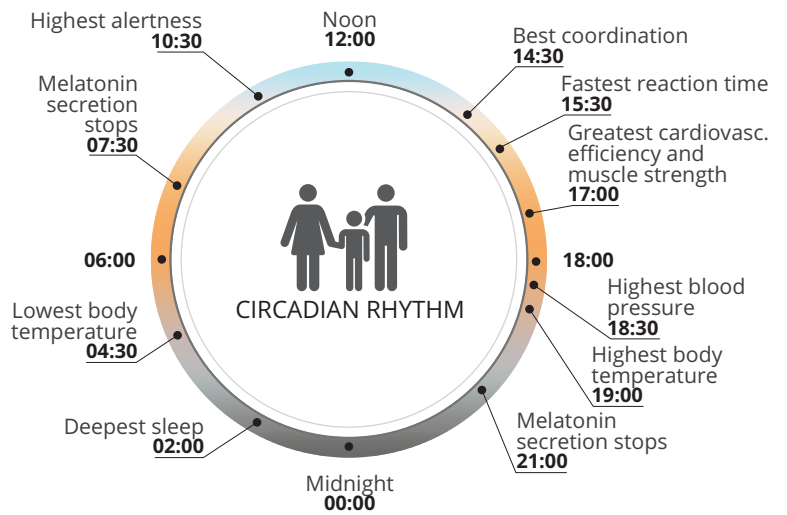


# TUNABLE WHITE/HCL LIGHTING SYSTEMS



# HUMAN CENTRIC LIGHTING - HCL

Claiming that better lighting can improve health is a big supposition. That said, it is not outlandish to state that carefully designed lighting can aid, even correct, circadian rhythms in human beings. Over time, people have evolved in harmony with the Earth's natural lighting cycle, which has low light levels and low correlated Colour temperatures (CCT) in the early morning, high light levels and high CCTs at mid-day, low light levels and low CCTs during evening, and extremely low light levels and a medium CCT under moonlight. These varying light levels are at the heart of a human being's 24 - hour internal clock, otherwise defined as circadian rhythm. Until 200 years ago, 90% of our waking time was spent outside. Now most of us spend 90% of our time indoors with electric lighting. While we're at work, our lighting is usually set at one light level with a constant CCT—this is not consistent with circadian rhythms. Without regular and direct exposure to such dynamic lighting, the circadian rhythm can be disrupted, which could lead to health issues. Specifically, light and darkness control hormone production. During the day, with a natural circadian rhythm, appropriate amounts of dopamine are secreted for pleasure, alertness and muscle coordination; serotonin for impulse control and carbohydrate cravings; and cortisol for stress response. During the night, melatonin allows for sleep, and refreshes our body. Recent research, specifically, the discovery of intrinsically photosensitive retinal ganglion cells (ipRGC) in our bodies, has been found to be very important in setting one's internal clock, so to speak. They are especially responsive to light that is rich in blue content, the mid-day sky, for example, which can be up to 10,000K. This is particularly notable in that blue light content suppresses melatonin and encourages dopamine, serotonin, and cortisol production, meaning greater exposure to it during the day can lead people to be more alert and productive at work, or even during night shifts. At the same time, at night, such melatonin disruption can create sleep issues.

Still more and more scientific researches confirm the influence of

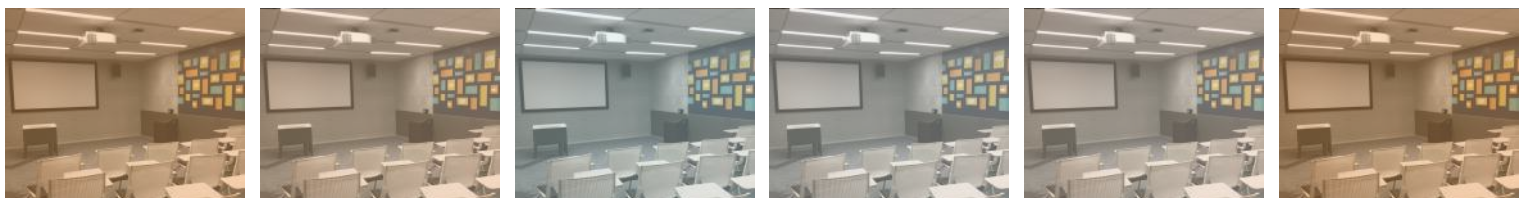
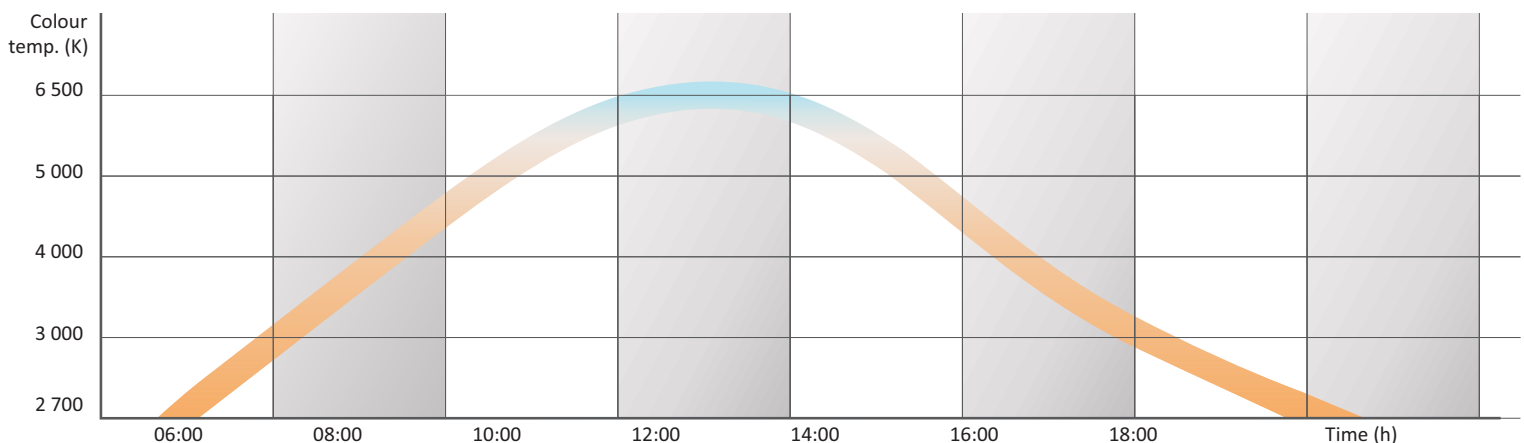


light on different aspects of human life. Light intensity and light spectrum play an important role in the proper functioning of the human body, not only in physical but also in a mental way. This is particularly important for areas where high mental performance is required. Luminaires with Human Centric Lighting fit perfectly into offices and classrooms, where their potential can be fully exploited due to their impact on work efficiency and learning. At the same time, the quality of light has an effect on the elimination of current tiredness and guarantees visual comfort. These are the basis for



90%

Average we spend up to 90% of our time indoors. In winter it is sometimes even more. All day, from morning to evening, artificial light is still the same with no changes.



Natural lighting is dynamic, it is changing constantly throughout the day from sunrise to sunset. The change is not just in the value of color temperature but also in color itself and intensity.

# HUMAN CENTRIC LIGHTING - HCL

## Office workspaces

Impact of physical condition, physical healing



### Office workspaces

Performance improvements



### Hospitals

Impact of physical condition, physical healing



### Educational institutions

Higher concentration, better learning ability



### Retirement homes

Better food, impact on daily rhythm, activity

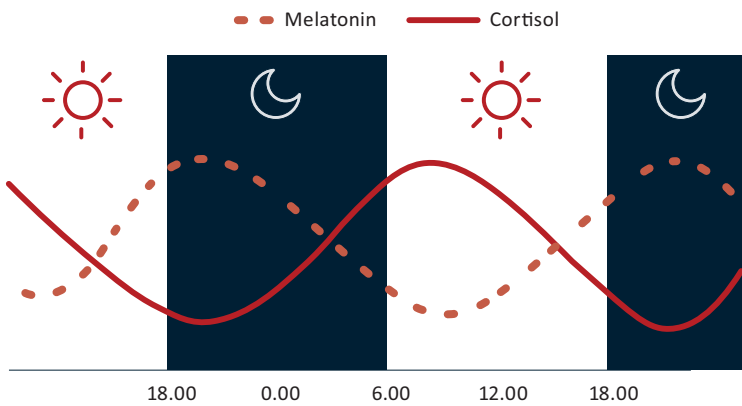


### Homes

Better sleep, relaxation, well-being

increasing the vigilance and vitality of employees. That is very important in the working environment. However, the greatest benefits of HCL are evident in the health care sector. Patients are often under the influence of artificial light in the interior for longer periods of time, it is always without the possibility of change. Ensuring a natural Circadian rhythm is important not only for the

well-being of patients but also for their faster treatment. Human Centric Lighting technology, also known as bio-dynamic lighting, was previously used very little due to its high initial and operating costs. Thanks to Luxtone, HCL technology is now available to everyone who expects countless colour temperatures and light intensity variations that mimic natural daylight.

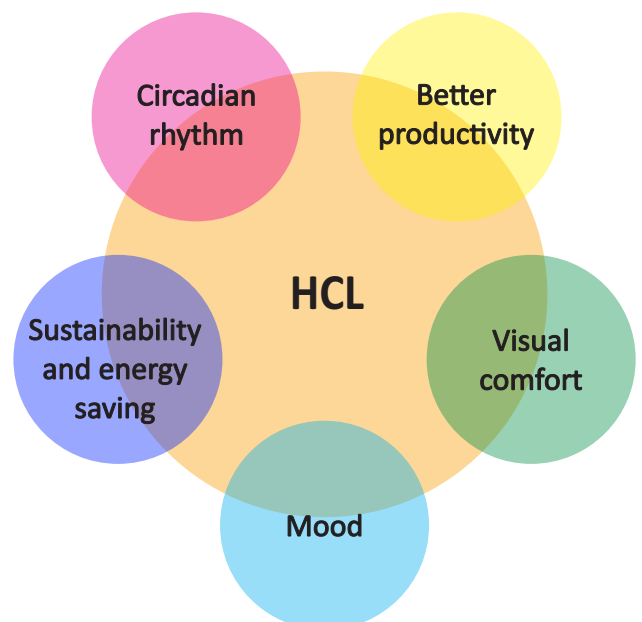


## The ten principles to incorporate into the design of a Human Centric Lighting scheme:

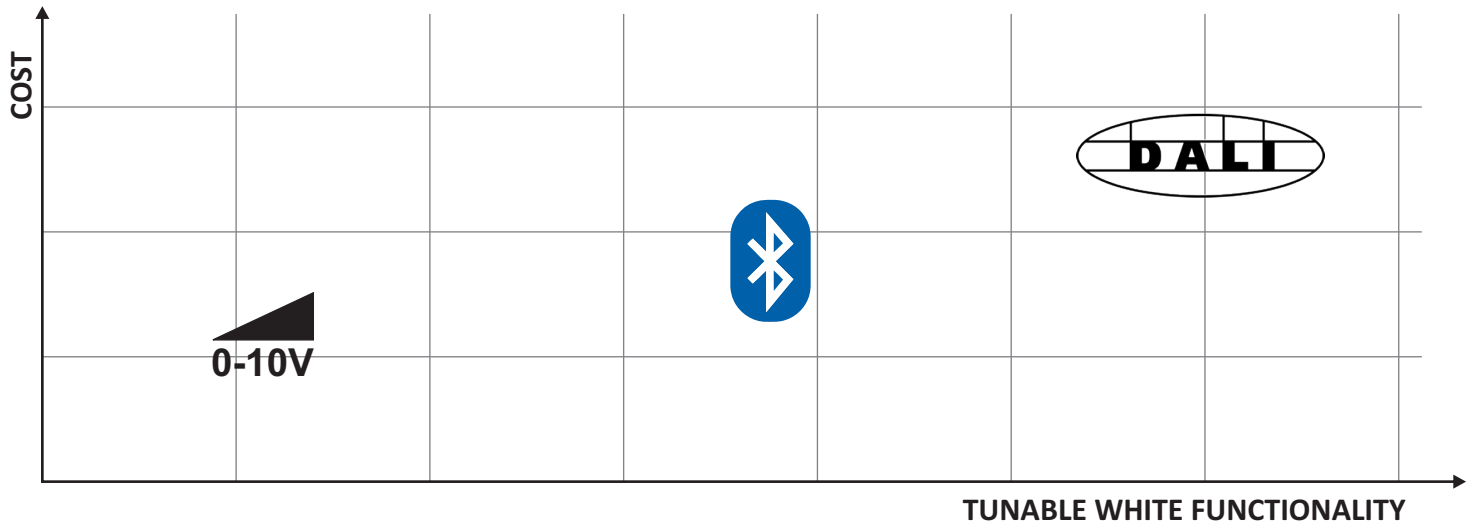
1. Use the available daylight
2. The right light at the right time
3. Ecological and sustainable planning
4. User-related planning
5. Application-related planning
6. Architectural planning
7. Bringing the sky inside
8. Plan dynamic light
9. Design with the right components
10. Design according to norms and standards

## MAIN ADVANTAGES

- 1 Synchronization with the natural rhythm**  
 Correct lighting helps a human body synchronize with the "natural day-night rhythm". It is healthier for the biological system and it is important for the proper production of melatonin that is crucial for good sleep.
- 2 Concentration increase**  
 Proper lighting keeps us alert and efficient throughout the whole day.
- 3 Health and well-being**  
 Light has a key influence on our sight and it directly affects our mental and physical well-being and the health of the whole organism.



# TUNABLE WHITE - 3 DIFFERENT SOLUTIONS



## 0-10V |

### Advantages

- Simple installation
- Suitable upto 20 nos. of 0-10V drivers
- Inexpensive solution for small offices

### Disadvantages

- No preset or scene control
- Manual control



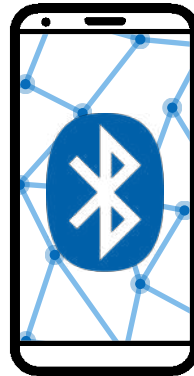
## Bluetooth Mesh |

### Advantages

- Highly scalable upto 30000 nodes
- Can be easily commissioned

### Disadvantages

- Relatively new technology



## DALI |

### Advantages

- Time tested DALI Protocol
- DT8 compatible
- Suitable for upto 200 DALI DT8 drivers.

### Disadvantages

- Limitations of 50 luminaires per DALI Master
- Complicated wiring





# ORDERING INFORMATION

## 2 - Channel Dimmable Drivers



Part No.	Input(V)	Output(I)	Output(V)	Max Power(W)	Dimming
2001708	180-260AC	700-1200mA	30-48 DC	50W	1-10V
2001709	180-260AC	700-1200mA	30-48 DC	50W	DALI DT8
2001710	180-260AC	700-1200mA	30-48 DC	50W	Bluetooth
2001711	180-260AC	350-700mA	30-48 DC	35W	1-10V
2001712	180-260AC	350-700mA	30-48 DC	35W	DALI DT8
2001713	180-260AC	350-700mA	30-48 DC	35W	Bluetooth
2001714	180-260AC	190-700mA	18-30 DC	21W	1-10V
2001715	180-260AC	190-700mA	18-30 DC	21W	DALI DT8
2001716	180-260AC	190-700mA	18-30 DC	21W	Bluetooth

## Built-in Power Switch with 1-10V dimmer

0-10V



Part No.	Input(V)	Output(I)	Maximum Drivers
2001697	100-240V AC	Max. 50mA	20

## DALI DT-8 MCU Digital Rotary CCT controller



Part No.	Input(V)	Output(I)	Maximum Drivers
2001699	100-240V AC	Dali Signal	100

Dali broadcast only

## DALI DT-8 MCU Touch Controller



Part No.	Input(V)	Output(I)	Maximum Drivers
2001698	100-240V AC	Dali Signal	100

4 Scenes and 4 Groups

## Tunable White LED Modules



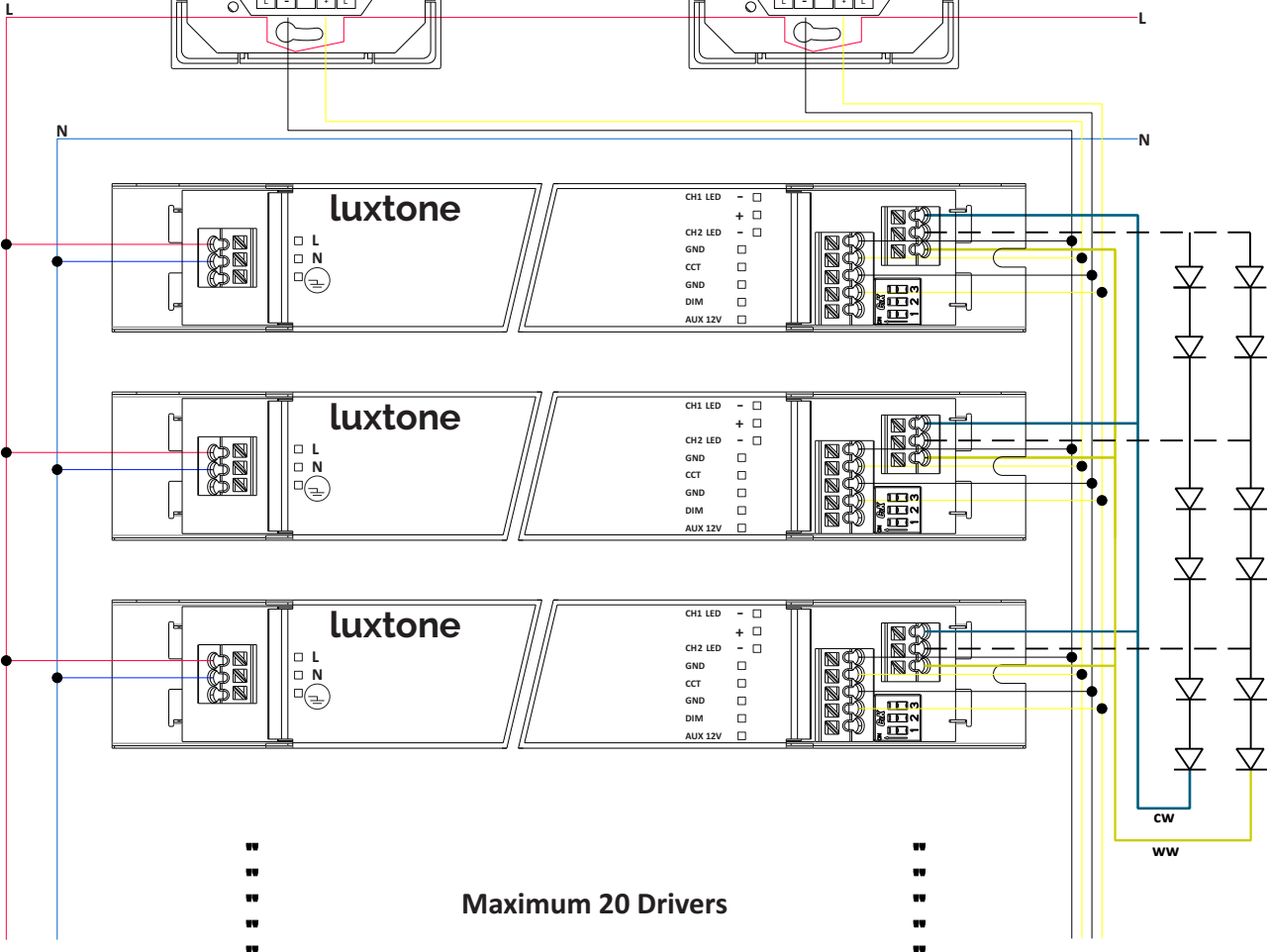
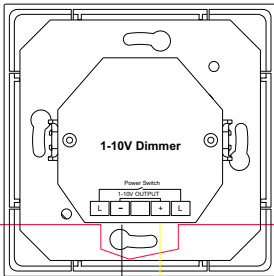
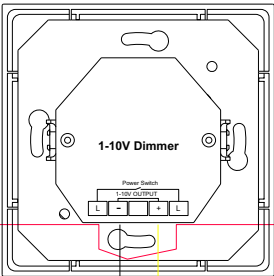
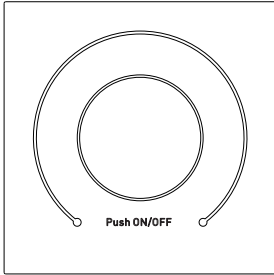
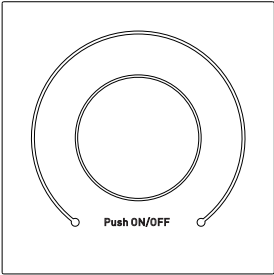
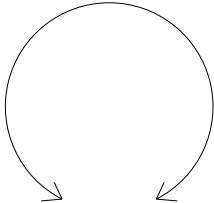
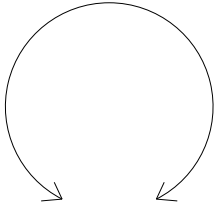
Part No.	LxW(mm)	Output(W)	Forward Voltage (I <sub>f</sub> )	Lumens/Watt at 65° C
2001695	280x10	5W	39V max	123
2001696	280x10	2.9W	9V max	132

# WIRING DIAGRAM

## Built-in Power Switch 1-10V Dimmer

Rotate the knob clockwise/counterclockwise to change CCT.

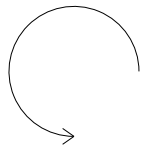
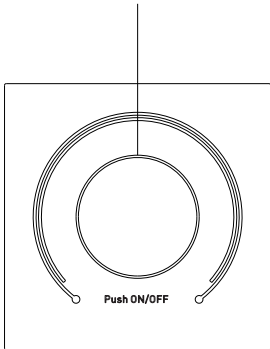
Rotate the knob clockwise to increase light intensity from 1% to 100% or vice-versa.



# WIRING DIAGRAM

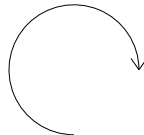
## DALI DT8 MCU Digital Rotary CCT Controller

Click the knob to switch ON/OFF. Double click the knob to switch between dual color mode and brightness mode.



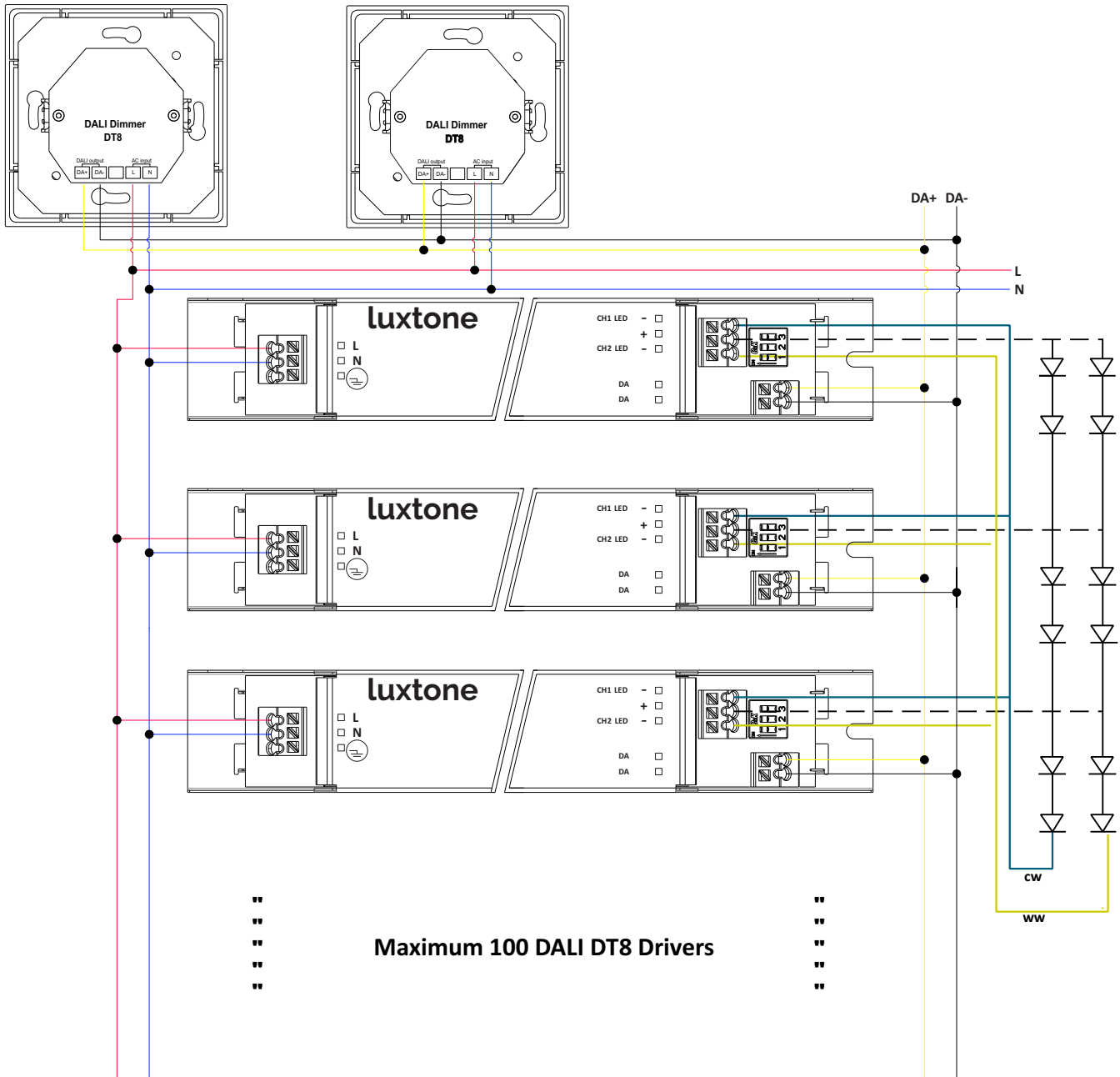
Rotate the knob counterclockwise:

1. Decrease light intensity from 100% to 1% (brightness mode).
2. Change color temperature from warm white to cold white (dual color mode).



Rotate the knob clockwise:

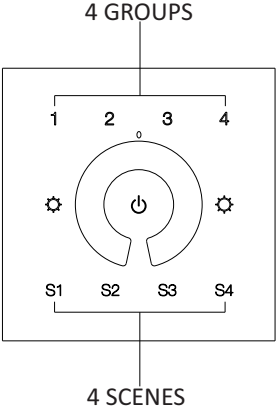
1. Increase light intensity from 1% to 100% (brightness mode).
2. Change color temperature from cold white to warm white (dual color mode).



Maximum 100 DALI DT8 Drivers

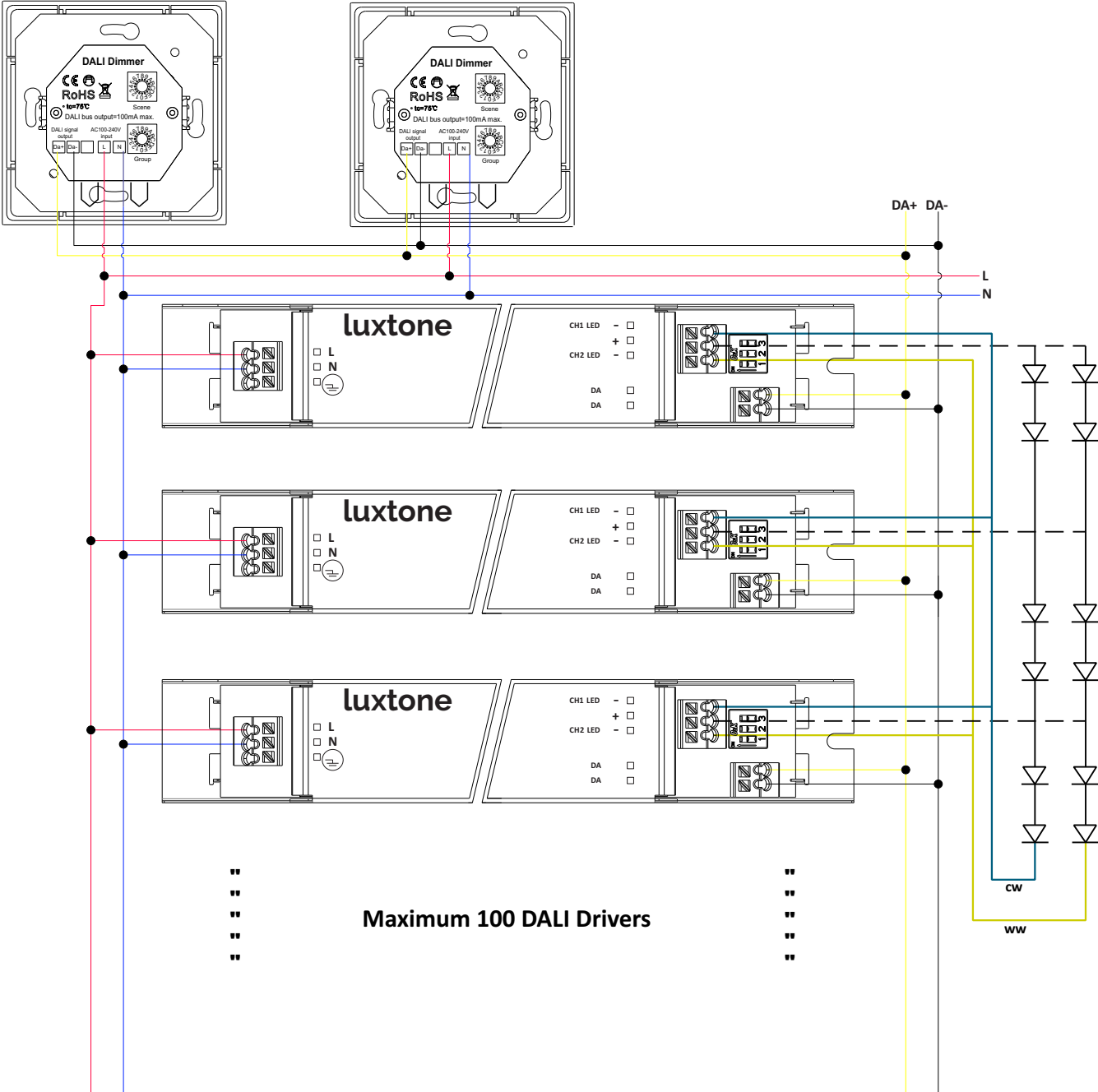


## DALI DT8 CCT Touch Controller



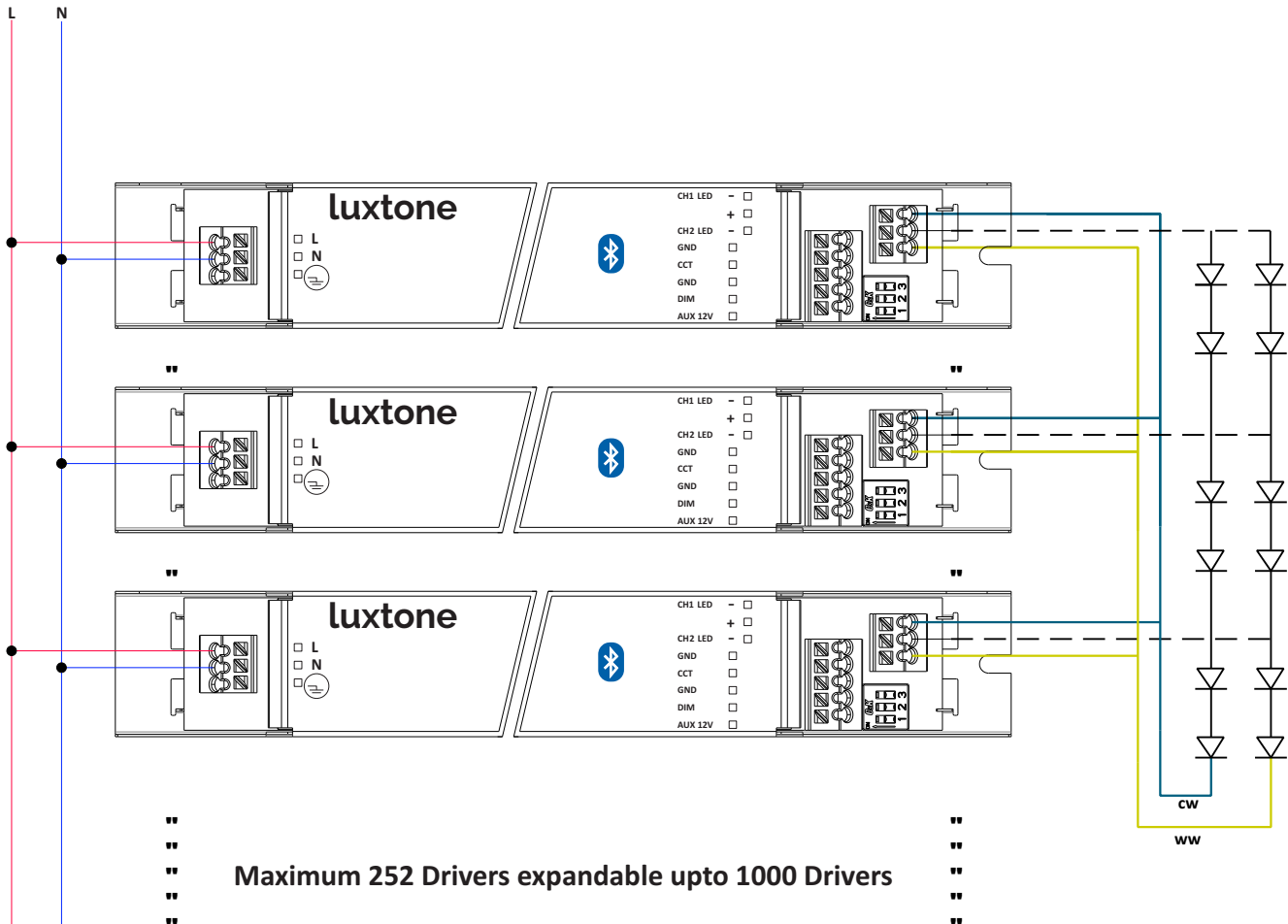
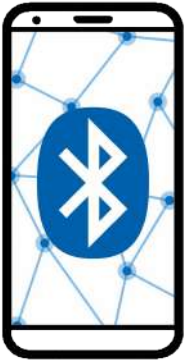
DALI Broadcast  
DALI Addressable

\* Please see our installation manual for further guidance.



# WIRING DIAGRAM

## Bluetooth Mesh Wireless Network



Maximum 252 Drivers expandable upto 1000 Drivers



[www.luxtone-global.com](http://www.luxtone-global.com) | **luxtone**

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