THOMSON™

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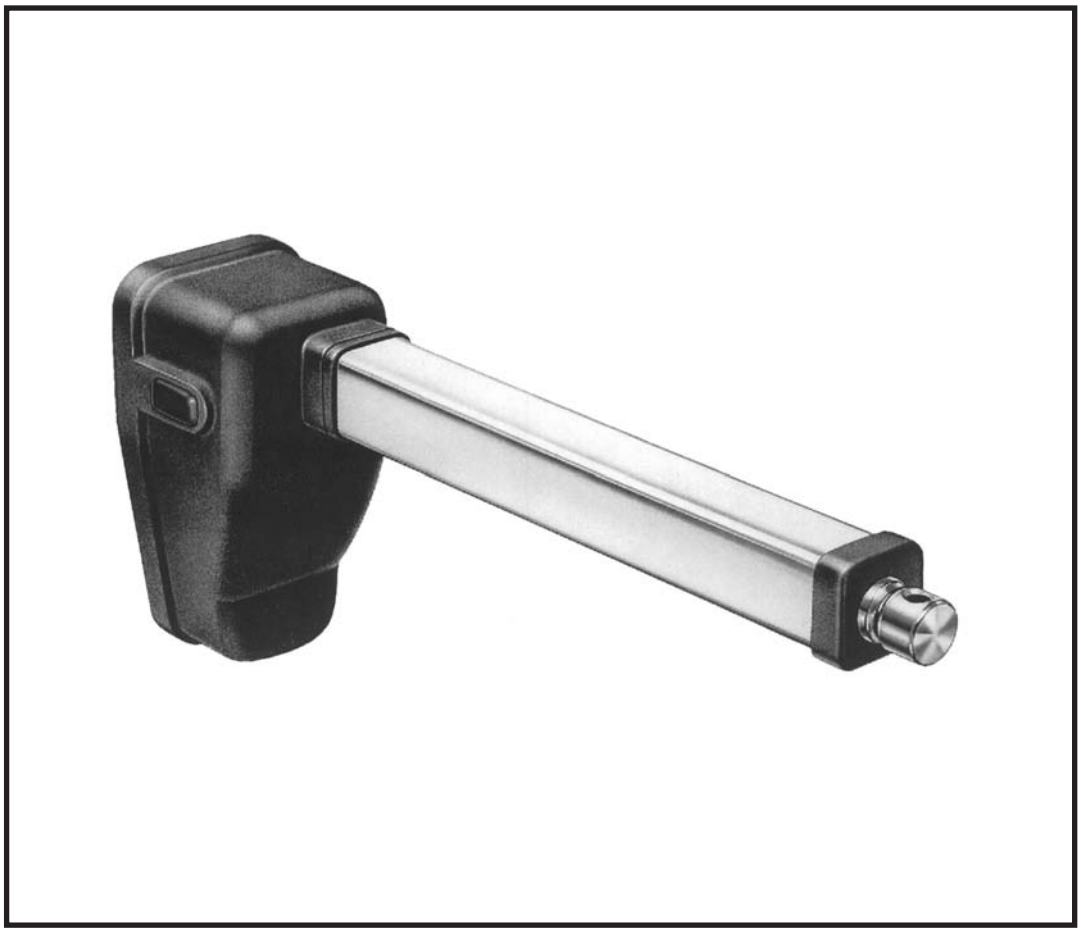
Installation & Operation Manual

E150 SERIES



Solutions by DANAHER MOTION

E150 Linear Actuators

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 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 E150 Series Linear Actuators. All of these products are easy to apply and require no maintenance.

Please follow the instructions provided in this manual carefully to ensure safe, reliable operation. The Application Notes 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 is not installed and operated in accordance with these instructions.

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Specifications

Rated Dynamic	**AC**	**Load**	**DC**
	1.80 in/sec	110 lbs.	1.80 in/sec
	0.80 in/sec	225 lbs.	0.80 in/sec
	0.36 in/sec	450 lbs.	0.40 in/sec

Static Load (DC Models): Two times rated dynamic load

Static Load (AC Models): Same as dynamic load

Power Required (DC Models): 14.0 amps @ 12 volts
7.0 amps @ 24 volts
At Full Rated Dynamic Load 4.7 amps @ 36 volts

Power Required (AC Models): 1.3 amps @ 115 volts
At Full Rated Dynamic Load

Duty Cycle: Twenty-five percent "on" time at 75°F at rated load (higher duty cycles at lower loads)

Life: 40,000 cycles, (B10 Life)

Motor Protection: Automatically resetting thermal overload protection. Not available on 36VDC

Overload Protection: Actuator will stall when overloaded, causing the motor thermal breaker to open if power is not removed.

Temperature Range: -30°F to +150° F

Stroke Length (inches): 1, 2, 4, 6, 8, 10, 12, 14, 16 (*16 inch stroke not available on units with potentiometer)*

End Play: Maximum 0.048 inch 110 lb. model; maximum 0.020 inch on 225 and 450 lb. models not including mounting pins

Mounting: Mounted with parallel pins equally supported on both ends. Actuator is not to be mounted from outer cover tube. Actuator has internal anti-rotation to prevent rotation of extension tube.

Lead Wires: 16 AWG PVC, 85°C insulation

End of Stroke (DC Model): Stall, or use independently adjustable internal limit switches for end of stroke control. (See wiring schematic)

End of Stroke (AC Model): Do not stall.Internal limit switches on LN and LP units. Use pot or other limit switches for end of stroke protection.(See wiring schematic)

Feedback: Optional, 10 turn, 10K potentiometer:
557 ohms/inch change on 110 lb. models
585 ohms/inch change on 225 lb. models
592 ohms/inch change on 450 lb. models

Application Notes

1. Always make sure power is off before attempting to work on or near the actuator and its electrical controls.

2. The duty cycle for the E150 is 25% “on” time. “ For instance, an actuator operating at rated load for 10 seconds must remain off for 30 seconds before operating again. Exceeding this maximum will cause the motor to overheat and trip its internal thermal breaker. On” time is further defined as the time to complete one full extension and retraction. Maximum continuous “on” time is load related and should never exceed 50%.

3. E150 actuators are weather protected for use in outdoor applications, but they are not waterproof and should not be used in underwater conditions. The vent tube in the wiring harness must be positioned to prevent water entry. The vent tube can be lengthened to end in a more suitable location to prevent water entry by using a barbed 1/16” I.D. connector and adding a desired length of 1/16” I.D. tubing.

4. E150 actuators are not explosion or dust ignition proof. Do not use in these types of environments.

5. E150 actuators are factory lubricated for life. No disassembly is ever required for routine maintenance purposes.

Mounting

Thomson actuators are quickly and easily mounted by slipping pins through the holes on each end of the unit and into brackets on the machine frame and the load.

.375 inch (8 mm) 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.

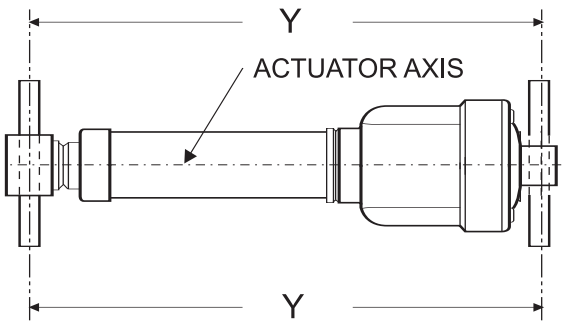


Figure 1

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.

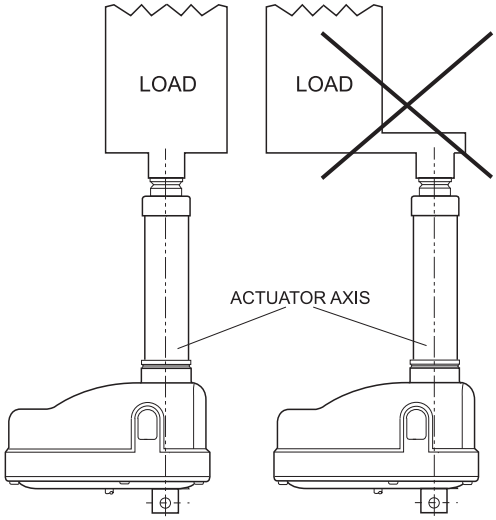


Figure 2

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

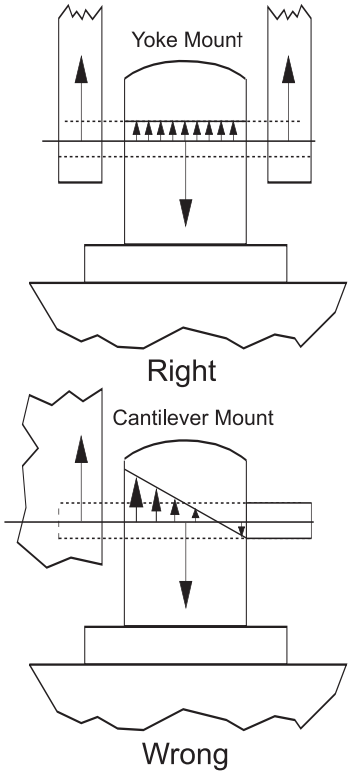
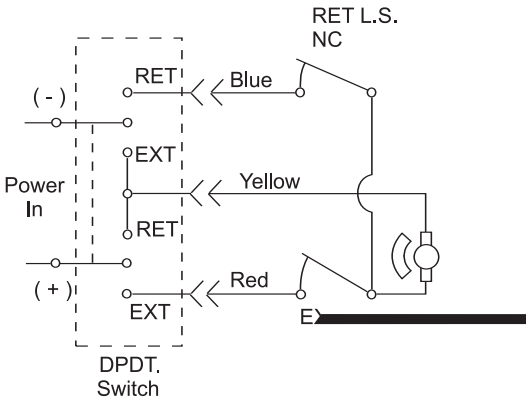


Figure 3

NOTE:
Do not attempt to mount the E150 on its cover tube. The tube is not designated to support the forces required for this type of mounting.

Under certain high vibration conditions a support bracket may be necessary to support the end of the actuator housing to prevent actuator damage. Consult factory for recommended bracket design.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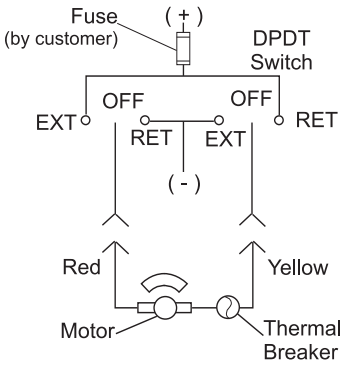
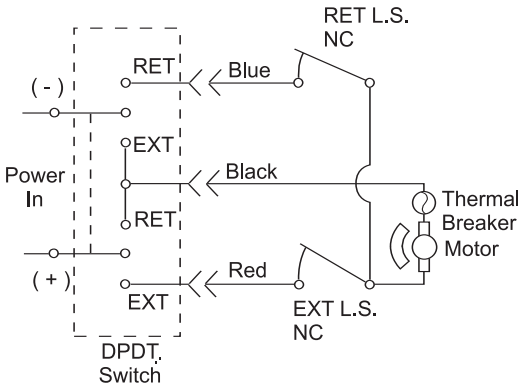
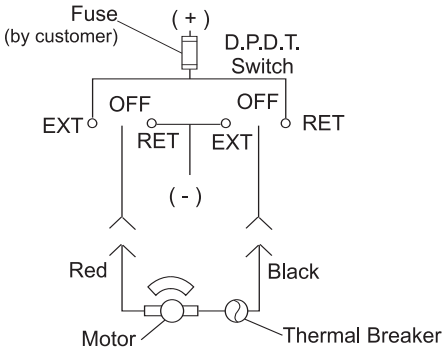
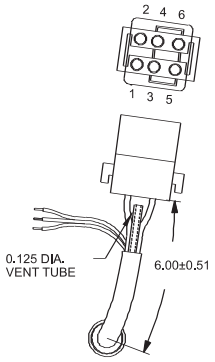
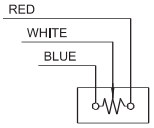
NC
RET
Blue
(-)
EXT
Power
In
Yellow
RET
(+)
Red
EXT
DPDT.
Switch

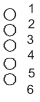

Fuse
(by customer)
(+)
DPDT
Switch
OFF
OFF
EXT
RET
RET
EXT
(-)
Red
Yellow
Motor
Thermal
Breaker


RET L.S.
NC
RET
Blue
(-)
EXT
Power
In
Black
Thermal
Breaker
Motor
RET
(+)
Red
EXT
EXT L.S.
NC
DPDT.
Switch


Fuse
(by customer)
(+)
D.P.D.T.
Switch
OFF
OFF
EXT
RET
RET
EXT
(-)
Red
Black
Motor
Thermal Breaker


2 4 6
1 3 5
0.125 DIA.
VENT TUBE
6.00±0.51


RED
WHITE
BLUE


1
2
3
4
5
6

EXT
RET

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 wire in accordance with the following wire gauge selection chart which is based on a 12 VDC power source. In order 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: An E150 actuator draws 10 amps current at rated load. The intersection of the maximum current and the distance between the actuator and power source (44 feet, for example) indicates the wire gauge required (#12).

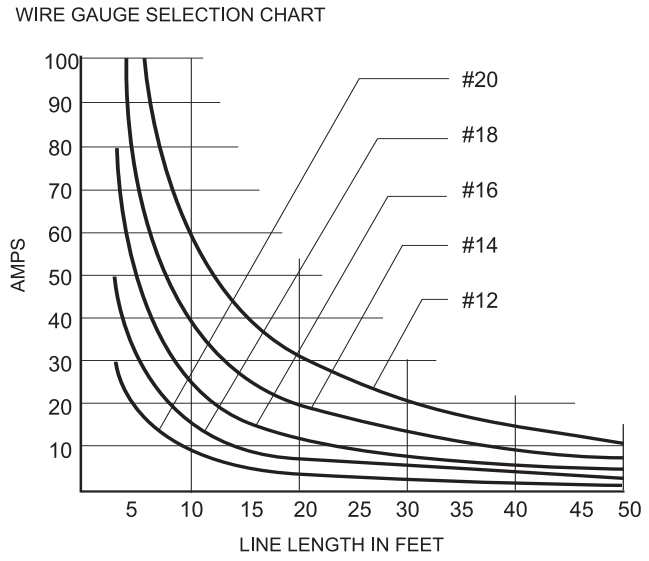


Figure 12

Switches

Actuator direction (extend, retract) is controlled with a double-throw switch with the center position “off”.

Actuator Switches
(Switches may be used for both DC and AC actuators)
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.
The following are required switch 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**

Connectors

The following connectors are supplied with our units with recommendations for appropriate mating connectors. Metric units are not supplied with connectors.

DC Models without limit switches:
Packard Electric 56 Series #2984883 with (2) blade terminals #2962987 (provided.) Recommended mating connector #2973781 with (2) blade terminals #2962573.

DC Models with limit switches:
Packard Electric 56 Series #2984678 with (3) blade terminals #2962987 (provided.) Recommended mating connector #2984378 with (3) blade terminals #2962573.

AC Models with pot only:
AMP Mate-N-Lock Body #1-480271-0 and (6) AMP pin terminals #61118-1 (provided). Recommended mating AMP connector #1-480270-0 and (6) pin terminals #60618-1.

AC Models with limit switches:
AMP Mate-N-Lock Body #1-480284-0 and (7) AMP pin terminals #61118-1 (provided.) Recommended mating connectors #1-480283-0 and (7) pin terminals #60618-1.

Fuses

Fuses are not supplied by Thomson. The following Slow Blow fuses are recommended:

Motor	Fuse
12 VDC	15A
24 VDC	8A
36 VDC	6A
120 VAC	3A

Limit Switch Adjustment

Optional on DC units.
AC units must have limit switches and/or pot for end of stroke protection.

Limit switches are preset at the factory to match the stroke indicated by your model number. Limit switches will not function properly unless wired as per the schematic found under “Wiring”. Be certain that power input polarity is as shown.

WARNING Disconnect power before adjusting limit switches if actuator is stalled at the end of stroke. Limit switches may be damaged if adjustment is attempted while motor is stalled.

Adjustment Procedure

To Shorten or Lengthen Stroke

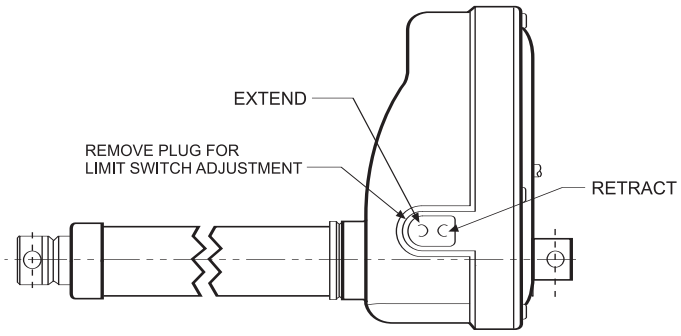
If adjustment is needed to shorten the extended length or lengthen the retracted length, proceed as follows:

1. Remove the rubber plug from the actuator housing covering the adjustment screws. Reinstall rubber plug after adjustment of limit switch to maintain IP56 rating. Refer to the lettering on top of the plug (Figure 13) to determine the location of the retract and extend adjustment screws.

2. To **shorten the extended length**, turn the extend adjustment screw clockwise (each turn changes the actuator travel by .90 inches (22.8 mm). Do not lengthen the extended length beyond factory settings or permanent damage may occur.

3. To **lengthen the retracted length**, turn the retract adjustment screw counterclockwise (each turn changes the actuator travel by .90 inches (22.8 mm). Do not shorten the retracted length beyond factory settings or permanent damage may occur.

Figure 13



To Correct Adjustment Screws

If the adjustment screws have been incorrectly adjusted, and the actuator stalls at the end of mechanical stroke, use the following procedure to approximate the factory setting of maximum extended length and minimum retracted length: (use 7/32” nut driver to prevent damage to adjustment screw due to over tightening).

WARNING Over tightening (more than 20 in/lbs) may cause permanent damage to the limit switch adjustment screw.

To set extend switch:

1. Turn extend adjustment screw **CW** until increased torque is felt (do not use excessive torque).

2. Turn extend adjustment screw **CCW** for 15 turns.

3. Power the actuator to full extend until motor stalls, which is the mechanical end of stroke. Shut off power.

4. Turn extend adjustment screw **CW** until increased torque is felt.

5. Turn extend adjustment screw **CCW** (3 1/4) turns.

To set retract switch:

1. Turn retract adjustment screw **CCW** until increased torque is felt (do not use excessive torque).

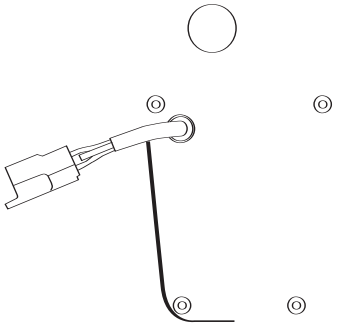
2. Turn retract adjustment screw **CW** for 15 turns.

3. Power the actuator to full retract until motor stalls, which is the mechanical end of stroke. Shut off power.

4. Turn retract adjustment screw **CCW** until increased torque is felt.

5. Turn retract adjustment screw **CW** (3-1/4) turns.

Run actuator in both directions to ensure that the limit switches shut off power to motor prior to actuator stall.



E150 Model Number

(Check with factory for metric units)

Screw Type: W = Worm
Gear Reduction: 10
Motor Voltage: 12, 24, or 36
Motor Voltage: 115AC
E150: DF=DC, AF=AC
Screw Diameter (tenths of an inch)
Screw Lead (tenths of an inch)
Customer Special and Drawing Ref number

DFXX-I0W5X-XXXXXXX

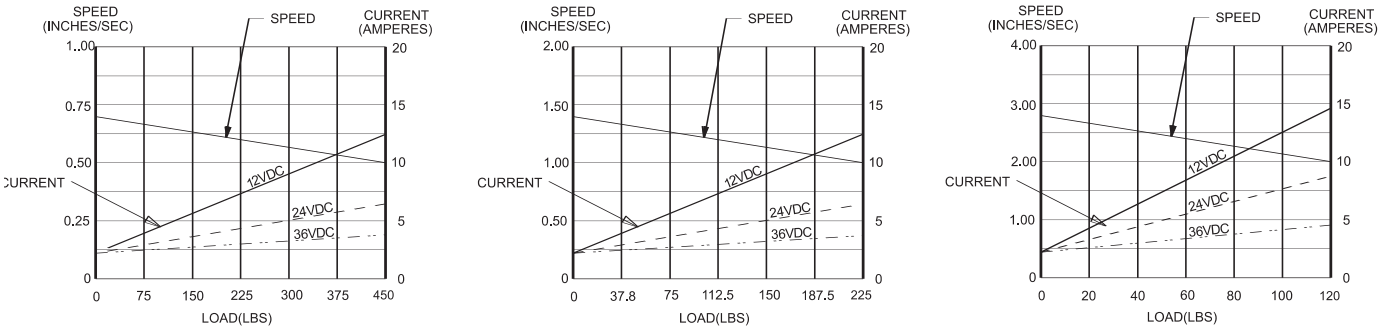
Stroke Length inches
Limit Switches: L = Limits, N = None
Feedback: N None, P = Potentiometer
*Rear Mtg.: H = Crosshole, M = M3 Mtg.:
*Front Mtg.: H = Crosshole
Other Options: (check with factory)

**Standard practice is to make both the front and rear mount the same.*

DC Actuators Nominal Performance Charts

Performance at Rated Load and 70°F (21°C)

	Input Voltage	Amperage (Max) At Rated Load	Maximum Amp Draw at Stall
12 VDC	10-16	13	50
24 VDC	20-28	6.5	25
36 VDC	30-40	4.5	18



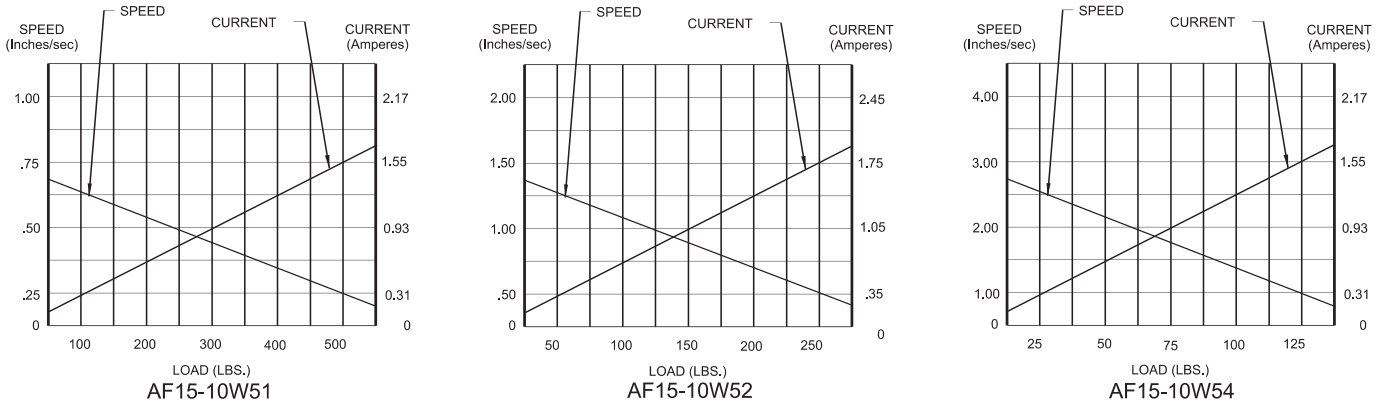
DFXX-10W51 DFXX-10W52 DFXX-10W54

Figure 14

AC Actuators Nominal Performance Charts

Performance at Rated Load and 70°F (21°C)

	Input Voltage	Amperage (Max) At Rated Load	Maximum Amp Draw at Stall
120 VAC	115	2	3.3



AF15-10W51 AF15-10W52 AF15-10W54

Figure 15

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. Contact the customer service department prior to shipment to obtain a return authorization number. Additional warranty information may be obtained by writing the Customer Service Department:

Thomson
A Danaher Company
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, 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.

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 manufacture, 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 that vary from state to state.

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