

Jordan Controls, Inc.

Instruction Manual

IM-0605

QT SERIES

ON/OFF 90°
ELECTRIC
VALVE ACTUATOR

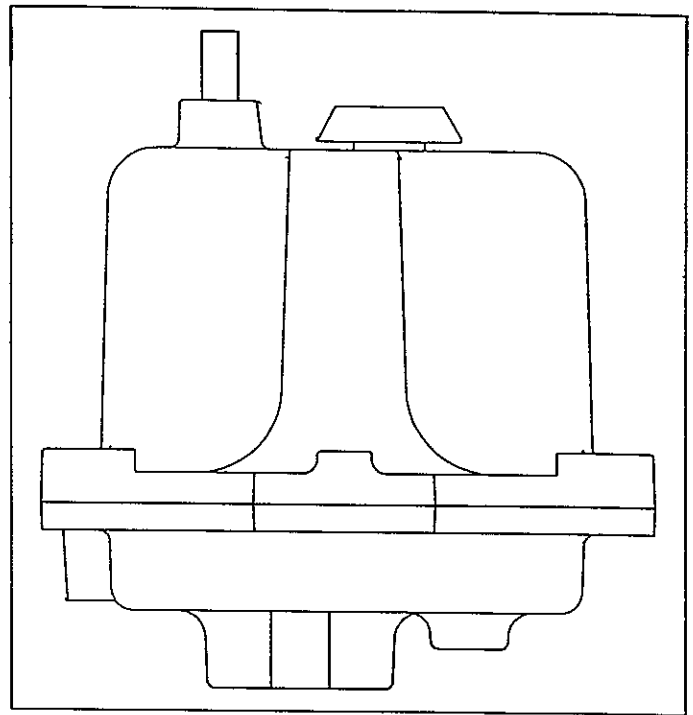


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GENERAL INFORMATION

INTRODUCTION

Jordan Controls, Inc., designs, manufactures and tests its products to meet many national and international standards. However, for these products to operate within their normal specifications, they must be properly installed and maintained. The following instructions must be adhered to and integrated with your safety program when installing, using and maintaining Jordan Controls products:

- Read and save all instructions prior to installing, operating and servicing this product.
- If you do not understand any of the instructions, contact your Jordan Controls representative for clarification.
- Follow all warnings, cautions and instructions marked on and supplied with the product.
- Inform and educate your personnel in the proper installation, operation and maintenance of the product.
- Install your equipment as specified on Jordan Controls installation instructions and per applicable local and national codes. Connect all products to the proper electrical sources.
- To ensure proper performance, use qualified personnel to install, operate, update, tune and maintain the product.
- When replacement parts are required, ensure that the qualified service technician uses replacement parts specified by Jordan Controls. Unauthorized substitutions may result in fire, electrical shock, other hazards, or improper equipment operation.
- Keep all actuator protective covers in place, (except when maintenance is being performed by qualified personnel), to prevent electrical shock, personal injury, or damage to the actuator.

RECEIVING/INSPECTION

Carefully inspect for shipping damage. Damage to the shipping carton is usually a good indication that it has received rough handling. Report all damage immediately to the freight carrier and Jordan Controls, Inc.

Unpack the actuator and information packet—taking care to save the shipping carton and any packing material should return be necessary. Verify that the items on the packing list or bill of lading agree with your own.

STORAGE

If the actuator will not be installed immediately, it should be stored in a clean, dry area where the ambient temperature is not less than -20° F. The actuator should not be stored in a corrosive environment.

EQUIPMENT RETURN

A Returned Goods authorization (RG) number is required to return any equipment for repair. This must be obtained from the Jordan Controls Service Department. The equipment must be shipped, freight prepaid, to the following address after the RG number is issued:

Jordan Controls, Inc.
5607 West Douglas Avenue
Milwaukee, Wisconsin 53218
Attn: Service Department

To facilitate quick return and handling of your equipment include:

RG Number on outside of box
Your Company Name, Contact Person, Phone/Fax number
Address
Repair Purchase Order Number
Brief description of the problem

IDENTIFICATION LABEL

An identification label is attached to each actuator cover. When ordering parts, requesting information, or service assistance, please provide all of the label information.

GENERAL PRODUCT INFORMATION

DESCRIPTION:

The Jordan Controls QT Series actuators are designed to provide on/off control of 1/4 turn butterfly, ball and plug valves in a wide variety of industries. Utilizing a split phase, reversing ac motor, these actuators can provide output torques from 150 to 3000 inch pounds (17 Nm to 339 Nm). Jordan Controls offers a full two-year warranty on all QT Series actuator mechanical components.

GENERAL SPECIFICATIONS:

Temperature Limits:

32° to 130° F (0° to 55° C) without heater.
-40° to 130° F (-40° to 55° C) with heater.

Environmental Ratings: Enclosures designed for NEMA 4, NEMA 4X, Class I, Division 1, Groups C & D and Class II, Division 1, Groups E, F & G

Rotation: 5° minimum, 320° maximum

Power Input: 120 or 240 Vac, 50/60 Hz versions

Field Wiring Terminations: Barrier terminal strip

PERFORMANCE SPECIFICATIONS:

MODEL	RUNNING TORQUE	90° CYCLE TIME
QT 0150	150 in.lbs. (17 Nm)	10 sec.
QT 0300	300 in.lbs. (34 Nm)	20 sec.
QT 0600	600 in.lbs. (68 Nm)	35 sec.

Approx. Weight: 13 lb. (5.9 kg)

Amp Draw: 0.3A @ 120 Vac, 0.2A @ 240 Vac, 60 Hz

MODEL	RUNNING TORQUE	90° CYCLE TIME
QT 1000	1000 in.lbs. (113 Nm)	20 sec.
QT 2000	2000 in.lbs. (226 Nm)	35 sec.
QT 3000	3000 in.lbs. (339 Nm)	60 sec.

Approx. Weight: 25 lb. (11.3 kg)

Amp Draw: 0.7A @ 120 Vac, 0.3A @ 240 Vac, 60 Hz

NOTE: All cycle times are nominal full load values. These times will be longer by approximately 20% and the actuator will draw approximately 20% more current at 50 Hz.

Duty Cycle: 25%

All actuators contain single phase, 3 wire, permanent split-capacitor motors. Motor power is applied across the motor common wire and one of the directional input wires. The capacitor creates a phase shift to the other motor directional input wire. This allows the motor to run and develop torque. With external input power applied to one winding, the opposite winding (energized by the capacitor) will have a voltage on it which is greater than the applied voltage while the motor is running. The voltage will be approximately 150 Vac for 120 Vac units and 300 Vac for 240 Vac units. As such, the actuators must never be connected in parallel or any inductive or resistive load be connected with the directional inputs. When operating more than one actuator from a common source, the use of isolated contacts between each actuator is required. Wiring ac actuators in parallel without isolation will cause one of the actuators to operate at a reduced torque when an end of travel limit switch in the other actuator is opened. The actuator with the opened switch may continue to run, receiving power to the direction winding with the closed switch, by way of the power supplied from the actuator that has not reached its limit switch.

END OF TRAVEL LIMIT SWITCHES are factory wired in series with the proper motor directional winding. When a switch is tripped (opened), motor power is removed from the winding and the motor will stop.

Exceeding the actuator's rated duty cycle may cause the thermal overload switch to temporarily shut off power to the motor. A 25% duty cycle means that for every operating cycle that the actuator is ON (to open or close the valve) the actuator must be OFF for a time equal to three operating cycles. For example, with an operating cycle time of 10 seconds ON, it must be OFF for 30 seconds before it is again operated.

INSTALLATION

CAUTION

Before installing the actuator, make sure the actuator supplied is suitable for the intended application with respect to torque, environmental conditions and the voltage/frequency of available line power.

WIRING

WARNING - SHOCK HAZARD

Installation and servicing must be performed only by qualified personnel. De-energize all sources of power BEFORE removing the actuator cover. KEEP COVER TIGHT WHEN CIRCUITS ARE ALIVE. Failure to follow these precautions may result in serious injury.

FUSING IS NOT PROVIDED WITHIN THE ACTUATOR. Line fusing must be provided by the customer and should not exceed 5 amperes; they should be of the "slow blow" motor type.

These actuators are designed to meet NEMA 4X, Class I, Division 1, Groups C & D; and Class II, Division 1, Groups E, F & G only when the installation is complete with conduit entry(s) sealed in accordance with all prevailing electrical code requirements, and the actuator cover is in place with the gasket and all cover bolts installed.

MOUNTING THE ACTUATOR

The actuator may be mounted in any position, except it is not recommended to install the actuator upside down in outdoor applications.

The actuator must be firmly secured to a sturdy mounting bracket. A minimum of four bolts with lock washers should be used to secure the actuator to the bracket. Flexibility in the bracket is not desired, and backlash, or "play," in the coupling should be minimized. The actuator output shaft must be in line (centered) with the valve shaft to avoid side-loading the shaft.

See Figure 5, page 5 for mounting dimensions

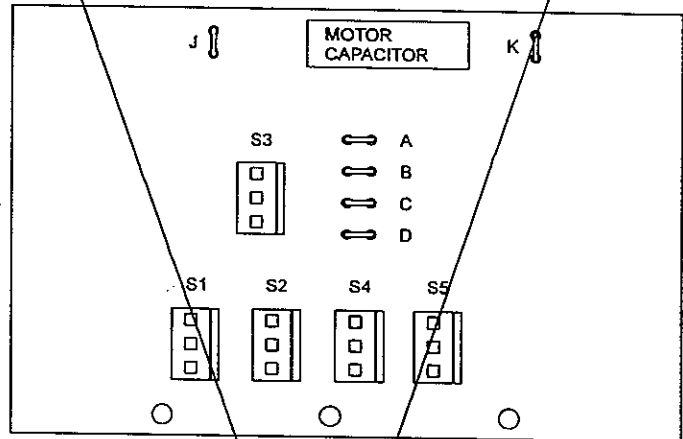
High Valve Fluid Temperatures: For valve fluid temperatures between 200° F (93° C) and 300° F (149° C), a shielding plate (about one inch larger than the actuator in each dimension and at least 1/16" thick) should be placed between the actuator and the mounting bracket. For fluid temperatures above 300° F (149° C), an extended valve shaft mounting arrangement should be used.

PLUG-IN CONNECTIONS

All integral electrical devices "plug in" to connectors on the back side of the terminal printed circuit board.

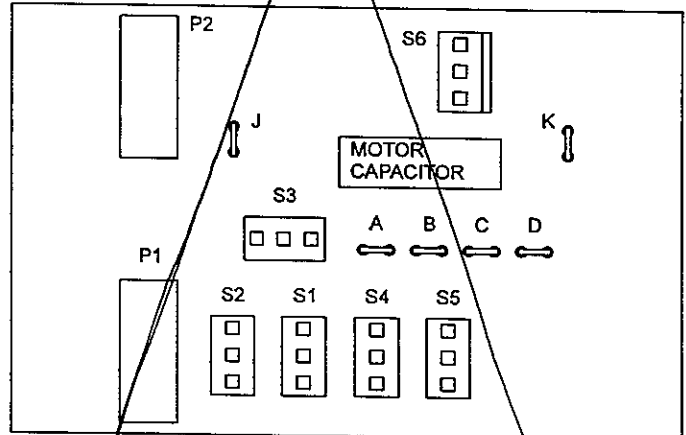
Following are locations of these connectors:

Figure 1: 120 Vac Actuators



S1=CW limit switch (2nd from bottom)(LS1)
 S2=CCW limit switch (bottom switch)(LS2)
 S3=Motor
 S4=LS3 (optional)(3rd from bottom)
 S5=LS4 (optional)(top switch)
 S5=VR1 (optional) when LS4 is not present
 J/K=Motor capacitor
 A,B,C,D=Optional heater and thermostat

Figure 2: 240 Vac Actuators



S1=CW limit switch (2nd from bottom)(LS1)
 S2=CCW limit switch (bottom switch)(LS2)
 S3=Motor
 S4=LS3 (optional)(3rd from bottom)
 S5=LS4 (optional)(top switch)
 S6=VR1 (optional)
 J/K=Motor capacitor
 A,B,C,D=Optional heater and thermostat
 P1/P2=Not used

INSTALLATION DIMENSIONS

QT 0150, QT 0300, QT 0600

Figure 3

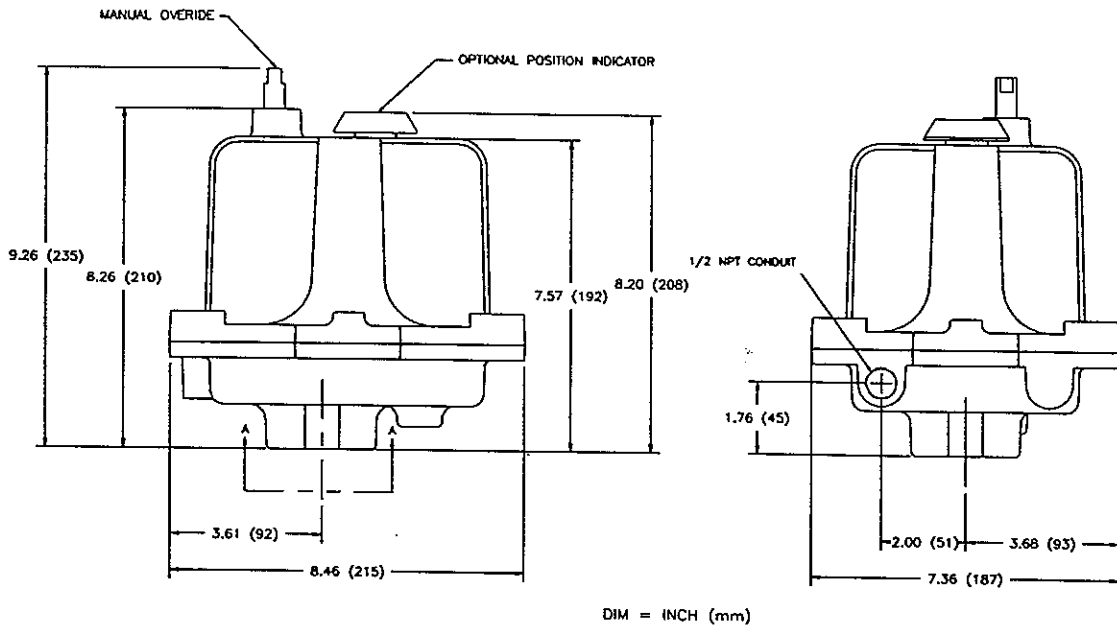


Figure 4

QT 1000, QT 2000, QT 3000

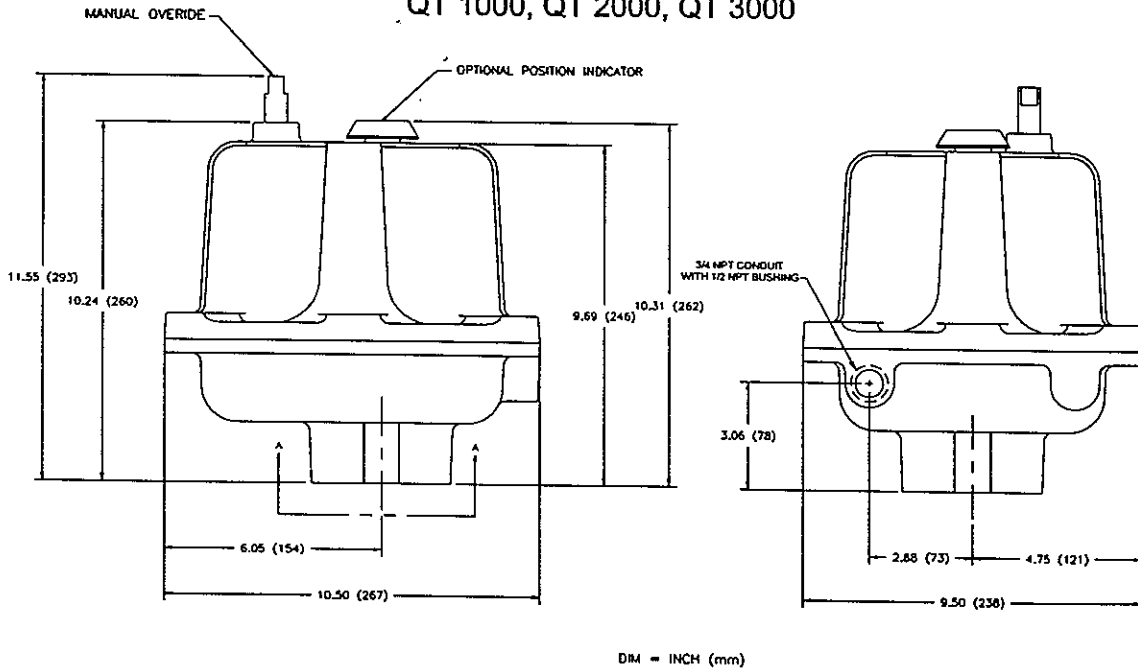
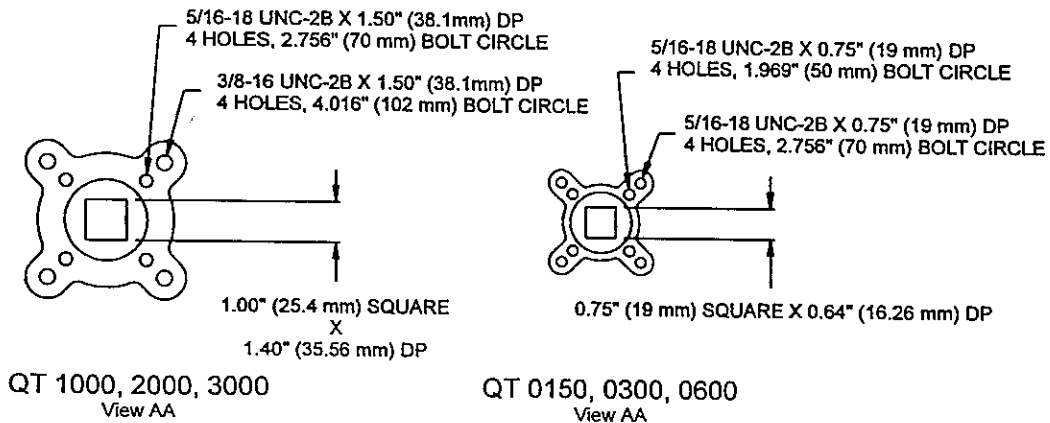


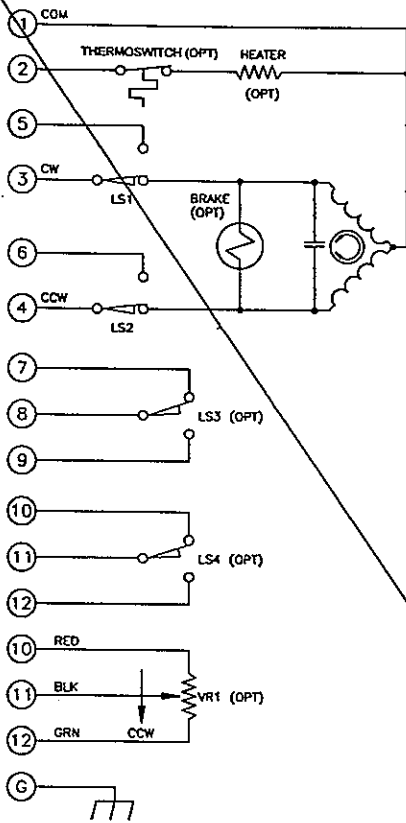
Figure 5



ORIENTATION OF DRIVE TO MOUNTING HOLES IS FIELD ADJUSTABLE

WIRING DIAGRAMS

Figure 6



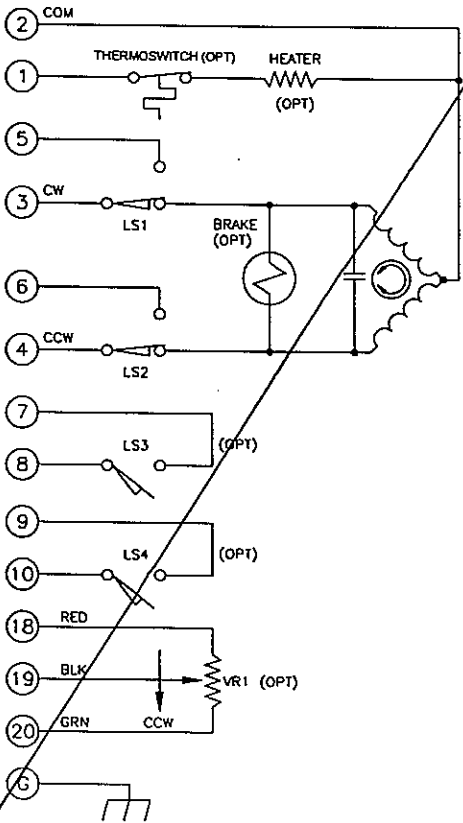
QT SERIES ACTUATOR - 120 Vac

NOTES:

1. Actuator is shown in mid-travel position, LS1 and LS2 are not tripped. LS3 and LS4 are tripped.
2. Applying power to terminals 1 and 3 will result in CW rotation of the output shaft (as viewed from the shaft end). Applying power to terminals 1 and 4 will result in CCW output shaft rotation.
3. Optional heater, brake, limit switches, and 1000 ohm position feedback potentiometer will be wired as shown when supplied.

NOTE: When LS3, LS4 and VR1 options are all supplied, connection to VR1 is via wirenuts to color coded pigtailed and not to terminals. VR1 is wired to terminals 10, 11 & 12 when LS3 and LS4 are not supplied.

Figure 7



QT SERIES ACTUATOR - 240 Vac

NOTES:

1. Actuator is shown in mid-travel position, LS1 and LS2 are not tripped. LS3 and LS4 are not tripped.
2. Applying power to terminals 2 and 3 will result in CW rotation of the output shaft (as viewed from the shaft end). Applying power to terminals 2 and 4 will result in CCW output shaft rotation.
3. Optional heater, brake, limit switches, and 1000 ohm position feedback potentiometer will be wired as shown when supplied.

CALIBRATION

The two limit switches operating off the cams on the output shaft determine the exact positions where the actuator will stop at the end of each cycle. The first limit switch (lower) determines the CCW position rotation. The second limit switch (upper) determines the CW position rotation. The limit switches can be adjusted from 5 to 320 degrees of actuator rotation. If an adjustment of any of the positions is required, proceed as follows:

- A. Remove actuator cover.
- B. Adjust the CW Limit Switch Cam
 1. Using a 1/16 inch hex wrench, loosen the set screw in the LS1 (CW) limit switch cam (the second up from the bottom).
 2. Apply power to terminals common and 3 to drive the actuator to the full CW position.
 3. Remove the power from the actuator
 4. Rotate the cam toward the limit switch arm just until the switch clicks closed.
 5. Re-tighten the set screw on the limit switch cam, being careful not to over-tighten the screw.
- C. Adjust the CCW Limit Switch Cam
 1. Using a 1/16 inch hex wrench, loosen the set screw in the LS2 (CCW) limit switch cam (the bottom one).
 - ~~2. Apply power to terminals common and 4 to drive~~
Drive the actuator to the full CCW position.
 3. Remove the power from the actuator.
 4. Rotate the cam toward the limit switch arm just until the switch clicks closed.
 5. Re-tighten the set screw on the limit switch cam, being careful not to over-tighten the screw.

The actuator's travel limit switches may be used to indicate the open and closed status of the actuator. Power at terminal 3 is switched to terminal 5 when the actuator is fully CW. Power at terminal 4 is switched to terminal 6 when the actuator is fully CCW.

OPTIONAL ADDITIONAL LIMIT SWITCHES

Two additional limit switches may be installed in the actuator. When installed, they will use the following connectors on the printed circuit board:

Extra Limit Switch LS3 ~~Connector S4~~

Extra Limit Switch LS4 ~~Connector S5~~

These limit switches may be adjusted to trip anywhere in the range of actuator rotation.

On 240 Vac models, limit switches installed at S4 and S5 have only two contacts available, either NO and COM or NC and COM. Factory settings are COM and NO. This can be changed by switching the red and black wires in the three position connector.

OPTIONAL POSITION FEEDBACK POTENTIOMETER

- A. Calibrate potentiometer
 1. Apply power (or use the manual override) to drive the actuator to its full CCW position.
 2. Connect an ohmmeter to the black and red pot leads.
 3. Rotate the cam shaft gear clockwise until the feedback pot just hits its stop.
 4. Now rotate the cam shaft gear counterclockwise until the ohmmeter reads 50 ohms (± 5 ohms).
 5. While holding this reading, tighten the cam shaft set screw.
- B. Confirm Proper Calibration
 1. Apply power (or use the manual override) to drive the actuator to its full CCW position.
 2. Connect the ohmmeter to the black and red pot leads. The reading should be between 35 and 60 ohms. If not, repeat the above procedure for calibrating the potentiometer.

~~C. Plug In Feedback Potentiometer~~

~~Connect the feedback potentiometer connector to S5 on 120 Vac models and S6 on 240 Vac models. NOTE: If LS3 and LS4 are installed on 120 Vac models, connection to the potentiometer is with wire nuts. Figures 6 and 7 on page 6 show the wiring for an optional position feedback pot.~~

OPTIONAL MOTOR BRAKE

Whenever the motor runs, the solenoid is energized and holds the friction pads away from the fan. Immediately after power is removed from the motor, the solenoid is de-energized and the friction pads contact the fan to prevent further rotation of the motor.

OPERATION

MANUAL OVERRIDE FUNCTION

To use the manual override function, push the override shaft down approximately 1/4 inch to disengage the motor from the gear train. While holding the shaft down, turn the shaft with a wrench reach the desired position. To avoid possible damage to installed options such as a feedback potentiometer, be careful not to drive the actuator past the limit switch settings.

NOTE: The manual override shaft must be returned to its fully upward position before the motor is re-engaged.

TROUBLESHOOTING

If the actuator fails to operate:

- Check that the proper voltages are present at the actuator's terminal connections.
- Check all the plug-in connections to be sure they are properly installed. See Figures 1 and 2 on page 4.

If the motor is hot, the actuator may have gone into thermal overload protection (the motors are equipped with internal thermal overload protection). Let the motor cool and check the following:

- Are the limit switches properly set?
- Is the actuator's duty cycle correct for the application?
- Is the actuator's output torque within the required range?

If the actuator's motor hums or turns slowly:

- Check the actuator's motor capacitor to see if it is broken or cracked.
- Make sure power is applied only to one terminal, ~~either 3 or 4, but not both.~~
- ~~Check for a bad connection at motor connector S3.~~
- Check for parallel wiring with other actuators, resistive or inductive devices.
- Check for actuator output shaft overload.

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