Application Note 2:
LED Power Supplies
Frequently Asked Questions

Q: Are the LED drivers/power supplies Constant Current or Constant Voltage?

A: LED drivers /power supplies are available in both Constant Current models, the LXC Series and Constant Voltage models, the LXV Series. Product datasheets are available to download or contact our office.

Q: What is the difference between Constant Current and Constant Voltage power supplies?

A: Constant Current drivers supply a fixed current to the LEDs. These can be connected directly to the LEDs. The output voltage varies depending on the number of LEDs being driven and their arrangement.

Constant Voltage drivers supply a fixed voltage. These are used in applications where the current control is implemented by additional components at the LED.

Q: Can the LXC & LXV LED drivers/power supplies be used in Outdoor applications?

A: Yes. These range of LED drivers/power supplies are IP67 rated. This rating defines that the power supplies are completely protected from dust, and protected against temporary immersion in water. For further information on IP ratings (Ingress Protection ratings), see Application Note - IP Ratings.

Q: Are the LXC & LXV LED drivers/power supplies potted/encapsulated?

A: Yes. There are two reasons for the potting of the LXC and LXV series of power supplies.
1. Waterproofing. Potting enhances the IP (Ingress Protection) rating of the driver/power supply by providing a waterproof barrier protecting components from

the intrusion of water. This is critical for Outdoor Applications such as street-lighting, road signs an architectural lighting.
2. Thermal performance. Potting compound has better thermal conductivity than air. The potting compound is used to conduct heat away from the key power components to the surface of the enclosure. This reduces thermal stress on components and improves lifetime and reliability of the drivers/power supplies.

Q: Can the LXC & LXV LED drivers/power supplies operate off 277VAC input voltage?

A: Yes. The LXC and LXV range of power supplies have an optional input voltage operating range of 90-305VAC. This is to meet the requirements of operating off 277VAC input voltage commonly used in street lighting applications.

Q: What is the efficiency of these LED drivers/power supplies?

A: The LXC & LXV range of LED power supplies provide industry leading efficiencies of up to 95%.

Q: What are the benefits of using High Efficiency LED drivers/power supplies?

A: There are a number of benefits in using High Efficiency LED drivers/power supplies.
1. Energy Cost Reduction. Energy efficiency is the main driver behind the conversion to Solid State Lighting. The use of High Efficiency drivers/power supplies complements and increases the energy savings that can be achieved. For example, power dissipation of a 150W LED driver at 93% efficiency is only 11.3W. At 80% power dissipation increases to 37.5W. Over the lifetime of the LED light, (for example 40,000 hours), this relates to an energy saving of 1500 kiloWatt x hours. At a rate of $0.20 per kiloWatt x hour, this equates to a saving of $300 over the lifetime.
2. Improved product lifetime and MTBF. Higher Efficiency power supplies dissipate less heat. For example, the power dissipated in a 93% efficient driver is approximately 33% of that dissipated in an 80% efficient driver. The increased heat in lower efficiency drivers significantly increases component temperatures. The life of electrolytic capacitors decreases by 50% for each 10 degC increase in temperature. Therefore higher efficiency drivers can easily have 3 times longer projected.

Q: Do these LED drivers/power supplies have PFC (Power Factor Correction)?

A: Yes. PFC (Power Factor Correction) is important and most probably will become a regulatory requirement (as in the case of other types of power supplies).

Power Factor is the ration of Real Power to Apparent Power in an AC power system. Real Power is the actual power drawn by the load, while Apparent Power is the product of load current and load voltage. Since the voltage and current may be out of phase, Apparent power may be significantly greater than Real Power. Ideal Power Factor is 1.

PFC is employed on switch mode power supplies in order to maintain a high Power Factor. This is important because a load with a low Power Factor draws more current than a load with High Power Factor (for the same amount of Real Power transferred). Low power factor results in greater power losses in the utility lines. High Power Factor reduces these losses , and thus reduces energy consumption.

Q: What is the difference between MTBF and Lifetime?

A: It is a common mistake to confuse MTBF and Lifetime.
Mean Time Between Failure (MTBF) is a statistical approximation of the cumulative hours a a number of units should operate before failure can be expected. It does not represent the expected life of any given product.
MTBF = (Number of Units x Number of Hours of Operation)/Number of Failures.
For example 5000 units operating for 1000 hours with 10 failures will result in an MTBF of 500,000 hours. This does not mean that any unit will operate 500,000 hours.

Another example will demonstrate this.
A unit is determined to have an MTBF of 300,000 hours and 1000 units are operational in the field. On average a failure could be expected every 12.5days (assuming 24 hour operation)

Lifetime indicates how long a product should be expected to operate under normal conditions. It is the period of time between starting to use the unit and the beginning of the wear-out phase.

Q: Whys should I use long life LED drivers/power supplies?

A: There are number of reasons to use long life, High Efficiency LED drivers.
1. Energy Savings. Higher efficiency power supplies reduces running costs significantly.
2. Lower maintenance costs. Longer Lifetime reduces the frequency of replacements and maintenance.

LEDs have the advantage of much longer life and lower power consumption than most other lighting technologies. It makes sense to increase the savings associated with this by using the high efficiency long life LED drivers.

Q: What are the common configurations for connecting multiple LEDs?

A: Most solid state lamps consist of a number of high brightness LEDs. These can be wired in a variety of configurations. Some of the common configurations are:

1. Series Connection. The cathode of the first LED is connected to the anode of the second and so on. A single constant current source can illuminate the string of LEDs. String voltage is proportional to the amount of LEDs in the string, so long strings can require high voltages. for example, assuming a forward voltage 3.5V, a string of 24 LED's will require a voltage of 84V and 350mA current approximately.

2. Parallel Strings Connection. This reduces the string voltage, and increases the current required to drive the LED arrangement. For example, assuming the 24 LEDs are connected as 4 parallel strings of 6 LEDs each, results in a forward voltage of 21V (6 x 3.5V) and 1.4A (4 x 350mA per string).

3. Matrix Connection. Multiple LED's are are connected in Parallel and multiple sets of the paralleled LED's are stacked in series. As in the example above, the 4 sets of LED's connected in parallel, and connected 6 high in series. Forward voltage is still 21V and Current required is 1.4A. This has the advantage of limiting the effect of a failing LED on the system.

For more information, see our Application Note - Common LED Configurations.