

C O N T R O L   O P T I O N S

# TECHNICAL GLOSSARY



**CREE** ⇄ LIGHTING



## Cree Lighting technical glossary

### CONTROL OPTIONS

Lighting control is about the ability to manually or automatically turn light on/off or change the brightness level to respond to the environment, tasks or desired effects.

In today's increasingly connected world, the race is on to be leaner, faster, smarter, better. Smart devices, smart buildings and now smart lighting can engage with the Internet of Things (IoT), all with the promise of new opportunities.

From this point of view, we can consider lighting networks as genuine data transmission networks.

With this in mind, Cree Lighting offers a unique and complete range of technologically-advanced products for intelligent light control that are able to provide flexible reductions in the power consumption of lighting systems in order to improve efficiency based on each client's requirements.

The efficiency of a good lighting system can be achieved through the correct management of switching on, switching off and controlling lighting levels.

The need to reduce energy consumption in order to achieve economic savings, combined with the requirements of the relevant regulations, brings up the inevitable need to control the flux emitted by the luminaires.

### OPTIONS

#### FIXED OUTPUT

The light fixture is pre-set with a fixed current amongst the standard settings available on the datasheet. Upon customer's request, it is also possible to set a specific current, within the operability parameters of the driver.

#### BI-LEVEL OPTION / LINE SWITCH

The luminaire is supplied, both in versions with and without Exit cable, with an additional pole connected to the driver. This makes it possible to manage two power levels for those installations where there is an additional conductor on the supply line, for example, using a timer in the control panel. The pilot cable transmits the signal that switches two factory-set LED pilot current levels by programming the driver. In addition to the standard levels available in the catalogue, custom power levels can be set at the customer's request and within the limits of the driver's operability.

#### FLUX REGULATOR

RF flow regulators are centralized systems commonly found in public lighting systems with sodium lamps. The RF lowers the nominal voltage of the system and this voltage drop is read and interpreted by the driver processor which switches the LED driving current from a high to a low preset level, set in the factory, by programming the driver. In addition to the standard levels available in the catalog, on customer request and within the operability limits of the driver, it is possible to set custom power levels.



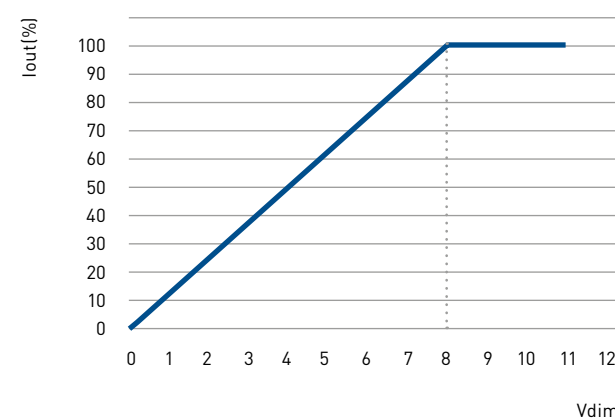
## DIMMING INTERFACES

### 1-10V

This is an analog control type, based on the distribution of a voltage signal ranging from 1 to 10 Volts, where 1V corresponds to the minimum value of light intensity and 10V corresponds to the maximum value. The 1-10V dimming is a simple and traditional method to adjust the luminous flux through various types of centralized potentiometers that control the various systems or through other external controllers (not supplied), common in ordinary systems.

In accordance with project needs and / or different operating conditions, the driving current can be adjusted through the analog input and achieve the best balance between expected LED life, light output and energy savings, always based on the needs of the project.

Dimming curve 0-10V / 1-10V Output current vs Voltage



#### 1-10V Dimming Curve Example - contact Cree Lighting for more information

Cree Lighting offers a simple system to manage the flux emitted by the LEDs through a 1-10V interface. By programming the driver, the maximum light level that can be reached for voltage values of 8V or higher can be limited to a maximum driving current value on the LEDs configured in the factory.

The minimum driving current for lower voltage values is specified in the driver data sheet and generally corresponds to 10% of the maximum power of the power supply.

### DALI / DALI 2.0

Digital Addressable Lighting Interface (DALI) is a digital communication protocol commonly used in lighting systems. This protocol is standardized by IEC and there are many control devices from Philips and other manufacturers that communicate using DALI. Using DALI, it is possible to send dimming commands (1-254 levels), set fade rates and fade times, query driver or LED status, etc.

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The voltage across DALI wires is typically 16V and it is polarity insensitive. Using DALI, it is possible to send dimming commands (1-254 levels), set fade rates and fade times, query driver or LED status, etc. The Xitanium LED drivers also respond to public LED specific DALI commands, for example: Query if the LED module is short-circuit or open-circuit.

For more information on DALI, refer to the IEC specification for DALI protocol

1-10V

DALI / DALI 2.0

## STAND ALONE OPTIONS

### CONSTANT LIGHT OUTPUT

Although to a lesser extent than traditional sources, LEDs are subject to a decay process that reduces their light output. However, modern electronic ballasts can be adequately programmed so that, during a predetermined time interval, the driving currents of the LEDs gradually increase automatically to keep the luminous flux constant.

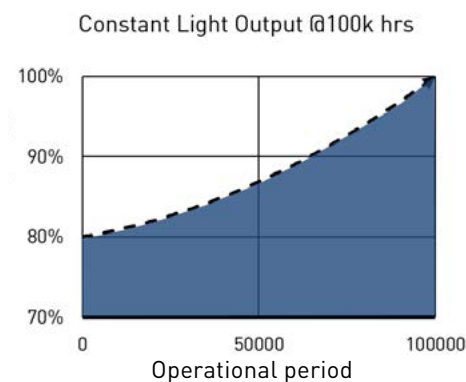
The compensation of the luminous flux, therefore, is not a real control system, but a self-regulating mechanism that allows a reduction in initial consumption. In practice, the lighting design must correspond to the decay of the flux during the useful operating life by applying appropriate reduction factors (Maintenance factor). This determines that in the initial phase of operation the lighting body illuminates more than necessary and consequently has a higher consumption.

Thanks to the CLO which proportionally compensates for the flux decay, optimal lighting is always obtained: the LEDs will provide a constant luminous flux and without energy waste throughout the life cycle.

Based on the type of LED used, the operating temperature and other factors, it is possible to correctly determine the decay curve and consequently, the compensation curve. Through the internal microprocessor the driver will be able to count the hours of operation and modify the driving currents according to the compensation curve.

The decay of the flux of the LEDs used by Cree Lighting is negligible during the first years of operation, reaching a maximum of 10% at the end of the operating cycle. Consequently, the CLO system would have a limited contribution. However, the switching of the systems from traditional lamps to LEDs means that the cyclical routine maintenance operations (lamp change and cleaning), which take place at regular intervals every two or three years, are no longer necessary and therefore they're not carried out for the majority of the installations.

Consequently, It's in these situations in which the flux compensation takes on a new value, not so much due to the decreased efficiency of the LEDs as to compensate for the accumulation of dirt on the optical systems. The modern drivers used by Cree Lighting in its luminaires have a useful operating life of at least 100,000 hours, corresponding to 25 years of operation for outdoor installations. During the life cycle, the fixtures do not require maintenance, therefore, it would be appropriate to provide flux compensation due to the lack of cleaning cycles.



CONSTANT LIGHT OUTPUT

### FIELD ADJUSTABLE OUTPUT

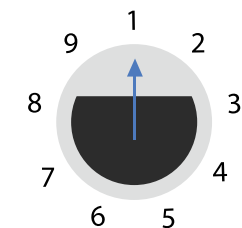
The Field Adjustable Output option enables the street luminaire to be tuned to the exact light emission needs of a particular application through multiple levels of adjustment, directly on field. Through the selection of a rotary switch, the Field Adjustable Output option offers maximum flexibility to best meet a variety of applications using a single luminaire.

### FIELD ADJUSTABLE OUTPUT + INTERFACCIA 1-10 V

Cree offers a simple system for controlling the light emitted by LEDs via a 1-10 V interface added to the Field Adjustable. It is possible to set the fixture to a determined maximum power output through a rotary switch integrated and manage Dimming by using an external control (not provided). The different operating conditions available can then be regulated to achieve the best balance between LED expected lifetime, light emission and energy savings, based on the requirements of the application.

#### Note

To set the desired level of adjustment a rotary switch is integrated on the interface. The flat part of the selector is facing the number related to the Power level required.



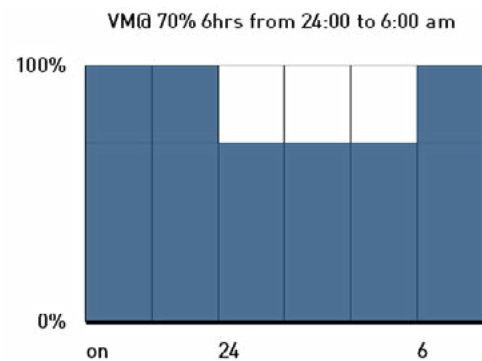
FIELD ADJUSTABLE OUTPUT

# VIRTUAL MIDNIGHT

This independent stand-alone system does not require additional wiring. The device is integrated into the luminaire and does not require any intervention by the installer. A system which is reliable and simple to set as the adjustment follows pre-set steps. Virtual Midnight provides excellent results in terms of savings: the device updates automatically according to the system's on and off times.

Most of the regulations for the containment of energy consumption - GPP and the like - provide that there is maximum emission during the first and last hours of operation of the plants, generally the busiest, and a reduction of at least 30% in the hours central night. Through a self-learning process, the microprocessor determines the central point - the so-called virtual midnight - between the instant of switching on (sunset) and that of switching off (dawn) of the system. The process is completed in three consecutive days with regular on-off cycles. Virtual midnight is the reference point for switching the setback intervals according to the desired profile.

The most commonly used profile provides a 30% reduction in luminous flux from 24:00 to 6:00, however Cree Lighting luminaires can manage up to 5 reduction steps



Within the offer of the Cree Lighting product series, there are three main virtual midnight systems:

## NOT REPROGRAMMABLE FROM THE PANEL

-During the assembly of the device, the power supply (driver) is programmed with the chosen profile

## REPROGRAMMABLE FROM THE PANEL

### -Cree Lighting Reprogrammable Virtual Midnight

During the assembly of the device, the power supply (driver) is programmed with the chosen profile; however, there is the possibility of changing the reduction intervals with a sequence of switching on and off from the electrical panel to which the appliances are connected.

### -Chronostep Virtual Midnight

During the assembly of the device, the power supply (driver) is programmed with the chosen profile; however, there is the possibility of changing the reduction intervals with a specific device provided by the manufacturer of the power supplies

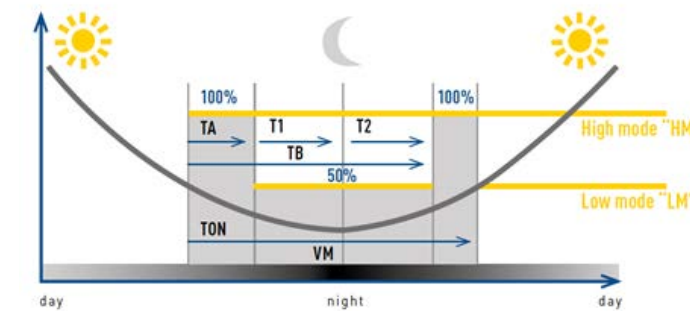


<https://www.tridonic.it/it/products/ready2mains-Programmer.asp>

# VIRTUAL MIDNIGHT REPROGRAMMABLE

The virtual midnight field programmable option is a proprietary CREE electronic circuit board. This circuit board enables the reduction of the LED driving current which improves energy savings during the middle hours of the night. The virtual midnight field programmable option is based on the "virtual midnight" mechanism: the circuit "remembers" the working time of the lighting fixture and calculates the central point of this time. Based on this central point, the customer can decide during which hours a lower driving current is desired.

The VM Device is powered directly by the 1-10V interface with no need for an external dedicated supply. It doesn't increase the power consumption of the fixture itself.



**The added value of the VM Reprogrammable option is the on-field reprogrammability.**

Usually all stand alone systems based on the «virtual midnight» concept consists in a dimming profile pre-programmed by the manufacturer. If the customer would like to modify the dimming profile he will need a PC, a proprietary software, a control board and a connection with every driver, doing a point-by-point programming. Doing that once your fixtures were already installed is not simple and isn't cost effective.

**Cree Lighting's VM Reprogrammable allows our customers to re-programm entire lines of fixtures on site, through simple external commands with no need for additional wiring or additional Software/PC. A simple turn on – off sequence on AC supply allows to set up all the installation.**

VIRTUAL MIDNIGHT

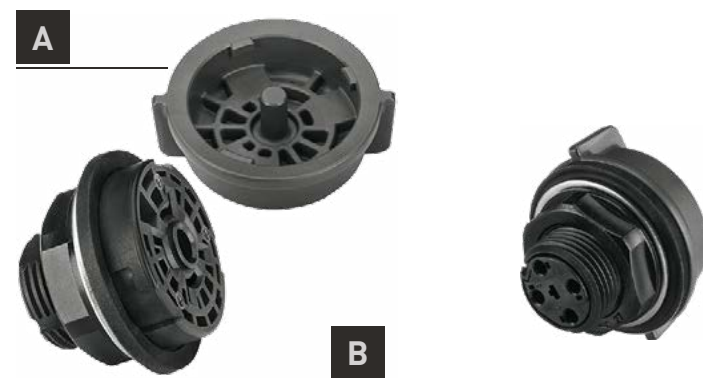
VIRTUAL MIDNIGHT

## CONNECTION OPTIONS for MANAGEMENT NODES

### ZHAGA SOCKET 4 PIN

Zhaga Book 18 Edition 2.0 describes an intelligent interface for outdoor luminaires and presence detection and / or communication systems, specifying the aspects of power supply, communication and the mechanical and electrical adaptation of the luminaire to create a connectivity system that allows any device based on the Zhaga Book 18 Standard to work with a luminaire equipped with the same interface.

The luminaire is equipped with a Zhaga socket. It is a compact 4-PIN IP66 (a) connector, with little impact on the aesthetics of the products that allows you to install third-party devices (crepuscular, motion and ambient light sensors and / or wireless point-to-point remote controls and others) and during the installation phase and in a subsequent phase, with a view to updating the systems in smart city contexts. This allows maximum flexibility and integration of the device into control grids. Cree Lighting supplies the socket in combination with modern drivers which in addition to being equipped with DALI-2 and D4i open communication protocols can provide an auxiliary power supply of 12 / 24V, allowing the continuous operation of the installed sensors in safety, while maintaining the appliance switched off during the day. The zhaga socket is made of high quality and high mechanical strength plastic materials and comes complete with its IP sealing cap (b).



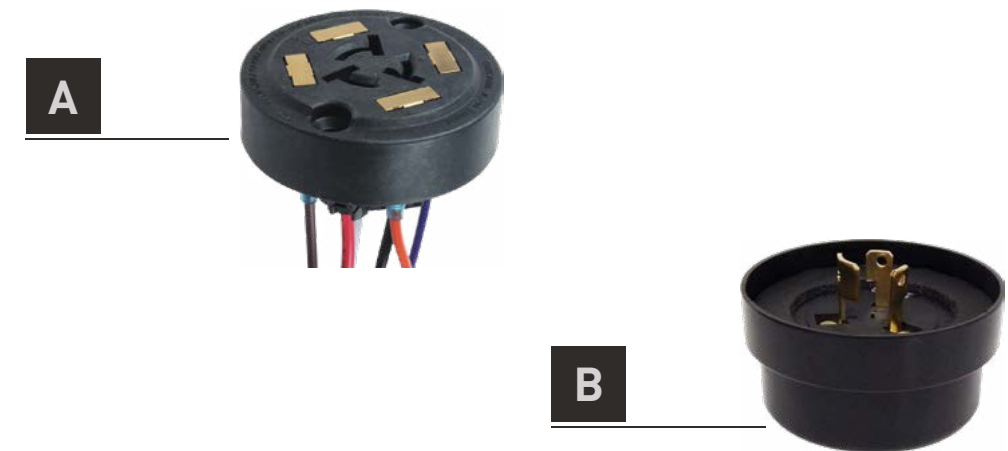
Why 4 pins?

- 1 pin for 12 / 24V auxiliary power supply
- 2 pins for controls (DALI)
- 1 additional conductive pins available

\*The DALI-2 standard sets benchmarks in terms of interoperability and control of LED drivers. The D4i standard - DALI for interoperability - represents an extension introduced to improve integration aspects of IoT products. The D4i drivers integrated in the lighting fixture are able to store and report a large volume of data in a standardized way. Additionally, these drivers can power external components such as sensors and communication modules.

### NEMA SOCKET

The lighting fixture is equipped with a NEMA socket. This is a 7 IN IP66 (a) connector / socket. The connector allows you to install third-party devices (twilight, motion and ambient light sensors and / or wireless point-to-point remote controls and others) both during the installation phase and in a subsequent phase, with a view to updating the systems in contexts smart city. This allows maximum flexibility and integration of the device into control grids. The NEMA socket provides for the possibility of power interruption, and interfacing with the DALI bus and / or 1-10V. The NEMA socket is made of high quality and high mechanical strength plastic materials and comes complete with its IP sealing cap (b)



Perche 7 pin?

- 3 pins for network / driver connection
- 2 pins for controls (1-10 V or DALI)
- 2 additional conductive pins available

## NFC DRIVER PROGRAMMERS

# NEAR FIELD COMMUNICATION

Technological progress offers competitive advantages to NFC driver programmers that were inaccessible few years ago. In the past it was next to impossible to build a stock of streetlights that could be adaptable to multiple contexts and the big question was how to choose power and dimming profiles. Today, the premium drivers used by Cree Lighting enable customers to build their own product stock, accelerating profitable installations.

To communicate with the drivers, different technologies are available : Cree selected its partner's reader/writer tools to configure a product portfolio using NFC that makes configuration quick, easy, and safe (due to wireless and power supply-free communication). If you have a smartphone or a tablet capable of electronic payments you will certainly have come across the acronym NFC: what is it exactly and what is it for?

NFC stands for Near Field Communication: this technology enables a very specific function allowing two devices to connect to each other through a wireless system. In this way, two devices can exchange files by touching interaction or by being at close proximity to each other. We're dealing, in fact, with a short-range bidirectional system, which usually works at a maximum distance of 10 cm. It is essentially a bidirectional system: in other words, files can "travel" from one device to another and vice versa; a peer-to-peer network is created in which both devices can exchange and receive information of various kinds.



Cree lighting's programming interfaces paired with the specific driver manufacturers' software, enable the reading and writing of program protocols in order to easily set different power levels or a stand-alone dimming configuration (such as Virtual Midnight profile or Constant Light Output or a combination of the two).

Drivers/luminaires do not need to be powered during programming, this is power supply-free process.

The driver's manufacturer software provides a simple interface for creating, changing and saving custom programs, Cree Lighting can also support its customers by sharing configuration files for the standard programs available in the catalogue in order to speed up the process

Dedicated Android Apps include most of software functionalities and allow program copying from an installed luminaire: this assures a speedy and efficient maintenance, replacing broken fixtures by utilizing back-up fixtures on stock.

**Contact Factory for further information**

# SMARTCITY

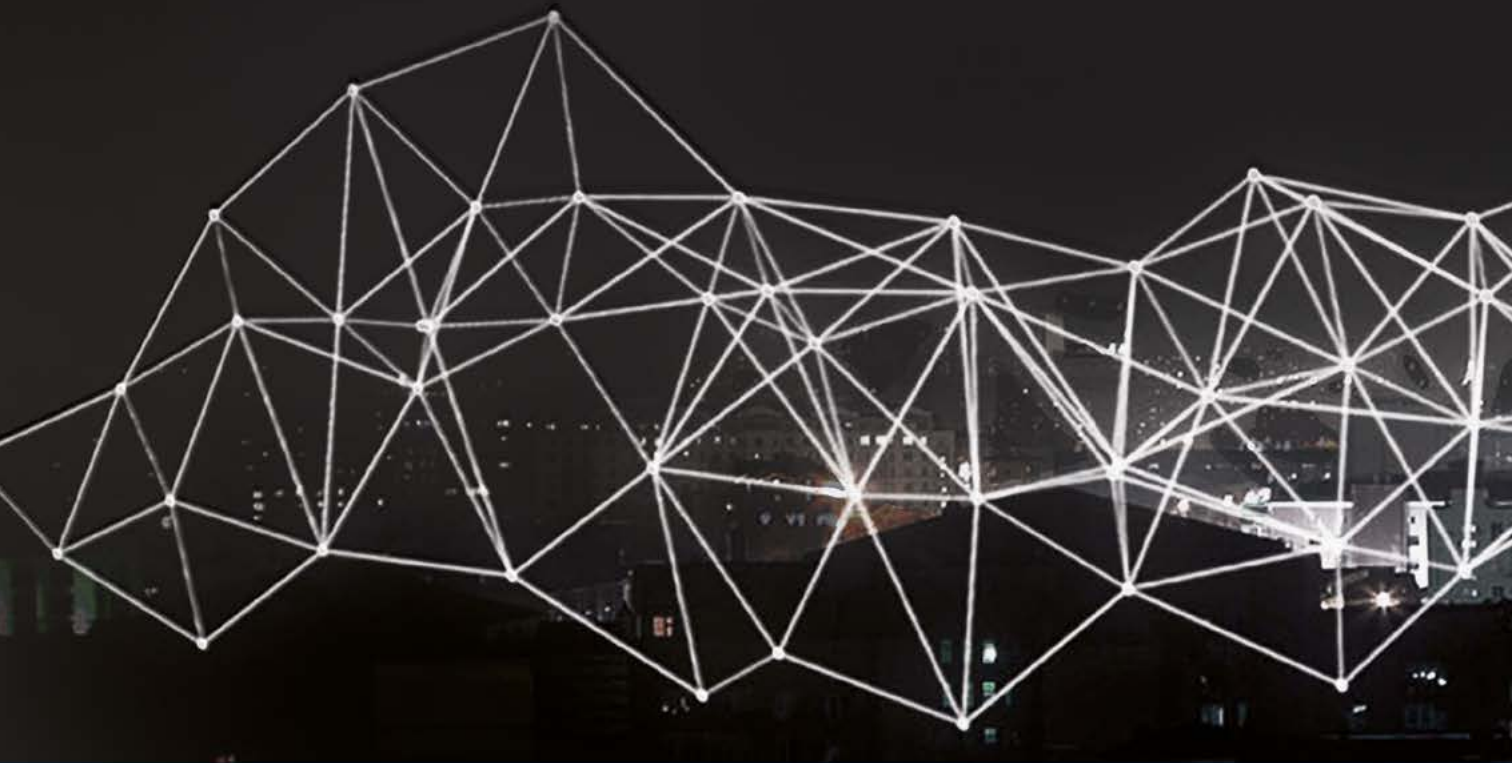
Cree Lighting offers open control protocols within its lighting fixtures, rendering them generally compatible with third-party devices, PLC or point-to-point wireless management systems. Needless to say, an open system is better for integrating, scaling and updating installations.

For this reason we will work with whichever system customers prefer to implement in their installations.



NFC DRIVERS

SMARTCITY



# CREE LIGHTING

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