

KNX/DALI Gateway Twin N 141/31

5WG1 141-1AB31

Product and function description



The KNX/DALI Gateway Twin N 141/31 is a KNX device with two independent DALI interfaces. It can be connected to up to 64 DALI actuators (e.g. ECG with DALI interface) and DALI sensors (e.g. DALI key interface, presence detectors) per channel.

DALI (Digital Addressable Lighting Interface) is a bidirectional communications interface to IEC 62386-101, whose specification was chosen by manufacturers for electronic ballasts. It not only receives, for example, switching and dimming commands, but also transmits status information such as failure of an illuminant or reporting of a detected error in the ballast. The KNX/DALI Gateway Twin N 141/31 communicates with up to 64 DALI actuators per channel. These can be connected and dimmed in groups. It also records and transfers DALI status and error messages. An individual name, a group, parameter and scenes are assigned to individual DALI ECG during commissioning with the ETS (Engineering Tool Software). DALI sensors are also assigned to groups in the ETS (for this, go to the application program description).

The integrated power supply unit supplies the gateway electronics and generates the DALI bus voltage. It facilitates operation of the gateway and direct switching and dimming of all DALI ECG's controlled via the DALI interface, even if the gateway has still not been operated with the ETS or if communication via KNX is interrupted. For this, the device has a key (figure 2, A3) on the front to disable or enable "Direct Mode". If the key is first held down, then the display (A5) indicates direct mode by "□". Then, all lights are switched on/off (tap the key) or dimmed (hold the key down) together via the key pair (A7 and A8) and controlled via the DALI bus line via the respective channel A or B. The LED (A4) indicates the switched status of the connected lights. If the "Direct Mode" key is held down for a second time, then the "□" in the display goes out and the N 141/31 is again in bus mode [display "□"] or in standalone mode, if KNX communication is unavailable.

The device has a voltage detector during initialisation, which detected whether a voltage has been applied to the DALI terminals incorrectly.

The DALI power supply feeds both ECG and sensors; verify that the maximum permissible current drain by all connected DALI devices is not exceeded.

DALI fundamentals

The universal DALI bus (DALI = Digital Addressable Lighting Interface) is a system for controlling electronic switching devices (ECG) in lighting systems. The DALI communication interface specification is set out in the international IEC 62386 standard.

DALI not only receives switching and dimming commands. Additionally, status information for lighting values or error states, such as the failure of a light or an ECG, can be reported via DALI. In addition, sensors with DALI interface are supported. In a single DALI line, up to 64 individual DALI switching devices (slaves) can be connected through the associated controller/gateway (master). On DALI commissioning, ECG receive an automatically generated address and in the further commissioning process a short address from 0...63 based on this address. As the address is assigned automatically, the equipment configuration is also random and the individual ECG/lights must first be identified as the commissioning continues.

Individual ECG in the system are addressed either on the basis of the short address (individual controller) or on the basis of a DALI group address (group addressing). For this purpose, any number of ECG's in a line can be arranged in up to 16 DALI groups. The group addressing in the DALI system ensures that different light switching and dimming processes in a system are performed concurrently without any time differences.

In addition to the addressing through short addresses and group addresses, lighting values for individual DALI ECG can also be aggregated in scenes and contacted via scene addressing.

You will find further information on DALI, for example in the DALI manual at: www.dali-ag.org

Gateway fundamentals

The KNX/DALI Gateway communicates with up to 64 DALI actuators per channel. These can be connected and dimmed in up to 16 groups per channel. The gateway also supports selected sensors with DALI interface. It also records and transfers DALI status and error messages. An individual name, a group, parameter and scenes are assigned to individual DALI ECG's during commissioning with the ETS (Engineering Tool Software). DALI sensors and their functionality are also assigned in the ETS.

All DALI subscribers and functions are independent and can be linked via group addresses.

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The device can only be operated in DALI segments with connected ECG and sensors and not with further DALI controllers within the segment (no multi-master mode). The power needed for ECG and sensors is supplied directly through the gateway. An additional DALI power supply is not required, neither is it permitted.

Functional overview

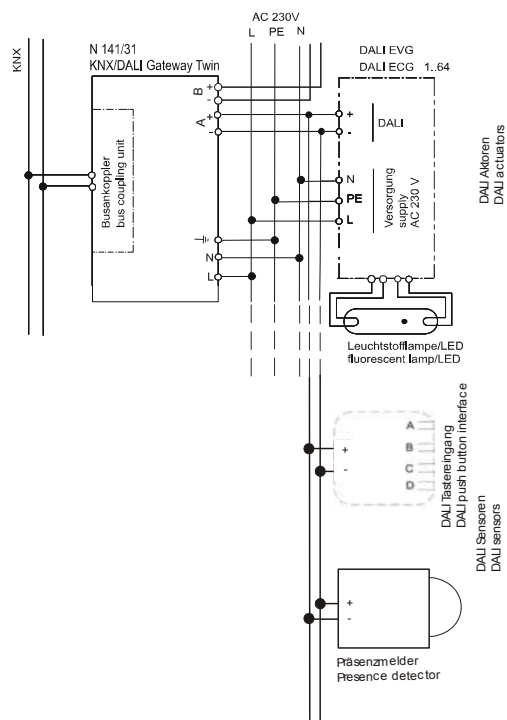
The device can be operated with ETS from Version 3.0f and upwards. The type and number of communication objects are determined by the number of connected DALI devices (ECG, sensors and functions), the configured groups and the functions and objects enabled via the parameter window.

The configuration steps are undertaken ideally as shown in Fig. 1. Parts of the configuration can be prepared "off-line", without connection to the gateway. Configuration, storage and documentation are implemented within the ETS or the parameters (plug-in). No additional files should be backed up or archived.

Application program**07 B0 KNX / DALI Gateway Twin 983301**

More informations

<http://www.siemens.com/gamma-td>

Connection example**Modes**

The gateway supports various modes, each of which is related to the device or to the group.

Normal mode

In normal mode, ECG can be connected and dimmed in groups without any restrictions. Three communication objects (switching, dimming and set value) also control each group).

A group assignment can be made only to a maximum of one DALI group. Multi-group assignments are not supported as a DALI group, but must be implemented as required by assigning KNX communication objects. Isolated status objects inform about the switching and value status of the groups.

Standalone mode

In standalone mode, the device can be operated without a connection to KNX. The configuration, which was loaded with ETS, is executed in standalone mode.

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In direct mode, direct switching on and off and dimming is possible at the device.

Night mode (timed surface lighting)

Night mode can be enabled or disabled via an optionally selectable object (1-bit). If night mode is enabled for the group, then this channel can only be switched on at certain times (surface lighting). The switched on period during night mode is variable via a parameter.

Constant light

The group is switched on permanently at the set value. All other parameters, up to the behaviour if there is a bus voltage failure, cannot be adjusted. However, status objects are available.

Timer mode

A timer mode can be started by an ON telegram, a dim telegram (brighter/darker) or a dimming value telegram. In "Time switch 1-level", dimming is switched on after the switched on time has elapsed. If "Time switch 2-level" is set, the interim value is dimmed (i.e. the dimming value after the dimming time set after the switched on time 1 has elapsed).

Error messagesDALI equipment failure

The 1-bit object "[Channel], DALI device failure" reports that the power supply to DALI devices must have failed. If more than the number configured with the parameter "Channel [A/B], failure >= DALI device(s)" are no longer responding to queries, a failure of the power supply for the DALI devices is assumed. If the object value = "0", then the power supply is present. If the object value = "1", then the power supply for the DALI devices has failed.

Power failure

The "Power failure" 1-bit status object reports the status of the common power supply for the gateway and the DALI line. If the object value = "0", then the power supply is present. If the object value = "1", then the power supply has failed. With this, the gateway is no longer functional and all ECG go to the configured dimming condition for a failure of the DALI voltage.

A short-term buffer power supply for the gateway electronics integrated with the device ensures that a mains power failure is detected and the power supply status telegram can still be transferred. These status objects are sent only if KNX communication is available.

DALI short circuit

The object "[Channel], DALI short circuit" reports a short circuit of the DALI line. If the object value = "0", then there is no short circuit. If the object value = "1", then the DALI line is short-circuited. The DALI gateway can no longer control the DALI devices and all ECG go to the dimming condition configured for a DALI voltage failure.

Groups

When controlling ECG via groups, these objects are relevant for groups.

Switching on/off (1-bit)

ECG connected to the gateway can be assigned to up to 32 groups.

A switching telegram to a group determines the configuration - whether the configured dimming value or the value before switching off is set. Whether the newly set value is dimmed or skipped is variable by means of a parameter. Switch-off telegrams always switch off. In timer mode, the delay time is (re)started if it has not been switched off. According to the configuration, switching telegrams enable delay times.

Dimming brighter/darker (4-bit)

The "Dimming time" property is variable. After receiving the start command, the gateway begins communication with the ECG, to change the dimming value in the given direction with the configured speed. If a stop command is received before the dimming process has ended, the dimming process is interrupted and the dimming value reached is held. In timer mode, the delay time is (re)started if it has not been switched off. A parameter determines whether you can switch on and off via dimming.

Dimming value, 8-bit value (1 byte)

The communication object with the description "[Channel], [Group], Dimming value", sets all ECG in this group to the transferred dimming value. Whether this value is skipped or dimmed is configurable. Depending on the configuration, say this object receives the value 0, the corresponding group is switched off. Values less than the minimum value (with the exception of the value 0) and values greater than the maximum value are limited to the minimum and maximum dimming values respectively. A parameter determines whether a switched off ECG assumes the received value immediately and switches on or assumes the received value only with an ON command. The configured switching value is then invalid. Depending on the configuration, dimming value telegrams also enable delay times. A communication object (3 bytes) can also control the group via a dimming value with a dimming time.

Dimming value limits

Limiting is used to configure maximum and minimum dimming values. With all switching/dimming processes, the dimming value can only be changed within the configured limits.

Switching status (1-bit)

The on/off status of any group can be sent via a communication object "[Channel], [Group], Switching status" on a read demand or automatically on an object value change.

Dimming value status (8-bit)

The object "[Channel], [Group], Dimming value status" is an 8-bit status object. It contains the current dimming value for the relevant group. It can be sent and/or read independently.

Error status (1-bit)

The 1-bit object "[Channel], [Group], Error status" can, for each group, report a detected lighting failure or ECG failure for a subscriber in this group, or also poll the status at any time.

Error status per channel (2-Byte)

The 2-byte status object "[Channel], Error status" can poll the error status of a group at any time. Depending on the configuration, error messages are sent for each ECG or only after polling has ended.

Sensors

The gateway supports selected sensors, such as key interfaces, presence detectors and brightness sensors with a DALI interface. Sensors are powered by the gateway. Sensors can be connected individually with other objects via the objects and are therefore independent.

8-bit scene control

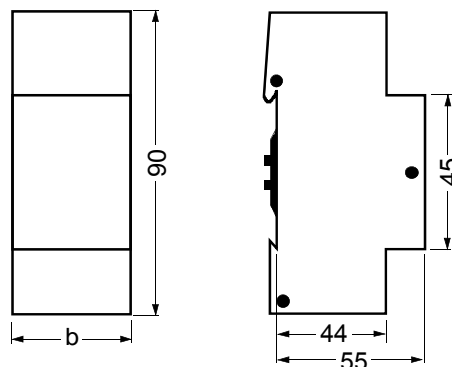
The application program can configure up to 32 scenes, each of which can contain up to 32 groups. Scenes are saved and called up via the 8-bit object "8-bit scene, Recall/Save". Timer functions cannot be executed within a scene.

2-point-lighting control

Up to sixteen independent switching brightness controllers (2-point controllers) are provided. These are independent of all other functions and can be used via objects.

Technical Data

Dimensions in mm



b = 4 WU

1 width units (WU) = 18 mm

Power supply

- KNX bus voltage: carried out via the bus line
- KNX bus current: 5 mA
- Electronics and DALI interface:
 - Integrated power supply for
 - AC 110-240 V, 50-60 Hz
 - DC 120-240V
 - Power consumption: max. 11 W

Inputs/outputs

- Mains connection: 3-pole (L, N, ground)
- DALI interface (according to IEC 60929):
 - max. 64 DALI devices per channel (each max. 2 mA) with > 8 kOhm input impedance
 - max. amount of sensors per channel depends on current consumption of sensors (typ. 10 with 6 mA each)
 - DALI power supply per channel:
 - approx. DC 19 V, floating, short-circuit-proof
 - max. current I_{max} = 250 mA
 - max. guaranteed current: I_{nmax} = 190 mA

Operating elements

- 1 teach-in button: toggle normal mode / addressing mode
- 2 buttons: toggle between bus- / direct mode; edit menu
- 4 buttons: all ECG on / off and dimming;

Display elements

- Device info display, 7 segment display, 2-digit, amber
- 2 LED red
- LED addressing mode

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- Conductors for net power supply and DALI terminal, stripping length 10 ... 11 mm (see stamping)
- The following conductor cross-sections are permitted:
 - 0.5 ... 2.5 mm² single-core
 - 0.5 ... 2.5 mm² stranded multi-core
 - 0.5 ... 2.5 mm² finely stranded, untreated
 - AWG 20 (0.75 mm²) – AWG 12 (3.3 mm²) solid, stranded
- The supply cable to the N 141/31 must be fused with a circuit-breaker of characteristic B or C for a max. nominal current of 6 A!
- KNX bus: bus terminal

Mechanical data

- Dimensions: device for DIN rail mounting in N-system dimensions, width: 4 module units (1 module unit = 18 mm)
- Weight: approx. 180 g
- Fire resistance: ca. 4 MJ ± 10%

Electrical safety

- Protection type (in accordance with EN 60529):

Reliability

- Failure rate: 419 FIT at 40°C

Environmental specifications

- Climatic withstand capability: EN 50491-2
- Ambient operating temperature: - 5 ... + 45 °C
- Storage temperature: - 25 ... + 70 °C
- Relative humidity (not condensing): 5 % to 93 %

Markings

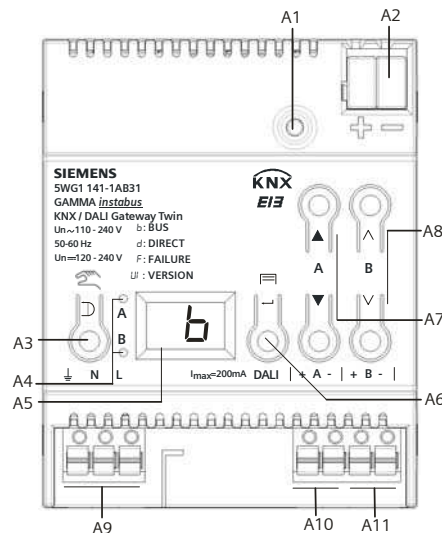
- KNX *EIB*

Installation instructions

The device may be used for permanent interior installations in dry locations within flush-mount boxes.

**WARNING**

- The device must be mounted and commissioned by an authorized electrician.
- A safety disconnection of the device must be possible.
- The device must not be opened.
- For planning and construction of electric installations, the relevant guidelines, regulations and standards of the respective country are to be considered.

Location and Function of the Display and Operating Elements

- A1 Programming key with LED (red) for switching in programming mode to accept the physical address and to display normal mode (LED Off) or programming mode (LED On).
- A2 Plug for KNX terminal
- A3 Operating key
Tap: "back" Hold down: Direct mode
- A4 Both these LEDs display information about the relevant channel.
- A5 Device info display
- A6 Operating key
"OK" and Menu
- A7 Key pair for menu control and direct mode channel A
- A8 Key pair for sub-menu control and direct mode channel B
- A9 Terminals for ground, neutral and phase lines (L, N, ground)
- A10 Terminal pair for DALI channel A
- A11 Terminal pair for DALI channel B
- A12 Stripping template (stamping)

Device info-Display**a) Status indication**

Mode	Indication	Description
Error Display flashes	88	Incorrect voltage detected at DALI terminals A9 and A10. → see below: Incorrect voltage detection

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Error (1 st position) flashing		The display flashes if there is an error. "F" is also displayed in the 1 st position together with the current symbol for the 2 nd position. → see below Error indication
Normal mode (2 nd position)		In normal mode (bus mode), all telegrams are sent via KNX.
Direct mode (2 nd position)		In direct mode, all ECGs connected via the DALI bus line can be switched and dimmed with the key pair A7/A8. The LED A4 indicates the switching status.
Standalone mode (2 nd position)		If standalone mode is configured, the device continues to work independently if communication with KNX is interrupted.

b) Menu functions

Pressing A6 "Menu" calls up information. Selection is performed by A7 . Press A6 "OK" to continue, press A3 for "back". After approximately 5 min, the display reverts automatically to status display. The information is scrolled up and down with the A7 keys in the first level and with the A8 keys in the second menu level.

^ v keys in the second menu level.

b1) Error indication

Key	Indication	Note
A6 		Error indication menu
A6 		First error Channel or DALI subscriber (e.g. channel A)
A8 		Use A8 to scroll to the next/previous error detail for channel error: F4 DALI voltage supply F5 DALI short circuit F6 No ECG found
A7 		Use A7 to scroll to next/previous error, e.g. channel A, DALI subscriber 36
A8 		Use A8 to scroll to next/previous error details with ECG error F0 Illuminant defective F1 ECG defective
		All errors were corrected during the error indication on continuing

		or switching back into the error codes
A3 		Use "back" to quit the display and return to the menu

Errors are indicated in descending order of priority as follows:

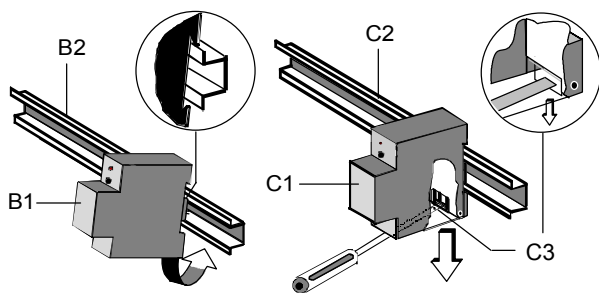
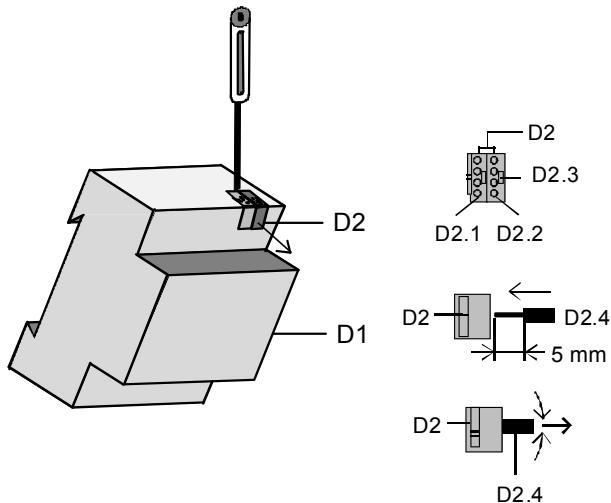
Error at	A4 indication	Example
Device	Top LED on, bottom LED on, code 88	
Channel A	Top LED on, bottom LED off, code 88	
Channel B	Top LED off, bottom LED on, code 88	
ECG channel A	Top LED on, bottom LED off, ECG no.	
ECG channel B	Top LED off, bottom LED on, ECG no.	

b2) Firmware version indication

Key	Indication	Note
A6 		Switch to menu with A6
A7 		After pressing A7 Menu heading "Indicate firmware version"
A6 		After pressing A6, the current firmware version is displayed, e.g. 01
A3 		"Back" A3 returns you to the menu; press A3 again to quit the menu.

KNX/DALI Gateway Twin N 141/31**5WG1 141-1AB31****Mounting and wiring**

The device may be used for permanent interior installations in dry locations within distribution boards or small casings with DIN rail EN 60715-TH35-7,5.

Mounting / dismantling the device:Connecting / disconnecting the bus cable:**Incorrect voltage detection**

The device is fitted with a voltage detector on both DALI channels. If an incorrect voltage is detected during initialization because lines have been connected to terminals A9 and A10 incorrectly, the device info indicator flashes with the symbol :BB. This protects the device against excessive voltage, e.g. if 230V AC (N, L) is applied to the pair of terminals A9 and A10. This mode is maintained until the connection error is corrected.

NOTE:

Owing to the internal connection of DALI terminals channel A- and channel B-, an incorrect voltage present here will not be detected and this will cause a direct short circuit and damage to the device.

General Notes

- The operating instructions must be handed over to the client.
- Any faulty device is to be sent together with a return delivery note of the local Siemens office.
- If you have further questions concerning the product please contact our technical support:

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+49 (911) 895-7223

support.automation@siemens.com

www.siemens.com/automation/support-request