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Application note

LightShape DALI network setup

eldoLED DUALdrive LightShape: LED driver factory settings

In the default factory setting, LightShape is set to 'off' for eldoLED DUALdrive LED drivers. This means that the driver will respond as a normal DALI DT6 ballast – except that there are 2 ballasts in a single DUALdrive LED driver. Each DALI ballast allows control over a (number of) LED output(s). This feature is used e.g.: in multiple-head downlights that need separate control per head or in pendant luminaires featuring direct and indirect light.

DALI factory settings, with LightShape 'off'

- DALI ballast 1: no short address set, group 0, controls Intensity for LED output 1
- DALI ballast 2: no short address set, group 1, controls Intensity for LED output 2

With LightShape set to 'on', the driver's internal algorithms combine the 2 ballast inputs to control Intensity (Int) and Colour Temperature (CT) in a tuneable white luminaire with a warm white and a cool white set of LEDs that are connected to the LED driver outputs. The parameters needed for proper LED driver operation are set in the driver with FluxTool software and TOOLbox pro.

DALI factory settings, with LightShape 'On'

- DALI ballast 1: no short address set, group 0, controls Int for combined LED outputs 1 and 2 *
- DALI ballast 2: no short address set, group 1, controls CT for combined LED outputs 1 and 2 *

*) Exact mode of operation can be set with FluxTool software and TOOLbox pro.

Standard DALI network initialization

In order to discover all LED drivers in a new standard DALI network and to be able to configure each driver individually, the DALI controller will first send an '*initialise'* command to all LED drivers. Then it sends a '*randomise'* command. With that command, each DALI ballast will generate a 24-bit random address.

After the randomise command, the controller searches for the ballast with the lowest random number. This is done by issuing a '*search address'* command, which contains the address that it is looking for, and a '*compare'* command to get replies from all the ballasts whose random address is lower or equal to the search addresses. Most controllers use binary search algorithm to narrow down the search range until they receive no more replies.

If the controller does not receive a reply, it backtracks to the middle point between the current and last search addresses to check the ballast with the last random address again. After a few loops, if the random address in the ballast equals the search address, the controller assigns a short address to the ballast. Then the controller tells that ballast to withdraw from the process so it doesn't respond to further compares this time round, and the search can continue for the next lowest ballast.

Once the controller has identified a ballast by search address, it is free to choose a short address. Some controllers do this automatically; others allow the user to enter the number they would like to use. It is usually at this point that one can identify which ballast has been found by means of flashing the lamps, using the short address.

DALI network initialization for eldoLED Tunable White

eldoLED DUALdrive is DALI 2.0 compatible. DALI 2.0 in fact is DALI 1.0 with some additional features that are relevant for sensors and control devices in the DALI network.

Each DUALdrive has two DALI 2.0 DT6 ballasts and two (or four) LED outputs. With LightShape for Tuneable White switched 'on', one ballast controls the intensity of the overall light output, and the other ballast controls the CT mix of the 2 LED outputs. So in fact both DALI ballasts influence the set points of both LED outputs.

The controller sees the DUALdrive as two normal DALI ballasts: it doesn't 'know' that these two ballasts belong to the same physical LED driver. So during the discovering process, the controller sends '*initialise'* and '*randomise'* commands, as if they were regular DALI ballasts.

In order to be sure that the two ballasts in one LED driver are addressed in a correct and consecutive order, the driver's internal algorithm will - once it has received the *'randomize'* commands - assign a random number X to the Intensity ballast, and assign random number X+1 to the other ballast that is responsible for CT control.

After the random addresses have been assigned to each ballast, the controller starts searching for the ballast with the lowest random address, using the binary search method mentioned in the previous section. Once it finds a ballast with random number X, it will assign short address A0Y to this ballast and exclude it from the searching process. The CT ballast with random address X+1 will be the next one to be discovered by the controller, and consequently get the short address A0Y+1. By implementing this internal algorithm together with the controller's binary search method, the two ballasts in each driver are discovered in the vast majority of cases as adjacent and in Int-CT sequence.
The controller is still free to assign short addresses.

The DALI standard does not dictate that binary search is the algorithm used in all controllers, but it is assumed that this is the best method, and that it is used by most of the controllers on the market today.

eldoLED Tuneable White DALI network application tips

Discovery

When finished installing a DALI network with eldoLED's Tuneable White DUALdrive, a full discovery from the controller side is needed if the user wants to control with more than just Group0 and Group1. This enables the user to see and configure each driver in the network.

During the new network discovery, the controller will ask the drivers for their status and information, and assign short addresses to each ballast. Each driver will be discovered as two ballasts with incremented short addresses.

If the user needs to make a change to an existing network, it is recommended to use functions such as "search device" or "system extension" in the controller. This action will only read out the parameters without changing any existing addresses in the drivers.

Addressing

As mentioned in previous sections, the controller assigns short addresses in the first network setup. Some controllers allow the user to change the address to their liking.

Before the first full discovery, a new eldoLED Tuneable White driver doesn't have a short address, so it won't be discovered by commands like "search device", but only by "full discovery".

Grouping

Each eldoLED Tuneable White DUALdrive is pre-programmed to Group 0 and Group 1 in the factory. Group 0 controls overall intensity and Group 1 controls overall CT.

Grouping can be easily changed from the controller side. Once the ballast has been grouped, the grouping information will remain in the driver. Depending on the controller, the group setting might sometimes be changed during new network discovery or existing network discovery.

The grouping methods and principles are the same as for normal DALI drivers.

Scene

Like all other regular DALI drivers, each intensity or CT ballast can store up to 16 scene values. Scene values in the intensity ballast determine the overall light intensity, and those scene values in the CT ballast determine the overall CT performance.

Direct Arc Power

Direct Arc Power command is sent to a certain ballast with a certain set point. The Intensity ballast and CT ballast can receive and respond to Direct Arc Power commands as normal DALI ballasts. But with Direct Arc on ‘0’ for intensity, setting Direct Arc to any value on CT ballast will give no visual response.

General Broadcast

The intensity ballast in eldoLED Tuneable White drivers will receive and respond to normal broadcast commands without commissioning. But the CT ballast will not react to broadcast Arc Power commands.

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Europe, Rest of World
eldoLED B.V.
Science Park Eindhoven 5125
5692 ED Son
The Netherlands

North America
eldoLED America
One Lithonia Way
Conyers, GA 30012
USA

www.eldoled.com

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