

45 RESI-DALI-SIO, RESI-DALI-ETH, RESI-DALI-PS

45.1 General information

With the RESI-DALI-SIO gateway, a DALI 1.0 and DALI 2.0 light system can be integrated in almost every system with a RS232 or RS485 interface and a MODBUS/RTU master protocol or serial ASCII text based protocol. The RESI-DALI-ETH gateway offers an integration with MODBUS/TCP server protocol or ASCII text socket over Ethernet.

The gateway is a serial interface for connection to the DALI with an integrated 2 wire DALI bus coupler. The time-critical DALI communication is done from the gateway itself. The gateway is configured with our MODBUSConfigurator software and maps the incoming and outgoing DALI telegrams to MODBUS holding registers. When the host writes to a MODBUS holding register, the gateway generates the corresponding DALI telegram. When the gateway receives a DALI telegram, it maps and converts the incoming data to the specific MODBUS holding registers for readout through a host.

To control our DALI converters you need a host system with a serial interface (RS232 or RS485), which is able to send ASCII command strings and which can receive ASCII characters. This feature is implemented in almost any media control system like CRESTRON®, AMX® or CONTROL4®. But almost every standard PLC can handle serial ASCII interfaces. Therefore our converter can be integrated everywhere. If the host system offers a MODBUS/RTU master or MODBUS/TCP client interface, our converter can be controlled via MODBUS holding registers.

Our DALI gateways support the easy installation and testing of DALI lamps in a DALI 1.0 or DALI 2.0 network. Therefore our software supports the automatic search and addressing of DALI lamps, physical selection and addressing of DALI lamps. Configuration of DALI scenes and DALI groups. Especially the gateway can handle all the new DALI device type 8 for RGB or RGBW dimmable DALI lamps. But also DALI device type 6 is supported.

Furthermore the device can send and receive to following DALI frame formats:

- * 8 Bit DSI commands
- * 16 Bit DALI 1.0/DALI 2.0 commands
- * 24 Bit DALI Multi Master commands or events
- * 25 Bit eDALI frames
- * 28 Bit DALI Frame for future use
- * 32 Bit DALI Frame for future use
- * Variable bit length frames from 1 to 64 bits for special purposes

This series of IO modules offer the following features:

- Easy integration of a complete DALI 1.0 and DALI 2.0 bus system
- MODBUS/RTU slave or MODBUS/TCP server protocol
- Additional commands with plain ASCII texts
- DALI and host interface are galvanically isolated
- Supports all DALI 1.0 commands
- Supports all DALI 2.0 commands
- Supports DALI priority slot sending
- Supports new DALI device type 6 and device type 8
- Integrated DALI bus-coupler
- RESI-xxx-SIO: Galvanic isolated RS232 and RS485 interface for communication with a host system
- RESI-xxx-ETH: Galvanic isolated Ethernet interface for communication with a host system



Figure: Our serial DALI module



Figure: Our Ethernet IO module

With our RESI-DALI-PS we deliver a powerful and stable DALI power supply with max. 200mA output current, but supplied from a primary 12 to 48Vdc power supply. Its extreme slim housing suits in every switchboard cabinet, where you usually have 24Vdc for other automation devices.



Figure: Our DALI power supply module

45.2 Technical specification

Beside the basic technical data, which fulfill all of our IO modules, this IO modules meet the following technical specifications:

Power consumption

RESI-DALI-SIO	<1.0W
RESI-DALI-ETH	<1.4W
RESI-DALI-PS	<6.0W

Product housing

RESI-DALI-SIO	CEM17
RESI-DALI-ETH	CEM35
RESI-DALI-PS	CEM17

Product weight

RESI-DALI-SIO	50g
RESI-DALI-ETH	83g
RESI-DALI-PS	65g

DALI bus interface

RESI-DALI-SIO	
RESI-DALI-ETH	
Protocol	DALI 1.0 and DALI 2.0 and DALI multi master
Baud rate	1200Bit/s
Cable connection	via terminals
Galvanic isolation	Yes
LED indicator	Yes

RESI-DALI-PS	
Nominal output voltage	Maximum 18V, typical ~14~18V
Maximum output current	~200mA
Short circuit output current	~225mA
Galvanic isolation	Yes
LED indicator	Yes

Default serial settings

Baud rate	via DIP switch
Parity	none
Stop bits	one
UnitID	255

Default Ethernet settings

IP address	192.168.0.191
IP mask	255.255.255.0
gateway	192.168.0.1
UnitID	255

User	RESI
password	RESI

45.3 Additional terminals & LED states

DALI INTERFACE	DALI bus connector	
	One 3 pin terminal blocks	
	Terminal type:	USLIM
	D+:	DALI+ bus wire
	D-:	DALI- bus wire
Pin layout	D+:	DALI+ bus wire
	N/C:	not connected
	D-:	DALI- bus wire
RESI-DALI-SIO		
RESI-DALI-ETH		
STATE	If the DALI bus power is OK and the module has no error, this LED flashes with a 1s rhythm. If the module has an internal error or the DALI bus power is not connected or there is a short circuit on the DALI bus line this LED flashes very quick (~250ms rhythm)	
DALI	If there is bus communication on the DALI, this LED is on, otherwise this LED is OFF	
RESI-DALI-PS		
POWER	Always on to indicate primary power supply is OK.	
DALI	DALI activity LED, when transmitting a DALI telegram the LED switches on for a few milliseconds.	
ERR	Power supply fault LED. If the power supply unit malfunctions or if there is a bus error on the DALI line or if there is a short circuit in the DALI system, this LED lights up. If the DALI bus is working properly, this LED is off.	

45.4 RESI-DALI-SIO: Connection diagram

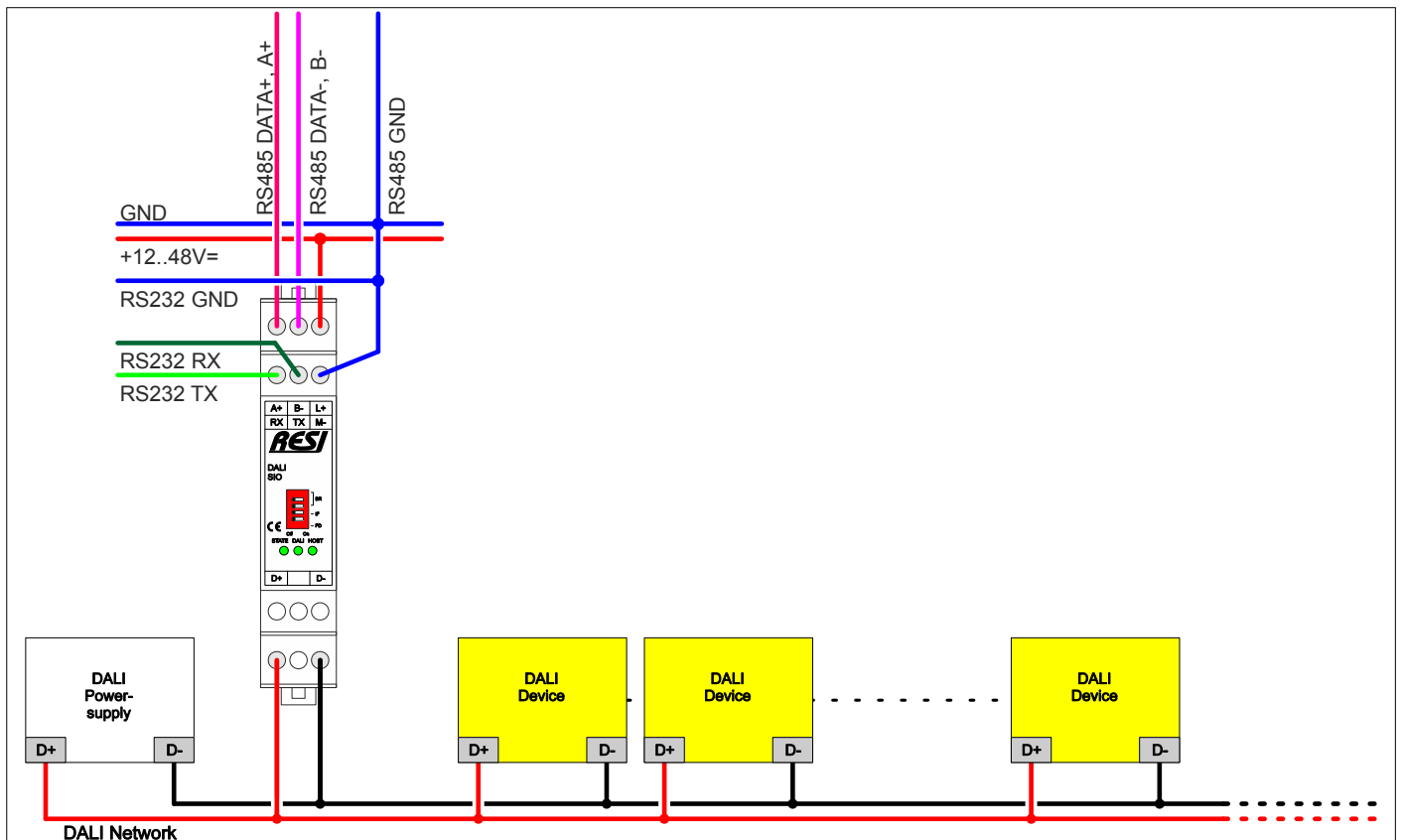


Figure: Connecting a DALI bus system to the RESI-DALI-SIO gateway with external DALI power supply

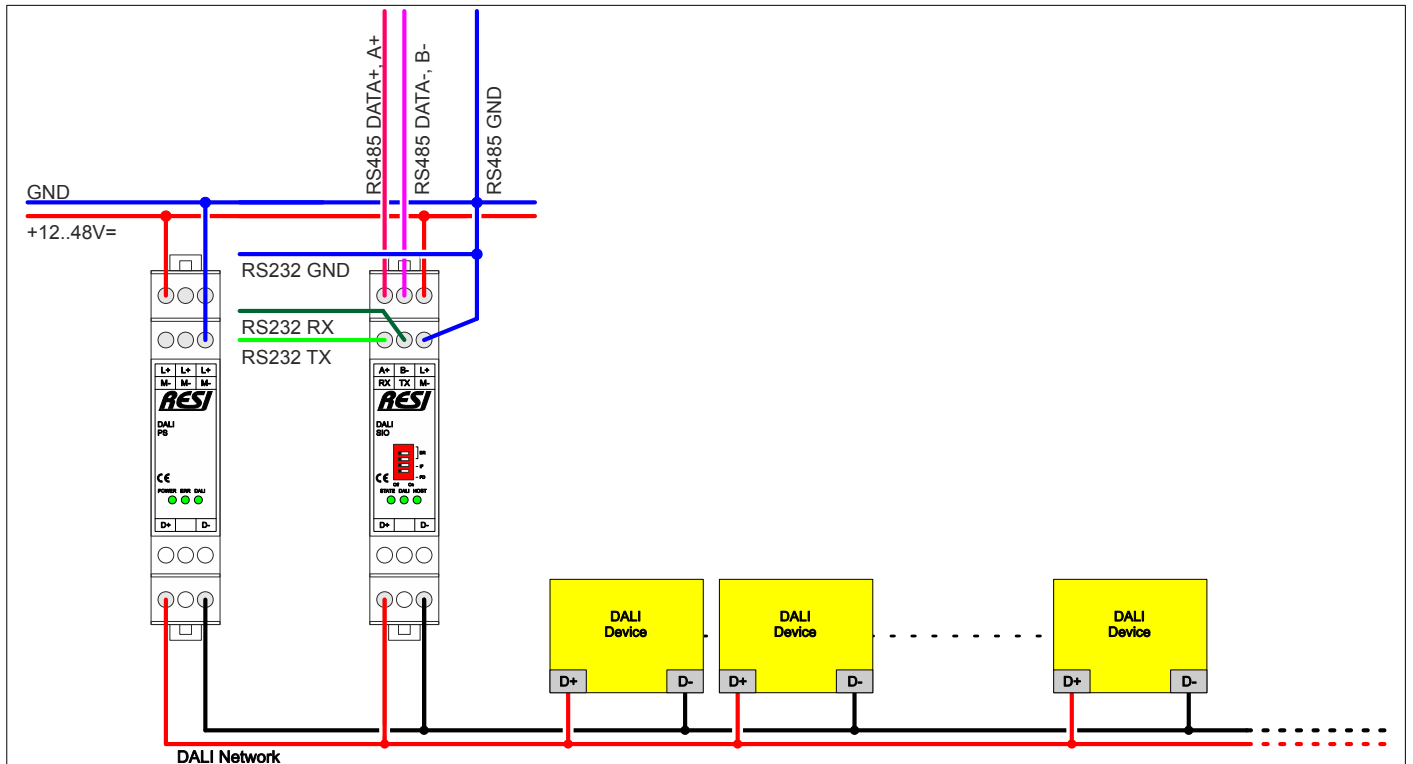


Figure: Connecting a DALI bus system to the RESI-DALI-SIO gateway with RESI-DALI-PS DALI power supply

45.5 RESI-DALI-ETH: Connection diagram

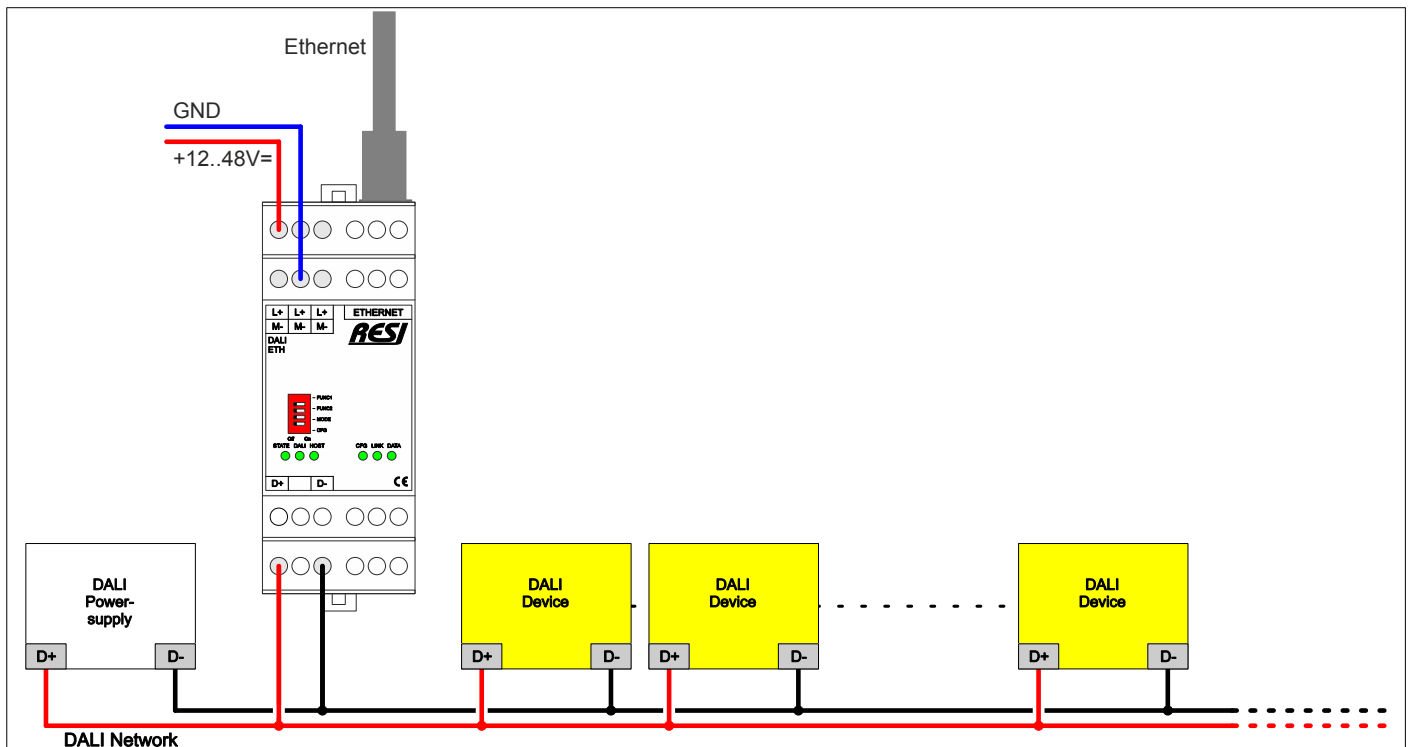


Figure: Connecting a DALI bus system to the RESI-DALI-ETH gateway with external DALI power supply

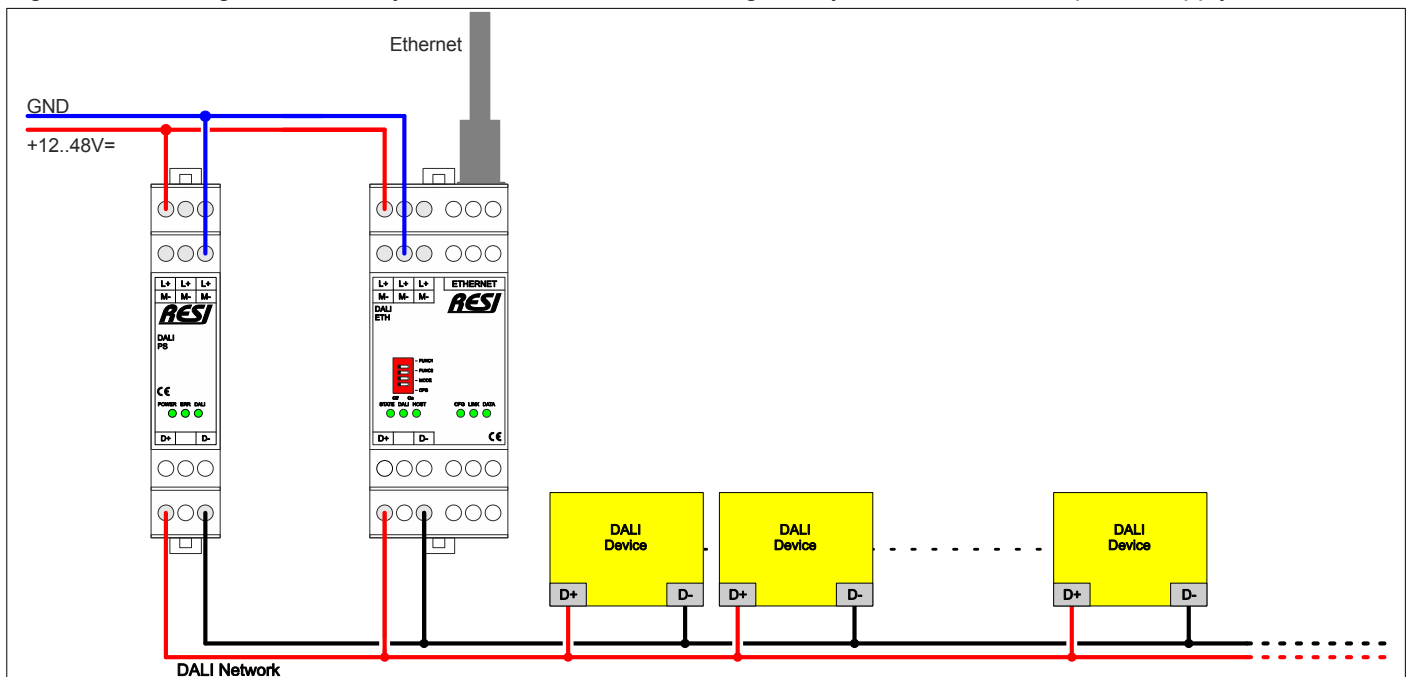


Figure: Connecting a DALI bus system to the RESI-DALI-ETH gateway with RESI-DALI-PS DALI power supply

45.6 RESI-DALI-PS: Connection diagram

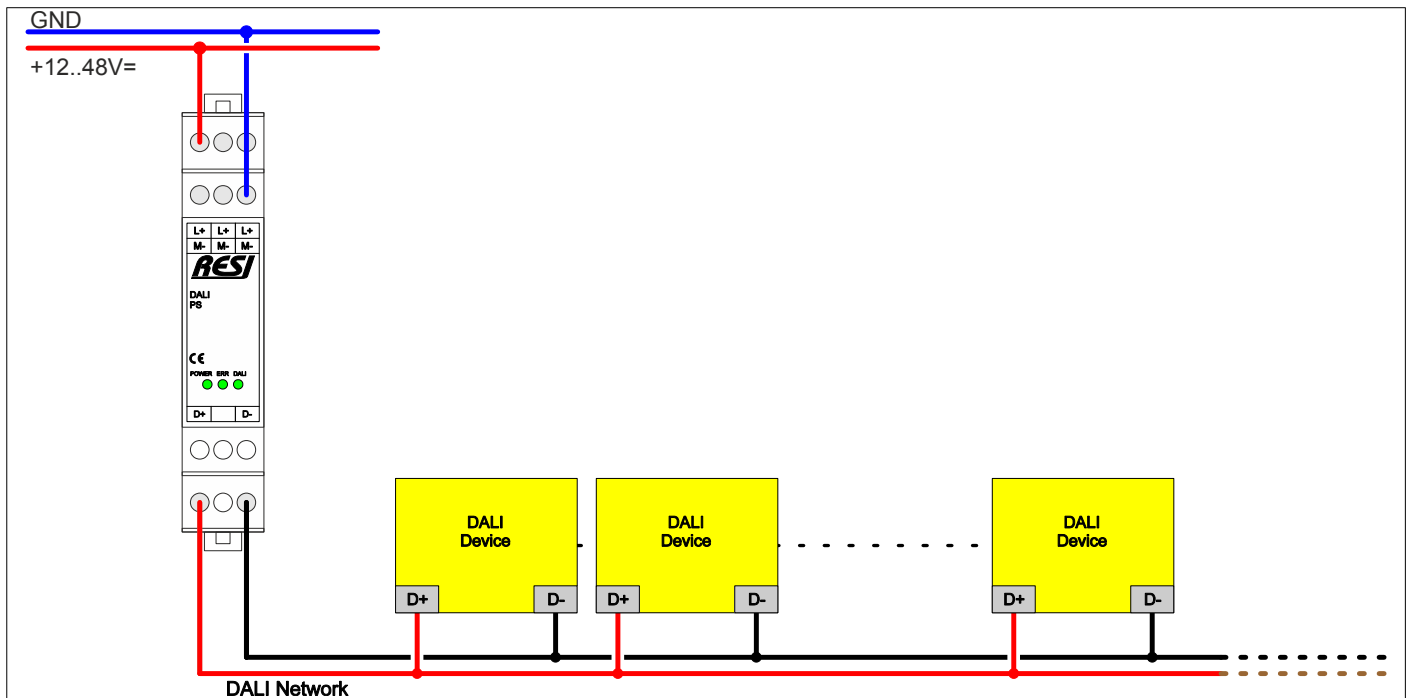


Figure: Establishing power supply to a DALI bus system with our RESI-DALI-PS

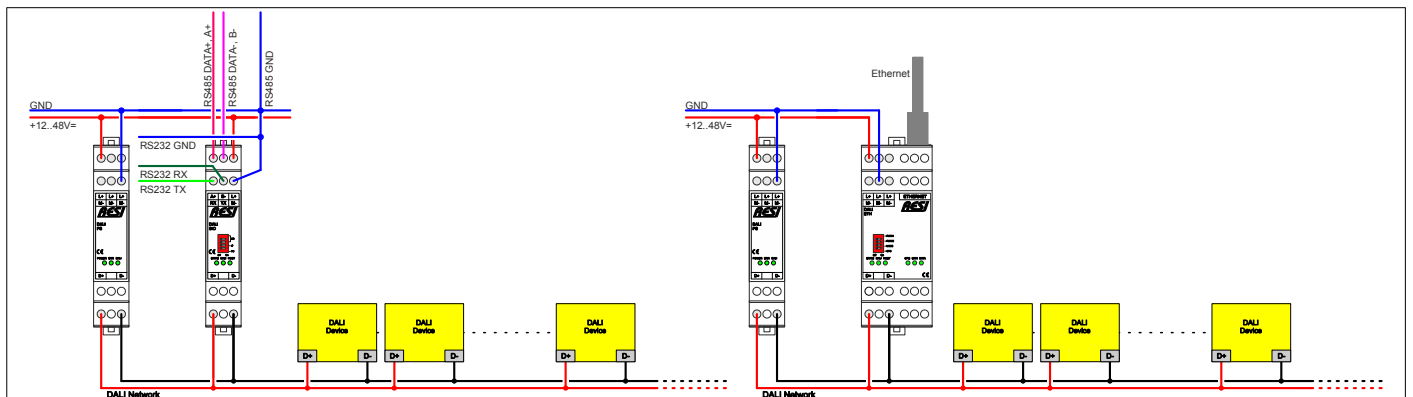


Figure: Using our RESI-DALI-PS DALI power supply in combination with our DALI gateways

45.7 DALI bus installation

There are many common pitfalls in using a DALI light bus system. We give answers to the most common questions around the DALI bus system here:

- What are the logical DALI limits
 - A DALI bus system can address 64 DALI lamps or DALI 1.0 devices
 - A DALI bus system can address 16 logical groups of DALI lamps or devices
 - A DALI bus system can address 64 DALI 2.0 control gears or DALI 2.0 devices like presence detectors, light sensors, motion detectors, manual control units
 - A DALI bus system can address 64 eDALI control gears like presence detectors, light sensors, motion detectors, manual control units (proprietary to LUNATONE)
 - Be careful, how many devices you use on your DALI bus, it depends strongly on your DALI power supply current.

- Maximum DALI cable length
 - The maximum cable length results from the maximum permitted voltage drop on the DALI cable, it is defined as a maximum of 2 V.
 - This corresponds to a maximum cable length of 300 m with a cable cross-section of 1.5 mm².
 - CAUTION: When designing the maximum cable length, the contact resistances must also be observed! 2 V voltage drop must not be exceeded!

- Do you have more than 64 DALI ballasts on a DALI line with a DALI power supply?
 - DALI only allows a maximum of 64 ballasts on a bus line!
 - Divide the DALI bus into two separate bus lines and use two DALI power supplies

- Is your bus system longer than 300m?
 - Separate the bus system into several separate segments with your own DALI power supplies and DALI master

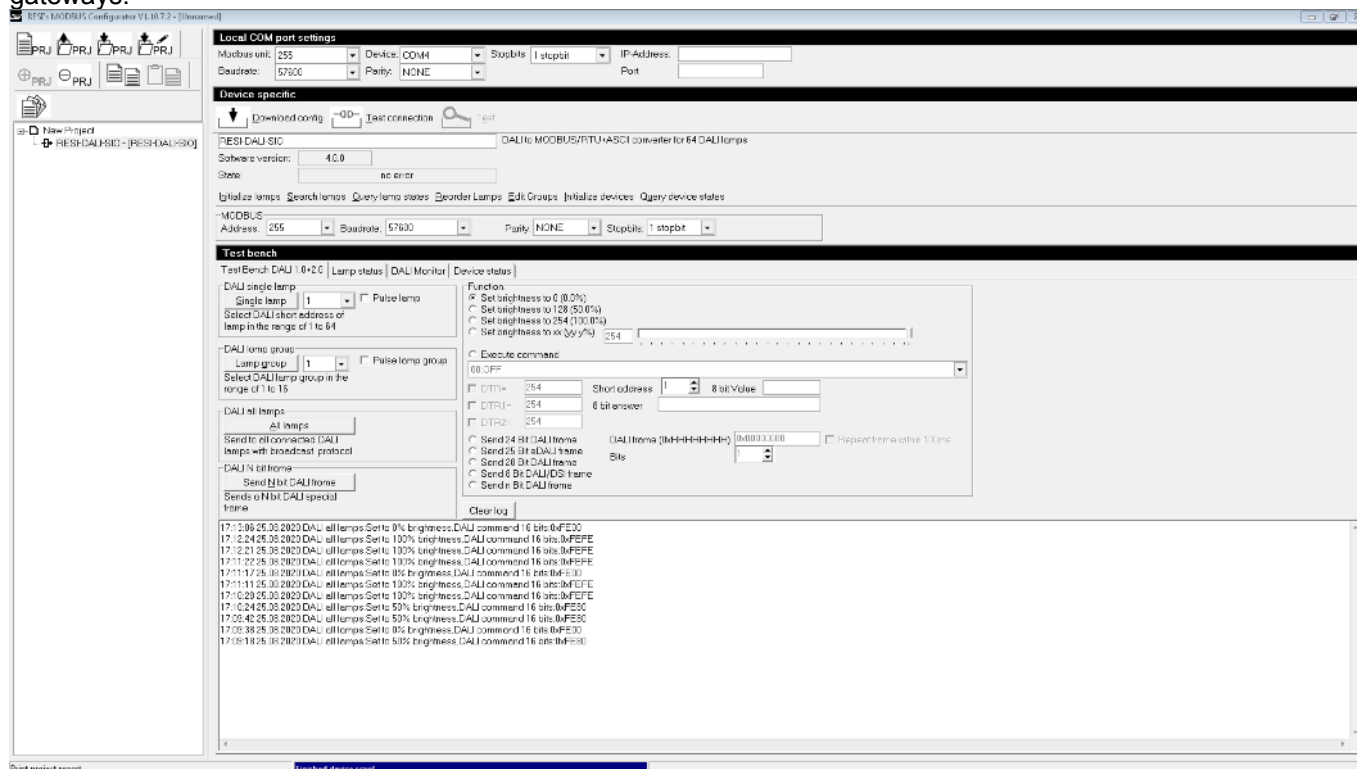
- Measure the DALI output voltage on the DALI-MASTER. This must be around 14 to 18V!
 - Too many lights with ballasts on the DALI bus?
 - Do the ballasts use more power than the DALI power supply can deliver?
 - Usually the DALI power supplies deliver 200mA or 250mA of current

- Does the DALI voltage drop at the ballasts?
 - There may be a maximum voltage drop on the DALI bus of 2V between the DALI supply and the DALI ballast.
 - In the event of a large voltage drop, DALI communication no longer works reliably!
 - Measure this with EVERY ballast using a voltmeter!
 - First check whether all DALI devices are working.
 - Make sure that there is no communication on the DALI line.
 - Measure the voltage on the DALI power supply.
 - The value must be between 11.5 V and 22.5 V; a typical value is 14-16 V.
 - A significantly lower value could indicate a short circuit.
 - Measure the voltage on the DALI device that is furthest away from the DALI power supply.
 - The value must be between 9.5 V and 20.5 V.
 - A much lower value indicates that there is a short circuit somewhere.
 - Create a short circuit between the two DALI bus lines on the DALI device that is furthest away from the DALI power supply.
 - Measure the voltage on the DALI power supply. The value you measure is the DALI voltage drop.
 - This value must not be higher than 2 V.

- If it is higher than 2 V, check whether the following events have occurred:
 - DALI line too long (over 300m with 1.5mm² cross-section)
 - Cross section too small
 - High contact resistance
 - The value must be brought below 2 V.
 - Remove the short circuit between the two DALI bus lines furthest away from the DALI device.
 - This can be solved by dividing the DALI bus system into two separate DALI bus systems
-
- Your DALI bus cabling must be a tree structure
 - There must be no ring or loop. If so, cut this loop open!
-
- Recommendations of DALI cable lengths for different conductor cross-sections: DALI cable length:
 - at Ø 1.5mm² max. 300m
 - at Ø 1.0mm² max. 238m
 - at Ø 0.75mm² max. 174m
 - at Ø 0.5mm² max. 116m

45.8 Configuration with MODBUSConfigurator software

Download our free software from our homepage www.RESI.cc and install it on your computer. After you have successfully established a connection, you will see the following picture for the RESI-DALI-SIO or RESI-DALI-ETH gateways:



In the section device specific you will find the following functions:

Local COM port settings

Modbus unit: Device: Stopbits: IP-Address:

Baudrate: Parity: Port:

Device specific

DALI to MODBUS/RTU+ASCII converter for 64 DALI lamps

Software version:

State:

Initialize lamps Search lamps Query lamp states Reorder Lamps Edit Groups Initialize devices Query device states

MODBUS

Address: Baudrate: Parity: Stopbits:

Test bench

- Button “Download config”: If you change the MODBUS/RTU slave address, or the serial parameters, you have to download the new configuration to the gateway to activate the changes.
- Button “Test connection”: This button tests, if the software can communicate with the gateway or not.
- Button “Test”: This function is not available in the DALI products.
- Button “Initialize lamps”: This button opens a dialog window to configure new DALI 1.0 devices with a specific short address. The detailed function is described below.
- Button “Search lamps”: This button starts a search for new DALI 1.0 lamps on the DALI bus and adds new lamps to the tree. The detailed function is described below.
- Button “Query lamp states”: This button queries from all 64 DALI 1.0 short addresses the current state of the DALI lamps and shows the result in a grid. The detailed function is described below.
- Button “Reorder lamp”: This button opens a dialog window, where you can readdress the DALI 1.0 devices and their short addresses. The detailed function is described below.

- Button “Edit Groups”: This button opens a dialog window, where you can edit the groups of a DALI 1.0 device. The detailed function is described below.
- Button “Initialize devices”: This button opens a dialog window, where you can search and address for new DALI 2.0 control gears on the DALI bus line. The detailed function is described below.
- Button “Query device states”: This button queries of all 64 DALI 2.0 short addresses the current state of the DALI control gear and shows the results in a grid. The detailed function is described below.

45.8.1 The Test Bench DALI 1.0+DALI 2.0

The test bench lets you send quickly DALI commands to the DALI bus for test and evaluation of your DALI installation. Open the tab seen below:

For DALI 1.0 devices:

First of all DALI 1.0 sends in general 16 bit DALI frames to a DALI 1.0 lamp and if the lamp gives an answer, this answer is an 8 bit DALI frame. Therefore you can send commands to DALI 1.0 devices in three different addressing schemes:

- **via SHORT ADDRESS of lamp:** The DALI standard allows up to 64 DALI lamps on one bus with a DALI short address between 0 and 63. We use for better understanding the DALI short addresses 1 to 64 in our software.
- **via GROUP ADDRESS of lamp:** The DALI standard allows up to 16 DALI groups on one DALI bus. A DALI lamp with a specific short address can be part of as many DALI groups, as you want it to be part of. Therefore DALI uses the groups 0 to 15, again, we use in our software 1 to 16 for better understanding.
- **via BROADCAST to all lamps:** The DALI standard supports a special addressing modes to send a DALI command to all connected DALI lamps. This is very useful for easy testing.

So, choose a DALI command from the Function area and the use the buttons "Single lamp" to send the command to a specific short address, "Lamp group" to send the command to a specific group of lamps or "All lamps" to send the command to all connected lamps.

Use the checkbox **Pulse lamp** to quickly find the lamp with the selected short address of the drop down list. The lamp will pulse the brightness to find the lamp easily.

Use the checkbox **Pulse lamp group** to quickly find a lamp group with the selected group of the drop down list. All lamps of the selected lamp group will pulse the brightness to find them easily.

The following functions are available for DALI 1.0 lamps:

- **Set brightness to ...:** With this command you set the brightness of the addressed lamps to the specific value.
- **Execute command:** With this command you can select a specific DALI 1.0 command from the drop down list and send it to the addressed lamps. For example choose the command 05:RECALL MAX LEVEL and press the button "All lamps". All connected DALI 1.0 lamps should dim up to the stored maximum brightness level. Some of the DALI commands will generate an answer. The answer will be shown in the log window below the command group. Also some of the commands need DTR, DTR1 or DTR2 register values. Therefore you have the check boxes before DTR, DTR1 and DTR2. This will activate automatic sending of DTR setup commands before executing the desired command. Some of the DALI 1.0 commands must be repeated within 100ms twice. This is also done by the gateway internally.

For DALI 2.0 devices:

The DALI 2.0 standard introduces new DALI frame formats. Therefore we have implemented a test functionality into the gateway: The functions "Send x bits DALI frame" offers a wide variety of possibilities to send new DALI 2.0 frames.

Enter a valid DALI 2.0 frame and click on the button "Send N bit DALI frame". You will see the result in the log window below.

45.8.2 Query lamp states

This function tries to read out basic data of all DALI 1.0 devices from the connected DALI bus. The result will be displayed in the grid view under the tab "Lamp status". A possible result could look like this:

Short address	Ballast state	Lamp error	Lamp power	Limit error	Dimming	Reset state	Short address missing	Power supply	Actual level	Device Type	Serial Number
1	OK	No	On	No	finished	No	No	No	169 -> 66.5%	6 -> LED lamp control gear	GTIN:000000000000.SN:000000
2	OK	No	On	No	finished	No	No	No	1 -> 0.4%	8 -> Colour lampcontrol gear:3CH->RGB	GTIN:000000000000.SN:000000
3	OK	Yes	Off	No	finished	No	No	No	255 -> MASK	3 -> Low-voltage halogen lamp control gear	GTIN:03A542930D59.SN:61D00
4	OK	No	On	No	finished	No	No	No	1 -> 0.4%	8 -> Colour lampcontrol gear Tc	GTIN:000000000000.SN:000000
5	Error	Yes	On	Yes	in progress	Yes	Yes	Yes	1 -> 0.4%	8 -> Colour lampcontrol gear:4CH->RGBW	GTIN:000000000000.SN:000000
6	OK	No	On	No	finished	No	No	No	06 -> 33.9%	0 -> Colour lampcontrol gear:4CH->RGBW	GTIN:FFFFFFFFFFFFFF.SN:FFFF

You will find the following information in this grid view:

- **Short address:** The current short address of the tested lamp
- **Ballast state:** The current state of the ballast (OK or Error) monitored by the DALI lamp controller.
- **Lamp error:** If the DALI lamp controller has detected an error in the ballast in the control gear, it will return Yes. Otherwise it will return No.
- **Lamp power:** If the DALI lamp controller currently powers the ballast, the return value will be On, else the return value will be Off.
- **Limit error:** If the brightness of the affected DALI lamp is not within the internal programmed limits of the DALI lamp controller, the return value will be Yes, else the return value will be No.
- **Dimming:** This flag (In progress or Finished) indicates if actual a dimming or fading is running in the DALI lamp controller (In progress). If the dimming or fading has ended Finished will be returned.
- **Reset state:** This flag (Yes or No) indicates if the DALI lamp is in reset state (Yes) or not (No).
- **Short address missing:** This flag (Yes or No) indicates if the DALI lamp has no programmed short address (Yes). If there is a short address programmed, the answer will be (No)
- **Power supply:** This flag (Yes or No) indicates if the DALI lamp has an error or problem with the power supply (Yes) or if the power supply of the DALI lamp is ok (No).
- **Actual level:** This is the actual brightness value of the lamp between 0 and 254 (0 to 100% scaled linear!) or 255 for MASK.
- **Device type:** This is the actual device type of the DALI lamp. Additional text information is shown to the basic device type.
- **Serial Number:** If possible to readout the correct value this is the serial number of the DALI lamp.

45.8.3 Search lamps

This function tries to read out basic data of all DALI 1.0 devices from the connected DALI bus. For each DALI 1.0 lamp, the software adds a leaf into the project tree under the selected DALI converter with the Name "Lamp <ShortAddress>". A possible result will look like this:



On the left side in the project tree you will see, that there are 6 lamps connected to the DALI bus line. We have selected Lamp 2 for detail view on the right side. The lamp is a DALI device type 3 lamp (Low-voltage halogen lamp control gear) with standard DALI 1.0 commands and parameters.

In this dialog you can execute the following commands:

- **Read lamp settings:** This command will re-read the current settings of the DALI ballast and displays the results on this page
- **Write lamp settings:** This command will write the changed settings from the PC to the DALI lamp control gear and store the new values in the control gear.
- **Switch MAX:** This command will switch the DALI lamp on and dim up to the programmed maximum brightness level stored in the DALI lamp control gear.
- **Switch MIN:** This command will switch the DALI lamp on and dim up to the programmed minimum brightness level stored in the DALI lamp control gear.
- **Switch OFF:** This command will switch the DALI lamp off.
- **Set new parameters:** This command will store the user changed parameters for the lamp. How you can edit the parameters, please read "How to edit the parameters" section below. You can modify the standard parameters Minimum, Maximum, Power Up, Bus fault Fade time or Fade rate with this function. These are basic setup values for almost every DALI lamp. But you have to select the function "Write lamp settings" to download the changes into the DALI lamp control gear.
- **Read all scenes (8 bit):** This command will read out all brightness values for all 16 scenes stored in the DALI lamp control gear. The result will be a brightness value in the range 0 to 254 or 0x00 to 0xFE for 0.0% to 100.0% and 255 or 0xFF for MASK.
- **Read all scenes (16 bit):** This command will read out all brightness values for all 16 scenes stored in the DALI lamp control gear using 16 Bit data format. The result will be a brightness value in the range 0 to 65279 or 0x0000 to 0xFEFF for 0.0% to 100.0% or 65280 to 65535 or 0xFF00 to 0xFFFF for MASK.
CAUTION: Not all DALI 1.0 devices support 16 Bit data mode. So better use only 8 bit data mode functions, if you don't know exactly, if your control device supports this data mode!
- **Write all scenes (8 bit):** This command will immediately write the new scene values to the DALI lamp control gear.
- **Write all scenes (16 bit):** This command will immediately write the new scene values to the DALI lamp control gear with 16 bit data format.
CAUTION: Not all DALI 1.0 devices support 16 Bit data mode. So better use only 8 bit data mode functions, if you don't know exactly, if your control device supports this data mode!
- **Query brightness:** This command will query the actual brightness of the selected lamp.
- **Set brightness:** The command will set the new selected brightness for the current lamp in the DALI lamp control gear. Select the brightness with the slider or the up down keys, if you have focused on the slider. Or double click on the text field with current selected brightness to edit the brightness as a text value. Then choose this button to generate the DALI command.
- **Groups:** Select the desired groups for this control gear by checking the Groups 1 to 16. Then press the button Write lamp settings to download the group selection into the control gear.

How to edit the parameters:

- **Brightness:** To change a brightness value, enter a valid number between 0 and 254 or 0x00 and 0xFE for the brightness 0% and 100%, 255 or 0xFF for MASK or 0.0 to 100.0 for a brightness level in percent. Enter the word MASK for the MASK value of 255.
- **Fade time:** To change a fade time, enter a valid number between 0 and 255 or 0x00 to 0xFF for the fade time or 0.0 to 90.5 for a fade time in seconds. Enter the word NO for no fade time (value 0).
- **Fade rate:** To change a fade rate, enter a valid number between 0 and 255 or 0x00 to 0xFF for the fade rate or 0.0 to 357.8 for a fade rate in steps/seconds. Enter NO for no fade rate (value 0).
- **Color parts RGB or WAF:** To change a color part, enter a new value for 8 bit mode between 0 and 254 or 0x00 to 0xFE for 0.0% to 100.0%, or 255 or 0xFF for MASK value. Enter a new value for 16 bit mode between 0 and 65279 or 0x0000 and 0xFEFF for 0.0% to 100.0% or 65280 to 65535 or 0xFF00 to 0xFFFF for MASK. Or enter a percentage value between 0.0% and 100.0%. Enter the word MASK for MASK.
- **Color temperature Tc:** To change a color temperature Tc, enter a new value for 16 bit mode between 0 and 65279 or 0x0000 and 0xFEFF or 65280 to 65535 or 0xFF00 to 0xFFFF for MASK. Or enter a KELVIN value between 1.0 and 1000000.0 Kelvin. Enter the word MASK for MASK.
- **Primary N:** To change a primary N channel, enter a new value for 16 bit mode between 0 and 65279 or 0x0000 and 0xFEFF or 65280 to 65535 or 0xFF00 to 0xFFFF for MASK. Or enter a percentage value between 0.0 and 100.0. Enter the word MASK for MASK.

The second page shows information about the failures or the operating mode of the DALI DT 6 lamp. Also you can change the fast fade time in this dialog, which is new to the DALI device type 6 lamps.

Dali lamp settings

Read lamp settings Write lamp settings Switch MAX Switch MIN Switch OFF

Lamp name:

Short address: Device type:

Physical minimum:

Groups: 1 2 3 4 5 6 7 8
 9 10 11 12 13 14 15 16

Minimum: <input type="text" value="169,0xA9 -> 66.54%"/>	Maximum: <input type="text" value="250,0xFA -> 98.43%"/>	1: <input type="text" value="255->MASK"/>	5: <input type="text" value="255->MASK"/>	9: <input type="text" value="255->MASK"/>	13: <input type="text" value="255->MASK"/>
Power up: <input type="text" value="254,0xFE -> 100.00%"/>	Bus fault: <input type="text" value="254,0xFE -> 100.00%"/>	2: <input type="text" value="255->MASK"/>	6: <input type="text" value="255->MASK"/>	10: <input type="text" value="255->MASK"/>	14: <input type="text" value="255->MASK"/>
Fade time: <input type="text" value="0,0x0 -> no fade time"/>	Fade rate: <input type="text" value="7,0x7 -> 44.7steps/s"/>	3: <input type="text" value="255->MASK"/>	7: <input type="text" value="255->MASK"/>	11: <input type="text" value="255->MASK"/>	15: <input type="text" value="255->MASK"/>
<input type="button" value="Set new parameters"/>		4: <input type="text" value="255->MASK"/>	8: <input type="text" value="255->MASK"/>	12: <input type="text" value="255->MASK"/>	16: <input type="text" value="255->MASK"/>

Brightness:

DT6 status 1 | DT6 status 2

Failure status

- Bit 0:1:Shortcut is detected
- Bit 1:1:Open circuit is detected
- Bit 2:0:No load decrease is detected
- Bit 3:0:No load increase is detected
- Bit 4:0:Current protection is not active
- Bit 5:1:Thermal shutdown is active
- Bit 6:1:Luminous flux reduction due to thermal overload detection is active
- Bit 7:0:Reference measurement was ok

Operating mode

- Bit 0:0:PWM mode is not active
- Bit 1:0:AM mode is not active
- Bit 2:1:Output is current controlled
- Bit 3:0:High current impulse mode is not active
- Bit 4:0:Logarithmic dimming curve is active

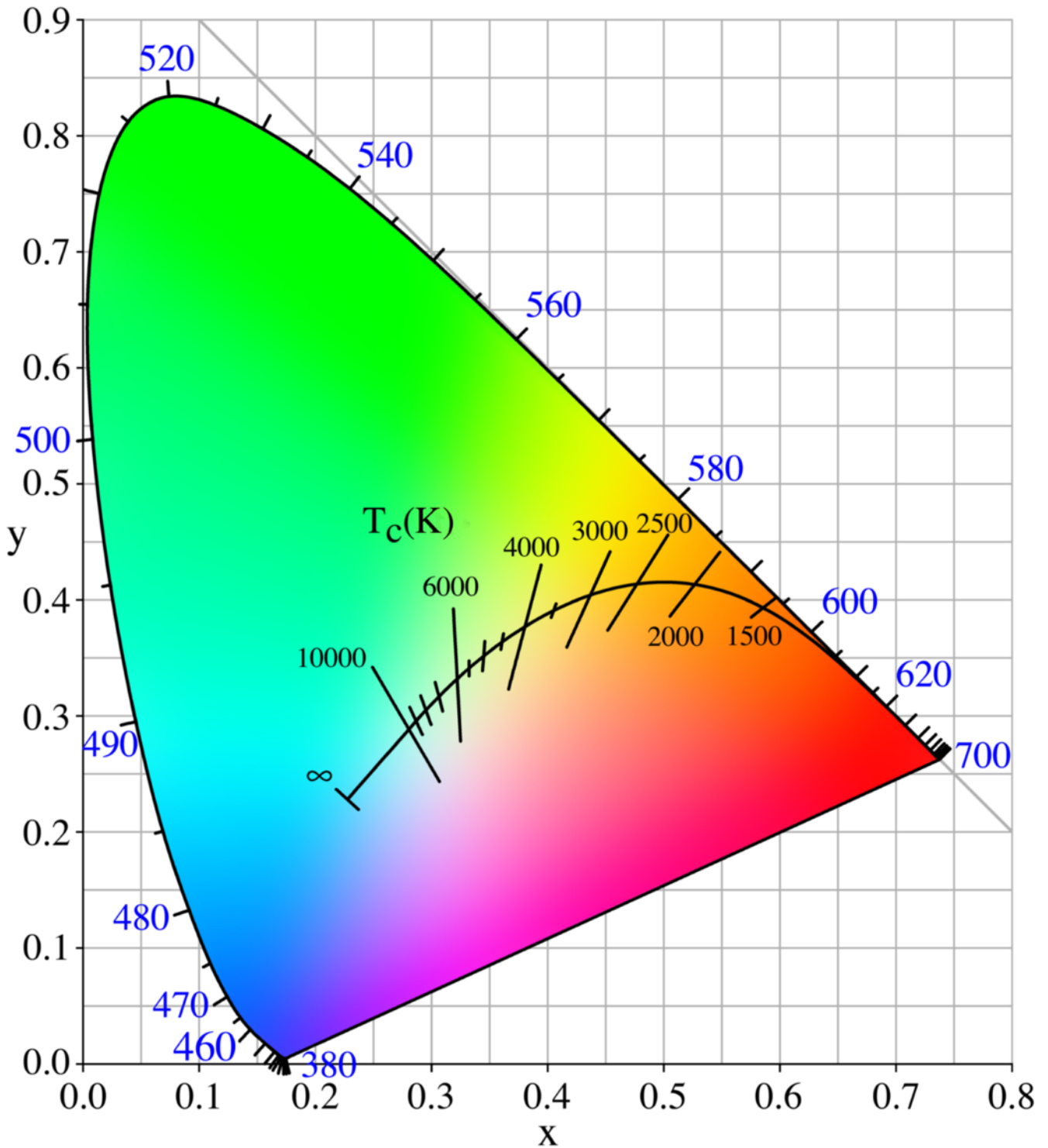
Fast fading

Fast fade time is

Minimum fast fade time is

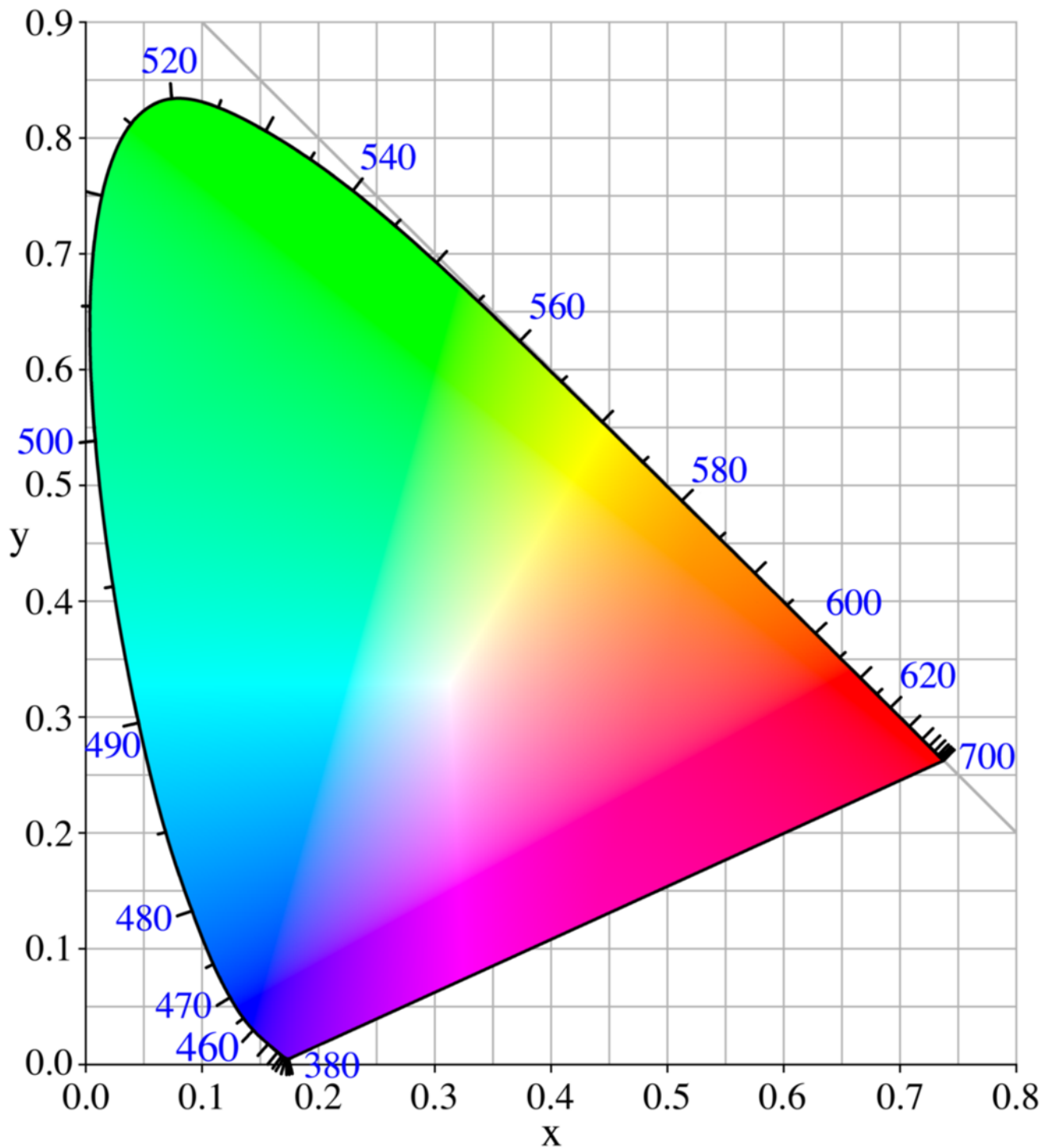
Please consult the DALI standard to understand the different DALI color schemes. basically DALI 2.0 supports:

- Color type Tc (Tunable White): Allows control of the correlated color temperature (CCT) along the black-body line, from warm white to cool white.



- Color type primary N : Allows simple control of up to 6 dimmable channels .
- Color type RGBWAF: Allows simple control of up to 6 channels of color (Red, Green, Blue, White, Amber and Free-color).

- **Color type xy coordinate:** Also known as xy chromaticity, this allows precise and repeatable selection of the color co-ordinates from the CIE color space chromaticity diagram (1931).



On the tab Color, you can read and write new color settings to the lamp:

Dali lamp settings

Read lamp settings Write lamp settings Switch MAX Switch MIN Switch OFF

Lamp name:

Short address: Device type:

Physical minimum: Set manual device type

Groups: 1 2 3 4 5 6 7 8
 9 10 11 12 13 14 15 16

Minimum: Maximum:
Power up: Bus fault:
Fade time: Fade rate:

Scene values:

1: 255->MASK	5: 255->MASK	9: 255->MASK	13: 255->MASK
2: 255->MASK	6: 255->MASK	10: 255->MASK	14: 255->MASK
3: 255->MASK	7: 255->MASK	11: 255->MASK	15: 255->MASK
4: 255->MASK	8: 255->MASK	12: 255->MASK	16: 255->MASK

Brightness:
Query brightness Set brightness

Read all scenes(8 bit) Write all scenes(8 bit)
Read all scenes(16 bit) Write all scenes(16 bit)

DT8 status Colour Scenes Init parameters

Read colours (8 bit mode)... Read colours (16 bit mode)...

x coordinate X- X+ XY
y coordinate Y- Y+

Tc colour temperature Tc+
Tc Tc-
CH0
CH1
CH2
CH3
CH4
CH5

Primary N dimlevel 0
Primary N dimlevel 1
Primary N dimlevel 2
Primary N dimlevel 3
Primary N dimlevel 4
Primary N dimlevel 5

Channel 0 RED
Channel 1 GREEN
Channel 2 BLUE
Channel 3 WHITE
Channel 4 AMBER
Channel 5 FREE COLOUR

RGBWAF control
Colour type

In this tab page you can execute the following commands:

- **Read colors (8-bit mode):** This commands will read the current settings of all colors of the DALI ballast and displays the results on this page. Only the supported color values are displayed here. Not every DALI ballast can handle all four color profiles defined by the DALI standard.
- **Read colors (16-bit mode):** This commands will read the current settings of all colors of the DALI ballast with 16 bit data mode and displays the results on this page. Only the supported color values are displayed here. Not every DALI ballast can handle all four color profiles defined by the DALI standard.
CAUTION: Not all DALI 1.0 devices support 16 Bit data mode. So better use only 8 bit data mode functions, if you don't know exactly, if your control device supports this data mode!
- **RGB:** The command will set the new RGB colors (red, green and blue) for the current lamp in the DALI lamp control gear. Select the red, green and blue parts of your desired color with the slider or the up down keys, if you have focused on the slider. Or double click on the text field with current selected color part to edit the color part as a text value. Then choose this button to generate the DALI DT8 commands.
- **WAF:** The command will set the new WAF colors (white, amber, freecolor) for the current lamp in the DALI lamp control gear. Select the white, amber and freecolor parts of your desired color with the slider or the up down keys, if you have focused on the slider. Or double click on the text field with current selected color part to edit the color part as a text value. Then choose this button to generate the DALI DT8 commands.
- **RGBWAF:** The command will set the new RGB and WAF colors (red, green blue, white, amber, freecolor) for the current lamp in the DALI lamp control gear. Select the red, green, blue, white, amber and freecolor parts of your desired color with the slider or the up down keys, if you have focused on the slider. Or double click on the text

field with current selected color part to edit the color part as a text value. Then choose this button to generate the DALI DT8 commands.

- **Tc**: The command will set the new color temperature Tc between 0 and 100000K for the current lamp in the DALI lamp control gear. Select your desired color temperature Tc with the slider or the up down keys, if you have focused on the slider. Or double click on the text field with current selected color part to edit the color temperature as a text value. The choose this button to generate the DALI DT8 commands.

HINT: Color temperature Tc mode uses 16 bit data mode. So first read out the current colors with the button Read colours (16 bit mode). Then write the new color temperature to the lamp with this button or use Tc+ and Tc- button.

- **Tc+**: This command will step the current color temperature a little bit warmer.
- **Tc-**: This command will step the current color temperature a little bit colder.

Dali lamp settings

Read lamp settings Write lamp settings Switch MAX Switch MIN Switch OFF

Lamp name: Groups: 1 2 3 4 5 6 7 8
 9 10 11 12 13 14 15 16

Short address: Device type: Set manual device type

Physical minimum:

Minimum: Maximum:
 Power up: Bus fault:
 Fade time: Fade rate:

Scene values:

1: 255->MASK	5: 255->MASK	9: 255->MASK	13: 255->MASK
2: 255->MASK	6: 255->MASK	10: 255->MASK	14: 255->MASK
3: 255->MASK	7: 255->MASK	11: 255->MASK	15: 255->MASK
4: 255->MASK	8: 255->MASK	12: 255->MASK	16: 255->MASK

Brightness:
 Query brightness Set brightness

Read all scenes(8 bit) Write all scenes(8 bit)
 Read all scenes(16 bit) Write all scenes(16 bit)

DT8 status Colour Scenes Init parameters

Read colours (8 bit mode)... Read colours (16 bit mode)...

x coordinate X- X+ XY
 y coordinate Y- Y+

Tc colour temperature Tc+ Tc Tc-
 Primary N dimlevel 0 CH0
 Primary N dimlevel 1 CH1
 Primary N dimlevel 2 CH2
 Primary N dimlevel 3 CH3
 Primary N dimlevel 4 CH4
 Primary N dimlevel 5 CH5

Channel 0 RED RGB
 Channel 1 GREEN
 Channel 2 BLUE
 Channel 3 WHITE RGBWAF
 Channel 4 AMBER
 Channel 5 FREE COLOUR WAF

RGBWAF control
 Colour type

- **XY:** Set the selected XY coordinate according to the CIE color space chromaticity diagram (1931).

HINT: xy coordinate mode uses 16 bit data mode. So first read out the current colors with the button Read colors (16 bit mode). Then set the new xy coordinate for the lamp with this button or use X-,X+,Y- or Y+ command buttons.

- **X-:** Decrement X coordinate with one step
- **X+:** Increment X coordinate with one step
- **Y-:** Decrement Y coordinate with one step
- **Y+:** Increment Y coordinate with one step

Dali lamp settings

Read lamp settings Write lamp settings Switch MAX Switch MIN Switch OFF

Lamp name: Lamp 1

Short address: 1 Device type: 8:Colour lampcontrol gear

Physical minimum: 1

Minimum: 1.0x01 -> 0.39% Maximum: 254.0xFE -> 100.00%

Power up: 254.0xFE -> 100.00% Bus fault: 127.0x7F -> 50.00%

Fade time: 10.0xA -> 16.0s Fade rate: 6.0x6 -> 63.3steps/s

Scene values:

1: 255->MASK	5: 255->MASK	9: 255->MASK	13: 255->MASK
2: 255->MASK	6: 255->MASK	10: 255->MASK	14: 255->MASK
3: 255->MASK	7: 255->MASK	11: 255->MASK	15: 255->MASK
4: 255->MASK	8: 255->MASK	12: 255->MASK	16: 255->MASK

Brightness: Query brightness Set brightness

DT8 status Colour Scenes Init parameters

Read colours (8 bit mode)... Read colours (16 bit mode)...

x coordinate: 65534->0.99997 X- X+ XY

y coordinate: 51985->0.79323 Y- Y+

Tc colour temperature: Tc+ Tc Tc-

Primary N dimlevel 0-5: CH0 CH1 CH2 CH3 CH4 CH5

Channel 0 RED Channel 1 GREEN Channel 2 BLUE Channel 3 WHITE Channel 4 AMBER Channel 5 FREECOLOUR: RGB RGBWAF WAF

RGBWAF control Colour type

Now select a scene from the list, the current scene parameters will be shown in the dialog below the 16 scenes. It could look like this:

Dali lamp settings

Read lamp settings Write lamp settings Switch MAX Switch MIN Switch OFF

Lamp name: Groups: 1 2 3 4 5 6 7 8
 9 10 11 12 13 14 15 16

Short address: Device type: Set manual device type

Physical minimum:

Minimum: Maximum:
 Power up: Bus fault:
 Fade time: Fade rate:

Scene values:

1: <input type="text" value="255->MASK"/>	5: <input type="text" value="255->MASK"/>	9: <input type="text" value="255->MASK"/>	13: <input type="text" value="255->MASK"/>
2: <input type="text" value="255->MASK"/>	6: <input type="text" value="255->MASK"/>	10: <input type="text" value="255->MASK"/>	14: <input type="text" value="255->MASK"/>
3: <input type="text" value="255->MASK"/>	7: <input type="text" value="255->MASK"/>	11: <input type="text" value="255->MASK"/>	15: <input type="text" value="0->0.0%"/>
4: <input type="text" value="255->MASK"/>	8: <input type="text" value="255->MASK"/>	12: <input type="text" value="255->MASK"/>	16: <input type="text" value="0->0.0%"/>

Brightness:

DT8 status | Colour Scenes | Init parameters

Scene	X	Y	Tc	N Ch 0	N Ch 1	N Ch 2	N Ch 3	N Ch 4	N Ch 5	R	G	B	W	A	F
1	????	????	????	????	????	????	????	????	????	229	204	178	127	????	????
2	????	????	????	????	????	????	????	????	????	229	204	178	127	????	????
3	????	????	????	????	????	????	????	????	????	229	204	178	127	????	????
4	????	????	????	????	????	????	????	????	????	229	204	178	127	????	????
5	????	????	????	????	????	????	????	????	????	229	204	178	127	????	????
6	????	????	????	????	????	????	????	????	????	229	204	178	127	????	????
7	????	????	????	????	????	????	????	????	????	229	204	178	127	????	????
8	????	????	????	????	????	????	????	????	????	229	204	178	127	????	????
9	????	????	????	????	????	????	????	????	????	229	204	178	127	????	????
10	????	????	????	????	????	????	????	????	????	229	204	178	127	????	????
11	????	????	????	????	????	????	????	????	????	229	204	178	127	????	????
12	????	????	????	????	????	????	????	????	????	229	204	178	127	????	????
13	????	????	????	????	????	????	????	????	????	229	204	178	127	????	????
14	????	????	????	????	????	????	????	????	????	229	204	178	127	????	????
15	????	????	????	????	????	????	????	????	????	229	204	178	127	????	????
16	????	????	????	????	????	????	????	????	????	229	204	178	127	????	????

XY coordinate X: Y:

Colour temperature Tc:

Primary N CH0: CH1: CH2: CH3: CH4: CH5:

RGBWAF Red: Green: Blue: White: Amber: Freecolour:

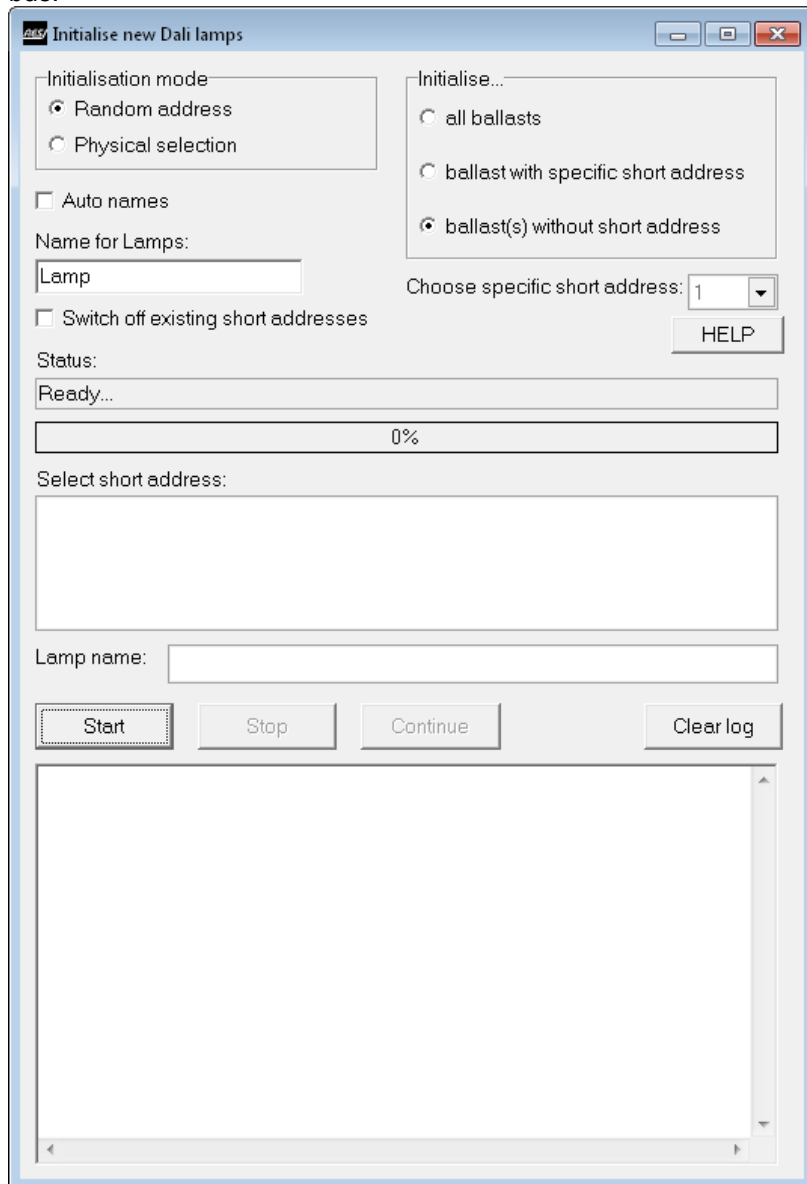
Scenes: 1 2 3 4 5 6 7 8
 9 10 11 12 13 14 15 16

Now modify the scene values by entering new values into the selected fields. Then choose other scenes by checking the appropriate check boxes if you want to modify more than one scene at a time. Then click onto "Set RGBWAF" or the other set buttons to modify the selected scenes in the PC software.

Last but not least you have to download the scenes into your lamp by using the buttons "Write all scenes(8 bit)" or "Write all scenes(16 bit)".

45.8.4 Initialize lamps

This function opens a window where you can select how you want to address the new DALI 1.0 lamps on the DALI bus:



You can select the following options:

- **Initialisation mode:** DALI supports two modes of initialization of new lamps:
 - **Random address:** In this mode the system searches automatically for new lamps on the DALI bus and address the new lamps with a unique short address between 1 and 64 (0 to 63 in the DALI commands).
 - **Physical selection:** Older DALI lamps support an additional addressing mode, where you can address the lamp by disconnecting the bulb in the lamp and then address the lamp with a unique short address between 1 and 64 (0 to 63 in the DALI commands).
- **Initialize...:** This selection offers three possible search modes for random addressing mode:
 - **all ballasts:** All ballast will be readdressed with new short addresses. All stored short addresses are deleted before the search will start. This means a complete reinitialisation of the DALI network.
 - **ballast with specific short address:** You can choose a specific short address from the drop down list, before you start search to readdress this ballast with a new short address. This mode is supported by the DALI standard but makes in real life not much sense.
 - **ballast(s) without short address:** This mode is the most common used mode to address only the new connected ballasts without a short address on the DALI bus.

- **Auto names:** This option allows you a complete automatic search process. If this check box is checked, the software will search for new ballasts and give each found ballast a unique name consisting out of the prefix entered in the text filed Name for lamp and the assigned short address from 1 to 64.
- **Switch off existing short addresses:** To visualize only the new lamps when searching, you can use this checkbox, then all existing ballasts with short addresses are switched off before the search for new lamps will began.
- **Start, Stop, Continue Buttons:** While the search process will run, use this buttons to navigate through the addressing search process.

This process will add automatically all found DALI lamps to the project tree!

45.8.5 Reorder DALI lamps

This function opens a window where you can easily change the short address of DALI lamps to order your lamps in a certain way. You will see the following dialog:

RESI Reorder DALI Lamps

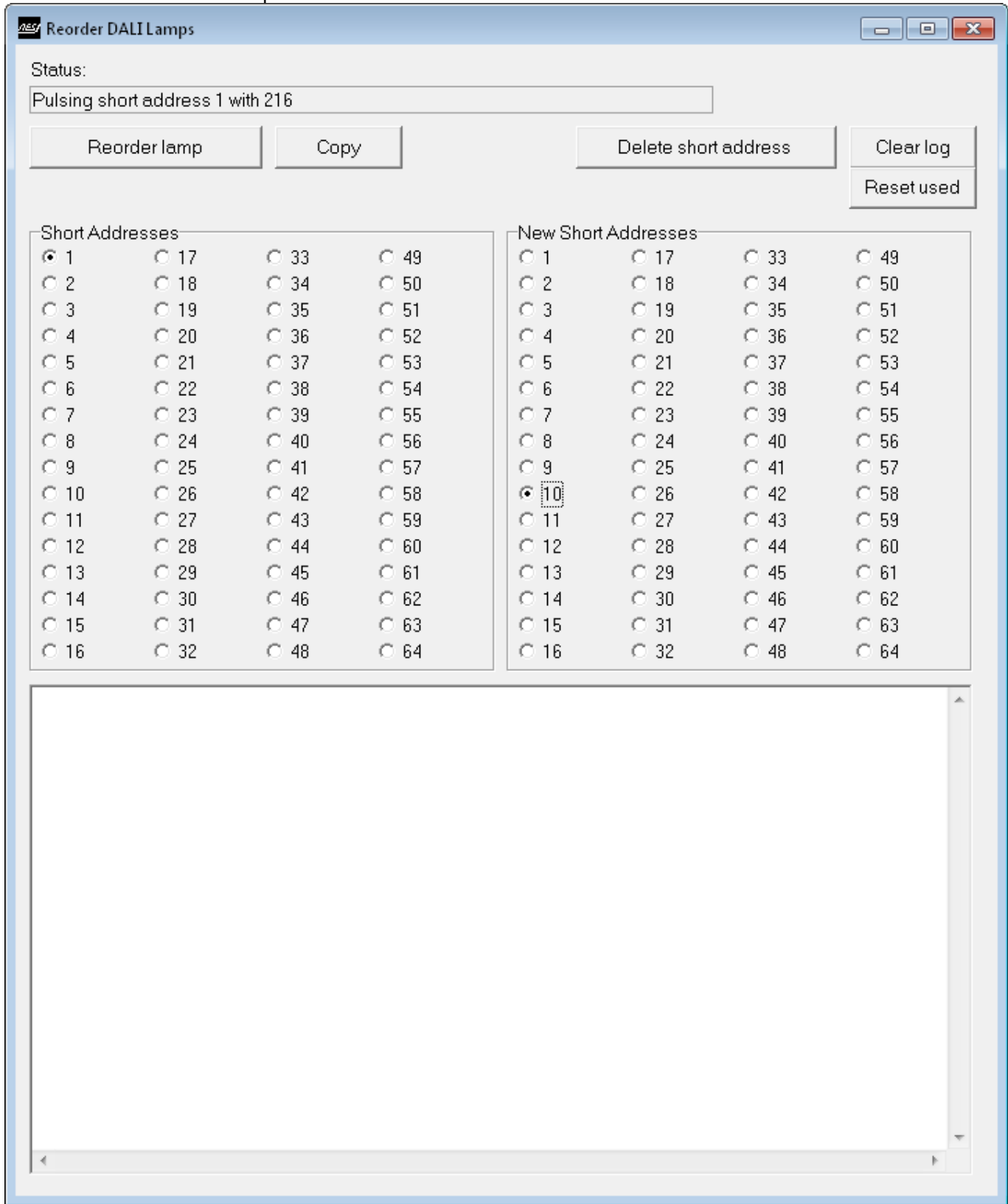
Status:
Pulsing short address 1 with 244

Reorder lamp Copy Delete short address Clear log
Reset used

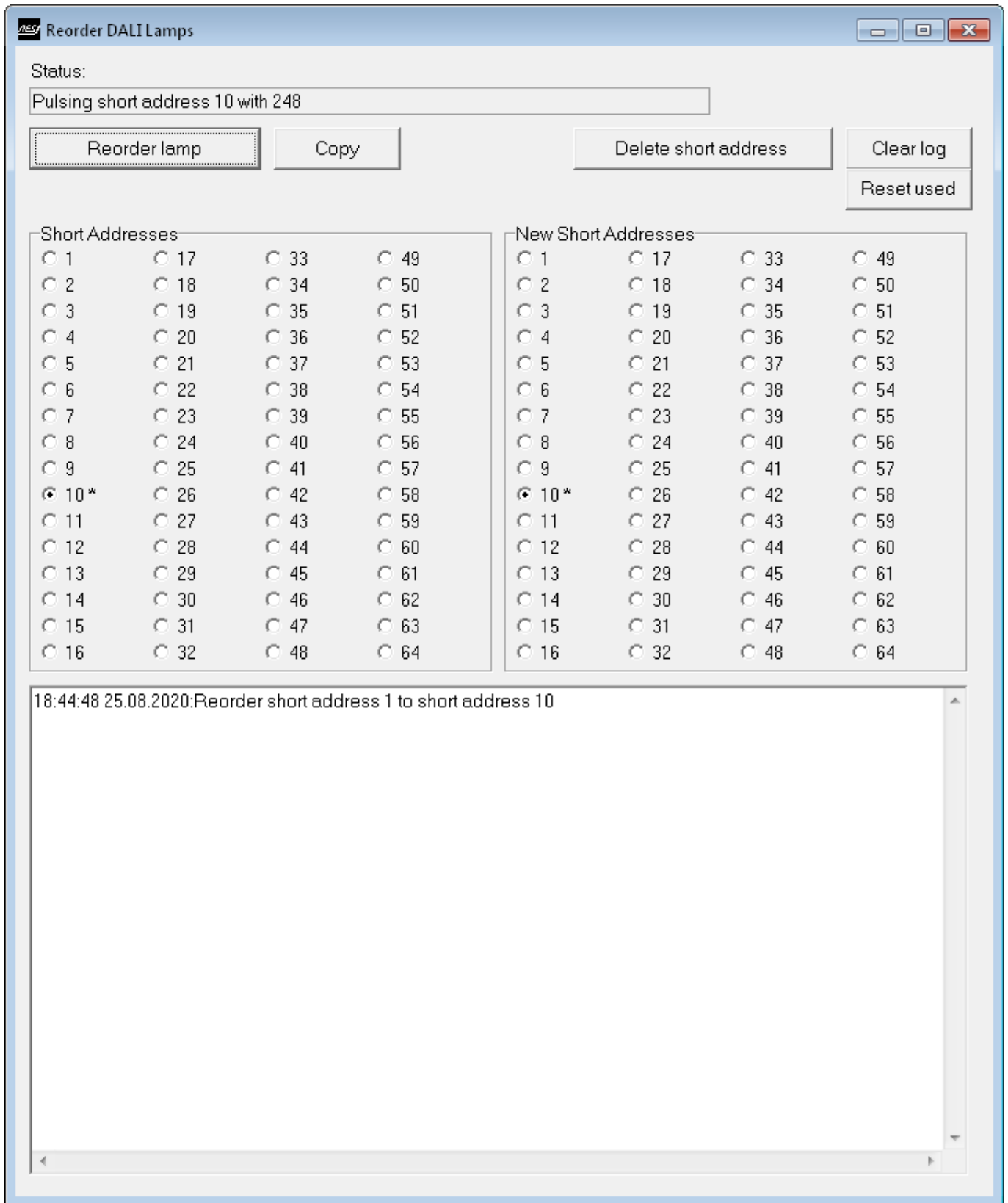
Short Addresses				New Short Addresses			
<input checked="" type="radio"/> 1	<input type="radio"/> 17	<input type="radio"/> 33	<input type="radio"/> 49	<input checked="" type="radio"/> 1	<input type="radio"/> 17	<input type="radio"/> 33	<input type="radio"/> 49
<input type="radio"/> 2	<input type="radio"/> 18	<input type="radio"/> 34	<input type="radio"/> 50	<input type="radio"/> 2	<input type="radio"/> 18	<input type="radio"/> 34	<input type="radio"/> 50
<input type="radio"/> 3	<input type="radio"/> 19	<input type="radio"/> 35	<input type="radio"/> 51	<input type="radio"/> 3	<input type="radio"/> 19	<input type="radio"/> 35	<input type="radio"/> 51
<input type="radio"/> 4	<input type="radio"/> 20	<input type="radio"/> 36	<input type="radio"/> 52	<input type="radio"/> 4	<input type="radio"/> 20	<input type="radio"/> 36	<input type="radio"/> 52
<input type="radio"/> 5	<input type="radio"/> 21	<input type="radio"/> 37	<input type="radio"/> 53	<input type="radio"/> 5	<input type="radio"/> 21	<input type="radio"/> 37	<input type="radio"/> 53
<input type="radio"/> 6	<input type="radio"/> 22	<input type="radio"/> 38	<input type="radio"/> 54	<input type="radio"/> 6	<input type="radio"/> 22	<input type="radio"/> 38	<input type="radio"/> 54
<input type="radio"/> 7	<input type="radio"/> 23	<input type="radio"/> 39	<input type="radio"/> 55	<input type="radio"/> 7	<input type="radio"/> 23	<input type="radio"/> 39	<input type="radio"/> 55
<input type="radio"/> 8	<input type="radio"/> 24	<input type="radio"/> 40	<input type="radio"/> 56	<input type="radio"/> 8	<input type="radio"/> 24	<input type="radio"/> 40	<input type="radio"/> 56
<input type="radio"/> 9	<input type="radio"/> 25	<input type="radio"/> 41	<input type="radio"/> 57	<input type="radio"/> 9	<input type="radio"/> 25	<input type="radio"/> 41	<input type="radio"/> 57
<input type="radio"/> 10	<input type="radio"/> 26	<input type="radio"/> 42	<input type="radio"/> 58	<input type="radio"/> 10	<input type="radio"/> 26	<input type="radio"/> 42	<input type="radio"/> 58
<input type="radio"/> 11	<input type="radio"/> 27	<input type="radio"/> 43	<input type="radio"/> 59	<input type="radio"/> 11	<input type="radio"/> 27	<input type="radio"/> 43	<input type="radio"/> 59
<input type="radio"/> 12	<input type="radio"/> 28	<input type="radio"/> 44	<input type="radio"/> 60	<input type="radio"/> 12	<input type="radio"/> 28	<input type="radio"/> 44	<input type="radio"/> 60
<input type="radio"/> 13	<input type="radio"/> 29	<input type="radio"/> 45	<input type="radio"/> 61	<input type="radio"/> 13	<input type="radio"/> 29	<input type="radio"/> 45	<input type="radio"/> 61
<input type="radio"/> 14	<input type="radio"/> 30	<input type="radio"/> 46	<input type="radio"/> 62	<input type="radio"/> 14	<input type="radio"/> 30	<input type="radio"/> 46	<input type="radio"/> 62
<input type="radio"/> 15	<input type="radio"/> 31	<input type="radio"/> 47	<input type="radio"/> 63	<input type="radio"/> 15	<input type="radio"/> 31	<input type="radio"/> 47	<input type="radio"/> 63
<input type="radio"/> 16	<input type="radio"/> 32	<input type="radio"/> 48	<input type="radio"/> 64	<input type="radio"/> 16	<input type="radio"/> 32	<input type="radio"/> 48	<input type="radio"/> 64

You will notice that after opening this dialog, the DALI lamp with the short address 1 (out of 64) will flash. This will help you to find the lamp in the field. As soon as you select a new short address from the panel Short addresses, the new selected DALI lamp will flash and all other DALI lamps are off.

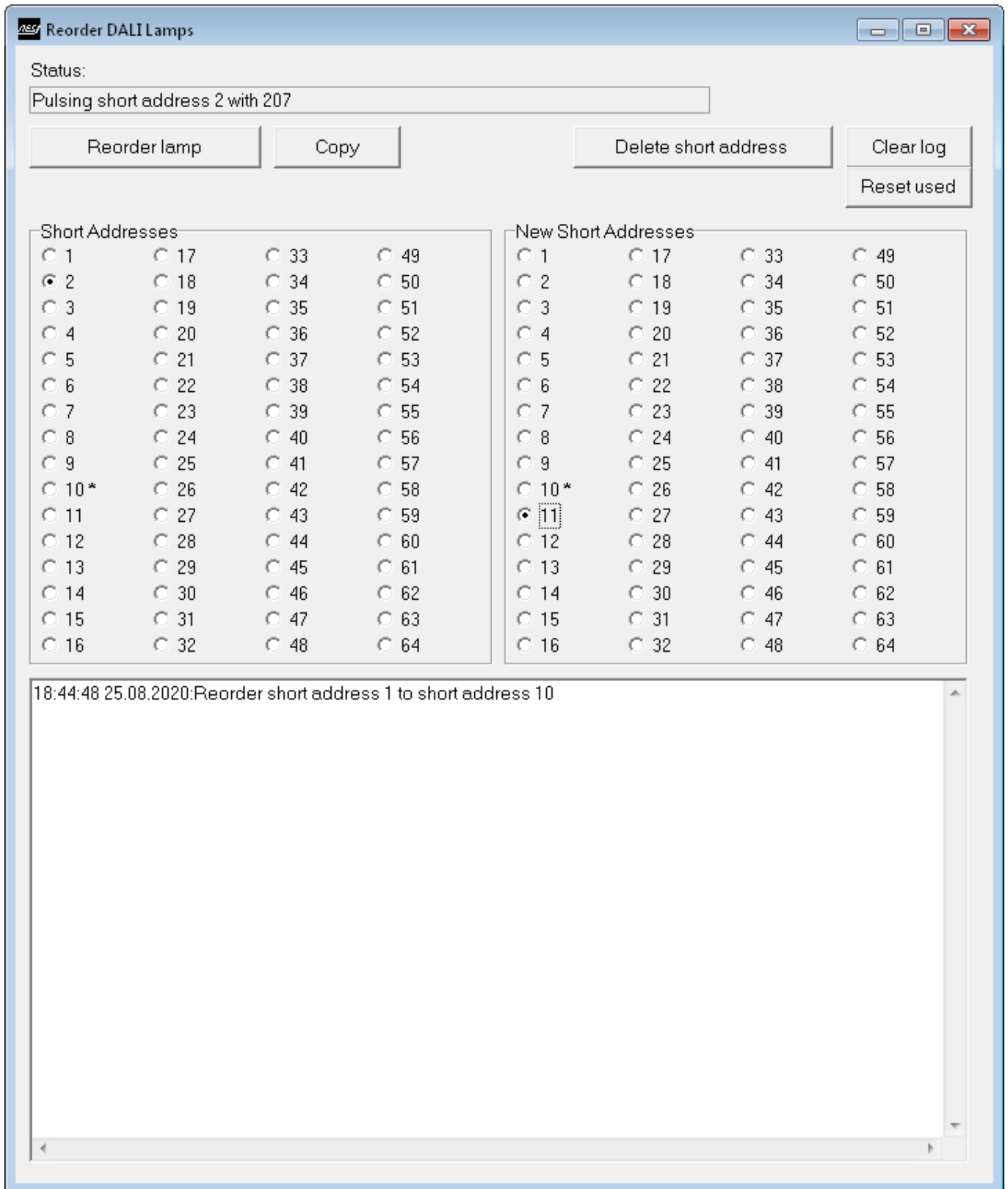
In our sample we want to readdress the DALI lamps 1 and 2 to the short addresses 10 and 11. So we select 1 and see that the correct lamp will flash. No we select in the right panel New Short addresses the address 10 and then we select the button Reorder lamp:



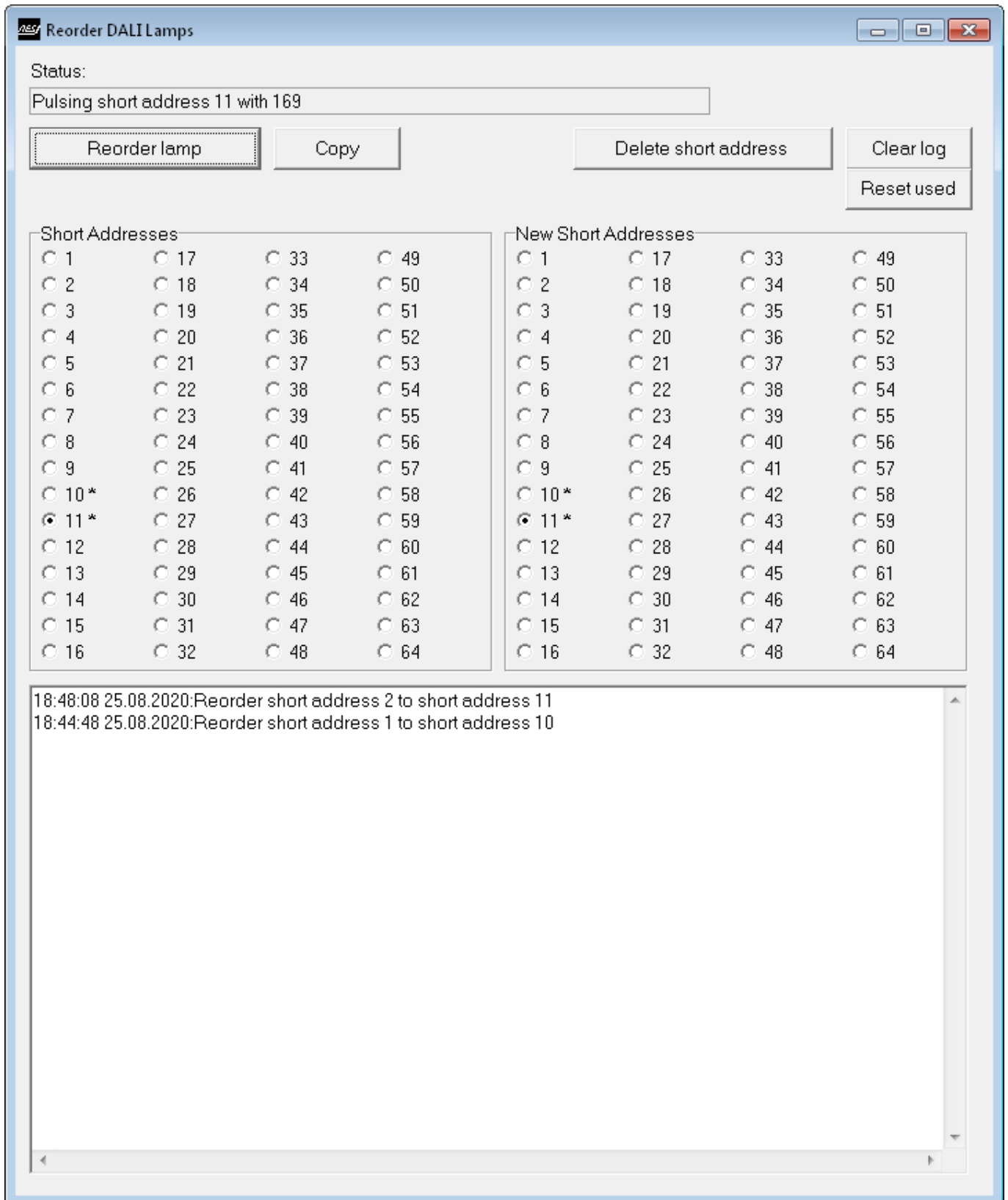
The system will show the following dialog:



As you will notice, now the old DALI lamp 1 has the new short address 10 and will flash. To indicate, that we have used the short address 10, there is an asterisk behind the short address in both panels. Now we select the DALI short address 2 in the left panel. The second DALI lamp will flash. In the right panel we select the new DALI short address 11. Now we click again on the button Reorder lamp.



If successful you will see the following result:



Again now in the left panel the new short address 11 is selected and the DALI lamp flashes. In both panels now the addresses 10 and 11 are marked with an asterisk to indicate, that we have used them already. You can clear this signs with the button "Reset used". In the log you see the last actions.

The button Copy will select the same short address in the right panel as you have selected in the left panel.

45.8.6 Edit groups

This function opens a window where you can easily change the groups of all DALI lamps. You will see the following dialog. Select the button "Read groups from all lamps". You will see a similar result:

Short Address	Status	Desired Groups	Actual Groups
1	ERR		
2	ERR		
3	OK		1,3
4	OK		3-4
5	OK		
6	OK		
7	ERR		
8	ERR		
9	ERR		
10	OK		4-6
11	OK		4-6
12	ERR		
13	ERR		
14	ERR		
15	ERR		
16	ERR		
17	ERR		
18	ERR		
19	ERR		
20	ERR		
21	ERR		
22	ERR		

Actual short address: N/A

Desired groups: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Actual groups: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Test groups: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Activate Group Test

In the List you will see the following information in the columns:

- **Short Address:** The DALI short address from 1 to 64
- **Status:** The status of the DALI lamp since the last readout of group data from this lamp. OK means the readout was ok, ERR means that the short address is not available (no lamp connected with this DALI short address). Unknown means, that no readout has been done.
- **Desired Groups:** This is the list of desired groups for each short address. You can prepare a list of groups for all short addresses, and the download this list to all DALI lamps with one command. But you can also modify only one DALI lamp or a DALI lamp group.
- **Actual Groups:** This are the group settings which are currently stored in the DALI lamp.

As soon as you click on one line in this list, the display will show the actual group configuration below this list for this short address:

Short Address	Status	Desired Groups	Actual Groups
1	ERR		
2	ERR		
3	OK		1,3
4	OK		3-4
5	OK		
6	OK		
7	ERR		
8	ERR		
9	ERR		
10	OK		4-6
11	OK		4-6
12	ERR		
13	ERR		
14	ERR		
15	ERR		
16	ERR		
17	ERR		
18	ERR		
19	ERR		
20	ERR		
21	ERR		
22	ERR		

Actual short address: 10

Desired groups: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Actual groups: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Test groups: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Now you can copy the actual groups to the desired groups section by using the button "Copy actual groups to desired groups". You will notice, that now the same groups are selected in the panel Desired groups. No we manually check the group 10. After that we multi select the lamps 3 to 6 in the list. Now we press the button "Change selected lamps to desired groups". You will see the following result:

Short Address	Status	Desired Groups	Actual Groups
1	ERR		
2	ERR		
3	OK	4-6,10	1,3
4	OK	4-6,10	3-4
5	OK	4-6,10	
6	OK	4-6,10	
7	ERR		
8	ERR		
9	ERR		
10	OK		4-6
11	OK		4-6
12	ERR		
13	ERR		
14	ERR		
15	ERR		
16	ERR		
17	ERR		
18	ERR		
19	ERR		
20	ERR		
21	ERR		
22	ERR		

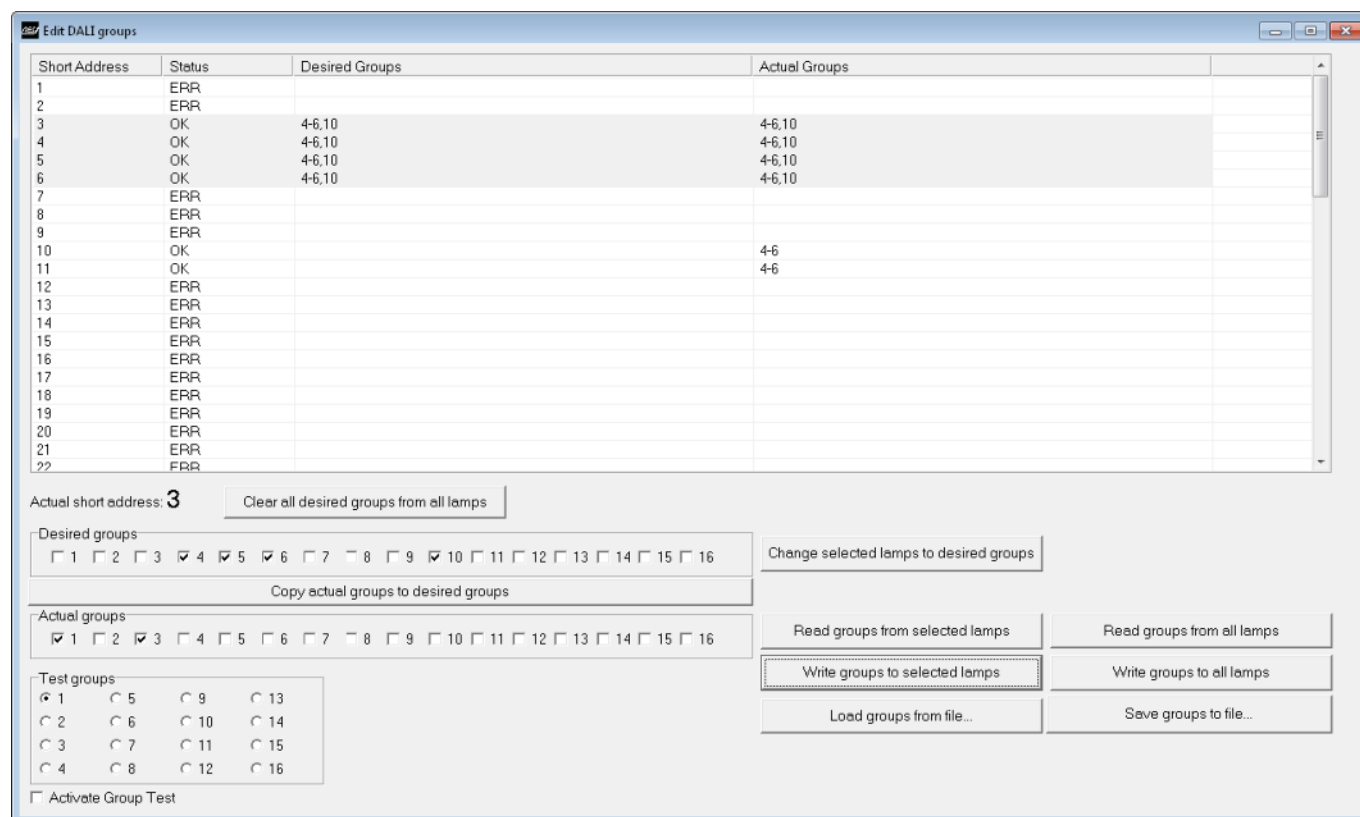
Actual short address: 3

Desired groups: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

Actual groups: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

As long as the groups are not identical in the columns "Desired Groups" and "Actual Groups", you have to download the group configuration into the lamps. For that you can use the buttons "Write groups to selected lamps", which will modify only the selected lamps from the list or you use the button "Write groups to all lamps" to modify all 64 DALI lamps with the new group information.

HINT: If the field Desired groups is empty no download will be done for the selected lamp.



With the button "Read groups from selected lamps" you can update the list with new status information from the selected lamps.

The buttons "Load groups from file..." and "Save groups to file..." you can save your group setup for all 64 DALI lamps for further use in a similar DALI system.

The button "Clear all desired groups from all lamps" will clear all desired groups from all 64 DALI lamps to start with an empty group information in the list.

For easy testing of the new group setup you can activate the checkbox "Activate Group Test" and select a group from 1 to 16 (in the DALI command from 0 to 15). All DALI lamps which are part of this group will flash. Select from the panel Test groups other groups to check if your configuration meets your requirements.

45.8.7 Initialize devices

This function opens a window where you can search and address DALI24 (DALI 2.0) control devices. It is similar to the search for DALI 1.0 lamps, but it uses 24 bit DALI frames and special DALI 2.0 commands to address the DALI 2.0 control devices like occupancy sensors or push button devices.

Initialise new DALI 2.0 devices (DALI24)

Initialisation mode

- Random address
- Auto names

Name for control devices: Device

Initialise...

- all control devices
- control devices with specific short address
- control device(s) without short address

Choose specific short address: 1

Status: Ready...

0%

Select short address:

Device name:

Start Stop Continue Clear log

You can select the following options:

- **Initialisation mode:** DALI supports two modes of initialization of new devices:
 - **Random address:** In this mode the system searches automatically for new devices on the DALI bus and address the new devices with a unique short address between 1 and 64 (0 to 63 in the DALI commands). This is NOT the same short address, which a DALI ballast will use. So in fact, you can combine 64 DALI ballasts and 64 DALI control devices on a DALI line.

- **Initialize...:** This selection offers three possible search modes for random addressing mode:
 - **all control devices:** All control devices will be readdressed with new short addresses. All stored short addresses are deleted before the search will start. This means a complete reinitialisation of the 24 bit DALI network.
 - **control devices with specific short address:** You can choose a specific short address from the drop down list, before you start search to readdress this control device with a new short address. This mode is supported by the DALI standard but makes in real life not much sense.
 - **control device(s) without short address:** This mode is the most common used mode to address only the new connected control devices without a short address on the DALI bus.

- **Auto names:** This option allows you a complete automatic search process. If this check box is checked, the software will search for new control devices and give each found devices a unique name consisting out of the prefix entered in the text filed Name for control devices and the assigned short address from 1 to 64.

- **Start, Stop, Continue Buttons:** While the search process will run, use this buttons to navigate through the addressing search process.

This process will add automatically all found DALI control devices to the project tree!

45.8.8 Query device states

This function tries to read out basic data of all DALI 2.0 (DALI24) control devices from the connected DALI bus. The result will be displayed in the grid view under the tab "Device status". A possible result could look like this:

Initialize lamps Search lamps Query lamp states Reorder Lamps Edit Groups Initialize devices Query device states

MODBUS
Address: 255 Baudrate: 57600 Parity: NONE Stopbits: 1 stopbit

Test bench

Test Bench DALI 1.0+2.0 | Lamp status | DALI Monitor | Device status

Short address	App Controller	Instances	Nr. of instances	Input device	Quiescent	SA=MASK	Application	Controller Error	Power Cycle seen	Reset state	Instance types
1	NO	YES	2	OK	YES	NO	NO	NO	YES	NO	I0:occupancy sensor,I1:light sensor
2	YES	YES	1	ERROR	YES	NO	NO	NO	YES	NO	I0:push button

You will find the following information in this grid view:

- **Short address:** The current short address of the tested control device
- **App controller:** The current state of the internal application controller of the device. YES indicates, that the application controller is running, NO indicates that the application controller is stopped.
- **Instances:** If the devices supports instances, this flag is YES, otherwise NO.
- **Nr. of instances:** Maximum number of instances of the device
- **Input device:** If the device supports input and everything is ok, this flag is OK, otherwise ERROR
- **Quiescent:** if the device is currently in quiescent mode (No events are generated by the devices) this flag is YES, otherwise NO.
- **SA=MASK:** This flag is YES if the short address is 255, 0xFF or MASK
- **Application:** This flag (Yes or No) indicates if the application is active or not
- **Controller error:** This flag (Yes or No) indicates if the application controller has an error or not
- **Power cycle seen:** This flag (Yes or No) indicates if the device has seen a power cycle since last DALI power on
- **Reset state:** This flag (Yes or No) indicates if the device is in reset state or not
- **Instance types:** this list shows the name of each instance of the device

45.8.9 DALI Monitor

We have implemented a DALI monitor feature in the software. Our RESI-DALI-SIO or RESI-DALI-ETH gateway can save up to 128 incoming or outgoing DALI frames in an internal FIFO. This FIFO is cyclically readout by this function and the DALI frames are decoded for easier understanding. If you activate this function you can use the rest of the software normal, so you can easily monitor all your activities. But don't forget to close the dialog by unchecking the checkbox Enable DALI monitor, before you change to another device in the project tree.

This feature is for better understanding, what happens on a DALI bus and for better error search in case of problems. You can save the log file in a text file and mail it to our support if you have a suspicious behavior on the DALI bus.

Also you can use our gateway to sniff a foreign DALI bus, what happens on the BUS or what special DALI events are sent by control devices.

Local COM port settings

Modbus unit: Device: Stopbits: IP-Address:

Baudrate: Parity: Port:

Device specific

RESI-DALI-SIO DALI to MODBUS/RTU+ASCII converter for 64 DALI lamps

Software version:

State:

MODBUS

Address: Baudrate: Parity: Stopbits:

Test bench

Test Bench DALI 1.0+2.0 | Lamp status | DALI Monitor | Device status

Enable DALI monitor | |

TYPE	DATA	ADDRESS	DESCRIPTION	TIMESTAMP	GAP
24.DALI24:TX	0xFFFE1D	Broadcast	Device:START QUIESCENCE MODE	19:43:21 25.08.2020	37ms
24.DALI24:TX	0xFFFE1D	Broadcast	Device:START QUIESCENCE MODE	19:43:21 25.08.2020	6.162s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:21 25.08.2020	29.685s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:21 25.08.2020	29.675s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:21 25.08.2020	29.682s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:21 25.08.2020	29.678s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:21 25.08.2020	29.678s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:21 25.08.2020	29.689s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:21 25.08.2020	29.680s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:21 25.08.2020	29.678s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:21 25.08.2020	29.687s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:21 25.08.2020	29.688s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:21 25.08.2020	29.689s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:21 25.08.2020	29.691s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:21 25.08.2020	29.686s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:21 25.08.2020	29.676s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:21 25.08.2020	29.676s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:21 25.08.2020	29.678s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:21 25.08.2020	29.685s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:21 25.08.2020	29.678s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:21 25.08.2020	29.677s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:21 25.08.2020	29.681s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:20 25.08.2020	29.686s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:20 25.08.2020	29.675s
24.DALI24:RX	0x888415	Event DSA-5	Instance number:0x01:Event:21,0x015	19:43:20 25.08.2020	3.672s
24.DALI24:TX	0xFFFE1E	Broadcast	Device:STOP QUIESCENCE MODE	19:43:20 25.08.2020	37ms
24.DALI24:TX	0xFFFE1E	Broadcast	Device:STOP QUIESCENCE MODE	19:43:20 25.08.2020	45ms
16:Command:TX	0xA100	Spcl cmd:161,0xA1	256:TERMINATE	19:43:20 25.08.2020	184ms
24.DALI24:TX	0x61FE35	DSA:49	Device:QUERY NUMBER OF INSTANCES	19:43:20 25.08.2020	184ms
24.DALI24:TX	0x61FE30	DSA:49	Device:QUERY DEVICE STATUS	19:43:20 25.08.2020	180ms
24.DALI24:TX	0x61FE46	DSA:49	Device:QUERY DEVICE CAPABILITIES	19:43:20 25.08.2020	295ms
24.DALI24:TX	0x5FFE35	DSA:48	Device:QUERY NUMBER OF INSTANCES	19:43:20 25.08.2020	184ms
24.DALI24:TX	0x5FFE30	DSA:48	Device:QUERY DEVICE STATUS	19:43:20 25.08.2020	183ms
24.DALI24:TX	0x5FFE46	DSA:48	Device:QUERY DEVICE CAPABILITIES	19:43:20 25.08.2020	310ms
24.DALI24:TX	0x5DFE35	DSA:47	Device:QUERY NUMBER OF INSTANCES	19:43:20 25.08.2020	182ms
24.DALI24:TX	0x5DFE30	DSA:47	Device:QUERY DEVICE STATUS	19:43:20 25.08.2020	183ms

45.8.10

45.9 Additional MODBUS register & coils

Here you will find only the additional MODBUS registers and coils especially for this IO module. Please refer to the description of the standard MODBUS mapping for more details about the available basic MODBUS registers and coils.

Please refer to the external document for detailed documentation of the current MODBUS register mapping for this IO module:

[RESI-L-DALI-SIO-ETH-MODBUS+ASCII-ENxx.pdf](#)

Don't forget, that there are some standard MODBUS registers for this device, which you cannot overwrite with your configuration!

45.10 Additional ASCII commands

Here you will find only the additional ASCII commands especially for this IO module. Please refer to the description of the standard commands for more details about the available basic ASCII commands.

Please refer to the external document for detailed documentation of the current ASCII commands for this IO module:

[RESI-L-DALI-SIO-ETH-MODBUS+ASCII-ENxx.pdf](#)

45.11 HOWTO use the MODBUS registers

This chapter will show sample code, how to use the MODBUS registers with a host.

HINT: Our demo software is designed for a MODBUS master, which uses for the registers the index 0 to 65535, not the MODBUS syntax of 1 to 65536.

45.11.1 Set brightness of a lamp

To set the brightness of a lamp use this register:

LAMP LEVEL	3x00511 4x00511 I:510	0,0x0000 B:00 00	639	50,0	UINT16 RW	NO
			0x027F			
			LAMP	2:LAMP SHORT ADDRESS 3		

Sets for a lamp short address a new brightness level between 0 and 254. 255 means MASK.
Upper 8 bits: 8-15: SHORTADDRESS: number of the lamp to be controlled (0..63)
Lower 8 bits: 0-7: VALUE: brightness value that should be send (0..254 for 0..100% and 255 for MASK)

Sample code:

```
// ASio: In our development system the handle to the serial port
// AUnitID: The unit ID of the RESI-DALI-SIO module
sub DALI.Brightness.Lamp(num ASIO,int AUnitID,int ALamp,int ABrightness)
  int v
  bit r
  // High 8 Bit of holding register is lamp address between 0 and 63
  // Low 8 Bit of holding register is brightness value between 0 and 254, 255 stands for MASK
  v=(ALamp<<8)|ABrightness
  // REGISTER: LAMP LEVEL 3x00511 4x00511 I:510
  r=ModbusMaster.MbWriteSingleRegister(ASIO,AUnitID,510,v)
  if r==true then
    DALI.Info("SUCCESS")
  else
    DALI.Info("ERROR with MODBUS communication")
  endif
endsub
```

Sample code to use this function:

```
// Set lamp 1 to 100%
DALI.Brightness.Lamp(SIO,255,1,254)
// Set lamp 3 to 50%
DALI.Brightness.Lamp(SIO,255,3,128)
// Set lamp 63 to 0%
DALI.Brightness.Lamp(SIO,255,63,0)
```

45.11.2 Set brightness of a group of lamps

To set the brightness of a group of lamps use this register:

GROUP LEVEL	3x00521 4x00521 I:520	0,0x0000 B:00 00	383	50,0	UINT16 RW	NO
			0x017F			
			GROUP	1:LAMP GROUP 2		

Sets for a lamp group a new brightness level between 0 and 254. 255 means MASK.
Upper 8 bits: 8-15: GROUP: number of the group to be controlled (0..15)
Lower 8 bits: 0-7: VALUE: brightness value that should be send (0..254 for 0..100% and 255 for MASK)

Sample code:

```
// ASio: In our development system the handle to the serial port
// AUnitID: The unit ID of the RESI-DALI-SIO module
sub DALI.Brightness.Group(num ASIO,int AUnitID,int AGroup,int ABrightness)
  int v
  bit r
  // High 8 Bit of holding register is group number between 0 and 15
  // Low 8 Bit of holding register is brightness value between 0 and 254, 255 stands for MASK
  v=(AGroup<<8)|ABrightness
  // REGISTER: GROUP LEVEL 3x00521 4x00521 I:520
  r=ModbusMaster.MbWriteSingleRegister(ASIO,AUnitID,520,v)
  if r==true then
    DALI.Info("SUCCESS")
  else
    DALI.Info("ERROR with MODBUS communication")
  endif
endsub
```

Sample code to use this function:

```
// Set group 1 to 100%
DALI.Brightness.Group(SIO,255,1,254)
// Set group 5 to 50%
DALI.Brightness.Group(SIO,255,5,128)
// Set group 15 to 0%
DALI.Brightness.Group(SIO,255,15,0)
```

45.11.3 Set brightness for all lamps

To set the brightness for all lamps use this register:

ALL LEVEL	3x00531 4x00531 I:530	0,0x0000 B:00 00	127	50,0	UINT16 R/W	NO
Sets for all lamps a new brightness level between 0 and 254. 255 means MASK. Upper 8 bits: 8-15: Unused, always 0 Lower 8 bits: 0-7: VALUE: brightness value that should be send (0. 254 for 0..100% and 255 for MASK)						
0x007F						

Sample code:

```
// ASio: In our development system the handle to the serial port
// AUnitID: The unit ID of the RESI-DALI-SIO module
sub DALI.Brightness.All(num ASIO,int AUnitID,int ABrightness)
  int v
  bit r
  // High 8 Bit of holding register is 0
  // Low 8 Bit of holding register is brightness value between 0 and 254, 255 stands for MASK
  v=ABrightness
  // REGISTER: ALL LEVEL 3x00531 4x00531 I:530
  r=ModbusMaster.MbWriteSingleRegister(ASIO,AUnitID,530,v)
  if r==true then
    DALI.Info("SUCCESS")
  else
    DALI.Info("ERROR with MODBUS communication")
  endif
endsub
```

Sample code to use this function:

```
// Set all ballasts to 100%
DALI.Brightness.All(SIO,255,254)
// Set all ballasts to 50%
DALI.Brightness.All(SIO,255,128)
// Set all ballasts to 0%
DALI.Brightness.All(SIO,255,0)
```

45.11.4 Send DALI 1.0 command to lamp

To send a DALI 1.0 command to a lamp use this register:

LAMP COMMAND DALI 1.0	3x00512 4x00512 I:511	????	919	A0	UINT16 W/O	NO
Sends a command to a specific lamp short address. The 16 bit value is divided into two parts: Upper 8 bits: 15-8: Short address of lamp 0..63 for lamp 1 to 64 Lower 8 bits: 7-0: Command value between 0 and 255 or 0x00 and 0xFF						
If you read this register, you can poll the 8 bit DALI answer. The return value is defined with: 0x0000: No answer received from the DALI bus up to now 0x20FF: A collision was detected on the DALI bus 0x00..0xFF: The 8 bit result of the last command. HINT: After you have read out the DALI result, the next MODBUS readout will again result in 0x0000 for no further 8 bit data! So you can only readout the result one time						
0x0397						
COMMAND 97: QUERY VERSION NUMBER						
LAMP 3: LAMP SHORT ADDRESS 4						

Sample code for sending a command to a specific DALI lamp. Please refer to the section Basic DALI command list for more details about commands.

```
// ASio: In our development system the handle to the serial port
// AUnitID: The unit ID of the RESI-DALI-SIO module
sub DALI.CommandLx.Lamp(num ASIO,int AUnitID,int ALamp,int ACommand)
  int v
  bit r
  v=(ALamp<<8) | ACommand
  // REGISTER: LAMP COMMAND DALI 1.0 3x00512 4x00512 I:511
  r=ModbusMaster.MbWriteSingleRegister(ASIO,AUnitID,511,v)
  if r==true then
    DALI.Info("SUCCESS")
  else
    DALI.Info("ERROR with MODBUS communication")
  endif
endsub
```

```
// Switch off lamp 1
DALI.Command1x.Lamp(SIO,255,1,0x00)
// recall max level lamp 63
DALI.Command1x.Lamp(SIO,255,63,0x05)
```

45.11.5 Send DALI 1.0 command to group of lamps

To send a DALI 1.0 command to a group of lamps use this register:

GROUP COMMAND DALI 1.0	3x00522 4x00522 I:521	????	151	A0	UINT16 W/O	NO
			0x0097			
			COMMAND	97:QUERY VERSION NUMBER		
			GROUP	0:LAMP GROUP 1		

Sends a command to a specific lamp group. The 16 bit value is divided into two parts:
 Upper 8 bits: 15-8: Group of lamp 0, 15 for lamp group 1 to 16
 Lower 8 bits: 7-0: Command value between 0 and 255 or 0x00 and 0xFF

If you read this register, you can poll the 8 bit DALI answer. The return value is defined with:
 0x0000: No answer received from the DALI bus up to now
 0x20FF: A collision was detected on the DALI bus
 0x00, 0xFF: The 8 bit result of the last command.
 HINT: After you have read out the DALI result, the next MODBUS readout will again result in 0x0000 for no further 8 bit data! So you can only readout the result one time

Sample code for sending a command to a specific DALI lamp group. Please refer to the section Basic DALI command list for more details about commands.

```
// ASio: In our development system the handle to the serial port
// AUnitID: The unit ID of the RESI-DALI-SIO module
sub DALI.Command1x.Group(num ASIO,int AUnitID,int AGroup,int ACommand)
  int v
  bit r
  v=(AGroup<<8)|ACommand
  // REGISTER: GROUP COMMAND DALI 1.0 3x00522 4x00522 I:521
  r=ModbusMaster.MbWriteSingleRegister(ASIO,AUnitID,521,v)
  if r==true then
    DALI.Info("SUCCESS")
  else
    DALI.Info("ERROR with MODBUS communication")
  endif
endsub

// Switch off lamp group 1
DALI.Command1x.Group(SIO,255,1,0x00)
// recall max level lamp group 15
DALI.Command1x.Group(SIO,255,15,0x05)
```

45.11.6 Send DALI 1.0 command to all lamps

To send a DALI 1.0 command to all lamps use this register:

ALL COMMAND DALI 1.0	3x00532 4x00532 I:531	????	151	A0	UINT16 W/O	NO
			0x0097			
			COMMAND	97:QUERY VERSION NUMBER		

Sends a command to all lamps. Only the lower 8 bits of the 16 bit value is used:
 Upper 8 bits: 15-8: Always 0
 Lower 8 bits: 7-0: Command value between 0 and 255 or 0x00 and 0xFF

If you read this register, you can poll the 8 bit DALI answer. The return value is defined with:
 0x0000: No answer received from the DALI bus up to now
 0x20FF: A collision was detected on the DALI bus
 0x00, 0xFF: The 8 bit result of the last command.
 HINT: After you have read out the DALI result, the next MODBUS readout will again result in 0x0000 for no further 8 bit data! So you can only readout the result one time

Sample code for sending a command to all DALI lamps. Please refer to the section Basic DALI command list for more details about commands.

```
// ASio: In our development system the handle to the serial port
// AUnitID: The unit ID of the RESI-DALI-SIO module
sub DALI.Command1x.All(num ASIO,int AUnitID,int ACommand)
  int v
  bit r
  // ACommand 8 bit
  v=ACommand
  // REGISTER: ALL COMMAND DALI 1.0 3x00532 4x00532 I:531
  r=ModbusMaster.MbWriteSingleRegister(ASIO,AUnitID,531,v)
  if r==true then
    DALI.Info("SUCCESS")
  else
    DALI.Info("ERROR with MODBUS communication")
  endif
endsub
```

```
// Switch off all lamps
DALI.Command1x.All(SIO,255,0x00)
// recall max level on all lamps
DALI.Command1x.All(SIO,255,0x05)
```

45.11.7 Send DALI 1.0 16 bit command to all lamps

To send a DALI 1.0 16 Bit command to all lamps use this register:

DIRECT 16 BIT COMMAND DALI 1.0	3x00542 4x00542 I:541	????	43264	A100	UINT16 W/O	NO
			0xA900			
			COMMAND	A900:COMPARE		
			V	A0		

Sends a 16 bit DALI 1.0 frame to the DALI bus line

If you read this register, you can poll the 8 bit DALI answer. The return value is defined with:
 0x0000: No answer received from the DALI bus up to now
 0x20FF: A collision was detected on the DALI bus
 0x00, 0xFF: The 8 bit result of the last command.
 HINT: After you have read out the DALI result, the next MODBUS readout will again result in 0x0000 for no further 8 bit data! So you can only readout the result one time

Sample code for sending a 16 bit command to all DALI lamps. Please refer to the section Basic DALI command list for more details about commands.

```
// ASIO: In our development system the handle to the serial port
// AUnitID: The unit ID of the RESI-DALI-SIO module
sub DALI.16BitCommand1x.All(num ASIO,int AUnitID,int ACommand)
  int v
  bit r
  // ACommand 16 bit
  v=ACommand
  // REGISTER: DIRECT 16 BIT COMMAND DALI 1.0 3x00542 4x00542 I:541
  r=ModbusMaster.MbWriteSingleRegister(ASIO,AUnitID,541,v)
  if r==true then
    DALI.Info("SUCCESS")
  else
    DALI.Info("ERROR with MODBUS communication")
  endif
endsub

// Load DTR with value 0x12
DALI.16BitCommand1x.All(SIO,255,0xA312)
// enable device type 8
DALI.16BitCommand1x.All(SIO,255,0xC108)

// Set short address 0 to 100%
DALI.16BitCommand1x.All(SIO,255,0x0x0000|(0<<9)|0xFE)
// Set short address 63 to 100%
DALI.16BitCommand1x.All(SIO,255,0x0x0000|(63<<9)|0xFE)
// Set group address 0 to 100%
DALI.16BitCommand1x.All(SIO,255,0x0x8000|(0<<9)|0xFE)
// Set group address 15 to 100%
DALI.16BitCommand1x.All(SIO,255,0x0x8000|(15<<9)|0xFE)
// Set all lamps to 100%
DALI.16BitCommand1x.All(SIO,255,0x0xFE00|0xFE)

// Send command OFF to short address 0
DALI.16BitCommand1x.All(SIO,255,0x0x0100|(0<<9)|0x00)
// Send command OFF to short address 63
DALI.16BitCommand1x.All(SIO,255,0x0x0100|(63<<9)|0x00)
// Send command OFF to group address 0
DALI.16BitCommand1x.All(SIO,255,0x0x8100|(0<<9)|0x00)
// Send command OFF to group address 15
DALI.16BitCommand1x.All(SIO,255,0x0x8100|(15<<9)|0x00)
// Send command OFF ot all lamps
DALI.16BitCommand1x.All(SIO,255,0x0xFF00|0x00)
```

45.11.8 Send DALI 1.0 command twice to lamp

Special DALI commands need to be sent twice within 100ms to the DALI ballasts. Therefore we have special MODBUS registers implemented. To send a DALI 1.0 command to a lamp twice within 100ms use this register:

LAMP COMMAND+REPEAT DALI 1.0	3x00513 4x00513 I:512	????	768	A0		UINT16 W/O	NO
			0x0300				
			COMMAND	00:OFF			
			LAMP	3:LAMP SHORT ADDRESS 4			

Sends a command twice within 100ms to a specific lamp short address. The 16 bit value is divided into two parts:
Upper 8 bits:15-8: Short address of lamp 0, 83 for lamp 1 to 84
Lower 8 bits:7-0: Command value between 0 and 255 or 0x00 and 0xFF

If you read this register, you can poll the 8 bit DALI answer. The return value is defined with:
0x0000: No answer received from the DALI bus up to now
0x20FF: A collision was detected on the DALI bus
0x00, 0xFF: The 8 bit result of the last command.
HINT: After you have read out the DALI result, the next MODBUS readout will again result in 0x0000 for no further 8 bit data! So you can only readout the result one time

Sample code for sending a command twice to a specific DALI lamp. Please refer to the section Basic DALI command list for more details about commands.

```
// ASio: In our development system the handle to the serial port
// AUnitID: The unit ID of the RESI-DALI-SIO module
sub DALI.Command2x.Lamp(num ASIO,int AUnitID,int ALamp,int ACommand)
  int v
  bit r
  v=(ALamp<<8)|ACommand
  // REGISTER: LAMP COMMAND+REPEAT DALI 1.0 3x00513 4x00513 I:512
  r=ModbusMaster.MbWriteSingleRegister(ASIO,AUnitID,512,v)
  if r==true then
    DALI.Info("SUCCESS")
  else
    DALI.Info("ERROR with MODBUS communication")
  endif
endsub

// Send STORE ACTUAL LEVEL IN DTR to ballast 1
DALI.Command2x.Lamp(SIO,255,1,0x21)

// Load DTR with value 0xFE 100%
DALI.16BitCommand1x.All(SIO,255,0xA3FE)
// Send STORE THE DTR AS MAX LEVEL to ballast 1
DALI.Command2x.Lamp(SIO,255,1,0x2A)
```

45.11.9 Send DALI 1.0 command twice to group of lamps

Special DALI commands need to be sent twice within 100ms to the DALI ballasts. Therefore we have special MODBUS registers implemented. To send a DALI 1.0 command to a lamp group twice within 100ms use this register:

GROUP COMMAND+REPEAT DALI 1.0	3x00523 4x00523 I:522	????	0	A0		UINT16 W/O	NO
			0x0000				
			COMMAND	00:OFF			
			GROUP	0:LAMP GROUP 1			

Sends a command twice within 100ms to a specific lamp group. The 16 bit value is divided into two parts:
Upper 8 bits:15-8: Group of lamp 0, 15 for lamp group 1 to 18
Lower 8 bits:7-0: Command value between 0 and 255 or 0x00 and 0xFF

If you read this register, you can poll the 8 bit DALI answer. The return value is defined with:
0x0000: No answer received from the DALI bus up to now
0x20FF: A collision was detected on the DALI bus
0x00, 0xFF: The 8 bit result of the last command.
HINT: After you have read out the DALI result, the next MODBUS readout will again result in 0x0000 for no further 8 bit data! So you can only readout the result one time

Sample code for sending a command to a specific DALI lamp group. Please refer to the section Basic DALI command list for more details about commands.

```
// ASio: In our development system the handle to the serial port
// AUnitID: The unit ID of the RESI-DALI-SIO module
sub DALI.Command2x.Group(num ASIO,int AUnitID,int AGroup,int ACommand)
  int v
  bit r
  v=(AGroup<<8)|ACommand
  // REGISTER: GROUP COMMAND+REPEAT DALI 1.0 3x00523 4x00523 I:522
  r=ModbusMaster.MbWriteSingleRegister(ASIO,AUnitID,522,v)
  if r==true then
    DALI.Info("SUCCESS")
  else
    DALI.Info("ERROR with MODBUS communication")
  endif
endsub
```

```
// Send STORE ACTUAL LEVEL IN DTR to lamp group 15
DALI.Command2x.Group(SIO,255,15,0x21)

// Load DTR with value 0xFE 100%
DALI.16BitCommand1x.All(SIO,255,0xA3FE)
// Send STORE THE DTR AS MAX LEVEL to ballast group 3
DALI.Command2x.Group(SIO,255,3,0x2A)
```

45.11.10 Send DALI 1.0 command twice to all lamps

Special DALI commands need to be sent twice within 100ms to the DALI ballasts. Therefore we have special MODBUS registers implemented. To send a DALI 1.0 command to all lamps twice within 100ms use this register:

ALL COMMAND+REPEAT DALI 1.0	3x00533 4x00533 I:532	????	0	A0	UINT16 W/O	NO
			0x0000			
			COMMAND	00:OFF		

Sends a command twice within 100ms to all lamps. Only the lower 8 bits of the 16 bit value is used:
 Upper 8 bits: 15-8: Always 0
 Lower 8 bits: 7-0: Command value between 0 and 255 or 0x00 and 0xFF

If you read this register, you can poll the 8 bit DALI answer. The return value is defined with:
 0x0000: No answer received from the DALI bus up to now
 0x20FF: A collision was detected on the DALI bus
 0x00, 0xFF: The 8 bit result of the last command.
 HINT: After you have read out the DALI result, the next MODBUS readout will again result in 0x0000 for no further 8 bit data! So you can only readout the result one time

Sample code for sending a command to all DALI lamps. Please refer to the section Basic DALI command list for more details about commands.

```
// ASio: In our development system the handle to the serial port
// AUnitID: The unit ID of the RESI-DALI-SIO module
sub DALI.Command2x.All(num ASIO,int AUnitID,int ACommand)
  int v
  bit r
  // ACommand is 8 bit
  v=ACommand
  // REGISTER: ALL COMMAND+REPEAT DALI 1.0 3x00533 4x00533 I:532
  r=ModbusMaster.MbWriteSingleRegister(ASIO,AUnitID,532,v)
  if r==true then
    DALI.Info("SUCCESS")
  else
    DALI.Info("ERROR with MODBUS communication")
  endif
endsub

// Send STORE ACTUAL LEVEL IN DTR to all lamps
DALI.Command2x.All(SIO,255,0x21)

// Load DTR with value 0xFE 100%
DALI.16BitCommand1x.All(SIO,255,0xA3FE)
// Send STORE THE DTR AS MAX LEVEL to all lamps
DALI.Command2x.All(SIO,255,0x2A)
```

45.11.11 Send DALI 1.0 16 bit command twice to all lamps

Special DALI 16 bit commands need to be sent twice within 100ms to the DALI ballasts. Therefore we have special MODBUS registers implemented. To send a DALI 1.0 16 bit command to all lamps twice within 100ms use this register:

DIRECT 16 BIT COMMAND+REPEAT DALI 1.0	3x00543 4x00543 I:542	????	41215	A100	UINT16 W/O	NO
			0xA100			
			COMMAND	A100:TERMINATE		
			V	A0		

Sends a 16 bit DALI 1.0 frame twice within 100ms to the DALI bus line

If you read this register, you can poll the 8 bit DALI answer. The return value is defined with:
 0x0000: No answer received from the DALI bus up to now
 0x20FF: A collision was detected on the DALI bus
 0x00, 0xFF: The 8 bit result of the last command.
 HINT: After you have read out the DALI result, the next MODBUS readout will again result in 0x0000 for no further 8 bit data! So you can only readout the result one time

Sample code for sending a 16 bit command to all DALI lamps. Please refer to the section Basic DALI command list for more details about commands.

```
// ASIO: In our development system the handle to the serial port
// AUnitID: The unit ID of the RESI-DALI-SIO module
sub DALI.16BitCommand2x.All(num ASIO,int AUnitID,int ACommand)
  int v
  bit r
  v=ACommand
  // REGISTER: DIRECT 16 BIT COMMAND+REPEAT DALI 1.0 3x00543 4x00543 I:542
  r=ModbusMaster.MbWriteSingleRegister(ASIO,AUnitID,542,v)
  if r==true then
    DALI.Info("SUCCESS")
  else
    DALI.Info("ERROR with MODBUS communication")
  endif
endsub

// Start random addressing mode INITIALIZE (ALL GEARS)
DALI.16BitCommand2x.All(SIO,255,0xA500)
```

45.11.12 Send DALI 1.0 command to lamp and wait for answer

To send a DALI 1.0 command to a lamp and wait for the answer use this register:

LAMP COMMAND DALI 1.0	3x00512 4x00512 I:511	????	919	A0		UINT16 W/O	NO
			0x0397				
			COMMAND	97:QUERY VERSION NUMBER			
			LAMP	3:LAMP SHORT ADDRESS 4			

Sends a command to a specific lamp short address. The 16 bit value is divided into two parts:
Upper 8 bits: 15-8: Short address of lamp 0..83 for lamp 1 to 84
Lower 8 bits: 7-0: Command value between 0 and 255 or 0x00 and 0xFF

If you read this register, you can poll the 8 bit DALI answer. The return value is defined with:
0x8000: No answer received from the DALI bus up to now
0x20FF: A collision was detected on the DALI bus
0x00..0xFF: The 8 bit result of the last command.
HINT: After you have read out the DALI result, the next MODBUS readout will again result in 0x8000 for no further 8 bit data! So you can only readout the result one time

Sample code for sending a command to a specific DALI lamp and wait for the answer or timeout. Please refer to the section Basic DALI command list for more details about commands.

```
// ASio: In our development system the handle to the serial port
// AUnitID: The unit ID of the RESI-DALI-SIO module
sub DALI.CommandIx.Answer.Lamp(num ASIO,int AUnitID,int ALamp,int ACommand,intadr AAnswer)
    int v
    bit r,ok
    num Timeout
    v=(ALamp<<8) |ACommand
    AAnswer=0xFFFFFFFF
    // REGISTER: LAMP COMMAND DALI 1.0 3x00512 4x00512 I:511
    r=ModbusMaster.MbWriteSingleRegister(ASIO,AUnitID,511,v)
    if r then
        // We define 2000ms Timeout, if no answer is available...
        Timeout=DateTime.ActualDateTime2Num()+DateTime.MilliSeconds2Num(2000.)
        ok=false
        while DateTime.ActualDateTime2Num()<=Timeout and not ok
            r=ModbusMaster.MbReadHoldingRegisters(ASIO,AUnitID,511,v,1)
            if r==true then
                // 0x8000 means wait for answer
                // 0x20FF means collision
                // 0x00 to 0xFF means 8 bit answer
                if v!=0x8000 then
                    DALI.Info("Answer is here:"+String.FormatHex(v,4))
                    AAnswer=v
                    ok=true
                endif
            endif
        endwhile
    endif
endsub

// query status of lamp 0
int MyAnswer

DALI.CommandIx.Answer.Lamp(SIO,255,0,0x90,MyAnswer)
if MyAnswer==0xFFFFFFFF then
    DALI.Info("Host Timeout has happened")
elseif MyAnswer==0x20FF then
    DALI.Info("DALI bus collision has happened")
else
    DALI.Info("DALI Asnwer is:"+String.FormatHex(MyAnswer,4))
endif
```

45.11.13 Send DALI 1.0/2.0 command frames

To send a DALI 1.0 or DALI 2.0 commands to the DALI bus system use this registers:

DALI 8 BIT FRAME							
DALI10 SEND 8 BIT DALI FRAME	3x10001 4x10001 I:10000	????	255	FF		UINT32 W/O	YES
Writing a 8 bit value to this register generates a 8 bit DALI/DSI value on the DALI bus							
DALI10 SEND 8 BIT DALI FRAME AND REPEAT WITHIN 100ms	3x10003 4x10003 I:10002	????	160	A0		UINT32 W/O	YES
Writing a 8 bit value to this register generates a 8 bit DALI/DSI value on the DALI bus							
DALI10 SEND 8 BIT DALI FRAME	3x10005 4x10005 I:10004	????	255	FF		UINT32R W/O	YES
Writing a 8 bit value to this register generates a 8 bit DALI/DSI value on the DALI bus							
DALI10 SEND 8 BIT DALI FRAME AND REPEAT WITHIN 100ms	3x10007 4x10007 I:10006	????	160	A0		UINT32R W/O	YES
Writing a 8 bit value to this register generates a 8 bit DALI/DSI value on the DALI bus							
DALI 16 BIT FRAME							
DALI10 SEND 16 BIT DALI FRAME	3x10011 4x10011 I:10010	????	65278	FEFE		UINT32 W/O	YES
Writing a 16 bit value to this register generates a 16 bit DALI1.0 command on the DALI bus							
DALI10 SEND 16 BIT DALI FRAME AND REPEAT WITHIN 100ms	3x10013 4x10013 I:10012	????	65024	FE00		UINT32 W/O	YES
Writing a 16 bit value to this register generates a 16 bit DALI1.0 command on the DALI bus							
DALI10 SEND 16 BIT DALI FRAME	3x10015 4x10015 I:10014	????	65278	FEFE		UINT32R W/O	YES
Writing a 16 bit value to this register generates a 16 bit DALI1.0 command on the DALI bus							
DALI10 SEND 16 BIT DALI FRAME AND REPEAT WITHIN 100ms	3x10017 4x10017 I:10016	????	65024	FE00		UINT32R W/O	YES
Writing a 16 bit value to this register generates a 16 bit DALI1.0 command on the DALI bus							
DALI 24 BIT FRAME							
DALI20 SEND 24 BIT DALI FRAME	3x10021 4x10021 I:10020	????	8946700	88840C		UINT32 W/O	YES
Writing a 24 bit value to this register generates a 24 bit DALI2.0 frame on the DALI bus							
DALI20 SEND 24 BIT DALI FRAME AND REPEAT WITHIN 100ms	3x10023 4x10023 I:10022	????	8946701	88840D		UINT32 W/O	YES
Writing a 24 bit value to this register generates a 24 bit DALI2.0 frame on the DALI bus							
DALI20 SEND 24 BIT DALI FRAME	3x10025 4x10025 I:10024	????	8946700	88840C		UINT32R W/O	YES
Writing a 24 bit value to this register generates a 24 bit DALI2.0 frame on the DALI bus							
DALI20 SEND 24 BIT DALI FRAME AND REPEAT WITHIN 100ms	3x10027 4x10027 I:10026	????	8946701	88840D		UINT32R W/O	YES
Writing a 24 bit value to this register generates a 24 bit DALI2.0 frame on the DALI bus							

DALI 25 BIT eDALI FRAME – automatic redundand bit						
DALI20 SEND 25 BIT eDALI FRAME	3x10031 4x10031 I:10030	????	272742	42966	UINT32 W/O	YES
Writing a 24 bit value to this register generates out of a 24 bit eDALI command a valid 25 bit eDALI frame on the DALI bus						
DALI20 SEND 25 BIT eDALI FRAME AND REPEAT WITHIN 100ms	3x10033 4x10033 I:10032	????	272743	42967	UINT32 W/O	YES
Writing a 24 bit value to this register generates out of a 24 bit eDALI command a valid 25 bit eDALI frame on the DALI bus						
DALI20 SEND 25 BIT eDALI FRAME	3x10035 4x10035 I:10034	????	272742	42966	UINT32R W/O	YES
Writing a 24 bit value to this register generates out of a 24 bit eDALI command a valid 25 bit eDALI frame on the DALI bus						
DALI20 SEND 24 BIT DALI FRAME AND REPEAT WITHIN 100ms	3x10037 4x10037 I:10036	????	272743	42967	UINT32R W/O	YES
Writing a 24 bit value to this register generates out of a 24 bit eDALI command a valid 25 bit eDALI frame on the DALI bus						
DALI 25 BIT eDALI FRAME – user defined redundand bit						
DALI20 SEND 25 BIT eDALI FRAME	3x10041 4x10041 I:10040	????	545382	85266	UINT32 W/O	YES
Writing a 25 bit value to this register generates a 25 bit eDALI frame on the DALI bus						
DALI20 SEND 25 BIT eDALI FRAME AND REPEAT WITHIN 100ms	3x10043 4x10043 I:10042	????	545383	85267	UINT32 W/O	YES
Writing a 25 bit value to this register generates a 25 bit eDALI frame on the DALI bus						
DALI20 SEND 25 BIT eDALI FRAME	3x10045 4x10045 I:10044	????	545382	85266	UINT32R W/O	YES
Writing a 25 bit value to this register generates a 25 bit eDALI frame on the DALI bus						
DALI20 SEND 25 BIT DALI FRAME AND REPEAT WITHIN 100ms	3x10047 4x10047 I:10046	????	545383	85267	UINT32R W/O	YES
Writing a 25 bit value to this register generates a 25 bit eDALI frame on the DALI bus						
DALI 28 BIT FRAME						
DALI20 SEND 28 BIT DALI FRAME	3x10051 4x10051 I:10050	????	19088743	1234567	UINT32 W/O	YES
Writing a 28 bit value to this register generates a 28 bit DALI2.0 frame on the DALI bus						
DALI20 SEND 28 BIT DALI FRAME AND REPEAT WITHIN 100ms	3x10053 4x10053 I:10052	????	19088744	1234568	UINT32 W/O	YES
Writing a 28 bit value to this register generates a 28 bit DALI2.0 frame on the DALI bus						
DALI20 SEND 28 BIT DALI FRAME	3x10055 4x10055 I:10054	????	19088743	1234567	UINT32R W/O	YES
Writing a 28 bit value to this register generates a 28 bit DALI2.0 frame on the DALI bus						
DALI20 SEND 28 BIT DALI FRAME AND REPEAT WITHIN 100ms	3x10057 4x10057 I:10056	????	19088744	1234568	UINT32R W/O	YES
Writing a 28 bit value to this register generates a 28 bit DALI2.0 frame on the DALI bus						
DALI 32 BIT FRAME						
DALI20 SEND 32 BIT DALI FRAME	3x10051 4x10051 I:10050	????	305419896	12345678	UINT32 W/O	YES
Writing a 32 bit value to this register generates a 32 bit DALI2.0 frame on the DALI bus						
DALI20 SEND 32 BIT DALI FRAME AND REPEAT WITHIN 100ms	3x10053 4x10053 I:10052	????	305419896	12345678	UINT32 W/O	YES
Writing a 32 bit value to this register generates a 32 bit DALI2.0 frame on the DALI bus						
DALI20 SEND 32 BIT DALI FRAME	3x10055 4x10055 I:10054	????	305419896	12345678	UINT32R W/O	YES
Writing a 32 bit value to this register generates a 32 bit DALI2.0 frame on the DALI bus						
DALI20 SEND 32 BIT DALI FRAME AND REPEAT WITHIN 100ms	3x10057 4x10057 I:10056	????	305419896	12345678	UINT32R W/O	YES
Writing a 32 bit value to this register generates a 32 bit DALI2.0 frame on the DALI bus						

Sample code for sending commands with special frame length. Please refer to the section Basic DALI command list for more details about commands.

```
// ASIO: In our development system the handle to the serial port
// AUnitID: The unit ID of the RESI-DALI-SIO module
sub DALI.Command.nBits(num ASIO,int AUnitID,int ABits,int ACommand,bit ARepeat)
    int V[2]
    bit r
    // Split ACommand into two 16 bit registers
    V[0]=(ACommand>>16)&0xFFFF
    V[1]=ACommand&0xFFFF
    if ABits==8 then
        // REGISTER: DALI10 SEND 8 BIT DALI FRAME      3x10001 4x10001 I:10000
        // REGISTER: DALI10 SEND 8 BIT DALI FRAME AND REPEAT WITHIN 100ms 3x10003 4x10003 I:10002
        if ARepeat==false then
            r=ModbusMaster.MbWriteMultipleRegisters(ASIO,AUnitID,10000,V,2)
        else
            r=ModbusMaster.MbWriteMultipleRegisters(ASIO,AUnitID,10002,V,2)
        endif
        return
    elseif ABits==16 then
        // REGISTER: DALI10 SEND 16 BIT DALI FRAME      3x10011 4x10011 I:10010
        // REGISTER: DALI10 SEND 16 BIT DALI FRAME AND REPEAT WITHIN 100ms 3x10013 4x10013 I:10012
        if ARepeat==false then
            r=ModbusMaster.MbWriteMultipleRegisters(ASIO,AUnitID,10010,V,2)
        endif
    endsub
```

```

else
    r=ModbusMaster.MbWriteMultipleRegisters(ASIO,AUnitID,10012,V,2)
endif
return
elseif ABits==24 then
// REGISTER: DALI20 SEND 24 BIT DALI FRAME    3x10021 4x10021 I:10020
// REGISTER: DALI20 SEND 24 BIT DALI FRAME AND REPEAT WITHIN 100ms 3x10023 4x10023 I:10022
if ARepeat==false then
    r=ModbusMaster.MbWriteMultipleRegisters(ASIO,AUnitID,10020,V,2)
else
    r=ModbusMaster.MbWriteMultipleRegisters(ASIO,AUnitID,10022,V,2)
endif
return
elseif ABits==25 then
// REGISTER: DALI20 SEND 25 BIT eDALI FRAME    3x10031 4x10031 I:10030
// REGISTER: DALI20 SEND 25 BIT eDALI FRAME AND REPEAT WITHIN 100ms    3x10033 4x10033 I:10032
if ARepeat==false then
    r=ModbusMaster.MbWriteMultipleRegisters(ASIO,AUnitID,10030,V,2)
else
    r=ModbusMaster.MbWriteMultipleRegisters(ASIO,AUnitID,10032,V,2)
endif
return
elseif ABits==28 then
// REGISTER: DALI20 SEND 28 BIT DALI FRAME    3x10051 4x10051 I:10050
// REGISTER: DALI20 SEND 28 BIT DALI FRAME AND REPEAT WITHIN 100ms 3x10053 4x10053 I:10052
if ARepeat==false then
    r=ModbusMaster.MbWriteMultipleRegisters(ASIO,AUnitID,10050,V,2)
else
    r=ModbusMaster.MbWriteMultipleRegisters(ASIO,AUnitID,10052,V,2)
endif
return
elseif ABits==32 then
// REGISTER: DALI20 SEND 32 BIT DALI FRAME    3x10061 4x10061 I:10060
// REGISTER: DALI20 SEND 32 BIT DALI FRAME AND REPEAT WITHIN 100ms 3x10063 4x10063 I:10062
if ARepeat==false then
    r=ModbusMaster.MbWriteMultipleRegisters(ASIO,AUnitID,10060,V,2)
else
    r=ModbusMaster.MbWriteMultipleRegisters(ASIO,AUnitID,10062,V,2)
endif
return
else
    DALI.Info("Wrong DALI frame bit length!")
endif
endsub

// query status of lamp 0
int MyAnswer

DALI.CommandIx.Answer.Lamp(SIO,255,0,0x90,MyAnswer)
if MyAnswer==0xFFFFFFFF then
    DALI.Info("Host Timeout has happened")
elseif MyAnswer==0x20FF then
    DALI.Info("DALI bus collision has happened")
else
    DALI.Info("DALI Answer is:"+String.FormatHex(MyAnswer,4))
endif

// Send 8 bit value without repeat
DALI.Command.nBits(SIO,255,8,0xFF,false)
// Send 16 bit command Brightness to 0% to all lamps
DALI.Command.nBits(SIO,255,16,0xFE00,false)
// Send 24 bit DALI 2.0 control gear command and repeat it within 100ms
DALI.Command.nBits(SIO,255,24,0x123456,true)
// Send 25 bit eDALI frame
DALI.Command.nBits(SIO,255,25,0x123456,false)
// Send 28 bit DALI frame for future use
DALI.Command.nBits(SIO,255,28,0x1234567,false)
// Send 32 bit DALI frame for future use
DALI.Command.nBits(SIO,255,32,0x12345678,false)

```

45.11.14 Receive DALI 1.0/2.0 frames

To received a DALI 1.0 or DALI 2.0 frames the gateway has an internal ring puffer. To red out this ring puffer, you can use this registers:

DALI ANSWER RING PUFFER						
DALI RING PUFFER COUNTER	3x20001 4x20001 I:20000	1,0x0001 B:00 01	1	1		UINT16 R/O
Returns a 16 bit counter for indicating a change in the received data. Every time the gateway receives a new DALI frame this counter will be incremented by one.						
DALI RING PUFFER FLAGS	3x20002 4x20002 I:20001	2,0x0002 B:00 02	1	1		UINT16 R/O
Flags of the received DALI frame:2 -> 2:RX						
Indicates additional information for the DALI frame: =1: DALI frame was transmitted by the gateway =2: DALI frame was received by the gateway =3: DALI collision on the bus detected						
DALI RING PUFFER BITLENGTH	3x20003 4x20003 I:20002	24,0x0018 B:00 18	1	1		UINT16 R/O
Bit size of last received DALI frame:24 bits						
Indicates the DALI frame length in bits of the last received DALI frame						
DALI RING PUFFER DATA 32 BIT	3x20004 4x20004 I:20003	8946700,0x0088840C B:00 88 84 0C	1	1		UINT32 R/O
32 bit DALI frame from ring puffer:0088840C						
Contains the 32 bit value of the last received DALI frame						
DALI RING PUFFER TICKS	3x20006 4x20006 I:20005	24449,0x00005F81 B:00 00 5F 81	1	1		UINT32 R/O
Gap to previous DALI frame:24449ms -> 24,449s						
Contains a value in Milliseconds, which describes the gap to the previous DALI frame on the DALI bus.						
DALI RING PUFFER DATA 32 BIT	3x20008 4x20008 I:20007	8946700,0x0088840C B:84 0C 00 88	1	1		UINT32R R/O
32 bit DALI frame from ring puffer:0088840C						
Contains the 32 bit value of the last received DALI frame						
DALI RING PUFFER TICKS	3x20010 4x20010 I:20009	24449,0x00005F81 B:5F 81 00 00	1	1		UINT32R R/O
Gap to previous DALI frame:24449ms -> 24,449s						
Contains a value in Milliseconds, which describes the gap to the previous DALI frame on the DALI bus.						

Sample code for reading the internal ring puffer:

```
// Counter of last read ring puffer entry
int OldCounter

sub DALI.Init()
    OldCounter=0xFFFFFFFF
endsub

// ASio: In our development system the handle to the serial port
// AUnitID: The unit ID of the RESI-DALI-SIO module
function bit DALI.Check.RxRing(num ASIO,int AUnitID,intadr ACounter,intadr AFlags,intadr ABits,intadr
AFrame,intadr AGap)
    int V[7]
    bit r
    // REGISTER: DALI RING PUFFER COUNTER 3x20001 4x20001 I:20000
    // REGISTER: DALI RING PUFFER FLAGS 3x20002 4x20002 I:20001
    // REGISTER: DALI RING PUFFER BITLENGTH 3x20003 4x20003 I:20002
    // REGISTER: DALI RING PUFFER DATA 3x20004 4x20004 I:20003
    // REGISTER: DALI RING PUFFER TICKS 3x20006 4x20006 I:20005
    r=ModbusMaster.MbWriteMultipleRegisters(ASIO,AUnitID,10000,V,7)
    if r==true then
        ACounter=V[0]
        AFlags=V[1]
        ABits=V[2]
        // UINT32 -> first register: HIGH 16 bit word, second register LOW 16 bit word
        AFrame=(V[3]<<16)|V[4]
        // UINT32 -> first register: HIGH 16 bit word, second register LOW 16 bit word
        AGap=(V[5]<<16)|V[6]
        // Check for new data in ring buffer ...
        if ACounter!=OldCounter then
            OldCounter=ACounter
            return true
        else
            return false
        endif
    else
        DALI.Info("MODBUS error")
        return false
    endif
    return false
endfunction
```

```
// Init system
DALI.Init()

sub DALI.Test.Receive()
  int MyCounter
  int MyFlags
  int MyBits
  int MyFrame
  int MyGap
  while true
    // Check for new data in receive ringpuffer...
    if DALI.Check.RxRing(SIO,UnitID,MyCounter,MyFlags,MyBits,MyFrame,MyGap) then

      // Check flags
      if MyFlags==1 then
        DALI.Info("DALI frame was sended by the RESI-SIO-xxx gateway")
      elseif MyFlags==2 then
        DALI.Info("DALI frame was received by the RESI-SIO-xxx gateway")
      elseif MyFlags==3 then
        DALI.Info("Collision on the DALI bus was detected by RESI-SIO-xxx gateway")
      endif

      // Check Bit Length
      if MyBits==8 then
        DALI.Info("8 bit frame:DALI 1.0 answer:"+String.FormatHex(MyFrame&0xFF,2))
      elseif MyBits==16 then
        DALI.Info("16 bit frame:DALI 1.0 command:"+String.FormatHex(MyFrame&0xFFFF,6))
      elseif MyBits==24 then
        DALI.Info("24 bit frame:DALI 2.0 command:"+String.FormatHex(MyFrame&0xFFFFFF,6))
      elseif MyBits==25 then
        DALI.Info("25 bit frame:eDALI command:"+String.FormatHex(MyFrame&0FFFFFFF,6))
      elseif MyBits==28 then
        DALI.Info("28 bit frame:future use:"+String.FormatHex(MyFrame&0FFFFFFF,7))
      elseif MyBits==32 then
        DALI.Info("32 bit frame:future use:"+String.FormatHex(MyFrame,8))
      else
        DALI.Info("Invalid frame:"+String.FormatInt(MyBits,1)+":"+String.FormatHex(MyFrame,8))
      endif

      // Show gap time to previous DALI frame
      DALI.Info("Gap:"+String.FormatInt(MyGap,1)+"ms")

    endif
  endwhile
endsub
```

45.12 Basic DALI command list

This is an excerpt from the DALI standard, it is only for quick information. For more details refer to the original DALI standard.

STANDARD	VALUE	COMMAND	ADDRESSING/PARAMETER	FUNCTION
DALI 1.0	0,0x00	OFF	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: NO	Switch off lamp
DALI 1.0	1,0x01	UP	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: NO	Dim lamp up for 200ms. If the lamp was switched off it stays switched off.
DALI 1.0	2,0x02	DOWN	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: NO	Dim lamp down for 200ms. As soon as the lower brightness threshold level is reached the lamp stays at this value.
DALI 1.0	3,0x03	STEP UP	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: NO	Lamp switches one step brighter. If the lamp was switched off it stays switched off.
DALI 1.0	4,0x04	STEP DOWN	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: NO	Lamp switches one step darker. As soon as the lower brightness threshold level is reached the lamp stays at this value.
DALI 1.0	5,0x05	RECALL MAX LEVEL	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: NO	Set lamp to maximal threshold level.
DALI 1.0	6,0x06	RECALL MIN LEVEL	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: NO	Set lamp to minimal threshold level.
DALI 1.0	7,0x07	STEP DOWN AND OFF	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: NO	Lamp switches one step darker. If the lower brightness threshold level is reached the lamp switches off.
DALI 1.0	8,0x08	ON AND STEP UP	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: NO	Lamp switches one step brighter. If the lamp was switched off it is now switched on.
DALI 1.0	9,0x09	ENABLE DAPC SEQUENCE	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: NO	This command defines the start of a direct arc power control (DAPC) sequence that allows the host to control the dimming speed by sending direct arc power commands.
DALI 1.0	10,0x0A	GOTO LAST ACTIVE LEVEL	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: NO	Indirect Arc Power command. The last active level will be restored.
DALI 1.0	16,0x10 to 31,0x1F	GOTO SCENE x	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: NO	Load scene value stored in scene 0 to 15.
DALI 1.0	32,0x20	RESET	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	Reset the ballast
DALI 1.0	33,0x21	STORE ACTUAL LEVEL IN DTR	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	Stores the actual brightness level in the register DTR
DALI 1.0	42,0x2A	STORE THE DTR AS MAX LEVEL	ADDRESSING: LAMP, GROUP, ALL DTR: YES, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	Stores the actual register value DTR as maximum level for lamp
DALI 1.0	43,0x2B	STORE THE DTR AS MIN LEVEL	ADDRESSING: LAMP, GROUP, ALL DTR: YES, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	Stores the actual register value DTR as minimum level for lamp
DALI 1.0	44,0x2C	STORE DTR AS SYSTEM FAILURE LEVEL	ADDRESSING: LAMP, GROUP, ALL DTR: YES, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	Stores the actual register value DTR as system failure level for lamp
DALI 1.0	45,0x2D	STORE DTR AS POWER ON LEVEL	ADDRESSING: LAMP, GROUP, ALL DTR: YES, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	Stores the actual register value DTR as power on level for lamp
DALI 1.0	46,0x2E	STORE DTR AS FADE TIME	ADDRESSING: LAMP, GROUP, ALL DTR: YES, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	Stores the actual register value DTR as fade time for lamp
DALI 1.0	47,0x2F	STORE DTR AS FADE RATE	ADDRESSING: LAMP, GROUP, ALL DTR: YES, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	Stores the actual register value DTR as fade rate for lamp
DALI 1.0	64,0x40 to 79,0x4F	STORE THE DTR AS SCENE x	ADDRESSING: LAMP, GROUP, ALL DTR: YES, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	Stores the actual register value DTR as new brightness level for scene x (0 to 15)
DALI 1.0	80,0x50 to 95,0x5F	REMOVE FROM SCENE x	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	Removes the affected lamps from the scene x (0 to 15)

STANDARD	VALUE	COMMAND	ADDRESSING/PARAMETER	FUNCTION
DALI 1.0	96,0x60 to 111,0x6F	ADD TO GROUP x	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	Adds the lamps to group x (0 to 15)
DALI 1.0	112,0x70 to 127,0x7F	REMOVE FROM GROUP x	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	Removes the lamps from group x (0 to 15)
DALI 1.0	128,0x80	STORE DTR AS SHORT ADDRESS	ADDRESSING: LAMP, GROUP, ALL DTR: YES, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	Stores the actual register value DTR as new short address
DALI 1.0	129,0x81	ENABLE WRITE MEMORY	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	Activates memory write operations in ballasts.
DALI 1.0	144,0x90	QUERY STATUS	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	Query of the status of the lamp Answer: Bit 0: Status of control gear 0=OK Bit 1: Lamp failure 0=OK Bit 2: Lamp arc power on 0=OFF 1=ON Bit 3: Limit Error 0=Actual level is between MIN and MAX or OFF Bit 4: Fade running 0=Fading is finished 1=Fading is active Bit 5: RESET STATE 0=OK Bit 6: Missing short address 0=No 1=Yes Bit 7: POWER FAILURE 0=No
DALI 1.0	145,0x91	QUERY CONTROL GEAR	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	If the ballast exists and can answer, the answer is YES, otherwise NO. YES is 0xFF, NO is timeout or no answer
DALI 1.0	146,0x92	QUERY LAMP FAILURE	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	If the ballast has a problem with the lamp, the answer is YES, otherwise NO. YES is 0xFF, NO is timeout or no answer
DALI 1.0	147,0x93	QUERY LAMP POWER ON	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	If the ballast has switched on the lamp, the answer is YES, otherwise NO. YES is 0xFF, NO is timeout or no answer
DALI 1.0	148,0x94	QUERY LIMIT ERROR	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	If the arc power of the ballast is outside of MIN and MAX LEVEL, the answer is YES, otherwise NO. YES is 0xFF, NO is timeout or no answer
DALI 1.0	149,0x95	QUERY RESET STATE	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	If the ballast is in RESET STATE, the answer is YES, else NO. YES is 0xFF, NO is timeout or no answer
DALI 1.0	150,0x96	QUERY MISSING SHORT ADDRESS	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	If the ballast has no short address (=0xFF MASK), the answer is YES, else NO. YES is 0xFF, NO is timeout or no answer
DALI 1.0	151,0x97	QUERY VERSION NUMBER	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	The answer is always 1.
DALI 1.0	152,0x98	QUERY CONTENT DTR	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	The answer is the current content of register DTR.
DALI 1.0	153,0x99	QUERY DEVICE TYPE	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	The answer is the actual device type of the ballast. The following device types are defined by the DALI consortium: 0:Fluorescent lamp control gear 1:Self-contained emergency lamp control gear 2:Discharge (HID) lamp control gear 3:Low-voltage halogen lamp control gear 4:Incandescent lamp dimmer 5:DC voltage lamp dimmer (0/1-10V) 6:LED lamp control gear 7:witching (relay) control gear 8:Color lamp control gear 15:Load referencing" 16:Thermal gear protection 17:Dimming curve selection 18:Under consideration 19:Centrally supplied emergency operation 20:Demand response 21:Thermal lamp protection 22:Under consideration 23:Non-replaceable light source
DALI 1.0	154,0x9A	QUERY PHYSICAL MINIMUM LEVEL	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	Returns the current physical minimum arc power level for the ballast in the range of 0 to 254. 255 means MASK.

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DALI 1.0	155,0x9B	QUERY POWER FAILURE	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	If there is a failure with the arc power, the result is YES; else NO. YES is 0xFF, NO is timeout or no answer
DALI 1.0	156,0x9C	QUERY CONTENT DTR1	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	The answer is the current content of register DTR1.
DALI 1.0	157,0x9D	QUERY CONTENT DTR2	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	The answer is the current content of register DTR2.
DALI 1.0	160,0xA0	QUERY ACTUAL LEVEL	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	The answer is the current arc power between 0 and 254 or 255 for MASK.
DALI 1.0	161,0xA1	QUERY MAX LEVEL	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	The answer is the current setting of the maximum level for the arc power between 0 and 254, 255 means MASK
DALI 1.0	162,0xA2	QUERY MIN LEVEL	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	The answer is the current setting of the minimum level for the arc power between 0 and 254, 255 means MASK
DALI 1.0	163,0xA3	QUERY POWER ON LEVEL	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	The answer is the current setting of the power on level for the arc power between 0 and 254, 255 means MASK
DALI 1.0	164,0xA4	QUERY SYSTEM FAILURE LEVEL	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	The answer is the current setting of the system failure level for the arc power between 0 and 254, 255 means MASK
DALI 1.0	165,0xA5	QUERY FADE TIME/FADE RATE	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	The answer is the current setting of the fade time and fade rate for the ballast. The higher 4 bits define the fade time The lower 4 bits define the fade rate
DALI 1.0	178,0xB0 to 191,0xBF	QUERY SCENE LEVEL x	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	The answer is the current setting of the scene x (0 to 15) level for the arc power between 0 and 254, 255 means MASK
DALI 1.0	192,0xC0	QUERY GROUPS 0-7	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	The answer is the group membership of the ballast. Each bit stands for one group: Bit 0 for group 0, bit 1 for group 1,...
DALI 1.0	193,0xC1	QUERY GROUPS 8-15	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	The answer is the group membership of the ballast. Each bit stands for one group: Bit 0 for group 8, bit 1 for group 9,...
DALI 1.0	194,0xC2	QUERY RANDOM ADDRESS (H)	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	The answer are the highest 8 bit of the 24 bit random number used for random addressing mode
DALI 1.0	195,0xC3	QUERY RANDOM ADDRESS (M)	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	The answer are the middle 8 bit of the 24 bit random number used for random addressing mode
DALI 1.0	196,0xC4	QUERY RANDOM ADDRESS (L)	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	The answer are the lowest 8 bit of the 24 bit random number used for random addressing mode
DALI 1.0	196,0xC5	READ MEMORY LOCATION	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1: YES, DTR2: NO ANSWER: YES, REPEAT: NO	The answer is the content of the memory location defines with DTR within the memory bank defined with DTR1
DALI 1.0	255,0xFF	QUERY EXTENDED VERSION NUMBER	ADDRESSING: LAMP, GROUP, ALL DTR, DTR1, DTR2: NO ANSWER: YES, REPEAT: NO	The answer is the extended version number of the ballast

STANDARD	VALUE	COMMAND	ADDRESSING/PARAMETER	FUNCTION
DALI 1.0	0xA100	TERMINATE	ADDRESSING: ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: NO	This commands terminates special functions for all ballasts
DALI 1.0	0xA3HH	DTR=	ADDRESSING: ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: NO	This command loads the hex value HH into the DTR register
DALI 1.0	0xA500	INITIALIZE (ALL GEARS)	ADDRESSING: ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	This command starts random addressing mode for all ballasts
DALI 1.0	0xA5FF	INITIALIZE (GEARS WITHOUT SHORT ADDRESS)	ADDRESSING: ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	This command starts random addressing mode for all ballasts without a short address
DALI 1.0	0xA5HH	INITIALIZE (SHORT ADDRESS)	ADDRESSING: ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	This command starts random addressing mode for one ballasts with a specific short address. $HH=(SA\ll 1) 1$
DALI 1.0	0xA700	RANDOMIZE	ADDRESSING: ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	This command commands the ballasts to dice a 24 bit random number for automatic addressing
DALI 1.0	0xA900	COMPARE	ADDRESSING: ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: NO	This command activates a compare of the internal diced 24 bit number with the given number with SEARCHADR commands. if the internal number is less than or equal the answer is YES (0xFF)
DALI 1.0	0xAB00	WITHDRAW	ADDRESSING: ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: NO	The ballast with the same 24 bit random number as defined by the SEARCHADR commands should exit the addressing mode.
DALI 1.0	0xB1HH	SEARCHADDRH=	ADDRESSING: ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: NO	The command sets the highest 8 bit of the 24 bit random number for compare mode in all ballasts.
DALI 1.0	0xB3HH	SEARCHADDRM=	ADDRESSING: ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: NO	The command sets the medium 8 bit of the 24 bit random number for compare mode in all ballasts.
DALI 1.0	0xB5HH	SEARCHADDRL=	ADDRESSING: ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: NO	The command sets the lowest 8 bit of the 24 bit random number for compare mode in all ballasts.
DALI 1.0	0xB7HH	PROGRAM SHORT ADDRESS	ADDRESSING: ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	If the ballast is selected (physical selection mode or random address fits) the given short address is stored as new short address of the device. $HH=(SA\ll 1) 1$
DALI 1.0	0xB9HH	VERIFY SHORT ADDRESS	ADDRESSING: ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	The ballast answers with YES 0xFF, if the given short address is the same as the internal stored short address. $HH=(SA\ll 1) 1$
DALI 1.0	0xBB00	QUERY SHORT ADDRESS	ADDRESSING: ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	If the random address fits the ballast will answer with the internal stored short address in the format $HH=(SA\ll 1) 1$ or MASK (0xFF), if none is defined
DALI 1.0	0xBD00	PHYSICAL SELECTION	ADDRESSING: ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	This command start physical selection addressing mode
DALI 1.0	0xC1HH	ENABLE DEVICE TYPE	ADDRESSING: ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	If you want to use special device type depended commands you have to precede this commands with this enable command. HH is the selected device type e.g. 8)
DALI 1.0	0xC3HH	DTR1=	ADDRESSING: ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	This command loads the hex value HH into the DTR1 register
DALI 1.0	0xC5HH	DTR2=	ADDRESSING: ALL DTR, DTR1, DTR2: NO ANSWER: NO, REPEAT: YES	This command loads the hex value HH into the DTR2 register
DALI 1.0	0xBDHH	WRITE MEMORY LOCATION	ADDRESSING: ALL DTR, DTR1: YES, DTR2: NO ANSWER: NO, REPEAT: YES	This command writes the content HH into the memory bank defined with DTR1 at the memory address defined with DTR.