

TW - HCL

HUMAN CENTRIC LIGHTING





Human Centric Lighting

HCL is a concept that represents a deep cultural change that aims to achieve a healthier and more balanced relationship with the spaces we live in.

Our modern lifestyle is not aligned with nature's rhythms.

We spend most of our time indoors where artificial lighting has virtually abolished the difference between day and night. Over the last decades, however, scientific research has made it clear that light isn't just for seeing, but also for governing how our body works from both the biological and psychological points of view.





Therefore the goal of **H**uman **C**entric **L**ighting is to design lights that don't take into account only of the visual effects, but also of the biological and emotional impact on humans.

The biologic clock

We use the definition of "biological clock" because, over the course of the day, the variations of light, from dawn to dusk, up to the dark of the night, send precise signals to our body, triggering specific psychological responses.

Blood pressure, body temperature and the production of specific hormones vary over the course of 24 hours.

When we wake up, the morning light triggers processes that stimulate attention span, which reaches its peak during the central hours of the day, to then decline with the arrival of the evening in order to prepare our body for night-time rest. This mechanism, which varies according to seasons and individual characteristics, is necessary for our body to work properly.

visual effects

emotional effects

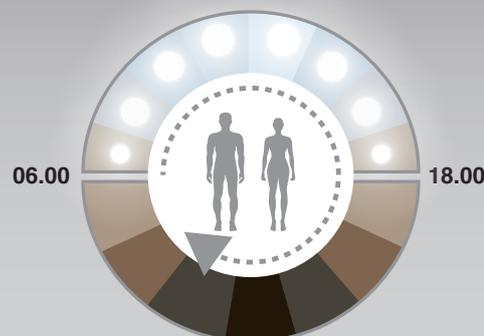


biological effects

Circadian rhythm



12.00

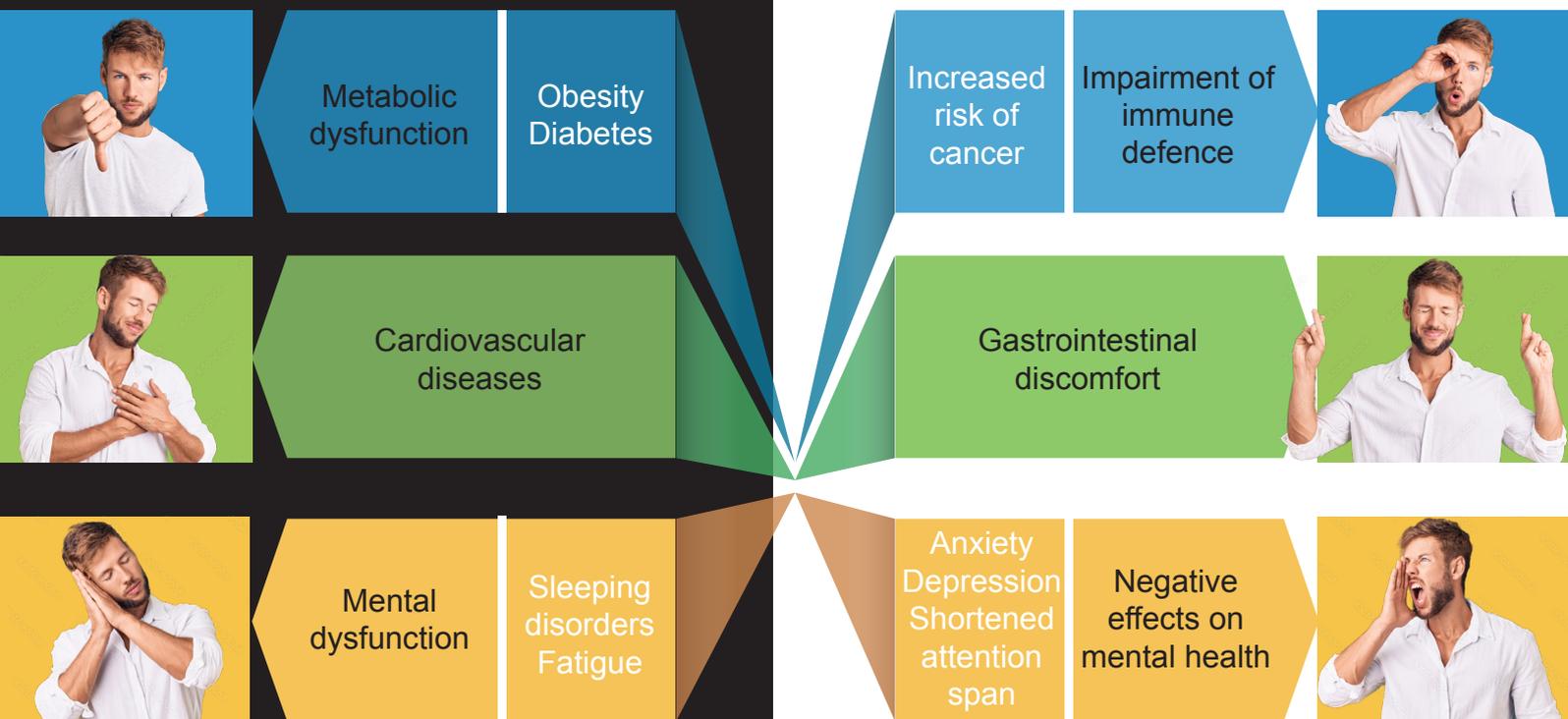


24.00

- 7:30 a.m. Melatonin secretion stops
- 10:00 a.m. High alertness
- 2:30 p.m. Best coordination
- 3:30 p.m. Fastest reaction time
- 7:00 p.m. Highest body temperature
- 9:00 p.m. Melatonin secretion starts
- 2:00 a.m. Deepest sleep
- 4:30 a.m. Lowest body temperature
- 6:00 a.m. Release of cortisol

A systematic disruption of our biological clock has negative effects on our health. Numerous studies have shown that the disruption of our sleep-wake cycle provokes fatigue and sleeping disorders. It negatively affects our mood and psychological wellbeing, and may cause anxiety or depression, as well as gastrointesti-

Moreover, if prolonged over time, it can increase the risk of cardiovascular diseases (strokes and heart attacks) and metabolic dysfunctions (such as obesity and diabetes). Lastly, it can weaken the immune system favouring the outburst of some cancers.



According to research, it is important that our body receives signals like daylight and its variation throughout the day. Yet, we spend most of our time, whether at work or at home, in closed and artificially illuminated spaces. So what can we do? We can get a greater amount of daylight inside. This is why designers and architects are making buildings that recover as much as possible the relationship with the outside world. And a great help is given by the technological evolution of artificial lighting, including Human Centric Lighting.



The new frontier of Human Centric Lighting

The new LED lighting fixtures have features that allow artificial lights to mimic the quality of natural light, and have the necessary amount of light to allow us to complete, as best as possible, different work and study activities, as well as create a pleasant environment where lights can follow the natural trend of daylight. Designers who follow the principles of Human Centric Lighting using the new LED fixtures will achieve:

Greater amount of light:

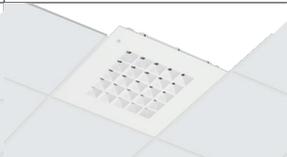
LED sources cut down energy costs while achieving a high luminous flux in accordance with sustainable consumption patterns.

Improved light quality:

the new sources combine high colour rendering and correct light distribution, guaranteeing maximum visual comfort; while anti-glare optics and the low-flicker sources protect human eyesight.

Efficient light control:

the possibility to adjust lights via more accurate and programmable control systems can dim lights during the day in order to reproduce the rhythm of outdoor light or automatically adjust them to the amount of daylight. Moreover, it is possible to choose the best amount of light for a certain type of activity, whether it is reading, working at the PC or a business meeting.

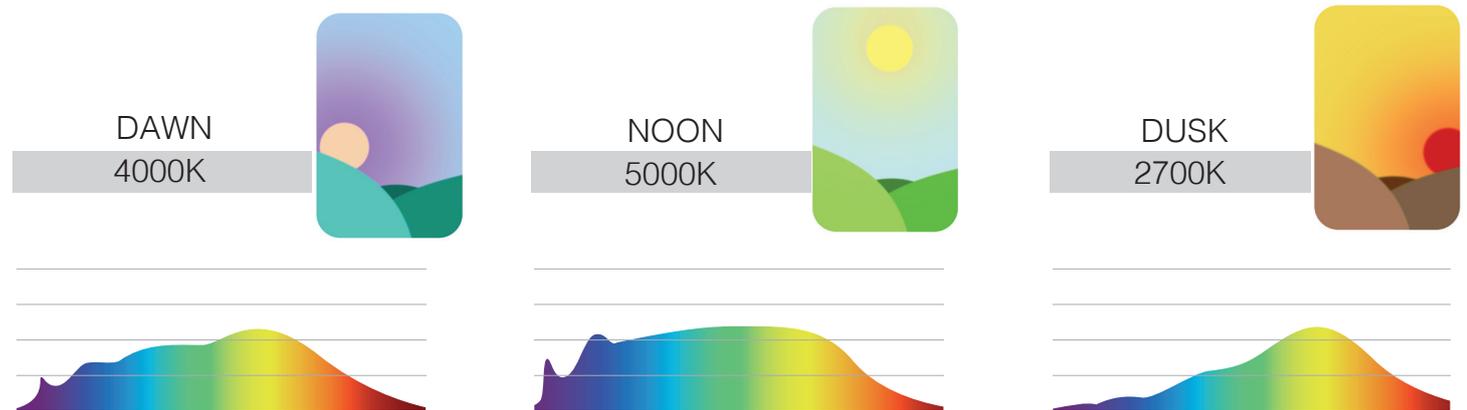
Toledo TW - HCL	Comfortsquare TW - HCL	Office 1 TW	Liset 2.0 TW - HCL	Liset 2.0 TW - HCL
				
p. 18-21	p. 22-25	p. 26	p. 30-33	

LEDs emit light in the blue wavelength range, affecting the secretion of melatonin, which in turn influences our biological clock and alters our sleep-wake cycle.

Therefore, using artificial light that mimics the spectrum of natural light, like the Tunable White LEDs, is fundamental.

Tunable **W**hite LED:

Enables the shade of light to be changed manually throughout the day (no circadian rhythm).



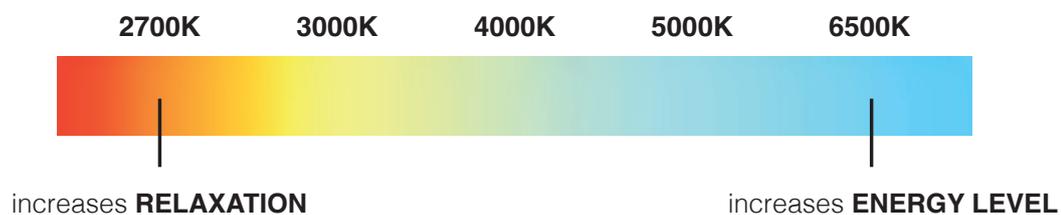
This concept allows for perfect visual and working conditions and, above all, it places the attention on the notion of circadian rhythm that regulates our biological clock.

Biorhythms depend on external signals, such as the quality and the quantity of daylight and environmental colour temperature.

This is way Tunable White creates an environment that can help people in a natural way, just like a bright sunny day.

Tunable White LED

It is a latest generation LED technology that allows adjusting colour temperatures from **2700K to 6500K**, from a **warm light** to a **cold light**. LED Tunable White LED modules for HCL applications contain two adjacent diodes that emit light at 2700K and 6500K, as well as intermediate colours by mixing colour temperatures.



Researchers have demonstrated that our brain is stimulated:

- by the **warm light** of morning and evening hours (2700K) increasing our sense of relaxation;
- by the **cold light** of daylight (6500 K) making us feel more energetic and concentrated.

Presence and light sensors for HCL applications

In addition to the Tunable Light technology, the fixtures can be equipped with presence and lighting sensors that allow adjusting artificial lighting, while keeping the lumen value set according to the room's occupancy and the contribution of natural light. The built-in sensor measures constantly the luminosity value in the environment and compares it with the value set in the presence detector.

1. Immediate detection of anyone entering within its range.



2. Adjustment of lights based on daylight



3. Constant measurement of the environment's lighting level.



The mission of

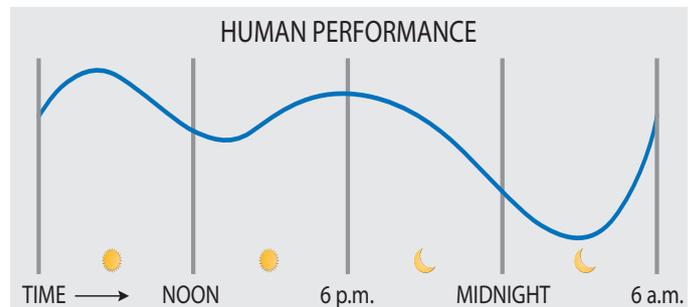
Human **C**entric **L**ighting is to create a balance between natural outside light and artificial inside light.

Below are some examples showing why it is important to choose HCL in our environments.

Human **C**entric **L**ighting:

Simulation of daylight changes: colour of light changes automatically based on the time of the day and daylight.

The Dynamic White function allows adjusting the colour temperature from 2700K to 6500K to create a sense of the passing of time (circadian rhythm) and to set the mood and ambiance of a space according to our daily activities. Circadian lighting obtained with the Dynamic White function is the best solution to implement Human Centric Lighting in classrooms, university campuses, offices and hospitals where lights can mimic the natural trend of daylight throughout the entire day.



HCL in the workplace - page 12

High quality lighting, together with good interior design and an adequate ventilation/air conditioning of spaces are key elements of the ideal office. In particular, a lighting system that applies, even if only partly, the principles of Human Centric Lighting allows building a space that facilitates work, improves concentration and protects the health of workers.



HCL in education institutions - page 14

The possibility to study in a comfortable, pleasant and well-illuminated environment increases academic performance. This means that fixtures installed in classrooms, laboratories and corridors should be chosen not only to meet viewing needs, but also to create a study and work environment that is pleasant and functional, while also being energy-efficient and low-cost.



HCL in healthcare facilities - page 16

With the right fixtures and the correct Human Centric Lighting approach it is possible to choose different colour temperatures and light levels for different rooms based on the amount of daylight entering the room at specific hours of the day, with pleasant and soothing results..





Research has shown that satisfied employees are also more productive.

A pleasant, low-stress and adequately furnished workspace not only helps people work better but it also boosts their energy levels and their sense of belonging to the company.

How can we achieve this?

The technology currently available in modern lighting fixtures (LED sources, light control systems, easy installation) allows improving the quality of the workplace remarkably, awarding the investment not only through the energy savings guaranteed by modern lamps, but, above all, because it increases the productivity and the satisfaction of workers.



How do we get the benefits of HCL in the workplace?

Workplaces designed according to the principles of HCL consider the different effects of lighting on the human body.

With HCL, our workspaces are more comfortable for workers and also more functional and easier to manage for companies.

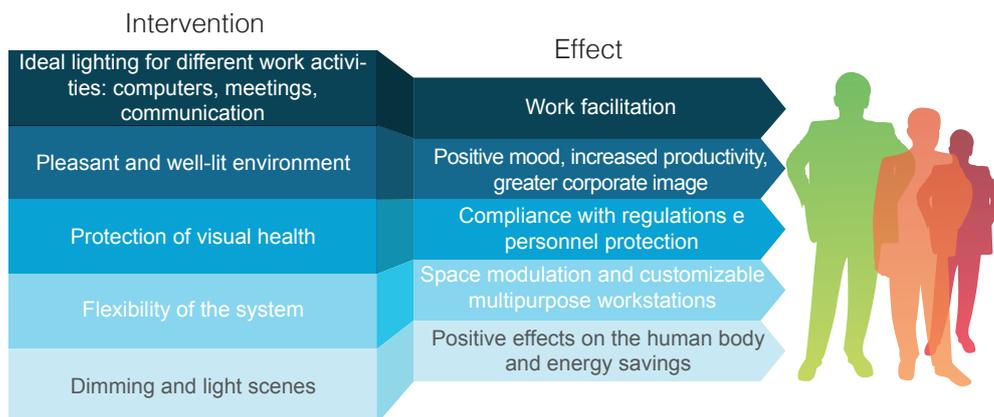
Our offices have changed and require certain lighting adjustments.

For example, traditional workstations are being replaced by multi-use spaces that require flexible lighting solutions, characterized by dynamic lights capable of adjusting to different needs and work tasks.

This flexibility is even more necessary with co-working offices and workstations shared among different users, who must be able to quickly change space layout.

The effects of light in the workplace

	Visual effects Lighting levels comply with standards:	<ul style="list-style-type: none"> • In task areas • On walls and ceilings • In cylindrical luminance areas
	Emotional effects	<ul style="list-style-type: none"> • Balanced relationship between natural and artificial light • Choice and arrangement of luminaires to create a pleasant result
	Biological effects	<ul style="list-style-type: none"> • The lighting spectrum is considered at different moments of the day in order to follow our biological clock as best as possible • Lights are biologically effective throughout the day in order to support tasks and productivity as best as possible



Which lighting fixtures can be used to achieve HCL at work?

To achieve the desired goals, lighting fixtures must have different features. Designers should use them in the best way possible according to the space's specific needs.

Today there are many fixtures available and include:

Suspended luminaires for the direct/indirect lighting of workstations.

Ceiling/recess luminaires for the lighting of space with a wide distribution of light.



Lighting is certainly a fundamental element for the image and the prestige of a school.

Buildings fitting innovative LED fixtures designed according to Human Centric Lighting criteria make an excellent impression for a school that wants to succeed in an increasingly competitive market.

How do we get the benefits of HCL in learning institutions?

Human centric lighting is, above all, stable, evenly distributed, and especially without glare and flickering effects that not only affect our concentration but are also harmful to our health. Moreover, with the new LED fixtures, it is possible to provide different lighting levels according to different needs, such as reading, working at a computer, laboratory activity and for communicating with the teacher. A very important advantage is the dynamic element of lighting that can be introduced in all the rooms of the school, like classrooms, labs, auditorium, and transit zones. A dynamic light can provide the right balance with the daylight coming from the windows and help teachers work better. During the first hours of the school morning, for example, a cold light helps keep students attentive and focused; with the passing of the hours a warmer light can have a relaxing effect on an agitated and hyperactive class.



Reading: 3000 K

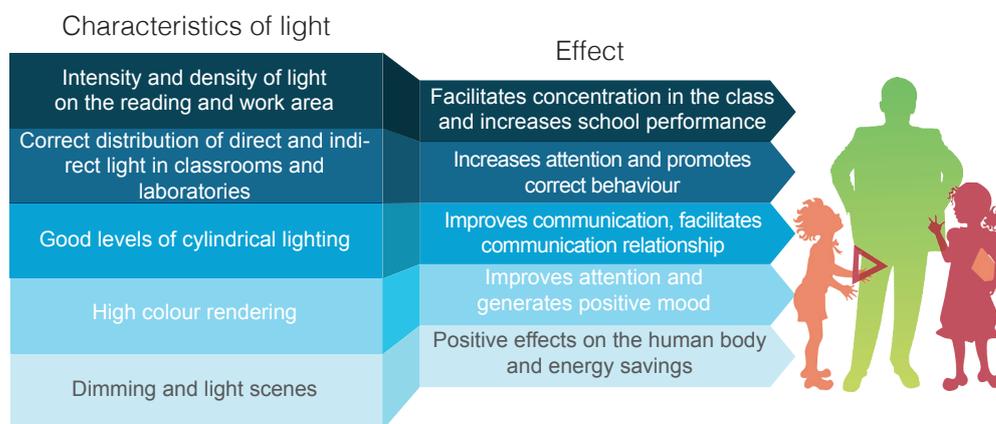
Class work: 3500 K

Lesson: 4200 K

Energy: 5000 K

How do we get the benefits of HCL in learning institutions?

A lighting design that follows Human Centric Lighting criteria will take into account of the visual effects of light in accordance with applicable legal criteria, as well as emotional effects (impact on mood, attention and concentration) and biological effects (circadian rhythm), which will all contribute to the development of the right lighting system.

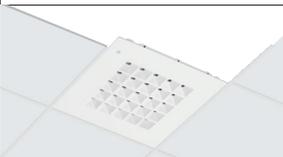


Which lighting fixtures can be used to achieve HCL at school?

To obtain the results above, we can choose LED fixtures with different characteristics and functions.

Ceiling/recessed luminaires for ambient lighting with wide distribution, with the following functions:

- stable and well-distributed general lighting
- good balance with daylight in all seasons
- improve concentration (with or without computers, tablets)
- ease communication (teacher's lessons, students' interventions)
- dimmable systems, colour variations, lighting scene management

Toledo	Comfortsquare	Office 1	Liset 2.0	Liset 2.0
TW - HCL	TW - HCL	TW	TW - HCL	TW - HCL
				
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Light designed for people is now possible thanks to the progress made in the LED technology and to the scientific research that has shown the multiple effects of light that affect both our biological rhythm and physiological wellbeing. These factors are particularly important in healthcare facilities that accommodate patients with health problems and workers employed to provide the best medical assistance possible.

Human Centric Lighting in hospitals?

Energy saving: in developed countries, where population is aging and life expectancy is increasing, health is one of the most important items in a country's public expenditure and it is expected to increase further in the future. Therefore, energy savings are crucial for hospitals and private and public healthcare structures. In buildings where lights always stay on, LED sources and light dimmers make the lighting system more efficient and sustainable.

Healthcare and the new technologies: modern hospitals are healthcare centres with highly specialised machinery, and homes for the elderly are places designed to ensure the wellbeing of their guests. In these places, lighting must help create functional, cosy, and comfortable environments. To achieve this result, it is possible to use light sources with a high colour rendering, dynamic lighting and dimmers, while balancing the right amount of daylight.

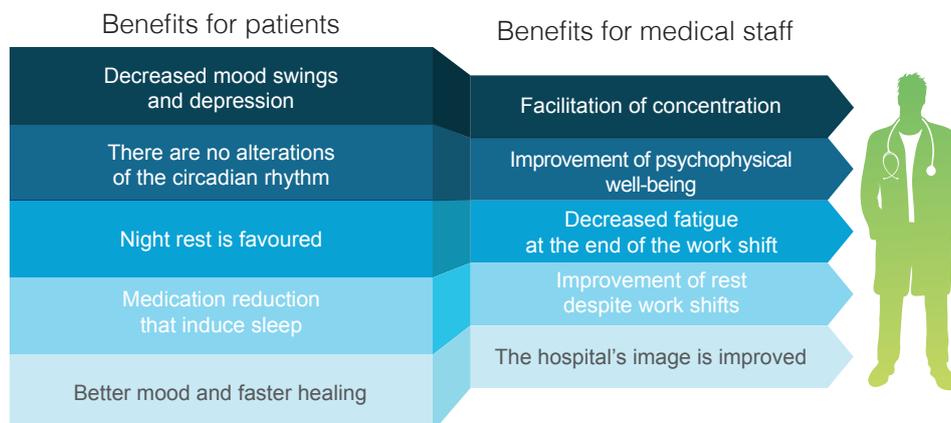
A support for patients and staff: extensive research has demonstrated that good lighting can favour the psycho-physical wellbeing of people and therefore speed up the patients' healing and recovery. Good lighting is equally important for doctors and nurses, who often work for very long shifts, so having a functional lighting system helps them feel less tired at the end of their workday.

Pleasant environments for elderly and sick patients: in care homes and hospices, people are more prone to depression or sadness. A lighting system based on the principles of Human Centric Lighting can be very helpful to improve their mood and allow staff and patients to face the day more pleasantly.



How do we get the benefits of HCL healthcare facilities?

Inside hospitals, the need for protected and well-ventilated environments and the presence of delicate equipment in patient rooms and in operating theatres often prevent a good balance with natural light. This may have a negative impact on the biological and psychological wellbeing of both patients and medical staff who are forced to spend many hours under artificial lighting.



With the right luminaires and a correct Human Centric Lighting approach, it is possible to use different colour temperatures and light intensities in the various rooms, as well as dimming the lights throughout the day, with pleasant and relaxing effects. Thanks to tests and clinical studies carried out in healthcare facilities, it was possible to see that a correctly designed lighting system offers major benefits to patients and healthcare staff alike.

The advantages of dynamic lighting

- In residential healthcare facilities, which host mostly elderly people, many of whom suffering from neurodegenerative diseases, it is very important for guests to enjoy a stable mood.
- Using light sources with different colour temperatures and dynamic dimmers, allows mimicking the trend of natural light with positive effects on mood and life quality.
- Human Centric Lighting can play an important role especially in winter when the exposure to natural light is limited.

Time	From 9:00 a.m. to 3:00 p.m.	From 3:00 p.m. to 8:00 p.m.
E_z cylindrical illuminance	1200 lux every 1.2 metres in rooms and 1.6 in corridors	
Colour temperature	6500 K	2700-3000 K

Which lighting fixtures can be used to achieve HCL in hospitals?

For a lighting system installed in hospital facilities to comply with Human centric Lighting principles, several types of fixtures can be used:

Ceiling/recessed luminaires: for the general lighting of rooms with wide light distribution or for special lighting in operating theatres.

Suspended luminaires: for direct/indirect lighting. Dimmers, colour changes, light scenes controllers.

Toledo	Comfortsquare	Office 1	Liset 2.0	Liset 2.0
TW - HCL	TW - HCL	TW	TW - HCL	TW - HCL
p. 18-21	p. 22-25	p. 26	p. 30-33	



Housing and frame: housing in galvanised steel sheet, and frame in aluminium, contact mounting on the cross T structure.

Diffuser: in prismatic engineering plastic with high thermal transmittance.

Wiring: rapid wiring connection, the fixture does not need to be opened.

UGR glare index: UGR<19 (in any situation). - EN 12464.

LED: luminous flux maintenance 90%; 80.000h (L90B10). Power factor ≥ 0.95 .
Photobiological safety class: exempt group.

ADVANTAGES:

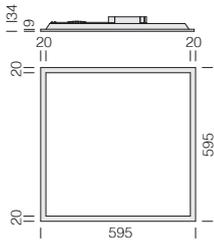
- Possibility to change the colour of light manually
- No circadian cycle

APPLICATIONS:

- Corridors, stairways, entrance halls
- Public spaces: stores, hotels and restaurants
- Public buildings and offices

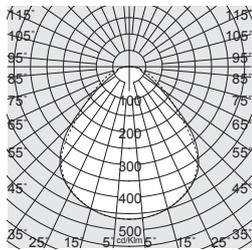


v.a. IP20 IK06
v.l. IP40 IK06



Toledo TW - UGR<19

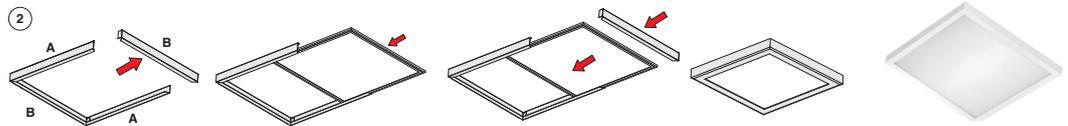
		CLD D-DIG (DALI)		LUMEN OUTPUT (tq= 25 °C)	
LED	colour	weight	code	W tot	K - ølm - CRI
LED	white	1.30	22150310-0024	40	2700K÷6500K - 4681lm - CRI>90



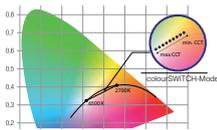
Frame for Toledo - 600x600 h70

white	22097003-00
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Frame in white-coated aluminium; to be used for ceiling installation.



TECHNICAL CHARACTERISTICS - TOLEDO TW BASIC



- Colour temperature adjustment range from 2700K to 6500K on a linear scale
- MacAdams 3
- Full 3% to 100% dimming range
- ≤4% flicker
- Constant colour temperature over the entire dimming range
- Constant luminous flux

colourSWITCH function

A conventional pushbutton can be used to control the system via colourSWITCH. Use of pushbutton with indicator lamp is not permitted. If the device is controlled via DALI/DSI, colourSWITCH is not available. For control via a pushbutton different settings can be made:

- Short press: setting the colour temperature via colourSWITCH mode with 9 values between 2,700 and 6,500 K.
- Long press (> 1 s): stepless setting of colour temperature. After completion the colour temperature direction will be inverted. In installations with LED Drivers with different colour temperature or opposite colour temperature directions (e.g. after a system extension), all LED Drivers can be synchronized to 4,500 K by a 10 s push.

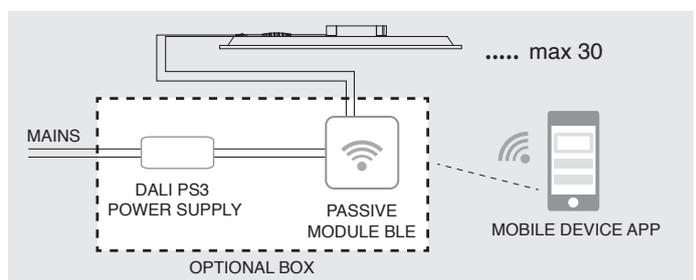
switchDIM function

Integrated switchDIM function allows a direct connection of a pushbutton for dimming and switching. Brief push (< 0.6 s) switches LED Driver ON and OFF. The dim level is saved at power-down and restored at power-up. When the pushbutton is held, LED modules are dimmed. After releasing and pushing the LED modules are dimmed in the opposite direction. In installations with LED Drivers with different dimming levels or opposite dimming directions (e.g. after a system extension), all LED Drivers can be synchronized to 50 % dimming level by a 10 s push. Use of pushbutton with indicator lamp is not permitted.

TOLEDO - HCL BASIC VERSION: INSTALLATION EXAMPLE

Toledo can be upgraded to the HCL version (with pre-set circadian cycle) by purchasing the DALI PS3 supplier and the BLE transmitter (that does not need a control line) separately and connecting it downstream the system in order to control maximum 30 fixtures. The ceiling fixture can be easily controlled from a smartphone/tablet via an app.

COMPONENTS	CODE
power supply DALI PS3	986440-00
BLE Passive module	986441-00
APP 4remote BT (to download on iOS or Android)	free





Housing and frame: housing in galvanised steel sheet, and frame in aluminium, contact mounting on the cross T structure.

Diffuser: in prismatic engineering plastic with high thermal transmittance.

Wiring: rapid wiring connection, the fixture does not need to be opened.

UGR glare index: UGR<19 (in any situation). - EN 12464.

LED: luminous flux maintenance 90%; 80.000h (L90B10). Power factor ≥ 0.95 .
Photobiological safety class: exempt group.

ADVANTAGES:

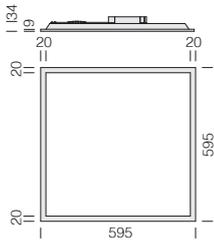
- Simulation of daylight changes throughout the day
- Circadian cycle: colour changes automatically based on the time of the day and daylight

APPLICATIONS:

- Corridors, stairs, entrances
- Public spaces: shops, hotels and restaurants
- Public buildings and offices

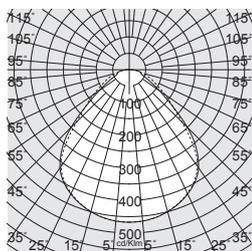


v.a. IP20 IK06
v.l. IP40 IK06



Toledo **HCL** - WIRELESS - UGR<19

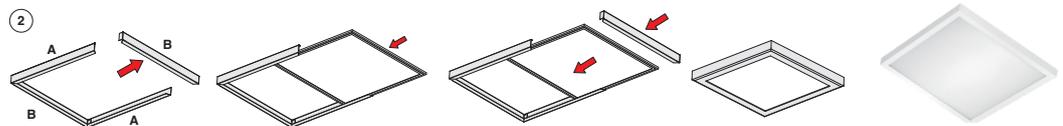
		CLD DW (HCL)		LUMEN OUTPUT (tq= 25 °C)	
LED	colour	weight	code	W tot	K - ølm - CRI
LED	white	1.30	22150310-89	40	2700K÷6500K - 4681lm - CRI>90



Frame for Toledo - 600x600 h70

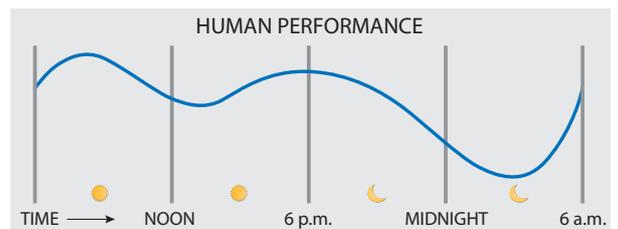
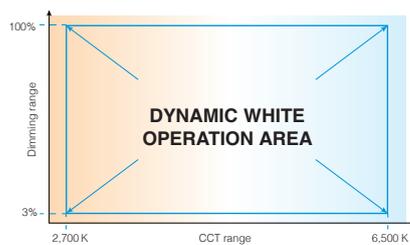
white	22097003-00
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Frame in white-coated aluminium; to be used for ceiling installation.



TECHNICAL CHARACTERISTICS - **HCL** WIRELESS VERSION

- Colour temperature adjustment range from 2700K to 6500K on a linear scale
- MacAdams 3
- Full 3% to 100% dimming range
- ≤4% flicker
- Constant colour temperature over the entire dimming range
- Constant luminous flux
- LED driver that automatically adjusts lights to the desired colour temperature and the required luminous flux

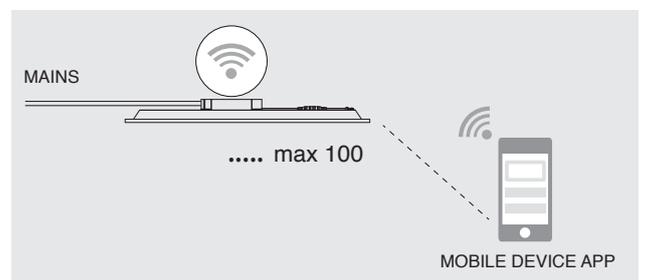


The Dynamic White function allows adjusting the colour temperature from 2700K to 6500K to create a sense of the passing of time (circadian rhythm) and to set the mood and ambiance of a space according to our daily activities. Circadian lighting obtained with the Dynamic White function is the best solution to implement Human Centric Lighting (HCL) in classrooms, university campuses, offices and hospitals where lights can mimic the natural trend of daylight throughout the entire day.

HCL WIRELESS INSTALLATION EXAMPLE (POINT-TO-POINT)

The wireless driver is integrated directly into the panel that does not require additional accessories. Comfortsquare can be easily controlled from a smartphone/tablet via the free app.

COMPONENTS	CODE
Nr. 4 Comfortsquare 813 (max.100)	150331-1989
APP 4 remote BT (to download on iOS or Android)	free





The standard version of Comfortsquare integrates a presence/lighting sensor to turn lights on or off when it detects occupancy in the room and based on the level of light at that moment.

Housing: self-extinguishing injection-moulded polycarbonate in RAL 9016 colour.

LED: luminous flux maintenance 80%: 80.000h (L80B20).

Luminous flux maintenance 90%: 40.000h (L90B10).

Power factor ≥ 0.95 .

Photobiological safety class: exempt group.

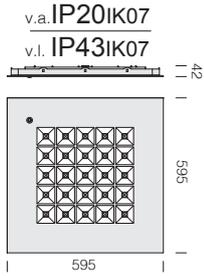
ADVANTAGES:

- Possibility to change the colour of light manually
- No circadian cycle

APPLICATIONS:

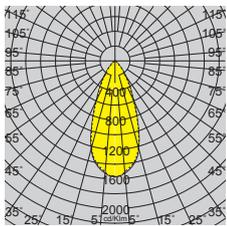
- Corridors, stairways, entrance halls
- Public spaces: stores, hotels and restaurants
- Public buildings and offices

UGR <16



812 Comfortsquare TW - PRESENCE AND LIGHT SENSOR

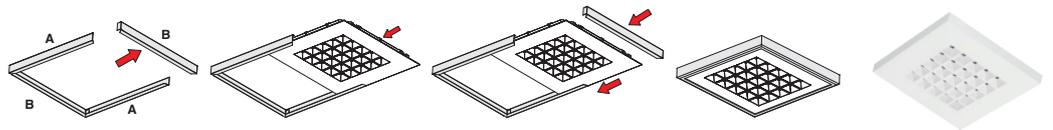
		CLD D-DIG (DALI)		LUMEN OUTPUT (tq= 25 °C)	
wattage	colour	weight	code	W	K - ølm - CRI - degrees
LED	white	4.00	150330-1924	28	2700 K (2452 lm) ÷ 6500 K (2658 lm) - CRI 90 - 43°



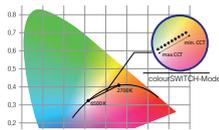
acc. 595 frame 600x600 h70

white 998035-00

Frame in white-coated aluminium; to be used for ceiling installation of Comfortsquare LED.



TECHNICAL CHARACTERISTICS - COMFORTSQUARE TW BASIC VERSION



- Colour temperature adjustment range from 2700K to 6500K on a linear scale
- MacAdams 3
- Full 3% to 100% dimming range
- ≤4% flicker
- Constant colour temperature over the entire dimming range
- Constant luminous flux

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A conventional pushbutton can be used to control the system via colourSWITCH. Use of pushbutton with indicator lamp is not permitted. If the device is controlled via DALI/DSI, colourSWITCH is not available. For control via a pushbutton different settings can be made:

- Short press: setting the colour temperature via colourSWITCH mode with 9 values between 2,700 and 6,500 K.
- Long press (> 1 s): stepless setting of colour temperature. After completion the colour temperature direction will be inverted. In installations with LED Drivers with different colour temperature or opposite colour temperature directions (e.g. after a system extension), all LED Drivers can be synchronized to 4,500 K by a 10 s push.

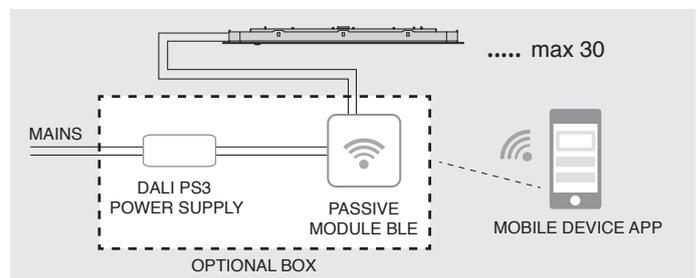
switchDIM function

Integrated switchDIM function allows a direct connection of a pushbutton for dimming and switching. Brief push (< 0.6 s) switches LED Driver ON and OFF. The dim level is saved at power-down and restored at power-up. When the pushbutton is held, LED modules are dimmed. After releasing and pushing the LED modules are dimmed in the opposite direction. In installations with LED Drivers with different dimming levels or opposite dimming directions (e.g. after a system extension), all LED Drivers can be synchronized to 50 % dimming level by a 10 s push. Use of pushbutton with indicator lamp is not permitted.

COMFORTSQUARE - HCL BASIC VERSION: INSTALLATION EXAMPLE

Comfortsquare can be upgraded to the HCL version (with pre-set circadian cycle) by purchasing the DALI PS3 supplier and the BLE transmitter (that does not need a control line) separately and connecting it downstream the system in order to control maximum 30 fixtures. The ceiling fixture can be easily controlled from a smartphone/tablet via an app.

COMPONENTS	CODE
power supply DALI PS3	986440-00
BLE Passive module	986441-00
APP 4remote BT (to download on iOS or Android)	free





The standard version of Comfortsquare integrates a presence/lighting sensor to turn lights on or off when it detects occupancy in the room and based on the level of light at that moment. When lights switch on, the ceiling lamp will reset from the pre-set cycle.

Housing: self-extinguishing injection-moulded polycarbonate in RAL 9016 colour.

LED: luminous flux maintenance 80%: 80.000h (L80B20).

Luminous flux maintenance 90%: 40.000h (L90B10).

Power factor ≥ 0.95 .

Photobiological safety class: exempt group.

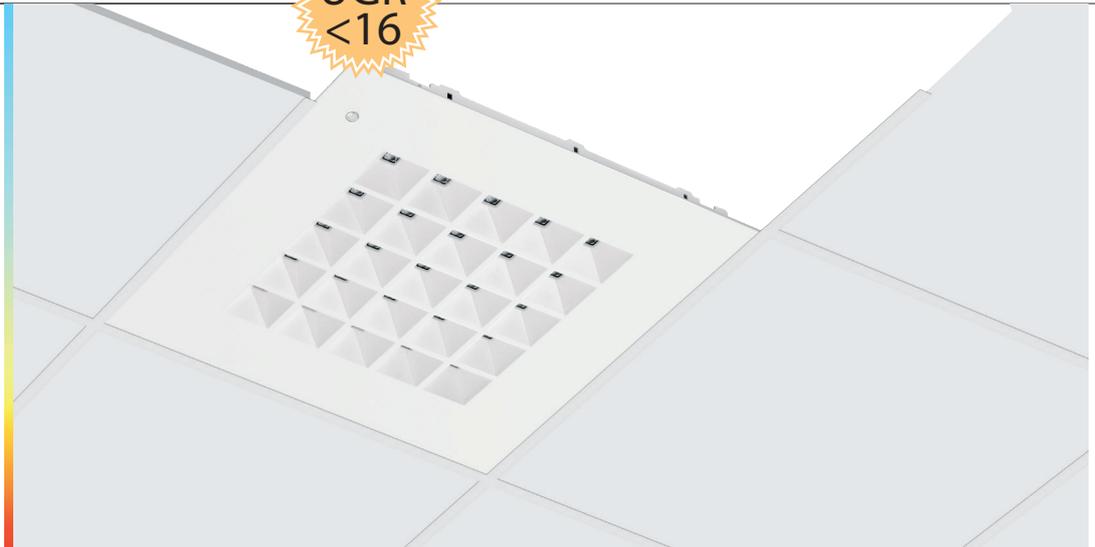
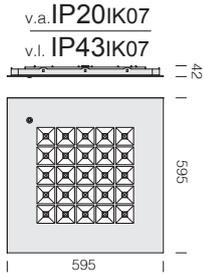
ADVANTAGES:

- Simulation of daylight changes throughout the day
- Circadian cycle: colour changes automatically based on the time of the day and daylight

APPLICATIONS:

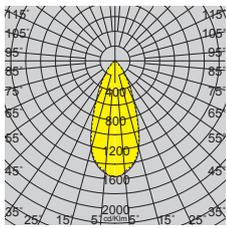
- Corridors, stairs, entrances
- Public spaces: shops, hotels and restaurants
- Public buildings and offices

UGR <16



813 Comfortsquare HCL - WIRELESS - PRESENCE AND LIGHT SENSOR

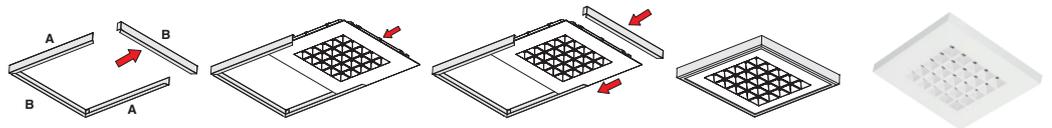
		CLD DW (HCL)			LUMEN OUTPUT (tq= 25 °C)	
wattage	colour	weight	code	W	K - ølm - CRI - degrees	
LED	white	4.00	150331-1989	28	2700 K (2452 lm) ÷ 6500 K (2658 lm) - CRI 90 - 43°	



acc. 595 frame 600x600 h70

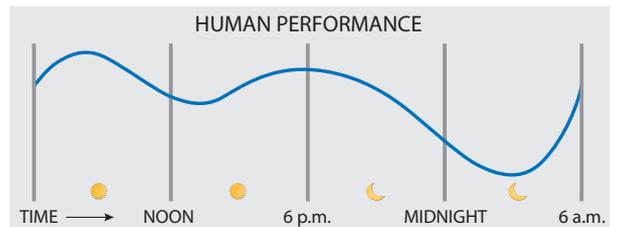
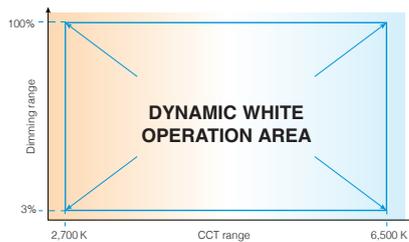
white 998035-00

Frame in white-coated aluminium; to be used for ceiling installation of Comfortsquare LED.



TECHNICAL CHARACTERISTICS - HCL WIRELESS VERSION

- Colour temperature adjustment range from 2700K to 6500K on a linear scale
- MacAdams 3
- Full 3% to 100% dimming range
- ≤4% flicker
- Constant colour temperature over the entire dimming range
- Constant luminous flux
- LED driver that automatically adjusts lights to the desired colour temperature and the required luminous flux

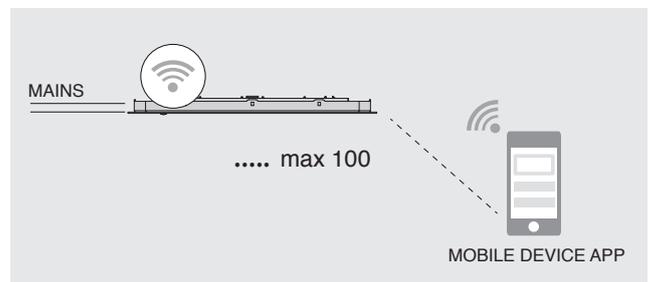


The Dynamic White function allows adjusting the colour temperature from 2700K to 6500K to create a sense of the passing of time (circadian rhythm) and to set the mood and ambiance of a space according to our daily activities. Circadian lighting obtained with the Dynamic White function is the best solution to implement Human Centric Lighting (HCL) in classrooms, university campuses, offices and hospitals where lights can mimic the natural trend of daylight throughout the entire day.

HCL WIRELESS INSTALLATION EXAMPLE (POINT-TO-POINT)

The wireless driver is integrated directly into the panel that does not require additional accessories. Comfortsquare can be easily controlled from a smartphone/tablet via the free app.

COMPONENTS	CODE
Nr. 4 Comfortsquare 813 (max.100)	150331-1989
APP 4 remote BT (to download on iOS or Android)	free





Housing-reflector: in V2 shatterproof, self-extinguishing polycarbonate, coated with high-performance aluminium powder and equipped with anti-reflection and anti-glare optics. Perimeter border on the false ceiling has white or aluminium coloured photogravure finishing. Support bracket in galvanised steel with housings for fastening springs made in galvanised steel wire for false ceiling mounting. Shielding at 65°.

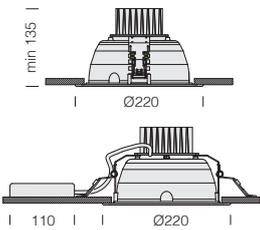
Functions:

- constant light output function (CLO)
- switchDIM and colourSWITCH with memory function;
- colourSWITCH with 9 predefined colours;
- configurable via DALI;

v.a. IP20 IK07

v.l. IP40 IK07

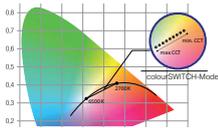
min Ø 190
max Ø 215



Office 1 **TW** - BASIC - DARK

LED	colour	CLD D-DIG (DALI)		W tot	LUMEN OUTPUT (tq= 25 °C)
		weight	code		K - ølm - CRI - degrees
COB	aluminium	0.90	22152378-00	31	2700 K ÷ 6500 K - 3000lm - CRI>90

TECHNICAL CHARACTERISTICS - OFFICE 1 **TW** VERSION



- Colour temperature adjustment range from 2700K to 6500K on a linear scale
- MacAdams 3
- Full 3% to 100% dimming range
- ≤4% flicker
- Constant colour temperature over the entire dimming range
- Constant luminous flux

colourSWITCH function

A conventional pushbutton can be used to control the system via colourSWITCH. Use of pushbutton with indicator lamp is not permitted. If the device is controlled via DALI/DSI, colourSWITCH is not available. For control via a pushbutton different settings can be made:

- Short press: setting the colour temperature via colourSWITCH mode with 9 values between 2,700 and 6,500 K.
- Long press (> 1 s): stepless setting of colour temperature. After completion the colour temperature direction will be inverted. In installations with LED Drivers with different colour temperature or opposite colour temperature directions (e.g. after a system extension), all LED Drivers can be synchronized to 4,500 K by a 10 s push.

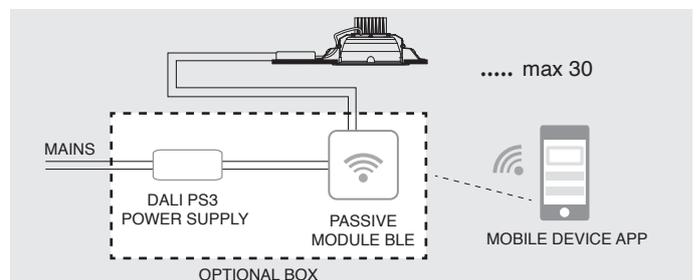
switchDIM function

Integrated switchDIM function allows a direct connection of a pushbutton for dimming and switching. Brief push (< 0.6 s) switches LED Driver ON and OFF. The dim level is saved at power-down and restored at power-up. When the pushbutton is held, LED modules are dimmed. After releasing and pushing the LED modules are dimmed in the opposite direction. In installations with LED Drivers with different dimming levels or opposite dimming directions (e.g. after a system extension), all LED Drivers can be synchronized to 50 % dimming level by a 10 s push. Use of pushbutton with indicator lamp is not permitted.

COMFORTSQUARE - **HCL** BASIC VERSION: INSTALLATION EXAMPLE

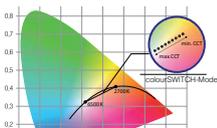
Comfortsquare can be upgraded to the HCL version (with pre-set circadian cycle) by purchasing the DALI PS3 supplier and the BLE transmitter (that does not need a control line) separately and connecting it downstream the system in order to control maximum 30 fixtures. The ceiling fixture can be easily controlled from a smartphone/tablet via an app.

COMPONENTS	CODE
power supply DALI PS3	986440-00
BLE Passive module	986441-00
APP 4remote BT (to download on iOS or Android)	free





TECHNICAL CHARACTERISTICS - LISET2.0 TW BASIC VERSION



- Colour temperature adjustment range from 2700K to 6500K on a linear scale
- MacAdams 3
- Full 3% to 100% dimming range
- ≤4% flicker
- Constant colour temperature over the entire dimming range
- Constant luminous flux

colourSWITCH function

A conventional pushbutton can be used to control the system via colourSWITCH. Use of pushbutton with indicator lamp is not permitted. If the device is controlled via DALI/DSI, colourSWITCH is not available. For control via a pushbutton different settings can be made:

- Short press: setting the colour temperature via colourSWITCH mode with 9 values between 2,700 and 6,500 K.
- Long press (> 1 s): stepless setting of colour temperature. After completion the colour temperature direction will be inverted. In installations with LED Drivers with different colour temperature or opposite colour temperature directions (e.g. after a system extension), all LED Drivers can be synchronized to 4,500 K by a 10 s push.

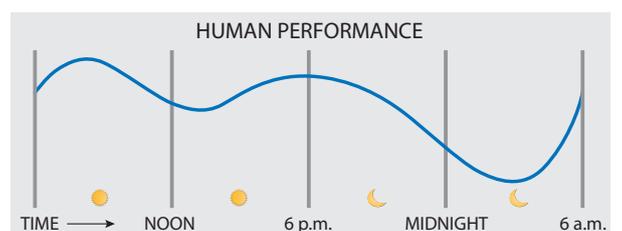
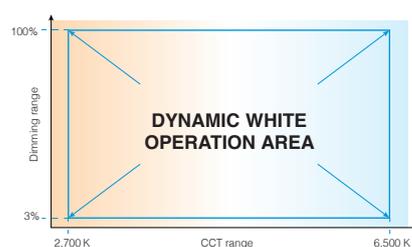
switchDIM function

Integrated switchDIM function allows a direct connection of a pushbutton for dimming and switching. Brief push (< 0.6 s) switches LED Driver ON and OFF. The dim level is saved at power-down and restored at power-up. When the pushbutton is held, LED modules are dimmed. After releasing and pushing the LED modules are dimmed in the opposite direction. In installations with LED Drivers with different dimming levels or opposite dimming directions (e.g. after a system extension), all LED Drivers can be synchronized to 50 % dimming level by a 10 s push. Use of pushbutton with indicator lamp is not permitted.



TECHNICAL CHARACTERISTICS - HCL WIRELESS VERSION

- Colour temperature adjustment range from 2700K to 6500K on a linear scale
- MacAdams 3
- Full 3% to 100% dimming range
- $\leq 4\%$ flicker
- Constant colour temperature over the entire dimming range
- Constant luminous flux
- LED driver that automatically adjusts lights to the desired colour temperature and the required luminous flux



The Dynamic White function allows adjusting the colour temperature from 2700K to 6500K to create a sense of the passing of time (circadian rhythm) and to set the mood and ambiance of a space according to our daily activities. Circadian lighting obtained with the Dynamic White function is the best solution to implement Human Centric Lighting (HCL) in classrooms, university campuses, offices and hospitals where lights can mimic the natural trend of daylight throughout the entire day.



Housing: made of extruded aluminium.

Heads: in die cast-aluminium.

Diffuser: in polycarbonate.

LED: luminous flux maintenance 80%: 50.000h (L80B20). Power factor: $\geq 0,92$.
Photobiological safety class: exempt group.

ADVANTAGES:

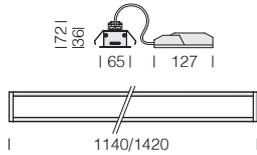
- Possibility to change the colour of light manually
- No circadian cycle

APPLICATIONS:

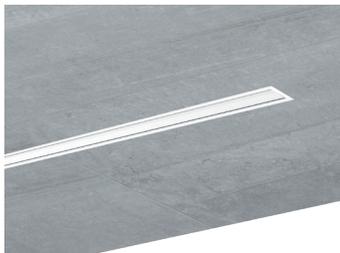
- Corridors, stairways, entrance halls
- Public spaces: stores, hotels and restaurants
- Public buildings and offices

v.a. **IP20 IK07**
 v.l. **IP40 IK07**

55 x 1150
 55 x 1435



IP40 IK07



Liset 2.0 TW - BASIC - recessed

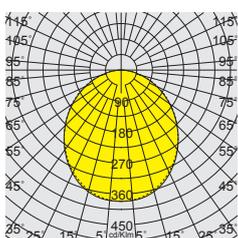
		CLD D-DIG (DALI)			LUMEN OUTPUT (tq= 25 °C)	
LED	colour	L (mm)	weight	code	W tot	K - ølm - CRI
LED 4 modules	white	1140	1.60	22302201-0024	40	2700K±6500K - 3250±3220lm - CRI>90
LED 5 modules	white	1420	2.00	22302202-0024	40	2700K±6500K - 2984±3176lm - CRI>90

Liset 2.0 TW - BASIC - ceiling

		CLD D-DIG (DALI)			LUMEN OUTPUT (tq= 25 °C)	
LED	colour	L (mm)	weight	code	W tot	K - ølm - CRI
LED 4 modules	white	1135	2.50	22302203-0024	40	2700K±6500K - 2899±3357lm - CRI>90
	black			22302233-0024		
LED 5 modules	white	1415	3.10	22302204-0024	40	2700K±6500K - 3044±3524lm - CRI>90
	black			22302234-0024		

Liset 2.0 TW - BASIC - suspension - direct light

		CLD D-DIG (DALI)			LUMEN OUTPUT (tq= 25 °C)	
LED	colour	L (mm)	weight	code	W tot	K - ølm - CRI
LED 4 modules	white	1135	2.50	22302208-0024	40	2700K±6500K - 2899±3357lm - CRI>90
	black			22302238-0024		
LED 5 modules	white	1415	3.10	22302209-0024	40	2700K±6500K - 3044±3524lm - CRI>90
	black			22302239-0024		





Housing: made of extruded aluminium.

Heads: in die cast-aluminium.

Diffuser: inl polycarbonate.

LED: luminous flux maintenance 80%: 50.000h (L80B20). Power factor: $\geq 0,92$.
Photobiological safety class: exempt group.

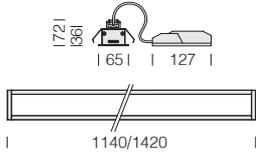
ADVANTAGES:

- Simulation of daylight changes throughout the day
- Circadian cycle: colour changes automatically based on the time of the day and daylight

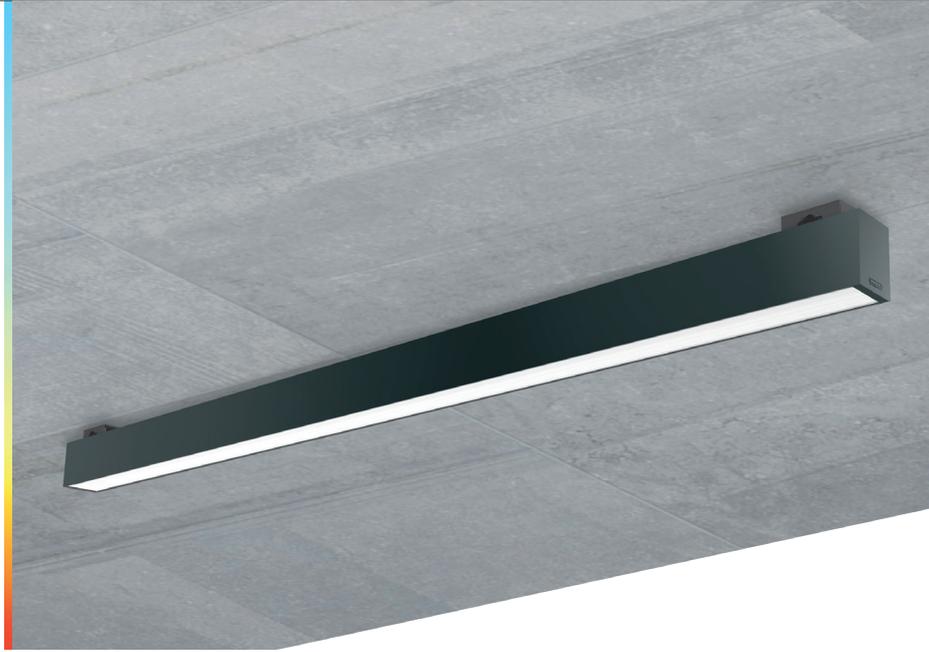
APPLICATIONS:

- Corridors, stairs, entrances
- Public spaces: shops, hotels and restaurants
- Public buildings and offices

v.a. **IP20 IK07** 
 v.l. **IP40 IK07** 
 55 x 1150
 55 x 1435



IP40 IK07 



Liset 2.0 HCL - WIRELESS - recessed

LED	colour	CLD DW (HCL)			W tot	LUMEN OUTPUT (tq= 25 °C)
		L (mm)	weight	code		K - ølm - CRI
LED 4 modules	white	1140	1.60	22302201-89	40	2700K÷6500K - 3250÷3220lm - CRI>90
LED 5 modules	white	1420	2.00	22302202-89	40	2700K÷6500K - 2984÷3176lm - CRI>90



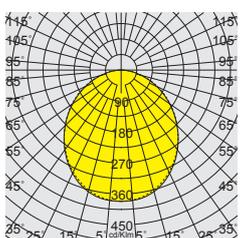
Liset 2.0 HCL - WIRELESS - ceiling

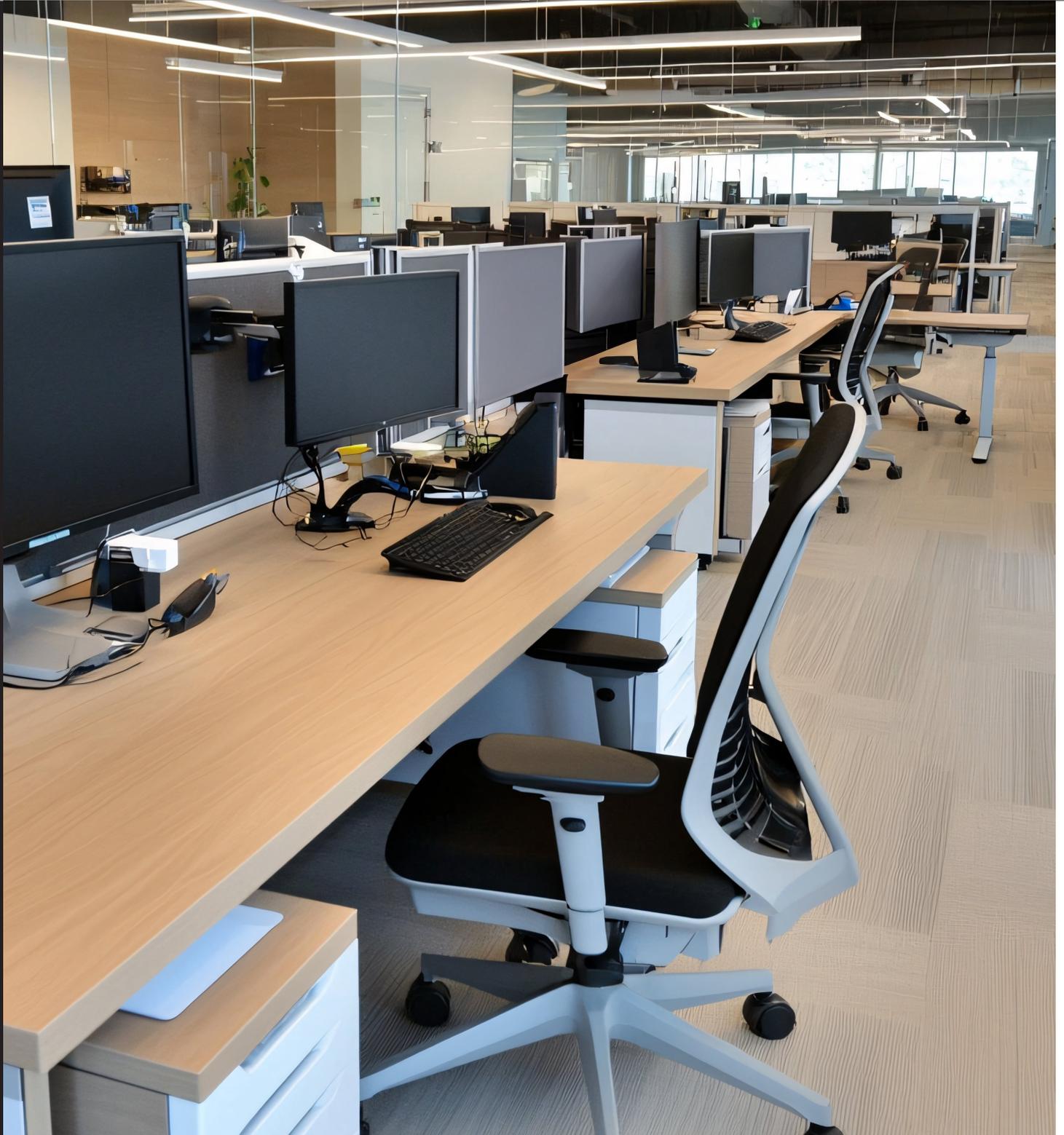
LED	colour	CLD DW (HCL)			W tot	LUMEN OUTPUT (tq= 25 °C)
		L (mm)	weight	code		K - ølm - CRI
LED 4 modules	white	1135	2.50	22302203-89	40	2700K÷6500K - 2899÷3357lm - CRI>90
	black			22302233-89		
LED 5 modules	white	1415	3.10	22302204-89	40	2700K÷6500K - 3044÷3524lm - CRI>90
	black			22302234-89		



Liset 2.0 HCL - WIRELESS - suspension - direct light

LED	colour	CLD DW (HCL)			W tot	LUMEN OUTPUT (tq= 25 °C)
		L (mm)	weight	code		K - ølm - CRI
LED 4 modules	white	1135	2.50	22302208-89	40	2700K÷6500K - 2899÷3357lm - CRI>90
	black			22302238-89		
LED 5 modules	white	1415	3.10	22302209-89	40	2700K÷6500K - 3044÷3524lm - CRI>90
	black			22302239-89		





Housing: made of extruded aluminium.

Heads: in die cast-aluminium.

Comfort optics: in white anti-glare polycarbonate for improved visual comfort.

LED: luminous flux maintenance 80%: 50.000h (L80B20). Power factor: $\geq 0,92$.
Photobiological safety class: exempt group.

ADVANTAGES:

- Possibility to change the colour of light manually
- No circadian cycle

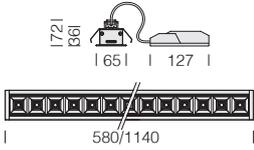
APPLICATIONS:

- Corridors, stairways, entrance halls
- Public spaces: stores, hotels and restaurants
- Public buildings and offices

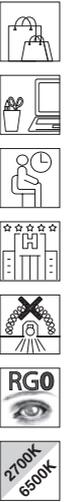


v.a. IP20 IK07
v.l. IP40 IK07

55 x 570
55 x 1130

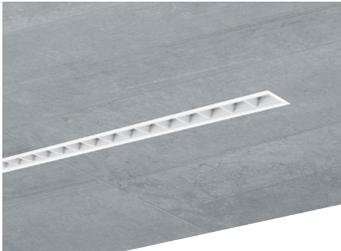


IP40 IK07



Liset 2.0 TW - BASIC - recessed - UGR<19

LED	colour	CLD D-DIG (DALI)			W tot	LUMEN OUTPUT (tq= 25 °C)
		L (mm)	weight	code		K - ølm - CRI - degrees
LED 14 lenses	white	580	1.10	22302101-0024	16	2700K÷6500K - 2092lm - CRI>80 - 65°
LED 28 lenses	white	1140	2.30	22302102-0024	29	2700K÷6500K - 3603lm - CRI>80 - 65°



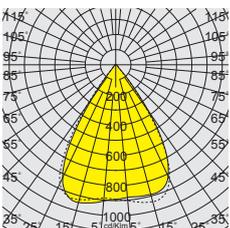
Liset 2.0 TW - BASIC - ceiling - UGR<19

LED	colour	CLD D-DIG (DALI)			W tot	LUMEN OUTPUT (tq= 25 °C)
		L (mm)	weight	code		K - ølm - CRI - degrees
LED 28 lenses	white black	1135	3.00	22302111-0024 22302135-0024	29	2700K÷6500K - 3375lm - CRI>80 - 65°

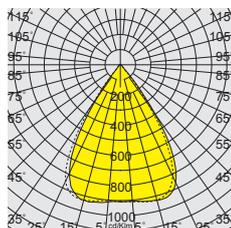


Liset 2.0 TW - BASIC - suspension - direct light - UGR<19

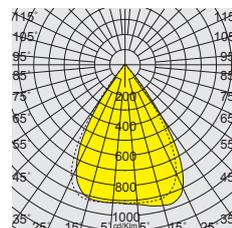
LED	color	CLD D-DIG (DALI)			W tot	LUMEN OUTPUT (tq= 25 °C)
		L (mm)	weight	code		K - ølm - CRI - degrees
LED 28 lenses	white black	1135	3.00	22302111-0024 22302131-0024	29	2700K÷6500K - 3375lm - CRI>80 - 65°



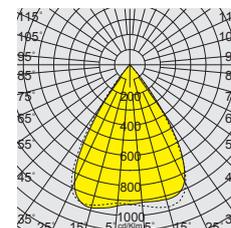
2700 K - white optic



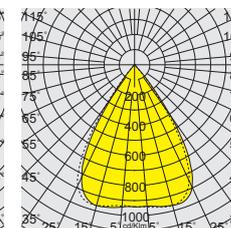
4000 K - white optic



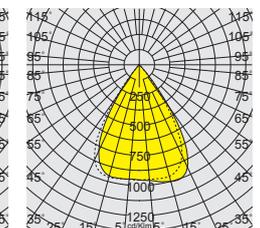
6500 K - white optic



2700 K - black optic



4000 K - black optic



6500 K - black optic



Housing: made of extruded aluminium.

Heads: in die cast-aluminium.

Comfort optics: in white anti-glare polycarbonate for improved visual comfort.

LED: luminous flux maintenance 80%: 50.000h (L80B20). Power factor: $\geq 0,92$.
Photobiological safety class: exempt group.

ADVANTAGES:

- Simulation of daylight changes throughout the day
- Circadian cycle: colour changes automatically based on the time of the day and daylight

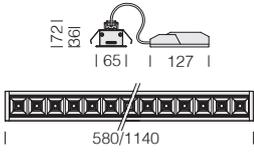
APPLICATIONS:

- Corridors, stairs, entrances
- Public spaces: shops, hotels and restaurants
- Public buildings and offices



v.a. IP20 IK07
v.l. IP40 IK07

55 x 570
55 x 1130



IP40 IK07

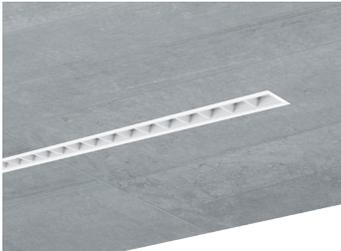
160
150

160
150



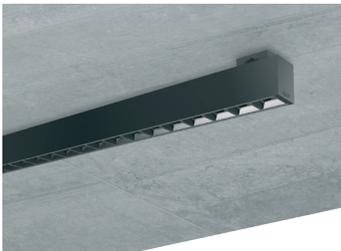
Liset 2.0 HCL - WIRELESS - recessed - UGR<19

LED	colour	CLD DW (HCL)			W tot	LUMEN OUTPUT (tq= 25 °C)
		L (mm)	weight	code		K - ølm - CRI - degrees
LED 14 lenses	white	580	1.10	22302101-89	16	2700K÷6500K - 2092lm - CRI>80 - 65°
LED 28 lenses	white	1140	2.30	22302102-89	29	2700K÷6500K - 3603lm - CRI>80 - 65°



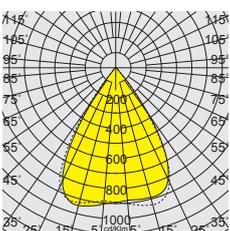
Liset 2.0 HCL - WIRELESS - ceiling - UGR<19

LED	colour	CLD DW (HCL)			W tot	LUMEN OUTPUT (tq= 25 °C)
		L (mm)	weight	code		K - ølm - CRI - degrees
LED 28 lenses	white black	1135	3.00	22302105-89 22302135-89	29	2700K÷6500K - 3375lm - CRI>80 - 65°

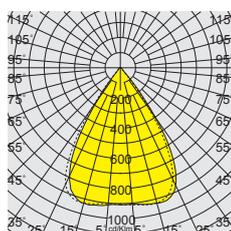


Liset 2.0 HCL - WIRELESS - suspension - direct light - UGR<19

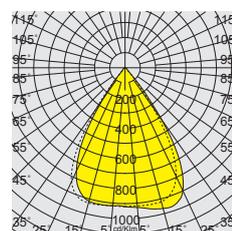
LED	colour	CLD DW (HCL)			W tot	LUMEN OUTPUT (tq= 25 °C)
		L (mm)	weight	code		K - ølm - CRI - degrees
LED 28 lenses	white black	1135	3.00	22302111-89 22302131-89	29	2700K÷6500K - 3375lm - CRI>80 - 65°



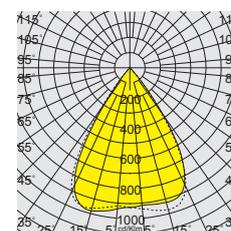
2700 K - white optic



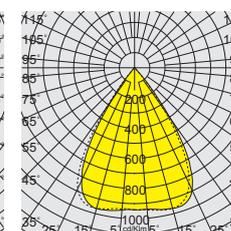
4000 K - white optic



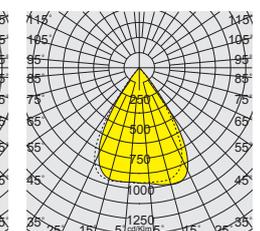
6500 K - white optic



2700 K - black optic



4000 K - black optic



6500 K - black optic

TM - FOC

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