SAFEBACK | SMART AQUACULTURE | GUANGZHOU, CHINA

4G IoT Gateway

Modbus RS485 to 4G MQTT · 2 RS485 terminal groups · edge rule engine · keeps running when the link drops

Product datasheet (EN) · Rev. 2026-10 · Vietnam market



Fig. 1 TK-4G-GW: product photo (left) and outline drawing (right); DIN-rail housing, terminals at the base

1. Product overview

The 4G gateway is the access device of the SAFEBACK control layer. It handles nothing in the pond itself: no screen, no sensor, no direct drive. It does one job: take the pond-side equipment that only speaks RS485 and put it into a form that 4G and the cloud can carry.

One bus runs through the site. Aerator controllers, water quality probes, lighting controllers, pumps, feeders and energy-storage units all hang on the same RS485 bus. The gateway polls them one by one over Modbus RTU, normalises the register values, and publishes them over 4G as MQTT messages. The phone and the cloud show plain numbers: water temperature, dissolved oxygen in mg/L, whether a pump is running. Nobody downstream has to read the protocol underneath.

What matters at a pond is the night the uplink fails. Rules live inside the gateway and the decisions are made locally: DO below the set point closes the circuit and starts the aerator, DO back above the stop line opens it, and none of this waits for the cloud or for the network. Slaves are still polled, rules

still fire, readings queue on local storage and are back-filled when the link returns. So the aerator keeps running, and the trend line still fills in the next day.

For integrators and distributors there is a second, practical advantage: the gateway is our own design. Protocol, register map and firmware are ours, so connecting a third-party RS485 device, or pushing data into the customer's own platform, does not start with a wait for someone else's permission.

2. Key features

- **Modbus RS485 and 4G MQTT, translated both ways** — polls slaves over Modbus RTU on one side, publishes to topics over MQTT on the other, so the field bus and the cloud speak to each other without a second box.
- **Two RS485 terminal groups, each with 12 V out** — the two groups are wired in parallel on the same bus (one transceiver, not two independent buses), so you pick the nearer set of terminals on site; each group carries its own 12 V and GND, and probes need no separate power run.
- **Edge rule engine, autonomous when offline** — thresholds and interlock logic run on the board. When the link drops the pond keeps working to the rules, and the results are back-reported once the link is back, leaving no gap in the history.
- **Bluetooth local configuration, done in 30 seconds** — connect a phone mini-program over Bluetooth and set server address, port, topic and RS485 baud rate. No panel removal, no laptop, no cabling — the man on site can change it himself.
- **4G Cat.1, ordinary SIM card** — a Cat.1 module is built in, so there is no communications module to fit and no special SIM to buy; one card slot takes a normal SIM.
- **4G today, satellite where there is no 4G** — the uplink can be changed without touching the control loop. Ask for the **Starlink version** and the same gateway runs MQTT over the dish's Ethernet port on ponds with no cellular coverage at all, with the local rules and the data log unaffected either way.
- **Events reported by the gateway, not discovered on the walk-round** — power loss, a slave dropping off the bus, a parameter going out of range: the gateway reports it and raises the notification.
- **Configuration survives power loss, logs on a separate partition** — configuration and data are kept apart, so settings are not lost on a power cut, while run logs and history stay available for diagnosis.
- **One protocol and one model range across SAFEBACK** — the monitoring station, aerators and feeders share this bus, this numbering and this cloud; fit monitoring this season and add automatic control next season without changing interfaces.

3. TK model family and coding

Every SAFEBACK aquaculture product carries the **TK** prefix: **TK – category code + specification**

number. The two-letter code identifies the category; the number carries the single most important figure for that product — rated power in watts for powered equipment, measured parameters ×100 for sensors, screen size ×100 for terminals. One rule across the range, so a customer can tell from the model number what a unit is and what class it belongs to.

This gateway is the **TK-4G-GW**: **4G** for the 4G Cat.1 uplink, **GW** for gateway. It neither drives a load nor measures water, so it carries no power figure and no parameter count — only the radio generation and the role, which is enough to read it as the entry point of the system.

Code	Category	Model	What the number means
GW	4G IoT gateway	**TK-4G-GW**	4G Cat.1 uplink; GW = gateway
DO	Fluorescence DO sensor	TK-DO100	Single parameter
PH	pH sensor	TK-PH100	Single parameter
ORP	ORP sensor	TK-ORP100	Single parameter
MP	Multi-parameter probe	TK-MP500	Five parameters
YL	Impeller aerator	TK-YL1500	Rated power 1500 W
YC	Waterwheel aerator (mains)	**TK-YC750SL**	Rated power 750 W, twin impeller
YC	Waterwheel aerator (mains)	**TK-YC1500SL**	Rated power 1500 W, four impellers
FS	Pneumatic feeder	TK-FS2000	Rated power 2000 W, 30 m throw
—	Two-bag feeder	TK-150D	150 kg/h class; D = dual hopper

The system has three layers. **Sensing** is the probes (TK-DO100 / TK-PH100 / TK-ORP100 / TK-MP500) and the monitoring station (TK-WQS). **Decision** is the TK-4G-GW described here. **Execution** is the aerator (TK-YL1500), the feeders (TK-FS2000 / TK-150D) and the high-current control board. Between the layers there is one RS485 bus; replacing any one layer leaves the other two untouched.

On larger farms the execution side is handled by the twelve-channel control board **TK-R12-SC4S-BG** (three-phase U/V/W × 4 channels, up to 3 kW per channel), cascaded with the gateway. That model has its own datasheet and is not covered here.

4. Technical specifications

4.1 Unit and communications

Item	Specification
Model	TK-4G-GW
Cellular	4G Cat.1, full band (ML307A + ESP32 + host MCU)
Bands	FDD-LTE B1 / B3 / B5 / B8 / B28; TDD-LTE B34 / B38 / B39 / B40 / B41 — covering the bands in use by Viettel, Vinaphone and Mobifone as well as the three Chinese carriers
Uplink	4G Cat.1 as standard; a **Starlink version with an RJ45 Ethernet uplink** is available on request (see section 8)
Cloud protocol	MQTT, publish/subscribe, topics configurable
Field bus	Modbus RTU over RS485, baud rate configurable, 9600 default

Item	Specification
Data rate	20 Mbps down / 1 Mbps up (module rating)
Antenna	External, standard SMA connector; long or high-gain antenna optional for weak sites
SIM	One standard card slot, ordinary SIM plugs in directly — no dedicated card, no adapter
EMC	Industrial-grade EMC design (IEC 61000-4 series) for the electrostatic, surge and RF environment at the pond side; type testing to the certification requirements of each target market (CE and others) is carried out at the production stage, with reports issued as certifications are completed
Remote update	Production units support OTA with automatic rollback; entry is one tap in the mini-program, a cloud push, or a local USB update

4.2 Interfaces and electrical

Item	Specification
RS485	Two 4-terminal groups (12 V / A / B / GND × 2), **wired in parallel on one transceiver** — not two independent buses; the 12 V output feeds probes and small peripherals
Slave limit per bus	Up to 64 slave addresses (both terminal groups share the same bus, so 64 in total)
Supply	DC 12 V input; a supply rated ≥ 2 A continuous is recommended. The adapter is not part of the standard scope and must be ordered separately or supplied by the customer
Supply headroom	4G transmission draws a current spike; an under-rated supply causes repeated restarts. Do not share one small supply with inductive loads
Indicator	One LED, blinking at roughly 500 ms means running normally
Button	One, not needed in daily operation; used for firmware update
Data port	USB, for reading run logs from a PC during troubleshooting
Local configuration	Bluetooth with phone mini-program: server address, port, topic, RS485 baud rate
Storage	Configuration retained through power loss; a separate partition holds run logs and history
Housing and mounting	DIN-rail plastic housing, **flame-retardant grade A0**; **IP65 on the unit itself**, so it can be installed outdoors; in long-sun-exposure sites a rainproof enclosure is still recommended
Operating environment	−20 to +60 °C, 5% to 95% RH non-condensing
Dimensions	90 × 54 × 58 mm (L × W × H, excluding antenna and terminals)
Net weight	Confirmed by the label and drawing supplied with the unit (to be weighed)

4.3 Data and interlock behaviour

Item	Behaviour
Periodic upload	Temperature, DO, voltage, switch states reported on a cycle, 30 s by default
Change upload	A value that moves is reported within 2 s instead of waiting for the cycle
Command latency	Phone command → cloud → gateway → RS485 → relay, with acknowledgement, inside 1 s

Item	Behaviour
Offline behaviour	Slaves keep being polled and rules keep firing; data queues locally and is back-reported when the link returns
Default slave addresses	Relay and power devices default to address 40, water quality probes to 41; both configurable
Supported devices	Aerator controllers, water quality probes, lighting controllers, pumps, feeders, energy-storage units — any standard Modbus RTU slave
Rule capability	Editable thresholds and interlocks (for example aerator on below 5 mg/L DO, off above 7 mg/L), with multiple conditions and delay
Alarm events	Power loss, slave offline, parameter out of range, communication error — each raises a report and a notification

Timing figures are typical values measured in the laboratory on a normal network. In the field they depend on local 4G quality, the carrier and the number of slaves on the bus. Where a tender or acceptance test requires a committed figure, please confirm the test method and pass criteria with us first.

5. How it works

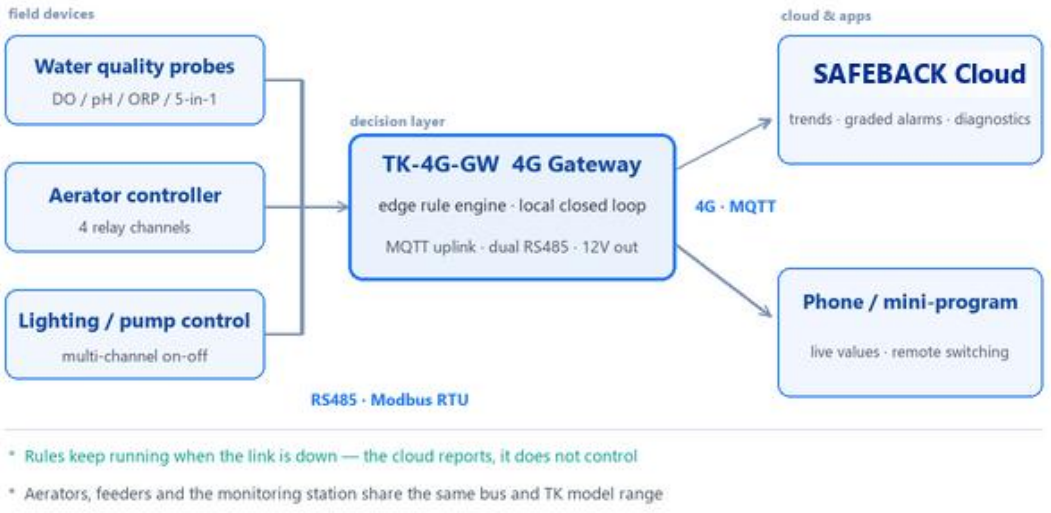


Fig. 2 System layout: field devices feed the TK-4G-GW over RS485; the gateway decides locally and sends data to the cloud and the phone over 4G

1. **Poll** — the gateway works through the slaves on the bus one at a time over Modbus RTU, reads the registers and checks the response. Slave address, baud rate and register mapping are all configurable.
2. **Decide** — each value is compared against the configured rules: below the low limit it acts, back inside the safe band it resets. A dead band is configurable so a value hovering at the threshold does not cycle the equipment.
3. **Act** — the decision becomes a write to a relay channel or a VFD frequency command on the same bus, and the resulting state is read back as confirmation.
4. **Publish** — the same values go out as MQTT topic messages to the cloud, where they become trends, alarms and history. The phone app reads the same source, so there are never two versions of the truth.

5. **Back-report** — while the link is down data lands on the local partition and rules keep running; when the link returns the backlog is sent in time order and the trend line has no gap.

On the protocols: Modbus RTU is the most common master-slave serial protocol in industrial field wiring — one question, one answer, a simple frame, supported by practically every water quality probe, controller and meter. MQTT is a lightweight publish/subscribe protocol built for low bandwidth and unstable links, which is why it holds up better than a direct connection on a weak 4G signal. The gateway converts between the two inside one box, so no separate protocol converter has to be bought.

6. Installation and wiring

- **Location** — DIN-rail mounted in the pond-head control box, or wall-mounted in a pump room or office. The unit itself is IP65 and can sit outdoors, but long sun exposure ages the housing, so a rainproof enclosure and a position clear of standing water and spray are recommended.
- **Supply** — DC 12 V from its own supply rated at least 2 A, not shared with heavy loads. Thin cable and optimistic supply ratings are the first cause of a gateway that keeps restarting.
- **Terminal order** — each RS485 channel is a 4-way terminal in the order **12 V / A / B / GND**; both channels are wired the same way. Check the terminal marking before landing a wire.
- **Three rules** — (1) A to A, B to B; reversed polarity gives no response at all. (2) Common ground: the gateway GND and the device GND must be connected. (3) Run the bus in shielded twisted pair with the shield earthed at one end.
- **Antenna** — lead the SMA antenna out of the enclosure and stand it upright; fit a high-gain antenna on weak sites and never tape the antenna against a metal enclosure.
- **SIM** — a standard card goes straight in; power off before inserting, and follow the marking for orientation. Outside China use a local data-capable SIM.
- **Address plan** — factory default is 40 for relay and power devices and 41 for water quality probes; with several units of the same kind continue 40, 42, 43 and record each one on the wiring sheet.
- **Surge and earthing** — in thunderstorm areas fit surge protection on the supply and antenna sides and earth the enclosure properly; check the earth resistance before each rainy season.

Field checklist

Symptom	Most likely cause
No device responds at all	A and B reversed, or no common ground
Responds but values are wrong	Wrong baud rate (9600 default) or wrong slave address
Intermittent dropouts	Bus too long, missing terminating resistor, spur too long
Gateway keeps restarting	Supply current too low — the 4G burst pulls the rail down
Data reads but never reaches the cloud	Server address, port or topic wrong; SIM out of credit or no signal
Phone command does nothing	Gateway online but the rule is not enabled, or the slave did not acknowledge — read the log first

7. Configuration and typical layouts

No laptop is needed. Connect a phone over Bluetooth, open the mini-program and enter four parameters: **server address, port, topic and RS485 baud rate**. Address and port decide where the data goes, the topic decides which channel it lands on, and the baud rate decides whether the bus can be heard at all.

Rules are configured the same way: set the condition per pond — which parameter, which threshold, which channel to drive, whether a delay and a dead band apply — save it, and it is pushed down to the gateway to run locally. Losing the cloud link does not disturb a rule already deployed.

Three layouts cover the three most common requirements on Vietnamese ponds:

Layout	Composition	What it does	Where it fits
A — Monitoring	TK-4G-GW ×1 + TK-DO100 ×1 (or TK-MP500)	DO and temperature on the phone; push alarms on limit; no automatic switching	Farms that want data first and are not ready to touch the electrical panel; budget-first projects
B — Closed loop	TK-4G-GW ×1 + probes + four-channel aerator controller (or TK-R12 board)	DO closed-loop start/stop of aerators; remote switching from the phone; still automatic when offline	Intensive fish and shrimp ponds; sites with nobody on night watch
C — Multi-pond	One TK-4G-GW per pond plus that pond's equipment, all on one cloud account	Many ponds on one account; per-pond thresholds, grouped alarms, one overview screen	Cooperatives, contiguous estates, dealer demonstration sites

The three layouts are stages rather than alternatives: buy A, add a control circuit to reach B, add gateways horizontally to reach C. The gateway itself is not replaced, and the parameters and rules already configured carry over.

8. Satellite data link with Starlink

A share of Vietnamese ponds simply has no usable 4G: offshore rafts and sea cages, islands, reservoirs in the hills, plots along the Cambodian border. These are exactly the sites where remote monitoring matters most, because nobody lives there. Low-earth-orbit satellite broadband such as Starlink is currently the only wideband link that can be installed and paid for at those points.

The Starlink terminal already provides an **Ethernet port** — built in on the business kit, supplied as the Ethernet adapter on the standard kit — so the dish cables straight into the gateway. What it replaces is the leg between the gateway and the internet, **not the gateway itself**: the RS485 bus, the Modbus polling, the register mapping and the edge rules are untouched. **TK-4G-GW is therefore offered in a Starlink version, selectable on request**: the same board and the same firmware, with the uplink brought out on an RJ45 port.

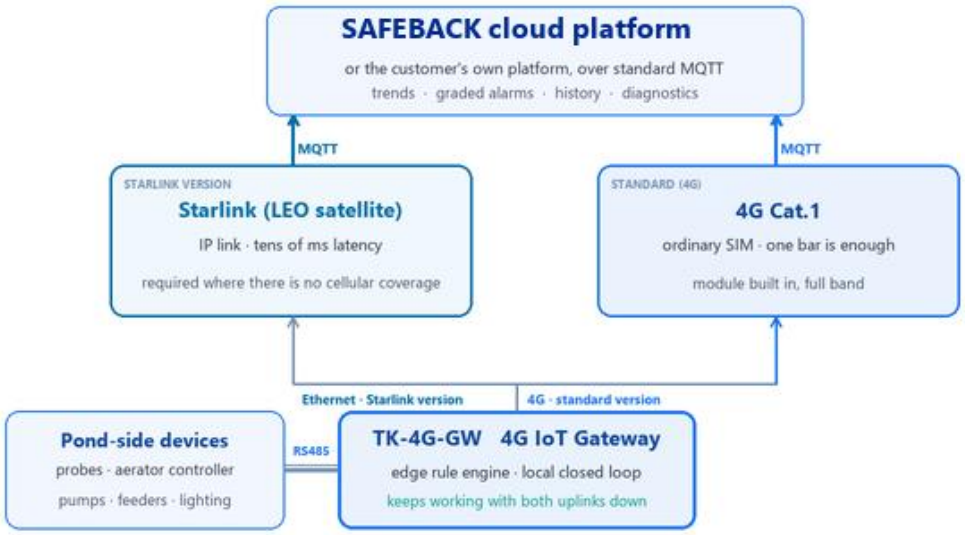


Fig. 3 The satellite replaces the 4G leg only — bus, polling and local rules are unchanged

Version	Uplink	Where it fits
Standard (4G Cat.1)	4G Cat.1, cellular module built in, ordinary SIM card. If a dish is present it serves the people and the cameras on site, while telemetry stays on 4G	Any pond with usable 4G — the default build
Starlink version	**Ethernet (RJ45)** taken straight from the dish; the cellular module is not fitted. MQTT runs over the satellite link, with no coverage needed at all	No 4G at all: offshore rafts, islands, remote reservoirs, stretches along the border
Starlink version, dual uplink	**Ethernet (RJ45)** and 4G on one unit, with automatic failover and a settable priority	Unmanned sites where the link must not be a single point of failure

The Starlink version is chosen when the order is placed, not switched in the field: state the uplink you need, the number of units and the target market at enquiry stage and we confirm the build, the lead time and the price. Nothing changes on the pond side — the same probes, the same RS485 wiring and the same rule set carry over unchanged.

Why the satellite leg suits this gateway. A dish suffers rain fade in the Mekong Delta wet season, and a link that drops under a monsoon is precisely the objection raised against cloud-dependent control. Here it costs nothing that matters: the rules run on the board, the pond keeps aerating, readings queue on the local partition and are back-reported when the sky clears. What a satellite outage takes away is the trend line, not the aeration. LEO latency of a few tens of milliseconds is irrelevant to a 30-second telemetry cycle and still comfortable for a manual command.

What the site has to provide

- **Power for the dish** — the terminal is mains-powered, typically drawing 50 to 75 W including the router, so on a 24-hour basis roughly 36 to 54 kWh a month. At the Vietnamese industrial rate of about 1,987 VND/kWh for the normal period under 6 kV, that is in the order of VND 70,000 to 110,000 a month; the gateway itself adds only a few watts. On a pond with no grid, size the solar and battery for the dish, not for the gateway.

- **Clear sky view** — the dish needs an unobstructed arc; a tree line or a roof edge on the wrong side costs throughput or the link entirely. Choose the mounting point first, then the gateway position.
- **Lightning protection** — a dish on a pole is more exposed than anything else on the pond. Earth the mast and the cable entry properly and fit surge protection; this is the single most common way a satellite site is lost.
- **Cable run** — respect the maximum cable length stated by the terminal supplier, and keep the gateway inside its rainproof enclosure on the DC side rather than running 12 V across the yard.
- **Service plan and licensing** — availability, tariff and any licensing requirement for satellite broadband in the destination country are the buyer's to confirm with the operator. We supply the gateway side; the dish, mount, power supply and subscription are not part of the unit.

9. Notes for regional markets

This unit runs on DC 12 V and never connects to the grid directly — there is always an adapter or a power supply in between. So what differs is not the voltage level, but the adapter's input range, the radio bands and the certification. Check the table first.

Country / region	Single-phase	Three-phase	Frequency	Relation to this unit
Vietnam	220 V	380 V	50 Hz	Identical
Thailand	220 V	380 V	50 Hz	Identical
Indonesia	220 V	380 V	50 Hz	Identical
Cambodia	220 V	380 V	50 Hz	Identical
Bangladesh	220 V	380 V	50 Hz	Identical
Mongolia	220 V	380 V	50 Hz	Identical
Myanmar	230 V	400 V	50 Hz	+5%
Singapore	230 V	400 V	50 Hz	+5%
Malaysia	240 V	415 V	50 Hz	+9%
India	230 V	400 / 415 V	50 Hz	+5–9%
Philippines	220 V	380 / 480 V	60 Hz	Frequency differs

9.1 Fully compatible — 380 V / 50 Hz

- **Vietnam, Thailand, Indonesia, Cambodia, Bangladesh, Mongolia** — These six markets use the same low-voltage system as China: 380 V three-phase, 220 V phase-to-neutral, 50 Hz. The machine connects directly — no transformer, no re-wound motor. This is where the TK series is easiest to sell against European or American equipment.
- **Vietnam is the reference market** — 0.4 kV three-phase four-wire, 380 V between phases, 220 V phase-to-neutral, 50 Hz — the same as China. Small ponds in the south often have only a

single-phase 220 V service, or three-phase with too little capacity; tell us the service type, transformer rating and existing load before ordering. If a single-phase machine is required, specify the D configuration.

- **Phase loss and voltage sag** — Voltage sag at the end of a rural feeder, and phase loss, are the number-one cause of burnt motors — not the voltage level. Fit a phase-failure overload relay per machine; if you run demand-based aeration (C configuration), the control board already provides that protection.

9.2 Wide-range coverage — 400 to 528 V / 50 Hz

- **Malaysia 415 V, India 400–415 V, Singapore 400 V, the Philippines 480 V — no transformer needed** — These voltages look higher than 380 V, but they are not a problem for our machines: the control supply is a 90–528 VAC wide-range input. Single-phase 220 V, 380 V phase-to-phase, 440 / 480 V — all accepted, and 100–745 VDC as well. No step-down transformer, no country-specific model. One machine covers Southeast Asia.
- **CE covers 100–400 VAC only — say so plainly** — Operation between 480 and 528 VAC is fine, but it sits outside the CE certification range. Quote within 400 VAC for tenders and certification files; where 480 V is genuinely used, state it in the technical deviation sheet rather than glossing over it — this is exactly what a customer's acceptance engineer will check.
- **The motor side still deserves a glance** — A wide-range control supply does not make the motor wide-range. A 380 V three-phase motor on a 415 V supply sees +9.2%, which is inside the ±10% window of IEC 60034-1 and will run; but in hot, humid pond-side enclosures the thermal margin is thin, so for continuous full-load duty confirm the actual voltage once, or take one frame size up. Same logic for 240 V single-phase in Malaysia.

9.3 Different frequency — the Philippines at 60 Hz

- **A 50 Hz motor must not be connected to a 60 Hz supply** — The Philippines runs 220 V / 60 Hz nationwide, with 380 V or 480 V three-phase for industry. On 60 Hz a 50 Hz motor turns 20% faster; for impeller and fan loads shaft power rises with the square to cube of speed, so the demand reaches 1.4–1.7 times rated power — this is not 'a bit faster', it is guaranteed overload.
- **Three ways out — decide before ordering** — ① Order a 60 Hz motor; cleanest. ② Run a VFD with the frequency clamped to 50 Hz, at the cost of about 17% of output. ③ Size up one frame and run it at 60 Hz. This has to be settled at the order stage; it cannot be fixed in the field.
- **Confirm the three-phase voltage as well** — Both 380 V and 480 V three-phase exist in the Philippines — legacy US-era projects are usually 480 V, local distribution usually 380 V. Ask the customer to photograph the panel nameplate before ordering.

9.4 Power draw, bands and local networks

- **Under 3 W — the electricity is irrelevant** — DC 12 V at about 0.2 A continuous; the 4G transmit burst pulls to roughly 0.5 A, so leave 2 A of headroom on the supply or the unit will keep rebooting — the number-one cause of 'the gateway keeps dropping off'.
- **Check the 4G bands per country** — The module is multi-band and covers the main Southeast Asian and South Asian bands. Confirm the operator before ordering: Viettel / Vinaphone / Mobifone in Vietnam, AIS / True / dtac in Thailand, Telkomsel in Indonesia, Globe / Smart in the Philippines, Maxis / Celcom in Malaysia, Jio / Airtel in India.
- **SIM and data plan are the customer's** — No SIM is included. Recommend an IoT SIM (500 MB a month is ample) rather than a consumer SIM, which gets suspended and drops the link.

9.5 Climate and corrosion

- **Hot and humid** — Across Southeast Asia: enclosures IP55 or better with desiccant inside; surge protection on the incoming supply, essential in thunderstorm areas.
- **Salt spray** — Coastal salt spray attacks terminals and PCB solder joints. Inspect terminals every six months, apply anti-oxidation grease, and specify stainless or coated enclosures.
- **Monsoon flooding** — India, Bangladesh, Myanmar: mount above the historical flood level, run cables on trays or overhead.

9.6 Certification and documents

- **Mandatory certification differs by country** — Vietnam CR (QCVN 4:2009/BKHCN for low-voltage equipment), Thailand TISI, Indonesia SNI, the Philippines BPS/PS or ICC, Malaysia SIRIM / ST, India BIS. Most schemes are mandatory only for certain power ranges — confirm against the local customs requirement.
- **CE and IEC reports are the passport** — Beyond the local schemes, a CE declaration and IEC test reports are the two documents customers ask for most, tenders in particular. Ask before ordering and we ship them with the goods.
- **Language of the documents** — Standard documentation is bilingual Chinese/English. Vietnamese, Thai, Indonesian or Tagalog manuals and nameplates must be requested in advance — they are typeset separately, priced separately, and extend the lead time.

9.7 Five questions before ordering

① Is the pond service three-phase or single-phase? What is the transformer rating?

② What is the measured voltage on site? — the actual reading, not the nominal figure.

③ Is the frequency 50 Hz or 60 Hz? — the Philippines must be confirmed separately.

④ Is the water fresh, brackish or salt? Roughly what salinity?

⑤ Which language do you need for the manual and the nameplate?

This table is a general judgement. Province-level differences — a rural feeder that sits low all year, an

extra clearance step at a particular port, a local subsidy scheme — should be added by the local sales team to the project file. For a country not listed here, judge by the same three dimensions: voltage, frequency, certification; if in doubt, ask the factory.

10. FAQ

If 4G drops, does automatic control still work? Yes. The rules sit on the gateway and both the comparison and the interlock run on the board; 4G is only the reporting channel. Data queues locally while the link is down and is back-reported afterwards. This is the question worth asking of any gateway — plenty of imported solutions put the logic in the cloud, which means the pond loses control when the link does.

How many devices can one gateway carry? Up to **64 slave addresses** on the bus (both terminal groups are parallel, so 64 in total). The polling cycle depends on the number of slaves, each one's response time and the baud rate, so as engineering practice we suggest keeping a bus to 16 slaves or fewer, with a full poll cycle shorter than one third of the upload period. When there is more equipment or a faster requirement, add a gateway to split the bus rather than cramming one line.

Can it take third-party RS485 devices? Yes, provided they are standard Modbus RTU slaves. We need the register table (address, data type, unit, scale) from the supplier and then map it in configuration. Non-standard protocols need evaluation and separate development.

Must we use your cloud? No. The gateway publishes standard MQTT and can feed the customer's own platform or a third-party IoT platform; alternatively an account on the SAFEBACK cloud can be used directly. Either way the local loop stays in place.

How fast does a phone command act? Under typical network conditions the command, execution and acknowledgement complete inside 1 s. On a poor link it takes longer, in which case the local rules govern — a manual command never overrides a safety logic that is already active.

Why does the gateway keep restarting? Nine times out of ten it is the supply. The 4G transmit burst lifts the current and an under-rated supply drags the rail below the reset threshold. Fit a genuine supply rated at 2 A or more on its own circuit and the problem normally disappears.

There is no broadband and no easy cable run — what then? That is the design premise: one bar of 4G is enough to reach the cloud. On a weak site, lead the antenna out of the enclosure and raise it, or fit a high-gain antenna. If there is no signal at all, the local loop still works.

There is no 4G whatsoever — only Starlink. Can the site still work? Yes. Order the **Starlink version**: the dish's Ethernet port connects to the gateway and MQTT runs over the satellite link with no cellular coverage at all. Where some 4G exists but is unreliable, take the version carrying both uplinks and let the failover pick. Either way the rules stay on the board, so a rain-faded link costs you the trend line, not the aeration. Section 8 sets out the three versions, the power the dish adds and

what the site has to provide.

Can the firmware be updated later? Yes. Production units support OTA update with automatic rollback; push it with one tap in the phone mini-program, or remotely from the cloud platform, or locally over USB.

11. Packing, delivery and commercial terms

- **Packing** — antistatic bag and individual carton, master carton for bulk; the unit measures 90 × 54 × 58 mm and the carton size and gross weight follow the packing list.
- **Container loading** — 20GP / 40HQ quantities are calculated from the final carton size; our loading plan is confirmed before the order.
- **Lead time** — scheduled on order confirmation; stock availability advised separately.
- **Port of loading** — Nansha / Yantian, China.
- **Cloud platform and data** — a basic cloud account is opened with the unit (English by default, switchable to Chinese; Vietnamese and other languages localised per project). The domestic version includes three years of carrier data; the export version ships without a SIM card or data, so the customer supplies a local IoT card. Platform use is subscription-based: the basic account carries no extra charge within the bundled service period; anything beyond it (extra sub-accounts, multiple organisations, on-premise deployment, custom development, renewal) is quoted separately, with the data allowance, subscription price and term as confirmed in the contract. **The final interpretation of the service scope and billing rests with us.** Connecting to the customer's own or a third-party platform carries no platform fee — we provide the protocol document.
- **Documents** — wiring and configuration guide in Chinese and English; the MQTT topic structure and JSON field document is available on request; a Vietnamese version can be prepared on request.
- **Not included** — 12 V power adapter (a separate product, order it with the unit), SIM card and data charges, antenna extension cable, rainproof enclosure, surge protector, on-site labour and consumables. Where a satellite data link is required, the dish, mount, its power supply and the subscription are supplied by the customer or by the satellite operator.
- **Warranty** — one year against manufacturing defects, **counted from the date of manufacture**. Lightning damage, water ingress and unauthorised repair are excluded.

12. Contact

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Specifications are subject to change without notice as the product is improved; confirm current data before tendering or volume orders.