

INTEGRATED STEPPER MOTORS

ABSOLUTE MOTORS

Motion. Logic. Safety. HMI. — One Platform.

ABSOLUTE POSITION. ABSOLUTE CONTROL. ABSOLUTE SCALABILITY.



The most capable integrated stepper motor on the market today — drive, motion controller, and absolute encoder built into every motor, coordinated across a single M12 bus.

— MOTION

AB-SM-17 through AB-SM-34, closed-loop stepper. 24–48 VDC. 0.4–6 A adjustable phase current. Microstepping 1–128. Backlash compensation built in.

— LOGIC

Onboard DSP. Distributed motion controller. Coordinated multi-axis motion is computed across the bus by the motors themselves — no central controller card. Deterministic command execution.

— SAFETY

Optional brake controlled over the bus. No extra wiring. Engage/release commanded from AutoCode. Supervised E-stop cuts power via the Control Block's safety controller and safety relay.

— HMI

Live on the Pendant from connect. Every axis is auto-detected, jog-able, teach-able, and diagnosable from the Pendant or Web HMI the moment it joins the bus.

Distributed motion. **One platform.**

Traditional steppers force a cabinet full of drives and a separate motion-controller card. The Absolute Motor collapses all of that into the motor itself — a single M12 cable carries power, communication, and brake control. Up to ten motors connect to the Control Block (daisy-chain or home-run across 4 ports) with full coordinated motion across all of them.

MULTI-TURN
**ABSOLUTE
ENCODER**
No homing required

PER SYSTEM
UP TO 10 AXIS
Daisy-chain or home-run · 4 ports

NEMA 17–34
3 FRAME SIZES
One architecture across the line

BUILT IN
**INTEGRATED
BRAKE**
Optional · no extra wiring

HARDWARE

Part numbers	AB-SM-17, AB-SM-23, AB-SM-34
Motor type	Integrated closed-loop stepper
Drive	Integrated (no cabinet drive required)
Motion controller	Onboard DSP — distributed across the bus
Encoder	Multi-turn absolute (no homing at power-on)
Brake	Optional integrated — controlled over the bus, no extra wiring
Supply voltage	24–48 VDC (48 VDC recommended for full speed range)
Phase current	0.4–6 A, adjustable (frame-dependent)

MOTION ARCHITECTURE

Control modes	Speed, position
Microstepping	1–128
Coordinated motion	Distributed across the bus
Axis type	Linear or rotary — set in AutoCode
Gear ratio	Set per axis in AutoCode
Zero / direction	Set in AutoCode
Backlash compensation	Built in (actuator backlash)
Tuning	None — closed-loop, factory-tuned

SYSTEM INTEGRATION

Motors per system	Up to 10
Topology	Daisy-chain or home-run
Control Block ports	4 motor ports on the back
Cabling	Single M12 per motor (power + comm + brake)
E-stop behavior	Power cut by safety controller + safety relay
Auto-detection	Detected by the Control Block on connect

EXTERNAL PORTS

- ▶ **(1)** M12 motor port — power, communication, and brake control on one cable
- ▶ **(4)** Control Block motor ports — daisy-chain or home-run any combination
- ▶ **(0)** Brake wires required — integrated brake is commanded over the motor bus

COMMUNICATION & SOFTWARE

- ▶ **Motor bus** — single M12 cable carries power, comm, and brake control to every motor
- ▶ **AutoCode** — configures axis as linear or rotary, sets gear ratio, commands brake engage/release, coordinates motion across every axis
- ▶ **Autoblocks Studio** — offline programming, diagnostics, and remote support

SUPPORTED DEVICES — PLUG & CONFIGURE

PLATFORM HOSTS

Control Block · Pendant · Web HMI

APPLICATIONS

Linear & rotary axes · Gantries · SCARA · Dispensing · Inspection

COMPATIBLE MECHANICS

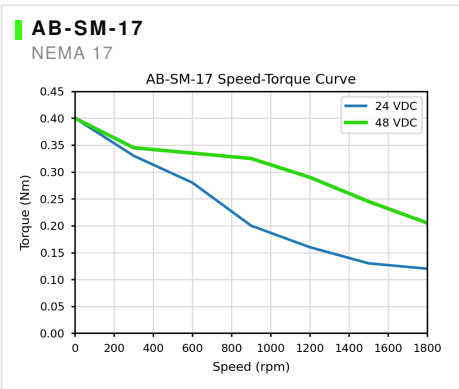
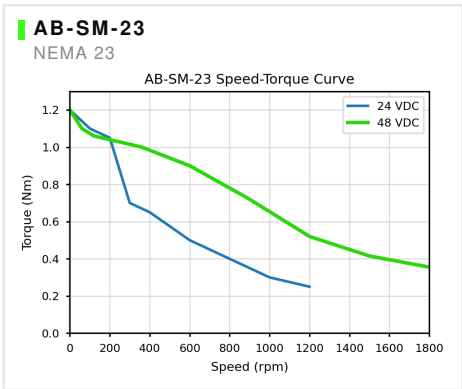
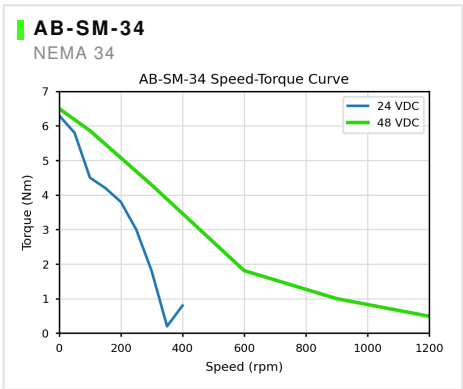
AB+ ball-screw & belt-drive actuators · OEM custom mechanics

CONFIGURATION OPTIONS

Configure in minutes. Auto-detected on the bus. Set each axis as **linear or rotary**, define its **gear ratio**, and command the **optional brake** — all directly in AutoCode. Coordinated multi-axis groups defined visually. Up to 10 motors per system.

Performance / Speed-Torque / By Frame

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FRAME COMPARISON

SPECIFICATION	AB-SM-17	AB-SM-23	AB-SM-34
Holding torque	0.43 Nm	1.26 Nm	6.5 Nm
Rotor inertia	75 g·cm ²	300 g·cm ²	1900 g·cm ²
Phase current	1.68 A	2.8 A	6 A
Phase voltage	2.8 VDC	2.3 VDC	2.4 VDC
Phase resistance	1.65 Ω	0.83 Ω	0.4 Ω
Phase inductance	2.8 mH	2.8 mH	3.43 mH
Step angle	0.1125°	0.1125°	0.1125°
Weight	418 g	810 g	3.8 kg

MAJOR FEATURE — INTEGRATED BRAKE

Optional integrated brake on every frame, commanded from AutoCode. No additional wiring, no relay logic, no cabinet hardware — the brake engages and releases on command across the same single M12 cable that carries power and motion data. Ideal for vertical axes, load-holding applications, and any axis that must hold position safely on power loss.

Reading the curves. AB-SM-23 and AB-SM-34 24 VDC curves are AutoBlocks measurements at nominal phase current and 1/16 microstepping. 48 VDC curves are shown at 3.5 A rms (AB-SM-23) and 6 A rms (AB-SM-34). AB-SM-17 curves are shown at 1.68 A rms. Tuned for stable low-speed holding, controlled mid-band behavior, and application-appropriate high-speed performance. Size to about 70% of the curve. See the sizing guide on the following pages, or contact Autoblocks engineering for frame selection.

Sizing / Five Steps / One Example

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Standard Absolute Motors at 48 VDC cover most axes. Size by workload, not by frame.

TORQUE

Turn the load into motor torque. Force times lead, divided by efficiency. Add acceleration while the axis speeds up.

SPEED

Read the curve at your rpm. Torque falls as speed rises, so the number that matters is the one at your working speed, not at zero.

VOLTAGE

48 VDC raises the curve. Current reaches the winding faster, for roughly 1.5–2.5× the torque at working speed.

RATIO

Lead trades force for speed. A shorter lead or smaller pulley gives more force and less speed. Power stays the limit.

THE FIVE STEPS

1 Convert the move to motor speed

The fastest point of the move sets the rpm.

$$\text{rpm} = \text{speed} \div \text{lead} \times 60$$
$$\text{belt: rpm} = \text{speed} \div (\pi \times \text{pulley dia.}) \times 60$$

2 Add up the force

Process push, friction, weight if vertical, plus mass × acceleration while speeding up.

$$F = \text{push} + \mu \cdot m \cdot g + (m \cdot g \text{ if vertical}) + m \cdot a$$

3 Convert force to torque

Efficiency matters most on steep or polymer screws (40–65%). Ball screws run near 90%.

$$T = F \times \text{lead} \div (2\pi \times \text{efficiency})$$

4 Read the curve at that rpm

Find the torque available at your speed on page 3, at 24 VDC and at 48 VDC.

5 Check the workload

Keep it at 70% or less. From 70 to 100%, bench-test the axis. Above 100%, change the lead, the move, or the voltage.

$$\text{workload} = \text{torque needed} \div \text{torque available}$$

WORKED EXAMPLE

VERTICAL LIFT · STEEP-LEAD SCREW

Stroke · speed · accel 900 mm · 329 mm/s · 1,300 mm/s²

Moving mass 6.7 kg

Lead · efficiency 50 mm/rev · 55%

STEP	RESULT
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1 · Motor speed	395 rpm
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2 · Force at peak of accel	76 N (66 weight + 1 friction + 9 accel)
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3 · Torque needed	1.14 Nm
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4 · AB-SM-34 at 395 rpm	0.74 Nm at 24 VDC · 3.5 Nm at 48 VDC
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5 · WORKLOAD	24 VDC	48 VDC
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AB-SM-34	154% · fails	33% · good
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AB-SM-23	175% · fails	116% · fails
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THE ANSWER

The standard AB-SM-34 at 48 VDC runs this lift at a third of its available torque, in about 3.0 seconds. At 24 VDC it can't make the move at this speed. A longer stack wouldn't shorten the cycle: the commanded speed, not the motor, sets the time.

READING THE WORKLOAD

70% OR LESS

GOOD

Margin for load changes and wear. Build it.

70 – 100%

MARGINAL

Bench-test the axis under its real load first.

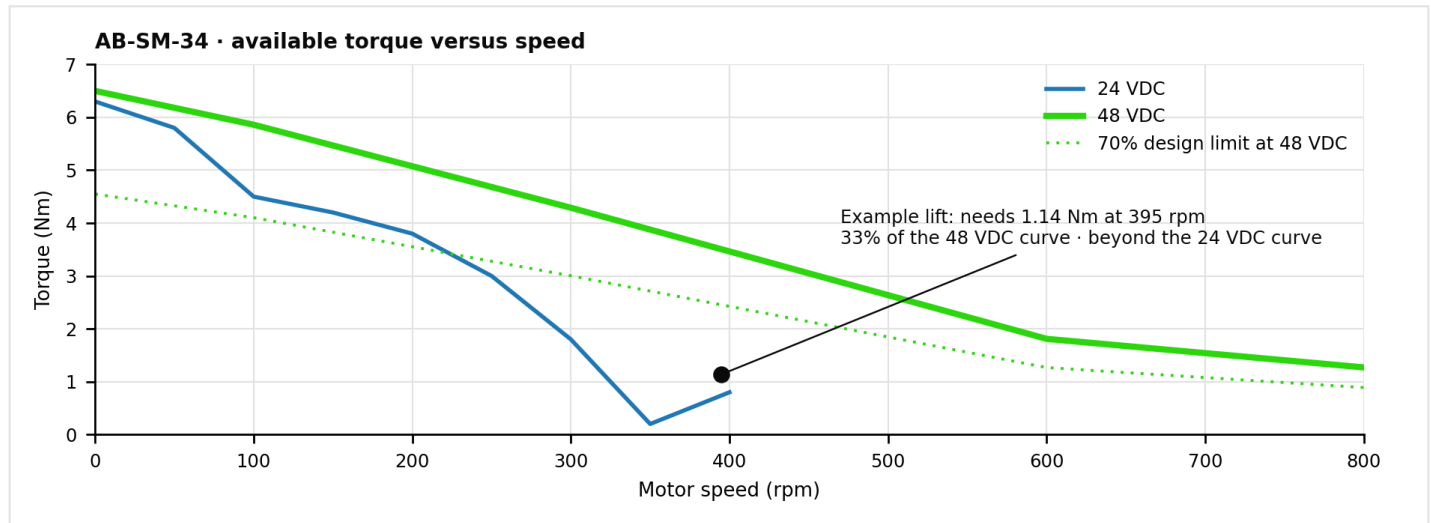
OVER 100%

CHANGE IT

Adjust the lead, the move, or the supply voltage.

Sizing / Curves / Rules of Thumb

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Why a bigger motor often **doesn't** help.

A longer motor adds holding torque, and it also adds winding inductance and rotor weight. At working speed those effects eat into the extra torque, so a longer stack often doesn't move the load any faster. Supply voltage raises the limit, and the lead or pulley shapes the result. Most machine-builder axes are short moves, where acceleration sets cycle time and a lighter rotor helps. Go bigger when an axis is force-limited, such as pressing or a heavy, slow lift.

RULES OF THUMB

- ▶ **Short moves are about acceleration.** Under about 30 mm the motor never reaches top speed. Weigh load mass and rotor weight, not top rpm.
- ▶ **Big frames are low-speed motors.** The AB-SM-34 makes most of its torque below about 500 rpm. Above that, a longer lead that keeps the motor slower usually helps more than a bigger motor.
- ▶ **Vertical lifts size on the lift.** Lowering is lighter, and the integrated brake holds the load at rest.
- ▶ **Check port power.** One Control Block motor port supplies about 96 W at 24 VDC and about 192 W at 48 VDC.

LEAD TRADES FORCE FOR SPEED

LEAD	FORCE PER NM	AT 400 RPM
5 mm	1,131 N	33 mm/s
10 mm	565 N	67 mm/s
20 mm	283 N	133 mm/s
50 mm	113 N	333 mm/s

At 90% efficiency. Same motor, same power: force and speed trade one for one.

WHEN A LARGER MOTOR OR A DIFFERENT RATIO HELPS

- ▶ **Force-limited axes.** Pressing, insertion or staking, where extra torque lets you keep a longer lead and finish sooner.
- ▶ **Heavy, slow lifts.** Where load mass dominates and rotor weight matters less.

Size your axis. The AutoBlocks Motor Sizing Calculator runs these five steps at 24 and 48 VDC and suggests changes when an axis is marginal. Ask your AutoBlocks contact for the link, or contact Autoblcks engineering for frame selection.



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autoblocks.co/motors-actuators

AUTOBLOCKS, INC.
333 Route 46 W, Building B · Fairfield, NJ 07004
autoblocks.co · info@autoblocks.co