IRIS
Iris Dynamics Ltd.

POWERED BY MAGKNETIX

MAGKNETIX LINEAR ACTUATOR

Product Overview

Silent <20dBA

Integrated Position & Force Sensing

Customizable Travel Length

Integrated IP67 Driver

Single Moving Part

Low voltage DC 12-24 V

Hardened RS485 Controller

Back-Drivable with Zero Force Ripple

Low Maintenance

Stackable/Modular

Magknetix™ linear actuators are designed for silent, smooth, and fast force control at any length.

Combining proprietary magnetic circuits and algorithms with integrated drive electronics results in a compact and cost-effective solution for a wide range of engineering problems, including human compliant robotics, high speed stabilization, and force feedback/haptic controls.

Virtually silent operation (<20dBA) makes Magknetix™ actuators one of the quietest motor technologies available. Unlike motors requiring mechanical linkages the force-producing magnetic fields have kHz range response enabling vibrations and rapid motions that aren't available in alternative linear force solutions.

These motors exceed where traditional motor technologies like ball screws, hydraulics, and pneumatics fall short.

Magknetix™ allows for smooth and linear force output while at a sustained stall or while being back driven without the need of complicated & expensive external load cell force sensors.

A proprietary "flux processor" interpolates data from integrated sensors and drive electronics to produce a quasi-closed-loop magnetic force model which allows the motor to perform force and position sensing without relying on external force sensors. Minimum force accuracy of ±17g (0.16N) and positional accuracy of ±0.00725mm (7µm or 0.00028"), results in some of the highest resolution force feedback available.

ELECTRICAL SPECIFICATIONS

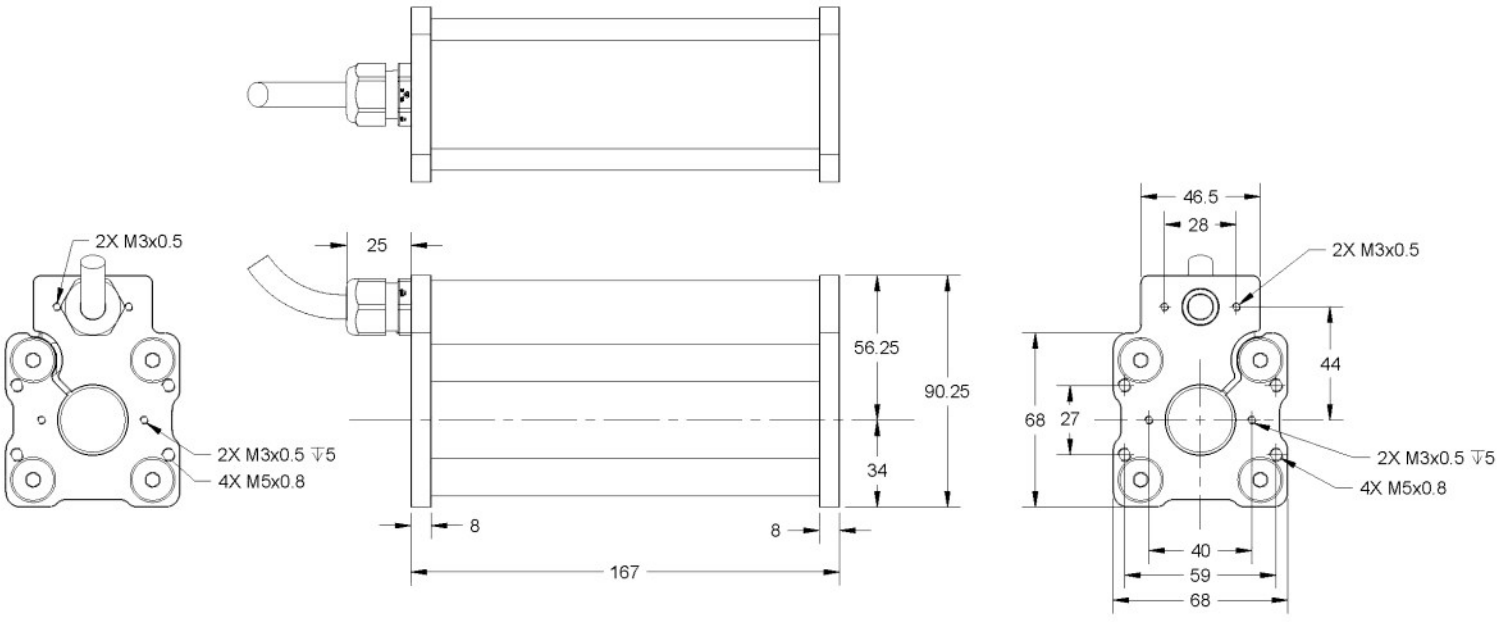
Parameter	Notes	Min	Typ	Max	Unit
Supply					
Supply Voltage (Vcc)		11	24	26	V
Peak Supply Current	Vcc = 24 V			20	A
Sustained Supply Current	Passive cooling		0.93		A
External Fuse Required		20		25	A
Force					
Peak Force	Tc = 25 (max), Tc = 80 (min)	152 (34)		169 (38)	N (lbf)
Max Sustained Stall Force	Passive cooling, Ta = 25		51 (7.3)		N (lbf)
Force Constant @ 25 C	example @25°C: 8.16 lbf = 1.74 * sqrt(22 W)		1.74		Lbf / sqrt (W)
Force Constant drift	example @ 85°C: K(85) = 1.74 + 1.74 * (85-25) * (-0.0017) = 1.56		-0.0017		% / °C
Position Sensors					
Redundancy	2 independent positions sensors				
Type	Linear Hall (Contactless and integrated)				
Output Pattern	Sawtooth (increasing as shaft is extended)				
Pattern Period	Each sensor		50.4		mm
Resolution	Each sensor; reported as 11 bit value over 50.4 mm		0.025		mm
Refresh Rate	Each sensor		3000		Hz
Thermal Data					
Thermal Resistance	Passive Cooling		2.7		°C / W
Thermal Settling Time			1800		seconds
Max Case Temperature	Adjustable over RS485			85	°C
Speed					
70% Force	Vcc = 24 V		1.3		m/s
Frequency Response Internal	Internal Control Loop (6000 Hz)		166		µs
Frequency Response External	External Control Loop via RS485 (3000 Hz)		333		µs
Full-Duplex RS485 Communications					
Baud Rate	250 kHz				
Transceiver	Texas Instruments SN65HVD1792DR				
Rx Parallel Termination	120 ohm				
Protection					
Overvoltage	Crowbar circuit (destroys external fuse)	29 V			
Reverse Vcc	High-side PMOS (self resetting)				
Over temperature	Firmware current limiting				

MECHANICAL SPECIFICATIONS

Build Materials	
Parameter	Description
Bearings	igus® JSM-2528-30
Cable	igus® CF11-010-D
Actuator Housing	Anodized Aluminum
Epoxy Potting Compound	UL94 V-0
Shaft	Anodized Aluminum Type III Engineered Hardcoat

Shaft				
Parameter	Notes	Min	Max	Unit
Stroke	25.4 mm increments	17.3	837.7	mm
Length	25.4 mm increments	217.3	1004.7	mm
Mass		0.69	3.23	kg
Diameter		25	25	mm

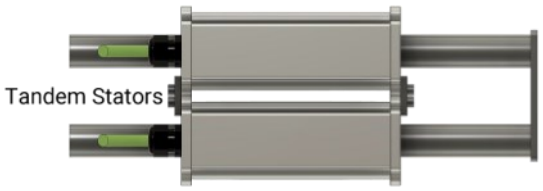
Stator		
Parameter	Measurement	Unit
Width	68	mm
Height	90.25	mm
Length	167	mm
Mass	1.9	kg
IP Rating	IP67	



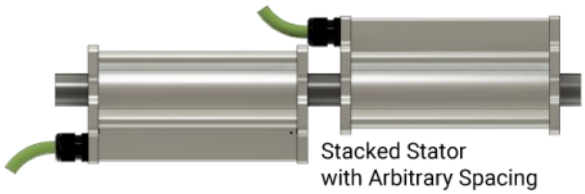
Moving Shaft- In a moving shaft configurations, the stator is fixed and the shaft actuates the load. In applications with side loading, linear guides should be installed to support the load and prevent bending moments and excessively loading the actuator bearings. Moving shafts are advantageous for short strokes and fast motions, as the mass of the shaft is relatively small and stator cables are fixed.

Moving Stator- In a moving stator configurations, the shaft is fixed on both ends and the stator moves. The stator needs support from a linear guide to prevent rotation about the shaft axis. To prevent binding, a combination of fixed and floating bearings should be used to mount the shaft or stator. Multiple stators can be installed along a single shaft if the application requires it. Moving shafts are advantageous for longer strokes and for applications with length restrictions. Cable guides should be used to manage cable movement.

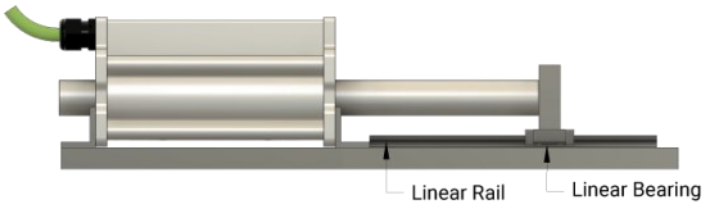
Clevis/Universal Joint

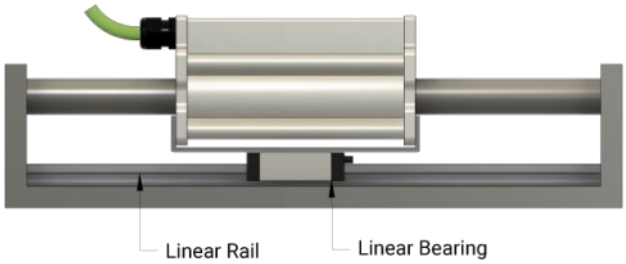


Tandem Stators



Stacked Stator
with Arbitrary Spacing





A rear shaft cover allows mounting using clevis or universal joints, enabling the line of action to move with the load. Useful for replacing traditional lead screw or pneumatic actuators.

Mounting stators in tandem and coupling the shafts increases the force output without increasing stator length. Shaft spacing is variable. Useful for applications with higher force and sideload requirements.

Multiple stators can be added along the shaft to increase force output. Stators can be mounted face to face, or be spaced at any required interval. Can be utilized with moving stators that independently shuttle along the shaft, or fixed stator/moving shaft applications.

info@irisdynamics.com

+1 (888) 995-7050

3948 Quadra Street, Unit 2
Victoria, British Columbia
CANADA V8X1J6

www.irisdynamics.com