SAFEBACK | SMART AQUACULTURE | GUANGZHOU, CHINA

Four-Impeller Waterwheel Aerator TK-YC1500SL

1.5 kW three-phase · four PE impellers φ670 mm · ≥2.0 kgO_2/h · one unit for 3–6 mu (0.2–0.4 ha)

Product datasheet (EN) · Rev. 2026-11 · Vietnam market | factory model YC-1.5SL

1. Overview

The TK-YC1500SL is the largest mains-powered waterwheel aerator in the TK range: a 1.5 kW three-phase motor driving one horizontal shaft with four φ670 mm PE impellers in two pairs, carried on three HDPE floats. It does two jobs at once — puts oxygen in and moves the water.

Why four impellers. A twin-impeller waterwheel cannot push water across a large pond; the current dies halfway. Four impellers share the same shaft, so the volume lifted doubles and the loop can travel right around the pond. On intensive ponds of 3–6 mu, shrimp ponds in particular, that current decides whether feed residue and faeces settle on the bottom or are carried to the sludge zone.

1.5 kW is the universal size: 380 V three-phase, rated current about 3.4 A, identical to Vietnam's 0.4 kV low-voltage network — no transformer, no rewinding. The catch is that a three-phase feed is required; a single-phase pond should step down to the TK-YC750SL or add a VFD.



Fig. 1 TK-YC1500SL: three HDPE floats, four impellers in two pairs, 304 stainless frame, vertical motor and gearbox assembly

2. Key features

- **Four impellers move the whole pond — two pairs on one shaft double the volume lifted**

and the area of water curtain, and the loop can travel right around a 3–6 mu pond.

- **Oxygen, circulation and sludge collection in one — directional flow carries feed residue, faeces and moults to the sludge zone or drain, slowing bottom deterioration.**
- **380 V three-phase, the same standard Vietnam uses — 0.4 kV three-phase four-wire, 380 V between phases, 220 V phase-to-neutral, 50 Hz; the motor needs no change and no transformer.**
- **Stainless throughout — motor housing, frame, shaft, coupling flanges and bolts are all 304; only the floats are HDPE and the gearbox cast iron. In brackish water, rust is what decides service life.**
- **PE impellers, replaceable one at a time — thickened PE, 670 mm diameter, acid/alkali resistant and UV-stable; when one is fouled or damaged, swap that one instead of the whole shaft.**
- **Gear reduction, cheaper to run than worm drive — chromium-manganese-titanium alloy gears in a cast iron housing, higher transmission efficiency than a traditional worm gearbox (industry figure; confirm by test).**
- **Ready for on-demand aeration — with the TK-4G-GW gateway, TK-R12-SC4S-BG board and TK-DO100 DO probe the aerator starts itself below a DO threshold, so nobody has to stay up at night.**

3. The TK family and model coding

Every SAFEBACK aquaculture product carries the TK prefix: TK – category code + specification number. The two-letter code marks the category, the number carries the one figure that matters most — rated power in watts for mains equipment, throughput for feeders, measured parameters for sensors. Waterwheel aerators use YC: the factory model YC-1.5SL becomes TK-YC1500SL (YC = waterwheel, 1.5 W rated watts, SL = three-phase mains version). The solar direct-drive version of the same machine is TK-YC750SP — impellers and floats are common, only the power side differs.

Code	Category	Model	What the number means
GW	4G IoT gateway	**TK-4G-GW**	4G Cat.1 uplink (role-based code)
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 (air-blower) feeder	TK-FS2000	Rated power 2000 W, 30 m throw
—	Two-bag feeder	TK-150D	150 kg/h class; D = dual hopper
DO	Fluorescence DO sensor	TK-DO100	Single parameter
PH	pH sensor	TK-PH100	Single parameter

Code	Category	Model	What the number means
ORP	ORP sensor	TK-ORP100	Single parameter
MP	Multi-parameter probe	TK-MP500	Five parameters

Where this unit sits in the family: impeller aerators (TK-YL1500) handle oxygen, the waterwheel (this unit) handles flow, feeders handle feed, and the sensors and gateway let you see the numbers in the pond. Buy them separately or as a package from the configuration table; the interfaces and protocol are common, so later additions need no new platform.

4. Technical specifications

Item	Specification	Notes
Model	**TK-YC1500SL**	Waterwheel type, four impellers, float-mounted
Rated power	1,500 W (2 HP)	—
Rated voltage	380 V, 3-phase, 50 Hz	Three-phase four-wire; matches Vietnam's 0.4 kV network
Rated current	approx. 3.4–3.7 A	Varies with winding and load
Oxygen transfer rate	≥2.0 kgO_2/h (to be tested)	SC/T 6010 floor for this power class; replaced by the measured value before shipment
Aeration efficiency	≥1.5 kgO_2/(kW·h)	As above
Impellers	4 × φ670 mm, thickened PE	Acid/alkali resistant, UV-stable; two pairs on one shaft, replaceable singly
Reduction	Cast iron gearbox, Cr-Mn-Ti alloy steel gears	Oil 10#–30#, fill to the sight plug
Floats	3 × HDPE, 1650 × 325 × 190 mm	Virgin material; impact, acid and UV resistant
Motor	304 stainless housing, 3-phase asynchronous, all-copper winding	Check seals and paint annually in brackish water
Frame and shaft	304 stainless steel (SUS 304)	Includes triangular brackets, coupling flanges and bolt bag
Water area served	3–6 mu (2,000–4,000 ㎡)	Allow 1 kW per mu in dense shrimp ponds; above 8 mu use two units on the diagonal
Net weight	approx. 70–80 kg (to be weighed)	Ships in parts; container load from measured carton size
Noise	≤80 dB(A)	SC/T 6010 limit
Warranty	12 months on the machine, from date of manufacture	Wear parts (impellers, oil seals) excluded

Values marked "≥" for oxygen transfer and efficiency are the SC/T 6010 acceptance floor for this power class, not measured maxima. Items marked "to be tested" or "to be weighed" will be replaced by the factory's measured figures before shipment. Actual oxygen transfer depends on water temperature, salinity, atmospheric pressure and blade submergence; acceptance should be based on a site test.

5. How it works

1. **Lift — the motor drives the horizontal shaft through the cast iron gearbox; the PE impellers lift water from below.**
2. **Push — the lifted water is thrown tangentially from the blades and guided into one**

direction, creating a continuous surface current.

3. **Exposure — as the blades leave the water the sheet breaks into droplets and spray, multiplying the surface area in contact with air.**
4. **Circulation — the current reaches the bund, turns and travels around the pond, carrying feed residue, faeces and moults toward the centre or the drain.**
5. **Repeat — these four steps run continuously; over a few weeks dissolved oxygen, water-column structure and bottom condition improve and the risk of a dawn crash falls.**

Be clear about the trade-off: a waterwheel transfers less oxygen per kW than an impeller, and in exchange gives you directional flow and shallow-water capability. Decide what the pond needs — oxygen, or flow. Impeller (TK-YL1500) for oxygen, this unit for flow; on ponds above 5 mu the two are used together.

6. Installation and operating points

- **Blade submergence 10–15 cm — about one sixth to one quarter of the impeller diameter. Judge by the water: a full sheet, no heavy spray, steady current. Too deep and the motor overloads and current rises; too shallow and it spins in spray, losing both oxygen and flow.**
- **Check direction before running — after wiring, jog the motor; water must be pushed the intended way. If it runs backwards, swap any two phases.**
- **Floats and mooring — three HDPE floats form the platform; moor all four corners to stakes or anchors on the bund. Before the monsoon or a typhoon, check ropes and floats so the unit cannot drift into the bund or capsize.**
- **Clamp the cable to the frame — a cable that works loose while the machine is moved or in wind and waves is the first cause of phase loss and a burnt motor. Tie it to the frame with slack for water-level change; keep it off the ground and out of the mud.**
- **Fit phase-loss and overload protection — phase loss and voltage sag are common at the end of a rural feeder; the protector costs little and saves the motor. Keep voltage within ±5% of rated.**
- **Check oil before the season — fill the gearbox with 10#–30# oil to the sight plug before first use, then check monthly. Milky oil means the seal has gone and must be replaced immediately.**
- **Match push direction to the time of day — in a long pond push along the long axis so the current circles the pond. Run in the sunny afternoon for layer exchange, the morning after an overcast day, and in the middle of the night during prolonged rain to prevent a dawn crash.**
- **Clear the impellers — weeds, rope and plastic bags wrap the blades and push current up. Check every one to two weeks, and always before and after pond cleaning.**

7. Configuration and selection

The aerator is the actuator; combined with SAFEBACK monitoring and control products it forms four configurations. Choose by the supply available at the pond and by how the farm is managed:

Configuration	Composition	Supply	Suits
A Manual	TK-YC1500SL ×1	380 V 3-phase	3–6 mu; someone on site switches it; lowest cost
B Timed	TK-YC1500SL + TK-4G-GW	380 V 3-phase	3–6 mu; fixed schedule, no night trips
C On-demand	TK-YC1500SL + TK-4G-GW + TK-DO100 + TK-R12-SC4S-BG	380 V 3-phase	3–6 mu; starts itself below a DO threshold, no missed judgement
D Single-phase	220 V 1-phase 1.5 kW (to be confirmed)	220 V 1-phase	1–3 mu; ponds with only a single-phase supply

How many units: for a normal intensive pond (about 2 m deep, roughly 1,000 kg per 667 ㎡) allow 0.5–0.75 kW per 667 ㎡; in shrimp ponds needing strong circulation allow 1 kW per mu. One unit covers 3–6 mu; above 6 mu use two on the diagonal, pushing toward each other so the loop forms faster.

8. Notes for regional markets

This unit is built for 380 V three-phase, 50 Hz. What differs between countries is not whether it fits, but three things: voltage level, frequency and certification. Check the table first, then read the note for your region.

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

8.1 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.

8.2 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.

8.3 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.

8.4 Running cost at local tariffs

- **A 1.5 kW machine running 8 h a day uses about 12 kWh — 12 kWh a day, roughly 3,600 kWh a year at 300 days.**
- **Annual cost at local tariffs (2025 public data, tax included, indicative) — Vietnam USD 0.079–0.094/kWh, about USD 285–340 per unit per year; Thailand about 0.126, about 455; Indonesia 0.07–0.11, about 250–400; India 0.08–0.10, about 290–360.**
- **Demand-based switching cuts a third or more** — With C-configuration demand-based aeration the actual running hours typically fall by more than 30% against fixed timers, and the bill falls with them — a more direct saving than changing the motor.

8.5 Climate and corrosion

- **Hot and humid** — Southern Vietnam, central Thailand, the Philippines, Indonesia, Malaysia: year-round humidity plus afternoon convective storms. Control enclosures IP55 or better, surge protection on the incoming supply; check mooring lines and floats before typhoon season.
- **Brackish and salt water** — Ca Mau, Bac Lieu, Soc Trang and Ben Tre in Vietnam, southern Thailand, coastal Indonesia: high salinity, aggressive corrosion. Shaft and frame are stainless; the motor and gearbox sit in the splash zone, so inspect oil seals and paint annually. Tell us in advance for long-term high-salinity sites.
- **Monsoon flooding** — India, Bangladesh, Myanmar: monsoon flooding with salt spray. Raise the enclosure base, keep every cable joint on the bank.

8.6 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.

8.7 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.

9. Frequently asked questions

How many mu does a 1.5 kW four-impeller unit really cover? 3–6 mu is the safe range: on a 2 m deep pond producing about 1,000 kg per 667 ㎡, one unit holds both the oxygen and the circulation. Above 8 mu use two units on the diagonal — pushing toward each other, the loop forms faster. In dense shrimp ponds allow 1 kW per mu.

I cannot get up at night — what are my options? Take configuration C: the DO probe starts the aerator below the set threshold and stops it above it, and you can see the curve on your phone. That is more reliable than a timer — when the weather turns, the DO curve collapses before you notice anything.

Four impellers or two — what is the difference? Volume moved and coverage. The twin-impeller TK-YC750SL (0.75 kW) suits 1.5–3 mu or boosting flow in a large pond; this unit doubles both power and impeller count, so one machine covers 3–6 mu, with a single control point, a single mooring position and less cabling.

Waterwheel or impeller — how do I choose? Ask what the pond needs: oxygen or flow. For oxygen and fast recovery from a dawn crash, take the impeller aerator (TK-YL1500, ≥2.3 kgO_2/h); for flow, sludge collection and shallow water, take the waterwheel. On ponds above 5 mu the usual arrangement is an impeller for oxygen plus a waterwheel for flow.

Will it injure fish or shrimp? A waterwheel pushes water horizontally in one direction, which is gentler than the circular stirring of a vertical impeller. It is fine for grow-out ponds; for hatchery tanks and very small water bodies 1.5 kW is too much flow and will affect the fry.

My pond has no three-phase supply — can I still use it? Order the 220 V single-phase 1.5 kW version (configuration D, to be confirmed), or run a VFD that converts single-phase to three-phase. The VFD also gives you speed control, at the cost of extra electronics that need surge protection in thunderstorm areas.

What does it cost to run for a year? At 8 hours a day for 300 days that is about 3,600 kWh, roughly USD 285–340 a year at Vietnamese industrial tariffs. That is the upper bound for continuous running; your own switching strategy will come in lower.

What does the warranty cover? Twelve months on the machine from the date of manufacture, covering the motor, gearbox, frame and floats. Impellers, oil seals and cable are wear parts and

are not covered, but they are inexpensive and can be ordered separately.

10. Packing, delivery and commercial terms

- **Packing — impellers, frame, floats and motor packed separately in cartons and woven bags, one set per package; carton dimensions and gross weight to be confirmed at order.**
- **Lead time** — scheduled after order confirmation; stock availability advised separately.
- **Port of loading** — Nansha / Yantian, China.
- **Documents supplied** — installation and operating instructions in English or Chinese; Vietnamese version available on request in advance.
- **Not included** — phase-loss protector, extension cable, anchor rope, installation service.

11. 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.