

# The Optional Locking Ring – A Quick Connection for Zhaga's Book 3 Modules

Matteo Raimondi from A.A.G. Stucchi demonstrates the Locking Ring option specified in the Zhaga Book 3 “Spot LED Light Engine with Separate Electronic Control Gear”; requirements, specification and benefits.

**Figure 1:** Overview of the single components of the Zhaga “Locking Ring” system for Book 3 modules and the attached system

The Zhaga consortium has created several interface specifications for LED light sources. One of these interface specifications is called “Book 3: Spot LED Light Engine with Separate Electronic Control Gear”. Book 3 defines the interface between a luminaire and an LED light source consisting of a round, 50 mm diameter, LED module and its associated electronic control gear (driver) in separate housings.

LED light sources that comply with “Book 3” are interchangeable. That means that a luminaire manufacturer can replace the light source with another Book 3-compliant light source without any change in the mechanical, thermal, and photometric components of the luminaire.

The so-called “Locking Ring” system is an optional component developed for the Book 3 spotlight engine. In this article we explain what the locking is and what requirements it places on the LED module.

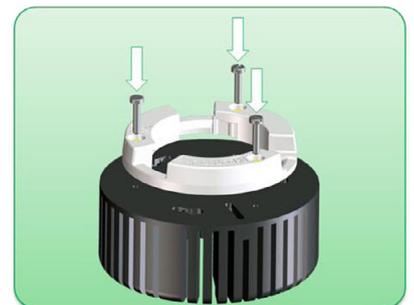


## The Locking Ring

The locking ring is a module holder that, when used together with its matching ring, eliminates the need to screw the LED module onto the heat sink. The locking ring has been inserted in the Zhaga Book 3 as an alternative to the screw-fixing for LED spot modules.



**Figure 2:** The Locking Ring consists of two components: one holder and one ring



**Figure 3:** The holder is fixed to the heat sink

**Figure 4:**  
When the module is positioned inside the holder, the rotation of the ring gives the required pressure to the module against the heat sink and fixes the module in the correct position

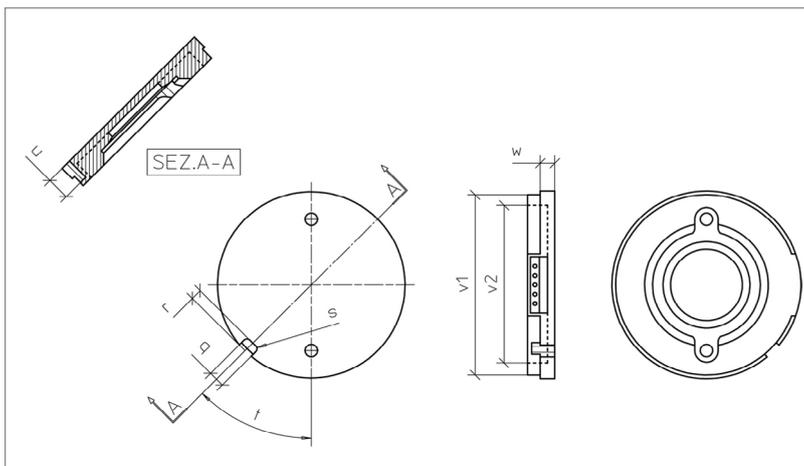


### The Requirements for the Locking Ring in Zhaga

In Book 3, the requirements for the locking ring system are described in Chapter 3 “Mechanical Interface”.

In paragraph 3.8 “Optional Locking Ring Feature”, some extra-requirements for the module are specified, while in paragraph 3.12 “Optional Locking Ring System (LRS)” the mechanical interface between the holder and the module is described.

**Figure 5:**  
Drawing of the optional features that are necessary for a locking ring system



### Paragraph 3.8 “Optional locking ring feature”

Zhaga Book3 allows two different designs for the spot module that could be named “Normal” and “Locking Ring” configuration.

In the “Normal” configuration, the maximum outline of the spot module is

- Circular diameter of 50 mm
- Minimum height “g” not defined

In this case the module is NOT COMPATIBLE with the locking ring, meaning that it can be fixed only by screws.

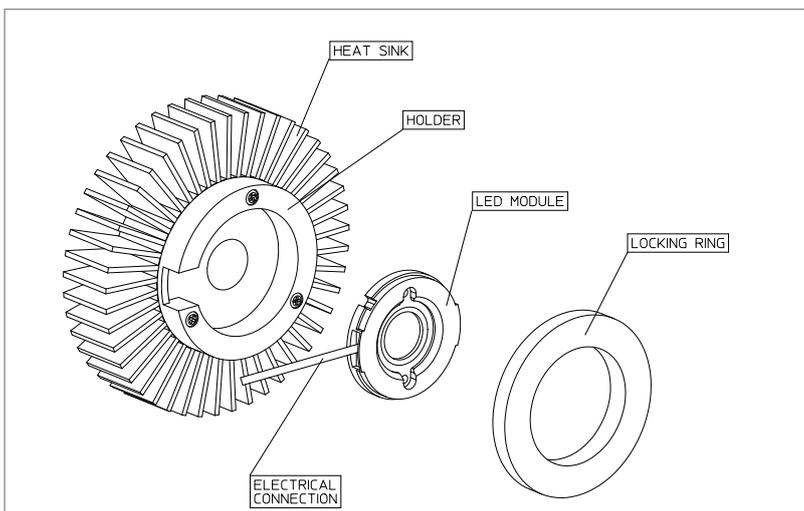
**Figure 6:**  
Differences between modules that are compatible and non-compatible to the locking ring system



In the “Locking Ring” configuration the module shall fulfil the following characteristics:

- A notch positioned on the outer diameter of the module (as described in Figure 5)
- Minimum height “g” of 6.75 mm
- The module can withstand 50 N of force by the holder

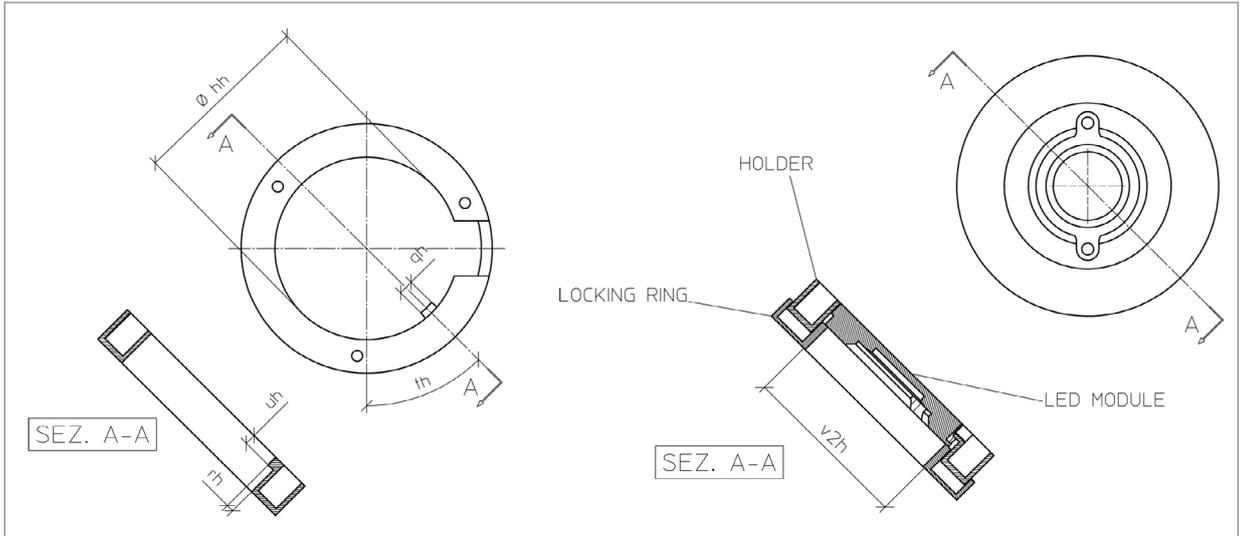
**Figure 7:**  
Functional drawing of the locking ring interface and the module



In this case the module is COMPATIBLE with the locking ring. In other words, the notch prevents installation of non-compatible LED modules.

Modules designed with the notch and with a thickness from 6.75 mm to 7.2 mm are suitable for locking ring.

**Figure 8:**  
Mechanical drawing of the locking ring interface and the module



### The Mechanical Interface of the Locking Ring

The mechanical interface between the holder and the module is described in Book 3, section 3.12. The interface has the following requirements:

- A suitable thermal interface material shall be used, preferably attached to the LED module: it is recommended that the TIM material is easily removable when using the locking ring system.
- The holder shall provide a homogeneous pressure between 25 and 50 N to the rim of the LED module
- The anti-rotation notch shall be used by a suitable pin in the holder to prevent rotation.

The notch on the module together with the key on the holder avoid any rotation of the module during locking. In this way any deformation of the TIM is avoided.

### Locking Ring Benefits for the Luminaire Manufacturer

The main benefits for the luminaire manufacturers using the locking rings are:

- Simplification of the production process as no TIM material is to be handled in the production line and tightening the holder screws is less critical than fixing the module directly to the heat sink.
- More flexible products and reduction of stocks as the desired LED module is chosen, purchased and mounted just before the delivery.
- Reduction of the luminaires part numbers: the “standard fittings” can be stocked without an LED module allowing a significant reduction of the number of different end products to be stocked.

### Locking Ring Benefits for the Module Lifetime

Thanks to the springs mounted inside the holder, the locking ring assures homogeneous homogeneous pressure on the TIM. In fact the pressure is applied by the ring to the complete circular surface of the module and not only in two positions around the screws.

Moreover, any thermal expansion of the module and compression of the TIM material during lifetime of the module is compensated by the holder springs.

### Locking Ring Benefits for the End User

The locking ring allows a more “user friendly” insertion and removal of the module. In this way, installation is much more “future proof” and the module can be easily upgraded to a new product generations. ■

**Figure 9:**  
Advantages of the locking ring from left to right - secure placement, homogeneous pressure on the TIM, compensation of the thermal expansion during lifetime due to the springs of the holder

