THE ORGANIC RESPONSE

USER GUIDE

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DOCUMENT CONTROL

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2.0	-	Jul 2017	Features explanation
2.1	A.C	Feb 2017	Portal Addition
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2.3	A.C	Nov 2018	ELMT Extension

organic response
by ORTechnologies

Whitecroft lighting

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CHAPTER ONE

1. INTRODUCTION TO ORGANIC RESPONSE

Welcome to Organic Response!

Inspired by nature, Organic Response lighting control is based entirely on Distributed Intelligence; the best example of which is a school of fish. Schooling fish move effortlessly and in complete harmony with their environment, with individual fish continuously making small decisions in response to the actions of their neighbors and the environment. Each fish is smart enough to operate independently, yet together they comprise an elegantly flexible system that solves complex problems easily without the need for centralized control.

Organic Response enabled lighting operates in a similar fashion. There is no centralized control; each light fitting is fitted with a Sensor Node that allows it to respond to its environment and information from its neighboring light fittings, so that the optimal amount of light is delivered when and where needed.

Figure 1 ORGANIC RESPONSE ENABLED LUMINAIRE

Each Sensor Node is fitted with a motion sensor, ambient light sensor, infrared transmitter and infrared receiver that allows each Sensor Node to communicate wirelessly with each of its closest neighbors.

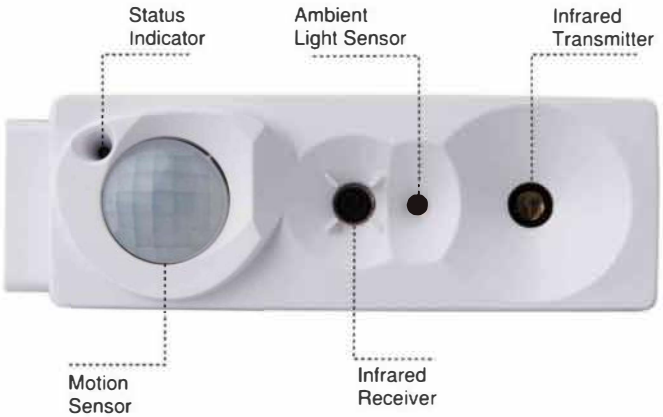


Figure 2 SENSOR NODE 3 components

To enable a Sensor Node to control lighting it must first be integrated into a luminaire. Once a luminaire has been fitted with an Organic Response Sensor Node it becomes "Organic Response enabled", and allows the luminaire to make lighting decisions based on:

- the presence of occupants sensed directly by its own motion sensor;
- occupancy information it receives from neighboring luminaires via proximity limited infrared signals;
- ambient light levels sensed directly by its own ambient light sensor, and
- a variety of algorithms in the onboard microcontroller

1.1. HOW ORGANIC RESPONSE WORKS

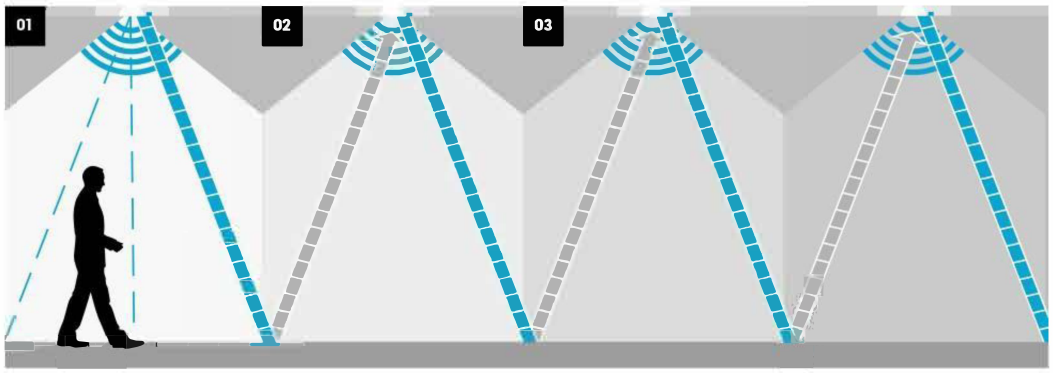


Figure 3 HOW ORGANIC RESPONSE WORKS

1. The moment a Sensor Node detects occupancy, the luminaire responds by outputting a predetermined light level (for example 100%). It simultaneously communicates that it can see someone to its neighboring luminaires using a level 1 proximity-limited infrared signal.
2. On receipt of this level 1 signal, neighboring Sensor Nodes know someone is located within one light fitting of them. They respond by outputting a predetermined light level appropriate to an occupant in that vicinity (e.g. 80% brightness), and simultaneously relay a level 2 signal to their own neighbors, informing them there is an occupant two light fitting away.
3. This communication propagates rapidly throughout the floor, creating the Occupancy Information Cloud. Each Sensor Node knows at all times how close the nearest occupant is and can adjust its light level accordingly.

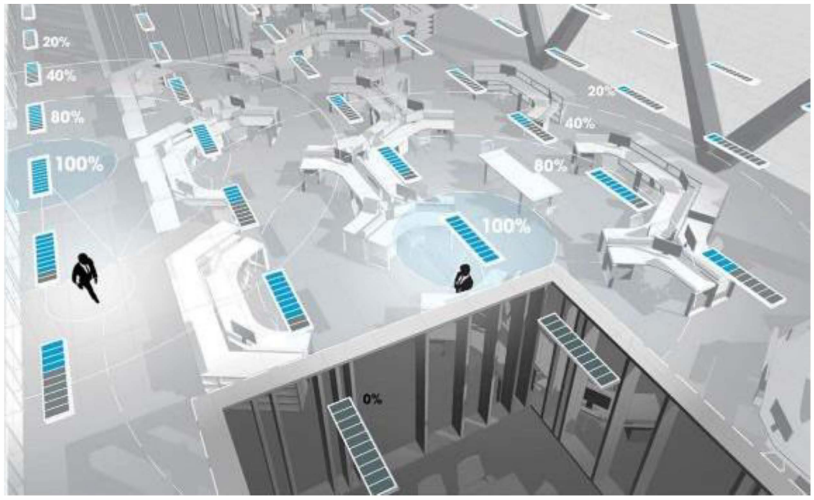


Figure 4 HOW ORGANIC RESPONSE WORKS

The relationship between light levels and distance from the detected motion is determined by what we call the "Personality" (discussed in Chapter 2). Different Personalities allow for gentler or more aggressive reduction in light levels as distance from motion increases, allowing users to experience their preferred lighting behavior for their building environment.

The result is comfortable lighting conditions around all occupants, lower light levels in areas adjacent to them, but importantly no wasted lighting of unoccupied or naturally lit areas. Once an area becomes vacant, each light gently dims to a LowLight state until the system is sure that nobody remains in the area. After this time, the lights switch off completely.

1.2. THE TIERS OF SIMPLICITY

As indicated above, Organic Response is a "plug & play" system requiring no commissioning and operates out of the box with default factory settings (see Appendix 6.3) However, the system also allows for simple Optimization and more advanced Configuration to both increase energy savings and provide a more customized user experience. In future, it is anticipated that the Occupancy Information Cloud will interact with third party building management systems, allowing a two-way sharing of information to allow each system to become even more efficient.

The Tiers of Simplicity provide a framework for understanding the different levels at which an end user can interact with the Organic Response system through the Occupancy Information Cloud.

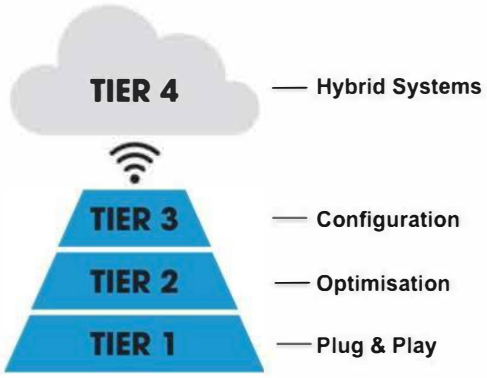


FIGURE 5: THE TIERS OF SIMPLICITY

Tier 1 Interaction: Plug & Play
The first tier is the standard "plug & play" system, operating with default factory settings. No optimisation is required at this level – the system will simply operate using its defaults settings, delivering energy savings whilst maintaining occupancy comfort.

An Organic Response Wireless Wall Switch can be used at this level, given that it is also plug & play, and interacts with the lighting system using its own default settings which allow temporary dimming, a range of preset "scenes", and on/off switching.

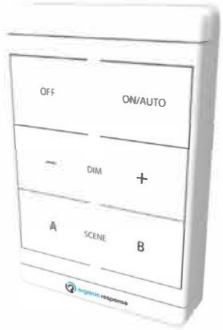


FIGURE 6: ORGANIC RESPONSE WIRELESS WALL SWITCH

Tier 1 Scenario Example

Hiva is a small business owner who is trying to contain costs, especially in the face of recent rises in electricity prices. She runs a small accounting practice out of a single open plan office with 4 desks and a small reception area. She and her staff work regular hours during the week, but she does sometimes come into the office herself for a few hours on weekends. Hiva is happy with how the lights operate with their default settings.

Tier 2 Interaction: Optimisation
At a Tier 2 level of interaction, users can optimize Organic Response by adjusting key system parameters to provide greater energy efficiency and/or occupancy comfort. These adjustments are made using the Organic Response smartphone app (see section 1.3), and include, amongst others:

- Temporary dimming
- Trimming maximum light output levels
- Adjusting dwell times
- Using different "personalities"
- Daylight dimming
- Adjusting motion sensor sensitivity

Tier 2 Scenario Example

David is an office manager of a medium sized internet services business that recently relocated to a refurbished office in the city. The business has 24 staff working across half of one floor of a three storey building. The office fit out is a few years old and includes Organic Response enabled light fittings across the entire office – including the open plan area, two closed offices, three meeting rooms and an open plan kitchen area. David is impressed with the way the lights turn on and off automatically, but thinks the office is too bright, especially given that there is so much natural light coming into the office through a long row of windows along one side.

David downloaded the remote sapp to his smartphone and subsequently optimised some of the settings on his Organic Response installation to improve comfort, light level and to improve energy savings for his business.

- Scenes
- Wall Switch customization
- Start-up mode

Tier 3 Scenario Example

Carlos is a Facilities Manager responsible for a high-rise office block that has recently completed a lighting upgrade with new lights fitted with Organic Response. Carlos has had several years' experience working with addressable lighting control systems; which he finds to be relatively energy efficient, but unreliable and difficult to work with. One of his key performance areas is energy efficiency, and he appreciates that lighting contributes significantly to the cost of running the building.

Carlos has a range of tenants in the building who have very different office layouts. Some of them have multiple small offices off longer corridors, whilst others have large open plan areas. One of the tenants approached Carlos recently asking if he could refer her to a company that could install automated lighting for their Boardroom. Carlos also has to look after all the common areas such as lift lobbies, bathrooms and storage rooms on each floor.

Carlos used the full range of Configuration features on the remote app to set up Zones for some of his tenants. Several of the meeting rooms now use the Organic Response Wireless Wall Switch to access a range of Scenes. He has also used different Personalities across different types of work spaces to deliver optimal lighting whilst maximizing energy savings.

Tier 4 Integration & Analytics: Connected Solutions

Tier 4 represents the future exploitation of the Occupancy Information Cloud. It involves sophisticated integration of the OIC with third party building management systems (BMS). This integration allows all the energy management systems of a building to work in an integrated fashion to further reduce energy consumption and improve occupancy comfort. Organic Response Portal provides a very meaningful insight into the space utilization and enable monitoring of lighting assets. OR Portal is a cloud-based software platform that moves lighting control into the Internet of Things (IoT). It utilises the Organic Response Enabled Lighting Control System to aggregate occupancy data, amongst other things, that can help organisations revolutionise the way they utilise their property footprint.

A future application of Tier 4 might be useful in the following scenario:

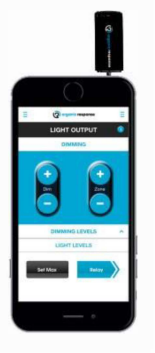
Tier 4 Scenario Example

Donna runs a building service company responsible for a large commercial property portfolio. Her company offers customers a full building management service for a fixed annual fee. The more efficient that Donna's team can run their buildings, the more profit they make. Whilst she understands the relationship between a building's key systems (e.g. lighting and air conditioning), Donna's team is often frustrated by the lack of integration across these different systems.

One of Donna's team members keeps talking to her about the efficiency gains that could be made if all of these systems could share each other's information. He has told Donna that the real time occupancy data that can be accessed from the Occupancy Information Cloud (OIC) could improve the efficiency of all the systems that service the building's occupants. For example, air conditioning systems could respond a lot quicker and more appropriately to changes in occupancy; a building's lift management system could use the information to deliver greater efficiency to lift capacity, etc. Furthermore, the team questions if there was an easy way to analyze the information from OIC, control the system and attain all maintenance updates remotely.

Occupancy Information Cloud through OR Portal can provide Donna & team with visibility into space utilization, remote lighting control, future proofed workplace. Analytics within the portal would allow Donna in performing energy audits, assessing energy consumption hours of day to years customizable for different space types in the building. The team felt that the monitoring of lighting assets becomes time consuming and is of critical nature. The notification system with just appropriate access controls would benefit their team in efficiently managing the lighting assets. Productivity can be increased further by efficient usage of real estate within a space and correlating it with the occupancy requirements of staff.

1.3. THE ORGANIC RESPONSE REMOTE APP



The Organic Response remote app is free to download from the Apple App Store and Google Play and includes contextual help and FAQ's.

The remote app requires an Organic Response infrared dongle, which communicates with Organic Response Sensor Nodes using directional infrared signals. Further information on downloading of the app and acquiring the dongle is available from organicresponse.com.

FIGURE 7: SMARTPHONE WITH IR DONGLE

The remote app provides users with access to the different levels of functionality that are reflected in the Tiers of Simplicity. The app itself contains all the relevant information and contextual help that you need to utilize these simple features.

1.4. HOW TO USE THIS USER GUIDE

This User Guide is the most comprehensive source of information you will find about operating an Organic Response lighting control installation, and every effort is made to keep it up to date. Additional information can also be obtained through application notes, which are published in the **Resources** section of our website as well as a Design Guide, updated as and when required. We encourage you to access the website at regular intervals, to keep up to date with information about user applications.

The following chapters go into full detail of how to interact with the system at the Tier 2, Tier 3 & Tier 4 levels, using the remote app & cloud-based OR Portal. Their content is structured to make it easy for you to access the information you need.

Note that you must have the Organic Response remote app downloaded to a compatible iOS (Apple) or Android device fitted with the infrared dongle before you will be able to perform any optimization or configuration of your Organic Response enabled lighting system. OR portal has support for web browsers across several platforms we recommend installation of latest versions of chrome or safari for best results.

Step-by-step instructions for executing commands on the remote app are detailed in a consistent table format as shown below.

HOW TO DIM A LUMINAIRE		
Remote app commands	Response from Sensor Node	Response from luminaire(s)
1. Point the dongle at the Sensor Node of the light you want to dim and press the Dim+ button or Dim- button	Dome of Sensor Node flashes red once to acknowledge receipt of command.	Light will increase in brightness by one dimming level (Dim+) or decrease in brightness by one dimming level (-Dim)

The Appendices contain a variety of more detailed information about the Organic Response system that you may find useful. Some of the Appendices will be specifically referred to in the body of the User Guide, whereas other information is provided for more general interest. We encourage you to review all of the content in the Appendices so that you are familiar with the information and where to access it.

Chapter Two

2. OPTIMISATION

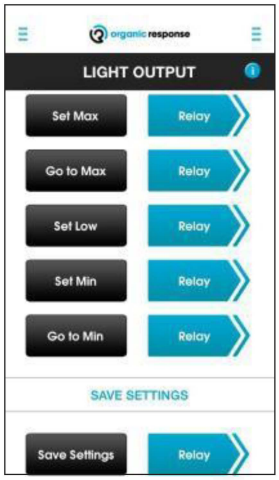
Tier 2, or Optimisation, allows users to optimise a range of parameters of their system in situ for increased energy efficiency and occupancy comfort. This section describes how to optimise a system using the Optimiser features of the remote app. The features that will be covered in this section are:

Light Output
How to raise and/or lower light levels for one or more luminaires. How to achieve significant energy savings by reducing average light levels. How to use light levels to enhance occupancy comfort.

Personality
The role of Personality in defining how your lighting will respond to occupancy. How to use different Personalities to deliver appropriate lighting behavior to different types of workspaces.

Dwell Time
How Dwell Times impact lighting behavior. How to change Dwell Times to increase energy savings.

Daylight Dimming
How, when and where to activate Daylight Dimming to take advantage of natural light, thereby further reducing energy consumption without compromising occupancy comfort.



Note that you must have the remote app downloaded to a compatible iOS (Apple) or Android device fitted with the Organic Response infrared dongle before you will be able to perform any Optimization of your Organic Response enabled lighting system.

If you do not have access to the Optimization Level features on your smart device, then you need to complete the training and ensure you are registered at the appropriate app level via LinkedIn before access will be given. Please contact us if you are experiencing problems accessing the required level of the remote app.

Before moving through the Optimization features of the remote app, it is worth noting some generic buttons on the remote app, which are used across a number of the screens at various levels of the app (see remote app screen shot opposite). The first of these is the Relay button. The second is the Save Settings button.

The Relay buttons allow you to relay a setting from a single luminaire to all other luminaires in that zone. All Sensor Nodes are shipped in the default zone of Zone 1, so they will all communicate with each other. It saves time, in that it removes the need for you to adjust every luminaire in the zone individually.

HOW TO RELAY A COMMAND		
Remote app commands	Response from Sensor Node	Response from luminaire(s)
1. Point the dongle at the Sensor Node that has the setting you wish to relay. Press the relevant "Relay" button. *Note that when you press the Relay button, a confirmation message pops up asking you to confirm the Relay. To bypass this confirmation pop-up, just quickly double-press the Relay button for immediate execution of the Relay command.*	Dome of Sensor Node flashes red once to acknowledge receipt of Relay command, and then continues to flash red for 30 seconds. The Sensor Nodes of each of the neighboring luminaires that receive the Relay message will glow red for 30 seconds to indicate that they have received the Relay MaxLight signal. Any Sensor Node that does not glow red has not received the signal.	Adopts the relayed setting. Sometimes this is visible (e.g. adopting a new MaxLight level); sometimes there is no visible response from the luminaire (e.g. adopting a new Dwell Time)

Whilst transmitting changes across an entire zone very quickly is useful when the new settings are in fact required across the entire zone, you should be careful to consider whether this is actually the case before you use the Relay button. If you only want to make changes to some of the luminaires in a zone, then you will need to make the changes to each one of these luminaires individually.

The Save Settings buttons allow you to save the settings of an individual Sensor Node so that these can be restored at some later date using the Recall Settings function (discussed in Section 3.6). You can use the Relay button next to Save Settings to tell all Sensor Nodes in a zone to store their current settings. This is useful if you've just completed an optimization or configuration of an area and you're happy with the way it is operating. Using the Relay button for Save Settings will store the entire range of settings across the zone; useful if in future you try out some new settings and are not entirely happy with how they are working. In this situation you can restore the entire zone to the previously Saved Settings and start again.

HOW TO SAVE SETTINGS		
Remote app commands	Response from Sensor Node	Response from luminaire
1. Point the dongle at the Sensor Node whose settings you want to save and press the "Save Settings" button.	Dome of Sensor Node flashes red once to acknowledge receipt of "Save Settings" command.	Nil.

2.1. OPTIMISING LIGHT OUTPUT

One of the most fundamental aspects of lighting control is the control of light output, which directly affects both energy efficiency and occupancy comfort – an important balance to get right. Good lighting control turns lights on when occupants arrive in a space (but only to the level that is appropriate for the task being performed under the lights), and then turns them off again when occupants leave.

However, occupancy itself is not the only determinant of light output. The amount of light output required from luminaires can also change for other reasons. For example:

- An occupant may require a temporary increase in brightness so that he or she can see fine detail more clearly
- During a sunny day when there is lots of natural light coming through windows, the light output from luminaires in this area can reduce
- Conversely at night, when there is no contribution from natural light, luminaires may need to increase their light output to compensate
- During a presentation in a meeting room, there may be a need to temporarily reduce light output, so the audience can better view a screen

The diagram below shows the behavior of an Organic Response enabled light fitting when motion is detected, and after motion is no longer detected. We can see the various parameters that determine the light output of a luminaire: MaxLight, LowLight and MinLight.

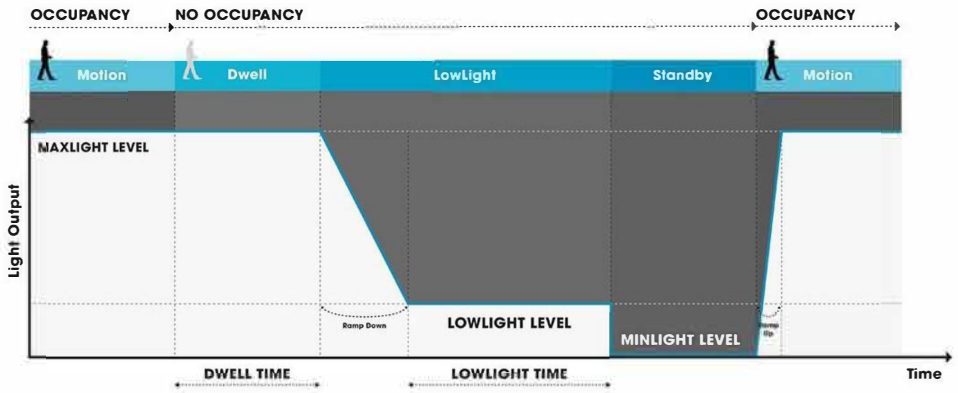


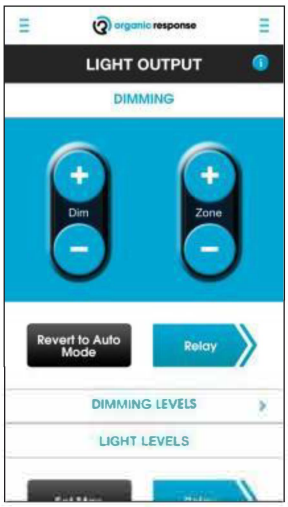
FIGURE 8: HOW ORGANIC RESPONSE RESPONDS TO OCCUPANCY

MaxLight sets the maximum light output of a luminaire. When a luminaire directly senses an occupant through its own Sensor Node, it will illuminate to 100% of its MaxLight setting. When the occupant leaves the space completely, and after the Dwell Time has elapsed, the luminaire will dim to its 'LowLight' state. Once the LowLight time has elapsed the luminaire will dim to its 'MinLight' level. MinLight is the light level that the luminaire will adopt when there is no one in the space. Under most circumstances, the MinLight would be set to zero – the default setting – meaning the light would turn off a few minutes after the space is completely vacated.

However, there may be circumstances (e.g. for security reasons a night light is required), where you want one or more lights to remain on, even after the space is vacated. In this case, you would set the MinLight setting for these specific luminaires to a low level so that they remain on, but at low levels, to reduce energy consumption.

Organic Response allows all these parameters of light level to be adjusted in various ways using the remote app.

2.1.1. TEMPORARY DIMMING



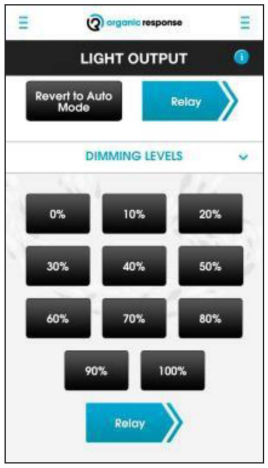
The dimming function of the Remote App allows you to adjust the light level of an individual luminaire. This can be useful when you need to adjust the brightness of one or more luminaires temporarily. Any dimming adjustment is only temporary, and the light will eventually revert to using its pre-existing MaxLight (more on this later) after the adjusted luminaire's Dwell Time has elapsed.

There are two ways for you to dim a light fitting. The first method involves dimming a light using the Dim +/- buttons on the remote app (see Light Output screenshot opposite) until you reach the required light level

You can dim a single luminaire using the left-hand side buttons, or an entire zone using the right hand side buttons.

HOW TO DIM A LUMINAIRE		
Remote app commands	Response from Sensor Node	Response from luminaire(s)
1. Point the dongle at the Sensor Node of the light you want to dim and press Dim+ button or –Dim button	Dome of Sensor Node flashes red once to acknowledge receipt of command	Light will increase in brightness by one dimming level (Dim+) or decrease in the brightness by one dimming level (-Dim)
2. Continue to press the Dim+ or –Dim button until the desired light level is achieved *Note that you can speed up dimming by holding the Dim+ or –Dim button down until the desired light level is reached*	Dome of Sensor Node flashes red once for each command received. Note that the light will eventually turn off if the –Dim button is pressed repeatedly. To switch the light on again, simply press the Dim+ button. If the Sensor Node flashes red twice in response to a dim command, then you have either reached the maximum light level of the luminaire, or the luminaire is in Burn In mode and cannot be dimmed (see section 4.2 on Burn In Mode)	Light will increase in brightness (Dim+) or decrease in brightness (-Dim)

The second option for dimming a luminaire is to select from one of the preset dimming percentages provided in the expanded Dimming Levels screen shown below.

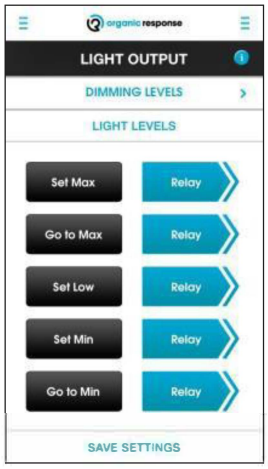


HOW TO SELECT (AND RELAY) A SPECIFIC DIMMING PERCENTAGE		
Remote app commands	Response from Sensor Node	Response from luminaire(s)
1. Press the expand (^) button next to Dimming Levels, and the list of dimming level percentages will appear. Whilst pointing the dongle at the target Sensor Node, press the percentage you require. Select another percentage option if you are not happy with the resulting light level.	Dome of Sensor Node flashes red once to acknowledge receipt of Dimming command	Luminaire will dim to the selected percentage
2. To Relay the dimming percentage, point the dongle at the Sensor Node of the light you have just adjusted and press the Relay button	Dome of Sensor Node flashes red once to acknowledge receipt of Relay command, and then continues to flash red for 30 seconds. The Sensor Nodes of each of the neighboring luminaires that receive the Relay message will glow red for 30 seconds to indicate that they have received the Relay signal. Any Sensor Node that does not glow red has not received the signal and will not adopt the new light level.	All the luminaires that received the relayed Dimming signal will immediately adopt this light level.

2.1.2. MAXLIGHT

Adjusting the MaxLight of a luminaire allows you to set the maximum light output for that luminaire. Once a MaxLight level is set, the luminaire will not exceed this light output during automatic operation (the luminaire can still be manually dimmed above this level). An Organic Response enabled luminaire will always deliver 100% of its MaxLight level in response to motion detection by its Sensor Node (except if Daylight Dimming is enabled or a Scene is active).

There are good reasons to adjust the MaxLight level of luminaires. A correctly designed lighting system will necessarily over illuminate a space when the luminaires are first installed. This is to allow for the depreciation in light output from the luminaires over time. In some instances, a space will be over illuminated simply because the choice of ceiling and luminaire results in a high lux level (i.e. highly reflective surfaces, or the spacing of luminaires, etc). If an area is too brightly lit, it not only consumes too much electricity, it also creates stress for occupants dealing with too much glare.



By setting the MaxLight level appropriately for the area, you can reduce energy consumption and significantly improve occupancy comfort. As MaxLight is an attribute of an individual Sensor Node, the light output from each Organic Response enabled luminaire can be adjusted to exactly match the task being undertaken in the space under it. For example, corridor and breakout areas can have their MaxLight levels reduced to lower levels than open plan or closed office areas. The system can easily be set to provide exactly the right amount of light in exactly the right place, whilst still allowing the flexibility to raise (or lower) the MaxLight of a specific light fitting above an occupant who requests more (or less) light.

The process of adjusting MaxLight levels across an entire building space to save energy and improve occupancy comfort is called "Trimming" and is covered later in this chapter under Trimming Using MaxLight.

HOW TO SET (AND GO TO) THE MAXLIGHT FOR A SINGLE LUMINAIRE		
Remote app commands	Response from Sensor Node	Response from luminaire(s)
1. Using the Dimming Percentages or the Dim+ and –Dim buttons of the remote app, adjust the light output to the desired level.	Dome of Sensor Node flashes red once to acknowledge receipt of each dimming command.	Light will increase in brightness by one dimming level (Dim+) or decrease in brightness by one dimming level (-Dim) for each button press.
2. Still pointing your dongle at the luminaire's Sensor Node, press the Set Max button.	Dome of Sensor Node flashes red once to acknowledge receipt of SetMax command.	The luminaire will immediately adopt this light level as its new MaxLight setting, and in future come on to this level in response to motion detection.
3. If you have dimmed light levels up or down temporarily and want to return to the SetMax Light level, simply press the Go To Max button. To relay this message to all other luminaires in the zone, press the Relay button next to Got To Max.	Dome of Sensor Node flashes red once to acknowledge receipt of Go To Max command.	Luminaire will immediately adopt the MaxLight level previously set.

Once you have set a MaxLight level for an individual luminaire, you can use the Relay function to have all the other luminaires in the space adopt this same MaxLight setting. This function is used in the process of trimming an office space for optimized MaxLight level.

2.1.3. TRIMMING USING MAXLIGHT

A space which is over illuminated will unnecessarily waste energy and diminish occupancy comfort. A space that is optimized to appropriate light levels will correct these problems. This is achieved by a process all trimming, which is explained below.

To conduct the process of trimming effectively, you'll need the following:

- A light meter that measures lux levels
- The minimum lux levels that you are required to deliver for the occupants for the different kinds of spaces in the building (this information is often provided in building codes or Occupational Health & Safety guidelines)
- To conduct the optimization at night time, so that natural light does not affect the light meter reading

Step 1
Find a working area in the largest, typical space of the office – usually the open plan office area. Try to avoid areas very close to any perimeter (windows or walls), or that are dominated by a large feature like a pillar.

Step 2
Set the light meter on the appropriate illuminated surface (the appropriate illuminated surface, known as the working plane, is the surface where tasks are carried out within the space). This is typically the surface of a desk In the middle of the office space. Note the lux level reading on the light meter. Let's assume, for this example, that the lux level reading is 640lux, and you are targeting a lux level of 320.

Step 3
Dim the light that is closest to the light meter until it's just above 320lux - aim for about 340lux. Press the Set Max button so that this luminaire adopts this MaxLight level.

Step 4
Now relay that MaxLight level to all the other luminaires. You will notice that all the luminaires in the area - except for any that might be in a temporary dimming state - immediately adjust their light output to match the output of the luminaire you were working on. All of these lights – including those that were in a temporary dimming state - now have the same MaxLight setting as the luminaire you have just adjusted.

Step 5
Because all of the lights in the area have now dimmed to the new MaxLight level, you will find your lux meter reading has fallen. If it falls below 320lux, increase the MaxLight of the initial luminaire a little more, set MaxLight, and relay this new MaxLight setting again. Conversely, it the lux level is still significantly above the target (about 5-10% or more), then dim the luminaire slightly and carry out the same process.

Step 6
Go to a few other areas in the space and measure the lux level using the light meter. If the lux level is too high or too low, you can set the individual MaxLight levels for those luminaires that are affecting the lux level in that area. Adjust each of these individually – do NOT relay these MaxLight settings because it will relay the adjustment to all the luminaires in the space.

In this step, you are just wanting to change MaxLight settings for one or a few luminaires in a small area, by exception. That is why it is best to set and relay the initial MaxLight reading from a representative area in the space.

Step 7
Once you are happy with the lux levels in the general area, you can now begin tailoring MaxLight levels for the other types of areas of the office space.

For example, the open plan corridor in the example does not need to be illuminated to such a high level as it only needs enough light for walking through, not working in. Let's say this can be illuminated to 150lux. To achieve this, set your light meter on the working plane (in this case the working plane is the floor) and reduce the lux level of these local corridor luminaires using the Dim+ and –Dim buttons and setting the MaxLight for each of the individual luminaires in the corridor area.

Remember that you cannot use the Relay command as you will override all your previous MaxLight settings for the luminaires outside of the corridor! Repeat the individual MaxLight adjustments until you are happy with the light levels in the corridor area, and any other areas that you feel need adjusting.

Look at the space that you have adjusted. If you are happy with it, then your trimming is complete. You have now set light levels that reduce energy consumption and improve occupancy comfort.

2.1.4. USING MAXLIGHT AS FEATURE LIGHTING

Once the trimming of general areas described above is complete, you can individually change the Max Light settings for other individual luminaires as you see fit. Usually this would be carried out to highlight specific areas within a space for a design effect.

One of the highlighting options is called wall washing, whereby the lights immediately above or adjacent to a large wall are brightened to increase the amount of softer, reflected light off the wall. To use this feature, increase the MaxLight of the relevant luminaires and change their Personality to "Wall Wash" (see section 2.2 on Personalities)

Conversely, you can target lower MaxLight levels for luminaires that sit above pot plants or other decorative furniture. By reducing the light levels above these items, you further reduce energy consumption and create a more interesting and pleasing lighting environment for the occupants.

2.1.5. LOWLIGHT

HOW TO ADJUST AND RELAY LOWLIGHT LEVELS		
Remote app commands	Response from Sensor Node	Response from luminaire(s)
Using the Dim+ and Dim- buttons of the remote app, adjust the light output to the desired LowLight level.	Dome of Sensor Node flashes red once to acknowledge receipt of each dimming command.	Light will increase in brightness by one dimming level (Dim+) or decrease in brightness by one dimming level (Dim-) for each button press.
Still pointing your dongle at the luminaires Sensor Node, press the Set Low button.	Dome of Sensor Node flashes red once to acknowledge receipt of Set Low command	The luminaire will immediately adopt this light level as its new LowLight setting, and in future come on to this level when entering the LowLight phase of operation.
To relay the LowLight setting to other luminaires within the space, point the dongle at the Sensor Node of the light you have just adjusted and press the Relay button. *Note: As always, be careful when using the Relay command, as ALL luminaires that receive the relay signal will adopt the new LowLight setting. If you are only wanting to change some of the luminaires in the space, change each of their LowLight settings individually.*	Dome of Sensor Node flashes red once to acknowledge receipt of Relay command, and then continues to flash red for 30 seconds. The Sensor Nodes of each of the neighboring luminaires that receive the Relay message will glow red for 30 seconds to indicate that they have received the Relay signal. Any Sensor Node that does not glow red has not received the signal and will not adopt the new LowLight setting.	All the luminaires that received the relayed Relay LowLight signal will immediately adopt their respective LowLight levels.

You can adjust the LowLight levels of luminaires in the same way you adjust MaxLight levels. LowLight settings are typically changed infrequently, given that default LowLight levels are at 10%. However, you could make LowLight adjustments for much the same reasons as adjustments to MaxLight; i.e. to increase energy savings and/or improve occupancy comfort.

2.1.6. MINLIGHT

As indicated earlier, the default light level for MinLight is zero (i.e. the light will be off when in this MinLight state). However, there are occasions when adjusting the MinLight can be very useful. Examples of this include security requirements (where some level of lighting is required at all times), or when turning lights off in a space is inappropriate for other reasons, as discussed in the MinLight Applications section below.

HOW TO SET, RELAY AND GO TO A MINLIGHT LEVEL		
Remote app commands	Response from Sensor Node	Response from luminaire
1. Using the Dim+ and -Dim buttons of the remote app, adjust the light output to the target luminaire to the desired light level.	Dome of Sensor Node flashed red once to acknowledge receipt of each dimming command.	Light will increase in brightness by one dimming level (DIM+) or decrease in of brightness by one dimming level (-Dim) for each button press.
2. Press the Set Min button on the app,	Dome of Sensor Node flashes once to acknowledge receipt of Set Min command.	The luminaire will immediately adopt this light level as its new MinLight setting, and in future come on to this level when entering the Standby phase of operation
3. Relay the MinLight if required.	Dome of Sensor Node flashes red once to acknowledge receipt of relay command and then continues to flash red for 30 seconds. The sensors node of each of the neighboring luminaire that receive the Relay message will glow red for 30 seconds to indicate that they have received the Relay signal. Any Sensor Node that does not glow red has not received the signal and will not adopt the new MinLight setting.	All the luminaires that received the relayed Relay MinLight signal will immediately adopt their respective Minlight levels
4. To restore the previous MinLight setting, simply point the dongle at the target luminaire and press the "Go To Min" button	Dome of Sensor Node flashes once to acknowledge receipt of Restore Min command	The luminaire will immediately adopt the previously stored MinLight setting, and in future come on to this level when entering the Standby phase of operation
5. Relay the Restored MinLight, if required.	Dome of Sensor Node flashes red once to acknowledge receipt of Relay command, and then continues to flash red for 30 seconds. The Sensor Nodes of each of the neighboring luminaires that receive the Relay Restore Min message will glow red for 30 seconds to indicate that they have received the Relay signal. Any Sensor Node that does not glow red has not received the signal and will not restore its previous MinLight setting.	All the luminaires that received the relayed Restore MinLight signal will immediately adopt their previously stored Minlight levels.

2.1.7. MINLIGHT APPLICATIONS

Security Lighting
One of the most useful applications for MinLight is the ability to set any luminaire as a security light.

In this situation, one or more lights can be selected to remain on at all times, even when the space is vacated. Go to any light that you wish to remain on at all times and set the Min Light to any non- zero level.

Night Lighting
Min light can be set at any non-zero level in corridors to provide night lighting. In this instance, if all luminaires were set with, say a 10% MinLight, then the space will still be illuminated to 10% even when there are no occupants present. This is particularly useful at night time in a Hospital or Aged Care facility to ensure corridors are never dark. This function eliminates the need for a separate night lighting system as is often been a requirement in Healthcare facilities.

Unoccupied/Out of Hours Lighting
There are some spaces in a building that may require lights to be on when unoccupied or after normal business hours. A good example of this is the lighting in a street front or client facing reception area which, without ongoing occupancy would turn off. In this case, Minlight can be used to highlight Architectural features or walkways. Because the lights still respond to occupancy, there is no need to include time clock control. Whenever there is no occupancy, the lights dim to their Minlight setting. Whenever an occupant returns, the lights return to their MaxLight settings.

Lift lobbies are also a great application of Minlight. It's not particularly pleasant to arrive at a completely dark lift lobby, but its also not necessary to have the lights on full when no-one is there. To overcome this, set the Minlight of the lift lobby luminaires to, for example, 20%. This means that an occupant arriving by lift is greeted by an illuminated space. As soon as they step out into the lobby, the lights will illuminate to their Maxlight.

2.1.8. THINGS TO CONSIDER WHEN OPTIMISING LIGHT OUTPUT

There are some key considerations to bear in mind when you look to optimize your space for light output.

The Impact of MaxLight Setting on Lighting Behavior.
If the MaxLight level is adjusted, this affects the other light levels (the levels determined by the distance from motion) by capping them at this new MaxLight level. This makes more sense when you consider how Personality determines the relationship between light level and distance from motion.

For example, if the MaxLight Level below in Figure 9 (Open Floor Personality) is set to 70%, then the light levels that follow are untouched, as they are already below the new value. If, however, any of the subsequent light levels are greater than the new MaxLight level, they are capped at the new MaxLight Level.

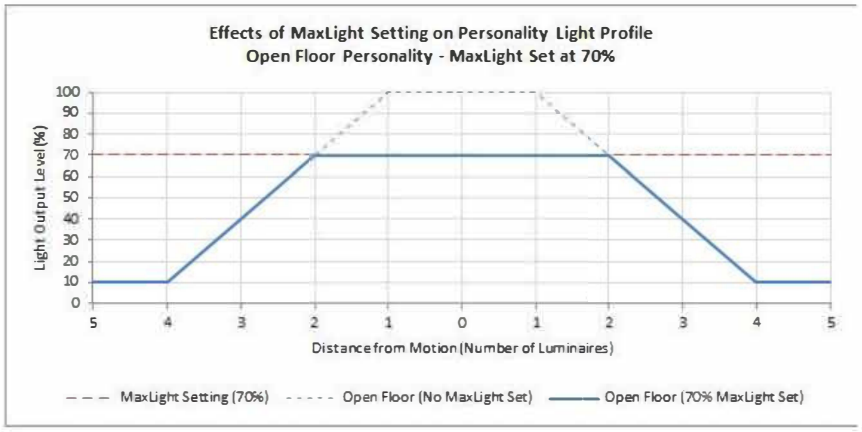


FIGURE 9: IMPACT OF MAXLIGHT ON OTHER LIGHT LEVELS

The Relationship Between Maxlight, LowLight and MinLight

There are no restrictions on the light level that Max, Low or Min light levels can be set at. This provides for maximum flexibility. However, this flexibility should be applied carefully. For example, in theory the MaxLight could be set at 0%, LowLight at 50% and MinLight at 0%. What this would do is turn the lights off when occupancy is detected - which is probably not desirable!

It is recommended that you always maintain the following relationship between the various light level settings: Min light < Lowlight < Maxlight.

Energy Conscious Use of MinLight

A non-zero MinLight setting can be extremely useful in a number of different scenarios. However, before you set your min light to anything above zero its worth asking yourself if it's really necessary. Remember, this means that the light will not turn off under any circumstances (except for a specified scene). More energy will be used when a non-zero MinLight is used that if the light is allowed to switch off completely. This may be a trade-off that is worth making but use the option selectively.

Don't forget that you can always restore previous settings if something goes wrong, or you're not happy with a particular setting.

2.2. OPTIMISING PERSONALITY

Personality is a new concept in lighting control that is unique to Organic Response.

The Personality defines the relationship between the occupancy level signal (i.e. distance from occupancy as measured in number of light fittings away from motion detection) and the light output of the luminaire. Each Personality defines the level of light output for each occupancy level signal. It thereby effectively sets how wide or narrow the cone of light around the occupant will be. Personalities also have their own preset Dwell Times (See Section 3.2 of the User Guide) and LowLight times.

The graphic below illustrates how each of three personalities (Open Floor, Open Floor Saver and Corridor) affect the light output of each light as distance from detected motion increases. As you can see, the more aggressive personality of Open Floor Saver has light output falling away much more quickly as distance from motion increases, as compared to the gentler gradient of the Corridor personality, or the Open Floor Personality, which has a profile between the other two. The default Personality for Organic Response is Open Floor.

Looking at the Open Floor Personality in the graphic below, we can see that the light that detects motion comes on to 100% of its MaxLight level. The immediately adjacent light fitting (which receives a Level 1 signal from the Sensor Node that has detected motion) also comes on at 100%, as it is also contributing light to the space where the occupant is located. The second light away from motion comes on at 70%, the third light away at 40% and the 4th light away at 10%. Subsequent lights also come on at 10%, up until the 14th light, after which the lights ignore occupancy and remain in their MinLight (standby) state.

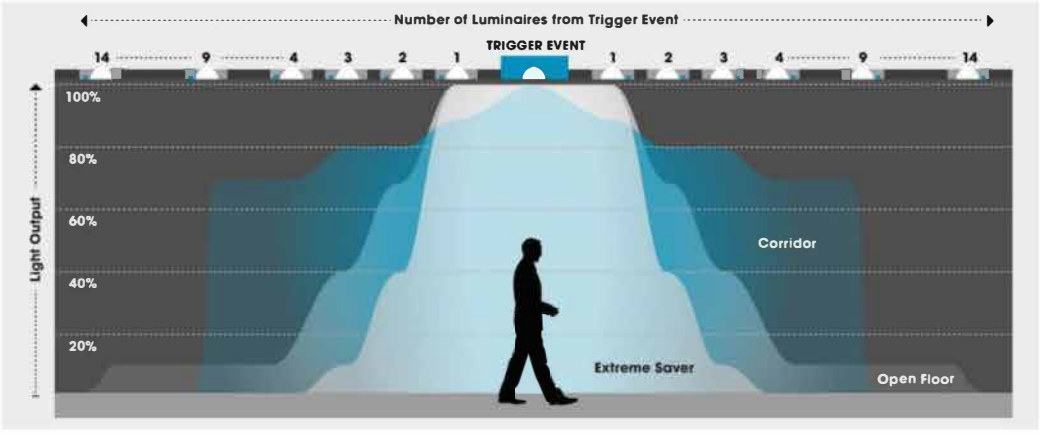


FIGURE 10: PERSONALITY PROFILES

The Personality features of the system are accessed and modified via the Personality section of the remote app. The app contains 14 different Personalities. You can review the full table of Personalities, their behavior profiles and their typical applications in Appendices 5.4-5.7.

HOW TO CHANGE (AND RELAY) PERSONALITY		
Remote app commands	Response from Sensor Node	Response from luminaire
1. Point the dongle at the Sensor Node of the light whose personality you want to change and press the button showing your preferred Personality	Dome of Sensor Node flashes red once to acknowledge receipt of Personality command	The luminaire will immediately adopt the new Personality Time
2. Point the dongle at the Sensor Node of the light whose Personality you have just adjusted and press the Relay button. Note: If you use the Relay Personality command, it will adjust the Personality of every Sensor Node that receives the message, so if you're looking to adjust only some of the luminaire's, adjust their Personalities individually.	Dome of Sensor Node flashes red once to acknowledge receipt of Relay command, and then continues to flash red for 30 seconds. The Sensor Nodes of each of the neighboring luminaires that receive the Relay message will glow red for 30 seconds to indicate that they have received the Relay Personality signal. Any Sensor Node that does not glow red has not received the signal and has not changed its Personality.	All the luminaires that received the relayed Lowlight Time signal will immediately adopt the new Personality.

2.2.1. PERSONALITY APPLICATIONS

Although each of the available Personalities has their own unique lighting profile, the underlying reason for changing the default personality is often an improvement in energy savings. Importantly, if the right Personality is chosen for the space, you can achieve the energy savings without any negative impact on the occupants.

In a general open plan office context, for example, you might choose a more aggressive Personality like Super Saver, which has light levels falling away much more quickly as distance from occupancy increases. In this case, you might want to adjust the Personality of the entire open plan space to Super Saver in which case you could relay the Super Saver Personality to all luminaires and then make by- exception adjustments to other luminaires once the relay of the Super Saver Personality is complete (e.g. changing the Personality of corridor luminaires as described below).

A very common application of Personalities during the optimization of a space is to apply the Corridor Personality to all luminaires servicing corridor areas. In this case, and assuming all of the lights are already in their default "Open Floor" Personality, you need to approach each of the corridor luminaires and change their personalities individually to the Corridor Personality. The Corridor Personality illuminates to a brighter level for a greater distance from the occupant to avoid any feeling of walking into darkness; so, in this case, the change in Personality improves occupancy comfort.

Another more creative application of Personality is the Wall Wash Personality. An example of this would involve changing the Personality of one or more luminaires adjacent to a wall on the perimeter of a large open plan office to the Wall Wash Personality. The Wall Wash Personality brings its luminaire to 100% light output upon receipt of any occupancy signal (up to 35 luminaires away). This is particularly effective in offices where only a few people might be working at night. The reflected light off the selected wall gives a comfortable illumination to the otherwise empty space, without sacrificing overall energy performance

2.2.2. THINGS TO CONSIDER WHEN OPTIMISING PERSONALITY

When you adopt and/or relay a new Personality, that Personality's dwell times (system dwell and lowlight time) will be adopted by the Sensor Node unless the Sensor Node's default dwells have already been manually overridden. In other words, only default dwell times will be updated to match the Personality's prescribed Dwell Time.

2.3. OPTIMISING DWELL TIME

As you learned in the previous section, Dwell Times are one of the parameters of Personality, and have an impact on lighting behavior. Referring back to the graphic of Organic Response lighting behavior, we can see that there are two types of Dwell Time: Dwell Time and LowLight Time.

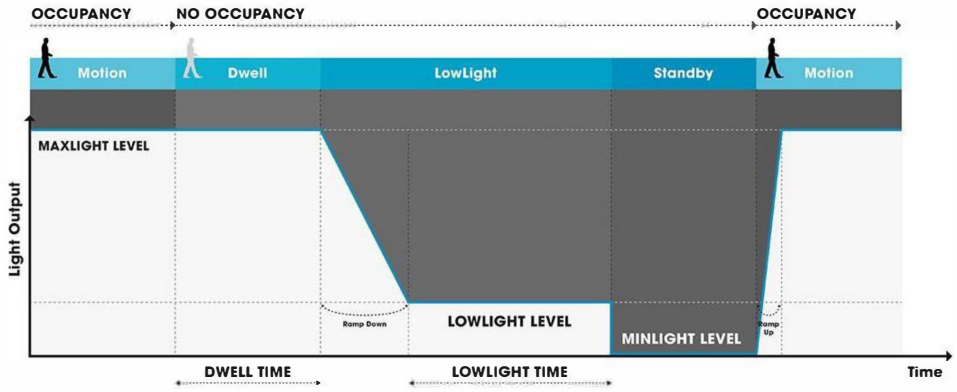


FIGURE 11: ORGANIC RESPONSE DWELL TIME & LOWLIGHT TIME

Dwell Time defines the length of time it takes for a luminaire to dim from its occupancy state (motion or any other motion level signal received via the OIC) to its Lowlight state, once occupancy is no longer detected. If detecting motion via its own Sensor Node, the light will stay in an occupancy state until the Dwell Time has lapsed, after which it enters the Dwell Time state, and remains in this state for as long as:

- occupancy messages are received from other luminaires, or
- it detects motion again directly via its own Sensor Node, and
- no further occupancy messages are received for the length of the Dwell Time

after which, it enters its LowLight state for the defined LowLight Time.

The longer the Dwell Time, the longer the lights stay on, and the less energy is saved. Conversely, the shorter the Dwell Time, the quicker the lights will dim down, and the more energy will be saved; but the greater the risk of a false switch off of the lights. The default Dwell Time is 10 minutes, which strikes a conservative balance between energy efficiency and occupancy comfort.

LowLight Time defines the amount of time the luminaire remains in its LowLight state prior to switching off completely. The default LowLight time is 10 minutes.

Both of these dwell times are adjustable using the smartphone app. Given that Dwell Time is also a function of the Personality that the Sensor Node is in at the time, changing a Sensor Node's Dwell Time will override the default Dwell Time for the Personality. So always consider the Dwell Time of the current Personality before looking to make independent adjustment to Dwell Times.

HOW TO ADJUST DWELL TIME		
Remote app commands	Response from Sensor Node	Response from luminaire
1. Point the dongle at the Sensor Node of the light you want to adjust and press the button showing your preferred Dwell Time.	Dome of Sensor Node flashes red once to acknowledge receipt of Dwell Time command	The luminaire will immediately adopt the new Dwell Time
Point the dongle at the Sensor Node of the light whose Dwell Time you have just adjusted and press the Relay button. *Note: If you use the Relay Dwell Time command, it will adjust the Dwell Time of every Sensor Node that receives the message, so if you're looking to adjust only some of the luminaire's, adjust their Dwell Times individually.*	Dome of Sensor Node flashes red once to acknowledge receipt of Relay command, and then continues to flash red for 30 seconds. The Sensor Nodes of each of the neighboring luminaires that receive the Relay message will glow red for 30 seconds to indicate that they have received the Relay Dwell Time signal. Any Sensor Node that does not glow red has not received the signal and has not changed its Dwell Time setting.	All the luminaires that received the relayed Dwell Time signal will immediately adopt the new Dwell Time setting.

2.3.1. DWELL TIME APPLICATIONS

In the context of an optimization of a simple office space, changing the MaxLight and reducing Dwell Times are the two major contributors to energy savings. In this situation, and once MaxLight adjustments and Personality changes have been completed, it is appropriate to consider changes to Dwell Times.

The default Dwell Time is 10 minutes. Whilst this is certainly appropriate for a typical open or closed office environment, it can be further reduced, especially in open plan offices where there is moderate to high occupancy. Reducing the Dwell Time to, for example, 5 minutes will dim lights quicker, so that they do not continue to deliver high light levels in vacant space for too long. One approach is to reduce the Dwell Times to the point of it becoming uncomfortable for occupants, and then increase it slightly. This will strike the optimum balance between energy savings and occupancy comfort.

Also bear in mind that if most people in a space are happy with a particular Dwell Time, but one or two people are not, you can leave most of the office at the lower Dwell Time but increase the Dwell Times of those Sensor Nodes above or immediately next to these people.

You can also consider lowering (or raising) the Dwell Times for specific areas of the office. Some examples are as follows:

- Reducing the Dwell Time of lights in a small storeroom. In small storerooms, which people access for a specific purpose and then leave within a few minutes, it makes sense to consider having the storeroom light(s) on a short Dwell Time (e.g. 5 minutes) so that the light turns off very quickly once the storeroom is vacated.
- Transition areas, like close or open corridors, can also have reduced Dwell Times, as occupancy is temporary and it is wasting energy to light the space for any length of time once the corridor area is vacated. Consider a Dwell Time of between 2-5 minutes for corridor areas.
- Conversely in bathrooms it may make more sense to increase the Dwell Times to 20 minutes, so that people are not having lights turn off on them whilst in a toilet cubicle.

Ultimately, Organic Response is infinitely flexible and there is a wide range of Dwell Times to choose from. Remember that if you choose a Dwell Time that is not suitable, it is just as easy to re-adjust it, so don't be afraid to experiment with Dwell Time optimization.

2.3.2. LOWLIGHT TIME

The Configuration section of the app (see opposite) allows you to adjust the Lowlight Time. The primary reason you would reduce LowLight Time is to save energy. If a light is in its LowLight state, then by definition there is no occupancy in the space, so it may make sense to reduce the LowLight time below the default setting. However, if you make the LowLight time too short, then the lights may turn off (their MinLight level) whilst there are still some undetected occupants in the space, which may cause some discomfort.

HOW TO ADJUST LOWLIGHT TIME		
Remote app commands	Response from Sensor Node	Response from luminaire
1. Point the dongle at the Sensor Node of the light you want to adjust and press the button showing your preferred Lowlight Time	Dome of Sensor Node flashes red once to acknowledge receipt of Lowlight Time command	The luminaire will immediately adopt the new Lowlight Time.
2. Point the dongle at the Sensor Node of the light whose Lowlight Time you have just adjusted and press the Relay button.	Dome of Sensor Node flashes red once to acknowledge receipt of Relay command, and then continues	All the luminaires that received the relayed Lowlight Time signal will immediately adopt the new Lowlight Time setting.
Note: If you use the Relay Lowlight Time command, it will adjust the Lowlight Time of every Sensor Node that receives the message, so if you're looking to adjust only some of the luminaire's, adjust their Lowlight Times individually.	The Sensor Nodes of each of the neighboring luminaires that receive the Relay message will glow red for 30 seconds to indicate that they have received the Relay Lowlight Time signal. Any Sensor Node that does not glow red has not received the signal and has not changed its Lowlight Time setting.	

2.3.3. THINGS TO CONSIDER WHEN OPTIMISING DWELL TIMES

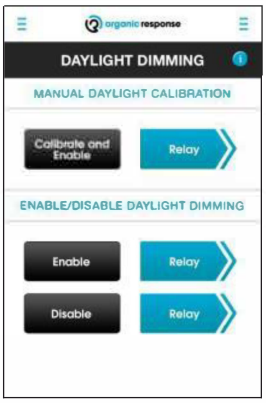
Whilst reducing Dwell Times will reduce energy consumption, if taken too far it may also negatively impact occupancy comfort as light levels change more frequently, and false switch offs potentially increase. One approach to striking the right balance is to gradually reduce dwell times until occupants become uncomfortable, and then increase them slightly so that you find the optimum balance between energy savings and occupancy comfort.

If your focus is on energy savings, consider reducing Dwell times for luminaires that are lighting non- working spaces (e.g. corridors and other transit areas, entrances, store rooms, etc).

2.4. OPTIMISING DAYLIGHT DIMMING

When a Sensor Node makes a decision about its appropriate light level, it can be configured to take into account the amount of ambient light in the surrounding environment. By reducing a luminaire's light output in the presence of natural light, especially from those light fittings that are close to windows or skylights, energy savings can be increased, and occupancy comfort further improved. While lights that service an area with lots of natural light will see maximum benefit from Daylight Dimming operation, all Organic Response enabled lights can be configured to operate in Daylight Dimming mode.

It is recommended that Daylight Dimming be used in combination with suitable MaxLight Levels – and the process for enabling Daylight Dimming explained below assumes that all MaxLight have already been set.



Note that the default setting for Daylight Dimming is off. Daylight Dimming is enabled using the Daylight Dimming section of the remote app.

Daylight Dimming calibration should be done at a time of day when there is a low to moderate amount of natural light in the environment. This is so the Sensor Node can take into account how natural light plays on the environment it is observing, while still enabling

the user to achieve the desired light level (measured with a light meter if required) by dimming the luminaires. Avoid calibrating for Daylight Dimming at night or when direct sunlight is entering the space as either of these scenarios may result in over or under-compensation by the lights.

HOW TO CALIBRATE AND ENABLE DAYLIGHT DIMMING		
Remote app commands	Response from Sensor Node	Response from luminaire
1. Using the Dim+ and –Dim buttons of the remote app, adjust the light output of the target luminaires to the desired level (use a light meter if necessary, as described in MaxLight Applications). Note that this is not an adjustment to MaxLight, but a temporary dimming of the lights to a level that the Sensor Node can "calibrate" for Daylight Dimming.	Dome of Sensor Node flashes red once to acknowledge receipt of each dimming command.	Light will increase in brightness by one dimming level (Dim+) or decrease in brightness by one dimming level (-Dim) for each button press.
2. Repeat the temporary dimming of all luminaires in the zone so that light levels across the space are set appropriately for a Daylight Dimming calibration. This will allow you to Relay a calibration signal across the entire zone at once.	Dome of Sensor Node flashes red once to acknowledge receipt of each dimming command.	Light will increase in brightness by one dimming level (Dim+) or decrease in brightness by one dimming level (-Dim) for each button press.
3. Now point the dongle at the Sensor Node of the target luminaire and press the Calibrate & Enable button. This calibration process can be carried out for all of the lights in the zone by using the relay function. Note that the dim level of all of the luminaires in the zone must be set prior to this relay command being sent.	The Sensor Node will acknowledge the calibration message by flashing its dome red and allow you 3 seconds to move out of the way before it takes a light reading and calibrates the Sensor Node for this level of light (as read by the ambient light sensor).	From this point onward, the luminaire will attempt to maintain the same level of light that was read by the ambient light sensor at the moment Daylight Dimming was calibrated.
4. If you wish to calibrate and enable all of the luminaires in the space, just press the Calibrate and Enable Relay button.	Each Sensor Node in the zone will acknowledge the calibration message by flashing its dome red and allow you 3 seconds to move out of the way before it takes a light reading and calibrates the Sensor Node for this level of light (as read by the ambient light sensor).	From this point onward, the luminaire will attempt to maintain the same level of light that was read by the ambient light sensor at the moment Daylight Dimming was calibrated.

Once you have calibrated for Daylight Dimming, you can disable it and re-enable it if required, using the "Disable" and "Enable" buttons on the remote app.

2.4.1. THINGS TO CONSIDER WHEN OPTIMISING DAYLIGHT DIMMING

YOU will derive most benefit from calibrating Daylight Dimming for those luminaires that are immediately adjacent to windows or skylights as these lights can reduce their light output significantly when natural light is present and will make the biggest impact on energy consumption.

The rate with which the Sensor Node responds to changes in ambient light is deliberately slow. This is so the Daylight Dimming operation of the light is not obvious and distracting to clients/users/workers.

If at any time the lighting response from Luminaries operating Daylight Dimming mode becomes undesirable – recalibrating one or all of the Sensor Nodes may be required. This can often happen with significant changes to the environment such as a change in floor color.

A word on Lumen Maintenance

When the Sensor Nodes are operating in Daylight Dimming mode, they will automatically adjust to compensate for the degrading performance of the Luminaire over time. As a result of this automatic compensation, if a lamp in an existing (and aged) installation is replaced then it may be necessary to reset MaxLight for this Luminaire.

Lumen Maintenance can be achieved when operating outside of Daylight Dimming mode – but this must be done manually by periodically resetting Maxlight, to ensure that minimum light levels are being delivered over the life of the light fitting.

2.5. SIMULATED WALL SWITCH

The Simulated Wall Switch performs exactly the same functions as the physical Wall Switch (when it is operating using its default settings). As with the physical Wall Switch, activating Scene A or Scene B using the Simulated Wall Switch will activate Scenes 1 and 2 respectively (either with their default settings or any reconfigured settings done for these Scenes using the remote app). (Refer to Section 3.3 of the Configuration User Guide for more information on the Wall Switch).

Chapter Three

3. CONFIGURATION

More specialized lighting control features are provided by Tier 3 – Configuration. The contents of this chapter build on the previous chapters. It is assumed that you are familiar with the key concepts introduced in Chapter 1, and the Optimization features covered in Chapter 2. The Configuration level of the remote app provides some additional options for some of the Optimization features covered in the previous chapter.

The following Configuration features are covered in this chapter:

Zones

How to set up different zones, and how to configure them correctly so that they deliver the appropriate responses to occupancy and configuration messages.

Scenes

How to access pre-configured scenes. How to create customized scenes.

Wall Switch Setup

How to set up an Organic Response Wireless Wall Switch.

Note that you must have the remote app downloaded to a compatible iOS (Apple) or Android device fitted with the Organic Response infrared dongle before you will be able to perform any Configuration of your Organic Response enabled lighting system. If you do not have access to the Configuration level features on your smart device, then you need to complete the training and ensure you are registered at the appropriate app level via LinkedIn before access will be given. Please contact us if you are experiencing problems accessing the required level of the remote app.

3.1. CONFIGURING ZONES

If you do decide to implement zones, then it is strongly recommended that you complete your zone configuration before doing any other optimization or configuration.

There are many instances where areas within a building that are adjacent to each other have very different purposes. An example of this is an open plan corridor adjacent to an open plan work space, or a closed office that is located adjacent to a corridor. It naturally follows that you might want the lights to react in a way that is appropriate to the area in which they are installed. For example, you may want to walk along a corridor, but have no intention of walking into an adjacent open plan area. In this case, you want to light up the corridor lights, but not the open plan lights.

Zoning is the method we use to allow this type of operation. Zoning allows Sensor Nodes to interact with other Sensor Nodes in a different manner than is usually the case. Organic Response has the ability to place Sensor Nodes into 12 separate zones (zones 1 – 12) and a special purpose zone - X. Note that the default zone for all Sensor Nodes is Zone 1.

Figure 12 below, shows a typical office layout with open plan working area, an adjacent corridor and a small office opening onto the open floor area. All the Sensor Nodes are in their default zone (Zone 1), and communicate seamlessly with each other.

Let's look at how zones can be configured to improve the operational efficiency of the lights in this space.

FIGURE 12: A TYPICAL OFFICE LAYOUT WITH LUMINAIRES IN DEFAULT ZONE 1

In this example, you want to be able to walk down the corridor without automatically bringing on the open plan office luminaires (you might be walking past the open plan space on our way to another area of the building, hence you have no need for the open plan lights to come on). You only want the open plan lights to come on when you actually move into that space. Also, whilst there are people in the open plan area, but on-one in the cellular office, you want the office lights to remain off (until someone walks into it).

To achieve this kind of lighting behavior you need to define some new zones, based on the purpose of the different spaces in the area. So, in Figure 13 below, we have set up all the corridor luminaires as a separate zone (Zone 2), and the luminaires in the cellular office as Zone 3. We have left the luminaires servicing the open floor area in their default zone (Zone 1). We generally recommend that whichever zone includes the most number of lights remains in the Zone 1. This simply minimized the amount of work required to zone the installation.

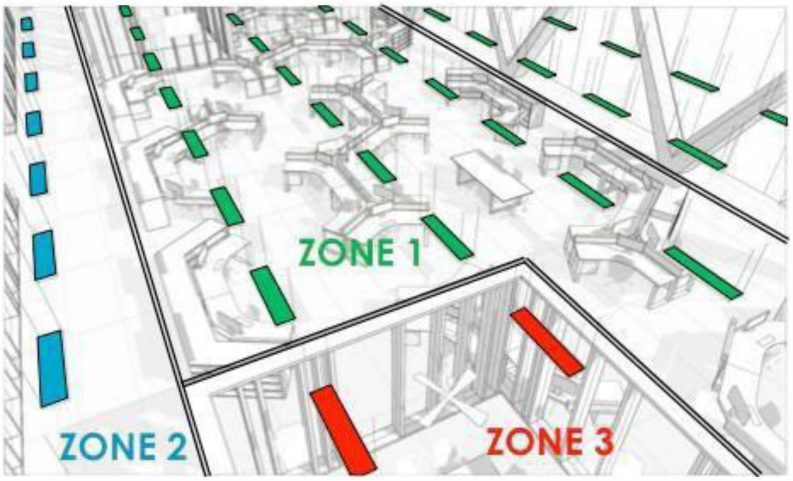


FIGURE 13: A TYPICAL OFFICE LAYOUT WITH NEW ZONES CREATED

Configuring the lights into zones as per the example above is achieved using the 'Zones' page of the remote app and the 'Set Zone' buttons. You will need to adjust the zone number for each luminaire in the new zone, as there is no option to Relay a zone setting. If you did so, all luminaires would adopt the new zone number, which would be pointless!

HOW TO SET A ZONE		
Remote app commands	Response from Sensor Node	Response from luminaire
1. Point the dongle at the target luminaire and press the required zone number from 1-12 (1 is default zone).	Dome of Sensor Node flashes red once to acknowledge receipt of the Set Zone command	None
2. Repeat step 1 above for all other luminaires that you want to join this new zone. You can do this by pointing the dongle up at the ceiling and walking under all of the relevant luminaires whilst pressing and holding down the numbered button until all of the relevant luminaires have been changed to that zone. As you walk the route, check to see that each Sensor Node dome flashes red to acknowledge they have received the Set Zone signal.	Dome of Sensor Node flashes red once to acknowledge receipt of the Set Zone command	None

Once established, each different zone that you have set up is effectively isolated from the other zones. So in the case illustrated above (Figure 13), as you walk down the Zone 2 corridor, the Zone 1 luminaires still receive occupancy level signals but do not respond to those signals because they are coming from a different zone. However, sometimes complete isolation of these zones does not necessarily result in the lighting behavior we want.

In the above example you did not want the lights in the open plan area to automatically come on when someone walked down the corridor, as this wasted energy. The zoning you performed has delivered this result. However, if someone was working in the open floor area by themselves late at night, it would be more pleasant if the corridor

lights stayed on in response to occupancy from the open plan area, to increase the feeling of comfort and security. This can be achieved by 'stitching' the zones back together as illustrated and in Figure 14 below.

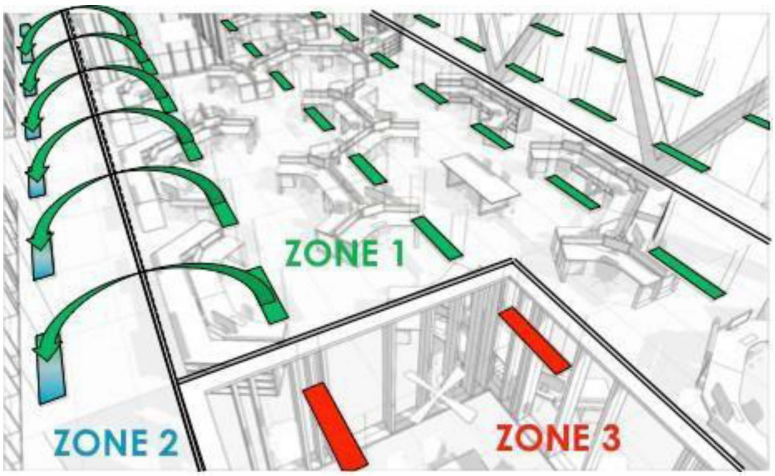


FIGURE 14: STITCHING ZONES TOGETHER

3.1.1. HOW TO STITCH A ZONE TOGETHER

You stitch zones together using the "Respond To" options in the ZONES section of the remote app. Press the expand button (^) next to "Respond To" and you will see the following screen:

In the illustrated example above (Figure 14) we have instructed the Zone 2 lights to respond to the occupancy messages of Zone 1, using the steps described below.

HOW TO STITCH ZONES TOGETHER		
Remote app commands	Response from Sensor Node	Response from luminaire
1. Enter the zone that you require to start responding to occupancy signals from another zone. Point the dongle at a target luminaire and press the relevant "Respond" button. For example, if you want Zone 2 to respond to Zone 1 occupancy, then enter Zone 2 and press the Respond button opposite Zone number 1 on the remote app screen.	Dome of Sensor Node flashes red once to acknowledge receipt of the Set Zone command.	None.
2. Repeat step 1 above for all other luminaires in the zone. You can do this quickly simply by pointing the dongle up at the ceiling and walking under all of the relevant luminaires, whilst pressing and holding down the same "Respond" button until all of the relevant luminaires have been adjusted. As you walk the route, check to see that each of the Sensor Node domes flashes red to acknowledge they have received the Respond signal.	Dome of Sensor Node flashes red once to acknowledge receipt of the Set Zone command	None.

This method of 'stitching' zones back together is infinitely flexible within the Organic Response system. Any zone can be told to respond to any other zone, in any direction. The Ignore button on the app does exactly as it describes – it stops the lights responding to the selected zone. Following on from the above example, you could walk along the corridor (Zone 2) pressing the 'Ignore zone 1' button and the 'stitching' just completed would be undone, resulting in zones 1 and 2 becoming isolated once again.

Luminaires that have been configured to respond to another zone will treat occupancy level messages from that zone as their own. As such, if a luminaire in zone 2 has been configured to respond to zone 1 occupancy messages, any zone 1 occupancy message received by this luminaire will be propagated within zone 2 as if ti was a zone 2 occupancy message. For this reason, when stitching two zones together it is only required to stitch the luminaires at the border of the two zones.

3.1.2. HOW TO FORWARD ZONE CONFIGURATION MESSAGES

So far in our example of zoning we have described how to set up zones to respond appropriately to *occupancy* within and across zones. There is another important type of information sharing that zones affect. This is *configuration* information. All the parameters that have been previously described in this document comprise configuration information (e.g. Personalities, Dwell Time, MaxLight, Scenes. etc). When a new zone is initially created, it not only isolates the zone from other zones' occupancy messages; it also isolates that zone from other zones' configuration messages.

In our example above, we can now send configuration messages only to those luminaires within the same zone. So if we change the MaxLight in Zone 1 and Relay the MaxLight, the luminaires in zones 2 and 3 will ignore the Relayed command and maintain their existing MaxLight. This isolation of configuration commands is very useful, since it is quite likely that we do want separately zoned areas to act differently from each other. Now that the corridor has been zoned as Zone 2, you can change the Personality of one of the luminaires in Zone 2 to "Corridor" Personality and Relay this Personality using the Relay command. Give that zones are now in place; the Corridor Personality will only be relayed to other Zone 2 luminaires. Which is exactly what you would want to happen.

This is also one of the main reasons why it is strongly recommended that you carry out zoning as the first step in the configuration of your building space. It makes the other configuration steps a lot easier.

There are situations, where you do want configuration messages to be received and responded to by another non-adjacent zone. In Figure 15 below, another zone (Zone 2) has been added. Let's assume that it represented another corridor, running parallel to Zone 2, which is why you have also defined it as Zone 2. When you configure settings in one of the Zone 2 corridors, you may want the other Zone 2 corridor to respond and adopt these settings to, as it is also a corridor.

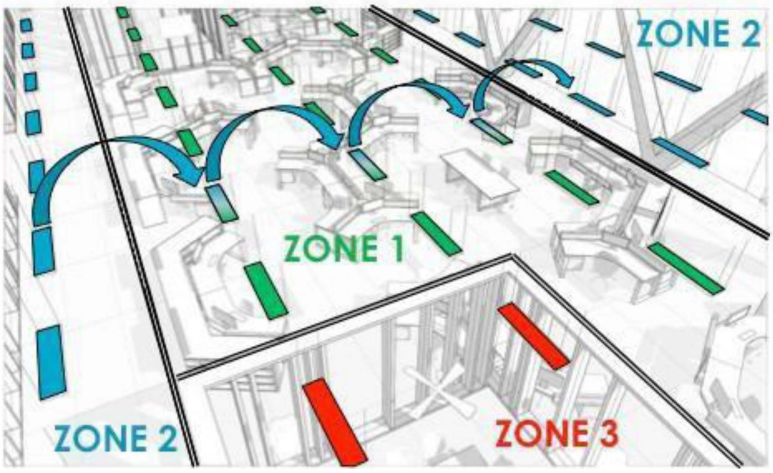


FIGURE 15: FORWARDING CONFIGURATION MESSAGES

In this case, if you change the Dwell Times in Zone 2, you want any relay of the new Dwell Time to not only be picked up by all the luminaires in this corridor, but you want the luminaires in the second Zone 2 corridor to also pick up the relayed new Dwell Time setting and adopt it.

To achieve this, you must create a path for the relayed configuration messages to move from each Zone 2 corridor, through Zone 1, to the other Zone 2 corridor. You do this by pointing the dongle at a Zone 1 Sensor Node and in the 'Forward Message for Zone' sub-section of the remote app, press the 'Forward" button next to zone number 2. Repeat this step for each of the Zone 1 luminaires until you reach one adjacent to the other Zone 2. You have now created a path for the forwarding of messages through Zone 1 to the other Zone 2 zone.

Now, when you change the Dwell Time (or any other configuration setting) for one of the Zone 2 zones and relay it, it will also be received and adopted by all the luminaires in the other Zone 2 zone.

You need to think about whether this setup is appropriate for you as ALL configuration messages will now be shared between the two Zone 2 zones. If the two corridor areas require different settings, it would be more appropriate for them to operate independently – in which case you would not create a path through Zone 1, and might define the second corridor as Zone 4 (although, even if defined as Zone 2, it would operate independently of the other Zone 2, unless you created the message forwarding path described above).

Another application of the forwarding of Zone configuration messages is as follows. In Figure 16 below, another zone (Zone 4) has been added. Now let's assume we wanted the Zone 4 lights to be controlled by an Organic Response Wall Switch located in Zone 2.

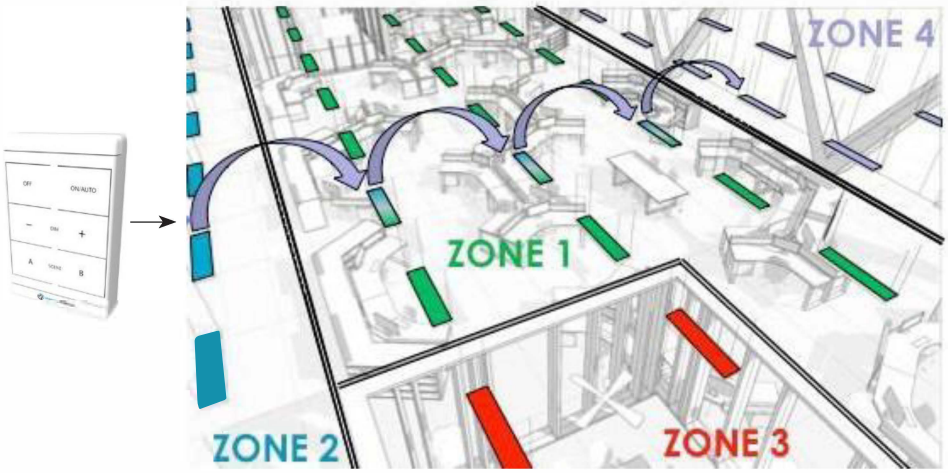


FIGURE 16: FORWARDING CONFIGURATION MESSAGES

To achieve this, we must first tell the Wall Switch that it is a Zone 4 wall switch. This is done in exactly the same way as setting a new zone for a Sensor Node, as described previously. First press the On/Auto button on the Wall Switch to bring it out of standby/sleep mode. Then point the dongle at the Wall Switch and press number 4 on the remote app Set Zone screen. The Wall Switch LED will flash once to acknowledge receipt of the command. All the signals that the Wall Switch now sends will be Zone 4 signals.

However, the Sensor Node that the Wall Switch is now communicating with (i.e. the sensor in the light directly above it) is a Zone 2 Sensor Node; whilst it will receive the message from the Wall Switch, it will ignore it. What we need to do is tell that Zone 2 Sensor Node to forward configuration messages for Zone 4. To do this we point the dongle at that Sensor Node and in the 'Forward Message for Zone' sub-section of the remote app, we press the 'Forward" button next to zone number 4.

HOW TO FORWARD ZONE CONFIGURATION MESSAGES		
Remote app commands	Response from Sensor Node	Response from luminaire
1. Point the dongle at a target luminaire and press the "Forward" button next to zone whose messages you want forwarded.	Dome of Sensor Node flashes red once to acknowledge receipt of the Set Zone the command.	None.
2. Repeat step 1 above for all other luminaires that need to forward the chosen zone's messages. Often this is in the form of a pathway from the zone initiating the message to the zone that ultimately will respond to the message.	Dome of Sensor Node flashes red once to acknowledge receipt of the Set Zone command	None.
3. To stop the forwarding of messages repeat steps and 1 and 2 as required but press the "Don't Forward" button next to the zone number whose messages you no longer want forwarded.	Dome of Sensor Node flashes red once to acknowledge receipt of the Set Zone command	

Now the Zone 2 Sensor Node will receive the Zone 4 message and re-transmit or forward the message on. It will not act on the message because it is a Zone 2 Sensor Node.

You carry out the same process for the Zone 1 luminaires indicated above in Figure 16. This is achieved in exactly the same way, pressing the same zone 4 forwarding button. So, you would press and hold the "Forward" Zone 4 button and, still pointing the dongle up at the lights above you, walk a path from the Wall Switch until you reach Zone 4. Now those Sensor Nodes in between the Wall Switch and Zone 4 have been instructed to pass on Zone 4 messages. When a message reaches a Zone 4 Sensor Node, the Zone 4 Sensor Node will respond to it, because the zone of the configuration message matches the zone of the receiving Sensor Node. All other Sensor Nodes in zone 4 will also now respond to the message that is relayed from the Zone 4 Sensor Node.

We now have a situation where someone can, for example, press the Dim+ button on the Wall Switch in Zone 2, and the Zone 4 luminaires will respond by increasing their light output. All the other luminaires in Zones 1, 2 and 3 will ignore the message from the Wall Switch. In effect, we have opened up a pathway for messages to be sent through and across zones. Any Sensor Node can be instructed to forward messages for any number of zones.

Message forwarding can be de-activated by pressing the "Don't Forward" button on the remote app.

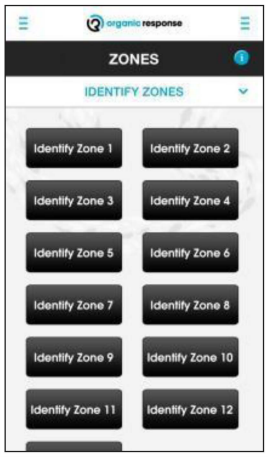
3.1.3. ZONE X

Zone X is a special zone for specific applications. Configuration messages sent from a Zone X sensor node will be propagated and acted on by Sensor Nodes in any zone. For example: a relayed Scene 4 command sent from a Zone X Sensor Node will set all of the luminaires in the connected OIC into scene 4 – whatever their designated zone.

Zone X is also unique in the way it responds to occupancy messages from other Zones. Occupancy messages received from other zones will be acted on and forwarded as the same zone. For example: a Zone X Sensor Node receiving a Zone 1 occupancy message will act on this message and then pass the message on as a Zone 1 message.

An example of this would be for a Wall Switch to be configured as Zone X. Now when the Wall Switch is operated, all luminaires that receive the relayed message will act on the command regardless of what zone they are in. This is very useful for Wall Switch control of an entire floor.

3.1.4. HOW TO IDENTIFY ZONES



You can identify what zone a Sensor Node by using the "Identify Zones" sub-section of the remote app.

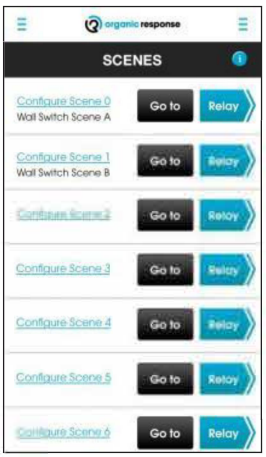
HOW TO IDENTIFY A ZONE		
Remote app commands	Response from Sensor Node	Response from luminaire
1. Point the dongle at the luminaire whose zone you are trying to identify and press any of the "Identify Zone" buttons. Keep pressing a different button until you receive confirmation from the Sensor Node, at which point you have now identified what zone that Sensor Node is set up as.	If the Sensor Node is in the same zone as the number you have just pressed, it will glow red for 30 seconds to identify itself as belonging to that zone number. At the same time, the domes of any other adjacent Sensor Nodes that are in the same zone will also glow red, confirming that they also belong to this zone. If the Sensor Node is not in the same zone as the zone number you have pressed, the Sensor Node will just flash red once – acknowledging the signal but indicating it does not belong to this zone.	None.

3.2. CONFIGURING SCENES

Scenes allow for a designated group of lights to adopt pre-configured light levels for a period of time. During the time the scene is activated, the lights effectively ignore occupancy and daylight dimming and deliver a light level defined by the settings of the scene they are in.

One immediate and obvious application of a scene is during a presentation in a meeting room. In this instance, the moment a scene is activated, each light in the zone (meeting room) will adopt the pre- configured light levels for that "presentation" scene so that the presentation can proceed with the appropriate levels of light, irrespective of the movement of occupants in the space. Once the scene is de- activated (or times out), the lights return to their normal mode of operation.

3.2.1. ACTIVATING A SCENE



There are eight pre-configured scenes, numbered 0 – 7. Scenes 0 and 1 are the equivalents of Scene A and Scene B on the Wall Switch. Scene 7 effectively turns off all the lights in that zone, so effectively acts as an Off switch. Scene 7 is the only Scene which cannot be modified using the remote app. Each scene has a pre-set light level that will be adopted when you instruct a luminaire to adopt that scene. For a full list of default settings for the seven scenes, see Appendix 6.3

To set the lights in a particular zone (e.g. a meeting room) to one of the scene options, proceed as shown in the table below.

HOW TO ACTIVATE AND DE-ACTIVATE A SCENE		
Remote app commands	Response from Sensor Node	Response from luminaire
1. Access the main Scenes menu on the remote app	None	None
2. If activating a single luminaire, point the dongle at the target luminaire and press the "Go to" button next to the desired Scene number. *Note that you can also press the "Configure Scene..." button for the desired Scene to enter the Scene configuration menu, where you can then activate the scene by pressing the "Go to Scene" button.*	Dome of Sensor Node flashes red once to acknowledge receipt of "Go to Scene" command.	Luminaire will immediately adopt the light level associated with the chosen Scene.
3. If activating an entire zone (e.g. a meeting room), point the dongle at any luminaire in the zone and press the "Relay" button next to the desired Scene number. *Note that you can also relay the scene to other luminaires within the zone via the Scene configuration menu for a specific scene. To do this access the specific Scene menu and press the "Relay" button*	Dome of Sensor Node flashes red once to acknowledge receipt of Relay command, and then continues to flash red for 30 seconds. The Sensor Nodes of each of the neighboring luminaires that receive the Relay message will glow red for 30 seconds to indicate that they have received the Relayed Scene signal. Any Sensor Node that does not glow red has not received the signal and has not changed its Scene setting.	All the luminaires that received the relayed Scene signal will immediately adopt the light level associated with the chosen Scene.
4. To manually exit the scene and return the lights in the zone to normal operation, you need to be in the specific Scene configuration menu. Under "Scene Functions", you will see the "Revert to Auto Mode" button, which will return the lights to normal operation. Press this button, or the Relay button next to it, to restore the entire zone to normal operation.	Dome of Sensor Node of target luminaire flashes once to acknowledge receipt of remote app signal. When relayed, all other luminaire Sensor Node domes will flash red for 30 seconds to indicate they have received the "Revert to Auto Mode" signal.	All the luminaires that received the relayed signal will exit the scene and return to their normal light levels for the occupancy level they are detecting.

Note that whilst in scene mode, Sensor Nodes ignore occupancy and daylight dimming settings and will only deliver the light level defined by the scene they are in. They will only revert back to responding to occupancy and ambient light once they exit the scene, or when you select the "Revert to Auto Mode" button on the remote app to exit the scene and return the lights to normal operation.

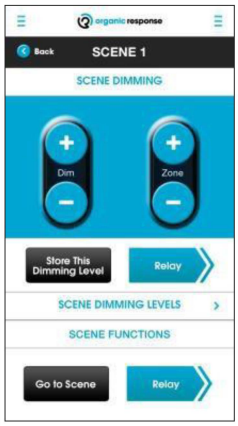
3.2.2. PROGRAMMING A SCENE

The light output of all of the scenes (except for Scene 7) can be modified from preset values using the remote app. Scene 7 has a light output of 0% and is used within the Organic Response system as the off scene.

For example, instead of using one of the scenes with preset values (when all the lights in a zone come on at the same preset level), you can configure lights in a meeting room to come on at *different* levels when a particularscene is selected. This makes sense in a larger meeting room with a large screen in the front of the room, onto which a presentation is being projected.

In this instance you might prefer to have the row of lights immediately above the screen remain off, the next row back from the screen to be on at 20%, the next row back at 40% and each additional row on at 60%. This would allow the screen to be seen more clearly as it would have little or no direct or reflected light on it, but provide enough light in the room for the audience to feel comfortable, take notes, etc.

Ton configure a scene, you will need to access the individual Scene configuration screen on the remote app



By way of example, to configure a Scene along the lines of the description above, you would proceed as follows:

Step 1 (First row of luminaires, above the screen)
Select a Scene to configure on the Scene home screen (e.g. Configure Scene 1). Using the Dim +/- button (or by pressing "0%" in the "Scene Dimming Levels" table) on the remote app, dim the first luminaire until it turns off. Then, still pointing the dongle at this luminaire, press the "Store this dimming level" button. Repeat this process of each of the luminaires in this first row that you would like to turn "off" when Scene 1 is activated.

Step 2
Move to the next row of luminaires. Dim the first luminaire to 20% and press "Store this Dimming Level". Repeat for all those luminaires that you would like to be at a 20% light level for Scene 1.

Step 3
Repeat Step 2 as many times as necessary to set the required light levels of all remaining luminaires in the room.

That's it! You have now told each of the luminaires in the room what light level to adopt when Scene 1 is selected on the remote app. To test your setup of Scene 1, point the dongle at one of the luminaires in the room and press the "Revert to Auto Mode button". Relay this message to all lights in the room – restoring the luminaires to automatic operation. Still in the Scene 1 screen, press the "Go to scene" button. All of the lights in the room should immediately adopt the light levels you just specified in steps 1-3 above. To exit the Scene, simply press "Revert to Auto Mode" again.

Of course, you do not have to have different light levels in the room, you can configure all of the lights to the same level. This is easier because you can use the Relay button opposite the "Store this dimming level" button to relay your desired light level for the Scene to all of the other lights in the room/zone.

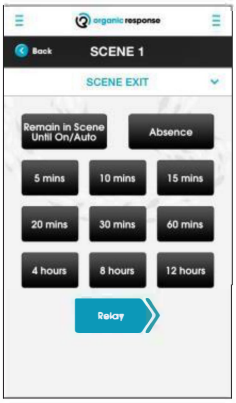
You can also use the Zone +/- button to dim all the lights in the zone simultaneously, which allows you to develop a feel for the appropriate light level for the entire zone before pressing the "Store this dimming level" button.

3.2.3. SET SCENE AS START UP MODE

This option means that in the event of a power failure (defined as a loss of power for more than 3 seconds), when power is restored, the lights will automatically default to the light levels of this scene. This option is specifically designed for those buildings where back-up power is supplied by a generator and having a "soft start" helps manage the load on the generator when power is restored. Scenes automatically applied in this Start Up Mode have the same light output and scene exit conditions as for normal scene operation. See more detail about this in section 3.4.

3.2.4. EXITING A SCENE

You have several options when it comes to exiting a scene. If you expand the Scene Exit section of the Scene screen you will see the range of options available to you.



Remain in Scene Until On/Auto
The Scene will remain active for a period of 1 year. In other words, it effectively remains in place until there is manual intervention via the remote app (Return to Auto Mode) or Wall Switch (On/Auto).

Absence
Remains in the Scene until the existing Dwell time expires, after which the luminaires in the room will return to their LowLight levels and their normal (Auto) mode of operation.

Defined Exit Times
The Scene will remain active for the length of time chosen from the selection available. Once the set time elapses, the lights will return to their normal LowLight levels and normal (Auto) mode of operation.

3.3. ABSENCE DETECTION

Note: This feature is only available on Sensor Nodes with Firmware 160 or above.

Absence Detection, or 'manual on/auto off', enables an Organic Response installation (or part thereof) to be configured such that luminaires do not automatically switch on in response to occupancy. Instead they require an 'ON/AUTO' signal from a wall switch or smartphone to switch on, whilst still switching off automatically based on absence. This feature gives users more control and is designed to address situations where a user enters an Organic Response enabled room (e.g. an office or meeting room) for a brief period and does not require the lights to come on.

Absence Detection is used in conjunction with the Organic Response Wall Switch. When the user requires that the lights be on – they simply press the ON button on the wall switch, the lights will then come on and behave as a standard Organic Response installation – responding to occupancy and ambient light if configured to do so. Alternatively, also using the wall switch, the user can turn the lights on and into scene A or B.

3.3.1. CONFIGURING FOR ABSENCE DETECTION

A brief explanation of each of the most common Wall Switch applications is given below.

HOW TO CONFIGURE ABSENCE DETECTION		
Remote app commands	Response from Sensor Node	Response from luminaire
1. Access the Absence Detection menu on the remote app.	None.	None.
2. Point the dongle at a target luminaire and press the "Enable" button	Dome of target Sensor Node will flash red once to acknowledge receipt of command.	None.
3. Repeat 2. Above for each luminaire in the space or use the "Relay" command to relay Absence Detection Mode to all luminaires in the zone.	Each luminaire that receives the enable Absence Detection signal from the dongle will flash its Sensor Node dome once in acknowledgement. Those receiving the Relay command will glow solid red for 30 secs.	None.

Please note the following in relation to Absence Detection:

- Once Absence Detection is activated, then the Wall Switch On button needs to be pressed to turn the lights on – they will no longer automatically come on when motion is detected.
- Once they are turned on via the Wall Switch, all of the lights that are in Absence Detection mode will come on to their MaxLight level for at least their configured Dwell Time. The lights will then continue to operate with all of their normal configuration settings (e.g. MaxLight levels, Personalities, etc)
- Once the lights have been turned on via the Wall Switch, the Wall Switch scene buttons can still be used to activate Scenes A or B
- When the Sensor Nodes that have Absence Detection enabled go into standby mode, the green LED light will flash twice per second. This lets the occupants in the space know that there is no fault with the lighting control (given that they have not come on automatically in response to occupancy)

3.4. CONFIGURING THE WALL SWITCH

A Wall Switch uses its default settings to communicate with Sensor Nodes within range of the infrared signals it sends out when its buttons are pressed. The buttons perform a range of simple functions as shown in Figure 17 below.

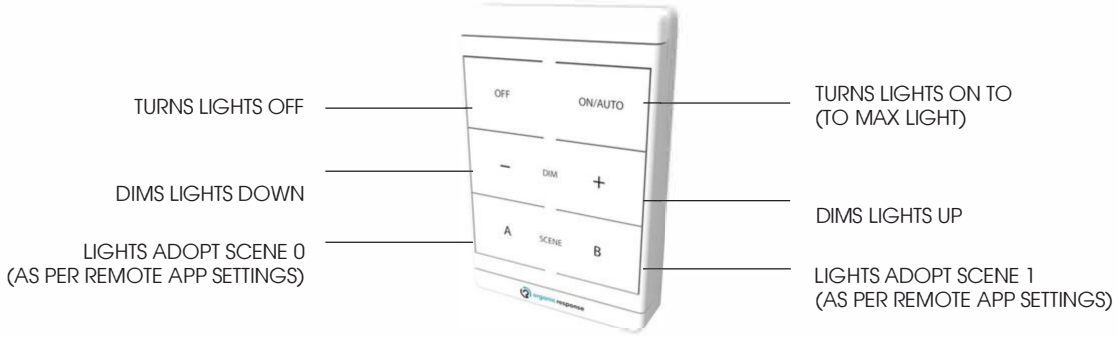


FIGURE 17: ORGANIC RESPONSE WIRELESS WALL SWITCH

It is important for you to understand how the Wall Switch works, as this will make it easier for you to understand how best to use it to optimize or configure the space. The important things to remember about Wall Switch infrared communication are as follows:

- The Wall Switch is "plug & play" and will by default interact with Organic Response enabled light fittings within range.
- The Wall Switch can only communicate with Sensor Nodes that receive its infrared messages directly
- (in this sense, think of it as a simple form of the remote app).
- The Wall Switch is shipped in un-zoned (or zone agnostic) configuration. In this configuration, any Sensor Nodes within direct range will act on and then relay configuration messages from the Wall Switch. Configuration messages from an un-zoned wall switch are always Relay messages that will be relayed by Sensor Nodes within range to their same-zone neighbors.
- To prolong battery life the Wall Switch effectively enters "sleep" mode after 5 seconds of a button being pushed or a message from the remote app being received. Whilst the buttons will operate immediately (even if the Wall Switch is in sleep mode), the Wall Switch will ignore a message from the remote app unless it has first been "woken" by a manual press of one of its buttons (we suggest pressing the Auto/On button to wake up the Wall Switch before issuing commands to it from the remote app).

3.4.1. WALL SWITCH APPLICATIONS

A brief explanation of each of the most common Wall Switch applications is given below.

Controlling the Zone, it is In

In default mode, the Wall Switch will allow control of all luminaires in the zone that it is located in. This means that all Sensor Nodes within reach of the relayed signals from Sensor Nodes responding to the Wall Switch will react to those commands. Obviously, Sensor Nodes that have the same zone but that do not receive the relayed signal (e.g. if they are in a closed office) will not respond.

Controlling a Different Non-adjacent Zone

If a Wall Switch located in a specific zone is required to control a different zone that is then it must be re- zoned in the same way that Sensor Nodes are given a new zone (see previous section on Zones). As per the discussion on forwarding zone messages, you then need to create a path between the Wall Switch and the zone it is to control. Once the pathway has been set up, the Wall Switch will control the distant zone as if it were located within that zone.

Controlling all Zones

For a Wall Switch to control all zones within reach of relayed signals, it must be zoned as Zone X. Any messages it now generates are Zone X messages and all Sensor Nodes are pre-programmed to always respond to Zone X messages. In this way, you can still have all of the benefits of zoning, but still have a Wall Switch that can, for example, turn off all of the lights across all of the zones with the push of a single button on the Wall Switch. Note that this will still only apply to Sensor Nodes that are in a position to receive the relayed Zone X signal.

If you have a need to restore a previously re-zoned Wall Switch to its original default settings (where it will send zone-agnostic messages), then you can set it to "Any" zone, using the process described below.

3.4.2. SETTING A WALL SWITCH TO A SPECIFIC ZONE

You can define a specific zone for a Wall Switch simply by pointing the dongle at the Wall Switch (after waking it up out of sleep mode) and pressing the relevant scene number on the remote app screen (as shown opposite).

3.4.3. WALL SWITCH TRANSMISSION TEST

You can conduct a Transmission Test from the Wall Switch which will indicate which Sensor Nodes are within range of receiving direct messages from the Wall Switch.

HOW TO DO A WALL SWITCH TRANSMISSION TEST		
Remote app commands	Response from Sensor Node	Response from luminaire
1. Press the On/Auto button on the Wall Switch to bring it out of sleep mode. Then point the dongle at the Wall Switch and press the "Transmission Test" button. The Wall Switch LED will flash red as it sends out a series of 30 infrared signals (2 per second over 15 seconds)	All Sensor Nodes that receive the test signal from the Wall Switch blink red in acknowledgement of each test signal it receives. If the signal is strong and reliable, the Sensor Node should blink 30 times (or close to 30 times). If the signal is weak and unreliable, the Sensor Node will only flash red a few times.	None.

3.4.4. ADJUST WALL SWITCH POWER TRANSMISSION

You can adjust the strength of the Wall Switch's infrared signals using the remote app. For example, if your Wall Switch transmission test resulted in unreliable communication with neighboring Sensor Nodes, you can try increasing transmission power from the default level of 30%. Conversely if signals from the Wall Switch are too strong, then signal strength can be reduced.

HOW TO ADJUST THE STRENGTH OF WALL SWITCH IR SIGNALS		
Remote app commands	Response from Sensor Node	Response from luminaire
1. Press the On/Auto button on the Wall Switch to bring it out of sleep mode. Then point the dongle at the Wall Switch and press the relevant percentage of Infrared transmission Power. The Wall Switch LED will flash once to acknowledge the command, and immediately increase or decrease the power of its normal infrared messages.	None.	None.

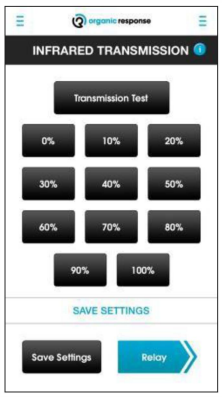
3.5. START UP MODE

Startup mode gives you the option of determining at what level lights come on after a power failure (defined as a loss of power for more than 3 seconds). The default setting is for lights to come back on at their normal MaxLight settings (equivalent to On/Auto). The Start Up Mode on the remote app gives you the option to select a softer start up mode, with lower initial light levels. A soft start up is specifically useful for those buildings where back-up power is supplied by a generator and having a "soft start" helps manage the load on the generator when power is restored.

To configure for a Soft Start, go to the Start Up mode section of the remote app and relay the preferred Start Up Scene to all zones that require it.

HOW TO SET START UP MODE		
Remote app commands	Response from Sensor Node	Response from luminaire
1. Point the dongle at the target luminaire and press the relevant Scene that you want to apply for Soft Start (On/Auto is the default of normal operation).	Dome of Sensor Node flashes red once to acknowledge receipt of the Start Up Mode scene.	None.
2. Repeat for other luminaires that require a Soft Start, or relay to all luminaires within the zone by pressing the Relay button. Repeat steps 1 and 2 for each Zone if required.	Dome of Sensor Node of target luminaire flashes once to acknowledge receipt of remote app signal. When relayed, all other luminaire Sensor Node domes will flash red for 30 seconds to indicate they have received the "Relayed Soft Start" signal.	All the luminaires that received the relayed signal will adopt the Soft Start Scene for any future start up following a power failure..

3.6. INFRARED TRANSMISSION

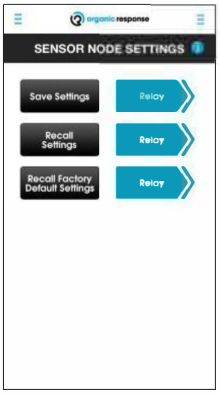


This remote app function allow you to conduct a transmission test and adjust Sensor Node infrared transmission power, using the power percentage options provided.

A Transmission Test is done to test the range and quality of the communication from one Sensor Node to its neighbors (a communication that is critically important for effective Organic Response lighting control).

HOW TO CONDUCT A TRANSMISSION TEST & ADJUST TRANSMISSION POWER		
Remote app commands	Response from Sensor Node	Response from luminaire
1. Point the dongle at the target Sensor Node and press the "Transmission Test button. The dome of the target Sensor Node will flash red as it sends out a series of 30 infrared signals (2 per second over 15 seconds) that can be picked up by any Sensor Node within range.	All Sensor Nodes that receive the test signal from the Wall Switch blink red in acknowledgement of each test signal it receives. If the signal is strong and reliable, the Sensor Node should blink 30 times (or close to 30 times). If the signal is weak and unreliable, the Sensor Node will only flash red a few times. Sensor Nodes that are closer to the target Sensor Node will receive stronger signals than those that are further away. Those that do not receive the test signal will not respond at all.	None.
2. If neighboring Sensor Nodes are reliably receiving signals, then no further actions is required. However, if the transmission power signals are travelling too far (e.g. 3-4 Sensor Nodes away from the transmitting Sensor Node), or not being received reliably by immediate neighbors, then you can decrease or increase transmission power respectively as follows. Point the dongle at the transmitting Sensor Node and select the percentage power button that you wish to adjust to. Once adjusted, repeat the transmission test to check on the result. Repeat if necessary.	The Dome of the Sensor Node will flash once to acknowledge receipt of the change in transmission power signal.	None.

3.7. SENSOR NODE SETTINGS



The Node Settings area of the remote app allows you to store and recall configuration settings. The three options available to you are explained below.

Save Settings
Saves the complete range of configuration settings for a single luminaire (or all luminaires in a zone if the Relay Save Settings command is used).

Recall Settings
Recalls the previously saved configurations settings for the target luminaire (or for all luminaires in a zone if the Relay Recall Settings command is used).

This is useful if you have previously saved a preferred and stable configuration and have been experimenting with a range of new settings which aren't delivering the right result, and you want to revert back to the previous stored settings.

Recall Factory Default Settings
This button restores all factory defaults settings for the target luminaire (or for all luminaires in a zone if the Relay Recall Settings command is used). The full range of factory default settings is shown in Appendix 6.3.

Chapter Four

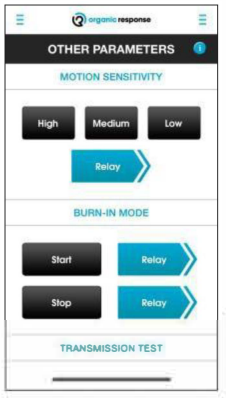
4. OTHER PARAMETERS

There are some additional parameters offered by the remote app that you should be aware of. These include the ability to adjust the sensitivity of the Sensor Node's motion sensor, activating or de-activating Burn In mode, and performing a Transmission Test.

4.1. MOTION SENSITIVITY

If a Sensor Node is installed near a mechanical or electrical device (e.g. an air conditioning supply outlet), this may trigger a false activation of the Sensor Node's motion sensor. This means that the luminaire may think an occupant is nearby and switch on to its MaxLight level, unnecessarily increasing energy consumption. Using the options below the Motion Sensitivity heading on the remote app (see screenshot below), it is possible to set the PIR sensitivity to High, Medium or Low to reduce the possibility of a Sensor Node false triggering.

4.2. BURN-IN MODE



In order to maximize lamp life, new fluorescent lamps should be burnt-in (i.e. not dimmed) for the first 100 hours of operation. Organic Response provides a built-in Burn-In Mode function to make this process very simple for users. When Burn-In Mode is enabled, luminaires will not dim until they have accrued 100 hours of operation. After the 100 hours of operation has passed, Burn-In Mode is automatically disabled, and you can then optimize luminaires to take full advantage of the energy savings offered by the Organic Response system.

By default, each Sensor Node is shipped with Burn-In Mode disabled. This is entirely appropriate for LED luminaires, but for new fluorescent fittings, it will prolong the life of the fluorescent tube if Burn In mode is activated prior to installation.

If you are having trouble dimming a luminaire, the most likely explanation is that Burn-In Mode is enabled. If the lamp in the luminaire are still new, it is recommended that you keep this setting in order to maximize the life of the lamps.

If you do want to disable Burn-In Mode it can be disabled using the Organic Response remote control.

4.3. TRANSMISSION TEST

This remote app function allow you to conduct a transmission test to test the range and quality of the communication from one Sensor Node to its neighbors (a communication that is critically important for effective Organic Response lighting control). It is one of the simple diagnostic tests that you can perform to confirm reliable communications; and something you might be asked to perform by Tech Support staff.

HOW TO CONDUCT A TRANSMISSION TEST		
Remote app commands	Response from Sensor Node	Response from luminaire
1. Point the dongle at the target Sensor Node and press the "Transmission Test" button". The dome of the target Sensor Node will flash red as it sends out a series of 30 infrared signals (2 per second over 15 seconds), which can be picked up by any Sensor Nodes within range.	All Sensor Nodes that receive the test signal will blink red in acknowledgement of each test signal they receive. If the signal is strong and reliable, the Sensor Node should blink 3o times (or close to 30 times). If the signal is weak and unreliable, the Sensor Node will not respond, or respond only a few times. Sensor Nodes that are closer to the target Sensor Node will receive stronger signals than those that are further away.	None.

4.4. FIRMWARE INTERROGATION

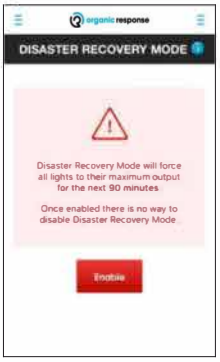
This feature is not required for any aspect of optimization. However, if you ever report a technical problem with the Sensor Nodes you may be asked by someone from tech support to tell them the version of that Sensor Node's firmware. To determine the Sensor Node's firmware version, you will need to use the remote app's Firmware Interrogate feature, which is found in the Other Parameters menu of the app.

HOW TO CONDUCT FIRMWARE INTERROGATION		
Remote app commands	Response from Sensor Node	Response from luminaire
1. Point the dongle at the target Sensor Node and press the Interrogate button under the Firmware heading on the remote app screen. The Sensor Node will then communicate the firmware version by flashing its dome in Morse Code	Sensor Node dome will flash a series of short and long flashes in Morse Code.	None.

Use the table in Appendix 6.2 to interpret the Morse Code and identify the Sensor Node's firmware version. Once you have identified it, you can communicate this information to Tech Support.

Chapter Five

5. DISASTER RECOVERY MODE



Note: This feature is only available on Sensor Nodes with Firmware 160 or above.

Disaster Recovery Mode forces all luminaires to remain at 100% light output for 90 minutes. It can only be cancelled by power cycling the luminaires. Disaster Recovery Mode allows users to turn all lights on immediately without exception.

Note: Once enabled there is no way to disable Disaster Recovery Mode; the system will return to normal operation only after 90 minutes has lapsed.

ACTIVATING DISASTER RECOVERY MODE		
Remote app commands	Response from Sensor Node	Response from luminaire
1. Access the "Disaster Recovery Mode" menu on the remote app	None.	None.
1. Point the dongle at any Sensor Node and press the ENABLE button". The command contains an automatic relay command, which means that the signal is transmitted to ALL luminaires across ALL zones.	All Sensor Nodes that receive the signal will light up the domes red, and they will stay red for the entire duration of Emergency Mode (90 minutes).	All lights that receive an "Emergency Mode" signal will turn on or brighten to their maximum light output for 90 minutes, after which they will return to their light levels for standard operation.

Chapter Six

6. ORGANIC RESPONSE PORTAL

IMPORTANT RESOURCES:

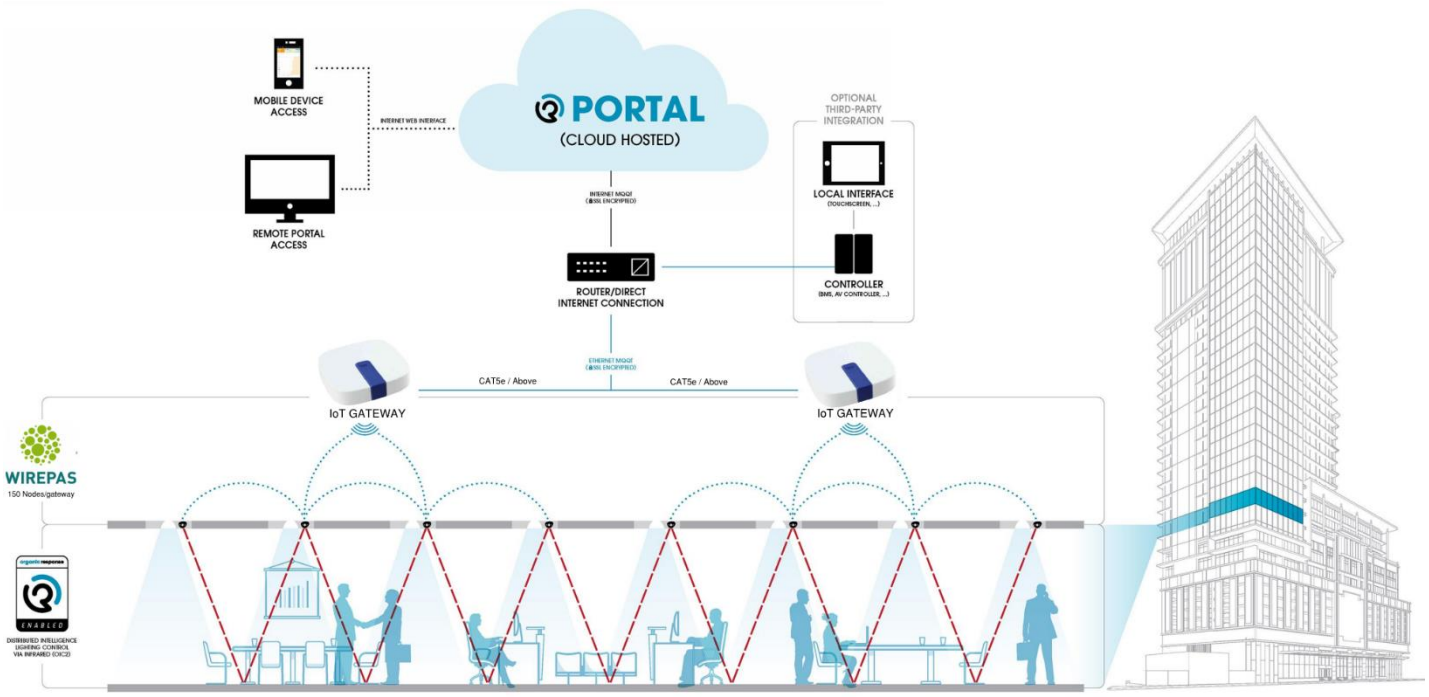
a. ***PORTAL USER REFERENCE GUIDE – To navigate within the portal and familiarize menus, pages & options referred throughout this document***
b. ***PORTAL COMMISSIONING GUIDE – To commission a Portal Installation***

OR Technologies' cloud-based analytics & lighting control platform allows its users to remotely monitor & control of lighting assets. Organic Response Portal is remotely accessible through supported web-browsers (recommended Chrome & Safari). All sensor nodes installed constantly collect, store & communicate data on occupancy, luminaire performance & energy consumption.

Tier 4 solution by OR Technologies sits on decentralized RF mesh. When sensor nodes are powered up by default the mesh is created which has the following characteristics;

- Auto-forming (Mesh is formed as soon as sensor nodes are powered up)
- Self-healing (No single point of failure)
- Self-optimizing (Automatically takes & adjust to most suitable path to the gateway)
- Enhanced interference avoiding capability

Each SN3 employs Wirepas as proprietary communications protocol to communicate over this Low-energy Bluetooth mesh. This communications transfer information from one node to other node using 27 pre-allocated channels employing frequency hopping spread spectrum. Each sensor node is capable of self-optimizing its route based upon low-cost mechanism in search of an Organic Response IoT gateway. Each IoT gateway comes configured out-of-the-box to connect over internet to Organic Response Web-based Portal API as a DHCP (Dynamic Host Configuration Protocol) device.



Each IoT gateway must be in the communications range of at least one sensor node i.e. within 5 meters LOS. Each sensor node has capability to connect to any gateway with low cost path if there are multiple IoT gateways in its proximity. An IoT gateway in turn can connect to any DHCP (Building specific) network by default to forward and receive information from OR Portal. Refer to IoT gateway installation guide for information on suitable location.

6.1. COMMISSIONING

Although each sensor nodes has capability to connect to IoT gateway and then in turn report to portal, however the Portal need the nodes to be commissioned physically in order to associate the information within the portal to a node. This process is called commissioning which associates physical nodes to nodes in the portal added manually following a simple mapping process.

6.2. ADMINISTRATION

A building setup involves setting up several parameters from a settings page in the portal. A building setup is completed prior to handover of the project i.e. as part of the commissioning process. Set of parameters can be changed at any stage to reflect any relevant changes and these parameters include:

6.2.1. Building Credentials
Create / edit a custom name, enter address, time zone & add photograph for your building.

6.2.2. Gateways
Add, remove or update the gateway credentials in the building.

Note: Refer to Gateway installation guide and portal commissioning guide for detailed process and how to achieve this.

6.2.3. Floors
Add/remove floor plans after adding floors to a building. Remember changing a floor plan would cause loss of correct positioning of any previously mapped nodes on the floor.

6.2.4. Users
An administrator can invite other users with their LinkedIn email addresses. This page also displays a list of current users with their access levels.

6.2.5. Roles
Custom definition of access permissions that can be created for different user access levels only through admin access.

- All – Admin Access checks all available access permissions
- View – View only permission
- Analytics – access to analytics page
- Control light
- Nodes – access to nodes page, make changes e.g. add, edit map/Unmap & tag nodes. Note this permission is tied internally to tagging permission hence to be checked with tags menu
- Floors – Add or edit floors.
- Gateways – Add or edit gateway credentials
- Tags – Create and assign tags, note that it is tied internally to nodes menu, hence must be checked with nodes permission
- Users – Ability to add or edit / view users page
- Roles – Ability to access roles window, create and/or edit permissions
- Building – Access to building page useful in case of more than one building
- Schedules – Access to schedules page and ability to run, edit & add scheduled operation for lighting control systems
- Emergency Lighting – Access to emergency lighting menu
- Maintenance & maintenance updates – Both checked to receive maintenance updates for each floor via access email. The email is sent automatically when nodes are reported to be disconnected, having faults or issues.

6.3. ANALYTICS

An analytics page is heat map visualization menu that displays data based upon data type selected in form of Heat map on a selected floor plan. The sections available from an analytics page would include the following;

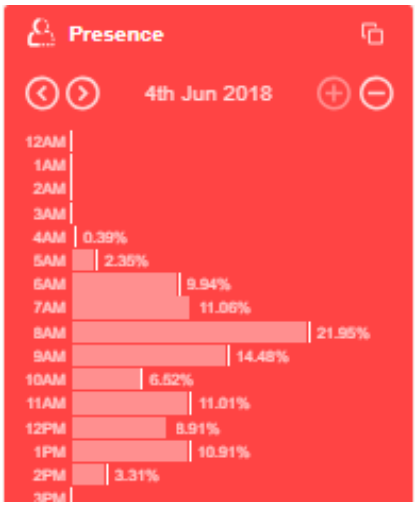
6.3.1. Data Set

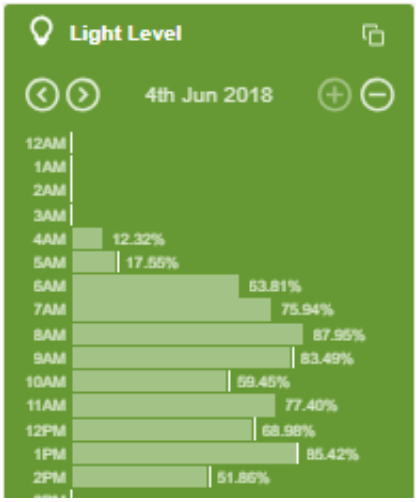
Choice of data type from presence, light level & energy consumption. The data resolution can be changed from whole year up to a window of 5 minutes. There is also an option to access live mode to visualize the current space utilization. Moreover, if the nodes are properly tagged the data sets can be filtered to see analytics for different spaces. Several data sets and their significance is as below;

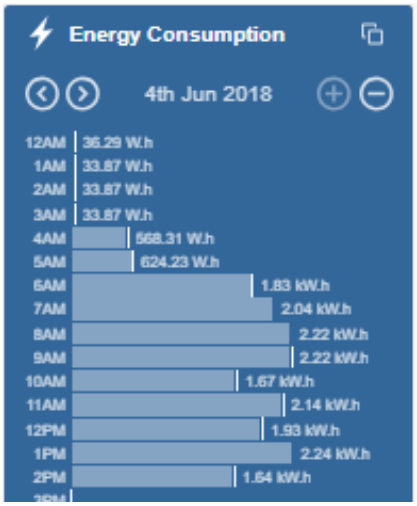
- **Presence** – Space usage at any particular time since the portal commissioning can be visualized from this data set. The presence is shown as percentage e.g. if there are 100 luminaires and a 50% presence is shown for 10 am window. Then it means that for whole one hour 10:00:00 am to 10:59:99 am 50 luminaires saw occupancy for this whole period. Since the luminaires are installed in a grid format this essentially translates to a space being utilized 50% during one-hour period.

- **Light Levels** – Percentage levels achieved for any period of time against the full capacity of any luminaire or whole space. As an example, take the above example and if for the same hour the light levels are showing up as 75%. This would essentially be translated in that out of 100 luminaires the luminaire output can be quantified (visualized) as;
    - EITHER 75 luminaires out of 100 were at 100% light output for that period of time
    - OR All 100 luminaires were on 75% light output for this one-hour window.[1]

- **Energy Consumption** – in kW.h for any window of time. The default calculation are normalized upon 40W luminaire. The luminaires can be custom assigned similar to tagging upon selection of nodes which would enable the lamp type to be selectable from right hand side menu within the "Nodes" page/menu. If you are unable to locate your installation specific luminaires contact ORT with luminaire specifications.

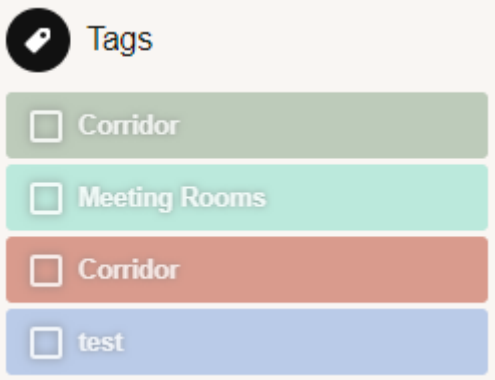






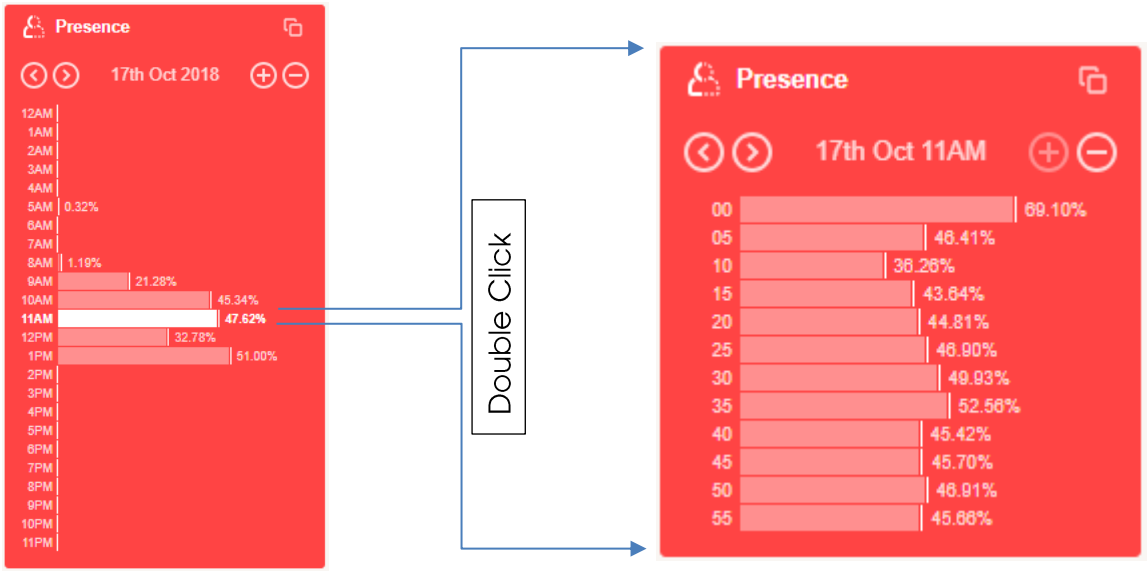
[1] NOTE: Any values shown above are an indication only and are taken to help quantify the values and interpretation of those values available in data sets. These values are normalized values over time period based upon the reporting from luminaires.

The three data sets by carefully choosing the time window and tags would allow the facilities management to access specific information about any space and perform informed audits and implement efficient space utilization plans. Users also have the ability to copy this information to their clipboard and extract to perform custom analysis, refer to portal user reference guide to learn how this is achieved.



6.3.2. Custom Analytics View

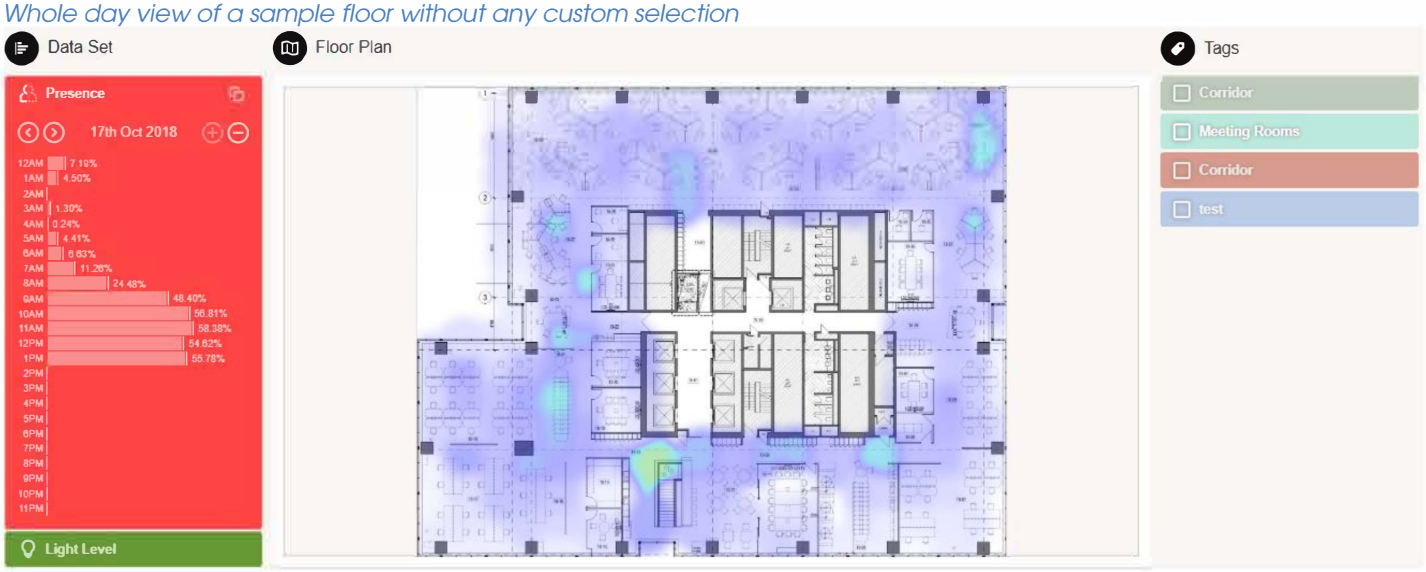
- Click on any time bar from any of the above data sets would segregate the heat map view based upon only that time window
- Left Double click on any of these bars would allow user to go to more granular resolution of that time window



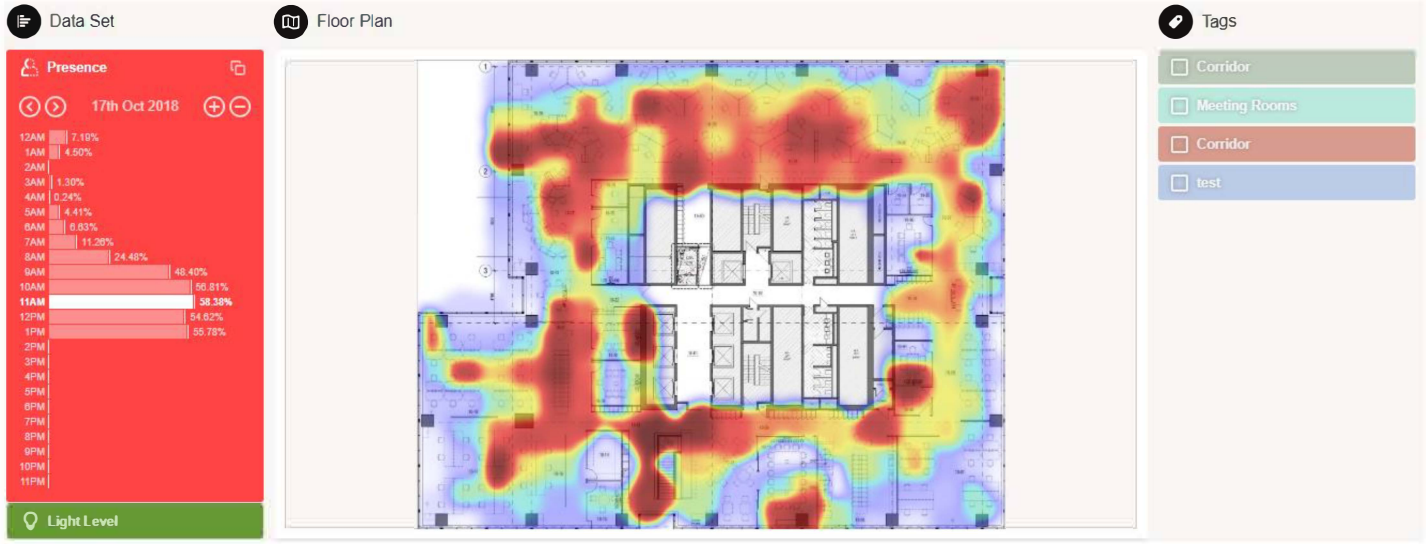
- The granularity offered goes in the sequence as below;
    - Yearly view – for whole year with data showing up in the data sets for each month
    - Monthly view – with data presented in data sets for each day of the selected month
    - Daily view – with data sets representing hourly information
    - Hourly view – with data set showing a 5-minute window-based data.
- Right click on the bar would revert the above step & clicking on the same bar would deselect the time window.
- Select any tag along with a time window to see a particular space utilization for a period of time

An illustration is shown below;

Whole day view of a sample floor without any custom selection



Selection of Time window for 11 am



Selection of meeting room through tags for 11 am

6.4. NODES

Allows user to tap into individual performance of any OR enabled luminaire. Users can add nodes and map them from the same menu refer to portal commissioning guide on detailed process of mapping any node. User can add multiple tags here based upon utilization of the space and assign tags to nodes by simple selection menu. Each node has the following information visible in the portal once correctly mapped:

- Node Address – automatically generated when nodes are mapped during the commissioning process
- Burn Hours – calculated since the time of installation
- Energy consumption – calculated based upon the current light outputs

Note: Here it is worthwhile to mention that once mapped the nodes can't be relocated. If a user wish to change the location or uninstall any node the on-site mapping process would need to be followed including adding nodes on the portal from edit nodes option. The user can easily delete the previously added nodes and then have the ability to add the nodes where required if he has correct access privileges. The same goes when a luminaire is replaced with new hardware.

6.5. SCHEDULES

This menu allows users to create, edit & enable any schedule based upon the customized needs and analytics page can help facilities management in making decisions on what and when to schedule.

6.5.1. Schedule Settings

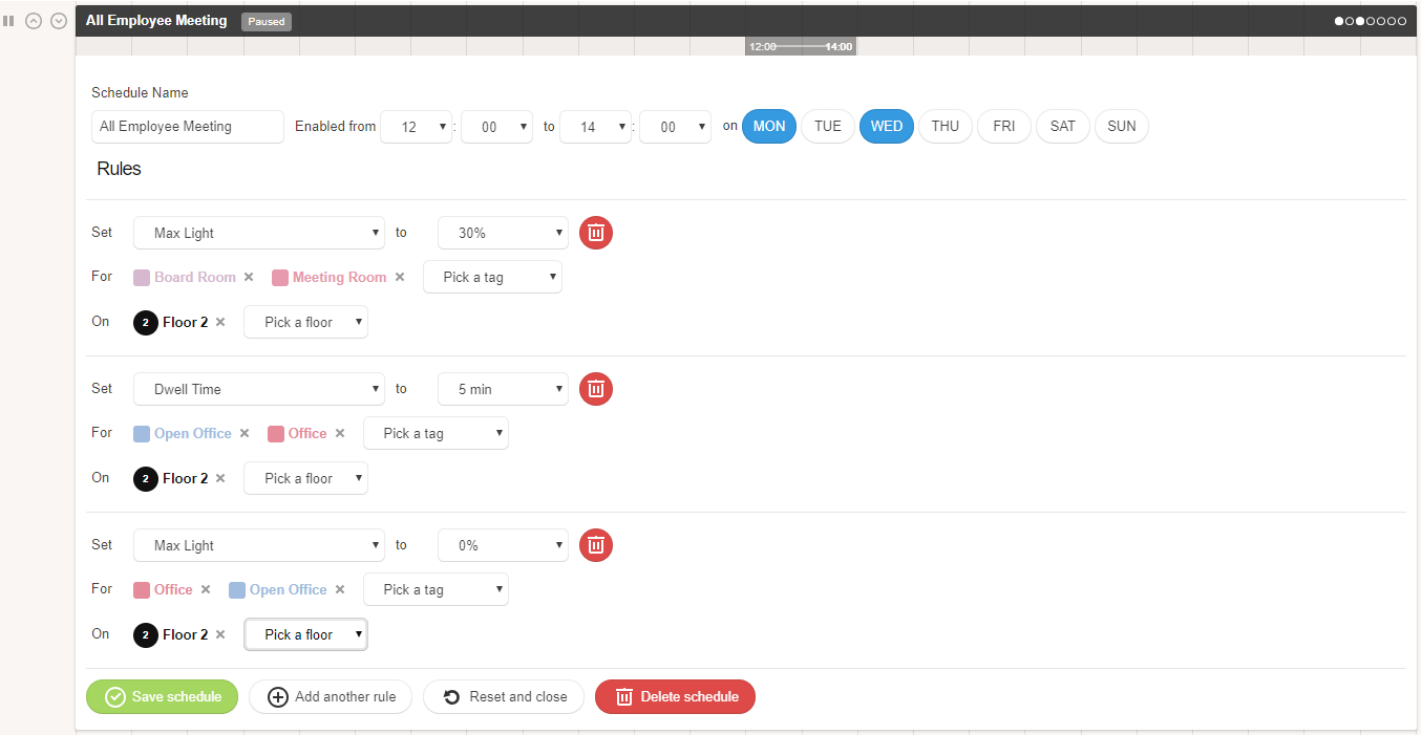
Each schedule can be custom named to run different days of the week for different times of the day. For example, a schedule could be named "Natural Light Utilization" to reduce the light output (Maxlight) of luminaire during 10 am to 3 pm for Monday to Friday.

6.5.2. Rules

Each schedule can have as many rules as necessary with ability to choose from a range of configuration changes that are required to run on specific time from above and beyond the automatic operation of LCS. Each Rule is defined by the following:

- **Set**:
    - Max light – to – available lighting output percentages ranging from 0% to 100%
    - Min Light – to – available lighting output percentages ranging from 0% to 100%
    - Low light – to – available lighting output percentages ranging from 0% to 100%
    - Dwell Time – to – available times from 1 minute up to 60 minutes
    - Low Light Time – to – available times from 1 minute up to 60 minutes
    - Personality – to – from the whole range of profiles available to OR lighting control system
    - Scenes – to – one of the eight scenes available in OR enabled LCS.
- **For**: here user can pick multiple tags created & assigned earlier in the node's menu
- **On**: allows user to pick a floor where they wish for this rule to be implemented

An example of schedule is as below:



Which would intend to achieve from "All employee meeting" named schedule following the control philosophy as below;

- During 12:00 pm to 14:00 pm on Monday & Wednesday
    - Set max light for boardroom & meeting room to 30% on floor 2
    - Set Dwell time for open office & other offices to 5 minutes on floor 2
    - Set max light for open and other offices to 0% on floor 2
    - You may also add another rule where "security light" tagged luminaires were to stay 10% on the same floor to enable enough illumination for security in corridor area etc…

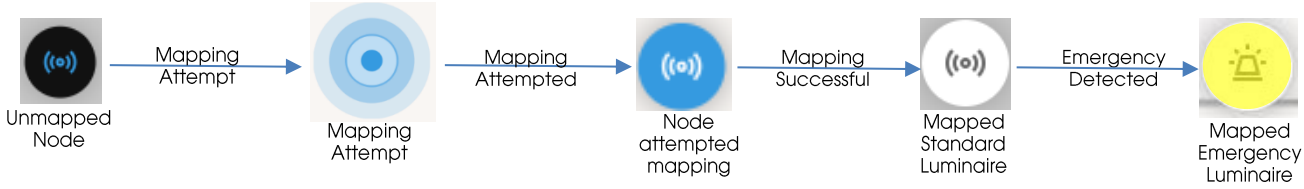
User can add as much schedules as required to achieve intended outcomes. In the end you can measure the energy efficiency from your schedule based upon your timed operation for any space.

6.6. Emergency Lights Monitoring & Testing - ELMT

OR enabled emergency luminaires can be added to the portal through the same process of commissioning. Upon a successful commissioning attempt the emergency luminaire is automatically discovered by the portal. The auto discovery works for luminaires that can respond to query from a sensor node that the emergency gear is attached to them. The emergency luminaires should be compliant to standards based upon the applicable region;

- IEC62386-202(ED1.0)

The sensor node upon mapping would go through these phases for an emergency luminaire;

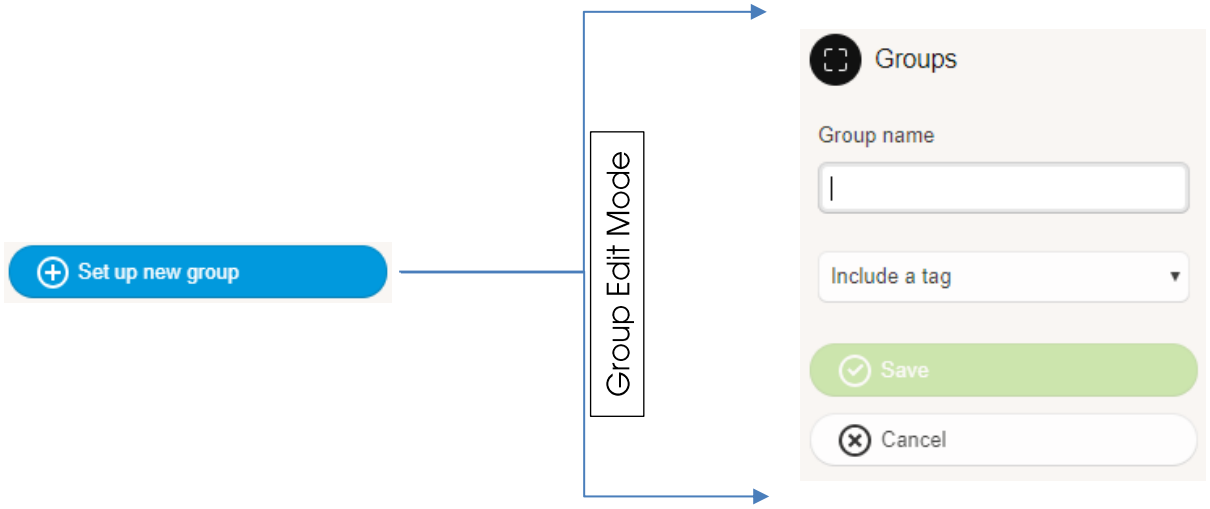


Once a building has emergency luminaire detected the option to navigate to emergency lighting page/menu become available within the portal based upon the user access level within the building settings page. The specific access is addressed as explained above by checking the Emergency Lighting option. Setting up ELMT involves;

1. Setting up groups – (with ability to manually run tests on individual nodes through simple selection)
2. Setting up Schedules
3. Extract / View Reports

6.6.1. Setting up Groups

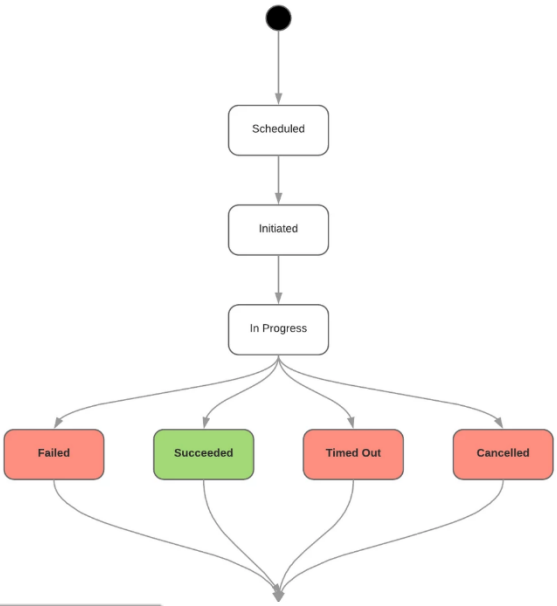
Setting up groups has an underlying mandatory requirement to tag the nodes. The groups can only be created by selection of tags from list of already created tags. Creation of a group automatically creates a schedule with the same name as the group name and would be assigned to a floor and tags, you create a group for. Care must be taken while putting emergency luminaires to groups because of the way the schedules are implemented.



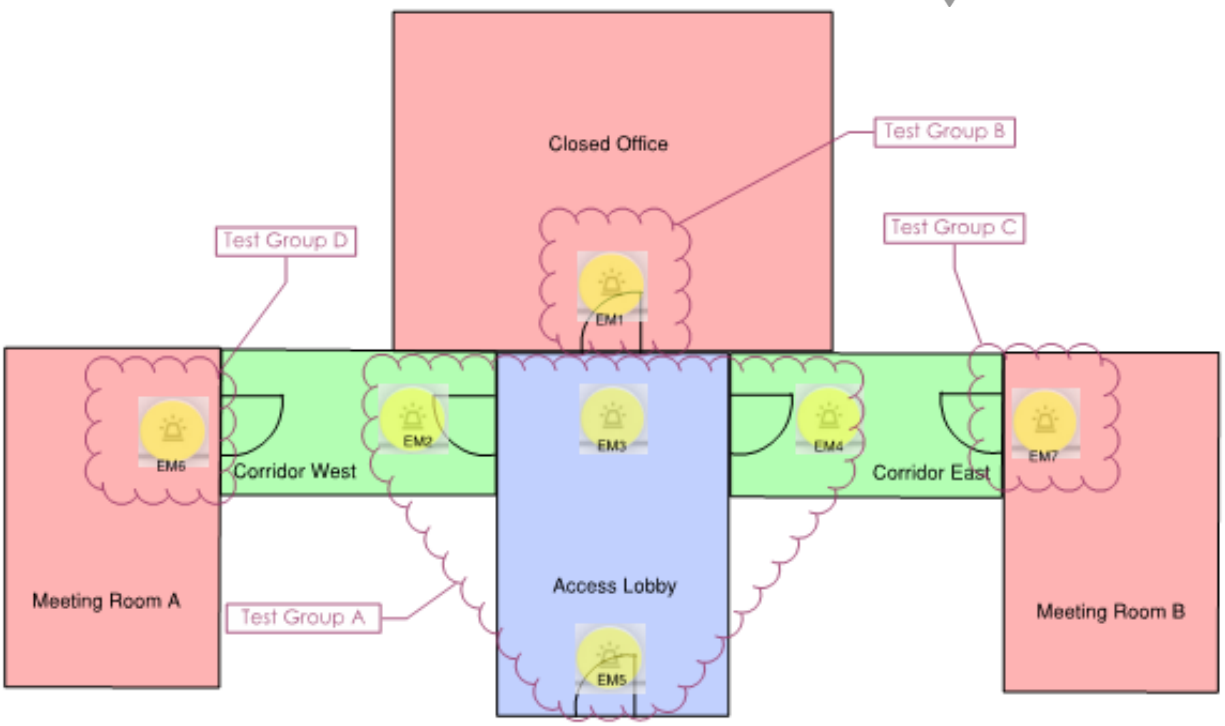
Group's menu allows visualization of emergency luminaire on the selected floor plan and provides user to initiate functional and duration tests manually. The selection of luminaires is done one at a time by clicking on an emergency node and selecting intended test.

Selecting a node would highlight that node and selecting any of the options below would initiate a relevant test once clicked.

STATE DIAGRAM: EMERGENCY LIGHTING TEST



Consider a use case[2] below on "FLOOR 1";



- There are seven emergency luminaires EM1, EM2……. EM7
- Each of them are tagged as shown in the space e.g. EM1 tagged as Closed Office, EM7 as Meeting Room B and so forth.
- The purple cloud highlight would show the recommended grouping strategy for these emergency luminaires.
- Creating a "Test Group A" would involve entering this name and selecting the tags from the list "Corridor West", "Corridor East" & "Access Lobby"

The logic behind selection of a group for this use case is explained further in setting up emergency schedules.

[2] The use case here is just an indication to be used only to understand the concepts and help visualize the functionality. Refer to implementation and design constraints specific to each site and consult ORT where necessary.

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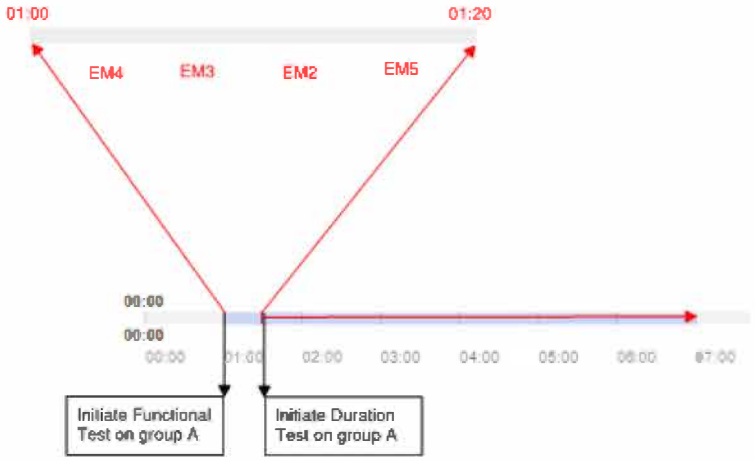
6.6.2. Setting up Schedules

Setting up schedules involves editing and enabling an automatically created schedule which is tied to;

a. *Floor*
b. *Tags*

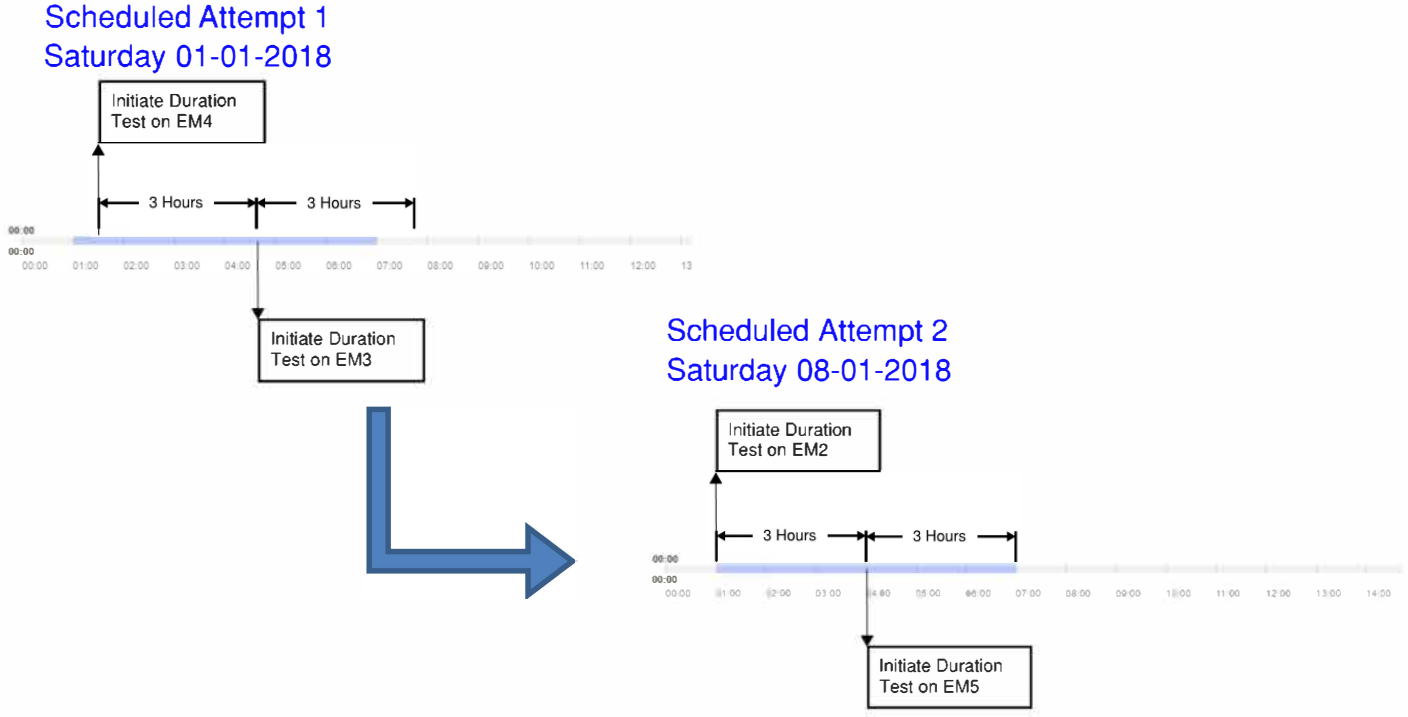
Since each schedule is originating from a group thus carry the characteristics from the group. *By default, the schedule is disabled*. The schedules once enabled are implemented based upon the following hierarchy;

1. Functional tests always take priority to duration tests within a schedule and are performed sequentially. The priority is given since they take a lot less time than duration tests. The functional test would first be performed on all luminaires in a group one by one. The node is chosen at random to start the test. No consider test group A example above which is scheduled to run on Saturday from 01:00 am to 07:00 am and if we assume that functional test on a luminaire takes about 5 minutes each, the timeline would be as below;



Blue highlight indicate the time window for enabled schedule

2. The duration tests are scheduled after functional test and the only restriction is upon start of a test for any emergency luminaire within the scheduled window. Now for instance take the same schedule and same group consider timeline below with assumption that the duration test on average takes 3 hours for each luminaire;



It is worth noting that

- The first sequence for functional test is done at random while sequence for duration test follows the same sequence.
- EM3 test was initiated within the window of schedule even though it took more time than the time window for the schedule.
- If a group of luminaires are unable to complete the test in a time window, they would take the next available time based upon the schedule. The schedule would show a brief summary which would include
    - *Last successful test run and next scheduled time for functional test*
    - *Last successful test run and next scheduled time to run for durational test.*

3. Now referring back to use case where the grouping on Floor 1 is indicated above the ideology behind a grouping methodology is such as;
    a. The testing is sequential i.e. making sure not all emergency luminaires (on a floor or in a collective space) go to test mode. Especially because the duration test depletes the battery inhibiting the battery to operate as intended in the emergency mode.
    b. The functional test are recommended to run once or twice a month
    c. The duration test is very time taking as depleting the battery to deep discharge point takes 3 hours but recharging a luminaire could take 20 to 21 hours i.e. a whole day. Hence the recommended frequency is once or twice a year.
    d. Considering all above a group is logically created in such a manner that not all the luminaire in a space would have emergency testing running concurrently on them.
    e. Different schedules can be created to run tests concurrently for different space topologies

4. It is highly recommended to avoid running concurrent test for all emergency luminaires as these would cause the luminaires to deplete the battery at the same time and thus wouldn't have enough illumination if there is emergency mode.

6.6.3. Extract / View Reports

The reporting menu acts as a tool which creates a summarized view of tests conducted on each luminaire. In order to understand reporting a few references are explained below;

Filters: are automatically available to filter reports based upon groups created. If there are no groups created the reports would have no filters. Selection of filters is done by clicking on a group or multiple groups by holding control key (or selection key based upon your local machine). Clicking on the same group name would clear that filter.

Floor Selection: The reports are viewable only for the selected floor and not across floor even though the groups are visible across floors in the filters. In order to view the correct reports, ensure the selection of relevant floors.

Time Frame: is another filter which would allow the selection of time window e.g. 01-01-2018 to 31-01-2018 would only show reports for the month of January.

Group: Name of the group the node belongs to against a test.

Date: Time, date & time zone, this is based upon the settings of a building. If this seems incorrect check the time zone settings for your building.

Test Type: Duration or Functional

Node (ID / Numbers): is an automatically generated ID for each individual node upon mapping. Each ID is visible once you hover mouse over any node to see the information and follows the prefix "Node # XXXXXXXX" where X represents automatically assigned number.

Report Status: is the status as reported by a schedule as a result of a test whether it fails, succeeds or gets cancelled etc. In order to view the exhaustive list, refer to portal user reference guide.

Message: is the outcome message of a luminaire e.g. the status may show that the result failed, however the message would indicate the reason of failure e.g. emergency lamp failure, status showing cancelled could have a message cancelled by user etc. In order to view the exhaustive list, refer to portal user reference guide.

Notes: is a way for users to input their personalized inputs against any result.

Node IDs displayed against each report can be clicked upon to visualize the exact node on the floor plan. This would automatically take a user to groups page with floor plan highlighting the node. The report(s) can be exported or printed directly upon clicking the print button available in top right corner of reports section. The exporting is done based upon the printing plugins installed on your web browser and localized machine settings.

6.6.4. Skipped Tests

If the tests are skipped the following mitigation is applied in general;

- Missed/skipped tests by the portal e.g. due to portal being down or upgraded are attempted as soon as possible
- They will be run immediately as long as the time window hasn't elapsed for the scheduled test
- If the time has elapsed and window is missed the test is automatically scheduled to run at next available time and this information is available in the schedule
- The test once scheduled if gets skipped for any reason would be scheduled automatically for next available time window on next scheduled day. No tests are missed or forgotten if not completed.

6.6.5. Transient Failures

Tests are reinitiated if they time out or are failed duration tests with no reason and the battery is not fully charged.

6.6.1. Disabling a Schedule

Disabling a schedule won't create any reports if the test hasn't already started/initiated. However, if the schedule is disabled half way then the reports tab may contain already reported status from test that has already run.

7. APPENDICES

7.1. GLOSSARY OF TERMS

Ambient Light Level: The light level reading of the ambient light sensor

Burn-in Mode: The life of fluorescent lamps is compromised if they are dimmed during the first 100 hours of their life. Organic Response Enabled fluorescent light fittings are shipped in burn-in mode, which means that the light fitting will operate only in on/off mode and will reject any dimming commands.

Configuration: Refers to the process of adjusting the more sophisticated features of the Organic Response system.

Daylight Dimming: Daylight Dimming allows each luminaire to dynamically respond to ambient light levels and reduce its own output to maintain the light level required by occupants. This ensures both optimal and consistent lighting conditions, as well as providing increased energy efficiency.

Default Settings (Factory Defaults): The configuration settings that Sensor Nodes are shipped with when they leave the factory. A full list of these default settings can be found in Appendix 6.2

Dimming: The process of decreasing or increasing the light output of an Organic Response Enabled luminaire

Dimming Level: The level of light output being delivered by the luminaire as a result of pressing the Dim +/- button

Dongle: An Organic Response infrared transmission device that plugs into the headphone jack of compatible iOS (Apple) and Android devices. Together with the Organic Response remote apps, the dongle turns the smart device into a simple remote-control tool that allows you to optimize or configure the Organic Response Sensor Nodes.

Dwell Time: The System Dwell Time refers to how long it takes for a light fitting to dim down to LowLight state after an area becomes vacant.

Firmware: The software that runs on the microprocessor on Sensor Node. Different versions of the firmware apply to different versions of the remote app, as well as the User Guide. The details of each firmware release is contained in the Release Notes for each firmware release, available at organicresponse.com.au.

Firmware Interrogate: The remote button that initiates the Sensor Node to display the firmware version in Morse Code on the dome LED of the Sensor Node.

Infrared Dongle: Infrared attachment that turns your iPhone/iPad/iPod into an infrared remote control that allows you to optimize your Organic Response Enabled lighting system

LinkedIn Forum: The online (LinkedIn) forum that all Organic Response remote app users join when they register to use the Organic Response remote app. The forum is a very useful community of Organic response users that share information and respond to queries about installing and using Organic Response

LowLight: The state an Organic Response Enable luminaire enters once there is no occupancy in the area, just prior to entering Standby state.

LowLight Time: The length of time that an Organic Response enabled luminaire remains in its LowLight state before dimming down and switching off completely.

Lumen Maintenance: similar to daylight dimming, but rather than compensating for natural light, it compensates for degradation in the output of the light source at a given dimming level. It is functionally the same process for the Sensor Node/light fixture

Luminaire Integration Test: When first powered, each Sensor Node will automatically run a short Luminaire Integration Test to ensure that it has been wired correctly into the luminaire. Once a luminaire has been continuously powered for 15 minutes, the Luminaire Integration Test is disabled indefinitely. The test procedure is as follows:

- Luminaire is powered on and outputs 100% brightness
- Confirm that luminaire then switches off entirely for 1 second before switching back on – relay is wired correctly
- Confirm that luminaire dims from 100% brightness to 10% brightness over 5 seconds – dimming line is wired correctly
- Sensor Node dome LED flashes to show the end of the test process

The luminaire will then resume normal operation at 100% brightness, entering Burn-In mode if enabled (default setting)

Maxlight: The MaxLight level caps the maximum level of light that a luminaire will emit. This is an important setting for maintaining both occupancy comfort and energy savings. Many luminaires emit much more light than is required for the area they service and the tasks being performed beneath them. By setting a luminaire's MaxLight value to the optimal level for its purpose, you will ensure the comfort of occupants, as well as contribute to significant energy savings.

Motion Sensor (PIR) Sensitivity: If a Sensor Node is mounted within proximity of a non-human motion sensor trigger (e.g. an air conditioning supply outlet), the system will potentially false trigger, reducing the energy efficiency. Using the PIR Sensitivity buttons in the Advanced menu on the remote, it is possible to set the PIR sensitivity to High, Medium or Low to reduce the possibility of a Sensor Node false triggering

Occupancy Information Cloud (OIC): The OIC comprises the infrared signals shared between Sensor Nodes that contain the occupancy information each Sensor Node is collecting and disseminating. It contains real time, location specific data relating to the closest occupant with respect to any given location.

Optimization: Although an Organic Response lighting system is completely plug and play, the behavior can be optimized to the requirements of the area that it is servicing

Personality: Each Sensor Node has the ability to adopt one of a range of pre-set "Personalities" which represent a particular lighting behavior relevant to specific areas, as presented in Appendix 6.4. The default Personality is Open Floor.

Personality: A setting of the Sensor Node that determines the dimming level for various distances from the closest occupants, as well as default values for the dwell timers

PIR: Passive Infrared. The motion sensor in the Sensor Node is a PIR sensor.

Relay: Rather than optimizing each luminaire separately, the Relay function on the remote control makes it possible to optimize a single luminaire (the "source" light fitting), and then have it relay those settings to all other luminaires. This saves time by immediately providing a fully operational starting point for all lights in an area. This allows you to eliminate the repetitive work of setting up identical parameters on each luminaire, and only spend time individually optimizing specific luminaires where required.

Remote App: The Organic Response app that turns your iPhone/iPad/iPod touch into an infrared remote control, in association with the infrared dongle.

Scene: A temporary mode that typically is to have light at preset levels and ignore occupancy. For example, a board room may require lights to be at a specific level for "projector mode", or a hospital may have a "night light" mode where lights are maintained at 10% to provide adequate light to move around without waking up patients with lights responding to occupancy.

Sensor Node: The Organic Response hardware that contains the sensors and Distributed Intelligence that forms the Occupancy Information Cloud (OIC.

Soft Start: A deliberate approach to powering lights up at lower levels following a power failure. The typical application is for those buildings which use generator backup when mains power fails; the soft start placing a lower and/or more evenly distributed load on the generator on start up.

Start Up Mode: The mode that lights will adopt when powering up after a power failure. The Start Up mode is determined by selecting an appropriate Scene which sets the light levels on startup (only following a power failure)

Stitching (zones): a feature to allow uni- (or bi-) directional transfer of information between different zones

Transmission Test: A test of the effectiveness/reliability of infrared communications between the Wall Switch and neighboring Sensor Nodes, or between Sensor Nodes.

Wall Switch: The Organic Response Wireless Wall Switch allows for manual control of Organic Response enabled luminaires. The Wall Switch is plug & play and will interact with Sensor Nodes using its default settings. The Wall Switch also allows for more sophisticated setup using the remote app.

Zones/Zoning: a feature that allows different areas within communications distance of each other to pass messages between each other.

4.1. MORSE CODE TABLE

The Interrogate Firmware remote command initiates the Sensor Node to flash the dome LED with the firmware version encoded in Morse Code. The following table is to assist with decoding it. The length of a dot is one unit. A dash is three units. Short gap between digits is three units.

DECIMAL NUMBER	MORSE CODE
1	.----
2	..---
3	...--
4	....-
5	.....
6	-....
7	--...
8	---..
9	---.
0	-----

4.2. FACTORY DEFAULTS SETTINGS

The following table contains all of the factory default settings for Organic Response Sensor Nodes

SYSTEM PARAMETER	SENSOR NODE DEFAULT	WALL SWITCH DEFAULT
Light Level --- Max	100.00%	
Light Level --- Min	0.00%	
Light Level --- Low	10.00%	
Dwell Time	10min	
Lowlight Time	10min	
Personality	Open Floor	
Daylight Dimming	Disabled	
Motion Sensitivity	High	
Burn In Mode	Disabled	
Zone	1	Un---zoned
Scene 0 dimming level	50%	
Automatic scene exit --- Scene 0	Exit on absence	
Scene 1 dimming level	10%	
Automatic scene exit --- Scene 1	Exit on absence	
Scene 2 dimming level	90%	
Automatic scene exit --- Scene 2	Exit on absence	
Scene 3 dimming level	70%	
Automatic scene exit --- Scene 3	Exit on absence	
Scene 4 dimming level	25%	
Automatic scene exit --- Scene 4	Exit on absence	
Scene 5 dimming level	100%	
Automatic scene exit --- Scene 5	Exit on absence	
Scene 6 dimming level	Maxlight	
Automatic scene exit --- Scene 6	Exit on absence	
Scene 7 dimming level (fixed)	0%	
Automatic scene exit --- Scene 7	Exit on absence	
IR Transmission Power	30%	30%
Startup Mode	ORES auto mode	

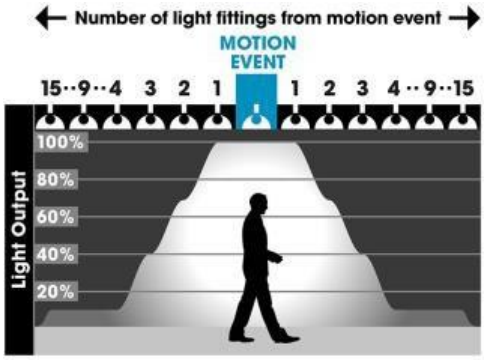
4.3. PERSONALITY TABLE

The following is a list of configurable Personalities for the system, highlighting both the Light Level Output of each level, and how long the system will dwell in that state.

		LIGHT LEVELS (%)										
PERSONALITY	DWELL TIME (Mins)	MOTION (MaxLight)	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	LEVEL 6+	0% FROM LEVEL	LOWLIGHT	STANDBY	LOWLIGHT TIME (MINS)
Open Floor	10	100%	100%	70%	40%	10%	10%	10%	16	10%	0%	10
Open Floor Saver	10	100%	100%	10%	10%	10%	10%	10%	11	10%	0%	10
Corridor	10	100%	90%	80%	80%	70%	70%	70%	11	10%	0%	10
Closed Office	15	100%	80%	10%	10%	0%	0%	0%	5	10%	0%	15
Amenities	15	100%	50%	10%	10%	10%	10%	10%	11	10%	0%	15
Store Room	10	100%	100%	80%	80%	0%	0%	0%	5	10%	0%	15
Breakout	15	100%	100%	50%	10%	10%	10%	10%	11	10%	0%	15
Super Saver	5	100%	100%	40%	10%	0%	0%	0%	5	10%	0%	2
Demo	10s	100%	60%	40%	10%	10%	10%	10%	11	10%	0%	5
All On Always	10	100%	100%	100%	100%	100%	100%	100%	Never off	100%	100%	10
100/50/0	10	100%	50%	0%	0%	0%	0%	0%	2	10%	0%	0
Ripples	10	100%	0%	100%	0%	100%	0%	0%	5	10%	0%	2
Wall Wash	10	100%	100%	100%	100%	100%	100%	100%	20	10%	0%	0
Motion Only	10	100%	0%	0%	0%	0%	0%	0%	1	10%	0%	10

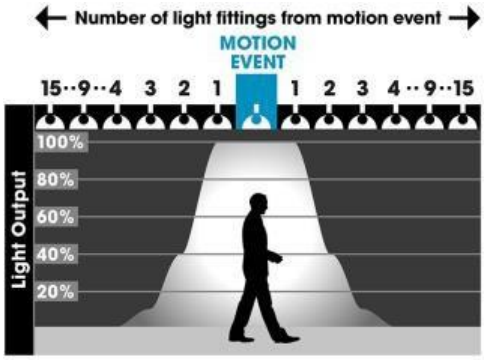
4.4. PERSONALITY PROFILES

OPEN FLOOR



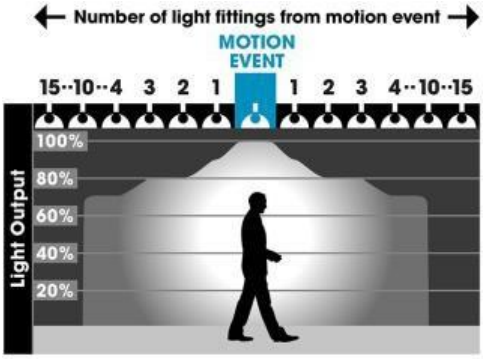
The factory default personality for all Sensor Nodes. Appropriate for general commercial office use, and suitable, if not ideal, across a range of building spaces.

SUPER SAVER



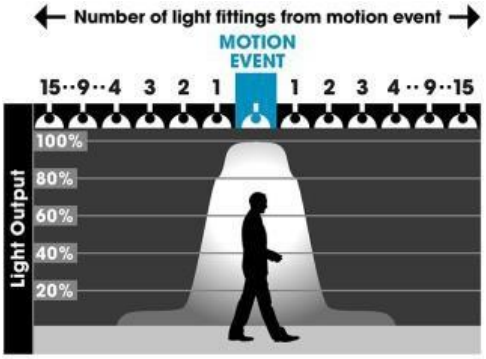
Reduces energy consumption further by having a slightly narrower cone of light around occupancy. Definitely worth trying in most office spaces.

CORRIDOR



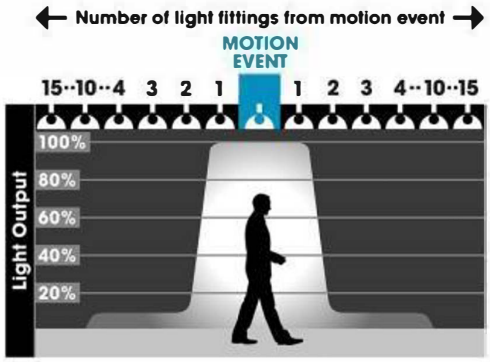
Developed for corridor spaces and other transition spaces. A wide throw of light is delivered when occupancy is detected – so the entire length of a corridor is lit up when someone enters the space. Additional energy savings in these spaces can be achieved by reducing Dwell Times.

CLOSED OFFICE



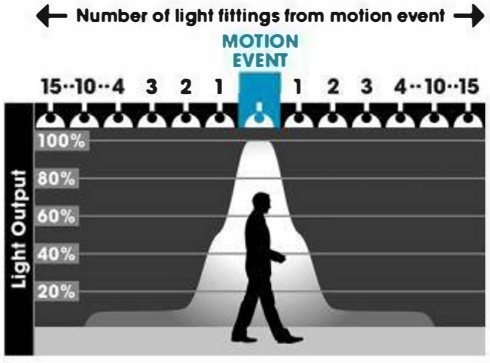
Suitable for enclosed offices, where the focus of light is often around a single occupant. IF the occupant experiences switch off due to lack of detected motion, then consider increasing Dwell Time to compensate.

OPEN FLOOR SAVER



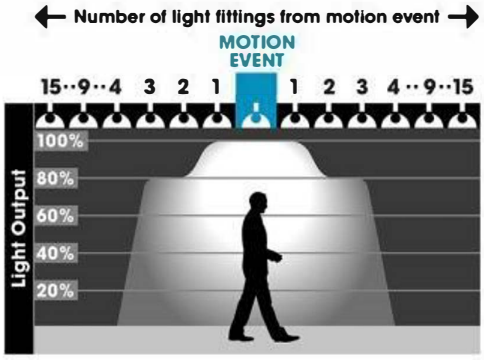
A more aggressive open office personality, with a much tighter cone of light around occupancy. Suitable for open planoffices with medium to high occupancy.

AMENITIES



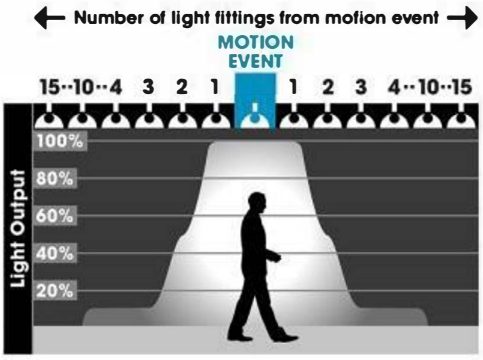
Suitable for bathrooms & toilets with low occupancy. Can be complemented by adjusted Dwell Times if required.

STORE ROOM



Appropriate for small storerooms, with low occupancy and short periods of occupancy. Additional energy savings can be achieved by reducing Dwell Times – especially if the average duration of a visit to the storeroom is very short.

BREAKOUT



Very similar to the Super Saver in profile, but with the lower light levels extending out to 11 lights away from motion. Suitable for "breakout" spaces (e.g. informal meeting areas) within a larger, open plan space.

organic response
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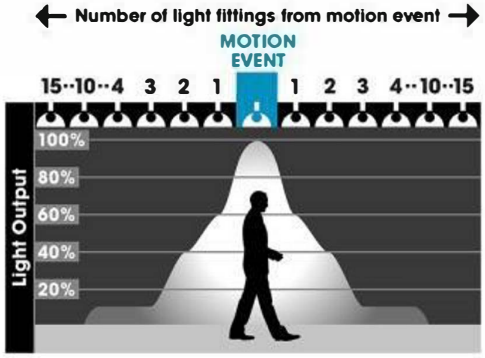
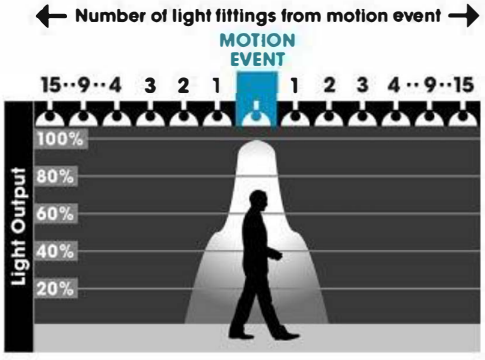
Whitecroft lighting

DEMO



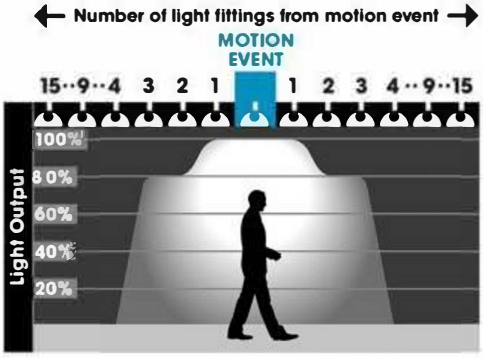
Typically used for demonstration purposes only as it comes with very short Dwell Times.

100/50/0



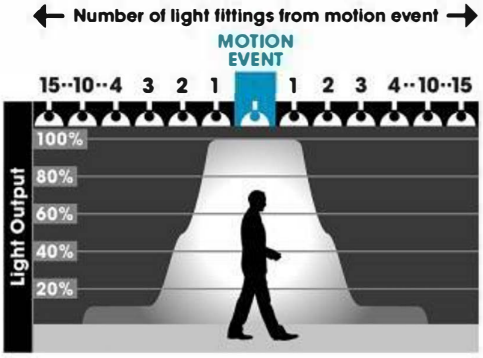
The second smallest cone of light possible, so can be used to push the boundaries of energy savings.

RIPPLES



Use this to trouble shoot the Occupancy Information Cloud, with a real time visualization of the distance of level signal propagation.

MOTION ONLY



Luminaires only respond to direct motion detection, so can be used for demonstration purposes.

WALLWASH

A luminaire in Wallwash mode is always on at 100% of its MaxLight level, irrespective of the level of occupancy message it receives. Useful for providing a constant source of reflected light of walls and other features.

ALL ON ALWAYS

If you ever needs the lights to stay on always and not respond to external inputs, then use this Personality. However, remember to turn off or de- activate when the last person leaves the office, otherwise they will burn all night.