

Linear Actuators

Installation Instructions

P-6150-WL



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⚠ WARNING Failure to follow these instructions may result in product damage, equipment damage, and serious or fatal injury to personnel.

Introduction

Warner Electric has many years of experience in providing linear actuators for a variety of applications on a wide range of mobile applications such as combines, school buses, industrial sweepers; as well as in factory applications such as lift tables, die handling racks, diverters and vent positioning. The Warner Electric linear actuator you have purchased is a well designed quality unit which will provide consistent maintenance-free service throughout its life.

Warner Linear actuators are ideally suited for intermittent duty cycle applications requiring lifting, positioning, sorting, opening or adjusting on both in-plant or mobile applications. This manual provides information needed to install all Warner Linear actuators.

Please follow the instructions provided in this manual carefully to ensure safe reliable operation. Mounting Guidelines on page 4 are of key importance, so please be sure to read them thoroughly before proceeding with unit installation.

Mounting

Warner Linear actuators are quickly and easily mounted by slipping pins through the holes at each end of the unit and into brackets on the machine frame and load to be moved.

Proper diameter* solid pins provide maximum holding capability. Use of a retaining ring or cotter pin on each end will prevent the solid pin from falling out of the mounting bracket. (It is best to avoid roll pins and spring pins.)

Mounting pins must be parallel to each other as shown in Figure 1. Pins which are not parallel can cause excess vibration or binding.

* M-Track 1 - 1/4 inch (.250)
 S-track - 3/8 inch (.375)
 All Others - 1/2 inch (.500)

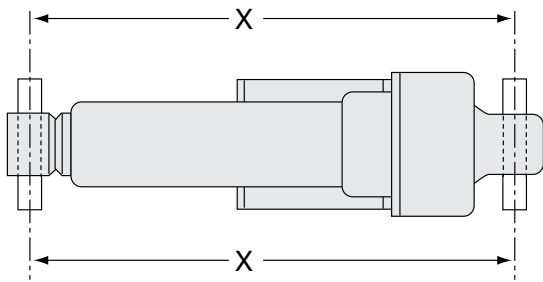


Figure 1

Loads should act along the axis of the actuator. Off center loads may cause binding and lead to premature unit failure. (See Figure 2)

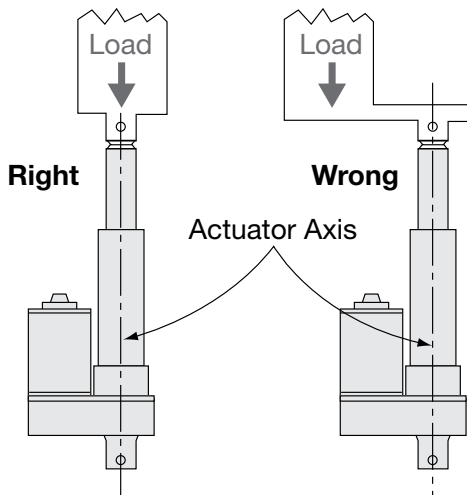


Figure 2

Ensure that mounting pins are supported at both ends. Cantilevered mounting is unacceptable. Failure to provide proper support will shorten unit life.

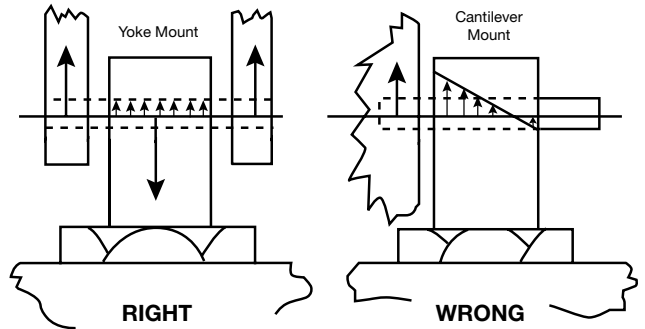


Figure 3

Do not attempt to mount Warner Linear actuators by the cover tube. The tube is not designed to support the forces required for tube mounting.

The actuator mounting supports must be capable of withstanding the load and torque developed when the unit extends or retracts. Restraining torque values are also provided with the details on each unit.

M-Track 1 - Torque created 20 in. lbs.
 All others - Torque created 100 in. lbs.

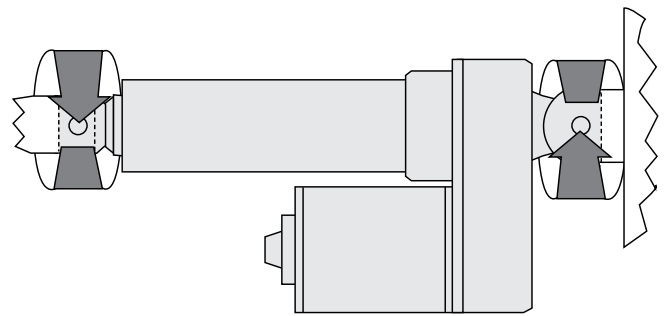


Figure 4



Scan to watch!
Proper Steps and Best Practices for Mounting of Warner Linear Actuators Video
<https://p.widencdn.net/k3etry>

Electrical Installation

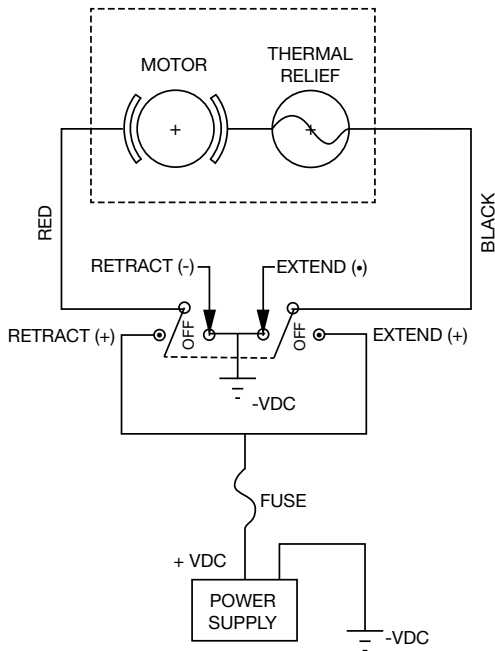
One connector is provided mounted to the actuator, the mating connector is included in the actuator box.

M-Track (with limit switches)

Use wire gauge 16 AWG
(Actuator 18 AWG)

Packard (Delphi) Connectors

Male Connector 8911773
Male Terminal 6294511 (2 required)
Female Connector 8911772
Female Terminal 12040508 (2 required)

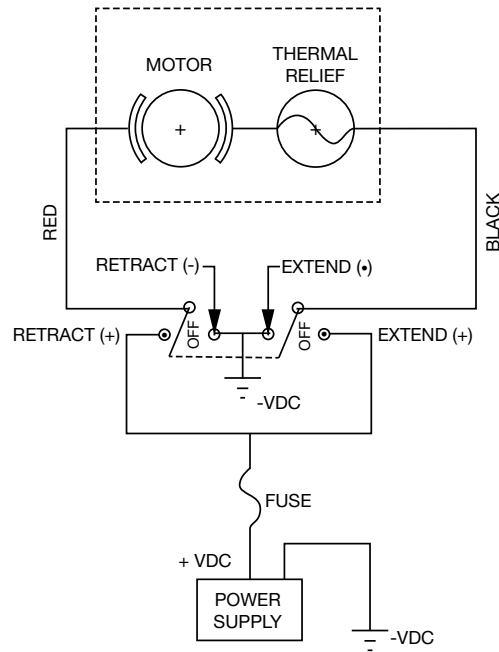


M-Track (with potentiometer feedback)

Use wire gauge 16 AWG

Packard (Delphi) Connectors

Male Connector 8911773
Male Terminal 6294511 (2 required)
Female Connector 8911772
Female Terminal 12040508 (2 required)



Wire Color	Wire Gauge	Connect to
White	26 AWG	10 K
Purple	26 AWG	Feedback Potentiometer
Yellow	26 AWG	0 OHM

POT HOOK-UP



S-Track Mechanical

The end of travel limit switches are factory set for selected stroke length and are not adjustable. Extension Tube anti-rotation is built into the body of the actuator.

S-Track Electrical

12 or 24 volt DC power

Feedback will be voltage or current depending upon which unit configuration has been ordered.

Integral Metri-Pack 150 Series – 8 PIN Connector

Use wire gauge 16 AWG

Packard (Delphi) Connectors

Mating Part #

12047937 Body

12066304 TPA

12048074 Terminal (8 pcs)

12089678 Seal (8 pcs)

12059168 Plug (if less than 8 connections are made)

Port A = Motor power in (+/-12 or 24 VDC)

Port B = Extend end limit output

Port C = Live power in (+/-12 or 24 VDC)

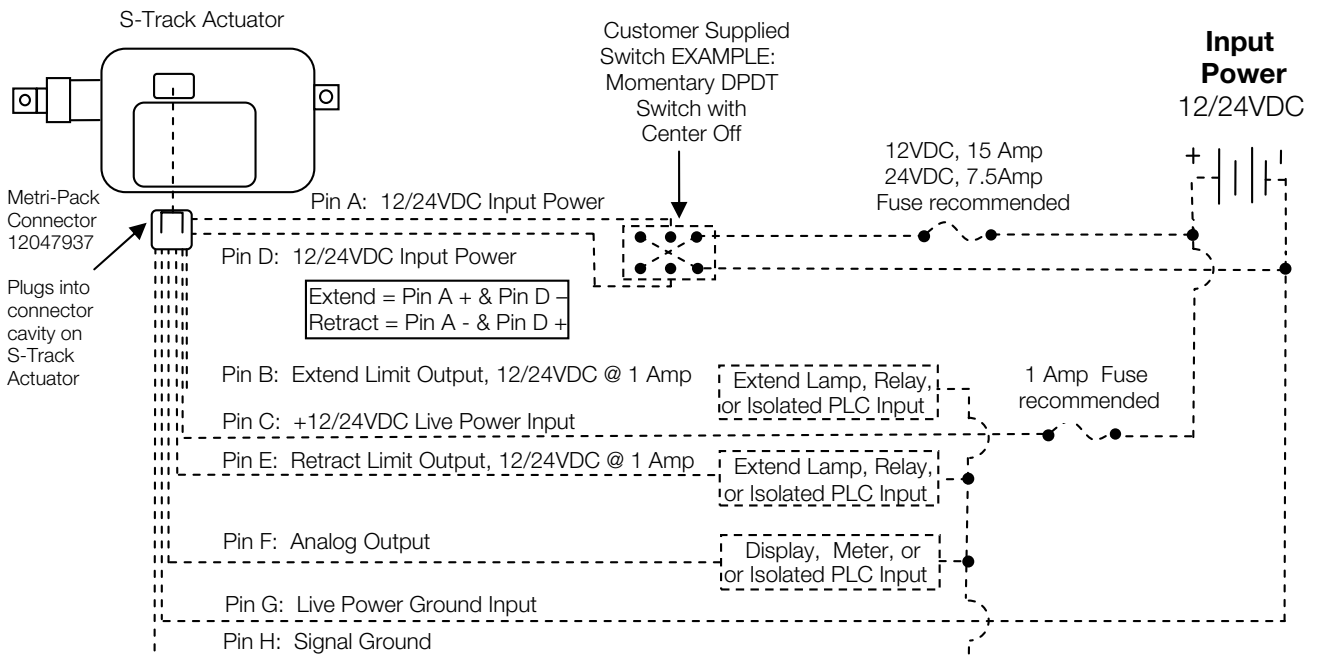
Port D = Motor power in (+/-12 VDC)

Port E = Retract end limit output

Port F = Stroke position output (0-10 VDC, 4-20 mA, ect.)

Port G = Live power in (12/24 VDC ground)

Port H = Signal ground out



[Note: All dotted lines are customer supplied]

S-Track – Adjustable End Limit Control Operation

Features

12/24VDC @ 15/7.5Amps maximum.

4 Adjustable Stop Positions using Membrane Keypad

- Shipped from factory to stop at maximum retract and extend positions using internal switches on potentiometer strip
- Customer can adjust Retract & Extend stops using membrane keypad. These values will be stored in permanent EEPROM memory for the life of the actuator.
- Adjusted stop positions can also be erased at any time to go back to factory default.
- Retract is Stop 1 and Extend is Stop 2. Stop 3 and Stop 4 can be set anywhere inside these two values.
- When Stop 1 (Retract) and Stop 2 (Extend) positions are reached the actuator will automatically stop and not allow movement in that direction. Power will have to be reversed in the opposite direction to move actuator.
- If Stop 3 and Stop 4 positions are used, when these positions are reached the control will remove power to the actuator until input power is cycled. Then when power is reapplied it can move in either direction.
- Positional Accuracy, under no load conditions from the initial stop position setting is within 0.10". This will improve with loaded applications since there will be less coast.
- Repeatability of hitting the same stop position every time is within .010".

Outputs

- Stop 1 (Retract) and Stop 2 (Extend) Outputs – 12/24VDC@ 1 amp maximum
 - Active High or Low (factory set to Active High)
- Positional Feedback – Signal conditioned potentiometer feedback, available in:
 - 0-5, or 0-10, or 1-5, or 2-10 VDC
 - 0-10, or 0-20, or 2-10, or 4-20 mA

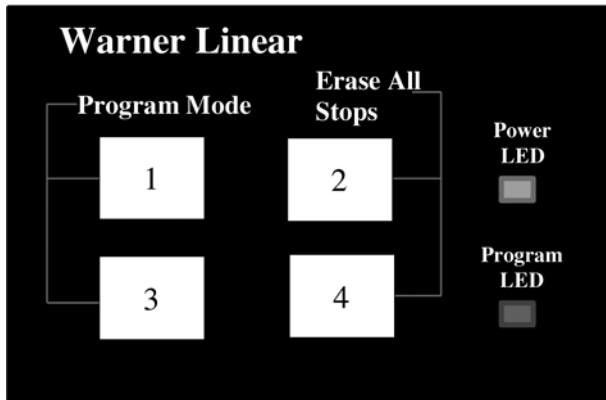
The signal conditioned feature adjusts the output so Stop 1 (full Retract) is always 0 (or min. value of the output setting chosen) even if the potentiometer value is not zero. Therefore, Stop 2 (full Extend) is also conditioned to be the maximum output of the setting chosen. This conditioning is done once (either at the factory or when either Stop 1 or Stop 2 is changed). Then the value is saved in EEPROM for the life of the actuator.

- Live Power – Keeps outputs and feedback information on when switched power off.
 - This power needs to be from the same source as the actuator main power, just taken before the switched.

Note: If Positions 1 or 4 are changed the analog output will reset to provide full range of output for the new positions. For example, if Full Retract is set at +1 inch, then '0' volt output will be at +1 inch.

Molded 8-pin Sealed Connector for Customer Connections

S-Track – Programming Stop Positions



- **Green LED** indicates there is **Power** to the control
- **Red LED** indicates when in Program Mode
- Press **keys 1 & 3** together to enter **Program Mode**
 - Red LED stays LIT for ~90 seconds waiting for another key command until:
 - Actuator is commanded to extend or retract (immediately leaves programming mode)
 - One of the keys listed below is pressed, Red LED will turn off and control will return to normal operation
 - No key is pressed after ~90 seconds, Red LED will turn off and control will return to normal operation
- Press **key 1** or
 - New **Retract** end limit stop position
 - Signal conditioned output will change this position to 0V output
 - Red LED will turn off & program returns to normal operation
- Press **key 2** or
 - New **Extend** end limit stop position
 - Signal conditioned output will change this position to ~5V output
 - Red LED will turn off & program returns to normal operation
- Press **key 3** or
 - **3rd Stop** position Set
 - Red LED will turn off & program returns to normal operation
- Press **key 4** or
 - **4th Stop** position Set
 - Red LED will turn off & program returns to normal operation
- Press **key 2 & 4**
 - **Erase** all 4 stop positions and goes back to factory default (maximum stroke)

OR

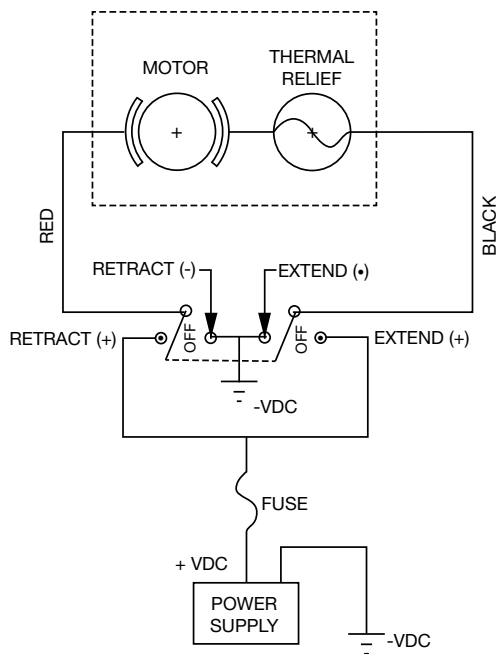
 - To change only one stop position, press one of the keys 1 to 4 again in the new desired location

K2VL, K2 and K2X DC Electrical Wiring

One connector is provided mounted to the actuator, the mating connector is included in the actuator box.

Packard (Delphi) Connectors (Warner Linear part number)

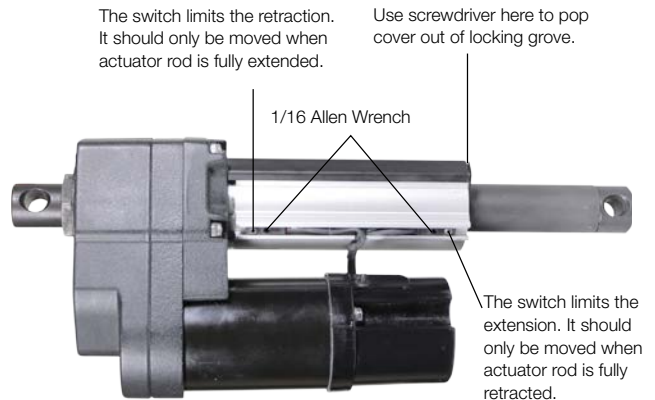
Male connector	2973781 (055-0101-01)
Male Terminal (2 req)	2962573 (2 Required) (055-0107-01)
Female connector	2984883 (055-01010-02)
Female terminal	2962987 (2 Required) (055-0107-02)



Note: Wiring diagrams for limit switch and potentiometer feedback are included in the manual for those products.

K2/K2X EP

The external Limit Switch design allows the customer to set the end of travel stop position for both the extend and retract of the extension tube. The design includes a magnet within the extension tube and one limit switch at each end of the cover tube. As the magnet crosses in front of the switch, the switch will change states from open to close.



To access the limit switches use a thin flat head screw driver to remove the end cap from the side cover. Slide the cover off of the unit to expose the limit switches.



When the actuator leaves the manufacturing plant, the switches are set at the maximum stroke for that unit. Care should be taken so that the switch is not moved past the point where the extension tube can travel. If this happens, the actuator will continue to drive causing excess wear on the clutch assembly. Wiring for the EP limit switch design is the same as for internal limit switches



Scan to watch!

How to Adjust the Limit Switches for a K2 or K2X Actuator with External or EP Limit Switches

<https://p.widencdn.net/imzc9v>

Hall-Effect Switch Wiring

General Description:

The hall-effect switch is a non-contact, NPN output, solid state device. When the switch comes in range of the magnet internal to the Warner Linear actuator the output is pulled low and should read 0 VDC and can sink up to 20mA maximum. On the K2E actuators, the switches can be adjusted in the outer rail, by removing the black switch rail cover and loosening the #6 set screw holding the switch in place. The typical switch hysteresis is 100 gauss which requires the switches to be at least 1 inch apart so nuisance trips do not occur.

A pull-up resistor is required from the output to the supply power to ensure only 20mA maximum is drawn from the sensor. Therefore, for a 5 VDC supply a 1K ohm, 1/4watt resistor is recommended and for anything above a 5VDC supply a 5K ohm 1/4watt resistor should be used. There should also be protection on the power and ground to ensure the switch sees no more than 24VDC.

General Specifications:

Supply Power: 4.5 to 24 VDC @ 8mA max

Output: Current sinking (NPN), maximum of 20mA continuous

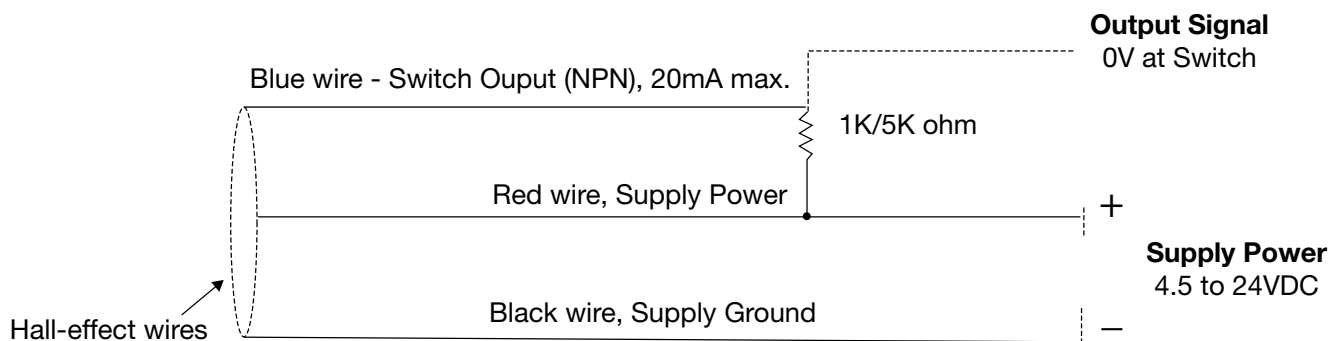
Lead Wires: 26 AWG

Operating Temperature: -40 to 125°C

Protection: Reverse polarity protected

Housing: Rugged thermoplastic

Typical Hall-effect switch wiring example:



Note: Dotted line supplied by customer

Reed Switch Operation

Normally open switches.

General Description:

The reed switch is a hermetically sealed, magnetically operated sensor. When the switch comes in range of the magnet internal to the Warner Linear actuator the normally open contacts will close. The switch can be set in place on the actuator in one of the two switch rails provided on the K2E actuator tube with a #6 set screw.

General Specifications:

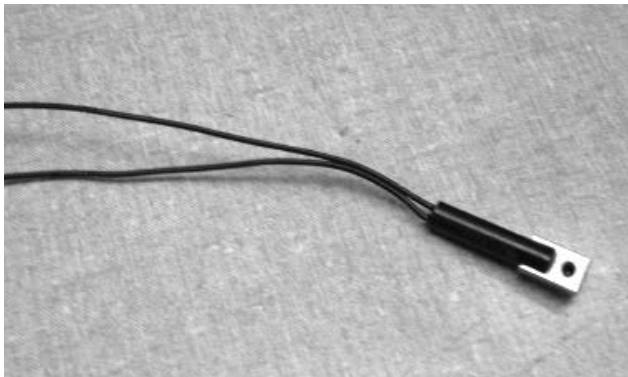
Supply Voltage: Up to 200 VDC maximum

Switching Current: 1.2 Amps maximum

Contact Rating: 10 Watts maximum

Lead Wires: 24 AWG

Operating Temperature: -40 to 105 deg C
to 200 VDC maximum



K2AC and K2XAC

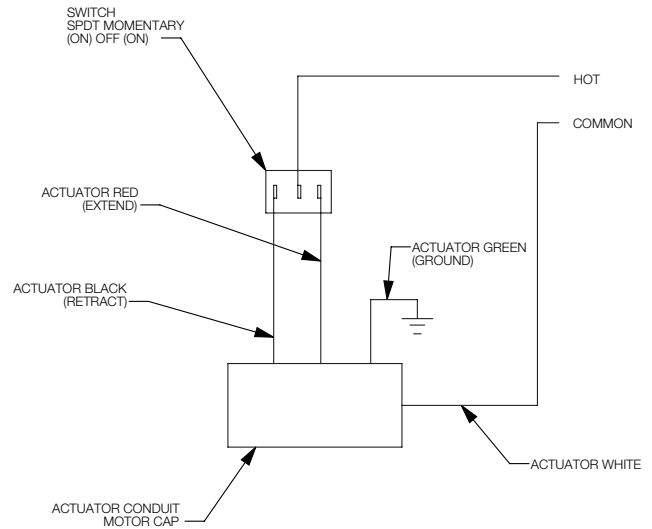
23-1/2 inch long cable provided

Green to ground

White to Neutral

Black (Hot) to retract

Red (Hot) to extend



Troubleshooting

Unit will not extend or retract (power concerns)	
Possible Problem	Reccomended Action
No Power to the unit	<p>A. Inspection Method Use voltmeter to confirm that power is reaching the motor lead wires.</p> <p>B. Open/Blown Fuse Confirm that the fuse installed is sized properly for the application. Current draw information for each motor is included with the data for each model of actuator.</p> <p>C. Switch Failure If power reaches the switch, but not the actuator, the switch has failed and must be replaced.</p> <p>D. Switch Wiring Confirm that the wiring at the switch is accurate per the wiring diagram provided with each model of actuator. Re-wire as needed.</p> <p>E. Wiring Failure Inspect for cut or broken wires between the power source and the switch and between the switch and the actuator. Replace wires as needed.</p>
Motor Failure	<p>Inspection Use ohmmeter to check resistance of the coil.</p>
Thermal Overload Open	<p>If the actuator has been run at a duty cycle greater than 25% or the unit has been overloaded, the thermal overload in the motor may have opened to protect the motor.</p> <p>Allow sufficient time for the motor to cool which will allow the overload to reset. Confirm the application to ensure that the unit is not overloaded and that it is not running at greater than 25% duty cycle.</p>
Insufficient Current	<p>Power may be reaching the motor, but with insufficient current to provide full load moving capacity. Use an amp meter to confirm that sufficient current is reaching the actuator. Use the load/current charts in the catalog to confirm current requirements based on the unit loading.</p>

Troubleshooting

Unit will not extend or retract (mechanical issues)	
Power is reaching the motor, but the unit will not move the load.	
Possible Problem	Reccomended Action
Unit Overloaded	Inspect to confirm that the load applied does not exceed the rating for the actuator. Reduce load as needed, or replace actuator with a unit with sufficient capacity for the load applied.
Unit Binding	As noted on page 3 mounting pins must be parallel and mounting must avoid side loading. Out-of-parallel pins or sideloading may cause unit binding that will reduce unit capacity. If the above checks do not reveal the source of the problem, remove the unit from its mounting and run the unit under no load. Observe unit behavior and make adjustments as necessary.
Unit will not extend/retract or stops in mid stroke	
Possible Problem	Reccomended Action
Overloading Clutch Slipping	When a unit is overloaded in a sufficient amount, the clutch will slip. This will generate a ratcheting noise within the unit. Load has exceeded the capacity of the unit. Reduce the load to fall within unit specifications; or, replace the actuator with a unit with sufficient capacity to move the load. If the unit has seen many slip occurrences, the clutch may be worn out.
Insufficient Current	Insufficient current is reaching the unit to provide full load capability. Use the load/current draw charts provided for each unit to confirm current requirements and adjust power source accordingly.
Motor hums, but does not move the load AC actuators	
Possible Problem	Reccomended Action
	Inspect to confirm that the load applied does not exceed the rating for the actuator. Reduce load as needed, or replace actuator with a unit with sufficient capacity for the load applied.
Unit stops at mid stroke or exceeds stroke length	
Units with limit switches	
Possible Problem	Reccomended Action
	The limit switches have been improperly set. Review the limit switch adjustment process and correct so that the unit travel is set properly.

Warranty

Warner Linear warrants that it will repair or replace (whichever it deems advisable) any product manufactured and sold by it which proves to be defective in material or workmanship within a period of one (1) year from the date of original purchase for consumer, commercial or industrial use. This warranty extends only to the original purchaser and is not transferable or assignable without Warner Linear's prior consent.

Warranty service can be obtained in the U.S.A. by returning any defective product, transportation charges prepaid, to the appropriate Warner Electric LLC factory. Additional warranty information may be obtained by writing the Customer Satisfaction Department, Warner Linear, 5693 Revlon Drive, Belvidere, IL 61008, or by calling 815-547-1106.

A purchase receipt or other proof of original purchase will be required before warranty service is rendered. If found defective under the terms of this warranty, repair or replacement will be made, without charge, together with a refund for transportation costs. If found not to be defective, you will be notified and, with your consent, the item will be repaired or replaced and returned to you at your expense.

This warranty covers normal use and does not cover damage or defect which results from alteration, accident, neglect, or improper installation, operation, or maintenance.

Some states do not allow limitation on how long an implied warranty lasts, so the above limitation may not apply to you.

Warner Linear's obligation under this warranty is limited to the repair or replacement of the defective product and in no event shall Warner Linear be liable for consequential, indirect, or incidental damages of any kind incurred by reason of the manufacture, sale or use of any defective product. Warner Linear neither assumes nor authorizes any other person to give any other warranty or to assume any other obligation or liability on its behalf.

WITH RESPECT TO CONSUMER USE OF THE PRODUCT, ANY IMPLIED WARRANTIES WHICH THE CONSUMER MAY HAVE ARE LIMITED IN DURATION TO ONE YEAR FROM THE DATE OF ORIGINAL CONSUMER PURCHASE. WITH RESPECT TO COMMERCIAL AND INDUSTRIAL USES OF THE PRODUCT, THE FOREGOING WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, WHETHER EXPRESSED OR IMPLIED BY OPERATION OF LAW OR OTHERWISE, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS.

Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

Changes in Dimensions and Specifications

All dimensions and specifications shown in Warner Linear catalogs are subject to change without notice. Weights do not include weight of boxing for shipment. Certified prints will be furnished without charge on request to Warner Linear.



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