

Raytec White-Paper
Modular Ex
Lighting –
How it Delivers
Huge Savings



Modular Ex Lighting – How it Delivers Huge Savings

Given the high risk environments in which Ex lights must operate in, regular maintenance checks are mandatory. Maintenance and servicing is essential to ensure Ex lights continue to function as required, but maintaining your lighting system can incur significant costs given the challenges of hazardous environments

This article looks into the importance of modular Ex lighting systems, and how they can significantly reduce maintenance costs and improve the ease with which the unit can accessed, inspected, and serviced.

Maintenance at a Glance

Hazardous area lighting is designed to prevent a spark or contain an explosion and eradicate the risk of explosion on-site in a diverse range of applications where there is a presence of flammable gas or dust. Although the design and materials which go into manufacturing an Ex light mean their purchase price is higher than luminaires designed for non-hazardous environments, in reality this is only likely to account for a fraction of its total cost during the course of its life. Maintenance and servicing costs are typically the largest ongoing expenditure during the life of an Ex light.

Ex lighting is used extensively in the oil, gas and petrochemical industry as well as a range of other sectors such as food and pharmaceuticals, with Ex e (increased safety) and Ex d (flameproof) luminaires the most commonly installed design.

Ex e LED Luminaire



***Pro-Tip** The greatest cost of your Ex luminaire is not the purchase cost, but the ongoing maintenance and servicing costs.*

Installing and maintaining Ex d luminaires, such as traditional SON floodlights is often more complex; flame paths are designed to extinguish flames should they occur, but often make access to the unit difficult due to the high number of screws, at a specific torque, which must first be removed to gain access. These screws are essential in order for the unit to maintain its Ex rating. Flame paths also require careful inspection to ensure the paths are maintained at an even flame gap.

In contrast, Ex e luminaires, which are designed to prevent any arcs, sparks or hot spots from occurring, tend to be far easier to access and maintain; they do not have flame paths meaning there is one less element to inspect and they have fewer screws making access the unit easier and quicker. Although a vast range of traditional lighting technology exists in the market, LED luminaires are becoming a more popular choice for Ex e luminaires due to the advantages they offer. LED luminaires have much cooler running technology, a higher quality light output performance and eradicate the need for frequent bulb changes thanks to a long 10 year+ life.

However, regardless of the type of Ex light and whatever the application, with maintenance checks being mandatory in hazardous environments, the ease of maintenance and consideration of long term costs should be an essential factor behind an end users choice of luminaire.

***Pro-Tip** Ex e luminaires provide much easier maintenance than Ex d luminaires*

Understanding Maintenance Costs and How to Reduce Them

Finding an Ex light which can reduce the level of maintenance and increase the ease in which servicing can be carried out, can provide an end user with huge savings over the course of the luminaires operating life. Thinking of cost in this way is crucial in order for an end-user to generate value from their lighting solution.

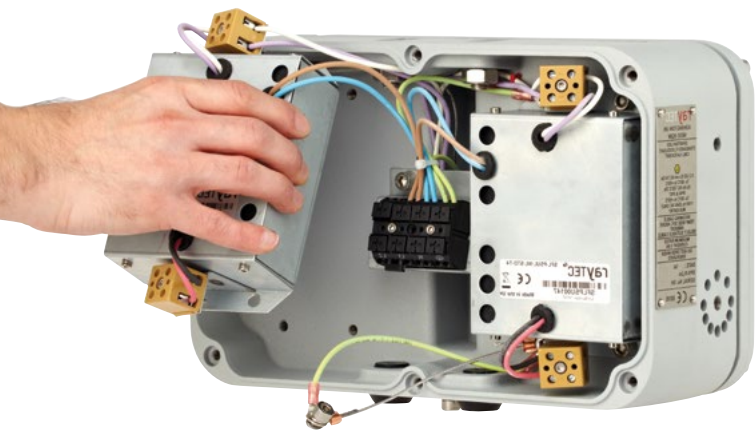
Although end users may look at a variety of ways they can save on maintenance, the most effective way is to consider the choice of luminaire itself. An LED luminaire with a modular design, built from the ground up with maintenance in mind, is the most effective way for end users to achieve maintenance savings. This is demonstrated by a shift towards LED technology with an estimated £200 million to be spent on LED lighting in EMEA by 2019.

What is a modular design?

LED luminaires with a modular design feature interchangeable key components, meaning parts such as power supply units (PSU) and LED modules can be removed and replaced independently. This design provides end users with a host of benefits over non-modular LED luminaires, such as easier access and the ability to service and maintain on-site should maintenance be required, while providing all the advantages of LED over traditional lighting technologies.

Non-modular LED luminaires tend to be factory sealed and therefore cannot be maintained or serviced unless they are returned to the manufacturer, which as we will discuss, can result in significant long-term costs. While traditional Ex lighting can generally be accessed without having to return the unit to the manufacturer, its parts do not tend to be interchangeable which makes maintenance more complex, while also limiting the flexibility of the luminaire during installation.

Modular Ex LED Luminaire



***Pro-Tip** A modular luminaire should have interchangeable components that can be swapped out or changed as required*

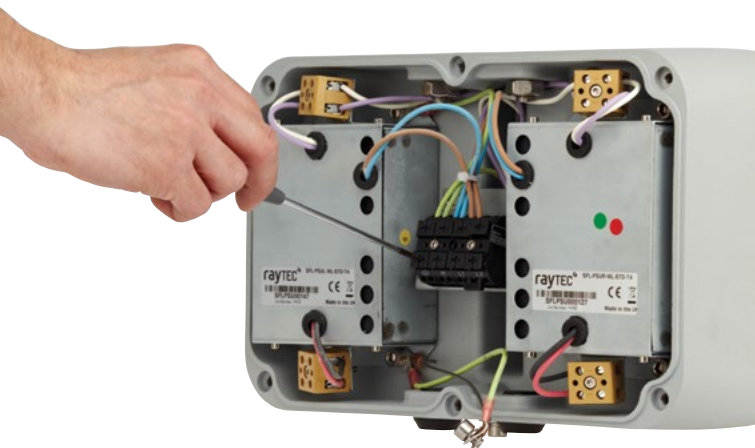
How a modular design can make servicing easier

Non-modular Ex lights which are factory sealed make maintenance more challenging and drive costs up due to the following implications;

- The unit cannot be serviced on-site without voiding warranty
- Specialist tools are required to carry out servicing
- Only the manufacturer has the ability to carry out maintenance work
- Any maintenance work requires the unit to be removed and sent off site to the manufacturer

A modular design solves these problems by providing an Ex light which can be maintained on-site by a customer's own electricians or a specialised sub-contractor thanks to its interchangeable components. This benefit makes servicing significantly easier and avoids the lengthy process of removing the unit and returning it to the manufacturer to repair, reducing downtime of the light.

Easy access to key components



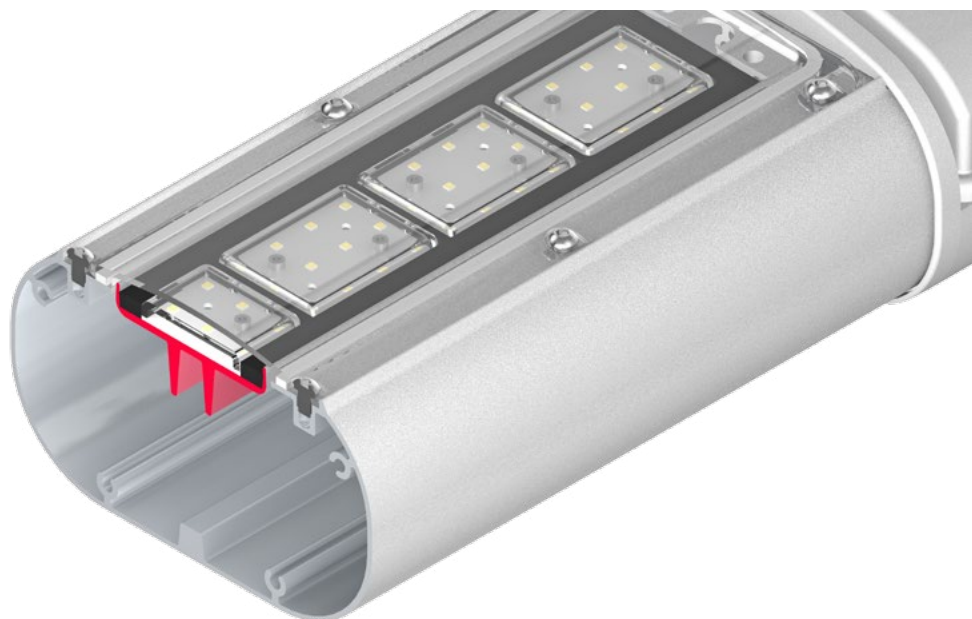
How a modular design and the use of LEDs reduces costs

By making servicing quicker and easier, modular Ex lights also ultimately reduce maintenance costs. Each light requires less time to service, less stock is required to service a full lighting installation and ultimately the site is at less risk of having to cease operations to replace or service light fittings. In particular lighting in hazardous environments can often be in difficult, hard to reach locations that increase the cost of local access so reducing maintenance time means large savings can be achieved.

***Pro-Tip** By making servicing quicker modular luminaires reduce maintenance costs and potential downtime on site.*

While a modular design makes the act of maintaining and servicing less costly, the use of LEDs also mean maintenance is required less frequently. If designed efficiently with LEDs that are correctly thermally managed, LED luminaires benefit from a significantly improved operating life in excess of 10 years given that the LEDs are able to run at a much cooler temperature and prolong their life. As a result of this improved operating life, the need for regular lamp changes associated with bulb based alternatives becomes redundant. Traditional bulb-based Ex lights are designed with arc tubes which burn out at a much faster rate and are susceptible to vibration, meaning they're unable to achieve the same prolonged, maintenance free operating life as LED alternatives.

Ex LED Thermal Management System



Accessibility

Having already discussed how a modular LED luminaire can reduce the cost and frequency in which maintenance is carried out, an aspect we haven't yet covered is the difficulty of actually accessing the luminaire to perform an inspection or necessary maintenance, and how a modular Ex light can help the end user in this regard.

Often located in restricted areas, gaining access to a luminaire can result in significant costs, especially when it requires rope access maintenance or the use of specialist machinery, such as helicopters or cherry pickers. The solution does not lie in being able to relocate the fittings to a more accessible location; areas of restricted access are often some of the most critical safety areas which require illumination, such as applications above machinery or on drilling derricks. While advancements in technology, such as the use of drones as a method of visual inspection, may help in some cases, the true solution is to focus on the luminaire itself and instil flexibility in its design through being modular.



How can a modular design make access easier?

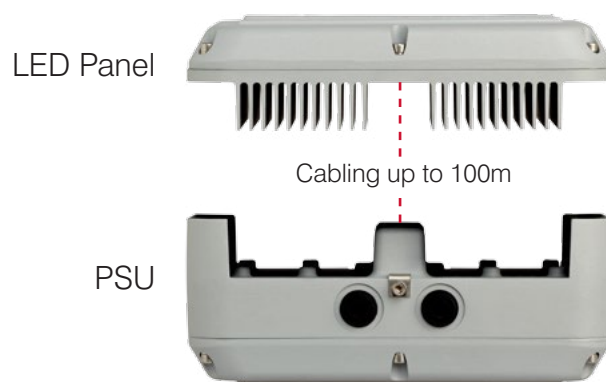
As well as making maintenance quicker and easier, a modular design provides greater flexibility during installation. The interchangeable key components mean the PSU on some units can be removed and located remotely at ground level. For example, PSUs on SPARTAN Flood luminaires can be located up to 100m away from the unit, meaning that for applications in even the most restrictive locations, there may be an opportunity to greatly improve ease of access, further increasing maintenance savings.

SPARTAN PSU mounting options

1: Integrated with the LED panel



2: Separated for Ease of Access



***Pro-Tip** A modular luminaire should allow the option of fitting the PSU locally or remotely*

What if there is nowhere suitable to mount the luminaire?

Depending on the application, there may also be other issues encountered by end users such as the limitation of suitable mounting locations, for example in cleaning rooms where the prohibition of dust prevents the ability to drill the holes required to mount the unit. Transportable lighting solutions can help to overcome this by providing lighting which does not need to be mounted, or uses more innovative mounting methods, such as the use of magnets to diversify the end users' mounting options. While transportable variants exist of traditional bulb-based or fluorescent luminaires, they are often more fragile and prone to damage compared to LED equivalents which are more durable and resistant to shock.

Transportable Ex LED Luminaire



Flexibility

Flexible installation options are important in reducing installation costs and providing suitable mounting solutions for end users, and as previously discussed, one of the major advantages of LED luminaires is that it significantly reduces the frequency of lamp changes. However, over time there is a possibility that a change in the environment causes the output requirement or functionality of lighting on-site to change. For example, a standard luminaire may need to be replaced with an emergency fitting, or the area of illumination may change. The solution is selecting an Ex luminaire which is flexible and can adapt to change.

How can a modular design protect against a changing environment?

A modular luminaire's interchangeable components allow additional modules to be added as requirements change. For example, all standard SPARTAN luminaires can be converted into an emergency fitting at any time with an additional battery back-up module, while a range of accessories are also designed so they can be fitted on-site to instantly diversify the luminaire's functionality and provide additional mounting solutions for standard and transportable variants.

***Pro-Tip** A modular luminaire should be convertible to an emergency fitting at any time with the minimum of effort*

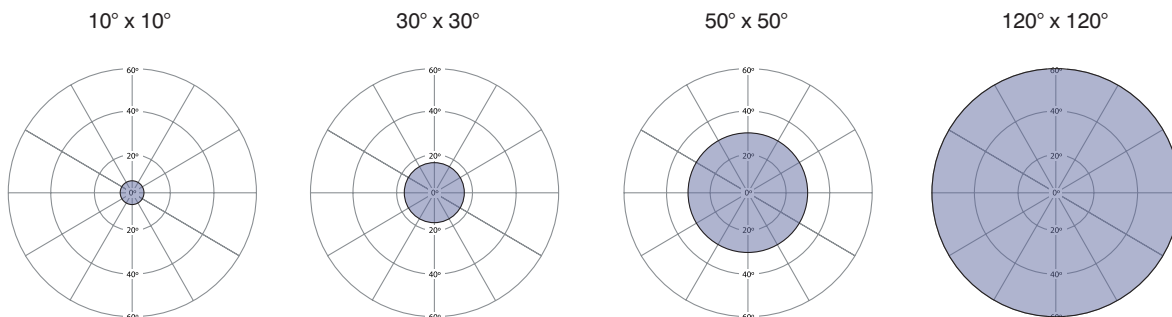
Ex LED Emergency Module



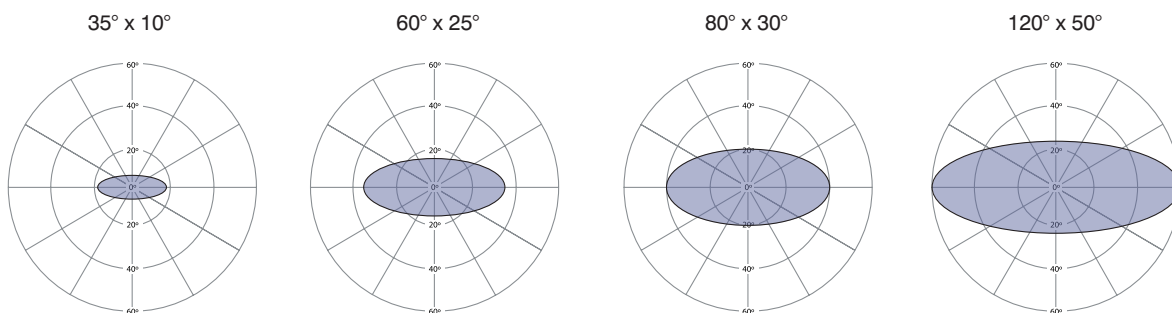
SPARTAN luminaires also feature a range of interchangeable beam patterns which allow the unit to be easily adapted if the required area of illumination changes. With 8 different beam patterns, both circular and elliptical, the angle of illumination can be altered on-site, unlike most LED luminaires. Most LED fittings use fixed optics within the unit to alter the beam pattern and are restricted to the choice of fewer patterns. Although some traditional Ex luminaires also offer adaptable beam patterns, they tend to use reflective metals to direct the light; a method which is more restrictive and cannot be easily or accurately adapted onsite. The use of this technology is crude and severely limited when compared to LED luminaires with adaptable beam patterns which provide a more precise and accurate light output.

Beam Patterns Available on SPARTAN Flood luminaires:

Beam patterns - Circular



Beam patterns – Elliptical (Vario)



Without a modular Ex light which facilitates some of the flexibility benefits discussed above, changes to the environment may make a luminaire redundant or unsuitable for purpose, leaving end users to fund a costly replacement or be left stuck with a luminaire which does not perform as required. This can also be beneficial to installers given that the expected beam pattern required is not always suitable once actually installed on-site. Installers also therefore have greater flexibility during installation.

***Pro-Tip** SPARTAN modular Ex LED luminaires allow the output angle of an illuminator to be changed quickly and easily from a core 10 degree beam pattern*

Summary

This paper has demonstrated the broad range of benefits of a modular LED Ex luminaire. With regular maintenance checks being mandatory, we have explored common problems with non-modular and traditional Ex lighting such as; complex servicing, restricted access and mounting options, frequent lamp changes and limited installation flexibility, and discussed how an LED modular luminaire can provide practical solutions to all of these issues.

Modular LED technology is the future of the lighting market for hazardous area environments, and our range of modular ATEX/IEC Ex LED Ex luminaires, SPARTAN, can provide the ideal solution for your lighting requirements

At Raytec we love to talk lighting, so speak to us about your application at hazardous@raytecltd.com or visit www.raytecltd.com to discover our full range of SPARTAN Ex LED luminaires.



Global HQ
T: +44 (0) 1670 520055
F: +44 (0) 1670 819760
sales@raytecled.com

Americas
T: +1 613 270 9990
T: +1 888 505 8335 (Toll Free)
ussales@raytecled.com
www.raytecled.com

No part of the publication may be reproduced in any material form (including photocopying or storing in any medium by electronic means and whether or not transiently or incidentally to some other use of this publication) without the written permission of the copyright holder, Raytec.