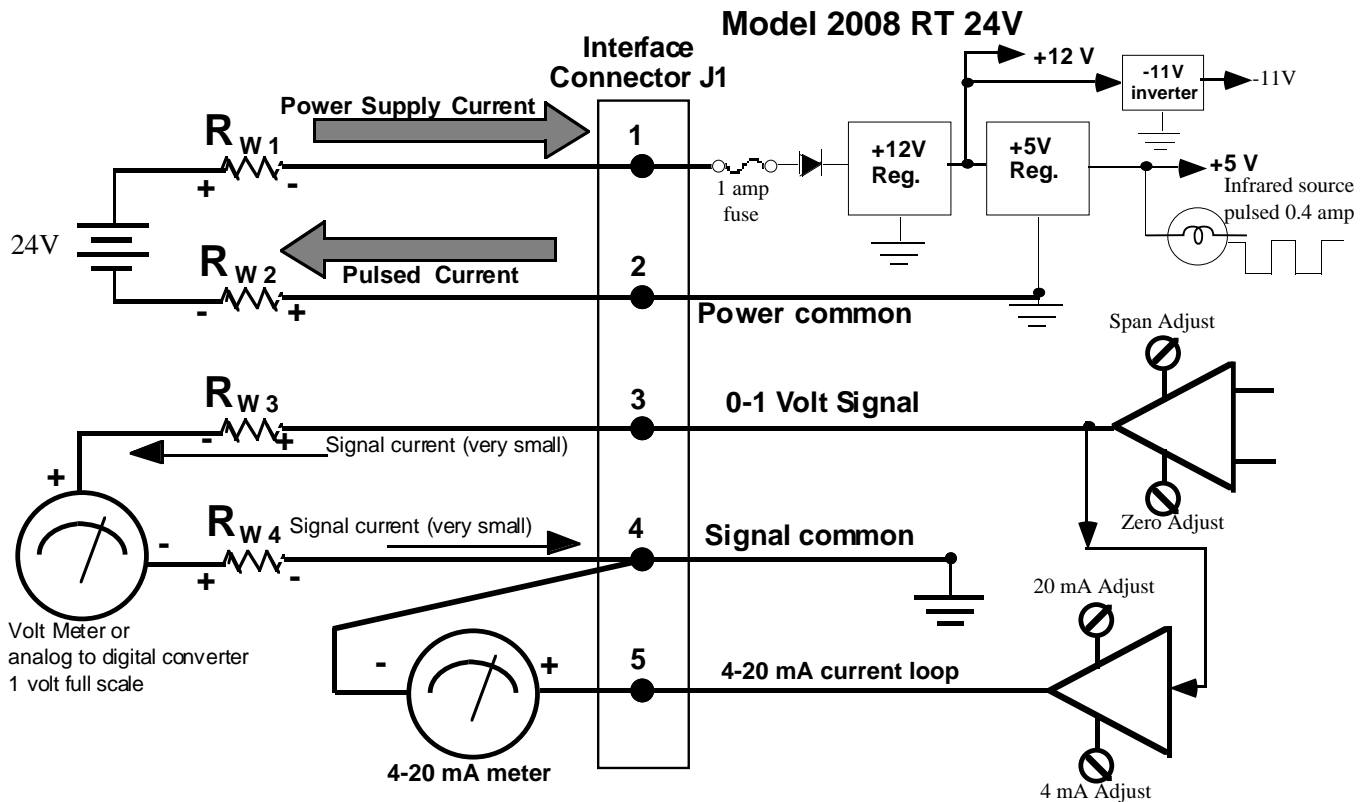


# Application Note A8

## Model 2008 RT 24VDC

### How to avoid Ground Loops & electro-magnetic interference (EMI)

As you can see below, you should keep the two circuits (two loops), the **power supply circuit** and the **signal circuit** separate. Even though the Power common and the Signal common are tied together on our printed circuit board you must run separate wires for each one and make sure that the Power common wire is a large wire gauge and as short as possible. The object is to **prevent the pulsed power supply current** from getting into the **signal path**. The power supply current pulses, created by the infrared source turning on and off every 1.4 seconds, will follow the path of least resistance (represented by  $R_{W1}$  and  $R_{W2}$ , the resistance of the wires). The **current** flowing through the wire resistance creates a voltage drop (current x resistance) that would appear to be noise if the two loops were connected together. This is classically called a **ground loop problem**. It should be called ground loops.



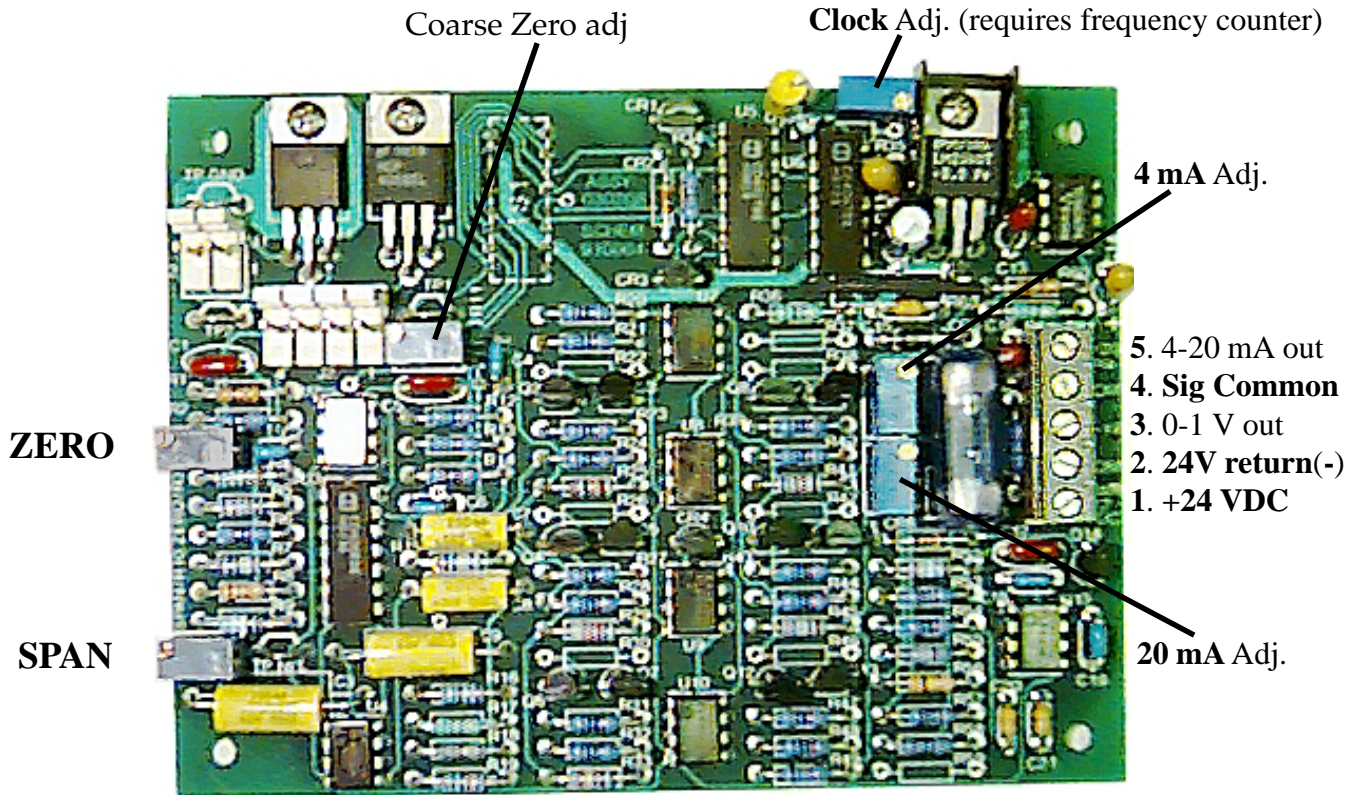
- The pulsating **power supply return current** will take the path of least resistance. If the wire from pin# 2 is large and short it will travel through it and not in the signal path which would introduce an offset and noise. The **SIGNAL COMMON** must have a separate wire for signal current to flow through. There must be a minimum of four (4) wires. A three (3) wire connection where one wire is used for both power supply and signal common will **not work** even with the current loop.

The other concern is **electro-magnetic interference (EMI)**. The infrared sensor and its amplifiers are sensitive to strong magnetic fields that are building and collapsing at 50 Hz or 60 Hz rates. Examples of this would be devices like fan motors, florescent light fixtures, or AC solenoids that are within a few centimeters of the 2008 RT 24V (remote diffusion head). The magnetic field induces a signal that beats with the pulse rate of our infrared source. The symptom of this type of EMI is an output signal (0 to 1 volt) that slowly goes up and down at a period of about 8 to 15 seconds. This can be easily avoided by keeping the unit away from the sources of the strong fields. If you cannot avoid being close to an EMI source, then place an earth grounded steel shield between the EMI source and the 2008 RT 24V circuit board and remote gas cell.

# Application Note A8

## Model 2008 RT 24VDC

How to avoid Ground Loops & electro-magnetic interference (EMI)



External DC Power Source: ..... 24 Volts D.C. @ 0.4 amp. max. ( 20.0 to 26.0 VDC absolute min./max. )

Power Consumption: ..... 4 watts typical but about 12 watts peak power at 24.0 VDC

Please remember:

**1. The circuit board is calibrated with the gas cell as a matched calibrated pair. The control number that is marked on the gas cell must match the same number on the circuit board.**

**2. The 24 VDC return wire connected to pin # 2 must be separated from the signal common wire connected to pin # 4 to keep the power supply return current out of the signal path.**