

PLEASE NOTE
During shipping and difficult installation, the actuator may fall outside of factory settings. If during initial start up the actuator does not function, please follow the following procedures.

YouTube
"NXT Calibration REV2"
bit.ly/S70NXTCalibrate

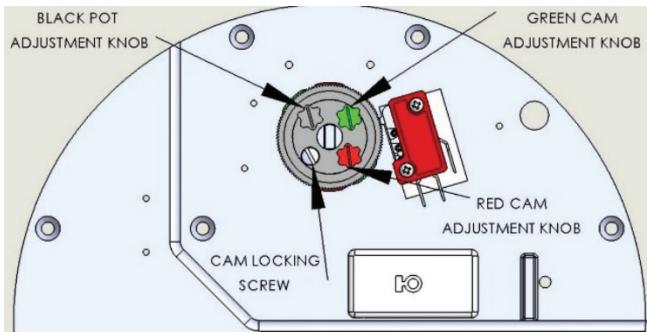
1.0 CLOSE CAM

- 1.1 Pull the Handwheel to disable the electric motor. Apply power to power terminals. For Servo NXT electronic modules, adjust display settings using arrow keys and checkmark.
- 1.2 Manually operate the actuator hand wheel clockwise until the valve reaches the fully closed position. This can be accomplished by using the dome valve position indicator.

NOTICE

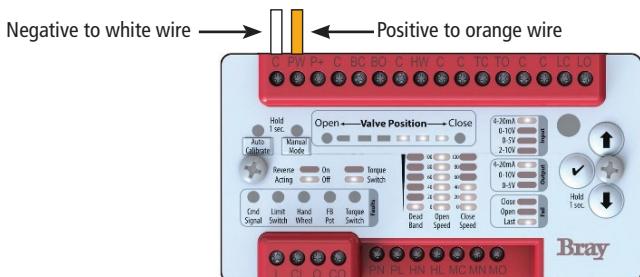
Cam Locking Screw must be loosened before each cam/pot drive gear adjustment and re-tightened after each cam/pot drive gear adjustment. It is likely that the rotation of one will move the other. Hold the other knobs or cams/pot drive gear during adjustment

- 1.3 Rotate the RED Cam Adjustment Knob with a flat head screwdriver until the cam lobe just activates (depresses) the switch from a clockwise direction. This can be accomplished by viewing the RED Valve Position LED Close light or by listening for the second click sound from the travel limit switch. Note, the first click sound comes from the auxiliary switch when applicable.



2.0 POTENTIOMETER DRIVE GEAR

- 2.1 The BLACK Potentiometer Drive Gear is not used for On/Off actuators, skip step 2.2.
- 2.2 For NXT Servo actuators, the Potentiometer's Volts Direct Current (VDC) must be measured using a Multimeter.
 - a. Contact multimeter NEGATIVE to FB Pot Com (WHITE wire)
 - b. Contact multimeter POSITIVE to FB Pot Wiper (ORANGE wire)
 - c. Rotate the BLACK Potentiometer Drive Gear adjustment knob with a flat head screwdriver until the Multimeter VDC measurement falls within 0.16 – 0.21 VDC, in the closed position.
 - d. Note: Make gentle contact when bringing the mechanical stop in contact with the output gear. When tightening the nut, use two wrenches. One to hold the bolt in place and one to tighten the nut. **DO NOT** drive the mechanical stop into the internal segment gear and crack the plastic washer.



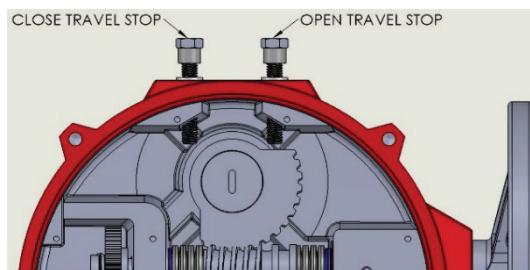
- 2.3 With the travel switch in the closed position, rotate the handwheel clockwise:

1/2 turn	300-800 lb-in (34-90 N m) 5,000-6,500 lb-in (565-734 N m)
1 turn	1,200-3,000 lb-in (136-339 N m)
2 turns	13,000-18,000 lb-in (1,469-2,034 N m)

Adjust the closed travel stop bolt until it bottoms against the internal segment gear and lock it in position with the locknut.

3.0 OPEN CAM

- 3.1 Manually operate the actuator handwheel counterclockwise until the valve reaches the desired open position.
- 3.2 For On/Off actuators, rotate the GREEN Cam adjusting knob until the cam lobe just activates (depresses) the switch from a counterclockwise direction. This can be accomplished by using a switch contact indicator device with lights and by listening for the second click sound from the travel limit switch. Skip step 3.3.
- 3.3 For NXT Servo actuators, the full open valve position will depend on the VDC measured at the appropriate Potentiometer terminals. Manually rotate the actuator until the Pot voltage is between 2.99 – 3.04 VDC. Rotate the GREEN Cam Adjustment Knob with a flat head screwdriver until the cam lobe just activates (depresses) the switch from a counterclockwise direction. This can be accomplished by viewing the GREEN Valve Position LED Open light or by listening for the second click sound from the travel limit switch.
- 3.4 With the travel switch in the open position, rotate the handwheel counterclockwise using the turns listed in step 2.3. Adjust the open travel stop bolt until it bottoms against the internal segment gear and lock it in position with the locknut.



4.0 TESTING

- 4.1 For On/Off actuators, electrically command the actuator full open and close to verify proper valve position. If positions are good, then calibration is complete. Otherwise return to step 1 or contact Bray.
- 4.2 For NXT Servo actuators, put the Servo NXT into Autocalibration mode by pressing the autocalibration button. Wait approximately 2.5 - 7.5 min. for autocalibration to complete before moving to next step.
- 4.3 Electrically command the actuator full open and close to verify proper valve position and recheck potentiometer VDC measurements to the specifications below, using Command Inputs. If position and potentiometer measurements are good, then calibration is complete. Otherwise return to step 1 or contact Bray.
 - Close Position = 0.10 – 0.26 VDC
 - Open Position = 2.94 – 3.10 VDC
- 4.4 **Note:** For actuator sizes 13,000 in.lb. and 18,000 in.lb., disable the Motor Stall Detection. The Stall Detection feature can be disabled by simultaneously pressing and holding the Up and Down Arrow keys for 5 seconds. After 5 seconds, all valve position indicators will flash simultaneously for 1 second indicating that the feature has been disabled.

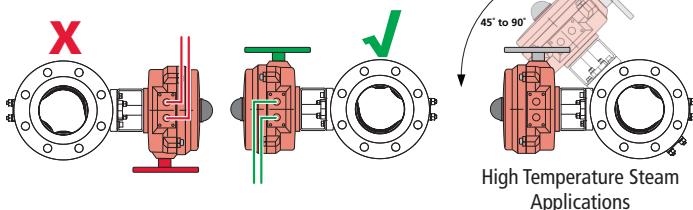
WARNING
The electrical travel switches must be set to activate (depress) prior to reaching the mechanical travel stop bolts.

CAUTION
Disconnect power supply before making electrical connections to avoid electric shock.

QUICK START GUIDE – SERIES 70 ELECTRIC ACTUATORS

1.0 Mounting

- a. Actuator should not be installed with handwheel facing DOWN.
- b. Electrical conduits locations should NOT allow moisture to drain into the actuator.
- c. On Steam Line Applications, install valve with stem at 45° to 90° from vertical.



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WARNING

All safety precautions stated in the full Operations Manual must be read and understood before proceeding with this document.

2.0 Wiring - Use wiring diagrams under actuator lid (sticker) and tucked near the motor (paper), that matches your specific order.

WARNING

Turn off all power and lockout/tag out service panel before installing or modifying any electrical wiring.

NOTICE

1. Power and control wiring should use separate conduit entries, excluding 24VAC applications.
2. Control wiring should be shielded, and the shield line should only be grounded at one end, preferably at the controller.
3. The conduit connections must be properly sealed to maintain the weatherproof integrity of the actuator enclosure to meet applicable NEMA standards.
4. A minimum of 18 AWG wire is recommended for all field wiring.
5. Some On/Off units require additional terminal wiring to power the heaters, and the heaters are recommended.

3.0 Calibration - See other side of S70 Quick Start Guide.

4.0 Troubleshooting - Warning: Turn off all power and lockout/tag out service panel before installing or modifying any elecrical wiring.

ISSUES	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
Servo NXT does not turn on when power is applied	Fuse is blown Servo NXT is incorrectly wired Servo NXT is not receiving power	Verify and replace 5A Fast Blow 5x20mm Fuse on the side of the NXT Electronic Module. Verify wire connections against the wiring diagram. Wiring diagrams found inside actuator lid and upon email request. Test the Input Power connection with a multimeter or oscilloscope.
Actuator moves back and forth near setpoint (hunting)	Deadband is too narrow Excessive noise on the signal lines	Increase the deadband setting. Use an oscilloscope to test for the presence of EMI. Utilize EMI reducing techniques to mitigate the issue. Command Signal and Feedback wires must be shielded and grounded. Some applications require separate conduits for signal wires, per NEC.
Servo NXT not responding to Command Signal	Servo NXT in local Control Box mode Servo NXT in manual or autocalibration mode Autocalibration not conducted after CAM Shaft assembly adjustments Servo NXT is incorrectly wired	If local control is being used, ensure the local control station is not active or is set to remote mode. If local control is not being used, test the voltage on the Control Box Open and Close pins relative to the COM pins. Greater than 3V should be measured. Check the indicators for manual and autocalibration mode. Autocalibrate Servo NXT. Verify wire connections against the wiring diagram. Wiring diagrams found inside actuator lid and upon email request.
Cmd Signal Fault	Command signal does not match Input setting Servo NXT is incorrectly wired Servo NXT is not receiving the command signal	Adjust the Input setting to match the command signal used. Verify wire connections against the wiring diagram. Wiring diagrams found inside actuator lid and upon email request. Test the Input Command connection with a multimeter or oscilloscope. Command Signal and Feedback wires must be shielded and grounded. Some applications require separate conduits for signal wires, per NEC.
Limit Switch Fault	Both limit switches are engaged or disengaged at the same time Servo NXT is incorrectly wired Travel limit switch failure	Adjust actuator cams. Verify wire connections against the wiring diagram. Wiring diagrams found inside actuator lid and upon email request. Test the switches to ensure that they are changing Limit Switch fault light states when engaged. View the NXT's OPEN (green) and CLOSE (red) Valve Position indicator lights.
Hand Wheel Fault	Hand Wheel is engaged Servo NXT is incorrectly wired Hand wheel switch failure	Disengage (push in) hand wheel. Verify wire connections against the wiring diagram. Wiring diagrams found inside actuator lid and upon email request. Test the switch to ensure that it is changing Hand Wheel fault light states when engaged.
FB Pot Fault	Potentiometer outside of travel range Servo NXT is incorrectly wired	Operate the actuator to the fully open and fully closed position, and adjust the potentiometer position to always be between 0.1-3.1 VDC. Follow calibration procedure. Verify wire connections against the wiring diagram. Wiring diagrams found inside actuator lid and upon email request.
Torque Switch Fault	Torque Switch setting enabled with no torque switches connected Torque switch(es) engaged Servo NXT is incorrectly wired Torque Switch failure Top Plate has been removed or adjusted	Disable torque switch setting. Check the valve and/or actuator for obstructions. Verify wire connections against the wiring diagram. Wiring diagrams found inside actuator lid and upon email request. Test the switches to ensure that they are changing Torque Switch fault light states when engaged. This will effect Torque Switch calibration, requiring factory recalibration.
Motor Stall Fault (All 5 fault lights flash)	Operational torque is exceeding the torque rating of the actuator Fault lights exist while initiating autocalibration Autocalibration not conducted after CAM Shaft assembly adjustments Motor Stall enabled on 13k and 18k in.lb. actuators Servo NXT is incorrectly wired	Check the valve and/or actuator for obstructions. Remove actuator, measure the valve stem torque required to rotate the valve disk and verify against the actuator torque rating. Correct applicable fault light. Autocalibrate Servo NXT. Disable Motor Stall Detection, by holding UP and DOWN arrows simultaneously for 5 seconds. Verify wire connections against the wiring diagram. Wiring diagrams found inside actuator lid and upon email request.
Fault condition during autocalibration	Fault occurring during calibration Servo NXT is incorrectly wired	Correct any faults lights. Operate the actuator to the fully open and fully closed position, while verifying potentiometer voltage is between 0.1-3.1 VDC and NXT's OPEN (green) and CLOSE (red) Valve Position indicator lights function. Verify wire connections against the wiring diagram. Wiring diagrams found inside actuator lid and upon email request.
Pulsing Motor Rotation	Excessive motor use Motor Speed selection below 100%	UL listed NXT modules will reduce runtime to 33% (1s On/2s Off) until high temperature actuator has cooled. Increase Deadband span or reduce duty cycle. Motor Speed below 100% will use an On/Off pulsing action to reduce speeds. Change Motor Speed selection as needed, unless speed has been limited due to temperature.

REFERENCE FILE

S70 NXT IOM Manual	https://www.bray.com/docs/default-source/manuals-guides/iom-manuals/s70-servo-nxt-devicenet_halfsize_2_2020.pdf
S70 IOM MANUAL	HTTPS://WWW.BRAY.COM/DOCS/DEFAULT-SOURCE/MANUALS-GUIDES/IOM-MANUALS/ELECTRIC-ACTUATORS-SERIES-70-OM-EN-US.PDF
S70 NXT Calibration YouTube Video	https://www.youtube.com/watch?v=tGlqF8GwT2Y
S70 NXT Calibration And Testing	https://www.youtube.com/watch?v=tGlqF8GwT2Y
S70 Servo NXT Potentiometer Setting	https://as-comd-site-webapi-wus2-prd-01.azurewebsites.net/documents/48bff248-c97c-4880-a8d6-15baa41c3d81/Bray%20Commercial%2070%20Series%20NXT%20Potentiometer%20Setting
S70 Technical Manual	https://www.bray.com/docs/default-source/manuals-guides/technical-sales-guide/en_br_tsm_s70-electric-actuator_20240628.pdf
S70 Sales Brochure	https://www.bray.com/docs/default-source/specifications/datasheets/en_sds_ac_70_20220304.pdf