

Thomson Electrak® LL Electric Linear Actuator

Installation Manual

Edition 2021-08



Version history

Edition	Reason for revision
2020-04	First edition
2020-11	Page references added after brake resistor in diagram legend + back page updated
2021-08	Updated warning for onboard control functions (control type LEX)

Warranty

The Thomson Electrak® LL is warranted to be free from defects in materials and workmanship for a period of twelve (12) months from date of delivery. The application of this product is the responsibility of the buyer and Thomson makes no representation or warranty as to the suitability of the product for any particular use or purpose. For a copy of the entire warranty for this product that is contained in our standard terms and conditions of sale, please go to http://www.thomsonlinear.com/website/com/eng/support/terms_and_conditions.php.

Disclaimer

Technical changes to improve the performance of the equipment may be made without prior notice!

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1. General

1.1 About this manual

This manual contains mechanical and electrical installation instructions for the Thomson Electrak® LL electric linear actuator. It also contains, among other things:

- technical data
- installation data
- type designation key.

It is important to carefully read this manual before installing the actuator and to have the correct qualifications needed to perform the installation.

1.2 Target group

This manual addresses qualified mechanical and electrical personnel.

1.3 Symbols used



This symbol is shown to highlight a general warning, general instruction or as a warning for a mechanical hazard.

1.4 Transport and storage

The actuator may only be transported and stored in the original packaging supplied by Thomson. The temperature during transportation and storage must be between -40 to +85° C (-40 to +185° F). Avoid shocks to the package. If the package is damaged, check the actuator for visible damage and notify the carrier, and if appropriate also Thomson.

1.5 Packaging

The packaging consists of a cardboard box. The box contains the actuator and this manual. For large quantity orders bulk packaging may be used in which case the packaging and the content will vary depending on the order agreement.

1.6 Disposal

Where required by law, used packaging and actuators are taken back by Thomson for professional disposal if the transportation cost is paid by the sender. Please contact Thomson for shipping information.

1.7 Support

If technical support or information is needed for this product, please contact the nearest Thomson Service Center. See the back of this manual. You can also visit www.thomsonlinear.com for information on this product and how to contact us.

2. Safety

2.1 Safety notes



- Only properly qualified personnel are permitted to perform mechanical and electrical installation of this product. Properly qualified personnel are familiar with mechanical or electrical installation work and have the appropriate qualifications for their job.
- Read this manual and any other available documentation before working on the equipment that the actuator is or shall be a part of.
- Conform strictly to the information contained in this manual and on the actuator product label on the actuator. Never exceed the performance limits stated herein.
- Never work on the actuator or its installation with the power on.
- Never unplug any cables or connectors during operation or with power on.
- Immediately stop using the actuator if it seems faulty or damaged in any way and notify an appropriate person so that corrective actions can be taken.
- Never open the actuator as that will compromise the sealing and the function of the actuator. There are no serviceable components inside.
- Grease may be present on the extension tube. Contact is non-hazardous. Film should not be removed.

3. Standards

3.1 EC Declaration of incorporation of partly completed machinery

We, Thomson Linear

declare that this product corresponds with the International Standard ISO 13766:2006-05 2nd Edition (Earth Moving Machinery, Electromagnetic Compatibility) and standards EN 50155, EN 60077, EN 45545. The directive (MD) 2006/42/EC annex 2.1.B, RoHSII directive 2011/65/EU, and that the standard EN ISO 12100:2010, Safety of machinery, have been applied.

Thomson Electrak® LL Linear Actuator

Product

LLxxBxxx-xxxxxxxxxxx

Description

Can be used when the machine or the system, which it shall be, a part of is in accordance with the demands in the EEC Machinery Directive and/or other relevant regulations.

Kristianstad 2019-06-17

Date

Håkan Persson

Name

Business Unit Manager

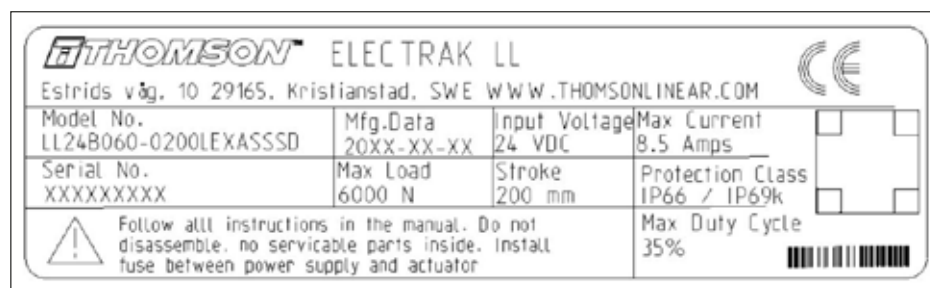
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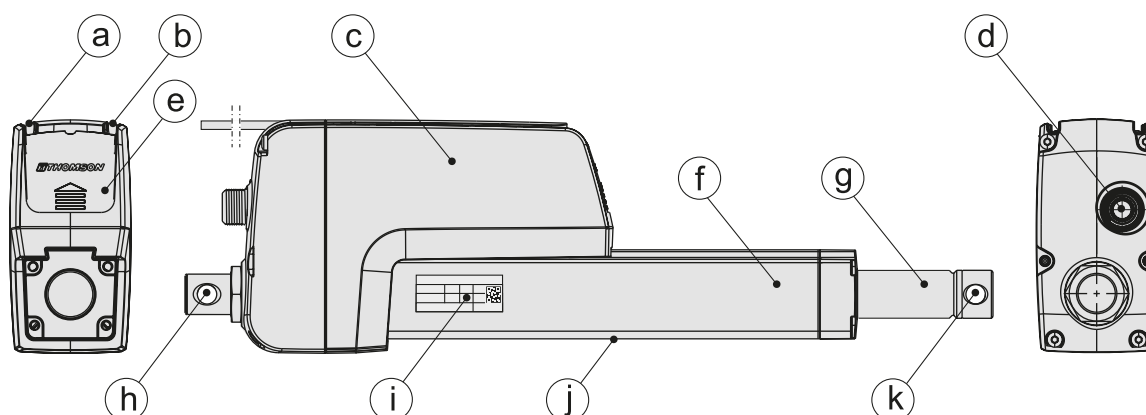
4. Installation

4.1 Product label

The product label can be found on the side of the cover tube. It will tell you which model of actuator you have, its basic performance data and where it is manufactured. Please study the product label to determine actuator type before starting any installation or service on the actuator. If you need any assistance from Thomson, please provide the serial number, manufacturing date and the designation of the actuator(s) in question. You can also use the QR code on the label to directly access Electrak LL information on www.thomsonlinear.com.



4.2 Terminology

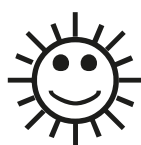


- a. power cable
- b. signal cable
- c. housing
- d. hand wind input
- e. cable connector cover plate
- f. cover tube
- g. extension tube
- h. rear adapter
- i. product label
- j. limit switch slots
- k. front adapter

4.3 Operation environment



Min. -40° C (-40° F)



Max. +85° C (+185° F)



IP66 / IP69K

1. Operation temperature range is -40 to +85° Celsius (-40 to +185° Fahrenheit).
2. Protection degree against the ingress of water and particles is IP66 / IP69K.
3. Relative humidity range is 10 - 90 % non-condensing.

4.4 Mechanical installation

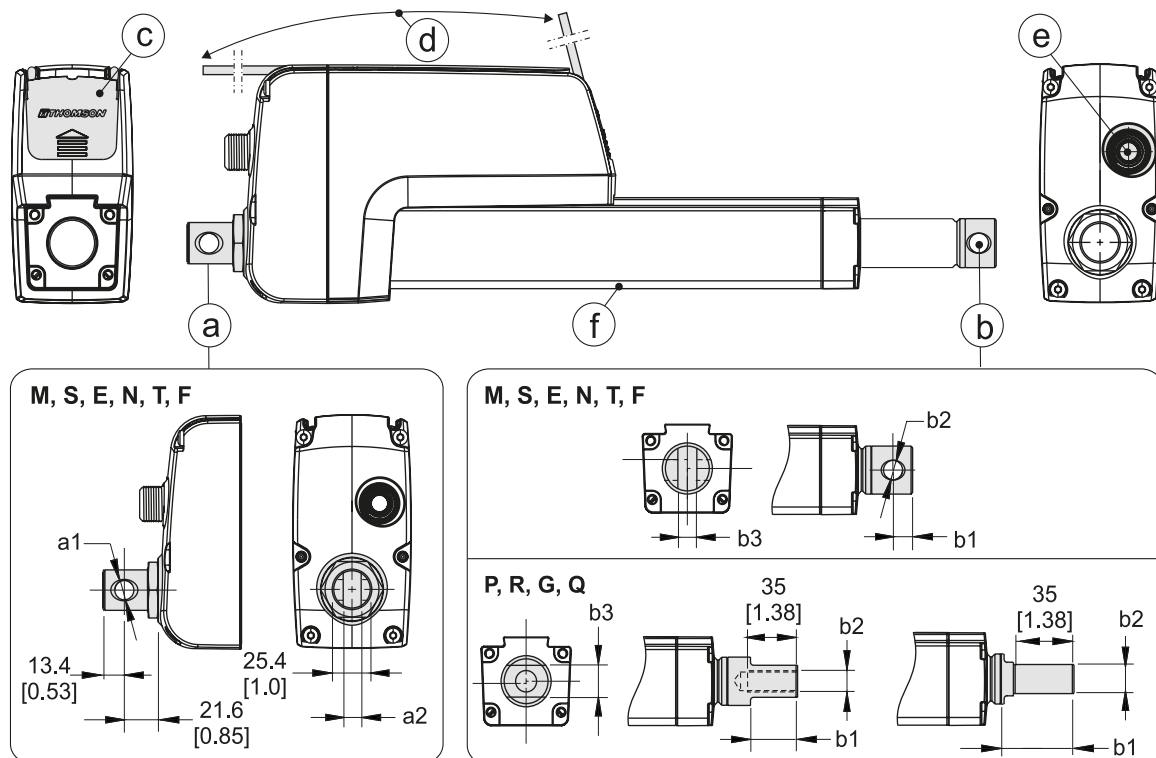
4.4.1 General installation safety notes



- Never work on the actuator with the power switched on!
- Do not hold the extension tube while the unit is energized.
- Failure modes of the actuator should be considered to ensure it does not create harm.

4.4.2 Basic installation considerations

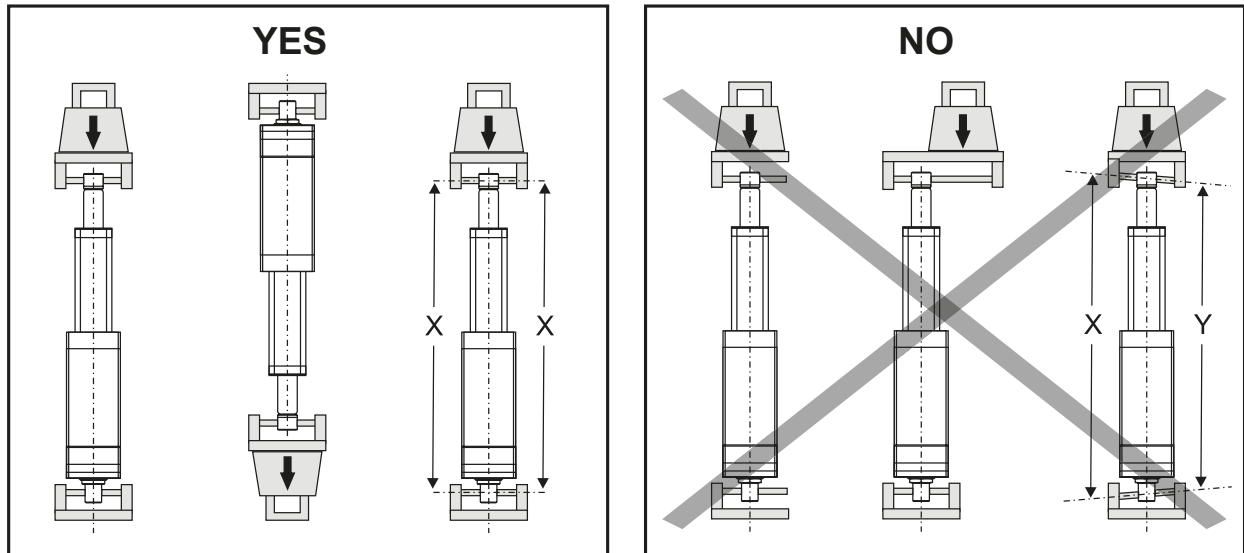
1. Only mount the actuator using the holes in the rear (a) and front (b) adapters. Check the model number on the actuator product label (section 4.1) and then look at the ordering key (section 7.2) to find out your adapter type configuration. See the below drawings and table to find out the exact adapter dimensions.
2. Make sure that the actuator mounting position allows access to the cable connector cover plate (c), so that it can be removed to allow access to the cable connector(s) (section 4.4.4).
3. The cable or cables (d) exit the cable slot at the rear of the actuator housing at delivery but can be made to leave the housing at any point after the cable connector cover plate.
4. The hand wind input (e) must have enough free space around it to allow it to be operated (section 4.4.5).
5. If external limit switches will be used, the mounting of the actuator must allow access to the limit switch slots (f) running along the underside of the cover tube (section 4.4.6).



Adapter Dimensions [mm (in)]							
Adapter type							
	M, S	E	N, T	F	P, R	G	Q
a1	12.2 E9 (0.48)	12.8 (0.506)	12.2 E9 (0.48)	12.8 (0.506)	-	-	-
a2	-	-	8.2 (0.323)	8.2 (0.323)	-	-	-
b1	10.9 (0.429)	10.9 (0.429)	12.9 (0.508)	12.9 (0.508)	30 (1.18)	30 (1.18)	42 (1.654)
b2	12.2 E9 (0.48)	12.8 (0.506)	12.2 E9 (0.48)	12.8 (0.506)	M12 × 1.75	1/2-20 NF-2B	M16 × 2
b3	-	-	8.2 (0.323)	8.2 (0.323)	19 (0.748)	19 (0.748)	19 (0.748)

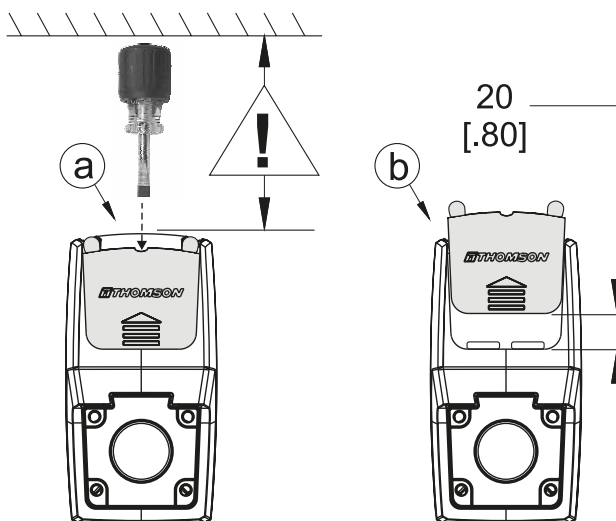
4.4.3 Mounting orientation and forces

1. The actuator can be mounted in any orientation and handle both pushing and pulling loads.
2. Always install actuator so that the force of the load acts in the center of the extension tube and the rear adapter.
3. Only mount the actuator to the rear and front adapter mounting holes.
4. Only use solid mounting pins and support them at both ends.
5. The mounting pins must be parallel to each other both radially and axially.



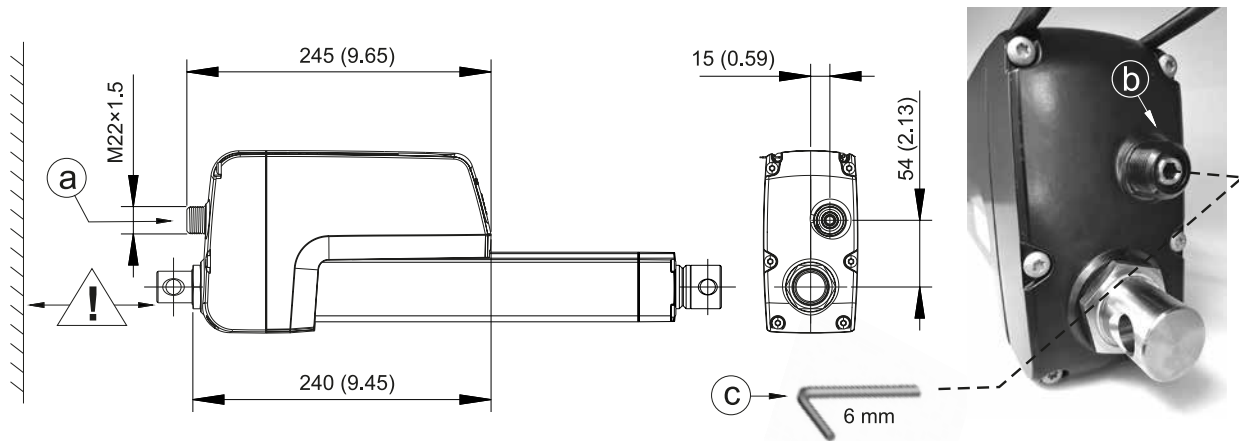
4.4.4 Cable connector cover plate

1. The cover plate is held in place by a screw (M3 with Torx T10 head) that can be accessed through the hole in the top of the cover plate (a). Keep in mind to mount the actuator so that there is enough clearance to access the screw with a tool!
2. Once the cover plate is released it needs to be pushed about 20 mm (0.8 inch) in the direction of the arrow symbol on the cover plate before it can be removed from the actuator (b). The connectors are a part of the backside of the cover plate and can be accessed once the cover plate is removed.
3. Make sure to put the cover plate back correctly and torque the screw to 1.2Nm (10.6 in-lb) to ensure that the actuator cover plate and connectors are properly sealed.



4.4.5 Hand wind mounting and operation

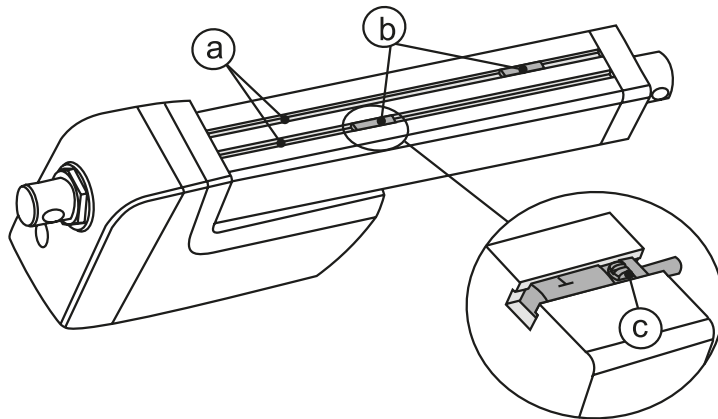
1. Make sure when mounting the actuator that there is space enough between the rear adapter and any object behind it to allow the hand wind to be operated!
2. To be able to operate the hand wind, remove the cover plug placed over the hand wind input (a).
3. Next, move the extension tube by turning the hand wind input hexagon socket (b) using a 6 mm male hexagon key (c).
4. The maximum torque required to move the extension tube at the fully rated actuator load using the hand wind is typically 4-6 Nm (35-50 in-lb).



Always make sure to switch off the power to the actuator before using the hand wind.
Do not apply higher torque than 10 Nm (88 in-lb) to the hand wind input.
Never run the extension tube in to the end of stroke as that may damage the actuator.
Never use any type of drill or power tool to operate the hand wind.

4.4.6 Mounting of optional external limit switches

1. The external limit switches are mounted in the two slots (a) at the bottom of the cover tube.
2. Put the sensor (b) into one of the slots and lock it at the desired position by turning the clamp screw 45 degrees (c).



If the sensor is mounted in the immediate vicinity of magnetic components, the switching characteristics of the sensor may change.

4.5 Electrical installation

4.5.1 General notes



- Make sure the leads/cables leading to the motor can handle the maximum motor current.
- An emergency stop is recommended to reduce the chance of a crushing hazard.
- Never work on the actuator or the wiring with the power switched on!

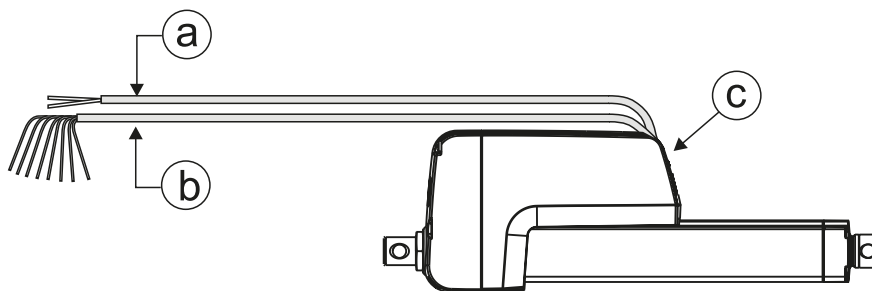
4.5.2 Fuse size

Protect the actuator and the wiring by using a slow blow fuse between the actuator and the power source.

Recommended Fuse Size	
Actuator supply voltage	Fuse size
24 Vdc	20 A

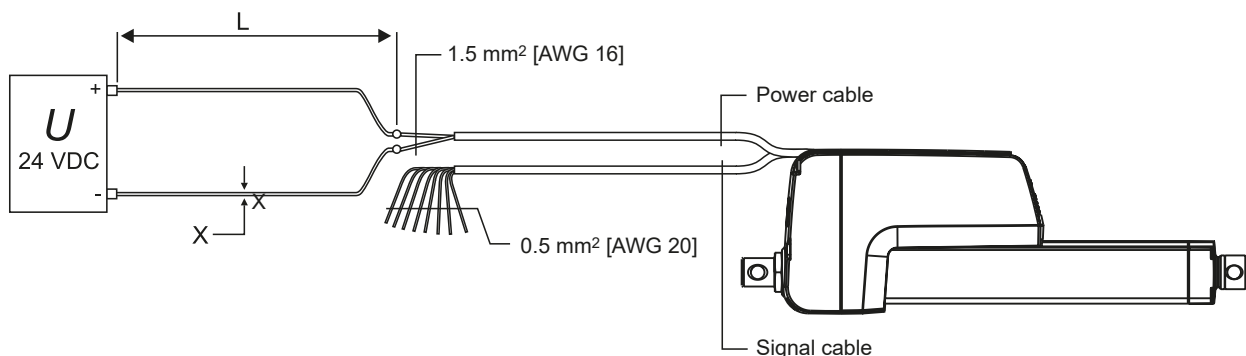
4.5.3 Electrical connections

The actuator is always supplied with a power cable (a). Depending on which control option was selected, it can also have a signal cable (b). The cable(s) have flying leads in one end for customer connections. In the other end the cable(s) are integrated in to the cable connector cover plate (c) (section 4.4.4). The plug in connector allows replacing the actuator without disconnecting the flying leads.



4.5.4 Lead cross sections

To avoid malfunction due to voltage drop the cross section of the leads between the actuator power cable leads and the power source must be of sufficient size. For longer cables than stated in the table, calculations based on the supply voltage, the current draw, the length of the cables and the ambient temperature must be done.



Power Lead Cross Sections	
Length of cable (L)	Min. allowed cross section (X)
0 - 4 m	1.5 mm² [AWG 16]
4 - 10 m	2.5 mm² [AWG 14]

4.5.5 Inrush current

At the start of the actuator there is an inrush current to the motor that will last between 75 to 150 milliseconds. See below table to determine the inrush current for the control option being used.

Control Option Inrush Current Level	
Option	Inrush current
LEX	up to $1.5 \times$ rated current for the actuator model and load in question



If using an AC powered power supply it must be sized to handle the inrush current (batteries typically have no problem delivering the inrush current). Also contacts, switches and relays must be sized appropriately to be able to handle the inrush current.

4.5.6 Brake resistor

If the unit is to operate with a helping load (pulling load) that are above 50% of the rated maximum load, the unit must be equipped with a brake resistor (also see section 4.6.3). The resistor must have a resistance between 2.3 - 3.3 Ohm and be able to handle at least 100 W.

4.6 Control options installation and operation

4.6.1 General notes



- Avoid placing signal cables along power cables to reduce the risk of interference.
- Avoid using a vehicle earth as the return conductor. Instead use a two wire system to reduce the risk of interference.
- In very sensitive applications or where there is a risk of interference we recommend using shielded signal cables.
- Keep in mind that long cables in combination with small lead cross sections and low voltages may lead to undervoltage and malfunction due to voltage drop.
- Relays or other coil operated devices should have spark protection to avoid interference.
- Never work on the actuator or the wiring with the power switched on!

4.6.2 Speed control by adjusting the input voltage



Electrak LL can not be speed controlled by adjusting the input voltage. When using battery or full wave rectified direct current that are within the acceptable voltage limits, the built in Electronic monitoring package will keep the actuator at the correct speed for the load in question. Outside of the limits the actuator will be stopped (section 4.6.3). When using PWM (Pulse Width Modulation) to speed control the actuator, the internal PCB will be permanently damaged and cause malfunction.

4.6.3 Onboard control functions (control type LEX)

Utilizing the internal control system the actuator will:

- Stop the actuator immediately at each end of mechanical travel and throughout the stroke anytime current exceeds a factory preset value for the rated load (over load condition). This value is adjusted during operation automatically to provide consistent force. Resetting the actuator requires motion in opposite direction to continue normal operation.
- Stop the actuator when the current move is finished in the situation where voltage or temperature are outside their normal operating ranges. Once within the normal operating range the actuator will automatically reset and normal operation can be continued.



To eliminate the risk of the actuator making unplanned moves for example during emergency stop or when performing maintenance work, always turn power off AND deactivate control signals.

Power the actuator by connecting lead 2 to + Vdc and lead 1 to - Vdc in the power cable.

If using a brake resistor it should be connected between leads 2 and 3 in the power cable. Make sure to use the correct type of resistor (section 4.5.6).

To extend the actuator apply voltage between lead 6 and 8 in the signal cable. To retract the actuator apply voltage between lead 7 and 8 in the signal cable.

The actuators will stop automatically when reaching the mechanical end of stroke in any directions and motion will only be possible in the opposite direction.

External limit switches can be connected to leads 3 and 5 (stop extend) and 4 and 5 (stop retract) in the signal cable in order to stop the motion in either direction before reaching the mechanical ends of stroke. When affected they will stop the actuator and motion will only be possible in the opposite direction.

Control Option Specifications		
Supply voltage	[Vdc]	16.8 - 32
Max. actuator current draw	[A]	see product label
Input logical high level	[Vdc]	5 - 32
Input current @ 24 Vdc	[mA]	2

F Fuse

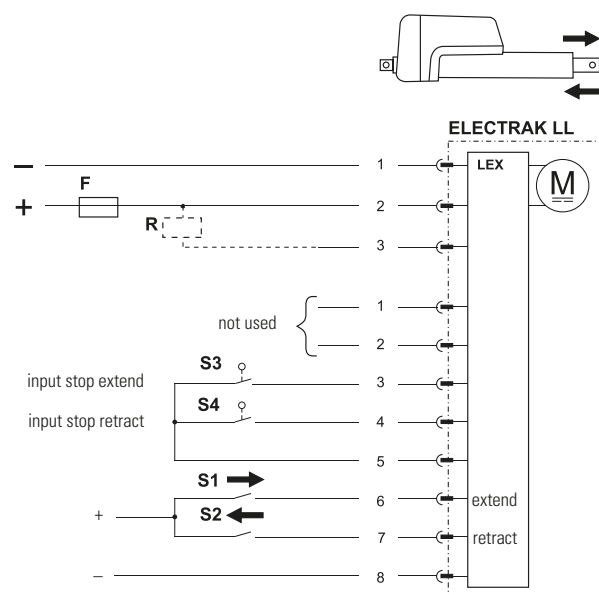
R Brake resistor (section 4.5.6)

S1 Switch retract

S2 Switch extend

S3 Limit switch stop extend

S4 Limit switch stop retract



5. Troubleshooting

5.1 Troubleshooting

Troubleshooting list		
Issue	Problem	Solution
Actuator does not move, makes no sound.	Actuator is not receiving proper input voltage.	Ensure the actuator is being supplied with proper rated input voltage.
Actuator makes buzzing sound, does not move.	Actuator does not have enough power and is stalled.	Ensure your power supply can provide enough current to move the rated load.
The actuator, when powered, is causing my fuse to blow.	Fuse is not rated for current draw of the actuator.	Make sure that the fuse is rated for the in-rush current of the actuator, which is typically 1.5 times the rated current draw of the actuator at full load. Slow-blow fuses are also recommended.
The actuator is not stopping at the right place.	External limit switches are in incorrect position or are not working.	Control the functionality of the external limit switches.

6. Technical specifications

6.1 Technical data

Technical Specification		ELECTRAK LL
Input voltage	[Vac]	24
Input voltage tolerance	[Vdc]	16.8 - 32
Stroke length	[mm]	see product label
Static load at fully retracted (Fx), maximum	[kN (lbs)]	18 (4050)
Dynamic load (Fx), maximum	[N]	see product label
Speed (constant speed regardless of load) LLxx-B040 LLxx-B060	[mm/s (inch/s)]	30 (1.18) 15 (0.59)
Current draw @ rated max. load	[A]	see product label
Weight ⁽¹⁾	[kg]	(stroke [mm] × 0.006) + 7
End play, maximum	[mm (in)]	1.2 (0.047)
Operating temperature limits, standard units	[°C (°F)]	- 40 to + 85 (- 40 to + 185)
Full load duty cycle @ 25 °C	[%]	see product label
Restraining torque	[Nm (lbf-in)]	0 (internally restrained)
Motor cable lead cross section	[mm ² (AWG)]	1.5 (16)
Signal cable lead cross section	[mm ² (AWG)]	0.5 (20)
Cable length	[mm (in)]	0.3 (11.8)
Protection class - static		IP66 / IP69K
Protection class - dynamic		IP66
Safety features static load holding brake internal end-of-stroke limit switches overload protection temperature monitoring temperature compensation voltage monitoring		yes yes yes yes yes yes
Compliances		CE, RoHS, EN 50155, EN 60077, EN 45545

(1) Conversion factor for kilogram to pound: 1 kg = 2.204623 lbs

6.2 Ordering key

Ordering Key									
Position	1	2	3	4	5	6	7	8	9
Example	LL24	B040-	0300	LEX	1	M	M	S	D
<p>1. Actuator type and supply voltage LL24 = Electrak LL, 24 Vdc</p> <p>2. Screw type, dynamic load capacity B040- = ball screw, 4.0 kN (899 lbs) B060- = ball screw, 6.0 kN (1388 lbs)</p> <p>3. Ordering stroke length 0100 = 100 mm 0150 = 150 mm 0200 = 200 mm 0250 = 250 mm 0300 = 300 mm 0350 = 350 mm 0400 = 400 mm 0450 = 450 mm 0500 = 500 mm</p> <p>4. Electrak® Modular Control System options LEX = Electronic Monitoring Package + low-level signal motor switching + external end-off-stroke limit switch inputs</p> <p>5. Cable option 1 = 0.3 m long cable</p>					<p>6. Rear adapter option M = cross hole for 12 mm pin E = cross hole for ½ inch pin N = forked cross hole for 12 mm pin F = forked cross hole for ½ inch pin S = stainless cross hole for 12 mm pin T = stainless forked cross hole for 12 mm pin</p> <p>7. Front adapter option M = cross hole for 12 mm pin E = cross hole for ½ inch pin N = forked cross hole for 12 mm pin F = forked cross hole for ½ inch pin P = metric female thread M12 × 1.75 G = inch female thread 1/2-20 UNF-2B S = stainless cross hole for 12 mm pin Q = stainless metric male thread M16 × 2 R = stainless metric female thread M16 × 2 T = stainless forked cross hole for 12 mm pin</p> <p>8. Adapter orientation S = standard M = 90 ° turned</p> <p>9. Connector option D = flying leads</p>				

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