NANOMUSCLE

Advanced Miniature Motion
RS-CE Rotary Actuators

System Includes

- Bi-directional 60° Rotary Actuator
- Internal Drive Electronics
- Digital End Stop Indicators
- Digital Control Input
- Integrated Over-Strain Protection

Benefits

- No Gearbox Required
- Miniature Size
- Completely Silent Operation
- Simple Electrical Interface
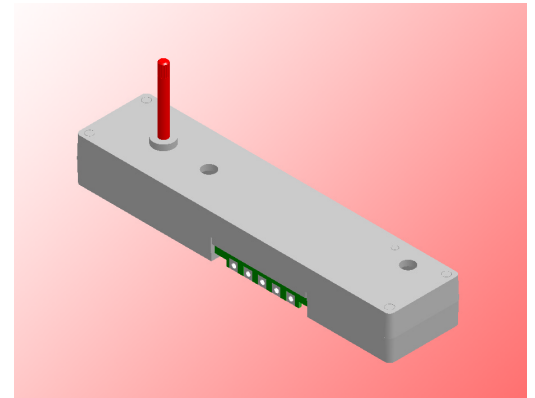- Position Feedback

Applications

- Action figure animation
- Talking creatures with lip synchronization
- Creature animation

The best way to evaluate NanoMuscle products is by purchasing our Demonstration Kit. Order yours today!

Contact Information:
NanoMuscle, Inc.
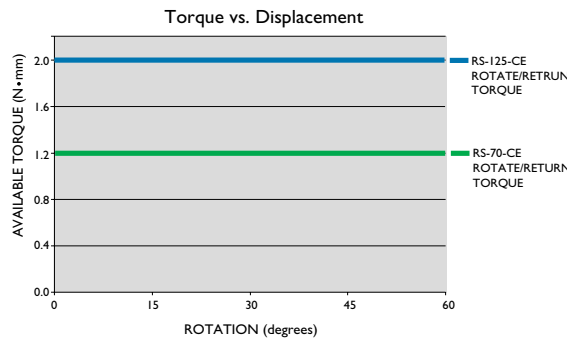2545 West 10th St.
Suite A
Antioch, CA 94509

Office: 925-776-4700
Sales: 925-776-4726
Fax: 925-755-9572
www.NanoMuscle.com
sales@nanomuscle.com

The NanoMuscle RS-CE Rotary Actuators are a range of bi-directional actuators which rotate as much as 60° when activated and return when deactivated, providing force in both directions. The actuators can interface with all CMOS digital controllers and include drive electronics, endstop position sensors, and position feedback for optional position control.
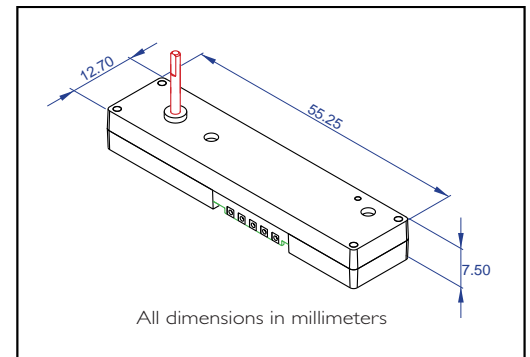
Torque Profiles

Actuators can be selected that match the required torque:

Torque vs. Displacement

- RS-125-CE ROTATE/RETRUN TORQUE
- RS-70-CE ROTATE/RETURN TORQUE

AVAILABLE TORQUE (N•mm) vs ROTATION (degrees)

External Dimensions

All dimensions in millimeters

12.70 / 55.25 / 7.50

Electrical Specifications

| Model | General Electrical | | | | | Rotate | | Return | |
	Resistance	$I_{AVERAGE}$	V_{DC}			I_{ROTATE}	t_{ROTATE}	I_{RETURN}	t_{RETURN}
			Range	Nom					
	Ω	mA	V	V		mA	ms	mA	ms
RS-70-CE 1030	8.50	175	Typical: 3.0 - 6.4	3.0		350	150	0	400
			Absolute: 2.5 - 6.4	4.5		530	100		
RS-125-CE 1030	4.80	315	Typical: 3.0 - 4.8	3.0		630	400	0	600
			Absolute: 2.5 - 4.8	4.5		940	150		

NANOMUSCLE

How Does it Work?

When the NanoMuscle control signal (CTRL) is set to high (see usage schematics, next page), the actuator shaft starts to rotate clockwise 60 degrees and draws I_{ROTATE} amount of current from the V_{DC} pin. When the actuator has completed its motion(after t_{ROTATE}), the internal electronics modulate the current drawn from the V_{DC} pin to match the required holding power. The amount of holding power depends on the applied load, ambient temperature and other parameters. The unit will continuously modulate the amount of power drawn while CTRL is held high, typically to about 40% of the minimum I_{ROTATE} current value.

Once CTRL is set low by the micro controller, the NanoMuscle actuator stops drawing current and the actuator shaft returns to its starting point (after t_{RETURN}).

This means that the NanoMuscle actuator only draws power for the few hundred milliseconds that it is rotating, draws limited power while holding and draws no power while the shaft is returning to its starting position even though it provides force in both directions. Therefore, the average current drawn $I_{AVERAGE}$ is much lower than I_{ROTATE}.
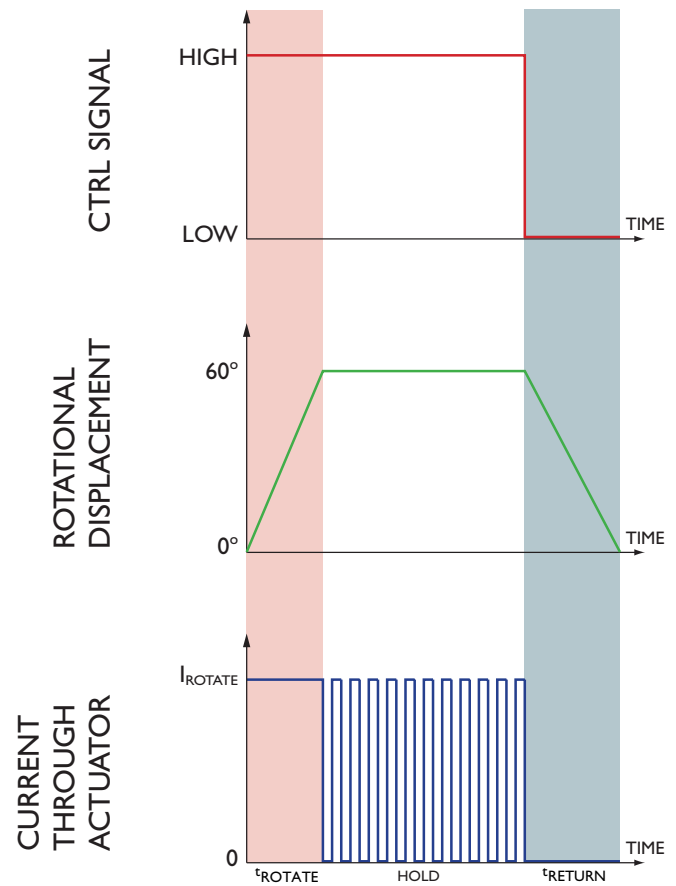
Detailed Dimensions
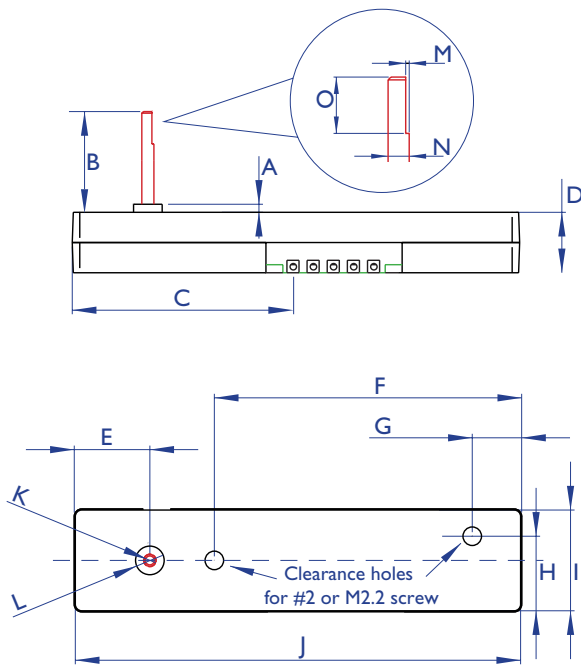
A	1.00 mm
B	SEE SHAFT OUTPUT OPTIONS
C	25.86 mm
D	7.50 mm
E	9.38 mm
F	38.13 mm
G	6.13 mm
H	9.25 mm
I	12.50 mm
J	55.25 mm
K	2.00 mm $\varnothing$
L	4.00 mm $\varnothing$
M	0.25 mm
N	1.50 mm $\varnothing$
O	4.00 mm

Shown actual size.

Output Shaft Options

• Output side: Top, bottom, both
• Type: D-shaft (see detail to left), splined shaft (press fits into 1.5mm diamter hole

Mechanical Mounting Possibilities

• Capture
• Heatstake through holes
• Screws
• Eyelets

Electrical Connection Possibilities

• Edge connector
• Through hole solder for wires or 0.1" headers

Application Notes

• Rotational travel limit stops must be integrated into the target application

Environmental Specifications

Model	Battery Life			Miscellaneous	
	Cycles from 3 alkaline AAA	Cycles from 2 alkaline AA	Cycles from 3 alkaline AA	Cycle Life	Mass
	cycles	cycles	cycles	cycles	g
RS-70-CE 1030	30,000	10,000	60,000	200,000	5.5
RS-125-CE 1030	12,000	5,000	28,000		

NANOMUSCLE

RS-CE Rotary Actuator Module
Electrical Usage
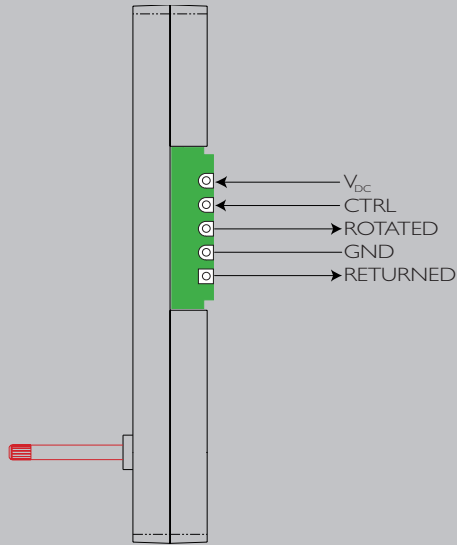
Circuit Pinout

Terminal	Description	I/O
ROTATE	Indicates status of full rotation	O
RETURN	Indicates status of full return	O
CTRL	Input control signal	I
V_{DC}	Applied Voltage	I
GND	Ground	

Electrical Characteristics

Motor Position	ROTATE	RETURN
Fully Rotated	V_{DC}	O
Intermediate	O	O
Fully Returned	O	V_{DC}

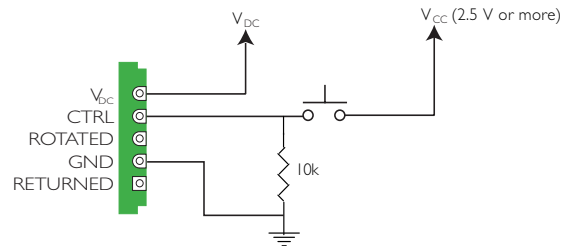| CTRL	Actuator
CTRL < 1V (LOW)	OFF
CTRL > 2.5V (HIGH)	ON

Typical Configurations

SIMPLE ON/OFF SWITCH 1
When the switch in the schematic (below) is closed, the drive electronics activate the actuator, causing the shaft of the actuator to rotate. When the switch is opened, the actuator shaft returns to its original position.
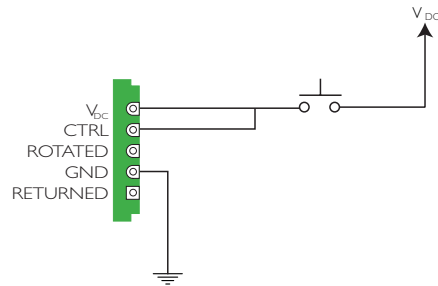

SIMPLE ON/OFF SWITCH 2
When the switch in the schematic (below) is closed, the drive electronics activate the actuator, causing the shaft of the actuator to rotate. When the switch is opened, the actuator shaft returns to its original position.

DIGITAL CONTROL WITH LOGIC LEVEL V_{DC}
When CTRL is set HIGH, the actuator shaft rotates. Otherwise, the actuator shaft remains in its original position.
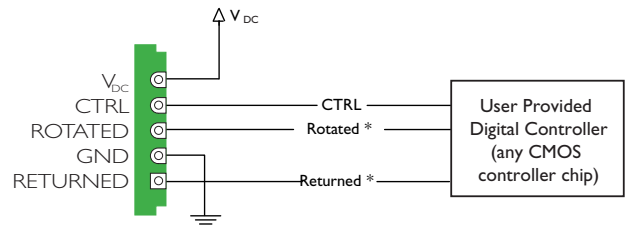
* Optional

DIGITAL CONTROL WITH NON LOGIC LEVEL VOLTAGE
When V_{DC} is outside the acceptable range of the controller's voltage, V_{CC}, comparators must be used to buffer the output signals from the actuator. The outputs of the voltage comparators/translators are pulled up to the logic voltage level of the external control electronics. This translates the ROTATE and RETURN output signal levels to that of the external control electronics, V_{CC}. The comparators are open collector devices.