THOMSON™

Linear Motion. **Optimized.**

Electrak Pro

Installation and Operation Manual

A DANAHER MOTION COMPANY

DW1105875GB-0910 EDITION 1

Version History

Edition Number	Edition Date	Reason for Revision
1	2009-03-06	First edition

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Introduction

Thomson has many years of experience designing and manufacturing linear actuators for a wide variety of applications on agricultural equipment, school buses, industrial sweepers, vans for the disabled, and other mobile applications. The Thomson linear actuator you have purchased is a well designed, high quality unit, which will provide consistent maintenance-free service throughout its life.

This manual provides complete information needed to install and troubleshoot Thomson **Electrak Pro** 12 and 24 VDC linear actuators. All of these products are easy to install and require no maintenance.

Please follow the instructions provided in this manual carefully to ensure safe, reliable operation. The Application Notes found on page 4 are of paramount importance; be sure to read them thoroughly before proceeding with installation. All stated or implied manufacturer's warranties are voided if this product in not installed and operated in accordance with these instructions.

Warranty

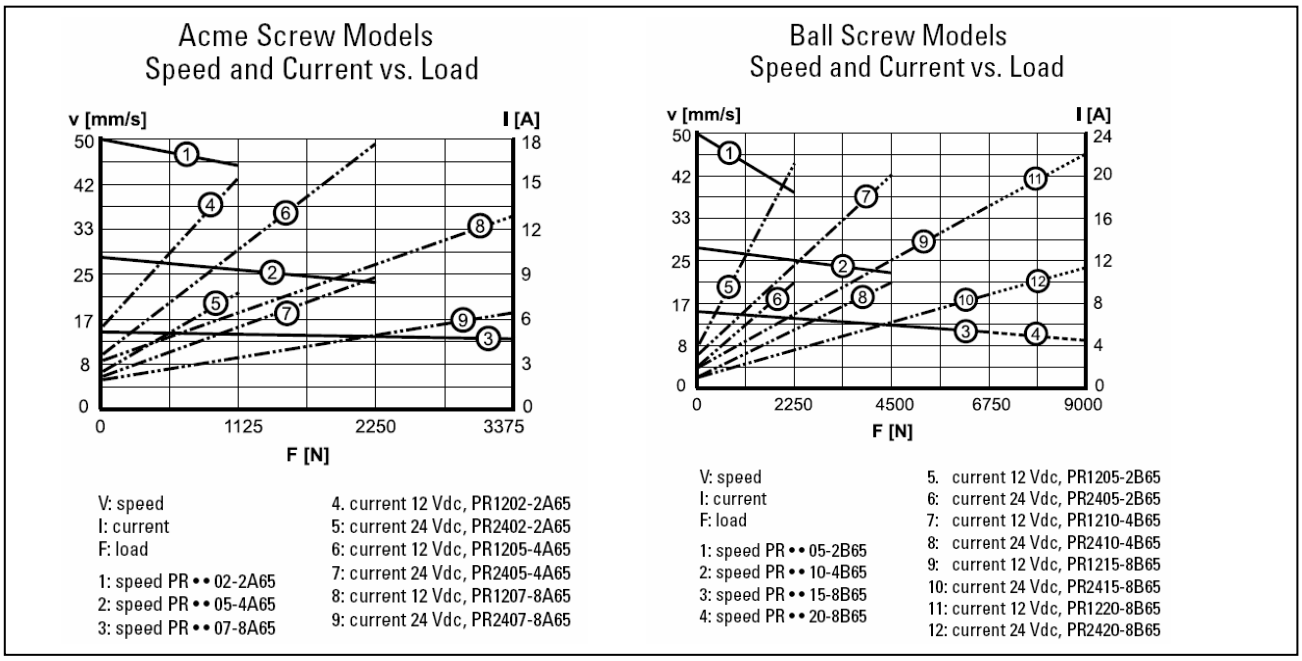
Normal warranty is twelve (12) months from the delivery date. The warranty will not cover any malfunctions due to any type of misuse, faulty installation or if exceeding the performance limits of the unit stated by Thomson. National warranty regulations/laws may have to be considered. Please contact your nearest Thomson office for further advice.

Application Notes

1. Always make sure power is off before attempting to work on or near the **Electrak Pro** actuator and its electrical controls.
2. **Electrak Pro** actuators include integral Electronic Load Monitoring (ELM) that shuts off power to the motor any time the speed drops below a factory set threshold either at ends of stroke or during a mid-stroke overload, or by exceeding a temperature limit due to excessive duty cycle.
3. **Electrak Pro** actuators have an intermittent duty cycle with a maximum “on time” of 25% at rated load. For example, an actuator operating for 10 seconds at rated load must remain off for 30 seconds before it is operated again. Exceeding this maximum will cause excessive motor heat that will cause the ELM to shut off power to the motor until temperatures drop to acceptable levels.
4. **Electrak Pro** actuators are weather protected for use in outdoor application, but they are not waterproof and should not be used in underwater conditions.
5. **Electrak Pro** actuators are not explosion or dust ignition proof; do not apply them to those types of environments.
6. **Electrak Pro** actuators are factory lubricated for life. No disassembly is ever required for routine maintenance purposes. Internal components of **Electrak Pro** actuators are not to be serviced in the field and must be returned to the factory for service.

Specifications

Performance



Standard stroke lengths (mm)…… 100, 150, 200, 300

Operating temperature limits (°C)…….…….. - 40 to +85

Maximum load duty cycle at 25°C (%)…… 25

Axial end play maximum (mm)…… 1,0

Restraining torque maximum (Nm)…….…….. 17

Protection class…… IP66

Electrical Connector …….. Delphi Metri-Pack 280

Mating Connector…… Delphi 12020599 connector
12077411 terminals
15324980 seals
12089754 secondary lock

Mounting

Thomson **Electrak Pro** linear actuators are quickly and easily mounted by installing pins through the holes on each end of the unit and into customer mounting brackets on the machine frame.

Note: Do not attempt to mount the Pro-Series actuator from its cover tube. The cover tube is not designed to support the forces required for mounting the actuator. Actuator damage or personal injury may result.

Half inch (ø12,7mm) diameter solid pins provide maximum holding strength and a retaining or cotter pin on each end will prevent the solid pin from falling out of its mounting bracket. Roll or spring type mounting pins should be avoided. The mounting pins must be parallel to each other as shown in Figure 1. Pins that are not parallel to each other may cause the actuator to bind and lead to premature failure.

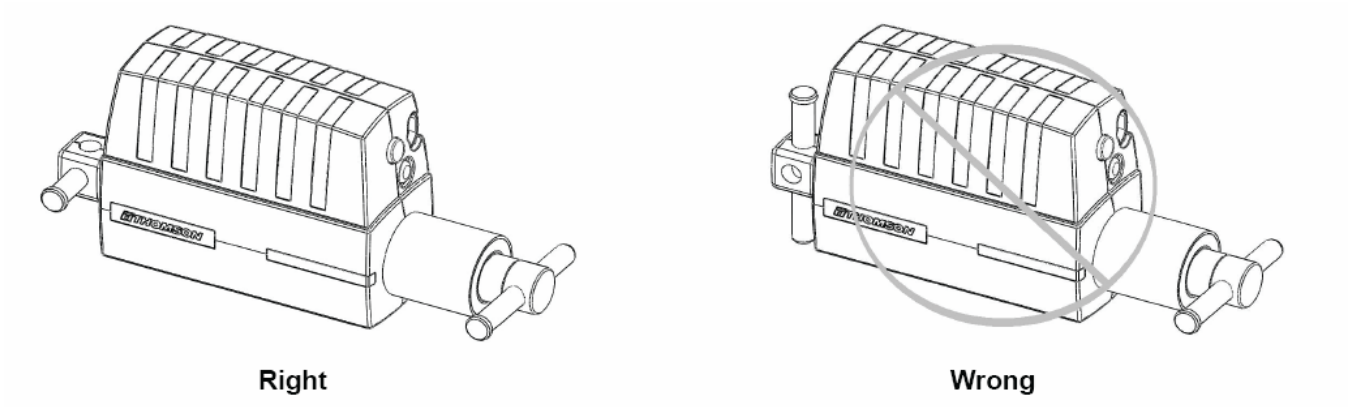


Figure 1.

The load should act along the stroke axis of the actuator since off center loads may cause binding and lead to premature failure. See Figure 2.

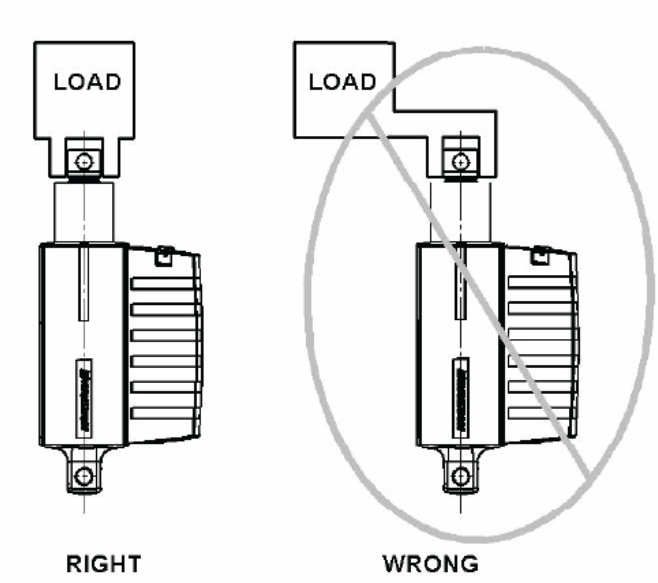


Figure 2.

Make sure that mounting pins are supported on both ends. Failure to do so could shorten the life of the actuator. See Figure 3. Cantilever mounts are unacceptable.

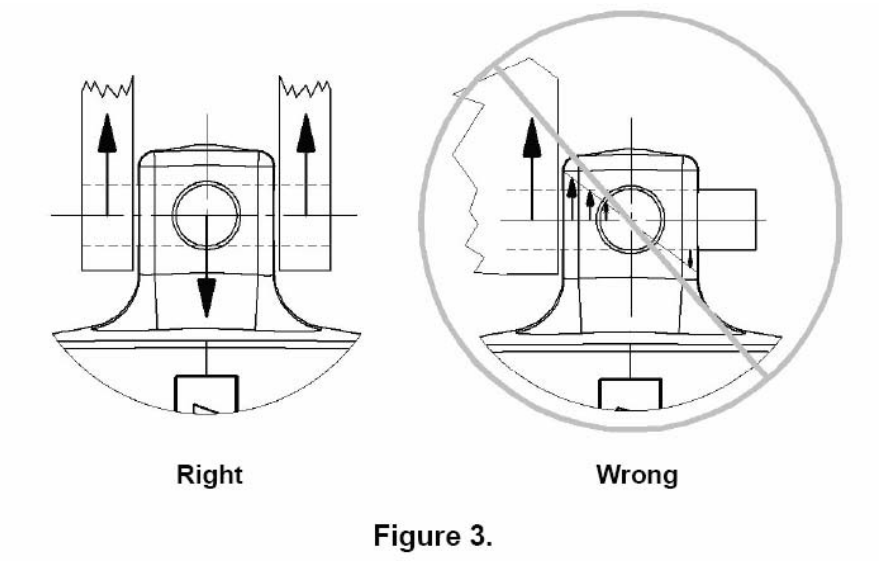


Figure 3.

The actuator mounting brackets must be able to withstand the torque that is developed when the unit extends or retracts. See Figure 4. Restraining torque varies with the model being used; see the chart below for the required value for the actuator used.

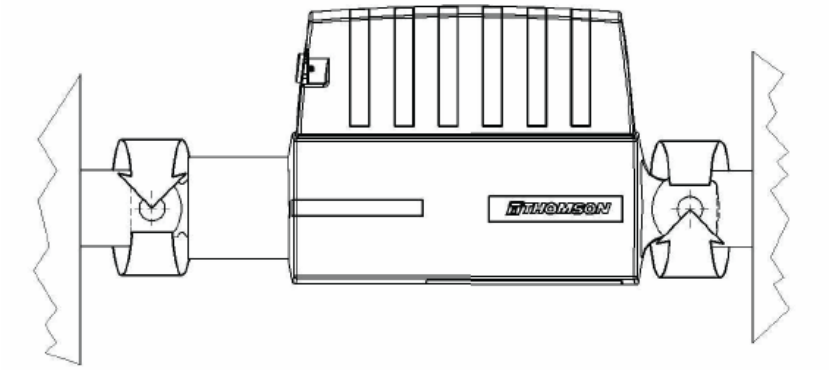


Figure 4.

PRXX02-2A65…….. 2,8 Nm
PRXX05-4A65…….. 5,7 Nm
PRXX07-8A65…….. 8,5 Nm
PRXX05-2B65…….. 2,8 Nm
PRXX10-4B65…… 5,7 Nm
PRXX15-8B65……11,3 Nm
PRXX20-8B65…… 17,0 Nm

Electrical Installation

Note: Make sure power is off before attempting to wire the actuator.

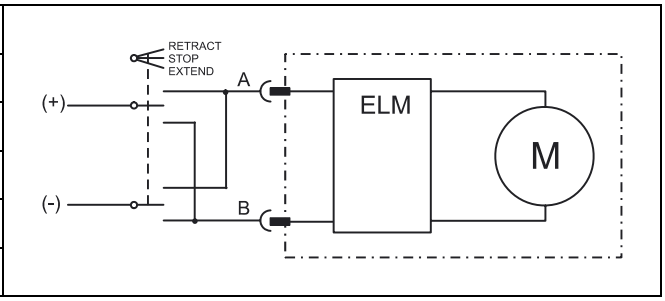
Electrak Pro actuators are offered with many control options to suit specific customer needs. Recommended wiring diagrams are shown below for each option.

Electronic Load Monitoring (S) - Standard feature for Electrak Pro

The integral Electronic Load Monitoring (ELM) shuts off power to the motor anytime the actuator speed drops below a pre-set threshold due to motor speed variation (either at ends of stroke, or during a mid-stroke overload), or by exceeding a temperature limit (excessive duty cycle). The threshold value is scaled based upon available input voltage and ambient temperature. The control will dynamically brake the actuator anytime the ELM is activated. The ELM function requires the actuator to be at a complete stop prior to direction reversal (approximately 100 milliseconds).

Interconnection is achieved by the integral 2 wire input to the actuator with directional control provided by the customer via a double-pole, double-throw switch with a contact rating for actuator rated load current. This is the standard offering and is equivalent with the customer wiring interface used on typical Danaher Motion actuators.

Possible motor voltages	12, 24 V DC
Anti-rotation option required	No
Auxiliary cable harness	No

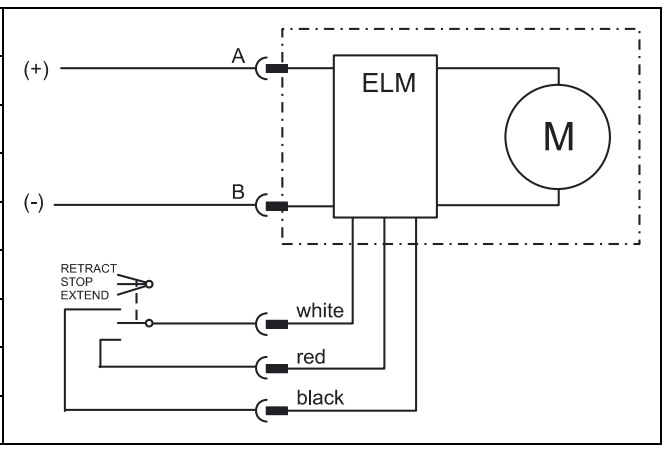


ELM + Low Level Switching Option (T) - Only available for 12 V DC motor voltage

This design allows the customer to use low current outputs to extend or retract the actuator. Polarity changes to the motor are controlled internal to the actuator using a second relay. The control will dynamically brake the actuator anytime the ELM is activated or the commanded direction has been changed.

Interconnection requires 5 wire inputs to the actuator, 2 power leads directly from battery to the integral connector and 3 signal input leads through an auxiliary harness. The customer control must supply 2 contact closures to indicate direction (contacts must be rated for 20 mA at 12 V DC).

Possible motor voltages	12 V DC
Anti-rotation option required	No
Auxiliary cable harness	Yes
Max. I/O switching current	0.02 A



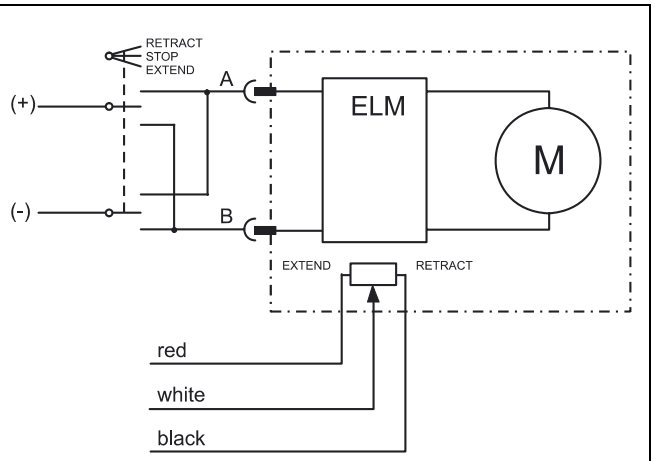
ELM + Analog Feedback Option (L) - Available for all motor voltages

This design includes a 5 kohm linear potentiometer for strokes equal to or less than 150 mm or 10 kohm linear potentiometer for strokes greater than 150 mm, integral to the actuator that must be powered and read by the customer's control (1 watt maximum power dissipation). Total resistance is ± 15 % with essentially infinite linear resolution. The user should apply control voltage to one end of the potentiometer and 0 V to the other end. To retrieve a positional output, compare the wiper to 0 V voltage.

The control will dynamically brake the actuator anytime the ELM is activated.

The analog feedback requires 3 signal level interconnections (one for each end of the resistance element and one for the wiper).

Possible motor voltages	12, 24 V DC
Anti-rotation option required	Yes, for ball screw models
Auxiliary cable harness	Yes
Potentiometer resistance stroke up to 150 mm stroke longer than 150 mm	 5 kohm ± 15 % 10 kohm ± 15 %
Max. potentiometer input voltage	24 V



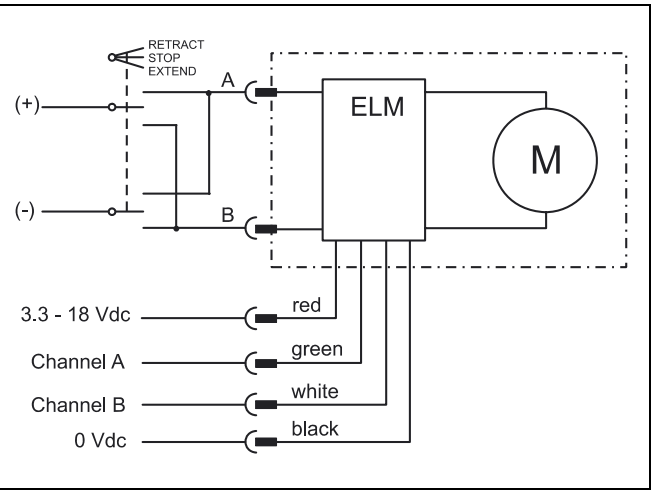
ELM + Digital Feedback Option (D) - Available for all motor voltages

This design simulates a single Hall Effect acting in quadrature, triggered by the multi-pole magnet on the rotating motor shaft. The customer's control must provide a 3.3 - 18 V DC input power for the Hall Effects, count the pulses, interpret the actuator position, and control the start/stop of the actuator. The customer control must also provide an initialization process when power is re-started. A recommended schematic is available to help with interface. Linear resolution will be 0.03 mm (0.0012 in) for the lowest gear reduction, 0.015 mm (0.0006 inches) for the middle gear reduction and 0.008 mm (0.0003 in) for the highest gear reduction. Protection for the Hall Effects is integral to the actuator.

The control will dynamically brake the actuator anytime the ELM is activated.

The digital feedback interconnection requires 4 signal level leads (2 for power input of 3.3 – 18 V DC and 2 for the output of channel A and B).

Possible motor voltages	12, 24 V DC
Anti-rotation option required	No
Auxiliary cable harness	Yes
Pulses / mm PR • • • • - 2A(B)65 PR • • • • - 4A(B)65 PR • • • • - 8A(B)65	 33.3 66.6 125.0
Input voltage range for the digital feedback option	3.3 - 18 V DC



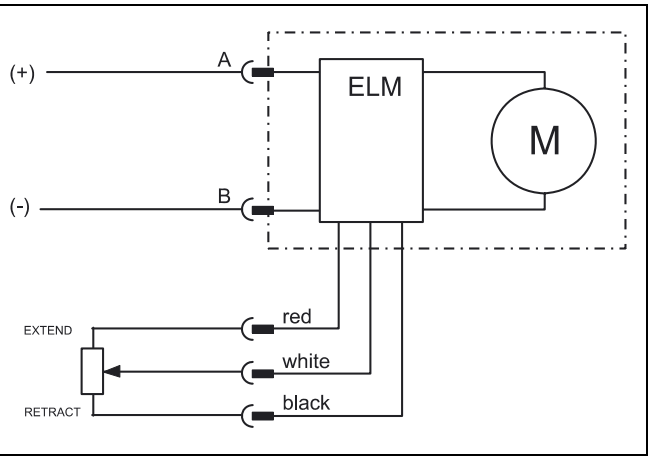
ELM + Signal Follower Option (K) - Only available for 12 V DC motor voltage

This feature will enable the actuator to “follow” an analog input “signal” coming from a 10 kohm potentiometer or any 0 - 5 V DC analog control signal. The actuator control provides the 5 V DC power supply for the 10 kohm input “signal” potentiometer. The actuator microprocessor continuously compares the “signal” voltage from the customer potentiometer to the “follower” voltage from the internal actuator potentiometer. Any differences cause the control to drive the actuator until the signals match. The control will dynamically brake the actuator anytime the ELM is activated.

Interconnection requires 3 signal level leads for the customer potentiometer (one for each end of the resistance element and one for the wiper), and 2 power leads directly from the battery to the integral actuator connector.

For more repeatable positioning, customers may want to consider a multi-position rotary switch with discreet resistance values.

Possible motor voltages	12, V DC
Anti-rotation option required	Yes, for ball screw models
Auxiliary cable harness	Yes
Input signal	0 - 10 kohm
Output voltage for the follower potentiometer	5 V DC



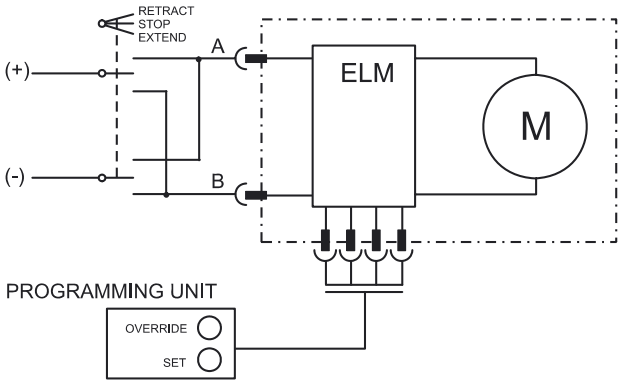
ELM + Programmable Limit Switch Option (P) - Available for all motor voltages

This feature will enable the customer to “program” end limit points in the application without requiring the end of stroke to be limited by either the actuator or the mechanism. These “programmed” points will trigger the ELM circuit to control ends of stroke.

The design requires 2 wire input power switching to the actuator integral connector plus a 5 wire custom cable connector. A two button “programming unit” with cable and mating connector are required for programming. With power applied to extend the actuator, the programmer presses the O/R (over-ride) button on the unit to manually jog the actuator to the desired extend position and then presses the SET button to input the position into the microprocessor. Similarly, with power applied to retract the actuator, the customer presses the O/R (over-ride) button on the programming unit to manually jog the actuator to the desired retract position and then presses the SET button to input the position into the microprocessor. The microprocessor stores the last two positions programmed into its memory. When the voltage at the potentiometer equals the voltage of one of the “program” settings, the microprocessor will shut off power to the actuator via the ELM circuitry. The control will dynamically brake the actuator anytime the ELM is activated.

The programming unit can be removed from the actuator once the positions are stored in the control memory; the housing connector is a sealed design that can be accessed again if positions need to be changed.

Possible motor voltages	12, 24 V DC
Anti-rotation option required	Yes, for ball screw models
Auxiliary cable harness	Yes
Programming unit required	Yes

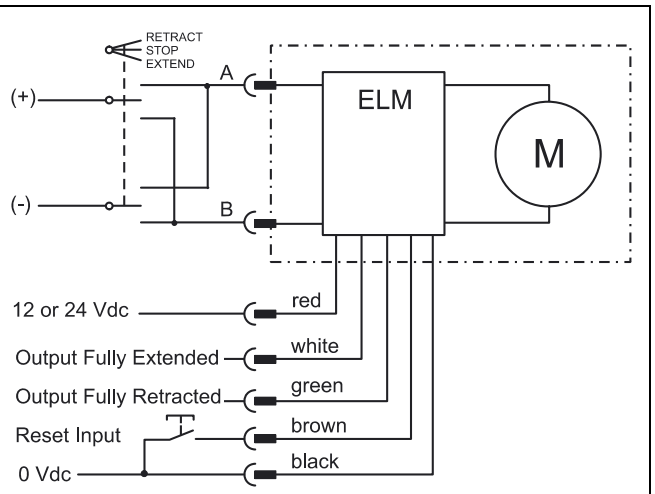


ELM + End of Stroke Indication Outputs Option (R) - Available for all motor voltages

This feature uses a continuously powered control system to monitor the self programmed end of stroke locations. This allows an output indication even if the actuator is not running. The limits are established approximately 5.08 mm (0.2 in) from the mechanical limit. Either output can supply 20mA at 12 or 24 V DC. The actuator will dynamically brake at end of stroke or when the ELM is activated.

Interconnection is achieved by a 2 wire motor control input to the actuator's integral connector with a directional control provided via a double-pole, double-throw switch (not provided) with a contact rating for actuator rated load current. Also, a 5 wire system includes the 12 or 24 V DC control supply voltage input (continuous), end of stroke outputs, and an end of stroke reset (attaching the reset lead to common ground will reset the set points). End of Stroke set points are self programmed by running actuator to full extend, then full retract.

Possible motor voltages	12, 24 V DC
Anti-rotation option required	Yes, for ball screw models
End of stroke indication output positions	5.08 mm before fully extended and fully retracted
Option supply	12 or 24 V DC @ 0,1 A
Max. output current	0.02 A
Auxiliary cable harness	Yes
Electronic Load Monitoring	Yes

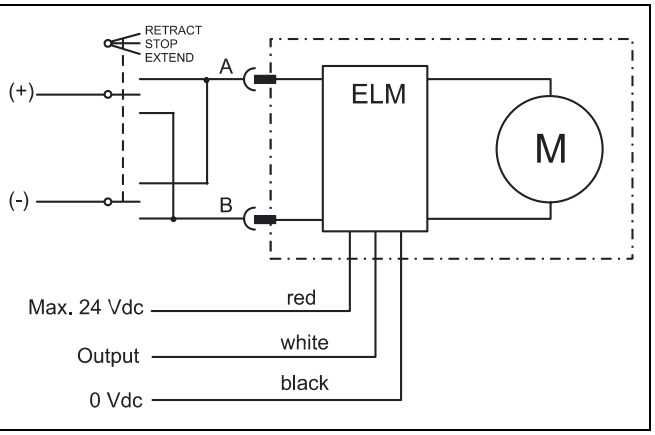


ELM + ELM Indication Output Option (U) - Available for all motor voltages

This feature provides an output signal from the actuator microprocessor anytime the ELM feature is activated. The actuator will dynamically brake anytime the ELM is activated.

Interconnection is achieved by a 2 wire input to the actuator integral connector with directional control provided via a double-pole, double-throw switch (not provided) with a contact rating for actuator rated load current; and 2 low level connections to monitor a contact closure whenever the ELM is activated with a maximum contact rating of 20 mA and 24 V DC.

Possible motor voltages	12, 24 V DC
Anti-rotation option required	No
Max. option supply	24 V DC @ 0,02 A
Max. output current	0.02 A
Auxiliary cable harness	Yes



Wire Gauge Selection

Long lead wires between the power source and the actuator will result in a voltage drop. This voltage drop can be minimized by sizing the wires in accordance with the following Lead Cross Section table, which is based on DC power sources and an ambient temperature of 30°C or less. A higher ambient temperature may result in the need for a greater cross section.

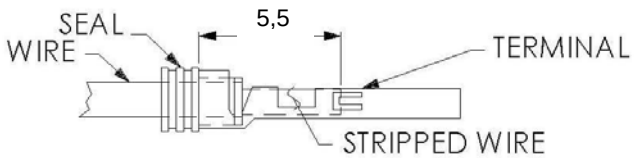
Lead Cross Section Selection Table [mm²]

Current draw [A]	Cable length [m]	Actuator input voltage [Vdc]		
		12	24	36
0 - 10	0 - 3	1,5	1,5	1,5
	3 - 6	2,5	1,5	1,5
	6 - 10	4	1,5	1,5
10 - 15	0 - 3	1,5	2,5	1,5
	3 - 6	2,5	2,5	1,5
	6 - 10	4	2,5	1,5
15 - 20	0 - 3	2,5	-	-
	3 - 6	4	-	-
	6 - 10	6	-	-
20 - 28	0 - 3	4	-	-
	3 - 6	6	-	-
	6 - 10	10	-	-

Connectors

Pro actuators include a mating connector kit that can be assembled to lead wires for the power input. The kit consists of Delphi Metri-Pack 280 12020599 connector, (2) 12077411 terminals, (2) 15324980 seals, and 12089754 secondary lock. Terminals and seals are to be assembled to the lead wires per the drawing and notes below.

1. Strip insulation to 5,5 +/- 0,5 mm.
2. Assemble seal to lead as shown.
3. Crimp terminal to lead and seal as shown. Crimp to hold 50 N pull.
4. Assemble terminals and seals into connector body in correct orientation



Auxiliary signal wires are provided through a 1 meter long jacketed cable with conductors of 22 AWG (0,325 mm^2) stranded copper. Terminals and connectors must be provided by the customer.

Actuation

To extend the actuator, connect Position “B” of the electrical connector to positive voltage and Position “A” of the electrical connector to negative voltage. To retract the actuator, connect Position “B” of the electrical connector to negative voltage and Position “A” of the electrical connector to positive voltage.
Note that actuation is performed differently (according to wiring schematic) for the control options “T”, “K”, and “W”.

Switches

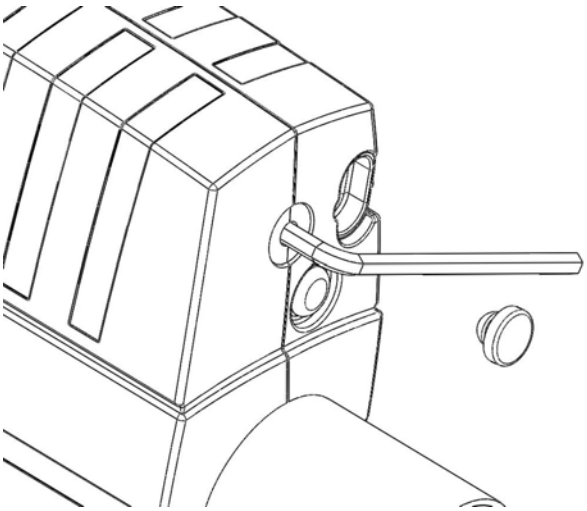
Pro-Series DC actuators require double-pole, double-throw switches. McGill 0121-004, Cutler Hammer 8835-K4, or equivalent are recommended and can usually be obtained locally. The required switch can also be purchased from Danaher Motion under part number 830-8004-016.

Recommended Switch Specifications include:

Double-pole, double-throw
Momentary contacts with center off position
Rated for 20 amperes at 28 VDC

Manual Operation

If power is lost, the actuator can be manually extended or retracted by operating the manual override. Remove the rubber plug from the front of the actuator housing (see diagram below). Insert a 5 mm or 3/16” hex key (allen wrench) into the slot and rotate it (CCW) to extend or (CW) retract the actuator. You may want to use a hand drill to drive the hex key for faster and easier extension / retraction. Replace the rubber plug when not using the manual override.



Troubleshooting

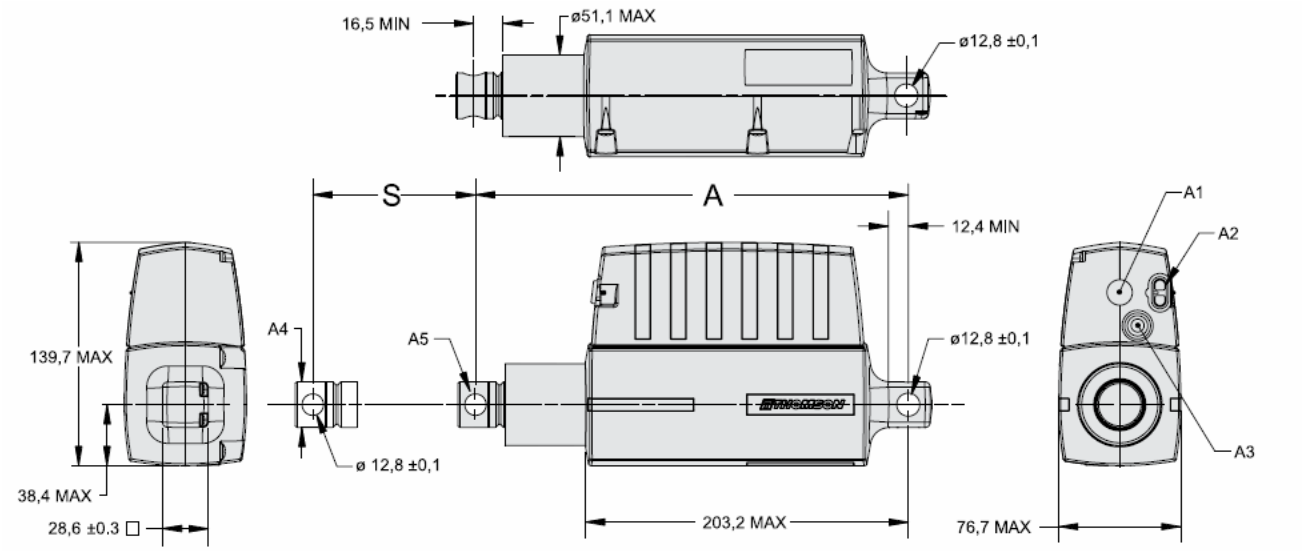
The chart below may be helpful in isolating malfunctions in the control system, countering difficulties with system start-up, and in troubleshooting for worn or broken components in units that have been operating for some time. For proper diagnosis, it is important to do all tests prior to returning the actuator.

Symptom: Actuator will not extend or retract		
Checkpoint	**Probable Cause**	**Possible Solution**
No voltage or current draw	Actuator not receiving power	Check power supply, fuse, and wiring
Proper voltage, no current draw	Motor “open”	Return for Service
	ELM (control) “open”	
	Direction reversed too rapidly	Allow 100 milli-seconds off time prior to reversing
Proper voltage, current present	Mechanical Overload	Check Load
	Thermal Overload	Cool and Check Duty Cycle
Symptom: Actuator stops mid-stroke		
Checkpoint	**Probable Cause**	**Possible Solution**
Proper voltage, current present initially but then drops to zero	Mechanical Overload	Check Load
	Thermal Overload	Cool and Check Duty Cycle
Current present but voltage is low	Power Supply inadequate	Check power supply
	Wiring inadequate	Check wiring

Dimensions

The outline drawings shown below describe the ball screw and acme screw actuators. The table shows the stroke, retracted length and weight for the various models.

Note: Specifications, part numbers, dimensions, etc., may be changed without notification.



S: stroke
A: retracted length
A1: manual override cover (manual override requires 5 mm or 3/16 hexagon key to operate)
A2: motor connector
A3: knock out plug for signal wire exit
A4: adapter / extension tube diam. for 1125 - 6800 N models = 28,58 ±0,13 mm, for 9000 N model diam. = 30,16 ±0,13 mm.
A5: front adapter cross hole shown in standard position

Stroke (S)	[mm]	100	150	200	300
Retracted length, acme screw models (A)	[mm]	257,5	307,5	357,5	457,5
Retracted length, ball screw models (A)	[mm]	289,5	339,5	389,5	489,5
Weight, acme screw models	[kg]	3,0	3,2	3,4	3,9
Weight, ball screw models	[kg]	3,4	3,6	3,8	4,1
Potentiometer resistance change*	[ohm/mm]	36,2	26,5	41,7	29,3

* Potentiometer is optional

Type Designation Key

1	2	3	4	5	6	7
PR24	20-8B65	D	10	R	C	S

1. Model and input voltage
PR12 = Electrak Pro, 12 Vdc
PR24 = Electrak Pro, 24 Vdc

2. Dynamic load capacity and screw type
02-2A65 = 1100 N, acme
05-4A65 = 2250 N, acme
07-8A65 = 3375 N, acme
05-2B65 = 2250 N, ball
10-4B65 = 4500 N, ball
15-8B65 = 6750 N, ball
20-8B65 = 9000 N, ball

3. Protection class
D = IP66 (standard)
G = IP67

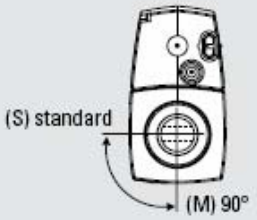
4. Stroke
10 = 100 mm
15 = 150 mm
20 = 200 mm
30 = 300 mm

5. Control PCB options
S = electronic load monitoring, ELM (standard)
D = ELM + encoder
L = ELM + linear potentiometer[1]
P = ELM + programmable limit switches [1]
T = ELM + low level power switching[2]
R = ELM + end of stroke indication outputs[1]
U = ELM + ELM trip indication output
W = ELM + PWM speed control monitoring[3]
K = ELM + signal follower input[1/2]

6. Front adapter hole and anti-rotation options
C = freely rotatable cross hole, no anti-rotation
S = adapter hole in standard position, anti-rotation[4]
M = adapter hole rotated 90°, anti-rotation[4]

7. Finish
S = no paint (standard)
B = actuator painted black

[1] Requires anti-rotation mechanism (specify option S or M in position 6).
[2] Only possible on 12 Vdc input voltage models.
[3] PWM speed control monitoring requires the ELM to be set from factory to match the customer's PWM source. Contact customer support for more information.
[4] Definition of adapter hole positions.



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