

DALI-2 Switch Cross

Datasheet

Multifunctional Switch Module



DALI-2 control unit with four programmable pushbuttons
Art. Nr. 86459793-__-__
GTIN: 9010342010224

Colour variants – art.nr. addition

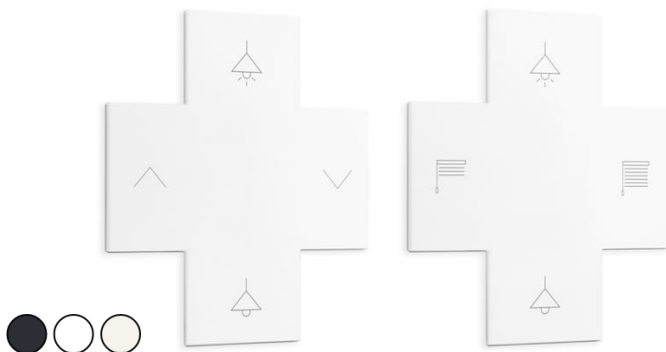
86459793-W-__ white RAL9010
86459793-W16-__ white RAL9016
86459793-B-__ black

Functional variants – art.nr. addition:

86459793-__-2-app
factory default setting **app-controller** activated

86459793-__-2-int
factory default setting: **instances** activated

86459793-__-NFC
version with NFC
factory default setting: **app-controller** activated



Accessory:

cross plates with symbols

custom symbols
Art. Nr. 86459793-Z00
GTIN: 9010342010248

dimming
Art. Nr. 86459793-Z01
GTIN: 9010342010255

dimming and blinds
Art. Nr. 86459793-Z02
GTIN: 9010342010262

DALI-2 Switch Cross - Multifunctional Switch Module




Overview

- DALI-2 control device with 4 buttons according to IEC62386-101, IEC62386-103 and IEC62386-301 (from FW3.0).
- Multi-master capable: Several modules can be installed within a DALI circuit.
- Different DALI commands can be assigned to each button.
- Integrated DALI-2 application controller.
- Four DALI-2 pushbutton instances are available for an easy integration.
- In addition to the standard DALI commands, the application controller also supports DALI DT8 TC and RGB (W) control.
- short button press, long button press (with repetition for dimming) and «toggle» are supported.
- Alternative configuration: A second function can be assigned to each input. Activated / deactivated via a scene command or switch at input 4. Thus, Offering an easy solution to the partition wall problem.
- With the application controller Sequences, macros and other functions can be realized.
- Easy configuration via Lunatone DALI USB interface and DALI-Cockpit Software Tool.
- New: NFC variant for simple, contactless configuration with the Lunatone NFC smartphone app.
- Easy installation: the device can be installed on a flush-mounted installation box and is supplied via the DALI bus.
- Buzzer for localization.
- DALI-2 control unit according to IEC62386-103.



Specification, Characteristics

Colour variants:

colour	white RAL 9010	white RAL 9016	black
			
article number	86459793- W -__	86459793- W16 -__	86459793- B -__
GTIN	9010342010224	901034201023	9010342010217

Functional variants:

type	DALI-2 Switch Cross	DALI-2 Switch Cross integrated	DALI-2 Switch Cross NFC
Factory default settings	app-controller activated	instances activated	app-controller activated
article number	86459793-__- 2-app	86459793-__- 2-int	86459793-__- NFC

type	DALI-2 Switch Cross, DALI-2 Switch Cross integrated, DALI-2 Switch Cross NFC
article number	86459793-__-__
GTIN	9010342010224

DALI interface, power supply: DA, DA

output type	DALI, DALI-2, Multimaster
terminal markings	DA, DA
voltage range	9,5V ... 22,5Vdc according to IEC62386
typical current consumption DALI (16,5V)	3.6 mA
max. current consumption DALI (22,5V)	4 mA
DALI addresses	none
DALI-2 addresses	1

insulation data:

impulse voltage category	II
pollution degree	2
rated insulation voltage	250V
insulation DALI / housing	reinforced isolation
insulation test voltage DALI / housing	3000Vac

environmental conditions:

storing and transportation temperature	-20°C ... +75°C
operational ambient temperature	-20°C ... +50°C
rel. humidity, not condensing	15% ... 90%

general data:

dimensions (l x w x h)	82mm x 82mm x 8,5mm (details Figure 1 and Figure 2)
mounting	wall mounting or on conduit box (details Figure 4)
rated maximum temperature t_c	55°C
expected lifetime	200.000h
protection class	SKII (when used/installed as intended)
protection degree housing	IP40
protection degree terminals	IP20

terminals:

connector type	Push-In
wire size solid core	0,5 ... 1,5 mm ² (AWG20 ... AWG16)
wire size fine core	0,5 ... 1,5 mm ² (AWG20 ... AWG16)
wire size using wire end ferrule	0,25 ... 1 mm ²
stripping length	8,5 ... 9,5 mm / 0,33 ... 0,37 inch
release connector	push button

standards:

DALI	IEC62386-101:2014 IEC62386-103:2014
EMV	EN 61547 EN 50015 / IEC CISPR15
safety	EN 61347-2-11 EN 61347-1
Markings	DALI-2, CE

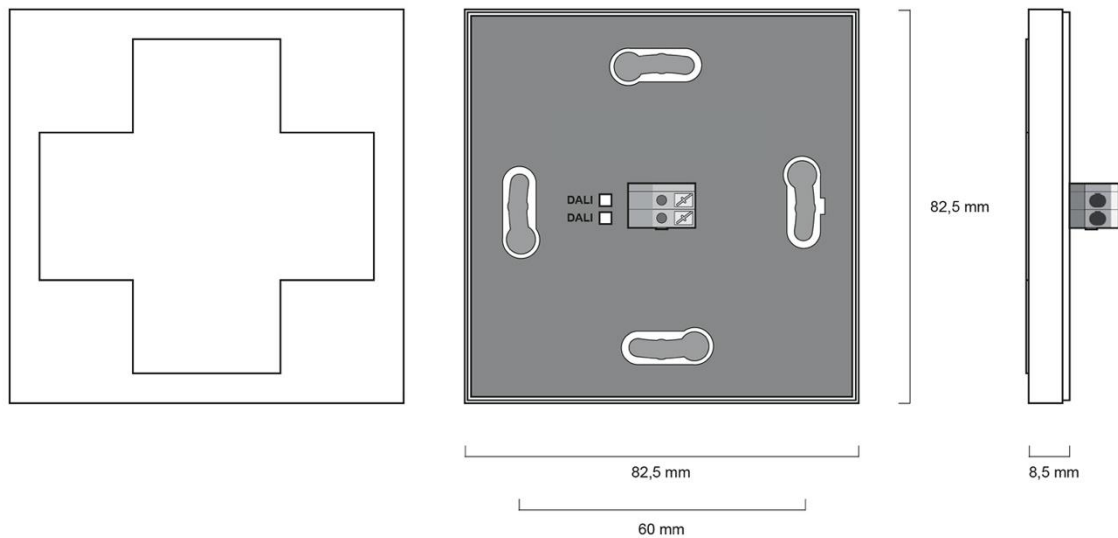


Figure 1: Dimensions DALI-2 Switch Cross

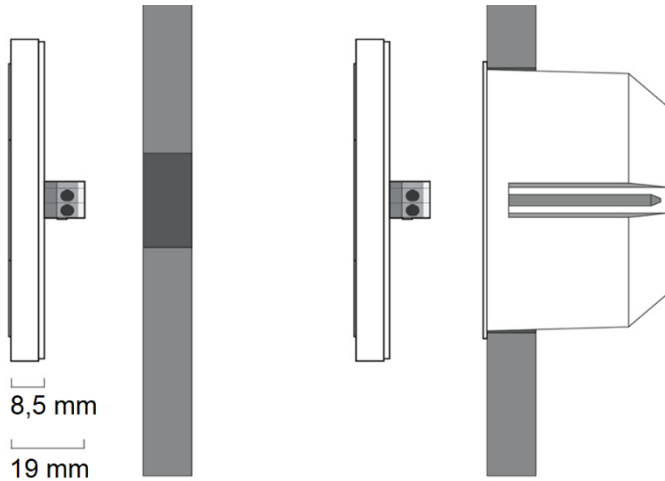


Figure 2: mounting cavity wall and conduit box

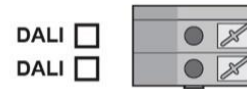
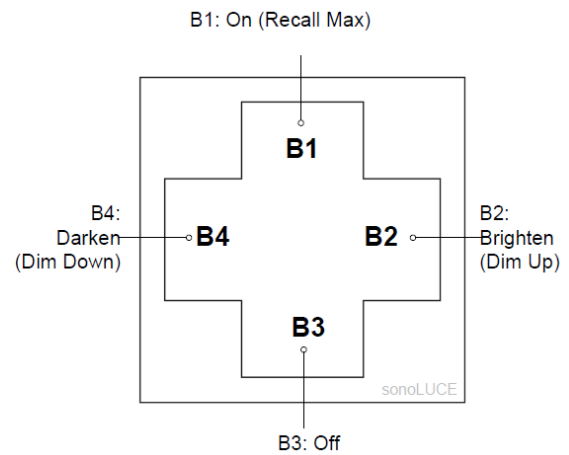


Figure 3: terminals

Factory Default Settings

A basic configuration is already implemented on delivery (factory default setting). If necessary, this can be changed and adapted.



Version Application controller: Art.Nr. 86459793-2-app

	input 1: B1	input 2: B2	input 3: B3	input 4: B4
application controller	active			
instances – event messages	inactive	inactive	inactive	inactive
effective range	Broadcast	Broadcast	Broadcast	Broadcast
button function	BF1	BF1	BF1	BF1
command X (CmdX)	RECALL MAX	UP	OFF	DOWN
command Y (CmdY)	--	--	--	--

Version Integration: Art.Nr. 86459793-2-int

	input 1: B1	input 2: B2	input 3: B3	input 4: B4
application controller	inactive			
instances – event messages	active	active	active	active
Event filter	short press, long press, repeat, stop, stuck			
Instancegroups	none			
Timer				
Short press			400 ms	
Double			-	
Repeat			160 ms	
Stuck			20 ms	

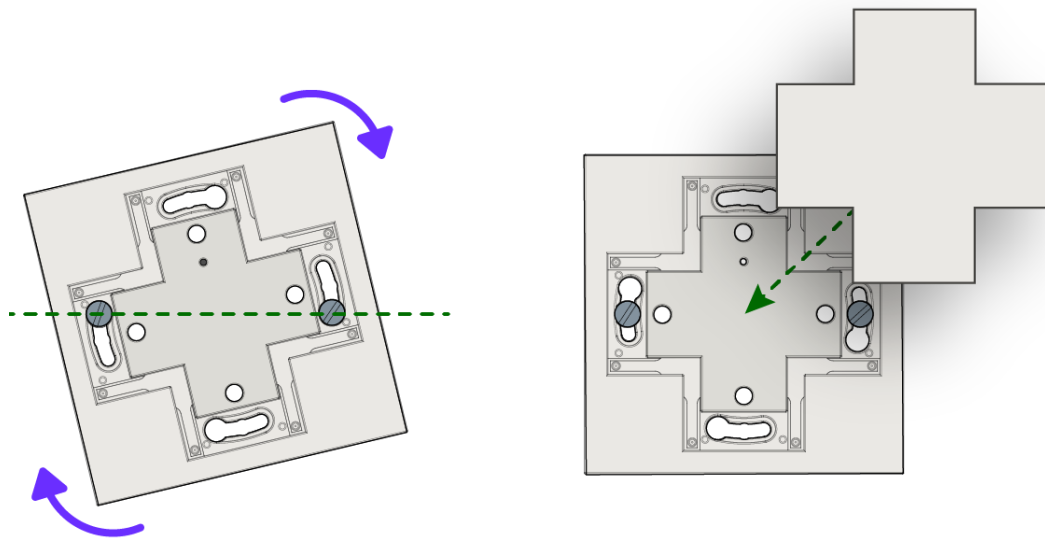




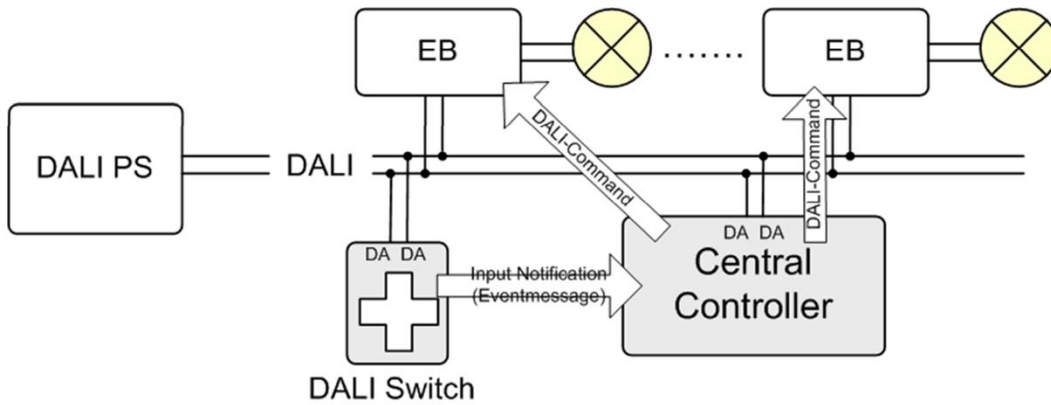
Figure 4: mounting with screws

1. attach with screws,
2. rotate until straight
3. place cross on top

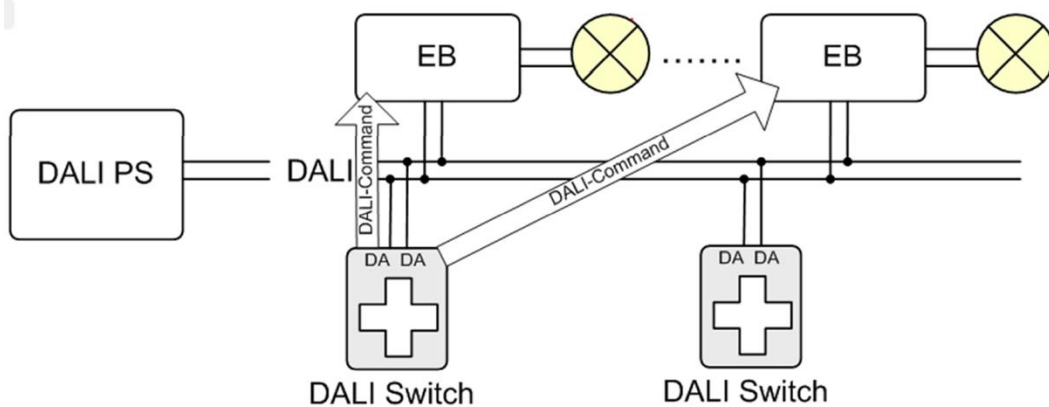
Installation

- The DALI Switch is intended for mounting on a flush mounted box or on a cavity wall.
 - The device is directly connected and supplied by the DALI bus. A general DALI bus power supply (e.g. DALI PS) is required.
 - The connection to the DALI terminals can be made regardless of polarity. The bus input is protected against overvoltage (mains voltage).
 - The wiring should be carried out as a permanent installation in a dry and clean environment.
 - Installation may only be carried out in a voltage-free state of the system and by qualified specialists.
 - National regulations for setting up electrical systems must be followed.
 - The DALI wiring can be realized with standard low-voltage installation material. No special cables are required.
 - Only 1 wire may be connected to each terminal. When using double wire end ferrules, the connection capacity of the terminal must be considered.
-  **Attention:** The DALI-signal is not classified as SELV circuit (Safety Extra Low Voltage). Therefore, the installation regulations for low voltage apply.
-  **Note:** The cross section: the voltage drop on the DALI line must not exceed 2V at maximum length (300m) and maximum bus load (250mA).

Typical Application



Application 1: integration in a system with central control unit, pushing buttons results in input notifications (event messages)



Application 2: direct control of luminaires

Set-Up

- After installation, the device can be operated with the factory settings (see page 5).
- Addressing and changes to the factory settings, such as setting the effective range and functions, are possible with the Software tool DALI Cockpit (Windows PC).
- DALI-2 Switch Cross NFC: Addressing and changes to the factory settings, such as setting the effective range and functions, are possible with the Software tool DALI Cockpit (Windows PC) and the Lunatone DALI NFC smartphone app.
- When using the [DALI Cockpit Software](#), the PC must be connected to the DALI bus via a suitable interface module ([DALI-2 USB](#); [DALI USB](#), [DALI-2 WLAN](#), [DALI-2 Display](#), [DALI-2 IoT](#), [DALI 4Net](#), [DALI SCI RS232](#)). The device is automatically recognised by the DALI

Cockpit during the addressing process and listed in the device overview. Effective range and desired functions can then be assigned to each input.

- The addressing is done according to the DALI-2 specification and the device receives a corresponding address.
- For localisation, a buzzer is integrated in each DALI-2 Switch Cross device. Alternatively, the allocation can also be done via the serial number of the device.
- Physical selection: At the end of the addressing process: By double-clicking the physical button , the DALI Cockpit

identifies and adds the input to the device list.

- Instance: Instance parameters can be configured according to IEC 62386-301.

Operation and function

The DALI-2 Switch Cross is a universal module to control DALI-compatible lights. The function of each push button input can be set individually.

As with other Lunatone control devices, the settings can be made with the DALI Cockpit Software tool. Figure 5 shows the general settings available in the DALI Cockpit.

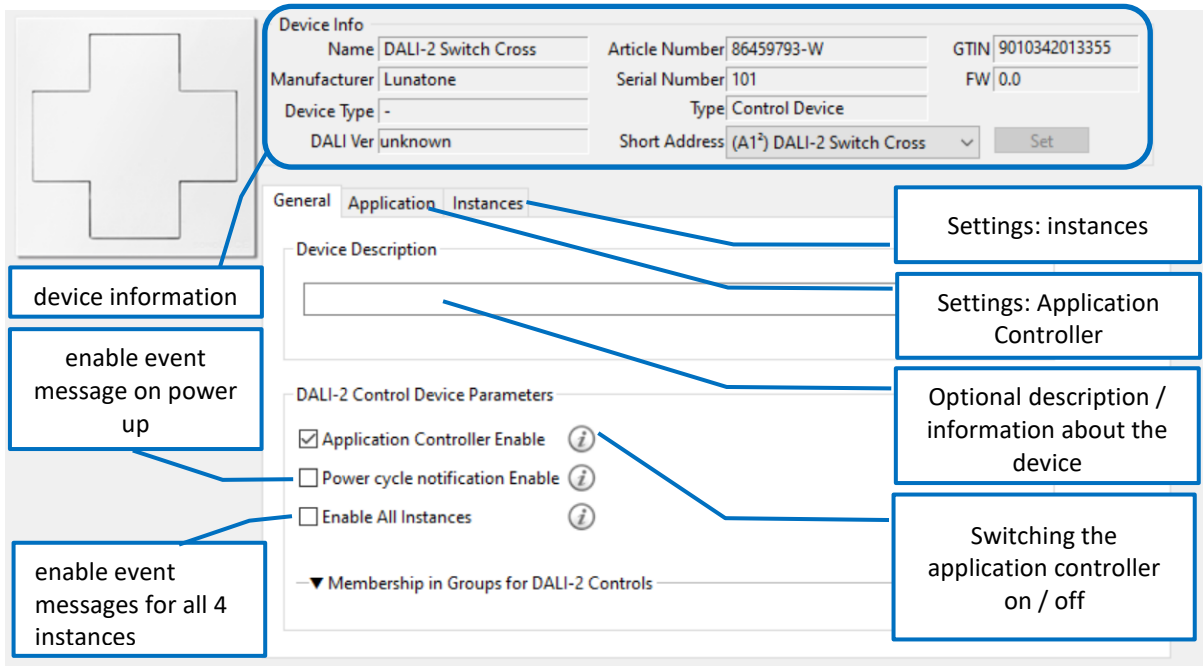


Figure 5: Cockpit General Settings

It is necessary to distinguish between application controller and DALI-2 instances.


The application controller gives direct DALI control commands that are immediately executed by the DALI drivers. Configuration of the application is described in the section "Application Controller - Configuration buttons 1-4" on page 9

The DALI-2 instances generate event messages that are interpreted and processed by higher-level control units (WAGO, Beckhoff, LUNATONE DALI-2 KNX gateway). (General information on the DALI-2 instance mode: [https://www.lunatone.com/wp-](https://www.lunatone.com/wp-content/uploads/2021/10/DALI-2_Instance-Guide_EN_M0024.pdf)

[content/uploads/2021/10/DALI-2_Instance-Guide_EN_M0024.pdf](https://www.lunatone.com/wp-content/uploads/2021/10/DALI-2_Instance-Guide_EN_M0024.pdf))

Configuration of the instances is described in section: "DALI-2 Instances" on page 14.

The Application controller and instances can be active at the same time.

 **Additional Information:** A deactivated Application Controller is indicated in the DALI Cockpit device tree with: **A**. A device with active instances is indicated with: **i**

Application Controller - Configuration buttons 1-4

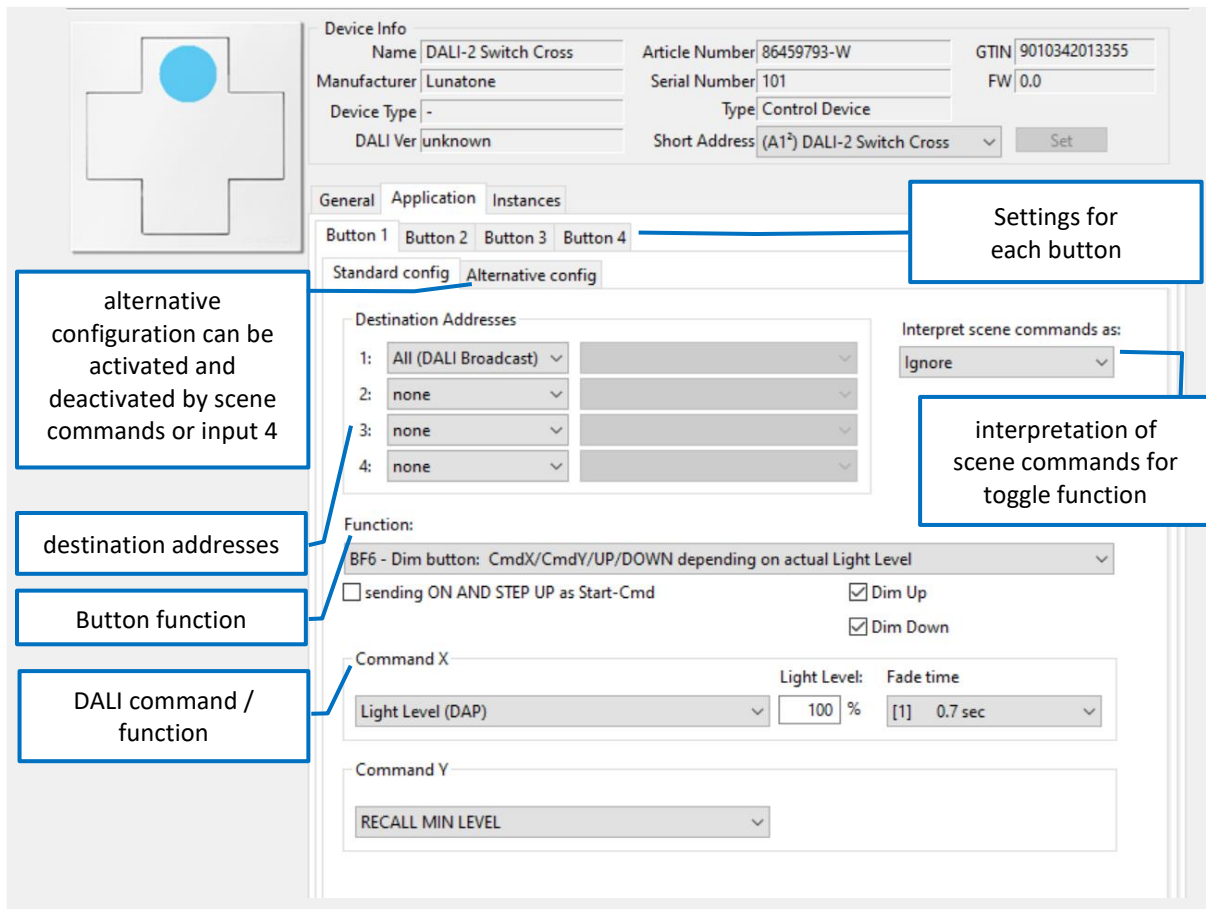


Figure 6: Cockpit Settings: Application Controller

Destination address / effective range

Here you can set which devices are affected by the button function. Possible destination addresses:

- Broadcast (an alle)
- DALI group (0 - 15)
- DALI single address (0 - 63)

Up to 4 different target addresses can be defined for each button input. When the button is pressed the target addresses 1 to 4 will be processed sequentially (see Figure 7)

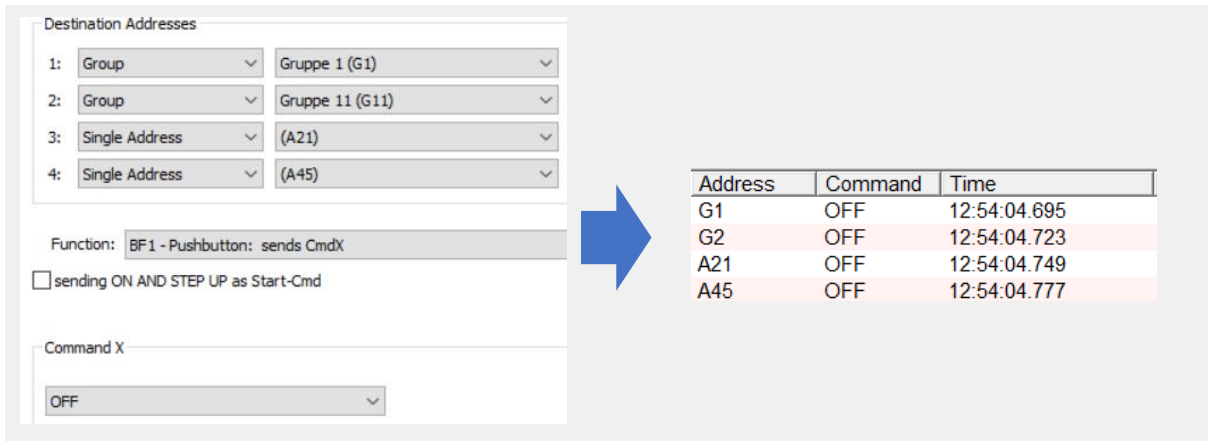


Figure 7: Example: Addressing Inputs 1-4 – sequentially processed

Button Function (BF)

Various "Button Functions" (BF) can be assigned to the individual buttons. The "Button Function" defines the behaviour of a button. A short or long press of the button can trigger different DALI commands. A toggle

function (switching between on and off) is also possible.

Key presses (short / long) are queried according to the following timing diagram and translated into internal signals (**key events**):

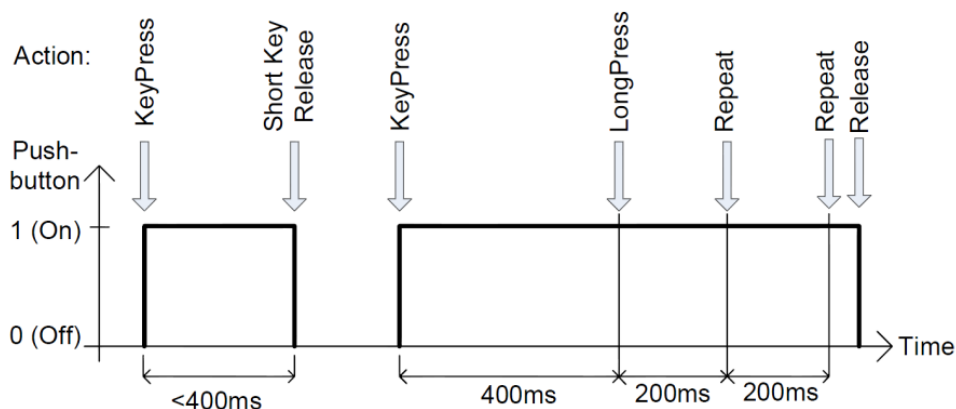


Figure 8: Key Events

The following table shows how the selected “Button Function” (lines 0 to 13) sends the commands **CmdX** and **CmdY** in connection with the “Key Events” (see figure 7). CmdX and CmdY refer to DALI commands.



Note: The DALI commands are transmitted to all assigned target addresses.

button function number	event: press	event: short press (release)	event: long press	event: extra-long press	event: repeat	function	typical application
0	-	-	-	-	-	-	-
1	CmdX	-	-	-	-	sends CmdX on key press	master off
2	CmdX	-	CmdY	-	-	sends CmdX on key press sends CmdY on long key press	switch to 2 different levels
3	-	CmdX	-	CmdY	-	sends CmdX on key press sends CmdY on extra-long key press	store level as scene
4	CmdX / CmdY toggle	-	-	-	-	sends alternating CmdX and CmdY on key press	toggle push button
5	CmdX / CmdY toggle	-	-	-	-	sends CmdX or CmdY on key press depending on bus status	changeover button
6	-	CmdX / CmdY toggle	UP / DOWN	-	UP / DOWN	sends CmdX or CmdY on short key press depending on bus status sends alternating UP or DOWN on long press and repeat	push and dim
7	CmdX CmdY on any release	-	-	-	-	sends CmdX on key press sends CmdY on key release (after any duration)	switch
8	CmdX / CmdY toggle CmdY / CmdX toggle on any release	-	-	-	-	sends CmdX or CmdY on key press depending on bus status sends CmdY or CmdX on key release (after any duration) depending on bus status	changeover switch
9	CmdX CmdY on delay	-	-	-	-	sends CmdX on key press sends CmdY after a programmable delay	staircase control
10	-	CmdX	CmdY	-	CmdY	sends CmdX on short key press sends CmdY on long key press sends CmdY on repeat	push and dim
11	CmdX	-	-	-	CmdY	sends CmdX on key press sends CmdY on repeat	push and dim
13	-	CmdX / CmdY toggle	-	-	WARMER / COOLER	sends CmdX or CmdY on short key press depending on bus status sends alternating WARMER or COOLER on repeat	tunable white dim

Table 1

Commands

The actual action (which function is triggered when pressing a button) is determined by the button function and command assigned to the button.

In most cases, an X command (CmdX) and also a Y command (CmdY) can be selected.

The following options are available: see Table 2.

Depending on the selected command, additional input fields might appear for further settings, see Figure 9.



Figure 9: Example for CmdX: DAP additional inputs: Light Level and Fade time

Predefined macros

Macros are predefined/ user defined command sequences that can be triggered by a single command.

The following macros are available, see Table 3.

Command number	Command name	action / function
no Nr.	DIRECT ARC POWER	direct arc power Level in %
0	OFF	off
1	UP	dim up (using fade rate)
2	DOWN	dim down (using fade rate)
3	STEP UP	increases light level by one increment
4	STEP DOWN	decreases light level by one increment
5	RECALL MAX	recalls MAX value
6	RECALL MIN	recalls MIN value
7	STEP DOWN AND OFF	decreases light level by one increment, if value at MIN switch off
8	ON AND STEP UP	increases light level by one increment, if OFF switch on
10	GOTO LAST ACTIVE LEVEL (DALI 2)	DALI-2-Cmd for switching on to the last active level (Memory-Function)
16-31	GO TO SCENE	go to scene 0-15

Table 2

Nr	Macro	Function
M1	Go Home	Light dims down to DAP 0 with predefined fade time, then fade time is set back to a programmable value
M2	Sequential Scenes	A list of the scenes can be defined; the scene is switched with each button press.
M3	Dynamic Scenes	A dynamic sequence of up to 16 scenes can be defined, including custom fade times and delays.
M4	Save actual light level as scene	When triggered the current level is saved in a scene (options: light level, RGB colour value, WAF colour value or colour temperature).
M5	User Defined Cmd-List	A user-defined macro script with up to 19 commands is executed. (delay up to 3h from firmware 5.0 on)
M6	TC cooler	Activates the DT8 mode and sends the command "COOLER" 3 times.
M7	TC warmer	Activates the DT8 mode and sends the command "WARMER" 3 times.
M8	Send RGB +	Activates the DT8 mode and sends an ascending RGB color table value.
M9	Send RGB -	Activates the DT8 mode and sends a descending RGB color table value.
M10	Delayed Off	Sends a DAP level and after a delay the OFF command. DAP level and delay are user defined.

Table 3

Alternative configuration

An alternative/second configuration can be made for each button. All previously explained configuration options and settings are available.

Activate / deactivate the "Alternative Configuration"

- **"Disabled"**: the function is switched off, there is only the standard configuration

- **"Activation by Scene Commands"**: scenes can be selected which will activate / deactivate the alternative configuration
 - activate**: the selected scene commands to the effective range of the standard configuration activate the alternative configuration
 - deactivate**: the selected scene commands to the effective range of the standard configuration and the effective range of the alternative configuration deactivate the alternative configuration

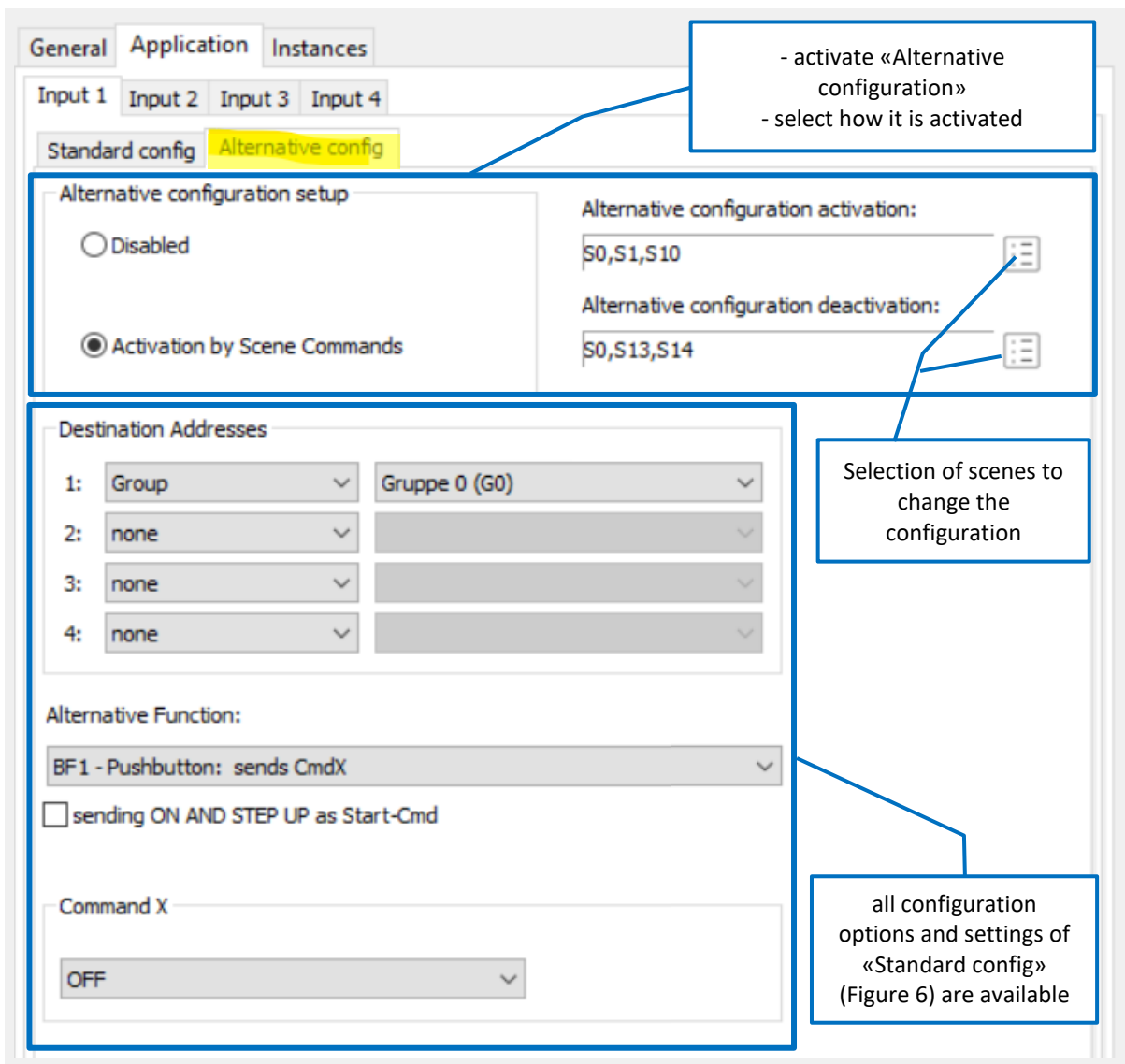


Figure 10: Cockpit Settings: Alternative Configuration

Interpretation of scene commands when using toggle function

In order to correctly trigger the on and off commands with the toggle function, scene calls must be interpreted correctly. It is possible to set whether a scene should be interpreted as Off or On

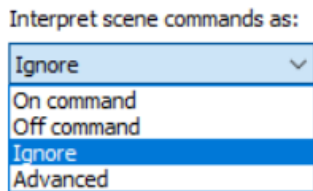


Figure 11.: Scene Interpretation

Behaviour on power-up

The behaviour when the device starts up can be defined for each input. The following settings are possible:

- No action: (the device starts and only sends commands when triggered by the input)
- Sending a scene or OFF command with or

DALI-2 Instances

In this operating mode DALI-2 event messages for DALI-2 compatible central control systems are sent, instead of standard DALI control commands.

The DALI-2 Switch Cross supports 4 instances of type 1 (IEC62386-301, Input Devices - Push Button), which are assigned to the 4 buttons.

instance 0	button 1
instance 1	button 2
instance 2	button 3
instance 3	button 4

As defined in the standard, the following events are supported and sent on the DALI bus as INPUT NOTIFICATIONS, see Table 4.

Event name	Event Information	Description
Button released	00 0000 0000b	The button is released
Button pressed	00 0000 0001b	The button is pressed
Short press	00 0000 0010b	The button is pressed and released, without being pressed quickly again (in case of double press enabled), or the button is pressed and quickly released (in case double press is disabled)
Double press	00 0000 0101b	The button is pressed and released, quickly followed by another button press
Long press start	00 0000 1001b	The button is pressed without releasing it
Long press repeat	00 0000 1011b	Following a long press start condition the button is still pressed, the event occurs at regular intervals as long as the condition holds
Long press stop	00 0000 1100b	Following a long press start condition, the button is released
Button free	00 0000 1110b	The button has been stuck and is now released
Button stuck	00 0000 1111b	The button has been pressed for a very long time and is assumed stuck.

Table 4

Which events are sent can be determined using the event filter.

Further parameters of the instances 0-3 are: event filter and event timer settings (short timer, double timer, repeat timer, stuck timer), which can be configured via the DALI Cockpit Software, see Figure 12.

Instances can be queried using Query Input Value. Pushbutton instances return the following values in response to a query:

button free	0x00	button not pressed / switch open
button pressed	0xFF	Button pressed / switch closed

The screenshot shows the 'Instance Settings' configuration page for a DALI-2 Switch Cross. The interface includes several sections:

- Device Info:** Name (DALI-2 Switch Cross), Manufacturer (Lunatone), Device Type (-), DALI Ver (unknown).
- Instances:** A dropdown menu for selecting an instance (Instance 0 is selected).
- Instance type:** Set to 'Push button'.
- Enable Instance:** A checkbox to enable the instance.
- Primary Group:** Set to 'none'.
- Group 1:** Set to 'none'.
- Group 2:** Set to 'none'.
- Event scheme:** Set to 'Instance addressing'.
- Event Filters:** A list of checkboxes for event types: Button released, Button pressed, Short press (checked), Double press, Long press Start (checked), Long press Repeat (checked), Long press Stop (checked), and Button stuck/free (checked).
- Timers:** Sliders and input fields for 'Short' (400 ms), 'Double' (- ms), 'Repeat' (160 ms), and 'Stuck' (20 s).

Callouts in the image provide additional context:

- Selection of the pushbutton instance / input for configuration:** instance 0: button 1, instance 1: button 2, instance 2: button 3, instance 3: button 4. The settings shown below apply to the selected instance (input).
- Enable event messages for the instance:** Points to the 'Enable Instance' checkbox.
- Event address information:** Points to the 'Event scheme' dropdown.
- Timer settings:** Points to the 'Timers' section.
- Event filter, depending on the selection, events are sent for the respective events:** Points to the 'Event Filters' section.

Figure 12: DALI Cockpit: Instance Settings

NFC-Version

(Article number 86459793-__-NFC)



DALI-2 Switch Cross NFC includes a nearfield communication interface. This allows additional configuration over the NFC interface with a smartphone app.

- The DALI-2 Switch Cross NFC does not have to be connected to a DALI power supply for configuration with NFC, it is supplied directly via NFC.
- The functions required to operate the application controller can be configured with the Lunatone DALI NFC App.
- Easy to use smartphone app for quick configuration in the field as well as preparation before installation.
- Fast transfer and copying of device settings

App Download:

The Lunatone "DALI NFC" app is available for Android devices on the Play Store.



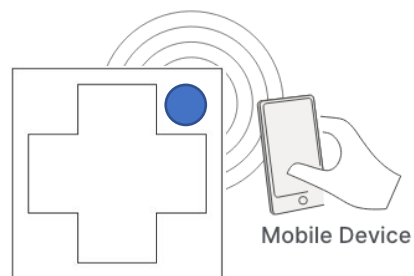
Connect:

- Switch on the NFC function and start the "DALI NFC" app.
- This is followed by the request to pair an "NFC-enabled device".
- As soon as the DALI-2 Switch Cross NFC is within range (indicated by signal tone / vibration) the device is automatically read out and shown on the display.



Figure 13

It is important that the NFC antennas of the two devices are as close as possible to each other. The NFC antenna of the DALI-2 Switch Cross NFC is located in the top right corner of the device.



For Information on the NFC interface of your smartphone please check the instructions of the device manufacturer.

Lunatone DALI NFC App

The configuration options are the same as in the DALI Cockpit, see section "Operation and function" Figure 6.

device information

device address

Device settings of the 4 buttons

selection which button (input 0 - 3) should be configured

Destination addresses

selection of button function behaviour

DALI Kommando / Funktion

"Save to device": parameters are saved on the device

← **Dali Switch Cross white** ⋮

Dali Switch Cross white
[set description](#)
 Firmware V1.2
<http://www.lunatone.com>
[Datasheet](#)
 Article Nr. 86459793-W
 Serial Nr. 578437695701910276

Addressing
 Address **none**
 Control Device Groups **none**

Device Settings




Input 0	1	2	3
Destination Address			
1: all (DALI Broadcast)	▼		
2: none		▼	
3: none			▼
4: none			▼
Function			
BF6: DIM BUTTON - CmdX/CmdY/UP/DOWN depending on light level			▼
<input type="checkbox"/> dim up			
<input type="checkbox"/> dim down			
CmdX (On Command)			
RECALL MAX LEVEL			▼
CmdY (Off Command)			
OFF			▼

SAVE TO DEVICE

👉 Macros and instances cannot be set via NFC.

Figure 14

Purchase Information

-  pure white - RAL 9010
-  traffic white - RAL 9016
-  black – RAL 9005

Art. Nr. 86459793-W-2-app
DALI-2 Switch Cross
 white RAL9010
 GTIN 9010342010248
 factory default settings: app controller activated

Art. Nr. 86459793-W16-2-app
DALI-2 Switch Cross
 white RAL9016
 GTIN 901034201023
 factory default settings: app controller activated

Art. Nr. 86459793-B-2-app
DALI-2 Switch Cross
 black
 GTIN 9010342010217
 factory default settings: app controller activated

Version Integration:

Art. Nr. 86459793-W-2-int
DALI-2 Switch Cross Integration
 white RAL9010
 GTIN 9010342010248
 factory default settings: instances activated

Art. Nr. 86459793-W16-2-int
DALI-2 Switch Cross Integration
 white RAL9016
 GTIN 901034201023
 factory default settings: instances activated

Art. Nr. 86459793-B-2-int
DALI-2 Switch Cross Integration
 black
 GTIN 9010342010217
 factory default settings: instances activated

Version NFC:

Art. Nr. 86459793-W-NFC
DALI-2 Switch Cross NFC
 white RAL9010
 GTIN 9010342010248
 factory default settings: app controller activated

Art. Nr. 86459793-W16-NFC
DALI-2 Switch Cross NFC
 white RAL9016
 GTIN 901034201023
 factory default settings: app controller activated

Art. Nr. 86459793-B-NFC
DALI-2 Switch Cross NFC
 black
 GTIN 9010342010217
 factory default settings: app controller activated

Accessories / Cross inlay:

Cross with custom symbols
 Art. No. 86459793-Z00
 GTIN: 9010342010248

Cross with dim symbols
 Art. No. 86459793-Z01
 GTIN: 9010342010255



Cross with Dim and blind icons
 Art. No. 86459793-Z02
 GTIN: 9010342010262



Additional Information and Equipment

DALI Cockpit - free configuration software for DALI systems

<https://www.lunatone.com/en/product/dali-cockpit/>

Lunatone DALI products

<https://www.lunatone.com/en>

Lunatone Datasheets and Manuals

<https://www.lunatone.com/en/download-s-a-z/>

Lunatone DALI NFC App

<https://play.google.com/store/apps/details?id=com.lunatone.dalinf&hl=de>



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Disclaimer

Subject to change. Information provided without guarantee. The datasheet refers to the current delivery.

The function in installations with other devices must be tested for compatibility in advance.