ABB i-bus® KNX
DALI Light Controller DLR/S 8.16.1M
Product Manual

Power and productivity
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1 General

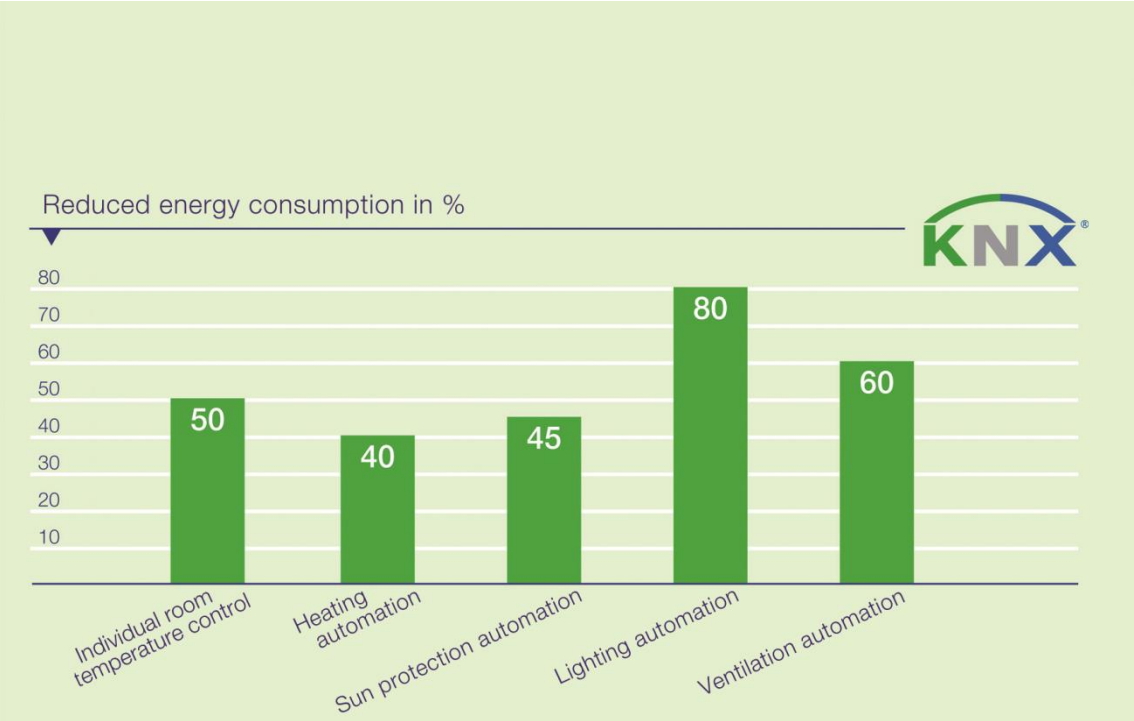
The ABB i-bus® KNX DALI Light Controller DLR/S combines both the internationally standardized and open standards for digital illumination control DALI (EN 62 386) and the installation system KNX (ISO/IEC 14 543-3 and EN 50 090) and, at the same time, allows energy-efficient, constant light control.

Up to 64 DALI devices can be connected to DALI output of the DLR/S. The 64 DALI devices can be individually addressed and allocated as required in up to 16 lighting groups. Control using KNX is implemented exclusively via these 16 lighting groups.
With eight light sensors, up to eight separate constant light controls are possible that additionally provide enhanced comfort and automatic energy conservation.

Constant light 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 detailed technical information relating to the function, installation and programming of the ABB i-bus® KNX DALI Light Controller DLR/S 8.16.1M and the corresponding Light Sensor LF/U 2.1. The use of the DLR/S is explained using examples.

This manual is divided into the following chapters:

- Chapter 1 General
- Chapter 2 Device technology
- Chapter 3 Start-up
- 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 of 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 website (*www.abb.com/knx).*

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

In addition, the Software Tool can be used for simplified setting of the control parameters for constant light control in the DALI Light Controller. No ETS is required for the Software Tool. However, Falcon Runtime (version 1.6 or higher and version 1.8 or higher for Windows 7) must be installed to set up a connection between the PC and KNX.

Note
When the Software Tool is connected to the DALI Light Controller, the function of the DALI devices is, at first, not influenced. Only when you switch to the configuration mode are the functions, such as Staircase lighting, Slave and Control, deactivated. The Block and Forced operation functions are by-passed, meaning that the DALI devices can be identified clearly for commissioning. However, the Block and Forced operation functions remain in the background and are reactivated on exiting the Software Tool. Nonetheless, the brightness value set in the Software Tool remains intact if Forced operation or Block is present. During the connection to the Software Tool, incoming KNX telegrams are executed. This also applies to the Staircase lighting, Slave and Control functions. The functions are deactivated again when the Software Tool is exited or when the DALI device is selected again in the Software Tool.

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.

Attention
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 to life and limb with inappropriate use.

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

1.2 Product and functional overview

The group-oriented ABB i-Bus® KNX DALI Light Controller DLR/S 8.16.1M is a modular installation device in Pro*M* design. Up to 64 DALI devices can be connected to a DALI output and can be controlled in 16 lighting groups. The DALI power source for the 64 DALI devices is integrated into the DLR/S.

Control using KNX is implemented exclusively via 16 lighting groups. Only the first 8 lighting groups can be used for direct constant light control combined with 8 Light Sensors LF/U 2.1. Using the *Slave* function, 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 lamp strip, to control 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 *Staircase lighting* function is available. As an option, constant light control can be combined with the *Staircase lighting* function.

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 polled (broadcast) together. This is also possible without previous commissioning (group assignment) via the KNX.

Information relating to a lamp and/or ballast fault is available individually for a lighting group or for a DALI device on the KNX. DALI fault messages can be disabled on the KNX with the assistance of a KNX communication object. Because of this disabling, the DLR/S can, for example, work together with the emergency lighting monitoring systems which disconnect the lamps from the DALI during an emergency lighting test. The resulting system-related ballast malfunction detected by the DLR/S is not reported.

Individual lighting groups can be switched or dimmed using manual control on the device. Furthermore, errors/faults in the lighting group are displayed.

The brightness value (0…100 %) of the ballast after ballast supply voltage recovery (power-on level) can be parameterized. The initial DALI address assignment occurs automatically via the DALI Light Controller. For this, when a DALI device is replaced and there is seamless DALI addressing, the new DALI device can be commissioned automatically without any aids. This function can be suppressed by a parameter in the application.

Readdressing of the DALI devices and the assignment of the 64 DALI devices into 16 lighting groups is implemented in the 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. Fault states of the individual DALI devices and/or lighting groups are represented graphically. Furthermore, commissioning of the constant light control is simplified. DALI addresses and group assignments can be deleted and DALI devices 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.

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/S or via communication object
- For every Light Controller, a brightness offset that can be activated for a second light strip via KNX
- 14 independent light scenes, which can be recalled or stored via 1 bit or 8 bit telegrams
- *Staircase lighting* function including warning

1.3 DALI principles for the DLR/S

ABB Stotz Kontakt GmbH currently has 4 KNX-DALI devices in the ABB i-bus® KNX range, for the integration of DALI interfaces in a KNX building installation. Independent of additional functions such as constant light control, every device has its strengths, which become obvious with the different project types.

The following table shows the fundamental technical differences between the DALI controls. This manual deals primarily with group-oriented DALI control that is supported in the DLR/S. 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 units	4 units	4 units	4 units	6 units	220 x 147 x 50 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	max. 16	A: 64 max. B: 64 max.	max. 64	max. 64	max. 64	max. 64
DALI addressing	not required	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 is possible when KNX voltage is connected. Gateway operating voltage for KNX programming is not required.

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

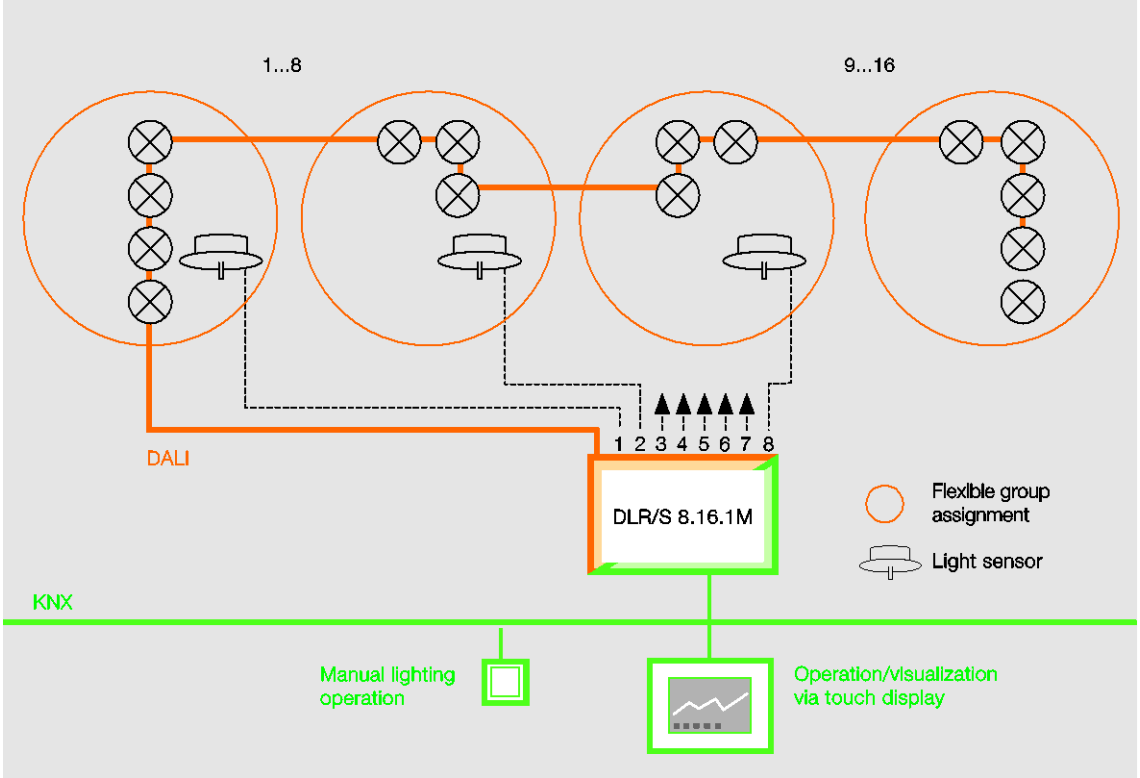
1.3.1 DALI group control

The ABB i-bus® KNX DALI Light Controller DLR/S 8.16.1M provides the option of individually addressing 64 DALI devices on a DALI output and making them available via 16 lighting groups on the KNX.
The advantage of this concept is that, at any time, the 64 DALI devices can be assigned to a lighting group individually and without a change to the installation. As a result, maximum flexibility is retained until final acceptance or when the room usage changes. At the same time, the programming effort in ETS is considerably reduced by the assignment of 64 individual devices to 16 lighting grouplighting groups. Furthermore, the programming effort can also be reduced using the copy and exchange function of lighting groups in the DLR/S.

The Light Sensors LF/U 2.1 required for constant light control can be assigned to one of the first 8 DALI lighting groups via ETS. The detected brightness is used in the DALI Light Controller for the 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/S or indirectly via the communication objects on the KNX.

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

The following diagram clarifies the function of the group-oriented DALI Light Controller DLR/S 8.16.1M:



Note
If a DALI device is assigned to several DALI groups, this is referred to as overlapping groups. This function is not supported.

2 Device technology

2CDC 071 076 S0009

DLR/S 8.16.1M

2CDC 071 018 F0008

LF/U 2.1

The ABB i-bus® KNX DALI Light Controller DLR/S 8.16.1M is a KNX modular installation device (MDRC) in Pro*M* design for installation in the distribution board on a 35 mm mounting rail.

The DALI Light Controller can, in conjunction with the application program *Control Dim Groups 8f DALI/1*, integrate devices with DALI interfaces into a KNX building installation. The connection to the KNX is implemented via a KNX connection terminal on the device shoulder.

The 8 sensor inputs for the Light Sensor LF/U, together with the first 8 lighting groups of the DALI Light Controller, can be used for a constant light control.

Up to 64 DALI devices can be connected to the DALI output. The 64 DALI devices should be assigned to 16 lighting groups with the ETS-independent Software Tool. Control of the 64 DALI devices via KNX is exclusively group-oriented.

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/S, a staircase lighting time curve can be set. Constant light control can be combined with a staircase lighting time curve, so that constant light control can be implemented during the staircase lighting time curve. The 16 lighting groups can be integrated into scenes as required. Using 1 bit or 8 bit KNX scene telegrams, 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 light control.

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

The DLR/S 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 operating voltage) must be applied. Should one of these voltage sources be absent, the DALI devices can no longer be controlled. The reaction of the DALI devices on voltage failure can be parameterized.

Individual lighting groups can be switched or dimmed using manual control on the device. Furthermore, the fault for every lighting group is indicated by a yellow LED on the DLR/S.

2.1 DLR/S 8.16.1M

2.1.1 Technical data DLR/S 8.16.1M

Supply	Light controller supply voltage	100…240 V AC (+10 %/-15 %) 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)]
	Current consumption KNX	Maximum 10 mA
	Power consumption via KNX	Maximum 210 mW
DALI output	Number of outputs	1 to EN 60 929 and DIN EN 62 386 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	16
	Distance between DLR/S and last DALI device Cable cross-section 0.50 mm² 0.75 mm² 1.00 mm² 1.50 mm²	 100 m[2)] 150 m[2)] 200 m[2)] 300 m[2)]
Sensor inputs	Light Sensor LF/U 2.1	For detailed information, see Light Sensor LF/U 2.1, page 18
	Number of inputs	8
	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	KNX connection terminal, 0.8 mm Ø, solid
	DALI outputs and mains voltage	Screw terminal: 0.2…2.5 m^{m2} fine stranded 0.2…4 mm² single core
	Tightening torque	Max. 0.6 Nm
	Light Sensor LF/U:	
	Wire end ferrule without/with plastic sleeve	Without 0.25…2.5 mm² / with 0.25…4 mm²
	TWIN ferrule	0.5…2.5 mm²
	Tightening torque	Max. 0.6 Nm
Brightness detection	Lighting control operating range	Optimized for 500 Lux. 200…1,200 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. 3,000 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/LED	For assignment of the physical address
	Button /LED	For switchover between manual operation and KNX operation
	Button	Switch to next lighting group
	Button	Switch ON or dim UP
	Button	Switch OFF or dim DOWN
	Button	Detect devices
	LED ON	Display for operation readiness
	LED DALI	DALI operating voltage display
	16 LED G1 … G16	Lighting group 1…16 display
Degree of protection	IP 54	Compliant to EN 60 529
Protection class	II	Compliant to EN 61 140
Isolation category	Overvoltage category	III to EN 60 664-1
	Pollution degree	2 to EN 60 664-1
	Atmospheric pressure	Atmosphere up to 2,000 m
KNX safety extra low voltage	SELV 24 V DC	
DALI voltage	Typical 16 V DC (9.5…22.5 V DC)	To DIN EN 60 929 and DIN 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	Power	-5 °C…+45 °C
	Storage	-25…+55 °C
	Transport	-25…+70 °C
Environmental conditions	Humidity	Maximum 95 %, no condensation allowed
Design	Modular installation device (MDRC)	Modular installation device, Pro*M*
	Dimensions	90 x 108 x 64.5 mm (H x W x D)
	Mounting width	6 x 18 mm modules
	Mounting depth	68 mm
Mounting	On 35 mm mounting rail	Compliant to EN 60 715
Installation position	Any	
Weight	0.26 kg	
Housing, color	Plastic housing, halogen-free, gray	
Approvals	KNX to EN 50 090-1, -2	Certification
	EN 62 386 (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 entire routed DALI control cable.
The maximum values are rounded off and relate to the resistance value. 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 light of the lamps. Not all the 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 light control in daily operation, deviations to the setpoint 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, people, 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 a CRO 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.

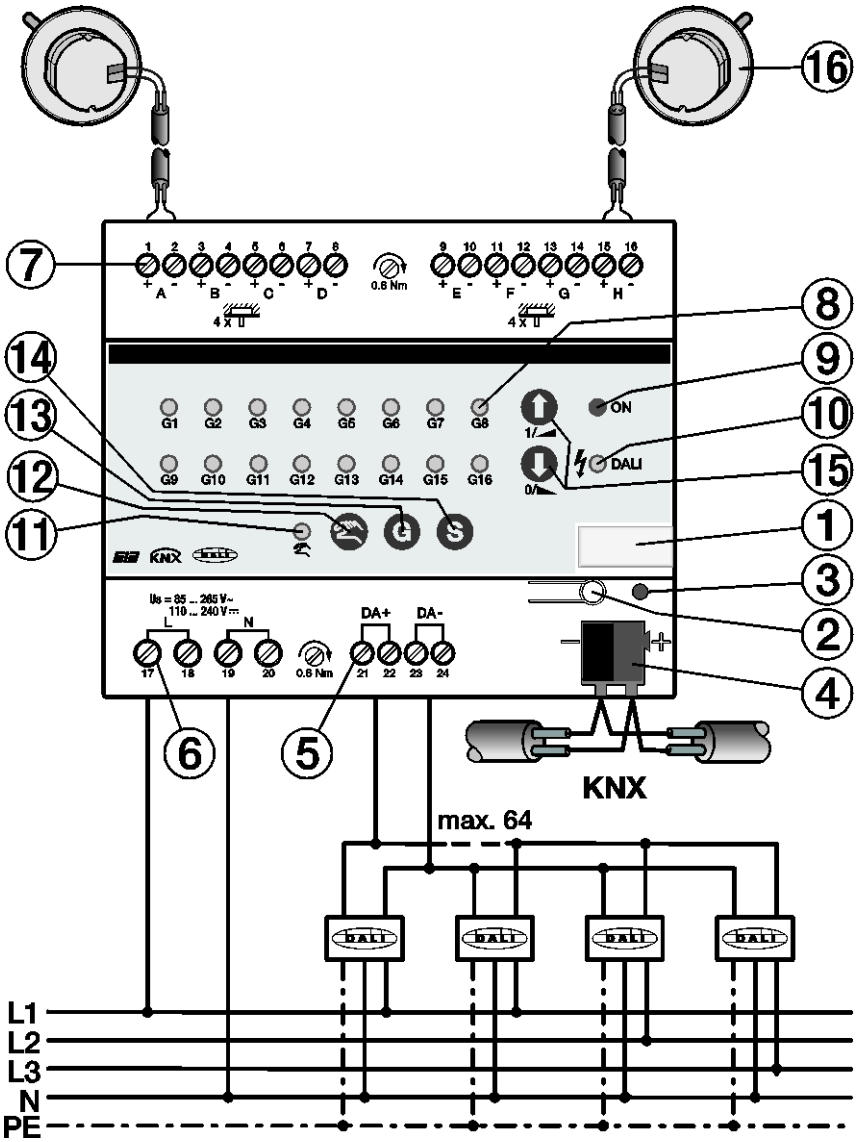
Note
The DALI gateway conforms to the SELV properties to IEC 60 364 4 41 (DIN VDE 0100 410). DALI does not need to feature SELV properties, and it is possible to route the DALI control lines together with the mains voltage on a multi-core cable. All-pole disconnection must be ensured in order to avoid dangerous touch voltages which originate from feedback from differing phase conductors. Installation must be performed so that both DALI lines and lines carrying mains voltage are disconnected when an area is disconnected.

Device type	Application	Max. number of communication objects	Max. number of group addresses	Max. number of associations
DLR/S 8.16.1M	Control Dim Groups 8f DALI/1*	212	254	255

* … = Current version number of the application. **Please refer the software information on our website for this purpose.**

Note
ETS and the current version of the device application are required for programming. Editing with the ETS2 is **not** possible! The current application can be found with the respective software information for download on the Internet at *www.abb.com/knx.* After the import to the ETS, the application can be found at *ABB/Illumination/Light Controller/Control Dim Groups 8f DALI/1*. The device does not support the locking function of a KNX device in ETS. If you use a *BCU code* to inhibit access to all the project devices, it has no effect on this device. Data can still be read and programmed.

2.1.2 Connection diagram DLR/S 8.16.1M



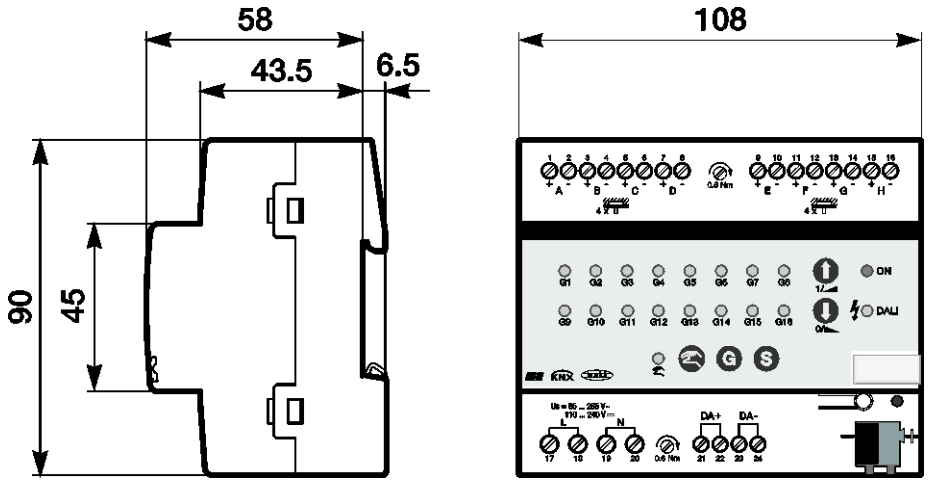
2CDC 072 024 F0011

1	Label carrier	9	LED *Operation display* ON
2	*Programming* button	10	LED *DALI operating voltage* DALI
3	*Programming* LED (red)	11	LED *Manual operation*
4	Bus connection terminal	12	*Manual operation* button
5	DALI output	13	*Groups* button
6	Light controller supply voltage	14	*Detect devices* button
7	8 Light Sensor inputs LF/U 2.1	15	Button ON/UP OFF/DOWN
8	16 LED groups G1 … G16	16	Light Sensor LF/U 2.1

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 fibre-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/S, 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/S 8.16.1M



2CDC 072 002 F0011

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 installed 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 eight Light Sensors LF/U 2.1 can be connected to a DALI Light Sensor DLR/S 8.16.1M. The Light Sensor measures brightness values in closed rooms. When combined with the detected values, the DLR/S is used for constant light 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 light control in rooms with difficult lighting conditions.

The electrical connection of the LF/U to the DLR/S 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.

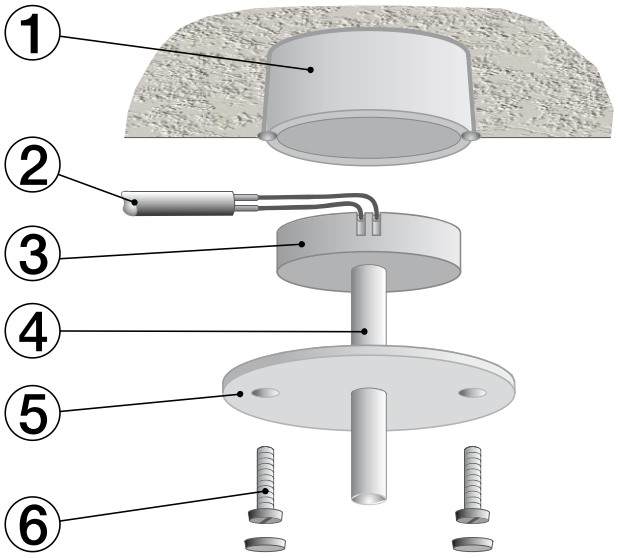
2.2.1 Technical data LF/U 2.1

Supply	SELV	Implemented via DLR/S 8.16.1M
Connections	On the DLR/S 8.16.1M	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…1,200 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. 3,000 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
Protection class	II	To EN 61 140
Isolation category	Overvoltage category Pollution degree Atmospheric pressure	III to EN 60 664-1 2 to EN 60 664-1 Atmosphere up to 2,000 m

Temperature range	Power Storage Transport	-5 °C…+45 °C -25…+55 °C -25…+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
Installation position	Any	
Housing, color	Plastic housing, halogen-free, gray	
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	

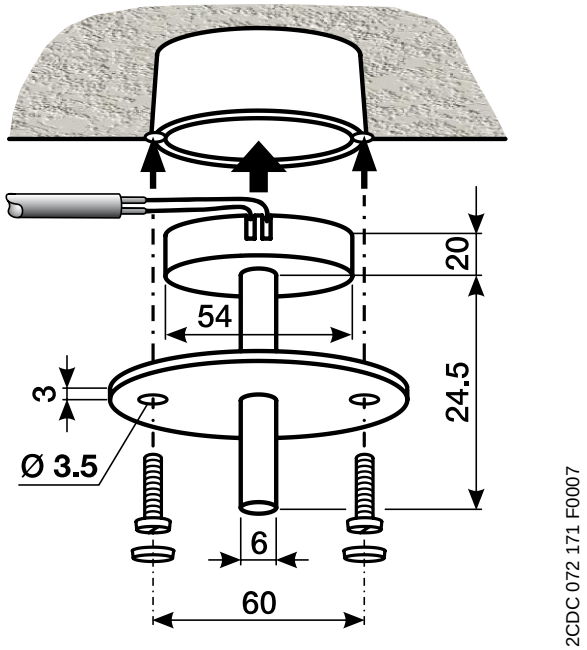
1) Rooms are lit up differently by the incidental daylight and the artificial light of the lamps. Not all the surfaces in the rooms, e.g. walls, floor, and furniture, reflect the light that falls on them in the same manner. Accordingly, even though there is an exactly calibrated constant light control 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, people, 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 diagram LF/U 2.1



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

2.2.3 Dimensional drawing LF/U 2.1



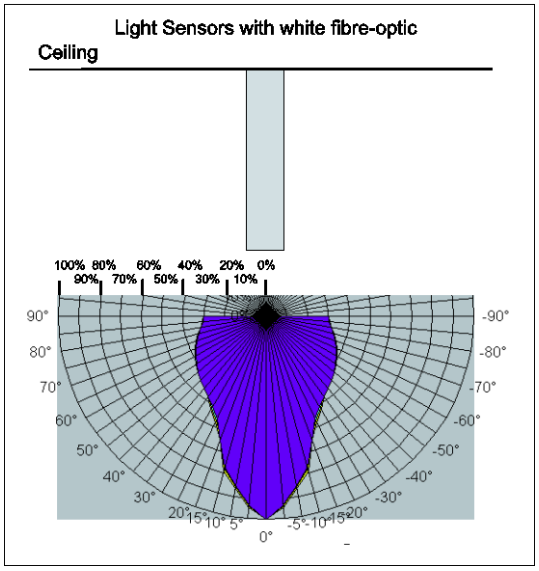
Dimensions

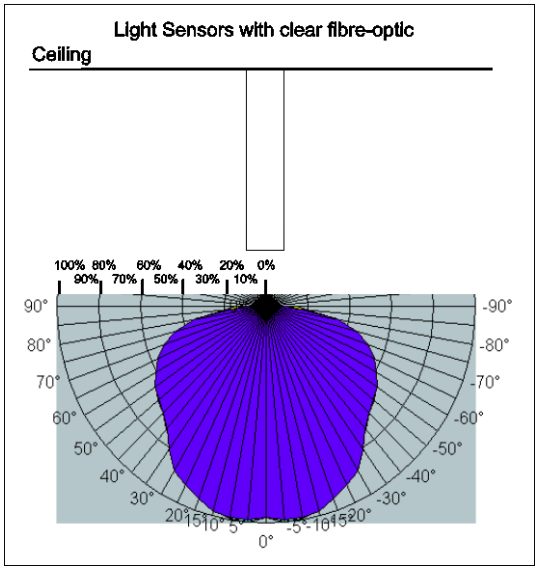
Flush mounted device	For installation in 60 mm flush mounted box
Dimensions	54 x 20 mm (Ø x H)

2.2.4 Polar diagram LF/U 2.1

The Light Sensors include two fibre-optic rods. The white fibre-optic rod has a smaller detection range and is less sensitive to lateral lighting influences. This fibre-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 fibre-optic rod.

Note
Please note that the white fibre-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 light control.





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

2.3 Mounting and installation

The DALI Light Controller DLR/S 8.16.1M is a modular installation device for quick installation in the distribution board on 35 mm mounting rails to EN 60 715. The installation position can be selected as required.

The electrical connection is implemented using push-in screw terminals. The connection to the KNX is implemented using a supplied push-in screw terminal. The terminal designations are 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 requirement

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

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

Mounting and start-up may only be carried out by electrical specialists. The appropriate standards, guidelines, regulations and specifications for the appropriate country should be observed when planning and setting up electrical installations and security systems for intrusion and fire detection.

- Protect the device from moisture, dirt and damage during transport, storage and operation.
- Only operate the device within the specified technical data!
- 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

To avoid dangerous touch voltages which originate through feedback from differing phase conductors, all poles must be disconnected 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 supplied fibre-optic rods. Refer to the Polar diagram LF/U 2.1, page 22 for the detection range.

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/S 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. Downloads may take longer after a change of application or a discharge.

Download reaction

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/S.

Assignment of the physical address

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

Press the Programming button on the DLR/S 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 is 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/S 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/S. The connection of a further DALI voltage supply can cause superimposition of voltages and lead to a malfunction of the DLR/S. Inadvertent connection of 230 V mains voltage to the DALI output will not destroy the DALI output 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/S to DALI device	100	150	200	300

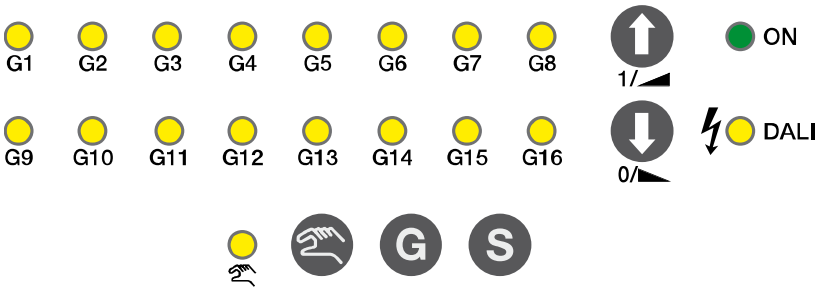
These values are rounded off and relate to the resistance values. EMC influences are not considered. For this reason, the values should be considered as absolute maximum values.

It is possible to assemble the DALI control cable with conventional installation material for mains cables. The two cores of the five-core NYM 5x1.5 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

19 display LEDs are located on the front of the DALI Light Controller:



In manual mode, the selection of the lighting group is indicated. In KNX operation, the monitoring state of the DALI lighting group is indicated via the LEDs.

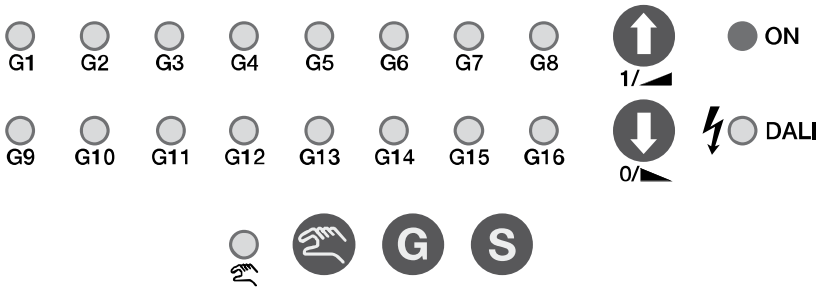
Note
Manual operation is only possible if the KNX voltage and light controller voltage are applied on the DLR/S. The ready to operate state is indicated by the green LED ON when it is lit up. If the light controller operating voltage has failed or is not connected, the LED ON flashes and, at the same time, the LED DALI lights up to indicate that no DALI voltage is being generated by the DLR/S. Should the KNX voltage fail, no LED will light up. The reaction of the connected lighting groups at KNX bus voltage failure can be parameterized.

The reaction of the display elements according to the operating states, *KNX operation* and *manual operation* is described in the following table:

LED	KNX operation	Manual operation
 Groups 1…16	*Flashing*: There is a fault in the lighting group (ballast or lamp fault). *Off*: Normal state, OK.	*On*: Lighting group is selected. *Flashing*: There is a fault in the lighting group (ballast or lamp fault). *Off*: Lighting group is not selected.
 Manual operation	*Off*: DLR/S is in KNX mode *Flashing* (for about 3 seconds.): Changeover to Manual operation. *Flashing continuously*: Manual operation is software-inhibited via KNX. The LED flashes until button is pressed. The LED switches off when released.	*On*: DLR/S is in manual mode *Flashing* (for about 3 seconds): Changeover to KNX operation.
 LED operation indicator	*On*: When application is running (DLR/S supplied with light controller operating voltage) and KNX is available. *Flashing*: KNX is available (application running), but light controller operating voltage is not available *Off*: Application is stopped but not loaded or is currently being loaded. KNX voltage absent.	*On*: Application is running (DLR/S supplied with light controller operating voltage) and KNX is available. *Flashing*: KNX is available (application running) and light controller operating voltage is not available *Off*: Application is stopped but not loaded or is currently being loaded. KNX voltage absent.
 LED DALI	*On*: DALI error (short-circuit) *Flashing*: DLR/S is in the initialization phase, or DALI devices are being detected. The DLR/S is not ready to function during this time. *Off*: Normal state, everything OK.	*On*: DALI error (short-circuit) *Flashing*: DLR/S is in the initialization phase, or DALI devices are being detected. The DLR/S is not ready to function during this time.

2.6 Operating controls

5 buttons for manual operation are located on the front of the DALI Light Controller DLR/S 8.16.1M:



The operating controls are enabled or disabled by the *Manual operation* button. The button must be pushed for at least 1.5 seconds for this purpose. This prevents unintentional actuation of the operating controls.

Individual lighting groups or all lighting groups can be selected manually using the Groups button:

- *Short button operation*: Individual lighting groups can be selected successively.
- *Long button operation*: All lighting groups are selected.

Using the *Detect devices* button (detect devices), you can integrate the DALI devices into the monitoring function.

Long button operation (> 5 sec.): The connected ballasts are detected and marked as monitored. During detection of the ballasts, the LED DALI flashes.

Using the *ON/UP* *OFF/DOWN* buttons, you can switch the selected light group(s) manually ON/OFF or dim them UP/DOWN.

Note
Manual operation can be disabled via the KNX using communication object *Block manual Operation/Status* (no. 1). In this case, it is not possible to changeover to manual operation using the *Manual operation* button. For as long as the button *Manual operation* is pressed during the Block, the LED *Manual operation* will flash continuously. The Block can be removed by sending a telegram with the value 0 on the communication object *Block manual Operation/Status* (no. 1). The Block is also removed after a download and KNX voltage recovery.

Note
The *Forced operation* and *Block* function of a lighting group has a higher priority than manual operation, i.e., if a lighting group is forcibly operated or blocked, this lighting group cannot be manually switched or dimmed. Telegrams of the Software Tool are executed during manual operation. Incoming KNX telegrams are not executed during manual operation. The exception is for telegrams for the Forced operation and Block of a lighting group.

The reaction of the operating elements is described in the following table, according to the operating states, *KNX operation* and *Manual operation*:

Button	KNX operation	Manual operation
 Manual operation	Long button operation (about 3 sec.): Switch to manual operation, provided that manual operation is not blocked by a parameter setting. Short button operation: LED Manual operation flashes and switches off again. DLR/S continues in KNX mode. When manual mode is achieved, the first lighting group G1 is automatically selected, but not yet controlled. The LED G1 lights up.	Long button operation (about 3 sec.): Changeover to KNX operation. The brightness values of the lighting groups initially remain unchanged. The functions are updated only after receipt of new values on the corresponding communication objects. KNX telegrams are ignored in manual operation and also not subsequently implemented. Resetting of manual operation in KNX operation occurs after the last operation within the parameterized time 10…300…6000 s.
 Groups	No reaction	Short button operation: Lighting groups can be selected successively. The exited lighting group retains its current brightness value. The state of the newly selected lighting group remains unchanged (group function). Long button operation: All the lighting groups are selected together. The brightness of the lighting groups remains unchanged (broadcast function).
 Detect devices	No reaction	Long button operation (> 5 Sec.): LED DALI flashes. The connected ballasts are detected and marked as monitored.
 ON/Dim UP	No reaction	Short button operation: The selected lighting group(s) is/are switched on. Long button operation: Relative dimming up of the selected lighting group(s) when the button is pressed. The switch-on or dimming reaction corresponds with the parameterized values as set in the ETS or that have been changed via KNX.
 OFF/Dim DOWN	No reaction	Short button operation: The selected lighting group(s) is/are switched off. Long button operation: Relative dimming down of the selected lighting group(s) when the button is pressed. The switch-off or dimming reaction corresponds with the parameterized values as set in the ETS or that have been changed via KNX.

3 Commissioning

The parameterization of the DLR/S is performed with the application *Control Dim Groups 8f DALI/1* and the Engineering Tool Software ETS. The application provides the DLR/S with a comprehensive and flexible range of functions. The standard settings allow simple commissioning. The functions can be extended if required.

The application is available under *ABB/Illumination/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/S (ETS3 or higher)
- Grouping of the connected DALI devices with the Software Tool
- Commissioning is necessary for constant lighting control. Commissioning is performed using artificial light and daylight calibration. The selected brightness value for the room is selected with this calibration. Commissioning can be performed 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 43. A re-addressing of the DALI device and the assignment to any lighting group is also possible with the Software Tool, even without ETS.

Note
The DLR/S can only control the lamps which have a DALI short address and that are assigned to a lighting group. The only exception is in manual mode. In manual mode, all DALI devices can be controlled in broadcast, irrespective of whether they have a DALI address or assigned to a lighting group. If required, you can parameterize the DLR/S so that it should automatically assign all DALI devices not assigned to a lighting group to lighting group 16, see Parameter window Gx Group, page 67.

3.1 Overview

The DALI Light Controller DLR/S 8.16.1M requires, in addition to the KNX voltage, a light controller operating voltage to generate the DALI voltage for full function capability. The light controller operating voltage range can be found in the chapter Technical data LF/U 2.1, on page 18. The KNX voltage alone is sufficient to program the application in the DALI Light Controller. Thus, in an office environment, it is possible to pre-program the DLR/S exclusively using the KNX voltage without having to resort to a light controller operating voltage (a 230 V AC/DC supply).

For commissioning with the Software Tool, in which the compilation of the lighting groups and the calibration of constant light 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 8 lighting groups have a special feature, as they can be used for constant light 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, acceptable constant light control is established in a room, even under difficult lighting conditions. The description of the calibration procedure as well as correct positioning of the light sensor can be found in chapter Constant light control, page 171.

In the DLR/S, it is possible to parameterize a lighting group using the copy and exchange function and to transfer the parameters to another lighting group. The copy and exchange function is described in detail under Copying and exchanging parameter settings, page 37.

The following table provides an overview of the functions used by the DLR/S 8.16.1M and those possible with the application program *Control Dim Groups 8f DALI/1*.

DALI Light Controller properties	**DLR/S 8.16.1M**
Installation type	MDRC
Number of outputs (DALI)	1
Number of inputs (Light Sensor LF/U 2.1)	8
Module width (units)	6
DALI devices	64
Lighting group total/controllable	16 / 8
Manual operation	■
Display of DALI fault	■

■ = Property applies

General parameterization options	DLR/S 8.16.1M
Enable/disable manual operation	■
Enable/disable automatic DALI address assignment	■
Request status values via 1 bit communication object	■
Limit number of telegrams	■
Acknowledge fault messages	■
Cyclic monitoring telegram (in operation)	■

■ = Property applies

Parameterization options	Per group	All devices	Per device
Functions			
Constant lighting control function	G1…G8		
Slave function	■		
Staircase lighting function	■		
Burn-in function	■		
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/S	■		
Power on level (Brightness after ballast/supply voltage recovery)	■		
Switch functions			
Switch-on value	■	■	
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 switch-on via dimming	■	■	
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			
Fault 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 fault message	■	■	■
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	■		
Reaction on KNX or DALI bus voltage recovery	■		
Brightness after ballast operating voltage recovery on the DLR/S	■		
Power-on level (Brightness after ballast/supply voltage recovery)	■		
Other functions			
Forced operation	■		
- 2 bit coded forced operation	■		
- 1 bit forced operation recall	■		
Block, disable output via 1 bit communication object	■		
Staircase light. permanent ON	■		
Warning staircase lighting	■		
Activate stairc. light./Status	■		
General functions			
Characteristic adjustment	■		
Request status values via 1 bit communication object	■	■	
Disable automatic DALI address assignment	■		
Cyclic monitoring telegram (in operation)	■		
Limit status telegrams	■		
DLR/S parameterization for lighting groups 1…8			
Flexible light sensor assignment via ETS parameterization	■		
Optional use of several Light Sensors per control circuit	■		
Control speed	■		
Dimming value for light control	■		
Light control can be switched off via the switch, dim brightness or scene telegram	■		
Light 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 light calibration	■		
Automatic recording of illumination characteristic curve for determination of the optimum control parameters	■		
Setpoint can be changed via the bus	■		
Control reaction after KNX bus voltage recovery	■		
***Slave* function, lighting group 1…16**			
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	■		
***Staircase lighting* function, lighting group 1…16**			
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

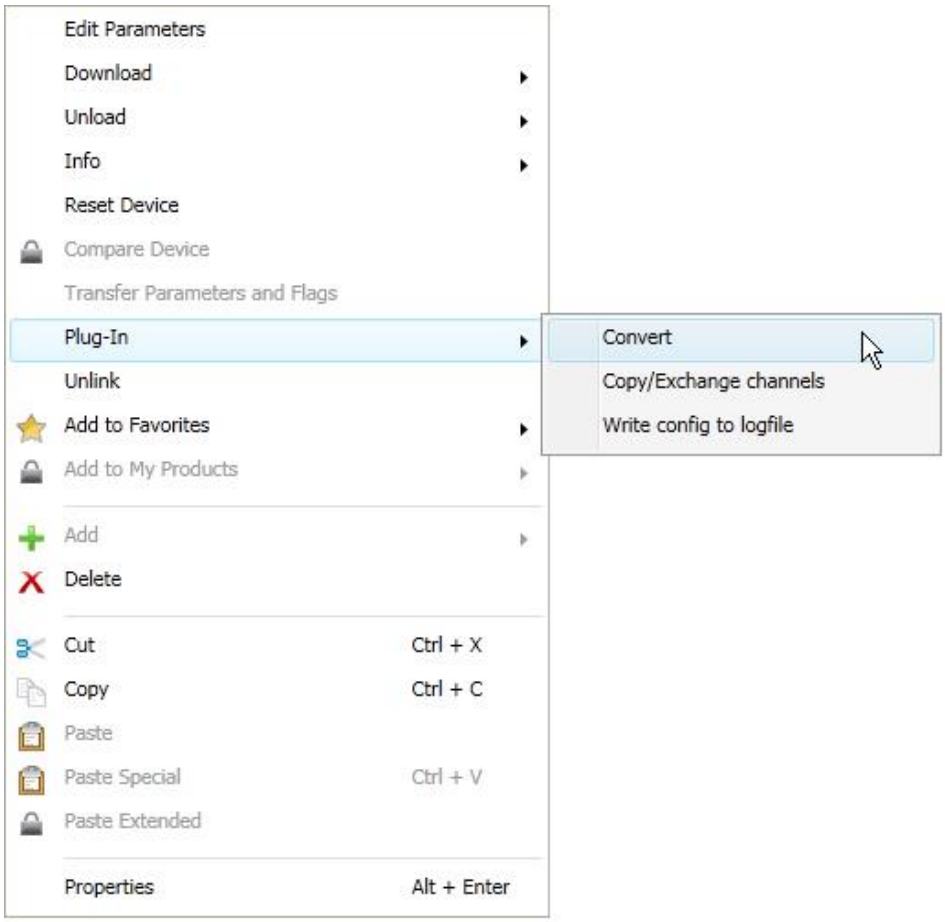
3.1.1 Conversion

For ABB i-bus® KNX devices of 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 the product and select *Plug-in* > *Convert* in the context menu.



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

Should you wish only to copy individual inputs/outputs within a device, use the Copying and exchanging parameter settings function, page 37.

3.1.2 Copying and exchanging parameter settings

Note
The copy and exchange function for the parameter settings of lighting groups is only possible if the target and source lighting groups support the same functions. A lighting group with programmable additional function Light control, e.g. Lighting group 1, cannot be copied to another lighting group that does not support the additional function Light control, e.g. Lighting group 9.

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/S lighting groups. To keep commissioning work to the minimum possible, using the *Copy/Exchange channels* function, parameter settings of an output can be copied or exchanged to/with any output. Optionally, the group addresses can be retained, copied or deleted in the target lighting group.

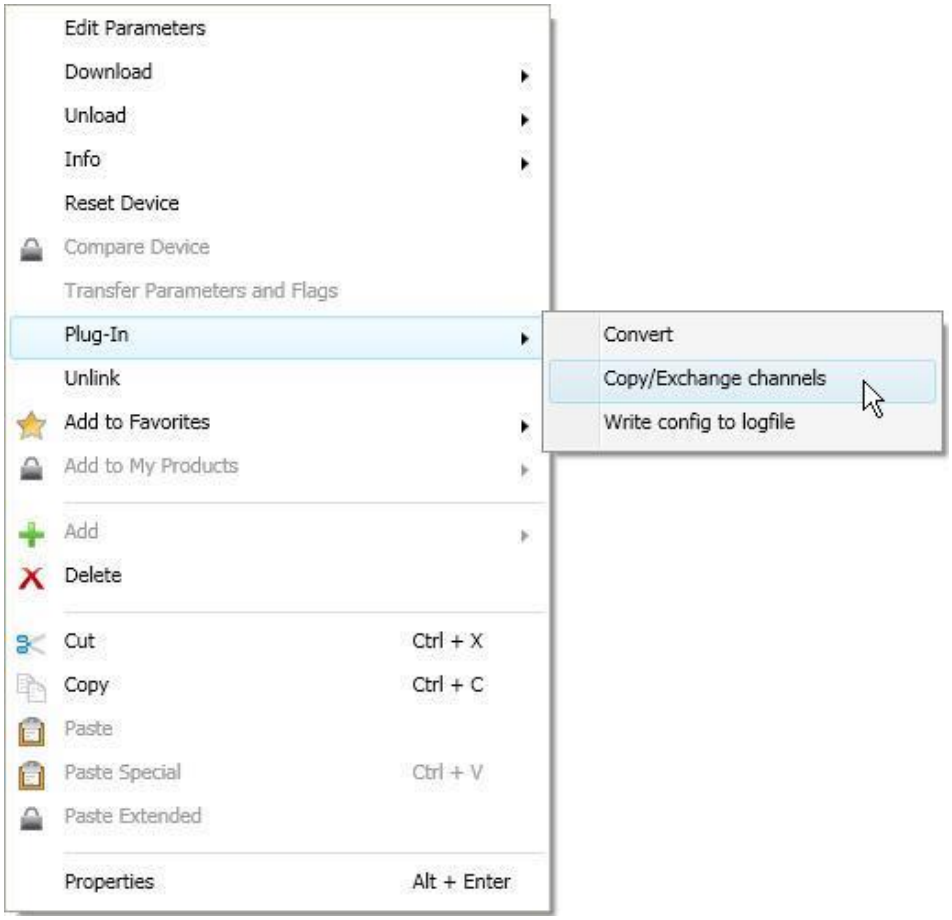
Note
When the term "channels" is used in ETS, it always means inputs and/or outputs or groups. To make the language of ETS generally valid for as many ABB i-bus® devices as possible, the word channels is used in this document.

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, the parameter settings of lighting group X can be copied to all the other lighting groups or to a special lighting group of the DLR/S. Thus, the parameters for this lighting group need not be set separately, which significantly shortens the commissioning time.

Note
The information for the calibration of the constant light 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 light control must be performed again.

3.1.2.1 Procedure for copy and exchange

- Click 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*.



Then make the required settings in the *Copy/Exchange channels* dialog.

Note
To recall the Copy/exchange group functions in the ETS4, click 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

At the top left, you will see the Source channel selection window for marking the source channel. Beside this is the selection window for the target channel or channels for marking the target channel or channels.

Source channel

The source channel selection defines 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 *Exchange* function, only one destination DALI output can be selected at a time.
- For the *Copy* function, various destination channels can be selected simultaneously. To do this, press the Ctrl key and mark the required channels, e.g. channel G1 group and G5 group, with the mouse pointer.

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

If a DALI device is assigned to several DALI groups, this is referred to as overlapping groups. This function is not supported.

3.2 Parameter

This chapter describes the parameters of the DALI Light Controller DLR/S 8.16.1M using the parameter window. The parameter windows have 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 any one of the 16 lighting groups of a DLR/S.

Note
The additional *Light controller* function is only available for lighting groups 1…8. With the description of the DLR/S with its properties and parameters, the explanations and the notation *Lighting group x* always only refer to one of the first 8 lighting groups of the DLR/S.

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

Option: Yes
No

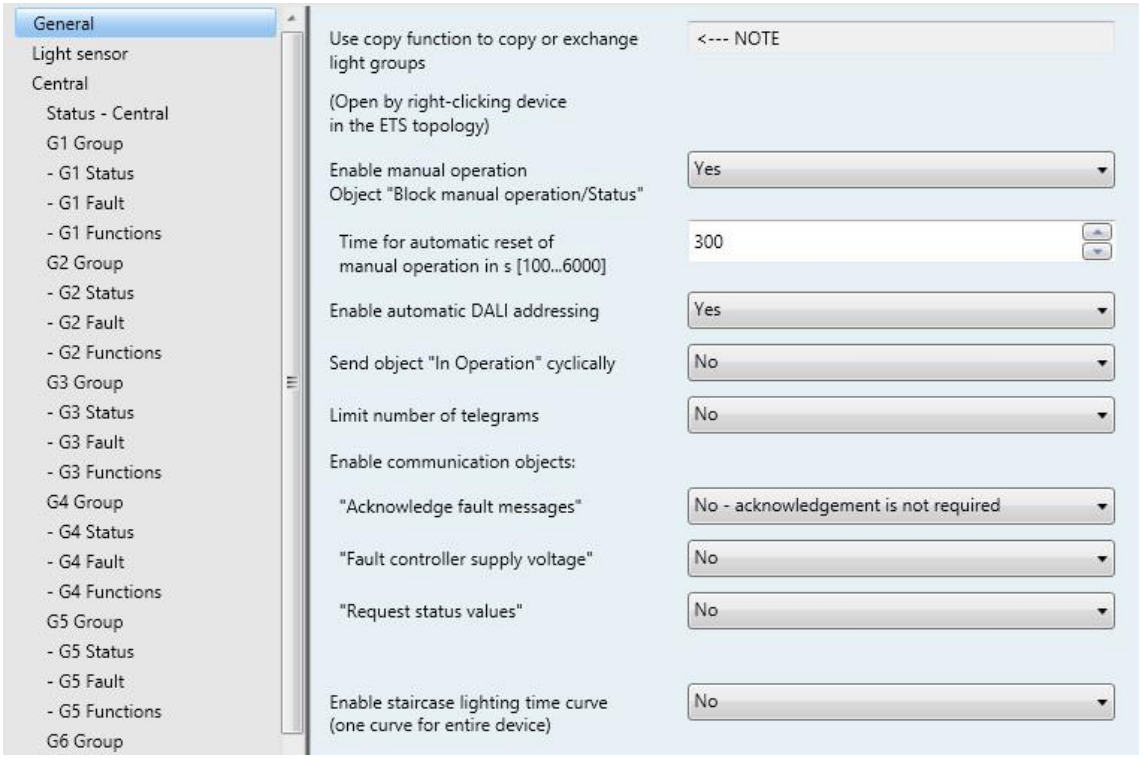
Indented parameter descriptions indicate that this parameter is only visible when the main parameter is parameterized accordingly.

The illustrations of the parameter windows in this manual correspond to the ETS4 parameter windows. The application is optimized for the ETS3. Parameterization with the ETS2 is not possible. If the ETS version is higher than ETS3, the representation may deviate slightly.

Note
If, in the following section, 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

(Open by right-clicking device in the ETS topology)

<--- NOTE

Enable manual operation
Object "Block manual operation/Status"

Options: Yes
No

This parameter defines if the switch over between the operating states *Manual operation* and *KNX operation* is enabled or disabled via the button on the device.

- *Yes*: The communication object *Block manual operation/Status* is enabled.

Telegram value: 0 = Enable button
1 = Block button

Note
Blocked manual operation is re-enabled on KNX voltage recovery or after a download.

- *No*: Manual operation is generally disabled. The communication object *Block manual operation/Status* is not enabled.

Function of manual operation

After connection to the KNX, the device is in KNX mode. The LED is off. All the LEDs display the current input state. The respective buttons are non-functional. It is possible to switch between *KNX operation* and *Manual operation* by pressing the button.

During manual operation, the states received via the KNX are executed. The manually set states are retained if manual operation is deactivated.

Switching on manual operation:

Press the button until the yellow LED lights continuously.

Switching off manual operation:

Press the button until the LED is no longer lit.

Note
If the button is released again before 1.5 seconds have elapsed, the LED reverts to its old state and there is no reaction. If manual operation is disabled via the application, there is no reaction and the device remains in the KNX mode. If manual operation has been enabled, the LED is switched on or over, after it has flashed for 1.5 seconds.

For further information see: Display elements and Operating controls. page 28

Time for automatic reset of manual operation in s [100...6000]

Options: 100…300…6000

This parameter is enabled if manual operation is enabled. It specifies for how long the device remains in manual operation after the button is pressed and after the last manual operation in the *Manual operation* operating state.

The automatic reset is performed after the last manual operation and after the set time has elapsed.

Enable automatic DALI addressing

Options: Yes
No

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

- *Yes*: The DLR/S automatically performs a DALI addressing assignment. If the DLR/S locates a DALI device without DALI address assignment, it automatically allocates the first free DALI address in ascending order 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 need only be installed for this purpose. The DALI Light Controller addresses the new devices with the free address of the failed device and transfers the properties that were present in the DALI device removed beforehand. If the DALI device does not yet have a group address (it 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 DLR/S or the 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 from the DLR/S. For further information see: Planning and application, page 159

- *No*: The DLR/S does not automatically assign DALI addresses, either in normal mode or on light controller voltage recovery. If a DALI device with an invalid DALI short address is installed, the DLR/S can only control it via a broadcast telegram (manual operation or DALI output communication objects). A DALI address is not necessary for this purpose. If a DALI device with an existing address has been installed, the DLR/S will not change it. The communication object *Trigger DALI addressing* is enabled, see Communication objects General, page 124.

Send object "In operation" cyclically

Options: Yes
No

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

This cyclic telegram can be monitored by an external device for example.

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

Object value to be sent

Options: 1/0

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

Telegram is repeated every in s [1…65,535]

Options: 1…60…65,535

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

Limit number of telegrams

Options: No
Yes

The KNX load 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/S monitors its sent telegrams and limits the telegrams sent depending on the following two parameters, which appear with the Yes option:

  Maximum number of sent 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/S within a period of time. The telegrams are sent as quickly as possible at the start of a period.

Note
The DLR/S 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 at the time of sending is always sent. 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. Example: Maximum number of sent telegrams = 5, period = 5 s 20 telegrams are ready to send. The DLR/S immediately sends 5 telegrams. The next 5 telegrams are sent after a maximum of 5 seconds. From this point, a further 5 telegrams are sent on the KNX every 5 seconds.

Enable communication objects:

"Acknowledge fault messages"

Options: No - acknowledgement is not required
Yes - acknowledgement is required

Should a fault occur (ballast, lamps, DALI, operating voltage), the DLR/S sends a telegram on the KNX using the respective communication object (see Parameter window Central and Parameter window Status - Central, from page 53).

- *No - acknowledgement is not required*: As soon as the fault has been remedied, the DLR/S will reset the fault message, and it automatically sends the status change, depending on the parameterization, to the communication object, e.g. *Lamp fault*. A telegram with the value 0 is sent. The change in the fault state may take up to 45 seconds and depends on the number of connected DALI devices.
- *Yes - acknowledgement is required*: First of all, the communication object *Acknowledge fault messages* is enabled. As soon as the fault is rectified, a telegram with the value 0 is not sent automatically. This fault message remains set until the fault has been rectified and the fault message is acknowledged or reset via the communication object *Acknowledge fault messages*. 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 voltage* is enabled. As soon as the light controller operating voltage has been interrupted, the communication object *Fault controller supply voltage* sends a telegram with the value 1 on the KNX. The time at which a telegram is sent can be adjusted using the following parameter:

  Send

  Options: After a change
  On request
  After a change or request

  - *After a change*: The status is sent via the communication object after a change.
  - *On 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 *On request*.

- *No*: The 1 bit communication object *Request status values* is not enabled.
- *Yes*: The 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. This function offers the option of providing up-to-date values to a visualization system, for example.

  - *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 for entire device)

Options: No
Yes

The DLR/S has the option of implementing a staircase lighting 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 lighting time curve is defined in the next parameter that appears with the Yes option.

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

  Scenes 13 and 14 are used for function staircase lighting

Note
If the *Staircase lighting* function is used in the DLR/S, 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/S dims to the brightness value for the staircase lighting time. The *Staircase lighting* function is switched on with a soft start. This brightness value (staircase lighting) is set with the *Brightness value after switching on* parameter after dimming in the Parameter window - Gx Staircase lighting, page 94.

- *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 the involved lighting groups are dimmed with the brightness value of the *Staircase lighting* function.

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 *Staircase lighting* function remains switched on for the lighting group.
- *No limitation*: The *Staircase lighting* function is no longer switched off automatically. The brightness value is changed only if a new telegram is received via the KNX or the brightness value is changed by forced operation, e.g. when there is a fault.

Time for dimming down after light (warning)

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/S dims down from the *Staircase lighting* function to a basic brightness. This indicates that the *Staircase lighting* function will switch off shortly (go out) or will be set to basic brightness.

- *Jump to*: The lighting groups are immediately set to the basic brightness after the staircase lighting time has elapsed. The basic brightness can be set in the Parameter window - Gx Staircase lighting, page 94.
- *0.7 s...90.5 s*: This is the time period, in which the lighting group is dimmed to the parameterized basic brightness at the end of the staircase lighting time. The basic brightness can be set in the Parameter window - Gx Staircase lighting, page 94.

Run time for basic brightness

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 basic brightness is switched on.
- *No limitation*: The basic brightness is not switched off automatically. The brightness value is changed only if a new telegram is received via the KNX or the brightness value is changed by forced operation, e.g. when there is a fault.

Note
The *Staircase lighting* function 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 performed in the Parameter window Gx Group, page 67. The reaction to various KNX telegrams (brightness value, relative dimming, scene recall) and voltage recovery can also be parameterized there. The reaction to a switch telegram is not explicitly programmable and responds as follows: The *Staircase lighting* function 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 basic brightness of the *Staircase lighting* function. The *Staircase lighting* function remains in standby mode and is started by a renewed ON telegram. Should the lighting group receive a renewed ON telegram during an ongoing *Staircase lighting* function, the *Staircase lighting* function is restarted (retriggered). The *Staircase lighting* function is also started if the lighting group receives an ON telegram with the value 1 on the communication object *Activate stairc. light./Status*. **For further information see: Staircase lighting, page 167**

3.2.2 *Light sensor* parameter window

In the *Light sensor* parameter window, the Light Sensors LF/U 2.1 (up to four possible) are assigned to the first four lighting groups of the DLR/S. Only the first four lighting groups feature a function for constant light control in combination with the light sensor. However, it is possible to parameterize each of the 16 lighting groups as a slave. If the corresponding master lighting group is parameterized with constant light 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 99 and Constant light control, page 171

Free light sensor assignment to lighting group 1...8

Options: No
Yes

A free light sensor assignment to one of the first 8 lighting groups can be parameterized with these parameters.

- *No*: In this default setting, each of the eight light sensors is assigned to exactly one lighting group. Commencing numerically, the light sensor at light sensor input A is assigned to lighting group 1, light sensor B to lighting group 2 through to light sensor H to lighting group 8.
- *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 eight lighting groups.

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

Light sensor X* is allocated to

* (X = A, B, C…H represents one of the eight possible light sensors)

Options: Group 1
…
Group 8

With this parameter, every light sensor can be assigned to any of the first 8 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 light control. The specification for the calculated actual value is made in the *Gx: Controller* parameter window, which is enabled as soon as the lighting group features the additional Light control function. The options *Smallest sensor value*, *Largest sensor value* or *Average sensor value* are available.

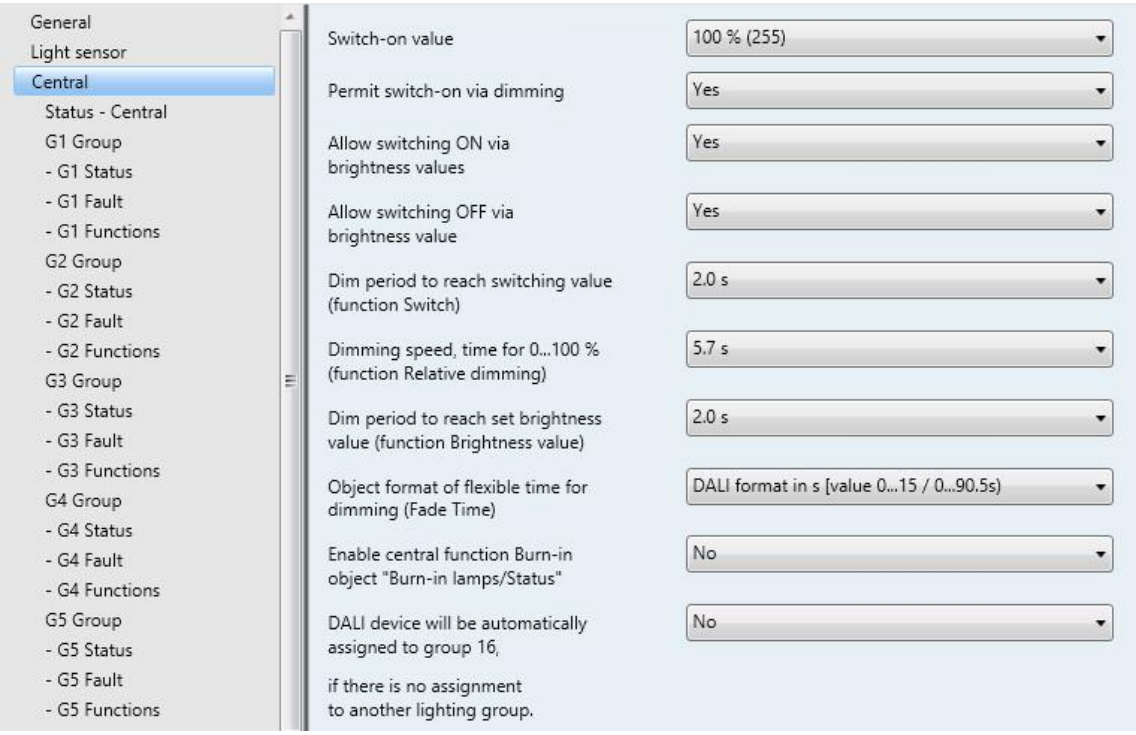
For further information see: Parameter window - Gx Light controller, page 99

The programmer is responsible for ensuring that a useful assignment of the Light Sensor is performed. The ETS does not perform 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 in such a way that ideally it is not influenced by any other source of artificial light. Furthermore, no direct incidence of light and no reflections may influence the Light Sensor. **For further information see: Constant light control, page 171**

3.2.3 Parameter window *Central*

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



Note
If a central telegram is referred to in the following section, this is a telegram which is received via one of the communication objects with the name *DALI Output*. These are communication objects no. 11 to 29. The function of the communication object relates to all lighting groupslighting groups available in the DLR/S. If DALI devices are connected to the output but are not assigned to lighting groupslighting groups, they are not controlled via the central telegrams *DALI output*. In the *Gx: Group* parameter window, it is possible to parameterize the DLR/S so that all devices, which are not assigned to a group, are automatically assigned by the DLR/S to group 16. In this way, it is possible to control all the connected DALI devices jointly via the KNX, even without manual group assignment, using the communication objects *DALI output*. If, at the time of the incoming central telegram, an individual group telegram is executed, this is immediately interrupted and the central telegram is executed for the DALI output. If all the lighting groupslighting groups are controlled with a central telegram and a subsequent telegram is then received for an individual lighting group, this lighting group will execute the group telegram. The telegram received last always has the higher priority and is executed. Central telegrams interrupt the *Slave*, *Light control* and *Staircase lighting* functions of a lighting group. The lighting groups execute 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.

Switch-on value

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

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

The dimming thresholds of the individual lighting groups apply for 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 the lighting groups are switched on at the brightness value which they had when switched off centrally via the communication object *Switch (DALI output)*.

Note
Saving of the last brightness value takes place 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, this 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 the 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 the 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. If there is a light controller operating voltage failure, the last brightness value is lost, and after recovery of the light controller 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-oriented switching via communication objects *Switch (Group x)*. Both values are independent of each other. This means that, if some lighting groups are dimmed or switched on or off via the group telegrams, the last brightness value for the central telegram is retained unchanged. When a central ON telegram is received, the brightness values that were set during the last central OFF telegram are set again.

Permit switch-on via dimming

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*: Switch-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 reaction 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
Flexible dimming time – settable via KNX

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

- *Jump to*: All the 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.

- *Flexible dimming time – settable via KNX*: 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 129, and Table of fading times Fade Time (no. 8), page 203

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 the lighting groups switch off simultaneously.

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

Options: 0.7 s
…
5.7 s
…
90.5 s
Flexible dimming time – settable via KNX

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

- *Flexible dimming time – settable via KNX*: 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 dimming value) in the Parameter window Gx Group, page 67, 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 (basic brightness).

During the activated *Burn-in* function, the lamps are switched on at 100 % brightness independently of the central dimming 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
Flexible dimming time – settable via KNX

This parameter determines the time duration, in which the DLR/S sets the received brightness value for all the DALI devices on the DALI output via the communication objects *Brightness value* or *Brightness value/Status*.

- *Jump to*: All the 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.
- *Flexible dimming time – settable via KNX*: 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/S 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 129, and Table of fading times Fade Time (no. 8), page 203

- *DALI format in s (value 0...15/0...90.5 s)*: The values received via the communication object are interpreted by the DLR/S as a discreet numeric value, which is converted directly in 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/S as a 100 ms value and mathematically rounded off to the next DALI value.

For further information see: Code table Diagnostics Low byte (no. 6), page 199

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 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 that is not 100% identical and synchronous occurs. In such applications, the KNX lighting equipment times should be used that are also available to DALI.

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

Options: No
Yes

The DLR/S has the possibility of activating the *Burn-in* function 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 *Burn-in* is not enabled.
- *Yes*: The central function *Burn-in* is enabled. The communication object *Burn-in lamps* appears. At the same time, the following parameter appears:

  Status of burn-in

  Options: No
  Yes

  - *No*: The status of the burn-in state is not provided.
  - *Yes: Burn-in lamps via object/Status:* The communication object *Burn-in lamps* is replaced by the communication object *Burn-in lamps/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
    On request
    After a change or request

    - *After a change*: The status is sent via the communication object after a change.
    - *On 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 lamps* or *Burn-in lamps/Status*, the DLR/S activates the function *Burn-in* for all the lighting groups that have enabled the function *Burn-in*. The corresponding burn-in time, parameterized for the lighting group in the Parameter window Gx Group, page 67, applies.

During the *Burn-in* function, 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 lighting equipment, page 165

Note
With the DLR/S, there is an additional possibility to burn in the individual lighting group individually via the optional communication object for a Group X. The optional communication object *Burn-in lamps/Status* should be selected in the Parameter window - Gx Functions, page 86, using one of the two additional objects.

Reaction of *Burn-in* function on download, KNX bus or light controller voltage failure

The *Burn-in* function is interrupted on KNX 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 the *Burn-in* function for all lighting groups.

DALI device will be automatically assigned to group 16, if there is no assignment to another lighting group.

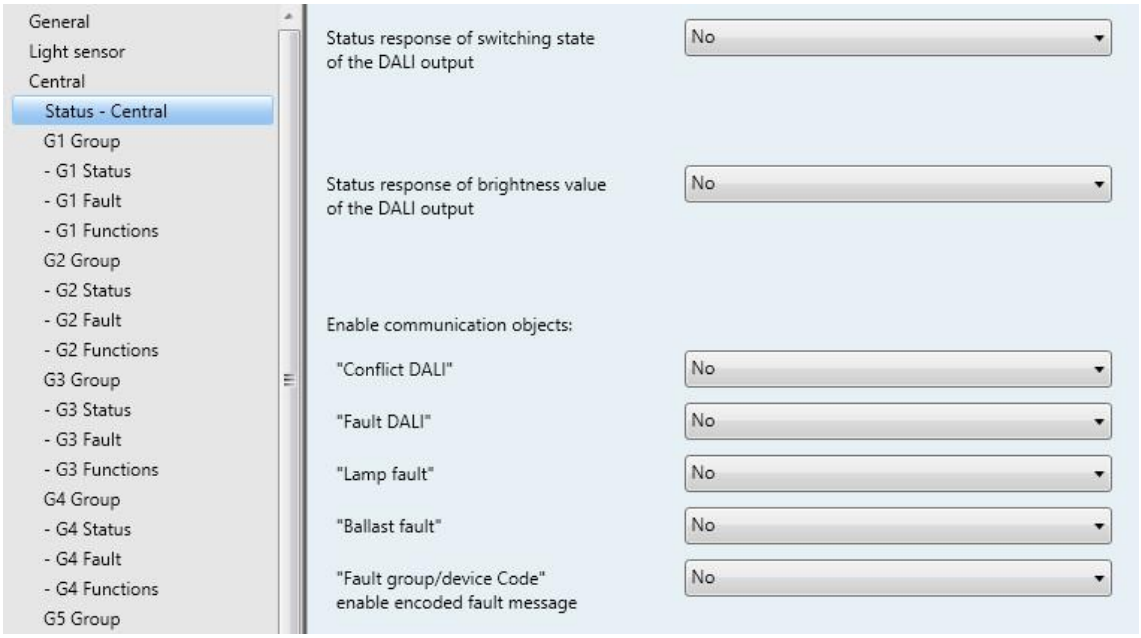
Options: Yes
No

- *No*: Lighting group 16 is available as a normal lighting group in the DLR/S. It has the same properties and functions as the lighting groups 1 to 15.
- *Yes*: The DLR/S initially automatically allocates all DALI devices to lighting group 16. If the DALI device is assigned to another lighting group, this device will be removed from lighting group 16. Using this procedure, it is possible to control all DALI devices jointly via the DALI output in the KNX without any manual DALI group assignment.

Note
Lighting group 16 is only used internally by the DLR/S. The communication objects of lighting group 16 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/S via the KNX, they must be assigned to a lighting group. The assignment occurs using the Software Tool. All the lighting groups are indicated on the KNX. Control of the individual 64 DALI devices via the KNX is not possible with the DLR/S. All the 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 16, using the parameters described here. This is performed automatically by the DLR/S. If a lighting group is assigned to another lighting group, the DLR/S removes the device again from group 16. The DLR/S does not automatically use a DALI broadcast telegram for the telegrams that are received via the communication object of output A. Depending 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 reaction of the output is parameterized. The status reaction of the individual lighting group can be set accordingly in the respective group under the Parameter window - Gx Status, page 77.



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, in order to eliminate mutual interference of devices as a result of differing status messages.

With the option *Yes: ...*, the following parameters appear:

Send

Options: <u>After a change</u>
On request
After a change or request

- *After a change*: The status is sent via the communication object after a change.
- *On 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*.

Value for different switching states at 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 the *Yes: ...* options, the following parameters appear:

Send

Options: <u>After a change</u>
On request
After a change or request

- *After a change*: The status is sent via the communication object after a change.
- *On 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*.

Value for for different brightness states at 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 the 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 can be enabled for the output of the DLR/S:

Enable communication objects:

"Conflict DALI"

Options: <u>No</u>
Yes

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

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

Send

Options: <u>After a change</u>
On request
After a change or request

- *After a change*: The status is sent via the communication object after a change.
- *On 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, for example 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 *Ballast fault*. The following parameter appears:

  Send

  Options: <u>After a change</u>
  On request
  After a change or request

  - *After a change*: The status is sent via the communication object after a change.
  - *On 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*.

"Lamp Fault"

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 *Lamp fault* is not enabled.
- *Yes*: The communication object *Lamp fault* is enabled. As soon as there is a lamp fault on the output, it is indicated by a 1 in the communication object *Lamp fault*. The following parameter appears:

Send

Options: After a change
On request
After a change or request

- *After a change*: The status is sent via the communication object after a change.
- *On 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*.

"Ballast fault"

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 *Ballast fault* is not enabled.
- *Yes*: The communication object *Ballast fault* is enabled. As soon as there is a ballast fault on the output, it is indicated by a 1 in the communication object *Ballast fault*.

Note
In order to detect the fault of a ballast correctly, the DLR/S 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 devices* or by the S button in manual mode. An automatic *Detect devices*, e.g. after a KNX voltage recovery or light controller operating 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 are 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 the DALI devices of a lighting group are no longer recognized by the DLR/S, 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>
On request
After a change or request

- *After a change*: The status is sent via the communication object after a change.
- *On 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* must 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 137, and Code table Fault group/device code (no. 19), page 206

- *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

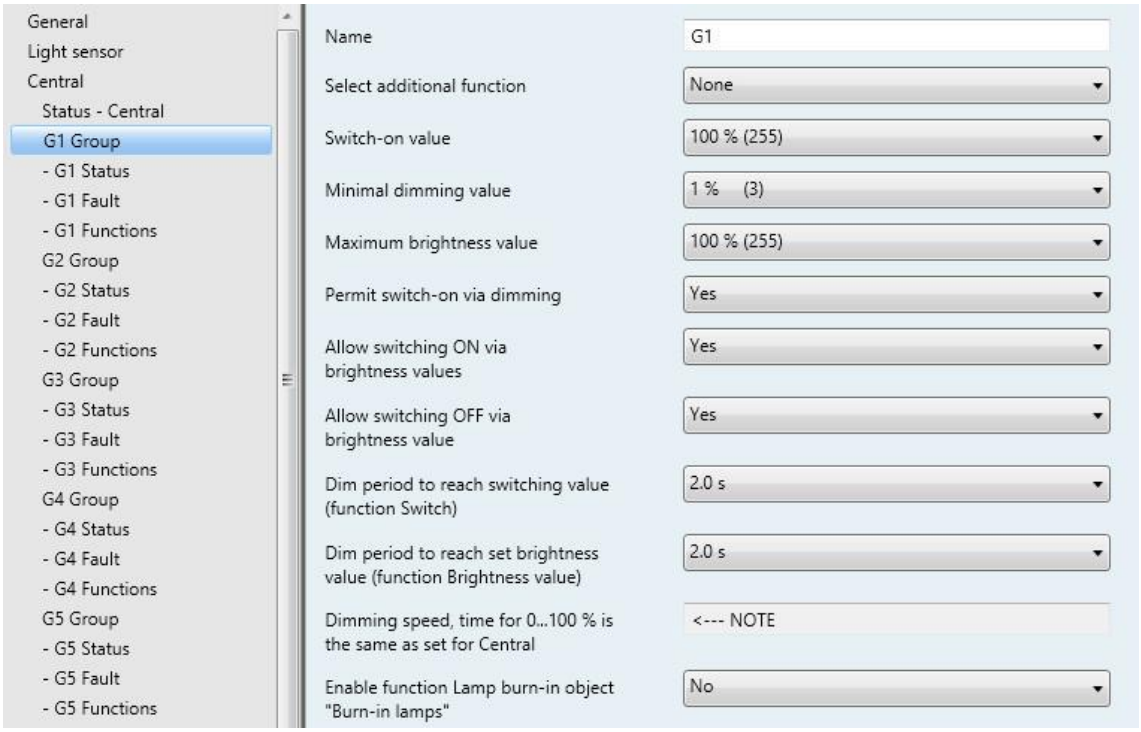
  Options: <u>Group oriented</u>
  Device oriented

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

  - *Group oriented*: 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.
  - *Device oriented*: 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 address plus 1) 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 using the number of the lighting group G1…G16. The lighting groups are parameterized independently of each other. For this reason, the following section refers to the general lighting group Gx. X can represent any of the 16 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 a name consisting of a maximum of 40 characters.

The name is stored in the ETS database and also stored in the DLR/S 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/S 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/S or a second KNX device. In this case, data is exchanged via KNX with communication objects. The Parameter window - Gx Slave, page 112, is enabled. The properties of the slave lighting group are parameterized in this window.
- *Light control*: The lighting group performs light control. The brightness value of the lighting group is calculated according to the brightness detected via the light sensor, so that the luminance (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. Refer to Parameter window - Gx Light controller, page 99, and Parameter window - Gx Control Operating, page 107, as well as the chapter Constant light control, page 171. The light control can be switched on and off via the *Function Activate controller* communication object. Accordingly, 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*, *Block*, *Forced operation* and *Characteristic adjustment* must be enabled in the Parameter window - Gx Functions, page 86.

Note
The additional functions *Slave* and *Light control* can assume the following operating states: **Additional function is not active:** The additional function has been deactivated, a telegram with the value 0 has been received. In this state, the DLR/S behaves like a “normal” group-orientated DALI Light Controller. 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 *Function Activate Slave/Function Activate controller* 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. An ON telegram (telegram to the communication object *Switch*) triggers the additional function again, i.e., *Light control* operates and the slave lighting group again responds to the communication object *Brightness value of slave*. **Additional function running:** *Light control* runs, the *Slave* function 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 a 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 *Fct Activate Slave/Status* or *Fct Activate controller/Status* after a download.

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

Switch-on value

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

If an additional function is enabled, the parameter name changes to *Switch-on value (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 dimming value* or *Minimal dimming value*), the threshold is set as the minimum or maximum dimming 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 is switched on with the brightness value which it had when the OFF telegram was received.

Note
Saving of the last brightness value is undertaken with every OFF telegram, unless the lighting group is already switched off. 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. If there is a light controller operating voltage failure, the information of the last brightness value is retained. With a renewed ON telegram after light controller operating 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-oriented switching via the 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 value for the lighting group is 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 dimming 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 dimming value, the minimum brightness value is set equal to the maximum dimming value.

If the function *Burn-in lamp* is activated, the lighting 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 are below the defined minimum dimming value, the minimum dimming value is set.

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

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, in this constellation, the DLR/S receives a central telegram 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 (basic brightness) which the ballast lamp combination can assume. This device-specific value is programmed in the device 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 dimming curve, page 195**

Maximum dimming value

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

This parameter defines the maximum dimming 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 dimming value is set which is below the minimum dimming value, the maximum dimming value is set equal to the minimum dimming value.

If the *Burn-in lamp* function is activated, the lighting 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 dimming value also applies in the *Staircase lighting* and *Scenes* functions.

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, in this constellation, the DLR/S receives a central telegram to set the brightness value to 5% on the communication object *Brightness value* or *Brightness value/status*, the lighting group is set to 5 %.

Note
The set minimum brightness value for the lighting group has nothing to do with the absolute minimum brightness value (basic brightness) which the ballast lamp combination can assume. This device-specific value is programmed in the device 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 dimming curve, page 195**

Permit switch-on via dimming

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*: Switch-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
Flexible dimming time – settable via KNX

A soft start or soft stop can be set with this parameter. For this purpose, the time duration during which the DLR/S 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.
- *Flexible dimming time – settable via KNX*: The time received via the communication object *Fade time (DALI format)* or *(KNX format)* has an effect on the ON/OFF switching reaction. There are 16 discreet values which are defined according to DALI for the *Flexible time for dimming*. If the KNX format is selected for the *Flexible dimming time*, rounding off errors can occur as a result of discreet DALI times.

For further information see: Communication object no. 8, page 129, and Table of fading times Fade Time (no. 8), page 203

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.

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

Options: Jump to
0.7 s
2.0 s
…
90.5 s
Flexible dimming time – settable via KNX

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

- *Jump to*: All the 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.
- *Flexible dimming time – settable via KNX*: 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 discreet values which are defined according to DALI for the *Flexible time for dimming*. If the KNX format is selected for the *Flexible dimming time*, rounding off errors can occur as a result of discreet DALI times.

For further information see: Communication object no. 8, page 129, and Table of fading times Fade Time (no. 8), page 203

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

<−−− Note

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

Options: Yes
No

This parameter defines whether the lighting group should be considered when the *Burn-in* function is activated. 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*.

The *Burn-in* function is enabled in the Parameter window Central, page 53. In addition to the central function *Burn-in*, every lighting group can be burnt-in individually via the additional communication object *Burn-in lamps/Status*. The additional communication object is selected in the Parameter window - Gx Functions, page 86, under the additional objects.

- *Yes*: The lighting group is considered during an active *Burn-in* function and, during the burn-in phase, 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 *Burn-in* function and can also be dimmed during an activated *Burn-in* function.

Reaction with activated *Burn-in* function

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

During burn-in, only those lighting groups are considered that have been selected with the corresponding parameterization. Parameterization takes place in the Parameter window Gx Group, page 67, with the parameter *Enable function Lamp burn-in object "Burn-in lamp"*.

During the *Burn-in* function, 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 lighting equipment, page 165

Note
With the DLR/S, there is an additional possibility of burning in the individual lighting group individually via the optional communication object for a Group X. The optional communication object *Burn-in lamps/Status* should be selected in the Parameter window - Gx Functions, page 86, using one of the two additional communication objects.

Lamp burn-in period in hours [1…254]

Options: 1…100…254

This parameter determines the time period for *Burn-in* function. For 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/S features the option of sending the status of the *Burn-in* function on the KNX via communication object *Burn-in lamp/Status*.

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

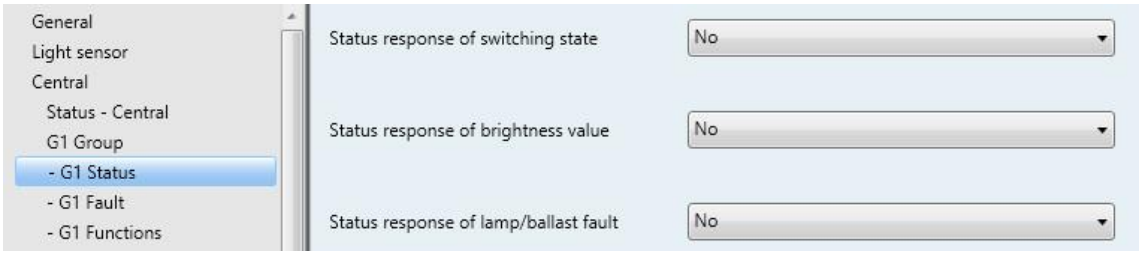
  Send

  Options: After a change
  On request
  After a change or request

  - *After a change*: The status is sent via the communication object after a change.
  - *On 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 reaction of the whole output, see Parameter window Status - Central, page 61, 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 166** 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, in order 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
On request
After a change or request

- *After a change*: The status is sent via the communication object after a change.
- *On 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>
On request
After a change or request

- *After a change*: The status is sent via the communication object after a change.
- *On 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 send reaction can be parameterized with the following *Send* parameter
- *No*: No status message is sent and no communication object is displayed.

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

Send

Options: <u>After a change</u>
On request
After a change or request

- *After a change*: The status is sent via the communication object after a change.
- *On 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: Lamp fault
Ballast fault
Lamp or ballast fault

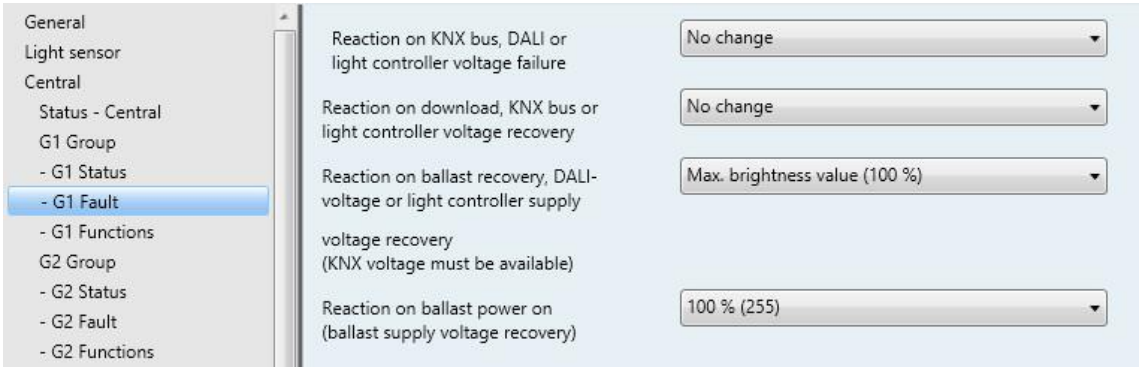
This parameter determines the equipment fault, which is provided on the enabled communication object.

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

Note
In order to detect a ballast fault correctly, the function *Detect devices* must have triggered in the DALI Light Controller. With this function, the DLR/S notes the exact number of DALI devices and the DALI address of the individual DALI devices currently connected to the DLR/S for reference purposes. If the determined number of DALI devices does not correspond to 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, according to the sending parameterization. The *Detect devices* function can be triggered either via the communication object *Detect devices* 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/S via the KNX is not possible due to a KNX bus voltage failure or there is a DALI short-circuit or failure of the light controller operating voltage.

A download is comparable with a KNX bus voltage failure, whereby the lighting group initially assumes the parameterized brightness value 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 time functions, such as *Staircase lighting* and *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
Reaction 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 has applied, the power-on level is started by the ballast. However, a few hundred ms later, the ballast will detect that there is no DALI voltage applied. This on the other hand will trigger the system error *Level* (no DALI voltage). In this way, the user will only visually detect the system error (the parameterized reaction on a DALI voltage failure).

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

Reaction on download or KNX voltage recovery

Options: No change
Last value 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.
- *Last value before failure*: The lighting group is brought to the state which it had before the failure. The brightness value must have been set for at least two seconds before a 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 *Scene, Staircase lighting, Block and Forced operation* functions as well as dimming processes are interrupted. The state of the time functions after a download or after KNX bus voltage recovery is to be set separately in the appropriate parameter window of the time 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 reacts if it is has already been detected by the DLR/S, and does not respond (has failed) and is once again detected by the DLR/S.

- *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 its recovery.

Note
The minimum and maximum dimming values (dimming thresholds) still remain valid. The *Scene*, *Staircase lighting*, *Block* and *Forced operation* functions as well as dimming processes are interrupted. The state of the time functions after a download or after KNX bus voltage recovery is to be set separately in the appropriate parameter window of the time 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 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.

In “normal” operation, this reaction may not be desirable: If there is a ballast operating voltage failure and ballast operating voltage recovery, all the ballasts switch on with the maximum brightness. This can lead to increased inrush currents 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 at which the DALI device (ballast) switches on independently after ballast supply voltage recovery.
- *Last value*: The DALI device (ballast) is switched on with the last (previous) set brightness value used before the 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
Reaction 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 has applied, the power-on level is started by the ballast. However, a few hundred 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 reaction on a 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. This 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/S on the DALI will once again receive responses from the DALI device (ballast). As a result, the DLR/S informs the re-detected DALI device (ballast) again about the lighting group information. After to this procedure, the lamp is controlled with the parameterized brightness level on DALI bus voltage recovery. If the power-on brightness is to be retained, then the option *No change* has to be set for the parameter *Brightness after ballast and DALI recovery*.

3.2.3.2.3 Parameter window - *Gx Functions*

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

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

The DLR/S does not check the plausibility of the parameterization. Accordingly, the same communication object can be selected twice as can a communication object, which is completely unsuitable for its function, for example the communication object *Warning staircase lighting* does not have a function without *Activate stairc. light./Status* function.

Enable additional object 1

Enable additional object 2

Options: No function
Burn-in lamps/Activate status
Block
Staircase light. permanent ON
Warning staircase lighting
Activate stairc. light./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.
- *Burn-in lamps/Activate status*: The communication object *Burn-in lamps/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 out or sent on the KNX. A prerequisite is that the function *Burn-in* is selected in the Parameter window Gx Group, page 67. The burn-in time must also be parameterized under this parameter.

- *Block*: The communication object *Block* is available for the lighting group. The *Block* function 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 is set after the block is lifted. A block during a dimming up or down process or scene operation interrupts the dimming process and freezes the current brightness value. A block during the *Staircase lighting* or *Controller* function leads to an immediate blocking of the lighting group and freezing of the brightness value. After unblocking, the *Staircase lighting* function continues with dimming (prewarning). If light control or slave operation were active before the block, they will be re-established. Forced operation has a higher priority than the *Block* function. With activated Forced operation, the *Block* function 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 communication objects only have a meaning in conjunction with the *Staircase lighting* function:

- *Staircase light. permanent ON*: The communication object *Staircase light. permanent ON* is available for the lighting group. The *Staircase light. permanent ON* function 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 infinite and the lighting group is switched on with the brightness value for the *Staircase lighting* function, see Parameter window - Gx Staircase lighting, page 94. The reaction of the operating functions, e.g. Dimming, Set brightness value and Scene recall remains valid even when *Staircase light. permanent ON* is activated. The reaction as parameterized in the parameter window - *Gx Staircase lighting* applies. *An OFF telegram* causes dimming to the basic brightness. If a telegram is executed, *Staircase light. permanent ON* is deactivated (reset). With the deactivation of *Staircase light. permanent ON*, the dimming phase of the staircase lighting is initiated. After the basic brightness has elapsed, the *Staircase lighting* function is in standby and *Staircase light. permanent ON* is deactivated.

Note
Forced operation and Block have a higher priority than *Permanent ON*. After the end of Forced operation or Block, the staircase lighting is started with the dimming down phase and *Staircase light. permanent ON* is deactivated. **For further information, see: Staircase lighting, page 167**

- *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.
- *Activate stairc. light./Status*: The communication object *Activate stairc. light./Status* is available for the lighting group. The *Staircase lighting* function can be activated (telegram with value 1) or deactivated (telegram with value 0) via this communication object. Should the *Staircase lighting* function not be activated, the lighting group is a “normal” lighting group. The following communication objects for the *Staircase lighting* function (*Staircase light. permanent ON* and *Warning*) have no effect for the “normal” lighting group. After activation of the *Staircase lighting* function via the communication object *Activate stairc. light./Status*, the *Staircase lighting* function runs to completion and thereafter is in standby.

Note
If the *Staircase lighting* function is used, it is highly recommended that this additional communication object be enabled, as only this communication object allows the *Staircase lighting* function that has been deactivated to be reactivated. The *Status* sending reaction can be set in Parameter window - Gx Staircase lighting, page 94.

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 if 1 bit control has been parameterized:

  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.

Status of forced operation after KNX 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 light control was activated before forced operation, it will be active.
- *Switch on by force*: The lighting group is forcibly operated and switched on at the brightness parameterized in *Brightness while object value = 1* (forced operation, active, ON).

  How does forced operation function?

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

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

  With the end of Forced operation, the brightness value saved 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. *Light control*, *Staircase lighting* or *Slave*, it will also be active after Forced operation. If the DALI Light Controller had control before Forced operation, the light control will be reassumed after Forced operation at the switch-on brightness. If the *Staircase lighting* function was activated before Forced operation, the *Staircase lighting* function will continue after Block is rescinded.

  The state of Forced operation is displayed in the communication object *Diagnostics*, see Communication object no. 6, Diagnostics, page 126.

  Forced operation has a higher priority than the Block of 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	Enabled	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	Enabled	
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 calculated and stored 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 on bus voltage recovery.

- *Inactive*: The lighting group is enabled after bus voltage recovery and is no longer subject to Forced operation. If parameterized constant light 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 fct Characteristic adjustment

Options: No
Yes: linear lighting curve
Yes: linear light. curve, without phys-min bright.

With this parameter, it is possible to adjust 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 dimming curve, page 195

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*: The dimming curve is not modified. The DALI dimming 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 dimming curve, page 195

- *Yes: 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 characteristic 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 characteristic curve be applied, the KNX value of 50 % would be applied in this case.

For further information see: DALI dimming curve, page 195

- *Yes: linear light.curve, without phys-min bright.*: 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 realize is omitted.

For further information see: DALI dimming curve, page 195

Note
Characteristic adjustment can only be performed correctly when the brightness value is internally calculated and simulated with the characteristic adjustment via the DALI Light Controller and transferred to the DALI devices. This is the case when the brightness value is set, for example. During dimming, irrespective of whether a group command or central command is concerned, differences may occur between the set brightness value and the (simulated) status of the brightness value. To allow even dimming, the DALI Light Controller must use the DALI commands DIM-UP and DIM-DOWN. These commands trigger a dim step in the DALI device, which is transformed using the DALI characteristic stored in the DALI device. As the exact length of the dim step is not known, there may be deviations between the calculated (simulated) value and the brightness value actually set. This can occur when, after dimming, the status of the brightness value is fed back to the dimmed lighting group as a brightness value. In this case, there may be a brightness jump.

Enable function Staircase lighting

Options: No
Yes

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

- *No*: No *Staircase lighting* function is available for the lighting group.
- *Yes*: The *Staircase lighting* function is available for the lighting group. The special properties of the *Staircase lighting* function are set for the lighting group in the Parameter window - Gx Staircase lighting, page 94. As there is only a timed progress in the DLR/S for the *Staircase lighting* function, the times for the staircase lighting progression are parameterized in the Parameter window General, page 43. With an activated *Staircase lighting* function, the lighting group is switched on, and after a defined time it is automatically switched off or dimmed down slowly as a warning. The basic brightness is the brightness, to which the lighting group is set after the staircase lighting time has elapsed. This basic brightness may also be not equal to zero.

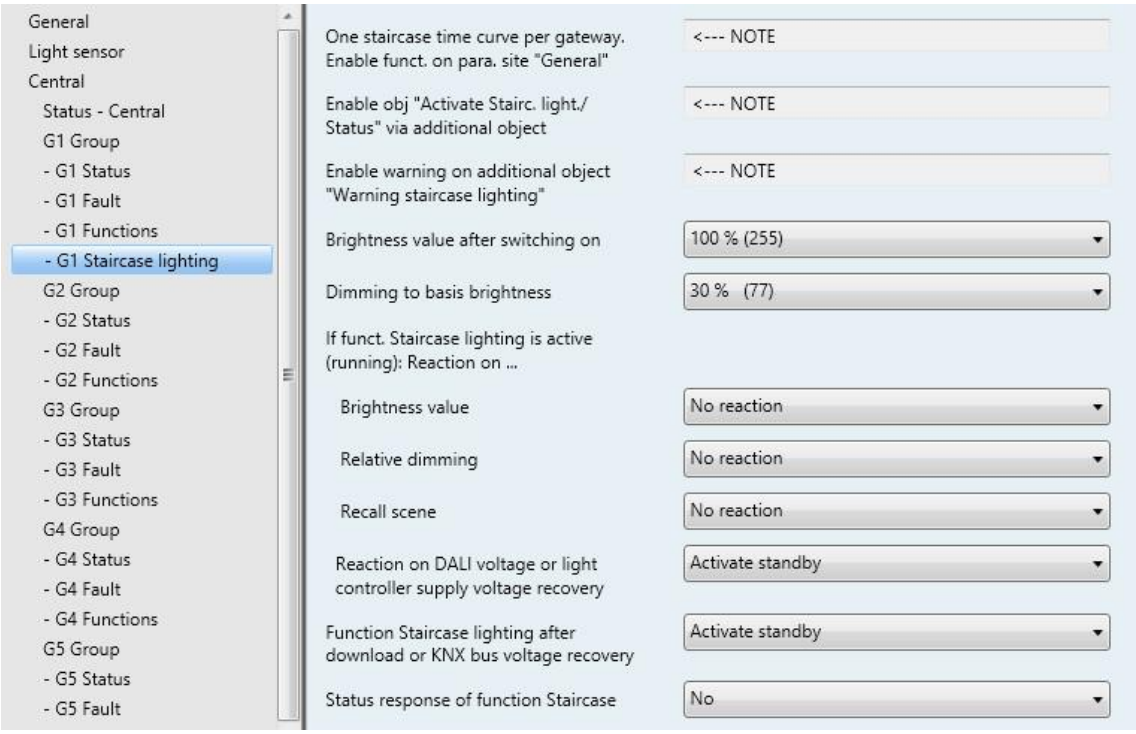
Example
This function can ensure that a basic brightness level always exists, for example in the hallways in nursing homes or hospitals. Maximum brightness is only activated when someone enters the hallway (detected by a presence detector). It is dimmed down automatically to the basic brightness, after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

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

Note
The *Staircase lighting* function is comprised of two scenes. The DLR/S automatically selects the internal scenes 13 and 14 when the *Staircase lighting* function is selected. **For further information see: Staircase lighting, page 167**

3.2.3.2.4 Parameter window - *Gx Staircase lighting*

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



The DLR/S features a *Staircase lighting* function, which can be triggered and stopped via individual switch telegrams of the individual lighting groups. For each DLR/S, a staircase lighting sequence can be parameterized, which can be set in the Parameter window General, page 43.

Note
The *Staircase lighting* function is comprised of two scenes. The DLR/S automatically selects the internal scenes 13 and 14 when the *Staircase lighting* function is selected. Scenes 13 and 14 can still be used and can be recalled via the appropriate scene communication object. In this case, groups parameterized with the *Staircase lighting* function are controlled with the switch-on brightness of the *Staircase lighting* function. **For further information, see: Staircase lighting, page 167**

In the 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 reacts as follows:

The *Staircase lighting* function can be triggered by an ON telegram to the communication object *Switch* or by activation of the *Staircase lighting* function of a lighting group. If there is an OFF telegram at the communication object *Switch*, the lighting group is controlled with the basic brightness of the *Staircase lighting* function. The *Staircase lighting* function is in standby mode and can be 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 *Staircase lighting* function 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 *Activate stairc. light./Status*.

When, in the following section, the communication objects *Switch* (ON telegram) or *Brightness value* are mentioned, this also applies for the communication objects *Switch/Status* or *Brightness value/Status*.

Brightness value after switching on

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

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

- *100 % (255)…0 % (OFF)*: Brightness value to which the lighting group is set when the *Staircase lighting* function is operational after dimming up.

Dimming to basic brightness

Options: 100 % (255)
99 % (252)
…
30 % (77)
…
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 run time for the basic brightness and the time for dimming down (pre-warning time) can be set in the Parameter window General, page 43.

Note
Typical applications for a basic brightness are, for example, in nursing homes or residential care homes, in hallways where the lighting is never fully switched off. There should always be a basic brightness of approx. 20 %. If a person enters the area, it should be illuminated for a certain time (staircase lighting time) with maximum brightness (100 %).

If funct. Staircase lighting is active (running): Behavior on ...

Brightness value

Options: No reaction
Function switches to standby

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

- *No reaction*: A brightness value telegram is ignored.
- *Function switches to standby*: A brightness telegram ends the *Staircase light* function, and the DLR/S executes the brightness telegram via the communication object *Brightness value*. The *Staircase lighting* function is latent and waits until a renewed activation via the communication object *Activate stairc. light.* or via an ON telegram to the communication object *Switch*.

Relative dimming

Options: No reaction
Function switches to standby

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

- *No reaction*: Dimming telegrams are ignored.
- *Function switches to standby*: A dimming telegram ends the *Staircase lighting* function, and the lighting group executes the dimming telegram. The *Staircase lighting* function is latent and waits until a renewed activation via the communication object *Activate stairc. light./Status* or via an ON telegram to the communication object *Switch*.

Recall scene

Options: No reaction
Function switches to standby

When the activated *Staircase lighting* function is activated, 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.
- *Function switches to standby*: A scene recall ends the *Staircase lighting* function, and the DLR/S executes the dimming telegram. The *Staircase lighting* function is latent and waits until a renewed activation via the communication object *Activate stairc. light./Status* or via an ON telegram to the communication object *Switch*.

Reaction on DALI voltage or light controller supply voltage recovery

Options: Not activated
Activate standby
Activate and ON
Previous state to malfunction

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

After a DALI or light controller operating voltage recovery, the lighting group first assumes the state as parameterized in the Parameter window - Gx Fault, page 81. The following states can be parameterized for the *Staircase lighting* function:

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

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

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

Function staircase lighting after download or KNX bus voltage recovery

Options: Not activated
Activate standby
Activate and ON
Previous state to malfunction

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

After a light controller supply voltage recovery, the parameterized brightness value in the Parameter window - Gx Fault, page 81, is set. The *Staircase lighting* function is then executed with the option defined here.

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

Status response of fct. Stairc. light.

Options: No
Yes: via obj. "Activate stairc.light./Status"

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

  Send,
  additional object, see note above

  Options: After a change
  On request
  After a change or request

  - *After a change*: The status is sent via the communication object after a change.
  - *On 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*.

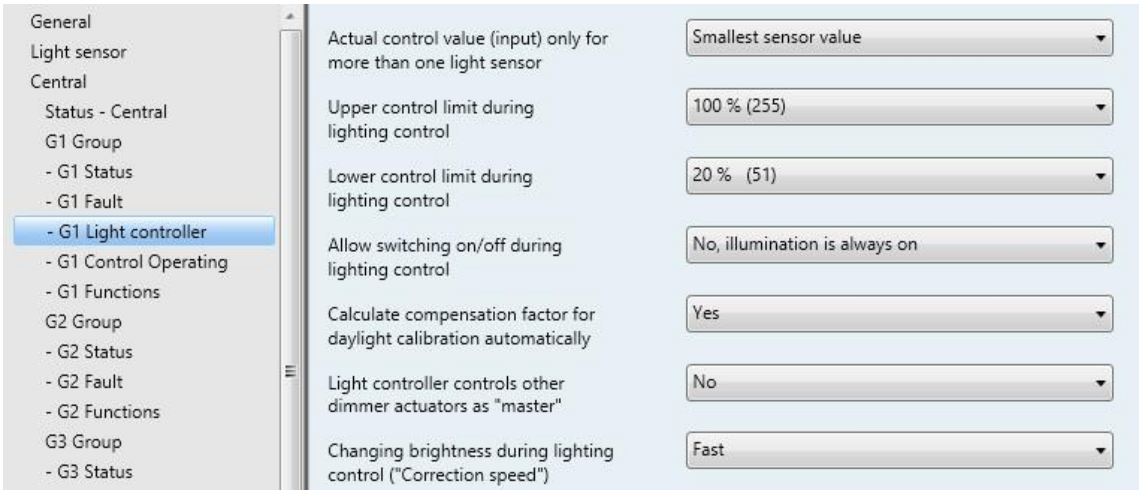
3.2.3.2.5 Parameter window - *Gx Light controller*

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

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

A more detailed description of a light controller as well as a detailed description of the terminology, e.g. such as sensor value, setpoint, actual value etc., can be found under Constant light control, page 171.

The parameter window - *Gx Light controller* is visible when, in the Parameter window Gx Group, page 67, the additional function *Light controller* is parameterized for the lighting group. The additional function *Light controller* is only available for the first eight lighting groups of the DLR/S. Lighting groups 9…16 can be integrated into the controller by a master/slave assignment.



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

Options:
- Smallest sensor value
- Average sensor value
- Largest sensor value

If multiple Light Sensors are assigned to a lighting group, the actual value for the constant light control is determined with this parameter. The lowest value, the highest value or the average value of the detected sensor values can be used for light 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.

- *Smallest sensor value*: The DLR/S uses the lowest sensor value of the assigned Light Sensors as its actual value for constant light control. All those Light Sensors are considered that are assigned to the output (control circuit). With this setting, the room is lit up most brightly by constant light control. The setpoint should not be undershot in normal, malfunction free operation, e.g. when there are no reflections or no direct incidence of light on the Light Sensor.
- *Average sensor value*: The DLR/S uses the linear average value of the assigned Light Sensors as its actual value for constant light control.
- *Largest sensor value*: The DLR/S uses the highest sensor value of the assigned Light Sensors as its actual value for constant light control. This setting ensures that constant light control requires the least possible level of artificial light. 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 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/S can use during light control.

The control limits are independent of the dim and value limits that are parameterized in the Parameter window Gx Group, page 67.

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/S.

- *No, illumination is always on*: The lighting is not switched on or off independently by the light controller. Switching on is implemented by an ON telegram via the *Switch* communication object. This can be undertaken manually using a pushbutton or automatically by a presence detector. In this way, a problematic or extended period of lighting up the lighting equipment can be avoided. This is the case particularly when ignition takes a few seconds. This causes interference and damages the service life of the lighting equipment.
- *Switching OFF only via going up*: The DLR/S 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, in which it is possible to parameterize switch-off, according to the setpoint value deviation. The DLR/S estimates the magnitude of the brightness difference by switching off. It only switches off when the brightness difference is so great that it is not possible to switch on again immediately. In this way, continuous switch on and switch off is avoided. This would cause annoyance and would damage the lighting equipment. 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/S 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/S 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/S does not immediately switch the lighting back on.

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

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.

Calculate compensation factor for daylight calibration automatically

Options: No
Yes

With this parameter, the factor for the daylight compensation can be entered manually via the ETS. This factor considers the evaluation of the artificial light and the natural incidence of light using the Light Sensor. Generally, this factor is determined automatically by the DLR/S during the daylight calibration, refer to Commissioning/calibration of the constant lighting control, page 177.

- *No*: 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.

  Apply 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/S 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/S 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/S during the daylight calibration, refer to Commissioning/calibration of the constant lighting control, page 177.

Light controller controls other dimmer actuators as "master"

Options: No
Yes

- *No*: The DLR/S 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 *Brightness 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:

  Blocking time after sending between two brightness telegrams in s [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 Block time only relates to the communication *Master: Brightness value*.

  Use fct "Master offset brightness"

  Options: No
  Yes

  - *No*: The *Master brightness offset* is not considered or not enabled. An offset is not considered.
  - *Yes*: The brightness value that the DLR/S sends via 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 brightness offset* corresponds to 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 x% of 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 193.

Changing brightness during lighting control ("Correction speed")

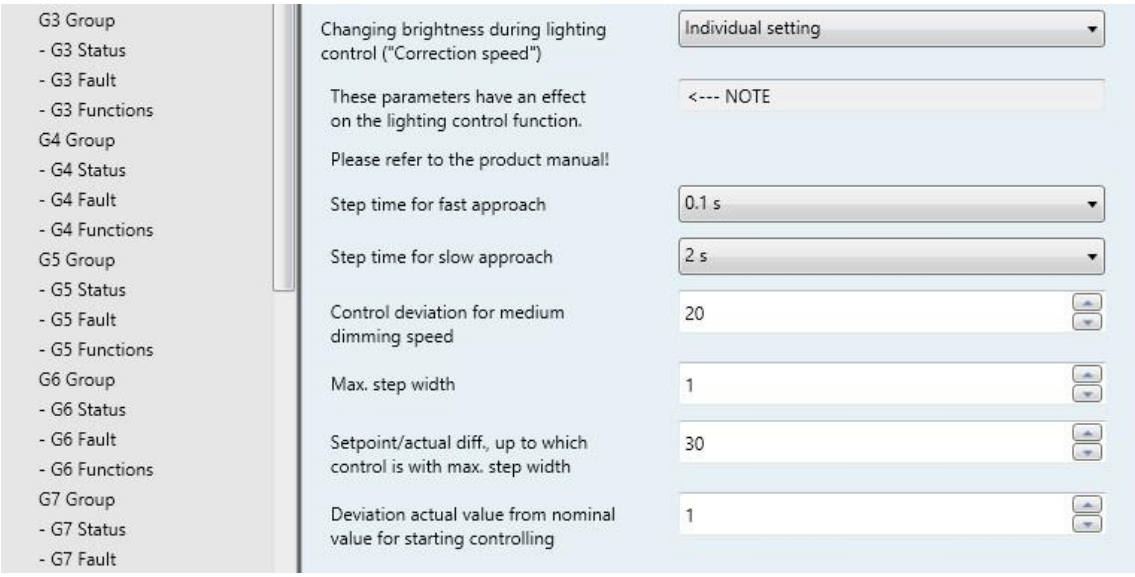
Options: Fast
Medium
Slow
Individual setting

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* settings are possible to reduce the bus load.

- *Fast*: The DLR/S 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 light control has the react quickly to the shade or shadows which result from a blind which closes quickly.
- *Medium*: The DLR/S commences with sending dimming steps at medium speed (< 3 seconds) to approach the setpoint.
- *Slow*: The DLR/S commences with sending dimming steps at slow speed (< 4 seconds) to approach the setpoint. The control speed is dependent on the divergence from the setpoint, see table Determine the setpoint, page 175. Achieving the setpoint value is also dependent on the control increment size, see control dynamics, page 105.
- *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 light and daylight are sufficient in order to ensure exact and stable constant light control. Should this not be possible however – due to particular ambient conditions and/or the properties of the lighting equipment – then the controller 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 light and daylight calibration with the preset control dynamic parameters is sufficient to set good and stable constant light control. If, however, this is not the case and it is not possible to set stable light control due to special conditions in the room, e.g. delays in the lighting circuit, manual fine tuning of the light control can be undertaken with these enabled control dynamic parameters.

Caution: These parameters have an effect on the light 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 light control, page 171

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 lighting equipment. If the step time is less than the delay of the control circuit, the DLR/S will set the brightness beyond the target value and oscillation will occur in the light 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 controller 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 light control, page 171

Setpoint/actual difference, for changeover of fast/slow approach

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 light control, page 171

Max. step width

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/S can perform per control step. In this way, the DLR/S can approach the setpoint value in large steps. There is a danger, however, it exceeds the setpoint and that the light control will be unstable.

For further information see: Constant light control, page 171

Setpoint/actual diff., up to which control is with max. step width

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/S 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 light control, page 171

Deviation actual value from nominal value for starting controlling

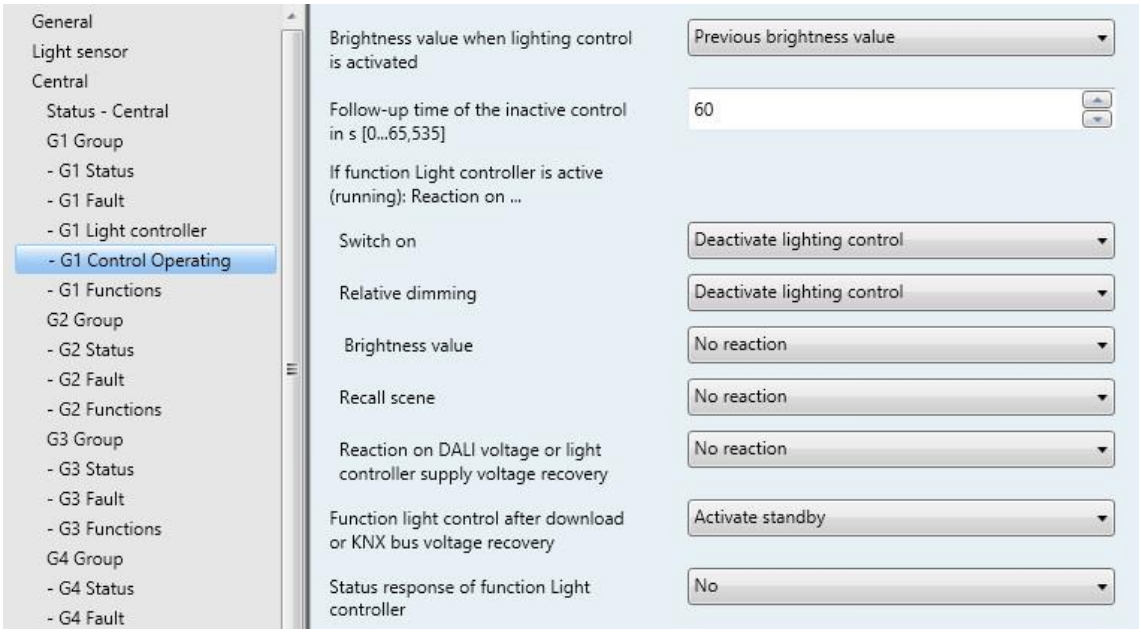
Options: 0…1…30

This value defines a range around the setpoint, in 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 light control, page 171

3.2.3.2.6 Parameter window - *Gx Control Operating*

The parameter window - *Gx Control Operating* is enabled if, in the Parameter window Gx Group, page 67, 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 controller 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 controller. The light controller is in standby mode and can recommence light control via an ON telegram or when a telegram with the value 1 is again received on the communication object *Function Activate controller*.

Brightness value when light control is activated

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

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

- *Last brightness value*: This is the last constant brightness value that existed when the light controller was switched off. If no previous brightness value is stored, 100 % or maximum brightness is assumed.
- *Brightness value (calibration lighting)*: The brightness value that was set during artificial light calibration to set the setpoint brightness. As this value is the current constant light control operating point, the current brightness value required should not deviate greatly from it. Thus, the controller 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…65,535

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), light 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 light control via the communication object *Switch*, a follow-up time is not started.

This reaction 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 controller can assume three operating states: **Light controller is not active:** The light controller was deactivated via the communication object *Fct Activate controller/Status* (telegram has been received with value 0). 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 has been received on the communication object *Fct Activate controller*, is it possible to start the light controller. Whether the additional function *Light control* is active is indicated by the communication object *Status additional functions*, see Communication object no. 3, page 125. **Light controller is in standby operation:** The light controller is active but has however been ended, e.g. by the OFF telegram to the communication object *Switch*. The light controller still remains active in the background and starts again with control after an ON telegram to the communication object *Switch* or *Fct Activate controller/Status*. **Light controller controlling:** The DLR/S controls and adjusts the lighting so that the setpoint brightness is set. The state of the light controller is indicated by the communication object *Status Additional function*, see communication object no. 3, page 125.

If function Light controller is active (running):
Reaction on ...

With these three parameters, you can set how the lighting group of the DLR/S reacts with active light 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*

It is also possible to parameterize the reaction of the controller after DALI bus voltage recovery or light controller supply voltage recovery.

Switch on

Options: No reaction
Deactivate light control
Restart control with brightness value

- *No reaction*: An ON telegram on the communication object *Switch* has no effect on the lighting and the light controller.
- *Deactivate light control*: An ON telegram via the communication objects *Switch* or *Switch/Status* interrupts light control. Light control can be reactivated by an ON telegram or via the communication object *Fct Activate controller/Status*.
- *Restart control with brightness value*: With activated light control, the switch on brightness and light controller 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 controller. The light controller 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 *Fct Activate controller/Status*.

Relative dimming

Options: No reaction
Deactivate light 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 light controller.
- *Deactivate light control*: Light control can be interrupted by a dimming telegram via the communication object *Relative dimming*. Light control can be reactivated by an ON telegram or via the communication object *Fct Activate 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 – light control will continue with the new setpoint. The old setpoint is restored at the next activation of light control, e.g. switch on via communication object *Switch* or via the communication object *Fct Activate controller/Status*.

Note
Characteristic adjustment can only apply exactly for brightness values set via the DALI Light Controller. During dimming, irrespective of whether a group command or central dimming commands are concerned, differences may occur between the set brightness value and the (simulated) brightness value adjusted in the DALI Light Controller. The reason for this is that the DALI uses the commands DIM-UP and DIM-DOWN to control the DALI device in small dim steps with its own DALI characteristic. The DALI characteristic in the DALI device (ballast) cannot be changed by the DALI Light Controller. This deviation can, for example, be determined when the brightness value fed back as the status value after dimming is used directly to set the brightness value. In this case, there may be a brightness jump.

Brightness value

Options: No reaction
Function switches to standby

- *Function switches to standby*: Light control can be interrupted by a brightness telegram. The light controller switches to 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 light control.

Recall scene

Options: No reaction
Function switches to standby

- *Function switches to standby*: Light control can be interrupted by a scene recall. The light controller switches to standby mode. The received scene telegram is implemented. The light controller 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 light control.

Reaction on DALI voltage or light controller supply voltage recovery

Options: No reaction
Function switches to standby

- *Function switches to standby*: The controller switches to the standby state after DALI voltage recovery or light controller operating voltage recovery. Receipt of a subsequent ON telegram starts control. This can be implemented via the communication object *Fct Activate controller/Status*.
- *No reaction*: No function is executed after DALI voltage recovery or light controller operating voltage recovery. The lighting group assumes the parameterized brightness at DALI bus voltage recovery. The controller 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
Activate standby
Activate and ON
Previous state to malfunction

- *Not activated*: No function is executed after download or KNX voltage recovery. The lighting group assumes the parameterized brightness at DALI bus voltage recovery. The controller is deactivated, the lighting group is a normal DALI lighting group without additional function.
- *Activate standby*: After a download or a KNX voltage recovery, the light controller 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 voltage recovery or after a download in the Parameter window - Gx Fault, page 81.
- *Activate and ON*: The light controller is activated and running after download or KNX voltage recovery, i.e. the lighting group immediately commences with control immediately after download of KNX 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 light control has been implemented.
- *Previous state to malfunction*: After a download or KNX voltage recovery, the lighting group assumes the state before download or before KNX voltage failure, i.e., if the lighting group was controlling beforehand, it will continue with control at KNX voltage recovery. If control was deactivated, it is deactivated again after the failure. After the first download, the controller is active and is in standby.

Status response of function Light controller

Options: No
Yes: via object "Fct Activate controller/Status"

- *No*: The status of the light controller is not transferred on the KNX.
- *Yes: via obj. "Fct Activate controller/Status"*: The communication object *Fct Activate controller/Status* does not just activate or deactivate the controller. This communication object also displays the status of whether the control is active or inactive. The following parameter appears:

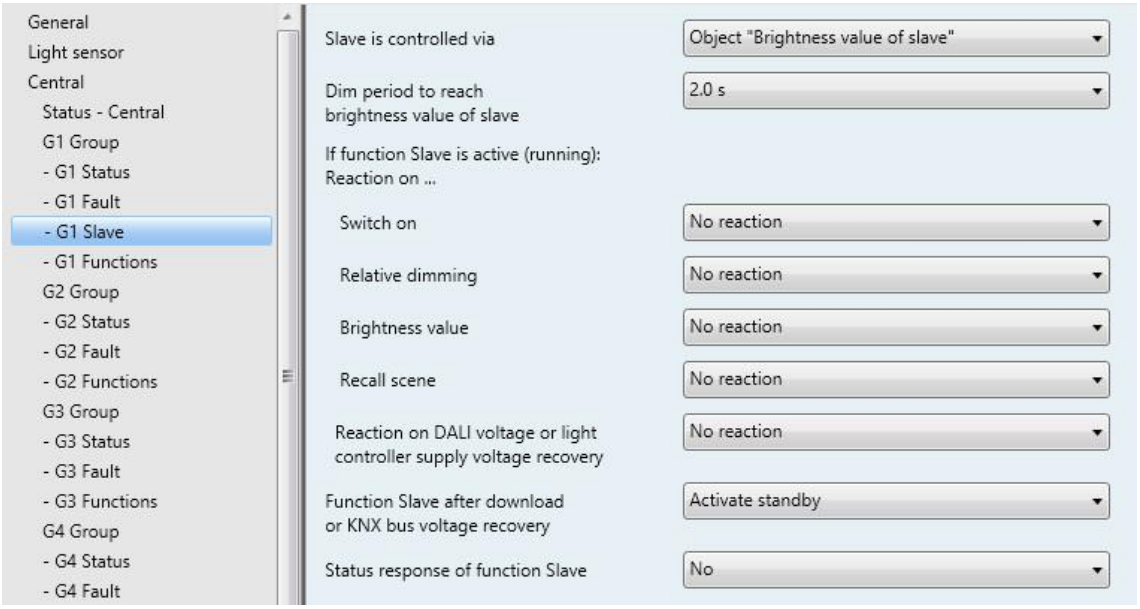
  Send

  Options: After a change
  On request
  After a change or request

  - *After a change*: The status is sent via the communication object after a change.
  - *On 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 the Parameter window Gx Group, page 67, if the parameter *Select additional function* has been set to the option *Slave*.



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

If, in the following section, 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 190

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 from 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/S from one of the first eight 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/S from lighting group x. The brightness value does not have an offset from the master.
- *Group x brightness offset*: In this case, the slave receives its brightness value internally in the DLR/S from lighting group x. The brightness value has an offset from the master of the corresponding lighting group.

Dim period to reach brightness value of slave (function Brightness value)

Options: Jump to
0.7 s
2.0 s
…
90.5 s

This parameter determines the time duration, in which the DLR/S 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 *Slave* function.

- *Jump to*: All the 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): Behavior on ...

Switch on

Options: No reaction
Function switches to standby

When the *Slave* function is activated, 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.
- *Function switches to standby*: An ON telegram ends the *Slave* function and the DLR/S executes the switch telegram. The *Slave* function is latent and waits until a renewed activation (standby state) via the communication object function *Function Activate 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 *Slave* function. The *Slave* function goes over to standby mode, in which the brightness values on the communication object *Brightness value of Slave* are ignored. The *Slave* function 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 the communication object *Function Activate Slave*. The master/slave unit is separated, for example, by deactivation of the function *Slave* (telegram with the value 0 to the communication object *Function Activate Slave*). If the *Slave* function is not active, the brightness values received from the *Slave* function via the communication object *Brightness value of slave* are not available on a lighting group.

Relative dimming

Options: No reaction
Function switches to standby

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

- *No reaction*: A dim telegram is ignored.
- *Function switches to standby*: A dim telegram ends the *Slave* function and the DLR/S executes the dim telegram. The *Slave* function is latent and waits until a renewed activation via the communication object *Function Activate Slave* or via an ON telegram to the communication object *Switch*.

Brightness value

Options: No reaction
Function switches to standby

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

- *No reaction*: A brightness value telegram is ignored.
- *Function switches to standby*: A brightness telegram ends the *Slave* function, and the DLR/S executes the brightness telegram via the communication object *Brightness value*. The *Slave* function is latent and waits until a renewed activation via the communication object *Function Activate Slave* or via an ON telegram to the communication object *Switch*.

Recall scene

Options: No reaction
Function switches to standby

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

- *No reaction*: A scene recall is ignored.
- *Function switches to standby*: A scene telegram ends the *Slave* function, and the DLR/S executes the scene recall. The *Slave* function is latent and waits until a renewed activation via the communication object *function Activate Slave* or via an ON telegram to the communication object *Switch*.

Reaction on DALI voltage recovery or light controller supply voltage recovery

Options: No reaction
Function switches to standby

- *No reaction*: After DALI bus voltage recovery or light controller supply voltage recovery, the *Slave* function is active and responds to the master.
- *Function switches to standby*: The *Slave* function switches to the standby state after DALI voltage recovery or light controller operating 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 executed after download or KNX voltage recovery. The lighting group assumes the parameterized brightness at DALI bus voltage recovery. The *Slave* function is deactivated, the lighting group is a normal DALI lighting group, without additional function.
- *Activate standby*: After a download or KNX bus voltage recovery, the *Slave* function is activated and in the standby state, i.e. after an ON telegram or renewed activation of the *Slave* function, the slave responds to its communication object *Brightness value of slave* or to a defined master lighting group.
- *Activate and ON*: After a download or KNX bus voltage recovery, the *Slave* function is activated and the slave responds to the master.
- *Previous state to malfunction*: After a download or KNX bus voltage recovery, the lighting group assumes the state before the download or before the 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 *Slave* function 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 *Slave* function 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 the *Slave* function and simultaneously sends the current status of the *Slave* function *actively* on the KNX. It is possible to parameterize when the status is sent on the KNX. The following parameter appears:

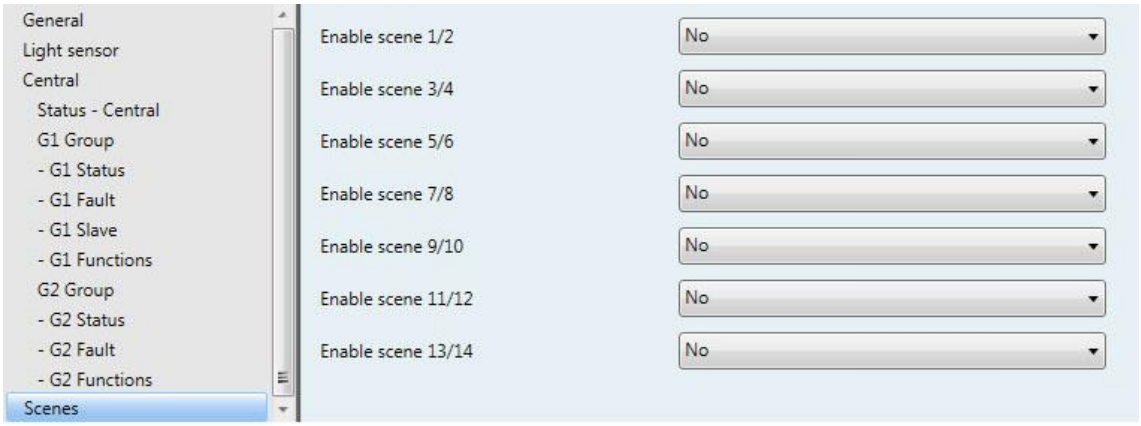
  Send

  Options: After a change
  On request
  After a change or request

  - *After a change*: The status is sent via the communication object after a change.
  - *On 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 *Scene* function is enabled in pairs. The DLR/S facilitates the integration of the 16 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 187

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

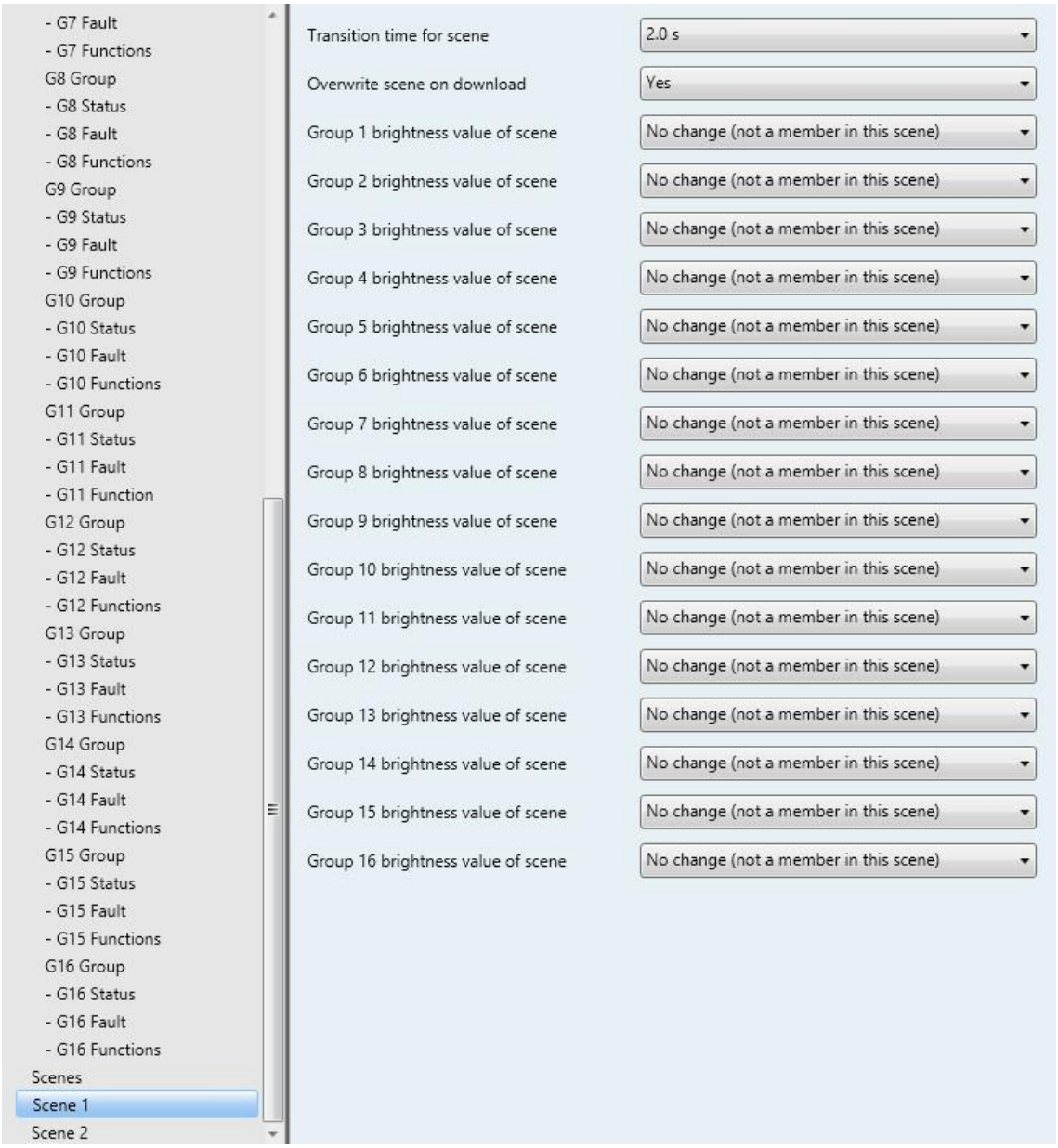
Options: No
Yes

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 the 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 the Parameter window Scenes, page 117, the required scene is enabled.



A scene value must be set in order to assign a lighting group to a scene. The scene value corresponds to the brightness value, which the lighting group assumes when the scene is recalled.

Note
When the *Staircase lighting* function is enabled or an additional function (*Light control* or *Slave*) is enabled, the reaction to a scene recall can be parameterized in the 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
Flexible dimming time – settable via KNX

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 the lighting groups of the scene are dimmed from their current brightness value to the parameterized brightness value within this time duration.
- *Flexible dimming time – settable via KNX*: With a scene recall, all the lighting groups of the scene are adjustable from their current brightness value, to dim them to the parameterized brightness value, using the flexible dimming time 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 129, and Table of fading times Fade Time (no. 8), page 203

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/S 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 the lighting group sets itself to when a scene is recalled.

- *No change (not a member in this scene):* This lighting group does not belong in this scene. During a scene recall, 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 saved.
- *100 % (255)...0 % (OFF):* The lighting group belongs to the scene. During a scene recall, the lighting group is set to the brightness value parameterized here. If the set brightness value is above or below the set maximum or minimum dimming value of the respective lighting group (see the Parameter window Gx Group, page 67), the respective brightness value is saved in the scene.

3.3 Communication objects

This chapter describes the communication objects of the DALI Light Controller DLR/S 8.16.1M. 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 *Scene* x function

In order to obtain a quick overview of the function possibilities of the DLR/S, all the 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…16 and Scene x represents any scene 1…14.

Note
If a DALI device is assigned to several DALI groups, this is referred to as overlapping groups. This function is not supported.

3.3.1 Summary of communication objects

CO No.	Function	Name	Data Point Type (DPT)	Length	Flags				
					C	R	W	T	U
0	In operation	General	1.002	1 bit	x			x	
1	Block manual operation/Status	General	1.003	1 bit	x	x	x	x	
2	Trigger DALI addressing	General	1.003	1 bit	x		x		
3	Status Additional functions	General	non	2 byte	x	x		x	
4	Fault controller supply	General	1.005	1 bit	x	x		x	
5	Acknowledge fault message	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	Lamp fault	DALI output	1.005	1 bit	x	x		x	
17	Ballast fault	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 message	DALI output	1.008	1 bit	x		x		
23	Disabel send. of fault message	DALI output	1.003	1 bit	x		x		
24	Conflict DALI	DALI output	1.005	1 bit	x	x		x	
25	Detect devices	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	W	T	U
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	
	Function Activate Slave	Group 1	1.003	1 bit	x		x		
	Fct Activate slave/Status	Group 1	1.003	1 bit	x	x	x	x	
	Function Activate controller	Group 1	1.003	1 bit	x		x		
	Fct Activate 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	Lamp or ballast fault	Group 1	1.005	1 bit	x	x		x	
	Ballast fault	Group 1	1.005	1 bit	x	x		x	
	Lamp fault	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	
	Activate stairc. light./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 the Parameter window General, page 43, the parameter *Send object "In operation" cyclically* is set with the *Yes* option. In order to monitor the presence of the DLR/S on the KNX at regular intervals, a monitoring telegram can be sent cyclically on the KNX.				
1	**Block manual operation/Status**	**General**	**1 bit** **DPT 1.003**	**C, R, W, T**
Manual operation can be enabled or disabled via this communication object. Telegram value: 0 = Manual operation is enabled 1 = Manual operation is disabled With disabled manual operation, it is not possible to switch the connected DALI devices manually via the DLR/S. Furthermore, the *Detect devices* function cannot be implemented manually using the S button. At the same time, the status of manual operation can be read via this communication object, disabled (1) and enabled (0) and/or sent on the KNX. The value of the communication object is sent on a change, at KNX voltage recovery, after a download and on request. With disabled manual operation, pressing the *Manual operation* button has no effect. The yellow *Manual operation* LED flashes as long as the *Manual operation* button is pressed. After download and KNX voltage recovery, the blocking of manual operation is removed.				
2	**Trigger DALI addressing**	**General**	**1 bit** **DPT 1.003**	**C, W**
The communication object is enabled if, in the Parameter window General, page 43, automatic address assignment is selected via the parameter *Enable automatic DALI addressing* with the *No* option. Using this communication object, the internal function of the DLR/S 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/S verifies the DALI addresses. DALI devices without an address receive a DALI address. DALI addresses that are assigned twice are removed.				

No.	Function	Object name	Data type	Flags
3	**Status Additional functions**	**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 running
(Slave does not follow its master. The brightness of the controller lighting group does not automatically follow the controller)
1 = Additional function not running
(Slave follows its master. The brightness of the controller lighting group automatically follows the controller)

Bit 0 contains the information of the lighting group 1, bit 15 contains the information concerning the status of the additional function of lighting group 16.

The example clarifies the interpretation of the communication object:

This is a 2-byte communication object. The value read from the communication object, e.g. 1058 (= $2^{10} + 2^5 + 2^1$) complies with the binary code below.

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 11, 6 and 2, an additional function (*Light control* or *Slave*) is activated for each and that they operate.

4	**Fault controller supply**	**General**	**1 bit** **DPT 1.005**	**C, R, T**

This communication object is enabled if, in the Parameter window General, page 43, the parameter *Fault controller supply* is set with the *Yes* option.

Should the light controller supply voltage fail for more than one to two seconds, a fault message telegram is immediately sent should *Send on change* be parameterized.

Telegram value: 0 = No fault
1 = Fault

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

This communication object is enabled if, in the Parameter window General, page 43, the parameter *Acknowledge fault messages* is set with the *Yes - acknowledgement is required* option.

This communication object enables both the reset of *Fault controller supply* and the lamp, ballast and DALI fault messages of the individual lighting 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 fault messages

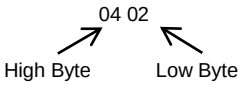
No.	Function	Object name	Data type	Flags
6	**Diagnostics**	**General**	**2 byte** **Non DPT**	**C, R, T**

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

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

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

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



The hexadecimal representation can be found, for example, if you select the DTP 7.001 *(2 byte unsigned, 7.001 Pulses*). This setting is set via 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

Continuation of 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 to the information as queried in the communication object *Request Diagnostics* (no. 7). The content identifies the DALI device or the 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: Lamp fault:
Value 0 = No fault
Value 1 = Fault

Bit 9: Ballast fault:
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 of *Burn-in* function
Value 0 = *Burn-in* function not activated
Value 1 = *Burn-in* function activated (device or lighting group) can only assume state OFF and 100 %

Bit 12: Status of 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 disabled
Value 1 = Lighting group is disabled

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 message is not disabled
Value 1 = Fault message is disabled

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

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

For further information see: Code table Diagnostics High byte (no. 6), page 200

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

This communication object, together with the communication object *Diagnostics* (no. 6), has to represent the function state of the DALI output, a lighting group or an individual DALI device on the KNX. The required information is queried by the DLR/S via the communication object *Request Diagnostics*.

The DLR/S sends the required information on the KNX via the communication object *Diagnosis* (no.6).

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 diagnostics of the 64 DALI devices is requested via the values 0 / 0 Hex (device 1) to 63 / 3F Hex (device 64). The diagnostics of a lighting group is requested via the values 64 / 40 Hex (lighting group 1) to 79 / 49 Hex (lighting group 16).

For further information see: Code table Diagnostics High byte (no. 6), page 200

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 the Parameter window Central, page 53, the parameter *Object format of flexible time for dimming (Fade Time)* is parameterized with the option *DALI format in s [value 0...15 / 0...90.5 s]*.

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 the Parameter window Central, page 53, 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 fade 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 fade 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/S 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 fade 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 value of the communication object is sent automatically on a change or sent by the *Request status values* function 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 the Parameter window General, page 43, the parameter *Request status values* is parameterized with the *Yes* option.

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 *Only 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.

These are central functions (Broadcast mode) that relate to all devices of the output. The properties of the central telegrams are determined in the Parameter window Central, page 53, and Parameter window Status - Central, page 61.

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

Using this communication object, all the DALI devices connected to the DALI output are switched on or off with the predefined brightness values in the Parameter window Central, page 53.

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, then these DALI devices too are set with the parameterized switch-on value.

You can parameterize whether a DLR/S dims or jumps to the brightness value. If the switch-on values are above or below the maximum or minimum 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 *Burn-in* function can influence the brightness of the DALI devices.

If the *Staircase lighting* function 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 the Parameter window Status - Central, page 61, the parameter *Status response of switching state for the output* is parameterized 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 feed back the status.

No.	Function	Object name	Data type	Flags
12	**Status Switch**	**DALI output**	**1 bit** **DPT 1.001**	**C, R, T**

This communication object is enabled if, in the Parameter window Status - Central, page 61, the parameter *Status response of switching state for the output* is parameterized 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*.

No.	Function	Object name	Data type	Flags
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 the Parameter window Central, page 53, it can be parameterized whether the brightness value is jumped to 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 the Parameter window Status - Central, page 61, the parameter *Status response of brightness value for this 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.

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 the Parameter window Status - Central, page 61, the parameter *Status response of brightness value of this output* is parameterized 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 the connected DALI devices is received via this communication object. These 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 from 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	**Lamp fault**	**DALI output**	**1 bit** **DPT 1.005**	**C, R, T**

This communication object is enabled if, in the Parameter window Status - Central, page 61, the parameter *Lamp fault* is parameterized 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 device.

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/S will also be unable to detect a lamp fault. In order to monitor a lamp fault, the function *Detect devices* does not need to be explicitly activated.

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

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

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

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

This communication object is enabled if, in the Parameter window Status - Central, page 61, the parameter *Ballast fault* is parameterized with the *Yes* option.

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/S does not receive a status response from the ballast
- The ballast has lost its address, a query from the DLR/S remains unanswered

It is possible to parameterize if 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/S has to know how many ballasts are to be monitored. This is implemented by one-time activation of the communication object *Detect devices* (no. 25). Using this function, the DLR/S independently determines which ballasts (DALI device/DALI address) 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 *Detect devices* function must be executed again.

The process does not need to be repeated when exchanging a DALI device with the same address. The new DALI device contains the old DALI address and assumes the position of the DALI device it replaced.

The *Detect devices* function can not only be triggered via the communication object *Detect devices*, but also by pressing the S button in manual mode. Furthermore, this function can be triggered with the Software Tool using the *Detect devices* button in the *Options* window.

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

This communication object is enabled if, in the Parameter window Status - Central, page 61, the parameter *Fault DALI* is parameterized with the *Yes* option.

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 if 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 the Parameter window Status - Central, page 61, the parameter *Fault group/device code enable encoded fault message* is parameterized with the *Yes* option.

Via this communication object, the DLR/S transfers the status of a fault of every lighting group or of each individual DALI device to the KNX. It can be parameterized whether the bit combination corresponds to a lighting group 0…15 (group-oriented) or an individual DALI device 0…63 (device based).

Bit 0…5 = Contains the binary number (0…15 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 oriented 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

Device oriented 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 206

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 fault state 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 the Parameter window Status - Central, page 61, the parameter *Fault group/device code enable encoded fault message* is parameterized with the *Yes* option.

Using this communication object, the number of lighting groups or individual DALI devices, which have at least one lamp or ballast fault, is displayed. The value relates to the lighting group or the individual DALI device, depending on whether parameterization is *group-orientated* or *device-based*.

The communication object value is sent after a change. If the acknowledgement of fault messages is activated, the communication object value (Number of faults) only changes after acknowledgement.

Telegram value: 0…16 = number of lighting groups with fault
0…64 = number of individual DALI devices with fault

21	**No. Group/device fault**	**DALI output**	**1 byte** **DPT 5.010**	**C, R, T**

This communication object is enabled if, in the Parameter window Status - Central, page 61, the parameter *Fault group/device code enable encoded fault message* is parameterized with the *Yes* option.

With this communication object, the first lighting group or the first DALI device is displayed as a numeric value. The value relates directly to the lighting group or the individual DALI device depending on the *group-oriented* or *device-based* parameterization. A correction by 1, as required for the values in the communication objects *Diagnostics* (6) and *Fault group/device code* (no. 7) is not necessary in the communication object described here.

Telegram value: 1…16 = number of lighting group with fault
1…64 = number of individual DALI device with fault

All the lighting groups or DALI devices with a fault can be displayed successively in conjunction with the communication object *Switch up next fault message* (no. 22). If the communication group *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.

22	**Switch up next fault message**	**DALI output**	**1 byte** **DPT 1.008**	**C, W**

This communication object is enabled if, in the Parameter window Status - Central, page 61, the parameter *Fault group/device code enable encoded fault message* is parameterized with the *Yes* option.

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 highest number of the lighting groups or DALI devices with a fault is displayed on the communication object *No. Group/device fault* (no. 21).
1 = "Switch down": The next lowest number of the lighting groups or DALI devices 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	**Disabel send. of fault message**	**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/S. If the fault messages are disabled, the DLR/S 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 fault messages are enabled, the malfunctions will be sent in accordance with their parameterization. If a fault still exists after enabling of the fault 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/S). In this case, the DLR/S 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 by the DLR/S. Operation can continue as normal. After checking the lighting equipment, normal monitoring can be reactivated via the fault message communication object *Disabel send. of fault message*.

24	**Conflict 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/S 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 group assignments are installed on the DLR/S.

Telegram value 0 = There is no DALI conflict, i.e. the state (groups and scenes) matches the information stored in the DLR/S.
1 = There is a DALI conflict

No.	Function	Object name	Data type	Flags
25	**Detect devices**	**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 detect a ballast fault correctly, the DALI Light Controller must have correctly identified all the 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, the 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 according to the parameterization. Automatic detection, e.g. after a KNX voltage recovery or light controller operating 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 observed, 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 device detection
0 = No function

Note

This function can be triggered in manual mode using the S button. Furthermore, DALI devices can be detected and saved as a reference value in the Software Tool using the *Detect devices* button.

26	**Burn-in lamp**	**DALI output**	**1 bit** **DPT 1.010**	**C, W**

This communication object is enabled if, in the Parameter window Central, page 53, the parameter *Enable central function Burn-in object "Burn-in lamps / Status"* is parameterized with the *Yes* option. Furthermore, the *Burn-in* function must be enabled in the Parameter window Gx Group, page 67. Here, the burn-in time for the lighting group also has to be set.

Using this communication object, the *Burn in* function is activated or deactivated to protect the ballast and the lamp. After receiving a telegram with the value 1, all the 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 the Parameter window Gx Group, page 67, with the parameter *Enable function burn-in object "Burn-in lamps"*. Incoming telegrams have an effect on all the 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 scenes can be recalled. If another 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 *Burn-in* function 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 lighting equipment, page 165

Alternatively, burn-in of an individual lighting group can be triggered via the communication object *Burn-in lamps group x* (no. 37). The communication objects *Burn-in lamps/Status (group x)*, *Burn in lamps* and *Burn-in lamps/Status (DALI output)* 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 the Parameter window Central, page 53, the parameter *Enable central function Burn-in object "Burn-in lamp/status"* is parameterized with the *Yes* option 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 lamps* described previously, 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 light and daylight calibration of a constant light control.

Using this communication object, the communication objects *Daylight calibration* or *Artificial light calibration* are enabled for receipt of a telegram, i.e., the DLR/S only performs daylight or artificial light calibration if the communication object *Enable controller calibration* has received a telegram with the number of the respective lighting group (1…8) beforehand. This ensures that calibration is not performed unintentionally.

The readiness to receive a telegram for the activation of the daylight or artificial light 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…8 = The numeric value enables the lighting group, via the communication objects *Calibration artificial light* or *Calibration daylight*, to perform a calibration 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 light 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/S, 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 light takes about a minute. When the calibration of the artificial light is completed, the communication object value is reset to 0. The value is sent on the KNX by setting the T flag. After calibration, light control for the DALI output is activated and controls.

The DLR/S is taught to recognize the artificial light levels with lighting calibration. At the same time, a characteristic for the lighting is recorded and stored in the DLR/S.

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 light control in the room, is set.

After a reset or discharge of the DLR/S 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 light calibration should always be performed, so that the characteristic curve of the lighting equipment is known to the DLR/S.

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/S as the new setting for a setpoint value via the communication object Control parameter, e.g. for lighting group 1, communication object no. 41. This overwrites the controller setting for the current setpoint value.

For further information see: Performing artificial light calibration, page 178

The sequence of daylight and artificial light 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/S, 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 light from the lighting is switched off. 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 seconds. When 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, light control for the DALI output is activated and controls.

The DLR/S is taught to recognize the natural lighting levels with daylight calibration. In this way, the DLR/S determines the relationship between artificial light and daylight which improves the constant light control. The daylight calibration should be performed without the influence of artificial light. 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 factor for daylight calibration can be assigned via the ETS. This factor can be optimized manually through experimentation by observing the light controller so that the light controller sets itself to the setpoint brightness.

For further information see: Performing daylight calibration, page 180

The sequence of daylight and artificial light 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 67).

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 lighting group is switched on with any brightness value and it receives a renewed ON telegram, the parameterized brightness value of the switch-on value is set. Any *Burn-in* function 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 switch-on value 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 the Parameter window - Gx Status, page 77.

No.	Function	Object name	Data type	Flags
30	**Switch/Status**	**Group x**	**1 bit** **DPT 1.001**	**C, R, W, T**

The communication object is enabled if, in the Parameter window - Gx Status, page 77, the parameter *Status response of switching state* is parameterized 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 it 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 feed back 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 the Parameter window - Gx Status, page 77, the parameter *Status response of switching state* is parameterized 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 the Parameter window Gx Group, page 67, you can parameterize whether to jump to this value or dim 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*. Normally, a separate communication object *Status brightness value* is used. This can be enabled in the Parameter window - Gx Status , page 77.

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 the Parameter window - Gx Status, page 77, the parameter *Status response of brightness value* is set with the *Yes: via object "Brightness value/Status"* option.

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 the Parameter window - Gx Status, page 77, the parameter *Status response of brightness value* is set with the *Yes: via separate object "Brightness value/Status"* option. 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**
The relative dimming telegram is received for the respective lighting group via this communication object. They are the 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. Due to the DALI functionality (dimming step 200 ms), the "Step-by-step dimming" rarely used in KNX is only conditionally supported.				

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	**Lamp or ballast fault** **Ballast fault** **Lamp fault**	**Group x**	**1 bit** **DPT 1.005**	**C, R, T**

Depending on the parameterization in the Parameter window - Gx Status, page 77, a fault in the lighting group x can be displayed on the KNX using this communication object.

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

Ballast fault: The loss of a 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/S does not receive a status message.
- The ballast has lost its address, a query from the DLR/S remains unanswered.

Note

In order to guarantee correct evaluation of a ballast fault, the DLR/S has to know how many ballasts are to be monitored. This is implemented by one-time activation of the communication object *Detect devices* (no. 25). Using this function, the DLR/S 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 *Detect devices* function must be executed 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 *Detect devices* function can not only be triggered via the communication object *Detect devices*, but also by pressing the S button in manual mode. Furthermore, this function can be triggered with the Software Tool using the *Detect devices* button in the *Options* window.

Lamp fault: A defective lamp in the lighting group is indicated. This function must be supported by the DALI device. 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/S will also be unable to detect a lamp fault. In order to monitor a lamp fault, the *Detect devices* function does not need to be explicitly run.

Lamp of ballast fault: 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/S with a logical OR.

Note

The information about an individual DALI device is provided with a fault by the DLR/S 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 the Parameter window - Gx Functions, page 86, the *Forced operation 2 bit control* function 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. Forced operation is active.
3 = The lighting group is switched on forcibly with the parameterized brightness value. Forced operation is active.

Incoming telegrams during Forced operation are not executed, but are, however, evaluated in the background (dimming processes are not considered). After the enabling 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 previous *Light control* or *Slave* function is recommenced (in standby). The *Staircase lighting* function 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 86.

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 the Parameter window - Gx Functions, page 86, the *Forced operation 1 bit control* function 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 operated forcibly and switched on with the parameterized brightness value. 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/S had control before *Forced operation*, light 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 86.

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 the Parameter window - Gx Functions, page 86. The communication object relates individually to the lighting group x. The burn-in time is entered in the Parameter window Gx Group, page 67, if the *Burn-in* function is enabled via the parameter *Enable function Lamp burn-in object "Burn-in lamps"* for the lighting group.

Using the additional communication object *Burn-in lamps/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 lamps* (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 another 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 *Burn-in* function and enables "normal" operation. The burn-in time is only counted if a ballast is connected to the DALI output 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 lighting equipment, page 165

Alternatively, the burn-in of all the lighting groups can be initiated via the communication object *Burn-in lamps* (no. 26) of the DALI output. The communication objects *Burn-in lamps/Status* of the DALI output and group x are independent of each other. The burn-in time of the lighting group is triggered 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 or the DALI output communication object.

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 the Parameter window - Gx Functions, page 86.

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.

On the other hand, a Block during the staircase lighting time or control function leads to an immediate Block of the DALI output and freezing of the brightness value. After unblocking, the function *Staircase lighting* continues with dimming (prewarning). If the *Light control* or *Slave* functions 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 160.

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 the Parameter window Scenes, page 117. Enabling is always in pairs.

In the Parameter window Scene x, page 118, it is possible to parameterize which lighting group is a member of the scene.

Note

The *Staircase lighting* function is comprised of two scenes. The DLR/S automatically selects the internal scenes 13 and 14 when the *Staircase lighting* function is selected.

For further information see: Staircase lighting, page 167

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 values (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	0Dh	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 210

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 the Parameter window Scenes, page 117, the respective scenes have been enabled.

A telegram, which is received via the communication object from the DLR/S, recalls scene x or y. Only the lighting groups which also 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 the Parameter window Scene x, page 118. If the option *Overwrite scene on download* is selected with the *Yes* option, the scene values parameterized by the ETS are written to the DALI devices of the lighting groups 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 the Parameter window Scenes, page 117, the respective scenes have been enabled.

A telegram, which is received via this communication object from the DLR/S, causes the DLR/S to save the current brightness values of the lighting groups 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 possibly 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 *No* option for *Overwrite scene on download* in the Parameter window Scene x, page 118. In this case, the brightness values parameterized in the ETS are not written into the DALI devices of the lighting groups. The scene brightness values set manually via the KNX are retained.

Note

Not all 16 lighting groups are considered when saving. Only the lighting groups, which belong to the scene, are considered.

Thus, for example, the lighting groups in adjacent rooms, which are not part of the scene, are not changed.

3.3.6 Communications object *Light control*

If one of the first 8 lighting groups is parameterized with the additional function *Light control*, the following communication objects appear.

Optionally, the status of the *Light control* function 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 description, see Communication object no. 30, page 144.				
31	**Function Activate controller**	**Group 1**	**1 bit** **DPT 1.003**	**C, R, W**
This communication object is enabled if, in the Parameter window Gx Group, page 67, in the parameter *Select additional function*, the *Light control* option is enabled and, simultaneously in the Parameter window - Gx Control Operating, page 107, the parameter *Status response of function Light controller* is parameterized with the *No* option. The light controller can be activated (telegram with value 1) and deactivated (telegram with value 0) via this communication object. An activation of the light controller simultaneously causes the light controller to commence control immediately. The controller starts with the switch-on value for the light control parameterized in the Parameter window - Gx Control Operating, page 107. 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	**Fct activate controller/Status**	**Group 1**	**1 bit** **DPT 1.003**	**C, R, W, T**
This communication object is enabled if, in the Parameter window Gx Group, page 67, the additional function *Light control* is enabled and, simultaneously in the Parameter window - Gx Control Operating, page 107, the parameter *Status response of function Light controller* is parameterized with the *Yes: via object "Fct Activate controller/Status"* option. In this case, the status of the *Controller* function 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**
For a description, see communication object no. 32, page 145				

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 the Parameter window - Gx Light controller, page 99, 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, *Slave* function remains active
…
255 = 100 %

As an option, the brightness value can also be sent internally in the DLR/S directly to the slave. This reduces the KNX bus load. This property is set in the slave in the Parameter window - Gx Slave, page 112, using the parameter *Slave is controlled via*.

Using the master/slave function, additional lighting equipment such as DALI lighting equipment can be integrated into the light control with the DLR/S using a normal ABB i-bus® DALI Gateway or other 1-10 V lighting equipment 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 *Function Activate controller*), the master continues to send the brightness value via the 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 disconnected, for example, by deactivation of the slave (telegram with the value 0 to communication object *Function Activation Slave*). If the slave is deactivated, the brightness values received from the slave via the communication object *Master/Slave: Brightness value* are 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 the Parameter window - Gx Light controller, page 99, the lighting group of the DLR/S is parameterized as a master and an offset is enabled.

Using this communication object, the current brightness value of the controller is sent with the parameterized offset 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/S to another lighting group (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 using the next communication object *Master: Offset activate* (activated, value 1) or switched off (deactivated, value 0). This is particularly useful if no natural light shines through the window and differing brightness from two lamp strips is inexpedient to light up the room uniformly.

With deactivated light control (telegram with the value 0 to the communication object *Function Activate controller*), the master continues to send the brightness value via the 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 disconnected, for example, by deactivation of the slave mode (telegram with the value 0 to the communication object *Activate slave mode*). If Slave mode is deactivated, the brightness values received from the slave via the communication object *Master/Slave: Brightness value* are 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 the Parameter window Gx Group, page 67, the *Light control* option is enabled in the 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.

When an offset is activated, the brightness value of the master has the parameterized percentage applied and is made available to the slave via the 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 193

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 the Parameter window Gx Group, page 67, 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.

Thus, different setpoint settings for light control can be set for various applications, e.g. for competition and training settings in sports centers. The procedure is described under Changing the setpoint, page 175.

It is inadvisable to transfer the control parameter setting for a setpoint from other rooms, as it is practically impossible that both rooms have exactly the same reflection properties and brightness conditions. Furthermore, the characteristic which controls the lighting is determined during the automatic artificial light calibration. If a control parameter for a setpoint value is still to be 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 *Slave* function

If the additional function *Slave* has been selected in the Parameter window Gx Group, page 67, the following communication objects appear.

The status value of the *Slave* function is fed back. In the Parameter window - Gx Slave, page 112, you can parameterize whether the status of the *Slave* should be sent. In this case, the status is sent via the communication object *Fct Activate Slave/Status*.

No.	Function	Object name	Data type	Flags
31	**Function Activate Slave**	**Group 1**	**1 bit** **DPT 1.003**	**C, W**

This communication object is enabled if, in the Parameter window Gx Group, page 67, the additional function *Slave* is enabled.

This communication object is used for activation/deactivation of the *Slave* function.

During deactivation, the lighting group behaves like a "normal" lighting group of the DLR/S. The *Slave* function can be reactivated when the DLR/S 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 *Slave* function 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 controller groups 1…8 (master). The brightness value of the master is transferred directly in the DLR/S to the slave. As a result, the KNX bus load is minimized. Optionally, the brightness value from the master can be provided with an offset, whereby the second lamp strip (Slave) is controlled with an increased or reduced brightness value in comparison to the master.

In the Parameter window - Gx Slave, page 112, you can parameterize whether a switch, brightness value or relative dimming telegram interrupts the *Slave* function.

Note

With the *Slave* function selected, the DLR/S 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	**Fct Activate Slave/Status**	**Group 1**	**1 bit** **DPT 1.003**	**C, W, R, T**

This communication object is enabled if, in the Parameter window Gx Group, page 67, the additional function *Slave* is enabled and, simultaneously in the Parameter window - Gx Slave, page 112, the parameter *Status response of function Slave* is programmed with the *Yes: via object "Activate Slave/Status"* option.

In this case, the status of the *Slave* function 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 parameter setting. When the *Slave* function is activated, the brightness values received via this communication object are normally ignored.

Optionally, however, if a telegram is received on this communication object, the *Slave* function can be deactivated. The appropriate parameterization must be carried out in the Parameter window - Gx Slave, page 112.

No.	Function	Object name	Data type	Flags
33	**Brightness value of slave**	**Group 1**	**1 byte DPT 5.001**	**C, W**

This communication object is enabled if, in the Parameter window Gx Group, page 67, the additional function *Slave* is enabled and, in the Parameter window - Gx Slave, page 112, for the *Slave is controlled via* parameter, the *Object "brightness value of slave"* option 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 *Slave* function 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 the Parameter window - Gx Slave, page 112, you can parameterize whether a switch, brightness value or relative dimming telegram interrupts the *Slave* function.

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 *Slave* function remains active.
…
255 = 100 %

In the case of internal master/slave communication, the brightness value is transferred internally in the DLR/S from a controller lighting group. With the *Slave is controlled via* parameter in the Parameter window - Gx Slave, page 112, it is possible to parameterize by which controller 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 lamp 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 190

The offset can be switched on or off via the communication object *Master: Offset activate* (no. 40).

3.3.8 Communication objects *Staircase lighting* function

The communication objects for the *Staircase lighting* function are to be enabled as additional communication objects in the Parameter window - Gx Functions, page 86. A maximum of two communication objects can be enabled simultaneously for the *Staircase lighting* function. The communication objects appear as number 37 or 38.

No.	Function	Object name	Data type	Flags
37/38	**Activate stairc. light./Status**	**Group 1**	**1 bit** **DPT 1.003**	**C, R, W, T**
This communication object can be enabled in the Parameter window - Gx Functions, page 86, as one of the two additional communication objects. This communication object is used for the activation/deactivation of the *Staircase lighting* function. On deactivation, the lighting group behaves like a “normal” lighting group of the DLR/S without the *Staircase lighting* function. The *Staircase lighting* function can be reactivated if a telegram with the value 1 is received on the DLR/S 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 the *Staircase lighting* function is activated, the *Staircase lighting* function is initiated by a telegram with the value 1 to one of both communication objects *Switch* or *Switch/Status*. In the Parameter window - Gx Staircase lighting, page 94, it is possible to parameterize whether a switch, brightness value, relative dimming or scene telegram interrupts the *Staircase lighting* function. Furthermore, using this communication object, the status of *Staircase lighting* function can be made available on the KNX. The status indicates whether the *Staircase lighting* function is activated or deactivated. It does not show that the staircase lighting is running. For further information, see: Parameter window - Gx Staircase lighting, page 94, or Staircase lighting, page 167				
37/38	**Staircase light. permanent ON**	**Group 1**	**1 bit** **DPT 1.003**	**C, R, W, T**
This communication object can be enabled in the Parameter window - Gx Functions, page 86, as one of the two additional communication objects. When the *Staircase lighting* function is activated, it allows 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 the Parameter window - Gx Functions, page 86, 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)* 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 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

In this section, you will find some tips and application examples for practical use of the DALI Light Controller DLR/S 8.16.1M.

4.1 Automatic DALI addressing

To help you appreciate the functionality of the DALI Light Controller better, this chapter describes the addressing of the DLR/S.

DALI commissioning (configuration) is necessary for the DALI Light Controller. The connected DALI devices are automatically detected and an address in ascending order is assigned if no DALI address is available.

Note
The DLR/A does not perform automatic DALI addressing for DALI devices if, in the Parameter window General, page 43, the parameter *Enable automatic DALI addressing* has been set to *No*.

As soon as the light controller operating voltage has been applied to the DLR/S, it automatically and independently checks the DALI devices connected to the DALI output. This process is also started after a download or KNX voltage recovery or light controller operating voltage recovery and may take about 60 seconds, depending on the number of connected DALI devices. If equipment with a DALI interface is detected, which does not possess a defined DALI address (default delivery state, DALI short address 255), the DALI Light Controller will automatically assign a DALI address. The detected DALI device will be assigned the first free DALI address (0 to 63) in the DLR/S. If no DALI devices have yet been 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/S, finds a device with DALI interface cannot be influenced. If the connected DALI device already has a DALI address, e.g. exchange device from another system, it will not be changed.

If the new DALI device has a DALI address, which is used in the DLR/S, one of both DALI devices with the same address will be assigned a new and unused DALI address. This means that the old DALI device, which is already connected to the DLR/S, will receive a new address.

With the DLR/S, you can now control the connected DALI devices with the DALI output communication objects 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.

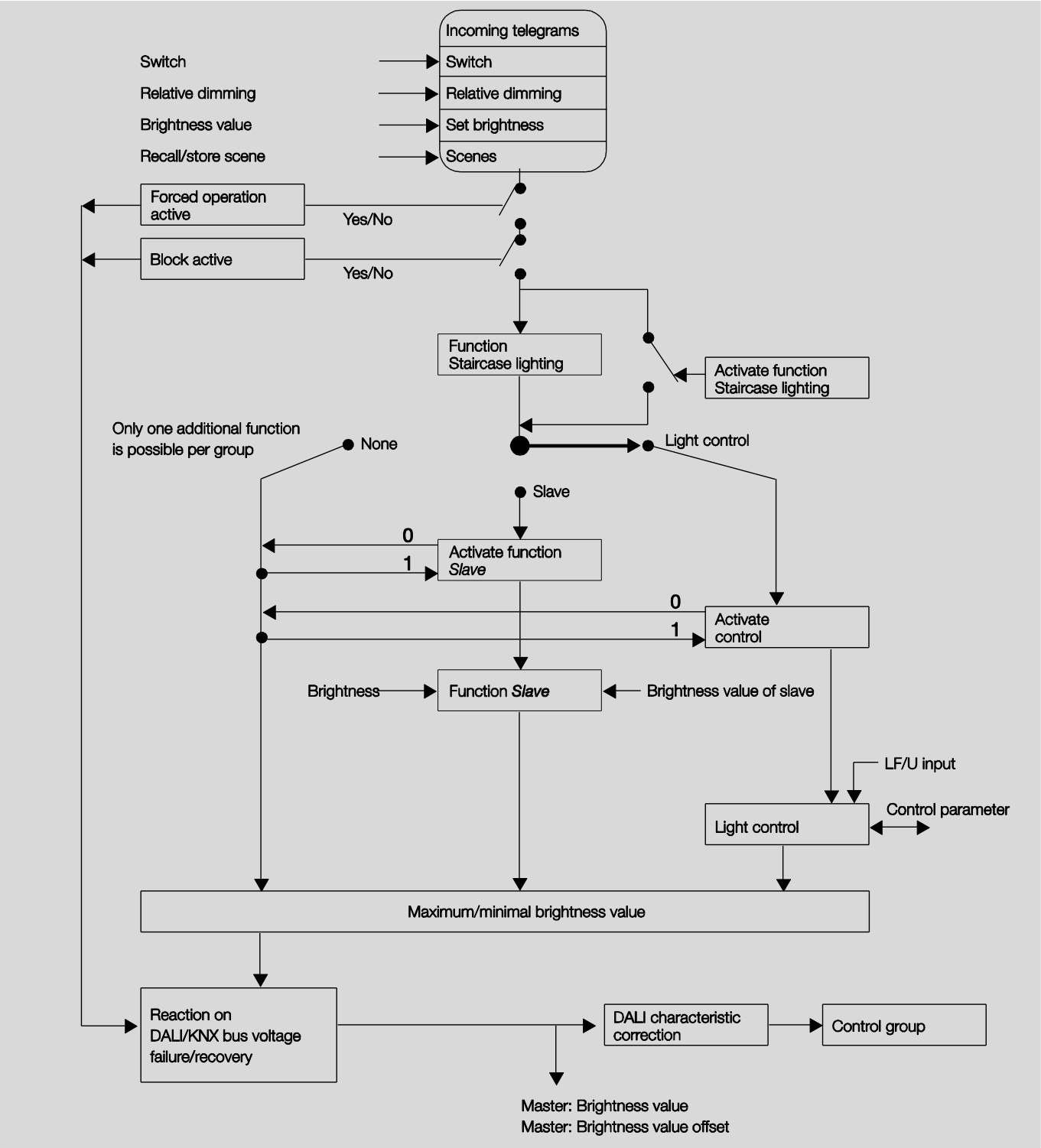
For more information see: online help, Software Tool

4.2 Function diagram

The function diagram indicates the sequence in which the functions of the DLR/S are processed. If several communication objects in the function diagram 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 specified in simplified form, as follows: 1. Forced operation 2. Block 3. Manual operation 4. Software Tool 5. KNX telegrams

Note
The additional function *Slave* has a higher priority than the *Staircase lighting* function, with regard to the parameterized reaction to incoming KNX telegrams. The *Staircase lighting* function has a higher priority than the additional function *Light control* with regard to the parameterized reaction to incoming KNX telegrams. The *Burn-in* function does not interrupt a function. However, all the brightness values not equal to 0 are set to a brightness value of 100 %. Manual operation: The Forced operation and Block of a lighting group have a higher priority than manual operation. Telegrams from the Software Tool are also executed during manual operation. Other incoming KNX telegrams are not executed during manual operation. Central telegrams interrupt the functions *Slave*, *Light control* and *Staircase lighting* of a lighting group. The lighting groups execute 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
Set brightness
Scenes
Switch
Relative dimming
Brightness value
Recall/store scene
Forced operation active
Yes/No
Block active
Yes/No
Function Staircase lighting
Activate function Staircase lighting
Only one additional 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 value offset

4.3 Monitoring of lamps and ballasts

With the DLR/S, the fault 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/S 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.) is available for a fault message per lighting group. This communication object can contain the information about a lamp fault (*Lamp fault*), a ballast fault (*Ballast fault*) or a logical OR combination of lamp and ballast fault (*Lamp or ballast fault*).
- 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 device or lighting group number (this can be parameterized) and the fault information (*Lamp or ballast fault*). The function can be taken from the descriptions in the chapter Communication objects, from page 121.
  - The communication object *Diagnostics* (no. 6) and be made available on the KNX. The function can be taken from the descriptions in the chapter Communication objects, from page 121.
- The number of the DALI device with a fault or a lighting group with a fault (can be parameterized) can be sent as a numeric 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 message* (no. 22). The number 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/S has to know how many ballasts are to be monitored. This is implemented by one-time activation of the communication object *Detect devices* (no. 25). With this function, the DLR/S establishes automatically how many DALI devices are connected and the addresses to which they are connected. The DLR/S saves this information as a reference value. If this system has to be extended or reduced, the *Detect devices* function should again be executed. 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 execute *Detect devices* 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 as a 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 failed ballast from the DLR/S and can assume the functions of the failed DALI device, should it have the same technical characteristics.

Note
The parameter *Enable automatic DALI addressing* in the Parameter window General, page 43, 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/S.

The DLR/S assigns the first free DALI address to the new DALI device. If the new DALI device has a DALI address which is already used in the DLR/S, one of both DALI devices with the same address will be assigned a new and unused DALI address. In this way, the fault-free DALI device, which is already on the DLR/S, may receive a new address.

Using the Software Tool, a correction or exchange of the DALI address, along 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 lighting equipment

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 lighting equipment has no effect on the control circuit. If a lower brightness level is achieved due to ageing of the lighting equipment with the same control, the DLR/S, e.g. via a DLR/S lighting group, will continue to increase the level of artificial light until the setpoint brightness is achieved.

However, it must be considered that the characteristic of the lighting equipment changes with ageing. The characteristic was 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 light 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/S then assumes that the level of daylight is lower than it actually is. There appears to be less daylight needing to be compensated.

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/S would control to a level which is too dark by 10 %.

In concrete terms, this would mean that a light control originally set by the DLR/S to 500 lx will now only provide a brightness value of 450 lx. Furthermore, the tolerances of the DALI Light Controller as described in chapter Technical data , page 12, apply.

Note
The burn-in time, where the light may not be dimmed, must be complied with to ensure that the most stable possible lighting equipment performance is assured. During the burn-in time, which usually lasts between 50 and 100 hours, the lighting equipment must be operated at 100 % brightness. The burn-in time of a luminaire can be obtained from the manufacturer.

4.6 Burning-in of lighting equipment

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 lamp 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 lamps.

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 a burn-in time via the communication object *Burn-in lamps/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 for the *Burn-in* function, 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 *Burn-in* function can be activated for all the lighting groups together (DALI output) or by using an additional communication object for each lighting group individually (group x). In the Parameter window Gx Group, page 67, every lighting group can be approved for burn-in with the parameter *Enable central function Burn-in object "Burn-in lamps/Status"*. The activation of the *Burn-in* function can be undertaken centrally via the communication object *DALI output* or per lighting group via the *Group x* communication objects.

The DALI Light Controller features a separate hour counter (1…255 h) for each individual DALI device for the *Burn-in* function. The accuracy 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 five 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/S allows the option of simultaneously feeding back the status (*Switch/Status*, *Brightness value/Status*) via the control communication objects (*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 communication objects. The DALI device should be parameterized as the broadcaster. Otherwise, it is possible that there is continuous switching over and back of the controller 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 *Staircase lighting* function, 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 period of time. 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 the KNX.

It must be considered that the *Staircase lighting* function consists of two scenes. The DALI Light Controller automatically selects the internal scenes 13 and 14 when the *Staircase lighting* function is selected.

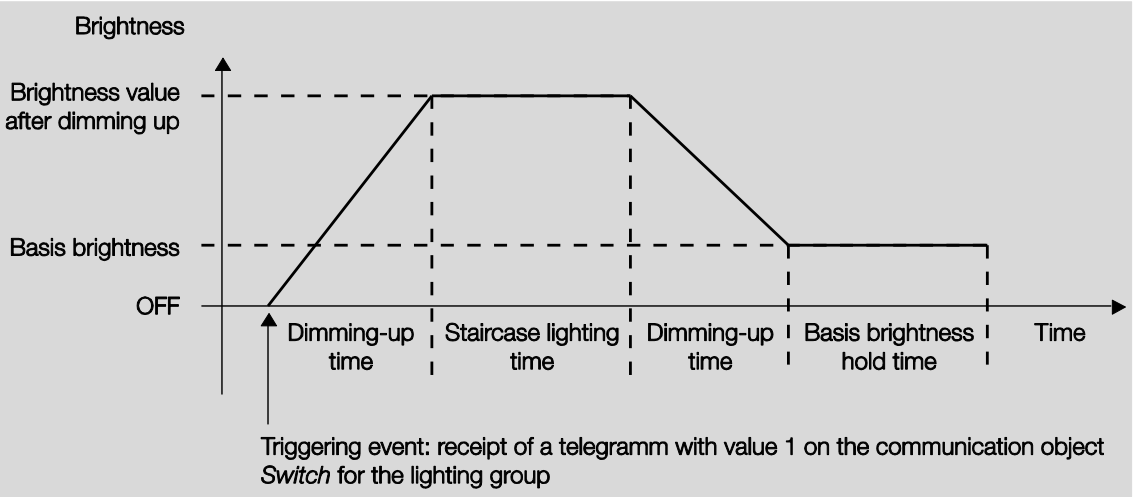
In the DALI Light Controller, the *Staircase lighting* function is an independent function that is also combined with a light controller, (see Staircase lighting with Light *control* function, page 170).

If the *Staircase lighting* function is, for example, deactivated via the communication object *Activate stairc. light./Status* (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 reaction of the *Staircase lighting* function is explained in the following section.

For each DALI Light Controller, only one staircase lighting sequence needs to be set. Parameterization is undertaken in the Parameter window General, on page 43, and applies for all staircase lighting recalls. The brightness values (switch-on brightness and basic brightness) are to be set individually in the Parameter window - Gx Staircase lighting, page 94. These parameter windows are enabled by release of the *Staircase lighting* function in the Parameter window - Gx Functions, page 86. With the *Staircase lighting* function active and the 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 the Parameter window Gx Group, page 67.

During dimming-down from the switching value to the basic value, the communication object *Warning staircase lighting* receives the value 1, which indicates switching off of the staircase lighting.

Voltage recovery behavior

The reaction after KNX bus voltage recovery as well as after light controller supply voltage recovery is parameterized in the Parameter window - Gx Staircase lighting, page 94.

Response to switch telegram during the Staircase lighting sequence

If the dimming time has not yet been reached 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 the basic brightness causes the lighting to switch off, if the time period for the basic brightness has not been set to unlimited, see the Parameter window General, page 43. If the time period for the basic brightness is permanent, the staircase lighting remains switched on. In both cases, the *Staircase lighting* function is in standby and can be restarted by an ON telegram.

As long as the *Staircase lighting* function 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 basic brightness, the staircase lighting is retriggered (restarted from the beginning). However, the dimming-up phase is not performed again.

Behavior with blocking and forced operation

Should the lighting group be blocked via the communication object *Block* or forcibly operated via the 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 a Block or Forced operation, the *Staircase lighting* function starts with the dimming-down phase. If the *Staircase lighting* function was inactive, it will remain inactive.

The following table shows the reaction of the lighting groups when *Staircase lighting* function is parameterized.

Operating situation or communication objects		***Staircase lighting* function**				
		Inactive	**Active**			
			Standby	**Dimming-up time**	**Staircase lighting time**	**Dimming-down time** / **Basic brightness run time**
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 *Staircase lighting* function is not continued.			
	Voltage recovery	Programmable: - *Staircase lighting* function: - Gx Staircase lighting - Brightness value - Gx Fault				
DALI or light controller-operating	**Voltage failure**	Programmable: - Brightness value - Gx Fault - *Staircase lighting* function is not continued.				
	Voltage recovery	Programmable: - *Staircase lighting* function: - Gx Staircase lighting - Brightness value - Gx Fault				
Switch	**ON**	Switch-on value	→ 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 basic brightness run time 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 Stairc. light. activate	**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 *Light control* function

With the DALI Light Controller, there is a possibility of using the *Staircase lighting* function in conjunction with the constant light control. This means constant light control is performed during the operation of the *Staircase lighting* function. 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.

Control is only used during the operation of the *Staircase lighting* function. During the dimming-up, dimming-down and during the basic brightness run time, light control is suspended and is in standby.

During switching on or retriggering of the staircase lighting, the lighting is switched on at the switch-on brightness of the *Staircase lighting* function.

Should the *Staircase lighting* function be deactivated, the lighting group has a “normal” control function. In the same way, the lighting group with the deactivated *Light control* function behaves like a lighting group with the *Staircase lighting* function. If both functions are deactivated, the lighting group is a "normal" lighting group.

If the light controller is inactive and is activated via the communication object *Function Activate controller*, the *Light control* function 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 light controller start to control during the staircase lighting time. A prerequisite for this is that the staircase lighting time has been ended and the *Staircase lighting* function is in the dimming time, basic brightness run time or subsequently in standby.

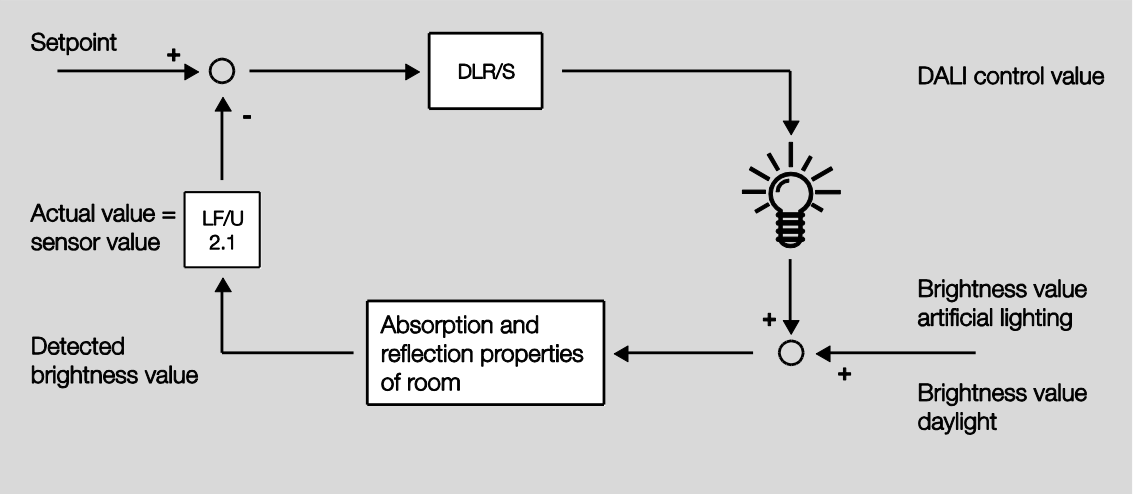
The *Staircase lighting* function has a higher priority than the additional function *Light control* with regard to the parameterized reaction to incoming KNX telegrams. The reaction should be defined in the parameter window - *Gx Staircase lighting*.

Operating situation or communication objects		***Staircase lighting* function**				
		Inactive	**Active**			
			Standby	**Dimming-up time**	**Staircase lighting time**	**Dimming-down time** / **Basic brightness run time**
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 light control

Constant light control is possible with the DALI Light Controller DLR/S 8.16.1M in conjunction with the Light Sensor LF/U 2.1.

Principle representation of constant light control:



Constant light control 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 light or daylight or is read via the communication object *Control parameter* in the DALI Light Controller. The technical lighting properties of the room and the characteristic of the lighting equipment are automatically determined during the artificial light calibration by the DALI Light Controller. The DALI Light Controller uses these characteristics for the determination of the controlled system. The DALI Light Controller sets the brightness (lighting equipment) 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 reaction 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 people located in the room. Various 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).

Light control constraints

Rooms are lit up differently by the incidental daylight and the artificial light 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 light 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, people, 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
Lighting equipment with varying brightness characteristic curves should be avoided in control circuits. In a DALI Light Controller circuit, a mix of DALI lighting equipment and 1-10 V lighting equipment (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 lighting equipment, causes a brightness of 50 %. With DALI lighting equipment, 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/ 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 correspond to 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/S. The sensor value is used to detect brightness values directly 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 the Parameter window - Gx Light controller, you can parameterize if the smallest, the largest or the average sensor values are used for light control calculations. **For further information see: Constant light control, page 171**
Control parameter (setpoint)	The control parameter corresponds to the setting of the controller if the setpoint brightness value is set in the room. For this reason, the control parameter can be set equal to the control setpoint. In the following section, we refer to the setpoint. The setpoint is the decisive control value in practical applications for constant light 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 specified using 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 parameters to the room. **For further information see: Constant light control, page 171** Irrespective of this calibration, an overshoot or undershoot of the setpoint brightness value can occur during phases in ongoing operation of constant light 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. A deviation of +/- 10% from the setpoint is normal.

Calibration artificial light	With the artificial light calibration, the DALI Light Controller determines the internal actual value which results with the required setpoint (control parameter) if artificial light 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 as they would also be used during light control. During the artificial light 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 properties 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 light control. The calibration may take up to 90 seconds depending on the deviations in brightness during calibration. Artificial lighting calibration must always be undertaken. **For further information see: Constant light control, page 171** The sequence of daylight and artificial light 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 light control, page 171** The sequence of daylight and artificial light calibration is **not** random. Calibration with artificial light must be performed before calibration with daylight.
Light control active/inactive	At any time, the user can operate the light controller with appropriate parameterization using normal dimming telegrams, e.g. interrupt dimming, switching or scene recall, in order to operate the lighting manually according to their requirements. The DALI Light Controller is in standby mode here and recommences light control via an ON command, e.g. via a telegram with the value 1 on the communication object *Switch*. The actual deactivation of the light controller is implemented via the communication object *Function Activate controller*. Lighting control is stopped. It is now possible to control the lighting group normally via switching or dimming telegrams. Telegrams are implemented without light control being started. Light control is only restarted if a telegram with the value 1 is received on the communication object *Function Activate controller*. Whether the light control of a lighting group is activated can be detected via the communication object *Fct Activate 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 172, on DALI and 1-10 V lighting equipment.

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 light control via the KNX. The communication object *Control parameter* is provided for this purpose.

Commissioning with artificial light and daylight calibration is implemented initially using the brightness (setpoint 1), which is most frequently used with normal operation. In so doing, 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 light.

Procedure

If this has not already taken place, the lighting group of the DALI Light Controller is first calibrated with the brightness setpoint (1) used primarily during operation. A detailed procedure is described in the Commissioning/calibration of the constant lighting control, page 177. 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 a visualization.

In order to determine the second setpoint brightness (2), the room must also be darkened and the brightness is set exclusively using artificial light only. The *Actual value* (control parameter) for the second setpoint setting 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 a visualization.

Determine the setpoint and set it via KNX (using the example of lighting group [1])

	Version	By	Effect
1.	Deactivate lighting control.	Send 0 to communication object *Function Activate controller* (no. 31). Alternatively, this can occur 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 *Function Activate 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 area of the light sensor less than 20 lx[1)].
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. The control difference is equal to zero.
6.	Set control parameter for setpoint via KNX.	Write the communication object *Control parameter* (no. 41) with previously read control parameter (actual value) using a pushbutton or visualization, 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 light 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 light control

Constant light control can be deactivated by users at any time if this option has been enabled. Corresponding parameterization options can be found in the Parameter window - Gx Control Operating, page 107. The deactivation of 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 the light controller operates (controls), the lighting group in the Parameter window Gx Group, page 67, must be selected as the light controller 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 light controller 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 *Function Activate controller*. In the activated state, the light controller is started as follows:

Constant light control is then started or set to the control state when the switched off lighting is switched on (a telegram with the value 1 is sent via communication object *Switch*). Alternatively, a renewed telegram with the value 1 can be sent to the communication object *Function Activate 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 controller 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 dimming value and the light controller 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 the Parameter window - Gx Control Operating, page 107.

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 light 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 light control. In the simplest case, this can lead to larger setpoint overshoots or undershoots. In extreme cases, it can lead to unstable oscillating light 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 light 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 Sensor is checked. The bit combination of the communication object *Status Sensors* (no. 9) displays 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 Sensors relevant to the light controller, the required light controller should be deactivated. This can be performed, for example, by a telegram with the value 0 to the communication object *Function Activate contro*ller. The light can now be dimmed independently of the parameterization of the light controller, any brightness can be set and the calibration of the constant light control can commence.

Performing artificial light calibration (for lighting group 1…8)

Artificial light calibration must be performed for each group where the additional function *Light control* is enabled. Light control is only possible for lighting groups 1…8.

Implementation using ETS is described in the following.

Important
The sequence of daylight and artificial light 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 light calibration caused by daylight has the effect that the DALI light controller assumes that the illumination can produce a greater 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 positioned vertically above the working surface to be monitored. If it is not possible to darken the room, the artificial light calibration should be performed early in the morning or in the evening. The artificial light should be set with all the lighting groups involved in light control (masters and slaves) using a luxmeter 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

When this brightness value has set itself as a constant, the relevant light controller group for storing the setpoint must be enabled. First of all, the selection of the light controller group (1…8) must be made using communication object (no. 27) *Enable controller calibration* (1 byte). The communication objects *Calibration artificial light* and *Calibration daylight* are then ready to receive. This is a security feature to ensure that a calibration is not triggered unintentionally during normal operation, unintentionally overwriting the set values. The communication objects are ready to receive for an hour or until the calibration is triggered (telegram with value 1).

The artificial light calibration is triggered by a telegram to the communication object *Calibration artificial light*. At the start of the artificial light calibration, the communication object *Fct Activate 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, follow the lighting curve 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 after this. The light control is started at the same time.

This concludes the artificial lighting calibration.

Artificial light calibration[1] (using lighting group 1 as an example)			
	Version	**By**	**Effect**
1.	Checking of the light sensor(s) that is/are relevant for light control.	Read out communication object *Status Sensors* (no. 9).	The corresponding bit(s) for the relevant light sensor must have the value 1.
1a.	Check the light sensor position.	See Light control constraints page 172	Sensor value is not subject to interference.
2.	Deactivate light control.	Send the value 0 to communication object *Fct Activate controller/Status* (no. 31).	Light control is deactivated.
3.	Slaves must be active and integrated in the lighting.	Write the value 1 to corresponding communication objects *Function Slave*.	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.	Dimming via communication object *Relative dimming* (no. 34) or set 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 controller group.	Communication objects *Calibration artificial light* 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 light* (no. 28).	Light controller commences calibration of artificial light. 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 light calibration, ensure that the lighting equipment offers a constantly reproducible dimming performance during dimming. For this purpose, the burn-in time (Effect of ageing on lighting equipment, page 164) of the lighting equipment must be considered and already completed. Consider also that a fluorescent lamp only develops its full lighting intensity after a few seconds.

2) Interference in the artificial light calibration caused by daylight has the effect that the DLR/S assumes that the illumination can produce a larger brightness level than is actually the case. The DLR/S will set a lower level of brightness in light control operation.

Performing daylight calibration, automatically

Daylight calibration must be performed for each lighting group, where the additional function *Light control* is enabled. Light control is only possible for lighting groups 1…8.

Implementation using ETS is described in the following.

Important
The sequence of daylight and artificial light calibration is **not** random. Calibration with artificial light must be performed before calibration with daylight.

The daylight calibration can be performed automatically by the DALI Light Controller or experimentally by the commissioner. The required setting can be made in Parameter window - Gx Light controller, page 99, with the parameter *Calculate factor for daylight compensation automatically*. Automatic calibration is preferred.

For automatic daylight calibration, the artificial light must be switched off and the light control deactivated. The same brightness level (setpoint) as artificial light can generally be created using shading units. In order to prevent, with a high level of certainty, the setpoint from being undershot in the controlled state, a brightness value can be set for the daylight brightness, which is about 10 % above the brightness value of the artificial brightness calibration.

Using the communication object *Enable controller calibration* (no. 27), set the readiness to receive the communication object *Calibration daylight* (no. 29). The calibration can now be performed using a telegram with value 1 sent to the communication object *Calibration daylight*. The DALI Light Controller performs the calibration and determines the levels (weighting) of artificial light and daylight. After this calibration, the DALI Light Controller switches to the setpoint and commences light 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			
	Version	**By**	**Effect**
0.	Artificial light calibration	See Performing artificial light calibration, page 178	The lighting characteristic is stored in the DALI Light Controller.
1.	Deactivate light control.	Send the value 0 to communication object *Fct Activate 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 value 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 light* 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 Controller* if, in the parameter *Calculate factor for daylight compensation automatically* using daylight calibration is parameterized with *No*, see Parameter window - Gx Light controller, page 99.

A factor between 0 and 99 can be entered. This factor defines the relationship between daylight and artificial light.

If the general conditions have not changed, but the compensation factor has, the following applies:

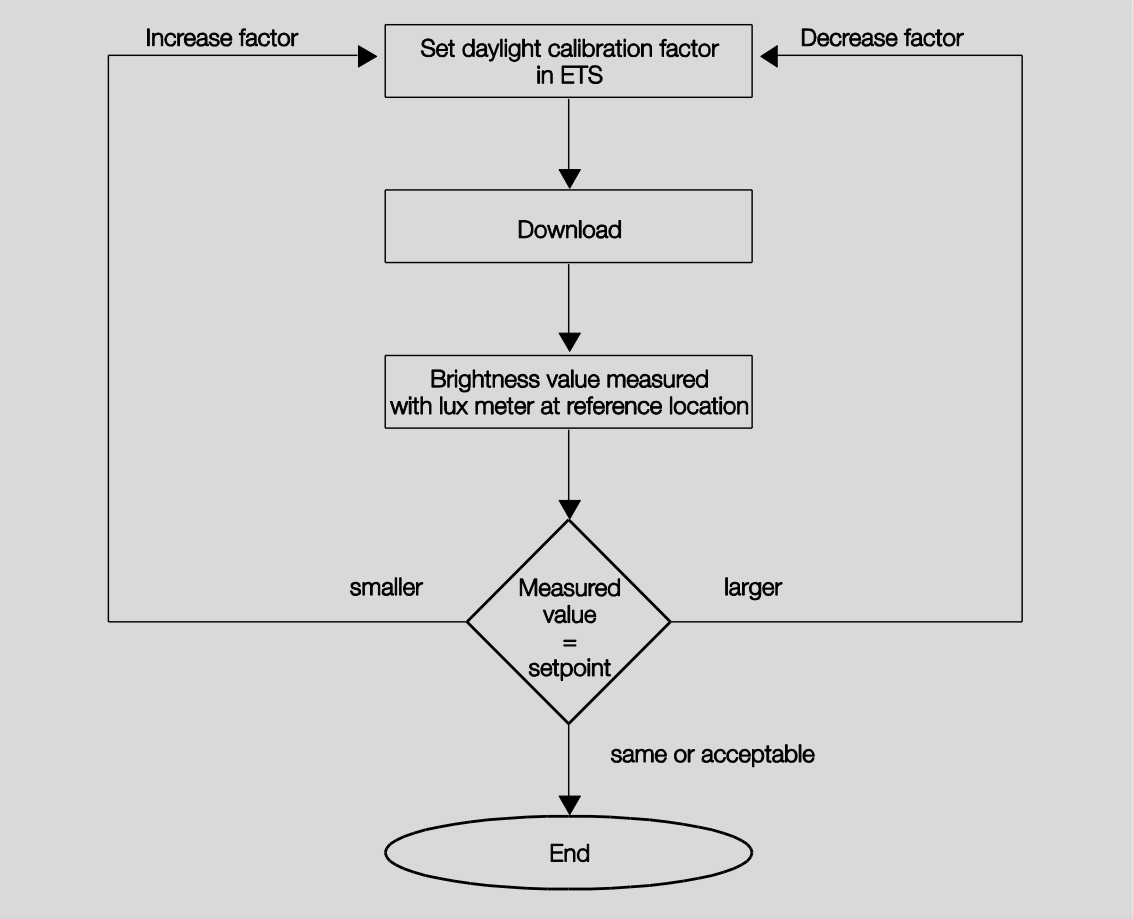
A greater compensation factor increases the artificial light, because the daylight component is weighted less in the constant light calculation. A smaller compensation factor reduces the artificial light, because the daylight component is weighted more in the constant light calculation.

After the factor has been transferred to the DALI light controller via a download, light control should be compared with the brightness measured in the detection range of the light controller as measured by a luxmeter. If the required setpoint is still too low, more artificial light is still required. This is achieved by increasing the compensation factor.

If the desired setpoint is exceeded, then there is too much artificial light. A reduction of the artificial light can be achieved by a reduction of the compensation factor. As an example in the following section, short operating instructions for a lighting group are listed for manual daylight calibration:

Ideally, 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			
	Execution	**By**	**Effect**
1.	Undertake manual daylight calibration.	In the Parameter window - Gx Light controller, page 99, 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.

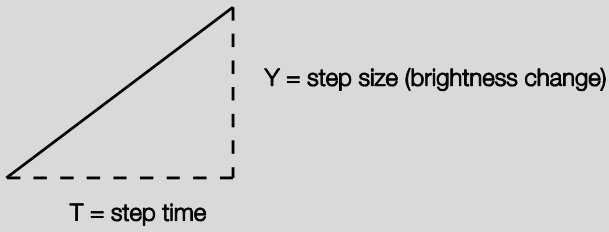
4.9.6 Brightness detection function

The Light Sensor LF/U 2.1 of the DALI Light Controller DLR/S 8.16.1M detects the luminance of the surfaces in its detection area 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 luminance is, on the one hand, dependent on the lighting intensity, i.e. the intensity of the daylight or artificial light, and on the other hand on the characteristics of the surfaces (reflections) which are to be illuminated. If, for example, the surface in the detection range of the light sensor is completely covered with white paper, the light sensor measures a different luminance at the same lighting intensity as when the surface is covered with gray recycled paper. When setting the setpoint, the luminance is measured by the light sensor and stored as a setpoint value. Subsequently, the light controller will control the artificial light level in the room so that it more and more accurately achieves this setpoint value, i.e. the light controller attempts to keep the luminance and not the lighting intensity at a constant level.

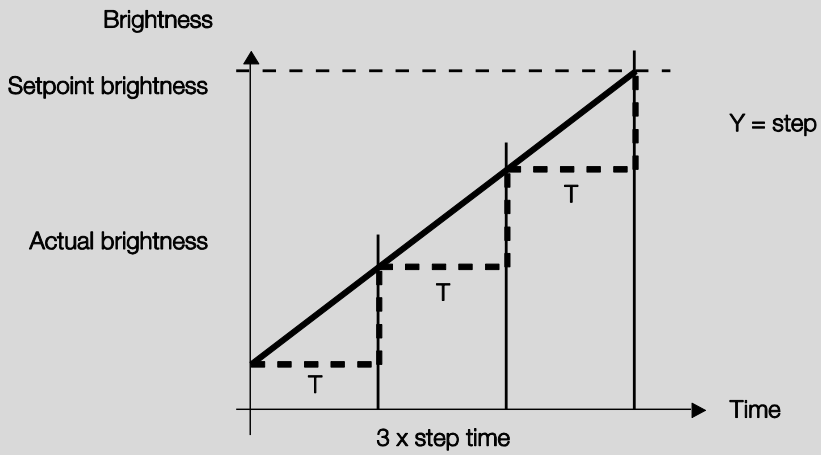
4.9.7 Function of the constant lighting control

The task of constant light 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).

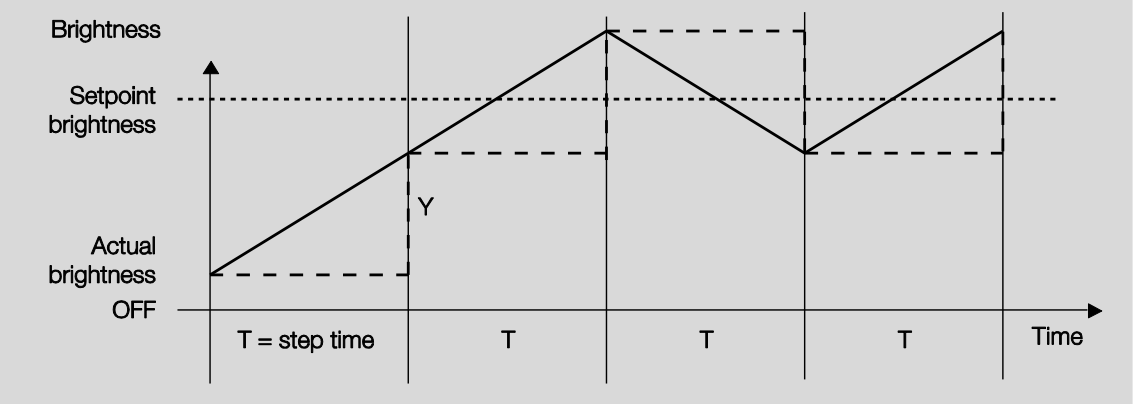
A control step is defined by the increment (brightness change) and the step time (time duration), in which the brightness change is performed.



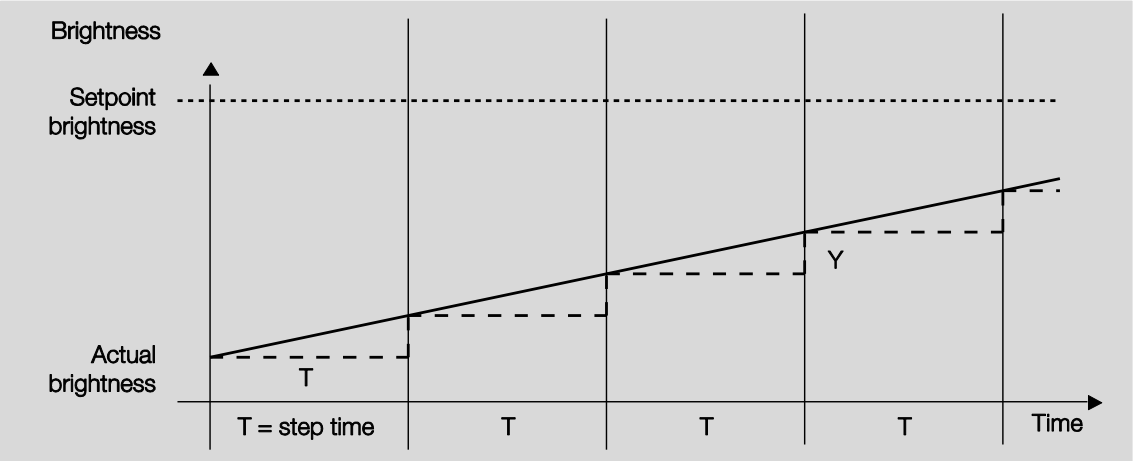
A simplified lighting control can in principle look as follows. The setpoint brightness is achieved starting from an actual brightness level in three steps:



If the increment is too large, the light controller reaches the setpoint faster. The setpoint brightness is exceeded. The DLR/S starts to oscillate around the setpoint brightness.



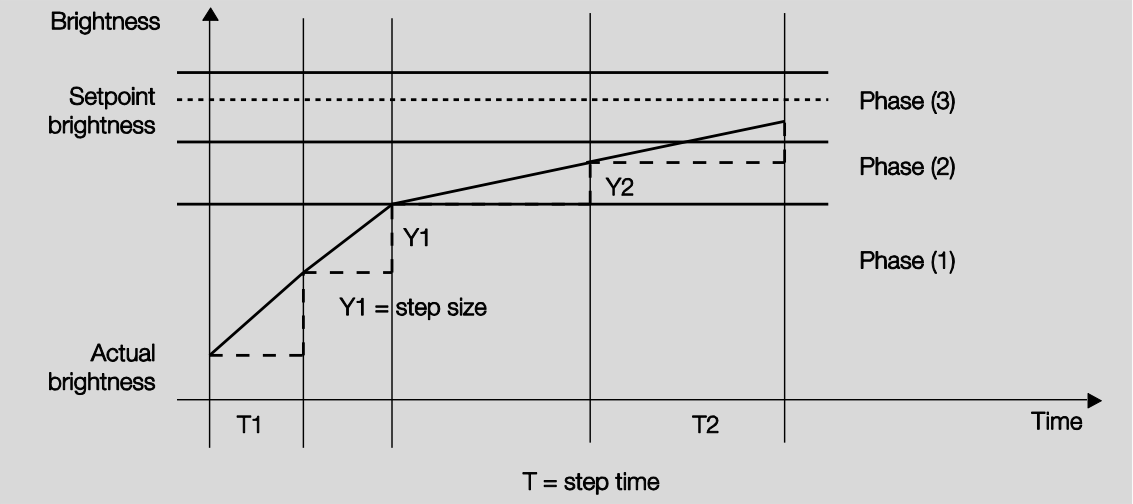
If the increment is too small, it will take too long until the setpoint brightness is reached. This is particularly critical in cases where blinds are closing to darken the room quickly.



The increment time should be selected so that the brightness change of a control step is available to the DLR/S via the Light Controller/lighting equipment/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/S determines these control variables. However, if required, these variables can be set individually in the Parameter window - Gx Light controller, page 99. The parameters are enabled if, in the parameter *Changing brightness during lighting control*, the *Individual setting* option 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 is, 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 setpoint value is approached more slowly using *Step time for slow approach* (T2), commences.

The increment (Y2) can also be parameterized, in order to reach the setpoint value more quickly or more slowly. This increment only is valid until a determined interval to the setpoint value. This interval can be set via the parameter *Setpoint/actual diff., up to which control is with max. step width*.

With an additional parameter (*Setpoint/actual diff., up to which control is with max. step width*), you set the phase (3) in which light 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 greater than this difference will 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/S, as well as the individually adjustable values for the *Changing brightness during lighting control (fast[1]), medium, slow* and the *individual setting*):

Changing brightness during light control (correction speed)	Fast	Medium	Slow	Individual setting
Step time for fast approach [0.1 s…2.0 s]I	As quickly as possible.	0.5	1	1
Step time for slow approach [1 s…10 s]	2	3	4	4
Setpoint/actual difference, for changeover of fast/slow approach [0…50]	20	20	20	20
Maximum increment size of a control step [1…10]	1	1	1	1
Setpoint/actual difference, up to which control is with max. step width [10…255]	30	30	30	30
Deviation actual value from nominal value for starting controlling [0...30]	1	1	1	1

1) The selection *fast* is only possible if the light controller does not control any further slaves via the communication object *Master brightness value*. The setting is made in parameter window - *Gx Light controller* with the parameter *Light controller controls other dimmer actuators as "master" other dimmer actuators*).

4.10 Scene

The DLR/S facilitates the integration of the 16 lighting groups in 14 scenes.

The scenes 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 the *Staircase lighting* function, scenes 13 and 14 are used directly for parameterization of the staircase lighting. If, in the *Staircase lighting* function, the scenes 13 or 14 are to be parameterized directly via parameter windows *Scene 13* and *Scene 14*, the options for *Time for dimming up (soft start), Staircase lighting time*, *Time for dimming down (warning)* and *Run time for basic brightness* set in the parameter window *Staircase light* are lost.

The scene value of a scene can be parameterized in the ETS in the Parameter window Scene x, page 118, or stored via the KNX. If storing of the scene is triggered via the communication object *Store scene* or the respective 8 bit scene telegram, the currently set brightness values of the lighting groups 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 recall 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 the 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 *Scene* function.

For further information, see: Code table 8 bit scene (no. 212), page 210

Important
The light scene settings remain stored in the DLRG/S even after a KNX voltage failure or light controller operating voltage failure. If a ballast has to be exchanged, the light scenes are immediately available without further commissioning.

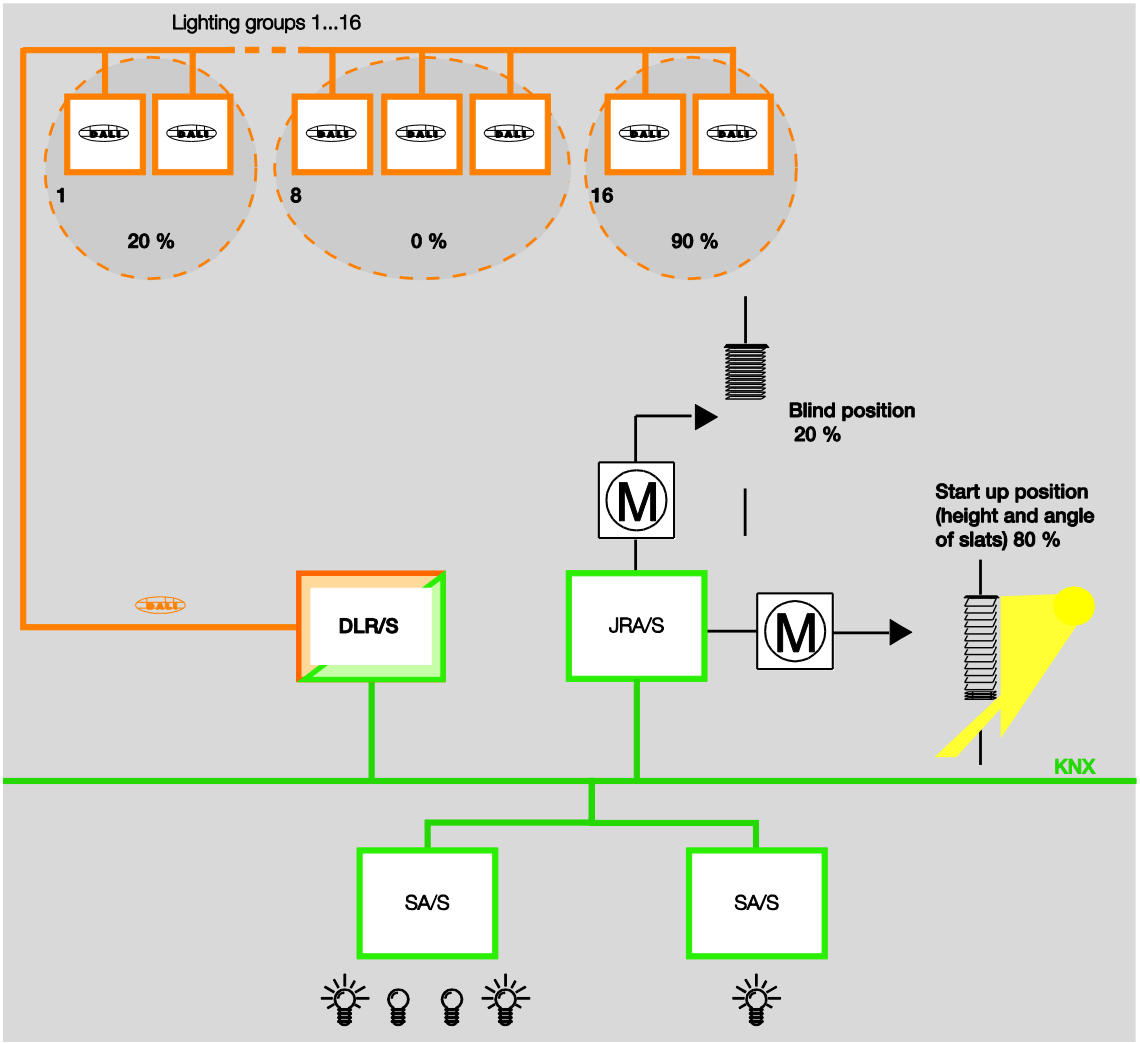
The *Scene* function is not continued if there is a KNX voltage failure or light controller operating voltage failure. The brightness is set which is selected with voltage failure or recovery in the Parameter window - Gx Fault, page 81.

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 *Scene* function.

A typical *Scene* function might be 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 basic lighting
- Blind actuator for shading
- DLR/S for dimmable lighting and constant light control



Example

An 8 bit scene (no. 8) consists of some lamps, controlled using two switch actuators and lighting groups of the DALI Light Controller.

Furthermore, two blinds are integrated into the *Scene* function via a blind actuator. The *Scene* can be recalled 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 devices switch on their Scene with no. 8. The blind actuator moves the blinds to the corresponding position, the lighting assumes the predefined brightness values and switching states defined by the scene.

Advantage

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 a single telegram is sent on the KNX and which is received by all participants in the scene and implemented accordingly. 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/S lighting groups are stored in the respective devices and must not be transferred on 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/S can only be used in one of the first 14 scenes.

For further information, see: Code table 8 bit scene (no. 212), page 210

4.11 Slave

If the additional function *Slave* is activated, the lighting group of the DLR/S 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 slave 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 the Parameter window - Gx Slave, page 112. This internal assignment means that no KNX group assignments are required. Furthermore, the KNX bus load is reduced through the internal communication.

A telegram with the value 0 on the communication object *Function Activate Slave* deactivates the *Slave* function. A telegram with the value 1 reactivates the *Slave* function. 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 executed.

An OFF telegram (receipt of a telegram with the value 0 on the communication object *Switch*, e.g. from a presence detector) has the effect that the *Slave* function 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 via the communication object *Brightness value*, are executed. 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 *Function Activate Slave*. The lighting group is again in slave mode and only responds to the communication object *Brightness value of slave*.

The *Slave* function is also put into standby mode if, in the Parameter window - Gx Slave, page 112, the reaction to a switch, dimming, brightness value setting telegram or scene recall is parameterized with the option *Function switches to standby*. The *Slave* function is in standby mode. The lighting group responds again to the communication object *Brightness value of Slave* if a telegram with the value 1 is received on the communication object *Switch* or via the communication object *Function Activate 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 have no effect.

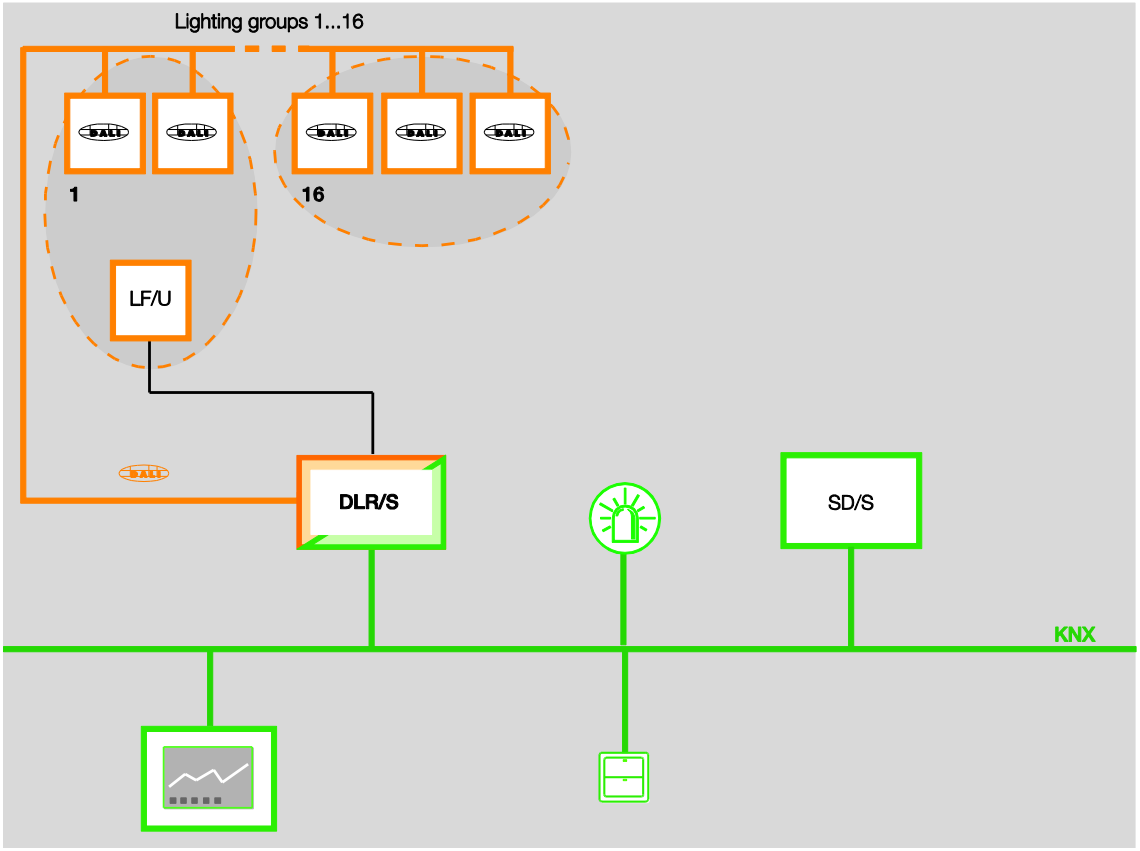
The minimum and maximum dimming values parameterized in the Parameter window Gx Group, page 67, also apply in the *Slave* function. The undershoot and overshoot of these values are set using the parameterized minimum or maximum dimming value. If the master sends the brightness value 0, the lighting is switched off.

The reaction of the *Slave* function after KNX voltage recovery can be parameterized: In the Parameter window - Gx Slave, page 112, you can set whether operation is active or inactive. The brightness value of the lighting group after KNX voltage recovery can be set in the Parameter window - Gx Fault, page 81. If the *Active* mode is parameterized, the parameterized brightness value is initially set after KNX 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 *Slave* function is shown.

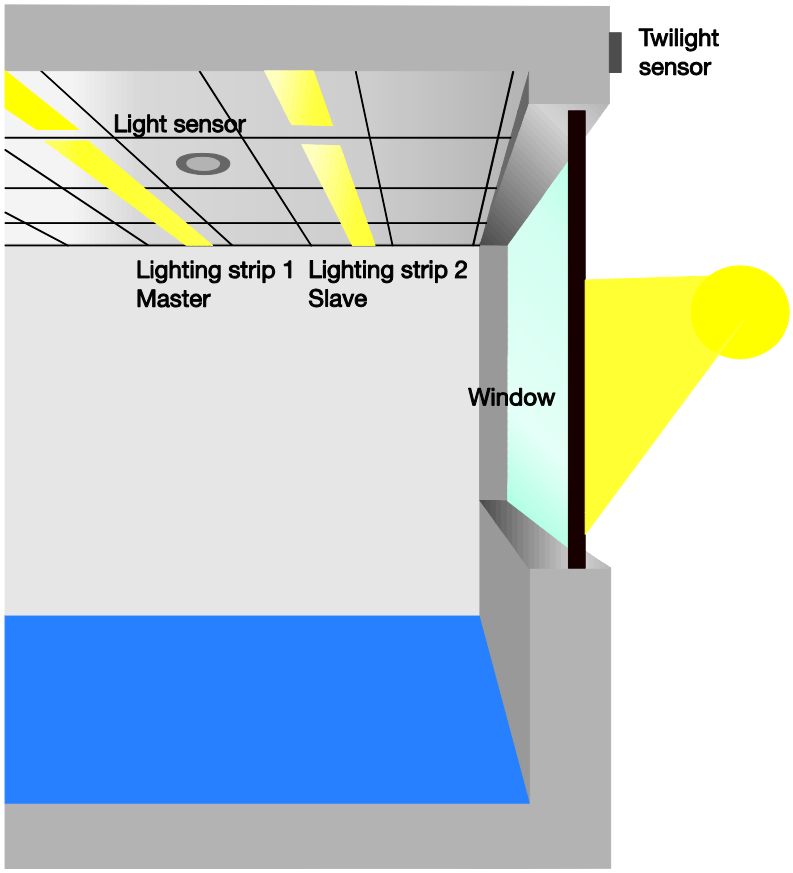
Operating situation or **Communication objects**		**Additional function *Slave***		
		Inactive (*Function Activate Slave* = 0)	**Active in standby (Activate slave mode = 1)**	**Active and ON (running) (Function = 1)**
Download (start)Download (start)		Such as KNX bus voltage failure		
Download (end)		Such as KNX bus voltage recovery		
KNX bus	**Voltage failure**	Parameterizable:- 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**	Switch-on value	→ 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
***Slave* function 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 *Slave* function, an offset with which the slave can be used to control a lower or higher level of brightness than the brightness level of the master. In the following section, both these functions are described in more detail using a room with two lamp strips as an example.



Using the additional *Slave* function, a second lamp strip (slave) can be controlled in the room. Up to now, both lamp 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 load is minimized by internal communication. This parameterization is performed in the Parameter window - Gx Slave, page 112.

The daylight provides more light to the area near the window than the area at the rear of the room. In order to sufficiently light up the rear of the room, strip 1 must provide brightness value x. Using the daylight, lamp strip 2 can 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 reaction for every light controller lighting group. This parameterization is performed in the Parameter window - Gx Light controller, page 99. The parameter for the offset is visible if the parameter *Light controller controls other dimmer actuators as "master"* 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: Brightness offset* 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, lamp strip 1 is combined 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, lamp 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 light to ensure optimum working conditions. In order to counteract this natural reaction in an automated manner, 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 dimming 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.

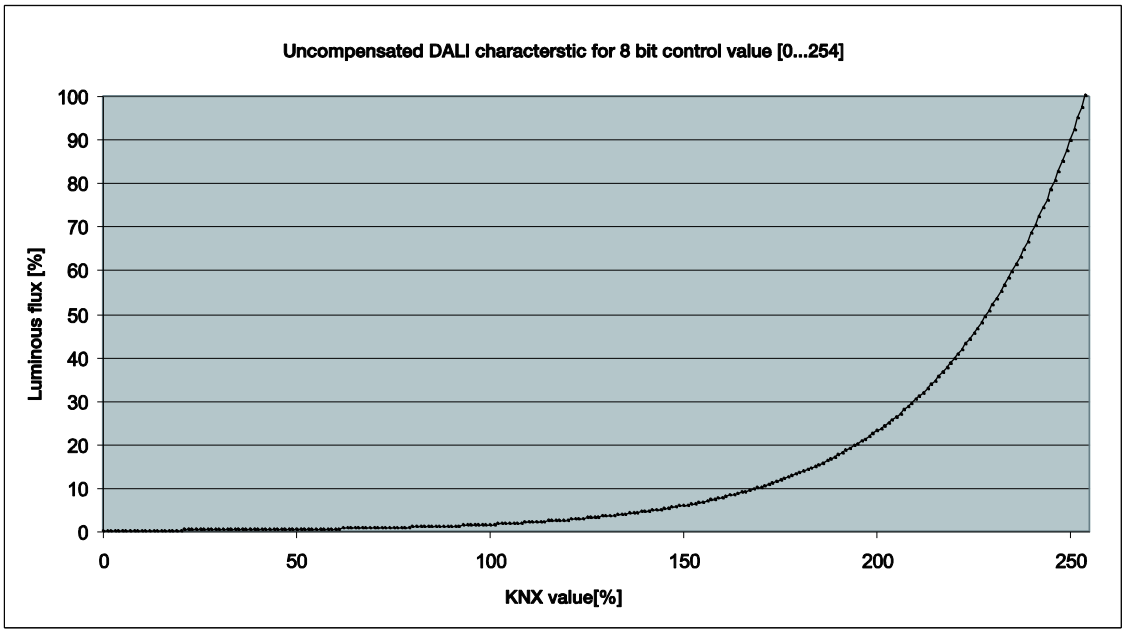
Note
IEC 62386-102 describes the DALI values as *arc power across the light source*, which, in most cases, is an almost linear relationship to the luminous flux. The luminous flux describes the lighting power emitted from a light source in all directions. The unit is stated in lumens (lm).

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/S, a KNX dimming range of 0.4…100 %.

Row A and B are the brightness value of the DLR/S received via the KNX as a digital numeric value (0…255) or in % (0…100). This value is implemented by the DLR/S on the DALI (row C). It results in the luminous flux which is emitted by the lighting equipment via the DALI characteristic (row D). The DLR/S then sends the status of the brightness value (row E) back on the KNX.

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, correspond to 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 section, DALI equipment with a minimum physical luminous flux of 3 % is considered. In the KNX, a dimming range of 126…254 is thus available. This means that 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 this threshold value and fed back by the DLR/S 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 performed correctly when the brightness value is internally calculated and simulated with the characteristic adjustment via the DALI Light Controller and transferred to the DALI devices. This is the case when the brightness value is set, for example.

During dimming, irrespective of whether a group command or central command is concerned, differences may occur between the set brightness value and the (simulated) status of the brightness value. To allow even dimming, the DALI Light Controller must use the DALI commands DIM-UP and DIM-DOWN. These commands trigger a dim step in the DALI device, which is transformed using the DALI characteristic stored in the DALI device. As the exact length of the dim step is not known, there may be deviations between the calculated (simulated) value and the brightness value actually set.

This can occur, for example, when, after dimming, the status of the brightness value is fed back to the dimmed lighting group as a brightness value. In this case, there may be a brightness jump.

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/S calculates the corresponding DALI control value (column C), which is required to achieve the same luminous flux (column 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 dimming value

In the ideal case, (ballast with a physical minimum brightness value of 0), the "normal" DALI transformation table results, page 197, results.

With a realistic physical dimming value of 3% (DALI 126), the following table results. In the KNX value range 0…50 %, the ballast cannot set a brightness difference.

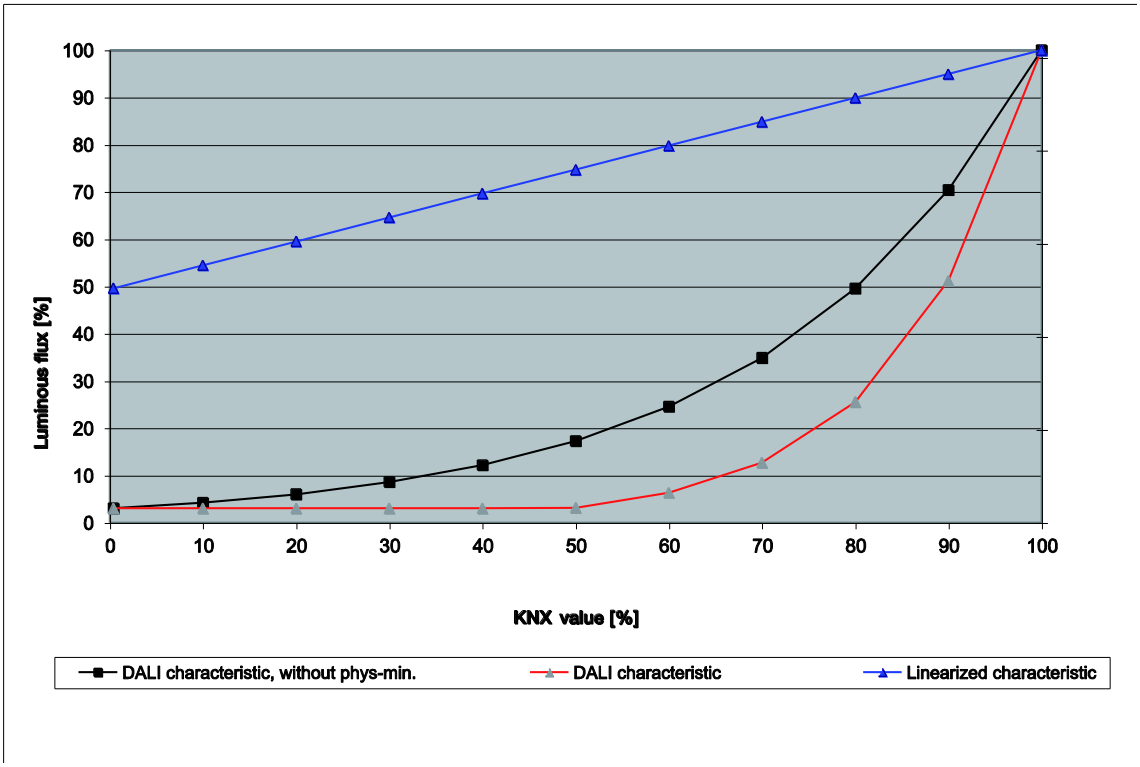
E	KNX status Brightness value	0	126	126	126	126	144	170	195	210	220	229	235	241	246	250	255
D	Luminous flux [%]	0	3	3	3	3	5	10	20	30	40	50	60	70	80	90	100
C	DALI value	0	1	60	85	126	144	170	195	210	220	229	235	241	246	250	254
B	KNX value	0	1	60	85	126	144	170	195	210	220	229	235	241	246	250	255
A	KNX 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 adjustment *Yes, linear dimming curve without phys-min dimming 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/S is 1 % (digital value 3), only this value can be set and fed back.

The possible characteristics with the DALI Light Controller and the characteristic adjustment 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 nos. 6 and 7, page 126

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) defines the DALI devices or the lighting group.

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

A.2 Code table *Diagnostics* 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 nos. 6 and 7, page 126

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 high byte specifies 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-oriented. In the case of the device-based display, bit 7 contains information on whether the device is available, i.e., whether it reports to the DALI. In the case of group-oriented display, bit 7 contains information indicating if the fault messages are blocked.

Bit No.		7	6	5	4	3	2	1	0
Decimal communication object value	Hexadecimal communication object value	Disabel send. of fault message[1] DALI device available[2]	DALI telegram collision	DALI short-circuit	Extra function	Function Burn-in	Device monitoring	Ballast fault	Lamp fault
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	Disabel send. of fault message[1] DALI device available[2]	DALI telegram collision	DALI short-circuit	Extra function	Function Burn-in	Device monitoring	Ballast fault	Lamp fault
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	8A	■				■		■	
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	AB	□		□		□		□	□

Bit No.		7	6	5	4	3	2	1	0
Decimal communication object value	Hexadecimal communication object value	Disabel send. of fault message[1] DALI device available[2]	DALI telegram collision	DALI short-circuit	Extra function	Function Burn-in	Device monitoring	Ballast fault	Lamp fault
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-oriented

[2] Device-based

A.3 Code table *Request diagnostics* (no. 7)

The diagnostics information of communication object no. 6 *Diagnostics* is requested with the 1 byte communication object *Request diagnostics*.

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

A.4 Table of fading times *Fade Time* (no. 8)

Using the communication objects *Fade time (DALI format)* or *(KNX format)*, it is possible that the DALI fading dimming as defined in the DALI standard DIN EN 62386-102 can be transferred via the DALI control line on the KNX, so that the intended DALI devices use the DALI dimming 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 *Flexible dimming time* option for the lighting group can be selected in different parameter windows and parameters, e.g. in Parameter window Gx Group, page 67, 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 *DALI format* parameter setting:

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). The highest bit (bit number 7) indicates the status of light sensor H (8).

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	8A	■				■		■	
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	AB	■		■		■		■	■

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

A.6 Code table *Fault group/device code* (no. 19)

Using the communication object *Fault group/device code*, there is the option of representing 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 137

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 the Parameter window Status - Central, page 61, using 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

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	Ballast fault	Lamp fault	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	Ballast fault	Lamp fault	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	8A	■				■		■		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 next 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	Ballast fault	Lamp fault	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	Ballast fault	Lamp fault	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	Ballast fault	Lamp fault	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	8A	■				■		■		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	AB	■		■		■		■	■	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	Ballast fault	Lamp fault	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 the KNX, only the first 14 scenes are available with the DLR/S.

When recalling 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	Ballast fault	Lamp fault	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	8A	■				■		■		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	

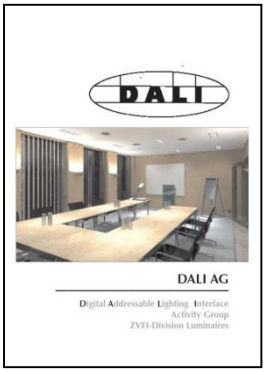
■ = Value 1, applicable
empty = value 0, not applicable

A.8 Further information about DALI

Further information about DALI and its possibilities in lighting technology can be found in our manuals.

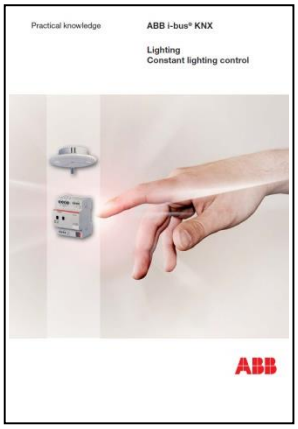
Note
This additional documentation is currently only available in German and in English.

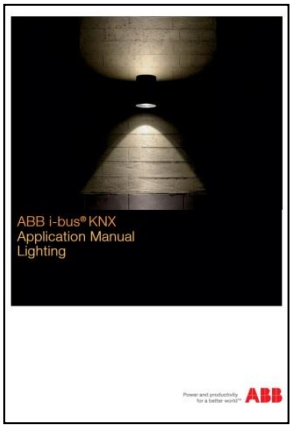
DALI, manual from DALI AG which is part of the ZVEI:



This manual and further information about DALI can be found on the DALI AG website at www.dali-ag.org.

Further information about KNX and lighting technology can be found in the application manual *Lighting and practical constant light control*:





A.9 Scope of delivery

The ABB i-bus® KNX DALI Light Controller DLR/S 8.16.1M is supplied together with the following components.

Please check the items received using the following list:

- 1 (one) DLR/S 8.16.1M REG
- 1 (one) set of installation and operating instructions
- 1 (one) KNX bus connection terminal (red/black)

A.10 Order details

Short description	Designation	Order No.	bbn 40 16779 EAN	Price group	Weight 1 pc. [Kg]	Packaging [pcs.]
DLR/S 8.16.1M	DALI Light Controller, 8-fold, MDRC	2CDG 110 101 R0011	**67656 4**	P2	0.26	1
DLR/A 4.8.1.1	DALI Light Controller, 4-fold, SM	2CDG 110 172 R0011	**88237 8**	P2	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**	P2	0.22	1
DG/S 8.1	8x, MDRC	2CDG 110 025 R0011	**58582 8**	P2	0.31	1
DG/S 1.16.1	16 groups, MDRC	2CDG 110 103 R0011	**66950 4**	P2	0.22	1
DGN/S 1.16.1	Emergency lighting 16 groups, MDRC	2CDG 110 142 R0011	**84556 4**	P2	0.22	1

[1)] For a compact function description see DALI principles for the DLR/S, page 8

A.11 DALI equipment

ABB provides a comprehensive range of DALI components.

Ballasts (electrical upstream devices) for fluorescent lamps, electronic transformers for low-voltage halogen lamps, dimmers, switch actuators, DALI LED converters etc. with DALI interfaces are available.

All the DALI components and their technical properties are listed in the *Low voltage* main catalog, Chapter 15, *Lighting equipment*.

More information is available by writing to the following address:

ABB STOTZ-KONTAKT/Striebel & John

Vertriebsgesellschaft mbH (ASJ)
Postfach 10 12 69
69002 Heidelberg
Eppelheimer Strasse 82
69123 Heidelberg
e-mail: asj.customer@de.abb.com

Telephone: +49 (0)1805 69 2002
Fax: +49 (0)1805 69 3003

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Contact us

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Eppelheimer Strasse 82
69123 Heidelberg, Germany
Phone: +49 (0)6221 701 607
Fax: +49 (0)6221 701 724
E-mail: knx.marketing@de.abb.com

Further information and local contacts:
www.abb.com/knx

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