ABB i-bus® KNX
DALI-Light Controller DLR/A 4.8.1.1
Product Manual

Power and productivity
for a better world™

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1 General

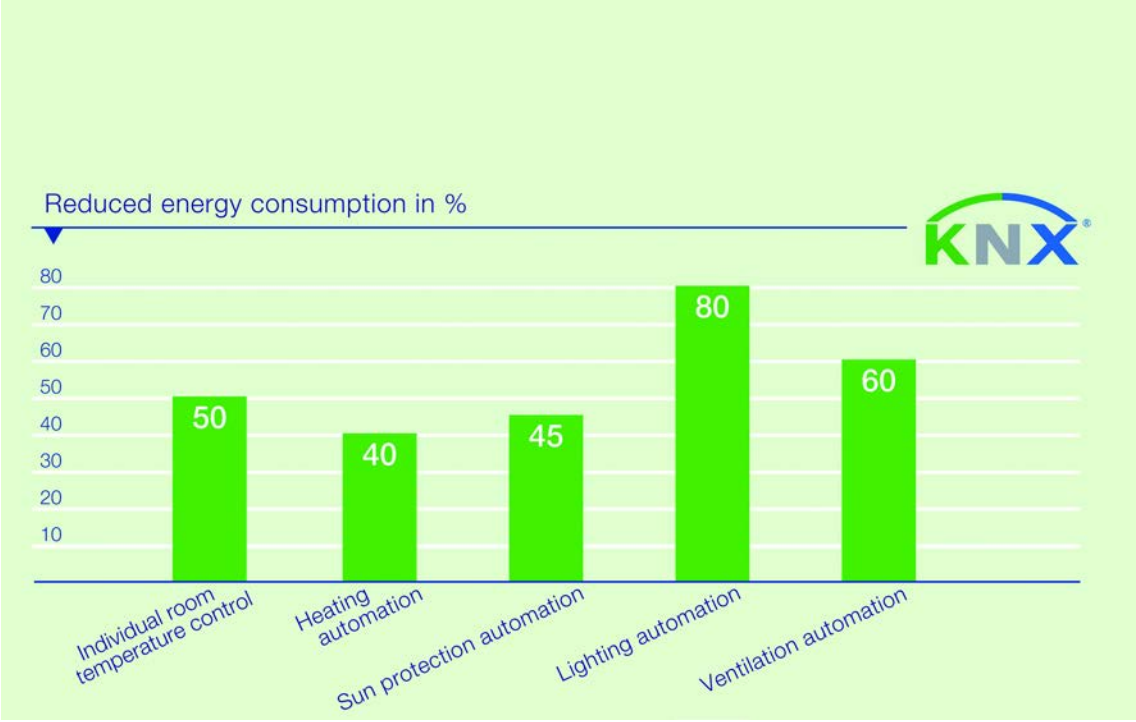
The ABB i-bus® KNX DALI Light Controller DLR/A combines both the internationally standardized and open standards in the digital illumination control DALI (EN 62386) and the intelligent installation system KNX (ISO/IEC 14543-3 and EN 50090) and, at the same time, allows energy-efficient, constant lighting control.

Its surface-mounted design means that the DLR/A is suitable for installation in suspended ceilings or underfloor to integrate remote DALI lighting areas into the KNX building automation. The DALI output of the DLR/A can be used to connect up to 64 DALI devices. The 64 DALI devices can be individually addressed and allocated as required in up to 8 lighting groups. Control using KNX is implemented exclusively via these 8 lighting groups.
With 4 light sensors, up to 4 separate constant lighting controls are possible that additionally provide enhanced comfort and automatic energy conservation.

Constant lighting control can:

- reduce operating costs
- save energy
- guarantee an optimum working environment at constant brightness
- provide enhanced lighting comfort in day-to-day operation

The occupancy is also automatically detected in addition to lighting control via a KNX presence detector, an above average energy saving potential can also be achieved using KNX lighting technology alone. The following graphic provides an overview of the energy that can be saved by the use of modern, automatic intelligent installation systems.



1.1 Using the product manual

This manual provides you with detailed technical information relating to the function, installation and programming of the ABB i-bus® KNX DLR/A 4.8.1.1 DALI Light Controller and its corresponding LF/U 2.1 light sensor. The application of the DLR/A is explained using examples.

This manual is subdivided into the following chapters:

- Chapter 1 General
- Chapter 2 Device technology
- Chapter 3 Commissioning
- Chapter 4 Planning and application
- Chapter A Appendix

1.1.1 Structure of the product manual

In this manual, you will find all the descriptions of the parameters and communication objects as well as application examples.

For the actual configuration of the DALI system you will require the Software Tool. This Software Tool is designed exclusively for working with ABB i-bus® KNX devices. A description can be found in the online help for the tool.

1.1.1.1 Software Tool

A Software Tool is available for DALI commissioning (changing DALI short addresses and DALI group assignment).

This Software Tool can be downloaded free of charge from our homepage (*www.abb.com/knx*).

Other test and analysis functions are also available, depending on the gateway version.

In addition, the Software Tool offers simplified parameter setting for the constant lighting control on the DALI Light Controller. No ETS is required for the Software Tool. However, to establish a connection between PC and KNX, Falcon Runtime (version V1.6 and higher, or for Windows 7, V1.8 and higher) must be installed.

Note
Connecting the Software Tool to the DALI Light Controller has no initial influence on the DALI devices. Functions like staircase lighting, slave and controller are only deactivated once the system is switched to configuration mode. The block and forced operation functions are bypassed so that DALI devices are clearly identifiable during commissioning. However the block and forced operation functions continue to run in the background and are reactivated when you exit the Software Tool. But the brightness value set in the Software Tool remains unaffected by existing forced operations or blocking. Received KNX telegrams are executed while the connection with the Software Tool is live. This also applies to the staircase lighting, slave and controller functions. When you exit the Software Tool or select a new DALI device in the Software Tool, this deactivates the functions again.

1.1.2 Notes

Notes and safety instructions are represented as follows in this manual:

Note
Tips for usage and operation

Examples
Application examples, installation examples, programming examples

Important
These safety instructions are used as soon as there is danger of a malfunction without risk of damage or injury.

Caution
These safety instructions are used as soon as there is danger of a malfunction without risk of damage or injury.

 **Danger**
These safety instructions are used if there is a danger for life and limb with inappropriate use.

 **Danger**
These safety instructions are used if there is a danger to life with inappropriate use.

1.2 Product and functional overview

The group-orientated ABB i-bus® KNX DALI Light Controller DLR/A 4.8.1.1 is a surface mounted device for installation in suspended ceilings or underfloor. Up to 64 DALI devices that can be controlled in 8 lighting groups may be connected to a DALI output. The DALI power source for the 64 DALI devices is integrated into the DLR/A.

Control using KNX is implemented exclusively via 8 lighting groups. Only the first 4 lighting groups can be used for direct constant lighting control combined with 4 Light Sensors LF/U 2.1. Using the function Slave, any number of lighting groups can be assigned to a master, e.g. controller. A brightness value offset is available for a slave, e.g. a second lighting strip, to utilize a brightness value that deviates from the master for every controller group (master). The offset can, for example, be time-controlled or switched off or on with KNX using an outdoor brightness sensor, so that the room is always lit with the optimum level of brightness. Furthermore, the function *Staircase lighting* is available. As an option, the constant lighting control can be combined with the function *Staircase lighting*.

Furthermore, setting of 14 light scenes is possible, which can be recalled or stored via 8 bit or 1 bit KNX telegrams.

The DALI devices connected to the DALI output (max. 64) can also be controlled or recalled (broadcast) together. This is also possible without previous commissioning (group assignment) via the KNX.

Information relating to a lamp and/or ballast malfunction is available individually for a lighting group or for a DALI device on the KNX. DALI error messages can be inhibited on the KNX with the assistance of a KNX communication object.

Via a Test button, connected DALI devices can be commonly (by broadcast) turned on or off for testing.

The brightness value (0…100 %) of the ballast after ballast supply voltage recovery (power on level) is programmable. The initial DALI address assignment occurs automatically via the DALI Light Controller. This means that when replacing a DALI device, where DALI addresses are assigned without any gaps the new DALI device is automatically brought into operation without the need for any auxiliary tools. This function can be vetoed via a parameter in the application.

Readdressing of the DALI devices and the assignment of the 64 DALI devices into 8 lighting groups is implemented in the ETS independent Software-Tool, so that for example a facility manger without ETS knowledge is capable of exchanging and reassigning DALI devices should maintenance be required. Error states of the individual DALI devices and/or lighting groups are represented graphically. Furthermore, commissioning of the constant lighting control is simplified. DALI addresses and group assignments can be deleted and devices can be reset to their supplied state.

The setting of the parameters and allocation of the group addresses is implemented with the Engineering Tool Software ETS. The most up-to-date version should be used.

General

The application offers a wide range of functions:

- Switching, dimming, setting of brightness values including status feedbacks
- Programming of individual maximum and minimum dimming limit values (dimming thresholds)
- Status response of lamps and/or ballast malfunctions
- Coded error checks for each of the individual 64 DALI devices
- Different dimming speeds for switching, setting brightness and dimming
- Reaction on DALI and KNX bus voltage failure and recovery
- Programming of the brightness value (power on level) after a ballast supply voltage recovery
- Individual burn-in of lighting groups
- Block function and forced operation
- Internal master/slave control in the DLR/A or via communication object
- For every Light Controller a brightness offset that can be activated for a second lighting strip via KNX
- 14 independent light scenes, which can be recalled or stored via 1 bit or 8 bit telegrams
- Function Staircase lighting including warning

1.3 DALI principles for the DLR/A

ABB Stotz Kontakt GmbH currently has 6 KNX-DALI devices in the ABB i-bus® KNX range, for integration of DALI interfaces into a KNX building installation. Independent of additional functions such as constant lighting control, every device has its strengths, which become obvious with the different project types.

In the following table, the fundamental technical differences between the DALI controls are compiled. This manual deals primarily with group-orientated DALI control that is supported in the DLR/A. A detailed description of the DALI Gateway DG/S specific functions can be found in the product manuals of the DALI Gateway.

Property	DG/S 8.1 Central control	DG/S 1.1 Individual control	DG/S 1.16.1 Group control	DGN/S 1.16.1 Group control	DLR/S 8.16.1M Group control	DLR/A 4.8.1.1 Group control
Design	MDRC	MDRC	MDRC	MDRC	MDRC	SM
Mounting width (1 space unit = 18 mm)	6 space units	4 space units	4 space units	4 space units	6 space units	220x147x50 mm
DALI outputs	8 (A…H)	2 (A, B)	1 (A)	1 (A)	1 (A)	1 (A)
Light Sensor (LF/U 2.1) inputs	-	-	-	-	8	4
DALI equipment (ballast) per gateway (IEC62386-101)	128 (max. 16 per output)	128 (max. 64 per output)	64	64 (ballasts and emergency lighting converter)	64	64
DALI emergency lighting converter (IEC62386-202)	-	-	-	64	-	-
Lighting groups per Gateway	8 (installation)	A: max. 255 (KNX) B: 1	16[1] (DALI)	16 (DALI)	16 (DALI)	8 (DALI)
Lighting groups established via	cable installation	A: KNX B: Cable installation	DALI	DALI	DALI	DALI
DALI devices (e.g. ballasts) per lighting group	16 max.	A: 64 max. B: 64 max.	64 max.	64 max.	64 max.	64 max.
DALI addressing	not necessary	A: 64 Individual B: 64 individual	64 individual	64 individual	64 individual	64 individual
Number of DALI telegrams per KNX telegram of the group	1 telegram	A: max. 64 telegrams B: 1 telegram	1 telegram per group	1 telegram per group	1 telegram per group	1 telegram per group
Power supply to KNX processor[2] via	KNX	KNX	KNX	KNX	KNX	KNX
DALI-voltage[3]	integrated power supply	integrated power supply	integrated power supply	integrated power supply	integrated power supply	integrated power supply

1) Overlapping DALI groups are supported, i.e. a DALI device may belong to several DALI groups.

2) KNX programming possible if KNX-voltage supplied. Gateway supply voltage for KNX-programming is not required.

3) A Gateway supply voltage (85…265 V AC or 110…240 V DC) is prerequisite.

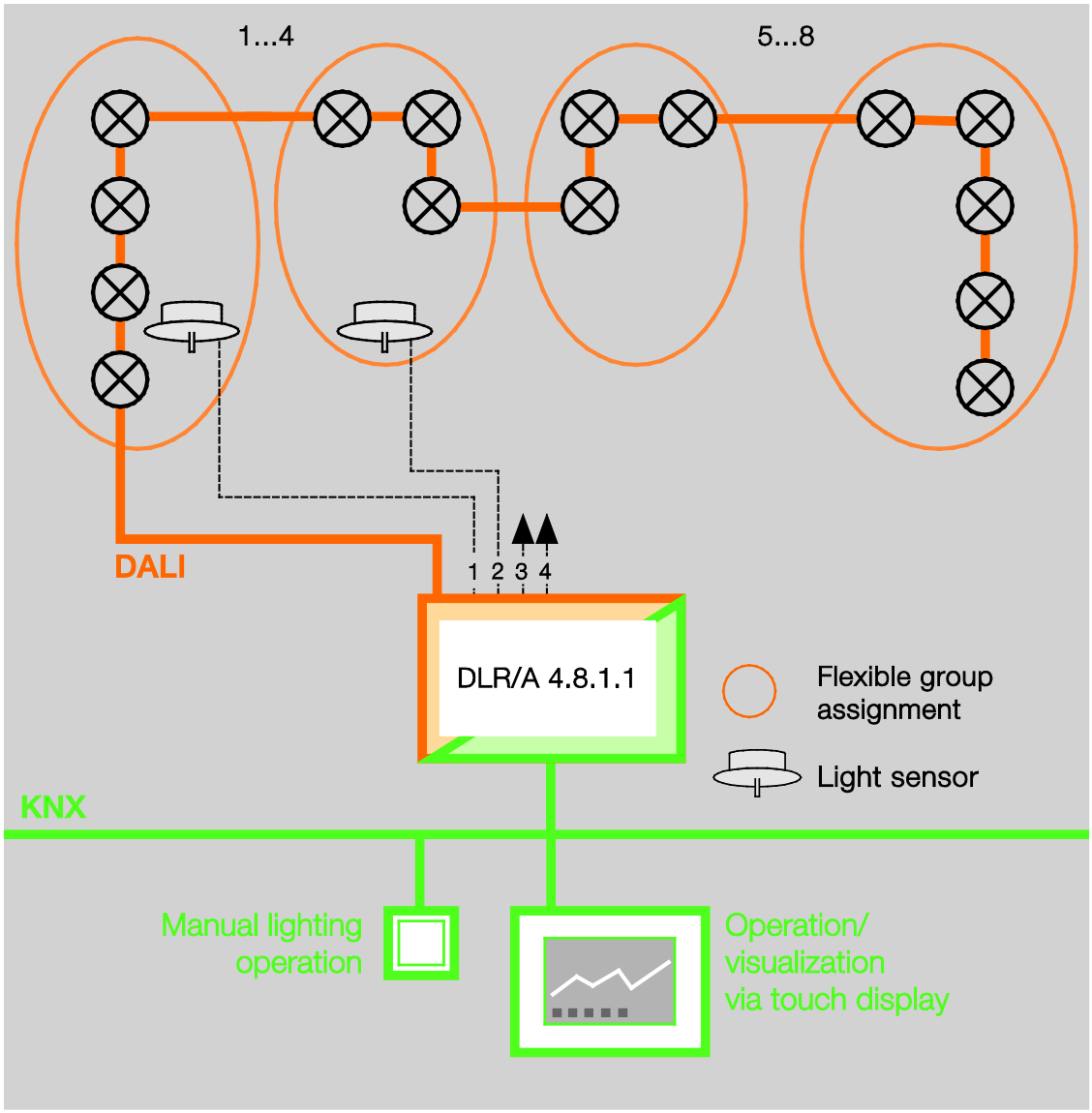
1.3.1 DALI group control

The ABB i-bus® KNX DALI Light Controller DLR/A 4.8.1.1 provides the option of individually addressing 64 DALI devices on a DALI output and making them available via 8 lighting groups on the KNX. The advantage of this concept is that at any time the 64 DALI devices can be assigned individually and without a change to the installation to a lighting group. As a result, maximum flexibility is retained until final acceptance or when a change is required later to the room usage. At the same time, the programming effort in ETS is considerably reduced by the assignment of 64 individual devices into 8 lighting groups. Furthermore, the programming effort can also be reduced using the copy and exchange function of lighting groups in the DLR/A.

The Light Sensor LF/U 2.1 required for constant lighting control can be assigned to one of the first 4 DALI lighting groups via ETS. The registered brightness values are used in the DALI Light Controller for calculation of the control values. The calculated control value is sent directly, without any additional KNX bus communication, to the assigned DALI lighting group. Using master/slave operation, further lighting groups can be integrated directly in the DLR/A or indirectly via the communication objects on the KNX.

For every lighting group, the DALI Light Controller can send the status of the lighting group on the KNX. Furthermore, it is possible to read the fault status of every single DALI device individually via the KNX. Coded telegrams are available for this purpose.

The following representation clarifies the method of function of the group-orientated DALI Light Controller DLR/A 4.8.1.1:



In principle, it is possible to integrate a lamp (DALI device) in several lighting groups. In this case, we refer to several overlapping lighting groups. The DLR/A does not forcibly inhibit this option. However, these overlapping lighting groups are not specially supported. There are also no special parameterization options. The behavior of the overlapping lighting group is not defined. It is not recommended, especially with constant lighting control, to use overlapping lighting groups. The control circuits should not mutually influence one another or be influenced by an unknown external controller. In these cases, unsteady, incorrect or highly fluctuating constant lighting controls can result.

2 Device technology

2CDC 071 023 S0012

DLR/A 4.8.1.1

2CDC 071 018 F0008

LF/U 2.1

The ABB i-bus® KNX DALI Light Controller DLR/A 4.8.1.1 is a KNX device surface-mounted (SM) device for installation in suspended ceilings or underfloor.

The DALI Light Controller can in conjunction with the application program *Control Dim Groups 4f DALI/1* integrate devices with DALI interfaces into a KNX building installation. The connection to KNX is implemented via a bus connection terminal.

The 4 sensor inputs for the Light Sensor LF/U together with the first 4 lighting groups of the DALI Light Controller can be used for a constant lighting control.

The DALI output can be used to connect up to 64 DALI devices. The 64 DALI devices should be assigned into 8 lighting groups with the ETS independent Software Tool. Control of the 64 DALI devices via KNX is exclusively group-orientated.

The fault status (lamps and ballasts) of every individual DALI device can be sent via a coded communication object on the KNX.

In the DLR/A, a staircase lighting time curve can be set. Constant lighting control can be combined with a staircase lighting time curve, so that constant lighting control can be implemented during the staircase lighting time curve. The 8 lighting groups can be integrated into scenes as required. Using a 1 bit or 8 bit KNX scene telegram, these scenes can then be recalled or stored via the KNX. Furthermore, a *master/slave* function with integrated offset is available that can be used to integrate further lighting groups or dimming actuators into the lighting control.

Using central telegrams, all the DALI devices connected to a DALI output can be commonly controlled via the KNX (broadcast).

The DLR/A is a DALI control device (master) and requires an AC or DC auxiliary power supply. The DALI power source for the 64 DALI devices is integrated into the DALI Light Controller. In order to control the DALI devices manually or via the KNX, the KNX voltage and the auxiliary voltage (light controller supply voltage) must be applied. Should one of these voltage sources be absent, the DALI devices can no longer be controlled. The behavior of the DALI devices on voltage failure can be parameterized.

All the DALI devices connected can be commonly turned on or off via manual operation on the device.

2.1 DLR/A 4.8.1.1

2.1.1 Technical data DLR/A 4.8.1.1

Supply	light controller supply voltage	85…265 V AC, 50/60 Hz 110…240 V DC
	Power consumption total via mains	Maximum 3.5 W at 230 V AC and max. load[1)]
	Current consumption total via mains	Maximum 15 mA at 230 V AC and max. load[1)]
	Leakage loss total for device	Maximum 1.6 W at 230 V AC and max. load[1)]
	KNX voltage	21…31 V DC
	Current consumption KNX	Maximum 10 mA
	Power consumption via KNX	Maximum 210 mW
DALI output	Number of outlets	1 to DIN EN 62386 (Part 101 and 102) The DALI output is a fixed 230 V, i.e. unintentional application of the light controller supply voltage will not cause destruction of the DALI output.
	Number of DALI devices	Maximum 64
	Number of lighting groups	8
	Distance between DLR/A and last DALI device Cable cross-section 0.50 mm^2 0.75 mm^2 1.00 mm^2 1.50 mm^2	 100 m[2)] 150 m[2)] 200 m[2)] 300 m[2)]
Sensor inputs	Light Sensor LF/U 2.1	Detailed information Light Sensor LF/U 2.1, page 18
	Number of inputs	4
	Max. cable length per sensor	Per light sensor 100 m, Ø 0.8 mm, P-YCYM or J-Y(ST)Y cable (SELV), e.g. shielded KNX bus cable
Connections	KNX, DALI, Light Sensor, line voltage	Plug-in screw terminals: 0.2…2.5 mm^2 single core or stranded 0.2…2.5 mm^2 ferrules 0.2…1 mm^2 2 rigid conductors, same cross section 0.2…1.5 mm^2 2 flexible conductors, same cross section
	Tightening torque	Maximum 0.6 Nm
Brightness detection	Lighting control operating range	optimized for 500 Lux. 200 ..1200 Lux for rooms with average furnishing level degree of reflection 0.5 max. 860 Lux in a very brightly furnished room (reflection 0.7) max. 3000 Lux in a very darkly furnished room (reflection 0.2) The Lux values are measured values on the work surface (reference surface) [3)].

Operating and display elements	Button	DALI output test
	Button/LED	For assignment of the physical address
	LED	Display for operation readiness
	LED	For displaying DALI fault, constant light
		For displaying test operation, slow flashing
		For displaying initialization or more than 64 DALI devices, quick flashing
Degree of protection	IP 54	Compliant to EN 60 529
Safety class	II	Compliant to EN 61 140
Insulation category	Overvoltage category	III to EN 60 664-1
	Pollution degree	2 to EN 60664-1
KNX safety extra low voltage	SELV 24 V DC	
DALI voltage	Typical 16 V DC (9.5…22.5 V DC)	to EN 60 929 and EN 62 386
	No-load voltage	16 V DC[4)]
	Lowest supply current at 11.5 V	< 160 mA
	Highest supply current	< 230 mA
Temperature range	Operation	-20 °C…+45 °C
	Storage	-25 °C…+55 °C
	Transport	-25 °C…+70 °C
Environmental conditions	Humidity	Maximum 95 %, no condensation allowed
Design	Surface mounted device	Screw fixing
	Dimensions	147 x 202 x 50 mm (H x W x D)
Mounting Position	as required	
Weight	0.66 kg	
Housing, color	Plastic, grey, halogen free	
Approvals	KNX to EN 50 090-1, -2	Certification
	EN 62386 (Part 101 and 102)	DALI
CE mark	In accordance with the EMC guideline and low voltage guideline	

1) Maximum load corresponds to 64 DALI devices at 2 mA each.

2) The length relates to the common DALI control cable.

The maximum values are rounded off and relate to the resistance values. EMC influences are not considered. For this reason, the values should be considered as absolute maximum values.

3) Rooms are lit up differently by the incidental daylight and the artificial lighting of the lamps. Not all surfaces in the rooms, e.g. walls, floor and furniture reflect the light, which falls on them, in the same manner. Accordingly, even though there is an exactly calibrated constant lighting control in daily operation, deviations to the set target value may occur. These deviations may be up to +/- 100 lx should the current ambient conditions in the room, and accordingly the reflection properties of the surfaces (paper, persons, reorganized or new furniture), differ significantly from the original ambient conditions at the time of calibration. Deviations may also occur if the light sensor is influenced by direct or reflected light falling on it, which is not influenced or only slightly influenced by the surfaces in the detection range of the light sensor.

4) Cannot be measured directly on the digital multimeter, as there is not a constant DC voltage due to the DALI telegrams. Measure with an oscilloscope for correct results. One exception is the KNX download phase. In this phase no DALI telegrams are sent, whereby the DALI voltage is constantly present on the DALI output.

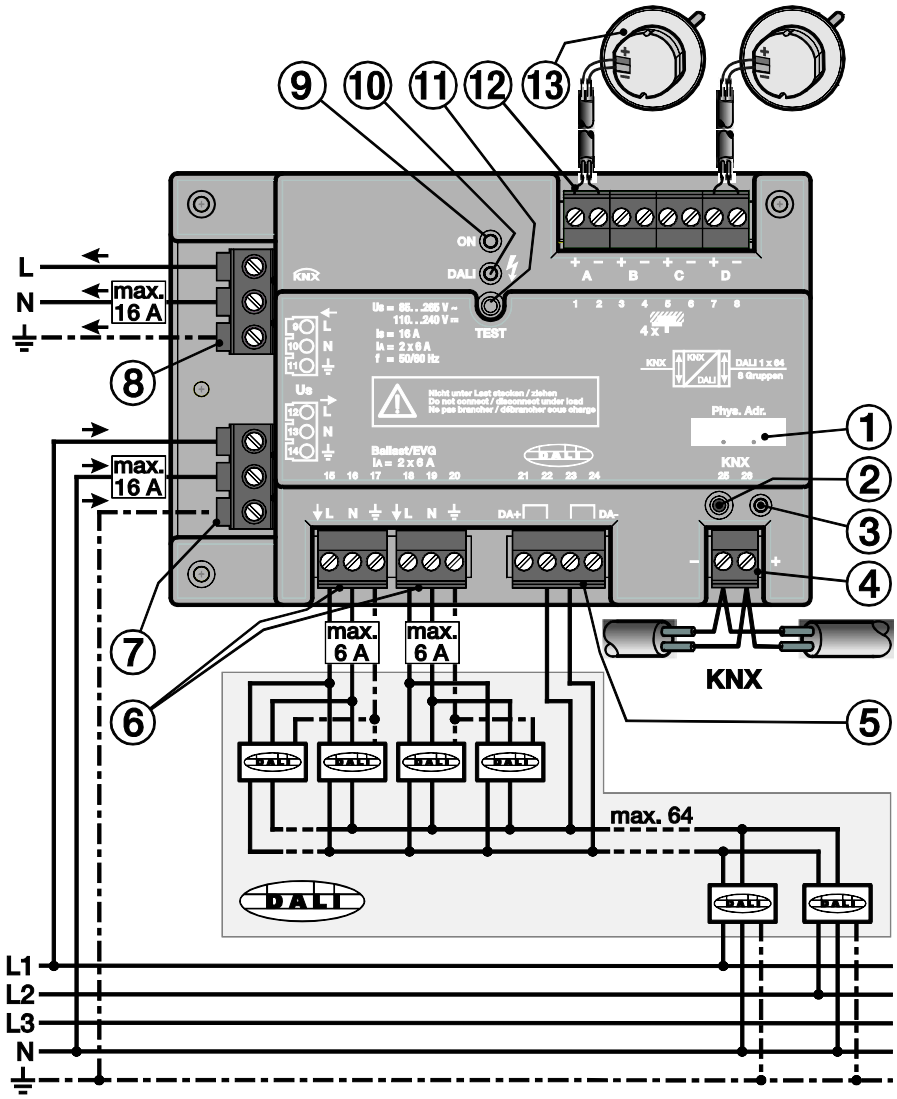
Note
The DALI Light Controller is compliant to the SELV characteristics to IEC 60 364-4-41 (VDE 0100-410). DALI does not need to feature SELV properties, and it is possible to route the DALI control lines together with the mains voltage on a multi-core cable.

Device type	Application	Max. number of Communication objects	Max. number of group addresses	Max. number of associations
DLR/A 4.8.1.1	Control Dim Groups 4f DALI/1*	212	254	255

* … = current version number of the application. **Please observe the software information on our homepage for this purpose.**

Note
The ETS and the current version of the device application are required for programming. Editing parameters with ETS2 is **not** possible! The current application program can be found with the respective software information for download on the Internet at *www.abb.com/knx.* After import in the ETS, the application is available under *ABB/Lighting/Light Controller/Control Dim Groups 4f DALI/1*. The device does not support the locking function of a KNX device in the ETS. If you inhibit access to all devices of the project with a *BCU code*, it has no effect on this device. Data can still be read and programmed.

2.1.2 Connection schematic DLR/A 4.8.1.1

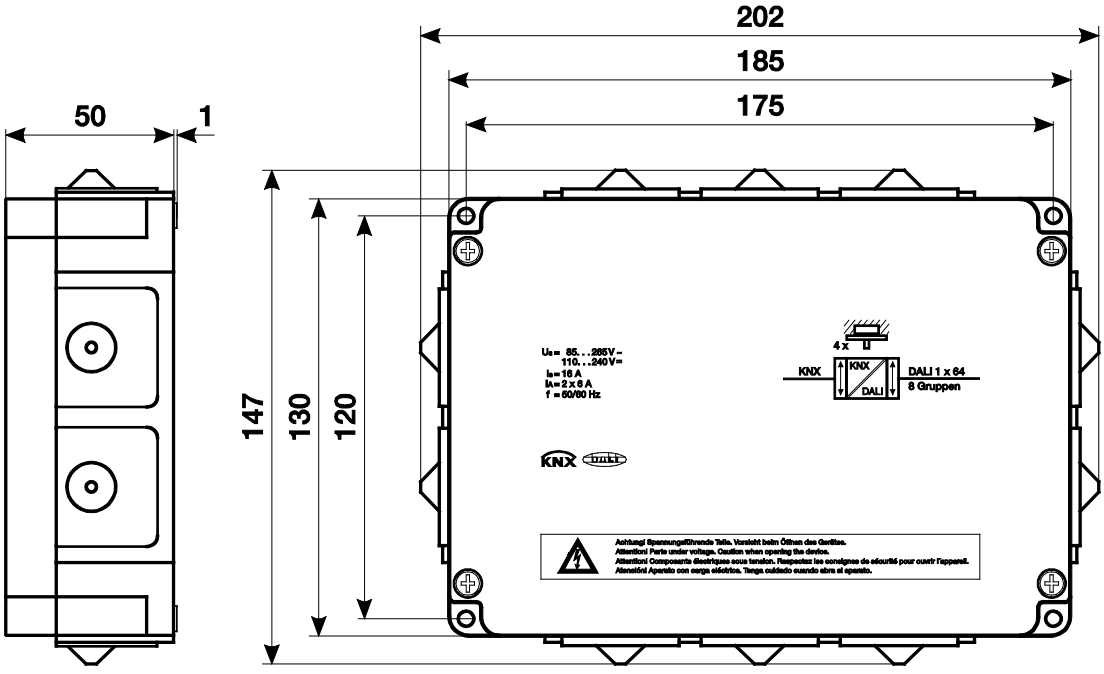


1	Labeling area	**8**	Terminal clamp Rated voltage OUT
2	Button *Programming KNX*	**9**	LED *Operation* ● (green)
3	LED *Programming* ● (red)	**10**	LED *Fault* ● (yellow)
4	Connection terminal KNX	**11**	Button DALI
5	Connection terminal DALI	**12**	Terminal clamp Light Sensor LF/U
6	Terminal clamp Rated voltage Ballast	**13**	Light Sensor LF/U
7	Terminal clamp Rated voltage IN		

Note
When positioning the Light Sensor LF/U in the room, it is important to ensure that the individual control circuits cannot interfere with one another. The LF/U should be mounted above the area, in which the actual lighting intensity is measured. The luminaires or sunlight may not shine directly into the brightness sensor. Pay attention to unfavorable reflections, for example, from mirrored or glass surfaces. The white fiber-optic rod can limit the detection range and reduce the lateral lighting sensitivity to external lighting sources.

Note
If the LF/U is not connected to the DLR/A, a DC voltage of a few mV can be measured directly with a multi-function measurement device. The measured value is between 0 mV (absolute darkness) and a few 100 mV depending on the brightness. If 0 mV is also measured at normal brightness, this is due to an open circuit, short circuit or inverse polarity fault or a defective sensor.

2.1.3 Dimensional drawing DLR/A 4.8.1.1



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2.2 Light Sensor LF/U 2.1

LF/U 2.1

The ABB i-bus® KNX Light Sensor LF/U 2.1 is a brightness sensor for closed rooms. The light sensor is mounted in a standard installation box in the ceiling. The cover (white) of the sensor is stuck firmly onto the device. The complete unit is then screwed into a flush-type box.

Up to 4 Light Sensors LF/U 2.1 can be connected to a DALI Light Controller DLR/A 4.8.1.1. The light sensor measures brightness values in closed rooms. When combined with the detected values, the DLR/A is used for constant lighting control. It is possible to combine the brightness values from several Light Sensors for the calculation of an individual control circuit. It is thus possible to implement control of the lighting in rooms with difficult lighting conditions.

The electrical connection of the LF/U to the DLR/A is undertaken with a twin core MSR cable (SELV), e.g. KNX bus cable. The total length of this cable may not exceed 100 m.

The LF/U is supplied with a Plexiglas rod, which snaps into the sensor housing. The registration area can be limited with the Plexiglas rod with the white coating.

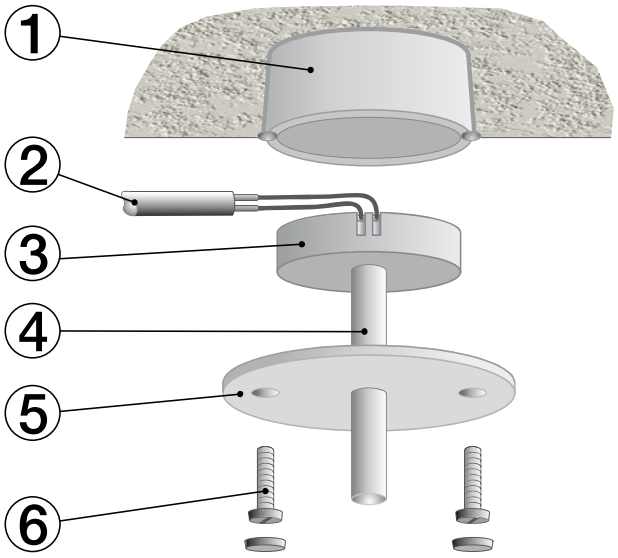
2.2.1 Technical data LF/U 2.1

Supply	SELV	Implemented via DLR/A 4.8.1.1
Connections	On the DLR/A 4.8.1.1	1 connecting terminal white/yellow (connecting terminals are supplied with the device)
	Max. cable length per sensor	per sensor 100 m, Ø 0.8 mm, P-YCYM or J-Y(ST)Y cable (SELV), e.g. shielded KNX bus cable
Brightness detection	Lighting control operating range	optimized for 500 Lux. 200..1200 Lux for rooms with average furnishing level degree of reflection 0.5 max. 860 Lux in a very brightly furnished room (reflection 0.7) max. 3000 Lux in a very darkly furnished room (reflection 0.2) The Lux values are measured values on the work surface (reference surface)[1)].
	Optimum installation height	2…3 m
Degree of protection	IP 20	To EN 60 529
Safety class	II	To EN 61 140
Insulation category	Overvoltage category Pollution degree	III to EN 60 664-1 2 to EN 60 664-1

Temperature range	Operation Storage Transport	-5 °C…+45 °C -25 °C…+55 °C -25 °C…+70 °C
Environmental conditions	Humidity	Maximum 95 %, no condensation allowed
Design	Flush mounted device Dimensions	For installation in 60 mm flush mounted box 54 x 20 (Ø x H)
Weight	in kg	0.04
Mounting Position	as required	
Housing, color	Plastic housing, grey	
Approvals	KNX to EN 50 090-2-2	Certificate, in conjunction with ABB i-bus® KNX light controllers
CE mark	In accordance with the EMC guideline and low voltage guideline	

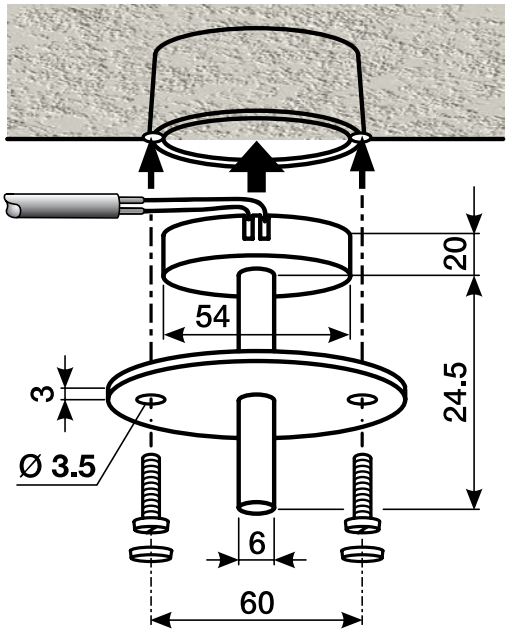
1) Rooms are lit up differently by the incidental daylight and the artificial lighting of the lamps. Not all surfaces in the rooms, e.g. walls, floor, and furniture reflect the light that falls on them in the same manner. Accordingly, even though there is an exactly calibrated constant lighting control in daily operation, deviations to the set target value may occur. These deviations may be up to +/- 100 lx should the current ambient conditions in the room, and accordingly the reflection properties of the surfaces (paper, persons, reorganized or new furniture), differ significantly from the original ambient conditions at the time of calibration. Deviations may also occur if the light sensor is influenced by direct or reflected light falling on it, which is not influenced or only slightly influenced by the surfaces in the detection range of the light sensor.

2.2.2 Connection schematic LF/U 2.1



1 Flush mounted box (FM switch box)
2 Shielded sensor connection cable
3 Light sensor
4 Fiber-optic rod
5 Cover
6 Fixing screw

2.2.3 Dimensional drawing LF/U 2.1



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Dimensions

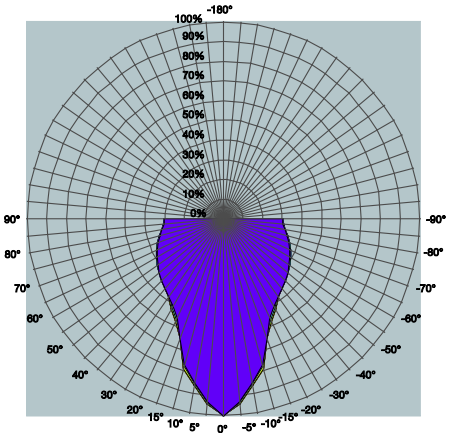
Flush mounted device	For installation in 60 mm flush mounted box
Dimensions	54 x 20 mm (Ø x H)

2.2.4 Polar diagram LF/U 2.1

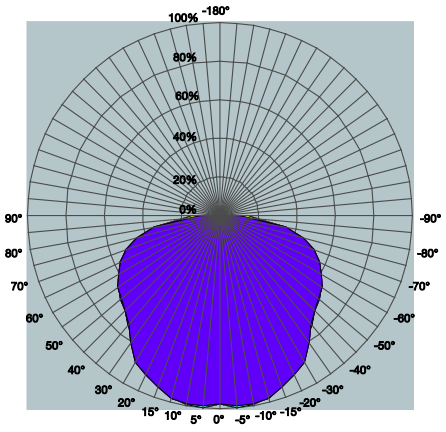
The light sensors include two fiber-optic rods. The white fiber-optic rod has a smaller detection range and is less sensitive to lateral lighting influences. This fiber-optic rod can be used if the detection range has to be limited as the reflected light may be influenced, for example, by window sills, which affects the large reference area of the clear fiber-optic rod.

Note
Please note that the white fiber-optic rod may not be subject to direct sunlight, artificial light or reflections. This leads to a direct misinterpretation of the brightness in the reference area and thus to incorrect constant lighting control.

Light sensor with white fibre-optic rod



Light sensor with white fibre-optic rod



The diagrams show the light sensitivity of the sensors in the room. The percentage values refer to the maximum sensitivity of the LF/U.

2.2.5 Checking the LF/U 2.1

On the Light Controller, a DC voltage of a few mV can be measured directly with a multi-function measurement device. Disconnect the LF/U from the DLR/A for this purpose. The value is between 0 mV (absolute darkness) and a few 100 mV depending on the brightness. If 0 mV is also measured at normal brightness, this is due to an open circuit, short circuit or a defective LF/U.

2.3 Assembly and installation

The DALI Light Controller DLR/A 4.8.1.1 is a modular installation device for quick installation in the distribution board on 35 mm mounting rails to EN 60 715. The mounting position can be selected as required.

The electrical connection is implemented using plug-in screw terminals. The connection to the KNX is implemented using the supplied plug-in screw terminal. The terminal designation is located on the housing.

Accessibility of the devices for the purpose of operation, testing, visual inspection, maintenance and repair must be provided compliant to VDE 0100-520.

Commissioning requirements

In order to commission the DLR/A, a PC with ETS and a KNX interface, e.g. USB or IP, are required. The DLR/A is ready for operation after connection to the bus voltage supply.

The assignment of DALI devices to lighting groups which are controlled in the KNX, is undertaken in the DGS Software Tool.

For more information see: online help, Software Tool

The device is ready to operate when the KNX voltage and the light controller supply voltage are applied.

The installation and commissioning may only be carried out by electrical specialists. The appropriate norms, guidelines, regulations and specifications for your country should be observed when planning and setting up electrical installations and security systems for intrusion and fire detection.

- Protect the device from damp, dirt and damage during transport, storage and operation.
- Only operate the device within the specified technical data limits!
- The device should only be operated in an enclosed housing (distribution board)!
- The voltage supply to the device must be switched off, before mounting work is performed.

Danger

In order to avoid dangerous touch voltages, which originate through feedback from differing phase conductors, all-pole disconnection must be observed when extending or modifying the electrical connections.

The Light Sensor LF/U 2.1 is optimized for ceiling installation in a commercially available 60 mm flush mounted box. The brightness detection can be influenced with the enclosed fiber-optic rods. The detection range should be taken from the Polar diagram LF/U 2.1, page 22.

The brightness sensor should be situated so that it is not influenced directly or indirectly by the lamps. Pay attention to reflections, e.g. from window sills, mirrored or glass surfaces.

Supplied state

The DLR/A is supplied with the physical address 15.15.255. The application is pre-installed. It is therefore only necessary to load group addresses and parameters during commissioning.

However, the complete application can be reloaded if required. A longer downtime may result if the application is changed or after a discharge.

Download response

Depending on the PC which is used, the progress bar for the download may take up to one and a half minutes, before it appears, due to the complexity of the DLR/A.

Assignment of the physical address

The assignment and programming of the physical address is carried out in the ETS.

The programming button on the device is pressed to assign the physical address. The red LED ● lights up. It switches off, as soon as the ETS has assigned the physical address or the programming button has been pressed again.

Cleaning

If devices become dirty, they can be cleaned using a dry cloth or a cloth dampened with a soapy solution. Corrosive agents or solutions should never be used.

Maintenance

The DLR/A is maintenance-free. No repairs should be carried out by unauthorized personnel if damage occurs, e.g. during transport and/or storage.

2.4 Description of the DALI output

On the DALI output, up to 64 DALI devices can be connected. The DALI Light Controller is a DALI master with integrated DALI voltage supply.

Note
Other DALI masters may not be connected to the DALI output of the DALI Light Controller. This can cause communication malfunctions in a single master system.

Note
Other DALI power supplies may not be connected to the output of the DLR/A. The connection of a further DALI voltage supply can cause superimposition of voltages and lead to malfunction of the DLR/A. Inadvertent connection of 230 V mains voltage to the DALI output will not destroy the DALI end stage. The DALI output is protected by an internal self-restoring fuse.

A control line on the DALI output with the following maximum length can be used:

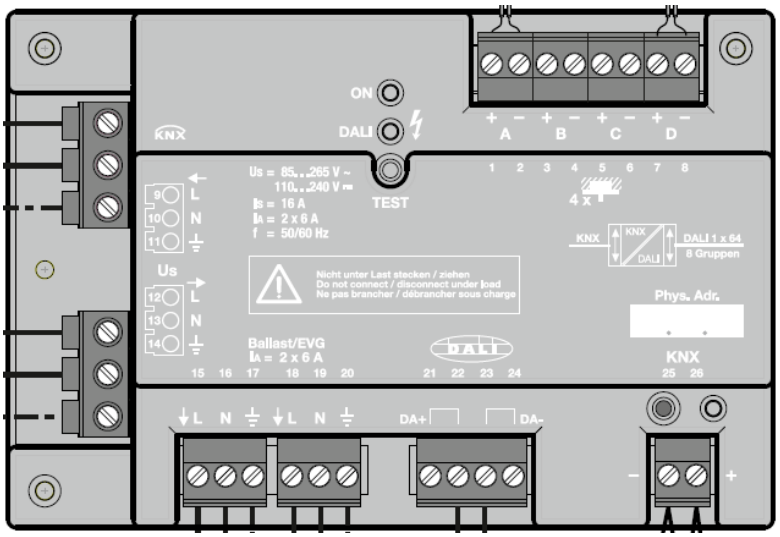
Cable length [mm]	2 x 0.5	2 x 0.75	2 x 1.0	2 x 1.5
Max. cable length [m] from the DLR/A to DALI device	100	150	200	300

These values are rounded off and relate to the resistance values. EMC influences are not considered. For this reason, the values should be considered as absolute maximum values.

It is possible to assemble the DALI control cable with conventional installation material for mains cables. The two cores of the five-core NYM 5 x 1.5 mm^2 which are not required can be used without consideration of the polarity. It is not mandatory to lay a separate control cable.

The isolation between DALI control cables and the power supply is assured by the simple insulation properties according to EN 410. SELV properties are not featured.

2.5 Display elements



ON LED Operation, green

- Lights up if the operating voltage is available and the device is ready for operation
- Flashes if the KNX voltage is available but operating voltage is not

DALI LED Fault DALI, yellow

- Normal operation, lights up yellow if a DALI fault occurs
- Test operation, flashes slowly while in test mode
- Initialization operation, flashes quickly while initializing

LED, red with *Programming* button

- Lights up red when the device is in programming mode (after pressing the *Programming* button).

2.6 Operators

***DALI Test* push button**

For manual switching of the DALI output, without KNX also.

By pressing the test button > 2 Sec. < 5 Sec. the test mode will start. The green LED switches off. The current lighting group brightness values are stored. Individual brightness values will be lost. After release the yellow LED flashes and all DALI devices on the DALI output are switched on. Pressing the button again for < 2 Sec. switches off the devices again. After the test button is pressed > 2 Sec. < 5 Sec. the test mode ends. The lighting groups retain the brightness values they had in test mode. DALI devices that are not assigned to a group keep their brightness values. The yellow LED switches off and the green LED switches back on. The devices retain their brightness state from test mode. If the button is pressed for longer than 5 Sec. the current mode will continue to be active. DALI addressing is triggered once, whereby DALI devices without a DALI address receive a DALI address.

Test mode ends automatically after 1 minute if no test is being run.

Note
Manual operation is only possible if KNX voltage and light controller voltage are applied on the DLR/A. The ready to operate state is indicated by the green LED ON when it is lit up. If the light controller supply voltage has failed or is not connected, the ON LED flashes and at the same time the DALI LED lights up to indicate that no DALI voltage is generated by the DLR/A. If there is a KNX bus voltage failure, no LEDs light up.

Note
The *Forced operation* and *Block* functions of a lighting group are inactive during manual operation. Blocks or forced operations are reactivated when manual operation is ended. Blocks or forced operations can be changed during manual operation also, via the KNX. And lighting group switching commands are recognized, and executed when test mode ends. Other commands initiated during test mode via the KNX will be lost. Commands from the Software Tool are the exception: these are executed even during test mode.

3 Commissioning

The parameterization of the DLR/A is implemented with the application *Control Dim Groups 4f DALI/1* and the Engineering Tool Software ETS. Using the application, a comprehensive and flexible range of functions are available to the DLR/A. The standard settings allow simple commissioning. The functions can be extended if required.

The application is available under ABB/Lighting/Light Controller/.

For parameterization purposes, a PC or laptop with ETS3 or higher and a connection to the KNX, e.g. via RS232, USB or IP interface, is required.

Note
Commissioning with ETS2 is **not** possible!

The following work must be carried out:

- Assignment of the physical KNX device address (ETS)
- Parameterization of the DLR/A (ETS3 or higher)
- Grouping of the connected DALI devices with the Software-Tool
- Commissioning is necessary for constant lighting control. Commissioning is undertaken in an artificial lighting and daylight calibration process. The selected brightness value for the room is selected with this calibration. The commissioning can be undertaken using the Software Tool.

For more information see: online help, Software Tool

The DALI Light Controller assigns every connected DALI device, which does not yet have a valid DALI short address, the first free address. This automatic addressing can be prevented using a parameter setting in the ETS application, see Parameter window General, page 40. A readdressing of the DALI device and the assignment to any lighting group is also possible with the Software Tool even without ETS.

3.1 Overview

The DALI Light Controller DLR/A 4.8.1.1 requires, in addition to the KNX voltage, a light controller supply voltage to generate the DALI voltage for full function capability. The light controller supply voltage range can be found in Technical data LF/U 2.1, on page 12. The KNX voltage alone is sufficient for programming the application in the DALI Light Controller. Thus in an office environment it is possible to pre-program the DLR/A exclusively using the KNX voltage without having to resort to a light controller supply voltage (a 230 V AC/DC supply).

For commissioning of the Software Tool, in which the compilation of the lighting groups and the calibration of constant lighting control can be implemented, the light controller supply voltage must also be connected.

The properties of the lighting groups are independent of each other and can be programmed individually. It is thus possible, depending on the application, to freely define every lighting group and to parameterize them accordingly.

The first 4 lighting groups have a special feature, as they can be used for constant lighting control together with the connected Light Sensor LF/U. If required even two or more light sensors can be assigned to a lighting group (control circuit). In this manner an acceptable constant lighting control is established in a room even with difficult lighting conditions. The description of the calibration procedure as well as correct positioning of the light sensor can be found in chapter Constant lighting control, page 167.

In the DLR/A, it is possible to parameterized a lighting group by using the copy and exchange function and to transfer the parameters to another lighting group. The copy and exchange function is described in detail at Copying and exchanging parameter settings, page 35.

The following table provides an overview of the functions used by the DLR/A 4.8.1.1 and those possible with the application program *Control Dim Groups 4f DALI/1.*

DALI Light Controller properties	**DLR/A 4.8.1.1**
Type of installation	SM
Number of outputs (DALI)	1
Number of inputs (Light Sensor LF/U 2.1)	4
Enclosure	IP54
DALI devices	64
Lighting group total/controllable	8 / 4
Manual operation	■
Display of DALI fault	■

■ = property applies

General parameterization options	DLR/A 4.8.1.1
Automatic DALI address assignment enable/inhibit	■
Request status values via 1 bit communication object	■
Limit number of telegrams	■
Acknowledge faults	■
Cyclic monitoring telegram (In operation)	■

■ = property applies

Parameterization options	Per group	All devices	Per device
Functions			
Function *Constant lighting control*	G1…G4		
Function *Slave*	■		
Function *Staircase lighting*	■		
Function *Burn-in*	■		
14 Scenes			
Recall and save via KNX with 1 bit telegram	■		
Recall and save via KNX with 8 bit telegram	■		
DALI device properties			
Minimum and maximum dimming limit values (dimming thresholds)	■	■	
Brightness after ballast recovery on the DLR/A	■		
Power on level (brightness after ballast/supply voltage recovery)	■		
Switch functions			
Brightness value when turned ON	■	■	
Dimming speed for switch on/off fixed or adjustable via KNX	■	■	
Switch telegram and status, common or separate communication objects	■	■	
Dimming			
Dimming speed for 0…100 %	■	■	
Permit channel to be turned on via dim telegram	■	■	
Brightness value	■	■	
Dimming speed for transition brightness values	■	■	
Permit set switch on and off brightness via value	■	■	
Brightness value and status, common or separate communication objects	■	■	
Fault messages			
Malfunction light controller supply voltage	■		
Fault DALI	■		
DALI device (ballast) fault via 1 bit communication object	■	■	
Lamp fault via 1 bit communication object	■	■	
Coded fault message via 2 byte communication object	■		■
Number of devices or groups with a fault	■		■
Number of devices or group with a fault	■		■
Acknowledge faults	■	■	■
Disable fault message via KNX communication object	■		

Parameterization options	Per group	All devices	Per device
Reaction on voltage failure/recovery			
Reaction on KNX or DALI voltage failure	■		
Behavior on KNX or DALI bus voltage recovery	■		
Brightness after ballast supply voltage recovery on the DLR/A	■		
Power on level (brightness after ballast/supply voltage recovery)	■		
Other functions			
Forced operation	■		
- 2 bit coded forced operation	■		
- 1 bit forced operation recall	■		
Blocking, block output via 1 bit communication object	■		
Staircase light. permanent ON	■		
Warning staircase lighting	■		
Stairc. light. activate/status	■		
General functions			
Characteristic curve	■		
Request status values via 1 bit communication object	■	■	
Automatic DALI address assignment inhibit	■		
Cyclic monitoring telegram (In operation)	■		
Status limit telegrams	■		
DLR/A parameterization for lighting groups 1…4			
Flexible light sensor assignment via ETS parameterization	■		
Optional use of several Light Sensors per control circuit	■		
Control speed	■		
Dimming value for lighting control	■		
Lighting control can be switched off via the switch, dim brightness or scene telegram	■		
Lighting control can be switched on via the switch telegram	■		
Second brightness value via offset brightness	■		
Switch offset on/off via KNX	■		
Control circuit calibration via daylight and artificial lighting calibration	■		
Automatic recording of illumination characteristic curves for determination of the optimum control parameters	■		
Target value can be changed via the bus	■		
Control behavior after KNX bus voltage recovery	■		
Function *Slave* lighting group 1…8			
Internal master/slave control or via communication object	■		
Reaction to switch, dim, brightness value, preset and scene telegrams can be parameterized	■		
Brightness weighting between master and Slave via offset brightness of the master	■		
Slave operation after bus voltage recovery can be parameterized	■		
Function *Staircase lighting* lighting group 1…8			
Reaction to switch, dim, brightness value, preset and scene telegrams can be parameterized	■		
Staircase lighting after KNX bus voltage recovery can be parameterized	■		

■ = property applies

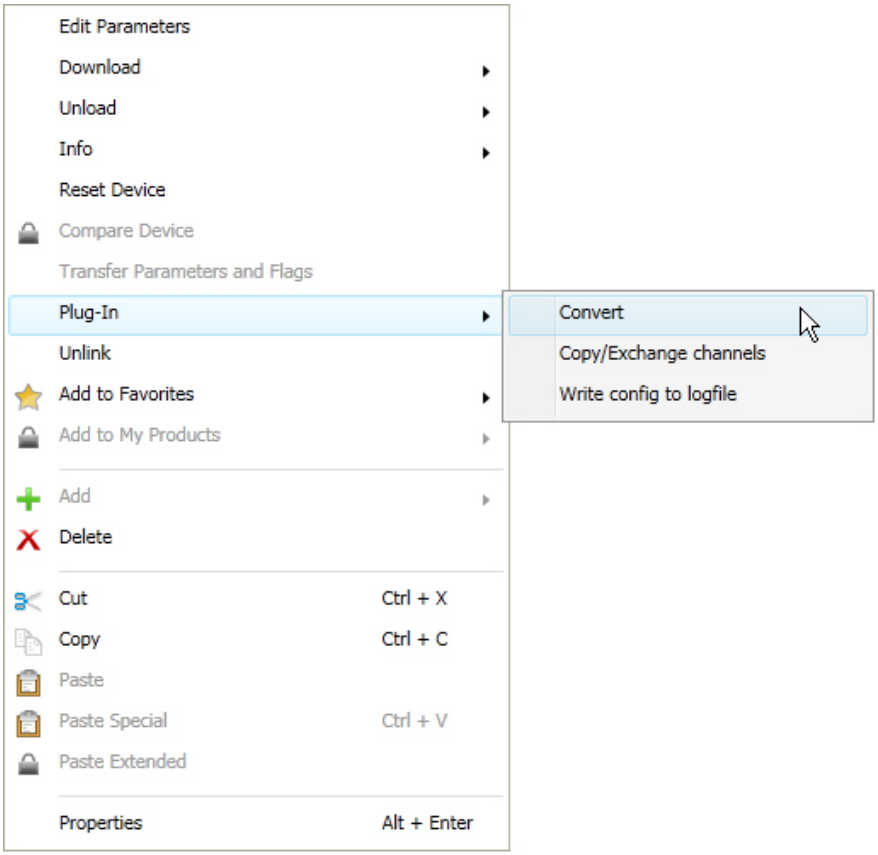
3.1.1 Conversion

For ABB i-bus® KNX devices from ETS3 or higher, it is possible to assume the parameter settings and group addresses from earlier application programs.

Furthermore, conversion can be used to transfer the existing parameterization of a device to a different device.

3.1.1.1 Conversion procedure

- Import the current application into ETS.
- Insert the desired device into your project.
- Right click on the product and select *Plug-in* > *Convert* in the context menu.



- Then make the desired settings in the dialog *Convert*.
- Finally, you must exchange the physical address and delete the old device.

Should you wish to only copy individual channels within a device, use the function Copying and exchanging parameter settings, page 35.

3.1.2 Copying and exchanging parameter settings

Note
The copy and exchange function for parameter settings of lighting groups is only possible if the target and source lighting groups support the same functions.

Parameterization of devices can take a lot of time depending on the complexity of the application and the number of device outputs, particularly in the case of DLR/A lighting groups. To keep the commissioning work to the minimum possible, using the function *Copy/exchange channels*, parameter settings of a lighting group can be copied or exchanged with freely selectable lighting groups. Optionally, the group addresses can be retained, copied or deleted in the target lighting group.

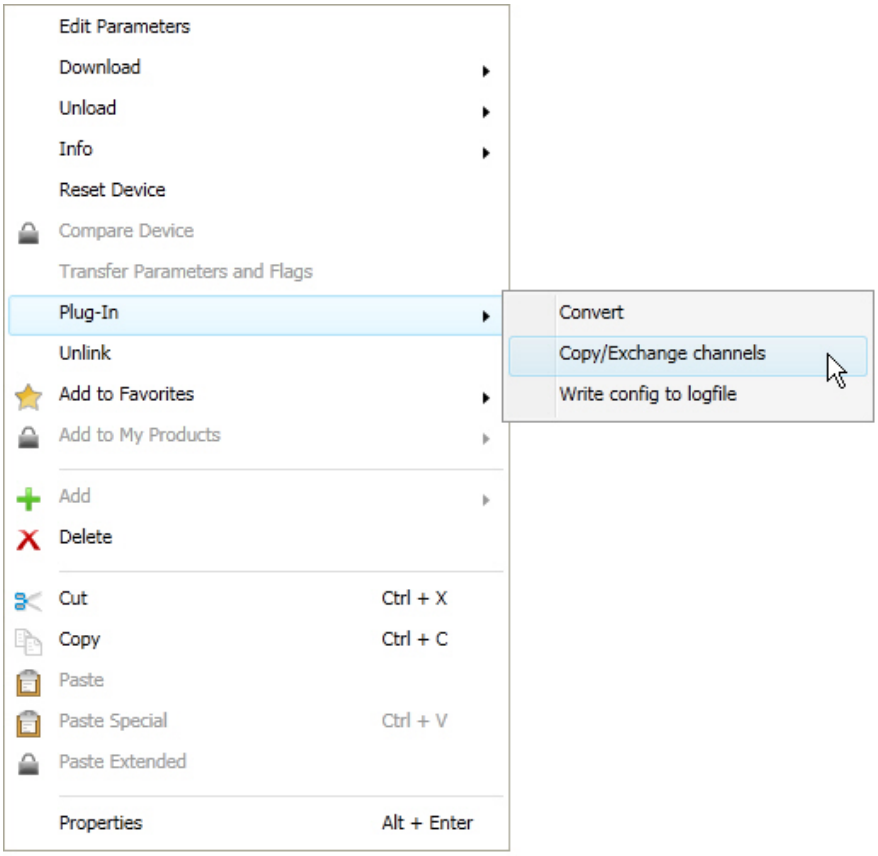
Note
When the term channels is used in the ETS, this means inputs and/or outputs or groups. In order to ensure that the ETS language generally applies for as many ABB i-bus® devices as possible, the word channels is used here.

The copying function of lighting groups is ideal, particularly with DALI Light Controllers, where several lighting groups have the same parameter settings. For example, lighting in a room is frequently controlled in an identical manner. In this case, all parameter settings of lighting group X can be copied to all other lighting groups or to a special lighting group of the DLR/A. Thus the parameters for this lighting group must not be set separately, which significantly shortens the commissioning time.

Note
The information for the calibration of the constant lighting control already performed for a lighting group using the additional function *Light control* is not copied using the function described here. Calibration of the constant lighting control must be undertaken again.

3.1.2.1 Procedure for copy and exchange

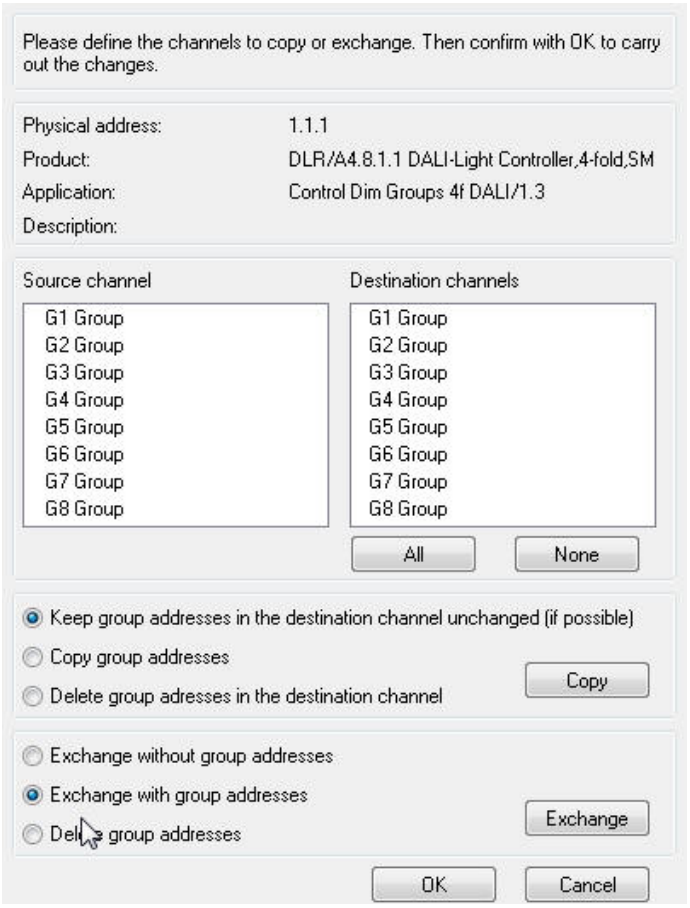
- Click with the right mouse button on the product, whose outputs you wish to copy or exchange, and select the context menu *Plug-in* > *Copy/exchange channels*.



Thereafter, undertake the required settings in the Copy/exchange channels dialog.

Note
To recall the copy/exchange group functions, click with the right mouse button on the product, whose outputs you wish to copy or exchange, and select the context menu *Plug-In* > *Copy/Exchange channels*.

3.1.2.2 Functional overview



Top left you can see the Source channel selection window for marking the source channels. Next to this is the Destination channels selection window for marking the destination channel/channels.

Source channel

With the selection of the source channel, you define which parameter settings should be copied or exchanged. Only one source channel can be selected at a time.

Destination channels

With the selection of the destination channel/channels, you define which channel/channels are to assume the parameter settings of the source channel.

- For the function *Exchange*, only one target DALI output can be selected at a time.
- For the function *Copy*, different destination channels can be selected simultaneously. For this purpose, press the Ctrl key and mark the required channels with the mouse cursor, e.g. channel G1 Group and G5 Group.

With this button, you select **all** available destination channels, e.g. A…H.

Reset the selection of the destination channel with this button.

Copy

The following options can be selected before copying the parameter settings:

- Keep group addresses in the destination channel unchanged (if possible)
- Copy group addresses
- Delete group addresses in the destination channel

Copy — With this button, you copy the settings from the source channel to the destination channel/channels.

Exchange

The following options can be selected before exchanging the parameter settings:

- Exchange without group addresses
- Exchange with group addresses
- Delete group addresses

Exchange — With this button, you exchange the settings of the source channel with those of the destination channel.

OK — Confirm your selection with this button, and the window closes.

Cancel — Using this button, the window closes without accepting the changes.

3.1.3 Overlapping lighting groups

In principle, it is possible to integrate a lamp (DALI device) in several lighting groups. In this case, we refer to several overlapping lighting groups.

The DLR/A does not forcibly inhibit this option. However, these overlapping lighting groups are not specially supported. There are also no special parameterization options that can be used to determine how an overlapping lighting group should behave when the lamps in a lighting group assume different states.

It is assumed that the overlapping lighting groups will report the following states/values as the status value:

- *Switch state:* ON, if at least one lamp is switched on
- *Brightness value*: average brightness value

It is not recommended, especially with constant lighting control, to use overlapping lighting groups. The control circuits should not mutually influence one another or be influenced by an unknown external controller. In these cases, unsteady, incorrect or highly fluctuating constant lighting controls can result.

Note
The telegram last entered is carried out with the control of overlapping lighting groups. All DALI devices of the lighting group concerned are controlled even when these DALI devices are also assigned to further lighting groups.

3.2 Parameters

This chapter describes the parameters of the DALI Light Controller DLR/A 4.8.1.1 using the parameter window. The parameter window features a dynamic structure so that further parameters or whole parameter windows may be enabled, depending on the parameterization and the function of the lighting groups.

In the following description, the lighting group X or Gx (abbreviated form) represents one of the 8 lighting groups of a DLR/A.

Note
The additional function *Light control* is only available for lighting groups 1…4. With the description of the DLR/A with its properties and parameters, the explanations and the notation *Lighting group x* always only refer to one of the first 4 lighting groups of the DLR/A.

The default values of the parameters are underlined, e.g.:

Option: yes
no

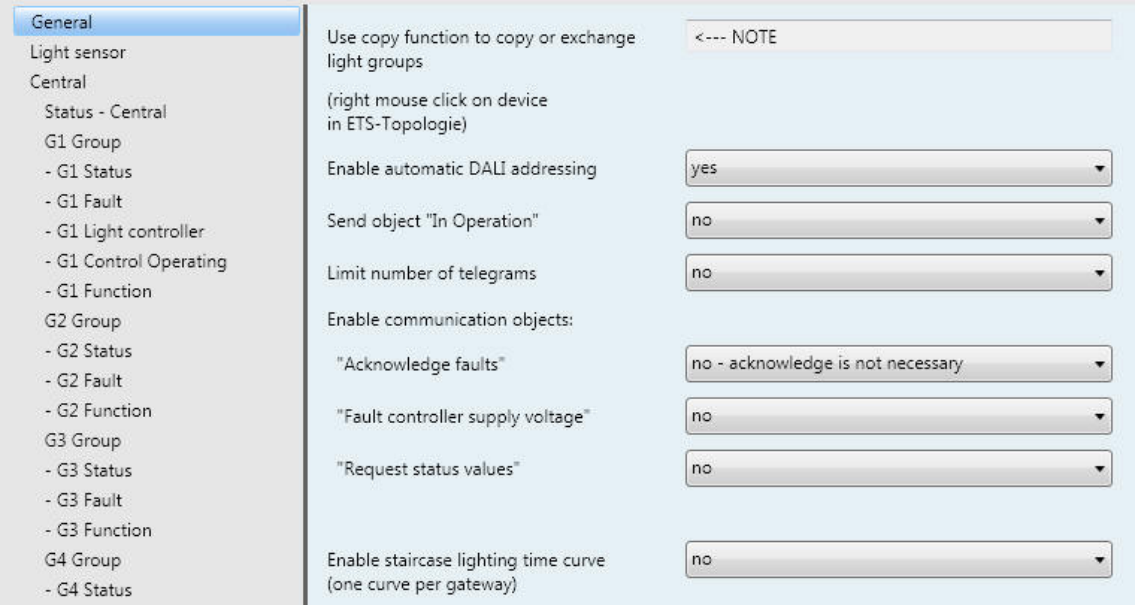
Indented parameter descriptions indicate that this parameter is only visible when the main parameter is parameterized accordingly.

The illustrations of the parameter windows in this manual correspond to the ETS3 parameter windows. The application is optimized for ETS3. Editing parameters with ETS2 is not possible. If the ETS version is higher than ETS3, the representation may deviate slightly.

Note
If in the following the communication objects *Switch* or *Brightness value* are mentioned, they also apply for the communication objects *Switch/status* or *Brightness value/status*.

3.2.1 Parameter window *General*

In this parameter window, the main parameter settings relevant for the entire DALI Light Controller are undertaken.



Use copy function to copy or exchange light groups.

(right mouse click on device in ETS-Topologie)

<−−− NOTE

Enable automatic DALI addressing

Options: yes
no

Using this parameter, the automatic DALI addressing process of the DLR/A can be switched off.

- *yes:* The DLR/A automatically performs a DALI addressing assignment. If the DLR/A locates a DALI device without DALI address assignment, it automatically allocates the first free DALI address to the DALI device.

Note
If there is DALI addressing without gaps, the exchange of a defective DALI device is possible without additional addressing or commissioning. A new DALI device without a DALI address must only be installed for this purpose. The DALI Light Controller addresses the new devices with the free address of the device, which has failed, and transfers the properties that were present in the DALI device removed beforehand. If the DALI device does not yet have a group address (is new directly from the factory), it will also receive the group assignment. If another group assignment exists in the DALI device, a conflict will be indicated in the Software Tool. This can be remedied with the Software Tool by adopting the DRL/A or ballast information. If the DALI Light Controller detects several DALI devices with the same DALI address, these DALI addresses are deleted, and the devices automatically receive the first free DALI addresses in the address range from the DLR/A. For further information see: Planning and application, page 155

- *no:* The DLR/A does not automatically assign DALI addresses, neither in normal mode nor at light controller voltage recovery. If a DALI device with an invalid DALI short address is installed, the DLR/A can only control it via a broadcast telegram (manual operation or DALI output communication object). A DALI address is unnecessary for this purpose. If a DALI device with an existing address has been installed, the DLR/A will not change it. The communication object *Trigger DALI addressing* is enabled, see Communication objects General, page 128.

Send object "In operation"

Options: yes
no

The In operation communication object indicates the presence of the DLR/A on the KNX. The DLR/A sends a parameterized value to the communication object *In operation*.

This cyclic telegram can, e.g., be monitored by an external device.

- *no:* The communication object *In operation* is not enabled.
- *yes:* The communication object In operation is enabled. The DLR/A cyclically sends a telegram with the value 1 or 0 via this communication object. The following parameters appear:

  send object value

  Options: 1/0

  Using this parameter, you determine whether the DLR/A cyclically sends a telegram with the value 1 or 0 on the KNX.

  Telegram will repeated all in s [1…65,535]

  Options: 1…60…65,535

  Here the time interval at which the DLR/A cyclically sends an *In operation* communication object telegram is set.

Limit number of telegrams

Options: no
yes

The load on the KNX generated by the device can be limited with the limitation on the number of telegrams sent. This limit relates to all telegrams sent by the device.

- *yes:* The DLR/A monitors its sent telegrams and limits the telegrams sent in dependence on the following two parameters, which appear via option yes:

  Time between two response telegrams in s [1…255]

  Options: 1…20…255

  In period

  Options: 50 ms/100 ms…1 s…30 s/1 min

  This parameter defines the number of telegrams sent by the DLR/A within a period. The telegrams are sent as quickly as possible at the start of a period.

Note
The DLR/A counts the number of telegrams sent within a parameterized period. As soon as the maximum number of sent telegrams is reached, no further telegrams are sent on the KNX until the end of the period. A new period commences at the end of the previous period. The telegram counter is reset to zero, and sending of telegrams is allowed again. The current communication object value is always sent at the time of transmission. The first period (break time) is not predefined exactly. The period can be between zero seconds and the parameterized time. The subsequent sending times correspond with the parameterized time. For example: Maximum number of sent telegrams = 5, period = 5 s 20 telegrams are ready for sending. The DLR/A immediately sends 5 telegrams. The next 5 telegrams are sent after maximum 5 seconds. From this point, a further 5 telegrams are sent on the KNX every 5 seconds.

Enable communication objects:

"Acknowledge faults"

Options: no - acknowledge is not necessary
yes - acknowledgement is required

Should a fault occur (ballast, lamps, DALI, operating voltage), the DLR/A sends a telegram on the KNX using the respective communication object (see Parameter window Central and Parameter window Status - Central from page 49).

- *no - acknowledge is not necessary:* As soon as the fault is remedied, the DLR/A will reset the fault message, and it automatically sends the status change in dependence on the parameterization to the communication object, e.g. *Fault lamp*. A telegram with the value 0 is sent. The change in the malfunction state may take up to 45 seconds and depends on the number of connected DALI devices.
- *yes - acknowledgment required:* First of all the communication object *Acknowledge faults* is enabled. As soon as the fault is rectified, a telegram with the value 0 is not sent automatically. This fault signal remains set until the fault is rectified and the fault signal is acknowledged or reset via the communication object Acknowledge faults. Only then does the corresponding communication object send its value 0. This can be very useful with the detection of sporadic faults or results.

"Fault controller supply voltage"

Options: no
yes

- *no:* Failure of the light controller supply voltage is not reported to the KNX.
- *yes:* The communication object *Fault Controller supply* is enabled. As soon as the light controller supply voltage is interrupted, the communication object *Fault Controller supply* sends a telegram with the value 1 on the KNX. The time at which a telegram is sent can be adjusted using the following parameters:

  Send

  Options: after a change
  after request
  after a change or request

  - *after a change:* The status is sent via the communication object after a change.
  - *after request:* The status is sent after a request by the communication object *Request status values*.
  - *after a change or request:* The status is sent via the KNX when the status changes or the status is requested via the communication object *Request status values*.

"Request status values"

Options: no
yes

Via this communication object, all status messages can be requested, provided that they have been parameterized with the option *after a change or request* or only *after request*.

- *no:* The 1 bit communication object *Request status values* is not enabled.
- *yes:* A 1 bit communication object *Request status values* is enabled. The following parameter appears:

  Request with object value

  Options: 0
  1
  0 or 1

  This parameter defines the value at which the communication object *Request status values* is triggered. With this function, an opportunity is presented, e.g. to provide up-to-date values to a visualization system.

  - *0:* Sending status messages is requested with the value 0.
  - *1:* Sending status messages is requested with the value 1.
  - *0 or 1:* Sending status messages is requested with the values 0 or 1.

Enable staircase lighting time curve (one curve per gateway)

Options: no
yes

The DLR/A has the option of implementing a staircase time curve incorporating a dimming up and pre-warning phase. This curve can be recalled individually, however, for every lighting group with the switch telegram of the lighting group. The staircase time curve is defined in the next parameter that appears with the option yes.

- *no:* In the DLR/A, *Staircase lighting* is not available.
- *yes:* The DLR/A has a *Staircase lighting* function. A time curve is defined in the next parameters.

  Scenes 13 and 14 are used for function staircase lighting

Note
If the function *Staircase lighting* is used in the DLR/A, the scenes 13 and 14 are used for this function. These are then no longer available as "normal" scenes.

Time for dimming up (soft start)

Options: jump to
0.7 s
…
2.0 s
…
90.5 s

This parameter determines the time duration, in which the DLR/A dims to the brightness value for the staircase time. The function *Staircase lighting* is switched on with a soft start. This brightness value (Staircase lighting) is set with the parameter *Brightness value after dimming* in the Parameter window - Gx Staircase lighting, page 90.

- *jump to:* The lighting group switches on immediately with the start of the Staircase lighting time.
- *0.7 s…90.5 s:* This is the time period in which all involved lighting groups are dimmed with the brightness value of the function *Staircase lighting*.

Staircase lighting time

Options: 1…45/50 s,
1/2…10…50 min,
1…18/24 h,
No limitation

- *1 s…24 h*: This is the time period for which the function *Staircase lighting* remains switched on for the lighting group.
- *No limitation:* The function *Staircase lighting* is no longer switched off automatically. The brightness value is changed only if a new telegram is received via the KNX or by forced operation, e.g. with a fault where the brightness value is changed.

Time for dimming down after light (Warning before light turned off)

Options: jump to
0.7 s
1.0 s
…
5.7 s
…
90.5 s

This parameter determines the time duration, in which the DLR/A dims down from the function *Staircase lighting* to a basis brightness. In this way, you indicate that the function *Staircase lighting* will switch off shortly (go out) or will be set to basis brightness.

- *jump to:* The lighting groups are immediately set to the basis brightness after the Staircase lighting time has timed out. The basis brightness can be set in parameter Parameter window - Gx Staircase lighting, page 90.
- *0.7 s…90.5 s*: This is the time period, in which the lighting group is dimmed to the parameterized basis brightness at the end of the staircase lighting time. The basis brightness can be set in parameter Parameter window - Gx Staircase lighting, page 90.

Basis brightness hold time

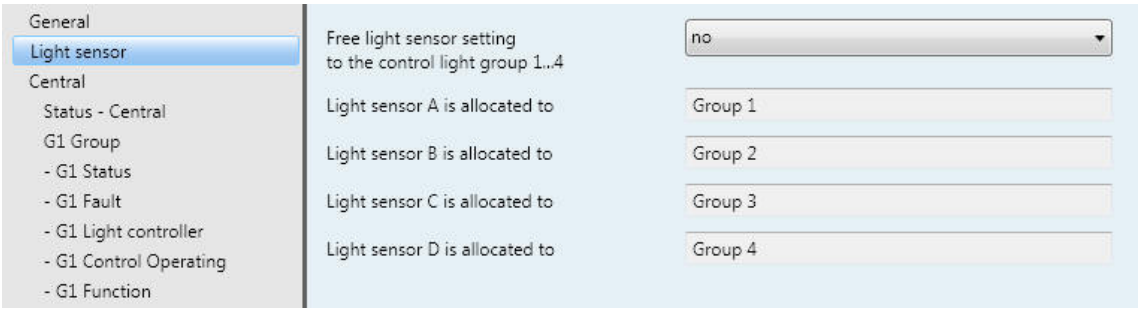
Options: 1 s, 2 s, …10 s, 12 s, 15 s, 20 s, 30 s, 45 s, 50 s,
1 min, 2 min… 5 min…10 min…50 min,
1 h, 2 h…24 h,
No limitation

- *1 s…24 h*: This is the time duration, in which the basis brightness is switched on.
- *no limitation:* basis brightness is not switched off automatically. The brightness value is changed only if a new telegram is received via the KNX or by forced operation, e.g. with a fault where the brightness value is changed.

Note
The function *Staircase lighting* is recalled by an ON telegram of the lighting group if the additional function Staircase lighting is selected for this lighting group. This parameterization is undertaken in the Parameter window Gx Group, page 63. The response to various KNX telegrams (brightness value, relative dimming, scene recall) and voltage recovers can also be parameterized there. The reaction to a switch telegram is not explicitly programmable and responds as follows: The function *Staircase lighting* is triggered by an ON telegram with the value 1 to the communication object *Switch* of a lighting group. With an OFF telegram, the lighting group is controlled with the basis brightness of the function *Staircase lighting*. The function *Staircase lighting* remains in standby mode and is started by a renewed ON telegram. Should the lighting group receive a renewed ON telegram during ongoing function *Staircase lighting*, the function *Staircase lighting* is restarted (retriggered). The function *Staircase lighting* is also started if the lighting group receives an ON telegram with the value 1 on the communication object *Activate staircase mode* or *Activate staircase function/status*. **For further information see: Staircase lighting, page 163**

3.2.2 Parameter window *Light sensor*

In the parameter window *Light sensor*, the Light Sensors LF/U 2.1 (up to 4 possible) are assigned to the first 4 lighting groups of the DLR/A. Only the first 4 lighting groups feature a function for constant lighting control in combination with the light sensor. However, it is possible to parameterize each of the 8 lighting groups as a slave. If the corresponding master lighting group is parameterized with constant lighting control, the slave lighting group is also included.



If several light sensors are assigned to an output, it is necessary to define which sensor value is used as the actual value (input variable) for the control circuit.

For further information see: Parameter window - Gx Light controller, page 95 and Constant lighting control, page 167

Free light sensor setting to the control light group 1...4

Options: no
yes

A free light sensor assignment to one of the first 4 lighting groups can be parameterized with these parameters.

- *no:* In this default setting, each of the 4 light sensors is assigned to exactly one lighting group. In ascending order, the light sensor is allocated to light sensor input A of lighting group 1, light sensor B to lighting group 2, through light sensor D to lighting group 4.
- *yes:* The individual parameters on the parameter page are enabled. In this way it is possible to assign the light sensor to any of the first 4 lighting groups.

Note
Please only use real settings. ETS does not check parameterization.

Light sensor X* allocated to

* (X = A, B, C, D represents one of the 4 possible light sensors)

Options: Group 1
…
Group 4

With this parameter, every light sensor can be assigned to any of the first 4 lighting groups.

If several light sensors are assigned to a lighting group, a calculated sensor value is used as the actual value (input variable) for the constant lighting control. The calculated actual value is entered in the parameter window *Gx: controller* which is enabled as soon as the lighting group features the additional Light control function. The options *smallest, largest* or *average brightness values* are available.

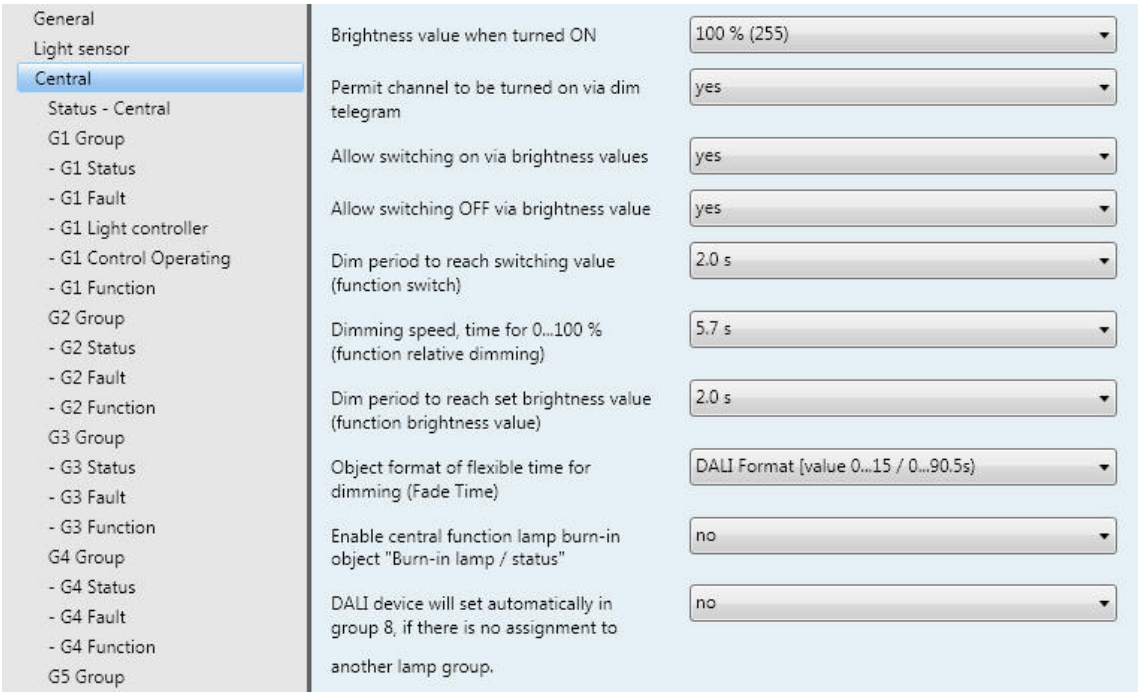
For further information see: Parameter window - Gx Light controller, page 95

The programmer is responsible to ensure that a useful assignment of the Light Sensor is undertaken. ETS does not undertake a plausibility test.

Note
For ideal constant lighting control, every controllable lighting group is assigned to exactly one sensor. This sensor should be positioned in the room, so that ideally it is not influenced by any other source of artificial lighting. Furthermore, no direct incidence of light and no reflections may influence the Light Sensor. **For further information see: Constant lighting control, page 167**

3.2.3 Parameter window *Central*

In the parameter window *Central*, the settings for simultaneous control of all lighting groups are parameterized.



Note
If a central telegram is referred to in the following, this is a telegram, which is received via one of the communication objects with the name *DALI Output*. They are the communication objects No. 11 to 29. The function of the communication object relates to all lighting groups available in the DLR/A. If DALI devices are connected to the output that is not assigned to lighting groups, they are not controlled via the central telegram *DALI output*. In the parameter window *Gx: group* it is possible to program the DLR/A, so that all devices, which are not assigned to a group, are automatically assigned by the DLR/A to group 8. In this way, it is possible to commonly control all connected DALI devices even without manual group assignment via the communication object *DALI output*. If at the time of the incoming central telegram an individual group telegram is implemented, this is immediately interrupted and the central telegram is executed on the DALI output. If all lighting groups are controlled with a central telegram and if a subsequent telegram is received for an individual lighting group, this lighting group will execute the group telegram. The telegram received last has an even higher priority and is executed. Central telegrams interrupt the functions *Slave, Light control* and *Staircase lighting* of a lighting group. The lighting groups undertake the central telegram. The functions switch to standby mode and must be restarted/activated after completion/fulfillment of the central telegram by an ON telegram or activation of the function.

Brightness value when turned ON

Options: previous value
100 % (255)
…
1 % (3)

This parameter defines the brightness value, which is used to switch on all the lighting groups when an ON telegram is received. If a value is set, which is outside the dimming value range (*Maximum brightness value or Minimal brightness value*), the threshold is set as the minimum or maximum brightness value.

The dimming thresholds of the individual lighting groups apply with the control of all groups. In this way, the brightness values of the individual lighting groups under common control can be differentiated.

If individual lighting groups, e.g. are set to a brightness not equal to the switch on value due to dimming, and then receive an ON telegram (central telegram), the parameterized switch on value of the output is set.

- *previous value:* All lighting groups are switched on with the brightness value which they had when switched off centrally via the communication object *Switch (DALI output)*.

Note
Saving of the last brightness value is implemented with each central OFF telegram that is received via the communication object *Switch* or *Switch/status*. At this point, the brightness values of the individual lighting groups are saved and switched back on with the next central ON telegram that is received with the communication object *Switch* or *Switch/status*. If a lighting group is already switched off at the time of the central OFF telegram, the state (brightness value equal to 0) is saved as the last state for the lighting group. Thus the actual room state at the time of switch off is recreated. One exception is if all lighting groups on the output are already switched off. In this case, with a further central OFF telegram, the OFF state is not saved as the last brightness value for all lighting groups. One exception is if all lighting groups on the output are already switched off. In this case, with a further central OFF telegram, the OFF state is not saved as the last brightness value for all lighting groups. If a renewed OFF telegram is received during dimming down, the current brightness value is saved as the last brightness value for the lighting group. On Gateway operating voltage failure the last brightness value is lost, and after recovery of the Gateway operating voltage, the maximum brightness is set. The last brightness value is retained after a download or KNX bus voltage failure. A differentiation is made between the last brightness value with central switching via communication object *Switch (DALI output)* and with group-orientated switching via communication objects *Switch (Group x)*. Both values are independent of each other. This means if some lighting groups are dimmed or switched on or off via the group telegrams, the last brightness values for the central telegram is retained without change. When a central ON telegram is received, the brightness values that were set during the last central OFF telegram are set again.

Permit channel to be turned on via dim telegram

Options: yes
no

With this parameter, the switch on behavior of the DALI output is parameterized during dimming with the central telegram.

- *yes:* Switch on using the dim telegram is allowed.
- *no:* Switching on using the dim telegram is not allowed. The output must be switched on in order to be dimmed.

Allow switching on via brightness values

Options: yes
no

Using this parameter, the switch on behavior of the DALI output with a received brightness value (communication object DALI *output: Brightness value*) is set.

- *yes:* Switch on with a brightness value (8 bit > 0) is permitted.
- *no:* Switch on with a brightness value is not permitted. The output must be switched on in order to execute the brightness value telegram.

Allow switching OFF via brightness value

Options: yes
no

Using this parameter, the switch off behavior of the DALI output is set with a received brightness value.

- *yes*: Switch off with a brightness value is permitted.
- *no*: Switch off with a brightness value is not permitted. The output must be implemented with an OFF telegram via the communication objects *Switch* or *Switch/status*.

Dim period to reach switching value (function switch)

Options: jump to
0.7 s
2.0 s
…
90.5 s
time for dimming changeable via bus

A soft start or soft stop can be set with this parameter. For this purpose, the period is defined, during which the DLR/A dims the lighting group from 0 % brightness to the switch on value after receipt of a switch ON telegram on one of the central communication objects of output A, *Switch* or *Switch/status*. The same speed also applies for an OFF telegram. The dim period is only relevant for central ON/OFF telegrams (1 bit).

- *jump to:* All devices on the DALI output immediately switch ON.
- *0.7 s…90.5 s*: During this time, the lighting group is dimmed from 0 % brightness to the switch on value.

- *time for dimming changeable via bus*. The time received via the communication object *Fade time* (DALI format) or (KNX format) has an effect on the ON/OFF switching performance. The format for the flexible dimming time has to be determined in the parameter *Object format of flexible time for dimming (Fade time)*.

For further information see: Communication object No. 8, page 125, and Table of fading times Fade time (No. 8), page 199

Note
The switch off time is also considered when the lighting group is at the lower dimming threshold and an OFF telegram is received. In this case, the lighting group switches off at the lower dimming value limit only after the programmed dimming time for switch ON/OFF. This ensures that all lighting groups switch off simultaneously. Hierdurch ist sichergestellt, dass alle Leuchtengruppen gleichzeitig ausschalten.

Dimming speed, time for 0...100 %
(function relative dimming)

Options: 0.7 s
…
5.7 s
…
90.5 s
time for dimming changeable via bus

This dimming time only affects DIM telegrams, which are received for the DLR/A via the central communication object *Relative dimming* for the DALI output.

- *time for dimming changeable via bus:* The time received via the communication object *Fade time (DALI format)* or *(KNX format)* has an effect on the dimming speed from 0…100%. The format for the dimming time has to be determined in the parameter *Object format of flexible time for dimming (Fade time)*.

Note
The following should be taken into account when selecting any fade time: depending on the lighting equipment involved, staged dimming can occur with fast dimming speeds and low dimming times. The cause of this is that dimming steps are defined in the DALI standard in order to achieve a logarithmic lighting curve, which appears as a linear response to the human eye.

With the central function, the defined dimming thresholds (minimal/maximum brightness value) in parameter window Parameter window Gx Group, page 63, continue to apply as thresholds for the individual group. If the minimum dim value is less than the possible physical dim value of the DALI equipment, this device is automatically set to the lowest possible physical dim value (background brightness).

During the activated burn-in function the lamps are switched on with 100 % brightness independently of the central DIM telegrams and set brightness values.

Dim period to reach set brightness value (function brightness value)

Options: jump to
0.7 s
…
2.0 s
…
90.5 s
time for dimming changeable via bus

Dieser Parameter bestimmt die Zeitdauer, während der der DLR/A den über die Kommunikationsobjekte *Helligkeitswert* oder *Helligkeitswert/Status* empfangenen Helligkeitswert für alle DALI-Teilnehmer am DALI-Ausgang einstellt.

- *jump to:* All devices on the DALI output immediately switch ON with the received brightness value.
- 0.7 s…90.5 s: During this time, the lighting group is dimmed down to the received brightness value.
- *time for dimming changeable via bus:* The time received via the communication object *Fade time (DALI format)* or *(KNX format)* has an effect on the ON/OFF dimming via the brightness value. The format for the flexible dimming time has to be determined in the parameter *Object format of flexible time for dimming (Fade time)*.

Object format of flexible time for dimming (Fade time)

Options: DALI format in s (value 0...15/0...90.5 s)
KNX format in 100 ms (value 0...65,535/0...9050 ms)

The DLR/A features the option of changing the dimming time via the KNX. For this purpose, only times that are defined in the DALI can be defined and used. These are 16 discrete values.

For further information see: communication object No. 8, page 120, and Table of fading times Fade time (No. 8), page 199

- *DALI format in s (value 0...15/0...90.5 s):* The values received via the communication object are interpreted by the DLR/A as discrete figure values, which are converted directly to the DALI value for the fading time. These values comply with the specified transition times according to the DALI standard. Here, for example, the value 0 means immediate activation of the value whereas 15 corresponds to 90.5 seconds.
- *KNX format in 100 ms (value 0...65,535/0...9050 ms):* The values received via the communication object are interpreted in the DLR/A as 100 ms values and mathematically rounded off to the next DALI value.

For further information see: Code table Diagnostics Low byte (No. 6), page 195

Note
It is recommended that you use the DALI format as this ensures that the exact DALI system based values can be used. When using the KNX format the KNX values (0…9050 ms) are rounded off to the DALI values. This fact is to be considered, particularly when KNX lighting equipment is in combined usage with DALI lighting equipment during brightness response curves, e.g. a KNX dimmer can be dimmed using a dimming time of 13654 ms. As this time is not available in DALI, the DALI equipment is dimmed with 16 seconds. A brightness curve synchronous response that is not 100% identical occurs. In such applications, the KNX lighting equipment times should be used that are also available to DALI. In solchen Anwendungen sind für die KNX-Leuchtmittel Zeiten zu verwenden, die auch im DALI zur Verfügung stehen.

Enable central function *lamp burn-in*
object "Burn-in lamp/status"

Options: no
yes

The DLR/A has the possibility for activation of the function *lamp burn-in* for all connected DALI devices.

Note
Continuous dimming of lamps, which are not burnt in, can mean that the maximum defined brightness of the lamp may not be achieved, and the required brightness value in the area may not be achievable. In order to guarantee the maximum lamp life and correct function of the ballast in the dimmed state, some lamps (vapor filled) must be operated for a certain number of hours at 100 % brightness during initial operation, before they can be permanently dimmed. Detailed information should be taken from the technical data of the lamps.

- *no:* The central function *lamp burn-in* is not enabled.
- *yes:* The central function *lamp burn-in* is enabled. The communication object *Burn-in lamp* appears. The following parameter appears:

  Status of burn-in

  Options: no
  yes

  - *no:* The status of the burn-in state is not provided.
  - *yes: via object "Burn-in lamp/status":* The communication object *Burn-in lamp* is replaced by the communication object *Burn-in lamp/status*. Using this communication object, burn-in of all lighting groups is initiated (when they are parameterized for this function). At the same time, burn-in is indicated by this communication object. The burn-in status is present when at least one lighting group is in the burn-in state. The sending behavior of the status can be parameterized using the following parameter:

    Send

    Options: after a change
    after request
    after a change or request

    - *after a change:* The status is sent via the communication object after a change.
    - *after request:* The status is sent after a request by the communication object *Request status values*.
    - *after a change or request:* The status is sent via the KNX when the status changes or the status is requested via the communication object *Request status values*.

If a telegram with the value 1 is received via the communication object *Burn-in lamp* or *Burn-in lamp/status*, the DLR/A activates the function *Burn-in* for all lighting groups that have enabled the function *Burn-in*. The corresponding burn-in time parameterized for the lighting groups in the parameter window Parameter window Gx Group, page 63, applies.

During function *Burn-in*, the lighting group can only assume the state 0 % (OFF) or 100 % (ON). Every device has its own "burn-in counter", which decrements when the device is switched on. The counter has a counting interval of five minutes, i.e. if the lamp has been switched on for five minutes, the burn-in time is reduced by five minutes.

The internal burn-in counter has a size of 1 byte and provides a timer with 5-minute intervals and a maximum value of 254 hours.

The burn-in time is only counted if a DALI device is connected to the DALI output and is supplied with voltage ready for operation.

For further information see: Burning-in of luminaires, page 161

Note
With the DLR/A there is an additional possibility to individually burn-in the individual lighting group via the optional communication object for a Group X. The optional communication object *Burn-in lamp/status* should be selected in the parameter window Parameter window - Gx Functions, page 82, using one of both additional objects.

Behavior of the function burn-in at KNX bus voltage failure, light controller supply voltage failure and download

The function B*urn-in* is interrupted at KNX bus voltage failure, light controller voltage failure and download. The time for the switched on lamps does not continue to count down. The burn-in time already elapsed is retained and continues to count after KNX bus voltage recovery and light controller supply voltage recovery and download.

The burn-in process is restarted by a telegram with the value 1 to the communication object *Burn-in lamp* or *Burn-in lamp/status*.

A telegram with the value 0 sets the burn-in counter to 0 and ends function *Burn-in* for all lighting groups.

DALI device will automatically be assigned to lighting group 8, if it is not assigned to any other group.

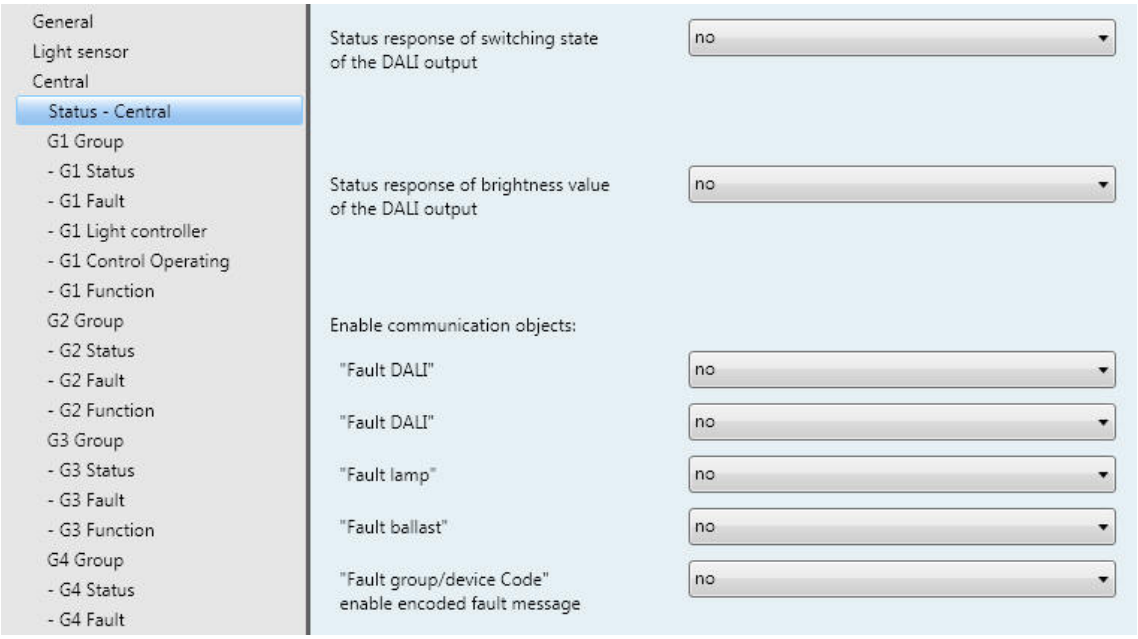
Options: yes
no

- *no:* Lighting group 8 is available as a normal lighting group in the DLR/A. It has the same properties and functions as the lighting groups 1 to 7.
- *yes*: the DLR/A automatically initially assigns all DALI devices to lighting group 8. If the DALI device is assigned to another lighting group, this device will be removed from lighting group 8. Using this procedure, it is possible to commonly control all DALI devices via the DALI output in the KNX without any manual DALI group assignment.

Note
Lighting group 8 is only used internally by the DLR/A. The communication objects of lighting group 8 are still available and can be used for example, to make non-assigned DALI devices visible, by switching on and off without using the Software Tool. In order to control the lamps on the DLR/A via the KNX, they must be assigned to a lighting group. The assignment occurs using the Software-Tool. All lighting groups are indicated on the KNX. Control of the individual 64 DALI devices via the KNX is not possible with the DLR/A. All DALI devices can be controlled via the communication objects DALI output, if they are already assigned to any lighting group. If this is not the case, it is possible to assign DALI devices, which are not assigned to lighting group 8, using the parameters described here. This is undertaken automatically by the DLR/A. If a lighting group is assigned to another lighting group, the DLR/A removes it again from group 8. The DLR/A does not automatically use a DALI broadcast telegram for the telegrams that are received via the communication object of output A. In dependence on different properties of the DALI devices, e.g. minimum and maximum dimming values (dimming thresholds), several DALI group telegrams may be utilized. It is therefore recommended that as many DALI devices as possible with the same physical properties are compiled into a lighting group.

3.2.3.1 Parameter window *Status - Central*

In this parameter window, the status response of the output is parameterized. The status response of the individual lighting group can be set accordingly in the respective group under Parameter window – Gx Status, page 73.



Status response of switching state of the DALI output

Options: no
yes: via object "Switch/status"
yes: via separate object "Status switch"

- *no:* The status of the switch status of a DALI device is not actively sent on the KNX.
- *yes: via object "Switch/status":* The common communication object *Switch/status* receives the switch telegram, and the current status becomes active and is sent on the KNX.
- *yes: via separate object "Status switch":* An additional *Status switch* communication object is enabled. Using it, a 1 bit telegram with the actual switch status is sent on the KNX.

Note
This status message relates to all lighting groups of the DALI output. With a change of the parameterization or after a subsequent switching of the status object, the assignment of the group addresses already allocated to the communication object *Switch* is lost and needs to be reprogrammed. If the communication object *Switch/status* is used for switching and status feedback, particular care must be taken with the send properties of the communication objects.

Important
Unwanted switching states may result for lighting group devices due to differing status messages within a lighting group. For this reason, only one communication object should report the status in a lighting group with several *Switch/status* communication objects to eliminate mutual interference of devices as a result of differing status messages.

With option *yes:* .... the following parameters appear:

Send

Options: <u>after a change</u>
after request
after a change or request

- *after a change:* The status is sent via the communication object after a change.
- *after request:* The status is sent after a request by the communication object *Request status values*.
- *after a change or request:* The status is sent via the KNX when the status changes or the status is requested via the communication object *Request status values*.

Switch value for different brightness values in the output

Options: OFF
<u>ON</u>

This parameter defines the status to be sent if DALI devices with different states are present on the output. This parameter defines the status to be sent if DALI devices with different states are present on the output.

- *ON:* The switch status is sent as an ON (telegram with the value 1) if at least one DALI device is switched on.
- *OFF:* The switch status is only sent as an ON (telegram with the value 1) if all DALI devices are switched on.

Status response of brightness value of the DALI output

Options: <u>no</u>
yes: via object "Brightness value/status"
yes: via separate obj. "Status brightness value"

The parameter defines how the current status of the brightness value of the output (the lighting) is sent on the KNX.

- *no:* The brightness value is not actively sent on the KNX.
- *yes: via object "Brightness value/status"*: The brightness value is sent on the KNX via the communication object *Brightness value/status*.
- *yes: via separate object "Status Brightness value":* An additional *Status Brightness value* communication object for the status message is enabled.

With option yes: .... the following parameters appear:

Send

Options: <u>after a change</u>
after request
after a change or request

- *after a change:* The status is sent via the communication object after a change.
- *after request:* The status is sent after a request by the communication object *Request status values*.
- *after a change or request:* The status is sent via the KNX when the status changes or the status is requested via the communication object *Request status values*.

Brightness value for different values in the output

Options: <u>average brightness of all lamps in the output</u>
highest brightness of all lamps in the output
lowest brightness of all lamps on the output

This parameter defines the status to be sent if devices with different states are present on the output.

- *average brightness of all lamps in the output:* The average brightness of all DALI devices (not the lighting groups) is sent as the status of the output on the KNX. Thus a lighting group with many DALI devices has a higher weighting in the calculation of the average brightness.
- *highest brightness of all lamps in the output:* The highest brightness value of the DALI devices is taken as the status of the output sent on the KNX.
- *lowest brightness of all lamps on the output:* The lowest brightness value of the DALI devices is taken as the status of the output sent on the KNX.

Using the following parameters, further communication objects and their associated functions for the output of the DLR/A can be enabled:

Enable communication objects:

"Fault DALI"

Options: <u>no</u>
yes

There is a DALI conflict should the assignment of DALI devices stored in the DLR/A diverge from the actual group assignment in the DALI line.

- *no:* The communication object *Fault DALI* is not enabled.
- *yes:* The communication object *Fault DALI* is enabled. As soon as there is a conflict, this is indicated by the value 1 in the communication object *Fault DALI*. The following parameter appears:

Send

Options: <u>after a change</u>
after request
after a change or request

- *after a change:* The status is sent via the communication object after a change.
- *after request:* The status is sent after a request by the communication object *Request status values*.
- *after a change or request:* The status is sent via the KNX when the status changes or the status is requested via the communication object *Request status values*.

"Fault DALI"

Options: <u>no</u>
yes

Using this communication object, a fault of the DALI communication of the output, i.e. a short-circuit > 500 ms or a data collision, can be sent or read, e.g. for diagnostic purposes. Individual fault indication objects are available for a ballast/lamp fault.

- *no:* The communication object *Fault DALI* is not enabled.
- *yes:* The communication object *Fault DALI* is enabled. As soon as there is a DALI fault on the output, it is indicated by a 1 in the communication object *Fault ballast*. The following parameter appears:

  Send

  Options: <u>after a change</u>
  after request
  after a change or request

  - *after a change:* The status is sent via the communication object after a change.
  - *after request:* The status is sent after a request by the communication object *Request status values*.
  - *after a change or request:* The status is sent via the KNX when the status changes or the status is requested via the communication object *Request status values*.

"Fault lamp"

Options: <u>no</u>
yes

Via this communication object, a fault of a lamp for the DALI output can be sent or read.

- *no:* The communication object *Fault lamp* is not enabled.
- *yes:* The communication object *Fault lamp* is enabled. As soon as there is a lamp fault on the output, it is indicated by a 1 in the communication object *Fault lamp*. The following parameter appears:

Send

Options: after a change
after request
after a change or request

- *after a change:* The status is sent via the communication object after a change.
- *after request:* The status is sent after a request by the communication object *Request status values*.
- *after a change or request:* The status is sent via the KNX when the status changes or the status is requested via the communication object *Request status values*.

"Fault ballast"

Options: no
yes

Using this communication object, a ballast fault can be sent or read. Using this communication object, a ballast fault can be sent or read.

- *no:* The communication object *Fault ballast* is not enabled.
- *yes:* The communication object *Fault ballast* is enabled. As soon as there is a ballast fault on the output, it is indicated by a 1 in the communication object *Fault ballast*.

Note
In order to correctly detect the fault of a ballast, the DLR/A must have correctly identified all connected DALI devices and thus know the addresses to be monitored. This identification process can be triggered via the communication object *Detect ballasts*. An automatic *Detect ballasts*, e.g. after a KNX bus voltage recovery or light controller supply voltage recovery does not take place. After approx. 90 seconds, all the DALI devices are detected and the failure of a ballast can be correctly established. Not just the number of ballasts is considered, but also the DALI addresses. If a DALI device has failed and has been replaced by a DALI device with another address, a ballast fault will still be indicated. The ballast fault is only remedied after a new DALI device has received the address of the DALI device that has malfunctioned. The activation should be carried out directly after commissioning or when extending or reducing the DALI devices. The DALI devices are continually monitored, regardless of whether the lamp is active or not active. The DALI devices must be installed properly and supplied with operating voltage. If all DALI devices of a lighting group are no longer recognized by the DLR/A, e.g. all ballasts have failed, the status values of the lighting group are reset as follows: Brightness value to 0, Switch state to 0 (OFF) and any existing lamp fault is reset, as a statement of the state of the lighting group is no longer possible.

With the option *yes*, the following parameters appear:

Send

Options: <u>after a change</u>
after request
after a change or request

- *after a change:* The status is sent via the communication object after a change.
- *after request:* The status is sent after a request by the communication object *Request status values*.
- *after a change or request:* The status is sent via the KNX when the status changes or the status is requested via the communication object *Request status values*.

"Fault group/device code"
enable encoded fault message

Options: <u>no</u>
yes

With this parameter, the communication object *Fault group/device code* can be enabled. The fault status (lamp and ballast fault) of the lighting groups or the individual DALI devices are sent on the KNX.

For further information see: Communication object No. 19, page 133, and Code table Fault group/device code (No. 19), page 202

- *no:* The communication object *Fault group/device code* is not enabled.
- *yes:* The communication object *Fault group/device code* is enabled. The following parameter appears:

  Send number of the failed group or failed device

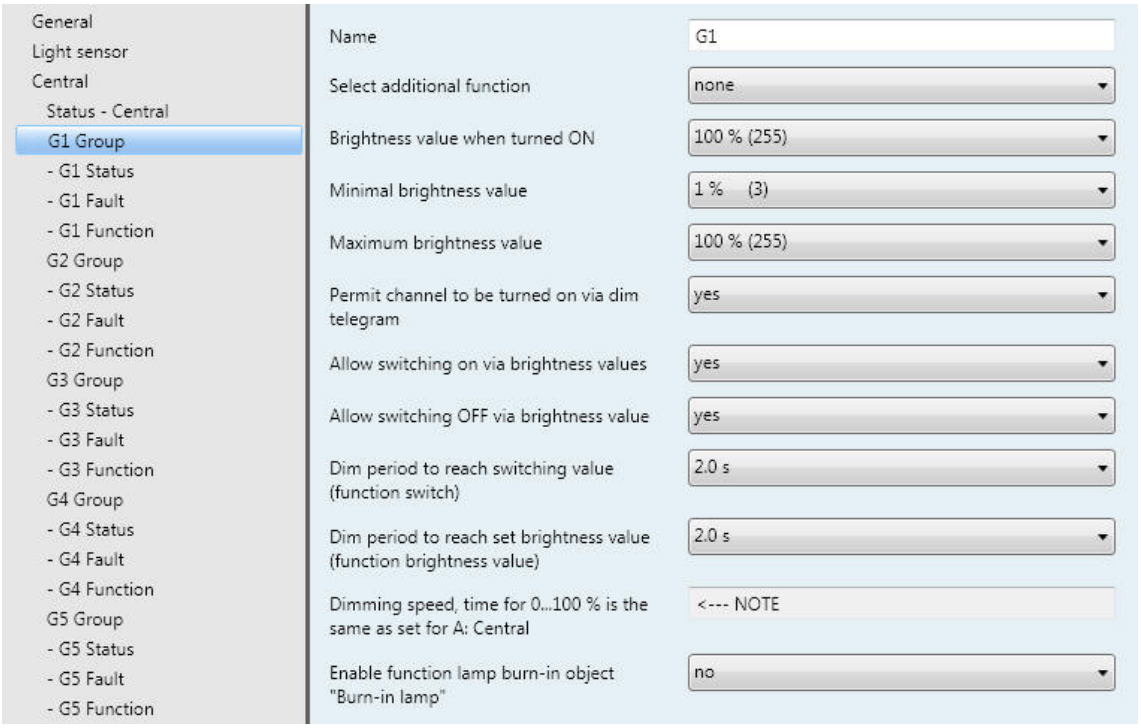
  Options: <u>group orientated</u>
  based on DALI device

  This parameter determines whether the fault relates to a lighting group or an individual DALI device.

  - *group orientated:* The values of the communication objects *Fault group/device code* (No. 19) and *No. Group/device fault* (No. 21) relate to a lighting group fault. The numbers of the lighting groups and information about the lighting groups are sent.
  - *based on DALI device:* The values of the communication objects *Fault group/device code* (No. 19) and *No. Group/device fault* (No. 21) relate to a DALI device fault. The numbers (DALI short addresses with 1 added) of the DALI devices and information about the DALI devices are sent.

3.2.3.2 Parameter window *Gx Group*

In these parameter windows, the properties for every lighting group are parameterized



First of all, the lighting group to be parameterized is selected by the number of the lighting group G1…G8. The lighting groups are parameterized independently of each other. For this reason, we refer to the general lighting group Gx in the following. X can represent any of the 8 lighting groups.

The assignment of the individual DALI lamps to a lighting group is undertaken with the ETS independent Software Tool.

For more information see: online help, Software Tool

Name

Options: Gx

Every lighting group can be assigned with a name consisting of a maximum of 40 characters.

The name is stored in the ETS database and also stored in the DLR/A by a download. Accordingly, the name is also available in the Software Tool. A uniquely universal designation simplifies the description of the engineering project.

Select additional function

Options: none
Slave
Light control

This parameter defines an additional function for this lighting group.

- *none:* This lighting group operates as a "normal" group of the DLR/A without additional function. It can be switched, dimmed or controlled with a brightness value.
- *slave:* This lighting group is defined as a slave. This slave lighting group is forcibly operated by a master. This can be another lighting group in the DLR/A or a second KNX device. In this case data is exchanged via KNX with communication objects. Parameter window - Gx Slave, page 108, is enabled. In these windows, the properties for the slave lighting group are parameterized.
- *light control:* The lighting group undertakes lighting control. The brightness value of the lighting group is calculated in dependence on the brightness detected via the light sensor, so that the light density (brightness of the surface underneath the light sensor) detected by the light sensor remains constant. The setpoint value should be set via a commissioning routine with artificial and daylight calibration. See Parameter window - Gx Light controller, page 95, and Parameter window - Gx Control Operating, page 103 plus chapter Constant lighting control, page 167. The lighting control can be switched on and off via the *Activate controller* communication object. Accordingly, an energy efficient building automation with optimum brightness during occupancy can be generated together with the use of a presence detector.

Note
Other functions such as staircase lighting, blocking, forced operation and characteristic curve adjustment are enabled in Parameter window - Gx Functions, page 82.

Note
The additional functions Slave and lighting control can assume the following operating states: **additional function not activated:** The additional function has been deactivated via its communication object *Select additional function*; a telegram with value 0 has been received. In this state, the DLR/A behaves like a "normal" group-orientated DALI gateway. In this state, an ON telegram does not start the additional function. Only after a telegram with the value 1 has been received on the communication object Select additional function is it possible to start the additional function. **additional function is in standby mode:** The additional function is active but has however been interrupted, e.g. by the OFF telegram. The lighting group is in standby mode. With an ON telegram (telegram to the communication object *Switch*) the additional function is again triggered, i.e., the *Lighting control* operates and the slave lighting group again responds to the communication object *Brightness value of slave*. **additional function is running:** *Lighting control* runs, the function *Slave* receives brightness values from the master. With corresponding parameterization of the switching telegrams, the additional functions can be set to standby mode. **state after download:** After a download, the additional functions are active and can be found in standby mode. Thus, the additional function can be started immediately after download without any additional activation, exclusively with a corresponding ON telegram. When the corresponding communication object for the status message of the additional function is enabled via the parameterization, the status of the additional function (activated/deactivated) is sent via the respective communication object *Activate additional function/status* after a download.

If an additional function is not selected or deactivated, the following parameters apply:

Brightness value when turned ON

Options: previous value
100 % (255)
99 % (252)
…
1 % (3)

If an additional function is enabled, the parameter name changes to *Brightness value when turned ON (only if addition function is not activated)*.

This parameter defines the brightness value, which is used to switch on the lighting group when an ON telegram is received.

If a value is set, which is outside the dimming value range (*Maximum brightness value or Minimal brightness value*), the threshold is set as the minimum or maximum brightness value.

If for example, the lighting group is at a brightness value, which is not equal to the switch on value, and it receives an ON telegram, the parameterized switch on value is set.

- *previous value:* The lighting group switches on with the brightness value, which it had when the OFF telegram was received.

Note
Saving the last brightness value is undertaken with every OFF telegram except for the lighting groups already switched off. In this case, with a further OFF telegram, the OFF state is not saved as the last brightness value. In this case, with a further OFF telegram, the OFF state is not saved as the last brightness value. If a renewed switch OFF telegram is received during dimming down, the current brightness value is saved as the last brightness value. On light controller supply voltage failure, the information of the last brightness value is retained. With a renewed ON telegram after light controller supply voltage recovery, the brightness value of the last OFF telegram is still set. The last brightness value is lost after a download or KNX bus voltage failure. After KNX bus voltage recovery, the last brightness value is set to maximum brightness. A differentiation is made between the last brightness value with central switching via the communication object *Switch (DALI output)* and group-orientated switching via communication object *Switch (Group x)*. Both values are independent of each other. This means if some lighting groups are dimmed or switched on or off via a central telegram, the last brightness values for the lighting group are retained without change. When an ON telegram is received for the lighting group, the brightness value, which was set with the last OFF telegram, is set again with the lighting group.

Minimal brightness value

Options: 100 % (255)
99 % (252)
…
1 % (3)

This parameter defines the minimum brightness value, which the lamps of the lighting group assume. This value is stored in the DALI devices and thus applies for all functions. If a minimum brightness value is set, which exceeds the maximum brightness value, the minimum brightness value is set equal to the maximum brightness value.

If the function *Burn-in lamp* is activated, the lamp group will be operated only with 0 % (OFF) or 100 % brightness, regardless of this setting.

If a brightness value is received via the communication objects *Brightness value* and *Brightness value/status* or *Brightness value of Slave*, which are below the defined minimum dimming value, the minimum dimming value is set.

The Minimum brightness value also applies in the functions *Staircase lighting* and *Scenes*.

Note
The maximum and minimum dimming values selected for the lighting group are also valid with a central telegram via the communication objects of output A. Example: Lighting group 1 is parameterized with a minimum dimming value of 20 %; lighting group 2 is parameterized with 10 %. If the DLR/A receives a central telegram in this constellation to *set the brightness value to 5*; lighting group 1 is set to 20 %, and lighting group 2 is set to 10 %.

Note
The set minimum brightness value for the lighting group has nothing to do with the absolute minimum brightness value (basis brightness) which the ballast lamp combination can assume. This device-specific value is programmed by the manufacturer during the manufacturing process. Typically the values are between 1 and 5 %. It is important to note that the % specification does not correlate with the KNX values but relates to the luminous flux. **For further information see: DALI lighting curve, page 191**

Maximum brightness value

Options: 100 % (255)
99 % (252)
…
1 % (3)

This parameter defines the maximum brightness value, which the lamps of the lighting group can assume. This value is stored in the DALI devices and thus applies for all functions. If a maximum brightness value is set, which is below the minimum dimming value, the maximum brightness value is set equal to the minimal dimming value.

If the function *Burn-in lamp* is activated, the lamp group will be operated only with 0 % (OFF) or 100 % brightness, regardless of this setting.

If a brightness value is received via the communication objects *Brightness value*, *Brightness value/status* or *Brightness value of Slave*, which is above the defined maximum dimming value, the maximum dimming value is set.

The Maximum brightness value also applies in the functions *Staircase lighting* and *Scenes*.

Note
The maximum and minimum dimming values selected for the lighting group are also valid with a central telegram via the communication objects of output A. Example: Lighting group 1 is parameterized with a maximum dimming value of 80 %; lighting group 2 is parameterized with 90 %. If the DLR/A receives a central telegram in this constellation to *set the brightness value to 100*; lighting group 1 is set to 80 %, and lighting group 2 is set to 90 %.

Note
The set minimum brightness value for the lighting group has nothing to do with the absolute minimum brightness value (basis brightness) which the ballast lamp combination can assume. This device-specific value is programmed by the manufacturer during the manufacturing process. Typically the values are between 1 and 5 %. It is important to note that the % specification does not correlate with the KNX values but relates to the luminous flux. **For further information see: DALI lighting curve, page 191**

Permit channel to be turned on via dim telegram

Options: yes
no

This parameter defines the switch on response of the lighting group at dimming.

- *yes:* Switch on using the dim telegram is allowed.
- *no:* Switching on using the dim telegram is not allowed. The output must be switched on in order to be dimmed.

Allow switching on via brightness values

Options: yes
no

This parameter defines the switch on performance with a received brightness value.

- *yes:* Switch on with a brightness value is permitted.
- *no:* Switch on with a brightness value is not permitted. The output must be switched on in order to execute the brightness value telegram.

Allow switching OFF via brightness value

Options: yes
no

This parameter defines the switch off performance with a received brightness value.

- *yes*: Switch off with a brightness value is permitted.
- *no*: Switch off with a brightness value is not permitted. The output must be implemented with an OFF telegram via the communication objects *Switch* or *Switch/status*.

Dim period to reach switching value (function switch)

Options: jump to
0.7 s
2.0 s
…
90.5 s
time for dimming changeable via bus

A soft start or soft stop can be set with this parameter. For this purpose, the time duration during which the DLR/A dims the lighting group from 0 % brightness to the switch on value with an ON telegram is defined.

The same speed also applies for an OFF telegram. The dim period is only relevant for ON/OFF telegrams (1 bit).

- *jump to:* All devices of the lighting group switch ON immediately.
- *0.7 s…90.5 s*: During this time, the lighting group is dimmed from 0% brightness to the switch on value.
- *time for dimming changeable via bus:* The time received via the communication object *Fade time (DALI format)* or *(KNX format)* has an effect on the ON/OFF switching performance. There are 16 discrete values, which are defined according to DALI for the time for dimming changeable via bus. If the KNX format is selected for the *time for dimming changeable*, rounding off errors can occur as a result of discrete DALI times.

For further information see: Communication object No. 8, page 125, and Table of fading times Fade time (No. 8), page 199

Note
The switch off time is also considered when the lighting group is at the lower dimming threshold and an OFF telegram is received. In this case, the lighting group switches off at the lower dimming value limit only after the programmed dimming time for switch ON/OFF. This ensures that all lighting groups switch off simultaneously. This ensures that all lighting groups switch off simultaneously.

Dim period to reach set brightness value (function brightness value)

Options: jump to
0.7 s
2.0 s
…
90.5 s
time for dimming changeable via bus

This parameter determines the time duration used to achieve the brightness value received via the communication objects *Brightness value* or *Brightness value/status*.

- *jump to:* All devices of the lighting group immediately switch ON with the received brightness value.
- 0.7 s…90.5 s: During this time, the lighting group is dimmed down to the received brightness value.
- *time for dimming changeable via bus:* The time received via the communication object *Fade time (DALI format)* or *(KNX format)* has an effect on the ON/OFF dimming via the brightness value. There are 16 discrete values, which are defined according to DALI for the time for dimming changeable via bus. If the KNX format is selected for the *time for dimming changeable*, rounding off errors can occur as a result of discrete DALI times.

For further information see: Communication object No. 8, page 125, and Table of fading times Fade time (No. 8), page 199

Dimming speed, time for 0...100 % is the same as set for A: Central

<−−− Note

Enable function lamp burn-in object "Burn-in lamp"

Options: yes
no

This parameter defines whether the lighting group should be considered with function *lamp burn-in*. Lighting equipment, e.g. incandescent bulbs, which does not require a burn-in phase can be excluded from the burn-in process. They can always be dimmed independently of the function *Burn-in lamp*.

The function *Burn-in lamp* is enabled in Parameter window Central, page 49. In addition to the central function *Burn-in lamp*, every lighting group can be burnt-in individually via the additional object *Burn-in lamp/status*. The additional communication object is selected under additional objects in Parameter window - Gx Functions, page 82.

- *yes:* The lighting group is considered during active function *Burn-in lamp* and during the burn-in phase and it can only be switched off with 0 % brightness (OFF) and on with 100 % brightness (ON).
- *no:* The lighting group is not taken into consideration during an activated function *Burn-in lamp* and can also be dimmed during an activated function B*urn-in lamp*.

Response with activated function Burn-in lamp

If a telegram with the value 1 is received via the communication object *Burn-in lamp*, the DLR/A activates the function *Burn-in* and sets the programmable burn-in time..

During burn-in only the lighting groups are considered that have been selected with the corresponding parameterization. The parameterization is implemented in Parameter window Gx Group, page 63, with the parameter *Enable with burn-in fu*nction (*communication object "Burn-in lamp"*).

During function *Burn-in*, the lighting group can only assume the state 0 % (OFF) or 100 % (ON). Every device has its own "burn-in counter", which decrements when the device is switched on. The counter has a counting interval of five minutes, i.e. if the lamp has been switched on for five minutes, the burn-in time is reduced by five minutes.

The internal burn-in counter has a size of 1 byte and provides a timer with 5-minute intervals and a maximum value of 254 hours.

The burn-in time is only counted if a DALI device is connected to the DALI output and is supplied with voltage ready for operation.

For further information see: Burning-in of luminaires, page 161

Note
With the DLR/A there is an additional possibility to individually burn-in the individual lighting group via the optional communication object for a Group X. The optional communication object *Burn-in lamp/status* should be selected in the parameter window Parameter window - Gx Functions, page 82, using one of both additional objects.

Lamp Burn-in period in hours [1…254]

Options: 1…100…254

This parameter determines the time period for function *Burn-in*. As long as this time has not elapsed, the DALI device can only be operated with 100 % and OFF on the DALI output, i.e., at every set brightness value not equal to 0 %, the lamp is switched on with 100 % brightness.

After the burn-in time has elapsed or the function is deactivated (received telegram with the value 0 via communication object *Burn-in lamp*), the DALI device can be dimmed as usual.

The burn-in time is only counted if a DALI device is connected to the DALI output and is supplied with voltage ready for operation.

On light controller supply voltage failure of KNX bus voltage failure, the remaining burn-in time is stored and used again after voltage recovery. This also applies after an ETS download.

Status of burn-in

Options: no
yes: via object "Burn-in lamp/status"

The DLR/A features the option of sending the status of the function *Burn-in* on the KNX via communication object *Burn-in lamp/status*.

- *no:* No status message is sent for the function *lamp burn-in*.
- yes: The communication object *Burn-in lamp* changes to *Burn-in lamp/status*. If this communication object receives an ON telegram, the function *Burn-in* is started and the status is sent on the KNX. The following parameter appears:

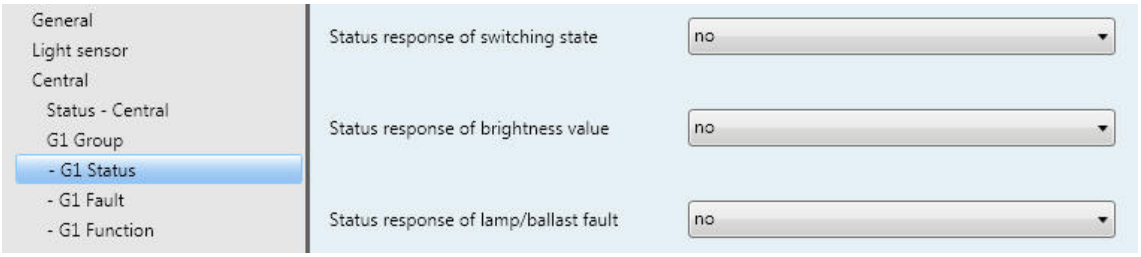
  Send

  Options: after a change
  after request
  after a change or request

  - *after a change:* The status is sent via the communication object after a change.
  - *after request:* The status is sent after a request by the communication object *Request status values*.
  - *after a change or request:* The status is sent via the KNX when the status changes or the status is requested via the communication object *Request status values*.

3.2.3.2.1 Parameter window - *Gx Status*

In this parameter window, the status response of the selected lighting group is parameterized.



Each lighting group is individual and can be programmed independently of the other lighting groups. The parameterization relates to the communication objects of the lighting group (*Group x*).

The status behavior of the output, see Parameter window Status - Central, page 57, is independent of the parameterization of the status response of the lighting group.

Status response of switching state

Options: no
yes: via object "Switch/status"
yes: via separate object "Status switch"

- *no:* The status of the switch state is not actively sent on the KNX.
- *yes: via object "Switch/status":* The common communication object *Switch/status* receives the switch telegram, and the current status becomes active and is sent on the KNX.
- *yes: via separate object "Status switch":* An additional *Status switch* communication object is enabled. Using it, a 1 bit telegram with the actual switch status is sent on the KNX. This option is not available if the lighting group is parameterized as a Light controller or Slave.

Note
This status message relates to all connected devices of the lighting group. With a change of the parameterization or after a subsequent switching of the status object, the assignment of the group addresses already allocated to the communication object *Switch* is lost and needs to be reprogrammed. If the communication object *Switch/status* is used for switching and status feedback, particular care must be taken with the read and write properties (flags) of the communication objects. **For further information see: Control telegram and status with a communication object, page 162** Unwanted switching states may result for lighting group devices due to differing status messages within a lighting group. For this reason, only one communication object should report the status in a lighting group with several *Switch/status* communication objects to eliminate mutual interference of devices as a result of differing status messages.

With the option *yes: via object "Switch/status"*, the following parameter appears:

Send

Options: after a change
after request
after a change or request

- *after a change:* The status is sent via the communication object after a change.
- *after request:* The status is sent after a request by the communication object *Request status values*.
- *after a change or request:* The status is sent via the KNX when the status changes or the status is requested via the communication object *Request status values*.

Status response of brightness value

Options: no
yes: via object "Brightness value/status"
yes: via separate obj. "Status Brightness value"

The parameter defines how the current status of the brightness value of the output (the lighting) is sent on the KNX.

- *no:* The brightness value is not actively sent on the KNX.
- *yes: via object "Brightness value/status"*: The brightness value is sent on the KNX via the communication object *Brightness value/status*.
- *yes: via separate object "Status Brightness value"*: An additional *Status Brightness value* communication object for the status message is enabled. This option is not available if the lighting group is parameterized as a Light controller or Slave.

With the option *yes: via object "Brightness value/status"*, the following parameter appears:

Send

Options: <u>after a change</u>
after request
after a change or request

- *after a change:* The status is sent via the communication object after a change.
- *after request:* The status is sent after a request by the communication object *Request status values*.
- *after a change or request:* The status is sent via the KNX when the status changes or the status is requested via the communication object *Request status values*.

Status response of lamp/ballast fault

Options: yes
<u>no</u>

This parameter defines how the current status of a lamp/ballast fault is sent.

- *yes:* A status message is sent. The sending behavior can be set using the following *Send* parameter
- *no:* No status message is sent and no communication object is displayed.

With option *yes*, the following parameters appear:

Send

Options: <u>after a change</u>
after request
after a change or request

- *after a change:* The status is sent via the communication object after a change.
- *after request:* The status is sent after a request by the communication object *Request status values*.
- *after a change or request:* The status is sent via the KNX when the status changes or the status is requested via the communication object *Request status values*.

Content of communication object

Option: Fault lamp
Fault ballast
Fault lamp or ballast

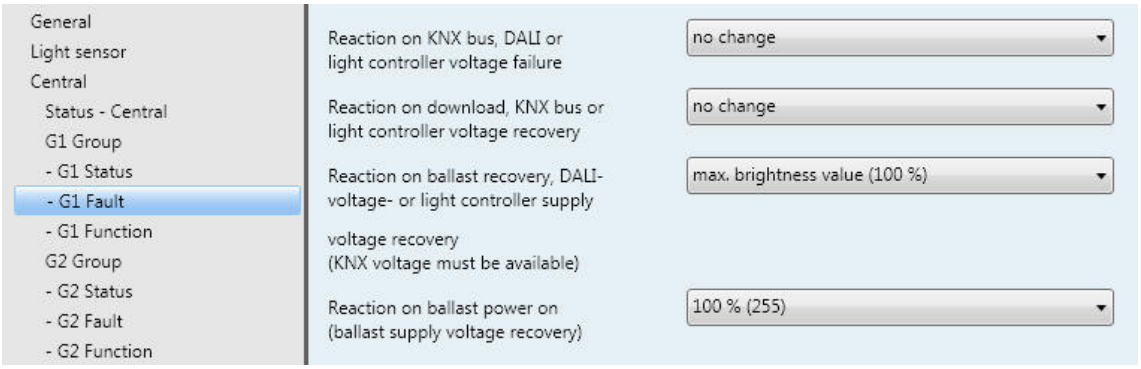
This parameter determines the equipment fault, which is provided on the enabled communication object.

- *Fault lamp:* The communication object *Fault lamp* is enabled. Using this communication object, it is possible to provide information on whether the lighting group of a lamp has failed on the KNX. Should there be a fault, the communication object *Fault lamp* is written with a 1 and sent on the KNX in dependence on the parameterization set beforehand.
- *Fault ballast:* The communication object *Fault ballast* is enabled. Using this communication object, it is possible to provide information on whether the lighting group of a ballast has failed on the KNX. Should there be a fault, the communication object *Fault lamp* is written with a 1 and sent on the KNX in dependence on the parameterization set beforehand.
- *Fault lamp or ballast:* The communication object *Fault lamp or ballast* is enabled. Using this communication object, it is possible to provide information on the KNX relating to a lamp failure or a ballast failure in the lighting group.

Note
In order to correctly detect a ballast fault, the function *Detect ballasts* must be activated in the DALI Light Controller. With this function, the DLR/A notes the exact number of DALI devices and the DALI address of the individual DALI devices currently connected to the DLR/A for reference purposes. If the determined number of DALI devices does not correspond with the referenced number of devices or if a DALI address has disappeared, this is evaluated as a ballast fault and displayed on the KNX using the communication object, as dependent on the sending parameterization. The function *Detect ballasts* can be triggered either via the communication object *Detect ballasts* or by pressing the S button when in manual mode. Alternatively, this function can also be performed during the DALI group assignment phase in the Software Tool.

3.2.3.2.2 Parameter window - *Gx Fault*

In this parameter window, the reaction of the lighting group to failure and recovery of the KNX/DALI voltage, light controller supply voltage or a ballast is parameterized.



Reaction on KNX bus, DALI or light controller voltage failure

Options: no change
max. brightness value (100 %)
min. brightness value (1 %)
OFF (0 %)

This parameter defines how the DALI devices of the lighting group react if communication with the DLR/A via KNX is not possible due to a KNX bus voltage failure, a DALI short-circuit or failure of the light controller supply voltage.

A download is comparable with a KNX bus voltage failure, whereby the lighting group initially assumes the parameterized value of brightness here. The value for KNX bus voltage recovery is set at the end of the download.

- *no change:* The brightness of the lighting group does not change. DALI devices, which are switched off, remain off. The timer functions, such as *Staircase lighting* and *lamp burn-in*, are not continued.
- *max. brightness value (100 %):* The lighting group is switched on or dimmed with the maximum brightness value.
- *min. brightness value (1 %):* The lighting group is switched on or dimmed with the minimum brightness value.
- *OFF (0 %):* The lighting group is switched off.

Note
The factory default setting of the ballast is changed with this parameter (system failure level).

Note
Behavior between ballast power on and absent DALI voltage (interface failure/system failure) According to the DALI standard, no exact priority has been defined between these two functions. The behavior depends of when the ballast is again ready to receive and the ballast detects that DALI voltage is not present. Both depend on the electronics and firmware of the ballast. In most cases, the following behavior is expected: After the ballast operating voltage is applied, the power-on level is started by the ballast. However, a few 100 ms later the ballast will detect that there is no DALI voltage applied. This on the other hand will trigger the system fault Level (no DALI voltage). In this way, the user will only visually detect the system fault (the parameterized behavior of the DALI voltage failure).

Note
The minimum and maximum dimming values (dimming thresholds) still remain valid. The functions Scene, Staircase lighting, Blocking, Forced operation as well as dimming processes are interrupted. The states of the timer functions after a download or after KNX bus voltage recovery are to be set separately in the respective parameter windows of the timer function. The operating voltage applied to DALI equipment, e.g. ballasts, is a prerequisite for correct behavior of the DALI equipment.

Reaction on download, KNX bus or light controller voltage recovery

Options: no change
Status before failure
max. brightness value (100 %)
min. brightness value (1 %)
OFF (0 %)

This parameter determines how the DALI device of the lighting group reacts after a download or at KNX bus voltage recovery or after light controller supply voltage recovery.

- *no change:* The brightness of the lighting group does not change. DALI devices, which are switched off, remain off.
- *Status before failure:* The lighting group is brought to the state which it had before the voltage failure. The brightness value must be set for at least two seconds before KNX bus voltage failure or a download in order to ensure that it is set again after KNX bus voltage recovery.
- *max. brightness value (100 %):* The lighting group is switched on or dimmed with the maximum brightness value.
- *min. brightness value (1 %):* The lighting group is switched on or dimmed with the minimum brightness value.
- *OFF (0 %):* The lighting group is switched off.

Note
The minimum and maximum dimming values (dimming thresholds) still remain valid. The functions *Scene, Staircase lighting, Block, Forced operation* as well as dimming processes are interrupted. The states of the timer functions after a download or after KNX bus voltage recovery are to be set separately in the respective parameter windows of the timer function. The operating voltage applied to DALI equipment, e.g. ballasts, is a prerequisite for correct behavior of the DALI equipment.

Reaction on ballast recovery, DALI-voltage- or light controller supply

Voltage recovery
(KNX voltage must be available)

Options: actual KNX target state
max. brightness value (100 %)
min. brightness value (1 %)
OFF (0 %)
no change

This parameter determines how a DALI device that has failed behaves if it is has already been detected by the DLR/A, and does not respond (has failed) and is once again detected by the DLR/A.

- *actual KNX target state:* The DALI device assumes the brightness value, which it has assumed via a KNX telegram, if it had not failed.
- *no change:* The DALI device does not change its current brightness value after its recovery.
- *max. brightness value (100 %):* After recovery, the DALI device is switched on with the maximum brightness value or is dimmed to it.
- *min. brightness value (1 %):* .After recovery, the DALI device is switched on with the minimum brightness value or is dimmed to it.
- *OFF (0 %):* The DALI device is switched off after recovery.

Note
The minimum and maximum dimming values (dimming thresholds) still remain valid. The functions Scene, Staircase lighting, Blocking, Forced operation as well as dimming processes are interrupted. The states of the timer functions after a download or after KNX bus voltage recovery are to be set separately in the respective parameter windows of the timer function. The operating voltage applied to DALI equipment, e.g. ballasts, is a prerequisite for correct behavior of the DALI equipment.

Reaction on ballast power on (ballast supply voltage recovery)

Options: previous brightness value
100 % (255)
99 % (252)
…
1 % (3)
0 % (OFF)

This parameter determines the response of the DALI device (ballast) at ballast supply voltage recovery. A storage location is provided in the DALI device (ballast) for this purpose. The brightness value used by the DALI device (ballast) at ballast supply voltage recovery to switch on the lamp is stored at this memory location.

The brightness value of the DALI device (ballast) is set as a factory default value to the maximum brightness (100 %). This has the advantage that without any DALI programming or commissioning requirement, the DALI device (ballast) is switched on and off normally via the operating voltage of the ballast. This can be useful particularly during commissioning. Should no DALI commissioning have been undertaken, the lighting can be switched on and off via the operating voltage of the ballast using a normal miniature circuit-breaker.

However under "normal" operation this behavior can prove to be a disadvantage: at ballast operating voltage failure and ballast supply voltage recovery, all ballasts switch on with the maximum brightness. This can lead to increased inrush current and in the worst case can cause a circuit-breaker to trip. Moreover, the entire building is fully illuminated and must be switched off manually.

In order to allow the user to set the default factory switch on response with ballast supply voltage recovery, the parameter can be used to set any brightness value between 0 % (OFF) and 100 % (maximum brightness value) or the previous brightness value before failure.

- *100 % (255)…0 % (OFF):* This is the brightness value used to switch on the DALI device (ballast) independently after ballast supply voltage recovery.
- *previous value:* The DALI device (ballast) is switched on with the last (previous) set brightness value used before ballast voltage failure. This function must be supported by the DALI devices. Since the end of 2009 this property has been defined in the standard for DALI devices. Please contact the ballast manufacturer in case of doubt.

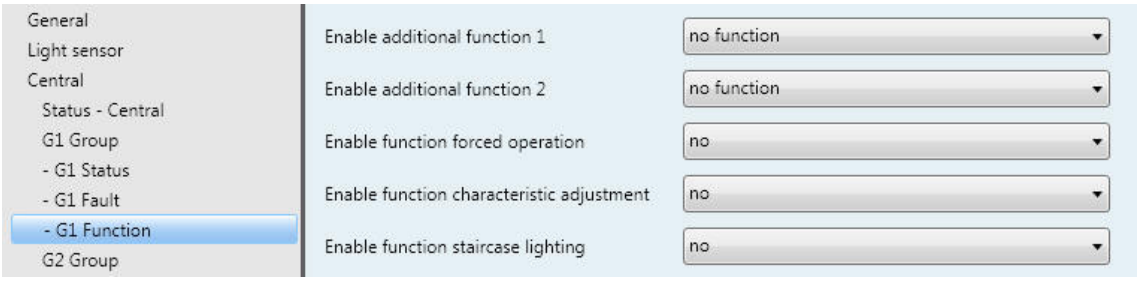
Note
The factory default setting of the ballast is changed with this parameter (power on level).

Note
Behavior between ballast power on and absent DALI voltage (interface failure/system failure) According to the DALI standard, no exact priority has been defined between these two functions. The behavior depends of when the ballast is again ready to receive and the ballast detects that DALI voltage is not present. Both depend on the electronics and firmware of the ballast. In most cases, the following behavior is expected: After the ballast operating voltage is applied, the power-on level is started by the ballast. However, a few 100 ms later the ballast will detect that there is no DALI voltage applied. This on the other hand will trigger the system fault Level (no DALI voltage). In this way, the user will only visually detect the system fault (the parameterized behavior of the DALI voltage failure).

Note
Interaction between ballast power on and DALI voltage recovery (interface failure): The power-on level of the DALI device (ballast) is set first of all after DALI device (ballast) supply voltage recovery. The brightness value is stored in the DALI device (ballast) and is set independently by the DALI device (ballast) directly after the ballast supply voltage recovery. Simultaneously, the DLR/A on the DALI will once again receive responses from the DALI device (ballast). As a result, the DLR/A informs the re-detected DALI device (ballast) again about the lighting group information. After to this procedure, the lamps are controlled with the parameterized brightness level at DALI bus voltage recovery. If the power-on brightness is to be retained, the option no change has to be set for the parameter *Reaction on DALI bus voltage recovery or DALI voltage recovery*.

3.2.3.2.3 Parameter window - *Gx Functions*

In this parameter window, additional functions of the output can be enabled.



The DLR/A has the option to make two additional communication objects available. These communication objects are primarily intended for certain functions, which are not required in parallel. For this reason, the user has a free selection of enabling two additional objects for their application.

The DLR/A does not check the plausibility of the parameterization. Accordingly, the same communication object can be selected twice or a communication object, whose function is fully unsuited, e.g. the communication object *Warning staircase lighting*, does not have a function without function *stairc. light activate/status*.

Enable additional function 1

Enable additional function 2

Options: no function
Enable burn-in lamp/status
Block
Staircase light. permanent ON
Warning staircase lighting
Stairc. light. activate/status

With both these parameters, two additional communication objects can be enabled for the lighting group that are useful for special applications.

- *no function:* No additional communication object is enabled.
- *Enable burn-in lamp/status:* The communication object *Enable burn-in lamp/status* is available for the lighting group. Using this communication object, the burn-in of these individual lighting groups can be initiated, and the status can be read or sent on the KNX. A prerequisite is that the function *Burn-in* is selected in Parameter window Gx Group, page 63. The burn-in time must also be parameterized under this parameter.

- *Block:* The communication object *Block* is available for the lighting group. The function *Block* is activated by a telegram with the value 1 and deactivated with the value 0. The lighting group can be blocked using this communication object, so that it cannot be changed via the bus. The current brightness value of the lighting group is frozen. All telegrams with the exception of forced operation and the reactions to KNX bus voltage failure and recovery are ignored. Incoming telegrams are processed in the background. Dimming processes are not simulated in the background. The value calculated in the background will be set after the block is removed. A block during a dimming up or down process or scene operation interrupts the dimming process and freezes the brightness value at the current level. A block during the function *Staircase lighting* or *Controller* function on the other hand leads to an immediate blocking of the lighting group and freezing of the brightness value. A block during the function *Staircase lighting* or *Controller* function on the other hand leads to an immediate blocking of the lighting group and freezing of the brightness value. After unblocking, the function *Staircase lighting* continues with dimming (prewarning). If lighting control or slave operation were active before the block, they will be re-established. Forced operation has a higher priority than the function *Block*. With activated forced operation, the function *Block* can be activated or deactivated. In this way, the current blocked state is available after forced operation as would be the case without activated forced operation.

The following three additional objects only have a meaning in conjunction with the function *Staircase lighting*:

- *Staircase light. permanent ON*: The communication object *Staircase light. permanent ON* is available for the lighting group. The function *Staircase light. permanent ON* is activated by a telegram with the value 1 and switched off with the value 0. With the activation of Staircase light. permanent ON, the staircase lighting time is set to permanently on and the lighting group is switched on with the brightness value for the function Staircase lighting, see Parameter window - *Gx Staircase lighting*, page 90. The behavior of the operating functions, e.g. *Dimming, Set brightness value* and *Scene recall* remain valid even when *Staircase light. permanent ON* is activated. The behavior as parameterized in the parameter window - *Gx Staircase lighting* applies. An *OFF telegram* causes dimming to the basis brightness. An OFF telegram causes dimming to the basis brightness. With the deactivation of *Staircase light. permanent ON*, the dimming phase of the staircase lighting is initiated. With the deactivation of Staircase light. permanent ON, the dimming phase of the staircase lighting is initiated. After the basis brightness is implemented, the function *Staircase lighting* is in standby and *Staircase light. permanent ON* is deactivated.

Note
Forced operation and blocking have a higher priority than *permanent ON*. After the end of forced operation or blocking, the staircase lighting is started with the dimming down phase and *Staircase light. permanent ON* is deactivated. **For further information see: Staircase lighting, page 163**

- *Warning staircase lighting:* The communication object *Warning staircase lighting* is available for the lighting group. During the dimming time, additional warning is possible by setting the communication object *Warning staircase lighting* to 1. Thus for example, a pushbutton LED can be controlled or a warn signal initiated, which informs concerning the impending staircase lighting switch off. If the dimming down phase is parameterized with jump to, no *Warning staircase lighting* is displayed.
- *Stairc. light. activate/status:* The communication object *Stairc. light. activate/status* is available for the lighting group. The function *Staircase lighting* can be activated (telegram with value 1) and deactivated (telegram with value 0) via this communication object. Should the function *Staircase lighting* not be activated, the lighting group is a "normal" lighting group. The following communication objects for the function *Staircase lighting* (*Stairc. light. permanent ON* and *Warning*) have no effect for the "normal" lighting group. After deactivation of the function *Staircase lighting* via the communication object *Stairc. light. activate/status* the function *Staircase lighting* runs to completion and thereafter is in standby.

Note
If the function *Staircase lighting* is used, it is highly recommended that this additional object be enabled as only this communication object allows the function *Staircase lighting* that has been deactivated to be reactivated. The sending behavior can be set in parameter window Parameter window - Gx Staircase lighting, page 90.

Enable function *forced operation*

Options: no
1 bit control
2 bit control

With this parameter, the lighting group can be enabled for forced operation.

- *1-bit control:* A 1 bit *Forced operation* communication object is enabled. If the DALI Light Controller receives a telegram with the value 1 via this communication object, the lighting group of the DALI Light Controller is forcibly operated. With the value 0, the forced operation is rescinded and the lighting group is once again enabled. The following parameters appear with 1-bit control::

  Brightness while object value = 1
  (forced operation = active, ON)

  Options: 100 % (255)
  99 % (252)
  …
  0 % (off)

  The brightness value applied for switching on the lighting group during activated forced operation can be parameterized with this parameter. Forced switch off of the lighting group is also parameterized.

Setting force operation after bus voltage recovery

Options: inactive
switch on by force

Using this parameter, the state of forced operation after bus voltage recovery is parameterized.

- *inactive:* The lighting group is enabled after bus voltage recovery and is no longer subject to forced operation. If parameterized constant lighting control was activated before forced operation, it will be active.
- *switch on by force:* The lighting group is forced operated and switched with the brightness, which has been parameterized in the brightness parameter, if the object value = 1 (switch on by force).

  How does forced operation function?

  The active forced operation, irrespective of whether it is a 1 bit or 2 bit recall, has an influence on the overall behavior of the lighting group. When the forced operation is recalled, the parameterized brightness value in the ETS is set. A dimming telegram currently running or a lighting control is interrupted.

  Brightness values received during forced operation are not set; however, they are processed in the background and saved. Switch telegrams and lighting controls operating in the background are also saved. Relative dimming telegrams and dimming ramps are ignored. This also applies for prewarning times at the end of the function *Staircase lighting*. The target brightness value is saved directly.

  With the end of forced operation, the brightness value stored in the background is set. The lighting group returns to the state it was in before forced operation. If an additional function was active, e.g. *Constant lighting control*, *Staircase lighting* or *Slave*, it will also be active after forced operation. If the DALI Light Controller had control before forced operation, the lighting control will be reassumed after forced operation with the switch on brightness. If the function *Staircase lighting* was activated before forced operation, the function *Staircase lighting* will continue after the block is removed.

  The state of forced operation is displayed in the communication object Diagnostics, see communication object Communication object No. 6, Diagnostics, page 122.

  Forced operation has a higher priority than blocking a lighting group.

- *2-bit control:* A 2 bit *Forced operation* communication object is enabled. If the lighting group receives a telegram with the value 2 or 3 via this communication object, the lighting group is forcibly operated. The reaction to another telegram value is described in the following table:

Value	Bit 1	Bit 0	State	Description
0	0	0	Free	If the communication object *Forced operation* receives a telegram with the value 0 (binary 00) or 1 (binary 01), the lighting group is enabled and can be actuated via different communication objects.
1	0	1	Free	
2	1	0	Forced OFF	If the communication object *Forced operation* receives a telegram with the value 2 (binary 10), the output of the lighting group is forced OFF and remains inhibited until forced operation is again deactivated. Actuation via another communication object is ignored as long as the Forced operation is active. Telegrams are run in the background, and the end values are saved. After deactivation of Forced operation, the brightness value, which is continuously processed in the background, is set.
3	1	1	Forced ON	If the communication object *Forced operation* receives a telegram with the value 3 (binary 11), the output of the lighting group is forced ON and remains inhibited until forced operation is again deactivated. Actuation via another communication object is ignored as long as the Forced operation is active. Telegrams are run in the background, and the end values are saved. After deactivation of Forced operation, the brightness value, which is continuously processed in the background, is set.

Both the following parameters are enabled with parameterized *2 bit control*:

Brightness on object value = 3
(forced operation = active, ON)

Options: <u>100 % (255)</u>
99 % (252)
…
2 % (5)
1 % (3)
0 % (off)

The brightness value used to control the DALI output when it is forced ON is set with this parameter.

Setting forced operation after bus voltage recovery

Options: inactive (value 0)
switch off by force (value 2)
switch on by force (value 3)

This parameter determines which value the communication object *Forced operation* is assigned, with bus voltage recovery.

- *inactive:* The lighting group is enabled after bus voltage recovery and is no longer subject to forced operation. If parameterized constant lighting control was activated before forced operation, it will be active.
- *switch off by force (value 2)*: The output of the lighting group is forced off and remains blocked until forced operation is deactivated again.
- *switch on by force (value 3):* The lighting group is switched on and controlled with the parameterized brightness for forced operation in the ETS.

Enable function characteristic adjustment

Options: no, logarithm DALI lighting curve
linear lighting curve
linear light. curve, without phys-min bright. value

With this parameter, it is possible to adapt the lighting curve for the control of a lighting group.

The method of adaptation of the value range for the brightness values of the KNX (0, 1…255 or 0…100 %) to DALI (0, 1…254 or 0, physical minimum …254) can be parameterized.

For further information see: DALI lighting curve, page 191

Note
The *physical minimum* is the minimum brightness value that the ballast can set based on its physical properties. The term originates directly from IEC 62386 and EN 60929.

- *no, logarithm DALI lighting curve*: The lighting curve is unchanged. The DALI lighting curve as it is stipulated in the DALI standard (EN 62386 and EN 60929) is used unchanged for the control of DALI devices

For further information see: DALI lighting curve, page 191

- *linear lighting curve:* The KNX value range is converted to the DALI value range, so that a linear relationship between KNX values and DALI values (electronic power on the lighting equipment or luminous flux) results. The logarithmic DALI curve is thus converted to a linear representation. In this way, ballasts with an applied minimum dimming value (in other words luminous flux) of 3 % can be controlled exactly with this value. Should the logarithmic DALI curve be applied, the KNX value of 50 % would be applied in this case.

For further information see: DALI lighting curve, page 191

- *linear light. curve, without phys-min bright. value:* The KNX value range (1…255) is converted to the DALI value range (physical minimum…254), whereby the unusable range of DALI control values (0…physical minimum), which the lighting equipment cannot realized, is omitted.

For further information see: DALI lighting curve, page 191

Note
Characteristic adjustment can only be carried out correctly if brightness value is calculated internally with characteristic adjustment via the DALI Light Controller, simulated, and provided to the DALI devices. This is the case e.g. when setting the brightness value. When dimming, irrespective of whether this is via a group or a central command, differences can occur between the set brightness value and the simulated status of the brightness value. To make it possible to obtain equal dimming, the DALI commands DIM-UP and DIM-DOWN must be used on the DALI Light Controller. These commands trigger a dimming step in the DALI device, which is then transformed into the DALI characteristic on the DALI device. As the exact length of the dimming step is unknown, deviations can arise between the calculated (simulated) value and the actual set brightness value. This can become apparent if, after dimming, the brightness value status is fed back directly to the dimmed lighting group as the brightness value. Where this is the case, it can result in a jump in brightness.

Enable function staircase lighting

Options: no
yes

With this parameter, the lighting group can be enabled for the function *Staircase lighting*.

- *no:* For the lighting group no function *Staircase lighting* is available.
- *yes:* For the lighting group the function *Staircase lighting* is available. The special properties of the function *Staircase lighting* are set for the lighting group in Parameter window - Gx Staircase lighting, page 90. As there is only a timed progress in the DLR/A for the function *Staircase lighting*, the times for the staircase lighting progression are activated in the Parameter window General, page 40. With activated function *Staircase lighting*, the lighting group is switched on, and after a defined time it is automatically switched off or dimmed down slowly as a warning. The basis brightness is the brightness, to which the lighting group is set after the staircase lighting time has elapsed. This basis lighting time may also be not equal to zero.

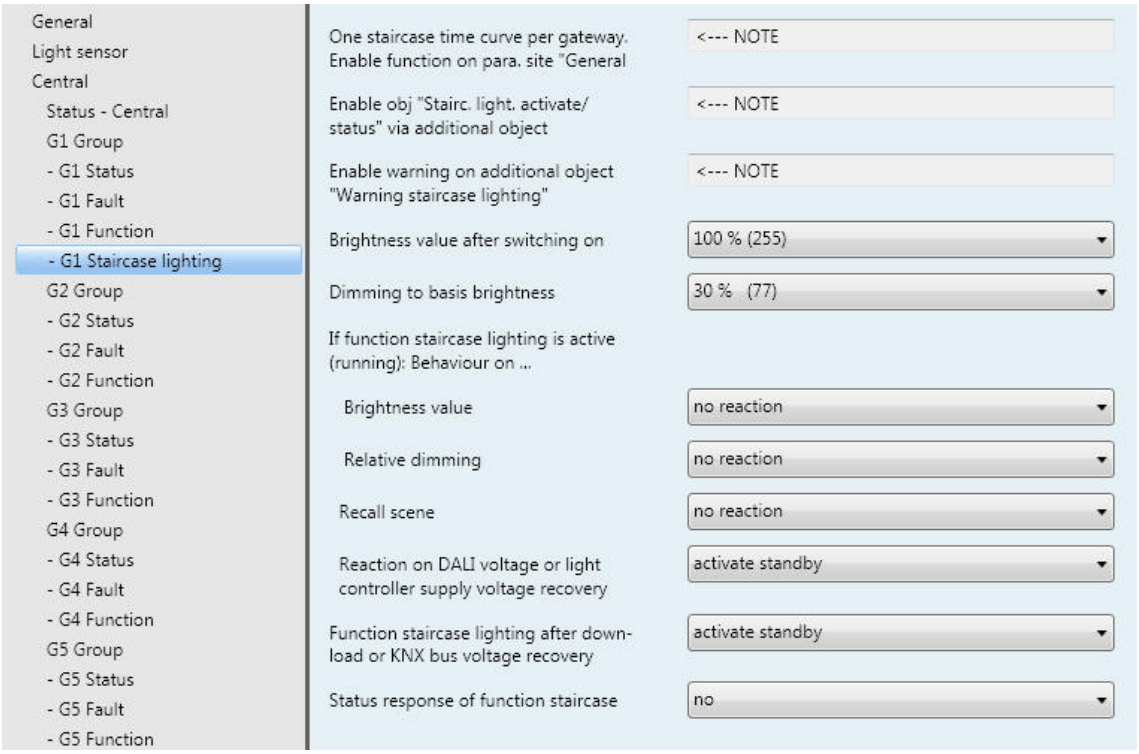
Example
This function can ensure, e.g. that a basis brightness level always exists in the hallways in nursing homes or hospitals. Maximum brightness is only activated when someone enters the hallway (detected by a presence detector). It is dimmed down automatically to the basis brightness, after the staircase lighting time has timed out and when nobody is in the hallway.

The setting of a warning before the function *Staircase lighting* switches off is possible using dimming down. Optionally the warning can be displayed via an additional communication object, see parameter *Enable additional function 1/2*.

Note
The function *Staircase lighting* is comprised of two scenes. The DLR/A automatically selects the internal scenes 13 and 14 when the function *Staircase lighting* is selected. **For further information see: Staircase lighting, page 163**

3.2.3.2.4 Parameter window - *Gx Staircase lighting*

The parameter window - *Gx Staircase lighting* is enabled in parameter window *Gx Functions*, the parameter *Enable function staircase lighting* is set with the option *yes*.



The DLR/A features a function *Staircase lighting* which can be triggered and stopped via individual switch telegrams of the individual lighting groups. For each DLR/A, a Staircase lighting sequence can be programmed which can be adjusted in the parameter window Parameter window General, page 40.

Note
The function *Staircase lighting* is comprised of two scenes. The DLR/A automatically selects the internal scenes 13 and 14 when the function *Staircase lighting* is selected. Scenes 13 and 14 can are then enabled and can be recalled via the corresponding scene communication object. Whereby, groups parameterized with the function *Staircase lighting* are controlled by the switch on brightness of the function *Staircase lighting*. **For further information see: Staircase lighting, page 163**

In parameter window - *Gx Staircase lighting*, the reaction to various KNX telegrams such as brightness value, relative dimming, recall scene and voltage recovery can be parameterized. The reaction to a switch telegram is not explicitly programmable and responds as follows:

The function *Staircase lighting* can be triggered by an ON telegram to the communication object *Switch* or by activation of the function *Staircase lighting* of a lighting group. With an OFF telegram to the communication object *Switch*, the lighting group is controlled with the basis brightness of the function *Staircase lighting*. The function *Staircase lighting* is in standby mode and is started by a renewed ON telegram. If the *Staircase lighting* is already at the switch on value, the staircase lighting time is restarted (retriggered).

The function *Staircase lighting* is also started if the lighting group receives a telegram with the value 1 (enabling the additional communication object in parameter window *Gx Functions*) on the communication object *Stairc. light. activate/status*.

If in the following the communication objects *Switch* (ON telegram) or *Brightness value* are mentioned, it also applies for the communication objects *Switch/status* or *Brightness value/status*.

Brightness value after switching on

Options: <u>100 % (255)</u>
99 % (252)
…
1 % (3)
0 % (OFF)

This parameter defines the brightness value for operating function *Staircase lighting*, which is set after the dimming up phase and before dimming down (pre-warning phase).

- *100 % (255)…0 % (OFF):* Brightness value used by the lighting group during the running function *Staircase lighting* after dimming up as its set value.

Dimming to basis brightness

Options: 100 % (255)
99 % (252)
…
<u>30 % (77)</u>
…
1 % (3)
0 % (OFF)

This parameter defines the brightness value that is set after the Staircase lighting time has timed out taking the dimming down time (pre-warning phase) into consideration.

- *100 % (255)…0 % (OFF):* Brightness value to which the lighting group is set after the dimming time. The Basis brightness hold time as well as the Time for dimming down after light on (Warning before light turned off) is programmable in the parameter window Parameter window General, page 40.

Note
Typical applications for basis brightness are e.g. corridors in nursing homes. The lighting is never completely switched off in these corridors. A basis brightness of approx. 20 % should always exist. If a person enters the area, it should be illuminated for a certain time (staircase lighting time) with maximum brightness (100 %).

If function staircase lighting is active (running):
Behaviour on ...

Brightness value

Options: <u>no reaction</u>
set function in standby

With activated function *Staircase lighting*, the parameter can be used to define the reaction to a brightness value telegram.

- *no reaction:* A brightness value telegram is ignored.
- *set function in standby:* A brightness telegram ends function *Staircase lighting*, and the DLR/A carries out the brightness telegram via the communication object *Brightness value*. The function *Staircase lighting* is latent and waits until a renewed activation via the communication object function *Activate staircase lighting* or via an ON telegram to the communication object *Switch*.

Relative dimming

Options: no reaction
set function in standby

With activated function *Staircase lighting*, the parameter can be used to define the reaction to dimming telegram to the communication object *Relative dimming*.

- *no reaction:* Dimming telegrams are ignored.
- *set function in standby:* A dimming telegram ends function *Staircase lighting*, and the lighting group carries out the dimming telegram. The function *Staircase lighting* is latent and waits until a renewed activation via the communication object function *Stairc. light. activate/status* or via an ON telegram to the communication object *Switch*.

Recall scene

Options: no reaction
set function in standby

With activated function *Staircase lighting*, the parameter can be used to define the reaction to a scene recall on the communication object *Recall scene*.

- *no reaction:* A scene recall is ignored.
- *set function in standby:* A scene recall ends the function *Staircase lighting*, and the DLR/A carries out the dimming telegram. The function *Staircase lighting* is latent and waits until a renewed activation via the communication object function *Stairc. light. activate/status* or via an ON telegram to the communication object *Switch*.

Reaction on DALI bus voltage recovery or recovery light control supply voltage

Options: not activated
activate standby
activate and ON
previous state to malfunction

This parameter determines the state that the function *Staircase lighting* assumes after DALI or light controller supply voltage recovery.

After a DALI or light controller supply voltage recovery, the lighting group assumes the state as parameterized in parameter window Parameter window - Gx Fault, page 77. The following states can be parameterized for the function *Staircase lighting*:

- *not activated:* The function *Staircase lighting* is not reactivated after DALI or light controller supply voltage recovery. The lighting group behaves like a normal lighting group without additional functions.
- *activate standby:* The function *Staircase lighting* is activated after DALI or light controller supply voltage recovery and is in standby. The lighting group can be started by an ON telegram or a renewed activation via the communication object *Stairc. light. activate/status*.

- *activate and on:* The function *Staircase lighting* is activated and started after DALI or light controller supply voltage recovery.
- *previous state to malfunction:* The function *Staircase lighting* receives the operating state (standby or not activated) that it had before DALI or light controller supply voltage recovery.

Note
A Staircase lighting in operation before the light controller supply voltage failure is not automatically restarted. The lighting group is in standby mode. The function *Staircase lighting* will be started only after an ON telegram with the value 1 has been received on the communication object *Switch*.

Function staircase lighting after down-load or KNX bus voltage recovery

Options: not activated
activate standby
activate and ON
previous state to malfunction

This parameter defines if function *Staircase lighting* is active or inactive after KNX bus voltage recovery or a download.

After a light controller supply voltage recovery, the parameterized brightness value in Parameter window - Gx Fault, page 77 is set. The function *Staircase lighting* is then undertaken with the option defined here.

- *not activated:* Function *Staircase lighting* is not activated after a download or after KNX bus voltage recovery. The lighting group behaves like a normal lighting group without additional functions.
- *activate standby:* The function *Staircase lighting* is activated after a download or KNX bus voltage recovery and is in standby. The lighting group can be started by an ON telegram or a renewed activation via the communication object *Stairc. light. activate/status*.
- *activate and ON:* Function *Staircase lighting* is activated and started after a download or after KNX bus voltage recovery.
- *previous state to malfunction:* The function *Staircase lighting* receives the operating state (standby or not active), which it had before download or KNX bus voltage failure. A staircase lighting time in operation before the download is not automatically restarted. The lighting group is in standby mode. The function *Staircase lighting* will be started only after an ON telegram with the value 1 has been received on the communication object *Switch*.

Status response of function staircase

Options: no
yes: via object "Stairc. light. activate/status"

- *no:* The status of the function *Staircase lighting* is not transferred to the KNX.
- *yes: via object "Stairc. light. activate/status":* Using the communication object *Stairc. light. activate/status* does not just activate or deactivate the function *Staircase lighting*. This communication object also uses the status to display whether the function *Staircase lighting* is active or inactive. The following parameter appears:

  send,
  additional object, see note above

  Options: after a change
  after request
  after a change or request

  - *after a change:* The status is sent via the communication object after a change.
  - *after request:* The status is sent after a request by the communication object *Request status values*.
  - *after a change or request:* The status is sent via the KNX when the status changes or the status is requested via the communication object *Request status values*.

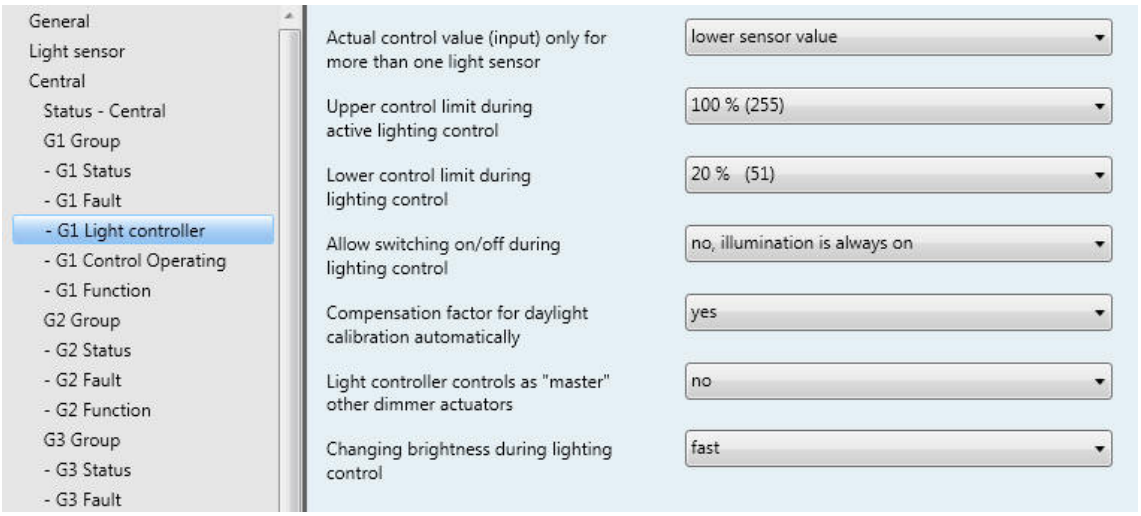
3.2.3.2.5 Parameter window - *Gx Light controller*

In this parameter window, the settings for the lighting control are undertaken.

With the additional function *Light controller*, a constant lighting control is possible in principle with any KNX lighting components. In the simplest case it can be the lighting groups in the DLR/A. However, with the function master/slave there is an additional method to integrate other ABB i-bus® KNX devices, e.g. switching/dimming actuators, into the lighting control.

A more detailed description of a lighting control as well as a detailed description of the terminology, e.g. such as sensor value, setpoint, actual value etc., can be found under Constant lighting control, page 167.

The parameter window -*Gx Light controller* is visible when in Parameter window Gx Group, page 63, the additional function *Light controller* is parameterized for the lighting goup. The additional function light controller is only available for the first 4 lighting groups of the DLR/A. Lighting groups 5…8 can be integrated into the control by a master/slave assignment.



Actual control value (input) only for more than one light sensor

Options: lower sensor value
average sensor value
upper sensor value

If the lighting group is assigned with several light sensors, the actual value for the constant lighting control is determined with this parameter. The lowest, the largest or the average value of the detected sensor values can be used for lighting control. If only a single Light Sensor is assigned to an output, the current sensor value is used as the actual value irrespective of the setting.

- *lower sensor value:* The DLR/A uses the lowest sensor value of the assigned light sensors as its actual value for constant lighting control. All light sensors are considered that are assigned to the output (control circuit). With this setting, the room is lit up most brightly by constant lighting control. The setpoint should not be undershot in normal, malfunction free operation, e.g. no reflections or no direct incidence of light on the light sensor.
- *average sensor value:* The DLR/A uses the linear average value of the assigned light sensors as its actual value for constant lighting control.
- *upper sensor value:* The DLR/A uses the highest sensor value of the assigned light sensors as its actual value for constant lighting control. This setting ensures that constant lighting control requires the least possible level of artificial lighting. This achieves the largest possible conservation of energy. However, the brightness at many locations in the room is very likely below the target brightness level.

Upper control limit during active lighting control

Options: 100 % (255)
99 % (252)
…
51 % (130)
50 % (128)

This parameter defines the maximum brightness value, which the lighting group of the DLR/A can use during light control.

The control limits are independent of the dim and value limits that are parameterized in Parameter window Gx Group, page 63.

Lower control limit during lighting control

Options: 50 % (128)
49 % (125)
…
20 % (51)
…
1 % (3)
0.3 % (1)

This parameter defines the minimum brightness value, which the lighting group of the light controller, can use during light control.

Allow switching on/off during lighting control

Options: no, illumination is always on
Switching OFF only via going up
Switching ON and OFF via going up/down

These parameters define if switch off or switch off and switch on of the lighting during light control is allowed by the DLR/A.

- *no, illumination is always on:* The lighting is not switched on or off independently by the light control. Switching on is implemented by an ON telegram via the *Switch* communication object. This can be undertaken by a pushbutton or automatically by a presence detector. In this way, a problematic or extended period of lighting up the luminaires can be avoided. This is the case particularly when ignition takes a few seconds. This causes interference and damages the service life of the luminaires.
- *Switching OFF only via going up*: The DLR/A switches off the light, however the lighting must be implemented manually via an ON telegram.
- *Switching ON and OFF via going up / down*: Dependent on the level of detected daylight (actual value), the light controller dims down to the lower control limit in steps and then switches OFF. If it is too dark, the light controller switches back ON and controls from the lower control limit upwards until the lighting group has reached the set setpoint. If this option is selected, the following parameter appears where it is possible to parameterize switch off dependent on the setpoint value deviation. The DLR/A estimates the magnitude of the brightness difference by switching off. It is only switched off if the brightness difference is not large enough to immediately switch it back on. In this way, continuous switch on and switch off is avoided. This would cause annoyance and would damage the luminaires. The following parameter appears:

  Switch off if control deviation is greater than [0...30]

  Options: 0/1/2…5…29/30

  When the lower control limit is reached, the DLR/A normally switches off the lighting immediately. This avoids abrupt changes in the brightness or in certain circumstances that the lighting is switched back on immediately. In order to avoid continuous switch on and off of the lighting, a divergence can be parameterized with this parameter.

  The DLR/A maintains the minimum control limit until the calculated setpoint deviation has exceeded the parameterized value. Only then is the lighting switched off.

  This ensures that the existing brightness level is so high during switch off that the DLR/A does not immediately switch the lighting back on.

  The DLR/A calculates the divergence from the current sensor value of the Light Sensor and the brightness which would result in switching on the artificial lighting. This artificial lighting brightness level has been automatically recorded and saved via the light sensor during artificial lighting calibration of the DLR/A.

Note
The parameterized setpoint deviation is not a Lux value, but rather relates to the calculated setpoint in the light controller. The setpoint deviation is not visible for the user. The appropriate optimum value must be determined by tests if necessary.

Compensation factor for daylight calibration automatically

Options: no
yes

With this parameter the factor for the daylight compensation can be entered manually in the ETS. This factor considers the evaluation of the artificial lighting and the natural incidence of light using the Light Sensor. Generally this factor is determined automatically by the DLR/A during the daylight calibration, refer to Commissioning/calibration of the constant lighting control, page 173.

- This should be selected if no daylight calibration is to be performed, e.g. the natural brightness is not sufficient or no shading possibilities are available to set the setpoint during daylight. The following parameters appear:

  Factor for daylight compensation in % [0…99]

  Options: 0…35…99

  A larger value compensates more for natural light. This means that artificial light has a higher weighting, which also means that more artificial light is added, and that the light is switched off later as a result. The room will remain brighter than the setpoint brightness.

  A smaller value compensates less for natural light. This means that artificial light has a lower weighting and that less artificial light is added. The setpoint value tends to be slightly undershot, and the artificial light is switched off earlier.

  In practical usage it has been shown that – depending on the ambient conditions – a factor of between 30 and 50 generally provides the best results in most cases.

  Restore factor for daylight compensation after download

  Options: no
  yes

  This parameter defines if the factor for daylight compensation is overwritten with the value from the ETS.

  - *yes:* With a download, the value stored in the DLR/A for daylight compensation is overwritten with the value set in the ETS.
  - *no:* The factor is not overwritten during download. This is useful, for example, if you want to avoid that the values that have been determined over the course of many attempts in the DLR/A are not overwritten by mistake, and that a renewed calibration is required.

- *yes:* This setting is the recommended parameterization. The factor for daylight compensation is determined automatically by the DLR/A during the daylight calibration, refer to Commissioning/calibration of the constant lighting control, page 173.

**Light controller controls as "master"
other dimmer actuators**

Options: no
yes

- *no:* The DLR/A only calculates the control value of the connected lighting for its own lighting group. The status of the brightness value is only sent via the communication objects B*rightness value* or *Brightness value/status*
- *yes:* The communication object *Master brightness value* is enabled. Using this communication object, a slave can be controlled via KNX. The following parameters appear:

  **Time between 2 brightness telegrams
  [0...10 s]**

  Options: 0…10

  With this parameter sending of the *Master brightness value* can be limited. As a result the bus load can be reduced significantly. This defines the time intervals at which the brightness values are sent on the KNX. The interval is only relevant for the communication object *Master brightness value*.

  Use function "Master offset brightness"

  Options: no
  yes

  - *no:* The *Master offset brightness* is not considered or not enabled. An offset is not considered. An offset is not considered.
  - The brightness value that the DLR/A sends the communication object *Master brightness value* is provided with an offset, i.e., an offset is added or subtracted by the *Master brightness value*. Furthermore, the communication object *Activate master offset* is enabled. The offset can be activated or deactivated via this communication object. With a deactivated offset (value 0), the brightness value sent by the communication object *Master offset brightness* corresponds with the actual brightness value of the master. With activated offset (value 1), the offset brightness value is modified in the parameters set in the offset values. The brightness value of the master is always used as the basis.

Note
The offset is deactivated at KNX bus voltage recovery, reset or download.

  Using this function, e.g. the offset can be deactivated in the evening when no natural brightness is available. Accordingly, both lighting strips are controlled with the same level of brightness.

Offset value to (increase/decrease) master brightness value

Options: +10/ +80…+20, 0 , -20…-80 %
Using this parameter, the percentage offset is determined that is used to increase or decrease the brightness value of the master, refer to Slave with offset function, page 189.

Changing brightness during ("lighting control")

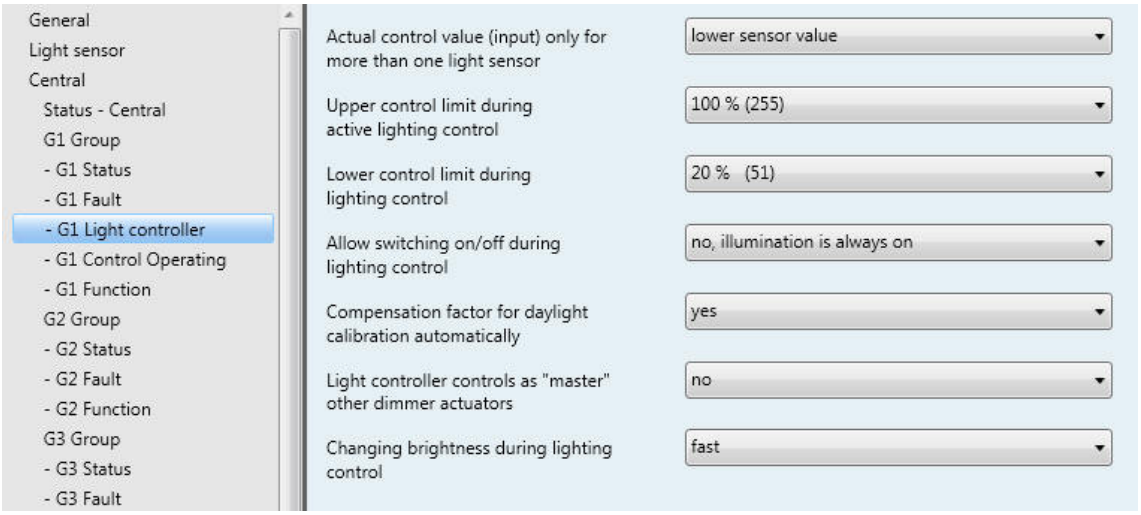
Option: fast
medium
slow
individual setting

This parameter determines how fast the lighting changes when the lighting control commences.

Normally this parameter can be used to select between *fast, medium, slow* and *individual setting*. With master mode only *medium, slow* and *individual setting* are possible to reduce the bus load.

- *fast:* The DLR/A starts to control with fast successive (< 2 seconds) dimming steps in order to reach the setpoint as quickly as possible. A fast correction may be necessary if the constant lighting control has to react quickly to the shade or shadows that result from a blind, which closes quickly.
- *medium:* The DLR/A commences with sending dimming steps at medium speed (< 3 seconds) to achieve the setpoint.
    - *slow:* The DLR/A commences with sending dimming steps at slow speed (< 4 seconds) to achieve the setpoint. The control speed is dependent on the divergence from the setpoint, see table Determine setpoint, page 171. Achieving the setpoint value is also dependent on the control increment size, refer here to control dynamics, page 101.
- *individual setting:* A fine adjustment of the control can be undertaken. Further parameters are enabled that can be used to influence the light control.

    Generally artificial lighting and daylight are sufficient in order to ensure exact and stable constant lighting control. Should this not be possible however – due to particular ambient conditions and/or the properties of the lamp – the control can be influenced with the following parameters:



The following parameters influence the control dynamics of the light controller. Generally this fine tuning of the control circuit is not necessary. Normally the artificial lighting and daylight calibration with the preset control dynamic parameters is sufficient to set good and stable constant lighting control. If however this is not the case and it is not possible to set stable lighting control due to special conditions in the room, e.g. delays in the lighting circuit, manual fine tuning of the lighting control can be undertaken with these enabled control dynamic parameters.

Caution: These parameters have effect on the lighting control function.

Please refer to the product manual!

<−−− NOTE

Step time for fast approach

Options: as quickly as possible.
0.1/0.2…1*…9/2.0 s

* Default value if control parameterized as a master

This parameter defines the step time of a control step in the start up phase. The smaller the step time, the faster the control steps are applied with their increment size (brightness). The light control quickly approaches the setpoint.

This step time is used if the actual value still varies greatly from the setpoint. Otherwise the step time for slow approach is used.

For further information see: Constant lighting control, page 167

Note
The step time may not be selected to be less than the delay of the control circuit. This is comprised of the detection speed of the light sensor and the dynamic response of the luminaires. If the step time is less than the delay of the control circuit, the DLR/A will set the brightness beyond the target value and oscillation will occur in the lighting control. In this case, the change in brightness due to a control step will only be achieved after sending the next control step.

Step time for slow approach

Options: 1/2…4*…9/10 s

* Default value if control parameterized as a master

This parameter defines the step time of a control step when approaching the actual value. The larger the step time, the longer until the brightness of the control step is set. The Light Control slowly approaches the setpoint. This step time is used when the actual value is relatively near to the setpoint. Otherwise the step time for fast approach is used.

For further information see: Constant lighting control, page 167

Control deviation for medium dimming speed

Options: 10…20…50

This value represents the control divergence (difference between the setpoint and actual value), at which there is a change between fast and slow approach to the setpoint. Above this control divergence there is a fast approach (small increments of the control step), below it there is slow approach with a large step time.

At the same time, the response of the lighting control is slower with larger values, whereby they do not respond too sensitively to brightness changes caused by clouds or temporary changes, e.g. persons in the detection area of the light sensor in the room.

For further information see: Constant lighting control, page 167

Maximum brightness change

Options: 1…5*…10

* Default value if control parameterized as a master

This value defines the maximum increment size of a control step. This is the maximum brightness difference that the DLR/A can perform per control step. In this way, the DLR/A can approach the setpoint value in large steps. There is a danger, however, that the setpoint is exceeded and the light control circuit will be unstable.

For further information see: Constant lighting control, page 167

Control deviation for high increments (max. control step)

Options: 10…30…255

This value represents the control divergence (difference between the setpoint and actual value) up to which the maximum increment can be controlled. In this way, the DLR/A can approach the setpoint value in fast steps. The increment should always be considered in conjunction with both approach parameters. Both parameters change the control dynamics and the approach speed to the setpoint value.

For further information see: Constant lighting control, page 167

Deviation actual value from nominal value for starting controlling

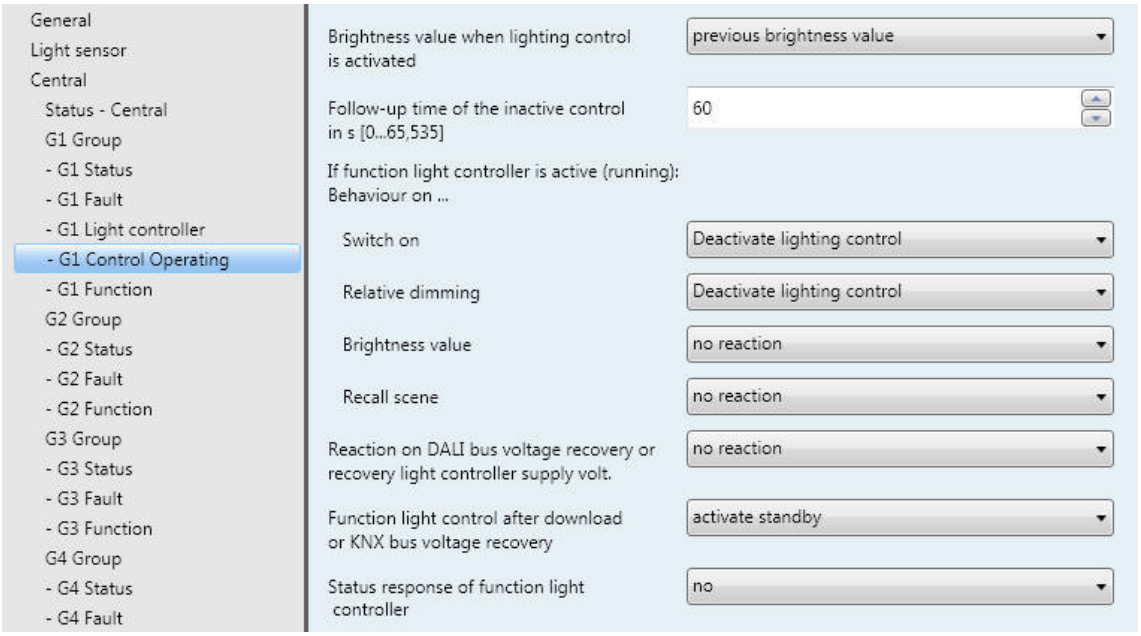
Options: 0…1…30

This value defines a range around the setpoint at which no light control occurs. Only after the actual value (brightness value) is again outside this range does light control recommence. In this way, continuous control with the respective changes in brightness is avoided. This generates a smoother and less abrupt response and considerably reduces the bus load with a master/slave control.

For further information see: Constant lighting control, page 167

3.2.3.2.6 Parameter window - *Gx Control Operating*

Control Operating is enabled if in parameter window Parameter window Gx Group, page 63, the parameter *additional function* is selected with the option *Light control*.



In this parameter window, the response of the light controller to the switch, dim, brightness or scene telegram is defined.

The light control is activated by an ON telegram (receipt of a telegram with the value 1 on the communication object *Switch* or *Switch/status*). An OFF telegram always causes switch off of the lighting and the light control. The light control is in standby mode and recommences with light control via an ON telegram or when a telegram with the value 1 is again received on the communication object *Activate function controller*.

Brightness value when lighting control is activated

Options:
100 % (255)
Brightness value (calibration lighting)
previous brightness value
99 % (252)
…
70 % (179)
2 % (5)
1 % (3)

Using this parameter, the brightness value that is set immediately after activation of the light control can be defined. Commencing at this value the lighting is gradually controlled up to the setpoint.

- *previous brightness value:* The last brightness value is the constant brightness value which existed when light control was switched off. If no previous brightness value is stored, 100 % or maximum brightness is assumed.
- *Brightness value (calibration lighting):* Brightness value that has been set during artificial lighting calibration to set the setpoint brightness. As this value is the current constant lighting control operating point, the current brightness value required should not deviate greatly from it. Thus the control very quickly achieves the setpoint brightness without needing to undertake control steps.

**Follow-up time of the inactive control
in s [0...65,535]**

Options: 0…60…65.53

If constant lighting control is deactivated or interrupted by the user, e.g. by manual dimming, the current dimmed-to brightness value is stored for the duration of the follow up time. The follow-up time commences after the lighting group is switched off.

If the lighting is switched back on during the follow-up time using the communication object Switch (manually or automatically by a presence detector),lighting control is not restarted. The lighting is switched on with the brightness value stored beforehand.

If however, the lighting is switched on by the switching object after the follow-up time, the lighting control is recommenced.

Should the lighting group be switched off during lighting control via the communication object *Switch*, a follow-up time is not started.

This behavior is intended for the user who, after leaving the room and returning after a short period, wishes to retain the lighting state set manually beforehand. This can be undertaken by manual switching or automatically by a presence detector via the communication object *Switch*.

Note
The light control can assume three operating states: **Lighting control is not active:** The lighting control has been deactivated via the communication object *Activate fct controller/status* (telegram with value 0 has been received). In this state, the lighting group behaves like a "normal" DALI lighting group. ON telegrams on the communication object *Switch* do not cause the light control to start. Only after a telegram with the value 1 is has been received via communication object *Activate. fct controller* is the light control started. Whether the additional function *Light control* is active is indicated by the communication object *Status additional function*, see Communication object No. 3, page 121. **Lighting control is in standby mode:** The lighting control is active but has however been ended, e.g. by the OFF telegram to the communication object *Switch*. The lighting control still remains active in the background and starts again with control after an ON telegram to the communication object *Switch* or *Activate fct controller/status* **Lighting control operates:** The DLR/A controls and adjusts the lighting so that the setpoint brightness is set. The state of the lighting control is indicated by the communication object *Status additional function*, see KONr3Communication object No. 3, page 121.

If function light controller is active (running):
Behaviour on ...

With these three parameters, you can set how the lighting group of the DLR/A reacts with active lighting control if the following telegrams have been received:

Switch on	Receipt of the telegram value 1 on the communication objects *Switch* or *Switch/status*
Relative dimming	Receipt of a telegram on the communication object *Relative dimming*
Brightness value	Receipt of a telegram on the communication object *Brightness value*
Scenes	Receipt of a telegram on the communication object *Recall scene*

There is an additional possibility to parameterize the behavior of the controller after DALI bus voltage recovery or light controller supply voltage recovery.

Switch on

Options: no reaction
Deactivate lighting control
Restart control with brightness value

- *no reaction:* An ON telegram on the communication object *Switch* has no effect on the lighting and the lighting control.
- By an ON telegram via the communication objects *Switch* or *Switch/status*, the light control is interrupted. The lighting control can be reactivated by an ON telegram via the communication object *Activate fct controller/status*.
- *Restart control with brightness value:* With activated light control, the switch on brightness and light control are restarted with an ON telegram.

Note
An OFF telegram (with the value 0) to the communication object *Switch* or *Switch/status* always causes a switch off of the lighting group and the light control. The light control is in standby mode and recommences with light control via an ON telegram (with the value 1) received on the communication object *Switch* or *Switch/status* or *Activate fct controller/status*

Relative dimming

Options: no reaction
Deactivate lighting control
setpoint = new sensor value (temporary)

- *no reaction:* A dimming telegram to the communication object *Relative dimming* has no effect on the lighting and the lighting control.
- *Deactivate lighting control:* The lighting control can be interrupted by a dimming telegram via the communication object relative dimming. The lighting control can be reactivated by an ON telegram via the communication object *Activate fct controller/status.*
- *setpoint = new sensor value (temporary):* The new sensor value (current brightness) is accepted as a temporary setpoint. After a brief interruption – until the temporary setpoint is accepted – the light control will continue with the new setpoint. The old setpoint is restored at the next activation of the light control, e.g. switch on via communication object *Switch* or via the communication object *Activate fct controller/status.*

Note
Precise characteristic adjustment can only be applied to brightness values that are set via the DALI Light Controller. When dimming, irrespective of whether this is via a group command or central dimming command, differences can occur between the set brightness value and the (simulated) brightness value adjusted by the DALI Light Controller. This is because DALI uses the DIM-UP and DIM-DOWN commands, using its own DALI characteristic to control the DALI devices in small dimming steps. The DALI characteristic in the DALI devices (ballasts) cannot be modified by the DALI Light Controller. This deviation becomes apparent e.g. when the brightness value fed back as status value after dimming is used directly to set a brightness value. Where this is the case, it can result in a jump in brightness.

Brightness value

Options: no reaction
set function in standby

- *set function in standby:* Lighting control can be interrupted by a brightness telegram. The lighting control switches to the standby mode. The received *Brightness value* telegram is implemented. The lighting control can be reactivated by an ON telegram or via the communication object *Switch*.
- *no reaction:* A brightness telegram has no effect on the lighting and the lighting control.

Recall scene

Options: no reaction
set function in standby

- *set function in standby:* Lighting control can be interrupted by a scene recall. The lighting control switches to the standby mode. The received scene telegram is implemented. The lighting control can be reactivated by an ON telegram or via the communication object *Switch*.
- *no reaction:* A scene recall has no effect on the lighting and the lighting control.

Reaction on DALI bus voltage recovery or recovery light control supply voltage

Options: no reaction
set function in standby

- *set function in standby:* The controller switches to the standby state after DALI bus voltage recovery or light controller supply voltage recovery. Receipt of a subsequent ON telegram starts the control. This can be implemented via the communication object *Activate fct controller/status*.
- *no reaction:* A function is not undertaken after DALI voltage recovery or light controller supply voltage recovery. The lighting group assumes the parameterized brightness at DALI bus voltage recovery. The control is deactivated, the lighting group is a normal DALI lighting group without additional function.

Function light control after download or KNX bus voltage recovery

Options: not activated
<u>activate standby</u>
activate and ON
previous state to malfunction

- *not activated:* No function is carried out after download or KNX bus voltage recovery. The lighting group assumes the parameterized brightness at DALI bus voltage recovery. The control is deactivated, the lighting group is a normal DALI lighting group without additional function.
- After a download or a KNX bus voltage recovery, the lighting control is activated and in the standby state, i.e., the controller starts with control after an ON telegram or re-activation of the control via the communication object. Until the start of control, the lighting group has the brightness value that has been parameterized for KNX bus voltage recovery or after a download in the parameter window Parameter window - Gx Fault, page 77.
- *activate and ON:* Lighting control is activated and running after download or KNX bus voltage recovery, i.e. the lighting group immediately commences with control immediately after download of KNX bus voltage recovery. Commencing at the switch-on brightness, the lighting group controls the room to the setpoint brightness, independently of whether the lighting group was switched off before failure or whether a lighting control has been implemented.
- *previous state to malfunction:* After download or KNX bus voltage recovery, the lighting group assumes the state before download or before KNX bus voltage failure, i.e., if the lighting group was controlling beforehand, it will continue with control at KNX bus voltage recovery. If control was deactivated, it is deactivated again after failure. After the first download, the controller is active and is in standby.

Status response of function light controller

Options: <u>no</u>
yes: via object "Activate fct controller/status"

- *no:* The status of the lighting control is not transferred on the KNX.
- *yes: via object "Activate fct controller/status"*: With the communication object *Activate fct controller/status* it is possible to not just activate or deactivate control. This communication object also uses the status to display whether the control is active or inactive. The following parameter appears:

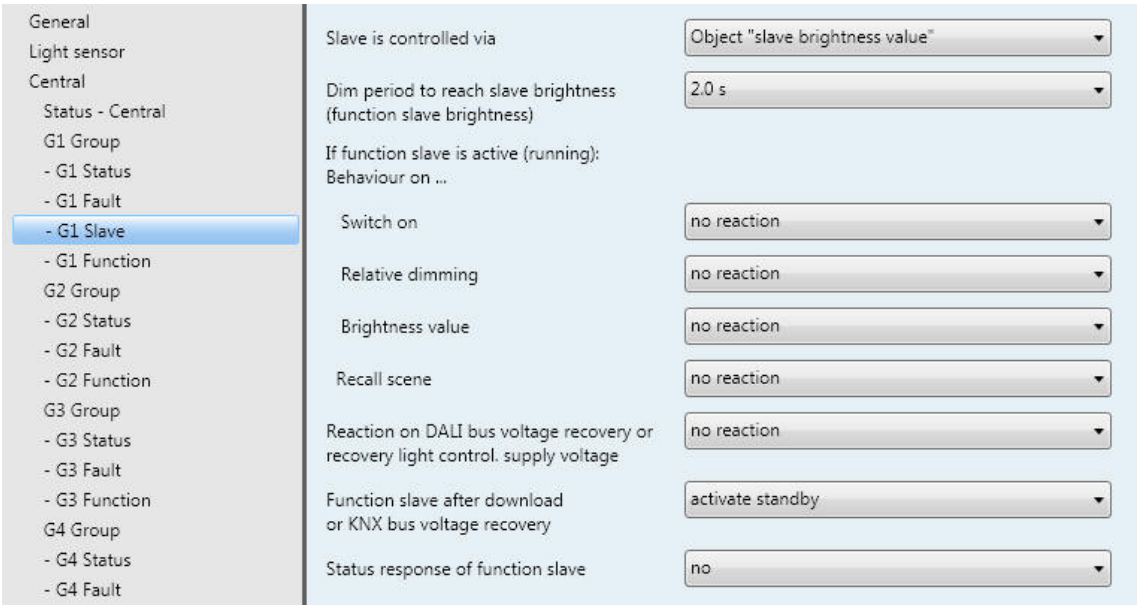
  Send

  Options: <u>after a change</u>
  after request
  after a change or request

  - *after a change:* The status is sent via the communication object after a change.
  - *after request:* The status is sent after a request by the communication object *Request status values*.
  - *after a change or request:* The status is sent via the KNX when the status changes or the status is requested via the communication object *Request status values*.

3.2.3.2.7 Parameter window - *Gx Slave*

The parameter window *Gx Slave* is enabled in Parameter window Gx Group, page 63, if the parameter *Select additional function* has been set to the option *Slave*.



With operating function *Slave*, the lighting follows the brightness value provided by the master via the communication object *Brightness value of Slave*. The reaction to switch, dim or brightness value telegrams can be parameterized individually.

With the function *Slave*, each individual lighting group of the DLR/A can be integrated into a constant lighting control. The master can be in the DLR/A or another ABB i-bus® device with master properties.

If in the following, the communication object *Switch* or *Brightness value* is mentioned, the details apply for the communication objects *Switch/status* or *Brightness value/status*.

For further information see: Slave, page 186

Slave is controlled via

Options: Object "Brightness value of slave"
Group 1 brightness
Group 1 brightness offset
Group 2 brightness
Group 2 brightness offset
…
Group 4 brightness
Group 4 brightness offset

This parameter determines where the slave receives its brightness value. This brightness value can originate externally via the KNX, from one of the other KNX devices or internally in the DLR/A from one of the first 4 lighting groups.

- *Object "Brightness value of slave":* In this case, the slave evaluates the value received via the object Brightness value of slave as a control signal for its lighting group.
- *Group x brightness:* In this case, the slave receives its brightness value internally in the DLR/A from lighting group x. The brightness value is not applied with an offset from the master.
- *Group x brightness offset:* In this case, the slave receives its brightness value internally in the DLR/A from lighting group x. The brightness value is applied with an offset from the corresponding lighting group.

Dim period to reach slave brightness (function slave brightness)

Options: jump to
0.7 s
2.0 s
…
90.5 s

This parameter determines the time duration, in which the DLR/A sets the brightness value from the communication object *Brightness value of slave* or internally from another lighting group for the lighting group when activating the function *Slave*.

- *jump to:* All DALI devices of the lighting group immediately switch on with the received brightness value.
- *0.7 s…90.5 s:* This is the time duration used by the lighting group to dim to the received brightness value.

If function slave is active (running): Behaviour on ...

Switch on

Options: no reaction
set function in standby

With activated function *Slave*, the parameter can be used to define the reaction to an ON telegram on the communication object *Switch* or *Switch/status*.

- *no reaction:* An ON telegram is ignored.
- *set function in standby:* An ON telegram ends function Slave, and the DLR/A carries out the switch telegram. The function *Slave* is latent and waits until a renewed activation (standby state) via the communication object *Activate function slave* or via a telegram with the value 1 to the communication object *Switch* or *Switch/status*.

Note
The reaction to an OFF telegram on the communication object *Switch* or *Switch/status* cannot be parameterized. An OFF command always interrupts the function *Slave*. The function *Slave* goes over to standby mode, in which the brightness values on the communication object *Brightness value of Slave* is ignored. The function *Slave* is reactivated, if an ON telegram is received on the communication object *Switch* or *Switch/status* or a telegram with the value 1 is received on communication object *Activate function slave*. The master/slave unit is separated, for example, by deactivation of the function *Slave* (telegram with the value 0 to communication object *Activate function slave*). If the function *Slave* is not active, the brightness values received from the function *Slave* via the communication object *Brightness value of slave* are not available on its lighting group.

Relative dimming

Options: no reaction
set function in standby

With activated function *Slave*, the parameter can be used to define the reaction to dimming telegram to the communication object *Relative dimming*.

- *no reaction:* A dim telegram is ignored.
- *set function in standby:* A dim telegram ends function *Slave*, and the DLR/A carries out the switch telegram. The function *Slave* is latent and waits until a renewed activation via the communication object *Activate function slave* or via an ON telegram to the communication object *Switch*.

Brightness value

Options: no reaction
set function in standby

With activated function *Slave*, the parameter can be used to define the reaction to a brightness value telegram.

- *no reaction:* A brightness value telegram is ignored.
- *set function in standby:* A brightness telegram ends function *Slave* and the DLR/A carries out the brightness telegram via the communication object *Brightness value*. The function *Slave* is latent and waits until a renewed activation via the communication object *Activate function slave* or via an ON telegram to the communication object *Switch*.

Recall scene

Options: no reaction
set function in standby

With activated function *Slave*, the parameter can be used to define the reaction to a scene recall.

- *no reaction:* A scene recall is ignored.
- *set function in standby:* A scene telegram ends function *Slave*, and the DLR/A carries out the scene recall. The function *Slave* is latent and waits until a renewed activation via the communication object *Activate function slave* or via an ON telegram to the communication object *Switch*.

Reaction on DALI bus voltage recovery or recovery light control supply voltage

Options: no reaction
set function in standby

- *no reaction:* After DALI bus voltage recovery or light controller supply voltage recovery, the function *Slave* is active and listens to the master.
- *set function in standby:* The function *Slave* switches to the standby state after DALI bus voltage recovery or light controller supply voltage recovery. After the switch telegram, the slave again responds to the brightness value from the master. This can be received externally via the communication object *Brightness value of slave* or internally by the lighting group.

Function slave after download or KNX bus voltage recovery

Options: not activated
activate standby
activate and ON
previous state to malfunction

- *not activated:* No *Slave* function is carried out after download or KNX bus voltage recovery. The lighting group assumes the parameterized brightness at DALI bus voltage recovery. The function *Slave* is deactivated, the lighting group is a normal DALI lighting group without additional function.
- *activate standby:* After download or KNX bus voltage recovery, the function *Slave* is activated and in the standby state, i.e. after an ON telegram or renewed activation of the function *Slave*, the slave responds to its communication object *Brightness value of slave* or to a defined master lighting group.
- *activate and ON:* After download or KNX bus voltage recovery, the function *Slave* is activated and the slave responds to the master.
- *previous state to malfunction:* After download or KNX bus voltage recovery, the lighting group assumes the state before download or before KNX bus voltage failure, i.e., if the lighting group responded to the master beforehand, it will continue to respond after voltage recovery.

Status response of function slave

Options: no
yes: via object "Activate Slave/status"

This parameter defines whether the status of the function *Slave* of the lighting group is sent on the KNX. For this purpose, the communication object *Activate Slave/status* is enabled.

- *no:* The state of the function *Slave* is not actively sent on the KNX.
- *yes: via object "Activate Slave/status":* The common communication object *Activate Slave/status* receives a telegram with the value 1 to Activate function slave and simultaneously sends the current *active* status of the function *Slave* on the KNX. It is possible to parameterize when the status is sent on the KNX. The following parameter appears:

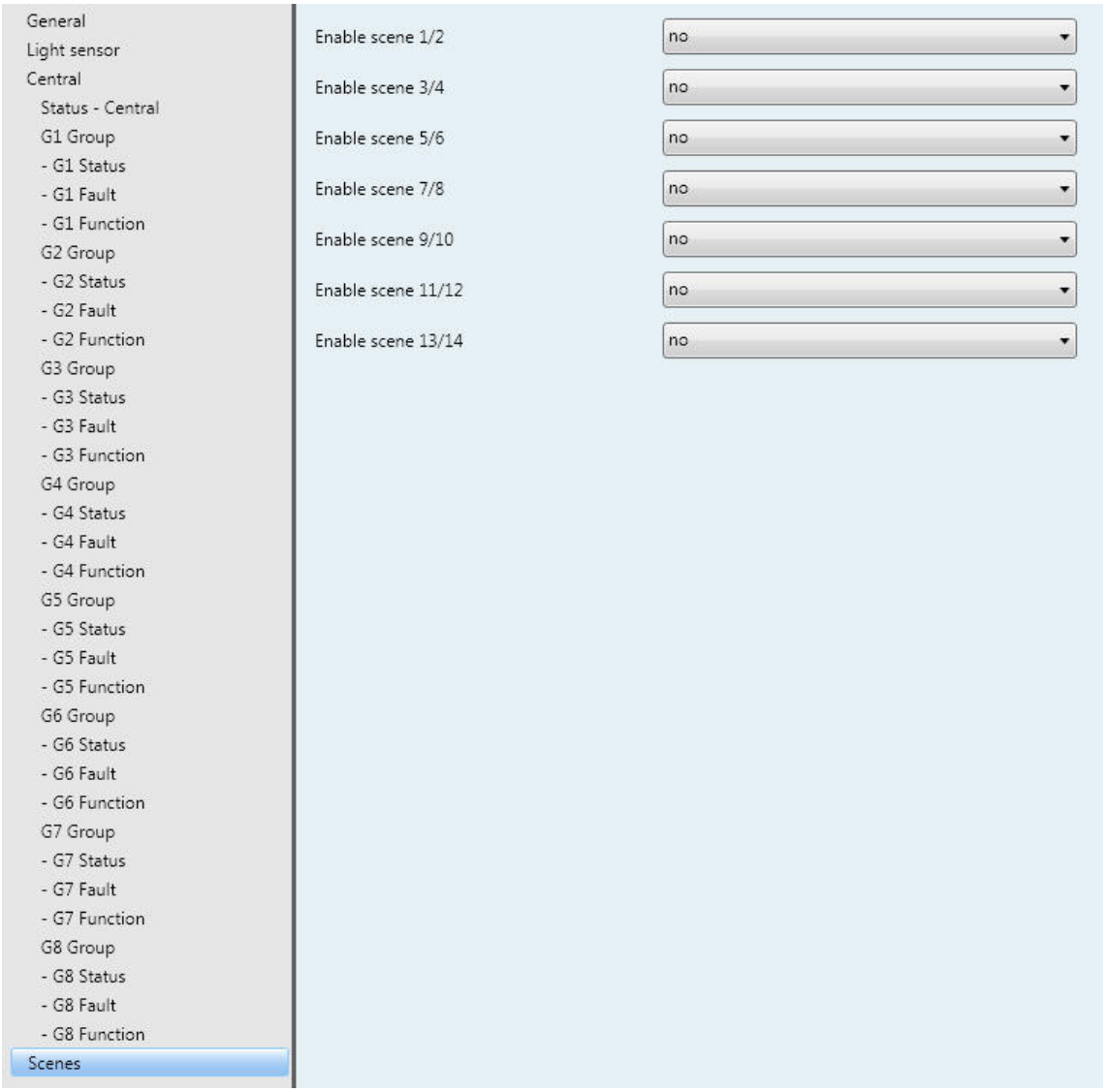
  Send

  Options: after a change
  after request
  after a change or request

  - *after a change:* The status is sent via the communication object after a change.
  - *after request:* The status is sent after a request by the communication object *Request status values*.
  - *after a change or request:* The status is sent via the KNX when the status changes or the status is requested via the communication object *Request status values*.

3.2.4 Parameter window *Scenes*

In this parameter window, the function *Scene* is enabled in pairs. The DLR/A facilitates the integration of the 8 lighting groups in 14 scenes.



In order to parameterize a scene in the ETS, the corresponding parameter window *Scene x/y (x/y* = 1/2, 3/4, 5/6…13/14) must be enabled.

For further information see: Scene, page 183

Enable Scene x/y (x/y = 1/2, 3/4, 5/6…13/14)

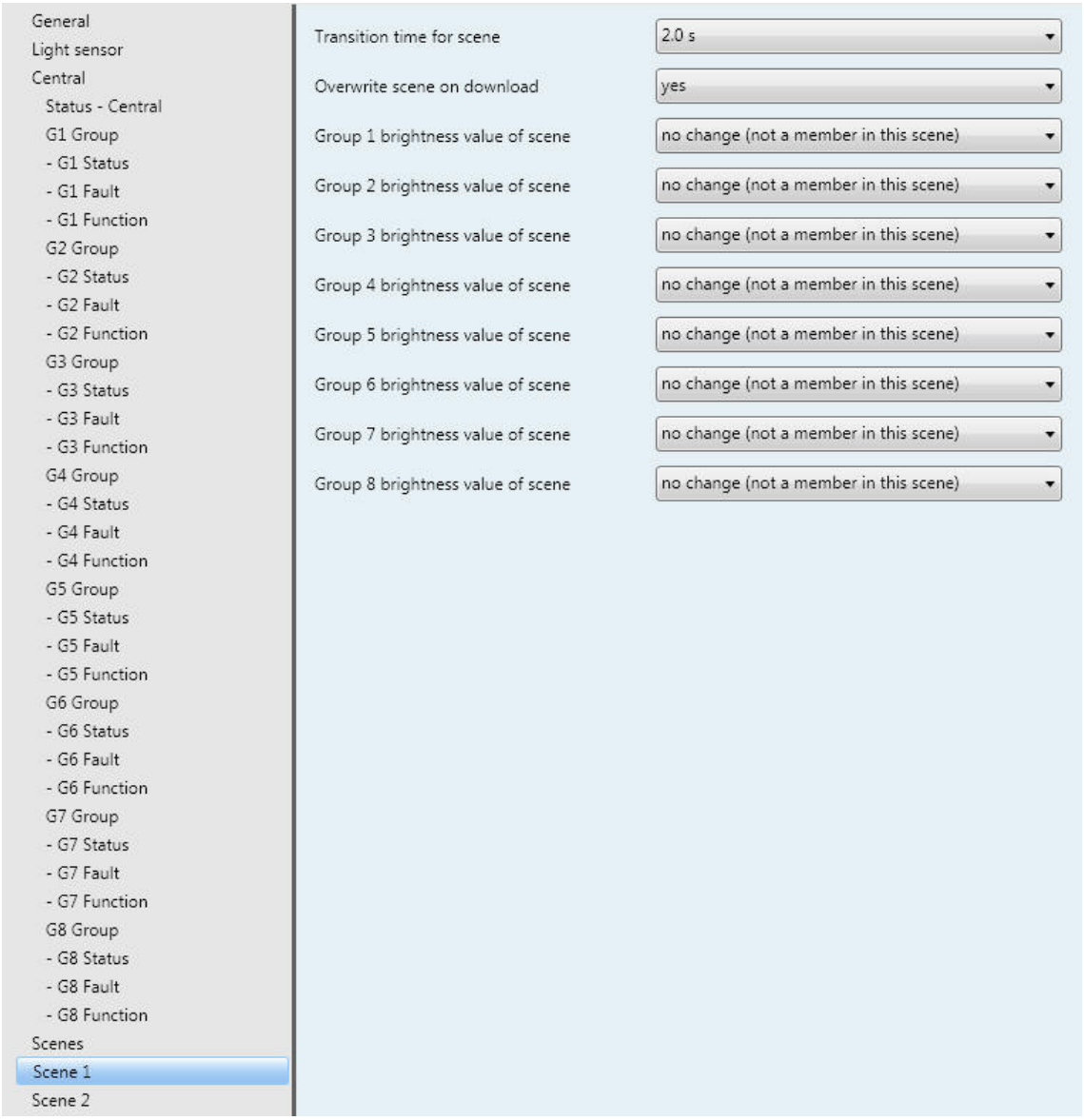
Options: no
yes

This parameter enables different *Scene x/y* parameter windows in pairs.

- *no:* No *Scene x/y* parameter windows are enabled.
- *yes: Scene x/y* parameter windows are enabled.

3.2.4.1 Parameter window *Scene x*

In parameter window Scene x (x = 1, 2…14), the general settings for the light scenes are undertaken. The parameter window *Scene x* is enabled if in parameter window Parameter window Scenes, page 113, the required scene is enabled.



A scene value must be assigned in order to set a scene value for the lighting group. The scene value complies with the brightness value, which the lighting group assumes when the scene is recalled.

Note
When the function *Staircase lighting* is enabled or an additional function (*Light control* or *Slave*) is enabled, the reaction to a scene recall can be parameterized in parameter window- *Gx Control Operating*, *Gx Slave* or *Gx Staircase lighting*.

Transition time for scene

Options: jump to
0.7 s
2.0 s
…
90.5 s
time for dimming changeable via bus

This parameter sets the duration, in which the scene retrieval of the dimming process for all lighting groups of the scene are completed together. If the dimming process is completed, the lighting groups of the scene have achieved the parameterized brightness value of the scene.

Example
Lighting group 1, which is dimmed from 10 % to 100 %, and lighting group 2, which is dimmed from 90 % to 100 %, achieve the parameterized brightness value of the scene simultaneously.

- *jump to:* When a scene is recalled, the lighting groups are switched on immediately with the parameterized brightness value of the scene.
- *0.7 s…90.5 s:* When a scene is recalled, all lighting groups of the scene are dimmed from their current brightness value to the parameterized brightness value within this time duration.
- *time for dimming changeable via bus:* With a scene recall, all lighting groups of the scene are adjustable from their current brightness value to dim them to the parameterized brightness value, via the time for dimming changeable via bus, which can be set via the KNX. The value can be modified via the communication objects *Fade time (DALI format)* or *(KNX format).*

For further information see: Communication object No. 8, page 125, and Table of fading times Fade time (No. 8), page 199

Overwrite scene on download

Options: yes
no

- *yes:* The scene values and the scene transition times in the DALI devices of the lighting group are overwritten after a download by the values set in the ETS.
- *no:* The scene values and the scene transition times in the DALI devices of the lighting group are not overwritten after a download by the values set in the ETS. If no scene values have been stored, they are set by the DLR/A to the maximum brightness.

Note
If there is a KNX bus voltage failure the brightness value of scenes set via the KNX are still retained. With a recall scene or with a store scene, only the lighting groups, which are constituents of the scene, are taken into consideration.

Group x Brightness value of Scene (x = 1…16)

Options: no change (not a member in this scene)
100 % (255)
99 % (252)
…
1 % (3)
0 % (OFF)

Note
The options 100 % (255) to 0 % (OFF) are only visible if the parameter *Overwrite scene on download* is set to *yes*. With the option *no*, the possible settings are reduced to *no change (no member in this scene)* and *member in this scene*.

This parameter defines the brightness value that is set in the lighting group when a scene is recalled.

- *no change (no member in this group)*: This lighting group is not included in this scene. During a Recall scene, the lighting group is not influenced. The current brightness value of the lighting group remains unchanged and even when the scene is stored via the KNX, the brightness value of this group is not stored.
- *100 % (255)…0 % (OFF):* The lighting group belongs to the scene. During a Recall scene, the lighting group is set to the parameterized brightness value here. If the set brightness value is above or below the set maximum or minimum brightness value of the respective lighting group (see Parameter window Gx Group, page 63), the respective brightness value is saved in the scene.

3.3 Communication objects

In this chapter, the communication objects of the DALI Light Controller DLR/A 4.8.1.1 are described. The description is divided into blocks, which relate to the name of the communication object.

- General - Communication objects, valid for the entire DALI Light Controller
- DALI output - Communication objects which relate to the entire DALI output
- Group x - Communication objects for a lighting group x
- Scene x - Communication objects for the function *Scene*

In order to obtain a quick overview of the function possibilities of the DLR/A, all communication objects are listed in an overview table. The detailed function can be examined in more detail in the subsequent description of the individual communication objects.

Note
Some communication objects are dynamic and are only visible if the corresponding parameters are activated in the application. In the following description, Group x represents a lighting group 1…8 and Scene x represents any scene 1…14.

Note
Overlapping lighting groups (a DALI device is assigned to several lighting groups) are not prohibited by the DLR/A. However, they cannot be supported by parameters in the DLR/A. Overlapping lighting groups should not be used due to the complexity of a lighting control.

3.3.1 Short overview of the communication objects

CO No.	Function	Name	Data Point Type (DPT)	Length	Flags				
					C	R	S	T	A
0	In operation	General	1,002	1 bit	x			x	
1	Not assigned								
2	trigger DALI addressing	General	1,003	1 bit	x		x		
3	Status additional function	General	non	2 byte	x	x		x	
4	Fault controller supply	General	1,005	1 bit	x	x		x	
5	Acknowledge faults	General	1,015	1 bit	x		x		
6	Diagnostics	General	non	2 byte	x	x		x	
7	Request Diagnostics	General	non	1 bit	x		x		
8	Fade time (DALI format)	General	non	1 byte	x	x	x	x	
8	Fade time (KNX format)	General	7,004	2 byte	x	x	x	x	
9	Status sensors	General	non	1 byte	x	x		x	
10	Request status values	General	1,017	1 bit	x		x		
11	Switch	DALI output	1,001	1 bit	x		x		
	Switch/status	DALI output	1,001	1 bit	x	x	x	x	
12	Status switch	DALI output	1,001	1 bit	x	x		x	
13	Brightness value	DALI output	5,001	1 byte	x		x		
	Brightness value/status	DALI output	5,001	1 byte	x	x	x	x	
14	Status brightness value	DALI output	5,001	1 byte	x	x		x	
15	Relative dimming	DALI output	3,007	4 bit	x		x		
16	Fault lamp	DALI output	1,005	1 bit	x	x		x	
17	Fault ballast	DALI output	1,005	1 bit	x	x		x	
18	Fault DALI	DALI output	1,005	1 bit	x	x		x	
19	Fault group/device code	DALI output	non	1 byte	x	x		x	
20	Number of faults	DALI output	5,010	1 byte	x	x		x	
21	No. Group/device fault	DALI output	5,010	1 byte	x	x		x	
22	Switch up next fault alarm	DALI output	1,008	1 bit	x		x		
23	Disable sending of fault alarm	DALI output	1,003	1 bit	x		x		
24	Fault DALI	DALI output	1,005	1 bit	x	x		x	
25	Detect ballasts	DALI output	1,010	1 bit	x		x		
26	Burn-in lamp	DALI output	1,010	1 bit	x	x	x	x	
	Burn-in lamp/status	DALI output	1,010	1 bit	x	x	x	x	
27	Enable controller calibration	DALI output	non	1 byte	x	x	x		
28	Calibration artificial light	DALI output	1,003	1 bit	x		x		
29	Calibration daylight	DALI output	1,003	1 bit	x		x		

CO No.	Function	Name	Data Point Type (DPT)	Length	Flags				
					C	R	S	T	A
30	Switch	Group 1	1,001	1 bit	x		x		
	Switch/status	Group 1	1,001	1 bit	x	x	x	x	
31	Status switch	Group 1	1,001	1 bit	x	x		x	
	Activate function slave	Group 1	1,003	1 bit	x		x		
	Activate fct slave/status	Group 1	1,003	1 bit	x	x	x	x	
	Activate function controller	Group 1	1,003	1 bit	x		x		
	Activate fct controller/status	Group 1	1,003	1 bit	x	x	x	x	
32	Brightness value	Group 1	5,001	1 byte	x		x		
	Brightness value/status	Group 1	5,001	1 byte	x	x	x	x	
33	Status brightness value	Group 1	5,001	1 byte	x	x		x	
	Brightness value of slave	Group 1	5,001	1 byte	x		x		
	Master: Brightness value	Group 1	5,001	1 byte	x	x		x	
34	Relative dimming	Group 1	3,007	4 bit	x		x		
35	Fault lamp or ballast	Group 1	1,005	1 bit	x	x		x	
	Fault ballast	Group 1	1,005	1 bit	x	x		x	
	Fault lamp	Group 1	1,005	1 bit	x	x		x	
36	Forced operation	Group 1	1,003	1 bit	x	x	x		
	Forced operation	Group 1	2,001	2 bit	x	x	x		
37/38	Burn-in lamp/status	Group 1	1,010	1 bit	x	x	x	x	
	Block	Group 1	1,003	1 bit	x	x	x		
	Staircase light. permanent ON	Group 1	1,003	1 byte	x		x		
	Warning staircase lighting	Group 1	1,005	1 bit	x			x	
	Stairc. light. activate/status	Group 1	1,003	1 bit	x	x	x	x	
39	Master: Brightness offset	Group 1	5,001	1 byte	x	x		x	
40	Master: Offset activate	Group 1	1,003	1 bit	x	x	x		
41	Control parameter	Group 1	5,001	1 byte	x	x	x		
42…197	Group x, as complete group 1	Group x							
198	recall scene	Scene 1/2	1,022	1 bit	x		x		
199…204	recall scene	Scene x/y	1,022	1 bit	x		x		
205	Store scene	Scene 1/2	1,022	1 bit	x		x		
206…211	Store scene	Scene x/y	1,022	1 bit	x		x		
212	8 bit scene	Scene 1…14	18,001	1 byte	x		x		

* CO = communication object

3.3.2 Communication objects *General*

No.	Function	Object name	Data type	Flags
0	**In operation**	**General**	**1 bit** **DPT 1.002**	**C, T**
This communication object is enabled if in parameter window Parameter window General, page 40, the parameter *Send object "In operation"* is set with the option *yes*: In order to regularly monitor the presence of the DLR/A on the KNX, a monitoring telegram can be sent cyclically on the KNX.				
1	**empty**			
Communication object is not assigned				
2	**Trigger DALI addressing**	**General**	**1 bit** **DPT 1.003**	**C, W**
The communication object is enabled if in Parameter window General, page 40, the automatic address assignment is selected via the parameter *Enable automatic DALI addressing* with the option *no*. Using this communication object, the internal function of the DLR/A is recalled, the DALI device addressing is verified and a DALI address assigned if necessary. Telegram value: 0 = DALI address assignment not initiated 1 = DALI address assignment is recalled once When the address assignment is recalled, the DLR/A verifies the DALI addresses. DALI devices without address receive a DALI address. Doubled DALI addresses are separated.				

No.	Function	Object name	Data type	Flags
3	**Status additional function**	**General**	**2 byte non DPT**	**C, R, T**

This communication object is always enabled and indicates if the additional functions (*Light control* or *Slave*) are operating.

Bit value: 0 = Additional function not operating
(Slave not following its master. The brightness of the controller lighting group does not automatically follow the control)
1 = Additional function operating
(Slave following its master. The brightness of the controller lighting group automatically follows the control)

Bit 0 contains the information of the lighting group 1, bit 7 contains the information concerning the status of the additional function of lighting group 8.

The example clarifies the interpretation of the communication object:

The example here is of a 2 byte communication object. The value read from the communication object, e.g. 34 (= $2^5 + 2^1$) complies with the binary code below. 34 (= $2^5 + 2^1$).

2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0

This means that for lighting groups 6 and 2 an addition function (*Lighting control* or *Slave*) is activated for each and that they operate.

No.	Function	Object name	Data type	Flags
4	**Fault controller supply**	**General**	**1 bit DPT 1.005**	**C, R, T**

This communication object is enabled if in Parameter window General, page 40, the parameter *Fault controller supply* is set with the option *yes*.

Should the light controller supply voltage fail for more than one to two seconds, an error message telegram is immediately sent should sending a telegram at a change be parameterized.

Telegram value: 0 = no fault
1 = fault

No.	Function	Object name	Data type	Flags
5	**Acknowledge faults**	**General**	**1 bit** **DPT 1.015**	**C, W**

This communication object is enabled if in Parameter window General, page 40, the parameter *Acknowledge faults* is set with the option *yes - acknowledgement is required*.

This communication object enables both the reset of the *Fault Controller supply* and the lamp, ballast and DALI fault signals of the individual lamp groups. The fault(s) is (are) only reset after an acknowledgement if the corresponding fault(s) has (have) been rectified.

Telegram value: 0 = no function
1 = reset faults

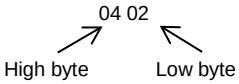
No.	Function	Object name	Data type	Flags
6	**Diagnostics**	**General**	**2 byte** **non DPT**	**C, R, T**

This communication object has the task to make available the function state of the connected DALI system of a lighting group or an individual DALI device on the KNX. The communication object *Diagnosis* should be observed together with the communication object *Request Diagnosis* (No. 7).

After receipt of a telegram on the communication object *Request diagnostics*, the DLR/A automatically sends the information via the communication object *Diagnostic* on the KNX.

In order to guarantee that no information is lost and simultaneously ensure a unique assignment of the sent information, the identical information requested via the communication object *Request Diagnosis* (No. 7) is repeated in bit 0 to bit 7.

High byte/low byte is represented as follows in the ETS:



The hexadecimal representation is received, for example, if you select the DTP 7.001 (*2 octet unsigned* or *2 byte unsigned pulse*). This setting is set via the properties (select communication object, press right mouse button) as a data type.

The following numbering applies for the following list:

High byte								Low byte							
2^{15}	2^{14}	2^{13}	2^{12}	2^{11}	2^{10}	2^{9}	2^{8}	2^{7}	2^{6}	2^{5}	2^{4}	2^{3}	2^{2}	2^{1}	2^{0}

No.	Function	Object name	Data type	Flags
continued No. 6				

The bit number (bit 0 to bit 15) corresponds to the exponent in the binary system, e.g. bit 8, number 8 corresponds to 2^8.

Bit 0…5: corresponds with the information as queried in the communication object *Request diagnosis* (No. 7). The content identifies the DALI device or lighting group, for which information has been requested.

Bit 6: determines if a group (value 1) or an individual device (value 0) has been recalled

Bit 7: contains a 0

Bit 8…15: contains the following coded information concerning the recalled DALI device or recalled lighting group

Bit 8: Fault lamp:
Value 0 = no fault
Value 1 = fault

Bit 9: Fault ballast:
Value 0 = no fault
Value 1 = fault

Bit 10: status of the device monitoring:
Value 0 = there is no monitoring (the DALI devices are not considered with the monitoring of the ballast)
Value 1 = monitoring available

Bit 11: Status function *Burn-in*
Value 0 = function *Burn-in* not activated
Value 1 = function *Burn-in* activated (device or lighting group) can only assume state OFF and 100 %

Bit 12: Status additional function, *slave, light control*:
Value 0 = no additional function for the device or the lighting group is activated
Value 1 = the additional function for the device or the lighting group is activated

Bit 13: Block status:
Value 0 = Lighting group is not blocked
Value 1 = Lighting group is blocked

Bit 14: Status forced operation:
Value 0 = Lighting group is not forcibly operated
Value 1 = Lighting group is forcibly operated

Bit 15 Status disable sending of fault alarm: (by group, if selected)
Value 0 = fault alarm is not blocked
Value 1 = fault alarm is blocked

DALI device available: (by device, if selected)
Value 0 = DALI device available
Value 1 = DALI device not available
This information is independent of whether the DALI device is no longer responding because of a fault, or is completely unavailable.

After a KNX bus voltage recovery (Power On) on the DLR/A, this communication object receives the value FF FF Hex. After download or light controller supply voltage failure, the previous value called after the KNX bus voltage recovery remains in the communication object.

For further information see: Code table Diagnostics High byte (No. 6), page 196

No.	Function	Object name	Data type	Flags
7	**Request Diagnostics**	**General**	**1 byte** **non DPT**	**C, W**

This communication object is always enabled and together with the communication object *Diagnostics* (No. 6) has to provide the function state of the DALI output, a lighting group or a DALI device on the KNX. The required information is queried by the DLR/A via the communication object *Request diagnostics*.

The DLR/A automatically sends the information via the communication object *Diagnostics* (No. 6) on the KNX

Bit 0 to 5: contains the number of the DALI device (short address) or the number of the lighting group (group address)

Bit 6: shows whether the number displayed in Bit 0…5 represents a group number (value 1) or an individual DALI device number (value 0).

Bit 7: has no further function and must have the value 0. If this bit has the value 1, no sending of the diagnostic byte (No. 6) is triggered.

The diagnosis of the 64 DALI devices is requested via the values 0/0 Hex (device 1) to 63/3F Hex (device 64). The diagnosis of a lighting group is requested via the values 64/40 Hex (lighting group 1) to 71/47 Hex (lighting group 8).

For further information see: Code table Diagnostics High byte (No. 6), page 196

No.	Function	Object name	Data type	Flags
8	**Fade time (DALI format) [Value 0…15/0…90.5 s]**	**General**	**1 byte DPT 20.602**	**C, R, W, T**

This communication object is enabled if in Parameter window Central, page 49, the parameter *Object format of flexible time for dimming (Fade time)* is parameterized with the option *DALI format in s [value 0...15 / 0...90.5s]*.

Using this communication object, it is possible to define the fading time as described in the DALI standard EN 62386-102 via the DALI control by using the KNX, so that the intended DALI devices use the DALI fading times.

Telegram value: 0 to 15 corresponds to the fading times to DALI

Telegram value	Fading time [s] to EN 62386-102
0	jump to
1	0.7
2	1.0
3	1.4
4	2.0
5	2.8
6	4.0
7	5.7
8	8.0
9	11.3
10	16.0
11	22.6
12	32.0
13	45.3
14	64.0
15	90.5
> 15	No reaction, is not transferred to DALI

The fade time is specified as the time duration required for changing the lamp power from the current brightness value to the required target brightness. In the case of a switched off lamp, the preheat and ignition time is not included in the fading time.

The set dimming time is retained at light controller supply voltage failure.

On KNX bus voltage failure the dimming time is lost and must be set once again. The value 5.7 s is set as a default value until a new value is received.

No.	Function	Object name	Data type	Flags
8	**Fade time (KNX format) [Value 0...65,535/0...9050 ms]**	**General**	**2 byte DPT 7.004**	**C, W**

This communication object is enabled if in Parameter window Central, page 49, the parameter *Object format of flexible time for dimming (Fade time)* is parameterized with the option *KNX format in 100 ms [value 0...*65,535/0…9050 ms*]*.

Using this communication object, it is possible to define the fading time as described in the DALI standard EN 62386-102 via the DALI control by using the KNX, so that the intended DALI devices use the DALI fading times.

Please note that it is not the sent KNX value that is used in the DALI, but rather the nearest DALI value. The DLR/A performs a mathematical rounding off in order to determine the most suitable DALI value.

Telegram value: 0…65,535 x 100 ms, KNX value that is transformed into one of the 16 fading times of the DALI-Standard.

Telegram value in 100 ms	Active fading time [s] to EN 62386-102
0…3	jump to
4…8	0.7
9…12	1.0
13…17	1.4
18…24	2.0
25…34	2.8
35…48	4.0
49…68	5.7
69…96	8.0
97…136	11.3
137…193	16.0
194…273	22.6
274…386	32.0
387…546	45.3
547…772	64.0
>773	90.5

The fade time is specified as the time duration required for changing the lamp power from the current brightness value to the required target brightness. In the case of a switched off lamp, the preheat and ignition time is not included in the fading time.

The set dimming time is retained at light controller supply voltage failure.

On KNX bus voltage failure the dimming time is lost and must be set once again. The value 5.7 s is set as a default value until a new value is received.

No.	Function	Object name	Data type	Flags
9	**Status sensors**	**General**	**1 byte** **non DPT**	**C, R, T**

This communication object is always enabled. It is used to detect the function of the light sensor, e.g. during commissioning.

If the DALI Light Controller receives a sensor value from the light sensor, this is indicated by setting the appropriate bit in the communication object.

The communication object value is sent automatically on a change or sent by the function *Request status values* via the communication object *Request status values* (No. 10). If this is not desired, the T flag can be removed.

Bit 0: indicates information for sensor input 1.

Bit 3: Indicates the information for sensor input 4. A code table can be found in the appendix.

Bit-value: 0 = DALI Light Controller does not receive a sensor value from the light sensor.
1 = DALI Light Controller receives a sensor value from the light sensor.

It is possible for the following reasons that the DALI Light Controller does not receive a sensor value from the light sensor:

- No light sensor connected
- Light sensor connected with reverse polarity
- Light sensor cable open circuit
- Absolute darkness

10	**Request status values**	**General**	**1 bit** **DPT 1.017**	**C, W**

This communication object is enabled if in Parameter window General, page 40, the parameter *Request status values* is parameterized with the option *yes*.

Sending of status values on the KNX can be triggered via this communication object. A prerequisite is that the option *after request* is parameterized in the corresponding communication object.

Telegram value: 0 = no sending of the status values, no function
1 = all status messages are sent, provided they are programmed with the option *after request*

3.3.3 Communication objects *DALI output*

The communication objects change depending on the parameterization, e.g. whether separate or common status communication objects are used for the status messages.

Note

In the following, the communication objects are described, which relate to the overall DALI output and thus to the DALI devices connected to it.

It is a central function (Broadcast mode) that relates to all devices of the output. The properties of the central telegram are determined in Parameter window Central, page 49, and Parameter window Status - Central, page 57.

No.	Function	Object name	Data type	Flags
11	**Switch**	**DALI output**	**1 bit** **DPT 1.001**	**C, W**

Using this communication object, all DALI devices connected to the DALI output are switched on or off with the predefined brightness values in Parameter window Central, page 49.

Telegram value: 0 = OFF: all lamps switched off
1 = ON: all lamps switched on

When an ON telegram is received, the parameter settings define if a predefined brightness value or the value before switch off is set. If individual DALI devices are already switched on, these will also set with the parameterized brightness switch on value.

You can parameterize whether a DLR/A dims down to or jumps to the brightness values. If the switch on values are above or below the max. or min. dimming values (dimming thresholds), the respective dimming threshold is set.

Note

For the maximum and minimum dimming values, the individual values of the lighting group remain valid.

The activated function Burn-in can influence the brightness of the DALI devices.

If the function *Staircase lighting* is activated, this function is triggered with an ON telegram (value 1) and the respective timing is started.

No.	Function	Object name	Data type	Flags
11	**Switch/status**	**DALI output**	**1 bit** **DPT 1.001**	**C, R, W, T**

This communication object is enabled if in Parameter window Status - Central, page 57, the parameter *Status response of switching state of the DALI output* is set with the option *yes: via object "Switch/status"*.

This communication object has the same functions and properties as the communication object *Switch*. The status is additionally fed back.

Telegram value: 0 = OFF and status: all DALI devices are switched off
1 = ON and status: all DALI devices are switched on

Note
If several KNX group addresses are assigned to the communication object *Switch/status*, the status address should be set as the sending address. In a KNX group with several status messages, it is useful to allow just a single group member to feedback the status.

12	**Status switch**	**DALI output**	**1 bit** **DPT 1.001**	**C, R, T**

This communication object is enabled if in Parameter window Status - Central, page 57, the parameter *Status response of switching state of the DALI output* is set with the option *yes: via separate object "Switch/status"*.

Telegram value: 0 = OFF and status: all lamps switched off
1 = ON and status: all lamps switched on

The value of the communication object directly shows the current switch state of the lamp. The status can be sent *after a change* and/or *after request*.

13	**Brightness value**	**DALI output**	**1 byte** **DPT 5.001**	**C, W**

A brightness value for all connected DALI devices is received via this communication object. Any elapsing burn-in time currently active has a higher priority, so that under certain circumstances individual devices can only assume a brightness of 100 % or OFF.

In Parameter window Central, page 49 it can be parameterized whether the brightness value is set abruptly or dimmed to with a dimming speed.

Brightness values, which are above or below the predefined max. or min. dimming values (dimming thresholds), are not set. The dimming thresholds for the individual groups as set apply.

Telegram value: 0 = OFF, or min. dimming threshold, if parameterized
…
255 = 100 %

No.	Function	Object name	Data type	Flags
13	**Brightness value/status**	**DALI output**	**1 byte** **DPT 5.001**	**C, R, W, T**

This communication object is enabled if in Parameter window Status - Central, page 57, the parameter *Status response of brightness value of the DALI output* is set with the option *yes: via object "Brightness value/status"*.

This communication object has the same functions and properties as the communication object *Brightness value*. The status is additionally fed back. With differing brightness values, the DALI devices are displayed with average brightness. Different brightness values can only occur if overlapping lighting groups (one device is assigned to several groups) are parameterized. Overlapping lighting groups should not be used due to the complexity of a lighting control. However, they are not prohibited, but they cannot be supported by parameters in the DLR/A.

The parameterization is implemented in the parameter window Status - Central.

Telegram value: 0 = OFF, or minimum dimming threshold
…
255 = 100 %

Note

If several groups are assigned to the communication object *Brightness value/status*, the status address should be set as the sending address. In a KNX group with several status messages, it is useful to allow just a single group member to feedback the status.

14	**Status brightness value**	**DALI output**	**1 byte** **DPT 5.001**	**C, R, T**

This communication object is enabled if in Parameter window Status - Central, page 57, the parameter *Status response of brightness value of the DALI output* is set with the option *yes: via separate object "Brightness value/status"*.

Telegram value: 0 = OFF
…
255 = 100 %, max. brightness value

This communication object reports the current brightness value of the DALI device. The value of the communication object updates itself during a dimming process, scene or staircase lighting time curve.

It is possible to parameterize if the status is sent on *after a change* and/or *after request*.

No.	Function	Object name	Data type	Flags
15	**Relative dimming**	**DALI output**	**4 bit** **DPT 3.007**	**C, W**

The *Relative dimming telegram* of all connected DALI devices is received via this communication object. They are dimming telegrams BRIGHTER, DARKER and STOP. After a START telegram is received, the brightness value is changed in the defined direction with the parameterized speed. If a STOP telegram is received before the dim process ends or the maximum or minimum dimming value is reached, the dimming process is interrupted and the received brightness value is retained.

If the dimming values are above or below the max. or min. dimming values (dimming thresholds), the respective dimming threshold is set. If the dimming values are above or below the max. or min. dimming values (dimming thresholds), the respective dimming threshold is set.

The dimming thresholds on the individual lighting groups continue to apply.

Resulting for the DALI functionality (dimming step 200 ms), the step-by-step dimming rarely used in KNX is only conditionally supported. A small KNX dimming step can trigger a larger DALI dimming step under certain conditions.

16	**Fault lamp**	**DALI output**	**1 bit** **DPT 1.005**	**C, R, T**

This communication object is enabled if in Parameter window Status - Central, page 57, the parameter *Fault lamp* is set with the option *yes*.

Using this communication object, a lamp fault can be sent or read.

Telegram value 0 = no lamp fault
1 = lamp fault
(at least one connected DALI device has sent a lamp fault)

Note

This function must be supported by the DALI devices.

If DALI devices are used, which do not monitor their lighting equipment and which thus do not provide this information on the DALI, the DLR/A will also be unable to detect a lamp fault. In order to monitor a lamp fault, the function *Detect ballasts* does not need to be explicitly activated.

In most cases, a lamp fault is only determined or indicated by the DLR/A when the lighting equipment should be switched on. For this reason, the DLR/A cannot report a fault beforehand.

Using the communication object *Fault lamp* (Gx Group), the state of the lamps for every lighting group can be indicated. Using the communication object (*Diagnosis*, No. 6) it is possible to request the lamp state for each DALI device.

It is possible to parameterize whether the fault is sent on *after a change* and/or *after request*.

No.	Function	Object name	Data type	Flags
17	**Fault ballast**	**DALI output**	**1 bit** **DPT 1.005**	**C, R, T**

This communication object is enabled if in Parameter window Status - Central, page 57, the parameter *Fault ballast* is set with the option *yes*.

Using this communication object, a ballast fault can be sent or read. Using this communication object, a ballast fault can be sent or read.

Telegram value 0 = no ballast fault
1 = ballast fault (at least one connected ballast has a fault)

A ballast fault can occur in one of the following situations:

- The ballast is faulty and does not send telegrams on the DALI control line
- The ballast has no ballast operating voltage and does not send telegrams on the DALI control line
- The DALI control line to the ballast is interrupted, so that the DLR/A does not receive a status response
- The ballast has lost its address, a query from the DLR/A remains unanswered

It is possible to parameterize whether the fault is sent on *after a change* and/or *after request*.

Note

In order to guarantee correct evaluation of a ballast fault, the DLR/A has to know how many ballasts are to be monitored. This is implemented by one-time activation of the communication object *Detect ballasts* (No. 25). Using this function, the DLR/A independently determines which ballasts (DALI devices/DALI addresses) are connected and uses this state as a reference value. Here not only the number but also the address of the DALI device is registered. If the system has to be modified, the function *Detect ballasts* must be undertaken again.

The function *Detect ballasts* can be triggered not only via the communication object *Detect ballasts*, but also via the Software Tool.

No.	Function	Object name	Data type	Flags
18	**Fault DALI**	**DALI output**	**1 bit** **DPT 1.005**	**C, R, T**

This communication object is enabled if in Parameter window Status - Central, page 57, the parameter *Fault DALI* is set with the option *yes*.

Using this communication object, a DALI fault can be sent or read.

There is a DALI fault if the short circuit persists for more than 500 ms.

Telegram value: 0 = no DALI fault
1 = DALI fault of the DALI communication

It is possible to parameterize whether the fault is sent on *after a change* and/or *after request*.

No.	Function	Object name	Data type	Flags
19	**Fault group/device code**	**DALI output**	**1 byte** **non DPT**	**C, R, T**

This communication object is enabled if in Parameter window Status - Central, page 57, the parameter *Fault group/device Code enable encoded fault message* is parameterized with the option *yes*:

Via this communication object, the DLR/A transfers the status of a fault of every lighting group or of each individual DALI device on the KNX. It can be parameterized, whether the bit combination corresponds to a lighting group 0…7 (group-orientated) or an individual DALI device 0…63 (device based).

Bit 0…5 = contains a binary number (0...7 or 0…64). This number added to 1 corresponds to the number of the faulty lighting group or the faulty DALI device

Bit 6 = indicates a lamp fault

Bit 7 = indicates a ballast fault

A logical 1 indicates the fault.

The values read via the communication object can be interpreted as follows:

Group orientated setting:

No fault	Value	0…7	+1	= Number of the lighting group
Lamp fault	Value	64…71	-63	= Number of the lighting group
Ballast fault	Value	128…135	-127	= Number of the lighting group

Device based setting:

No fault	Value	0…63	+1	= No. DALI device (ballast no.)
Lamp fault	Value	64…127	-63	= No. DALI device
Ballast fault	Value	128…191	-127	= No. DALI device

For further information see: Code table Fault group/device code (No. 19), page 202

The telegrams are sent immediately after detection of the fault. Should several faults occur at the same time, the telegrams are sent consecutively on the KNX. If a fault is remedied, this will also be indicated on the communication object *Fault group/device code* (No. 19). The information will be retained in the communication object until the error status changes or a telegram with the value 1 is received on the object *Request status values* (No. 10). In this case, the fault state of the DALI device or the lighting group is displayed as contained in the communication object *Group/device fault* (No. 21).

Note: The detection of the error state can take up to 90 seconds, depending on the situation.

No.	Function	Object name	Data type	Flags
20	**Number of faults**	**DALI output**	**1 byte** **DPT 5.010**	**C, R, T**

This communication object is enabled if in Parameter window Status - Central, page 57, the parameter *Fault group/device Code enable encoded fault message* is parameterized with the option *yes*:

Using this communication object, the number of groups or lighting groups or individual DALI devices are displayed, which have at least one lamp or ballast fault. The value relates to the lighting group or the individual DALI device in dependence on the *group-orientated* or *device-based* parameterization.

The communication object value is sent after a change. If the acknowledgement of error messages is activated, the communication object value (Number of faults) only changes after acknowledgement.

Telegram value: 0…8 = number of lighting groups with fault
0…64 = number of individual DALI devices with fault

No.	Function	Object name	Data type	Flags
21	**No. Group/device fault**	**DALI output**	**1 byte** **DPT 5.010**	**C, R, T**

This communication object is enabled if in Parameter window Status - Central, page 57, the parameter *Fault group/device Code enable encoded fault message* is parameterized with the option *yes*:

With this communication object, the first lighting group or the first DALI device is displayed as a figure value. The value relates directly to the lighting group or the individual DALI device in dependence on the *group-orientated* or *device-based* parameterization. A correction by 1 as required for the values in the communication objects *Diagnosis* (6) and *Fault group/device code* (No. 7) is not necessary in the communication object described here.

Telegram value: 1…8 = number of lighting group with fault
1…64 = number of individual DALI device with fault

All lighting groups or DALI devices with a fault can be displayed successively in conjunction with the communication object *Switch up next fault alarm* (No. 22). If the communication object *Number of faults* is added, you can recognize how often you will need to switch up in order to view all faults.

All detected faults are sent. The last recognized fault remains.

If this is remedied, the previous fault is displayed.

No.	Function	Object name	Data type	Flags
22	**Switch up next fault alarm**	**DALI output**	**1 byte** **DPT 1.008**	**C, W**

This communication object is enabled if in Parameter window Status - Central, page 57, the parameter *Fault group/device Code enable encoded fault message* is parameterized with the option *yes*:

This communication object should be considered in conjunction with the communication object *No. Group/device fault* (No. 21). Should there be several group or device faults, this communication object can be used to switch to the next number of the communication object *No. Group/device fault*. With the value 0, you can advance by a number, and with the value 1 you can go back by a number.

Telegram value: 0 = "switch up": The next higher number of lighting group or DALI device with a fault is displayed on the communication object *No. Group/device fault* (No. 21).
1 = "switch down": The next lower number of lighting group or DALI device with a fault is displayed on the communication object *No. Group/device fault* (No. 21)

If the highest number is reached when switching up or the lowest number when switching down, the indication cycle loops, i.e. the first DALI device fault is indicated again.

No.	Function	Object name	Data type	Flags
23	**Disable sending of fault alarm**	**DALI output**	**1 byte** **DPT 1.003**	**C, W**

With this communication object, it is possible to disable the fault messages (lamp or ballast fault) of the DLR/A. If the fault messages are inhibited, the DLR/A will continue to undertake fault message examination regarding lamp and ballast faults.

During the inhibit, the faults are evaluated but not sent on the KNX. The values of the communication objects are also not updated.

The latent time of the system can be minimized at low KNX load when the fault messages are inhibited.

When all error messages are enabled, the malfunctions will be sent in accordance with their parameterization. If a fault still exists after enabling of the error message, this fault is recorded and the information is sent on the KNX in accordance with the parameterization.

Telegram value: 0 = enabling of fault messages (lamp and ballast fault)
1 = disabling of fault messages (lamp and ballast fault)

Note
This function can, for example, be useful for systems with emergency lighting applications for daily checking of the lamps of the DALI devices by the DALI control line, and thus disconnect them from the DALI master (DLR/A). In this case, the DLR/A detects the loss of the DALI device and sends a ballast fault even though this is a normal operating state. Should the fault message be disabled before separation from the DALI control line, no fault is reported on the DLR/A. Operation can continue as normal. After checking the lighting equipment, normal monitoring can be reactivated via the error message communication object Disable sending of fault alarm.

24	**Fault DALI**	**DALI output**	**1 bit** **DPT 1.005**	**C, R, T**

This communication object is always enabled.

Using this communication object, you indicate if the system state does not correspond with the state in the DALI Light Controller, i.e., there are differences between the group and scene assignments stored in the DLR/A when compared to the information stored in the DALI devices. This can, for example, be the case if exchanged or pre-programmed DALI devices with a group assignment are installed on the DLR/A.

Telegram value 0 = There is no DALI conflict, i.e. the state (groups and scenes) matches the information stored in the DLR/A.
1 = There is a DALI conflict

No.	Function	Object name	Data type	Flags
25	**Detect ballasts**	**DALI output**	**1 bit** **DPT 1.010**	**C, W**

Using this communication object, the current state of the DALI Light Controller can be stored as the reference state.

In order to correctly detect a ballast fault, the DALI Light Controller must have correctly identified all connected DALI devices and thus know the number of connected DALI devices to be monitored. This identification process runs autonomously and fully automatically in the background, after the DALI Light Controller has received a detection telegram with value 1 via this communication object. The DALI Light Controller notes the current system configuration as a reference state. For this purpose, all DALI addresses are stored in the DALI Light Controller. Should a DALI address now be lost, e.g. by a ballast fault, cable break, etc., this is interpreted by the DALI Light Controller as a ballast fault and sent on the KNX as set in the parameterization. An automatic detection, e.g. after a KNX bus voltage recovery or light controller supply voltage recovery, does not take place.

The detection should be carried out directly after commissioning or when extending or reducing the DALI devices.

The DALI devices are continually monitored, regardless of whether the lamp is activated or deactivated.

The DALI devices must be installed properly and supplied with operating voltage if necessary.

Telegram value 1 = start ballast detection
0 = no function

Note

This function can be triggered in manual mode using the S button. Furthermore, the detection of DALI devices and saving them as a reference value is possible in the Software-Tool using the button *Detect ballasts*.

No.	Function	Object name	Data type	Flags
26	**Burn-in lamp**	**DALI output**	**1 bit** **DPT 1.010**	**C, W**

This communication object is enabled if in Parameter window Central, page 49, the parameter *Enable central function lamp Burn-in object "Burn-in lamp/status"* is parameterized with the option *yes*. Furthermore, the function *Burn-in* must be enabled in Parameter window Gx Group, page 63. At this position, the burn-in time for the lighting group has to be set.

Using this communication object, the function Burn in is activated or deactivated for protecting the ballast and the lamp. After receiving a telegram with the value 1, all lighting groups intended for burn-in can only be controlled with 0 % (OFF) or 100 % brightness. Whether a lighting group is considered during burn-in is set in Parameter window Gx Group, page 63, with the parameter *Enable function lamp burn-in object "Burn-in lamp"*. Incoming telegrams have an effect on all lighting groups which are intended for burn-in purposes.

The time duration for burn-in is defined commonly for all lighting groups. After this burn-in time has elapsed, the lighting group can be dimmed as usual, and the programmed light scene can be recalled. If a telegram with the value 1 is received on the communication object *Burn-In Lamp* during the burn-in time, the period restarts from the beginning.

A telegram with the value 0 deactivates the function *Burn-in* and enables "normal" operation.

The burn-in time is only counted if a ballast on the DALI output is connected and supplied with power.

Telegram value: 0 = deactivate burn-in function
1 = activate burn-in function

For further information see: Burning-in of luminaires, page 161

Alternatively, burn-in of an individual lighting group can be enabled via the communication object *Burn-in lamp group x* (No. 37). The communication objects *group x Burn-in lamp* and *DALI output Burn-in lamp* are independent of each other. The burn-in time of the lighting group is triggered or restarted with the value 1 on both communication objects.

No.	Function	Object name	Data type	Flags
26	**Burn-in lamp/status**	**DALI output**	**1 bit** **DPT 1.010**	**C, W**

This communication object is enabled if in Parameter window Central, page 49, the parameter *Enable central function lamp Burn-in object "Burn-in lamp/status"* is parameterized with the option *yes* and a status message about the burn-in process is also required.

The communication object also features in addition to the properties of the communication object Burn-in lamp are previously described, the property that the burn-in status can be requested or sent on the KNX in accordance with the parameterization.

Telegram value: 0 = deactivate *burn-in* function or no lighting group is in the burn-in state.
1 = activate *Burn-in* function or at least one lighting group is in the burn-in state.

No.	Function	Object name	Data type	Flags
27	**Enable controller calibration**	**DALI output**	**1 byte** **non DPT**	**C, W**

This communication object is always enabled; however, it is only required for the artificial lighting and daylight calibration of a constant lighting control.

Using this communication object, the communication objects *Daylight calibration* or *Artificial lighting calibration* are enabled for receipt of a telegram, i.e., the DLR/A only performs a daylight or artificial lighting calibration if the communication object *Enable controller calibration* has received a telegram with the number of the respective lighting group (1…4) beforehand. This ensures that calibration is not performed unintentionally.

The readiness to receive a telegram for activation of the daylight or artificial lighting calibration remains in effect for 1 hour, if a calibration request has not been received and has taken place beforehand via the communication objects *Calibration artificial light* or *Calibration daylight*.

Telegram value: 1…4 = The number value enables the lighting group via the communications objects, to perform a *Calibration artificial light* or *Calibration daylight* of the constant lighting control
0 = Immediately resets the readiness to receive for the communication objects *Calibration daylight* and *Calibration artificial light,* i.e. telegrams to the communication objects *Calibration artificial light* or *Calibration daylight* are not actioned.

No.	Function	Object name	Data type	Flags
28	**Calibration artificial light**	**DALI output**	**1 bit** **DPT 1.003**	**C, W**

This communication object is always enabled and is only required for the lighting groups with the additional function *Light control*.

Using this communication object, the artificial lighting calibration for the lighting group is initiated via the communication object *Enable controller calibration* (No. 27). The calibration of the lighting group occurs automatically via the DLR/A, if on the communication object Calibration artificial light, a telegram with the value 1 is received.

Telegram value: 0 = no effect
1 = triggering of artificial light calibration

The calibration of the artificial lighting takes about a minute. When the calibration of the artificial lighting is completed, the communication object value is reset to 0. The value is sent on the KNX by setting the T flag. After calibration, the light control for the DALI output is activated and controlled.

The DLR/A is thought to recognize the artificial lighting levels with lighting calibration. At the same time, a characteristic for the lighting is recorded and stored in the DLR/A.

The artificial light calibration should be undertaken without the influence of daylight.

The lighting should be set so that the brightness value (setpoint), which is required during constant lighting control in the room, is set.

After a reset or discharge of the DLR/A via the ETS, the stored values are lost. The determined values are retained with a download, KNX bus voltage failure or a light controller supply voltage failure. The values are only overwritten after a renewed calibration.

The artificial lighting calibration should always be undertaken, so that the characteristic curve of the luminaires is known to the DLR/A.

Using the Software-Tool (control), a control parameter (actual value) can be determined for a setpoint value (brightness value). If required, this setting can be read into the DLR/A as the new setting for a setpoint value via the communication object Control parameter, e.g. communication object No. 41 for lighting group 1. In this way, the control setting for the current setpoint is overwritten. In this way, the control setting for the current setpoint is overwritten.

For further information see: Performing artificial lighting calibration , page 174

The sequence of daylight and artificial lighting calibration is **not** random. Calibration with artificial light must be performed before calibration with daylight.

No.	Function	Object name	Data type	Flags
29	**Calibration daylight**	**DALI output**	**1 bit** **DPT 1.003**	**C, W**

This communication object is always enabled and is only required for the lighting groups with the additional function *Light control*.

Using this communication object, the daylight calibration for the lighting group is initiated via the communication object *Enable controller calibration* (No. 27). The calibration of the lighting group occurs automatically via the DLR/A, if on the communication object *Calibration daylight* a telegram with the value 1 is received.

The daylight calibration is undertaken with natural light. The artificial lighting source is switched off by the lighting. In order to avoid an undershoot of the set brightness setpoint in the controlled state, the brightness for the daylight calibration in the reference range should be about 10 % above the brightness for the artificial light calibration.

Telegram value: 1 = triggering of daylight calibration
0 = no effect

The daylight calibration takes about ten minutes. When the calibration is completed, the communication object value is reset to 0. The value is sent on the KNX by setting the T flag. After calibration, the light control for the DALI output is activated and controlled.

The DLR/A is thought to recognize the natural lighting levels with daylight calibration. In this way, the DLR/A determines the relationship between artificial lighting and daylight which improves the constant lighting control. The daylight calibration should be performed without the influence of artificial lighting. The setpoint brightness is again to be set on the reference point in the room by the change of shading of the setpoint brightness value. If this is not possible, the daylight calibration factor can be assigned via the ETS. This factor can be optimized by experiment by observing the light controller so that the light control is set to the setpoint brightness.

For further information see: daylight calibration, page 176

The sequence of daylight and artificial lighting calibration is **not** random. Calibration with artificial light must be performed before calibration with daylight.

3.3.4 Communication objects *Group x*

It is possible to parameterize status messages. The communication objects change accordingly.

Depending on the parameterization, the communications objects change, e.g. for group 1:

No. 30 and 31 separate communication objects or common communication object No. 30

No. 32 and 33 separate communication objects or common communication object No. 32

No.	Function	Object name	Data type	Flags
30	**Switch**	**Group x**	**1 bit** **DPT 1.001**	**C, W**

Using this communication object, the lighting group is switched on or off with the predefined brightness value (Parameter window Gx Group, page 63).

Telegram value: 0 = OFF: Lighting group switched off
1 = ON: Lighting group switched on

When an ON telegram is received, the parameter settings define if a predefined brightness value or the value before switch off is set.

If the parameterized lighting group is switched on with any brightness value and it receives a renewed ON telegram, the parameterized brightness switch on value is set. Any ongoing function *Burn-in* currently active has a higher priority, so that under certain circumstances individual devices can only assume a brightness of 100 % or OFF.

Other parameter settings define whether the brightness value when turned on is dimmed to, or whether it takes immediate effect. Switch on values, which are above or below the maximum/minimum brightness values, are replaced by the corresponding brightness values.

If one of the additional functions *Slave* or *Staircase lighting* is activated, this function is triggered with an ON telegram (value 1) and the respective timing is started. An inversion is not intended.

It is possible to parameterize that the switch status is fed back via the communication object *Status switch* or via *Switch/status*. Generally, the status messages use a separate communication object *Status switch* for this purpose. This can be parameterized in Parameter window – Gx Status, page 73.

30	**Switch/status**	**Group x**	**1 bit** **DPT 1.001**	**C, R, W, T**

The communication object is enabled if in Parameter window – Gx Status, page 73, the parameter *Status response of switching state* is set with *yes: via object "Switch/status"*.

This communication object has the same functions and properties as the communication object *Switch*. The status is additionally fed back. Additionally, the value of the communication object is also updated if this is not sent on the KNX.

Telegram value: 0 = OFF or OFF and status: Lighting group switched off
1 = ON or ON and status: Lighting group switched on

Note

If several KNX group addresses are assigned to the communication object *Switch/status*, the status address should be set as the sending address. In a KNX group with several status messages, it is useful to allow just a single group member to feedback the status.

No.	Function	Object name	Data type	Flags
31	**Status switch**	**Group x**	**1 bit** **DPT 1.001**	**C, R, T**

This communication object is enabled if in Parameter window – Gx Status, page 73, the parameter Status *response of switching state* is set with *yes: via separate object "Switch/status"*.

Telegram value: 0 = OFF and status: Lighting group switched off
1 = ON and status: Lighting group switched on

The value of the communication object directly shows the current switch state of the lighting group x. The status can be sent *after a change* and/or *after request*.

No.	Function	Object name	Data type	Flags
32	**Brightness value**	**Group x**	**1 bit** **DPT 5.001**	**C, W**

A defined brightness value for the corresponding lighting group x is received via this communication object. Any elapsing burn-in time currently active has a higher priority, so that under certain circumstances individual devices can only assume a brightness of 100 % or OFF.

In Parameter window Gx Group, page 63, you can parameterize whether to jump to this value or dimmed to it using a dimming speed.

If the brightness values are above or below the max. or min. dimming values (dimming thresholds), the respective dimming threshold is set.

Telegram value: 0 = OFF, or min. dimming threshold, if parameterized
…
255 = 100 %

It is possible to parameterize that the status of the brightness value is fed back via the communication object *Brightness value/status*. Generally, a separate communication object *Status brightness value* is used. This can be enabled in Parameter window – Gx Status, page 73.

No.	Function	Object name	Data type	Flags
32	**Brightness value/status**	**Group x**	**1 bit** **DPT 5.001**	**C, R, W, T**

This communication object is enabled if in Parameter window – Gx Status, page 73, the parameter *Status response of brightness value* is set with the option *yes: via object "Brightness value/status"*.

This communication object has the same functions and characteristics as the communication object *Brightness value*. The status is additionally fed back.

Additionally, the value of the communication object is also updated if this is not sent on the KNX.

Telegram value: 0 = OFF, or minimum dimming threshold
…
255 = 100 %

Note

If several KNX group addresses are assigned to the communication object *Brightness value/status*, the status address should be set as the sending address.

In a KNX group with several status messages, it is useful to allow just a single group member to feedback the status.

No.	Function	Object name	Data type	Flags
33	**Status brightness value**	**Group x**	**1 bit** **DPT 5.001**	**C, R, T**
This communication object is enabled if in Parameter window – Gx Status, page 73, the parameter *Status response of brightness value* is set with the option *yes: via separate object "Brightness value/status"*. Telegram value: 0 = OFF … 255 = 100 %, max. brightness value This communication object reports back the current brightness value of the lighting group. The value of the communication object updates itself during a dimming process, staircase lighting time curve or scene sequence. It is possible to parameterize when a status telegram is sent. The status can be sent *after a change* and/or *after request*.				
34	**Relative dimming**	**Group x**	**1 bit** **DPT 3.007**	**C, W**
Via this communication object, the relative dimming telegram is received for the respective lighting group. They are dimming telegrams BRIGHTER, DARKER and STOP. After a START telegram is received, the brightness value is changed in the defined direction with the parameterized speed. If a STOP telegram is received before the dim process ends or the maximum or minimum dimming value is reached, the dimming process is interrupted and the received brightness value is retained. If the dimming values are above or below the max. or min. dimming values (dimming thresholds), the respective dimming threshold is set. If the dimming values are above or below the max. or min. dimming values (dimming thresholds), the respective dimming threshold is set. This communication object is not available with a parameterized additional function. Owing to DALI functionality (dimming step 200 ms), the step-by-step dimming rarely used in KNX is only conditionally supported. A small KNX dimming step can trigger a larger DALI dimming step under certain conditions.				

In addition to the control telegrams and status responses of the lighting groups, there is the possibility to set the fault status for the lighting group on the KNX via a separate communication object for every lighting group.

No.	Function	Object name	Data type	Flags
35	**Fault lamp or ballast** **Fault ballast** **Fault lamp**	**Group x**	**1 bit** **DPT 1.005**	**C, R, T**

By parameterizing this communication object, in Parameter window – Gx Status page 73, a fault in the lighting group x can be displayed on the KNX.

This communication object is a variable communication object, which contains, according to its parameterization, information about a ballast fault, a lamp fault or a combination of both faults.

Telegram value 1 = fault of one or more DALI devices in the lighting group x
0 = no fault

Fault ballast: The failure of ballast in the lighting group is displayed. Loss of a ballast can be due to one of the following situations:

- The ballast is faulty and does not send telegrams on the DALI control line.
- The ballast has no ballast operating voltage and does not send telegrams on the DALI control line.
- The DALI control line to the ballast is interrupted, so that the DLR/A does not receive a status response
- The ballast has lost its address, a query from the DLR/A remains unanswered

Note

In order to guarantee correct evaluation of a ballast fault, the DLR/A has to know how many ballasts are to be monitored. This is implemented by one-time activation of the communication object *Detect ballasts* (No. 25). Using this function, the DLR/A independently determines which ballasts (DALI devices/DALI addresses) are connected and uses this state as a reference value. Here not only the number but also the address of the DALI device is registered. If the system has to be modified, the function *Detect ballasts* must be undertaken again.

The process does not need to be repeated when exchanging a DALI device with the same address. The new DALI device receives the old DALI address and assumes the position of the DALI device it replaced.

The function *Detect ballasts* can be triggered not only via the communication object *Detect ballasts*, but also by pressing the S button in manual mode. Furthermore, this function can be triggered with the Software-Tool using button *Detect ballasts* in the *Options* window.

Fault lamp: A defective lamp in the lighting group is indicated. This function must be supported by the DALI devices. If DALI devices are used, which do not monitor their lighting equipment and which thus do not provide this information on the DALI, the DLR/A will also be unable to detect a lamp fault. In order to monitor a lamp fault, the function *Detect ballasts* does not need to be explicitly run.

Fault lamp or ballast: A fault in the lighting group is displayed if at least one lamp or ballast of the lighting group exhibits a fault. Both faults are logically linked in the DLR/A with a logical OR.

Note

The information about an individual DALI device with a fault is provided by the DLR/A via coded diagnostics communication objects (No. 19).

No.	Function	Object name	Data type	Flags
36	**Forced operation**	**Group x**	**2 bit** **DPT 2.001**	**C, R, W**

This communication object is enabled if in Parameter window - Gx Functions, page 82, the function *forced operation 2 bit control* is enabled.

Lighting group x can be forcibly operated via this communication object (e.g. by a higher-level control). The value of the communication object directly defines the forced position of the lighting group:

Telegram value:
0 or 1 = The lighting group is not forced operated, an existing forced operation is rescinded.
2 = The lighting group is forcibly switched off.
The forced operation is active.
3 = The lighting group is forcibly switched on with the parameterized brightness value.
The forced operation is active.

Incoming telegrams during forced operation are not undertaken, they are however evaluated in the background (dimming processes are not considered). After enable of the lighting group, the incoming telegrams are processed again. When forced operation is removed, the lighting group is set with the brightness value calculated in the background. A previously operating function *Light control* or *Slave* is recommenced (in standby). The function *Staircase lighting* is started in the dimming phase.

If the lighting group had control before forced operation, lighting control will be reassumed after forced operation.

After a download, the communication object *Forced operation* has the value 0.

The forced operation is not activated.

Forced operation has a higher priority than blocking a lighting group.

The state of the KNX bus voltage can be parameterized.

For further information see: Parameter window - Gx Functions, page 82

No.	Function	Object name	Data type	Flags
36	**Forced operation**	**Group x**	**1 bit** **DPT 1.003**	**C, R, W**

This communication object is enabled if in Parameter window - Gx Functions, page 82, the function *forced operation 1 bit control* is enabled.

Lighting group x can be forcibly operated via this communication object (e.g. by a higher-level control). The value of the communication object directly defines the forced position of the lighting group:

Telegram value:
0 = The lighting group is not forced operated, a forced operation is rescinded.
1 = The lighting group is forcibly switched on with the parameterized brightness value.
The forced operation is active.

The brightness value of the lighting group is calculated with an incoming telegram during forced operation, but is not however displayed. Dimming speeds are not considered with the calculation, i.e. in the background, the immediate end values are stored. After the completion of forced operation, the brightness values calculated in the background are set.

A dim, scene or staircase lighting recall will not be reinitiated.

If the DLR/A had control before forced operation, lighting control will be reassumed after forced operation with the switch on value.

After a download, the communication object *Forced operation* has the value 0.

The forced operation is not activated.

Forced operation has a higher priority than blocking a lighting group.

The State on bus voltage recovery can be parameterized.

For further information see: Parameter window - Gx Functions, page 82

No.	Function	Object name	Data type	Flags
37/38	**Burn-in lamp/status**	**Group x**	**1 bit** **DPT 1.010**	**C, W**

This communication object is one of the additional communication objects that can be selected in Parameter window - *Gx Functions*, page 82. The communication object relates individually to the lighting group x. The burn-in time is entered in Parameter window Gx Group, page 63, if the function *Burn-in* is enabled via the parameter *Enable function lamp burn-in object "Burn-in lamp"* for the lighting group.

Via additional communication object *Burn-in lamp/status*, the lamps of the lighting group can be burned in individually. Furthermore, it is possible to burn-in the lighting group together with the other lighting groups via the communication object *Burn-in lamp* (No. 26) of the DALI output.

Burn-in is initiated by a telegram with the value 1. The lighting group can only be controlled with 0 % (OFF) or 100 % brightness.

After this burn-in time has elapsed, the lighting group can be dimmed as usual, and the programmed light scene can be recalled.

If a telegram with the value 1 is received on the communication object *Burn-In Lamp* during the burn-in time, the period restarts from the beginning.

A telegram with the value 0 deactivates the function *Burn-in* and enables "normal" operation. The burn-in time is only counted if a ballast on the DALI output is connected and supplied with power. The burn-in time counts in five minute steps.

The burn-in time is not lost via KNX bus voltage failure, light controller supply voltage failure or download.

Telegram value: 1 = activate function
0 = deactivate function

For further information see: Burning-in of luminaires, page 161

Alternatively, the burn-in of all lighting groups can be initiated via the communication object *Burn-in lamp* (No. 26) of the DALI output. The communication objects *Burn-in lamp/status* of the DALI output and group x are independent of each other. The burn-in time of the lighting group is initiated by a telegram with the value 1 or reset with the value 0. This is independent of whether the telegram is received via the lighting group x communication object or the DALI output.

37/38	**Block**	**Group x**	**1 bit** **DPT 1.003**	**C, W**

This communication object is one of the additional communication objects that can be selected in Parameter window - *Gx Functions*, page 82.

The communication object is used for blocking a DALI output to prevent unwanted operation. Further incoming telegrams are ignored and not evaluated in the background. The incoming telegrams will only be evaluated after a renewed release of the lighting group. The lighting remains unchanged when a block is removed.

A block during the staircase lighting or control function on the other hand leads to an immediate blocking of the DALI output and freezing of the brightness value. After unblocking, the function *Staircase lighting* continues with dimming (prewarning). If the functions *Lighting control* or *Slave* were active before the block, they will be re-established.

The *Block* function has a lower priority than *forced operation*; refer to the Function diagram, page 156.

After KNX bus voltage recovery or download, the blocking is removed and must be reset if required.

Telegram value: 0 = remove block
1 = activate block

3.3.5 Communication objects *Scene x/y*

The 8 bit scene communication object is always available. The communication objects for the 1 bit control of a scene are only visible when the respective scene has been enabled in Parameter window Scenes, page 113. Enable is always in pairs.

In Parameter window *Scene x*, page 114, which lighting group is a member of the scene.

Note

The function *Staircase lighting* is comprised of two scenes. The DLR/A automatically selects the internal scenes 13 and 14 when the function *Staircase lighting* is selected.

For further information see: Staircase lighting, page 163

No.	Function	Object name	Data type	Flags
212	**8 bit scene**	**Scene 1…14**	**1 byte** **DPT 18.001**	**C, W**

This communication object is always enabled.

Using this 8 bit communication object, a scene telegram can be sent using a coded telegram which integrates the lighting groups in a KNX scene. The telegram contains the number of the respective scene as well as the information whether the scene is to be retrieved, or if the brightness values in the scene are to be assigned to the lighting group in the scene.

Telegram value (1 Byte): M0SS SSSS
(MSB) (LSB)
M: 0 = scene is recalled
1 = scene is stored (if allowed)
S: Number of the scene (1…13: 00000000…00001101)

KNX 8 bit telegram value		Meaning
Decimal	**Hexadecimal**	
00	00h	Recall scene 1
01	01h	Recall scene 2
02	02h	Recall scene 3
…	…	…
13	0Hh	Recall scene 14
128	80h	Store scene 1
129	81h	Store scene 2
130	82h	Store scene 3
…	…	…
141	8Dh	Store scene 14

Other numeric values do not affect the communication objects *Store scene* or *Recall scene*.

For further information see: Code table 8 bit scene (No. 212), page 206

No.	Function	Object name	Data type	Flags
198…204	**recall scene**	**Scene x/y** **x = 1, 3…13** **y = 2, 4…12**	**1 bit** **DPT 1.022**	**C, W**

This communication object is enabled if in Parameter window Scenes, page 113, the respective scenes have been enabled.

A telegram, which is received via the communication object from the DLR/A, recalls scene x or y. Only the lighting groups, which belong to the scene, are activated.

Telegram value: 0 = recall first scene number (x = odd scene number.)
1 = recall second scene number (y = even scene number)

The standard brightness values of a scene are parameterized in Parameter window *Scene x*, page 114. If the option *Overwrite scene on download* is selected with the option *yes*, the ETS parameterized scene values are written into the DALI devices of the lighting group with a download. Any values saved on the KNX are overwritten and lost.

No.	Function	Object name	Data type	Flags
205…211	**Store scene**	**Scene x/y** **x = 1, 3…13** **y = 2, 4…12**	**1 bit** **DPT 1.022**	**C, W**

This communication object is enabled if in Parameter window Scenes, page 113, the respective scenes have been enabled.

A telegram, which is received via this communication object from the DLR/A, causes the DLR/A to save the current brightness values of the lighting group, which are part of the scene as new scene brightness values for the scene, and to write in the corresponding lighting groups of the devices. The saved scene values received via the ETS during a download are overwritten and are lost.

Telegram value: 0 = saving of the scene brightness values of the first scene No. (x)
1 = saving of the scene brightness values of the second scene No. (y)

The scene that is set manually once via the KNX can be protected against overwriting with a download by setting the option *no* for *Overwrite scene on download* in Parameter window *Scene x*, page 114. In this case, the brightness values parameterized in the ETS are not written into the DALI devices of the lighting group. The scene brightness values set manually via the KNX are retained.

Note

Not all 8 lighting groups are considered when saving. Only the lighting groups, which belong to the scene, are considered.

Thus, for example, the lamp groups in adjacent rooms, which are not part of the scene, are not changed.

3.3.6 Communications object *Lighting control*

If one of the first 4 lighting groups is parameterized with the additional function *Light control*, the following communication objects appear.

Optionally, the status of the function *Light control* can be sent on the KNX.

No.	Function	Object name	Data type	Flags
30	**Switch**	**Group x**	**1 bit** **DPT 1.001**	**C, W**
For a description see Communication object No. 30, page 140.				
31	**Activate function controller**	**Group 1**	**1 bit** **DPT 1.003**	**C, R, W**
This communication object is enabled if in Parameter window Gx Group, page 63, in parameter *Select additional function*, the option *Light control* is enabled and simultaneously in Parameter window - Gx Control Operating, page 103, the parameter *Status response of function light controller* is parameterized with the option *no*. Light control can be activated (telegram with value 1) and deactivated (telegram with value 0) via this communication object. An activation of light control simultaneously causes this light control to immediately commence control. The control starts with the switch on value for the lighting control that is parameterized in Parameter window - Gx Control Operating, page 103. Telegram value: 0 = light control inactive 1 = light control active With deactivation of the light control, the brightness value initially remains unchanged until a telegram is received that changes the brightness.				
31	**Activate fct controller/status**	**Group 1**	**1 bit** **DPT 1.003**	**C, R, W, T**
This communication object is enabled if in Parameter window Gx Group, page 63 the additional function *Light control* is enabled and simultaneously in Parameter window - Gx Control Operating, page 103, the parameter *Status response of function light controller* is parameterized with the option *yes: via object "Activate fct controller/status"* In this case, the status of the function *Controller* is sent on the KNX in addition to the functions described above.				
32	**Brightness value/status**	**Group x**	**1 bit** **DPT 5.001**	**C, R, W, T**
Description see Communication object No. 32, page 141				

No.	Function	Object name	Data type	Flags
33	**Master: Brightness value**	**Group 1**	**1 bit** **DPT 5.001**	**C, R, T**

This communication object is enabled if in Parameter window - Gx Light controller, page 95, the lighting group is parameterized such that further dimming actuators can be controlled.

Via this communication object, the current brightness value of the light controller is sent on the KNX so that further devices (slaves) can be set to the same value.

Telegram value: 0 = OFF, lighting group is switched off, function *Slave* remains active
…
255 = 100 %

As an option, the brightness value can also be internally sent in the DLR/A directly to the slave. This reduces the KNX bus load. This property is set in the slave in Parameter window - Gx Slave, page 108, using the parameter *Slave is controlled via*.

Using the function master/slave, additional luminaires such as DALI luminaires can be integrated into the lighting control with the DLR/A using a normal ABB i-bus® DALI Gateway or other 1-10 V luminaires via the ABB i-bus® KNX Switch/Dim Actuators SD/S. In this way, highly flexible and energy efficient KNX lighting systems can be integrated into the intelligent installation systems.

With deactivated light control (telegram with the value 0 to the communication object *Activate function controller*) the brightness value is forwarded from the master via communication object *Master: brightness value.* In this way, the lighting combination (master/slave) is always controlled as a unit even with deactivated light control.

The master/slave unit is separated, for example, by deactivation of the slave (telegram with the value 0 to communication object *Activate slave mode*). If the slave mode is deactivated, the brightness values received from the slave via the communication object *Master/Slave brightness value* is not switched to its output.

No.	Function	Object name	Data type	Flags
39	**Master: Brightness offset**	**Group x**	**1 byte** **DPT 5.001**	**C, R, T**

This communication object is enabled if in Parameter window - Gx Light controller, page 95, the lighting group of the DLR/A is parameterized as a master and an offset is enabled.

Using this communication object, the current brightness value of the control with the parameterized offset is sent on the bus, so that further devices (slaves) can be set to the same value. Alternatively, this value can also be transferred internally in the DLR/A to other lighting groups (slave).

Telegram value: 0 = OFF, lighting group is switched off, Slave mode remains active
…
255 = 100 %

If smaller or larger brightness values result through the offset, the maximum or minimum control limits are set.

The offset can be switched on (activated, value 1) or switched off (deactivated, value 0) via the next communication object *Master: Offset activate*. This is particularly useful if no natural light shines through the window and differing brightness from two lighting strips is inexpedient to light up the room uniformly.

With deactivated light control (telegram with the value 0 to the communication object *Activate function controller*) the brightness value is forwarded from the master via communication object *Master: brightness value.* In this way, the lighting combination (master/slave) is always controlled as a unit even with deactivated light control.

The master/slave unit is separated, for example, by deactivation of the slave mode (telegram with the value 0 to the communication object *Activate slave mode*). If the slave mode is deactivated, the brightness values received from the slave via the communication object *Master/Slave brightness value* is not switched to the DALI output.

No.	Function	Object name	Data type	Flags
40	**Master: Offset activate**	**Group 1**	**1 bit** **DPT 1.003**	**C, R, W, T**

This communication object is enabled if in Parameter window Gx Group, page 63, the option *Light control* is enabled in parameter *Select additional function*.

Using this communication object, the offset for the master/slave control is activated or deactivated. In this way, for example, the offset is switched off (deactivated) or switched on (activated) at a determined level of external brightness or by a timer.

With deactivated offset, the slave is controlled with same brightness as the master.

On activated offset, the brightness value of the master has the parameterized percentage applied and the provided to the slave via communication object *Master: Brightness offset*

Telegram value: 1 = the offset for Master: Brightness offset is activated
0 = the offset for Master: Brightness offset is deactivated

For further information see: Slave with offset function, page 189

No.	Function	Object name	Data type	Flags
41	**Control parameter**	**Group 1**	**1 byte** **DPT 5.001**	**C, R, W**

This communication object is enabled if in Parameter window Gx Group, page 63, the additional function *Light control* is enabled.

Using this communication object, the internally set variables (control parameters) in the DALI Light Controller can be read or defined for the current setpoint.

Hereby, different setpoint settings for lighting control can be set for various applications, e.g. for competition and training settings in sports centers. The procedure is described in Changing the setpoint, page 171.

It is inadvisable to transfer control parameter settings for a setpoint from other rooms, as it is practically excluded that both rooms have exactly the same reflection properties and brightness relationships. Furthermore, the characteristic, which controls the lighting, is determined during the automatic artificial lighting calibration. If control parameters for a setpoint value are still transferred regardless of these facts, it must be assumed that the light control will be inexact (large setpoint deviations).

Telegram value: 0 = OFF
…
255 = 100 %

Note

This communication object can be read and written in the ETS.

However, the value of the communication object is not sent automatically on the KNX by the DALI Light Controller, regardless of whether the T flag is or is not set.

3.3.7 Communication objects function - *Slave*

If the additional function *Slave* has been selected in Parameter window Gx Group, page 63, the following communication objects appear.

The status value of the function *Slave* is fed back. It is possible to parameterize in Parameter window - Gx Slave, page 108, whether the status of the function *Slave* should be sent. In this case, the status is sent via communication object *Activate fct slave/status*.

No.	Function	Object name	Data type	Flags
31	**Activate function slave**	**Group 1**	**1 bit** **DPT 1.003**	**C, W**

This communication object is enabled if in Parameter window Gx Group, page 63, the additional function *Slave* is enabled.

This communication object is used for activation/deactivation of the function *Slave*.

During deactivation the lighting group behaves like a "normal" lighting group of the DLR/A. The function *Slave* can be reactivated when the DLR/A receives a telegram with the value 1 for the lighting group via this communication object.

By setting the T flag, the communication object is actively sent after KNX bus voltage recovery.

Telegram value: 0 = Slave not active
1 = activate Slave

As long as the function *Slave* is activated, the lighting group can be controlled in two ways:

- Externally by the KNX via the communication object *Brightness value of slave*
- Internally directly from one of the control groups 1…8 (master). The brightness value of the master is transferred directly in the DLR/A to the slave. As a result, the KNX bus load is reduced. Optionally, the brightness value from the master can be provided with an offset, whereby the second lighting strip (Slave) is controlled with an increased or reduced brightness value in comparison to the master.

In Parameter window - Gx Slave, page 108, you can parameterize whether a switch, brightness value or relative dimming telegram interrupts the function *Slave*.

Note

With selected function *Slave*, the DLR/A of the switch status can only display the switch status via the common communication object *Switch/status* (No. 30) on the KNX. There is no separate communication object for the switch status.

31	**Activate fct slave/status**	**Group 1**	**1 bit** **DPT 1.003**	**C, W, R, T**

This communication object is enabled if in Parameter window Gx Group, page 63, the additional function *Slave* is enabled and simultaneously in Parameter window - Gx Slave, page 108, the parameter *Status response of function slave* is programmed with the option *yes: via object "Activate Slave/status"*.

In this case, the status of the function Slave is sent on the KNX in addition to the functions described above.

No.	Function	Object name	Data type	Flags
32	**Brightness value or Brightness value/status**	**Group 1**	**1 byte DPT 5.001**	**C, W, T C, W, R, T**
This communication object is always enabled in order to enable setting of a brightness value without further parameterization. With activated function Slave, the brightness values received via this communication object are normally ignored. Optionally, however, if a telegram is received on this communication object, function *Slave* can be deactivated. The respective parameterization can be set in the Parameter window - Gx Slave, page 108.				
33	**Brightness value of slave**	**Group 1**	**1 byte DPT 5.001**	**C, W**
This communication object is enabled if in Parameter window Gx Group, page 63, the additional function *Slave* is enabled and in Parameter window - Gx Slave, page 108, and for the parameter *Slave is controlled via*, the option *via Object "brightness value of slave"* has been selected. Via this communication object, the slave lighting group receives the brightness value, e.g. from a higher level light controller group. If the function *Slave* is not active or is latent (standby) after an OFF telegram with the value 0 to the communication object *Switch* or *Switch/status*, the telegrams to the communication object *Brightness value of Slave* have no effect. In Parameter window - Gx Slave, page 108, you can parameterize whether a switch, brightness value or relative dimming telegram interrupts the function *Slave*. Brightness values, which are above or below the predefined max. or min. dimming values (dimming thresholds), are not set. In this case, the dimming limits are set. Telegram value: 0 = OFF, the output is switched, off, the function *Slave* remains active. … 255 = 100 % In the case of internal master/slave communication, the brightness value is transferred internally in the DLR/A from a controller lighting group. With parameter *Slave is controlled via* in Parameter window - Gx Slave, page 108, you can parameterize from which control the brightness value is received. Regardless of whether the master brightness value is externally or internally received, the master brightness value can be increased or reduced by an offset. In this way, a second lighting strip (slave) can be controlled with another brightness value other than the master brightness value. Thus, the maximum level of energy conservation can be achieved. **For further information see: Slave, page 186** Via the communication object *Master: Offset activate* (No. 40) the offset can be switched on or off.				

3.3.8 Communication objects function *Staircase lighting*

Communication objects for the function *Staircase lighting* can be enabled in Parameter window - *Gx Functions*, page 82. A maximum of two communication objects can be enabled simultaneously for the function *Staircase lighting*. The communication objects appear as number 37 or 38.

No.	Function	Object name	Data type	Flags
37/38	**Stairc. light. activate/status**	**Group 1**	**1 bit** **DPT 1.003**	**C, R, W, T**

This communication object can be enabled in Parameter window - *Gx Functions*, page **Fehler! Textmarke nicht definiert.**, as one of the two additional communication objects,

This communication object is used for activation/deactivation of the function *Staircase lighting*. On deactivation, the lighting group behaves like a "normal" lighting group of the DLR/A without function *Staircase lighting*. The function *Staircase lighting* can be reactivated if a telegram with the value 1 is received on the DLR/A via this object.

By setting the T flag, the communication object is actively sent after KNX bus voltage recovery.

Telegram value: 0 = Staircase lighting is deactivated
1 = Staircase lighting is activated and started

As long as function *Staircase lighting* is activated, the staircase lighting is initiated by a telegram with the value 1 to one of both communication objects *Switch* or *Switch/status*.

In Parameter window - Gx Staircase lighting, page 90, you can parameterize whether a switch, brightness value, relative dimming or scene telegram interrupts the function *Staircase lighting*.

Furthermore, using this communication object, the status of function *Staircase lighting* can be provided on the KNX. The status indicates whether the function *Staircase lighting* is activated or deactivated. It does not show that the Staircase lighting is running.

For further information see: Parameter window - Gx Staircase lighting, page 90, or Staircase lighting, page 163

37/38	**Staircase light. permanent ON**	**Group 1**	**1 bit** **DPT 1.003**	**C, R, W, T**

This communication object can be enabled in Parameter window - *Gx Functions*, page 82, as one of the two additional communication objects,

It serves when the function *Staircase lighting* is activated for permanent switch on of the lighting (also called "Service light"). The staircase lighting time is set to permanent. Thus, the staircase lighting remains on until a telegram with the value 0 is received via the communication object *Staircase lighting permanent ON*.

After KNX bus voltage recovery or download, the value of the communication object is set to 0 and a permanent on is not active.

Telegram value: 0 = permanent ON not active
1 = Permanent ON active

37/38	**Warning staircase lighting**	**Group 1**	**1 bit** **DPT 1.005**	**C, R, T**

This communication object can be enabled in Parameter window - *Gx Functions*, page 82, as one of the two additional communication objects,

The value of the communication object is used to provide a warning before the staircase lighting time times out. The communication object has the value 1 during the warning.

Should the *Time for dimming down after light on (Warning before light turned off)* be parameterized with *jump to*, no warning is parameterized for the staircase lighting. The communication object *Warning staircase lighting* remains unchanged with the value 0 (no warning).

Should a forced operation be activated during the warning, the warning is reset, the communication object *Warning staircase lighting* receives the value 0 and a telegram with the value 0 is sent on the KNX.

4 Planning and application

You will find some tips and application examples in this section for practical use of the DALI Light Controller DLR/A 4.8.1.1.

4.1 Automatic DALI addressing

In order to better appreciate the functionality of the DALI Light Controller, the addressing of the DLR/A is described in this chapter.

A DALI set-up (configuration) is necessary for the DALI Light Controller. The connected DALI devices are automatically detected equipment, and an address in ascending order is assigned if no DALI address is available.

Note
The DLR/A does not automatically allocate DALI addressing for DALI devices if in Parameter window General, page 40, the parameter *Enable automatic DALI addressing* has been set to *no*.

As soon as the light controller supply voltage has been applied to the DLR/A, it automatically and independently checks the DALI devices connected to the DALI output. This process is also started after a download or KNX bus voltage recovery or light controller supply voltage recovery and may take about 60 seconds depending on the number of connected DALI devices. If equipment with DALI interfaces is detected, which has not been assigned with a DALI address (default delivery state, DALI short address 255), the DALI Light Controller will automatically assign a DALI address. The detected DALI devices will be assigned with the first free DALI address (0 to 63) in the DLR/A. If no DALI services are detected, it is assigned with the first DALI address 0. The second device is assigned with DALI address 1. The sequence in which the DALI master, e.g. the DLR/A, finds a device with DALI interface cannot be influenced. If the connected DALI device already has a DALI address, e.g. an exchanged device from another system, it will not be changed.

If the new DALI device has a DALI address, which is used in the DLR/A, one of both DALI devices with the same address will be assigned with a new and unused DALI address. Here, the old DALI device, which is already connected to the DLR/A, may receive a new address.

With the DLR/A, you can now control the connected DALI devices with the communication objects DALI output via the KNX without additional DALI group assignment.

The connected DALI devices must be assigned to a lighting group to control individual lighting groups. The assignment is implemented with the external ETS independent Software Tool.

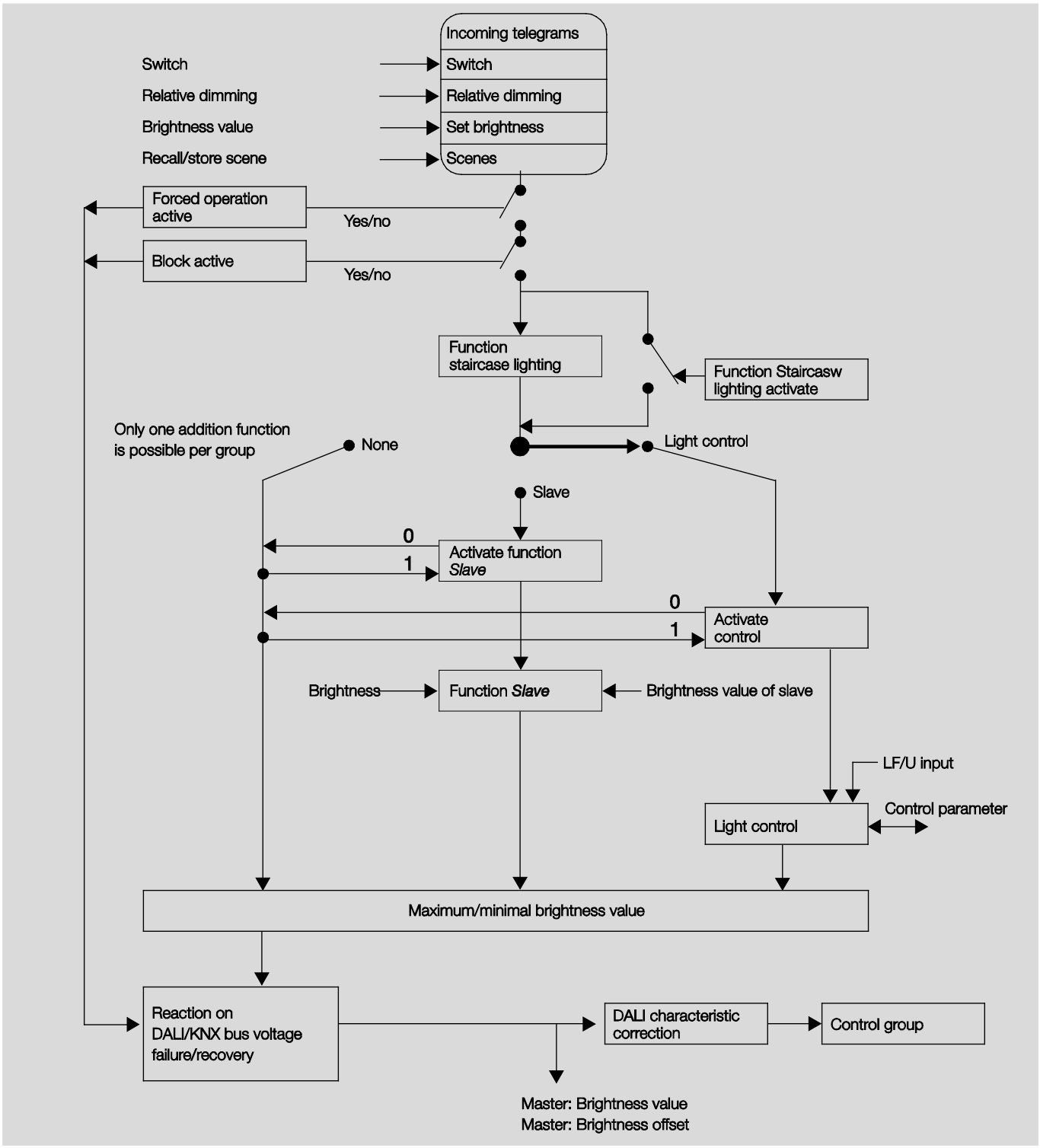
For more information see: online help, Software Tool

4.2 Function diagram

The function chart indicates the sequence, in which the functions of the DLR/A are processed. If several communication objects in the function block point to the same function, they have equal priority and are processed in the sequence in which they are received.

Note
In principle, the priorities in the DALI Light Controller from the highest to the lowest are described in simplified form in the following: 1. Software Tool 2. Manual operation (test mode) 3. Forced operation 4. Block 5. KNX telegrams

Note
The function *Slave* has a higher priority than the additional function *Staircase lighting* with regard to the parameterized behavior for incoming KNX telegrams. The function *Staircase lighting* has a higher priority than the additional function *Light control* with regard to the parameterized behavior for incoming KNX telegrams. The function *Burn-in* does not interrupt a function. However, all brightness values not equal to 0 are set to a brightness value of 100 %. Test mode (manual operation) of a lighting group has a higher priority than forced operation and blocking. When test mode ends, forced operation and blocking is re-enabled. The brightness values set are those that were set before test mode. The Software Tool continues to send telegrams while in test mode. These incoming KNX telegrams are not executed. Nor are they stored intermediately. Commands incoming via the objects *forced operation, block* and *switch group* are the exception. These commands are saved in the background and executed when test mode ends. Central telegrams interrupt the functions *Slave, Light control* and *Staircase lighting* of a lighting group. The lighting groups undertake the central telegram. The functions switch to standby mode and must be restarted/activated after completion/fulfillment of the central telegram by an ON telegram or activation of the function.


Incoming telegrams
Switch
Relative dimming
Brightness value
Recall/store scene
Switch
Relative dimming
Set brightness
Scenes
Forced operation active
Yes/no
Block active
Yes/no
Function staircase lighting
Function Staircasw lighting activate
Only one addition function is possible per group
None
Light control
Slave
0
1
Activate function Slave
0
1
Activate control
Brightness
Function Slave
Brightness value of slave
LF/U input
Control parameter
Light control
Maximum/minimal brightness value
Reaction on DALI/KNX bus voltage failure/recovery
DALI characteristic correction
Control group
Master: Brightness value
Master: Brightness offset

4.3 Monitoring of lamps and ballasts

With the DLR/A, the malfunction state of the lighting in the building can be broadcast on the KNX. A control panel or control center can evaluate or display this information. Required repair measures or corresponding maintenance cycles can be initiated. It is thus possible to integrate the lighting in a higher-order Facility Management system.

The prerequisite is that the lighting equipment is connected to the DLR/A and features a DALI interface compliant to EN 62386 or EN 60929. Different possibilities are available for the fault messages:

- One communication object (No. 35, 47 etc.) per lighting group is available for an error message. This communication object can contain the information about a lamp fault (*Fault lamp*), ballast fault (*Fault ballast*) or a logical OR combination of lamp and ballast fault (*Fault ballast or lamp*).
- The fault status of the individual DALI device can be read via:
    - a coded communication object (Fault group/device code No. 19). This 1 byte communication object contains the devices or lighting group number (this can be parameterized) and the fault information (Fault ballast or lamp). The function can be taken from the descriptions in chapter Communication objects, from page 117.
    - The communication object *Diagnosis* (No. 6) is read and provided on the KNX. The function can be taken from the descriptions in chapter Communication objects, from page 117.
- The number of the DALI device with a fault or a lighting group with a fault (can be parameterized) can be sent as a figure value with the communication object *No. Group/device fault* (No. 21) on the KNX. If several faults exist, the number of the next/previous DALI device or the next/previous lighting group can be displayed via the communication object *Switch up next fault alarm* (No. 22). The numbers of devices or lighting groups with a fault are sent via the communication object *Number of faults* (No. 20) on the KNX.

In order to guarantee correct operation, the DLR/A has to know how many ballasts are to be monitored. This is implemented by one-time activation of the communication object *Detect ballasts* (No. 25). With this function, the DLR/A establishes automatically how many DALI devices are connected and the addresses to which they are connected. The DLR/A saves this information as a reference value. If this system has to be extended or reduced, the function *Detect ballasts* should be undertaken again. This process is only necessary if the number of ballasts per output has changed or when the DALI address assignment has changed. Should a ballast be exchanged by a device that has the same DALI address, it is not necessary to undertake *Detect ballasts* again. Detection of a ballast can also be performed manually be pressing the S button in manual mode. In the Software Tool it is also possible to trigger detection of the ballasts.

Note
In order to detect a lamp malfunction it must be sent by the DALI device on the DALI control line. This is generally supported by the DALI ballasts. DALI dimmers and DALI switch actuators often do not have this characteristic. The function can be found in the technical data of the DALI device or by consulting the manufacturer of the lamps.

4.4 Exchange of DALI devices

If a DALI device fails in an existing DALI installation where DALI addresses are assigned without any gaps, a DALI device as provided in the default state from the factory (without a DALI address assignment) can be used for replacement and will avoid the requirement for re-commissioning. The new DALI device automatically receives the first free DALI address, group assignments and scene parameters of the faulty ballast from the DLR/A and can assume the functions of the failed DALI device with the same technical characteristics.

Note
The parameter *Enable automatic DALI addressing* in Parameter window General, page 40, must be enabled for this purpose.

If multiple DALI devices on a DALI output fail or there are gaps in the DALI address assignment, it is not possible to guarantee a unique assignment of the replacement device by the DLR/A.

The DLR/A assigns the new DALI device with the first free DALI address. If the new DALI device has a DALI address, which is already used in the DLR/A, one of both DALI devices with the same address will be assigned with a new and unused DALI address. In this way, the fault-free DALI device, which is already on the DLR/A, may receive a new address.

Using the Software-Tool, a correction or exchange of the DALI address, as with the assignment to a lighting group, can be implemented in a simple manner by Drag and Drop even without using ETS.

For more information see: online help, Software Tool

4.5 Effect of ageing on lamps

Every fluorescent lamp ages in service. The lighting power of the fluorescent lamps degrades, i.e. a lower brightness is produced at the same control value. This can even mean that the setpoint originally required can no longer be achieved with maximum control. For this reason, the lighting is to be dimensioned, so that the required setpoint brightness can be achieved until the luminaires are routinely exchanged.

In principle, the ageing luminaires have no effect on the control circuit. If a lower brightness level is achieved due to ageing of the luminaires with the same control, the DLR/A, e.g. via a DLR/A lighting group, will continue to increase the level of artificial lighting until the setpoint brightness is achieved.

However, it must be considered that the characteristic of the luminaires change with ageing. The characteristic has been determined during the calibration procedure and is the basis for the control algorithm. In this way, it is possible that light control discrepancies result.

The following approach results

The recorded characteristic of the artificial lighting is calculated with the control value. Assuming that the lamp generated 30 % less light, the value of the characteristic would be 1.33 times larger than the real value.

The DLR/A then assumes that the level of daylight is lower than it actually is. There appears to be less daylight available and compensation is necessary.

With a compensation factor of 30 (for the control algorithm 0.3), an approximate reduction of the setpoint value by 10 % would be achieved. The DLR/A would control to a level, which is too dark by 10 %.

In concrete terms that would mean that a light control originally set by the DLR/A to 500 lx will now only provide a brightness value of 450 lx. Furthermore, the tolerances apply as described in the chapter Technical data DLR/A 4.8.1.1, page 12, of the DALI Light Controller.

Note
The burn-in time, where the light may not be dimmed, must be complied with to ensure that the most stable possible luminaire performance is assured. During the burn-in time, which usually lasts between 50 and 100 hours, the luminaires must be operated at 100 % brightness. The burn-in time of a luminaire can be obtained from the manufacturer.

4.6 Burning-in of luminaires

In the case of lamps filled with gas, a burn-in time is recommended. This burn-in process is only required once at the start of commissioning.

Only after this burn-in time do fluorescent lamps have a stable operating value, which ensures the best possible dimming behavior and an optimum service life. An optimum pressure level is created in the fluorescent tube by burn-in.

For installations with dimmable ballasts, many lamp manufacturers make a recommendation that a burn-in time of 20 to 100 hours must be observed. The recommended values are about 20 hours for T8 lamps and 100 hours for T5 lamps. The exact values are available from the luminaire's manufacturers. During the burn-in time, the lamps are only switched on at maximum capacity. Dimming is not possible.

The information about burn-in times can often not be found in the catalogue of the lamp manufacturer, but in the descriptions of the electronic ballasts, as the burn-in time only becomes relevant with dimmable systems. Stable operating values and reproducible brightness values are a prerequisite in these installations. Moreover, only poor evaporation of the solid or fluid additives is possible for dimmed lights due to the reduced capacity, so that in certain circumstances the maximum light yield is only achieved at a later date or not at all. This can lead to the complete replacement of the lights.

According to statements of lighting planners, if fluorescent lamps (particularly T5 lamps) are not burned in, they can even be damaged causing them to fail prematurely.

With the DALI Light Controller, it is possible to activate the burn-in time via the communication object Burn-in lamp / status and to place individual lighting groups or all lighting groups on the DALI Light Controller in the burn-in state. The lighting groups, which are considered during function Burn-in, can be set via parameters. During this time, the lamps can only be switched on with 100 % or switched off. Dimming is not possible.

The function *Burn-in* can be activated for all lighting groups together (DALI output) or by using an additional object for each lighting group individually (group x). In Parameter window Gx Group, page 63, every lighting group can be enabled for burn-in with the parameter *Enable central function lamp Burn-in object "Burn-in lamp/status"*. The activation of the function *Burn-in* can be undertaken centrally via the communication object *DALI output* or per lighting group via communication objects *Group x*.

The DALI Light Controller features a counter (1…255 h) for each individual DALI device for the function *Burn-in*. The resolution of the timing is set internally to five minutes, even though the time is counted in hours. The DALI Light Controller only indicates the burn-in state but not the remaining or elapsed burn-in time.

If the lamp is switched off during the activated burn-in time, the burn-in counter stops the counting process. Should the lamp be switched on again, the counting process will continue and the remaining time will be rounded off to the nearest 5-minute step.

On light controller supply voltage failure or KNX bus voltage failure on the DALI Light Controller, the elapsed burn-in time is stored and continues to be used after voltage recovery. The same applies after a download.

4.7 Control telegram and status with a communication object

The DLR/A allows the option to simultaneously feed back the status (*Switch/status, Brightness value/status*) via the control object (*Switch*, *Brightness value*).

Here it is important to observe that only one DALI device may feed back the status in a KNX group with several control objects. The DALI device should be programmed as the broadcaster. Otherwise it is possible that there is continuous switching over and back of the control and the status.

Example

The lamps to be switched are located in the three lighting groups (group 1, 2 and 3), which are commonly controlled via a KNX group. The status of the lighting group is to be sent via the KNX. The following assignments result:

The state of group 1 is used as the status for the entire lighting group.

communication object no.	Name	Group assignment
1	Switch/status	Group 1 1/1/4*, 1/1/1
6	Switch	Group 2 1/1/1
12	Switch	Group 3 1/1/1

*) Set send

KNX groups	Name
1/1/1	Switching lighting
1/1/4	Status lights

4.8 Staircase lighting

The DALI Light Controller features a function *Staircase lighting*, which can be triggered and stopped via individual switch telegrams of the individual lighting groups. In this way, the lighting group is switched on with a determined interval. Switch off occurs automatically. A warning before switch off can be made visible by dimming. Furthermore, the communication object *Warning staircase lighting* (additional object No. 37 or 38) is available. In this way, the end of the staircase lighting can trigger further reactions via KNX.

It must be considered that the function *Staircase lighting* consists of two scenes. The DALI Light Controller automatically selects the internal scenes 13 and 14 when the function *Staircase lighting* is selected.

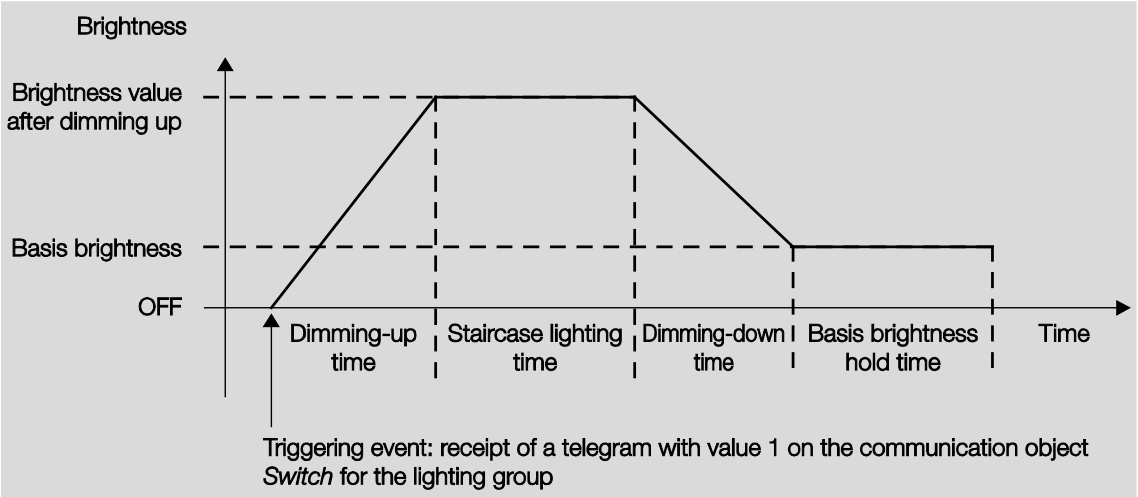
In the DALI Light Controller, the function *Staircase lighting* is an independent function that is also combined with a lighting control (see Staircase lighting with function *Light control*, page 166).

If the function *Staircase lighting* e.g. is deactivated via the communication object *Activate staircase lighting* (telegram with the value 0), the lighting group behaves like a "normal" group, which can be switched on and off via the communication object *Switch*.

The behavior of the function *Staircase lighting* is explained in the following.

Per DALI Light Controller, only one Staircase lighting sequence needs to be set. Parameterization is undertaken in Parameter window General, page 40, and applies for all staircase lighting recalls. The brightness values (switch on brightness and basis brightness) are to be set individually per lighting group, in Parameter window - Gx Staircase lighting, page 90. With active function *Staircase lighting* and receipt of a telegram with the value 1 on the communication object *Switch*, the staircase lighting sequence for the lighting group is started. With active function *Staircase lighting* and receipt of a telegram with the value 1 on the communication object *Switch*, the staircase lighting sequence for the lighting group is started.

The staircase lighting sequence is graphically represented in the following illustration:



During the Staircase lighting sequence, the maximum and minimum dimming values (dimming thresholds) remain valid. They can be parameterized in Parameter window Gx Group, page 63.

During dimming-down from the switching value to the basis value, the communication object *Warning staircase lighting* receives the value 1, which indicates switching off of the staircase lighting.

Voltage recovery behavior

The behavior after KNX bus voltage recovery as well as after light controller supply voltage recovery is parameterized in the Parameter window - Gx Staircase lighting, page 90.

Response to switch telegram during the Staircase lighting sequence

If the dimming time has not yet been achieved and the DALI Light Controller receives an OFF telegram for the lighting group, dimming is started immediately. If the lighting group is currently dimming down, dimming down continues when an OFF telegram is received. An OFF telegram during basis brightness causes the lighting to switch off, if the time period for basis brightness has not been set to unlimited, see Parameter window General, page 40. If the time period for basis brightness is unlimited, the staircase lighting remains switched on. In both cases, the function *Staircase lighting* is in standby and can be restarted by an ON telegram.

As long as the function *Staircase lighting* is active, an ON telegram causes a restart of the staircase lighting. If the staircase lighting is already at the switch on value, the switch on phase is restarted (retriggered). During dimming-down or reaching of the basis brightness, the staircase lighting is retriggered (restarted from the start again). However the dimming-up phase will not run again.

Behavior with blocking and forced operation

Should the lighting group be blocked via communication object *Block* or forcibly operated via communication object *Forced operation* during the staircase lighting sequence, the current brightness value is frozen or the forced brightness is set and the lighting group is blocked. After the end of blocking or forced operation, the function *Staircase lighting* starts with the dimming-down phase. If the function *Staircase lighting* was inactive, it will remain inactive.

In the following table with the parameterized function *Staircase lighting*, the response of the lighting groups is shown.

Operating situation or Communication objects		Function *Staircase lighting*				
		inactive	active			
			Standby	Dimming-up time	Staircase lighting time	Dimming-down time Hold time Basis brightness
Download (start)Download (start)		As with KNX bus voltage failure or light controller supply voltage failure				
Download (end)		As with KNX bus voltage recovery or light controller supply voltage recovery				
KNX bus	Voltage failure	Programmable: - Brightness value - Gx Fault	Programmable brightness value Gx: fault is set Function *Staircase lighting* is not continued.			
	Voltage recovery	Programmable: - Function *Staircase lighting:* - Gx Staircase lighting - Brightness value - Gx Fault				
DALI- or Light controller-operating	Voltage failure	Programmable: - Brightness value - Gx Fault - Function *Staircase lighting* is not continued.				
	Voltage recovery	Programmable: - Function *Staircase lighting:* - Gx Staircase lighting - Brightness value - Gx Fault				
Switch	ON	Brightness value when turned ON	→ Active and starts Staircase lighting	no reaction	Staircase lighting time will be restarted	Staircase lighting is restarted
	OFF	OFF	OFF	Dimming-down time starts		No reaction, if hold time basis brightness unlimited, otherwise OFF
Relative dimming		Dimming	Programmable: - no reaction/goes to standby and brightness value is dimmed down			
Set Brightness Value		Brightness value	Programmable: - no reaction/goes to standby and brightness value is set			
Function Activate Staircase lighting	0	no reaction	→ goes to inactive	→ goes to inactive, brightness value is retained		
	1	→ Activated, and starts Staircase lighting	→ Activated, and starts Staircase lighting	Restarts Staircase lighting		
Recall scene		Scene is executed	Scene is executed	Programmable: - no reaction/goes to standby and scene is executed		
Permanent ON		No effect	Starts or remains in staircase lighting time (staircase lighting time set to permanent)			
Forced operation	ON	Forced brightness is frozen				
	OFF	Calculated brightness value is set	Dimming-down time starts			
Block	ON	Current brightness is frozen				
	OFF	Calculated brightness value is set	Dimming-down time starts			

4.8.1 Staircase lighting with function *Light control*

With the DALI Light Controller there is a possibility of using the function *Staircase lighting* in conjunction with the constant lighting control. This means constant lighting control is undertaken during the operation of function *Staircase lighting*. This combination is very efficient from an energy-efficiency point of view. In addition to the limited switch on duration of the lighting, it is only controlled with the brightness value that is actually necessary to light up the room to a sufficient level.

The control is only used during the operation of function *Staircase lighting*. During the dimming-up, dimming-down and during the basis brightness running time, the lighting control is suspended and is in standby.

During switching on or retriggering of the staircase lighting, the switch on brightness of the function *Staircase lighting* is used switching on.

Should the function *Staircase lighting* be deactivated, the lighting group has a "normal" control function. In the same way, the lighting group with deactivated function *Light control* behaves like a lighting group with function *Staircase lighting*. If both functions are deactivated, the lighting group is a "normal" lighting group.

If lighting control is inactive and is activated via communication object *Activate function controller*, the function *Light control* initially goes to standby. The staircase lighting is not restarted or retriggered in this case. Only after the next switch on via the communication object *Switch* will the lighting control start to control during the staircase lighting time. A prerequisite for this is that the staircase lighting time has been ended and the function *Staircase lighting* is in the dimming down time, basis brightness hold time or subsequently in standby.

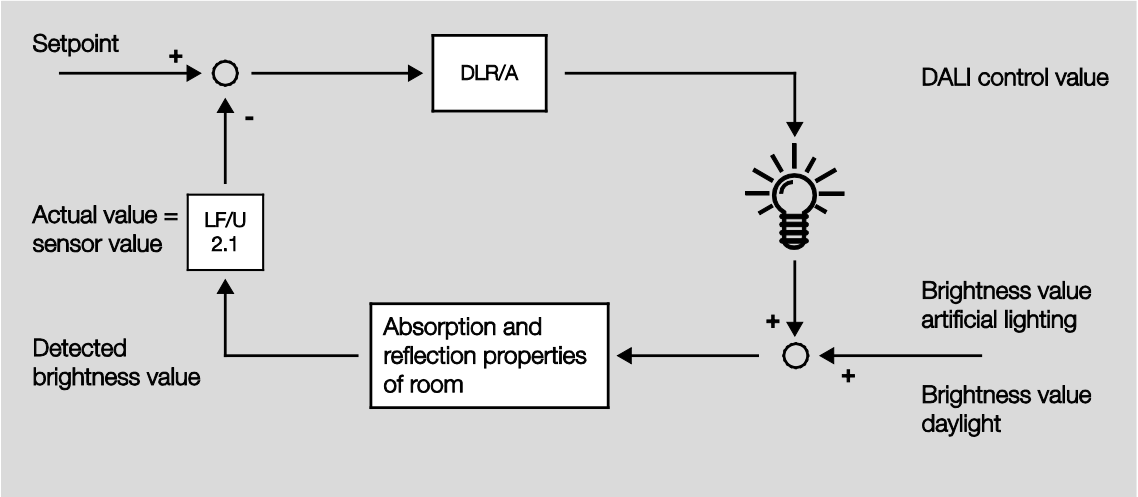
The function *Staircase lighting* has a higher priority than the additional function *Light control* with regard to the parameterized behavior for incoming KNX telegrams. The behavior should be defined in parameter window - *Gx Staircase lighting*.

Operating situation or Communication objects		**Function *Staircase lighting***				
		inactive	**active**			
			Standby	**Dimming-up time**	**Staircase lighting time**	**Dimming-down time** **Hold time** **Basis brightness**
Light control	**active**	Normal function *Light control*	Light control in standby	Light control in standby	Controls	Light control in standby
Light control	**inactive**	Normal lighting groups	Normal function *Staircase lighting*			

4.9 Constant lighting control

Constant lighting control is possible with the DALI Light Controller DLR/A 4.8.1.1 in conjunction with the Light Sensor LF/U 2.1.

Principle representation of constant lighting control:



With constant light control, this is a so-called fixed (or constant) value control or interference variable control. The interference variable in our case is the incidence of daylight. The setpoint is the brightness value, which should be set automatically in the room. The setpoint (control parameter) is stored during the commissioning in the DALI Light Controller with the calibration of the artificial lighting or daylight or is read via the communication object *Gx Control parameter* in the DALI Light Controller. The technical lighting properties of the room and the characteristic of the luminaires are automatically determined during the artificial lighting calibration by the DALI Light Controller. This parameter uses the DALI Light Controller for determination of the controlled system. The DALI Light Controller sets the brightness (luminaires) so that the control divergence between the setpoint and the actual value is equal to 0.

The following EN 12464-1 compliant brightness levels must be observed for special working conditions:

Self-service restaurants	200 lx
Open-plan offices	500 lx
Assembly of fine devices, e.g. radio and television sets	750 lx

In ideal cases, the daylight is sufficient to ensure optimum brightness levels at the place of work. In this case, the artificial light is completely switched off by the DALI Light Controller. If the level of daylight is not sufficient for the setpoint, artificial lighting is added until the setpoint brightness is achieved.

This behavior ensures that only energy necessary to ensure the optimum level of brightness is used. The energy consumption can be reduced further if an additional presence detector is integrated into the system. In this way the light and the light control can only be switched on if there are persons located in the room. Many studies[1)] have shown that use of a constant light control can save up to 50 % (see chapter General, page 3.

[1)] Reference source: Zentralverband Elektrotechnik- und Elektroindustrie e.V. (ZVEI) - (German Electrical and Electronic Manufacturers' Association).

Lighting control constraints

Rooms are lit up differently by the incidental daylight and the artificial lighting of the lamps. Not all surfaces in the rooms, e.g. walls, floor and furniture reflect the light, which falls on them, in the same manner. Accordingly, even though there is an exactly calibrated constant lighting control in daily operation, deviations to the set target value may occur. These deviations may be up to +/- 100 lx should the current ambient conditions in the room, and accordingly the reflection properties of the surfaces (paper, persons, reorganized or new furniture), differ significantly from the original ambient conditions at the time of calibration.

Deviations may also occur if the light sensor is influenced by direct or reflected light falling on it, which is not influenced or only slightly influenced by the surfaces in the detection range of the light sensor.

Note
Luminaires with varying brightness characteristic curves should be avoided in control circuits. In a DALI Light Controller circuit, a mix of DALI luminaires and 1-10 V luminaires (controlled via Switch/Dim Actuator SD/S) is not possible. This is because of the different brightness characteristic curves (linear/logarithmic) involved. The same control value, e.g. of 50 % with 1-10 V luminaires causes a brightness of 50 %. Using DALI luminaires, where the characteristic curve is adapted logarithmically to the response of the human eye, a light current of 3 % results in a brightness level of about 3 %. Because of these brightness differences at the same control value, a common lighting control (in a DALI Light Controller control circuit) is not possible.

Explanations of terms

These variables are only partly available in the Software-Tool for commissioning, see Software-Tool online help.

Sensor value	This value corresponds with the physically measured value on the sensor input, which results from the room brightness detected by the Light Sensor LF/U 2.1 (luminance of the area monitored by the sensor). This value is displayed exclusively as an additional auxiliary value during commissioning using an external commissioning tool (Software-Tool). The sensor value does not comply with the lighting intensity (Lux value) in the room, but rather it is an electrical variable that is present on the sensor input of the DLR/A. The sensor value is used to directly detect brightness values in the detection range of the light sensor.
Actual value	The actual value of the control circuit is the fed back of the control path. If the controlling lighting group is only assigned to a light sensor, the actual value corresponds to the sensor value. If several light sensors are allocated to a lighting group, the actual value is determined from the sensor values of the individual sensors. In Parameter window - Gx Light controller, page 95 you can parameterize if the smallest, the largest or the average sensor values are used for light control calculations. **For further information see: Constant lighting control, page 167**
Control parameter (setpoint)	The control parameter corresponds to the setting of the control if the setpoint brightness value is set in the room. For this reason, the control parameters can be set equal to the control setpoint. In the following, we refer to the setpoint. The setpoint is the decisive control value in practical application for constant lighting control. The DALI Light Controller calculates the setpoint for the lighting so that the actual value to be set is as near as possible to the predefined setpoint (control parameter) with all room lighting conditions. Due to the differing ambient conditions in rooms (incidence of light, reflections and absorption conditions), this setpoint cannot be easily achieved via the figure value defined in the ETS, but must rather be set using a daylight and artificial light calibration. With this calibration, the lighting characteristic and the technical lighting properties of the room are automatically detected by the DALI Light Controller in order to match the control parameter to the room. **For further information see: Constant lighting control, page 167** Irrespective of this calibration, overshoot or undershoot of the setpoint lighting value can occur during phases in ongoing operation of constant lighting control. These are even greater with greater differences of the reflection and absorption conditions from the original ambient conditions during the calibration procedure. A further reason for the deviation is a direct or indirect incidence of light on the light sensor. As a result, a deviation of +/- 10 % from the setpoint is normal.

Calibration artificial light	With artificial lighting calibration, the DALI Light Controller determines the internal actual value, which results with the required setpoint value (control parameter) if artificial lighting is switched on exclusively. The artificial light calibration should be undertaken without the influence of daylight. During calibration all light sources (including slaves) should be set so that they are also used during lighting control. During the artificial lighting calibration, the DALI Light Controller automatically determines the characteristic curve of the lighting and detects the technical lighting properties of the room. During the calibration, the DALI Light Controller automatically progresses through the brightness characteristic from maximum to minimum brightness. In this way, the brightness characteristic of the room, the operating point and the associated parameters for light control are determined. If the brightness curve has been run through and the control parameters have been automatically set, the DALI Light Controller switches to the setpoint brightness and starts lighting control. Calibration can take up to 90 seconds if the brightness values fluctuate. Artificial lighting calibration must always be undertaken. **For further information see: Constant lighting control, page 167** The sequence of daylight and artificial lighting calibration is **not** random. Calibration with artificial light must be performed before calibration with daylight.
Calibration daylight	During daylight calibration, the DALI Light Controller determines the different influences of artificial lighting and natural incidence of light on the light sensor and determines a compensation factor. The daylight calibration should be performed without the influence of artificial lighting. This should be set by the change of shading of the setpoint brightness value on the reference point in the room. If the setpoint brightness value cannot be set with natural brightness, a daylight compensation factor can be defined using the ETS. By observing the control behavior of this factor, it should be optimized empirically, so that the light control is set as exactly as possible to the setpoint brightness level. **For further information see: Constant lighting control, page 167** The sequence of daylight and artificial lighting calibration is **not** random. Calibration with artificial light must be performed before calibration with daylight.
Light control active/inactive	The user can interrupt Light control via the relevant parameterization at any time using normal operational telegrams, e.g. Dim, Switch or Recall scene, to manually operate the lighting according to requirements. Here, the DALI Light Controller is in standby mode, and light control is reactivated e.g. by an ON telegram with the value 1 to communication object *Switch*. The actual deactivation of the light control is implemented via the communication object *Activate function controller*. Lighting control is deactivated/stopped. It is possible to control the lighting group completely normally via switch or dim telegrams. Telegrams are implemented without light control being started. Light control is only restarted if on communication object *Activate function controller* a telegram with the value 1 is received. Whether the light control of a lighting group is activated can be detected via the communication object *Activate fct controller/status* or via bit 12 of the communication object *Diagnostics* (No. 6).
Master/slave operation	It is possible that with one lighting group of the DALI Light Controller other lighting groups can also be controlled. It is possible that the controller lighting group (master) controls the other lighting groups (slaves) either directly internally in the DALI Light Controller or externally via the communication object *Brightness value of slave*. The external slaves can, for example, be ABB i-bus® Switch/Dim Actuators or Universal Dimmers. Please refer to Note, page 168, on DALI and 1-10 V luminaires.

4.9.1 Changing the setpoint

Depending on the intended purpose of the room or area, e.g. training or competition areas in sports halls, it may be useful to apply a changeable setpoint (control parameter) for the constant lighting control via the KNX. The communication object *Control parameter* is provided for this purpose.

Commissioning with artificial lighting and daylight calibration is implemented initially using the brightness (setpoint 1), which is most frequently used with normal operation. Hereby, the characteristic of the lighting is recorded by the DALI Light Controller and stored to ensure optimum light control. For the second brightness value (setpoint 2), the Actual value must be determined again exclusively with artificial lighting.

Procedure

If this has not already been undertaken, the lighting group of the DALI Light Controller is calibrated with the brightness setpoint (1) used primarily during operation. A detailed procedure is described in page 173. The *Actual value* (control parameter) for setpoint 1 is read using the light controller section in the Software Tool. This value has to be written to the communication object *Control parameter* when changing to setpoint 1. This can, for example, be implemented with the assistance of a button or visualization.

In order to determine the second setpoint brightness (2), the room is also darkened and the brightness is set exclusively using artificial lighting only. The Actual value (control parameter) for the second setpoint is read again using the controller in the Software-Tool. This value has to be written to the communication object *Control parameter* when changing to setpoint 2. This can, for example, be implemented with the assistance of a button or visualization.

Determine the setpoint and set it via KNX (using the example of lighting group [1])

	Configuration	By	Effect
1.	Deactivate lighting control.	Send 0 to communication object *Activate function controller* (No. 31). Alternatively, this can be done with the corresponding button in the Software-Tool.	Lighting control is deactivated/stopped.
2.	Slaves must be actively integrated into the control.	Write the corresponding communication objects *Activate function slave* with a 1.	The entire lighting that should be effective in the lighting control is activated during calibration.
3.	Darken the room.	Blind or time of day.	Brightness in the detection range of the light sensor less than 20 lx1).
4.	Set the artificial lighting so that the setpoint brightness is set to the reference point.	Dimming via communication object *Relative dimming* (No. 34).	Setpoint is set, e.g. 500 lx. Lux meter is positioned vertically below the light sensor.
5.	Read control parameter.	The control parameter (actual value) is to be read via external Software Tool	In a perfectly controlled circuit, the actual value is equal to the setpoint and can be used as a control parameter. Control difference equal to zero.
6.	Set control parameter for setpoint via KNX.	Write communication object *Control parameter* (No. 41) by a pushbutton or visualization with previously read control parameter (actual value), see point 6.	The control parameter for the new setpoint is stored in the DALI Light Controller for the controller lighting group and used with lighting control.

[1] Interference of the artificial lighting calibration caused by daylight has the effect that the DALI Light Controller assumes that the illumination can produce a larger brightness level than is actually the case. The light controller will set a lower level of brightness in control operation.

4.9.2 Deactivation of constant lighting control

Constant lighting control can be deactivated by users at any time if this option has been enabled. Corresponding parameterization options can be found in Parameter window - Gx Control Operating, page 103. The deactivation of the light control can for example be implemented by a local operation, dimming or switching of the lighting. Thus the user always has the option of setting their optimum brightness.

4.9.3 Activating constant lighting control

Before lighting control operates (controls), the lighting group in Parameter window Gx Group, page 63, must be selected via the parameter *Select additional function*.

The light control is activated and controlled after the first download.

With a further download, the state of the lighting control is set to suit the parameterized setting. Light control can be activated (telegram with value 1) or deactivated (telegram with value 0) via the communication object *Activate function controller*. In the activated state, the light control is started as follows:

Constant lighting control is then started or set to the control state when the switched off lighting is switched on (via communication object *Switch* a telegram with the value 1 is sent). Alternatively, a renewed telegram with the value 1 can be sent to the communication object *Activate function controller* to start control.

The switch telegram can also be sent by a presence detector. Hereby, manual operation of the lighting is totally unnecessary. This is useful to ensure optimum energy consumption. A special brightness level is always available for certain tasks.

In the following cases, the light control, which is in standby mode, is not initiated by an ON telegram:

- The output is blocked or is under forced operation.
- The Follow-up time of the inactive control is active.

4.9.4 Follow-up time of the inactive light control

This function is particularly useful, when there is a presence detector in the room.

Example
The user has deactivated the light control and set the maximum level of brightness. The user leaves the room, and the presence detector switches off the light. If the user returns after a short time (within the adjustable follow-up time), the lighting is automatically set again to the maximum brightness value and the light control remains active. The temporary setpoint set by the user, e.g. by dimming, remains active. A more detailed explanation can be found under the parameter Follow-up time of the inactive control in s [0...65,535] in Parameter window - Gx Control Operating, page 103.

4.9.5 Commissioning/calibration of the constant lighting control

Commissioning of the constant lighting control should be undertaken when the intended furnishings are in place. The technical lighting attributes of the room are influenced by the furniture and the floor coverings, e.g. reflection and absorption. This on the other hand has a direct effect on the brightness value, which is detected by the light sensor.

If constant lighting control is set in a room that does not yet have its final configuration and changes are then made to the layout in the room, this will have a direct effect on the lighting control. In the simplest case, this can lead to larger setpoint overshoots or undershoots. In extreme cases, it can lead to unstable oscillating control.

With a calibration of the constant lighting control, all lamps controlled directly (master) or indirectly (slave) by the DALI Light Controller are to be included in the calibration.

Important
The sequence of daylight and artificial lighting calibration is **not** random. Calibration with artificial light must be performed before calibration with daylight.

Before the calibration process it is recommended that the function of the Light Sensors is checked. Using the bit combination of the communication object *Status sensors* (No. 9), you can display whether brightness is detected on the sensor input. If this is not the case, the sensor cable may have the poles reversed, be open circuit or the room may be in absolute darkness. After verifying the function of the light sensor, which is of relevance for the light controller, the required light control should be deactivated. This can be undertaken, e.g. by a telegram with the value 0 to the communication object *Activate function controller*. The light can now be dimmed independently of the parameterization of the light controller, the light and any brightness can be set and calibration of the constant lighting control can commence.

Performing artificial lighting calibration (for lighting group 1…4)

Artificial lighting calibration must be performed for each group where the additional function *Light control* is enabled. Lighting control is only possible for lighting groups 1…4.

Implementation using ETS is described in the following.

Important
The sequence of daylight and artificial lighting calibration is **not** random. Calibration with artificial light must be performed before calibration with daylight.

The room should be darkened. The lighting intensity in the detection range of the light sensor must be less than 20 lx. Interference of the artificial lighting calibration caused by daylight has the effect that the light controller assumes that the illumination can produce a larger brightness level than is actually the case. The light controller will set a lower level of brightness in control operation.

The light sensor is ideally vertically positioned above the monitored working surfaces. If it is not possible to darken the room, the artificial lighting calibration should be performed early in the morning or in the evening. The artificial lighting should be set with all the lighting groups involved in lighting control (master and slaves) using a Lux meter on the reference surface to measure the setpoint brightness, e.g. 500 lx. Proceed as follows for the best results:

- Deactivating light control
- Switch the artificial lighting fully on
- Wait until the Lux meter on the reference surface indicates a stable value
- Set the setpoint brightness

If this brightness value has been set constant, the relevant lighting controller group must first be enabled to store the setpoint. To do so, first select the lighting controller group (1…4) via communication object (Nr. 27) *Enable controller calibration* (1byte). The communication objects *Calibration artifical light* and *Calibration daylight* will then be ready to receive. This is a safety measure to ensure that calibration cannot be triggered accidentally during normal operation, so as not to overwrite the values set. The communication objects remain ready to receive for one hour or until calibration is triggered (telegram with value 1).

The artificial lighting calibration is triggered by a telegram to the communication object *Calibration lighting*. At the start of the artificial lighting calibration the object *Activate fct controller/status* of the lighting group is automatically set to 1 by the DALI Light Controller. Now the calibration can be started immediately.

The DALI Light Controller saves the current brightness value as a setpoint for light control. As a confirmation, the DALI Light Controller switches the lighting group to be controlled on at 100% brightness.

Thereafter the lighting curve is followed through right down to the minimum value and stored in the DALI Light Controller. This calibration takes about a minute, but can take up to 90 seconds if the brightness values fluctuate. The lighting group to be controlled can be switched on thereafter. The lighting control is started at the same time.

This concludes the artificial lighting calibration.

Artificial lighting calibration[1] (using lighting group 1 as an example)			
	Configuration	**By**	**Effect**
1.	Checking of the light sensor(s) that is/are relevant for lighting control.	Read out communication object *Status sensor value* (No. 9).	The corresponding bit(s) for the relevant light sensor must have the value 1.
1a.	Check the light sensor position.	See Lighting control constraints, page 168	Sensor value is not subject to interference.
2.	Deactivating light control.	Send the value 0 to communication object *Activate fct controller/status* (No. 31).	Light control is deactivated.
3.	Slaves must be actively integrated into the lighting.	Write the corresponding communication objects *Activate function slave* with the value 1.	The entire lighting which is effective in the control must be active during calibration.
4.	Dim room lighting.	Blind or time of day.	Brightness in the detection range of the light sensor(s) less than 20 lx [2]
5.	Set the artificial lighting so that the setpoint brightness is set to the reference point. The light sensor should be positioned above the reference surface.	Set dimming via communication object *Relative dimming* (No. 34) or brightness value via communication object *brightness value* (No. 32).	Setpoint is set, e.g. 500 lx. The sensor of the lux meter should be positioned vertically below the light sensor.
6.	Switch calibration communication object to ready to receive.	Send a telegram to communication object *Enable controller calibration* (No. 27) with the number of the lighting group.	Communication objects *Calibration artificial lighting* and *Calibration daylight* are ready to receive for 1 hour or until calibration has been completed.
7.	Initiate artificial lighting calibration.	Send a telegram with the value 1 to the communication object *Calibration artificial lighting* (No. 28).	Light controller commences calibration of artificial lighting. Jump to 100 % brightness. Dimming to 0. The calibration is completed after about 1 minute.
8.	Artificial lighting calibration end.	Automatic through DALI Light Controller.	At the end, the lighting control is active and controlled.

1) Before the artificial lighting calibration, ensure that the luminaires feature a constantly reproducible dimming performance during dimming. For this purpose, the burn-in time (Effect of ageing on lamps, page 160) of the luminaires must be considered and already completed. Consider also that some fluorescent lamps only develop their full lighting intensity after a few seconds.

2) Interference of the artificial lighting calibration caused by daylight has the effect that the DLR/A assumes that the illumination can produce a larger brightness level than is actually the case. The DLR/A will set a lower level of brightness in light control operation.

Undertaking daylight calibration automatically

Daylight calibration must be performed for each lighting group, where the additional function *Light control* is enabled. Lighting control is only possible for lighting groups 1…4.

Implementation using ETS is described in the following.

Important
The sequence of daylight and artificial lighting calibration is **not** random. Calibration with artificial light must be performed before calibration with daylight.

The daylight calibration can be undertaken automatically by the DALI Light Controller or experimentally by the user. The required setting can be found in Parameter window - Gx Light controller, page 95 with the parameter *Compensation factor for daylight calibration automatically*. Automatic calibration is preferred.

For automatic daylight calibration, the artificial lighting must be switched off and the light control deactivated. The same brightness level (setpoint) as artificial lighting can generally be created using shading units. In order to prevent with a high level of certainty that the setpoint is not undershot in the controlled state, a brightness can be set for the daylight brightness, which is about 10 % above the brightness value of artificial brightness calibration.

Using communication object *Enable controller calibration* (No. 27), the readiness to receive the communication object *Calibration daylight* (No. 29) must be undertaken. The calibration can be undertaken by a telegram with value 1 sent to the communication object *Calibration daylight*. The DALI Light Controller undertakes the calibration and determines the levels (weighting) of artificial lighting and daylight. After this calibration, the DALI Light Controller switches the setpoint and commences with lighting control.

If a shading device is not available for use or the daylight is not sufficient to set the desired brightness, a manual daylight calibration cannot be undertaken.

As an example, short operating instructions for lighting group 1 are listed for automatic daylight calibration:

Automatic daylight calibration			
	Configuration	**By**	**Effect**
0.	Calibration artificial light	see Performing artificial lighting calibration, page 173	Lighting characteristic is stored in the DALI Light Controller.
1.	Deactivating light control.	Send the value 0 to communication object *Activate fct controller/status* (No. 31).	Light control is deactivated.
2.	Switch off artificial lighting.	Send the value 0 to communication object *Switch* (No. 30).	Artificial lighting switched off.
3.	Set the setpoint brightness, e.g. 500 lx with daylight.	The same setpoint can be set using blinds or time of day as with artificial lighting calibration. Note: In order to prevent with a high level of certainty that the setpoint is not undershot in the controlled state, set a brightness about 10 % above the brightness value of artificial brightness calibration.	Setpoint is set, e.g. 500 lx. Optional manual calibration possible.
4.	Switch calibration communication object to ready to receive.	Send a telegram to communication object *Enable controller calibration* (No. 27) with the number of the controller group.	Communication objects *Calibration artificial lighting* and *Calibration daylight* are ready to receive for 1 hour or until calibration has been completed.
5.	Initiate daylight calibration.	Send a telegram with the value 1 to the communication object *Calibration daylight* (No. 29).	Light controller commences daylight calibration. Calibration has ended after about 5 seconds.
6.	End of daylight calibration.	Automatic through DALI Light Controller.	Light control active and controlling.

Undertaking daylight calibration manually

If a daylight calibration is not possible, for example, because the setpoint is not reached with the available daylight or a shading option is not available to darken the brightness level so that the setpoint can be set, manual daylight calibration must be undertaken. This occurs with a factor for daylight compensation that appears in the parameter window *Gx Light controller* if in parameter *Compensation factor for daylight calibration automatically* is parameterized with *no*, see Parameter window - Gx Light controller, page 95.

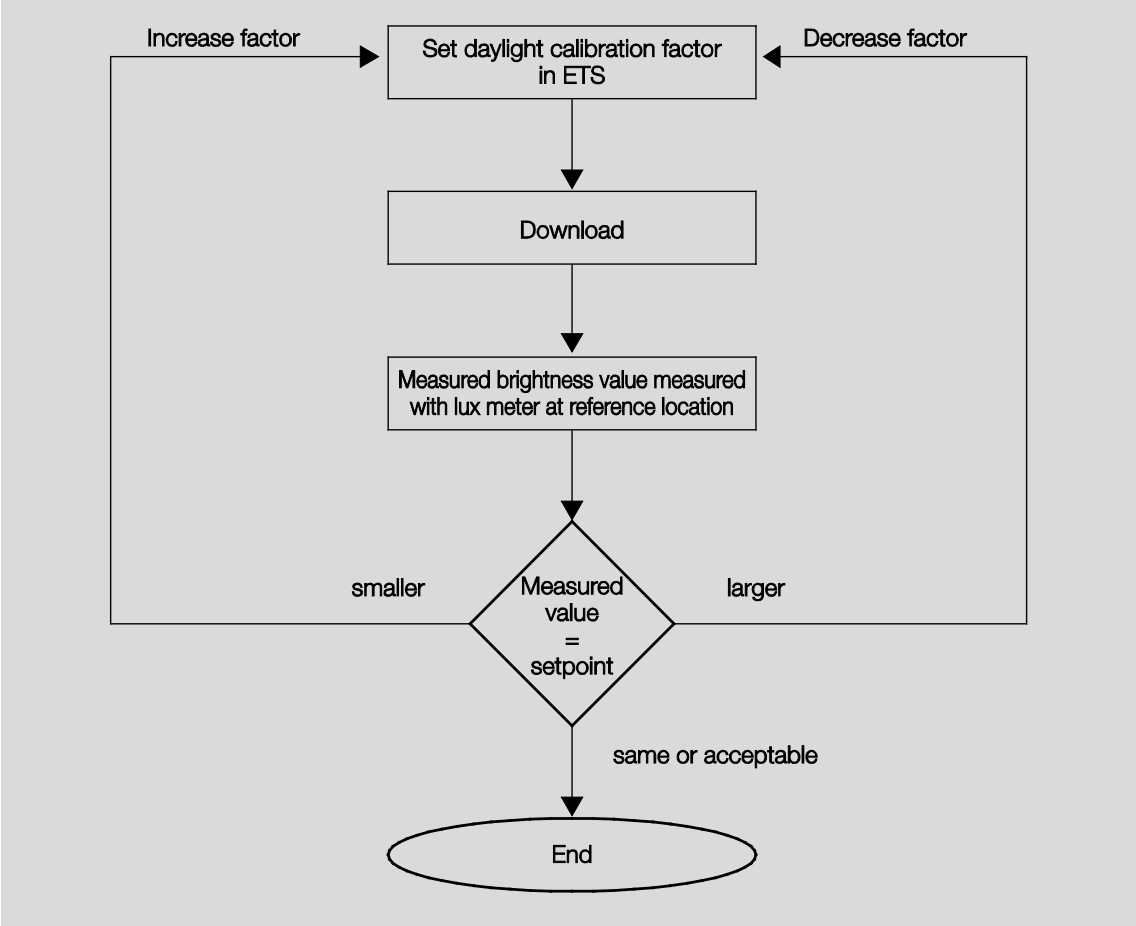
A factor between 0 and 99 can be entered. This factor defines the relationship between daylight and artificial lighting.

A larger value compensates more for daylight. A smaller value on the other hand gives a higher weighting to artificial lighting. After the factor has been transferred for download in the DALI Light Controller, the lighting control has to be compared using the brightness measured in the detection range of the light controller by the lux meter. If the required setpoint is still too low, more artificial lighting is still required. This is achieved by increasing the factor.

Too much artificial lighting is provided should the desired setpoint be exceeded. A reduction of the artificial lighting can be achieved by a reduction of the compensation factor. As an example in the following, short operating instructions for a lighting group are listed for manual daylight calibration:

The calibration should be performed at two different measurement points within the room. In this way, the influence of the daylight compensation factor can be observed in conjunction with the brightness at different measurement points.

Manual daylight calibration			
	Configuration	**By**	**Effect**
1.	Undertake manual daylight calibration.	In Parameter window - Gx Light controller, page 95, the parameter *Compensation factor for daylight calibration automatically* must be set to *no*.	Parameter for the assignment of a factor for daylight calibration is enabled.
2.	Load the factor for daylight calibration in the DALI Light Controller.	Download	The factor is stored in the DALI Light Controller after download.
3.	Checking of the controlled brightness value.	The brightness is to be measured in the detection range of the light sensor with the Lux meter.	The factor must be reduced if the constant brightness to be set is greater than the required setpoint. The factor must be increased if the brightness is too low. Step 2 should be repeated until the required brightness is set.



Important

After the reset or discharge of the DALI Light Controller via the ETS, the stored values for the calibration of the lighting are still available to the DALI Light Controller. The values are stored outside the application segment.

The values are only overwritten again after a renewed calibration. The artificial lighting and the daylight calibrations should be considered separately in this case.

This is independent of whether the calibration has been performed manually or automatically.

The artificial lighting and daylight calibration must be performed again with a change of the light sensor arrangement.

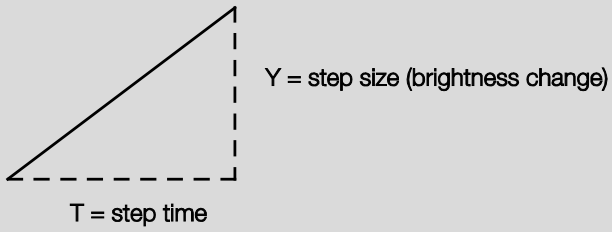
4.9.6 Brightness detection

The Light Sensor LF/U 2.1 of the DALI Light Controller DLR/A 4.8.1.1 detects the light intensity of the surfaces in its detection range and converts it to a current. Before the light reaches the photodiode, it passes through a light filter, whose maximum pass band attributes are in the visible wavelength range of the human eye. The light intensity is on the one hand dependent on the lighting intensity, i.e. the intensity of the daylight or artificial lighting, and on the other hand on the characteristics of the surfaces (reflections), which are to be illuminated. If the surfaces in the detection range of the light sensor are completely covered with white paper, the light sensor measures a different light intensity with the lighting intensity as when the surface is covered with grey recycled paper. When setting the setpoint, the light density is measured by the light sensor and stored as a setpoint value. Subsequently, the light control will control the artificial lighting level in the room, so that it more and more accurately achieves this setpoint value, i.e. the lighting control attempts to keep the lighting density and not the lighting intensity at a constant level.

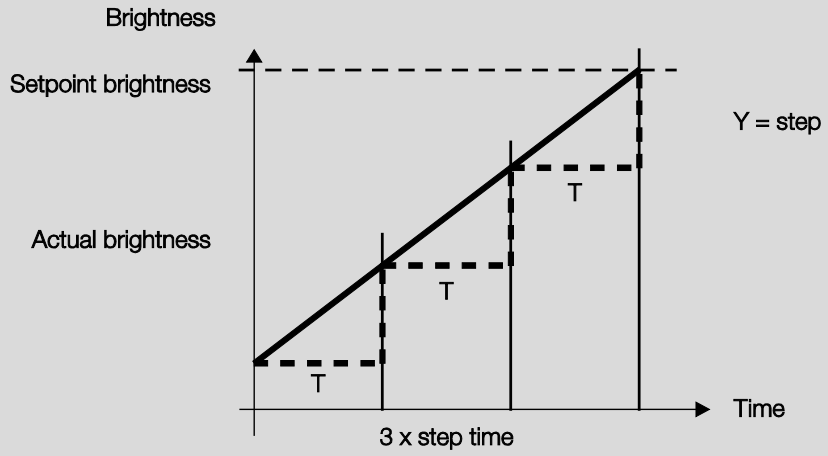
4.9.7 Function of the constant lighting control

The task of a constant lighting control is to control the setpoint brightness, which results at a reference point in the room as accurately as possible. Starting from the actual brightness, the setpoint brightness is approached in steps (brightness change over time).

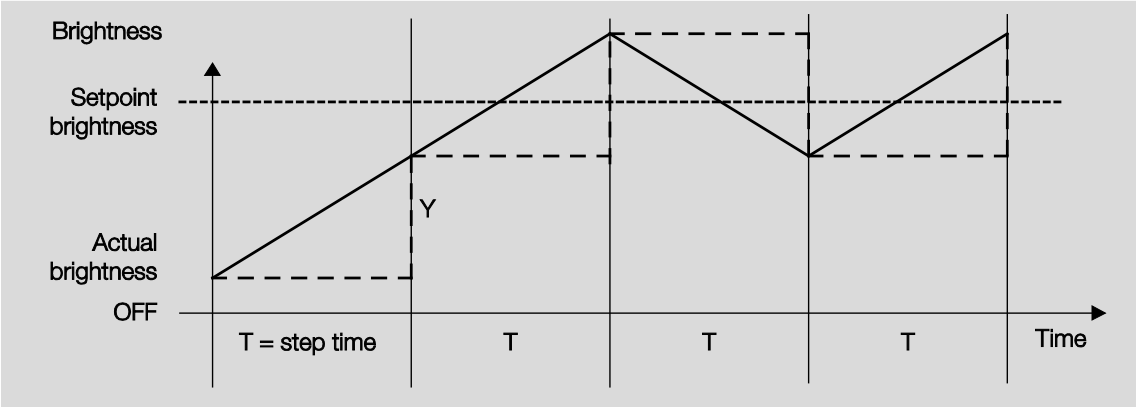
A control step is defined by the increment (brightness change) and the step time (time duration), in which the brightness change is performed.



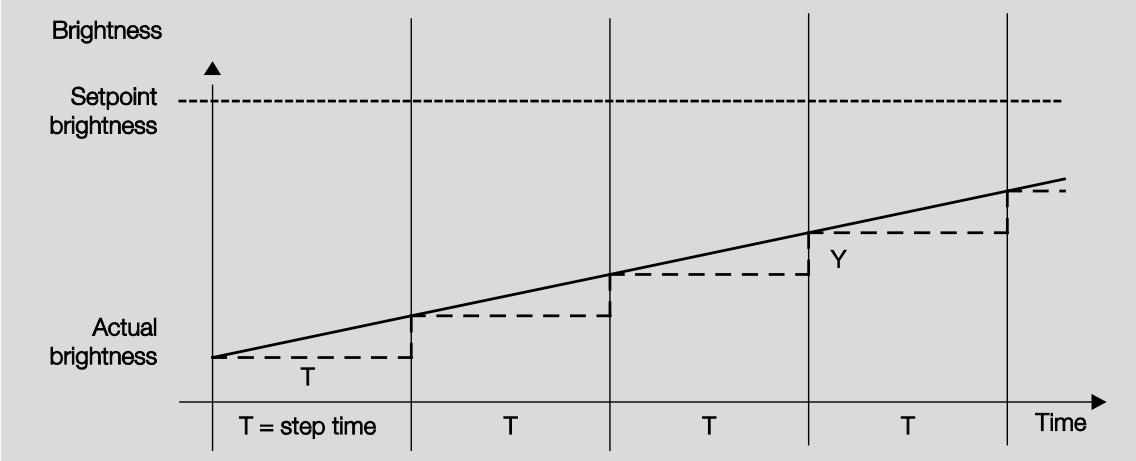
A simplified lighting control can in principle look as follows. The setpoint brightness is achieved starting from an actual brightness level in three steps:



If the increment is too large, the light control reaches the setpoint faster. The setpoint brightness is exceeded. The DLR/A starts to oscillate around the setpoint brightness.



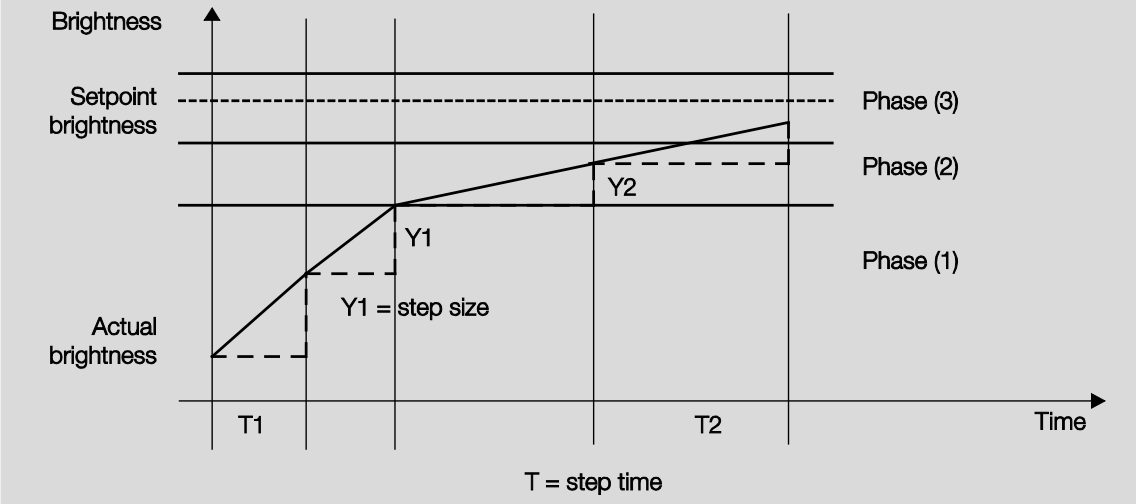
If the increment is too small, it will take too long until the setpoint brightness is reached. This is critical, particularly in cases where blinds are closing to darken the room quickly.



The increment time should be selected so that the brightness change of a control step is available to the DLR/A via the Light Controller/luminaire/Light Sensor before the next control step is triggered. Otherwise the brightness setpoint will be exceeded and has to be regulated back a step.

Normally the DLR/A determines these control variables. If required, these variables can be set individually in Parameter window - Gx Light controller, page 95. The parameters are enabled if in the parameter *Changing brightness during lighting control* the option *individual setting* is selected.

The parameterized variables are written in the following illustration.



In the start-up phase (1), the *Step time for fast approach* (T1) of the control step can be parameterized. The smaller this time, the faster the control steps are sent with the calculated step increment (Y1). The setpoint brightness is approached in a relatively short time.

If the difference between the setpoint brightness and the actual brightness has undershot a parameterized value, the fine tuning phase (2), in which the *Step time for slow approach* (T2) slowly approaches, the setpoint value commences.

The step increment (Y2) can also be parameterized to reach the setpoint faster or slower. This increment only is valid until a determined interval to the setpoint value. This interval can be set via the parameter *Control deviation for high increments (max. control step).*

With an additional parameter (*Control deviation for high increments*), you set the phase (3), in which the lighting control is suspended. A range around the setpoint value, where there is no light control, must be parameterized. Only when the actual brightness is again larger than this difference will the light control recommence. In this way, continuous control with the respective changes in brightness is avoided. This generates a smoother and less abrupt response and considerably reduces the KNX bus load with a master/slave control.

In order to get a point of reference for the individual control parameterization, in the following table, you will find a list of the fixed parameterized settings in the DLR/A and/or the individually adjustable values for the *Changing brightness during lighting control (fast[1]), medium, slow* and the *individual setting*):

Changing brightness during lighting control **Changing brightness during lighting control**	fast	mediu m	slow	individual setting
Step time for fast approach [0.1 s…2.0 s]	As quickly as possible.	0.5	1	1
Step time for slow approach [1 s…10 s]	2	3	4	4
Control deviation for medium dimming speed [0…50]	20	20	20	20
Maximum increment size of a control step [1…10]	1	1	1	1
Control deviation for high increments (max. control step) [10…255]	30	30	30	30
Deviation actual value from nominal value for starting controlling [0...30]	1	1	1	1

1) It is only possible to select *fast* if the light controller is controlling no additional slaves via the communication object *Master Brightness value*. (This can be set in parameter window - *Gx Light Controller*, with parameter *Controls as "master" other dimmer actuators).*

4.10 Scene

The DLR/A facilitates the integration of the 8 lighting groups in 14 scenes.

The scene parameterized once in the ETS can be used in the following functions:

- Normal scene recall via the communication objects *8 bit scene* (1 byte) or Recall scene (1 bit)
- In function *Staircase lighting*, scenes 13 and 14 are used directly for parameterization of the staircase lighting. If in function *Staircase lighting*, the scenes 13 or 14 are to be parameterized directly via parameter window *Scene 13 and Scene 14*, the options for *Time for dimming up (soft start), Staircase time, Time for dimming down after light on (Warning before light turned off)* and *Basis brightness hold time* undertaken in the parameter window *Staircase lighting* are lost.

The scene value of a scene can be parameterized in the ETS in Parameter window *Scene x*, page 114, or saved via the KNX. If storing of the scene is triggered via communication object *Store scene* or the respective 8 bit scene telegram, the currently set brightness values of the lighting group are saved as the new scene value. Only the lighting groups, which are also members of the scene, are used during storage. The other lighting groups are not influenced.

The normal scene can be recalled via the 1 bit communication object *Recall scene* or via a 1 byte communication object *8 bit scene*.

With 1 bit control, a received telegram on communication object *Recall scene* (Scene x/y) has the following function:

- Telegram value 0 = recall scene x
- Telegram value 1 = recall scene y

The following function table results with the 1 byte communication object *8 bit scene*:

KNX 1 byte telegram value		Meaning
Decimal	**Hexadecimal**	
00	00h	Recall scene 1
01	01h	Recall scene 2
…	…	…
13	0Ch	Recall scene 14
128	80h	Store scene 1
129	81h	Store scene 2
…	…	…
140	8Ch	Store scene 14

Other numeric values do not affect the function *Scene*.

For further information see: Code table 8 bit scene (No. 212), page 206

Important
The light scene settings remain stored in the DLR/A even after a KNX bus voltage failure or light controller supply voltage failure. If a ballast has to be exchanged, the light scenes are immediately available without further commissioning.

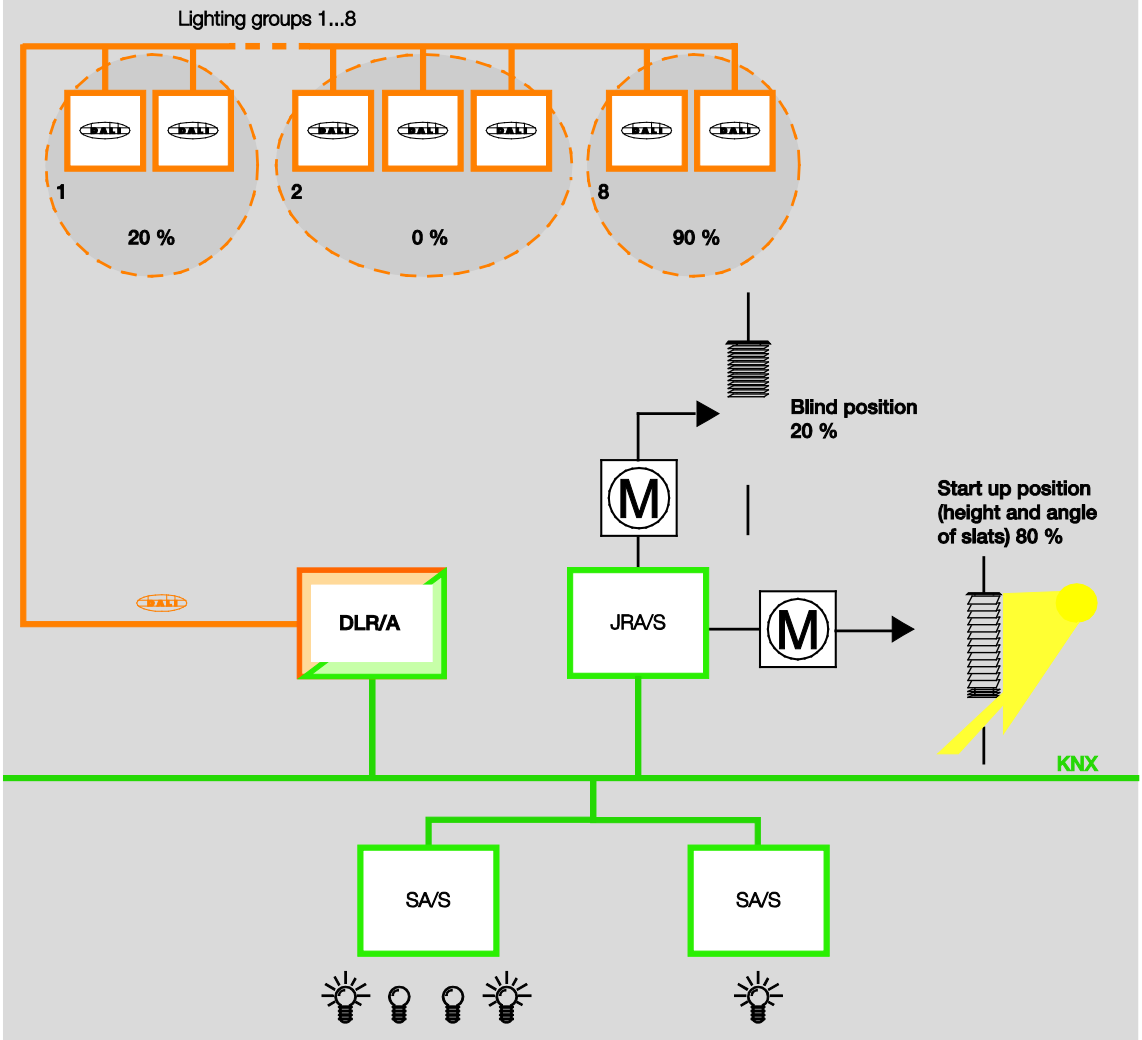
The function Scene is not continued with a KNX bus voltage failure or light controller supply voltage failure. The brightness is set, which is selected with voltage failure or recovery in Parameter window - Gx Fault, page 77.

If the ballast operating voltage fails on an individual DALI device, the brightness value will stop and will not be reintegrated into the ongoing Scene when the ballast operating voltage recovers. Only after the next scene recall will this DALI device actively participate in the function *Scene*.

A typical function *Scene* could, for example, appear as follows and is described using the 8 bit scene telegram as an example:

The task is to implement the room lighting for a presentation with ABB i-bus® KNX devices. The following devices are used in the room:

- Switch actuators for the basis lighting
- Blind actuator for shading
- DLR/A for dimmable lighting and constant lighting control



Example
An 8 bit scene (No. 8) comprises of some lamps, which are connected to two switch actuators and lighting groups that are controlled via the DALI Light Controller. Furthermore, two shutters are integrated into the function *Scene* via a shutter actuator. The *Scene* can be retrieved via a single KNX telegram. The prerequisite for this is that all devices have programmed scene No. 8 accordingly in their devices. After a telegram has been received, the slave switches on its Scene No. 8. The shutter actuator moves the shutters to the corresponding position; the lighting assumes the predefined brightness values and switching states defined by the scene.

Benefits
The 8 bit scene offers some advantages compared to conventional scene programming via several KNX groups. On the one hand when a scene is recalled only one telegram is sent via the KNX, which is received and implemented by all members of the scene. On the other hand the target positions of the blinds, the contact position of the switch actuator outputs and the brightness values of the DLR/A lighting groups are stored in the respective devices and must not be transferred via the KNX each time there is a recall.

Note
The scene numbering 1…64 is accessed via the KNX with a telegram value 0…63, whereby the DLR/A can only be used in one of the first 14 scenes. **For further information see: Code table 8 bit scene (No. 212), page 206.**

4.11 Slave

If the additional function *Slave* is activated, the lighting group of the DLR/A strictly adheres to the brightness value, which is predefined by the communication object *Brightness value of slave*. Brightness values on the communication object *Brightness value* are ignored.

Alternatively, the scene lighting group can also directly receive the *Brightness value of slave* in the DALI Light Controller from another lighting group. This can be parameterized in Parameter window - Gx Slave, page 108. This internal assignment means that no KNX group assignment is required. Furthermore, the KNX bus load is reduced through the internal communication.

A telegram with the value 0 on the communication object *Activate function slave* deactivates function *Slave*. A telegram with the value 1 reactivates function *Slave*. In the non-activated state, the lighting group again responds to the brightness values, which are sent via the communications object *Brightness value*. Dimming, switch, scene or sequence telegrams are also undertaken.

An OFF telegram (receipt of a telegram with the value 0 on the communication object *Switch*, e.g. by a presence detector) has the effect that the function *Slave* switches over to standby. During standby mode, the lighting group responds to dimming, scene and sequence telegrams. Furthermore, in standby mode the brightness values, which the DALI Light Controller receives for the communication object *Brightness value*, are carried out. Brightness values that are received via the communication object *Brightness value of slave* are ignored by the DALI Light Controller.

Standby mode is exited if the DALI Light Controller receives an ON telegram (receipt of a telegram with the value 1 on the communication object *Switch*, e.g. by a presence detector) or a telegram with the value 1 on the communication object *Activate function slave*. The lighting group is again in slave mode and only responds to the communication object *Brightness value of slave*.

The function *Slave* is also set to standby mode if in Parameter window - Gx Slave, page 108, in response to a Switch, dim or brightness vale telegram or a Recall scene, the option *deactivate operation* is set. The function *Slave* is in standby mode. The lighting group starts to respond again to the communication object *brightness value of slave* if a telegram with the value 1 is received by communication objects *Switch* or Activate *function slave*.

The parameterization *no reaction* has the effect that no dimming, switch and brightness setting telegram can be executed. A scene recall and storing of a scene also has no effect.

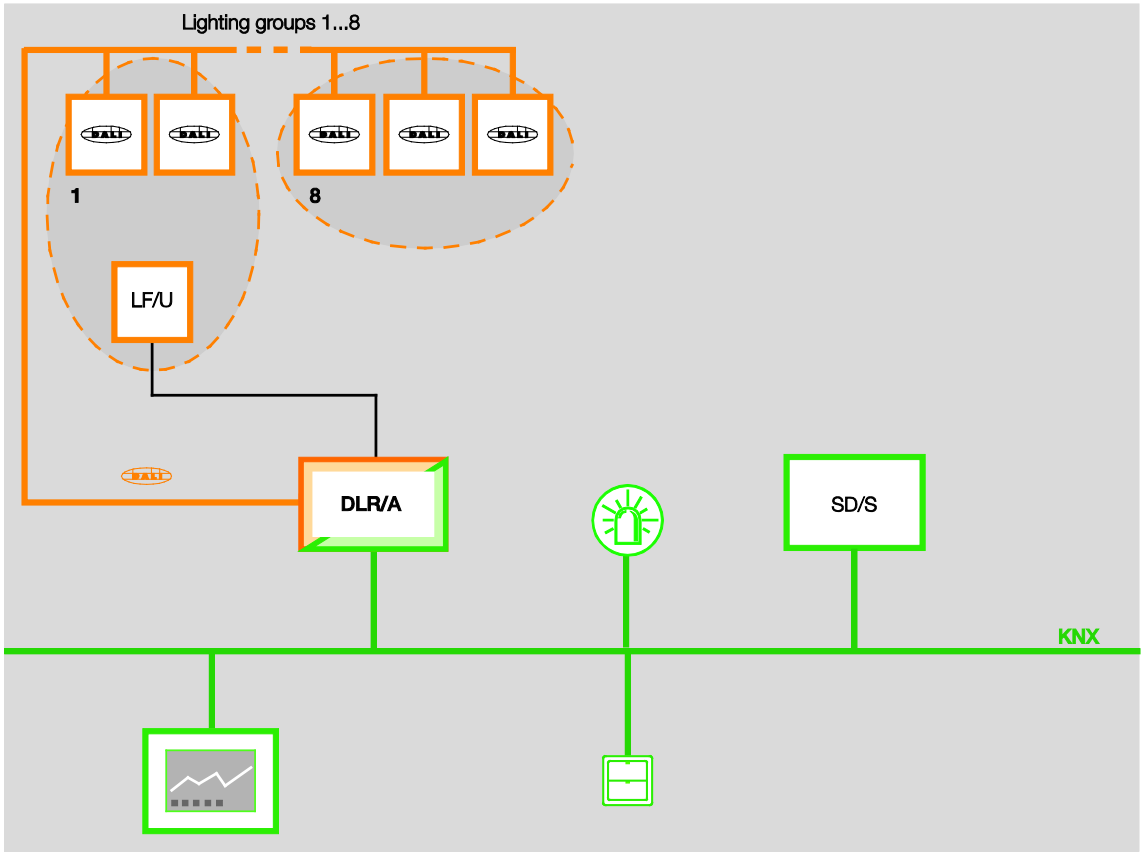
The parameterized minimum and maximum dimming values also apply in function *Slave* in the parameter window Parameter window Gx Group, page 63. The undershoot and overshoot of these values are set using the parameterized minimum or maximum brightness value. If the master sends the brightness value 0, the lighting is switched off.

The behavior of the function *Slave* after KNX bus voltage recovery can be parameterized: in Parameter window - Gx Slave, page 108 you can set whether operation is active or inactive. The brightness value of the lighting group after KNX bus voltage recovery can be set in Parameter window - Gx Fault, page 77. If the mode *active* is parameterized, the parameterized brightness value is initially set after KNX bus voltage recovery. Subsequently, the next brightness value received via communication object *Brightness value of Slave* is then set.

In the following table, the response to received telegrams with the parameterized function *Slave* is shown.

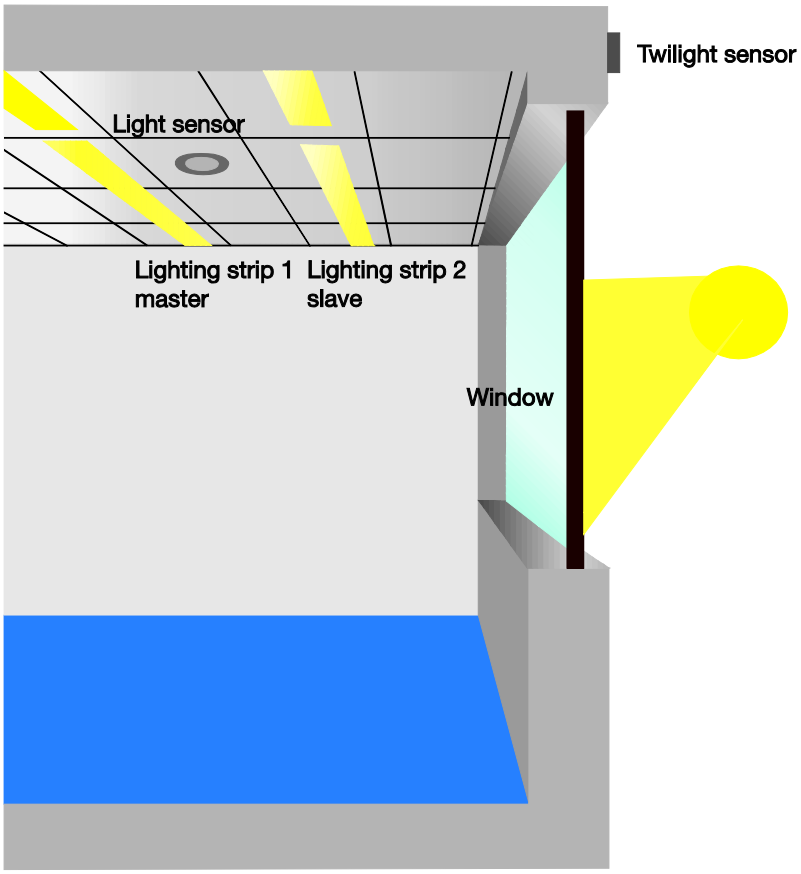
Operating situation or **Communication objects**		**Additional function *Slave***		
		inactive (Activate function slave = 0)	**Active in standby (Activate slave mode = 1)**	**Active and ON (running) (Function = 1)**
Download (start)Download (start)		Such as KNX bus voltage failure		
Download (end)		Such as KNX bus voltage recovery		
KNX bus	**Voltage failure**	Programmable:- Brightness value - Gx Fault		
	Voltage recovery	Programmable: - Mode: - Gx Slave - Brightness value - Gx Fault		
DALI or Gateway operation	**Voltage failure**	Programmable: - Brightness value - Gx Fault		
	Voltage recovery	Programmable: - Mode: - Gx Slave - Brightness value - Gx Fault		
Switch	**ON**	Brightness value when turned ON	→ Active, current *Brightness value of slave* is set	Programmable: - no reaction - goes to standby and sets switch on value
	OFF	OFF	OFF, remains in standby	OFF and goes to standby
Relative dimming		Dimming	Dimming, remains in standby	Programmable: - no reaction - goes to standby and dims
Brightness value		Brightness value	Brightness value, remains in standby	Programmable: - no reaction - goes to standby and sets brightness value
Brightness value of slave		no reaction	no reaction	Brightness value of slave is set
Function *Slave* activate	**0**	no reaction	→ Inactive	→ Inactive
	1	Current Brightness value of slave → Active	Current Brightness value of slave → Active	Current Brightness value of slave
recall scene		Scene	Scene	Programmable: - no reaction - goes to standby and starts scene

An integration of further ABB i-bus® KNX components in the light control can typically appear as follows:



4.11.1 Slave with offset function

The DALI Light Controller features, in addition to the additional function *Slave*, an offset with the slave that can be used to control a lower or higher level of brightness than the brightness level of the master. In the following, both these functions should be described in more detail using a room with two lighting strips as an example.



Using the additional function *Slave*, a second lighting strip (slave) can be controlled in the room. Up to now, both lighting strips were normally controlled with the same brightness value.

With the DALI Light Controller, the transfer of the master/slave brightness value can be via a communication object (*Brightness value of slave of group x*) or directly internally in the DALI Light Controller. The bus loading is minimized by internal communication. This parameterization is undertaken in the Parameter window - Gx Slave, page 108.

Daylight lights the area of the room near the window more than the rear area of the room. To light the rear area of the room adequately, Strip 1 must produce a brightness value x. Owing to the daylight, Strip 2 could be controlled with a lower brightness value (x - x %) without the room being too dark.

In the DALI Light Controller, an offset is available for this behavior for every light controller lighting group. This parameterization is undertaken in the Parameter window - Gx Light controller, page 95. The parameter for the offset is visible if the parameter *Light controller controls as "master" other dimmer actuators* is set to *yes*. A percentage value x can be parameterized as an offset. The slave is controlled with a brightness value X % brighter or darker than the master.

The brightness value associated with the offset is sent via the communication object *Master offset brightness* from the light controller lighting group. Alternatively, this brightness value can also be internally transferred to the slave in the light controller.

In this example, lighting strip 1 is compiled to a light controller lighting group. The slave lighting group consists of the lamps of lighting strip 2. A value of -20 % is parameterized as an offset. In this way, lighting strip 2 is controlled with a brightness value that is 20% less than the brightness value of the master. The following brightness values result:

Master brightness value	Brightness value of slave
100 % (255)	80 % (205)
75 % (191)	60 % (153)
50 % (126)	40 % (101)
20 % (50)	16 % (40)
10 % (26)	8 % (21)
0 % (0)	0 % (0)

As soon as the daylight starts to fade, the area of the room beside the window is no longer provided with sufficient natural lighting. The side of the room beside the window now receives too little artificial lighting to ensure optimum working conditions. In order to automatically counteract this natural behavior, it is possible for each light controller lighting group in the DALI Light controller to use the communication object *Master: Offset activate* to switch off the offset via the KNX. Thus the slave is controlled with same brightness level as the master.

Switching ON and OFF the offset can, for example, be implemented using a twilight sensor switch or a timer.

As a result, there is always sufficient brightness in the room with the minimum of energy consumption.

4.12 DALI lighting curve

The DALI lighting curve is adjusted to the sensitivity of the human eye. In this way, a logarithmic characteristic curve results for the luminous flux, which is perceived by the human eye as a linear brightness characteristic.

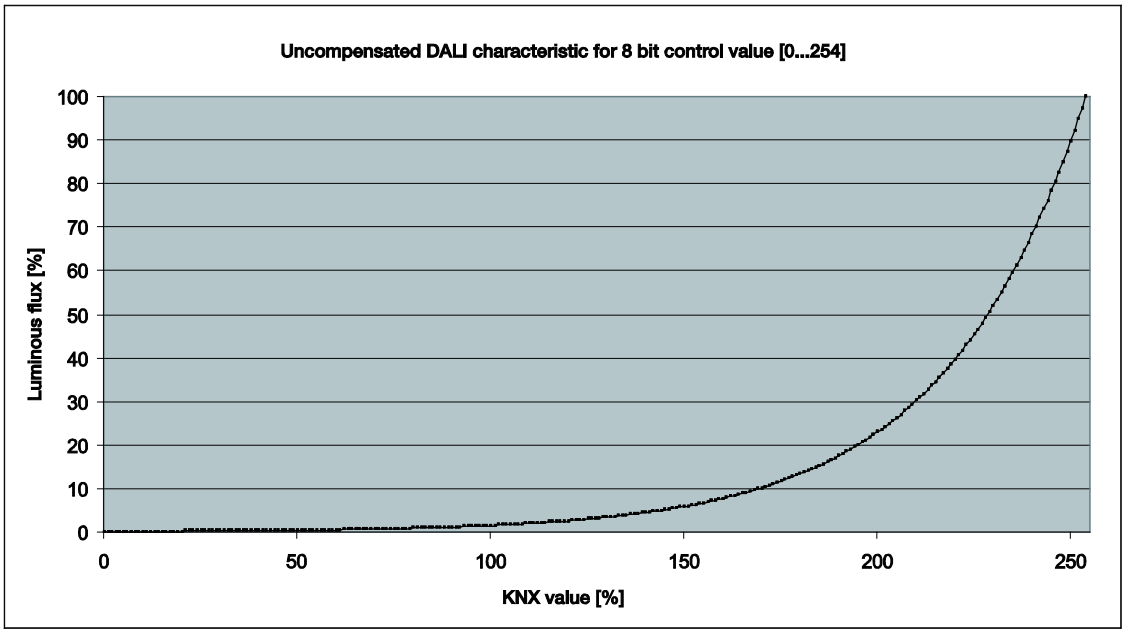
Note
IEC 62386-102 describes the DALI values as *arc power across the light source*, which in most cases is an almost linear relationship to the luminous flux. The luminous flux describes the lighting power emitted from a light source in all directions. The unit is stated in lumens (lm).

For the luminous flux under DALI, the characteristic shown in the following illustration is defined compliant to the DALI standard (EN 60929 or IEC 62386-102):

$$X(n) = 10^{\frac{n-1}{253/3}-1} \qquad \left|\frac{X(n) - X(n+1)}{X(n)}\right| = \text{const.} = 2.8\ \%$$

n = 1…254 (digital control value)

The following DALI characteristic thus results:



E	**KNX status brightness value**	0	1	60	85	126	144	170	195	210	220	229	235	241	246	250	255
D	**Luminous flux [%]**	0	0.1	0.5	1	3	5	10	20	30	40	50	60	70	80	90	100
C	**DALI value**	0	1	60	85	126	144	170	195	210	220	229	235	241	246	250	254
B	**KNX value**	0	1	60	85	126	144	170	195	210	220	229	235	241	246	250	255
A	**KNX value [%]**	0	0.4	24	33	49	57	67	77	82	86	90	92	95	97	98	100

The table assumes ideal DALI equipment (DALI dimming range 0.1…100 %) and in the DLR/A a KNX dimming range of 0.4…100 %.

Rows A and B are the brightness value that the DLR/A is receiving via the KNX as digital number values (0…255) or in % (0…100) empfängt. The DLR/A transfers these to DALI (row C). Then(row D) there is the DALI characteristic of the luminous flux from the luminaire. Finally the DLR/A sends the status of the bright value (row E) back to the KNX again.

The dimmable range printed on the ballast relates to the luminous flux. Typical specifications are 3 % or 0.2 %, which due to the logarithmic nature of the DALI curve, are the KNX values of 49 % (126) or 10 % (26).

The maximum possible dimming range can only be set with DALI equipment, which has a dimming range up to 0.1 % (KNX value 1 or 100/255 % = 0.4 %). Other DALI equipment has a limited dimming range. This value is a physical property of the ballast and cannot be changed. This dimming limit has nothing to do with the minimum dimming value parameterized in the application.

As an example, in the following, DALI equipment with a minimum physical luminous flux of 3 % can be observed. In the KNX, a dimming range of 126…254 is thus available. This means, the lowest brightness value that can be set and fed back on the KNX is 126 or 50 %. KNX values, which are less than 126 or 50 %, are set by the DALI equipment to the threshold value and fed back by the DLR/A on the KNX.

E	**KNX status brightness value**	0	126	126	126	126	126	126	144	229	235	241	246	250	255
D	**Luminous flux [%]**	0	3	3	3	3	3	3	5	50	60	70	80	90	100
C	**DALI value**	0	1	8	26	60	85	126	144	229	235	241	246	250	254
B	**KNX value**	0	1	8	26	60	85	126	144	229	235	241	246	250	255
A	**KNX value [%]**	0	0.4	3	10	24	33	49	57	90	92	95	97	98	100

The characteristic curve described in the following section is represented as the useable range for the ballast with the control value range for the brightness value on the KNX. In this way, a higher resolution of the brightness values on the KNX is possible. However, nothing changes in the physical threshold values of the ballast and the light yield.

Note

Characteristic adjustment can only be carried out correctly if brightness value is calculated internally with characteristic adjustment via the DALI Light Controller, simulated, and provided to the DALI devices. This is the case e.g. when setting the brightness value.

When dimming, irrespective of whether this is via a group or a central command, differences can occur between the set brightness value and the simulated status of the brightness value. To make it possible to obtain equal dimming, the DALI commands DIM-UP and DIM-DOWN must be used on the DALI Light Controller. These commands trigger a dimming step in the DALI device, which is then transformed into the DALI characteristic on the DALI device. As the exact length of the dimming step is unknown, deviations can arise between the calculated (simulated) value and the actual set brightness value.

This can become apparent if, after dimming, the brightness value status is fed back directly to the dimmed lighting group as the brightness value. Where this is the case, it can result in a jump in brightness.

4.12.1 Characteristic adjustment of the linear lighting curve

The DALI characteristic compliant to IEC 62386-102 described in the previous chapter can be modified via the DALI Light Controller, so that it provides a linear characteristic from KNX brightness value [%] to luminous flux.

Based on the KNX brightness value (row A or B), the DLR/A calculates the corresponding DALI control value (row C), which is required to achieve the same luminous flux (row D) from the figure value.

Thus, a brightness value on the KNX of 3 % (digital value 8) is also provided as a luminous flux of 3 %. This has the benefit that the KNX value range can be used almost completely for the brightness value. In this way, the light yield of the lighting equipment has not changed. Furthermore, it must be considered that the perceived linear brightness response due to the logarithmic DALI curve is no longer available.

In an ideal case, the following transformation table results:

E	**KNX status brightness value**	0	3	8	13	26	51	77	102	128	153	179	204	230	255
D	**Luminous flux [%]**	0	1	3	5	10	20	30	40	50	60	70	80	90	100
C	**DALI value**	0	85	126	144	170	195	210	220	229	235	241	246	250	254
B	**KNX value**	0	3	8	13	26	51	77	102	128	153	179	204	230	255
A	**KNX value [%]**	0	1	3	5	10	20	30	40	50	60	70	80	90	100

With the linear characteristic, a dimming range of 3…100 % results with a DALI device as featured in the following table:

E	**KNX status Brightness value**	0	3	8	13	26	51	77	102	128	153	179	204	230	255
D	**Luminous flux [%]**	0	1	3	5	10	20	30	40	50	60	70	80	90	100
C	**DALI value**	0	85	126	144	170	195	210	220	229	235	241	246	250	254
B	**KNX value**	0	3	8	13	26	51	77	102	128	153	179	204	230	255
A	**KNX value [%]**	0	1	3	5	10	20	30	40	50	60	70	80	90	100

The marked values are again the values, which result for a ballast with a dimming range of 3 %…100 %. It becomes evident that on the KNX the variables for the brightness value between 3 % and 100 % can be used (row A), even though the DALI value (row C) changes between 126 (50%) and 254 (100%).

4.12.2 Characteristic adjustment of phys-min brightness value

In the ideal case (ballast with a physical minimum brightness value of 0), the "normal" DALI-transformation table page 193, results.

With a realistic physical brightness value of 3% (DALI 126), the following table results. In the KNX value range 0…50 % the ballast cannot set a brightness difference.

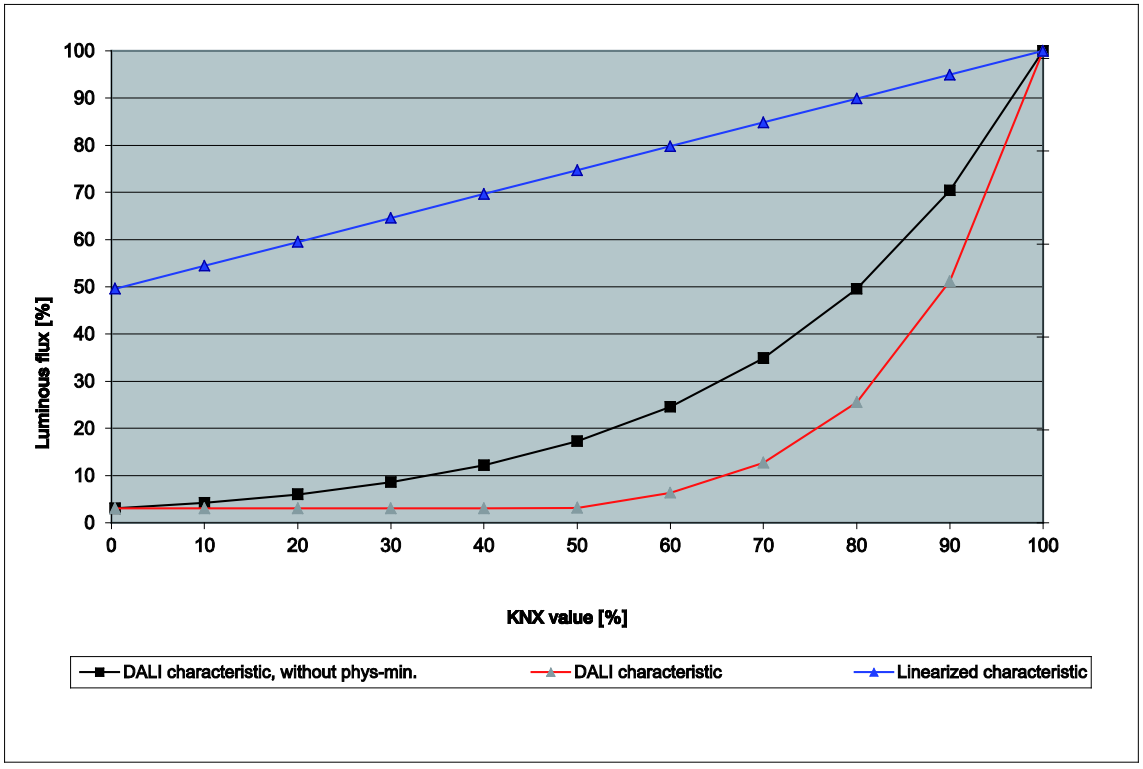
E	KNX status Brightness value	0	126	126	126	126	144	170	195	210	220	229	235	241	246	250	255
D	Luminous flux [%]	0	3	3	3	3	5	10	20	30	40	50	60	70	80	90	100
C	DALI value	0	1	60	85	126	144	170	195	210	220	229	235	241	246	250	254
B	KNX value	0	1	60	85	126	144	170	195	210	220	229	235	241	246	250	255
A	KNX value [%]	0	0.4	24	33	49	57	67	77	82	86	90	92	95	97	98	100

The following table results with the characteristic correction *DALI lighting curve, without phys-min brightness value* with a DALI device featuring a dimming range of 3…100 %:

E	KNX status Brightness value	0	3*)	8	26	51	77	102	128	153	179	204	230	255
D	Luminous flux [%]	0	1	3	4	6	9	12	17	25	35	50	70	100
C	DALI value	0	85	126	138	151	164	177	190	203	215	228	241	254
B	KNX value	0	3	8	26	51	77	102	128	153	179	204	230	255
A	KNX value [%]	0	1	3	10	20	30	40	50	60	70	80	90	100

*) Theoretically the value 1 is reported back. As the minimum dimming threshold in the DLR/A is 1 % (digital value 3), only this value can be set and fed back.

The possible characteristic with the DALI Light Controller and the characteristic correction are represented in the following illustration. A ballast with a minimum physical brightness value of 3 % has been assumed.



A Appendix

A.1 Code table *Diagnostics* Low byte (No. 6)

With the 2 byte communication object *Diagnostics*, the information about a DALI device or a lighting group is provided on the KNX. The communication object No. 6 *Diagnostics* is updated via the communication object No. 7 *Request diagnostics* and sent on the KNX.

For further information see: Communication object No. 6 and 7, page 122

The 2 byte communication object No. 6 can be divided into two 1 byte values:

- High byte (bit 8…15)
- Low byte (bit 0…7)

In the low byte, the information of the communication object No. 7 *Request diagnostics* is repeated. The Code table *Diagnostics* High byte (No. 6) lists the DALI devices or lighting groups.

The following code table shows the relationship between the value of the communication object of the low byte and the DALI devices or the lighting group.

Bit No.		7	6	5	4	3	2	1	0		
Decimal communication object value	Hexadecimal communication object value	Not defined	DALI device/lighting group	Binary code						No. DALI device	No. lighting group
0	00									1	
1	01								■	2	
2	02							■		3	
3	03							■	■	4	
4	04						■			5	
5	05						■		■	6	
6	06						■	■		7	
7	07						■	■	■	8	
8	08					■				9	
9	09					■			■	10	
10	0A					■		■		11	
11	0B					■		■	■	12	
12	0C					■	■			13	
13	0D					■	■		■	14	
14	0E					■	■	■		15	
15	0F					■	■	■	■	16	
16	10				■					17	
17	11				■				■	18	
18	12				■			■		19	
19	13				■			■	■	20	
20	14				■		■			21	
21	15				■		■		■	22	
22	16				■		■	■		23	
23	17				■		■	■	■	24	
24	18				■	■				25	
25	19				■	■			■	26	
26	1A				■	■		■		27	
27	1B				■	■		■	■	28	
28	1C				■	■	■			29	
29	1D				■	■	■		■	30	
30	1E				■	■	■	■		31	
31	1F				■	■	■	■	■	32	
32	20			■						33	
33	21			■					■	34	
34	22			■				■		35	
35	23			■				■	■	36	
36	24			■			■			37	
37	25			■			■		■	38	
38	26			■			■	■		39	
39	27			■			■	■	■	40	

Bit No.		7	6	5	4	3	2	1	0		
Decimal communication object value	Hexadecimal communication object value	Not defined	DALI device/lighting group	Binary code						No. DALI device	No. lighting group
40	28			■		■				41	
41	29			■		■			■	42	
42	2A			■		■		■		43	
43	2B			■		■		■	■	44	
44	2C			■		■	■			45	
45	2D			■		■	■		■	46	
46	2E			■		■	■	■		47	
47	2F			■		■	■	■	■	48	
48	30			■	■					49	
49	31			■	■				■	50	
50	32			■	■			■		51	
51	33			■	■			■	■	52	
52	34			■	■		■			53	
53	35			■	■		■		■	54	
54	36			■	■		■	■		55	
55	37			■	■		■	■	■	56	
56	38			■	■	■				57	
57	39			■	■	■			■	58	
58	3A			■	■	■		■		59	
59	3B			■	■	■		■	■	60	
60	3C			■	■	■	■			61	
61	3D			■	■	■	■		■	62	
62	3E			■	■	■	■	■		63	
63	3F			■	■	■	■	■	■	64	
64	40		■								1
65	41		■						■		2
66	42		■					■			3
67	43		■					■	■		4
68	44		■				■				5
69	45		■				■		■		6
70	46		■				■	■			7
71	47		■				■	■	■		8
72	48		■			■					9*)
73	49		■			■			■		10*)
74	4A		■			■		■			11*)
75	4B		■			■		■	■		12*)
76	4C		■			■	■				13*)
77	4D		■			■	■		■		14*)
78	4E		■			■	■	■			15*)
79	4F		■			■	■	■	■		16*)

■ = Value 1, applicable; empty = Value 0, not applicable

*) DLR/A has only 8 lighting groups

A.2 Code table D*iagnostics* High byte (No. 6)

With the 2 byte communication object *Diagnostics*, the information about a DALI device or a lighting group is provided on the KNX. The communication object No. 6 *Diagnostics* is updated via the communication object No. 7 *Request diagnostics* and sent on the KNX.

For further information see: Communication object No. 6 and 7, page 122

The 2 byte communication object No. 6 can be divided into two 1 byte values:

- High byte (bit 8…15)
- Low byte (bit 0…7)

In the low byte the information of the communication object No. 7 *Request Diagnosis* is repeated. The high byte defines the DALI devices or the lighting group.

The following code table shows the relationship between the value of the communication object of the high byte and the status of the DALI system with its DALI devices or the lighting group.

The information in bit 7 is dependent on whether the information is device-based or group-orientated. In cases of device-based display, bit 7 contains information of whether the device is available, i.e., if it reports on the DALI. In the case of group-orientated display, bit 7 contains information indicating if error messages are blocked.

Bit No.		7	6	5	4	3	2	1	0
Decimal communication object value	Hexadecimal communication object value	Disable sending of fault alarm[1] DALI device available[2]	DALI telegram collision	DALI short-circuit	Additional function	Function Burn-in	Device monitoring	Fault ballast	Fault lamp
0	00								
1	01								■
2	02							■	
3	03							■	■
4	04						■		
5	05						■		■
6	06						■	■	
7	07						■	■	■
8	08					■			
9	09					■			■
10	0A					■		■	
11	0B					■		■	■
12	0C					■	■		
13	0D					■	■		■
14	0E					■	■	■	
15	0F					■	■	■	■
16	10				■				
17	11				■				■
18	12				■			■	
19	13				■			■	■
20	14				■		■		
21	15				■		■		■
22	16				■		■	■	
23	17				■		■	■	■
24	18				■	■			
25	19				■	■			■
26	1A				■	■		■	
27	1B				■	■		■	■
28	1C				■	■	■		
29	1D				■	■	■		■
30	1E				■	■	■	■	
31	1F				■	■	■	■	■
32	20			■					
33	21			■					■
34	22			■				■	
35	23			■				■	■
36	24			■			■		
37	25			■			■		■
38	26			■			■	■	
39	27			■			■	■	■
40	28			■		■			
41	29			■		■			■
42	2A			■		■		■	
43	2B			■		■		■	■
44	2C			■		■	■		
45	2D			■		■	■		■
46	2E			■		■	■	■	
47	2F			■		■	■	■	■
48	30			■	■				
49	31			■	■				■
50	32			■	■			■	
51	33			■	■			■	■
52	34			■	■		■		
53	35			■	■		■		■
54	36			■	■		■	■	
55	37			■	■		■	■	■
56	38			■	■	■			
57	39			■	■	■			■
58	3A			■	■	■		■	
59	3B			■	■	■		■	■
60	3C			■	■	■	■		
61	3D			■	■	■	■		■
62	3E			■	■	■	■	■	
63	3F			■	■	■	■	■	■
64	40		■						
65	41		■						■
66	42		■					■	
67	43		■					■	■
68	44		■				■		
69	45		■				■		■
70	46		■				■	■	
71	47		■				■	■	■
72	48		■			■			
73	49		■			■			■
74	4A		■			■		■	
75	4B		■			■		■	■
76	4C		■			■	■		
77	4D		■			■	■		■
78	4E		■			■	■	■	
79	4F		■			■	■	■	■
80	50		■		■				
81	51		■		■				■
82	52		■		■			■	
83	53		■		■			■	■
84	54		■		■		■		
85	55		■		■		■		■

Bit No.		7	6	5	4	3	2	1	0
Decimalcommunication object value	Hexadecimal communication object value	Disable sending of fault alarm[1] DALI device available[2]	DALI telegram collision	DALI short-circuit	Additional function	Function Burn-in	Device monitoring	Fault ballast	Fault lamp
86	56		■		■		■	■	
87	57		■		■		■	■	■
88	58		■		■	■			
89	59		■		■	■			■
90	5A		■		■	■		■	
91	5B		■		■	■		■	■
92	5C		■		■	■	■		
93	5D		■		■	■	■		■
94	5E		■		■	■	■	■	
95	5F		■		■	■	■	■	■
96	60		■	■					
97	61		■	■					■
98	62		■	■				■	
99	63		■	■				■	■
100	64		■	■			■		
101	65		■	■			■		■
102	66		■	■			■	■	
103	67		■	■			■	■	■
104	68		■	■		■			
105	69		■	■		■			■
106	6A		■	■		■		■	
107	6B		■	■		■		■	■
108	6C		■	■		■	■		
109	6D		■	■		■	■		■
110	6E		■	■		■	■	■	
111	6F		■	■		■	■	■	■
112	70		■	■	■				
113	71		■	■	■				■
114	72		■	■	■			■	
115	73		■	■	■			■	■
116	74		■	■	■		■		
117	75		■	■	■		■		■
118	76		■	■	■		■	■	
119	77		■	■	■		■	■	■
120	78		■	■	■	■			
121	79		■	■	■	■			■
122	7A		■	■	■	■		■	
123	7B		■	■	■	■		■	■
124	7C		■	■	■	■	■		
125	7D		■	■	■	■	■		■
126	7E		■	■	■	■	■	■	
127	7F		■	■	■	■	■	■	■
128	80	■							
129	81	■							■
130	82	■						■	
131	83	■						■	■
132	84	■					■		
133	85	■					■		■
134	86	■					■	■	
135	87	■					■	■	■
136	88	■				■			
137	89	■				■			■
138	8 A	■				■		■	
139	8B	■				■		■	■
140	8C	■				■	■		
141	8D	■				■	■		■
142	8E	■				■	■	■	
143	8F	■				■	■	■	■
144	90	■			■				
145	91	■			■				■
146	92	■			■			■	
147	93	■			■			■	■
148	94	■			■		■		
149	95	■			■		■		■
150	96	■			■		■	■	
151	97	■			■		■	■	■
152	98	■			■	■			
153	99	■			■	■			■
154	9A	■			■	■		■	
155	9B	■			■	■		■	■
156	9C	■			■	■	■		
157	9D	■			■	■	■		■
158	9E	■			■	■	■	■	
159	9F	■			■	■	■	■	■
160	A0	■		■					
161	A1	■		■					■
162	A2	■		■				■	
163	A3	■		■				■	■
164	A4	■		■			■		
165	A5	■		■			■		■
166	A6	■		■			■	■	
167	A7	■		■			■	■	■
168	A8	■		■		■			
169	A9	■		■		■			■
170	AA	■		■		■		■	
171	DOWN	□		□		□		□	□

Bit No.		7	6	5	4	3	2	1	0
Decimalcommunication object value	Hexadecimal communication object value	Disable sending of fault alarm[1] DALI device available[2]	DALI telegram collision	DALI short-circuit	Additional function	Function Burn-in	Device monitoring	Fault ballast	Fault lamp
172	AC	■		■		■	■		
173	AD	■		■		■	■		■
174	AE	■		■		■	■	■	
175	AF	■		■		■	■	■	■
176	B0	■		■	■				
177	B1	■		■	■				■
178	B2	■		■	■			■	
179	B3	■		■	■			■	■
180	B4	■		■	■		■		
181	B5	■		■	■		■		■
182	B6	■		■	■		■	■	
183	B7	■		■	■		■	■	■
184	B8	■		■	■	■			
185	B9	■		■	■	■			■
186	BA	■		■	■	■		■	
187	BB	■		■	■	■		■	■
188	BC	■		■	■	■	■		
189	BD	■		■	■	■	■		■
190	BE	■		■	■	■	■	■	
191	BF	■		■	■	■	■	■	■
192	C0	■	■						
193	C1	■	■						■
194	C2	■	■					■	
195	C3	■	■					■	■
196	C4	■	■				■		
197	C5	■	■				■		■
198	C6	■	■				■	■	
199	C7	■	■				■	■	■
200	C8	■	■			■			
201	C9	■	■			■			■
202	CA	■	■			■		■	
203	CB	■	■			■		■	■
204	CC	■	■			■	■		
205	CD	■	■			■	■		■
206	CE	■	■			■	■	■	
207	CF	■	■			■	■	■	■
208	D0	■	■		■				
209	D1	■	■		■				■
210	D2	■	■		■			■	
211	D3	■	■		■			■	■
212	D4	■	■		■		■		
213	D5	■	■		■		■		■
214	D6	■	■		■		■	■	
215	D7	■	■		■		■	■	■
216	D8	■	■		■	■			
217	D9	■	■		■	■			■
218	DA	■	■		■	■		■	
219	DB	■	■		■	■		■	■
220	DC	■	■		■	■	■		
221	DD	■	■		■	■	■		■
222	DE	■	■		■	■	■	■	
223	DF	■	■		■	■	■	■	■
224	E0	■	■	■					
225	E1	■	■	■					■
226	E2	■	■	■				■	
227	E3	■	■	■				■	■
228	E4	■	■	■			■		
229	E5	■	■	■			■		■
230	E6	■	■	■			■	■	
231	E7	■	■	■			■	■	■
232	E8	■	■	■		■			
233	E9	■	■	■		■			■
234	EA	■	■	■		■		■	
235	EB	■	■	■		■		■	■
236	EC	■	■	■		■	■		
237	ED	■	■	■		■	■		■
238	EE	■	■	■		■	■	■	
239	EF	■	■	■		■	■	■	■
240	F0	■	■	■	■				
241	F1	■	■	■	■				■
242	F2	■	■	■	■			■	
243	F3	■	■	■	■			■	■
244	F4	■	■	■	■		■		
245	F5	■	■	■	■		■		■
246	F6	■	■	■	■		■	■	
247	F7	■	■	■	■		■	■	■
248	F8	■	■	■	■	■			
249	F9	■	■	■	■	■			■
250	FA	■	■	■	■	■		■	
251	FB	■	■	■	■	■		■	■
252	FC	■	■	■	■	■	■		
253	FD	■	■	■	■	■	■		■
254	FE	■	■	■	■	■	■	■	
255	FF	■	■	■	■	■	■	■	■

■ = Value 1, applicable; empty = Value 0, not applicable

[1] group orientated

[2] device based

A.3 Code table *Request diagnostics* (No. 7)

With the 1 byte communication object *Request diagnostics*, the diagnostics information of the communication object No. 6 *Diagnostics* is requested.

The following code table shows the relationship between the value of the communication object and the DALI devices or the lighting group:

Bit No.		7	6	5	4	3	2	1	0		
Decimal communication object value	Hexadecimal communication object value	Not defined	DALI device/ lighting group	Binary code						No. DALI device	No. lighting group
0	00									1	
1	01								■	2	
2	02							■		3	
3	03							■	■	4	
4	04						■			5	
5	05						■		■	6	
6	06						■	■		7	
7	07						■	■	■	8	
8	08					■				9	
9	09					■			■	10	
10	0A					■		■		11	
11	0B					■		■	■	12	
12	0C					■	■			13	
13	0D					■	■		■	14	
14	0E					■	■	■		15	
15	0F					■	■	■	■	16	
16	10				■					17	
17	11				■				■	18	
18	12				■			■		19	
19	13				■			■	■	20	
20	14				■		■			21	
21	15				■		■		■	22	
22	16				■		■	■		23	
23	17				■		■	■	■	24	
24	18				■	■				25	
25	19				■	■			■	26	
26	1A				■	■		■		27	
27	1B				■	■		■	■	28	
28	1C				■	■	■			29	
29	1D				■	■	■		■	30	
30	1E				■	■	■	■		31	
31	1F				■	■	■	■	■	32	
32	20			■						33	
33	21			■					■	34	
34	22			■				■		35	
35	23			■				■	■	36	
36	24			■			■			37	
37	25			■			■		■	38	
38	26			■			■	■		39	
39	27			■			■	■	■	40	

Bit No.		7	6	5	4	3	2	1	0		
Decimal communication object value	Hexadecimal communication object value	Not defined	DALI device/ lighting group	Binary code						No. DALI device	No. lighting group
40	28			■		■				41	
41	29			■		■			■	42	
42	2A			■		■		■		43	
43	2B			■		■		■	■	44	
44	2C			■		■	■			45	
45	2D			■		■	■		■	46	
46	2E			■		■	■	■		47	
47	2F			■		■	■	■	■	48	
48	30			■	■					49	
49	31			■	■				■	50	
50	32			■	■			■		51	
51	33			■	■			■	■	52	
52	34			■	■		■			53	
53	35			■	■		■		■	54	
54	36			■	■		■	■		55	
55	37			■	■		■	■	■	56	
56	38			■	■	■				57	
57	39			■	■	■			■	58	
58	3A			■	■	■		■		59	
59	3B			■	■	■		■	■	60	
60	3C			■	■	■	■			61	
61	3D			■	■	■	■		■	62	
62	3E			■	■	■	■	■		63	
63	3F			■	■	■	■	■	■	64	
64	40		■								1
65	41		■						■		2
66	42		■					■			3
67	43		■					■	■		4
68	44		■				■				5
69	45		■				■		■		6
70	46		■				■	■			7
71	47		■				■	■	■		8
72	48		■			■					9*)
73	49		■			■			■		10*)
74	4A		■			■		■			11*)
75	4B		■			■		■	■		12*)
76	4C		■			■	■				13*)
77	4D		■			■	■		■		14*)
78	4E		■			■	■	■			15*)
79	4F		■			■	■	■	■		16*)

■ = value 1, applicable

empty = value 0, not applicable

*) The surface mounted DALI Light Controller has only 8 lighting groups

A.4 Table of fading times *Fade time* (No. 8)

Using the communication object *Fade time (DALI format)* or *(KNX format)*, it is possible that the DALI fading time as defined in the DALI standard EN 62386-102 can be transferred via the DALI control line on the KNX, so that the intended DALI devices use the DALI fading times. In DALI format, the dimming time can be sent directly on the KNX as one of the 16 possible DALI values. Here the value of the communication object corresponds with one of the time values (Fade times) in the DALI standard. The individual values can be found in the following table.

Alternatively, a time value in multiples of 100 ms (DPT 7.0004) can be sent as a KNX value. In this case, the received value is converted to the next possible DALI value. It is rounded off mathematically. The values available in DALI can be found on the following table. Times exceeding 7725.1 ms are converted to 90.5 s (maximum DALI value).

The option t*ime for dimming changeable via bus* for the lighting groups can be selected in different parameter windows and parameters, e.g. in Parameter window Gx Group, page 63, under the parameter *Dimming speed, time for 0...100 %*.

The telegram values 0 to 15 correspond to the following DALI fading times and correspond to the parameter settings of the *DALI format*:

Telegram value DALI format) in s Non DTP	**Telegram value (KNX format) in 100 ms DPT 7.004**	**Active fading time [s] to DIN EN 62386-102**
0	0…3	jump to
1	4…8	0.7
2	9…12	1.0
3	13…17	1.4
4	18…24	2.0
5	25…34	2.8
6	35…48	4.0
7	49…68	5.7
8	69…96	8.0
9	97…136	11.3
10	137…193	16.0
11	194…273	22.6
12	274…386	32.0
13	387…546	45.3
14	547…772	64.0
15	>773	90.5
> 15	-	no reaction, is not transferred to DALI

A.5 Code table *Status sensors* (No. 9)

The status of the 4 light sensors is visible with this communication object. If a light sensor provides a changed sensor value within a time of 5 seconds, the DALI Light Controller assumes that a light sensor is not connected or the light sensor is defective.

A missing sensor signal is indicated by a 0 in the corresponding bit of the communication object *Status sensors* (No. 9).

The lowest bit (bit number 0) indicates the status of light sensor A (1). Bit number 3 indicates the status of light sensor H (4).

The following code table shows you the status of all light sensors based on the hexadecimal or decimal values read from the communication object *Status sensors*.

Bit No.		7	6	5	4	3	2	1	0
Decimal communication object value	Hexadecimal communication object value	Light sensor H*)	Light sensor G*)	Light sensor F*)	Light sensor E*)	Light sensor D	Light sensor C	Light sensor B	Light sensor A
0	00								
1	01								■
2	02							■	
3	03							■	■
4	04						■		
5	05						■		■
6	06						■	■	
7	07						■	■	■
8	08					■			
9	09					■			■
10	0A					■		■	
11	0B					■		■	■
12	0C					■	■		
13	0D					■	■		■
14	0E					■	■	■	
15	0F					■	■	■	■
16	10				■				
17	11				■				■
18	12				■			■	
19	13				■			■	■
20	14				■		■		
21	15				■		■		■
22	16				■		■	■	
23	17				■		■	■	■
24	18				■	■			
25	19				■	■			■
26	1A				■	■		■	
27	1B				■	■		■	■
28	1C				■	■	■		
29	1D				■	■	■		■
30	1E				■	■	■	■	
31	1F				■	■	■	■	■
32	20			■					
33	21			■					■
34	22			■				■	
35	23			■				■	■
36	24			■			■		
37	25			■			■		■
38	26			■			■	■	
39	27			■			■	■	■
40	28			■		■			
41	29			■		■			■
42	2A			■		■		■	
43	2B			■		■		■	■
44	2C			■		■	■		
45	2D			■		■	■		■
46	2E			■		■	■	■	
47	2F			■		■	■	■	■
48	30			■	■				
49	31			■	■				■
50	32			■	■			■	
51	33			■	■			■	■
52	34			■	■		■		
53	35			■	■		■		■
54	36			■	■		■	■	
55	37			■	■		■	■	■
56	38			■	■	■			
57	39			■	■	■			■
58	3A			■	■	■		■	
59	3B			■	■	■		■	■
60	3C			■	■	■	■		
61	3D			■	■	■	■		■
62	3E			■	■	■	■	■	
63	3F			■	■	■	■	■	■
64	40		■						
65	41		■						■
66	42		■					■	
67	43		■					■	■
68	44		■				■		
69	45		■				■		■
70	46		■				■	■	
71	47		■				■	■	■
72	48		■			■			
73	49		■			■			■
74	4A		■			■		■	
75	4B		■			■		■	■
76	4C		■			■	■		
77	4D		■			■	■		■
78	4E		■			■	■	■	
79	4F		■			■	■	■	■
80	50		■		■				
81	51		■		■				■
82	52		■		■			■	
83	53		■		■			■	■
84	54		■		■		■		
85	55		■		■		■		■

Bit No.		7	6	5	4	3	2	1	0
Decimal communication object value	Hexadecimal communication object value	Light sensor H*)	Light sensor G*)	Light sensor F*)	Light sensor E*)	Light sensor D	Light sensor C	Light sensor B	Light sensor A
86	56		■		■		■	■	
87	57		■		■		■	■	■
88	58		■		■	■			
89	59		■		■	■			■
90	5A		■		■	■		■	
91	5B		■		■	■		■	■
92	5C		■		■	■	■		
93	5D		■		■	■	■		■
94	5E		■		■	■	■	■	
95	5F		■		■	■	■	■	■
96	60		■	■					
97	61		■	■					■
98	62		■	■				■	
99	63		■	■				■	■
100	64		■	■			■		
101	65		■	■			■		■
102	66		■	■			■	■	
103	67		■	■			■	■	■
104	68		■	■		■			
105	69		■	■		■			■
106	6A		■	■		■		■	
107	6B		■	■		■		■	■
108	6C		■	■		■	■		
109	6D		■	■		■	■		■
110	6E		■	■		■	■	■	
111	6F		■	■		■	■	■	■
112	70		■	■	■				
113	71		■	■	■				■
114	72		■	■	■			■	
115	73		■	■	■			■	■
116	74		■	■	■		■		
117	75		■	■	■		■		■
118	76		■	■	■		■	■	
119	77		■	■	■		■	■	■
120	78		■	■	■	■			
121	79		■	■	■	■			■
122	7A		■	■	■	■		■	
123	7B		■	■	■	■		■	■
124	7C		■	■	■	■	■		
125	7D		■	■	■	■	■		■
126	7E		■	■	■	■	■	■	
127	7F		■	■	■	■	■	■	■
128	80	■							
129	81	■							■
130	82	■						■	
131	83	■						■	■
132	84	■					■		
133	85	■					■		■
134	86	■					■	■	
135	87	■					■	■	■
136	88	■				■			
137	89	■				■			■
138	8 A	■				■		■	
139	8B	■				■		■	■
140	8C	■				■	■		
141	8D	■				■	■		■
142	8E	■				■	■	■	
143	8F	■				■	■	■	■
144	90	■			■				
145	91	■			■				■
146	92	■			■			■	
147	93	■			■			■	■
148	94	■			■		■		
149	95	■			■		■		■
150	96	■			■		■	■	
151	97	■			■		■	■	■
152	98	■			■	■			
153	99	■			■	■			■
154	9A	■			■	■		■	
155	9B	■			■	■		■	■
156	9C	■			■	■	■		
157	9D	■			■	■	■		■
158	9E	■			■	■	■	■	
159	9F	■			■	■	■	■	■
160	A0	■		■					
161	A1	■		■					■
162	A2	■		■				■	
163	A3	■		■				■	■
164	A4	■		■			■		
165	A5	■		■			■		■
166	A6	■		■			■	■	
167	A7	■		■			■	■	■
168	A8	■		■		■			
169	A9	■		■		■			■
170	AA	■		■		■		■	
171	DOW	■		■		■		■	■

Bit No.		7	6	5	4	3	2	1	0
Decimal communication object value	Hexadecimal communication object value	Light sensor H*)	Light sensor G*)	Light sensor F*)	Light sensor E*)	Light sensor D	Light sensor C	Light sensor B	Light sensor A
172	AC	■		■		■	■		
173	AD	■		■		■	■		■
174	AE	■		■		■	■	■	
175	AF	■		■		■	■	■	■
176	B0	■		■	■				
177	B1	■		■	■				■
178	B2	■		■	■			■	
179	B3	■		■	■			■	■
180	B4	■		■	■		■		
181	B5	■		■	■		■		■
182	B6	■		■	■		■	■	
183	B7	■		■	■		■	■	■
184	B8	■		■	■	■			
185	B9	■		■	■	■			■
186	BA	■		■	■	■		■	
187	BB	■		■	■	■		■	■
188	BC	■		■	■	■	■		
189	BD	■		■	■	■	■		■
190	BE	■		■	■	■	■	■	
191	BF	■		■	■	■	■	■	■
192	C0	■	■						
193	C1	■	■						■
194	C2	■	■					■	
195	C3	■	■					■	■
196	C4	■	■				■		
197	C5	■	■				■		■
198	C6	■	■				■	■	
199	C7	■	■				■	■	■
200	C8	■	■			■			
201	C9	■	■			■			■
202	CA	■	■			■		■	
203	CB	■	■			■		■	■
204	CC	■	■			■	■		
205	CD	■	■			■	■		■
206	CE	■	■			■	■	■	
207	CF	■	■			■	■	■	■
208	D0	■	■		■				
209	D1	■	■		■				■
210	D2	■	■		■			■	
211	D3	■	■		■			■	■
212	D4	■	■		■		■		
213	D5	■	■		■		■		■
214	D6	■	■		■		■	■	
215	D7	■	■		■		■	■	■
216	D8	■	■		■	■			
217	D9	■	■		■	■			■
218	DA	■	■		■	■		■	
219	DB	■	■		■	■		■	■
220	DC	■	■		■	■	■		
221	DD	■	■		■	■	■		■
222	DE	■	■		■	■	■	■	
223	DF	■	■		■	■	■	■	■
224	E0	■	■	■					
225	E1	■	■	■					■
226	E2	■	■	■				■	
227	E3	■	■	■				■	■
228	E4	■	■	■			■		
229	E5	■	■	■			■		■
230	E6	■	■	■			■	■	
231	E7	■	■	■			■	■	■
232	E8	■	■	■		■			
233	E9	■	■	■		■			■
234	EA	■	■	■		■		■	
235	EB	■	■	■		■		■	■
236	EC	■	■	■		■	■		
237	ED	■	■	■		■	■		■
238	EE	■	■	■		■	■	■	
239	EF	■	■	■		■	■	■	■
240	F0	■	■	■	■				
241	F1	■	■	■	■				■
242	F2	■	■	■	■			■	
243	F3	■	■	■	■			■	■
244	F4	■	■	■	■		■		
245	F5	■	■	■	■		■		■
246	F6	■	■	■	■		■	■	
247	F7	■	■	■	■		■	■	■
248	F8	■	■	■	■	■			
249	F9	■	■	■	■	■			■
250	FA	■	■	■	■	■		■	
251	FB	■	■	■	■	■		■	■
252	FC	■	■	■	■	■	■		
253	FD	■	■	■	■	■	■		■
254	FE	■	■	■	■	■	■	■	
255	FF	■	■	■	■	■	■	■	■

■ = Value 1, light sensor provides sensor value;

empty = value 0, light sensor does not provide sensor values, no sensor connected or sensor defective

*) The surface mounted DALI Light Controller has only 4 light sensors

A.6 Code table *Fault group/device code* (No. 19)

Via communication object *Fault group/device code* there is a possibility to represent coded information concerning the malfunction state of the lighting group or the individual device on the KNX.

For further information see communication object No. 19, page 133

Lamp and ballast faults are sent in a 1 byte communication object together with the number of the DALI device or the lighting group.

Whether the communication object contains the fault status of the lighting group or of an individual DALI device is set in Parameter window Status - Central, page 57 via the parameter *Send number of the failed group or failed device*. This parameter is visible, if the parameter *"Fault Group/Device Code" enable encoded fault message* has been parameterized with *yes* and the communication object has been enabled.

The values read via the communication object can be interpreted as follows:

Group-orientated setting:

No fault	Value	0…15	+1	= Number of the lighting group
Lamp fault	Value	64…79	-63	= Number of the lighting group
Ballast fault	Value	128…143	-127	= Number of the lighting group

Note
The surface mounted DALI Light Controller uses only the first 8 lighting groups

Device-based setting:

No fault	Value	0…63	+1	= Number of DALI device (ballast No.)
Lamp fault	Value	64…127	-63	= Number of DALI device (ballast No.)
Ballast fault	Value	128…191	-127	= Number of DALI device (ballast No.)

The following code table shows the relationship between the DALI device and/or the lighting group and its fault status (lamp or ballast fault).

Initially the code table is shown for the fault status of a lighting group:

Bit No.		7	6	5	4	3	2	1	0		
Decimal communication object value	Hexadecimal communication object value	Fault ballast	Fault lamp	Lighting group binary code						No. lighting group	Lighting group status
There is no fault.											
0	00									1	There is no fault.
1	01								■	2	
2	02							■		3	
3	03							■	■	4	
4	04						■			5	
5	05						■		■	6	
6	06						■	■		7	
7	07						■	■	■	8	
8	08					■				9*)	
9	09					■			■	10*)	
10	0A					■		■		11*)	
11	0B					■		■	■	12*)	
12	0C					■	■			13*)	
13	0D					■	■		■	14*)	
14	0E					■	■	■		15*)	
15	0F					■	■	■	■	16*)	
There is a lamp fault.											
64	40		■							1	There is a lamp fault.
65	41		■						■	2	
66	42		■					■		3	
67	43		■					■	■	4	
68	44		■				■			5	
69	45		■				■		■	6	
70	46		■				■	■		7	
71	47		■				■	■	■	8	
72	48		■			■				9*)	
73	49		■			■			■	10*)	
74	4A		■			■		■		11*)	
75	4B		■			■		■	■	12*)	
76	4C		■			■	■			13*)	
77	4D		■			■	■		■	14*)	
78	4E		■			■	■	■		15*)	
79	4F		■			■	■	■	■	16*)	

Bit No.		7	6	5	4	3	2	1	0		
Decimal communication object value	Hexadecimal communication object value	Fault ballast	Fault lamp	Lighting group binary code						No. lighting group	Lighting group status
There is a ballast fault.											
128	80	■								1	There is a ballast fault.
129	81	■							■	2	
130	82	■						■		3	
131	83	■						■	■	4	
132	84	■					■			5	
133	85	■					■		■	6	
134	86	■					■	■		7	
135	87	■					■	■	■	8	
136	88	■				■				9*)	
137	89	■				■			■	10*)	
138	8 A	■				■		■		11*)	
139	8B	■				■		■	■	12*)	
140	8C	■				■	■			13*)	
141	8D	■				■	■		■	14*)	
142	8E	■				■	■	■		15*)	
143	8F	■				■	■	■	■	16*)	
There is a ballast and lamp fault.											
192	C0	■	■							1	There is a ballast and lamp fault.
193	C1	■	■						■	2	
194	C2	■	■					■		3	
195	C3	■	■					■	■	4	
196	C4	■	■				■			5	
197	C5	■	■				■		■	6	
198	C6	■	■				■	■		7	
199	C7	■	■				■	■	■	8	
200	C8	■	■			■				9*)	
201	C9	■	■			■			■	10*)	
202	CA	■	■			■		■		11*)	
203	CB	■	■			■		■	■	12*)	
204	CC	■	■			■	■			13*)	
205	CD	■	■			■	■		■	14*)	
206	CE	■	■			■	■	■		15*)	
207	CF	■	■			■	■	■	■	16*)	

■ = value 1, applicable

empty = value 0, not applicable

*) The surface mounted DALI Light Controller uses only the first 8 lighting groups

The following code table shows the relationship between the value of the communication object and the fault state of a device:

Bit No.		7	6	5	4	3	2	1	0		
Decimal communication object value	Hexadecimal communication object value	Fault ballast	Fault lamp	DALI devices binary code						No. DALI device	State of the DALI devices
There is no fault.											
0	00									1	There is no fault.
1	01								■	2	
2	02							■		3	
3	03							■	■	4	
4	04						■			5	
5	05						■		■	6	
6	06						■	■		7	
7	07						■	■	■	8	
8	08					■				9	
9	09					■			■	10	
10	0A					■		■		11	
11	0B					■		■	■	12	
12	0C					■	■			13	
13	0D					■	■		■	14	
14	0E					■	■	■		15	
15	0F					■	■	■	■	16	
16	10				■					17	
17	11				■				■	18	
18	12				■			■		19	
19	13				■			■	■	20	
20	14				■		■			21	
21	15				■		■		■	22	
22	16				■		■	■		23	
23	17				■		■	■	■	24	
24	18				■	■				25	
25	19				■	■			■	26	
26	1A				■	■		■		27	
27	1B				■	■		■	■	28	
28	1C				■	■	■			29	
29	1D				■	■	■		■	30	
30	1E				■	■	■	■		31	
31	1F				■	■	■	■	■	32	
32	20			■						33	
33	21			■					■	34	
34	22			■				■		35	
35	23			■				■	■	36	
36	24			■			■			37	
37	25			■			■		■	38	
38	26			■			■	■		39	
39	27			■			■	■	■	40	
40	28			■		■				41	
41	29			■		■			■	42	
42	2A			■		■		■		43	
43	2B			■		■		■	■	44	
44	2C			■		■	■			45	
45	2D			■		■	■		■	46	
46	2E			■		■	■	■		47	
47	2F			■		■	■	■	■	48	
48	30			■	■					49	
49	31			■	■				■	50	
50	32			■	■			■		51	
51	33			■	■			■	■	52	
52	34			■	■		■			53	
53	35			■	■		■		■	54	
54	36			■	■		■	■		55	
55	37			■	■		■	■	■	56	
56	38			■	■	■				57	
57	39			■	■	■			■	58	
58	3A			■	■	■		■		59	
59	3B			■	■	■		■	■	60	
60	3C			■	■	■	■			61	
61	3D			■	■	■	■		■	62	
62	3E			■	■	■	■	■		63	
63	3F			■	■	■	■	■	■	64	

Bit No.		7	6	5	4	3	2	1	0		
Decimal communication object value	Hexadecimal communication object value	Fault ballast	Fault lamp	DALI devices binary code						No. DALI device	State of the DALI devices
There is a lamp fault.											
64	40		■							1	There is a lamp fault.
65	41		■						■	2	
66	42		■					■		3	
67	43		■					■	■	4	
68	44		■				■			5	
69	45		■				■		■	6	
70	46		■				■	■		7	
71	47		■				■	■	■	8	
72	48		■			■				9	
73	49		■			■			■	10	
74	4A		■			■		■		11	
75	4B		■			■		■	■	12	
76	4C		■			■	■			13	
77	4D		■			■	■		■	14	
78	4E		■			■	■	■		15	
79	4F		■			■	■	■	■	16	
80	50		■		■					17	
81	51		■		■				■	18	
82	52		■		■			■		19	
83	53		■		■			■	■	20	
84	54		■		■		■			21	
85	55		■		■		■		■	22	
86	56		■		■		■	■		23	
87	57		■		■		■	■	■	24	
88	58		■		■	■				25	
89	59		■		■	■			■	26	
90	5A		■		■	■		■		27	
91	5B		■		■	■		■	■	28	
92	5C		■		■	■	■			29	
93	5D		■		■	■	■		■	30	
94	5E		■		■	■	■	■		31	
95	5F		■		■	■	■	■	■	32	
96	60		■	■						33	
97	61		■	■					■	34	
98	62		■	■				■		35	
99	63		■	■				■	■	36	
100	64		■	■			■			37	
101	65		■	■			■		■	38	
102	66		■	■			■	■		39	
103	67		■	■			■	■	■	40	
104	68		■	■		■				41	
105	69		■	■		■			■	42	
106	6A		■	■		■		■		43	
107	6B		■	■		■		■	■	44	
108	6C		■	■		■	■			45	
109	6D		■	■		■	■		■	46	
110	6E		■	■		■	■	■		47	
111	6F		■	■		■	■	■	■	48	
112	70		■	■	■					49	
113	71		■	■	■				■	50	
114	72		■	■	■			■		51	
115	73		■	■	■			■	■	52	
116	74		■	■	■		■			53	
117	75		■	■	■		■		■	54	
118	76		■	■	■		■	■		55	
119	77		■	■	■		■	■	■	56	
120	78		■	■	■	■				57	
121	79		■	■	■	■			■	58	
122	7A		■	■	■	■		■		59	
123	7B		■	■	■	■		■	■	60	
124	7C		■	■	■	■	■			61	
125	7D		■	■	■	■	■		■	62	
126	7E		■	■	■	■	■	■		63	
127	7F		■	■	■	■	■	■	■	64	

■ = value 1, applicable
empty = value 0, not applicable

Bit No.		7	6	5	4	3	2	1	0		
Decimal communication object value	Hexadecimal communication object value	Fault ballast	Fault lamp	DALI devices binary code						No. DALI device	State of the DALI devices
There is a ballast fault.											
128	80	■								1	There is a ballast fault.
129	81	■							■	2	
130	82	■						■		3	
131	83	■						■	■	4	
132	84	■					■			5	
133	85	■					■		■	6	
134	86	■					■	■		7	
135	87	■					■	■	■	8	
136	88	■				■				9	
137	89	■				■			■	10	
138	8 A	■				■		■		11	
139	8B	■				■		■	■	12	
140	8C	■				■	■			13	
141	8D	■				■	■		■	14	
142	8E	■				■	■	■		15	
143	8F	■				■	■	■	■	16	
144	90	■			■					17	
145	91	■			■				■	18	
146	92	■			■			■		19	
147	93	■			■			■	■	20	
148	94	■			■		■			21	
149	95	■			■		■		■	22	
150	96	■			■		■	■		23	
151	97	■			■		■	■	■	24	
152	98	■			■	■				25	
153	99	■			■	■			■	26	
154	9A	■			■	■		■		27	
155	9B	■			■	■		■	■	28	
156	9C	■			■	■	■			29	
157	9D	■			■	■	■		■	30	
158	9E	■			■	■	■	■		31	
159	9F	■			■	■	■	■	■	32	
160	A0	■		■						33	
161	A1	■		■					■	34	
162	A2	■		■				■		35	
163	A3	■		■				■	■	36	
164	A4	■		■			■			37	
165	A5	■		■			■		■	38	
166	A6	■		■			■	■		39	
167	A7	■		■			■	■	■	40	
168	A8	■		■		■				41	
169	A9	■		■		■			■	42	
170	AA	■		■		■		■		43	
171	DOW	■		■		■		■	■	44	
172	AC	■		■		■	■			45	
173	AD	■		■		■	■		■	46	
174	AE	■		■		■	■	■		47	
175	AF	■		■		■	■	■	■	48	
176	B0	■		■	■					49	
177	B1	■		■	■				■	50	
178	B2	■		■	■			■		51	
179	B3	■		■	■			■	■	52	
180	B4	■		■	■		■			53	
181	B5	■		■	■		■		■	54	
182	B6	■		■	■		■	■		55	
183	B7	■		■	■		■	■	■	56	
184	B8	■		■	■	■				57	
185	B9	■		■	■	■			■	58	
186	BA	■		■	■	■		■		59	
187	BB	■		■	■	■		■	■	60	
188	BC	■		■	■	■	■			61	
189	BD	■		■	■	■	■		■	62	
190	BE	■		■	■	■	■	■		63	
191	BF	■		■	■	■	■	■	■	64	

Bit No.		7	6	5	4	3	2	1	0		
Decimal communication object value	Hexadecimal communication object value	Fault ballast	Fault lamp	DALI devices binary code						No. DALI device	State of the DALI devices
There is a ballast and lamp fault.											
192	C0	■	■							1	There is a ballast and lamp fault.
193	C1	■	■						■	2	
194	C2	■	■					■		3	
195	C3	■	■					■	■	4	
196	C4	■	■				■			5	
197	C5	■	■				■		■	6	
198	C6	■	■				■	■		7	
199	C7	■	■				■	■	■	8	
200	C8	■	■			■				9	
201	C9	■	■			■			■	10	
202	CA	■	■			■		■		11	
203	CB	■	■			■		■	■	12	
204	CC	■	■			■	■			13	
205	CD	■	■			■	■		■	14	
206	CE	■	■			■	■	■		15	
207	CF	■	■			■	■	■	■	16	
208	D0	■	■		■					17	
209	D1	■	■		■				■	18	
210	D2	■	■		■			■		19	
211	D3	■	■		■			■	■	20	
212	D4	■	■		■		■			21	
213	D5	■	■		■		■		■	22	
214	D6	■	■		■		■	■		23	
215	D7	■	■		■		■	■	■	24	
216	D8	■	■		■	■				25	
217	D9	■	■		■	■			■	26	
218	DA	■	■		■	■		■		27	
219	DB	■	■		■	■		■	■	28	
220	DC	■	■		■	■	■			29	
221	DD	■	■		■	■	■		■	30	
222	DE	■	■		■	■	■	■		31	
223	DF	■	■		■	■	■	■	■	32	
224	E0	■	■	■						33	
225	E1	■	■	■					■	34	
226	E2	■	■	■				■		35	
227	E3	■	■	■				■	■	36	
228	E4	■	■	■			■			37	
229	E5	■	■	■			■		■	38	
230	E6	■	■	■			■	■		39	
231	E7	■	■	■			■	■	■	40	
232	E8	■	■	■		■				41	
233	E9	■	■	■		■			■	42	
234	EA	■	■	■		■		■		43	
235	EB	■	■	■		■		■	■	44	
236	EC	■	■	■		■	■			45	
237	ED	■	■	■		■	■		■	46	
238	EE	■	■	■		■	■	■		47	
239	EF	■	■	■		■	■	■	■	48	
240	F0	■	■	■	■					49	
241	F1	■	■	■	■				■	50	
242	F2	■	■	■	■			■		51	
243	F3	■	■	■	■			■	■	52	
244	F4	■	■	■	■		■			53	
245	F5	■	■	■	■		■		■	54	
246	F6	■	■	■	■		■	■		55	
247	F7	■	■	■	■		■	■	■	56	
248	F8	■	■	■	■	■				57	
249	F9	■	■	■	■	■			■	58	
250	FA	■	■	■	■	■		■		59	
251	FB	■	■	■	■	■		■	■	60	
252	FC	■	■	■	■	■	■			61	
253	FD	■	■	■	■	■	■		■	62	
254	FE	■	■	■	■	■	■	■		63	
255	FF	■	■	■	■	■	■	■	■	64	

■ = value 1, applicable

empty = value 0, not applicable

A.7 Code table *8 bit scene* (No. 212)

This code table indicates the telegram code for an 8 bit scene in hexadecimal and binary code.

Note
Of the 64 possible scenes in KNX only the first 14 scenes are available with the DLR/A.

When retrieving or storing a scene, the following 8 bit values are sent.

Bit No.		7	6	5	4	3	2	1	0		
Decimal communication object value	Hexadecimal communication object value	Recall/ store	Not defined	Scene binary code						Scene No.	recall scene
0	00									1	Recall
1	01								■	2	
2	02							■		3	
3	03							■	■	4	
4	04						■			5	
5	05						■		■	6	
6	06						■	■		7	
7	07						■	■	■	8	
8	08					■				9	
9	09					■			■	10	
10	0A					■		■		11	
11	0B					■		■	■	12	
12	0C					■	■			13	
13	0D					■	■		■	14	
64	40		■							1	Recall
65	41		■						■	2	
66	42		■					■		3	
67	43		■					■	■	4	
68	44		■				■			5	
69	45		■				■		■	6	
70	46		■				■	■		7	
71	47		■				■	■	■	8	
72	48		■			■				9	
73	49		■			■			■	10	
74	4A		■			■		■		11	
75	4B		■			■		■	■	12	
76	4C		■			■	■			13	
77	4D		■			■	■		■	14	

Bit No.		7	6	5	4	3	2	1	0		
Decimal communication object value	Hexadecimal communication object value	Fault ballast	Fault lamp	Scene binary code						Scene No.	Store scene
128	80	■								1	Save
129	81	■							■	2	
130	82	■						■		3	
131	83	■						■	■	4	
132	84	■					■			5	
133	85	■					■		■	6	
134	86	■					■	■		7	
135	87	■					■	■	■	8	
136	88	■				■				9	
137	89	■				■			■	10	
138	8 A	■				■		■		11	
139	8B	■				■		■	■	12	
140	8C	■				■	■			13	
141	8D	■				■	■		■	14	
192	C0	■	■							1	Save
193	C1	■	■						■	2	
194	C2	■	■					■		3	
195	C3	■	■					■	■	4	
196	C4	■	■				■			5	
197	C5	■	■				■		■	6	
198	C6	■	■				■	■		7	
199	C7	■	■				■	■	■	8	
200	C8	■	■			■				9	
201	C9	■	■			■			■	10	
202	CA	■	■			■		■		11	
203	CB	■	■			■		■	■	12	
204	CC	■	■			■	■			13	
205	CD	■	■			■	■		■	14	

■ = value 1, applicable
empty = value 0, not applicable

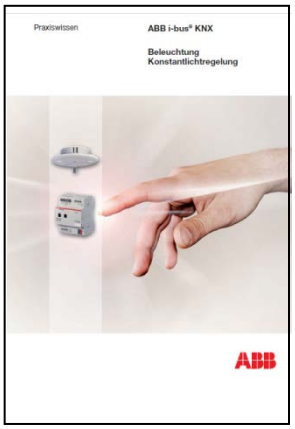
A.8 Further information about DALI

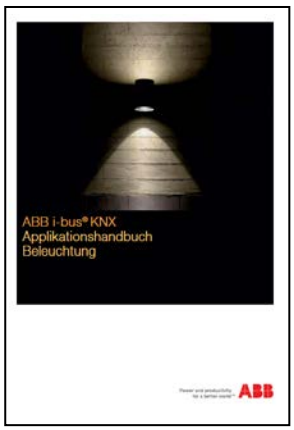
Further information about DALI and its possibilities in lighting technology can be found in our manuals:

DALI, manual from DALI AG which is part of the ZVEI:

This manual and further information about DALI can be found on the DALI AG Internet page under www.dali-ag.org.

Further information about KNX and lighting technology can be found in the application manual *Lighting and Practical constant lighting control:*





A.9 Ordering details

Short description	Description	Order No.	bbn 40 16779 EAN	Price group	Weight 1 pc. [kg]	Pack unit [pc.]
DLR/A 4.8.1.1	Light Controller, 4f, AP	2CDG 110 172 R0011	**88237 8**		0.66	1
DALI Gateways in the ABB i-bus® KNX range [1]						
DG/S 1.1	Single, MDRC	2CDG 110 026 R0011	**58583 5**		0.19	1
DG/S 8.1	8x, MDRC	2CDG 110 025 R0011	**58582 8**		0.2	1
DG/S 1.16.1	16 groups, MDRC	2CDG 110 103 R0011	**66950 4**		0.19	1
DGN/S 1.16.1	Emergency lighting 16 groups, MDRC	2CDG 110 103 R0011	**66950 4**		0.19	1
DLR/S 8.16.1M	Light Controller, 8f, MDRC	2CDG 110 103 R0011	**67656 4**		0.22	1

[1] For compact function description see DALI principles for the DLR/A, page 8.

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