PlantPulse® **Edge**

INDUSTRIAL IIOT GATEWAY

PRODUCT OVERVIEW & PROPOSAL

Every machine on the floor, one box to connect them.

An industrial edge gateway that reads PLCs, sensors and instruments over **42 industrial protocols**, applies formulas on the spot and forwards the result upstream. Runs fully standalone too.



42
industrial protocols

80K+
tags on one live unit

5 min
one-line install

September 2026

Industrial IIoT Gateway · On-premises / air-gapped

kopens®

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One-page summary

> Every machine speaks its own language. PlantPulse Edge is **the one box that understands all of them** — it sits at the front of the plant, collects, tidies and forwards the data.

42 protocols
From major PLC vendors to metering, building and marine standards

Standalone
Collects, stores and serves without an upstream platform

5-minute install
One command, or an air-gapped bundle

THE KEY DIFFERENCE

It is an edge computer, not a protocol converter. Beyond collection, a time-series store, a formula engine, an OPC UA server, MQTT/Sparkplug B publishing, Node-RED flows and container apps all run on the same unit. When the upstream network drops, the plant keeps running.

What this document covers

What can be connected

Pages 3–8. Supported protocols, collection structure, standalone operation and upstream integration.

What keeps it running

Pages 9–13. High availability, automatic PLC address discovery (coming soon), architecture, the single-container stack.

How it is actually used

Pages 14–17. The protocol list and screens captured from a running unit.

What deployment looks like

Pages 18–21. Security and operations, install options, verification, schedule.

01 · Background

Why now — the collection problem

The first gate of a smart factory is not analytics but **connectivity** — and most projects spend far longer at that gate than planned.

PROBLEM 1

Every machine speaks differently

Siemens uses S7, Mitsubishi MELSEC, LS XGT, Rockwell LOGIX — one plant mixes vendors and generations. Attaching a gateway per protocol multiplies the number of boxes to manage.

PROBLEM 2

Data vanishes when the uplink drops

A collect-and-forward design loses everything that happened while the network was down — and the local screens go dark with it.

PROBLEM 3

Processing ends up upstream

Pushing raw values means the upstream system has to compute everything. Traffic grows, and the values the floor needs right now arrive late.

PROBLEM 4

Nobody is on site

Unmanned sites, remote equipment. When one box dies, collection stops until somebody drives there — and so do installs and updates.

So what is needed

> One box at the front of the plant that **understands anything**, **runs on its own**, **hands over to its partner when it dies**, and **updates remotely**.

PlantPulse Edge is that box. It folds 42 protocols into one driver layer, puts a time-series store and a formula engine inside the unit, and ships high availability and remote updates as product features.

02 · Introduction

What PlantPulse Edge is

An industrial edge gateway placed at the front of the plant. It connects directly to PLCs, sensors and instruments, reads tags on a schedule, applies formulas and forwards the result to the upstream platform. **It runs standalone with no platform at all.**

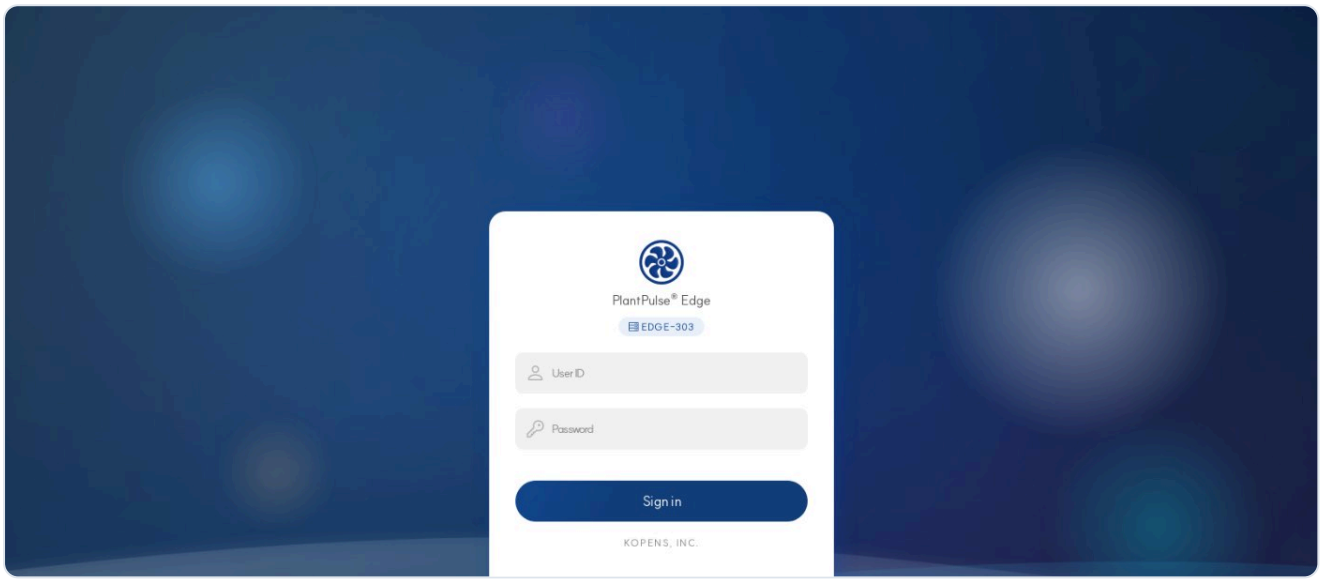


Figure 1. The screen you see when you connect to the unit. A web browser is all you need — no client software. (Captured from a live unit.)

COLLECT
42 protocols

PLC, instrumentation, building and marine standards handled by a single driver layer.

PROCESS
Formula engine

Converts raw values into plant units and creates derived tags, taking load off the upstream.

FORWARD · SERVE
Sends up, and opens out

Forwards to the platform and also serves the floor directly over OPC UA, MQTT and REST.

Where it sits

Location	Role
Next to the line · control cabinet	On the same control network as the PLC, reading tags directly
Plant IT/OT boundary	Between the control network and the corporate network, passing data upward only
Remote · unmanned sites	Keeps collecting and storing locally when the uplink is down

It is bigger than the word “gateway” suggests. With a time-series store, computation, standard servers and app execution on board, a small site can **complete its whole monitoring setup with this single unit**.

03 · Overview

What one unit does

Log in and the state of the unit is on one screen — device connections, tag count, collection success rate, throughput, and the health of the box itself.

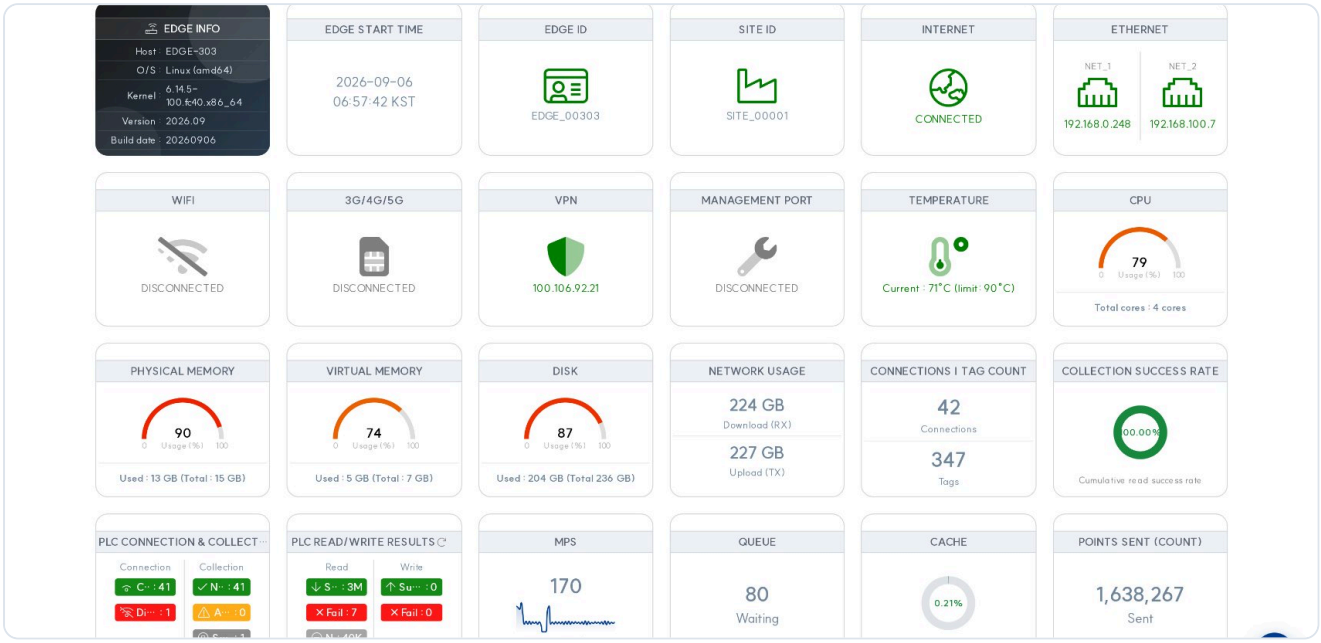


Figure 2. Main dashboard. Device info top-left, network paths (wired, Wi-Fi, 5G, VPN), temperature, CPU, memory and disk, connection/tag counts, collection success rate, queue, cache and forwarded message counts at a glance. *Live values from a running unit.*

What the screen tells you

Are connections and collection alive?

Connection success/failure and normal/abnormal/stopped collection counts are colour-coded, alongside read/write success and failure counts.

Is the box holding up?

Temperature against its limit, CPU, physical/virtual memory and disk usage — you can check the heat inside a field enclosure remotely.

Which way is the data leaving?

Link state and IP address for two wired ports, Wi-Fi, 3G/4G/5G, VPN and the management port.

Is anything backing up?

Messages per second, queue depth, cache usage and cumulative forwarded count — upstream latency shows up immediately.

04 · Key strengths

① Vendor-agnostic

A single plant mixes makers and generations. PlantPulse Edge supports **42 industrial protocols** through one driver layer, so every device is registered the same way and managed the same way, whatever it is.

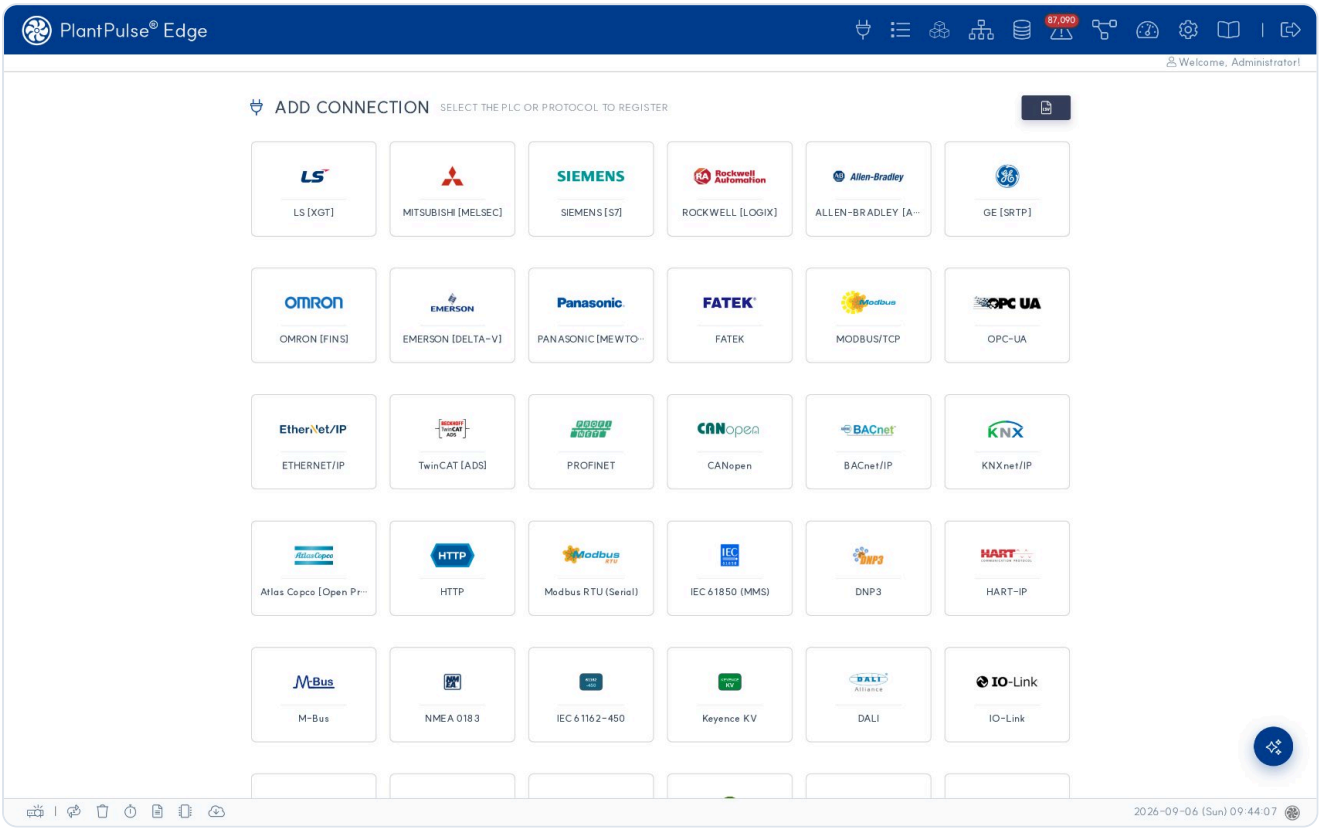


Figure 3. Add-connection screen. Pick the maker or protocol and the matching form appears. Bulk registration from CSV is also available.

Why one layer matters

- **The box count stays flat.** A dedicated gateway per protocol means that many more devices to manage.
- **Operations are unified.** Registration, monitoring, diagnostics and logs use the same screens regardless of protocol.
- **New standards don't change the UI.** Drivers are added; the way you work stays the same.

NOT JUST READING

Writing (control) is supported too. Values sent from upstream can be written to the PLC, and the history is kept with **who, when and from where**. In an HA pair, a dedicated mechanism grants write permission to only one unit (page 9).

04 · Key strengths

② The floor keeps running when the uplink drops

A plain relay leaves nothing behind the moment the upstream link fails. PlantPulse Edge **keeps a time-series store inside the unit**, so it collects, stores and queries without any upstream.

Nothing is lost — store-and-forward

When the upstream channel drops, collected data is queued locally — **up to 500,000 messages** — and pushed automatically as soon as the link is back. Reconnection is retried every 30 seconds and a full resynchronisation runs on recovery, so **the outage never becomes a gap**.

Standalone operation

At install time you choose **platform-connected** or **standalone** mode. In standalone mode collection, storage, screens, OPC UA serving and MQTT publishing all work. You can roll out the edge first and add the upstream system later.

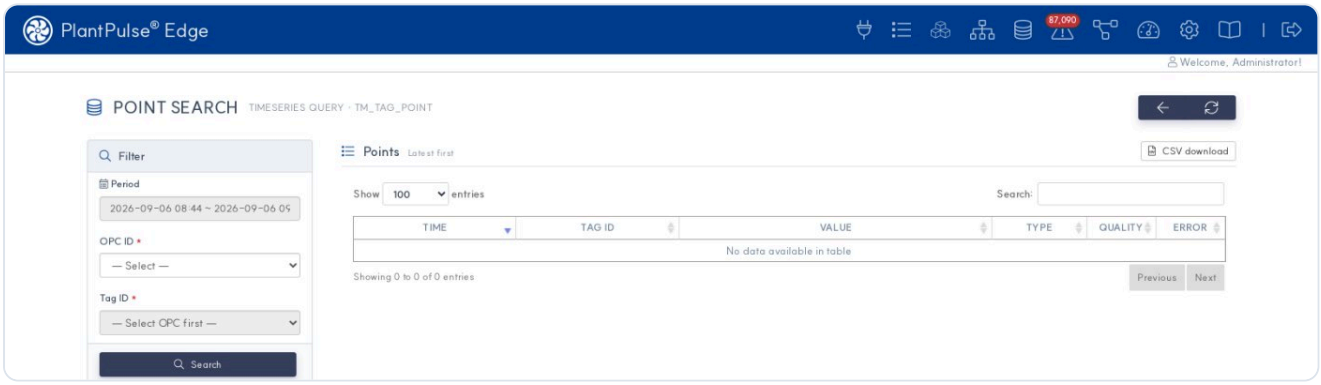


Figure 4. On-device time-series query — filter by connection, tag and period to check collected values. Data can be validated on site with no upstream system.

Opens out over standards — built-in OPC UA server

Collected tags are re-exposed through an **OPC UA server**. SCADA, MES and third-party HMIs attach to the edge in the standard way, so it integrates with systems outside the PlantPulse family.

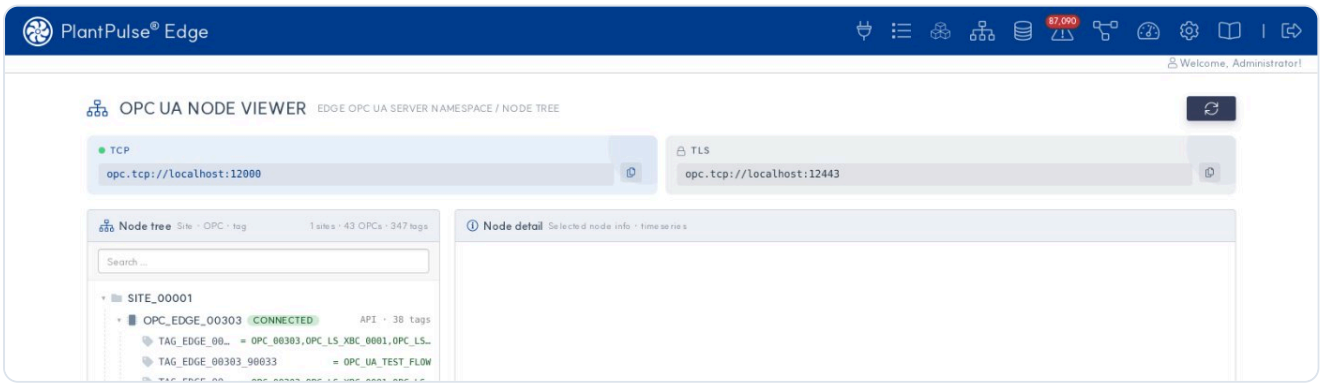


Figure 5. Node tree of the built-in OPC UA server. The site → connection → tag hierarchy becomes the standard address space as-is. TCP and TLS endpoints are both provided.

04 · Key strengths

③ Computes before it sends

Values straight out of a PLC are rarely usable — scales differ, units are missing, and meaning only emerges from combining several values. Edge **applies formulas at collection time**.

Formula engine

Assign a formula to a tag and the raw value is converted in place. Arithmetic, comparison, conditional expressions and math functions are supported, and derived tags can reference several tags at once.

Use	Example
Scaling	Divide raw counts into real physical quantities before sending
Unit normalisation	Bring per-device units into the plant's standard unit
Derived KPIs	Combine tags into availability or efficiency figures at the edge
Anomaly flags	Express threshold conditions as formulas and send a status flag alongside

Why compute at the edge

- **Less traffic.** Only tidy values go upstream, so bandwidth and storage cost drop.
- **The floor sees it first.** Results appear on the device screens and OPC UA immediately, with no upstream round trip.
- **Upstream gets simpler.** Per-device exceptions no longer leak into upstream logic.

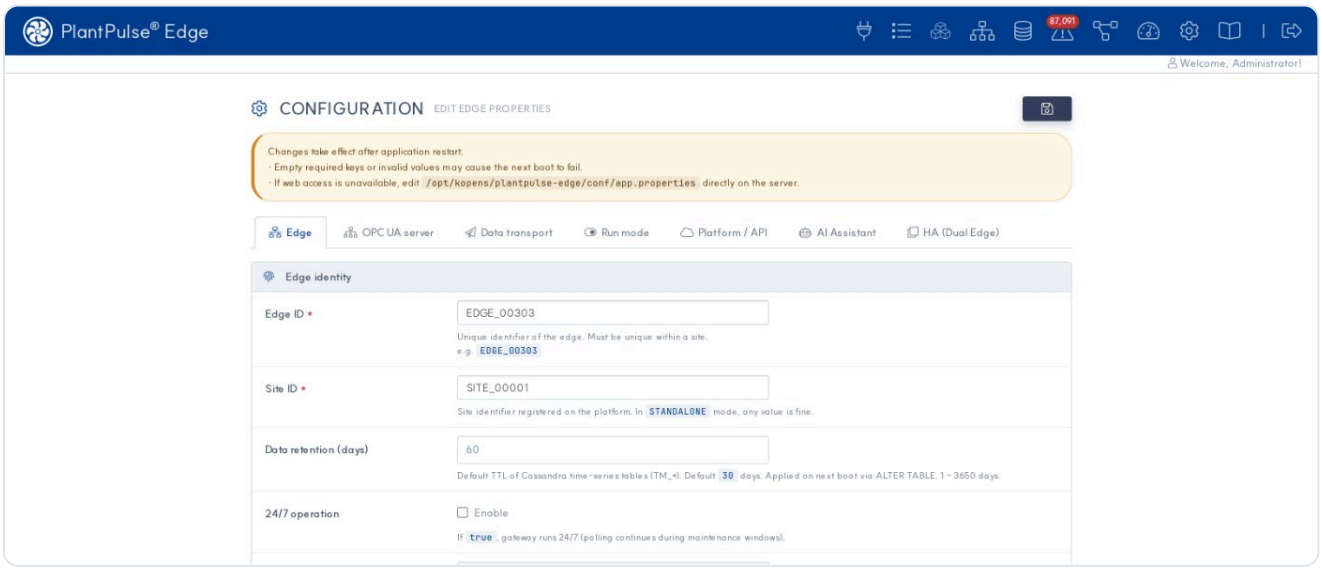
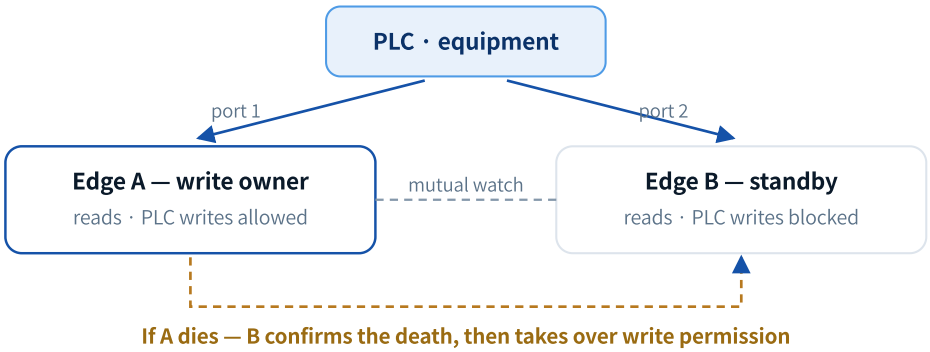


Figure 6. Edge properties — collection interval, forwarding target, storage policy and more are changed on screen. A direct config-file path is documented for cases where web access is unavailable.

05 · Key strengths

④ Collection continues when a unit dies

When a gateway stops at an unmanned site, the data stays blank until somebody gets there. PlantPulse Edge provides **edge high availability (HA)** as a product feature.



The structure itself is the redundancy

Both units read at the same time, by design. Two edges are wired directly to one PLC and collect the same tags together, so collection never stops when one unit fails. The hard part is **writing** — two units must never write to the PLC at once.

Write permission always belongs to exactly one unit

Mode	Behaviour	Recommended for
Manual promotion	An operator confirms and hands over write permission. This is the default	Staffed sites
Automatic failover	Uses the PLC as a witness to confirm the partner is dead, then promotes in **8 seconds by default**	Unmanned · remote sites

> **“Unreachable” and “dead” are different things.** Automatic promotion is never triggered by a momentary network blip; it happens only after the PLC confirms the partner has really stopped — a design that rules out two units writing at once.

05 · Key strengths

⑤ The edge speaks for itself

In the edge console you **ask and control operations in natural language**. Ask “why did collection on line 3 stop?” and the edge looks it up and answers; any action it proposes runs **only with human approval**.

Queries run automatically

Status, tag and log queries are executed right away and answered.

Control needs approval

Starting/stopping collection and writing tags require a human to confirm.

The model is your choice

Point it at an in-house local model and no data leaves the site.

Apps run on the edge too

Every site needs something extra. **Container apps can be run and managed directly on the unit**, absorbing requirements outside the standard feature set.

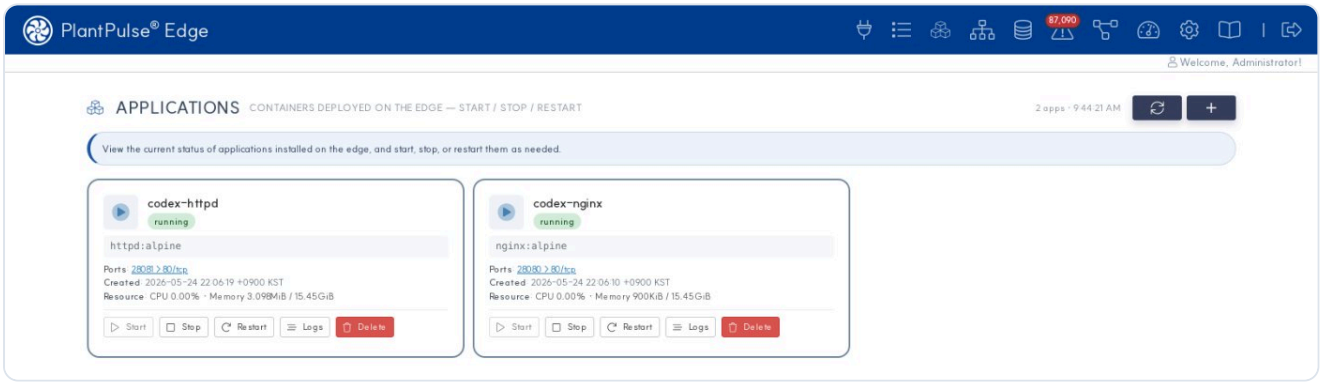


Figure 7. Containers deployed on the edge. Start, stop and restart from the screen. Only product-managed containers are listed, so system containers cannot be touched.

What runs alongside by default

Component	Role
Time-series store	Keeps collected data on the unit — no loss during upstream outages
MQTT broker	Publish/subscribe within the site. Sparkplug B supported
OPC UA server	Exposes collected tags as a standard address space
Node-RED	Draw flows without code to add simple integrations and processing

SAFEGUARDS

App deployment is limited to **allowed images** and **allowed volume paths**; host networking and Docker-socket mounts are blocked by default. Resource limits are enforced, and containers without the product's label are excluded from listing and control.

05 · Strengths · Coming soon

⑥ Connects even without an address list Coming soon

Many machines on the floor have **no PLC I/O address list.** To connect an edge, someone has to look back and forth between the HMI and the PLC and find addresses one by one, and this is where most of the onboarding time goes. **PLC profiling** lets the edge do that work.

① Scans read-only

Scans a running PLC for a set time (10 minutes to 2 hours) to find the **addresses actually in use**. It never sends a write request.

② Sorts by how values move

Classifies each address by how its value changes: counter · analog · status bit · setpoint · 32-bit float.

③ Names from screen photos and programs

Attach HMI/SCADA screen photos and the PLC program, and AI proposes tag names, descriptions and units. The **edge itself matches** the numbers in the photos against live PLC values.

④ A person confirms, then registers at once

Every address shows a **confidence (%) and its evidence**. Only what a person confirms is registered as a connection plus tags, with export to a registration CSV and a customer-ready I/O list (CSV that opens directly in Excel).

OPERATION MARKERS

While scanning, tap «Now!» on the screen the moment someone presses a button on the machine; the address that changes right after is **pinned to that button**. Operated addresses can be found without photos or AI.

Target PLCs

Vendor	Scope
LS Electric	XGK, XGI/XBC
Mitsubishi	MELSEC (MC protocol), A series (1E)
Siemens	S7. **Optimized DBs** on S7-1200/1500 **cannot be read by address**, so they are named only from screen photos and program evidence
Modbus	TCP / UDP (including RTU behind a gateway)

BUILT NOT TO DISTURB THE FLOOR

Read-only · **slows itself down when the PLC responds slower, and stops if it persists** · running collection always comes first · S7 DB probing is also limited by request spacing and a cap · it starts only after confirming «the site owner has agreed», and who scanned what and when is kept in the audit log · no name is registered without a person confirming it.

This feature is coming soon. Its impact will be reported once measured.

06 · Architecture

Topology — what runs where

Collector, store, computation and servers live together inside one edge unit. If the path upstream breaks, the left half keeps running.

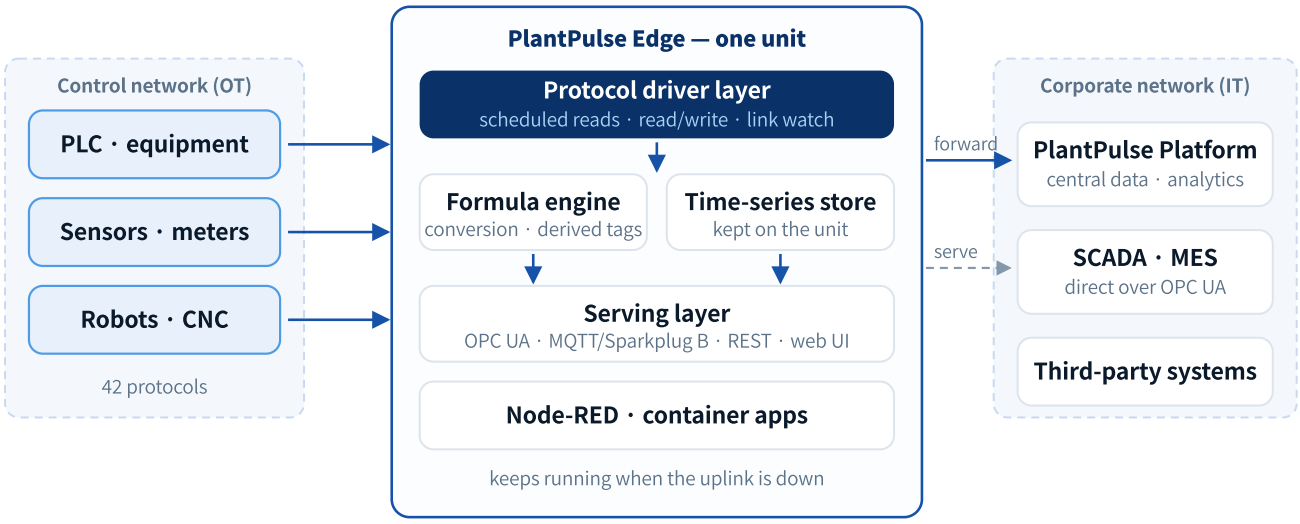


Figure 8. The edge sits between the control network and the corporate network. Even if both the upward (forward) and rightward (serve) paths are cut, collection, computation and storage continue inside the unit.

In standalone mode the right-hand side need not exist at all. Install only the edge to start site monitoring first, and attach the platform later — a staged rollout.

What this structure gives you

No loss on outage

The store is inside the unit, so data from the outage window survives and is pushed once the link recovers.

Less goes upstream

Formulas apply at collection time, so raw values need not all be sent — bandwidth and upstream storage cost fall together.

The floor sees it first

Device screens and OPC UA do not pass through upstream. No lag between the control room and the floor.

Not tied to one family

Open over OPC UA, so it attaches to non-PlantPulse SCADA and MES. Add it without ripping out existing systems.

07 · Architecture

Technology stack and the single-container build

This product lives on field hardware, so **simple install and simple recovery** came first in its design. Everything it needs ships in **one container image**.

Layer	Composition
Application	Java 21 · Spring MVC 6.2 (Jakarta EE) · Apache Tomcat 10.1
Protocol drivers	Single-entry driver library — **42 protocols**. Socket layer implemented independently, with no framework dependency
Formula engine	Expression-evaluation engine. Per-tag conversion and derived expressions
Time-series store	Apache Cassandra — embedded on the unit
Messaging	Built-in MQTT broker · Sparkplug B · Kafka publishing
Standard server	OPC UA server (Eclipse Milo) — TCP and TLS endpoints
Flow editor	Node-RED — integration flows without code
Packaging	Single Docker image · systemd registration · native install also supported
Supply chain	Image signing (cosign) · checksum verification of air-gapped bundles

Why one container

Simple install

Pull one container and you are done. No component version matrix to reconcile on site.

Simple recovery

If something goes wrong, rolling the image back to the previous tag is the whole fix.

Limited resources

Field hardware is modest. Leaving out an orchestrator keeps it light.

Native install is supported too

For environments that cannot host a container runtime, direct installation on the OS is also provided. Both methods deliver identical functionality; only the install procedure differs.

08 · Connectivity

Supported protocols

The list below is every driver actually implemented in the product. New standards are added as drivers; the way you work and the screens stay the same.

PLC · controllers

LS [XGT]	MITSUBISHI [MELSEC]	SIEMENS [S7]	ROCKWELL [LOGIX]
ALLEN-BRADLEY [AB-ETH]	GE [SRTP]	OMRON [FINS]	PANASONIC [MEWTOCOL]
FATEK	BECKHOFF [TwinCAT ADS]	KEYENCE KV	CC-Link IE
EtherNet/IP	PROFINET		

Industrial standards · fieldbus

MODBUS/TCP	MODBUS/UDP	MODBUS RTU (Serial)	OPC-UA
BACnet/IP	KNXnet/IP	CANopen	M-Bus
DALI	IO-Link	HART-IP	DNP3
IEC 61850 (MMS)	IEC 60870-5-104	SNMP	

Specialised equipment · domain

Atlas Copco [Open Protocol]	FANUC [FOCAS]	SECS/GEM	MTConnect
EMERSON [DELTA-V]	MotorSense	NMEA 0183	IEC 61162-450
ROS 2			

Messaging · web

MQTT Client	Sparkplug B	Kafka	HTTP
WebSocket	CoAP		

Have a device that is not on the list? Tell us. The driver layer is built to extend, so a new protocol is handled as a product development item — not as a one-off custom gateway per customer.

09 · How it is used

Four steps in practice

Every screen below was **captured from a unit in live operation**.

1 stall · log in → 2 Register devices → 3 Tags · formulas → 4 Verify · operate

Step 1 · Install and log in

Connect power and network, run the one-line install command and the service comes up. From then on everything is done in a browser — no console access needed.

Step 2 · Register the devices

Pick the maker or protocol, enter IP, port, station number and so on, and the connection is created. With many devices, **bulk-register from CSV**.

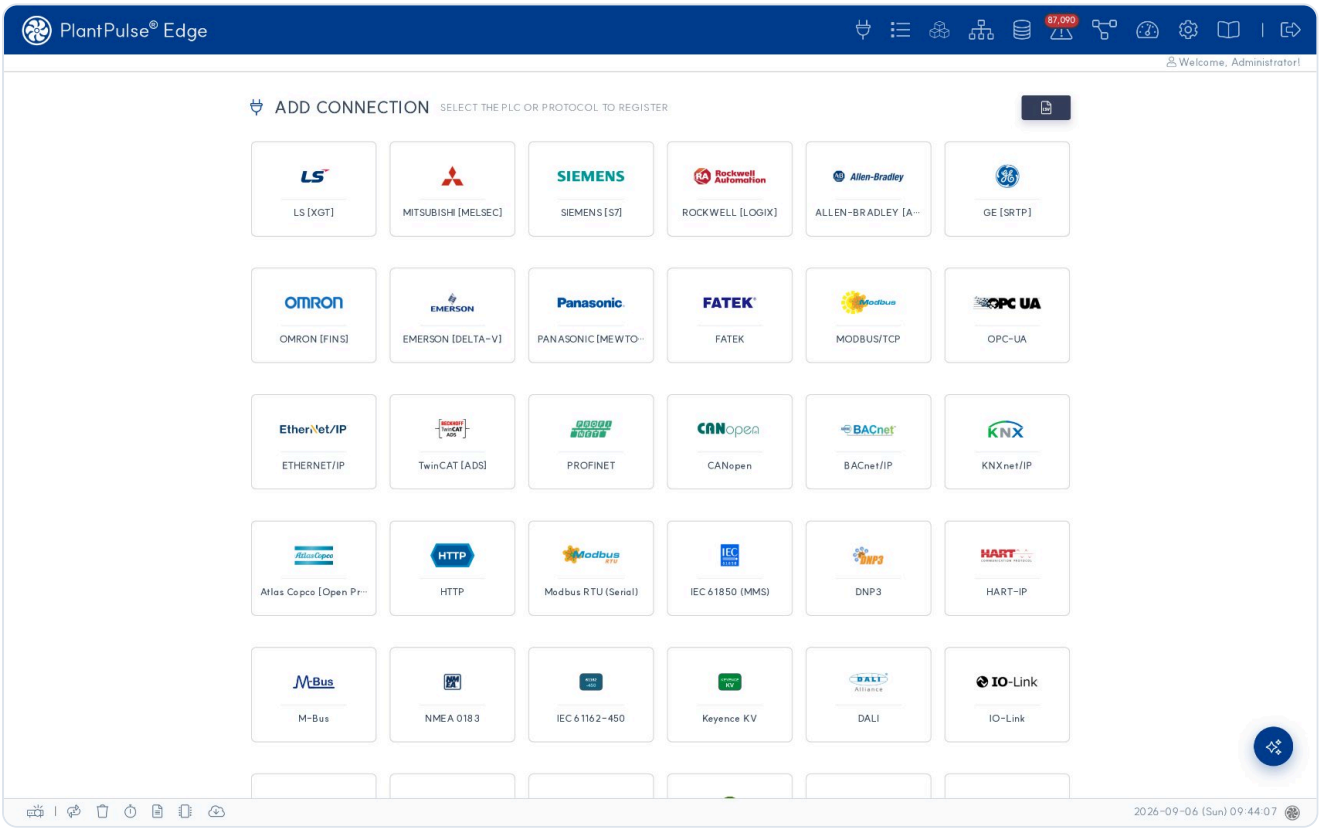


Figure 9. Registration starts by choosing a protocol. The button at the top right handles CSV bulk registration.

A **connection test** right after registration confirms real communication, catching wiring and firewall problems before any tags are added.

09 · How it is used

Step 3 · Register tags and check values

Under each connection you register the addresses (tags) to read. Set address, data type, interval and formula, and collection starts that moment, with values accumulating on the unit.

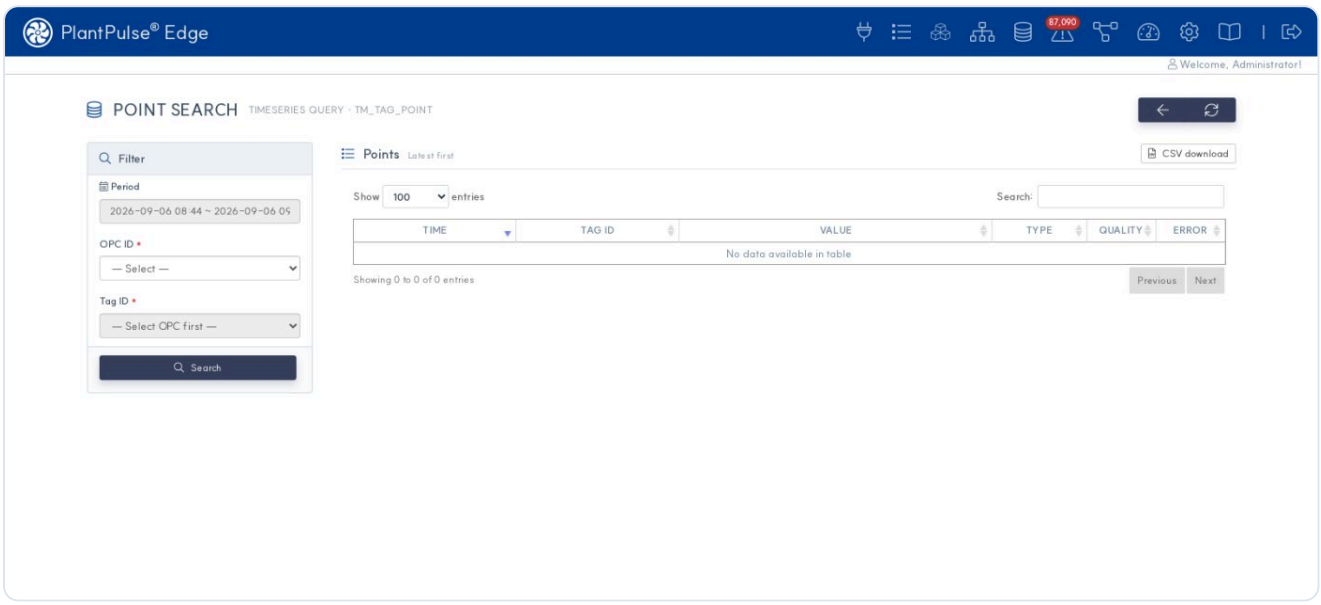


Figure 10. Querying collected values, filtered by connection, tag and period. Data can be verified **right on site** with no upstream system.

What you decide at registration

Item	Meaning
Address · data type	Which PLC area to read, and in which format
Interval	Can differ per tag — separate fast values from slow ones
Formula	Convert raw values into plant units or create derived values
Notes	A description the equipment owner understands — later, a handover asset

Bulk registration is the real-world problem. Assuming sites with tens of thousands of tags, CSV upload and bulk editing are standard features. The unit captured for this document carries **more than 80,000 tags**.

09 · How it is used

Step 4 · Open it out, and keep watch

Opened over a standard

Collected tags are exposed immediately through the **OPC UA server**. SCADA, MES and HMIs attach in the standard way with no conversion work.

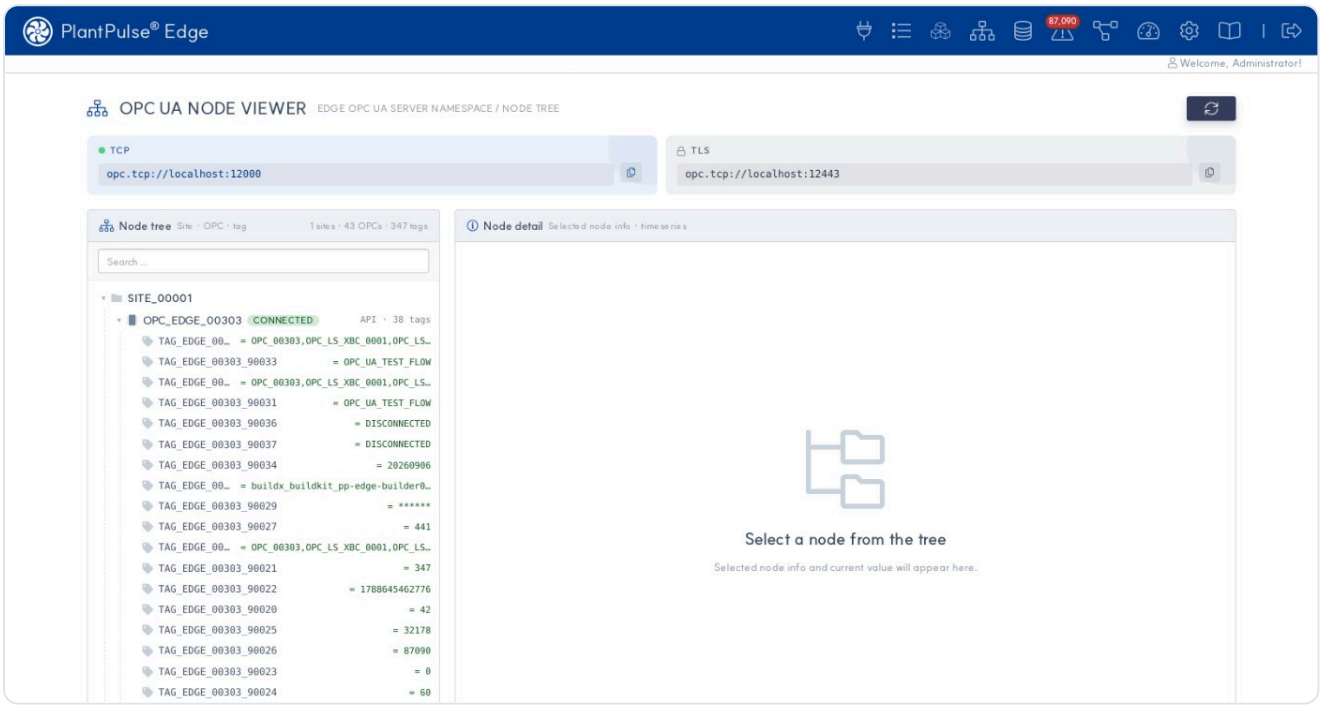


Figure 11. Address space of the built-in OPC UA server. The site → connection → tag hierarchy becomes the node tree as-is.

A record of what happened

Collection failures, dropped connections, configuration changes and write history are all logged, searchable and downloadable on screen. Root causes can be narrowed down without a site visit.

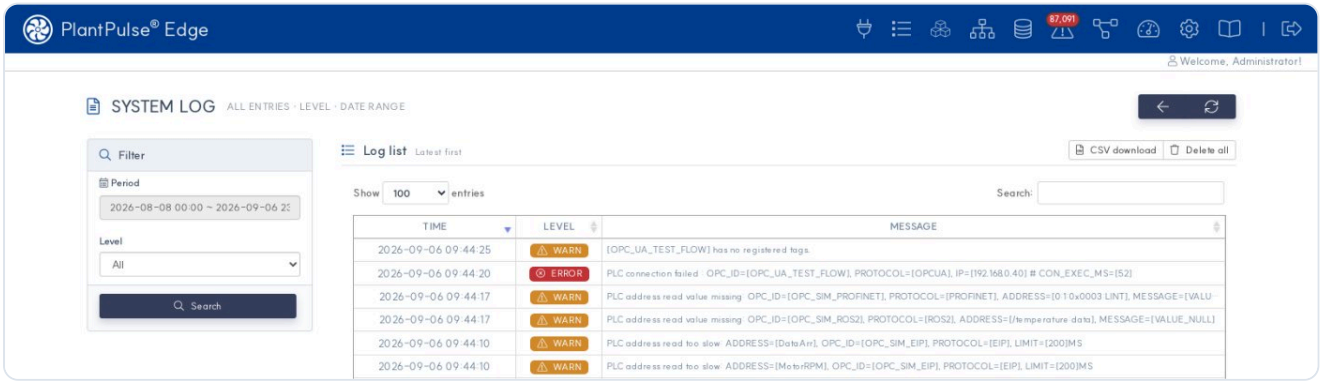


Figure 12. System log — filter by level, period and keyword; download as CSV.

In addition, a diagnostics tool checks network, port and service state in one pass and exports the result as a file for technical support.

10 · Security

Security · operations

The edge is a device that **attaches directly to the control network**, so its controls differ from a general-purpose server. It is designed on the assumption that nobody is on site and physical access may not be controlled.

Access control

- **Web access requires authentication**; passwords are stored with a standard hash.
- **Every change requires an anti-forgery token** — a single link cannot alter configuration.
- **TLS** encrypts web, OPC UA and MQTT. Certificates are generated at install and can be replaced.
- **API keys** authenticate upstream integrations.

App execution control

Being able to run container apps on the edge means they must be controlled. Only allowed images and volumes can be used, host networking and Docker-socket mounts are blocked, and resource limits are enforced. Containers without the product's label are excluded from control.

Operations tooling

Tool	What it does
Remote update (OTA)	Upgrade to a new version without a site visit; rolls back on failure
Backup · restore	Scripted backup of configuration and data; restore as-is when replacing hardware
Diagnostics	One-pass check of ports, services and connections, with a generated report
Boot verification	After install or restart, confirms automatically that required ports and endpoints are actually up

> **The rule for a device on the control network.** We recommend configuring the edge to **export upward only**. Open inbound paths from upstream only where needed, and allow PLC writes on one unit only via the HA permission mechanism.

11 · Delivery

Installation · delivery model

Field installation must be **short and reversible**. Three methods are offered; the same image goes on the box whichever you choose.

Method	Procedure	Internet	Time
One-line install	One command → pre-checks → image pull → service registration → start → boot verification	Required	~5 min
Manual install	Pull the image and start it as a container — for sites with their own procedure	Required	~10 min
Air-gapped install	Bring in the bundle → verify checksum and signature → load → start	No	~15 min

What the installer asks

1. **Edge ID · Site ID** — names identifying the unit; defaults proposed from hardware identifiers.
2. **Operating mode** — platform-connected or standalone.
3. **Upstream server address · auth key** — connected mode only.

With many sites, prepare a **profile** once and apply these values in bulk — nobody retypes the same answers per box.

What happens automatically after install

Pre-checks

Runtime, disk, ports and signing tools verified first; the install does not start if conditions fail.

Boot verification

Required ports and endpoints polled until they respond; access details printed.

Certificate setup

Generated with the unit's real address — TLS works without warnings even by IP.

Service registration

Registered as a system service; starts automatically after a reboot.

Not software alone — industrial hardware

Running 42 protocols, on-edge AI and HA takes real hardware. We supply a **fanless industrial gateway** alongside.

4 cores · 16 GB · 256 GB SSD

Runs on-edge AI and HA together.

Fanless design

No moving parts — survives dust and vibration.

Wired · Wi-Fi · serial

Wireless where cabling is hard; COM ports for legacy gear.

Upgrades. Remote update (OTA) replaces the version without a site visit and rolls back on failure. Versions carry a monthly calendar label plus build date, so operations can be pinned to a specific build.

12 · References

References — what has been verified

An industrial gateway is judged by **how many real devices it has actually been attached to**. PlantPulse Edge verifies that continuously through **automated regression testing**.

Protocol simulators — regression without real hardware

We build and operate **more than 25 protocol simulators** in-house. Every driver change is connected to its simulator to confirm collection really works — the bar is **"it communicates"**, not "it compiles".

EtherNet/IP · LOGIX · MODBUS · FINS · MELSEC · AB-ETH · ADS · BACnet · CANopen · DNP3 · FATEK · S7 · IEC 61850 · HART · KNX · M-Bus · DALI · IO-Link · MQTT · Sparkplug B and more — one independent simulator per protocol.

Verification run automatically on every release

Check	Content
Code quality gate	Static analysis · type/compile checks · unit tests · localisation consistency — one failure blocks the merge
Integration tests	Connect to simulators; confirm collection and writes work
UI regression	Browser automation checks key screens and console errors
Staging deployment	Image deployed to real hardware; start-up, health checks and endpoints verified
Image signing	Digital signatures attached automatically to release images
Air-gapped bundle check	Bundle checksum and signature verified before install

Track record

162
projects delivered

34
sites in operation

642,021
connected sensors

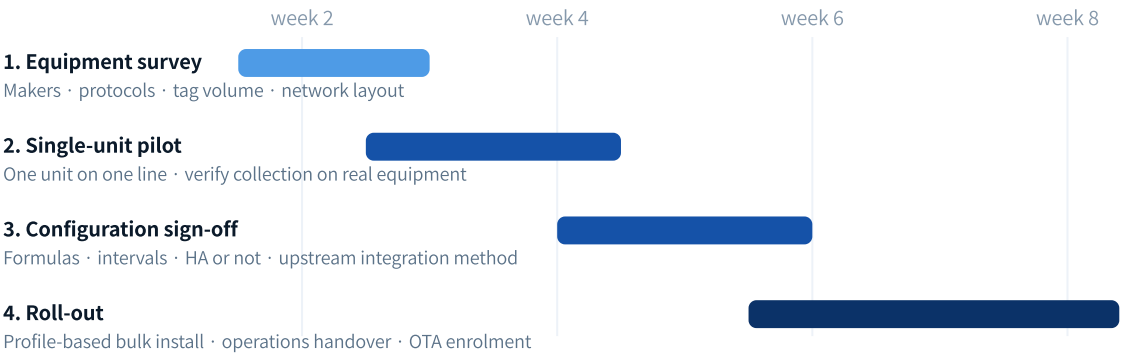
Key customers: Samsung Electronics · LG · Doosan · Hanwha Ocean · Hanwha Aerospace · Lotte Chilsung · Hyundai Rotem · Hyundai Mobis · HD Hyundai Heavy Industries · Hyosung · SK Chemicals · CJ Logistics · KAI · KEPCO · KERI and others — 15 years proven on manufacturing floors.

Every screen in this document was captured from a real unit in continuous operation, running with more than 80,000 registered tags.

13 · Deployment

Deployment plan and schedule

We recommend **four stages** — start at one site, then widen to the enterprise. The schedule below is the standard one and is adjusted to your equipment and network policy.



What to confirm in the pilot

- Do **real values come through** over our equipment's protocol — being on the list and actually connecting are different things
- Are **collection intervals kept** at tens of thousands of tags
- When the uplink is cut, **does the data survive and resume**
- Does the air-gapped install procedure **complete within our security policy**

Decisions to make together during deployment

HA scope

Every line, or only lines where downtime is expensive.

Write permission

Allow PLC writes from the edge, or keep it read-only.

Upstream integration

Platform forwarding, OPC UA serving or MQTT publishing — which to use.

Network policy

Export-only from the edge, or open a remote management path.

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