NUVOLIGHT

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System Installation

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1 Introduction

We are pleased that you have chosen the Nuvolight system to implement your project. You have acquired a high quality product that was developed in German workmanship.

The Nuvolight system is primarily designed as a lighting control solution specifically for cinemas. Accordingly, this guide focuses particularly on installation in cinemas, but it also covers most other areas of application.

Our support team is available at any time for further information and questions.

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2 Product Overview

The Nuvolight system is a user-friendly solution for lighting and automation control, which is based on the standard network protocol and supports a large number of buses.
Take over control by using our intuitive and in-house developed iOS app NuvoTouch. The integration of traditional light switches is also easily possible. Automated control via network command or GPOs, e.g. from the cinema server, is also enabled.

A control server unit (**SMARThub**) is the central element of the Nuvolight system and is used to manage scenes, time scheduling and device configurations. Any number of network control units (**SMARTgateway**) can be connected, which in turn offer a variety of interfaces for connecting lights and electrical components.
Since the communication between SMARThub and SMARTgateway takes place via network, long distances can be covered within the installation. Also, a network structure with network cables already exists in many buildings. The SMARTgateway then serves as a local network converter for lighting in the respective zone.

For buildings in which the highest level of lighting reliability is required, the SMARThub can be used in a redundant version in order to achieve maximum reliability. The SMARThub consists of a network switch and two control computers (NKS1 and NKS2), which also act as routers. Should NKS1 fail, NKS2 takes over control seamlessly. In connection with our remote maintenance service, our service team receives an email notification about the system status and can react accordingly.

2.1 SMARThub

The **SMARThub** is the heart of the Nuvolight System. It consists of

– the Master Server NKS1
– the Slave Server NKS2 (in the case of the redundant SMARThub version)
– a network switch (in the case of the redundant SMARThub version)

The SMARThub is the intelligent interface between all control components. The servers behave as master (NKS1) and slave (NKS2), whereby the slave takes over immediately if the master is not visible in the network. Network routing is also mapped by the NKS computers. The computers manage all information about the installation, e.g. how many groups there are, which devices are in which group and which scenes there are. The NuvoTouch app obtains all display information from the SMARThub and thus serves as a visualization and control interface. The SMARThub is only required once for the entire building.
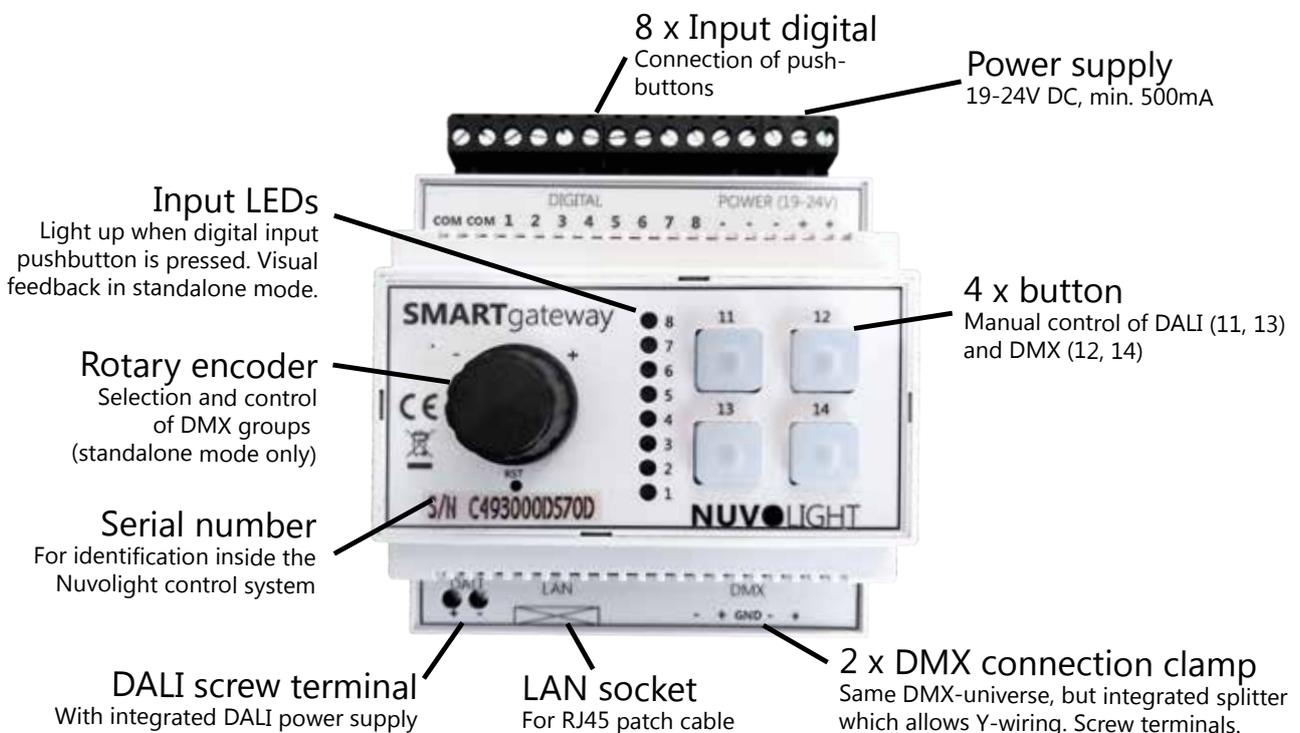
2.2 SMARTgateway

The Nuvolight **SMARTgateway** is a control device that is used as a converter from network communication to the "outside world". The SMARTgateway offers the following connection options:

 – Eight inputs for buttons and GPO contacts
 – Two DMX outputs
 – One DALI output via which the bus is also supplied with power
 – Network port for connection to the SMARThub

NOTE: The SMARTgateway can also be used standalone without a SMARThub server. For that, it is also able to store scenes and sequences internally. You can find detailed instructions on this in the data sheet of the SMARTgateway.
When using the SMARThub with a SMARThub, internal scenes of the SMARTgateway will collide with scenes in the SMARThub. Therefore, the SMARTgateway's internal scenes need to be empty.

It is advisable to use a separate SMARTgateway for each zone or room in order to keep the lengths of the bus lines low. When used in the cinema, one SMARTgateway is usually used per room.

8 x Input digital
Connection of push-buttons

Power supply
19-24V DC, min. 500mA

Input LEDs
Light up when digital input pushbutton is pressed. Visual feedback in standalone mode.

4 x button
Manual control of DALI (11, 13) and DMX (12, 14)

Rotary encoder
Selection and control of DMX groups (standalone mode only)

Serial number
For identification inside the Nuvolight control system

DALI screw terminal
With integrated DALI power supply

LAN socket
For RJ45 patch cable

2 x DMX connection clamp
Same DMX-universe, but integrated splitter which allows Y-wiring. Screw terminals.

2.3 DMX luminaires and spots

Nuvolight **luminaires** are controlled via DMX bus. In addition to a 230V power supply, a two-core shielded cable is also required. A CAT7 cable is best suited for permanent installations. This cable must be connected in a daisy-chain structure from luminaire to luminaire starting from the SMARTgateway. Branches are not allowed, as they can otherwise influence the signal quality. The DMX standard also provides for a maximum of 32 lights per DMX cable. Each DMX-compatible luminaire has an address that must be set individually. Each luminaire should have an individual address assignment so that it can be controlled separately.

Below is a typical DMX address assignment using the example of the **Nuvolight luminaire NewYork**:

Start address   --> Red
Start address + 1 --> Green
Start address + 2 --> Blue
Start address + 3 --> White (separately dimmable)
Start address + 4 --> Dimmer RGB
Start address + 5 --> Warm white
Start address + 6 --> Cold white
Start address + 7 --> Dimmer warm- and cold white

This results in a typical distribution of DMX **start addresses** for luminaires in the same DMX universe:

Luminaire 1 --> Start address 1
Luminaire 2 --> Start address 9
Luminaire 3 --> Start address 17
Luminaire 4 --> Start address 25
Luminaire 5 --> Start address 33
... etc.

Of course, other DMX-controlled lights or spotlights can also be used with the same DMX line. For Nuvolight luminaires and BUS receivers, addressing is done via a web interface. For event technology devices, it is common to program the device via an integrated display and menu buttons. The address assignment and the correct settings can be found in the manual for the luminaire.

2.3 DALI luminaires

DALI is a bus system commonly used for dimming of warm white lights. Compared to DMX, DALI is significantly slower, has a lower resolution and many luminaires often only offer a rough gradation of brightness in low dimming levels. Likewise, fade times can only be set in discrete steps.

Despite these restrictions, DALI offers many advantages during installation. Virtually any type of cable can be used, the bus is protected against polarity reversal, requires no shielding and the cabling allows branches and rings.

DALI lights can either be operated with the same dimming behavior on the same cable without addressing, or with individual addressing and control. Like DMX lights, DALI lights have to be addressed in advance. Therefore, a special programming device and associated programming software is needed. The DALI bus also requires its own short-circuit proof power supply with special specificatinos such as current limitation. However, this power supply is already integrated in the Nuvolight control actuators SMARTgateway and MIO.

Up to 64 lights can be operated on one DALI bus. Either you do without addressing and control all lights on the same bus cable using a broadcast command, or you address all lights, with addresses 0-63 being assigned. Additionally, each lamp can also be assigned to one of 16 groups with the number 0-15. Address and group membership are saved within the luminaire, there is no central administrative unit. Therefore, addressed luminaires cannot simply be exchanged, but replacement/new luminaires must be programmed with the corresponding address and group. .

The Nuvolight SMARTgateway offers the following brightness commands of the DALI protocol:

DALI broadcast — *All luminaires are affected, no matter what address*
DALI address 0-63 — *Only one luminaire with address 0-63 is affected*
DALI group 0-15 — *All lights with the respective group membership*

We recommend the use of DALI lights in foyers, catering areas or for general lighting in event halls. The DMX bus is preferred for effect lighting, colored lights or for light sequences.

3 Hardware installation

The central control unit of the Nuvolight system is the SMARThub, which consists of two redundant servers (NKS1 and NKS2) and a network switch. Any number of SMART-gateways serve as satellite-units to convert network commands into corresponding control signals for lights and automation where required. The network topology enables distances of any length to be covered up to the SMARTgateway, which then converts the control commands abstracted at the network level into the corresponding control signals and makes them available locally.

3.1 SMARThub installation and network setup

The SMARThub components (NKS server and switch) have a 19-inch rack format and should be installed in a central location in the building, from where every SMART gateway and every Nuvolight access point can be reached via LAN cable.

After the SMARThub is mounted in a 19-inch rack, the network cables must be connected as follows:
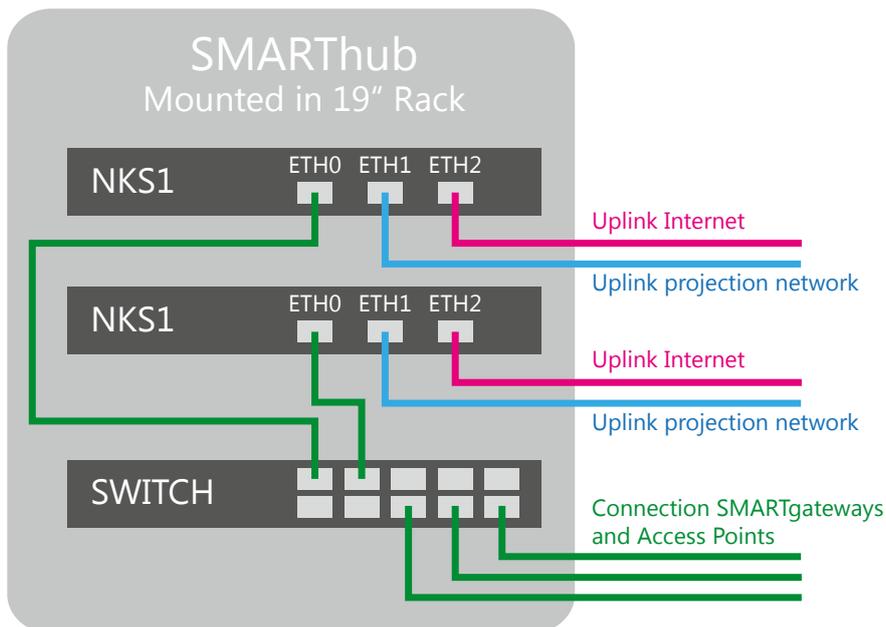
The NKS servers start up immediately after plugging in the power cable. Make sure that all network cables have been connected beforehand. The NKS servers also act as DHCP routers inside the Nuvolight internal network. With a redundant SMARThub there are two NKS servers, in which the slave (NKS2) not only takes over control but also routing if the master (NKS1) fails.

The Nuvolight system uses up to three networks.

1) *Internal Nuvolight Network:*
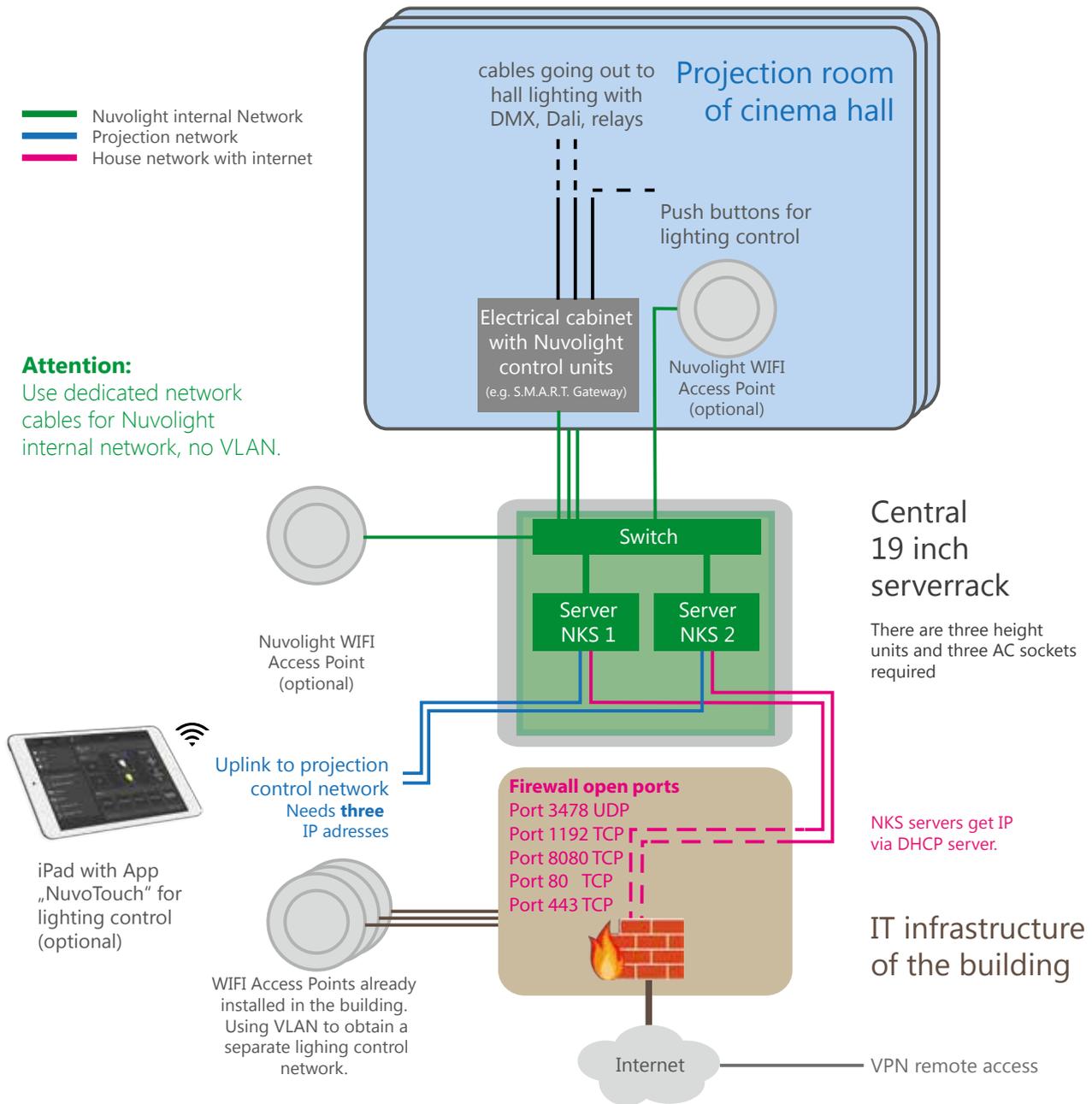   Used for communication between the SMARThub and the SMARTgateways.

2) *External network (scene execution from other device, e.g. cinema server):*
   Modern cinema servers can trigger scenes by sending a UDP network command to the SMARThub (two identical packets, to NKS1 and to NKS2). The cinema server control-network usually does not have a DHCP server running, so the NKS servers are expected to use static IP addresses. The setting of a static IP for an NKS server is described in *Section 4.1.1.*

3) *House network (Internet-uplink):*
   A remote internet connection is required to access the Nuvolight system. This network is expected to have a DHCP server.

A complete network overview is shown in the following figure:

Nuvolight internal Network
Projection network
House network with internet

Projection room of cinema hall

cables going out to hall lighting with DMX, Dali, relays

Push buttons for lighting control

Electrical cabinet with Nuvolight control units
(e.g. S.M.A.R.T. Gateway)

Nuvolight WIFI Access Point (optional)

Attention:
Use dedicated network cables for Nuvolight internal network, no VLAN.

Nuvolight WIFI Access Point (optional)

Central 19 inch serverrack

Switch

Server NKS 1

Server NKS 2

There are three height units and three AC sockets required

iPad with App „NuvoTouch" for lighting control (optional)

Uplink to projection control network
Needs **three** IP adresses

Firewall open ports
Port 3478 UDP
Port 1192 TCP
Port 8080 TCP
Port 80   TCP
Port 443 TCP

NKS servers get IP via DHCP server.

WIFI Access Points already installed in the building. Using VLAN to obtain a separate lighing control network.

IT infrastructure of the building

Internet

VPN remote access

To get wireless access to the NKS, connect a Nuvolight Access Point to the internal Nuvolight network.

NOTE: The initialization of the access point normally takes a few minutes.

Some ports have to be open for remote maintenance via the house network. A firewall used here should open the following ports for the NKS server:

Port	Protocol	Usage
80	TCP	Send status emails, perform software updates
443	TCP	Send status emails, perform software updates
1192	TCP	openVPN Nuvolight remote maintenance
3478	TCP	Access Point Cloud Key, STUN
8080	TCP	Access Point Cloud Key, communication

3.2 SMARTgateway installation

The SMARTgateway is designed for mounting on DIN rails in an electrical cabinet. The power supply takes place via a suitable power supply unit with 24V output voltage and a nominal power of 30W.
From this electrical sub-distribution, all the necessary lines go to the lights and buttons. A LAN network connection to the SMARThub must also be available with an RJ45 connector.

NOTE: If you do not have a suitable control cabinet available, you can also purchase a pre-assembled Nuvolight control cabinet, which is tailored to your project. Please contact us at info@nuvolight.de

3.2.1 Digital Inputs for light switches and sensors

The digital inputs of the SMARTgateway are used to connect external push-buttons, sensors or GPOs. It is recommended to use pushbuttons, not switches, as these can be integrated into the control in a variety of ways.
The buttons are best connected so that an electrical contact is made when the button is pressed and the contact is opened again when the button is released.
Instead of buttons, sensors can also be connected that close and open a contact.

NOTE: Sensors that actively output a control voltage must be connected with a coupling relay. This is often the case with brightness sensors and motion detectors.
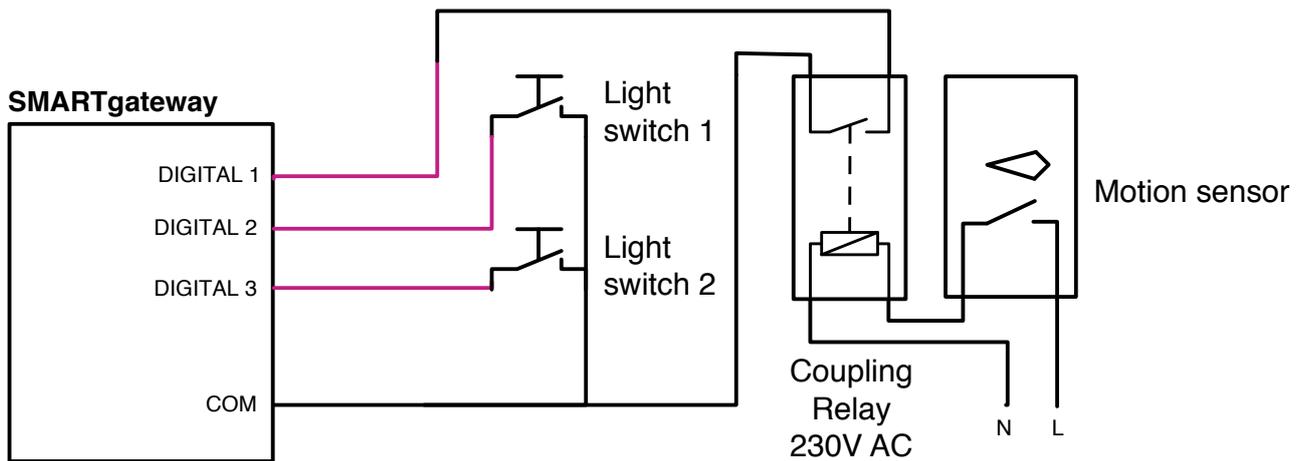
The inputs can also be configured so that a different scene is triggered each time a button is pressed. For example:

„Lights on" >> „Lights off" >> „Lights on" >> ...
oder
„Lights on" + „Color red" >> „Lights on" + „Color green" >> „Lights off" >> ...

An unlimited number of scenes can be chained, which are triggered one after the other each time a button is pressed. It is also possible to trigger multiple scenes at the same time. In addition, it is possible to activate or deactivate light switches and sensors only at certain times of the day or days of the week. For example, a master-pushbutton that turns on or off the whole illumination of a store, but which is deactivated during the opening times so that no one accidently turns off the light when customers are in the store.

The options for pushbutton uses in the Nuvolight system should be considered when planning the purpose and position of a light switch in the building.

3.2.2 DMX

DMX is a bus that is often used in event technology to control colored lighting. It uses two wires from a shielded cable. A network cable of type CAT7 is recommended for permanent installations. With DMX, each luminaire can be controlled individually on the same line. The wires of the data line are called DMX+ and DMX-.

IMPORTANT: The DMX bus must not be branched or laid as a ring. Instead, the cabling has to be in a daisy-chain topology. The two wires DMX+ and DMX- may not be reversed.

The connection of DMX devices to the SMARTgateway is shown in the following diagram:
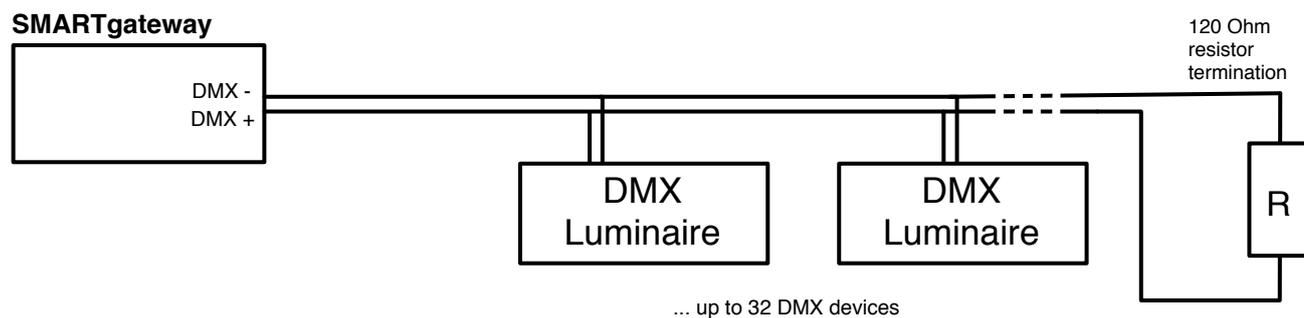
With DMX, the address of each lamp must be set directly on the lamp. For more information on correct addressing, see section *2.3 Nuvolight luminaires and spots*. If lights do not respond or flicker wildly, this is an indication of a fault in the DMX bus. You can find more information on checking the correct DMX cabling in the *Troubleshooting* section.

The DMX standard also recommends using a 120-ohm terminator at the end of each DMX line to get a cleaner signal and avoid errors. This resistor must be connected between the DMX+ and DMX- of the DMX wire. In practice, the terminating resistor is only required if a very long cable is used.

The shielding of the cable may be connected to the GND terminal of the SMARTgateway to increase the stability of the signal. Make sure that the shielding is either connected to the GND terminal on the SMARTgateway or to GND of the lights or spots. The shielding **must not be connected to both**. When using multiple luminaires on the same DMX cable, make sure that the shielding is also plated through at every terminal point.

3.2.3 DALI

DALI is a two-wire bus for light control that enables the dimming of monochrome lights. Similar to the DMX bus, several DALI lights are connected to the same bus line and receive the same data. With an appropriate DALI programmer, each DALI luminaire can be programmed with an individual address so that the luminaires can be controlled individually or in groups. On the other hand, without programming, all connected lights are dimmed at the same time.
DALI has only a relatively low data transfer rate and is therefore only suitable for dynamic effect lighting to a limited extent. However, the bus signal is very stable and the polarity of the DALI+ and DALI- bus wires can also be interchanged. Branching and laying as a ring are also permitted with the DALI bus. In addition, all types of cables can be used for the bus, e.g. two wires of a five-wire 230V power cable. However, it is recommended to use two cores of a separate cable (CAT7 or YStY), since the remai-

ning cable cores can also be used for other buses and, if necessary, also enable DMX retrofitting at a later time.
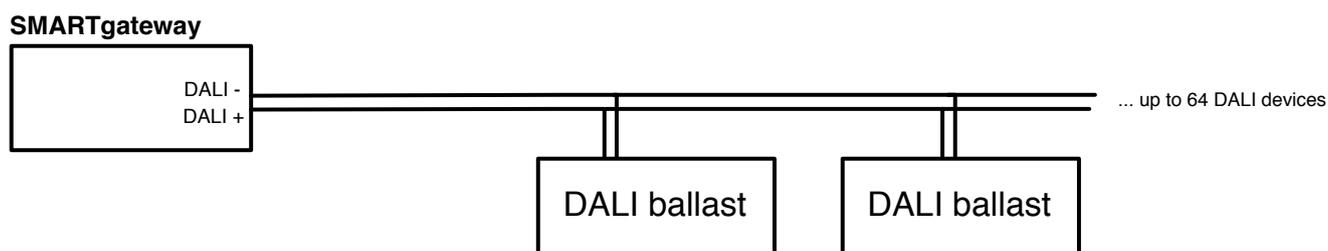
NOTE: The SMARTgateway has an integrated power supply for the DALI bus on board. If possible, use only global DALI dimming and avoid the need for individual DALI programming. This means that luminaires can easily be replaced afterwards without any further programming.

3.2.4 Relays

The SMARTgateway does not contain any dedicated connections for relays, however, these can be easily controlled with a Nuvolight BUS Receiver as an extension. A diagram for the connection of relays to the SMARTgateway using a DMX controller is shown below.
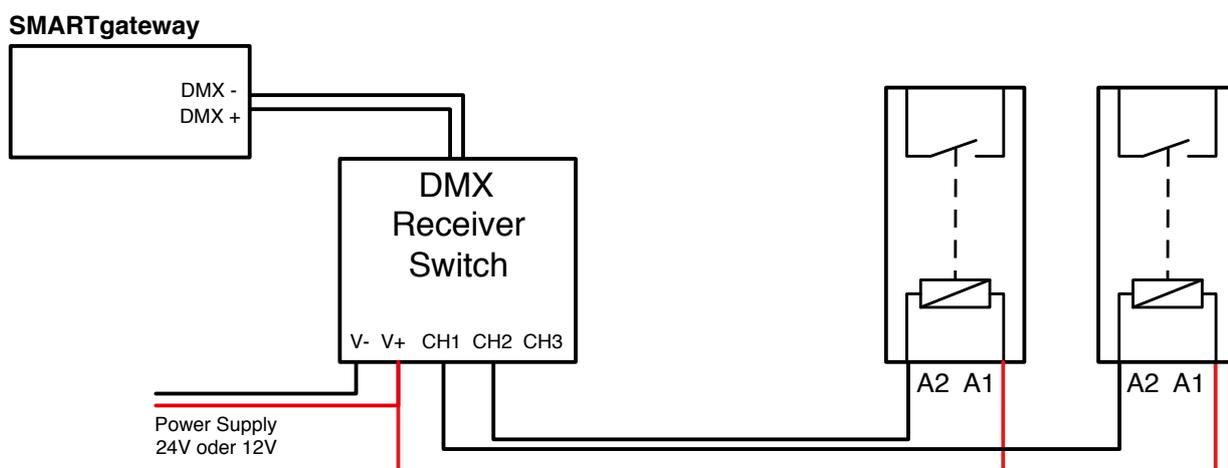
NOTE: It is advisable to use 24V as control voltage for the relays as well as for the SMARTgateway. The appropriate control voltage must therefore be taken into account when procuring the relays.

4 Software configuration

Before starting, make sure that all required devices are ready for use. Both the NKS server, network switches and AccessPoint must be switched on and all network cables should be connected. Also see *3.1 SMARThub installation and network setup*.

4.1 Router configuration

4.1.1 Set up cinema server to run scenes

When installing the Nuvolight system in the cinema, the server must automatically execute scenes from the control using a network command. To do this, the projection network must be connected to the SMARThub using a network cable.
As a rule, there is no DHCP server in the projection network and therefore only static IP addresses. The port ETH1 of the SMARThub is set up accordingly.

First, three IP addresses must be defined that the lighting control system receives in the projection network:

IP address 1: IP of NKS1
IP address 2: IP of NKS2
IP address 3: Common IP of NKS1 and NKS2, required for router redundancy.

Now the static IP addresses must be entered on NKS1 and NKS2 via the web interface. The best way to do this is to go to the Nuvolight network with your iPad (or a computer) via WiFi, open an Internet browser and call up the NKS1 and NKS2 web interfaces in two tabs. The browser addresses for NKS1 and NKS2 in the Nuvolight network are:

Webinterface NKS1:   http://192.168.142.2:8090
Webinterface NKS1:   http://192.168.142.3:8090

You will see the user interface below. Enter the IP addresses accordingly in the fields, click on the „Set IP addresses" button and then in the „General" tab click on „Reboot SMARThub" to restart the server and activate the changes. Do this for both NKS servers.Then the NKS server must be created as network devices in the cinema server. The procedure for Dolby / Doremi servers is explained below.
First open the Device Manager and create two new „Raw" network devices with the following settings:

NKS1
Name: Nuvolight NKS1
IP: The assigned IP of NKS1 in the projection network
Port: 42742

NKS2
Name: Nuvolight NKS2
IP: The assigned IP of NKS2 in the projection network
Port: 42742

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Nuvolight SMARThub

General Execute Upload **Network** Live Dump Configuration

NKS current IP Adresses

Interface	MAC address	IP address	Note
br-lan	00:0D:B9:49:93:BE	192.168.142.2/24 192.168.142.1/32	*Nuvolight internal network bridge = eth2 + wlan0 (if present)*
eth0	00:0D:B9:49:93:BC	10.5.1.80/24	*External network, interface is a DHCP client. For internet remote access*
eth1	00:0D:B9:49:93:BD	192.168.0.2/32	*External network, interface has a static IP address*
eth2	00:0D:B9:49:93:BE		*Nuvolight internal network, interface provides a DHCP server*
tun0	undefined	10.254.1.1/16	*VPN, used for external access by Nuvolight*

Change static IP address of interface eth1

NOTE: Interface eth1 of the SMARThub must have a static IP address.

Static IP address: `e.g. 192.168.0.2` Mask ▼ ⊕

Shared static IP address: `e.g. 192.168.0.1`
(must be the same on all hubs)

✎ Set IP adresses

Nuvolight SMARThub

General Execute Upload Network Live Dump Configuration

System information:

Hostname	SMARThub1
OS version	Linux 4.4.92 x86_64 GNU/Linux
System uptime	24 days, 22h 55m 05s
Router status	MASTER
Temperature	65.1°C
CPU load	<1 min: 1%	<5 min: 1%	<15 min: 0%
Memory usage	Total: 1.92	Free: 1.76	Used: 0.16 (8%)
Disk usage	Total: 14.7G	Free: 13.9G	Used: 728.7M (5%)
NKS status	Running
NKS uptime	24 days, 22h 43m 23s

Operations

⟳ Restart software   ⏻ Reboot SMARThub

NOTE: It is a known behavior of Dolby/Doremi cinema servers that new network devices can only be reached after the server has been restarted. Otherwise the cinema server will not send any network commands to the NKS servers. It is therefore recommended to reboot the cinema server afterwards.

In the next step, playlist macros can now be created or modified so that they send the correct network command for the respective lighting scenes. To do this, open the „Macro Editor" in the Dolby / Doremi server and create a macro for each desired lighting mood. Insert a text command for an NKS server in each of the macros.
In the **first** command, set „**Nuvolight NKS1**" as the receiver, select „Plain Text" as the

data format and enter the ActionID of the corresponding lighting mood in the text field. Make the same settings in the **second** command, but set „**Nuvolight NKS2**" as the receiver. So the command to run macro 42 is simply

42

The ActionID can be found in the group view of the associated group in the iPad app, see below.
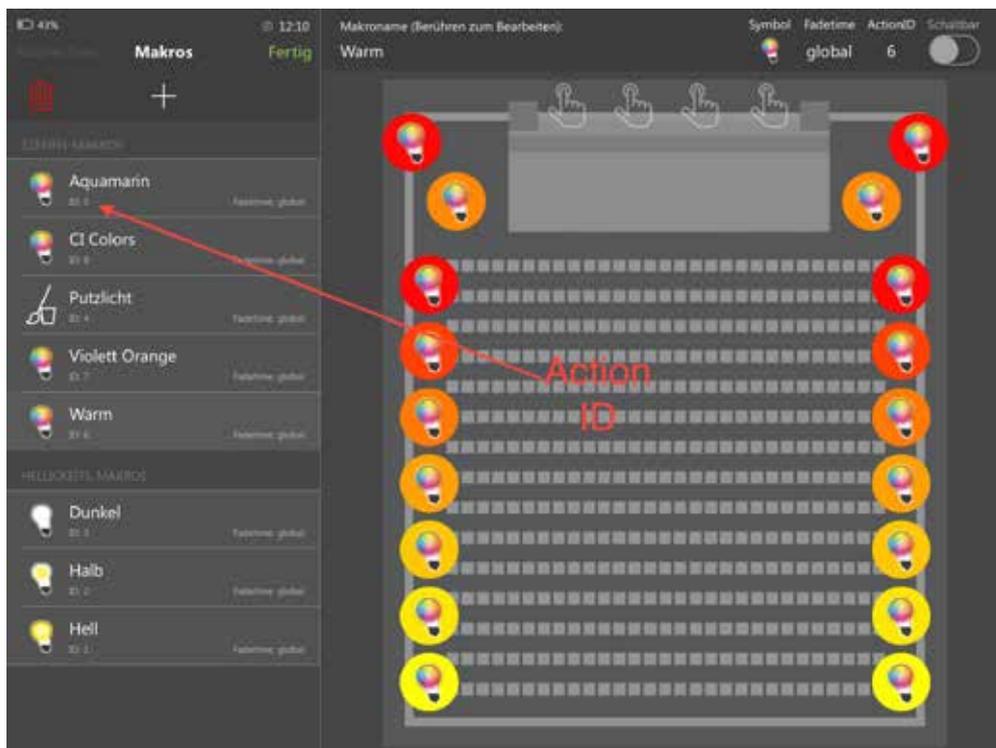
To start a sequence, only the ActionID is sufficient; to stop a sequence, the addition „stop |" must be added before the ActionID, e.g. The command to stop a sequence with ActionID 123 is as follows:

stop|123

NOTE: When executing the macro in the cinema server playlist, the server should send two commands with the same content to both, NKS1 and NKS2. Normally, NKS1 is the executive master that manages the lighting scenes and communication with the SMARTgateways. If for some reason NKS1 cannot be reached, NKS2 becomes the master and takes over control seamlessly. As soon as NKS1 becomes available again, NKS1 becomes the master again.

4.2 NuvoTouch iPad App

The following section describes the operation and configuration of the Nuvolight system with the NuvoTouch iPad app. NuvoTouch is also available for iPhone, but in-depth settings can only be made with the iPad version.

Make sure you are within range of the Nuvolight Access Point and connect your iPad to the Nuvolight network via WiFi and open the NuvoTouch app. The app should automatically find the NKS servers and display the standard screen after a short loading time. If the NKS servers are not found, please take a look at the *Troubleshooting* section at the end of this document. After opening the app, the main view should look something like the picture below.
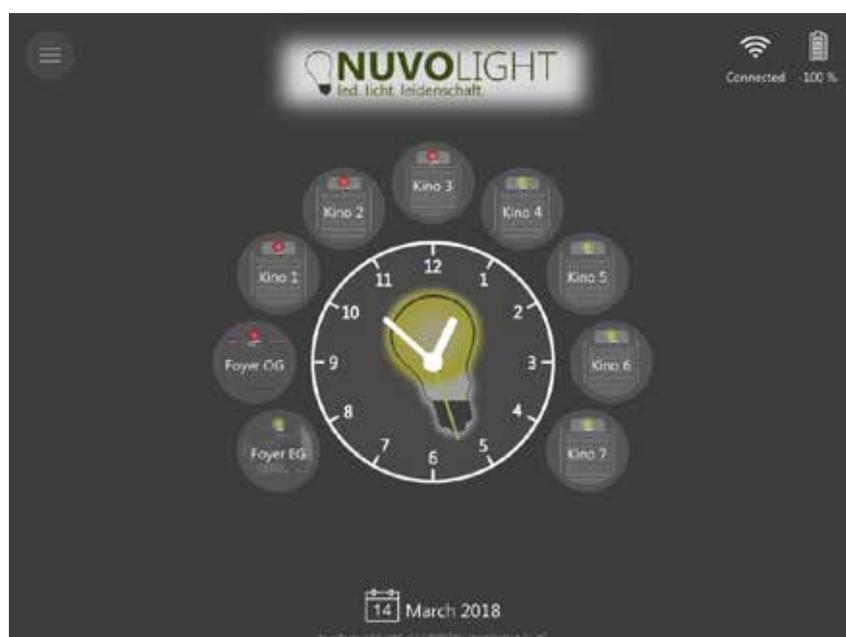
The existing groups are displayed as round symbols around the clock. The small lamp symbol above each group name is either red or green and shows the online status of the devices within the group. A green symbol means that all control actuators involved in the group (e.g. SMARTgateway) can be reached in the network. A red symbol means that at least one device cannot be reached via the network.

4.2.1 Permissions

There is a round button in the upper left corner of the screen that opens a menu. Systemwide actions can be performed here.

By default, you are not authorized to make any changes to the system after installing the app, only triggering scenes and controlling luminaires is possible. However, editing authorizations can be activated by entering a password. Therefore, tap on „Settings" and then on the lock symbol (see figure below).

After you have entered the password and set the required authorizations, click the lock icon again to stop changing authorizations without a password. The permitted actions can now be carried out from this iPad. All other apps still have their own permission settings.

NOTE: Since there is no user administration, the permissions always apply to the respective device and are retained even after the app is restarted. Permissions can be revoked at any time in the settings menu.

You may receive the password for changing the permissions from us personally, please write us a short email.

After entering the password, the following options are now offered:

NKS restart and restore

> A restart of the software application on the NKS server, which also leads to a **return to the last saved configuration**. Each time the configuration is saved, an intermediate image of the whole configuration is saved on the system, to which one can return.

Edit groups

> Allows you to create and delete groups, as well as change the group name and background image.

Edit devices

> Allows you to create, configure and change devices in the software. Necessary for commissioning or expanding the system with hardware components.

Edit macros

> Allows the creation, deletion and modification of scenes and sequences.

IMPORTANT: After changing settings through the iPad app, e.g. creating new lighting scenes, you need to **save the configuration** of the system by tapping the "Save Configuration" button. Otherwise the changes will be lost when the NKS server is restarted. This can also happen, for example, due to a power failure.
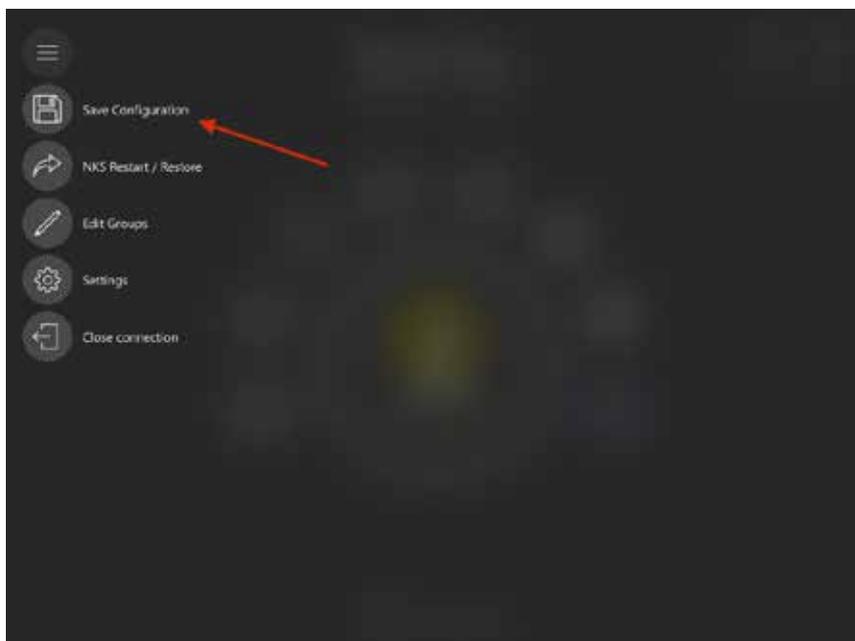
4.2.2 Creating groups

To create a new group, click on the „Edit groups" button in the menu. Now a „+" symbol is displayed as a group on the far right. Tap this icon to create a new group. Edit the group by tapping the new group icon.

You can change the group name by tapping on it. The background image can also be selected using the corresponding icon in the top bar.

4.2.3 Add a device

In "Edit group" mode, devices can be added by clicking on the "+" symbol at the top of the left bar in a group view.

If you select „Nuvolight Device", a window opens in which the new device can be configured.
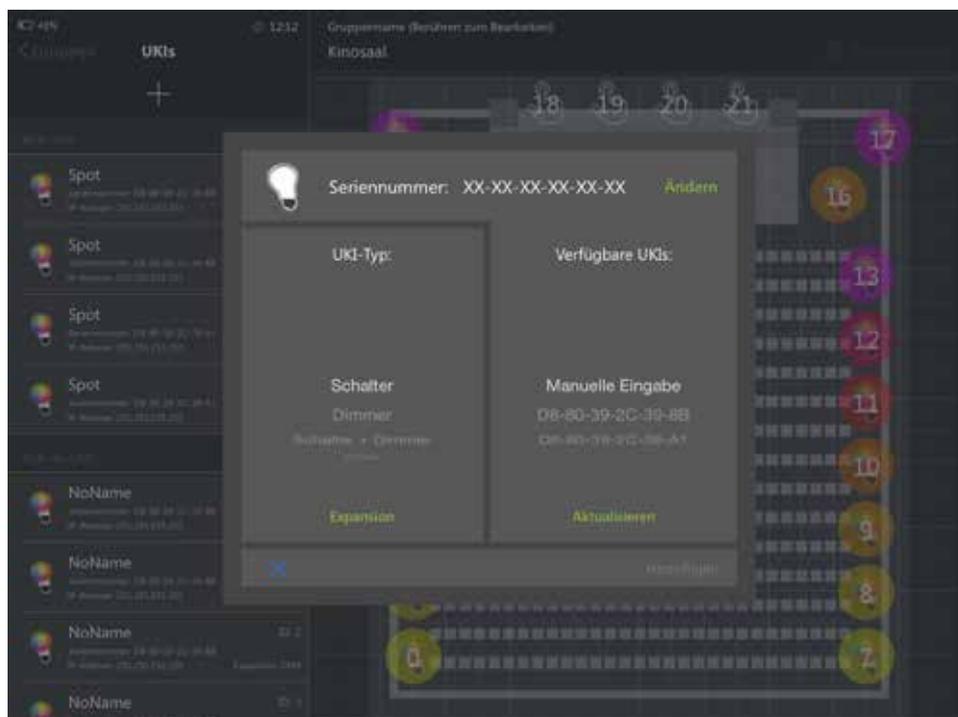
First enter the **serial number of the SMARTgateway** to which your device is connected (via DMX or DALI). You will find the serial number printed on the housing. If the device was previously created or is connected to the network, you can also select its serial number from the list of available devices on the right instead of typing it.
A separate device must be created in the app for each separately controllable DMX or DALI luminaire or DALI group. The serial number always refers to **the respective SMARTgateway** to which the luminaire is connected. A separate device must also be created for each button or sensor that is connected to a digital input.

After entering the serial number, set the **type** in the left list and then the **expansion** of the device. The type defines the user interface with which the device is operated and should also match the corresponding hardware. The expansion indicates the output of the hardware (SMARTgateway) via which the connected luminaire is connected.

The following options are available for the type:

Type	GUI elements
Switch	On/Off Switch e.g. For lights and devices that are switched on and off via relays.
Dimmer	Dimmer Monochrome dimmable lights, e.g. Phase cut, DALI or DMX
Switch + Dimmer	On/Off Switch + dimmer especially for older 1-10V luminaires, which have to be disconnected from the mains separately for dimming in order to turn off completely.
RGB	RGB color picker + RGB dimmer Especially for DMX luminaires which have a separate dimmer channel in the DMX protocol.
RGB (virtual Dimmer)	RGB color picker + RGB dimmer For devices with RGB LEDs where the dimming is set via the RGB mixing ratio.
RGB + W	RGB Farbwähler + RGB Dimmer + Separat Weiß e.g. Nuvolight luminaire NewYork (until mid 2017)
RGB + W (virtual Dimmer)	RGB Farbwähler + RGB Dimmer + Separat Weiß e.g. Nuvolight BUS receiver 6ch PWM with RGBW LED-Strip. For devices with RGBW LEDs in which the dimming of RGB is set via the mixing ratio of RGB. White channel can be dimmed separately.
RGB + W + CCT2	RGB Farbwähler + RGB Dimmer + Separat Weiß + Farbtemperatur + Farbtemperatur Dimmer z.B. Nuvolight luminaire NewYork (from mid 2017). Frontpanel with RGB + warm white + cold white LEDs, additional single-color and separately dimmable LEDs (surrounding light).
CCT2	Color temperature + dimmer For luminaires and LED strips with <u>two</u> different color temperatures (warm white and cold white).
CCT3	Color temperature + dimmer For luminaires and LED strips with <u>three</u> different color temperatures (warm white, neutral white and cold white).

Type	GUI elements
Movinghead RGB	RGB color picker + RGB dimmer + Tilt/Pan + Shutter + Function selector For head-moving motorized RGB headlights, mainly used in event technology, e.g. Nuvolight MovingHead
NuvoTunnel	RGB color picker + RGB dimmer + Separate white + Effect selector + Effect speed + Effect depth For Nuvolight lamp NuvoTunnel with integrated effect LEDs. Can also be used separately with Nuvolight DMX Receiver and WS2812 RGB LED strips.
Input	Configuration of a digital input e.g. Photoelectric switch, sensor, external switching contact which should execute scenes in the Nuvolight system.

NOTE: Many RGB controllers in the entry-level segment do not have their own dimmer channels and regulate the overall brightness through the mixing ratio of red, green and blue. In order to control these devices, a type with **virtual dimmer** must be used so that the NKS server calculates the dimming and regulates the color channels accordingly „virtually". Many DMX lights from event technology as well as all Nuvolight lights and controllers have their own dimmer channel that can be addressed via the bus to regulate the brightness regardless of the color. This also allows a finer resolution of the dimming levels.

After the type has been set, the corresponding expansion must be set. To do this, tap the flashing green Expansion button. In the opening view, the Expansion Art must be selected in the upper area. In the lower part of the window, the functions of the user interface (previously defined by the type) must then be assigned to the hardware channels.

Expansion	Channel	Function
DALI	Br	DALI Broadcast: All luminaires on the same cable react the same, no matter what address they have.
	Fix0 - Fix63	Individual DALI address 0 to 63. When using a DALI programming device, luminaires can be assigned individual addresses. A luminaire therefore reacts both to its own address and to broadcast commands.
	Gr0 - Gr15	DALI group 0 to 15. With a DALI programming device, luminaires can be grouped into up to 16 groups. A luminaire can have its own address and at the same time be in a DALI group. This is how it reacts to its own address, to the group number and to broadcast commands.

Expansion	Channel	Function
DMX	1 - 512	DMX channel 1 to 512. The DMX channels to which the luminaire should react must be set on the luminaire itself.
PWM	1-6	Direct control of PWM outputs. Available for BUS receiver 6ch PWM when connected via WIFI, or older UKI devices.
0-10V	1-4	Available for older UKI devices with 0-10V output. For newer devices (e.g. SMARTgateway) we recommend using a DALI to 0-10V converter.

When the channels are set, press the green check button to apply your settings and create the device. A new round symbol appears in the upper left corner of the iPad screen with the corresponding list entry on the left.

Now the position of the symbol can be moved on the user interface according to its actual position in the room. To do this, first select the list entry from the left-hand side and then move the light symbol to the desired position with your finger.
By tapping the green pencil icon you can edit the device settings such as change the channel assignments and also assign a name for clear presentation on the display. The function of the device can also be tested in this view.

4.2.4 Creating macros

One of the main advantages of the Nuvolight system is the ability to create light scenes (macros) quickly and intuitively. A macro is always linked to a group and the software devices within the group.
To create a macro, open the group and select „Edit" in the macro list at the top left. You can now select an existing macro from the list to edit it or create a new macro by pressing „+".
The macro name, an icon, the fade time and the ActionID can be set on the right.

NOTE: If you deactivate the **Live Edit** switch, you can edit macros without the changes to the lights being directly visible. This is helpful if, for example, you want to make a change in a room where there are currently guests, but you do not want to be disturbed by changing lighting.

The **fadetime** determines how long the smooth transition from the current state to the selected macro takes. When you create a color scene, you may want the new color to fade in from the current state for a few seconds to get a smooth transition. In contrast, for macros in which lights or devices are only switched on and off, a bridging time of 0 seconds makes sense so that the switchover is carried out immediately. You can also set the fade time to „global" and set the global fade time in the settings menu of the app. By default, the global fade time is set to 5 seconds.

The **ActionID** is a unique number that is assigned to each macro for identification. The NuvoTouch app and other network devices such as a cinema server, can send the ActionID via UDP message to the NKS server to trigger the macro. The ActionID is always a number and can also be changed manually, but only to a value that is not already occupied by another macro.

By tapping on the clock symbol in the header, a **schedule** for automatically triggering the macro can be defined. This enables you to ensure that the lighting is set correctly at all times and days of the week, but much more flexible with individual macros, as with a timer.

To determine what should happen in a macro, select the luminaires and devices that should be integrated on the app interface. To do this, you can tap the icons individually or select several devices at the same time by drawing a rectangle on the screen with your fingertip. Likewise, all lights and devices of a certain type can be selected simultaneously using the quick selection.

Now a view opens with the controls of the selected devices. Here you can make the desired lighting settings. On the right side of the overlay there are switches that determine whether the value of the corresponding control is saved in the macro or not.

NOTE: By optically highlighting the device symbols, you can see which devices are involved in the macro and which are not and which color and brightness are stored.
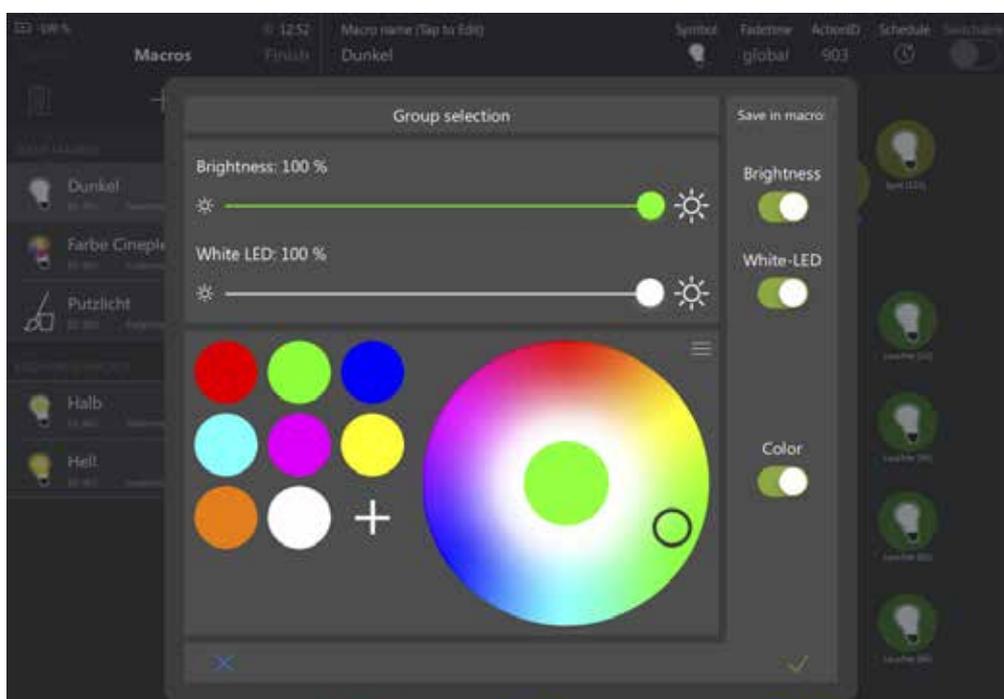
Macro examples

First change the editing mode using the „Edit" button and select an existing macro from the list or create a new macro by tapping the „+" button. When you create a new macro, it is named „Empty Macro" or the previously edited macro is duplicated.
After creating the macro, tap the newly generated list entry.

Example macro 1:
Dim the lights to 100% and set them to a specific color within 5 seconds

Set the macro's fade time to „5s". Select all the lights by dragging a rectangle around them with your finger. If you have selected different luminaire types, a small pop-up window appears in which you still have to select the type to be edited. In the surface that now opens, set the desired color using the color selector and switch the „Color" switch to ON to save the color in the macro. Also set the brightness control to 100% and the „Brightness" switch on the right-hand side to ON in order to apply the brightness setting of 100% also in the macro. If you leave the „Brightness" switch OFF, the dimmer control remains unchanged when the macro is executed. Finally, click on the green tick and repeat the process with all other lights and devices that you want to control with the macro.

When you are finished, you can assign another name in the header and select a display symbol. Finally, tap the green diskette symbol to save the macro.

Example macro 2:
Turn off all lighting

Select all the lights in the group by dragging a rectangle around them with your finger. Set the brightness control to 0%. Set the „Brightness" switch on the right to ON to save the brightness setting in the macro. Depending on the selected type, also set the sliders „White" and „CCT Dimmer" to 0% and switch the switch on the right side to ON. Set the „Color" switch to OFF, as the color of the lights should not be influenced in this macro. The light should go out, no matter what color the lights are. Finally click on the save symbol.
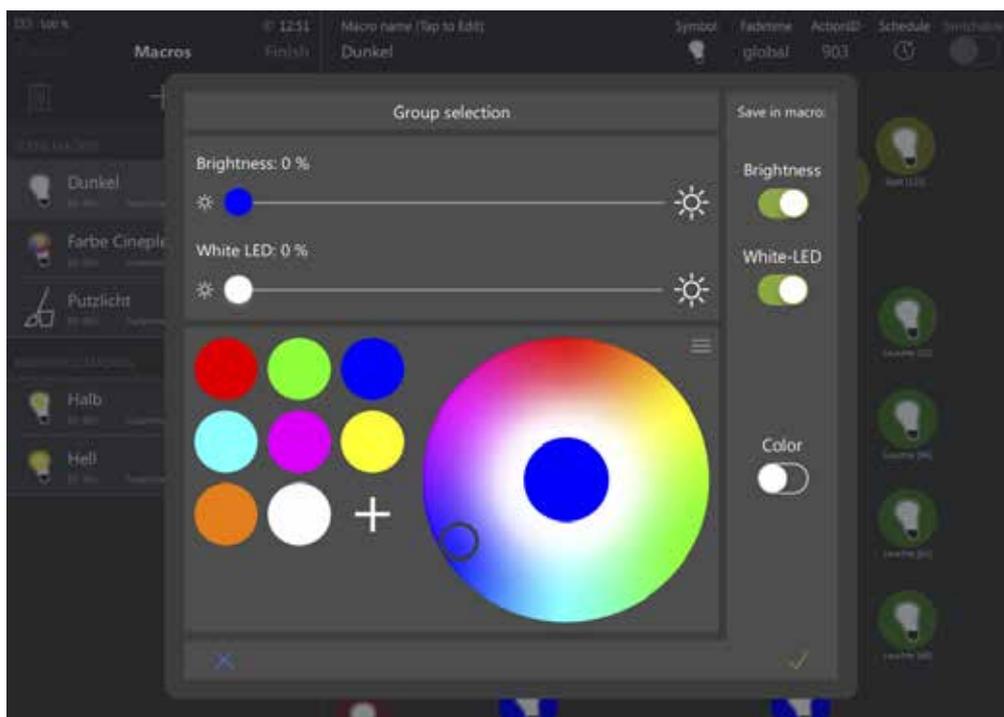

NOTE: When creating macros, it is recommended to differentiate between color macros, brightness macros and white tone macros. This enables complex scenarios to be assigned to buttons and the moods to be used in granular sequences (see section *4.2.6 Sequences*).
However, it should be noted that, for example, a button that is to switch between color moods should always have a brightness at the same time. Otherwise, a dark room would still remain dark when the color mood changes, even though the color changes.

4.2.5 Digital Input configuration

Light sensors and sensors can be connected via digital inputs, which trigger macros and sequences and can be configured very flexibly. In order to use a digital input, the input must first be created as a device in "Edit group" mode (see section *4.2.3 Adding a device*). The created input can then be configured using the edit button (green pen). By pressing the „+ Add action" button, lighting scenes can now be selected, which are then executed simultaneously when the digital input is triggered. To close the view, tap next to the selection window.

NOTE: Scenes can also be carried out across groups. For example, a button can be created in this way that switches the lighting on or off in the entire building, even if the building is divided into several groups in the Nuvolight system.
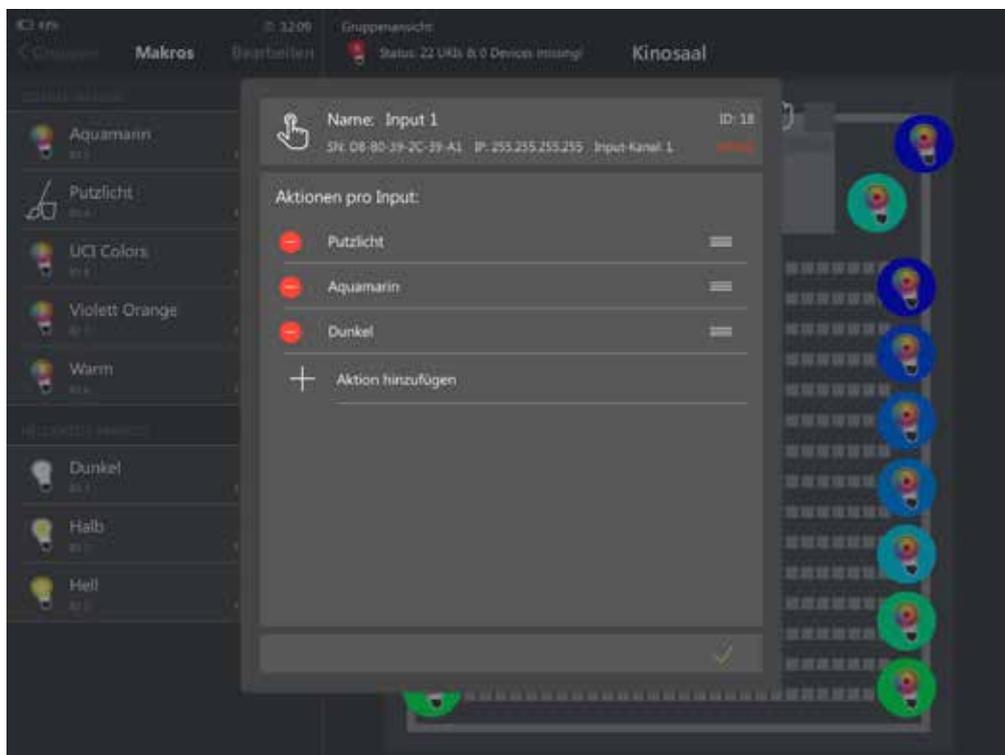
If the button is to execute further scenes when **pressed again**, additional lines can be added. The next line is executed each time the button is pressed. As soon as the last line is reached, the cycle starts again with the top line.

The switch in each line can be used to determine whether the scenes are executed on **opening or closing the contact** on the digital input. Switch OFF means closing the contact (standard setting) and switch ON opening the contact to trigger the macros.

NOTE: In this way, **classic light switches** (not to be confused with push-buttons) can also be integrated into the control. To do this, two lines must be created, e.g. with the moods light bright and light dark, while one of the lines reacts to „open" and the other to „close".

The **time-dependent activation** or deactivation of button scenes can be set by tapping on the clock symbol. A calendar view opens in which you can specify the times of the day and days of the week that the respective actions should be active or inactive. An example of use: You own a shop that is open at certain times. There is a staff entrance through which cleaning staff have access outside of opening hours. There is a light button at the staff entrance, which switches the lighting off to 100% brightness in the entire building and when it is pressed again. However, this button should be inactive during opening hours so that someone does not switch off the light during operation.

4.2.6 Sequences

The Nuvolight system offers the possibility to easily program dynamic light sequences and to execute macros in chronological order. Sequences can be used, for example, to create a repeating color change, to create lighting effects that are synchronized with a film trailer, or to dim the light in a room gradually from front to back - to name just a few options.

Before you create a sequence, you should first consider which group the sequence should be in, what kind of effect you want to create and how the light should change step by step. A sequence is a chronological sequence of macros. The macros are executed at defined times from the start of the sequence and each have an individual fade time. First of all, all the macros needed should be created and then inserted in the right place in the sequence.

> *Step 1:* Think about the sequence you want to create and sub-divide it into separate stages.
> *Step 2:* Create a macro for each stage of the sequence. Macros can be hidden from the default macro list by name convention.
> *Step 3:* Create a new sequence and add the desired macros to its timeline (adding keyframes).

Depending on the scope of the sequence, a large number of macros can arise. So that the macro list does not become confusing, there is the possibility to make a macro invisible by having the name of the macro begin with the character string „**seq_**". To display seq_ macros in the list for editing, the „Sequence Macros" switch below the „Live editing" switch must be on when editing macros.
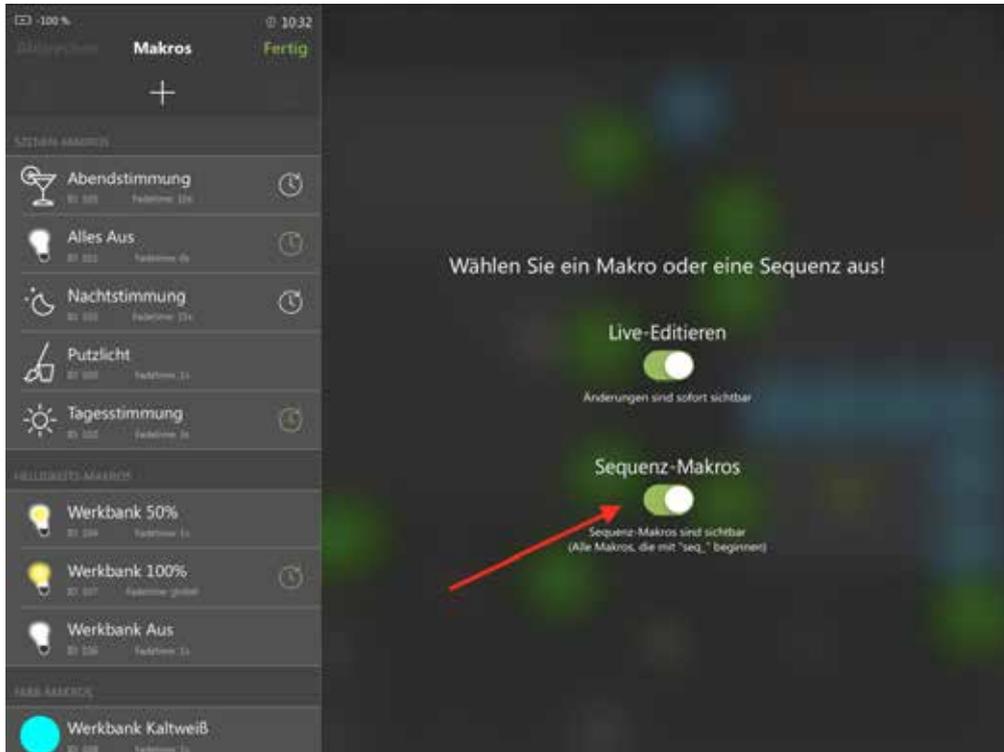
As soon as you have created the required macros for a sequence, you can create the sequence yourself. To do this, go to the desired group, tap on the green „Edit" button and then on the „+" symbol. In the menu that opens, select „Add sequence". A new sequence appears in the list. Tap this to open the sequence editor.
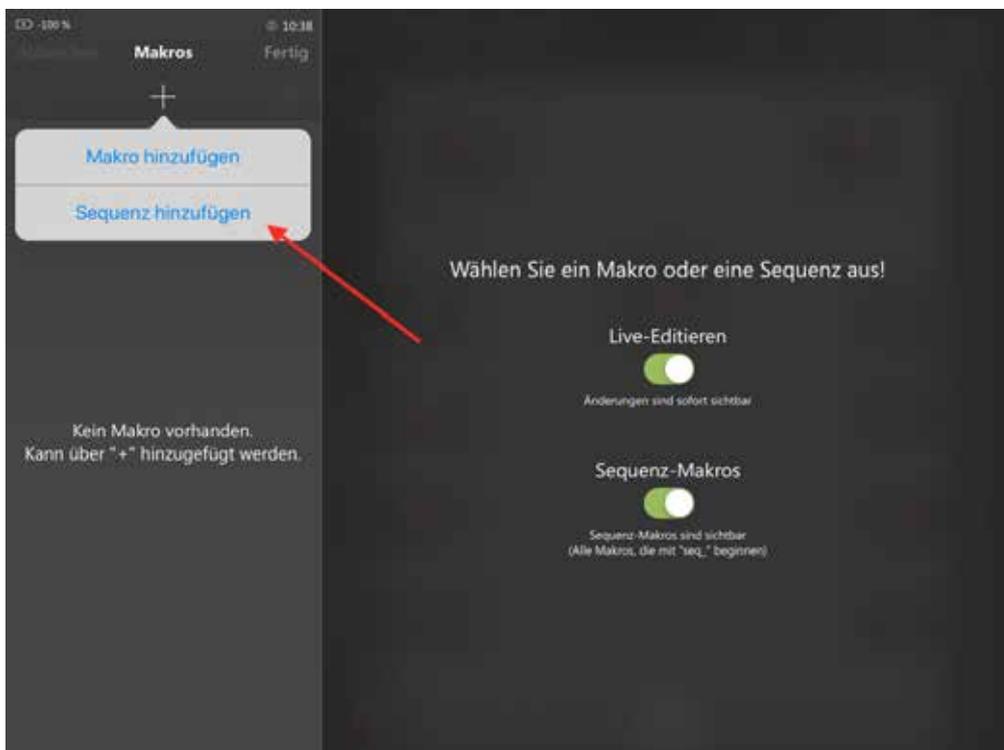
In the upper area of the editor, you can assign a name for the sequence, select an icon to be displayed in the list, assign an individual ActionID, set an individual schedule for executing the sequence, and use a switch to select whether the sequence should repeat indefinitely or is executed only once. You will also find buttons for starting, stopping and pausing the sequence in the upper area of the editor. The total duration of the sequence can also be specified here.
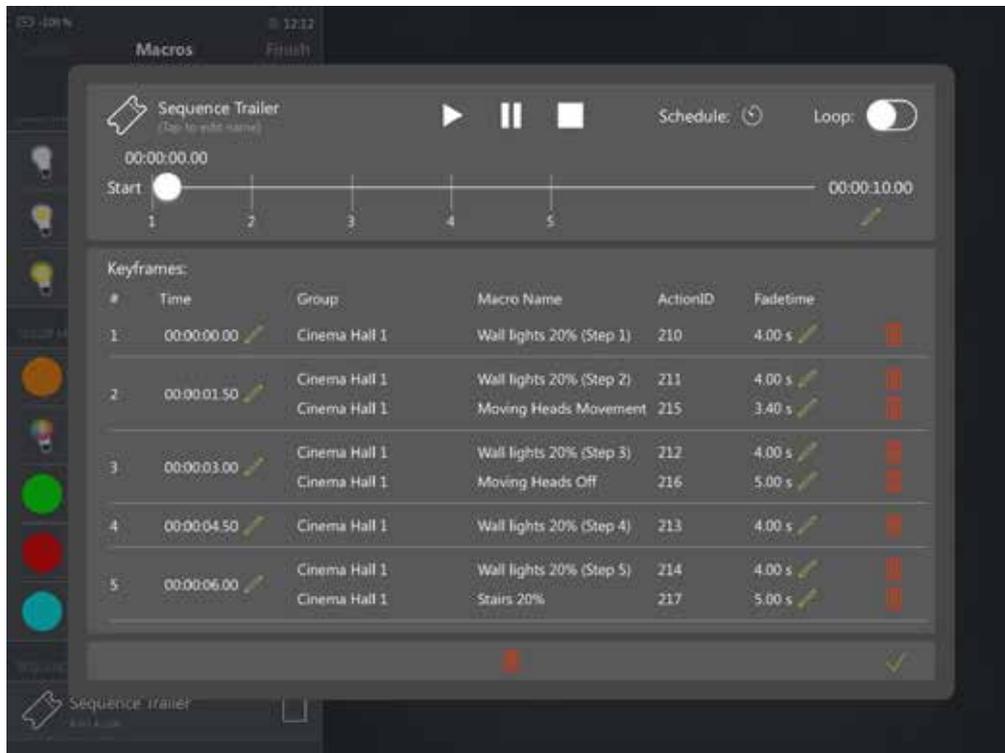
Similar to many video editing programs, keyframes can now be added. A keyframe is a point in time when one or more macros are executed in the sequence. Within the same keyframe, each macro can have an individual fade time. To create a keyframe, tap the „Add keyframe" button. You can now select multiple macros (also across groups) in the view that opens. On the right side of the keyframe editor you can select the point in time within the sequence for executing the keyframe and the fade time at which the macros are executed. To create the keyframe, tap the green check mark.

The keyframe now appears both in the list and on the timeline of the sequence editor. You can now further edit the fade time of each individual macro within the keyframe. Macros can also be removed from the keyframe using the red garbage can symbol. If you add another keyframe with the same start time, the new and existing keyframe are combined.
You can use the Play / Stop / Pause buttons to test your sequence.

NOTE: When you've created all the keyframes, check the total length of your sequence. A sequence does not need to take longer than necessary. Therefore, set the length to the start time of the last keyframe + the longest fade time within the last keyframe. **Save** youryour sequence by tapping on the green check mark on the bottom right.

A Troubleshooting and How-To

A.0 The iPad app does not find an NKS

Please check the following points:
- WIFI is activated on the iPad
- The iPad is connected to the right network, e.g. a Nuvolight Access Point with network name „nuvolight_XXX"
- The NKS servers NKS1 and NKS2 are switched on
- The LAN cables are inserted correctly
- The access point has already booted completely (after switching on, it takes about 2-3 minutes until the green LED ring lights up permanently)

If all of the above conditions are met and the NKS is still not found, the app offers the option to search for the NKS manually. You will find this option in the boot screen of the app. Select „Manual IP address" and enter the IP address of NKS1 (192.168.142.2). If necessary, also try the IP address of NKS2 (192.168.142.3).

If you are still unsuccessful, open a browser on your iPad and type the following address lines in two tabs:

Webinterface NKS1:   http://192.168.142.2:8090
Webinterface NKS2:   http://192.168.142.3:8090

Now a configuration view should open for each of the two NKS servers if the respective server can be reached. If the page does not open it means that the NKS is either
- switched off
- not physically connected via network (check LAN cable)
- physically connected to the wrong network (see chapter 3.1 for connections)

Nuvolight SMARThub

General	Execute	Upload	Network	Live Dump	Configuration

System information:

Hostname	SMARThub1
OS version	Linux 4.4.92 x86_64 GNU/Linux
System uptime	24 days, 22h 55m 05s
Router status	MASTER
Temperature	65.1°C
CPU load	<1 min: 1% | <5 min: 1% | <15 min: 0%
Memory usage	Total: 1.92 | Free: 1.76 | Used: 0.16 (8%)
Disk usage	Total: 14.7G | Free: 13.9G | Used: 728.7M (5%)
NKS status	Running
NKS uptime	24 days, 22h 43m 23s

Operations

[↻ Restart software] [⏻ Reboot SMARThub]

In the „General" tab, you can see in the „NKS status" line whether the control software is running on the NKS server or not. If there is something other than „Running", restarting the server can help if necessary (using the „Reboot SMARThub" button).

A.1 Check whether a network command reaches the SMARTgateway

If a GUI element is moved in the iPad app or lighting scenes are executed, the NKS server sends the corresponding network commands to the affected SMARTgateways. When messages are received, the buttons on the SMARTgateway light up yellow for a few seconds. The right two buttons indicate that changes are taking place on the DMX output, the left two buttons the DALI output. With older MIO devices, an orange LED flashes for a few seconds to indicate that the outputs are changing.

If the SMARTgateway or MIO does not display any change status when lighting moods are being carried out, check the following points to ensure that the network between SMARThub and SMARTgateway or MIO is working:

SMARTgateway or MIO is connected to the Nuvolight network via LAN cable
Link LEDs on the LAN port of the switch and the SMARTgateway or MIO light up
LAN cable works perfectly (newly installed cables may be prone to errors here and should still be measured)

If the messages still do not arrive at SMARTgateway or MIO, check whether the NKS servers receive the command to execute macros (see section *A.2*).

A.2 No lighting scenes can be executed by an external network device (e.g. cinema server), but control via the iPad app works perfectly

There can be various causes for this:
• With Dolby / Doremi cinema servers, the server must first be restarted after creating new network devices in order to send network commands
• There is no network connection from the Nuvolight network to the projection network. Check LAN cable and network settings
• The sender device is sending to the wrong IP address / port
• The sender device is sending the wrong message

The trigger command for the NKS is a UDP message that contains the ActionID of the corresponding macro as a text message. There must be no text content other than ActionID, which is always a number. All devices in the Nuvolight network (iPad with NuvoTouch app) send trigger commands directly to the NKS server. Likewise, a device outside the Nuvolight network, e.g. a cinema server, sends the trigger command to the NKS server. *Section 4.1.1* provides some information for setting up the network.

8 Notizen

Hier ist Platz für eigene Notizen:

NUVOLIGHT
www.nuvolight.de