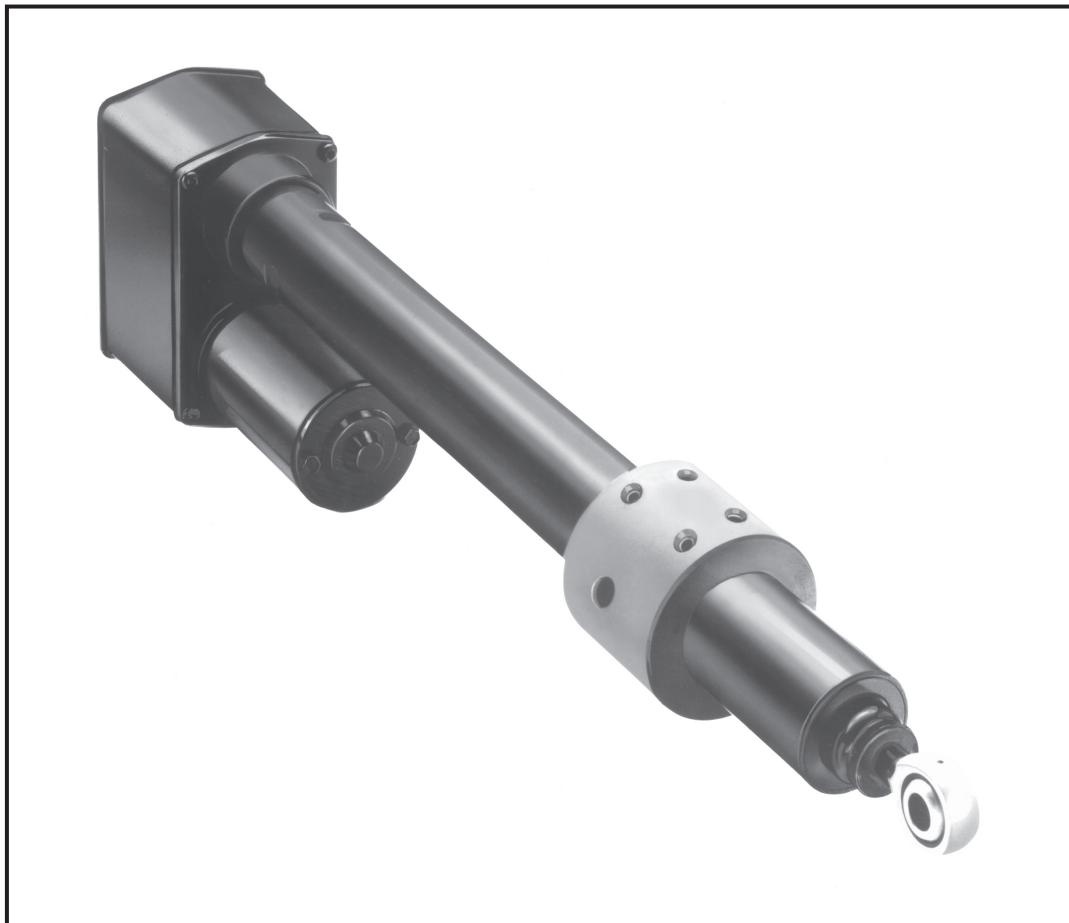


***Electrak 100 Series / Electromechanical Linear Actuator***



## INTRODUCTION

Thomson has many years of experience designing and manufacturing linear actuators for a wide variety of applications on combines, school buses, industrial sweepers, vans for the handicapped, 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 actuator incorporates a potentiometer for stroke position sensing. When mated with an MCS-2035 or MCS-2030 power supply, it will provide position feedback as well as controlled linear force for positioning, adjusting, closing or opening on in-plant or mobile applications.

This manual provides complete information needed to install and troubleshoot P24-05B5 or P24-20B5 DC Linear Actuators. Each of these products is easy to apply and requires no maintenance.

Please follow the instructions provided in this manual carefully to ensure safe, reliable operation. The Application Notes found on page 3 are of paramount importance, so be sure to read them thoroughly before installing. All stated or implied manufacturer's warranties are voided if this product is not installed and operated in accordance with these instructions.

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## WARRANTY

Thomson 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 Thomson's prior consent.

Warranty service can be obtained in the U.S.A. by returning any defective product, transportation charges prepaid, to the appropriate Thomson factory. Additional warranty information may be obtained by writing the Customer Service Department:

### Thomson

45 Hazelwood Drive - Amherst, NY 14228  
800-566-5274

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, without 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 warrant lasts, so the above limitation may not apply to you.

Thomson's obligation under this warranty is limited to the repair or replacement of the defective product and in no event shall Thomson be liable for consequential, indirect, or incidental damages of any kind incurred by reason of the manufacturer, sale or use of any defective product. Thomson 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 EXPRESS OR IMPLIED BY OPERATION OF LAW OR OTHERWISE, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS.

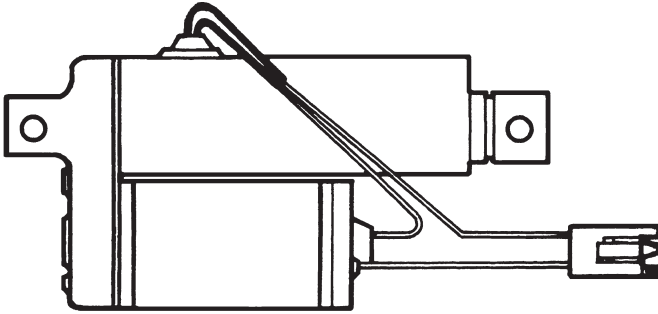
Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

## Other Actuator Products

Thomson's family of actuators offers the right load capacity, stroke length, and control package for almost every application. With stroke lengths from 2 to 24 inches, load ratings from 25 to 1000 lbs., AC or DC models, and control systems from simple on-off control to sophisticated closed loop sensing types, Thomson actuator systems

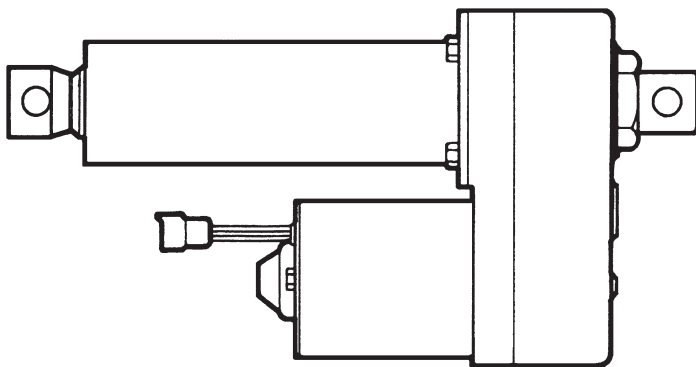
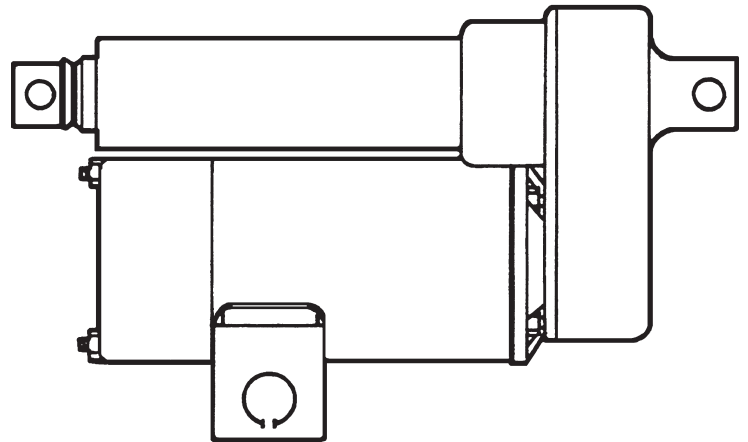
encompass a broad product range. The actuator series described on this page are available at your local Thomson distributor or directly from the address on the back cover of this manual.

Ask for catalog no. P-786 for more information on these products.



Electrak 1 – Nominal load capacities in a small package.  
Load Ratings: 25 or 75 lbs. max.  
Stroke Lengths: 2, 4, or 6 inches  
Power Input: 12 or 24 VDC  
Overall Lengths: 7 to 11 inches, depending on stroke.

Electrak 5 – A 115 VAC for in-plant applications.  
Load Ratings: 500 lbs. max.  
Stroke Lengths: 4, 8, 12, 18 or 24 inches



Electrak 10 – The outdoor actuators – designed for mobile equipment.  
Load Ratings: 500 or 1000 lbs. max.  
Power Input: 12 or 24 VDC  
Stroke Lengths: 4, 6, or 12 inches

The Thomson family of actuator controls - a choice of separate or combined power supplies and controls to meet your various needs.

### MCS-2015

A power supply for use with a remote control station, photoscanner or programmable controller to run any 24 VDC actuator. 115/230 VAC input, 24 VDC output, thermal overload protection, fused, power on/off switch.



### MCS-2025

Combines the power supply of the MCS-2015 and the control of the PC compatible MCS 2020 in a single enclosure for ease of installation and wiring.



### MCS-2020

A control that can be used with the MCS-2015 or other 12 or 24 VDC power sources. Provides extend, retract, jog, run and auto return functions. Programmable controller compatible, 12 or 24 VDC input-output.



### MCS-2035

Combines the power supply of the MCS-2015 and the control of the PC compatible MCS-2030 in one enclosure for ease of installation and wiring.



### MCS-2030

Same as the MCS-2020 but includes an analog meter to display the position feedback from the Electrak 100.



## Application Notes

1. Before wiring an Electrak 100 actuator to an MCS series or other customer control, be sure to first read the wiring instructions in this manual.
2. Always make sure power is off before attempting to work on or near an actuator and its electrical controls.
3. Electrak 100 actuators are load protected with a mechanical slip clutch. The clutch will slip when the load exceeds the actuator's rating, preventing any movement of the load. Clutch is factory set based on load rating.
4. The duty cycle for the Electrak 100 is twenty-five percent "on time." For instance, an actuator operating for 25 seconds must remain off 75 seconds before operating again. Exceeding this maximum will cause the motor to overheat and trip its internal thermal breaker.
5. Electrak 100 actuators are weather protected for use in outdoor applications, but they are not waterproof and should not be used in underwater applications.
6. If limit switches are not used or improperly set, the actuator will extend/retract to its mechanical end-of-stroke. An overload clutch is provided to protect the actuator at end of stroke and also mid-stroke if the unit experiences a mechanical overload.
7. Electrak 100 actuators must be mounted by the axial mount kit included. No rear clevis mount is provided.
8. Electrak 100 actuators must be mounted motor down to assure that water or other liquids do not enter into the actuator through the drain holes. The drain hole must be plugged if other mounting orientations are used. (See mounting instructions for drain hole location.)
9. Electrak 100 actuators are factory lubricated for life. No disassembly is ever required for routine maintenance purposes.
10. Electrak 100 actuators are not explosion or dust ignition proof; do not use in those types of environments.

## Specifications

<b>Stroke Length:</b>	4, 8, 12, 18, and 24"
<b>Duty Cycle:</b>	Twenty-five percent "on" time at 75°F at rated load (higher duty cycle, lower loads)
<b>Life:</b>	20,000 cycles, nominal
<b>Motor Protection:</b>	Automatically reset thermal overload protection.
<b>Temperature Range:</b>	-15°F to +150°F
<b>End Play:</b>	.035 inch maximum
<b>Overload Protection:</b>	Mechanical load limit clutch
<b>Mounting:</b>	Actuator ends must be restrained from rotating (to counter 90 in-lb maximum torque developed) and mounted with parallel ½ inch solid pins equally supported on front swivel mount and cover tube collar.
<b>Feedback:</b>	10K ohm potentiometer; accurate within .007 inches
<b>Resistance Change:</b>	250 ohms/inch of travel
<b>End of Stroke Protection:</b>	Mechanical load limit clutch and adjustable end of stroke (extend and retract) limit switches
<b>Conduit Opening:</b>	½ inch NPT
<b>Static Loads:</b>	3000 lbs. maximum

Dynamic Loads:		Performance		
Model	Volts	Max. Load	Max. Amps	Speed at Max. Load
P24-05B5	24 VDC	500	10	1.2 in/sec
P24-20B5	24 VDC	1000	4.5	.40 in/sec

## Mounting

Electrak 100 Linear Actuators are to be mounted by slipping pins through the holes in the extending rod and the tube mounting collar.

Use half inch diameter solid pins for maximum strength and a retaining or cotter pin on each end to 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 must be parallel so the actuator will not bind.

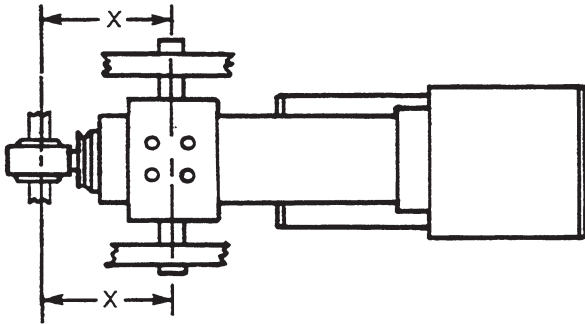


FIGURE 1

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

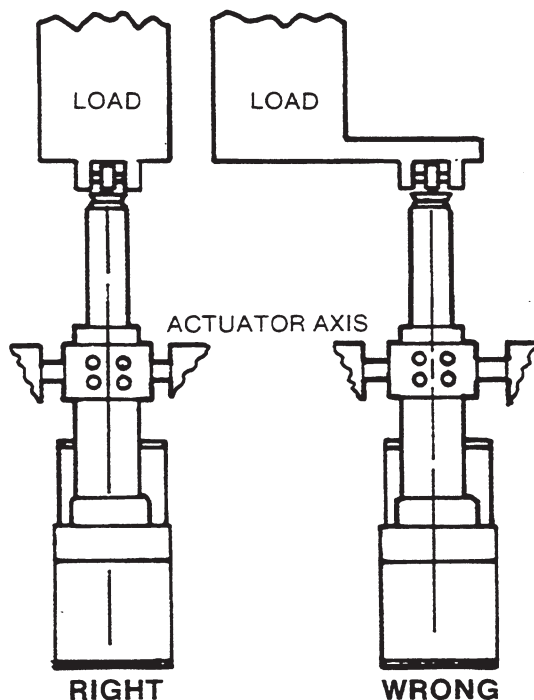


FIGURE 2

The actuator mounting brackets must be able to withstand the 100 in-lb restraining torque which is developed when the unit extends or retracts.

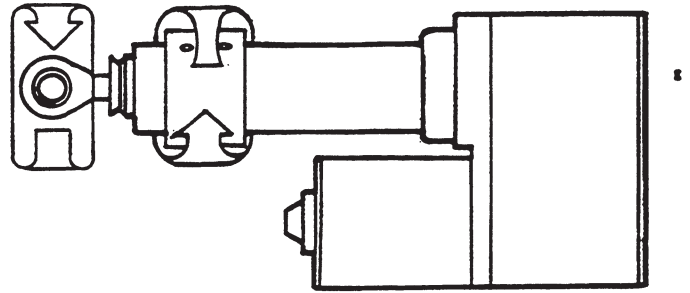


FIGURE 3

The included tube mounting collar may be adjusted anywhere along the cover tube to allow flexibility of mount location. The four set screws are to be tightened once the mounting location has been determined. Recommended torque on the set screws is 22 in-lb minimum

If a customer designed tube mount is used, make sure the mount allows freedom of movement to assure that the actuator does not bind during travel. The mount may be welded to the outer tube but do not disassemble the tube from the actuator. Take care not to damage seals when welding.

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

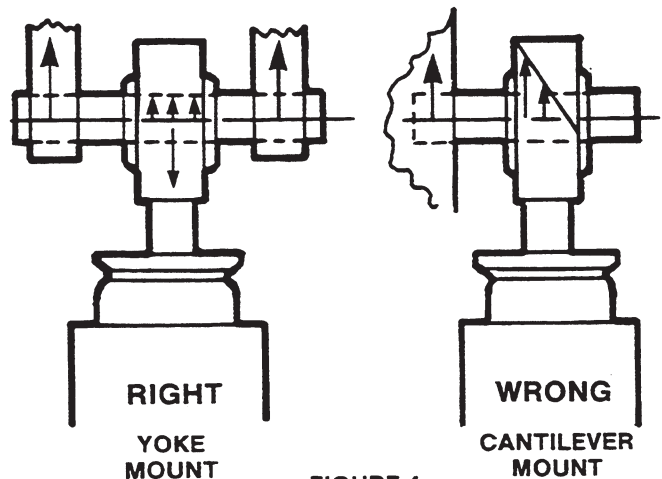
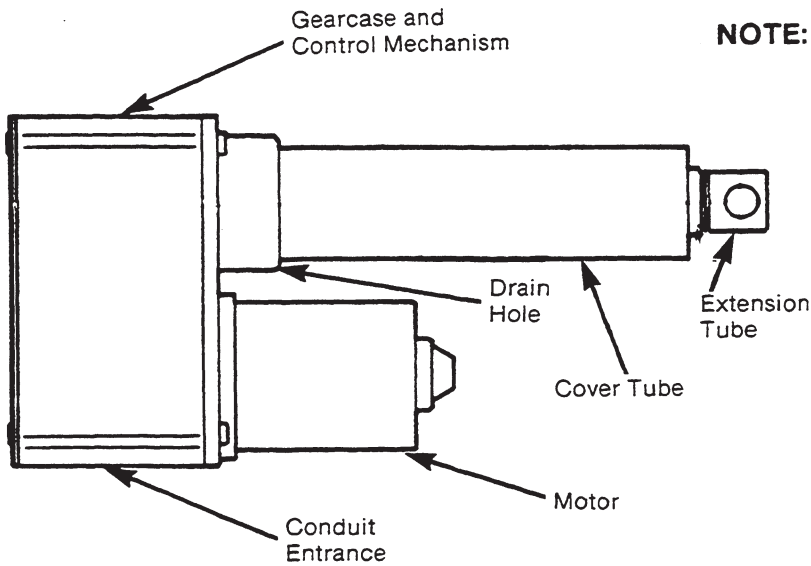


FIGURE 4





**NOTE:** Electrak 100 actuators are provided with drain holes as shown in the picture below. Take care to mount actuator with the hole pointing downward.

## ELECTRICAL INSTALLATION

### WIRE GAUGE SELECTION

#### DC Actuators

Long lead wires between the power source and the actuator will result in a voltage drop for DC units. This voltage drop can be avoided by sizing the wires

in accordance with the following wire gauge selection chart, Figure 1, which is based on a 12 or 24 VDC power source. To use the chart, find the point of intersection of the two known factors, such as amperage and distance, and read the required wire gauge from the curves on the chart. Example: A P24-05B5 actuator draws 10 amps current at rated load. The intersection of the maximum current and the distance between the actuator and power source (25 feet, for example), indicates the wire gauge required (#16).

WIRE GAUGE SELECTION CHART

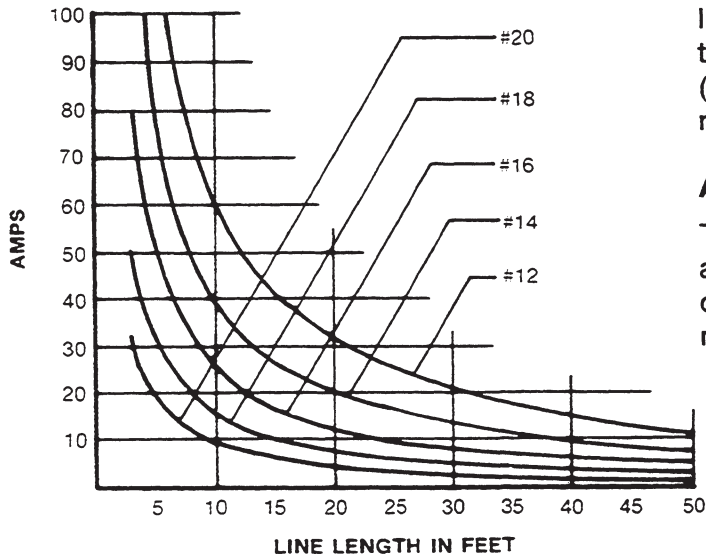


FIGURE 1

#### ACTUATION

To extend actuator, connect the red lead to positive and the yellow to negative. To retract actuator, connect the yellow lead to positive and the red to negative.

## WIRING WITH THE FEEDBACK POTENTIOMETER

To wire an Electrak 100 actuator, remove the rear cover to expose the terminal strips.

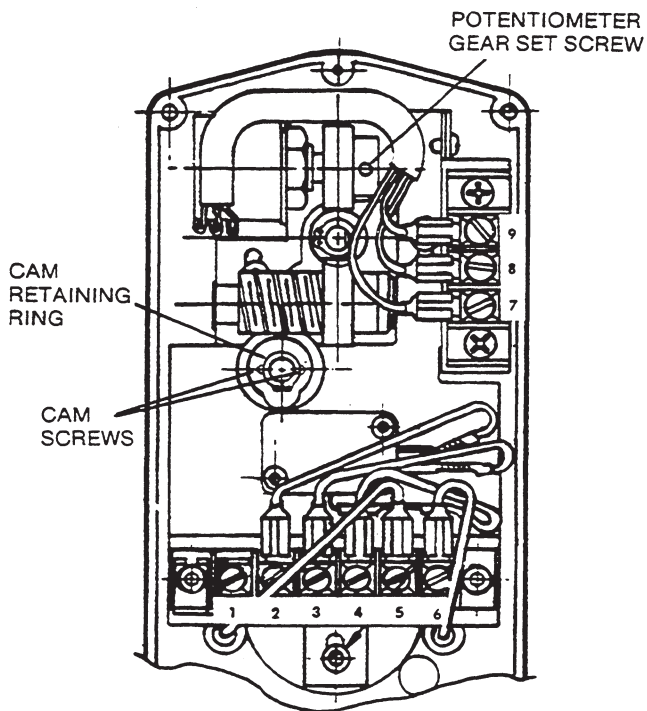
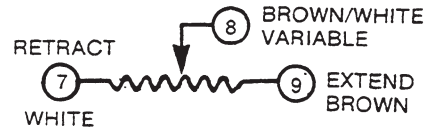
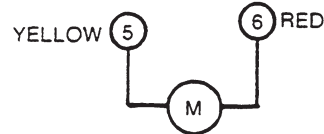


FIGURE 2

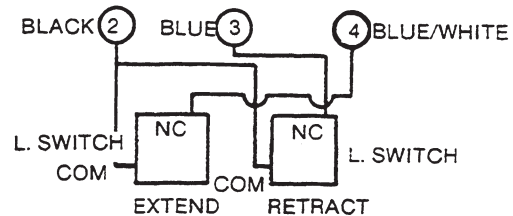
Terminal connections 7, 8, and 9 are for the potentiometer feedback.



Terminal connections 5 and 6 are motor power leads.



Terminal connections 2, 3, and 4 are limit switch connections.



Terminal connection 1 is case ground.



### Setting Limit Switches:

**NOTE:** Limit switches are factory adjusted for optimum stroke length and should not require adjustment. If limit switch adjustment becomes necessary, the following procedure should be used to avoid possible damage to the actuator and the its motor.

Refer to Figure 3 for these operations.

1. Remove the rear cover and gasket. Save all parts. **NOTE:** Before attempting to set limit switches, loosen the set screw on the potentiometer gear to avoid damaging it.
2. With the front mount disconnected from the extension tube, retract the actuator under power until the unit stops. Do not restrain the extension tube from rotating.
3. Rotate the extension tube counterclockwise (viewed from tube end) by hand to the desired retracted position. Two complete turns minimum are required.
4. Refasten the extension tube in its front mount and extend the actuator to the desired extended position. **NOTE:** This position must be no more than the maximum stroke length shown in the dimensional section of this manual. Extending the actuator under power beyond these dimensions may damage the actuator and its motor.
5. Remove the retaining ring from the cam shaft.
6. Loosen the two screws that hold the upper cam and rotate the cam clockwise until an audible "click" from the limit switch is heard. Hold the cam in this position and tighten the screws to secure the cam. **NOTE:** Use care in tightening the screws so as not to deform the cam slots.
7. Run the actuator to full extend and retract positions to check the limit switch settings. If the extend position is not correct, repeat step five to obtain the desired location.
8. Replace the retaining ring.
9. Reset the potentiometer as described in the next section.



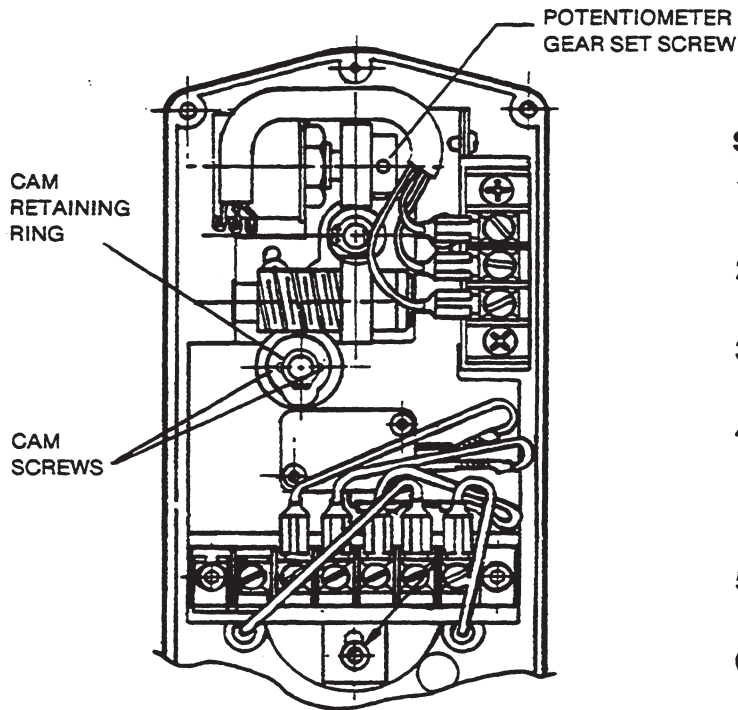


FIGURE 3

**Setting the Potentiometer:**

1. Loosen the potentiometer gear set screw, if not done previously.
2. Retract the actuator to full electrical retract as determined by limit switch.
3. Turn the potentiometer shaft clockwise until it stops.
4. Turn shaft counterclockwise to 1000 ohms  $\pm$  10% (as measured across brown and brown/white lead wires) or one complete turn of the potentiometer shaft.
5. Align the potentiometer gear to mesh with the worm and tighten the set screw.
6. Replace gasket and rear cover.

Interconnect to an MCS-2035 or MCS-2030 control by adhering to the wiring diagram provided in the control package.

If an MCS control is not being used, a control circuit must be developed. A typical schematic is shown for reference in Figure 5 shown on page 8.

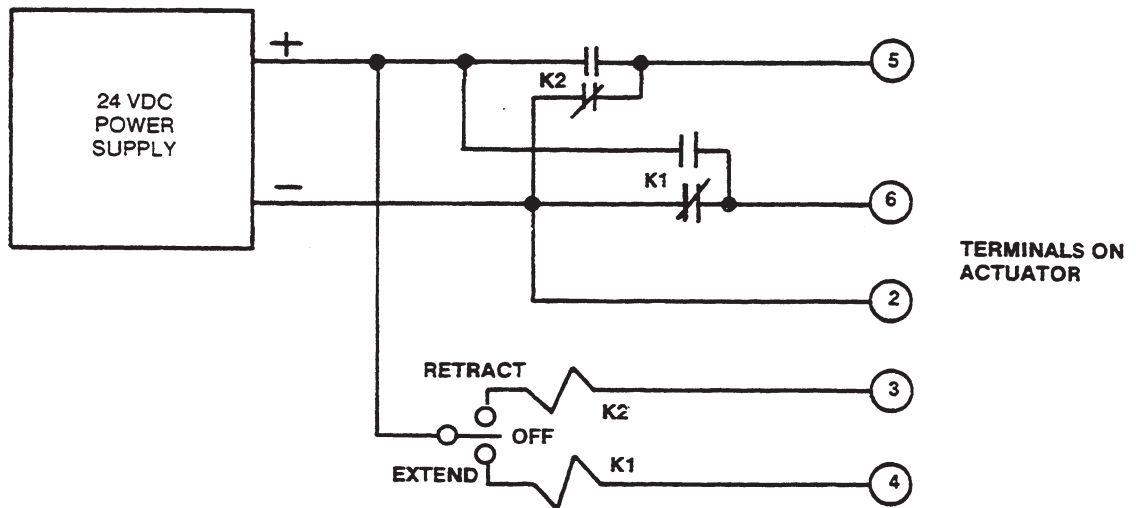


FIGURE 4  
Actuator Connection Diagram

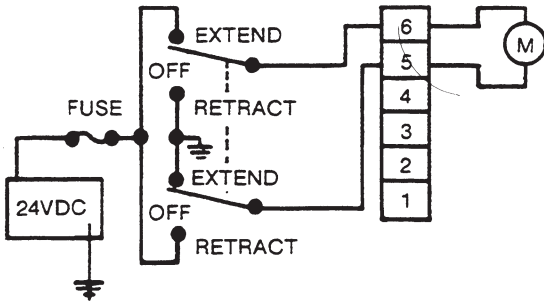
**User Furnished Components —**

- Power Supply: 24 VDC at 20 Amps
- Relays K1 and K2: 24 VDC Coils  
SPDT Contacts Rated  
20 Amps at 24 VDC

- Extension and Retraction Switches: SPDT Contact Rated at 3 Amps at 24 VDC

### Wiring Without Feedback:

Thomson linear actuators used without limit switches or potentiometer feed back should be connected in accordance with the diagram show below.



**FIGURE 5**

**Typical Schematic for Customer Supplied Control**

### SWITCHES:

Actuator direction (forward, reverse) is controlled with a double-throw switch with the center position "off".

### DC Actuator Switches:

DC actuators require double pole, double throw switches. McGill switch no. 0111-004, Cutler Hammer switch no. 8835-K4, or equivalent are recommended and are usually available locally. The required switch can be purchased from Thomson under part number 830-8004-016.

Here are the required parameters:

- Double-pole, double-throw
- 20 Amp at 28 VDC
- Lever seal to keep out dirt and moisture
- Center "off"
- Two momentary contacts
- 15/32" bushing
- Screw terminals

## TROUBLESHOOTING

**This section covers all P24 Models, used with or without MCS series controllers.**

General: The chart below will be helpful for isolating malfunctions in the control system, countering difficulties with system start-up, and in troubleshooting for worn or broken mechanical or electrical components in units which have been operating for some time. For correct diagnosis, it is important to do all tests before removing the actuator or controller from service.

**Symptom: Actuator will not extend/retract**

Checkpoint	Probable Cause	Possible Solution
No voltage or amp draw at controls.	Controller fuse(s) blown.	-Check manual for fuse location(s). Replace.
	Switch not turned on.	-Put power to control.
Proper voltage, no amp draw	Thermal breaker in transformer has tripped. MCS-2020 & MCS-2030 have no thermal breakers.	-Let cool, check duty cycle.
	Thermal breaker in actuator motor has tripped.	-Let cool, check duty cycle
	Limit switch has been tripped.	-Check switch, reset cams.
	If limit switches are not used, the control may not be properly jumpered.	-Check TB2 and control operations manual for connections.
	Limit switch not properly wired.	-Check control operations manual.
Proper voltage, amp draw present, clutch slips	Improperly set limit switch.	-Reset switch (see wiring section).
	Clutch worm too low (excessive ratcheting)	-Replace clutch.

**Symptom: Actuator stops in mid-stroke**

<b>Checkpoint</b>	<b>Probable Cause</b>	<b>Possible Solution</b>
Clutch slips	Actuator overloaded. Limit switch improperly set.	-Check rated load; reset switch (see wiring section).
No amp draw.	Thermal cut-out in motor. Thermal cut-out in transformer. Limit switch improperly set	-Let cool, check duty cycle. -Let cool, check duty cycle. -Reset switch (see wiring section).
Clutch doesn't slip, amp present.	Motor stalled.	-Check voltage (too low).

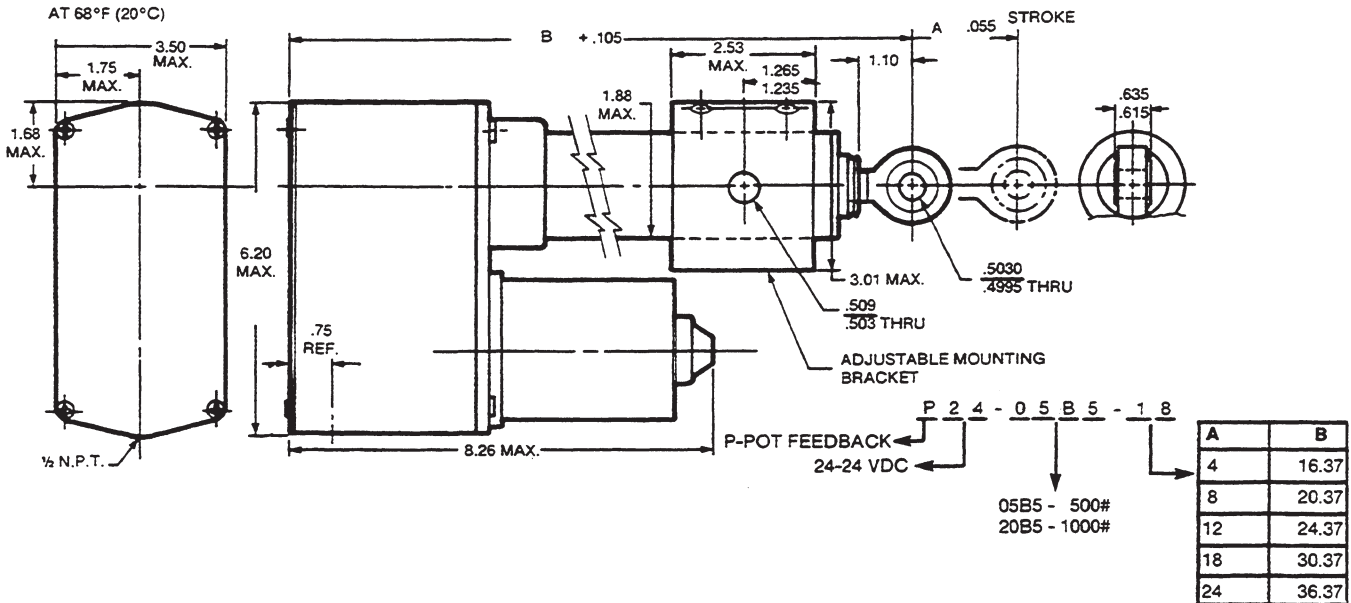
**Symptom: Meter does not show correct percentage of stroke.**

<b>Checkpoint</b>	<b>Probable Cause</b>	<b>Possible Solution</b>
Resistance at full retract 1000 ohms $\pm$ 10%.	Limit switches have been reset without resetting the potentiometer.	-Reset potentiometer (see electrical section).

**If the above checks do not reveal the source of the difficulty, remove actuator from the mechanism to run by itself. Watch and listen for any changes in behavior.**

## DIMENSIONS

The outline drawing below describes Electrak 100 actuators. The tabulated dimension chart shows lengths for each model and describes part numbers.



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

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