

TORQUE

THE TOBMS BLDC MOTORS JOURNAL

Where Torque Meets Thrust

Six verified picks across eleven products — frameless torque motors, robotic actuators, gimbal drives, underwater thrusters and multi-rotor propulsion. Every figure traceable to a manufacturer source.

6

Editor's picks across five jobs

3

Manned-class motors compared on one bench

1

Inspection UAV propulsion study

1

Rated vs peak torque, explained



ON THE COVER

T-Motor U15 II KV80

Heavy-lift propulsion · 36.5 kgf max thrust · 8,580 W max power at 180 s · 36N42P stator · 1,740 g. Three motors from the same line are compared on page 06.

- 03 Editor's Picks — six motors across five jobs
- 06 Spec Comparison — U15 II, U15XL, U15XXL
- 07 Application Spotlight — inspection UAV propulsion
- 08 Engineering Note — rated versus peak torque

EDITOR'S NOTE

Choosing Without Guesswork

Why this issue starts from data, not from marketing copy.

Engineers rarely lack motor options. What they lack is comparable, verifiable data — figures published under the same conditions, with units stated, and with the gaps marked as gaps. This first issue of TORQUE was assembled from the live ToBMS product index under exactly that rule: every model selected here has a published product page, a traceable manufacturer source, and enough recorded parameters to support a real engineering decision.

The six Editor's Picks span robotic joints, camera gimbals, underwater propulsion and multi-rotor aircraft. That spread is deliberate. Cross-domain reading is often where the best selection intuitions come from — a gimbal designer's approach to cogging torque frequently reframes a joint-control problem in robotics.

The comparison section stays deliberately narrow: three T-Motor U15 motors from one product line, measured under one manufacturer's bench conventions. Width was traded for comparability, because a wide table of mismatched test conditions is worse than no table at all. Where a value is absent from the record, it is marked as absent rather than estimated.

Specifications were verified against current ToBMS records and the linked manufacturer sources at publication (September 2026). This PDF is a snapshot: the figures inside it do not update, while the linked product pages always carry the latest record. Provenance for each model is retained in the editorial data record for future audit.

A gap in the data is information too — it is not zero, and it is not an estimate.

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ABOUT THIS JOURNAL

Published monthly

TORQUE is produced by the ToBMS editorial desk. Each issue takes one theme across robotics and UAV propulsion and presents verifiable product findings alongside engineering notes.

Data rules

Every figure traces back to a manufacturer source; gaps are printed as gaps; results taken under different bench conditions are never presented as directly equivalent.

Snapshot, not live data

The printed pages are a point-in-time record. Linked product pages carry the latest figures and should be treated as authoritative after publication.

EDITOR'S PICKS · ONE OF TWO

Six Motors Worth a Closer Look

Selected from the published ToBMS product index across five jobs. The picks reflect distinct engineering needs — not a ranking.



ROBOTIC ACTUATOR

AK80-6 KV100

CubeMars · Integrated actuator, 6:1 reducer

Peak torque	12 Nm
Rated torque	6 Nm
Rated power	340 W @ 48 V
No-load speed	800 rpm
Mass	485 g

A middleweight for dynamic joints: 6:1 reduction keeps output speed usable while 12 Nm peak absorbs start-stop loads in quadruped and exoskeleton builds.



QUASI DIRECT DRIVE

AKE90-8 KV35

CubeMars · QDD actuator, 8:1 reducer

Peak torque	170 Nm
Rated torque	55 Nm
Rated power	700 W @ 48 V
No-load speed	210 rpm
Mass	1,400 g

Humanoid-leg class torque density: 170 Nm peak from a 1.4 kg, 107.5 mm module, with the backdrivability only a low 8:1 ratio delivers.



GIMBAL MOTOR

GL60 II KV28

CubeMars · Direct-drive gimbal motor

Peak torque	1.5 Nm
Rated torque	0.6 Nm
Stator	24N28P
Rated current	1.54 A
Mass	276 g

Low cogging and a 24N28P stator make this a quiet holder for camera platforms — here torque quality matters more than torque quantity.

HOW THESE PICKS WERE MADE

Published and verifiable

Every pick has a live ToBMS product page, a recorded manufacturer source, and enough parameters to justify inclusion. Nothing was selected from search results alone. Where one manufacturer publishes the same label with two different values across its own regional datasheets, this issue prints the figure carried in the ToBMS record.

Needs, not brands

The six picks span five jobs on purpose: joint actuation, stabilisation, underwater thrust, industrial lift and FPV payload. Coverage of distinct engineering needs outweighs even brand representation.

No unproven ranking

These are discoveries, not placements. Where a category lacks comparable data, the section states that instead of manufacturing a ranking.

EDITOR'S PICKS · TWO OF TWO

Propulsion for Water and Air

Three different thrust problems: a sealed underwater drive, a long-endurance industrial lift, and a cinematic FPV payload.



UNDERWATER THRUSTER

DW25

CubeMars · Sealed ROV thruster

Max mooring thrust	≥25 kgf
Rated power	1,315 W @ 48 V
Depth rating	0–350 m
Envelope	Ø152 × 191 mm
Mass	1,790 g

Flagship of the DW line: ≥25 kgf of bollard thrust in a 1.79 kg sealed unit, maintenance-free and corrosion-resistant for large ROV frames.



UAV MOTOR

U8 Lite L KV110

T-Motor · U-Efficiency series

Max thrust	11.2 kgf
Max continuous power	492 W (180 s)
Bus	12S LiPo, 48–52 V
Peak current	45.8 A
Mass	282 g

A workhorse for inspection and mapping UAVs: 11.2 kgf of thrust at 282 g, with a manufacturer-quoted MTBF of about 1,000 hours for industrial duty.



DRONE MOTOR

F90 KV1300

T-Hobby · Long-range and cinelifter FPV

Max thrust	2.36 kgf
Max power	1,059 W (60 s)
Bus	5–6S LiPo
Stator	12N14P
Mass	46.6 g

Built for 6–8 in long-range and X8 cinelifter frames: a 46.6 g motor that still delivers over 1 kW for 60 s when a heavy camera rig demands it.

READING THE NUMBERS

Thrust is propeller-specific

Maximum thrust figures come from each manufacturer's bench table at a stated propeller and voltage. They are upper-bound references for that setup, not transferable guarantees.

Name the power condition

Max power 180 s, max power 60 s and maximum continuous power are different measurements. Each figure here keeps the label used by its source rather than collapsing them into one number.

Gaps stay visible

"Not in current record" means the value is absent from the ToBMS record at the basis this issue prints. It is not zero, and it is not a figure borrowed from a rating measured on a different basis.

02

Spec Comparison

Three motors from one manufacturer's U15 line, tested under a single set of bench conventions — the closest thing to an apples-to-apples heavy-lift comparison published anywhere in the current index.

T-Motor U15XXL KV29

The largest of the three: 101.4 kgf max thrust, 210 A peak current over 80 s, 5,130 g — and the reference point for the read-out on the next page.



T-Motor U15XXL KV29

Manned-class reference point · 101.4 kgf max thrust · 210 A peak over 80 s.

SPEC COMPARISON

Three U15 Motors for Manned-Class Lift

Same manufacturer, same 36N42P stator family, same product line — but the published limits are not all quoted over a shared window.

	U15 II KV80 Heavy-lift and freight multi-rotor	U15XL KV38 Manned and heavy-lift UAV	U15XXL KV29 Manned and eVTOL class
KV rating	80 rpm/V	38 rpm/V	29 rpm/V
Battery bus	12–24S LiPo	24S LiPo	24S LiPo
Max thrust manufacturer bench	36.5 kgf	81.2 kgf	101.4 kgf
Peak current manufacturer's window	143 A over 180 s	180 A over 120 s	210 A over 80 s
Max power	8,580 W at 180 s	Not in current record	Not in current record
Stator	36N42P	36N42P	36N42P
Internal resistance	17 mΩ	17 mΩ	20 mΩ
Mass	1,740 g	4,408 g	5,130 g
Body	Ø147.5 × 55 mm	Ø151.5 × 96 mm	Ø151.5 × 106 mm
Shaft	20 mm	25 mm	25 mm

How to read this table. Thrust scales far faster than mass: from U15 II to U15XXL, thrust rises 2.8× while mass rises 2.9× — but the real design trade sits in the bus and the propeller. The U15 II keeps 12S compatibility, which matters for existing industrial airframes; stepping to XL or XXL commits the build to 24S and a 25 mm shaft. Peak current is **not** a like-for-like comparison: the three figures are the limits each motor is rated to for its own stated duration — 180 s on the U15 II, 120 s on the U15XL and 80 s on the U15XXL — so the row reads as three separate ratings, not a ranking. Max power stays blank for the XL and XXL because T-Motor publishes no 180 s power figure for them; the continuous ratings it does publish (5,275 W and 4,971 W) rest on a different basis and are therefore kept out of the same row. **Thrust figures are propeller-specific** and come from each manufacturer's bench table; treat them as upper-bound references for that propeller, not guarantees on a different airframe. All thrust values are printed in **kilograms-force (kgf)**; where a manufacturer publishes gram-force (gf), figures convert at 1000 gf = 1 kgf, with the source values on file.

Full product pages: [U15 II KV80](#) · [U15XL KV38](#) · [U15XXL KV29](#) · further analysis in [Manned Aircraft Propulsion Systems: Three T-Motor U15 Motors Compared](#).

APPLICATION SPOTLIGHT

Propulsion for Inspection UAVs

Inspection platforms live at part throttle — stable hover near structures, long loiter time, and reserve thrust for gusts.



The duty profile. A typical inspection multi-rotor hovers at 40–60% throttle for 25–40 minutes, often within metres of steel and concrete. That rewards efficiency-tuned KV ratings matched to larger, slower propellers, low idle current, and genuine thermal headroom — not headline peak power.

The mass budget. Every gram saved on propulsion converts into flight time or sensor payload. Comparing motors on thrust-to-weight at the intended hover point, taken from the manufacturer's bench table, predicts field behaviour far better than comparing maximum thrust.

Durability as a specification. For fleets flying daily, rated lifespan and ingress protection belong in the selection table next to KV and thrust. A rated 1,000-hour MTBF changes total cost of ownership more than a few points of peak efficiency.

U8 Lite L KV110

Industrial long-endurance class

Max thrust **11.2 kgf** · Mass **282 g** · 12S · 492 W continuous

U5 KV400

Versatile mid-size platform

Max thrust **2.85 kgf** · Mass **195 g** · 3–8S · 120 W continuous

MN3110 KV470

Light aerial-survey builds

Max thrust **1.22 kgf** · Mass **98 g** · 3–6S · 330 W (180 s)

Hover efficiency sets the flight time. Reserve thrust sets the safety margin. Sizing for peak thrust alone produces an airframe that is heavy, hot and short-legged.

CONTINUE READING ON TOBMS

How to Choose an Inspection UAV Motor

KV, thrust and stable hover — the full selection walk-through for inspection platforms.

UAV Motors: Matching KV, Thrust and Mass

The companion guide to sizing multi-rotor propulsion from first principles.

UAV Motors category

Every published UAV motor with recorded KV, thrust, mass and bench conditions.

ENGINEERING NOTE

Rated Torque vs Peak Torque

The most common datasheet misreading in actuator selection — and the one that overheats motors in the field.

The two definitions. Rated, or continuous, torque is what a motor sustains indefinitely without exceeding its thermal limit. Peak torque is a short burst bounded by current limits, magnet demagnetisation margins and duty cycle — typically seconds. Two actuators featured in this issue show how wide that gap can be.

	AK80-6 KV100 Robotic actuator, 48 V	AKE90-8 KV35 QDD actuator, 48 V
Rated torque	6 Nm	55 Nm
Peak torque	12 Nm · 2.0× rated	170 Nm · 3.1× rated
Rated current	9.7 A	21 A
Peak current	20 A	72 A

Size the continuous load against rated torque. Reserve peak torque for transients — acceleration, impact recovery, start-stop.

The sizing rule. Compute the worst-case continuous joint load — gravity holding, payload at full extension, sustained duty — and keep it below rated torque with 20–30% margin. Then verify that transient events fit inside peak torque for their actual duration. A joint that appears viable at peak torque but holds near peak continuously will derate, overheat, or fail early.

The ratio is information. The AKE90-8's 3.1× peak-to-rated ratio reflects a design built for dynamic, backdrivable motion such as humanoid legs and exoskeletons; the AK80-6's 2.0× suits steadier positioning duty. Neither is better — each describes the thermal and magnetic design intent. Compare ratios only within one manufacturer's test conventions.

THE METHOD IN THREE LINES

Rated torque is the thermal budget

The continuous holding load, including a 20–30% margin, must stay under rated torque — not under peak.

Peak torque is a transient budget

Acceleration, impacts and start-stop events draw on peak torque for seconds at a time, then return below rated.

The ratio describes design intent

Peak-to-rated ratios differ by design goal; compare them only within one manufacturer's bench conventions.

DISCOVER TOBMS

Find, Filter and Compare in Four Steps

A worked example: shortlisting a UAV motor for a 12S inspection platform. The same flow works in every category on the site.

01

Open the selection index

Start from the [Select](#) index. Every published product is listed there with its category, manufacturer and key parameters — no account and no sign-up.

02

Filter by what actually constrains the design

Narrow by category — here [UAV Motors](#) — then by hard constraints such as KV rating, battery bus or mass. Filtering on the constraint before the brand keeps the candidate list honest.

03

Add candidates to the comparison table

Add any model from its product card or product page, then open [Compare Products](#) to see the shortlist side by side, parameter by parameter — the same rows used in this issue's comparison table.

04

Verify against the manufacturer source

Every product page links to the manufacturer's own page. Cross-check bench conditions — voltage, propeller, duration — before treating any thrust or power figure as final. That is the convention applied throughout this issue.

Why this order works. Category, then constraint, then comparison, then verification — this mirrors exactly how the editorial selection in this issue was built, and it is repeatable: two engineers applying the same filters reach the same candidate set, which makes selection decisions auditable across a team.

WHAT THE INDEX COVERS TODAY

Six product categories

Frameless torque motors, robotic actuators, quasi direct drive actuators, UAV motors, drone motors, gimbal motors and underwater thrusters — each with its own parameter set and selection guide.

Parameter-level filtering

Filters operate on recorded specifications — KV, voltage, torque, thrust, mass and envelope — rather than on marketing categories, so shortlists stay comparable.

Traceable to the source

Every record links back to the manufacturer's own product page, which is the same rule this issue applies to each figure it prints.

Keep Exploring on ToBMS

PRODUCT CATEGORIES

[Frameless Torque Motors](#)

[Robotic Actuators](#)

[Quasi Direct Drive Actuators](#)

[UAV Motors](#) · [Drone Motors](#)

[Gimbal Motors](#) · [Underwater Thrusters](#)

SELECTION TOOLS

[Select](#) — filter the full index by parameters

[Compare Products](#) — side-by-side specification tables

FEATURED MANUFACTURERS

[CubeMars](#) — actuators, frameless motors, gimbal drives, thrusters

[T-Motor](#) — UAV and heavy-lift propulsion

[T-Hobby](#) — FPV and long-range drone motors

FROM THE ARTICLE DESK

[Robotic Actuators: Choosing an Integrated Actuator](#)

[Manned Aircraft Propulsion: Three U15 Motors Compared](#)

[BLDC Motors: A Complete Guide](#)

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JOURNAL

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Issue 01 · September 2026 · Published by ToBMS editorial.

Specifications verified against current ToBMS records and linked manufacturer sources at publication. This issue is a point-in-time snapshot; linked pages carry the latest data. Set in Source Serif 4 and Source Sans 3 (SIL Open Font License 1.1). Product names and marks belong to their respective manufacturers.