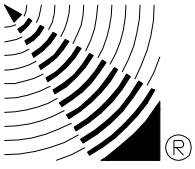
INSTRUCTION MANUAL

MODEL GT820
OXYGEN SENSOR

70046



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MODEL GT820 OXYGEN DEFICIENCY/ENRICHMENT GAS SENSOR

DESCRIPTION

Model GT820 Oxygen Deficiency/Enrichment Gas Sensors measure the concentration of oxygen in a protected area and transmit this information to a central control point. The sensor includes a loop powered transmitter which converts the sensor output to a standard 4-20 mA signal. This signal may be connected to any device with a standard 4-20 mA input.

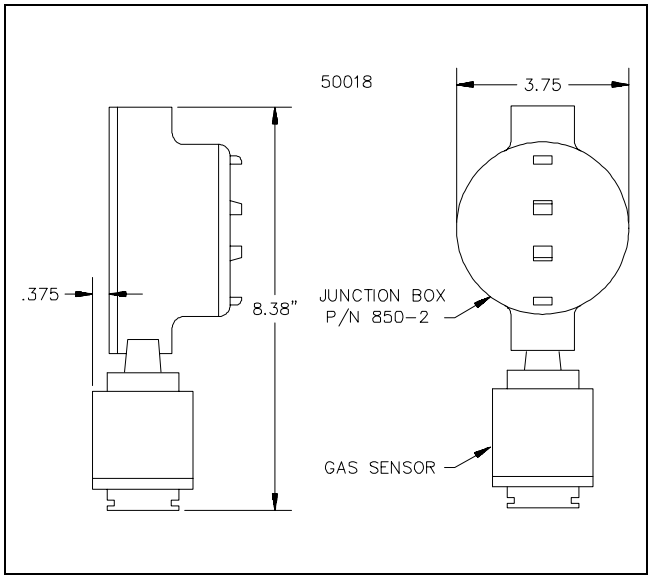

Figure 820-1 Mounting Dimensions

PRINCIPLE OF OPERATION

The Oxygen Deficiency/Enrichment gas sensor uses an electrochemical fuel cell to sense the percentage of oxygen present in the atmosphere of the protected area. The sample enters the cell through a diffusion barrier and gas permeable membrane. A reaction takes place at the working electrode (anode), releasing electrons which flow to the counter electrode (cathode), where a counter reaction occurs. The number of electrons released in the chemical reaction is linearly dependent on the oxygen concentration. The gas diffusion barrier only allows a small quantity of sample atmosphere to reach the electrode. As a result, only a small fraction of the active electrolyte is reacted, leaving a large quantity “in reserve” for higher concentrations of oxygen. Cell output remains linear at concentrations of 30% and above.

The currents generated by the oxidation reaction are quite low, typically 0.4 uA/%O_2. However, the intrinsically low background current and low noise output of the cell result in an excellent sensitivity to the gas.

ELECTRICAL SPECIFICATIONS

Power Supply required:
24 volts DC nominal. Will operate within specifications at any supply voltage between 16 and 32 volts.

Sensor output:
Integral transmitter will supply standard 4-20 mA signal into a load resistance of 700 ohms or lower.

ENVIRONMENTAL SPECIFICATIONS

Changes in humidity or direct exposure to moisture have little effect on the SST electrochemical cell. All reactions take place at the working electrode, where moisture is continually present. The electrolyte reservoir has sufficient overcapacity to allow the cell to accommodate all but the most prolonged periods of very high or very low humidity. The cell has been tested for three (3) months at a relative humidity of 0% without ill effects. In addition, once the RH was increased, the cell reabsorbed all lost moisture.

LOCATION OF DETECTORS

Location of the sensors is important. The sensor should be located roughly at eye level for a typical person in areas occupied by personnel. Do not locate sensors closer than one foot to floor to prevent damage from water, dust, etc. You must also consider air circulation, the pressure of leaking gases, and obstructions that could trap “pockets” of gas or air when locating sensors.

Preferred orientation of sensor is with screen pointing down. If necessary, it may be installed at an angle or horizontally. The sensor must never be installed pointing upwards.

INSTALLING AND WIRING THE DETECTORS

A junction box with 3/4 inch hubs for the sensor and conduit connections, SST part number 850-2, is required for mounting and terminating the sensor.

The Model GT820 uses a self-contained two wire transmitter. The operating power source for the transmitter electronics is obtained from the same 2 wires that are used to transmit the 4-20 mA output signal. Use two-conductor shielded cable, or two wires installed in metal conduit. These wires carry a maximum of 20 mA current. Wire size of 22 AWG is suitable for up to 6000 feet. Wire size of 0.35 mm^2 is suitable for distances up to 1800 meters. Typical connections are shown in Figure 820-2. Note that you can use the 4-20 mA indicator, the 1-5 volt indicator, or both. The total “loop resistance” of the circuit, including the field wiring to the sensor, must not exceed 700 ohms.

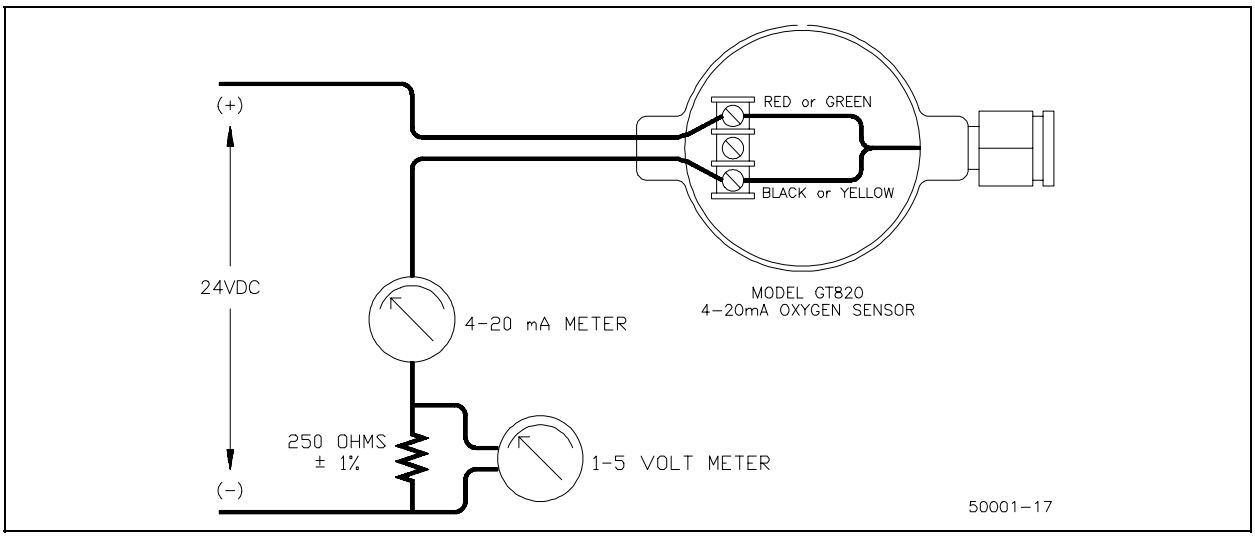

Figure 820-2 Typical Connections to GT820 Sensor

DETECTOR ACCEPTANCE TESTS

The current loop output of the sensor is normally between 4 mA and 20 mA, and is a direct linear read-out of oxygen concentration. The output is 4 mA when 0% Oxygen is being detected and 20 mA with 25% Oxygen. Thus, the output loop will generate 17.37 mA at normal Oxygen levels of 20.9%. During normal operation, the loop current can be determined with the following formula:

I (mA) = 4 + 0.64 x %Oxygen

Should a malfunction occur in the sensor head, the output will be 4 mA (equivalent to 0% Oxygen). Faults of the transmitter or malfunction of the current loop wiring will result in 0 mA loop current (-6.25% Oxygen). Any current outside the 4-20 mA range indicates improper hookup. Check the indicator for proper reading; if not correct, perform the calibration procedures below.

MAINTENANCE

The linear nature of the SST sensor, along with its absolute zero and excellent repeatability, allow single point calibration at six-month intervals. This is primarily to check that the sensor screen has not become physically blocked by dust, paint or oil. SST sensors have been operating for up to three years with unchanged calibration.

Calibration Gas

Oxygen Deficiency/Enrichment Gas sensors require no special calibration gas.

Calibration Instructions

Calibration requires access to the potentiometer on the transmitter PC board located inside the GT820 housing. Unscrew the front cover from the sensor housing to locate the pot. Some housings have a setscrew in the front of the housing which must be loosened before the front cover can be unscrewed.

! If the sensor is installed in a hazardous area, be sure that no combustible gasses are present before the front cover is removed from the housing.

Once the front cover is removed, you must identify the type of transmitter pc board that is used in your detector. Look for the identifying part number **1647** or **10256** on the pc board.

Calibrating transmitter type 1647

A small potentiometer for routine span adjustment is located on the transmitter circuit board. For calibration purposes, the output signal may be monitored using either a standard milliammeter inserted into the 4-20 mA circuit, by connecting a millivolt meter to connector CN2 (which is across a 10 Ohm precision resistance on the circuit board), or by observing the reading on the associated control equipment.

! If using CN2, accessory calibration cable, SST part no. 20185-1, is required.

To adjust the potentiometer a small, non-metallic screwdriver is required. Perform the following procedure to calibrate the sensor/transmitter combination:

1. Unscrew the front of the sensor housing to gain access to the calibration potentiometer.

2. Ensure the sensor is in pure ambient air, free from any other gases.

3. Adjust the span potentiometer until a reading of 17.37 mA output current, or 173.7 mV across CN2, is obtained. This corresponds to a reading of 20.9% oxygen on a scale of 0 to 25%.

Routine Calibrating transmitter type 10256

Potentiometers for span and zero adjustment are located on the rear side of the transmitter circuit board. Look for the markings span and zero on the printed circuit board. For calibration purposes, the signal must be monitored using either a standard milliammeter inserted into the 4-20 mA circuit, or by observing the reading on the associated display equipment. To adjust the potentiometers a small screwdriver is required. In most cases, the routine adjustments, which do not require any calibrating gas, will be sufficient. Adjust as follows:

1. Ensure the sensor is located in pure atmospheric air with no other gases present. Apply power (positive power goes to connector pin nearest to edge of pc board) and wait for the output reading from the transmitter to stabilize. This could require up to five minutes, although required time is usually much shorter.

2. Adjust the **span** potentiometer until a reading of 20.9% oxygen is shown in the measuring system, or until the current drawn by the sensor is exactly 17.37 mA. Turn the

span pot clockwise to increase the output. If the required output cannot be obtained, the cell is beyond its useful life and must be replaced.

Complete Calibration Instructions transmitter type 10256

These calibrations are performed at the factory, and need to be repeated only if the transmitter is inadvertently misadjusted so far out of range that the routine instructions will not work. Read the transmitter output current with a milliammeter or read on the associated display equipment. As each test is made, be sure to wait for output to stabalize.

1. Place sensor in pure atmospheric air with no other gases present. Apply power (positive power goes to connector pin nearest to edge of pc board). Output will stabalize in 5 minutes or less.

2. Unplug the purple oxygen fuel cell from the printed circuit board. Adjust the zero potentiometer for an output of 4.0 milliamps on the milliammeter or zero percent (0%) on the display equipment . Then reinstall the fuel cell on the PC board.

3. Adjust the span potentiometer for an output of 17.37 mA on the milliammeter or for an output of 20.9% oxygen on display equipment.

4. Repeat steps 2 and 3 until no further adjustments are needed.

Replacing the fuel cell

The operating life of the fuel cell is affected by temperature, relative humidity and the amount of gas to which it has been exposed. After several years of operation, it may no longer be possible to calibrate the transmitter to the output of the cell. In that case, order replacement cells from SST. Unscrew the cover from the GT820 housing, remove the old fuel cell and replace with a new one. After replacement, recalibrate the transmitter output.

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