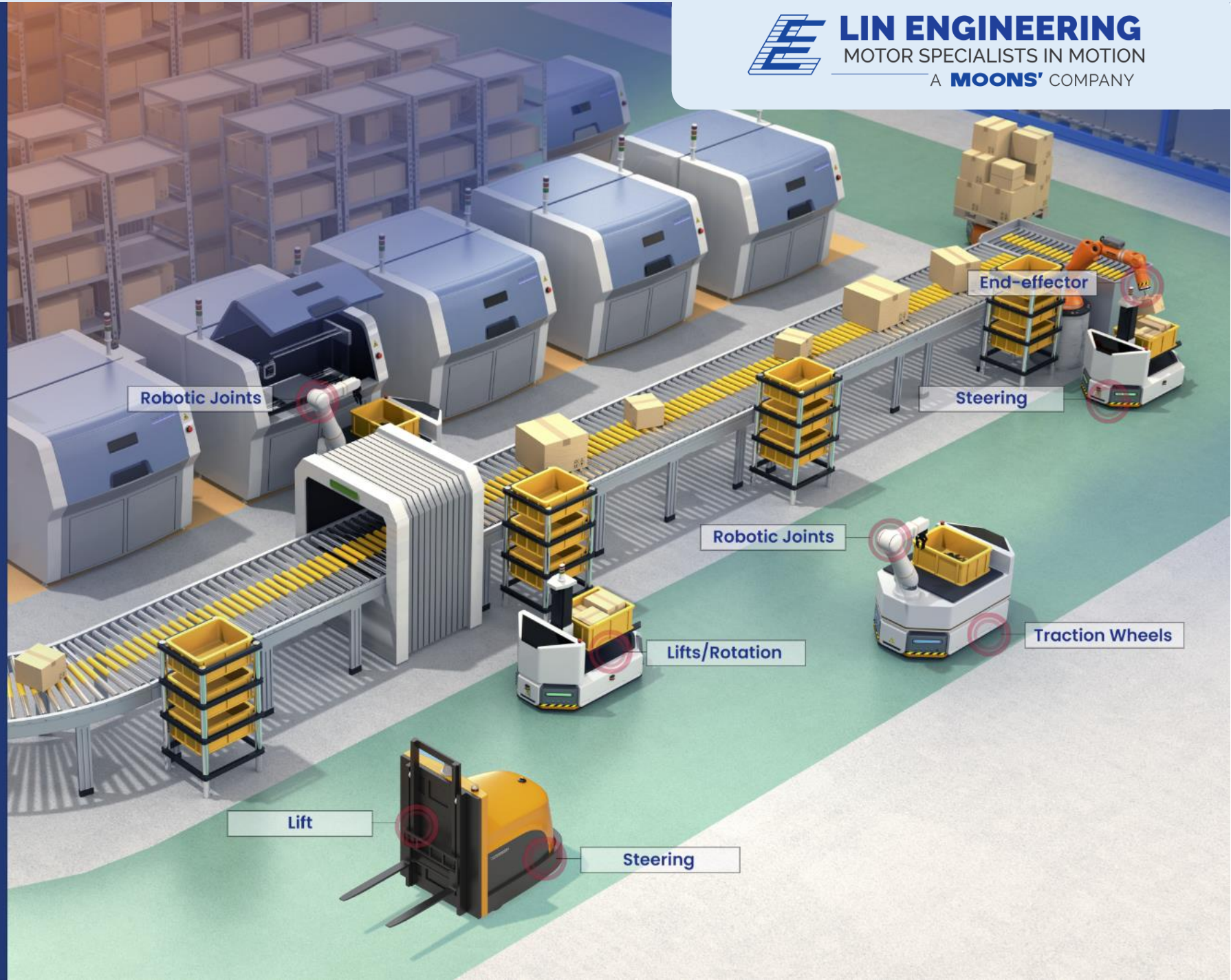
Motion Solutions for Warehouse Automation

- Servo Traction Wheels
- Intelligent Servo Drives
- Lift Actuators
- Micro-Actuators
- Integrated Linear Systems
- Autonomous Mobile Robots (AMRS)
- Micro-Fulfillment G2P/P2G
- AS/RS
- Sortation System



LIN ENGINEERING
MOTOR SPECIALISTS IN MOTION
A MOONS' COMPANY

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Why Lin Engineering?

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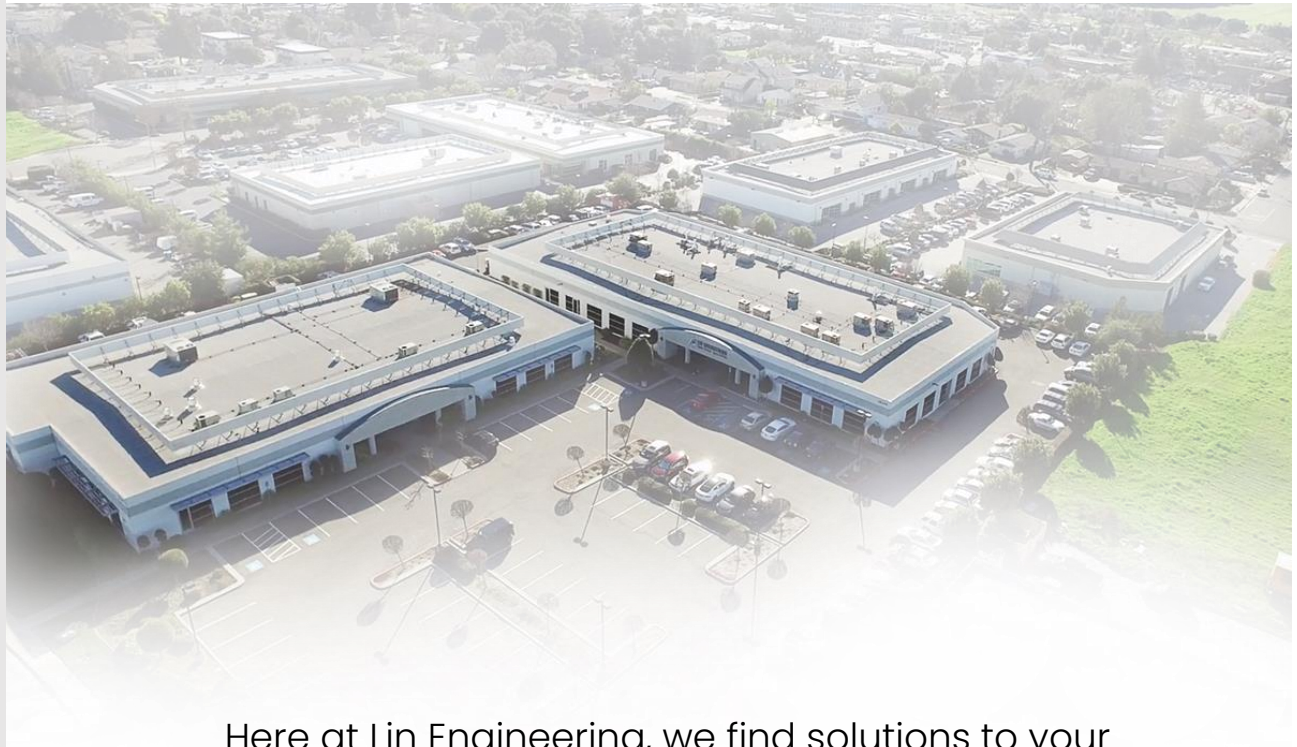

Here at Lin Engineering, we find solutions to your problems by focusing on three basic elements:

Find

Optimize

Integrate

There are such a vast number of products on the market that just narrowing the options can be difficult. Our engineers will help you find the motor you need. The motor may then be optimized to your application by changing the winding, magnets, bearings, and more. We work with your team throughout this process to configure the motor to your application so it can be seamlessly integrated within your product or assembly.

Supply Chain Support

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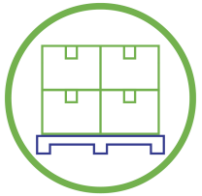
When designing a product, it is also important to consider supply chain structure and how it impacts both short-term and long-term.

At Lin Engineering, we offer supply chain support from our Morgan Hill, California office for design and prototypes. Once your project is ramping into production, we have four overseas factories with high-volume production capabilities.

This combined with our optional Kanban programs allows for a versatile supply chain structure designed to reduce lead time.

On-Time Delivery

Scheduled deliveries to support your manufacturing schedule



Kanban Stocking

Kanban stocking available within the USA

Long Term Support

Long-term product availability and support upon agreement

Motor Customizations

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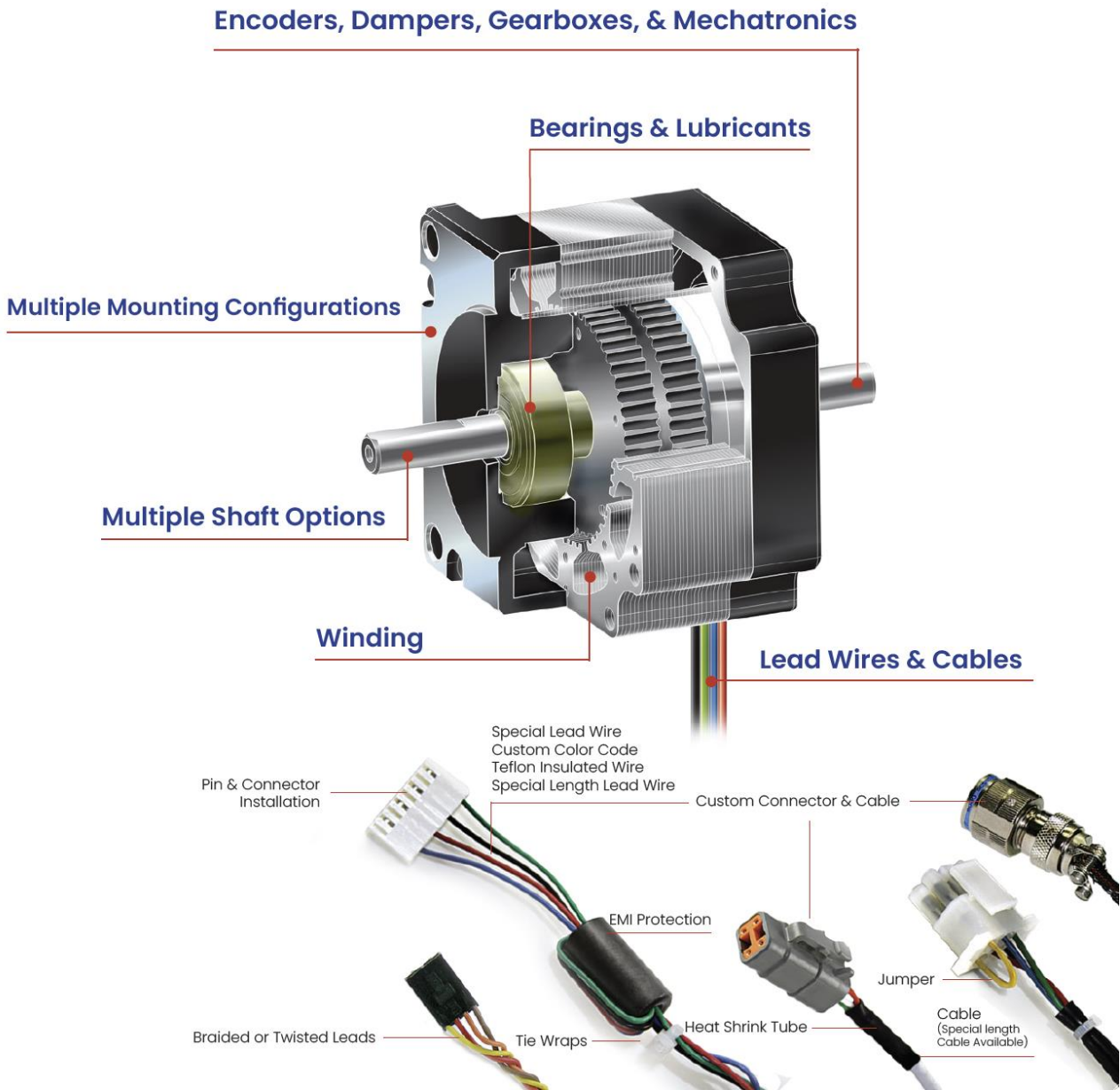
What sets us apart from other manufacturers is our extensive ability to optimize and customize our motor for your specific application needs. We can ensure that our motors are optimized to deliver the required performance for your specific application, whether it's increasing torque at a specific speed range, reducing noise or vibration, or optimizing for minimal power consumption.

Furthermore, we can create custom modifications to the motor's lead wires and connectors, customized mounting brackets or motor housings for proper fit and alignment, or customized motor shafts with gears or pulleys to drive. Also, we can extend the motor's capabilities with value-add components such as gearboxes, encoders and dampers, or even custom electronics.



USA Based Support

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Everything starts with our facility in Morgan Hill, California which is conveniently located in the heart of Silicon Valley. Not only do we have a full Engineering staff, but there is also a local Quality team, Applications, Sales, Customer Service, and so much more. The crown jewel of it all? A California-based manufacturing facility that proudly assembles and customizes motors in the USA.

For added support, we have a nationwide team of Applications Engineers and Account Managers that can provide you with the benefits of localized support.

Remember, we've been solving challenging problems in motion control for over 30 years!

Engineering Support

Optimize motor performance for your application and customize it for seamless integration

Prototype Support

Quickly assemble and test prototypes for your application

USA Support

USA Based Support & Manufacturing

Motion Control Solution For **Automation**

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Servo Motors

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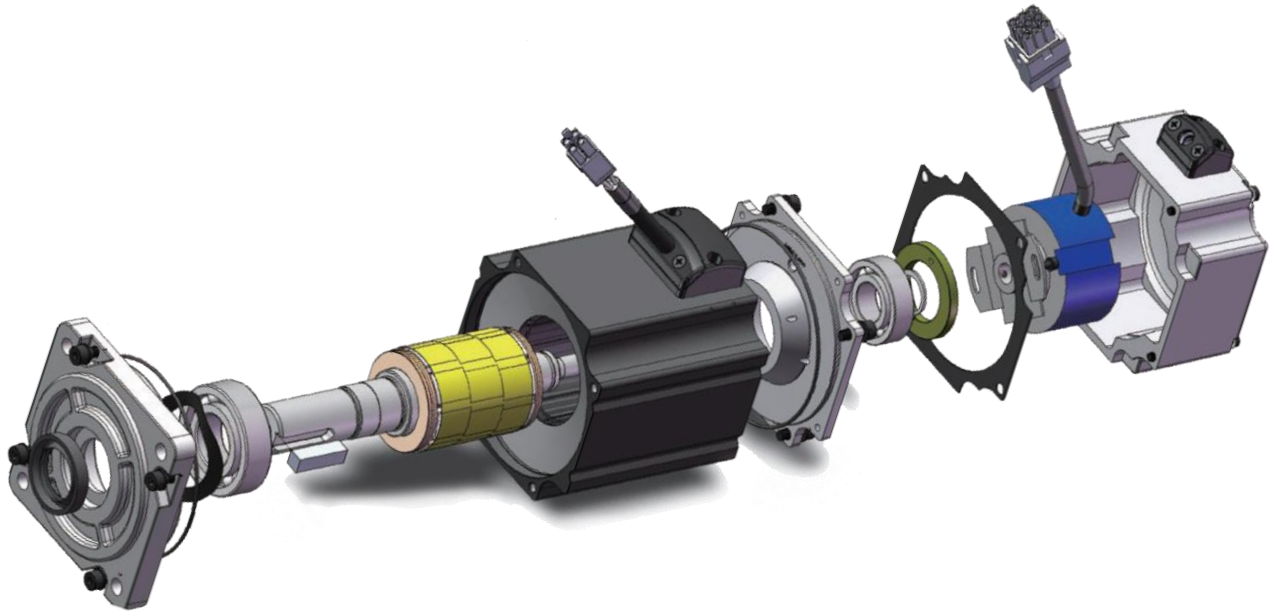
APPLICATIONS

- Drive Wheels
- Steering
- Lift Actuators
- Tilt Actuators
- Rotation Axis
- Robotics

POWERFUL. EFFICIENT. RELIABLE.

Lin Engineering's advanced servo motor technology is at the core of the most demanding vehicles manufactured by industry-leading warehouse automation OEMs. Lin Engineering's servo motors feature:

- Segmented winding technology for maximum power density.
- Epoxy-encapsulated stator for optimal heat dissipation.
- High energy skewed magnets for greater peak torque and speed control.
- Double bonded magnets and precision balancing for smooth, safe operation.
- High-capacity bearings for long life with high radial loads.
- IP65 Rating for durability
- Multiple encoder options available
- Servo Motor Sizes: 40 mm to 180 mm
- Available in AC or DC



Slotless BLDC Motors

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A typical brushless BLDC motor is constructed using a stator with “slots”; a copper wire is then wound around these slots. Although this technology works well, it has an inherent problem with cogging. To combat these issues, we are using a unique process of winding the copper wire without the need for “slots.” This drastically reduces cogging and improves the motor’s ability to respond, accelerate quickly, and operate smoothly. Slotless BLDC motors are also quieter and provide more power with a smaller frame size than their slotted counterparts.

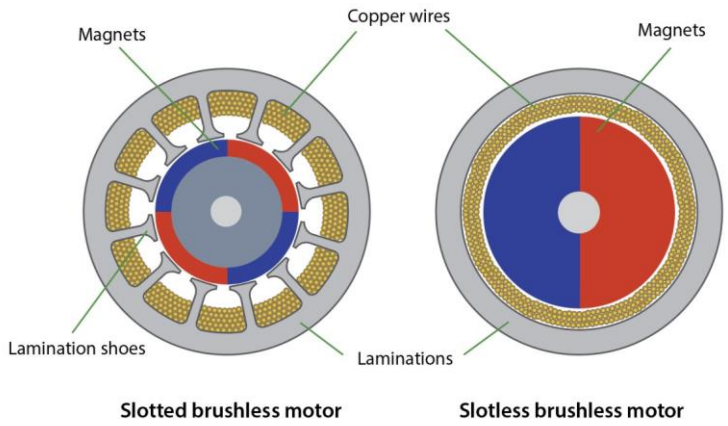
APPLICATIONS

- Pumps
- Grippers
- End-Effectors
- Fluid Transport

POWER-DENSE. ULTRA EFFICIENT. COMPACT.

Through the increased use of high-energy, rare-earth magnets such as samarium cobalt and neodymium iron boron, slotless motors can enable the same or greater torque performance than slotted motors. Lin Engineering’s slotless motors feature:

- Slotless design eliminates cogging
- Smooth motion at all speeds
- High top speeds (Up to 50,000 RPMs)
- Thermal function of the motor is better balanced
- Low operation noise due to lack of cogging
- Gearboxes available in popular gear ratios
- Multiple encoder options available



Stepper Motors

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For over 30 years, Lin Engineering has been manufacturing and modifying stepper motors. We have a wide selection of stepper motors from NEMA 6 up to NEMA 42. What sets us apart from other manufacturers is our extensive ability to optimize and customize our motors for your specific application needs. We can ensure that our hybrid stepper motors are optimized to deliver the required performance for your specific application, whether it's increasing torque at a specific speed range, reducing noise or vibration, or optimizing for minimal power consumption.

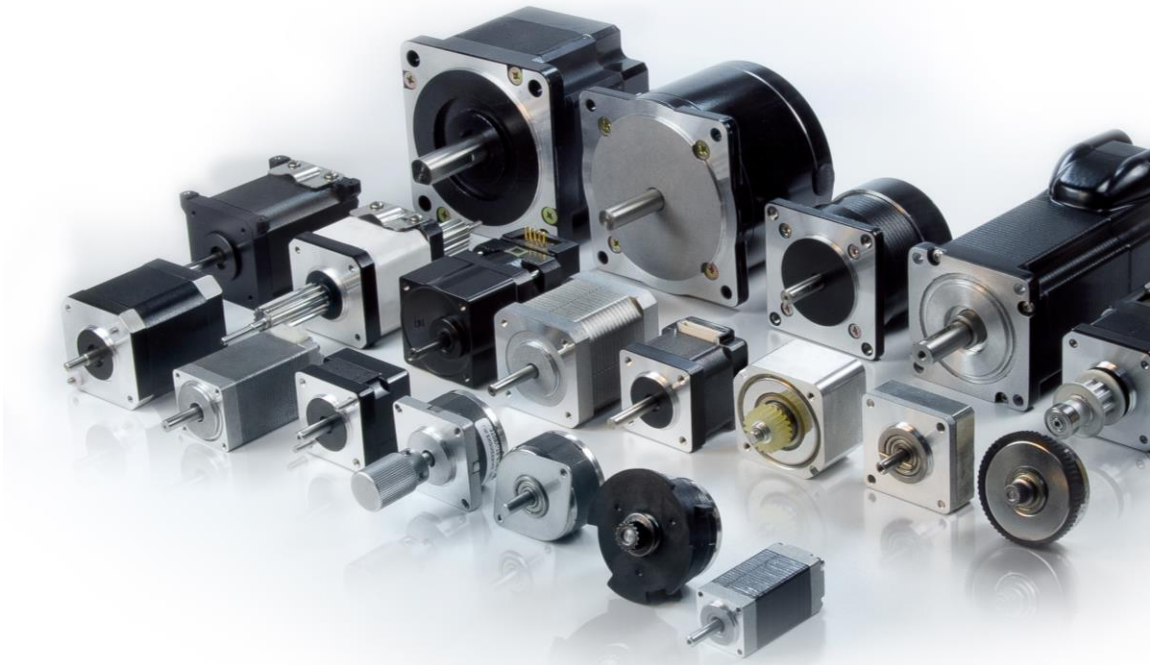
APPLICATIONS

- **Diverters**
- **Tilt Mechanism**
- **Push / Pull Actuators**
- **Smart Conveyors**

ACCURATE. EFFICIENT. RELIABLE. CUSTOMIZABLE.

We can also extend the motor's capabilities with value-add components such as gearboxes, encoders, dampers, and custom electronics. Lin Engineering's stepper motors feature:

- High reliability with little maintenance
- Open loop operation - No feedback is required for position or speed control
- High torque
- Non-cumulative positional error
- Inherently more fail-safe than servo-controlled motors
- Customizable Windings, Shafts, Connectors, Housings, and more
- IP65 & IP67 Rated versions available



Linear Actuators

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Linear actuators are used in applications where precise linear motion is needed. Our linear actuators can be driven by a stepper, servo, or brushless motor depending on the application's needs. As well we can customize the winding of the motor and the pitch of the lead screw to achieve your targeted speed or torque values. Lead wires, connectors, mounting brackets, housings, and more can be customized to fit your needs or to make a "drop-in" replacement.

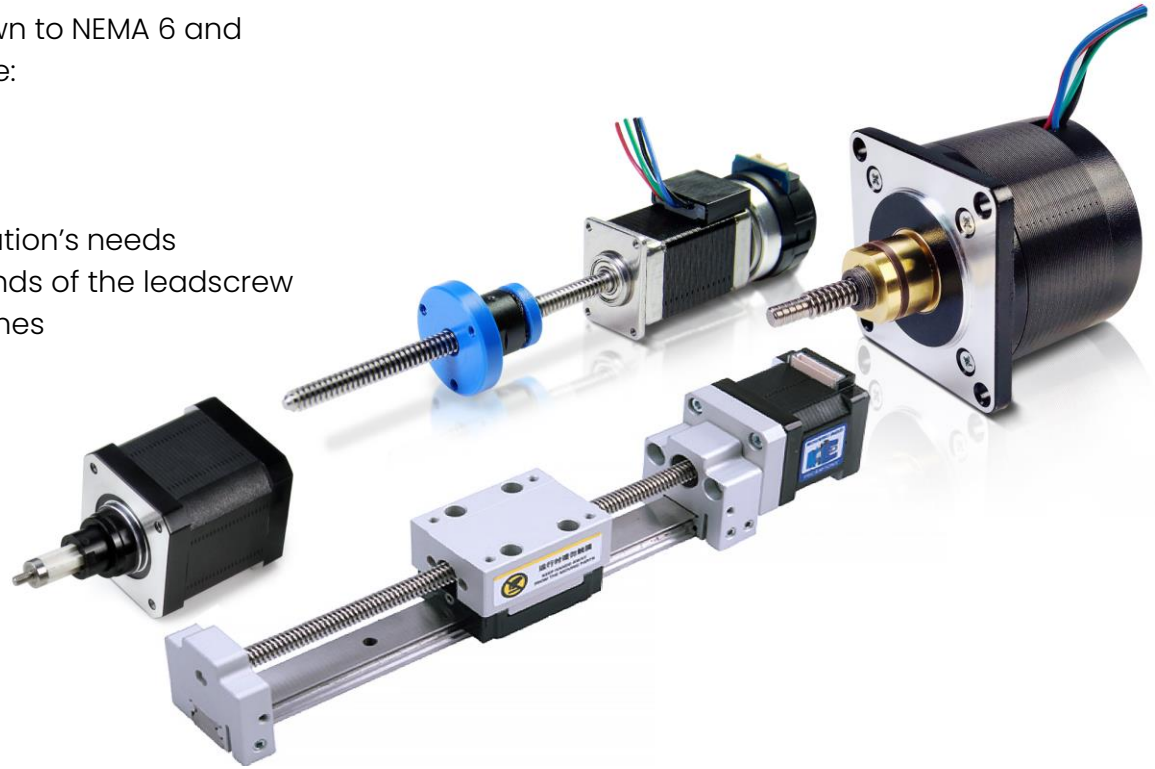
APPLICATIONS

- **Lift Actuators**
- **Wheel Engagement**
- **Diverters**

EXTERNAL NUT. INTERNAL NUT. CAPTIVE NUT.

We can provide a variety of linear actuators down to NEMA 6 and smaller. Lin Engineering's linear actuators feature:

- Available in LN, LE, & LC configurations
- Multiple nut options available
- Different lead screw pitches to fit your application's needs
- In-House machine shop can customize the ends of the leadscrew
- Online rapid prototyping tool with fast lead times
- Encoders available



Brushless Motors

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Brushless DC (BLDC) Motors are designed for high performance. BLDC motors are ideal for applications where rapid acceleration and high constant speeds are required. Lin Engineering's BLDC motors have an efficient, compact design with a high torque density. This makes our BLDC motors a great choice for a wide range of motion applications.

APPLICATIONS

- **Sliding Door/Gate**
- **Conveyor Belts**
- **Automated Storage**
- **Drive Wheels**

POWERFUL. EFFICIENT. HIGH SPEED.

Brushless motors deliver smooth and consistent torque output throughout the continuous operating speed range of the motor. Lin Engineering's BLDC motors feature:

- High efficiency
- High performance
- Optimized winding
- Long-term durability
- Quiet operation
- Multiple encoder options
- Available in NEMA 17, 23, & 34 frame sizes
- Accessories: Brake, Gearbox, Drivers
- Linear BLDC available

Integrated Stepper Motors

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Starting with our proven stepper motors, we added a driver, controller, and encoder to create an all-in-one convenient motion control solution. This helps to save space as everything is compactly integrated into one motor. These motors have the same smooth operation and strong holding torque as our standard steppers with the advantage of positional correction control.

APPLICATIONS

- **Packaging**
- **Labeling**
- **Automated Testing**
- **Product Assembly**

COMPACT. ALL-IN-ONE. HIGH POWER DENSITY

The integrated stepper motor series takes the guesswork out of stepper motor, controller, driver, and encoder compatibility. Lin Engineering's integrated motors feature:

- Motor + Driver + Controller + Encoder
- NEMA 17 & 23
- Wire harness and other accessories available
- Control the motor with Lin Command software
- Positional correction control
- High efficiency
- Cool operating temperatures

Frameless BLDC Motors

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With Frameless BLDC motors, all structural and mechanical supports needed for the design can be integrated directly into the apparatus. The benefit is that both the stator and the rotor can be seamlessly incorporated into the system, reducing size without sacrificing performance. The motor can be designed to fit the application rather than forcing the application to fit the motor. This gives you the freedom and flexibility to design systems with the smallest footprint possible.

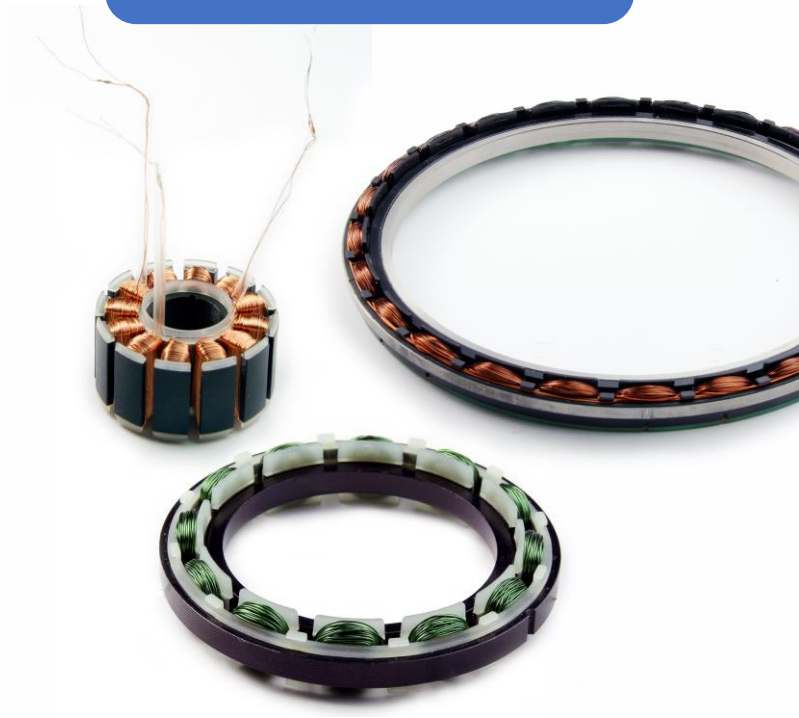
APPLICATIONS

- LiDAR Towers
- Robotic Joints
- PTZ Cameras
- Multi Axis Gimbals

SEAMLESS INTEGRATION. LOW WEIGHT.

Frameless motors are available in multiple sizes. Inrunner and outrunner designs can be customized to your specific requirements. Lin Engineering's frameless BLDC motors feature:

- Customizable to fit your application
- Minimalist design reduces weight
- Optional hall sensors
- High torque
- Highly efficient
- High-quality manufacturing ensures long-term reliability



Motors Drives

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Single and multi-axis drives are offered for board-level, or cabinet/chassis mount. These motion drives are high-performance and feature state-of-the-art motion controllers, high efficiency, small footprint, and Safe-Torque-Off (STO) to SIL2 and SIL3 compliance. Some of our drives can output up to 140 amps peak or 100 amps continuous.

Lin Engineering also offers a fully intelligent controller and driver in one. As well we can integrate these into our motors to create an all-in-one motion control solution.

MOTION CONTROL BY:

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TECHNOSOFT

Fieldbuses Available:

EtherCAT. CANopen Modbus EtherNet/IP

iPOS360x SY-CAN 6-Axis

iPOS8010 7/14A – 80V

iGVD71 8KW

R208

R725

R701P

BLDC50 & BLDC100

High Precision Planetary Gearboxes

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Lin Engineering high precision planetary gearboxes utilize high-quality materials to create one of the most precise gearboxes on the market. Utilizing a true planetary design these gearboxes have low backlash and a highly-efficiency design. They are compatible with popular motors sizes like NEMA 23 and NEMA 34. These gearboxes can survive in harsh environments with their IP65 certification. As well, they can operate in temperatures as low as negative 20°C and up to 90°C.

APPLICATIONS

- Drive Wheels
- Conveyor Belts
- Lifting Drive
- Robotic Joints

ACCURATE. EFFICIENT. RELIABLE.

The true backlash design in these gearboxes helps to reduce vibrations and noise. Lin Engineering's high precision planetary gearboxes feature:

- True planetary design
- Low backlash design
- NEMA mounting standards
- High-efficiency design
- Quick installation
- IP65 rated
- Backlash is less than 5 arc.min
- Multiple gearbox ratios: 5:1, 10:1, 20:1, & 50:1

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Traction Wheel Solutions

Motorized Traction Wheels

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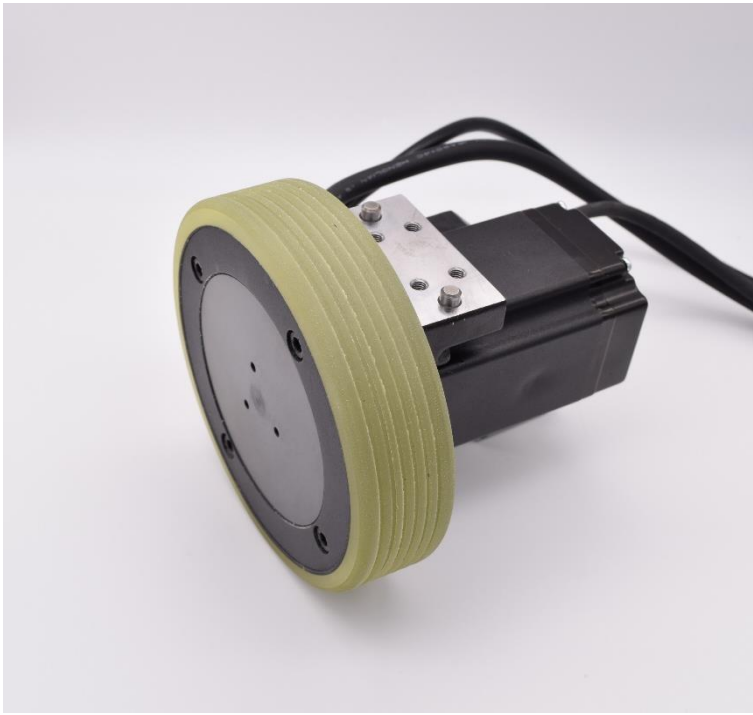
Lin Engineering's motorized traction wheel solutions are designed to deliver compact, easy-to-use, and more efficient traction solutions.

- In-Wheel motors are gearless, high pole count BLDC motors specifically designed for the direct drive of low payload vehicles, up to 500 Watts per wheel.
- Servo-Wheel motors are geared and gearless servo motors with greater power density and efficiency. They are best suited for medium-to-high payload vehicles and are available with power up to 2 Kilowatts. These wheels can accommodate multiple-sized motors.

Servo-wheel motors are available with optional brakes, encoders or dual encoders, as well as your choice of planetary, belt, or spur gear transmissions.



Motorized Traction Wheels

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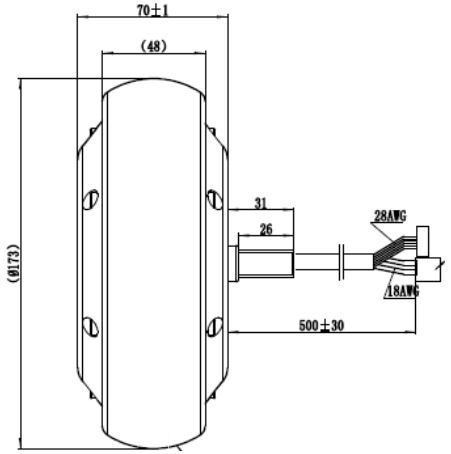
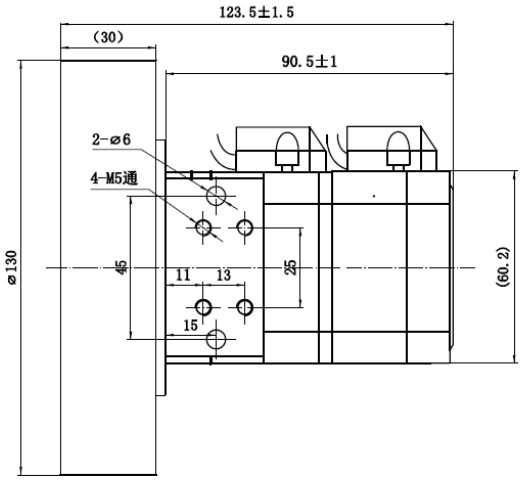


Model: R173

Rated Voltage	24 VDC
Rated Speed:	150 RPM
Rated Power:	100 W
Rated Current:	6.0 A
Rated / Peak Torque:	5.0 Nm/10.0 Nm
Encoder:	Magnetic

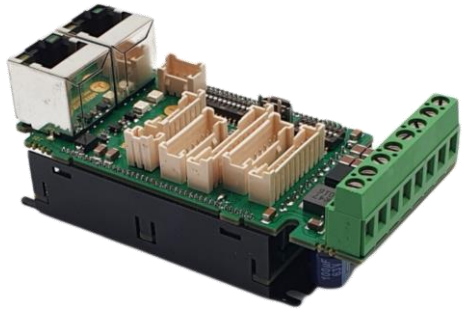
iPOS8010 7/14A – 80V

	Per traction Wheel	2x Differential Wheels AMR
Nominal Speed	1.36 m/s	
Rated feed force Accel. @ 100 Kg / 220 lbs	15 N	30N Accel: 0.3 m/s²
Peak feed force Accel. @ 100 Kg / 220 lbs	30 N	60N Accel: 0.6 m/s²



Model: 60SV04302-0200P-005

Rated Voltage	48 VDC
Rated Speed:	300 RPM
Rated Power:	200 W
Rated Current:	6.1 A
Rated / Peak Torque:	6.4 Nm/12.0 Nm
Encoder:	Magnetic
Brake:	1.3 Nm



iPOS4815 XZ-CAT 11-50V 15A

	Per traction Wheel	2x Differential Wheels AMR
Nominal Speed	2.0 m/s	
Rated feed force Accel. @ 200 Kg / 440 lbs	98 N	196N Accel: 1.0 m/s²
Peak feed force Accel. @ 200 Kg / 440 lbs	185 N	370N Accel: 1.85 m/s²

Motorized Traction Wheels

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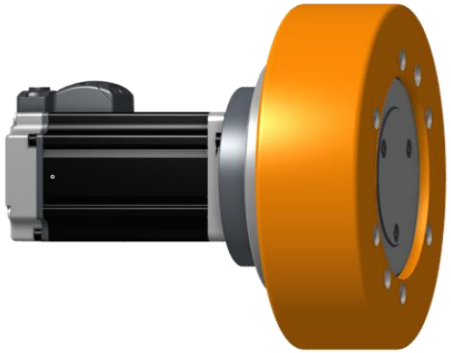
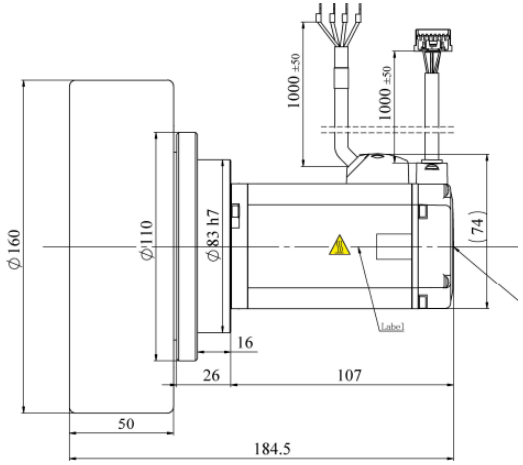


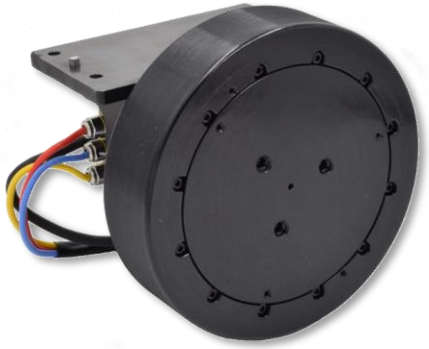


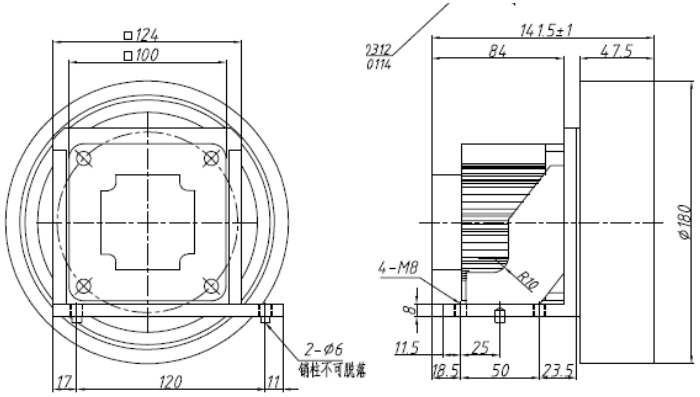
Model: SM0602GSL-KCY-NNV-PG28

Rated Voltage	48 VDC
Rated Speed:	3,000 RPM
Rated Power:	400 W
Rated / Peak Current:	11.8 A/30.6 A
Rated / Peak Torque:	1.27 Nm/3.8 Nm
Encoder:	Magnetic

MBDV: Dual & single Axis

	Per traction Wheel	2x Differential Wheels AMR
Nominal Speed	2.0 m/s	
Rated feed force Accel. @ 450 Kg / 1,000 lbs	114 N	228N Accel: 0.5 m/s²
Peak feed force Accel. @ 450 Kg / 1,000 lbs	343 N	686N Accel: 1.5 m/s²





Model: 100SV04202-0750K-001

Rated Voltage	48 VDC
Rated Speed:	2,000 RPM
Rated Power:	750 W
Rated Current:	19.3 A
Rated / Peak Torque:	3.6 Nm/7.2 Nm
Encoder:	Magnetic

MBDV: Dual & single Axis

	Per traction Wheel	2x Differential Wheels AMR
Nominal Speed	2.0 m/s	
Rated feed force Accel. @ 750 Kg / 1,650 lbs	360 N	720 N Accel: 1.0 m/s²
Peak feed force Accel. @ 750 Kg / 1.650 lbs	720 N	1440 N Accel: 1.85 m/s²

Motorized Traction Wheels

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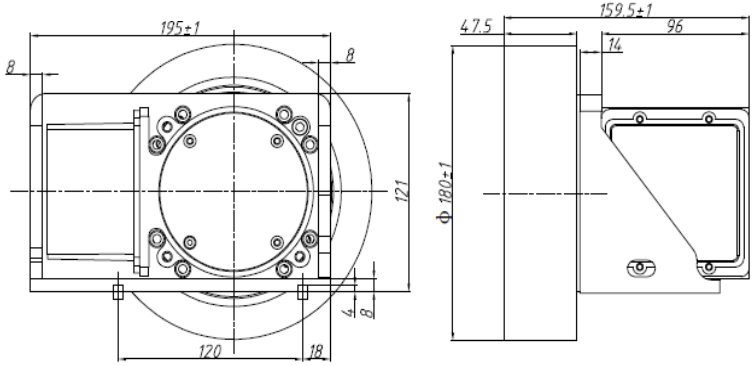
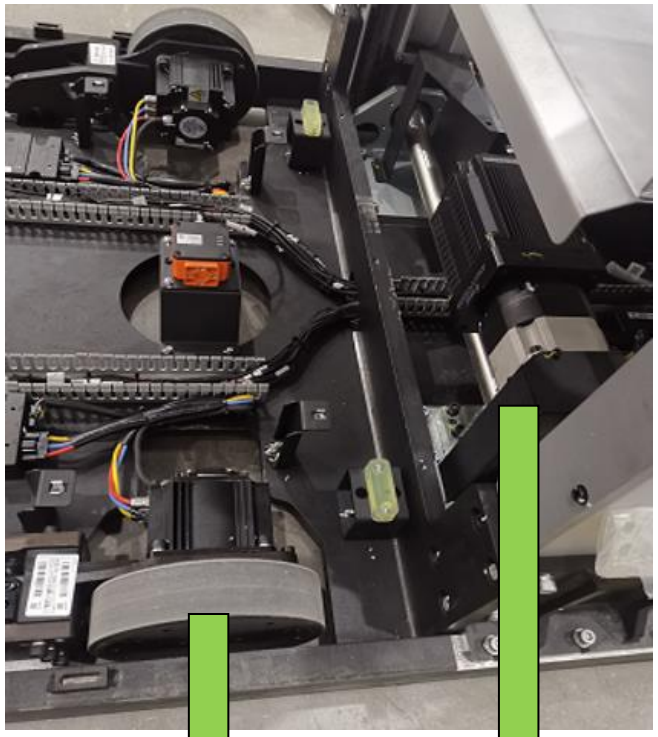


Model: 100SV04202-1000K-002

Rated Voltage	48 VDC
Rated Speed:	2,000 RPM
Rated Power:	1,000 W
Rated Current:	25.0 A
Encoder:	Magnetic
Integrated Gearbox:	10:1
Rated Output Torque:	45.12 Nm
Peak Output Torque:	90.24 Nm

iGVD71 8KW

	Per traction Wheel	2x Differential Wheels AMR
Nominal Speed	2.0 m/s	
Rated feed force Accel. @ 1,000 Kg / 2,200 lbs	475 N	950 N Accel: 0.95 m/s²
Peak feed force Accel. @ 1,000 Kg / 2,200 lbs	950 N	1,900N Accel: 1.9 m/s²



Geared Servo Motor

Geared Servo Motor

AMRs up to
1,000Kg

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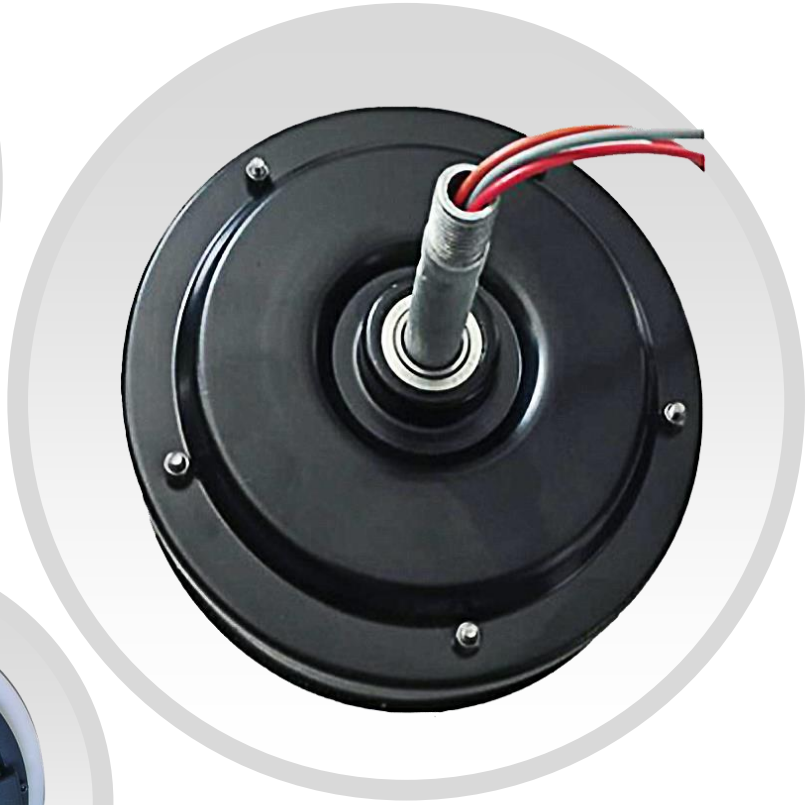
Outer Rotor Motors



Outer Rotor Motors

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Model: 57BL02102-0060-001

Phase:	3
Poles:	28
Rated Power:	60 W
No-load Speed:	1,700 RPM
Rated Torque:	0.57 Nm
Rated Speed:	1,000 RPM

Outer rotor motors are different from typical motors as they have the rotor and stator switched. By doing this the outside of the motor will turn instead of the shaft. This can be helpful in situations where direct drive is needed.

Model: 65BL21752-0080-001

Phase:	3
Poles:	8
Rated Power:	80 W
No-load Speed:	8,500 RPM
Rated Torque:	0.1 Nm
Rated Speed:	7,500 RPM

Features:

- **Low Noise**
- **Long Life**
- **Energy Saving**

Outer Rotor Motors

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Model: 165BL04491-0890-001

Phase:	3
Poles:	46
Rated Power:	890 W
No-load Speed:	600 RPM
Rated Torque:	17.3 Nm
Rated Speed:	490 RPM

Model: 220BL04421-1180-001

Phase:	3
Poles:	46
Rated Power:	1,320 W
No-load Speed:	560 RPM
Rated Torque:	27 Nm
Rated Speed:	460 RPM

Features:

- High Torque
- Low Noise
- Large Motor Inertia

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Servo Motors

Servo Motors

Model: 40SV Series

Rated Voltage:	48 VDC
Rated Speed:	3,000 RPM
Rated Power:	50W - 100W
Rated Torque:	0.16 Nm - 0.32 Nm
Accessories:	Encoder/Pulley
Rated Load:	10 kg

Model: 60SV Series

Rated Voltage:	48 VDC
Rated Speed:	3,000 RPM
Rated Power:	200W - 400W
Rated Torque:	0.64 Nm – 1.27 Nm
Accessories:	Encoder/Gearbox/Brake
Rated Load:	10 kg

Servo Motors

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Model: 60SV – Short Length

Rated Voltage:	48 VDC
Rated Speed:	3,000 RPM
Rated Power:	400W
Rated Torque:	1.27 Nm
Accessories:	Encoder/Gearbox
Rated Load:	400 kg

Model: 80SV Series

Rated Voltage:	48 VDC
Rated Speed:	3,000 RPM
Rated Power:	750W – 1,000W
Rated Torque:	2.4 Nm – 3.18 Nm
Accessories:	Encoder **/Gearbox/Brake
Rated Load:	600 kg

** *Double encoder for CE certification*

Servo Motors

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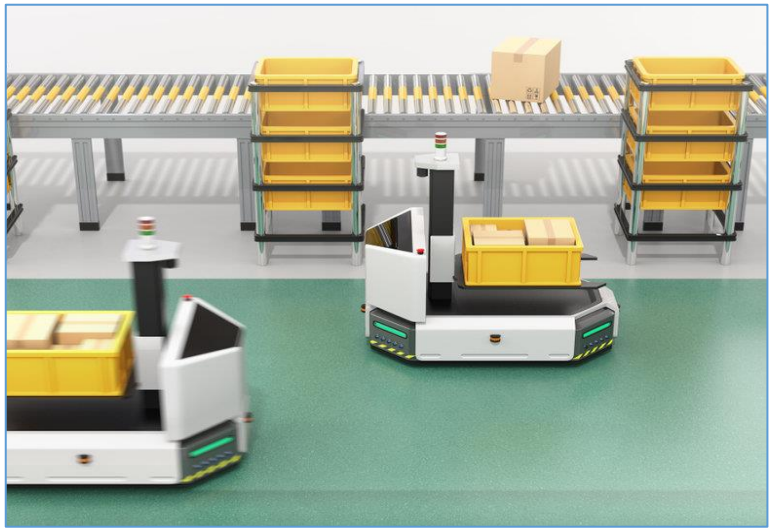
Model: 100SV Series

Rated Voltage:	24 - 48 VDC
Rated Speed:	2,000 RPM
Rated Power:	750W – 1,000W
Rated Torque:	3.6 Nm – 4.8 Nm
Accessories:	Encoder/Gearbox/Brake
Rated Load:	600 kg

Model: 110SV Series

Rated Voltage:	48 VDC
Rated Speed:	3,000 RPM
Rated Power:	1,000W – 2,300W
Rated Torque:	3.18 Nm – 15 Nm
Accessories:	Encoder/Gearbox/Brake
Rated Load:	600 kg



Servo Motors

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Model: 130SV Series

Rated Voltage:	48 VDC
Rated Speed:	3,000 RPM
Rated Power:	1,300W – 2,300W
Rated Torque:	4.1 Nm – 15 Nm
Accessories:	Encoder/Gearbox/Brake
Rated Load:	1,000 kg

Model: 180SV Series

Poles:	10
Rated Speed:	1,500 RPM
Rated Power:	5,500W
Rated Torque:	35 Nm
Advantages	High Torque, Low noise, Quick response

Thank you !

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