



## **DODGE ENGINEERING & CONTROLS, INC.**

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# **RE Generation II Troubleshooting Guide Section I**

## **Preliminary Information and Evaluation**

**Please review the troubleshooting guide and answer as many of the general questions as possible before calling for assistance. It is helpful to be at the job site with a quality meter and cell phone when calling for troubleshooting assistance.**

### **General Information before calling Customer Support:**

- 1. What is the part number of the actuator?**  
Valve Assembly Example: RE20G2 / RS2A-10 (The RE20G2 is the actuator portion of the assembly. See page AC-3 of our catalog for RE Part Number descriptions).
- 2. Is the actuator two-position, tri-state or modulating?**
  - **Two-Position or Tri-state Control:** This actuator will come with one circuit card.
  - **Modulating:** Typically factory set to 0-10V or 4-20 mA. This actuator will come with two control cards sandwiched together.
- 3. Did the actuator ever work? For how long?**
- 4. Is the actuator manually rotated outside of the proper operating range?** If you put the cover on the actuator, the indicator knob should point somewhere between the Open and Closed stickers, typically at 90 degrees unless you have a torque maximizer "T" or "X". If it does not, manually rotate the actuator into the range. At this point the actuator should start to rotate properly.
- 5. What power do you have connected to it? (24V or 120V)** Have you measured across TB1 to confirm power is present and correct voltage? Do you have the correct voltage supplied to the actuator based on the model that was purchased? (If there is a transformer present inside the actuator the unit is a 120V or 230V model. If there is no transformer present, the actuator is a 24V model which takes 24V AC or DC).
- 6. Have there been any power problems or lightning issues?** Are there any burn marks on the card? Incorrect voltage could have been applied to the card?

7. **Any signs of moisture damage?** Is there rusting in the case or white powdery substance on the circuit card? If the actuator is used in a cold or moist environment, does it have a functional heater and thermostat (H/S indicated on model number) to prevent condensation or moisture damage. In cold or moist environments, you must seal all conduits entering the actuator to prevent moisture migration into the actuator. A heater and thermostat by itself will not solve moisture problems. See Symptom 4 of the Troubleshooting Guide.
8. **Check the fuse on the card.** If it is blown, see Symptom 4 of the Troubleshooting Guide.
9. **What position is the J1 jumper in?** It should be in the T position for Tri-state or Modulating. For Two-position, if wired to A and C, place jumper in A position. If wired to B and C, place jumper in B position.
10. **Speed Setting (P2):** Is it at 100% or 50%? If the actuator sounds like it is chattering, and it is a Modulating RE1.5-8.5, someone rotated the speed setting too high. Move back to 50%.
11. **Current setting (P1):** If the actuator is unable to rotate the valve to the full closed position, and the current light is coming on, it may not be a valve issue. It could be that the current setting is no longer full clockwise (maximum torque).
12. **Do any of the LED's light up on the card?** Which ones? In what direction? If the green LED's come on before 90 degrees of rotation, someone may have moved the cams. See Troubleshooting Guide Symptoms 1-3.
13. **Does it move at all?** In what direction? For approximately how many degrees? (typically set up for 90 degrees of rotation). See Troubleshooting Guide Symptoms 6 & 7.
14. **Test the functioning of the current-limited card.** Remove the control signal wiring. Manually move the J1 jumper from the middle position (if tri-state), and move either to pins 1&2 (typically CW) or pins 3&4 (typically CCW). This should drive the actuator. If this worked correctly, there is a problem with the field wiring, or the modulating card (if applicable).
15. **What is the size of the field installed transformer?** It should be 30 VA for RE1.5-8.5, 56 VA for RE10-30 and 56 VA for models incorporating a torque maximizer. Dedicated transformers should be used for RE's due to potential grounding issues when other devices are attached to the same transformer. To calculate transformer size, add up the total VA requirements for all the RE's attached to the transformer, including line loss, then multiply the total by 1.25 (factor of safety). Add an additional 16 VA per actuator if a heater and stat has been provided.

16. **Internal Transformer testing** (applies to 120V actuators only). If the actuator is 24 Volt, there will not be a transformer. If the actuator is 120 Volt, measure the primary and secondary side. It should read 120V on the primary and 24V on the secondary.
17. **If the actuator is current limiting out**, indicated by either the yellow or red LED, stroke the actuator full CW and CCW to determine what position the actuator is in when the LED's come on. If the option alarm relay has been installed, when the actuator is in current limit, the position can be determined remotely by collecting the input, feedback and alarm contact in a history page. See Troubleshooting Guide Symptom 3.

### **Current Limiting Card:**

1. **How many wires have been run to the actuator for power and signal?**
  - a) **120 Volt modulating:** power and signal should be run in a separate conduit.
  - b) **24 Volt modulating:** the wires can be run together. The power and signal wires should be 2 twisted separate pairs. The signal twisted pair should be shielded.
  - c) **24V or 120V 2 position and tri-state:** the power and signal can be individual wires in same conduit. Do not use spiral wrapped cable.
2. **What is the voltage being sent to the current limiting card?** The current limiting card is always powered by 24V AC or DC. **Never connect 120V to the input power terminal of the board (right side of the board).**
3. **Confirm input signal.**
  - a) **2-position or Tri-State:** should read between 9–130V AC/DC. What does the meter read when measuring across A&C and A&B?
  - b) **Modulating:** the signal should be DC if the switch is set for volts. If set for mA, it will typically read 0-20 mA or 4-20 mA. What does the meter read across terminals 1 & 2 on the modulating card (if applicable) for voltage signal?  
Note: For mA readings, the meter must be set up properly in series with signal loop.
4. **Using Triac Signals:** Do not drive the actuator directly with a Triac. If a Triac is being used for signal input, place a relay between the Triac and the actuator signal input.

### **Modulating Cards:**

1. **Disconnect the feedback wires** (terminals 3&4(0-10V) or 3&5(4-20 mA). If the actuator works when disconnected, see Symptom 7 of the Troubleshooting Guide.
2. **Review the jumper positions on the modulating card.** W1 should be in the activated position to automatically modulate (in the right hand position when looking from the conduit entry side of the actuator at the conduit connectors). All three of the W2 jumpers should be either up or down depending on the type of action desired (direct or reverse acting).
3. **Did anyone move the potentiometer settings?** May need to recalibrate.

# **RE Generation II Troubleshooting Guide Section II Symptoms and Solutions**

## **SYMPTOM 1:**

**Green LED is not coming on in full clockwise and/or counterclockwise rotation.**

### **POSSIBLE SOLUTION:**

- A. Check the lower 2 cams on the actuator.** The bottom cam makes contact when the actuator rotates to the full clockwise position (lights up the top green LED). The second cam should make contact when the actuator rotates to the full counterclockwise position (lights up the second green LED). If they do not make contact, adjust accordingly (snug set screw when in the correct position). Note: The third cam from the bottom is for customer use for feedback and can be set at any angle of rotation.

## **SYMPTOM 2: Both Green LED's come on at the same time.**

### **POSSIBLE SOLUTION:**

- A. The cams have been moved.** The top green LED should come on when the actuator is full clockwise. The second green LED should come on when the actuator is full counterclockwise. (Typically 90 degrees at rotation, 270 (or 320) degrees when the "T" or "X" torque maximizers are being used).
- B. One wire has been removed from the motor.** Make sure both wires are connected to the motor.

## **SYMPTOM 3. The Yellow and/or Red LED's are lighting up on the current limited card.**

### **POSSIBLE SOLUTION:**

- A. For modulating applications, check speed setting (P2) on the current limited card:**  
For RE 10-30, P2 should be full clockwise maximum speed; for RE 1.5 – 8.5, P2 (left side of board) should be set at 50% of the range.
- B. Current setting (P1) should be set for full clockwise,** which is the maximum setting, unless discussed with the factory.

- C. **Look for a torque problem.** The yellow LED lights up when the actuator has exceeded its torque rating. The red LED will latch on if the actuator has exceeded the torque rating. The red LED will stay lit until power is removed. Listed below are a few common torque issues.
1. The valve could have a **physical obstruction**. If it is a 3-way BF valve and you are retrofitting an application, make sure the drive arm is not hitting the bracket. If so remount the actuator appropriately.
  2. **Pinched Butterfly Valve Seat** (Due to incorrect flange bolt tightening sequence, overtorquing or not evenly torquing bolts). To correct this:
    - a) Loosen all bolts around valve. Manually spin disc through butterfly valve a couple of times to try to reshape the seat. Retighten bolts properly. If the valve has been installed incorrectly for an extended period of time and this does not help, the valve seat may have taken a set and may need to be replaced.
    - b) If some leakage is acceptable, move the end switch cam so that the disc does not drive as far into the seat. This will not correct the problem, but may allow the actuator to operate depending on how much interference fit exists. If this is not acceptable, try to reseal the valve as indicated above. If this does not solve the problem, replace the seats or valve or upgrade the actuator to a higher torque.
  3. **Pinched Butterfly Valve Seat** (Due to improperly supported pipes or improperly welded flanges.)
    - a) Install proper pipe supports and re-weld flange properly.
  4. **Chemical deposits due to improper treatment** -Excessive addition of system chemicals at one time may cause excessive deposits on seats or disc.
    - a) If some leakage is acceptable, move the end switch cam so that the disc does not drive as far into the seat. This will not correct the problem, but may allow the actuator to operate depending on how much buildup has occurred. If this is not acceptable, replace the seats or valve.
  5. **Dirty, coarse or abrasive media** may cause sludge buildup. Excessive addition of system chemicals at one time may coat the surfaces of the valve seats and disks, (i.e. once a year water treatments.)  
Note: Chemicals should be added very gradually to avoid suspended particles in a system.
  6. **The actuator does not have enough torque** for the particular application. (Could be caused by higher close-off requirement or piping issue - see below).
  7. **Double-check the close-off pressure.** Was the actuator selected properly? Close-off requirement could have changed on the project. Upgrade torque on actuator. Example: actuator and valve were provided for 50 PSI differential, but system requires 100 PSI differential close off.

8. Was the valve installed too close to an elbow, strainer, pipe reduction or other obstruction? Most manufacturers recommend 6 pipe diameters of straight pipe both before and after the valve. Either change the piping or change the location of the valve. Only as a last resort should the actuator torque be upgraded. When installed at an elbow other problems can occur, even with an upgraded actuator.
9. Is the valve oriented to the correct location and orientation to the flow for the application? (See BF installation instructions). If the valve is installed incorrectly, reinstall in the correct position.

#### **SYMPTOM 4. The actuator is not moving.**

##### **POSSIBLE SOLUTION:**

- A. **Wired Incorrectly:** Make sure there are two power wires and two signal wires run to the actuator. Check for appropriate voltage with a meter. (See Page 3, Current Limited Card #1.
- B. **Blown fuse:** Check the fuse. This typically only blows if there is a direct short in the wiring or damage on the circuit card. It can also occur if there is a short in the windings of the motor.
- C. **Bad Motor:** If power is going to the motor, but there is no response it could have a broken brush, a short or carbon build-up. Measure across the two connections on the top to see what voltage the motor is receiving. When the current limited board is calling for the motor to run the DC voltage to the motor should be between 20 and 24V DC (depending on the speed setting on the board).
- D. **Carbon Buildup:** Check for carbon build-up on the motor (looks like black powder). This may be caused by the actuator hunting. If this is the case, it will prematurely wear out the motor on the actuator. This can be replaced in the field –
  1. Check for proper wiring;
  2. Check the controller program to determine why it is hunting.
- E. **Bad Circuit Card: Look for signs of moisture on the card** (looks like a white powder).
  1. When the actuator is installed in an unheated or moist environment, always make sure conduit connections are sealed and service loops are installed.
  2. Moisture problems are caused by not having a heater and stat or a heater and stat that is not functioning correctly. The cards may need to be replaced.

- F. Bad Circuit Card: Incorrect power or signal could have been supplied to the actuator.** Check the model purchased against the power being provided. This can be seen on the product label on the actuator. Power to the circuit board, TB1, (right side) should always be 24V AC or DC – Never 120V directly to the board.  
Control Signal Inputs:
1. Control input signal for 2-position should be between 9-130 VAC/VDC
  2. Control input signal for modulating is typically 0(2) -10VDC or 0(4)-20 mA.
- G. Check to make sure the actuator has not been manually rotated outside of its quadrant (typically 90 degrees).**
1. If it is, manually rotate actuator until indicator knob on the cover shows it is in between the open and closed labels.
  2. If operating with a torque maximizer, it should be between 270 (320) degrees. See diagram page AC-10 of our catalog.
- H. Bad transformers:** To check transformer function, follow instructions on Page 3. If bad, replace transformer. Damage can be caused due to several reasons: applying the incorrect voltage, over-heating or brown out conditions. Check the building power system and lightning protection as well as confirm you have a dedicated Class II transformer for RE actuators. No other products other than RE's should be on the transformer.
- I. Check the size of the transformer.** It should be a Class II transformer:
1. for RE1.5 - 8.5; 30VA
  2. for RE10 – 30X.; 56VA
  3. If a heater and Stat is added, add an additional 16VA.
  4. Always multiply the total VA requirements, including line loss, by 1.25 minimum to allow for a factor of safety.
- J. Measure the voltage at the power connections** with the actuator rotating and not rotating. If there is a large voltage drop when the actuator is running, the wrong size wire could have been run to the actuator or there may not be a properly sized transformer.
- K. Measure the input signal.** The signal is typically calibrated to 0-10V or 4-20 mA. If it is not reading the correct signal recheck the output from the controller.
- L. Is feedback connected?** If so, see Symptom 7 on Page 8.

**SYMPTOM 5. The actuator is rusting internally.**

POSSIBLE SOLUTION

- A. **The actuator is located in an outdoor or unheated/moist environment.** Conduit entries must be sealed and a heater and stat **MUST** be used when installed in this type of environment.
  
- B. **The wiring conduits were not sealed correctly.** Warm moist air can come in through improperly sealed connections.

**SYMPTOM 6. The actuator will not move over its entire range – Modulating and 2-Position.**

POSSIBLE SOLUTION

- A. **The cams were loosened or changed.** Readjust the cam switch. See Symptom 1, Green LED on Page 1.

**SYMPTOM 7. The actuator will not move over its entire range – Modulating Only.**

POSSIBLE SOLUTION

- A. **If you have wired to the feedback on the modulating card, temporarily remove the wires** and see if the actuator functions correctly. If it does, check the input on your controller to make sure it is set up correctly for the proper type of analogue input. Check controller literature for proper set up. When wired for voltage feedback, the control system will typically appear as a very high resistance and therefore will not load the voltage on the RE control board. For 4-20 mA feedback, the control system will have a lower resistance value than when in voltage mode to allow for proper signal current range.
  
- B. **Make sure jumper J1 on the current limited card is over pins 2 & 3** (mid-position).
  
- C. **Check the three W2 jumpers** on the modulating card to make sure all 3 are in the normal or reverse acting position. Make sure the jumper is placed over 2 pins. Also make sure jumper W1 is to the left hand side, viewed from conduit entry side).
  
- D. **Check the slide that is marked milliamps or voltage.** Make sure it is set to the desired position (factory calibration will be indicated on the actuator sticker – this should match the slide position). If it does not match and you desire to change it, call the factory for recalibration instructions.



**SYMPTOM 8. Motor moves, but gearbox does not.**

POSSIBLE SOLUTION

- A. **The manual override may not be re-engaged properly.** Signal should not be applied when actuator is being manually moved. Pull up on the override. Reapply power and signal to the actuator.
- B. **Check to see if stem shaft is broken.** The shaft may break if someone attempts to override the actuator without pushing down first. Replace the gear motor shaft.

**SYMPTOM 9. Actuator rotates in the wrong direction.**

POSSIBLE SOLUTION

- A. **Leads on the motor were swapped.** Swap Leads and recheck rotation.
- B. **Connectors on cam switches 1 and 2 could have been reversed.** Swap connectors and recheck rotation.

**Note: Once your troubleshooting steps are completed you may find you need replacement parts. You have two choices: 1) send the actuator back to DEI for repair with and Return Material Authorization or 2) most components are field replaceable and can be ordered directly from Dodge Engineering & Controls.**

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