



ELECTRIC ACTUATOR

AVE-3-OTQ

INSTALLATION, OPERATION & MAINTENANCE

*For Spears® Premium Actuated
Ball Valves & Butterfly Valves
OTQ declutchable override*

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This manual covers THE OTQ-06 AND OTQ-028 (ONLY) ELECTRIC ACTUATORS used on Spears® Premium Standard Actuated Valve Packages for Ball Valves 4" through 6" and 1-1/2 through 12" Butterfly valves. Valve packages (valve & actuator) are shipped with actuator fully installed and factory adjusted for proper operation. Section I, Initial Installation, should be followed for valve installation and electrical connection of the actuator. Additional procedures provided are for actuator re-installation in the event that Spears® factory installed actuator is removed for servicing, for use in making future adjustments, and for troubleshooting actuator problems. See supplemental instructions for actuators with positioner boards. Please review all instructions and information to assure proper and safe operation prior to use.

OTQ

ELECTRICAL SHOCK HAZARD



To avoid serious personal injury, property damage or death, turn off ALL power to the ACTUATOR before removing the cover.



Before installation or use, verify the nameplate information to insure the correct model number, torque, voltage and enclosure type.



Be sure to completely review the ACTUATOR manual prior to operation.



Final limit switch adjustment MUST be done after mounting the ACTUATOR to the valve. Incorrect adjustment may cause ACTUATOR failure.



Over torque switches are factory set. Tampering with the over torque switch settings may damage the ACTUATOR and VOID the Warranty.



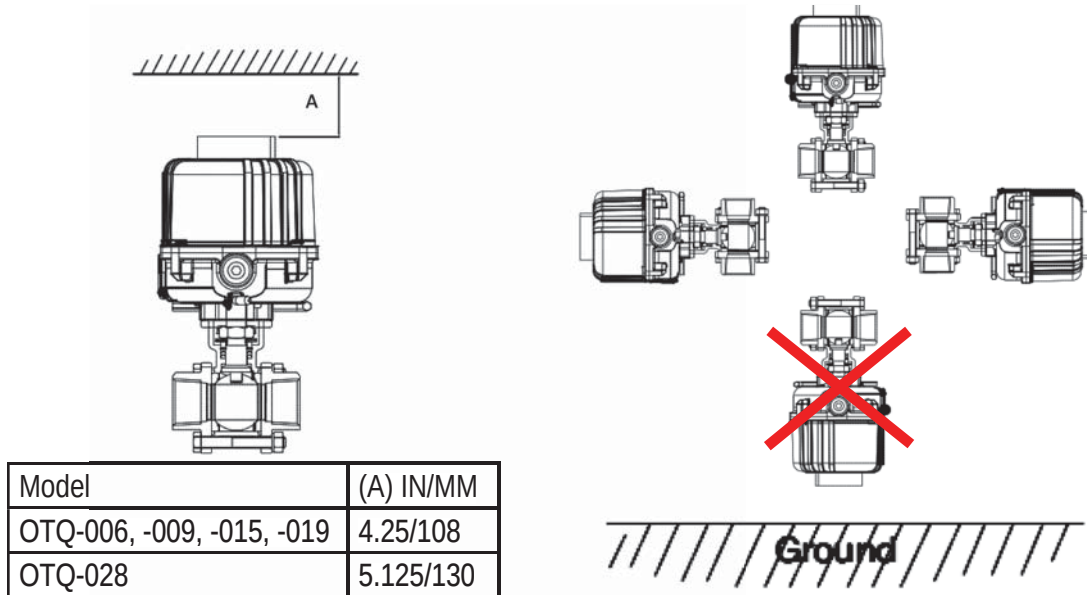
Actuator MUST be properly grounded. Use the grounding lugs provided on the inside or outside of the ACTUATOR body.

INITIAL INSTALLATION

1. Install valve in system according to valve installation instructions provided.
2. Run electrical supply to the actuator. CAUTION: Make sure power is OFF Locked/ Tagged/ Verified Off; check proper voltage required for actuator (standard is 115 VAC).
3. Connect power cord/line to the actuator housing.
4. Wire the actuator per the diagram attached. Special actuators will have separate diagrams enclosed inside the cover.
5. Position cover gasket, replace cover and tighten screws.

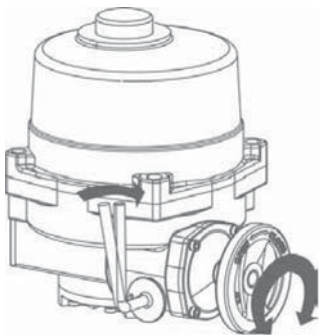
Actuator Installation Clearance

When installing an ACTUATOR, proper clearance around the ACTUATOR is required. After installation and wiring it is recommended that the conduit entries be sealed at the ACTUATOR and that the heater is energized.



Manual Override Operation

1. Pull the lever located on the side of the ACTUATOR toward the hand wheel. The lever should “lock” in position. Turn the hand wheel and the ACTUATOR output will rotate.
2. If the lever does not “lock” in the upright position, then turn the hand wheel halfway and pull lever to the upright position.



Turn the hand wheel clockwise for CLOSE
Turn the hand wheel counter clockwise for OPEN

3. After manual operation , leave the lever as is. When power is re-applied to the ACTUATOR, the lever will disengage and declutch the manual override. The ACTUATOR motor will then rotate the valve to the powered position.
4. If the Lever does not “lock” in the manual position while trying to manually operate the ACTUATOR, then the ACTUATOR gearing may be jammed and needs to be checked.

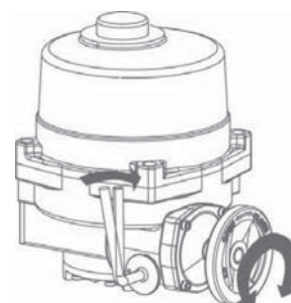
ACTUATOR RE-INSTALLATION (Use only if actuator is removed for servicing)

1. Operate valve manually and place it in the same position as indicated in the actuator dome.
2. Check that valve mounting brackets are in place and secure.
3. Ensure that the actuator output shaft and valve stem are aligned properly. If they are not, operate the valve manually until they are correct.
4. Mount actuator to valve mounting bracket. Do not tighten nuts and bolts at this time.
5. Remove actuator cover.
6. **CAUTION:** Make sure power is OFF.
7. Wire the actuator, per the diagram attached. Special actuators will have separate diagrams enclosed inside the cover.
8. Securely tighten bolts used to mount the actuator to mounting bracket or directly to the valve mounting pad if applicable.
9. Cycle the unit several times and check the open and closed positions of the valve. Cams are pre-adjusted at the factory; due to the variety of valve designs and types, however, slight adjustments might be required. (See section titled Limit Switch Setting)
10. Position cover gasket, replace cover and tighten screws.

Limit Switch Setting

Close/Open Limit Switch Cam Setting

1. Confirm that the power is off. Pull lever located on the side of the ACTUATOR to engage the manual override hand wheel. Rotate the hand wheel clockwise to fully close the ACTUATOR / valve.
2. Loosen the Closed Limit Switch cam set screw as shown. Rotate cam in the closed / clockwise direction and engage the switch lever to actuate the switch



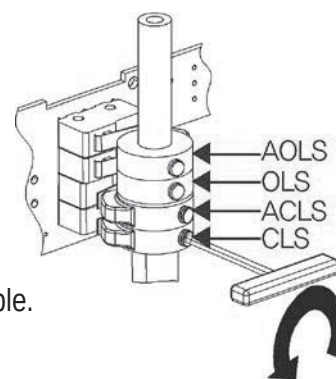
If Auxiliary limit switches are included in the ACTUATOR, then set the corresponding auxiliary switch at this time.

LIMIT SWITCH SETTING

AOLS	Auxiliary Open Limit Switch
OLS	Open Limit Switch
ACLS	Auxiliary Close Limit Switch
CLS	Close Limit Switch

Setting the open position.

1. Cycle the valve to the open position. Cam OLS controls this position. In the open position, the set screw in the OLS cam will be accessible.
2. If the valve is not open completely:
 - A. With the power off, slightly loosen the set screw on the OLS cam.
 - B. Rotate the cam clockwise (CW) by hand until a click is heard; tighten set screw. Power on the unit. The valve will move. Power off unit. By making incremental CW movements of the OLS cam, the valve can be positioned precisely in the desired position.
 - C. When the OLS cam is set, tighten the set screw securely.



Setting the open position. (CONTINUED)

3. If the valve opens too far; run the valve towards the closed position.
 - A. Rotate the valve to the open position by applying power to it. When valve is in the exact position desired, remove power from actuator.
 - B. Loosen the set screw in the OLS cam.
 - C. Rotate the top cam counterclockwise (CCW) until the switch makes contact, a slight click can be heard as the switch changes state. Tighten set screw.
 - D. Continue powering down, making adjustments, and powering back up until the valve is in the desired position.

Setting the closed position.

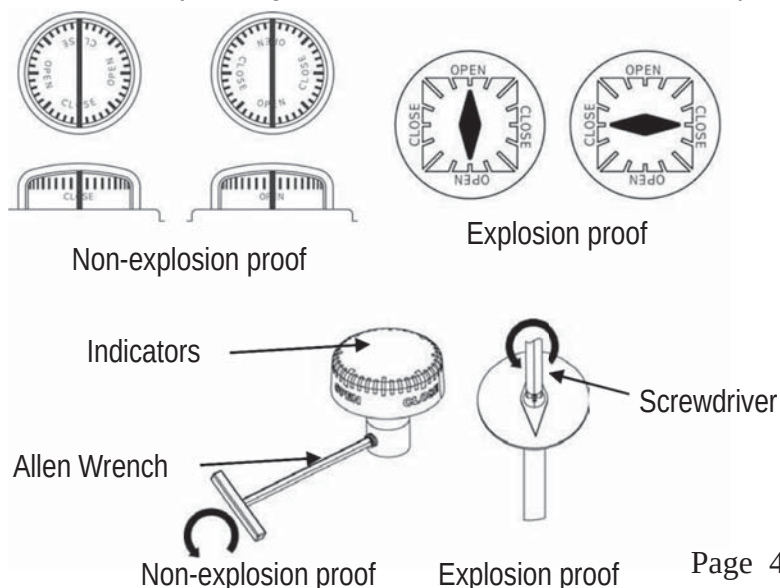
1. Apply power to move the valve toward the closed position. The bottom cam and switch control the closed position. In the closed position, the set screw in the bottom cam will be accessible.
2. If the valve is not closed completely:
 - A. With the power off, slightly loosen the set screw on the bottom cam.
 - B. Rotate the cam CCW by hand until a slight click can be heard; tighten set screw; power on the unit. The valve will move. Power off the unit. By making incremental CCW movements of the bottom cam, the valve can be positioned precisely in the desired position.
 - C. When the bottom cam is set, tighten the set screw securely.
3. If the valve closes too far, run the valve towards the open position.
 - A. Rotate the valve to the closed position by applying power to it. When valve is in the exact position desired, remove power from actuator.
 - B. Loosen the set screw in the top cam.
 - C. Rotate the top cam CW until the switch makes contact, a slight click can be heard. Power on the unit. The valve will move. Power off the unit. By making incremental CW movements of the top cam, the valve can be positioned precisely in the desired position. Tighten set screw.

INDICATOR SETTINGS

The valve position is easily confirmed from a distance by looking at the indicator dome located on the top of the actuator cover.

LED lights illuminate to allow for easy visual confirmation of full closed and full open

If the position of the indicator is not aligned correctly, an adjustment can be made by simply loosening the set screw and manually turning the indicator to the proper location, re-tightening the set screw



MAINTENANCE

Under normal conditions, no additional grease needs to be added to the ACTUATOR. However if the ambient temperature is greater than 40°C or the humidity is less than 15%, periodic re-greasing is recommended. The Recommended grease used in the NA-Series ACTUATOR is SHELL ALVIDA EP2.

TROUBLESHOOTING

Problem		Cause	Solution
Manual override will not move		The worm wheel and mechanical limit stop is jammed	Loosen the mechanical limit stop and the valve mounting bolts. Correct the mechanical stop position and then secure the mounting bolts and limit stop.
Level will not hold position when pulled toward the hand wheel		The worm wheel and mechanical limit stop is jammed	
The hand wheel is engaged and rotated, but the output drive bushing will not move.		Worm Wheel and Gear Separation and Failure	Disassemble the ACTUATOR and replace damaged gear.
In manual operation, the ACTUATOR will not cycle full open or full close		Mechanical limit stop is not set correctly	Reset the mechanical limit stop
Normal Operation by Remote location	ACTUATOR will not cycle to full open or full close	Limit Switch malfunction and / or Mechanical limit stop set incorrectly	Reset the limit switch cam and rest the mechanical limit stop
	ACTUATOR suddenly stops during operation	The over Torque Switch has tripped	Valves torque has increased. Valve needs to be checked / repaired or replaced, or the over torque switch has failed and needs to be reset
	ACTUATOR will not function from remote location	Main Power Failure	Main Power Check
		Wire Disconnect or Short circuit	Replace defective wire
		Motor or condenser is Damaged	Replace Motor or condenser
		Motor has over heated	Do not over cycle the motor
		Wiring failure	Check the circuit diagram and wiring status
		Gears are JAMMED	Release JAMMED Gears
When 3-phase operation rotates ACTUATOR in the opposite direction than the signal that is applied		Phase reversal	Switch two of the 3-phase wires
When ACTUATOR continues to rotate even after the cam strikes the limit switch	Limit Switch Failure, disconnect or short circuit	Replace defective switch and reconnect loose wire	
	Phase reversal	Switch two of the 3-phase wire	

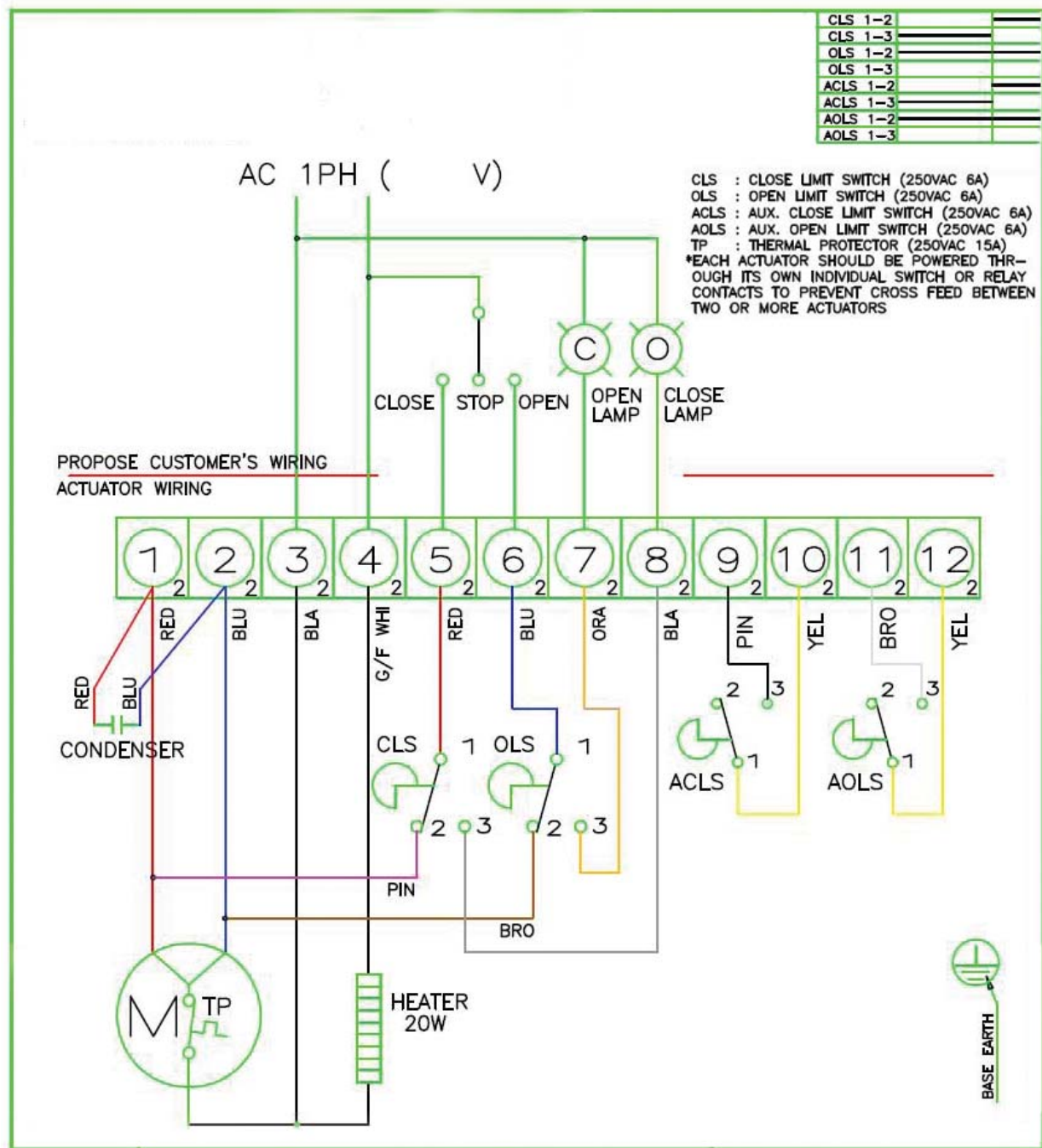
SPECIFICATIONS STANDARD 2-POSITION

Enclosure	Weatherproof Enclosure IP68 Nema 4 and 6 (0.5bar 72hr)
Ambient Temperature	-20° to +70° , 120° / 1hr
Power Supply	DC12V, DC24V, AC24V
	110 / 230V 50/60Hz
Limit Switches	Open / Close+ Dry Contact Open / Close (250AC 3A)
Stall Protection	Thermal Protection (Open 120°)
Travel Angle	90°±5° Optional extended travel up to 270-degrees.
Indicator	Dome Type With LED illumination.
Manual Operation	6mm hexagon "L" wrench handle included.
Self Locking	Provided by Means of Worm Gearing
Space Heater	2-watt (110 / 230VAC, 24VDC)
Conduit Entries	Two PF 1/2" Option : PG13.5, NPT 1/2", M20 Pitch1.5
Lubrication	Grease Moly(EP Type)
Materials	Aluminium
Surface Treatment	Anodizing
External Coating	POLYESTER (Tgic-Free)
Dielectric Strength	AC1800V / 1min

ELECTRIC ACTUATOR WIRING DIAGRAMS

The following wiring diagrams illustrate basic actuator connection for standard 110 VAC, 230 VAC, plus optional 24 VAC, and 24 VDC actuators. Additional accessory connections may be shown on the wiring diagram provided inside the enclosure cover with each valve.

OTQ 006 009 115 VAC WIRING DIAGRAM



OTQ-015 to OTQ-100 115 VAC WIRING DIAGRAM

