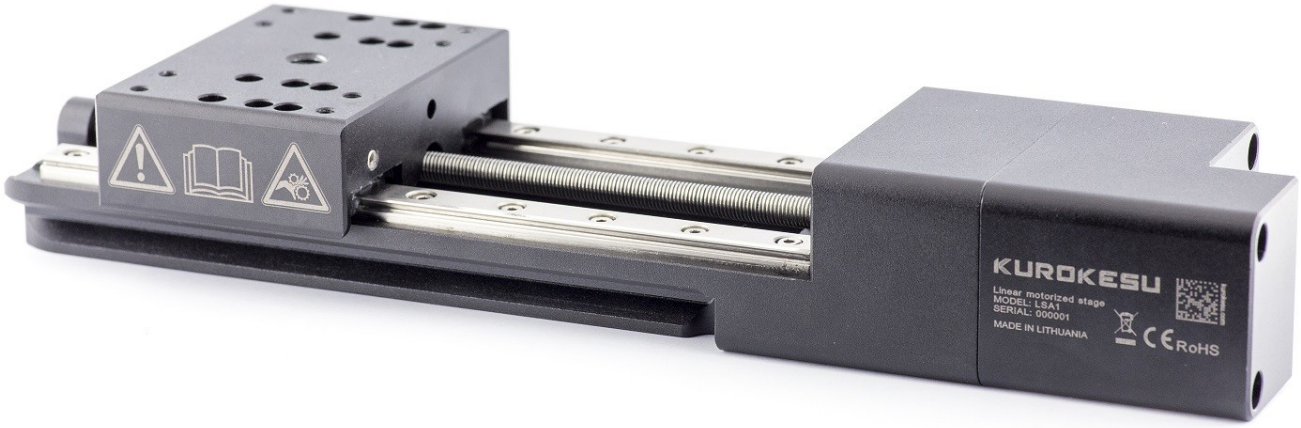
# LSA1

Motorized precision linear actuator

# Overview

**LSA1** linear motorized actuator designed for automated DOF stacking photography and other precision automated tasks. Can be connected to 4 channel SCE2-MOTION controller over standard RJ45 cable.




- Anodized CNC machined aluminum construction
- Arca-Swiss compatible quick release base
- Multiple 1/4" mounting holes
- 90mm travel length
- Precision homing position with hall sensor
- Multiple lead screw options: 0.635mm, 1.27mm, ...
- Precision linear guideways with light preload

# Specifications

## LSA1 specifications

| Feature | Value | Units |
|---|---|---|
| Travel length | 90 | mm |
| Max drive speed | 500 | mm/min |
| Lead screw options | • 0.635<br>• 1.27<br>• 6.35 | mm |
| Static load | >200 | N |
| Push/pull force | >50 | N |
| Weight | 517 | g |

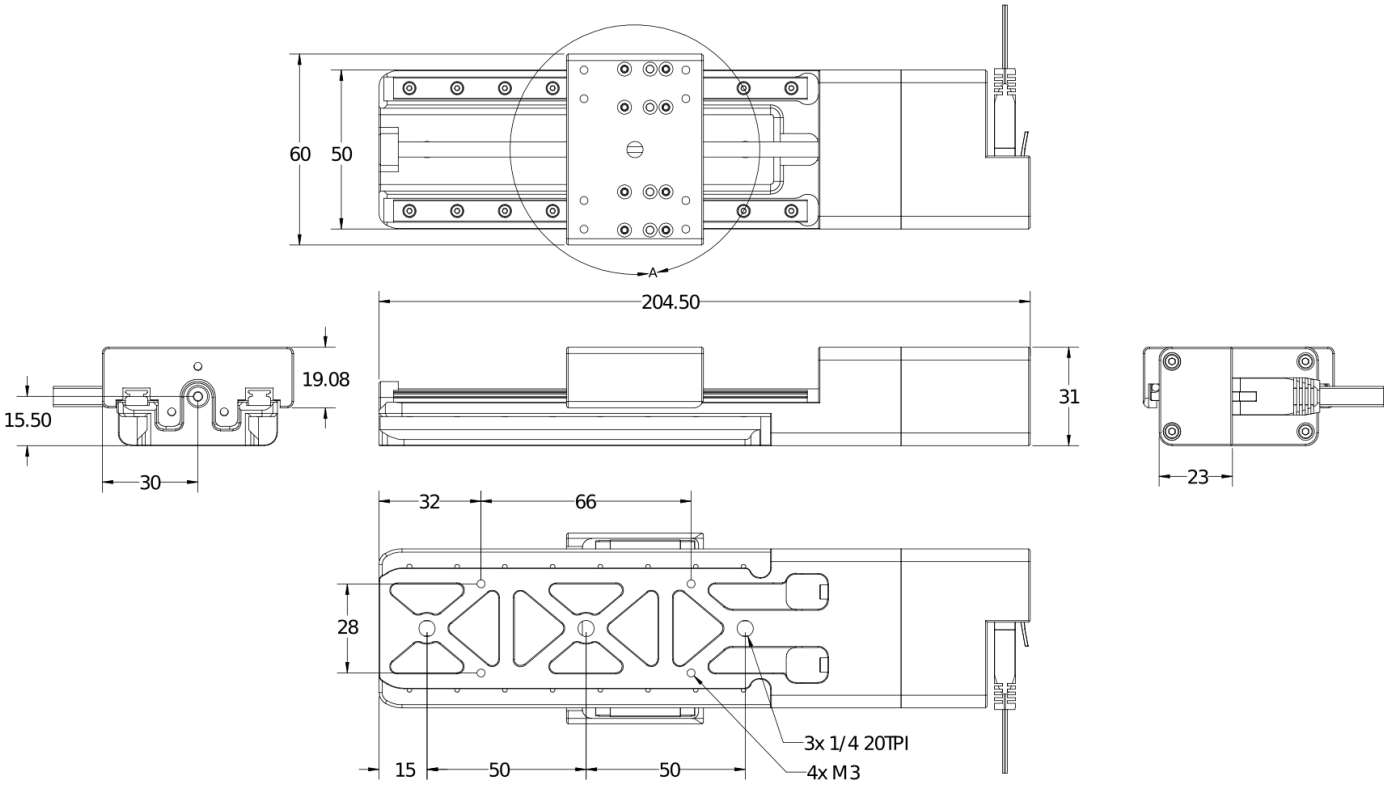
## Notes

> Homing position at 11mm (for pinch safety, but after homing zero position can be driven to -11mm)

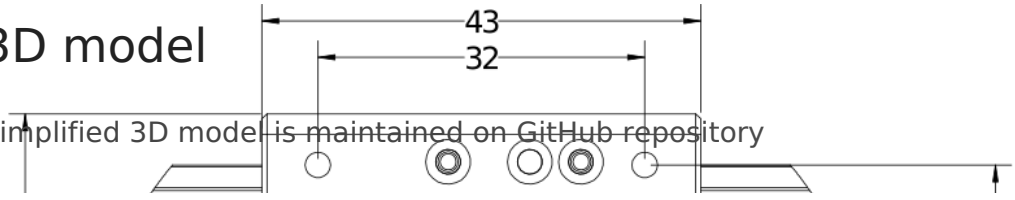
# Dimensions

## External dimensions

LSA1 external dimensions [mm]: 204.5 x 60 x 31




## LSA1 carriage dimensions




## 3D model

Simplified 3D model is maintained on GitHub repository

# Wiring

## RJ45 pinout

| Pin | Signal |
|---|---|
| 1 | GND |
| 2 | 5V |
| 3 | SIG1 |
| 4 | A1 |
| 5 | A2 |
| 6 | SIG2 |
| 7 | B1 |
| 8 | B2 |

SIG1 is used for homing signal

# Drive train specifications

## Lead screw

LSA1 can be fitted with different spring loaded lead screws

| Parameter | Pitch 0.635mm | Pitch 1.27mm | Pitch 6.35mm | Unit |
|---|---|---|---|---|
| Push pull force | >50 | >40 | TBD | N |
| Backlash | 5 | TBD | TBD | µm |

## Motor

| Parameter | Value | Unit |
|---|---|---|
| Size | NEMA11 | |
| Step angle | 1.8 ±5% | deg |
| Phase count | 2 | |
| Rotor inertia | 12 | $g*cm^2$ |
| Mass | 180 | g |
| Rated voltage | 4.5 | V |
| Rated current | 0.75 | A |
| Resistance per phase | 6.7 ±10% | Ω |
| Inductance per phase | 3 ±20% | mH |
| Holding torque | 95 | mN*m |

# GRBL motion settings

## Recommended GRBL parameters

Motion controller needs to know about actuator capabilities.

> Assume motor is connected to Y axis.

## LSA1 pitch 0.635mm

| GRBL parameter | Value | Definition |
|---|---|---|
| $101 | 10078.740158 | Y steps/mm |
| $111 | 250.000 | Y Max rate, mm/min |
| $121 | 40.000 | Y Acceleration, mm/sec$^2$ |
| $131 | 90.000 | Y Max travel, mm |

## LSA1 pitch 1.27mm

| GRBL parameter | Value | Definition |
|---|---|---|
| $101 | 5039.37008 | Y steps/mm |
| $111 | 500.000 | Y Max rate, mm/min |
| $121 | 50.000 | Y Acceleration, mm/sec$^2$ |
| $131 | 90.000 | Y Max travel, mm |

## LSA1 pitch 6.35mm

| GRBL parameter | Value | Definition |
|---|---|---|
| $101 | 1007.87402 | Y steps/mm |
| $111 | 2500.000 | Y Max rate, mm/min |

| | | |
|---|---|---|
| $121 | 300.000 | Y Acceleration, mm/sec$^2$ |
| $131 | 90.000 | Y Max travel, mm |

# Calculating steps/mm constant

| Variable | Value | Definition |
|---|---|---|
| p | 6.35 | Lead screw pitch |
| s | 200 | Stepper motor steps per revolution |
| m | 32 | Microstepping |

**const = 1/(p*s*m)**

# Ordering

LSA1 linear actuator can be ordered directly on Kurokesu e-store