



## 1. CENTROID'S PROGRAMMABLE FUEL AND WATER SENDERS

Centroid's new microcontroller-based senders can be distinguished from our older analog style by a "P" in the part number : ie CGFP or CGWP. Senders with aluminum tubing are for oil, diesel, or gasoline of up to 10% ethanol; and senders with PVC tubing are for potable water. We don't make units for non-potable water, because that leaves deposits on the sense wire.

## 2. HOW THE SENDERS MEASURE LIQUID LEVEL

Centroid's senders work by measuring capacitance. This means no moving parts are required. Electronics in the head convert this measured capacitance to the programmed output of ohms or volts. In fuel senders, capacitance is measured between the inner sensing tube and the grounded outer tube, and requires the fluid to be non-conductive. In water senders, capacitance is measured between the inner insulated sense wire and the water, which is grounded by the outer wire.

## 3. SHORTENING SENDERS (if required)

A fuel sender's outer tube can be shortened using a tubing cutter, and the inner tube snipped. Unless the sender was ordered as bendable, bending the tubing risks shorting the inner to outer tube, which causes a false Empty reading. A sender ordered as bendable can be safely bent above the black bend line on the tubing because it is insulated internally above that line.

Shortening a water sender requires the following steps: 1) unwind the outer ground wire; 2) pull the PVC tube from its friction fit on the head to expose the white sense wire; 3) use a heat gun to soften and pull off the black sealing piece at the end of the white wire; 4) shorten both wires and the tube; 5) put the black sealing piece back on the shortened white wire and heat it to get a good seal again (important!); 6) put on the outer tube and rewrap the outer ground wire.

## 4. CONNECTIONS

**NEG:** connect this to DC ground. NOTE: our senders work with *negative-ground* systems only.

**SEND:** connect this to the Send input of your gauge or display. NOTE: this is an electronic output which will confuse your ohmmeter if you try to take a resistance reading. Instead we troubleshoot by voltages, while connected to the gauge.

**POS** (most senders): Most Centroid senders have an ignition-voltage POS terminal to run their electronics. A fused voltage between 11-28vdc should be wired to the POS connection. The voltage should turn off when the system is turned off, both for safety and to avoid running down the battery. For a number of brands of 240/33 ohm gauge (not all), we can make a special sender that doesn't have this POS connection. These senders run their electronics from voltage on the Send connection.

**ALARM** (if ordered): The ALARM output switches to ground when the sender is in a factory-programmed alarm state, meaning a low or high level. A DC load which requires 0.3A or less can be connected to this output, with the far side of the load connected to battery voltage. Typically the load is an alarm light. During an alarm, If the ALARM output is momentarily shorted to NEG by a pushbutton switch, the alarm will turn off until a new alarm condition occurs. This is convenient for audible alarms.

## 5. CALIBRATION

### A. OUTPUT RANGE AND ALARM LEVELS ARE NOT CHANGEABLE BY THE CUSTOMER

The output range (eg 240/33 ohms) and alarm levels (if ordered) are set at the factory per the customer's order. They cannot be changed by the end user. They can be changed back at the factory if needed, however.

### B. FACTORY CALS

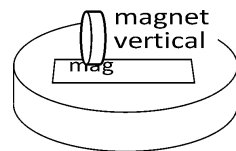
**If you did not need to shorten the sender, the factory Empty and Full settings should be correct. Please email for advice if they seem wrong, rather than recalibrating.** ONLY if you shorten the sender, follow the recalibration steps below:

### C. PRELIMINARY NOTE: CALIBRATION BY JUMPERING AT POWERUP

The programmable senders are calibrated by a jumpering scheme at powerup, rather than by potentiometers:

--For senders with 3 or 4 electrical TERMINALS, you will jumper the Send terminal to the Neg terminal, such as with a clip lead.

--**Only** for senders with 2 terminals, or with WIRES, or with CONNECTORS, the "jumpering" is done by a magnet. If you have one of these senders but a magnet was not included, you need a "rare earth" (strong) magnet such as Radio Shack 64-1895. Hold it vertically against the surface of the sender, on the word MAG, as shown in the diagram. This will best align the magnet field with the internal magnetic switch.



### D. SETTING THE EMPTY

1) Have the sender out of the tank and wired normally to the gauge, with the ignition switch **OFF**; 2) have the jumper or magnet **applied**; 3) turn the ignition switch **ON** and count "1000-1, 1000-2" (ie 2 sec) and **remove** the jumper or magnet; 4) depending on how quick your gauge's response is, the needle may do some bouncing. It will end on an Empty reading.

### E. SETTING THE FULL

For fuel senders with 1/2" tubing, Full is set **automatically** by the Full Detection sensor at powerup each time the tank has been filled. This is useful because it corrects for "dielectric constant" differences between tank-fulls of fuel. Don't set a manual Full.

But for water senders or fuel senders with 1/4" tubing, or if for some reason you find you need a non-automatic Full:

1) Have the sender in a full tank of the appropriate liquid and wired normally to the gauge, with the ignition switch **OFF**; 2) have the jumper or magnet **applied**; 3) turn the ignition switch **ON** and count "1000-1, 1000-2, 1000-3, 1000-4, 1000-5" (ie 5 sec) and **remove** the jumper or magnet; 4) depending on how quick your gauge's response is, the needle may do some bouncing. It will end on a Full reading.

## 6. HELP

We provide free technical support, but by email or fax only. You'll be answered the same working day, usually within an hour.