# XM-800 Transmitter Troubleshooting

The XM-800 Continuous Level Sensors utilizes a float that moves up and down a stem along with your liquid. Inside the stem, there are reed switches. They are opened and closed by the magnets inside the float to electrically establish the float's height. This height is converted into an output voltage signal.

The XM-800 series utilizes the **Proportional Output** meaning that the output voltage is proportional to the input voltage. For example (assuming you have a sensor configured that the wires come out of the top, as shown):

- **If your Supply Voltage is 24VDC:**
  - When the float is at the bottom of the stem, the output is 0VDC.
  - When the float is half-way between the two stops, the output is 12VDC.
  - When the float is at the top of the stem, the output is 24VDC.

- **If you took the same XM-800 and only applied 12VDC as the supply voltage, then:**
  - When the float is at the bottom of the stem, the output is still 0VDC.
  - When the float is half-way between the two stops, the output is now only 6VDC.
  - But, when the float is at the top of the stem, the output is now only 12VDC.

## Troubleshooting Steps to Take:

| Symptom | Steps to Investigate |
|---|---|
| No Output | - Check wiring to ensure all is correct<br>- Check to make sure the wires coming out of the sensor are intact, not broken<br>- Check that Power Supply is on<br>- Check that Power Supply is set to the correct voltage |
| Steps in the output (Jumpy, not smooth) | - Check that there is no debris between the float and stem<br>- Check that float can move up and down freely |
| Output is not what you expected | - Check to ensure Power Supply is set to correct voltage<br>- Check wiring circuit to ensure that no other device/wiring is influencing your circuit.<br>- Above steps can be re-tested by removing sensor completely from your system and bench test the sensor separately. |

| | |
|---|---|
| Float is not floating | - Determine SG (Specific Gravity) of your fluid<br>- Check the XM-800 catalog page in the float section to ensure that your fluid is above the Minimum SG per the float used in your sensor.<br>- For example, if your fluid has an SG of 0.67 and you are using the float with part # 43590, the float will not operate correctly.<br>- Link to the XM-800 catalog page: https://www.gemssensors.com/docs/default-source/resource-files/catalog-pages/catalog-c_xm-xt-800_alloys.pdf |

If above steps do not yield positive results, the next steps are to ensure the sensor itself is in good working condition.

# Sensor Functionality Check:

1. Download the Installation Bulletin:
   a. https://www.gemssensors.com/docs/default-source/resource-files/instructions/instructions_179685.pdf

2. Disconnect the sensor from your Power Source and all other wiring.
   a. This ensures that the measurements you are taking are of the sensor alone with no external influences.

3. Determine Total Resistance Value – Two Paths to Take:
   a. Path 1:
      i. Determine the sensor's Gems part number via invoice, packing slip, or order acknowledgment.
         1. This will be a 5 or 6-digit part number or it could begin with the letter W.
      ii. Email Gems to request the Total Resistance Value in ohms (Ω) for your sensor: *https://www.gemssensors.com/contact-us/technical-support*
      iii. Note the value that Gems provided you: _____ Ω

   b. Path 2:
      i. Measure the resistance between the Red and Black wires, in ohms (Ω).
      ii. Note the measured value: _____Ω. This is called the Total Resistance Value.
      iii. Typical Total Resistance Values will be in the range of 1000 to 2500 Ω.
      iv. Contact Gems if your reading does not fall within this range. https://www.gemssensors.com/contact-us/technical-support.

4. Determine if sensor is functioning properly via resistance measurements:
   a. Move the float to the bottom of the stem

   b. If you took path 1 (above), confirm the Total Resistance Value by measuring between the Black & Red wires.
      i. Should be equal to the Total Resistance Ohms value that Gems provided to you.

   c. Next, measure the resistance between the Black & White wires.
      i. Should be equal to 330 Ω.

   d. Finally, measure the resistance between the Red & White wires.
      i. Should be equal to Total Resistance + 330 Ohms

Notes:

- Tolerance on the Resistance and Total Resistance Values above is +/- 10%

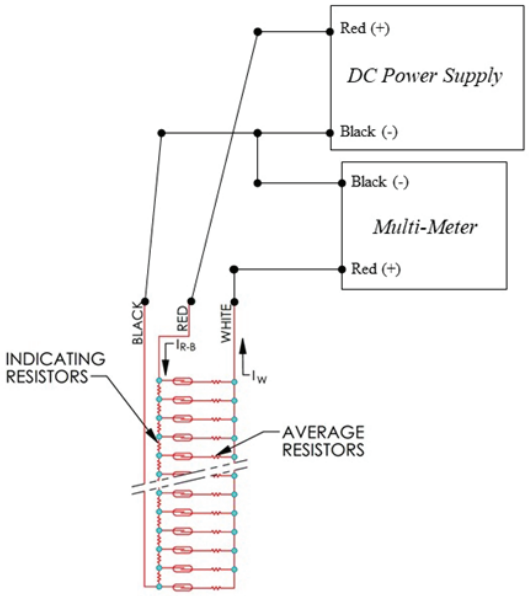
- If you happen to measure resistance across the Red and White or Black to White wires as the float moves up and down, you will see resistance toggles in a non-regular pattern. This is normal due to the orientation of the reed switches and internal resistors; the measurements will not be linear.

5. If all goes well in Step 4 and you still have issues, then it is time to test the sensor by applying voltage to the device.

   a. We strongly suggest removing your sensor from your application/wiring to ensure you are testing the sensor itself, not the whole system.

   b. Turn off all of your test equipment off before connecting anything.

   c. Set up your test circuit like schematic below:




   d. The DC Power Supply should be in the 10-30 VDC range.

   e. The Multi-Meter should be set for Volts and the probes in the appropriate connection holes.

   f. Turn your equipment on.

   g. Assuming you have a sensor configured that the wires come out of the top, place the float at the bottom and take a volt reading. It should read 0VDC.

   h. Then, move the float to the top of the stem. Take another voltage reading. It should be very close to your supply voltage.

   i. Repeat above measurements with Float at 25%, 50%, 75%
      i. Note if the readings at these points do not correlate.

6. If you are still having issues, please contact Gems: https://www.gemssensors.com/contact-us/technical-support.

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