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)

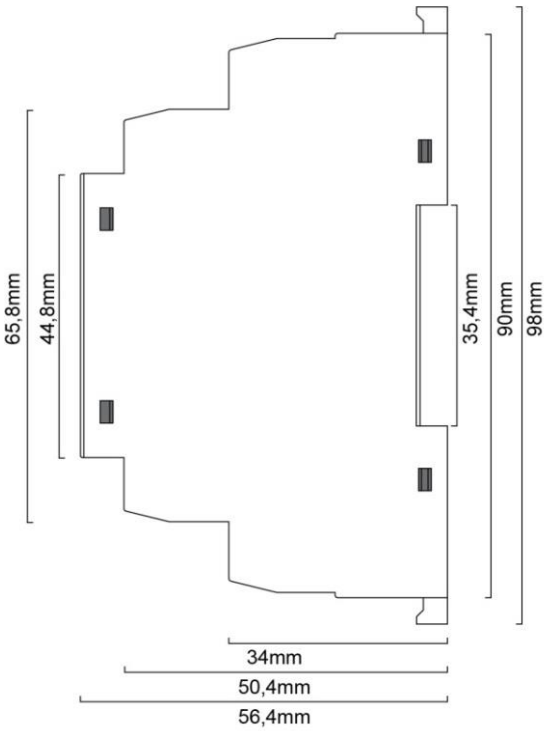
DALI-2 SCI RS232 Interface

Overview

- Module with a serial interface to communicate 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 requests and monitoring
- collision detection
- Support for several proprietary DALI-protocol extensions.
- Electrical isolation
- No external power supply necessary; 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 power supply: see datasheet for RS232-PS (Article Nr.: 24166096-PS)

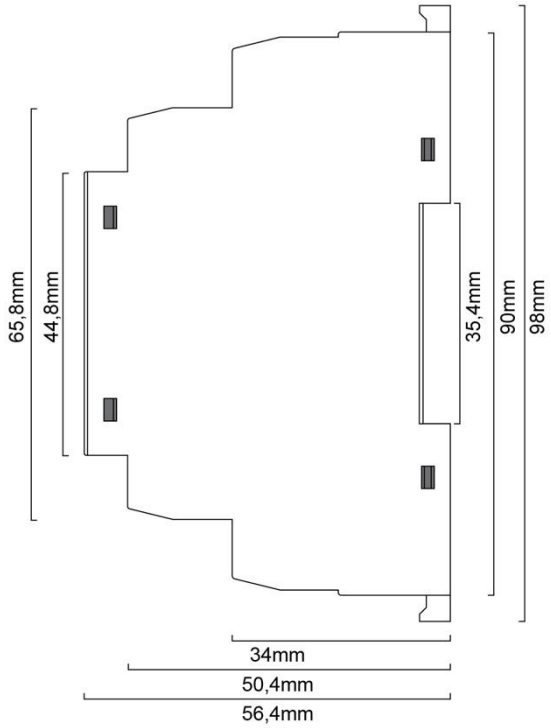
Specification, Characteristics

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



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.

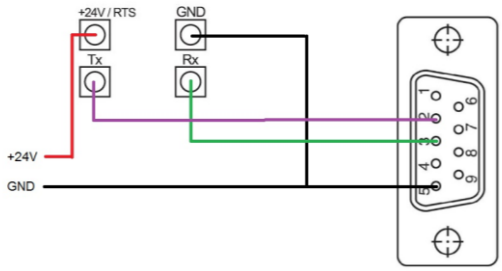


Figure 1 Installation with external supply (6V up to 24V)

Installation with supply via RTS pins see Figure 2 below.

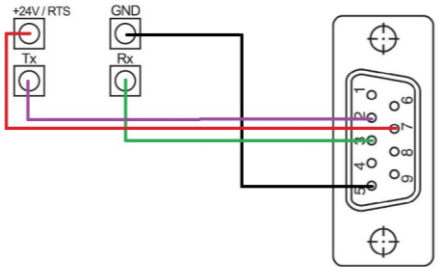
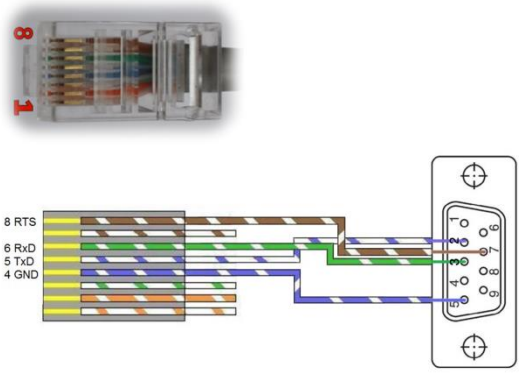


Figure 2 Installation with supply via RTS-Pin

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

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/wp-content/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.

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
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/wp-content/uploads/2020/06/24166096-PS-HS_DALI_RS232_PS_EN_D0046.pdf

Additional Information and Equipment

LUBA -Protocol description:
https://www.lunatone.com/wp-content/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/dali-cockpit/

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

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

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 compatibility with other devices must be tested in advance to the installation.

