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Application Note 1000: Driver Pre-Set Dim Settings

INTRODUCTION: The AC50CD1.4APQ6 constant current LED driver is the first device from AC Electronics to use a remotely mounted occupancy sensor. This occupancy sensor detects when there is someone in the area, and forces the driver to its full brightness (i.e., 100%) level. When there is no one in the area, the driver dims to the level determined by the dimmer attached to the driver's purple and gray dimming leads.

Normally, the purple and gray leads of the driver are connected to a wall-mounted 0-10V dimmer, and the driver's dimming level is variable as set by this dimmer. As the setting of the dimmer is changed, the voltage across the driver's purple and gray leads is changed which results in a change in driver's output and hence the LED brightness. As the voltage across the purple and gray leads increases, the brightness increases. As the voltage decreases, the brightness decreases.

A somewhat unique feature of all of AC Electronics 0-10V dimming drivers is that they can act as either a current-sink or a current-source on the purple and gray leads. This allows different types of controls to set the dimming level. For instance, a professional, complex dimming control system may directly output a control voltage to the driver. In this case, the driver acts as a current sink. A more standard configuration is to use a wall mounted dimmer that operates from a voltage created by the driver. In this case the driver operates as a current source. It is this current-source feature that allows the driver's dim level to be set by a simple fixed-value resistor. By choosing the appropriate resistor value, the dimming level can be set to a constant value. This app note describes how to accomplish this.

DIMMING RESISTANCE: The table below shows the approximate dimming levels resulting from given resistance values across the purple and gray driver leads. The dimming level is measured as a ratio of minimum power to maximum power. As with all electronic devices, there are some tolerances associated with any specification. For the dimming level, this parameter is within ±15%. If more precise dim levels are required for a given application, it is recommended that the user insert a variable resistor and then "dial in" the desired value.

Table 1: Resistance for Fixed Dimming Levels

DIM LEVEL	Resistor Value (Ω)
7%	0.910K
10%	0.950K
11%	1.0K
16%	1.3K
20%	1.4K
50%	3.2K
75%	6.2K
86%	8.2K
90%	8.8K

ASSEMBLY: Adding a fixed resistor to set the dimming level is a fairly simple soldering process. However, it is recommended that experienced technical personnel perform the task to ensure reliable solder joint integrity. The components necessary to implement this task are shown in Figure 1 below. As can be seen, only a fixed-value, leaded, thru-hole resistor (1/8 watt or greater) and a short piece of heat-shrink tubing is necessary (in addition to the driver).

Figure 1: Required Components

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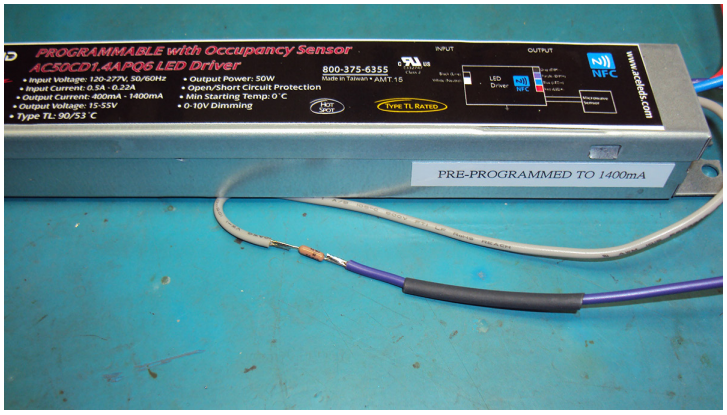
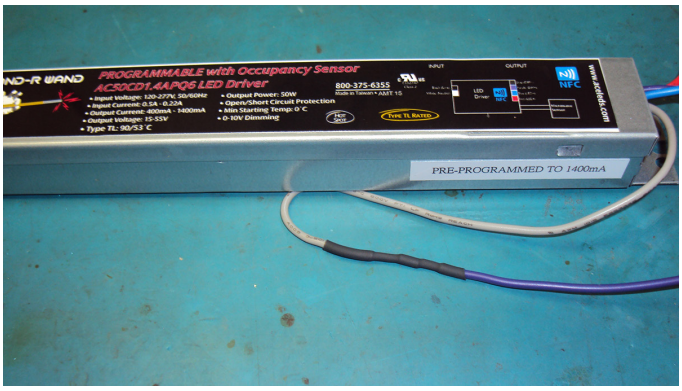
The resistor should be soldered in series between the purple and gray driver dimming leads as shown in Figure 2. Please note, the heat-shrink-tubing is installed over the driver's dimming lead prior to soldering the resistor in place. In this case, a resistor value of 1.0 KΩ (5%) is used to attain approximately 11% dimming. The resistor should be soldered in such a way as to leave a smooth surface with no sharp edges or burrs that could puncture the shrink tubing insulation and cause a short. By leaving the driver and resistor leads straight (i.e., not twisting them together), a smooth surface for the solder is possible.

Figure 2: Resistor Soldered In Place



After soldering the resistor in place, the heat-shrink-tubing should be moved over the resistor and its solder joints, and hot air applied to cause the tubing to shrink. The end result is shown in Figure 3 below. As you can see, the tubing covers all solder joints, and is positioned with the resistor somewhat in the middle of the tubing.

Figure 3: Finished Product



SUMMARY: Because of the design of AC50CD1.4APQ6 driver dimming circuitry, this driver allows the use of simple resistor to set a constant dimming level. The appropriate resistor value determines the approximate brightness as indicated in Table 1. If a different brightness level is required, a simple variable resistor can be installed to set any desired dimming level. Soldering a resistor in series with the driver's purple and gray leads, provides a permanently set brightness level. Now, when motion is detected in the area covered by the sensor, the driver is set to 100% brightness. When no motion is detected, the driver will dim to the level set by the installed resistor.

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