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Lunatone

DALI-2 SCI RS232

Datasheet

DALI-2 - RS232 Interface

Communication interface between a PC (or PLC) and modules in a DALI lighting system

New: **L**unatone **U**niversal **B**uilding and **A**utomation Protocol
Art. Nr. 24166096-LU-HS

previous protocol:
Art. Nr. 22176438-HS

replaces: Art. Nr. 86458525 (DIN-Rail)
Art. Nr. 22176438 (DIN-Rail RJ45)
Art. Nr. 24166096 (Mouse)

DALI-2 SCI RS232 Interface

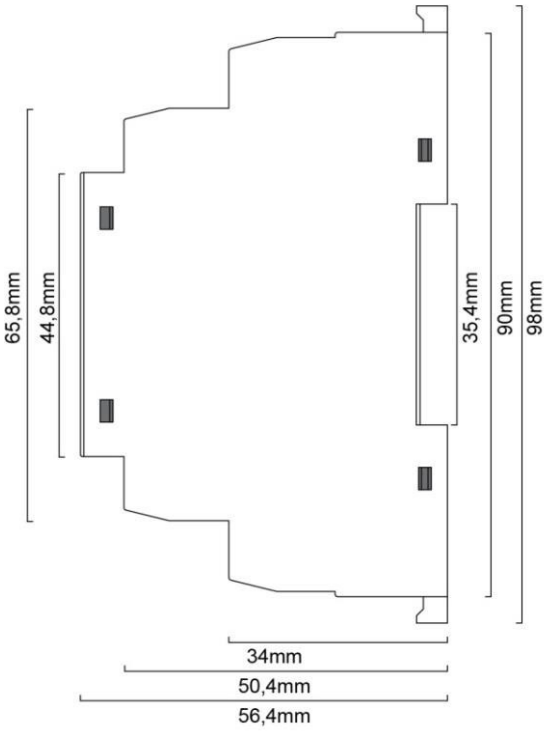
Overview

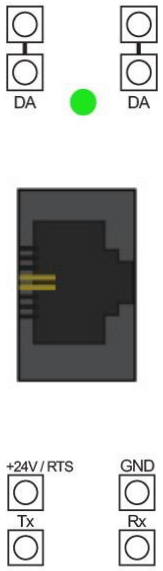
- Module with a serial interface to with components in a DALI-line via RS232
- A simple way to connect a PC or PLC to a DALI network.
- bidirectional data transfer
- Addressing, configuration, status monitoring
- collision detection
- Support for several proprietary DALI- protocol extensions.
- Electrical isolation
- No external power supply necessary; communicate the device is supplied via the DALI bus and the serial interface.
- Double DALI-terminals
- New version with LUBA Protocol: Art Nr.: 24166096-LU-HS
- Version with integrated 240mA bus requests and power supply: see datasheet for RS232-PS (Article Nr.: 24166096-PS)

Specification, Characteristics

type	**DALI-2 RS232**
article number	24166096-LU-HS 22176438-HS
electrical data:	
typ. current consumption DALI	10mA
max. current consumption DALI	10mA
RS232	38400Baud, 8databits, no parity, 1 stop bit (38400,8,n,1)
supply	6-24V DC
typ. supply current	5mA
max. start-up time	150ms
technical data:	
storage and transportation temperature	-20°C … +75°C
operational ambient temperature	-20°C … +75°C
protection code	IP20
connectors RS232	screw terminals (max. 2.5 mm^2) RJ45 female
connectors DALI	screw terminals, max. 2,5mm^2
dimensions	90mm x 17.5mm x 18mm
mounting	DIN rail

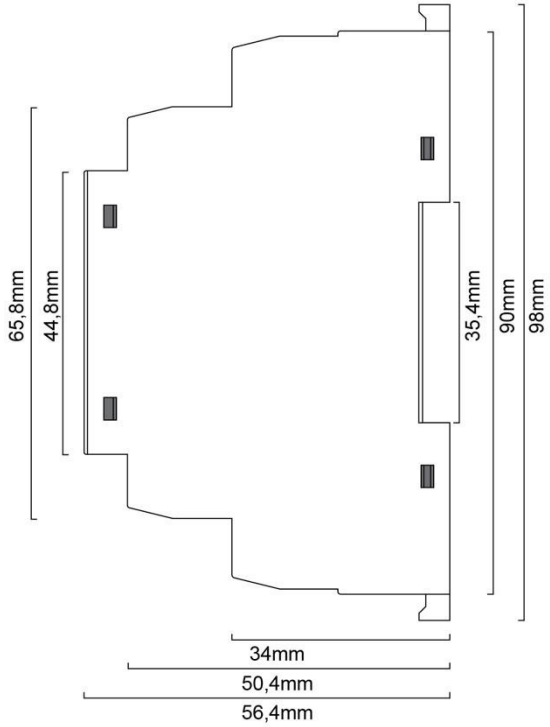
DALI-2 RS232, Datasheet ©2022-10-05





dimensions
Art. Nr. 22176438-HS

connection plan
Art. Nr. 22176438-HS



dimensions
Art. Nr. 24166096-LU-HS

connection plan
Art. Nr. 24166096-LU-HS

Connection, Installation

The DALI-2 SCI RS232 is connected to the DALI-line. A typical value for the current consumption is 10mA.

The connection to the DALI-line is polarity free. For easy installation, each DALI-terminal is executed as double clamp (linked contacts are marked on the housing).

With the test button on the device (Art.Nr.: 24166096-LU-HS) the wiring of the DALI system can be checked. Pressing the test button all luminaires connected to the DALI system will be controlled:

- Short press: the LED on the device is flashing and a test sequence (on, off, dimming) is started
- Long press: ON – 100%
- Second press: OFF and the test mode is ended

The DALI-line and the RS232 are electrically isolated.

RS232 can be accessed either via a RJ45 connector or via screw terminals. Beside the communication signals (RxD, TxD, GND) a supply is required (6V-24V, GND). Instead of connecting 24V the RTS-Pin of the RS232 connector can be used. A typical value of the current consumption is 5mA.

Installation with external 6V up to 24V supply, connected via screw terminals (SubD to RS232 of a PC) see Figure 1.

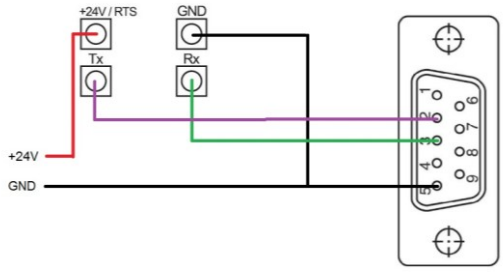


Figure 1 Installation with external supply (6V up to 24V)

Installation with supply via RTS pins see Figure 2 below.

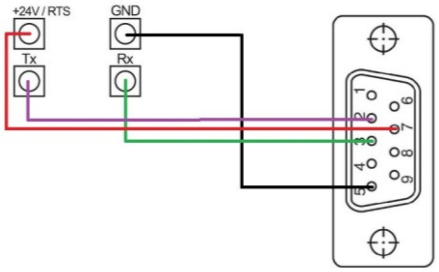
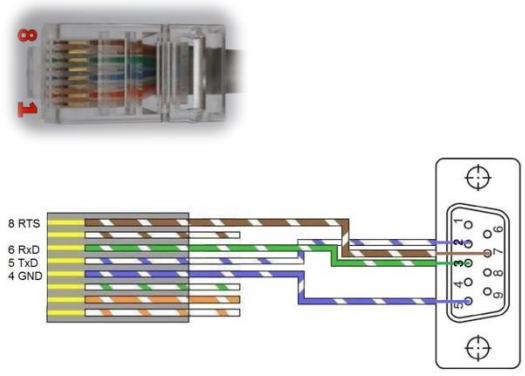


Figure 2 Installation with supply via RTS-Pin

For Connection from RJ45 -> SubD (for direct connection to the RS232 of a PC, supply via RTS-Pin) see Figure 3.



SubD	RJ45	Signal description
Pin5	Pin4	GND
Pin2	Pin5	TxD
Pin3	Pin6	RxD
Pin7	Pin8	RTS

Figure 3 Connection from RJ45 -> SubD

Interface Configuration

DALI-2 RS232, Datasheet © 2022-10-05

In order to ensure asynchronous communication with the interface the settings of the transmission channel should be configured as followed (38400,8,n,1).

transfer rate	38400 Baud
number of data bits	8
parity bit	no
stop bit	1

DALI Specifications and Operating Modes

The DALI-2 SCI RS232 supports the transmission of Standard DALI commands as well as several proprietary protocol extensions:

- standard DALI (16Bit)
- standard DALI (8Bit), backchannel
- standard DALI (24Bit, DALI-2) for control devices and event messages
- eDALI, special 25bit protocol (24bit data) - Tridonic
- different bit numbers: e.g. 17Bit (special DALI frame by Helvar)

The DALI-2 SCI RS232 offers sending and receiving of commands as well as the ability to monitor and observe the DALI-line communication. In monitoring mode each message will be transmitted to a PC if it corresponds to one of the supported protocols.

DALI Cockpit

With the free configuration and monitoring software for DALI systems, DALI- Cockpit, the full functionality of the DALI-2 SCI RS232 can be used without having to implement the transmission protocol yourself.

The new LUBA protocol and devices (Art. Nr. 24166096-LU-HS, Art. Nr. 24166096-LU-PS-DE and Art. Nr. 24166096-LU-PS-HS) are supported from DALI Cockpit Version: 1.38.60 and higher.

Alternatively, the data transfer can be processed by any program that supports the respective protocol.

Communication Protocol – new:

LUBA Protocol

Art. Nr. 24166096-**LU-HS**

An easy transmission protocol is implemented for communication with the DALI-2 RS232 interface, called LUBA Protocol (Lunatone universal Building and Automation Protocol).

Supported Commands

General DALI commands

- **Read/Write DALI Settings** – read and write of DALI settings
- **Read DALI Status** – read the DALI interface status
- **add DALI Frame to TX Buffer** – add DALI commands to the send buffer
- **add 16bit DALI Frame to TX Buffer** – add 16-bit DALI commands to the send buffer
- **add 24bit DALI Frame to TX Buffer** – add 24-bit DALI commands to the send buffer
- **add eDALI Frame to TX Buffer** – add eDALI commands to the send buffer

Commands for DALI addressing

- **Read Device List** – read the device list stored in the device
- **Device Search***)* – search for addressed devices
- **Addressing**– start DALI addressing (new installation or system extension)

- **Find Duplicates**– find devices with the same address
- **Delete Device**– delete the DALI address of a specific device

Special Commands

- **Read Device Types**– read DALI device types
- **Read/Write Memory Bank**– read or write memory bank entries
- **Fade to Level / Color**– Fade to a certain light level and / or colour value
- **Read / Store Scene**– read or write scene values

System commands

- **Query Device Info** – read out device information
- **Read/Write Device Name** – read or write name of the interface
- **Query Device Descriptor** – read device descriptor
- **Read / Write User Definable Memory** – read or write user definable memory
- **Makro Status –** Status Display of the commands created as macros and, if necessary, stop running macros. Read status of commands

A detailed description of the commands, their command numbers and structure can be found in the LUBA protocol description: https://www.lunatone.com/wpcontent/uploads/2021/04/LUBA_Protocol_EN. pdf

A Python example project can be downloaded here: www.lunatone.at/projects/LUBA/lubadevkit.zip

Communication Protocol previous protocol

Art. Nr. 22176438-HS

The communication protocol between PC and DALI-2 SCI is implemented as followed. Both forward and backward data frame between PC and interface consist of 5 bytes.

Forward frame (Command to DALI-2 SCI)

8bit	8bit	8bit	8bit	8bit
Control	**Data_HI**	**Data_MI**	**Data_LO**	**CheckSum**

- **Control**

bit7	**bit6**	**bit5**	**bit4**	**bit3**	**bit2**	**bit1**	**bit0**
ME	identify /nDALI	Echo	0	0	MS		

bit 7:	**monitor enable (ME)**	**1**: enable monitoring (if enabled all received DALI data will be transmitted to PC)
bit 6:	**identify /nDALI**	**1**: no data on DALI-line, communication only between PC and SCI2 **0**: DALI output enabled (data on DALI-line)
bit5:	**Echo**	**1**: immediate response (no wait for an answer from the DALI-system) **0**: Wait for DALI response (max. 10ms, if no DALI-answer within this period, “NO” will be sent)
bit4:	**Send Twice**	the command is a TWICE-command (thus to be sent 2x in 100ms)

Bit3-0:	**mode selection (MS)**	**0**: not used, reserved **1**: not used, reserved **2**: send DALI (8bit) in Data_LO **3**: send DALI (16bit), data in Data_MI, Data_LO **4**: send eDALI (24bit), data in Data_HI, Data_MI, Data_LO **5**: send DSI on DALI-line; 8 bit data in Data_LO, 16bit data in Data_MI, Data_LO **6**: Send 17bit DALI, 16bit in Data_MI, Data_LO; 17. bit in LSB of Data_HI (=last bit after DALI-frame)
		7: not used, reserved **8**: send DALI-2 24bit forward frame, data in Data_Hi, Data_MI, Data_LO **9-15** reserved

- **Data_HI, Data_MI, Data_LO**

The data are transmitted within these bytes. For detailed information check the selected mode (control byte, bit 3-0). Following, examples for mode 3, DALI 16bit:

To adjust brightness using a Direct Arc Power (DAP) command:

Data_LO: DAP value: 0-254 *Data_MI*: depending on the desired destination address:

	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
device address	0	address (0-63)						0
Group	1	0	0	group (0-15)				0
Broadcast	1	1	1	1	1	1	1	0
Broadcast unaddressed	1	1	1	1	1	1	0	0

To send a specific command:

Data_LO: value from the list:

Command	**dec**	**hex**
OFF	0	00
UP	1	01
DOWN	2	02
STEP UP	3	03
STEP DOWN	4	04
RECALL MAX	5	05
RECALL MIN	6	06
STEP DOWN and OFF	7	07
ON and STEP UP	8	08
enable DAP Sequence	9	09
GO TO LAST ACTIVE LEVEL	10	0A
GO TO SCENE 0	16	10
GO TO SCENE 1	17	11
…	…	…
GO TO SCENE 15	31	1F
RESET	32	20
REMOVE Address FROM SCENE 0	80	50
REMOVE Address FROM SCENE 1	81	51
…	…	…
REMOVE Address FROM SCENE 15	95	5F
ADD Address TO GROUP 0	96	60
ADD Address TO GROUP 1	97	61
…	…	…
ADD Address TO GROUP 15	111	6F
REMOVE Address FROM GROUP 0	112	70
REMOVE Address FROM GROUP 1	113	71
…	…	…
REMOVE Address FROM GROUP 15	127	7F

Data_HI: depending on the desired destination address:

	7	**6**	**5**	**4**	**3**	**2**	**1**	**0**
device address	0	address (0-63)						1
Group	1	0	0	group (0-15)				1
Broadcast	1	1	1	1	1	1	1	1
Broadcast unaddressed	1	1	1	1	1	1	0	1

- **CheckSum**

XOR-ing the previously submitted 4 bytes.

Backward frame (Response from DALI-2 SCI)

8bit	8bit	8bit	8bit	8bit
Status	**Data_HI**	**Data_MI**	**Data_LO**	**CheckSum**

- **Status**

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
identifier				0	status		

bit 7-4:	**identifier**	**6**: DALI-2 SCI ID
bit 3-0:	**status**	**0**: OK **1**: DALI answer "NO" **2**: DALI 8bit in Data_LO **3**: DALI 16bit in Data_MI, Data_LO **4**: eDALI 25bit in Data_HI, Data_MI, Data_LO **5**: DSI on DALI data (8bit if Data_MI=0; else 16bit in Data_MI, Data_LO) **6**: 17bit DALI (16bit in Data_MI, Data_LO, 17. bit in Data_HI **7**: error: checksum: data=1; DALI-Bus short circuit: data=2; DALI receive error: data=3 unknown command: data=4
		Collision detected: data=5 (received command with higher priority) **8**: DALI2 24Bit in Data_HI, Data_MI, Data_LO **9-15**: not used

- **Data and CheckSum**

Data_HI, Data_MI, Data_LO and CheckSum comply with the rules of the forward frame.

DALI-2-RS232 RS232 to DALI Interface, previous protocol DIN Rail Module

Version with bus power supply:

Art. Nr. 24166096-PS
DALI-2-RS232-PS240mA,
RS232 to DALI Interface with integrated Bus power supply 240mA

Datasheet:
https://www.lunatone.com/wpcontent/uploads/2020/06/24166096-PSHS_DALI_RS232_PS_EN_D0046.pdf

We recommend checking the backward frame anyway to ensure that the DALI-2 SCI has processed the DALI command and is ready to receive a new one. The DALI-2 SCI does not have a buffer for commands.

Please note that DALI-2 24bit forward frames, sending TWICE-commands and detailed info about errors in backward frame is only supported by the most recent DALI-2 certified version. In older version the corresponding bits and functions are not used.

Purchase Information

Art. Nr.: 24166096-LU-HS
DALI-2-RS232
RS232 to DALI Interface,
LUBA protocol
DIN Rail Module

Art. Nr.: 22176438-HS

Additional Information and Equipment

LUBA -Protocol description:
https://www.lunatone.com/wpcontent/uploads/2021/04/LUBA_Protocol_EN.pdf

DALI-Cockpit – free Software for DALI system configuration and DALI line traffic monitoring.
https://www.lunatone.com/en/product/dalicockpit/

Lunatone DALI products
https://www.lunatone.com/en/

Lunatone datasheets, manuals and software
https://www.lunatone.com/en/downloads-a-z/

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