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**
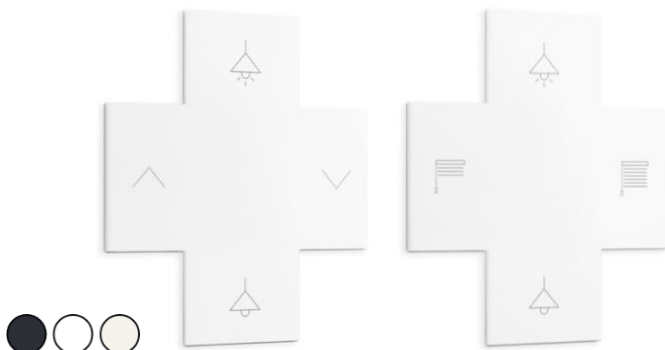factory default setting **app-controller** activated

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

- New: Alternative button function: 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)	1,7 mA
max. current consumption DALI (22,5V)	2 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 Fig. 1 and Fig. 2)
mounting	wall mounting or on conduit box (details Fig. 4)
rated maximum temperature tc	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:

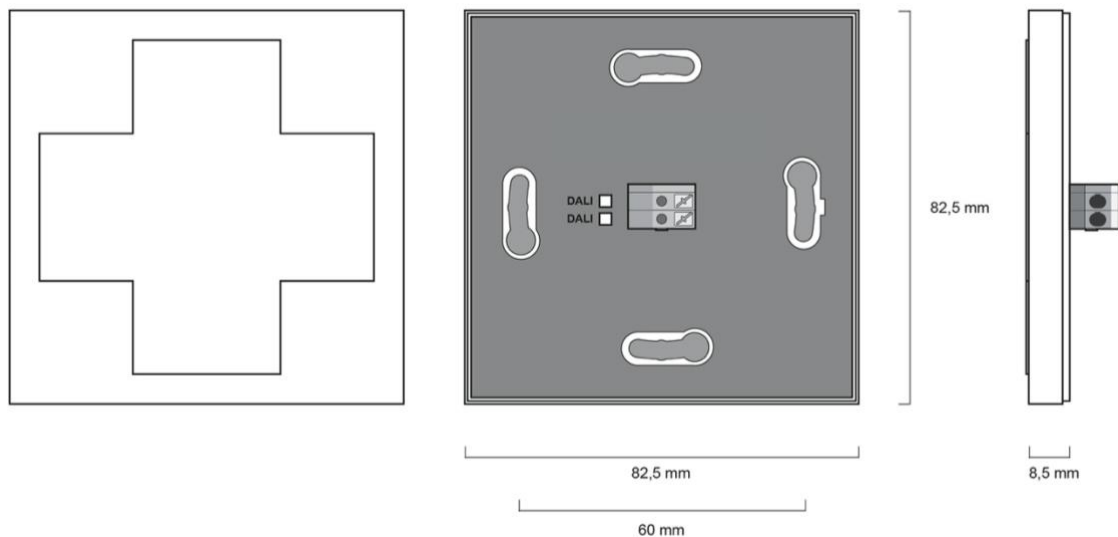|	
DALI	IEC62386-101:2014 IEC62386-103:2014
EMV	EN 61547 EN 50015 / IEC CISPR15
safety	EN 61347-2-11 EN 61347-1
Markings	DALI-2, CE

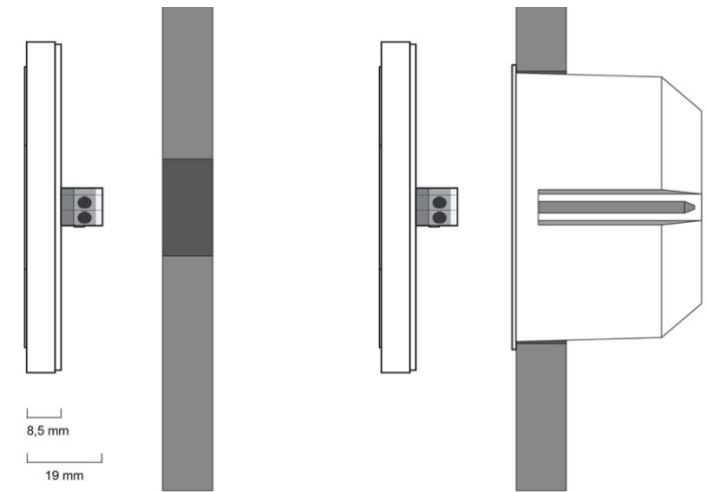Figure 1: Dimensions DALI-2 Switch Cross

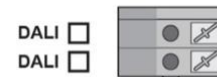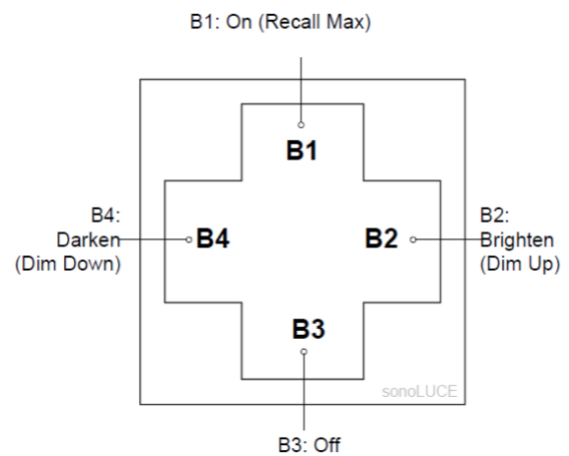Figure 2: mounting cavity wall and conduit box

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			
incstances – 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

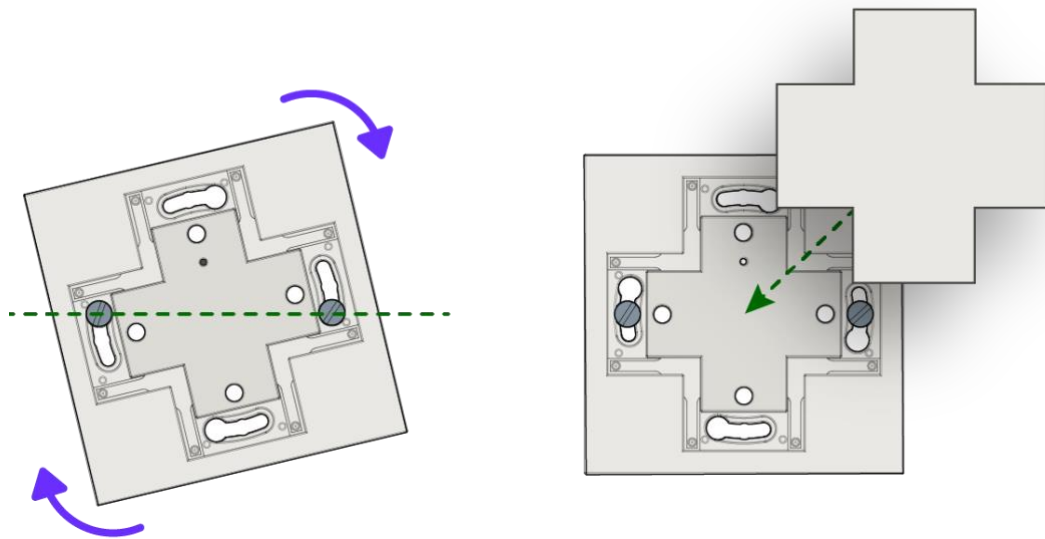|	input 1: B1	input 2: B2	input 3: B3	input 4: B4
application controller	inactive			
incstances – event messages	active	active	active	active
effective range	--	--	--	--
button function	--	--	--	--
command X (CmdX)	--	--	--	--
command Y (CmdY)	--	--	--	--

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).

Standard Application
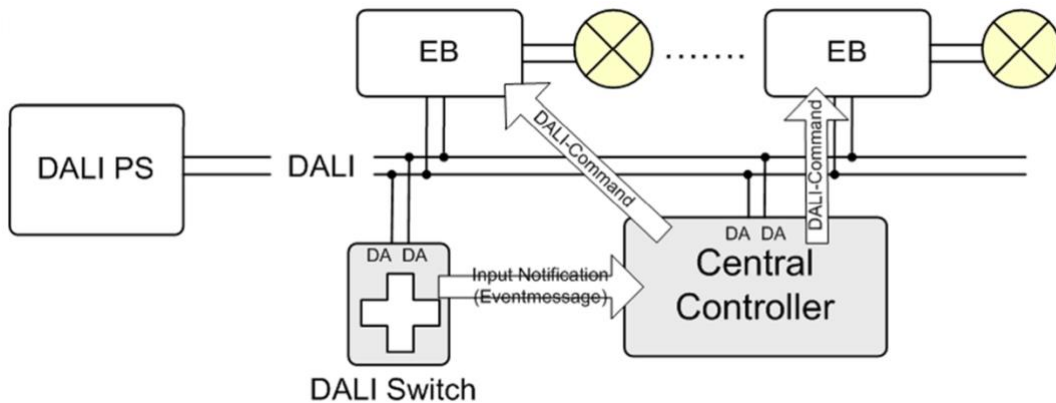
Application 1: integration in a system with central control unit, pushing buttons results in input notifications (event messages)
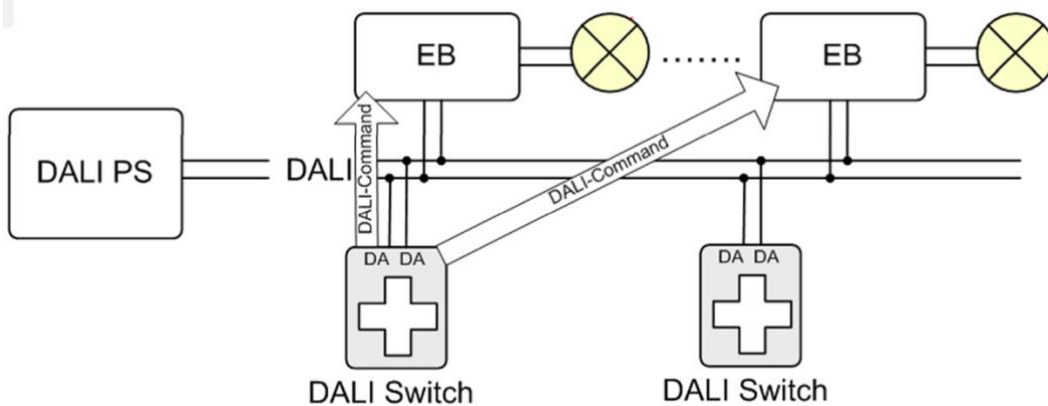
Application 2: direct control of luminaires

Set-Up

- After installation, the device can already be operated with the factory settings (Preset1); broadcasts switching and dimming.

- 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 USB, DALI 4Net, DALI SCI RS232). The DALI-2 Switch Cross is automatically

recognized 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 button.

- 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.

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.
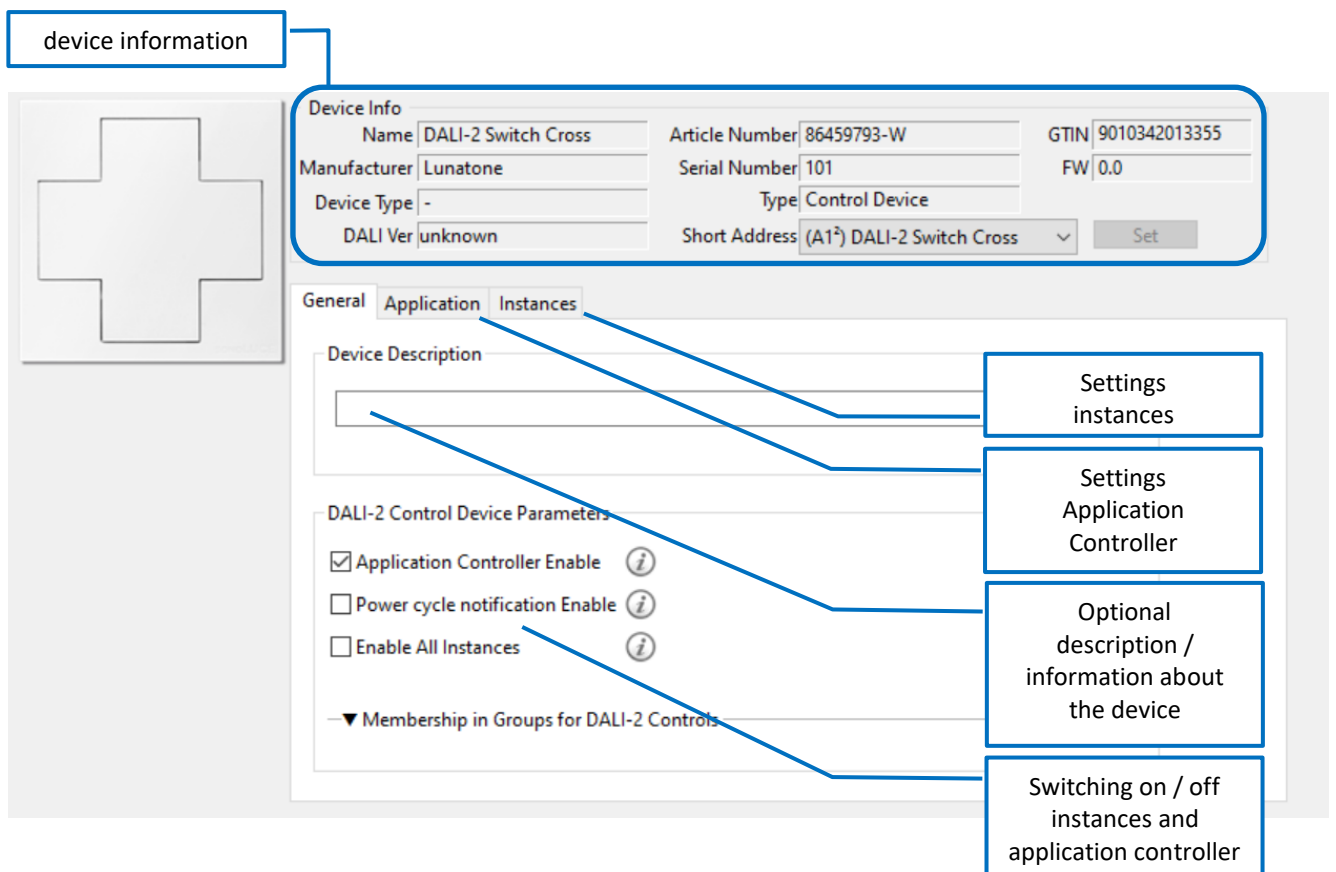

Figure 4: Cockpit General Settings

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.

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/en/dali-2-factsheet/ section: DALI-2 Instancemode)
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: Ⓐ.
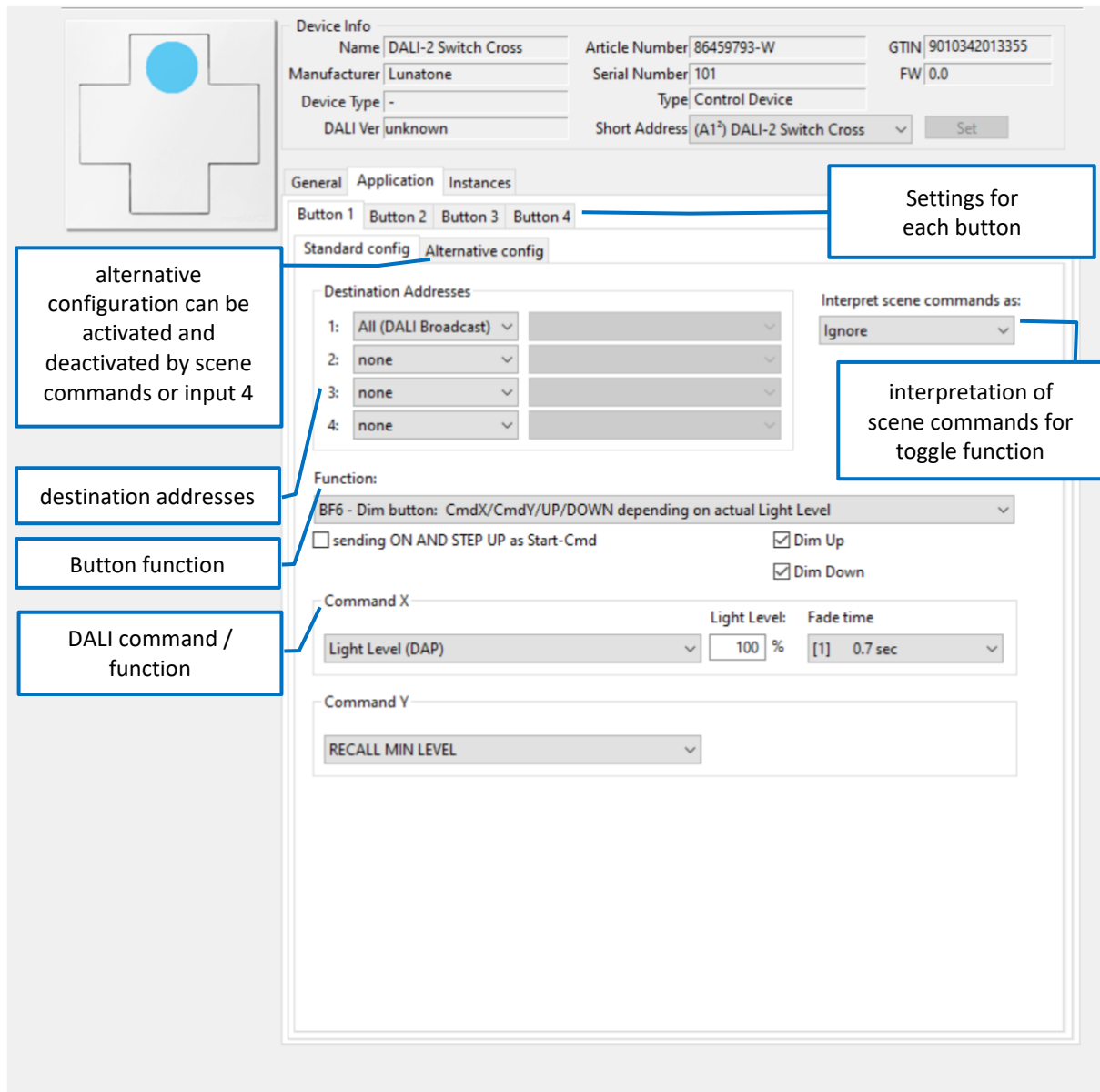A device with active instances is indicated with: ⓘ

Figure 5: Cockpit Settings: Application Controller

Application Controller - Configuration buttons 1-4

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. 6)
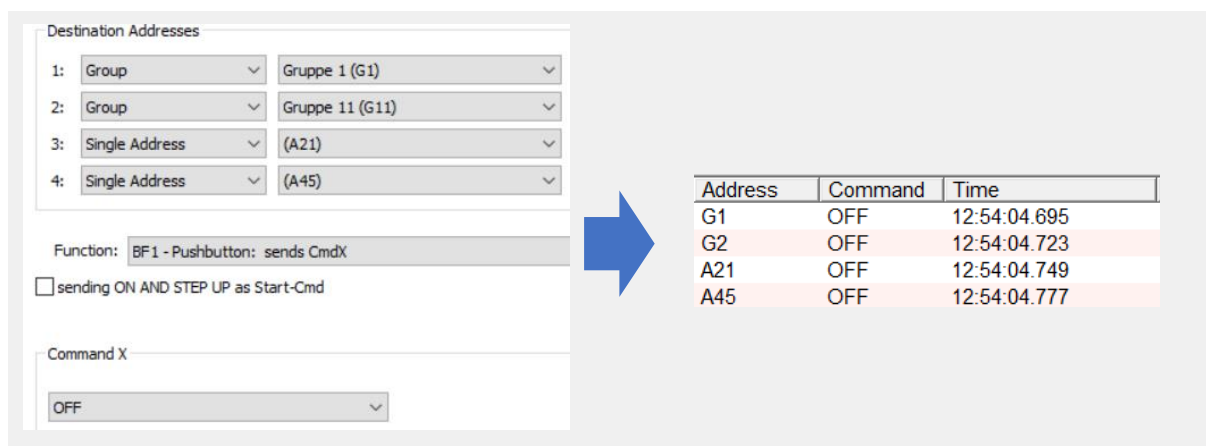

Figure 6: Example: Addressing Inputs 1-4 – sequentially processed

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**):
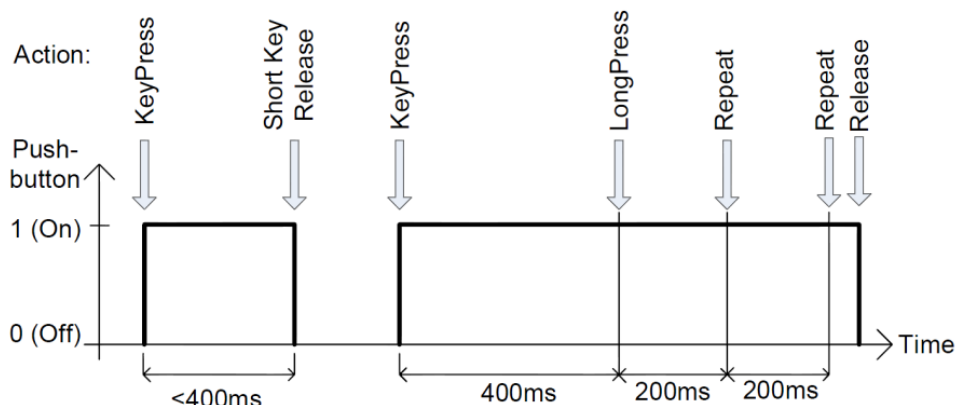

Figure 7: Key Events

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:

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

Depending on the selected command, additional input fields might appear for further settings:
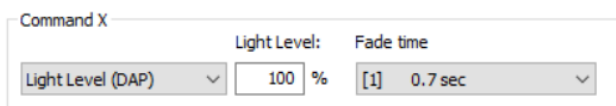

Figure 8: Example for CmdX: DAP additional inputs: Light Level and Fade time

Predefined macros

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

The following macros are available:

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.
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

New: Alternative configuration

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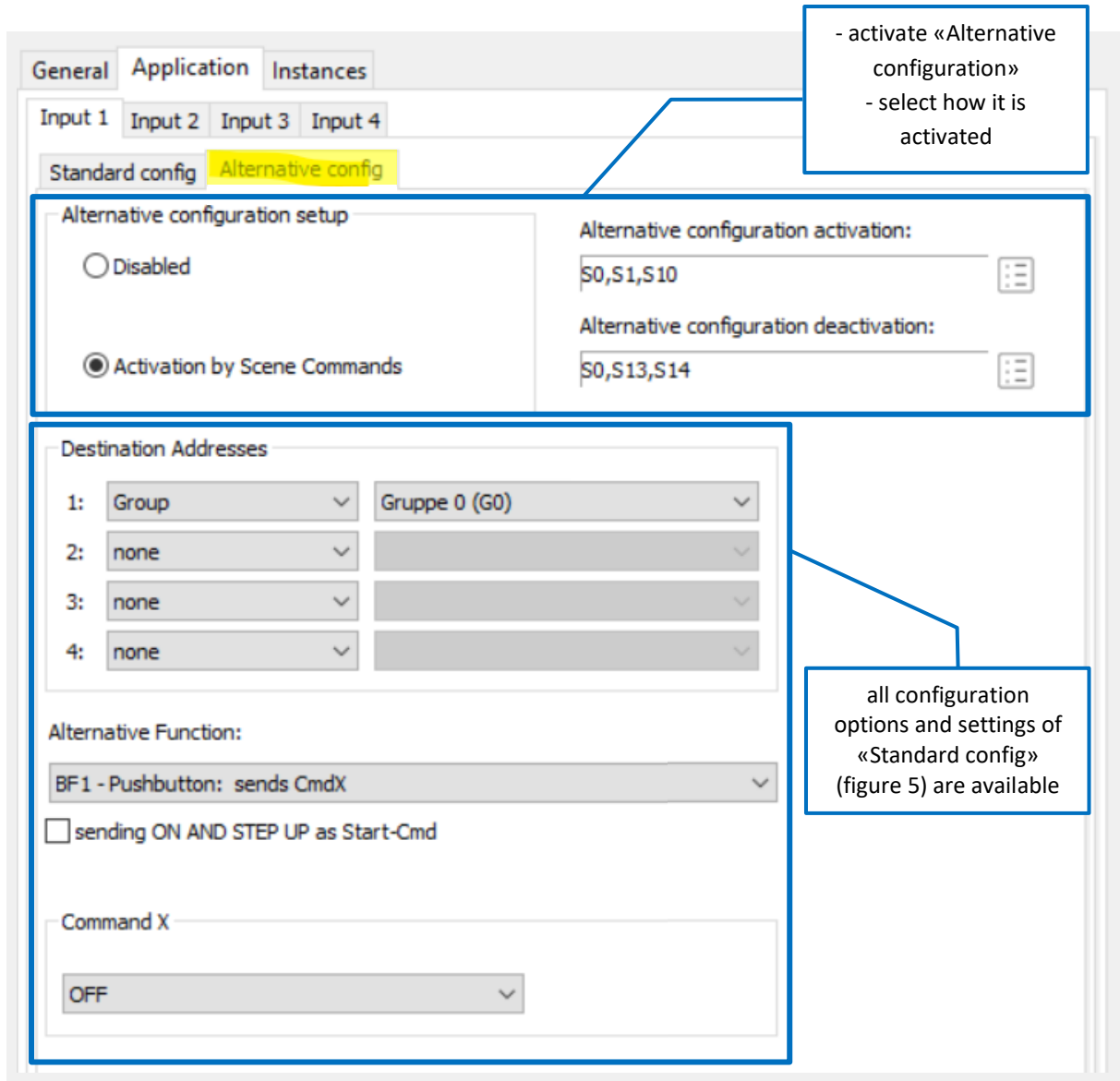are available.

Figure 9 Cockpit Settings: Alternative Configuration

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

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
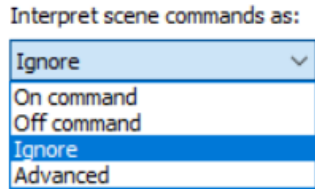

Figrue.10.: Scene Interpretation

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. As defined in the standard, the following events are supported and sent on the DALI bus as INPUT NOTIFICATIONs:

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

Further parameters of the instances 0-3 are: event filter, event timer settings (short timer, double timer, repeat timer, stuck timer), which can be configured via the DALI Cockpit Software.
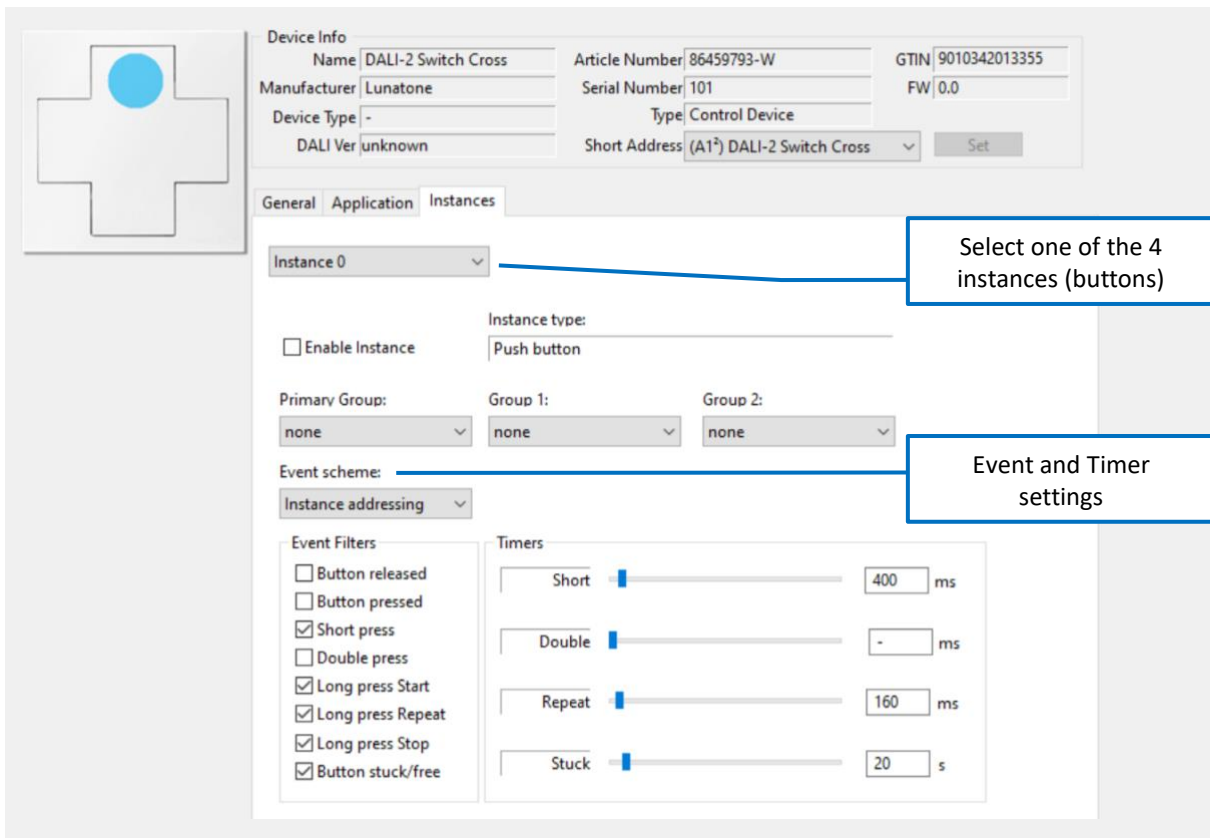
Figure 11: Cockpit: Instance Settings

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 12

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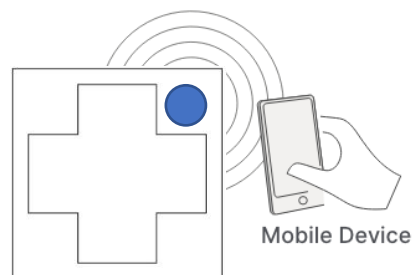
☞ For Information on the NFC interface of your smartphone please check the instructions of the device manufacturer.

Lunatone DALI NFC App

The configuration options are the same as in the DALI Cockpit, see section "Operation and function" figure 5.

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

☞ Macros and instances cannot be set via NFC.

Figure 13

Purchase Information

◯ RAL 9010
◯ RAL 9016
⬤ schwarz

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

Lunatone

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/downloads-a-z/

Lunatone DALI NFC App
https://play.google.com/store/apps/details?id=com.lunatone.dalinfc&hl=de

Contact

Technical Support:
support@lunatone.com

Requests: sales@lunatone.com

www.lunatone.com

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.