Lunatone

DALI-2 MC4L POTI

Datasheet
Multi Control Device

DALI control module with four programmable switching inputs for mains voltage and four potentiometers for control of light levels

Art. Nr. 86458507-4L-POTI

ON/OFF

DIM

DALI-2 MC4L POTI Control Device

Overview

- DALI-2 control module with 4 switching inputs for mains voltage

- 4 Potentiometers - push and rotational buttons for setting the light level – ON/OFF and dimming

- LED light indication of active inputs

- DIN rail mounting

- Supplied by the DALI bus

- galvanic isolation between switching input and DALI-line

- Multi-master capable: Several modules can be installed within a DALI circuit.

- Different DALI commands, destination addresses and switching modes can be assigned to each input

- 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

- Suitable for push-buttons, as well as switches

- 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 realised.

- Easy configuration via Lunatone DALI USB interface and DALI-Cockpit Software Tool.

- DALI-2 control unit according to IEC62386-103

Specification, Characteristics

Type	DALI-2 MC4L POTI
article number	86458507-4L-POTI

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)	3.9 mA
DALI addresses	none
DALI-2 addresses	1

Input: LT1, LT2, LT3, LT4, N

Input type	switching input
number of inputs	4
marking input terminals	LT1, LT2, LT3, LT4, N
input voltage range	230Vac
tolerance of input voltage	+20%/-25%
frequency of a.c. voltage	50Hz … 60Hz
control impulse length min.	40ms
control impulse length for long press	>500ms
input resistance	660kΩ
wire length max.	10m (up to 50m in an interference-free environment i.e. no parallel power lines)
max. voltage between inputs	230Vac

insulation data:

|	
impulse voltage category	II
pollution degree	2
rated insulation voltage	250V
rated impulse withstanding voltage	4kV
insulation DALI / mains	reinforced isolation
insulation test voltage DALI / mains	3000Vac

environmental conditions:

storing and transportation temperature	-20°C … +75°C
operational ambient temperature	-20°C … +60°C
rel. humidity, not condensing	15% … 90%

general data

dimensions (l x w x h)	98mm x 17,5mm x 56mm
mounting	DIN rail, built-in
rated maximum temperature tc	75°C
expected life time	50.000h
protection class	SKII (when used/installed as intended)
protection degree housing	IP40

protection degree terminals	IP20

terminals

connection type	screw terminal
wire size: solid core	0,5 … 2,5 mm² (AWG20 … AWG14)
wire size: fine wired	0,5 … 2,5 mm² (AWG20 …AWG14)
wire size: using wire end ferrule	0,25 … 1,5 mm²
stripping length	7 mm / 0,27 inch
tightening/ release of wire	screw
tightening torque	0,5Nm

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, UKCA

dimensions DALI-2 MC4L POTI

terminals
DALI-2 MC4L POTI
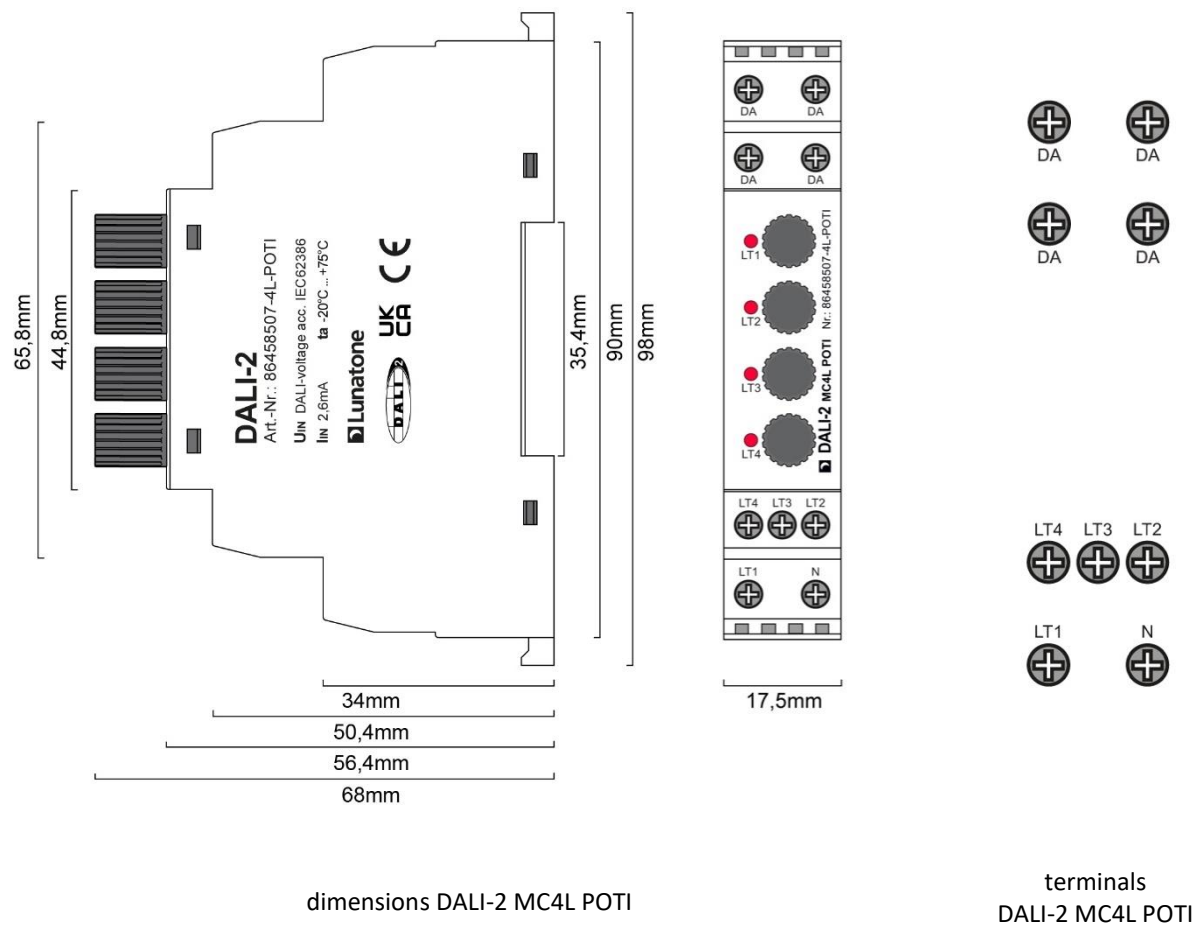
Factory Default Settings

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

|	input LT1	input LT2	input LT3	input LT4
application controller	active			
incstances – event messages	inactive	inactive	inactive	inactive
effective range	Broadcast	Group 0	Group 1	Group 2
button function	BF5 – Toggle	BF5 – Toggle	BF5 – Toggle	BF5 – Toggle
command X (CmdX)	Analog Input of Potentiometer	Analog Input of Potentiometer	Analog Input of Potentiometer	Analog Input of Potentiometer
fade time	fastest [0]	fastest [0]	fastest [0]	fastest [0]
command Y (CmdY)	OFF	OFF	OFF	OFF
command on power up	none	none	none	none
Potentiometer – direct feedback on turning	active	active	active	active
Potentiometer Min	1%	1%	1%	1%
Potentiometer Max	100%	100%	100%	100%

Typical Application
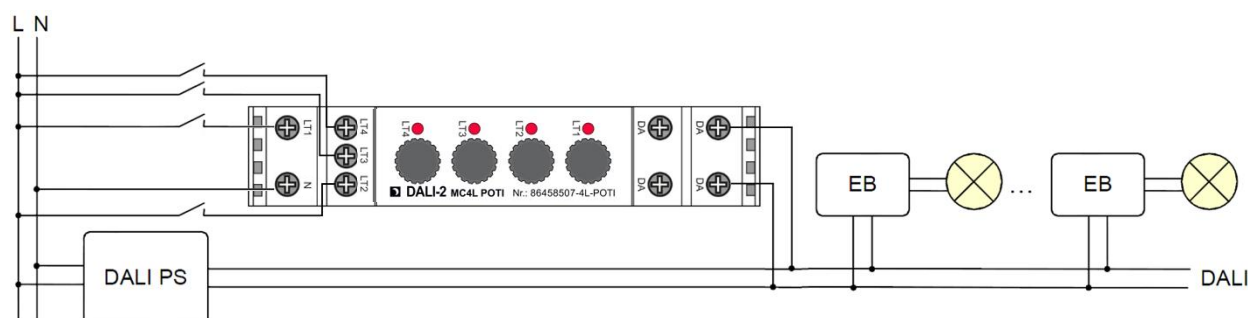
Figure 1 Typical Application, wiring diagram

Installation

- The DALI-2 MC4L POTI is suitable for DIN rail mounting, protection against electric shock has to be ensured by an appropriate enclosure

- The device is directly connected and supplied by the DALI bus. A DALI bus power supply (e.g. DALI PS) is required.

- Via the 4 potentiometers, the brightness of different effective areas can be adjusted. The 4 LEDs indicate which of the inputs LT1-LT4 are active.

- 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 realised 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.

- Switching inputs are intended for use with line voltage, they are galvanically separated from the DALI-line

☞ **Attention:** The DALI-signal is not classified as SELV circuit (Safety Extra Low Voltage). Therefore, the installation regulations for low voltage apply.

☞ The voltage drop on the DALI line must not exceed 2V at maximum length (300m) and maximum bus load (250mA).

Addressing and Configuration

- After installation, the device can already be used with the default factory settings. (see page 5). In the delivery state, the brightness can be set via the device's potentiometer.

- 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).

- 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 DALI-2 MC4L POTI 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.

- The LED on the DALI-2 MC4L POTI serve for localisation. 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 connections (T1 to T4 on the device) to the device list.

Operation and function

The DALI-2 MC4L POTI 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.

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 - Configure inputs LT1 - LT4" on page 8.

The DALI-2 instances generate event messages that are interpreted and processed by higher-level control units (WAGO, Beckhoff, …). (General information on the DALI-2 instance mode: https://www.lunatone.com/en/dali-2-factsheet/ section: DALI-2 Instancemode) Instance parameters can be configured according to IEC 62386-301, see section: "DALI-2 Instances" on page 13.

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**.
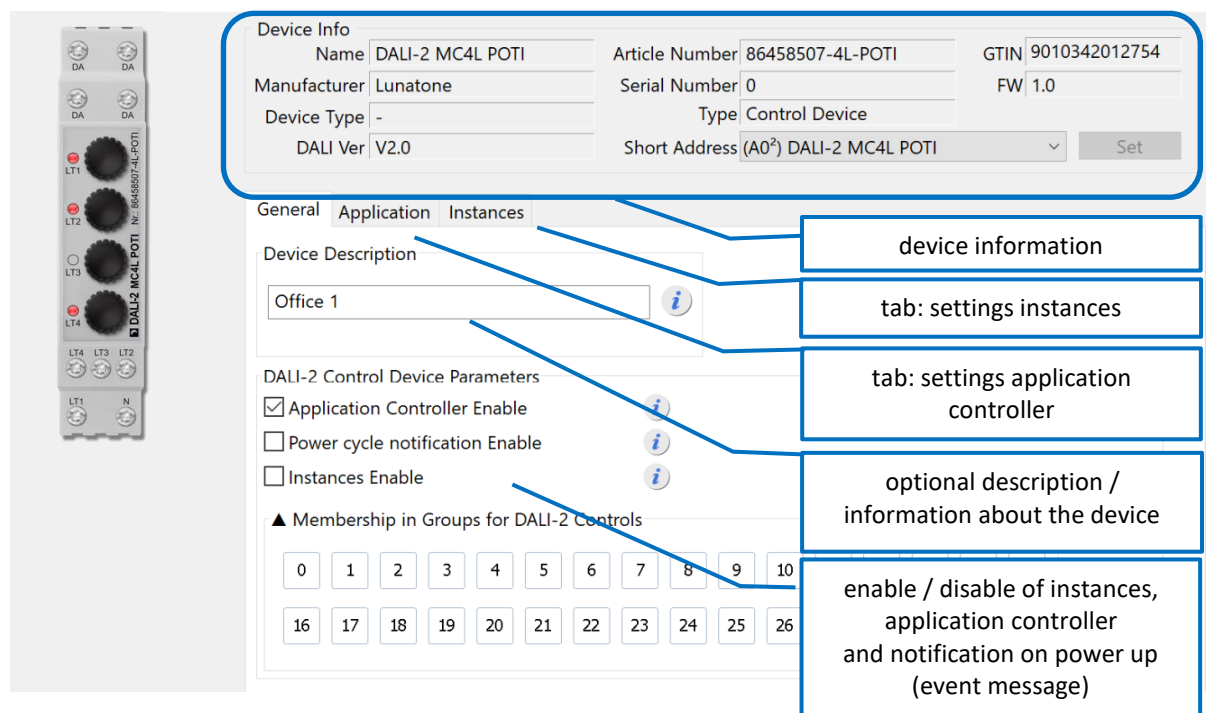A device with active instances is indicated with: **i**

Figure 2: General Settings

Labels in figure:
- device information
- tab: settings instances
- tab: settings application controller
- optional description / information about the device
- enable / disable of instances, application controller and notification on power up (event message)

Application Controller - Configure inputs LT1 - LT4

Figure 3: Application: 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 4*)
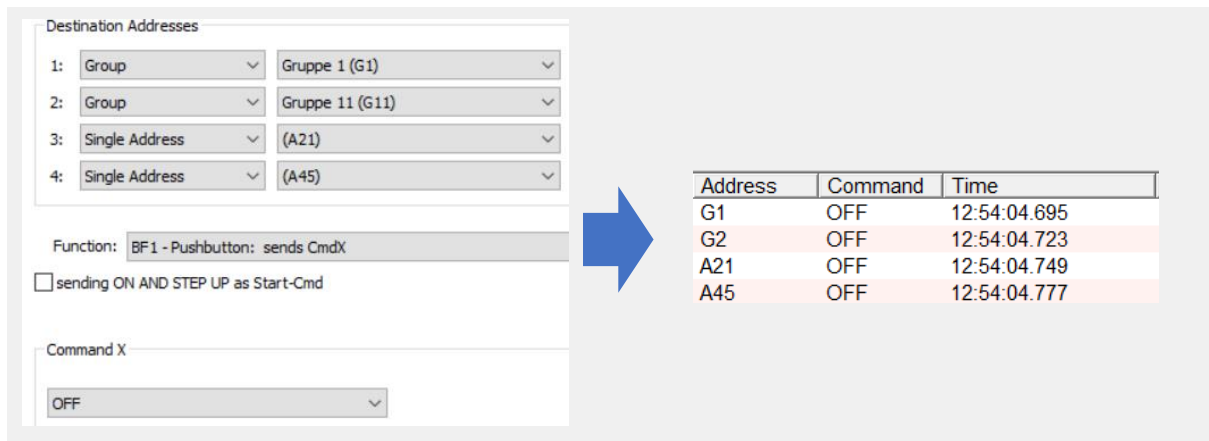
Figure 4: Example: Addressing Inputs 1-4 – sequentially processed

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**):
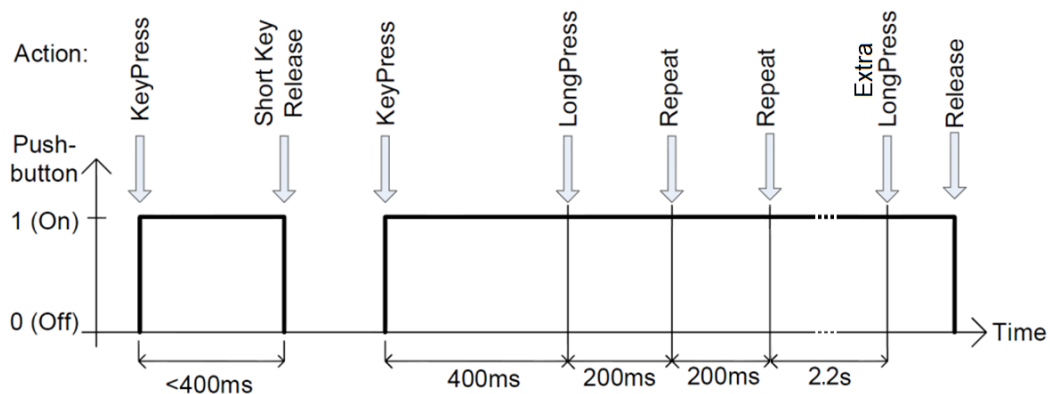

Figure 5: Key Events

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 5*). 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 Buttonfunctions

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 6*.

Figure 6: Example for CmdX: DAP additional inputs: Light Level and Fade

Predefined macros

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

The following macros are available, see *Table 3*.

Command number	Command name	action / function
no Nr.	DIRECT ARC POWER	direct arc power Level in %
no Nr.	Analog Input from potentiometer	specification of the light value via the corresponding potentiometer of the DALI-2 MC4L POTI
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 Commands

| Nr	Makro	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 Macros

M2: The selection "common scene list" allows the buttons (LT1-LT4) with M2 and this selection to continue switching the same scene list

M3, M5 and M10: From FW 5.0 on these macros can be configured to be stopped by a scene command or an Off command. When selected the Macros are always stopped on seeing a scene or Off-command sent broadcast, or to the first destination address.

Potentiometer
In addition to the standard options of each DALI-2 MC4L – with a DALI-2 MC4L POTI the light level can be controlled via the 4 potentiometers (push and turn knobs)
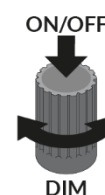
The CmdX or CmdY command can be defined. With the Potentiometer pushbutton the selected buttonfunction with the set CmdX and CmdY (for the respective input) are executed, as it would with a connected pushbutton.

The direct dimming of the light level when turning the potentiometer (Analog input from potentiometer) can be enabled or disabled. The dimming range of the potentiometer can be set via the analog input minimum and maximum value.

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 (Fig 8).
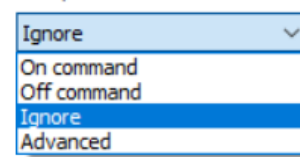
Figure 7

Behaviour on power-up

The behaviour when the device starts 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 configurable DALI command (light level, OFF, Max, Min, Scene, Go To Last Active Level)
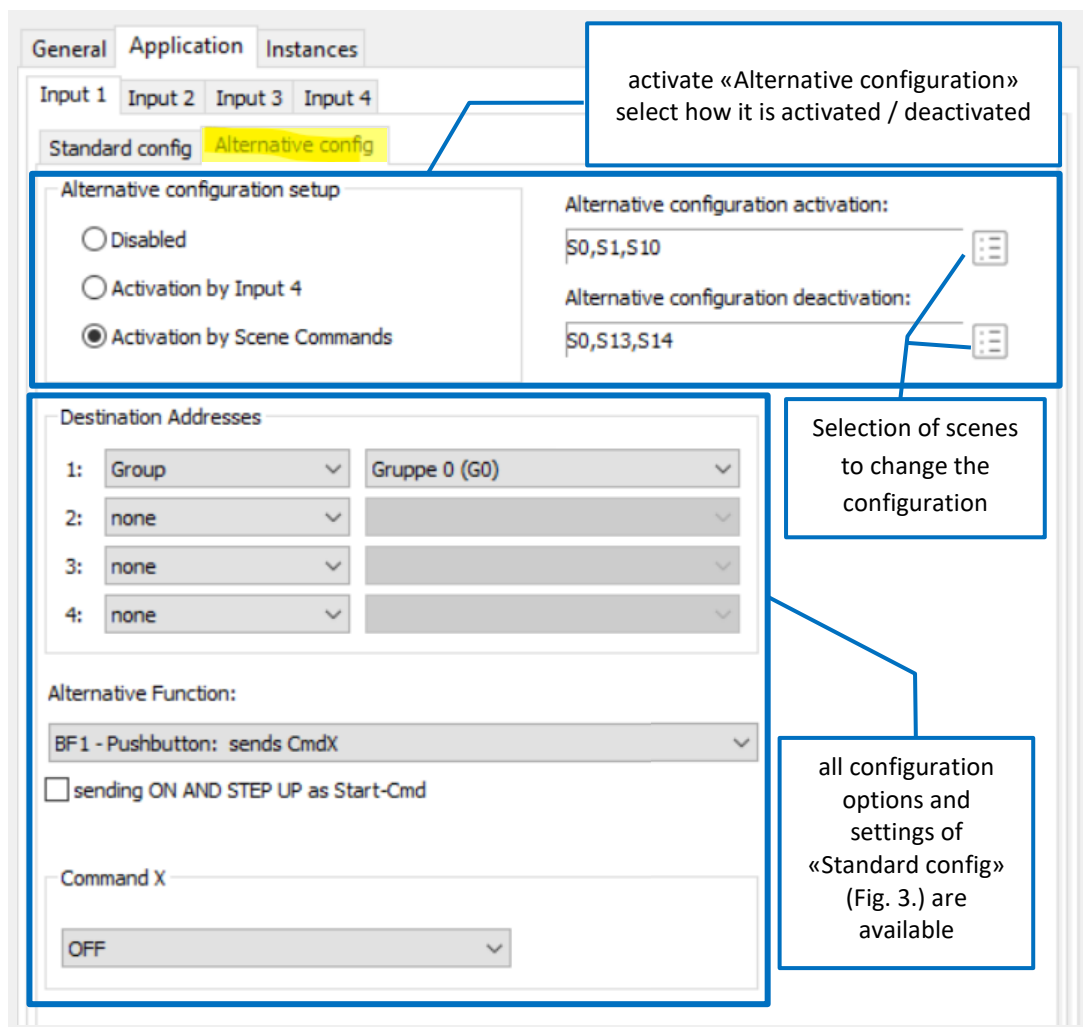
Figure 8: Settings for the alternative configuration

Alternative configuration

An alternative/second configuration can be made for each button, see *Figure 8*. All previously explained configuration options and settings are available, except for macros, which are not available for the alternative commands. The alternative configuration can be recalled with button input 4 or a scene command.

Activate / deactivate the "Alternative Configuration":

- **"Disabled":** the function is switched off, there is only the standard configuration
- **"Activation by Input 4":** the standard and alternative configuration are switched with a button connected to input 4.
- **"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 <u>and</u> the effective range of the alternative configuration deactivate the alternative configuration.

DALI-2 Instances

In this operating mode, no DALI control commands are sent on the bus, but DALI-2 event messages for DALI-2 compatible central control systems.
The DALI-2-MC4L supports 4 instances of type 1 (IEC62386-301, Input Devices - Push Button), which are assigned to the 4 button inputs as follows:

instance 0	input LT1
instance 1	input LT2
instance 2	input LT3
instance 3	input LT4

As defined in the standard, the following events are supported and sent on the DALI bus as INPUT NOTIFICATIONs, see *Table 4*. Which events are sent can be determined using the event filter.
Further parameters of the instances 1-4 are: event filter, event timer settings (short timer, double timer, repeat timer, stuck timer), which can be configured via the DALI Cockpit Software, see *Figure 9*.
With which origin/address information the events are sent is determined with the instance-scheme. General information on the DALI-2 instance mode and the instance types, event settings, event schemas etc. can be found in the instance guide:
https://www.lunatone.com/wp-content/uploads/2021/10/DALI-2_Instance-Guide_EN_M0024.pdf

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

| 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 of double press 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 Events
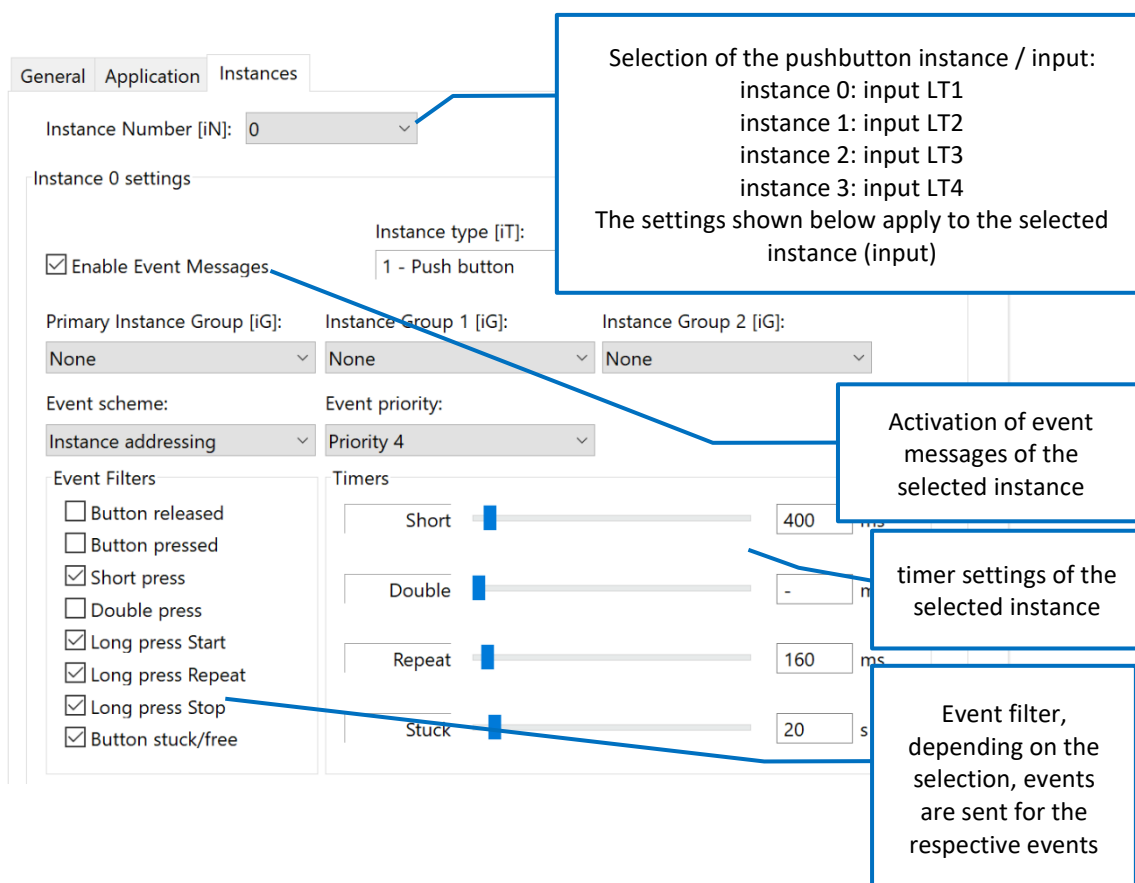
Figure 9: Instance Settings

Purchase Information

Art. Nr. 86458507-4L-POTI
DALI-2 MC4L with 4 potentiometers -
for DIN rail installation

Additional Information and Equipment

DALI-Cockpit – DALI system configuration tool, free when using a Lunatone interface device
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/

Contact

Technical Support:
support@lunatone.com

Requests: sales@lunatone.com

www.lunatone.com

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