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Dimming light with LED lighting fixtures

From the point of view of lighting design, the lighting needs in the industrial sector are very different according to the type of activity performed. Usually, production areas need lighting systems with a wide beam while, to facilitate the work in the warehouse facilities, lighting fixtures with a narrow beam are preferable.

In some cases, presence detection systems can be a solution to reduce the cost of energy but, often, they are not applicable because of worker safety issue.

In areas dedicated to production activities, lighting is used throughout the working period and, covered warehouses, have almost always windows through which a certain amount of daylight passes.

In this type of environments, it's appropriate to rely on systems for lighting control in function of the daylight in order to reduce energy costs. These systems use special sensors which measure the incidence and the intensity of natural light allowing the emission of artificial light so much as it's required to get the level of illumination needed.

Today, thanks to the increasing application of LED technology to explosion-protected lighting equipment, it's possible to dimming light source even in locations where there's a potentially explosive atmosphere.

1. The old dimmer

What is a dimmer?

A "Dimmer" is an electronic controller used to control the power absorbed by a load. The use of dimmer allows you to limit it, as you need.

The first dimmer was created in 1961 and, from then on, this technology has been used normally in home lighting, both with incandescent and halogen lamps.

Today the lighting dimming, with the necessary technicians distinctions, is experiencing a new reality with LEDs.

2. The regulation of the luminous intensity in LED lighting fixtures

Regarding LED lighting fixtures, it's correct to speak of dimmable ballast because the ability to adjust the luminous flux is already an intrinsic characteristic of the power supplies.

Right now, there are different standards to regulate the luminous intensity. The most applicable to Ex areas are:

- Analog signal 0-10V

- PWM
- Standard DALI
- [Analog signal 0-10V](#)

This is among the easiest control systems of electronic lighting. The control signal is a DC voltage that varies between 0 and 10 Volts.

At a voltage of 10 V, the controlled light should be 100% of its potential capacity, while at 0 V should be at the dimming level as low as possible.

Lighting control 0-10 V is widely used in commercial and industrial lighting by major manufacturers of power supplies.

- [PWM](#)

The PWM (acronym for pulse-width modulation) is a type of digital modulation, which allows obtaining a variable average voltage depending on the ratio between the duration of the positive pulse and the negative (duty-cycle) one. Similarly, it's used for communication protocols in which the information is coded in the form of duration in time of each pulse.

The pulse width modulation is widely used to vary the brightness of the lamps. Each LED has a rated current that corresponds to the amount of current that must flow in order to obtain maximum light output. In a PWM driver, the current is switched at high frequency between 0 and the rated output current, allowing the adjustment of the light flow.

- [DALI Standard](#)

Finally, we briefly talk of DALI standard.

DALI stands for "Digital Addressable Lighting Interface" and it's an interface protocol for digital communication between two electronic devices for lighting technology (reactors, transformers etc.).

DALI is the result of cooperation in the lighting industry, a uniform standard shared by the entire industry. DALI is not a system but an interface for digital communication between a control module and electronic power supplies.

Through the application of this standard, it's possible to manage the luminous flux both locally and remotely, through the transmission of data, which connect the place of command with power supplies. Furthermore, it is open to many other applications that, while already used in civil practice, they are not been applied in the industrial yet.

[3. The use in hazardous areas](#)

The use of lighting fixtures with LED technology is gaining ground in industrial plants and, in particular, in areas with potentially explosive atmosphere, therefore we can believe that, in the near

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future, all applications that today have already widely used in civil, will be applied successful also in all those environments that need to better control the luminous flux to ensure the safety of those who work in plants.