SA1737 Datasheet

Product: SA1737 **Full name:** Stepper Actuator 1737 **Revision:** A

Actuator type	Companion encoder	Use class
Rotary stepper actuator with gearbox	AA360 absolute magnetic encoder	Hobby-grade technical component

1. Product Overview

SA1737 is a compact hobby-grade rotary actuator based on a NEMA 17 stepper motor with an integrated 9:1 gearbox. It is intended for custom robotics, mechatronics and motion-control projects requiring increased output torque, continuous rotation capability and optional absolute angular feedback.

The actuator is driven by a standard external bipolar stepper motor driver. For position feedback, SA1737 is recommended to be used with the AA360 absolute magnetic encoder module as its integral companion module.

SA1737 is a strictly technical hobby-use component intended for user-integrated systems. It is not a certified industrial or safety-rated actuator.

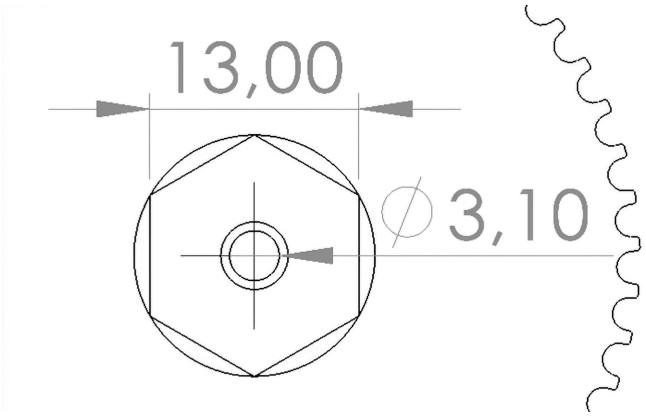
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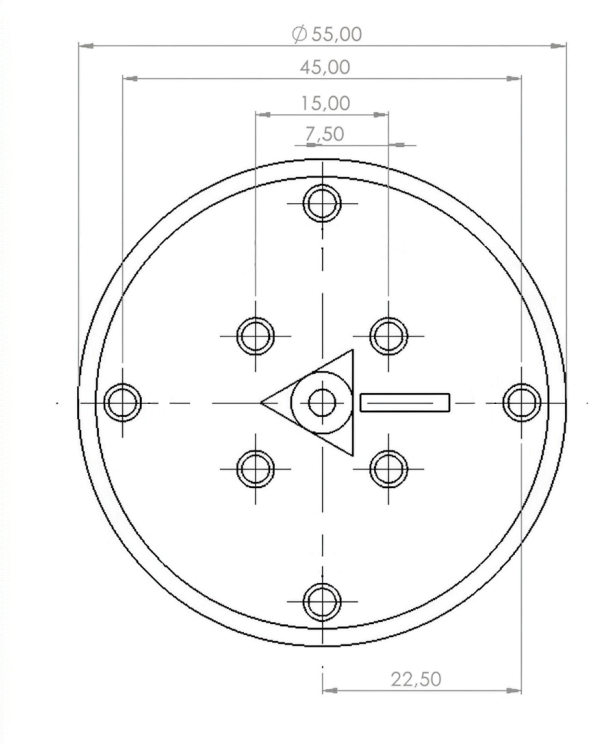
2. Key Features

• NEMA 17 stepper-based rotary actuator	• 9:1 gearbox reduction
• Calculated output holding torque up to 3.6 Nm	• Low-backlash gearbox, typically <1°
• Continuous rotation capability	• Compatible with common external stepper drivers
• Separate motor and encoder wiring	• Optional absolute position feedback through AA360
• Physical version manufactured in PCTG-CF	• DIY-friendly architecture for self-assembly

3. Technical Specifications

3.1 Mechanical Specifications

Parameter	Value
Dimensions	60 × 130 × 69 mm
Weight	530 g
Gear ratio	9:1
Backlash	<1°
Output shaft profile	Custom profile
Output shaft dimensions	

Mounting interface	

3.2 Material Information

Parameter	Value
Default material	PCTG-CF
Recommended DIY materials	PET, PCTG, PETG, PA, PC
Recommended material requirement	HDT > 60°C

Note: For self-printed versions, final performance depends on print quality, dimensional accuracy, material stiffness, thermal resistance and friction introduced by manufacturing tolerances.

3.3 Motor Specifications

Parameter	Value
Motor class	NEMA 17
Step angle	1.8°
Steps per motor revolution	200
Motor supply voltage	12–24 V
Reference condition for calculated holding torque	24 V, 0.5 A
Output holding torque	37 kg/cm
Continuous duty operation	Supported
Maximum recommended housing temperature	70°C

Important: The listed 37 kg·cm / 3.6 Nm value is a calculated output holding torque value. Actual usable torque depends on external driver configuration, motor current, supply voltage, microstepping mode, operating speed, gearbox friction and user assembly quality(DIY version).

3.4 Speed and Performance Notes

Parameter	Value
Maximum speed	Depends on user driver and operating conditions
Gear efficiency	~90%
Duty cycle	Continuous operation allowed

Performance note: Actual dynamic performance depends on external stepper driver, current setting, supply voltage, microstepping configuration, motion profile, application load, gearbox friction and self-printed part tolerances where applicable.

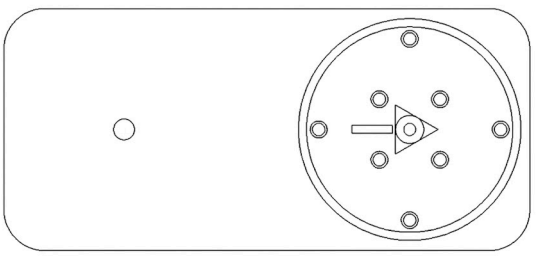
4. Encoder Companion Module

SA1737 is recommended to be used with the AA360 absolute magnetic encoder module for angular feedback in applications requiring position verification, closed-loop correction or absolute angle awareness at startup.

4.1 Recommended Companion Encoder

Parameter	Value
Recommended module	AA360
Encoder core IC	MT6701
Encoder type	Absolute magnetic encoder
Angle range	0–360°
Rotation behavior	Continuous rotation supported
Recommended usage	Integral module for SA1737

4.2 Encoder Electrical / Signal Characteristics

Parameter	Value
Encoder supply voltage	3.3–5 V
Available interfaces	I2C, PWM, Analog
I2C resolution	14-bit
Analog / PWM resolution	12-bit
Analog output range	0–5 V at 5 V supply
Encoder zero reference	Fixed toward front of actuator
Zero-reference illustration	

4.3 Encoder Accuracy Notes

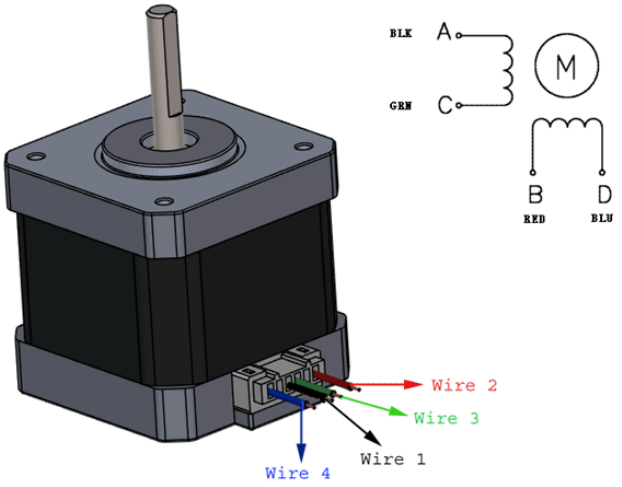
Parameter	Value
Internal angular precision claim	0.022°
System-level constant calibration-related error	±0.1°

Note: The ±0.1° value should be treated as a practical system-level constant error related to the calibration method and implementation, not as a formal industrial metrology specification.

5. Electrical Interfaces

SA1737 contains no internal driver electronics. The motor is connected directly to an external stepper motor driver chosen by the user.

5.1 Motor Interface

Parameter	Value
Motor connector	JST 6-pin
Internal driver included	No
User connection method	Direct connection to external bipolar stepper driver
Phase labeling image	

5.2 Encoder Interface

Parameter	Value
Encoder connector	4-pin Dupont
Encoder wiring	Separate from motor wiring
Encoder power supply	Separate from motor supply

Default Encoder Wire Colors

Parameter	Value
Red	VCC
Black	GND
Green	SDA
White	SCL

Note: In self-assembled versions, encoder connector type and exposed signals may vary depending on the builder configuration. Additional outputs such as Analog or PWM may also be used depending on implementation.

6. Recommended External Electronics

6.1 Stepper Driver Compatibility

SA1737 is compatible with standard bipolar stepper motor drivers. Recommended examples include TMC2209 and TMC2208. Other compatible driver families may also be used as long as they are suitable for the selected motor and operating current.

6.2 Control Architecture

Typical system architecture: MCU or motion controller, external stepper driver and SA1737 actuator

7. Operating Notes

- SA1737 does not impose internal angular motion limits.
- The actuator supports continuous rotation.
- No homing procedure is required when AA360 is used correctly as an absolute encoder reference.
- Lost steps are generally non-destructive, but they may affect task execution accuracy unless corrected in software using feedback.
- Self-printed gear components may introduce higher friction and altered backlash depending on printer quality, filament type and tolerances.
- Cooling is recommended for continuous operation at elevated ambient temperature, low-voltage / high-current operation, or thermally restrictive enclosures.

8. Environmental Information

8.1 Environmental Specifications

Parameter	Value
Operating temperature	-40 to 65°C
Formal ingress protection rating	None
Water exposure suitability	Not intended for contact with water
Dust / debris resistance	Relative resistance only, not formally certified

Note: The design offers relative resistance to contamination and common environmental debris, but no formal IP rating is claimed.

9. Safety Information

9.1 Intended Use

SA1737 is intended only for hobby projects, educational systems, prototyping and experimental mechatronic integration.

9.2 Restrictions

- Do not use SA1737 in medical devices.
- Do not use SA1737 in human-interactive safety-relevant machines.
- Do not use SA1737 in animal-interactive systems.
- Do not use SA1737 in life-critical or safety-critical applications.
- Do not use SA1737 in devices exposed to water unless fully protected by external system design.

9.3 Handling Warnings

• Do not touch moving parts during operation.
• Keep fingers, tools and loose materials away from the output mechanism while powered.
• Verify wiring before power-up.
• Incorrect encoder wiring may permanently damage the encoder.
• The user is fully responsible for safe integration, validation and operation in the final machine.

10. Compliance and Product Status

10.1 Compliance Summary

Parameter	Value
Product class	Hobby-grade component
Certified industrial testing	Not provided
Safety certification	Not provided
Formal product certification	Not provided
RoHS declaration	Declared by manufacturer

Disclaimer: SA1737 is a hobby-grade component supplied without detailed certified validation, industrial qualification or safety certification. The end user is responsible for verifying suitability, reliability and safety in the final application.

11. Physical product Contents

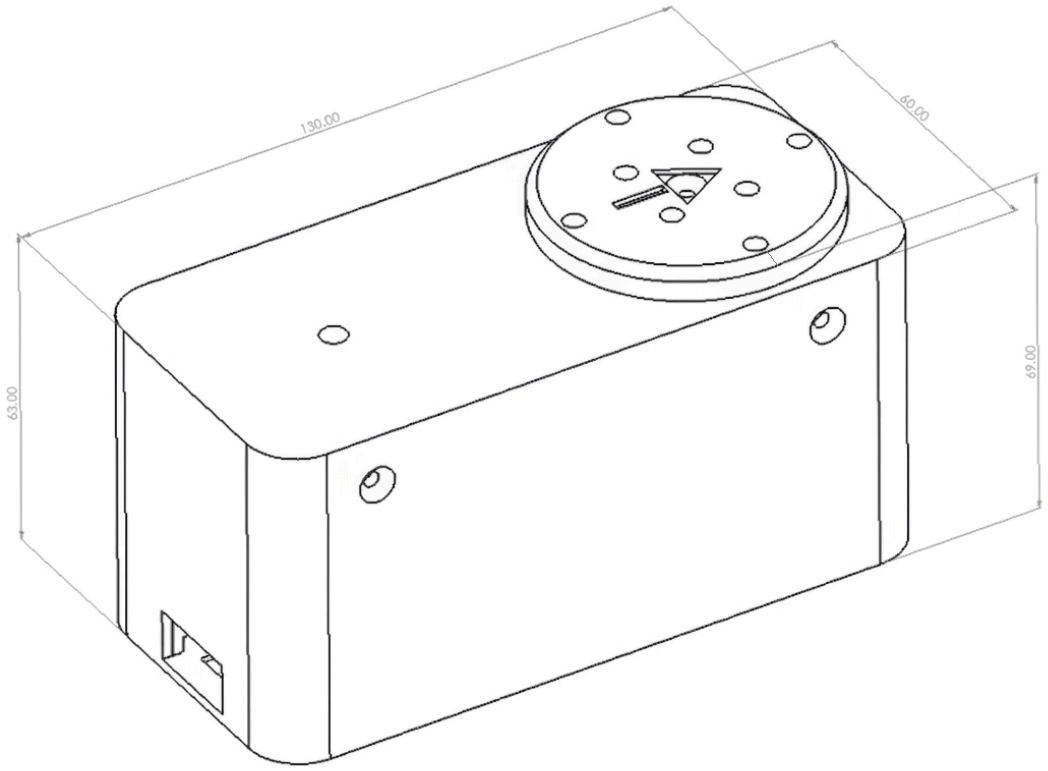
- 1 × SA1737 actuator

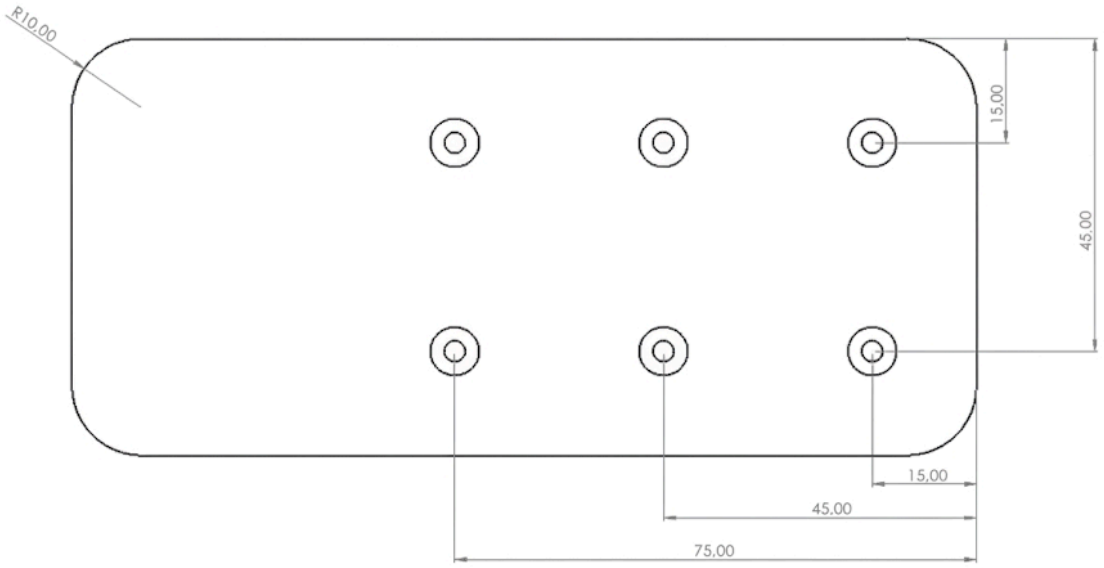
12. Digital product Resources

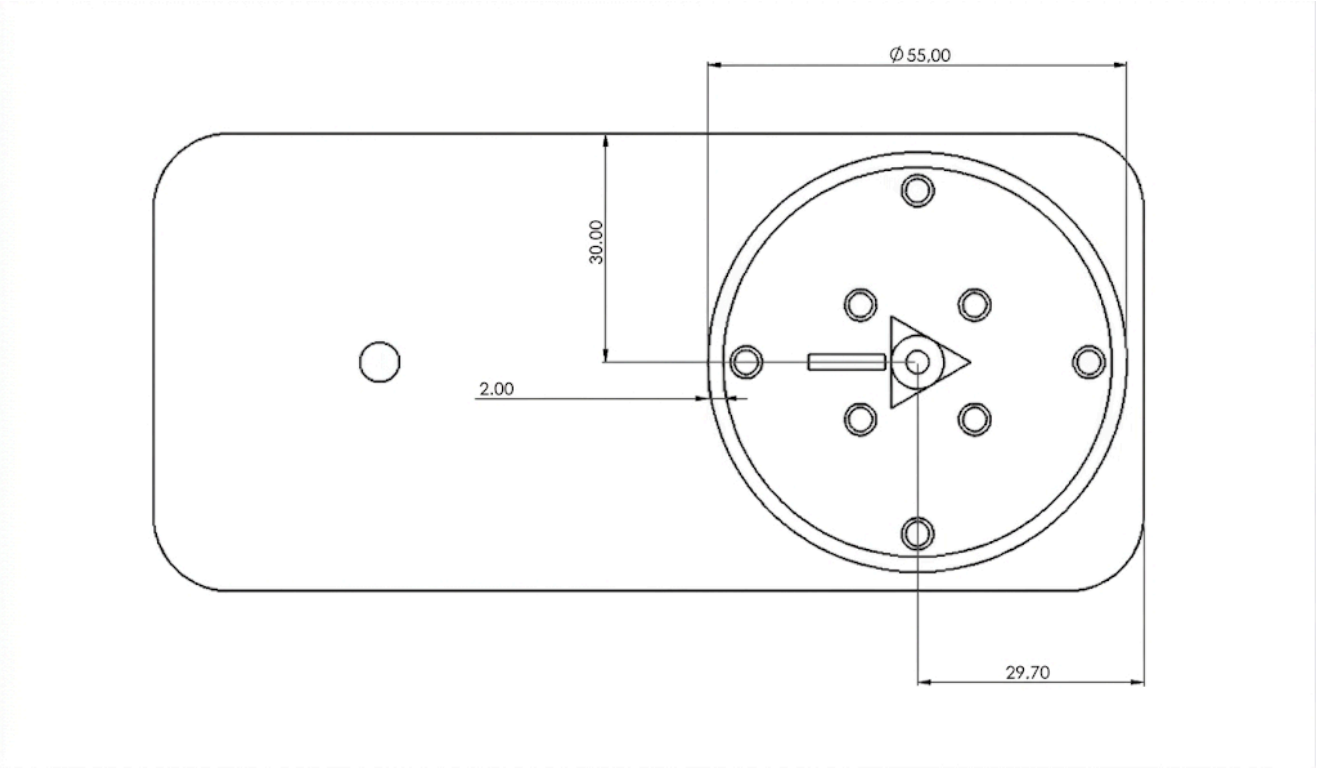
- STEP files
- Assembly-related digital files
- Datasheet
- Assembly instruction
- Online integration materials

https://www.youtube.com/@SpaceDragon-robotics

13. Mechanical Drawing Placeholder







14. Revision History

14.1 Document Revisions

Parameter	Value
A	Initial release