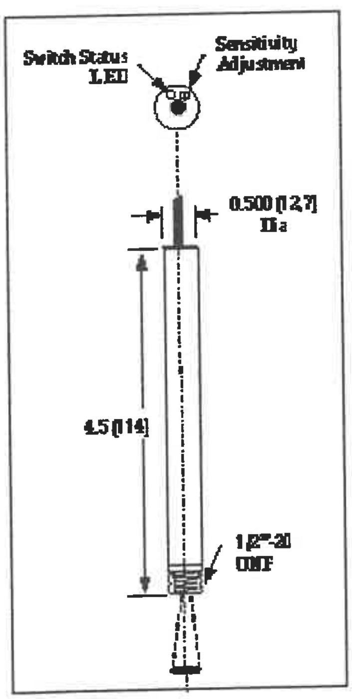
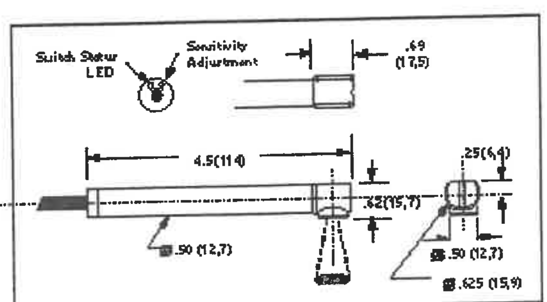
Installation Instructions For Infrared Thermal Switching With The SnakeEye™

Mechanical Installation

Mount the "Snake Eye" detector securely. When mounting .3-LTE, use the mounting bracket kit: MB-2, see Fig. 2. When mounting .3SV-LTE (side view), use the mounting bracket kit: MB-3, see Fig. 3. Place the application target within the detector's field of view (3:1, i.e. a 1" diameter spotsize has to be at least 3" from the target). Fill the field of view with the target if possible. Mounting the detector in close proximity to area being scanned for the presence of a change in temperature (heat signature, hot melt adhesive, cold glue, hot or cold objects, etc.), ensures adequate signal for the sensor to respond. Referring to Fig. 1, the field of view for the "Snake Eye" is 3:1(≈20°). The focal point for the sensor is 5/16" behind the sensor's front edge.



Straight Model: SnakeEye.3-LTE



Side View Model: SnakeEye.3SV-LTE

Fig. 1

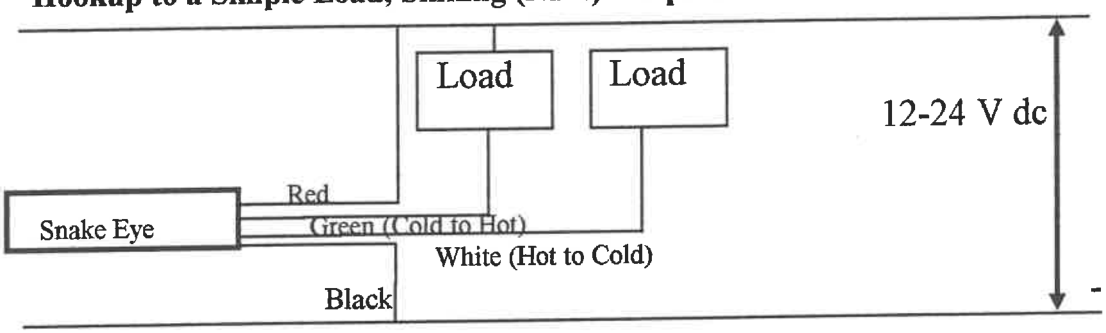
Electrical Connections

The detector is supplied with 6' of cable for power and switch outputs. The wire is color coded and to be connected as follows:

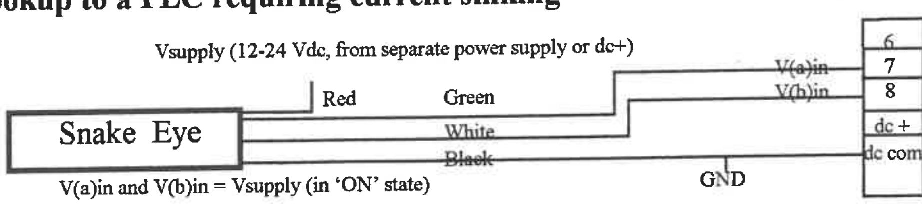
- **Red** - +12 to 24 Volts DC (< 50 mA.)
- **Black** - Ground - This is the ground return for both the 12-24 volt supply and the output transistor switches.
- **Green** - Cold to hot transition pulse. The transition has been detected at the leading edge of the low pulse. This corresponds to the leading edge of the presence of heat being presented to the detector.
- **White** - Hot to cold transition pulse. The transition has been detected at the leading edge of this low pulse, and corresponds to the trailing edge of the presence of heat being presented to the detector.

The Snake Eye offers sinking (NPN) outputs. Each output sinks up to 200mA, max.

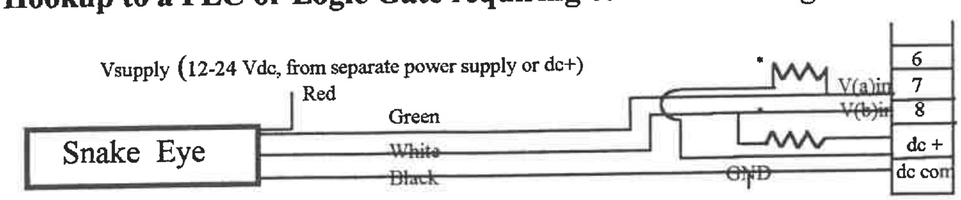
Hookup to a Simple Load, Sinking (NPN) Outputs



Hookup to a PLC requiring current sinking **PLC inputs**



Hookup to a PLC or Logic Gate requiring current sourcing **PLC inputs**



* Use pullup resistor to logic supply, (2kΩ, 1/4W is included).

V(a)in and V(b)in = (Vsupply)*(Input impedance)/(Input impedance+Pullup resistor impedance).

Use the table below or the formula to determine which pullup resistor is best for the PLC with the following specifications.

To obtain V(a)in and V(b)in =	and with Input impedance of PLC =	Use Vsupply:	Use Pullup resistor:
7	250	20	500
8	250	24	500
10	250	20	250
12	250	24	250
6	1000	12	1000
10	1000	20	1000
7	1000	20	2000
10	5000	12	1000
17	5000	20	1000
20	5000	24	1000
9	5000	12	2000
14	5000	20	2000
17	5000	24	2000
11	10000	12	500
19	10000	20	500
23	10000	24	500
11	10000	12	1000
18	10000	20	1000
22	10000	24	1000
10	10000	12	2000
17	10000	20	2000
20	10000	24	2000
12	12000	12	500
19	12000	20	500
23	12000	24	500
11	12000	12	1000
18	12000	20	1000
22	12000	24	1000
10	12000	12	2000
17	12000	20	2000
21	12000	24	2000
Volts	Ω	**Volts**	Ω

The Pullup resistor impedances should satisfy most PLC inputs. If the specifications of your PLC aren't shown, use the formula to determine the Pullup resistor to use:

Pullup impedance = $\dfrac{\textbf{(Vsupply*Input Impedance - Vin*Input Impedance)}}{\textbf{Vin}}$

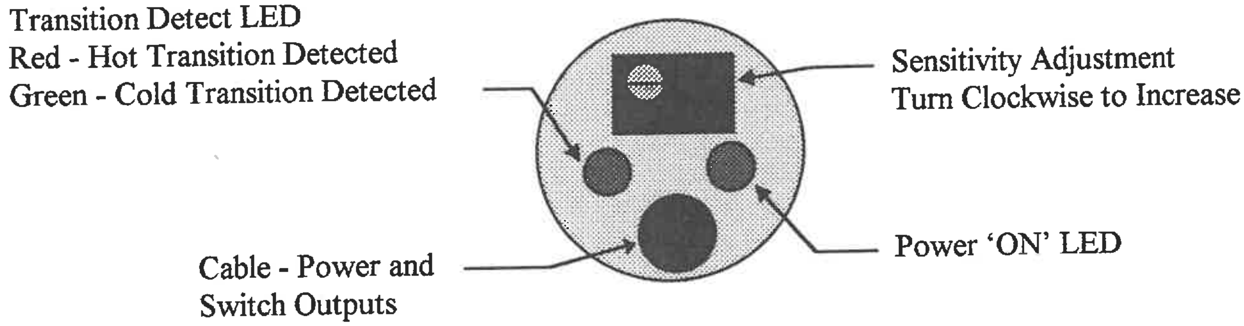
Example: Pullup impedance = (12V*4000Ω-8V*4000Ω)/8V = 2000Ω or 2KΩ

Vin = On voltage level required of the PLC
Input impedance = Input impedance of the PLC
Consult your PLC spec sheet for Vin and Input impedance values.

Also, connect the negative of the Snake Eye power supply to the negative of the PLC (input card) power supply, if they are separate supplies.

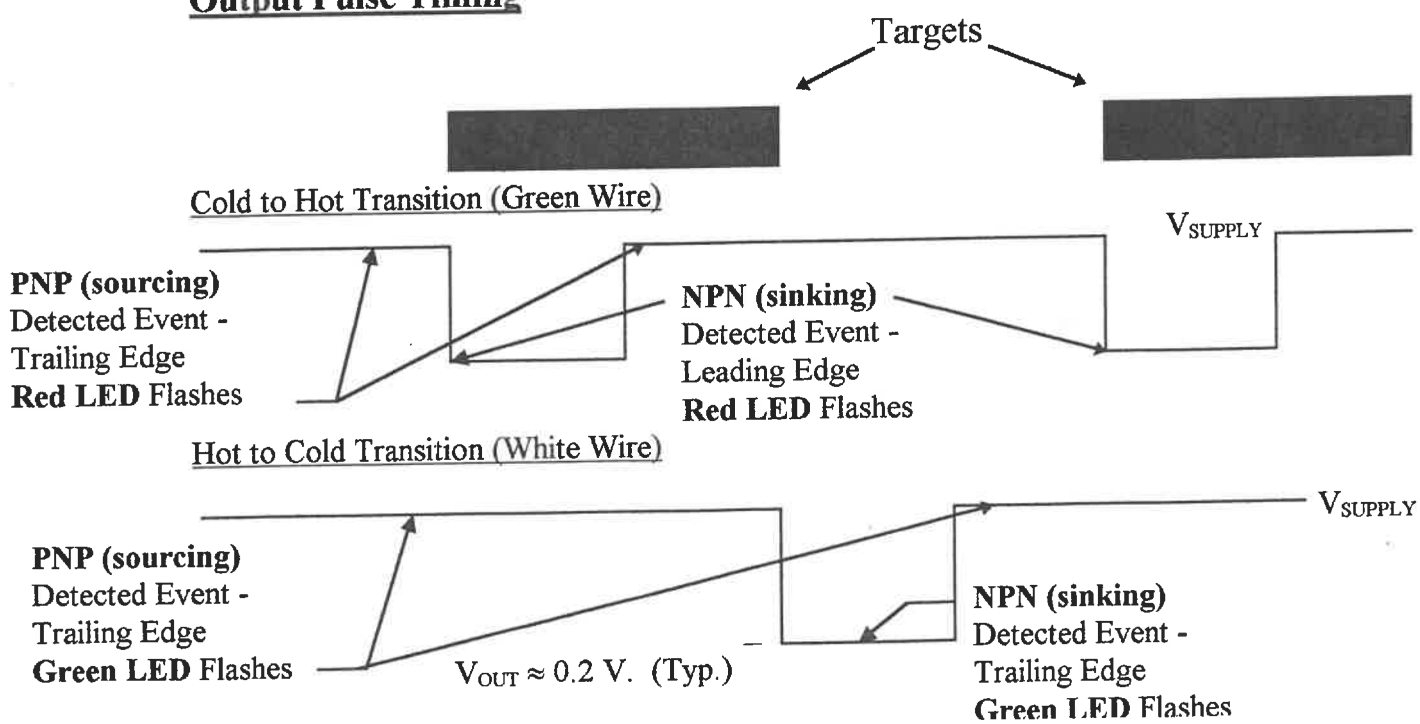
CALIBRATION

Turn the sensitivity potentiometer screw counter clockwise (10 turns minimum) to reduce the sensitivity to a minimum. With valid samples of material being presented to the sensor within its field of view, slowly increase the sensitivity adjustment (clockwise rotation of the pot adjustment screw) until the red and green indicating LED's start to flash on and off. Increase the sensitivity until the detection LED is flashing steadily. The **red LED** indicates the detection of the **leading edge (cold to hot)** of the material and the associated output pulse. The **green LED** indicates the detection of the **trailing edge (hot to cold)** of the material and the associated output pulse.



Snake Eye - End View

Output Pulse Timing



Application Notes

- This instrument has been designed to detect the transition in temperature resulting from the presence of hot melt, cold glue, hot objects, etc. It will not quantify the amount applied - it can only verify the presence.
- The sensitivity adjustment should be made with the process in operation. Significant changes in line speed may require a re-adjustment of detector sensitivity. This is especially true for slower speed lines, approaching the range of 1 to 2 inspections per second.
- If the pulse width is too short, increase the sensitivity slightly. Increasing the sensitivity beyond that which is required for output pulses may result in false triggering of output pulses and erroneous indications of inspection events.
- Output pulse widths are somewhat dependent on the 'amount' of signal present. Small targets that do not completely fill the field of view or small target temperature differentials can influence the pulse width. In general, with the detection LED flashing steadily, at slower line speeds (<10 Hz.) the output pulse is 25 milliseconds or greater in duration. As the frequency increases, the pulse width will decrease. First, the pulse width will decrease to just slightly less than 1/2 of the period 'T' (1/freq.(Hz.)). As the frequency of inspection events increases, the pulse width will decrease to a minimum of approximately 5 milliseconds (at approx. 100 Hz.). An oscilloscope may be used to verify pulse widths if desired, and may facilitate installation.
- The outputs of the detector are open collector transistors. **Maximum current through each transistor should be limited to 200 milliamps; the unit will be irreparably damaged if this limit is exceeded.** Applied voltage should not exceed +24 volts DC.
- The sensitivity adjustment has no effect on the amount of current through the transistor switches.
- Clean, dry purge air is recommended to keep the sensor window from being contaminated by dust and debris. Accumulated dust may affect detector sensitivity.

Definitions

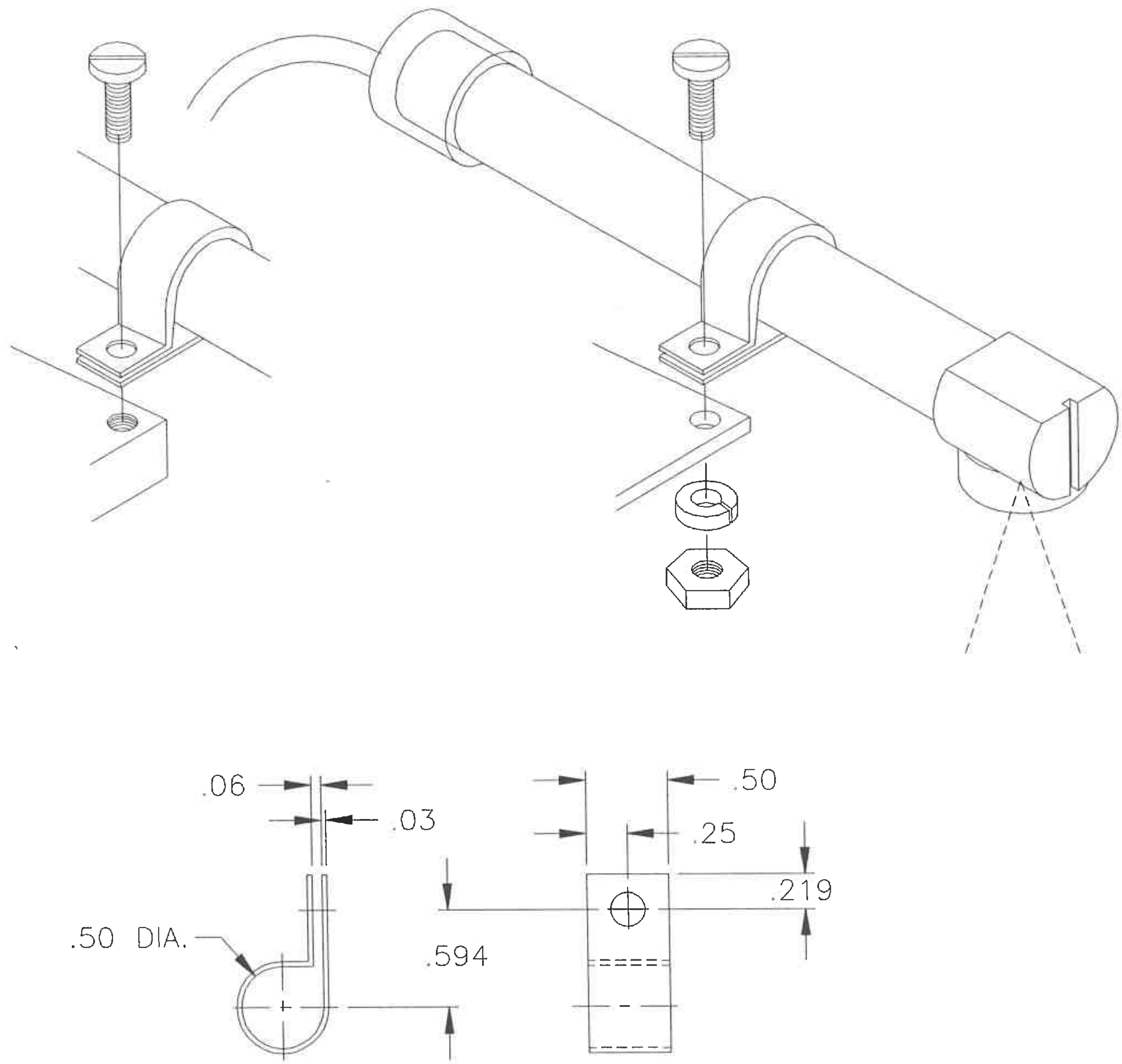
Current Sinking Output - The output of a dc device that switches ground (dc common) to a load. The load is connected between the output of the device and the positive side of the power supply. The switching component is usually an open collector NPN transistor, with its emitter tied to the negative side of the supply voltage.

Current Sourcing Output - The output of a dc device that switches positive dc to a load. The load is connected between the output of the device and the ground (dc common) side of the power supply. The switching component is usually an open collector PNP transistor, with its emitter tied to the positive side of the supply voltage.

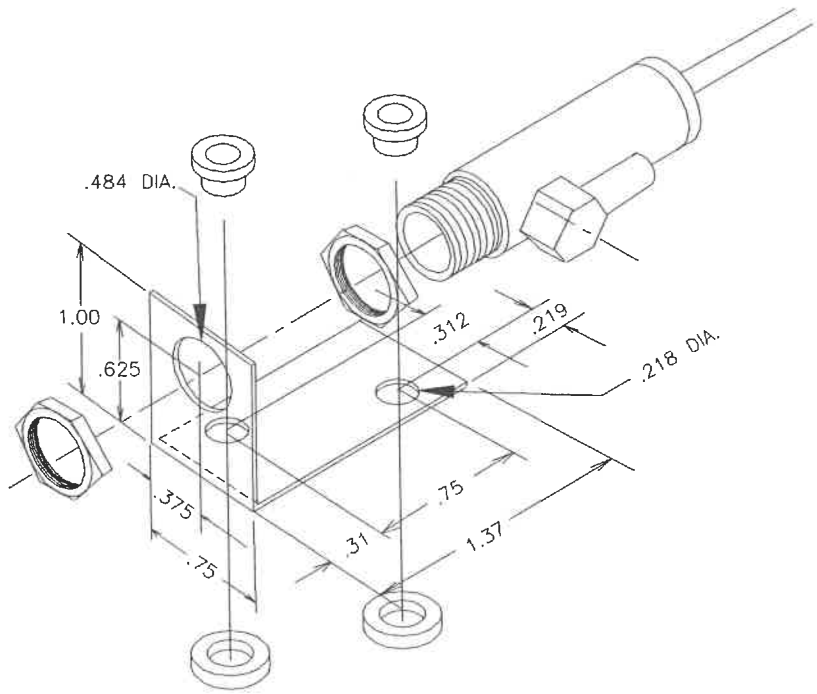
One-shot (One shot logic, or pulse stretcher) - Timing logic in which a timed output pulse begins at the leading edge of an input signal. The pulse is always of the same duration, regardless of the length of the input signal. The output cannot reenergize until the input signal is removed and then reapplied. A one shot timer is useful for initiating a control function keyed to the passing of either the leading or trailing edge of a product.

Pullup resistor - A resistor connected to the output of a device to hold that output voltage higher than the input transition level of a digital circuit. Usually a resistor connected between the output of a current sinking (NPN) device and the positive supply voltage of a logic gate.

Response time - The time required for the output of a sensor or sensing system to respond to a change of the input signal. Response time of a sensor becomes extremely important when detecting small objects moving at high speed. Narrow gaps between adjacent objects also must be considered when verifying that sensor response is fast enough for an application. Required Sensor Response Time = Apparent object (gap) size as it passes the sensor / Velocity of the object as it passes the sensor.



MB–3 MOUNTING BRACKET DIMENSIONS
FIG. 3



MB-2
FIG.2