

80 Series Actuator



Parker 80 Series Electric Actuators are designed to provide reliable and efficient operation of final control elements, such as 1/4 turn valves, with torque requirements up to 3000 inch pounds. 80 Series actuators are available as AC models with duty cycles of 25% or 75% and DC models with a 100% duty cycle. In addition, a variety of options and accessories are available and use a modular design where all “daughter” boards and actuator accessories plug into the “mother” board. Installation is simple and reliability is very high.

PARTS LIST

- 1 - Cover
- 2 - Cover Screws
- 3 - Gasket
- 4 - Base
- 5 - Output coupling
- 6 - Bull gear
- 7 - Bull gear retaining ring
- 8 - Output shaft / Cam shaft
- 9 - Cams
- 10 - Mother board
- 11 - Mother board bracket
- 12 - Limit switches
- 13 - Override shaft
- 14 - Motor gear box
- 15 - Motor support plate screws
- 16 - Motor support plate
- 17 - Pinion gear

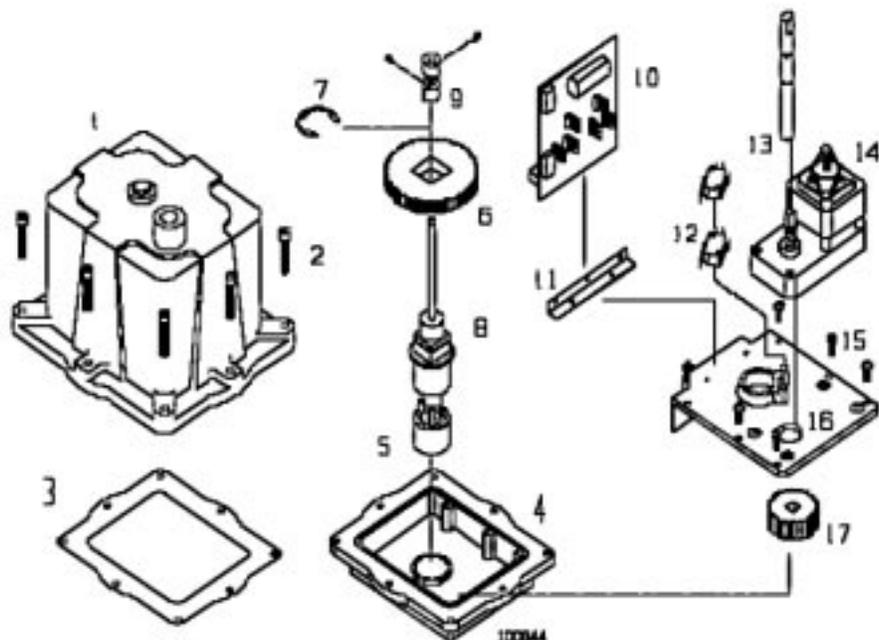


Figure 1: Parts Identification (No options installed)

GENERAL TECHNICAL INFORMATION

Parker 80 Series AC voltage actuators use a split phase motor which internally steps up the applied 115 AC voltage and feeds it back to the off terminal. For example, when 115 VAC power is applied at terminals 1 and 4, 230 volts will be fed back to terminal 3. This can create a problem for controllers with solid state outputs rated for less than 230 VAC and it is suggested that relay outputs be used. Additionally, due to this feed back, multiple actuators cannot be wired in parallel, and individual leads (isolated contacts) must be run to each actuator.

It is important to verify that the output torque of the actuator is appropriate for the torque requirements of the valve and that the actuator duty cycle is appropriate for the intended application.

DUTY CYCLE

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 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, an operating cycle time of 5 seconds ON, it must be OFF for 15 seconds before it is again operated. A 75% duty cycle means that for every operating cycle that the actuator is ON, the actuator must be OFF for 1/3 of a cycle.

TEMPERATURE LIMITS

Low ambient temperatures: The minimum recommended ambient temperature is 30 °F (-1 °C). With the optional heater and thermostat installed, the recommended minimum ambient temperature can be lowered to -40 °F (-40 °C).

High ambient temperatures: The maximum recommended ambient temperature is 150 °F (65 °C) with the actuator shaded from direct sunlight.

High media temperatures: For media temperatures between 200 °F and 300 °F (93 °C and 148 °C), a shielding plate (about one inch larger than the actuator in each dimension and at least a 1/16 " thick) should be placed between the actuator and the mounting bracket. Additionally, the actuator should be mounted at the 3 o'clock or 9 o'clock position relative to the pipe. For media temperatures above 300 °F (148 °C), a valve with an extended shaft mounting arrangement should be used.

INSTALLATION

CAUTION: Dangerous voltages are present inside the actuator cover unless the power supply to the actuator has been shut off or disconnected. Use extreme caution whenever working on the actuator with the cover removed.

Mounting the Actuator

The actuator may be mounted in any position. In outdoor applications the actuator should not be installed upside down.

Verify that the output torque of the actuator is appropriate for the torque requirements of the valve. 80 Series actuators are furnished with a female drive output. On the 80 Series actuators, the output is 0.75" square by 0.64" deep. Two I.S.O. bolt patterns (ISO 5211) are provided for actuator mounting.

It is mandatory that the actuator be firmly secured to a sturdy mounting bracket. A minimum of four bolts with lockwashers should be used to secure the actuator to the bracket. Flexibility in the bracket is not allowed, 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.

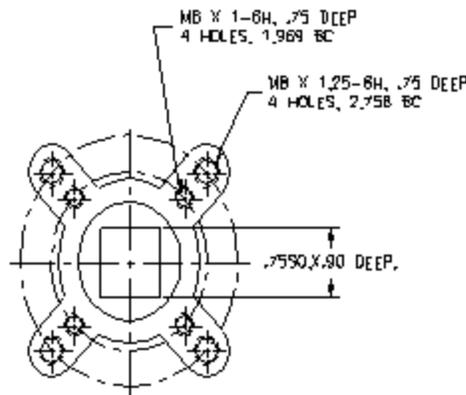


Figure 2: Mounting Pattern

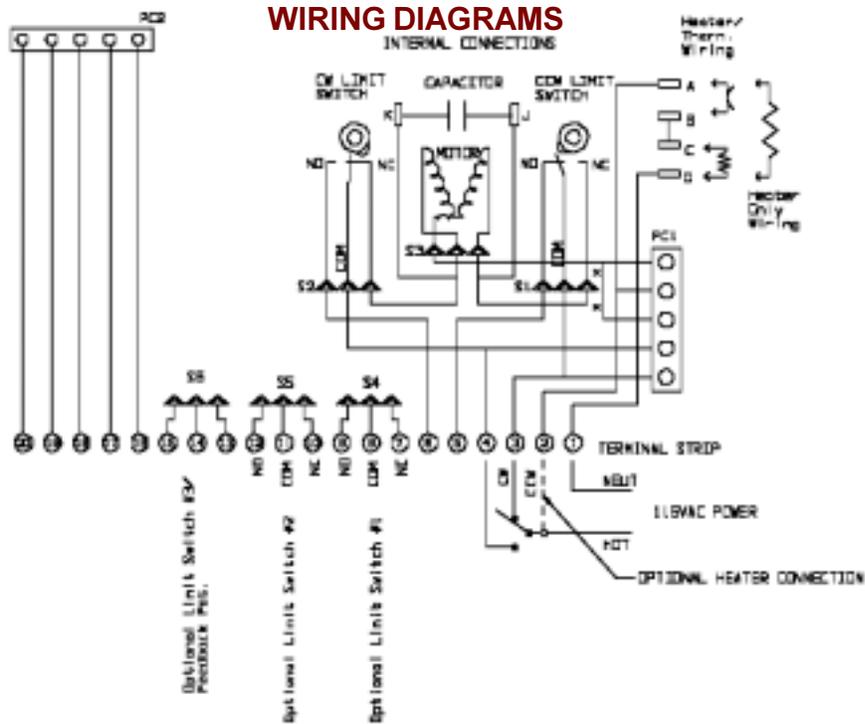
WIRING

For 115 VAC actuators, 18 or 20 gauge wire may be used for short runs. At least 16 gauge wire is recommended for longer runs. Be sure to follow local wiring codes.

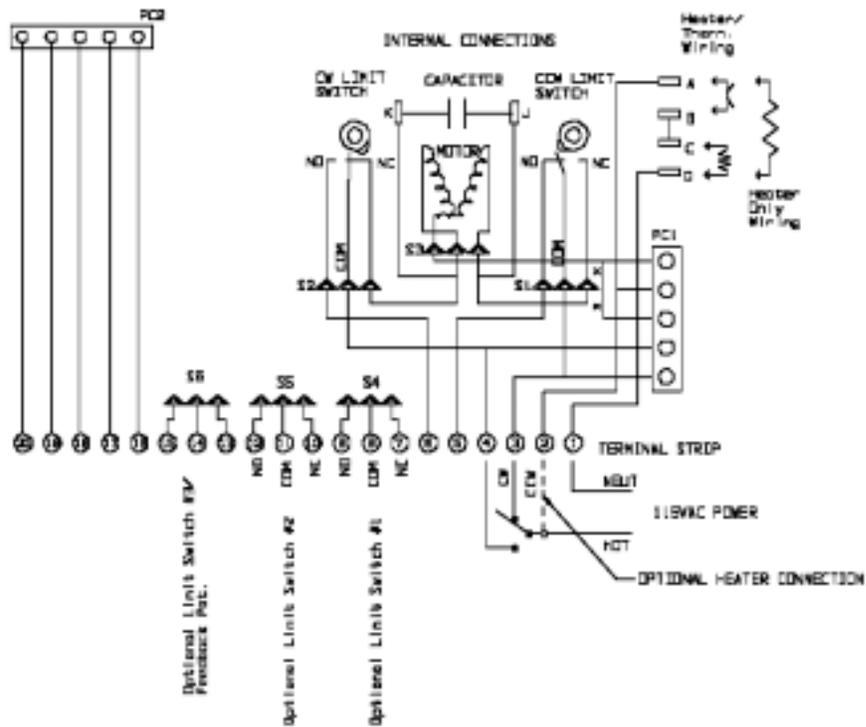
Actuators may run on one of the following voltages: 24VAC, 115VAC, 230 VAC, 12VDC and 24VDC, dependent on the actuator. Please match before wiring as the wrong voltage will destroy the motherboard. Input power is wired directly to the actuator's motor through the motherboard and two limit switches.

A wiring label is affixed to each actuator directly above the terminal strip, specific to the configuration of options included.

To drive the actuator counterclockwise, apply power to terminals 1 and 3. To drive the actuator clockwise, apply power to terminals 1 and 4. The actuator can be driven fully open counterclockwise or closed clockwise by maintaining power to the motor until the actuator trips the internal limit switches. Power can also be disconnected at any point during travel to position the actuator.



STANDARD WIRING - OPEN/CLOSE
Figure 3A: 115 or 24 VAC Actuator Diagram
 INTERNAL CONNECTIONS



STANDARD WIRING - OPEN/CLOSE
Figure 3B: DC Voltage Actuator Diagram

ADJUSTMENT OF LIMIT SWITCHES

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 closed position (CW rotation). The second limit switch (upper) determines the open position (CCW 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

Remove the actuator cover by removing the screws securing the cover to the base.

B. Adjust the OPEN limit switch cam

1. Using a 1/16 hex wrench, loosen the set screw in the OPEN limit switch cam (the second up from the bottom).
2. Apply power to terminals 1 and 3 (See Figures 3) to drive the actuator to the open position (counterclockwise rotation).
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 (Be careful not to over-tighten the screw).

C. Adjust the CLOSED limit switch cam

1. Using a 1/16 inch hex wrench, loosen the set screw in the CLOSED limit switch cam (the bottom one).
2. Apply power to terminals 1 and 4 (See Figures 3) to drive the actuator to the closed position (clockwise rotation).
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 (Be careful not to over-tighten the screw).

OPTIONAL ADDITIONAL LIMIT SWITCHES

For AC actuators, the two standard 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 counterclockwise. Power at terminal 4 is switched to terminal 6 when the actuator is fully clockwise.

MANUAL OVERRIDE FUNCTION

To use the manual override function, push the override shaft down approximately a 1/4 inch to disengage the motor from the gear train. While holding the shaft down, turn the shaft with a wrench to reach the desired position. NOTE: The rotation of the output may not be the same as the rotation of the override shaft! Note which way the output rotates whenever you use the override shaft. Also, be careful not to drive the actuator past the limit switch settings; it is possible to damage installed options.

TROUBLESHOOTING

If the actuator fails to operate:

Visually inspect for damage, burn marks, or loose connections.

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 -

- Motor to connector S3

- Bottom limit switch to S2

- Second limit switch to S1

- Motor capacitor to J & K.

If the motor is hot the actuator may have gone in to thermal over load protection (the motors are equipped with internal thermal overload protection). Let the motor cool and try again.

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 socket S3.

Ensure you do not have more than one actuator wired in parallel.

If the motor turns, but the output does not, ensure the manual override has returned to its fully upward position.

80 SERIES LIMIT SWITCH KIT

Parker 80 Series Limit Switch Kits add additional limit switches to an actuator. Standard actuators are shipped from the factory with two limit switches installed—one to operate at the fully open position and one to operate at the fully closed position. Additional limit switches may be installed to operate at any actuator position. This Limit Switch Kit is intended for use with any 80 Series Electric Actuator. The switches are rated for 5 amps at 230VAC.

For “S1”, the additional limit switch will be factory set at the full clockwise position.

For “S2”, the first additional limit switch will be factory set at the full clockwise position, and the second will be set at the full counterclockwise position.

PARTS LIST

- 1 - Limit switch(es)
- 2 - Cam(s)
- 3 - (2) #4-40 Studs
- 4 - (2) #4-40 Nuts
- 5 - Limit switch wiring assembly (not pictured)
- 6 - (2) Wire ties (not pictured)

TOOLS REQUIRED

- 1 - Small flat blade screwdriver
- 2 - 1/4 inch nut driver
- 3 - 1/16 inch hex wrench

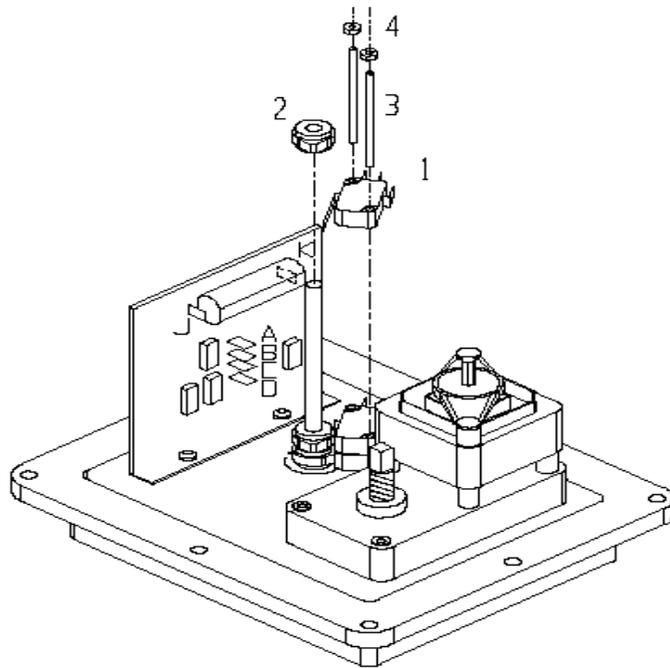


Figure 4: Limit Switch Part Identification

INSTALLATION

CAUTION: Dangerous voltages are present inside the actuator cover unless the power supply to the actuator has been shut off or disconnected. Use extreme caution whenever working on the actuator with the cover removed.

A. Remove the Actuator Cover

- 1) Remove the actuator cover by removing the screws securing the cover to the base.

B. Install the Limit Switch(es)

- 1) Carefully remove the #4-40 Limit Switch screws which secure the existing Limit Switches in place.
- 2) Place the additional Limit Switch(es) on top of the existing Limit Switches.
- 3) Slide the supplied #4-40 Studs (NOTE: The original 4-40 screws may be used if only one (1) limit switch is being installed) through the switch holes and using the 4-40 nuts, secure the Limit Switches in place. Do not over-tighten the fasteners.

C. Install the Wiring Assembly

- 1) Attach the White Wire to the Common (COM) spade connector on the new Limit Switch(es).
- 2) Attach the Black Wire to the Normally Open (NO) spade connector on the new Limit Switch(es).
- 3) Attach the Red Wire to the Normally Closed (NC) spade connector on the new Limit Switch(es).
- 4) Attach the three-wire connector to the Mother Board as follows:
 - Extra Limit Switch #1 connects to socket S4.
 - Extra Limit Switch #2 connects to socket S5.

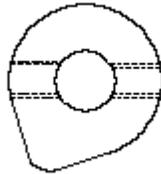
Note: Be sure that the locking fingers on the three-wire connector(s) firmly engage the mating fingers on the socket.
- 5) Using the supplied Wire Ties, secure the Limit Switch wires so they avoid contact with any moving parts.

D. Install the Cam(s)

- 1) Place the cam on the shaft. The stainless steel cams which are supplied with each actuator, or as a kit, have two locations where a set screw may be installed. The diagram below shows the installation of the set screw for both clockwise and counterclockwise rotation of the cams. To orient the cam, place on top of the figure.

Lower Cam

Place set screw for
"CW" cam setting



Upper Cam

Place set screw for
"CCW" cam setting

* Note: When installing the cams on the camshaft, ensure that the side with the set screw installed is oriented toward the left (the conduit openings straight ahead) and visible between the motherboard and the motor.

- 2) Drive the actuator to the desired trip point.
- 3) Rotate the Cam slowly to the point where the Limit Switch "clicks" closed. If the Limit Switch is to operate at a given point during the *opening* cycle of the actuator, rotate the Cam *counterclockwise* to set its position. If the Limit Switch is to operate at a given point during the closing cycle of the actuator, rotate the Cam *clockwise* to set its position.
- 4) Tighten the Cam set screw to secure the Cam in position. Do not over-tighten the screws (use less than 8 in/lbs of tightening torque).
- 5) Operate the actuator to verify the proper setting of the Cam(s).

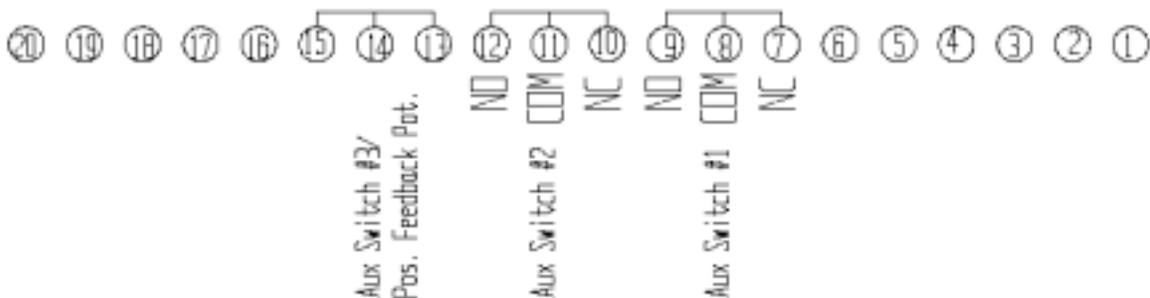


Figure 5: Limit Switch Wiring

80 SERIES HEATER/THERMOSTAT KIT

The 80 Series Heater/Thermostat Kit provides controlled heating of the actuator motor and gear train permitting the actuator to operate in temperatures as low as -40 °F (-40 °C). Separate kits are available for 115 VAC, 230 VAC, 24 VAC, 12 VDC and 24 VDC motor voltages (Note: Be certain the kit voltage matches the motor voltage). The heater is rated at 15 Watts (except for 230 VAC heaters, which are rated at 30 Watts). The thermostat turns the heater on at 40 °F (4 °C) and off at 60 °F (15 °C). The heater may also be installed without a thermostat to assist in humidity control.

PARTS LIST

- 1 - Heater element
- 2 - Thermostat
- 3 - (2) Wire ties (not pictured)

TOOLS REQUIRED

- 1 - 3/16 inch hex wrench

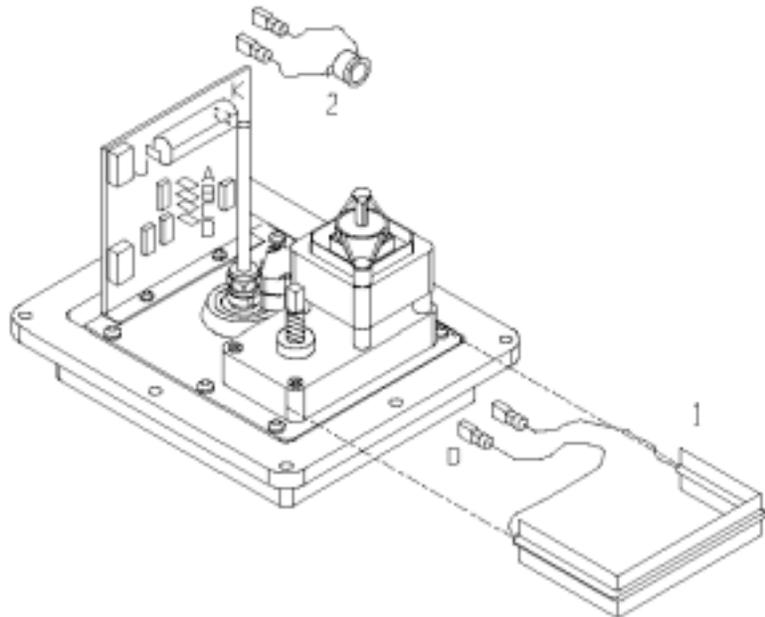


Figure 6: Heater/Thermostat Kit Part Identification

INSTALLATION

CAUTION: Dangerous voltages are present inside the actuator cover unless the power supply to the actuator has been shut off or disconnected. Use extreme caution whenever working on the actuator with the cover removed.

A. Remove the Actuator Cover

- 1) Remove the actuator cover by removing the screws securing the cover to the base.

B. Install the Heater Element

- 1) Remove the white plastic backing from the heater element to expose the adhesive surface of the heater element.
- 2) Locate the longer lead (Figure 6, part D) on the heater element and keep this lead on the left side of the motor gearbox (motor closest to you as indicated in Figure 6). Apply the adhesive surface of the heater element against the motor gearbox, wrap the heater element around both short sides and the backside of the gearbox (the side with the nameplate).
- 3) Route the long heater lead (D) between the gearbox and the limit switches.
- 4) Plug the heater element's leads onto terminals D and C (if using a heater only, plug into terminals A & D).
- 5) Using one of the supplied wire ties, secure the heater element wires to keep them clear of any moving parts.

C. Install Thermostat

- 1) Plug the thermostat leads onto terminals A and B.
- 2) Place the thermostat at the corner of the gearbox under the limit switch wiring.
- 3) Using the supplied wire ties, secure the thermostat to keep it clear of any moving parts.

WIRING

AC WIRING

AC power may already be connected at terminals 1 and 2. In this case, no additional wiring is required. If AC power is not already connected at terminals 1 and 2:

- 1) Wire terminal 1 to VAC Neutral.
- 2) Wire terminal 2 to VAC Hot.

DC WIRING

To wire a heater and thermostat in a DC powered actuator, a jumper must be brought from terminal location 5 to terminal location 2, and another jumper from terminal location 6 to terminal location 2. For other options, contact the factory.

80 SERIES FEEDBACK POTENTIOMETER OPTION

The Feedback Potentiometer provides a variable resistance (0-1000 ohms) to indicate the position of the actuator's output shaft. The signal can be fed at positions 13, 14 and 15 on the terminal strip.

CALIBRATION

The potentiometer has been calibrated at the factory. However, if re-calibration is required, proceed as follows:

- 1) Apply power (or use the manual override) to drive the actuator to its true closed position (clockwise rotation).
- 2) Unplug the potentiometer lead from the back of the motherboard (connection "S6").
- 3) Connect an ohmmeter to the BLACK and GREEN pot leads.
- 4) Loosen the cam shaft gear, raise it up above the pot shaft gear, and gently rotate it clockwise until the feedback pot hits its stop. (**NOT APPLICABLE WITH 360 POT**)
- 5) Gently rotate the cam shaft gear counterclockwise until the ohmmeter reads 50 ohms (+/- 5 ohms). **NOTE:** If you are installing a positioner with the optional 360 degree pot, adjust until the ohmmeter reads 140 ohms (+/- 5 ohms).
- 6) While maintaining this reading, re-engage the two gears and tighten the cam gear set screw.
- 7) Apply power (or use the manual override) to drive the actuator to its true open position.
- 8) Connect the ohmmeter to the BLACK and RED pot leads. The reading should be between 35 and 60 ohms. (or between 120 and 160 ohms for the 360 degree pot). If the reading is not between 35 and 60 ohms, repeat the above steps for calibrating the potentiometer.
- 9) Connect the feedback potentiometer plug to the motherboard connection "S6." Be sure that the locking tab and ramp face each other. Finally, use the wire ties provided to secure the pot wires away from any rotating components in the actuator.

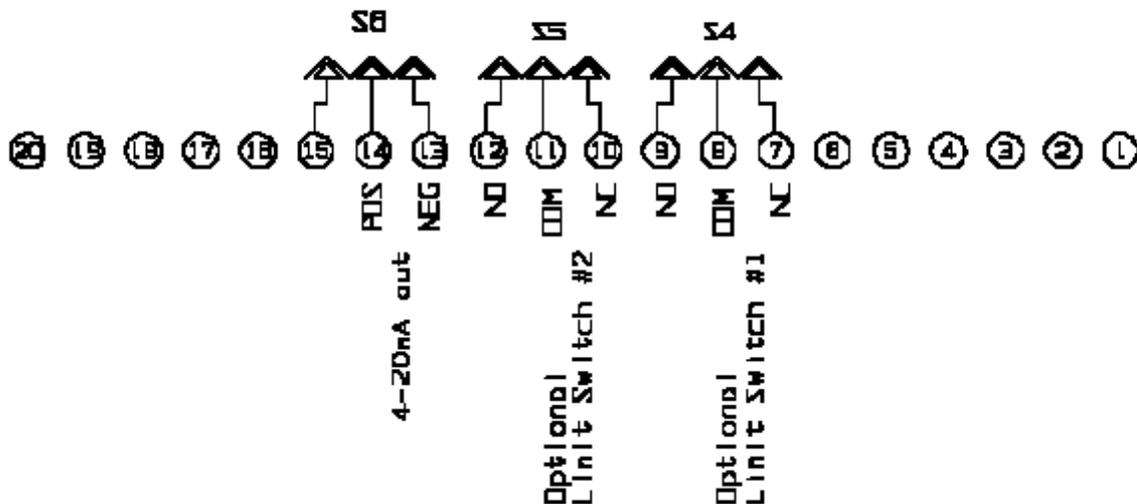


Figure 7: Re-transmit Wiring

WARNING

FAILURE OR IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

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