

LED's (light emitting diodes) being used as a light source in quality lighting fixtures is probably the fastest growing segment in the North American lighting market today. Not since the advent of fluorescent T8 lamps with electronic ballasts in the 80's and 90's has there been such fervor over a new technology in the lighting industry – And with good reason, LED's offer many features and benefits that simply can not be duplicated with traditional light sources or "lamps". These include; extremely small size, long life, easy installation and little to no damaging UV (ultraviolet light) and almost no IR (heat).

Delta light immediately saw the potential of using LED's in their high design fixtures several years ago and began a comprehensive LED Product development program. Several LED fixtures were introduced in the Delta Light Lighting Bible 5 in 2004, which were all met with tremendous success. In 2006 with the Lighting Bible 6 an entire section in devoted to LED technology and boasts of almost 200 different LED Lighting fixtures.

As the Technology is still somewhat new and is often quite different to "standard" light sources (incandescent, fluorescent, HID) we feel it is important to present a technical guide to LED technology in general, and specifically how Delta Light embraces and uses the this cutting edge technology. This Technical bulletin is meant to be used hand-in-hand with the new Lighting Bible 6 North American Edition.

THE LIGHTING BIBLE 6 - NORTH AMERICAN EDITION

The *Lighting Bible 6 North American Edition* is an adaptation of the European Lighting Bible that has been modified extensively for the North American market. Some of these modifications include:

All new 'Manual' pages located inside the front cover featuring:

- Catalog page explanation/breakdown with explanatory notes
- North American Technical Notes covering the most frequently asked questions
- Detailed explanations of LED Installation and usage

All new 'Legend' pages located inside the back with tables explaining:

- North American Lamps (Light bulbs) used throughout the catalog
- Fluorescent & Halogen 'Whips' (Power Supplies)

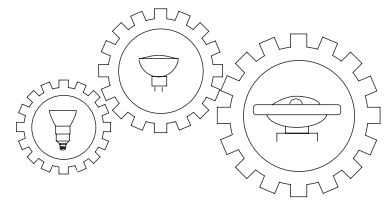
And of course:

- Dimensions in inches and weight in pounds
- Voltages for North America - *i.e.* 120V-60Hz
- Numerous technical, installation, and explanatory notes

What are LEDs and how do they work?

LED is the acronym for light emitting diode. A diode is a semiconductor that allows current to flow in one direction but does not allow it to flow in the reverse direction. Diodes are typically made of a material that is a poor conductor and they are "doped" with various elements to create a varying ability to conduct electrical current. This "varying" ability is the result of the doping of the material that can add free electrons (which are needed to conduct electricity), when this is done it is called a **N-type** material. Alternately some doping can create a "hole" where there is a "missing" electron at the atomic level. This is called a **P-type** material. In light emitting diodes there are both N-Type and P-type material and where these materials come together it is called a **junction**. As electricity flow it causes electrons to flow between the different materials and the different electron orbital paths (valance rings) at the atomic level. When an electron moves from a higher valance ring (higher orbit) to a lower valance ring energy is released in the form of a photon. A photon is the simplest form of light. While all diodes release photons to varying degrees, most are not efficient and not in the visible spectrum. LED are specialized diodes which product high energy photons (when the drop in valance rings is greater depending on materials). Not all LED's produce visible light, there are many infrared (not visible to the human eye) LED's. Light emitting diodes that produce visible light are actually referred to as VLED's (Visible light emitting diodes). But for the purpose of this document (and most lighting applications) they are referred to simply as LEDs. The light and its characteristics (Lumens, color, CRI) produced by LED's is dependent on a number of factors including the chemical make up of the materials used (N-type & P-type), voltage/current applied, and in some cases phosphors added (mostly for color).

Leaps in LED technology over the last five years has greatly improved the light producing characteristic of this light source, making it suitable for a wide variety of accent, task and in some cases ambient lighting applications. Delta light uses the only the highest quality, state-of-the art, LEDs in its luminaries giving them the utmost flexibility and performance for Delta light customers.



BENEFITS OF LEDs vs. CONVENTIONAL LIGHT SOURCES

LEDs offer many advantages over conventional light sources including extremely long life of 50,000+ hours. This is because light from LEDs (see above section) is not produced in the same way as traditional light sources, e.g. heating a back body (filament) or creating a high intensity discharge both of which involve high heat and/or vaporizing metal lamp components. Small sizes allowing for dramatically different fixture designs, energy efficiency, precise optical control and little to no heat or UV in the light beam are among the other benefits that LED technology provides. LED Luminaires from Deltalight are available in color temperatures of warm white 2800° & 3300°, cool white 5500° & 6500°K as well as Red, Blue, and Green. They are operated by Class 2 LED power supplies available from Deltalight USA.

ADVANTAGES

- Long life 50,000 + Hours
- Energy efficient Up to 20 + lumens per watt
- Small size Luminaire design flexibility
- No heat or UV in light beam Will not harm delicate objects
- Low-Voltage DC Operation ... Greater installation flexibility & safety

SUITABLE APPLICATIONS

With the great improvements in LED technology they can now be used in almost all interior and exterior applications, however they excel in step, accent, and decorative lighting applications. The new Power LEDs used by Deltalight are also excellent choices for many task or display lighting applications due to their excellent efficiency and the precise optical control. LED's also lend themselves to applications where maintenance (re-lamping) is a factor. With their extremely long life Delta Light LED Fixtures are perfect for inaccessible areas and for those that understand that maintenance is often the highest costs in any lighting system.

INSTALLATION

The low voltage aspects of LEDs allow for greater installation flexibility and do not require running line (or high) voltage connections between the power supply and the light source when limited to certain NEC and UL requirements this is known as a Class 2 or Power Limited Circuit.

Rather than running conduit or Romex cable, the connection between the Power Supply and the Luminaire or Profile is made with low-voltage cable, or more precisely, Class 2 plenum-rated cable. This is a 2 conductor, double-insulated low-voltage cable that is suitable for use in an air handling space or 'plenum'. The connection at the luminaire is simply made with wire nuts. Class 2 circuits may not be permitted in all municipalities or applications, please consult local officials and observe all Federal, State, and Local electrical codes.

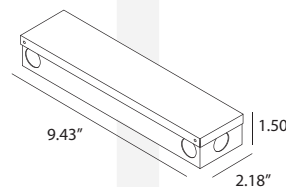
LED TYPES & POWER SUPPLYS

The previous Lighting Bible featured one type of LED powered by 12V-DC. In Lighting Bible 6 we now offer four different types of LED powered by two distinct power supplies: Voltage Controlled and Current Controlled. The four different power supplies are required because specialized LEDs have different qualities or characteristics, each requiring different electricals.

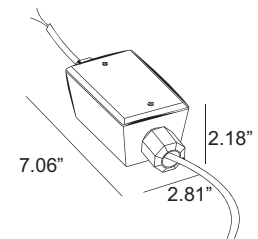
- **Voltage Controlled power supplies must be wired as Parallel Circuits.**
- **Current Controlled power supplies must be wired as Series Circuits.**

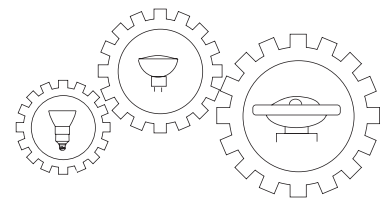
Regardless of the type, (voltage or current controlled) the vast majority of our LED Power Supplies must be installed in a remote location and are supplied in metal enclosures with ½" knock-outs for conduit connection for interior applications, or in water-tight enclosures with compression fittings for cable entry for exterior applications. As these are all DC power supplies there are not the same voltage drop concerns that are often seen in AC electronic transformers or ballasts. Typically (depending on specific driver) these remote power supplies may be placed up to 150 feet from the fixtures.

Interior Power Supply



Exterior Power Supply





FOUR TYPES OF LED'S USED BY DELTALIGHT:

LED Type: LED Ø0.2" 1

Power Supply: LED POWER SUPPLY 25W / 12V-DC

- Voltage controlled - wire as parallel circuit
- Max. 48 1 x LED Ø0.2" - per power supply
- *Luminaires shown below have 4 x LED Ø0.2" - So 1 power supply will operate 12 fixtures*

Example Luminaires: LEDS GO, PUK, HELI 1 LED

LED Type: POWERLED 1W 3

Power Supply: LED POWER SUPPLY 10W /350Ma-DC

- Current controlled - wire as series circuit
- Max. 7 POWERLED 1W - per power supply

Example Luminaires: UNDO, IRIS, MEDAR 61

LED Type: LEDSTRIP 2

Power Supply: LED POWER SUPPLY 25W / 24V DC

- Voltage controlled - wire as parallel circuit
- Max. 8 LEDSTRIP - per power supply

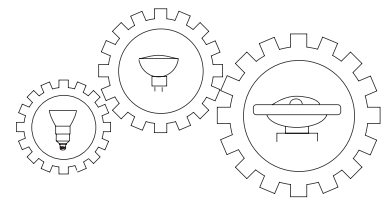
Example Luminaires: RELATION, LOGIC S, RENDEZ-VOUS

LED Type: POWERLED 3W 4

Power Supply: LED POWER SUPPLY 10W /700mA-DC

- Current controlled - wire as series circuit
- Max. 6 x POWERLED 3W - per power supply

Example Luminaires: SMART, PAR



LED LUMINAIRE SOLUTIONS OFFERED BY DELTALIGHT

NOTE: PRODUCT IMAGES & SPEC SHEETS MAY BE DOWNLOADED BY CLICKING THE LINK BELOW EACH IMAGE

INTERIOR

TASK LIGHTS



[SMART](#)



[WHITE](#)



[UNDO](#)

DOWNLIGHTS



[IRIS](#)

STEP/ PATH LIGHTS

RECESSED



[INLET S](#)



[INLET L](#)



[HELI 1 LED](#)



[RELATION 534](#)

SURFACE



[LEDS GO 3S](#)



[PUK 2](#)



[PUK 4](#)



[DOT.COM R](#)



[DOT.COM S](#)

INTERIOR/EXTERIOR

TASK LIGHTS

WALL



[MONO LED](#)



[MONO LED D/U](#)



[MC 2](#)



[MC](#)



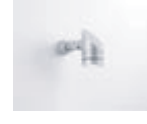
[MEDAR 51](#)



[LOGIC W](#)



[KIRR SINGLE 25](#)



[KIRR LED ORIENT](#)

BOLLARDS



[MONOSTEP](#)



[MEDAR 66](#)



[KIRR SINGLE 25](#)



[LOGIC S 20](#)



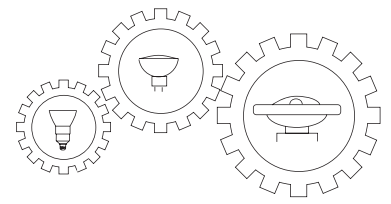
[LOGIC S 260](#)



[LOGIC R 460](#)



[LOGIC R 420](#)



STEP/ PATH LIGHTS

RECESSED



[LEDS C](#)



[LED C R](#)



[OUTLET](#)



[LEDS C 4S](#)



[RELATION X 534](#)



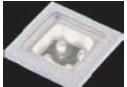
[RELATION X 334](#)

SURFACE



[LEDS GO 4Q ON](#)

IN-GROUND UP-LIGHTS



[LEDS GO 4Q IN](#)



[BASIC LSI 2PL](#)



[BASIC LSI 4PL](#)



[GENIE 200 LED](#)