BALDOR®
MOTORS AND DRIVES

Linear Motors

Installation & Operating Manual

1/01

MN1800

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Section 1
General Information

Overview This manual contains general procedures that apply to Baldor Linear Motor products. Be sure to read and understand the Safety Notice statements in this manual. For your protection, do not install, operate or attempt to perform maintenance procedures until you understand the Warning and Caution statements. A Warning statement indicates a condition that can cause harm to personnel. A Caution statement indicates a condition that can cause damage to equipment.

Important: **This instruction manual is not intended to include a comprehensive listing of all details for all procedures required for installation, operation and maintenance. This manual describes general guidelines that apply to most of the linear motor products shipped by Baldor. If you have a question about a procedure or are uncertain about any detail, Do Not Proceed. Please contact your Baldor distributor for more information or clarification.**

Before you install, operate or perform maintenance, become familiar with the following:

- NEMA Publication MG-2, Safety Standard for Construction and guide for Selection, Installation and Use of Electric Motors and Generators.
- The National Electrical Code
- Local codes and practices

Limited Warranty

1. Baldor Electric motors are warranted for a period of one (1) year, from date of shipment from the factory or factory warehouse against defects in material and workmanship. To allow for stocking and/or fabrication period and to provide one year of actual service, the warranty period is extended for an additional period of six (6) months for a total of eighteen (18) months from the original date of shipment from the factory or factory warehouse stock. In no case will the warranty period be extended for a longer period. Baldor extends this limited warranty to each buyer of the electric motor for the purpose of resale and to the original purchaser for use.
2. Baldor will, at its option repair or replace a motor which fails due to defects in material or workmanship during the warranty period if:
   a. the purchaser presents the defective motor at or ships it prepaid to, the Baldor plant in Fort Smith, Arkansas or one of the Baldor Authorized Service Centers and
   b. the purchaser gives written notification concerning the motor and the claimed defect including the date purchased, the task performed by the Baldor motor and the problem encountered.
3. Baldor will not pay the cost of removal of any electric motor from any equipment, the cost of delivery to Fort Smith, Arkansas or a Baldor Authorized Service Center, or the cost of any incidental or consequential damages resulting from the claimed defects. (Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply to you.) Any implied warranty given by laws shall be limited to the duration of the warranty period hereunder. (Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.)
4. Baldor Authorized Service Centers, when convinced to their satisfaction that a Baldor motor developed defects in material or workmanship within the warranty period, are authorized to proceed with the required repairs to fulfill Baldor's warranty when the cost of such repairs to be paid by Baldor does not exceed Baldor's warranty repair allowance. Baldor will not pay overtime premium repair charges without prior written authorization.
5. The cost of warranty repairs made by centers other than Baldor Authorized Service Centers **WILL NOT** be paid unless first authorized in writing by Baldor.
6. Claims by a purchaser that a motor is defective even when a failure results within one hour after being placed into service are not always justified. Therefore, Baldor Authorized Service Centers must determine from the condition of the motor as delivered to the center whether or not the motor is defective. If in the opinion of a Baldor Authorized Service Center, a motor did not fail as a result of defects in material or workmanship, the center is to proceed with repairs only if the purchaser agrees to pay for such repairs. If the decision is in dispute, the purchaser should still pay for the repairs and submit the paid invoice and the Authorized Service Center's signed service report to Baldor for further consideration.
7. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

Safety Notice:

This equipment contains high voltage! Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt installation, operation and maintenance of electrical equipment.

Be sure that you are completely familiar with NEMA publication MG-2, safety standards for construction and guide for selection, installation and use of electric motors and generators, the National Electrical Code and local codes and practices. Unsafe installation or use can cause conditions that lead to serious or fatal injury. Only qualified personnel should attempt the installation, operation and maintenance of this equipment.

WARNING: **The magnetic attraction between the motor and the magnet assembly is extremely high. Keep fingers and other body parts away from these objects to avoid injury by this magnetic attraction.**

WARNING: **Use proper care and procedures that are safe during handling, lifting, installing, operating and maintaining operations. Improper methods may cause muscle strain or other harm.**

WARNING: **Do not touch electrical connections before you first ensure that power has been disconnected. Electrical shock can cause serious or fatal injury. Only qualified personnel should attempt the installation, operation and maintenance of this equipment.**

WARNING: **Be sure the system is properly grounded before applying power. Do not apply AC power before you ensure that all grounding instructions have been followed. Electrical shock can cause serious or fatal injury. National Electrical Code and Local codes must be carefully followed.**

WARNING: **This equipment may be connected to other machinery that has moving parts that are driven by this equipment. Improper use can cause serious or fatal injury. Only qualified personnel should attempt to install operate or maintain this equipment.**

WARNING: **Do not by-pass or disable protective devices or safety guards. Safety features are designed to prevent injury to personnel or damage to equipment. These devices can only provide protection if they remain operative.**

WARNING: **Disconnect all electrical power from the motor windings and accessory devices before disassembly of the motor. Electrical shock can cause serious or fatal injury.**

WARNING: **Do not use these motors in the presence of flammable or combustible vapors or dust. These motors are not designed for atmospheric conditions that require explosion proof operation.**

WARNING: **Motors that are to be used in flammable and/or explosive atmospheres must display the UL label on the nameplate.**

Specific service conditions for these motors are defined in NEC 70-599.

Caution: **Be careful when sliding the motor from its shipping container. Slide the motor from the box onto a level, flat surface to prevent bending. Bending can damage the windings and commutators.**

Receiving

Each Baldor motor is thoroughly tested at the factory and carefully packaged for shipment. When you receive your motor, there are several things you should do immediately.

1. Observe the condition of the shipping container and report any damage immediately to the commercial carrier that delivered your motor.
2. Verify that the part number of the motor you received is the same as the part number listed on your purchase order.

Storage

If the parts are not put into service immediately, store them in a clean, dry and warm location. If the storage location is damp or humid, the exposed metal surface of the motors and windings must be protected from moisture. If the ambient temperature decreases suddenly, condensation may form. Protect all parts from moisture.

Unpacking

Each Baldor motor is packaged for ease of handling and to prevent entry of contaminants.

1. To avoid condensation inside the motor, do not unpack until the motor has reached room temperature. (Room temperature is the temperature of the room in which it will be installed). The packing provides insulation from temperature changes during transportation.
2. When the motor has reached room temperature, remove all protective wrapping material from the motor.
3. The magnet track sections may come packaged in one or more boxes. Do not flip any magnet track sections inside the box. Unpack the magnet track sections one piece at a time. Place each section on a clean non–magnetic surface away from other magnet track sections and any other ferrous material.
4. Always keep the magnet track sections at a safe distance from each other. If the assemblies are to be left unattended for any period of time, precautions should be taken to prevent accidents due to the strength of the magnets (it is best to leave them in their packing material to prevent injury due to magnetic attraction). Persons who will come in contact with this assembly while receiving, transporting, storing, installing, disassembling or at any other time, must be made aware of this danger.

Handling

Be extremely careful. Keep in mind:

1. The magnetic attraction between the motor and the magnet assembly is extremely high. Keep fingers and other body parts away from these objects to avoid injury by this magnetic attraction.
2. Use proper care and procedures that are safe during handling, lifting, installing, operating and maintaining operations.
   Improper methods may cause muscle strain or other harm.

Repairs

Baldor will not share any responsibility for damage caused by customer attempt to repair or modify a motor. Consult Baldor for any service.

For further assistance please contact the factory:

Baldor Linear Motion Products
25026 Anza Drive
Santa Clarita, CA 91355, USA
(661) 257–0216 (phone)
(661) 257–2037 (fax)

Section 2
Installation & Operation

Overview

Installation should conform to the National Electrical Code as well as local codes and practices. When other devices are coupled to the motor, be sure to install protective devices to prevent accidents. Machinery that is accessible to personnel should provide protection in the form of guard rails, screening, warning signs etc.

Location

The motor should be installed in an area that is protected from direct sunlight, corrosives, harmful gases or liquids, dust, metallic particles, welding spatters and vibration. Exposure to these can reduce the operating life and degrade performance. Be sure to allow clearance for ventilation and access for cleaning, repair, service and inspections. Ventilation is extremely important. Be sure the area for ventilation is not obstructed. Obstructions limit the free passage of air. Motors get warm and the heat must be dissipated to prevent damage.

These motors are not designed for atmospheric conditions that require explosion proof operation. They must NOT be used in the presence of flammable or combustible vapors or dust.

Clean Room

Stages prepared for Class 10, 100 and 10,000 clean room requirements can be ordered as an option to our standard products. Materials must be suitable for the specified environment. The customer must perform the final cleaning due to contamination during shipping and handling.

The most common changes to the stages include the replacement of the bellows, installation of special greases, elimination of bearing shields and the removal of other non–critical components that may contribute to particle generation.

Mounting a Stage to the Machine Base and Payload To Stage

- Your stage is provided with mounting holes to attach the stage to a machine base. If your stage is supplied with bellows, you must remove the bellows to access the mounting holes. The mounting holes are typically non–threaded, counter–bored holes that accommodate a variety of screw sizes. It is recommended that a hardened machine screw be used. Refer to the mechanical drawings provided with your stage for mounting screw size and hole locations.
- The flatness of your mounting surface will greatly influence the flatness and straightness specification of your stage. The stage structure will tend to mirror the flatness of the mounting surface. For the stage to maintain its specification, it must be mounted to a surface that is flat (maximum error of 0.0005 inches per foot). A maximum of 0.010 inches per foot is the maximum mounting surface flatness error allowable for operation of the stage. However, at 0.010 inches per foot mounting base flatness, the stage flatness and straightness specification will be degraded.
- The mounting surface must be clean and free of particles that could affect flatness (particles that come between the stage and the mounting surface) . It is also recommended that the base of the stage be cleaned to remove contamination. Cleaning with alcohol or acetone is suggested, however avoid submersion or contamination of the internal components.
- When mounting the payload to the slide assembly, use the same precautions mentioned for the stage. Refer to the stage outline drawing for hole locations and specifications.
- When pinning is required, Baldor recommends that the stage be machined and assembled at the factory.

Note: It is strongly recommended that a thread locking compound be used when mounting the stage to the base and when mounting the payload to the slide assembly.

LMAC Linear Induction Motor

General Description: Single or three phase, linear AC induction motor primary.

Construction: Epoxy encapsulated and steel laminated coil assembly (motor primary) Motor secondary (customer supplied) must conform to the following specifications: 1/8–inch aluminum or copper plate backed by a 1/4 inch cold rolled steel plate. The width of the secondary must be at least the with of the motor coil assembly.

Maintenance: Motor should be kept dry and relatively free of contamination. This motor is water resistant, not water proof. Avoid submersion. Avoid contact with petroleum–based solvents. Alcohol or soapy water can be used to remove contaminants.

Motor specifications: Refer to catalog or outline drawing supplied with motor for mechanical dimensions and electrical specifications.

Motor Mounting: Your motor may be supplied with either base or foot mounting, refer to catalog or outline drawing supplied with motor for mounting details and hole dimensions. It is recommended that all available coil assembly mounting holes be utilized to properly secure the coil assembly. If the coil is in motion, the motor wires must be strain relieved. We recommend that the motor secondary be secured with 1/4inch fasteners on the left and right sides of the secondary, every four to six inches of its length. An air–gap of 1/8 inch is recommended. Refer to linear induction motor duty cycle–force–current curves in this booklet for information regarding the affects of air–cap size on motor performance.

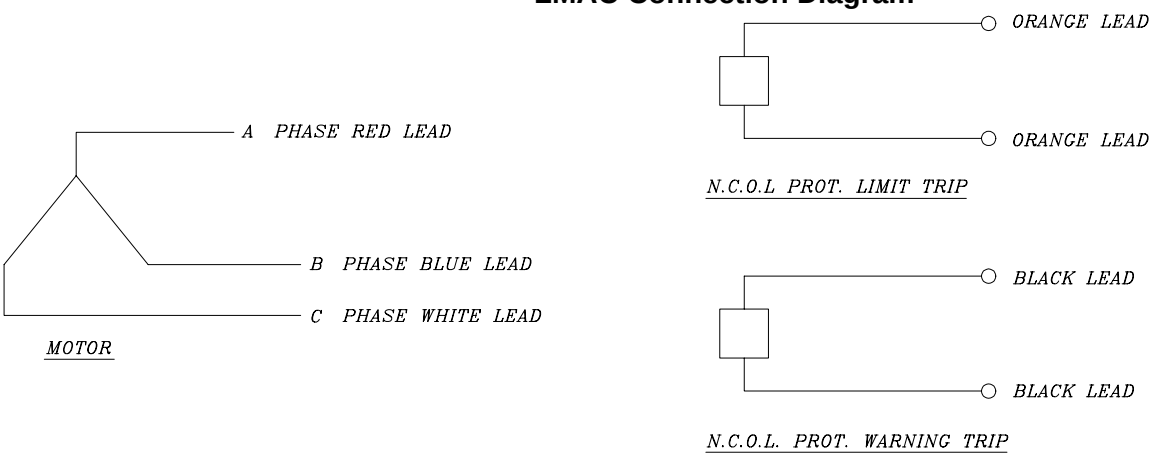
Electrical Connections For voltage and current specifications, refer to Catalog BR1800 or to documentation enclosed for custom motors. The 10 foot flying leads can be cut to remove excess length if required. Connectors are available; contact a Baldor representative for more information.

For single phase motors, refer to the table supplied with this booklet for capacitor selection.

Motor Wire

Function	Gauge	Color
Phase A	10	Red
Phase B	10	Blue (substituted by black in older models)
Phase C	10	White
Ground		Motor housing
Thermal switch	20	Orange (two wires, interchangeable)
Thermal warning	20	Black (two wires, interchangeable)

LMAC Connection Diagram



LMBR Series Brush DC Linear Servo Motor

Mounting

The motor primary must be aligned (parallel) to the equipment guide ways within 0.005″ (0.127mm) on each end. Use gauge blocks and shims as necessary. Precise parallel alignment of the motor to the equipment guideways is required. Align the stationary half of the motor to the guideways. Then align the moving half with the stationary half.

When securing the primary to the equipment base do not allow the screws to penetrate the motor more than .25″ deep (to prevent damage to the motor windings).

To mount the motor secondary, slide the table over the secondary and align the mounting holes. The secondary is to be secured to the moving table with screws after the proper amount of shims are added to maintain an air gap of .015″ min. to .020″ max. (unless otherwise specified) between the secondary and the primary. This is achieved by ensuring that the plastic shim provided does not bind anywhere over the length of the primary when moving the table top with secondary back and forth by hand.

The plastic shim between the primary and the secondary can now be removed. Be sure that the secondary is centered and runs parallel to the commutator to within .005″ at each end.

Electrical Check:

With an ohmmeter across input terminals, verify that the resistance reading does not drop to zero when the secondary / commutator assembly is moved over the entire length of the stationary primary. If a zero reading is observed, inspect the connections between the commutator brushes and the power input wires. In addition, inspect the connections between the motor windings and the commutator bar.

Motor Removal:

Insert the plastic shim between the primary and secondary to maintain the air gap. First, disconnect the power input wires. Next, remove the screws between the secondary and the moving table as this allows the secondary to sit on the primary. Then remove the mounting screws between the primary and the base. Finally, the complete motor assembly can be removed and placed on a level, flat surface.

Secondary Removal:

If just the secondary must be removed,slide the table with the secondary attached, to one end of the primary. Insert a .015″ minimum plastic shim between the secondary and the primary to maintain the air gap. Remove the screws between the secondary and the sliding table. Move the table out of the way and slide the secondary out using extreme caution so as to not damage the brushes. If brushes are worn out, contact Northern Magnetics for replacement.

Secondary Reinstallation:

Place .015″ minimum plastic shim on primary face. Next place .015″ min fiberglass shims on the brush assembly and completely depress the brushes into their holders. With the brushes toward the commutator bars, slide the secondary onto the primary face (with the shim in place). When the secondary is in place, gently remove the shim from between the brushes and commutator bars.

Note: Ensure that the shim between commutator and brushes has rounded ends and that they do not cut the leads to the commutator bars.

Refer to “Mounting” instructions to reinstall.

Brush Motor Connections: – Black / Red (+)
White (–)

LMBL Series

Brushless Linear Iron Core Servo Motor

Installation Refer to Figure 2-1.

1. Install the magnet assembly onto the machine mounting base.
2. With the slide assembly removed from the rails, install the coil assembly onto the slide, tightening the mounting screws.
3. Place a non–magnetic shim over the magnets, sized to cover all the magnets. (The shim thickness must be equivalent to the air gap specification. The normal air gap is 0.030″ ± 0.005″ unless otherwise specified).
4. Install and push the slide along the rails, positioning the coil assembly directly over the shim.

   (An alternate method is to install the slide on a set of rails that is identical to the one being used. Butt the temporary rails to the system rails and transfer the slide onto the system rails.)

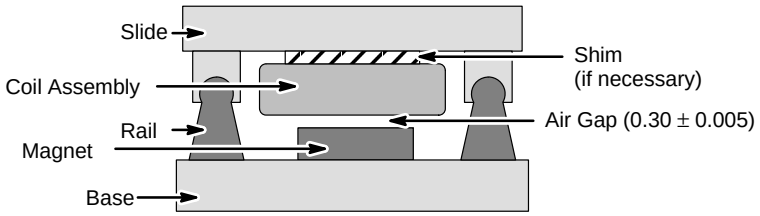
For either method, it is extremely important to uniformly tighten the mounting screws. Improper tightening will bend the primary or secondary and damage the motor.

If there is not enough space to install the coil assembly as described, use this alternate procedure.

Alternate Installation Refer to Figure 2-1.

1. Place the non–magnetic shim on the magnet track.
2. With a firm grip on the coil assembly, place one end of it on the shim and slide it into place, centered over the magnets. Be careful not to let the magnet and coil “Slam” together.
3. Align the fastening screw holes on the slide with the holes on the coil assembly.
4. Loosely install all the mounting screws.
5. Insert enough shims between the slide and the coil assembly to fill the gap.
6. Tighten all the mounting screws, alternating in a systematic manner while tightening such that the coil assembly is drawn–up evenly leaving a uniform air gap between the coil assembly and the magnets. **This air gap must be maintained along the entire length of the magnet assembly** i.e.; the coil assembly must never touch the magnets at any point when moving along the length of the magnet assembly and the air gap specification must be maintained at all times.
7. Remove the shim that sets the air gap prior to operation.

Figure 2-1 Air Gap Adjustment



LMBL Series Continued

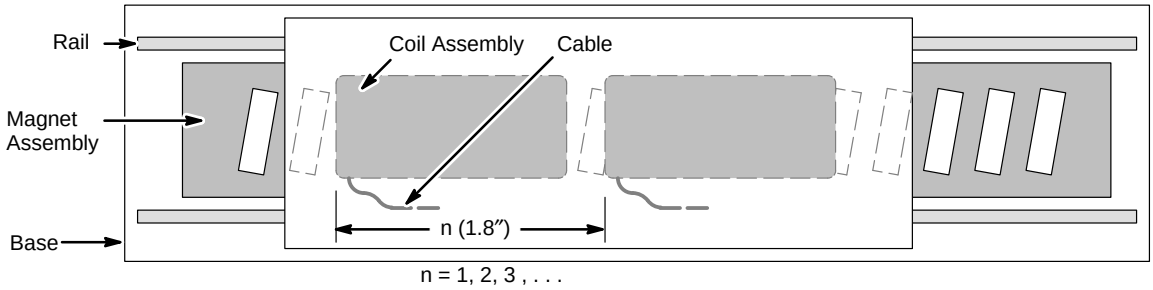
Brushless Linear Iron Core Servo Motor Continued

Multiple Coil Assembly Operation

In addition to maintaining an air gap, multiple coil assemblies must also maintain a spacing factor of 1.8″. In other words, the space between coil assemblies may vary, however, the distance from the front end of the first coil assembly to the front end of the next must be a multiple of 1.8″. See Figure 2-2.

Ensure that this spacing is established at the time of installation.

Figure 2-2 Multiple Coil Assemblies



Operation Considerations The motor must always be operated within the specified operating parameter limits. Exceeding those limits will permanently damage the motor Refer to the motor specifications for operating parameter limits.

The motor must never touch the magnets during operation. Refer to “Adjust Air Gap”.

Remove the shim that sets the air gap between the motor and the magnets prior to operation.

Note: Be aware that the total bearing load includes the magnetic attractive force.

The following steps must be completed to ensure safe and proper operation.

1. Verify that all electrical wiring and cables are properly connected. Refer to the manual provided with the control for this information.
2. Adjust the control continuous current limit to match the motor’s continuous current specifications.
3. Adjust the servo drive current to match the motor’s current specification.
4. Refer to the motor specifications for operating parameters. Adjust the control parameters as necessary to the motor data specifications.
5. Adjust the control for the proper P.I.D. loop tuning. Begin at a low gain setting and increase the gain as necessary.
6. Strain relieve the wires prior to operating.

AY1763A00 Leadwire Connection

Motor Cable			Hall Cable		Limit Cable	
Signal Name	Wire Color		Signal Name	Wire Color	Signal Name	Wire Color
	LinDrive	Trap				
Motor Phase A (U)	Red	Black	Hall 1	White	Limit + Output	White
Motor Phase B (V)	White	Red	Hall 2	Red	Limit – Output	Red
Motor Phase C (W)	Black	White	Hall 3	Black	Home Output	Black
Motor Ground	Green		Hall Ground	Green	Limit & Home PWR *	Brown
Thermal Switch+	Blue		Hall +5VDC	Brown	Limit & Home GND	Green
Thermal Switch–	Orange					

* Limit & Home power is +4 to +24VDC.

Note: Motor phasing is for LinDrive or MintDrive. Other controls may require different phasing (such as most trap drives (U) Black, (V) Red, (W) White). Phase angle between phases is 120 degrees.

Modular Magnet Track

Installation

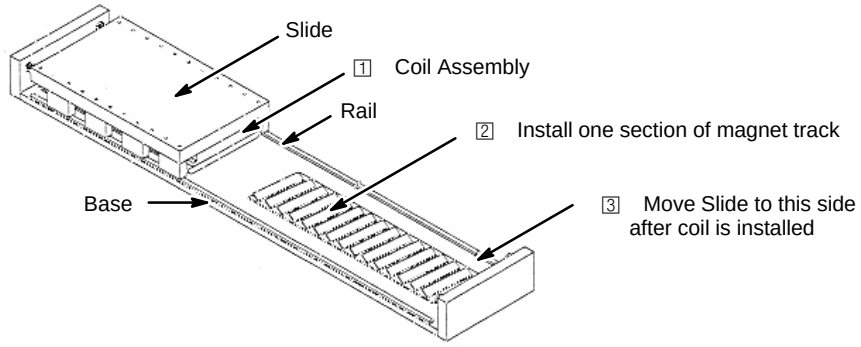
Refer to Figure 2-3. Some magnets are provided in modular segments. This is the recommended procedure to install these modular magnet track sections.

Note: It is recommended that rubber coated tool handles be used to reduce injury (pinching fingers etc.) and protect the surface of the magnets.

1. Bolt the coil assembly onto the underside of the slide (carriage). Ensure the leads extend in the proper direction.
2. Install the magnet track on the base–plate adjacent to or between the linear bearing. Magnet track ends should not oppose each other.

   Place a 0.030″ ± 0.005″ thick non magnetic shim on the magnet track. The shim thickness must be equal to the recommended air gap (space between the coil assembly and the magnet track).

Figure 2-3 Modular Magnet Track Installation

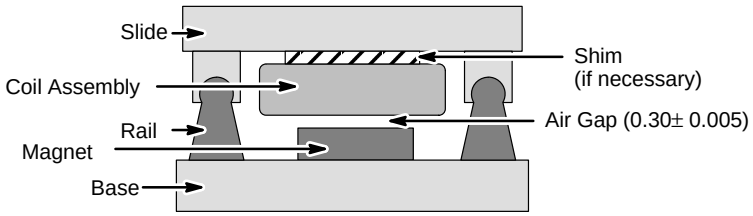


3. Hold the slide with a firm grip and move it over the magnet track section/shim.

Note: The slide will be drawn forcefully towards the magnet track and may overshoot the rails if not held firmly.

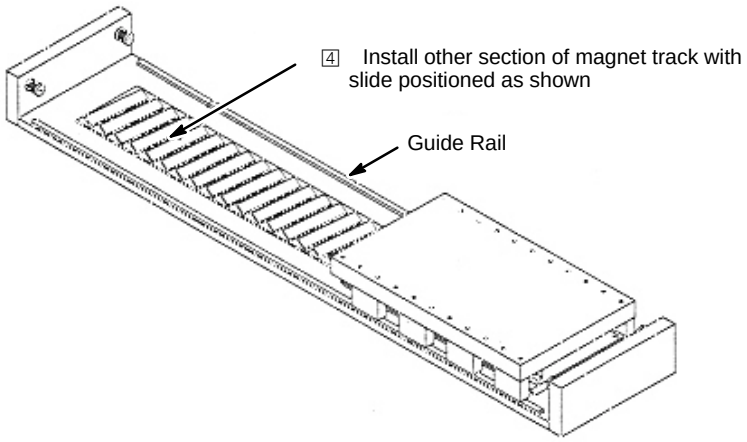
Check the space between the shim and the coil assembly. If the space between the shim and the coil assembly is large, uniformly loosen the mounting screws allowing the coil assembly to be fully and evenly lowered onto the shim. Insert another shim thick enough to fill the gap between the coil assembly and the slide, see Figure 2-4. Tighten the mounting screws once again.

Figure 2-4 Air Gap Adjustment



4. Install the remaining magnet track sections on the base plate. See Figure 2-5.
5. Remove the air–gap setting shim from the magnet track before use.

Figure 2-5 Modular Magnet Track Installation



Operation Considerations The motor must always be operated within the specified operating parameter limits. Exceeding those limits will permanently damage the motor Refer to the motor specifications for operating parameter limits.

The motor must never touch the magnets during operation. The air gap must be maintained over full length of travel.

Remove the shim that sets the air gap between the motor and the magnets prior to operation.

Note: Be aware that the total bearing load includes the magnetic attractive force.

The following steps must be completed to ensure safe and proper operation.

1. Verify that all electrical wiring and cables are properly connected. Refer to the manual provided with the control for this information.
2. Adjust the servo drive current to match the motor's current specification.
3. Refer to the motor specifications for operating parameters. Adjust the control parameters as necessary to the motor data specifications.
4. Adjust the control for the proper P.I.D. loop tuning. Begin at a low gain setting and increase the gain as necessary.
5. Strain relieve the wires prior to operating.

AY1763A00 Leadwire Connection

Motor Cable		Hall Cable		Limit Cable	
Signal Name	**Wire Color**	**Signal Name**	**Wire Color**	**Signal Name**	**Wire Color**
Motor Phase A (U)	Red	Hall 1	White	Limit + Output	White
Motor Phase B (V)	White	Hall 2	Red	Limit – Output	Red
Motor Phase C (W)	Black	Hall 3	Black	Home Output	Black
Motor Ground	Green	Hall Ground	Green	Limit & Home PWR *	Brown
Thermal Switch+	Blue	Hall +5VDC	Brown	Limit & Home GND	Green
Thermal Switch–	Orange				

* Limit & Home power is +4 to +24VDC.

Note: Motor phasing is for LinDrive or MintDrive. Other controls may require different phasing (such as most trap drives (U) Black, (V) Red, (W) White). Phase angle between phases is 120 degrees.

1. Install the coil and magnet assemblies. While mounting the coil, be sure to adjust coil assembly so it is centered within the magnet assembly with equal air gap in the vertical and horizontal positions. See Figure 2-6.
2. Verify that the coil assembly is centered within the magnet assembly with equal air gap in the vertical and horizontal positions along its entire length of travel. The coil assembly must never be allowed to touch the magnets at any point from one end of travel to the other.

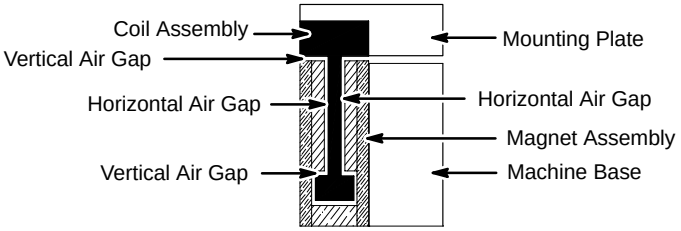
Note: For modular magnet mounting, magnets are mounted end–to–end without spacing. The mounting hole pattern is repeating and is unaffected by magnet segments. Hole pattern repeats across joining ends of magnets.

Multiple Coil Assembly Operation

In addition to maintaining an air gap, multiple coil assemblies must also maintain a spacing factor of 2.4″. In other words, the space between coil assemblies may vary, however, the distance from the front end of the first coil assembly to the front end of the next must be a multiple of 2.4″. See Figure 2-6.

Ensure that this factor is established at the time of installation.

Figure 2-6 Air Gap Spacing



Operation Considerations The motor must always be operated within the specified operating parameter limits. Exceeding those limits will permanently damage the motor.

The motor must never touch the magnets during operation. Equal horizontal and vertical air gap must be maintained.

Remove the shim that sets the air gap between the motor and the magnets prior to operation.

Note: Be aware that the total bearing load includes the magnetic attractive force.

The following steps must be completed to ensure safe and proper operation.

1. Verify that all electrical wiring and cables are properly connected. Refer to the manual provided with the control for this information.
2. Adjust the servo drive current to match the motor's current specification.
3. Refer to the motor specifications for operating parameters. Adjust the control parameters as necessary to the motor data specifications.
4. Adjust the control for the proper P.I.D. loop tuning. Begin at a low gain setting and increase the gain as necessary.
5. Strain relieve the wires prior to operating.

AY1763A00 Leadwire Connection

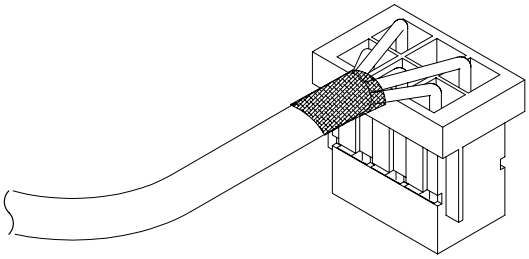
Motor Cable			Hall Cable		Limit Cable	
Signal Name	Wire Color		Signal Name	Wire Color	Signal Name	Wire Color
	LinDrive	Trap				
Motor Phase A (U)	Red	Black	Hall 1	White	Limit + Output	White
Motor Phase B (V)	White	Red	Hall 2	Red	Limit – Output	Red
Motor Phase C (W)	Black	White	Hall 3	Black	Home Output	Black
Motor Ground	Green		Hall Ground	Green	Limit & Home PWR *	Brown
Thermal Switch+	Blue		Hall +5VDC	Brown	Limit & Home GND	Green
Thermal Switch–	Orange					

* Limit & Home power is +4 to +24VDC.

Note: Motor phasing is for LinDrive or MintDrive. Other controls may require different phasing (such as most trap drives (U) Black, (V) Red, (W) White). Phase angle between phases is 120 degrees.

LMCF Series Brushless Linear Cog Free Servo Motor Continued

LD9073A00 Hall Sensor Cable Connections (6 pin to flying leads)



Pin#	Color	Description
1	Black	C
2	Red	B
3		N.C.
4	Green	Ground
5	White	A
6	Brown	+5VDC

LMNC Moving Coil Type

General Description Bi–directional DC linear motor consisting of a moving wound bobbin assembly and a stationary magnet assembly. (Refer to catalog BR1800 for motor specifications, if your motor is custom; refer to documentation included with shipment or contact Baldor).

Construction: Plated steel magnet housing assembly, nylon or like material wound bobbin assembly. Your motor may or may not be supplied with a mounting flange or other mounting provisions refer to catalog BR1800 for standard motor specifications or refer to documentation included with shipment for custom motors.

Bearing type: Bearings are not provided with standard models. It is the purchaser's responsibility to supply bearings on standard models. With the magnet assembly secured, the bearing must support the bobbin assembly so that it is mechanically centered in the magnet assembly. Failure to center the coil assembly may lead to mechanical contact between the coil and magnet assembly. If this occurs, motor electrical shorts are possible. If your motor is supplied with bearings, refer to documentation included with shipment for additional information. If this additional information is not available, contact your local Baldor representative for assistance.

Maintenance: Motor should be kept dry and relatively free of contamination. This motor is NOT WATER PROOF. Avoid submersion. Contact your local Baldor representative for service information. Avoid contact with petroleum–based solvents. Alcohol can be used to remove contaminants.

Motor specifications: Refer to catalog or outline drawing supplied with motor for mechanical dimensions and electrical specifications.

Motor Mounting: Refer to catalog or outline drawing supplied with motor for mounting details and hole dimensions. If you motor is supplied with drilled and tapped mounting holes, refer to the recommended seating torque for screws in this document. It is recommended that a thread locking compound be used with mounting screws. Motor wires must be strain relieved.

Electrical Connections For voltage and current specifications, refer to Catalog BR1800 for catalog motors or to documentation enclosed for custom motors. Your motor is supplied with 24 inch flying leads*. These wires can be cut to remove excess length if required. Connectors are available; contact a Baldor representative for more information.

Motor Wire

Function	*Color*
– DC	Black
+DC	White
Ground	Motor housing

* Some motors are supplied with custom cables; refer to documentation included with this shipment for any custom motor designs.

LMNM Moving Magnet Type Non Commutated DC Linear Servo Motor

General Description: Bi–directional DC linear motor with integral bearing. (Refer to catalog BR1 800 for motor specifications, if your motor is custom; refer to documentation included with shipment or contact Baldor)

Construction: Anodized aluminum or plated steel housing, aluminum end–caps, steel center shaft. Your motor may or may not be supplied with a mounting flange or other mounting provisions refer to catalog BR1 800 for standard motor specifications or refer to documentation included with shipment for custom motors.

Bearing type: Depending on motor catalog number the bearing may be one of the following: linear, anti rotational linear, rulon, sapphire, or flexure. Refer to catalog BR1 800. If your motor is custom, refer to documentation included with shipment. Maintenance: Motor should be kept dry and relatively free of contamination. This motor is NOT WATER PROOF. Avoid submersion. These motors are factory assembled and aligned, the bearings must be serviced by Baldor or a Baldor authorized repair center. Disassembly of motor will void warranty. Avoid contact with petroleum based solvents. Alcohol can be used to remove contaminants. Contact your local Baldor representative for service information.

Motor specifications: Refer to catalog or outline drawing supplied with motor for mechanical dimensions and electrical specifications.

Motor Mounting: Refer to catalog or outline drawing supplied with motor for mounting details and hole dimensions. When attaching payload to motor, avoid axial loading of the motor shaft. Axial loading can damage the bearing thus reducing its life. If your motor is supplied with drilled and tapped mounting holes, refer to the recommended seating torque for screws in this document. It is recommended that a thread locking compound be used with mounting screws.

Electrical Connections For voltage and current specifications, refer to Catalog BR1800 or to documentation enclosed for custom motors. Your motor is supplied with 24 inch flying leads*. These wires can be cut to remove excess length if required. Connectors are available; contact a Baldor representative for more information.

Motor Wire

Function	*Color*
– DC	Black
+DC	White
Ground	Motor housing
Thermal switch (optional on some models)	Orange and Blue pair

*If your motor was supplied with custom cables; refer to enclosed documentation for any custom motor designs.

LMPY Series Polynoid Linear Motor Holding Option

Mounting: The rectifier package is wired externally in the stator circuit.

For 115/60Hz, rectifier package CO0126A00 is provided.

For 230/60Hz, rectifier package CO0125A00 is provided.

Rated holding force is only achieved when the keeper plate is against the holding coil. To reduce shock loads, a shock absorbing connection between the polynoid rod and the load is recommended.

Switching: Two switching modes can be used for various applications.

Single Holding:

- Energized constantly except momentary interruption to release holding so rod can be reversed.
- Energized only during period when holding is required.
- Energized only when rod is moving towards the holding end of the stator and during the holding period.

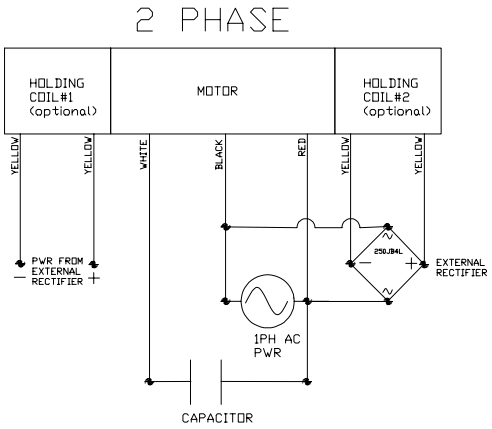
Double Holding:

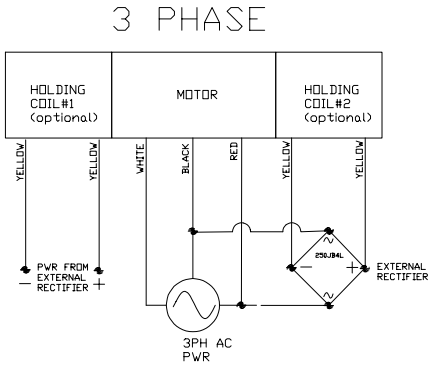
- Energized constantly except momentary interruption to release holding so rod can be reversed.
- Energized only during period when holding is required.
- Double holding coils may be switched together or one at a time.

Note: Double holding coil units are normally supplied with 2 yellow leads and one small diameter black lead so that the holding coils may be operated independently by applying rated voltage to the yellow and black lead. The wire marker on one yellow lead indicates the lead that operates the holding coil on the lead egress end of the stator. If desired, the 2 yellow leads can be tied together for simultaneous operation of both holding coils.

WIRING GUIDES:

1. **<u>Single Holding</u>:**





Polynoid Linear Motor Holding Option Continued

Operation Considerations The motor must always be operated within the specified operating parameter limits. Exceeding those limits will permanently damage the motor.

Note: Rod should not support axial loads that can induce premature bearing failure.

The following steps must be completed to ensure safe and proper operation.

1. Verify that all electrical wiring and cables are properly connected. Refer to the manual provided with the control for this information.
2. If using a control, adjust the control continuous current limit to match the motor's continuous current specifications.
3. Adjust the control peak current limit so it will not exceed the motor's peak current specification.

Leadwire Connection

Motor Cable	
Signal Name	**Wire Color**
Motor Phase A	Black
Motor Phase B	Red
Motor Phase C	White

Mounting Instructions Refer to the outline drawing (supplied with motor) for hole dimensions and mounting information. When attaching the payload to the motor, avoid axial loading of the motor shaft. Axial loading can damage the rulon bearing.

LMSS Series Linear Stepper

Roller Bearing Motor

Installation

Prior to placing the Forcer on the Platen both surfaces must be cleaned. Use this method:

1. Apply masking tape to lamination surface of the Forcer to remove any metallic contaminants.
2. Using alcohol, clean both surfaces to remove any adhesive residue and any other contaminants on the Forcer and the Platen.

Note: Apply small amount of alcohol to cloth for cleaning. Never pour or drip alcohol or other chemicals onto the forcer or platen surfaces.

3. Wax and polish Platen and Forcer surfaces. (Turtle Wax). Remove any visible residue.

Adjust Air Gap

Factory preset to 0.0015″.

Note: When receiving the Forcer and the Platen, the air gap is already set to 0.0015″. (Increasing the air gap will decrease the force). Use the following instructions only if you need to reset the air gap.

1. Carefully remove the Forcer from the platen by sliding off the Forcer of the end of the Platen. (So as not to score the Forcer and the Platen surfaces).
2. Loosen the four screws (1 turn) on the bearing kits using an Allen key.
3. Center the shim on the toothed section of the Platen.
4. Place the Forcer on the Platen. Be sure that the shim is only between the Forcer and the Platen, and not between the wheels and the Platen.
5. Apply downward pressure on both bearing kits only (the Forcer is attached magnetically) and then tighten the four screws to 30 in–lbs of torque.
6. Slide the Forcer down the Platen while holding the shim in place and remove the shim.

Maintenance

Waxing of the Forcer lamination for corrosion protection is recommended every month (or as needed) depending on environmental conditions (i.e. humidity and moisture).

Operation Considerations

The motor must always be operated within the specified operating parameter limits. Exceeding those limits will permanently damage the motor.

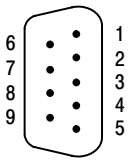
The forcer must never touch the platen during operation. Equal horizontal and vertical air gap must be maintained.

The following steps must be completed to ensure safe and proper operation.

1. Verify that all electrical wiring and cables are properly connected. Refer to the manual provided with the control for this information.
2. Adjust the stepper driver current to match the motor's current specification.
3. Strain relieve the wires prior to operating.

AY0165A00 Leadwire Connection (9 pin to flying leads)

Color	Pin#	Description
White	1	A1+ Winding
	2	N.C.
Green	3	B1+ Winding
	4	N.C.
Black	5	Ground
	6	N.C.
Red	7	A1– Winding
	8	N.C.
Orange	9	B1– Winding



Male (D Sub)

When a Male D Sub connector is used, use the pin numbers to connect the forcer.

When flying leads are used, use the color codes to connect the forcer.

Air Bearing Motor

Cleaning the Forcer and Platen

Prior to placing the Forcer on the Platen both surfaces must be cleaned.
Use this method:

1. Apply masking tape to lamination surface of the Forcer. Removing the tape removes large particle contaminants.
2. Using alcohol, clean both surfaces to remove any adhesive residue and any other contaminants on the Forcer and the Platen.

Note: Apply small amount of alcohol to cloth for cleaning. Never pour or drip alcohol or other chemicals onto the forcer or platen surfaces.

3. Wax and polish Platen and Forcer surfaces. (Turtle Wax). Remove any visible residue.

Cleaning the Air Bearings Required if the forcer is not lifting between 0.0005″ – 0.001″ (i.e. rubbing on the Platen).

1. Using a small screw driver, unscrew one air bearing.
2. Blow compressed air through the bearing in both directions.
3. Screw the air bearing back to its original position.

Note: Do not mix the air bearings, they have to be installed at their original position.

Installation:

Mounting the Forcer on the Platen

1. Before placing the forcer on the platen be sure there is at least 60 psi of regulated and filtered air flowing through the forcer.
2. At one end of the platen, carefully slide the Forcer onto the Platen. (BE EXTREMELY CAREFUL).

Removing the Forcer from the Platen

1. Before moving the forcer, be sure there is at least 60 psi of regulated and filtered air flowing through the forcer.
2. Carefully slide the Forcer to one end of the Platen and remove it. (Be Extremely Careful).

Maintenance Waxing of the Forcer lamination for corrosion protection is recommended every month (or sooner) depending on environmental conditions (i.e. humidity and moisture).

Operation Considerations The motor must always be operated within the specified operating parameter limits. Exceeding those limits will permanently damage the motor.

The forcer must never touch the platen during operation. Equal horizontal and vertical air gap must be maintained.

The following steps must be completed to ensure safe and proper operation.

1. Verify that all electrical wiring and cables are properly connected. Refer to the manual provided with the control for this information.
2. Adjust the stepper driver current to match the motor's current specification.
3. Strain relieve the wires prior to operating.

LD9145A00 9 pin Female to flying leads

Color	Pin#	Description
Red	1	A+ Winding
Green	2	A– Winding
Yellow	3	B+ Winding
Orange	4	B– Winding
Black	5	Ground
Blue	6	C+ Winding
Green	7	C– Winding
White	8	D+ Winding
Black	9	D– Winding

Use twisted pairs, shield is open at backshell.

LD9147A00 25 pin Female to flying leads

Color	Pin#	Description	Color	Pin#	Description
Red	1	1A+ Winding	Red	14	2A+ Winding
Green	2	1A– Winding	Green	15	2A– Winding
Yellow	3	1B+ Winding	Yellow	16	2B+ Winding
Orange	4	1B– Winding	Orange	17	2B– Winding
Blue	5	1C+ Winding	Black	18	2C+ Winding
Green	6	1C– Winding	Blue	19	2C– Winding
White	7	1D+ Winding	Green	20	2D+ Winding
Black	8	1D– Winding	White	21	2D– Winding
Black	13	1Ground	Black	13	2Ground

Use twisted pairs, shield is open at backshell.

LMDS Series Dual Axis Linear Stepper Motor

Items Required but NOT Included

1. A regulated 80 PSI air supply with a 5 micron filter for each motor.
   A water separator is also required.
2. Two or four phase, 2 ampere (micro) stepper motor driver/controller for each motor.

Cleaning the Forcer and Platen

Prior to placing the Forcer on the Platen both surfaces must be cleaned.

Use this method:

1. Apply masking tape to lamination surface of the Forcer. Removing the tape removes large particle contaminants.
2. Using alcohol, clean both surfaces to remove any adhesive residue and any other contaminants on the Forcer and the Platen.

Note: Apply small amount of alcohol to cloth for cleaning. Never pour or drip alcohol or other chemicals onto the forcer or platen surfaces.

3. Wax and polish Platen and Forcer surfaces. (i.e. Turtle Wax). Remove any visible residue.

Cleaning the Air Bearings Required if the forcer is not lifting between 0.0005″ – 0.001″ (i.e. rubbing on the Platen).

1. Using a small screw driver, unscrew one air bearing.
2. Blow compressed air through the bearing in both directions.
3. Screw the air bearing back to its original position.

Note: Do not mix the air bearings, they have to be installed at their original position.

Installation:

Mounting the Forcer on the Platen

1. Before placing the forcer on the platen be sure there is at least 60 psi of regulated and filtered air flowing through the forcer.
2. Use the lifting tool (in reverse) to gently, place the forcer on the platen. Be careful not to place your fingers between forcer and platen.

Removing the Forcer from the Platen

1. Before moving the forcer, be sure there is at least 60 psi of regulated air supply with a 5 µm air filter flowing through the forcer.
2. Place lifting tool (provided) in slot on the side of the forcer. Gently, pry the forcer from the platen with the tool. Lift the forcer and remove it from the platen. Be careful not to place your fingers between forcer and platen.

Maintenance Waxing of the Forcer lamination for corrosion protection is recommended every month (or as needed) depending on environmental conditions (i.e. humidity and moisture).

Operation Considerations The motor must always be operated within the specified operating parameter limits. Exceeding those limits will permanently damage the motor.

The following steps must be completed to ensure safe and proper operation.

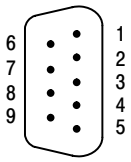
1. Verify that all electrical wiring and cables are properly connected. Refer to the manual provided with the control for this information.
2. Adjust the stepper driver current to match the motor's current specification.
3. Strain relieve the wires prior to operating.

Leadwire Connection

LD9068A00

Color	**Pin#**	**Description** (2 Phase 9 pin to flying leads)
Red	1	(X) A+ Winding
Green	2	(X) A– Winding
Yellow	3	(X) B+ Winding
Orange	4	(X) B– Winding
Black	5	Ground
Blue	6	(Y) A+ Winding
Green	7	(Y) A– Winding
White	8	(Y) B+ Winding
Black	9	(Y) B– Winding

Use twisted pair wires. Shield open at shell.

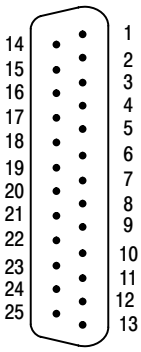


Female (D Sub)

LD9074A00

Color	**Pin#**	**Description** (2 Phase 25 pin pin to flying leads)
Red	1	(X) A+ Winding
Green	2	(X) A– Winding
Yellow	3	(X) B+ Winding
Orange	4	(X) B– Winding
Black	13	Ground
Blue	14	(Y) A+ Winding
Green	15	(Y) A– Winding
White	16	(Y) B+ Winding
Black	17	(Y) B– Winding

Use twisted pair wires. Shield open at shell.



Female (D Sub)

LD9092A00 (4 Phase 25 pin pin to flying leads)

X–Axis Connections

Color	**Pin#**	**Description**
Red	1	A+ Winding
Green	2	A– Winding
Yellow	3	B+ Winding
Orange	4	B– Winding
Blue	5	C+ Winding
Green	6	C– Winding
White	7	D+ Winding
Black	8	D– Winding
Black	13	Ground

Use twisted pair wires.
Shield open at shell.

Y–Axis Connections

Color	**Pin#**	**Description**
Red	14	A+ Winding
Green	15	A– Winding
Yellow	16	B+ Winding
Orange	17	B– Winding
Blue	18	C+ Winding
Green	19	C– Winding
White	20	D+ Winding
Black	21	D– Winding
Black	13	Ground

Use twisted pair wires.
Shield open at shell.

Positioning Stages

Unpacking

Observe the condition of the shipping container and report any damage immediately to the commercial carrier that delivered your stage. Carefully remove the positioning stage from the shipping crate or box. Inspect the stage and report any evidence of damage to your local Baldor sales office or authorized distributor. Save the shipping container for future transportation.

Handling and General Guidelines

Be sure to observe the following guidelines:

1. Carefully set the positing stage in place. Do not drop a positioning stage onto the mounting surface or machine base as this can result in internal damage to bearing and drive components.
2. Do not drill holes in a positing stage. Contact Baldor if holes must be added.
3. Avoid impact loads such as hammering and punching which may cause internal damage to bearing and drive components.
4. Avoid submersion in liquids of all types.
5. Do not disassemble the positioning stage as this may void the product warranty.

Stage Specifications Disclaimer

Positioning stage specifications are dependant on the three following variables:

Temperature: Catalog specifications are measured at 25 degrees Celsius. Measurements of performance at other temperatures may yield different measurements. Minimum ambient operating temperature: 5 degrees Celsius. Maximum ambient operating temperature: 75 degrees Celsius. The positioning stage can be modified by Baldor to allow the unit to be operated at temperatures outside of this range. Contact Baldor for more information.

Point of measurement: Catalog specifications are measured 25mm above the slide mounting surface. If measurements are taken from other relative locations, results may be different from the catalog specifications.

Mounting surface: Catalog specifications are measured with the positioning stage supported under its entire length, fastened down (bolted) and is mounted to a machine base that has a maximum flatness error of 0.0005”/ft.

LSE Series Enclosed Position Stage

General Description: Single axis linear stage with linear motor, linear bearings, linear encoder, limit switches, cable carrier, and bellows

Construction: Hard anodized aluminum

Bearing type: Recirculating ball linear bearing

Encoder type: Open glass scale, optical, magnetic

Motor type: Brushless three phase, iron core or cog free type linear motor. Refer to catalog for motor specifications and stage model number description. Brush type DC linear motors available upon request.

Maintenance: Refer to bearing and encoder maintenance recommendations in this manual. Exterior of stage should be kept dry and relatively free of contamination. This stage is NOT WATER PROOF. Avoid submersion.

Stage specifications: Refer to catalog or outline drawing supplied with stage for mechanical dimensions.

Stage Mounting: Removal of bellows is required for access to base mounting holes. Refer to mounting recommendations.

ELECTRICAL CONNECTIONS (cables labeled accordingly)

Encoder: Refer to Encoder connections.

Motor/hall/limit switches: Your stage has flying leads 10 foot in length. These cables can be cut if required. Connectors are available, contact Baldor for more information.

AY1763A00 Leadwire Connection

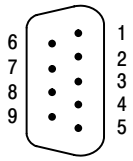
Motor Cable			Hall Cable		Limit Cable	
Signal Name	Wire Color		Signal Name	Wire Color	Signal Name	Wire Color
	LinDrive	Trap				
Motor Phase A (U)	Red	Black	Hall 1	White	Limit + Output	White
Motor Phase B (V)	White	Red	Hall 2	Red	Limit – Output	Red
Motor Phase C (W)	Black	White	Hall 3	Black	Home Output	Black
Motor Ground	Green		Hall Ground	Green	Limit & Home PWR *	Brown
Thermal Switch+	Blue		Hall +5VDC	Brown	Limit & Home GND	Green
Thermal Switch–	Orange					

* Limit & Home power is +4 to +24VDC.

Note: Motor phasing is for LinDrive or MintDrive. Other controls may require different phasing (such as most trap drives (U) Black, (V) Red, (W) White). Phase angle between phases is 120 degrees.

AY1780A00 Leadwire Connection for MintDrive (9 pin to flying leads)

Color	Pin#	Description
Brown	1	+5VDC
Pink	2	C+
Red	3	B–
Inner Shield	4	Inner Shield
Green	5	A+
Gray	6	C–
White	7	0V
Blue	8	B+
Yellow	9	A–

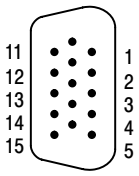


Male (D Sub)

Outer shield to shell.

AY1775A00 LSE, Encoder (RGH24) & Hall Connections for LinDrive/MintDrive (15 pin to flying leads)

Color	Pin#	Description
Green	1	A+
Blue	2	B+
Pink	3	C+
White	4	Hall1
	5	N/C
Yellow	6	A–
Red	7	B–
Gray	8	C–
Black	9	Hall3
Red	10	Hall2
Brown	11	+5VDC (Halls Brown)
	12	N/C
White	13	Encoder GND (Halls Green)
	14	
	15	

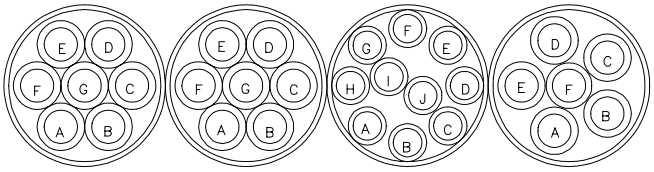


Male (D Sub)

Outer shield to shell.
Inner shield to pin 13.

AY1779A00 LSE with Renishaw Encoder (RGH24) Flying Leads

10 ft cable for use with Renishaw RGH24.
Flying leads are color coded as shown in this diagram.



Cable 1 (Hall Cable) | Cable 2 (Motor Cable) | Cable 4 (RGH24 Encoder Cable) | Cable 3 Limit Cable

Cable	Conductor	Signal Name	Color
1	A	Hall 3 (C)	Black
1	B	Hall 2 (B)	Red
1	C	N/C	N/C
1	D	Hall Ground	Blue, Green or Yellow
1	E	Hall 1 (A)	White
1	F	Voltage IN (+5VDC)	Brown or Violet
1	G	Shield	
2	A	Motor Phase A (U)	Red
2	B	Motor Phase B (V)	White
2	C	Motor Phase C (W)	Black
2	D	Motor Ground	Green
2	E	Thermal Switch +	Orange
2	F	Thermal Switch –	Blue
2	G	Shield	
3	A	Limit/Home Ground	Blue, Green or Yellow
3	B	Home Output	Black
3	C	Limit + Output	White
3	D	Shield	
3	E	Limit & Home PWR *	Brown
3	F	Limit – Output	Red
4	A	Signal A+	Green
4	B	Signal A–	Yellow
4	C	Signal B+	Blue
4	D	Signal B–	Red
4	E	Signal C+	Pink
4	F	Signal C–	Gray
4	G	+5VDC	Brown
4	H	0VDC	White
4	I	Outer Shield	
4	J	Inner Shield	

* Limit & Home power is +4 to +24VDC.

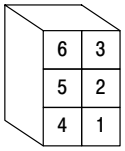
Note: Motor phasing is for LinDrive or MintDrive. Other controls may require different phasing (such as most trap drives (U) Black, (V) Red, (W) White). Phase angle between phases is 120 degrees.

External Connections

LD9127A00 Leadwire Connection Limit/Home Switch Interface (6 pin to flying leads)

Color	Pin#	Description
Black	1	Home Output
White	2	Limit+ Output
Red	3	Limit– Output
Green	4	Ground
Brown	5	Limit & Home PWR *
Orange	6	Series / Parallel (Jumper 6 to 3=Series, Jumper 6 to 5=Parallel)

* Limit & Home power is +4 to +24VDC.



Jumper pin 3 to pin 6 for Series operation.

Jumper pin 5 to pin 6 for Parallel operation.

(Series jumper option is for Omron 670/671P limits only).

(Connector viewed from cable side)

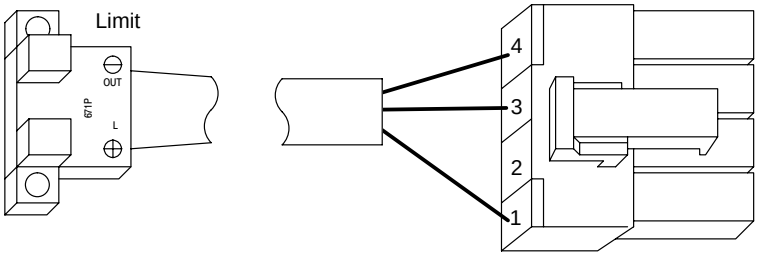
Internal Connections

Leadwire Connection Limit Switch Pigtails

LD9125A01 Limit only

Color	Pin#	Description
Brown	1	Limit & Home power *
	2	N/C
White	3	Limit Output
Green	4	Ground

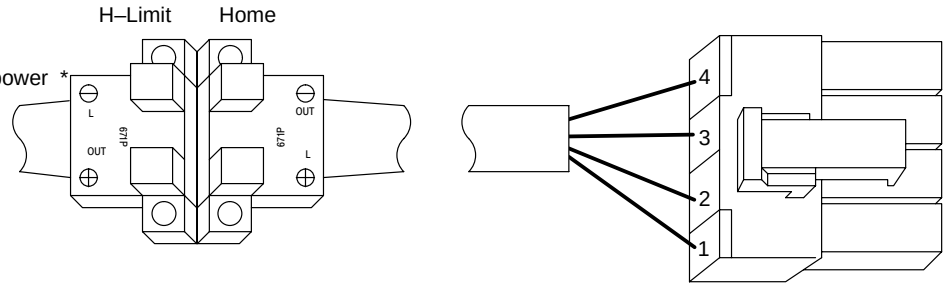
* Limit & Home power is +4 to +24VDC.



LD9125A02 Limit and Home

Color	Pin#	Description
Brown	1	Limit & Home power *
Black	2	Home Output
Red	3	Limit Output
Green	4	Ground

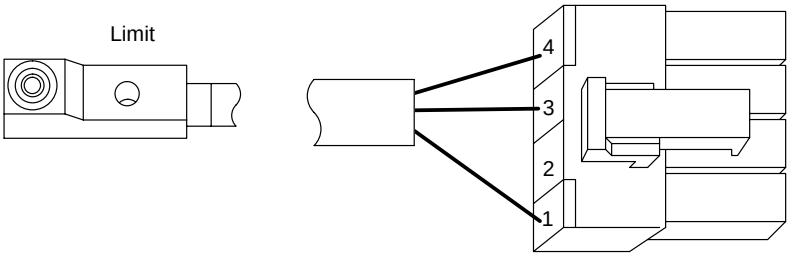
* Limit & Home power is +4 to +24VDC.



LD9137A01 Limit only

Color	Pin#	Description
Brown	1	Limit & Home power *
	2	N/C
Black	3	Limit Output
Blue	4	Ground

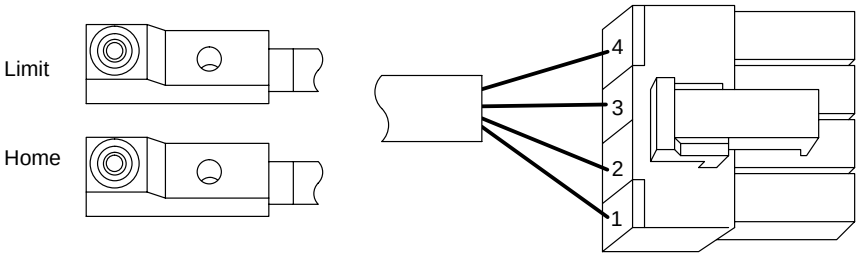
* Limit & Home power is +4 to +24VDC.



LD9137A02 Limit and Home

Color	Pin#	Description
Brown	1	Limit & Home power *
Black	2	Home Output
Black	3	Limit Output
Blue	4	Ground

* Limit & Home power is +4 to +24VDC.



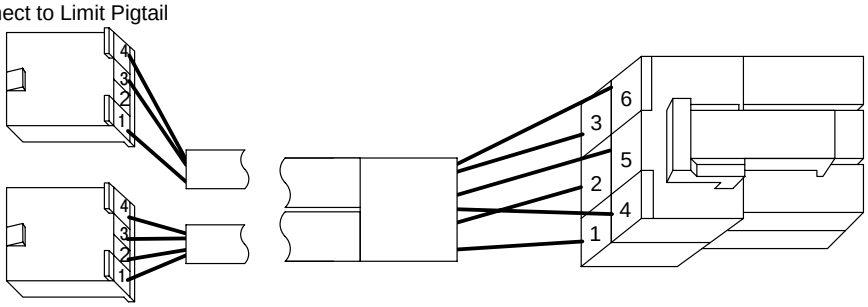
LD9124A00 Limit and Home, Axis 1, Internal

Connect to Limit Pigtail

Pin#	Color
1	Brown
2	
3	White
4	Green

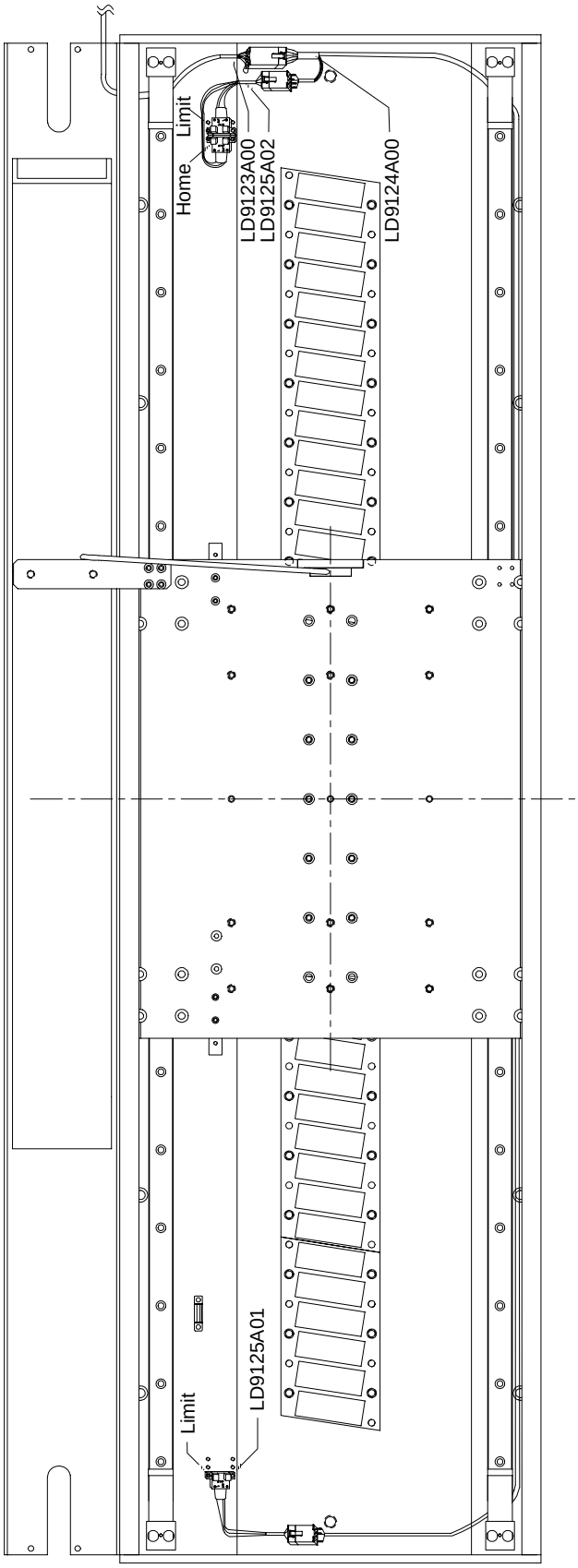
Pin#	Color
1	Brown
2	Black
3	Red
4	Green

Connect to Limit/Home Pigtail



Pin#	Color
1	Black
2	White
3	Red
4	Green
5	Brown from LD9125A02
6	Brown from LD9125A01

LSE Stage Connector Locations



LSC Series Cross Roller Position Stage

General Description: Single axis linear stage with linear motor, linear bearings, linear encoder, limit switches, cable carrier (on some models), and bellows

Construction: Hard anodized aluminum, black oxide steel

Bearing type: Cross roller linear bearing

Encoder type: Open glass scale if internal, or enclosed type if external

Motor type: Brushless three phase, iron core or cog free type linear motor. Refer to catalog for motor specifications and stage model number description. Brush type DC linear motors available upon request.

Maintenance: Refer to bearing and encoder maintenance recommendations in this manual. Exterior of stage should be kept dry and relatively free of contamination. This stage is NOT WATER PROOF. Avoid submersion.

Stage specifications: Refer to catalog or outline drawing supplied with stage for mechanical dimensions.

Stage Mounting: Removal of bellows is required for access to base mounting holes. Refer to mounting recommendations.

ELECTRICAL CONNECTIONS (cables labeled accordingly)

Encoder: Refer to RGH24 series internal encoder connections or MSA6x series external encoder connections in this manual.

Motor/hall/limit switches: Your stage has flying leads 10 foot in length. These cables can be cut if required. Connectors are available, contact Baldor for more information.

AY1763A00 Leadwire Connection

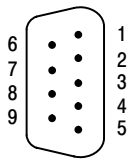
Motor Cable			Hall Cable		Limit Cable	
Signal Name	Wire Color		Signal Name	Wire Color	Signal Name	Wire Color
	LinDrive	Trap				
Motor Phase A (U)	Red	Black	Hall 1	White	Limit + Output	White
Motor Phase B (V)	White	Red	Hall 2	Red	Limit – Output	Red
Motor Phase C (W)	Black	White	Hall 3	Black	Home Output	Black
Motor Ground	Green		Hall Ground	Green	Limit & Home PWR *	Brown
Thermal Switch+	Blue		Hall +5VDC	Brown	Limit & Home GND	Green
Thermal Switch–	Orange					

* Limit & Home power is +4 to +24VDC.

Note: Motor phasing is for LinDrive or MintDrive. Other controls may require different phasing (such as most trap drives (U) Black, (V) Red, (W) White). Phase angle between phases is 120 degrees.

AY1780A00 Leadwire Connection for MintDrive (9 pin to flying leads)

Color	Pin#	Description
Brown	1	+5VDC
Pink	2	C+
Red	3	B–
Inner Shield	4	Shield
Green	5	A+
Gray	6	C–
White	7	0V
Blue	8	B+
Yellow	9	A–

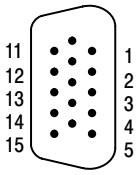


Male (D Sub)

Outer shield to shell.

AY1775A00 Leadwire Connection for LinDrive 15 pin

Color	Pin#	Description
Green	1	A+
Blue	2	B+
Pink	3	C+
White	4	Hall1
	5	N/C
Yellow	6	A–
Red	7	B–
Gray	8	C–
Black	9	Hall3
Red	10	Hall2
Brown	11	+5VDC
	12	N/C
White	13	Encoder GND (Halls Brown)
	14	
	15	

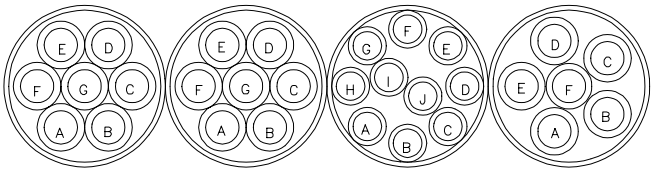


Male (D Sub)

Outer shield to shell.
Inner shield to pin 13.

AY1779A00 LSE with Renishaw Encoder (RGH24) Flying Leads

10 ft cable for use with Renishaw RGH24.
Flying leads are color coded as shown in this diagram.



Cable 1 (Hall Cable) | Cable 2 (Motor Cable) | Cable 4 (RGH24 Encoder Cable) | Cable 3 Limit Cable

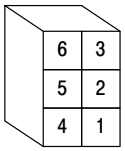
Cable	Conductor	Signal Name	Color
1	A	Hall 3 (C)	Black
1	B	Hall 2 (B)	Red
1	C	N/C	N/C
1	D	Hall Ground	Blue, Green or Yellow
1	E	Hall 1 (A)	White
1	F	Voltage IN (+5VDC)	Brown or Violet
1	G	Shield	
2	A	Motor Phase A (U)	Red
2	B	Motor Phase B (V)	White
2	C	Motor Phase C (W)	Black
2	D	Motor Ground	Green
2	E	Thermal Switch +	Orange
2	F	Thermal Switch –	Blue
2	G	Shield	
3	A	Limit/Home Ground	Blue, Green or Yellow
3	B	Home Output	Black
3	C	Limit + Output	White
3	D	Shield	
3	E	Limit & Home PWR *	Brown
3	F	Limit – Output	Red
4	A	Signal A+	Green
4	B	Signal A–	Yellow
4	C	Signal B+	Blue
4	D	Signal B–	Red
4	E	Signal C+	Pink
4	F	Signal C–	Gray
4	G	+5VDC	Brown
4	H	0VDC	White
4	I	Outer Shield	
4	J	Inner Shield	

* Limit & Home power is +4 to +24VDC.

LD9127A00 Leadwire Connection Limit/Home Switch Interface (6 pin to flying leads)

Color	Pin#	Description
Black	1	Home Output
White	2	Limit+ Output
Red	3	Limit– Output
Green	4	Ground
Brown	5	Limit & Home PWR *
Orange	6	Series / Parallel (Jumper 6 to 3=Series, Jumper 6 to 5=Parallel)

* Limit & Home power is +4 to +24VDC.



(Connector viewed from cable side)

Jumper pin 3 to pin 6 for Series operation.

Jumper pin 5 to pin 6 for Parallel operation.

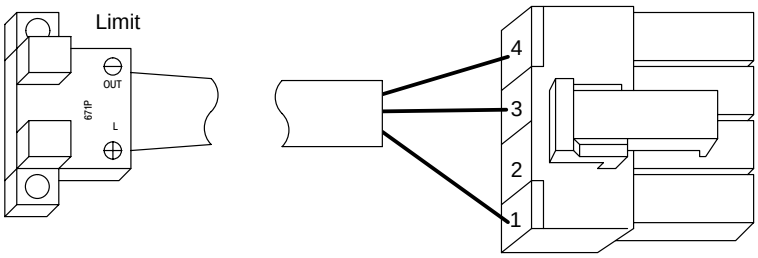
(Series jumper option is for Omron 670/671P limits only).

Leadwire Connection Limit Switch Pigtails

LD9125A01 Limit only

Color	Pin#	Description
Brown	1	Limit & Home power *
	2	N/C
White	3	Limit Output
Green	4	Ground

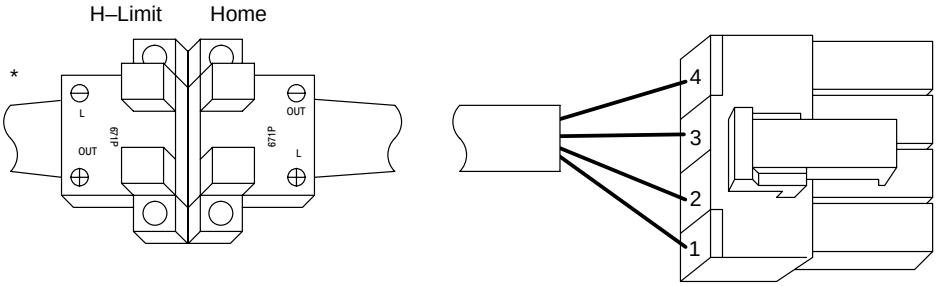
* Limit & Home power is +4 to +24VDC.



LD9125A02 H–Limit and Home

Color	Pin#	Description
Brown	1	Limit & Home power *
Black	2	Home Output
Red	3	Limit Output
Green	4	Ground

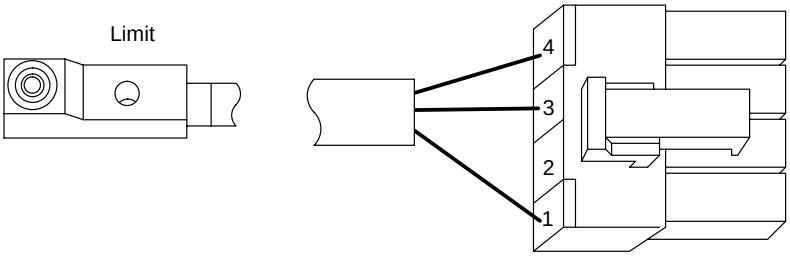
* Limit & Home power is +4 to +24VDC.



LD9137A01 Limit only

Color	Pin#	Description
Brown	1	Limit & Home power *
	2	N/C
Black	3	Limit Output
Blue	4	Ground

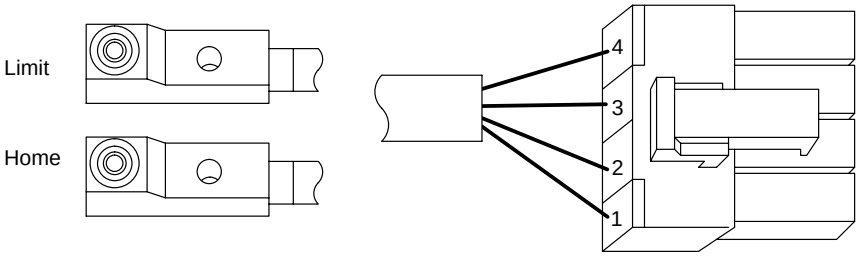
* Limit & Home power is +4 to +24VDC.



LD9137A02 Limit and Home

Color	Pin#	Description
Brown	1	Limit & Home power *
Black	2	Home Output
Black	3	Limit Output
Blue	4	Ground

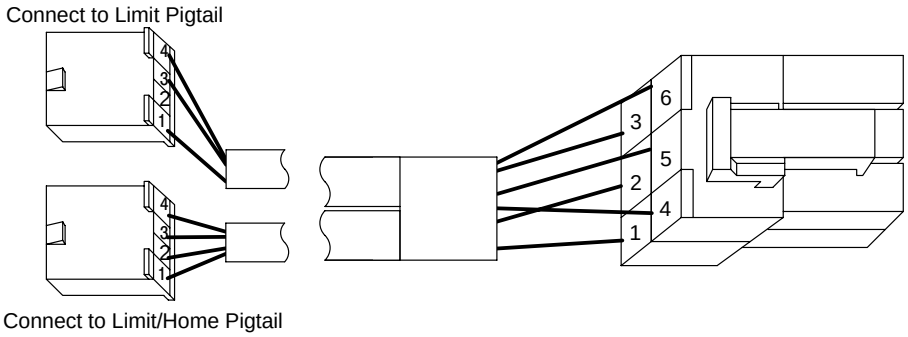
* Limit & Home power is +4 to +24VDC.



LD9124A00 Limit and Home, Axis 1, Internal

Pin#	Color
1	Brown
2	
3	White
4	Green

Pin#	Color
1	Brown
2	Black
3	Red
4	Green



Pin#	Color
1	Black
2	White
3	Red
4	Green
5	Brown from LD9125A02
6	Brown from LD9125A01

LSS Series Single Bearing Position Stage

General Description: Single axis linear stage with cog–free linear motor, linear bearings, optical linear encoder, limit switches, cable carrier and bellows

Construction: Magnet assembly/stage base is hard chrome plated steel. Slide is hard anodized aluminum

Bearing type: Recirculating ball type linear bearing

Encoder type: Open scale optical

Motor type: Brushless, three phase, cog free type linear motor. Refer to catalog for motor specifications and stage model number description.

Maintenance: Refer to bearing and encoder maintenance recommendations in this manual. Exterior of stage should be kept dry and relatively free of contamination. This stage is NOT WATER PROOF. Avoid submersion.

Stage specifications: Refer to catalog or outline drawing supplied with stage for mechanical dimensions.

Stage Mounting: Threaded mounting holes are provided on the underside of the stage base. Also, non–threaded countersunk holes are provided along the length of the stage. Refer to mounting recommendations.

ELECTRICAL CONNECTIONS (cables labeled accordingly)

Encoder: Refer to RGH22 or MS6x series internal (open type) encoder connections in this manual.

Motor/hall/limit switches: Your stage has flying leads 10 foot in length. These cables can be cut if required. Connectors are available, contact Baldor for more information.

AY1763A00 Leadwire Connection

Motor Cable			Hall Cable		Limit Cable	
Signal Name	Wire Color		Signal Name	Wire Color	Signal Name	Wire Color
	LinDrive	Trap				
Motor Phase A (U)	Red	Black	Hall 1	White	Limit + Output	White
Motor Phase B (V)	White	Red	Hall 2	Red	Limit – Output	Red
Motor Phase C (W)	Black	White	Hall 3	Black	Home Output	Black
Motor Ground	Green		Hall Ground	Green	Limit & Home PWR *	Brown
Thermal Switch+	Blue		Hall +5VDC	Brown	Limit & Home GND	Green
Thermal Switch–	Orange					

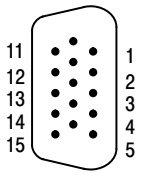
* Limit & Home power is +4 to +24VDC.

Note: Motor phasing is for LinDrive or MintDrive. Other controls may require different phasing (such as most trap drives (U) Black, (V) Red, (W) White). Phase angle between phases is 120 degrees.

Leadwire Connection for LinDrive/MintDrive (15 pin to flying leads)

AY1800A00 Renishaw RGH22 Encoder

Color	Pin#	Description
Green	1	A+
Blue	2	B+
Violet	3	C+
White	4	Hall1
	5	N/C
Yellow	6	A–
Red	7	B–
Gray	8	C–
Black	9	Hall3
Red	10	Hall2
Brown	11	+5VDC (Halls Brown)
	12	N/C
White	13	Encoder GND (Halls Green)
	14	
	15	



Male (D Sub)

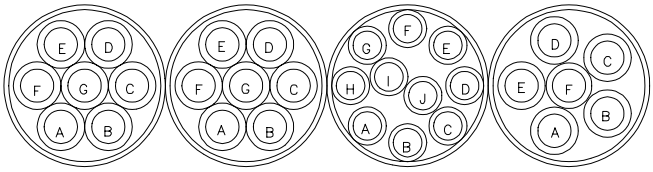
Outer shield to shell.
Inner shield to pin 13.

AY1759A00 Renishaw RSF Encoder

Color	Pin#	Description
Green	1	A+
Orange	2	B+
Blue	3	C+
White	4	Hall1
	5	N/C
Yellow	6	A–
Red	7	B–
Violet	8	C–
Black	9	Hall3
Red	10	Hall2
Black	11	+5VDC (Halls Brown)
	12	N/C
Brown	13	Encoder GND (Halls Green)
	14	
	15	

AY1801A00 Stages with Renishaw Encoder (RGH22) Flying Leads

10 ft cable for use with Renishaw RGH24.
Flying leads are color coded as shown in this diagram.



Cable 1 (Hall Cable) | Cable 2 (Motor Cable) | Cable 4 (RGH22 Encoder Cable) | Cable 3 Limit Cable (optional)

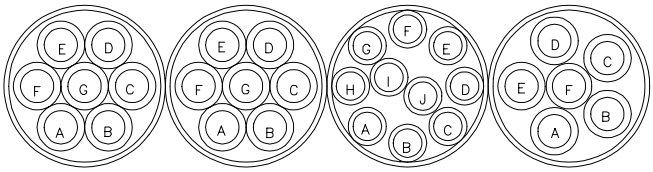
* Limit & Home power is +4 to +24VDC.

Cable	Conductor	Signal Name	Color
1	A	Hall 3 (C)	Black
1	B	Hall 2 (B)	Red
1	C	N/C	N/C
1	D	Hall Ground	Blue, Green or Yellow
1	E	Hall 1 (A)	White
1	F	Voltage IN (+5VDC)	Brown or Violet
1	G	Shield	
2	A	Motor Phase A (U)	Red
2	B	Motor Phase B (V)	White
2	C	Motor Phase C (W)	Black
2	D	Motor Ground	Green
2	E	Thermal Switch +	Orange
2	F	Thermal Switch –	Blue
2	G	Shield	
3	A	Limit/Home Ground	Blue, Green or Yellow
3	B	Home Output	Black
3	C	Limit + Output	White
3	D	Shield	
3	E	Limit & Home PWR *	Brown
3	F	Limit – Output	Red
4	A	Signal A+	Green
4	B	Signal A–	Yellow
4	C	Signal B+	Blue
4	D	Signal B–	Red
4	E	Signal C+	Violet
4	F	Signal C–	Gray
4	G	+5VDC	Brown
4	H	0VDC	White
4	I	Outer Shield	
4	J	Inner Shield	

Note: Motor phasing is for LinDrive or MintDrive. Other controls may require different phasing (such as most trap drives (U) Black, (V) Red, (W) White). Phase angle between phases is 120 degrees.

AY1802A00 Stages with Renishaw Encoder (RSF) Flying Leads

10 ft cable for use with RSF.
Flying leads are color coded as shown in this diagram.



Cable 1 (Hall Cable) | Cable 2 (Motor Cable) | Cable 4 (MS6X Encoder Cable) | Cable 3 Limit Cable (optional)

* Limit & Home power is +4 to +24VDC.

Cable	Conductor	Signal Name	Color
1	A	Hall 3 (C)	Black
1	B	Hall 2 (B)	Red
1	C	N/C	N/C
1	D	Hall Ground	Blue, Green or Yellow
1	E	Hall 1 (A)	White
1	F	Voltage IN (+5VDC)	Brown or Violet
1	G	Shield	
2	A	Motor Phase A (U)	Red
2	B	Motor Phase B (V)	White
2	C	Motor Phase C (W)	Black
2	D	Motor Ground	Green
2	E	Thermal Switch +	Orange
2	F	Thermal Switch –	Blue
2	G	Shield	
3	A	Limit/Home Ground	Blue, Green or Yellow
3	B	Home Output	Black
3	C	Limit + Output	White
3	D	Shield	
3	E	Limit & Home PWR *	Brown
3	F	Limit – Output	Red
4	A	Signal A+	Green
4	B	Signal A–	Yellow
4	C	Signal B+	Orange
4	D	Signal B–	Red
4	E	Signal C+	Blue
4	F	Signal C–	Violet
4	G	+5VDC	Black
4	H	0VDC	Brown
4	I	Limit +	Gray
4	J	Limit –	White

Note: Motor phasing is for LinDrive or MintDrive. Other controls may require different phasing (such as most trap drives (U) Black, (V) Red, (W) White). Phase angle between phases is 120 degrees.

LSX Series Single Bearing Position Stage

General Description: Single axis linear stage with linear motor, linear bearings, magnetic encoder, limit switches, cable carrier and bellows

Construction: Hard anodized aluminum

Bearing type: Recirculating ball type linear bearing

Encoder type: Magnetic

Motor type: Brushless three phase, iron core linear motor. Refer to catalog for motor specifications and stage model number description.

Maintenance: Refer to bearing and encoder maintenance recommendations in this manual. Exterior of stage should be kept dry and relatively free of contamination. This stage is NOT WATER PROOF. Avoid submersion.

Stage specifications: Refer to catalog or outline drawing supplied with stage for mechanical dimensions.

Stage Mounting: Two parallel “T” slots on surface opposite of slide. Insert drilled and tapped steel rod .

ELECTRICAL CONNECTIONS (cables labeled accordingly)

Encoder: Refer to Elgo Mix 5 series magnetic encoder connections in this manual (Elgo Mix 4 is optional).

Motor/hall/limit switches: Your stage has flying leads 10 foot in length. These cables can be cut if required. Connectors are available, contact Baldor for more information.

AY1763A00 Leadwire Connection

Motor Cable			Hall Cable		Limit Cable	
Signal Name	Wire Color		Signal Name	Wire Color	Signal Name	Wire Color
	LinDrive	Trap				
Motor Phase A (U)	Red	Black	Hall 1	White	Limit + Output	White
Motor Phase B (V)	White	Red	Hall 2	Red	Limit – Output	Red
Motor Phase C (W)	Black	White	Hall 3	Black	Home Output	Black
Motor Ground	Green		Hall Ground	Green	Limit & Home PWR *	Brown
Thermal Switch+	Blue		Hall +5VDC	Brown	Limit & Home GND	Green
Thermal Switch–	Orange					

* Limit & Home power is +4 to +24VDC.

Note: Motor phasing is for LinDrive or MintDrive. Other controls may require different phasing (such as most trap drives (U) Black, (V) Red, (W) White). Phase angle between phases is 120 degrees.

Leadwire Connection

LD9103A00

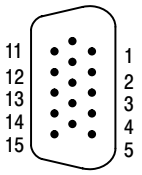
LSX to LinDrive (15 pin D Sub on each end of cable)

LXS Connections (Female)

Color	Pin#	Description
Green	1	A+
Pink	2	B+
Brown	3	C+
White	4	Hall1
	5	N/C
Yellow	6	A–
Red	7	B–
Gray	8	C–
Black	9	Hall3
Red	10	Hall2
White	11	+5VDC (Halls Brown)
	12	N/C
Black	13	Encoder GND (Halls Green)
	14	Hall Shield
	15	Encoder Shield

LinDrive Connections (Male)

Color	Pin#	Description
Green	1	A+
Pink	2	B+
Brown	3	C+
White	4	Hall1
	5	N/C
Yellow	6	A–
Red	7	B–
Gray	8	C–
Black	9	Hall3
Red	10	Hall2
White	11	+5VDC (Halls Brown)
	12	N/C
Black	13	Encoder GND (Halls Green)
	14	
	15	



Male (D Sub)

Outer shield to shell (LinDrive side only).

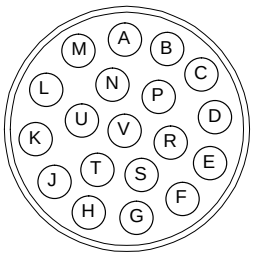
LD9114A00

LXS (15 pin to flying leads)

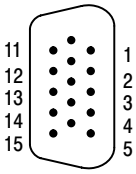
Color	Pin#	Description
Green	1	A+
Pink	2	B+
Brown	3	C+
White	4	Hall1
	5	N/C
Yellow	6	A–
Red	7	B–
Gray	8	C–
Black	9	Hall3
Red	10	Hall2
White	11	+5VDC (Halls Brown)
	12	N/C
Black	13	Encoder GND (Halls Green)
	14	Hall Shield
	15	Encoder Shield

AY1682A00 LSX Stage Endplate Internal Connections

19 Pin Circular Connector (Male)



15 Pin D Sub (Male)



Male (D Sub)

Encoder / Hall Connections

15 Pin D Sub (Male)

Color	Pin#	Description
Green	1	A+
Pink	2	B+
Brown	3	C+
White	4	Hall1
	5	N/C
Yellow	6	A–
Red	7	B–
Gray	8	C–
Black	9	Hall3
Red	10	Hall2
White	11	+5VDC (Halls Brown)
	12	N/C
Black	13	Encoder GND (Halls Green)
	14	Hall Shield
	15	Encoder Shield

Motor / Limit Connections

19 Pin Circular Connector (Male)

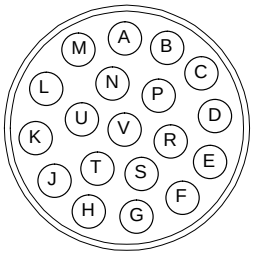
Color	Pin#	Description
Red	A	Motor Phase A (U)
White	B	Motor Phase B (V)
Black	C	Motor Phase C (W)
Green	D	Motor Ground
	E	Motor Shield
Blue	F	Thermal Switch +
Orange	G	Thermal Switch –
	M	Limit Shield
White	N	Limit + Output
Red	P	Limit – Output
Black	R	Home Output
Green	S	Limit & Home Ground
Brown	T	Limit & Home Power *

* Limit & Home power is +4 to +24VDC.

Note: Motor phasing is for LinDrive or MintDrive. Other controls may require different phasing (such as most trap drives (U) Black, (V) Red, (W) White). Phase angle between phases is 120 degrees.

LD9102A00 LSX Motor/Limit Cable Connections (19 pin to flying leads)

19 Pin Circular Connector (Female)



Note: Motor phasing is for LinDrive or MintDrive. Other controls may require different phasing (such as most trap drives (U) Black, (V) Red, (W) White). Phase angle between phases is 120 degrees.

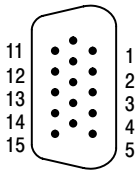
19 Pin Circular Connector (Female)

Color	Pin#	Description
Red	A	Motor Phase A (U)
White	B	Motor Phase B (V)
Black	C	Motor Phase C (W)
Green	D	Motor Ground
	E	Motor Shield
Blue	F	Thermal Switch +
Orange	G	Thermal Switch –
	M	Limit Shield
White	N	Limit + Output
Red	P	Limit – Output
Black	R	Home Output
Green	S	Limit & Home Ground
Brown	T	Limit & Home Power *

* Limit & Home power is +4 to +24VDC.

LD9114A00 LSX Encoder/Hall Cable Connections (15 Pin to Flying Leads)

15 Pin D Sub (Female)



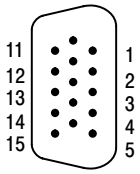
Male (D Sub)

15 Pin D Sub (Female)

Color	Pin#	Description
Green	1	A+
Pink	2	B+
Brown	3	C+
White	4	Hall1
	5	N/C
Yellow	6	A–
Red	7	B–
Gray	8	C–
Black	9	Hall3
Red	10	Hall2
White	11	+5VDC (Halls Brown)
	12	N/C
Black	13	Encoder GND (Halls Green)
	14	Hall Shield
	15	Encoder Shield

LD9117A00 LSX Encoder/Hall Cable Connections (15 Pin Encoder/Halls to 9 Pin Encoder & Halls Flying Leads)

15 Pin D Sub (Female)



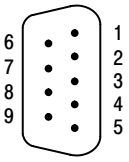
Male (D Sub)

Outer shield to shell.

15 Pin D Sub (Female)

Color	Pin#	Description
Green	1	A+
Pink	2	B+
Brown	3	C+
White	4	Hall1
	5	N/C
Yellow	6	A–
Red	7	B–
Gray	8	C–
Black	9	Hall3
Red	10	Hall2
White	11	+5VDC (Halls Brown)
	12	N/C
Black	13	Encoder GND (Halls Green)
	14	Hall Shield
	15	Encoder Shield

9 Pin D Sub (Male)



Male (D Sub)

Color	Pin#	Description
White	1	+5VDC
Brown	2	Encoder C+
Red	3	Encoder B–
	4	N/C
Green	5	Encoder A+
Gray	6	Encoder C–
Black	7	Ground
Pink	8	Encoder B+
Yellow	9	Encoder A–

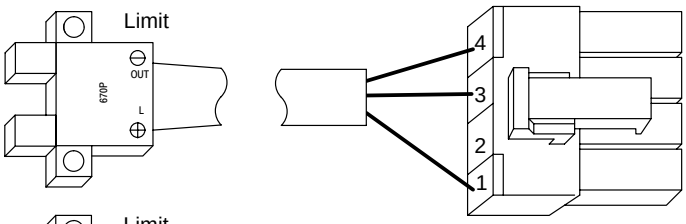
Outer shield to shell.

LSX Leadwire Connection Limit Switch Pigtails

LD9119A01

Color	Pin#	Description
Brown	1	Limit & Home power *
	2	N/C
White	3	Limit Output
Green	4	Ground

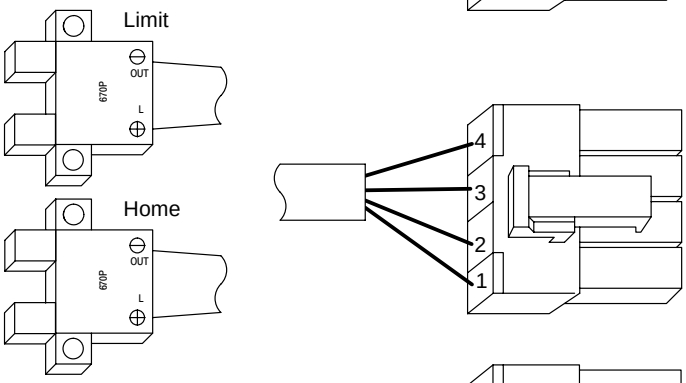
* Limit & Home power is +4 to +24VDC.



LD9119A02

Color	Pin#	Description
Brown	1	Limit & Home power *
Black	2	Home Output
Red	3	Limit Output
Green	4	Ground

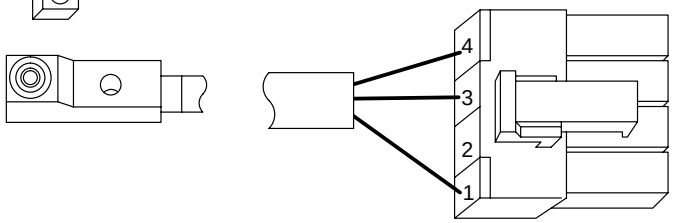
* Limit & Home power is +4 to +24VDC.



LD9137A01 Limit only

Color	Pin#	Description
Brown	1	Limit & Home power *
	2	N/C
Black	3	Limit Output
Blue	4	Ground

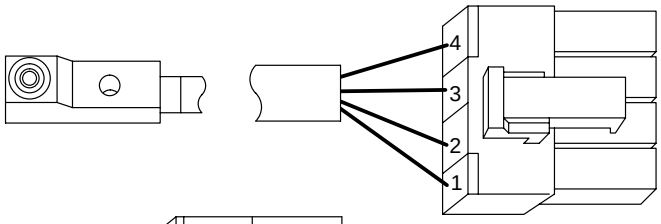
* Limit & Home power is +4 to +24VDC.



LD9137A02 Limit and Home

Color	Pin#	Description
Brown	1	Limit & Home power *
Black	2	Home Output
Black	3	Limit Output
Blue	4	Ground

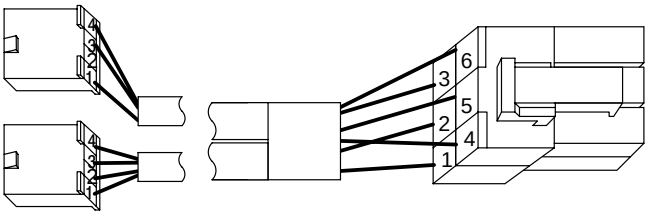
* Limit & Home power is +4 to +24VDC.



Connect to Limit Pigtail

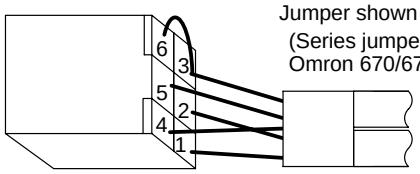
Pin#	Color
1	Brown
2	
3	White
4	Green

Connect to Limit/Home Pigtail



Pin#	Color
1	Black
2	White
3	Red
4	Green
5	Brown from LD9125A02
6	Brown from LD9125A01

LD9121A00 LSX Limit Switch Cable, for Axes 1 (19 pin to 6 pin)

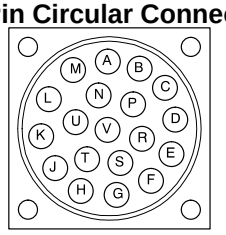


Jumper shown for Series Wired Limits.
(Series jumper option is for Omron 670/671P limits only).

Color	Pin#	Description
Black	1	Home Output
White	2	Limit+ Output
Red	3	Limit– Output
Green	4	Ground
Brown	5	Limit & Home PWR *
Orange	6	Series / Parallel (Jumper 6 to 3=Series, Jumper 6 to 5=Parallel)

* Limit & Home power is +4 to +24VDC.

19 Pin Circular Connector (Male)

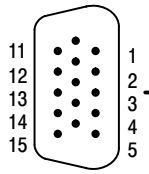


Color	Pin#	Description
	M	Limit Shield
White	N	Limit + Output
Red	P	Limit – Output
Black	R	Home Output
Green	S	Limit & Home Ground
Brown	T	Limit & Home Power *

* Limit & Home power is +4 to +24VDC.

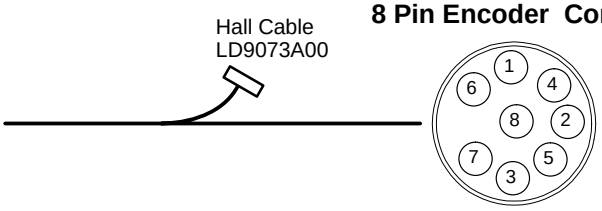
AY1743A00 LSX Internal Encoder/Hall Cable (15 pin to 8 pin and 6 pin)

Color	Pin#	Description
Green	1	A+
Blue	2	B+
Pink	3	C+
White	4	Hall1
	5	N/C
Yellow	6	A–
Red	7	B–
Gray	8	C–
Black	9	Hall3
Red	10	Hall2
Brown	11	+5VDC
	12	N/C
White	13	Encoder GND (Halls Brown)
	14	Hall Shield
	15	Encoder Shield



Male (D Sub)

Outer shield to shell.
Inner shield to pin 13.



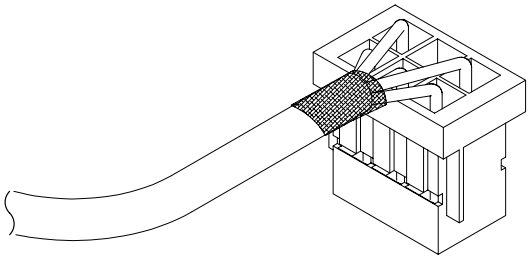
8 Pin Encoder Connector

8 Pin Encoder Connections

Color	Pin#	Description
Black	1	Encoder GND
White	2	+5VDC
Green	3	A+
Pink	4	B+
Brown	5	C+
Yellow	6	A–
Red	7	B–
Gray	8	C–

(Shield should not be connected at this connector)

LD9073A00 Hall Sensor Cable Connections (6 pin to flying leads)



Pin#	Color	Description
1	Black	C
2	Red	B
3		N.C.
4	Green	Ground
5	White	A
6	Brown	+5VDC

Bearing Maintenance

Recirculating Bearing Rail And Block

Lubrication type: For grease lubrication, a lithium–soap base grease (consistency No. 2 of JIS) is most frequently used. For linear guides operating under a heavy load, a grease containing extreme pressure additive is recommended.

Maintenance procedure: Clean rails with clean cloth. Apply a thin film of grease onto the rail. Manually pass the bearing block down the rail and allow the grease to pass through the wipers on the leading and trailing edges of the bearing block. Wipe away any excess grease. Avoid excess grease to achieve the lowest friction resistance.

Some bearings are supplied with special grease fittings. Contact Baldor for specific instructions for these fittings.

Frequency of maintenance: Recirculating bearing rails are lubricated by Baldor prior to shipment of the positioning stage. Inspect the rails frequently and apply grease at least once each year. Frequency of maintenance depends on factors including duty cycle and environment. Inspect for contamination, damage, corrosion, etc.

Note: Do not mix synthetic greases with petroleum based greases. For special requirements lubrication, consult Baldor.

Cross Roller Type Bearing

Lubrication type: Usually these bearings do not require additional lubrication. However, in applications where the duty cycle is high with rapid motion, lubrication with lithium, non paraffin base bearing grease is recommended. A mineral based grease with a viscosity of 15 to 30 is recommended

Maintenance procedure: Apply a thin film of grease into the “V” surface of the bearing rail. Avoid excess grease to achieve the lowest friction resistance.

Frequency of maintenance: Cross roller bearing assemblies are designed to provide long, trouble free working life and require minimal maintenance. Cross roller bearing rails are lubricated by Baldor prior to shipment of the positioning stage. We recommend that you inspect the rails frequently and apply grease at least once each year. Frequency of maintenance depends on factors including duty cycle and environment. Inspect for contamination, damage, corrosion, etc.

Encoder Maintenance

RSF Series MSA6x Enclosed Type

Technical Data: Linear encoders measure the position of linear axis without mechanical translation components. This reduces the potential error due to thermal behavior of the linear motor and backlash from mechanical translation.

Encoder type: Non contact optical, sealed type. Sealed linear encoders are used in harsh environments in such applications as milling machines, drilling machines, grinding machines, lathes, electrical discharge machines, and welding machines.

Mechanical design: Glass scale, optical scanning unit, high flex twisted shielded cable. Encoder scale, optical scanning unit and guide–way are protected from chips, swarf, dirt and fluids by an aluminum housing and flexible rubber type seals. The optical scanning unit travels on a low friction guide within the encoder enclosure.

Maintenance: The exterior of the encoder should be inspected and cleaned. An alcohol or soapy water saturated cloth is usually effective for removing external contamination. If the internal components are contaminated, please consult with Baldor or an authorized distributor for assistance. (DO NOT attempt to dissemble the encoder enclosure).

Wiring diagram: (for flying leads, high flex cable)

ML6003A24	**3.9mm Diameter Cable**	
Color	**Description**	**Function**
Black	+5VDC	Encoder Power
	0VDC	Encoder GND
Green	A+	Incremental Signal
Yellow	A–	Incremental Signal
Orange	B+	Incremental Signal
Red	B–	Incremental Signal
Blue	C+	Incremental Signal
Violet	C–	Incremental Signal
Gray	Limit+	Limit
White	Limit–	Limit
	Inner Shield	Inner Shield (Connect to 0VDC, Logic Ground)
	Outer Shield	Outer Shield (Connect to Earth Ground)

Technical Data:

Encoder Type:	Digital output, glass scale
Input power:	5VDC, 200mA
Output:	A/B quadrature and reference marks, differential line drive output
Resolution:	0.1, 1.0, 5.0, 10.0 micron
Accuracy:	±3 micron after scaling*
Reference mark:	±one count (bidirectional) (reference marks located 35mm from each end)**

* Scaling is a calibration technique used to determine and communicate linear encoder and positioning stage mechanical characteristics, (accuracy and resolution) to the motion controller.

** Custom location reference marks can be ordered, contact Baldor for more information

Note: Max speed is determined by the encoder resolution, the controller's band width and the mechanical limitations of the positioning stage. Should you need assistance in calculating the maximum speed for the positioning stage, please consult with Baldor.

RSF Series MS6x Open Type Glass Scale

Encoder type: Non contact optical, glass scale, open type. Open scale linear encoders are used primarily where environmental conditions are clean, dry and free of oils. Due to the fragile nature of the encoder scale, extra care should be taken to prevent physical damage from impact or abrasion.

Mechanical design: Glass scale, optical scanning unit, high flex twisted shielded cable. Encoder is adhered to stage surface with a two part, releasable bonding agent. (DO NOT attempt to remove the scale from the stage surface, for this will permanently damage the encoder scale. Contact Baldor or an authorized distributor for assistance)

Maintenance: The encoder scale can be cleaned with alcohol. Avoid chemicals such as acetone, MEK, and other solvents and soaps that can damage the scale or leave a film. The encoder optical scanning unit should be treated with great care as not to scratch or mar the external read head surface. If cleaning is required, the encoder read head surface can be cleaned with alcohol. (Avoid submersion). Using a cotton swab, lightly wipe clean the contaminated surfaces. If removal of the encoder optical read head is required, consult with Baldor or an authorized distributor.

Wiring diagram: (for flying leads, high flex)

ML6003A24 3.9mm Diameter Cable

Color	Description	Function
Black	+5VDC	Encoder Power
	0VDC	Encoder GND
Green	A+	Incremental Signal
Yellow	A–	Incremental Signal
Orange	B+	Incremental Signal
Red	B–	Incremental Signal
Blue	C+	Incremental Signal
Violet	C–	Incremental Signal
Gray	Limit+	Limit
White	Limit–	Limit
	Inner Shield	Inner Shield (Connect to 0VDC, Logic Ground)
	Outer Shield	Outer Shield (Connect to Earth Ground)

Technical Data:

Encoder Type:	Digital output, glass scale
Input power:	5VDC, 200mA
Output:	A/B quadrature and reference marks, differential line drive output
Resolution:	0.1, 1.0, 5.0, 10.0 micron
Accuracy:	±3 micron after scaling*
Reference mark:	±one count (bidirectional) (reference marks separated by n x 50mm)

* Scaling is a calibration technique used to determine and communicate linear encoder and positioning stage mechanical characteristics, (accuracy and resolution) to the motion controller.

Note: Max speed is determined by the encoder resolution, the controller's band width and the mechanical limitations of the positioning stage. Should you need assistance in calculating the maximum speed for the positioning stage, please consult with Baldor.

Renishaw RGH22 series Open Type Metal Scale

Encoder type: Non contact optical, metal scale, open type. Open scale linear encoders are used primarily where environmental conditions are clean, dry and free of oils. Due to the fragile nature of the encoder scale, extra care should be taken to prevent physical damage from impact or abrasion.

Mechanical design: Metal scale, optical scanning unit, high flex twisted shielded cable. Encoder is adhered to stage surface with a two part, releasable bonding agent. (DO NOT attempt to remove the scale from the stage surface, for this will permanently damage the encoder scale. Contact Baldor or an authorized distributor for assistance)

Maintenance: The encoder scale can be cleaned with alcohol. Avoid chemicals such as acetone, MEK, and other solvents and soaps that can damage the scale or leave a film. The encoder optical scanning unit should be treated with great care as not to scratch or mar the external read head surface. If cleaning is required, the encoder read head surface can be cleaned with alcohol. (Avoid submersion). Using a cotton swab, lightly wipe clean the contaminated surfaces. If removal of the encoder optical read head is required, consult with Baldor or an authorized distributor.

Wiring diagram: (for flying leads, high flex cable)

Color	Description	Function
Brown	+5VDC	Encoder Power
White	0VDC	Encoder GND
Green	A+	Incremental Signal
Yellow	A–	Incremental Signal
Blue	B+	Incremental Signal
Red	B–	Incremental Signal
Violet	C+	Incremental Signal
Gray	C–	Incremental Signal
Pink	Limit	Limit
Black	Alarm+	Alarm
Orange	Alarm–	Alarm
Clear	X	External Setup
	Inner Shield	Inner Shield (Connect to 0VDC, Logic Ground)
	Outer Shield	Outer Shield (Connect to Earth Ground)

Technical Data:

Encoder Type:	Digital output, metal scale
Input power:	5VDC, 120mA
Output:	A/B quadrature and reference marks, differential line drive output
Resolution:	0.1, 1.0, 5.0 micron
Accuracy:	±1–3 micron after scaling*
Reference mark:	±one count (bidirectional), Asynchronous pulse Q Available on specific heads only, provides end of travel home position.

* Scaling is a calibration technique used to determine and communicate linear encoder and positioning stage mechanical characteristics, (accuracy and resolution) to the motion controller.

Note: Max speed is determined by the encoder resolution, the controller's band width and the mechanical limitations of the positioning stage. Should you need assistance in calculating the maximum speed for the positioning stage, please consult with Baldor.

Renishaw RGH22 series Open Type Metal Scale Continued

Specifications:

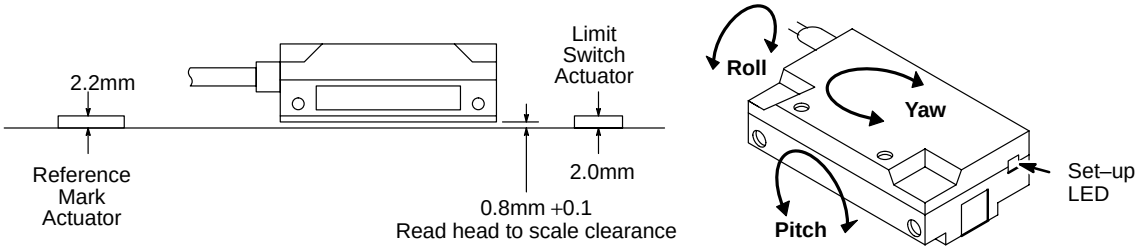
DC Power: 5VDC @ 120mA

Output Signal: Square wave differential line driver to EIA RS422 (except limit switch Q and external set–up signal X).

Model	**Resolution**	**Speed** (m per second)	**Edge Separation** (µ seconds)
RGH22D –	5µm resolution	5	0.5
RGH22X –	1µm resolution	3	0.15
RGH22Z –	0.5µm resolution	1.5	0.15
RGH22Y –	0.1µm resolution	0.3	0.1

The non–contact optical encoder is designed for position feedback solutions. The encoder system uses a reflective tape scale that is scanned by a read head. The RGH22 offers high resolution and high speed with stability and reliability.

Associated Components:
Self Adhesive Scale – RCS–S
Reference Mark Actuator – RGM22S
Limit Switch Actuator – RGP22S



ELGO Mix 4 series Magnetic Type

Encoder type: Non contact, magnetic, open type. Open scale linear encoders are used primarily where environmental conditions are clean, dry and free of oils. The magnetic encoder scale is susceptible to damage from magnetic fields. Great care should be taken to isolate the magnetic scale from magnets, static electricity, and electrical current.

Mechanical design: Magnetic scale with stainless steel protective cover, magnetic sensor unit, high flex twisted shielded cable. The magnetic linear encoder system features an integrated sensor and translator with a one shot marker pulse output (Elgo Mix 4). With the one shot marker pulse, the encoder can send a marker pulse once after power–up when it passes the marker tape (maximum speed 0.1 m/second). Encoder is bonded to the stage surface with a double sided industrial adhesive tape. (DO NOT attempt to remove the scale from the stage surface, for this will permanently damage the encoder scale. Contact Baldor or an authorized distributor for assistance).

Maintenance: The encoder scale can be cleaned with soapy water or alcohol. Avoid chemicals such as acetone, MEK, and other solvents. The encoder magnetic scanning unit should be treated with great care as not to scratch or mar the external read head surface. If cleaning is required, the encoder read head surface can be cleaned with soapy water or alcohol. (Avoid submersion). Using a cotton swab, lightly wipe clean the contaminated surfaces. If removal of the encoder magnetic read head is required, consult with Baldor or an authorized distributor.

Wiring diagram: (for flying leads, high flex cable, 5.7mm diameter)

ML6004A00 5.7mm Diameter Cable

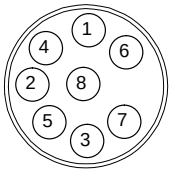
Color	Description	Function
White	+5VDC	Encoder Power
Black	0VDC	Encoder GND
Green	A+	Incremental Signal
Yellow	A–	Incremental Signal
Pink	B+	Incremental Signal
Red	B–	Incremental Signal
Brown	C+	Incremental Signal
Gray	C–	Incremental Signal
	Shield	Shield (Connect to Earth Ground)

Technical Data:

Encoder Type:	Quad digital output
Input power:	5VDC, 200mA
Output:	A/B quadrature and reference marks, differential line drive output
Resolution:	5.0, 10.0 micron
Accuracy:	Resolution dependent
Reference mark:	one shot (bidirectional)*

* Custom location reference marks can be ordered, contact Baldor for more information.

Encoder Head Output Connector Pin Assignment



ML6040A00 Cable

Color	Pin#	Description
Black	1	Encoder GND
White	2	+5VDC
Green	3	Encoder A+
Pink	4	Encoder B+
Brown	5	Encoder C+
Yellow	6	Encoder A–
Red	7	Encoder B–
Gray	8	Encoder C–

Mix 4 and Mix 5 Dial Settings

Dial Setting	Resolution (using 4x multiplier)	
1000	1000 µm/pulse (1mm)	Note: These resolutions are only available with 4 edge counting mode.
500	500 µm/pulse (0.5mm)	
100	100 µm/pulse (0.1mm)	
50	50 µm/pulse (0.05mm)	
10	10 µm/pulse (0.01mm)	
5	5 µm/pulse (0.005mm)	

ELGO Mix 5 series Magnetic Type

Encoder type: Non contact, magnetic, open type. Open scale linear encoders are used primarily where environmental conditions are clean, dry and free of oils. The magnetic encoder scale is susceptible to damage from magnetic fields. Great care should be taken to isolate the magnetic scale from magnets, static electricity, and electrical current.

Mechanical design: Magnetic scale with stainless steel protective cover, magnetic sensor unit, high flex twisted shielded cable. The magnetic linear encoder system features an integrated sensor and translator with a continuous marker pulse output. The marker pulse is sent every time the sensor passes the marker tape (maximum speed 0.1 m/second). Encoder is bonded to the stage surface with a double sided industrial adhesive tape. (DO NOT attempt to remove the scale from the stage surface, for this will permanently damage the encoder scale. Contact Baldor or an authorized distributor for assistance).

Maintenance: The encoder scale can be cleaned with soapy water or alcohol. Avoid chemicals such as acetone, MEK, and other solvents. The encoder magnetic scanning unit should be treated with great care as not to scratch or mar the external read head surface. If cleaning is required, the encoder read head surface can be cleaned with soapy water or alcohol. (Avoid submersion). Using a cotton swab, lightly wipe clean the contaminated surfaces. If removal of the encoder magnetic read head is required, consult with Baldor or an authorized distributor.

Wiring diagram: (for flying leads, high flex cable, 5.7mm diameter)

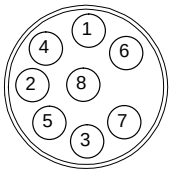
ML6004A00 5.7mm Diameter Cable

Color	Description	Function
White	+5VDC	Encoder Power
Black	0VDC	Encoder GND
Green	A+	Incremental Signal
Yellow	A–	Incremental Signal
Pink	B+	Incremental Signal
Red	B–	Incremental Signal
Brown	C+	Incremental Signal
Gray	C–	Incremental Signal
	Shield	Shield (Connect to Earth Ground)

Technical Data:

Encoder Type:	Quad digital output
Input power:	5VDC, 200mA
Output:	A/B quadrature and reference marks, differential line drive output
Resolution:	5.0, 10.0 micron
Accuracy:	Resolution dependent
Reference mark:	Continuous (bidirectional)

Encoder Head Output Connector Pin Assignment



ML6040A00 Cable

Color	Pin#	Description
Black	1	Encoder GND
White	2	+5VDC
Green	3	Encoder A+
Pink	4	Encoder B+
Brown	5	Encoder C+
Yellow	6	Encoder A–
Red	7	Encoder B–
Gray	8	Encoder C–

Encoder Specifications

Encoder Model	Resolution (microns)	Maximum Velocity (inch/second)	Air Gap	Power Supply Requirements	Z Pulse	Max Cable Length (ML6040A00)
EMIX3	10	196	0.8mm maximum	5VDC(±5%) @200mA	Yes	30 FT (9m)
MIX4	5, 10, 50	78, 157, 787	2.5mm maximum	5VDC(±5%) @200mA	One Shot	30 FT (9m)
MIX5	5, 10, 50	49, 98, 492	2.5mm maximum	5VDC(±5%) @200mA	Yes	30 FT (9m)
MS 61–46 (RSF)	10	393	0.5 ± 0.2mm	5VDC(±5%) @150mA	Yes	30 FT (9m)
MS 61–36 (RSF)	5	196	0.4 ± 0.2mm	5VDC(±5%) @150mA	Yes	30 FT (9m)
MS 61–26 (RSF)	2	78	0.3 ± 0.1mm	5VDC(±5%) @150mA	Yes	30 FT (9m)
MS 62–27 (RSF)	1	78	0.3 ± 0.1mm	5VDC(±5%) @150mA	Yes	30 FT (9m)
MS 63–55 (RSF)	0.5	59	0.2 ± 0.05mm	5VDC(±5%) @150mA	Yes	30 FT (9m)
RGH24D (Renishaw)	5	393	0.8 ± 0.1mm	5VDC(±5%) @150mA	Yes	30 FT (9m)
RGH24X (Renishaw)	1	196	0.8 ± 0.1mm	5VDC(±5%) @150mA	Yes	30 FT (9m)
RGH24Z (Renishaw)	0.5	118	0.8 ± 0.1mm	5VDC(±5%) @150mA	Yes	30 FT (9m)
RGH24Y (Renishaw)	0.1	27	0.8 ± 0.1mm	5VDC(±5%) @150mA	Yes	30 FT (9m)
LR050RD (Danaher)	5	787	0.2 ± 0.15mm	5VDC(±5%) @100mA	Yes	30 FT (9m)
LR025RD (Danaher)	10	787	0.2 ± 0.15mm	5VDC(±5%) @100mA	Yes	30 FT (9m)
LR010RD (Danaher)	25	787	0.2 ± 0.15mm	5VDC(±5%) @100mA	Yes	30 FT (9m)

Cables and Cable Chain Procedures

If your positioning stage is supplied with a cable chain, follow these recommendations regarding its use:

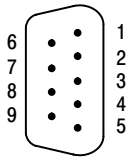
- Your stage is supplied with high flex cables that are designed to withstand millions of bend cycles. In addition, the internal conductors of the cable are twisted and shielded. A twisted, shielded cable reduces the problems associated with EMI and EFI noise. Using other types of cable may cause difficultly during servo tune procedure. Baldor recommends that any additional cables installed into the cable chain conform to this standard.
- The cable chain must never be more than 80% filled. Additional cables, pneumatic hoses, etc. contained by the cable chain require enough space to freely bend and conform to the cable chain without kinking or cork screwing as the stage cycles. The cables and pneumatic hoses must be installed without twists and should never be put on top of one another in high velocity and high cycle applications.
- If your stage was provided with flying leads, Baldor recommends that the cables be strain relieved, i.e. clamp the cables as they exit the cable chain to relieve tensile loads. Be sure not to pull the cables out of the cable chain making them “taut” inside the chain. Allow the cables to freely lay within the cable chain and find their natural position.
- To install additional cables and pneumatic hoses you must open one side of the cable chain. Typically the side of the cable chain facing the cable chain tray is the side that opens. Gently pull one end of the removable side toward the opposite end of the cable chain. Slowly pull the removable side loose, detaching the plastic segments. The segments are loosely attached to each other and may become separated. Be careful that the segments are not lost. To re–install the cable chain segments, it is recommended that a section of three or four segments be done at a time. Once a section is installed, additional sections can be easily assembled into place.
- Baldor recommends that you inspect the cables and pneumatic hoses during regular maintenance procedures.

Note: If your cable chain is not large enough to accommodate your cables and pneumatic hoses, please contact Baldor for assistance.

Additional Cables

LD9110A00 LinDrive External Encoder Output X7 Leadwire Connection (9 pin to flying leads)

Color	Pin#	Description
Green	1	A+
Pink	2	B+
Brown	3	C+
	4	N.C.
Black	5	DGND
Yellow	6	A–
Red	7	B–
Gray	8	C–
	9	N.C.



Male (D Sub)

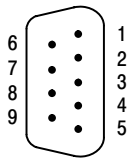
LD9101A00 LinDrive to Positioner Leadwire Connection (9 pin to 9 pin)

LinDrive Cable End Connections

Color	Pin#	Description
Green	1	A+
Pink	2	B+
Brown	3	C+
	4	N.C.
Black	5	DGND
Yellow	6	A–
Red	7	B–
Gray	8	C–
	9	N.C.

SmartMove or NextMove BX Cable End Connections

Color	Pin#	Description
	1	N.C.
Brown	2	C+
Red	3	B–
	4	N.C.
Green	5	A+
Gray	6	C–
Black	7	DGND
Pink	8	B+
Yellow	9	A–



Male (D Sub)
each cable end

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