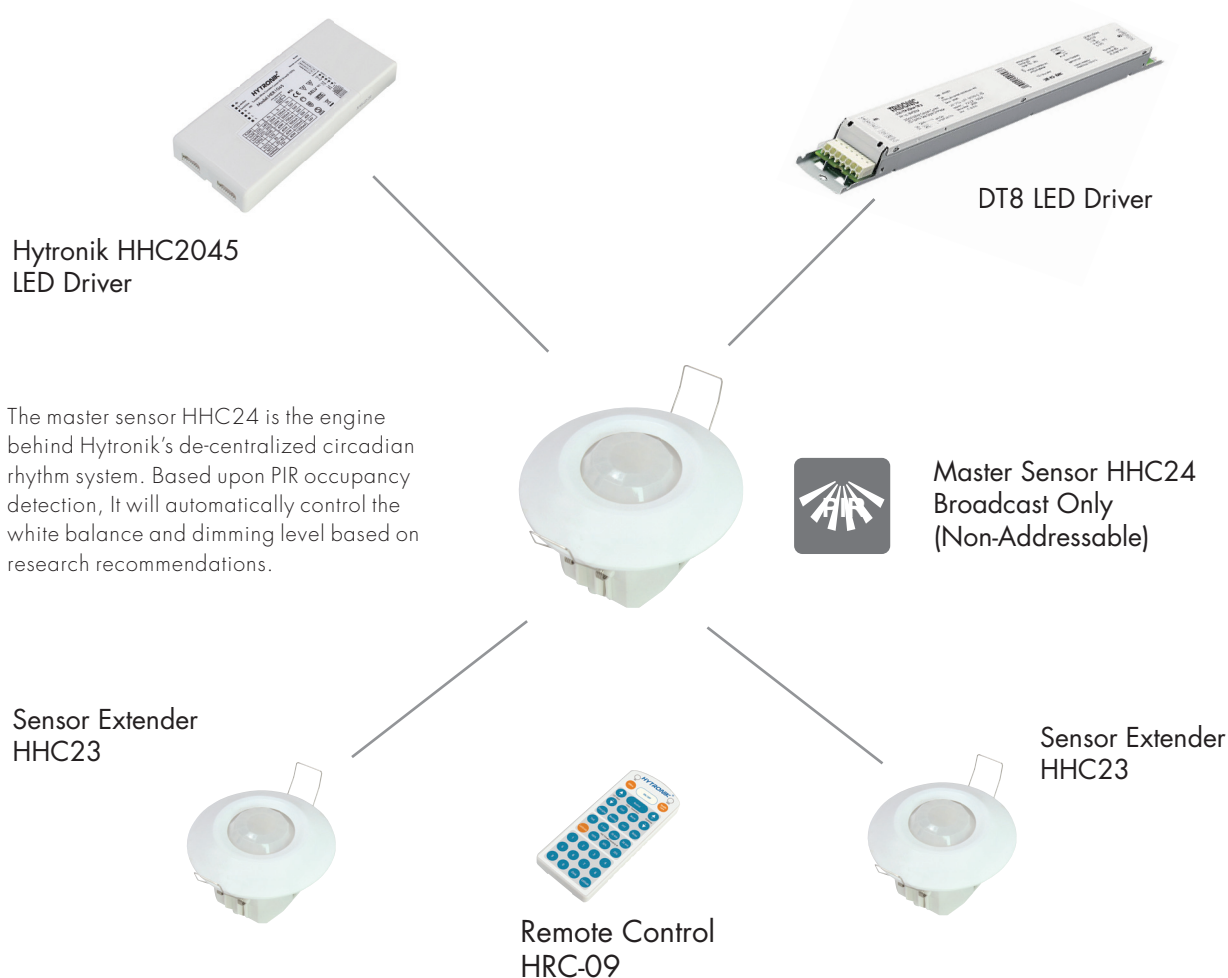


**HHC24 HHC23 HHC2045**

Circadian Rhythm sensor with Tunable white LED driver

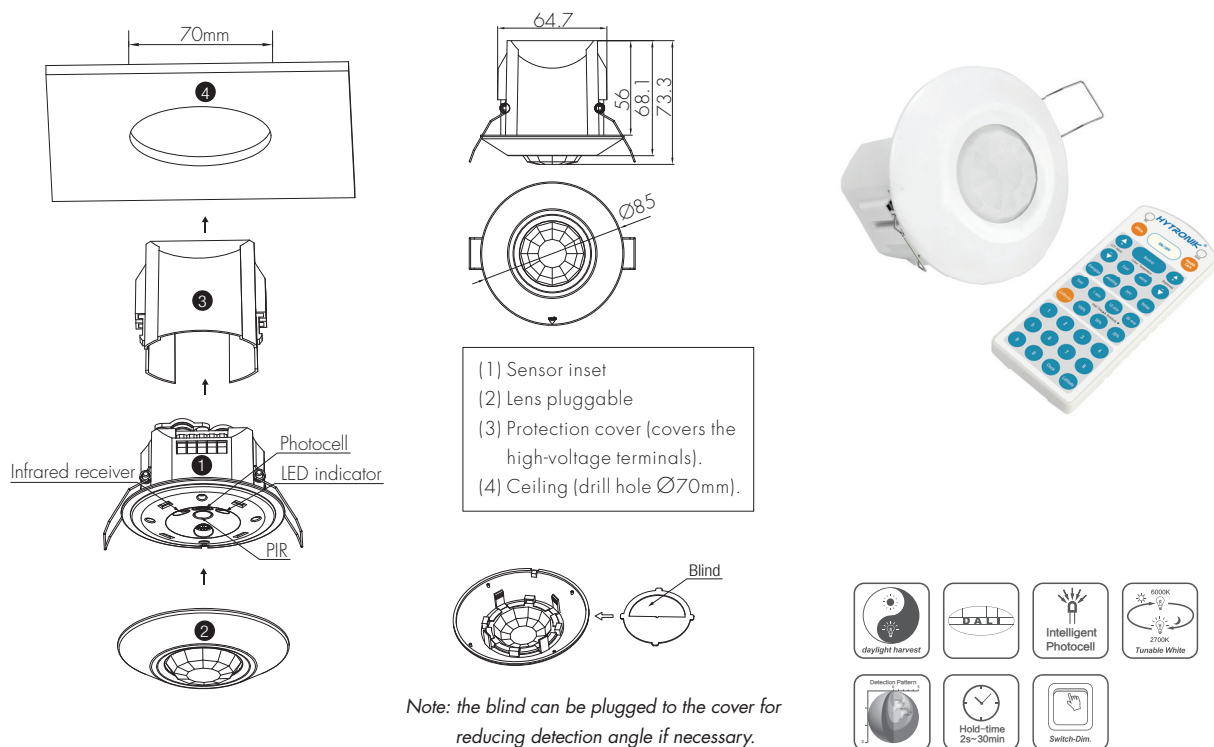
Lighting can reduce energy bills, it also can boost productivity and promote the wellbeing of humans in artificially lit environment. Hytronik has added to its de-centralised tunable white LED driver range with a new concept of time keeping for the most cost effective Circadian Rhythm Lighting.

Different from other complex lighting systems, Hytronik circadian rhythm system offers a simple de-centralized human centric lighting solution for offices, schools and hospitals with the tunable white feature. Comprised of just one master sensor HHC24, remote control handset HRC-09 and optional occupancy DALI sensor HHC23, the system allows great flexibility and high specification in an easy installation and commission package.

**How does this de-centralized system work?**

System Capacity	Component	DT8 Driver = 2mA	HHC23 Extender = 8mA
HHC24 Includes 80mA max. DALI PSU	Max. No of DT8 Drivers	40	0
	Max. No. of HHC23 Extender	4	9

## Mechanical Structure



## Technical Data

### Input Characteristics

Model No.	HHC24
Operating voltage	220~240VAC 50/60Hz
Stand-by power	<1W
Switched power	Max. 40pcs devices, 80mA
Warming-up	30s

### Safety and EMC

EMC standard (EMC)	EN55015, EN61000
Safety standard (LVD)	EN60669, AS/NZS60669
Certification	Semko, CB, CE, EMC, RED, SAA

### Sensor Data

Model No.	HHC24
Sensor principle	PIR detection
Detection range	(Ø x H) 10m x 3m
Detection angle	360°
Mounting height	5m (maximum)

### Environment

Operation temperature	Ta: -20°C ~ +50°C
IP rating	IP20

CE emc RED SAA CB IP20

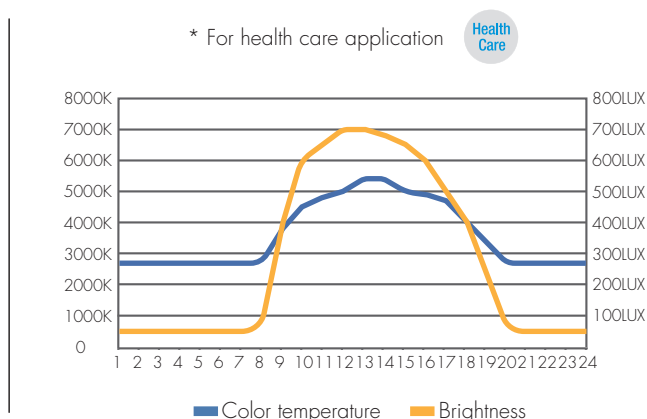
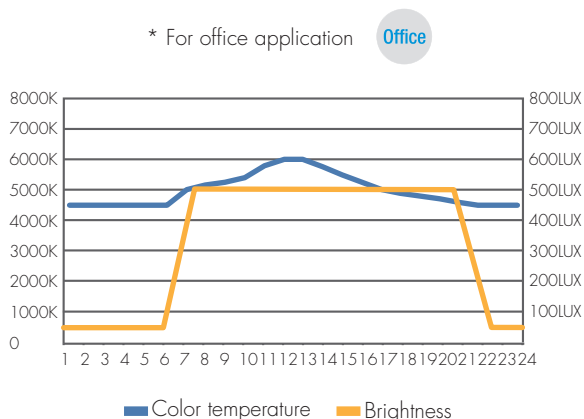
## 1 Circadian Rhythm Lighting

With geographic regional adjustments for latitude and automatic seasonal adjustment, the controlled light output can enhance a user's day-to-day mood, wellbeing, productivity and attention levels. The user can select the biodynamic lighting curve with pre-programmed color (CCT) and brightness (LUX) control which automatically change according to the time of the day.

### Circadian Rhythm Profiles:

A total of 9 profiles are available for selection; 1 for office application and 8 for health care purposes.

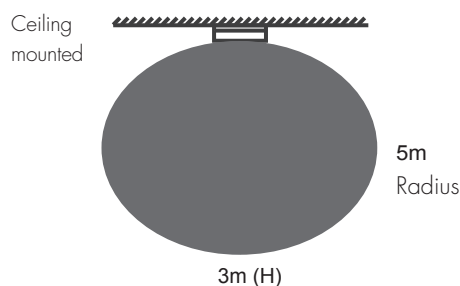
\* Default profile controls for Color Control (CCT) and brightness (LUX) Control



Cool white LED (channel 1): 2700K; Warm white LED (channel 2): 6500K

## 2 Occupancy Detection

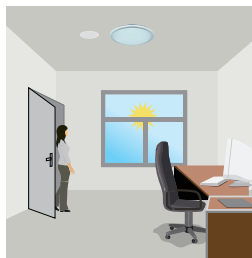
As a further energy saving opportunity, the PIR sensor will turn off the light in any unoccupied spaces after hold time, and automatically resume the algorithm when the space becomes occupied.



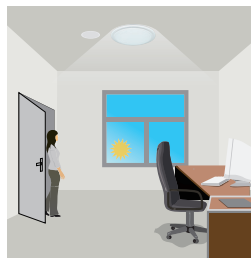
## 3 Daylight Harvest and Lux Off Function

The built-in photocell performs the function of reading the natural daylight, and maintaining the lux level by calculating how much artificial light is needed according to the target lux level required by the profile selected.

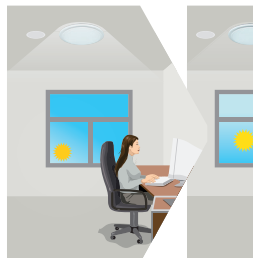
### Office Application



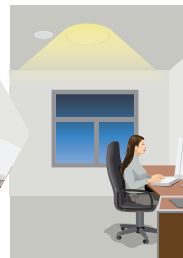
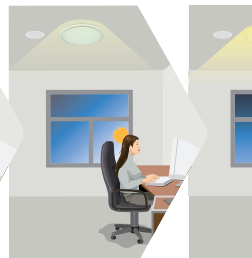
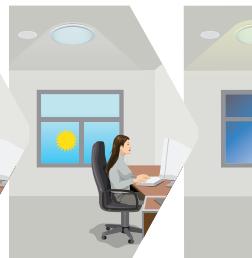
Light will not switch on when natural light is sufficient, even there is motion detected.



The light switches on automatically with presence when natural light is insufficient.



The light turns on at full or dims to maintain the lux level. The light output regulates according to the level of natural light available.



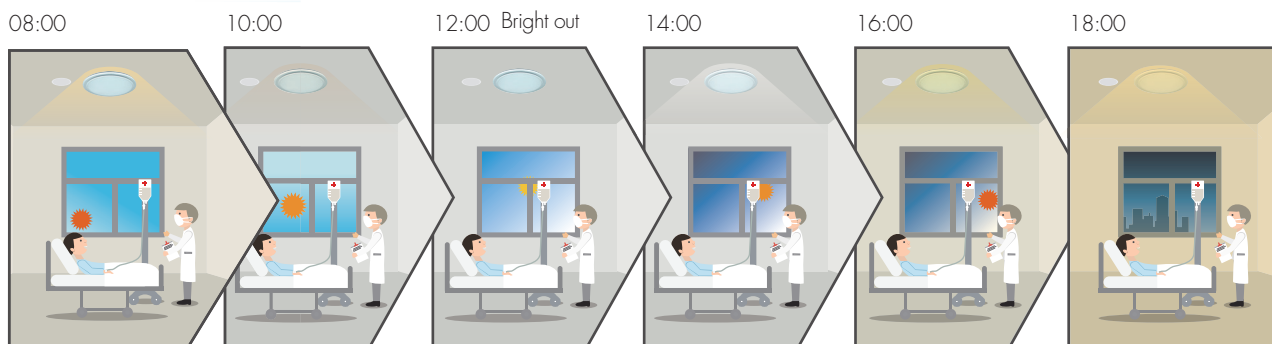


The light dims down and eventually turns off when the ambient natural light is sufficient.



The light switches off completely after hold-time.

### Health Care Application



#### 4 Manual Override (Push Function)

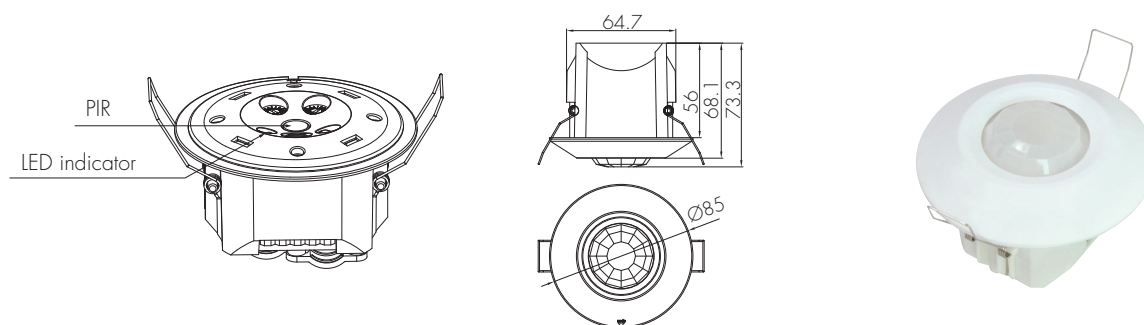
Two push terminals (P1, P2) are available on the control unit for end-users to switch on/off or change the light brightness and colour temperature temporarily.

\* Long push on P1: light brightness adjustment; Short push (<1s) on P1: on/off function

\* Long push on P2: CCT adjustment; Short push (<1s) on P2: resume circadian rhythm mode and back to the profile selected.

## Part 2: DALI Sensor Extender HHC23

End-user can add one or more occupancy DALI sensor HHC23 into the group, for extending the detection zone purpose. Any of the slave unit HHC23 can trigger the master unit HHC24 and turn all the lights in the group on.




## Part 3: Remote Control HRC-09

By using remote handset HRC-09, the user may manually adjust the regulation of color or brightness of the curves to suit individual comfort requirements. Further adjustments are available to shift the timing of the curve to match the working practice of the environment.



### Circadian Rhythm Set-up

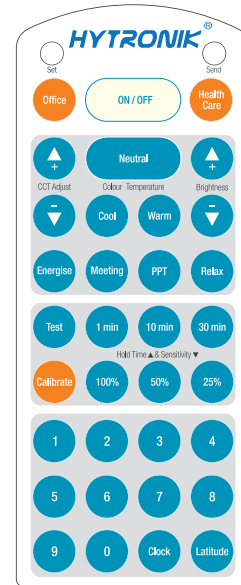
#### 1. Time and Date

Circadian rhythm mode requires the remote control HRC-09 to first be programmed with the time and date. This can be done by following the procedure below:

Press and hold the  button until the "Set" LED in the top left corner starts to flash (approximately 2 seconds) to indicate clock setting mode. The settings should be made in the strict following order:


- Enter the 4 figure year using the numbers 0-9: YYYY (e.g. 2016)
- Enter the 2 figure month: MM (e.g. 09 for September)
- Enter the 2 figure date: DD (e.g. 06 for the 6th)
- Enter the 2 figure hour in 24 hour time format : HH (e.g. 08 for 8 am)
- Enter the 2 figures for minutes: mm (e.g. 05)

After the 12 digits have been entered in the correct sequence, press  button to store the settings. The "send" LED at the top right of the remote will flash 5 times to indicate a valid entry. If the entry was not valid and the 5 send LED flashes are not seen, the procedure will need to be repeated. If a programming mistake is made anytime during the sequence, press  once to cancel the programming mode and re-start from the beginning of the procedure.




HRC-09

#### 2. Latitude adjustment (for Health care mode only)

To allow for regional variations / automatic seasonal adjustment, the latitude of the installation may be set. The default setting is 01 (0° Equator). Press and hold the  button until the "Set" LED in the top left corner starts to flash (approximately 2 seconds) to indicate city setting mode.


Enter the 2 figure number as per the table below:

No.	Latitude	Summer Time	Winter Time
01	0° Equator	06:00 ~ 18:00 (12 Hours)	06:30 ~ 18:00 (11.5 Hours)
02	15° North	06:00 ~ 18:30 (12.5 Hours)	08:00 ~ 18:30 (10.5 Hours)
03	30° North	06:30 ~ 19:30 (13 Hours)	08:00 ~ 18:00 (10 Hours)
04	45° North	06:00 ~ 19:30 (13.5 Hours)	08:00 ~ 17:30 (9.5 Hours)
05	60° North	05:30 ~ 19:30 (14 Hours)	08:00 ~ 17:00 (9 Hours)
06	15° South	07:00 ~ 19:30 (12.5 Hours)	08:00 ~ 18:30 (10.5 Hours)
07	30° South	06:30 ~ 19:30 (13 Hours)	08:00 ~ 18:00 (10 Hours)
08	45° South	06:00 ~ 19:30 (13.5 Hours)	08:00 ~ 17:30 (9.5 Hours)

Press  button to store the setting. The "send" LED at the top right of the remote will flash 5 times to indicate a valid entry. If the entry was not valid and the 5 send LED flashes are not seen, the procedure will need to be repeated.

*The remote is now programmed and should be handed to the responsible person of the installation when commissioning is completed.*




### Circadian Rhythm Sensor HHC24 Calibration





Each HHC24 on the installation now needs to upload the time and date also latitude settings from the remote control handset HRC-09. This is simply performed by pressing the calibrate  button at each HHC24 receiver point. The remote control is directional and confirmation of the upload is given by an audible beep.

*Note: If the supply to the HHC24 is interrupted, it will need to be re-calibrated via the remote control handset as per the above procedure.*



## Sensor Settings (Hold-time and Sensitivity)

HHC24 includes a HF occupancy sensor, which can be set for hold time (the time period the lights are required to be on after the last person has left the room) and detection range. This time period may be adjusted by selecting any one of the “  ” buttons as required.

Please note microwave occupancy detectors can ‘see’ through glass, plastic and plasterboard, so attention must be given to the correct settings of the sensitivity to avoid nuisance triggering. To assist with commissioning, a 2 second test mode has been provided to avoid unnecessary waiting time. This mode is accessed by pressing the “” button. The sensitivity is then adjusted by using the “  ” buttons.

The lights may be turned off manually at any time by pressing the “” button. Please note the occupancy detector is disabled when the off button is pressed. Pressing the “” button again will resume fully automatic operation with the occupancy sensor enabled.





## Office and Health Care Circadian Rhythm Mode

Short press “” or “” button to select office circadian rhythm profile or health care circadian rhythm profile.



## Circadian Rhythm & Manual Adjustments

In circadian rhythm operation, the light brightness and color temperature will automatically change according to the selected office or health care profile. The sensor will turn off the light in any unoccupied spaces, and automatically resume the above algorithm when motion is detected.





Manual adjustment of the profile is possible to suit individual lighting needs. Press and hold the “” “” buttons to change the light brightness and color temperature. The adjustments are saved and circadian rhythm profile is changed accordingly.

*Notes: If the circadian rhythm curve is changed via manual adjustment, press “” or “” more than 3 seconds to go back to the default settings at any time.*







## Scene Selection - Human Centric Lighting (non-circadian rhythm mode)

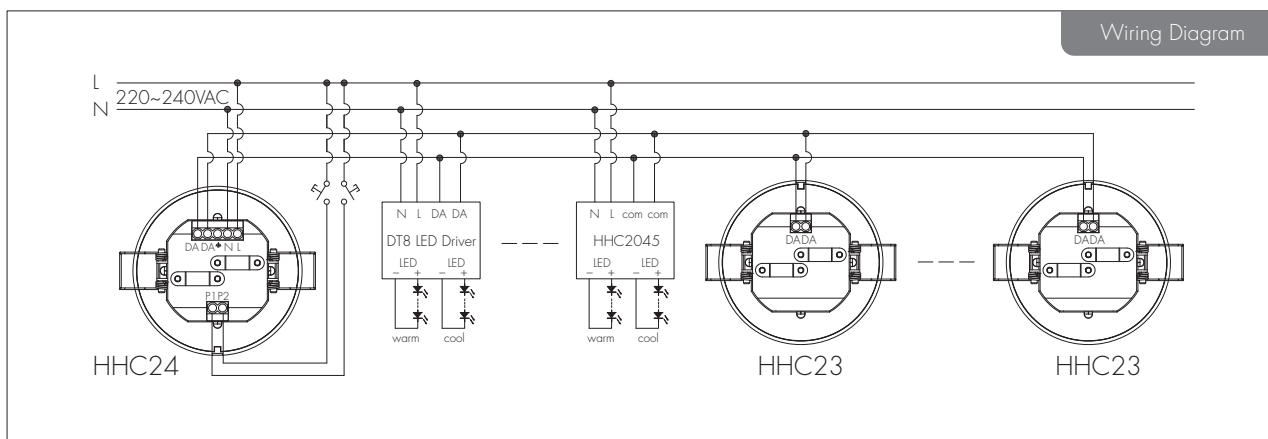
Each point may take commands from the remote control to suit an individual's lighting needs from any of the one-touch mood lighting pre-sets, in which the light brightness and color temperature is pre-defined. In these scene modes, the circadian rhythm profiles and photocell functions are disabled, however the occupancy sensor remains active.

Manual adjustment of the scene is possible to suit individual lighting needs. Press and hold the “” brightness “” buttons to change the light brightness, and the “” CCT Adjust “” to adjust color temperature. Any manual adjustment of a scene can be stored in the remote controller HRC-09 by a long press (>2s) on the desired scene button.

The color temperature can also be changed by a direct press on button “” “” “”.

### Notes on manual adjustments:

- 1) In office mode, the default profile will be re-instated after a long period of absence (hold time has finished and the lights have automatically turned off)
- 2) In health care mode, the default profile will be re-instated at 00:00 hours.
- 3) The circadian rhythm profiles can be manually resumed at any time by pressing the “” or “” buttons.
- 4) Press “” and “” for more than 5 seconds, all settings go back to the default value.



## Hytronik Tunable White LED Driver for Human Centric Lighting System

HHC2045 is specially designed to work with the Hytronik Human Centric (HHC) sensors. Dual channel tunable white LED driver for accurate white balance and intensity control.

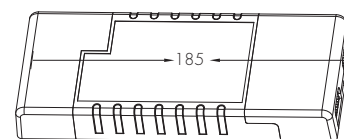
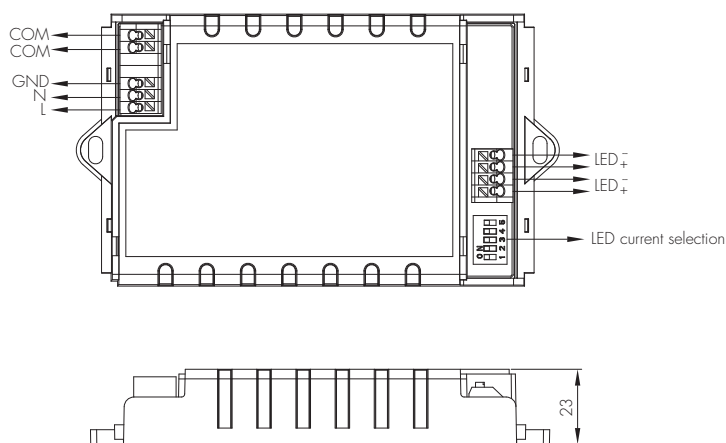
### Features

- Tunable White
  - Linear Dimming
  - Configurable Constant Current (CC) Output via Dip-Switch
  - Stand-by power < 0.5W
  - Active PFC design
  - Thermal Cut-out Protection
  - Short Circuit Protection
  - Over-load Protection
  - 5 Year, 50,000hr Warranty
- } All with Auto-restart

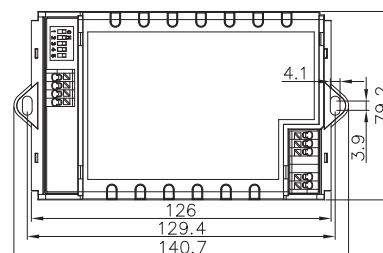
**CB SAA CE emc**  
**SELV IP20**



### Dimensions and Terminals



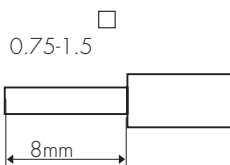
Additional cap for stand alone installation



## Technical Data

Input	Mains Voltage	220~240VAC 50/60Hz
	Mains Current	0.22~0.2A
	Power Factor	0.95
	Max. Efficiency	85%
	Dielectric Strength	Input→Output : 3000VAC
	Leakage Current	< 0.25mA
Output	Power/Current/ Voltage Range	20W/350mA/10~56V    28W/500mA/10~56V    40W/700mA/10~56V 45W/900mA/10~50V    42W/1050mA/10~40V    40W/1200mA/10~34V
	Output power handling	Channel 1 (CH1) + Channel 2 (CH2) = 45W max.
	Output channel function	CH1 = Cool white    CH2 = Warm White
	Ripple Current	<3%
	Uout Max.	75V
	Turn-on Time	< 0.5s
Environment	Operation Temp.	Ta: -20~+45°C
	Case Temp. (Max.)	85°C
	IP Rating	IP20
Safety and EMC	EMC standard	EN55015, EN61547, EN61000-3-2, EN61000-3-3
	Safety standard	EN61347-1, EN62493, EN61347-2-13
	Certifications	CB, CE, EMC, SAA

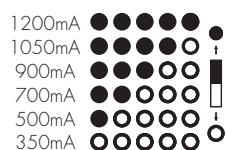
## Wire Preparation



Solid or Stranded wire type 0.75 - 1.5mm<sup>2</sup>.

To make or release the wire from the terminal, use a screwdriver to push down the button.

## LED Current Selection



**Warning:** Please make sure the correct current is selected before starting the driver!

## Loading and In-rush Current

Inrush Current (I <sub>max</sub> .)	7.2A
Pulse Time	100 μs

## Number of Drivers Based upon 16A Circuit Breaker

Type B	30
Type C	50



## Dual Output Control

Connection to the LED PCB is made for CH1 and CH2 output connections

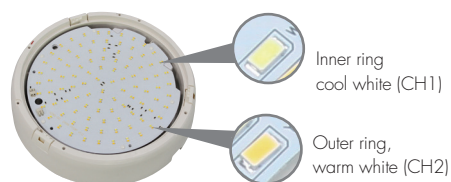
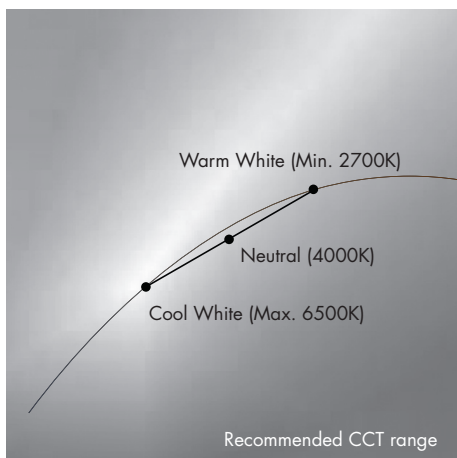
CH1 = Cool white LED array

CH2 = Warm white LED array.

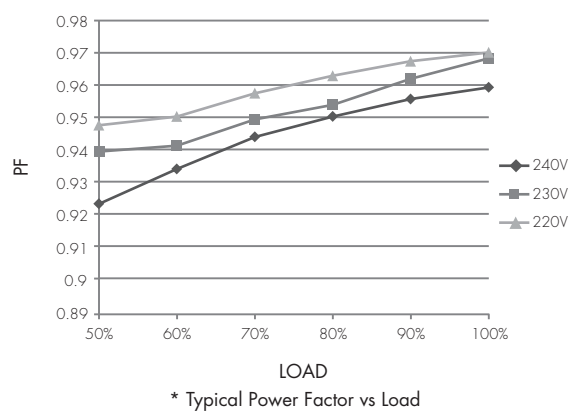
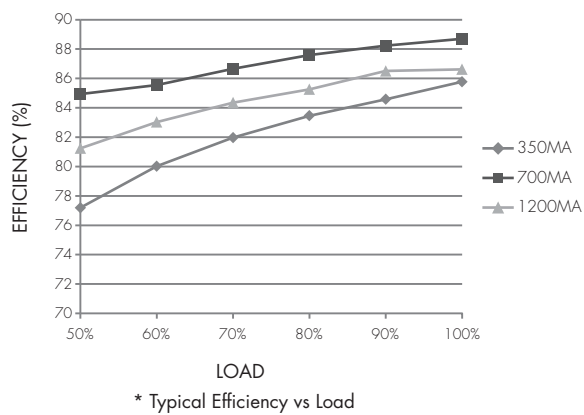
Each channel can supply up to 45W and white balance can be controlled as such:

Colour Temperature	Cool White	Neutral White	Warm White
Power Distribution	CH1=45W, CH2=0W	CH1=22.5W, CH2=22.5W	CH1=0W, CH2=45W

## Linear Colour Tuning Profile



## Performance Characteristics



## Dimming Characteristics

