



### PHOTO DIODE SENSOR APPLICATION NOTE

#### SENSOR CALIBRATION & SETPOINT DETERMINATION

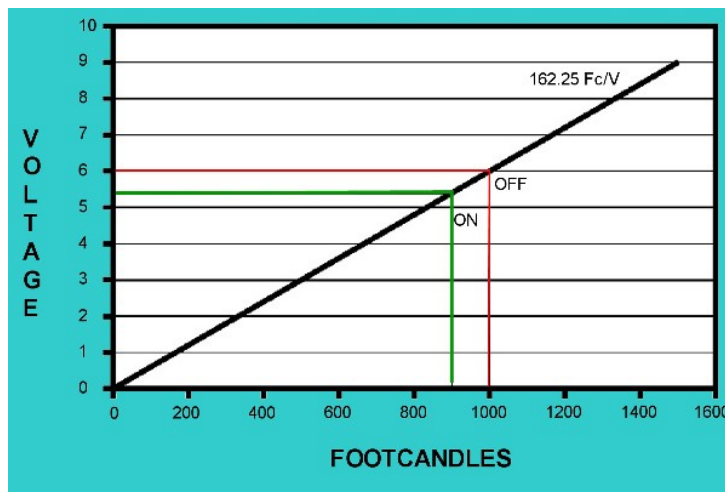
Photodiode (PD) sensors are sensitive to the amount of light sensed in blue bandwidth. PD sensors are different from Photoconductive sensors in two ways. PD sensors provide a linear response over the range of the sensor and have an adjustable footcandle sensitivity. Thus the same sensor can be calibrated for a wide variety of response ranges. The following figure shows a range response for a Photodiode sensor.

Calibration of the PD sensor is accomplished by a potentiometer in PLC-MULTIPOINT LC series controller boards such as the LC3X with 3X/PD adaptor board, LC6, LC7B4 and LC7B6. The adjustment of this potentiometer changes the sensitivity or **Footcandles per Volt (FC/V)** that the sensor uses in its output signal. PD sensors have a 0 to 8VDC output signal range. The sensitivity adjustment is used to optimized the light level range of the sensor. An optimized sensor range is important for control because it provides the best resolution of the sensor to precisely allow the controller to switch at the desired lighting levels. The PD sensor ranges are characterized as follows:

<u>MODEL</u>	<u>APPLICATION</u>	<u>MINIMUM</u>	<u>MAXIMUM</u>
PD1	Indoor	0 FC	2-750 FC
PD5	Outdoor	0 FC	2-750 FC
PD5D	Outdoor	5 FC	5-2500 FC
PD9	Atrium	2 FC	200-4,000 FC
PD9D	Skylight	10 FC	1,000-10,000 FC
PD9DT	Tunnel	10 FC	1,000-10,000 FC

APPLICATION NOTES

For the **PD9** Atrium sensor highlighted above the minimum footcandle detection level is fixed at 2FC. The maximum footcandle detection level can be calibrated from 200 to 4,000 FC. A good guideline to use in range selection is that the maximum sensor range should be approximately **30% higher** than the highest setpoint. For example, if the highest switching setpoint is 1,000 Footcandles, then maximum calibration range of the sensor should be 1300 FC.



Photodiode sensors require that the FC/V ratio be calculated:

**Footcandle per Volt= (Maximum-Minimum Footcandle)/(8-0)VDC.**

In the example above for a PD9 sensor, the sensitivity is calculated as follows:

**(1300-2)FC/(8-0)V=162.25 FC/V.**

This ratio is used to select setpoint voltages.

To switch lights OFF at 1000 FC, the corresponding voltage is:

**(1000FC / 162.25FC/V)=6.16V.**

To switch lights ON at 900 FC, the corresponding voltage is

**( 900FC / 162.25FC/V)=5.55V.**

By setting a **PLC-MULTIPOINT PD-SIM** to these voltages, and providing it as an input into a controller, the controller's setpoint potentiometers are adjusted to switch at that lighting level.