DALI Quick Start Guide

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This DiiA Guide provides basic information on DALI for specifiers, planners, lighting-system designers, system integrators, installers, commissioning engineers, luminaire manufacturers and others.

Contents

1.   What is DALI?

DALI (**D**igital **A**ddressable **L**ighting **I**nterface) is a **protocol (language) for bi-directional communication** between lighting control products.

A **2-wire bus** is used for communication (commands/data) as well as for power to some devices. It is typically around 16 V when there is no communication, but can be significantly above or below this.

Commands allow **control, configuration and querying** of the products.

- Examples of **control** commands include those that start a fade to a defined light output level, recall scenes or turn the lights off.
- Examples of **configuration** commands include those that change the fade time or change the light level stored in a scene.
- Examples of **query** commands include those that ask what the current light output level is, or whether there is a lamp failure.

Commands can be **addressed** to **individual** devices, to a **group** of devices, or **broadcast** to all devices. This makes communication very efficient.

Scenes allow fast and efficient recall of light levels across the system.

2.   What is the difference between DALI and DALI-2?

DALI-2 is the new version of the IEC 62386 standard. The main differences are in two areas:

2.1   Control gear

- For DALI-2, the IEC 62386 standard has been re-written, making it much clearer and more tightly specified, resulting in significantly improved product interoperability.
- Additionally, there has been a large increase in the amount of testing. As an example, a DALI-2 LED driver takes about three times longer to test than a DALI version-1 LED driver. This more-thorough testing results in a large increase in interoperability, with fewer problems expected in installations.
- Some features have also been added, the most significant being the *extended fade time*, allowing fades from 0.1 s up to 16 minutes.

2.2   Control devices

- Control devices are new to the DALI-2 standard (IEC 62386, part 103).
- Control devices were not specified in DALI version-1. Those that connected to the DALI-bus were proprietary solutions. This meant that such control devices had to be from the same manufacturer, to ensure they would work together.
- The DALI-2 standard gives requirements for application controllers and input devices, allowing devices from different manufacturers to be used together on the same DALI bus.

2.3   DALI-2 certification

DiiA has launched the DALI-2 certification program. DALI-2 products must be fully certified by DiiA before use of the DALI-2 trademark is allowed. Every certified product is listed on the [DiiA website](#).

Also see the DiiA website for a [comparison](#) between DALI version-1 and DALI-2.

3. DALI devices

The DALI standard (IEC 62386) describes three basic kinds of devices:

- Bus power supplies
- Control gear
- Control devices

Combinations of these are allowed within the same product.

3.1 Why is a bus power supply required?

The DALI bus must be powered to allow communication. The bus voltage is typically 16 V, with connected **bus power supplies** providing up to 250 mA. This is used for DALI communication, but can also be used by bus-powered devices – for example push-buttons, sensors or small relay devices. Bus power supplies can be separate products, or can be integrated with control devices or control gear.

3.2 What is control gear?

Power to the lamps, and therefore control of light output, is provided by **control gear**. For example, an LED driver typically converts the AC mains supply to a low-voltage regulated DC output, for connection to LED lamps.

All control gear must comply with part 102 of IEC 62386. The following types of control gear are specified in **DALI version-1**, each having a separate part (number) of the IEC 62386 standard, and a device type number.

Part	Type of control gear	Device type number
201	**Fluorescent** lamp control gear	Device Type 0 (DT0)
202	**Self-contained emergency** control gear	Device Type 1 (DT1)
203	**Discharge (HID)** lamp control gear	Device Type 2 (DT2)
204	**Low-voltage halogen** lamp control gear	Device Type 3 (DT3)
205	**Incandescent lamp** dimmer	Device Type 4 (DT4)
206	**Conversion to D.C. voltage** (1-10V, 0-10V converter)	Device Type 5 (DT5)
207	**LED** lamp control gear	Device Type 6 (DT6)
208	**Switching** (relay) control gear	Device Type 7 (DT7)
209	**Colour** control gear	Device Type 8 (DT8)

As an example, a DALI version-1 LED driver needs to comply with parts 101, 102 and 207 of IEC 62386.

Parts 201 and 207 are also available in DALI-2.

For **DALI-2**, the need for these device types is being removed. Instead, the new command QUERY LIGHT SOURCE TYPE can be used to determine the supported lamp types. New parts of IEC 62386 make specific features available for all lamp types:

Part	Type of control gear	Device type number
216	Load referencing	Device Type 15 (DT15)
217	Thermal gear protection	Device Type 16 (DT16)
218	Dimming curve selection	Device Type 17 (DT17)
219	(under consideration)	
220	Centrally supplied emergency operation	Device Type 19 (DT19)
221	Demand response	Device Type 20 (DT20)
222	Thermal lamp protection	Device Type 21 (DT21)
223	(under consideration)	
224	Non-replaceable light source	Device Type 23 (DT23)

These new features for DALI-2 are in progress – some have already been published by IEC, with others coming soon. Also under consideration are new parts for colour control.

Currently, DALI-2 LED drivers implement the DALI-2 requirements from parts 101, 102 and 207 of the standard, but in future they will implement parts 101, 102 and a selection of the features from parts 216 upwards.

3.3   What are control devices?

Control devices include **application controllers** and **input devices**. These have two different purposes, but are sometimes combined into the same product.

- **Application controllers** are the "brains" of a system. They use information from any source, make decisions and send commands to control, configure or query the lights (control gear) or other devices on the bus.
- **Input devices** provide information for use by application controllers. The information could be from push-buttons, occupancy sensors, light sensors, rotary controls, slider controls or other devices.

3.4   Bus wiring

A 2-wire bus is used to carry the communication and can be used to power some devices, such as sensors or push-buttons.

Bus wiring can use daisy-chain or star connections, or combinations of these. A closed loop should not be used.

It is recommended to use 1.5 mm^2 cable (15 AWG), allowing 300 m maximum distance between the farthest two devices on the bus, when using the maximum rated bus power supply of 250 mA. The two wires should be adjacent.

4. Addresses, groups and scenes

4.1 Addresses and groups

- A single DALI bus allows **64 addresses for control gear**, as well as **64 addresses for control devices**.
- There are **16 groups for control gear**; each item of control gear can be a member of any combination of the 16 groups.
- There are **32 groups for control devices**; each control device can be a member of any combination of the 32 groups.
- There are **32 groups for instances of input devices** (such as individual buttons within a panel); each instance can be a member of up to 3 of these groups.

4.2 Scenes

Scenes in control gear contain a light level, or can be set to "ignore". When the scene is recalled, the output will fade to the stored light level, or will have no effect if an "ignore" is stored.

Each item of control gear has 16 scenes. A single GO TO SCENE command instructs all the lights, or any combination of the lights, to go to individually pre-defined levels.

5. Using DALI-2 products

5.1 Do I need to choose DALI-2 control gear for my new system?

DALI-2 control gear has several advantages over DALI version-1 control gear, including improved interoperability and extended fade times.

If DALI-2 control gear is not available with the required properties, then DALI version-1 control gear can be used. This is unlikely to give a problem, but the new features of DALI-2 control gear will not be available.

5.2 How can I check if a product is really DALI-2 certified?

Every DALI-2 certified product is listed in the [Product Database](#) on the DiiA website. If a product does not appear in the list, it is **not** DALI-2 certified.

5.3 Can I check if a product is DALI version-1 registered?

The Product Database also lists DALI version-1 registered products. Registration is optional, but from 1st June 2018 all current and new DALI version-1 products need to be registered.

5.4 Can I use the DALI or DALI-2 trademarks?

The trademark logos, and the word trademarks are owned by DiiA. Members may use the trademarks in accordance with the DiiA Charter document and Trademark Guidelines document.

Community registration is available (with no fee) for luminaire manufacturers, allowing trademark use on luminaires, in accordance with the signed Community Registration and Trademark Guidelines documents.

Other use of the trademarks is not allowed.

For more information, please contact us:

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