Schréder
Experts in lightability™

# Zhaga-D4i
# White paper

Schréder position on Zhaga-D4i - Choose your architecture!

Schréder
Experts in lightability™

Recently the Zhaga consortium joined forces with the DiiA and produced a single Zhaga-D4i certification that combines the Zhaga Book 18 version 2 outdoor connectivity specifications with DiiA's D4i specifications for intra-luminaire DALI.

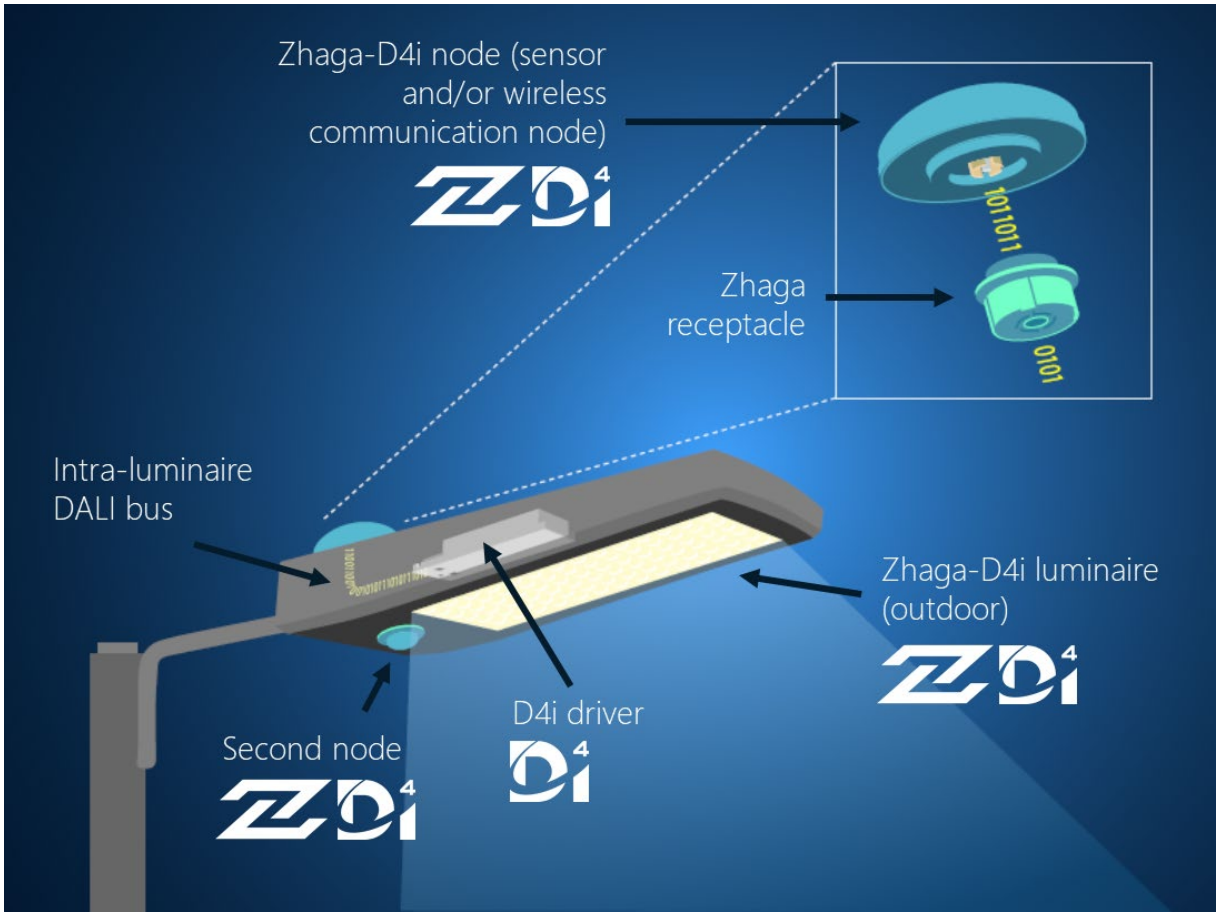
This certification covers all the critical features including mechanical fit, digital communication, data reporting and power requirements within a single luminaire, ensuring plug-and-play interoperability of luminaires (drivers) and peripherals such as connectivity nodes.

For many years, luminaires equipped with Zhaga sockets restricted customers to use only drivers in accordance with a propriety ecosystem specified and managed by just one manufacturer. This was the main reason for Schréder's reluctance to support this technology.


## Abstract

**The recently announced news that the Zhaga consortium joined forces with the DiiA to produce a single Zhaga-D4i certification will have major consequences on smart lighting and the future architecture of smart city applications that go beyond lighting. At Schréder-Hyperion we seek to support Schréder customers to make the right technology choices for the future of the Smart Cities that they want to build. The aim of this paper is to expose the benefits and limitations of both the Zhaga-D4i and ANSI specifications in the context of Smart Lighting for Smart Cities.**

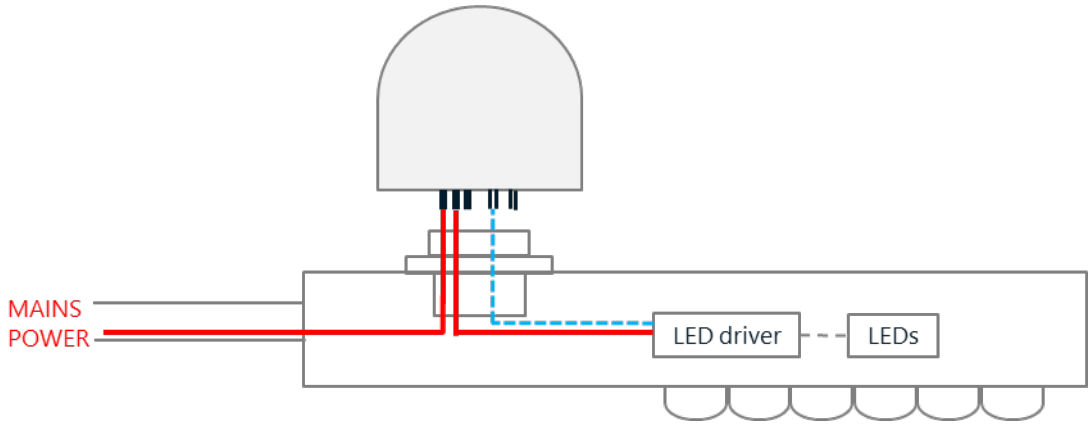
Recently the Zhaga consortium joined forces with the DiiA and produced a single Zhaga-D4i certification that combines the Zhaga Book 18 version 2 outdoor connectivity specifications with DiiA's D4i specifications for intra-luminaire DALI. This certification covers all the critical features including mechanical fit, digital communication, data reporting and power requirements within a single luminaire ensuring plug-and-play interoperability of luminaires (drivers) and peripherals such as connectivity nodes.




For many years, luminaires equipped with Zhaga sockets restricted customers to use only drivers in accordance with a propriety ecosystem specified and managed by just one manufacturer. Today the maturity of the recently released Zhaga Book 18 Ed. 2 and its associated certification program sets the path to an open standard. Unlike in the past, other driver manufacturers can now enter the race offering D4i certified equipment that interoperates in this open ecosystem.

As a founding member of the Zhaga consortium, Schréder has participated in the creation of, and therefore supports, the Zhaga-D4i certification program and the initiative of this group to standardise an interoperable ecosystem. On this basis, Schréder will henceforth be offering Zhaga-D4i certified luminaries. This is a first step in the right direction for the industry and, moving forward, it is important to know how to choose between Zhaga-D4i certified products versus those that adhere to the NEMA ANSI C136.41 standard. Both have their benefits and limitations. Understanding the implications of choosing one or the other as a solution is very important, especially for customers with Smart City aspirations. The following attributes and elements should be considered to help to understand both architectures better:

# NEMA ANSI C136.41




- **Architecture:** The NEMA socket receives the mains current upstream of the driver. Therefore, a typical NEMA based controller will provide surge protection, mains switching of the driver, power supply, energy metering, luminaire control (1-10V or DALI) as well as connectivity with almost limitless power. It is this limitless power that makes the controller well-disposed to enabling the luminaire to become a hub of connectivity for other smart city applications (beyond just presence sensors) because both high bandwidth connectivity chips and smart city sensors can be powered. This makes the NEMA architecture well adapted to future Smart City applications.

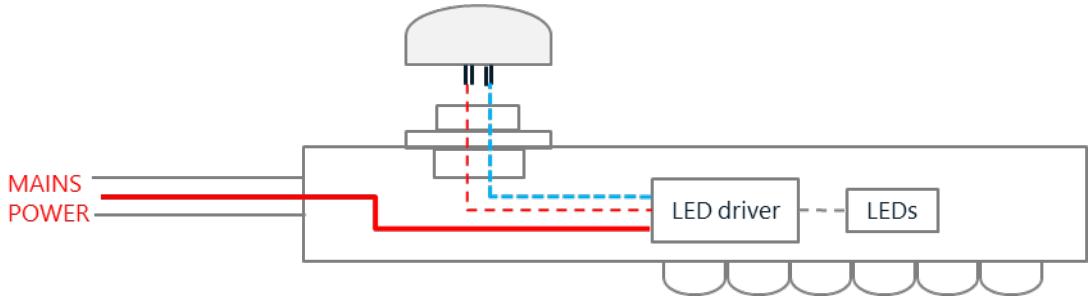
- **Maturity:** The Nema socket has been on the market for a long time and adoption has been widespread by a large number of driver, luminaire and controls manufacturers. For the majority of large projects, we see that NEMA has been the chosen solution and so there is a significant number of control solutions with the NEMA socket that exist on the market today.

- **Flexibility:** The NEMA socket includes two different contacts for dimming purposes, either 1-10v or DALI, while other protocols are also permitted according to ANSI C136.41. Seven pin NEMA sockets also offer two additional pins for other optional uses. This flexible architecture opens the door for creativity and many different Smart City use cases.

- **Electrical power and safety:** The NEMA socket receives the mains current directly and so nodes designed to fit the NEMA socket are powered directly from the grid. Proper electrical safety rules therefore have to be considered accordingly around the use of the socket and the installation of these control nodes.

- **Mechanical attributes:** The NEMA socket is big in size and can be seen as somewhat chunky for certain beautification use cases. This is because of the electrical safety clearance required for mains connection.

# ZHAGA-D4i




- **Architecture:** In a Zhaga-D4i certified luminaire the mains comes in through the driver and powers the controller. Therefore, a typical D4i driver will provide surge protection, diagnostics, energy metering and an auxiliary 24V power supply. A typical Zhaga-D4i based control device will provide luminaire control as well as connectivity within the given power limitation. This has created a fundamental change in the architecture of smart lighting solutions and has a few implications:
  - Any luminaire mounted control device has to accommodate the limitations of the Zhaga-D4i ecosystem in terms of wired communication protocols (DALI based) and power. This could be limiting to other non-lighting smart city applications as well as to the future proof-ness of the solution in the context of a fast-changing technological environment.
  - The Zhaga-D4i certified luminaire includes drivers offering features that had previously been in the control node, like energy metering, which has in turn simplified the control device therefore reducing the price of the control system. A point of caution for this new architecture for customers who purchase new Zhaga-D4i LED lights with a view to adding a control solution later in time, is to specify the level of meter accuracy required. Generally, the control system is purchased for its energy metering capabilities with a certain conscious guarantee of the level of the meter accuracy. Moving this function to the driver creates the risk that people may forget to think about the importance of the meter accuracy when buying their luminaire.

- **Maturity:** Although the Zhaga socket has been available for a couple of years, the specifications that describe how it should be used to safeguard truly open and interoperable 'plug and play' ecosystems have only just been released. The same is the case for the certification program that secures its proper implementation by manufacturers. Consequently, the number of Zhaga-D4i certified luminaires and control devices available on the market today is very limited. This may of course change with time.

- **Interoperability:** The new D4i specifications came by taking the best of the DALI2 protocol and adapting it to an intra-luminaire environment. By opening-up this certification program for drivers, the luminaires and the control solutions, interoperability is going to be guaranteed. With this comes certain limitations inherent to DALI, a digital protocol that is relatively slow and created for lighting

related commands. For example, if a pollution sensor (positioned on the light point) wants to communicate data in order to send it to the cloud, this may prove challenging for interoperability as this type of sensor is not specifically scoped in the standard, in comparison to occupancy sensors or light sensors.

- **Power limitation:** According to Zhaga book 18 only luminaire mounted control devices can be combined with a Zhaga-D4i luminaire. According to the specification, control devices are limited respectively to 2W and 1W average power consumption (for top or bottom mounted sockets). This limitation brings with it constrains around the choice of technologies (sensing, connectivity, etc.), some of which require higher power to operate. This is seen as a limitation to some smart city applications where a higher bandwidth is required for cloud computing solutions, for example, parking solutions that need to send images off to be analysed at cloud level.

- **Safety:** Because the Zhaga socket only holds a low voltage 24V power supply connection, there is a reduced safety risk around the use of the socket and the installation of control nodes.

- **Mechanical attributes:** The Zhaga socket is smaller in size and more suited to applications where aesthetics is essential. The architecture of Zhaga-D4i also foresees the possibility of putting two sockets on one luminaire allowing for instance the combination of a presence sensor and a control node. This also has the added value of standardising certain presence sensor communications with the D4i protocol.

These elements are presented to simply bring awareness of the potential shortcomings and benefits of both options for smart lighting control from a perspective that sees a future opportunity for new smart city applications based on light. As a company that profoundly believes that lighting has a central role to play in the future of smart cities, we care that our customers make the right choice for what they are trying to achieve both in the short term and the long term. Schréder supports the new Zhaga-D4i and the NEMA socket ecosystem because they are now both open. The outdoors will need openness, flexibility and modularity to answer the different use cases of Smart Cities and these will go beyond both Zhaga-D4i and the ANSI certifications in the future.