

# Technical Information - White Paper

## Electronic ballasts for applications with long operating times

### Current situation:

Standard devices such as PC PRO from TridonicAtco are designed for a rated life<sup>1</sup> of 50,000 hours at a rated failure rate<sup>2</sup> of  $\leq 0.2\%$  per 1,000 hours of operation. This value is directly linked to the ambient temperature of the ballast. A continuous maximum ambient temperature is generally assumed for the purposes of defining the rated life. This may differ however from manufacturer to manufacturer. At TridonicAtco the rated life of electronic ballasts is specified for the maximum ambient temperature. In installations with high annual operating times the rated life of standard devices is reached after only a few years.

- Ballasts with extended life spans are therefore recommended for lighting installations with service lives in excess of 10 years and annual operating periods of more than 4,000 hours.
- Operating the devices at different ambient temperatures may have a significant effect on the expected lifespan and on reliability. As a theoretical value we can assume that rated life will double if there is a 10 °C drop in the ambient temperature. An increase of 10 °C however will halve the rated life. In installations with high ambient temperatures the thermal load capacity of standard devices is not sufficient to meet the expected lifespan of the installation. Ballasts with a high permitted operating temperature, linked with a long rated life, are used here.



<sup>1</sup> Rated life: Number of hours of operation after which 90 % of the devices are still working.

<sup>2</sup> Rated failure rate: Statistical value for the percentage of devices that fail per 1000 hours of operation.

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## Extended ballast life

The life expectancy of all electronic devices is dependent on temperature. Standard devices from TridonicAtco achieve a rated life of 50,000 hours of operation at an ambient temperature of around 50 °C to 60 °C (type dependent, see data sheet). If the actual internal luminaire temperature is 10 °C lower (for example only 40 °C instead of 50 °C) the life expectancy rises to 100,000 hours of operation. In many cases therefore they achieve the same rated life as magnetic devices.

## Ballasts for industrial applications:

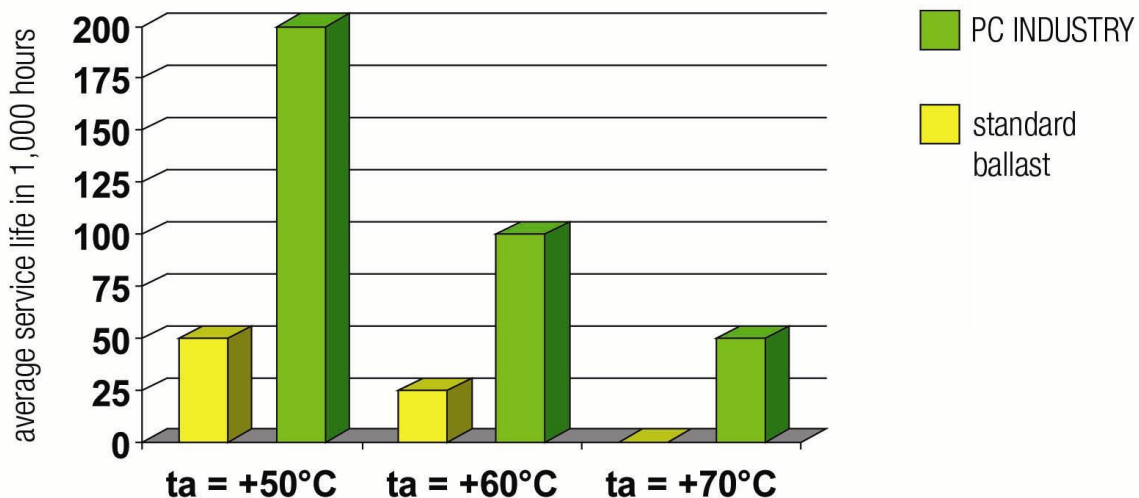
In industrial applications the question is mostly not just about high ambient temperatures **or** long life. Ballasts are needed that will operate for long periods **and** at high ambient temperatures.

For such applications TridonicAtco is the first company in the world to develop special industrial versions of electronic ballasts that meet the particular requirements:

- Extended operation of 100,000 hours at an ambient temperature of up to 60 °C
- Extrem ambient temperatures of -30 °C to up to 70 °C
- “Unfavourable” power supply conditions (e.g. high voltage peaks of up to 4,000 Vs)

The devices are therefore ideal for industrial luminaires, which are mostly designed as enclosed units (t protect against dust and moisture)

## Service life comparison



ta = ambient temperature of the ballast in the luminaire

This means a rated failure rate of

- 0.2 % per 1,000 hours for a rated life of 50,000 hours
- 0.1 % per 1,000 hours for a rated life of 100,000 hours
- and 0.05 % per 1000 hours for a rated life of 200,000 hours.

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## What are the differences between PC INDUSTRY and a standard ballast?

The requirements imposed by industrial environments can only be met by devices that have been specially developed to do so.

### Component design:

As with all TridonicAtco ballasts, only components with extremely high load capacities are used in PC INDUSTRY devices. Industrial devices make use of the extra space available in the luminaires used in industrial applications and therefore have larger dimensions. This reduces the amount of heat generated by the components by as much as 50 %.

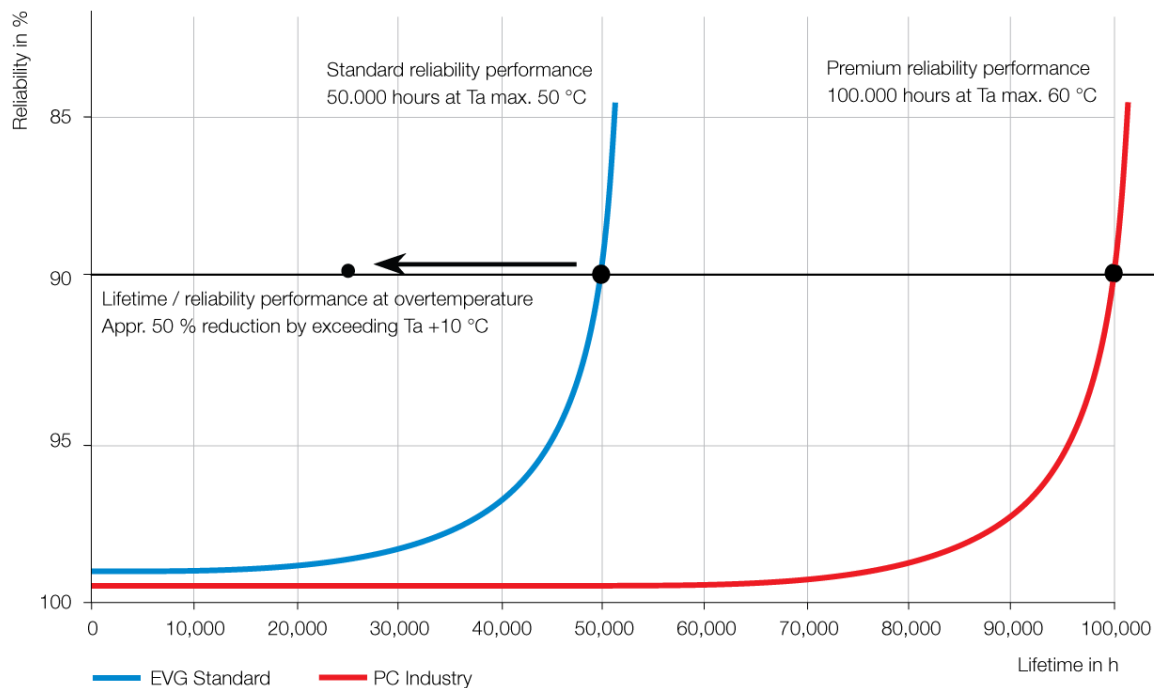
The limit temperature and the life of all the ballasts currently on the market are determined above all by the smoothing capacitor.

In PC INDUSTRY ballasts, two smoothing capacitors are used. A cascade circuit ensures that they are activated with a time delay with respect to one another to keep the inrush currents low without impairing the switch-on behaviour of the devices.

Its extremely robust input section protects the sensitive electronic components against mains transients of up to 4000 V. The circuit board, clad on both sides, forms the basis for effective protection against constant mechanical stresses.

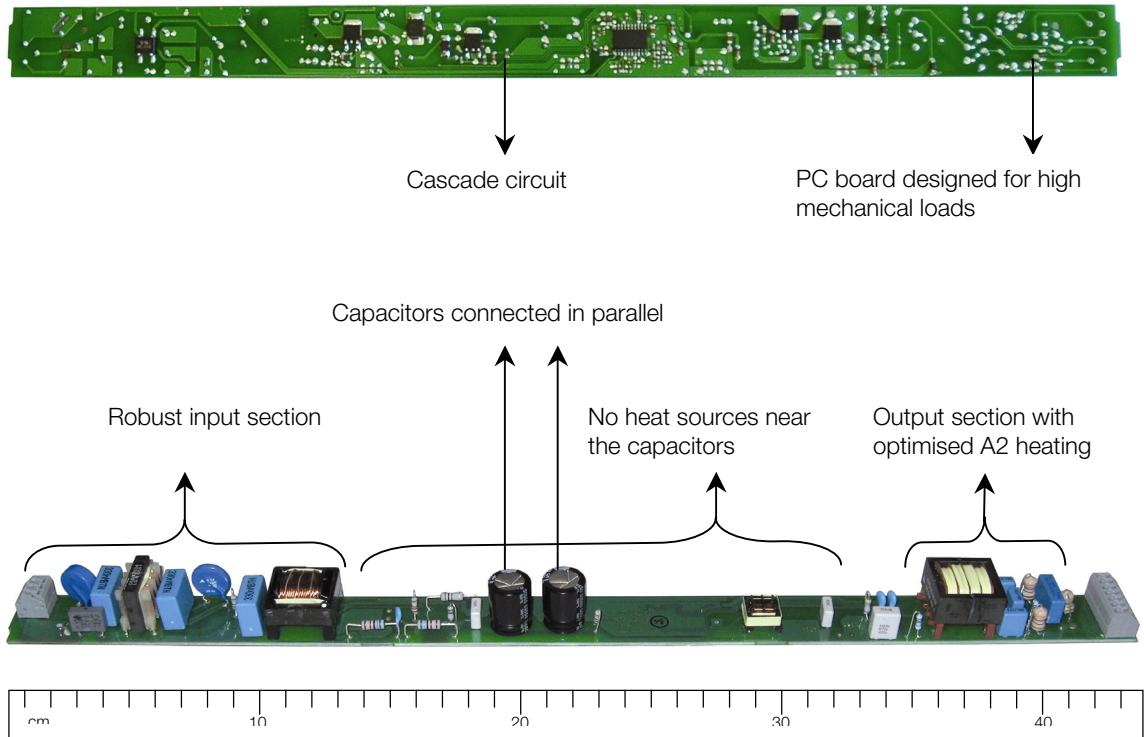
## PC Industry

### Product definitions



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**Robust design:**



**Summary:**

The PC INDUSTRY series is designed not just for long life. High reliability over many thousands of hours is achieved even at very high ambient temperatures so the ballasts continue to operate properly even if the luminaire is occasionally exposed to high temperatures.

PC INDUSTRY devices have been in use for more than two years now, providing many end customers with the benefits of electronic ballasts even under the harshest of conditions.

Careful selection of the right ballast for the particular operating conditions is the key to reliable lighting systems. TridonicAtco offers probably the most extensive range on the market.

It includes conventional ballasts, electronic ballasts and the PC INDUSTRY family, which offers a rated life of up to 200,000 hours depending on the operating conditions. They ensure that all the functions of a modern lighting system are available at all times even under the toughest conditions.