SATION KNX

SATION-GW2304 KNX/DALI Gateway
Product Manual

Contents

Page

1 General 1

1.1 Product and functional overview....2
1.2 General DALI information....3
1.2.1 DALI system description....3
1.2.2 DALI functional description....5
1.2.3 Behaviour of DALI devices on voltage recovery....5
1.2.4 Behaviour of DALI devices on DALI voltage failure....5
1.3 SATION® DALI-Gateways....6
1.3.1 DALI-Gateway GW2304....6

2 Device technology 8

2.1 Technical data for GW2304....8
2.2 Circuit diagram for GW2304....10
2.3 Dimension drawing for GW2304....10
2.4 Assembly and installation....11
2.5 Commissioning....12
2.6 Assignment of the physical EIB / KNX address....12
2.7 Manual operation....13
2.8 Supplied state....13
2.9 Maintenance and cleaning....13

3 Commissioning 14

3.1 DALI commissioning....14
3.1.1 Testing the DALI devices with ETS....14
3.1.2 DALI assignment by targeted connection of the DALI devices....14
3.2 EIB / KNX commissioning....16
3.3 Overview....16
3.4 Parameter window....16
3.4.1 “General” parameter window....17
3.4.2 “Devices Channel A" parameter window....21
3.4.2.1 “Normal” operating mode....22
3.4.2.2 “Dynamic” operating mode....26
3.4.2.3 “Slave” operation mode....30
3.4.3 “Devices Channel B” parameter window....31
3.4.4 “Central Function A&B” parameter window....32
3.4.5 “Dynamic” parameter window....35
3.4.6 “Scenes” parameter window....37
3.4.7 “Scenes number” parameter window....40
3.4.8 “Status” parameter window....41
3.5 Communication objects....44
3.5.1 Communication objects for the entire channel....46
3.5.2 Communication objects for every DALI device....49
3.5.3 Lightscene communication objects....53
3.5.4 Communication objects for individual devices in channel A....56
3.5.5 General communication objects....58

4 Application and planning 61
4.1 Control of the DALI devices..... 62
4.2 Monitoring of lamps and ballasts.....64
4.3 Replacement of DALI devices..... 65
4.4 Burn-in times..... 66
4.5 8-bit scene..... 67
4.6 Staircase lighting function with dynamic operation.....69
4.7 Behaviour on voltage failure.....73
4.8 Behaviour on voltage recovery..... 75
4.9 Addressing operation steps……..……77

5 Appendix 80
A.1 Feedback status behaviour..... 80
A.2 Code table for 8-bit scene telegram.....81
A.3 Code table for Digital tube display……82

1 General

This manual provides you with detailed technical information relating to the SATION® 2-fold EIB / DALI-Gateway including installation and parameterisation and explains the use of the gateway using examples.

With the SATION® DALI-Gateway GW2304, it is possible to integrate devices with DALI (DALI = Digital Addressable Lighting Interface) interfaces into EIB / KNX intelligent installation systems and to fully utilise the functions of the DALI standard across large areas.

SATION DALI-Gateway GW2304: The two DALI channels A and B are independent control channels.

Up to 64 DALI devices can be connected to a main channel. Every one of the 64 individual devices can be directly switched, dimmed or controlled with a brightness value using just one EIB / KNX communication object.

In the single master environment of the DALI, the gateway is a master with an integrated DALI power supply.

The DALI address assignment of 128 devices is implemented automatically by the DALI-Gateway. The DALI devices are addressed and allocated to EIB / KNX communication objects in an ascending and non-arranged sequence and are immediately available for control.

The connection to the SATION® EIB / KNX is implemented via bus connecting terminals.

The setting of the parameters is undertaken with the Engineering Tool Software ETS4 or ETS5.

1.1 Product and functional overview

The SATION® EIB / KNX DALI-Gateway GW2304 is a modular installation device with a module width of 4 units in pro*M* design for installation in the distribution board. The connection to the SATION® is established using the bus connecting terminal at the front of the device. The assignment of the physical addresses as well as the parameterisation is carried out with the Engineering Tool Software ETS.

The 1-fold&2-fold DALI-Gateway (DALI = Digital Addressable Lighting Interface) is used for controlling DALI equipment (ballasts, transformers, LED converters, actuators, etc.) via EIB / KNX.

The DALI addresses are allocated individually and automatically by the GW2304. A change of the DALI addresses is possible if required with the ETS.

The 64 DALI devices connected to the main channel A can be directly switched, dimmed or controlled with a brightness value using just one EIB / KNX communication object. The scanning of the individual lamp or ballast fault, as well as the activation of a burn-in time or slave operation for every device is implemented using coded address-based control with two communication objects. All 64 DALI devices connected to a second auxiliary channel B can be individually controlled using broadcast mode or address-based control. Primarily, auxiliary channel B is a broadcast channel which is used to control all devices from a common source.

Furthermore, the setting of 16 lightscenes via the ETS or via the EIB / KNX communication object is possible via a push button. The lightscene can be combined from any of the 128 DALI devices connected to the gateway.

Both channels can be controlled or scanned independently of each other via broadcast commands.

The lamp burn-in time can be activated individually via coded control or commonly for all 128 devices.

Group assignment of the DALI devices is implemented with the EIB / KNX group functions.

The DALI-Gateway GW2304 requires an AC or DC auxiliary voltage. The DALI voltage required for DALI devices is generated by the gateway. 64 DALI devices per channel can be supplied with power.



To enable the DALI-Gateway to function correctly, it must be ensured that the connected DALI equipment is in compliance with DIN EN/IEC 62386 and thus conforms to the DALI standard. In the future this standard will be adopted into the IEC 62386 standard.

Communication with other DALI masters such as control or operating devices is not foreseen or intended.

The special behaviour of the DALI devices must be considered, e.g. do the DALI devices switch to the “Power ON Level” stipulated by the manufacturer after voltage recovery. Normally this is the maximum brightness level (100%).

1.2 General DALI information

The requirements for modern lighting technology are extremely varied. While previously lighting was only required for visual tasks, nowadays factors such as comfort, ambience, functionality and energy saving are in the foreground. Furthermore, a modern lighting system is increasingly being incorporated in the Facility Management of the building installation in order to monitor the status of the entire lighting system. Often, a complex lighting management system is needed which meets the uses of the premises. All these requirements are either not adequately fulfilled by the traditional 1…10 V electrical installations or only with considerable effort and cost. The DALI standard (EN/IEC 62386) has emerged against this background in conjunction with leading manufacturers of lamp ballasts. It describes and defines the digital interface DALI (**D**igital **A**ddressable **L**ighting **I**nterface) for lighting technology equipment.

DALI has become established as an independent standard in the field of lighting technology. The range of ballasts, transformers, dimmers and relays with DALI interfaces has decisively influenced modern lighting technology.

1.2.1 DALI system description

The manufacturers from the lighting industry, primarily the leading manufacturers of electronic ballasts, joined together to define a new standard for the digital communication of a lighting system. This resulted in the DALI protocol (Digital Addressable Lighting Interface) for a digital interface.

The DALI standard enables the addressing of up to

- 64 devices with a DALI interface

and the compiling of these devices into

- 16 lightscenes (incl. dimming values and transitional periods) and
- 16 lighting groups (multiple assignments of the devices are possible).

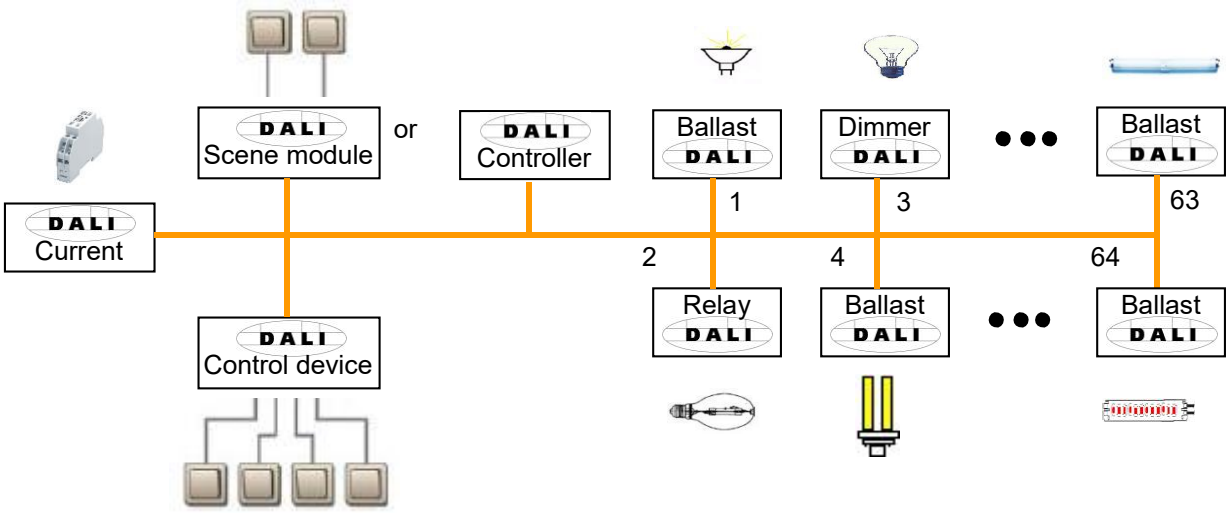

Fig. 1 DALI block diagram

A two-core control cable which does not need to be shielded is used for the exchange of information and transmission of the digital commands. It is not necessary to take the polarity into account. The control cable does not require any SELV characteristics (safety extra-low voltage). The two superfluous cores of the five-core NYM 5x1.5 mm^2 mains cable can thus be used for example as a DALI cable.

A DALI power source (15 V DC) supplies the individual DALI devices, the DALI processor, controller, control devices or modules which are responsible for managing the scenes and groups in the DALI line.

A separate relay or a calculation of the switching capacity is not required. The switching relay is integrated in the DALI ballast and matched to the load. Noiseless switching is thus enabled.

There are DALI devices (e.g. LED converter, switch actuators) which consist internally of several DALI devices and can only be addressed via a common DALI control cable. The internal DALI devices have different individual DALI addresses and can be addressed individually via DALI.



The DALI-Gateway GW2304 recognises every individual DALI device in the DALI equipment. Each DALI device can be monitored and controlled individually.

The following behaviour is defined in the supplied state of the DALI devices: when the operating voltage of the DALI devices is interrupted, the connected luminaire fails. On mains voltage recovery, the luminaire is switched on again with 100% brightness. The electrical installer can thus switch the DALI lighting on and off, e.g. with an automatic circuit-breaker, even if the individual DALI devices have not yet been addressed.

1.2.2 DALI functional description

The DALI interface standard is standardised in the DIN IEC 62386 covering electronic ballasts. Due to the large range of functions and application possibilities of DALI, the DALI sections are currently being extracted from the standard and written into a separate standard designated as DIN IEC 62386. With DALI, a standard has been created which meets the requirements of modern lighting technology due to its digital possibilities. The essential functions are:

- Individual dimming speeds for each device
- Lightscenes with fade times
- Scene devices reach their final brightness value simultaneously
- DALI ballasts have a dimming range of 1 to 100%
- DALI uses a logarithmic dimming curve
- Current brightness values and ON/OFF states can be queried
- Ballast and lamp faults are detected
- Behaviour in the event of a system fault can be defined
- Feedback such as lamp and ballast faults
- Global control of all DALI devices (broadcast mode)

DALI has established itself since 1999 as a manufacturer-independent interface standard. There is a wide range of equipment available with the DALI interface. SATION has a corresponding range of ballasts, transformers, relays, dimmers and actuators (refer to SATION main catalogue chapter 14 “Lighting equipment”). It is possible to control fluorescent lamps, incandescent lamps, LEDs etc. via DALI, combine them into lightscenes and to integrate them with the SATION® DALI-Gateway GW2304 in the EIB / KNX building installation.

The DALI standard can be seen as a subsystem of modern building system technology which links the components of lighting technology and is not dependent on a single manufacturer.

1.2.3 Behaviour of DALI devices on voltage recovery

In the supplied state, the equipment with DALI interfaces generally behaves so that the luminaires light up with maximum brightness the first time the operating voltage is applied or after voltage recovery. This “Power UP Level” is defined by the ballast manufacturer.

1.2.4 Behaviour of DALI devices on DALI voltage failure

In the supplied state, the equipment with DALI interfaces generally behaves so that the devices switch to emergency lighting mode and the lamps light up with maximum brightness in the event of a DALI voltage failure. This value can be programmed by the DALI-Gateway GW2304.

1.3 SATION® DALI-Gateways

SATION has one EIB/DALI-Gateways in the SATION® range, in order to integrate equipment with DALI interfaces into an EIB / KNX building installation. Every gateway has its advantages which benefit different project types. These differences are highlighted in the following section.

1.3.1 DALI-Gateway GW2304

The 1-fold&2-fold DALI-Gateway GW2304 provides the possibility of addressing two groups of 64 DALI devices individually and making them available on the EIB / KNX. Two outputs (main and auxiliary channel) are available for this purpose. The DALI wiring is implemented per output for each of the 64 DALI devices using one core pair. A minimum cable length is thereby assured. The use of individual addressing offers the maximum level of flexibility if there is a redesign or change in the usage of a room or building.

During an initialisation phase automatically implemented by the gateway, all of the DALI slaves are addressed and assigned to the EIB / KNX communication objects in an ascending and non-arranged sequence. This automatically addressing can be blocked via a parameter in the ETS. (see parameter window “General”, page 19)

Each of the individual 64 DALI devices can be connected to the main channel A and can be directly switched, dimmed or controlled with a brightness value using just one EIB / KNX communication object

The group assignment is implemented with the EIB / KNX group functions via ETS.



DALI has a relative slow transfer rate of 1200 Baud, therfore it is possible that EIB / KNX groups with more than 7 DALI samples switched or dim not at the same time. The reason is that one EIB/KNX telegramm released up to 64 single DALI telegramms. This behaviour is irrelevant for the broadcast mode.

The scanning of the individual lamp or ballast fault, as well as the activation of a burn-in time or slave operation for every device, is implemented using coded address-based control with two communication objects.

A further 64 DALI devices on a second auxiliary channel can be individually controlled in broadcast mode. Each device of the auxiliary channel can also be individually controlled with external logic or visualisation via coded address-based control using two communication objects.

Every channel can also be controlled and monitored in broadcast mode, i.e. all devices together.

If individual addressing is required, every individual device must be switched on and the assignment determined during the commissioning and test phase. The person carrying out the commissioning must be able to see the operation of the lamps for this purpose. If necessary, the assignment must be modified by readdressing the devices. The test phase can be implemented with the ETS4 / ETS5

These circumstances indicate the project types for which the 1-fold&2-fold DALI- Gateway is particularly suitable. They are projects with so-called multipurpose areas. They can be exhibition halls, museums, event centres, sports arenas, open-plan offices or similar areas and rooms. All these projects usually require that most of the lighting is switched on directly from a single location. It is not possible in this case to forego the test phase but it can be quickly implemented

from a single location without the need for radio or the requirement to walk through the entire building.

The 1-fold&2-fold DALI-Gateway GW2304 can of course be used for every other project. This can be necessary for example where the highest level of flexibility or individual status information for every individual device is required. In this case the installer must be prepared for an extensive test or commissioning phase.

2 Device technology

2.1 Technical data for GW2304

The 2-fold EIB/DALI-Gateway GW2304 is a modular installation device in *proM* design for installation in the distribution board on 35 mm mounting rails. The connection to the SATION® EIB / KNX is implemented via bus connecting terminals. The DALI-Gateway can integrate devices with a DALI interface into an EIB / KNX building installation using the application program *" KNX/DALI Gateway 1fold/2fold*".

Up to 64 DALI devices can be connected to a main channel. Every one of the 64 individual devices can be directly switched, dimmed or controlled with a brightness value using just one EIB / KNX communication object. A further 64 DALI devices on a second auxiliary channel can be individually controlled using broadcast mode. Each device of the auxiliary channel can also be individually controlled with external logic or visualisation via coded address-based control using two communication objects.

The DALI address assignment of 128 devices is implemented automatically by the DALI-Gateway. The DALI devices are addressed and allocated to EIB / KNX communication objects per channel in an ascending and non-arranged sequence and are immediately available for control.

The DALI-Gateway GW2304 is a DALI control device (master) and requires an AC mains supply. A separate DALI control supply is not required. The DALI current source is integrated into the gateway for the 2 x 64 DALI devices.

Power supply:	- Operating voltage	85...265 V AC, 50/60 Hz
	- Total power consumption via mains	Max. 12.5 W, at 230 V AC and max. load
	- Total current consumption via mains	Max. 55 mA, at 230 V AC and max. load
	- Total leakage loss for device	Max. 6 W, at 230 V AC and max. load
	- Current consumption via EIB / KNX	< 10 mA at 29 V DC
	- Power consumption via EIB / KNX	< 150 mW
DALI outputs (channels):	- Number of channels	2 independent channels conform to IEC 60929 / 62386 Per channel: 64 individual devices
	- Number of DALI devices	128 (per output max. 64)
	- Distance between gateway and DALI device Cable cross-section 0.5 mm^2 0.75 mm^2 1.0 mm^2 1.5 mm^2	 100 m 150 m 200 m 300 m
Connections	- EIB / KNX	Bus connecting terminal, 0.8 mm Ø, single-core
	- DALI outputs and - Mains voltage	Screw terminal 0.2... 2.mm^2 finely stranded 0.2... 4 mm^2 single-core
	- Tightening torque	Max. 0.6 Nm
Protection type	- IP 20	In acc. with DIN EN 60529 (IEC 62386)
Protection class	- II	In acc. with DIN EN 61140

Table 1 a DALI-Gateway GW2304, Technical data

Isolation category	- Overvoltage category - Pollution degree	III to DIN EN 60 664-1 2 to DIN EN 60 664-1
EIB / KNX safety extra-low voltage	- SELV 24 V DC	
DALI voltage	- typical 16 V DC (9.5…22.5 V DC)	to DIN IEC 60929 / 62386
Temperature range	- Operation	-5° C ... + 45° C
	- Storage	-25°C...+ 55°C
	- Transport	-25°C...+ 70°C
Design	- Modular installation device (MDRC)	Modular installation device, pro*M*
	- Dimensions	90 x 72 x 64,5 mm (H x W x D)
	- Module width	4 modules at 18 mm
	- Mounting depth	68 mm
Installation	- On 35 mm mounting rail	to DIN EN 60 715
Mounting position	- As required	
Weight	- 0.190 kg	
Housing, colour	- Plastic housing, grey	
Approvals	- EIB / KNX to EN 50 090-1, -2	Certification
CE mark	- in accordance with the EMC guideline and low voltage guideline	

Table 2 b DALI-Gateway GW2304, Technical data

Note: The DALI-Gateway conforms to the SELV properties in accordance with DIN EN 410. DALI does not require SELV properties, and it is possible to route the DALI control lines together with the mains voltage on a multi-core cable. Connection of 230 V mains voltage to one of the DALI outputs leads to the destruction of the DALI end stage and the output.

User programs

Device designation	Application program	Max. number of communication objects	Max. number of group addresses	Max. number of associations
GW2304	*KNX/DALI Gateway 1/2fold*	444	1280	1344

Table 3 Application programs for GW2304

Note: The programming requires EIB Software Tool ETS4 or higher.

2.2 Circuit diagram for GW2304

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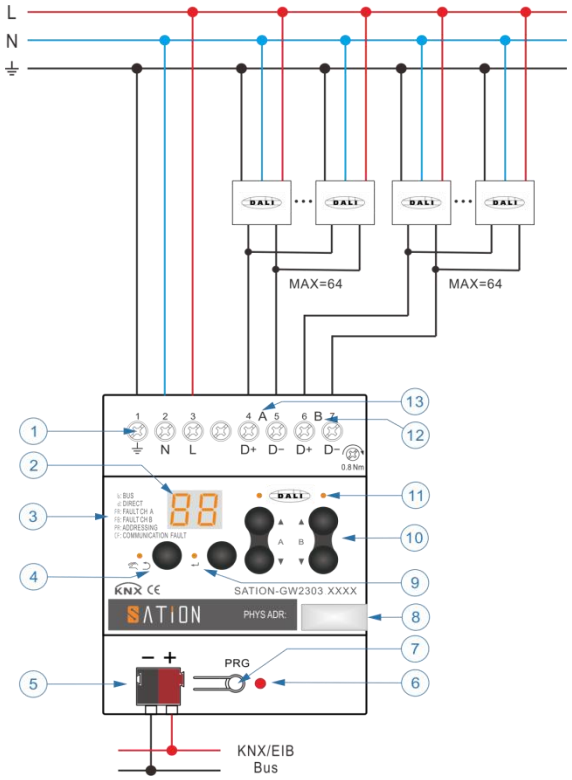

Fig. 4: Circuit diagram of the 1-fold&2-fold DALI-Gateway GW2304

1	Operating voltage	8	Label carrier
2	Code display	9	Enter button and LED
3	Code meaning	10	A/B up & down button
4	Return button and LED	11	A/B Channels LED
5	EIB / KNX connection terminal	12	B DALI output
6	EIB / KNX programming button	13	A DALI outputs
7	EIB / KNX programming LED		

Note: All-pole disconnection must be observed in order to avoid dangerous touch voltages which originate via feedback from different phase conductors.

2.3 Dimension drawing for GW2304

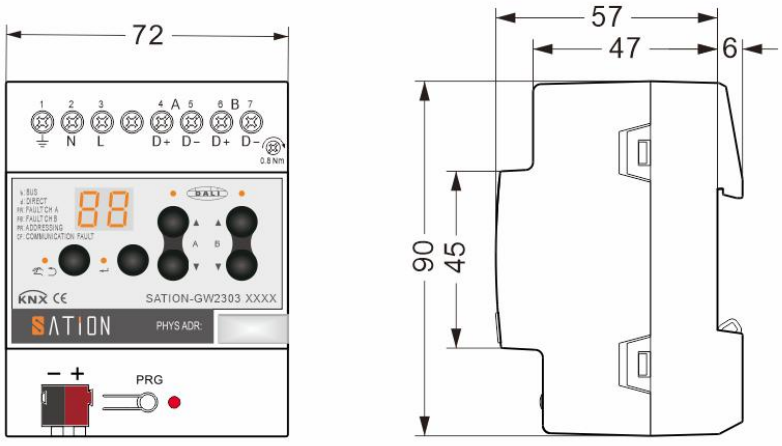

Fig. 5: Dimension drawing for GW2304

2.4 Assembly and installation

The DALI-Gateway GW2304 is suitable for installation in distribution boards or small enclosures for rapid installation on 35 mm mounting rails to DIN EN 60 715. The mounting position can be selected as required.



Accessibility to the device for the purpose of operation, testing, visual inspection, maintenance and repair must be provided (according to DIN VDE 0100-520).

The electrical connection is implemented using screw terminals. The connection to the EIB / KNX is established using a bus connecting terminal. The terminal designations are located on the housing.

The devices should be protected from damp, dirt and damage during transport, storage and operation.

- The device should only be operated in an enclosed housing (e.g. distribution board)!
- The devices should not be operated outside the specified technical data.

Up to 64 devices with DALI interface can be connected per DALI output (channel). The DALI-Gateway is a DALI master with an integrated DALI voltage supply. Other DALI masters or DALI voltage supplies may not be connected to the outputs of the DALI-Gateway. As the DALI is a single master system, there may be communication problems between two masters. If a further DALI voltage supply is used, it is possible that the DALI-Gateway can be destroyed due to voltage summation. The DALI output is not intended for 230 V.

It is possible to connect a control line with a maximum length (see table) to every DALI output. The figures are rounded.

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

Table 4 Maximum cable length per DALI output (channel)

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 necessary to lay a separate control cable.

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

The DALI-Gateway GW2304 is ready for operation once the operating voltage has been applied. The green operating LED on the front of the device lights up.

The flashing yellow DALI LED indicates the initialisation phase (may last up to 90 seconds) of the DALI-Gateway. The DALI environment is analysed in this phase. If required, new DALI devices will be allocated a DALI address and will be made available to the EIB / KNX. During this phase it cannot be guaranteed that an incoming telegram will be executed.

The initialisation phase starts automatically after download and recovery of the operating voltage and EIB / KNX voltage.

2.5 Commissioning

The parameterisation of the gateway and the DALI equipment is implemented with the user program *"KNX/DALI Gateway 1fold/2fold"* and the ETS program (from version ETS5). If ETS5 is used, a ".knxprod" type file must be imported. The following work must be carried out:

- Assignment of the physical EIB / KNX device addresses
- Optional readdressing of the DALI device (see section 3)
- Parameterisation of the gateway properties
- Assignment of the communication objects to EIB / KNX groups

A PC or laptop with ETS is required for parameterisation. A connection to the SATION® can be implemented via USB interface.

The DALI-Gateway allocates an address to every connected DALI device which does not have a DALI address and makes it available on the EIB / KNX. An individual, project-related readdressing is also possible without the ETS software tool.



The installation and commissioning may only be carried out by electrical specialists. The appropriate norms, guidelines, regulations and specifications should be observed when planning and setting up electrical installations.

2.6 Assignment of the physical EIB / KNX address

The assignment of the physical EIB / KNX address of the DALI-GATEWAY 1.1 is carried out via the ETS and the programming button on the device.

The DALI-Gateway GW2304 has a programming button for assigning the EIB / KNX physical address which is located on the collar of the device. The red programming LED lights up after the button has been pushed. It switches off as soon as ETS has assigned the physical address or the programming button is pressed again.

2.8 Manual operation

The DALI Return button is used for manual switching of the DALI channels without EIB / KNX. By pressing the Return button > 3 sec. the manual mode will start. The Return LED switches on. The current brightness values are lost. After pressed the channel A up button or down button(< 1 sec) and all DALI devices on channel A are switched on or switched off. After pressed the channel A up button or down button(> 1.5 sec)and all DALI devices on channel A are lightening or darkening. Channel B operates the same as Channel A. After the Return button is pressed > 3 sec. the test mode ends. The Return LED switches off. The devices retain their brightness state in manual mode.

If the DALI Enter button is pressed for longer than 5 seconds in normal mode, the detect mode will continue to be active. All DALI devices are detected and their number is determined. The number is automatically stored in the gateway and is used as a reference value for monitoring the DALI devices until a renewed activation. The same function can be activated via the EIB / KNX by the communication object (no. 251) “Detect Ballasts”.

If in the manual mode and the DALI Enter button is pressed for longer than 5 seconds,the DALI Addressing mode will be active.The Return LED and Enter LED switches on.By pressing the channel A up button > 1.5 sec. automatically assigns addresses will start for channel A all DALI device and the channel A LED blinking.If pressed the channel A down button > 5 sec. channel A all DALI device will be deleted all short addresses(Use with caution!). Channel B operates the same as Channel A.

2.9 Supplied state

The DALI-Gateway GW2304 is supplied with the physical address 15.15.255. The load connection terminals are open and the bus terminal is fitted.

The user program *KNX/DALI Gateway 1fold/2fold* is pre-installed.

2.10 Maintenance and cleaning

The GW2304 DALI-Gateway is maintenance free. No repairs should be carried out by unauthorised personnel if damage occurs (e.g. during transport or storage). The warranty expires if the device is opened.

If devices become dirty, they can be cleaned using a dry cloth. If this is not sufficient, they can be cleaned using a slightly damp cloth and soap solution. Corrosive materials or solutions should never be used.

3 Commissioning

3.1 DALI commissioning

DALI commissioning is not absolutely necessary. It can be implemented without any special DALI knowledge via the EIB / KNX.

As soon as the 1-fold&2-fold DALI-Gateway GW2304 is connected to the operating voltage, the GW2304 independently checks the DALI devices on both channels. This process (initialisation phase) is also started after a download or EIB / KNX and operating voltage recovery and may take up to 90 seconds depending on the number of connected DALI stations.

If equipment with a DALI interface is detected which has not been assigned a DALI address (default delivery state), the gateway will automatically assign a DALI address. The detected DALI devices will be assigned the first free DALI address (0 to 63) in the DALI-Gateway. If no DALI services are detected, it receives the first DALI address “0” and is made available on the EIB / KNX as device 1. The second device is allocated DALI address “1” and is made available on the EIB / KNX as device 2. The sequence in which the DALI master in our example finds the DALI interface for the DALI-Gateway cannot be influenced. If the connected DALI device already has a DALI address (e.g. replacement device from another system), it will not be changed. In order to recognise the exact assignment of the DALI addresses, every DALI device must be switched on and visually recognised in a test phase.

3.1.1 Testing the DALI devices with ETS

Every switch object of the individual device is assigned to an EIB / KNX group and can be switched on or off, for example, with the available group monitor in the ETS5. In this way the allocation of the lamp is detected and entered in an assignment list (see appendix).

This procedure is very time consuming and should only be used in exceptional cases.

3.1.2 DALI assignment by targeted connection of the DALI devices

If ETS is not available and only new, non-addressed DALI equipment is to be used, it is possible to commission the devices as follows.

The DALI-Gateway GW2304 automatically assigns a DALI address to every connected DALI device which does not have an address during the initialisation phase. The addresses are assigned sequentially and without omissions in ascending order.

If the DALI devices are connected in succession during commissioning, or the voltage is applied after every connection to the DALI-Gateway with an interruption to the bus (DALI or EIB / KNX) or operating voltage which triggers the initialisation routine on the gateway, a defined and ordered address assignment of the DALI devices will result. The time which should elapse before the next ballast is connected should be about 2 minutes.

This method is very simple but will require a very repetitive method of operation, and can be a very time consuming and ineffective method to connect ballasts to a gateway. Furthermore, there is no active confirmation as the lamps cannot be activated during commissioning without equipment such as push buttons or software tools.

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3.2 EIB / KNX commissioning

In the following chapter the functions of the user program *KNX/DALI Gateway 1fold/2fold* are described for the GW2304 with its parameter windows and communication objects.

3.3 Overview

The user program ***KNX/DALI Gateway 1fold/2fold*** must be used for the 2-fold DALI-Gateway GW2304. Programming is implemented with ETS4 or higher.

Device designation	Application program	Max. number of communication objects	Max. number of group addresses	Max. number of associations
GW2304	*KNX/DALI Gateway 1/2fold*	444	1280	1344

Table 5 Application program for GW2304

The application program is dynamically structured to guarantee simple project design, i.e. only the basic parameter windows with the corresponding parameters are enabled in the basic setting. Parameter pages or parameters can be enabled by the activation of corresponding functions, which will show the full range of functionality of the application program.

The DALI-Gateway GW2304 is supplied with the application program installed. Hence, only group addresses and parameters must be loaded during commissioning. If necessary, the entire application program can be loaded.

3.4 Parameter window

The functions of the outputs and their properties are determined in the individual parameter windows.
The parameter window is set up dynamically so that further parameter windows can be enabled depending on the parameterisation and function of the outputs.

In the following description "Device X" represents every DALI device which is connected to a channel of the DALI-Gateway.

The illustrations of the parameter windows in this manual correspond to the ETS5 parameter windows. The application program is optimised for ETS5. Using the corresponding knxprod file, it is also possible to parameterise and configure the GW2304 without any problems using ETS5. In the ETS5 program, it is possible however that the parameter page is automatically split by ETS if all parameters are used.

3.4.1 "General" parameter window

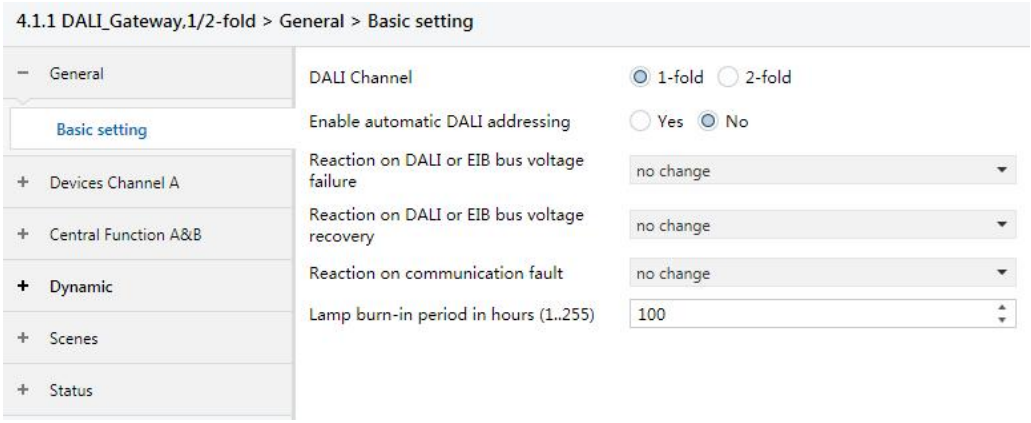


Fig. 6: "General" parameter window

In the "General" parameter window the basic settings of the 1-fold&2-fold DALI- Gateway GW2304 can be made which affect the gateway with both outputs/channels and all connected DALI devices.

DALI Channel

Options: 1-fold
2-fold

Using this parameter to select DALI Channel.

Enable automatic DALI addressing

Options: yes
no

Using this parameter the automatic DALI addressing process of the DALI-GATEWAY can be switched off.

- yes: If the DALI-GATEWAY locates a DALI device without DALI address assignment, the gateway automatically allocates the first free DALI address to the DALI device.

Benefits If there is DALI addressing without gaps, the exchange of a defective DALI device is possible without additional addressing or commissioning. A new DALI device without a DALI address must only be installed for this purpose. The DALI-Gateway addresses the new devices with the free DALI

- *no*: The DALI-GATEWAY does not assign DALI addresses, neither in normal mode nor at gateway voltage recovery. Should a non-addressed DALI device be installed, the DALI-GATEWAY can only control this using a broadcast telegram. A DALI address is unnecessary for this purpose. If a DALI device with an existing address has been installed,
  the DALI-GATEWAY will not be changed by it.

Reaction on DALI or EIB bus voltage failure

Option: **no change**
max. brightness value
min. brightness value
Off

With this parameter, you determine how the connected DALI equipment on channel A and B reacts if failure of the EIB / KNX bus voltage or DALI voltage means that communication with the DALI devices is no longer possible. In addition to the “no change” and “Off” states, the “max. brightness value” and “min. brightness value” are available. These parameters can be parameterised in the “Device” parameter window of the corresponding DALI device. The “Off” setting switches all DALI devices off. The “no change” setting leaves the brightness of the device unchanged in the event of a voltage failure. As the information (no change) is stored in the ballast, all DALI devices react immediately to the voltage failure. The time functions such as dynamic operation and burn-in time are not carried out.



The operating voltage on DALI equipment (e.g. ballasts) is a prerequisite for correct behaviour of the DALI devices.

Note: The DALI-Gateway generates a DALI voltage for up to 64 devices per channel as soon as the operating voltage is applied to the gateway. If the operating voltage fails, the DALI voltage will also fail.



It is important to note that an additionally connected external DALI power supply connected to the DALI-Gateway can destroy the gateway.

Reaction on DALI or EIB bus voltage recovery

Option: **no change**
max. brightness value
min. brightness value
Off

With this parameter, you determine how the connected DALI devices react when the EIB / KNX power supply or DALI control voltage (GW2304 operating voltage) recovers. In addition to the “no change” and “Off” states, the “max. brightness value” and “min. brightness value” are available. These values can be parameterised in the parameter window “Devices Channel x” (x = A, B) of the corresponding DALI device. The “Off” setting switches all DALI devices off.
The “no change” setting leaves the brightness of the device unchanged in the event of a voltage failure and the timing sequences are retained. The information (no change) is stored in the DALI device.

To function correctly, the DALI devices must be connected with operating voltage.



The DALI slaves have the attribute of assuming their maximum brightness value after their operating voltage (230 V) has recovered. This behaviour (Power Setup) is defined by manufacturers of ballasts and cannot be influenced by the DALI-GATEWAY
1.1. As far as the parameterisation is concerned, “no change” means that the brightness (100 %) defined by the manufacturer will be initially set. As the information “unchanged” is stored in the ballast after DALI voltage recovery, the maximum brightness value is retained after recovery of the DALI voltage.

If the supply voltage of the DALI equipment only becomes available at a later stage, the parameterisation is not retroactive. The DALI devices also assume the maximum brightness set at the factory.

The resetting of the ballast fault may take 90 seconds. This time is dependent on the number of DALI devices connected to the channel.

Reaction on communication fault:

Option: **no change**
Brightness value when turned on
max. brightness value
min. brightness value
Off

With this parameter, it is possible to define how the DALI devices are set if voltage is available, but no communication telegram has been received with the value "1" via the communication object “Telegr. Communication receive” within the defined receive interval. The time lapse for the receive interval is adjustable in the “*Status*” parameter with the function “Send/receive communication telegram cyclic”. If a "1" telegram is not received in this time, the DALI-Gateway assumes a safe state. The brightness of the DALI device is set with this parameter. The states “Brightness value when turned on”, “max. brightness value” or “min. brightness value” are available. These parameters can be configured in the “Device X” parameter window. With the setting “no change”, the brightness of the device with an EIB / KNX communication fault remains unchanged and the timing will continue. The “Off” setting switches all DALI devices off.



The DALI-Gateway will not send a telegram until a "1" telegram is received via the communication object "Telegr. Communication receive".

Lamp burn-in period in hours (1..255)

Option: 1…**100**…255 (in hours)

The continuous dimming of lamps which are not burned in can mean that the maximum defined brightness of the lamp may not be achieved and the required brightness value in the room cannot be set.
In order to guarantee the maximum lamp life and correct function of the ballast in the dimmed state, some lamps (vapour filled) must be operated for a certain number of hours at 100 % brightness during initial operation before they can be permanently dimmed.

If a telegram with the value "1" is received via the communication object “Lamp burn-in”, all devices on the channel may only be operated with 0 % (off) or 100 % brightness for the burn-in time set for this parameter. This applies independently of the other dimming, on/off and lightscene brightness values which have been set. The burn-in time has priority over all other settings. After the burn-in time has elapsed or the function is deactivated (telegram value of the communication object "Lamp burn-in" equal to "0"), the channel can be dimmed and programmed lightscenes can be accessed.

The same function can be activated or deactivated for an individual device with the coded device-related communication object “Lamp burn-in”. The respective DALI device must be selected beforehand with the "Select Device" communication object. A more detailed description of the DALI device control with two objects (addressing and function object) can be found in chapter 4 in the "DALI device control" section.

The burn-in time is only counted if a DALI device is connected to the channel and is ready for operation (supplied with power).

The function of the burn-in time remains activated in the event of an EIB bus voltage failure and counts the period during which the DALI equipment is switched on.



The information about the burn-in time which has elapsed up to now is lost after a download or after a failure of the AC/DC operating voltage on the DALI-GATEWAY. The burn-in time is deactivated.

3.4.2 "Devices Channel A" parameter window

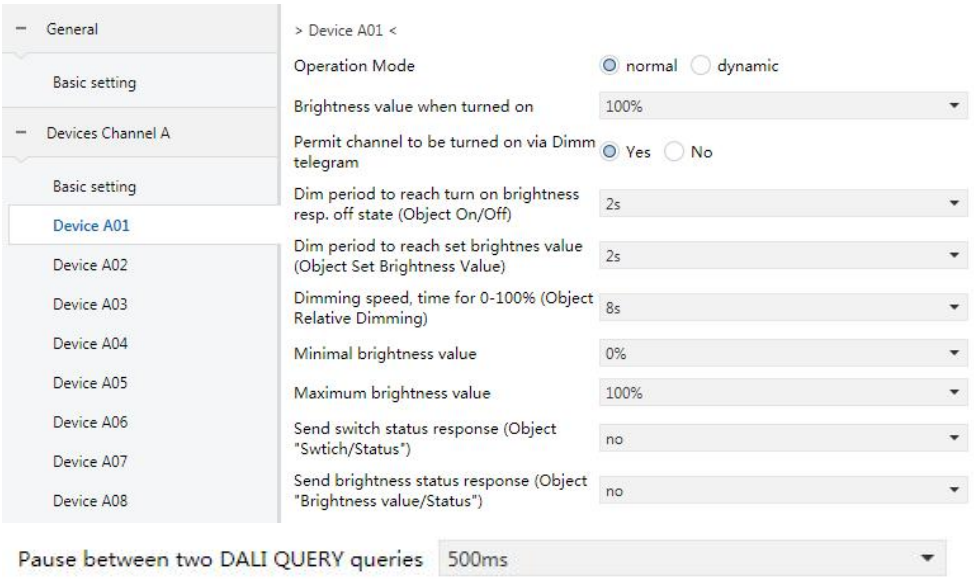


Fig. 7: Parameter window "Device – normal operating mode"

In this parameter window the properties of every DALI device on channel A are parameterised. For the devices of channel B an identical parameter window "Devices Channel B" is available with the exception of the status feedbacks and the brightness values.

First of all the devices to be parameterised are selected by the number of the device A01…A64 or B01…B64.

The parameterisation relates exclusively to the selected DALI devices.

It is important to note that the status messages of the switching states and the brightness values are received via the same communication objects with which the switching operation (object Device Axy "Switch/Status") is received or the brightness value (object Device Axy "Brightness value/Status") is set.

In the **Basic setting** parameter window has the following parameters:

Pause between two DALI QUERY queries

Options: 0(Disable)
500ms
600ms
…
10s
…
32s

500ms ~ 32s:DALI-GATEWAY will automatically query the fault status of DALI equipment and lamps recorded on the bus between two devices in this time parameter. The automatic query function will be performed in the DALI-GATEWAY idle state. If the fault is detected, the corresponding fault code will be displayed. See Appendix A.3.

0(Disable):DALI-GATEWAY does not query the fault status of DALI devices and lamps recorded on the bus

Device Number

Option: **A01**
A02
…
A64

With this parameter, it is possible to define which DALI devices are to be parameterised in channel A of the 1-fold&2-fold DALI-Gateway.

The device numbers (A01…A64) correspond to the allocation of the EIB / KNX names “Device A01” to “Device A64”.



Comment for the specialists: The DALI addresses which the EIB / KNX user does not require are reduced by one, i.e. the DALI device on the EIB / KNX with number 01 has the DALI address 00. Device 64 has the DALI address 63. The offset has been taken into consideration in complete application programs with all parameters and objects. The user only needs to use device numbers from 1 to 64.

3.4.2.1 “Normal” operating mode

In the “normal” operating mode, the connected DALI device operates as a normal load, which can be separately switched on, switched off and dimmed and where a brightness value can be set. As a contrast, the “dynamic” operating mode can be parameterised with a chronological sequence, e.g. a staircase lighting function.

Operating mode

Option: **normal**
dynamic

With this parameter, you set if the DALI device should be operated in “normal” or “dynamic” mode. For the “normal” operating mode the parameter window shown on the previous page is displayed. A detailed description of the dynamic operating mode can be found in section 3.4.2.2.

Brightness value when turned on

Option: last brightness value
100%
90%
…
20%
10%
0%

This parameter defines the brightness with which the DALI device is switched on as soon as an ON telegram is received.
If a value which is outside the minimum and maximum dimming value limits is to be set during operation, the brightness will be limited to the maximum or minimum dimming values.
If for example the device is at a brightness value which is not equal to the switch ON value and it receives an ON telegram, the parameterised switch ON value is set.
The “last brightness value” parameter setting has the effect that the device switches on with the brightness value which it had before the OFF command was received. The last brightness is stored in the ballast and is not changed with the central commands (Broadcast commands). The minimum physical brightness of DALI equipment is the brightness level which the luminaire can set as the minimum dimming value conditioned by its physical properties.

Minimal brightness value

Option: **0%**
5%
…
70%

With this parameter, the minimum brightness value is defined which the DALI devices should assume when dimming or when setting a brightness value. The absolute minimum brightness value (0%), which the ballast lamp combinations can assume is manufacturer-specific and is typically between 1 % and 5 %. If a minimum brightness value is set which exceeds the maximum brightness value, the minimum brightness value is set equal to the maximum brightness value. If the “Burn in Lamps” function is activated, the lamp will be operated only with 0 % (off) or 100 % brightness regardless of this setting.

If a brightness value is received via the “Brightness value/Status” communication object, which is below the defined minimum brightness value, the minimum brightness value is set.

The set minimum brightness value in the device continues to be valid with central commands.

Maximum brightness value

Option: **100%**
…
30

With this parameter, the maximum brightness value is defined which the DALI devices should assume when dimming or when setting a brightness value. If a maximum brightness value is set which is lower than the minimum brightness value, the maximum brightness value is set equal to the minimum brightness value. If the “Burn in Lamps” function is activated, the lamp will be operated only with 0 % (off) or 100 % brightness regardless of this setting.

If a brightness value is received via the “Brightness value/Status” communication object, which is above the defined maximum brightness value, the maximum brightness value is set.

The set brightness value in the device continues to apply for central commands received for channel A and channel B.

Permit channel to be turned on via dim telegram

Option: **yes**
no

If set to "yes", the channel can be turned on via the dimming function.



Switching off is not possible. This function is not supported by DALI. It is possible to dim down to the minimum brightness value. The device must be switched off via the shutoff command (e.g. short push of a button).

Dim period to reach turn on brightness resp. off state (Object Switch / Status)

Option: Immediate
0.7 s
2 s
…
90 s

This parameter determines the period which a dimming process requires when switching on at 0 % brightness to reach the switch ON value. The same speed applies for switching off from the set brightness value to the OFF value. This dimming time only affects dimming commands which are received via ON/OFF telegrams. A soft start or soft stop can be set with this parameter.

Dim period to reach turn on brightness (Object Set Brightness Value)

Option: Immediate
0.7 s
2 s
…
90 s

This parameter defines the time which a dimming process requires from 0 % to the switch ON value. This dimming time only affects dimming commands which are received via the communication object “Set Brightness Value” or “Brightness value/Status”.

Dimming speed, time for 0-100% (Object Relative Dimming)

Option: 0.7 s
…
8 s
…
90 s

This parameter defines the time in which a dimming process of 0...100% is carried out. This dimming time only affects dimming actions which were initiated by the communication object “Relative Dimming”.



For all three parameterisable dimming times: With individual device control via EIB / KNX group assignment, the parameterisable dimming time can be exceeded by the relatively low DALI telegram speeds, if more than 7 individual devices are contained in an EIB / KNX group. It must be considered that an EIB / KNX command can trigger up to 64 individual DALI telegrams, which have to be sent consecutively on the DALI control cable. As the influence also depends on the lighting equipment and the status feedbacks, a final statement of the performance can only be determined during real time operation. This behaviour is irrelevant in broadcast mode.



The following must be observed when selecting the dimming times: Depending on the lighting equipment involved, stepwise dimming can occur with excessively high dimming speeds and excessively short dimming times. This is due to the fact that dimming steps are defined in the standard in order to achieve a logarithmic dimming curve which appears as a linear response to the human eye.

Send switch status response (Object "Switch/Status")

Option: **no**
only if value change
always

With this parameter, you define if and under which conditions the switching status of the device should be sent via the “Switch/Status” object

No status is set with the setting “no” (default value).

The option “only if value change” has the effect that the switching status is only sent with a status change from ON to OFF or from OFF to ON. As the switching status can be changed via different functions, e.g. central control, slave mode, scene retrieval etc. and the 64 devices can only be scanned cyclically, a status message delay can result.

The option “always” has the effect that every received telegram which can change the status triggers a returned status message detailing the current state. It is possible that delayed status messages can occur in this case e.g. after a central command all devices respond in succession even if the status has not changed.

Send brightness status response (Object "Brightness value/Status")

Option: **no**
only if value change
always

With this parameter, you define if and under which conditions the brightness value of the device should be sent via the “Brightness value/Status” object

No status is set with the setting “no” (default value).

The option “only if value change” has the result that the brightness value is only sent if it is changed. The feedback only occurs if the brightness value deviates from the previous value at the time the cyclic scan occurs. This reaction allows the visualisation of a chronological brightness characteristic. As the brightness value can be changed via different functions, e.g. central control, slave mode, scene retrieval etc. and the 64 devices can only be scanned cyclically, a status message delay can result (the time delay can be over 90 seconds).

The option “always” means that a status message of the current state is sent each time a telegram is received. It is possible that delayed status messages can occur in this case.

3.4.2.2 “Dynamic” operating mode

If the “dynamic” operating mode is set, the DALI device or one channel is capable of implementing a staircase lighting function or special lighting sequences.

In order to allow the greatest possible variations, the dynamic sequence has been programmed so that it is composed of two scenes (see Figure 8). In order to set the chronological sequence, the “Dynamic” and “Scene” parameter windows have to be considered. In the “Scene” parameter window, the DALI devices intended for use in the dynamic operating mode should be parameterised individually with their lightscene values and transition values. In the “Dynamic” parameter window, the run time of the scenes are defined. After the operating time of the start scene has elapsed, the end scene commences with a transition time and an operating time. The device is switched off after the operating time. A cut-out warning (to DIN 18015) can be implemented with the end scene.

The dynamic operation commences with a start scene and terminates with an end scene. Any scenes from the 16 gateway scenes can be used for the scenes.

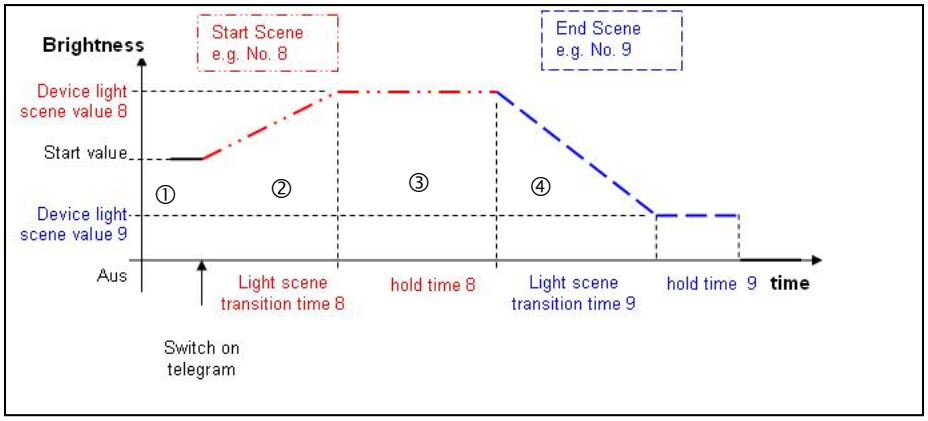


Fig. 8 Graphic representation of dynamic operation

Only one dynamic operation can be defined for each DALI-Gateway. Each device can run the parameterised dynamic operation arbitrarily and independently of the other devices. If more devices should follow the parameterised chronological sequence in dynamic operation, all Device xy “Switch/Status” objects should be linked with the same group address.



DALI has a relative slow transfer rate of 1200 Baud, therfore it is possible that EIB / KNX groups with more than 7 DALI samples switched or dim not at the same time. The reason is that one EIB/KNX telegramm released up to 64 single DALI telegramms. This behaviour is irrelevant for the broadcast mode.

The sequence parameterised in dynamic operation is accessed for a device in channel A via the communications object “Device Axy Switch/Status” (xy = 01…64). The dynamic operation of a DALI device from channel A can be accessed in the same way as every device of channel B by the communication objects “Select Device” and “Selected Device On / Off”.
To help in understanding this concept, the parameterisation of a staircase lighting function with several devices is described as an example in chapter 4.

The start of dynamic operation is implemented via a telegram with the value “1”. A telegram value of “0” has no effect.

Behaviour with retriggering: If renewed triggering occurs during phase ① (telegram with value "1"), the dynamic sequence continues unchanged. With

an ON telegram in phase ②, runtime 8 (stop phase) ② recommences. The ON telegram "1" in phase ③ or ④ has the effect that phases ② and ③ are rerun.

An OFF telegram ("Channel X ON/OFF = "0") in phase ① or ② has no effect. If an OFF telegram in phase ③ or ④ is received, the dynamic operation is continued unchanged or is retained until the switch OFF value.

The dynamic operation ends after a download. The brightness level which is used at the end of the dynamic operation is set (“standby” state).

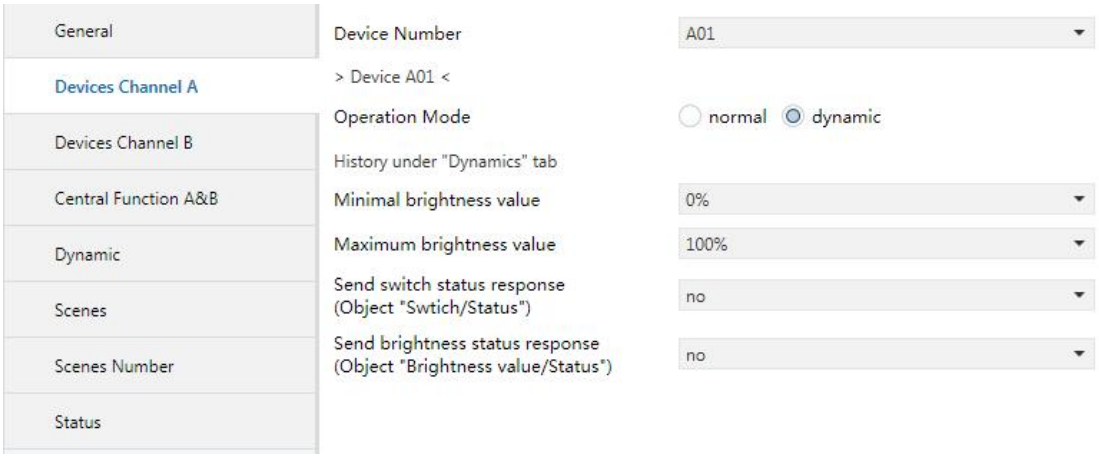


Fig. 9: Parameter window "Device – dynamic operating mode"

Device Number

Option: **A01**
A02
…
A64

With this parameter, it is possible to define which DALI devices (1 to 64) are to be parameterised in channel A of the 1-fold&2-fold DALI-Gateway.

The device numbers (1…A64) correspond to the allocation of the EIB / KNX names “Device A01” to “Device A64”.

Note for the specialists: The DALI addresses which the EIB / KNX user does not require are reduced by one, i.e. the DALI device on the EIB / KNX with number 01 has the DALI address 00. Device 64 has the DALI address 63. The offset has been taken into consideration in complete application programs with all parameters and objects. The user only needs to use device numbers from 1 to 64.

Operation Mode

Option: **normal**
dynamic

With this parameter you set whether the DALI device should be operated in “normal” or “dynamic” mode. For the “normal” operating mode, the parameter window shown in the previous section is displayed. The device can be switched on or off normally via the objects xy “Switch/Status” or via the selection object “Selected Device On/Off” (a device must be selected beforehand).
If the “dynamic” option is set, the corresponding device does not normally switch the device on or off via the objects Device xy “Switch/Status” or via the selected object “Selected Device On/Off” (the device must be selected beforehand), but rather calls up the corresponding scene values, i.e. if the GW2304 receives a telegram with the value “1”, the parameterised start scene and subsequently the parameterised end scene in the “Dynamic” parameter window are accessed.
The parameterisation of the dynamic operation is implemented via two scenes which are selected in the “Dynamic” parameter window. The actual scene setting is implemented in the corresponding scene parameter window. (A programming example can be found in chapter 4 “Planning and application” - Staircase lighting function with dynamic mode).

Minimal brightness value

Option: **0%**
5%
…
70%

With this parameter, the minimum brightness value is defined which the DALI devices should assume when dimming or when setting a brightness value. The absolute minimum brightness value (0%), which the ballast lamp combinations can assume is manufacturer-specific and is typically between 1 % and 5 %. If a minimum brightness value is set which exceeds the maximum brightness value, the minimum brightness value is set equal to the maximum brightness value. If the “Burn in Lamps” function is activated, the lamp will be operated only with 0 % (off) or 100 % brightness, regardless of this setting.

If a brightness value is received via the “Brightness value/Status” communication object, which is below the defined minimum brightness value, the minimum brightness value is set.

The set minimum brightness values in the device continue to be valid with central commands.

Maximum brightness value

Option: **100%**
…
30

With this parameter, the maximum brightness value is defined which the DALI devices should assume when dimming brighter or when setting a brightness value. If a maximum brightness value is set which is lower than the minimum brightness value, the maximum brightness value is set equal to the minimum brightness value. If the “Burn in Lamps” function is activated, the lamp will be operated only with 0 % (off) or 100 % brightness, regardless of this setting.

If a brightness value is received via the “Brightness value/Status” communication object, which is higher than the defined maximum brightness value, the maximum brightness value is set.

The set maximum brightness values in the device continue to be valid with central commands.

Send switch status response (Object "Switch/Status")

Option: **no**
only if value change
always

With this parameter, you define if and under which conditions the switch status of the device should be sent via the “Switch/Status” object.

No status is set with the setting “no” (default value).

The option “only if value change” has the effect that the switching status is only sent with a status change from ON to OFF or from OFF to ON. As the switching status can be changed via different functions, e.g. central control, slave mode, scene retrieval etc. and the 64 devices can only be scanned cyclically, a status message delay can result.

The option “always” has the effect that every received telegram which can change the status triggers a returned status message detailing the current state. It is possible that delayed status messages can occur in this case e.g. after a central command all devices respond in succession even if the status has not changed.

Send brightness status response (Object "Brightness value/Status")

Option: **no**
only if value change
always

With this parameter, you define if and under which conditions the brightness value of the device should be sent via the “Brightness value/Status” object.

No status is set with the setting “no” (default value).

The option “only if value change” has the result that the brightness value is only sent if it is changed. The feedback only occurs if the brightness value deviates from the previous value at the time the cyclic scan occurs. This reaction allows the visualisation of a chronological brightness characteristic. As the brightness value can be changed via different functions, e.g. central control, slave mode, scene retrieval etc. and the 64 devices can only be scanned cyclically, a status message delay can result (the time delay can extend for 90 seconds).

The option “always” means that a status message of the current state is sent each time a telegram is received. It is possible that delayed status messages can occur in this case.

3.4.2.3 "Slave" operation mode

The Slave mode will activate directly over the object "*Slave mode ON/OFF"* not over a parameter.
Individual DALI devices of the DALI-Gateway can be operated as a slave. In **Slave mode,** the DALI device is priority controlled via the 8-bit communication object "Brightness value". This mode is activated commonly for all DALI devices (Channel x "Selected Device Slave Mode") or individually for each device. For individual control, the device should be selected via the object "Selected Device" and subsequently switched on ("1") or off ("0") via the object "Selected Device Slave Mode". In slave mode, it is possible to implement central lighting control. A master control unit (e.g. the light controller LR/S or presence detector PM/A) sends brightness values in 8-bit format which controls the DALI devices via the DALI-Gateway. The
1-byte control value is transferred via the communication object xy "Set Brightness Value" (xy = 01…64) of the DALI-Gateway.

After switching on the slave mode (value "1" on the communication object "Selected Device Slave mode"), the brightness value last received from the communication object "Set Brightness Value" is set. If the slave mode is switched on, the brightness can only be controlled via the object Device xy "Brightness value/Status". The communication objects Device xy "Switch/Status" and "Relative Dimming" are blocked, i.e. telegrams received at this object will not be carried out. The exceptions are central (broadcast) channel commands which are received via the objects Channel x "On/Off" and Channel x "Relative Dimming". Both these objects are available without limitations.

After switching off the slave mode (value "0" to the communication object "Device Slave Mode"), the current brightness value is retained. The control of the channel via the object Device xy "Switch/Status" and Device xy "Relative Dimming" are again released.

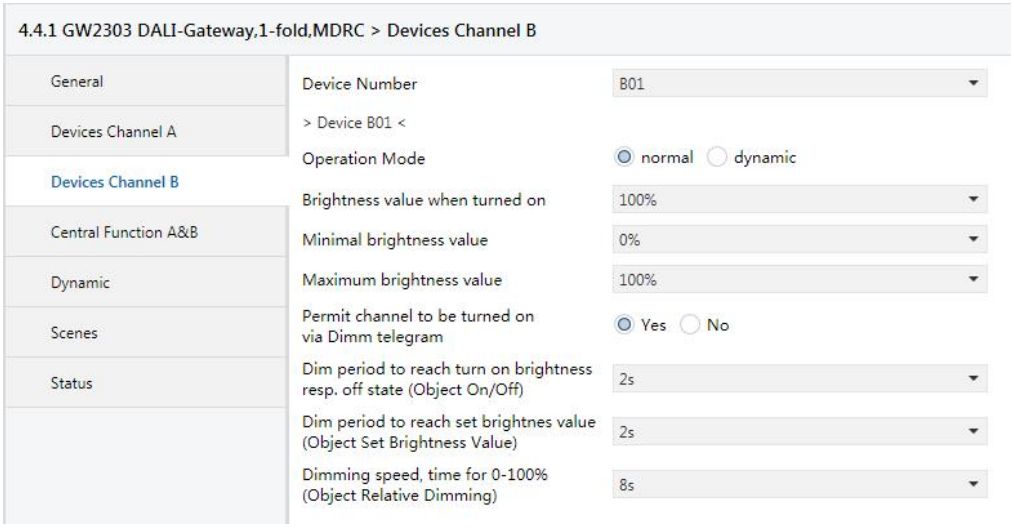


The central control (broadcast function) of the entire channel thus has a higher priority than the slave mode of individual devices.

The slave mode is deactivated after a download or EIB / KNX voltage recovery.

The slave mode can be activated for all devices of channel x with just a single "1" telegram via the object Channel x "Channel slave mode on/off". The slave mode can be deactivated for individual devices without influencing the state of the slave mode of other devices via the individual objects Channel x "Selected Device Slave Mode".

3.4.3 “Devices Channel B” parameter window



In this parameter window, the properties of every individual DALI device of auxiliary channel B are set. The parameters have the same functions as those described for channel A in the section “Device channel A parameter window”.
GW2304: The function of channel B is exactly the same as that of channel A.

3.4.4 “Central Function A&B” parameter window

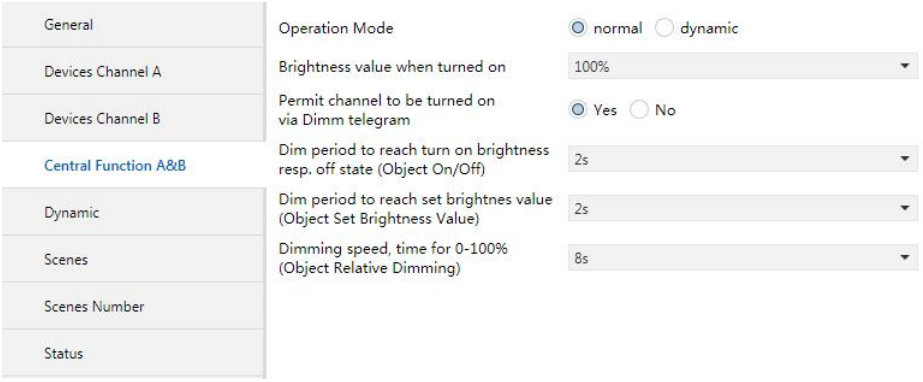


Fig. 10: “Central Function A&B” parameter window

In the *Central Function A&B* parameter window, the settings for simultaneous control of all DALI devices in channel A or B can be undertaken.

The properties defined in this parameter window for a central function apply both for channel A and for channel B.

The adjustable parameters which can be set individually in the “Devices” parameter window are ignored if the channels are centrally controlled. One exemption is the minimal and maximal brightness value. This Values are the same for central or individual control.

The setting “individual device adjustment” has the effect that the parameterisation (dimming speeds) of the individual sample is still valid for this DALI sample, if a central control received.

If an individual dynamic operation is started with a device when a channel command is received, it is immediately interrupted and the central channel command (broadcast command) is implemented.

Mode

Option: **normal**
dynamic

With this parameter you set whether the channels should be operated in “normal” or “dynamic” mode. The setting always relates to both channels.

If the “dynamic“ operating mode has been selected, the telegrams which are received via the central objects Channel x “On/Off” (x = 1, 2) only have to control the function of the dynamic operation, i.e. if the GW2304 receives a telegram with the value “1”, the parameterised start scene and subsequently the parameterised end scene in the “Dynamic” parameter window are accessed. Precisely those devices which are activated in both scenes are controlled.



In dynamic mode, no normal central switching on and off occurs as in the “normal” mode. Only both scenes of the dynamic operation are accessed.

Brightness value when turned on

Option: **100%**
90%
…
10%
0%

These parameters define the brightness value, with which each DALI device of channel A or B is switched on when an ON telegram is received.
If a value to be set is outside the minimum and maximum dimming value limits, the brightness will be limited to the maximum or minimum dimming values.
If for example the device is at a brightness value which is not equal to the switch ON value and it receives an ON telegram, the parameterised switch ON value is set.

Permit channel to be turned on via dim telegram

Option: **yes**
no

If set to "yes", the device can be turned on via the dimming function.

.



Switching off is not possible. This function is not supported by DALI. It is possible to dim down to the minimum brightness value. Switching off can be implemented via the OFF command (e.g. short push of a button).

Dim period to reach turn on brightness resp. off state (Object ON / OFF)

Option: Immediate
0.7 s
1.0 s
2 s
…
90 s

This parameter determines the period which a dimming process requires when switching on at 0 % brightness to reach the switch ON value(100 % brightness). The same speed applies for switching off from the set brightness value to the OFF value. This dimming time only affects dimming commands which are received via ON/OFF telegrams. A soft start or soft stop can be set with this parameter. With the setting “constant dimming speed”, the same speed (adjustable “Time duration for progressing through the dimming range 0…100%”) is used

independently of the brightness setting. This has the effect that the switch ON/OFF value is not achieved at the same time, but there are no unnecessary long time delays until the lamp switches, for example, from 30% brightness to the OFF state.

Dim period to reach turn on brightness (Object Set Brightness Value)

Option: Immediate
0.7 s
2 s
…
90 s

This parameter defines the time which a dimming process requires from 0 % to the switch ON value(100 % brightness). This dimming time only affects dimming commands which are received via the “Set Brightness Value” communication object.

Dimming speed, time for 0-100% (Object Relative Dimming)

Option: 0.7 s
…
8 s
…
90 s

This parameter defines the time which a dimming process requires from 0...100%. This dimming time only affects dimming commands which were received by the channel communication object “Relative Dimming”.



The following must be observed when selecting the dimming times: Depending on the lighting equipment involved, stepwise dimming can occur with fast dimming speeds and low dimming times. This is due to the fact that dimming steps are defined in the standard in order to achieve a logarithmic dimming curve which appears as a linear response to the human eye.

With the central function, the defined “Minimal brightness value” and “Maximum brightness value” in the *Devices* parameter window are retained. If the minimum dimming value is less than the possible physical dimming value of the DALI equipment, this device is automatically set to the lowest possible physical dimming value (minimum physical brightness).

Devices and channels where “Burn in Lamps” is active continue to be operated independently of the central dimming value commands of just 0 % (off) or 100%.

3.4.5 “Dynamic” parameter window

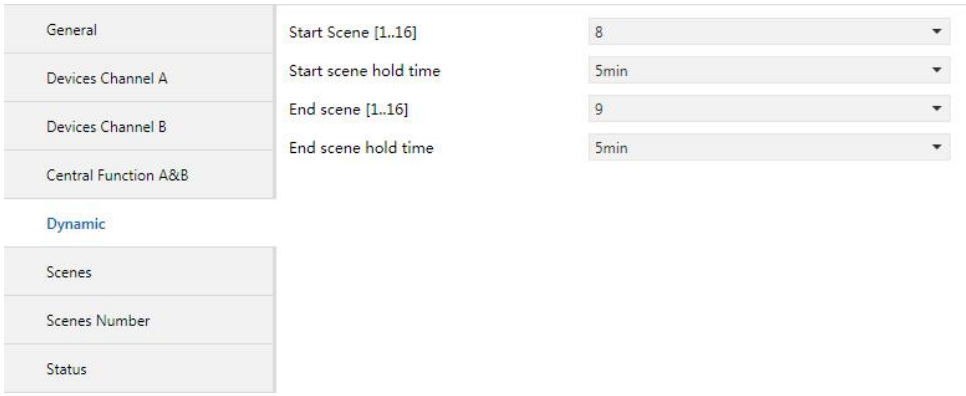


Fig. 11: “Dynamic” parameter window

This parameter window is only significant if the “Dynamic” mode has been selected for at least one of the 128 devices in the “Device” parameter window or for channel A and B in the “Central Function A&B” parameter window. If the “dynamic” operating mode is set, the DALI device or one channel is capable of implementing a staircase lighting function or special lighting sequences.

Only one dynamic operation can be defined for each DALI-Gateway. Every device can run the parameterised dynamic operation arbitrarily and independently of the other devices with the “On/Off” or “Switch/Status” dynamic operation.

The dynamic operation is composed of two of the 16 scenes. The scenes used and the run times of the scenes are selected in the parameter window (“Dynamic”) described here.

The following graphic should clarify the dynamic operation and the effect of the parameter setting. A cut-out warning (to DIN 18015) can be implemented with the end scene.

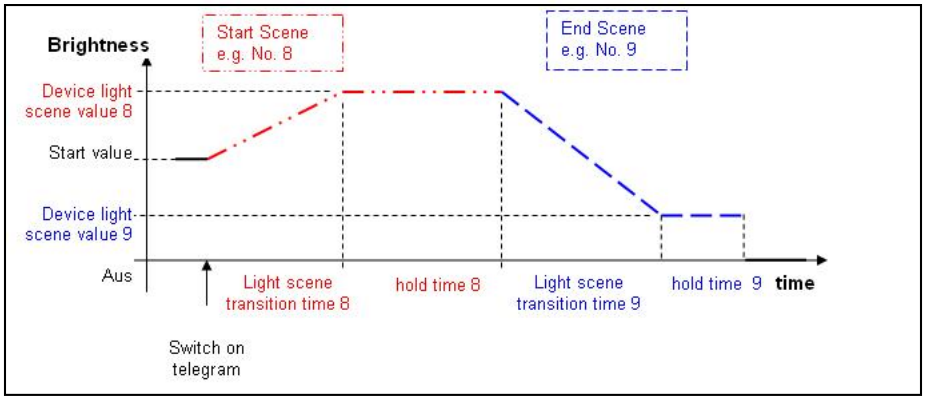


Fig. 12 Graphic representation of dynamic operation

A telegram with the value “1” starts the dynamic process of the transmitting device. A telegram with the value “0” has no effect.

Start Scenes

Option: 1
…
8
…
16

The start scene of the dynamic operation is defined with this parameter. Parameterisation of the selected scene is implemented in the “Scene” parameter window.

Start scene hold time

Option: 1 s
…
5min
…
24h

The run time of the start scene is defined with this parameter. The run time commences after the scene transition time which is parameterised in the “Scenes” parameter window. After the operating time ends, the end scene commences with its own operating time. See Figure 12 for the timing.

End Scene

Option: 1
…
9
…
16

The end scene of the dynamic operation is defined with this parameter. Parameterisation of the selected scene is implemented in the “Scene” parameter window. See Figure 13 for the timing.

End scene hold time

Option: 1 s
…
5min
…
24h
indefinitely

The run time of the end scene is defined with this parameter. The run time commences after the scene transition time which is parameterised in the “Scenes” parameter window. The dynamic device switches off after the run time has elapsed. See Figure 13 for the timing. If the setting “indefinitely” is selected, the lighting always remains at, for example, the minimum brightness value (safety value). The sequence (staircase lighting) will run again if the dynamic process is retriggered.
A very convenient warning time can be programmed at the end of the staircase lighting time with the end scene transition time (second scene) and the run time of the end scene.

3.4.6 "Scenes" parameter window

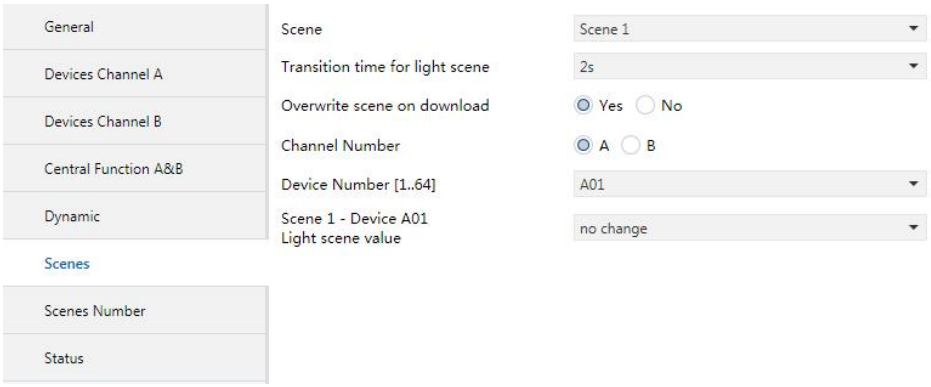


Fig. 13: "Scenes" parameter window

In the *Scenes* parameter window, the general settings for the lightscenes (maximum 16) are undertaken. Any two scenes for dynamic operation can be used. Both of these scenes are assigned to dynamic mode in the "Dynamic" parameter window.

The DALI samples included to the scene have to be individual parameterises with the brightness value (light scene value). Through this the DALI sample will activated for a scene. Every single DALI sample of the main channel A and auxiliary channel B can be included in the same scene.
The devices which are not to be included in the scene should be omitted using the "no change" setting in the "Device Lightscene value" parameter.

Each of the 16 lightscenes can be accessed and stored using the 1-bit and/or 1-byte telegram. Both communication objects are always visible and can be used independently of one another.

The telegram value has the following function with 1-bit control:
Telegram value "0" = retrieve scene 1
Telegram value "1" = retrieve scene 2

The following applies with the 1-byte telegram value:

The scene numbers of scene 1 to 16 can be set independently in the **Scenes number parameter window.**

EIB / KNX 1-byte telegram value	Meaning
0 or 64 1 or 65 2 or 66 … 63 or 127	Retrieve scene number 1 Retrieve scene number 2 Retrieve scene number 3 … Retrieve scene number 64
128 or 192 129 or 193 130 or 194 … 191 or 255	Store scene number 1 Store scene number 2 Store scene number 3 … Store scene number 64

Table 6 Retrieve / store scenes

Note: The scene is not continued if there is a bus voltage or supply voltage failure. The brightness is set which is selected with voltage failure or recovery on the “General” parameter window. If the operating voltage fails on an individual DALI device, it will stop and will not be reintegrated into the active lightscene even when the voltage recovers. The device will only be activated the next time the scene is retrieved.



The store scene command over the EIB / KNX includes all 128 DALI samples. This means that a scene stored with the object „store scene“ will include all 128 DALI samples. Every DALI samples will get the brightness in the moment of the storage. The brightness stored over the ETS parameterisation and the mask (sample not part of the scene) are lost. The next download will restore the stored calibration if the parameter „overwrite scene on download“ is set with „yes“.Otherwise the stored scene values are protected.

Scene

Option: **Scene 1**
…
Scene 16

The lightscene to be parameterised can be selected with this parameter. A maximum of 16 scenes are available of which two scenes can also be used for the dynamic mode.

Overwrite scene on download

Option: **yes**
no

With the “no” setting, the scene brightness values and scene transition times in the DALI devices will not be overwritten during an ETS download or EIB voltage recovery. The stored scene brightness values are retained. This can be useful e.g. to protect a complex lightscene which has been set via various buttons from being changed during a download.



Note: This can mean that the brightness values displayed in the *Scene X* parameters window do not correspond to the actual stored scene brightness values in the gateway and in the DALI devices after an ETS download.

The “no” setting has the effect that the scene brightness values and scene transition times in the DALI devices are overwritten by the ETS scene values with an ETS download after an EIB recovery.

Channel Number

Option: **A**
B

With this parameter, the channel is selected to which the device to be parameterised is connected.

This parameter is visible if the parameter “overwrite the scene on download” set with “yes”.

Device Number [1…64]

Option: **A01**
…
A64

These are the following options for parameter setting B

Option: **B01**
…
B64

The DALI devices which are to be parameterised are selected with this parameter according to their scene values.

This parameter is visible if the parameter “overwrite the scene on download” set with “yes”.

Device Lightscene value

Option: **no change**
max. brightness value
100%
90%
…
10%
min. brightness value
Off

This parameter is visible if the parameter “overwrite the scene on download” set with “yes”.

This parameter defines the brightness value to which the DALI devices are set when a scene is retrieved as a percentage. The lightscene value of the DALI device has the “no change” default setting. Only the brightness of the devices which are integrated into the scene has to be changed.

With the "no change" setting, the current brightness of this DALI device will not be influenced when a scene is retrieved, i.e. the device is not part of the scene. The device which is not shown (faded out) remains unchanged and does not participate in the scene after a manual change in the channel brightness and renewed storing of the lightscene.



Be careful: All DALI members connected on channel A and B (up to 128 members) are fitted to the scene if the scene is stored over the EIB/KNX. The scene settings from the ETS are lost. Also the scene (“device lightscene value”) parameterisation „no change“ are lost. This means all DALI devices are members in the scene.

If the set scene brightness is higher or lower than the set maximum or minimum value of the corresponding device (refer to the “*Device”* parameter window), this value is stored in the scene but the minimum or maximum brightness value of the corresponding DALI device is set automatically if the scene is retrieved.

Transition time for lightscene

Option: Immediate
0.7 s
…
2 s
…
90 s

This parameter is visible if the parameter “overwrite the scene on download” set with “yes”.

With this parameter, the time is set in which the scene retrieval of the dimming process for all luminaires which are part of the scene has to be completed. This means that for example, device A, which has to dim from 10 % to 100 % and device B which has to dim from 90 % to 100 % should reach their final brightness values at the same time.

The transition time for the lightscene applies to all devices of the scene and cannot be adjusted individually for each device. If the lightscene transition, e.g. for device A1 is changed, it is also changed for the following parameter windows of the device xy (x = A, B, y = 1….64).

3.4.7 “Scenes number” parameter window

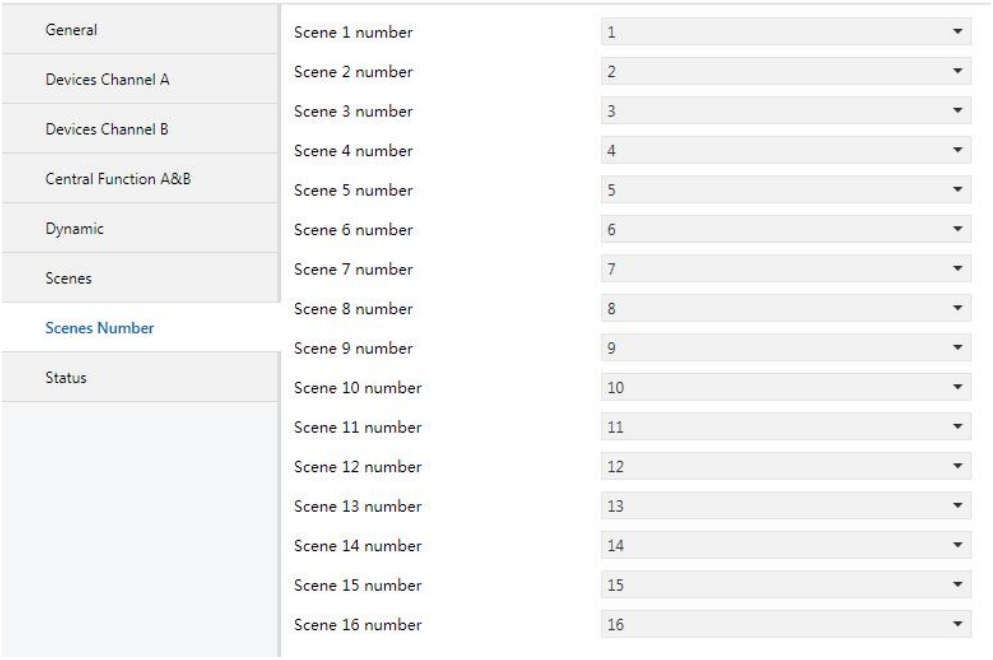


Fig. 13.2: “Scenes number” parameter window

In the Scenes number parameter window, the scene numbers of scene 1 to 16 can be set independently.

Scene Number [1…16]

Option: 1
…
64

3.4.8 “Status” parameter window

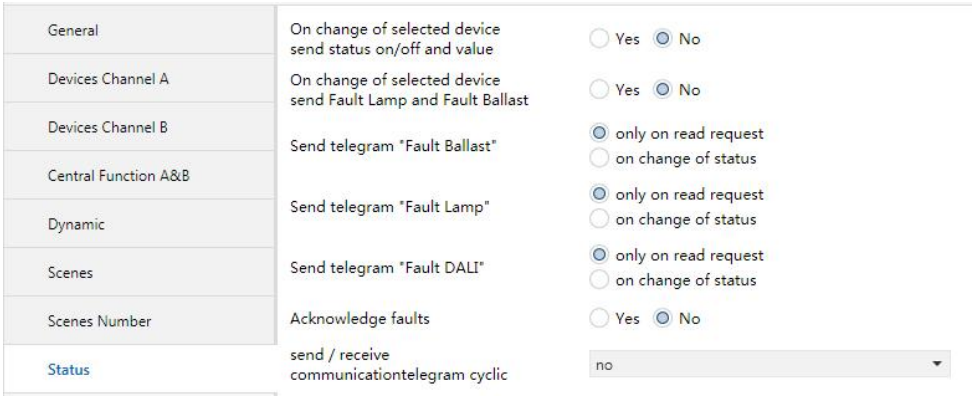


Fig. 14: “Status” parameter window

In the *Status* parameter window, the behaviour of the status and communication objects is defined.

On change of selected device send status on/off and value

Option: **Yes**
No

With the setting „yes“ the switching status and the brightness status are send if the DALI device is select with the object „Select device“ With the setting „no“ the status must read actively with a separate command.

On change of selected device send Fault Lamp and Fault Ballast

Option: **Yes**
No

With the setting „yes“ the status fault lamp and fault ballast are send if the DALI device is select with the object „Select device“ With the setting „no“ the status must read actively with a separate command.

Send telegram "Fault Ballast"

Option: **only on read request**
on change of status

With the setting "only on read request", the object value "Telegr. fault ballast" can only be read when requested. For the parameter setting "on change of status", the current status is sent independently via the communication object when changed.

Send telegram "Fault Lamp"

Option: **only on read request**
on change of status

With the setting "only on read request". the object value “Channel X telegr. fault lamp" can only be read when requested. For the parameter setting "on change of status", the current status on change is sent.

Send telegram "Fault DALI"

Option: **only on read request**
on change of status

With the setting "only on read request", the object value “Channel X telegr. heartbeat DALI-Gateway” can only be read on request. For the parameter setting "on change of status", the current status on change is sent.

Acknowledge faults

Option: **no**
yes

With the "no" setting, a telegram is sent using the corresponding communication object via the EIB if a fault occurs (ballast, lamps, DALI). As soon as the fault is rectified, a telegram with the value "0" is sent automatically. The change in the fault state may take 35 seconds and depends on the number of connected DALI devices.

With the "yes" setting, a telegram is sent if a fault occurs. This fault signal remains set until the fault is rectified and the fault signal is reset via the communication object "Acknowledge faults". Only then is a telegram with the value "0" sent via the corresponding communication object. This can be very useful with the detection of sporadic faults or events which occur during manned monitoring times.

Send / receive communication telegram cyclic

Option: **no**
send telegram
receive telegram
send/receive telegram

With the “no” setting, the functions and communication objects are not available. The DALI-Gateway does not send a monitoring telegram and thus does not check the EIB bus to monitor the communication channels.
With the “send telegram” setting, a telegram is sent cyclically via the EIB in order to signal the presence of the DALI-Gateway.
With the “receive telegram” setting, the DALI-Gateway expects a telegram to be sent cyclically which indicates the communication capability of the EIB or the presence of a device. If the DALI-Gateway does not receive a telegram within a defined time interval, the fault on the EIB communication channel or a device fault is assumed and a response defined in the *General* parameter

window is carried out. The parameterised state continues to exist until a telegram with the value “1” is received. The time period of the receive interval is adjustable via the setting “Transmission control timeout” in the *Status* parameter window.
With the “send/receive telegram” setting, the DALI-Gateway cyclically sends and receives a monitoring telegram which monitors communication via the EIB.

Transmission control timeout

Option: **5s**
…
1 min.
…
12h

The parameter is only visible if “Send / receive communication telegram cyclic?” is not set to “no”.
The set time applies both to the time interval between telegrams sent by the DALI-Gateway as well as to the time interval in which a telegram for monitoring of the bus must be received.

It is important to ensure that the transmission time of the EIB device which sends the EIB telegram is less than the selected receiving time in the DALI-Gateway.
The time interval of the send/receive interval must be selected as long as possible depending on the application, in order to keep the bus load as low as possible.
The behaviour during a fault if no telegram with the value “1” is received by object no. 250 “Telegr. communication received” within the parameterised time, must be set in the “General” parameter window.

3.5 Communication objects

In the following section, the communication objects are described which are available for channel A or B (broadcast or central commands) or the individual DALI devices (individual commands). Some communication objects are dynamic and are only visible if the corresponding parameters are activated in the application software. In the following description channel X represents DALI outputs A or B. In this case the same communication objects are available for both channels A and B.

For the DALI devices which are connected to channel A, the communication objects “Switch/Status”, “Relative Dimming” and “Brightness value/Status” are available to directly control each device.



Due to the relatively slow transmission speed of the DALIs (1200 baud, EIB / KNX 9600 baud), it can lead to delays in the execution of the individual DALI commands when an EIB / KNX group is accessed. This can lead to the DALI lamps being switched on unevenly.

It may also be the case that some group devices do not implement the last dimming step as they have already received a stop command when dimming in an EIB / KNX group. The difference is eliminated again during the next switching on/off. A slower dimming speed means a smaller dimming step.

In critical cases the switching on can be implemented with the help of a scene command or a broadcast command for the entire channel. In both cases, simultaneous switching of all scene devices or the connected DALI device on the channel occurs.

A DALI device must be selected first via the object “Select Device” for the functions “Read Position”, “Read Brightn.”, “Lamp Failure”, “Ballast fault”, “Burn in Lamp” and “Slave mode”. The next telegrams which are sent control or monitor the individually selected devices.

The same channels are available for channel B, however for the functions on/off, switching, dimming and brightness, the device must be selected via an addressing object for channel B “Select Device” beforehand. This means that the function of channel B can only be used with the corresponding logic. The logic must first of all select the device before the function can be implemented.

The function can be seen with the following block diagram.

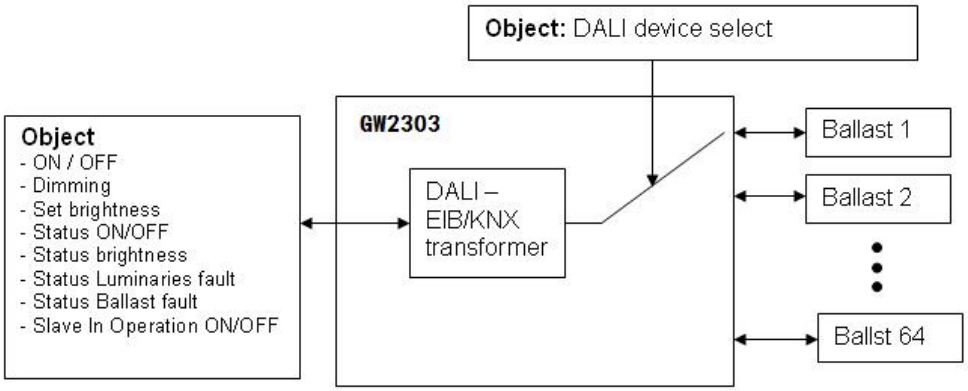


Fig. 15 Block diagram – Select Device

The selected device remains selected after a download or failure and recovery of the operating voltage. No device is selected after an EIB / KNX bus voltage recovery.

3.5.1 Communication objects for the entire channel

	Number	Name	Object Function	Length	C	R	W	T	U	Data Type	Priority
	0	Channel A	On / Off	1 bit	C	-	W	-	-	switch	Low
	1	Channel A	Relative Dimming	4 bit	C	-	W	-	-	dimming control	Low
	2	Channel A	Set Brightness Value	1 byte	C	-	W	-	-	percentage (0..100%)	Low
	3	Channel A	Devices Slave Operation On/Off	1 bit	C	R	W	-	-	enable	Low
	4	Channel A	Telegr. Fault DALI	1 bit	C	R	-	T	-	alarm	High
	5	Channel A	Telegr. Fault Lamp(s)	1 bit	C	R	-	T	-	alarm	High
	6	Channel A	Telegr. Fault Device	1 bit	C	R	-	T	-	alarm	High

Fig. 16 Communication objects for "Channel X"

In the following section, the communication objects are described which relate to a channel and all the DALI devices connected to it. It is a central function (broadcast mode) which relates to all devices of the channel.

The first figure in the field “No.” corresponds to channel A, the second figure to channel B.

No.	Function	Object name	Data type	Flags
0 & 18	On/Off	Channel A or Channel B	1 bit (EIS 1) DPT 1.001	C, W
Channel X On/Off [EIS 1; 1-bit switching]: Using this object, the DALI device of the channel is switched on or off according to the predefined brightness values (*Devices* parameter window). Telegram value “1”: On "0": Off When an ON telegram is received, the parameter settings define if a predefined brightness value or the value prior to switching off is set. The parameterised brightness value of the switch ON value is set if the channel is switched on with any brightness value and it then receives an ON telegram "1". Switch ON values which are greater than or less than the max. or min. values will not be set, but rather the parameterised max. or min. value. It can be set via parameters whether the brightness value is dimmed or immediately applied.				
1 & 19	Relative Dimming	Channel A or channel B	4 bit (EIS 2) DPT 3.007	C, W
Channel X Relative Dimming [EIS 2; 4-bit dimming]: The relative dimming telegram for the corresponding channel is received via this object. After a start command is received, the brightness is changed in the defined direction with the parameterised speed. If a stop command is received before the end of the dimming process, the dimming process is interrupted and the brightness value achieved is retained. Start-stop dimming: by "Dim by 100% brighter" or "Dim by 100% darker" . Step-wise dimming: by "Dim by 1/3/6/25/50 %brighter" or "Dim by 1/3/6/25/50 % darker" . Dimming values which are greater than or less than the max. or min. values will not be set, the parameterised max. or min. values are retained when dimming is continued.				

No.	Function	Object name	Data type	Flags
2 & 20	Set Brightness Value	Channel A or Channel B	8 bit (EIS 6) DPT 5.001	C, W

Channel X Set Brightness Value [EIS 6; 1-byte value]: The defined brightness value for the corresponding channel is received via this object. It can be set via parameters whether to dim or jump to the brightness value. A telegram with the value “0” switches off the channel. Brightness values which are greater than or less than the maximum or minimum value are not set, rather the corresponding max. or min. value is set.

Telegram value “0”: Off
“1“: Minimum physical brightness
"255" = 100%

Note: In the DALI command code, the value 255 means no change in brightness. The maximum brightness level (100%) in DALI is 254. A 100 % brightness value of 255 via EIB / KNX is automatically transformed to 254 in the DALI-Gateway. This fact is also taken into consideration when reading out a brightness value. A maximum DALI value of 254 is transformed on the EIB / KNX to 255.

3 & 21	Devices Slave Operation On/Off	Channel A or Channel B	1 bit (EIS 1) DPT 1.003	C, R, W

Channel X Devices Slave Operation On/Off [EIS 1; 1-bit switching]: The slave mode is used for the interaction of individual devices with a central lighting control using the 8-bit “Brightness value” object. The slave mode of all DALI devices can be commonly switched on or off via the bus with the communication object “X Devices Slave Operation On/Off”. Individual control with the objects “Select Device” (no. 7 or 25) and “Device Slave Mode” (no. 11 or 29) can occur.

Telegram value “1”: Switch on slave mode
"0": Switch off slave mode

For a description of the slave mode, see section 3.4.2.3 "Slave Mode"

The slave mode has no effect on the central (broadcast) channel objects Channel x “On/Off”, “Relative Dimming” and “Set Brightness Value”.

The slave mode is deactivated after a download, mains voltage failure or EIB / KNX bus voltage recovery.

4 & 22	Telegr. Fault DALI	Channel A or Channel B	1 bit (EIS 1) DPT 1.005	C, R, T

Channel X Telegr. Fault DALI [EIS 1; 1-bit switching]: With this object and depending on the parameter setting (*Status* parameter window), a fault in the DALI communication of the channel (i.e. short circuit) can be sent or read (e.g. for maintenance purposes).

Telegram value “1”: Fault of the DALI communication of the channel
"0": No fault

5 & 23	Telegr. Fault Lamp(s)	Channel A or Channel B	1 bit (EIS 1) DPT 1.005	C, R, T

Channel X Telegr. Fault Lamp(s) [EIS 1; 1-bit switching]: With this object and depending on the parameter setting (*Status* parameter window), a lamp fault (e.g. failure) which is caused by one or more ballasts of the channel, is sent or read out (e.g. for maintenance purposes).

Telegram value “1”: Fault of one or more lamps on the channel
"0": No fault

No.	Function	Object name	Data type	Flags
6 & 24	Telegr. Fault Device	Channel A or Channel B	1 bit (EIS 1) DPT 1.005	C, R, T

Channel X Telegr. Fault Device [EIS 1; 1-bit switching]: With this object and depending on the parameter setting (*Status* parameter window), a fault message which originates from one or more ballasts of the channel, is sent or read out (e.g. for maintenance purposes).

Telegram value "1": Fault of one or more ballasts on the channel
"0": No fault



In order to guarantee correct operation, the gateway has to know how many ballasts are to be monitored. This is implemented by activating the object "Detect Ballasts" (no. 251) just once. Using this function, the DALI-Gateway independently determines how many ballasts are connected and uses this number as a reference value. If this system has to be extended or reduced, the "Detect Ballasts" option should be reactivated. This procedure is necessary if the number of ballasts per channel has changed, and not with the exchange of a ballast on the same channel. The same function as for the object "Detect Ballasts" can be manually triggered if the enter button on the DALI device is pressed for longer than 5 seconds.

Table 7 Communication objects for "Channel X"

For the DALI output (channel) B, the corresponding communication objects 18 to 24 apply.

3.5.2 Communication objects for every DALI device

	Number	Name	Object Function	Length	C	R	W	T	U	Data Type	Priority
	7	Channel A	Select Device	1 byte	C	R	W	-	-	counter pulses (0..255)	Low
	8	Channel A	Selected Device On / Off	1 bit	C	-	W	-	-	switch	Low
	9	Channel A	Selected Device Rel. Dimming	4 bit	C	-	W	-	-	dimming control	Low
	10	Channel A	Selected Device Set Value	1 byte	C	-	W	-	-	percentage (0..100%)	Low
	11	Channel A	Selected Device Slave Mode	1 bit	C	R	W	-	-	enable	Low
	12	Channel A	Selected Device Burn in Lamp	1 bit	C	R	W	-	-	start/stop	Low
	13	Channel A	Selected Device Read Position	1 bit	C	R	-	T	-	switch	Low
	14	Channel A	Selected Device Read Brightn.	1 byte	C	R	-	T	-	percentage (0..100%)	Low
	15	Channel A	Selected Device Lamp Failure	1 bit	C	R	-	T	-	alarm	High
	16	Channel A	Selected Device Device Failure	1 bit	C	R	-	T	-	alarm	High
	17	Channel A	Program Short Address	1 byte	C	-	W	-	-	counter pulses (0..255)	Low

Fig. 17 Communication objects for "Channel X – Device"

The following section describes the communication objects which relate to one of the individual 128 DALI devices on channel A or B. Before the device is controlled or read, it must be contacted via its EIB / KNX device number (DALI address plus 1). This means that two telegrams with an address and function are necessary to carry out a function. This can occur for example with higher-level logic or visualisation.

There are 3 objects – “Switch/Status”, “Relative Dimming” and “Brightness value/Status” which can be used to individually contact the devices with just one object for each of the 64 DALI devices connected to channel A. These objects are allocated the numbers 53 to 244 and are described in section 3.5.4 “Communication objects for individual devices in channel A”.

No.	Function	Object name	Data type	Flags
7 & 25	Select Device	Channel A or Channel B	1 byte (EIS 6) DPT 5.010	C, R, W
Channel X Select Device [EIS 6; 1-byte counter value]: The DALI device which is to be controlled or read is selected via this object. The 1 byte value corresponds to the EIB / KNX number of the DALI device. The device remains selected until a new value is sent to the object. All telegrams sent or received via the “selection objects” (nos. 8 to 16 or 26 to 34) relate to this selected device. Telegram value “01”: Select device with EIB / KNX number 1 "02": Select device with EIB / KNX number 2 … “64”: Select device with EIB / KNX number 64 If a value larger than 64 or less than 0 is received, no DALI device is selected. The selected device stays selected after a download or operating voltage failure and recovery as well as when the test mode is terminated. No device is selected after an EIB / KNX bus voltage recovery. Note: The EIB / KNX number corresponds to the DALI address plus 1.				
8 & 26	Selected Device On/Off	Channel A or Channel B	1 bit (EIS 1) DPT 1.001	C, W
Channel x Selected Device On/Off [EIS 1; 1-bit switching]: With this object, the DALI device selected via the “Select Device” object (no. 7) of the channel is selected via the predefined brightness values (*Devices* parameter window). Telegram value “1”: On "0": Off When an ON telegram is received, the parameter settings define if a predefined brightness value or the value before switching off is set. The parameterised brightness value of the switch ON value is set if the channel is switched on with any brightness value and it then receives an ON telegram "1". Switch ON values which are greater than or less than the max. or min. values will not be set, but rather the parameterised max. or min. value. Parameters can be used to set whether the brightness value is dimmed or immediately applied.				

No.	Function	Object name	Data type	Flags
9 & 27	Selected Device Rel. Dimming	Channel A or Channel B	4 bit (EIS 2) DPT 3.007	C, W

Channel X Selected Device Rel. Dimming [EIS 2; 4-bit dimming]: Using this object, the DALI device selected via the “Select Device” object (no. 7) receives the relative dimming telegram. After a start command is received, the brightness is changed in the defined direction with the parameterised speed. If a stop command is received before the end of the dimming process, the dimming process is interrupted and the brightness value achieved is retained. Dimming values which are greater than or less than the max. or min. values will not be set, the parameterised max. or min. values are retained when dimming is continued.

This dimming command dims each individual device of channel A or B if they have been selected via the object “Select Device”.

No.	Function	Object name	Data type	Flags
10 & 28	Selected Device Set Value	Channel A or Channel B	8 bit (EIS 6) DPT 5.001	C, W

Channel X Selected Device Set Value [EIS 6; 1-byte value]: Using this object, the DALI device selected via the “Select Device” object (no. 7) receives its brightness value. It can be set via parameters whether to dim or jump to the brightness value. A telegram with the value “0” switches off the channel. Brightness values which are greater than or less than the maximum or minimum value are not set, rather the corresponding max. or min. value is set.

Telegram value “0”: Off
“1“: Minimum physical brightness
"255" = 100%

Note: In the DALI command code, the value 255 means no change in brightness. The maximum brightness level (100%) in DALI is 254. A 100 % brightness value of 255 via EIB / KNX is automatically transformed to 254 in the DALI-Gateway. This fact is also taken into consideration when reading out a brightness value. A maximum DALI value of 254 is transformed on the EIB / KNX to 255.

No.	Function	Object name	Data type	Flags
11 & 29	Selected Device Slave Mode	Channel A or Channel B	1 bit (EIS 1) DPT 1.003	C, R, W

Channel X Selected Device Slave Mode [EIS 1; 1-bit switching]: Using this object, a slave mode can be switched on or off for the DALI device which is selected via the object “Select Device” (no. 7). The slave mode is used for the interaction of a device with a central lighting controller using the “Brightness value/Status” object. This function can be switched on or off via the bus using the communication object “Device Slave Mode”.

The slave mode is deactivated after a download, mains voltage failure or EIB / KNX bus voltage recovery.

Telegram value "1": Switch on slave mode
"0": Switch off slave mode

Note: The slave mode for all devices of channel X can be activated with the channel object “Devices Slave Operation On/Off”.

No.	Function	Object name	Data type	Flags
12 & 30	Selected Device Burn in Lamp	Channel A or Channel B	1 bit (EIS 1) DPT 1.010	C, R, W

Channel X Selected Device Burn in Lamp [EIS 1; 1-bit switching]: The function “Burn in Lamps” (see *General* parameter window) for protecting the ballasts and the lamp during the initial operation is activated or deactivated via this object. After receipt of a telegram (value “1”), the lamps of the DALI device selected beforehand via the “Select Device” object (no. 7) can only be operated at 0% (off) or 100% brightness for the parameterised period. The burn-in period can be adjusted in the “General” parameter window. After this time has elapsed the device can be dimmed as usual and the programmed lightscene can be recalled. If a telegram (value “1”) is received during the burn-in time, the period restarts from the beginning. A telegram with the value “0” deactivates the function and enables normal operation. The burn-in time is only counted if DALI equipment is connected to the channel and supplied with power.

The burn-in function is deactivated after a download or operating voltage failure on the GW2304.

Telegram value “1”: Activate function
"0": Deactivate function

Note: If for example, the burn-in time should be activated after initial installation or after a complete exchange of all lamps, the general communication object no. 247 “Burn in Lamps” is more suited to the purpose.

13 & 31	Selected Device Read Position	Channel A or Channel B	1 bit (EIS 1) DPT 1.001	C, R, T

Channel x Selected Device Read Position [EIS 1; 1-bit switching]: The current switching state of the DALI device selected beforehand with the “Select Device” object (no. 7) is queried via this object (e.g. for visualisation purposes), depending on the parameter setting (*Status* parameter window).

Telegram value “1”: On
"0": Off

14 & 32	Selected Device Read Brightn.	Channel A or Channel B	8 bit (EIS 6) DPT 5.001	C, R, T

Channel X Selected Device Read Brightn. [EIS 6; 1-byte value]: The current brightness value of the DALI device selected beforehand with the “Select Device” object (no. 7) is read via this object (e.g. for visualisation purposes), depending on the parameter setting (*Status* parameter window).

Note: In the DALI command code, the value 255 means no change in brightness. The maximum brightness level (100%) in DALI is 254. A 100 % brightness value of 255 via EIB / KNX is automatically transformed to 254 in the DALI-Gateway. This fact is also taken into consideration when reading out a brightness value. A maximum DALI value of 254 is transformed on the EIB / KNX to 255.

15 & 33	Selected Device Lamp Failure	Channel A or Channel B	1 bit (EIS 1) DPT 1.005	C, R, T

Channel X Selected Device Lamp Failure [EIS 1; 1-bit switching]: A lamp fault (e.g. defect) of the DALI device selected beforehand with the “Select Device” object (no. 7) is transmitted or read via this object (e.g. for maintenance purposes), depending on the parameter setting (*Status* parameter window).

Telegram value “1”: Fault of one or more lamps on the channel
"0": No fault

No.	Function	Object name	Data type	Flags
16 & 34	Selected Device Device Failure	Channel A or Channel B	1 bit (EIS 1) DPT 1.005	C, R, T

Channel X Selected Device Device Failure [EIS 1; 1-bit switching]: A fault message of the DALI device selected beforehand with the “Select Device” object (no. 7) can be transmitted or read via this object (e.g. for maintenance purposes), depending on the parameter setting (*Status* parameter window).

Telegram value “1”: Fault of one or more ballasts on the channel
"0": No fault

In order to guarantee correct operation, the gateway has to know how many ballasts are to be monitored. This is implemented by activating the object "Detect ballasts" (no. 251) just once. Using this function, the DALI-Gateway independently determines how many ballasts are connected and uses this number as a reference value. If this system has to be extended or reduced, the "Detect ballasts” option should be reactivated. This procedure is necessary if the number of ballasts per channel has changed, and not with the exchange of a ballast on the same channel. The same function as for the object “Detect ballasts” can be manually triggered if the enter button on the DALI device is pressed for longer than 5 seconds.

17 & 35	Program Short Address	Channel A or Channel B	1 byte (EIS 6) DPT 5.010	C, W

Channel X Program Short Address [EIS 6; 1-byte counter value]: All DALI devices can be automatically addressed or manually addressed via this object. If in parameter window *General*, the parameter *Enable automatic DALI addressing* has been selected Yes and this object used to automatic addressing, or selected No and this object used to manual addressing.

If Yes is selected in the parameter *Enable automatic DALI addressing:*

Telegram value “1”: Start Channel A or B automatic addressing
"0": No reaction

If No is selected in the parameter *Enable automatic DALI addressing:*

Telegram value “0~63”: Programming all DALI devices with short address 0~63

"> 64": No reaction

Note: In the manual addressing, if individual address programming of DALI devices is required, they need to be connected to the DALI bus one by one.

Table 8 Communication objects for "Channel X"

For auxiliary channel B (DALI output), the corresponding communication objects 25 to 35 apply.

3.5.3 Lightscene communication objects

Number	Name	Object Function	Length	C	R	W	T	U	Data Type	Priority
36	Scene 1/2	Recall scene	1 bit	C	-	W	-	-	scene	Low
37	Scene 3/4	Recall scene	1 bit	C	-	W	-	-	scene	Low
38	Scene 5/6	Recall scene	1 bit	C	-	W	-	-	scene	Low
39	Scene 7/8	Recall scene	1 bit	C	-	W	-	-	scene	Low
40	Scene 9/10	Recall scene	1 bit	C	-	W	-	-	scene	Low
41	Scene 11/12	Recall scene	1 bit	C	-	W	-	-	scene	Low
42	Scene 13/14	Recall scene	1 bit	C	-	W	-	-	scene	Low
43	Szene 15/16	Recall scene	1 bit	C	-	W	-	-	scene	Low

Fig. 18 Communication objects for “Recall Lightscene x/y”

16 lightscenes can be activated via the parameter setting. The scenes can be defined by the ETS entries or set individually by the user according to personal requirements via the individual object. It is possible for each scene to disable overwriting of the brightness values during an ETS download. The individually set brightness values of the lightscene are hereby retained during an ETS download.

There are separate communication objects for retrieving or saving the 16 lightscenes. There is a further 8-bit communication object available, with which each one of the 16 lightscenes can be stored or retrieved via an 8-bit code.

No.	Function	Object name	Data type	Flags
36	Recall scene	Scene 1/2	1 bit (EIS 1) DPT 1.022	C, W
37	Recall scene	Scene 3/4	1 bit (EIS 1) DPT 1.022	C, W
38	Recall scene	Scene 5/6	1 bit (EIS 1) DPT 1.022	C, W
39	Recall scene	Scene 7/8	1 bit (EIS 1) DPT 1.022	C, W
40	Recall scene	Scene 9/10	1 bit (EIS 1) DPT 1.022	C, W
41	Recall scene	Scene 11/12	1 bit (EIS 1) DPT 1.022	C, W
42	Recall scene	Scene 13/14	1 bit (EIS 1) DPT 1.022	C, W
43	Recall scene	Scene 15/16	1 bit (EIS 1) DPT 1.022	C, W
Lightscene X/Y Recall scene [EIS 1; 1-bit switching]: The scenes are retrieved via this object. On receipt of a telegram, channels which are assigned to the scene are set to the stored or parameterised brightness values. The communication objects are only visible if the scenes have been activated in the *Scenes* parameter window. The scene can consist of devices from channel A and B. Telegram value “0”: Recall scene X "1": Recall scene Y				

Table 9 Communication objects for “Recall Lightscene x/y""

Number	Name	Object Function	Length	C	R	W	T	U	Data Type	Priority
44	Scene 1/2	Store scene	1 bit	C	-	W	-	-	scene	Low
45	Scene 3/4	Store scene	1 bit	C	-	W	-	-	scene	Low
46	Scene 5/6	Store scene	1 bit	C	-	W	-	-	scene	Low
47	Scene 7/8	Store scene	1 bit	C	-	W	-	-	scene	Low
48	Scene 9/10	Store scene	1 bit	C	-	W	-	-	scene	Low
49	Scene 11/12	Store scene	1 bit	C	-	W	-	-	scene	Low
50	Scene 13/14	Store scene	1 bit	C	-	W	-	-	scene	Low
51	Szene 15/16	Store scene	1 bit	C	-	W	-	-	scene	Low

Fig. 19 Communication objects for “Store Lightscene x/y”

With these communication objects, lightscenes can be stored individually e.g. with a push button or another operating device.



The store scene command over the EIB / KNX includes all 128 DALI samples. This means that a scene stored with the object „store scene“ will include all 128 DALI samples. Every DALI samples will get the brightness in the moment of the storage. The brightness stored over the ETS parameterisation and the mask (sample not part of the scene) are lost. The next download will restore the stored calibration if the parameter „overwrite scene on download“ is set with „yes“. Otherwise the stored scene values are protected.

No.	Function	Object name	Data type	Flags
44	Store scene	Scene 1/2	1 bit (EIS 1) DPT 1.022	C, W
45	Store scene	Scene 3/4	1 bit (EIS 1) DPT 1.022	C, W
46	Store scene	Scene 5/6	1 bit (EIS 1) DPT 1.022	C, W
47	Store scene	Scene 7/8	1 bit (EIS 1) DPT 1.022	C, W
48	Store scene	Scene 9/10	1 bit (EIS 1) DPT 1.022	C, W
49	Store scene	Scene 11/12	1 bit (EIS 1) DPT 1.022	C, W
50	Store scene	Scene 13/14	1 bit (EIS 1) DPT 1.022	C, W
51	Store scene	Scene 15/16	1 bit (EIS 1) DPT 1.022	C, W
Lightscene X/Y Store scene [EIS 1; 1-bit switching]: The scenes are stored via this object. On receipt of a telegram, the current brightness values of all the channels which are assigned to the scene are stored. The next time the scene is retrieved, all the channels which are assigned to the scene are set to these stored brightness values. Devices from channel A and B can be integrated into a scene. Telegram value “0”: Store scene X "1": Store scene Y				

Table 10 Communication objects for "Store Scene x/y"

With these 1-byte communication objects, lightscenes can be stored individually e.g. with a push button or another operating device.



Number	Name	Object Function	Length	C	R	W	T	U	Data Type	Priority
52	Scenes 1..16	8-bit-scene	1 byte	C	-	W	-	-	scene control	Low

Fig. 20 Communication objects for “Lightscenes 1...16”

No.	Function	Object name	Data type	Flags
52	Control scenes	Lightscenes 1 … 16	8 bit (Non EIS) DPT 18.001	C, W

Lightscenes 1 ... 16 Control scenes [Non EIS; 8-bit coded]: All 16 scenes can be controlled via this 1-byte communication object using a coded telegram. The number of the addressed scene is received via a telegram together with the information about whether the scene should be retrieved or the current scene should be stored (if permitted).

Telegram format (1 byte): MXSSSSSS
(MSB) (LSB)

M: 0 – scene is retrieved
1 – scene is stored (if allowed)
X: not used
S: Number of the scene (1 ... 16 as 8-bit value)

The scene numbers of scene 1 to 16 can be set independently in the Scenes number parameter window

EIB / KNX 1-byte telegram value	Meaning
0 or 64 1 or 65 2 or 66 … 63 or 127	Retrieve scene number 1 Retrieve scene number 2 Retrieve scene number 3 … Retrieve scene number 64
128 or 192 128 or 193 130 or 194 … 191 or 255	Store scene number 1 Store scene number 2 Store scene number 3 … Store scene number 64

The exact code table for 8-bit scene telegrams can be seen in the appendix.

An example of an 8-bit scene is described in section 5.1 "Application and planning".

Table 11 Communication objects for “Lightscenes 1...16”

3.5.4 Communication objects for individual devices in channel A

Number	Name	Object Function	Length	C	R	W	T	U	Data Type	Priority
53	Device A01	Switch/Status	1 bit	C	-	W	T	-	switch	Low
54	Device A01	Relative Dimming	4 bit	C	-	W	-	-	dimming control	Low
55	Device A01	Brightness value/Status	1 byte	C	-	W	T	-	percentage (0..100%)	Low

to

Number	Name	Object Function	Length	C	R	W	T	U	Data Type	Priority
242	Device A64	Switch/Status	1 bit	C	-	W	T	-	switch	Low
243	Device A64	Relative Dimming	4 bit	C	-	W	-	-	dimming control	Low
244	Device A64	Brightness value/Status	1 byte	C	-	W	T	-	percentage (0..100%)	Low

Fig. 21 Communication objects for "Individual device adjustment Axy"

The following communication objects only apply to the 64 devices of channel A. With these objects, each of the 64 devices of channel A can be individually switched on/off, dimmed or a brightness value can be set with just a single object.



Due to the relatively slow transmission speed of the DALIs (1200 baud, EIB / KNX 9600 baud), it can lead to delays in the execution of the individual DALI commands when an EIB / KNX group is accessed. This can lead to the DALI lamps being switched on unevenly.

It may also be that case that some group devices do not implement the last dimming step as they have already received a stop command when dimming in an EIB / KNX group. The difference is eliminated again during the next switching on/off. A slower dimming speed means a smaller dimming step.

In critical cases, the switching on can be implemented with the help of a scene command or a broadcast command for the entire channel. In both cases, simultaneous switching of all scene devices or the connected DALI device on the channel occurs.

No.	Function	Object name	Data type	Flags
53 56 … 242	Switch/Status	Device Axy XY = 01 … 64	1 bit (EIS 1) DPT 1.001	C, W, T

Device xy Switch/Status [EIS 1; 1-bit switching]: With this object, the 64 DALI devices of channel A are switched on or off individually via a communications object using the predefined brightness values (“Devices” parameter window). The ON/OFF status of the device is sent simultaneously via the object value if it is enabled in the “Device Status” parameter window. If it is necessary to read the object value, the “read flag” must be set manually.

Telegram value “1”: On
"0": Off

When an ON telegram is received, the parameter settings specify if a predefined brightness value or the value before switching off are set. The parameterised brightness value of the switch ON value is set if the channel is switched on with any brightness value and it then receives an ON telegram "1".
Switch ON values which are greater than or less than the max. or min. values will not be set, but rather the parameterised max. or min. value. Parameters can be used to set whether the brightness value is dimmed or immediately applied.

The sending of the status value can be delayed if the status of the device is changed via another function, with the exception of the “Switch/Status” object (e.g. channel objects). In this case, a change will be detected during an automatic cyclic scan of the 64 devices. The changed status will only be sent at this point. This delay time (can take more than 90 seconds) is dependent on the number of devices and the functions currently implemented.

No.	Function	Object name	Data type	Flags
54 57 … 243	Relative Dimming	Device Axy XY = 01 … 64	4 bit (EIS 2) DPT 3.007	C, W

Device xy Relative Dimming [EIS 2; 4-bit dimming]: With this object, the relative dimming value telegram for one of the 64 devices of channel A is individually sent. After a start command is received, the brightness is changed in the defined direction with the parameterised speed. If a stop command is received before the end of the dimming process, the dimming process is interrupted and the brightness value achieved is retained.

Because of the relatively low DALI transmission speeds, if one EIB/KNX group address contains multiple DALI devices in a group, it is recommended to use “step-wise dimming” to guarantee uniform dimming of all DALI devices in the group.

Due to the DALI functionality and the number of devices, if one EIB/KNX group address contains multiple DALI devices in a group, different brightness values may occur in a group of DALI devices when “start-stop dimming” is used.

Dimming values which are greater than or less than the max. or min. values will not be set, the parameterised max. or min. values are retained when dimming is continued.

No.	Function	Object name	Data type	Flags
55 56 … 244	Brightness value/Status	Device Axy XY = 01 … 64	8 bit (EIS 6) DPT 5.001	C, W

Device xy Brightness value/Status [EIS 6; 1-byte value]: The defined brightness value for one of the 64 devices of channel A is received via this object. It can be set via parameters whether to dim or jump to the brightness value. A telegram with the value “0” switches off the channel. Brightness values which are greater than or less than the maximum or minimum value are not set, rather the corresponding max. or min. value is set.

Telegram value “0”: Off
“1“: Minimum physical brightness
"255" = 100%

Note: In the DALI command code, the value 255 means no change in brightness. The maximum brightness level (100%) in DALI is 254. A 100 % brightness value of 255 via EIB / KNX is automatically transformed to 254 in the DALI-Gateway. This fact is also taken into consideration when reading out a brightness value. A maximum DALI value of 254 is transformed on the EIB / KNX to 255.

Only GW2304:For the DALI output (channel) B, the corresponding communication objects 246 to 437 apply.

3.5.5 General communication objects

Number	Name	Object Function	Length	C	R	W	T	U	Data Type	Priority
245	General	Central Control On/Off	1 bit	C	R	W	-	-	enable	Low
246	General	Burn in Lamps	1 bit	C	R	W	-	-	start/stop	Low
247	General	Delete Short Address	1 bit	C	-	W	-	-	start/stop	Low
248	General	Acknowledge Faults	1 bit	C	-	W	-	-	reset	Low
249	General	Telegr. Communication send	1 bit	C	R	-	T	-	acknowledge	Low
250	General	Telegr. Communication receive	1 bit	C	-	W	-	-	acknowledge	Low
251	General	Detect Ballasts	1 bit	C	-	W	-	-	start/stop	Low

Fig. 22 “General” communication objects

The following general communication objects relate to functions which concern the entire DALI-Gateway with both of its channels.

No.	Function	Object name	Data type	Flags
245	Central Control On/Off	General	1 bit (EIS 1) DPT 1.003	C, R, W

Central Control On/Off [EIS 1; 1-bit switching]: Central control is switched on and off via this object. If the object “Central Control On/Off” is equal to "1" (on), the device control objects have no effect.
Central control stays switched on until the object “Channel Control On/Off” is reset to "0" (off). Only then can the individual devices be individually controlled again. The values set by central control (brightness/switching states) remain and can be changed at any time by individual telegrams with any objects. If the object “Burn in Lamps” (see channel X objects) is set to “1”, the lamps on the channel can only be set to 0 % or 100 % during this burn-in time.

After a download or EIB / KNX voltage recovery, the object value is set automatically to “0” which means that forced central control is deactivated.

Telegram value “1”: On
"0": Off

No.	Function	Object name	Data type	Flags
246	Burn in Lamps	General	1 bit (EIS 1) DPT 1.010	C, R, W

Burn in Lamps [EIS 1; 1-bit switching]: The function “Burn in Lamps” (see *General* parameter window) for protecting the ballasts and the lamp during the initial operation is activated or deactivated via this object. After a telegram is received (value “1“), all lamps on the DALI-Gateway can only be switched to 0% (off) or 100 % brightness. The burn-in period in can be adjusted in the “General” parameter window. After this time has elapsed, the device can be dimmed as usual and the programmed lightscene can be recalled. If a telegram (value “1”) is received during the burn-in time, the period restarts from the beginning. A telegram with the value “0” deactivates the function and enables normal operation. The burn-in time is only counted if DALI equipment is connected to the channel and supplied with power.

Telegram value “1”: Activate function
"0": Deactivate function

Note: Activation of this burn-in time via this central object is useful after initial installation or complete exchange of all lamps. If one or just a few lamps are to be burned in, an individual activation of the burn-in time by the addressing object (no. 7 or 25) and the subsequent burn-in object 12 or 30 is possible.

No.	Function	Object name	Data type	Flags
247	Delete Short Address	General	1 bit (EIS 1) DPT 1.010	C, R, W
General Delete Short Address [EIS 1; 1-bit switching]: The function "Delete Short Address" uesd to deletes the short address for all DALI devices. Telegram value "1": Deleted short address for all DALI device of channel A. "0": Deleted short address for all DALI device of channel B				
248	Acknowledge Faults	General	1 bit (EIS 1) DPT 1.015	C, W
General Acknowledge Faults [EIS 1; 1-bit switching]: The 1-bit input communication object enables both the reset of the 230 VAC fault signal and the ballast, lamp and DALI fault signals of the individual channels. The communication object is only visible if the parameter "Acknowledge faults?" is activated in the *Status* parameter window. The fault(s) is (are) only reset after an acknowledgement if the corresponding fault(s) has (have) been rectified. Telegram value "1": Reset fault(s) "0": no function				
249	Telegr. Communication send	General	1 bit (EIS 1) DPT 1.016	C, R, T
General Telegr. Communication send [EIS 1; 1-bit switching]: To regularly check the presence of the DALI-Gateway on the EIB / KNX, a monitoring telegram can be sent cyclically on the bus. The communication object is only visible if the parameter "Send/receive communication telegram cyclically" has been set to "send telegram" or "send/receive telegram" in the *Status* parameter window. Telegram value "1": Status				
250	Telegr. Communication receive	General	1 bit (EIS 1) DPT 1.016	C, W
General Telegr. Communication receive [EIS 1; 1-bit switching]: The DALI-Gateway can receive a "1" telegram via this communication object which another EIB / KNX device (e.g. diagnostics module) sends cyclically. On receipt of the telegram, the communication capability of the bus can be monitored. If the DALI-Gateway does not receive a "1" telegram at the communication object "Telegr. Communication receive" within a specific time interval, a fault in the EIB communication path is assumed and the response defined in the "General" parameter window is carried out. The DALI-Gateway goes into a safety state and does not process any telegrams. Incoming telegrams are only processed again when a "1" is received again at the communication object "Telegr. Communication receive". An incoming telegram with the value "0" has the same effect as a telegram not being received. The time span of the receive interval can be set in the "Status" parameter window under "Transmission/receive period".				

No.	Function	Object name	Data type	Flags
251	Detect Ballasts	General	1 bit (EIS 1) DPT 1.010	C, W

General Detect Ballasts [EIS 1; 1-bit switching]: To be able to correctly detect a fault in a ballast, the DALI-Gateway must identify all the connected DALI devices and thereby know the number of DALI devices per channel that need to be monitored. This identification process runs independently and fully automatically in the background if it has been initiated by this communication object. An automatic detection, e.g. after a bus or mains voltage recovery does not take place. After approx. 60 seconds, all the DALI devices are detected and the failure of a ballast can be correctly established.

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 activated or deactivated. The DALI devices must be installed properly and supplied with operating voltage if necessary.

Telegram value “1”: Start ballast detection process
"0": no function

Note: The same function as for the object “Detect Ballasts” can be manually triggered if the enter button on the DALI device is pressed for longer than 5 seconds.

Table 12 "General” communication objects

For the ***GW2304***, the corresponding communication objects 438 to 444 apply.

4 Application and planning

The DALI-Gateway can be used wherever modern lighting technology is required or requested. It is particularly suitable if individual and flexible assignment of the individual DALI devices is required.

This can be simple office lighting, complex lighting control in hotel foyers or exhibition rooms as well as monitoring possibilities for the entire lighting system.

You will find some tips and application examples in this section for practical use of the DALI-Gateway GW2304

4.1 Control of the DALI devices

The following two solutions have been implemented in the 1-fold&2-fold DALI- Gateway GW2304 to control and monitor the 128 DALI devices due to the limited number of 255 communication objects in the bus coupler.

1. Broadcast control of the main and auxiliary channel

All devices of a channel can be controlled or read in broadcast mode, i.e. all devices can be read or controlled together. All the devices on the channel are controlled and monitored with just one communication object “Channel x” (x = A or B).

- Channel x – On/Off
- Channel x – Relative Dimming
- Channel x – Set Brightness Value
- Channel x – Device Slave Mode
- Channel x – Telegr. Fault DALI
- Channel x – Telegr. Fault Lamp(s)
- Channel x – Telegr. Fault Device

2. Individual control of a device

Each of the individual 64 DALI devices of main channel A can be switched on/off, dimmed or the brightness can be adjusted with just one "Device Axy" communication object, as is usually the case in the EIB / KNX.

- Device Axy – Switch/Status
- Device Axy – Relative Dimming
- Device Axy – Brightness value/Status

Only GW2304 can be adjusted with “Device Bxy”communication object:

- Device Bxy – Switch/Status
- Device Bxy – Relative Dimming
- Device Bxy – Brightness value/Status

In addition, the 1-fold&2-fold DALI-Gateway GW2304 features an address-related individual option to control or read every single device of main channel A as well as auxiliary channel B.

First of all, the communication object

- Channel x – Selected Device

will select a device via its device address.

With a second telegram to one of the following communication objects, each of the 128 DALI devices can be individually controlled or read.

- Channel x – Selected Device On/Off
- Channel x – Selected Device Rel. Dimming
- Channel x – Selected Device Set Value
- Channel x – Selected Device Slave Mode
- Channel x – Selected Device Burn in Lamps
- Channel x – Selected Device Read Position
- Channel x – Selected Device Read Brightn.
- Channel x – Selected Device Lamp Failure
- Channel x – Selected Device Device Failure

This type of addressing can be viewed as a switch which has 64 switch positions. An individual switch position is selected by the addressing object. Various telegrams which trigger a function can be sent via this connection. This is possible until another device is selected using an addressing command (see following illustration).

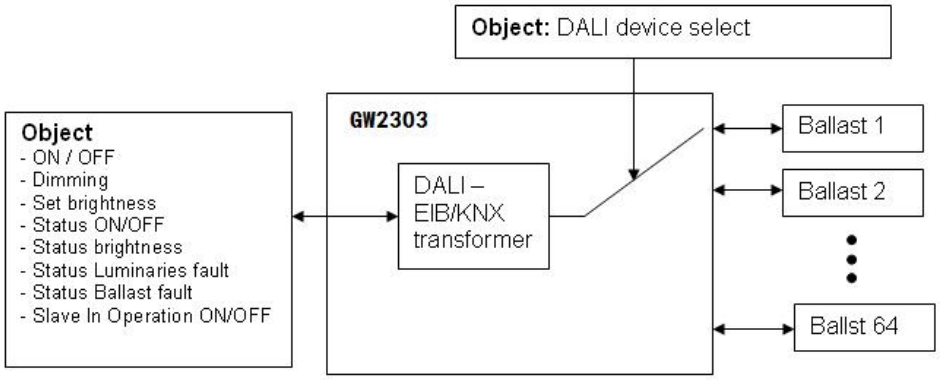


Fig. 23 Block diagram – Select Device

As long as the device is selected, it can be directly controlled or monitored with just one communication object.

The selected device stays selected after a download or operating voltage failure and recovery, as well as when the test mode is terminated. No device is selected after an EIB / KNX bus voltage recovery.

4.2 Monitoring of lamps and ballasts

With the DALI-Gateway, it is possible to monitor the every DALI devices of a channel together. With the DALI-Gateway, it is possible to distinguish between a lamp and a ballast fault. A fault is detected directly and displayed on the gateway by the Digital tube. The information is simultaneously made available via the EIB / KNX through a channel-related communication object and can be sent to a control unit or visualisation program for display purposes. From there, the necessary repair measures or corresponding maintenance cycles can be initiated. The current status of the lighting installation in the building is always available or can be retrieved on request. It is thus possible to integrate the lighting in a higher-order Facility Management system.

Failure of an individual device can be determined at any time via an address-related query by two telegrams which are sent successively. This can realised with a visualisation or external logic.

Equipment with a DALI interface can send a DALI telegram which displays a lamp fault. This information is queried by the DALI-Gateway. The corresponding data sheets of the device manufacturer state whether the DALI equipment in use reports a lamp fault.



With the DALI-Gateway GW2304, it is possible to detect lamp faults per channel. Detection of the individual defective device is possible by reading the addressing object (Select Device) and the actual status object.

Note: You can assume that in general all DALI ballasts support the reporting of a lamp fault. DALI dimmers and DALI switch actuators often do not have this feature.

In order to guarantee correct operation, the gateway has to know how many ballasts are to be monitored. This is carried out by activating the object “Detect Ballasts”. With this function, the DALI-Gateway establishes automatically how many ballasts are connected and uses this number as a reference value. If the installation should be extended or reduced, the option “Detect Ballasts” must be activated again. This process is only necessary if the number of ballasts per channel has changed and not when replacing a ballast in the same channel. Manual detection of the ballasts is also possible by pressing the enter button on the device for longer than 5 seconds.

The duration of the ballast detection is dependent on the number of connected DALI devices and can take approx. 90 seconds with the maximum number of devices.

4.3 Replacement of DALI devices

If only one ballast has failed and the DALI addresses are assigned without any gaps (normally the case with GW2304), a ballast without a DALI address (default state) can be replaced without commissioning. The new DALI device automatically receives the free DALI address of the ballast from the GW2304 and can assume the functions of the old device with the same technical characteristics.

If multiple DALI devices on a channel fail, or there are gaps in the address assignment, it is not possible to guarantee a unique assignment of the replacement device by the GW2304. The GW2304 assigns the new DALI device with the first free DALI address. If the new DALI device already has a DALI address which is being used in the DALI-Gateway, one of the two devices with the same address will be assigned an unused DALI address. In this case, the error-free DALI device which is already connected to the gateway may also receive a new address.

4.4 Burn-in times

In the case of lamps filled with gas, a burn-in time is recommended. This burn-in process is only necessary once before the start of the commissioning process.

Only after this burn-in time do fluorescent lamps have a stable operating value which ensures the best possible dimming behaviour and an optimum service life. An optimum pressure level is created in the fluorescent tube.

For installations with dimmable ballasts, many lamp manufacturers give the recommendation that a burn-in time of 20 – 100 hours must be observed. The recommended values are 20 hours for T8 lamps and 100 hours for T5 lamps. 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.
The reason for this is that the burn-in time is only relevant for dimmable installations. 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 lamps 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 which causes them to fail earlier.

With the 1-fold&2-fold DALI-Gateway, it is possible to use a communication object to activate a burn-in time to set all DALI devices on a gateway to the burn-in phase. During this time, the lamps can only be switched on with 100 % or switched off. Dimming is not possible.

Number	Name	Object Function	Length	C	R	W	T	U	Data Type
246	General	Burn in Lamps	1 bit	C	R	W	-	-	

In addition to an exchange of the individual fluorescent lamps, they can also be burned in via an individually addressed activation of the burn-in time, without influencing the function of other lamps.

Number	Name	Object Function	Length	C	R	W	T	U	Data Type
7	Channel A	Select Device	1 Byte	C	R	W	-	-	
12	Channel A	Selected Device Burn in Lamp	1 bit	C	R	W	-	-	

4.5 8-bit scene

With the 8-bit scene, there is the possibility of recalling one of 16 lightscenes of the DALI-Gateway or of combining with other EIB / KNX devices e.g. shutter actuators to create an EIB / KNX scene. This scene can be recalled via a single telegram. It is a prerequisite that all the operating devices which should be recalled are parameterised with the same scene number.

Each EIB / KNX device involved in the scene receives the telegram and automatically controls the outputs which belong to the scene. The lamps are switched on via the DALI-Gateway with the parameterised transition period of the scene.

Up to 64 different scenes can be managed via a single EIB / KNX group address and can be used for the DALI-Gateway. An 8-bit scene telegram (see appendix A2 for the key table) contains the following information.

- Number of the scene (1…16)
- Retrieve scene / store scene

Advantage: The 8-bit scene offers a few advantages in comparison to conventional scene programming. On the one hand, only a single telegram which is received by all participants in the scene and implemented accordingly, is sent on the bus to retrieve a scene. On the other hand, the target position of the shutter or the brightness of the DALI devices is stored in the actuator or DALI-Gateway and does not need to be transferred via the EIB after each recall.



The scene numbering 1 to 16 is retrieved via the EIB / KNX with a telegram number 0 to 15(Default value). Refer to the key table in appendix A.6 for the corresponding scene codes.



The store scene command over the EIB / KNX includes all 128 DALI samples. This means that a scene stored with the object „store scene“ will include all 128 DALI samples. Every DALI samples will get the brightness in the moment of the storage. The brightness stored over the ETS parameterisation and the mask (sample not part of the scene) are lost. The next download will restore the stored calibration if the parameter „overwrite scene on download“ is set with „yes“. Otherwise the stored scene values are protected.

4.6 Staircase lighting function with dynamic operation

A typical staircase lighting function with a cut-out warning time can be parameterised in the dynamic operating mode of the DALI-Gateway.

Task:

The DALI devices 1, 5 on main channel A and the first 16 devices on auxiliary channel B should be used for staircase lighting. After the staircase lighting is activated, the lamps should be lit at 100 % (maximum brightness) within 2 seconds. This brightness level should continue for 30 seconds (Start Scene). After a transition of 2 seconds, the brightness should dim to 50 % brightness as a warning (End Scene), before the light switches off.

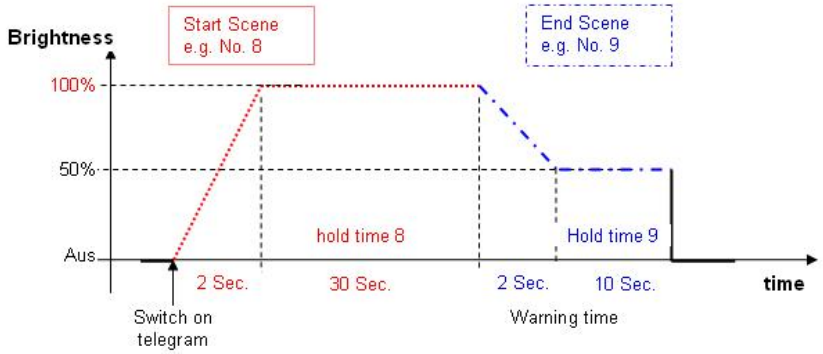


Fig. 26 Timed progression of the staircase lighting function

Devices A01 and A05 are set consecutively to the "dynamic" mode in the parameter window “Device Channel A”. All other devices on channel A retain their "normal" parameterisation, where they can still be switched on and off normally via the Device xy "Switch/Status" object and are not influenced by the dynamic operation.

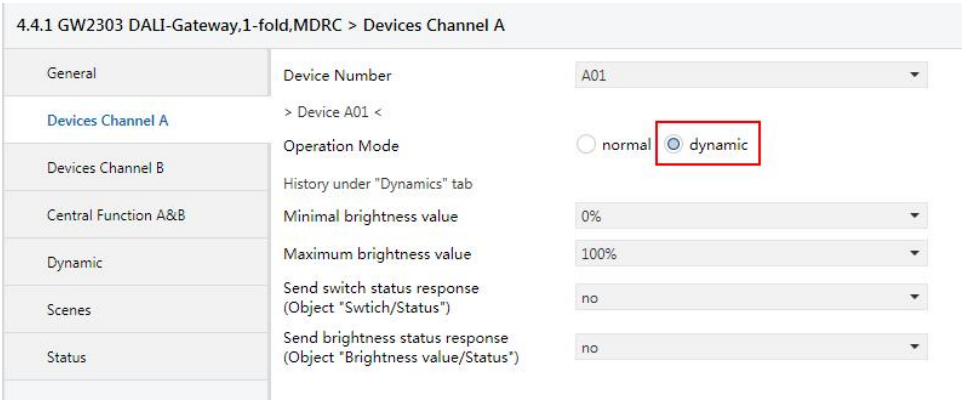


Fig. 27 Staircase lighting – Dynamic parameterisation

Central channel B is used for the dynamic retrieval of the 16 devices of channel B via the object channel B "On/Off" as there are fewer parameter settings. For this purpose, dynamic mode must be parameterised in the "Central Function A&B" parameter window.

Note: With this parameterisation, telegrams on object channel A "On/Off" automatically control both dynamic scenes. Thus no normal central switching on/off procedure in channel A is possible.

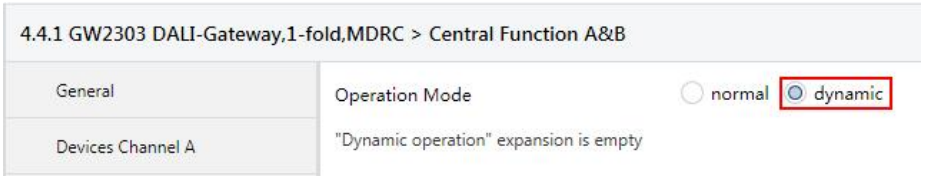


Fig. 28 Staircase lighting – Dynamic parameterisation

The start and end scene are selected in the "Dynamic" window. In our case it is scene 8 and 9. The hold times of the scenes will be parameterised.

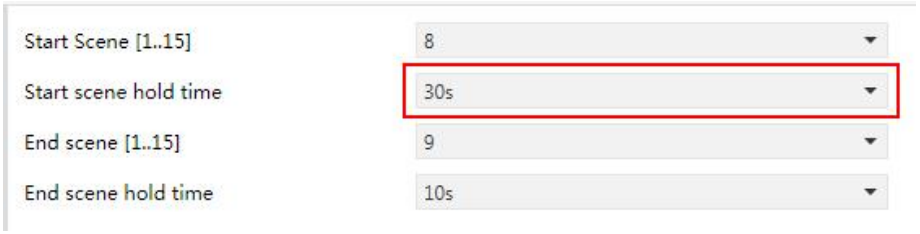


Fig. 29 Staircase lighting – Select start and end scene

After the scenes have been selected, the scene parameters hold value and transition value must be set. This is implemented in the "Scenes" parameter window where the devices are also assigned. It is important to ensure that the devices which are not used in the staircase are set to “no change” (Device xy Lightscene value) – the default setting.

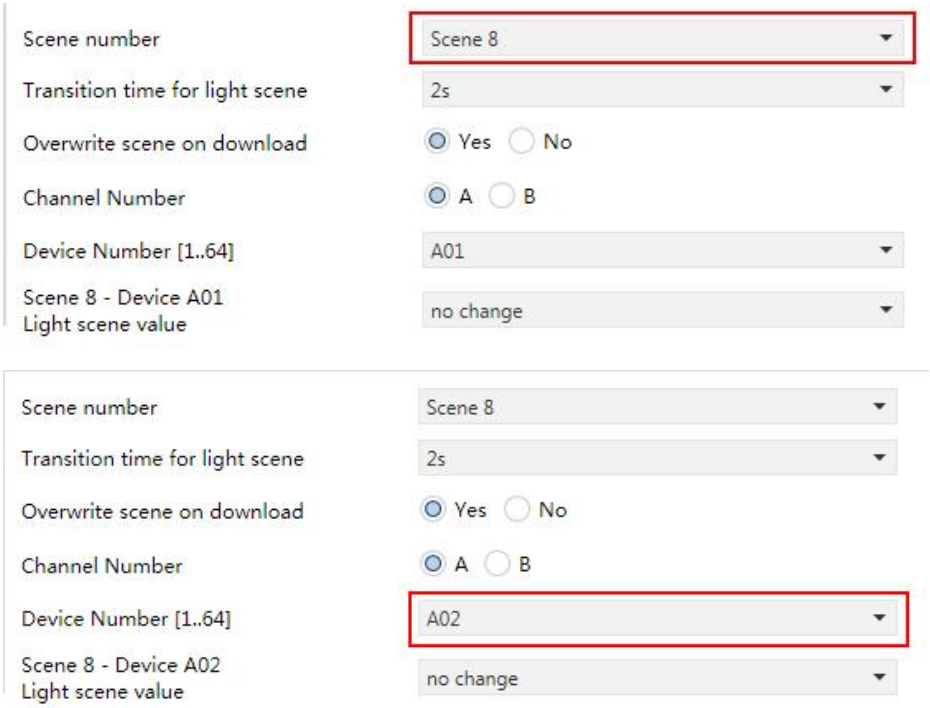


Fig. 30 Staircase lighting – Start scene parameterisation

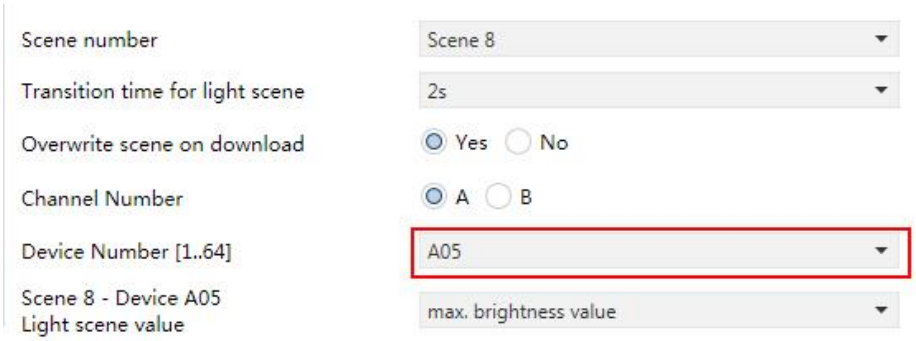


Fig. 31 Staircase lighting – Start scene parameterisation

The 16 lightscene values for the first 15 devices of channel B (B01…B15) must also be set.

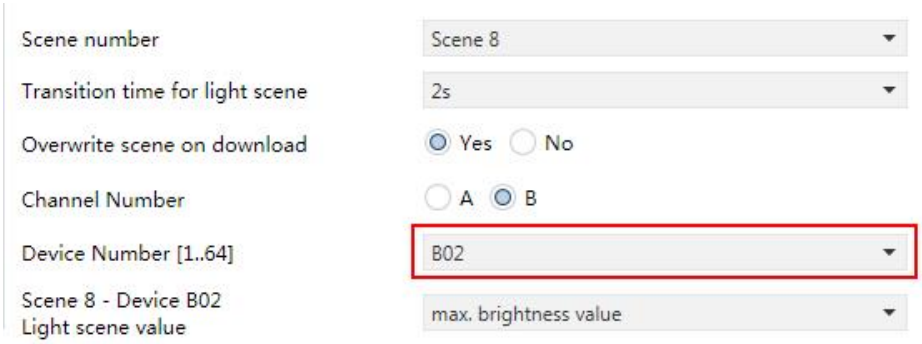


Fig. 32 Staircase lighting – Start scene parameterisation

The corresponding parameterisation must also be implemented for End Scene 9.

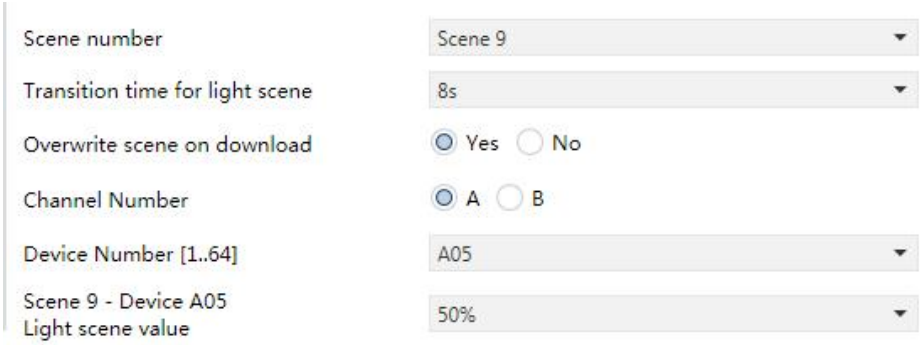


Fig. 33 Staircase lighting – End scene parameterisation

Then only EIB / KNX group assignment is necessary.



Object	Device	Group Address
0: Button 1 - Switch	4.4.2 SATION-PM1304.80/86 Push button 4f	4/6/0
18: Channel B - On / Off	4.4.1 GW2303 DALI-Gateway,1-fold,MDRC	4/6/0
53: Device A01 - Switch/Status	4.4.1 GW2303 DALI-Gateway,1-fold,MDRC	4/6/0
65: Device A05 - Switch/Status	4.4.1 GW2303 DALI-Gateway,1-fold,MDRC	4/6/0

Fig. 34 Staircase lighting – Group assignment

The staircase lighting function is triggered by switching the button on/off (telegram with value “1”).

A renewed telegram received with the value “1” during the dimming phase has no effect. A “1” telegram in the hold phase (30 seconds) means that the hold phase (30 seconds) will run again (retriggering). The same effect results if a “1” telegram is received in the warning phase. In this case the hold time (30 seconds) is restarted.

The lamps switch off after the warning time.

4.7 Behaviour on voltage failure

Failure of the operating voltage

The failure of the operating voltage on the DALI-Gateway is indicated by the green operating LED on the front of the device being extinguished. The yellow DALI fault LED also remains switched off as no operating voltage is available for triggering the LED.

The DALI-Gateway can also be programmed and parameterised without operating voltage via the EIB / KNX connection. Communication with the connected DALI devices is not possible. Incoming EIB telegrams are stored intermediately in the objects and the corresponding action is implemented after the operating voltage recovers.

The failure of the operating voltage means that the DALI power supply in the DALI-Gateway is no longer functioning. The communication to the connected DALI device is interrupted. In the event of a failure in the operating voltage in test mode, the mode is interrupted and must be restarted after recovery of the operating voltage.

The behaviour of the DALI device cannot be parameterised directly when the operating voltage fails. As a failure in the operating voltage however simultaneously leads to a failure of the DALI bus voltage, the response of the device can be set in the *General* parameter window via the parameter “Reaction on DALI or EIB bus voltage failure”. The following options are available for the DALI outputs: no change, turn on value, maximum and minimum dimming value or Off.

With the “no change” setting, it is possible that the lights will flicker briefly when the operating voltage fails. This depends on the ballast.

Scene sequences or the dynamic operating mode are retained with their current brightness value and are not continued after recovery of the operating voltage. The connected DALI devices adopt the state which was parameterised after bus voltage recovery.

The function of the burn-in time is lost on bus voltage failure and is deactivated after voltage recovery. The previously elapsed burn-in time is lost.

The information about the DALI device selected via the object “Select Device” is retained.



The operating voltage failure on the DALI device means that the lamps switch off and the ballasts no longer function. This state is detected as a ballast fault by the gateway.

EIB / KNX bus voltage failure

If the DALI-Gateway is supplied with AC or DC operating voltage, communication with the connected DALI devices is possible after an EIB / KNX bus voltage failure. The manual test function of the DALI outputs (channels) is possible.

The behaviour of the DALI devices can also be defined in the parameters. The parameter “Reaction on DALI or EIB bus voltage failure” is available for this purpose in the *General* parameter window. The following options are available for the DALI outputs: no change, turn on value, maximum and minimum dimming value or Off.

Any scene sequences that have been started and the dynamic operating mode (e.g. staircase lighting function) continue to run if “no change” has been selected in the *General* parameter window in the event of bus voltage failure. The DALI faults, ballast and lamp faults are also detected without EIB / KNX bus voltage. The corresponding fault telegram cannot be sent if the EIB / KNX bus voltage is not present. This means that a DALI fault in the EIB / KNX environment is not detected during an EIB / KNX bus voltage failure and the fault information is lost. If a faulty lamp is replaced during an EIB / KNX bus voltage failure, the telegram “Fault Lamp” with the value “0” (no fault) can likewise not be sent and is lost.

After an EIB / KNX bus voltage failure. the information concerning the device selected with the object “Select Device” is lost.

The functions “Burn in Lamps” and “Slave mode” remain active and are only deactivated after recovery of the EIB / KNX bus voltage.

DALI voltage failure

A failure in the DALI voltage (e.g. short circuit) of a channel is indicated by the yellow DALI fault LED which lights up if the operating voltage is applied. Communication with the connected DALI devices of the channel is not possible without DALI voltage.

The behaviour of the DALI-Gateway and the connected DALI devices must be parameterised on failure of the DALI voltage.

The parameter “Reaction on DALI or EIB bus voltage failure” is available in the *General* parameter window. The following options are available for the DALI outputs: no change, turn on value, maximum and minimum dimming value or Off.

The communication object “Channel X - Telegr. Fault DALI” can be activated in the *Status* parameter window. Depending on the parameterisation, the disruption in the DALI voltage of the channel is automatically routed via this object or via a read request.

If required, an acknowledgement of the fault signal can be parameterised. The general communication object “Fault Acknowledgement” is available which enables both the reset of the 230 VAC fault signal and the ballast, lamp and DALI fault signals of the individual channels.

The burn-in time function remains active and is continued after voltage recovery for the remaining period. The slave mode also remains activated.

4.8 Behaviour on voltage recovery

Recovery of the operating voltage

On recovery of the operating voltage on the DALI-Gateway, the green operating LED lights up again.

The behaviour of the DALI-Gateway and the connected DALI devices on recovery of the operating voltage (supply voltage) of the DALI-Gateway cannot be parameterised directly.

As a recovery of the operating voltage simultaneously leads to a recovery of the DALI voltage, the behaviour of the DALI devices can be defined in the parameters. The parameter “Reaction on DALI or EIB bus voltage recovery” in the *General* parameter window is available for this purpose. The following options are available for the DALI outputs: no change, turn on value, maximum and minimum dimming value or Off.

If the fault acknowledgement is activated, the fault signal remains set until the fault is rectified and the fault signal is reset via the communication object “Fault Acknowledgement”. Only then is a telegram with the value "0" sent via the corresponding communication object. This can be very helpful when detecting sporadic errors or events which take place during unmanned monitoring periods.

The function of the burn-in time is lost on bus voltage failure and is deactivated after voltage recovery. The previously elapsed time is lost.



The operating (supply) voltage recovery on the DALI device means that the lamps switch to the set default brightness value. Maximum brightness is the default setting. This behaviour cannot be influenced by the gateway.

EIB / KNX bus voltage recovery

The behaviour of the DALI devices on recovery of the EIB / KNX bus voltage can be defined via the parameters. The parameter “Reaction on DALI or EIB bus voltage recovery” in the *General* parameter window is available for this purpose. The following options are available for the DALI outputs:

- no change, brightness value when turned on
- maximum brightness value
- minimum brightness value
- off

The information about DALI faults, ballast and lamp faults which have occurred during the EIB / KNX voltage failure is routed after EIB / KNX bus voltage recovery.

After an EIB / KNX bus voltage recovery, the information concerning the device selected with the object “Select Device” is no longer lost. The device must be reselected.
If it is parameterised that the scene is to be overwritten with a download, it will be overwritten with the values which have been defined in the ETS after EIB / KNX bus voltage recovery.
The function of the burn-in time is lost on bus voltage failure and is deactivated after voltage recovery. The previously elapsed time is lost.

DALI voltage recovery

On DALI voltage recovery, the yellow DALI fault LED is extinguished.

The behaviour of the DALI-Gateway and the connected DALI devices on recovery of the DALI voltage can be parameterised.

The parameter “Reaction on DALI or EIB bus voltage recovery” is available in the *General* parameter window. The following options are available for the DALI outputs: no change, turn on value, maximum and minimum dimming value or Off.

The communication object “Channel X - Telegr. Fault DALI” can be defined in the *Status* parameter window. Depending on the parameterisation, the recovery of the DALI voltage of the channel is automatically routed via this object or via a read request.

If the fault acknowledgement is activated, the fault signal remains set until the fault is rectified and the fault signal is reset via the communication object “Fault Acknowledgement”. Only then is a telegram with the value "0" sent via the corresponding fault message communication object. This can be very helpful when detecting sporadic errors or events which take place during unmanned monitoring periods.

The functions “Burn in Lamps” and “Slave mode” are continued after voltage recovery for the remaining period.

4.9 Addressing operation steps

The SATION DALI gateway supports automatic addressing, detecting assigned addresses, manually addressing, and deleting addresses. The following lists several addressing operations and specific operational steps that may be encountered in engineering applications. All DALI drive devices must be connected to the power supply and DALI bus before proceeding. It is worth noting that the connection of the DALI driver device bus must be the same end connected together to prevent the left and right ends from being cross-wired, especially in the case of multiple devices, to avoid potential hazards such as unstable DALI communication.

Application 1: DALI drive device is in the factory state, no addressing record, can be used for automatic addressing

1: DALI gateway is connected to the power supply, KNX bus and DALI communication bus;

2: Download the DALI gateway physical address and database application configuration (the same configuration has been downloaded without repeating the download);

3: After the download is completed, the test wiring is normal. Press and hold the manual button for more than 3 seconds to enter the manual mode.

Operate the up and down buttons of the A/B channel for switching and dimming;

4: First turn off all the lights in manual mode, then press and hold the confirmation button for more than 5 seconds to appear PA enters the addressing mode, and the A/B channel press and hold the A/B channel up button for more than 3 seconds. The LED flashes automatically after A/B. The channel's DALI drive device is addressed;

Note: Only one channel can be addressed at a time;

5: The more devices, the longer the automatic addressing time, each successful write of a DALI driver device address will light the corresponding light, PS will appear after successful addressing, PF will appear after the address failure;

Note: PS will also be displayed if no device is detected or there is no addressless device;

6: After the addressing is completed, short press the return key to return to manual mode d, and then press and hold the return key for 3 seconds to return to bus mode b.

Application 2: The DALI driver device has been programmed with a short address, and the replacement DALI gateway does not want to re-allocate the address.

1: DALI gateway is connected to the power supply and KNX bus, and the DALI communication bus is not connected first;

2: Download the DALI gateway physical address and database application configuration (the same configuration has been downloaded without repeating the download);

3: After the download is completed, press and hold the confirmation button for 5 seconds or more to appear bd, enter the detection and record the assigned address and the number of devices of the DALI driver device. Because the DALI bus is not connected, the purpose of this operation is to clear the internal DALI gateway. Have records;

4: The DALI gateway is powered off, connected to the DALI communication bus, and then powered on, test whether the wiring is normal. Press and hold the manual button for more than 3 seconds to enter the manual mode, then turn on the light first, then turn off the light, and exit the manual mode in the same operation;

5: Under bus mode b, long press the confirmation button for b seconds, bd will automatically detect and record the assigned address and number of devices of the DALI drive device. Each detected will automatically update the configuration data and light the relevant lights. Exit automatically afterwards.

Application 3: Write the specified short address to the DALI driver device through the DALI gateway, using manual addressing

1: DALI gateway is connected to the power supply, KNX bus and DALI communication bus;

Note: Each time you write a specified short address, you can only connect one DALI device. If you connect multiple, then multiple DALI devices are the same DALI short address!

2: Configure the parameter shown in the figure below as No, and disable the automatic addressing function.

Configure the A channel object 17 group address

Configure the B channel object 35 group address (if the B channel is used)

Then download the DALI gateway physical address and database application configuration (the same configuration has been downloaded without repeating the download);

3: After the download is completed, connect the DALI drive device that needs to be addressed on the A/B channel, and test whether the wiring is normal. Press and hold the manual button for more than 3 seconds to enter the manual mode, and operate the A/B channel up and down buttons to switch and Dimming

4: Turn off the lights and exit the manual mode. Write the specified value of 17/35 of the transmitting object through ETS to the specified short address of all DALI devices of the A/B channel. The decimal values 0~63 correspond to the DALI short address 0~63 respectively. , other values are invalid,

After the address is successfully written, the relevant DALI device lights will be illuminated and the configuration parameters will be written to the DALI device at the same time.

Application 4: The DALI driver device is equipped with an address and wants to reassign the address using automatic addressing. Since automatic addressing does not delete the address that the DALI driver device has already configured, you can use the address to delete the address before auto-addressing.

1: DALI gateway is connected to the power supply, KNX bus and DALI communication bus;

2: Test the wiring is normal, long press the manual button for more than 3 seconds, d enter the manual mode, operate the A/B channel up and down buttons to switch and dim;

3: First turn off all the lights in the manual mode, then press and hold the confirmation button for more than 5 seconds to enter the PA address mode, and the A/B channel press and hold the A/B channel down button for more than 5 seconds to automatically access all the A/B channels. The DALI driver device deletes the address, the LED automatically turns off once, and automatically returns to the manual mode d. All the lights are illuminated, and the address is deleted successfully.

Application 5: Replace a faulty DALI drive unit and replace one or more devices

1: First replace all faulty DALI drive devices with new DALI drive devices without address. The alarm and search for faulty devices can activate the “DALI QUERY” function to monitor the working status of DALI devices in real time;

2: Start the automatic addressing with reference to the application one.

Note: The DALI drive device to be replaced must be a new factory-free device with no address!

5 Appendix

A.1 Feedback status behaviour

The following table provides a simple overview of when feedback objects are sent. They depend on the state of the output and the received command. With the “Switch/Status” object, it is also possible to set whether transmission is continuously on or only after a change.
“–” means that the feedback object is not sent.

Switch object “Switch/Status”

Old state	Received command	New state	Switch feedback content	
			“always send”	“send on change”
OFF	OFF command	OFF	OFF	-
OFF	DIM command	OFF	OFF	-
OFF	VALUE command	OFF	OFF	-
OFF	Scene command	OFF	OFF	-
OFF	OFF command	ON	ON	ON
OFF	DIM command	ON	ON	ON
OFF	VALUE command	ON	ON	ON
OFF	Scene command	ON	ON	ON
ON	OFF command	ON	ON	-
ON	DIM command	ON	ON	-
ON	VALUE command	ON	ON	-
ON	Scene command	ON	ON	-
ON	OFF command	OFF	OFF	OFF
ON	DIM command	Min. Dimm	ON	-
ON	VALUE command	OFF	OFF	OFF
ON	Scene command	OFF	OFF	OFF

Switch object “Brightness value/Status”

Old state	Received command	New state	Switch feedback content	
			“always send”	“send on change”
OFF	OFF command	OFF	OFF	-
OFF	DIM command	OFF	OFF	-
OFF	VALUE command	OFF	OFF	-
OFF	Scene command	OFF	OFF	-
OFF	OFF command	ON / y%	y %	y %
OFF	DIM command	ON / y%	y %	y %
OFF	VALUE command	ON / y%	y %	y %
OFF	Scene command	ON / y%	y %	y %
ON / x%	OFF command	ON / x%	x%	-
ON / x%	DIM command	ON / x%	x%	-
ON / x%	VALUE command	ON / x%	x%	-
ON / x%	Scene command	ON / x%	x%	-
ON / x%	OFF command	ON / y%	y %	y %
ON / x%	DIM command	ON / y%	y %	y %
ON / x%	VALUE command	ON / y%	y %	y %
ON / x%	Scene command	ON / y%	y %	y %
ON	OFF command	OFF	0%	0%
ON	DIM command	Min. Dim	Min. Dim %	Min. Dim %
ON	VALUE command	OFF	0%	0%
ON	Scene command	OFF	0%	0%

A.2 Code table for 8-bit scene telegram

The table indicates a telegram code of an 8-bit scene in hexadecimal and binary code of the first 16 scenes which are relevant for a 1-fold&2-fold DALI- Gateway.
When retrieving or storing a scene, an 8-bit value must be sent.

Retrieve scene

Bit no.		7	6	5	4	3	2	1	0		
8-bit value EIB / KNX telegram value	Hexadecimal	Recall/Store	not defined	Binary scene number						Scene number	Retrieve (A) Store (S)
0	00	0	0	0	0	0	0	0	0	1	A
1	01	0	0	0	0	0	0	0	1	2	A
2	02	0	0	0	0	0	0	1	0	3	A
3	03	0	0	0	0	0	0	1	1	4	A
4	04	0	0	0	0	0	1	0	0	5	A
5	05	0	0	0	0	0	1	0	1	6	A
6	06	0	0	0	0	0	1	1	0	7	A
7	07	0	0	0	0	0	1	1	1	8	A
8	08	0	0	0	0	1	0	0	0	9	A
9	09	0	0	0	0	1	0	0	1	10	A
10	0A	0	0	0	0	1	0	1	0	11	A
11	0B	0	0	0	0	1	0	1	1	12	A
12	0C	0	0	0	0	1	1	0	0	13	A
13	0D	0	0	0	0	1	1	0	1	14	A
14	0E	0	0	0	0	1	1	1	0	15	A
15	0F	0	0	0	0	1	1	1	1	16	A
16	10	0	0	0	1	0	0	0	0	17	A
17	11	0	0	0	1	0	0	0	1	18	A
18	12	0	0	0	1	0	0	1	0	19	A
19	13	0	0	0	1	0	0	1	1	20	A
20	14	0	0	0	1	0	1	0	0	21	A
21	15	0	0	0	1	0	1	0	1	22	A
22	16	0	0	0	1	0	1	1	0	23	A
23	17	0	0	0	1	0	1	1	1	24	A
24	18	0	0	0	1	1	0	0	0	25	A
25	19	0	0	0	1	1	0	0	1	26	A
26	1A	0	0	0	1	1	0	1	0	27	A
27	1B	0	0	0	1	1	0	1	1	28	A
28	1C	0	0	0	1	1	1	0	0	29	A
29	1D	0	0	0	1	1	1	0	1	30	A
30	1E	0	0	0	1	1	1	1	0	31	A
31	1F	0	0	0	1	1	1	1	1	32	A

Store scene

Bit no.		7	6	5	4	3	2	1	0		
8-bit value EIB / KNX telegram value	Hexadecimal	Recall/Store	not defined	Binary scene number						Scene number	Retrieve (A) Store (S)
128	80	1	0	0	0	0	0	0	0	1	S
129	81	1	0	0	0	0	0	0	1	2	S
130	82	1	0	0	0	0	0	1	0	3	S
131	83	1	0	0	0	0	0	1	1	4	S
132	84	1	0	0	0	0	1	0	0	5	S
133	85	1	0	0	0	0	1	0	1	6	S
134	86	1	0	0	0	0	1	1	0	7	S
135	87	1	0	0	0	0	1	1	1	8	S
136	88	1	0	0	0	1	0	0	0	9	S
137	89	1	0	0	0	1	0	0	1	10	S
138	8A	1	0	0	0	1	0	1	0	11	S
139	8B	1	0	0	0	1	0	1	1	12	S
140	8C	1	0	0	0	1	1	0	0	13	S
141	8D	1	0	0	0	1	1	0	1	14	S
142	8E	1	0	0	0	1	1	1	0	15	S
143	8F	1	0	0	0	1	1	1	1	16	S
144	90	1	0	0	1	0	0	0	0	17	S
145	91	1	0	0	1	0	0	0	1	18	S
146	92	1	0	0	1	0	0	1	0	19	S
147	93	1	0	0	1	0	0	1	1	20	S
148	94	1	0	0	1	0	1	0	0	21	S
149	95	1	0	0	1	0	1	0	1	22	S
150	96	1	0	0	1	0	1	1	0	23	S
151	97	1	0	0	1	0	1	1	1	24	S
152	98	1	0	0	1	1	0	0	0	25	S
153	99	1	0	0	1	1	0	0	1	26	S
154	9A	1	0	0	1	1	0	1	0	27	S
155	9B	1	0	0	1	1	0	1	1	28	S
156	9C	1	0	0	1	1	1	0	0	29	S
157	9D	1	0	0	1	1	1	0	1	30	S
158	9E	1	0	0	1	1	1	1	0	31	S
159	9F	1	0	0	1	1	1	1	1	32	S

Table 17 Code table for 8-bit scene

A.3 Code table for Digital tube display

Status and mode code display：

b	Bus control mode
d	Manual control mode
CF	Communication telegraph failure status
FA	DALI A channel device failure status
FB	DALI B channel device failure status
PA	DALI device addressing mode
bd	Detect and explore DALI devices mode

Code display in addressing mode：

PS	Addressing successfully
PF	Addressing failed

Code display in fault status query mode:

F1	DALI devices failure status
F2	Lamps failure status
F3	DALI communication failure status
01-64	Fault devices, the number 01~64 of device corresponds to DALI device with short address 00~63. For example:the number 01 of device corresponds to DALI device with short address 00.

SATION Technologies
Tel: +86(0756)-3628187/287/387 Fax: +86(0756)-2612730
www.sation.com.cn