



# COMMISSIONING GUIDE



Modified: 05/04/22

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**C-MAX NETWORK CONTROLS**



c-Max Network Controls make it easy for facilities to save energy, improve occupancy comfort and achieve code compliance by adding Luminaire Level Lighting Controls to indoor and outdoor applications. With a patent pending design, c-Max wireless sensors and network nodes simply plug into the integrated USB-C receptacle of MaxLite LED controls ready luminaires. Using the c-Max app, nodes can be commissioned without the need for a gateway!



**Simple**

- Easy DIY installation - low voltage sensor plugs into USB-C receptacle on MaxLite controls ready fixture
- Easy commissioning using c-Max app (iOS & Android)
- Easy on budget - affordable and scalable solution



**Versatile**

- Scale across both indoor and outdoor product portfolio
- Multiple energy-saving features packed in small form factor
- Choose from a variety of devices including sensors, network nodes and powerpack



**Future Ready**

- Add network controls during installation or later, depending on need
- Upgrade sensors without removing the fixture
- Version and firmware updates will be backwards compatible















## c-Max System Overview

c-Max Network controls leverages reliable Bluetooth Low Energy Mesh 4.2 technology to address individual or group of luminaires. The wireless system consists of various devices including sensors, wall switches, power packs and network nodes that get easily commissioned via a mobile app. c-Max Network controls is designed to operate as a local wireless system without the need for a gateway. The mesh network allows for device-to-device communication up to 100 feet apart and does not need any internet access during the commissioning process. All configuration settings concerning motion sensing, daylight harvesting, auto brightness levels, Linkage and Trim are stored on these devices and the values are retained even after a power outage. The control system is Room and Zone based but can scale across an entire Building based on its ability to create unlimited zones. Device firmware can be updated to the latest version with an OTA update that is accomplished using a separate c-Max Updater app. c-Max app uses a 128-bit data encryption for its secure mesh network and does not collect any private user data. Once a device (sensor, switches, powerpack or network node) is added to the secure network, that device is no longer discoverable to another person who might have the c-Max app. The configuration settings of the devices are stored in an encrypted QR code and the light points in that network cannot be accessed or reconfigured unless the user has access to the QR code. c-Max hardware and software is designed with global industry security standards in mind. c-Max meets UL cybersecurity standards.

## c-Max Network Controls Capabilities

FEATURES	DESCRIPTION
<b>Networking of Luminaires and Devices</b>	All MaxLite controls ready luminaires are integrated with sensor receptacles that are compatible with c-Max network lighting controls devices. c-Max uses Bluetooth mesh protocol to communicate between devices. The plug and play sensor receptable makes it easy to add devices to the network in the factory or in the field offering project flexibility.
<b>Occupancy Sensing</b>	c-Max offers Bluetooth wireless PIR (passive infrared) sensors that can detect presence or absence of people in a given space. c-Max also offers a dedicated vacancy sensor that supports Manual ON and Auto OFF.
<b>Daylight Harvesting/Photocell Control</b>	c-Max sensors are integrated with photocell that take into account natural daylight and or ambient light and thereby adjust light levels of the luminaires. Certain sensors also have the photocell ON/OFF capability making it an ideal choice for exterior applications. Refer to the key components for further information.
<b>High-End Trim</b>	c-Max offers the capability to set maximum light output for individual luminaires or multiple luminaires in a zone during commissioning process. User can reconfigure these settings in the field post commissioning.
<b>Zoning</b>	c-Max allows the installer and/or the end-user to add and control up to 100 light points in a zone. Users can create unlimited zones to accommodate installations greater than 100 light points. Each zone has a unique QR code that can be shared with administrators (installer/facilities manager) for commissioning or reconfiguration purposes.
<b>Individual Addressability</b>	Using the c-Max app, the user can access and modify the settings of any individual luminaire. Settings include functions such as ON/OFF, manual dimming and auto dimming based on motion sensing and daylight harvesting
<b>Grouping</b>	Ability to wirelessly group multiple luminaires within a zone based on application space. Users can create unlimited groups.
<b>Continuous Dimming</b>	c-Max app enables the user to set dimming levels for any luminaire ranging from 0 to 100% in 1% increment.
<b>Scheduling</b>	c-Max offers time-based scheduling that let's user set schedules on a time of a day and/or days of week basis. Schedules can be made for a day 1 year in advance. Schedules can be overridden by use of a local bluetooth wall switch.
<b>Luminaire Level Lighting Control (LLLC, Integrated)</b>	MaxLite controls ready luminaires come pre-configured with sensor receptacle at the onset allowing for direct integration of c-Max networked sensor, daylight harvesting or network node at an individual luminaire level. (1 to 1)
<b>Energy Monitoring</b>	c-Max offers the Energy Monitoring Data Collector (NN-EDC) device that uses a calculation method to compute energy consumption and percentage dimming level of individual luminaires. The energy data is collected every 15 minutes and the local storage micro-SD card on the device can record and store 2 years worth of data.
<b>Personal Control</b>	Personalized control can be achieved either by providing user access in the app or via Bluetooth Wall Switches. c-Max Network controls will allow up to 32 switches per zone.
<b>Cyber Security</b>	Designed to comply with UL1376 cybersecurity requirements, c-Max is a local Bluetooth wireless solution with 128-bit data encryption. c-Max does not use a gateway.
<b>Ease of Implementation</b>	c-Max app is designed to be easy and simple for the user. The plug and play interface makes it easy to install sensors at the onset or in the field.
<b>Scenes</b>	c-Max app allows the user to create up to 127 scenes for a zone set (up to 3) scenes on a switch



CONTROL IMAGE	ORDER CODE	ITEM #	DESCRIPTION	APPLICATION	FEATURES
<b>c-Max Network Node Devices</b>					
	105892	<b>NN-RTW</b>	NETWORK NODE RECTANGULAR, WHITE	Indoor & Outdoor	<i>Bluetooth, High Trim, Scenes, Schedules</i>
	105895	<b>NN-MGT</b>	NETWORK NODE MAGNET, TRANSLUCENT	Indoor	<i>Bluetooth, Magnetic, High Trim, Scenes, Schedules</i>
	105895	<b>NN-RDB</b>	NETWORK NODE ROUND BRONZE OR WHITE	Indoor & Outdoor	<i>Bluetooth, High Trim, Scenes, Schedules</i>
	105890	<b>NN-RDW</b>			
<b>c-Max Motion/Daylight Harvesting Sensors</b>					
	106059	<b>NN-RTPSW</b>	NETWORK NODE RECTANGULAR, PIR MOTION SENSOR/DAYLIGHT HARVESTING, WHITE	Indoor	<i>Bluetooth, Motion Sensor (PIR), Daylight Harvesting (continuous adjustment), High Trim, Scenes, Schedules</i>
	106001	<b>NN-RTVSW*</b>	NETWORK NODE RECTANGULAR, VACANCY SENSOR, WHITE	Indoor	<i>Bluetooth, Motion Sensor (PIR), Daylight Harvesting (continuous adjustment), High Trim, Scenes, Schedules</i>
	105893	<b>NN-RTDHW</b>	NETWORK NODE RECTANGULAR, DAYLIGHT HARVESTING, WHITE	Indoor	<i>Bluetooth, Daylight Harvesting (continuous adjustment), High Trim, Scenes, Schedules</i>
	108255	<b>NN-RDMPB</b>	NETWORK NODE ROUND, PIR MOTION SENSOR, PHOTOCELL, BRONZE	Outdoor	<i>Bluetooth, Motion Sensor (PIR), Photocell (On/Off), High Trim, Scenes, Schedules</i>
	105905	<b>NN-RDMSW</b>	NETWORK NODE ROUND, PIR MOTION SENSOR, DAYLIGHT HARVESTING, WHITE	Indoor	<i>Bluetooth, Motion Sensor (PIR), Daylight Harvesting (continuous adjustment), High Trim, Scenes, Schedules</i>
<b>c-Max AC Relay Node</b>					
	106318	<b>NPP-300W</b>	120-277V NETWORK POWER PACK 300W MAX	Indoor	<i>Bluetooth, High Trim, Scenes, Schedules</i>
<b>c-Max Standalone Sensors</b>					
	107788	<b>NPPSL-PSW</b>	NETWORK POWER PACK PIR SENSOR, 12V, WHITE	Indoor	<i>Motion Sensor (PIR) (Only pairs with NPP-300W)</i>
<b>c-Max Accessories</b>					
	106118	<b>WNS-W</b>	WALL NETWORK SWITCH (BLUETOOTH) WHITE	Indoor	<i>Bluetooth, On/Off, Scenes, Manual Dimming</i>
	107785	<b>CEA-RDB</b>	C-MAX EXTERNAL ADAPTER ROUND BRONZE OR WHITE	Indoor & Outdoor	<i>Adapter Paired with Round Nodes</i>
	106903	<b>CEA-RDW</b>			
	108859	<b>NN-RTC</b>	NETWORK NODE REAL TIME CLOCK SYNC DEVICE	Indoor & Outdoor	<i>Real Time Clock</i>
	108860	<b>NN-EDC</b>	NETWORK NODE ENERGY DATA COLLECTOR	Indoor & Outdoor	<i>Energy Monitoring + Real Time clock</i>

\*Vacancy sensors are pre-programmed to perform Manual On Auto Off and cannot be changed in the field via the c-Max App. Vacancy sensors have to be used in conjunction with the Wall Network Switch for manual On.

## Pair c-Max Network Nodes with Controls-Ready MaxLite products today, or in the future!



Patent Pending vandal-resistant design with locking screw that secures sensor to fixture.

### Controls Ready Fixtures

MaxLite Controls Ready (CR) fixtures allow for quick and easy in-field installation of controls. Simply purchase any CR fixture and the required Network Node and you're all set! (See individual product datasheets for available controls options and ordering information)

INDOOR							
NETWORK NODE	FlatMax Flat Panels	ArcMax Troffer	Troffer Retrofit Kit	LS Strip	LSV Vapor Tight	LSU Utility Wrap	Linear High Bay
NN-RTPSW							
NN-RTDHW							
NN-RTW							
NN-RDMSW**							

\*PIR requires line of sight and cannot not be used in products behind the lens.

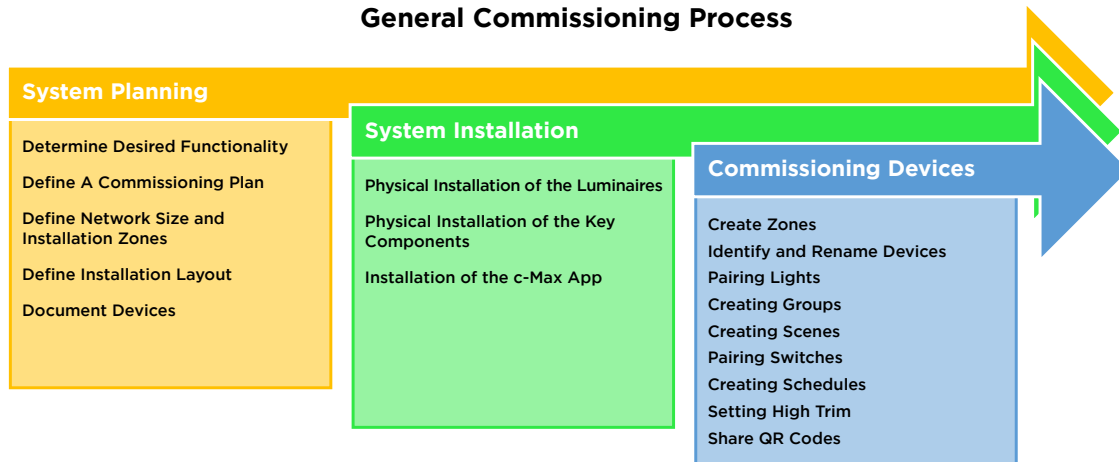
\*\*To use NN-RDMSW with the above linear and highbay products, the CEA-RDW External adapter also needs to be purchased separately

OUTDOOR				
NETWORK NODE	Open Face Wall Pack	Cutoff Wall Pack	M Series	Area AR Slim+
NN-RTW				
CEA-RDB**				
NN-RDMPB				
NN-RDB				

\*PIR requires line of sight and cannot not be used in products behind the lens.

\*\* Round nodes (NN-RD\*\*\*) can be used with the CEA-RDB External Adapter

### General Commissioning Process



## System Planning

A good system level planning will allow the user to maximize benefits from c-Max Network controls. Refer to the guidelines and best practices below before actual commissioning.

### Determine the desired functionality

Decisions to be made about the requirements for each area could include:

- Individual fixture control vs group/room level control
- Motion sensing requirements
- Photocell/Daylight Harvesting requirements
- Define grouping for switches and sensors
- Defining scenes
- Decide who will be maintaining the system and will have access to the c-Max app
- Determine the regulatory and utility program compliance requirements
- Unique considerations of each space

### Define a commissioning plan

A clear commissioning plan helps determine the project schedule and ensure smooth operation, especially with large system installation.

As a good practice, answering the following questions will help have a clear understanding of the project and define the correct key components/devices that are needed for installation.

- How many separate rooms are included in the project?
- How many fixtures are needed in each room?
- What type of control strategies or functionality will be used in each space?

### Define Network Size & Installation Zones

Understanding the network size requirements is critical from a planning perspective. c-Max supports unlimited zones. Each zone can support up to 100 light points. For sites greater than 100 light points, the site can be organized into multiple zones. Each zone then can be further broken into logical set of groups. For e.g. each floor of a multiple story building can be a separate zone (provided < 100 light point per zone) while each room on that individual floor could be a group within that zone. Each zone is associated with its unique QR code. Zone can also have an additional 32 switches to controls group of lights.



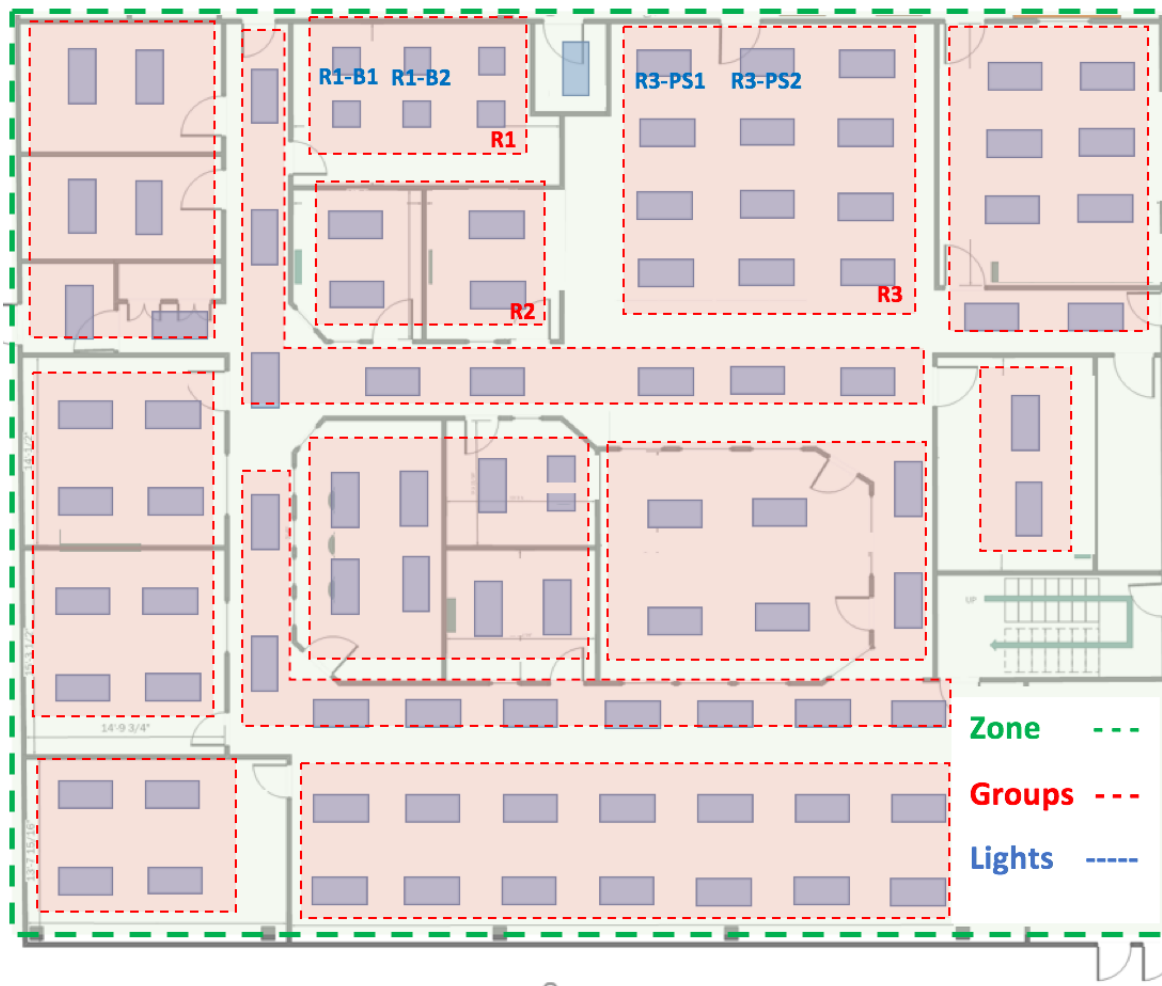
Please note that any light point (sensor node or network only node) cannot be part a part of multiple zones simultaneously

### Define Installation Layout

An Installation layout comes in handy to make sure that the functional requirements of the system are met. For e.g. an Installation layout is usually defined for one floor at a time and multiple layouts can be used for a building with multiple floors. System components may be mapped to the physical space allowing for easy identification of groups within a zone, scene areas and logical places to pull wall switches.

Divide the floor plan into multiple logical groups according to the operational needs of the space. For e.g. a group is one room or a particular area of a large space.

In the figure below, the **GREEN** boundary represents a zone. The **RED** boundary identifies the various groups with that zone. The **BLUE** boundaries indicate individual lights.



As a best practice while commissioning devices, follow the installation layout from one zone to the next to ensure all the correct devices are part of the right zone.

### Device Documentaion

MaxLite recommends logical naming conventions that will help identify various light points as per the installation layout. For example, each group can be named based on the room location with respect to the building and individual fixtures within the group can be named based on their type. Fixtures with motion sensors in a Room 1 of a building can be named as R1PS1, R1PS2, etc.

As a best practice, documenting c-Max devices using a device documentation list as show below can help the facilities manager map out devices with the various parts of the building.

Device Name	MAC Address	c-Max Device Type	Group
R1PS1	MM:MM:SS:SS	NN-RTPSW	Room 1
R1B1	MM:MM:SS:SS	NN-RTW	Room 1
R2B1	MM:MM:SS:SS	NN-RTW	Room 2

### Define Regulatory Compliance

c-Max Network Controls are designed to help meet code compliance requirements such as Title 24, IECC 2018 and ASHRAE 90.1. c-Max sensors support control strategies such as Manual ON, Partial Auto ON, Bi-Level and Multi-Level (with linkage feature), Daylight Harvesting, Auto OFF and Scheduled ON/OFF.

### System Installation

System installation consists of the physical installation of Maxlite Controls Ready luminaires, c-Max key components (sensors, relays, nodes etc.), c-Max app and commissioning of the system to ensure operation according to the specification.

#### Physical Installation of the luminaires

The installation of Maxlite controls ready fixtures should be completed by a qualified electrician following all the building codes and safety procedures. Please refer to the instruction manuals of the individual luminaires for installation instructions. They are beyond the scope of this document.

#### Physical installation of the key components

Ensure that all the key components are obtained. Please refer to the individual datasheet for the key components and the How-to-Videos to learn more about the installation instructions.

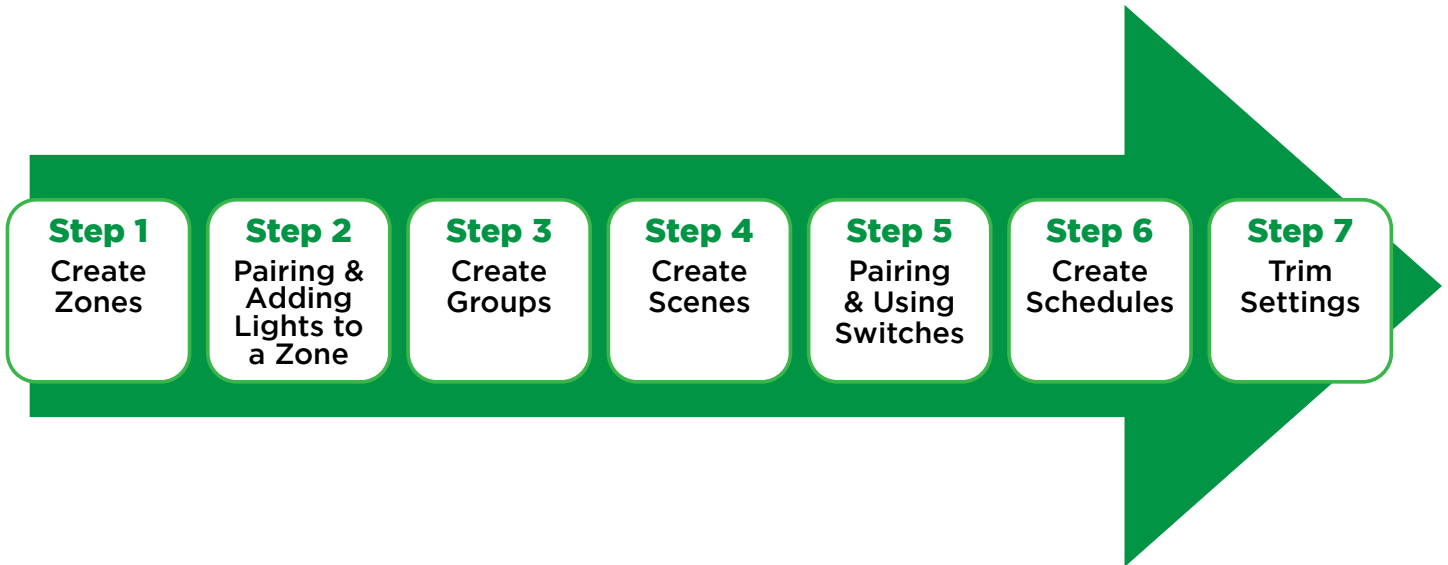
#### App installation

The c-Max app can be easily installed from App Store on IOS devices and from Google Play Store on Android devices. It is recommended to perform automatic updates on the c-Max app to ensure that the latest version of the app is installed.



c-Max does not need a gateway.

### Navigating c-Max App and Commissioning



#### Getting Started with the c-Max App

c-Max Network Controls can be commissioned with a smart, easy and intuitive c-Max app. It is recommended to use Maxlite Controls Ready Fixtures and c-Max control devices (sensors & nodes) for optimal performance of the system.

The app can be downloaded and installed from the Apple Store for iOS and Google Play Store for Android devices. [Click here](#) or scan the QR code to download the app.

Once the app is downloaded and installed, some permissions may need to be granted to access all the features. It is recommended to ensure that the latest version is installed.

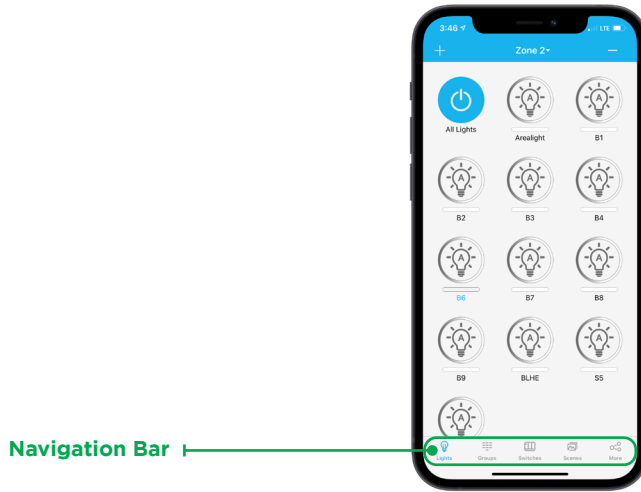


Use only one mobile device to commission the site.





The Lights page is the default home page once the app is started for the first time. The bottom of the screen shows the “Navigation Bar” allowing the user to access the different menus of the app.

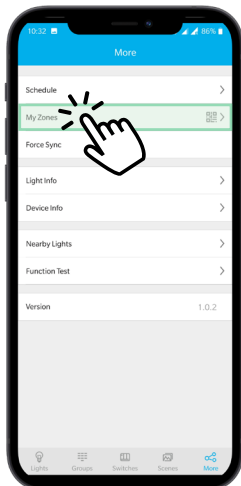


The Navigation bar contains “Lights”, “Groups”, “Switches”, “Scenes”, and “More” tabs which can be accessed by tapping on them.

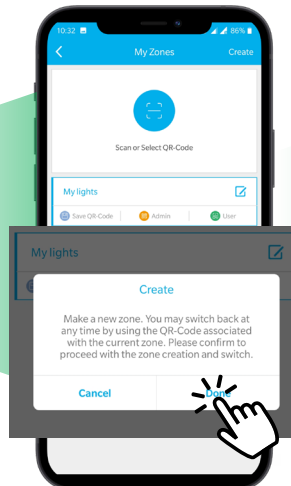
**Zone**

A zone is a network of luminaires that can be controlled in a predefined environment. A zone can support up to 100 light points (combination of network nodes, sensor or AC powerpack node). A unique QR code is associated with every Zone and can be viewed, saved and shared via the c-Max app. A good way to think about the zone is to ask a question, how many total light points do I want to control at once. If the answer exceeds more than 100 light points, break your site or project into multiple zones. E.g., A warehouse site that has say 180 light points, can be broken down into two logical zones (Warehouse Zone A and Warehouse Zone B)

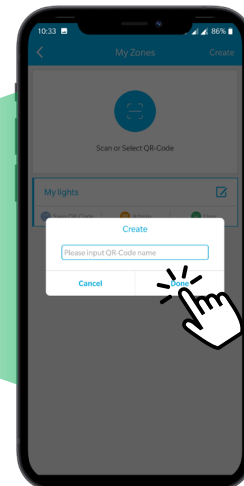
**Creating a Zone**



Navigate to “More” and click “My Zones” to open the My Zones page



Tap “Create” at the top right corner of the screen. Press “Done” to proceed further



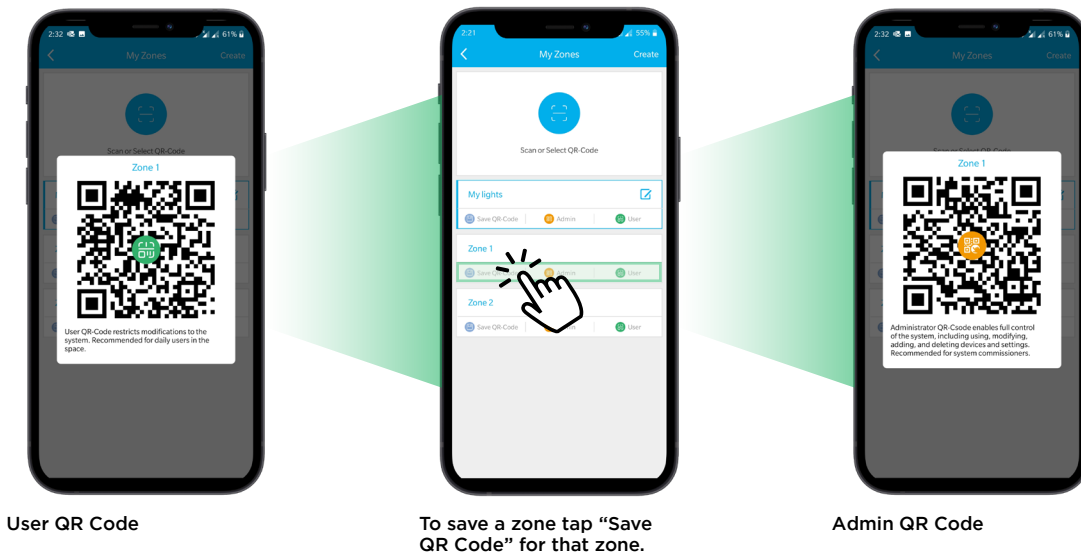
Enter a suitable name for the zone and press “Done” to finish



Once a zone is created, it is highly recommended to save and back-up QR code associated with the zone.

### Saving a Zone

Once a zone is created, a unique QR code is automatically generated. All commissioning settings associated with that zone (motion sensor settings, device names, etc.) are now tied to that QR code. It is therefore highly recommended to back-up the QR codes should your main device were lost or broken. A back up of QR code will allow the user to access the lighting network without needing to recommission the light points. In the event a QR code is lost post commissioning of the zone, the user will need to bring the nodes back to factory default state to add/subtract any light points or adjust any sensor settings. Please refer to the troubleshooting section this user guide on how to bring the system back to factory default.



### Types of QR Codes

There are two types of QR codes:

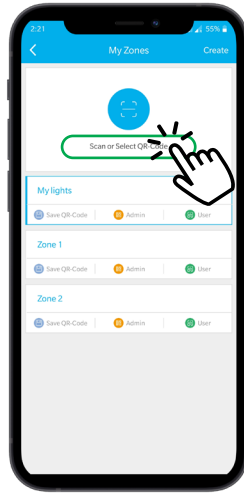
The Admin QR code enables full control of the system, including, modifying, adding, and deleting devices and settings. The Admin QR code is recommended for system commissioners/installers/facility managers.

The User QR code enables partial control over the basic functions of the system such as ON/OFF, Dimming and Scenes.

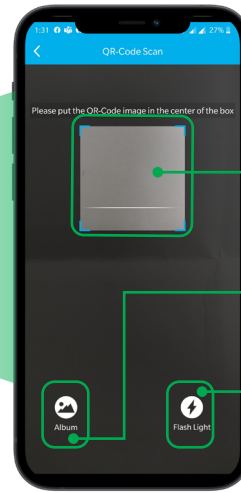
Functions	User QR Code	Admin QR Code
ON/OFF	✓	✓
Dimming	✓	✓
Scenes	✓	✓
Add/Delete Lights	✗	✓
Add/Delete Group	✗	✓
Add/Delete Scenes and Switches	✗	✓
Change Sensor Settings	✗	✓

**Sharing QR Codes**

Navigate to the “My Zones” page and select the Zone (QR code) that needs to be shared. Tap the desired type of QR code (Admin or User) to view the QR code on the screen. The User QR code has a green mark while the Admin QR code has an orange mark at the center of the QR code. The QR code can then be shared as an image once it is saved on the device. The QR code can be saved in the picture folder of the mobile device or can be saved as a screenshot image.



To access a shared or saved QR code, navigate to the “My Zones” page and tap “Scan or Select QR-Code”



Use the device camera to point at the QR code

Tap “Album” to access a saved QR code

Tap “Flashlight” to use device flashlight.

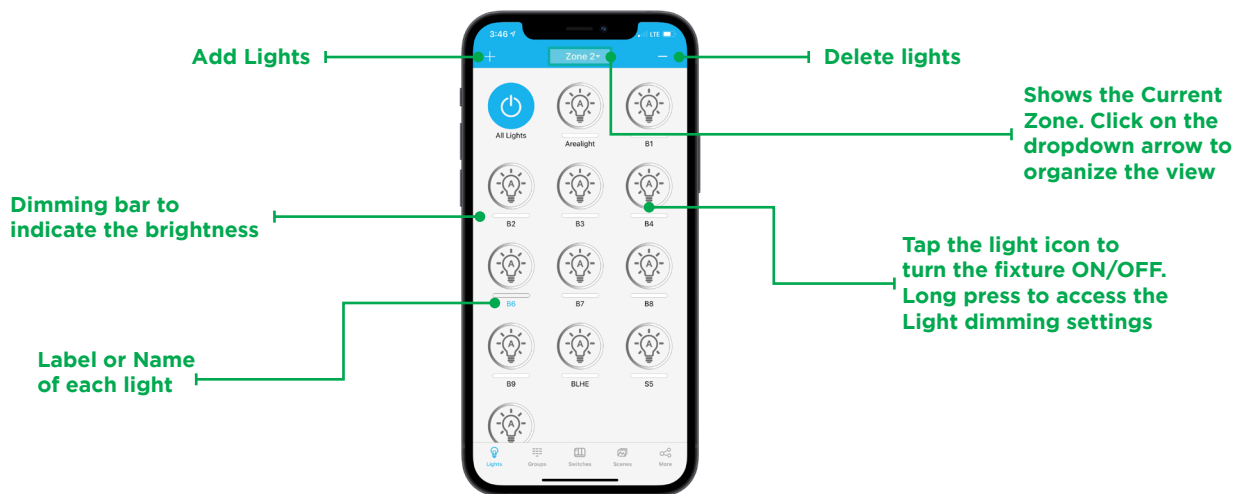
Simply pointing the camera at the QR code will transfer the zone settings to the new mobile device



The Admin QR code is recommended for system commissioners or installers who after commissioning can pass along that QR code to the site’s facilities manager. User QR code is recommended for certain users who have a good understanding of the lighting controls commissioning process and wish to use the app to control lights. For personalized controls, MaxLite recommends the use of the external wireless wall switch.

**Lights**

c-Max app defaults to the “Lights” tab. All the lights that are paired to the network are shown on this page as icons along with their label and brightness level. The app allows you to adjust the settings as well as read the settings.



Add Lights

Delete lights

Shows the Current Zone. Click on the dropdown arrow to organize the view

Dimming bar to indicate the brightness

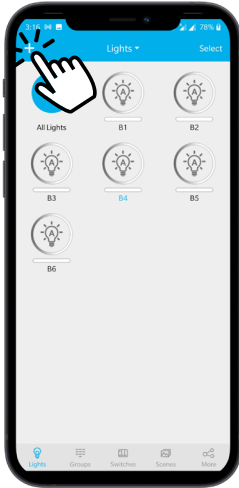
Tap the light icon to turn the fixture ON/OFF. Long press to access the Light dimming settings

Label or Name of each light

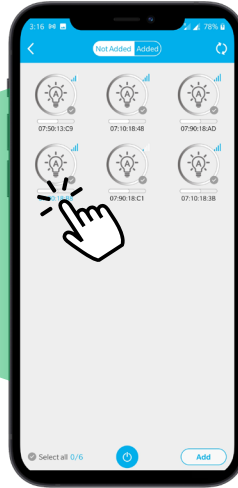
The Lights page view can be organized by sorting the lights either by Name, or Type, or ID or Signal Strength. To change the view, tap on the middle button at the top of the screen (it will show the zone name) and drop-down menu appears with the options to sort.

### Pairing Lights

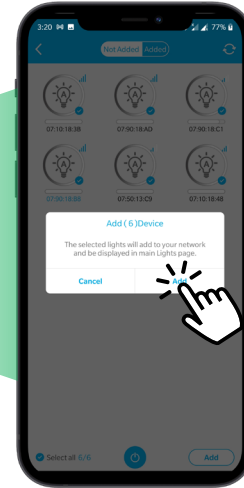
To add lights in the zone, navigate to the home page of the c-Max app. Make sure that the Lights page is active.



Press the “+” icon to add lights. The lights that can be added to the current zone will show up on the screen



Simply check the icons to select the lights. Once all the required lights have been added, press “Add”



Press “Add” to confirm. The added lights should now be visible on the “Lights” page.

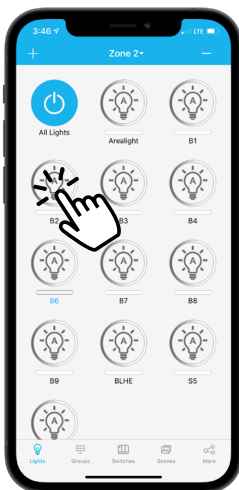
The lights can be viewed, edited and deleted by accessing the individual Light settings from the Lights page.



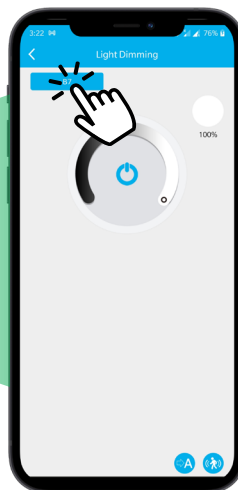
The added light fixtures will flash twice to indicate their successful pairing with the network. The lights paired to the network will now show up as icons on the Lights page.

### Identifying and renaming devices

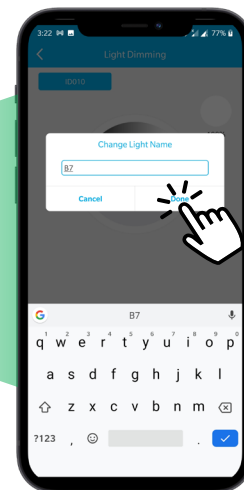
To avoid confusion and ensure smooth commissioning, a good practice is to label the light points as soon as they are added to the network. Document the devices in the network as necessary and as explained earlier during the general commissioning.



To rename a light, long press the light icon and the Light Dimming page should appear



Tap the ID label of the light right above the dimming dial



Rename the light according to an appropriate convention. Press Done to finish.

### Light Dimming

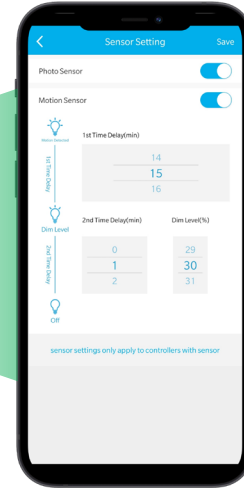
User can access individual lights and control the brightness level of each light from 0% to 100% in 1% increment.



Long press the light icon to open up the individual light dimming settings.



Adjust the dial to control the brightness. Tap the **A** at the bottom right to access Sensor settings



Sensor settings include Photosensor and Motion Sensor settings



In the Light Dimming settings, a percentage value is shown right next to the dial which indicates the brightness level of the luminaire from 0 to 100.

### Auto Brightness level

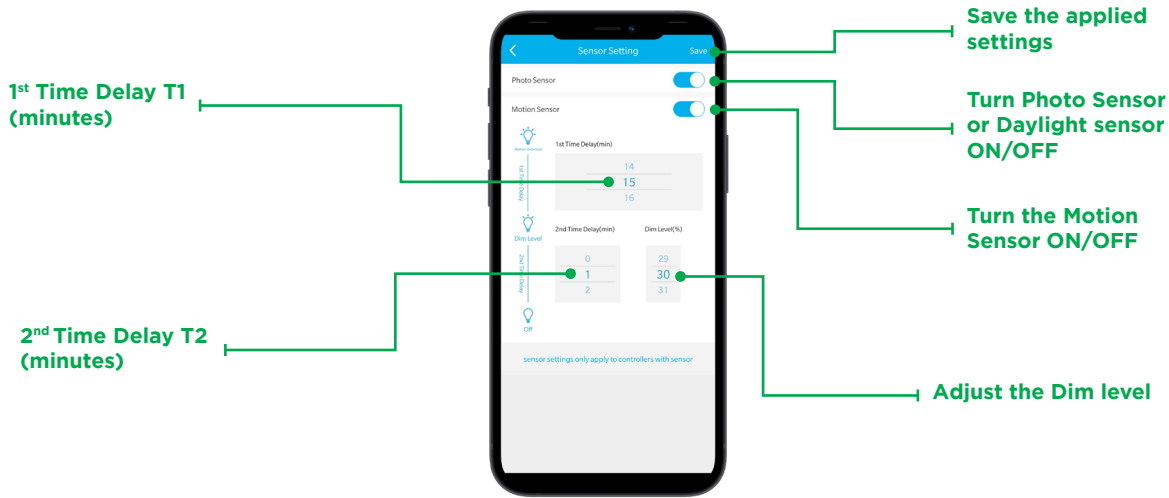
At the bottom right corner of the Light dimming page, **A** icon is used to set up the Automatic brightness level. The Auto brightness sets the brightness level of the light when it recovers from a passive state. For example, consider that the light is paired to a motion sensor and the Auto Brightness level is set at 80%. When the motion sensor is triggered, the light will reach to 80% brightness i.e., the Auto brightness level. To set the Auto Brightness level, simply adjust the dimming dial to get the desired brightness value and press the **A** icon once.

### Sensor Settings

To access the sensor settings (Photosensor or Motion sensor), press on the icon at the bottom right of the Light Dimming page. The sensor settings are primarily of 2 types:

1. Photo Sensor (Daylight harvesting sensor)
2. Motion Sensor (Occupancy/Vacancy)

The photo sensor can be turned On/Off by using the switch button provided next to it. Photo sensor is enabled to turn on daylight harvesting. The sensor detects daylight and adjusts output to maintain consistent lighting.



Simply pointing the camera at the QR code will transfer the zone settings to the new mobile device

Motion sensors are pre-programmed as occupancy or vacancy and can be enabled in similar ways as explained. The motion sensor can similarly be turned On/Off by using the switch button next to it. User can set bi-level dimming on individual luminaires by adjusting 1st Time Delay (T1), a Dim Level and a 2nd Time Delay (T2) to promote energy savings.

**1st Time Delay (T1):** The lights will maintain working level light during the T1 time delay period each time motion is detected. The user can set the T1 delay ranging from 1 minute to 59 minutes. The 1st Time delay is factory default set at 20 minutes. T1 can also be set as Infinite if the user does not want the lights to dim.

**Dim Level:** Dim Level is the brightness value (%) of the light when no motion is detected after T1 time duration has passed. Factory default is set at 50%.

**2nd Time Delay (T2):** T2 starts after T1 has expired and there is no motion detected. Dim level set after T1 expiration holds until T2 expires. After T2 elapses, the light turns off. The user can set the T2 delay ranging from 1 minute to 59 minutes. The 2nd Time delay factory default is set at 1 minute. T2 can also be set to Infinite in which case the luminaire will stay at the Dim level without turning off.

Once properly commissioned, all sensor settings are saved to the flash memory of the MCU. In case of power outage, sensors retain all its prior settings (High-trim, motion sensing and daylight harvesting).

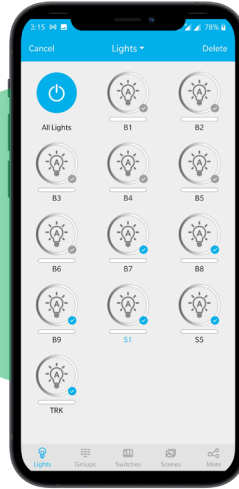


### Deleting Lights

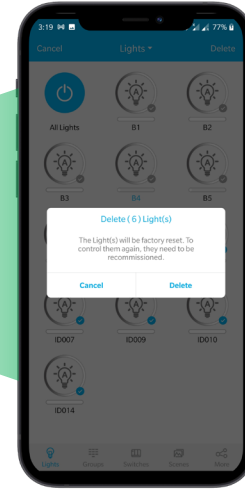
Lights can be removed from a zone from the Lights page. Lights get reset to factory default settings once they are deleted from the zone. Once a light is deleted, it becomes discoverable again to be paired with a zone.



Navigate to the "Lights" page and press "-" on the top right of the page



Select the lights that need to be deleted or Reset, and press "Delete"

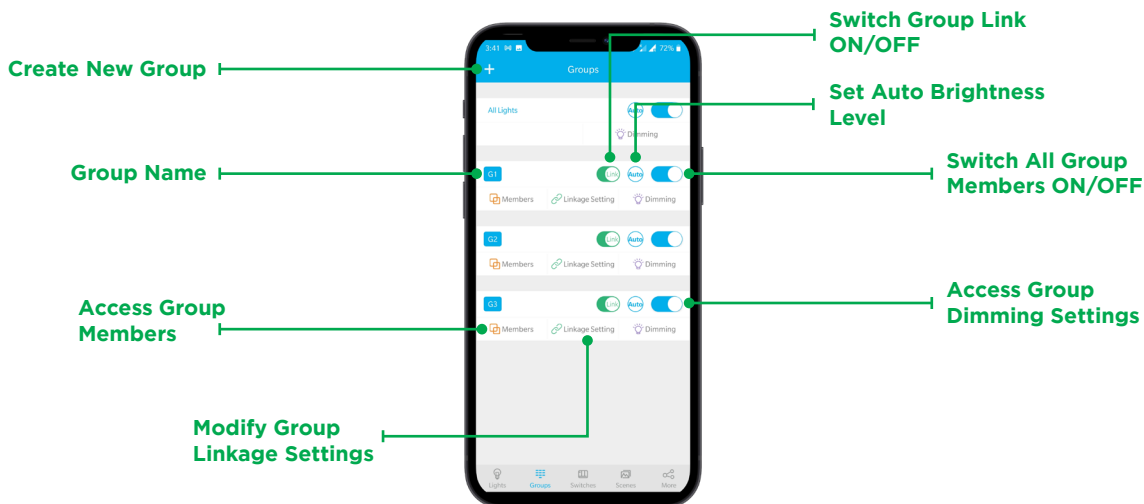


Press "Done" to confirm the deletion. The deleted lights are now reset and can be paired to another zone.

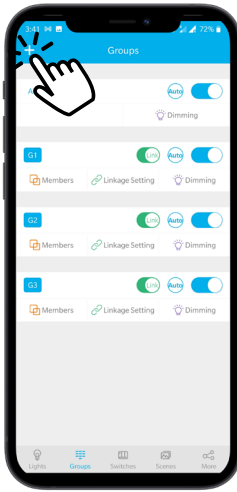
### Groups

Using Groups, user can wirelessly group and control multiple lights points. A group can include network nodes, powerpack and sensors.

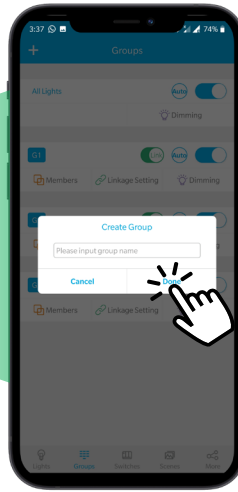
The "Groups Page" can be accessed by pressing "Groups" on the navigation bar at the bottom of the screen. The "All Lights" group is created by default which allows the user to control and modify the settings of all the lights in the zone at once.



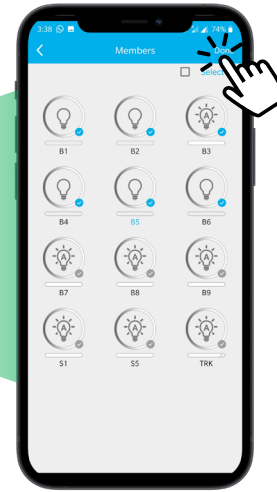
## Creating a Group



To create a group, tap the "+" icon on the top left of the screen



Enter the group name and tap "Done"

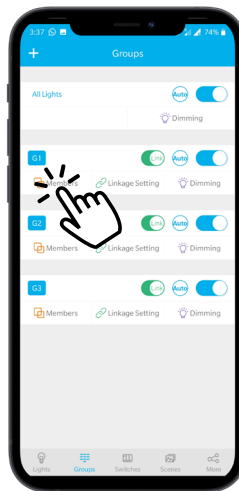


Select the members by checking the icons. Once the selection is complete, tap "Done"

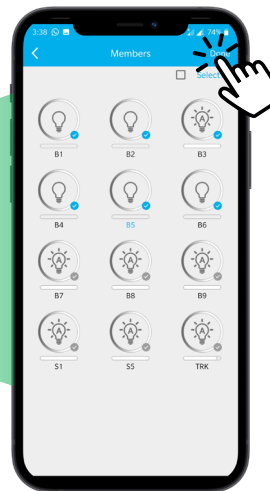


When a group is successfully created, all the luminaires in that group will flash

## Modifying Group Members



To modify group members, press the "Members" button in the corresponding group tab to access the Members page

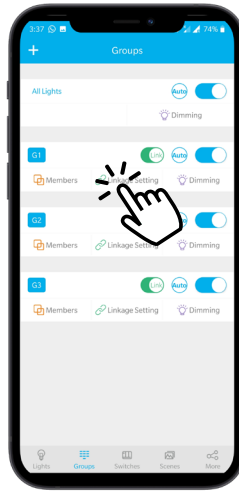


To add members, simply check the desired lights icons and uncheck to remove members. Click "Done" to apply the modifications

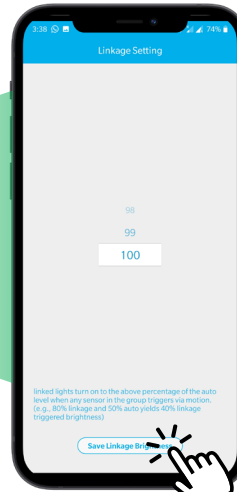
### Linkage Settings

c-Max Network Controls enables multi-level dimming allowing user to save more energy. The Group Link feature allows the user to adjust linkage value of the group members. If the Link toggle is turned ON for a group, the motion detected by any one sensor member of the group can be used to link its response with other members (sensors or network nodes only) of the group. For example, consider 3 sensors named B1, B2 and B3 in a group set to linkage setting of 80%. If motion is detected by B3 (parent member), B1 and B2 (child members) would correspond to 80% of the Auto Calibrated brightness value while B3 will be at 100% of its Auto Calibrated brightness value. The table below showcases few scenarios where a combination of Group Auto Brightness Level and Link settings help achieve additional energy.

	Group Settings		Brightness Level during T1	
	Group Auto Brightness Level	Linkage Settings	Triggered Member (Parent)	Other Members (Children)
<b>Scenario 1</b>	100%	100%	100%	100% (100% x 100%)
<b>Scenario 2</b>	100%	80%	100%	80% (100% x 80%)
<b>Scenario 3</b>	80%	50%	80%	40% (50% x 80%)



The Linkage settings for a group can be accessed by tapping the “Linkage Settings” button



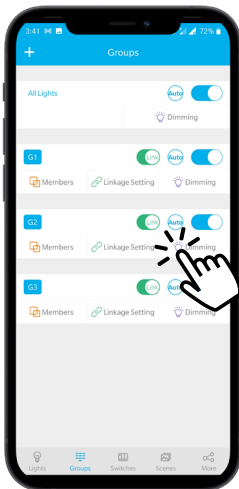
Use the scroll bar to set the appropriate Linkage Setting. Click Save Linkage Brightness to apply the changes



Linkage settings are set to 100% by default.


### Group Dimming Settings

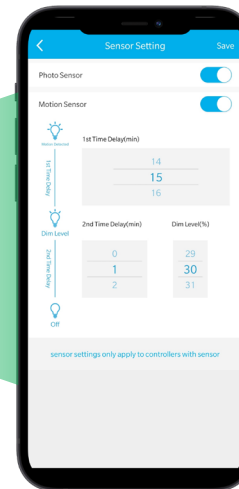
Unlike the Light Dimming settings, Group dimming applies to all the members of the group allowing the user to easily modify the settings of multiple light fixtures simultaneously.



Press the Dimming button for the corresponding group to access dimming settings







Adjust the dial to control the brightness. Tap the  at the bottom right to access Sensor settings




Sensor settings include Photosensor, Sensitivity and Motion Sensor settings

### Auto Brightness Level

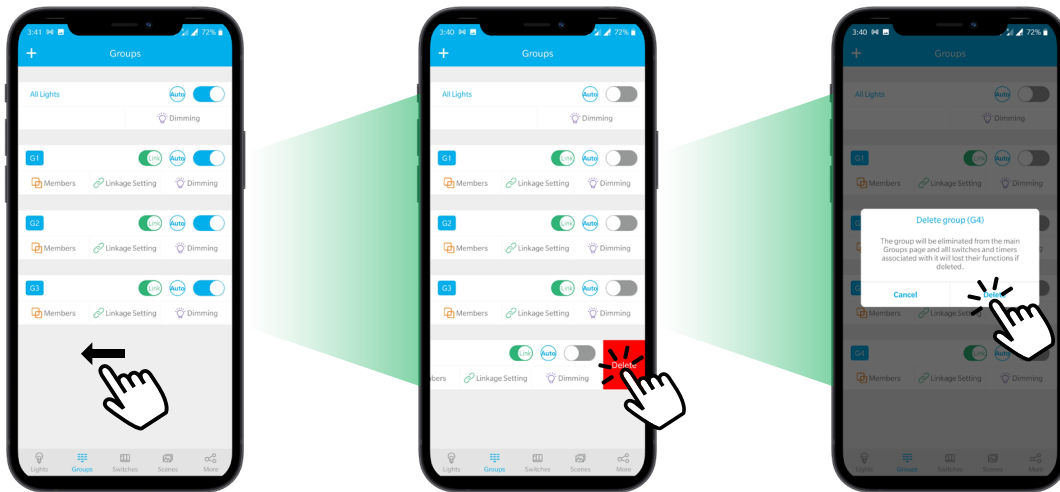
At the bottom right corner of the Group dimming page, there are two icons, the  icon and the  icon.  icon is used to set up the Automatic brightness level. The Auto brightness level sets the brightness level of the group when the group recovers from a passive state. For example, consider a scenario when the group contains light fixtures with motion sensor and the group dimming auto value is set to 80%. In this case, when the motion sensor is triggered, all the members of the group will reach 80% brightness. The Auto value for any group is set to 100% by default. To set the Auto Brightness level, simply adjust the dimming dial to get the desired brightness value and press the  icon once.

### Sensor Settings

The  icon is used to access the sensor settings of the group. These settings are similar to the sensor settings for the lights except they are applied to the entire group of lights at once. Please refer to sensor settings in Section 4.5.

### Deleting a Group

Any group can be easily deleted by following these steps:

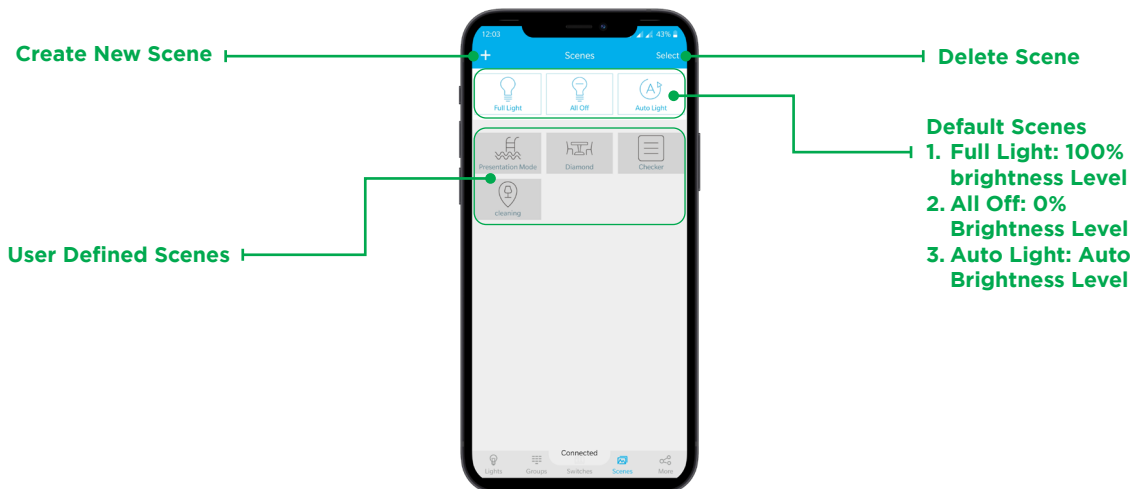


Swipe left on the group tab that needs to be deleted

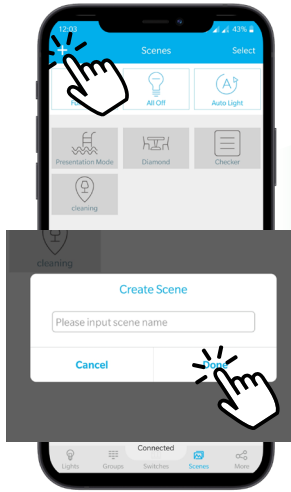
A red delete button should appear. Press the Delete button

Confirm deletion by clicking Delete once again

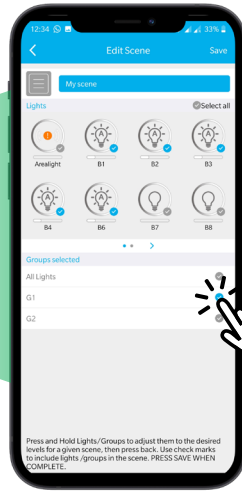
### Scenes



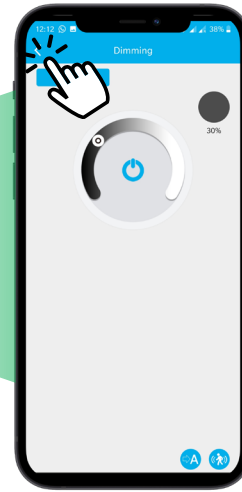
**Creating a Scene**



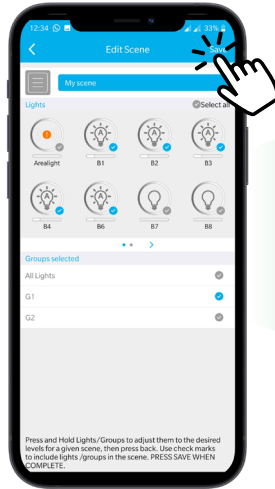
Click the “+” button on the top left to create a new scene. Enter appropriate name and click “Done” to proceed further



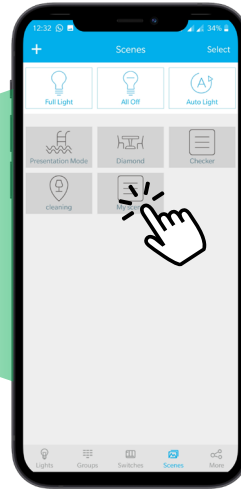
Select the lights that need to be a part of the scene by checking them. They can also be selected by groups. Long press Light/Group to adjust dimming.



Adjust the brightness level as needed for each light/group by using the dimming settings to define a scene. Navigate back to the previous page by using the Back button



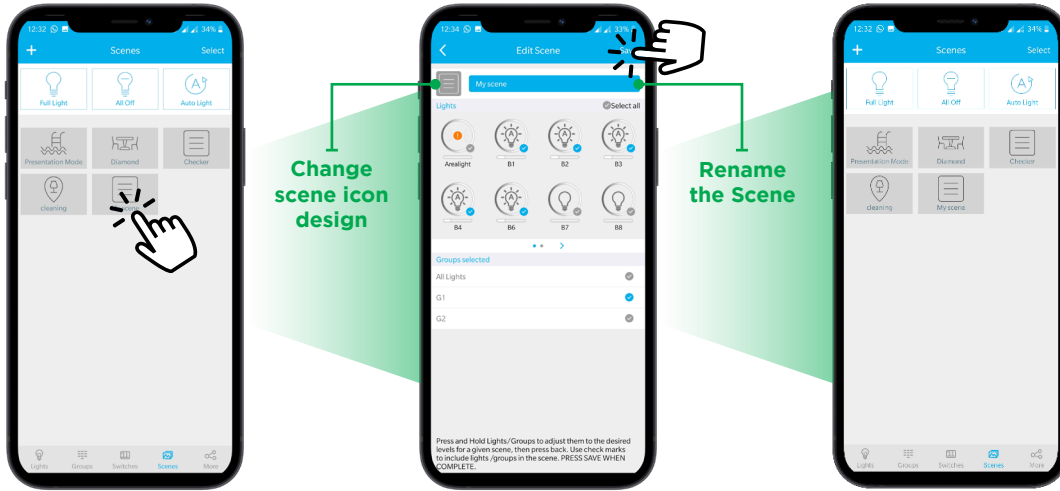
Confirm that the scene adjustments have been applied to the appropriate members and click “Save”



To call the scene simply tap the Scene icon.



**Modifying a Scene**



To edit a scene, long press the scene icon and the “Edit Scene” page should appear.

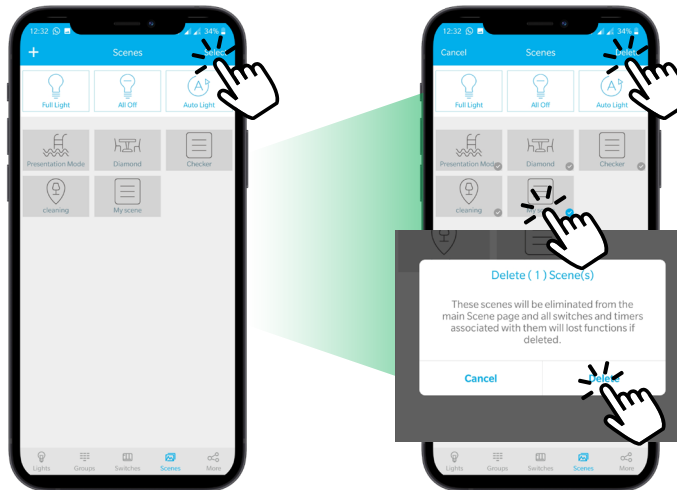
**Change scene icon design**

**Rename the Scene**

All the brightness values can be easily adjusted by accessing the light/group dimming settings. Members can be added and removed by checking/un-checking them. Click save to apply the changes.

Scene is now modified.

**Deleting a Scene**

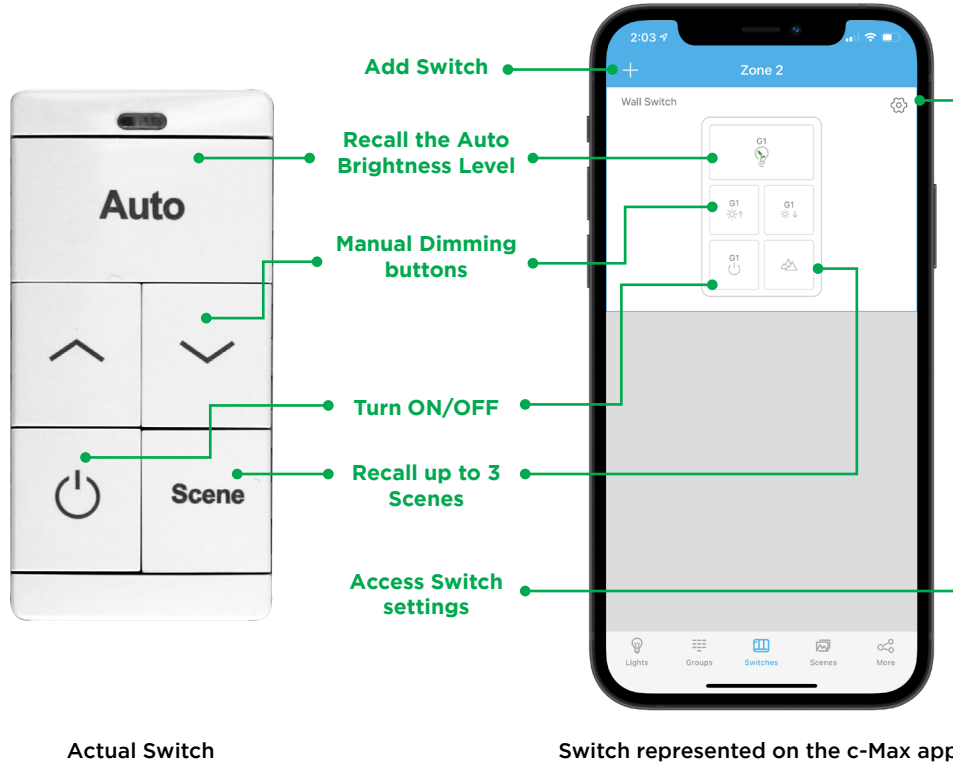


To delete a scene, click “Select” and check the scenes that need to be deleted.

Confirm the selection and click “Done” to proceed further. The scene will now be deleted.

**Switches**

c-Max Network controls allows the user to add/pair up to 10 switches in a zone. In addition to the basic switch functions such as ON/OFF and Dimming, the user can also define up to 3 scenes which can be called through the switch easily.

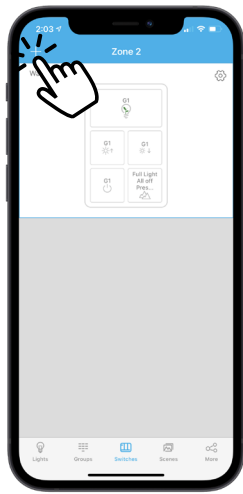


**Switch Buttons and Functions**

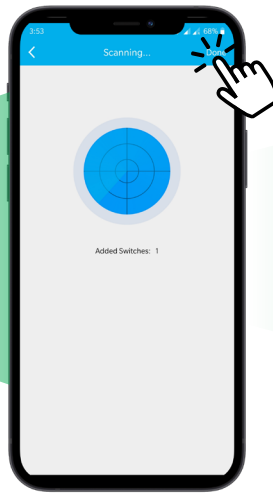
The functions of the 5 buttons on the switch can be summarized as below:

Buttons	Functions
	Recall the Auto Brightness Level.
	Manually increase the brightness level of the light.
	Manually decrease the brightness level of the light.
	Recall up to 3 scenes. Press this button to toggle between the scenes.
	Turn Light/Group ON/OFF

## Pairing Switches



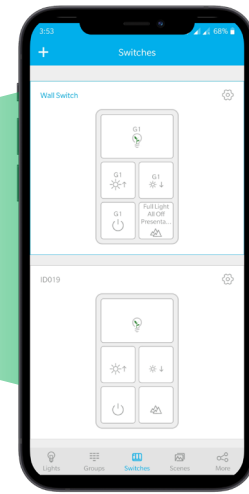
Press “+” at the top left of the switches page of the app



Press “+” at the top left of the switches page. On the physical hardware switch, long press the “Auto” and “Dim +” buttons to pair the switch. The number of Added switches will be indicated under the scanning icon.



**Long Press  
the Auto  
and Dim +  
buttons**



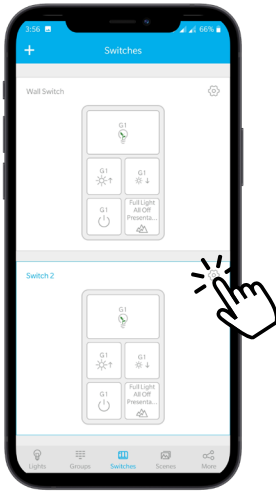
The added switches are visible on the “Switches” page




The blue indicator at the top of the physical hardware switch will blink once when it is ready to get paired. A red indicator would suggest that DC batteries need replacement.

## Editing Switches

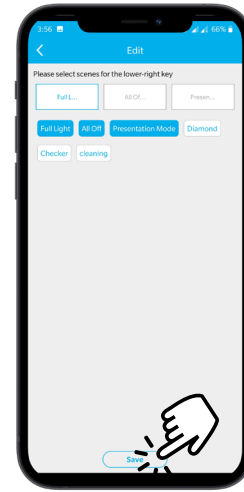
Once the switch is paired in the network, it can be used to control either a light or a group of lights.



Press the  icon for the switch that needs to be edited. Tap on the auto generated switch name to rename.

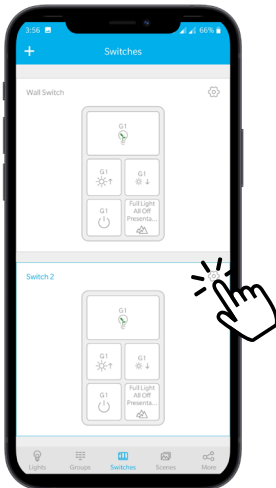



To pair switch with a light, use the "Lights" button and select the required light by checking it. Alternatively, the user can also select a group by using the "Groups" button in the same way. Click "Next Step" to proceed further.

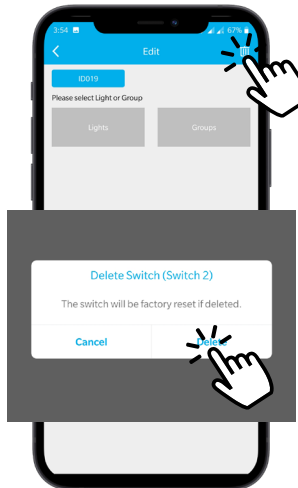


Select the scenes (up to 3) and press "Save". The switch is now ready to use.

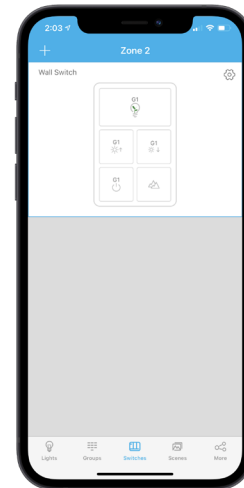
### Deleting Switches



Press the  icon for the switch that needs to be deleted



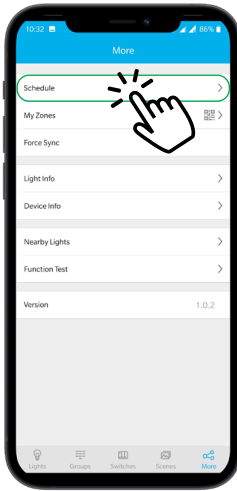
Press the  and press "Delete" to confirm deletion



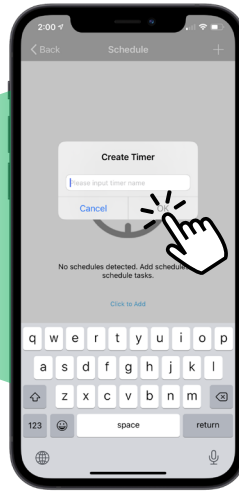
The switch is now deleted

### Creating a Schedule

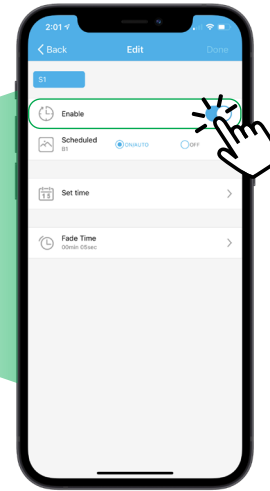
Lights/Scenes and Groups can be scheduled based on a time of the day and/or days of the week.



To create a schedule, click on "Schedule" on the "More" page.



On the "Schedule" page, press "+" and enter an appropriate name for the schedule.

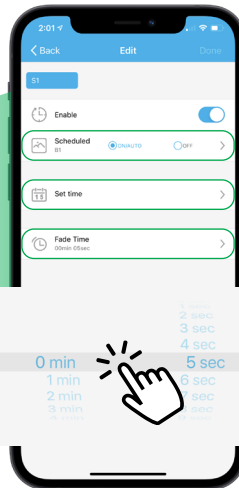


Enter the appropriate date and time using the set time button. The toggle button can be used to activate/de-activate the schedule.

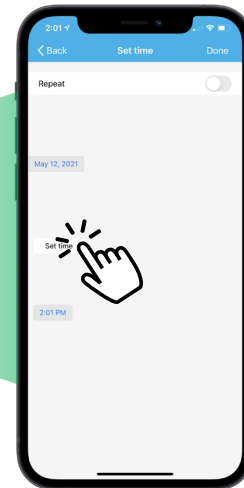
### Editing a Schedule



Using the "Scheduled" button, Select the light/group/scene that needs to be scheduled and press the "Done". Use the "Auto/On" or "Off" buttons to define the logic of the schedule.



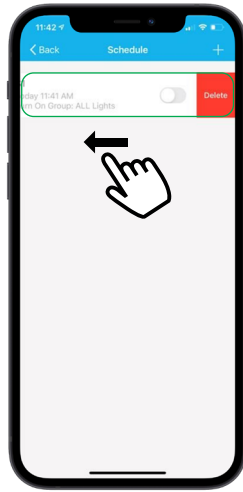
Using the "Fade Time" button, set an appropriate Fade Time so that the light turns On or Off in a smooth manner as it changes its dimming state.



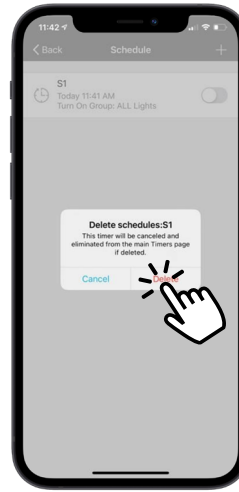
Using the "Set Time" button, Set the appropriate Date and Time for the Schedule. Use the Repeat button to repeat the schedule on specific days of the week.

In case of power outage, the system may not retain the scheduled times. This can be easily resolved by resyncing the app with the network once power is restored.

## Deleting a Schedule



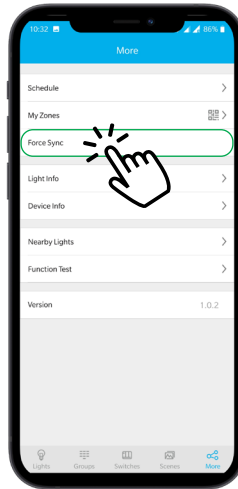
To delete a schedule, swipe left on the schedule tab and press the red "Delete" button.



Press "Delete" to confirm deletion.

## Force Sync

The Force Sync feature is useful when the installer or the end-user is commissioning without internet connection. Force Sync feature helps to ensure that all the changes during the commissioning process are saved correctly to the QR code.

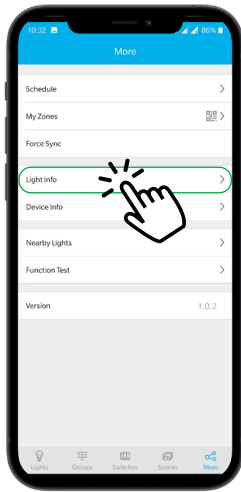


To synchronize, navigate to the more page and press Force Sync.

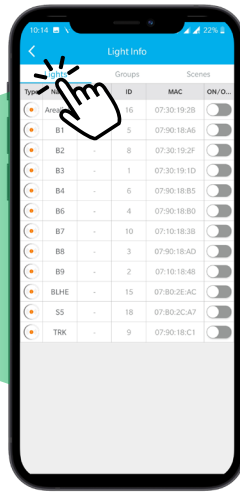


**Light Info**

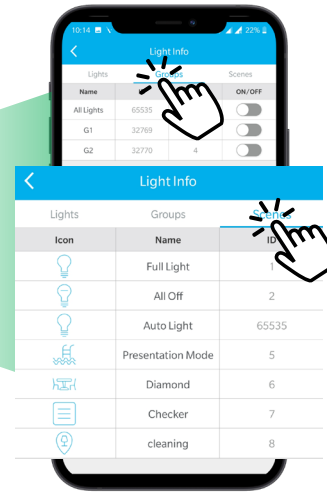
An organized view of the Lights, Groups and Scenes created for a particular zone can be accessed using the Light Info feature in the more section of the c-Max app. The user can access important information such as the Mac Address and the ID associated with each device.



Navigate to the more section and press "Light Info".



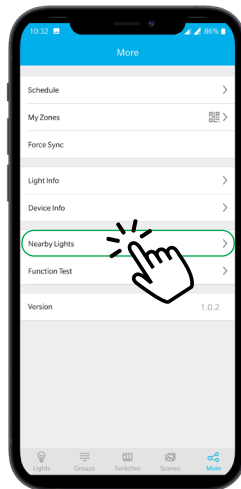
Information about individual lights can be obtained under the Lights tab.



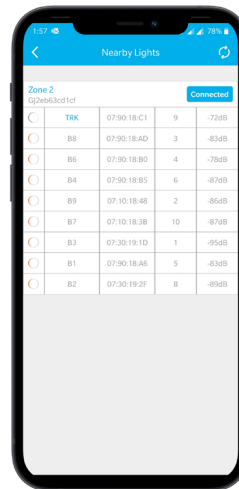
Toggle between Lights, Groups and Scenes to view the desired information.

**Nearby Lights**

User can access the information on the lights that are within the connection vicinity. Key information such as the ID, Mac Address and the range in decibels comes handy during commissioning to help user identify, locate and select the lights easily.



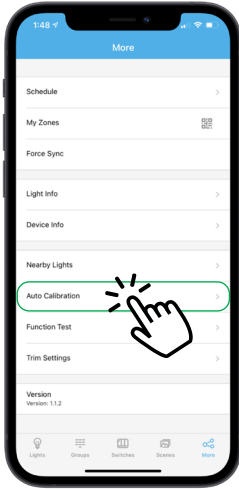
Navigate to the more section and press "Light Info"



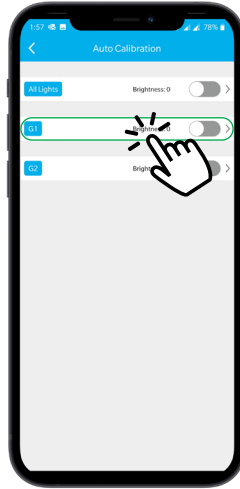
All the lights that are within the range can be seen along with important information which is helpful during commissioning.

### Auto Calibration

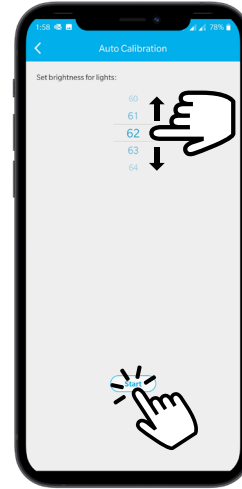
The Auto Calibration feature can be used to set a desired brightness level (% Lumen output) for a group. Typically this would require use of calibrated lux meters to understand the desired light levels within the space, taking into account natural and ambient light. Based on the ambient light conditions, the luminaires within the group would adjust independently to the calibrated state.



Navigate to the more section and press "Auto Calibration".



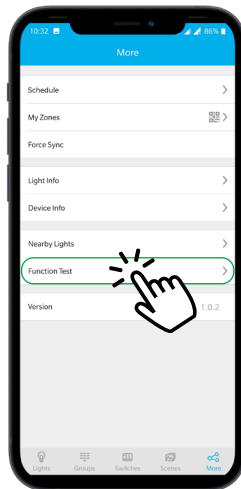
Select the appropriate group to perform Auto Calibration. One can also choose the "All Lights" group to select all the lights.



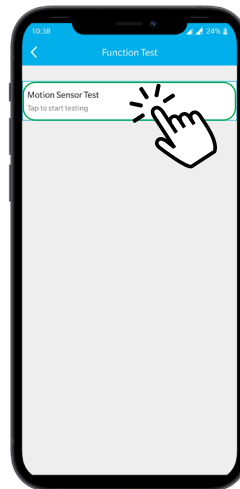
Set the appropriate brightness level and press "Start" to apply the settings.

### Function Test

The Function test button is used to verify the activation functions of sensors.



Navigate to the more section and press "Function Test".

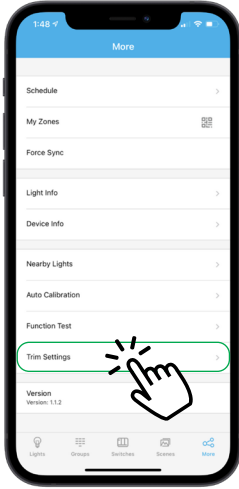


Press the "Motion Sensor Test" button to turn off the lights but keep motion sensor working. Walk near the motion sensor detection area to trigger and turn on the lights.

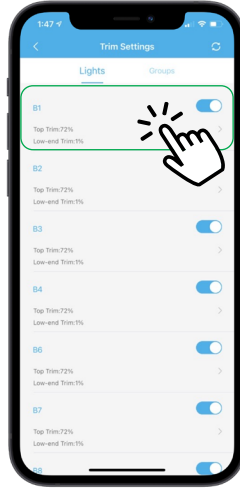
### Trim Settings

To enhance energy savings, High trim or Top trim and Low trim can be set using the Trim settings. Top trim feature sets the maximum light level allowed and can be adjusted between 50% and 100% in, % increment.

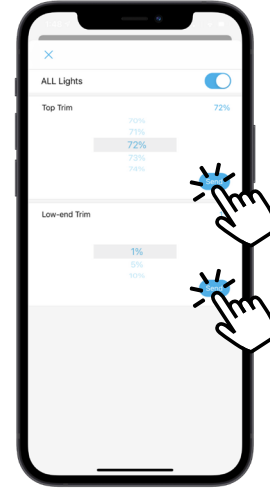
The Low-end trim defines the lowest light level to a percentage other than zero. Setting the low-end trim assures that your lights don't turn off when they're dimmed to their lowest setting.



To access Trim Settings, click "Trim Settings" in the more section.



Trim settings can be applied for an individual light or a group of lights. Select the desired light or group by clicking on the respective tab.



Set the appropriate Top trim and Low-end trim values and press send to apply the settings.

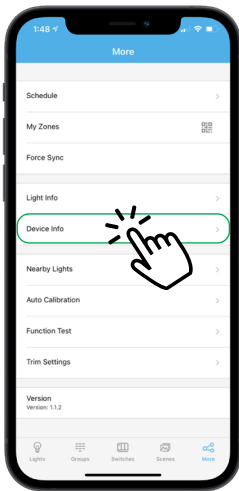
### Real Time Clock (NN-RTC) Device

The Real Time Clock (NN-RTC) device enables the bluetooth mesh network to get synchronized every 10 minutes with real local time. As a result, the schedules set up within the zone can be executed at the set times after a power outage.

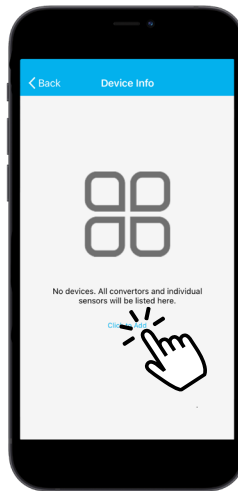
### Configure the RTC device with c-Max app

Before proceeding with the configuration steps, remove the battery tab to energize the RTC device and plug it in into a USB power outlet.

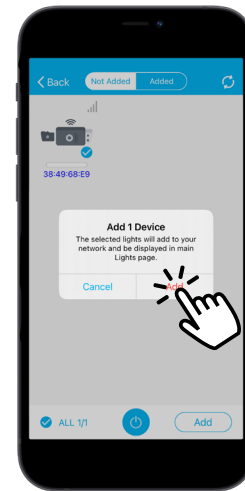
Ensure that the desired zone is active on the c-Max app. The RTC device will be configured with the active zone.



Navigate to the more page and press "Device Info" to search for the RTC device



Use the "Click to Add" button to search for the RTC device

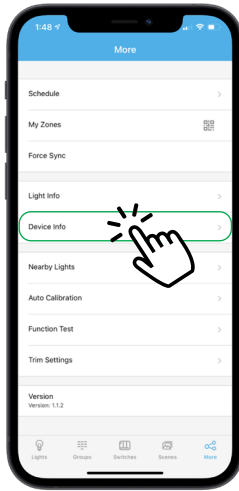


Select the device, click "Add" and confirm the step. The RTC device is now added to the zone successfully

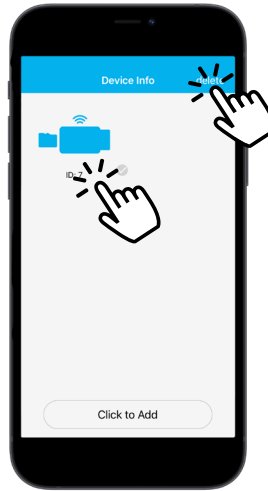


The added RTC device will be automatically paired with the active zone and will be configured with the lights and sensors within that zone.

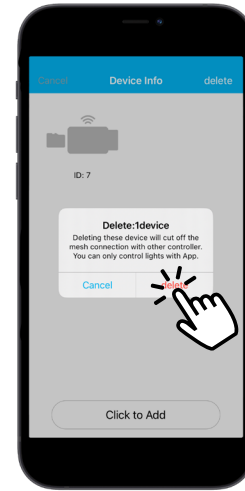
## Remove the RTC device from the zone



Navigate to the more page and press "Device Info" to search for the RTC device



Select the device icon. Press "Delete" from the top right of the screen



Confirm deletion by pressing "Delete" again. The device is now successfully removed

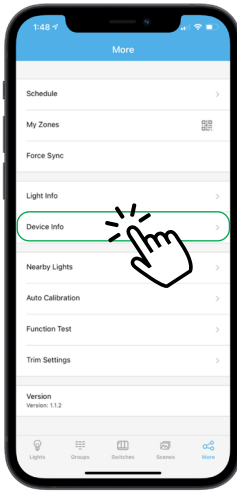
## Energy Monitoring

The Energy Monitoring Data Collector (NN-EDC) is a USB-A dongle with an internal battery that uses a calculation method to compute energy consumption of the luminaires (Components such as light engines, drivers, sensors, etc.) within the zone based on maximum wattage of the luminaire and the percentage dimming level of individual luminaires. The energy data is collected every 15 minutes. The NN-EDC device can also the real clock synchronization like NN-RTC.

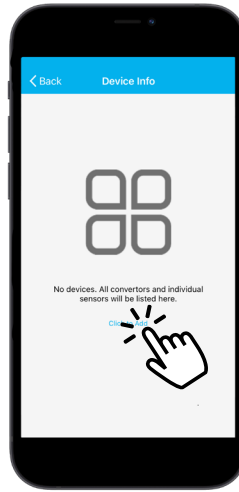
## Configure the Energy Monitoring Device

Before proceeding with the configuration steps, remove the battery tab to energize the Energy Data collector (NN-EDC) device and plug it in into a USB power outlet. Ensure that the device is equipped with a micro SD card for storage and formatted using FAT32 format method before usage.

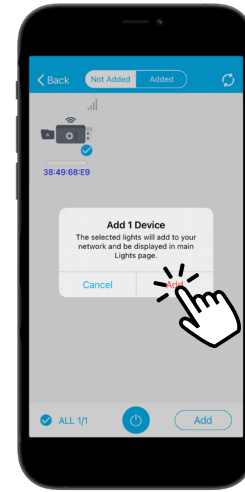
Ensure that the desired zone is active on the c-Max app. The NN-EDC device will be configured with the active zone.



Navigate to the more page and press “Device” Info to search for the Energy monitoring device



Use the “Click to Add” button to search for the Energy monitoring device



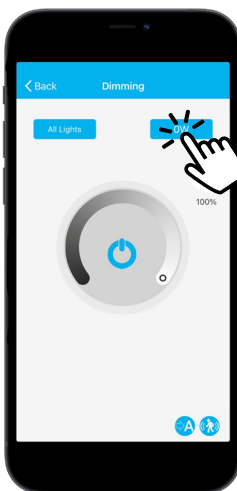
Select the device, click “Add” and confirm the step. The NN-EDC device is now added to the zone successfully



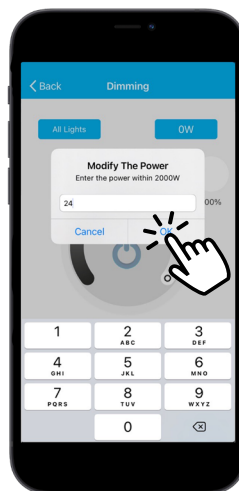
The added Energy monitoring device will be automatically paired with the active zone and will be configured with the lights and sensors within that zone.

### Manual Entry for Luminaire Power

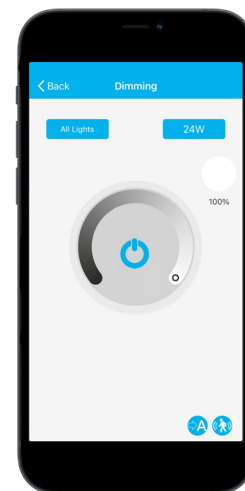
To use the energy monitoring feature on the c-Max app, it is essential to enter accurate information about the maximum power rating in Watts (W) for each individual luminaire. Manual entry of maximum luminaire power is done in the app either at the individual luminaire level or at a group level if all the members of the group are of the same type. Using incorrect information or failing to enter this information could lead to inaccurate energy calculations.



Access the Dimming page for lights/groups within the zone. Click on the wattage button to edit the power rating



Edit the power rating of the light and enter the correct value in Watts (W) and click “Ok”



Navigate back to the lights/groups page to enter information for other lights/groups

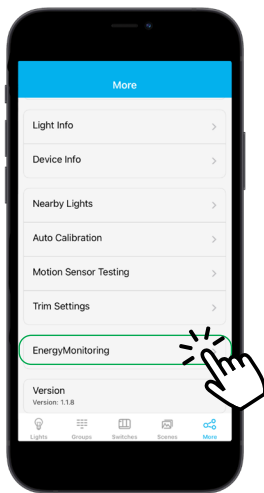
### Energy monitoring data overview

The Energy monitoring device is equipped with a memory storage micro SD card and records the energy data every 15 minutes. The energy data record for each month is automatically created and saved in the SD card as raw log files in .txt format. The micro SD card can record and store up to 2 years worth of energy data.

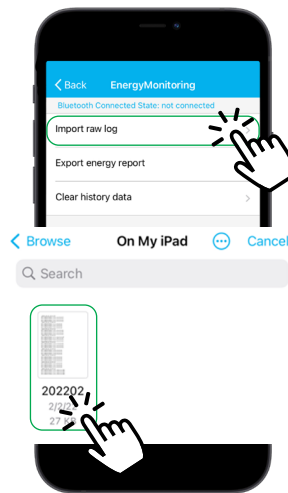
The nomenclature of the log files is YYYYMM, so for example, the log file for the month of February, 2022 would be stored as 202202. These files can be accessed using the SD card either on a smartphone or a computer. It is advisable to store the log files safely on a computer or a smartphone every month to avoid any loss of the data. These files need to be transferred to the smartphone device that is used for commissioning the c-Max Network Controls.

### Import Raw log data

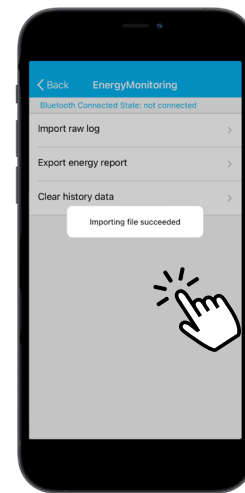
The Import raw log feature on the c-Max app is used to access the energy data stored in the micro SD card of the Energy monitoring device. Before proceeding to import, transfer the raw log data from the SD card to the commissioning device. Ensure that the correct zone is active on the c-Max app to be able to import the raw log file.



Navigate to the More page and click on the “Energy Monitoring” feature



On the Energy Monitoring page, click “Import raw log” to access the saved log file from the correct storage location



Once the desired log file has been imported, a success message should appear

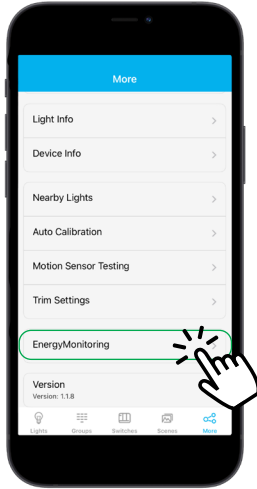


The raw log file can only be imported successfully when the correct zone is active on the c-Max app.

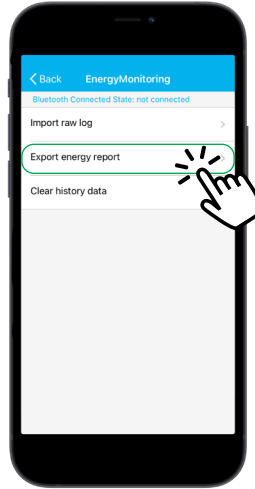


**Export energy report**

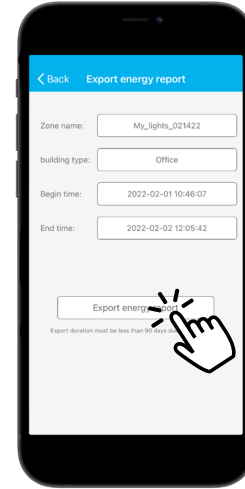
The raw log files imported in the c-Max app can be used to generate Energy reports in a .csv file format. To generate a report, the user would need to import all the raw log files for the corresponding months. For example, to generate a report for 90 days of data, import three months' worth of raw log files.



Navigate to the more page and click on the “Energy Monitoring feature”



On the Energy Monitoring page, click “Export energy report”



Enter information related to zone, building type, begin time and end time using the drop down. Click “Export energy report” when done

A maximum of 90 days' worth of raw data can be exported at one time. To generate an annual report, export 4 quarters worth of data.

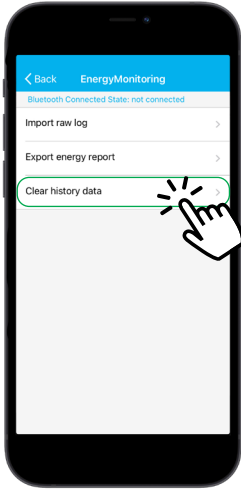
The energy report is generated in a .csv format which can be stored on the device or shared with other devices. The .csv file contains important details including the Building type, Data recording interval, Zone ID, etc. The energy data contains time stamps for each measurement along with Luminaire ID and Energy consumption percentage calculation. Below is a sample of the Energy report:

	A	B	C	D	E
1	NLC System Manufacturer	MaxLite Inc			
2	NLC System Product Name / Model	C-Max			
3	Building / Business Type	Office			
4	Energy Data Reporting Interval	15min			
5	Zone ID / Name	My_lights_021422			
6	Estimated Savings	Post-retrofit			
7	Energy Data Reporting Timestamp	Luminaire ID	Maximum Rated Power without Controls	Energy Measurement / Calculation	Percentage used
8	2/1/2022 10:46	3	36	6	17
9	2/1/2022 10:46	1	36	0	1
10	2/1/2022 10:46	5	36	0	1
11	2/1/2022 10:46	6	36	0	1
12	2/1/2022 11:01	1	36	0	0
13	2/1/2022 11:01	3	36	0	
14	2/1/2022 11:01	5	36	0	
15	2/1/2022 11:01	6	36	0	
16	2/1/2022 11:16	1	36	4	11
17	2/1/2022 11:16	3	36	1	2
18	2/1/2022 11:16	5	36	0	1
19	2/1/2022 11:16	6	36	0	1
20	2/1/2022 11:31	1	36	23	65
21	2/1/2022 11:31	3	36	1	3
22	2/1/2022 11:31	5	36	0	1
23	2/1/2022 11:31	6	36	0	1
24	2/1/2022 11:46	1	36	10	29
25	2/1/2022 11:46	3	36	0	1
26	2/1/2022 11:46	5	36	0	1
27	2/1/2022 11:46	6	36	0	1

Energy reports can be used to generate valuable insights regarding energy consumption and savings. They can be made available for Utility companies to support energy efficiency rebates and incentives.

### Clear history data

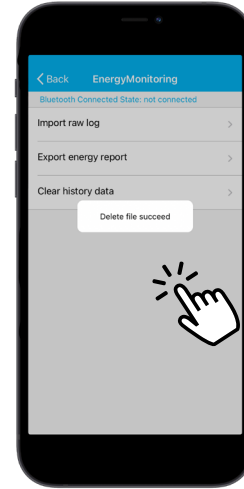
The energy data raw log files do not get replaced or overwritten after import. The Clear history data function is used to clear the history of all the raw log files that have been imported to the app. This does not remove the raw log files from the micro SD card or the local storage of the device.



Navigate the Energy Monitoring page and click "Clear history data"

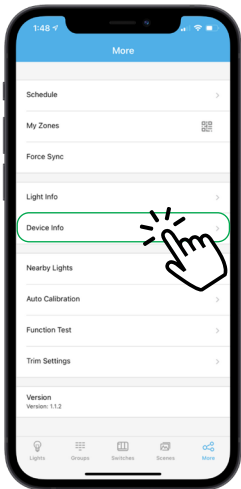


Select the zone, ensure the end time and click "Delete data". This will cause the app to clear the history of all the data until the selected end time

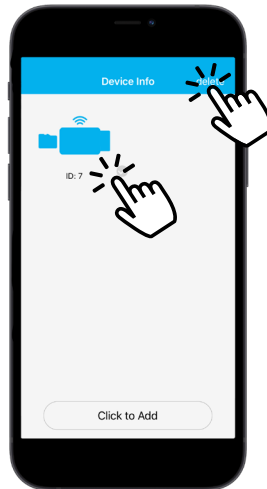


After successful deletion the Delete file succeed message will appear

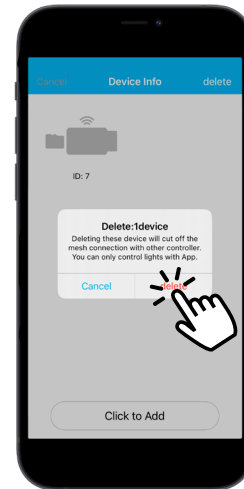
### Remove the Energy Monitoring Device from the zone



Navigate to the more page and press "Device Info" to search for the Energy monitoring device







Select the device icon. Press "Delete" from the top right of the screen



Confirm deletion by pressing "Delete" again. The device is now successfully removed

## Appendix

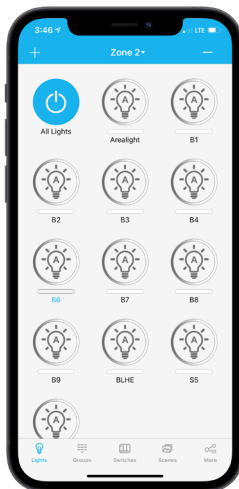
### Understanding the Light Icons

Light Icon	Status
	The Light is currently NOT part of the zone and can be therefore added to the zone
	The light is turned OFF
	The light is turned ON and set at the Auto Brightness Level
	The light is Offline but a part of the zone

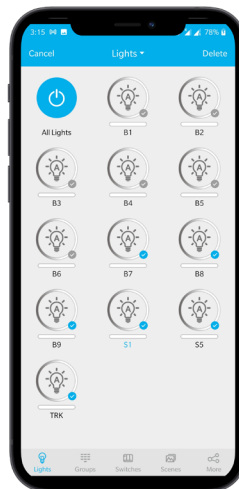
## Reset to Factory Defaults

### 1) Method 1: Software Reset

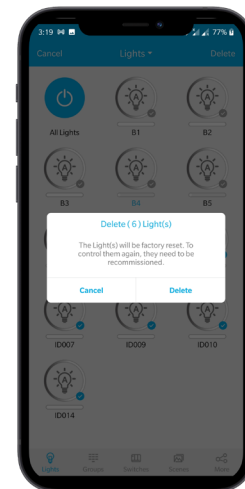
The Software reset method is recommended when the lights are to be transferred to a different zone and the user has complete information on how to locate the light in the c-Max app. This method of reset involves essentially the same steps as deleting a light from the zone.



Navigate to the "Lights" page and press "-" on the top right of the page



Select the lights that need to be deleted or reset, and press "Delete"



Press "Done" to confirm the deletion. The deleted lights are now reset and can be paired to another zone.

### 2) Method 2: Hardware Reset

Please call MaxLite Tech support for further instructions.

### Troubleshooting

Issue	Resolution
-------	------------

#### Fixture Issue

**Fixture does not turn on**

Unplug the node or sensor and confirm fixture is ON. If fixture is still OFF, contact MaxLite Technical Support.

**Fixture was working but no longer responds to the c-Max app even after power cycling**

Ensure that the c-Max sensors are attached to the fixture properly  
 Ensure that the fixture is a part of the Zone that is active on the c-Max app.  
 Ensure that the Bluetooth is enabled on the smartphone and is within the 50ft vicinity of the fixture to ensure connectivity. Check sensor settings.

#### Network Connectivity Issues

**Lights are powered On but do not appear in the c-Max app while pairing**

Ensure that the c-Max sensors are attached to the fixture properly  
 Ensure that the Lights are not part of any other zone. If the light is a part of another zone, delete it from zone or reset the node.

**Unable to connect to the mobile device via Bluetooth**

Check that the smartphone system requirements are met.  
 Reset the Bluetooth on the smartphone device if possible  
 Shut down and restart the smartphone device completely .

**Unable to add more lights**

Ensure there are no more than 100 devices in a Zone or more that 10 switches per Zone.

#### Operational Issues

**Lights not responding to the schedules programmed in the c-Max app**

Ensure that the schedules are defined within the expected Zone of the concerned lights. Check for conflict between two or more schedules. Make sure that the schedules are unique and not overlapping. Ensure that the smartphone device was within the connectivity range when the schedules were applied. Force sync the network when the device is back within range. Ensure there was not a power outage or loss of power. In case of power outage, reconnect the app with the zone.

**Unable to pair the switch**

Follow the steps under 4.8 Switches → Pairing Switches.  
 Make sure that the indicator on the wall switch is not red.  
 A red indicator means that batteries need replacement.

**Lights do not correspond to the set light/brightness level**

System remembers the last setting. If photo sensor is turned ON for daylight harvesting purposes it may adjust the brightness due to other ambient light. If daylight harvesting is not desired then deactivate photo sensor. Refer to section 4.5 Lights → Sensor setting.

## Firmware Updates Using the c-Max OTA Updater

### OTA App Introduction

The purpose of the OTA app is to perform an Over the air (OTA) firmware update for devices in a zone. OTA updates install latest revision of the firmware to the devices and are recommended to enable additional features in the c-Max app or resolve a software bug or to improve the performance of a feature or the entire system. While it is recommended to perform an OTA update prior to commissioning, OTA can also be done after a site has been commissioned.

The c-Max OTA updater app is only available for iOS devices and can be downloaded for free from the App store.

### Light upgrade

*Before starting the Light upgrade process, ensure that the mobile device is sufficiently charged and the OTA App is running in the foreground. Ensure that the mobile device screen is on during the entire update process. Typically this process can take up to 20-25 minutes if you were to perform OTA for multiple lights of the same model type in the entire zone.*

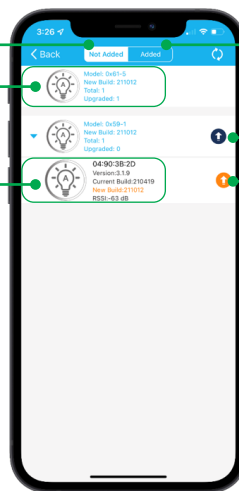
The Light upgrade function will update the lights with the latest firmware. The app shows the current build and the new build (if available) of the firmware for each type of light within the zone. Lights in the zone are categorized by model types. Each model can be expanded to view the lights that belong to the model type using the dropdown button next to it. A blue or orange arrow appears next to the model type suggesting the firmware needs an update. It is possible that the inventory of product might already have the latest firmware and in that situation, there will be no orange or blue arrow. The lights can be upgraded in two ways :

1. Mesh upgrade
2. Individual Light upgrade

Shows the components that are **Not added to the zone. Typically used when performing OTA update prior to commissioning**

Information of the model containing the lights with similar firmware

Information of the individual lights within the model



Shows the components that are **already a part of the zone. Typically used when performing OTA update post commissioning**

Mesh upgrade button

Individual Light upgrade button

### OTA Post-commissioning Instructions

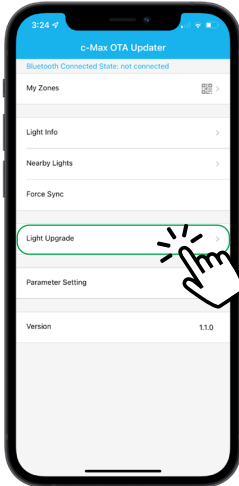
1. Open the c-Max Updater app
2. Click on My Zones and select the right zone that needs an OTA update
3. Click on Light Upgrade and the lights in the zone will show up in the “Added” section of the App as shown above

### OTA Pre-commissioning Instructions

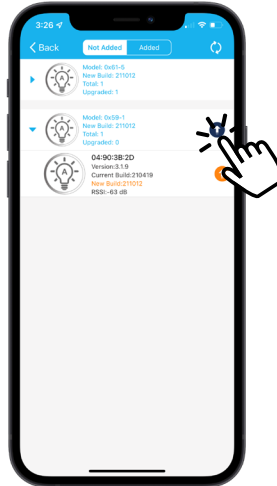
1. Open the c-Max Updater app
2. Click on Light Upgrade. Lights that have not been commissioned or added to a zone yet will show up in the “Not Added” section of the App as shown above.

**1) Mesh upgrade**

The blue arrow next to the model can be used to perform a Mesh upgrade. In a mesh upgrade, all lights within that model type are upgraded simultaneously. This helps save a lot of time as the entire batch of similar lights can be upgraded by a single press of a button. Mesh OTA upgrade can take about 20-25 minutes to complete.



Click "Light upgrade" to view a list of the models within the zone.



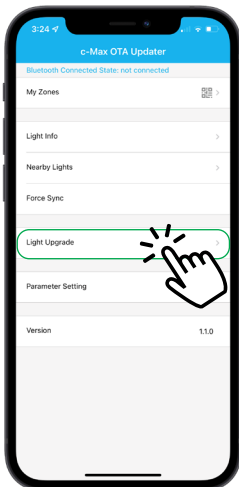
Press the blue arrow button next to the model to start the mesh upgrade.



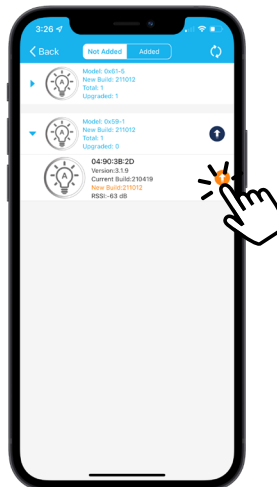
The progress of the mesh upgrade is shown on a separate page. Check if all lights have been upgraded successfully. The restart button can be used in case of any update failures.

**2) Individual Light upgrade**

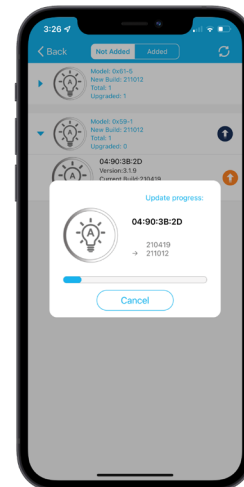
The orange arrow next to the individual lights can be used to perform Light upgrade. This function allows the user to update a particular light without affecting the other lights within the same zone. It typically takes about 90 seconds to perform an update per light.



Click "Light upgrade" to view a list of the lights within the zone.



The orange arrow next to the light indicates that an update is available. Press the orange button next to the individual light to begin the upgrade process.



The upgrade progress is shown on a progress bar. The lights will be updated one at a time until all the selected lights are updated.

Once the update progress is complete confirm the Upgraded count equals to the Total count of the model type. If those did not match, it would suggest few lights failed to update. It is recommended then to either restart the mesh OTA or to individually update the light. Light will flash several times to indicate a successful update. A rapid flash will indicate that the light update has failed. In such an event, relocate the mobile device near the light and restart the OTA update. Once the lights are successfully upgraded, it is recommended to do a circuit level power On/Off.