

## Calibration & Testing 2-Way S30 S31 Valve with S70 Electric Actuator

12/13/19

### 2-way Assembly, S30/S70 and S31/S70

- 1 Calibration
  - 1.1 Potentiometer Installation
  - 1.2 Close Cam
  - 1.3 Potentiometer Drive Gear
  - 1.4 Open Cam
- 2 Sertvo Pro Testing
- 3 Servo NXT Testing

#### PRECAUTIONS:

- Wear safety glasses and all other appropriate safety equipment before performing any of the listed tasks
- Assure all components are present before assembly
- This Work Instruction must be thoroughly reviewed and understood before conducted



#### **CAUTION: Risk of Electric Shock.**

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



#### **CAUTION: Risk of Property Damage.**

Do not apply power to the system before checking all wiring connections. Short circuited or improperly connected wires may result in permanent damage to the equipment.

**IMPORTANT:** Do not exceed the electrical ratings of the S70 Actuator.

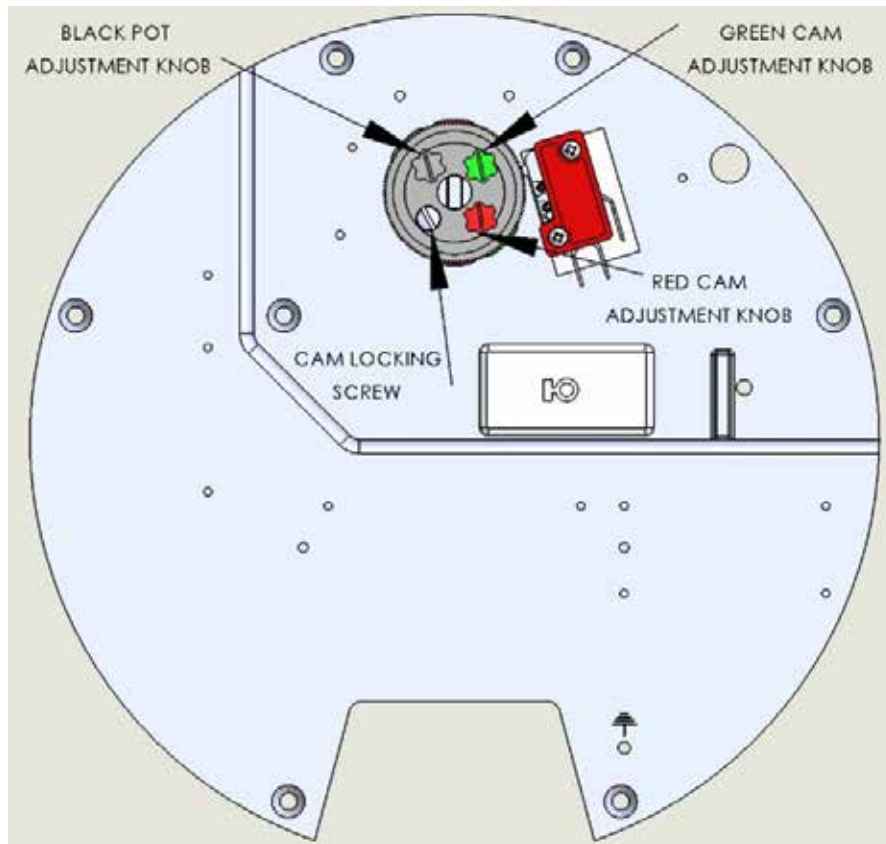
## 1 Calibration

### CAUTION

The electrical travel switches **must** be set to activate (depress) prior to reaching the mechanical travel stops. The cams are color coded (green for open, red for closed).

**NOTE:** Manual travel stops are designed to prevent manual overtravel from turning the handwheel, not to stop the electric motor. The travel stops have an adjustment range of approximately 10-degrees.

**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. See [Figure 1].



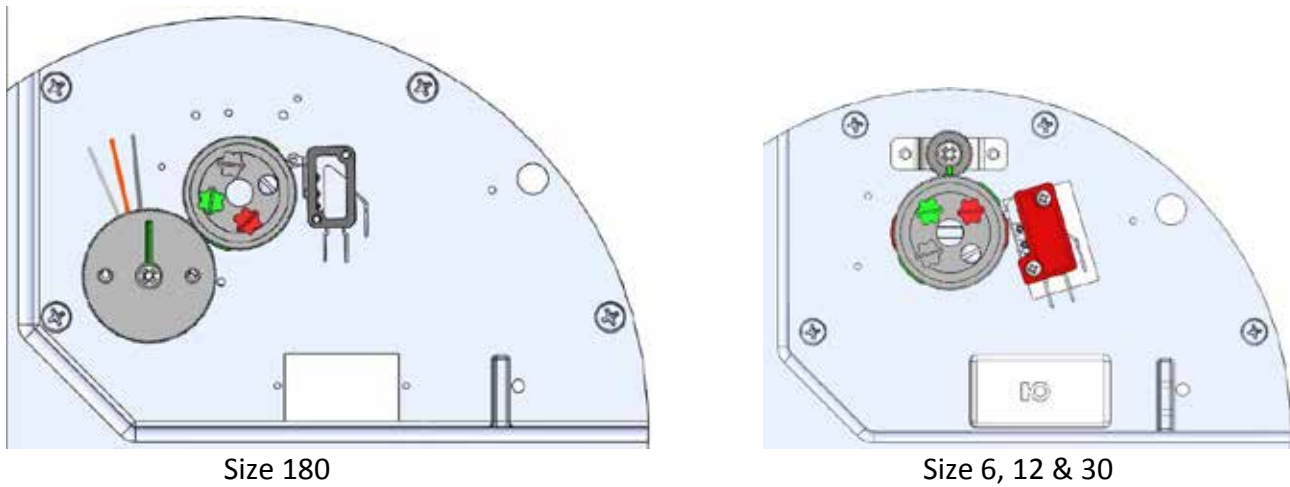
[Figure 1]

## 1.1 Potentiometer Installation

**NOTICE:** Step 1.1 applies to potentiometer installation and optional Servo Pro potentiometer initial setting, for all others skip to step 1.2.

1.1.1 Manually operate the actuator hand wheel counterclockwise until the valve reaches the desired fully open position.

1.1.2 Mount the appropriate potentiometer in the respective location and **GREEN** indicator orientation depicted in [Figure 2].



[Figure 2]

### 1.2 Close Cam

1.2.1 Skip to 1.2.2 for On/Off electronic modules. Servo electronic modules sometimes require special settings based on the Purchase Order documentation (i.e. reverse acting, 4-20mA signal input, 4-20mA feedback, fail open, etc.). Pull the Handwheel to disable the electric motor. Use the appropriate operations manual if instructions are needed to adjust the servo settings. Follow the applicable steps below:

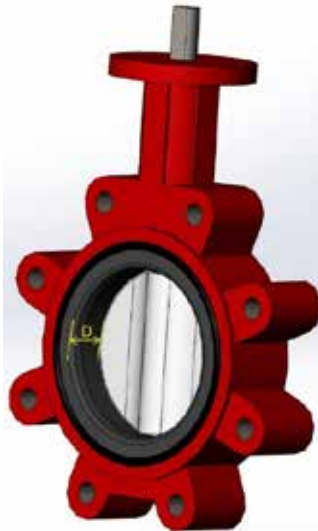
#### Servo Pro

1. Adjust dip switch settings.
2. Apply power to power terminals.

#### Servo NXT

1. Apply power to power terminals.
2. Adjust display settings using arrow keys and checkmark.

1.2.2 Manually operate the actuator hand wheel clockwise until the valve reaches the desired fully closed position. This can be accomplished by equalizing the distance "D" from the face of the valve to the edge of the disk on both sides of the valve using a screwdriver. See [Figure 3].



[Figure 3]

1.2.3 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 using a switch contact indicator device with lights or by listening for the sound that the contact makes.

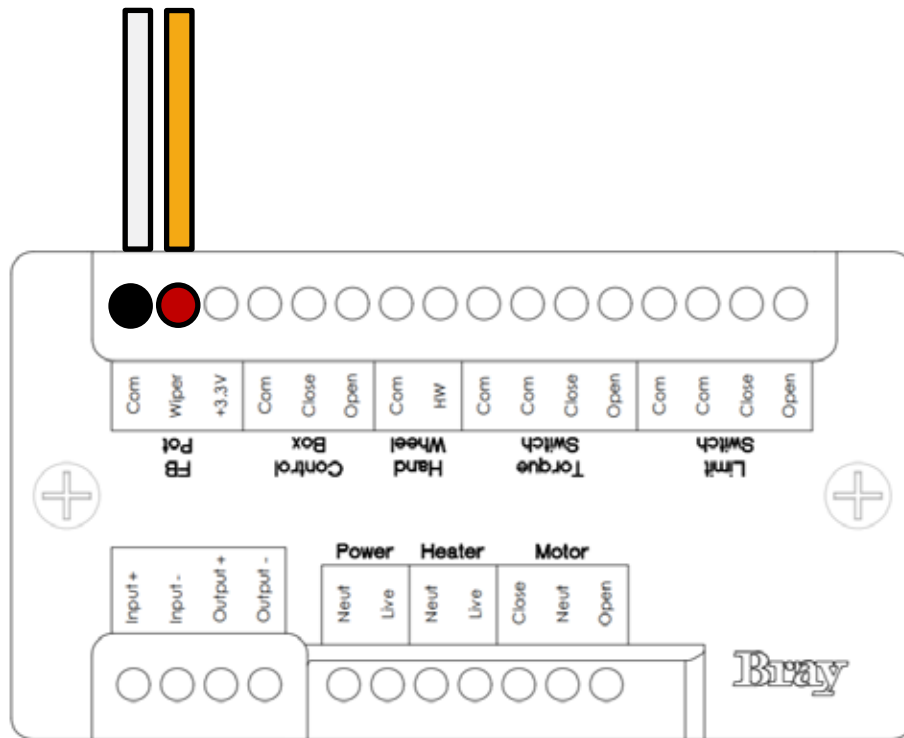
## 1.3 Potentiometer Drive Gear

1.3.1 The **BLACK** Potentiometer Drive Gear is not used for On/Off actuators. Skip step 1.3.2.

1.3.2 For NXT Servo actuators, the Potentiometer's Volts Direct Current (VDC) must be measured using a Multimeter. For Pro Servo actuators, this step is optional. See [Figure 4]

### Testing Potentiometer Voltage

3. Set Multimeter max range between 10-100 VDC.
4. Contact multimeter **NEGATIVE** to FB Pot Com (**WHITE** wire).
5. Contact multimeter **POSITIVE** to FB Pot Wiper (**ORANGE** wire).



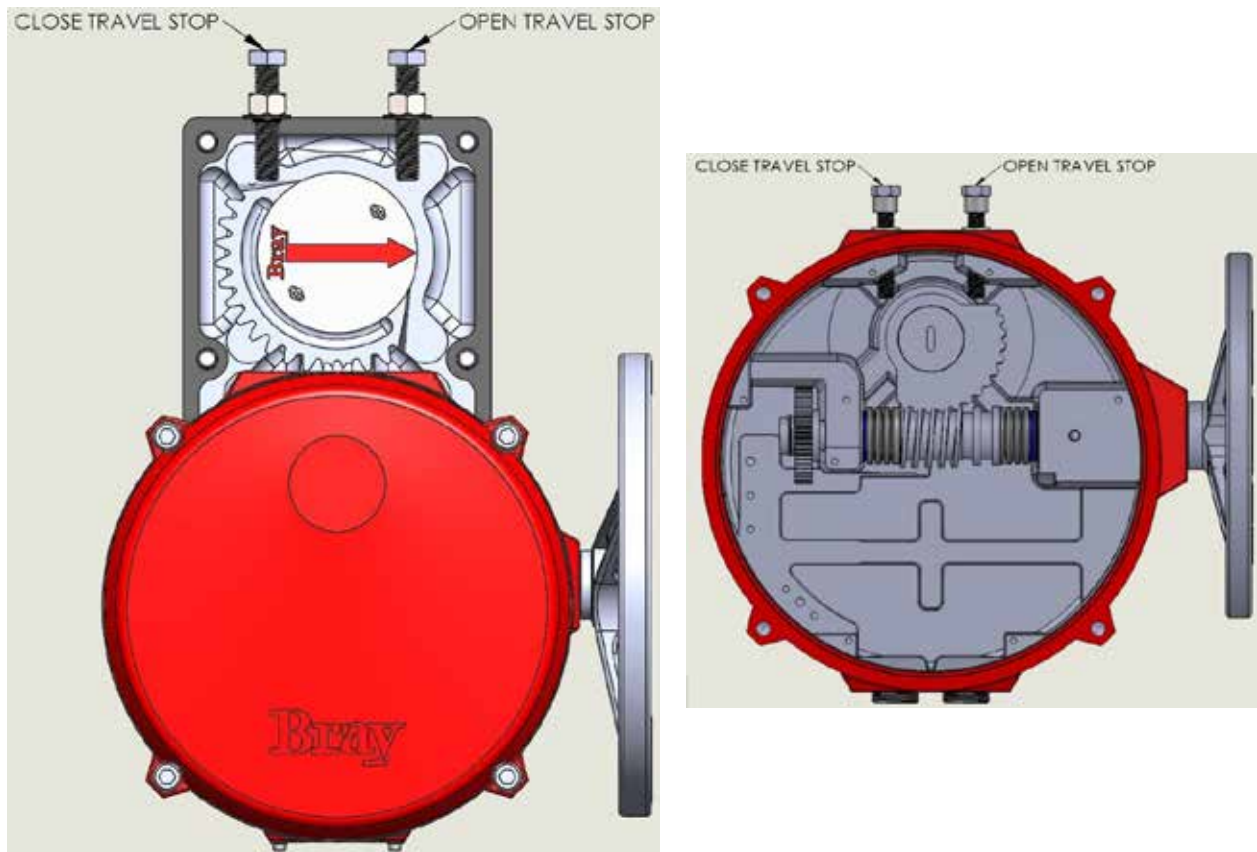
[Figure 4]

Rotate the **BLACK** Potentiometer Drive Gear Adjustment Knob with a flat head screwdriver until the Multimeter VDC measurement falls within the tolerance listed below, for the respective Servo Pro or Servo NXT.

- Servo Pro: 0.29 – 0.37 VDC
- Servo NXT: 0.20 – 0.25 VDC

**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. We want to avoid “driving” the mechanical stop into the internal segment gear and cracking the plastic washer.

- 1.3.3 With the travel switch in the closed position, rotate the handwheel clockwise 1/2 a turn for Housing Size 6, 1 turn for Housing Size 12, 1/2 a turn for Housing Size 30, and 2 turns for Housing Size 180. Adjust the closed travel stop bolt until it bottoms against the internal segment gear and lock it in position with the locknut. See [Figure 5].

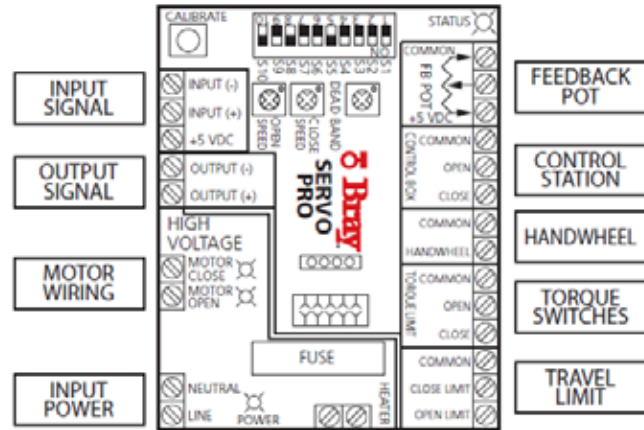


[Figure 5]

### 1.4 Open Cam

- 1.4.1 Manually operate the actuator handwheel counterclockwise until the valve reaches the desired open position. Visual alignment to center the valve disk at 90 degrees is sufficient, as changes in resilient seat valve disk flow coefficients are negligible in open position within a reasonable range.
- 1.4.2 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 sound that the contact makes. Skip step 1.4.3.
- 1.4.3 For NXT Servo actuators, the full open valve disk position will depend on the VDC measured at the appropriate Potentiometer terminals. Refer to the respective VDC values below. Notice the **GREEN** Cam does not directly affect the Potentiometer measurement. After every **GREEN** Cam adjustment, the actuator must rotate to match the new full Open position relative to the new **GREEN** Cam position. For Pro Servo actuators, this step is optional.
- Servo Pro: 4.63 – 4.71 VDC
  - Servo NXT: 2.95 - 3.00 VDC
- 1.4.4 With the travel switch in the open position, rotate the handwheel counterclockwise 1/2 a turn for Housing Size 6, 1 turn for Housing Size 12, 1/2 a turn for Housing Size 30, and 2 turns for Housing Size 180. Adjust the open travel stop bolt until it bottoms against the internal segment gear and lock it in position with the locknut.
- 1.4.5 Apply respective power according to the electronic module's requirements. Verify all LED lights illuminate, upon initial power up. Notice that LEDs are not applicable to Interposing Relay Boards (IRB).

2 Servo Pro Testing



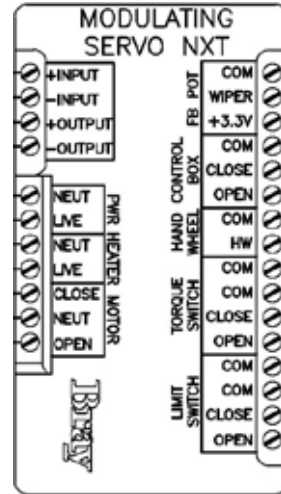
- 2.1 Deadband, Open Speed and Close Speed potentiometers shall be set to full open (counter-clockwise rotation), unless otherwise noted on purchase order.
- 2.2 Put the Servo Pro into autocalibration mode by pressing and holding the autocalibration button for a minimum of 2 seconds. Wait for autocalibration to complete before moving to next step.
- 2.3 Electrically command the actuator full open and close to verify proper valve disk position and recheck potentiometer VDC measurements to the specifications below, using a 0-10 VDC signal generator command input. If position and potentiometer measurements are good, then calibration is complete. Otherwise return to the applicable 1 step or ask a supervisor for assistance.

Close Position = 0.21 – 0.45 VDC  
 Open Position = 4.55 – 4.79 VDC

- 2.4 Verify the **STATUS** LED is flashing **GREEN**. For any other status lights correct the fault, check applicable operations manual or consult your supervisor.



## 3 Servo NXT Testing



- 3.1 Put the Servo NXT into autocalibration mode by pressing the autocalibration button. Wait for autocalibration to complete before moving to next step.
- 3.2 Electrically command the actuator full open and close to verify proper valve disk position and recheck potentiometer VDC measurements to the specifications below, using a 0-10 VDC signal generator command input. If position and potentiometer measurements are good, then calibration is complete. Otherwise return to the applicable **1** step or ask a supervisor for assistance.

Close Position = 0.14 – 0.30 VDC  
 Open Position = 2.90 – 3.06 VDC

- 3.3 For actuator sizes 13,000inlb and 18,000inlb, 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.
- 3.4 Verify the **RED** BRAY logo is flashing and that no fault lights are on.