Installation, Operation and Maintenance Instructions

HRSN2 Series

TO PREVENT POTENTIAL INJURY, DEATH, OR DAMAGE TO PROPERTY, READ THIS MANUAL CAREFULLY AND COMPLETELY.
IMPORTANT SAFETY INSTRUCTIONS

Basic safety precautions should always be followed, including the following: Failure to follow instructions can cause severe injury and/or death.

⚠️ This is the safety-alert symbol. When you see this symbol on your equipment or in this manual, look for one of the following signal words and be alert to the potential for personal injury.

⚠️ WARNING warns about hazards that could cause serious personal injury, death or major property damage and if ignored presents a potential hazard.

⚠️ CAUTION warns about hazards that will or can cause minor or moderate personal injury and/or property damage and if ignored presents a potential hazard. It can also make consumers aware of actions that are unpredictable and unsafe.

The NOTICE label indicates special instructions that are important but not related to hazards.

⚠️ WARNING - Read and follow all instructions in this IOM manual and on the equipment. Failure to follow instructions can cause severe injury and/or death.

⚠️ WARNING – Risk of Electric Shock. All electrical wiring MUST be in conformance with applicable local codes, regulations, and the National Electric Code (NEC). Hazardous voltage can shock, burn, and cause death or serious property damage. To reduce the risk of electric shock, do NOT use an extension cord to connect unit to electric supply. Provide a properly located electrical receptacle. Before working on any electrical equipment, turn off power supply to the equipment.

⚠️ WARNING – To reduce the risk of electric shock replace damaged wiring immediately.

⚠️ WARNING – Ground all electrical equipment before connecting to electrical power supply. Failure to ground all electrical equipment can cause serious or fatal electrical shock hazard.

⚠️ WARNING – Do NOT ground to a gas supply line.

⚠️ WARNING – To avoid dangerous or fatal electrical shock, turn OFF power to all electrical equipment before working on electrical connections.

⚠️ WARNING – Failure to bond all electrical equipment to system structure will increase risk for electrocution and could result in injury or death. To reduce the risk of electric shock, see installation instructions and consult a professional electrician on how to bond all electrical equipment. Also, contact a licensed electrician for information on local electrical codes for bonding requirements.

⚠️ CAUTION – Potential pinch point. Equipment connected to or driven by this device may start unexpectedly and may cause personal injury or entrapment in linkage systems.
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**NOTICE:** The HRSN2 Series is produced in two distinct versions.... one with a manual override shaft on the BOTTOM side of the actuator, and the other with a manual HAND WHEEL on the SIDE of the actuator.

**NOTICE:** ALL HRSN2 Series actuators rotate CW to CLOSE the OUTPUT shaft out the bottom of the actuator when viewed from ABOVE. On HRSN2A & 2R models, the CAM shaft and the INDICATOR rotate CW to close as well. However on HRSN2B & 2S models, the CAM shaft and the INDICATOR rotate CCW (opposite the OUTPUT shaft). (See detail on next page).

**NOTICE:** The calibration procedures are specific to each model (2A & 2R are the same, and 2B & 2S are the same. Please be sure to follow the correct sequence for your model.
### Actuator Specifications

<table>
<thead>
<tr>
<th>Supply</th>
<th>Torque Output (lbf-in / Nm)</th>
<th>HRSN2A</th>
<th>HRSN2B</th>
<th>HRSN2R</th>
<th>HRSN2S</th>
</tr>
</thead>
<tbody>
<tr>
<td>12VAC</td>
<td>Current Draw (Start / Run / LRA)</td>
<td>3.5A / 2.0A / 3.8A</td>
<td>3.5A / 2.0A / 3.8A</td>
<td>3.5A / 2.0A / 3.8A</td>
<td>3.5A / 2.0A / 3.8A</td>
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<tr>
<td>-</td>
<td>Speed (90°) DC, seconds</td>
<td>8</td>
<td>8</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>12VDC</td>
<td>Motor - 12vdc Perm Magnet Brush Type</td>
<td>6W</td>
<td>6W</td>
<td>6W</td>
<td>6W</td>
</tr>
<tr>
<td>-</td>
<td>Duty Cycle (on/off / mod)</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
</tr>
<tr>
<td>-</td>
<td>Motor Starts, per hour, Max</td>
<td>1200</td>
<td>1200</td>
<td>1200</td>
<td>1200</td>
</tr>
<tr>
<td>-</td>
<td>Motor Class</td>
<td>Class B</td>
<td>Class B</td>
<td>Class B</td>
<td>Class B</td>
</tr>
<tr>
<td>24VAC</td>
<td>Current Draw (Start / Run / LRA)</td>
<td>2.1A / 1.2A / 2.3A</td>
<td>2.1A / 1.2A / 2.3A</td>
<td>2.1A / 1.2A / 2.3A</td>
<td>2.1A / 1.2A / 2.3A</td>
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<tr>
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<td>Speed (90°) DC, seconds</td>
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<td>8</td>
<td>10</td>
<td>10</td>
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<tr>
<td>24VDC</td>
<td>Motor - 24vdc Perm Magnet Brush Type</td>
<td>6W</td>
<td>6W</td>
<td>6W</td>
<td>6W</td>
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<tr>
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<td>Duty Cycle (on/off / mod)</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
<td>75%</td>
</tr>
<tr>
<td>-</td>
<td>Motor Starts, per hour, Max</td>
<td>1200</td>
<td>1200</td>
<td>1200</td>
<td>1200</td>
</tr>
<tr>
<td>-</td>
<td>Motor Class</td>
<td>Class B</td>
<td>Class B</td>
<td>Class B</td>
<td>Class B</td>
</tr>
<tr>
<td>120V</td>
<td>Current Draw (Start / Run / LRA)</td>
<td>39A / .36A / .48A</td>
<td>39A / .36A / .48A</td>
<td>39A / .36A / .48A</td>
<td>39A / .36A / .48A</td>
</tr>
<tr>
<td>-</td>
<td>Speed (90°) 60Hz / 50Hz, seconds</td>
<td>9.2 / 11</td>
<td>9.2 / 11</td>
<td>12.5 / 15</td>
<td>12.5 / 15</td>
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<tr>
<td>-</td>
<td>Motor - 120vac Split-Phase Cap TENV</td>
<td>10W</td>
<td>10W</td>
<td>10W</td>
<td>10W</td>
</tr>
<tr>
<td>-</td>
<td>Duty Cycle (on/off / mod)</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
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<tr>
<td>-</td>
<td>Motor Starts, per hour, Max</td>
<td>1200</td>
<td>1200</td>
<td>1200</td>
<td>1200</td>
</tr>
<tr>
<td>-</td>
<td>Motor Protection, Temp / Class</td>
<td>135°C / Class F</td>
<td>135°C / Class F</td>
<td>135°C / Class F</td>
<td>135°C / Class F</td>
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<tr>
<td>-</td>
<td>Speed (90°) 60Hz / 50Hz, seconds</td>
<td>9.2 / 11</td>
<td>9.2 / 11</td>
<td>12.5 / 15</td>
<td>12.5 / 15</td>
</tr>
<tr>
<td>-</td>
<td>Motor - 120vac Split-Phase Cap TENV</td>
<td>10W</td>
<td>10W</td>
<td>10W</td>
<td>10W</td>
</tr>
<tr>
<td>-</td>
<td>Duty Cycle (on/off / mod)</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
<td>25%</td>
</tr>
<tr>
<td>-</td>
<td>Motor Starts, per hour, Max</td>
<td>1200</td>
<td>1200</td>
<td>1200</td>
<td>1200</td>
</tr>
<tr>
<td>-</td>
<td>Motor Protection, Temp / Class</td>
<td>135°C / Class F</td>
<td>135°C / Class F</td>
<td>135°C / Class F</td>
<td>135°C / Class F</td>
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<tr>
<td>Manual Override</td>
<td>Bottom 8mm Hex Shaft</td>
<td>Hand Wheel</td>
<td>Bottom 8mm Hex Shaft</td>
<td>Hand Wheel</td>
<td></td>
</tr>
<tr>
<td>Electrical Entry (2)</td>
<td>1/2&quot; EMT or Nylon gland</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>On/Off or Proportional</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambient Operating Range</td>
<td>-22°F to +158°F / -30°C to +70°C</td>
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<td>Humidity Range</td>
<td>0-95% RH</td>
<td></td>
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<tr>
<td>Altitude Limit</td>
<td>9,850 ft / 3000 m</td>
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</tr>
</tbody>
</table>

**Notes:**
- USE ONLY HAYWARD GENUINE REPLACEMENT PARTS
- www.haywardflowcontrol.com
- Hayward Flow Control
- 1-888-HAY-INDL (1-888-429-4635)
1. This actuator is shipped in the FULLY CLOSED (CW) position (2 color position indicator shows RED).

2. **NOTICE: THIS ACTUATOR MUST HAVE WATER TIGHT EMT FITTINGS, WITH CONDUIT DRAINAGE INSTALLED AND POWER SUPPLIED TO UNIT TO KEEP THE HEATER WARM AT THE TIME OF INSTALLATION.**

3. **Storage:** This unit should NOT be stored outside unless it is powered up and has proper conduit terminations. When NOT powered up, it should be stored in a clean, dry environment at all times.

4. This actuator has been **factory calibrated to operate between 0° and 90°. Most quarter-turn products will not require recalibration of these settings.** If any travel adjustment is necessary, please refer to pages 11-12 for instructions.

5. **NOTICE: The actuator CANNOT operate with a rotation greater than 95°.**

**Installation Notes**

- There are no mechanical stops on this series. Use caution when operating the manual override.
- These actuators are designed to be used between a horizontal and upright position. Do NOT mount the assembly with the actuator top below a horizontal position.
- When installing conduit, use proper techniques for entry into the actuator. Use drip loops to prevent conduit condensate from entering the actuator.
- Both NPT conduit ports MUST use proper equipment to protect the NEMA 4X integrity of the housing.
- The internal heater is to be used in ALL applications.
- Do NOT install the actuator outdoors or in humid environments unless it is powered up and the heater is functioning.
- Use proper wire size to prevent actuator failure (see chart on page 10 for proper wire sizing).
- All terminals accept 14-18AWG solid/stranded wire.
- **NOTICE: Do NOT parallel wire multiple on/off actuators together without utilizing isolation relays. If this is your intention, please contact HAYWARD FLOW CONTROL for a multiple actuator parallel wiring diagram.**

**Product Mounting and Setup**

1. Fully **CLOSE** the valve or damper to which the actuator is to be mounted.
   - Keep in mind the HRS Series actuator OUTPUT SHAFT rotates CW (as viewed from above the unit) when driving CLOSED.
2. Assemble necessary linkage components and attach the actuator to the driven device.
3. Tighten mounting bolts, making sure actuator is centered on the device drive shaft.
4. Utilize the manual override (8mm hex output drive on bottom of actuator or side mounted Hand Wheel) to check for unobstructed manual operation from fully CW to fully CCW positions BEFORE applying power to the unit.

**WARNING – DO NOT operate the BOTTOM manual override when power is present. Do not use powered tools to turn the manual override. Geartrain damage and/or personal injury may occur.**

Refer to your product part number to determine which wiring diagram to follow when wiring up the actuator. (Con’t pg 11).

**WARNING – To avoid dangerous or fatal electrical shock, turn OFF power to all electrical equipment before working on electrical connections.**

**Wiring Diagram Reference Table**

<table>
<thead>
<tr>
<th>MODEL HRSN2A / 2R</th>
<th>MODEL HRSN2B / 2S</th>
<th>ON/OFF</th>
<th>PROPORTIONAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>12VAC/VDC</td>
<td>12VAC/VDC</td>
<td>Pg 5</td>
<td>Pg 8</td>
</tr>
<tr>
<td>24VAC/VDC</td>
<td>24VAC/VDC</td>
<td>Pg 6</td>
<td>Pg 9</td>
</tr>
<tr>
<td>120/230VAC</td>
<td>120/230VAC</td>
<td>Pg 7</td>
<td>Pg 10</td>
</tr>
</tbody>
</table>

The actuator is shipped from the factory in its fully CW (CLOSED) position. RED color in the indicator window means fully CW, while GREEN means fully CCW.
HRSN2A2S-A1 - 12vdc on/off

HRSN2A2S-B1 - 12vac on/off

ALL SWITCHES SHOWN WITH ACTUATOR IN FULL CLOSED POSITION

* CONNECTIONS OPTIONAL

Terminals 7 & 8 may not exist or may not be utilized in all models.
HRSN2A2S-D1 - 24vdc on/off

HRSN2A2S-E1 - 24vac on/off

Items within dotted line located inside actuator housing

USE ONLY HAYWARD GENUINE REPLACEMENT PARTS
HRSN2A~2S Series

**HRSN2A~2S-K1** - 120vac on/off

Terminals 7 & 8 may not exist or may not be utilized in all models.

**HRSN2A~2S-L1** - 230vac on/off

Terminals 7 & 8 may not exist or may not be utilized in all models.

**USE ONLY HAYWARD GENUINE REPLACEMENT PARTS**

Hayward Flow Control

www.haywardflowcontrol.com

1-888-HAY-INDL (1-888-429-4635)

JOM16 HRSN2 070716
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Wiring Diagram

HRSN2A~2S Series

HRSN2A~2S-A8 - 12vdc proportional

HRSN2A~2S-B8 - 12vac proportional

Items within dotted line located inside actuator housing

USE ONLY HAYWARD GENUINE REPLACEMENT PARTS

Hayward Flow Control

1-888-HAY-INDL (1-888-429-4635)

www.haywardflowcontrol.com
HRSN2A~2S Series

HRSN2A~2S-D8 - 24vdc proportional

- Open
- Open Comp
- Closed
- Closed Comp

* Connections Optional

Terminals 7 & 8 may not exist or may not be utilized in all models.

Field Control Device

4-20mA Field Impedance ≤ 5000

Feedback Return -
Feedback OUT +

Feedback Return -
Feedback OUT +

4-20mA Input Impedance 250

Signal Return -
Signal IN +

24V DC IN +

GND Screw

Items within dotted line located inside actuator housing

HRSN2A~2S-E8 - 24vac proportional

- Open
- Open Comp
- Closed
- Closed Comp

* Connections Optional

Terminals 7 & 8 may not exist or may not be utilized in all models.

Field Control Device

4-20mA Field Impedance ≤ 5000

Feedback Return -
Feedback OUT +

Feedback Return -
Feedback OUT +

4-20mA Input Impedance 250

Signal Return -
Signal IN +

24VAC IN

GND Screw

Items within dotted line located inside actuator housing
5. HRS Series actuators utilize a removable terminal block to facilitate ease of field wiring and testing. To remove the terminal block from the PCB receiver, pull straight OUT in a direction parallel to the PCB. In the photo at right, the LEFT side of the terminal block (where the screws are located) is pulled out to the LEFT. After wiring, reinsert the terminal strip into the receiver. This is a keyed pair and can only be inserted ONE way. Screw terminals are rated to accept 14AWG down to 18AWG solid or stranded wire. TERMINAL NUMBERING HAS #1 AT THE BOTTOM. (reference the correct wiring diagrams for numeric sequencing).

6. Make the electrical connections per wiring diagrams found on pages 5–10.
   - Connect POWER and CONTROL to the correct terminals.
   - Terminals A–D on each actuator are for the (adjustable) aux switches. These are dry type (volt free) Form A contacts rated 250VAC @ 3A Max.

Wire sizing data is provided in the table below to assist in the selection of the proper wire size for Hayward HRSN2 Series actuators using various wire sizes over distance. Be make sure to reference the correct voltage and do not exceed the indicated length of the wire run for each model.

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**WARNING – To avoid dangerous or fatal electrical shock, turn OFF power to all electrical equipment before working on electrical connections.**

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### Wire Sizing Chart

<table>
<thead>
<tr>
<th>Actuator/</th>
<th>HRSN2 12VAC/VDC</th>
<th>HRSN2 24VAC/VDC</th>
<th>HRSN2 120VAC</th>
<th>HRSN2 230VAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWG Amps</td>
<td>2.0A</td>
<td>1.2A</td>
<td>0.36A</td>
<td>0.21A</td>
</tr>
<tr>
<td>18</td>
<td>24</td>
<td>79</td>
<td>2119</td>
<td>6887</td>
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<td>16</td>
<td>37</td>
<td>124</td>
<td>3330</td>
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<td>14</td>
<td>60</td>
<td>200</td>
<td>5379</td>
<td>17483</td>
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<tr>
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<td>306</td>
<td>8227</td>
<td>26738</td>
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<tr>
<td>10</td>
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<td>519</td>
<td>13986</td>
<td>45455</td>
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<tr>
<td>8</td>
<td>233</td>
<td>775</td>
<td>20875</td>
<td>67843</td>
</tr>
</tbody>
</table>

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**NOTICE! - HRS Series actuators are fully assembled, calibrated and tested prior to leaving our factory. In most cases, after you have mounted the actuator to your device, you should be able to operate the actuator from fully CLOSED (CW) to fully OPEN (CCW) and back again, and find that no adjustments are needed. The assembly can be put into service immediately and should afford the end user years of service without incident. For On/Off actuators, proceed to the section on commissioning found on pg 16. For Proportional Control actuators, proceed to the section on commissiioning found on pg 20. However, should it be necessary to make adjustments to the end-of-travel positions to overcome any assembly related issues (i.e. valve shaft incorrectly timed to the drive stem), follow the procedures found on pgs 12~15 to reset the end of travel cams before proceeding to the respective sections on commissioning.**

Page 12 - Travel limit cams for CW (CLOSED) & CCW (OPEN) positions, HRSN2A & HRSN2R
Page 13 - Auxiliary switch cams for CW & CCW positions, HRSN2A & HRSN2R
Page 14 - Travel limit cams for CW (CLOSED) & CCW (OPEN) positions, HRSN2B & HRSN2S
Page 15 - Auxiliary switch cams for CW & CCW positions, HRSN2B & HRSN2S
WARNING – To avoid dangerous or fatal electrical shock, turn OFF power to all electrical equipment before working on electrical connections or changing cam positions.

Cam 1 Adjustment

1. The lower cam is Cam 1, the CW end-of-travel adjustment. With the actuator at its required CW position, with POWER OFF, use a 2.5mm hex key to free up the #1 cam set screw. Once it is free, rotate the hex key to the RIGHT 10-15 degrees to reset the switch roller arm. Then snug the set screw up against the camshaft until slight pressure is felt. SLOWLY rotate the hex key pushing the cam to the LEFT until you hear the “click” on the bottom switch indicating that correct adjustment has been achieved. Tighten the cam set screw.

2. Apply power to the actuator and drive CCW at least 15-20 degrees. Then drive the actuator CW until the cam stops the electrical travel. Check to be sure this is the correct CW position you require. Repeat step 1 if further adjustment is needed.

3. If using the Auxiliary Switches, adjust Cam 3 per instructions on page 13.

Cam 2 Adjustment

4. The second cam is Cam 2, the CCW end of travel adjustment. With the actuator at its required CCW position with POWER OFF, use a 2.5mm hex key to free up the cam set screw. Once it is free, rotate the hex key to the LEFT 10-15 degrees to reset the switch roller arm. Then snug the set screw up against the camshaft until slight pressure is felt. SLOWLY rotate the hex key to the RIGHT until you hear the “click” on the second switch indicating that correct adjustment has been achieved. Tighten the cam set screw.

5. Apply power to the actuator and drive CW at least 15-20 degrees. Then drive the actuator CCW until the cam stops the electrical travel. Check to be sure this is the correct CCW position you require. Repeat step 1 if further adjustment is needed.

6. If using the Auxiliary Switches, adjust Cam 4 per instructions on page 13.
WARNING – To avoid dangerous or fatal electrical shock, turn OFF power to all electrical equipment before working on electrical connections or changing cam positions.

Cam 3 Adjustment
1. The third cam is Cam 3, the CW auxiliary switch. Drive the actuator to its CW position. Use a 2.5mm hex key to free up the cam set screw. Once it is free, rotate the hex key to the RIGHT 10-15 degrees to reset the switch roller arm. Then snug the set screw up against the camshaft until slight pressure is felt. SLOWLY rotate the hex key and cam to the LEFT until you hear the “click” on the third switch. Continue to rotate the cam between 3 and 5 degrees to the LEFT to make sure the auxiliary cam switch changes state before the actuator reaches its end of travel electrically. An easy indicator of correct CW Aux cam setting is to look at the setscrew on the #3 cam. It should be about one-half the setscrew diameter to the LEFT of the #1 cam setscrew. Tighten the cam set screw.

Cam 4 Adjustment
1. The fourth cam is Cam 4, the CCW auxiliary switch. Drive the actuator to its CCW position. Use a 2.5mm hex key to free up the cam set screw. Once it is free, rotate the hex key to the LEFT 10-15 degrees to reset the switch roller arm. Then snug the set screw up against the camshaft until slight pressure is felt. Then SLOWLY rotate the hex key to the RIGHT until you hear the “click” on the fourth switch. Continue to rotate the cam between 3 and 5 degrees to the RIGHT to make sure the auxiliary cam switch changes state before the actuator reaches its end of travel electrically. An easy indicator of correct CCW Aux cam setting is to look at the setscrew on the #4 cam. It should be about one-half the setscrew diameter to the RIGHT of the #2 cam setscrew. Tighten the cam set screw.

Warning: DO NOT operate manual override when power is present. Geartrain damage and personal injury may occur.

Do not use powered tools to turn the manual override -- it will DAMAGE the gear train or motor and VOID the warranty.

Bottom mounted Manual Override on Non-Hand wheel units. (Uses 8mm socket)

This page corresponds to HRSN2A & HRSN2R models.
WARNING – To avoid dangerous or fatal electrical shock, turn OFF power to all electrical equipment before working on electrical connections or changing cam positions.

This page corresponds to HRSN2B & HRSN2S models.

Cam 1 Adjustment

1. The lower cam is Cam 1, the CW end-of-travel adjustment. With the actuator at its required CW position, with POWER OFF, use a 2.5mm hex key to free up the #1 cam set screw. Once it is free, rotate the hex key to the LEFT 10-15 degrees to reset the switch roller arm. Then snug the set screw up against the camshaft until slight pressure is felt. SLOWLY rotate the hex key pushing the cam to the RIGHT until you hear the “click” on the bottom switch indicating that correct adjustment has been achieved. Tighten the cam set screw.

2. Apply power to the actuator and drive CCW at least 15-20 degrees. Then drive the actuator CW until the cam stops the electrical travel. Check to be sure this is the correct CW position you require. Repeat step 1 if further adjustment is needed.

3. If using the Auxiliary Switches, adjust Cam 3 per instructions on page 15.

Cam 2 Adjustment

4. The second cam is Cam 2, the CCW end of travel adjustment. With the actuator at its required CCW position with POWER OFF, use a 2.5mm hex key to free up the cam set screw. Once it is free, rotate the hex key to the RIGHT 10-15 degrees to reset the switch roller arm. Then snug the set screw up against the camshaft until slight pressure is felt. SLOWLY rotate the hex key to the LEFT until you hear the “click” on the second switch indicating that correct adjustment has been achieved. Tighten the cam set screw.

5. Apply power to the actuator and drive CW at least 15-20 degrees. Then drive the actuator CCW until the cam stops the electrical travel. Check to be sure this is the correct CCW position you require. Repeat step 4 if further adjustment is needed.

6. If using the Auxiliary Switches, adjust Cam 4 per instructions on page 15.
Cam 3 Adjustment

The third cam is Cam 3, the CW auxiliary switch. Drive the actuator to its CW position. Use a 2.5mm hex key to free up the cam set screw. Once it is free, rotate the hex key to the LEFT 10-15 degrees to reset the switch roller arm. Then snug the set screw up against the camshaft until slight pressure is felt. SLOWLY rotate the hex key and cam to the RIGHT until you hear the “click” on the third switch. **Continue to rotate the cam between 3 and 5 degrees to the RIGHT to make sure the auxiliary cam switch changes state before the actuator reaches its end of travel electrically.** An easy indicator of correct CW Aux cam setting is to look at the setscrew on the #3 cam. It should be about one-half the setscrew diameter to the RIGHT of the #1 cam setscrew. Tighten the cam set screw.

Cam 4 Adjustment

The fourth cam is Cam 4, the CCW auxiliary switch. Drive the actuator to its CCW position. Use a 2.5mm hex key to free up the cam set screw. Once it is free, rotate the hex key to the RIGHT 10-15 degrees to reset the switch roller arm. Then snug the set screw up against the camshaft until slight pressure is felt. Then SLOWLY rotate the hex key to the LEFT until you hear the “click” on the fourth switch. **Continue to rotate the cam between 3 and 5 degrees to the LEFT to make sure the auxiliary cam switch changes state before the actuator reaches its end of travel electrically.** An easy indicator of correct CCW Aux cam setting is to look at the setscrew on the #4 cam. It should be about one-half the setscrew diameter to the LEFT of the #2 cam setscrew. Tighten the cam set screw.

Warning: **DO NOT** operate manual override when power is present. Geartrain damage and personal injury may occur.

**Do not use powered tools to turn the manual override -- it will DAMAGE the gear train or motor and VOID the warranty.**

Side Mounted Manual Hand Wheel Override

(spring loaded push in to engage, then rotate)
Calibration Procedure - On/Off Control:
1. Before making any changes in this section, keep in mind that this actuator has been fully calibrated to respond between 0° and 90° degrees rotation. If NO changes to end stops are required, this unit is ready to be put into service immediately. IF changes to the cam positions are required, refer to pages 12 ~ 15 (depending on your model).
2. Apply correct power according to the actuator model.
3. Position the actuator to its full CCW (Open) and CW (Closed) positions and adjust the cams as necessary.
4. After making cam adjustments on either or both ends of travel, it is advisable to move off cam slightly, and then repeat the drive command to assure the cam settings are correct.
5. Be sure the cam setscrews are snug (overtightening during calibration will make it difficult to make minor incremental adjustments).
6. Unit is now calibrated and is ready to be put into service. No other calibration is necessary.

NOTICE: The HRSN2A & 2R models have a bottom mounted 8mm hex override shaft for manual operation. The HRSN2B & 2S models have a side mounted override hand wheel. The hand wheel is normally disengaged from the drive system. To operate the hand wheel, the hand wheel must be pushed and HELD in while rotating to engage the drive system. If the actuator is powered up and operating, the hand wheel will rotate while you press it into position.

Also, the HRSN2B & 2S models have LIMITED rotation angles of less than 130°. There are HARD mechanical stops in the geartrain which prevent the manual or automatic operation of the actuator beyond those limitations. Attempts to use the hand wheel system to move the geartrain beyond those limits will void the product warranty.

Commissioning Procedure - On/Off Control:
1. Utilize the handwheel or override shaft to rotate the actuator and damper, valve or other connected device through its full travel from full CW to full CCW and back again to check for any possible interference. Do NOT utilize any mechanical advantage devices to rotate the handwheel (pipes, wrenches, extension bars, etc.).
2. Manually position the actuator to its mid-stroke position.
3. Apply correct power to the unit.
4. Measure correct power and polarity on terminals 1 & 2 at the actuator terminal block.
5. Command the field device to generate a CCW signal. The actuator rotates in a CCW direction (as viewed from above).
6. Measure terminals 2 and 6 (Run CCW) for correct voltage (matching that measured in step 4).
7. Actuator will stop when it reaches it’s full CCW position.
8. With field command signal still present, measure terminals 2 and 5 and read voltage to match that measured in step 4.
9. Read continuity between terminals C & D to show the CCW Aux switch is closed.
10. Command the field device to generate a CW signal. The actuator rotates in a CW direction (as viewed from above).
11. Measure terminals 2 and 4 (Run CW) for correct voltage (matching that measured in step 4).
12. Actuator will stop when it reaches it’s full CW position.
13. With field command signal still present, measure terminals 2 and 3 and read voltage to match that measured in step 4.
14. Read continuity between terminals A & B to show the switch is closed.
15. Generate a mid-position signal at the field device to move the actuator off its full CW trip position.
16. Return Field control to automatic mode.
17. Actuator is now commissioned and operational.
First, identify the model being calibrated. There are several different models, and different procedures for each. Failure to identify and follow the correct model’s procedures will result in poor product performance and may damage various components in the actuator.

120/230vac model PCB shown

12/24vac/vdc model PCB shown

**Identify the correct camshaft / output shaft relationship:**

Referring to the photos below and on the next page, the process of setting the potentiometer correctly is a function of the model of the actuator. Be sure to use the correct model’s photo reference to prevent damage to the potentiometer. During the initial setup, BEFORE changing actuator rotation, be sure the sector gear setscrews (2) are loose enough to allow the sector gear / potentiometer to rotate freely by hand. This will prevent damage to the potentiometer if initial settings are incorrect. Check to be sure there are two setscrews (loose) in the sector gear, and two setscrews (tight) in the potentiometer pinion gear.

**HRSN2A, 2R Models:** From **ABOVE** the actuator, the sector gear rotates CW when the actuator is driving to the full CW position. This also means the potentiometer is rotating CCW when moving towards the full CW position. However, the pot itself has a limited angle of rotation.

With the geartrain in the full CW position, the pot should be rotated to its full CCW direction, then back one to two teeth, and then the sector gear should be lifted above the pot gear, and then rotated CW until the second or third tooth from the end is aligned with the pot gear. Drop the sector gear down onto and mesh with the pre-positioned potentiometer gear.

As the actuator rotates CCW (open), the sector gear will rotate CCW and the potentiometer gear will rotate CW until the actuator reaches its full CCW position. If the setting of this procedure is incorrect, the sector gear will overdrive the potentiometer and damage the pot.

**HRSN2A, 2R Models:**

Photo shows correct alignment of sector gear to potentiometer when the actuator is in its FULL CW position (CW cam tripped). Be sure the potentiometer gear is rotated fully CCW before aligning the two gear sets. The sector gear is pulled UP on the camshaft to clear the pinion gear teeth to facilitate proper rotation of components and alignment. (disregard shaft top deviation from correct model in this photo).

Note that the sector gear rotates CCW, and the pinion gear rotates CW as the actuator drives CCW (Open).
Calibration Procedure - Proportional Control (All Models)

HRSN2B, 2S Models: From ABOVE the actuator, the sector gear rotates CCW when the actuator is driving to the full CW position. This also means the potentiometer is rotating CW when moving towards the full CW position. However, the pot itself has a limited angle of rotation.

With the geartrain in the full CCW position, the pot should be rotated to its full CW direction, then back one to two teeth, and then the sector gear should be lifted above the pot gear, and then rotated CCW until the second or third tooth from the end is aligned with the pot gear. Drop the sector gear down onto and mesh with the pre-positioned potentiometer gear.

As the actuator rotates CCW (open), the sector gear will rotate CW and the potentiometer gear will rotate CCW until the actuator reaches its full CCW position. If the setting of this procedure is incorrect, the sector gear will overdrive the potentiometer and damage the pot.

HRSN2B, 2S Models:

Photo shows correct alignment of sector gear to potentiometer when the actuator is in its FULL CW position (CW cam tripped). Be sure the potentiometer gear is rotated fully CW before aligning the two gear sets. The sector gear is pulled UP on the camshaft to clear the pinion gear teeth to facilitate proper rotation of components and alignment. (disregard shaft top deviation from correct model in this photo).

Note that the sector gear rotates CW, and the pinion gear rotates CCW as the actuator drives CCW (Open).

Calibration Procedure - Proportional Control (120/230vac Models): (refer to pages 18 & 19)

1. Before applying power or making any wiring connections:
2. Set the geartrain in the full CW position.
3. Set the #1 and #3 cams according to the procedure found on pages 12~15.
4. Set the unit in the full CCW position.
5. Set the #2 and #4 cams according to the procedure found on pages 12~15.
6. Set the geartrain back to the full CW position.
7. Make your field wiring connections for power, control and feedback signals, referring to the correct wiring diagrams on pages 5~10.
   a. Connections are made ONLY TO THE MAIN TERMINAL BLOCK.
   b. No connections are made to the proportional control board directly.
8. Set the signal IN and OUT select switches in their correct positions.
9. Tighten the two M3 setscrews on the sector drive gear which drives the potentiometer gear. (Ref pgs 17 & 18 specific model settings).
10. Apply correct power according to the actuator model.
    a. The red LED D18 will turn on, and blue LED D4 will start to flash.
11. Press the black pushbutton on the Mod control board and hold it down for about three seconds, then release.
    a. The unit will auto-run between the cam settings set in steps 3~6 above.
    b. This procedure reads and saves the potentiometer readings into microcontroller EEPROM.
    c. Loss of power does not erase these settings.
    d. During the CCW drive process, the grn LED D6 will be ON, and turns off when CCW end of travel is reached.
    e. During the CW drive process, the red LED D7 will be ON, and turns off when CW end of travel is reached.
12. Upon completion of this procedure, the blu LED D4 will resume flashing at approx once every four seconds to indicate normal CPU activity.
13. The unit will start to respond to the incoming 4-20mA control signal being sent to the actuator.
14. Unit is now calibrated and is ready to be put into service. No other calibration is necessary. Proceed to Commissioning found on pg 20.
Calibration Procedure - Proportional Control
(120/230vac Models) continued-

D6 (grn) CCW Drive
Flashing while driving CCW
Off when reaches end of travel

D7 (red) CW Drive
Flashing while driving CW
Off when reaches end of travel

D10 (yel) Fault Indicator

D4 (blu) CPU Running
Flashes once every four seconds
to indicate normal CPU activity.

S3 PROG / LEARN
Press to Recalibrate
ONLY after resetting
cams!

D18 (red) POWER
On indicates power is
applied to unit.

S2 (Feedback Mode)
0-10vdc  2-10vdc  4-20mA*

S1 (Signal Mode)
1-5vdc  0-10vdc  2-10vdc  4-20mA*

* Default (factory) setting is 4-20mA In/Out

W2
Trims Full
CW FB Out
(4mA)

W1
Trims Full
CCW FB Out
(20mA)

DECREASE
4mA setting
to
DECREASE
20mA setting
to
Calibration Procedure - Proportional Control (24vac/vdc Models):

1. Before applying power or making any wiring connections:
2. Set the geartrain in the full CW position.
3. Set the #1 and #3 cams according to the procedure found on pages 12~15.
4. Set the unit in the full CCW position.
5. Set the #2 and #4 cams according to the procedure found on pages 12~15.
6. Set the geartrain back to the full CW position.
7. Make your field wiring connections for power, control and feedback signals, referring to the correct wiring diagrams on pages 5~10.
   a. Connections are made **ONLY TO THE MAIN TERMINAL BLOCK**
   b. No connections are made to the proportional control board directly.
8. Set the DIP switches for correct signal IN and OUT.
9. Tighten the two M3 setscrews on the sector drive gear.
10. Apply correct power according to the actuator model.
    a. The blue LED D1 will turn on, and grn LED STA will turn on.
11. Press the “SET” black pushbutton on the Mod control board and hold it down for about three seconds, then release.
    a. The grn STA LED will turn off and the unit will drive to the fully CW position and stop when the pre-set cam positions are reached. There are NO LED indicators to advise when the actuator is running.
12. When the actuator stops, press the CLO pushbutton ONCE.
    c. The actuator will drive to its full CCW (Open) position and stop when the pre-set cam postions are reached.
13. When the actuator stops, press the OP pushbutton ONCE.
14. The unit will start to respond to the incoming 4-20mA control signal being sent to the actuator.
15. Unit is now calibrated and is ready to be put into service. No other calibration is necessary.

Commissioning - Proportional Control Actuators

1. Utilize the handwheel or override shaft to rotate the actuator and damper, valve or other connected device through its full travel from full CW to full CCW and back again to check for any possible interference. Do NOT utilize any mechanical advantage devices to rotate the handwheel (pipes, wrenches, extension bars, etc.).
2. Manually position the actuator to its mid-stroke position.
3. Apply correct power to the unit.
4. Measure correct power and polarity on terminals 1 & 2 at the actuator terminal block.
5. Command the field device to generate a 20mA (10vdc) signal. The actuator OUTPUT shaft rotates in a CCW direction (as viewed from above) and stops at the full CCW (Open) position.
6. Measure terminals 5 (+) and 6 (-) to read 20mA (10vdc).
7. Read continuity between terminals C & D to show the CCW Aux switch is closed.
8. Command the field device to generate a 4mA (2vdc) signal . The actuator OUTPUT shaft rotates in a CW direction (as viewed from above) and stops at the full CW (Closed) position.
9. Measure terminals 5 (+) and 6 (-) to read 4mA (2vdc).
10. Read continuity between terminals A & B to show the CW Aux switch is closed.
11. Generate a 12mA (6vdc) signal at the field device to move the actuator to its mid-travel position.
12. Actuator stops at 50% travel, and feedback measurers 12mA (6vdc) +/- tolerance error if any (single decimal).
13. Return Field control to automatic mode. Actuator is now commissioned and operational.
### Calibration Procedure - Proportional Control

(24vac/vdc Models)

#### Function DIP Select

<table>
<thead>
<tr>
<th>DIP</th>
<th>ON</th>
<th>OFF</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4-20mA</td>
<td>0(2)-10V</td>
<td>Input</td>
</tr>
<tr>
<td>2</td>
<td>0-10V</td>
<td>2-10V/4-20mA</td>
<td>Feedback</td>
</tr>
<tr>
<td>3</td>
<td>4-20mA</td>
<td>0(2)-10V</td>
<td>Feedback</td>
</tr>
<tr>
<td>4</td>
<td>0-10V</td>
<td>2-10V/4-20mA</td>
<td>Feedback</td>
</tr>
<tr>
<td>5</td>
<td>Mod</td>
<td>On/Off</td>
<td>Control</td>
</tr>
</tbody>
</table>

#### Signal IN Connector

- **4-20mA**
- **0(2)-10V**
- **2-10V/4-20mA**
- **4-20mA**
- **0(2)-10V**
- **4-20mA**

#### Power

- **Open**: Mode On/Off Control
- **Close**: Mode On/Off Control
- **Set**: Mode On/Off Control

#### Program Port

- **CPU Running**

#### FB Out Connector

- **DECREASE**
- **20mA**

#### Potentiometer Connector

- **Option DIP Select**
  - **1 = Off, 2 = Off**: Fully CW upon loss of input signal
  - **1 = Off, 2 = On**: Fully CCW upon loss of input signal
  - **1 = On, 2 = On**: DA Mode (4mA = Closed CW)
  - **1 = On, 2 = On**: RA Mode (20mA = Closed CW)
  - **1 = On, 2 = On**: Factory Function

#### DIP Switches

- **DIP 1**: 4-20mA, 0(2)-10V
- **DIP 2**: 0-10V, 2-10V/4-20mA
- **DIP 3**: 4-20mA, 0(2)-10V
- **DIP 4**: 0-10V, 2-10V/4-20mA
- **DIP 5**: Mod, On/Off

#### Hot 24VAC

- **Com**
- **Red+** 24VDC
- **Blk -**

#### Fault OUT

- **(Dry Contact)**

#### On/Off Control

- **3 = Off**: DA Mode (4mA = Closed CW)
- **3 = On**: RA Mode (20mA = Closed CW)

#### Do NOT adjust!

- **DECREASE**
- **Current TRIP setpoint**
- **LCD Contrast** (not used)

---

**Default Settings**

- **VR2**: Trims Full CCW FB Out (20mA)

---

USE ONLY HAYWARD GENUINE REPLACEMENT PARTS

Hayward Flow Control

www.haywardflowcontrol.com

1-888-HAY-INDL (1-888-429-4635)

IOM16 HRSN2 070716

Page 21 of 27
By default, PCB is set for 4-20mA IN, 4-20mA OUT, Direct Acting mode

Modulating 120vac unit shown -

(24v mod board is housed in external rectangular enclosure - see dim data).

HRSN2 Series is completely wired as received.

The actuator cams must be set using a different procedure from the on/off units. The potentiometer drive gears are installed but not calibrated.

Switch configurations are set for the default mode.

Follow calibration routine per model.
## TECHNICAL INFORMATION, CONTINUED

### COVER REMOVAL CLEARANCE

#### HRSN2A/2R (NO HANDWHEEL)

<table>
<thead>
<tr>
<th>MODEL</th>
<th>A</th>
<th>A'</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E (HV)</th>
<th>E' (LV)</th>
<th>F</th>
<th>G'</th>
<th>J*</th>
<th>K*</th>
<th>L</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>on/off - LV</td>
<td>6.38/162</td>
<td>4.93/125</td>
<td>2.20/56</td>
<td>1.40/36</td>
<td>3.60/92</td>
<td>-</td>
<td>-</td>
<td>3.25/83</td>
<td>0.551/14</td>
<td>0.78/20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mod - LV</td>
<td>7.56/192</td>
<td>2.52/64</td>
<td>4.22/107</td>
<td>3.60/92</td>
<td>-</td>
<td>-</td>
<td>3.25/83</td>
<td>0.551/14</td>
<td>0.78/20</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>on/off - HV</td>
<td>3.60/92</td>
<td>-</td>
<td>-</td>
<td>3.25/83</td>
<td>0.551/14</td>
<td>0.78/20</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Note: Low Voltage Modulating units require additional enclosure as shown with dotted lines.

#### HRSN2B/2S (WITH HANDWHEEL OVERRIDE)

<table>
<thead>
<tr>
<th>MODEL</th>
<th>A</th>
<th>A'</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E (HV)</th>
<th>E' (LV)</th>
<th>F</th>
<th>G'</th>
<th>J*</th>
<th>K*</th>
<th>L</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>on/off - LV</td>
<td>7.40/188</td>
<td>4.93/125</td>
<td>2.20/56</td>
<td>1.40/36</td>
<td>3.60/92</td>
<td>-</td>
<td>-</td>
<td>3.25/83</td>
<td>0.551/14</td>
<td>0.78/20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mod - LV</td>
<td>8.58/218</td>
<td>2.99/76</td>
<td>2.32/59</td>
<td>4.22/107</td>
<td>3.60/92</td>
<td>-</td>
<td>-</td>
<td>3.25/83</td>
<td>0.551/14</td>
<td>0.78/20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>on/off - HV</td>
<td>2.5/63</td>
<td>12 turns 90°</td>
<td>13.8/6.3</td>
<td>6.8/3.1</td>
<td></td>
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<td></td>
<td></td>
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<th>C</th>
<th>D</th>
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<th>E' (LV)</th>
<th>F</th>
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<th>J*</th>
<th>K*</th>
<th>L</th>
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</tr>
</thead>
<tbody>
<tr>
<td>on/off - LV</td>
<td>6.38/162</td>
<td>4.93/125</td>
<td>2.20/56</td>
<td>1.40/36</td>
<td>3.60/92</td>
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<td>-</td>
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<td>0.78/20</td>
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</tr>
<tr>
<td>on/off - HV</td>
<td>3.60/92</td>
<td>-</td>
<td>-</td>
<td>3.25/83</td>
<td>0.551/14</td>
<td>0.78/20</td>
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</tr>
</tbody>
</table>

Note: Low Voltage Modulating units require additional enclosure as shown with dotted lines.
Easily distinguishable green/red position indicator

Steel Cut Gearing

Heavy Duty Drive Motor

Easily accessible switch & cam stacks

Modular Control Cards including internal heater, 2 position, 3 position, proportional control, custom interfaces.

Override Handwheel version

Aluminum Casting NEMA 4X Protection

Captured Cover Screws

NEMA 4X Cover Seal

Removable Wiring Block

Easily accessible switch & cam stacks

Steel Cut Gearing

NEMA 4X Sealed Conduit entry (2) - 1/2"

ISO5211 Double Square Female drive socket

8mm Bottom Mounted Manual Override Shaft on versions without Hand Wheel

**Auxiliary Switch Cam Mapping**

<table>
<thead>
<tr>
<th></th>
<th>cw</th>
<th>ccw</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>-5°</td>
<td>0°</td>
</tr>
<tr>
<td></td>
<td>85°</td>
<td>90°</td>
</tr>
<tr>
<td>D</td>
<td>Fully OPEN (CCW)</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Common</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>Fully CLOSED (CW)</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Common</td>
<td></td>
</tr>
</tbody>
</table>

**Common Switch Terminal**

-5° | 0°  | 5° |
| 85° | 90° | 95°|

**SW4 CCW AUX**
(Factory Set - Adj)

**SW3 CW AUX**
(Factory Set - Adj)

Used by Controller

-5° | 0°  | 5° |
| 85° | 90° | 95°|

**Auxiliary Switch Cam Mapping**

**ISO5211 Mounting System**

**ISO5211 Double Square Female drive socket**
# Troubleshooting - On/Off Actuators

If, after completing all mounting and wiring procedures and main power is available, the actuator does NOT respond as expected, the following procedure(s) may help in identifying the problem.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Target</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator does not move when commanded to do so.</td>
<td>Power Source</td>
<td>Measure incoming power AT the actuator terminal block.</td>
</tr>
<tr>
<td>Actuator does not move when commanded to do so.</td>
<td>Control Problem</td>
<td>Generate move commands by the field device. Measure correct voltage changes between terminals 2 and 6 (CCW) and between terminals 2 and 4 (CW).</td>
</tr>
<tr>
<td>Actuator does not move when commanded to do so.</td>
<td>Wire Sizing</td>
<td>Check for correct wire size per table on Pg 11.</td>
</tr>
<tr>
<td>Supply and controls are measured to be correct, but actuator still does not move.</td>
<td>Overtorque</td>
<td>Remove the actuator from the driven device. If the actuator now moves, the torque required by the mechanical device exceeds that of the actuator. Increase actuator size.</td>
</tr>
<tr>
<td>Supply and controls are measured to be correct, but actuator still does not move.</td>
<td>Insufficient power supply and/or incorrect wire size during installation.</td>
<td>Measure the voltage between terminals 1 &amp; 2 WHILE commanding the actuator to move. The measured voltage cannot drop more than 10%.</td>
</tr>
<tr>
<td>Supply and controls are measured to be correct, but actuator still does not move.</td>
<td>Cams improperly set.</td>
<td>REMOVE POWER. Check to see if cams rotate freely on the cam shaft using your finger. Cams MUST be secure and set according to the procedures on pages 12 ~ 15.</td>
</tr>
<tr>
<td>Motor is extremely hot to the touch.</td>
<td>Control “noise” or excessive duty cycle</td>
<td>Check for stray voltage fluctuations on the incoming control signals. The on/off line voltage actuators have a maximum 25% duty cycle. While the low voltage models have a 75% duty cycle.</td>
</tr>
<tr>
<td>Actuator does not stop at correct position at either end of travel</td>
<td>Actuator is out of quadrant (HRSN2A, 2R ONLY)</td>
<td>Check for parallel wiring of multiple on/off actuators. Review the site as-built wiring diagrams to verify.</td>
</tr>
<tr>
<td>Actuator does not stop at correct position at either end of travel</td>
<td>Travel cams not positioned correctly</td>
<td>The manual override system has been employed to rotate the actuator beyond its intended angle of rotation. Use the manual override to rotate the actuator back into its correct quadrant of operation. Reset end-of-travel cams as detailed on pages 12~15.</td>
</tr>
</tbody>
</table>
### Troubleshooting - Proportional Control Actuators

If, after completing all mounting and wiring procedures and main power is available, the actuator does NOT respond as expected, the following procedure(s) may help in identifying the problem.

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Target</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actuator does not move when commanded to do so.</td>
<td>Power Source</td>
<td>Measure incoming power AT the actuator terminal block.</td>
</tr>
<tr>
<td>Control Problem</td>
<td>Generate move commands by the field device. For most analog control systems, reversing the polarity will render the control system output as invalid. Check the polarity of the analog control signals as they are connected to the actuator. The actuator will NOT respond to inverted control signals.</td>
<td></td>
</tr>
<tr>
<td>Wire Sizing</td>
<td>Check for correct wire size per table on Pg 11.</td>
<td></td>
</tr>
<tr>
<td>Supply and controls are measured to be correct, but actuator still does not move.</td>
<td>Over torque</td>
<td>Remove the actuator from the driven device. If the actuator now moves, the torque required by the mechanical device exceeds that of the actuator. Increase actuator size.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>With the actuator removed from the mechanical equipment, manually rotate the valve or damper through its intended range of travel to check for mechanical problems.</td>
</tr>
<tr>
<td></td>
<td>Insuffucient power supply and/or incorrect wire size during installation.</td>
<td>Measure the voltage between terminals 1 &amp; 2 WHILE commanding the actuator to move. The measured voltage cannot drop more than 10%.</td>
</tr>
<tr>
<td></td>
<td>Cams improperly set.</td>
<td>REMOVE POWER. Check to see if cams rotate freely on the cam shaft using your finger. Cams MUST be secure and set according to the procedures on pages 12 ~ 15.</td>
</tr>
<tr>
<td></td>
<td>Motor is extremely hot to the touch.</td>
<td>Control &quot;noise&quot; or excessive duty cycle</td>
</tr>
<tr>
<td>Actuator does not stop at correct position at either end of travel</td>
<td>Actuator is out of quadrant (HRSN2A, 2R ONLY)</td>
<td>The manual override system has been employed to rotate the actuator beyond its intended angle of rotation. Use the manual override to rotate the actuator back into its correct quadrant of operation.</td>
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