LED iBOND

SMART LIGHT CONTROL

ELECTRICAL INSTALLATION & SYSTEM CONFIGURATION

TRACY & GRACY INDUSTRY with Smart Light Control
June 2024

This document provides general information for electrical configuration, installation, and programming of Smart Light Control system with LED iBond's Industry Lighting solution.

NOTICE:
ALL LOCAL BUILDING CODES AND REGULATIONS MUST BE FOLLOWED AT ALL TIMES WHEN INSTALLING THE SYSTEM AND LIGHTING SOLUTION.

1   Indhold

2   Introduction to Smart Light Control Solution

LED iBond's Smart Light Control solution is a simple but powerful self-contained plug-and-play solution requiring minimum configuration targeted smaller light installations or installations requiring only limited functionality.

LED iBond Technology platform	Basic Light Control — Simple Sensor Solution	Smart Light Control — Multi Sensor Solution	Advanced Light Management — Management Solution
Motion detection - On/off luminaire	●	●	●
Daylight Sensor (LUX level)	●	●	●
Grouping of light panels		●	●
Twilight functionality		●	●
Master/Slave configuration		●	●
DALI v2.0 support		●	●
Time scheduler mode			●
Advanced logic across zones			●
Multiple Scenarios support			●
Tablet and PC interface control (Wifi)			●
Battery Back-up (Emergency light)	○	○	○
PIR - Build into light panel	○		
	● Included		○ Optional

Figure 1 Overview of functionality of the SMART LIGHT CONTROL solution (compared to LED iBond's BASIC and ADVANCED solutions)

2.1   System components and overview

The system contains the following components:

- 1 Master unit controller with motion detector and daylight monitor.
- X slave units with motion detectors (Slaves units are optional).
- LED power supply(ies) with 2-wire DALI support interface.

Notice: Since the Master Unit controller contains the daylight monitor, pay attention to where this unit is installed to ensure best monitoring of the daylight.
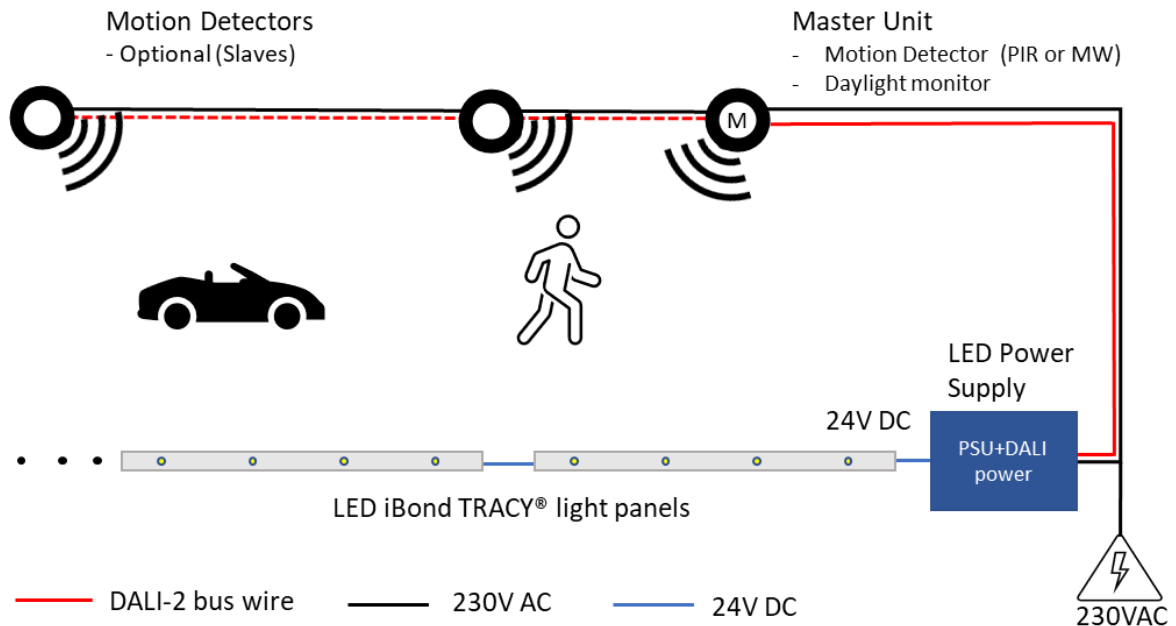
System overview:

Figure 2 System overview – SMART LIGHT CONTROL SOLUTION

The Slave units are powered through the 2-wire DALI bus (PIR). The Master Unit controller and Microwave Slave sensors (MW) requires 110/230V input and contains a power supply that provides 12V DC power to sensor. The Power supply unit contains a separate DALI bus power supply.

2.2   Functionality

The solution is based on an application master unit controller with build-in motion sensor and daylight monitoring function. As an option additional slave sensors can be connected to a single master controller to form a complete self-contained solution that can control a larger number of power supplies driving LED luminaires.

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Daylight monitoring function.

The master daylight sensor can tell the difference between natural light and artificial light from a lamp and will switch off the luminaires when ambient light is bright enough. When ambient light is below a target level, light is controlled by motion detection only.

By placing more optional motion sensors at various entries to a, e.g., parking facility or service station, it is possible to adjust the light dynamically following pedestrians or vehicles.

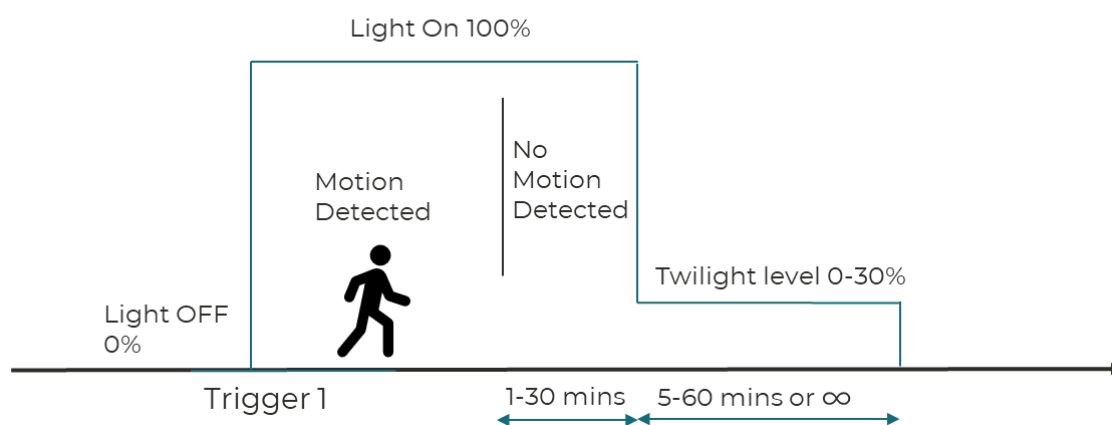**Night time operation: Natural light < 2-300 LUX**

Figure 3 Illustration of functionality of the SMART LIGHT CONTROL solution.

Motion detection

The motion sensors, by detecting the passage of people and vehicles, regulate the luminous flux by varying the intensity between two preset levels: a lower power level (twilight) and a higher power level, more suitable for the presence of people and traffic. Motion detection by any of the sensors in the solution, will trigger light to be turned on.

When motion is not detected anymore, the light will be dimmed to the lower twilight level for a period before light turns off completely.

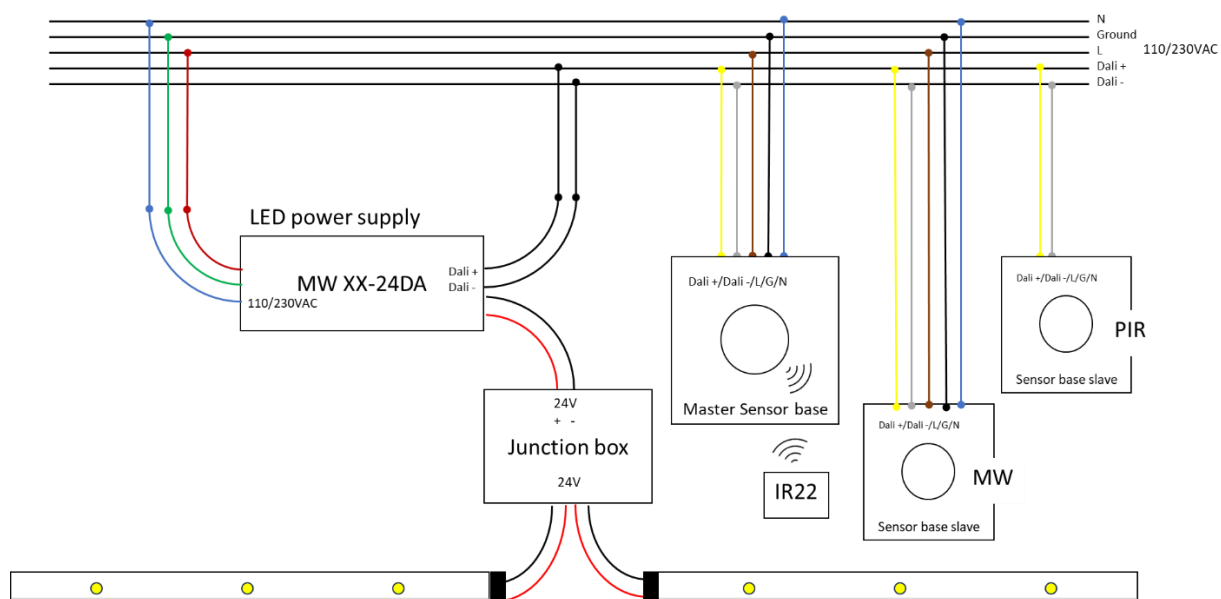# 3   Electrical Configuration

The diagrams below show the wiring configuration.

3.1   System with Master Sensor Unit only (No slave sensor units)
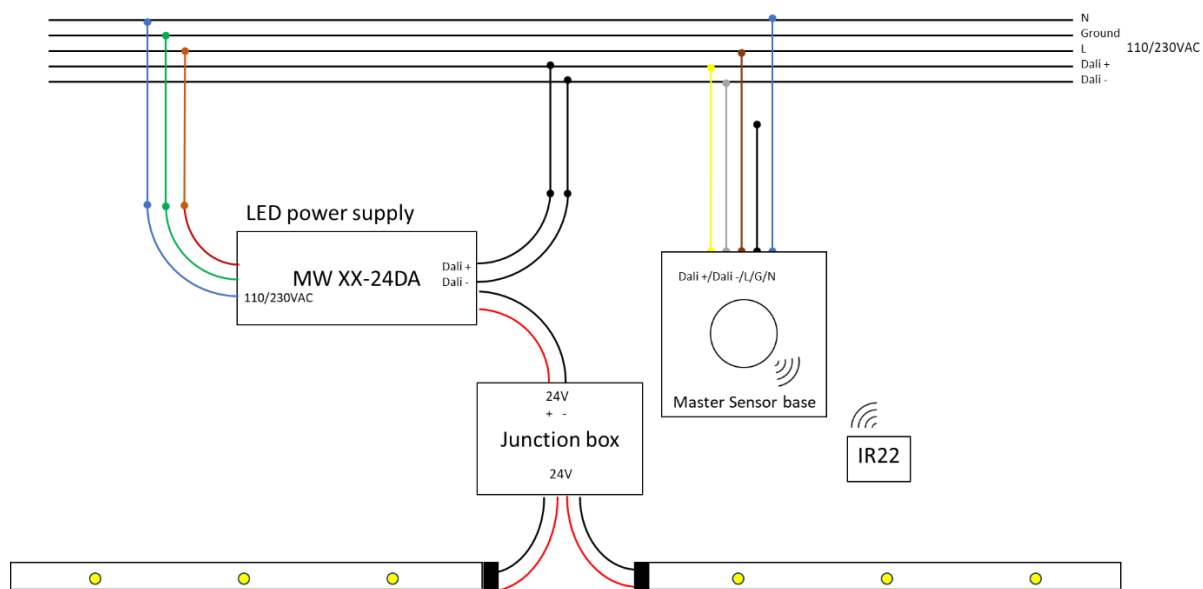
3.2   System with Master Unit only + Slave Units

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3.3   Recommended electrical configuration - Example

It is recommended to use a 5-wire cable for AC Power (N/Neutral, L/Hot, GND/Ground) and the 2-wire DALI bus as backbone for the network. Use this 5-wire cable to form a distribution network to connect the Master Unit controller, all Slave units, and the LED power supplies together in one network.   The devices can be connected in any order in the network.

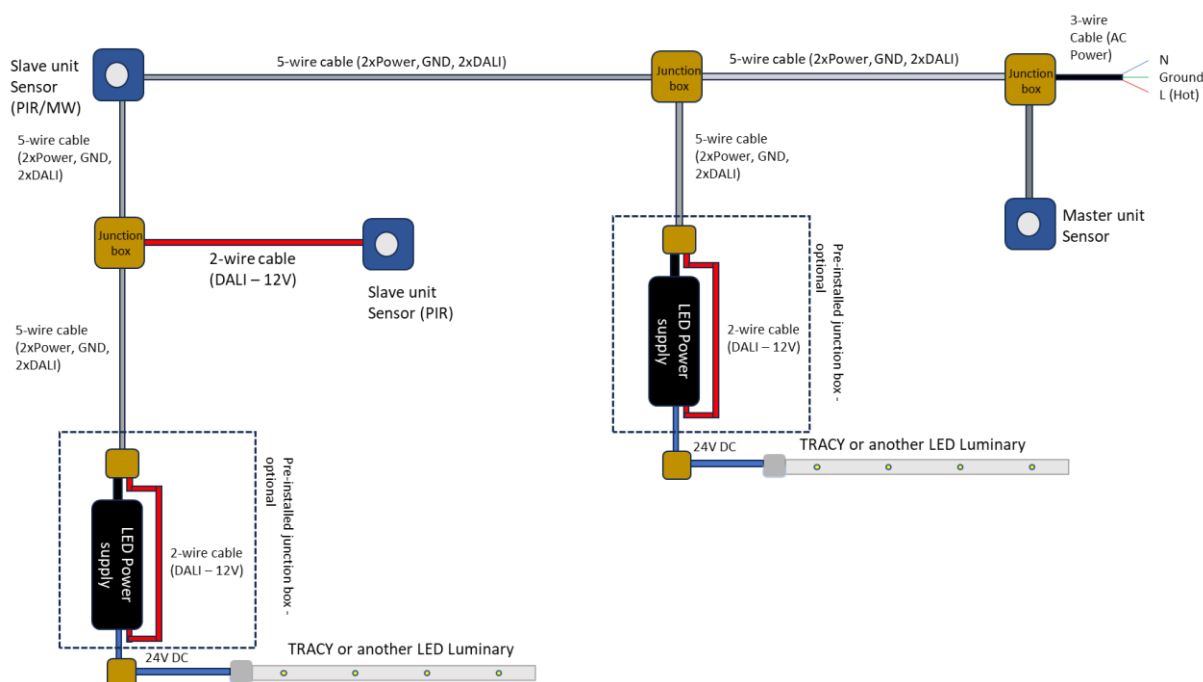Below is an illustration of a distribution cabling network (example only).

Figure 4 Illustration on ONE distribution network

The Slave units (PIR) need DALI bus only and no AC power (110/220 VAC) where as the Slave units (Microwave/MW) need AC power (110/220 VAC). The slave unit housing can be used as a junction box (feed through) for the 5-wire cable if desired as illustrated above.

NOTICE: *Check that local building codes and regulations allow the use of a 5-wire cable combining AC power (110/230 VAC) and low voltages DC power. If not allowed, the 5-wire cable needs to be replaced with a 3-wire cable for AC power and second cable with a 2-wire cable for the DALI DC bus.*

3.4   Pre-installed Mounting box with power supplies and DALI power

LED iBond offers pre-installed Mounting (junction) boxes containing power supply and DALI bus power supply. The 5-wire cable (N/Neutral, L/Hot,

GND/Ground and the 2-wire DALI bus) just need to be connected to all Mounting/junction boxes in the network. See illustration below:

5-wire cable
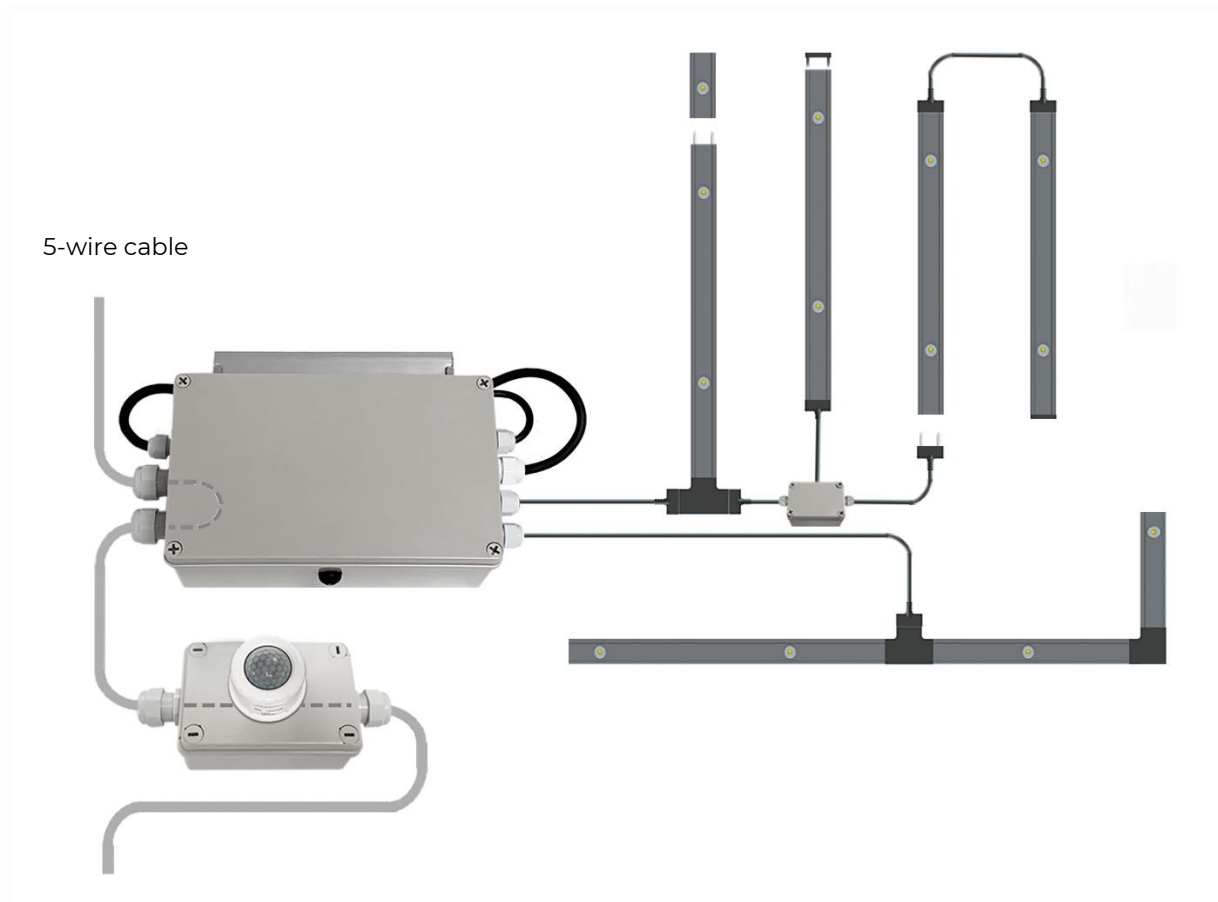
Figure 5 Configuration using pre-installed junction box with power supply for luminaries (TRACY)

The wiring diagram inside of the Mounting box (Junction box) containing Power supply and a DALI bus power supply is the following:
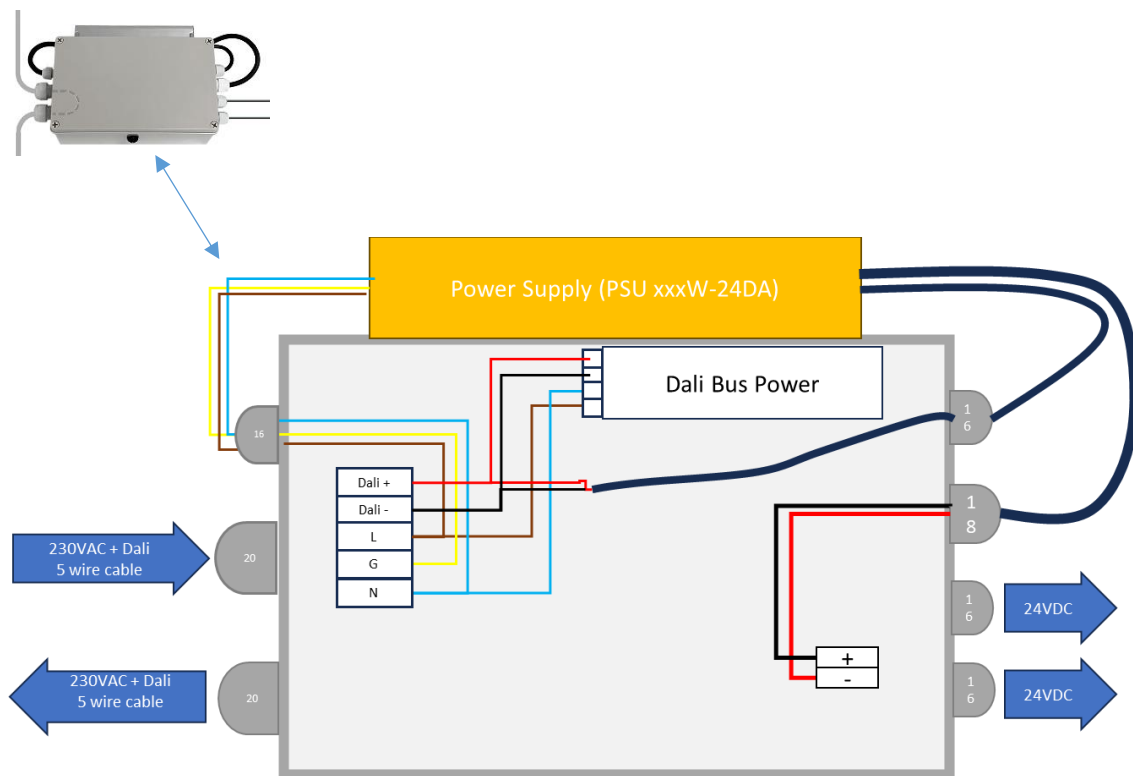
Figure 6 Mounting box for external driver with Dali bus power (Product art: 51595.02)

The wiring diagram inside of the Mounting box (Junction box) containing Power supply only but with support for DALI communication is the following:
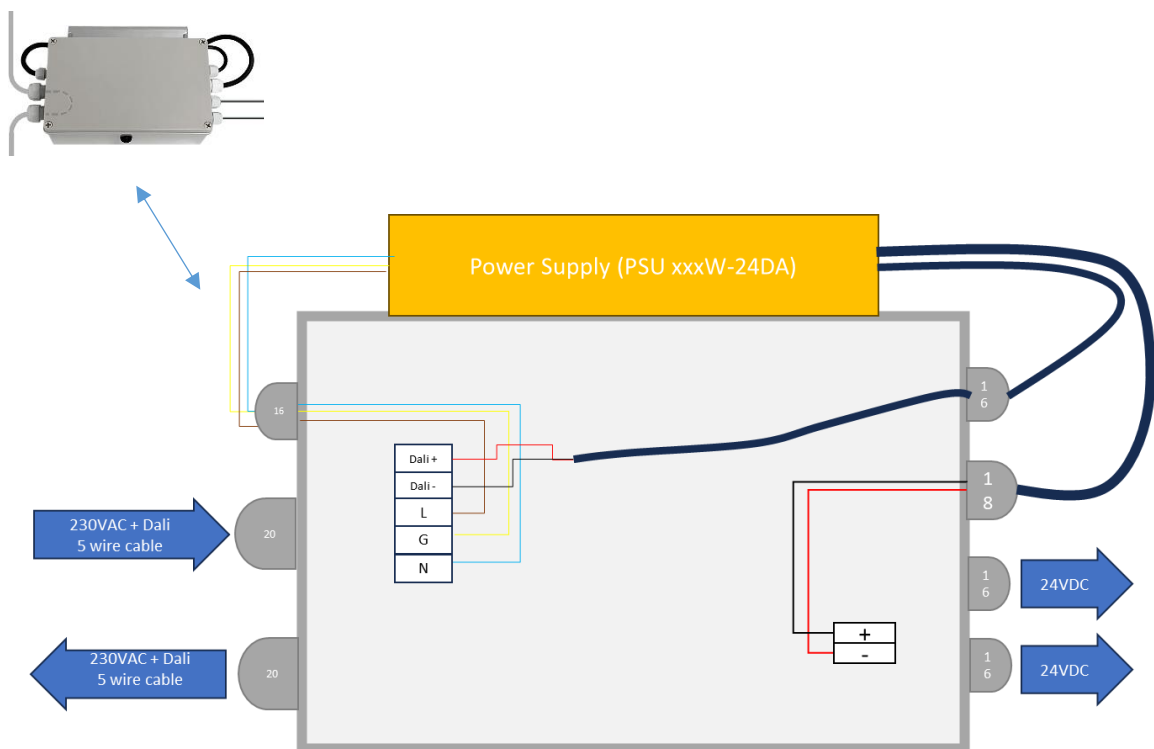
Figure 7 Mounting box for external driver only but with DALI support (Product art: 51595.01)

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3.5   Master unit controller – Mouting Box

The Master Unit controller and Slave units are mounted in housing that can be used as junction box for all the cabling.

Figure 8 Master/Slave units with housing (Junction box). Left: Ceiling mounting Right: Wall mounting.

Figure 9 Interior of Slave Unit PIR with DALI. Waga connectors for wiring 5G (in and out). Note: a 12V DC power supply is included for Master Units and Slave Units using MW sensors.

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3.6   Defining zones

One network (**Figure 4**) forms one zone; the Master Unit and all slave sensors in this one zone control all the luminaries connected to the DALI bus network. If more zones are desired, the DALI network needs to be split into more zones by splitting up the DALI network in more subnets.
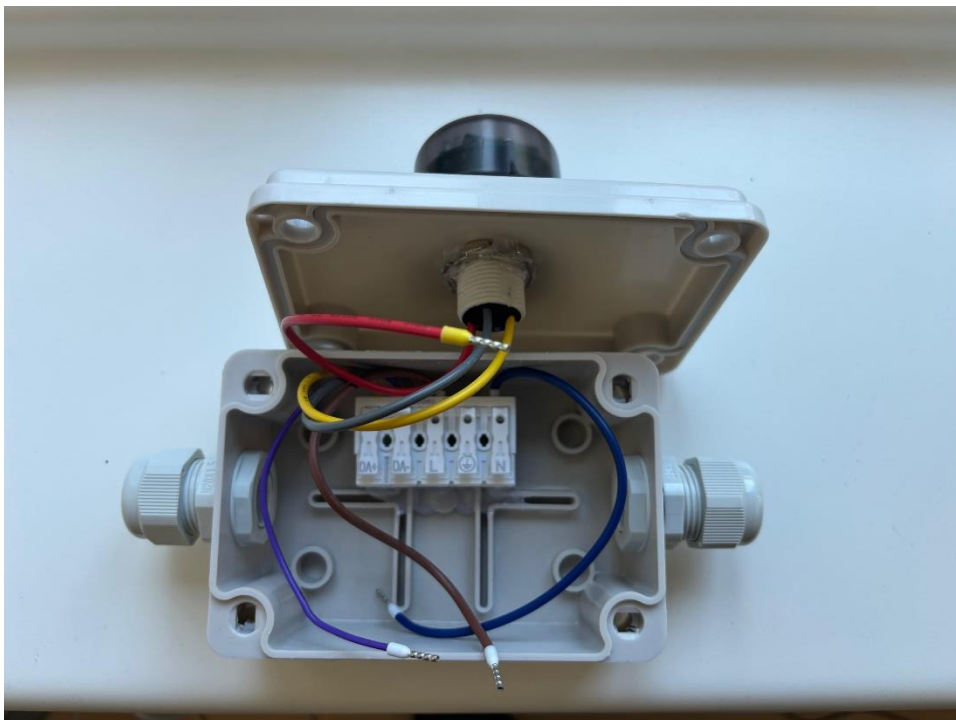
The zones are defined by the DALI network. Zones can share the same 110/230VAC network but not same DALI Network.

Example of a carport that is split into two zones:
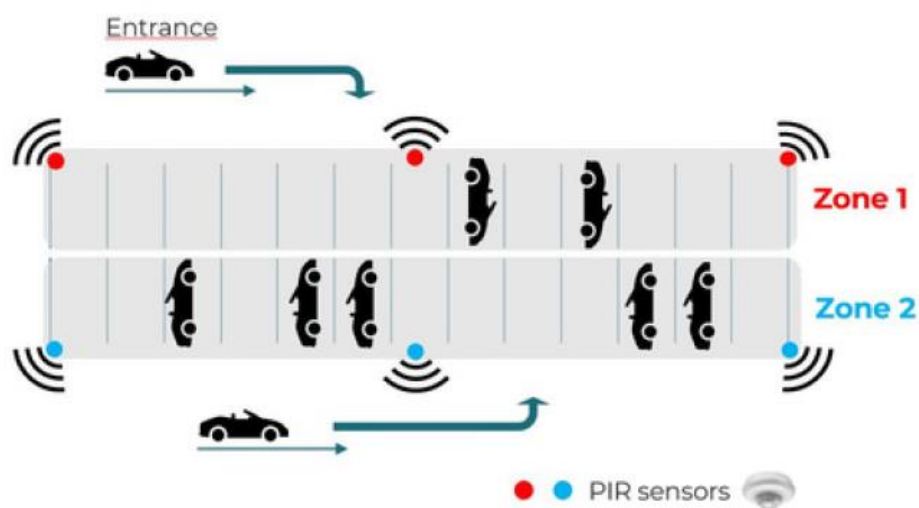
Figure 10 Example of two zones defined for a carport
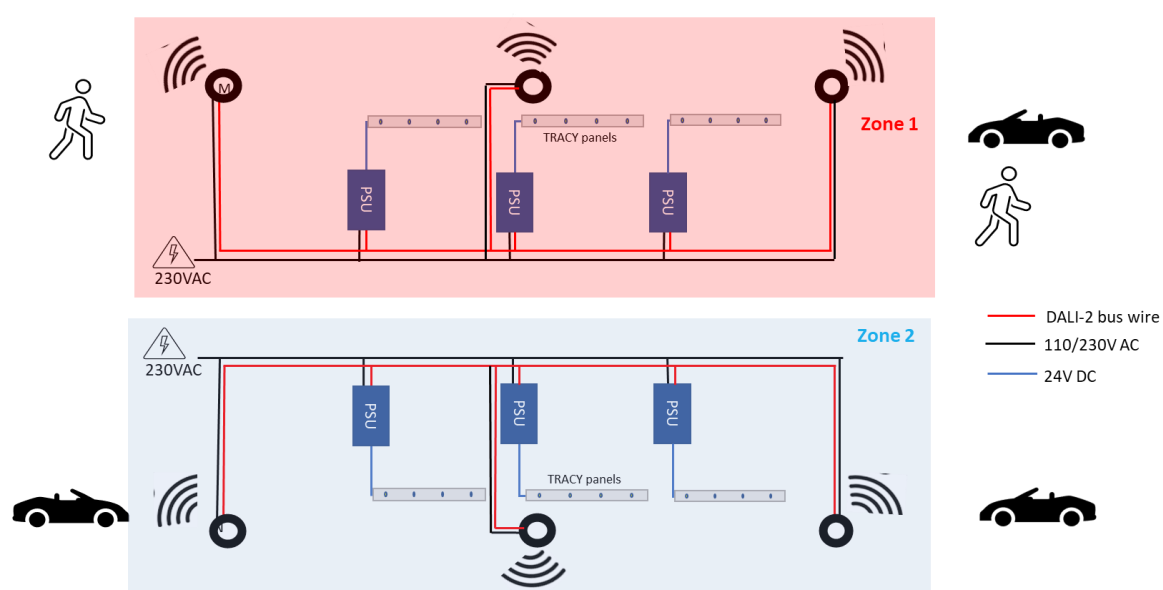
Figure 11 Electrical configuration of two zone solution of a carport – Example

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3.7   Defining zones – across larger areas (several carports)

In some cases, one zone may be defined across a larger area covering several carports or buildings. In such cases, it is important that the DALI bus network connects all power supplies and sensors in the desired zone and will require the that the DALI network cable is placed underground to connect the carports or buildings belonging to the specific zone

Figure 12 Zone 2 (Green color) is defined across two carport structures – A DALI network cable (2 wires) is required underground to complete the physical network and define the green zone.

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Figure 12 shows an example of a zone (green color) consisting of two carports. The dashed read line is the underground DALI cable. The result is that all light in the green zone 2 will turn on and off synchronously.

3.8   Limitation of DALI network

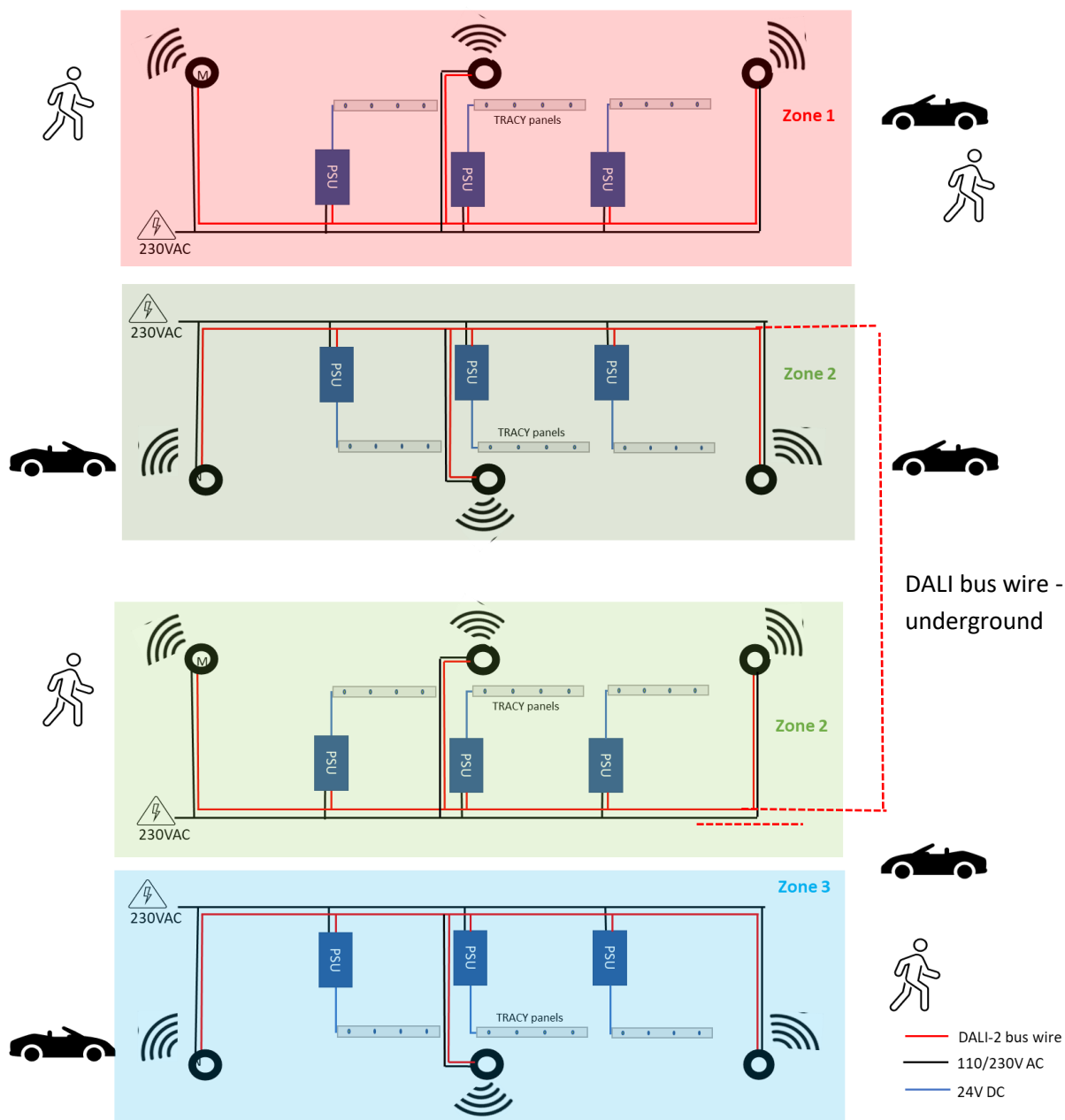The DALI network is formed with a standard 2 wires cable (typically 2x 1.5 mm2) without any shield.

The limitations of the DALI network are the following:

- Max length of 300 meters total of wire cabling (all power supplies and all sensors must be connected in one DALI network)

- Max 64 devices total on one DALI bus network (all power supplies + all sensors count as one device)

- DALI bus network cabling must connect all carports in ONE zone (cabling may go underground)

Recommendation is to keep zone smaller in terms of length of bus and number of devices (< 300 m and < 64 devices).

Notice: Compared to Smart Light Control for twhich the zones are defined by the physical DALI network, LED iBond's Advanced light management solution can combine many physical DALI zones (different DALI bus networks) into one logical zone. See separate description.

4   Detection pattern – Motion Sensors

There are two types of motion detectors: i) PIR and ii) Microwave.

NOTICE: The sensitivity for all slave units is by default set to 100%. It can not be change with the IR22 remote controller. Changing sensitivity for a slave requires DALI configuration software.

Changing sensitivity of a Master Unit controller can be done with the IR22 remote controller.

4.1   Detection - PIR sensor

The detection area depends on the height the sensor is mounted. Typically the detection area equals an circle with a diameter of two time the height; If the

sensor I mounted, e.g., 4 meters above the ground level, the detection area is a cirle with a diameter of 8 meters.

Detection pattern
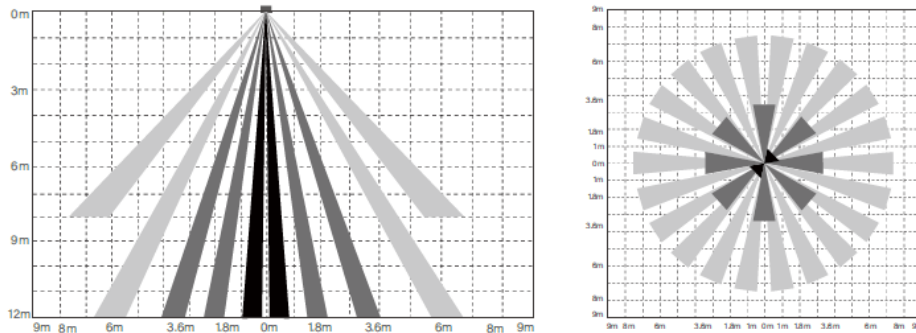
4.2   Detection - Microwave sensor

The detection area depends on the height the sensor is mounted. If mounted on ceiling, e.g., 4 meters above ground, the detection area equals an circle with a diameter of 15 meters. If wall mounted, the detection range may be up to 15-20 meters from the wall.

Detection pattern

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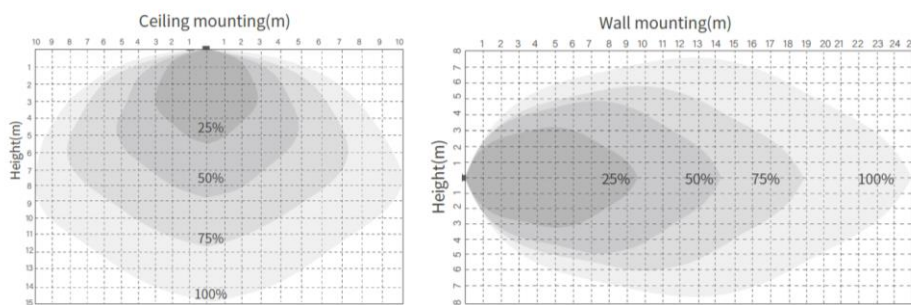
5 Programing the system with remote controller (IR22)

The Master unit controller must be programed and configured using a hand-held remote controller (IR22) that use wireless infra-red light for signaling.

Point the remote controller towards the Master unit control to program. The Master unit will respond with green light flashing when it receives data. Max distance between remote controller is ~5 meters.

NOTICE – important information:

- *It is only the Master Unit Controller that can be programmed. All Slave units are just motion detectors with a fixed sensitivity of 100%.*

- *Press the green "Auto" bottom on the remote control once programming is complete. This will store the latest configuration in the Master unit. The configuration is saved even if the Master unit controller is powered off (e.g., due to failure of electrical AC power).*

5.1 Remote Control IR22 - Overview

Remote control IR22 Instruction

Press "ON/OFF" button, fixture goes to permanent on or permanent off mode, sensor is disabled.
*press "Auto", "Reset" to quit this mode.

One-key memory commissioning

e.g.: setting 50% sensitivity,daylight sensor 100lux, hold time 30s, dim off 1h,dim level 10%,
Steps:
1. Long press "Start" button for 2s till green LED permanent on, then input "50%", "100lux", "30s", "1h", "10%", the green LED will flicker once to indicate the operation success.
2. Press "Memory" button to memorize all settings parameters. Green LED will flicker ONCE to indicate the operation success.
3. Press "Apply" button to copy the same settings to other sensors, point the remote control to the receiving sensor for min. 2s. Red LED will flicker to indicate the operation success, the receiving sensor

In this mode, when used for on/off control, after motion detected, sensor enters into a cycle of 3s on and 2s off.
In this mode, when used for tri-level dimming control, after motion detected, sensor enters into on 100% after motion detected.

Hold-time: the time period to keep the lamp on 100% after motion detected.
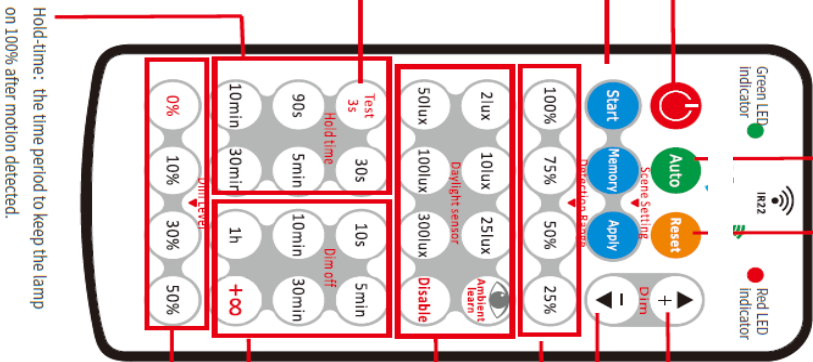
Press the button, the sensor starts to work and all settings remain the same as the latest status before the light was switched on/off.

Green LED indicator

Red LED indicator

Press "Reset" button, all settings go back to factory default settings.

*Factory default settings--
Sensitivity-100%
Daylight sensor-disable
Hold time-90s
Twilight time-5min
Twilight level-10%

Press "Power Dim +" button to dim up the power step by step 20%-40%-60%-80%-100%.

5 levels adjustable.

Press "Power Dim -" button to dim down the power step by step 100%-80%-60%-40%-20%.

Sensitivity - different level for detection range, 25% is smallest, 100% is biggest detection range (12m mounting height, 16-18m in diameter)

Choose the desired daylight sensor threshold, e.g.100lux, dim off time 10s: (1) surrounding brightness >100lux, when the light is off, even though movement, the light is still off; (2) surrounding brightness <100lux, when movement, the light will be on 100%; Press "Disable" button, the daylight sensor will be disabled, the motion sensor will work always, even in daytime.

Ambient learn   Press "Ambient learn" button, the latest surrounding luxvalue overwrites previous lux value learned, and set as the daylight threshold. This feature enables the fixture to function well in any real application circumstance.

Choose the desired dim off time. If choose + ∞, the light will not be turned off, and will keep dimming based on dim level.

Choose the desired dim level, if you choose 0%, the sensor will be only on/off sensor, only on / off function.

Note:
The lamp flickers once when sensor successfully receives RC signal after pressing any buttons except for "APPLY".

When "twilight level" set at 0%, it becomes ON/OFF control.

Remote control buttons: Start, Memory, Apply, Auto, Reset, Scene Setting, Detection Range, Dim (+/−), IR22

- Power dim levels: 100%, 75%, 50%, 25%
- Daylight sensor: 2lux, 10lux, 50lux, 100lux, 300lux, 25lux, Disable, Ambient learn
- Hold time: Test 3s, 30s, 90s, 5min, 10min, 30min
- Dim off: 10s, 5min, 1h, 30s, 30min, 10min, +∞
- Dim level: 0%, 10%, 30%, 50%

5.2   Programming procedure

Remote control

IR22

Model: IR22

Settings

⏻ **Permanent ON/OFF function**

Press "ON/OFF" button, fixture goes to permanent on
or permanent off mode, sensor is disabled.
• Press "Auto", "Reset" or "Ambient learn" to quit
  this mode.

Auto **Sensor mode**

Press "Auto" button, the sensor starts to work and all
settings remain the same as the latest status before the
light was switched on/off.

Reset **Reset function**

Press "Reset" button, all settings go back to factory
defaulted settings.

* Factory defaulted settings: Sensitivity=100%
                                       Daylight sensor=disable
                                       Hold-time=90s
                                       Twilight time=5min
                                       Twilight level=10%

Start **Memory** **Apply** **One-key commissioning**

Start **Start**

Step 1 Long press "Start" button for 2s till green LED permanent
on, then input all desired settings by pressing the buttons
in each function zone, the green LED will flicker once to
indicate the operation success.

    * The whole settings input process has to be completed
    within 10s, otherwise, re-operation of step 1 is needed.

Memory **Memory**

Step 2 Press "Memory" button to memorize all settings
parameters.
Green LED will flicker ONCE to indicate the operation
success.

Note:
The lamp flickers once when sensor
successfully receives RC signal after
pressing any buttons except for "APPLY".

When "twilight level" set at 0%, it
becomes ON/OFF control.

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Apply

Step 3 Press "Apply" button to copy the same settings to other sensors, point the remote control to the receiving sensor for min. 2s. Red LED will flicker to indicate the operation success, the receiving sensor will buzz also to indicate success receival.

e.g. setting detection range 50%, daylight threshold 200lux, hold-time 30s, dim off 1h, dim level 10%, the steps should be:

1. Press "start" button for 2s, choose "50%", "200lux", "30s", "1h", "10%" function zone button.
2. Press "memory" button.
3. Press "apply" to other sensors, then all of them will share the same settings.

Dim+/-

Press "Dim+" button to dim up the power step by step 20%-40%-60%-80%-100%. Press "Dim-" button to dim down the power step by step 100%-80%-60%-40%-20%.

Disable

Press "Disable" button, the daylight sensor will be disabled, the motion sensor will work always, even in daytime.

Test mode

"Test mode" is for testing purpose only, for users to check the functionality and choose the desired detection range. The sensor goes to test mode automatically after pressing this button.

Users can quit this mode by pressing "ON/OFF", "Reset", or any button of "Hold-time". The sensor settings are changed accordingly.

* Test mode defaulted settings: Daylight sensor=disable
Hold-time=3s
Twilight time=N/A
Twilight level=N/A

In this mode, after motion detected, sensor enters into a cycle of 3s on and 2s off (0.5s soft off + 1.5s off).

Ambient learn

Press "Ambient learn" button, the latest surrounding lux value overwrites previous lux value learned, and set as the daylight threshold. This feature enables the fixture to function well in any real application circumstance.