THE NEW AGE OF LIGHTING

HUMAN CENTRIC LIGHTING (HCL)

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LIGHT IS CRUCIAL FOR

how we feel

DAY & NIGHT

DECODING HUMAN CENTRIC LIGHTING (HCL)?

The sun plays a critical role in all biological processes on earth and sunlight is a crucial part of everyday life. Natural light changes with the season and has a significant impact on how we feel.

However, it is not only a question of seasonal changes, it is also the question of changes that takes place 24 hours a day. A hectic lifestyle can be challenging to our internal body clock also known as Circadian Rhythm. Therefore light is crucial for how we feel when we wake up in the morning to the evening when its time to get relaxed and ready for sleep.

It's not only a matter of feelings, but the impact of light can also be explained by the chemical reactions in the human brain and body.

THE CIRCADIAN RHYTHM ANATOMY:

The circadian rhythm is controlled by a small group of nerve cells called SCN (Suprachiasmatic Nucleus). The SCN contains clock genes which control our internal clock.

The SCN receives input from the retina through PACAP (Pituitary Adenylate Cyclase-Activating Polypeptide) neurotransmitter on how much light is there in our environment.

The SCN then regulates the secretion of some hormones, e.g. the stress hormone called cortisol, or the night hormone called melatonin, which also assists in regulating our blood pressure, alertness and body temperature.

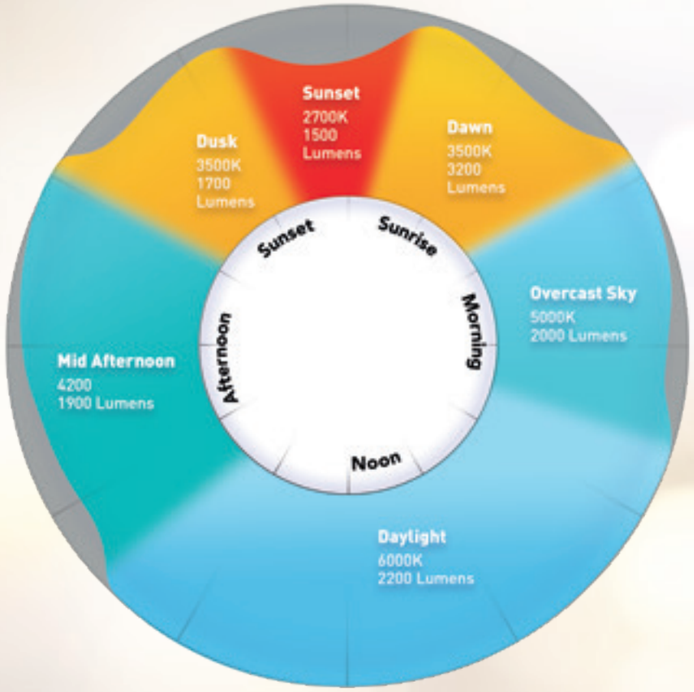
Throughout the day these hormones have a different effect on human body.

HOW HUMAN-CENTRIC LIGHTING WORKS?

Human Centric Lighting (HCL) systems feature controllable lighting that sits on a spectrum of correlated colour temperatures (CCTs). The systems are designed to evoke human biological responses and support health, well-being, and performance. CCTs are measured in Kelvin (K) and range from 2700k (warm) to 6500K (cool), a broad spectrum that gives them the ability to evoke different responses on a biological level.

Humans have developed to respond to the light around them: they are most alert during the middle of the day and are attuned to the rising and setting sun as its time changes throughout the year. HCL lighting systems can trigger this response if natural light is unavailable. CCT levels have three central agencies; cool (blue) temperatures are used to keep us alert, warm (yellow) temperatures are calming and are often used in healthcare facilities to enhance patient comfort, and medium (white) temperatures may improve the quality of sleep.

CCT 24 HOUR DISTRIBUTION



BENEFITS OF HUMAN CENTRIC LIGHTING:

IMPROVED HEALTH AND SLEEP

HCL can significantly boost patient and staff comfort, in turn helping to achieve high health outcomes. Additionally, it can regulate the production of important hormones and helps in proper functioning of circadian rhythm.

PRODUCTIVITY AND ENHANCED PERFORMANCE

According to Lighting Society Europe, HCL significantly enhances performance and wellbeing, to the point of enhancing productivity by 4.5%, reducing errors by 2%, and slashing absentee rates.

VISUAL ACUITY

Lighting has a direct impact on visual acuity. Light sources with higher amounts of blue light stimulate the intrinsically photosensitive retinal ganglion cells (ipRGC) photoreceptors, which in turn cause the pupils to contract. This contraction results in better visual acuity and allows clearer vision for longer, as the eye accommodates – rather than is stressed by – the light. While this clarity is not ideal at all times of day, it may aid healthcare and aged care employees in working effectively for extended periods of time.

SAFETY

As HCL systems significantly improve visibility, they can reduce the risk of trips and falls, which can be a major cause of injury in Australian workplaces.

HCL AREAS OF APPLICATION

WORKPLACES/OFFICES

HCL can help improve learning, increase concentration and performance, improve efficiency and accuracy and contribute to positive social behaviour and circadian rhythm. It can also assist in reducing fatigue and errors in the day-to-day work.

EDUCATION/SCHOOLS

HCL can help in increasing efficiencies and performance in studies by promoting circadian rhythm.
In some cases, it can assist in promoting better sleep.

An HCL for the classroom can consist of 5 controls – general light (classroom light), reading, concentration, energy boost, relaxation.

HEALTHCARE & AGED-CARE

HCL can assist in improving learning and concentration in aged care facilities. It can also help to improve human well-being and health by adapting to support circadian rhythm, potentially assisting with cognitive function amongst aged patients.

For hospital staff working at night, HCL can reduce fatigue and help them to serve their patients better.

By providing improved circadian rhythm from by Human Centric Lighting, we can get better sleep which can assist in achieving better health.

ENHANCING LIFE'S EXPERIENCES

through creating innovative and sustainable lighting solutions

LUMINAIRES FOR HCL
TUNABLE RANGE FROM PIERLITE

For years, Pierlite has led the Australian market in manufacturing and distributing premium commercial, residential, health and industrial lighting solutions. Pierlite's expert in-house engineering and design team allows the swift development of cutting-edge products and bespoke lighting solutions.

Pierlite now offers a range of luminaires that can assist in achieving desired outcomes for HCL systems.

Our product range supporting HCL systems include:

	
TROFFERS	DOWNLIGHTS
	
TRACK & SPOT	HEALTH & MEDICAL

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These are recommended tuneable white products that may assist Lighting Designers to achieve certain colour temperatures during certain time frames, hence supporting Human Centric Lighting. The HCL system needs to be designed and warrantied by the lighting designer/architect or the contractor involved.

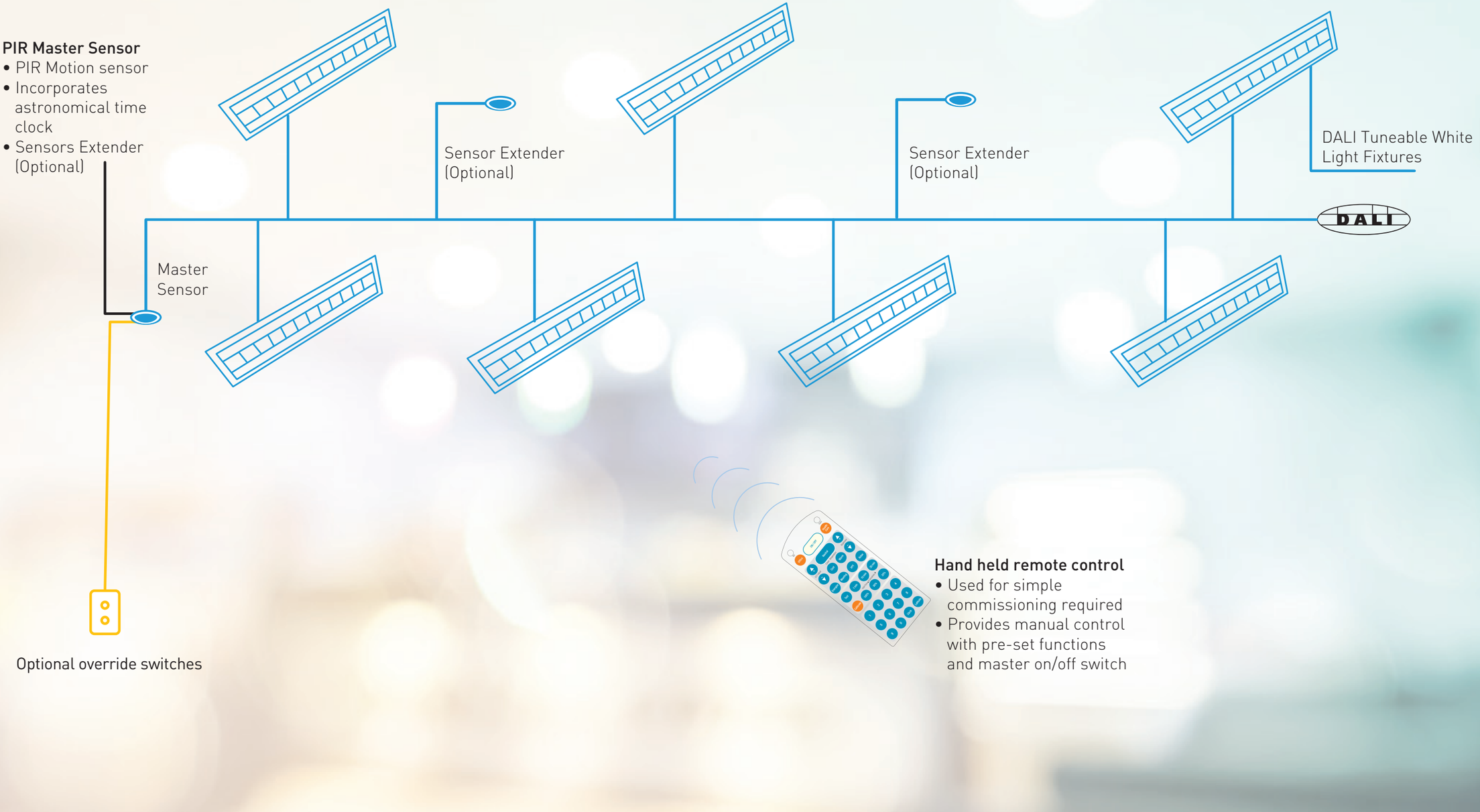
THE TECHNOLOGY BEHIND HCL

OPTION 1: SMALL TO MEDIUM INSTALLATION

THE RIGHT LIGHT FOR OUR ACTIVITIES, AT THE RIGHT PLACE AND THE RIGHT TIME

SMALL TO MEDIUM SOLUTION

- A simple de-centralised human centric lighting solution designed for small to medium installations
- Astronomical time clock in-built
- Simple to commission with the IR remote control handset



THE TECHNOLOGY BEHIND HCL

OPTION 2: FOR LARGE INSTALLATION

The RAPIX Lighting Control System is designed to communicate directly with both Ethernet and DALI. Ideal for larger installations including multi-level commercial applications and a wide range of industrial applications. Simple, fast and scalable, the RAPIX Integrator software is used to quickly and easily configure lighting zones/groups and scenes throughout a building.

Building wide communication

Light fitting communication

DAYLIGHT HARVESTING

Light level sensors help to cut energy use by reducing artificial light when adequate natural light is available.

TIME-BASED CONTROL

Scheduling time based control on clock times, sunrise or sunset or for specific work tasks.

OCCUPANCY-BASED CONTROL

Movement sensors can be used to automatically dim or switch off lights in unoccupied areas.

ENERGY SAVINGS

Well designed lighting control can save up to *60% of lighting energy, without compromising light quality, user comfort or safety

SCENE SETTING

Pre-arranged lighting effects in each ‘scene’ can be configured to facilitate a range of activities

PERSONAL TUNING

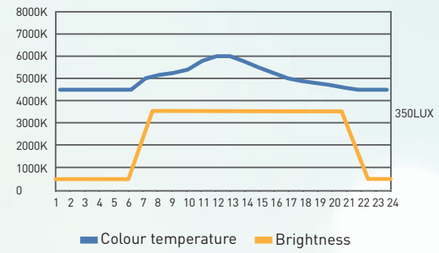
Giving employees the ability to personally ‘tune’ their lighting based on their task, mood and personal preferences.

* Source: Green Building Council Australia

SYSTEM OVERVIEW

TYPICAL PROFILES FOR HEALTHCARE AND OFFICE

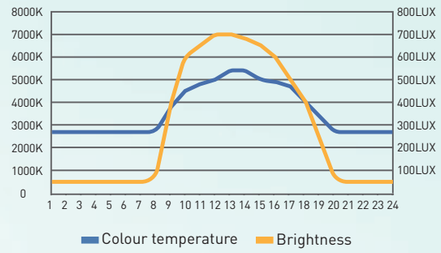
* For office applications



In these environments the brightness level does not change during business hours

The colour temperature starts at 4500k and rises to a maximum of 6000k around the middle of the day to simulate the most amount of sunlight.

* For health care applications

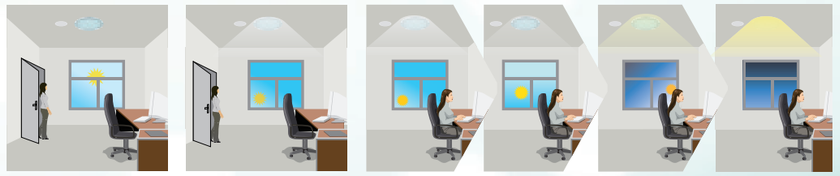


In these environments the brightness levels change significantly between 9am to 12pm, and again from 12pm to 8pm.

The colour temperature starts at 2700k and rises to a maximum of 7000k around the middle of the day.

People in healthcare environments are exposed to artificial lighting for much longer periods than in an office environment, hence the larger shift in brightness and colour temperature simulating the rising and setting of the sun.

TYPICAL OFFICE APPLICATION



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

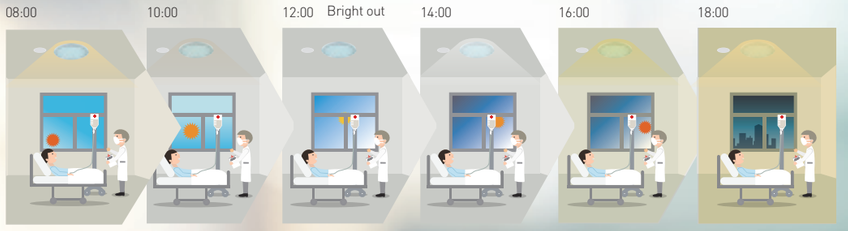
The light switches on automatically with presence when natural light is insufficient.

The light turns on at full or dims to maintain the lux level. The light output regulates accroding 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.

TYPICAL HEALTH CARE APPLICATION



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