LIGHTWARE
visual engineering

User's Manual

RAP-B511-EU -K, -W, -S
RAP-B511-UK -K, -W, -S
RAP-B511-US -K, -W, -S
RAC-B501

Room Automation Device

v2.5 12-12-2023

Important Safety Instructions

Class II apparatus construction.

The equipment should be operated only from the power source indicated on the product

To disconnect the equipment safely from power, remove the power cord from the rear of the equipment or from the power source. The MAINS plug is used as the disconnect device, the disconnect device shall remain readily operable.

There are no user-serviceable parts inside of the unit. Removal of the cover will expose dangerous voltages. To avoid personal injury, do not remove the cover. Do not operate the unit without the cover installed.

The appliance must be safely connected to multimedia systems. Follow instructions described in this manual.

CAUTION	AVIS
RISK OF ELECTRIC SHOCK DO NOT OPEN RISQUE DE CHOC ELECTRIQUE NE PAS OUVRIR	
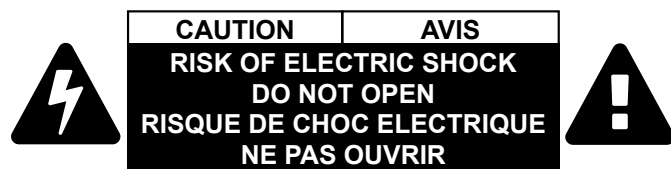
Ventilation

For the correct ventilation and to avoid overheating, ensure enough free space around the appliance. Do not cover the appliance, leave the ventilation holes free and never block or bypass the ventilators (if there are any).

WARNING

To prevent injury, the apparatus is recommended to be securely attached to the floor/wall or mounted in accordance with the installation instructions. The apparatus shall not be exposed to dripping or splashing, and no objects filled with liquids, such as vases, shall be placed on the apparatus. No naked flame sources, such as lit candles, should be placed on the apparatus.

Waste Electrical & Electronic Equipment WEEE

This marking shown on the product or its literature indicates that it should not be disposed of along with other household wastes at the end of its working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate this from other types of wastes and recycle it responsibly to promote the sustainable reuse of material resources. Household users should contact either the retailer where they purchased this product or their local government office for details of where and how they can take this item for environmentally safe recycling. Business users should contact their supplier and check the terms and conditions of the purchase contract. This product should not be mixed with other commercial wastes for disposal.

Common Safety Symbols

Symbol	Description
⎓	Direct current
∿	Alternating current
▣	Double insulation
⚡	Caution, possibility of electric shock
⚠	Caution

Symbol Legend

The following symbols and markings are used in the document:

▌ **WARNING! Safety-related information that is highly recommended to read and keep in every case!**

▌ **ATTENTION!** Useful information for performing a successful procedure; it is recommended to read.

▌ **DIFFERENCE:** Feature or function that is available with a specific firmware/hardware version or product variant.

▌ INFO: A notice, which may contain additional information. Procedure can be successful without reading it.

▌ DEFINITION: The short description of a feature or a function.

▌ TIPS AND TRICKS: Ideas that you may have not known yet, but can be useful.

Navigation Buttons

↩ Go back to the previous page. If you clicked on a link previously, you can go back to the source page by pressing the button.

🏠 Navigate to the Table of Contents.

‹ Step back one page.

› Step forward to the next page.

Document Information

All presented functions refer to the indicated products. The descriptions have been made while testing these functions in accordance with the indicated Hardware/Firmware/Software environment:

Item	Version
Lightware Device Controller (LDC) software	2.7.5b2
Lightware Device Updater V2 (LDU2) software	2.23.0b1
Firmware package	1.2.0
Hardware	1.1

Document revision: **v2.5**

Release date: **12-12-2023**

Editor: Tamas Forgacs

About Printing

Lightware Visual Engineering supports green technologies and eco-friend mentality. Thus, this document is made for digital usage primarily. If you need to print out few pages for any reason, follow the recommended printing settings:

- ▪ Page size: A4
- ▪ Output size: Fit to page or Match page size
- ▪ Orientation: Landscape

▌ TIPS AND TRICKS: Thanks to the size of the original page, a border around the content (grey on the second picture below) makes possible to organize the pages better. After punching the printed pages, they can be placed easily into a ring folder.
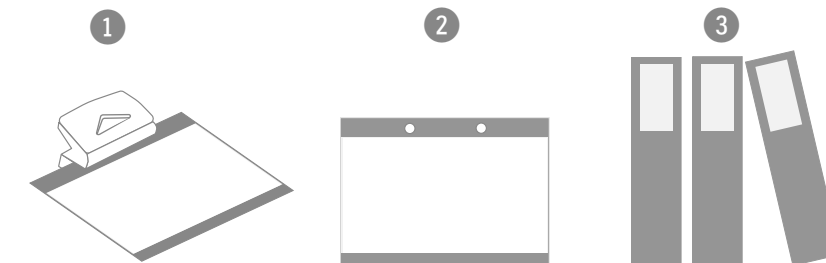
Hashtag (#) Keywords in the Document

This user's manual contains keywords with hashtags (#) to help you to find the relevant information as quick as possible.

The format of the keywords is the following:

#<keyword>

The usage of the keywords: use the **Search** function (Ctrl+F / Cmd+F) of your PDF reader application, type the # (hashtag) character and the wished keyword.

The **#new** special keyword indicates a new feature/function that has just appeared in the latest firmware or software version.

Example

#dhcp

This keyword is placed at the DHCP setting command in the LW3 Programmer's reference section.

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Introduction

Thank you for choosing Lightware's Room Automation Panel series device. In the first chapter we would like to introduce the device, highlighting the most important features in the coming sections.

- ▶ Description
- ▶ Model Comparison
- ▶ Compatible Devices
- ▶ Box Contents
- ▶ Features
- ▶ Typical Applications

1.1. Description

Room Automation Panel is an integrated control solution for AV systems installed in collaborative spaces. It features a programmable keypad, a volume knob, and a processor running Lightware Event Manager.

The stylish unit is available in different sizes and colors which fit EU, US and UK electrical boxes and tabletop enclosures. Rear panel RS-232, 3xGPIO and 2xRJ-45 ports provide connection to controlled devices. Snap-on front cover and PoE receiver of the first RJ-45 connector make the installation smooth. The additional RJ-45 connector makes cabling flexible and can supply PoE when an AC adapter is plugged in.

Model Denomination

Button   Outlet box type

RAP-B511-EU-K   Faceplate color (Key or Black)

Room Automation Panel   11 buttons altogether   5 buttons in the first line
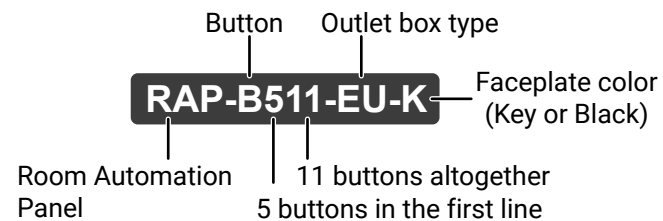
About the Serial Number

Lightware devices contain a label indicating the unique serial number of the product. The structure is the following:

7A000941 — 6-digit running sequence number

Month of the manufacturing:
1: Jan	4: Apr	7: Jul	A: Oct
2: Feb	5: May	8: Aug	B: Nov
3: Mar	6: Jun	9: Sep	C: Dec

Year of the manufacturing: (3-9, A-Y)
7=2017	A=2020	D=2023
8=2018	B=2021	E=2024
9=2019	C=2022	F=2025
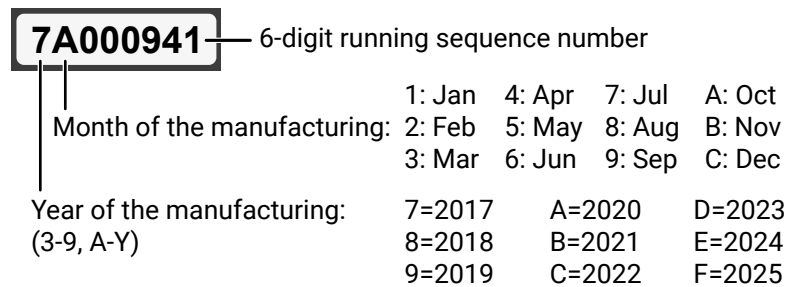
1.2. Model Comparison

1.2.1. Comparison of RAP and RAC Models

	RAP-B511 series	RAC-B501
User interface	11 configurable buttons & jog dial control knob	1 configurable button & 1 configurable feedback LED
Wall mountable	✓	✗
Rack mountable	✗	✓
Recommended application	Auditorium; Conference rooms, Office meeting rooms; Operation centers, Residential	Fixed install venue; Live events, Office meeting rooms

1.2.2. Comparison of RAP-B511 Series Models

INFO: All models have the same look and functionality, the difference is the size and color of the enclosure.

Model name	Color	Outlet box type
RAP-B511-EU-K	black	Double EU wall box (65mm)
RAP-B511-EU-W	white	
RAP-B511-EU-S	brushed steel	
RAP-B511-UK-K	black	Double UK wall box
RAP-B511-UK-W	white	
RAP-B511-UK-S	brushed steel	
RAP-B511-US-K	black	Double US wall box
RAP-B511-US-W	white	
RAP-B511-US-S	brushed steel	
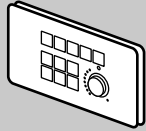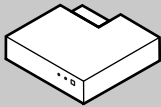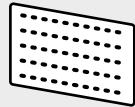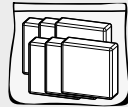
1.3. Compatible Devices

Room automation panel has standard RS-232, Ethernet and GPIO ports which are compatible with other Lightware products or third-party devices which have the same signal type.

1.4. Box Contents

1.4.1. Supplied Accessories
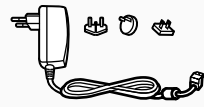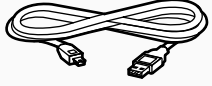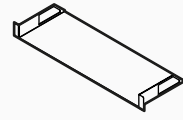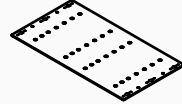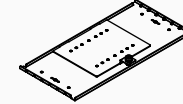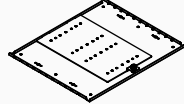
The following table describes all supplied accessories of the Room Automation Devices by models

	Supplied devices		Supplied accessories					
	RAP-B511 series device	RAC-B501 device	Safety and warranty info; QSG	Phoenix® Combicon 3-pole connector	Phoenix® Combicon 4-pole connector	Labels for button caps	Transparent button caps in a plastic bag *
RAP-B511-EU-K	✔	-	✔	✔	✔	✔	✔
RAP-B511-EU-W	✔	-	✔	✔	✔	✔	✔
RAP-B511-EU-S	✔	-	✔	✔	✔	✔	✔
RAP-B511-UK-K	✔	-	✔	✔	✔	✔	✔
RAP-B511-UK-W	✔	-	✔	✔	✔	✔	✔
RAP-B511-UK-S	✔	-	✔	✔	✔	✔	✔
RAP-B511-US-K	✔	-	✔	✔	✔	✔	✔
RAP-B511-US-W	✔	-	✔	✔	✔	✔	✔
RAP-B511-US-S	✔	-	✔	✔	✔	✔	✔
RAC-B501 #new	-	✔	✔	✔	✔	-	-

* The transparent caps are not placed onto the buttons, thus, you can easily insert the desired labels and fix the caps – see the Label and Cap Fixation section.

1.4.2. Optional Accessories

The following table describes all supplied and optional accessories of the Room Automation Devices by models. The optional (not-supplied) accessories can be purchased separately; please contact sales@lightware.com.

	Optional accessories						
	48V DC adaptor with 2-pole Phoenix® plug	USB cable (mini-B - USB-A)	1U high rack shelf	UD Mounting Plate F110	UD Mounting Plate F120	UD Mounting Pro P110	UD Mounting Pro P140
RAP-B511-EU-K	✔	✔	-	-	-	-	-
RAP-B511-EU-W	✔	✔	-	-	-	-	-
RAP-B511-EU-S	✔	✔	-	-	-	-	-
RAP-B511-UK-K	✔	✔	-	-	-	-	-
RAP-B511-UK-W	✔	✔	-	-	-	-	-
RAP-B511-UK-S	✔	✔	-	-	-	-	-
RAP-B511-US-K	✔	✔	-	-	-	-	-
RAP-B511-US-W	✔	✔	-	-	-	-	-
RAP-B511-US-S	✔	✔	-	-	-	-	-
RAC-B501 *#new*	✔	-	✔	✔	✔	✔	✔

1.5. Features

Basic Features

Built-in Event Manager

The Event Manager tool takes care of all the necessary control in a smaller configuration by performing predefined actions in response to device status changes. Hence, in a less complex environment, there is no need to invest in additional control solutions, which makes the receiver the best choice for numerous applications.

Ethernet Control

Multiple simultaneous TCP/IP connections are available with a simple ASCII-based protocol for controlling, configuring the device or perform a firmware update.

Built-in Mini Web

The Miniweb is able to display an adaptive surface of a virtual front panel, advanced web page displays buttons for Event manager Actions.

Remote Power

The RAP-B511 is PoE-compatible and can be powered locally by the supplied power adaptor, or remotely via the TPS connection (through the CATx cable) with a compatible power source equipment, e.g. MMX6x2-HT series matrix switchers and TPS2 matrix boards.

Bi-directional RS-232 Pass-through

AV systems can also contain serial port controllers and controlled devices. Serial port pass-through supports any unit that works with standard RS-232.

RS-232 Recognizer

Support recognizing incoming RS-232 messages to integrate with 3rd party devices or Lightware units.

GPIO Control Port

3 GPIO pins operating at TTL digital signal levels and can be controlled with both LW2 and LW3 commands.
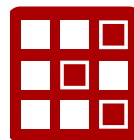
LDC

The Lightware Device Controller (LDC) application keeps receiving updates, adding new features and tools. The latest edition of LDC has gotten more intuitive, user friendly, smarter and has a modern user interface. The LDC is available for both Windows and macOS operating systems.

Real-time clock

Real-time clock with network time protocol and automatic daylight saving adjustment for Event Manager scheduling.

Only for RAP-B511 series

Front Panel Buttons and Rotary Knob

Integrated keypad with 11 programmable backlight buttons. Volume rotary knob to control Lightware devices, TVs or Power Amplifiers volume.

Infra

Infrared (IR) is a wireless technology used for device communication over short ranges. Third party control systems may send IR control commands to endpoints turning them on and off or switching their inputs.

Advanced Control Pack v3

DIFFERENCE: The following features are available from firmware package v1.1.0b3.

Basic IT-security

These entry-level network security improvements help to prevent unauthorized access to the Lightware device: cleartext login, TCP port blocking and MAC address filtering.

Batch Commands

A batch of LW3 commands (salvo) can be run by the Lightware device either by a previously stored macro or by sending a file to the device with the desired commands.

Event Manager +

Triggering a condition, defining variables and checking four conditions for an action – these features are available by the improved Event Manager.
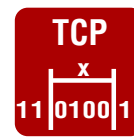
TCP Recognizer

Support recognizing the incoming TCP messages to integrate with 3rd party devices like the video conference codec devices.

1.6. Typical Applications

VINX Application Example
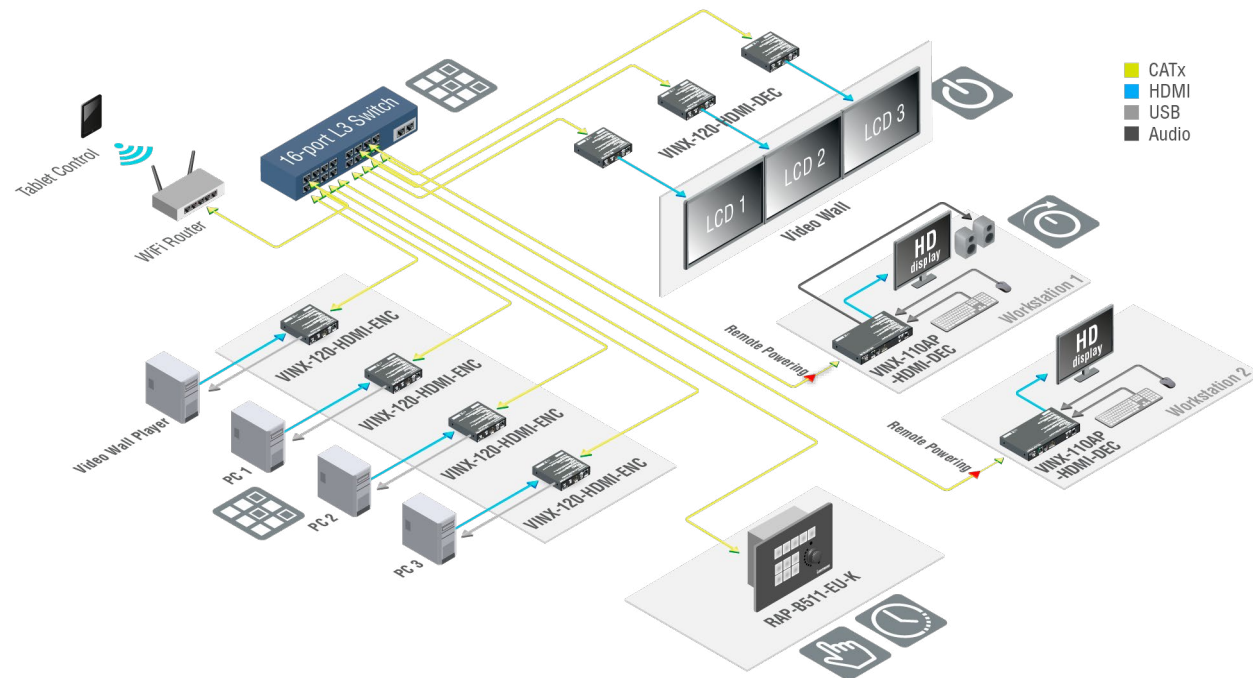
| CATx |
| HDMI |
| USB |
| Audio |

Conditions		Actions	
	Button Process		Source Switching
	Scheduling		Display / Projector On / Off
			Volume

Meeting Room Application Example
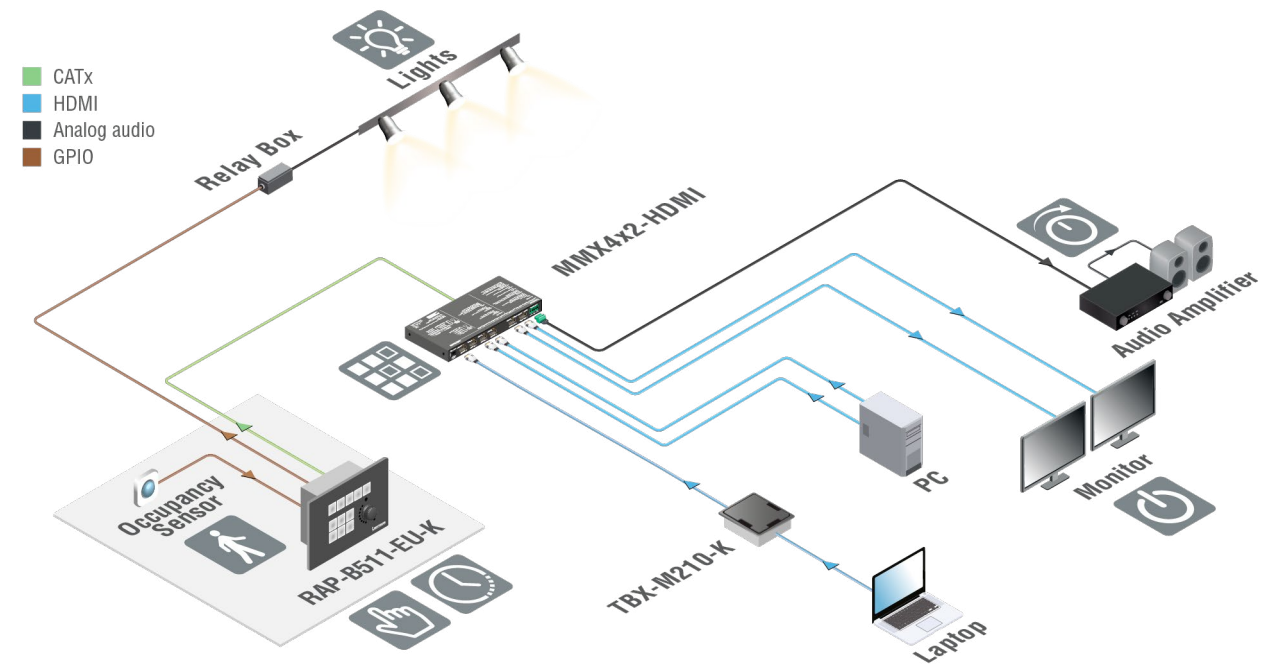
| CATx |
| HDMI |
| Analog audio |
| GPIO |

Conditions		Actions	
	Button Process		Source Switching
	Scheduling		Display / Projector On / Off
	Occupancy Sensor		Lamp On / Off
			Volume

Conference Room Application Example
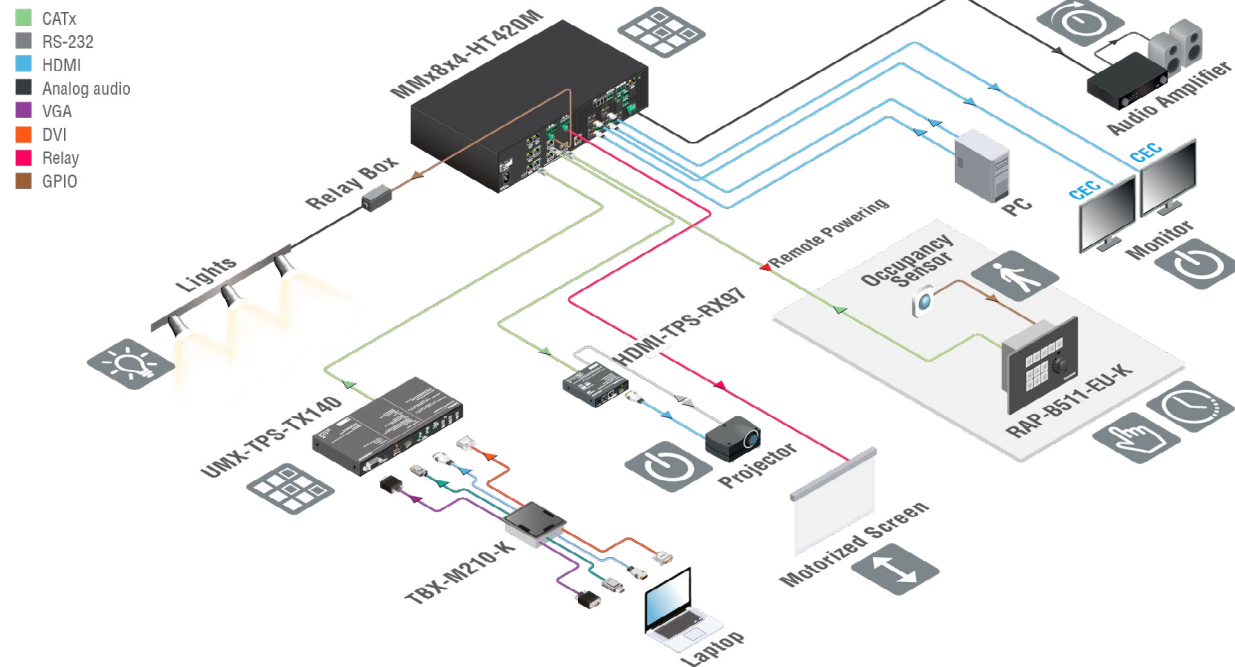
Legend:
- CATx
- RS-232
- HDMI
- Analog audio
- VGA
- DVI
- Relay
- GPIO

Conditions	Actions
Button Process	Source Switching
Scheduling	Display / Projector On / Off
Occupancy Sensor	Lamp On / Off
	Screen Up / Down
	Volume

Classroom Application Exampe

Legend:
- HDMI
- RS/232
- CAT5e+
- AUDIO
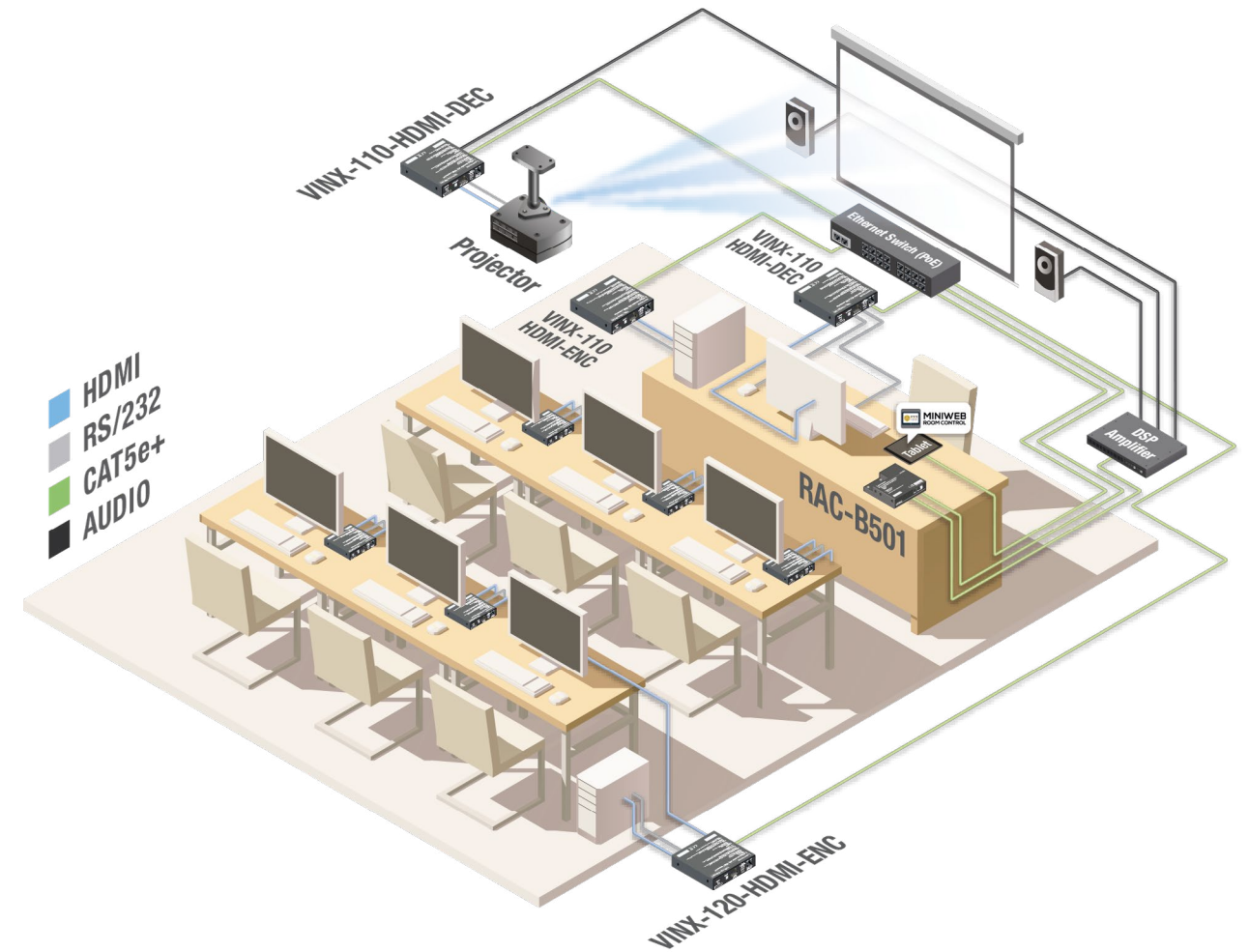
2

Product Overview

The following sections are about the physical structure of the device, input/output ports and connectors, buttons and status LEDs.

▶ RAP-B511 SERIES
▶ RAC-B501
▶ SPECIAL FUNCTIONS FOR RAP-B511 SERIES
▶ SPECIAL FUNCTIONS FOR RAC-B501

2.1. RAP-B511 Series

2.1.1. Front View

INFO: All the models have the same look and controls on the front panel, the only difference is the size and the color of the enclosure.

INFO: The labels of the buttons are just for illustration since the button caps are empty by default. The user can insert the desired label from the attached sheet.

1 Buttons 11 configurable buttons with short and long press detection.
Each button has a programmable background light. They can be configured for immediate feedback of pushing the buttons or can be set to five different modes: off / low bright / high bright / slow blink / sine pulse. Blinking of the button and rotary LEDs three times means, that the front panel functionality is locked. Unlocking is possible with Software Control - Lightware Device Controller or via LW3 protocol commands (for more details see LW3 Programmers' Reference section).

2 Rotary LEDs Eight green-colored LEDs for giving feedback about the current position of the jog dial knob.

- ● full bright
- ● half bright
- ● off

As the jog dial is rotated right (and the volume increases), the LEDs turn on one-by-one. One level means half brightness. The picture on the left shows that the volume is set 11.

3 Rotary knob Jog dial for volume control on a 16-level scale or it can be programmed for other controlling purposes by turning and clicking the knob.

4 Mute LED It gives feedback about the mute status of the volume. It can be toggled on and off by pushing the rotary knob.

- ● on   The volume is muted.
- ● off   The volume is unmuted.
- ☀ blinking   The device is in bootload mode. Press the rotary knob for 5 sec for changing to the normal operation mode.

5 IR detector Built-in IR eye to receive infra signal.

2.1.2. Rear View
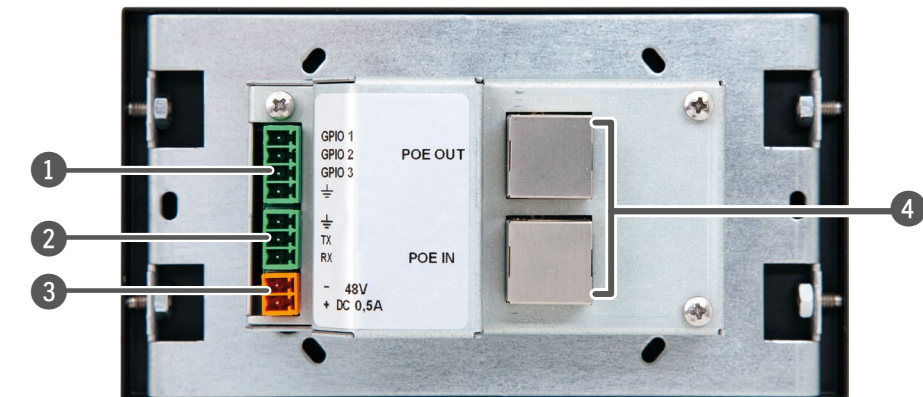
1 GPIO 4-pole Phoenix® connector for configurable general purpose.

2 RS-232 port 3-pole Phoenix® connector for bi-directional serial communication.

3 DC Input The device can be powered by a local adaptor. Connect the output to the 2-pole Phoenix® connector. For more information about the powering, see Powering Options section.

4 Ethernet ports Two RJ45 connectors for Ethernet communication. Both of them are PoE-compatible, one is a PoE receiver, the other can send PoE (PoE sending is available when the device is locally powered).

2.2. RAC-B501

2.2.1. Front View
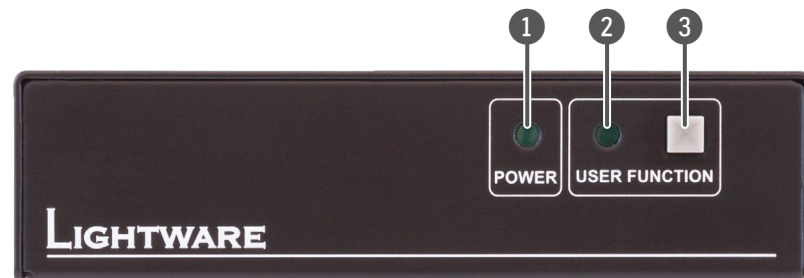
① **Power LED**   The LED gives immediate feedback about the current power status of the device.

      ⚪   off   The device is not powered.

      🟢   blinking (green)   The device is powered on.

② **User LED**   Configurable user LED for action feedback purpose.

③ **Function button**   Special functions are available with the button (DHCP settings, restore factory default settings, condition launching in Event Manager).

2.2.2. Rear View
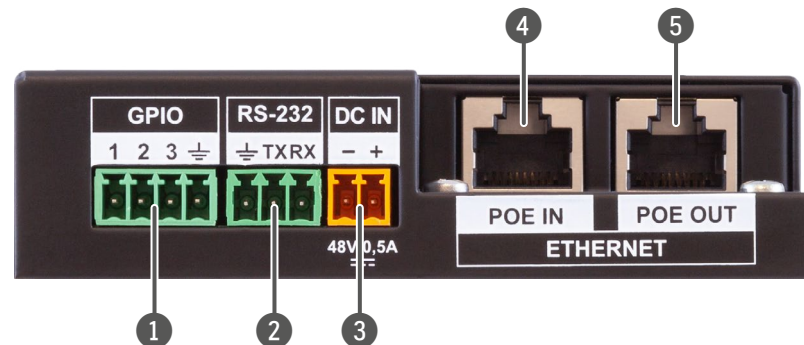
① **GPIO port**   4-pole Phoenix® connector for configurable general purpose.

② **RS-232 port**   3-pole Phoenix® connector for bi-directional serial communication.

③ **DC input**   The device can be powered by a local adaptor. For more information see the Powering Options section.

④ **Ethernet port with PoE input support**   RJ45 connector for Ethernet communication. The port is PoE-compatible to receive power from a remote device

⑤ **Ethernet port with PoE output support**   RJ45 connector for Ethernet communication. The port is PoE-compatible to send power to a remote device.

2.3. Special Functions for RAP-B511 Series

2.3.1. Behind the Front Panel

After removing the front plate (no special tool needed, just pull apart by hand), a USB connector, a reset button, and a live led can be seen.
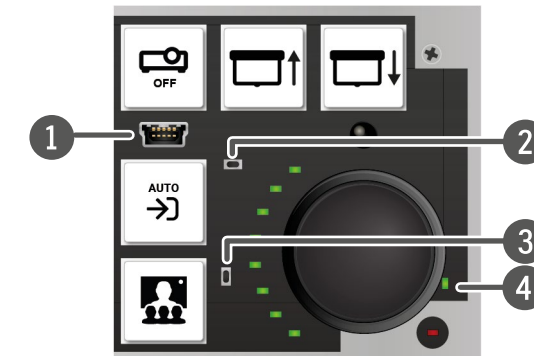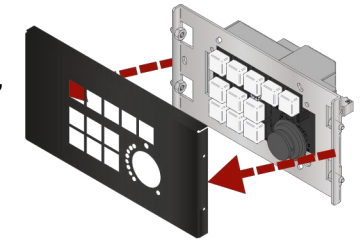
① **USB Port**   USB mini-B connector can be used for LDC access or firmware update.

② **Reset Button**   Hidden button to restart the device.

③ **Factory defeault**   Hidden button to reload the Factory Default Settings.

④ **Live LED**   🟢 blinking The unit is powered and ready to use.

              🟩 on   The device is powered, but the CPU is not running.

              ⬜ off   The unit is NOT powered or out of operation.

▌ **DIFFERENCE:** The hidden button for reloading the factory default settings is available from HW v1.1.

2.3.2. Restarting the Device

Step 1. Keep the 5th and the 9th button pressed for **10 seconds**.

Step 2. Release the buttons. The mute LED lights up when the device restarts.
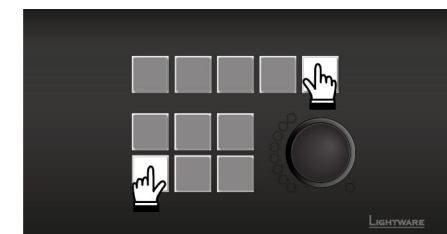
2.3.3. Entering Bootload Mode

It may happen that the firmware update process is unsuccessful and the device cannot be switched to bootload mode automatically. In this case, the device can be forced into bootload mode as follows:

Step 1. Make sure the device is powered off.

Step 2. Press and keep pressed the Rotary knob.

Step 3. Power on the RAP-B511 while the Rotary knob is being pressed. If the device is switched to bootload mode the Mute LED is blinking quickly. Release the knob.
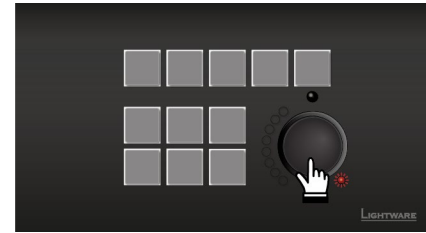
The other LEDs are off. The procedure of firmware update can be found in the Firmware Update chapter.

▌ INFO: Press the rotary for 5 sec to switch the normal operation mode.

2.4. Special Functions for RAC-B501

2.4.1. Programmable Function Button

Action or an operation can be assigned to the **Function** button as this button press is a condition that can be selected in the Event Manager. See more details in the Event Manager section.

2.4.2. Programmable User LED

Action or an operation can be assigned to the **User** LED as a condition is fulfilled and the LED responds on that. See more details in the Event Manager section.

2.4.3. Dynamic IP (DHCP) Settings

The device has a static IP address as a factory default setting. If this setting does not fit to the circumstances during install or usage, DHCP can be enabled from the front panel:

Step 1. Make sure the device is powered on and operational.

Step 2. Press and keep pressed the **Function** button for 5 seconds.

Step 3. After 5 seconds front panel LEDs start blinking; release the button and press it 3 times again quickly (within 3 seconds).

Step 4. The LEDs get dark, DHCP gets enabled. *#network #dhcp*

2.4.4. Recalling Factory Default Settings

To restore factory default values, do the following steps: *#factory*

Step 1. Make sure the device is powered on and operational.

Step 2. Press, and keep pressing the **Function** button **for 10 seconds**. After 5 seconds the front panel LEDs start blinking, but keep on pressing the button.

Step 3. After 10 seconds the LEDs start blinking faster; release the button and press it **3 times again quickly** (within 3 seconds).

Step 4. The LEDs get dark, the device restores the Factory Default Settings and reboots.

#new

3

Installation

The chapter is about the installation of the device and connecting to other appliances, presenting also the mounting options and further assembly steps.

3.1. Mounting Options for RAP-B511 Series

3.1.1. Label and Cap Fixation

The caps of the buttons are supplied separately with the product in a plastic bag. The list of supplied labels can be seen in the Supplied Button Labels for RAP-B511 series section. Select the desired label and insert it as shown in attached figure:

Step 1. Insert the label.

Step 2. Place the cap and pay attention to the nut; the direction of the buttons are different, thus, certain caps must be rotated by 90°.
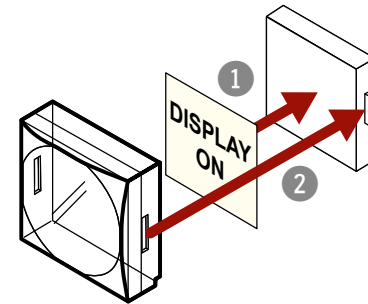
3.1.2. Compatible Outlet Box Types

The room automation panel can be easily mounted into an industrial standard switch/outlet box. See more details about the exact sizes of the device in the Mechanical Drawings section.

Model name refers to the box type, see the recommended box types for the models in the table below:

Model	Outlet box type
RAP-B511-EU	Double EU wall box (65mm) (e.g. Legrand: 0 801 22, 0 800 52, 2x0 801 51, 2x0 801 61, 0 819 42)
RAP-B511-UK	Double UK wall box (e.g. Appleby SB628 Galvanised Steel Knockout boxes 2G 47mm)
RAP-B511-US	Double US wall box (e.g. Carlon B225R-UPC Switch/Outlet Box, 2-Gang, Depth: 2-3/4")

INFO: The outlet box is not supplied with the product, it can be purchased from the local hardware store.

3.1.3. Dimensions

Model	Dimensions (mm)			
	a	b	c_1	c_2
RAP-B511-EU	152	82	40.5	17.6
RAP-B511-UK	140	80	40.5	17.6
RAP-B511-US	115.9	115.9	40.5	17.6
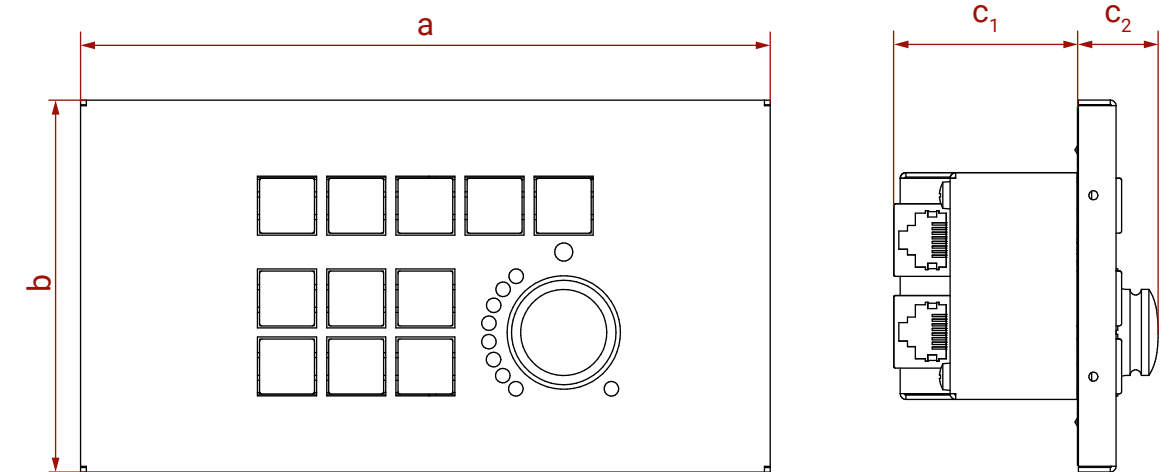
3.1.4. Mounting RAP-B511-EU into the Outlet Box

Step 1. Pull apart the **Front plate** from the **RAP-B511-EU** by hand (no special tool needed).
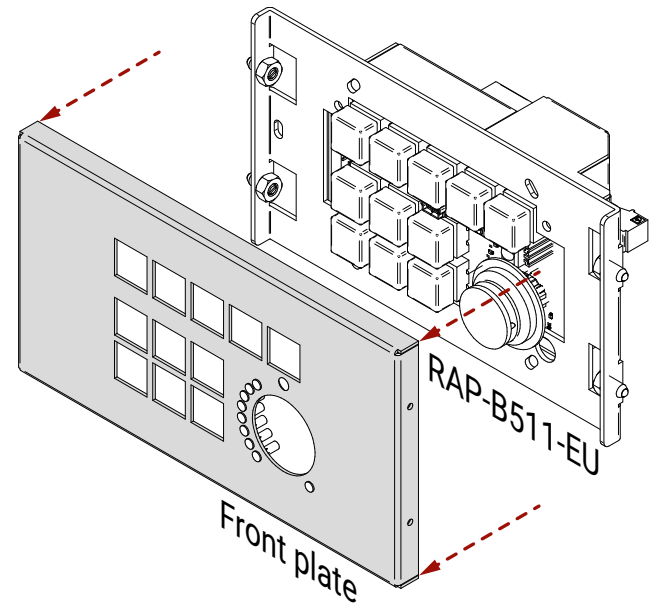
Step 2. Place two screws (marked with red color) **OR** four screws (marked with yellow color) in the holes.
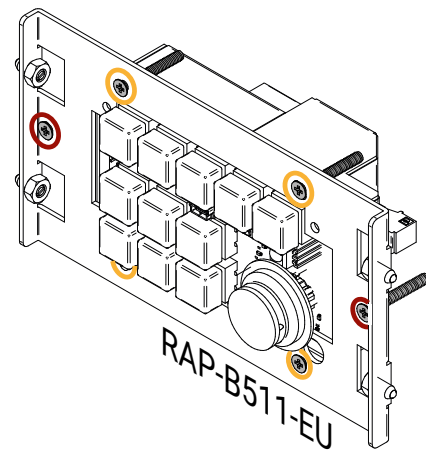
Step 3. Insert the **RAP-B511-EU** into the **Outlet box** and position it to get the holes aligned.
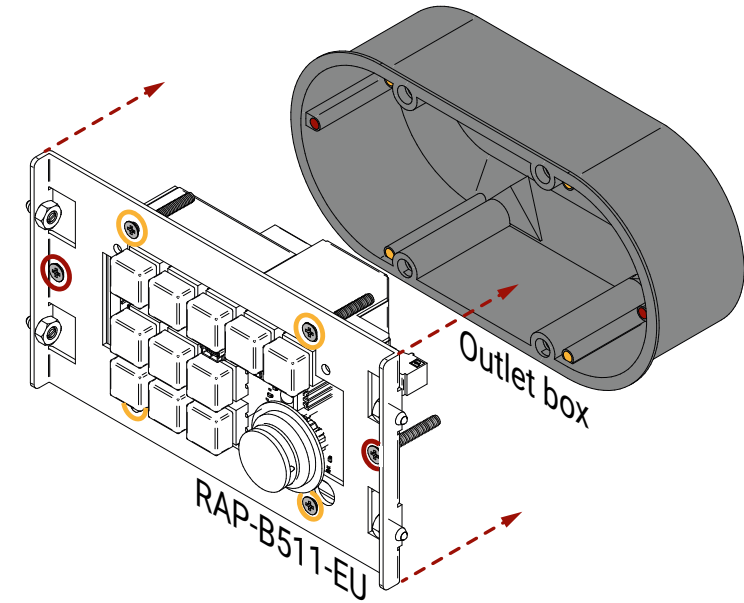
Step 4. Fasten the front side of the device to the **Outlet box** by fitting all the screws.

Step 5. Place back the **Front plate** to the **Button panel**.
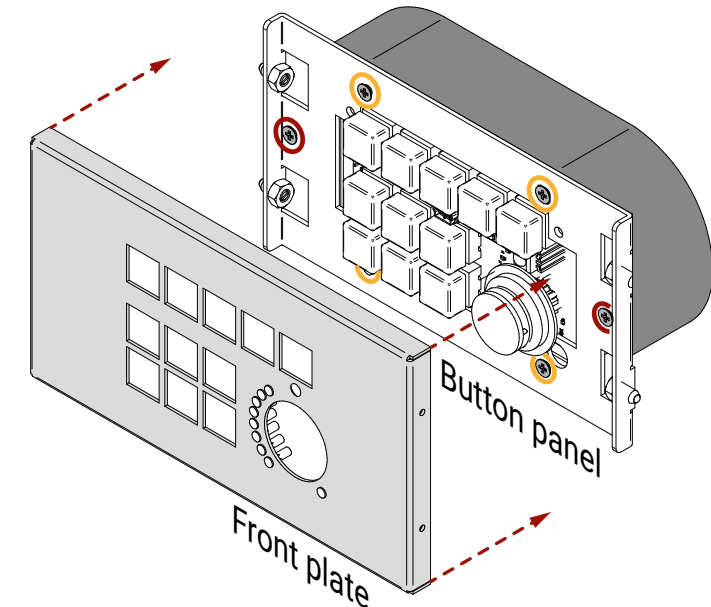
See more details about the exact sizes of the RAP-B511-EU in the Mechanical Drawings section.

3.1.5. Mounting RAP-B511-UK into the Outlet Box

Step 1. Pull apart the **Front plate** from the **RAP-B511-UK** by hand (no special tool needed).
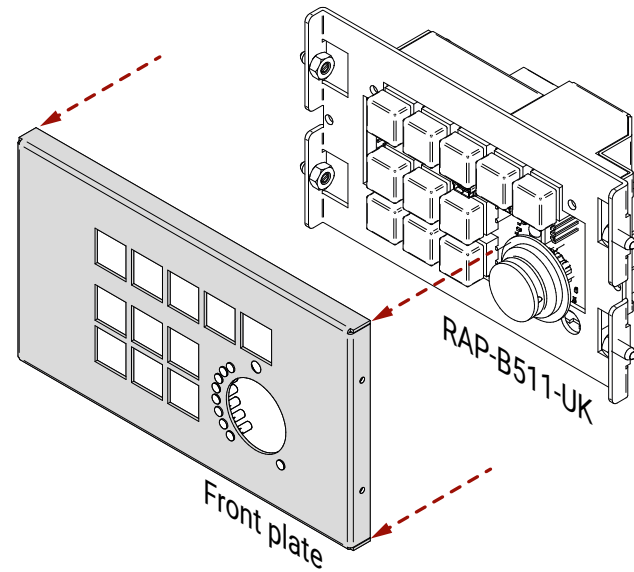
Step 2. Place the screws (marked with yellow) in the holes.
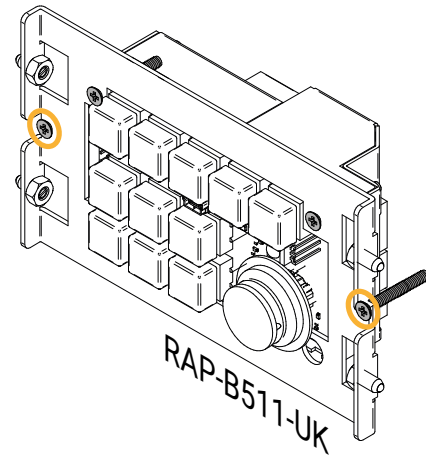
Step 3. Insert the **RAP-B511-UK** into the **Outlet box** and position it to get the holes aligned.
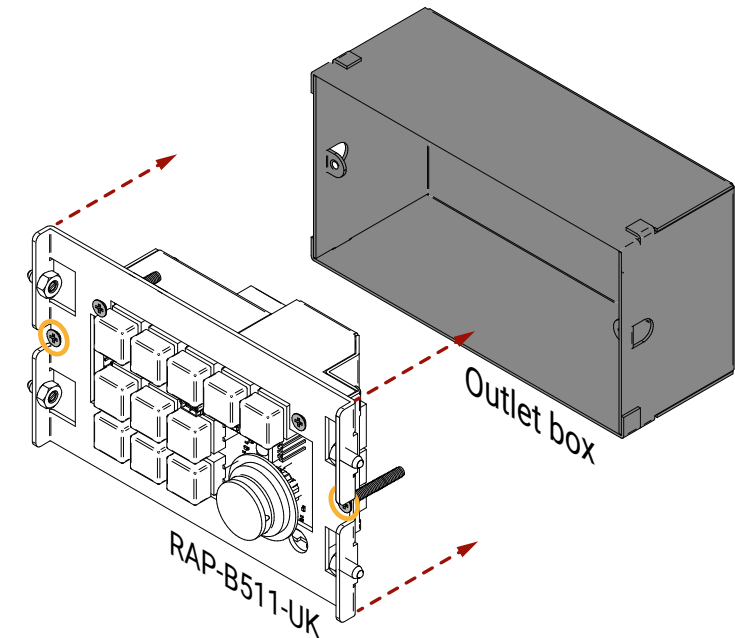
Step 4. Fasten the front side of the device to the **Outlet box** by fitting all the screws.

Step 5. Place back the **Front plate** to the **RAP-B511-UK**
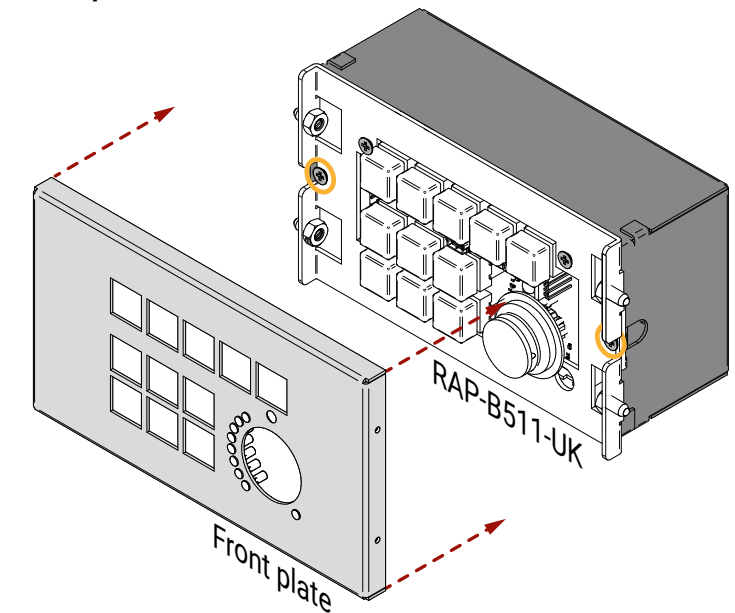
See more details about the exact sizes of the RAP-B511-UK in the Mechanical Drawings section.

3.1.6. Mounting RAP-B511-US into the Outlet Box

Step 1.   Pull apart the **Front plate** from the **RAP-B511-US** by hand (no special tool needed).
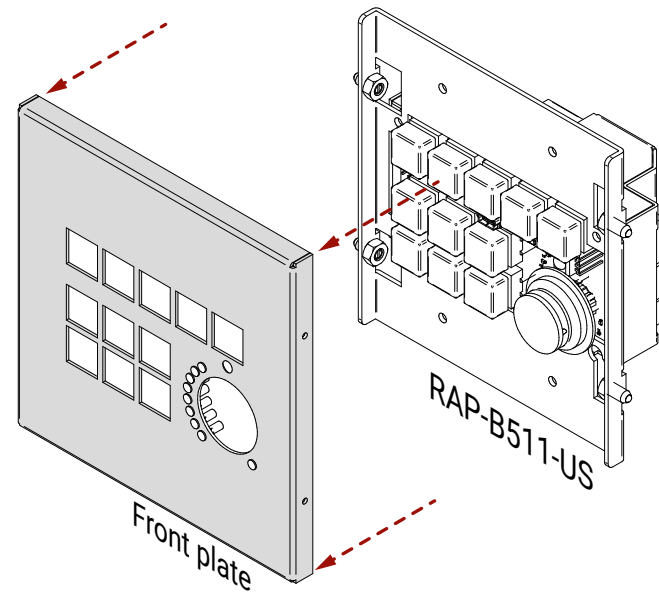
Step 2.   Place four screws (marked with yellow) in the holes.
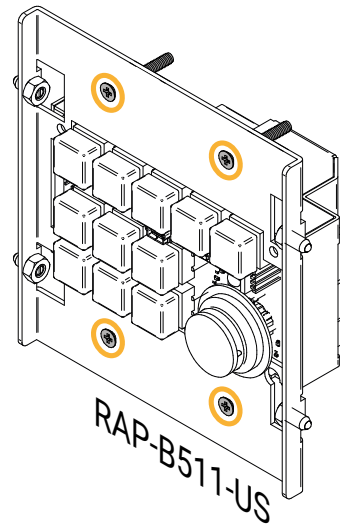
Step 3.   Insert the **RAP-B511-US** into the **Outlet box** and position it to get the holes aligned.
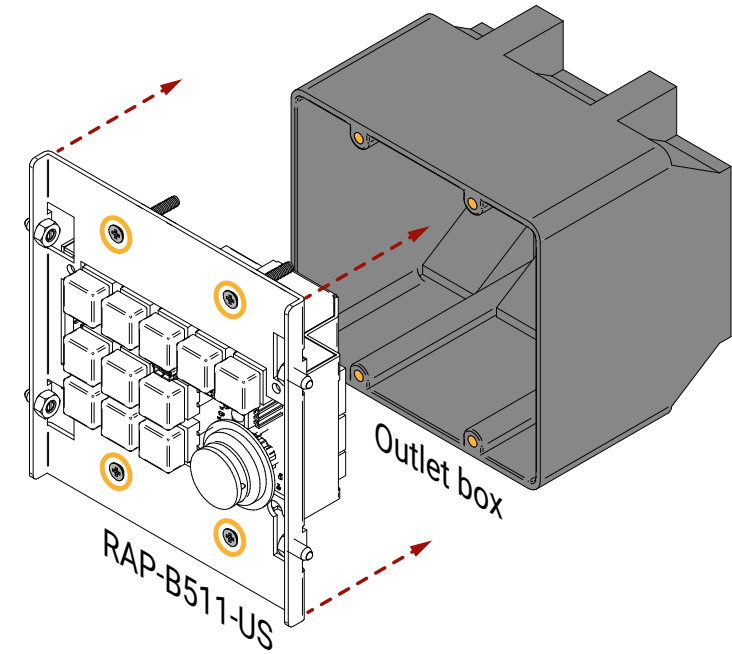
Step 4.   Fasten the front side of the device to the **Outlet box** by fitting all the screws.

Step 5.   Place back the **Front plate** to the **RAP-B511-US**
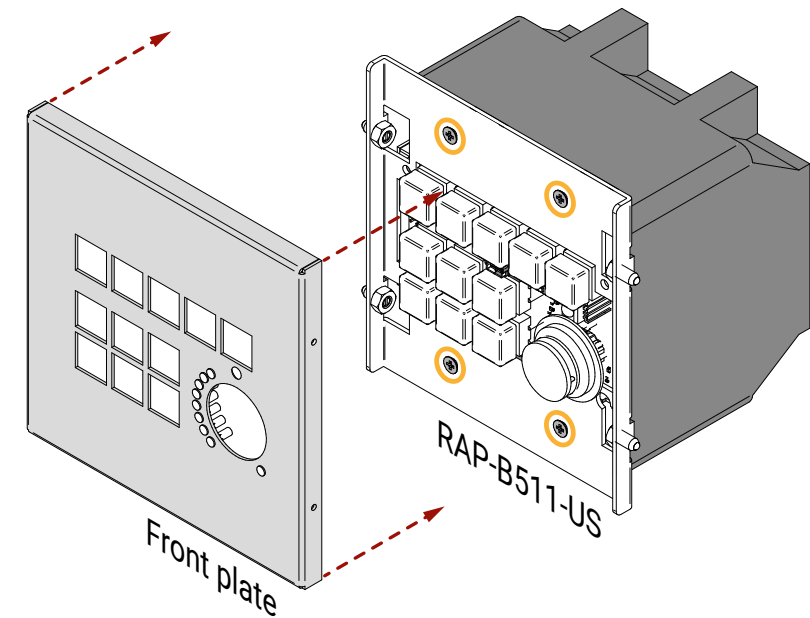
See more details about the exact sizes of the RAP-B511-US in the Mechanical Drawings section.

3.2. Mounting Options for RAC-B501

3.2.1. Rack Shelf Mounting

▌ **DIFFERENCE:** Only RAC-B501 model can be installed to a rack shelf.

Allows rack mounting for half-rack, quarter-rack and pocket sized units.
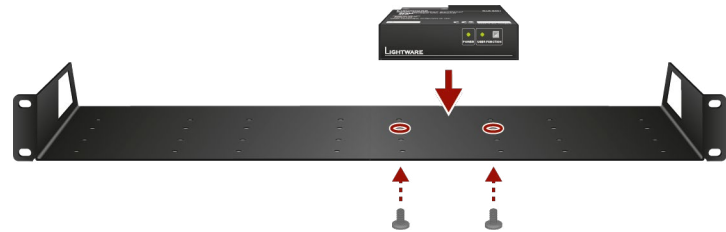
1U high rack shelf provides mounting holes for fastening two half-rack or four quarter-rack sized units. Pocket sized devices can also be fastened on the self.

▌ **WARNING! Always use M3x4 screws for fastening the device to the rack shelf. Using different (e.g. longer) ones may cause damage to the device.**

▌ INFO: The screws for the rack frame are not supplied to the device.

3.2.2. Under-Desk Mounting

▌ **DIFFERENCE:** Only RAC-B501 model can be installed under a desk or furniture.

Accessory		Number of mountable devices	Features
UD Mounting Plate F110		1 quarter-rack sized	Lightweight design
UD Mounting Plate F120		2 quarter-rack sized	Lightweight design
UD Mounting Pro P110		1 quarter-rack sized	Easy to change the mounted device
UD Mounting Pro P140		2 quarter-rack sized	Easy to change the mounted devices

▌ INFO: For more details about the options of the applications and the assembly steps, please download the **Mounting Accessory Guide** from our website: https://lightware.com/pub/media/lightware/filedownloader/file/Assembly-Guide/Mounting_AG.pdf

#new

3.3. Electrical Connections

3.3.1. 48V DC Connection

RAP-B511 series is built with 2-pole Phoenix connector for 48V DC 1A power connection.

Pin nr.	Signal
1	Ground
2	TX data
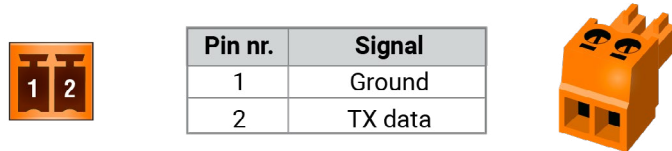
2-pole Phoenix connector and plug pin assignments

3.3.2. GPIO - General Purpose Input/Output Ports

RAP-B511 series contains a 4-pole Phoenix connector with three GPIO pins, which operates at TTL digital signal levels and can be set to high or low level (Push-Pull). The direction of the pins can be input or output (adjustable). Voltage ranges for GPIO inputs are the following:

	Input voltage [V]	Output voltage [V]	Max. output current [mA]
Logical low level	0 - 0.8	0 - 0.5V	30
Logical high level	2 - 5	4.5 - 5V	18

Pin nr.	Level and direction
1	
2	Configurable
3	
4	Ground
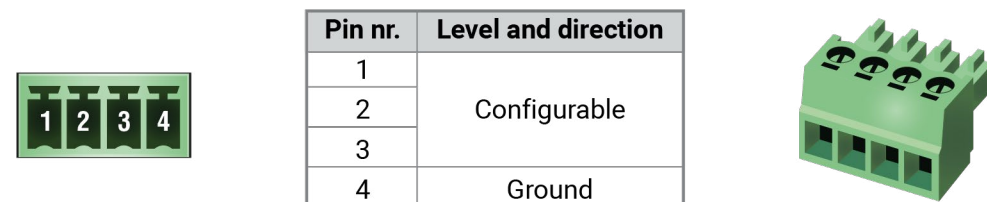
GPIO connector and plug pin assignments

▐ INFO: The maximum total current for the three GPIO pins is 180 mA.

Compatible plug type

Phoenix® Combicon series (3.5mm pitch 4-pole), type: MC 1.5/8-ST-3.5.

3.3.3. USB Connector

Behind the front panel there is a standard USB mini-B receptacle.

3.3.4. RS-232 Connector

The device contains a 3-pole Phoenix connector which is designed for RS-232 serial connection.

Pin nr.	Signal
1	Ground
2	TX data
3	RX data
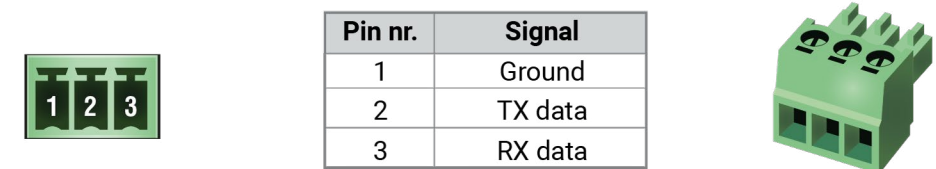
RS-232 connector pin assignments

RS-232 Output Voltage Levels

- Logic low level: 3V .. 15V
- Logic high level: -15V .. -3V

Compatible Plug Type

Phoenix® Combicon series (3.5mm pitch, 3-pole), type: MC 1.5/3-ST-3.5.

You can find more information about RS-232 in Settings for Control Interfaces section.

▐ INFO: The RAP-B511 series operates as a DCE unit according to its pin-out.

3.3.5. Control Ethernet Port

The room automation panel is supplied an RJ-45 connector for Ethernet/LAN connection for local control functions.

Wiring of LAN Cables

Lightware recommends the termination of LAN cables on the basis of TIA/EIA T 568 A or TIA/EIA T 568 B standards.

Pin	TIA/EIA T568A	TIA/EIA T568B
1	white/green	white/orange
2	green	orange
3	white/orange	white/green
4	blue	blue
5	white/blue	white/blue
6	orange	green
7	white/brown	white/brown
8	brown	brown
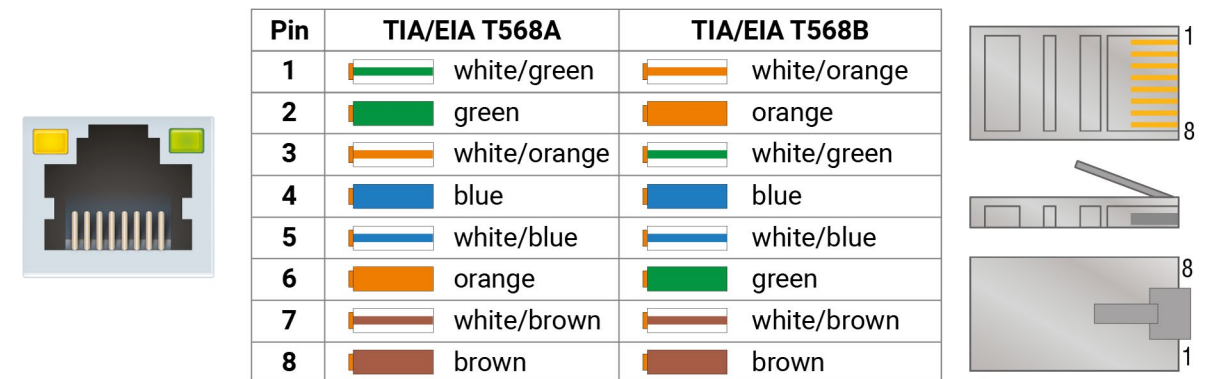
3.4. Powering Options

RAP-B511 series and RAC-B501 automation panels are compatible with IEEE 802.3af standard - Power over Ethernet (PoE) - and one Ethernet port can receive and the other one can send power over the Ethernet line.

The room automation panel can be powered by any of the following ways:

Local adaptor and remote power (PoE OUT)

When it is locally supplied with 48V DC adaptor, the room automation panel is able to send remote power via POE OUT RJ45 connector to other PoE-compatible device.

Remote power injector (PoE IN)

The devices can be powered remotely by a PoE-compatible power injector, like a PoE-compatible switch. Connect it to the POE IN labeled RJ45 connector.

Standalone Matrix or Matrix board (PoE IN)

Powering by a matrix board* over the CATx (TPS) cable. The output board needs to be powered by an external PSU. Connect it to the POE IN labeled RJ45 connector.

* TPS2 I/O board with PoE extension (-P)

▌ INFO: Over the CATx cable, the Ethernet communication is transmitted.

Local adaptor and remote power (PoE out)

48V DC Power adaptor

RAP-B511-EU-K

Power send

PoE-compatible unit

Remote power injector (PoE in)

PoE-compatible switch

Power send

RAP-B511-EU-K

Matrix board (PoE in)

External power supply

CATx (TPS)

Power send

RAP-B511-EU-K

3.5. Connecting Steps

Relay box   Projector   Lightware device

GPIO   RS-232   LAN

Power   LAN   IR

Power adaptor   Ethernet switch   Smartphone
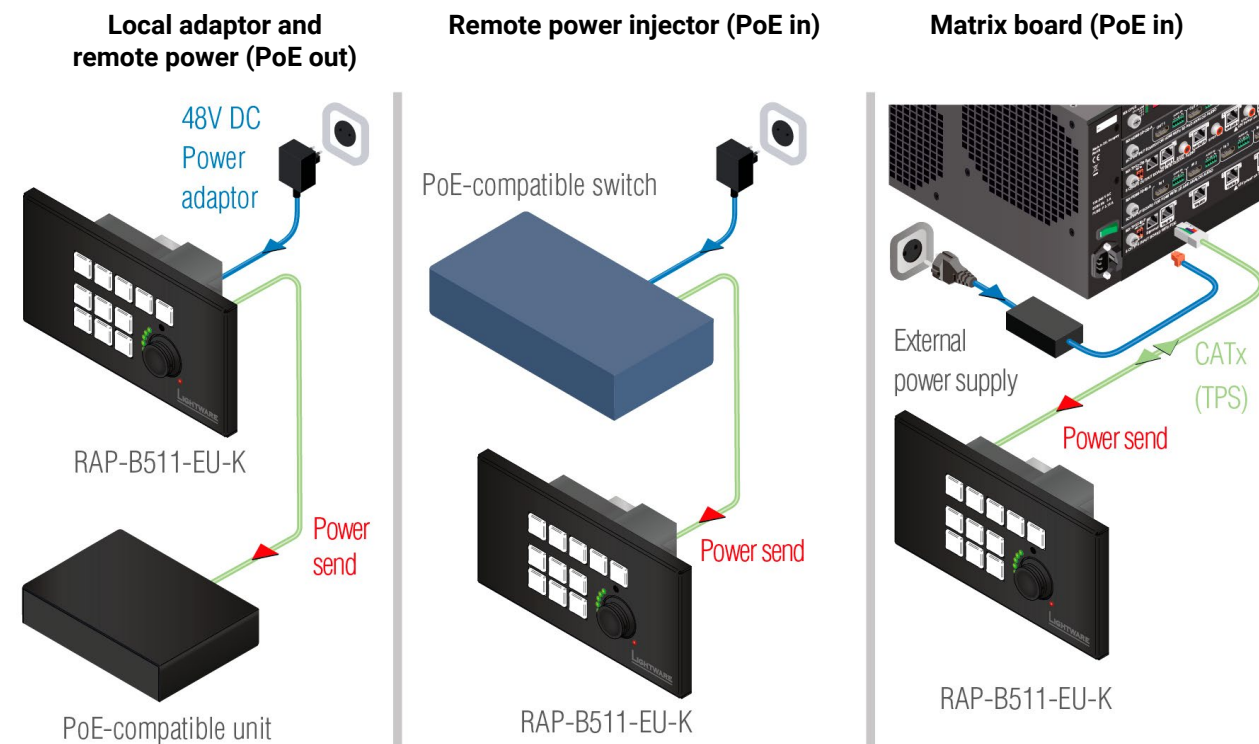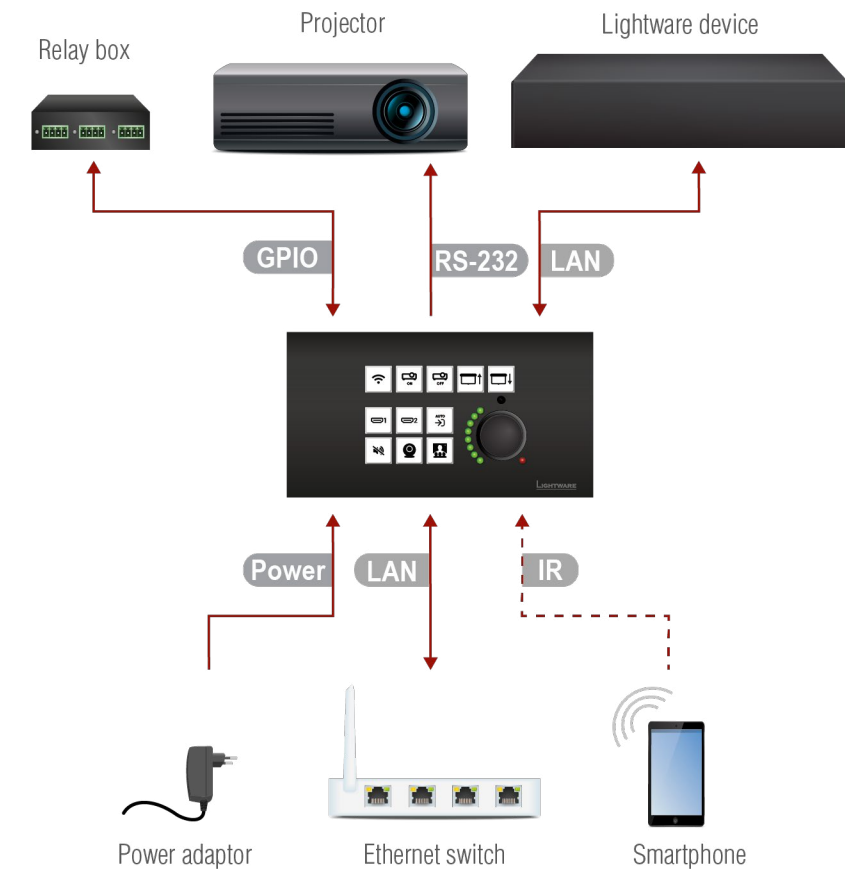
GPIO   Connect a controller/controlled device (e.g. relay box) to the GPIO port.

RS-232   For RS-232 extension: connect a controller/controlled device (e.g. Projector) to the RS-232 port.

LAN
- Connect the device to a LAN network in order to control the device.
- Connect a PoE-compatible device for remote powering and control to the PoE out LAN port.

IR   Built-in infra detector is ready to receive any IR signal without user intervention.

Power   Powering on the devices is recommended to do as the final step during the installation. Please check the Powering Options section for the details.

▌ **DIFFERENCE:** Infrared connection is only available for RAP-B511 series panels. RAC-B501 is not built with IR detector.

4

Device Concept

The following chapter describes the features of the device with a few real-life examples.

4.1. General Concept

Room automation panel is designed for advanced control functions. Industrial standard communication interfaces (RS-232, Ethernet, GPIO, IR) ensure the compatibility with third-party units or Lightware products. They make automating the whole AV system in a huddle room possible.

Customizing the control functions can be done by making connections between the proper inputs (triggers or conditions) and the desired outputs (actions). These settings can be done from a computer using the Software Control - Lightware Device Controller (LDC) software or via LW3 protocol commands (for more details see LW3 Programmers' Reference section).

Inputs may come from:

- The Room Automation Panel by pushing (or releasing) the button, turning or pushing the rotary switch. *
- Real-Time Clock (e.g. when the local time is equal 12:00 the action is executed).
- Other incoming signals: detected IR codes, recognized RS-232 messages, GPIO level changes.

Outputs can be the followings:

- Button LEDs of the Room Automation Panel. *
- Send messages (or signals) to the other device: RS-232 message sending, TPC/UDP message sending, GPIO output state changing.

* Only for RAP-B511 series models.

Buttons
IN: Button press, button release

Rotary
IN: Rotary turn, rotary press

Real-Time Clock
IN: Local time

Infra
IN: Detected IR hash

RS-232
IN: RS-232 recognizer

GPIO
IN: Input level change (high/ low)

LDC
UI Config menu

EVENT MANAGER

Button LEDs
OUT: Off / LED Light

RS-232
OUT: Serial message sending

GPIO
OUT: Output level change (high/ low)

Ethernet
OUT: TCP/UDP message sending
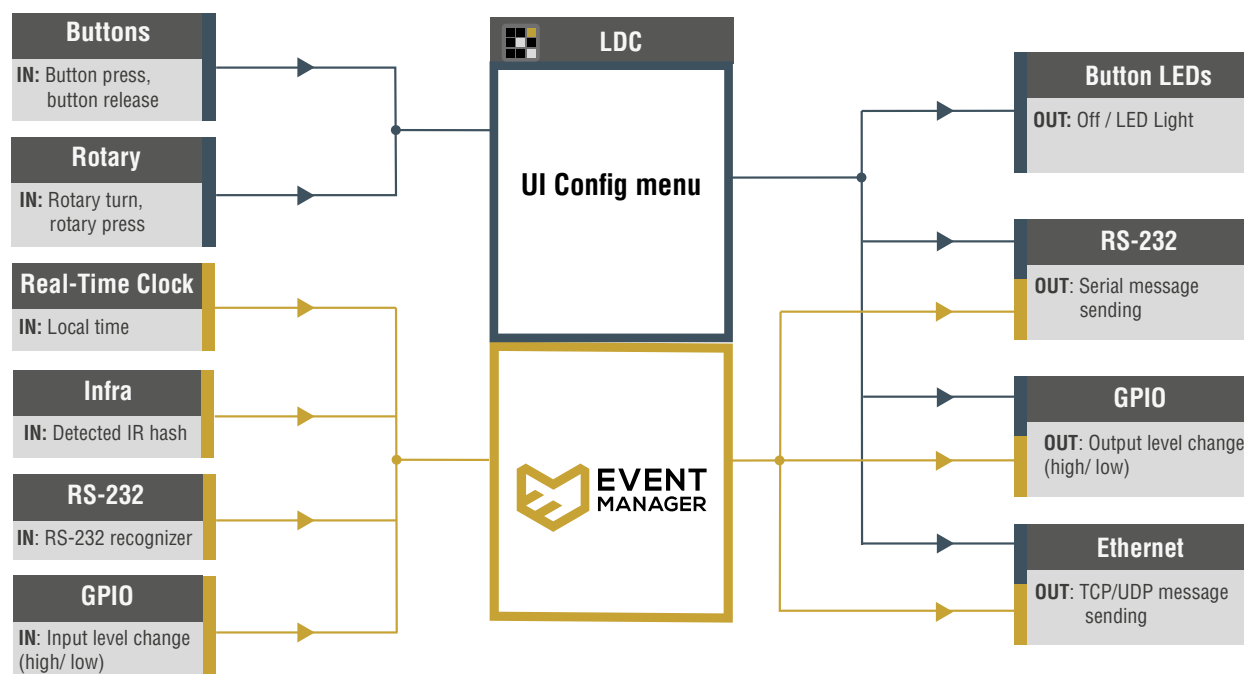
These settings are available both the Event manager and the UI Config menu, but managing the configuration is highly recommended in the UI config menu.

These settings are available only in the Event manager.

4.2. Inputs 1. - User Interactions

DIFFERENCE: This section relates to **RAP-B511 series models only**. RAC-B501 model is not built with buttons and rotary switch.

The operation of the RAP-B511 series is based on user interactions such as button press, or turn the rotary. These are the main triggers (or inputs) of the control functions. They can be quickly and easily customize in UI Config Menu of the Software Control - Lightware Device Controller (LDC) software.

4.2.1. Buttons

The RAP-B511 has 11 configurable buttons, and two main button states are defined: **Pressed** and **Released.**

Operation mode is an attribution of the button, which declares the button behavior when it is pressed or released. Three different operation modes are available: **momentary, toggle** and **radio group (1-5)**.

The chosen **operation mode** defines how the **interaction state** changes when the button is pressed or released (see the details about it in the table on the right). The true or false value of the **interaction state** triggers the button LED function and the desired action.
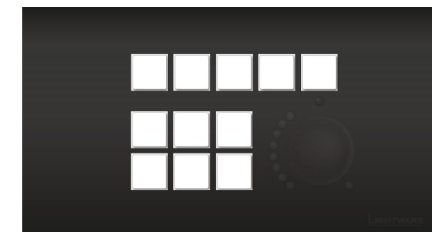
Momentary operation mode

Simple button function, when the button is pressed, the action will be executed.

Example: Roll down the shades with keeping the button pressed. When the button is released, the shades stop.

Explanation: When the button is pressed, the interaction state changes true, when the button is released, the interaction state changes false.

Toggle operation mode

This button type toggles between two states.

Example: Turn on and off the light with one button.

Explanation: When the button is pressed, the interaction state changes true, when the button is released, the interaction state does not change. When the button is pressed once again, the interaction state changes false.

Radio group operation mode

It defines the assigned radio group of the button. One button can belong to one group at the same time. Five groups are available, one group may contain max. 11 buttons.

Example: Select video input on a crosspoint or switcher. One input can be active at the same time.

Explanation: When the button is pressed, the interaction state changes true and the interaction state of the other group members are false. When the button is released, the interaction state does not change.

Summary of the button operation modes

Momentary Operation Mode			
	PRESS	RELEASE	PRESS	RELEASE
interaction state	**true**	**false**	**true**	**false**
Toggle Operation Mode			
	PRESS	RELEASE	PRESS	RELEASE
interaction state	**true**	**true**	**false**	**false**
Radio Group Operation Mode			
	PRESS	RELEASE	PRESS	RELEASE
	1　2　3	1　2　3	1　2　3	1　2　3
interaction state	**true　false　false**	**true　false　false**	**false　true　false**	**false　true　false**

Flowchart of the button configuration process

User interaction	Operation mode	Interaction state	Action
Button press / Button release	Momentary / Toggle / Radio Group	Changes / not changes, true / false	Executed / Not extecuted
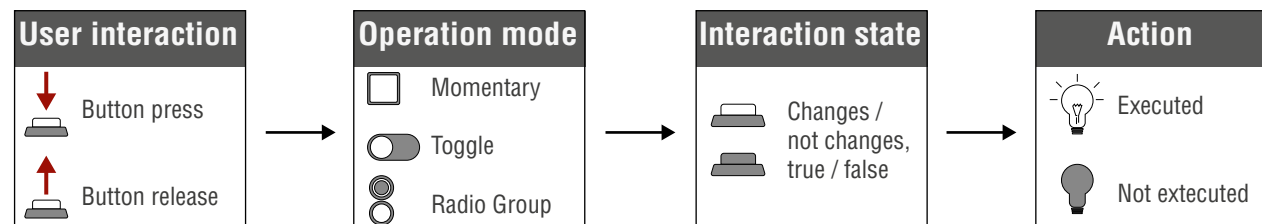
INFO: All settings of the button functions are available in the Lightware Device Contoller software (see the details in Buttons section) or via LW3 protocol commands (for more details see Button Configuration section).

4.2.2. Rotary

The jog dial knob is designed for volume control (in a 16-level scale), but it can be used for other controlling purposes, too.

Turning left and right the rotary changes the volume value from 0 to 16. The volume values are the conditions, which are assigned to the control commands (e.g. SET /MEDIA/PORTS/VIDEO/O2/ANALOGAUDIO.VolumedB=-96\x0d\x0a). When the rotary reaches the proper position, the action will be executed.
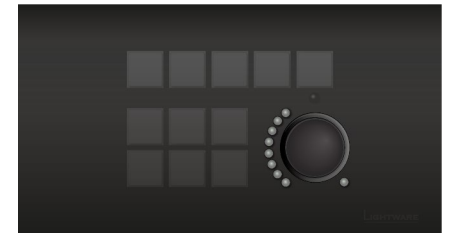
The control command can be sent over RS-232 or Ethernet (in this case, the IP address of the target device is needed).

LWR Volume Control Schema supports to load the LW3 command list automatically for controlling the volume (and the mute/unmute state) of the Lightware devices. Choose the proper schema (see more details about the compatibility table in Configurations of the Rotary section) and fill the audio port number.

Custom Volume Control Schema makes it possible to configure any command for controlling a third-party device.

Knob press toggles between the muted and the unmuted states. When the **Custom** schema is loaded, press and release event can be configure for any purpose.

Flowchart of the rotary configuration process

Input: User interaction	Output: Interface	Volume control schema	Action
Rotary turn / Rotary press	Ethernet / RS-232	LWR / Custom	Mute /unmute, volume up / volume down / Any action
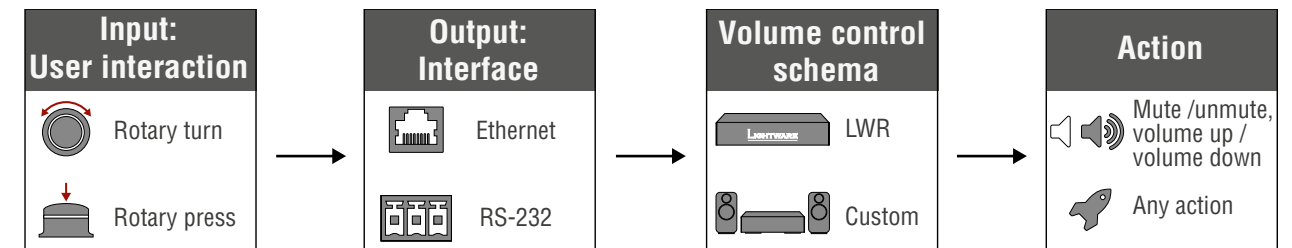
INFO: Customizing the rotary functions is possible with Lightware Device Contoller software (the details can be found in Configurations of the Rotary section) or with LW3 protocol commands (for more details see Volume Control Configuration section).

4.3. Inputs 2. - Automation Options

The below-listed features give an opportunity to "automate" the control system, and the Room Automation Panel reacts to the inputs automatically, user intervention is not necessary.

These inputs can be set as a condition in the Event Manager in the Software Control - Lightware Device Controller (LDC) software. They trigger the desired actions.

4.3.1. Real-Time Clock

The real-time clock feature supports the storage of the exact time in the device. The time can be programmed as a condition in the event manager: single and weekly repetitive events may be configured with this function. Local time elements (years, months, days, etc.) help customize the proper timing of the actions.

A BR1632A battery is supplied with the product, it ensures the fluent operation of the built-in timer while the device is not powered.

The battery is designed for life-long usage in a fixed installation, so it cannot be replaced!

Real-Time Clock Settings

The flowchart below displays the correlation of the time properties. The red colored settings can be defined by the user, the others generated automatically.
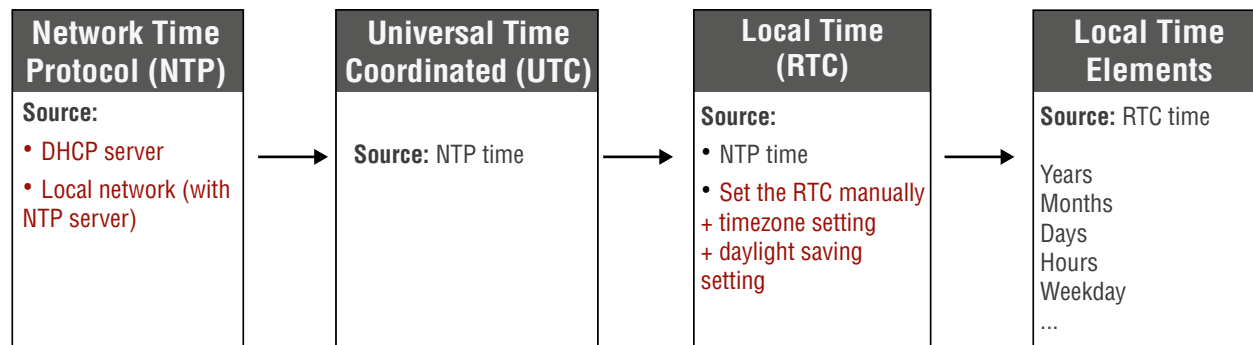
Flowchart of the real-time clock configuration process

INFO: All settings of the Real-time clock is possible using the Lightware Device Contoller software (see the details in Time Settings section) or via LW3 protocol commands (in the Time Settings section).

4.3.2. RS-232 Recognizer

This tool is able to recognize and store the incoming RS-232 message until the previously defined string (delimiter) has arrived or the timeout has elapsed after the last data. The last incoming serial data is stored and it can trigger an action in Event Manager.

ATTENTION! The recognizer function works when the operation mode of the RS-232 port is control or command injection (in this case, one of the Ethernet socket have to be opened). For more details about the operation modes, see the Serial Interface section.

RS-232 Recognizer Example

The lamp can be turned on and off both with the light switch and the RAP-B511. When the lamp is turned off by the switch, the relay box sends an RS-232 status message to the RAP-B511 to inform it that the lamp was turned off. When the lamp is controlled with the RAP-B511 the next time, the device sends the 'turn on' command to the relay box of the lamp. This example shows how to syncronize the same control function in the RAP with another device.
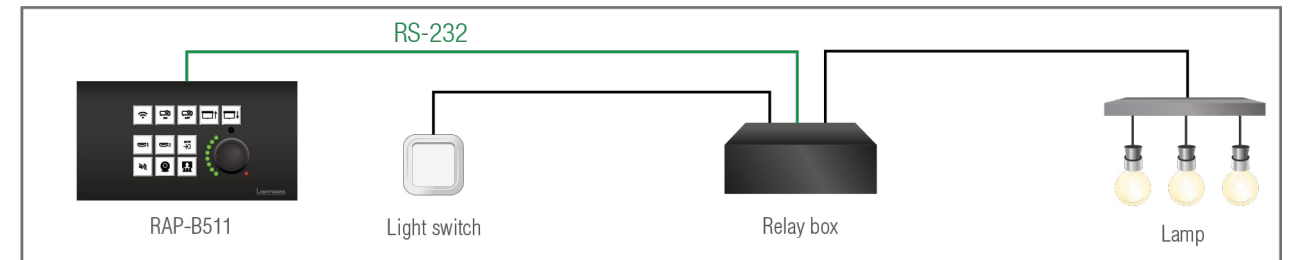
At first, configure the recognizer for the serial communication, after that, configure the Button1.

Step 1. Enable the operation of the recognizer, set an optimal timeout (e.g. 30 ms). Set the RS-232 operation mode to Control.

The flowcharts below show the process of the system. The blue highlight boxes display the settings connected to the RS-232 recognizer.

Turn on the lamp
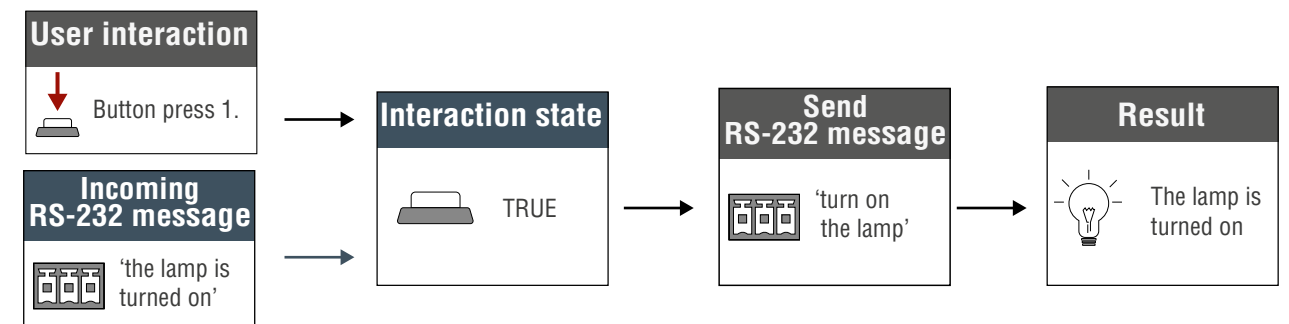
Turn off the lamp
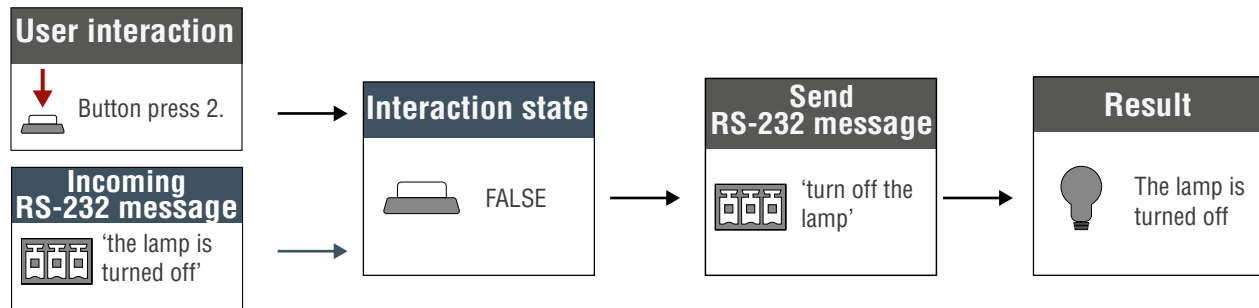
Do the following setting on the UI Config page:

Step 2. Select the **Button1** and set the operation mode to **Toggle**. The first button press changes the interaction state to true. It happens automatically.

Step 3. Choose the **TRUE feedbacks** tab and click on the **RS-232 message recognized** condition. Write the serial message that is sent by the relay box about the lamp status in the entry field of the pop-up window (e.g. 'the lamp is turned on'). Click on **Ok** to save.

Step 4. Choose the **FALSE feedbacks** tab and click on the **RS-232 message recognized** condition. Write the serial message that is sent by the relay box about the lamp status in the entry field of the pop-up window (e.g. 'the lamp is turned off'). Click on **Ok** to save.

The RS-232 recognizer settings need to be done with Lightware Device Controller Software (see details in the RS-232 Message Recognizer section) or with LW3 protocol commands (see more information in the RS-232 Message Recognizer section).

For more information about the button configuration, see the UI Config Menu section.

4.3.3. TCP Recognizer

▌ **DIFFERENCE:** The features mentioned below are available from FW package v1.1.0b3.

The feature is almost the same as in case of the RS-232, but for the network interface: the incoming TCP messages can be processed, which may trigger actions. The combination of the TCP recognizer and the Event Manager gives numerous opportunities for creating automatic room solutions.

TCP Recognizer Example

When the Projector switches off, the button light (2) of the RAP-B511 is turned off automatically.
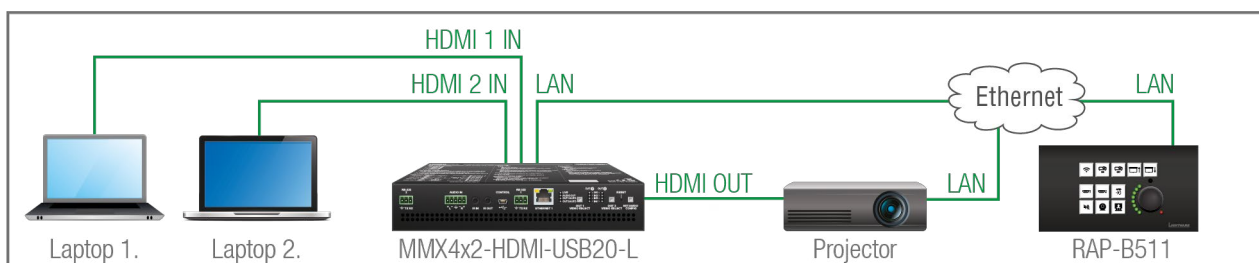
When the power-off process is started in the projector, it will send a message over Ethernet. That message will be recognized by the RAP-B511 and will be used as a Condition in Event Manager.

How to set up the RAP?

Step 1. Configure the recognizer for the communication by the LDC, (see the Ethernet section) or by LW3 protocol commands (see the TCP Message Recognizer section). Define the desired device as a TCP client. (The Projector is saved as 'C1' in this example.)

Step 2. Create the following event in the Event manager:
E1. When the `(PWR!001 "On")` message is recognized from the C1 client, the Background light of Button LED2 is set to **Off** state.

For more information about setting the events in LDC, see the Event Manager section.

4.3.4. IR Recognizer

▌ **DIFFERENCE:** This section relates to **RAP-B511 series models only**. RAC-B501 model has no built-in Infrared detector.

The RAP-B511 has a built-in IR eye with IR recognizer function. The incoming signal is stored in hash (fingerprint), and it can trigger actions in Event Manager.

▌ INFO: All settings are available in the LDC software, more details can be found in the Infra section.

IR Recognizer Example

IR signals are sent by the Remote controller, the projector is connected to the Ethernet port of the RAP-B511.
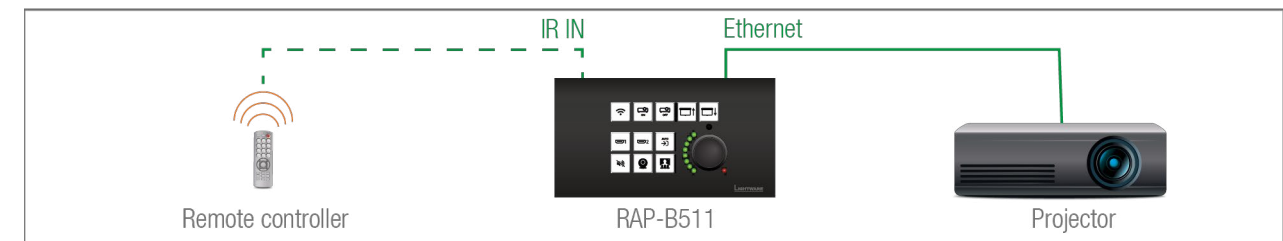
The projector can be powered on via the RAP-B511 by using the remote controller with the following way:

▪ Set an action in Event Manager: if the power button is pressed on the Remote controller, the RAP-B511 sends a control command ('Power on') to the projector via Ethernet. In this case you can control the device via the RAP-B511 remotely. See the details about the Event Manager settings in the Event Manager section.

4.3.5. GPIO Input Level Change

The GPIO (General Purpose Input/Output) port is a multifunctional input/output interface to control the RAP-B511 / RAC-B501 or third-party devices and peripherals. You can establish connection between the controller/controllable device and the RAP-B511 / RAC-B501 by the 4-pole Phoenix connector. Three pin's direction is configurable independently based on needs of the application.

When the GPIO pin is used as an input, it is able to receive feedbacks from the other device by changing the input level. The configuration is available in UI Config Menu and the Event Manager.

4.4. Outputs - Actions

Outputs of the Room Automation Panel can be a feedback about the executed event (e.g. after the button press the button LED lights) or a control signal to the other device. Outputs can be set in the UI Config Menu (and in the Event Manager) in the Software Control - Lightware Device Controller (LDC) software.

4.4.1. Button LED Configuration

▌ **DIFFERENCE:** This section relates to **RAP-B511 series models only**. RAC-B501 model is not built with buttons.

Button LEDs are customizable feedback of the user interaction or any input that is set as a condition. The LED behavior takes into consideration of the status of the **interaction states**. For more details about it, see the Buttons section. The button LEDs can be configured separately.

LED states

Six different LED behaviors are available:

Off / Low brightness / High brightness / Blinking / Slow blinking /Sine pulse

Default LED intensity

Low brightness and High brightness intensity can be customized in 0-5 level scale where 0 means no light, 5 means maximum intensity.

The factory default value of the low brightness: 2

The factory default value of the high brightness: 5

This setting is available in the LDC in the Front Panel Settings section or with LW3 protocol commands (for more details, see the Configure Button section).

Default LED function

The button LED can get a **default** function where two cases are defined:

▪ LED function for true state (when the **interaction state** is **true**)

Example: Button1 is in Momentary operation mode, so when it is pressed, the interaction state changes true. If the LED function for true state is on, the button LED will turn on while it is pressed.

▪ LED function for false state (when the **interaction state** is **false**)

Example: Button2 Button3, Button4 are in the same radio group. When Button2 is pressed, its interaction state changes to true and the other's interaction states change to false. If the LED function for false state is off (of all buttons in the group), the LEDs of Button3 and Button4 will turn off.

Momentarily LED function

The Button LED can get a **momentarily** function. This overwrites the **default** function for a while. Duration time has to be set if the LEDs **momentarily** function is off / low bright /high bright. Blinking number is required when the LEDs **momentarily** function is blinking.
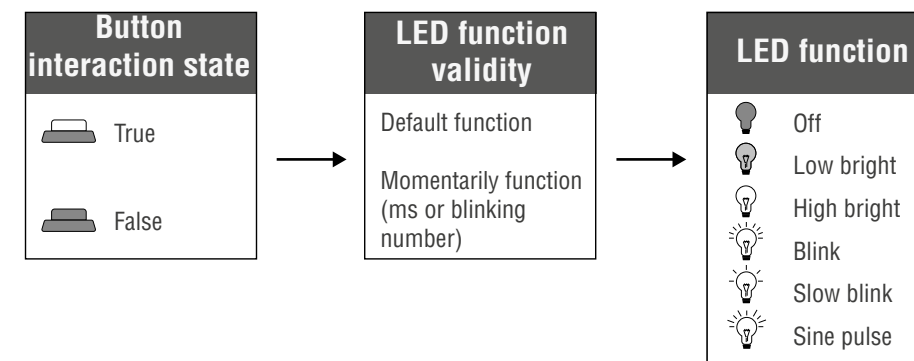
LED function settings has to be done with Software Control - Lightware Device Controller software (in UI Config Menu section) or with LW3 protocol commands (for more details see Button LED Configuration section).

4.4.2. Rotary LEDs

▌ **DIFFERENCE:** This section relates to **RAP-B511 series models only**. RAC-B501 model is not built with rotary switch.

Rotary LEDs always display the actual position of the rotary. For more details about it, see the RAP-B511 Series section.

4.4.3. Serial Message Sending

The Room Automation Devices can send serial messages via RS-232 port in order to control the other devices. This function can be set as an action which executed after the trigger condition (e.g. buttonpress).

Preparations and Settings

▪ The RS-232 port settings (baud rate, data bits, parity, stop bits) of the connected serial devices must be the same.
▪ The RS-232 port of the RAP-B511 must be in **Disconnect** mode. (If the target device is also Lightware unit, take care of the its operation mode, too)
▪ Pay attention to the correct serial cabling (connector pinout). For more details about the cabling, see Factory Default Settings section.

The configuration is available in the UI Config Menu and the Event Manager. The details about serial message sending are available in the RS-232 Message Sending section or in the Message Sending Application Note.

4.4.4. Ethernet Message Sending

The RAP-B511 and RAC-501 devices can send TCP or UDP messages via Ethernet port in order to control the other devices. This function can be set as an action which executed after the trigger condition (e.g. buttonpress).

Preparations and Settings

▪ Pay attention to the TCP/IP port no. (and have it opened) settings in the connected devices. (The Ethernet has to be enabled at the TPS and Ethernet ports.)

▪ The Ethernet devices must be in the same subnet.

▪ If you have problems with accessing a device over Ethernet, try to check the connection e.g. by pinging the IP address.

All settings are available in UI Config Menu and the Event Manager. The details about Ethernet message sending is available in the Ethernet Message Sending section or in the Message Sending Application Note.

4.4.5. HTTP Post and Put Message Sending

ATTENTION! This feature means posting or putting **HTTP** messages from the Lightware device to another device. Encrypted transmission (**HTTPS**) is not supported.

This feature allows sending HTTP post and put messages to the desired server IP:port no. Control commands can be set to the target device, but it is not suitable for processing the response (e.g. querying a parameter/status).

The feature is available in the LDC, see the HTTP Clients (HTTP Post and Put Message Sending) section, and by LW3 commands, see the HTTP Messaging section.

4.4.6. GPIO Output Level Change

The GPIO (General Purpose Input/Output) port is a multifunctional input/output interface to control the RAP-B511 or third-party devices and peripherals. You can establish connection between the controller/controllable device and the RAP-B511 by the 4-pole Phoenix connector. Three pin's direction is configurable independently based on needs of the application.

When the GPIO pin is used as an output, it is able to send a TTL signal the other device by changing the output level. GPIO output level change can be set as an action.

The configuration is available in UI Config Menu and the Event Manager.

GPIO Example

The projection screen is moved up and down by **Relay box** when the Button2 or the Button3 is pushed. Relay box is controlled by the GPIO port.
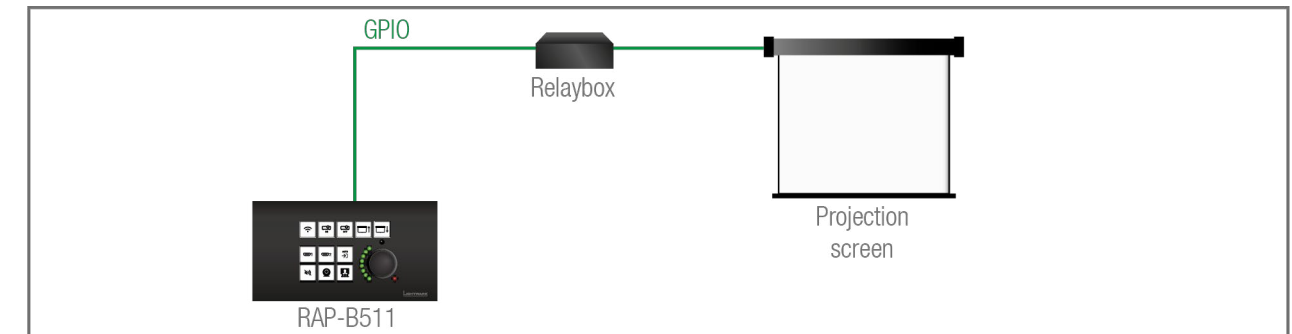
Step 1. Select the **Button2** and **Button3** set their operation mode to **Radio Group1**.

Step 2. When the **Button2** is pressed, it triggers the P1 pin of the GPIO to high level (it closes the Relay and the projection screen is rolled down). Select the **Button2** and choose the **Turn ON actions** tab. Click on the **Set output state to 'High'** action and set the **P1** output port. Click **OK** to save.

Step 3. When the **Button3** is pressed, it triggers the P1 pin of the GPIO to low level (it opens the Relay and the projection screen is rolled up). Select the **Button3** and choose the **Turn ON actions** tab. Click on the **Set output state to 'Low'** action and set the **P1** output port. Click **OK** to save.

ATTENTION! Please always check the electrical parameters of the devices what you want to control. The maximum current of one GPIO pin is 30 mA, the maximum total current for the three pins is 180 mA.

See the LDC settings for GPIO port in the GPIO section. See also the details about the button configuration, in the UI Config Menu section.

4.5. Settings for Control Interfaces

4.5.1. Serial Interface

Technical Background

Serial data communication can be established via the local RS-232 port (Phoenix connector). Three different RS-232 modes can be set for the serial port: Disconnect, Control mode, or Command Injection; see the figure below.
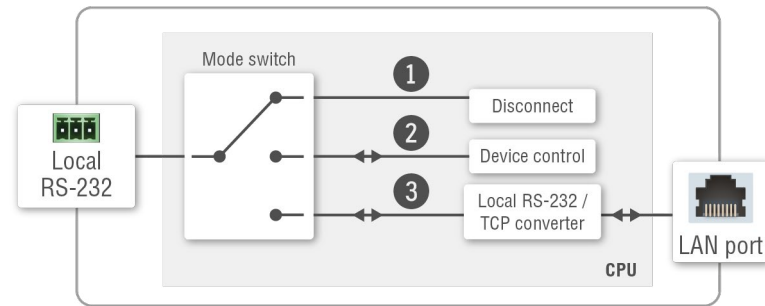
Serial port diagram of Room Automation Panels

The following settings are defined:

①   The serial port is in **Disconnect mode.**

②   The serial port is in **Control mode**.

③   The serial port is in **Command Injection mode**.

> INFO: All settings are available in the LDC software, see details in the RS-232 section.

Only one mode can be used at a time: **Disconnect**, **Control mode**, or **Command Injection** mode.

Disconnect Mode

This mode is for sending control commands to a third-party (or a Lightware) device from the RAP-B511. ASCII characters and binary data in hexadecimal format can be used in this case.

Control Mode

The incoming data from the given port is processed and interpreted by the CPU. The mode allows to control the device directly. LW2 or LW3 protocol commands are accepted – depending on the current port setting.

> INFO: Serial message sending is available in control mode.

Command Injection Mode

In this mode, the device works as a TCP/IP <-> RS-232 bidirectional converter. The TCP/IP data is converted to RS-232 data and vice versa. For this operation separated TCP/IP port number is defined (independent of the basic ones which are used for device control over TCP/IP).

4.5.2. Ethernet Interface

The device can be controlled via Ethernet (standard RJ45 connector). This interface supports:

- Configure the device with Lightware Device Controller. For more information about the LDC, see Software Control - Lightware Device Controller section.
- Control Lightware devices with LW2 and LW3 command protocols. See more details about the Lightware protocols in LW2 Programmer's Reference and LW3 Programmers' Reference sections.
- Establish the connection to Lightware Device Updater v2 software and perform a Firmware Update.
- Create local network, passthrough the Ethernet data traffic.

About PoE

The Ethernet ports of the RAP-B511 are in accordance with IEEE 802.3af (PoE) standard. One Ethernet port can receive and the other one can send power over the Ethernet line. For more information about the PoE function, see Powering Options section.

> INFO: PoE-compatible and not compatible devices can be connected simultaneously as the feature can be set individually on each port.

Example
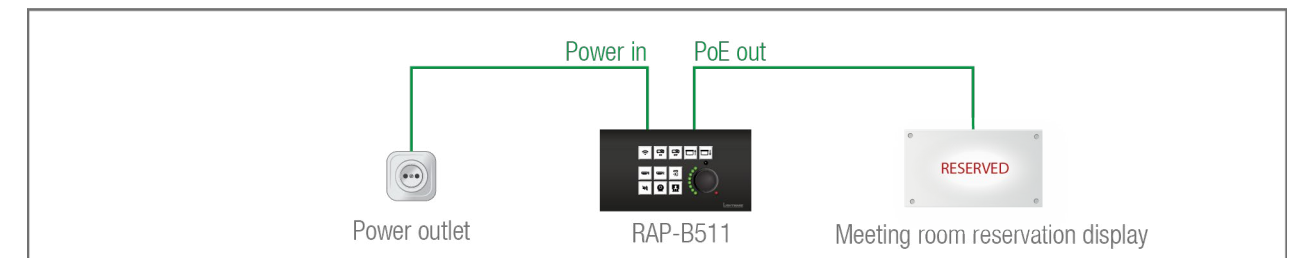
The Room Automation Panel sends PoE via Ethernet to the PoE-compatible display outside the meeting room, which shows the availability of the room.

4.5.3. USB Control Interface

The device can be controlled over front panel USB mini B-type connector. The interface can be used to establish a connection to Lightware Device Controller. For more information about the LDC, see Software Control - Lightware Device Controller section.

This interface only supports LW3 protocol. See more details about the Lightware protocols in LW3 Programmers' Reference sections.

Establish the connection via USB to Lightware Device Updater v2 software and perform Firmware Update.

4.5.4. Infra Interface

> **DIFFERENCE:** This section relates to **RAP-B511 series models only**. RAC-B501 model is not built with Infrared detector.

Technical background

RAP-B511 contains dedicated IR in connection and is able to receive IR signal via the built-in IR detector units. The signal is stored in hash (fingerprint)format.

With the help of the device's IR recognizer functionality you can assign actions in Event manager (for more details, see IR Recognizer section). The second option is the command injection mode (like at Serial Interface in the previous section) where you can send IR commands over LAN. Command injection mode can be turned on and off on the input port.
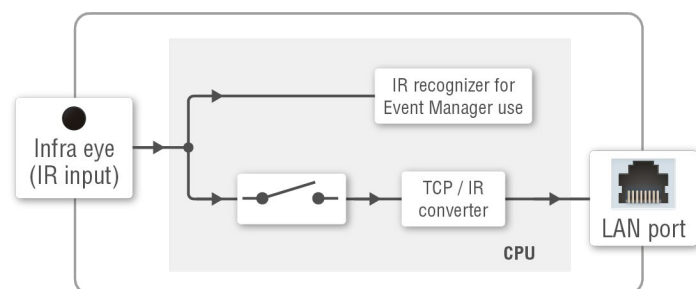
Port diagram of the IR interface

> INFO: All settings are available in the LDC software, see settings in the Infra section.

4.6. The Event Manager Feature

The Event Manager feature means that the device can sense changes on its ports and is able to react according to the pre-defined settings. Lightware Device Controller contains a user-friendly software tool and allows creating Events by defining a Condition and an Action.
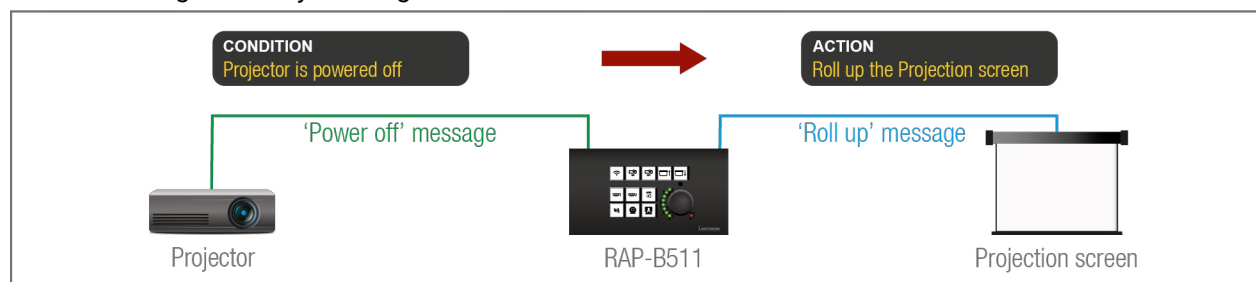
Event Manager Example

See more information about the settings in the Event Manager section in LDC.

Event Manager +

> **DIFFERENCE:** Below mentioned features are available from FW package v1.1.0b3.

The AND Operator

The practical experience has shown that there is a need to examine more conditions (up to four) as follows: if one of the set conditions becomes true (while the other conditions are fulfilled), then the set Action is launched. For example, in a meeting room we have the following situation:

- Signal is present on an input port,
- A GPIO pin state becomes 'low' (by an external device).

If the two **Conditions** are present at the same time, the **Action** is launched. Just create the two **Conditions** into separate Events, then create a third Event, select the two **Conditions** and define the **Action**.

See the Combine Links section for the settings in LDC.

Event Manager Variables

A brand new area is opened by implementing the variables. You can create custom variables (max. 30 pcs.) in number or text format which can be used in the Event Manager. The variables can have the following properties/methods:

- Numeric (integer) type with min/max value setting, or string-type (the type is set automatically)
- Increment/step the numeric value,
- Value-dependent case operations,
- Reading and storing the value of an LW3 property into a string or a numeric variable.

The defined variables are stored in a non-volatile memory and the value is kept in case of a reboot. The new opportunities allow creating a monitoring/controlling system without connecting an additional control processor.

See the Variables section for the settings in LDC.

Condition Trigger

This improvement in the Event Manager works as if a condition is detected. When a complex control system is built, a Condition may trigger numerous Actions. A typical example is when a system is powered on and the 'ready-to-use' state has to be loaded. In this case, there could be many actions which are based on the same condition. In order to reduce the number of the commands, you can trigger one 'key' condition, which could start the whole process. See the Condition Triggering section for the settings in LDC.

4.7. Basic IT Security

▌ DIFFERENCE: Below mentioned features are available from FW package v1.1.0b3.

These entry-level network security improvements help to prevent unauthorized access to the Lightware device:

- ▪ **Cleartext login**
- ▪ **IP Port Block**
- ▪ **MAC Filtering**

The **Cleartext Login** tool allows setting a password for login, thus, the device will not accept any command coming from an interface (RS-232, Ethernet, etc…), only the device type and the serial number can be queried without login. You can set all affected TCP/IP ports individually to enable or disable.

The **IP Port Block** feature is an additional protection for the Cleartext login. There are TCP/IP ports in Lightware devices which are not protected by the login, so you can disable them if necessary. Example: due to the working method of the LW2 communication, the Cleartext login does not provide protection when LW2 command is sent to the device, that is why the TCP port no.10001 shall be blocked manually.

Another level of security is the **MAC Filtering** tool. You can create an 'allowlist' of network devices based on the MAC address which are allowed:

- ▪ Controlling the device (Send option), or
- ▪ Querying parameters (Receive option) to/from the Lightware device.

Below table shows the protection levels of these features.

IP Port	Function	MAC Filter	Cleartext Login	IP Port Block
80	HTTP Post&Get	✔	-	✔
81	LW3 control (miniweb)	✔	✔	-
6107	LW3 protocol	✔	✔	-
800x	Command injection (RS-232)	✔	-	✔
900x	Command injection (IR)	✔	-	✔
10001	LW2 protocol	✔	-	✔

▌ ATTENTION! Be careful when combining these functions; improper settings may cause malfunction.

Most of these feature are available in LDC, see the Settings Menu section.

4.8. Batch Commands

▌ DIFFERENCE: Below mentioned features are available from FW package v1.1.0b3.

These features can be used to process a group of pre-defined commands. The commands can be stored in the device as macros or you can save the commands in a plain text file and send the device by an HTTP message.

LW3 over HTTP (Command Salvo)

This feature allows the LW device to be controlled over HTTP. In this case, a batch of commands is sent over HTTP to the Lightware device for processing. Save the LW3 commands into a file, post it to the <IP_address>/protocol.lw3 file and the commands are processed immediately.

Running Macros

In this case, the command sequences (macros) are stored in the device. You can create your custom macros in a file, upload into the device and run at any time. The number of the macros depends on the device type, at most 50 macros can be saved in the device. See more information about the feature in the Macros section.

5

Software Control - Lightware Device Controller

The device can be controlled by a computer through the Ethernet and RS-232 port using Lightware Device Controller (LDC). The software can be installed on a Windows PC or macOS. The application and the User's manual can be downloaded from www.lightware.com.

▶ RUNNING THE LDC
▶ ESTABLISHING THE CONNECTION
▶ UI CONFIG MENU
▶ CONTROL MENU
▶ EVENT MANAGER
▶ SETTINGS MENU
▶ BUILT-IN MINIWEB
▶ CONFIGURATION CLONING (BACKUP TAB)
▶ ADVANCED VIEW WINDOW
▶ PROTOCOL DESCRIPTION

5.1. Install and Update

Installation for Windows OS

> **ATTENTION!** The minimum display resolution shall be 1280x720.

Step 1. Run the installer. If the User Account Control drops a pop-up message click Yes.

Step 2. During the installation you will be prompted to select the type of the installation: **normal** and the **snapshot** install:

Normal install	Snapshot install
Available for Windows and macOS	Available for Windows
The installer can update only this instance	Cannot be updated
Only one updateable instance can exist for all users	Different versions can be installed for all users

Comparison of the Installation Types

> **ATTENTION!** Using the Normal install as the default value is highly recommended.

Installation for macOS

> INFO: After the installation, the Windows and the Mac application has the same look and functionality. This type of the installer is equal with the Normal install in the case of Windows and results an updateable version with the same attributes.

Mount the DMG file with double clicking on it and drag the LDC icon over the Applications icon to copy the program into the Applications folder. If you want to copy the LDC into another location just drag the icon over the desired folder.

> **ATTENTION!** Please check the firewall settings on the macOS device. LDC needs to be added to the exceptions of the blocked software for the proper operation.

The Updating of the LDC

Step 1. Run the application.

The **Device Discovery** window appears automatically and the program checks the available updates on Lightware's website and opens the update window if LDC updates are found. The current and the update version number can be seen at the top of the window and they are shown in this window even with the snapshot install. The **Update** window can also be opened by clicking the **About icon** and the **Update** button.

Step 2. Set the desired update setting in the **Options** section.

- If you do not want to check for the updates automatically, uncheck **the circle**, which contains the green tick.
- If you want to postpone the update, a reminder can be set with different delays from the **drop down list**.
- If the proxy settings traverse the update process, set the proper values then click the **OK** button.

Step 3. Click the **Download update** button to start the updating.

The updates can be checked manually by clicking the **Check now** button.

5.2. Running the LDC

The common way to start the software is double-click on the LDC icon. But the LDC can be run by command line parameters as follows:

Connecting to a Device with Static IP Address

The LDC is connected to a device with the indicated static IP address directly; the Device Discovery window is not displayed. When the port number is not set, the default port is used: 10001 (LW2 protocol). For LW3 devices use the 6107 port number.

Format: `LightwareDeviceController -i <IP_address>:<port>`

Example: `LightwareDeviceController -i 192.168.0.20:6107`

Connecting to a Device via a Serial Port

The LDC is connected to a device with the indicated COM port directly; the Device Discovery window is not displayed. If no Baud rate is set the application will detect it automatically.

Format: `LightwareDeviceController -c <COM_port>:<Baud>`

Example: `LightwareDeviceController -c COM1:57600`

Adjusting the Zoom

The window can be zoomed to a specific value to fit to the resolution of the desktop (higher/lower). '1' is the default value (100%).

Format: `LightwareDeviceController -z <magnifying_value>`

Example: `LightwareDeviceController -z 1.2`

> **ATTENTION!** The last set value is stored and applied when LDC is started without a parameter.
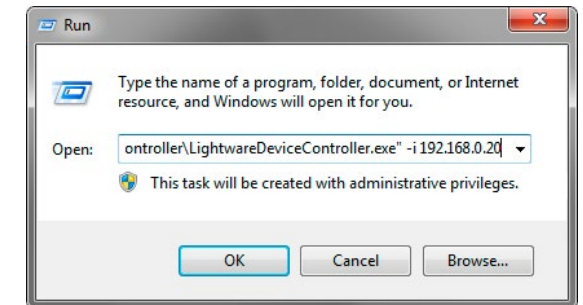
5.3. Establishing the Connection

Step 1. Connect the device to a computer via Ethernet (RS-232 or USB).

Step 2. Run the controller software; device discovery window appears automatically.
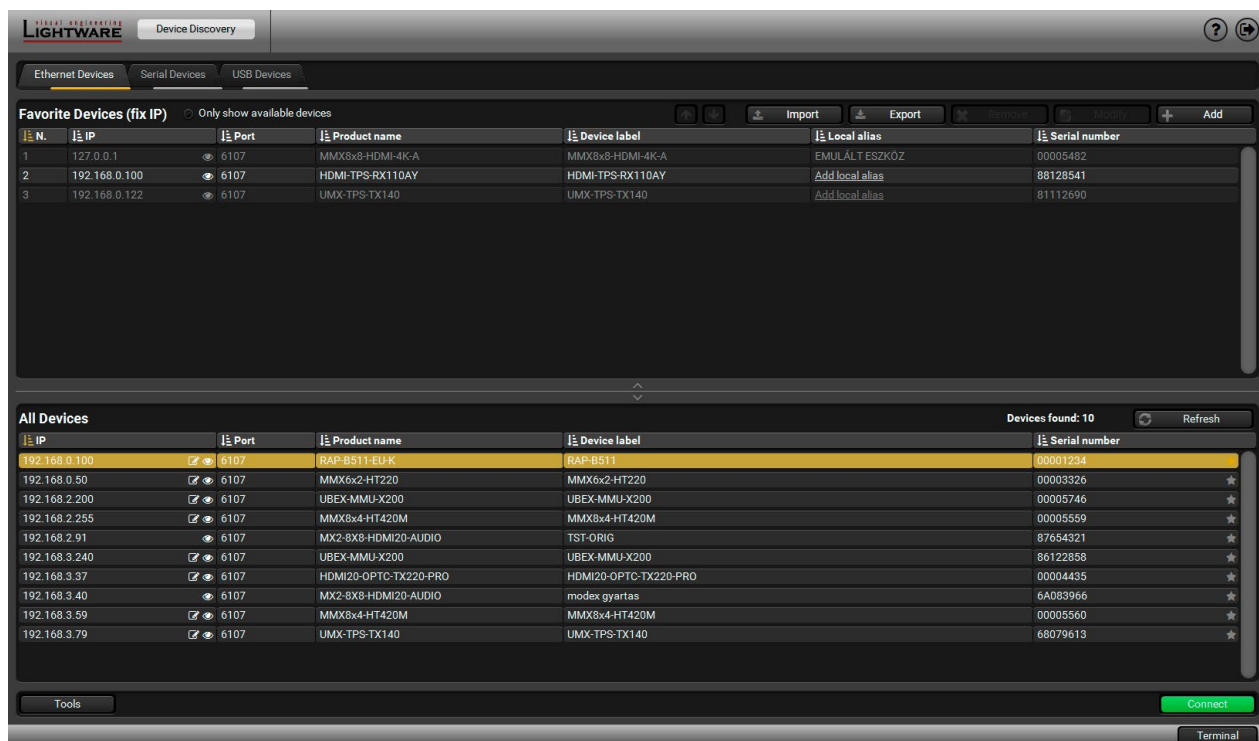
Device Discovery Window in LDC

Changing the IP Address 🖉

To modify IP address settings quickly it is not necessary to enter the device's settings/network menu, you can set them by clicking the pencil icon beside the IP address. In this window you can see only the new settings.
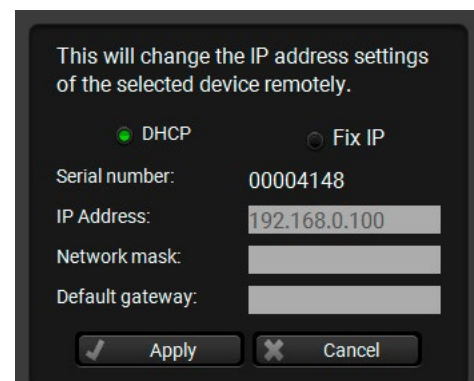
Identifying the Device 👁

Clicking on the icon results the blinking of the LEDs for 10 seconds. The feature helps to identify the device itself.

The Ethernet tab consists of two lists:

- **Favorite Devices:** You can add any Lightware device that is connected via Ethernet and no need to browse all the available devices. Devices can be added by pressing the **Add** button or marking the desired device by the ★ symbol in the **All Devices** list.
- **All Devices:** The Lightware devices are listed which are available in the connected network.

Step 3. Select the unit from the discovered Ethernet devices or under Serial devices; when the device is connected through RS-232 click on the **Query** button next to the desired serial port to display the device's name and serial number. Double click on the RAP-B511 or select the device and click on the **Connect** button.

▌**ATTENTION!** When the device is connected via the local RS-232 port, make sure that Control mode and LW3 protocol are set on the serial port.

Import/Export the List of Favorite Devices

▌**DIFFERENCE:** This feature is available only from LDC version v2.5.5.

The list of favorite devices can be exported/imported by the dedicated buttons (saved as *.JSON file). The list can be imported later (in another computer, too), but please note that the current list will be overwritten by the imported list.

Favorite Devices (fix IP) ☆

Clicking on the grey star icon next to of the discovered devices the most used units can be saved to the Favorite devices.

▌**ATTENTION!** Only the devices set with static (fix) IP address can be saved as favorite device.

Once the device is set as favorite, the star icon will be highlighted with yellow and the device will be displayed between the Favorite Devices (fix IP) window section.

5.4. UI Config Menu
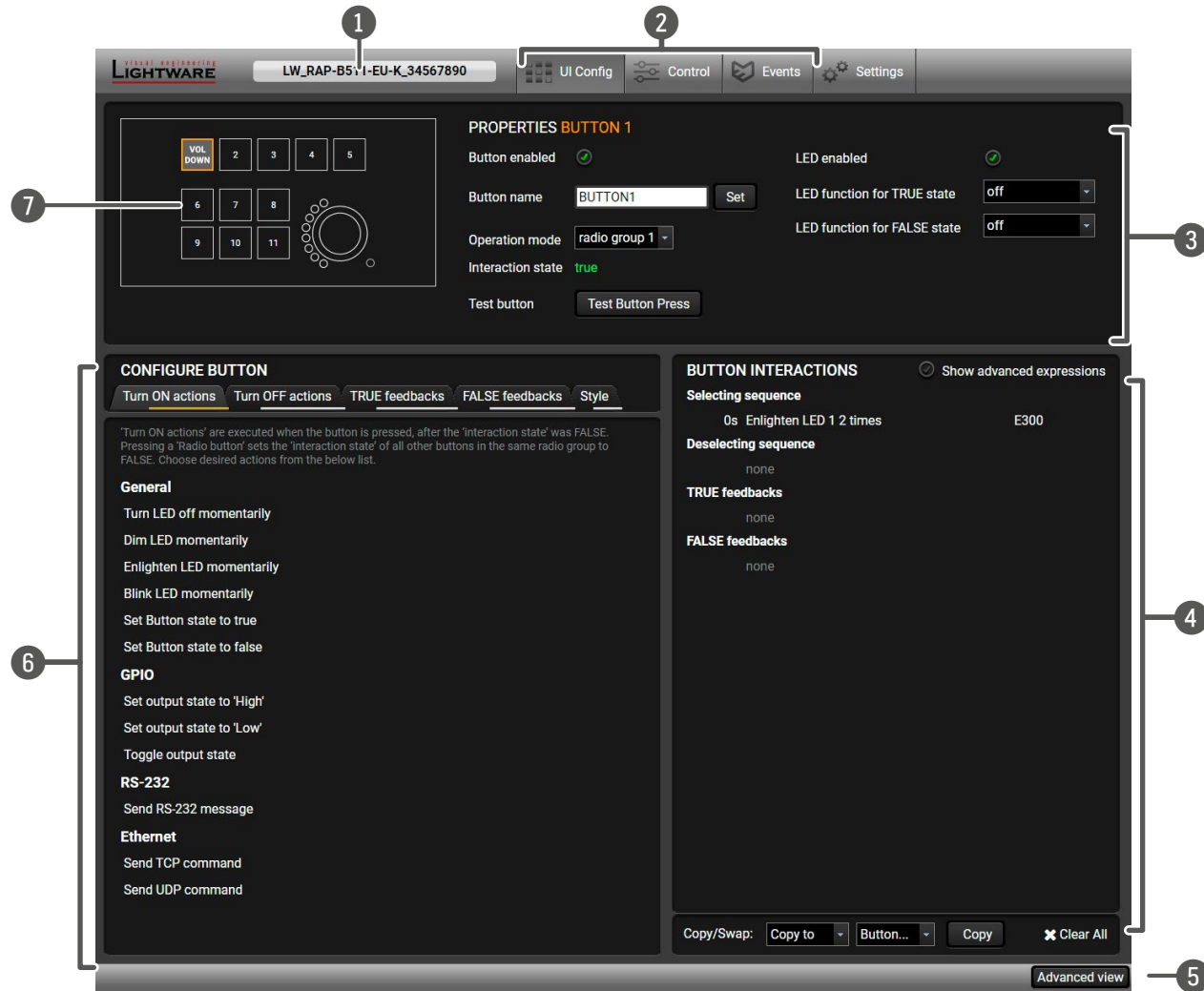
① **Information ribbon** The label shows the device label which can be edited in the Settings menu - Status tab. Device discovery window can be displayed by clicking on this ribbon. Hover the mouse cursor to the information ribbon; the **device label** and the **IP address** of the device will appear as a tooltip text.

② **Main menu** The available menu items are displayed. The active one is showed with dark grey background color.

③ **Button Properties** Basic button settings (e.g. button name, operation mode) can be done in this section. See more details in Button Properties section.

④ **Summary of the Button Interactions** This section contains all the defined events of the selected button. For more details about it, see Button Interactions section.

⑤ **Advanced View button** Displaying Advanced View Window, showing the Terminal window and the LW3 protocol tree.

⑥ **Configure button section** The tabs consist of actions and conditions which can be set to the selected button. The tab denomination depends on the button operation mode. The wireframe view of the buttons can be customized by icons and text on the Style tab. For more details about it, see Configure Button section.

⑦ **Wireframe view** Wireframe view shows the configurable button (or the rotary) with highlight color and shows the buttons in the same radio group, too. Click one to select and adjust it.

Legend of the Wireframe View

Icon	Sign	Explanation
1	no highlight, black background	default view
1	amber highlight	selected button
1	grey background	member of the same radio group
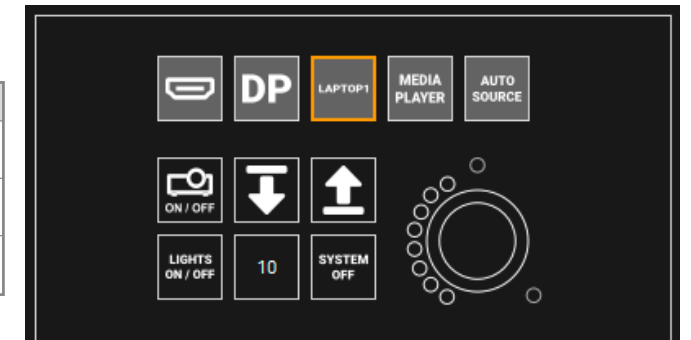
5.4.1. Button Properties

Click the button icon on the wireframe view to display and modify the related configuration.

ATTENTION! Clicking the button icon on the wireframe view does not simulate the button click. **Test Button Press** button is for that purpose.
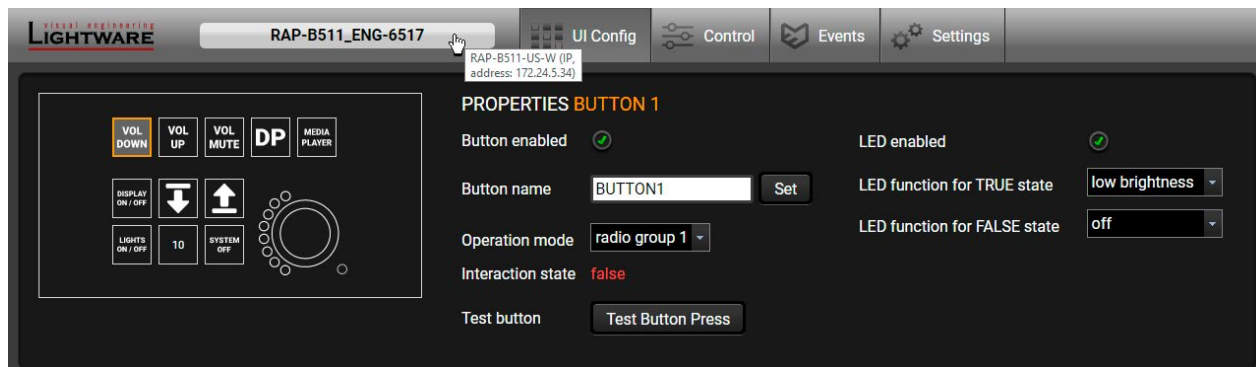
The following settings are available in the Button Properties section:

- **Button enabled**: The buttons can be enabled or disabled independently of each other (when the button is disabled, pressing it will have no effect).
- **Button name:** The button name can be 32 character-long, ASCII characters are allowed. Longer names are not accepted.
- **Operation mode:** Three modes are available: momentary, toggle, or radio group (1-5). For more details about the operation modes, see the Buttons section.
- **Interaction state**: Displays the current state of the selected button. For more information about the interaction states, see the Buttons section.
- **Test Button Press**: Press the **Test Button Press** button to test the buttonpress (indicates a virtual button press).
- **LED enabled:** LED function of the selected button can be turn on and off.
- **LED function for TRUE/FALSE state**: Six default button LED state can be set: off / low bright / high bright/ blink /slow blink / sine pulse.

  The LED behavior change depends on the interaction state. For more information, see the Button LED Configuration section.

INFO: The intensity of the LED brightness can be customized in the Settings menu, on the Front panel tab. For more details see Front Panel Settings section.

5.4.2. Configure Button

This section provides a layout where button functions can be set quick and easy.

The first two configuration tabs are **for setting the Actions (outputs)** of the chosen button. In this case, the trigger **condition is always the same**. The second two tabs are **for setting the Feedbacks (conditions or inputs)** and the **action is fix**.

The tab denomination depends on the button operation mode. A short description gives a hint to choose the proper condition or action for the selected button.

①   Tabs to set the action

②   Tabs to set the feedback

③   Tab to set the button Style

④   Short description

⑤   Action or condition list
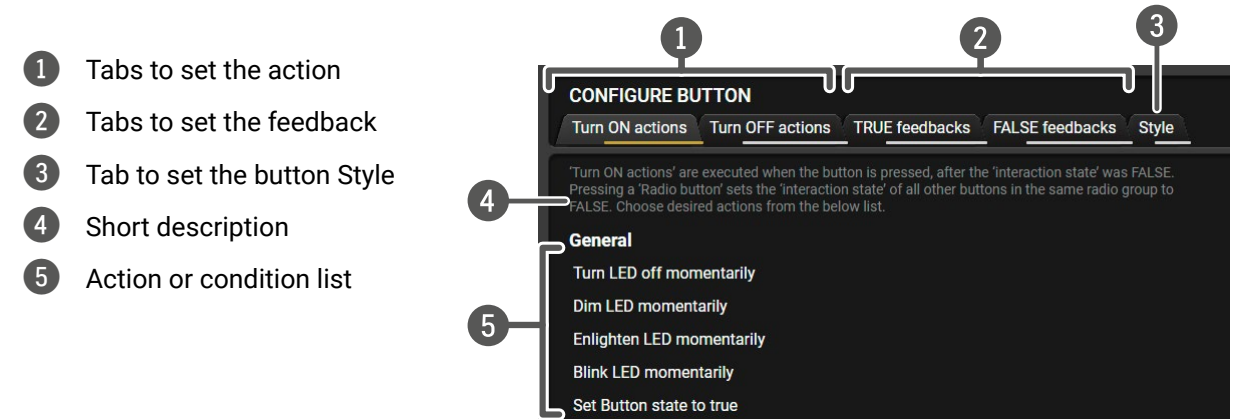
Summary of the actions and feedbacks tabs

Button operation mode	Tab name	Action	Feedback (condition)
Momentary	Press actions	Choose the desired action from the list	**Interaction state is true**
	Release actions	Choose the desired action from the list	**Interaction state is false**
	TRUE feedbacks	**Interaction state is true**	Choose the desired condition from the list
	FALSE feedbacks	**Interaction state is false**	Choose the desired condition from the list
Toggle	Toggle ON actions	Choose the desired action from the list	**Interaction state is true**
	Toggle OFF actions	Choose the desired action from the list	**Interaction state is false**
	TRUE feedbacks	**Interaction state is true**	Choose the desired condition from the list
	FALSE feedbacks	**Interaction state is false**	Choose the desired condition from the list
Radio group 1-5	Turn ON action	Choose the desired action from the list	**Interaction state is true**
	Turn OFF action	Choose the desired action from the list	**Interaction state is false**
	TRUE feedbacks	**Interaction state is true**	Choose the desired condition from the list
	FALSE feedbacks	**Interaction state is false**	Choose the desired condition from the list

Button configuration steps:

Step 1. Choose the tab and click on the desired action or condition in the thematic list.

Step 2. Type the missing parameters (and the delay, if it is necessary) in the pop up window (on the right).

Step 3. Click **OK** to save. The configuration is saved as an Event in the Event Manager. It can be seen in the event list, numbered backwards.

DELAY

No delay

| No delay ▾ | 0 ⬍ | min | 0 ⬍ | sec |

ACTION

Send TCP command 'CALL /MEDIA/VIDEO/XP:onClick(O1,I3)\x0d\x0a' to IP /MEDIA/ETHERNET.tcpMessage=192.168.0.80:61...

Category

Ethernet ▾

Expression

Send TCP command ▾

Message   IP address

CALL /MEDIA/VIDEO/   192.168.0.80

Port number

6107

Cancel   OK
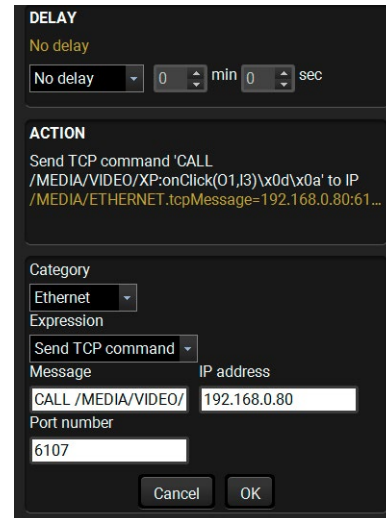
Stylize the Buttons

When the button has a function, the last step is to add a text or icon to the wireframe view. This layout will appear on the Built-in Miniweb and supports the identification of the virtual buttons with the front panel.

1 Tab of Style config.

2 Button icons (same with the device label stickers). Click one to set for the currently selected button.

3 Selected icon (highlighted with amber frame)

4 Button text entry field. Maximum three rows can be displayed for one button. 30 ASCII characters are allowed for all rows.

5 Click to clear the button style.

6 Click to open the Miniweb page in the web browser. For more details, see the Built-in Miniweb section.

7 This QR code contains the web address of the Miniweb page. It can be saved in png.

TIPS AND TRICKS: Using the same appearance of the button with the label on the physical device helps identify them easily.

Button Interactions

This section provides an overview of all defined events of the selected button. One line represents one event. It displays the delay time between the action and the condition, the condition or the action with the parameters, the event number, where the current setting is saved.

The ⚠ icon shows that the event was not created from the UI config page. It means that an event was set in the Event Manager, where the interaction state of the selected button was defined as an action or condition (e.g. / EVENTS/E3.Condition=/MANAGEMENT/UI/BUTTONS/ BUTTON11.State=true)

Click on the icon to **Show advanced expression**. It displays the LW3 path of the event.

TIPS AND TRICKS: If the Show advanced expression mode is not active, keep the cursor on the event line for a second, and the whole expression appears in the hint box.
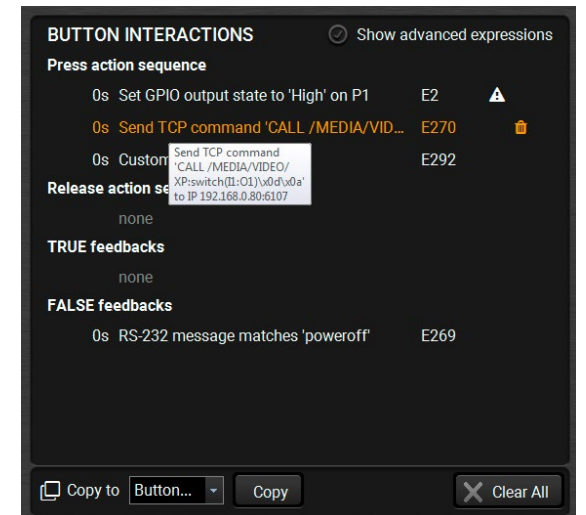
The following settings are available in this section:

- The existing events can be edited by clicking on the event line (when it is highlighted with amber). Modifying the event properties is possible in the pop-up window.
- Click on the icon beside the event to delete it.
- All events of the button can be copied to another button. Choose a target button by clicking on the drop-down menu and select the **Copy to** option.
- All events of the button can be swapped with another button. Choose a target button by clicking on the drop-down menu and select the **Swap with** option.
- **Clear All** button is for deleting all events of the selected button.

5.4.3. Configurations of the Rotary

Click the rotary icon on the wireframe view to display and modify the related configuration.

The jog dial knob can be configured for volume control (or other controlling purposes). Turning left and right the rotary triggers the command sending via RS-232 or Ethernet.

Mute and unmute commands are assigned to the knob press, level 0-16 commands belong to the volume setting on a 16-level scale.
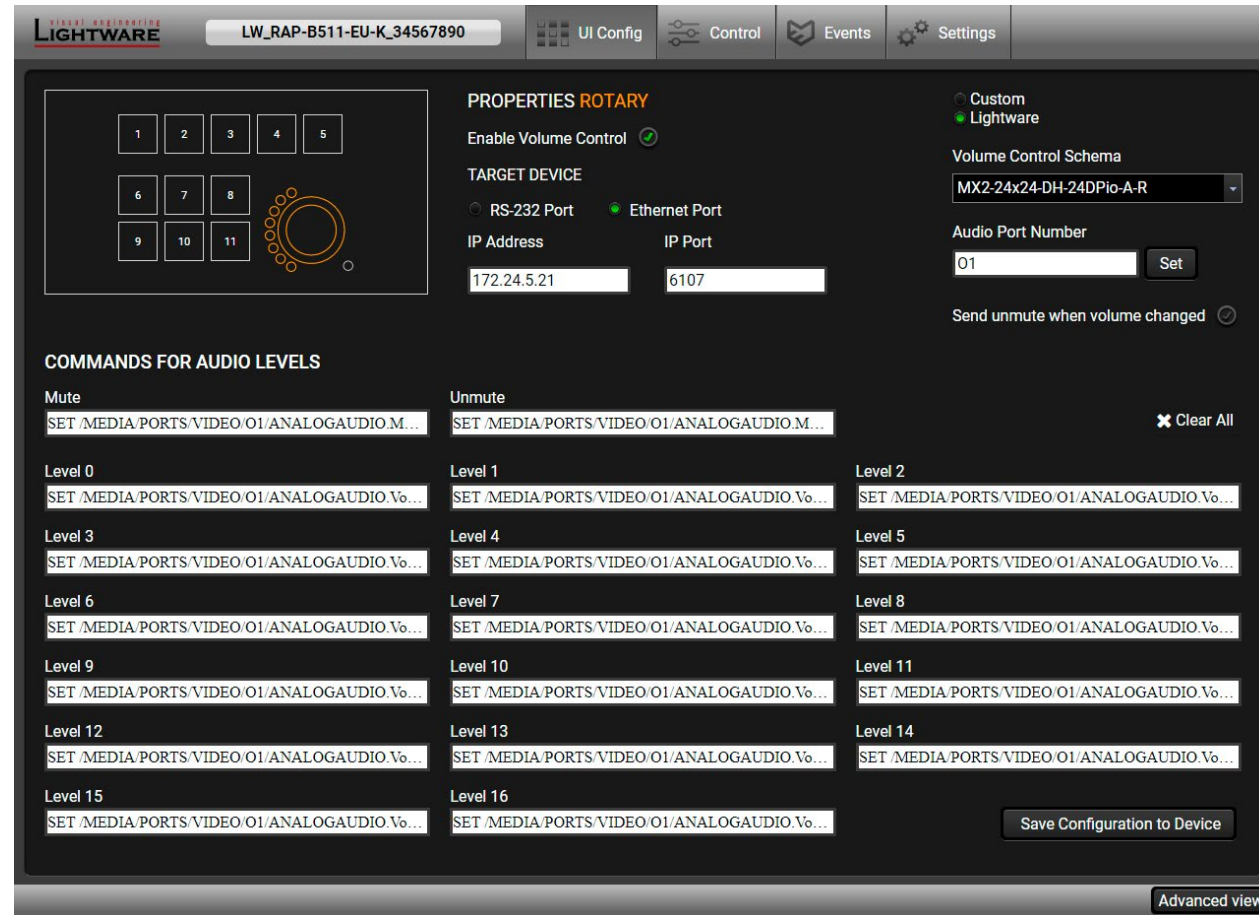
Follow the instructions to set the rotary:

Step 1. Choose an interface for the (volume) command sending (via RS-232 port or via Ethernet port). When the Ethernet is selected, IP address and port number are also required.

Step 2. Choose a volume control schema: **Custom** or **Lightware**.

   a) **Custom** schema makes it possible to send serial or Ethernet messages to the third-party (or Lightware) device depending on the rotary state. Type the desired commands into the proper entry fields.

   b) **Lightware** schema is for controlling the volume of the analog audio levels of the chosen audio port

in any Lightware device. The entry fields are inactive, because the command schema is loaded automatically after setting the parameters:

- ▪ The target device can be selected by typing the device type or chosen from the device list/ generic schema list in a drop-down menu. For more details about the generic schema see Volume Control Schema Table
- ▪ Write the audio port number (e.g. I2 or O8)
- ▪ Click **Set** to confirm. Commands are loaded into the list.
- ▪ The **Send unmute when volume changed** option allows setting the volume while the controlled device is in muted state. If the option is enabled, the unmute command is sent, the LED is switched off and the volume setting command is sent. If the option is unchecked, only the volume setting is processed.
- ▪ Save the Schema by clicking **Save Configuration to Device** button. The configuration is saved to Events in the Event Manager (one event for one level settings). It can be seen in the event list, numbered backwards.

Step 3. Rotary LEDs give feedback about the current position of the jog dial knob. As it is rotated right (and the volume increases), the LEDs turn on one-by-one. One level means half brightness.

Volume Control Schema Table

Generic schemes collects the Lightware devices by the same audio setting commands.

Schema ID	Device Type
Generic LWR-A	DP-TPS-TX220 DVI-HDCP-TPS-TX220 FP-UMX-TPS-TX120, TX130 HDMI-3D-OPT-RX150RA HDMI-3D-OPT-TX220 HDMI-TPS-RX110AY HDMI-TPS-TX220 MMX4x2-HDMI MMX4x2-HT200 SW4-OPT-TX240 SW4-TPS-TX240 UMX-TPS-TX120, -TX130, -TX140 WP-UMX-TPS-TX120, -TX130
Generic LWR-B	MX2-16x16-DH-8DPi-A-R, MX2-24x24-DH-12DPi-A-R MX2-24x24-DH-24DPio-A-R, MX2-24x24-HDMI20-Audio MX2-24x24-HDMI20-Audio-R, MX2-32x32-DH-16DPi-A-R MX2-32x32-HDMI20-A-R, MX2-48x48-DH-24DPio-A-R MX2-48x48-DH-48DPio-A-R, MX2-48x48-HDMI20-A-R MX2-8x4-HDMI20-CA, MX2-8x8-DH-4DPi-A MX2-8x8-DH-8DPi-A, MX2-8x8-DH-8DPio-A MX2-8x8-HDMI20-Audio, MX2-8x8-HDMI20-Audio-L MX2-8x8-HDMI20-CA
Generic LWR-C	MMX8x4-HT420M (mixer addon) MMX8x4-HT400MC (mixer addon)

Schema ID	Device Type
Generic LWR-D	MMX6X2-HT200 MMX6X2-HT210 MMX6X2-HT220
Generic LWR-E	MX-FR (IB/OB-A) UMX-OPT-TX150R UMX-TP-TX100
Generic LWR-F	UBEX-PRO20-HDMI-F110, -F120
Generic LWR-G	VINX-120AP-HDMI-ENC VINX-120AP-HDMI-ENC-DNT VINX-210AP-HDMI-ENC VINX-110AP-HDMI-DEC

5.5. Control Menu

5.5.1. RS-232
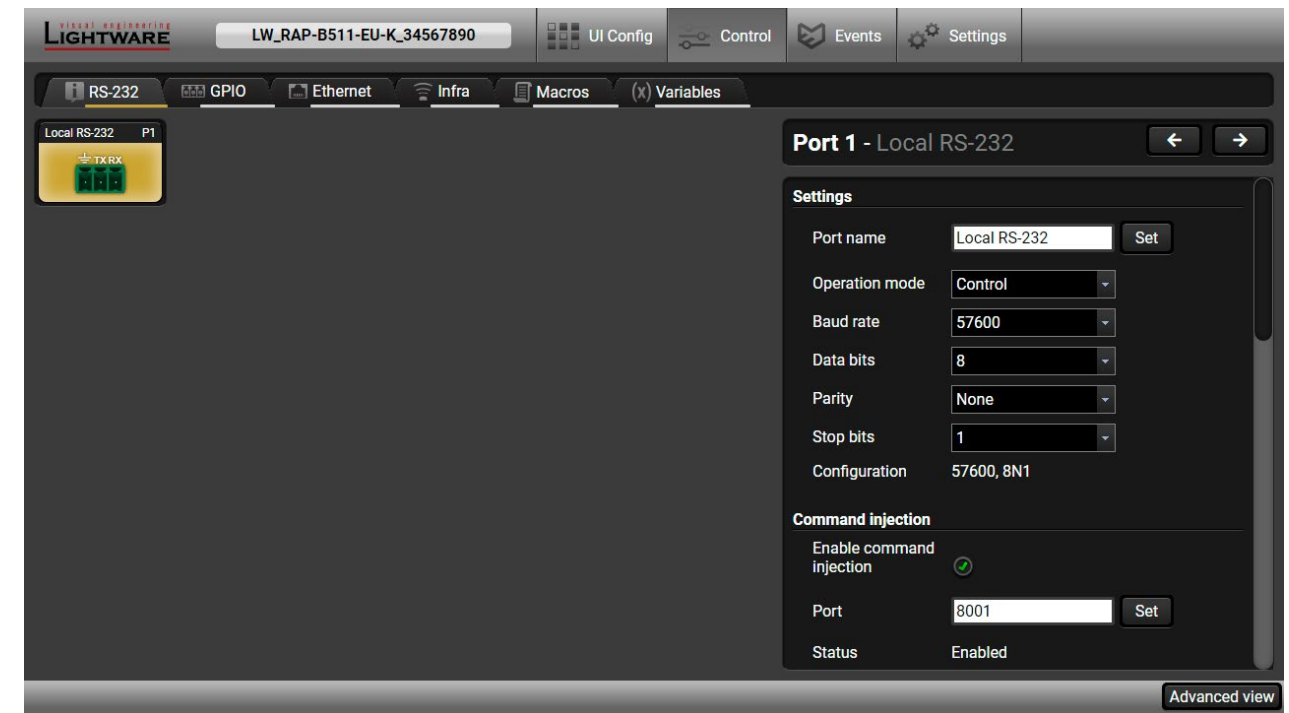
RS-232 Tab in Control Menu

The following settings and functions are available (both on local and TPS serial ports):

- Operation mode: Control, Command Injection, or Disconnected (for more details about serial interface modes see the Serial Interface section);
- Baud rate: 4800, 7200, 9600, 14400, 19200, 38400, 57600, 115200;
- Data bits: 8 or 9;
- Parity: None, Odd, or Even;
- Stop bits: 1, 1.5, or 2;
- Command injection: enable or disable; port number;   *#commandinjection*
- Control protocol: LW2 or LW3;   *#protocol*   *#rs232*   *#rs-232* *#serial*
- Message sending via serial port; *#message*
- Reloading factory defaults (see factory default settings in the Factory Default Settings section).

RS-232 Message Sending

The message in the field can be sent out via the current RS-232 port. Response cannot be seen in the surface.

> **ATTENTION!** The escaping is done automatically when sending a message via this surface. When the message is an LW3 command, it has to be closed by Carriage return and Line feed, e.g.: CALL /MEDIA/VIDEO/XP:switch(I1:O1)\x0d\x0a.

RS-232 Message Recognizer

This tool can be used to recognize messages coming from the RS-232 port. The message can be used as a Condition in Event manager and define an Action for it.

Definitions   *#message*

Delimiter sequence (hex): Each message is closed by this separator (if defined).

Accept timeout (ms): When the set time is elapsed after the last received message and delimiter was not detected, the device saves the data into the Text, Hex, and Hash properties. The timeout setting is useful if there is no special or easily defined delimiter in the incoming data, but there is a time gap between the messages.

Text: The recognized message in ASCII-format.

Hex: The recognized message in hex format.

Hash: Binary data that is mapped from the original message. The length of the hash is shorter, and the same message results the same hash.

Working Method

A message got recognized from the incoming data, if one of the following occurs:

- The set DelimiterHex is detected in the message, or
- The set TimeOut has been elapsed since receiving the last data bit.
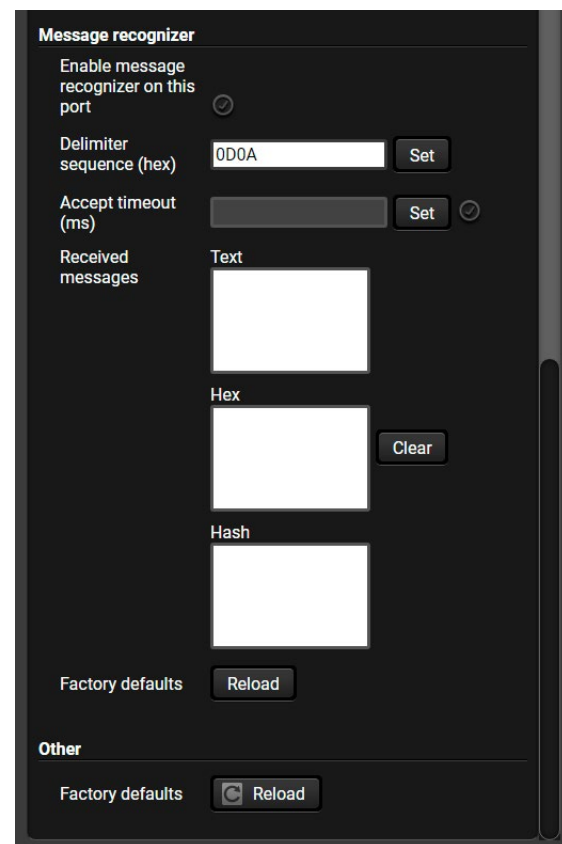
5.5.2. GPIO
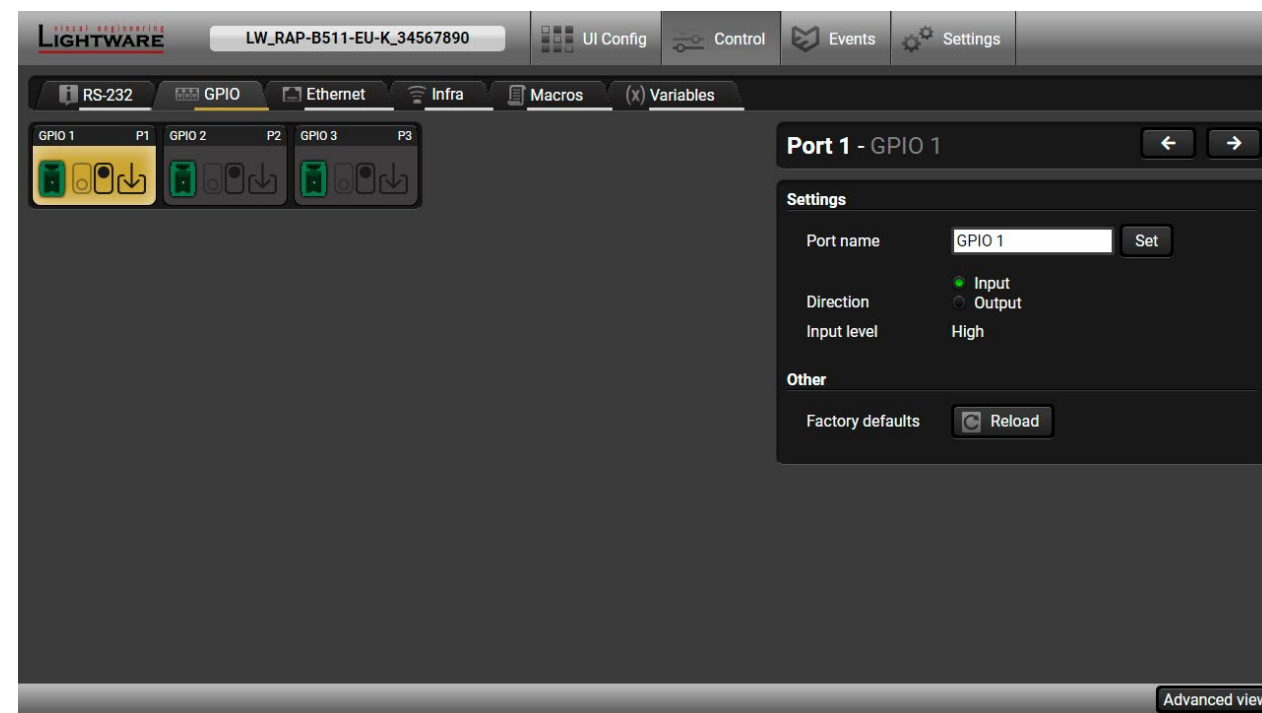
GPIO tab in Control menu

The GPIO port has 3 pins, which operate at TTL digital signal levels and can be controlled by LDC or protocol commands. Select a GPIO pin and under the Port settings section; the settings (pin direction and input level) are displayed on the port tiles as well:

① GPIO pin name
② GPIO port icon
③ Low level indicator
④ High level indicator *

⑤ Pin direction:
    Input: down arrow
    Output: up arrow
⑥ GPIO port number
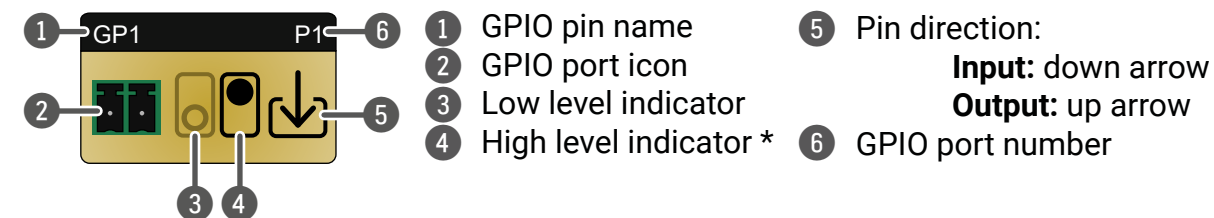
* Highlighted with black means the current setting.

> INFO: Output level can be set only in case of setting the pin direction to Output. In case of input direction the output level setting and the Toggle button is not available.

5.5.3. Ethernet

Ethernet Ports

Two ports are displayed in the Ethernet settings: **PoE in Eth** and **PoE out Eth**. You can check the status of the Ethernet line by each ports: the speed and the duplexity of the connection.

The following settings are available for each ports:

▪   Enable / disable the port,
▪   Reload the factory defaults.

The PoE feature can be enabled/disabled on **PoE out Ethernet** port.
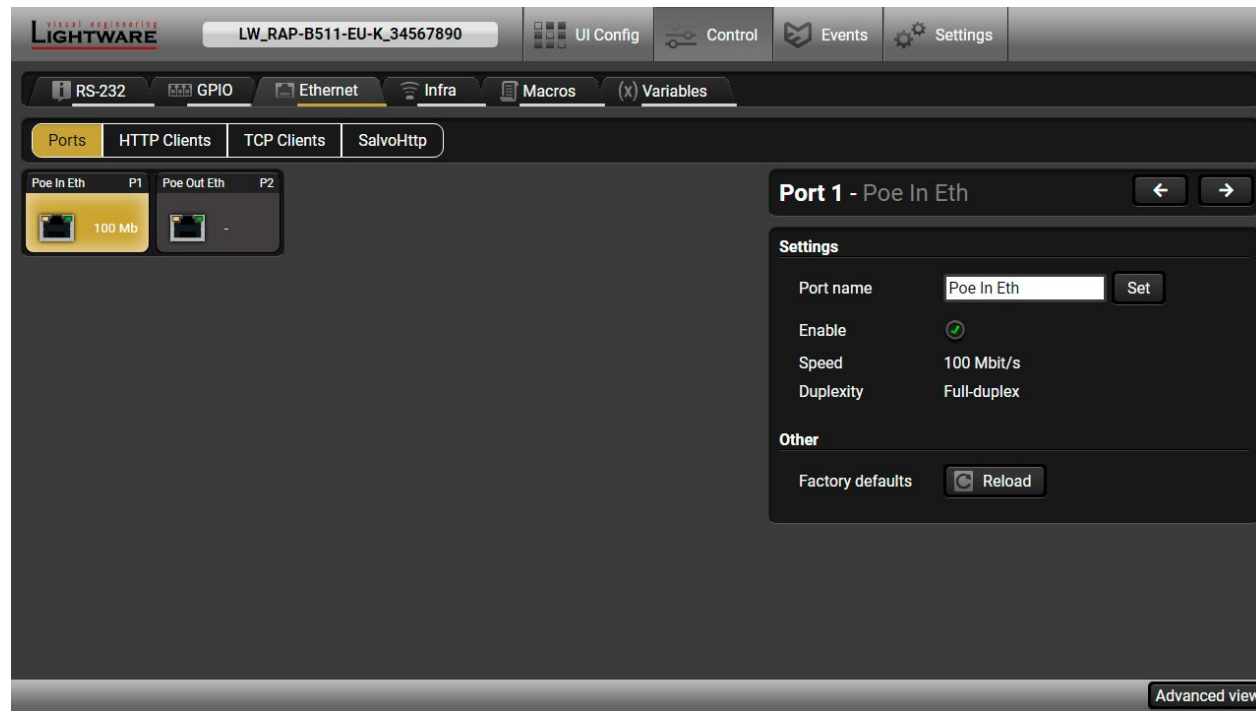
Ports tab in the Control/Ethernet menu

HTTP Clients (HTTP Post and Put Message Sending)

> **ATTENTION!** This feature means posting or putting **HTTP** messages from the Lightware device to another device. Encrypted transmission (**HTTPS**) is not supported.

The HTTP Clients tab allows sending HTTP post and put messages to the desired server IP:port no. Control commands can be set to the target device, but it is not suitable for processing the response (e.g. querying a parameter/status.   *#http*

The feature is available also by LW3 commands, see the HTTP Messaging section.
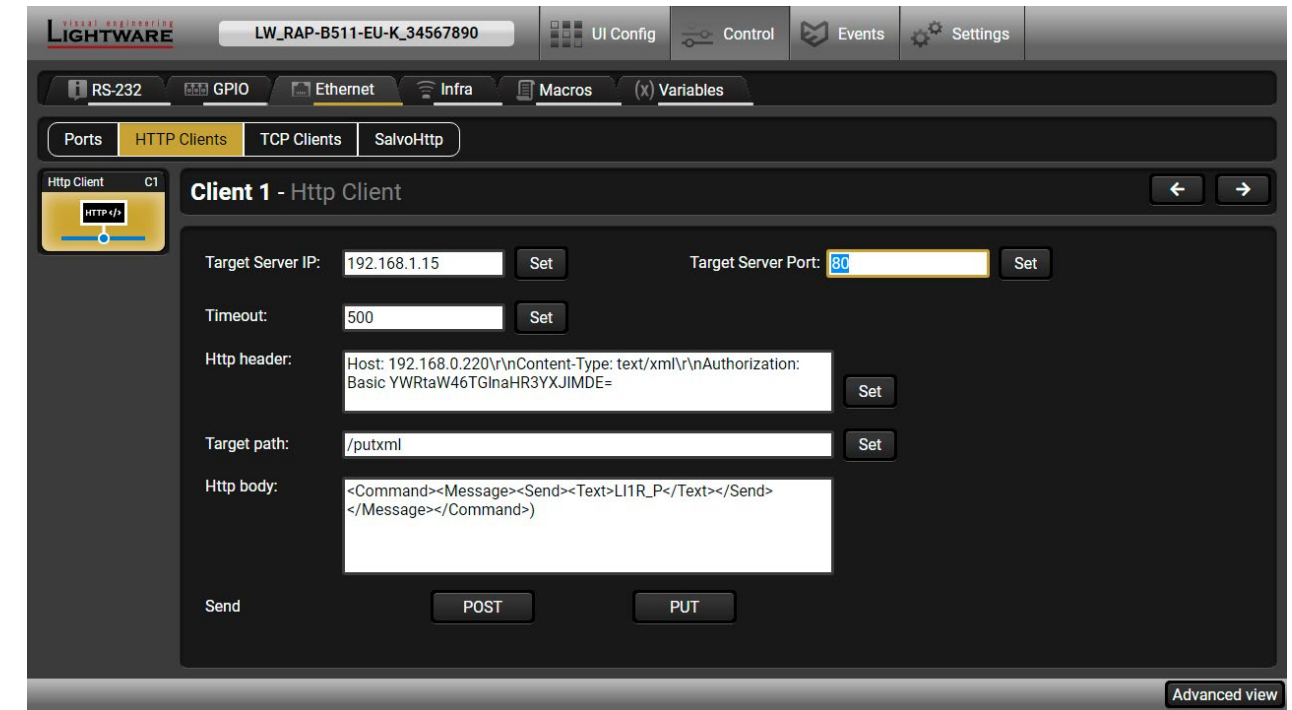
HTTP Clients tab in the Control/Ethernet men

When you press the enter in the **Http header** or **Http body** text box, the \r\n is added automatically.

TCP Clients (TCP Message Recognizer)

This tab is for the preparation and monitoring interface for the TCP recognizer feature. The incoming TCP messages can be detected which may trigger Event Manager Actions. A simple example can be seen in the TCP Recognizer section.   *#tcprecognizer   #message*

TCP Clients tab in the Control/Ethernet menu

The target device has to be set as a TCP client (three clients can be set):

Step 1. Type and set the **Target IP address**.

Step 2. Type and set the **TCP port number**.

Step 3. Make sure the same **TCP port is opened** and Enabled in the target device.

Step 4. Press the **Connect to target** button.

Step 5. Make the target device send a message and check it in the Detected messages list.

- ▪ **Auto reconnect:** Numeric value; sets the time (seconds) between the automatic reconnections.
- ▪ **Delimiter:** When the delimiter hex string is detected in the incoming data, the message is saved from the first bit until the delimiter (or the data between the two delimiters).
- ▪ **Timeout:** If there is no response within the set time interval (milliseconds), the data will be accepted, that is received from the last delimiter.
- ▪ **Trigger Action:** If data is received that is closed with the recognized delimiter, an Action can be run. Type the number of the Event (without letter 'E').

SalvoHttp Status Page (Receiving HTTP Message)

ATTENTION! This feature means sending **HTTP** messages from an external device to the Lightware device. Encrypted transmission (**HTTPS**) is not supported.

In this case, a batch of commands can be sent over HTTP to the Lightware device for processing. Post the commands to the <IP_address>/protocol.lw3 address and the commands are processed immediately and sequentially.   *#http*

Control commands can be sent to the Lightware device, but it is not suitable for querying a parameter/status since the LW3 responses are not sent back to the sender.

ATTENTION! If the Cleartext Login (Login Settings) is enabled in the device, the login has to be the first command. No commands will be processed without a successful login. See the syntax in the Login the Device section.

SalvoHttp tab in the Control/Ethernet menu

5.5.4. Infra

Infra-Red (IR) receiver options can be found on this tab. There are three submenus are available under it: **IR codes**, **Ports**, and **Clear all IR codes**.

IR Codes

The user can set the name of the IR code, the fingerprint (hash), and the repeat timeout in ms, actions can be ordered to each IR code as well.
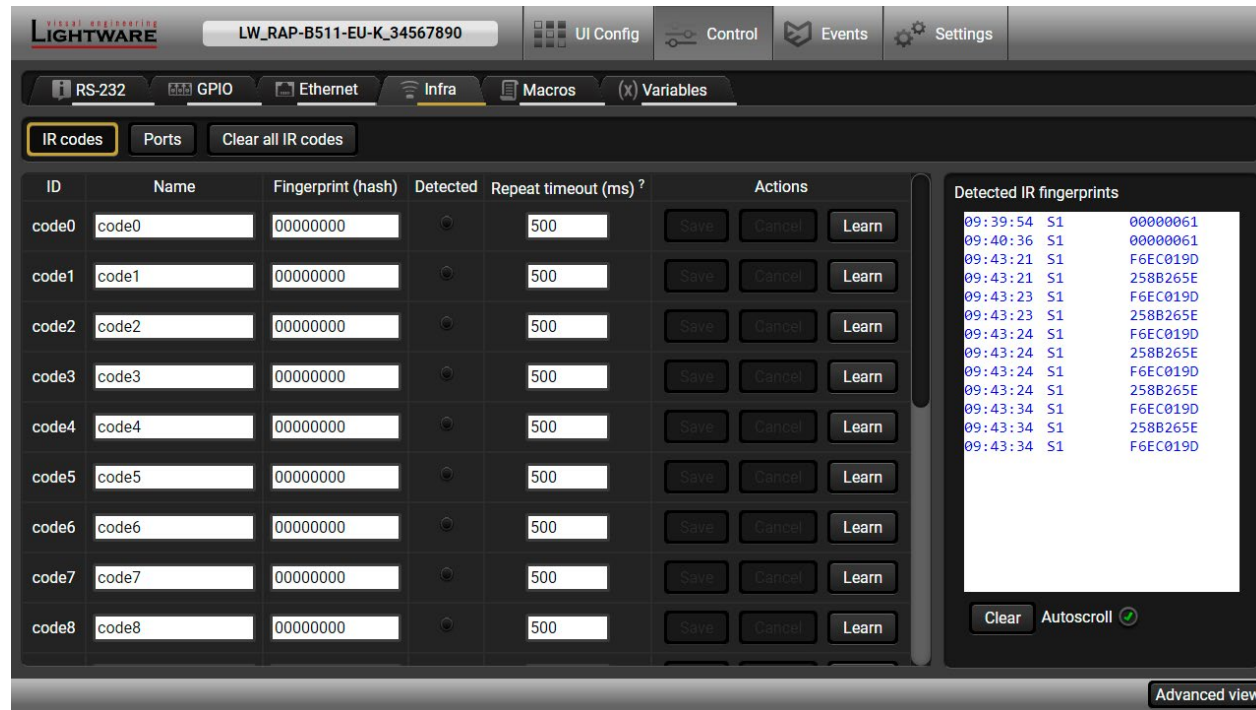
IR Codes Window in the Control Menu

Description	Function
ID	Code number.
Name	You can give an unique name for the desired code.
Fingerprint (hash)	Fingerprint code in pronto hexa format.
Detected	Indicator gives feedback about the given IR code is detected currently.
Repeat timeout (ms)	You can set a timeout to avoid the involuntary code recurrence.
Actions	**Save**: saving the fingerprint and/or the name of the IR code. **Cancel**: canceling the fingerprint. **Learn**: storing the fingerprint of the detected IR code.
Detected IR fingerprints	The IR fingerprints are displayed in the box that can be emptied by the **Clear** button.

20 fingerprints can be stored in the device at the same time. Each of them can be ordered to an action in Event Manager.

Learning IR Codes

Step 1. Click on the **Learn** button.

Step 2. Turn the remote controller to the IR detector. A pop-up window appears in LDC - press your remote button to learn.

Step 3. Once the code is received, a new window pops up in LDC - learning completed. Click **OK** to continue.

Step 4. Optionally type a unique name for the code in the **Name** text box. The default name is code#, e.g. code0.

Clear all IR codes

Clicking on the button results deleting all stored IR fingerprints.

Ports Tab

User can set the name and command injection port to each sources and destinations. For more details about IR interface see the Infra Interface section.
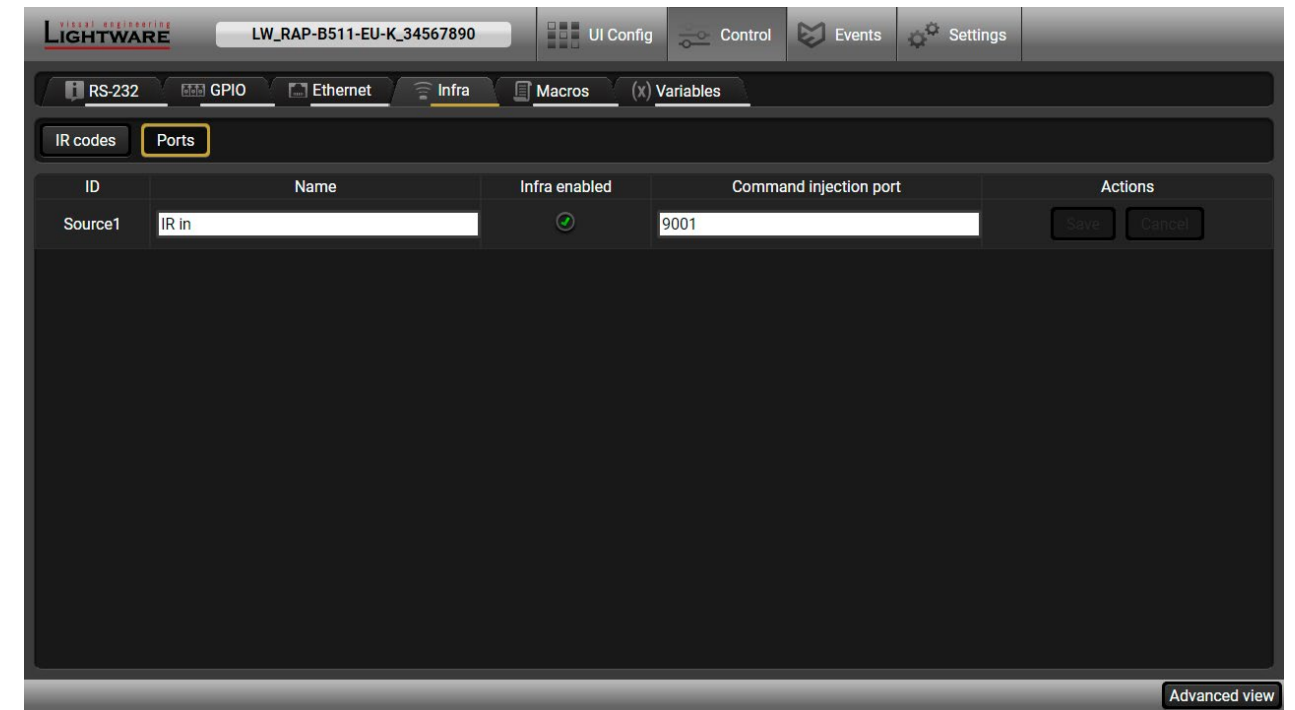
Infra Tab - Ports Window

5.5.5. Macros

> DEFINITION: Macro is a batch of pre-defined commands stored in the device. *#macro*

You can create your custom macros in a file, upload to the device and run at any time. This device can handle up to 50 macros.

Important Notes about Macros

- The macros are stored in device presets.
- The commands of a macro are executed sequentially (even if error happens at a command).
- Macros allow long commands that is suitable for e.g. infra code sending.
- Macros cannot be edited in the device.
- Macros are not saved when backup is created. See the Saving the Macros section.

Macro File Structure

<div align="center">

Format:

```
;<preset_name>
;Begin <macro1_name>
<LW3_commands>
;End <macro1_name>
;Begin <macro2_name>
<LW3_commands>
;End <macro2_name>
```

Example:

```
;myDeviceMacros
;Begin myMacro1
CALL /MEDIA/VIDEO/XP:unmuteSource(I3)
CALL /MEDIA/VIDEO/XP:switch(I3:O1;I3:O2)
;End myMacro1
;Begin myMacro2
CALL /MEDIA/VIDEO/XP:unmuteSource(I4)
CALL /MEDIA/VIDEO/XP:switch(I4:O1;I4:O2)
;End myMacro2
```

</div>

`<preset_name>`: it will be displayed in the Settings/Backup submenu (device configurations list).

`<macro_name>`: each macro must have a unique name.

`<LW3_commands>`: LW3 SET and CALL commands. Syntax is not checked, error is not reported.

> **ATTENTION!** If you use the same name for a new macro, the existing one will be deleted.

Open a simple text editor and save the file with 'LW3' extension.

Uploading New Macros into a New Preset

The recommended way for macros is to use a Device configuration preset for this purpose exclusively. When you have to add new macros or change any of them, use the dedicated preset. The uploading steps are the following:

Step 1. Create the **file** with macros according to the macro file structure and save it.

Step 2. Navigate to the **Settings/Backup** submenu.

Step 3. Select a device configuration **preset** at the bottom of the page.

Step 4. Press the **Upload** button, browse the LW3 file and press **Open**.

> **ATTENTION!** The preset and the macros of the selected slot will be erased. If there is a macro with the same name already in the device, it will be removed and the new one will be available.
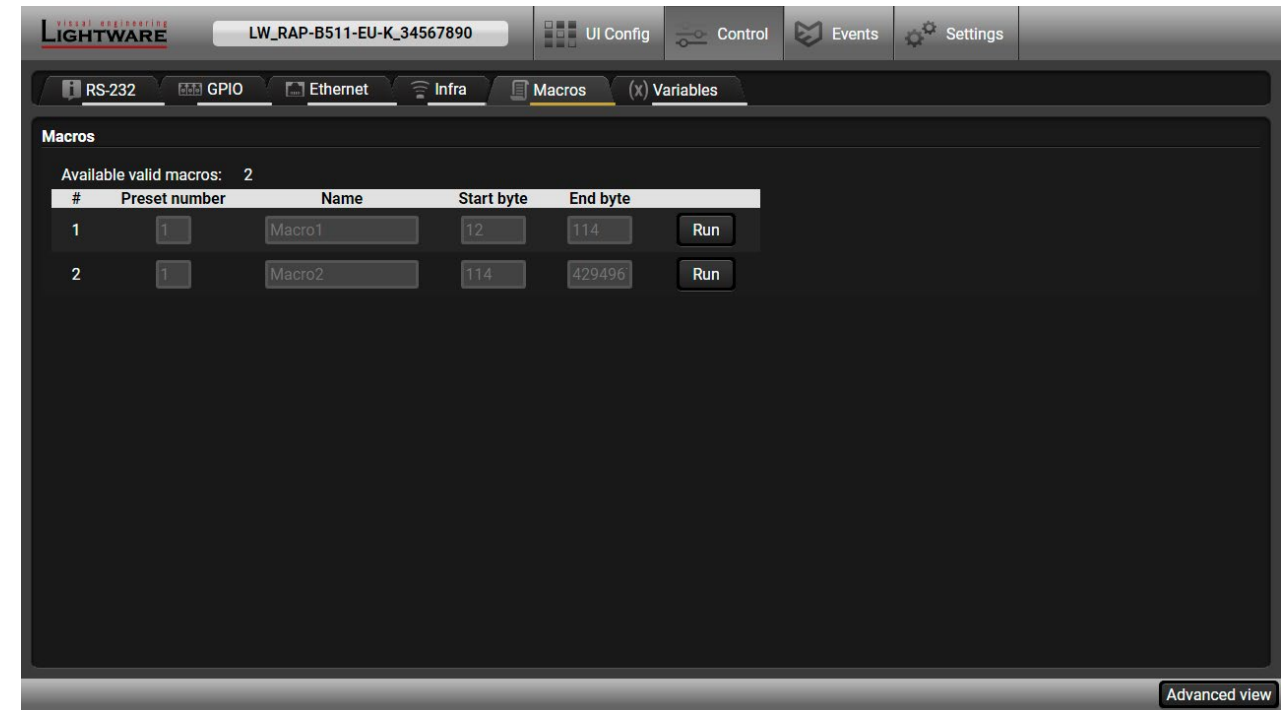
Discovered Macros in the device shown under Control/Macros submenu

Adding Macros to an Existing Preset

Step 1. Navigate to the **Settings/Backup** submenu.

Step 2. Select a device configuration **preset** at the bottom of the page.

Step 3. Press the **Download** button and click **Save** in the pop-up window.

Step 4. Open the **file** with a simple text editor and add the desired macros to the bottom of the commands between the `;Begin <macro_name>` and `;End <macro_name>` labels.

Step 5. Save the file and navigate to the **Settings/Backup** submenu.

Step 6. Select the same device configuration **preset** as selected in **Step 2**.

Step 7. Press the **Upload** button, browse the LW3 file and press **Open**.

If you follow above steps, the existing macros of the selected preset will be preserved. But if there is a macro with the same name already in the device, it will be removed and the new will be available.

Saving the Macros

When you make a backup of the device, the macros are not saved in that file. Sometimes, it is necessary to save the macros into a file and for example apply them in another (same type of) device. Follow these steps:

Step 1. Navigate to the **Settings/Backup** submenu.

Step 2. Select the device configuration **preset** that is used for the macros at the bottom of the page.

Step 3. Press the **Download** button and click **Save** in the pop-up window.

5.5.6. Variables

A brand new area is opened by implementing the variables. You can create custom variables in number or text format which can be used in the Event Manager. The variables can have the following properties/methods: *#variables*

- Numeric (integer) type with min/max value setting, or string-type (determined automatically)
- Increment/step the numeric value,
- Value-dependent case operations,
- Reading and storing the values of LW3 properties into string or numeric variables.
- The max length of a string variable can be 15 characters. Numeric variable is defined between -2147483648 and 2147483647.

The defined variables are stored in a non-volatile memory and the value is kept in case of a reboot.
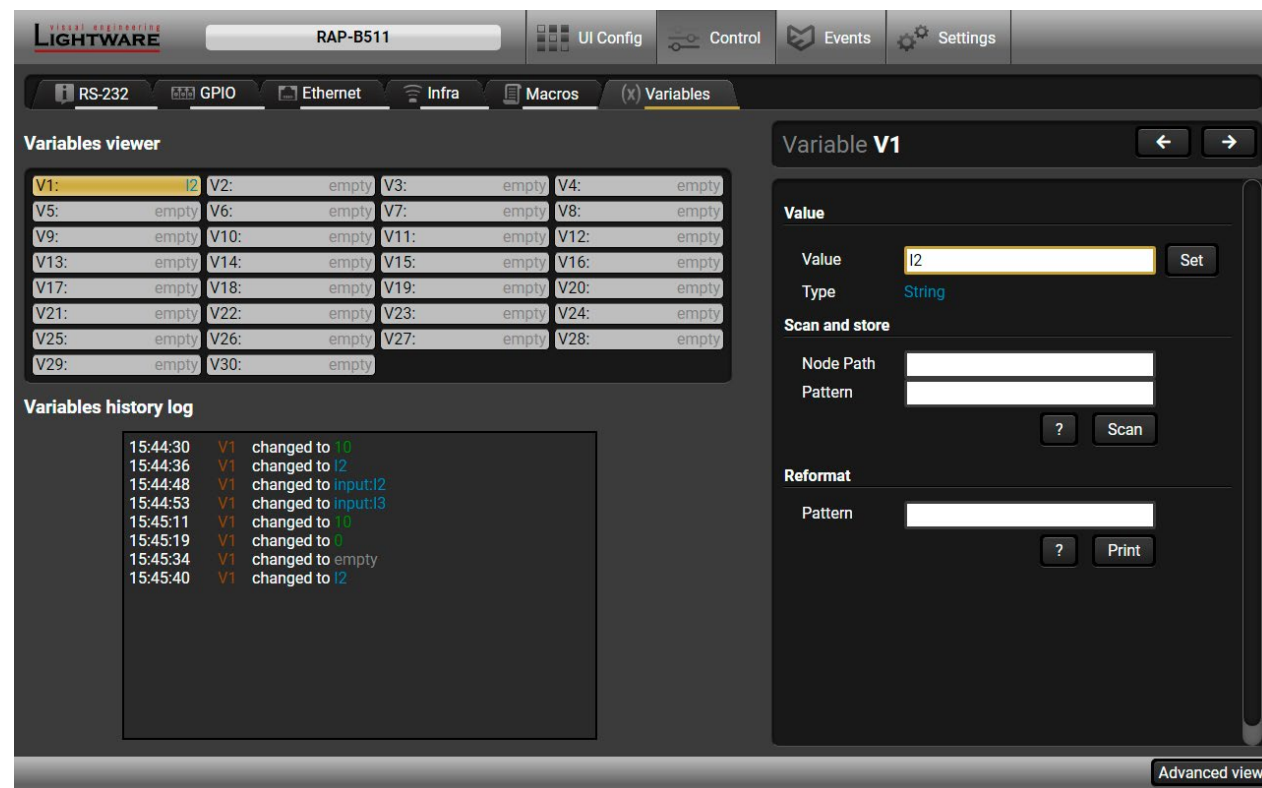
Variables tab in the Control menu

Value Section

You can set the value of the variable by the field. The type of the variable is determined automatically based on its value (numeric/string).

Add / Cycle Section

This section can be used for numeric types.

- **Operand**: the increment, the number that will be added to the current value (negative value is accepted).
- **Min (optional)**: the lowest allowed value.
- **Max (optional)**: the highest allowed value.
- **Add** button: the operand will be added to the current value. If the result would be higher than the max setting, the max will be valid; if the result would be lower than the min setting, the min will be valid.
- **Cycle** button: the operand will be added to the current value. If the result would be beyond the limit (min/max), the value will be stepped to the other end of the interval.

Examples

The following shows the difference between the **Add** and the **Cycle** options. The input values are the same in both cases:

- **Min**: 1
- **Max**: 5
- **Operand**: 1
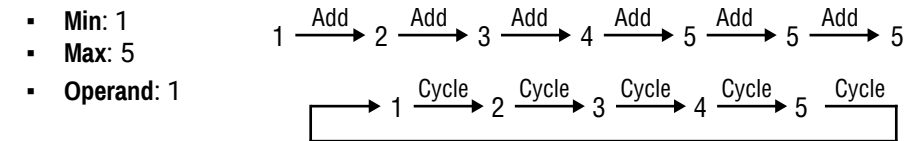
In **Add** case: when the value hits the limit (max), the operand will not increase the value any more.

In **Cycle** case: when the value hits the limit (max), the value will be stepped to the other end of the interval.

Similar case happens vice versa: when the operand is a negative number and the value hits the min value.

> TIPS AND TRICKS: Set min=1, max=2, operand=1 and use the **cycle** method. Thus, the value of the variable can be toggled which can be linked to a property with two states (e.g. low/high level) in Event manager.

Case Convert

This tool can be used to change the value of a variable if it fits in any of the defined intervals. The check and the change will be performed only if you press the **Convert** button. A typical example when two different ranges of values have to meet:

Incoming values: between 0 and 255 (e.g. the slider of a controller can have these values).

Outgoing values: between 0 and 100 (e.g. the controlled device accepts these values).

Defined cases:

	Min	Max	New value
Case 1	1	25	10
Case 2	26	50	20
Case 3	51	75	30
Case 4	76	100	40
Case 5	101	125	50

	Min	Max	New value
Case 6	126	150	60
Case 7	151	175	70
Case 8	176	200	80
Case 9	201	225	90
Case 10	226	255	100

Scan and Store

This tool can be used to get the value (or a part) of an LW3 property. The defined path will be checked according to the pattern and the result will be saved into the variable (number or string type). Press the **?** button to open the pattern options:

Pattern	Pattern description
%s	String of characters stopping at the first whitespace character
%\<number>s	The next \<number> of characters (string) stopping at the first whitespace
%c	One character
%\<number>c	The next \<number> of characters
%[\<characters>]	Defined character set, specified between brackets
%[^\<characters>]	Negated character set, specified between brackets which will be skipped
%*	Ignored part
\<custom_text>	User-defined text

Examples

Scanned property: /MANAGEMENT/STATUS.CpuTemperature=46 C; 0;75; 0;79; 3;48;

\<pattern>	Scan result	Variable type	Comment
%s	46	Number	Scanned from the first character till the first whitespace character
%5c	46 C;	String	The first 5 characters scanned
%*18c%4c	3;48	String	The first 18 characters skipped then 4 characters scanned
%*s %c	C	String	The first part till the first whitespace character (and the space) are skipped then 1 character scanned
%*[^;]; %4c	0;75	String	From the first character till the first semicolon and a space are skipped, then 4 characters scanned
%*[^;]; %*[^;]; %*[^;]; %4c	0;79	String	Three groups ended with semicolon and space are skipped then 4 characters scanned

Reformat

The value of the variable can be changed by adding text as prefix and/or postfix. Type **%s** to indicate where to insert the original value.

Example

- **Original value**: 3
- **Pattern**: input%s
- **Modified value**: input3

5.6. Event Manager

The feature means that the device can sense changes on its ports and able to react according to the pre-defined settings. The development idea of the Event manager is based on users' feedbacks. In many cases internal events are necessary to display but it is not easy when the device is hard to access (e.g. built under the desk).

The Event manager can be configured to perform an action if a condition has been detected. E.g. the desired setup is that after a certain type of IR signal has been detected on S1 port, the device send an RS-232 message. The settings can be done via the LDC in the main menu, or by LW3 protocol commands. Configurable events number depends on the device what you are using actually.

Numerous new ideas and requests have been received in connection with the features and settings of the Event manager since the first release. Therefore, the user interface has been re-designed and many new functions implemented. The Event editor can be opened by pressing the **Edit** button at each Event.

There is a **grey bar** on the left of the Event panel in each line. If a condition and an action are set and the Event is enabled, the bar is displayed **in green**.
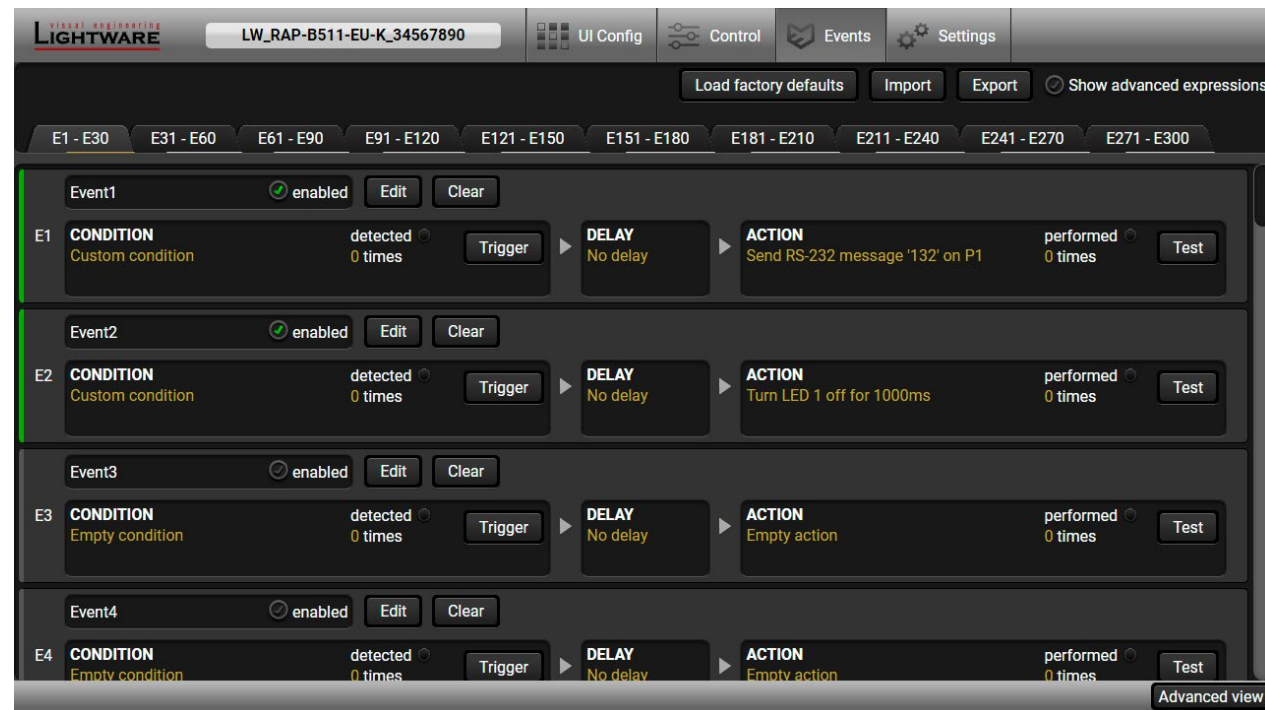
Control menu, Event Manager tab

#eventmanager

5.6.1. Event Manager in the RAP-B511 series

The functionality of the Room Automation Panel is based on the Event Manager. UI config page provides an interface where the events can be set easily and they are saved in the Event Manager. Events from the UI config page are listed backwards (e.g. first event is saved to the E300 slot).

These events are identified by the event name property, which refers to the button (e.g. UIConfig_B11_1) or the rotary position (e.g. UIConfig_ROT_13).

▐ **ATTENTION!** Rename the Events from the UI Config page is highly not recommended!

When one of these events is opened to Edit in the Event Manager, the warning message appears:
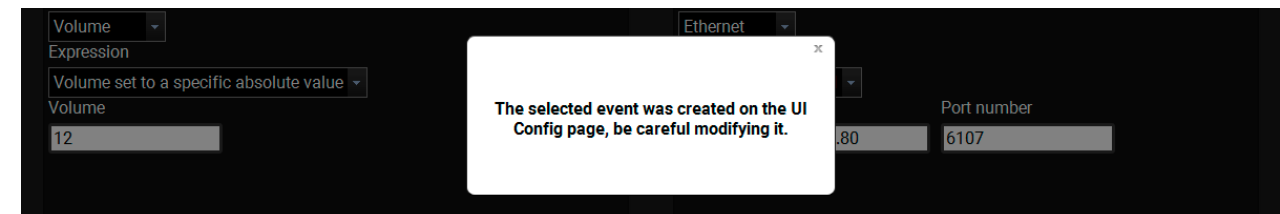
The tables below summarize the availablility of the conditions and actions of the RAP-B511.

Conditions

Launch configuration from...	...UI config menu	...Event Manager
Button press /button release	✔	⚠
Rotary turn / rotary press	✔	⚠
Real-time clock	✖	✔
Infra detector	✖	✔
RS-232 recognizer	✖	✔
GPIO input level change	✖	✔

Actions

Launch configuration from...	...UI config menu	...Event Manager
Button LEDs	✔	⚠
Button Interaction State	read-only	⚠
Ethernet	✔	✔
RS-232	✔	✔
GPIO	✔	✔

✔ The setting is available and recommended to do the configuration from this menu.

✖ The setting is not available in that menu.

⚠ Only for advanced users! The setting is available in the Event Manager, but doing the configuration is highly recommended from the UI config menu.

5.6.2. The Event Editor

Press the **Edit** button in the desired Event line to open the Event editor window.
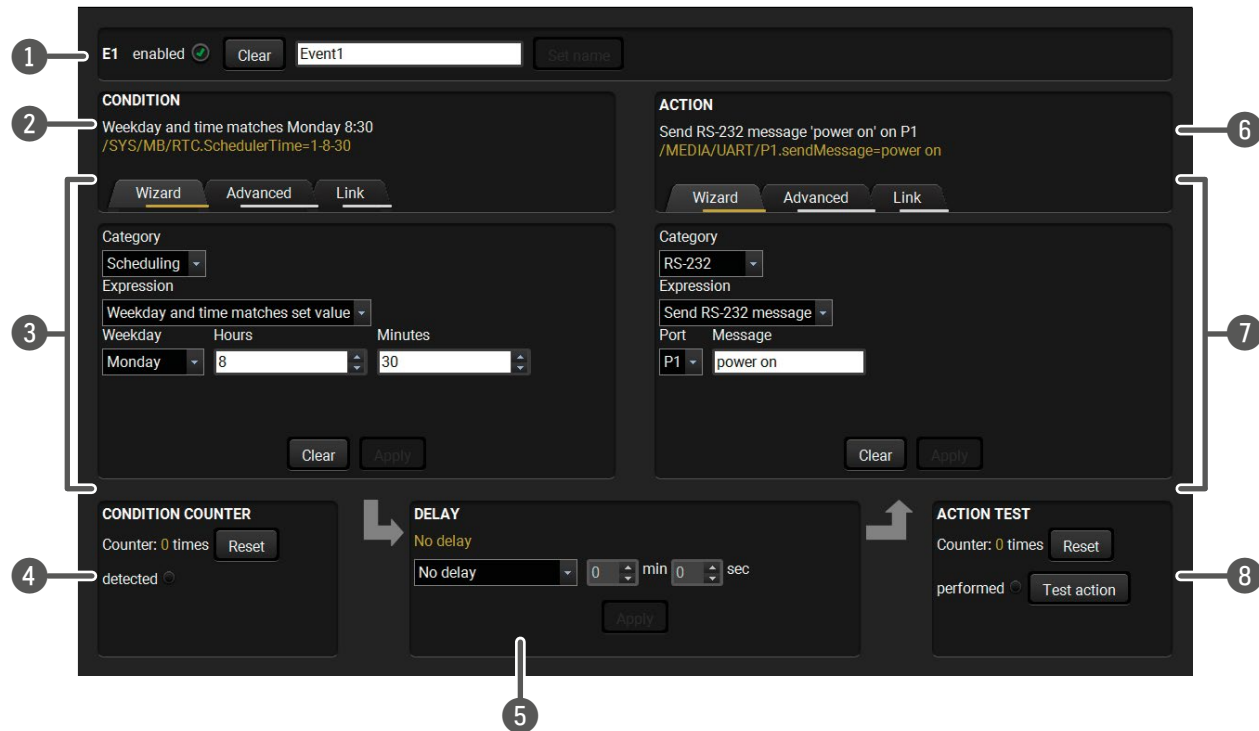
1   **Event header**   The name of the Event is displayed. Type the desired name and press the Set name button. The Event can be cleared by the **Clear** button. Use the tick mark to enable/disable the Event.

2   **Condition header**   If the condition is set, the description (white colored text) and the exact LW3 protocol expression (yellow colored text) can be seen. If the advanced mode was used the description is **Custom condition**.

3   **Condition panel**   The Wizard, the Advanced or the Link tool is available to set the condition. The parameters and settings are displayed below the buttons.

4   **Condition test**   The set condition can be tested to see the working method in the practice.

5   **Delay settings**   The action can be scheduled to follow the condition after the set time value.

6   **Action header**   If the action is set, the description (white colored text) and the exact LW3 protocol expression (yellow colored text) can be seen. If the advanced mode was used the description is **Custom action**.

7   **Action panel**   The Wizard, the Advanced or the Link tool is available to set the action. The parameters and settings are displayed below the buttons.

8   **Action test**   The set action can be tested to see the working method in the practice.

5.6.3. Create or Modify an Event

Wizard Mode

The wizard mode lists the most common conditions and actions, so the user does not have to look for LW3 nodes and properties.

Step 1. Click on the **Edit** button of the desired Event; the **Event editor** is displayed.

Step 2. The wizard mode is displayed as default. Select the desired **Category** first (e.g. Audio or Video).

Step 3. Select the desired **Expression** from the drop-down menu. If any other parameter is necessary to set, it is going to be displayed.

Step 4. Press the **Apply** button to store the settings of the Condition.

INFO: This mode is also available for setting the **Action**.

Advanced Mode

The goal of this mode is the same as of the wizard: set the properties and methods for conditions and actions. The difference is the number of the available and usable properties and methods of the LW3 protocol. Advanced mode allows almost all of it.

Step 1. Click on the **Edit** button of the desired Event; the **Event editor** is displayed.

Step 2. The wizard mode is the default, press the **Advanced** button. The LW3 protocol tree is displayed showing the list of the properties in the drop-down menu. Navigate to the desired node.

Step 3. Select the desired **Property** from the menu. The **manual** of the property is displayed below to help to select the necessary property and to set the value.

Step 4. Set the desired **value** and **operator**, then press the **Apply** button to store settings.

INFO: This mode is also available for setting the **Action**.
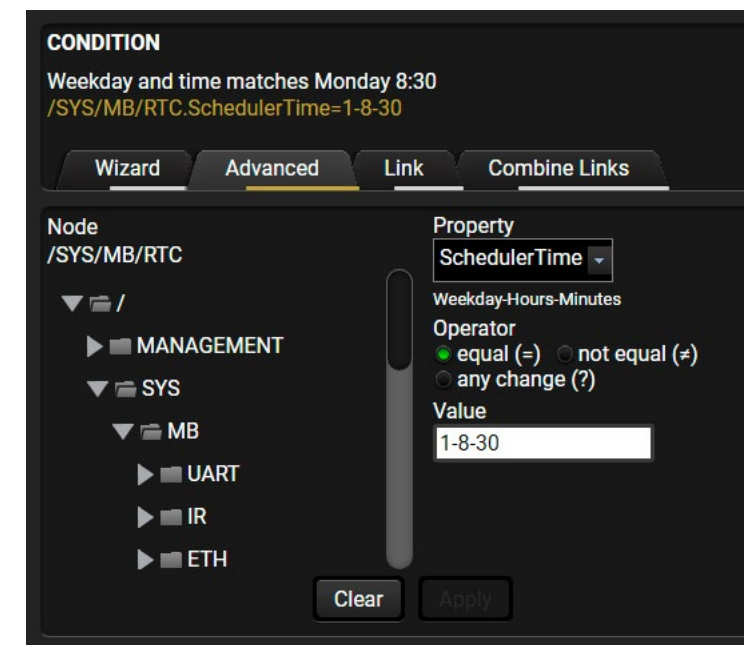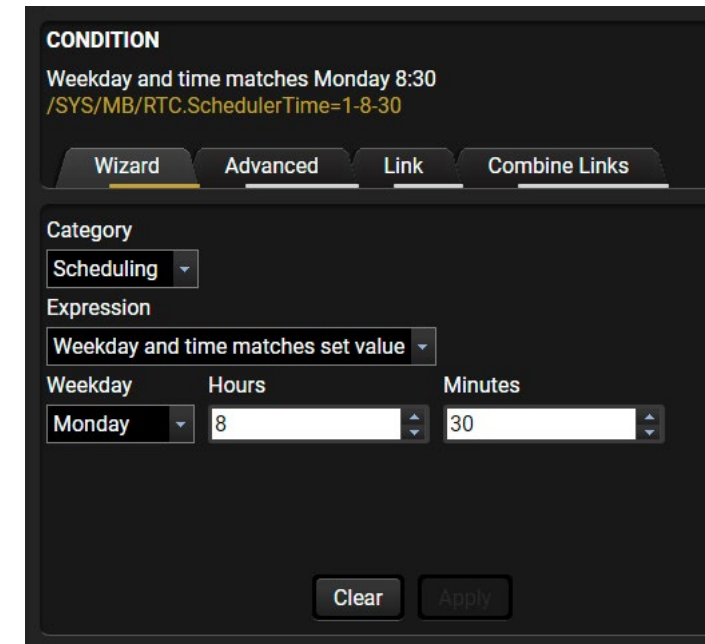
The Link Tool

The new interface allows creating more actions for the same condition. In that case, a condition can trigger more actions. To set such an Event, the Link tool has been introduced.

Step 1. Click on the **Edit** button of the desired Event; the **Event editor** is displayed.

Step 2. The wizard mode is displayed as default, press the **Link** button.

Step 3. All the saved Events are analyzed and the **conditions** are listed (it takes some seconds to finish). The **Show advanced expressions** option allows showing the exact path and set the value of the given property.

Step 4. Select the desired **Condition** and press the **Apply** button to store the settings.

INFO: This mode is also available for setting the **Action**.
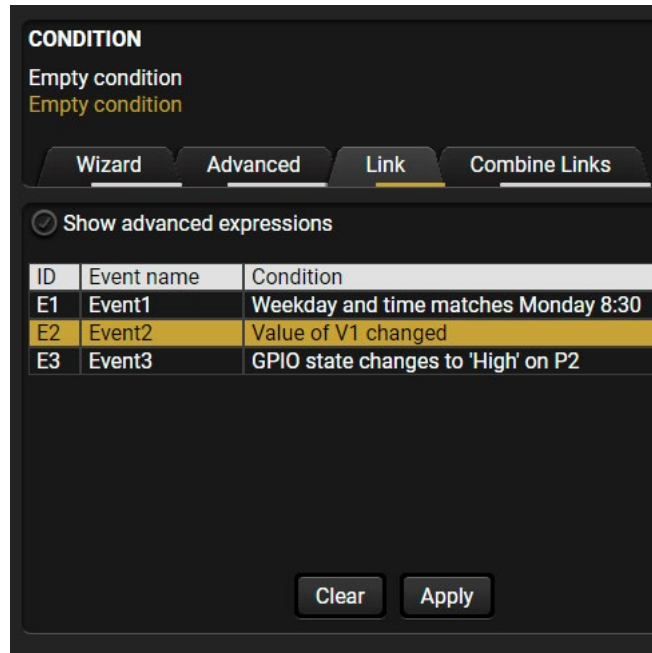
Combine Links

DIFFERENCE: This feature is available from FW package v1.1.0b3.

The first generation of the Event Manager is able to sense a change (one condition) but in some cases that is not enough. The practical experience has shown there is a need to examine more conditions as follows: if one of the set conditions becomes true (while the other conditions are fulfilled), then the set Action is launched. The **Combine Links** tool allows setting these Conditions. Follow the steps below:

Step 1. Create individual **Conditions** in separate Events.

Step 2. Create a new Event and navigate to the **Combine Links** tab in the Editor.

Step 3. Select up to four **Conditions** in the **left** panel.

Step 4. Set the desired **Action** (and do not forget to **enable** the Events).

INFO: This mode is available for setting the **Condition only**.
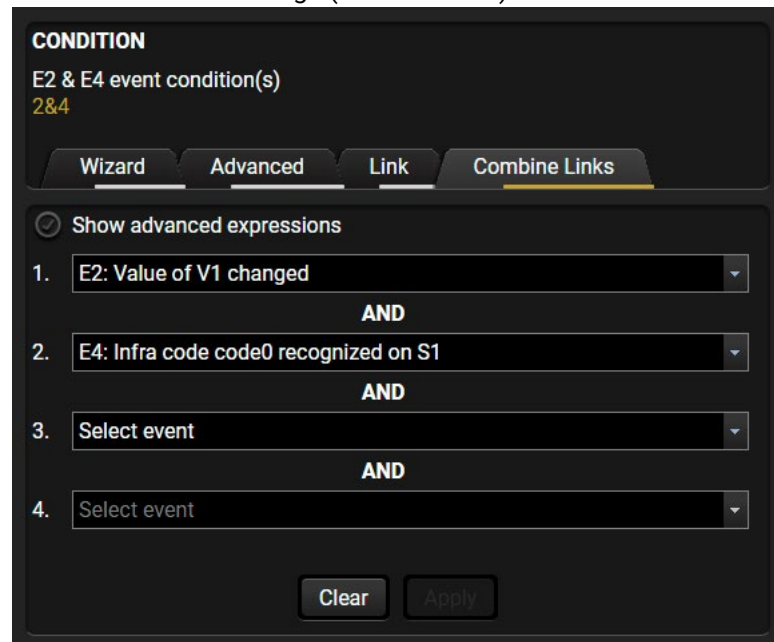
Linking a Macro (Action)

DIFFERENCE: This feature is available from FW package v1.1.0b3.

Macros stored in the device can be run as Actions. Thus, a lot of commands can be run by using only one Event. The commands will be processed one-by-one after each other.   *#macro*

Step 1. Click on the **Edit** button of the desired Event; the **Event editor** is displayed.

Step 2. The wizard mode is the default, press the **Macros** button in the **Action** panel.

Step 3. Select the desired **Macro** from the list then press the **Apply** button to store settings.

If the **Use variables** option is enabled, you can link a variable by the **$** character. If you do so (e.g. $1), the device will handle it as the V1 variable. You can send the value of the variable e.g. as a TCP message.

See more information about the Macro settings in the Macros section.
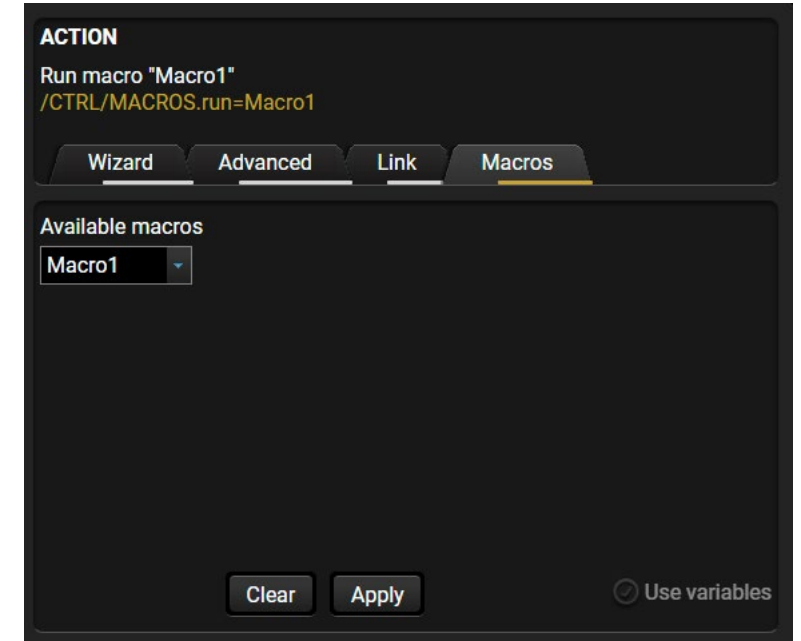
5.6.4. Special Tools and Accessories

The Name of the Event

The name of a port can be changed by typing the new name and clicking the **Set** button. The following characters are allowed when naming:

Letters (A-Z) and (a-z), numbers (0-9), special characters: hyphen (-), underscore (_), and space ( ).

Enable or Disable an Event

The set Event can be enabled or disabled in the Event list, or directly in the Event editor window by setting the **tick mark** beside the name.

Testing the Condition

When the desired Condition is arranged, the setting can be tested. The Event list and the Event editor contains a small panel that shows if the set condition is detected and how many times. The **Counter** can be reset by the button in Event editor. If the Condition is true, the **detected** mark turns green for two seconds and the **Counter** is increased.

Testing the Action

The method is the same as testing the Condition, but in this case, the Action can be triggered manually by pressing the **Test** button.

> TIPS AND TRICKS: The Test button is also placed on the Action panel in the Event list. Thus, you can check the Actions without opening the Event editor.

Delay the Action

In most cases the Action is performed immediately after the Condition is detected. But sometimes a delay is necessary between the Condition and the Action. Therefore, the new Event manager contains the Delay panel which allows that feature with below settings:

- **No delay**: when the Condition is detected, the Action is launched.
- **Simple delay**: when the Condition is detected, the Action is launched after the set time interval.
- **Still true after**: when the Condition is detected, the Action is launched after the set time interval only if the Condition still exists.
- **Continuously true**: when the Condition is detected, the Action is launched after the set time interval only if the Condition has been existing continuously.
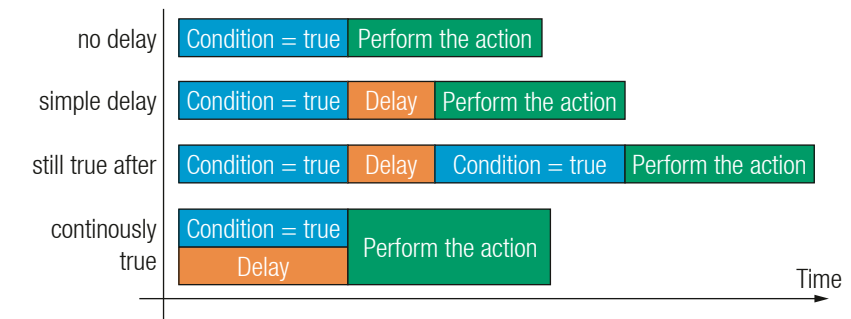
The available delay settings of an Event

> TIPS AND TRICKS: **Show advanced expressions** option is a useful tool when you look for the path or value of a property but just the expression is displayed. The option is available in the Event list window or when Link tool is used.

Variables

> **DIFFERENCE:** This feature is available from FW package v1.1.0b3.

The variables and the tools (shown in the Control/Variables tab) can be used in the Event Manager.

Condition Wizard   *#variables*

The desired variable can be checked if its value is changed to a specific value.

Action Wizard

The value of a variable can be set/changed by the same methods as in the Control/Variables tab:

- Setting the exact value
- Increasing the value with/without limits
- Converting the value (e.g. interval change)
- Scanning and storing, or reformatting a property/parameter

If the **Use variables** option is enabled, you can link a variable by the **$** character. If you do so (e.g. $1), the device will handle it as the V1 variable. You can send the value of the variable e.g. as a TCP message.

Condition Triggering

> **DIFFERENCE:** This feature is available from FW package v1.1.0b3.

This improvement works as if a condition is detected. When a complex control system is built, a Condition may trigger numerous Actions. A typical example is

when a system is powered on and the 'ready-to-use' state has to be loaded. In this case, there could be many actions which are based on the same condition. In order to reduce the number of the commands, you can trigger one 'key' condition, which could start the whole process.
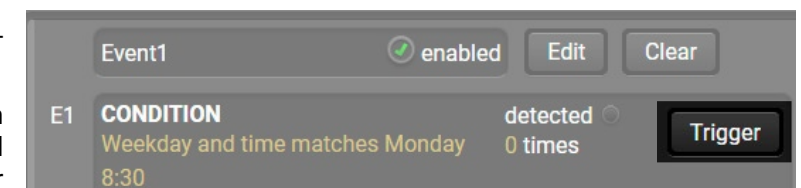
5.6.5. Clear One or More Event(s)

Clear an Event

Press the **Clear** button in the Event list or in the header section in the Event editor.

Clear all Events

When all the Events must be cleared press the **Load factory defaults** button above the Event list. You will be prompted to confirm the process.

> **WARNING! Clicking on Load factory defaults button means, the configuration of the buttons are also deleted, because the conditions and the actions of the buttons are saved as events.**

5.6.6. Export and Import Events

The feature allows saving all the Events. The backup file can be uploaded to another RAP-B511 series device.

Export all the Events

Step 1. Press the **Export** button above the Event list.

Step 2. The Save as dialog box will appear. Set the desired folder and file name, then press the **Save** button.

The generated file is a simple text file which contains LW3 protocol commands. The file can be viewed by a simple text editor, e.g. Notepad.

> **ATTENTION!** Editing the file is recommended only for expert users.

Import all the Events

Step 1. Press the **Import** button above the Event list.

Step 2. The Open dialog box will appear. Select the desired folder and file, then press the **Open** button.

5.7. Settings Menu

5.7.1. Status

Status Tab in Settings Menu

The most important hardware and software related information can be found on this tab: hardware and firmware version, serial numbers, temperatures, operation time, and voltage information. Device label can be changed to unique description by the **Set** button.

Enable **Lock buttons** disables the whole functionality of the front panel (buttons and the rotary). Blinking of the button and rotary LEDs three times means, that the front panel functionality is locked. Unlocking is also possible via LW3 protocol commands (for more details see LW3 Programmers' Reference section).

For more details about the Miniweb see Built-in Miniweb section.

#devicelabel   #label   #producttype   #firmwareversion   #identifyme   #status #serialnumber

5.7.2. Network
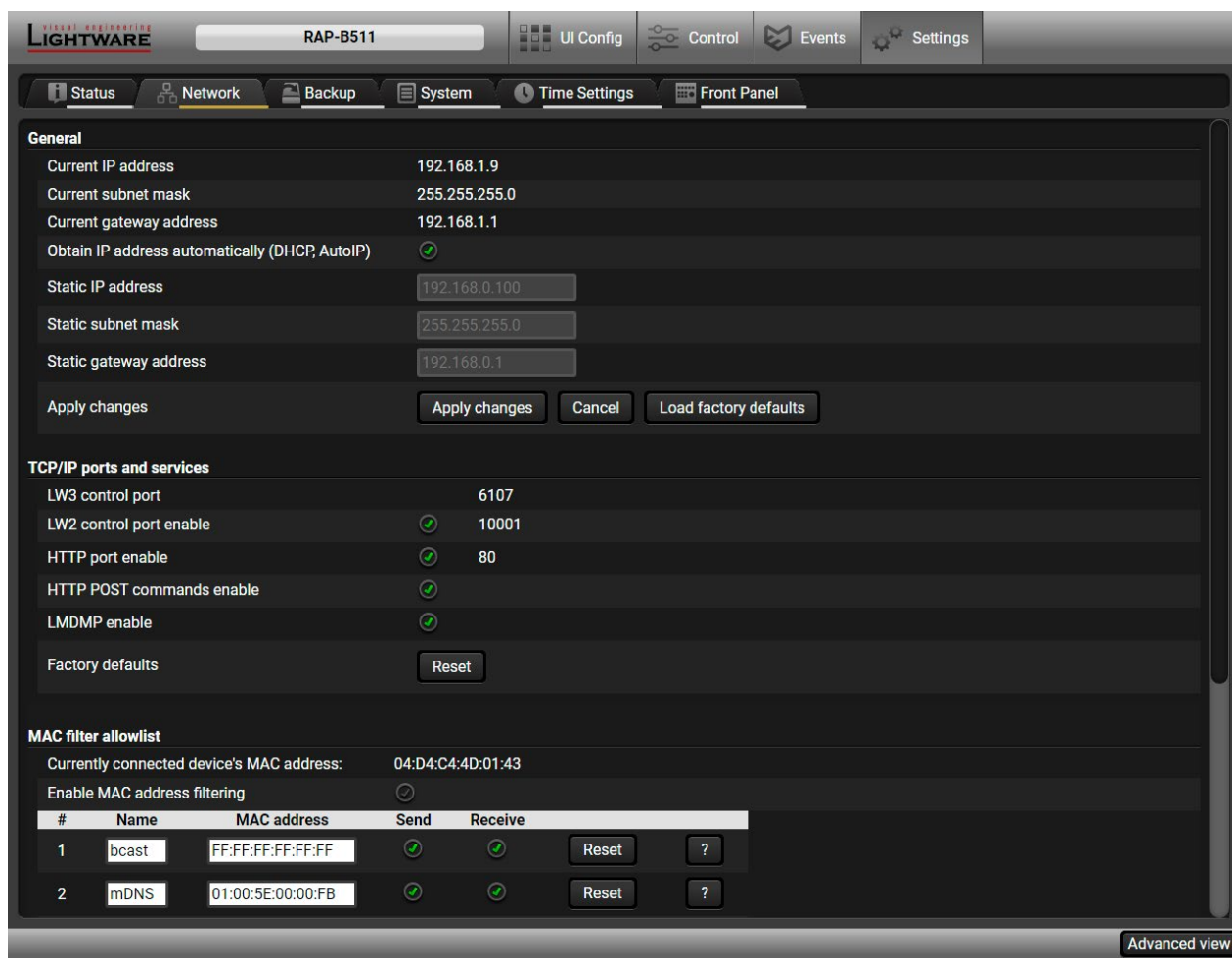
Network tab in Settings menu

General

IP address and DHCP settings can be set on this tab. Always press the **Apply settings** button to save changes. Factory Default Settings can be recalled with a dedicated button.

TCP/IP Ports and Services

▌ **DIFFERENCE:** This feature is available from FW package v1.1.0b3.

The IP Port Block option is an additional protection for the Cleartext Login (Login Settings) feature. There are TCP/IP ports in Lightware devices which are not protected by the login, so you can disable them if necessary. For example, due to the working method of the LW2 communication, the Cleartext login does not provide protection when LW2 command is sent to the device, that is why the TCP port no.10001 shall be blocked manually.   *#dhcp #ipaddress #network #portblock*

MAC Filter Allowlist

▌ **DIFFERENCE:** This feature is available from FW package v1.1.0b3.

Another level of the security is the MAC Filtering tool. You can create a list of network devices based on the MAC address which are allowed: *#macfilter*
- Controlling the device (Send option), or
- Querying parameters (Receive option) to/from the Lightware device.

Do not forget to press the **Apply changes** button to store the new settings.

▌ **ATTENTION!** The first three lines are factory default values and they are necessary for the proper working.

5.7.3. Backup

Details about this function can be found in the Configuration Cloning (Backup Tab) section.

5.7.4. System
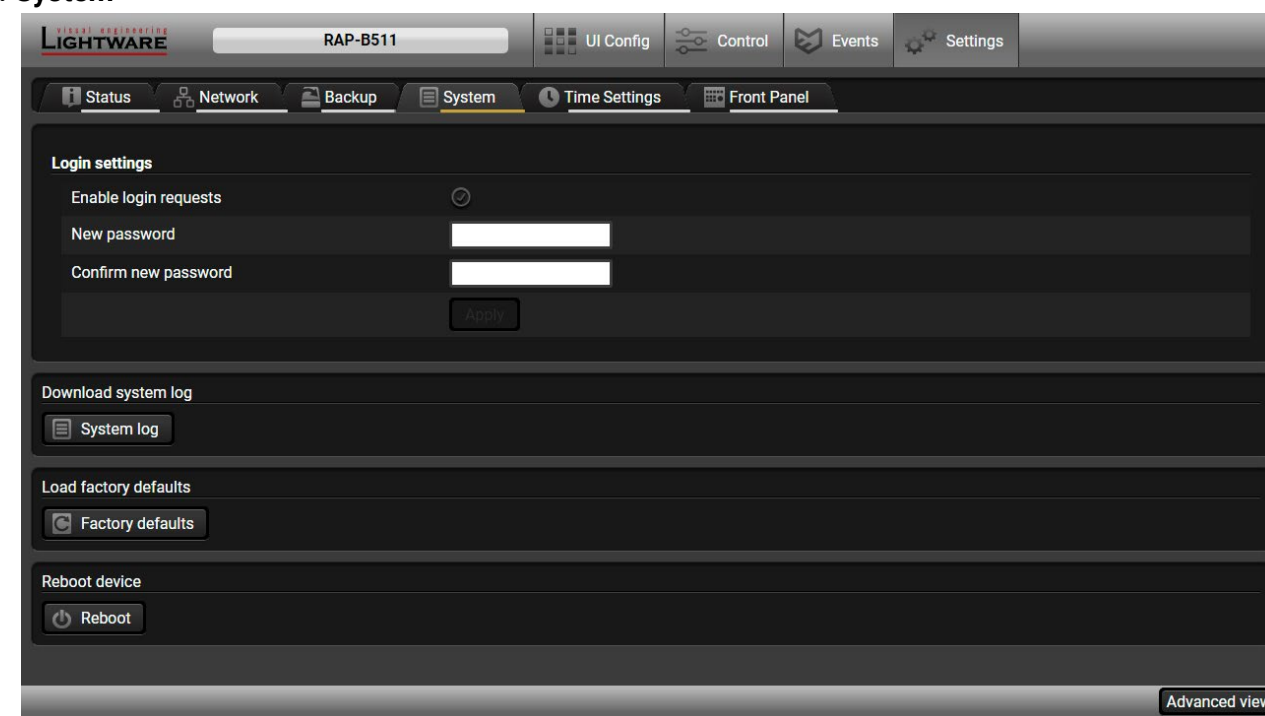
System tab in Settings menu

Cleartext Login (Login Settings)

▌ **DIFFERENCE:** This feature is available from FW package v1.1.0b3.

This cleartext login tool allows setting a password for login, thus, the device will not accept any command coming from a control interface (RS-232, Ethernet, etc…) without login. The device will be visible in the Device Discovery window (as the device type and the serial number can be queried without login) but connection can be established only after successful login. The login is valid until a TCP socket break in case of Ethernet connection.   *#login*

▌ **ATTENTION!** If the login is enabled, the password will be asked when the Built-in Miniweb is opened.

▌ INFO: The login password is erased and the login is disabled when restoring the factory default values.

Further functions

- ▪ **Download system log** - saving the file of the device.
- ▪ **Load factory defaults** - recalling factory defaults settings and values. All factory default settings are listed in the Factory Default Settings section.
- ▪ **Reboot** - rebooting the system.   *#factory   #log   #systemlog   #reboot #restart*

5.7.5. Time Settings

Real-Time settings can be managed from **Time settings** tab. For more details about the dependency of the time properties, see the Flowchart of the real-time clock configuration process.
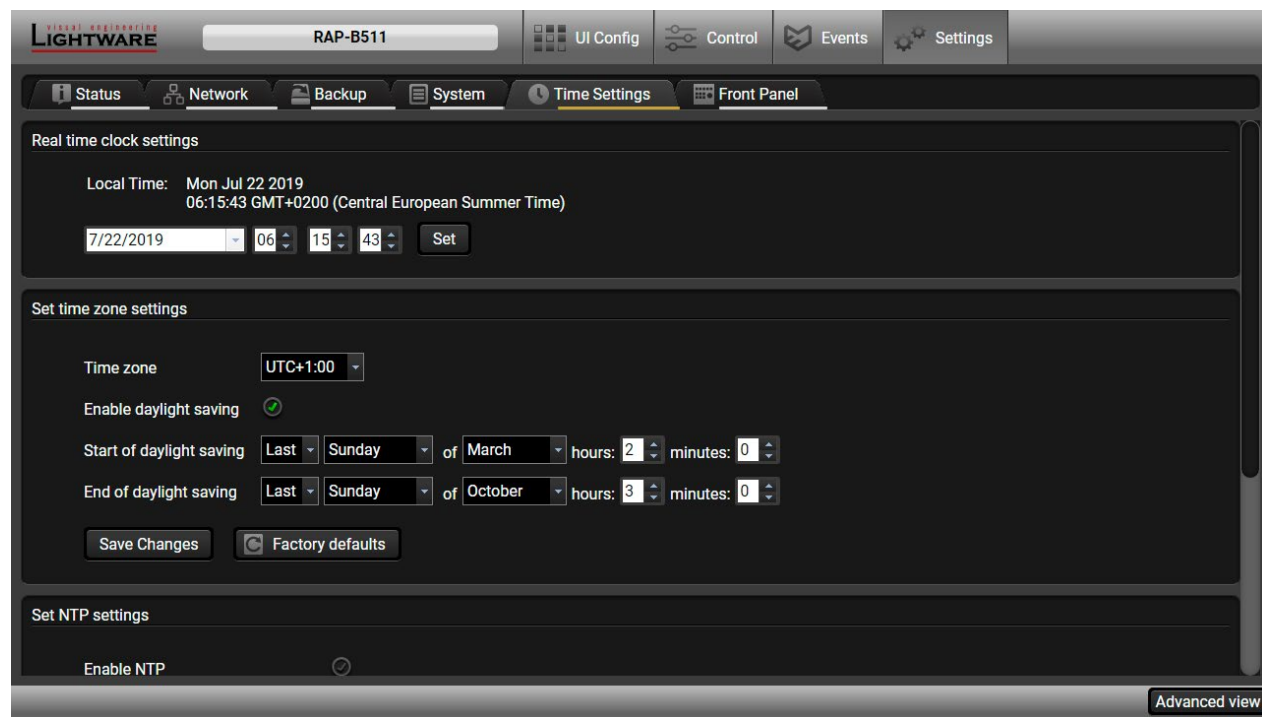
Real time clock setting

In this section the current RTC (Real-time clock) time is displayed and can be modified manually. Click to **Set** button to save the new setting.

Set time zone setting

- ▪ **Time zone** can be selected from the drop-down menu.
- ▪ Check **Enable the daylight saving** if it is needed, and set the start and end date. These setting will added to the UTC (Universal Time Coordinated) and the NTP (Network Time Protocol) time.

▌ INFO: If the RTC time is set manually, these settings will be ignored.

Set NTP (Network Time Protocol) settings

- ▪ **Enable NTP** makes it possible to query time information from an NTP server. It means, that the RAP-B511 is permitted to get time information from an NTP server. The device time synchronized repeatedly and automatically. In this case, the NTP server address entry field is active, where the IP address or URL of the NTP server can be typed manually. Click to set to save the address. The current setting is also displayed.
- ▪ Enable **GET NTP from DHCP server** means, when that DHCP server assigns an IP address to the device, its own IP address or URL can be queried, and this address may be saved as an NTP server. In this case, the user does not have to give the IP address or URL manually.

▌ INFO: If the RAP/RAC device receives an answer including a **DHCP option** (e.g. Option 42, which is listed the addresses of the NTP servers), the saved NTP server will be the address based on the option, otherwise the NTP server from the device will be set.

- ▪ Clicking on the **Synchronize now** button queries the time information from the NTP server. Time is updated, when the device is restarted, powered off and on again and in certain time periods.
- ▪ For more information about the time properties, the see the Real-Time Clock in the Device Concept chapter.

All settings are available with LW3 protocol commands, see the details in Time Settings section in LW3 programmers reference chapter.

5.7.6. Front Panel Settings

The following settings are available on the Front Panel tab:
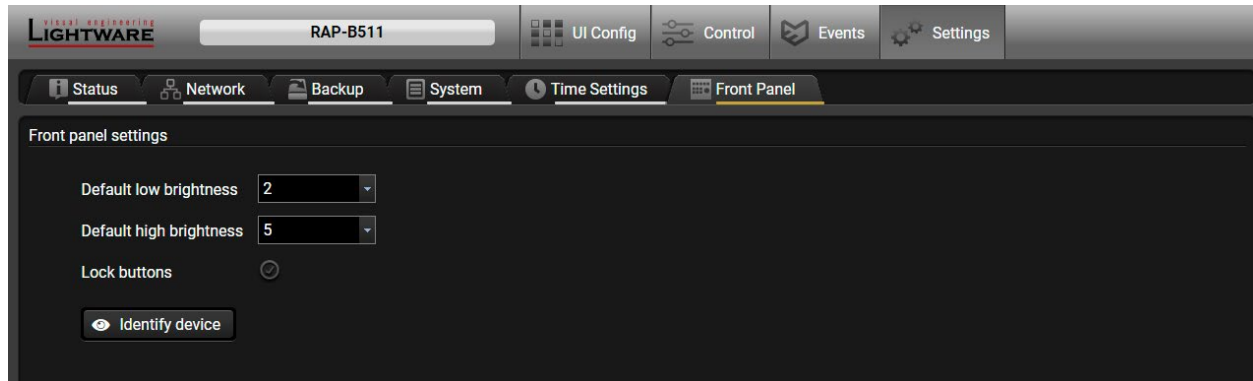
- **Default low brightness** and **default high brightness** intensity can be customized in 0-5 level scale where 0 means the no light, 5 means the maximum intensity.
  The factory default value of the low brightness: 2

  The factory default value of the high brightness: 5

- You can disable the functionality of the front panel buttons and the rotary knob with marking the **Lock buttons** option.

- Clicking on **Identify the device** button results the front panel LEDs blink for 10 seconds which helps to identify the device physically.

5.8. Built-in Miniweb

Built-in Miniweb feature supports to reach certain functions of the RAP-B511 in the web browser.

The RAP-B511 has three different type miniweb pages for different purposes: *#miniweb*   *#builtinweb*

- Default miniweb page: This interface provides similar functionality to the front panel.
- Advanced Miniweb Page: Action trigger buttons of the selected events are displayed on this page.
- Custom Miniweb page: Any .html site with custom content can be upload to the device.
- General system requirements
- System requirements for **operating systems**: Microsoft Windows XP, Windows Vista, Windows 7, Windows 10, macOS, Linux.
- Compatible **web browsers**: Mozilla Firefox, Google Chrome, Apple Safari.

Lightware system requirements

- Firmware package: the Miniweb is available from firmware package v1.0.3. The default control page can be installed in the device during the first firmware update process if the necessary parameter is enabled. See The Updating Steps section.
- **Lightware Device Controller** software supports the Miniweb feature above v1.33.
- Please be sure that the computer is in the same network as the RAP-B511. If the computer has multiple Ethernet connections (for example Wi-Fi and LAN connections are used simultaneously) you will have to know the IP address for the one that is used for controlling the automation panel.

Default miniweb page

This interface provides similar functionality to the front panel. Clicking on the button icon has the same effect as the buttonpress (or clicking on the **Test Button Press** button in the LDC). The volume control is available with the scrollbar. Button styles help to identify the buttons.

> INFO: Button configuration settings of the RAP-B511 are not available in the Built-in miniweb page, because it is designed for common usage.

To activate the Default Miniweb page click on the **Upload default** button in the Settings menu/ Status tab.

The website can be easily reached:

- **Write the IP address** of the device in the search bar of the web browser.
- Launch the LDC, connecting to the device, navigate to **Settings/Status** or **UI Config/Style** and pressing the **View miniweb** button.
- In the **UI Config/Style** tab, the **QR code** of the web address of the miniweb page is available and it can be download in .png format and print or display where the RAP-B511 is needed to control.

To delete the Default Miniweb page click on the **Clear** button.

Advanced Miniweb Page

> **ATTENTION!** If the Cleartext Login (Login Settings) function is enabled, the login password will be necessary to access the miniweb.

The Advanced Miniweb is available by opening the web browser with this address:
http://<device_IP_address>/index.html?admin

The action trigger buttons can be used to perform a configured Event Action without waiting for the condition to occur. This can be done remotely by a mobile device, too. The buttons of Action triggers section are linked to Actions of certain Events in the Event Manager.
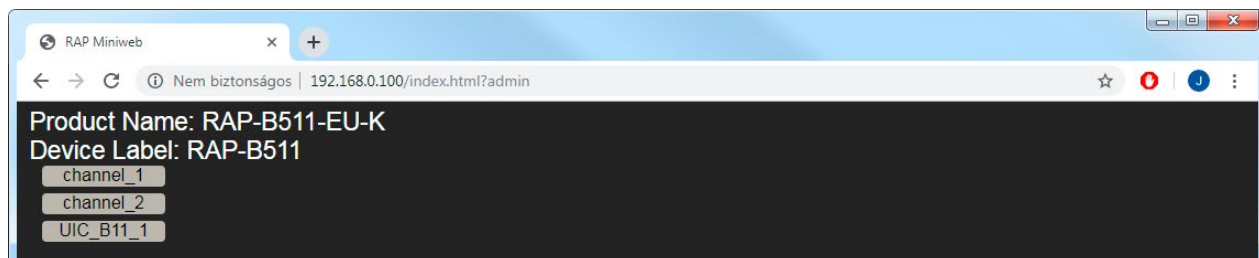
Advanced Miniweb Page

These buttons are displayed **only** for specific events:

- Any Event which does **not** have the **@W** suffix in its name will **not** be displayed as a trigger button.
- The displayed trigger buttons will get a **text label** with the **event name** except the suffix.

To add the desired Action as a button, append the name of the desired Event with the **@W** characters - see below (type uppercase for 'W' as it is case-sensitive):
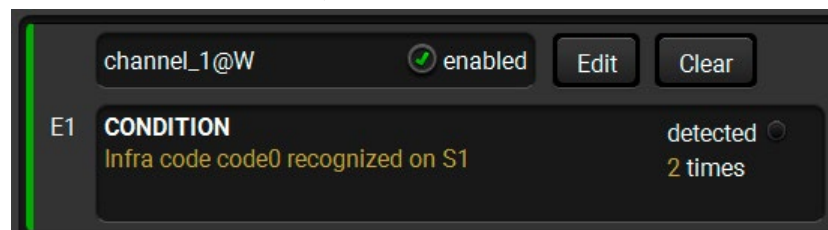
Custom Miniweb page

The control page can be replaced in the LDC; navigate to the Settings/Status page. A custom HTML file can be uploaded by pressing the Choose file button. Pay attention to the size of the HTML file. Only one file is allowed and the maximum file size is 1024 KB. The default control page can be restored during a firmware update process, see The Updating Steps section.

Press the **Clear** button to remove the control page. In this case, status information becomes available about the device.

Manufacturer Name	Lightware Visual Engineering
Device Name	RAP-B511-EU-K
Part Number	91330012
Hardware Version	V10_AAAX
Serial Number	00001234
Boot IP Address	192.168.0.100
Up time	17747
Mcu Firmware	v1.1.3b0
Control Software	software.lightware.eu
	Download log

Miniweb Status Page

> INFO: Status information is always available at http://<device_IP_address>/status.html page.

5.9. Configuration Cloning (Backup Tab)

The configuration cloning of Lightware LW3 devices is a simple method that eliminates the need to repeatedly configure certain devices to have identical (non-factory) settings. If the devices are installed in the same type of system multiple times then it is enough to set up only one device to fit the user's needs and then copy those settings to the others, thus saving time and resources.

ATTENTION! Macros cannot be saved into the backup file. If you have macros stored in a Configuration slot, download it separately and upload it in the target device.

Backup tab in Settings menu

5.9.1. Cloning Steps in a Nutshell

Installing multiple devices with the same customized configuration settings can be done in a few easy steps:

Step 1. Configure one device with all your desired settings with the LDC software.

Step 2. Backup the full configuration file to your computer.

Step 3. If needed, make some modifications to the configuration file using a text editor (e.g. Notepad). E.g. modifying the static IP address is needed when DHCP is not used.

Step 4. Connect to the other device which has to be configured and upload (restore) your configuration file.

Step 5. Done! You can have as many totally identical, customized devices as you like.

5.9.2. Save the Settings of the Device (Backup)

ATTENTION! The Macros stored in the device will not be saved to the backup file.

Step 1. Apply the desired settings in the RAP-B511 (events, serial settings, etc.)

Step 2. Select the Settings / Backup tab from the menu.

Step 3. Write a short description in the text box on the left (optional).

Step 4. Press the Create a full backup button. You will be prompted to save the file to the computer. The default file name is the following:

```
backup_<DEVICE LABEL>_SN<SERIAL NUMBER>.LW3
```

Step 5. Set the desired file name, select the folder and save the file.

TIPS AND TRICKS: Using the exact product type in the filename is recommended since it makes the file usage more comfortable.

About the Backup File

The backup file is a simple text file which contains LW3 protocol commands. The first line is the description, and the further lines are the commands which will be executed during the restore process. The file can be viewed (and/or edited) by a simple text editor, e.g. Notepad.

ATTENTION! Editing the command lines is only recommended for expert users.

See the entire list of saved data in the Content of Backup File section.

5.9.3. Upload the Settings to a Device (Restore)

> **WARNING! Please note that the settings will be permanently overwritten with the restored parameters in the device. Withdrawal is not possible.**

> **ATTENTION!** The cloning is successful when the backup file is downloaded from the same type of source device as the destination device.

The Restoring Process

Step 1.   Select the **Settings / Backup** tab from the menu.

Step 2.   Click on the **Choose file** button on the right panel and browse the desired file.

Step 3.   The file is checked and the result will be displayed in the textbox below. If the file is correct, the settings can be restored.

Step 4.   Choose **IP settings** what you want to use after backup. You can apply settings from the backup file, keep actual settings, set it manually in a dialog box or apply DHCP.

Step 5.   Select the desired **MAC filter settings** to be applied in the device. See more information about this feature in the MAC Filter Allowlist section.

Step 6.   Press the **Start restore process** button and click on the **Yes** button when asked.

Step 7.   Reboot the device to apply the network settings after finishing.

5.9.4. Create and Restore Backups from the Device Memory

The device can store configurations in its own memory, four slots are available for this purpose.

You can save the configuration to the desired slot:

- **without protection:** it can be easily applied/deleted, or
- **with protection:** it can be protected by a password to apply or delete the configuration.

Apply	Loading the selected configuration	**Delete**	Deleting the selected configuration
Save	Saving the current configuration to the selected slot without protection	**Upload**	Loading a configuration from a file to the selected slot
Save as protected	Saving the current configuration to the selected slot with a password	**Download**	Saving the selected configuration as a file

The presets can be used for the macros as well, please see the Macros section.

> **WARNING! Loading factory default settings will erase all presets in the device memory.**

5.10. Advanced View Window
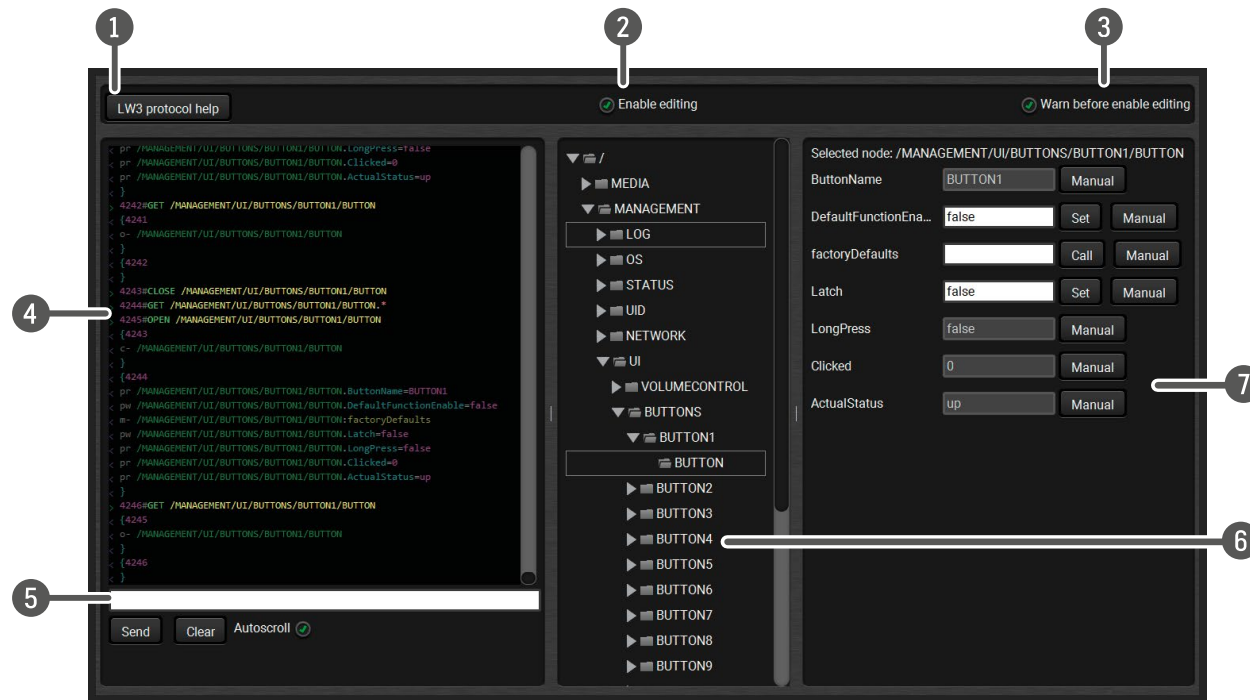
① **LW3 protocol help** — Pushing the button results a help window opening which describes the most important information about LW3 protocol commands in HTML format.

② **Edit mode** — The default appearance is the read-only mode. If you want to modify the values or parameters, tick the option. You will be prompted to confirm your selection.

③ **Warning mode** — If this is checked, a warning window pops up when you enable Edit mode.

④ **Terminal window** — Commands and responses with time and date are listed in this window. Sent command starts with '>' character, received response starts with '<' character. The color of each item depends on the type of the command and response. The content of the window can be emptied by the **Clear** button. If the **Autoscroll** option is ticked, the list is scrolled automatically when a new line is added.

⑤ **Command line** — Type the desired command and execute it by the **Send** button. Clear all current commands and responses in the Terminal window by the **Clear** button. The commands typed in this line are not escaped automatically. See more information in the Escaping section.

⑥ **Protocol tree** — LW3 protocol tree; select an item to see its content.

⑦ **Node list** — Correspondent parameters and nodes are shown which are connected to the selected item in the protocol tree. The commands typed in these fields are escaped automatically.

Manual button: Manual (short description) of the node can be called and displayed in the terminal window.

Set button: Saves the value/parameter typed in the textbox.

Call button: Calls the method, e.g. reloads factory default settings.

6

LW2 Programmer's Reference

The device can be controlled through a reduced command set of LW2 protocol commands to ensure the compatibility with other Lightware products. The supported LW2 commands are described in this chapter.

- ▶ INSTRUCTIONS FOR THE TERMINAL APPLICATION USAGE
- ▶ GENERAL LW2 COMMANDS
- ▶ NETWORK CONFIGURATION
- ▶ GPIO PORT CONFIGURATION
- ▶ LW2 COMMANDS − QUICK SUMMARY
- ▶ OVERVIEW

6.1. Protocol Description

The protocol description hereinafter stands for Lightware protocol. The commands can be sent to the device in RAW format via the TCP/IP port no. 10001.

The receiver accepts commands surrounded by curly brackets - { } - and responds data surrounded by round brackets - ( ) - only if a command was successfully executed. All input commands are converted to uppercase, but respond commands can contain upper and lower case letters as well.

Legend for Control Commands

Format	Explanation
<in>	Input number in 1 or 2 digit ASCII format (01, 5, 07, 16, etc.)
<out>	Output number in 1 or 2 digit ASCII format
<in/out>	input or output port number in 1 or 2 digit ASCII format *
<in2>	Input number in 2 digit ASCII format (01, 02, 10, 12 etc.)
<out2>	Output number in 2 digit ASCII format (01, 02, 10, 12 etc.)
<in2/out2>	input or output number in 2 digit ASCII format*
<loc>	Location number in 1, 2 or 3 digit ASCII format
<id>	id number in 1 or 2 digit ASCII format
<id2>	id number in 2 digit ASCII format
CrLf	Carriage return, Line feed (0x0D, 0x0A)
.	Space character (0x20)
→	Each command issued by the controller
←	Each response received from the router

* The command has the same arguments on the input ports and the output port, as well.

6.2. Instructions for the Terminal Application Usage

Terminal Application

The LW2 protocol commands can be applied to the receiver using a terminal application. You need to install one of them to your control device, for example **Putty** or **CLI**. *#terminal*

Establishing Connection

Follow the steps for establishing connection to the receiver:

Step 1. Connect the receiver to a LAN over Ethernet.

Step 2. Open the terminal application (e.g. Putty).

Step 3. Add the **IP address** of the device (default: 192.168.0.100) and the **port number (10001)**.

Step 4. Select the **Raw** connection type, and open the connection.

Once the terminal window is opened, you can enter the LW2 protocol commands which are listed in the following sections.
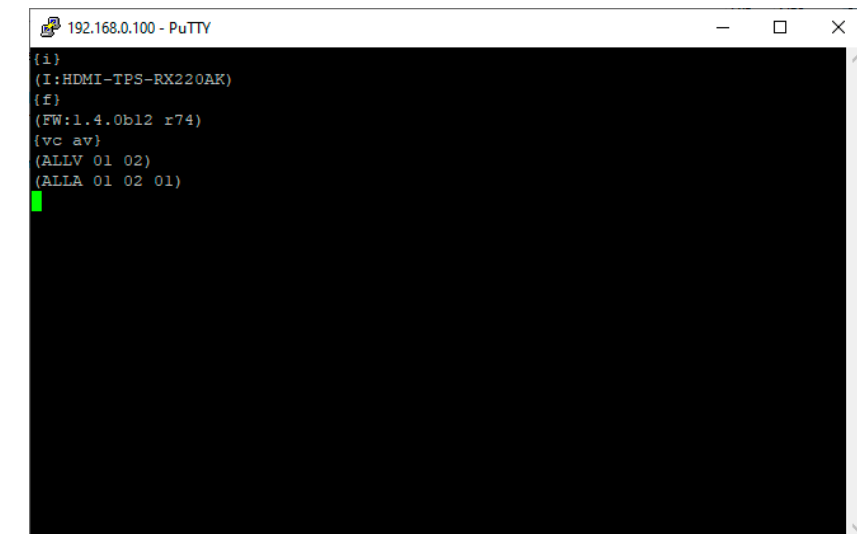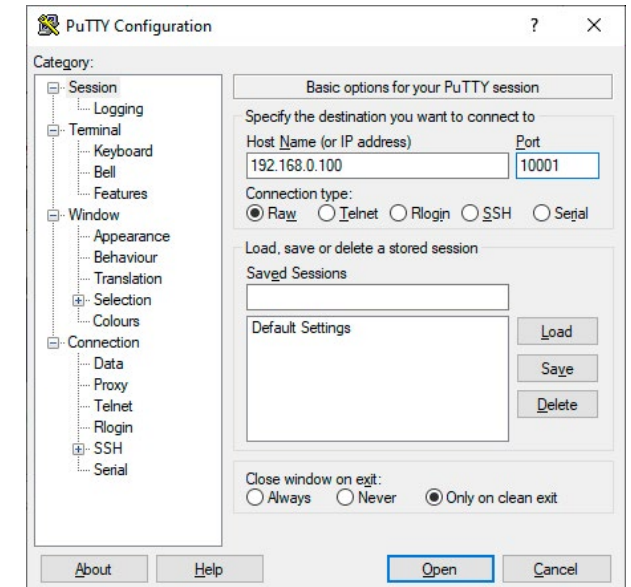
LW2 protocol command communication in a terminal window

6.3. General LW2 Commands

6.3.1. Querying the Supported Commands

The LW2 commands supported by the device can be queried by this command.

Command and Response *#producttype*

→ {LCMD}

← (LCMD# <command>: <description>)CrLf

← ...

← (LCMD END)CrLf

Example

→ {lcmd}

← (LCMD# LCMD: List all commands)

← (LCMD# PING: Always response PONG)

← (LCMD# CT: Compile time)

← ...

← (LCMD END)

▌ INFO: The response is longer, not all the lines can be seen in the example.

6.3.2. Querying the Product Type

The device responds its name.

Command and Response *#producttype*

→ {i}

← (I:<PRODUCT_TYPE>)CrLf

Example

→ {i}

← (I:RAP-B511-US-W)

6.3.3. Querying the Device Label

The respond shows the device label which is a read-only parameter in LW2, but it can be changed by an LW3 command, see the Set the Device Label section.

Command and Response

→ {LABEL}

← (LABEL=<device_label>)CrLf

Example

→ {label}

← (LABEL=RAP-B511_ENG-6517)

6.3.4. Querying the Control Protocol

The device can be controlled with different control protocols. This command queries the active protocol of the currently used control interface.

Command and Response *#protocol*

→ {P_?}

← (CURRENT·PROTOCOL·=·#<protocol>)CrLf

Example

→ {p_?}

← (CURRENT PROTOCOL = #1)

'#1' means the device communicates with LW2 protocol.

6.3.5. Querying the Current Firmware Package Version

Command and Response

→ {F}

← (FW:<FW_VER>)CrLf

Example

→ {f}

← (FW:1.0.3b2)

<FW_VER> is the firmware package version.

6.3.6. View Firmware for All Controllers

Shows the firmware versions of all installed controllers.

Command and Response *#firmwareversion*

→ {FC}

← (CF·<DESC>)CrLf

← (CF·<DESC>)CrLf

← ...

← (CF END)CrLf

Example

→ {fc}

← (CF RAP-B511-US-W v1.0.3b2)

← (CF END)

The device has one control panel.

6.3.7. Connection Test

Simple test to see if the connection is established successfully.

Command and Response

→ {PING}
← (PONG!)CrLf

Example

→ {ping}
← (PONG!)

6.3.8. Querying the Serial Number

The device responds its 8-digit serial number; see the structure in the About the Serial Number section.

Command and Response *#serialnumber*

→ {S}
← (SN:<SERIAL_N>)CrLf

Example

→ {s}
← (SN:5A004254)

6.3.9. Compile Time

Returns the date, when the CPU firmware was compiled.

Command and Response

→ {CT}
← (Complied: <DATE&TIME>)CrLf

Example

→ {ct}
← (Compiled: May 8 2020 12:16:47)

6.3.10. Querying the Health Status

Internal voltages and measured temperature values are shown.

Command and Response *#status*

→ {ST}
← (ST·<DESC>)CrLf

Example

→ {st}
← (ST CPU 3.32V 4.98V 1.81V 3.36V 44.37C 44.38C)

6.3.11. View Installed Board

Shows the hardware name and revision of the installed cards.

Command and Response

→ {IS}
← (SL#·0·<MB_DESC>)CrLf
← (SL·END)CrLf

Example

→ {is}
← (SL# 0 RAP-B511)
← (SL END)

The device reports its motherboard (slot 0).

6.3.12. Restarting the Device

The device can be restarted without unplugging power.

Command and Response *#reboot #restart*

→ {RST}
←

Example

→ {rst}
←

The device reboots; no response is sent in this case.

←

6.3.13. Restoring the Factory Default Settings

Settings can be reset to factory default values as follows:

Command and Response *#factory*

→ {FACTORY=ALL}
← (FACTORY ALL…)CrLf

Example

→ {factory=all}
← (FACTORY ALL…).

All settings and parameters are reset to factory default, see the table in the Factory Default Settings section.

6.4. Network Configuration

6.4.1. Querying the Current IP Status

The IP address settings can be queried as follows.   *#dhcp*   *#ipaddress*   *#network*

Command and Response

➞ {IP_STAT=?}

← (IP_STAT=<type>;<ip_address>;<subnet_mask>;<gateway_addr>)CrLf

Parameters

Parameter	Parameter description	Value	Value description
<type>	Assignment of the IP address	0	static
		1	dynamic (DHCP)
<ip_addr>	IP address	(four decimal octets separated by dots)	
<subnet_mask>	Subnet mask	(four decimal octets separated by dots)	
<gateway_addr>	Gateway address	(four decimal octets separated by dots)	

Example

➞ {ip_stat=?}

← (IP_STAT=0;192.168.0.100;255.255.255.0;192.168.0.1)

The device has a static (fix) IP address: 192.168.0.100; the subnet mask is 255.255.255.0, the gateway address is 192.168.0.1.

6.4.2. Setting the IP Address

IP address can be set as follows.

Command and Response

➞ {IP_ADDRESS=<type>;<ip_address>}

← (IP_ADDRESS=<type>;<ip_address>)CrLf

Parameters

See the previous section.

Example

➞ {ip_address=0;192.168.0.110}

← (IP_ADDRESS=0;192.168.0.110)

▌ INFO: The IP address can be queried by typing the **{ip_address=?}** command. The response contains the fix IP address that is stored in the device even if DHCP is enabled; in this case, this IP address is not valid.

6.4.3. Setting the Subnet Mask

Subnet mask can be set as follows.

Command and Response

➞ {IP_NETMASK=<subnet_mask>}

← (IP_NETMASK=<subnet_mask>)CrLf

Parameters

See the Querying the Current IP Status section.

Example

➞ {ip_netmask=255.255.255.0}

← (IP_NETMASK=255.255.255.0)

▌ INFO: The subnet mask can be queried by typing the {ip_address=?} command. The response contains the fix IP subnet mask that is stored in the device even if DHCP is enabled; in this case, this IP subnet mask is not valid.

6.4.4. Setting the Gateway Address

Gateway address can be set as follows.

Command and Response

➞ {IP_GATEWAY=<gateway_addr>}

← (IP_GATEWAY=<gateway_addr>)CrLf

Parameters

See the Querying the Current IP Status section.

Example

➞ {ip_gateway=192.168.0.50}

← (IP_GATEWAY=192.168.0.50)

▌ INFO: The gateway address can be queried by typing the {ip_gateway=?} command. The response contains the static IP gateway address that is stored in the device even if DHCP is enabled. In that case, the latest valid gateway address (for static IP) is stored.

6.4.5. Applying the Network Settings

Apply the network settings and restart the network interface.

Command and Response

➞ {ip_apply}

← (IP_APPLY)CrLf

Example

➞ {ip_apply}

← (IP_APPLY)

6.4.6. Enable/disable the Ethernet Port

Command and Response

→ {ETH_ENABLE=<switch>}

← (ETH_ENABLE=<switch>)CrLf

Parameters

If the <switch> parameter is **0**, the port is **disabled**. If its value is **1**, the port is **enabled**.

Example

→ {ETH_ENABLE=1}

← (ETH_ENABLE=1)

6.5. GPIO Port Configuration

6.5.1. Setting the Level and Direction for Each Pins

GPIO pins can be configured as follows. See more details about GPIO connector in the GPIO - General Purpose Input/Output Ports section.

Command and Response *#gpio*

→ {GPIO<pin_nr>=<dir>;<level>}

← (GPIO<pin_nr>=<dir>;<level>)CrLf

Parameters

Parameter	Parameter description	Value	Value description
<pin_nr>	GPIO pin number	**0-3**	static
<dir>	The direction of the communication	**I**	Input
		O	Output
<level>	The level of the pin	**L**	Low
		H	High
		T	Toggle between low and high

Example

→ {gpio1=O;H}

← (GPIO1=O;H)

GPIO pin 1 is set to output with high level.

▌ INFO: The current GPIO pin configuration can be queried by typing the {GPIO<pin_nr>=?} command.

6.6. LW2 Commands – Quick Summary

General LW2 Commands

Querying the Supported Commands

➞ {LCMD}

Querying the Product Type

➞ {i}

Querying the Device Label

➞ {LABEL}

Querying the Control Protocol

➞ {P_?}

Querying the Current Firmware Package Version

➞ {F}

View Firmware for All Controllers

➞ {FC}

Connection Test

➞ {PING}

Querying the Serial Number

➞ {S}

Compile Time

➞ {CT}

Querying the Health Status

➞ {ST}

View Installed Board

➞ {IS}

Restarting the Device

➞ {RST}

Restoring the Factory Default Settings

➞ {FACTORY=ALL}

Network Configuration

Querying the Current IP Status

➞ {IP_STAT=?}

Setting the IP Address

➞ {IP_ADDRESS=<type>;<ip_address>}

Setting the Subnet Mask

➞ {IP_NETMASK=<subnet_mask>}

Setting the Gateway Address

➞ {IP_GATEWAY=<gateway_addr>}

Applying the Network Settings

➞ {ip_apply}

Enable/disable the Ethernet Port

➞ {ETH_ENABLE=<switch>}

GPIO Port Configuration

Setting the Level and Direction for Each Pins

➞ {GPIO<pin_nr>=<dir>;<level>}

7

LW3 Programmers' Reference

The device can be controlled through Lightware 3 (LW3) protocol commands to ensure the compatibility with other Lightware products. The supported LW3 commands are described in this chapter.

7.1. Overview

The Lightware Protocol #3 (LW3) is implemented in almost all new Lightware devices (matrix switchers, signal extenders and distribution amplifiers) since 2012. The protocol is ASCII-based and all commands are terminated with a carriage return (Cr, '\r') and line feed (Lf, '\n') pair. It is organized as a tree structure that provides outstanding flexibility and user-friendly handling with 'nodes', 'properties' and 'methods'. The **Advanced View** of the Lightware Device Controller software is the perfect tool for browsing and learning how the LW3 protocol can be used in practice.

7.2. Instructions for the Terminal Application Usage

Terminal Application

The LW3 protocol commands can be applied to the receiver using a terminal application. You need to install one of them to your control device, for example **Putty** or **CLI**. *#terminal*

Establishing Connection

Follow the steps for establishing connection to the receiver:

Step 1. Connect the receiver to a LAN over Ethernet.

Step 2. Open the terminal application (e.g. Putty).

Step 3. Add the **IP address** of the device (default: 192.168.0.100) and the **port number (6107)**.

Step 4. Select the **Raw** connection type, and open the connection.

Once the terminal window is opened, you can enter the LW3 protocol commands which are listed in the following sections.
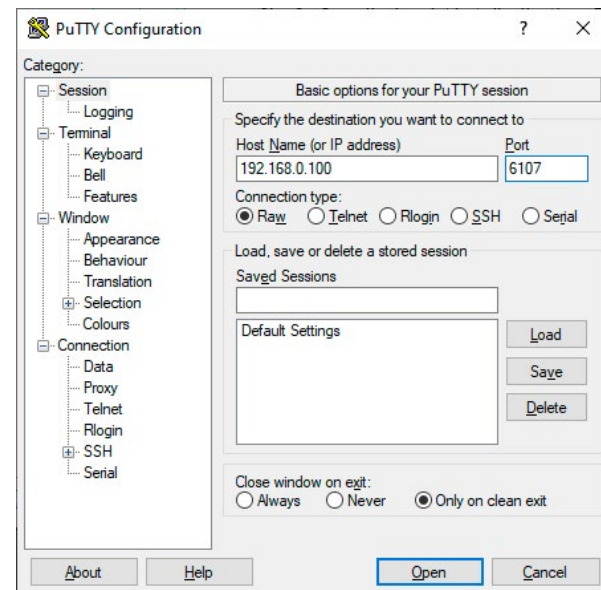
LW3 protocol command communication in a terminal window

7.3. Protocol Rules

7.3.1. LW3 Tree Structure and Command Structure (examples)
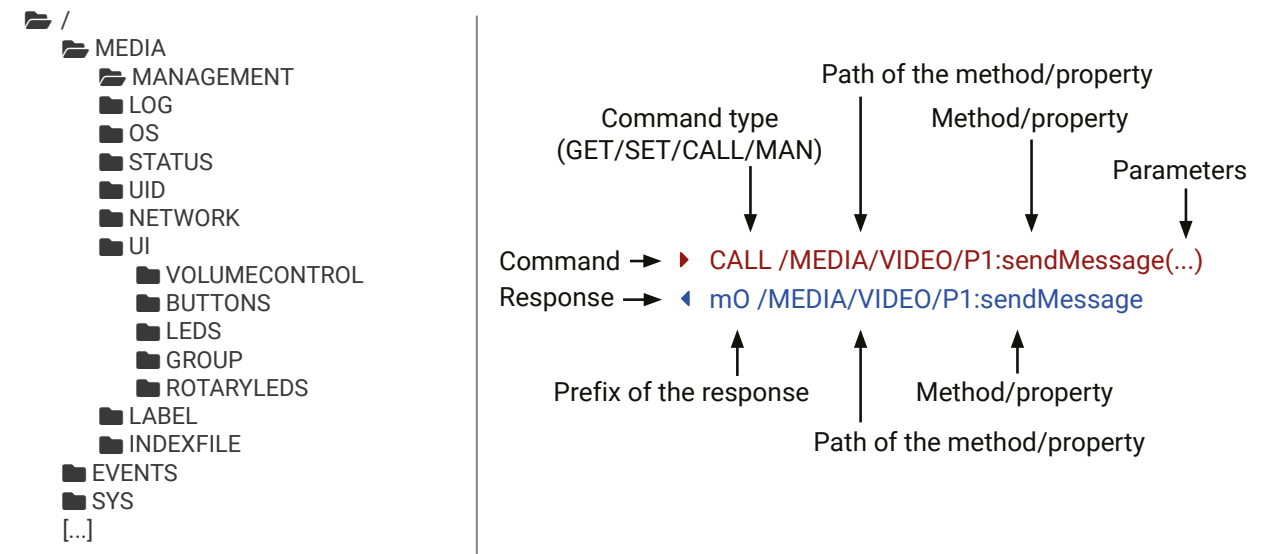
7.3.2. General Rules

- All names and parameters are **case-sensitive**.
- The nodes are separated by a slash ('/') character.
- The node name can contain the elements of the English alphabet and numbers.
- The command lines have to be closed by Carriage return and Line Feed (CrLf).
- Use the **TCP port no. 6107** when using LW3 protocol over Ethernet.
- The length of a line (command/response, command type / prefix, path, method/property and parameters together) can be **max. 800 byte**.
- When a command is issued by the device, the received response cannot be processed by the CPU.
- The node paths describe the exact location of the node, listing each parent node up to the root.

7.3.3. Command Types

GET command

The **GET** command can be used to get the child nodes, properties and methods of a specific node. It can also be used to get the value of a property. Use the dot character (.) when addressing a property:

▶ GET /.SerialNumber

◀ pr /.SerialNumber=87654321

GETALL command

The **GETALL** command can be used to get all child nodes, properties and methods of a node with one command.

▶ GETALL /MEDIA/UART

◀ ns /MEDIA/UART/P1

◀ ns /MEDIA/UART/RECOGNIZER

◀ pr /MEDIA/UART.PortCount=1

◀ pr /MEDIA/UART.PortUi=P1:01209

◀ pr /MEDIA/UART.P1=Local RS-232

SET command

The **SET** command can be used to modify the value of a property. Use the dot character (.) when addressing the property:

▶ SET /MANAGEMENT/UI/BUTTONS/BUTTON1.Enabled=false

◀ pw /MANAGEMENT/UI/BUTTONS/BUTTON1.Enabled=false

CALL command

A method can be invoked by the **CALL** command. Use the colon character (:) when addressing the method:

▶ CALL /MANAGEMENT/UI/BUTTONS/BUTTON1:factoryDefaults()

◀ mO /MANAGEMENT/UI/BUTTONS/BUTTON1:factoryDefaults

MAN command

The manual is a human readable text that describes the syntax and provides a hint for how to use the primitives. For every node, property and method in the tree there is a manual, type the MAN command to get the manual:

▶ MAN /MANAGEMENT/UI/LEDS/LED1.TrueFunction

◀ pm /MANAGEMENT/UI/LEDS/LED1.TrueFunction [0-5] 0: off, 1: low, 2: high, 3: blink, 4: slow blink, 5: sine pulse

7.3.4. Prefix Summary

DEFINITION: The prefix is a 2-character long code that describes the type of the response.

The following prefixes are defined in the LW3 protocol:

Prefix	Description
n-	a node
nE	an error for a node
nm	a manual for a node
pr	a read-only property
pw	read-write property
pE	an error for the property
pm	a manual for the property
m-	a method
mO	a response after a success method execution
mF	a response after a failed method execution
mE	an error for a method
mm	a manual for a method

7.3.5. Error Messages

There are several error messages defined in the LW3 protocol, all of them have a unique error number.

▶ CALL /MEDIA/VIDEO/XP:switch(IA:O1)

◀ nE /MEDIA/VIDEO/XP %E002:Not exists

7.3.6. Escaping

DEFINITION: An escape sequence is a sequence of characters that does not represent itself when used inside a character or string literal, but is translated into another character or a sequence of characters.

Property values and method parameters can contain characters which are used as control characters in the protocol. They must be escaped. The escape character is the backslash ('\') and escaping means injecting a backslash before the character that should be escaped (like in C language).

Control characters are the following: \ { } # % ( ) \r \n \t

The **original** message: CALL /MEDIA/UART/P1:sendMessage(Set(01))

The **escaped** message: CALL /MEDIA/UART/P1:sendMessage(Set\(01\))

7.3.7. Signature

> DEFINITION: The signature is a four-digit-long hexadecimal value that can be optionally placed before every command to keep a command and the corresponding responses together as a group.

Each line is terminated with a carriage return (Cr, '\r') and line feed (Lf, '\n') characters. In several cases the number of the lines in the response cannot be determined in advance, e.g. the client intends to receive for the whole response and also wants to be sure, that the received lines belong together and to the same command. In these cases, a special feature the 'signature' can be used. The response to that particular command will also be preceded by the signature, and the corresponding lines will be between brackets:

▸ GET /MEDIA/IR.*

◂ pr /MEDIA/IR.PortCount=1

◂ pr /MEDIA/IR.PortUi=S1:13313

◂ pr /MEDIA/IR.S1=IR in

> INFO: The lines of the signature are also Cr and Lf terminated.

7.3.8. Subscription

> DEFINITION: Subscription to a node means that the user will get a notification if a property of the node changes.

A user can subscribe to any node. These notifications are asynchronous messages and are useful to keep the client application up to date, without having to periodically poll the node to detect a changed property. When the user does not want to be informed about the changes anymore, he can simply unsubscribe from the node.

> ATTENTION! The subscriptions are handled separately for connections. Hence, if the connection is terminated all registered subscriptions are deleted. After reopening a connection all subscribe commands have to be sent in order to get the notifications of the changes on that connection.

Subscribe to a Node

▸ OPEN /MEDIA/IR

◂ o- /MEDIA/IR

Get the Active Subscriptions

▸ OPEN

◂ os /MEDIA/IR/S1

◂ o- /MANAGEMENT/UI/BUTTONS/BUTTON1

◂ o- /MANAGEMENT/UI/LEDS/LED1

◂ o- /MANAGEMENT/UI/VOLUMECONTROL

◂ o- /MANAGEMENT/LABEL

Subscribe to Multiple Nodes

▸ OPEN /MEDIA/ETHERNET/*

◂ o- /MEDIA/ETHERNET/*

Unsubscribe from a Node

▸ CLOSE /MEDIA/ETHERNET

◂ c- /MEDIA/ETHERNET

Unsubscribe from Multiple Nodes

▸ CLOSE /MEDIA/ETHERNET/*

◂ c- /MEDIA/ETHERNET/*

7.3.9. Notifications about the Changes of the Properties

When the value of a property is changed and the user is subscribed to the node, which the property belongs to, an asynchronous notification is generated. This is notification is called as the 'change message'. The format of such a message is very similar to the response for the **GET** command:

◂ CHG /EDID.EdidStatus=F48:E1

A Short Example of How to Use the Subscription

There are two independent users controlling the device through two independent connections (**Connection #1** and **Connection #2**). The events in the rows occur after each other.

▸ OPEN /MEDIA/AUDIO/O3

◂ o- /MEDIA/AUDIO/O3

▸ GET /MEDIA/AUDIO/O3.VolumePercent   connection #1

◂ pw /MEDIA/AUDIO/O3.VolumePercent=100.00

▸ GET /MEDIA/AUDIO/O3.VolumePercent

◂ pw /MEDIA/AUDIO/O3.VolumePercent=100.00   connection #2

▸ SET /MEDIA/AUDIO/O3.VolumePercent=50.00

◂ pw /MEDIA/AUDIO/O3.VolumePercent=50.00

◂ CHG /MEDIA/AUDIO/O3.VolumePercent=50.00   connection #1

The first user (**Connection #1**) set a subscription to a node. Later the other user (**Connection #2**) made a change, and thanks for the subscription, the first user got a notification about the change.

7.3.10. Legend for the Control Commands

Format	Description
<in>	Input port number
<out>	Output port number
<port>	Input or output port number
<loc>	Location number
<parameter>	Specific property, which is defined and described in the command
<expression>	Batched parameters: the underline means that more expressions or parameters can be placed by using a semicolon, e.g. **I2;I4;I5** or **F27:E1;F47:E2**
▸	Sent command
◂	Received response
·	Space character

7.4. System Commands

7.4.1. Query the Product Name

The name of the product is a read-only parameter and cannot be modified.

Command and Response

▶ GET·/.ProductName
◀ pr·/.ProductName=<product_name>

Example

▶ GET /.ProductName
◀ pr /.ProductName=RAP-B511-EU-K

7.4.2. Set the Device Label

This property can be changed to a custom text. The default format of the device label is the following:

LW_<product_name>_<serial_no>

▎ **ATTENTION!** The device label can be changed to a custom text in the Status tab of the LDC software. This writable parameter is not the same as the ProductName parameter.

Command and Response

▶ SET·/MANAGEMENT/LABEL.DeviceLabel=<custom_name>
◀ pw·/MANAGEMENT/LABEL.DeviceLabel=<custom_name>

The Device Label can be 31 character length and ASCII characters are allowed. Longer names are truncated.

Example

▶ SET /MANAGEMENT/LABEL.DeviceLabel=RAP-B511
◀ pw /MANAGEMENT/LABEL.DeviceLabel=RAP-B511

7.4.3. Query the Serial Number

Command and Response

▶ GET·/.SerialNumber
◀ pr·/.SerialNumber=<serial_nr>

Example

▶ GET /.SerialNumber
◀ pr /.SerialNumber=00009865

7.4.4. Query the Firmware Version

Command and Response

▶ GET·/SYS/MB.FirmwareVersion
◀ pr·/SYS/MB.FirmwareVersion=<firmware_version>

Example

▶ GET /SYS/MB.FirmwareVersion
◀ pr /SYS/MB.FirmwareVersion= v1.0.1b2

7.4.5. Resetting the Device

The device can be restarted – the current connections (LAN, RS-232 or USB) will be terminated.

Command and Response

▶ CALL·/SYS:reset()
◀ mO·/SYS:reset=

Example

▶ CALL /SYS:reset()
◀ mO /SYS:reset=

7.4.6. Restore the Factory Default Settings

Command and Response

▶ CALL·/SYS:factoryDefaults()
◀ mO·/SYS:factoryDefaults=

Example

▶ CALL /SYS:factoryDefaults()
◀ mO /SYS:factoryDefaults=

The device is restarted, current connections are terminated, and the default settings are restored. See the complete list in the Factory Default Settings section.

7.4.7. Enable PoE

Command and Response

▶ SET·/SYS/MB/POE.PoeEnabled=<PoE_status>

◀ pw·/SYS/MB/POE.PoeEnabled=<PoE_status>

Parameters

Identifier	Parameter description
<PoE_status>	**true:** PoE sending is enabled on the P2 Ethernet port. **false:** PoE sending is enabled on the P2 Ethernet port.

Example

▶ SET /SYS/MB/POE.PoeEnabled=true

◀ pw /SYS/MB/POE.PoeEnabled=true

▌ INFO: The RAP-B511 sends PoE when the connected device is also PoE-compatible.

7.4.8. Running a Macro

▌ **DIFFERENCE:** This command is available from FW package v1.1.0b3.

▌ DEFINITION: Macro is a batch of pre-defined commands stored in the device. *#macro*

You can create your custom macros in a file, upload to the device and run at any time. The uploading can be done over LDC, see the Uploading New Macros into a New Preset section. The following LW3 command is suitable only for running a macro.

Command and Response

▶ CALL·/CTRL/MACROS:run(<macro_name>)

◀ mO·/CTRL/MACROS:run

Example

▶ CALL /CTRL/MACROS:run(Macro1)

◀ mO /CTRL/MACROS:run

7.5. Cleartext Login Protection

▌ **DIFFERENCE:** This feature and below commands are available from FW package v1.1.0b3.

This cleartext login tool allows setting a password for login, thus, any change in the device can be performed only after a successful login – coming from any control interface (RS-232, Ethernet, etc…). The login is valid until a TCP socket break in case of Ethernet connection. *#login*

▌ **ATTENTION!** If the login is enabled, the miniweb is not available.

▌ INFO: The login password is erased and the login is disabled when restoring the factory default values.

The following can be queried without login:

- ▪ ProductName
- ▪ PartNumber
- ▪ SerialNumber
- ▪ FirmwareVersion
- ▪ PackageVersion
- ▪ MacAddress

7.5.1. Setting the Login Password

Command and Response

▶ CALL·/LOGIN:setPassword(<password>)

◀ mO·/LOGIN:setPassword

Example

▶ CALL /LOGIN:setPassword(pr0t3ctED)

◀ mO /LOGIN:setPassword

7.5.2. Login the Device

Command and Response

▶ CALL·/LOGIN:login(<password>)

◀ mO·/LOGIN:login

Example

▶ CALL /LOGIN:login(pr0t3ctED)

◀ mO /LOGIN:login

After a successful login, the **LoggedIn** property becomes **true** and the LW3 tree is available.

7.5.3. Logout from the Device

Command and Response

▶ CALL·/LOGIN:logout(<password>)

◀ mO·/LOGIN:logout

Example

▶ CALL /LOGIN:logout(pr0t3ctED)

◀ mO /LOGIN:logout

After a successful logout, the **LoggedIn** property becomes **false** and the LW3 tree is protected.

7.5.4. Enable the Cleartext Login Function

❚ **ATTENTION!** This property can be changed only, if the **LoggedIn** property is **true**.

Command and Response

▶ SET·/LOGIN:LoginEnable=<login_state>

◀ pw·/LOGIN.LoginEnable=<login_state>

Parameters

If the <login_state> parameter is **true** (or **1**), the Cleartext login function is **enabled**, if the parameter is **false** (or **0**), the function is **disabled**. Please note that the function can be enabled without setting a password by the **setPassword** method.

Example

▶ SET /LOGIN.LoginEnable=true

◀ pw /LOGIN.LoginEnable=true

7.6. Time Settings

7.6.1. Query the Timezone

Command and Response

▶ SET·/SYS/MB/TIMEZONE.Timezone=<timezone>

◀ pw·/SYS/MB/TIMEZONE.Timezone =<timezone>

Parameters

Identifier	Parameter description
<timezone>	Time zone setting in POSIX TZ format.

Example

▶ SET /SYS/MB/TIMEZONE.Timezone=CET-1CEST,M3.5.0/2,M10.5.0/3

◀ pw /SYS/MB/TIMEZONE.Timezone=CET-1CEST,M3.5.0/2,M10.5.0/3

❚ TIPS AND TRICKS: Timezone and daylight saving settings can be done easily and quickly with Lightware Device Controller software in the Time Settings section.

❚ TIPS AND TRICKS: Enable Network Time Protocol (NTP)

Enabling Network Time Protocol means, that the RAP-B511 is permitted to get time information from an NTP server. The device time synchronized repeatedly and automatically.

Command and Response

▶ SET·/SYS/MB/NTP.Enable=<enable_ntp>

◀ pw·/SYS/MB/NTP.Enable=<enable_ntp>

Parameters

Identifier	Parameter description
<enable_ntp>	**true: NTP** enabled **false: NTP** disabled

Example

▶ SET /SYS/MB/NTP.Enable=true

◀ pw /SYS/MB/NTP.Enable=true

7.6.2. Enable Getting NTP from DHCP server

When the DHCP server assigns an IP address to the device, there is an option to request an NTP time information. When the RAP-B511 connected to the internet, the NTP time is updated repeatedly.

Command and Response

▸ SET·/SYS/MB/NTP.NtpServerFromDhcp=<enable_ntp_dhcp>

◂ pw·/SYS/MB/NTP.NtpServerFromDhcp=<enable_ntp_dhcp>

Parameters

Identifier	Parameter description
<enable_ntp_dhcp>	**true:** Enable getting NTP from the DHCP server. **false:** Disable getting NTP from the DHCP server.

Example

▸ SET /SYS/MB/NTP.NtpServerFromDhcp=true

◂ pw /SYS/MB/NTP.NtpServerFromDhcp=true

7.6.3. Query the Active NTP Server

Command and Response

▸ GET·/SYS/MB/NTP.ActiveNtpServer

◂ pr·/SYS/MB/NTP.ActiveNtpServer=<server_address>

Parameters

Identifier	Parameter description
<server_address>	NTP server address (IP address or URL).

Example

▸ GET /SYS/MB/NTP.ActiveNtpServer

◂ pr /SYS/MB/NTP.ActiveNtpServer=pool.ntp.org

7.6.4. Set NTP server

Command and Response

▸ SET·/SYS/MB/NTP.NtpServer=<server_address>

◂ pw·/SYS/MB/NTP.NtpServer=<server_address>

Parameters

Identifier	Parameter description
<server_address>	NTP server address (IP address or URL).

Example

▸ SET /SYS/MB/NTP.NtpServer=pool.ntp.org

◂ pw /SYS/MB/NTP.NtpServer=pool.ntp.org

7.6.5. Synchronize with the NTP server

Command and Response

▸ CALL·/SYS/MB/NTP:updateTime()

◂ mO·/SYS/MB/NTP:updateTime

Example

▸ CALL /SYS/MB/NTP:updateTime()

◂ mO /SYS/MB/NTP:updateTime

7.6.6. Query the Last Synchronization

Command and Response

▸ GET·/SYS/MB/RTC.LastUpdate

◂ pr·/SYS/MB/RTC.LastUpdate=<last_sync>

Parameters

Identifier	Parameter description
<last_sync>	Displays the last synchronization time.

Example

▸ GET /SYS/MB/RTC.LastUpdate

◂ pr /SYS/MB/RTC.LastUpdate=2019-04-30T16:36:41

7.6.7. Query the Universal Time Coordinated Time (UTC)

Command and Response

▸ GET·/SYS/MB/RTC.UtcTime

◂ pr·/SYS/MB/RTC.UtcTime=<utcTime>

Parameters

Identifier	Parameter description
<utcTime>	Displays the date and the UTC time.

Example

▸ GET /SYS/MB/RTC.UtcTime

◂ pr /SYS/MB/RTC.UtcTime=2019-05-16T10:41:38

7.6.8. Query the Local Time (RTC)

Command and Response

▶ GET·/SYS/MB/RTC.LocalTime

◀ pr·/SYS/MB/RTC.LocalTime=<localtime>

Parameters

Identifier	Parameter description
<localtime>	Displays the date and the local time.

Example

▶ GET /SYS/MB/RTC.LocalTime

◀ pr /SYS/MB/RTC.LocalTime=2019-02-14T17:16:14

7.6.9. Query the Local Time (RTC) Elements

> TIPS AND TRICKS: When repetitive scheduled actions are required, these properties should be set as a condition in the Event Manager.

Command and Response

▶ GET·/SYS/MB/RTC.<RTC_element>

◀ pr·/SYS/MB/RTC.LocalTime=<RTC_element>

Parameters

Identifier	Parameter description	Parameter example
<RTC_element>	Years	2019 (four digit number between 2000 and 2099)
	Months	12 (max. two digit number between 1 and 12)
	Days	7 (max. two digit number between 1 and 31)
	Hours	9 (max. two digit number between 0 and 24)
	Minutes	54 (max. two digit number between 0 and 59)
	Seconds	11 (max. two digit number between 0 and 59)
	DaylightSaving	**true** or **false**
	Weekday	**1**: Monday; **2**: Tuesday; **3**: Wednesday; **4**: Thursday **5**: Friday; **6**: Saturday; **7**: Sunday It shows the which day is on the week.
	Yearday	193 (max. two digit number between 1 and 365) It shows the which day is in the year.
	Scheduler time	5-18-19 (Weekday-Hours-Minutes)

Example

▶ GET /SYS/MB/RTC.Years

◀ pr /SYS/MB/RTC.Years=2019

7.7. Button Configuration

> **DIFFERENCE:** This section relates to **RAP-B511 series models only**.

General parameters

Identifier	Parameter description	Parameter values
<btn_ID>	Button identifier	BUTTON1-BUTTON11

7.7.1. Lock the Front Panel Functionality

Command and Response

▶ SET·/MANAGEMENT/UI.ControlLock=<lock_status>

◀ pw·/MANAGEMENT/UI.ControlLock=<lock_status>

Parameters

Identifier	Parameter description	Parameter values
<lock_status>		**0:** None - All functions of the front panel buttons and the rotary are enabled.
		1: Locked - Locking and unlocking of the front panel buttons and the rotary are possible with Lightware Device Controller software or via protocol command.

Example

▶ SET /MANAGEMENT/UI.ControlLock=1

◀ pw /MANAGEMENT/UI.ControlLock=1

7.7.2. Lock the Buttons Separately

Command and Response

▶ SET·/MANAGEMENT/UI/BUTTONS/<btn_ID>.Enabled=<btn_lock_status>

◀ pw·/MANAGEMENT/UI/BUTTONS/<btn_ID>.Enabled= <btn_lock_status>

Parameters

Identifier	Parameter description	Parameter values
<btn_lock_status>		**true:** On buttonpress event, the funcitonality of the button is enabled. **false:** On buttonpress event, the funcitonality of the button is disabled.

Example

▶ SET /MANAGEMENT/UI/BUTTONS/BUTTON1.Enabled=false

◀ pw /MANAGEMENT/UI/BUTTONS/BUTTON1.Enabled=false

7.7.3. Set the Button Operation Mode

Command and Response

▸ SET·/MANAGEMENT/UI/BUTTONS/<btn_ID>.Mode=<btn_mode>

◂ pw·/MANAGEMENT/UI/BUTTONS/<btn_ID>.Mode=<btn_mode>

Parameters

Identifier	Parameter description	Parameter values
<btn_mode>	Shows the button type. It can be **momentary** or **toggle** or **radio**.	**0**: Momentary: Simple button function, when the button is pressed, the action will execute. ▪ When the button is pressed, the <btn_ID>.State-=true ▪ When the button is released, the <btn_ID>.State=false **1**: Toggle: This button type toggles between two states (e.g. control turning on and off the light with one button). ▪ When the button is pressed, the <btn_ID>.State changes. ▪ When the button is released, the <btn_ID>.State does not change. **2-6**: Radio: It defines the assigned radio group of the button. One button can belong to one group at the same time. When the button is pressed, the <btn_ID>.State changes true and <btn_ID>.State of the other members in the same group changes false. **2**: Member of group 1; **3**: Member of group 2; **4**: Member of group 3; **5**: Member of group 4; **6**: Member of group 5.

Example

▸ SET /MANAGEMENT/UI/BUTTONS/BUTTON1.Mode=1

◂ pw /MANAGEMENT/UI/BUTTONS/BUTTON1.Mode=1

7.7.4. Set the Button Interaction State

This property gives immediate feedback about the button status, which changes depending on the button mode. When the button function is configured with Lightware Device Controller Software, this parameter is set as a Condition in the Event Manager.

Command and Response

▸ SET·/MANAGEMENT/UI/BUTTONS/<btn_ID>.State=<btn_state>

◂ pw·/MANAGEMENT/UI/BUTTONS/<btn_ID>.State=<btn_state>

Parameters

Identifier	Parameter description	Parameter values
<btn_state>	Button state	**true** or **false**: It gives a feedback about the current state of the button, which changes depending on the Set the Button Operation Mode.

Example

▸ SET /MANAGEMENT/UI/BUTTONS/BUTTON1.State=true

▸ pw /MANAGEMENT/UI/BUTTONS/BUTTON1.State=true

7.7.5. Set the Button Name

Command and Response

▸ SET·/MANAGEMENT/UI/BUTTONS/<btn_ID>. Name=<btn_name>

◂ pw·/MANAGEMENT/UI/BUTTONS/<btn_ID>. Name=<btn_name>

Parameters

Identifier	Parameter description	Parameter values
<btn_name>	Button name	The button name can be 33 character-long, ASCII characters are allowed. Longer names are not accepted.

Example

▸ SET /MANAGEMENT/UI/BUTTONS/BUTTON1.Name=Projector on

▸ pw /MANAGEMENT/UI/BUTTONS/BUTTON1.Name=Projector on

7.7.6. Set the Icon for the Button

Command and Response

▸ SET·/MANAGEMENT/UI/BUTTONS/<btn_ID>.IconId=<icon_ID>

◂ pw·/MANAGEMENT/UI/BUTTONS/<btn_ID>. IconId=<icon_ID>

Parameters

Identifier	Parameter description	Parameter values
<icon_ID>	It defines the displayed icon of the button in the Miniweb or the LDC layout.	**i1-i140**: Sets the pictogram on the button.

Button Icon and IDs

0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	APPLE TV	tv
i1	i2	i3	i4	i5	i6	i7	i8	i9	i10	i11	i12	i13	i14
AUTO	AUTO SOURCE					BLACK SCREEN	BLANK / AV MUTE	BLURAY			CAMERA		
i15	i16	i17	i18	i19	i20	i21	i22	i23	i24	i25	i26	i27	i28
					DISPLAY 2	DISPLAY 1	DISPLAY OFF		DISPLAY ON		DISPLAY ON / OFF		DOC CAM
i29	i30	i31	i32	i33	i34	i35	i36	i37	i38	i39	i40	i41	i42
DP					HDMI	HDMI1	1	HDMI2	2				
i43	i44	i45	i46	i47	i48	i49	i50	i51	i52	i53	i54	i55	i56
	INPUT1		INPUT2		INPUT3		INPUT4		LAPTOP	LAPTOP1	1	LAPTOP2	2
i57	i58	i59	i60	i61	i62	i63	i64	i65	i66	i67	i68	i69	i70
	LECTERN PC	OFF	ON	ON / OFF	LIGHTS OFF	LIGHTS ON	LIGHTS ON / OFF		MEDIA PLAYER				
i71	i72	i73	i74	i75	i76	i77	i78	i79	i80	i81	i82	i83	i84
		PC	PC1	1	PC2	2			OFF	ON	ON / OFF	PROJ OFF	PROJ ON
i85	i86	i87	i88	i89	i90	i91	i92	i93	i94	i95	i96	i97	i98
PROJ ON / OFF			ROOM PC	1	2	SCREEN DOWN	OFF	ON	ON / OFF	SCREEN UP	SOURCE		
i99	i100	i101	i102	i103	i104	i105	i106	i107	i108	i109	i110	i111	i112
	SYSTEM OFF	ON / OFF	SYSTEM ON	ON	SYSTEM ON / OFF	ON / OFF							
i113	i114	i115	i116	i117	i118	i119	i120	i121	i122	i123	i124	i125	i126
VGA		VIDEO CONF					VOL DOWN	VOL MUTE	VOL UP	WALL PLATE			WIRELESS
i127	i128	i129	i130	i131	i132	i133	i134	i135	i136	i137	i138	i139	i140

Example

▸ SET /MANAGEMENT/UI/BUTTONS/BUTTON2.IconId=i139

▸ pw /MANAGEMENT/UI/BUTTONS/BUTTON2.IconId=i139

7.7.7. Set the Label for the Button

Command and Response

▸ SET·/MANAGEMENT/UI/BUTTONS/<btn_ID>. IconId=<row1>;<row2>;<row3>

◂ pw·/MANAGEMENT/UI/BUTTONS/<btn_ID>. IconId=<row1>;<row2>;<row3>

DP / laptop / on   <row1> <row2> <row3>
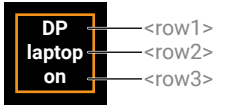
Parameters

Identifier	Parameter description	Parameter values
<row1>;<row2>;<row3>	It defines the displayed text of the button in the Miniweb or the LDC layout.	Maximum three rows can be displayed for one button separated with semicolon. 30 ASCII characters are allowed for all rows.

Example

▸ SET /MANAGEMENT/UI/BUTTONS/BUTTON1.IconId=DP;laptop;on

▸ pw /MANAGEMENT/UI/BUTTONS/BUTTON1.IconId=DP;laptop;on

7.7.8. Clear the Button Style

The buttons style deleted when IconId has no parameter.

Command and Response

▸ SET·/MANAGEMENT/UI/BUTTONS/<btn_ID>. IconId=

◂ pw·/MANAGEMENT/UI/BUTTONS/<btn_ID>. IconId=

Example

▸ SET /MANAGEMENT/UI/BUTTONS/BUTTON1.IconId=

▸ pw /MANAGEMENT/UI/BUTTONS/BUTTON1.IconId=

7.7.9. Button Status Indicators

Query the Latch

Command and Response

▸ GET·/MANAGEMENT/UI/BUTTONS/<btn_ID>/BUTTON.Latch

◂ pr·/MANAGEMENT/UI/BUTTONS/<btn_ID>/BUTTON.Latch=<btn_latch_status>

Parameters

Identifier	Parameter description	Parameter values
<btn_latch_status>	When the button is pressed, the latch property toggles between true and false values every time. This property operates independently of the Set the Button Operation Mode.	**True** or **False**.

Example

▸ GET /MANAGEMENT/UI/BUTTONS/BUTTON1/BUTTON.Latch

◂ pw /MANAGEMENT/UI/BUTTONS/BUTTON1/BUTTON.Latch=false

Query the Actual Status

Command and Response

▶ GET·/MANAGEMENT/UI/BUTTONS/<btn_ID>/BUTTON.ActualStatus

◀ pr·/MANAGEMENT/UI/BUTTONS/<btn_ID>/BUTTON.ActualStatus=<btn_status>

Parameters

Identifier	Parameter description	Parameter values
<btn_status>	Shows if the button is pressed or not at the moment.	**up**: The button is not pressed at the moment. **down**: The button is pressed at the moment.

Example

▶ GET /MANAGEMENT/UI/BUTTONS/BUTTON1/BUTTON.ActualStatus

◀ pr /MANAGEMENT/UI/BUTTONS/BUTTON1/BUTTON.ActualStatus=up

Query the Clicked Status

Command and Response

▶ GET·/MANAGEMENT/UI/BUTTONS/<btn_ID>/BUTTON.Clicked

◀ pr·/MANAGEMENT/UI/BUTTONS/<btn_ID>/BUTTON.Clicked=<clicked_nr>

Parameters

The <clicked_nr> parameter gives feedback about the number of the quick button presses (max. 1 sec between the presses). After the clicking, the value restores to default (0) immediately. It can be set as a condition in the Event Manager when the trigger should be e.g. a double click.

Example

▶ GET /MANAGEMENT/UI/BUTTONS/BUTTON1/BUTTON.Clicked

◀ pr /MANAGEMENT/UI/BUTTONS/BUTTON1/BUTTON.Clicked=0

Query the Longpress Status

Command and Response

▶ GET·/MANAGEMENT/UI/BUTTONS/<btn_ID>/BUTTON.LongPress

◀ pr·/MANAGEMENT/UI/BUTTONS/<btn_ID>/BUTTON.LongPress=<longpress_status>

Parameters

Identifier	Parameter description	Parameter values
<longpress_status>	True, when the button has been pressing more than 1 sec.	**true**: The button has been pressed more than 1sec. **false**: The button has been pressed less than 1 sec.

Example

▶ GET /MANAGEMENT/UI/BUTTONS/BUTTON1/BUTTON.LongPress

◀ pr /MANAGEMENT/UI/BUTTONS/BUTTON1/BUTTON.LongPress=false

7.8. Button LED Configuration

▌ **DIFFERENCE:** This section relates to **RAP-B511 series models only**.

General parameters

Identifier	Parameter description	Parameter values
<LED_ID>	LED identifier (LED1 is behind the BUTTON1)	LED1-11

7.8.1. Enable the Button LED

▌ **ATTENTION!** If the Button LED is not enabled, the following LED-related settings will not be displayed.

Command and Response

▶ SET·/MANAGEMENT/UI/LEDS/<LED_ID>.Enabled=<LED_enable>

◀ pw·/MANAGEMENT/UI/LEDS/<LED_ID>.Enabled=<LED_enable>

Parameters

Identifier	Parameter values
<LED_enable>	**true**: The button LED is allowed to light. **false**: The button LED is not allowed to light.

Example

▶ SET /MANAGEMENT/UI/LEDS/LED11.Enabled=true

◀ pw /MANAGEMENT/UI/LEDS/LED11.Enabled=true

7.8.2. Set the Default Intensity of the Low Brightness

Command and Response

▶ SET·/MANAGEMENT/UI/LEDS.LowBright=<light_intensity>

◀ pw·/MANAGEMENT/UI/LEDS.LowBright=<light_intensity>

Parameters

Identifier	Parameter description	Parameter values
<light_intensity>	The default intensity of the background light.	**0-5:0** means no bright, **5** is the maximum brightness.

Example

▶ SET /MANAGEMENT/UI/LEDS.LowBright=1

◀ pw /MANAGEMENT/UI/LEDS.LowBright=1

7.8.3. Set the Default Intensity of the High Brightness

Command and Response

▶ SET·/MANAGEMENT/UI/LEDS.HighBright=\<light_intensity>

◀ pw·/MANAGEMENT/UI/LEDS.HighBright=\<light_intensity>

Parameters

Identifier	Parameter description	Parameter values
\<light_intensity>	The default intensity of the background light.	**0-5:0** means no bright, **5** is the maximum brightness.

Example

▶ SET /MANAGEMENT/UI/LEDS.HighBright=3

◀ pw /MANAGEMENT/UI/LEDS.HighBright=3

7.8.4. Set Background Light of the Button

Set the TrueFunction

Here the LEDs behaviour can be defined how the when the button is pressed or released. This property takes into consideration the Set the Button Interaction State. If it is true (\<btn_ID>.State=true), the LED will light according to this setting.

Command and Response

▶ SET·/MANAGEMENT/UI/LEDS/\<LED_ID>.TrueFunction=\<light_mode>

◀ pw·/MANAGEMENT/UI/LEDS/\<LED_ID>.TrueFunction=\<light_mode>

Parameters

Identifier	Parameter description	Parameter values
\<light_mode>	Type of the background light.	**0**: Off **1**: Low brightness **2**: High brightness **3**: Blinking **4**: Slow blinking **5**: Sine pulse

Example

▶ SET /MANAGEMENT/UI/LEDS/LED11.TrueFunction=1

◀ pw /MANAGEMENT/UI/LEDS/LED11.TrueFunction=1

Set the FalseFunction

Here the LEDs behaviour can be defined, when the button is pressed or released. This property takes into consideration the Set the Button Interaction State. If it is false (\<btn_ID>.State=false), the LED will light according to this setting.

Command and Response

▶ SET·/MANAGEMENT/UI/LEDS/\<LED_ID>.FalseFunction=\<light_mode>

◀ pw·/MANAGEMENT/UI/LEDS/\<LED_ID>.FalseFunction=\<light_mode>

Parameters

Identifier	Parameter description	Parameter values
\<light_mode>	Type of the background light.	**0**: Off **1**: Low brightness **2**: High brightness **3**: Blinking **4**: Slow blinking **5**: Sine pulse

Example

▶ SET /MANAGEMENT/UI/LEDS/LED11.FalseFunction=2

◀ pw /MANAGEMENT/UI/LEDS/LED11.FalseFunction=2

7.8.5. Set the Background Light for a Period of Time

Command and Response

▶ CALL·/MANAGEMENT/UI/LEDS/\<led_ID>:\<button_func>(\<time>)

◀ mO·/MANAGEMENT/UI/LEDS/\<led_ID>:\<button_func>(\<time>)

Parameters

Identifier	Parameter description	Parameter values
\<led_ID>	LED identifier	LED1-11
\<button_func>	Type of the background lightning.	**tempFuncOff**: No brightness **tempFuncLowBright**: Low brightness **tempFuncHighBright:** High brightness **tempFuncBlink:** Blinking
\<time>	Duration of time in ms while the LED lights.	1-60000

Example

▶ CALL /MANAGEMENT/UI/LEDS/LED11:tempFuncOff(100)

◀ mO /MANAGEMENT/UI/LEDS/LED11:tempFuncOff

7.9. Button Group Configuration

█ **DIFFERENCE:** This section relates to **RAP-B511 series models only**.

7.9.1. Set the Buttons into Groups

The button mode defines which button belongs a certain group. For more information about it, see Set the Button Operation Mode section.

7.9.2. Query the Group Members

Command and Response

▸ GET·/MANAGEMENT/UI/GROUP/<group_ID>.GroupMembers

◂ pr·/MANAGEMENT/UI/GROUP/<group_ID>.GroupMembers=<member_list>

Parameters

Identifier	Parameter description	Parameter values
<group_ID>	Group identifier	G1-5
<member_list>	Shows which buttons belong to the group. The members are listed with their button ID numbers.	1-11;1-11;...1-11;

Example

▸ GET /MANAGEMENT/UI/GROUP/G1.GroupMembers

◂ pr /MANAGEMENT/UI/GROUP/G1.GroupMembers=1;2;3;

7.9.3. Set the Active Button

Command and Response

▸ SET·/MANAGEMENT/UI/GROUP/<group_ID>.Active=<btn_nr>

◂ pw·/MANAGEMENT/UI/GROUP/<group_ID>.Active=<btn_nr>

Parameters

Identifier	Parameter description	Parameter values
<group_ID>	Group identifier	G1-5
<btn_nr>	Shows which button is the active member of the group. It means, that the BUTTON<btn_nr>.State=true (and the State property of the other members in the group are false). For more information about the button states see Set the Button Interaction State section.	1-11

Example

▸ SET /MANAGEMENT/UI/GROUP/G1.Active=1

◂ pw /MANAGEMENT/UI/GROUP/G1.Active=1

7.10. Volume Control Configuration

█ **DIFFERENCE:** This section relates to **RAP-B511 series models only**.

7.10.1. Control Lock of the Jog Dial

This property can disable the control function of the jog dial without locking the buttons.

Command and Response

▸ SET·/MANAGEMENT/UI/VOLUMECONTROL.Enabled=<enabled>

◂ pw·/MANAGEMENT/UI/VOLUMECONTROL.Enabled=<enabled>

Parameters

Identifier	Parameter description	Parameter values
<enabled>	Enables or disables the jog dial.	**true**: Jog dial control is enabled. **false**: Operation of the jog dial is disabled. The mute LED and Rotary LEDs and are turned down. When the rotary is turned, VOLUMECONTROL.Volume will not change, and the rotary is pressed, the VOLUMECONTROL.Mute property will not toggle.

Example

▸ SET /MANAGEMENT/UI/VOLUMECONTROL.Enabled=true

◂ pw /MANAGEMENT/UI/VOLUMECONTROL.Enabled=true

█ **ATTENTION!** When the rotary is disabled, the Query the Rotating Direction of the Jog Dial, Query the Actual Status of the Rotary, Query the Longpress Status, Query the Clicked Status will change.

7.10.2. Set the Volume

Rotating the jog dial changes the volume property value (and turns on and off the volume indicator LEDs) between 0 and 16.

Command and Response

▸ SET·/MANAGEMENT/UI/VOLUMECONTROL.Volume=<volume_value>

◂ pw·/MANAGEMENT/UI/VOLUMECONTROL.Volume=<volume_value>

Parameters

Identifier	Parameter values
<volume_value>	**0-16:** Volume level can be set between 0 and 16.

Example

▸ SET /MANAGEMENT/UI/VOLUMECONTROL.Volume=5

◂ pw /MANAGEMENT/UI/VOLUMECONTROL.Volume=5

7.10.3. Mute the Volume

Clicking on the jog dial changes the mute state (and toggles on and off the mute LED).

Command and Response

▶ SET·/MANAGEMENT/UI/VOLUMECONTROL.Mute=<mute_state>

◀ pw·/MANAGEMENT/UI/VOLUMECONTROL.Mute=<mute_state>

Parameters

Identifier	Parameter description	Parameter values
<mute_state>	Enables or disables the mute state.	**true**: The volume is muted. **false**: The volume is unmuted.

Example

▶ SET /MANAGEMENT/UI/VOLUMECONTROL.Mute=false

◀ pw /MANAGEMENT/UI/VOLUMECONTROL.Mute=false

7.10.4. Volume Setting in Mute State

This command allows setting the volume while the controlled device is in muted state.

Command and Response

▶ SET·/MANAGEMENT/UI/VOLUMECONTROL.UnMuteOnVolumeChange=<unmute>

◀ pw·/MANAGEMENT/UI/VOLUMECONTROL.UnMuteOnVolumeChange=<unmute>

Parameters

If the <unmute> parameter is **true**, the unmute command is sent, the LED is switched off and the volume setting command is sent. If the <unmute> parameter is **false**, only the volume setting command is sent.

Example

▶ SET /MANAGEMENT/UI/VOLUMECONTROL.UnMuteOnVolumeChange=false

◀ pw /MANAGEMENT/UI/VOLUMECONTROL.UnMuteOnVolumeChange=false

7.10.5. Volume Control (Jog Dial) Status Indicators

These properties gives immediate feedback about the jog dial status. They are for using as a Condition in the Event Manager.

Query the Rotating Direction of the Jog Dial

Command and Response

▶ GET·/MANAGEMENT/UI/VOLUMECONTROL/ROTARY.RotaryPosition

◀ pw·/MANAGEMENT/UI/VOLUMECONTROL/ROTARY.RotaryPosition=<direction>

Parameters

If the <direction> parameter is **1**, the jog dial is rotating clockwise. If the value is **-1**, the jog dial is rotating counter clockwise. **0** value means the rotary does not turn (default value).

Example

▶ GET /MANAGEMENT/UI/VOLUMECONTROL/ROTARY.RotaryPosition

◀ pr /MANAGEMENT/UI/VOLUMECONTROL/ROTARY.RotaryPosition=-1

Query the Actual Status of the Rotary

Command and Response

▶ GET·/MANAGEMENT/UI/VOLUMECONTROL/ROTARY.ActualStatus

◀ pr·/MANAGEMENT/UI/VOLUMECONTROL/ROTARY.ActualStatus=<rotary_status>

Parameters

Identifier	Parameter description	Parameter values
<rotary_status>	Shows if the rotary button is pressed or not at the moment.	**up**: The rotary button is not pressed at the moment. **down**: The rotary button is pressed at the moment.

Example

▶ GET /MANAGEMENT/UI/VOLUMECONTROL/ROTARY.ActualStatus

◀ pr /MANAGEMENT/UI/VOLUMECONTROL/ROTARY.ActualStatus=up

Query the Longpress Status

Command and Response

▶ GET·/MANAGEMENT/UI/VOLUMECONTROL/ROTARY.LongPress

◀ pr·/MANAGEMENT/UI/VOLUMECONTROL/ROTARY.LongPress=<longpress_status>

Parameters

Identifier	Parameter description	Parameter values
<longpress_status>	True, when the rotary button has been pressing more than 1 sec.	**true**: The rotary button has been pressed more than 1 sec. **false**: The rotary button has been pressed less than 1 sec.

Example

▶ GET /MANAGEMENT/UI/VOLUMECONTROL/ROTARY.LongPress

◀ pr /MANAGEMENT/UI/VOLUMECONTROL/ROTARY.LongPress=false

Query the Clicked Status

Command and Response

▶ GET·/MANAGEMENT/UI/VOLUMECONTROL/ROTARY.Clicked

◀ pr·/MANAGEMENT/UI/VOLUMECONTROL/ROTARY.Clicked=<clicked_nr>

Parameters

Identifier	Parameter values
<clicked_nr>	Gives feedback about the number of the quick button presses (max. 1 sec between the presses).

Example

▶ GET /MANAGEMENT/UI/VOLUMECONTROL/ROTARY.Clicked

◀ pr /MANAGEMENT/UI/VOLUMECONTROL/ROTARY.Clicked=0

7.11. Event Manager Basics

The graphical interface of the Event Manager can be found in the LDC which allows creating any kind of Events. In certain cases, the Events have to be arranged or modified by LW3 commands from another device. These commands are detailed in the coming sections.

7.11.1. How to Arrange an Event?

The following are necessary to have a successful event:

- Defining the **Condition**
- Defining the **Action**
- Setting the **Delay** (optional)
- **Name** the Event and set to **Enabled**

▌ INFO: Setting the Event to **Enabled** as the last step is recommended.

7.11.2. Setting a Condition by Specifying a Direct Path

Command and Response

▸ SET·/EVENTS/E<loc>.Condition=<expression>

◂ pw·/EVENTS/E<loc>.Condition=<expression>

Parameters

The structure of the <expression> is: <node_path>.<property>=<value>.

Example 1

▸ SET /EVENTS/E1.Condition=/MEDIA/UART/RECOGNIZER.Rx=ON

◂ pw /EVENTS/E1.Condition=/MEDIA/UART/RECOGNIZER.Rx=ON

The Condition is fulfilled if the **SignalPresent** property changes to '1'.

Example 2

In some cases, the opposite is necessary: when the property does **not** equal with the value. If you need so, the **ConditionInverted** property must be set to **true**:

▸ SET /EVENTS/E2.Condition=/MEDIA/UART/RECOGNIZER.Rx=ON

◂ pw /EVENTS/E2.Condition=/MEDIA/UART/RECOGNIZER.Rx=ON

▸ SET /EVENTS/E2.ConditionInverted=true

◂ pw /EVENTS/E2.ConditionInverted=true

The Condition is fulfilled if the **ConnectedSource** property does not equal with 'I1' (in other words: if other input port is connected to O1 than I1).

Example 3

Sometimes, it is enough if the value of a property changes to anything. In this case, just put a **?** to the end of the property:

▸ SET /EVENTS/E3.Condition=/MEDIA/UART/RECOGNIZER.Rx?

◂ pw /EVENTS/E2.Condition=/MEDIA/UART/RECOGNIZER.Rx?

7.11.3. Setting a Condition by Linking Another Condition

Command and Response

▸ SET·/EVENTS/E<loc>.Condition=<event_nr>

◂ pw·/EVENTS/E<loc>.Condition=<event_nr>

Parameters

The <event_nr> means the number (location) of the linked event without letter 'E'.

Example

▸ SET /EVENTS/E2.Condition=1

◂ pw /EVENTS/E2.Condition=1

The Condition of the E2 Event is set to be the same as set at E1 Event.

7.11.4. Setting a Condition by Linking More Conditions

▌ **DIFFERENCE:** This command is available from FW package v1.1.0b3.

The first generation of the Event Manager is able to sense a change (one condition) but in some cases that is not enough. The practical experience has shown there is a need to examine more conditions (up to four) as follows: if one of the set conditions becomes true (while the other conditions are fulfilled), then the set Action is launched.

Command and Response

▸ SET·/EVENTS/E<loc>.Condition=<event_nr>&<event_nr>&<event_nr>&<event_nr>

◂ pw·/EVENTS/E<loc>.Condition=<event_nr>&<event_nr>&<event_nr>&<event_nr>

Parameters

The <event_nr> parameters mean the numbers (locations) of the linked Events without letter 'E'. Up to four event number can be set

Example

▸ SET /EVENTS/E4.Condition=1&2&3

◂ pw /EVENTS/E4.Condition=1&2&3

If two Conditions exist and the third is detected (changes to true), the Condition of E4 will be fulfilled and the Action of E4 will be launched.

▌ TIPS AND TRICKS: You do not have to define Actions for E1, E2 and E3 Events and you can leave those **Disabled**.

7.11.5. Setting an Action by Specifying a Direct Path

Command and Response

▶ SET·/EVENTS/E<loc>.Action=<expression>
◀ pw·/EVENTS/E<loc>.Action=<expression>

Parameters

The structure of the <expression> is: <node_path>.<property_or_method>=<value>. Properties and methods are handled in the same way: dot (.) stands after the path in both cases, colon (:) is not used. Do not use brackets for methods. The <value> parameter is optional in case of certain methods.

Example

▶ SET /EVENTS/E1.Action=/MEDIA/GPIO/P1.Output=H
◀ pw /EVENTS/E1.Action=/MEDIA/GPIO/P1.Output=H

7.11.6. Setting an Action by Linking Another Action

Command and Response

▶ SET·/EVENTS/E<loc>.Action=<event_nr>
◀ pw·/EVENTS/E<loc>.Action=<event_nr>

Parameters

The <event_nr> means the number (location) of the linked event without letter 'E'.

Example

▶ SET /EVENTS/E2.Action=1
◀ pw /EVENTS/E2.Action=1

The Action of the E2 Event is set to be the same as set at E1 Event.

7.11.7. Setting an Action by Linking a Macro

▌ **DIFFERENCE:** This command is available from FW package v1.1.0b3.

Command and Response

▶ SET·/EVENTS/E<loc>.Action=<macro_name>
◀ pw·/EVENTS/E<loc>.Action=<macro_name>

Parameters

The <macro_name> means the name of the macro that can be seen in LDC (see the Macros section) or can be queried by the `GET /CTRL/MACROS.<id>` command.

Example

▶ SET /EVENTS/E1.Action=Macro1
◀ pw /EVENTS/E2.Action=Macro1

7.12. Event Manager Tool Kit

7.12.1. Setting the Delay

In most cases, the Action is performed immediately after the Condition is detected. But sometimes a delay is necessary between the Condition and the Action, thus, the following delay options are defined:
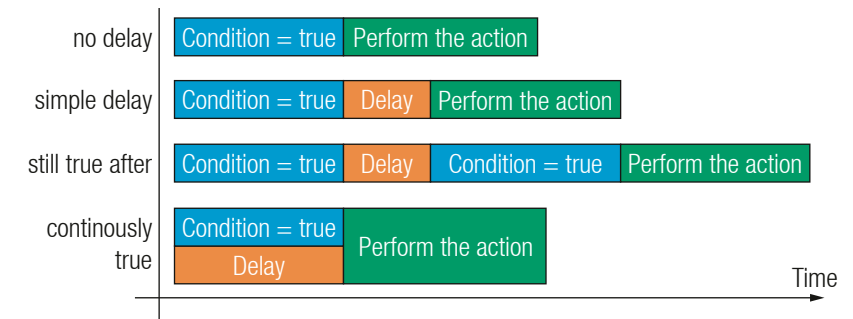
Command and Response (summary)

▶ SET·/EVENTS/E<loc>.ConditionTimeout=<time>
◀ pw·/EVENTS/E<loc>.ConditionTimeout=<time>
▶ SET·/EVENTS/E<loc>.ConditionEndCheck=<true/false>
◀ pw·/EVENTS/E<loc>.ConditionEndCheck=<true/false>
▶ SET·/EVENTS/E<loc>.ConditionTimeoutContinuous=<true/false>
◀ pw·/EVENTS/E<loc>.ConditionTimeoutContinuous=<true/false>

Parameters

The <time> parameter means seconds. Set the following properties for the desired delay type:

Delay type	Properties to set	Value	Result
no delay	/EVENTS/E<loc>.ConditionTimeout	**0**	The Action will be launched after the Condition is detected.
simple delay	/EVENTS/E<loc>.ConditionTimeout	<time>	If the Condition is detected, the action will be launched after the set time.
still true after	/EVENTS/E<loc>.ConditionTimeout	<time>	The Condition is fulfilled only if is detected after the set time **again**.
	/EVENTS/E<loc>.ConditionEndCheck	**true**	
continuously true	/EVENTS/E<loc>.ConditionTimeout	<time>	The Condition is fulfilled only if it is existing **continuously** during the set time.
	/EVENTS/E<loc>.ConditionEndCheck	**true**	
	/EVENTS/E<loc>.ConditionTimeoutContinuous	**true**	

Example 1 (simple delay)

▸ SET /EVENTS/E1.ConditionTimeout=10

◂ pw /EVENTS/E1.ConditionTimeout=10

If the Condition is detected (the **ConditionDetect** property becomes **true**), the **ConditionTimeoutPending** property becomes **true**. 10 seconds later the **ConditionTimeoutPending** property becomes **false** and the set Action is launched.

Example 2 ('still true after' delay type)

▸ SET /EVENTS/E1.ConditionTimeout=10

◂ pw /EVENTS/E1.ConditionTimeout=10

▸ SET /EVENTS/E1.ConditionTimeoutPending=true

◂ pw /EVENTS/E1.ConditionTimeoutPending=true

If the Condition is detected (the **ConditionDetect** property becomes **true**) the **ConditionTimeoutPending** property becomes **true**. 10 seconds later the Condition is checked again (the **ConditionTimeoutPending** property becomes **false**). If the Condition can be detected again (the **ConditionDetect** property becomes **true** again), the Condition is fulfilled and the set Action is launched.

Example 3 ('continuously true' delay type)

▸ SET /EVENTS/E1.ConditionTimeout=10

◂ pw /EVENTS/E1.ConditionTimeout=10

▸ SET /EVENTS/E1.ConditionTimeoutContinuous=true

◂ pw /EVENTS/E1.ConditionTimeoutContinuous=true

If the Condition is detected (the **ConditionDetect** property becomes **true**), the **ConditionTimeoutPending** property becomes **true**. If the Condition can be detected in the following 10 seconds continuously (the **ConditionDetect** property stays **true**), the Condition is fulfilled, the **ConditionTimeoutPending** property becomes **false**, and the set Action is launched.

7.12.2. Setting the Name of the Event

Command and Response

▸ SET·/EVENTS/E<loc>.Name=<string>

◂ pw·/EVENTS/E<loc>.Name=<string>

Parameters

The <string> may contain letters (A-Z) and (a-z), numbers (0-9), special characters: hyphen (-), underscore (_), and space ( ) up to 20 characters. Longer string results an error, unaccepted characters are skipped.

Example

▸ SET /EVENTS/E1.Name=Projector_ON

◂ pw /EVENTS/E1.Name=Projector_ON

7.12.3. Enable the Event

Command and Response

▸ SET·/EVENTS/E<loc>.Enabled=<true/false>

◂ pw·/EVENTS/E<loc>.Enabled=<true/false>

Parameters

When the property value is **true** (or **1**), the Action will be launched if the Condition is detected. If the property is **false** (or **0**), the Action will not run, however, the Condition counter will be increased when detected.

Example

▸ SET /EVENTS/E1.Enabled=true

◂ pw /EVENTS/E1.Enabled=true

7.12.4. Triggering a Condition

▌ **DIFFERENCE:** This command is available from FW package v1.1.0b3.

This feature works like a condition is fulfilled. When a complex control system is built, a Condition may trigger numerous Actions. A typical example is when a system is powered on and the 'ready-to-use' state has to be loaded. In this case, there could be many actions which are based on the same condition. In order to reduce the number of the commands, you can trigger one 'key' condition, which starts the whole process.

Command and Response

▸ CALL·/EVENTS/E<loc>:triggerCondition(1)

◂ mO·/EVENTS/E<loc>:triggerCondition

Example

▸ CALL /EVENTS/E1:triggerCondition(1)

◂ mo /EVENTS/E1:triggerCondition

The Condition of Event1 is fulfilled, the set Action will be launched (after the delay if set).

7.12.5. Querying the Condition Counter

This property shows how many times the Condition has been detected and triggered altogether. The counter is reset at boot.

Command and Response

▸ GET·/EVENTS/E<loc>.ConditionCount

◂ pw·/EVENTS/E<loc>.ConditionCount=<num_value>

Example

▸ GET /EVENTS/E1.ConditionCount

◂ pw /EVENTS/E1>.ConditionCount=5

7.12.6. Querying the Condition Trigger Counter

█ **DIFFERENCE:** This command is available from FW package v1.1.0b3.

This property shows how many times the Condition has been triggered but does not contain the number of real detections. The counter is reset at boot.

Command and Response

▶ GET·/EVENTS/E\<loc>.ExternalConditionTriggerCount
◀ pw·/EVENTS/E\<loc>.ExternalConditionTriggerCount=\<num_value>

Example

▶ GET /EVENTS/E1.ExternalConditionTriggerCount
◀ pw /EVENTS/E1.ExternalConditionTriggerCount=2

7.12.7. Testing an Action

This tool is for launching the Action without detecting or triggering the Condition.

Command and Response

▶ CALL·/EVENTS/E\<loc>:ActionTest(1)
◀ mO·/EVENTS/E\<loc>:ActionTest

Example

▶ CALL /EVENTS/E1:ActionTest(1)
◀ mO /EVENTS/E1:ActionTest

7.13. Variable-Management

█ **DIFFERENCE:** This feature and below commands are available from FW package v1.1.0b3.

Custom variables (30 pcs.) can be defined in number or text format which are available also in the Event Manager. The maximum length of a variable can be 15 characters and they are stored in a non-volatile memory, thus, the value is kept in case of a reboot. The type of the variable (text or string) is determined automatically based on the value. If an operation cannot be performed (e.g. adding number value to a string-type variable), error will be the response.   *#variables*

7.13.1. Value Assignment

Command and Response

▶ SET·/CTRL/VARS/V\<loc>.Value=\<value>
◀ pw·/CTRL/VARS/V\<loc>.Value=\<value>

Parameters

Parameter	Parameter description	Value	Value description
\<loc>	The location of the variable	**1-30**	
\<value>	The value of the variable	**Custom**	Length can be max 15 characters. Numeric variable is defined between -2147483648 and 2147483647.

Example

▶ SET /CTRL/VARS/V1.Value=120
◀ pw /CTRL/VARS/V1.Value=120

7.13.2. Addition and Subtraction (Add Method)

The value of a numeric variable can be increased by adding a positive value or it can be decreased by adding a negative value. Minimum and maximum values can be defined as limits.

Command and Response

▶ CALL·/CTRL/VARS/V\<loc>:add(\<operand>;\<min>;\<max>)
◀ mO·/CTRL/VARS/V\<loc>:add

Parameters

Parameter	Parameter description	Value	Value description
\<loc>	The location of the variable	**1-30**	
\<operand>	The value that is added to the variable	**Integer**	Negative value is also accepted
\<min>	The lowest allowed value (optional)	**Integer**	Negative value is also accepted
\<max>	The highest allowed value (optional)	**Integer**	Negative value is also accepted

If the value of the variable is higher or equals with \<max>, the new value will be \<max>. Likewise, in case of \<min> setting: if the value of the variable is lower or equals with \<min>, the new value will be \<min>.

Examples

Change messages (CHG) can be seen after each response for the better understanding, which is not the part of the command, but it can be set as described in the Subscription section.

Example 1 – addition

▶ GET /CTRL/VARS/V1.Value
◀ pw /CTRL/VARS/V1.Value=6
▶ CALL /CTRL/VARS/V1:add(1)
◀ mO /CTRL/VARS/V1:add
◀ CHG /CTRL/VARS/V1.Value=7
▶ CALL /CTRL/VARS/V1:add(1)
◀ mO /CTRL/VARS/V1:add
◀ CHG /CTRL/VARS/V1.Value=8
▶ CALL /CTRL/VARS/V1:add(2)
◀ mO /CTRL/VARS/V1:add
◀ CHG /CTRL/VARS/V1.Value=10

Example 2 – subtraction

▶ GET /CTRL/VARS/V1.Value
◀ pw /CTRL/VARS/V1.Value=10
▶ CALL /CTRL/VARS/V1:add(-2)
◀ mO /CTRL/VARS/V1:add
◀ CHG /CTRL/VARS/V1.Value=8
▶ CALL /CTRL/VARS/V1:add(-2)
◀ mO /CTRL/VARS/V1:add
◀ CHG /CTRL/VARS/V1.Value=6
▶ CALL /CTRL/VARS/V1:add(-10)
◀ mO /CTRL/VARS/V1:add
◀ CHG /CTRL/VARS/V1.Value=-4

Example 3 – addition with 'max' value

▶ GET /CTRL/VARS/V1.Value
◀ pw /CTRL/VARS/V1.Value=16
▶ CALL /CTRL/VARS/V1:add(2;10;20)
◀ mO /CTRL/VARS/V1:add
◀ CHG /CTRL/VARS/V1.Value=18
▶ CALL /CTRL/VARS/V1:add(2;10;20)
◀ mO /CTRL/VARS/V1:add
◀ CHG /CTRL/VARS/V1.Value=20
▶ CALL /CTRL/VARS/V1:add(2;10;20)
◀ mO /CTRL/VARS/V1:add
◀ CHG /CTRL/VARS/V1.Value=20

Example 4 – subtraction with 'min' value

▶ GET /CTRL/VARS/V1.Value
◀ pw /CTRL/VARS/V1.Value=14
▶ CALL /CTRL/VARS/V1:add(-2;10;20)
◀ mO /CTRL/VARS/V1:add
◀ CHG /CTRL/VARS/V1.Value=12
▶ CALL /CTRL/VARS/V1:add(-2;10;20)
◀ mO /CTRL/VARS/V1:add
◀ CHG /CTRL/VARS/V1.Value=10
▶ CALL /CTRL/VARS/V1:add(-2;10;20)
◀ mO /CTRL/VARS/V1:add
◀ CHG /CTRL/VARS/V1.Value=10

7.13.3. Addition and Subtraction (Cycle Method)

The value of a numeric variable can be increased by adding a positive value or it can be decreased by adding a negative value. Minimum and maximum values can be defined as limits. This method has the feature that if the value hits the limit (min/max), the value will be stepped to the other end of the interval.

Command and Response

▶ CALL·/CTRL/VARS/V\<loc>:cycle(\<operand>;\<min>;\<max>)
◀ mO·/CTRL/VARS/V\<loc>:cycle

Parameters

Parameter	Parameter description	Value	Value description
\<loc>	The location of the variable	**1-30**	
\<operand>	The value that is added to the variable	**Integer**	Negative value is also accepted
\<min>	The lowest allowed value (optional)	**Integer**	Negative value is also accepted
\<max>	The highest allowed value (optional)	**Integer**	Negative value is also accepted

If the calculated value is beyond the limit (min/max), the value will be stepped to the other end of the interval.

Examples

Change messages (CHG) can be seen after each response for the better understanding, which is not the part of the command, but it can be set as described in the Subscription section.

Example 1 – addition

▶ GET /CTRL/VARS/V1.Value
◀ pw /CTRL/VARS/V1.Value=18
▶ CALL /CTRL/VARS/V1:cycle(1;10;20)
◀ mO /CTRL/VARS/V1:cycle
◀ CHG /CTRL/VARS/V1.Value=19
▶ CALL /CTRL/VARS/V1:cycle(1;10;20)
◀ mO /CTRL/VARS/V1:cycle
◀ CHG /CTRL/VARS/V1.Value=20
▶ CALL /CTRL/VARS/V1:cycle(1;10;20)
◀ mO /CTRL/VARS/V1:cycle
◀ CHG /CTRL/VARS/V1.Value=10
▶ CALL /CTRL/VARS/V1:cycle(1;10;20)
◀ mO /CTRL/VARS/V1:cycle
◀ CHG /CTRL/VARS/V1.Value=11

Example 2 – subtraction

▶ GET /CTRL/VARS/V1.Value
◀ pw /CTRL/VARS/V1.Value=13
▶ CALL /CTRL/VARS/V1:cycle(-2;10;20)
◀ mO /CTRL/VARS/V1:cycle
◀ CHG /CTRL/VARS/V1.Value=11
▶ CALL /CTRL/VARS/V1:cycle(-2;10;20)
◀ mO /CTRL/VARS/V1:cycle
◀ CHG /CTRL/VARS/V1.Value=20
▶ CALL /CTRL/VARS/V1:cycle(-2;10;20)
◀ mO /CTRL/VARS/V1:cycle
◀ CHG /CTRL/VARS/V1.Value=18

7.13.4. Value Change with Intervals (Case)

This command can be used to change the value of a variable if it fits in any of the defined intervals.

Command and Response

▶ CALL·/CTRL/VARS/V<loc>:case(<min> <max> <val>;)

◀ mO·/CTRL/VARS/V<loc>:case

Parameters

Parameter	Parameter description	Value
<loc>	The location of the variable	**1-30**
<min>	The lowest value of the interval	**Integer**
<max>	The highest value of the interval	**Integer**
<val>	The new value that will be valid if the current value is in the interval	**Integer**

The parameters are divided by a space character, and the interval groups are divided by semicolon. Up to 16 cases can be defined.

Examples

▶ CALL /CTRL/VARS/V1:case(10 20 15)

◀ mO /CTRL/VARS/V1:case

A typical example when two different ranges of values have to meet:

Incoming values: between 0 and 255 (e.g. the slider of a controller can have these values).

Outgoing values: between 0 and 100 (e.g. the controlled device accepts these values).

Defined cases:

	Min	Max	New value
Case 1	1	25	10
Case 2	26	50	20
Case 3	51	75	30
Case 4	76	100	40
Case 5	101	125	50
Case 6	126	150	60
Case 7	151	175	70
Case 8	176	200	80
Case 9	201	225	90
Case 10	226	255	100

The command looks like:

▶ CALL /CTRL/VARS/V1:case(1 25 10;26 50 20;51 75 30;76 100 40;101 125 50;126 150 60;151 175 70; 176 200 80; 201 225 90; 226 255 100)

◀ mO /CTRL/VARS/V1:case

7.13.5. Scan and Store

This command can be used to get the value (or a part of the value) of an LW3 property. The defined path will be scanned according to the pattern and the result will be the value of the variable (number or string type).

Command and Response

▶ CALL·/CTRL/VARS/V<loc>:scanf(<path>.<property>;<pattern>)

◀ mO·/CTRL/VARS/V<loc>:scanf

Parameters

Parameter	Parameter description	Value
<loc>	The location of the variable	**1-30**
<path>.<property>	The LW3 property with node	
<pattern>	The pattern that scans the property for the desired result	**see below**

Pattern options

Pattern	Pattern description
%s	String of characters stopping at the first whitespace character
%<number>s	The next <number> of characters (string) stopping at the first whitespace
%c	One character
%<number>c	The next <number> of characters
%[<characters>]	Defined characterset, specified between brackets
%[^<characters>]	Negated characterset, specified between brackets which will be skipped
%*	Ignored part
<custom_text>	User-defined text

The patterns can be combined to get the desired result as shown in the examples.

ATTENTION! Do not forget to escape the % character as shown in below example.

Examples

▶ CALL /CTRL/VARS/V1:scanf(/CTRL/TCP/C1.ActiveRx;\%6c)

◀ mO /CTRL/VARS/V1:scanf

▶ GET /CTRL/VARS/V1.Value

◀ pw /CTRL/VARS/V1.Value=autorx

A simple pattern has been applied: we need the first six characters from the property value.

Further Examples

Scanned property: /MANAGEMENT/STATUS.CpuTemperature=46 C; 0;75; 0;79; 3;48;

<pattern>	Scan result	Variable type	Comment
%s	46	Number	Scanned from the first character till the first whitespace character
%5c	46 C;	String	The first 5 characters scanned
%*18c%4c	3;48	String	The first 18 characters skipped then 4 characters scanned
%*s %c	C	String	The first part till the first whitespace character and a space are skipped then 1 character scanned
%*[^;]; %4c	0;75	String	From the first character till the first semicolon and a space are skipped, then 4 characters scanned
%*[^;]; %*[^;]; %*[^;]; %4c	0;79	String	Three groups ended with semicolon and space are skipped then 4 characters scanned

7.13.6. Reformatting a Value

The value of the variable can be changed by adding text as prefix and/or postfix.

▌ **ATTENTION!** Think about the length of the value: 15 characters are allowed, the others are truncated.

Command and Response

▸ CALL·/CTRL/VARS/V<loc>:printf(<prefix>%s<postfix>)

◂ mO·/CTRL/VARS/V<loc>:printf

Parameters

Parameter	Parameter description	Value	Value description
<loc>	The location of the variable	1-30	
<prefix>	The text before the original value of the property (optional)	Custom	ASCII characters
%s	The original value of the variable		
<postfix>	The text following the original value of the property (optional)	Custom	ASCII characters

Example

▸ GET /CTRL/VARS/V1.Value

▸ pw /CTRL/VARS/V1.Value=01

▸ CALL /CTRL/VARS/V1:printf(PWR%s)

◂ mO /CTRL/VARS/V1:printf

▸ GET /CTRL/VARS/V1.Value

◂ pw /CTRL/VARS/V1.Value=PWR01

The 'PWR' string has been inserted before the original value.

7.14. Ethernet Port Configuration

▌ **ATTENTION!** When you change a network property the new value is stored but the **applySettings** method must be called always to apply the new settings. When two or more network parameters are changed the **applySettings** method is enough to call once as a final step.

7.14.1. Query the DHCP State

Command and Response

▸ GET·/MANAGEMENT/NETWORK.DhcpEnabled

◂ pw·/MANAGEMENT/NETWORK.DhcpEnabled=false

Parameters

If the <DHCP_state> parameter is **true**, the current IP address setting is DHCP, if the parameter is **false** the current IP address is static.

Example

▸ GET /MANAGEMENT/NETWORK.DhcpEnabled

◂ pw /MANAGEMENT/NETWORK.DhcpEnabled=true

7.14.2. Change the DHCP State

Command and Response

▸ SET·/MANAGEMENT/NETWORK.DhcpEnabled=<DHCP_state>

◂ pw·/MANAGEMENT/NETWORK.DhcpEnabled=<DHCP_state>

Parameters

See in the previous section.

Example

▸ SET /MANAGEMENT/NETWORK.DhcpEnabled=false

◂ pw /MANAGEMENT/NETWORK.DhcpEnabled=false

▸ CALL /MANAGEMENT/NETWORK:ApplySettings()

◂ mO /MANAGEMENT/NETWORK:ApplySettings

▌ INFO: The **applySettings** method will save and apply the new value and results the device to reboot.

7.14.3. Query the IP Address

Command and Response

▶ GET·/MANAGEMENT/NETWORK.IpAddress
◀ pr·/MANAGEMENT/NETWORK.IpAddress=<IP_address>

Example

▶ GET /MANAGEMENT/NETWORK.IpAddress
◀ pr /MANAGEMENT/NETWORK.IpAddress=192.168.0.100

7.14.4. Change the IP Address (Static)

Command and Response

▶ SET·/MANAGEMENT/NETWORK.StaticIpAddress=<IP_address>
◀ pw·/MANAGEMENT/NETWORK.StaticIpAddress=<IP_address>

Example

▶ SET /MANAGEMENT/NETWORK.StaticIpAddress=192.168.0.85
◀ pw /MANAGEMENT/NETWORK.StaticIpAddress=192.168.0.85
▶ CALL /MANAGEMENT/NETWORK:ApplySettings()
◀ mO /MANAGEMENT/NETWORK:ApplySettings

INFO: The **applySettings** method will save and apply the new value and results the device to reboot.

7.14.5. Query the Subnet Mask

Command and Response

▶ GET·/MANAGEMENT/NETWORK.NetworkMask
◀ pr·/MANAGEMENT/NETWORK.NetworkMask=<netmask>

Example

▶ GET /MANAGEMENT/NETWORK.NetworkMask
◀ pr /MANAGEMENT/NETWORK.NetworkMask=255.255.255.0

7.14.6. Change the Subnet Mask (Static)

Command and Response

▶ SET·/MANAGEMENT/NETWORK.StaticNetworkMask=<netmask>
◀ pw·/MANAGEMENT/NETWORK.StaticNetworkMask=<netmask>

Example

▶ SET /MANAGEMENT/NETWORK.StaticNetworkMask=255.255.255.0
◀ pw /MANAGEMENT/NETWORK.StaticNetworkMask=255.255.255.0
▶ CALL /MANAGEMENT/NETWORK:ApplySettings()
◀ mO /MANAGEMENT/NETWORK:ApplySettings

INFO: The **applySettings** method will save and apply the new value and results the device to reboot.

7.14.7. Query the Gateway Address

Command and Response

▶ GET·/MANAGEMENT/NETWORK.GatewayAddress
◀ pr·/MANAGEMENT/NETWORK.GatewayAddress=<gw_address>

Example

▶ GET /MANAGEMENT/NETWORK.GatewayAddress
◀ pr /MANAGEMENT/NETWORK.GatewayAddress=192.168.0.1

7.14.8. Change the Gateway Address (Static)

Command and Response

▶ SET·/MANAGEMENT/NETWORK.StaticGatewayAddress=<gw_add>
◀ pw·/MANAGEMENT/NETWORK.StaticGatewayAddress=<gw_add>

Example

▶ SET /MANAGEMENT/NETWORK.StaticGatewayAddress=192.168.0.5
◀ pw /MANAGEMENT/NETWORK.StaticGatewayAddress=192.168.0.5
▶ CALL /MANAGEMENT/NETWORK:ApplySettings()
◀ mO /MANAGEMENT/NETWORK:ApplySettings

INFO: The **applySettings** method will save and apply the new value and results the device to reboot.

7.14.9. Apply Network Settings

Always call the **Apply settings** function to save the network settings.

Command and Response

▶ CALL·/MANAGEMENT/NETWORK:ApplySettings()

◀ mO /MANAGEMENT/NETWORK:ApplySettings

Example

▶ CALL /MANAGEMENT/NETWORK:ApplySettings()

◀ mO /MANAGEMENT/NETWORK:ApplySettings

7.15. Ethernet Tool Kit

█ **DIFFERENCE:** This feature and below commands are available from FW package v1.1.0b3.

7.15.1. Device Filter Based on MAC Address

You can create a list of network devices based on the MAC address which are allowed controlling the device, or querying parameters to/from the Lightware device.   *#macfilter*

Command and Response

▶ SET·/MANAGEMENT/MACFILTER.MACaddress<loc>=<MAC_address>;<receive>;<send>;<name>

◀ pw·/MANAGEMENT/MACFILTER.MACaddress<loc>=<MAC_address>;<receive>;<send>;<name>

The filter is disabled as default. Set the **FilterEnable** property to **true** as shown in the example.

Parameters

Parameter	Parameter description	Values	Value description
<loc>	Location of the address	1-8	The default values of **1, 2** and **3** ensure that address resolution and device discovery continue to work after enabling the MAC filter
<MAC_address>	The MAC address of the device	Unique value	Hex format, divided by a colon
<receive>	Enable/disable the parameter querying option	**false** (or **0**)	The device is **not allowed** to query parameters from the LW device
		true (or **1**)	The device is **allowed** to query parameters from the LW device
<send>	Enable/disable the parameter setting option	**false** (or **0**)	The device is **not allowed** to change parameters in the LW device
		true (or **1**)	The device is **allowed** to change parameters in the LW device
<name>	Unique name for the better identification (optional)	Any string	Up to 5 ASCII characters (longer names are truncated)

Example

▶ SET /MANAGEMENT/MACFILTER/MACaddress4=(04:D4:C4:4D:01:43;1;1;Tech)

◀ pw /MANAGEMENT/MACFILTER/MACaddress4=(04:D4:C4:4D:01:43;1;1;Tech)

▶ SET /MANAGEMENT/MACFILTER.FilterEnable=true

◀ pw /MANAGEMENT/MACFILTER.FilterEnable=true

New MAC address is saved into the 4th property with name 'Tech', which may query/set parameters from/in the Lightware device. The **FilterEnable** property is set to **true**, thus, the filter is enabled.

7.15.2. LW2 Control Port Blocking

This command is for blocking the LW2 control port; it is an additional protection for the Cleartext login function.

Command and Response *#portblock*

▶ SET·/MANAGEMENT/SERVICEFILTER.Lw2Enabled=<port_mode>
◀ pw·/MANAGEMENT/SERVICEFILTER.Lw2Enabled=<port_mode>

Example

▶ SET /MANAGEMENT/SERVICEFILTER.Lw2Enabled=false
◀ pw /MANAGEMENT/SERVICEFILTER.Lw2Enabled=false

7.15.3. HTTP Port Blocking

This command is for blocking the HTTP port (80); it is an additional protection for the Cleartext login function.

Command and Response

▶ SET·/MANAGEMENT/SERVICEFILTER.HttpEnabled=<port_mode>
◀ pw·/MANAGEMENT/SERVICEFILTER.HttpEnabled=<port_mode>

Example

▶ SET /MANAGEMENT/SERVICEFILTER.HttpEnabled=true
◀ pw /MANAGEMENT/SERVICEFILTER.HttpEnabled=true

7.15.4. HTTP Post Receiving Blocking

This command is for blocking HTTP posts; it is an additional protection for the Cleartext login function.

Command and Response

▶ SET·/MANAGEMENT/SERVICEFILTER.HttpEnabled=<port_mode>
◀ pw·/MANAGEMENT/SERVICEFILTER.HttpEnabled=<port_mode>

Example

▶ SET /MANAGEMENT/SERVICEFILTER.HttpEnabled=true
◀ pw /MANAGEMENT/SERVICEFILTER.HttpEnabled=true

7.15.5. Powering on a Computer over Ethernet (Wake-on-LAN)

The well-known wake-on-lan feature (sending magic Packet to the target PC) is available by the following command:

Command and Response

▶ CALL·/MEDIA/ETHERNET:wakeOnLan(MAC_address)
◀ mO·/MEDIA/ETHERNET:wakeOnLan

Example

▶ CALL /MEDIA/ETHERNET:wakeOnLan(AA:BB:CC:22:14:FF)
◀ mO /MEDIA/ETHERNET:wakeOnLan

Please make sure the feature is enabled in the target PC and it is powered (but switched off).

7.16. Ethernet Message Sending

The device can be used for sending a message to a certain IP:port address. The three different commands allow controlling the connected (third-party) devices.

7.16.1. Sending a TCP Message (ASCII-format)

The command is for sending a command message in ASCII-format. This method allows escaping the control characters. For more information see the Escaping section.

Command and Response

▶ CALL·/MEDIA/ETHERNET:tcpMessage(<IP_address>:<port_no>=<message>)

◀ mO·/MEDIA/ETHERNET:tcpMessage

Example

▶ CALL /MEDIA/ETHERNET:tcpMessage(192.168.0.103:6107=C00)

◀ mO /MEDIA/ETHERNET:tcpMessage

The 'C00' message is sent to the indicated IP:port address.

Example – Controlling a Lightware Device

▶ CALL /MEDIA/ETHERNET:tcpMessage(192.168.0.17:6107=CALL /MEDIA/VIDEO/XP:switch\(I2:O1\)\\x0d\\x0a)

◀ mO /MEDIA/ETHERNET:tcpMessage

The switch command is executed in the target device; the switch command is closed by carriage return and line feed (LW3 rule), and the control characters are escaped by the backslash.

Example with HEX codes

▶ CALL /MEDIA/ETHERNET:tcpMessage(192.168.0.20:5555=C00\x0a\x0d)

◀ mO /MEDIA/ETHERNET:tcpMessage

The 'C00' message with CrLf (Carriage return and Line feed) is sent to the indicated IP:port address. The \x sequence indicates the HEXA code; see more information in the Using Hexadecimal Codes section.

7.16.2. Sending a TCP Text (ASCII-format)

The command is for sending a text message in ASCII-format. This method **does not allow** escaping or inserting control characters.

Command and Response

▶ CALL·/MEDIA/ETHERNET:tcpText(<IP_address>:<port_no>=<text>)

◀ mO·/MEDIA/ETHERNET:tcpText

Example

▶ CALL /MEDIA/ETHERNET:tcpText(192.168.0.103:6107=pwr_on)

◀ mO /MEDIA/ETHERNET:tcpText

The 'pwr_on' text is sent to the indicated IP:port address.

7.16.3. Sending a TCP Binary Message (HEX-format)

The command is for sending a binary message in Hexadecimal format. This method **does not require** escaping the control and non-printable characters.

Command and Response

▶ CALL·/MEDIA/ETHERNET.tcpBinary(<IP_address>:<port_no>=<HEX_message>)

◀ mO·/MEDIA/ETHERNET:tcpBinary

Example

▶ CALL /MEDIA/ETHERNET:tcpBinary(192.168.0.103:6107=0100000061620000cdcc2c40)

◀ mO /MEDIA/ETHERNET:tcpBinary

The '0100000061620000cdcc2c40' message is sent to the indicated IP:port address.

▌ INFO: There is no need to insert a space or other separator character between the binary messages.

7.16.4. Sending a UDP Message (ASCII-format)

The command is for sending a UDP message in ASCII-format. This method allows escaping the control characters. For more information see the Escaping section.

Command and Response

▶ CALL·/MEDIA/ETHERNET:udpMessage(<IP_address>:<port_no>=<message>)

◀ mO·/MEDIA/ETHERNET:udpMessage

Example

▶ CALL /MEDIA/ETHERNET:udpMessage(192.168.0.103:6107=C00)

◀ mO /MEDIA/ETHERNET:udpMessage

The 'C00' message is sent to the indicated IP:port address.

Example with HEX codes

▶ CALL /MEDIA/ETHERNET:udpMessage(192.168.0.20:9988=C00\x0a\x0d)

◀ mO /MEDIA/ETHERNET:udpMessage

The 'C00' message with CrLf (Carriage return and Line feed) is sent to the indicated IP:port address. The \x sequence indicates the HEXA code; see more information in the Using Hexadecimal Codes section.

7.16.5. Sending a UDP Text (ASCII-format)

The command is for sending a text message in ASCII-format via UDP-protocol. This method **does not allow** escaping or inserting control characters.

Command and Response

▶ CALL·/MEDIA/ETHERNET:udpText(<IP_address>:<port_no>=<text>)

◀ mO·/MEDIA/ETHERNET:udpText

Example

▶ CALL /MEDIA/ETHERNET:udpText(192.168.0.20:9988=open)

◀ mO /MEDIA/ETHERNET:udpText

The 'open' text is sent to the indicated IP:port address.

7.16.6. Sending a UDP Binary Message (HEX-format)

The command is for sending a binary message in Hexadecimal format. This method **does not require** escaping the control and non-printable characters.

Command and Response

▶ CALL·/MEDIA/ETHERNET:udpBinary(<IP_address>:<port_no>=<HEX_message>)

◀ mO·/MEDIA/ETHERNET:udpBinary

Example

▶ CALL /MEDIA/ETHERNET:udpBinary(192.168.0.20:9988=433030)

◀ mO /MEDIA/ETHERNET:udpBinary

The '433030' message is sent to the indicated IP:port address.

INFO: There is no need to insert a space or other separator character between the binary messages.

7.17. HTTP Messaging

DIFFERENCE: This feature and below commands are available from FW package v1.1.0b3.

Http **post** and **put** messages can be sent from the Lightware device for more integration with third-party devices.   #http

ATTENTION! This feature means posting or putting **HTTP** messages from the Lightware device to another device. Encrypted transmission (**HTTPS**) is not supported.

7.17.1. Setting the Target IP Address

Command and Response

▶ SET·/CTRL/HTTP/C1.ServerIP=<IP_address>

◀ pw·/CTRL/HTTP/C1.ServerIP=<IP_address>

Example

▶ SET /CTRL/HTTP/C1.ServerIP=192.168.0.220

◀ pw /CTRL/HTTP/C1.ServerIP=192.168.0.220

7.17.2. Setting the TCP Port

Command and Response

▶ SET·/CTRL/HTTP/C1.ServerPort=<port_no>

◀ pw·/CTRL/HTTP/C1.ServerPort=<port_no>

Example

▶ SET /CTRL/HTTP/C1.ServerPort=80

◀ pw /CTRL/HTTP/C1.ServerIP=80

7.17.3. Setting the Target Path

This property sets the path in the target device where the post/put message to be sent.

Command and Response

▶ SET·/CTRL/HTTP/C1.File=<path>

◀ pw·/CTRL/HTTP/C1.File=<path>

Example

▶ SET /CTRL/HTTP/C1.File=/putxml

◀ pw /CTRL/HTTP/C1.File=/putxml

7.17.4. Setting the Message Header

Command and Response

▶ SET·/CTRL/HTTP/C1.Header=<header_text>
◀ pw·/CTRL/HTTP/C1.Header=<header_text>

Example

▶ SET /CTRL/HTTP/C1.Header=Host: 192.168.0.220\r\nContent-Type: text/xml\r\nAuthorization: Basic YWRtaW46TGlnaHR3YXJlMDE=
◀ pw /CTRL/HTTP/C1.Header=Host: 192.168.0.220\r\nContent-Type: text/xml\r\nAuthorization: Basic YWRtaW46TGlnaHR3YXJlMDE=

7.17.5. Sending a Post Message

Command and Response

▶ CALL·/CTRL/HTTP/C1:post(<body_text>)
◀ mO·/CTRL/HTTP/C1:post

Example

▶ CALL /CTRL/HTTP/C1:post(<Command><Message><Send><Text>LI1R_P</Text></Send></Message></Command>)
◀ mO /CTRL/HTTP/C1:post

7.17.6. Sending a Put Message

Command and Response

▶ CALL·/CTRL/HTTP/C1:put(<body_text>)
◀ mO·/CTRL/HTTP/C1:put

Example

▶ CALL /CTRL/HTTP/C1:put(<Command><Message><Send><Text>LI1R_P</Text></Send></Message></Command>)
◀ mO /CTRL/HTTP/C1:put

7.18. TCP Message Recognizer

█ **DIFFERENCE:** This feature and below commands are available from FW package v1.1.0b3.

This tool can be used to recognize messages coming from a TCP server. You can link an immediate event Action that is run when a message is recognized, but you can also use it in Event manager.
#tcprecognizer   #message

Preparation

Step 1. Set a TCP client in the Lightware device (three TCP clients can be run at the same time), set the properties of the target TCP server.
Step 2. Set the **DelimiterHex** and the **TimeOut** settings for the proper message processing
Step 3. Make sure the TCP/IP port is opened in the target device (think about Firewall settings in the network).
Step 4. Connect to the TCP server.

Working Method

A message got recognized from the incoming data, if one of the following occurs:

▪ The set **DelimiterHex** is detected in the message, or
▪ The set **TimeOut** has been elapsed since receiving the last data bit.
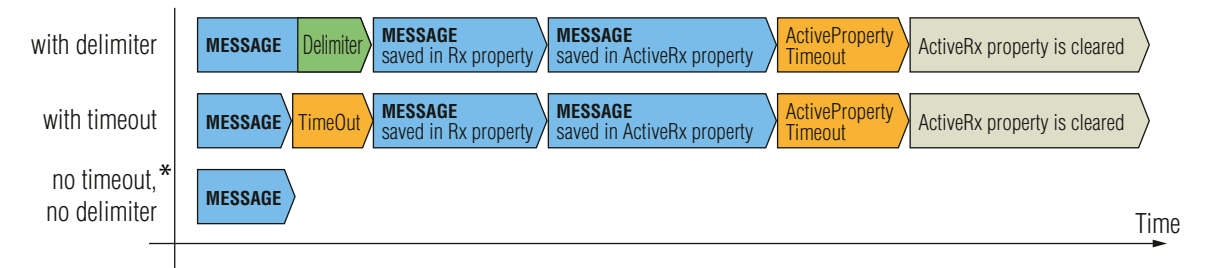
* In that case, the not-recognized data is kept in the memory (up to 128 bytes). If the **DelimiterHex** is detected later, or the **TimeOut** parameter is set meanwhile, the data appears in the **Rx**, **RxHex, Hash** and **ActiveRx**, **ActiveRxHex, ActiveRxHash** properties.

7.18.1. Setting the IP Address of the TCP Server

Command and Response

▶ SET·/CTRL/TCP/C<loc>.ServerIP(<IP_address>)
◀ pw·/CTRL/TCP/C<loc>.ServerIP(<IP_address>)

Parameters

The <loc> parameter can be 1, 2 or 3 as at most three TCP connections can be established at the same time.

Example

▶ SET /CTRL/TCP/C1.ServerIP(192.168.1.14)
◀ pw /CTRL/TCP/C1.ServerIP(192.168.1.14)

7.18.2. Setting the TCP/IP Port Number of the TCP Server

Command and Response

▶ SET·/CTRL/TCP/C<loc>.ServerPort(<port_no>)
◀ pw·/CTRL/TCP/C<loc>.ServerPort(<port_no>)

Example

▶ SET /CTRL/TCP/C1.ServerPort(4999)
◀ pw /CTRL/TCP/C1.ServerPort(4999)

7.18.3. Connecting to a TCP Server

Command and Response

▶ CALL·/CTRL/TCP/C<loc>:connect()
◀ mO·/CTRL/TCP/C<loc>:connect

Example

▶ CALL /CTRL/TCP/C1:connect()
◀ mO /CTRL/TCP/C1:connect

7.18.4. Disconnecting from a TCP Server

Command and Response

▶ CALL·/CTRL/TCP/C<loc>:disconnect()
◀ mO·/CTRL/TCP/C<loc>:disconnect

Example

▶ CALL /CTRL/TCP/C1:disconnect()
◀ mO /CTRL/TCP/C1:disconnect

7.18.5. Setting the Delimiter Hex

This property stores the delimiter that is between the messages (e.g. Cr, Lf, Space). The value has to be in hex format (e.g.0D, 0A, 20).

Command and Response

▶ SET·/CTRL/TCP/C<loc>.DelimiterHex=<delimiter>
◀ pw·/CTRL/TCP/C<loc>.DelimiterHex=<delimiter>

Parameters

The <delimiter> parameter can be max. 8-character long (16 hex digit) in hex format.

Example

▶ SET /CTRL/TCP/C1.DelimiterHex=00
◀ pw /CTRL/TCP/C1.DelimiterHex=00
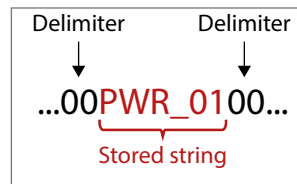
7.18.6. Setting the Timeout

When the set time is elapsed after the last received message and delimiter was not detected, the device saves the data into the **Rx, RxHex, Hash** properties. The timeout setting is useful if there is no special or easily defined delimiter in the incoming data, but there is a time gap between the messages.

Command and Response

▶ SET·/CTRL/TCP/C<loc>.TimeOut=<timeout>
◀ pw·/CTRL/TCP/C<loc>.TimeOut=<timeout>

Parameters

The <timeout> parameter sets the time value in milliseconds: **0** means the timeout is disabled, min. value is 10.

Example

▶ SET /CTRL/TCP/C1.TimeOut=20
◀ pw /CTRL/TCP/C1.TimeOut=20

7.18.7. Querying the Last Recognized Message (String)

The recognized message is stored as a string in the below property till the next recognized message or until the **clear()** method is called.

> TIPS AND TRICKS: When this property is set as a condition in the Event Manager, and the same strings follow each other, the action **will execute once**. (A Condition can be detected in Event Manager if a change happens. But if the same string is saved into the property after each other, it will not cause a change.)

Command and Response

▶ GET·/CTRL/TCP/C<loc>.Rx
◀ pr·/CTRL/TCP/C<loc>.Rx=<recognized_string>

Parameters

The <recognized_string> parameter can be max. 128 byte long.

Example

▶ GET /CTRL/TCP/C1.Rx
◀ pr /CTRL/TCP/C1.Rx=PWR_off

Delimiter   Delimiter

...00PWR_0100...

Stored string

7.18.8. Querying the Last Recognized Message (Hex)

The recognized message is stored as a hex message in the below property till the next recognized message or until the **clear()** method is called.

Command and Response

▸ GET·/CTRL/TCP/C\<loc\>.RxHex

◂ pr·/CTRL/TCP/C\<loc\>.RxHex=\<recognized_hex_data\>

Example

▸ GET /CTRL/TCP/C1.RxHex

◂ pr /CTRL/TCP/C1.RxHex=5057525F6F6666

7.18.9. Clearing the Last Recognized Stored Message

This method clears the stored recognized messages from **Rx**, **RxHex** and **Hash** properties.

Command and Response

▸ CALL·/CTRL/TCP/C\<loc\>:clear()

◂ mO·/CTRL/TCP/C\<loc\>:clear

Example

▸ CALL /CTRL/TCP/C1:clear()

◂ mO /CTRL/TCP/C1:clear

7.18.10. Querying the Last Recognized Active Message (String)

The recognized data is stored in string in the below property **temporary**. When the time set in the **ActiveTimeout** property is elapsed, the property is cleared.

> TIPS AND TRICKS: When this property is set as a condition in the Event Manager, and the same strings follow each other, the action **will execute every occasion.** (A Condition can be detected in Event Manager if a change happens. In this case, the string is stored in the property and after the **ActiveTimeout** it will be cleared. If the same string is saved into the (empty) property that will cause a change.)

Command and Response

▸ GET·/CTRL/TCP/C\<loc\>.ActiveRx

◂ pr·/CTRL/TCP/C\<loc\>.ActiveRx=\<recognized_string\>

Parameters

The \<recognized_string\> parameter is a max. 12 byte-long recognized data string.

Example

▸ GET /CTRL/TCP/C1.ActiveRx

◂ pr /CTRL/TCP/C1.ActiveRx=AudOut+

> INFO: Please note that the property contains the string until the **ActivePropertyTimeout** is elapsed only.

7.18.11. Querying the Last Recognized Active Message (Hex)

Command and Response

▸ GET·/CTRL/TCP/C\<loc\>.ActiveRxHex

◂ pr·/CTRL/TCP/C\<loc\>.ActiveRxHex=\<recognized_hex\>

Parameters

The \<recognized_hex\> parameter is the recognized data in hex format.

Example

▸ GET /CTRL/TCP/C1.ActiveRxHex

◂ pr /CTRL/TCP/C1.ActiveRxHex=4175644F75742B00

> INFO: Please note that the property contains the data until the **ActivePropertyTimeout** is elapsed only.

7.18.12. Set the Active Timeout

This property is responsible for clearing the **ActiveRx**, **ActiveRxHex**, **ActiveHash** properties after the elapsed time. Default value is 50ms.

Command and Response

▸ SET·/CTRL/TCP/C\<loc\>.ActivePropertyTimeout=\<a_timeout\>

◂ pw·/CTRL/TCP/C\<loc\>.ActivePropertyTimeout=\<a_timeout\>

Parameters

The \<a_timeout\> parameter is the active timeout value (ms) between 0 and 255.

Example

▸ SET /CTRL/TCP/C1.ActivePropertyTimeout=255

◂ pw /CTRL/TCP/C1.ActivePropertyTimeout=255

7.18.13. Running an Immediate Event Action

When a message is recognized (DelimiterHex is detected in the message, or TimeOut has been elapsed since receiving the last data bit) a specific Action of an Event can be run by the following command.

Command and Response

▸ SET·/CTRL/TCP/C\<loc\>.ActionTrigger=\<event_nr\>

◂ pw·/CTRL/TCP/C\<loc\>.ActionTrigger=\<event_nr\>

Parameters

The \<event_nr\> means the number (location) of the linked Event Action without letter 'E'. (There is no need to define a Condition in the linked Event.)

Example

▸ SET /CTRL/TCP/C1.ActionTrigger=16

◂ pw /CTRL/TCP/C1.ActionTrigger=16

7.19. RS-232 Port Configuration

7.19.1. Protocol Setting

Command and Response

▸ SET·/MEDIA/UART/P1.ControlProtocol=\<cont_protocol\>

◂ pw·/MEDIA/UART/P1.ControlProtocol=\<cont_protocol\>

Parameters

Identifier	Parameter description	Parameter values
\<cont_protocol\>	Selected protocol	**0**: LW2 **1**: LW3

Example

▸ SET /MEDIA/UART/P1.ControlProtocol=1

◂ pw /MEDIA/UART/P1.ControlProtocol=1

7.19.2. BAUD Rate Setting

Command and Response

▸ SET·/MEDIA/UART/P1.Baudrate=\<baud_rate\>

◂ pw·/MEDIA/UART/P1.Baudrate=\<baud_rate\>

Parameters

Identifier	Parameter description	Parameter values
\<baud_rate\>	Baud rate	**0**: 4800; **1**: 7200; **2**: 9600 **3**: 14400; **4**: 19200; **5**: 38400 **6**: 57600; **7**: 115200

Example

▸ SET /MEDIA/UART/P1.Baudrate=2

◂ pw /MEDIA/UART/P1.Baudrate=2

7.19.3. Databit Setting

Command and Response

▸ SET·/MEDIA/UART/P1.DataBits=\<databit\>

◂ pw·/MEDIA/UART/P1.DataBits=\<databit\>

Parameters

Identifier	Parameter description	Parameter values
\<databit\>	Databit	**8**: 8 **9**: 9

Example

▸ SET /MEDIA/UART/P1.DataBits=8

◂ pw /MEDIA/UART/P1.DataBits=8

7.19.4. Stopbits Setting

Command and Response

▸ SET·/MEDIA/UART/P1.StopBits=\<stopbit\>

◂ pw·/MEDIA/UART/P1.StopBits=\<stopbit\>

Parameters

Identifier	Parameter description	Parameter values
\<stopbit\>	Stopbit	**0**: 1 **1**: 1,5 **2**: 2

Example

▸ SET /MEDIA/UART/P1.StopBits=0

◂ pw /MEDIA/UART/P1.StopBits=0

7.19.5. Parity Setting

Command and Response

▸ SET·/MEDIA/UART/P1.Parity=\<parity\>

◂ pw·/MEDIA/UART/P1.Parity=\<parity\>

Parameters

Identifier	Parameter description	Parameter values
\<parity\>	Parity	**0**: no parity **1**: odd **2**: even

Example

▸ SET /MEDIA/UART/P1.Parity=0

◂ pw /MEDIA/UART/P1.Parity=0

7.19.6. RS-232 Operation Mode

Command and Response

▸ SET·/MEDIA/UART/P1.Rs232Mode=<rs232_mode>

◂ pw·/MEDIA/UART/P1.Rs232Mode=<rs232_mode>

Parameters

Identifier	Parameter description	Parameter values
<rs232_mode>	RS-232 operation mode	**0**: Disconnect **1**: Control **2**: Command injection

Example

▸ SET /MEDIA/UART/P1.Rs232Mode=1

◂ pw /MEDIA/UART/P1.Rs232Mode=1

▎ INFO: See more information about RS-232 modes in the Settings for Control Interfaces section.

7.19.7. Command Injection Mode

Command and Response

▸ SET·/MEDIA/UART/P1.CommandInjectionEnable=<CI_enable>

◂ pw·/MEDIA/UART/P1.CommandInjectionEnable=<CI_enable>

Parameters

    true: Command injection enable

    false: Command injection disable

Example

▸ SET /MEDIA/UART/P1.CommandInjectionEnable=true

◂ pw /MEDIA/UART/P1.CommandInjectionEnable=true

▊ **ATTENTION!** The Command injection status is stored in another read-only property: /MEDIA/UART/P1.CommandInjectionStatus.

7.20. RS-232 Message Sending

7.20.1. Sending a Message (ASCII-format) via RS-232

The command is for sending a command message in ASCII-format. This method **allows** escaping the control characters. For more information see the Escaping section.

Command and Response *#message*

▸ CALL·/MEDIA/UART/P1:sendMessage(<message>)

◂ mO·/MEDIA/UART/P1:sendMessage

Example

▸ CALL /MEDIA/UART/P1:sendMessage(PWR0)

◂ mO /MEDIA/UART/P1:sendMessage

The 'PWR0' message is sent out via the P1 serial port.

7.20.2. Sending a Text (ASCII-format) via RS-232

The command is for sending a command message in ASCII-format. This method **does not require** escaping the control and non-printable characters.

Command and Response

▸ CALL·/MEDIA/UART/P1:sendText(<message>)

◂ mO·/MEDIA/UART/P1:sendText

Example

▸ CALL /MEDIA/UART/P1:sendText(open)

◂ mO /MEDIA/UART/P1:sendText

The 'open' text is sent out via the P1 serial port.

7.20.3. Sending a Binary Message (HEX-format) via RS-232

The command is for sending a binary message in Hexadecimal format. This method **does not require** escaping the control and non-printable characters.

Command and Response

▸ CALL·/MEDIA/UART/P1:sendBinaryMessage(<message>)

◂ mO·/MEDIA/UART/P1:sendBinaryMessage

Example

▸ CALL /MEDIA/UART/P1:sendBinaryMessage(433030)

◂ mO /MEDIA/UART/P1:sendBinaryMessage

The '433030' message is sent out via the P1 serial port.

7.20.4. Using Hexadecimal Codes

Hexadecimal codes can be inserted in the ASCII message when using:

sendMessage command: `CALL /MEDIA/UART/P1:sendMessage(C00\x0D)`

tcpMessage command: `CALL /MEDIA/ETHERNET:tcpMessage(C00\x0D)`

udpMessage command: `CALL /MEDIA/ETHERNET:udpMessage(C00\x0D)`

- ▪ **C00**: the message.
- ▪ **\x**: indicates that the following is a hexadecimal code.
- ▪ **0D**: the hexadecimal code (Carriage Return).

7.21. RS-232 Message Recognizer

> █ **DIFFERENCE:** This feature and below commands are available from FW package v1.1.0b3.

This tool can be used to recognize messages coming from the RS-232 port. The message can be used as a Condition in Event manager and define an Action for it.

Working Method

A message got recognized from the incoming data, if one of the following occurs:

- ▪ The set DelimiterHex is detected in the message, or
- ▪ The set TimeOut has been elapsed since receiving the last data bit.
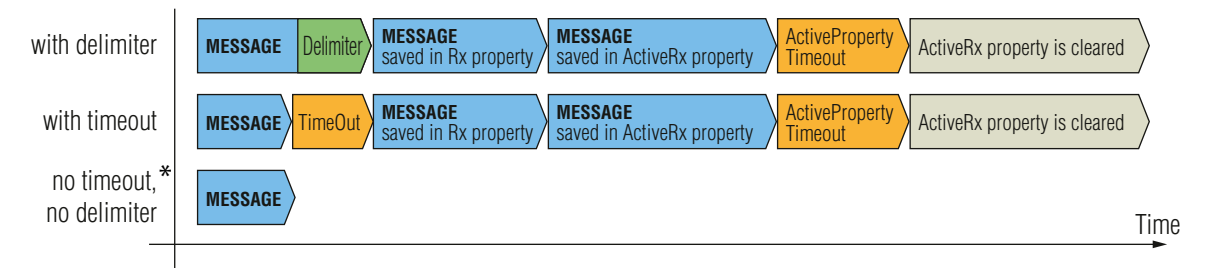
* In that case, the not-recognized data is kept in the memory (up to 128 bytes). If the **DelimiterHex** is detected later, or the **TimeOut** parameter is set meanwhile, the data appears in the **Rx**, **RxHex**, **Hash** and **ActiveRx**, **ActiveRxHex, ActiveRxHash** properties.

7.21.1. Enable the Recognizer

Command and Response

- ▸ SET·/MEDIA/UART/<serial_port>.RecognizerEnable=<recognizer_enable>
- ◂ pw·/MEDIA/UART/<serial_port>.RecognizerEnable=<recognizer_enable>

Parameters

Parameter	Parameter description	Values	Value description
<serial_port>	Serial port number	**P1, P2**	
<recognizer_enable>	Recognizer mode	**true**	Recognizer is enabled
		false	Recognizer is disabled

Example

- ▸ SET /MEDIA/UART/P1.RecognizerEnable=true
- ◂ pw /MEDIA/UART/P1.RecognizerEnable=true

#recognizer   #rs232recognizer   #rs-232recognizer

7.21.2. Set the Delimiter Hex

This property stores the delimiter that is between the messages (e.g. Cr, Lf, Space). The value has to be in hex format (e.g.0D, 0A, 20).

<div align="center">

Delimiter (hex format: 3A)

... Password : Login name : ...

Stored string

</div>

Command and Response

▶ SET·/MEDIA/UART/RECOGNIZER.DelimiterHex=<delimiter>

◀ pw·/MEDIA/UART/RECOGNIZER.DelimiterHex=<delimiter>

Parameters

The <delimiter> parameter can be max. 8-character long (or 16 hex digit) in **hex** format.

Example

▶ SET /MEDIA/UART/RECOGNIZER.DelimiterHex=3a

◀ pw /MEDIA/UART/RECOGNIZER.DelimiterHex=3a

7.21.3. Set the Timeout

When the set time is elapsed after the last received message and delimiter was not detected, the device saves the data into the **Rx, RxHex, Hash** properties. The timeout setting is useful if there is no special or easily defined delimiter in the incoming data, but there is a time gap between the messages.

Command and Response

▶ SET·/MEDIA/UART/RECOGNIZER.TimeOut=<timeout>

◀ pw·/MEDIA/UART/RECOGNIZER.TimeOut=<timeout>

Parameters

The <timeout> parameter sets the timeout value in milli seconds: **0** means the timeout is disabled, min. value is 10.

Example

▶ SET /MEDIA/UART/RECOGNIZER.TimeOut=20

◀ pw /MEDIA/UART/RECOGNIZER.TimeOut=20

7.21.4. Querying the Last Recognized Message (String)

The recognized message is stored as a string in the below property till the next recognized message or until the **RECOGNIZER.clear()** method is called.

> TIPS AND TRICKS: When this property is set as a condition in the Event Manager, and the same strings follow each other, the action **will execute once**. (A Condition can be detected in Event Manager if a change happens. But if the same string is saved into the property after each other, it will not cause a change.)

Command and Response

▶ GET·/MEDIA/UART/RECOGNIZER.Rx

◀ pr·/MEDIA/UART/RECOGNIZER.Rx=<recognized_string>

Parameters

The <recognized_string> parameter can be max. 12 byte-long recognized data string.

Example

▶ GET /MEDIA/UART/RECOGNIZER.Rx

◀ pr /MEDIA/UART/RECOGNIZER.Rx=Login:

7.21.5. Querying the Last Recognized Message(Hex)

Command and Response

▶ GET·/MEDIA/UART/RECOGNIZER.RxHex

◀ pr·/MEDIA/UART/RECOGNIZER.RxHex=<recognized_hex>

Parameters

The <recognized_hex> parameter is the recognized data in hex format.

Example

▶ GET /MEDIA/UART/RECOGNIZER.RxHex

◀ pr /MEDIA/UART/RECOGNIZER.RxHex=FF1F4C6F67696E3A

7.21.6. Clearing the Last Recognized Stored Message

This method deletes all the stored received serial messages.

Command and Response

▶ CALL·/MEDIA/UART/RECOGNIZER:clear()

◀ mO·/MEDIA/UART/RECOGNIZER:clear

Example

▶ CALL /MEDIA/UART/RECOGNIZER:clear()

◀ mO /MEDIA/UART/RECOGNIZER:clear

7.21.7. Querying the Last Recognized Active Message (String)

The recognized data is stored in string in the below property **temporary**. When the time set in the **ActiveTimeout** property is elapsed, the property is cleared.

> TIPS AND TRICKS: When this property is set as a condition in the Event Manager, and the same strings follow each other, the action **will execute every occasion.** (A Condition can be detected in Event Manager if a change happens. In this case, the string is stored in the property and after the **ActiveTimeout** it will be cleared. If the same string is saved into the (empty) property that will cause a change.)

Command and Response

▶ GET·/MEDIA/UART/RECOGNIZER.ActiveRx

◀ pr·/MEDIA/UART/RECOGNIZER.ActiveRx=<recognized_string>

Parameters

The <recognized_string> parameter is a max. 12 byte-long recognized data string.

Example

▶ GET /MEDIA/UART/RECOGNIZER.ActiveRx

◀ pr /MEDIA/UART/RECOGNIZER.ActiveRx=Login:

7.21.8. Querying the Last Recognized Active Message (Hex)

Command and Response

▶ GET·/MEDIA/UART/RECOGNIZER.ActiveRxHex

◀ pr·/MEDIA/UART/RECOGNIZER.ActiveRxHex=<recognized_hex>

Parameters

The <recognized_hex> parameter is the recognized data in hex format.

Example

▶ GET /MEDIA/UART/RECOGNIZER.ActiveRxHex

◀ pr /MEDIA/UART/RECOGNIZER.ActiveRxHex= 4C6F67696E3A

7.21.9. Set the Active Timeout

This property is responsible for clearing the **ActiveRx**, **ActiveRxHex**, **ActiveHash** properties after the elapsed time. Default value is 50ms.

Command and Response

▶ SET·/MEDIA/UART/RECOGNIZER.ActivePropertyTimeout=<a_timeout>

◀ pw·/MEDIA/UART/RECOGNIZER.ActivePropertyTimeout=<a_timeout>

Parameters

The <a_timeout> parameter is the active timeout value (ms) between 0 and 255.

Example

▶ SET /MEDIA/UART/RECOGNIZER.ActivePropertyTimeout=255

◀ pw /MEDIA/UART/RECOGNIZER.ActivePropertyTimeout=255

7.21.10. Running an Immediate Event Action

> **DIFFERENCE:** This command is available from FW package v1.1.0b3.

When a message is recognized (DelimiterHex is detected in the message, or TimeOut has been elapsed since receiving the last data bit) a specific Action of an Event can be run by the following command.

Command and Response

▶ SET·/CTRL/TCP/C<loc>.ActionTrigger=<event_nr>

◀ pw·/CTRL/TCP/C<loc>.ActionTrigger=<event_nr>

Parameters

The <event_nr> means the number (location) of the linked Event Action without letter 'E'. (There is no need to define a Condition in the linked Event.)

Example

▶ SET /CTRL/TCP/C1.ActivePropertyTimeout=255

◀ pw /CTRL/TCP/C1.ActivePropertyTimeout=255

7.22. GPIO Port Configuration

7.22.1. Set the Direction of a GPIO Pin

Command and Response

▶ SET·/MEDIA/GPIO/<gpio_port>.Direction=<dir>

◀ pw·/MEDIA/GPIO/<gpio_port>.Direction=<dir>

Parameters

Identifier	Parameter description
<dir>	**I:** input direction of the GPIO pin. **O:** output direction of the GPIO pin.

Example

▶ SET /MEDIA/GPIO/P1.Direction=I

◀ pw /MEDIA/GPIO/P1.Direction=I

7.22.2. Set the Output Level of a GPIO Pin

Command and Response

▶ SET·/MEDIA/GPIO/<gpio_port>.Output=<value>

◀ pw·/MEDIA/GPIO/<gpio_port>.Output=<value>

Parameters

Identifier	Parameter description	Parameter values
<gpio_port>	GPIO port number	P1-P3
<value>	Value of the GPIO pin	**H**: High level **L**: Low level

Example

▶ SET /MEDIA/GPIO/P1.Output=H

◀ pw /MEDIA/GPIO/P1.Output=H

7.22.3. Toggle the Level of a GPIO Pin

It toggles between the high and low level of the chosen output port.

Command and Response

▶ CALL·/MEDIA/GPIO/<gpio_port>:toggle()

◀ pw·/MEDIA/GPIO/ <gpio_port>:toggle

Example

▶ CALL /MEDIA/GPIO/P1:toggle()

◀ mO /MEDIA/GPIO/P1:toggle

7.23. LW3 Commands – Quick Summary

System Commands

Query the Product Name
- ▶ GET·/.ProductName

Set the Device Label
- ▶ SET·/MANAGEMENT/LABEL.DeviceLabel=<custom_name>

Query the Serial Number
- ▶ GET·/.SerialNumber

Query the Firmware Version
- ▶ GET·/SYS/MB.FirmwareVersion

Resetting the Device
- ▶ CALL·/SYS:reset()

Restore the Factory Default Settings
- ▶ CALL·/SYS:factoryDefaults()

Enable PoE
- ▶ SET·/SYS/MB/POE.PoeEnabled=<PoE_status>

Running a Macro
- ▶ CALL·/CTRL/MACROS:run(<macro_name>)

Cleartext Login Protection

Setting the Login Password
- ▶ CALL·/LOGIN:setPassword(<password>)

Login the Device
- ▶ CALL·/LOGIN:login(<password>)

Logout from the Device
- ▶ CALL·/LOGIN:logout(<password>)

Enable the Cleartext Login Function
- ▶ SET·/LOGIN:LoginEnable=<login_state>

Time Settings

Query the Timezone
- ▶ SET·/SYS/MB/TIMEZONE.Timezone=<timezone>
- ▶ SET·/SYS/MB/NTP.Enable=<enable_ntp>

Enable Getting NTP from DHCP server
- ▶ SET·/SYS/MB/NTP.NtpServerFromDhcp=<enable_ntp_dhcp>

Query the Active NTP Server
- ▶ GET·/SYS/MB/NTP.ActiveNtpServer

Set NTP server
- ▶ SET·/SYS/MB/NTP.NtpServer=<server_address>

Synchronize with the NTP server
- ▶ CALL·/SYS/MB/NTP:updateTime()

Query the Last Synchronization
- ▶ GET·/SYS/MB/RTC.LastUpdate

Query the Universal Time Coordinated Time (UTC)
- ▶ GET·/SYS/MB/RTC.UtcTime

Query the Local Time (RTC)
- ▶ GET·/SYS/MB/RTC.LocalTime

Query the Local Time (RTC) Elements
- ▶ GET·/SYS/MB/RTC.<RTC_element>

Button Configuration

Lock the Front Panel Functionality
- ▶ SET·/MANAGEMENT/UI.ControlLock=<lock_status>

Lock the Buttons Separately
- ▶ SET·/MANAGEMENT/UI/BUTTONS/<btn_ID>.Enabled=<btn_lock_status>

Set the Button Operation Mode
- ▶ SET·/MANAGEMENT/UI/BUTTONS/<btn_ID>.Mode=<btn_mode>

Set the Button Interaction State
- ▶ SET·/MANAGEMENT/UI/BUTTONS/<btn_ID>.State=<btn_state>

Set the Button Name
- ▶ SET·/MANAGEMENT/UI/BUTTONS/<btn_ID>. Name=<btn_name>

Set the Icon for the Button
- ▶ SET·/MANAGEMENT/UI/BUTTONS/<btn_ID>.IconId=<icon_ID>

Set the Label for the Button
- ▶ SET·/MANAGEMENT/UI/BUTTONS/<btn_ID>. IconId=<row1>;<row2>;<row3>

Clear the Button Style
- ▶ SET·/MANAGEMENT/UI/BUTTONS/<btn_ID>. IconId=

Button Status Indicators

▸ GET·/MANAGEMENT/UI/BUTTONS/<btn_ID>/BUTTON.Latch
▸ GET·/MANAGEMENT/UI/BUTTONS/<btn_ID>/BUTTON.ActualStatus
▸ GET·/MANAGEMENT/UI/BUTTONS/<btn_ID>/BUTTON.Clicked
▸ GET·/MANAGEMENT/UI/BUTTONS/<btn_ID>/BUTTON.LongPress

Button LED Configuration

Enable the Button LED

▸ SET·/MANAGEMENT/UI/LEDS/<LED_ID>.Enabled=<LED_enable>

Set the Default Intensity of the Low Brightness

▸ SET·/MANAGEMENT/UI/LEDS.LowBright=<light_intensity>

Set the Default Intensity of the High Brightness

▸ SET·/MANAGEMENT/UI/LEDS.HighBright=<light_intensity>

Set Background Light of the Button

▸ SET·/MANAGEMENT/UI/LEDS/<LED_ID>.TrueFunction=<light_mode>
▸ SET·/MANAGEMENT/UI/LEDS/<LED_ID>.FalseFunction=<light_mode>

Set the Background Light for a Period of Time

▸ CALL·/MANAGEMENT/UI/LEDS/<led_ID>:<button_func>(<time>)

Button Group Configuration

Set the Buttons into Groups

Query the Group Members

▸ GET·/MANAGEMENT/UI/GROUP/<group_ID>.GroupMembers

Set the Active Button

▸ SET·/MANAGEMENT/UI/GROUP/<group_ID>.Active=<btn_nr>

Volume Control Configuration

Control Lock of the Jog Dial

▸ SET·/MANAGEMENT/UI/VOLUMECONTROL.Enabled=<enabled>

Set the Volume

▸ SET·/MANAGEMENT/UI/VOLUMECONTROL.Volume=<volume_value>

Mute the Volume

▸ SET·/MANAGEMENT/UI/VOLUMECONTROL.Mute=<mute_state>

Volume Setting in Mute State

▸ SET·/MANAGEMENT/UI/VOLUMECONTROL.UnMuteOnVolumeChange=<unmute>

Volume Control (Jog Dial) Status Indicators

▸ GET·/MANAGEMENT/UI/VOLUMECONTROL/ROTARY.RotaryPosition
▸ GET·/MANAGEMENT/UI/VOLUMECONTROL/ROTARY.ActualStatus
▸ GET·/MANAGEMENT/UI/VOLUMECONTROL/ROTARY.LongPress
▸ GET·/MANAGEMENT/UI/VOLUMECONTROL/ROTARY.Clicked

Event Manager Basics

How to Arrange an Event?

Setting a Condition by Specifying a Direct Path

▸ SET·/EVENTS/E<loc>.Condition=<expression>

Setting a Condition by Linking Another Condition

▸ SET·/EVENTS/E<loc>.Condition=<event_nr>

Setting a Condition by Linking More Conditions

▸ SET·/EVENTS/E<loc>.Condition=<event_nr>&<event_nr>&<event_nr>&<event_nr>

Setting an Action by Specifying a Direct Path

▸ SET·/EVENTS/E<loc>.Action=<expression>

Setting an Action by Linking Another Action

▸ SET·/EVENTS/E<loc>.Action=<event_nr>

Setting an Action by Linking a Macro

▸ SET·/EVENTS/E<loc>.Action=<macro_name>

Event Manager Tool Kit

Setting the Delay

▸ SET·/EVENTS/E<loc>.ConditionTimeout=<time>
▸ SET·/EVENTS/E<loc>.ConditionEndCheck=<true/false>
▸ SET·/EVENTS/E<loc>.ConditionTimeoutContinuous=<true/false>

Setting the Name of the Event

▸ SET·/EVENTS/E<loc>.Name=<string>

Enable the Event

▸ SET·/EVENTS/E<loc>.Enabled=<true/false>

Triggering a Condition

▸ CALL·/EVENTS/E<loc>:triggerCondition(1)

Querying the Condition Counter

▸ GET·/EVENTS/E<loc>.ConditionCount

Querying the Condition Trigger Counter

▶ GET·/EVENTS/E<loc>.ExternalConditionTriggerCount

Testing an Action

▶ CALL·/EVENTS/E<loc>:ActionTest(1)

Variable-Management

Value Assignment

▶ SET·/CTRL/VARS/V<loc>.Value=<value>

Addition and Subtraction (Add Method)

▶ CALL·/CTRL/VARS/V<loc>:add(<operand>;<min>;<max>)

Addition and Subtraction (Cycle Method)

▶ CALL·/CTRL/VARS/V<loc>:cycle(<operand>;<min>;<max>)

Value Change with Intervals (Case)

▶ CALL·/CTRL/VARS/V<loc>:case(<min> <max> <val>;)

Scan and Store

▶ CALL·/CTRL/VARS/V<loc>:scanf(<path>.<property>;<pattern>)

Reformatting a Value

▶ CALL·/CTRL/VARS/V<loc>:printf(<prefix>%s<postfix>)

Ethernet Port Configuration

Query the DHCP State

▶ GET·/MANAGEMENT/NETWORK.DhcpEnabled

Change the DHCP State

▶ SET·/MANAGEMENT/NETWORK.DhcpEnabled=<DHCP_state>

Query the IP Address

▶ GET·/MANAGEMENT/NETWORK.IpAddress

Change the IP Address (Static)

▶ SET·/MANAGEMENT/NETWORK.StaticIpAddress=<IP_address>

Query the Subnet Mask

▶ GET·/MANAGEMENT/NETWORK.NetworkMask

Change the Subnet Mask (Static)

▶ SET·/MANAGEMENT/NETWORK.StaticNetworkMask=<netmask>

Query the Gateway Address

▶ GET·/MANAGEMENT/NETWORK.GatewayAddress

Change the Gateway Address (Static)

▶ SET·/MANAGEMENT/NETWORK.StaticGatewayAddress=<gw_add>

Apply Network Settings

▶ CALL·/MANAGEMENT/NETWORK:ApplySettings()

Ethernet Tool Kit

Device Filter Based on MAC Address

▶ SET·/MANAGEMENT/MACFILTER.MACaddress<loc>=<MAC_address>;<receive>;<send>;<name>

LW2 Control Port Blocking

▶ SET·/MANAGEMENT/SERVICEFILTER.Lw2Enabled=<port_mode>

HTTP Port Blocking

▶ SET·/MANAGEMENT/SERVICEFILTER.HttpEnabled=<port_mode>

HTTP Post Receiving Blocking

▶ SET·/MANAGEMENT/SERVICEFILTER.HttpEnabled=<port_mode>

Powering on a Computer over Ethernet (Wake-on-LAN)

▶ CALL·/MEDIA/ETHERNET:wakeOnLan(MAC_address)

Ethernet Message Sending

Sending a TCP Message (ASCII-format)

▶ CALL·/MEDIA/ETHERNET:tcpMessage(<IP_address>:<port_no>=<message>)

Sending a TCP Text (ASCII-format)

▶ CALL·/MEDIA/ETHERNET:tcpText(<IP_address>:<port_no>=<text>)

Sending a TCP Binary Message (HEX-format)

▶ CALL·/MEDIA/ETHERNET.tcpBinary(<IP_address>:<port_no>=<HEX_message>)

Sending a UDP Message (ASCII-format)

▶ CALL·/MEDIA/ETHERNET:udpMessage(<IP_address>:<port_no>=<message>)

Sending a UDP Text (ASCII-format)

▶ CALL·/MEDIA/ETHERNET:udpText(<IP_address>:<port_no>=<text>)

Sending a UDP Binary Message (HEX-format)

▶ CALL·/MEDIA/ETHERNET:udpBinary(<IP_address>:<port_no>=<HEX_message>)

HTTP Messaging

Setting the Target IP Address

▶ SET·/CTRL/HTTP/C1.ServerIP=<IP_address>

Setting the TCP Port

▸ SET·/CTRL/HTTP/C1.ServerPort=<port_no>

Setting the Target Path

▸ SET·/CTRL/HTTP/C1.File=<path>

Setting the Message Header

▸ SET·/CTRL/HTTP/C1.Header=<header_text>

Sending a Post Message

▸ CALL·/CTRL/HTTP/C1:post(<body_text>)

Sending a Put Message

▸ CALL·/CTRL/HTTP/C1:put(<body_text>)

TCP Message Recognizer

Setting the IP Address of the TCP Server

▸ SET·/CTRL/TCP/C<loc>.ServerIP(<IP_address>)

Setting the TCP/IP Port Number of the TCP Server

▸ SET·/CTRL/TCP/C<loc>.ServerPort(<port_no>)

Connecting to a TCP Server

▸ CALL·/CTRL/TCP/C<loc>:connect()

Disconnecting from a TCP Server

▸ CALL·/CTRL/TCP/C<loc>:disconnect()

Setting the Delimiter Hex

▸ SET·/CTRL/TCP/C<loc>.DelimiterHex=<delimiter>

Setting the Timeout

▸ SET·/CTRL/TCP/C<loc>.TimeOut=<timeout>

Querying the Last Recognized Message (String)

▸ GET·/CTRL/TCP/C<loc>.Rx

Querying the Last Recognized Message (Hex)

▸ GET·/CTRL/TCP/C<loc>.RxHex

Clearing the Last Recognized Stored Message

▸ CALL·/CTRL/TCP/C<loc>:clear()

Querying the Last Recognized Active Message (String)

▸ GET·/CTRL/TCP/C<loc>.ActiveRx

Querying the Last Recognized Active Message (Hex)

▸ GET·/CTRL/TCP/C<loc>.ActiveRxHex

Set the Active Timeout

▸ SET·/CTRL/TCP/C<loc>.ActivePropertyTimeout=<a_timeout>

Running an Immediate Event Action

▸ SET·/CTRL/TCP/C<loc>.ActionTrigger=<event_nr>

RS-232 Port Configuration

Protocol Setting

▸ SET·/MEDIA/UART/P1.ControlProtocol=<cont_protocol>

BAUD Rate Setting

▸ SET·/MEDIA/UART/P1.Baudrate=<baud_rate>

Databit Setting

▸ SET·/MEDIA/UART/P1.DataBits=<databit>

Stopbits Setting

▸ SET·/MEDIA/UART/P1.StopBits=<stopbit>

Parity Setting

▸ SET·/MEDIA/UART/P1.Parity=<parity>

RS-232 Operation Mode

▸ SET·/MEDIA/UART/P1.Rs232Mode=<rs232_mode>

Command Injection Mode

▸ SET·/MEDIA/UART/P1.CommandInjectionEnable=<CI_enable>

RS-232 Message Sending

Sending a Message (ASCII-format) via RS-232

▸ CALL·/MEDIA/UART/P1:sendMessage(<message>)

Sending a Text (ASCII-format) via RS-232

▸ CALL·/MEDIA/UART/P1:sendText(<message>)

Sending a Binary Message (HEX-format) via RS-232

▸ CALL·/MEDIA/UART/P1:sendBinaryMessage(<message>)

Using Hexadecimal Codes

RS-232 Message Recognizer

Enable the Recognizer

▸ SET·/MEDIA/UART/<serial_port>.RecognizerEnable=<recognizer_enable>

Set the Delimiter Hex

▸ SET·/MEDIA/UART/RECOGNIZER.DelimiterHex=<delimiter>

Set the Timeout

▸ SET·/MEDIA/UART/RECOGNIZER.TimeOut=<timeout>

Querying the Last Recognized Message (String)

▸ GET·/MEDIA/UART/RECOGNIZER.Rx

Querying the Last Recognized Message(Hex)

▸ GET·/MEDIA/UART/RECOGNIZER.RxHex

Clearing the Last Recognized Stored Message

▸ CALL·/MEDIA/UART/RECOGNIZER:clear()

Querying the Last Recognized Active Message (String)

▸ GET·/MEDIA/UART/RECOGNIZER.ActiveRx

Querying the Last Recognized Active Message (Hex)

▸ GET·/MEDIA/UART/RECOGNIZER.ActiveRxHex

Set the Active Timeout

▸ SET·/MEDIA/UART/RECOGNIZER.ActivePropertyTimeout=<a_timeout>

Running an Immediate Event Action

▸ SET·/CTRL/TCP/C<loc>.ActionTrigger=<event_nr>

GPIO Port Configuration

Set the Direction of a GPIO Pin

▸ SET·/MEDIA/GPIO/<gpio_port>.Direction=<dir>

Set the Output Level of a GPIO Pin

▸ SET·/MEDIA/GPIO/<gpio_port>.Output=<value>

Toggle the Level of a GPIO Pin

▸ CALL·/MEDIA/GPIO/<gpio_port>:toggle()

8

Firmware Update

This chapter is meant to help customers perform firmware updates on our products by giving a few tips on how to start and by explaining the features of the Lightware Device Updater v2 (LDU2) software. The latest software and firmware pack can be downloaded from **www.lightware.com**.

ATTENTION! While the firmware is being updated, the normal operation mode is suspended as the device is switched to bootload mode. The firmware update process has an effect on the configuration and the settings of the device.

8.1. Introduction

Lightware Device Updater v2 (LDU2) software is the second generation of the LFP-based (Lightware Firmware Package) firmware update process.

DIFFERENCE: This software can be used for uploading the packages with LFP2 extension only. LDU2 is not suitable for using LFP files, please use the LDU software for that firmware update.

LDU   LDU2

8.2. Preparation

Most Lightware devices can be controlled over more interfaces (e.g. Ethernet, USB, RS-232). But the firmware can be updated usually over one dedicated interface, which is the Ethernet in most cases.

If you want to update the firmware of one or more devices you need the following:

- **LFP2 file**,
- **LDU2 software** installed on your PC or Mac.

Both can be downloaded from www.lightware.com/downloads.

Optionally, you can download the **release notes** file in HTML format.

8.2.1. About the Firmware Package (LFP2 File)

All the necessary tools and binary files are packed into the LFP2 package file. You need only this file to do the update on your device.

- This allows the use of the same LFP2 package for different devices.
- The package contains all the necessary components, binary, and other files.
- The release notes is included in the LFP2 file which is displayed in the window where you select the firmware package file in LDU2.

8.2.2. LDU2 Installation

ATTENTION! Minimum system requirement: 2 GB RAM. The minimum screen resolution is 1600x900.

INFO: The Windows and the Mac application has the same look and functionality.

Download the software from www.lightware.com/downloads.

Installation in case of Windows OS

Run the installer. If the User Account Control displays a pop-up message click **Yes**.

Installation Modes

Normal install	Snapshot install
Available for Windows and macOS	Available for Windows
The installer can update only this instance	Cannot be updated
Only one updateable instance can exist for all users	More than one different version can be installed for each user

ATTENTION! Using the default Normal install is highly recommended.

INFO: If you have a previously installed version you will be prompted to remove the old version before installing the new one.

Installation in case of macOS

Mount the DMG file by double clicking on it, and drag the LDU2 icon over the Applications icon to copy the program into the Applications folder. If you want to copy LDU2 into another location, just drag the icon over the desired folder.

ATTENTION! Please check the firewall settings on the macOS device. LDC needs to be added to the exceptions of the blocked software for the proper operation.

INFO: This type of installer is equal to the **Normal install** of Windows.

Installation in case of Linux

Step 1. Download the **archive file** (tar.gz) from www.lightware.com and unpack it to a temp folder.

Step 2. Run the **install_ldu2.sh** file in the temp folder. The script will install LDU2 into the following folder: HOME/.local/share/lightware/ldu2.

Step 3. The folder above will contain this file: **LightwareDeviceUpdaterV2.sh** that can be used to start LDU2.

8.3. Running the Software

> **ATTENTION!** The computer which runs LDU2 and the target device (that will be updated) must be in the same subnet. The update cannot be performed behind a firewall or gateway.

You have two options:

- **Starting the LDU2** by double-clicking on the shortcut/program file, or
- Double-clicking on an **LFP2 file**.

LDU2 Auto-Update

At startup, the software checks if a newer version is available on the web.
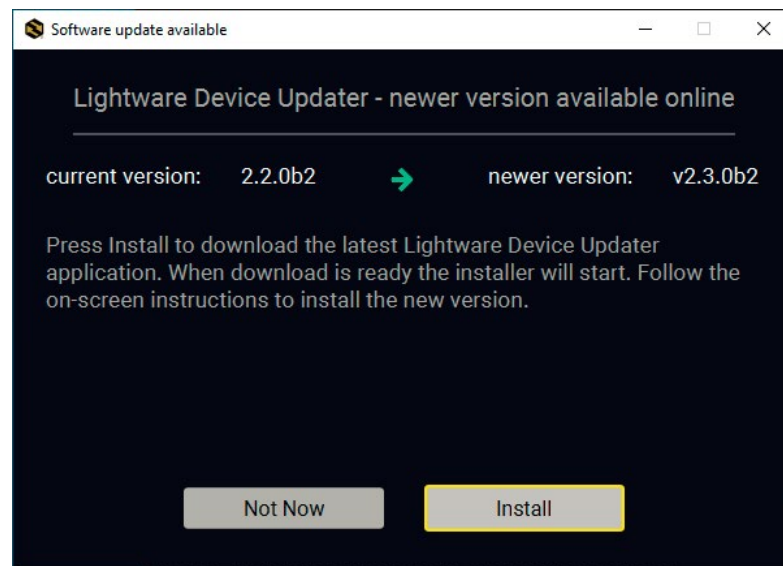
Main Screen

When the software is started by the shortcut, the device discovery screen appears. Press the **Search for devices** button to start finding the Lightware devices:
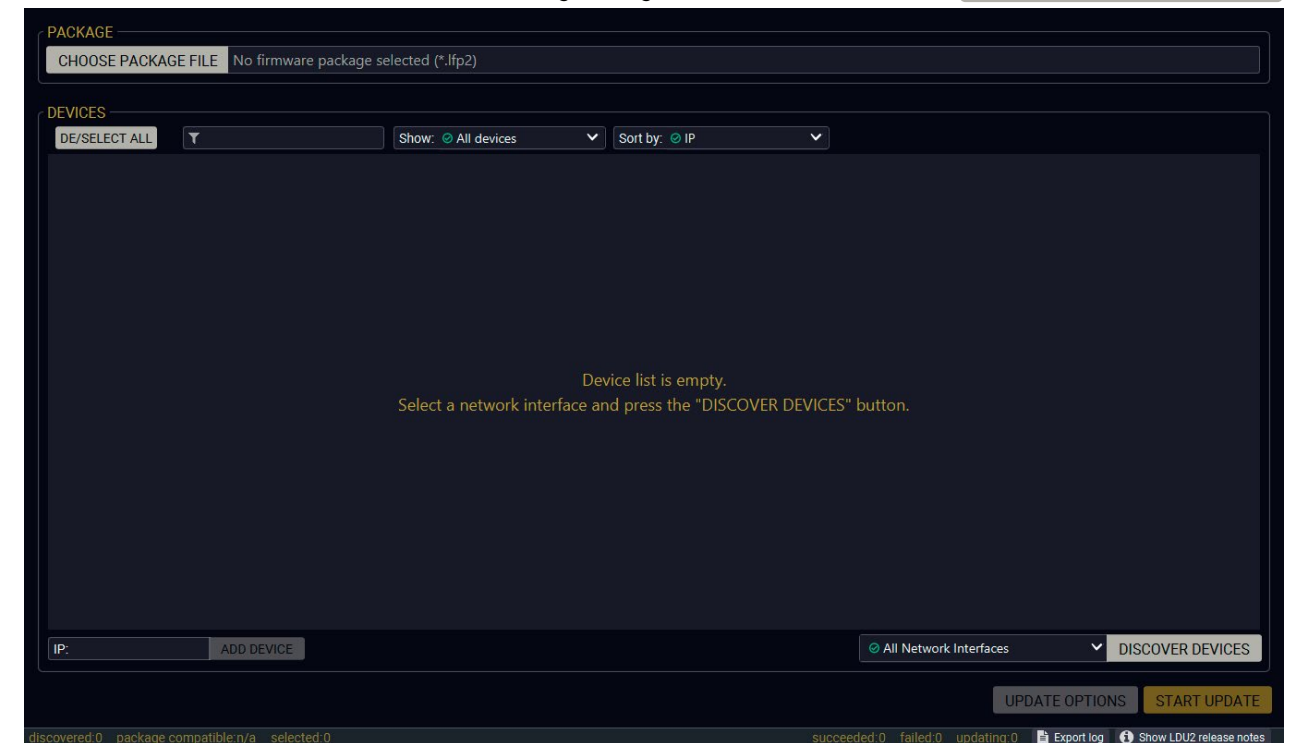
If you start the software by double-clicking on the LFP2 file, the firmware will be loaded. Press the **Discover devices** button; all the devices will be listed which are compatible with the selected firmware pack.

> INFO: If you press the **Choose package file** button, the release notes of the LFP2 file will be displayed in the right panel; see the Step 1. Select the Firmware Package. section.

Device List

When the discovery has completed, the devices available on the network are listed in the application.

If the desired device is not discovered, you can add it by typing the IP address in the dedicated field and press the **Add device** button.

Legend of the Icons

✎	**IP address editor**	The IP address of the device can be changed in the pop-up window.
👁	**Identify me**	Clicking on the icon results the front panel LEDs blink for 10 seconds which helps to identify the device phisically.
⭐	**Favorite device**	The device has been marked, thus the IP address is stored. When a device is connected with that IP address, the star will highlighted in that line.
ⓘ	**Further information available**	Device is unreachable. Change the IP address by pressing the **IP address editor** icon or use the front panel buttons (if available).
🔑	**Cleartext login enabled**	The password-protection is enabled. You have to enter the password to perform the firmware update in the **Parameters** window or in the appearing window in the beginning of the update.
⚒	**Service mode**	The device is in bootload mode. Backup and restore cannot be performed in this case.

8.4. The Updating Steps

> **ATTENTION!** While the firmware is being updated, the normal operation mode is suspended as the device is switched to bootload mode. Signal processing is not performed. Do not interrupt the firmware update. If any problem occurs, reboot the unit and restart the process.

Keeping the Configuration Settings

By default, device configuration settings are restored when firmware update is finished. If factory reset has been chosen in the parameters window, all device settings will be erased. In the case of factory reset, you can save the settings of the device in the Lightware Device Controller software and restore it later.

The following flow chart demonstrates how this function works in the background.

Step 1. Create a backup

The current configuration of the device is being saved into a configuration backup file on your computer.

Step 2. Start the Update

The device reboots and starts in bootload mode (firmware update mode).

Step 3. Update

The CPU firmware is changed to the new one.

Step 4. Factory reset

All configuration settings are restored to the factory default values.

Step 5. Conversion / Restore

The firmware package checks the backup data before the restoration procedure, and if it is necessary, a conversion is applied to avoid incompatibility problems between the firmware versions. All configuration settings are restored to the device after the conversion.

If the factory default option is selected in the Parameters window, the conversion / restoration procedure will not be performed!

Step 6. Finish

Once the firmware update procedure is finished, the device reboots and is ready for use.

Step 1. Select the Firmware Package.

Click on the **Choose Package File** button and navigate to the location where the LFP2 file was saved. When you click on the name of package, the preview of the release notes are displayed in the right panel.

CHOOSE PACKAGE FILE
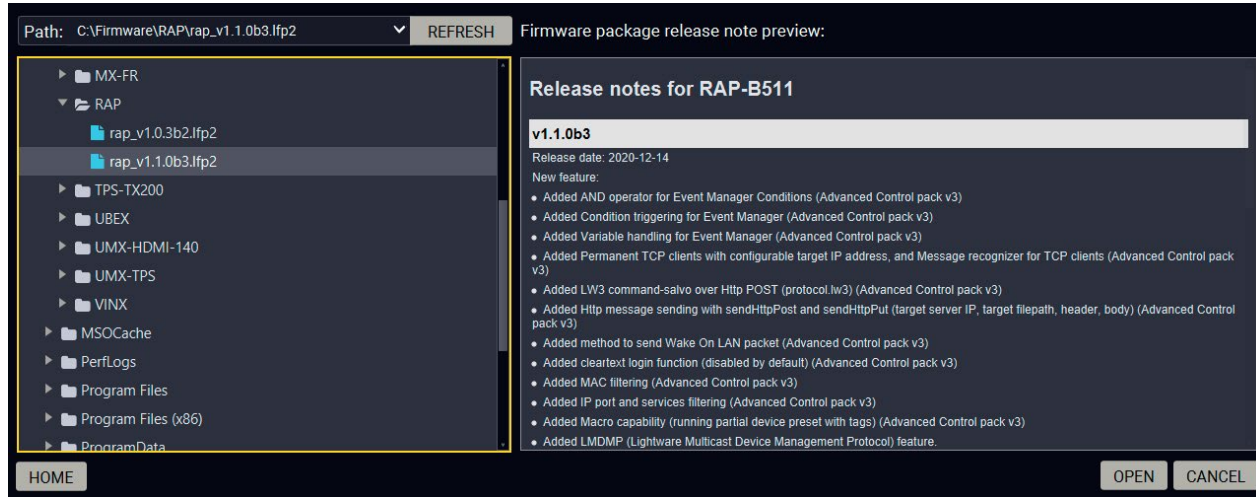
After the package file is loaded, the list is filtered to show the compatible devices only. The current firmware version of the device is highlighted in orange if it is different from the version of the package loaded.
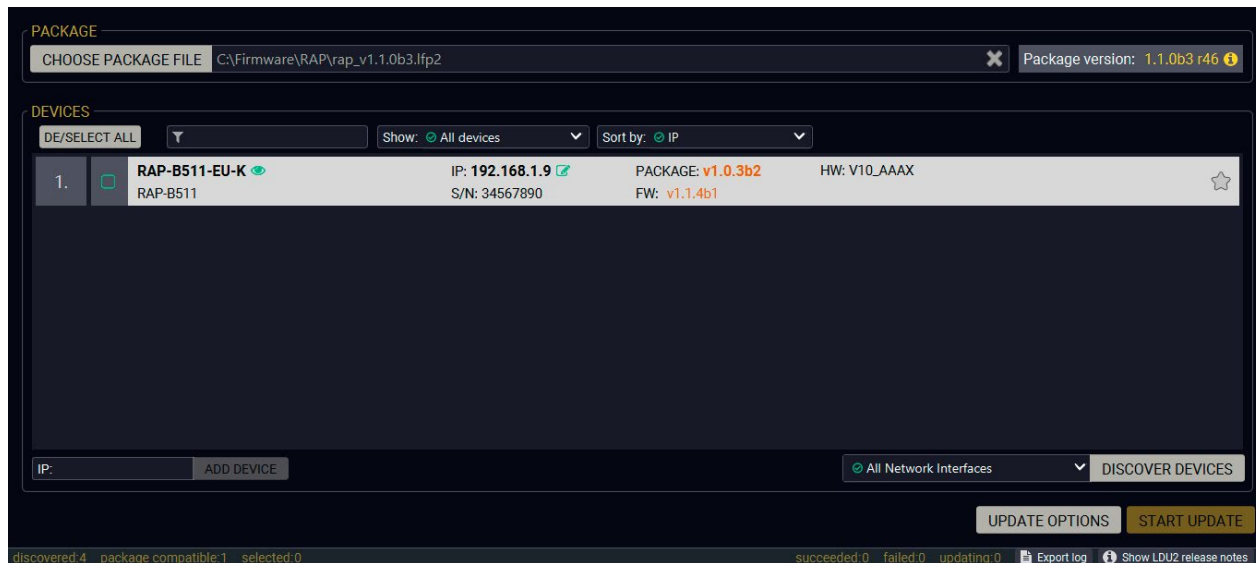
INFO: If you start the update by double-clicking on the LFP file, above screen will be loaded right away.

The Meaning of the Symbols
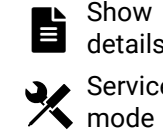
	Show details	The log about the updating process of the device can be displayed in a new window.
	Service mode	The device is in bootload mode. Backup and restore cannot be performed in this case.

Step 2. Select the desired devices for updating.

Select the devices for updating; the selected line will be highlighted in green.

If you are not sure which device to select, press the **Identify me** 👁 button. It makes the front panel LEDs blink for 10 seconds. The feature helps to find the device physically.
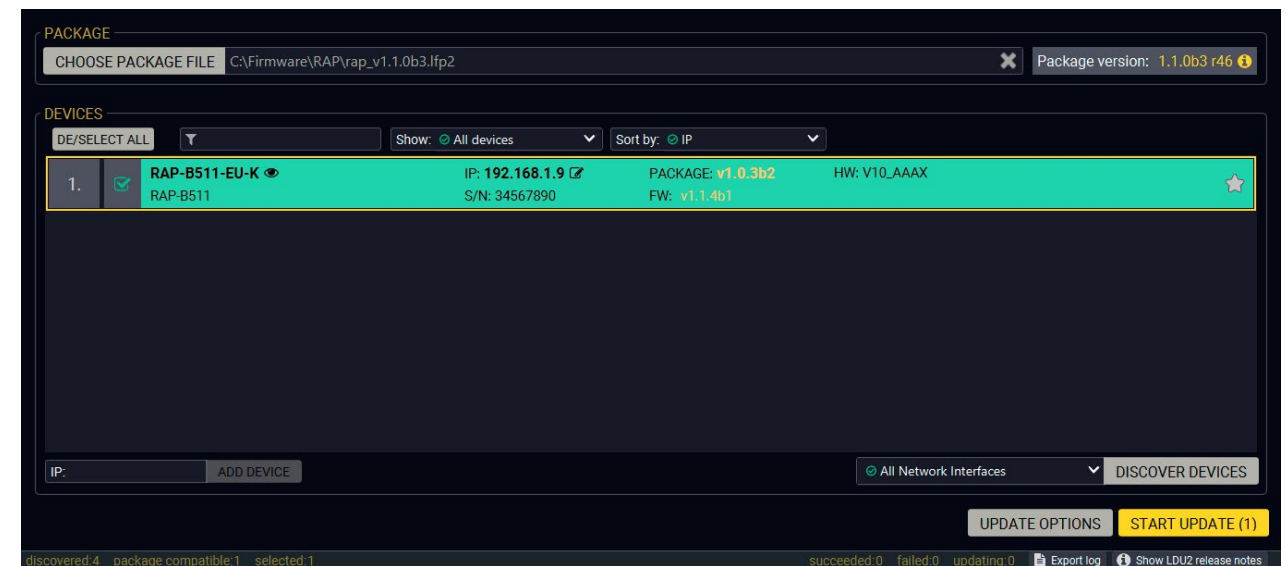
Step 3. Check the update parameters.

▌ **DIFFERENCE:** The appearing settings are device-dependent and can be different device by device.

Clicking on the **Update Options** button, special settings will be available like:

UPDATE OPTIONS

- ▪ Creating a backup about the configuration,
- ▪ Restore the configuration or reloading the factory default settings after the firmware update,
- ▪ Uploading the default Miniweb (if available)
- ▪ Enter the password for the Cleartext login.   *#builtinweb*   *#miniweb*   *#web*

▌ INFO: Hereby entered password will be used for all the selected devices where the Cleartext login is enabled. If the password is incorrect, a window will appear to get the correct one at each device during the update.

Please arrange the settings carefully.

Step 4. Start the update and wait until it is finished.

Click on the **Start Update** button to start the procedure. The status is shown in percent in the right side of the device line and the overall process in the bottom progress bar.

START UPDATE

If the Cleartext login is enabled and you did not enter the password in the **Parameters** window (or it is incorrect) a window will appear to get the password at each device.

▎ INFO: The device might reboot during the firmware update procedure.
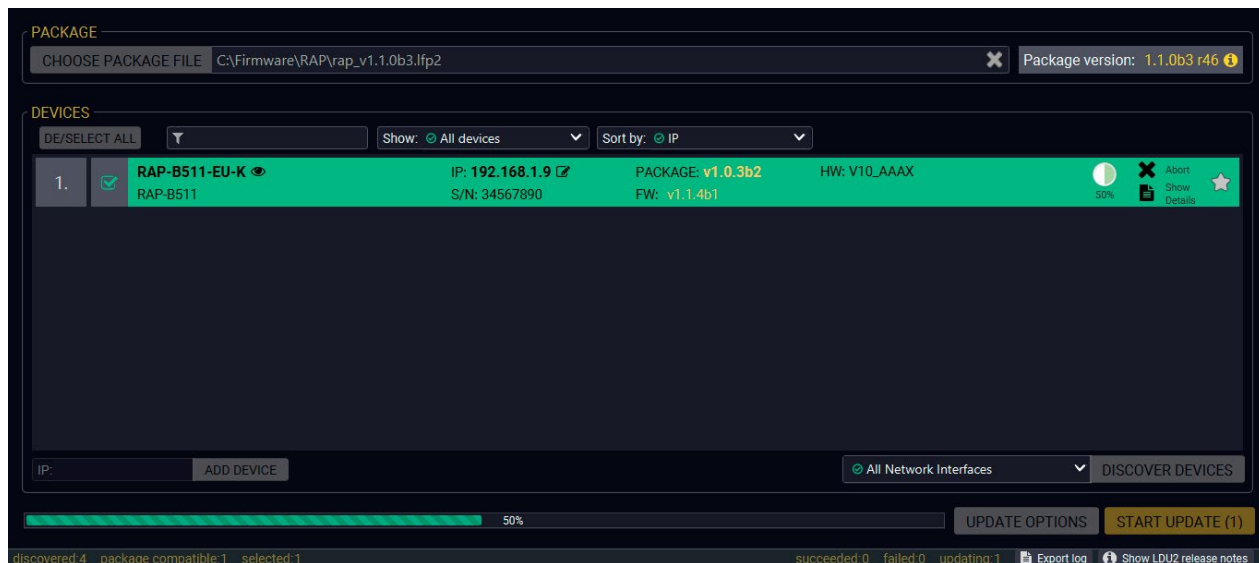
The log about the updating process can be displayed in a new window by pressing the 📄 button. When the progress bar reaches 100% (**Done** is displayed at all devices), the update of all devices are finished successfully and a message appears; you can close the software.
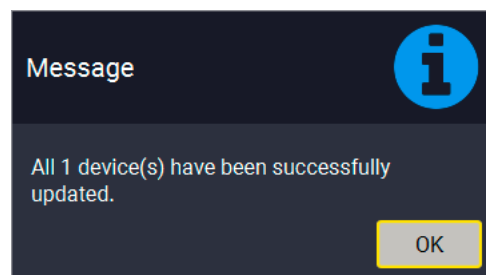
Step 5. Wait until the unit reboots with the new firmware.

Once the firmware update procedure is completed, the device is rebooted with the new firmware. Shutting down and restarting the device is recommended.

8.5. Command Line Interface (CLI)

▎ **DIFFERENCE:** The Command Line Interface is available from LDU2 v2.9.0b9.

The CLI of the LDU2 software is a simple tool for creating scriptable device updates without the need of human interactions. It allows batch updating with the same features which are available in case of GUI usage.　　*#new*

8.5.1. How to Run

Running under Windows® OS

The installer of LDU2 puts the following file into the installation folder:

`LightwareDeviceUpdaterV2_CLI.cmd`

CLI is available by this file, the exe is not suitable for that purpose. Open a command line window to execute or test the features directly.

Step 1. Open an Explorer window where the cmd file is located, the default is:
`c:\Program Files (x86)\Lightware\Lightware Device Updater V2\LightwareDeviceUpdaterV2_CLI.cmd`.

Step 2. Click on the address line (highlighted with blue in the picture), type `cmd.exe` and press enter. The command interpreter window of Windows is opened at the path of the LDU2 install folder.
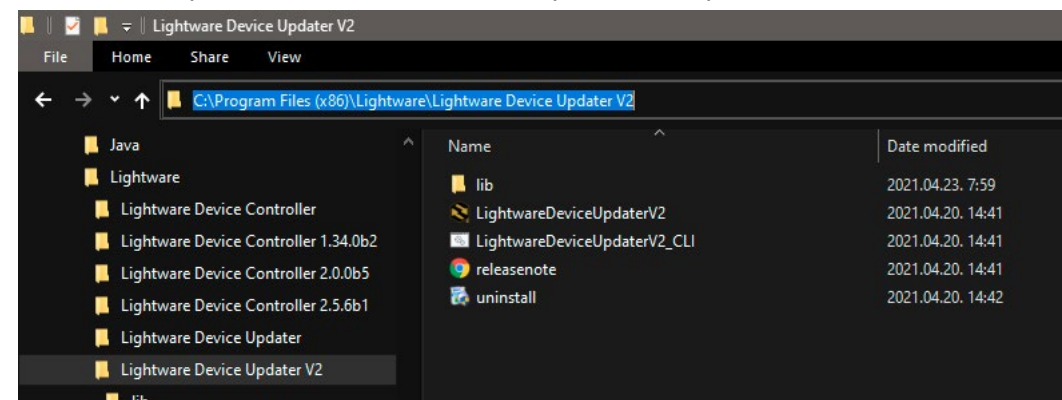
Step 3. Now you can use the `LightwareDeviceUpdaterV2_CLI.cmd` file with the commands and options which are described in the coming sections:

Running under Linux

The Command Line Interface under Linux Operating Systems can be run by the following:

`LightwareDeviceUpdaterV2.sh`

Runing an update:

```
bash LightwareDeviceUpdaterV2.sh update --ip 172.24.5.27 --package ~/Downloads/tps-tx200_1.3.1b3.lfp2
```

The commands and options are the same under Windows® and Linux, too. Following sections contain examples with **LightwareDeviceUpdaterV2_CLI.cmd**.

8.5.2. How to Use

Command Structure

The commands can be run over CLI by the following way:

`LightwareDeviceUpdaterV2_CLI.cmd [command] [options]`

`[Command]`: a certain command described in the coming sections; only one command can be run at a time

`[Options]:` mandatory and/or optional parameters of the command, if any. Optional parameters have a default value, which can be found at each affected command. You only have to define the parameter if you want to apply a different value. The **order of the options** is arbitrary.

Important Notes

- CLI is **case-sensitive** (including commands, options and other parameters).
- There is **no limit** regarding the number of the devices to update. At most 20 devices are updated simoultaneously, when one of them is finished, the following (21st) will be started automatically.
- If an update is failed, the IP address of the affected device(s) are listed at the end.

8.6. CLI Commands

> INFO: The commands and options described in the following sections are the same under Windows® and Linux, too. The examples contain **LightwareDeviceUpdaterV2_CLI.cmd**.

About the Examples

- Sent command is in blue, response is in grey.
- If the response in practice is **longer than listed** in the example, this symbol can be seen: [...].

8.6.1. Help

The defined commands and options can be listed by the **help** command.

Command

`LightwareDeviceUpdaterV2_CLI.cmd help`

Example

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd help

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar help
Command line usage:
    Win: LightwareDeviceUpdaterV2_CLI.cmd [command] [options]
    Linux: LightwareDeviceUpdaterV2.sh [command] [options]

    Commands:
        * help
        * version
        * update
        * deviceInfo
        * restore
        * packageOptions
[...]
```

8.6.2. LDU2 Version

The response shows the version of the LDU2 and the version of the Script API (the Application Programming Interface that is used by the LDU2 and the script).

Command

`LightwareDeviceUpdaterV2_CLI.cmd version`

Example

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd version

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar version
LDU2 version: 2.9.0b9
Script API version: 1.3.9
```

8.6.3. Check For New LDU2 Version

The following command can be used to check if an update of LDU2 is available. This is just a request, since the CLI is not suitable for handling the complete installer of the software.

Command

`LightwareDeviceUpdaterV2_CLI.cmd checkForUpdates`

Example 1

```
c:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd checkForUpdates

c:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar checkForUpdates
Current LDU2 version: 2.9.1b1
LDU2 is up-to-date
```

Example 2

```
c:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd checkForUpdates

c:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar checkForUpdates
Current LDU2 version: 2.9.1b1
New version is available online: v2.9.2b2
Download URL: http://update.lightware.hu/ldu2/lwr/v2.9.2b2/install_LDU2_v2.9.2b2.exe
```

8.6.4. Device Info

The most important information about the selected device is displayed; see the example for more details.

Command

```
LightwareDeviceUpdaterV2_CLI.cmd deviceInfo [options]
```

Options

Option	Description	Required?
-i or --ip	List of IP addresses of devices to be updated	one of them is mandatory
-n or --hostName	List of host names of devices to be updated	
-v or --packageVersion	Shows installed package version only	optional

Example 1

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd deviceInfo --ip
192.168.1.14

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar deviceInfo --ip
192.168.1.14
Product name:    UMX-TPS-TX140K
IP address:      192.168.1.14
Serial number:   00006363
MAC address:     a8:d2:36:ff:63:63
Part number:     91540050
Device label:    UMX-TPS-TX140K
Package version: v1.5.0b4
CPU FW version:  v1.5.0b4
HW version:      V20_DAX0
Operation mode:  Application mode
```

Example 2

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd deviceInfo --ip
192.168.1.14 --packageVersion

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar deviceInfo --ip
192.168.1.14 --packageVersion
v1.1.1b2
```

8.6.5. Update

This command can be used to update the firmware of the devices.

Command

```
LightwareDeviceUpdaterV2_CLI.cmd update [options]
```

Options

Option	Description	Required?
-p or --package	The path of the firmware package file	yes
-i or --ip	List of IP addresses of devices to be updated	one of them is mandatory
-n or --hostName	List of host names of devices to be updated	
-b or --backupFolder	Folder to create device configuration backup at. Default: USER_HOME/.ldu2/backup	optional
-f or --factoryDefault	Apply factory reset during device update. Default: false	optional
-r or --reportProgress	Report update progress in percentage form. Default: false	optional
Package-specific options	Certain LFP2 packages have features which can be applied at this command	optional

ATTENTION! The configuration is restored automatically if the factory default option is not applied in the **update** command.In that case, there is no need to run the **restore** command after the update.

Example

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd update --ip
192.168.1.14 --package c:\Firmwares\rap_v1.2.0b3.lfp2 --reportProgress

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar update --ip
192.168.1.14 --package c:\Firmwares\rap_v1.2.0b3.lfp2 --reportProgress
[2021-05-14 12:52:51.597] [ INFO] [          main] - Device IPs: [192.168.1.14]
[2021-05-14 12:52:55.786] [ INFO] [          main] - All the selected devices are accessible over the network.
[2021-05-14 12:52:56.032] [ INFO] [          main] - All the selected devices are compatible with the specified
package.
[2021-05-14 12:52:56.600] [ INFO] [    192.168.1.14] - Package version: 1.5.0b4
[2021-05-14 12:52:56.780] [ INFO] [    192.168.1.14] - Login functionality is currently not enabled.
[2021-05-14 12:52:56.816] [ INFO] [    192.168.1.14] - Creating backup of device settings...
[2021-05-14 12:53:00.517] [ INFO] [    192.168.1.14] - Backup HTTP enable properties
[2021-05-14 12:53:01.051] [ INFO] [ProgressReporter] - Progress: 2%
[2021-05-14 12:53:02.928] [ INFO] [    192.168.1.14] - HTTP and HTTP post have got enabled on port 80
[2021-05-14 12:53:03.080] [ INFO] [    192.168.1.14] - No miniweb file is found on the device.
[2021-05-14 12:53:05.566] [ INFO] [    192.168.1.14] - HTTP and HTTP post properties have got restored on port 80
[2021-05-14 12:53:05.613] [ INFO] [    192.168.1.14] - Switching device into bootload mode...
[2021-05-14 12:53:06.053] [ INFO] [ProgressReporter] - Progress: 5%
[...]
```

The lines containing "ProgressReporter" can be enabled optionally. If it is enabled, the current state is displayed in every 5 seconds.

8.6.6. Restore

Restores device configuration from a backup file.

> TIPS AND TRICKS: This command can be used for uploading a configuration to numerous devices (aka Configuration cloning by CLI).

Command

```
LightwareDeviceUpdaterV2_CLI.cmd restore [options]
```

Options

Option	Description	Required?
-i or --ip	List of IP addresses of devices to be updated	one of them is mandatory
-n or --hostName	List of host names of devices to be updated	
-b or --backupFile	The path of the configuration backup file	yes
-k or --keepOriginalIp	Do not override the network settings of the device with the ones in the backup file. It comes in handy when multiple devices' configuration is being restored from a single backup file. Default: false	optional

> **ATTENTION!** The configuration is restored automatically if the factory default option is not applied in the **update** command. In that case, there is no need to run the **restore** command after the update.

Example

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd restore --ip
192.168.1.14 --backupFile c:\My_backup\backup_RAC-B501_SN00006363.lw3 --keepOriginalIp

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar restore --ip
192.168.1.14 --backupFile c:\My_backup\backup_RAC-B501_SN00006363.lw3 --keepOriginalIp
[2021-05-14 14:11:04.631] [ INFO] [          main] - Executing configuration restore...
[2021-05-14 14:11:04.645] [ INFO] [          main] - Device IPs: [192.168.1.14]
```

> INFO: The firmware package checks the backup data before the restore procedure and if it is necessary, a conversion is applied to avoid incompatibility problems between the firmware versions. In that case, two backup files are created: the original and a new one with "_converted" suffix. Using the last one for restoring is recommended.

8.6.7. Package Options

Shows package-specific update options.

Command

```
LightwareDeviceUpdaterV2_CLI.cmd packageOptions [options]
```

Options

Option	Description	Required?
-p or --package	The path of the firmware package file	yes

Example

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd packageOptions
--package c:\Firmwares\rap_v1.2.0b3.lfp2

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar packageOptions
--package c:\Firmwares\rap_v1.2.0b3.lfp2

Backup and restore options:
        --skipPresetsAtRestore : if true, device presets will not be restored. (Default: false)
        --uploadDefaultMiniWeb : if true and no custom miniweb is present on the device, the default built-in
miniweb will be uploaded to the device. (Default: false)

Login options:
        --clearTextLoginPw : The cleartext login password used when updating devices. (Default: empty string)

Test options:
        --test : if true, no update will be performed, communication with the device will be tested. (Default:
false)

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>
```

Package option example can be seen in the following section.

8.6.8. Complex Examples

Example 1

The following options applied:

- Firmware is updated
- Factory default settings restored

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd update --ip
192.168.1.14 --factoryDefault --package c:\Firmwares\rap_v1.2.0b3.lfp2

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar update --ip
192.168.1.14 --factoryDefault --package c:\Firmwares\rap_v1.2.0b3.lfp2
[2021-05-14 14:20:26.242] [ INFO] [           main] - Device IPs: [192.168.1.14]
[2021-05-14 14:20:29.860] [ INFO] [           main] - All the selected devices are accessible over the network.
[2021-05-14 14:20:30.129] [ INFO] [           main] - All the selected devices are compatible with the specified
package.
[2021-05-14 14:20:30.709] [ INFO] [    192.168.1.14] - Package version: 1.2.0b3
[2021-05-14 14:20:30.861] [ INFO] [    192.168.1.14] - Login functionality is currently not enabled.
[2021-05-14 14:20:30.913] [ INFO] [    192.168.1.14] - Switching device into bootload mode...
[2021-05-14 14:20:51.497] [ INFO] [    192.168.1.14] - Gathering UID information from device...
[2021-05-14 14:20:51.881] [ INFO] [    192.168.1.14] - UID info - Device IP: 192.168.1.14 Product name: RAC-B501
Product part number: 91540050 Serial number: 00006363 Hardware version: V20_DAX0 MAC address: A8:D2:36:FF:63:63
[2021-05-14 14:20:52.224] [ INFO] [    192.168.1.14] - Package version on device: 1.5.0b4 r66
[2021-05-14 14:20:52.259] [ INFO] [    192.168.1.14] - Updating RAP series application fw - part 1...
[2021-05-14 14:20:52.595] [ INFO] [    192.168.1.14] -  [rap-f427.bin.ER_IROM1]'s current version on device:
1.5.0b4 r56
[2021-05-14 14:20:52.597] [ INFO] [    192.168.1.14] -  [rap-f427.bin.ER_IROM1]'s version in the package: 1.5.0b4
r56
[2021-05-14 14:21:09.260] [ INFO] [    192.168.1.14] -  [rap-f427.bin.ER_IROM1]'s firmware version updated in FVS
EEPROM.
[2021-05-14 14:21:09.263] [ INFO] [    192.168.1.14] - Updating rap series application fw - part 2...
[2021-05-14 14:21:09.590] [ INFO] [    192.168.1.14] -  [rap-f427.bin.ER_IROM2]'s current version on device:
1.5.0b4 r56
[2021-05-14 14:21:09.591] [ INFO] [    192.168.1.14] -  [rap-f427.bin.ER_IROM2]'s version in the package: 1.5.0b4
r56
[2021-05-14 14:21:30.832] [ INFO] [    192.168.1.14] -  [rap-f427.bin.ER_IROM2]'s firmware version updated in FVS
EEPROM.
[2021-05-14 14:21:30.833] [ INFO] [    192.168.1.14] - Updating VS100TX fw...
[2021-05-14 14:21:31.161] [ INFO] [    192.168.1.14] -  [vs100_tx.bin]'s current version on device: 1.1.0b0 r0
[2021-05-14 14:21:31.162] [ INFO] [    192.168.1.14] -  [vs100_tx.bin]'s version in the package: 1.1.0b0 r63
[2021-05-14 14:21:44.106] [ INFO] [    192.168.1.14] -  [vs100_tx.bin]'s firmware version updated in FVS EEPROM.
[2021-05-14 14:21:44.107] [ INFO] [    192.168.1.14] - Updating PS171 FW...
[2021-05-14 14:21:44.433] [ INFO] [    192.168.1.14] -  [tps_family_ps171.bin]'s current version on device: 1.0.6b0
r0
[2021-05-14 14:21:44.434] [ INFO] [    192.168.1.14] -  [rap_family_ps171.bin]'s version in the package: 1.0.6b0
r522
[2021-05-14 14:22:00.612] [ INFO] [    192.168.1.14] -  [rap_family_ps171.bin]'s firmware version updated in FVS
EEPROM.
[2021-05-14 14:22:06.740] [ INFO] [    192.168.1.14] - Setting system information...
[2021-05-14 14:22:12.862] [ INFO] [    192.168.1.14] - Starting application...
[2021-05-14 14:23:56.190] [ INFO] [    192.168.1.14] - Done

All 1 update(s) finished successfully.
```

Example 2

The following options applied:

- Cleartext login password is applied
- Custom backup folder is set
- Current configuration is saved
- Firmware is updated and saved configuration is restored

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd update --ip
192.168.1.14 --package c:\Firmwares\rap_v1.2.0b3.lfp2 --backupFolder c:\My_backup --clearTextLoginPw qwer1234

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar update --ip
192.168.1.14 --package c:\Firmwares\rap_v1.2.0b3.lfp2 --backupFolder c:\My_backup --clearTextLoginPw qwer1234
[2021-05-14 14:39:23.243] [ INFO] [           main] - Device IPs: [192.168.1.14]
[2021-05-14 14:39:26.379] [ WARN] [ pool-2-thread-1] - NetworkMask property is not available. Cannot determine
whether the device is on the same network or not.
[2021-05-14 14:39:26.466] [ WARN] [ pool-2-thread-1] - Bonjour device builder error messages: [object Array]
[2021-05-14 14:39:26.535] [ INFO] [           main] - All the selected devices are accessible over the network.
[2021-05-14 14:39:26.753] [ INFO] [           main] - All the selected devices are compatible with the specified
package.
[2021-05-14 14:39:27.307] [ INFO] [    192.168.1.14] - Package version: 1.5.0b4
[2021-05-14 14:39:27.441] [ INFO] [    192.168.1.14] - Logged in successfully.
[2021-05-14 14:39:27.471] [ INFO] [    192.168.1.14] - Creating backup of device settings...
[2021-05-14 14:39:31.010] [ INFO] [    192.168.1.14] - Backup HTTP enable properties
[2021-05-14 14:39:33.462] [ INFO] [    192.168.1.14] - HTTP and HTTP post have got enabled on port 80
[2021-05-14 14:39:33.656] [ INFO] [    192.168.1.14] - No miniweb file is found on the device.
[2021-05-14 14:39:36.091] [ INFO] [    192.168.1.14] - HTTP and HTTP post properties have got restored on port 80
[2021-05-14 14:39:36.186] [ INFO] [    192.168.1.14] - Switching device into bootload mode...
[2021-05-14 14:39:56.561] [ INFO] [    192.168.1.14] - Gathering UID information from device...
[2021-05-14 14:39:56.937] [ INFO] [    192.168.1.14] - UID info - Device IP: 192.168.1.14 Product name: RAC-B501
Product part number: 91540050 Serial number: 00006363 Hardware version: V20_DAX0 MAC address: A8:D2:36:FF:63:63
[2021-05-14 14:39:57.301] [ INFO] [    192.168.1.14] - Package version on device: 1.5.0b4 r66
[2021-05-14 14:39:57.714] [ INFO] [    192.168.1.14] - Updating RAP series application fw - part 1...
[2021-05-14 14:39:58.052] [ INFO] [    192.168.1.14] -  [rap-f427.bin.ER_IROM1]'s current version on device:
1.5.0b4 r56
[2021-05-14 14:39:58.053] [ INFO] [    192.168.1.14] -  [rap-f427.bin.ER_IROM1]'s version in the package: 1.5.0b4
r56
[2021-05-14 14:40:14.848] [ INFO] [    192.168.1.14] -  [rap-f427.bin.ER_IROM1]'s firmware version updated in FVS
EEPROM.
[2021-05-14 14:40:14.850] [ INFO] [    192.168.1.14] - Updating UMX-TPS-TX100 series application fw - part 2...
[2021-05-14 14:40:15.178] [ INFO] [    192.168.1.14] -  [rap-f427.bin.ER_IROM2]'s current version on device:
1.5.0b4 r56
[2021-05-14 14:40:15.179] [ INFO] [    192.168.1.14] -  [rap-f427.bin.ER_IROM2]'s version in the package: 1.5.0b4
r56
[2021-05-14 14:40:36.511] [ INFO] [    192.168.1.14] -  [rap-f427.bin.ER_IROM2]'s firmware version updated in FVS
EEPROM.
[2021-05-14 14:40:36.512] [ INFO] [    192.168.1.14] - Updating VS100TX fw...
[2021-05-14 14:40:36.837] [ INFO] [    192.168.1.14] -  [vs100_tx.bin]'s current version on device: 1.1.0b0 r0
[2021-05-14 14:40:36.839] [ INFO] [    192.168.1.14] -  [vs100_tx.bin]'s version in the package: 1.1.0b0 r63
[2021-05-14 14:40:49.849] [ INFO] [    192.168.1.14] -  [vs100_tx.bin]'s firmware version updated in FVS EEPROM.
[2021-05-14 14:40:49.851] [ INFO] [    192.168.1.14] - Updating PS171 FW...
[2021-05-14 14:40:50.177] [ INFO] [    192.168.1.14] -  [rap_family_ps171.bin]'s current version on device: 1.0.6b0
r0
[2021-05-14 14:40:50.179] [ INFO] [    192.168.1.14] -  [rap_family_ps171.bin]'s version in the package: 1.0.6b0
r522
[2021-05-14 14:41:06.386] [ INFO] [    192.168.1.14] -  [tps_family_ps171.bin]'s firmware version updated in FVS
```

```
EEPROM.
[2021-05-14 14:41:12.514] [ INFO] [    192.168.1.14] - Setting system information...
[2021-05-14 14:41:18.637] [ INFO] [    192.168.1.14] - Starting application...
[2021-05-14 14:43:03.605] [ INFO] [    192.168.1.14] - Waiting for VS100...
[2021-05-14 14:43:05.237] [ INFO] [    192.168.1.14] - Restoring device settings from the following backup file:
c:\My_backup\backup_91540050_00006363_2021-05-14_14-39-28_converted.lw3 ...
[2021-05-14 14:43:14.325] [ INFO] [    192.168.1.14] - Device settings have been restored
[2021-05-14 14:43:14.358] [ INFO] [    192.168.1.14] - Resetting device...
[2021-05-14 14:43:19.071] [ INFO] [    192.168.1.14] - Done

All 1 update(s) finished successfully.
```

Example 3

The following options applied:
- Cleartext login password is applied
- Custom backup folder is set
- Current configuration is saved
- Firmware is **not updated** but the process and the connection is **tested**

```
C:\Program Files (x86)\Lightware\Lightware Device Updater V2>LightwareDeviceUpdaterV2_CLI.cmd update --test --ip
192.168.1.14 --package c:\Firmwares\rap_v1.2.0b3.lfp2 --backupFolder c:\My_backup --clearTextLoginPw qwer1234

C:\Program Files (x86)\Lightware\Lightware Device Updater V2>lib\jre\bin\java.exe -jar lib\ldu2.jar update --test
--ip 192.168.1.14 --package c:\Firmwares\rap_v1.2.0b3.lfp2 --backupFolder c:\My_backup --clearTextLoginPw qwer1234
[2021-05-14 14:45:37.351] [ INFO] [            main] - Device IPs: [192.168.1.14]
[2021-05-14 14:45:40.396] [ WARN] [ pool-2-thread-1] - NetworkMask property is not available. Cannot determine
whether the device is on the same network or not.
[2021-05-14 14:45:40.481] [ WARN] [ pool-2-thread-1] - Bonjour device builder error messages: [object Array]
[2021-05-14 14:45:40.551] [ INFO] [            main] - All the selected devices are accessible over the network.
[2021-05-14 14:45:40.748] [ INFO] [            main] - All the selected devices are compatible with the specified
package.
[2021-05-14 14:45:41.347] [ INFO] [    192.168.1.14] - PASSED - Test #01 - Communication over LW3
[2021-05-14 14:45:41.427] [ INFO] [    192.168.1.14] - PASSED - Test #02 - Cleartext login - PW is correct
[2021-05-14 14:45:41.474] [ INFO] [    192.168.1.14] - Creating backup of device settings...
[2021-05-14 14:45:45.010] [ INFO] [    192.168.1.14] - Backup HTTP enable properties
[2021-05-14 14:45:47.417] [ INFO] [    192.168.1.14] - HTTP and HTTP post have got enabled on port 80
[2021-05-14 14:45:47.620] [ INFO] [    192.168.1.14] - No miniweb file is found on the device.
[2021-05-14 14:45:50.058] [ INFO] [    192.168.1.14] - HTTP and HTTP post properties have got restored on port 80
[2021-05-14 14:45:50.060] [ INFO] [    192.168.1.14] - PASSED - Test #03 - Configuration and/or device preset
backup created
[2021-05-14 14:45:50.080] [ INFO] [    192.168.1.14] - Switching device into bootload mode...
[2021-05-14 14:45:51.721] [ INFO] [    192.168.1.14] - PASSED - Test #04 - Switch device into bootloader mode
[2021-05-14 14:46:09.050] [ INFO] [    192.168.1.14] - PASSED - Test #05 - Communication with bootloader
[2021-05-14 14:46:09.063] [ INFO] [    192.168.1.14] - Gathering UID information from device...
[2021-05-14 14:46:09.403] [ INFO] [    192.168.1.14] - PASSED - Test #06 - TFTP file transfer
[2021-05-14 14:46:22.638] [ INFO] [    192.168.1.14] - PASSED - Test #07 - Start application FW
[2021-05-14 14:46:22.681] [ INFO] [    192.168.1.14] - Done

All 1 update(s) finished successfully.
```

8.6.9. Exit Codes

There is a return value in all cases, when a command run is finished. Currently, three codes are defined:

Code	Displayed text	Description
0	N/A	The update performed successfully
1	Update error (ErrorCode:1)	The error happened during the update
2	CLI error (ErrorCode:2	The error happened before starting the update

The error line contains further information about the error.

Querying the Exit Code under Windows®

```
c:\Program Files (x86)\Lightware\Lightware Device Updater V2\echo %errorlevel%
0
```

Querying the Exit Code under Linux

```
echo $?
0
```

So if this value is queried after the update and it is 0, the update performed successfully.

8.7. If the Update is not successful

- Restart the process and try the update again.
- If the device cannot be switched to bootload (firmware update) mode, you can do that manually as written in the User's manual of the device. Please note that backup and restore cannot be performed in this case.
- If the backup cannot be created for some reason, you will get a message to continue the process without backup or stop the update. A root cause can be that the desired device is already in bootload (firmware update) mode, thus, the normal operation mode is suspended and backup cannot be made.
- If an update is not successful, the **Export log** button becomes red. If you press the button, you can download the log file as a ZIP package which can be sent to Lightware Support if needed. The log files contain useful information about the circumstances to find the root cause.   *#bootload*

9

Troubleshooting

Usually, if the system seems not to transport the signal as expected, the best strategy for troubleshooting is to check signal integrity through the whole signal chain starting from source side and moving forward to device end.

▶ USE CASES
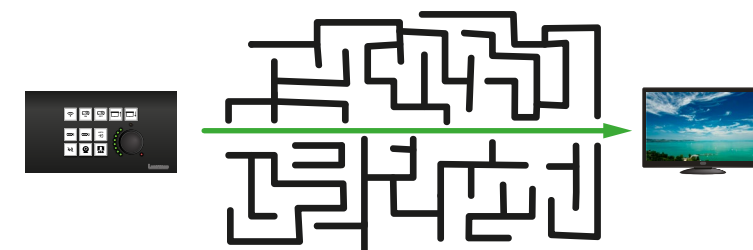▶ HOW TO SPEED UP THE TROUBLESHOOTING PROCESS

9.1. Use Cases

At first, check front panel LEDs and take the necessary steps according to their states. For more information about status, LEDs refer to RAP-B511 Series and Rear View sections.

Symptom	Root cause	Action
RS-232 signal		
Connected serial device does not respond	Cable connection problem	Check the connectors to fit well; check the wiring of the plugs.
	RS-232 settings are different	Check the port settings of the RAP-B511 and the connected serial device(s).
	RS-232 mode is not right	Check the RS-232 mode settings (control, command injection, or disconnected)
Network		
No LAN connection can be established	Incorrect IP address is set (fix IP)	Use dynamic IP address by enabling DHCP option.
		Restore the factory default settings (with fix IP).
	IP address conflict	Check the IP address of the other devices, too.
GPIO		
Connected device does not respond	Cable connection problem	Check the connectors to fit well; check the wiring of the plugs.
Output level cannot be changed	The direction of the selected pin is set to input	Check and modify the direction setting of the desired pin
Miscellaneous		
Front panel buttons are out of operation	Buttons are set as locked in LDC	Unlock the buttons

9.2. How to Speed Up the Troubleshooting Process

Lightware's technical support team is always working hard to provide the fastest support possible. Our team's response time is one of the best in the industry and in the toughest of cases we can directly consult with the hardware or software engineer who designed the product to get the information from the most reliable source.

However, the troubleshooting process can be even faster... with your help.

There are certain pieces of information that push us in the right direction to finding the root cause of the problem. If we receive most of this information in the first e-mail or it is gathered at the time when you call us, then there is a pretty high chance that we will be able to respond with the final solution right away.

This information is the following:

- Schematic (a pdf version is preferred, but a hand drawing is sufficient).
- Serial number(s) of the device(s) (it is either printed somewhere on the box or you can query it in the Device Controller software or on the built-in website).
- Firmware versions of the devices (please note that there may be multiple CPUs or controllers in the device and we need to know all of their firmware versions, a screenshot is the best option).
- Cable lengths and types (in our experience, it's usually the cable).
- Patch panels, gender changers or anything else in the signal path that can affect the transmission.
- Signal type (resolution, refresh rate, color space, deep color).
- Emulated EDID(s) (please save them as file and send them to us).
- Actions to take in order to re-create the problem (if we cannot reproduce the problem, it is hard for us to find the cause).
- Photo or video about the problem ('image noise' can mean many different things, it's better if we see it too).
- Error logs from the Device Controller software.
- In the case of Event Manager issue the event file and/or backup file from the Device Controller software.

The more of the above information you can give us the better. Please send these information to the Lightware Support Team (support@lightware.com) to speed up the troubleshooting process.

10

Appendix

Tables, drawings, guides, hashtag keyword list and technical details as follows:

- ▶ Specifications
- ▶ Factory Default Settings
- ▶ Cable Wiring Guide
- ▶ Button Numbering
- ▶ Mechanical Drawings
- ▶ Supplied Button Labels for RAP-B511 series
- ▶ Button Sizes for RAP-B511 series
- ▶ Applied Ports (Network Settings)
- ▶ Firmware Release Notes
- ▶ Hashtag Keyword List
- ▶ Further Information

10.1. Specifications

General

Compliance	CE, UKCA
EMC (emission)	EN 55032:2015+A1:2020
EMC (immunity)	EN 55035:2017+A11:2020
RoHS	EN 63000:2018
Electrical safety	EN 62368-1:2020
Warranty	3 years
Operating temperature	0° to +50°C (+32° to +122°F)
Operating temperature	0 to +50˚C (+32 to +122˚F)
Operating humidity	10% to 90%, non-condensing
Cooling	Passive

Power

Power supply option	Power adaptor / PoE
Power consumption (supplied by local power)	1.78W
Power consumption (supplied by PoE)	1.87W
Heat dissipation (max)	7 BTU/h
Power over Ethernet (PoE)	via Ethernet port (IEEE802.3af)

Power adaptor (not supplied)

Supported power source	100-240 V AC; 50/60 Hz
Supplied power	48V DC, 0.5A
AC power plug	Interchangable (EU, UK, JP/US, AUS/NZ)
DC power plug	2-pole Phoenix connector

Enclosure

RAP-B511 series

Rack mountable	No
Enclosure material	1 mm steel
Dimensions in mm (-EU)	152 W x 58.1 D* x 82 H
Dimensions in inch (-EU)	6 W x 2.3 D* x 3.3 H
Dimensions in mm (-UK)	140 W x 58.1 D* x 80 H
Dimensions in mm (-UK)	5.6 W x 2.3 D* x 3.2 H
Dimensions in mm (-US)	115.9 W x 58.1 D* x 115.9 H
Dimensions in mm (-US)	4.6 W x 2.3 D* x 4.6 H
Weight (-EU)	412 g (0.92 lb)
Weight (-UK)	380 g (0.84 lb)
Weight (-US)	433 g (0.95 lb)

* with the front panel and rotary knob

RAC-B501

Rack mountable	Yes, with 1U high rack shelf
Enclosure material	1 mm steel
Dimensions in mm	100.4 W x 98.4 D x 26 H
Dimensions in inch	3.9 W x 3.8 D 1 H
Weight	329 g (0.72 lb)

Control Ports

Control Ethernet

Connector type	RJ45 female connector
Ethernet data rate	10/100Base-T, full duplex with autodetect
Power over Ethernet (PoE)	PoE in (1x), PoE out (1x)

RS-232

Connector type	3-pole Phoenix connector
Baud rates	between 4800 and 115200 baud
Data bits	8 or 9
Parity	None / Odd / Even
Stop bits	1 / 1.5 / 2
Output voltage: Low / High level	3 - 15V / -15V - 3V

Infrared port **

Input	Built-in IR detector

** Only for RAP-B511 series models

GPIO port

Connector type	4-pole Phoenix connector
Number of configurable pins	3
Port direction	Input or output

INFO: Specifications are subject to change without notice.

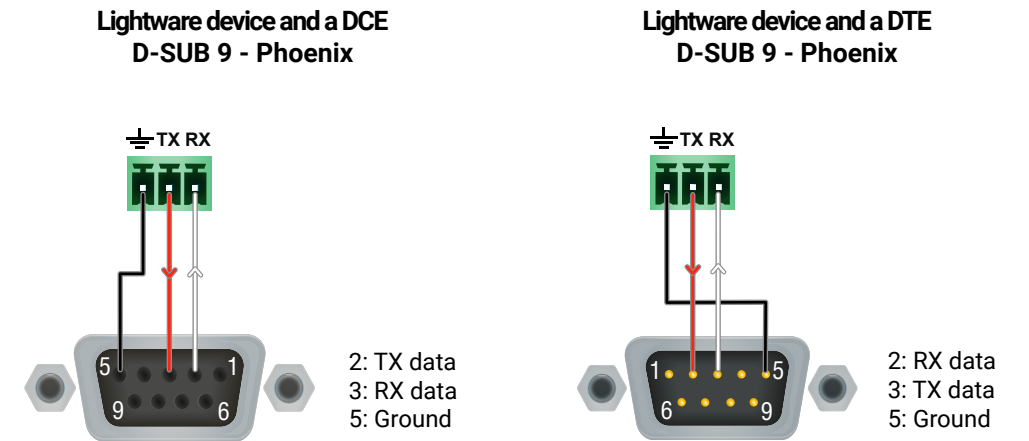## 10.2. Factory Default Settings

Parameter	Setting/Value
Button settings	
Button enabled	true
Operation mode	0
Interaction state	true
EnabLED	true
LED function for True state	off
LED function for False state	off
Button LED lowbright level	2
Button LED highbright level	5
Network settings	
IP address	192.168.0.100
Subnet mask	255.255.255.0
Static gateway	192.168.0.1
DHCP	Disabled
LW2 port number	10001
LW3 port number	6107
HTTP port number	80
RS-232 settings	
Control protocol	LW2
Baud rate	57600
Databits	8
Parity	No
Stopbits	1
Operation mode	Command Injection
Command injection port nr.	8001
Recognizer delimiter	0D0A
Recognizer Timeout	0 (disabled)
Recognizer Active property timeout	50
IR port settings - only for RAP-B511 series models	
Command injection status	Enabled
Command injection input port nr.	9001
GPIO port settings	
Output level / Direction	High / Input

10.3. Cable Wiring Guide

RS-232 Data Transmission

Room Automation Panel is built with 3-pole Phoenix connector. See the below examples of connecting to a DCE (Data Circuit-terminating Equipment) or a DTE (Data Terminal Equipment) type device:

Lightware device and a DCE
D-SUB 9 - Phoenix

2: TX data
3: RX data
5: Ground

Lightware device and a DTE
D-SUB 9 - Phoenix

2: RX data
3: TX data
5: Ground

■ INFO: The RAP-B511 series works as a DCE unit according to its pin-out.

10.4. Button Numbering
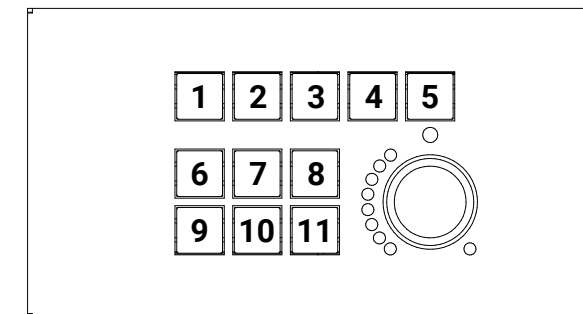
10.5. Mechanical Drawings

Dimensions are in mm.

10.5.1. RAP-B511 Series

RAP-B511-EU -K, -W, -S

▌ INFO: All the RAP-B511-EU models have the same size.

RAP-B511-UK -K, -W, -S

▌ INFO: All the RAP-B511-UK models have the same size.
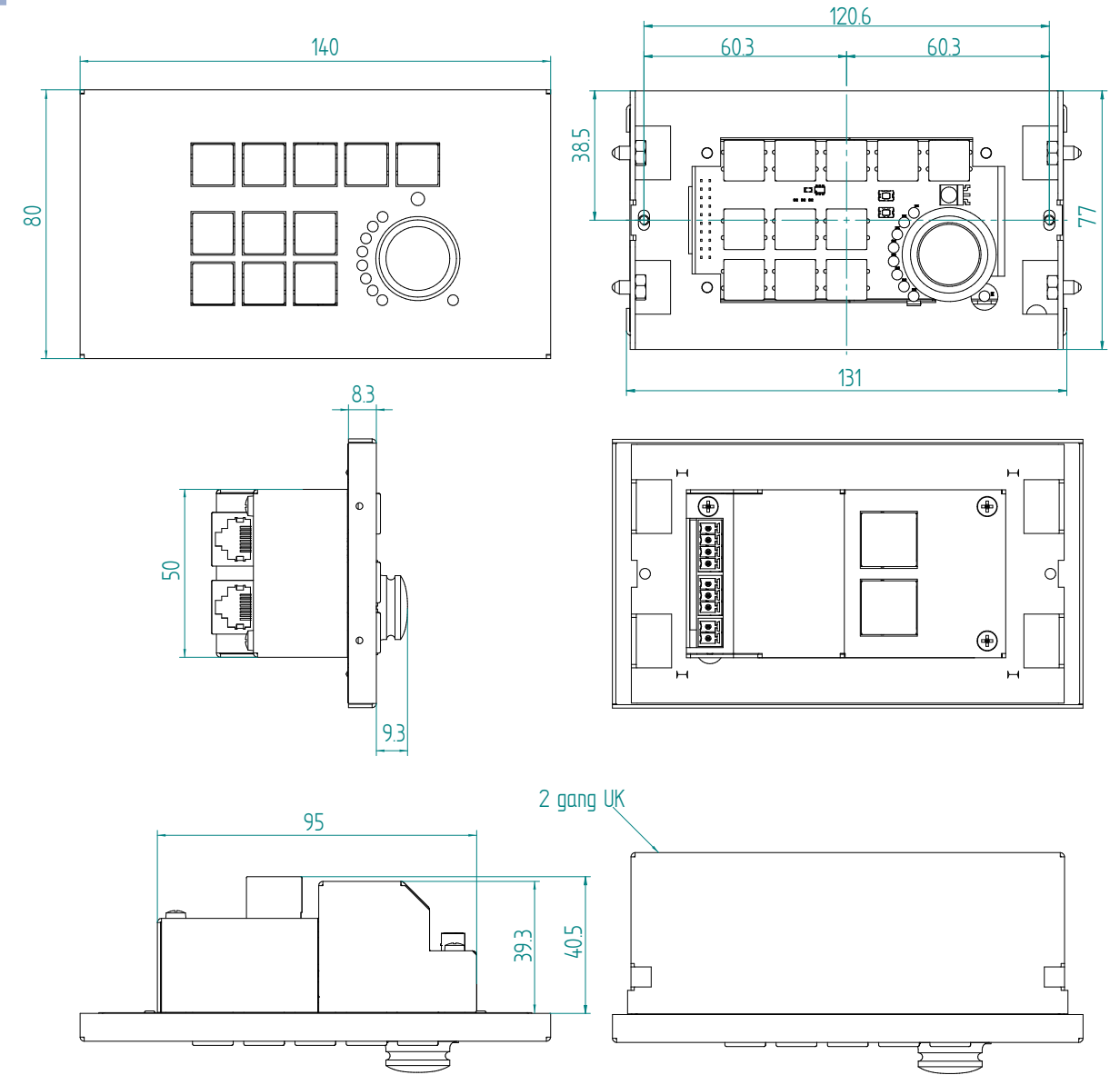
RAP-B511-US -K, -W, -S

> INFO: All the RAP-B511-US models have the same size.

10.5.2. RAC-B501

M3 thread,
max. screw size: M3x4
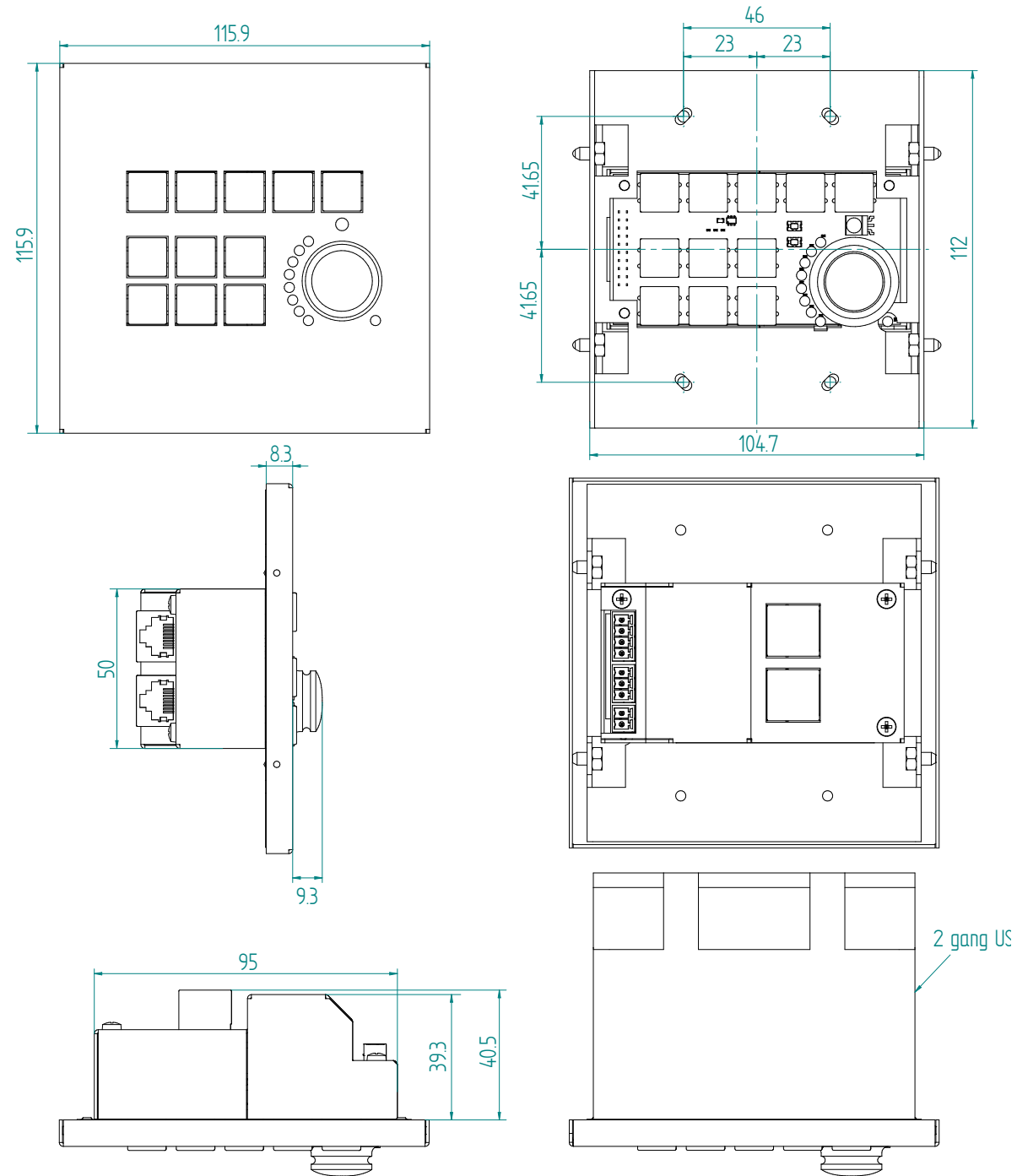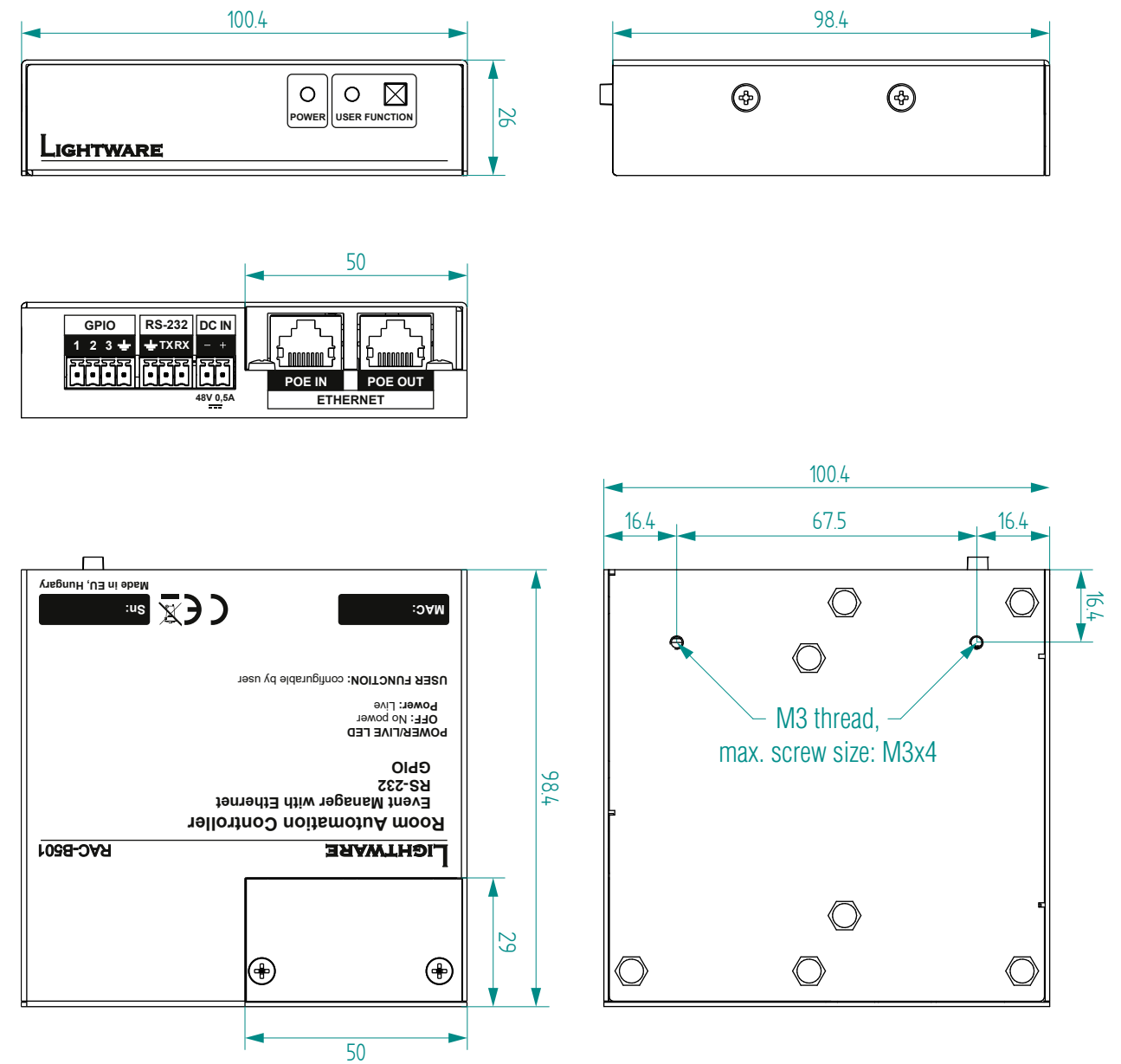
10.6. Supplied Button Labels for RAP-B511 series

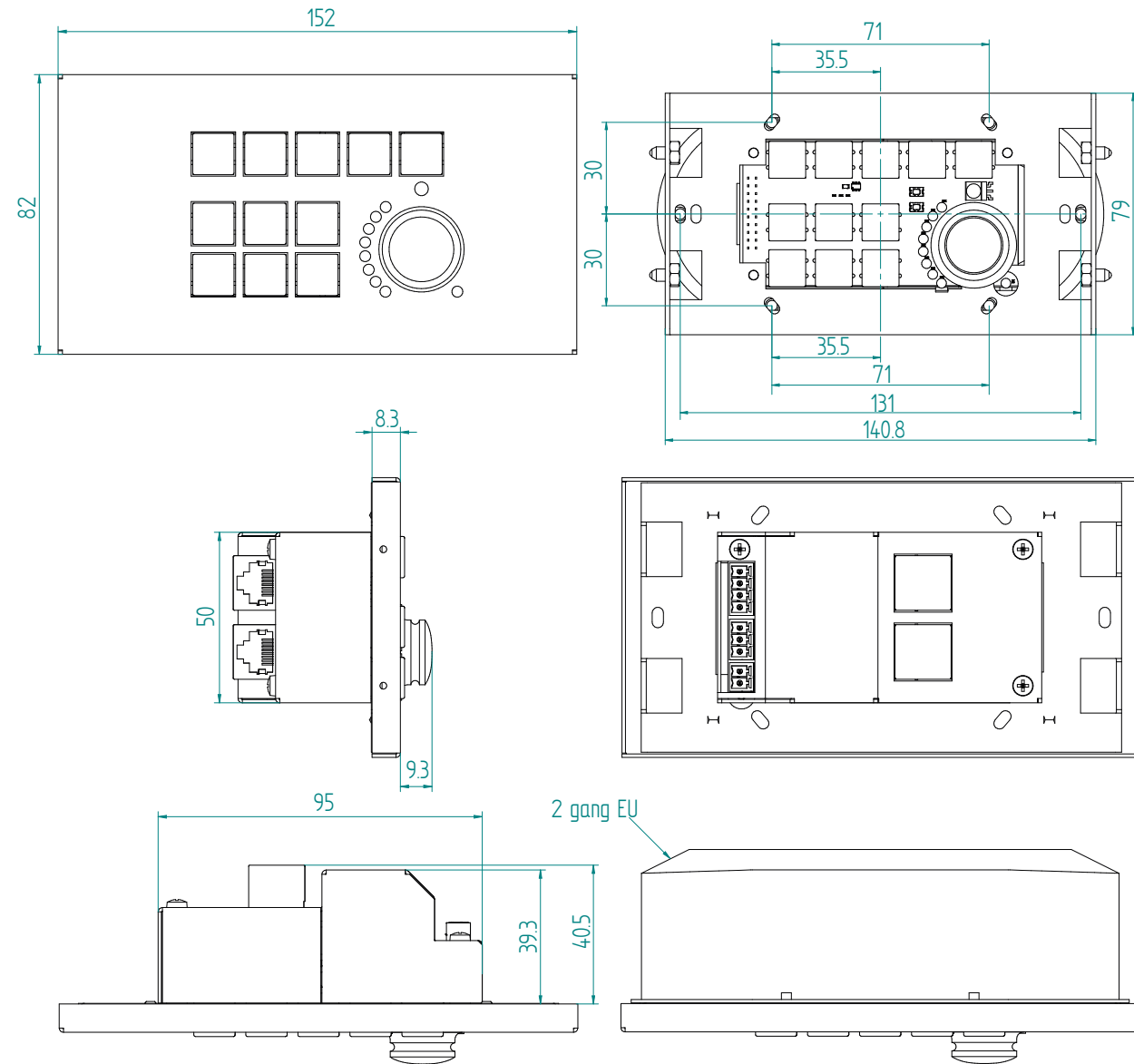|							
PROJ ON / OFF	PROJ ON	PROJ OFF	DISPLAY ON / OFF	DISPLAY ON	DISPLAY OFF	SCREEN UP	SCREEN DOWN
SYSTEM ON / OFF	SYSTEM ON	SYSTEM OFF	LIGHTS ON / OFF	LIGHTS ON	LIGHTS OFF	DISPLAY 1	DISPLAY 2
PC	PC1	PC2	LAPTOP	LAPTOP1	LAPTOP2	VGA	DP
HDMI	HDMI1	HDMI2	AUTO SOURCE	INPUT1	INPUT2	INPUT3	INPUT4
DOC CAM	CAMERA	BLURAY	MEDIA PLAYER	ROOM PC	WALL PLATE	VIDEO CONF	LECTERN PC
VOL UP	VOL DOWN	VOL MUTE		WIRELESS	APPLE TV	BLACK SCREEN	BLANK / AV MUTE
1	2	3	4	5	6	7	8
9	10	11	0				

10.7. Button Sizes for RAP-B511 series

The dimensions are in mm.
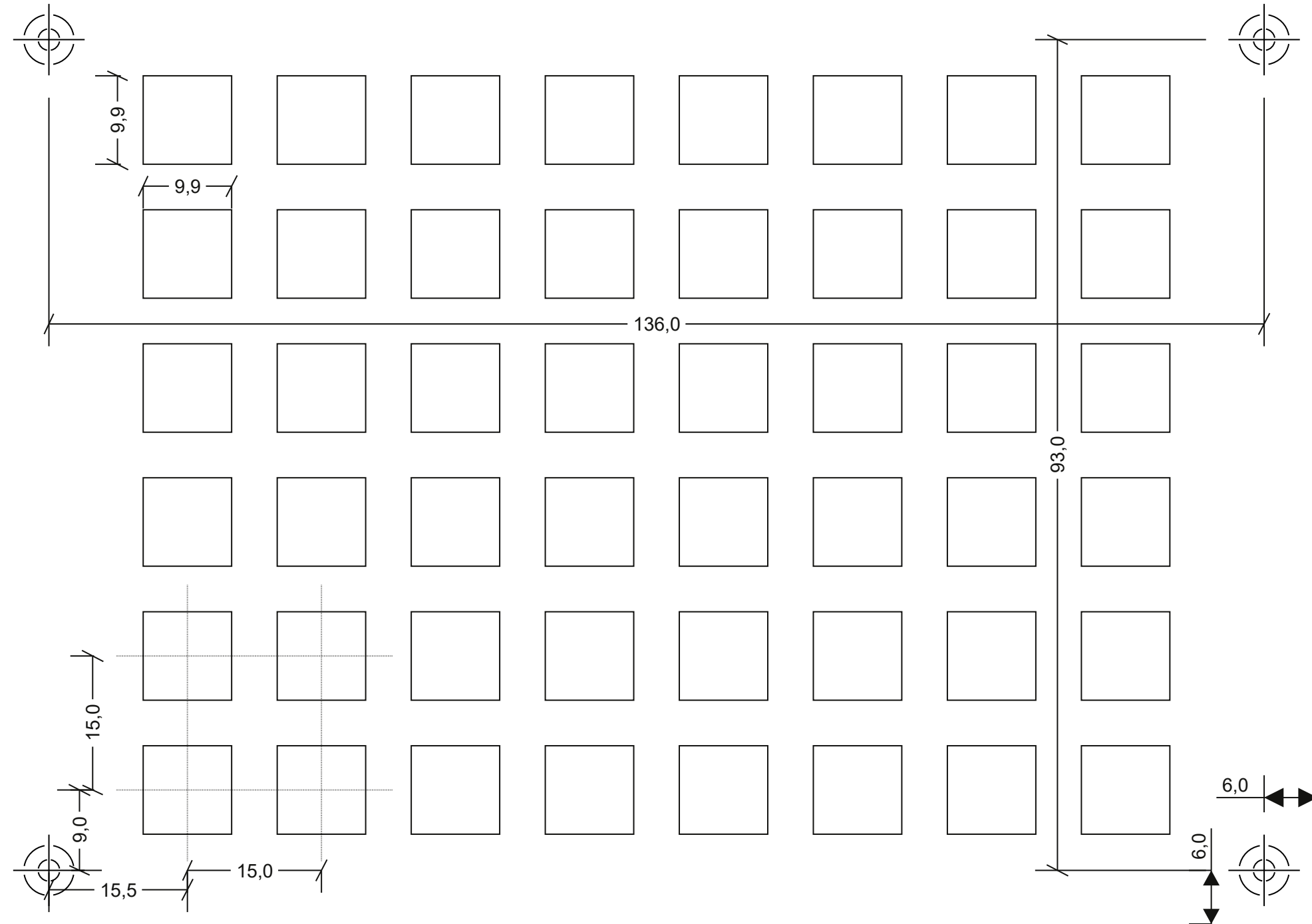
10.8. Applied Ports (Network Settings)

The following ports are necessary to pass via a network switch/firewall for a proper working between the device and the softwares:

Purpose/function	Affected software	Protocol	Port nr.
Firmware update TFTP	LDU2	UDP	69
		UDP	50000
Device Discovery	LDC	UDP	224.0.0.251:5353
Remote IP	LDC	UDP	230.76.87.82:37421
Find me (LMDMP)	-	UDP	230.76.87.82:37422
LW2 protocol	-	TCP	10001
LW3 protocol	-	TCP	6107
HTTP port	-	TCP	80
RS-232 command injection	-	TCP	8001, 8002
IR command injection	-	TCP	9001, 9002, 9003, 9004

10.9. Firmware Release Notes

The list below shows the released firmware packages with important notes.

v1.2.0b1

Release date: 2022-09-15

New feature:

- Support new product: RAC-B501

v1.1.1b2

Release date: 2021-05-31

New feature:

- Update Control USB interface driver.

Bugfix:

- Fixed an IP address mode setting bug

v1.1.0b3

Release date: 2021-01-12

New feature:

- Added AND operator for Event Manager Conditions (Advanced Control pack v3)
- Added Condition triggering for Event Manager (Advanced Control pack v3)
- Added Variable handling for Event Manager (Advanced Control pack v3)
- Added Permanent TCP clients with configurable target IP address, and Message recognizer for TCP clients (Advanced Control pack v3)
- Added LW3 command-salvo over Http POST (protocol.lw3) (Advanced Control pack v3)
- Added Http message sending with sendHttpPost and sendHttpPut (target server IP, target filepath, header, body) (Advanced Control pack v3)
- Added method to send Wake On LAN packet (Advanced Control pack v3)
- Added cleartext login function (disabled by default) (Advanced Control pack v3)
- Added MAC filtering (Advanced Control pack v3)
- Added IP port and services filtering (Advanced Control pack v3)
- Added Macro capability (running partial device preset with tags) (Advanced Control pack v3)
- Added LMDMP (Lightware Multicast Device Management Protocol) feature.
- Modified DeviceLabel property default text to LW_<productname>_<serialnum>
- Added properties in root node: FirmwareVersion, PackageVersion, MacAddress.
- Added property to indicate FeaturePackVersion (Advanced Control pack v3)
- Added Condition detect on property change to anything in Event Manager (Advanced Control pack v3)
- Added Network HostName property (default: lightware-<serialnum>).
- Support for the factory reset button on the front panel.

Bugfix:

- Improved network compatibility with 10.x.x.x IP address range.
- Minor performance improvements and modifications.
- Fixed issue with tick counter when the device is continuously operating for a very long time.
- Unmute on volume change property added.

v1.0.3b2

Release date: 2020-05-21

Bugfix:

- Cisco integration support
- Minor built-in miniweb bugfixes

v1.0.2b2

Release date: 2019-09-17

Bugfix:

▪ The setting of the device into factory default mode accidentally while operating the appliance has been ceased. In case of the device IP is unknown and no factory default hotkey is available, please connect the device to a computer using an USB cable.

v1.0.1b1

Release date: 2019-05-21

Bugfix:

▪ Fixed a potential Backup restore LED status bug

v1.0.0b17

Release date: 2019-04-17

New feature:

▪ Initial release

Known issue:

▪ If the USB connection is broken accidentally, it occurs that the device lost the connection. Check the cable and reset the device.

10.10. Hashtag Keyword List

This user's manual contains keywords with hashtag (#) to help you find the relevant information as quick as possible.

The format of the keywords is the following:

#<keyword>

The usage of the keywords: use the **Search** function (Ctrl+F / Cmd+F) of your PDF reader application, type the **#** (hashtag) character and the wished keyword.

The **#new** special keyword indicates a new feature/function that has just appeared in the latest firmware or software version.

Example

#dhcp

This keyword is placed at the DHCP (dynamic IP address) setting in the front panel operation, the Lightware Device Controller (LDC) and the LW3 programmer's reference section.

The following list contains all hashtag keywords placed in the document with a short description belonging to them. The list is in **alphabetical order** by the hashtag keywords.

Hashtag Keyword ↓↑	Description
#advancedview	Advanced view / Terminal window
#backup	Configuration cloning (backup)
#bootload	Bootload mode setting
#button	Button configuration
#buttonled	Button LED configuration
#buttonlock	Front panel button lock setting
#devicelabel	Device label
#dhcp	Dynamic IP address (DHCP) setting
#eventmanager	Event manager
#factory	Factory default settings
#firmwareversion	Firmware version query
#gpio	GPIO realted settings
#http	Http post and put messaging, salvo commands
#infra	Infrared port related settings
#infrared	Infrared port related settings
#ipaddress	IP address related settings
#label	Device label
#led	Button LED configuration

Hashtag Keyword ↓↑	Description
#lockbutton	Front panel button lock setting
#log	System log
#login	Cleartext login feature
#macfilter	MAC filtering (IT security)
#macro	Macro-handling
#message	Message sending via communication ports
#network	Network (IP address) related settings
#portblock	IP port blocking (IT security)
#producttype	Product type query
#protocol	RS-232 protocol setting
#real-time	Time settings
#reboot	Restarting the device
#recognizer	RS-232 recognizer
#restart	Restarting the device
#rotary	Rotary configuration
#rs232	RS-232 related settings
#rs-232	RS-232 related settings
#serial	RS-232 related settings
#serialnumber	Serial number query
#style	Button style configuration
#systemlog	System log
#tcprecognizer	TCP message recognizer-related settings
#terminal	Advanced view / Terminal window
#time	Time settings
#variables	Variable-management
#volume	Rotary configuration

10.11. Further Information

Limited Warranty Statement

1. Lightware Visual Engineering PLC (Lightware) warrants to all trade and end user customers that any Lightware product purchased will be free from manufacturing defects in both material and workmanship for three (3) years from purchase unless stated otherwise below. The warranty period will begin on the latest possible date where proof of purchase/delivery can be provided by the customer. In the event that no proof can be provided (empty 'Date of purchase' field or a copy of invoice), the warranty period will begin from the point of delivery from Lightware.

1.1. 25G and MODEX product series will be subject to a seven (7) year warranty period under the same terms as outlined in this document.

1.2. If during the first three (3) months of purchase, the customer is unhappy with any aspect of a Lightware product, Lightware will accept a return for full credit.

1.3. Any product that fails in the first six (6) months of the warranty period will automatically be eligible for replacement and advanced replacement where available. Any replacements provided will be warranted for the remainder of the original unit's warranty period.

1.4. Product failures from six (6) months to the end of the warranty period will either be repaired or replaced at the discretion of Lightware. If Lightware chooses to replace the product then the replacement will be warranted for the remainder of the original unit's warranty period.

2. The above-stated warranty and procedures will not apply to any product that has been:

2.1. Modified, repaired or altered by anyone other than a certified Lightware engineer unless expressly agreed beforehand.

2.2. Used in any application other than that for which it was intended.

2.3. Subjected to any mechanical or electrical abuse or accidental damage.

2.4. Any costs incurred for repair/replacement of goods that fall into the above categories (2.1., 2.2., 2.3.) will be borne by the customer at a pre-agreed figure.

3. All products to be returned to Lightware require a return material authorization number (RMA) prior to shipment and this number must be clearly marked on the box. If an RMA number is not obtained or is not clearly marked on the box, Lightware will refuse the shipment.

3.1. The customer will be responsible for in-bound and Lightware will be responsible for out-bound shipping costs.

3.2. Newly repaired or replaced products will be warranted to the end of the originally purchased products warranty period.

Document Revision History

Rev.	Release date	Changes	Editor
1.0	04-06-2019	Initial version	Judit Barsony
		. . .	
2.4	09-05-2023	Button lock information updated	Nikolett Keindl
2.5	12-12-2023	Specification updated	Tamas Forgacs

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