previous experiment, comparing two runs, or merging historical data with a fresh acquisition. Open it with the **database import** icon in the Tag List header.

CONCEPTS: SESSIONS AND RUNS

The database organizes data hierarchically:

- **Session**: Created each time you connect to a reader. It records the reader model, driver, connection string, and timestamp. A session lasts until you disconnect.
- **Run**: Created each time you press Play within a session. A session can contain multiple runs (e.g., you start inventory, stop it, adjust TX power, and start again). Each run records its start/stop time and the tag readings captured during that interval.
- **Tag**: A unique sensor tag identified by its ID (EPC, MAC, or UID). A tag can appear across multiple runs and sessions.

Example: You connect to an R700 reader (Session 1), run inventory twice (Run 1, Run 2), disconnect, then connect again (Session 2) and run once (Run 3). The database stores 2 sessions with 3 runs total.

SEARCH FILTERS

Filter	Description
From / **To**	Date range
Technology	Filter by RAIN, BLE, or NFC
Tag ID	Partial match on tag identifier

RESULTS VIEWS

Results can be browsed in two ways:

- **By Tag**: Tag > Session > Run hierarchy
- **By Session**: Session > Run > Tag hierarchy

SELECTION

- Use checkboxes to select individual runs, entire sessions, or all runs of a tag
- Parent checkboxes show indeterminate state when partially selected
- **Select all** / **Deselect all** button for bulk selection

LOADING

Click **Load** to import the selected runs into the current workspace. Loaded data **merges** with any existing live data — the same tag picked up from a previous run and from the current inventory will end up as a single entry whose chart contains both histories. This is intentional: it lets you start an acquisition, realise you want context from yesterday's data, and pull it in without losing your current readings.

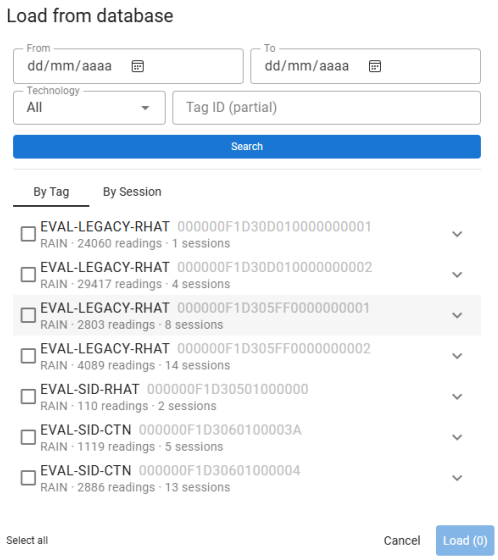


Figure 8: Load DB dialog

SETTINGS

The Settings dialog groups every application-wide preference under five tabs. Open it with the **gear icon** at the right end of the Reader Bar. Changes are applied when you click **Save**; closing with **Cancel** discards them. The theme switch is the only setting that takes effect immediately for preview purposes.

GENERAL

Setting	Description
Dark theme	Toggles between the default light interface and a dark variant. Useful in low-ambient-light environments and easier on the eyes during long acquisitions.

DATABASE (DB)

The DB tab controls the local SQLite store. The database file is created the first time the app runs and lives in the user's application data folder (see Installation for the per-platform path).

Setting	Description
Database file	Full path to the SQLite database (read-only — shown for reference).
Save data to database	Master switch for persistence. When off, the app still keeps live data in memory but nothing is written to disk.
Statistics	Live counters of the current database: total size on disk, distinct tag count, total sample count and number of runs recorded.

MQTT

The MQTT tab enables real-time publication of tag readings to an MQTT broker. This is the recommended path for integration with cloud platforms, dashboards and IoT pipelines.

Setting	Description
Enable MQTT forwarding	Master switch. When off, the rest of the fields are hidden.
Connection string	Format: `mqtt://[user:pass@]broker:1883/topic`. The topic part is appended automatically; the connection accepts both anonymous and authenticated brokers.
SenseID tags only	When enabled, only tags decoded as recognised SenseID products are published. Generic UHF / NFC tags read by the antenna are excluded — useful to keep the broker quiet when working in an environment with many unrelated tags.

NATS

NATS is an alternative messaging system, often preferred for low-latency edge deployments. The fields mirror the MQTT tab.

Setting	Description
Enable NATS forwarding	Master switch.
Connection string	Format: `nats://[user:pass@]server:4222/subject`.
SenseID tags only	Same semantics as the MQTT version — filter out generic tags.

SOCKET

The Socket tab provides the simplest forwarding option: raw newline-delimited JSON payloads sent over TCP or UDP. Best for piping into a custom script, an existing collector, or quick tests with `netcat`.

Setting	Description
Enable socket forwarding	Master switch.
Connection string	Format: `tcp://host:port` or `udp://host:port`. Use TCP for reliability, UDP for fire-and-forget telemetry.
SenseID tags only	Filter generic tags out of the stream.

FORWARDING STATUS ICONS

When forwarding services are active, small icons appear in the bottom-right corner of the main interface:

Icon	Service
Database icon	Database storage active
Broadcast icon	MQTT active
Lightning bolt icon	NATS active
Plug icon	Socket active

KEYBOARD SHORTCUTS

A small set of keyboard shortcuts is available globally inside the application. They are intended for hands-on operations during an acquisition — toggling fullscreen for a clean view, or panning and zooming the chart without reaching for the mouse.

Key	Action
F	Toggle fullscreen mode for the window.
Left / **Right**	Pan the chart X axis (only when a tag is selected).
Up / **Down**	Zoom the chart X axis in / out.
+ / **-**	Zoom the chart Y axis in / out.

Keyboard shortcuts are automatically disabled while the focus is inside any input field — typing a TX power value or a connection string won't accidentally trigger them.

SUPPORTED READERS

KL-Osiris ships with built-in drivers for the readers listed below. The **Driver ID** column matches the value shown in the Reader Connection dialog's Reader Type dropdown; the **Connection String** column is the value to enter in the field below it when connecting manually.

Reader	Driver ID	Interface	Connection String
Impinj R700	`IMPINJ_IOT`	REST API (HTTPS)	IP address (e.g. `192.168.1.100`)
Impinj Speedway R420 / R220 / R120	`IMPINJ_LLRP`	LLRP	IP address
Zebra FX9600 / FX7500	`ZEBRA_LLRP`	LLRP	IP address
NordicID Sampo / Stix	`NURAPY`	Serial	COM port (e.g. `COM3`)
Phychips RED4S	`REDRCP`	Serial	COM port
Kliskatek BLE Reader (KL-SBLE-LCR)	`KLSBLELCR`	BLE (USB serial)	COM port
ACS ACR1552	`ACR1552`	PC/SC (NFC)	Auto-detected

TROUBLESHOOTING

This section collects the most common issues users report on a fresh installation. They are grouped by the symptom you observe in the UI.

READER NOT DISCOVERED

The Reader Connection dialog shows an empty *Discovered Readers* list, or your specific reader is missing from it. Discovery is family-dependent, so the checks differ per reader type:

- Make sure the reader is powered on and, for network readers, connected to the **same broadcast domain** as the host machine — mDNS announcements do not traverse routers.
- On the host, verify that firewall rules allow inbound mDNS on **UDP port 5353** (Windows Defender blocks it on some profiles).
- For serial readers (NordicID, Phychips, Kliskatek BLE), check that the USB-to-serial driver is installed and the device appears as a COM port in Device Manager / `dmesg`.
- For NFC readers (ACR1552), the system **PC/SC** service must be running: *Smart Card* on Windows, `pcscd` on Linux. On macOS this is built-in.

You can always fall back to **Manual Connection** if discovery fails but you know the address.

CONNECTION FAILS

You picked a reader and pressed *Connect*, but the dialog shows an error banner.

- Double-check the connection string: the wrong IP address or COM port is the most common cause.
- For **Impinj R700** the REST API requires authentication; the factory defaults are user `root` and password `impinj`. Change them on the reader and they must match in KL-Osiris (currently passed through the connection string when needed).
- For network readers, run `ping <ip>` from the host to confirm the reader is reachable at the network level before blaming the application.

NO TAGS DETECTED

Inventory is running but no tags appear in the Tag List.

- Verify that the antennas are physically connected and selected in the antenna toggles.
- Increase **TX power** — depending on the tag and the antenna gain, you may need close to the regulatory maximum.
- For multi-mode readers, make sure the **mode** is appropriate: SENSEID for standard SenseID tags (data encoded in the EPC), SENSEREAD for Kliskatek senseRead tags (data in User memory), NDEF / BULK for NFC tags (see Reader modes). Picking the wrong mode is the most common cause of an empty Tag List with otherwise-fine hardware.
- If you are reading non-SenseID tags, the funnel icon in the Tag List header may be filtering them out — toggle it off to show every read.

CHART NOT UPDATING

You selected a tag but its chart does not move.

- Confirm the inventory is running (the Play button should display the red Stop icon).
- Make sure the tag is selected — the row should be highlighted in the Tag List.
- Check **auto-scroll** in the chart toolbar: when off, the visible window stays fixed and new data may be appearing off-screen to the right.

FORWARDING NOT WORKING

You enabled MQTT / NATS / Socket forwarding in Settings, but no data reaches the destination.

- Recheck the connection string format in Settings (`mqtt://...`, `nats://...`, `tcp://host:port`). Typos here do not raise dialog errors — the forwarder logs the failure silently.
- Make sure the target service is reachable from the host (open broker, listening collector).
- Confirm that the forwarding status icons are lit in the bottom-right corner of the Tag List area — if the icon is missing, the forwarder failed to initialise and you should check the application log.

KL-Osiris is developed by Kliskatek.