Jürgen Schilder and Thorsten Reibel – ABB STOTZ KONTAKT GmbH July 2015

ABB STOTZ-KONTAKT GmbH
Webinar ABB i-bus® KNX
DALI Digital Addressable Lighting Interface

TRAINING KNX

Power and productivity for a better world™ ABB

Webinar “DALI – Digital Addressable Lighting Interface”
Introduction

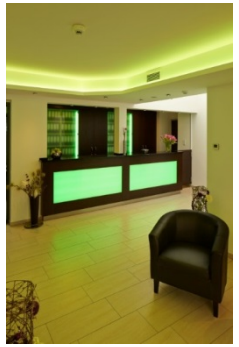
- What is DALI ???
- DALI standard IEC 62386
- DALI 2
- DALI Technology
- DALI devices (control and operating devices)
- ABB i-bus® KNX Gateways

Webinar “DALI – Digital Addressable Lighting Interface”
What is DALI ???

„Digital Addressable Lighting Interface“

- The subject DALI is a synonym for a standard, independent of the manufacturer to control electronic ballast devices (ebd`s) and lamps the digital way






Webinar “DALI – Digital Addressable Lighting Interface”
What is DALI ???

- Modern lighting technology requires systems that are
  - Flexible
  - simple and
  - that provide room-based lighting control with just a few components
- Its wiring needs to be easy, minimum combined with user-friendly operation
- Installing and applying changes to traditional lighting installations, like 1-10V solutions, generally are more challenging and time consuming
- More components are required in order to create scenes, facilitate flexible grouping and to integrate advanced functions like daylight-dependent control

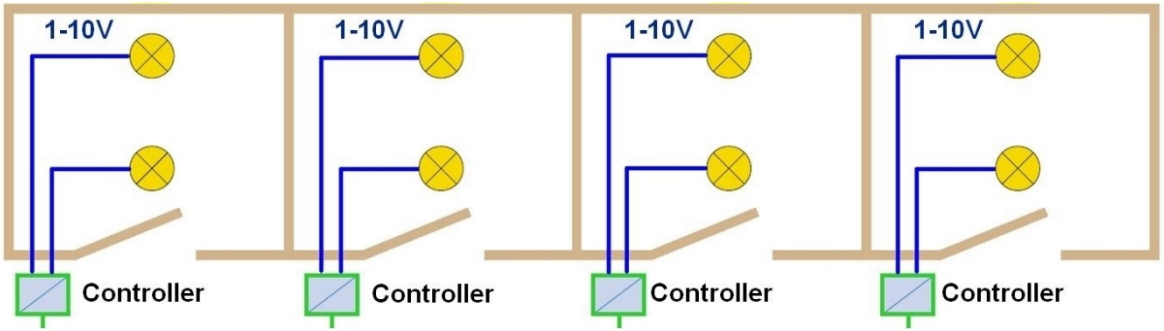
Webinar “DALI – Digital Addressable Lighting Interface”
What is DALI ???

DALI Chances

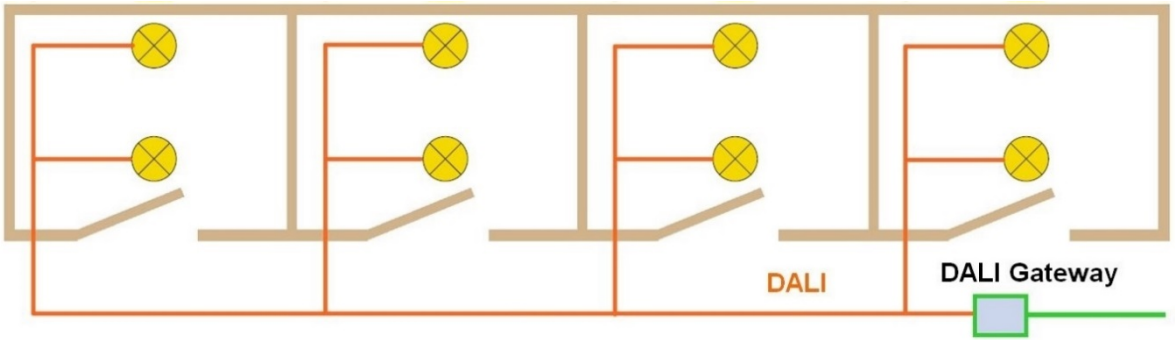
- DALI has been established for commercial buildings
- DALI expands the functionality of the existing light control components e.g. the 1...10V technology
- Light architects have recognized DALI as medium for light effects and they specify it
- Modern lighting technology including coloured light is often mentioned in combination with DALI
- Over a Gateway, KNX can occur in connection with further innovative techniques

Webinar “DALI – Digital Addressable Lighting Interface
What is DALI ???

1-10 V: More wiring, more components, less flexibility



DALI: Less wiring, less components, more flexibility



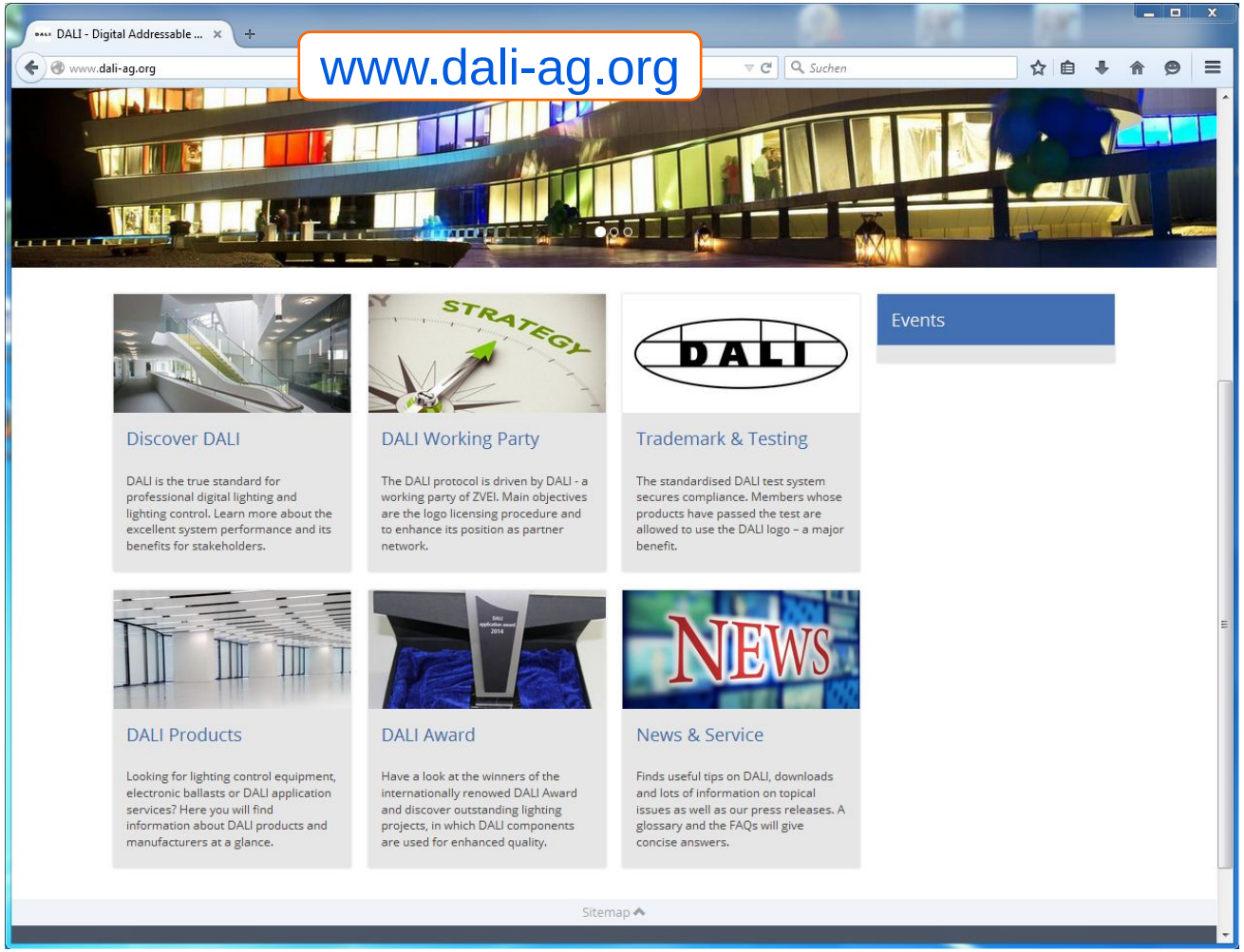
Webinar “DALI – Digital Addressable Lighting Interface”
What is DALI ???

- Switching operation (ON/OFF)
- Setting of brightness value
- Dimming via logarithmic characteristic (human perception)
- Fading time for scenes
- Control of individual devices or groups
- Status feedback (lamp on/off, brightness value, lamp-, ballast-failure)

Webinar “DALI – Digital Addressable Lighting Interface”
What is DALI ???

- The Interface standard (DALI) is worldwide supported by the producers of ballasts since 1999
- Out of the German “Electrical and Electronic Manufacturers Association” (ZVEI), the Activity Group DALI (AG DALI – www.dali-ag.org) has been founded to establish the DALI standard
- Since 15.10.2003 ABB STOTZ-KONTAKT is member of the working group DALI and is therefore entitled to print DALI devices with the DALI logo
- Members of the DALI AG are e.g.:
  ABB, BAG, CEAG, DIAL, ERCO, ETAP,HADLER, HELVAR, JOHANSON CONTROLS, LIGHTOLIER, LUTRON, LUXMATE, MAY&CHRISTE, OSRAM, PHILIPS, TRIDONIC and many more

Webinar “DALI – Digital Addressable Lighting Interface”
What is DALI ???

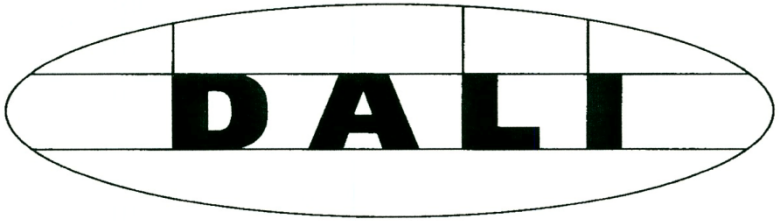


Webinar “DALI – Digital Addressable Lighting Interface”
What is DALI ???

- Task of the DALI AG is
  - The worldwide distribution of DALI
  - To ensure the interchangeability of the DALI devices
  - Support of the use of DALI
- No certification or registration of the DALI devices is required
- DALI logo shall display the conformity of the device
- DALI is a stand-alone system
- It describes itself as digital control and subsystem for the lighting technology and not as a bus system

Webinar “DALI – Digital Addressable Lighting Interface”
What is DALI ???

- DALI – **The Digital Addressable Lighting Interface** is based on an international recognized IEC 62386 standard for intelligent and easy management of lighting equipment
- The standard incorporates several parts that provide control and monitoring functionality for Ballasts, Emergency gear and LED driver
- Its digital simplicity and flexibility enables customers to create solutions that easy-to-use, robust, interoperable and above all affordable
- DALI has proven its reliability for many years, and will continue to develop and support the growing demands for professional lighting



Webinar “DALI – Digital Addressable Lighting Interface”
DALI standard IEC 62386

- DALI refers to the standard IEC 62386, which defines a digital Interface for electronic ballasts (EBDs)
- Standardized are:
  - Technical data (current, voltage, Timing etc.)
  - Protocol
  - Test condition for electronic ballasts
- New standard IEC 62386 DALI Edition 2 (Ed2) is published

Webinar “DALI – Digital Addressable Lighting Interface”
DALI standard IEC 62386

209 Colour Control			
205 Incandescent Dimmer	206 1-10 V Converter	207 LED	208 Switching
201 Fluorescent	202 Self-contained Emergency	203 HID	204 LV Halogen

102 – General requirements - Control gear

101 – General requirements - System

Webinar “DALI – Digital Addressable Lighting Interface”
DALI – IEC 62386 standard

Interoperability

- DALI components are produced worldwide by many manufacturers based on the IEC 62386 standard
- The DALI AG introduced a DALI test system aiming to safeguard the highest interoperability quality for lighting systems
- Manufacturers can test their DALI products under predefined conditions through DALI AG approved test hardware and software
- The test system is available to all DALI AG members and ensures the interoperability of DALI products
- Products that fulfil the IEC 62386 standard, and comply with the DALI test system, are allowed to carry the official DALI logo

Webinar “DALI – Digital Addressable Lighting Interface”
Interoperability

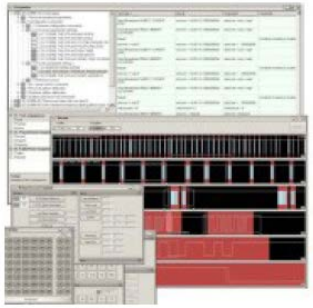
Interoperability and registration process

Following main conditions will have to be fulfilled in order to apply the DALI logo on products

1. The manufacturer must have a signed Trade Mark Agreement with ZVEI and be a member of DALI AG
2. Product registration is based on the conformity with the IEC 62386 standard as well as a positive test result with the DALI test system
3. The product, and its test results, will be registered with DALI AG

DALI device

DALI tester



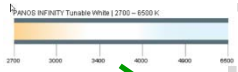
DALI test sequence software

Webinar “DALI – Digital Addressable Lighting Interface”
DALI standard IEC 62386 Edition 2

Why DALI 2 ?

- The IEC 62386 standard was first drafted in 2000 and has undergone revisions as it evolved
- New editions 101 & 102 were necessary to facilitate the introduction of control devices
- Control devices part 103 describes general requirements for single-masters and multi-masters, application controllers and input devices
- Specific input devices such as push-buttons and sensors described in 3xx parts
- Improvements & clarification – improving interoperability

Webinar “DALI – Digital Addressable Lighting Interface”
DALI standard IEC 62386 Edition 2



DALI

DALI 2

216-22x Control gear functions

209 Colour Control			
205 Incandescent Dimmer	206 1-10 V Converter	207 LED	208 Switching
201 Fluorescent	202 Emergency	203 HID	204 LV Halogen

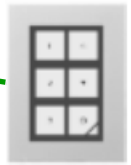
Edition 2 — 102 – Control gear

New: Edition 2

333 Manual configur-ation	3xx Other devices		
305 Colour sensor	306 Remote Interface	307 Relative input device	332 Feedback
301 Push Buttons	302 Absolute input devices	303 Occupancy Sensors	304 Light sensor

103 – Control devices

Edition 2 — 101 – General requirements - System



Webinar “DALI – Digital Addressable Lighting Interface”
DALI standard IEC 62386 Edition 2

What is new?

- The key tenet of DALI is interoperability and DALI Version 2 will help fill some of the gaps in the original standard
- Already Version 2 will allow for input control devices and will set a basis for the future incorporation of control devices
- To increase compatibility the DALI working group is now designing with its partners a new DALI test rig and test sequence
- Part 103 “General requirements Control devices”
  - Single masters and multi-masters allowed
  - Input devices defined
  - Application controllers defined
  - 24-bit frame format defined
  - Manufacturer specific modes defined

Webinar “DALI – Digital Addressable Lighting Interface”
DALI – IEC 62386 standard

Future use of the DALI logo & word

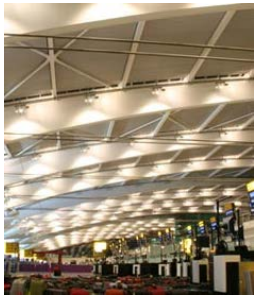
- The original DALI logo and “DALI” word may continue to be used on marketing material as well as compliant products and product literature
- The DALI 2 logo shows a combination of the original DALI ellipse, together with the version “2” compliance mark.
- All ABB i-bus KNX DALI Gateways comply with the new DALI Standard IEC 62386-101ed2 und -102ed2
- The DALI 2 logo is a strong indicator of interoperability and may only be shown on products that have successfully passed the compliance tests, and has been uploaded and checked on the licence web-server

Webinar “DALI – Digital Addressable Lighting Interface”
Application of DALI

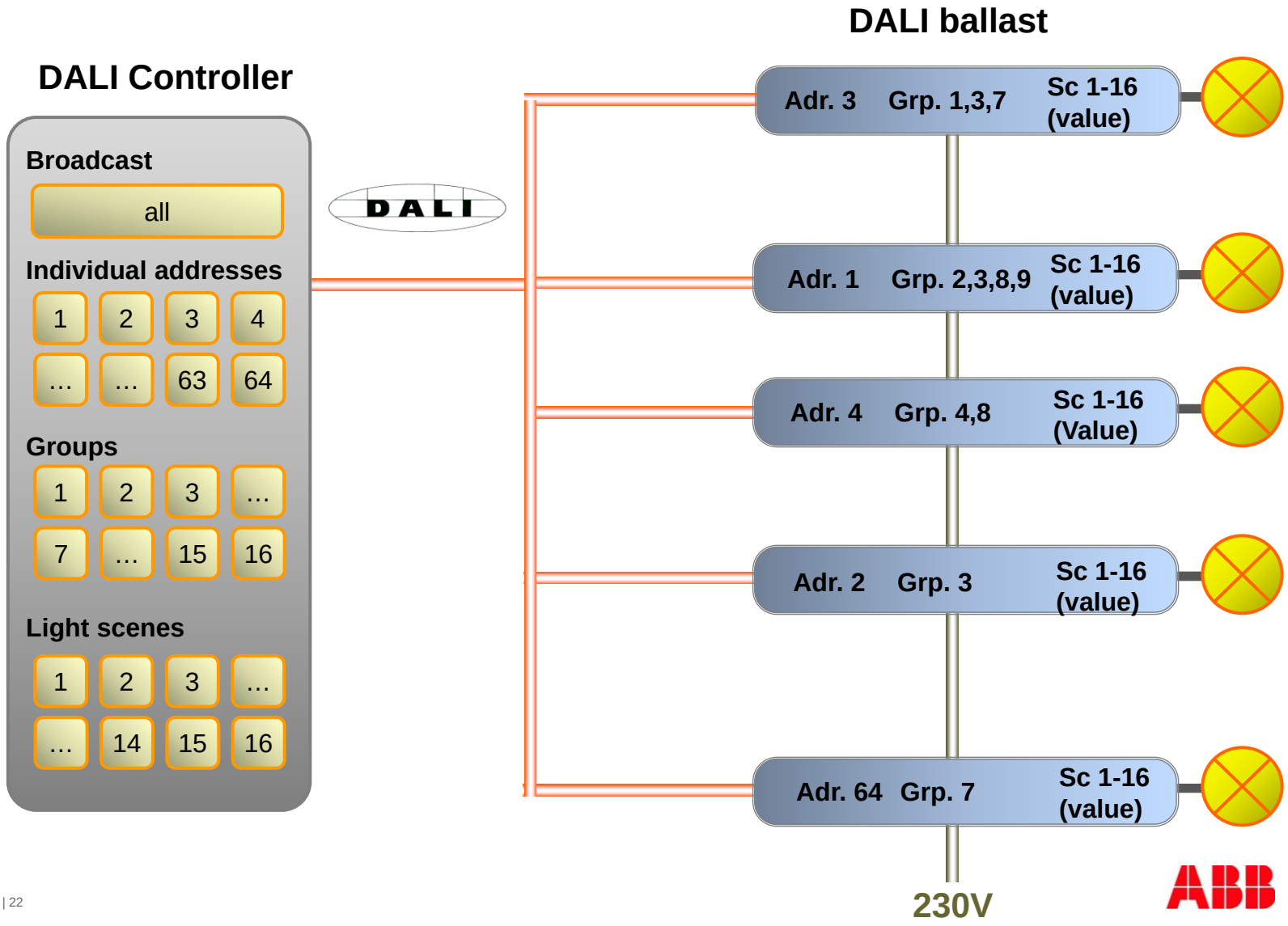
- Light effects / scenes
- Control of LEDs
- Energy saving (daylight control)
- Feedback of e.g. lamp and ballast failure
- Coloured light usage and effect lighting (sequences)
  - Bar: different colours will be changed in particular intervals
  - Shop: special offers will be presented on illuminated exhibition boards and colour sequences run continously
  - Changing light moods not only to have a visual effect, but also to control the behaviour of persons
- In combination with gateways to superior systems like KNX it is used in typical commercial projects like office buildings with powerful lighting solutions

Webinar “DALI – Digital Addressable Lighting Interface”
DALI Addressing

- The DALI standard enables the control with status messages of
  - Max. 64 devices (slaves)
  - Allocation to 16 groups
  - Up to 16 light scenes
- The settings and light values are locally stored in the ballast
- DALI Edition2 allows multi-master
  - Additional 64 master devices


Webinar “DALI – Digital Addressable Lighting Interface”
DALI Addressing



Webinar “DALI – Digital Addressable Lighting Interface”
DALI Addressing: Broadcast (all)

e.g. multi controller

DALI Controller

Broadcast

all

Individual addresses

1	2	3	4
…	…	63	64

Groups

1	2	3	…
7	…	15	16

Light scenes

1	2	3	…
…	14	15	16

DALI

DALI ballast

- Adr. 3 Grp. 1,3,7 Sc 1-16 (value)
- Adr. 1 Grp. 2,3,8,9 Sc 1-16 (value)
- Adr. 4 Grp. 4,8 Sc 1-16 (Value)
- Adr. 2 Grp. 3 Sc 1-16 (value)
- Adr. 64 Grp. 7 Sc 1-16 (value)

230V

Webinar “DALI – Digital Addressable Lighting Interface”
DALI Addressing: Broadcast (all)

e.g. multi controller

DALI Controller

Broadcast

all

Individual addresses

1	2	3	4
…	…	63	64

Groups

1	2	3	…
7	…	15	16

Light scenes

1	2	3	…
…	14	15	16

DALI

Broadcast: ON

DALI ballast

all ON

Adr. 3	Grp. 1,3,7	Sc 1-16 (value)	
Adr. 1	Grp. 2,3,8,9	Sc 1-16 (value)	
Adr. 4	Grp. 4,8	Sc 1-16 (Value)	
Adr. 2	Grp. 3	Sc 1-16 (value)	
Adr. 64	Grp. 7	Sc 1-16 (value)	

230V

Webinar “DALI – Digital Addressable Lighting Interface”
DALI Addressing: 64 individual addresses

e.g. touch box

DALI Controller

Broadcast

all

Individual addresses

1	2	3	4
…	…	63	64

Groups

1	2	3	…
7	…	15	16

Light scenes

1	2	3	…
…	14	15	16

DALI

DALI ballast

Adr. 3	Grp. 1,3,7	Sc 1-16 (value)
Adr. 1	Grp. 2,3,8,9	Sc 1-16 (value)
Adr. 4	Grp. 4,8	Sc 1-16 (Value)
Adr. 2	Grp. 3	Sc 1-16 (value)
Adr. 64	Grp. 7	Sc 1-16 (value)

230V

Webinar “DALI – Digital Addressable Lighting Interface”
DALI Addressing: 64 individual addresses

e.g. touch box

DALI Controller

Broadcast

all

Individual addresses

1	2	3	**4**
…	…	63	64

Groups

1	2	3	…
7	…	15	16

Light scenes

1	2	3	…
…	14	15	16

DALI

DALI dev. 4 ON

DALI ballast

Adr. 3	Grp. 1,3,7	Sc 1-16 (value)
Adr. 1	Grp. 2,3,8,9	Sc 1-16 (value)
Adr. 4	Grp. 4,8	Sc 1-16 (Value)
Adr. 2	Grp. 3	Sc 1-16 (value)
Adr. 64	Grp. 7	Sc 1-16 (value)

ON

230V

Webinar “DALI – Digital Addressable Lighting Interface”
DALI Addressing: 64 individual addresses

e.g. touch box

DALI Controller

Broadcast

all

Individual addresses

1	**2**	3	4
…	…	63	64

Groups

1	2	3	…
7	…	15	16

Light scenes

1	2	3	…
…	14	15	16

DALI

DALI dev. 2
50%

DALI ballast

Adr. 3	Grp. 1,3,7	Sc 1-16 (value)
Adr. 1	Grp. 2,3,8,9	Sc 1-16 (value)
Adr. 4	Grp. 4,8	Sc 1-16 (Value)
Adr. 2	Grp. 3	Sc 1-16 (value)
Adr. 64	Grp. 7	Sc 1-16 (value)

50%

230V

Webinar “DALI – Digital Addressable Lighting Interface”

DALI Addressing: 16 groups

e.g. group controller

DALI Controller

Broadcast

all

Individual addresses

1	2	3	4
…	…	63	64

Groups

1	2	3	…
7	…	15	16

Light scenes

1	2	3	…
…	14	15	16

DALI

DALI ballast

Adr. 3	Grp. 1,3,7	Sc 1-16 (value)
Adr. 1	Grp. 2,3,8,9	Sc 1-16 (value)
Adr. 4	Grp. 4,8	Sc 1-16 (Value)
Adr. 2	Grp. 3	Sc 1-16 (value)
Adr. 64	Grp. 7	Sc 1-16 (value)

230V

Webinar “DALI – Digital Addressable Lighting Interface”
DALI Addressing: 16 groups

e.g. group controller

DALI Controller

Broadcast
- all

Individual addresses
- 1, 2, 3, 4
- …, …, 63, 64

Groups
- 1, 2, **3**, …
- 7, …, 15, 16

Light scenes
- 1, 2, 3, …
- …, 14, 15, 16

DALI

DALI group 3 ON

DALI ballast

Adr. 3	Grp. 1,3,7	Sc 1-16 (value)
Adr. 1	Grp. 2,3,8,9	Sc 1-16 (value)
Adr. 4	Grp. 4,8	Sc 1-16 (Value)
Adr. 2	Grp. 3	Sc 1-16 (value)
Adr. 64	Grp. 7	Sc 1-16 (value)

ON

ON

ON

230V

Webinar “DALI – Digital Addressable Lighting Interface”
DALI Addressing: 16 groups

e.g. group controller

DALI Controller

Broadcast
- all

Individual addresses

1	2	3	4
…	…	63	64

Groups

1	2	3	…
7	…	15	16

Light scenes

1	2	3	…
…	14	15	16

DALI

DALI group 7
60%

DALI ballast

- Adr. 3 Grp. 1,3,7 Sc 1-16 (value) — 60%
- Adr. 1 Grp. 2,3,8,9 Sc 1-16 (value)
- Adr. 4 Grp. 4,8 Sc 1-16 (Value)
- Adr. 2 Grp. 3 Sc 1-16 (value)
- Adr. 64 Grp. 7 Sc 1-16 (value) — 60%

230V

Webinar “DALI – Digital Addressable Lighting Interface”

DALI Addressing: 16 light scenes

e.g. scene controller

DALI Controller

Broadcast

all

Individual addresses

1	2	3	4
…	…	63	64

Groups

1	2	3	…
7	…	15	16

Light scenes

1	2	3	…
…	14	15	16

DALI

DALI ballast

Adr. 3	Grp. 1,3,7	Sc 1-16 (value)
Adr. 1	Grp. 2,3,8,9	Sc 1-16 (value)
Adr. 4	Grp. 4,8	Sc 1-16 (Value)
Adr. 2	Grp. 3	Sc 1-16 (value)
Adr. 64	Grp. 7	Sc 1-16 (value)

All scene values are stored inside DALI ballast !

230V

Webinar “DALI – Digital Addressable Lighting Interface”

DALI Addressing: 16 light scenes

e.g. scene controller

DALI Controller

Broadcast

all

Individual addresses

1	2	3	4
…	…	63	64

Groups

1	2	3	…
7	…	15	16

Light scenes

1	2	**3**	…
…	14	15	16

DALI

DALI scene 3

DALI ballast

Adr. 3	Grp. 1,3,7	Sc 1-16 (value)	20%
Adr. 1	Grp. 2,3,8,9	Sc 1-16 (value)	85%
Adr. 4	Grp. 4,8	Sc 1-16 (Value)	40%
Adr. 2	Grp. 3	Sc 1-16 (value)	25%
Adr. 64	Grp. 7	Sc 1-16 (value)	100%

All scene values are stored inside DALI ballast !

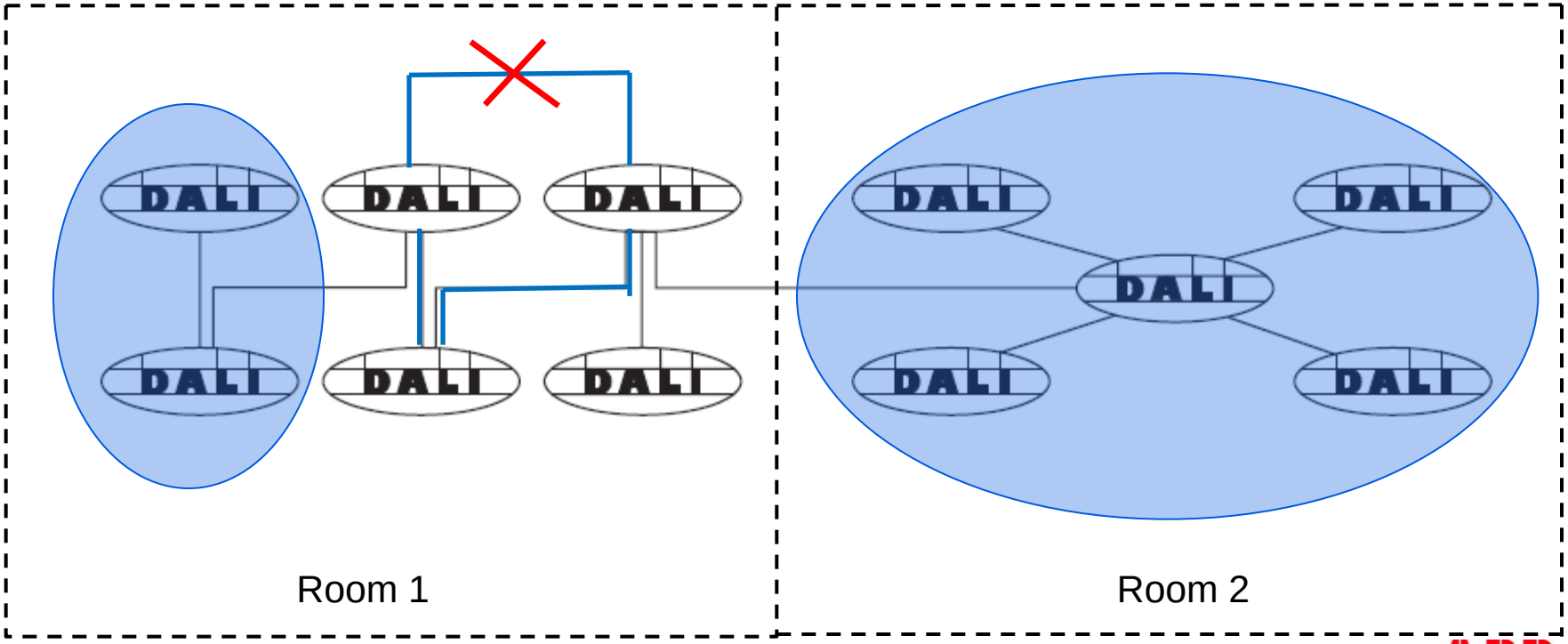
230V

Webinar “DALI – Digital Addressable Lighting Interface”
DALI Technology

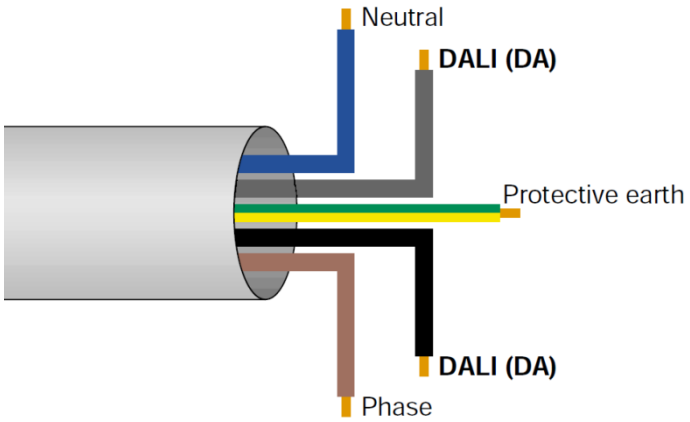
- Technical data
  - Transfer rate 1,200 baud (bit/sec.)
  - Master-Slave System without collision control
  - The DALI system is not centralized
  - Control cable 2 wires
  - Interface voltage 16V (9,5V to 22,5V)
  - Interface current 250mA
  - DALI devices takes max. 2mA
  - No SELV – no specific cable required
  - The DALI devices are wired in parallel

Webinar “DALI – Digital Addressable Lighting Interface”
DALI Technology

- Topology: Star/tree/serial connections are possible
- Ring wiring is not permitted
- Max. 64 DALI devices



Webinar “DALI – Digital Addressable Lighting Interface”
DALI Technology



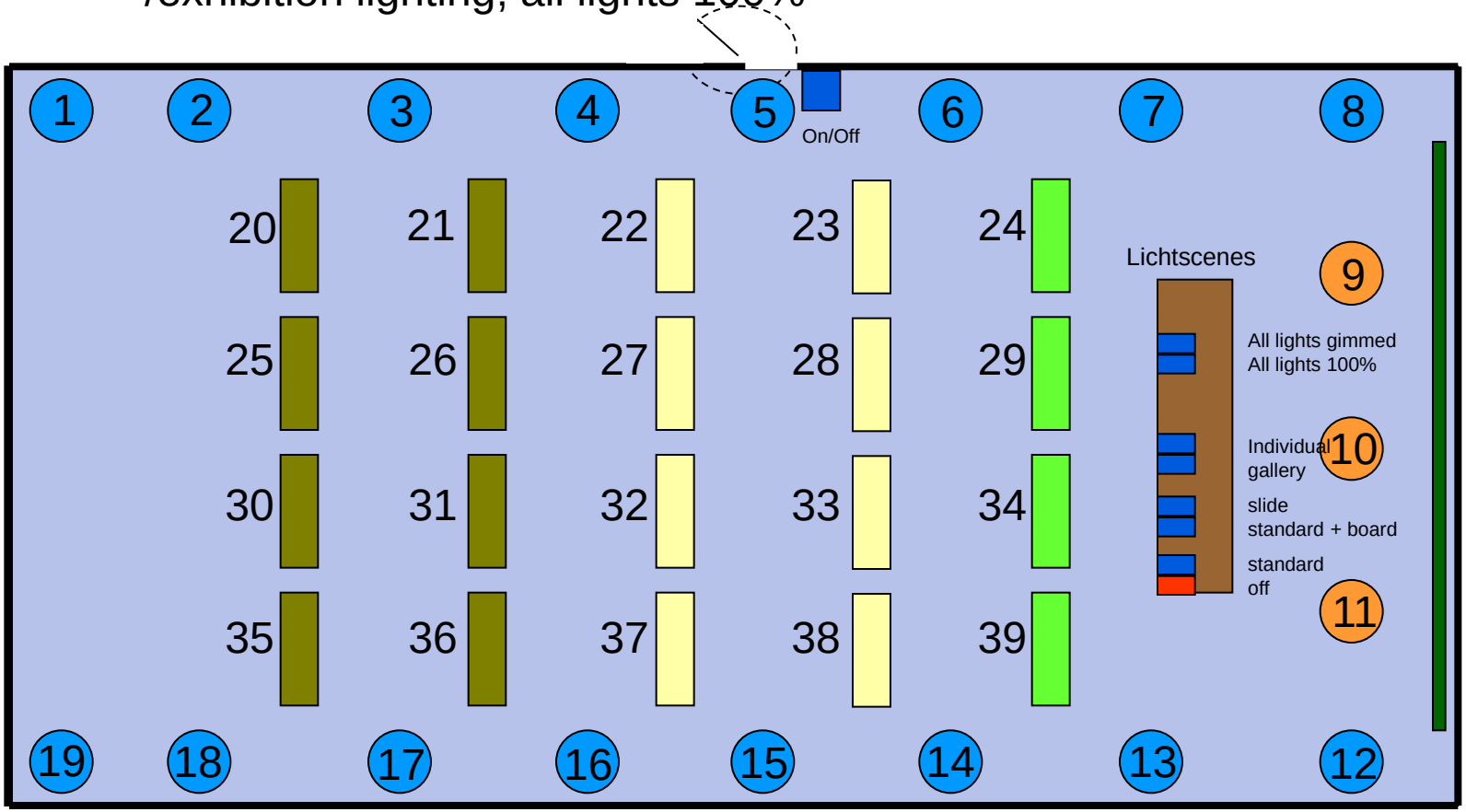
DALI wiring:
All what is needed for DALI and power supply is a single standard 5-core cable

- 2 wires cable polarity free
- DALI power and data on same pair of wires
- Use of standard installation cable (1.5mm²)
- The DALI control line can be installed together with mains cable
  e.g. by using a 5 wires standard cable
- Free wiring topology
- Controllers and ballasts may be connected to different power supply phases

National regulations, standards and directives are to be strictly adhered to!

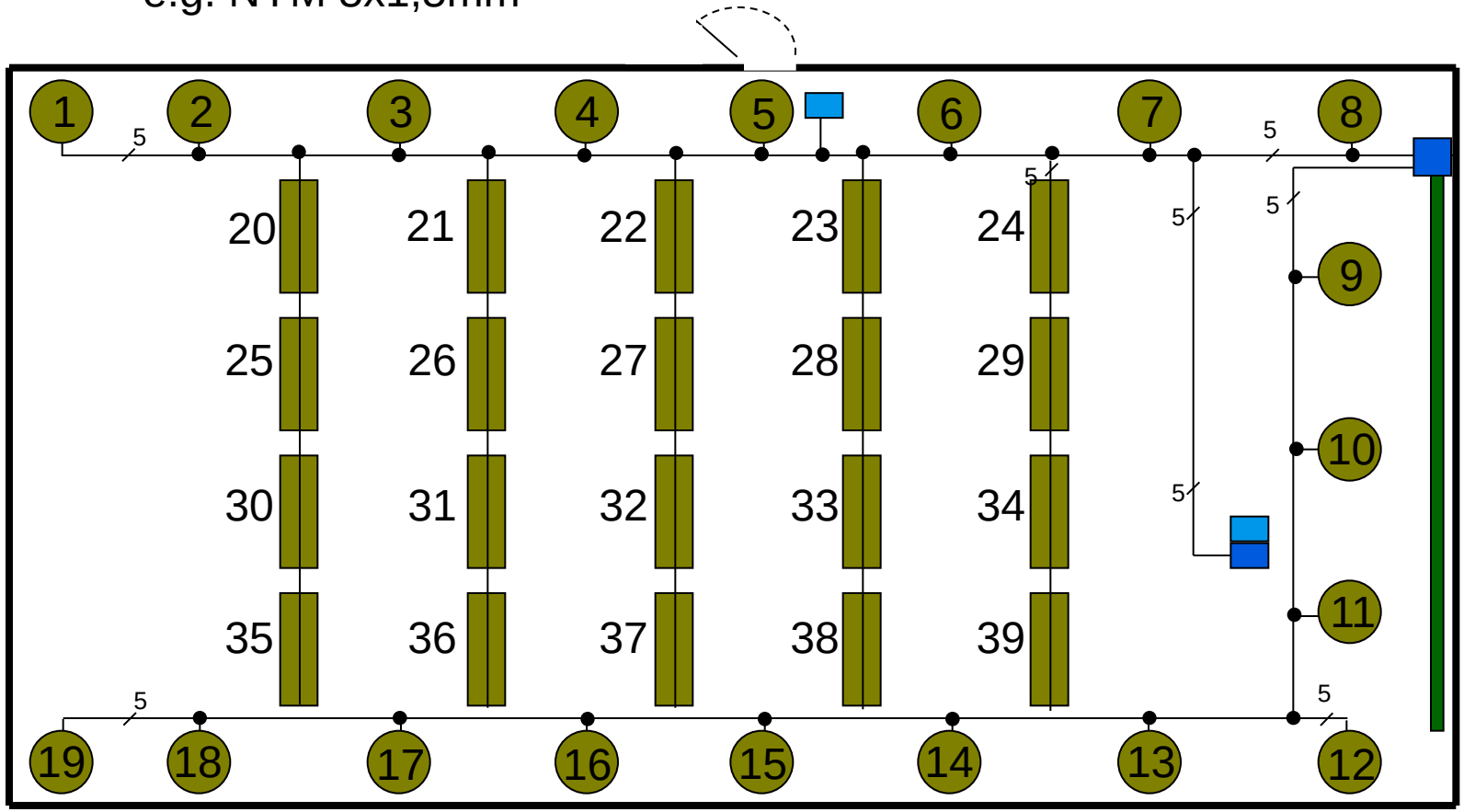
Webinar “DALI – Digital Addressable Lighting Interface”
DALI Technology

- Scenes/Groups: Individual lighting; slide-/film lighting; gallery-/exhibition lighting; all lights 100%



Webinar “DALI – Digital Addressable Lighting Interface”
DALI Technology

- DALI / 230V cabling with standard cable
  e.g. NYM 5x1,5mm^2



Webinar “DALI – Digital Addressable Lighting Interface”
DALI Technology

- The maximum permitted length of cable between the controller and the connected ballasts is 300 m
- Cross-section of the power cable:

$$A\ (mm^2) = L \times I \times 0.018$$

A = Cable cross-section in mm^2, L = Cable length in m
I = Maximum supply current in A

- Recommended basis for finding the cable cross-section

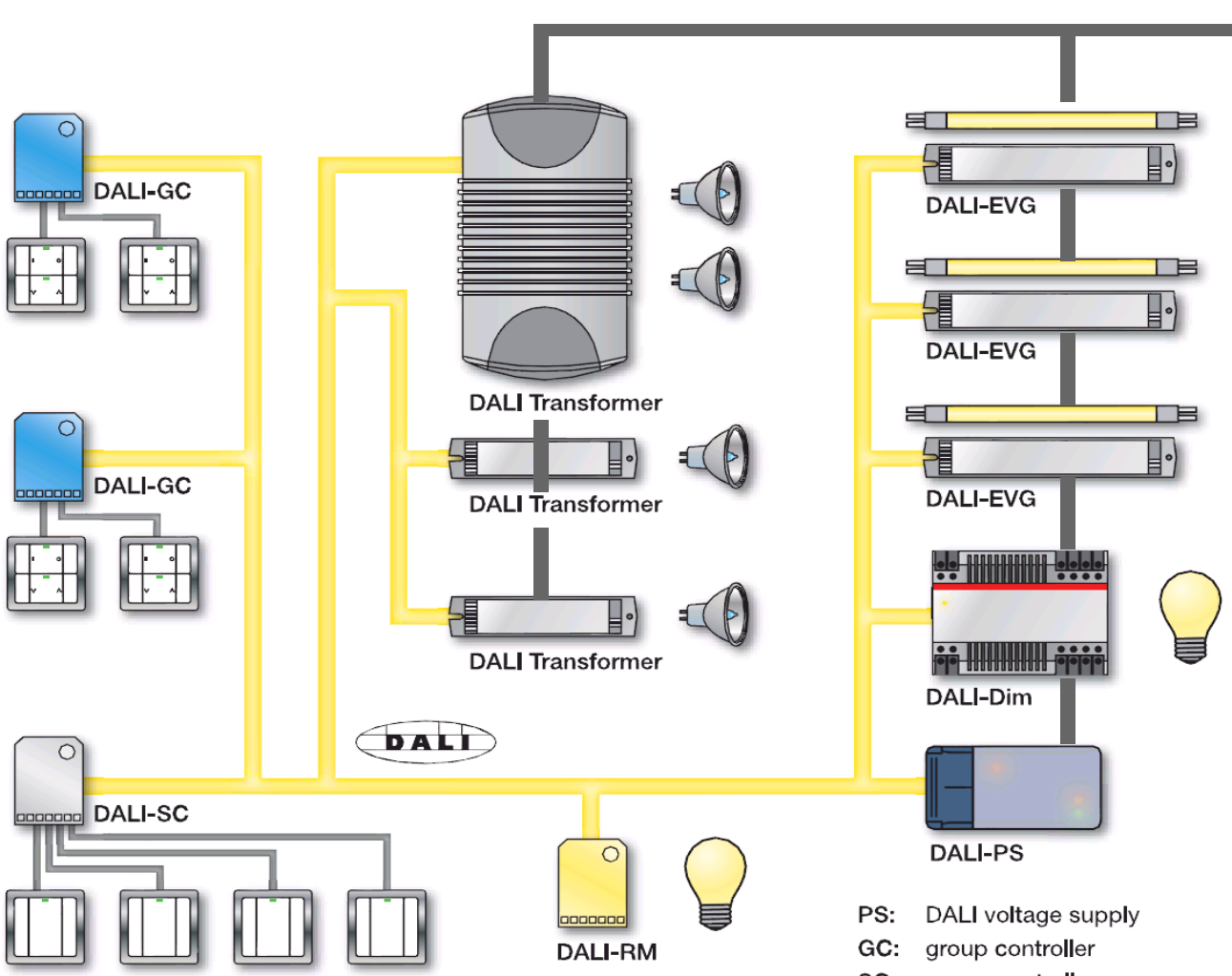
Cable length up to	100 m	100 to 150 m	150 to 300 m
Cable cross-section	0.5 mm^2	0.75 mm^2	1.5 mm^2

Webinar “DALI – Digital Addressable Lighting Interface”
DALI applications

Variants of DALI

- DALI as stand-alone system
  - Stand-alone light operation system, without a connection to the facility management
  - All functions will be locally executed
- DALI as a sub system in the facility management
  - The Gateway serves as translator
  - Use of control elements, pushbuttons, sensors, controller, visualization systems etc.

Webinar “DALI – Digital Addressable Lighting Interface”
DALI as stand-alone system

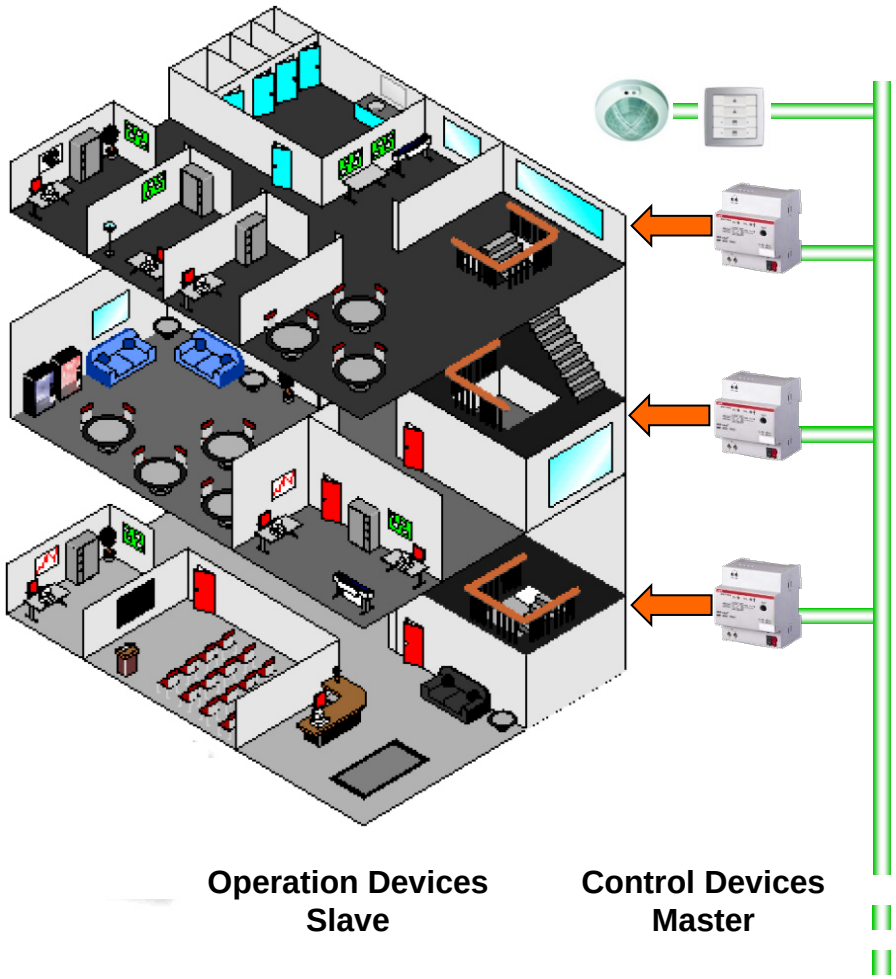


Webinar “DALI – Digital Addressable Lighting Interface”
DALI as a sub system

Integrating DALI in larger networks

- Having 64 addressable DALI devices is in practice sufficient for stand-alone single room lighting solutions e.g. single cell office or meeting room
- However in larger installations there might be a need for integrating hundreds or even thousands of DALI devices
- In such case different manufacturers offer so called DALI-Gateways, which can network multiple DALI subnets e.g. Gateway to KNX, Ethernet, LON

Webinar “DALI – Digital Addressable Lighting Interface”
DALI as a sub system



- DALI is a subnet of up to 64 devices
- Gateways to create multiple DALI subnets
  → more than 64 devices
  → KNX, Ethernet, LON, …
- Feedback for maintenance
- Automated emergency test, reporting and logging
- From individual to central control and monitoring
- KNX offer a backbone for integrated building control to combine e.g. HVAC and Lighting

Webinar “DALI – Digital Addressable Lighting Interface”
DALI devices

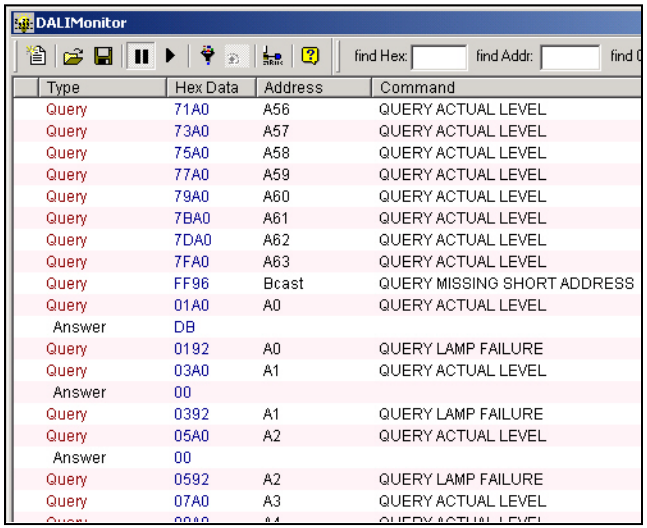
Power Supply

- Power supply for all DALI components (max 250mA)
- To supply the individual DALI devices, the DALI processor and controller as well as the DALI control devices or modules, which are responsible for managing the scenes and groups

Webinar “DALI – Digital Addressable Lighting Interface”
DALI devices

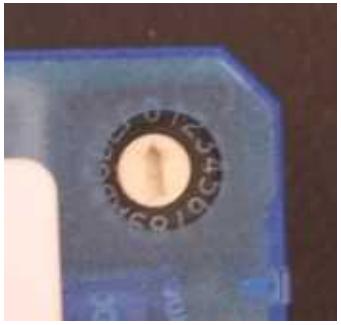
USB Interface

- Set parameters of DALI devices “masterCONFIGURATOR”
  - e.g. max/min level, power on level, fade time, …
- DALI-diagnostic with software „DALI Monitor“



Type	Hex Data	Address	Command
Query	71A0	A56	QUERY ACTUAL LEVEL
Query	73A0	A57	QUERY ACTUAL LEVEL
Query	75A0	A58	QUERY ACTUAL LEVEL
Query	77A0	A59	QUERY ACTUAL LEVEL
Query	79A0	A60	QUERY ACTUAL LEVEL
Query	7BA0	A61	QUERY ACTUAL LEVEL
Query	7DA0	A62	QUERY ACTUAL LEVEL
Query	7FA0	A63	QUERY ACTUAL LEVEL
Query	FF96	Bcast	QUERY MISSING SHORT ADDRESS
Query	01A0	A0	QUERY ACTUAL LEVEL
Answer	DB		
Query	0192	A0	QUERY LAMP FAILURE
Query	03A0	A1	QUERY ACTUAL LEVEL
Answer	00		
Query	0392	A1	QUERY LAMP FAILURE
Query	05A0	A2	QUERY ACTUAL LEVEL
Answer	00		
Query	0592	A2	QUERY LAMP FAILURE
Query	07A0	A3	QUERY ACTUAL LEVEL

Webinar “DALI – Digital Addressable Lighting Interface”
DALI devices



Control Devices

- Group controller GC
  Dimming and switching of 2 groups via push buttons

Pos.	Group push button 1	Group push button 2
0	Broadcast	1
1	1	2
2	2	3
3	3	4
…		
F	15	16

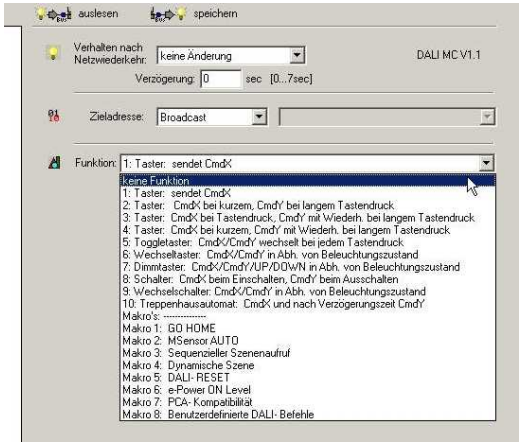
Webinar “DALI – Digital Addressable Lighting Interface”
DALI devices

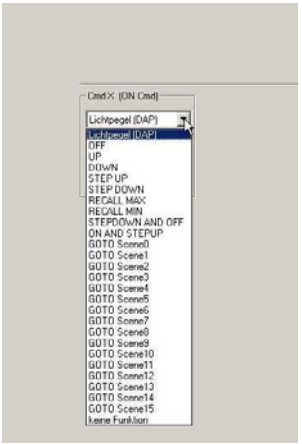
Control Devices

- Scene controller SC
  Control of 4 light scenes via push buttons

Pos	Scene pb 1	Scene pb 2	Scene pb 3	Scene pb 4
1	1	2	3	4
2	2	3	4	5
3	3	4	5	6
…				
F	15	16	1	2
0	16	1	2	3

Webinar “DALI – Digital Addressable Lighting Interface”
DALI devices

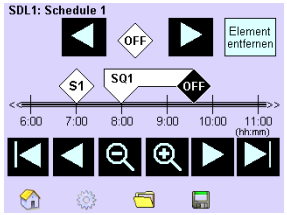


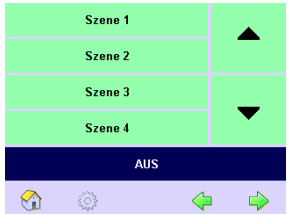


Control Devices

- Multi controller MC
  Control of 4 inputs via push buttons
  - Groups on/off
  - Groups dim
  - Light scenes
  - Sequences
- Programming with software “masterCONFIGURATOR”

Webinar “DALI – Digital Addressable Lighting Interface”
DALI devices

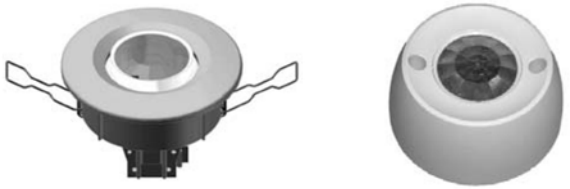




Control Devices

- Touchpanel and Touchbox
  - Programming
  - Monitor ballasts and lamps
  - Control scenes, central functions, …

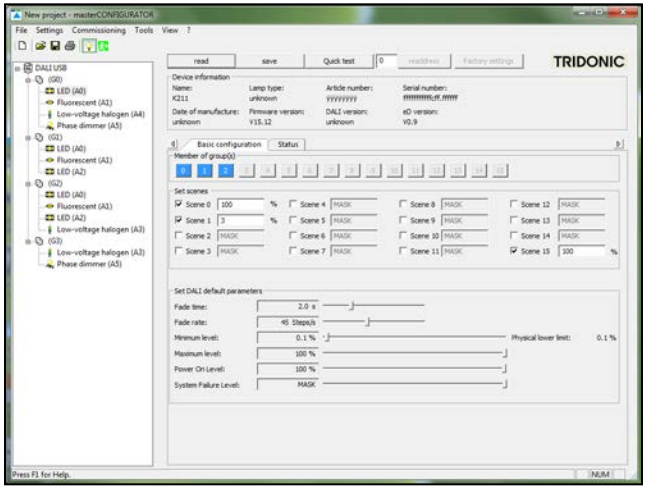
Webinar “DALI – Digital Addressable Lighting Interface”
DALI devices



Control Devices

- DALI M-Sensor
  - Presence detector and light controller
- Built-in IR receiver (remote control)

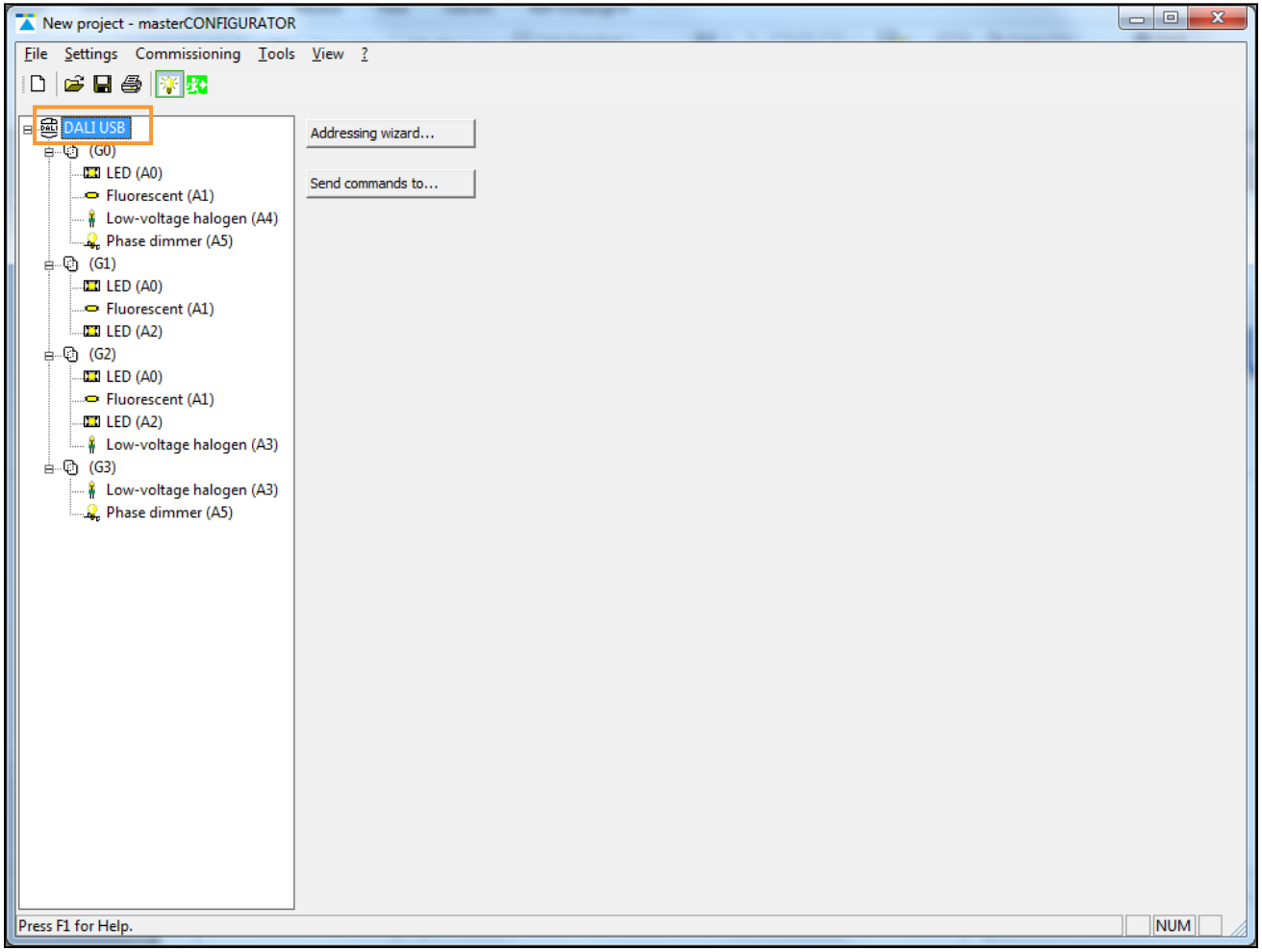
Webinar “DALI – Digital Addressable Lighting Interface”
DALI devices



Operation Devices

- Programming by software tool e.g. “masterCONFIGURATOR”
- The settings and light values are locally stored in the ballast
  - DALI address
  - Group allocation
  - Light scene values
  - Dimming speed (Fade Time)
  - Minimum and maximum dim level
  - Power On Level (Switch-on light in case of main voltage recovery)
  - System Failure Level (Brightness in the event of DALI failure)

Webinar “DALI – Digital Addressable Lighting Interface”
DALI devices



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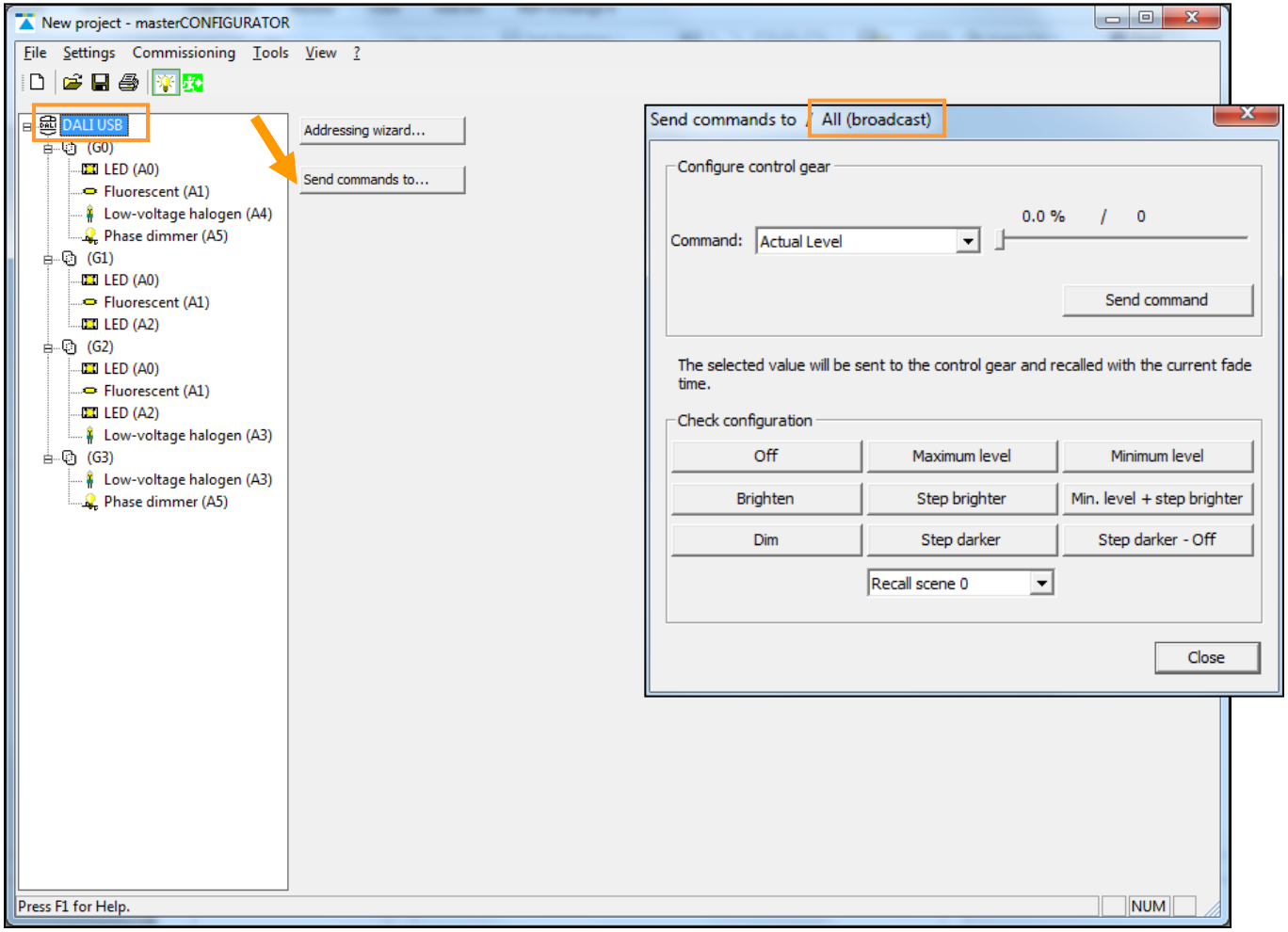
DALI devices



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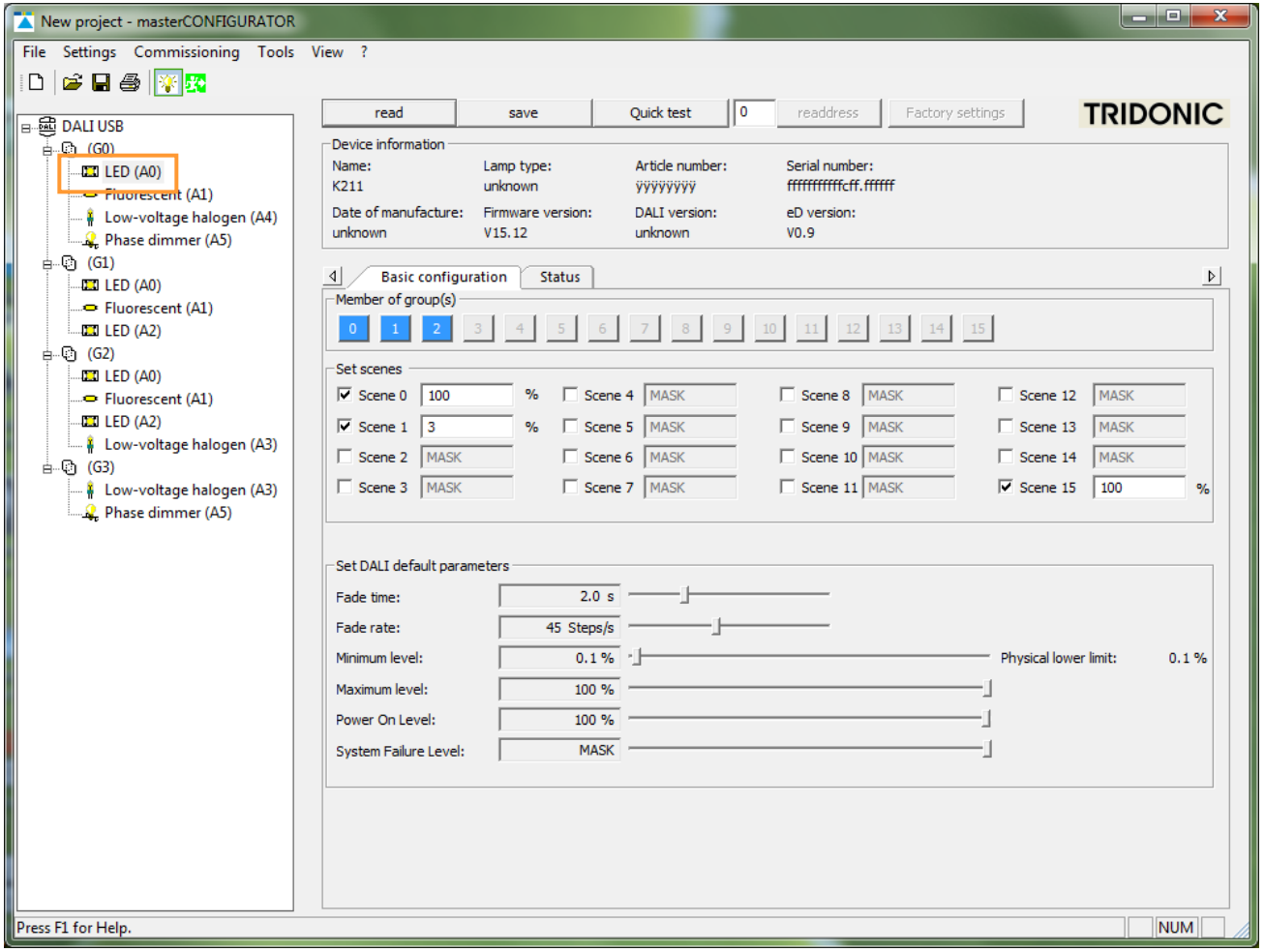
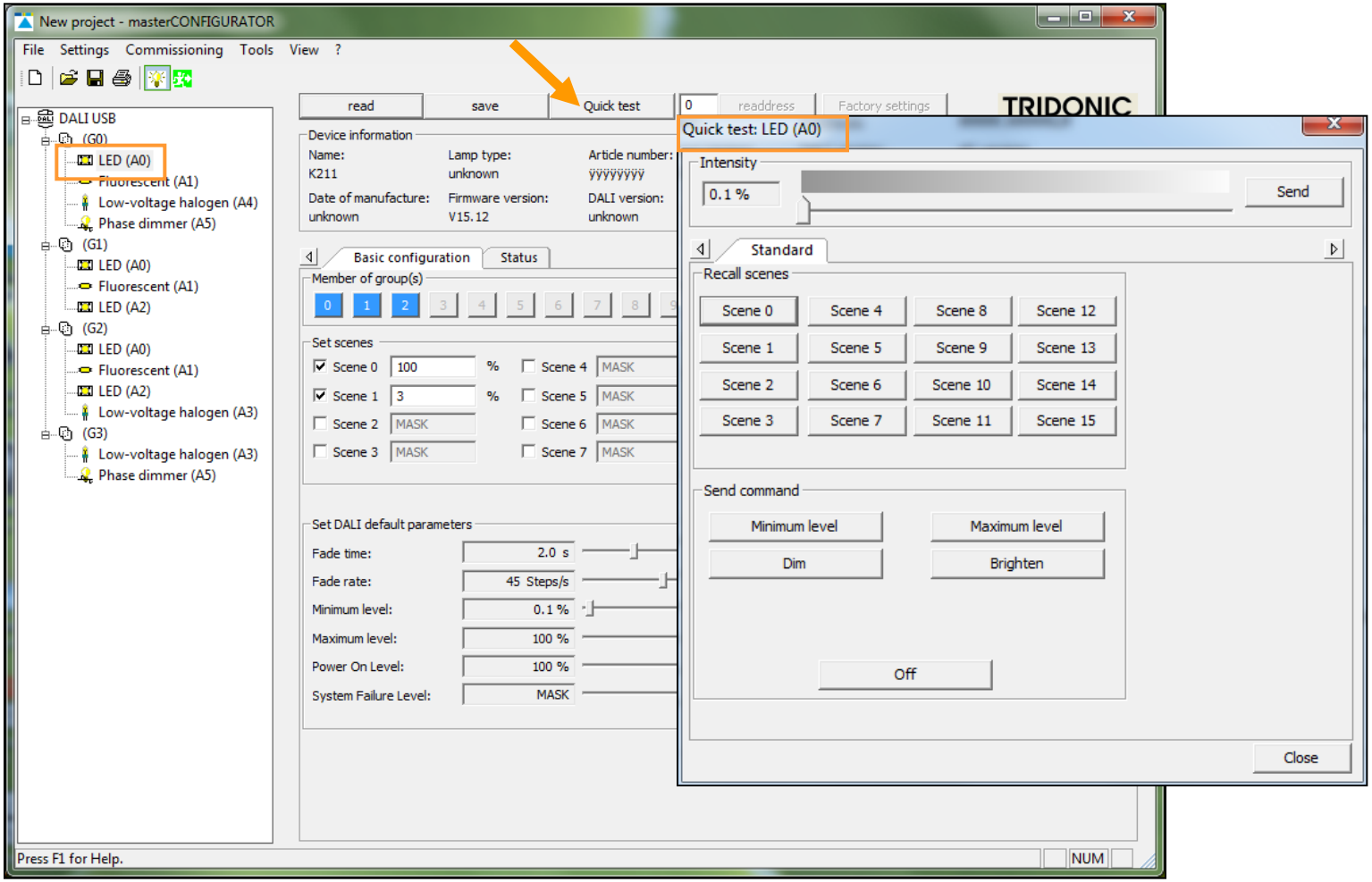
DALI devices

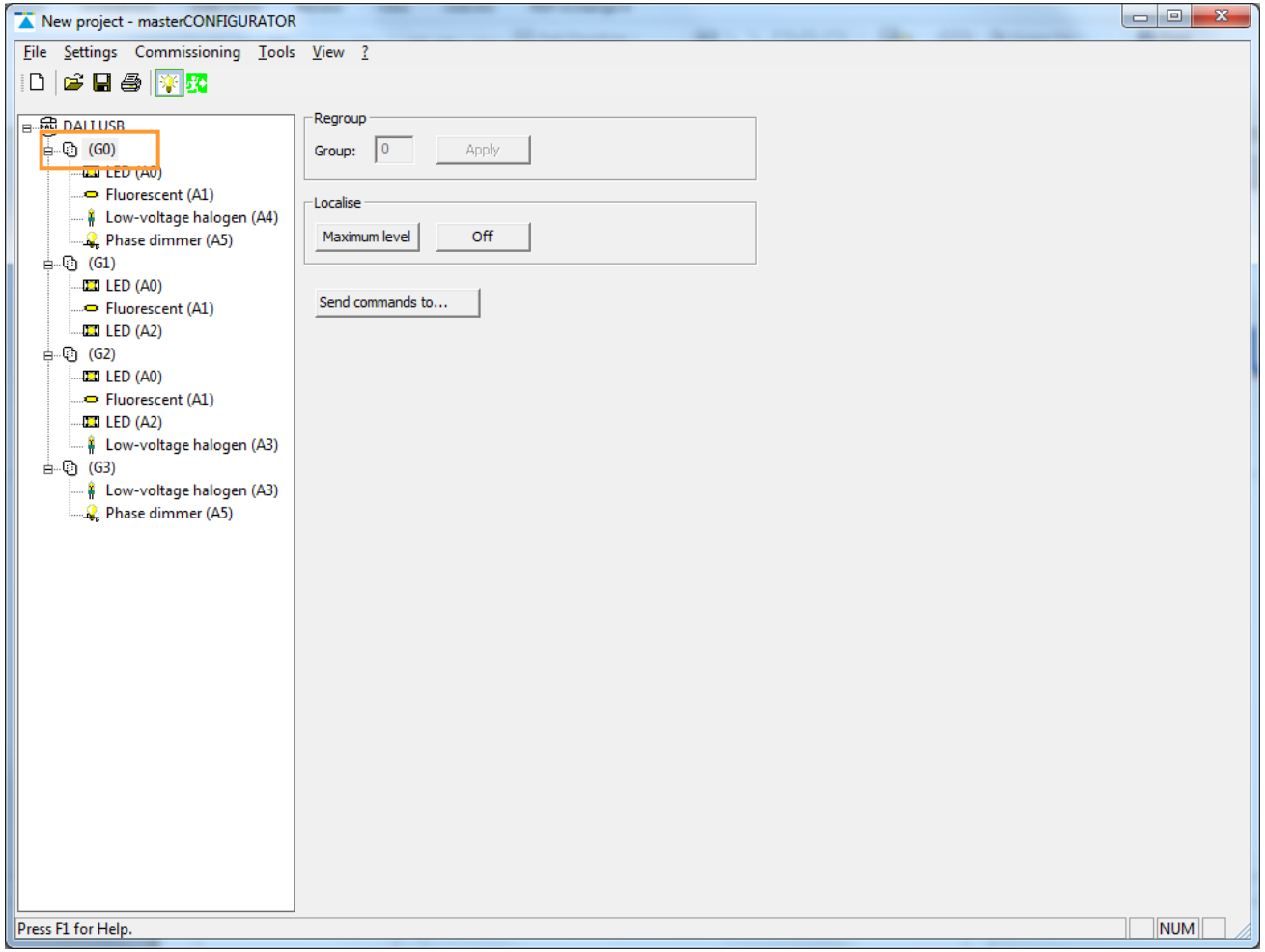


Webinar “DALI – Digital Addressable Lighting Interface”

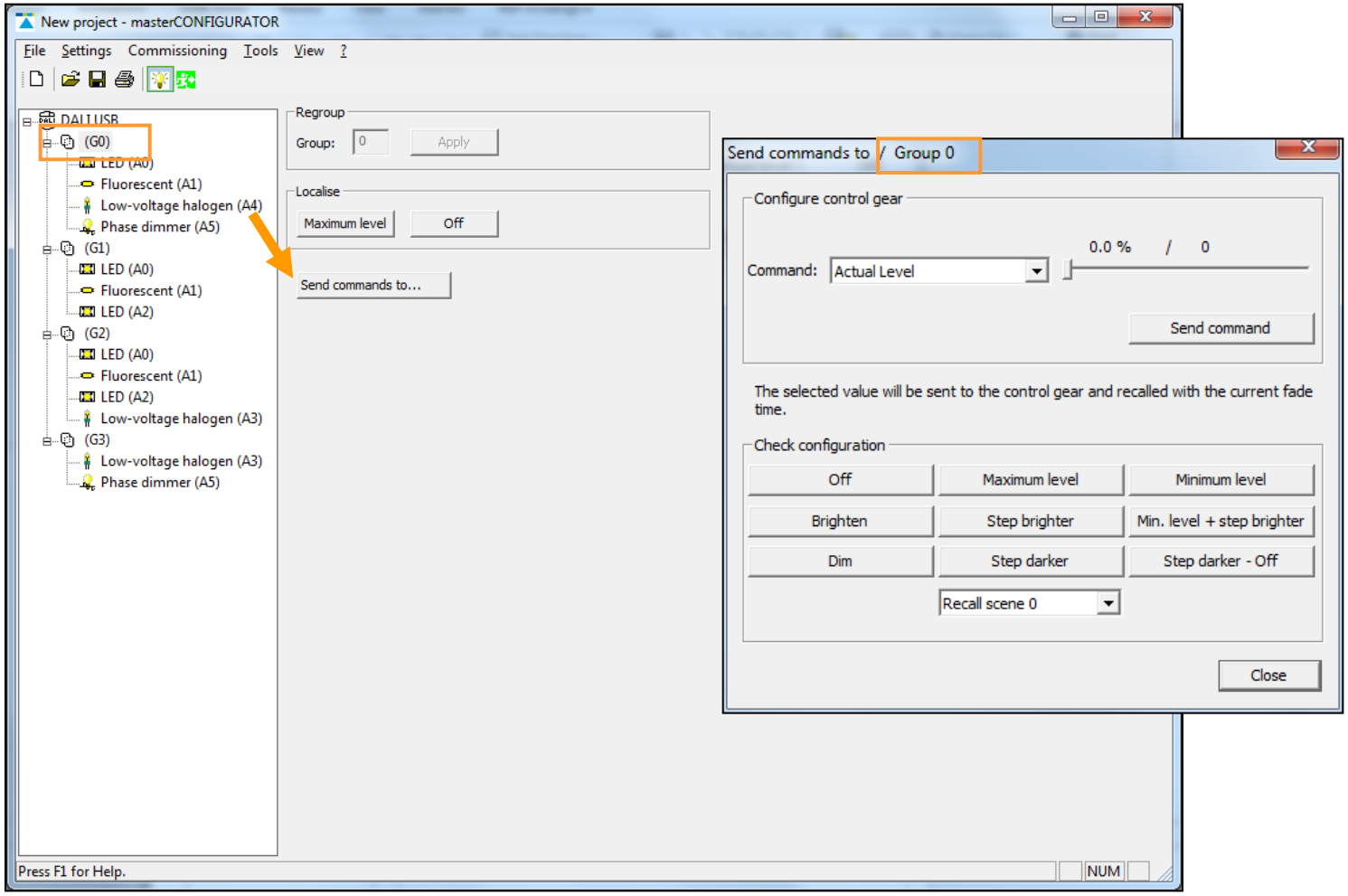
DALI devices



Webinar “DALI – Digital Addressable Lighting Interface”
DALI devices



Webinar “DALI – Digital Addressable Lighting Interface”
DALI devices



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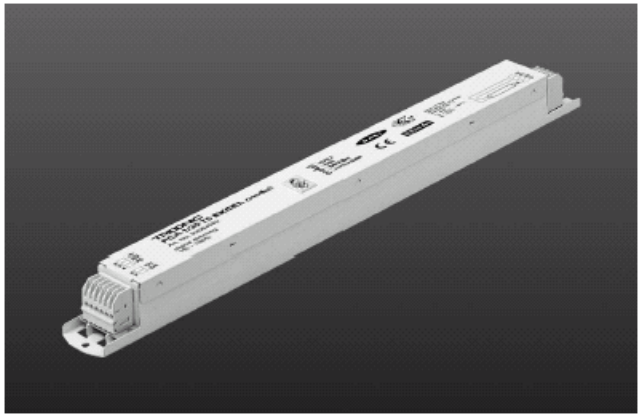
DALI devices



Operation Devices

- Electronic ballast for fluorescent lamps (e.g. T5 or T8)
  - One or two outputs
    → one DALI address
  - Dimming range: 1-100%

Webinar “DALI – Digital Addressable Lighting Interface”
DALI devices

Operation Devices

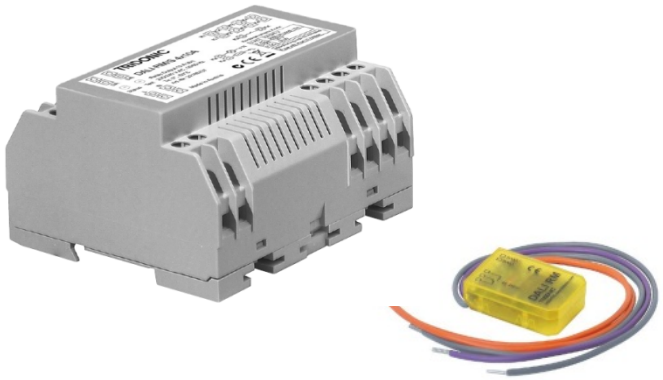
- Electronic transformer for low-voltage halogen lamps
- Output 12V AC or DC (up to 20m)
- Power max. 105VA / 150VA / 300VA / …
- Switching and dimming

Webinar “DALI – Digital Addressable Lighting Interface”
DALI devices

Operation Devices

- Dim Actuator
  - Automatic load detection
  - Output power 40-300VA / 1000VA

Webinar “DALI – Digital Addressable Lighting Interface”
DALI devices



Operation Devices

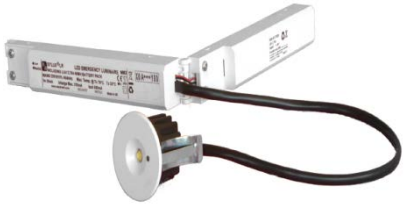
- Switch actuator e.g.
  - 4-fold, 10 A, potential free contacts
    → 4 DALI addresses
  - 2-fold, 16 A, potential free contacts
    → 2 DALI addresses
- Relay module (switching)

Webinar “DALI – Digital Addressable Lighting Interface”
DALI devices

Operation Devices

- LED dimmer/ converter / driver
  - 1 channel
    → 1 DALI address
  - 3 channels (RGB leds)
    → 3 DALI addresses
  - 4 channels (RGB-W leds)
    → 4 DALI addresses
  - ….
  - e.g. Output: 72W/12V or 144W/24V
    1.5A per channel, 4 channels → 6A

Webinar “DALI – Digital Addressable Lighting Interface”
DALI devices

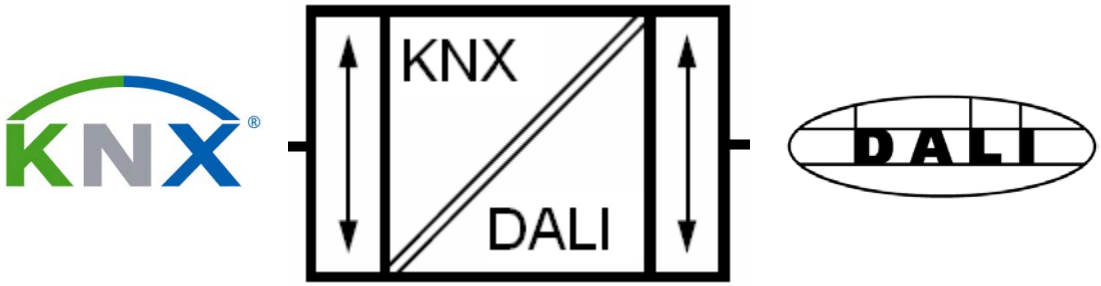


Operation Devices

- Emergency lights and converter
  - DALI Emergency Converter is responsible for emergency operation and tests according to DALI Standard IEC 62386-202
  - Superior Emergency Control System triggers tests and stores the data
  - DGN/S is a Gateway transferring the data from DALI to KNX and vice versa
  - DGN/S supports lighting systems with emergency lighting

Webinar “DALI – Digital Addressable Lighting Interface”
ABB i-bus® KNX and DALI Gateways

With the ABB i-bus® DALI-Gateways there it is possible to integrate devices with the DALI-Interface in the KNX intelligent building installation so that the functions and advantages of the DALI-standard can be used



DG/S 8.1, DG/S 1.1, DG/S 1.16.1, DGN/S 1.16.1

DLR/S 8.16.1M and DLR/A 4.8.1.1

Webinar “DALI – Digital Addressable Lighting Interface”
ABB i-bus® KNX and DALI Gateways

Important

- The DALI Gateway is a DALI master with integrated DALI voltage supply
- On the DALI output, up to 64 DALI devices can be connected
- Other DALI masters may not be connected to the DALI output (single master system)
- Other DALI power supplies, functional devices or conventional pushbuttons may not be connected

Which DALI system devices will be required?

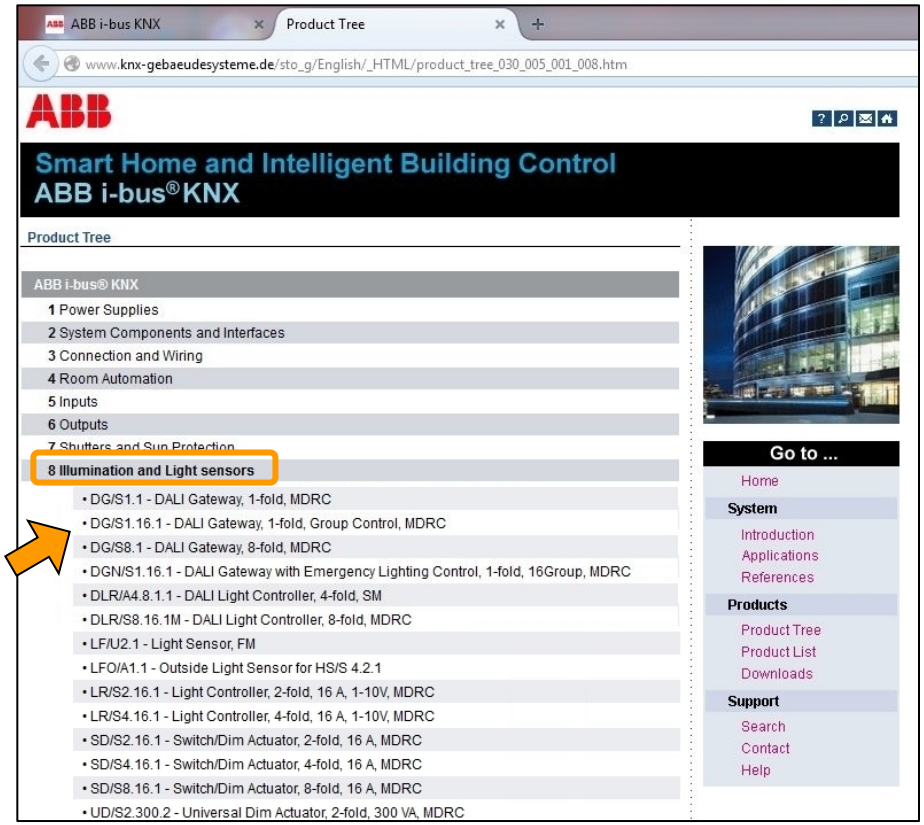
- DALI operation devices (=slaves)
  e.g. ebds, dimmer, transformers, RGB converter, …

Webinar “DALI – Digital Addressable Lighting Interface”
ABB i-bus® KNX and DALI Gateways

	 Gateway DG/S 8.1	 Gateway DG/S 1.1	 Gateway DG/S 1.16.1	 Gateway DGN/S 1.16.1	 Light Controller DLR/S 8.16.1M	 Light Controller DLR/A 4.8.1.1
Controlled	Broadcast	Individual	Group	Group	Group	Group
DALI outputs	8 (A…H)	2 (A, B)	1	1	1	1
DALI ballast	128 (max. 16 per output)	128 (max. 64 per output)	64	64 (ballasts and emergency lighting converter)	64	64
DALI addressing	not necessary	A: 64 individual B: 64 individual	64 individual	64 individual	64 individual	64 individual
Lighting groups established via	cable installation	A: KNX B: Broadcast*	DALI	DALI	DALI	DALI
Lighting groups per Gateway	8 (installation)	A: Limited via KNX B: 1*	16 (DALI)	16 (DALI)	16 (DALI)	8 (DALI)
Constant light control	-	-	-	-	8 groups	4 groups

*Coded control per DALI ballast with two objects possible

Webinar “DALI – Digital Addressable Lighting Interface”
DALI Gateways

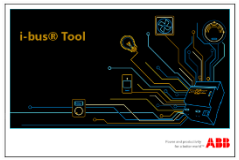


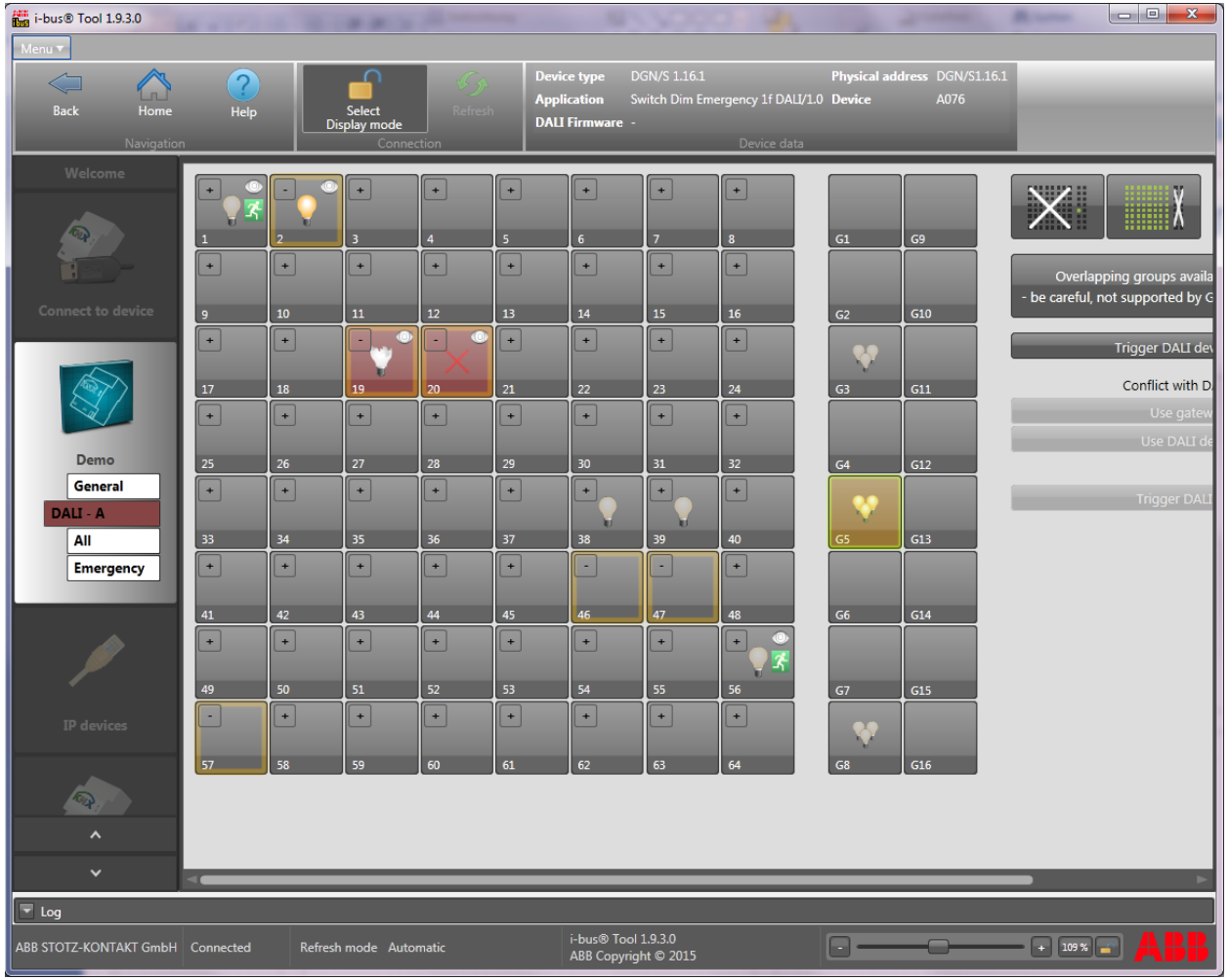
Product data:

- www.abb.com/knx
- → Product Category 8:
  Illumination and Light sensors

- Links to all needed information

Webinar “DALI – Digital Addressable Lighting Interface”
i-bus Tool 1.9.3.0: DALI-Software-Tool inside





Webinar “DALI – Digital Addressable Lighting Interface”
Next KNX Trainings in Heidelberg

- KNX Certified Advanced Course
  - 6th – 10th of July 2015
  - Fail-safe planning, HVAC, integrated applications, couplers, IP, constant lighting control, security, multimedia, metering and more
- KNX Application
  - 13th – 14th of July 2015

Webinar “DALI – Digital Addressable Lighting Interface”
Next Webinar

- **Wednesday 29th of July 2015**
  - Morning 09:00 am Europe Time (Berlin, UTC + 2h)
  - Afternoon 03:00 pm Europe Time (Berlin, UTC + 2h)
- **Security and Surveillance**
  Fault Monitoring and Data Logging
  - Fault Monitoring Unit SMB/S 1.1
  - Monitoring Unit EUB/S 1.1
  - Data Logging Unit BDB/S 1.1

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