

Automation Devices, Inc.

MODEL 8800 SERIES SENSI-TRON

➤ DESCRIPTION

The Model 8800 Series SENSI-TRON PART SENSOR is a versatile medium speed parts detector which will indicate and provide external control signals upon either the presence or the absence of parts. The basic models are the following:

8800 Series Sensi-Tron Models		
Model Number		Mounting Method
120 Volts	240 Volts	
8800.1	8800.2	Enclosure
8806.1	8806.2	Circuit Board

The Source Probe emits an invisible beam of light in the infrared spectrum. These emissions are sent out as a series of pulses at a fixed rate of speed. The Receiver Probe detects these emissions. Its circuit is timed to be synchronous with the pulse rate of the Source Probe. This feature significantly reduces false signals from light sources within the plant. Light restrictors are not needed and sensitivity of detection is improved.

Be sure to read all of the accompanying instructions, including the wiring diagrams, to take advantage of the reliability designed into the Model 8800 Series photoelectric switch. Metal oxide varistors (MOV's) protect the circuit from electrical surges on the input line.

➤ POWER CONNECTION

We recommend that a qualified electrical or electronic technician make the connections for both the probes and the input power to the Model 8800 Series printed circuit board. The terminals are clearly identified as L1 and L2 on the TB1 Terminal Block (see the Block Diagram on Page 3).

➤ SENSOR INPUTS

The Model 8800 Series accepts two types of inputs:

1. LED/Photo-Transistor probe pairs such as Automation Devices 8820 (LED probe) and 8821 (Receiver probe) ;also, ADI's 8809A (Reflective) and 8810 (Proximity) probes.
2. Open collector type Three-Wire proximity devices (NPN current sinking). These can be capacitive, inductive, or reflective in operation.

ADI PROBES

The ADI probes connect to the circuit board terminals marked *ADI I/R PROBES* on the TB2 Terminal Block. The RED wires connect to the positive (+) terminals and the BLACK wires connect to the negative (-) terminals.

THREE-WIRE PROBES

Special terminals have been designated for connecting *Three-wire Probes*. The supply voltage terminals are marked **12V** and **COM**. A third terminal labeled **OUT** identifies the connection of the output signal wire. Read the following sections on *PROBE MOUNTING* and on *ALIGNMENT* before attaching any probes or making any mechanical adjustments to the probe(s).

NOTE: Although probes do not use visible light, dust and dirt on the sensing element of the probe reduce the effectiveness of the probe. Include the cleaning of these surfaces in your systems maintenance program.

➤ CONTROL OUTPUTS

The Model 8800 Series SENSI-TRON PART SENSOR has a versatile output structure with which to control vibratory feeders or other equipment. A DPDT relay provides both a SWITCHED AC output and a set of isolated SPDT contacts. A 12 Volt DC output can be used to interface to Automation Devices' Model 6000 Series controller or to any PLC (Programmable Logic Controller).

The following table illustrates the state of the control outputs related to the state of the DPDT relay (as indicated by the status of the RELAY lamp):

Control Outputs

Relay State	Relay Lamp	Vout to ADI 6000	Switched AC			ISOL Relay		
			NO1	L2	NC1	NO2	C2	NC2
Off	Off	0 Vdc	0 Vac	Neut.	120 Vac	open	to NC2	to C2
On	On	12Vdc	120 Vac	Neut.	0 Vac	to C2	to NO2	open

➤ LIGHT & DARK OPERATING MODES

The status of the Model 8800's control outputs depends on the position of the LIGHT/DARK switch (SW1), on whether there is a target or object being sensed, and on the type of probes being used. The factory setting is LIGHT mode operation.

The following tables (in conjunction with the Control Output table shown above) can be used as an aid during installation and when aligning the probe(s). The table for the three-wire sensing devices is based on the Three-Wire Sensor acting as a sinking device (that is, it effectively shorts the OUT terminal to the COM terminal when it detects the presence of a part).

With ADI's *Opposed Head Probes*
Connected to the ADI I/R PROBE Terminals

LIGHT/DARK Switch Position	Is Object Present?	SENSE Lamp Status	RELAY Lamp Status
Light	No	On	On
	Yes	Off	Off
Dark	No	On	Off
	Yes	Off	On

With a *Reflective Probe*
Connected to the ADI I/R PROBE Terminals

LIGHT/DARK Switch Position	Is Object Present?	SENSE Lamp Status	RELAY Lamp Status
Light	No	Off	Off
	Yes	On	On
Dark	No	Off	On
	Yes	On	Off

With a *Three-Wire Sensor*
Connected to the THREE-WIRE SENSE Terminals

LIGHT/DARK Switch Position	Is Object Present?	SENSE Lamp Status	RELAY Lamp Status
Light	No	Off	Off
	Yes	On	On
Dark	No	Off	On
	Yes	On	Off

➤ **ON & OFF TIME DELAY**

The ON time delay **prevents** the circuit from activating the relay until a specified time has elapsed. Turn the T/D ON trimpot P3 (adjacent to the LIGHT-DARK switch S2) clockwise to increase the amount of time before the relay will activate in response to the absence or presence of a part (as directed by the LIGHT-DARK switch).

The OFF time delay **holds** the relay activated until a specified time has elapsed. An example of this is a Light Activated mode of operation with a gravity track where the Model 8800 Series probes are mounted to sense a full track. As each part drops down the track past the probes, the relay remains energized. When the parts in the track get high enough, a single part blocks the beam for a period of time longer than the setting on the T/D OFF trimpot and the relay is deactivated. The OFF time delay has its own time delay, trimpot P4, marked T/D OFF.

Select the time range desired by sliding the SHORT/LONG switch SW2 to the left for a 12.5 mSec to an 800 mSec range and to the right for a 400 mSec to a 16 Sec range. **NOTE:** the time range selected by the SHORT/LONG switch affects *both* the ON and the OFF time delays.

➤ **PROBE MOUNTING**

Decide whether an opposed head configuration or a reflective configuration would be best for your application. In the opposed head configuration, the probes are mounted facing each other and in a straight line. When both probes are mounted facing a common reflector (such as a mirror), they are in a reflective configuration. In a top-down view of the latter, the probes form a "V" with an included angle of 10 to 15 degrees. This configuration is helpful when a part can only be viewed from one side of the machine.

For both configurations, we suggest that the bracket be designed to ensure reliable alignment. In the reflective mode, the bracket must be made adjustable for final alignment and sensitivity. However, provisions should be made so that the entire bracket will not move after completing the alignment procedure.

Never mount the receiver probe in the direction of a source of intense light.

For some applications, the ADI 8809A reflective probe or commercially available three-wire sensors may be more appropriate. For Three-Wire proximity and reflective sensors, see the manufacturer's instructions for mounting and alignment.

➤ **ALIGNMENT**

The following is an alignment procedure for ADI probes. When Three-Wire sensing devices are used, see the manufacturer's instructions.

1. Set the GAIN trimpot (P2) to the midpoint of its adjustment range with SHORT/LONG set to SHORT.
2. Set the ON and OFF Time Delays fully counterclockwise for minimum time delay.
3. Locate the yellow indicator lamp, marked SENSE, on the Model 8800 Series enclosure or on the printed circuit board. Adjust the positions of the probe so that they are mechanically aligned. When alignment is correct, there is a link between the LED probe and the Receiver probe and the SENSE indicator lamp is lit. Obstruct the probes with your hand and see if the indicator lamp goes out. Tighten down one probe. Take the other probe and adjust it in and out for best part sensing.

The best alignment will be attained when you have reliable part sensing at the lowest possible setting of the GAIN (or SENSITIVITY) trimpot on the circuit board.

The maximum distance between LED probes is 24 inches for an opposed head configuration and 12 inches maximum from the reflector when used in the reflective mode. The normal sensing distance for Three-Wire sensors will depend on the manufacturer and will usually vary from 0.1 to 2 inches.

Be sure to test the Model 8800 Series under normal operating conditions. The GAIN (SENSITIVITY) adjustment may have to be altered slightly under working conditions to compensate for the speed at which parts move through the sensing area. The GREEN indicator lamp (marked RELAY) will light if either the GAIN potentiometer is set too high (and should be turned counterclockwise and decreased) or the probes are properly aligned.

It is well worth your time to go back through the mechanical adjustments on the probes to make sure they are all secure. In addition, check to make sure the probes cannot be obstructed by external equipment during normal operation.

➤ **TROUBLESHOOTING**

Most difficulties occur at the time of installation. If your Model 8800 Series has been in service and had no problems until now, we suggest you question any possible changes on or around the probes or the printed circuit board. If an obvious problem is not discovered, then follow this test procedure in the order in which it is presented:

- Check the lenses on the probe(s). A soft cotton swab is a convenient means of cleaning the lens portion of a probe.
- Check for obstruction between probes. See if a bracket or other piece of tooling has fallen into the sensing area.
- Refer to the Block Diagram (Figure 1) and check the input voltage directly on the terminals (L1 and L2 on TB1).
- Check the continuity of the fuse (F1). If the interior glass of the fuse is blackened or has a metallic appearance, do not install a new fuse until you have given the printed circuit board a full visual inspection. Look for obvious signs of components shorting, etc.

Do not install a fuse if the problem is not resolved! It could lead to personal injury and permanent damage to the printed circuit board or probes. Return the complete Model 8800 Series and probes to Automation Devices for repair. *Do not substitute a fuse of a different style or rating.*

- Probes can be tested individually using a multimeter with diode test function. The LED (gray) probe will measure as a standard LED with approximately 0.5-1.5 volts across it. The REC (black) probe will read a low resistance when exposed the light and will read very high resistance when covered.

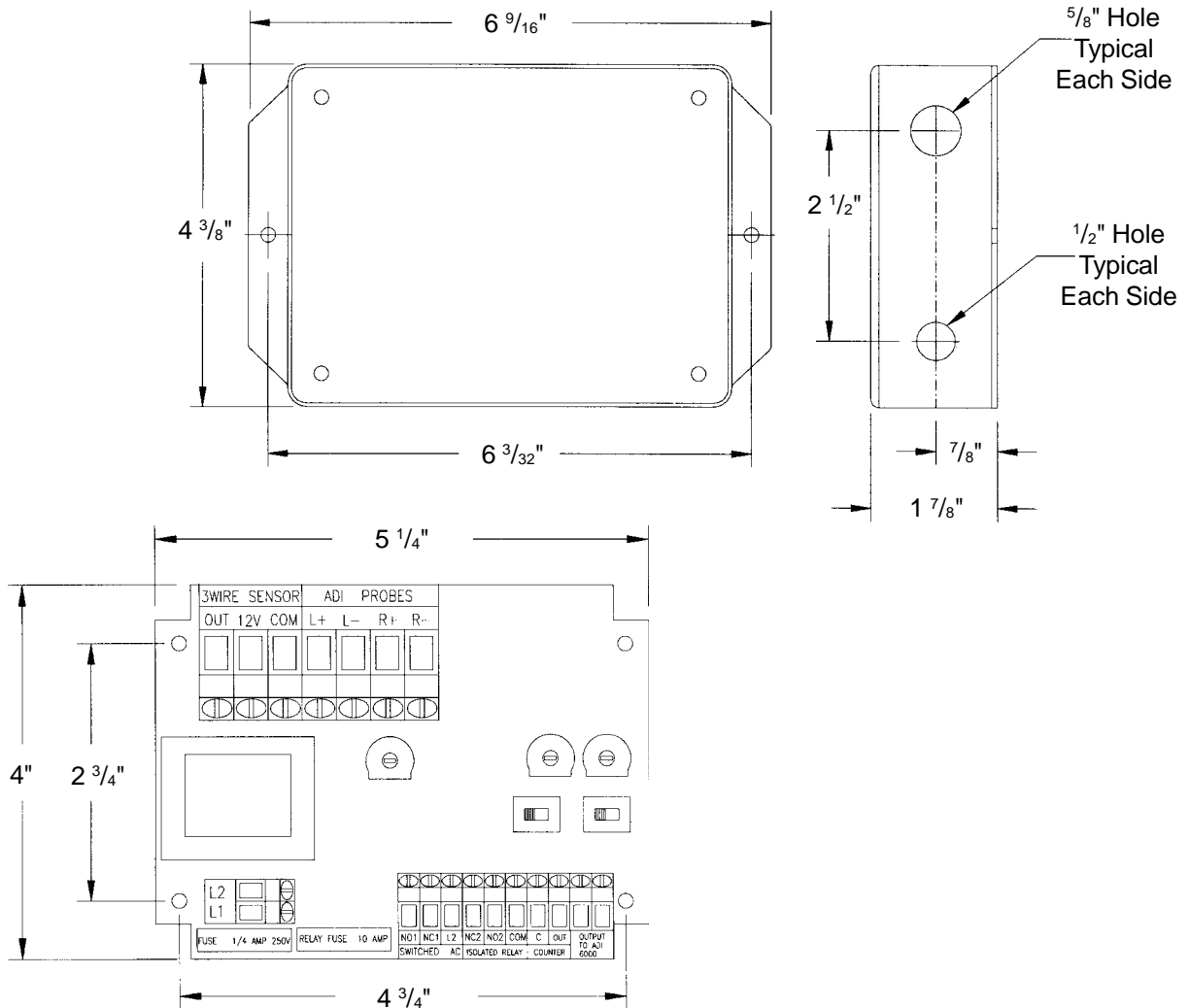
The above section describes a method of testing both the printed circuit board and the probe(s). If you were not able to identify the problem, then all components should be *returned to Automation Devices for evaluation and repair*. You can expedite repairs by including a brief note on the problems encountered. Include your name and telephone number so we can contact you regarding the problem and the cost of repair.

SPECIFICATIONS

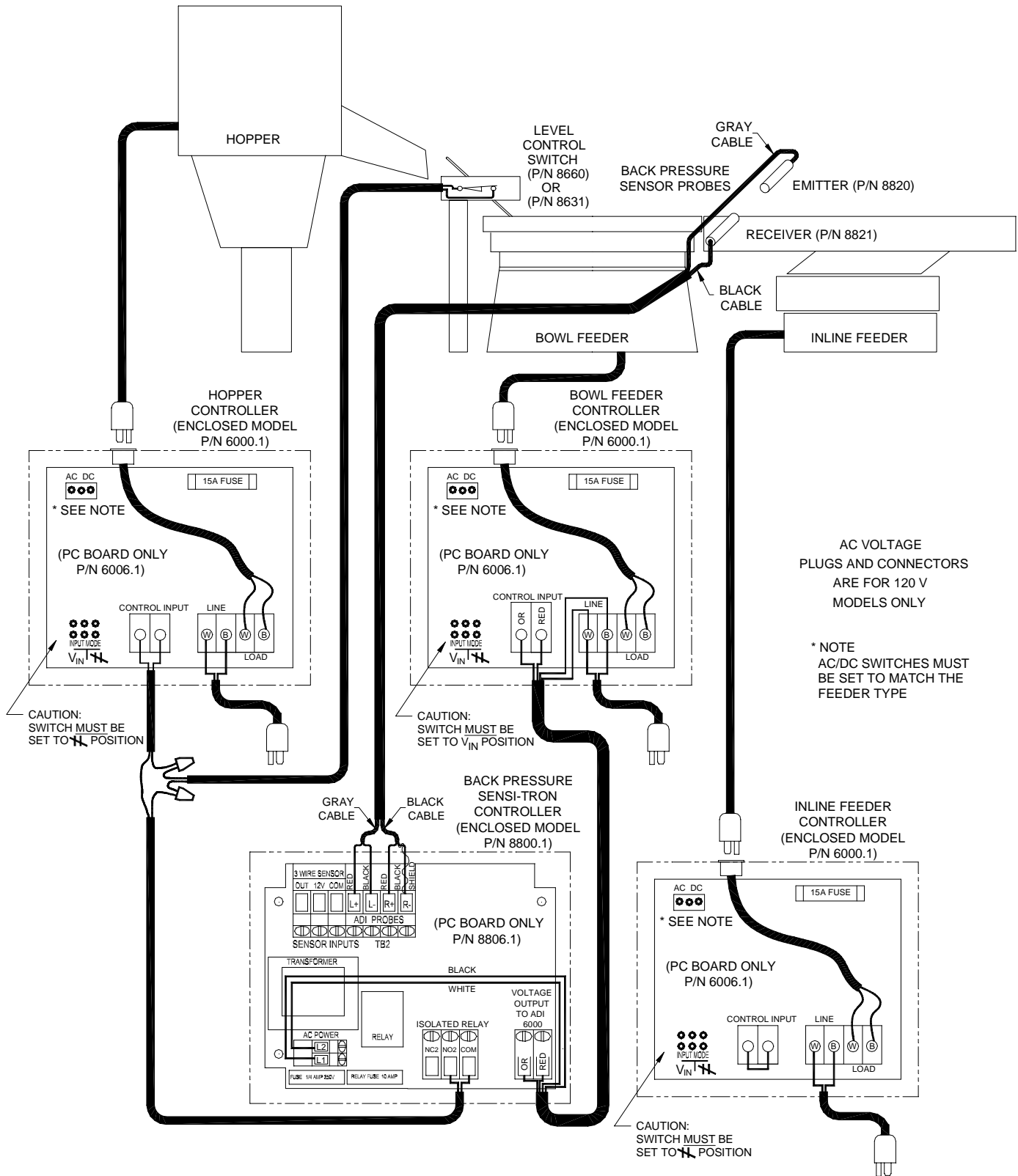
Model 8800 Series Part Sensing Device

INPUT VOLTAGE	120 Volts AC, 50/60 HZ if P/N suffix is .1	SYSTEM INDICATOR LAMPS	Red	Power is ON
	240 Volts AC, 50/60 HZ if P/N suffix is .2 (Field Changeable from 120 Volt Model)		Yellow	Uninterrupted Beam in Opposed Head configuration Three-Wire device output is ON
	Power 5 Watts nominal, 10 Watts maximum		Green	Relay is activated (turned ON)
	Fusing Type F, 1/4 Amp @ 250 Volts AC (5mm X 20 mm)			
OUTPUTS	Control Output 12 Volts DC @ 10 mA	ADJUSTABLE TIME DELAYS	ON	Delayed response in turning ON the Control Outputs from 12.5 mSec to 16 Seconds
	SPDT Relay, Form C contacts (10 Amp Resistive @ 240 Volts AC)		OFF	Delayed response in turning OFF the Control Outputs from 12.5 to 16 Seconds
	120 Volts AC @ 10 Amps (maximum) Type F (5mm X 20mm)			
	Counter Output 12 Volts DC @ 10 mA			
SENSORS	ADI P/N 8820 Source Probe (Light Emitting Diode)	TIME RANGES	Short	12.5 mSec to 800 mSec
	ADI P/N 8821 Receiver Probe (Photo Transistor)		Long	400 mSec to 16 Sec
	Three-Wire Sensor Probes (NPN Open Collector Type) Typically 10-15 VDC @ 15mA (maximum)			
SENSITIVITY	Adjustable with GAIN control		Selectable via SW2 slide switch	
LIGHT & DARK OPERATION	Selectable via SW1 slide switch	OPERATING TEMPERATURE	35" to 135" F	

Model 8800 Series Mounting Dimensions



TYPICAL SYSTEM WIRING DIAGRAM



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