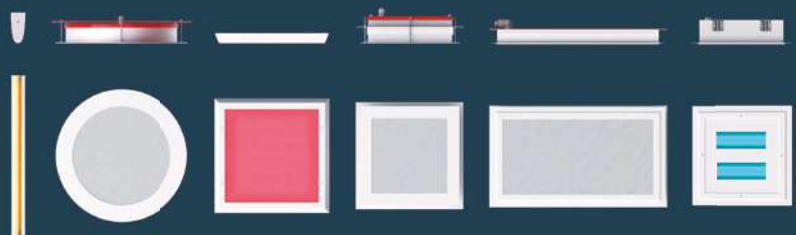


ISCOONE

Cleanroom lighting



Lighting systems for cleanrooms

March 2023

ISOONE

Cleanroom lighting

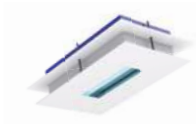


FRENCH DESIGNER AND MANUFACTURER
OF LIGHTING SYSTEMS
FOR CLEANROOMS

SUMMARY

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RECESSED, UV-C DISINFECTION



Li3

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B5

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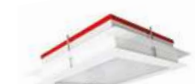
RECESSED, ACCESS FROM THE TOP



LUNA

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Sandwich panel



MARS

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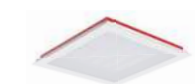
Sandwich panel



Mg12

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Sandwich panel



Nd60_U

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T55 Profile



BATDX

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Sandwich panel



Ir77_H

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RECESSED, ACCESS FROM THE BOTTOM



DRACO

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Cut-out ceiling



Xe54

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Cut-out ceiling



Ir77_Evo

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T24 Profile Cut-out ceiling



Nd60_D

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T55 Profile



Sm62

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Clip'in

LED PANEL



H1_Evo

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H1_E Page **72**

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IDA

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SURFACE MOUNTING, ACCESS FROM THE BOTTOM



SIRIUS

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H2O

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H2O_LC Page **91**

ANTI-DEFLAGRATION ATEX



MARS Ex-e D

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FEL_G

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DRACO Ex_D

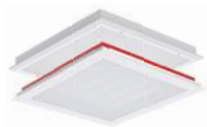
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Recessed, access from the bottom



FEL_B

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PERPETUATE A KNOW-HOW

ISOONE

Cleanroom lighting

ISOONE is a trademark of La Manufacture de France SAS, specialized in the design and manufacture of cleanroom lighting systems. The choice of the ultra-cleanliness area was quite natural, forty years ago we designed, at the time of SEAE, the first luminaires for illuminating cleanrooms, the famous BATDX.



BATDX by SEAE, the first cleanroom luminaire (1980)

Later we created Radium and Iridium, the best runners in cleanroom lighting. Over the years, we have learned to master the constraints to illuminate these so specific spaces. Light sources have evolved, power systems and the needs related to contamination control too. In order to continue innovating in the field of cleanroom lighting, we felt it was essential to focus on it, this is the purpose of ISOONE, created to meet the specific needs of ultra-clean spaces users. It is therefore with knowledge and with our sensibility of lighting designer that we want to create the luminaires of the future, to illuminate the industries of the future. So our products qualities give added value to those of our customers.



In 1940, a few years after their arrival from Italy, François Colombo and his two eldest sons, Gino and Tino, founded SEAE. It is by following the technological evolution that the company discovered the electric welding, a revolution for a blacksmith. Then the fluorescent lighting opened the way to the mass industry. SEAE entered in general lighting, grew and exported, it's the 70's and 80's. At the dawn of the 2010s the mass industrial model was no longer sustainable, a new technology came out: LED. It was time to re-invent the model, so the family sold the activity of fluorescent lighting manufacturing in 2013.

In 2016, Corinne and Frédéric Colombo, Tino's grandchildren founded La Manufacture de France SAS. The goal? Perpetuate the family tradition in a sustainable model in France, allowing to maintain a local manufacture.

The shareholding remains 100% family. A workshop was created in the outskirts of Toulouse where digital machines and craft techniques are working together, a fascinating program !

The model changed but the craft continues, **La Manufacture de France** is specialized in the design and manufacture of very specific luminaires : art chandelier under the mark of **MAELIS** and cleanroom luminaires with **ISOONE**, because technique is never far from art.

Radium by SEAE





SPECIALIZATION | A MODERN FACTORY

THE CLEANROOM LIGHTING

SPECIALIZED DESIGN AND MANUFACTURING

ISOONE IS SPECIALIZED IN THE DESIGN AND MANUFACTURING OF LUMINAIRES FOR CONTROLLED CONTAMINATION AREA. THE TERMINOLOGY USED TO DEFINE THE TYPE OF AREA VARIES ACCORDING TO THE FIELD OF ACTIVITY, BUT THE TERM CLEANROOM IS COMMONLY USED.



Cleanroom

WHY DOES A CLEANROOM (CONTROLLED CONTAMINATION AREA) NEED SPECIFIC LUMINAIRES ?

The control of the contamination is achieved thanks to a specific enclosure, an air handling system and appropriate procedures for the entry and exit of people and materials.

The mechanical adaptation to the cleanroom environment is therefore one of the specific aspects related to our activity.

It is not the only one, as the activities developed in cleanrooms (scientific research, high-tech or pharmaceutical production) require a suitable type of lighting.

It is often a question of not blinding, of ensuring the best possible visual quality but also of adapting the light spectrum according to the sensitivity of the substrates or living beings present in the room.

Of course, it must be ensured that the luminaire can never become a source of contamination in the cleanroom.

Finally, maintenance methods and the expected lifetime of the room determine the configuration of the luminaires at the design stage of the cleanroom.

WHAT IS ISOONE'S APPROACH ?

The only objective of ISOONE products is excellence in their integration into these very specific spaces that are cleanrooms. To achieve this successfully we have chosen the way of specialization.

It allows to focus exclusively on the application.

So, all the manufacturing technologies we conceive and implement in our products have all been thought to meet the need of the adaptation and improvement of controlled contamination spaces.



RESEARCH | DEVELOPMENT

ISOONE'S TECHNOLOGIES

GOOD LIGHT, THAT LASTS, WITHOUT CONTAMINATING

BECAUSE A CLEANROOM LUMINAIRE MUST PROVIDE GOOD LIGHTING WITHOUT ANY RISK OF CONTAMINATION, WE HAVE DEVELOPED SPECIFIC SOLUTIONS. HERE ARE SOME OF THESE SOLUTIONS, BASED ON OUR EXPERIENCE AND OUR CONTINUOUS IMPROVEMENT APPROACH.



BlocMax

Aluminium frame with high rigidity that close the body by overlapping. Fixation by screws to remove any risk regarding the waterproofness and the particulate emissions in the future.

IsoFlex

Clamping system on false ceiling allowing to maintain a reliable and longterm waterproofness thanks to a flexible membrane.

EasyOpen

Springs for holding the frame in the maintenance position, allowing a single person to carry out maintenance operations without risk.

KilBac

Broad-spectrum antibacterial coating with silver ions. BioCote process, validated according to ISO 22196, with a minimum result of 95% until 99.99% regarding the population reduction of Escheria Coli and Staphylococcus aureus methicillin-resistant (MRSA).

CleanSeal

Mixed-cell PU sealing system directly applied on the frame. This is a continuous sealing without any junction or gluing, that regains its volume at each opening of the frame. Antibacterial properties according to ISO EN 846.

LaserWeld

Sealed weld seam for thin sheet metal workpieces using robotised high-power lasers.

ReChange

Electrical and/or electronic components included in our products can be changed and replaced. Excepted for the LED-panel, the LED-PCB have a standardized size available at most of the suppliers. Moreover, these LED-PCB are always mounted on removable and repairable plate. Finally, we ensure that the dimensions of the cut-outs and fixing points are maintained in the future to simplify the replacement or the revamping of our products at the end of their life.

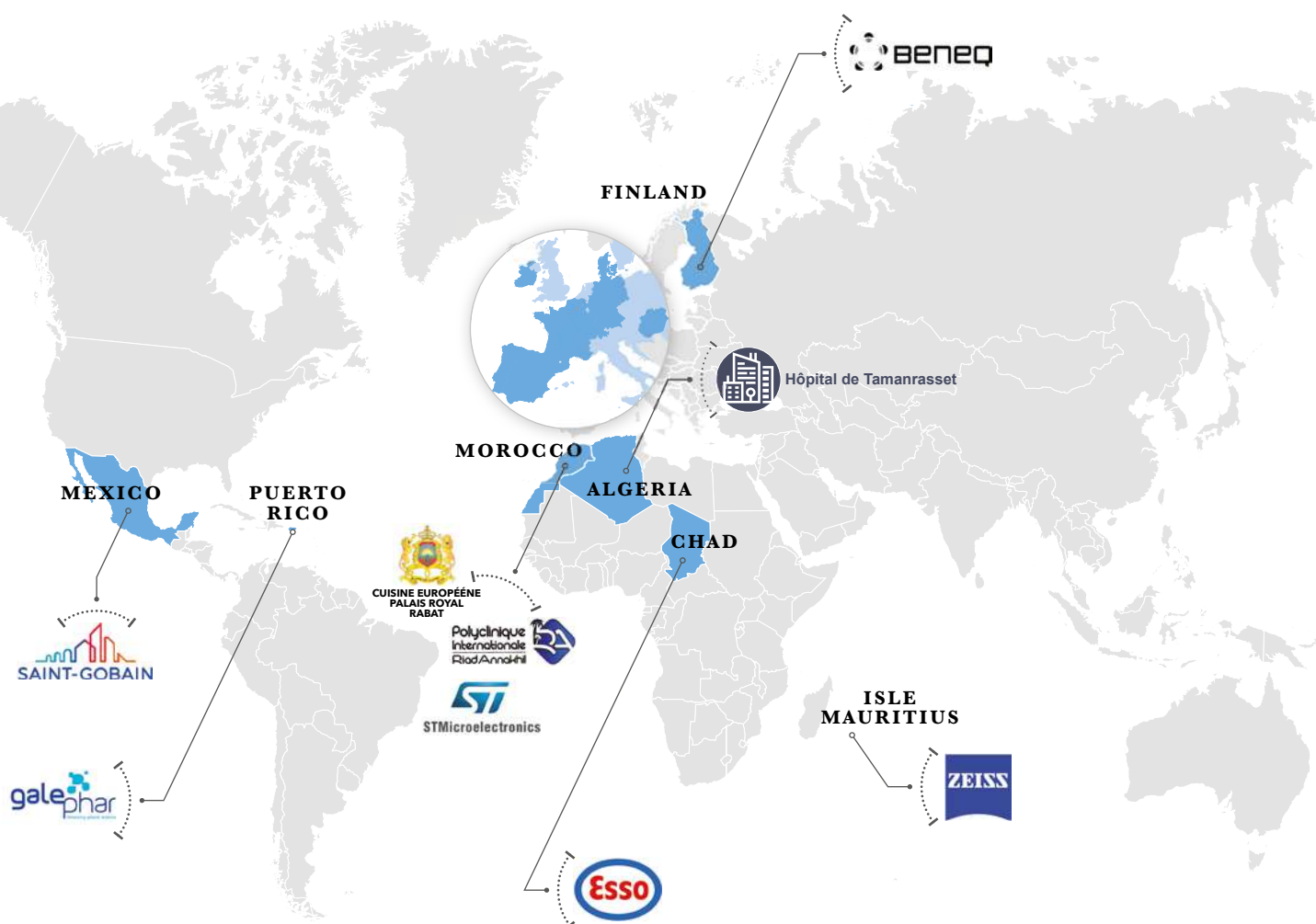


REFERENCES | OUR CLIENTS

ISOONE, LEADING BRAND

A GLOBAL BRAND

THANKS TO A CLOSE COLLABORATION WITH THE USERS OF OUR PRODUCTS, WE ARE CONSTANTLY ABLE TO IMPROVE OUR RANGE. WITH A DEEP UNDERSTANDING OF REQUIREMENTS AND CONSTRAINTS, WE CAN DEVELOP AND IMPLEMENT SPECIFIC TECHNOLOGIES THAT MAKE A DIFFERENCE. ISOONE NATURALLY ESTABLISHES ITSELF AS A REFERENCE BRAND IN THE FIELD OF CLEANROOM LIGHTING WITH INNOVATIVE AND TAILORED PRODUCTS. THIS IS DEMONSTRATED BY THE NUMBER OF USERS WHO HAVE ALREADY VALIDATED AND USED OUR PRODUCTS IN FRANCE AND ABROAD, WHERE 40% OF PRODUCTION IS EXPORTED. HERE IS A NON-EXHAUSTIVE LIST OF THE MOST IMPORTANT LOCATIONS THAT ARE ILLUMINATED BY OUR PRODUCTS IN THE WORLD.







NEWS | INNOVATIONS

NEW AT ISOONE

UVC DISINFECTION - ROUND FITTING INACTINIC SPECTRA

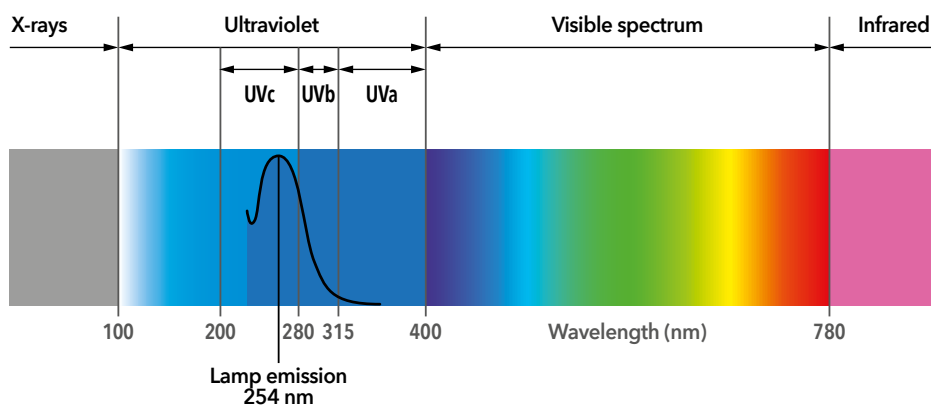
UVC DISINFECTION

C type Ultraviolet (UV) has the power to destroy amino acids, and no cell has ever developed effective protection against it. The maximum germicidal effect is reached at the wavelength of 260 nm.

There are two main families of technologies for generating UV-C: mercury vapour tubes, similar to fluorescence, and LEDs.

Thanks to the know-how acquired by our company for its brand of UV-C purifiers, YUVIDEE, we are in position to offer adapted products for cleanroom, recessed in the ceiling.

Our new Li3 and B5 ranges can be installed like luminaires, but their effect is quite different. To implement them, we have developed simulation tools. This allows us to support our clients in the design phase



Electromagnetic spectrum of light

Ultraviolet are between a wavelength of 100 and 400 nm.

of UV disinfection installations in order to estimate the radiation levels and their effects. In order to validate the installation, we also propose an in-situ validation phase to determine the exact effects of

the radiation. The Li3 and B5 ranges are compact low pressure mercury vapour lamp purifiers. Recessed in the ceiling, you can have an access from above (Li3) or below (B5).

LUNA, FOR A BETTER LIVING IN THE CLEANROOM !

Cleanrooms are areas where life is often made more difficult. Sanitary constraints and the lack of natural light are the most recurrent causes. Therefore, we would

like to participate in improving the well-being of the operators. For this purpose, we present our LUNA range, the first round and recessed cleanroom luminaire with top access. Moreover, all products in the range incorporate LEDs with a color rendering index of 95.



LUNA lighting

INACTINIC SPECTRA : FROM FLUORESCENT TUBES TO LEDS

Yellow or amber inactinic fluorescent tubes used two types of technologies : the use of a specific fluorescent powder or the application of a filter on the glass.

These lamps are now banned in the EU. We have tried to offer LED products with a similar light flow level to fluorescent solutions.

A Fluoro > Led revamp in amber inactinic environments is still tricky. Since the resulting spectra are different, the perception of light will always be different.

Pre-validation trials are always important, and we would be happy to help you with this.

AMBER INACTINIC SOLUTIONS

For applications most commonly associated with microelectronics or other applications where UV-sensitive substrates are

used, we have developed two high-pass technologies that block any light emission below 500 nm :

- **The LTO solution** is an option which use LEDs with a reduced spectrum in the unwanted wavelengths, complemented by a filter that ensures complete blocking below 500 nm.

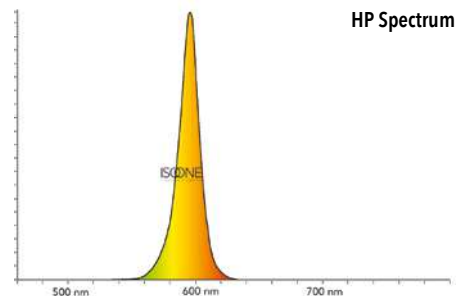
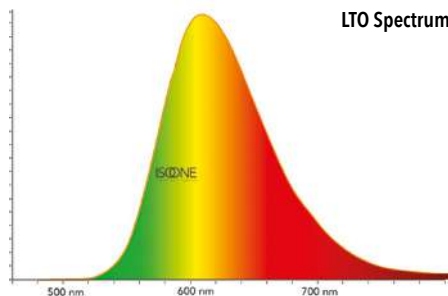
- **The HP solution** use monochromatic LEDs with an emission wavelength of 590 nm.

Each solution has specific characteristics to consider when selecting.

OTHER INACTINIC SPECTRA

Another type of inactinic spectrum is commonly used in cleanroom applications : red light centered at 620 nm.

These are usually used in animal experimentation and photography. We have products in our catalog that are tailored to this type of need.



FIND IN THIS NEW CATALOGUE



H1_Evo

This is a new version of our extra-thin LED panels for cleanrooms. We have introduced rounded edges and improved the light flow. The color rendering index is now over 90, and the spectrum reproduction in red has been improved.



Mars Ex-e D

Lighting for areas with low explosive atmosphere caused by particles, in zone 22 areas. Recessed lamps with top access.



Draco Ex_D

Lighting for areas with low explosive atmosphere caused by particles, in zone 22 areas. Recessed lamps with bottom access.



H2O_LC

We now have the possibility to mount our range of laminar flow luminaires in a continuous line with the H2O_LC.



REVAMPING | ISOONE's KITS RENOVATION KITS

SWITCHING TO LED'S, A SIMPLE MAINTENANCE OPERATION

We have been active in cleanroom luminaires market for many years, long before the creation of our ISOONE brand. We therefore have a great knowledge of the products that have been installed over the last 25 years.

In addition, our organization and our production tools allow us to offer great reactivity and flexibility, whether at the design or production level.

This is how we have developed a great experience in the renovation of fluorescent clean room luminaires for their transition to LEDs.

We offer standard ranges for the renovation of the most common products in the field.

In cases where we would not know the product, we are able to travel, study the best solutions and take the necessary measures to design them.

In any case our technical approach is multiple :

> **To allow a simple, safe and fast renovation, without disassembling the luminaire box.** Our kits take up fixing points, already present on the luminaire, and can be integrated in place of the old generation components.

> **Maintain the integrity of the product and in particular its waterproofness.**

> **Ensure the same level of illumination as when the luminaires were first switched on.**

As for all our luminaires, we use first-class electrical and electronic components, enabling us to ensure a very high level of reliability and flow maintenance.

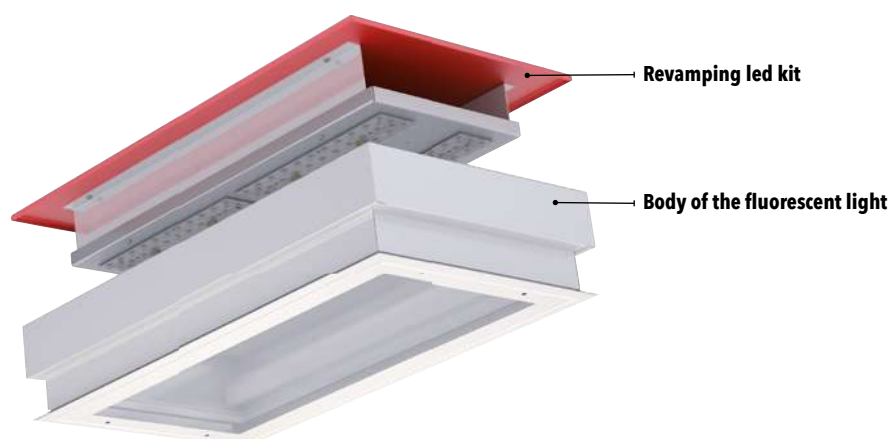
This results in a multiple benefit for the user of the installation :

> **Durability of luminaires** reaching the end of their life without compromising the integrity of the cleanroom.

> **Energy saving** : the reduction in consumption is often more than 50%. We can implement a complete profitability study.

> **Recovering Lighting quality** : a factor of well-being for operators and quality of visual tasks.

EXEMPLE OF REVAMPING LED KIT



In this case, access to the luminaire is via the plenum. After opening the cover and disconnecting, it will be necessary to remove the cover and the inner plate in order to replace them with the LED renovation kit. Connections are made using the connectors supplied as standard and that's it: the room's activity has not been interrupted.

CONSULT US !



TAYLOR-MADE | SPECIFIC LUMINAIRES

TAYLOR-MADE LUMINAIRES

WE MANUFACTURE ON SPECIFIC REQUEST

TAYLOR-MADE MANUFACTURING

The ISOONE product range is adapted to the recurrent needs of the Hi-Tech industries working in cleanrooms. It may happen from time to time that our standard range are not adapted to certain very specific requirements.

In this case, we can propose to our clients the design of a tailor-made luminaire to meet their needs. Our policy in the field of tailor-made products is service-oriented to our user customers.

This mean that if the only one possible solution to a cleanroom lighting problem is the design and manufacture of a tailor-made luminaire, then we are committed to develop it, without any required MOQ.

Our tailor-made approach is based on a very adapted organization method. As soon as the representative request is made the project is referenced and all the steps are followed. A first feasibility study is carried out by our services before any price offer. After validation from the client, the complete design of the luminaire is carried out.

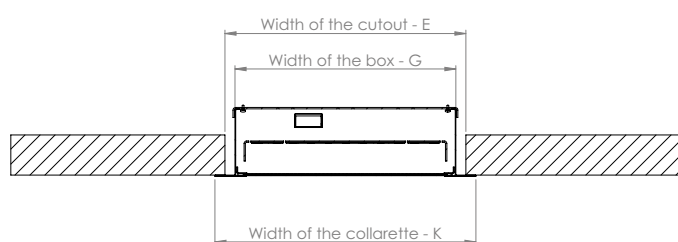
After several internal validations, the client's agreement on the final version is required before to start the production. Concerning the tailor-made luminaires, the concept of «futureproof» is also our priority. Here, everything is tracked and saved : methods, brands and product nomenclatures are recorded and stored in detail. The goal is to be able to refabricate all or part of a tailor-made luminaire, even long time after the initial series.

The importance of defining the needs : our experience shows that the earlier the need is defined, the more errors and/or revisions are reduced.

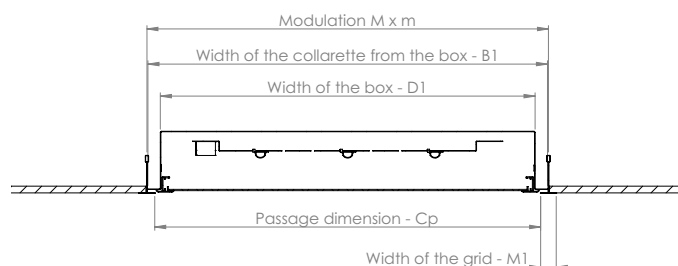
Therefore, we implement specific tools and documents that we ask to the client to fill in as early as possible. This is a sometimes time-consuming step at the preliminary step, but it is mandatory for the finale satisfaction. The adaptation fields of the luminaires often involve a mechanical adaptation to an existing structure.

We can also carry out the following characteristics : light spectrum on request, photometric distribution, reduced or enhanced sealing, supply voltage, mechanical or chemical resistance.

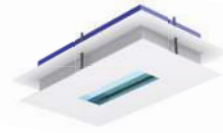
EXAMPLE OF REQUIRED DIMENSIONS



— Cut-out ceiling —



— Modular ceiling —



SELECTION | WHICH LUMINAIRE TO CHOOSE ?

CHOOSING A LIGHT

INSTALLATION AND USE ARE DECISIVE

AN ADAPTED LIGHT

From the lighting designer's side, the first thing to take in consideration is to adapt the light to the visual task being done, in the volume to be lit.

In this area, the EN 12464 standard sets the guidelines. It defines illumination levels (Lux), uniformity and colour rendering.

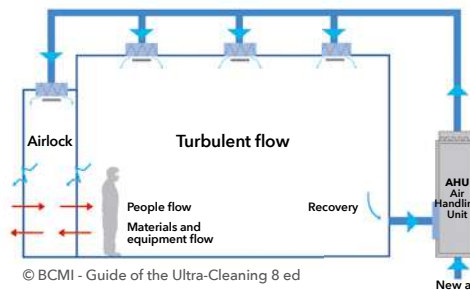
Usually, the materials or living beings processed in cleanrooms require a kind of illumination with a particular adaptation of the light spectrum, like for example, the different kind of inactinic light.

It is therefore necessary to list the lighting requirements for the activity carried out in the cleanroom at the beginning of the project.

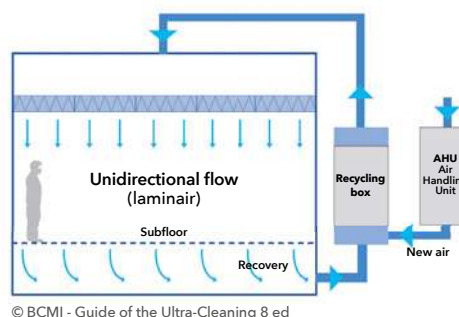
KIND OF ENVIRONMENT AND MECHANICAL ADAPTATION

There are two main families of controlled contamination areas. Those where the air flow is turbulent and those where the air flow is unidirectional.

This characteristic is defined at the design stage according to the target particle cleanliness class. This choice is usually decisive for the structure of the



Controlled contamination area with turbulent flow
(kind of flow suitable for iso classes 6 to iso 9)



Controlled contamination area with unidirectional flow
(kind of flow suitable for iso 5 and less)

cleanroom and therefore the kind of luminaire to use. There are two main types of ceiling structures: smooth cut-out structures (BA13 type or sandwich panels) or modular grid-ceiling (T24, T55 or clip'in).

THE LIFE OF THE CLEANROOM AND ITS MAINTENANCE METHODS

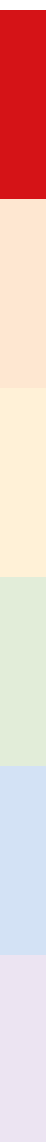
At the design phase, it is essential to define the estimated lifetime of the cleanroom, the components used must allow to achieve this lifetime. Throughout the useful life of this technical unit, maintenance operations will be necessary. They should be foreseen and estimated at the design stage in order to simplifying these operations and ensuring the reliability of the room. Regarding the lighting, LEDs have reduced the frequency of maintenance.

But a cleanroom often has a lifetime of more than 20 years. Moreover, this is expensive equipment that can be used day and night. It is therefore still necessary to plan maintenance operations for the luminaires.

Good planning will reduce maintenance time and costs while ensuring the integrity of the cleanroom throughout all its lifetime. The main points to consider at the design stage are: reliability and life expectancy of the components used in the luminaire, the possibility of replacing the LED modules, and how to access the equipment.

Our technical sales staff are qualified in the specificities of cleanrooms and are familiar with all the issues related to the use of luminaires in these specific rooms.





RECESSED, DISINFECTION **UV-C**



DATA SHEETS

Li3 B5

The germicidal effects of UV-C radiation have been known since the end of the 19th century thanks to the work of scientists Downes, Blunt, Koch and Geisler. Since then, these effects have been confirmed and well documented. The sources used to produce them are reliable and have a long-life span. Moreover, a new technology is emerging, called UV-C LEDs. The recent health crisis and the search for ever more effective and environmentally friendly disinfection treatments have generated a renewed interest in UV-C purification. This process is also recognized as not suffering from the biological evolution of micro-organisms: none has developed resistance to this radiation. The knowledge accumulated over the last decades allows us to focus on applications, security and new technologies, taking great care in the validation of treatments. It is in this context that our company has implemented a research and development approach based on the use of UV-C which enables us to already offer equipment for cleanrooms.

However, the use of such emissions must be subject to :

- **prior assessments** to estimate the need and simulate the effects.
- **a validation of the results** to characterise the installation.
- **information and training for personnel** who could be irradiated.

ISOONE can assist users with all these projects, and in this first phase we offer products for flush mounting, top access (Li3) or bottom access (B5). As always in our approach to adaptation we can make special products on request.



UV-C AND SECURITY

NF EN ISO 15858:2016 NORME

DISINFECTION BY DIRECT RADIATION MUST ONLY BE DONE WHEN THERE IS NO UNPROTECTED HUMAN OR ANIMAL IN THE ROOM.

UV-C RADIATION

« UVC radiation (100-280 nm) is invisible for humans, and exposure to UVC radiation can have health effects. Ocular damage usually begins with photokeratitis but can also result in photokeratoconjunctivitis. The symptoms, which may appear after several hours after exposure, can vary from a sudden sensation similar to that caused by sand in the eyes, to watery eyes and various levels of eye pain. Such symptoms may occur between 1 h and 12 h after exposure to UVC and resolve completely within 24-48 hours. Acute overexposure to UVC radiation can lead to disability due to ocular discomfort, but this will disappear after several days without permanent damage. The skin lesions appear with an erythema, a redness of the skin similar to a sunburn, but without tanning. The most significant erythema occurs at a wavelength of 297 nm in the UVB band. UVC radiation at a wavelength of 254 nm does not cause such a significant erythema. This is one of the reasons why the areas subject to exposure should be indicated and marked out. Warning signs should be placed at some locations to protect staff or visitors from the risks associated to UV. Appropriate locations include access doors, air handling units located outside walls, room doors, etc. »

MAXIMAL EXPOSURE ACCEPTABLE TO UV-C

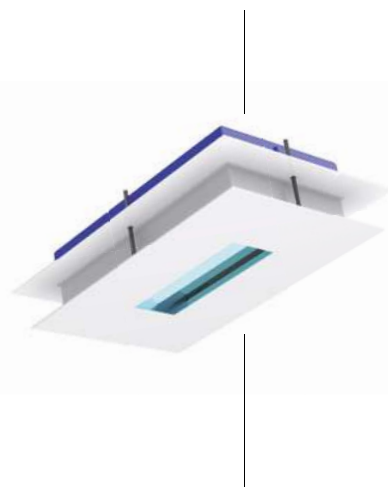
« This International Standard adopts the maximum allowable exposure values for UVC and the maximum exposure to UVC shall not exceed the ACGIH TLV and the NIOSH REL NIOSH REL of 6.0 mJ/cm² for an exposure of 8 h per day, 40 h per week to UV radiation at 254 nm. The Threshold Limit Value® (TLV®) used should be based on the real occupation time of the spaces disinfected areas. »

Allowable exposure time	Efficient irradiance $\mu\text{W}/\text{cm}^2$
24 h	0,07
18 h	0,09
12 h	0,14
10 h	0,17
8 h	0,2
4 h	0,4
2 h	0,8
1 h	1,7
30 min	3,3
15 min	6,7
10 min	10
5 min	20
1 min	100
30 s	200
15 s	400
5 s	1200
1 s	6000

NOTE > This table is based on the NIOSH/ACGIH maximum exposure times for UV light from NIOSH/ACGIH

ASSISTANCE TO PROJECTS AND IMPLEMENTATION

We offer technical assistance in the design of implementation projects. The simulation allows us to estimate the quantity of products to be installed but the real final results obtained need to be evaluated. In collaboration with certified laboratories, we can offer measurements of the radiation and its effects on site. These measurements allow us to validate the treatment process and, in particular, the right exposure time according to the objective.



TYPE OF PRODUCTS

Purifying UV-C lighting for cleanrooms, compact, recessed, IP65, access from the top, walkable. For sandwich false ceilings with cut-out. UV-C lamp 254 nm.

MECHANICAL CONSTRUCTION

The structure of the luminaire is made of 1 mm steel powder coated with KilBac white RAL 9003, certified qualicoat class 1 and antibacterial. Upper clamping frame made of 1.5 mm lacquered steel. Top cover blue lacquered of 2 mm aluminium.

UV-C SOURCE

Philips low-pressure mercury vapour TUV-PL lamp with 254 nm wavelength emission. These sources contain a filter to avoid any ozone production.

OPTIC

- VRSI : quartz glass with special aluminium UV-C reflector.

CONTAMINATION CONTROL

Reduced risk of microbial growth :

>> KilBac technology, broad spectrum antibacterial finish with silver ions (BioCote, validated according to ISO 22196).

The mechanical construction of the luminaire ensures a particle emission class 3 according to ISO 14644-14. This range is made without silicone.

WALKABLE

Luminaires designed and tested to withstand the application of a 100 kg mass on the top cover corresponding to accidental feet pressure on the luminaire in the walkable plenum.

H₂O₂ RESISTANCE

The components that may come into contact with hydrogen peroxide during the decontamination process were tested by cyclic, direct and prolonged contact with a 35% H₂O₂ solution.

TEMPERATURE AND HUMIDITY

Reference ambient temperature : 20°C / 68°F. Operating temperature range : 5 to 25°C / 41 to 77 °F (the temperature affects the lifetime of the LEDs). For environments with a moisture content of more than 70%, we recommend the use of lacquered INOX 304 for the housing, in option.

POWER SUPPLY

Luminaires supplied with European-branded EPF electronic no dimmable driver. Rated voltage 220-240 V.

INSTALLATION

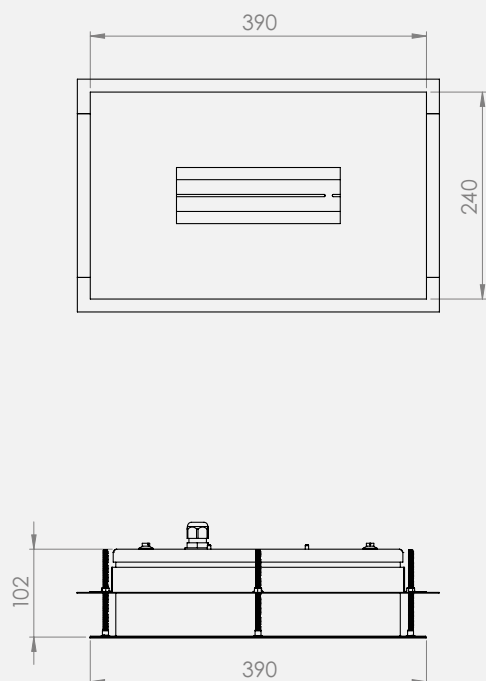
Installation in sandwich panels from 15 to 100 mm. Adaptations for different thicknesses are possible on request. Quick installation without opening the luminaire.

WIRING

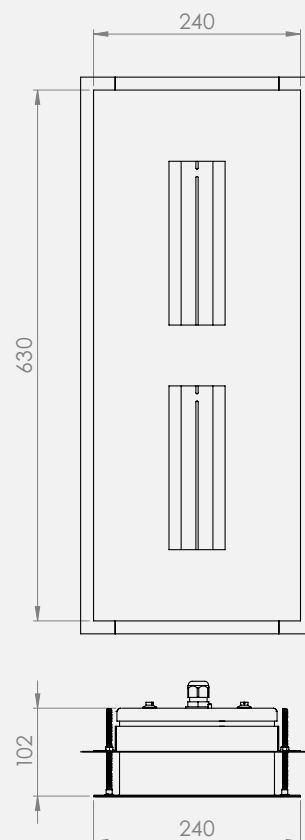
By a waterproof Wieland brand connector, RST20i, fixed to the top of the luminaire (installation on flexible cord).

DIMENSIONS (mm)

TYPE A



TYPE B



REFERENCES AND FEATURES

CODE	REFERENCE	Type	Cut-out (mm)	P (W)	UV power of the source (W)	Efficiency (%)	Weight (Kg)	H ₂ O ₂
VRSI optics - Quartz glass								
EUP2205EPF	Li3 VRSI 118 EPF	A	217x367	1x18	5,5	50	4,5	●
EUP2206EPF	Li3 VRSI 218 EPF	B	217x605	2x18	11	50	6	●
EUP2207EPF	Li3 VRSI 195 EPF	B	217x605	1x95	27	50	6	●

Light and power output tolerance $\pm 10\%$



TYPE OF PRODUCTS

Purifying UV-C lighting for cleanrooms, compact, recessed, IP65. For false ceiling with cut-out. UV-C lamp 254 nm.

MECHANICAL CONSTRUCTION

Luminaire structure made of 0.8 mm steel. Powder coated with KilBac white RAL 9003, certified qualicoat class 1 and antibacterial. White lacquered aluminium frame fixed to the housing by 4 stainless steel screws, closed by overlapping. Screwless frame available in option.

UV-C SOURCE

Philips low-pressure mercury vapour TUV-PL lamp with 254 nm wavelength emission. These sources contain a filter to avoid any ozone production.

OPTICS

- **VRSI** : quartz glass with special aluminium UV-C reflector.

CONTAMINATION CONTROL

Reduced risk of microbial growth :

>> **KilBac** technology, broad spectrum antibacterial finish with silver ions (BioCote, validated according to ISO 22196).

>> **CleanSeal** technology, use of two-component antimicrobial seals according to VDI-6022 and DIN EN ISO 846.

The mechanical construction of the luminaire ensures a particle emission class 3 according to ISO 14644-14. This range is made without silicone.

H₂O₂ RESISTANCE

The components that may come into contact with hydrogen peroxide during the decontamination process were tested by cyclic, direct and prolonged contact with a 35% H₂O₂ solution, see the resistance in the reference table.

TEMPERATURE AND HUMIDITY

Reference ambient temperature : 20°C / 68°F. Operating temperature range : 5 to 25°C / 41 to 77 °F (the temperature affects the lifetime of the LEDs). For environments with a moisture content of more than 70%, we recommend the use of lacquered INOX 304 for the housing, in option.

POWER SUPPLY

Luminaires supplied with European-branded EPF electronic no dimmable driver. Rated voltage 220-240 V.

INSTALLATION

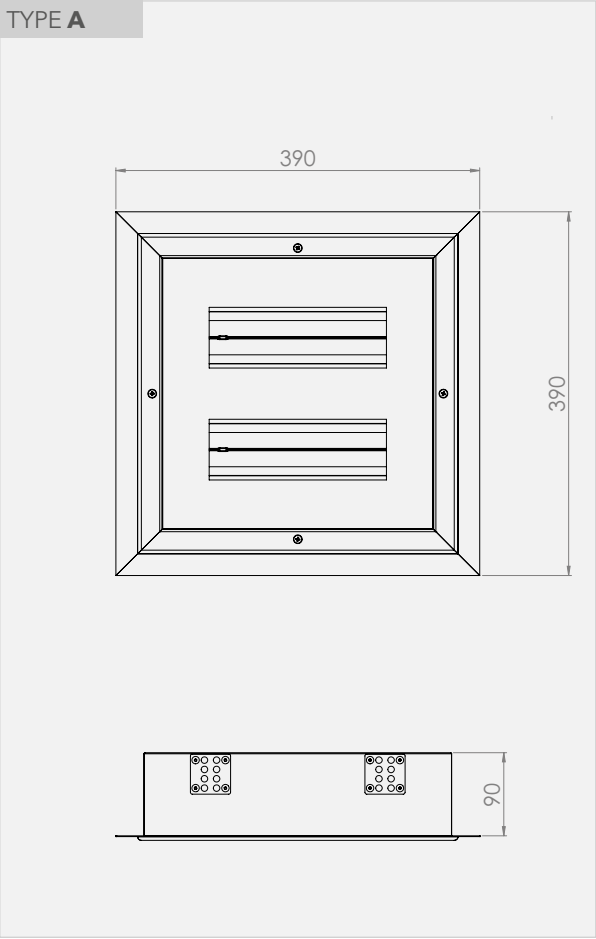
Installation of the housing in false ceiling with cut-out, from 13 to 80 mm thickness :

- **By clamping** (supplied with the luminaire) which allow an installation from the inside of the luminaire with the IsoFlex system, which ensure the watertightness.
- **By suspension** with threaded rods (not supplied) fixed to the housing.
- **By optional mounting brackets.**

WIRING

By a waterproof Wieland brand connector, RST20i, fixed to the top of the luminaire (installation on flexible cord).

DIMENSIONS (mm)



REFERENCES AND FEATURES

CODE	REFERENCE	Type	Cut-out (mm)	P (W)	UV power of the sourcee (W)	Efficiency (%)	Weight (Kg)	H ₂ O ₂
VRSI optics - Quartz glass								
EDO2302EPF	B5 VRSI 118 EPF	A	350x350	1x18	5,5	50	4,5	●
EDO2303EPF	B5 VRSI 218 EPF	A	350x350	2x18	11	50	4,5	●

Light and power output tolerance ± 10%



RECESSED, ACCESS FROM THE **TOP**

RECESSED, ACCESS FROM THE TOP



DATA SHEETS
LUNA
Mg12
BATDX
MARS
Nd60_U
Ir77_H

Top Access Recessed Luminaires. This is the most convenient and sustainable solution, it avoids the need to declassify the cleanroom during maintenance. These products are recommended for rooms that are used intensively or placed at high ceiling. The lifespan of the luminaires must always be compared with the lifespan of the cleanroom. For example, a device that is switched on 24/7 will have a shorter life span than the cleanroom. All products in this category are repairable, circuits and power supplies can be changed. Depending on the range, we offer cleanroom lighting that are walkable, flush from the top and the bottom of the ceiling and with large or small dimensions. Our solutions are suitable for sandwich panels or T55 grid ceilings.

RANGES	Walkable	Top Access	Bottom Access	Flush from The top	Compact lightings	Inactinic Version
LUNA	•	•	•		•	
Mg12	•	•	• (HB version)	•		
BATDX	•	•	•		•	
MARS	•	•			•	•
Nd60_U		•	•			• (on request)
Ir77_H		•				



TYPE OF PRODUCTS

Cleanroom luminaires, circular, recessed LED, IP65, access from the top. Walkable solution.

MECHANICAL CONSTRUCTION

Structure of the luminaire made of 1 mm steel continuously welded. Powder coated with KilBac white RAL 9003, certified qualicoat class 1 and antibacterial. Upper clamping frame made of 3 mm red lacquered aluminium. Top cover red lacquered of 1 mm steel.

LED MODULES

Circular LED modules with an energy efficiency until 170 Lm/W. Assembled on a 2 mm aluminium plate to ensure an optimal heat dissipation for the lifespan of the LEDs. Low chromatic distortion: 3SDCM. Colour rendering index over 90. Expected luminous flux : L80 at 50.000 h.

OPTICS

- OPMI : opal diffuser in special LED PMMA (Perspex).

CONTAMINATION CONTROL

Reduced risk of microbial growth :

>> KilBac technology, broad spectrum antibacterial finish with silver ions (BioCote, validated according to ISO 22196).

The mechanical construction of the luminaire ensures a particle emission class 3 according to ISO 14644-14. This range is made without silicone.

WALKABLE

Luminaires designed and tested to withstand the application of a 100 kg mass on the top cover corresponding to accidental feet pressure on the luminaire in the walkable plenum.

H₂O₂ RESISTANCE

The components that may come into contact with hydrogen peroxide during the decontamination process were tested by cyclic, direct and prolonged contact with a 35% H₂O₂ solution, see the resistance in the reference table.

TEMPERATURE AND HUMIDITY

Reference ambient temperature : 20°C / 68°F. Operating temperature range: 5 to 25°C / 41 to 77 °F (the temperature affects the lifetime of the LEDs). For environments with a moisture content of more than 70%, we recommend the use of lacquered INOX 304 for the housing, in option.

POWER SUPPLY

Luminaires supplied with European-branded EPF electronic driver. Rated voltage 220-240 V. DALI dimming (GDA) available in option Access from the top of the luminaire, without breaking the room classification.

INSTALLATION

Installation in sandwich panels from 15 to 100 mm. Adaptations for different thicknesses are possible on request. Quick installation without opening the luminaire. The sealing between the false ceiling and the lower frame must be applied at the installation.

WIRING

By a waterproof Wieland brand connector, RST20i, fixed to the top of the luminaire (installation on flexible cord).



OPTIONS

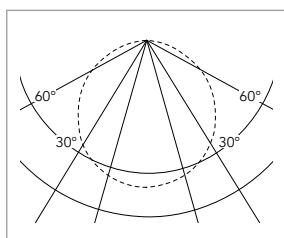


Extra cover
Extra walkable protection
on top the luminaire.



KS3 emergency kit
Philips Trustsight BASIC kit, 3.6 V 4000 mAh NiMH battery,
power supply 3 W for 3 h, approx. 300 Lm

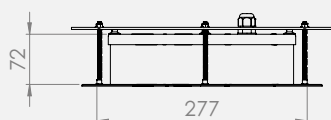
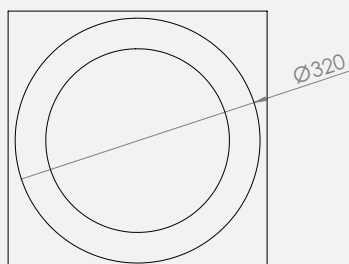
PHOTOMETRY



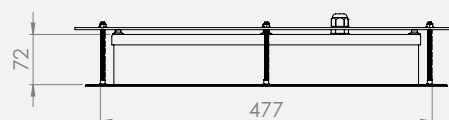
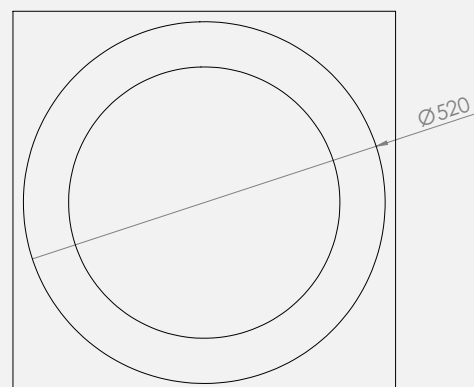
Opal

DIMENSIONS (mm)

TYPE A



TYPE B



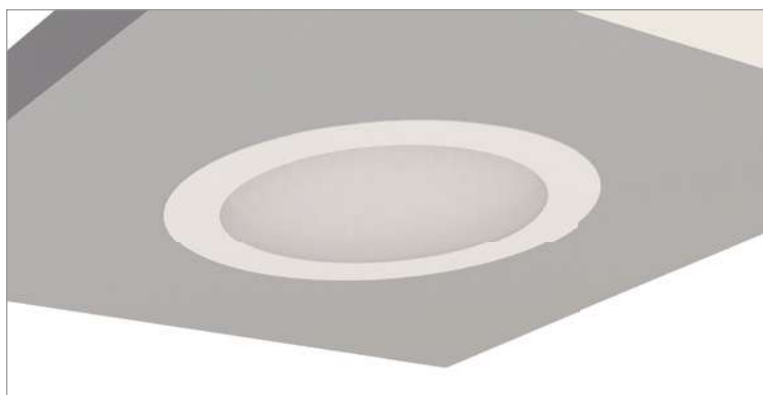
INSTALLATION PLAN



PHOTOGRAPHIC DETAILS



View from the plenum. An additional cover for closure and protection is available in option. Power cord included but not illustrated.



Installed luminaire, view from cleanroom side.

REFERENCES AND FEATURES

CODE	REFERENCE	Type	Cut-out (mm)	P (W)	Emitted flux (Lm)	Efficiency (Lm/W)	Weight (Kg)	H ₂ O ₂
OPMI optics - PMMA opal PERSPEX diffuser								
EUP2208EPF	LUNA 500 OPMI / 4000/1 40/940 EPF	B	Diam 480	35	4000	115	8	●
EUP2209EPF	LUNA 300 OPMI / 2000/1 20/940 EPF	A	Diam 280	18	2000	110	6	●

Light and power output tolerance $\pm 10\%$



Mg12



TYPE OF PRODUCTS

LED recessed luminaires for cleanrooms, with sandwich panel ceiling, with cut-out. Once installed, the luminaire is flush on the top and the bottom of the ceiling, its cover is walkable. The standard version allows access inside the luminaire from above only. In the HB version access is possible from above and from below. The TR trapdoor version has only an access from below and allow an access to the top of the ceiling.

MECHANICAL CONSTRUCTION

Luminaire structure made of two 1 mm steel frames, clamped together on the panel, finished with white KilBac powder-coating. Reinforced upper cover in bright red lacquered steel.

The HB and TR version with access from below : bottom frame in white lacquered extruded aluminum to close the housing by overlapping. It is screwed to the housing of the luminaire with 4 stainless steel screws.

LED MODULES

Zagha LED modules Book7, L28W6, with an energy efficiency until 185 Lm/W, rated AA+. Assembled on a 2 mm aluminium plate to ensure an optimal heat dissipation for the lifespan of the LEDs. Low chromatic distortion : 3SDCM. Colour rendering index over 80. Expected luminous flux : see table.

OPTICS

- MPVR : clear tempered glass diffuser + inner microprismatic plate. Low luminance.
- OPMI : opal diffuser in special LED PMMA (Perspex). 80% of light transmission.

MAINTENANCE

- From the top for the standard Mg12 version.
- From the top and/or the bottom for the Mg12 HB version.
- Only from the bottom for the TR trapdoor version.

CONTAMINATION CONTROL

Reduced risk of microbial growth :

- >> KilBac technology, broad spectrum antibacterial finish with silver ions (BioCote, validated according to ISO 22196).
- >> CleanSeal technology, use of two-component antimicrobial seals according to VDI-6022 and DIN EN ISO 846.

The mechanical construction of the luminaire ensures a particle emission class 3 according to ISO 14644-14. This range is made without silicone.

WALKABLE

Luminaires designed and tested to withstand the application of a 100 kg mass on the top cover corresponding to accidental feet pressure on the luminaire in the walkable plenum. **Thanks to the mechanical configuration of the luminaire, the pressure is transmitted to the ceiling and not to the luminaire body in order to prevent any loss of airtightness in the room at the level of the luminaire.**

H₂O₂ RESISTANCE

The components that may come into contact with hydrogen peroxide during the decontamination process were tested by cyclic, direct and prolonged contact with a 35% H₂O₂ solution, see the resistance in the reference table.

TEMPERATURE AND HUMIDITY

Reference ambient temperature: 20°C / 68°F. Operating temperature range: 5 to 25°C / 41 to 77 °F (the temperature affects the lifetime of the LEDs). For environments with a moisture content of more than 70%, we recommend the use of lacquered INOX 304 for the housing, in option.

POWER SUPPLY

Luminaires supplied with European-branded EPF electronic driver. Rated voltage 220-240 V. DALI dimming (GDA) available in option. Access from the top or the bottom depending on the model.

INSTALLATION

Installation in sandwich panels from 50 to 80 mm. Adaptations for different thicknesses are possible on request. The sealing between the false ceiling and the lower frame must be applied at the installation.

WIRING

By a waterproof Wieland brand connector, RST20i, 90° angled, fixed to the top of the luminaire. This configuration allows a better organization of the wiring in the plenum.

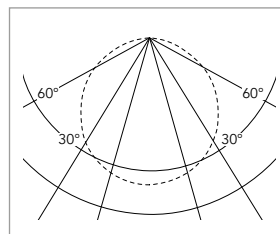
OPTIONS



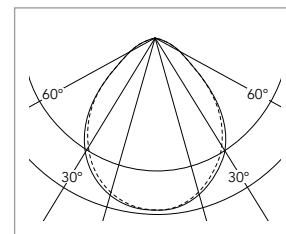
Kit secours KS3

Philips Trustsight BASIC kit, 3.6 V 4000 mAh NiMH battery, power supply 3 W for 3 h, approx. 300 Lm.

PHOTOMETRY



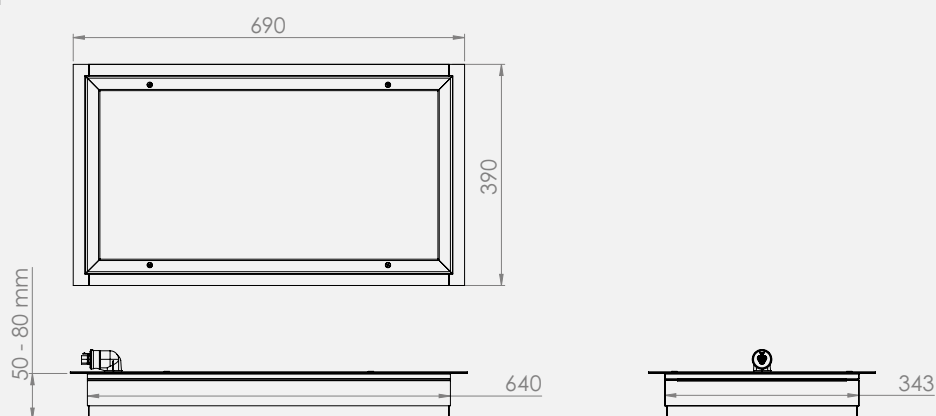
Opal



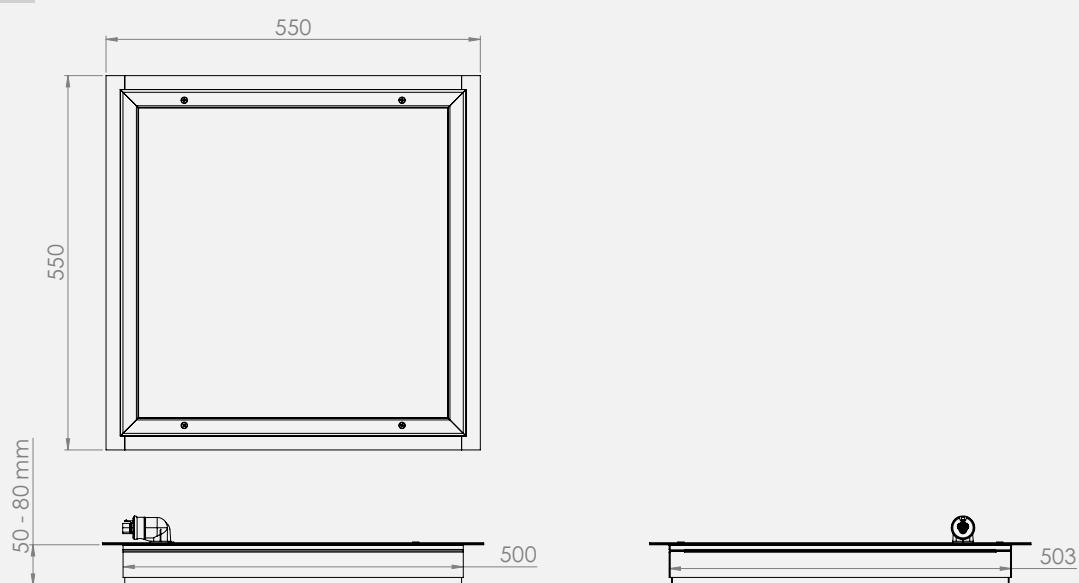
MPVR

DIMENSIONS (mm)

TYPE A



TYPE B



REFERENCES AND FEATURES

CODE	REFERENCE	L80 (x1000h)	Cut-out mini (mm)	P (W)	Emitted flux (Lm)	Weight (Kg)	H ₂ O ₂
Type A - Access from the top - Optics MPVR low luminance in tempered glass							
EUP2162EPF	Mg12 MPVR 700/400 5000/4 45/840 EPF	70	350x650	45	5000	11	●
EUP2170EPF	Mg12 MPVR 700/400 7000/4 70/840 EPF	70	350x650	70	7000	11	●

Type A - Access from the top - Optics OPMI in PMMA

EUP2171EPF	Mg12 OPMI 700/400 5000/4 40/840 EPF	70	350x650	40	5000	9	●
EUP2172EPF	Mg12 OPMI 700/400 7000/4 60/840 EPF	70	350x650	60	7000	9	●

Type A - Access from the top and the bottom - Optics MPVR low luminance in tempered glass

EUP2164EPF	Mg12-HB MPVR 700/400 5000/4 40/840 EPF	70	350x650	40	5000	11	●
EUP2165EPF	Mg12-HB MPVR 700/400 7000/4 60/840 EPF	70	350x650	60	7000	11	●

Type A - Access from the top and the bottom - Optics OPMI in PMMA

EUP2167EPF	Mg12-HB OPMI 700/400 5000/4 40/840 EPF	70	350x650	40	5000	9	●
EUP2168EPF	Mg12-HB OPMI 700/400 7000/4 60/840 EPF	70	350x650	60	7000	9	●

CODE	REFERENCE	L80 (x1000h)	Cut-out mini (mm)	P (W)	Emitted flux (Lm)	Weight (Kg)	H ₂ O ₂
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Type B - Access from the top - Optics MPVR low luminance in tempered glass

EUP2178EPF	Mg12 MPVR 600/600 3800/1 43/840 EPF	50	510x510	43	3800	16	●
EUP2179EPF	Mg12 MPVR 600/600 5000/1 61/840 EPF	50	510x510	61	5000	16	●

Type B - Access from the top - Optics OPMI in PMMA

EUP2176EPF	Mg12 OPMI 600/600 3800/1 35/840 EPF	50	510x510	35	3800	14	●
EUP2177EPF	Mg12 OPMI 600/600 5000/1 50/840 EPF	50	510x510	50	5000	14	●

Type B - Access from the top and the bottom - Optics MPVR low luminance in tempered glass

EUP2182EPF	Mg12-HB MPVR 600/600 3800/1 45/840 EPF	50	510x510	45	3800	16	●
EUP2183EPF	Mg12-HB MPVR 600/600 5000/1 60/840 EPF	50	510x510	60	5000	16	●

Type B - Access from the top and the bottom - Optics OPMI in PMMA

EUP2180EPF	Mg12-HB OPMI 600/600 3800/1 35/840 EPF	50	510x510	35	3800	14	●
EUP2181EPF	Mg12-HB OPMI 600/600 5000/1 50/840 EPF	50	510x510	50	5000	14	●

CODE	REFERENCE	L80 (x1000h)	Cut-out mini (mm)	P (W)	Emitted flux (Lm)	Weight (Kg)	H ₂ O ₂
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Type B - Version trappe - Access only from the bottom - Optics OPMI in PMMA

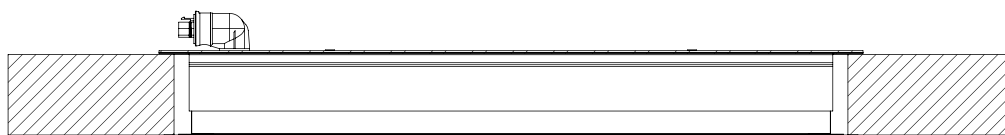
EDO2310EPF	Mg12-TR OPMI 600/600 4000/4 35/840 EPF	50	510x510	35	3800	14	●
EDO2311EPF	Mg12-TR OPMI 600/600 5800/4 50/840 EPF	70	510x510	50	5800	14	●

Light and power output tolerance $\pm 10\%$

PHOTOGRAPHIC DETAILS

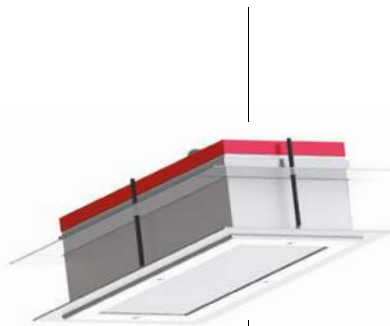


INTEGRATION IN SANDWICH PANEL





BATDX



TYPE OF PRODUCTS

IP65 LED compact recessed luminaires, **access from the top and the bottom**. For installation in cut-out ceiling.

MECHANICAL CONSTRUCTION

Luminaire housing made of steel. Powder coated with KilBac white RAL 9003, certified qualicoat class 1 and antibacterial. Upper clamping frame in lacquered steel. Upper cover bright red lacquered. Bottom frame in white lacquered extruded aluminum, screwed on the luminaire housing by 4 stainless steel screws.

LED MODULES

Zagha LED modules Book7, L28W6, with an energy efficiency until 185 Lm/W, rated AA+. Assembled on a 2 mm aluminium plate to ensure an optimal heat dissipation for the lifespan of the LEDs. Low chromatic distortion : 3SDCM. Colour rendering index over 90. Expected luminous flux : L80 at 70.000 h.

OPTICS

- **OPPC** : opal polycarbonate diffuser, high impact resistance.
- **OPMI** : opal diffuser in PMMA, high chemical resistance.
- **MPPC** : polycarbonate micro prismatic diffuser which reduce luminance to achieve UGR lower than 19.
- **MPVR** : optics made of hardened laminated glass and an internal micropism diffuser which reduce luminance to achieve UGRs lower than 19. Excellent resistance to hydrogen peroxide.

CONTAMINATION CONTROL

Reduced risk of microbial growth :

- >> **KilBac** technology, broad spectrum antibacterial finish with silver ions (BioCote, validated according to ISO 22196).
- >> **CleanSeal** technology, use of two-component antimicrobial seals according to VDI-6022 and DIN EN ISO 846.

The mechanical construction of the luminaire ensures a particle emission class 1 according to ISO 14644-14. This result is certified by the **Fraunhofer IPA** laboratory. This range is made without silicone.

WALKABLE

Luminaires designed and tested to withstand the application of a 100 kg mass on the top cover corresponding to accidental feet pressure on the luminaire in the walkable plenum.

H₂O₂ RESISTANCE

The components that may come into contact with hydrogen peroxide during the decontamination process were tested by cyclic, direct and prolonged contact with a 35% H₂O₂ solution, see the resistance in the reference table.

TEMPERATURE AND HUMIDITY

Reference ambient temperature: 20°C / 68°F. Operating temperature range: 5 to 25°C / 41 to 77 °F (the temperature affects the lifetime of the LEDs). For environments with a moisture content of more than 70%, we recommend the use of lacquered INOX 304 for the housing, in option.

POWER SUPPLY

Luminaires supplied with European-branded EPF electronic driver. Rated voltage 220-240 V. DALI dimming (GDA) available in option. Access from the top or the bottom.

INSTALLATION

Installation in sandwich panels from 15 to 100 mm. Adaptations for different thicknesses are possible on request. Quick installation without opening the luminaire. The sealing between the false ceiling and the lower frame must be applied at the installation.

WIRING

By a waterproof Wieland brand connector, RST20i, fixed to the top of the luminaire (installation on flexible cord).



OPTIONS

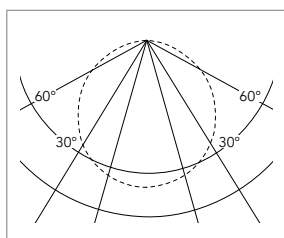


Reinforced clamping frame
Reinforced clamping frame made of 2 mm steel.

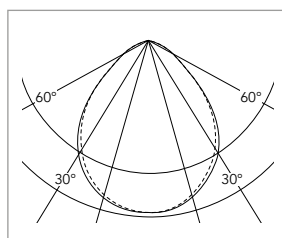


KS3 emergency kit
Philips Trustsight BASIC kit, 3.6 V 4000 mAh NiMH battery, power supply 3 W for 3 h, approx. 300 Lm.

PHOTOMETRY



Opal



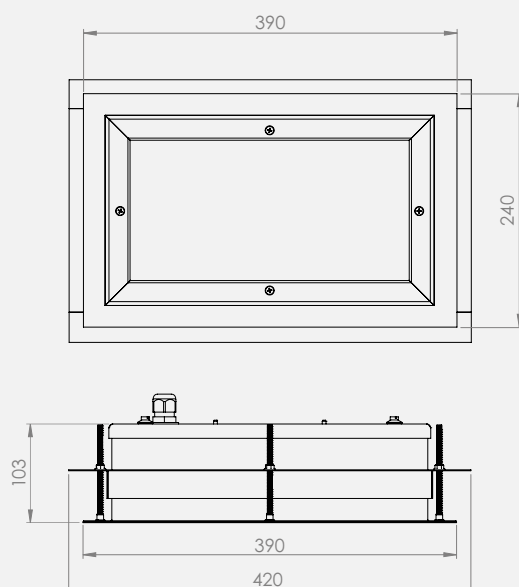
MPVR

FRAUNHOFER IPA TEST

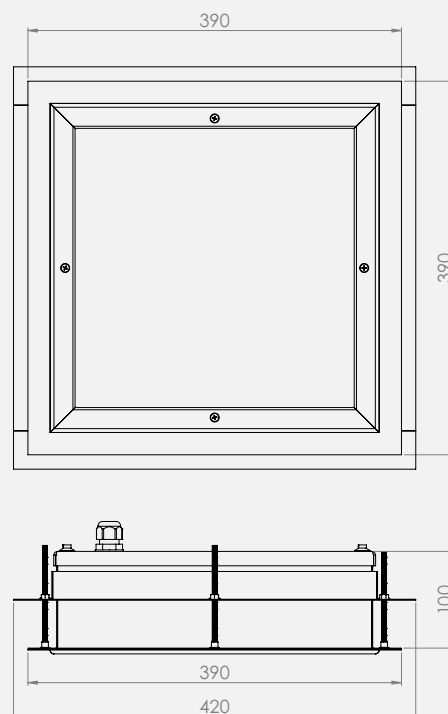


DIMENSIONS (mm)

TYPE A



TYPE B



REFERENCES AND FEATURES

CODE	REFERENCE	Type	Cut-out (mm)	P (W)	Emitted flux (Lm)	Weight (Kg)	H ₂ O ₂
OPMI optics							
EUP2077EPF	BATDX OPMI 390/240 1700/2 14/840 EPF	A	217x367	14	1700	5,5	●
EUP2079EPF	BATDX OPMI 390/390 5300/5 44/840 EPF	B	367x367	44	5300	7	●
EUP2115EPF	BATDX OPMI 390/390 3900/5 31/840 EPF	B	367x367	31	3900	7	●
OPPC optics							
EUP2078EPF	BATDX OPPC 390/240 1450/2 14/840 EPF	A	217x367	14	1450	5,5	●
EUP2080EPF	BATDX OPPC 390/390 4500/5 44/840 EPF	B	367x367	44	4500	7	●
EUP2116EPF	BATDX OPPC 390/390 3400/5 31/840 EPF	B	367x367	31	3400	7	●
MPPC optics							
EUP2118EPF	BATDX MPPC 390/390 5100/5 44/840 EPF	B	367x367	44	5100	7	●
EUP2122EPF	BATDX MPPC 390/390 3700/5 31/840 EPF	B	367x367	31	3700	7	●
MPVR optics							
EUP2123EPF	BATDX MPVR 390/390 3700/5 38/840 EPF	B	367x367	38	3700	6,5	●
EUP2124EPF	BATDX MPVR 390/390 5100/5 48/840 EPF	B	367x367	48	5100	8	●

Light and power output tolerance ± 10%



MARS



TYPE OF PRODUCTS

IP65 LED compact recessed luminaires, access from the top. Wide range of powers and optics. High power models for high ceilings. For false ceilings with cut-outs.

MECHANICAL CONSTRUCTION

Luminaire structure made of 1 mm steel, LaserWeld waterproof assembling technology, powder coated with KilBac white RAL9003, certified qualicoat class 1 and antibacterial. Upper clamping frame in lacquered steel of 1,5 mm. Upper cover in aluminium of 2 mm red lacquered.

LED MODULES

White light : Zagha LED modules Book7, L28W6, with an energy efficiency until 185 Lm/W, rated AA+. Assembled on a 2 mm aluminium plate to ensure an optimal heat dissipation for the lifespan of the LEDs. 3SDCM. Colour rendering index 85. Expected luminous flux : L80 at 70.000 h.

Inactinic light : amber (590 nm) or red (620 nm), specific led's PCB in aluminium with Zagha Book7, L28W6, made in France.

OPTICS

- **TRPC/30** : Intensive optics (30°), microlenses installed directly on the LED module. Transparent polycarbonate diffuser.
- **TRPC/60** : Intensive optics (60°), microlenses installed directly on the LED module. Transparent polycarbonate diffuser.
- **OPPC** : opal polycarbonate diffuser, high impact resistance.
- **OPMI** : opal diffuser in PMMA, high chemical resistance.
- **MPPC** : polycarbonate micro prismatic diffuser which reduce luminance to achieve UGR lower than 19.
- **MPVR** : optics made of hardened laminated glass and an internal micropism diffuser which reduce luminance to achieve UGRs lower than 19. Excellent resistance to hydrogen peroxide.

CONTAMINATION CONTROL

Reduced risk of microbial growth :

>> **KilBac** technology, broad spectrum antibacterial finish with silver ions (BioCote, validated according to ISO 22196).

The mechanical construction of the luminaire ensures a particle emission class 3 according to ISO 14644-14. This range is made without silicone.

WALKABLE

Luminaires designed and tested to withstand the application of a 100 kg mass on the top cover corresponding to accidental feet pressure on the luminaire in the walkable plenum.

H₂O₂ RESISTANCE

The components that may come into contact with hydrogen peroxide during the decontamination process were tested by cyclic, direct and prolonged contact with a 35% H₂O₂ solution, see resistance in the reference table.

TEMPERATURE AND HUMIDITY

Reference ambient temperature: 20°C / 68°F. Operating temperature range: 5 to 25°C / 41 to 77 °F (the temperature affects the lifetime of the LEDs). For environments with a moisture content of more than 70%, we recommend the use of lacquered INOX 304 for the housing, in option.

POWER SUPPLY

Luminaires supplied with European-branded EPF electronic driver. Rated voltage 220-240 V. DALI dimming (GDA) available in option Access from the top of the luminaire, without breaking the room classification.

INSTALLATION

Installation in sandwich panels from 15 to 100 mm. Adaptations for different thicknesses are possible on request. Quick installation without opening the luminaire. The sealing between the false ceiling and the lower frame must be applied at the installation.

WIRING

By a waterproof Wieland brand connector, RST20i, fixed to the top of the luminaire (installation on flexible cord).



OPTIONS

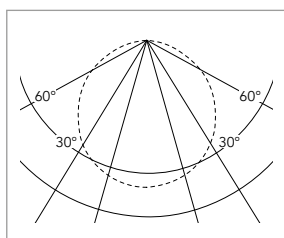


Reinforced clamping frame
Reinforced clamping frame made of 2 mm steel.

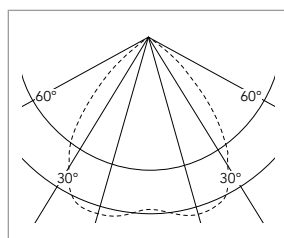


KS3 emergency kit
Philips Trustsight BASIC kit, 3.6 V 4000 mAh NiMH battery, power supply 3 W for 3 h, approx. 300 Lm.

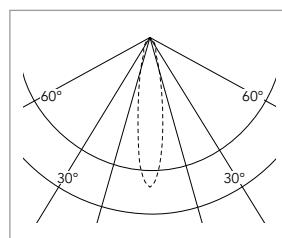
PHOTOMETRY



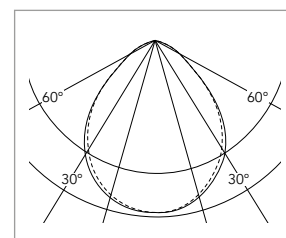
Opal



Optic 60°



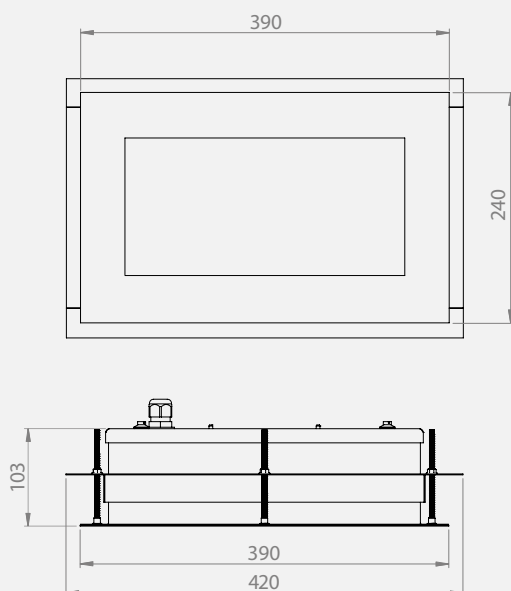
Optic 30°



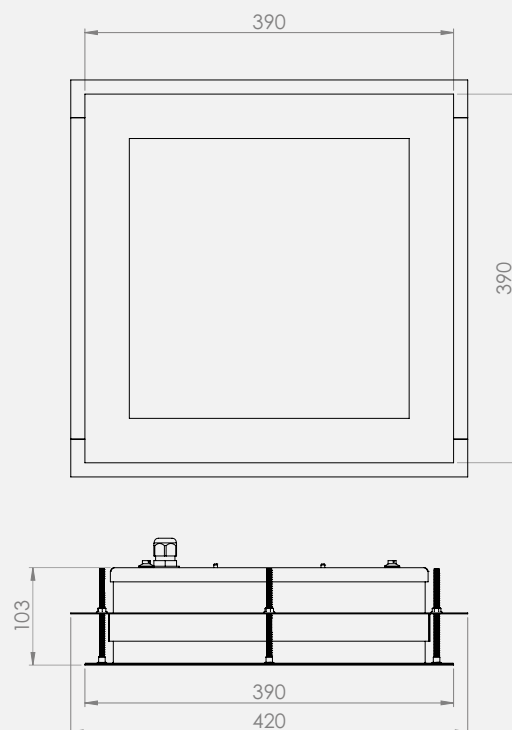
MPVR

DIMENSIONS (mm)

TYPE A



TYPE B



REFERENCES AND FEATURES

CODE	REFERENCE	Type	Cut-out (mm)	P (W)	Emitted flux (Lm)	Efficiency (Lm/W)	UGR	Weight (Kg)	H ₂ O ₂
TRPC/30 optics - Intensive 30° - Polycarbonate									
EUP2019EPF	MARS TRPC/30 LED 390/390 4500/4 35/840 EPF	B	367x367	35	4500	128		6	●
EUP2020EPF	MARS TRPC/30 LED 390/390 9200/4 76/840 EPF	B	367x367	76	9200	120		6	●
TRPC/60 optics - 60° Opening - Polycarbonate									
EUP2021EPF	MARS TRPC/60 LED 390/390 4500/4 35/840 EPF	B	367x367	35	4500	128		6	●
EUP2022EPF	MARS TRPC/60 LED 390/390 9200/4 76/840 EPF	B	367x367	76	9200	120		6	●
OPMI optics - PMMA opal diffuser									
EUP2093EPF	MARS OPMI LED 240/390 1700/2 14/840 EPF	A	217x367	14	1700	118		4,5	●
EUP2094EPF	MARS OPMI LED 390/390 3950/5 31/840 EPF	B	367x367	31	3950	127		6	●
EUP2095EPF	MARS OPMI LED 390/390 5300/5 44/840 EPF	B	367x367	44	5300	121		6	●
EUP2214EPF	MARS OPMI LED 390/390 7300/5 65/840 EPF	B	367x367	65	7300	112		6	●
EUP2110EPF	MARS OPMI LED 390/390 9900/5 90/840 EPF	B	367x367	90	9900	110		6	●
OPPC optics - Polycarbonate opal									
EUP2010EPF	MARS OPPC LED 240/390 1450/2 14/840 EPF	A	217x367	14	1450	101		4,5	●
EUP2023EPF	MARS OPPC LED 390/390 3400/5 31/840 EPF	B	367x367	31	3400	109		6	●
EUP2024EPF	MARS OPPC LED 390/390 4500/5 44/840 EPF	B	367x367	44	4500	103		6	●
MPPC optics - Micro-prismatic polycarbonate									
EUP2081EPF	MARS MPPC LED 390/390 5100/5 44/840 EPF	B	367x367	44	5100	117		6	●
EUP2082EPF	MARS MPPC LED 390/390 3700/5 31/840 EPF	B	367x367	31	3700	119	<19	6	●
EUP2089EPF	MARS MPPC LED 390/390 9200/5 89/840 EPF	B	367x367	89	9200	103		6	●
MPVR optics - Tempered glass + micro-prismatic plate									
EUP2120EPF	MARS MPVR 390/390 3800/5 36/840 EPF	B	367x367	36	3800	105	<19	6	●
EUP2121EPF	MARS MPVR 390/390 5200/5 48/840 EPF	B	367x367	44	5200	108		6	●
White Gradation (TW) - MPPC optics - Micro-prismatic polycarbonate									
EUP2081GDATW	MARS MPPC LED 390/390 5100/5 44/TW GDA	B	367x367	36	3800	105	<19	6	●
590 nm amber inactinic light - OPMI optics									
EUP2154EPF	MARS OPMI LED 390/390 1500/2 38/590 EPF	B	367x367	38	1500			6	●
640 nm red inactinic light - OPMI optics									
EUP2153EPF	MARS OPMI LED 390/390 1000/2 38/640 EPF	B	367x367	38	1000			6	●

Light and power output tolerance ± 10%



TYPE OF PRODUCTS

IP65 LED recessed luminaires, access from the top. Installation in modular grid ceiling **T55 with 600 mm module**.

MECHANICAL CONSTRUCTION

Low height structure in 10/10 steel. Powder coated with KilBac white RAL 9003, certified qualicoat class 1 and antibacterial. Upper cover in steel of 1mm, bright red lacquered.

LED MODULES

European high efficiency linear LED module, energy classification AA+. Installed on an internal 2 mm aluminium plate. Low chromatic distortion : 3 SDCM. Maintenance of the expected luminous flux depending on the model : L80 at 50.000 or 70.000 hours (see table).

OPTICS

Optical assembly bonded with silicone-free sealant, certified for use in clean rooms :

- **OPMI** : opal diffuser in PMMA (perspex).
- **MPPC** : clear tempered glass diffuser + inner microprismatic plate. High visual comfort and impact resistance.
- **MPVR** : clear tempered glass diffuser + inner microprismatic plate. High visual comfort, easy cleaning excellent ageing.

CONTAMINATION CONTROL

Reduced risk of microbial growth :

>> **KilBac** technology, broad spectrum antibacterial finish with silver ions (BioCote, validated according to ISO 22196).

The mechanical construction of the luminaire ensures a particle emission class 3 according to ISO 14644-14. This range is made without silicone.

H₂O₂ RESISTANCE

The components that may come into contact with hydrogen peroxide during the decontamination process were tested by cyclic, direct and prolonged contact with a 35% H₂O₂ solution.

TEMPERATURE AND HUMIDITY

Reference ambient temperature : 20°C / 68°F. Operating temperature range : 5 to 25°C / 41 to 77 °F (the temperature affects the lifetime of the LEDs). For environments with a moisture content of more than 70%, we recommend the use of lacquered INOX 304 for the housing, in option.

POWER SUPPLY

Luminaires supplied with European-branded EPF electronic driver. Rated voltage 220-240 V. DALI dimming (GDA) available in option. Access from the top.

INSTALLATION

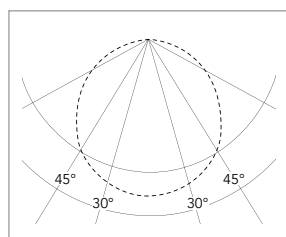
Installation in modular T55 grid ceiling with 600mm module (other modules on request). The luminaire can be fixed with clamping bracket supplied with the false ceiling.

WIRING

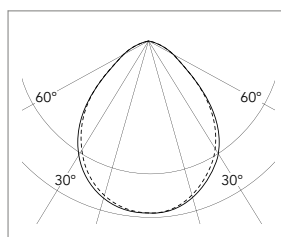
By a Wieland waterproof connector, RST20i on cord + female connector.



PHOTOMETRY



OPMI



MPPC

OPTIONS

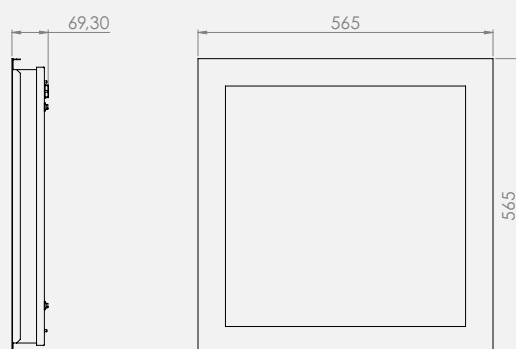


KS3 emergency kit

Philips Trustsight BASIC kit, 3.6 V 4000 mAh
NiMH battery, power supply 3 W for 3 h,
approx. 300 Lm.

DIMENSIONS (mm)

TYPE A



TYPE B



REFERENCES AND FEATURES

CODE	REFERENCE	L80 (x1000 h)	Type	P (W)	Emitted flux (Lm)	Weight (Kg)
T55 GRID CEILING, MODULE 600 - OPENING FROM THE TOP						
OPMI optics - Opal diffuser in PMMA						
EUP2163EPF	Nd60 UM600 OPMI 565/565 5000/1 42/840 EPF	50	A	42	5000	9
EUP2166EPF	Nd60 UM600 OPMI 565/565 10000/5 87/840 EPF	50	A	87	10000	9
EUP2169EPF	Nd60 UM600 OPMI 1165/565 10000/12 87/840 EPF	70	B	87	10000	17
MPPC optics - PC microprismatic diffuser - UGR lower than 19						
EUP2174EPF	Nd60 UM600 MPPC 565/565 4700/1 42/840 EPF	50	A	42	4700	9
EUP2175EPF	Nd60 UM600 MPPC 565/565 9500/5 87/840 EPF	50	A	87	9500	9
EUP2173EPF	Nd60 UM600 MPPC 1165/565 10000/12 87/840 EPF	70	B	87	10000	17
MPVR optics - Tempered glass diffuser + inner microprismatic plate						
EUP2203EPF	Nd60 UM600 MPVR 565/565 4500/1 40/840 EPF	50	A	40	4500	12

Light and power output tolerance $\pm 10\%$

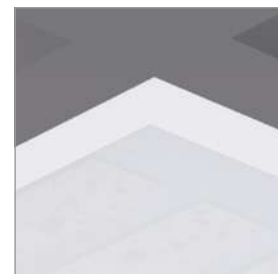
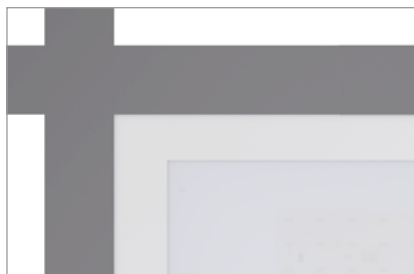
INTEGRATION DETAILS IN T55 GRID CEILING (mm)

U-Version, access from the top

Sectional view



Photographic details





lr77_HLED



TYPE OF PRODUCTS

Recessed LED luminaire IP65 with smooth opal polycarbonate, PMMA optics, or glass. Access from the top. Wide range of powers and dimensions. Installation in sandwich panels.

MECHANICAL CONSTRUCTION

Luminaire structure made of 1 mm steel. Powder coated with KilBac white RAL 9003, certified qualicoat class 1 and antibacterial. Upper clamping frame in white lacquered steel. Upper cover red lacquered for a better identification of the luminaires.

LED MODULES

European LED circuits with very high efficiency (> 150 Lm/W), screwed on a internal plate made of steel to ensure an optimal heat dissipation for the lifespan of the LEDs. 3SDCM. Expected luminous flux: L80 at 70.000 h.

OPTICS

Optical assembly bonded with silicone-free sealant, certified for use in clean rooms :

- **OPPC** : opal polycarbonate plate with high resistance to impact.
- **OPMI** : opal plate in PMMA with high resistance to chemical agents.
- **MPVR** : tempered glass diffuser + inner microprismatic plate. High visual comfort, easy cleaning excellent ageing.

CONTAMINATION CONTROL

Reduced risk of microbial growth :

>> **KilBac** technology, broad spectrum antibacterial finish with silver ions (BioCote, validated according to ISO 22196).

The mechanical construction of the luminaire ensures a particle emission class 3 according to ISO 14644-14. This range is made without silicone

H₂O₂ RESISTANCE

The components that may come into contact with hydrogen peroxide during the decontamination process were tested by cyclic, direct and prolonged contact with a 35% H₂O₂ solution.

TEMPERATURE AND HUMIDITY

Reference ambient temperature: 20°C / 68°F. Operating temperature range : 5 to 25°C / 41 to 77 °F (the temperature affects the lifetime of the LEDs). For environments with a moisture content of more than 70%, we recommend the use of lacquered INOX 304 for the housing, in option.

POWER SUPPLY

Luminaires supplied with European-branded EPF electronic driver. Rated voltage 220-240 V. DALI dimming (GDA) available in option. Access from the top of the luminaire, without breaking the room classification.

INSTALLATION

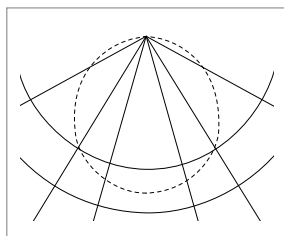
Installation of the luminaire structure from the bottom, clamping of the holding frame from the top with 4 or 6 knurled nuts, without any need to open the luminaire. Luminaire made for installation in false ceilings from 15 to 100 mm. The sealing between the false ceiling and the lower frame must be applied at the installation.

WIRING

By a waterproof Wieland brand connector, RST20i, fixed to the top of the luminaire (installation on flexible cord).



PHOTOMETRY



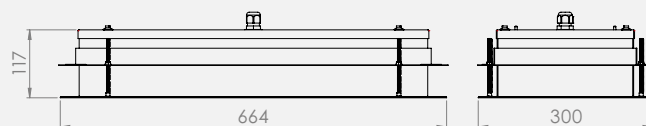
OPTIONS



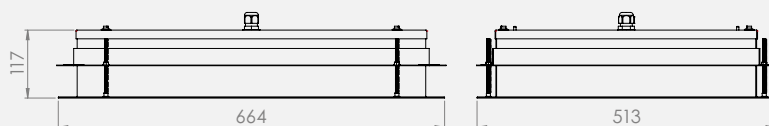
KS3 emergency kit
Philips Trustsight BASIC kit, 3.6 V battery
4000 mAh NiMH battery, power supply
3 w for 3 h, approx. 300 Lm.

DIMENSIONS (mm)

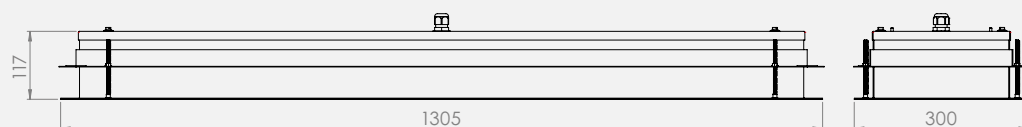
TYPE A



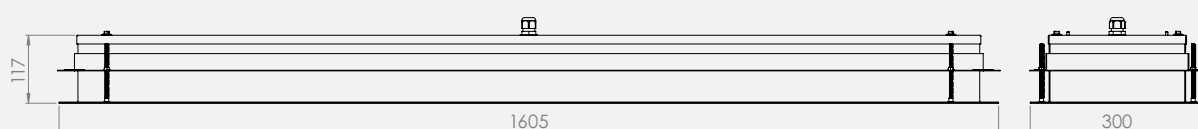
TYPE B



TYPE C



TYPE D



REFERENCES AND FEATURES

CODE	REFERENCE	Type	Cut-out (mm)	P (W)	Emitted flux (Lm)	Weight (Kg)
OPMI optics - Opal PMMA diffuser						
EUP2072EPF	Ir77-HLED OPMI 665/300 2800/2 28/840 EPF	A	275x640	28	2800	8
EUP2070EPF	Ir77-HLED OPMI 665/515 4000/3 39/840 EPF	B	490x640	39	4000	11
EUP2090EPF	Ir77-HLED OPMI 665/515 5500/4 54/840 EPF	B	490x640	54	5500	11
EUP2071EPF	Ir77-HLED OPMI 1305/300 4000/2 39/840 EPF	C	1275x275	39	4000	11
EUP2113EPF	Ir77-HLED OPMI 1305/300 5500/2 60/840 EPF	C	1275x275	60	5500	11
EUP2088EPF	Ir77-HLED OPMI 1605/300 7000/2 70/840 EPF	D	1575x275	70	7000	15
OPPC optics - Polycarbonate opal diffuser						
EUP2075EPF	Ir77-HLED OPPC 665/300 2000/2 28/840 EPF	A	275x640	28	2000	8
EUP2073EPF	Ir77-HLED OPPC 665/515 3200/3 39/840 EPF	B	490x640	39	3200	11
EUP2091EPF	Ir77-HLED OPPC 665/515 4200/4 54/840 EPF	B	490x640	54	4200	11
EUP2074EPF	Ir77-HLED OPPC 1305/300 3200/2 39/840 EPF	C	1275x275	39	3200	11
EUP2114EPF	Ir77-HLED OPPC 1305/300 4200/2 54/840 EPF	C	1275x275	54	4200	11
EUP2112EPF	Ir77-HLED OPPC 1605/300 5500/2 60/840 EPF	D	1575x275	60	5500	15
MPVR optics - Tempered glass diffuser + inner microprismatic plate						
EUP2202EPF	Ir77-HLED MPVR 665/300 3000/2 25/840 EPF	A	275x640	25	3000	8
EUP2200EPF	Ir77-HLED MPVR 665/515 5000/4 45/840 EPF	B	490x640	45	5000	11
EUP2201EPF	Ir77-HLED MPVR 1305/300 7000/4 65/840 EPF	C	1275x275	65	7000	11

Light and power output tolerance $\pm 10\%$



RECESSED, ACCESS FROM THE **BOTTOM**

RECESSED, ACCESS FROM THE **BOTTOM**



DATA SHEETS

DRACO
Ir77_Evo
Sm62
Xe54
Nd60_D

When access from the top is not possible or wanted, recessed luminaires with access to the active parts from inside the room can be used. They are the best economic and technical solution when maintenance from inside the cleanrooms is not a problem (availability or cost) and when ceiling heights allow easy access. The luminaires presented in this section are suitable, depending on the range, for the most common types of structures in cleanrooms. It means for continuous cut-out supports or modular grid ceilings. The compact DRACO range makes it easier to integrate luminaires in rooms with a classification until 3, where free ceiling space is limited by the presence of HVAC systems (excluding laminar flow). As for all our ranges, we have included in our standard references inactinic versions for the most common uses.

RANGES	False ceiling with cut-out	Modulation 600	625	Modular false ceiling T24 Clip'in	T55	Inactinic Version
DRACO	•					•
Ir77_Evo	•	•		•		•
Sm62		•	•		•	• (on request)
Xe54	•	• (on request)	• (on request)			
Nd60_D					•	• (on request)



TYPE OF PRODUCTS

Compact recessed LED luminaires, IP65, access from below. Wide range of powers and dimensions. Installation in false ceiling with cut-out.

MECHANICAL CONSTRUCTION

Luminaire structure made of 0.8 mm steel, LaserWeld waterproof assembling technology, powder coated with KilBac white RAL 9003, certified qualicoat class 1 and antibacterial. White lacquered aluminium frame fixed to the housing by 4 stainless steel screws, closed by overlapping. Screwless frame available in option (SV).

LED MODULES

Zagha LED modules Book7, L28W6, with an energy efficiency until 185 Lm/W, rated AA+. Assembled on a 2 mm aluminium plate to ensure an optimal heat dissipation for the lifespan of the LEDs. Low chromatic distortion: 3SDCM. Colour rendering index over 90. Expected luminous flux : L80 at 70.000 h.

Light spectra : white 4000 K, white gradation (TW), inactinic amber 590 nm, inactinic red 640 nm.

OPTICS

- **TRPC/30** : intensive optics (30°), microlenses installed directly on the LED module. Transparent polycarbonate diffuser.
- **TRPC/60** : intensive optics (60°), microlenses installed directly on the LED module. Transparent polycarbonate diffuser.
- **OPPC** : opal polycarbonate diffuser, high impact resistance.
- **OPMI** : opal diffuser in PMMA, high chemical resistance.
- **MPPC** : polycarbonate micro prismatic diffuser which reduce luminance to achieve UGR lower than 19.
- **MPVR** : optics made of hardened laminated glass and an internal microprism diffuser which reduce luminance to achieve UGRs lower than 19. Excellent resistance to hydrogen peroxide.

CONTAMINATION CONTROL

Reduced risk of microbial growth :

>> **KilBac** technology, broad spectrum antibacterial finish with silver ions (BioCote, validated according to ISO 22196).

>> **CleanSeal** technology, use of two-component antimicrobial seals according to VDI-6022 and DIN EN ISO 846.

The mechanical construction of the luminaire ensures a particle emission class 3 according to ISO 14644-14. This range is made without silicone.

H₂O₂ RESISTANCE

The components that may come into contact with hydrogen peroxide during the decontamination process were tested by cyclic, direct and prolonged contact with a 35% H₂O₂ solution.

TEMPERATURE AND HUMIDITY

Reference ambient temperature: 20°C / 68°F. Operating temperature range : 5 to 25°C / 41 to 77 °F (the temperature affects the lifetime of the LEDs). For environments with a moisture content of more than 70%, we recommend the use of lacquered INOX 304 for the housing, in option.

POWER SUPPLY

Luminaires supplied with European-branded electronic driver. Rated voltage 220-240 V 50/60 Hz. Access to the luminaire from the bottom. Rated voltage from 220 to 240 V. DALI dimming (GDA) available in option.

INSTALLATION

Installation of the housing in false ceiling with cut-out, from 13 to 80 mm thickness :

- **By clamping** (supplied with the luminaire) which allow an installation from the inside of the luminaire with the **IsoFlex** system, which ensure the watertightness.
- **By suspension** with threaded rods (not supplied) fixed to the housing.
- **By optional mounting brackets.**

WIRING

Wieland waterproof connector RST20i male + female on HO7RNE 3G1.5 cord.

OPTIONS



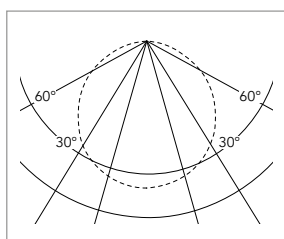
KS3 emergency kit

Philips Trustsight BASIC kit, 3.6 V 4000 mAh NiMH battery, power supply 3 W for 3 h, approx. 300 Lm.

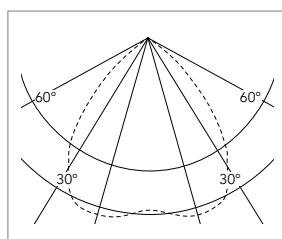
Frame without screws (SV)

The 4 INOX screws are replaced by internal springs.

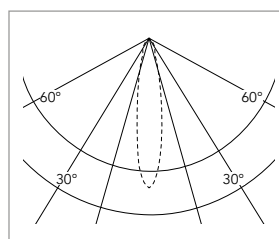
PHOTOMETRY



Opal



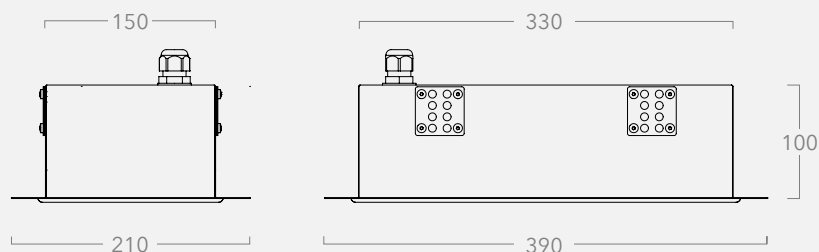
Optics 60°



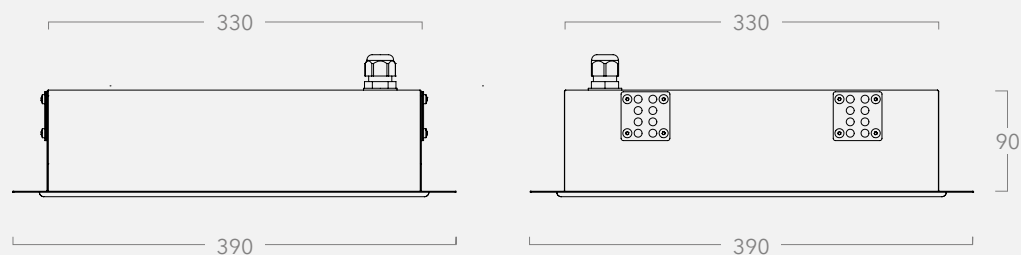
Optics 30°

DIMENSIONS (mm)

TYPE A

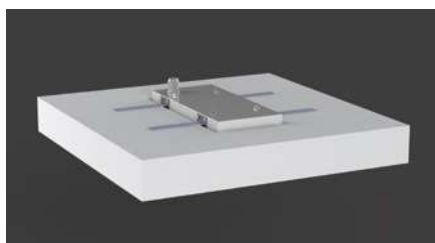


TYPE B



DETAILS

STANDARD CLAMPING



OPTIONAL CLAMPING

A1067ACC - DRACO STRIPPER 2139



For models 210x390mm

REFERENCES AND FEATURES

CODE	REFERENCE	Type	Cut-out (mm)	P (W)	Emitted flux (Lm)	UGR	4-point fixing (mm)	Weight (Kg)
TRPC/30 optics - Intensive 30° - Polycarbonate								
EDO2021EPF	DRACO TRPC/30 LED 390/390 4500/4 35/840 EPF	B	350x350	35	4500	<19	187x187	4,5
EDO2022EPF	DRACO TRPC/30 LED 390/390 9200/4 76/840 EPF	B	350x350	76	9200	<19	187x187	4,5
TRPC/60 optics - Opening 60° - Polycarbonate								
EDO2023EPF	DRACO TRPC/60 LED 390/390 4500/4 35/840 EPF	B	350x350	35	4500	<19	187x187	4,5
EDO2024EPF	DRACO TRPC/60 LED 390/390 9200/4 76/840 EPF	B	350x350	76	9200	<19	187x187	4,5
OPPC optics - Polycarbonate opal								
EDO2013EPF	DRACO OPPC LED 210/390 1450/2 14/840 EPF	A	170x350	14	1450		101x187	2,5
EDO2014EPF	DRACO OPPC LED 210/390 2900/2 33/840 EPF	A	170x350	33	2900		101x187	2,5
EDO2025EPF	DRACO OPPC LED 390/390 3400/5 31/840 EPF	B	350x350	31	3400		187x187	4,5
EDO2026EPF	DRACO OPPC LED 390/390 4500/5 44/840 EPF	B	350x350	44	4500		187x187	4,5
OPMI optics - PMMA opal diffuser								
EDO2092EPF	DRACO OPMI LED 210/390 1700/2 14/840 EPF	A	170x350	14	1700		101x187	2,5
EDO2093EPF	DRACO OPMI LED 210/390 3300/2 33/840 EPF	A	170x350	33	3300		101x187	2,5
EDO2094EPF	DRACO OPMI LED 390/390 3950/5 31/840 EPF	B	350x350	31	3950		187x187	4,5
EDO2095EPF	DRACO OPMI LED 390/390 5300/4 44/840 EPF	B	350x350	44	5300		187x187	4,5
EDO2108EPF	DRACO OPMI LED 390/390 9900/5 89/840 EPF	B	350x350	89	9900		187x187	4,5
MPPC optics - Polycarbonate micro-prismatic								
EDO2086EPF	DRACO MPPC LED 390/390 3700/5 36/840 EPF	B	350x350	36	3700	<19	187x187	4,5
EDO2087EPF	DRACO MPPC LED 390/390 5100/5 44/840 EPF	B	350x350	44	5100		187x187	4,5
EDO2100EPF	DRACO MPPC LED 390/390 9200/5 89/840 EPF	B	350x350	89	9200		187x187	4,5
MPVR optics - Laminated tempered glass and micro-prismatic diffuser								
EDO2185EPF	DRACO MPVR LED 390/390 3800/5 38/840 EPF	B	350x350	38	3800	<19	187x187	5,5
EDO2186EPF	DRACO MPVR LED 390/390 5200/5 48/840 EPF	B	350x350	48	5200	<19	187x187	5,5
White gradation (TW) - MPPC optics - Polycarbonate micro-prismatic								
EDO2087GDATW	DRACO MPPC LED 390/390 5100/5 44/TW GDA	B	350x350	44	5100		187x187	4,5
590 nm amber inactinic light - OPMI optics								
EDO2209EPF	DRACO OPMI LED 390/390 1500/2 38/590 EPF	B	350x350	38	1500		187x187	4,5
640 nm red inactinic light - OPMI optics								
EDO2208EPF	DRACO OPMI LED 390/390 1000/2 38/640 EPF	B	350x350	38	1000		187x187	4,5

Light and power output tolerance $\pm 10\%$



Ir77_Evo



TYPE OF PRODUCTS

Recessed LED luminaires IP65, access from the bottom. Installation in modular false ceilings T24 or smooth ceilings with cut-out.

MECHANICAL CONSTRUCTION

Luminaire structure made of 0,8mm steel, LaserWeld waterproof assembling technology, powder coated with KilBac white RAL 9003, certified qualicoat class 1 and antibacterial. The flat return of the structure allows an optimal application of the seal during installation. Lower frame in aluminium white lacquered, screwed on the luminaire structure through 4 or 6 stainless steel screws, closed by overlapping.

LED MODULES

White light : Zagha LED modules Book7, L28W6, with an energy efficiency until 185 Lm/W, rated AA+. Assembled on a 2 mm aluminium plate to ensure an optimal heat dissipation for the lifespan of the LEDs. 3SDCM. Colour rendering index 85. Expected luminous flux : L80 at 70.000 h.

Inactinic light : amber (590 nm) or red (620 nm), specific led's PCB in aluminium with Zagha Book7, L28W6, made in France.

OPTICS

- **OPMI** : opal diffuser in PMMA, high chemical resistance.
- **MPPC** : clear polycarbonate diffuser + inner micropismatic plate. High visual comfort and impact resistance.
- **MPVR** : clear tempered glass diffuser + inner micropismatic plate. High visual comfort, easy cleaning excellent ageing.

CONTAMINATION CONTROL

Reduced risk of microbial growth :

>> **KilBac** technology, broad spectrum antibacterial finish with silver ions (BioCote, validated according to ISO 22196).

>> **CleanSeal** technology, use of two-component antimicrobial seals according to VDI-6022 and DIN EN ISO 846.

The mechanical construction of the luminaire ensures a particle emission class 3 according to ISO 14644-14. This range is made without silicone.

TEMPERATURE AND HUMIDITY

Reference ambient temperature : 20°C / 68°F. Operating temperature range : 5 to 25°C / 41 to 77 °F (the temperature affects the lifetime of the LEDs). For environments with a moisture content of more than 70%, we recommend the use of lacquered INOX 304 for the housing, in option.

POWER SUPPLY

Luminaires supplied with European-branded electronic driver. Rated voltage 220-240 V. Access to the luminaire from the bottom, interchangeable aluminium plate. DALI dimming (GDA) available in option.



OPTIONS



DALI Dimming

Driver to control the light flow with DALI protocol or push button. For hybrid inactinic luminaires, dimming is only possible with DALI protocol.



Housing INOX 304

For rooms where the risk of oxidation is high. We offer a housing made of 304 stainless steel, white lacquered.



WIELAND RST20i connector

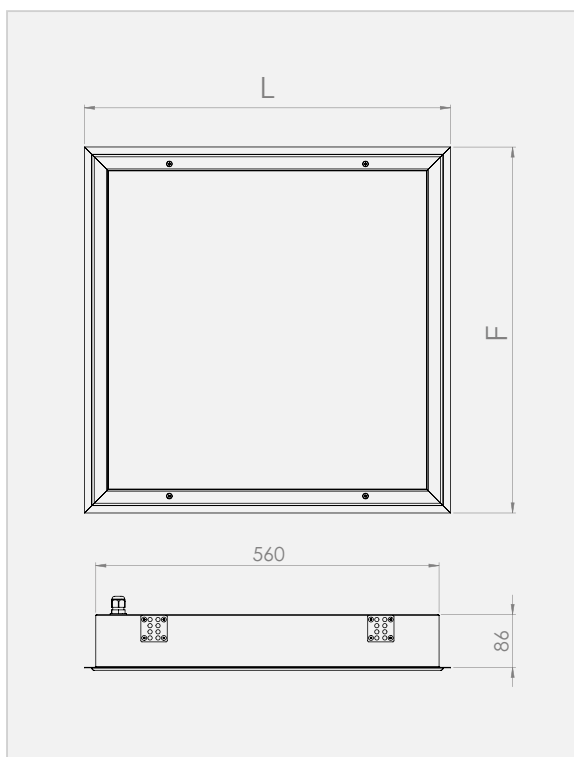
RST20i waterproof, male on 500 mm cord + female.



Kit secours KS3

Philips Trustsight BASIC kit, 3.6 V 4000 mAh NiMH battery, power supply 3 W for 3 h, approx. 300 Lm.

DIMENSIONS (mm) AND INSTALLATION



DIMENSIONS AND CUT-OUT

TYPE	L (mm)	F (mm)	Minimum cut-outs (mm)
A	597	597	575x575
B	1197	297	1175x275
C	597	297	575x275

INSTALLATION

Installation of the housing in T24 modular false ceiling (excepted clip'in) or cut-out ceiling from 13 to 80 mm :

By clamping ISOFLEX waterproof (supplied with the luminaire), which allow to maintain watertightness even in maintenance position.

By suspension with threaded rods (not supplied) fixed to the housing

By optional mounting brackets (see page 56).

The sealing between the false ceiling and the lower frame must be applied at the installation.

POWER SUPPLY

Power supply through a PE13 cable gland on top of the luminaire :

White light

2-Pole terminal block + earth inside the luminaire. Access through the luminaire housing through a cable gland (rewiring impossible).

Hybrid white + inactinic light without dimming

Two independent circuits wired on a 5-pole terminal block : N1F1-N2F2-T

Hybrid white + inactinic light with dimming DALI

A single electrical circuit wired to a 5-pole terminal block : N1F1T-D1D2. One DALI bus but two addresses per luminaire. Switching on and off via DALI controller only (push button not possible).

REFERENCES AND FEATURES

White light

CODE	REFERENCE	Radiation	Type	P (W)	Emitted flux (Lm)	Weight (Kg)
OPMI optics - Opal PMMA diffuser						
EDO2265EPF	Ir77 EVO OPMI 297/597 2500/2 20/840 EPF	4000 K - CRI 85	C	20	2500	4,5
EDO2239EPF	Ir77 EVO OPMI 597/597 4000/4 35/840 EPF	4000 K - CRI 85	A	35	4000	8
EDO2274EPF	Ir77 EVO OPMI 597/597 6000/4 55/840 EPF	4000 K - CRI 85	A	55	6000	8
EDO2240EPF	Ir77 EVO OPMI 297/1197 4400/6 36/840 EPF	4000 K - CRI 85	B	36	4400	9
EDO2271EPF	Ir77 EVO OPMI 297/1197 6000/6 57/840 EPF	4000 K - CRI 85	B	57	6000	9

MPPC optics - Clear polycarbonate diffuser + inner microprismatic - UGR<19

EDO2263EPF	Ir77 EVO MPPC 597/597 4000/4 39/840 EPF	4000 K - CRI 85	A	39	4000	8
EDO2264EPF	Ir77 EVO MPPC 297/1197 4000/6 43/840 EPF	4000 K - CRI 85	B	43	4000	8

MPVR optics - Clear glass diffuser + inner microprismatic - UGR<19

EDO2283EPF	Ir77 EVO MPVR 597/597 4000/4 34/840 EPF	4000 K - CRI 85	A	34	4000	11
EDO2284EPF	Ir77 EVO MPVR 597/597 5000/4 45/840 EPF	4000 K - CRI 85	A	45	5000	11
EDO2285EPF	Ir77 EVO MPVR 297/1197 5000/6 45/840 EPF	4000 K - CRI 85	B	45	5000	11

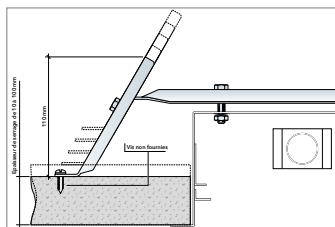
Light and power output tolerance $\pm 10\%$

Inactinic and hybrid light

CODE	REFERENCE	Radiation	Type	P (W) White	Emitted flux White (Lm)	P (W) Inactinic	Emitted flux Inactinic (Lm)
OPMI optics - Opal PMMA diffuser - Inactinic amber spectrum							
EDO2272EPF	Ir77 EVO OPMI 597/597 800/3000/1 55/590/840 EPF	590 nm + 4000 K	A	39	3000		800
EDO2275EPF	Ir77 EVO OPMI 597/597 1500/1 55/590 EPF	590 nm	A				1500
EDO2277EPF	Ir77 EVO OPMI 597/597 1000/1500/1 55/590/840 EPF	590 nm + 4000 K	A	13	1500		1000
OPM optics - Opal PMMA diffuser - Inactinic red spectrum							
EDO2273EPF	Ir77 EVO OPMI 597/597 750/3000/1 35/620/840 EPF	620 nm + 4000 K	A	39	3000		750
EDO2276EPF	Ir77 EVO OPMI 597/597 1500/1 35/620 EPF	620 nm	A				1500

Light and power output tolerance $\pm 10\%$

ACCESSORIES



Clamping brackets

CODE	REFERENCE
Clamping brackets for false ceilings from 13 to 100 mm. Allow to increase the clamping pressure on the false ceiling.	
A1000ACC	PTTS DUO
A1001ACC	PTTS TRIO/QUARTO
Security steel cable	
A1021ACC	Rope kit Duo Ir77-Ra88 (for format type A, C and D)
A1022ACC	Rope kit Quarto Ir77-Ra88 (for format type B)



TYPE OF PRODUCTS

Recessed LED luminaires IP65, access from the bottom. Smooth opal optics. Wide range of powers and dimensions. Installation in clip'in modular false ceilings, 600 or 625 modules.

MECHANICAL CONSTRUCTION

Luminaire housing made of 0,8mm steel. Powder coated with KilBac white RAL 9003, certified qualicoat class 1 and antibacterial. Lower frame in aluminium white lacquered, screwed on the luminaire structure through 8 stainless steel screws, closed by overlapping.

LED MODULES

Zagha LED modules Book7, L28W6, with an energy efficiency until 185 Lm/W, rated AA+. Assembled on a 2 mm aluminium plate to ensure an optimal heat dissipation for the lifespan of the LEDs. 3SDCM. Colour rendering index 85. Expected luminous flux : L80 at 70.000 h.

OPTICS

- **OPMI** : opal diffuser in PMMA, recommended for its high chemical resistance.
- **MPPC** : clear polycarbonate diffuser + inner microprismatic plate. High visual comfort and impact resistance.
- **MPVR** : clear tempered glass diffuser + inner microprismatic plate. High visual comfort, easy cleaning excellent ageing.

CONTAMINATION CONTROL

Reduced risk of microbial growth :

- >> **KilBac** technology, broad spectrum antibacterial finish with silver ions (BioCote, validated according to ISO 22196).
- >> **CleanSeal** technology, use of two-component antimicrobial seals according to VDI-6022 and DIN EN ISO 846.

The mechanical construction of the luminaire ensures a particle emission class 3 according to ISO 14644-14. This range is made without silicone.

H₂O₂ RESISTANCE

The components that may come into contact with hydrogen peroxide during the decontamination process were tested by cyclic, direct and prolonged contact with a 35% H₂O₂ solution.

TEMPERATURE AND HUMIDITY

Reference ambient temperature : 20°C / 68°F. Operating temperature range : 5 to 25°C / 41 to 77 °F (the temperature affects the lifetime of the LEDs). For environments with a moisture content of more than 70%, we recommend the use of lacquered INOX 304 for the housing, in option.

POWER SUPPLY

Luminaires supplied with European-branded electronic driver. Rated voltage 220-240 V 50/60 Hz. Access to the luminaire from the bottom. DALI dimming (GDA) available in option.

INSTALLATION

Flush mounting of the housing in clip'in modular false ceiling :

- **Through gravity** with clampings (supplied with the luminaire), which allow, thanks to the **Isoflex** system, an installation from inside the lighting while maintaining watertightness. Clampings need to be mounted on the top from the grid ceiling.

WIRING

By a waterproof Wieland connector fixed on the top of the luminaire (installation on flexible cord).



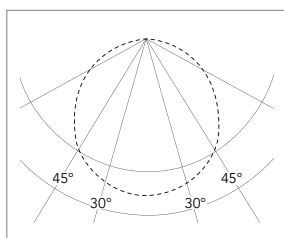
OPTIONS



KS3 emergency kit

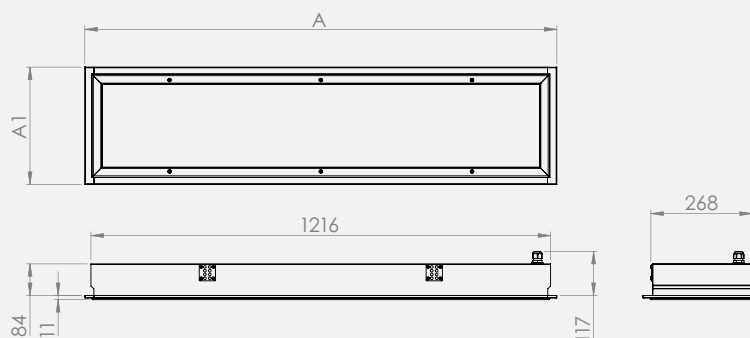
Philips Trustsight BASIC kit, 3.6 V 4000 mAh
NiMH battery, power supply 3 W for 3 h,
approx. 300 Lm.

PHOTOMETRY

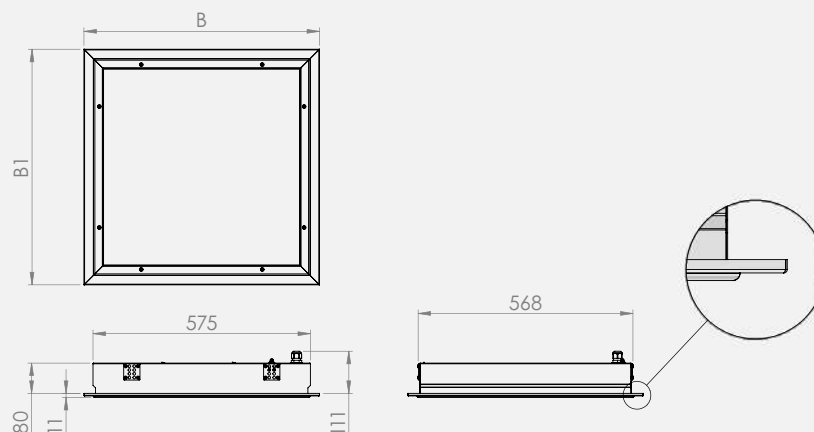


DIMENSIONS (mm)

TYPE A



TYPE B

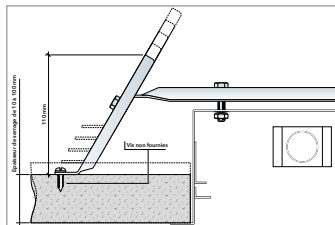


REFERENCES AND FEATURES

CODE	REFERENCE	Type	A or B	A1 ou B1	Cut-out (mm)	P (W)	Emitted flux (Lm)	Weight (Kg)
MODULE 625								
OPMI optics - Opal diffuser PMMA								
EDO2215EPF	Sm62 CI OPMI 623/623 3900/1 37/840 EPF	B	623	623	580x580	37	3900	9,5
EDO2216EPF	Sm62 CI OPMI 623/623 5800/1 55/840 EPF	B	623	623	580x580	55	5800	9,5
EDO2217EPF	Sm62 CI OPMI 1248/310 5000/1 47/840 EPF	A	1248	310	1180x280	47	5000	9,5
EDO2218EPF	Sm62 CI OPMI 1248/310 7000/1 65/840 EPF	A	1248	310	1180x280	65	7000	9,5
MPPC optics - Clear polycarbonate diffuser + inner microprismatic								
EDO2305EPF	Sm62 CI MPPC 623/623 3500/1 37/840 EPF	B	623	623	580x580	37	3500	9,5
EDO2306EPF	Sm62 CI MPPC 623/623 5200/1 55/840 EPF	B	623	623	580x580	55	5200	9,5
EDO2307EPF	Sm62 CI MPPC 1248/310 4500/1 47/840 EPF	A	1248	310	1180x280	47	4500	9,5
EDO2308EPF	Sm62 CI MPPC 1248/310 6300/1 65/840 EPF	A	1248	310	1180x280	65	6300	9,5
MPVR optics - Clear glass diffuser + inner microprismatic								
EDO2312EPF	Sm62 CI MPVR 623/623 3500/1 37/840 EPF	B	623	623	580x580	37	3500	12
EDO2313EPF	Sm62 CI MPVR 623/623 5200/1 55/840 EPF	B	623	623	580x580	55	5200	12
EDO2314EPF	Sm62 CI MPVR 1248/310 4500/1 47/840 EPF	A	1248	310	1180x280	47	4500	12
EDO2315EPF	Sm62 CI MPVR 1248/310 6300/1 65/840 EPF	A	1248	310	1180x280	65	6300	12
MODULE 600								
OPMI optics - Opal diffuser PMMA								
EDO2227EPF	Sm62 CI OPMI 599/599 3900/1 37/840 EPF	B	599	599	580x580	37	3900	9,5
EDO2228EPF	Sm62 CI OPMI 599/599 5800/1 55/840 EPF	B	599	599	580x580	55	5800	9,5
EDO2229EPF	Sm62 CI OPMI 1199/299 5000/1 47/840 EPF	A	1199	299	1180x280	47	5000	9,5
EDO2230EPF	Sm62 CI OPMI 1199/299 7000/1 65/840 EPF	A	1199	299	1180x280	65	7000	9,5
MPPC optics - Clear polycarbonate diffuser + inner microprismatic								
EDO2297EPF	Sm62 CI MPPC 599/599 3500/1 37/840 EPF	B	599	599	580x580	37	3500	9,5
EDO2298EPF	Sm62 CI MPPC 599/599 5200/1 55/840 EPF	B	599	599	580x580	55	5200	9,5
EDO2299EPF	Sm62 CI MPPC 1199/299 4500/1 47/840 EPF	A	1199	299	1180x280	47	4500	9,5
EDO2300EPF	Sm62 CI MPPC 1199/299 6300/1 65/840 EPF	A	1199	299	1180x280	65	6300	9,5
MPVR optics - Clear glass diffuser + inner microprismatic								
EDO2293EPF	Sm62 CI MPVR 599/599 3500/1 37/840 EPF	B	599	599	580x580	37	3500	12
EDO2294EPF	Sm62 CI MPVR 599/599 5200/1 55/840 EPF	B	599	599	580x580	55	5200	12
EDO2295EPF	Sm62 CI MPVR 1199/299 4500/1 47/840 EPF	A	1199	299	1180x280	47	4500	12
EDO2296EPF	Sm62 CI MPVR 1199/299 6300/1 65/840 EPF	A	1199	299	1180x280	65	6300	12

Light and power output tolerance $\pm 10\%$

ACCESSORIES



Clamping brackets

CODE	REFERENCE
Clamping brackets for false ceilings from 13 to 100 mm. Allow to increase the clamping pressure on the false ceiling.	
A1000ACC	PTTS DUO
A1001ACC	PTTS TRIO/QUARTO
Security steel cable	
A1021ACC	Rope kit Duo Ir77-Ra88 (for format type A, C and D)
A1022ACC	Rope kit Quarto Ir77-Ra88 (for format type B)



TYPE OF PRODUCTS

Recessed LED luminaire IP65 for operating theatre, access from below. Low luminance optics, CRI over 85. Xe54 allows the lighting of operating theatre according to the EN12464 standard. Installation in false ceilings with cut-out. Slim for an optimal aesthetic integration into the architecture.

MECHANICAL CONSTRUCTION

Luminaire structure made of 0,8mm steel. Powder coated with KilBac white RAL 9003, certified qualicoat class 1 and antibacterial. The flat return of the housing allows an optimal application of the seal during installation. Lower frame in aluminium white lacquered, screwed on the luminaire structure through 6 stainless steel screws, closed by overlapping.

LED MODULES

Zagha LED modules Book7, L28W6, with an energy efficiency until 185 Lm/W, rated AA+. Assembled on a 2mm aluminium plate to ensure an optimal heat dissipation for the lifespan of the LEDs. Low chromatic distortion : 3SDCM. Colour rendering index over 85. Expected luminous flux : L90 at 50.000 h.

OPTICS

Optical unit made of a white lacquered aluminium frame, a transparent polycarbonate cover plate and an internal diffuser with three-dimensional microprisms. This ensures high mechanical strength combined with a UGR lower than 19. Moreover, since the optics are smooth on the outside, soiling is very limited, and cleaning is easy.

CONTAMINATION CONTROL

Reduced risk of microbial growth :

- >> **KilBac** technology, broad spectrum antibacterial finish with silver ions (BioCote, validated according to ISO 22196).
- >> **CleanSeal** technology, use of two-component antimicrobial seals according to VDI-6022 and DIN EN ISO 846.

The mechanical construction of the luminaire ensures a particle emission class 3 according to ISO 14644-14. This range is made without silicone.

POWER SUPPLY

Luminaires supplied with electronic dimmable power supply (push button and DALI) from European brand, nominal voltage 220/240 V 50/60 Hz. Access to the luminaire from below. Reference ambient temperature : 20°C / 68°F. Operating temperature range : 5 to 25°C / 41 to 77 °F.

INSTALLATION

Installation of the housing in false ceiling with cut-out from 13 to 60 mm :

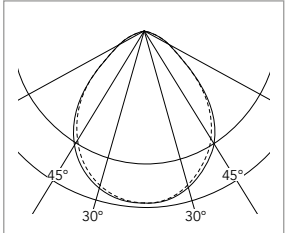
- **By clamping** ISOFLEX waterproof (supplied with the luminaire), which allow to maintain watertightness.
- **By suspension** with threaded rods (not supplied) fixed to the housing.

WIRING

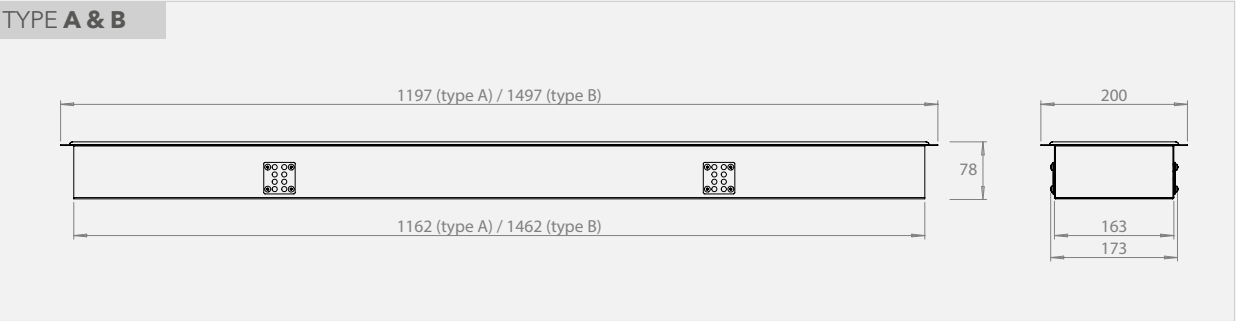
Power supply via PG13 cable gland, connection to a 5-pole automatic terminal block (Phase, Neutral, Earth, D1, D2).



PHOTOMETRY



DIMENSIONS (mm)



REFERENCES AND FEATURES

CODE	REFERENCE	Type	Cut-out (mm)	P (W)	Emitted flux (Lm)	Weight (Kg)
PRPC optics - Polycarbonate micro-prism diffuser						
EDO2164GDA	Xe54-LED MPPC LED 1197/200 6600/1 65/840 GDA	A	180x1180	65	6600	7
EDO2166GDA	Xe54-LED MPPC LED 1497/200 8200/1 75/840 GDA	B	180x1480	75	8200	8

Light and power output tolerance ± 10%



Nd60_D



TYPE OF PRODUCTS

LED recessed luminaire for cleanroom. Installation in modular grid ceiling **T55 module 600**, access from below.

MECHANICAL CONSTRUCTION

Housing made of 10/10 steel. Powder coated with KilBac white RAL 9003, certified qualicoat class 1 and antibacterial. Lower frame in white lacquered aluminium, screwed on the luminaire structure through 8 or 10 stainless steel screws, closed by overlapping.

LED MODULES

Linear LED PCB from European brand, energy classification AA+, assembled on a 2 mm aluminium plate. Low chromatic distortion : 3SDCM. Expected luminous flux: L80 at 50.000 h or 70.000 h.

OPTICS

- **OPMI** : opal diffuser in PMMA (Perspex).
- **MPPC** : clear polycarbonate diffuser + inner microprismatic plate. High visual comfort and impact resistance.
- **MPVR** : clear tempered glass diffuser + inner microprismatic plate. High visual comfort, easy cleaning excellent ageing.

CONTAMINATION CONTROL

Reduced risk of microbial growth :

- >> **KilBac** technology, broad spectrum antibacterial finish with silver ions (BioCote, validated according to ISO 22196).
- >> **CleanSeal** technology, use of two-component antimicrobial seals according to VDI-6022 and DIN EN ISO 846.

The mechanical construction of the luminaire ensures a particle emission class 3 according to ISO 14644-14. This range is made without silicone.

H₂O₂ RESISTANCE

The components that may come into contact with hydrogen peroxide during the decontamination process were tested by cyclic, direct and prolonged contact with a 35% H₂O₂ solution.

TEMPERATURE AND HUMIDITY

Reference ambient temperature : 20°C / 68°F. Operating temperature range : 5 to 25°C / 41 to 77 °F (the temperature affects the lifetime of the LEDs). For environments with a moisture content of more than 70%, we recommend the use of lacquered INOX 304 for the housing, in option.

POWER SUPPLY

Luminaires supplied with European-branded electronic driver. Rated voltage 220-240 V. Access to the luminaire from below for this D-version. DALI dimming (GDA) available in option.

INSTALLATION

Installation in modular T55 false ceiling. The luminaire can be fixed through clamping brackets, supplied with the false ceiling.

WIRING

By a Wieland waterproof connector, RST20i on cord + female connector.



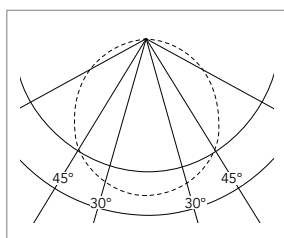
OPTIONS



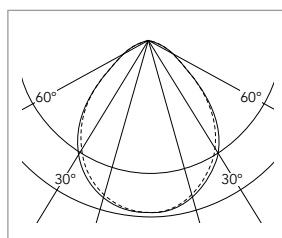
KS3 emergency kit

Philips Trustsight BASIC kit, 3.6 V 4000 mAh
NiMH battery, power supply 3 W for 3 h,
approx. 300 Lm.

PHOTOMETRY



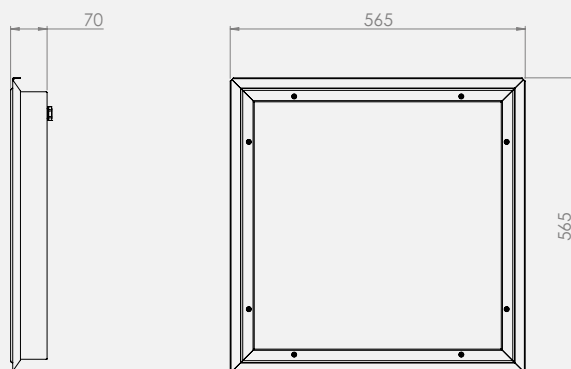
OPMI



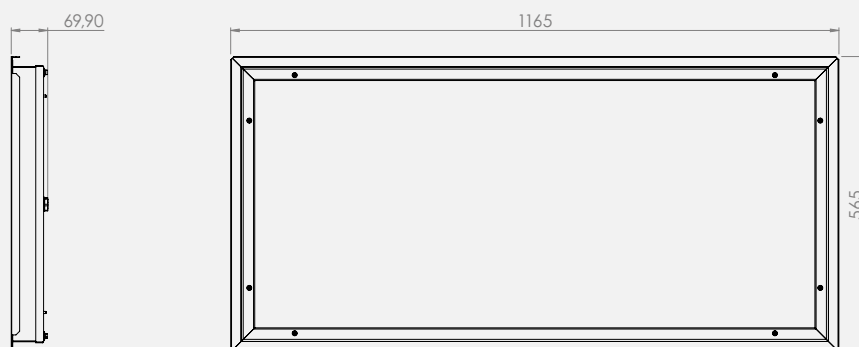
MPPC-MPVR

DIMENSIONS (mm)

TYPE A



TYPE B



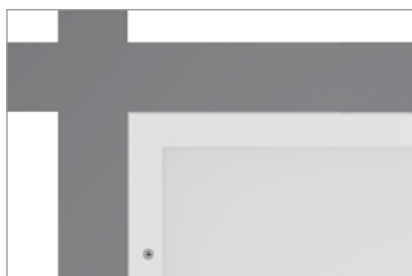
INTEGRATION DETAILS IN T55 GRID CEILING (mm)

D-Version, access from the bottom

Sectional view



Photographic details



REFERENCES AND FEATURES

CODE	REFERENCE	L80 (x1000h)	Type	P (W)	Emitted flux (Lm)	Weight (Kg)
T55 GRID CEILING, MODULE 600 - ACCESS FROM THE BOTTOM						
OPMI optics - Opal PMMA diffuser						
EDO2244EPF	Nd60 DM600 OPMI LED 565/565 5000/1 42/840 EPF	50	A	42	5000	9
EDO2245EPF	Nd60 DM600 OPMI LED 565/565 10000/5 87/840 EPF	50	A	87	10000	9
EDO2243EPF	Nd60 DM600 OPMI LED 1165/565 10000/12 87/840 EPF	70	B	87	10000	17
MPPC optics - Polycarbonate microprismatic diffuser - UGR lower than 19						
EDO2250EPF	Nd60 DM600 MPPC LED 565/565 4700/1 42/840 EPF	50	A	42	4700	9
EDO2251EPF	Nd60 DM600 MPPC LED 565/565 9500/5 87/840 EPF	50	A	87	9500	9
EDO2249EPF	Nd60 DM600 MPPC LED 1165/565 10000/12 87/840 EPF	70	B	87	10000	17
MPVR optics - Tempered glass diffuser + inner microprismatic						
EDO2301EPF	Nd60 DM600 MPVR LED 565/565 4500/1 45/840 EPF	50	A	45	10000	12

Light and power output tolerance $\pm 10\%$

LED PANEL



DATA SHEETS
H1_Evo
H1_E
H1_WR
IDA

The advent of LEDs has seen the emergence of a new technology for light transmission in lighting products : light transmission through the slice of a light guide. This consists of illuminating a plastic plate from the side, which is as crystalline as possible so that it conducts the light over the entire surface. This achieves the dual objective of obtaining high light uniformity on the diffuser while at the same time obtaining an extremely thin product.

Our cleanroom panels are suitable for installation on cleanroom ceiling without the need for adapter frames and, where applicable, without visible fasteners or plugs. For the installation of these products, it is necessary to foresee spaces in the plenum where the power supplies can be accommodated. Compared to a recessed or surface-mounted solution with direct lighting via a diffuser, this solution reduces weight and thickness and has better uniformity on the diffuser. On the other hand, the LED components inside the product are not replaceable (the panel will have to be replaced) and it is more sensitive to plastic ageing as the light path inside the plastic is longer.

Depending on the estimated lifespan of the cleanroom, the defined maintenance plans, and its utilisation rate, it will be necessary to replace the cleanroom panel over the life of the cleanroom. We are aware of the problem of maintenance and replacement of luminaires in cleanrooms, which is why we take care to always maintain replacement solutions that respect the dimensions and fixing points of our historical products. "Futureproof" is part of our product policy.

RANGES	IP65	IP40	Recessed Mounting		Surface Mounting			Hybrid Inactinic (white + red)
			T24 Module 600	T24 Module 625	Crew mounting	Clip fixing (invisible)	Trhreaded rod mounting (invisible)	
H1_Evo	●				● (V version)	● (C version)	● (TF version)	
H1_E	●		●	●				
H1_WR	●		● (E version)		● (V version)	● (C version)	● (TF version)	●
IDA		●	● (E version)		● (V version)			



H1_Evo



TYPE OF PRODUCTS

Very slim LED Panels (11 mm), especially made for cleanrooms. Smooth luminaire section, curved. **IP65 from the top and the bottom**, resistant to hydrogen peroxide. Wide range of luminous flux, from 1500 to 7000 Lm. Available in 4000K or 6500K. CRI 90 and R9 above 50.

MECHANICAL CONSTRUCTION

Extruded aluminium frame welded and white powder-coated with high covering power to maintain the frame's heat dissipation capacity, RAL9016. Double silicone gasket on top and bottom, cable gland and EPDM gasket fixed on the top part to ensure a reinforced seal. Top clamping plate in 0,8mm galvanized steel.

LED MODULES

LED PCB placed inside the aluminium edge. High efficiency LEDs encapsulated on a medium power Epistar chip size 26*46 mil to obtain a better efficiency and increase reliability.

OPTICS

Optical unit made with a reflective sheet incorporating Toray Lumirror technology, a Mitsubishi PMMA light guide and a PMMA diffuser film. Allow to reach an UGR lower than 19.

CONTAMINATION CONTROL

A set of technical seals ensures waterproofness, prevents the proliferation of bacteria, and reduces gas exchanges : **air cleanliness Class 1 in compliance with ISO 14644-14**. Certified by Fraunhofer IPA laboratory. The free ceiling space of clean rooms class 1 to 5 can be limited by the HVAC system.

H₂O₂ RESISTANCE

The components that may come into contact with hydrogen peroxide during the decontamination process were tested by cyclic, direct and prolonged contact with a 35% H₂O₂ solution, see resistance in the reference table.

TEMPERATURE

Reference ambient temperature : 20°C. Operating temperature range : 5 to 25°C (the temperature affects the lifetime of the LEDs).

POWER SUPPLY

Luminaire made with a not dimmable external electronic power supply (EPF) from PHILIPS. DALI dimming (GDA) available in option. Nominal voltage 220/240V 50/60Hz.

INSTALLATION

H1_Evo is available in several versions :

- /C installation by clips on metal ceiling.
 - /TF installation through threaded rod for laminate panel.
 - /V direct clamping by visible tapered head screws.
- Except for the /V versions, the fixings are invisible.

WIRING

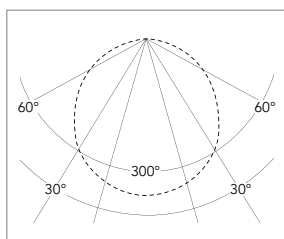
Connection on the external power supply, with a traction stop system to be tightened and closed (accessories included). Foresee a reservation in the plenum for the power supply (70 cm of cable).



OPTION



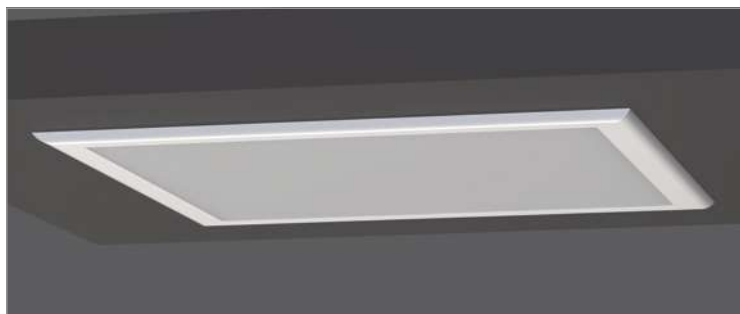
PHOTOMETRY



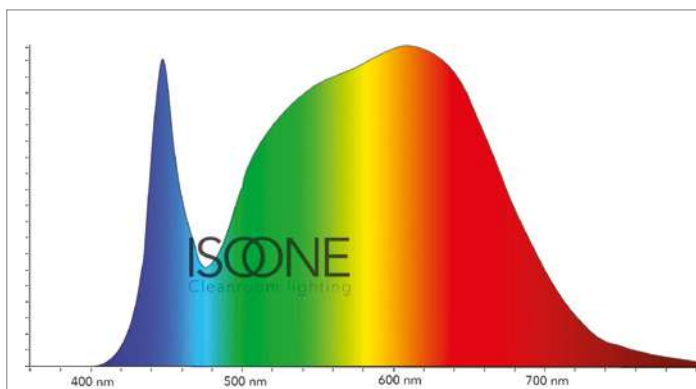
FRAUNHOFER IPA TEST



DETAILS



LIGHT SPECTRUM (VERSION 940)



REFERENCES AND FEATURES

CODE	REFERENCE	Colour (K) temperature	IRC	Type	P (W)	Emitted flux (Lm)	Weight (Kg)	H ₂ O ₂
------	-----------	---------------------------	-----	------	-------	----------------------	----------------	-------------------------------

H1 EVO - 940

Foresee a reservation for the driver in the plenum. For the TF et C version, it is necessary to order a drilling template.

Installation by clips on smooth metal panel - 940

SUR1192EPF	H1 EVO - C OP LED 631/631 4300/1 38/940 EPF	3950	>90	A	40	4300	4,5	●
SUR1193EPF	H1 EVO - C OP LED 331/1231 6500/1 65/940 EPF	3950	>90	C	65	6500	4,5	●
SUR1194EPF	H1 EVO - C OP LED 331/331 1800/1 16/940 EPF	3950	>90	B	16	1800	1,5	●

Installation through threaded rod on smooth laminate panel - 940

SUR1186EPF	H1 EVO - TF OP LED 631/631 4300/1 36/940 EPF	3950	>90	A	40	4300	4,5	●
SUR1187EPF	H1 EVO - TF OP LED 331/1231 6500/1 54/940 EPF	3950	>90	C	65	6500	4,5	●
SUR1188EPF	H1 EVO - TF OP LED 331/331 1800/1 18/940 EPF	3950	>90	B	16	1800	1,5	●

Installation by screws - 940

SUR1189EPF	H1 EVO - V OP LED 631/631 4300/1 36/940 EPF	3950	>90	A	40	4300	4,5	●
SUR1190EPF	H1 EVO - V OP LED 331/1231 6500/1 54/940 EPF	3950	>90	C	65	6500	4,5	●
SUR1191EPF	H1 EVO - V OP LED 331/331 1800/1 18/940 EPF	3950	>90	B	16	1800	1,5	●

H1 EVO - 965

Foresee a reservation for the driver in the plenum. For the TF et C version, it is necessary to order a drilling template.

Installation by clips on smooth metal panel - 965

SUR1201EPF	H1 EVO - C OP LED 631/631 4300/1 36/965 EPF	6500	>90	A	40	4300	4,5	●
SUR1202EPF	H1 EVO - C OP LED 331/1231 6500/1 54/965 EPF	6500	>90	C	65	6500	4,5	●
SUR1203EPF	H1 EVO - C OP LED 331/331 1800/1 18/965 EPF	6500	>90	B	16	1800	1,5	●

Installation through threaded rod on smooth laminate panel - 965

SUR1195EPF	H1 EVO - TF OP LED 631/631 4300/1 36/965 EPF	6500	>90	A	40	4300	4,5	●
SUR1196EPF	H1 EVO - TF OP LED 331/1231 6500/1 54/965 EPF	6500	>90	C	65	6500	4,5	●
SUR1197EPF	H1 EVO - TF OP LED 331/331 1800/1 18/965 EPF	6500	>90	B	16	1800	1,5	●

Installation by screws - 965

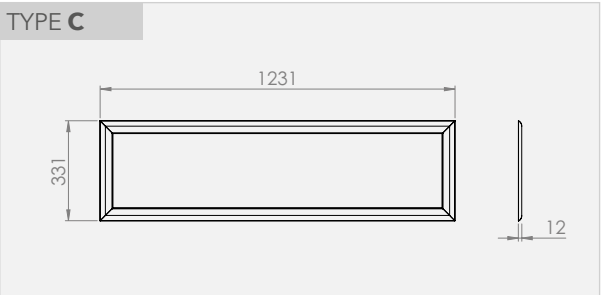
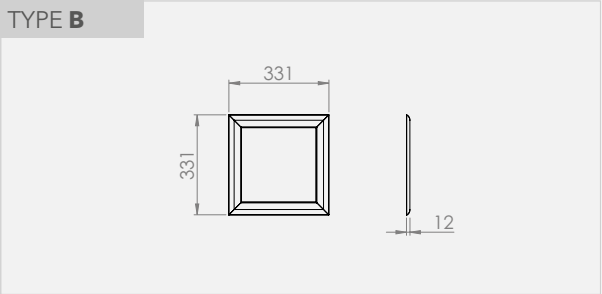
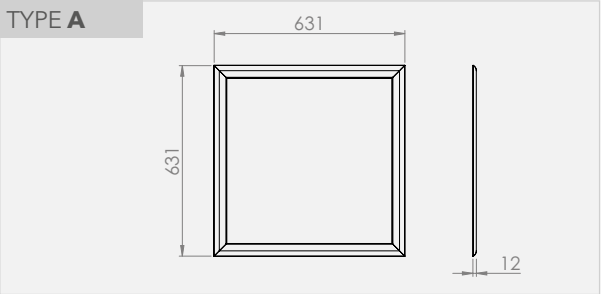
SUR1198EPF	H1 EVO - V OP LED 631/631 4300/1 36/965 EPF	6500	>90	A	40	4300	4,5	●
SUR1199EPF	H1 EVO - V OP LED 331/1231 6500/1 54/965 EPF	6500	>90	C	65	6500	4,5	●
SUR1200EPF	H1 EVO - V OP LED 331/331 1800/1 18/965 EPF	6500	>90	B	16	1800	1,5	●

Light and power output tolerance $\pm 10\%$, colour temperature $\pm 3\%$, IRC 2%

ACCESSORIES

CODE	REFERENCE	CODE	REFERENCE
Drilling template			
A1012ACC	H1/C - Drilling template 300/300	A1017ACC	H1/TF - Drilling template 300/300
A1009ACC	H1/C - Drilling template 600/600	A1014ACC	H1/TF - Drilling template 600/600
A1010ACC	H1/C - Drilling template 300/1200	A1015ACC	H1/TF - Drilling template 300/1200

DIMENSIONS (mm)





H1_E



TYPE OF PRODUCTS

Very slim LED Panels (11 mm), especially made for cleanrooms. **IP65 from the top and the bottom**, resistant to hydrogen peroxide. Wide range of luminous flux, from 1500 to 5150 Lm. Available in 4000 K or 6500 K.

MECHANICAL CONSTRUCTION

Extruded aluminium frame welded and white powder-coated with high covering power to maintain the frame's heat dissipation capacity, RAL 9016. Double silicone gasket on top and bottom, cable gland and EPDM gasket fixed on the top part to ensure a reinforced seal. Top clamping plate in 0,8mm galvanized steel.

LED MODULES

LED PCB placed inside the aluminium edge. High efficiency LEDs encapsulated on a medium power Epistar chip size 26*46 mil to obtain a better efficiency and increase reliability.

OPTICS

Optical unit made with a reflective sheet incorporating Toray Lumirror technology, a Mitsubishi PMMA light guide and a PMMA diffuser film. Allow to reach an UGR lower than 19.

CONTAMINATION CONTROL

A set of technical seals ensures waterproofness, prevents the proliferation of bacteria, and reduces gas exchanges : **air cleanliness Class 1 in compliance with ISO 14644-14**. Certified by **Fraunhofer IPA** laboratory. The free ceiling space of clean rooms class 1 to 5 can be limited by the HVAC system.

H₂O₂ RESISTANCE

The components that may come into contact with hydrogen peroxide during the decontamination process were tested by cyclic, direct and prolonged contact with a 35% H₂O₂ solution, see resistance in the reference table.

TEMPERATURE

Reference ambient temperature : 20°C. Operating temperature range : 5 to 25°C (the temperature affects the lifetime of the LEDs).

POWER SUPPLY

Luminaire made with a not dimmable external electronic power supply (EPF) from PHILIPS. DALI dimming (GDA) available in option. Nominal voltage 220/240 V 50/60 Hz.

INSTALLATION

H1 is available in several versions :

- /E installation on T24 modular ceiling module 600 or 625.

WIRING

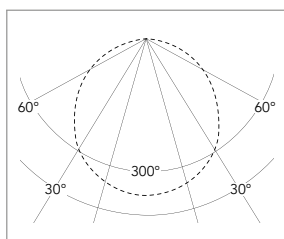
Connection on the external power supply, with a traction stop system to be tightened and closed (accessories included). Foresee a reservation in the plenum for the power supply (70 cm of cable).



OPTION



PHOTOMETRY



FRAUNHOFER IPA TEST



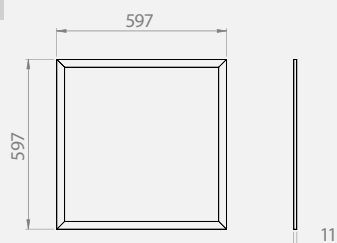
DETAILS



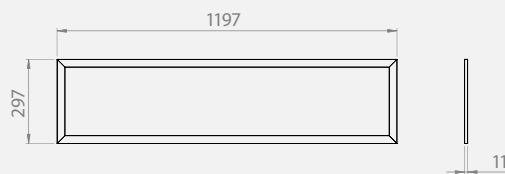
Waterproofing of the power cable

DIMENSIONS (mm)

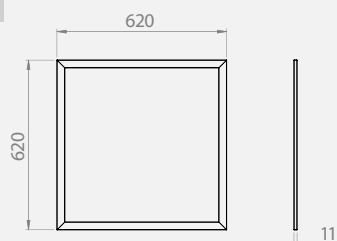
TYPE A



TYPE C



TYPE D



REFERENCES AND FEATURES

CODE	REFERENCE	Colour (K) temperature	IRC	Type	P (W)	Emitted flux (Lm)	Weight (Kg)	H ₂ O ₂
H1 - INSTALLATION IN T24 FALSE CEILING MODULE 600x600								
Installation on grid ceiling - Module 600x600								
SUR1028EPF	H1-E OP LED 597/597 4250/1 36/840 EPF	4000	>80	A	36	4250	4,5	●
SUR1041EPF	H1-E OP LED 597/597 4250/1 36/865 EPF	6500	>80	A	36	4250	4,5	●
SUR1029EPF	H1-E OP LED 297/1197 5150/1 54/840 EPF	4000	>80	C	54	5150	4,6	●
SUR1042EPF	H1-E OP LED 297/1197 5150/1 54/865 EPF	6500	>80	C	54	5150	4,6	●

H1 - INSTALLATION IN T24 FALSE CEILING MODULE 625x625

Installation on grid ceiling - Module 625x625								
EDO2252EPF	H1-E OP LED 620/620 4250/1 36/840 EPF	4000	>80	D	36	4250	4,5	●
EDO2253EPF	H1-E OP LED 620/620 4250/1 36/865 EPF	6500	>80	D	36	4250	4,5	●

Light and power output tolerance $\pm 10\%$

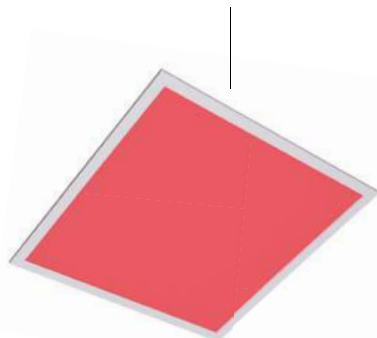
ACCESSORIES

CODE	REFERENCE
Safety rope	
A1013ACC	H1/P15 - Safety rope
Frame for surface mounting - Thickness 50 mm - Can integrate the driver	
A1051ACC	Adaptation frame for surface-mounting for H1 297/297
A1050ACC	Adaptation frame for surface-mounting for H1 597/597
A1079ACC	Adaptation frame for surface-mounting for H1 1197/297

Light and power output tolerance $\pm 10\%$



H1_WR



TYPE OF PRODUCTS

Very slim LED Panels (11mm), especially made for cleanrooms. **IP65 from the top and the bottom**, resistant to hydrogen peroxide. Combined 4000 K white or inactinic RED (640 nm) illumination via separate supply circuits.

MECHANICAL CONSTRUCTION

Extruded aluminium frame welded and white powder-coated with high covering power to maintain the frame's heat dissipation capacity, RAL 9016. Double silicone gasket on top and bottom, cable gland and EPDM gasket fixed on the top part to ensure a reinforced seal. Top clamping plate in 0,8mm galvanized steel.

LED MODULES

LED PCB placed inside the aluminium edge. High efficiency LEDs encapsulated on a medium power Epistar chip size 26*46 mil to obtain a better efficiency and increase reliability. White light with a colour temperature of 4000 K and red light with a wavelength of 640 nm.

OPTICS

Optical unit made with a reflective sheet incorporating Toray Lumirror technology, a Mitsubishi PMMA light guide and a white chimei PMMA diffuser film.

CONTAMINATION CONTROL

A set of technical seals ensures waterproofness, prevents the proliferation of bacteria, and reduces gas exchanges : **air cleanliness Class 1 in compliance with ISO 14644-14**. Certified by **Fraunhofer IPA** laboratory. The free ceiling space of clean rooms class 1 to 5 can be limited by the HVAC system.

H₂O₂ RESISTANCE

The components that may come into contact with hydrogen peroxide during the decontamination process were tested by cyclic, direct and prolonged contact with a 35% H₂O₂ solution, see resistance in the reference table.

TEMPERATURE

Reference ambient temperature: 20°C. Operating temperature range : 5 to 25°C (the temperature affects the lifetime of the LEDs).

POWER SUPPLY

Luminaires with two circuits. External electronic power supply (EPF) from European brand. Nominal voltage 220/240V 50/60 Hz. DALI dimming (GDA) available in option.

INSTALLATION

H1/WR is available in several versions :

- /E installation on modular grid ceiling.
- /C installation by clips on metal ceiling.
- /TF installation through threaded rod for laminate panel.

WIRING

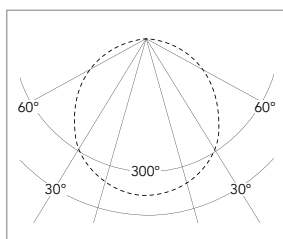
Connection on the external power supply, with a traction stop system to be tightened and closed (accessories included). Foresee a reservation in the plenum for the power supply.



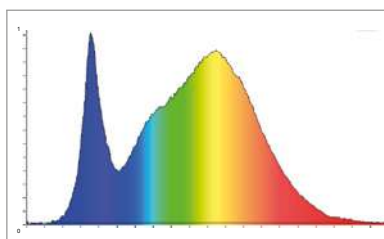
OPTION



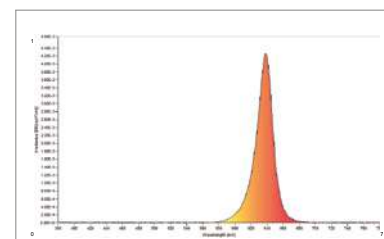
PHOTOMETRY



LIGHT SPECTRUM



WHITE 4000 K



INACTINIC RED (620-640 nm)

DETAILS



Installed luminaire



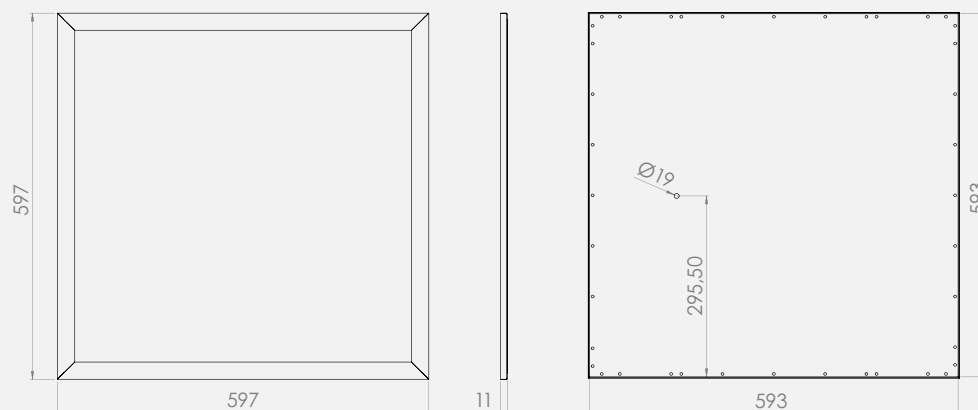
Fixation by clips



Waterproofing of the power cable

DIMENSIONS (mm)

TYPE A



REFERENCES AND FEATURES

CODE	REFERENCE	Colour (K) temperature	Type	P (W)	Emitted flux 4000 K (Lm)	Emitted flux 625 nm (Lm)	H ₂ O ₂
Installation without accessories, on grid ceiling							
SUR1053EPF	H1-E OP W/R LED 597/597 3800/1 36/840 EPF	4000	A	40+20	3800	1000	●
Surface-mounting by clips through 8 points on 0,6 mm plate (sandwich panels)							
SUR1054EPF	H1-C OP W/R LED 597/597 3800/1 36/840 EPF	4000	A	40+20	3800	1000	●
Surface-mounting through threaded rod (4) on laminate panels							
SUR1055EPF	H1-TF OP W/R LED 597/597 3800/1 36/840 EPF	4000	A	40+20	3800	1000	●
Surface-mounting with screws (4)							
SUR1056EPF	H1-V OP W/R LED 597/597 3800/1 36/840 EPF	4000	A	40+20	3800	1000	●

Light and power output tolerance $\pm 10\%$

ACCESSORIES

CODE	REFERENCE	CODE	REFERENCE
Drilling template			
A1009ACC	H1/C - Drilling template 600/600	A1014ACC	H1/TF - Drilling template 600/600
Safety rope			
A1013ACC	H1/P15 - Safety rope		

Light and power output tolerance $\pm 10\%$



TYPE OF PRODUCTS

Very slim LED panels with high efficiency and low luminance. UGR lower than 19, for installation in T24 false ceilings, module 600 or 625. IDA can also be surface-mounted, with an optional frame or directly with screws (/V version)

MECHANICAL CONSTRUCTION

Extruded aluminium frame welded and white powder-coated with high covering power to maintain the frame's heat dissipation capacity, RAL 9016. Unit receiving the LED equipment and ensuring the assembly of the optical layers. Closing by a steel plate on the back of the luminaire.

OPTICS

Optical unit made with a reflective sheet incorporating Toray Lumirror technology, a Mitsubishi PMMA light guide and a microprismatic diffuser. Allow to reach an **UGR lower than 19**.

LED MODULES

LED modules SMD placed over the edges of the luminaire.

Optimised lifetime, L80 to 50.000 hours.

Low colour dispersion, (3 SDCM).

Colour rendering index : 85 (±3).

TEMPERATURE

Reference ambient temperature: 25°C. Operating temperature range: 10 to 30°C (the temperature affects the lifetime of the LEDs).

POWER SUPPLY

Luminaire made with an external electronic power supply (EPF) from PHILIPS Xitanium. DALI dimming (GDA) available in option.

INSTALLATION

/E Version

- On T24 grid ceiling with hook for safety suspension.

- Surface-mounted with the optional frame.

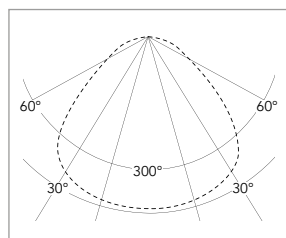
/V Version

- To screw directly on the ceiling. In this case, foresee an access to the power supply on the top of the false ceiling.

WIRING

Connection to the power grid on the external power supply.

PHOTOMETRY



MP VERSION (UGR<19)

OPTIONS



Kit secours KS3

Philips Trustsight BASIC kit, 3.6 V 4000 mAh NiMH battery, power supply 3W for 3 h, approx. 300 Lm.

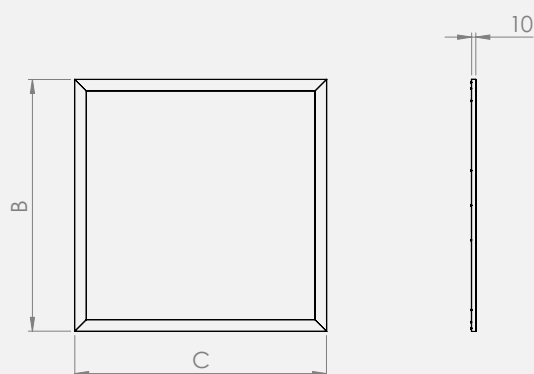
DETAIL



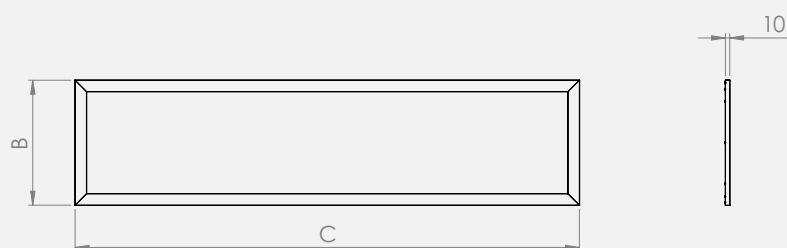
SMOOTH FRAME
in welded aluminium

DIMENSIONS (mm)

TYPE A



TYPE B



ACCESSORIES



CODE	REFERENCE
Frame for surface-mounting with integration of the driver, thickness 50 mm	
A1050ACC	Frame for surface-mounting - For LED panel 600x600
A1052ACC	Frame for surface-mounting - For LED panel 1200x300

REFERENCES AND FEATURES

CODE	REFERENCE	Type	B (mm)	C (mm)	P (W)	Emitted flux (Lm)	Lm/W	K
Recessed version - MPMI - Module 600x600 - Installation on grid ceiling								
EDO2104EPF	IDA-E 20/40 MPMI LED 597/597 4400/1 40/840 EPF	A	597	597	34	4400	110	4000
EDO2105EPF	IDA-E 20/40 MPMI LED 1197/297 5940/1 54/840 EPF	B	1197	297	54	5940	110	4000
Versions /V - MPMI - Module 600x600 - Fixation with screws (power supply to put on the top of the false ceiling) For metal ceiling only								
SUR1082EPF	IDA-V 20/40 MPMI LED 597/597 4400/1 40/840 EPF	A	597	597	34	4400	110	4000
SUR1083EPF	IDA-V 20/40 MPMI LED 1197/297 5940/1 54/840 EPF	B	1197	297	54	5940	110	4000
Recessed version - MPMI - Module 625x625 - Installation on T24 grid ceiling								
EDO2246EPF	IDA-E 20/40 MPMI LED 620/620 4400/1 40/840 EPF	A	620	620	34	4400	110	4000

Light and power output tolerance $\pm 10\%$



SURFACE MOUNTING, ACCESS FROM THE **BOTTOM**

SURFACE MOUNTING, ACCESS FROM THE **BOTTOM**



DATA SHEETS

**SIRIUS
H2O
H2O_LC**

When it is not possible to install recessed luminaires or when the plenum is not accessible, surface-mounted luminaires should be used. These products integrate the power supply needed to operate the LEDs, making it accessible for maintenance operations from inside the cleanrooms. The **SIRIUS** range is suitable for a wide range of turbulent flow cleanroom solutions. The **H2O** luminaires are intended for use in laminar flow environments and are designed to be installed on T55 grid ceiling and smooth ceiling.



SIRIUS



TYPE OF PRODUCTS

Surface mounted LED luminaires, IP65 all around, access from the bottom. Overall height 38 mm, with integrated power supply.

MECHANICAL CONSTRUCTION

Inverted pyramidal body, made of 0.8mm steel plate, LaserWeld waterproof assembling technology, powder coated with KilBac white RAL 9003, certified qualicoat class 1 and antibacterial. Lower frame in white lacquered aluminium, screwed on the housing through 4 stainless steel screws, closed by overlapping.

LED MODULES

White light : Zagha LED modules Book7, L28W6, with an energy efficiency until 185 Lm/W, rated AA+. Assembled on a 2 mm aluminium plate to ensure an optimal heat dissipation for the lifespan of the LEDs. 3SDCM. Colour rendering index 85. Expected luminous flux : L80 at 70.000 h.

Inactinic light : amber (590 nm) or red (620 nm), specific led's PCB in aluminium with Zagha Book7, L28W6, made in France.

OPTICS

Optical assembly bonded with silicone-free sealant, certified for use in cleanrooms :

- **OPMI** : opal diffuser in PMMA (Perspex).
- **MPPC** : clear polycarbonate diffuser + inner microprismatic plate. High visual comfort and impact resistance.

CONTAMINATION CONTROL

Reduced risk of microbial growth :

- >> **KilBac** technology, broad spectrum antibacterial finish with silver ions (BioCote, validated according to ISO 22196).
- >> **CleanSeal** technology, use of two-component antimicrobial seals according to VDI-6022 and DIN EN ISO 846.

The mechanical construction of the luminaire ensures a particle emission class 3 according to ISO 14644-14. This range is made without silicone.

H₂O₂ RESISTANCE

The components that may come into contact with hydrogen peroxide during the decontamination process were tested by cyclic, direct and prolonged contact with a 35% H₂O₂ solution, see resistance in the reference table.

TEMPERATURE AND HUMIDITY

Reference ambient temperature: 20°C / 68°F. Operating temperature range : 5 to 25°C / 41 to 77 °F (the temperature affects the lifetime of the LEDs). For environments with a moisture content of more than 70%, we recommend the use of lacquered INOX 304 for the housing, in option.

POWER SUPPLY

Luminaires supplied with electronic driver from European brand. Rated voltage 220-240V 50/60Hz. DALI dimming (GDA) available in option. Access from the bottom.

INSTALLATION

Application on a rigid support, 4-point fixing.

WIRING

Power supply through a membrane plug gland on top of the luminaire :

White light : 2-pole terminal block + earth inside the luminaire. Access through the luminaire housing through a cable gland (rewiring impossible).

Hybrid white + inactinic light without dimming : two independent circuits wired on a 5-pole terminal block : N1F1-N2F2-T.

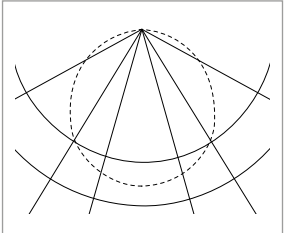
Hybrid white + inactinic light with dimming DALI : a single electrical circuit wired to a 5-pole terminal block : N1F1T-D1D2. One DALI bus but two addresses per luminaire. Switching on and off via DALI controller only (push button not possible).



OPTIONS

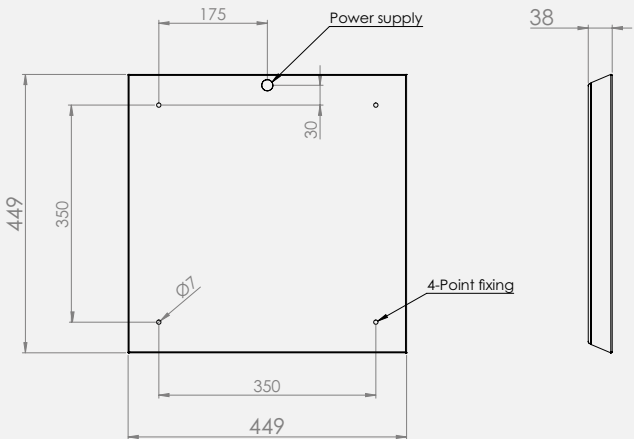


PHOTOMETRY

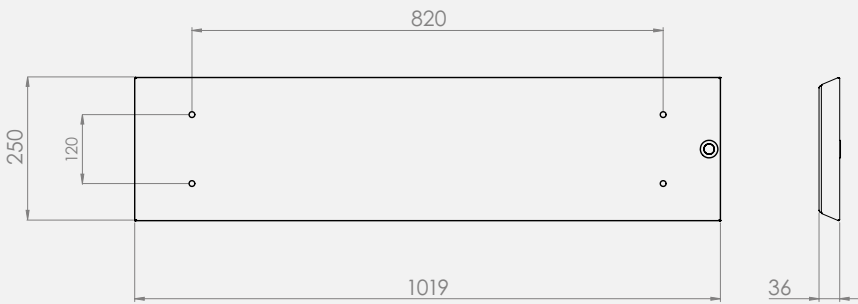


DIMENSIONS (mm)

TYPE A



TYPE B



REFERENCES AND FEATURES

CODE	REFERENCE	Type	P (W)	Emitted flux (Lm)	UGR	H ₂ O ₂
OPMI optics - Opal diffuser PMMA						
SUR1078EPF	SIRIUS OPMI LED 450/450 3900/5 28/840 EPF	A	28	3900	<21	●
SUR1084EPF	SIRIUS OPMI LED 450/450 5500/1 44/840 EPF	A	44	5500	<21	●
SUR1003EPF	SIRIUS OPMI LED 1020/250 4500/6 38/840 EPF	B	38	4500	<21	●
SUR1080EPF	SIRIUS OPMI LED 1020/250 7000/6 57/840 EPF	B	57	7000	<21	●
MPPC optics - Microprismatic diffuser						
SUR1132EPF	SIRIUS MPPC LED 450/450 2950/1 25/840 EPF	A	25	2950	<19	●
SUR1151EPF	SIRIUS MPPC LED 1020/250 6500/1 57/840 EPF	B	57	6500	<19	●

Light and power output tolerance $\pm 10\%$

Inactinic and hybrid light

CODE	REFERENCE	Type	P (W) White	Emitted flux White (Lm)	P (W) Inactinic	Emitted flux Inactinic (Lm)
Hybrid version 4000 K + 590 nm (inactinic amber) - OPMI - Opal PMMA diffuser						
SUR1076EPF	SIRIUS OPMI YE/W 450/450 4000/900 840/590 EPF	A	30	4000	35	900
Version 590 nm, amber - OPMI - Opal diffuser PMMA						
SUR1119EPF	SIRIUS OPMI YE LED 450/450 1500/1 60/590 EPF	A			60	1500
Hybrid version 4000 K + 620 nm (inactinic red) - OPMI - Opal PMMA diffuser						
SUR1153EPF	SIRIUS OPMI WR LED 450/450 2500/900 620/840 EPF	A	30	4000	40	900
Version 620 nm, red - OPMI - Opal diffuser PMMA						
SUR1154EPF	SIRIUS OPMI WR LED 450/450 1200/1 50/620 EPF	A			60	1200

Light and power output tolerance $\pm 10\%$



TYPE OF PRODUCTS

LED surface-mounted lighting with aerodynamic section, for installation in cleanroom **when the air flow must be laminar**. Available in white light or inactinic amber 590 nm.

MECHANICAL CONSTRUCTION

Housing in extruded aluminium lacquered white RAL 9003, end caps made of 2 mm aluminium. Aerodynamically shaped polycarbonate diffuser clipped on the housing.

LED MODULES

White light : Zaghera LED modules, with an energy efficiency until 185 Lm/W, rated AA+. Assembled on a 2 mm aluminium plate to ensure an optimal heat dissipation for the lifespan of the LEDs. 3SDCM. Colour rendering index 85. Expected luminous flux : L80 at 70.000 h.

Inactinic light :

- **LTO version** : LEDs with limited radiation emission below 500 + 500 nm high pass filter.
- **HP version** : high power monochromatic amber leds 590 nm.

OPTICS

Transparent polycarbonate diffuser, ribbed on the inside to reduce the luminance of the LEDs.

CONTAMINATION CONTROL

Air cleanliness Class 1 in compliance with ISO 14644-14. Luminaire adapted to be used in cleanroom with laminar flow.

H₂O₂ RESISTANCE

The components that may come into contact with hydrogen peroxide during the decontamination process were tested by cyclic, direct and prolonged contact with a 35% H₂O₂ solution.

TEMPERATURE AND HUMIDITY

Reference ambient temperature : 20°C / 68°F. Operating temperature range : 5 to 25°C / 41 to 77 °F (the temperature affects the lifetime of the LEDs).

POWER SUPPLY

Luminaires supplied with electronic driver from European brand. Rated voltage 220-240V 50/60Hz. DALI dimming (GDA) available in option. Access from the bottom.

INSTALLATION

The H2O teardrop lighting can be installed on all kind of rigid ceilings by :

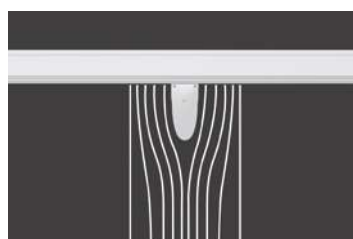
- **Direct screwing, V version**, two 8 mm diameter holes on the luminaire housing.
- **External clamping on T55 grid-ceiling, version T55**.

WIRING

V version : cable entry at the back of the luminaire through a membrane cap. Connection inside the on a 2-pole + earth terminal block, without possibility to make a continuous wiring through the luminaires.

T55 version : luminaire provided with 1m cable without connector. External installation : There is no need to open the light during installation.

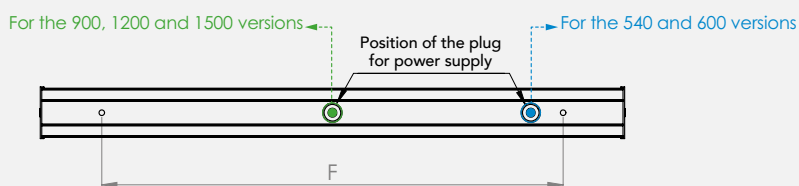
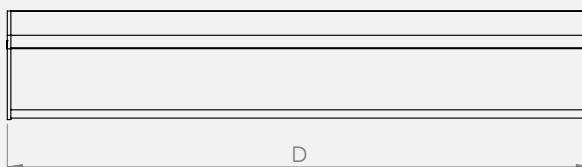
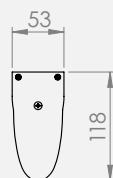
LAMINAR AIR FLOW



Schematic drawing of the airflow behaviour around the H2O luminaire.

DIMENSIONS (mm)

TYPE A



REFERENCES AND FEATURES - WHITE LIGHT

CODE	REFERENCE	D (mm)	Center distance F (mm)	P (W)	Emitted flux (Lm)	Efficiency (Lm/W)
White light, 4000 K, CRI 85 - Fixation through screws						
SUR1147EPF	H2O-V PC 540/50 2400/1 19/840 EPF	540	407	19	2400	126
SUR1141EPF	H2O-V PC 600/50 3000/1 23/840 EPF	604	500	23	3000	130
SUR1155EPF	H2O-V PC 900/50 3500/1 35/840 EPF	904	800	35	3500	100
SUR1140EPF	H2O-V PC 1200/50 6000/1 46/840 EPF	1204	1100	46	6000	130
SUR1145EPF	H2O-V PC 1200/50 4500/1 32/840 EPF	1204	1100	32	4500	140
White light, 4000 K - Mounting on T55 grid-ceiling with bottom groove						
SUR1209EPF	H2O-T55 PC LED 600/50 3000/1 23/840 EPF	604	500	23	2400	104
SUR1210EPF	H2O-T55 PC LED 900/50 3500/1 35/840 EPF	904	800	35	3000	100
SUR1207EPF	H2O-T55 PC LED 1200/50 4500/1 32/840 EPF	1204	1100	32	3500	140
SUR1208EPF	H2O-T55 PC LED 1200/50 6000/1 46/840 EPF	1204	1100	46	6000	130
SUR1211EPF	H2O-T55 PC LED 1500/50 7000/1 50/840 EPF	1504	1400	50	7000	140

Light and power output tolerance $\pm 10\%$

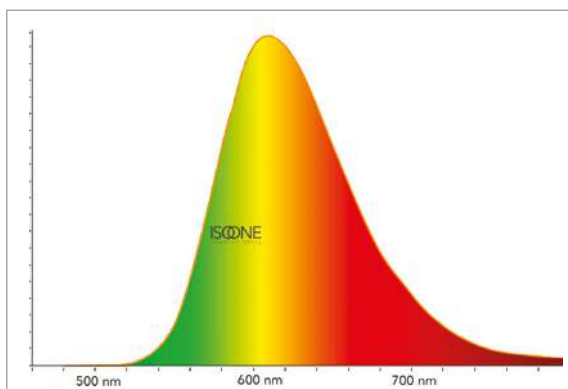
REFERENCES AND FEATURES - INACTINIC LIGHT

CODE	REFERENCE	D (mm)	Center distance F (mm)	P (W)	Emitted flux (Lm)	L80*
LTO Combined Inactinic Light - Screw Fixation						
SUR1221EPF	H2O-V PC LTO 600/50 1600/1 30/500 EPF	604	500	30	1600	50.000 h
SUR1222EPF	H2O-V PC LTO 900/50 2400/1 45/500 EPF	904	800	45	2400	50.000 h
SUR1223EPF	H2O-V PC LTO 1200/50 3200/1 60/500 EPF	1204	1100	60	3200	50.000 h
SUR1220EPF	H2O-V PC LTO 1500/50 4000/1 75/500 EPF	1504	1400	75	4000	50.000 h
LTO Combined Inactinic Light - Mounting on T55 grid-ceiling with bottom groove						
SUR1217EPF	H2O-T55 PC LTO 600/50 1600/1 30/500 EPF	604	500	30	1600	50.000 h
SUR1218EPF	H2O-T55 PC LTO 900/50 2400/1 45/500 EPF	904	800	45	2400	50.000 h
SUR1219EPF	H2O-T55 PC LTO 1200/50 3200/1 60/500 EPF	1204	1100	60	3200	50.000 h
SUR1216EPF	H2O-T55 PC LTO 1500/50 4000/1 75/500 EPF	1504	1400	75	4000	50.000 h
Monochromatic amber 590 nm HP inactinic light - Screw fixing						
SUR1180EPF	H2O-V PC HP 600/50 1100/1 15/590 EPF	604	500	15	1100	50.000 h
SUR1181EPF	H2O-V PC HP 900/50 1700/1 25/590 EPF	904	800	25	1700	50.000 h
SUR1182EPF	H2O-V PC HP 1200/50 2300/1 30/590 EPF	1204	1100	30	2300	50.000 h
SUR1206EPF	H2O-V PC HP 1500/50 2900/1 38/590 EPF	1504	1400	38	2900	50.000 h
Monochromatic amber 590 nm HP inactinic light - Mounting on T55 grid-ceiling with bottom groove						
SUR1213EPF	H2O-T55 PC HP 600/50 1100/1 15/590 EPF	604	500	15	1100	50.000 h
SUR1214EPF	H2O-T55 PC HP 900/50 1700/1 25/590 EPF	904	800	25	1700	50.000 h
SUR1215EPF	H2O-T55 PC HP 1200/50 2300/1 30/590 EPF	1204	1100	30	2300	50.000 h
SUR1212EPF	H2O-T55 PC HP 1500/50 2900/1 38/590 EPF	1504	1400	38	2900	50.000 h

Light and power output tolerance $\pm 10\%$

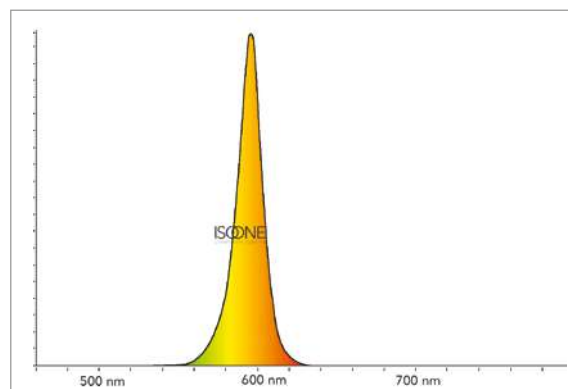
* Maintenance of the LED flow, excluding potential deterioration of the filter, to be checked every year

INACTINIC SOLUTIONS



SPECTRUM OF THE LTO VERSION

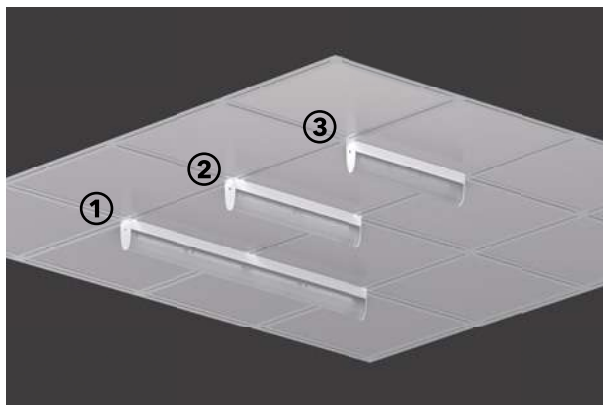
- Higher luminous flux
- More colour in the spectrum
- Filter maintenance required
- Better Lm/€ solution
- Risk of light leakage below 500 nm < 1.5% (maintenance failure, breakage, end of filter lifetime...)



SPECTRUM OF THE HP VERSION

- Better Lm/W efficiency
- No filter, amber LEDs
- Lower luminous flux
- Lower Lm/€ ratio
- No risk of light leakage below 500 nm

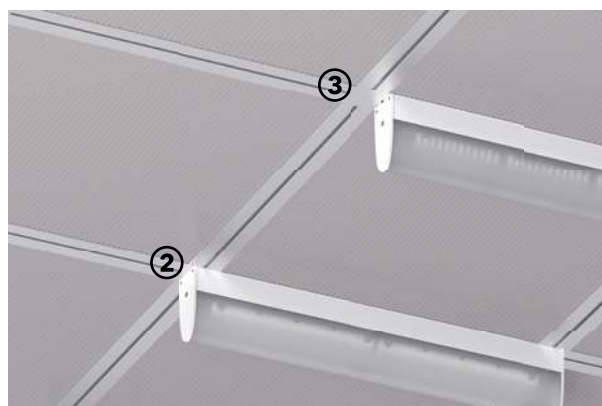
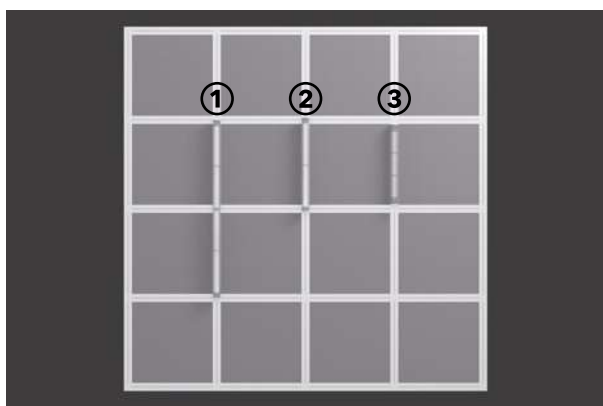
EXAMPLES OF INSTALLATION IN T55 FALSE CEILING



Mounting example in T55 false ceiling module 600 mm of the 3 lengths :

- ① Length of 1200 mm
- ② Length of 600 mm
- ③ Length of 540 mm

The H2O brand car also be mounted in false ceiling with cut-out or metal ceiling





H2O_LC



TYPE OF PRODUCTS

LED surface-mounted lighting with aerodynamic section, for installation in cleanroom **when the air flow must be laminar**. Available in white light or inactinic amber 590 nm.

MECHANICAL CONSTRUCTION

Housing in extruded aluminium lacquered white RAL 9003, end caps made of 2 mm aluminium. Aerodynamically shaped polycarbonate diffuser clipped on the housing.

LED MODULES

White light : Zaghera LED modules, with an energy efficiency until 185 Lm/W, rated AA+. Assembled on a 2 mm aluminium plate to ensure an optimal heat dissipation for the lifespan of the LEDs. 3SDCM. Colour rendering index 85. Expected luminous flux : L80 at 70.000 h.

Inactinic light :

- **LTO version** : LEDs with limited radiation emission below 500 + 500 nm high pass filter.
- **HP version** : high power monochromatic amber leds 590 nm.

OPTICS

Transparent polycarbonate diffuser, ribbed on the inside to reduce the luminance of the LEDs.

CONTAMINATION CONTROL

Air cleanliness Class 1 in compliance with ISO 14644-14. Luminaire adapted to be used in cleanroom with laminar flow.

H₂O₂ RESISTANCE

The components that may come into contact with hydrogen peroxide during the decontamination process were tested by cyclic, direct and prolonged contact with a 35% H₂O₂ solution.

TEMPERATURE AND HUMIDITY

Reference ambient temperature : 20°C / 68°F. Operating temperature range : 5 to 25°C / 41 to 77 °F (the temperature affects the lifetime of the LEDs).

POWER SUPPLY

Luminaires supplied with electronic driver from European brand. Rated voltage 220-240V 50/60Hz. DALI dimming (GDA) available in option. Access from the bottom.

INSTALLATION

The H2O_LC teardrop lighting can be installed on all kind of rigid ceilings by :

- **Direct screwing, V version**, two 8 mm diameter holes on the luminaire housing.
- Each continuous line module is supplied with an intermediate cap.
- A separate bag of end caps must be ordered for each luminaire line.

WIRING

Cable entry at the bottom of the luminaire through a membrane plug. Integrated through-wiring. Connection inside the profile on 2-pole + ground terminal block.



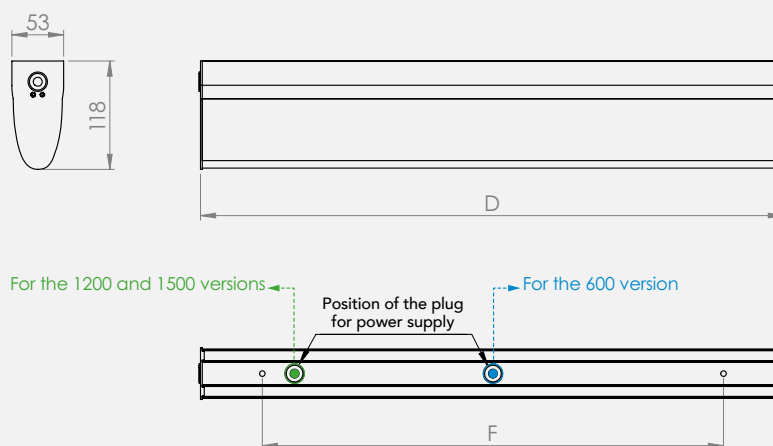
LAMINAR AIR FLOW



Schematic drawing of the airflow behaviour around the H2O luminaire.

DIMENSIONS (mm)

TYPE A

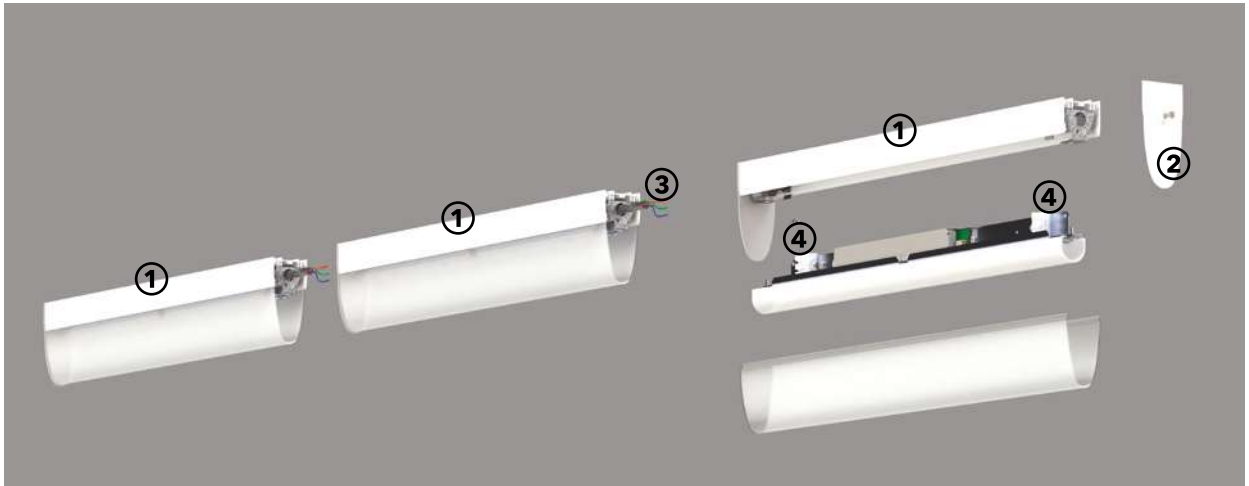


REFERENCES AND FEATURES - WHITE LIGHT

CODE	REFERENCE	D (mm)	Center distance F (mm)	P (W)	Emitted flux (Lm)	Efficiency (Lm/W)
White light, 4000 K, CRI 85 - Screw Fixation for continuous line wiring						
SUR1238EPF	H2O-V-LC PC 600/50 3000/1 23/840 EPF	602	500	23	3000	130
SUR1234EPF	H2O-V-LC PC 1200/50 4500/1 32/840 EPF	1202	1100	32	4500	140
SUR1235EPF	H2O-V-LC PC 1500/50 7000/1 32/840 EPF	1502	1400	50	7000	140
LTO Combined Inactinic Light - Screw Fixation for continuous line wiring						
SUR1239EPF	H2O-V-LC PC LTO 600/50 1600/1 30/840 EPF	602	500	30	1600	
SUR1236EPF	H2O-V-LC PC LTO 1200/50 3200/1 60/840 EPF	1202	1100	32	3200	
SUR1237EPF	H2O-V-LC PC LTO 1500/50 4000/1 75/840 EPF	1502	1400	32	4000	
Monochromatic amber 590 nm HP inactinic light - Screw Fixation for continuous line wiring						
SUR1240EPF	H2O-V-LC PC HP 600/50 1100/1 15/590 EPF	602	500	15	1100	
SUR1241EPF	H2O-V-LC PC HP 1200/50 2300/1 30/590 EPF	1202	1100	30	2300	
SUR1242EPF	H2O-V-LC PC HP 1500/50 2900/1 38/590 EPF	1502	1400	38	2900	
Ends caps for continuous line wiring						
A1168ACC	Kit embout H2O LC (2u.)					

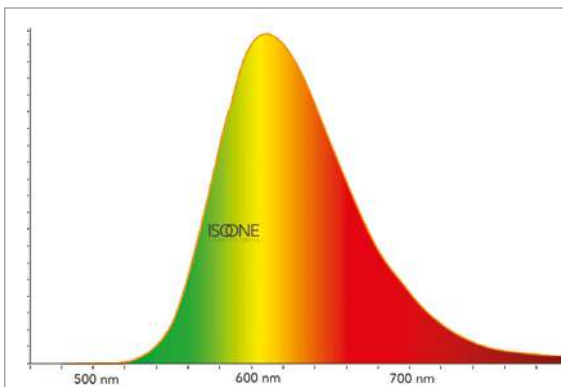
Light and power output tolerance $\pm 10\%$

DETAIL FROM A CONTINUOUS LINE WIRING



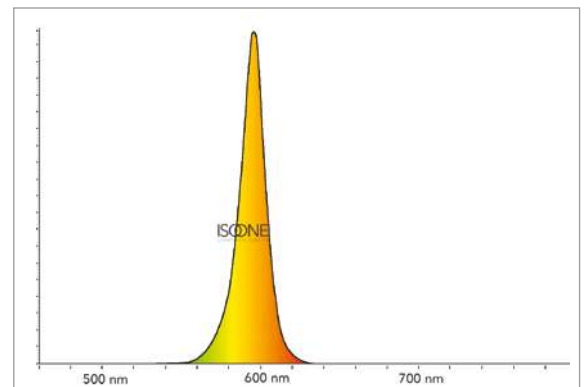
- ① Continuous line module
- ② End cap kit, 1 per line
- ③ Connecting cables, not included
- ④ Internal through-wiring terminal block

INACTINIC SOLUTIONS



SPECTRUM OF THE LTO VERSION

- Higher luminous flux
- More colour in the spectrum
- Filter maintenance required
- Better Lm/€ solution
- Risk of light leakage below 500 nm < 1.5%
(maintenance failure, breakage, end of filter lifetime...)



SPECTRUM OF THE HP VERSION

- Better Lm/W efficiency
- No filter, amber LEDs
- Lower luminous flux
- Lower Lm/€ ratio
- No risk of light leakage below 500 nm



ANTI-DEFLAGRATION **ATEX**



DATA SHEETS
MARS Ex-e D
DRACO Ex_D
FEL_G
FEL_B

An explosive atmosphere (ATEX) is a mixture with air of flammable substances in the form of gases, vapors, or dusts under normal atmospheric conditions and in which, after ignition, combustion spreads to the entire unburnt mixture. To avoid the risk of explosion, electrical equipment, and therefore lighting fixtures, must be specially protected. Their design must be specific and the validation circuit is very strict.

The ATEX standard determines area’s categories and the corresponding product categories:

HAZARDOUS AREAS*	DEFINITIONS	ATEX
Area 0 Area 20	Areas with permanent explosive atmospheres during normal operation caused by air/gas mixtures, vapours, mists or dusts.	Category 1
Area 1 Area 21	Areas with occasional explosive atmospheres during normal operation due to mixtures of air and gases, vapors, mists or dusts.	Category 2
Area 2 Area 22	Areas with explosive atmospheres that may occur accidentally. In the event of malfunctioning due to mixtures of air and gas, vapors, mists, or dusts.	Category 3

*gas/vapors, dusts

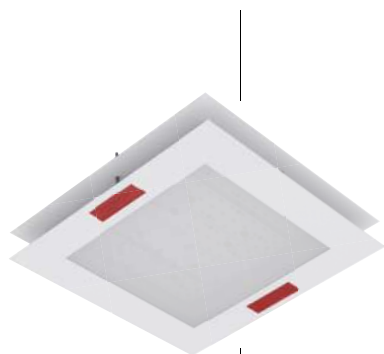
The classification of luminaires is based on their ability to withstand each type of area by including them in the corresponding categories. To this is added the following information :

Typical ATEX and IECEx Marking									
CE	0359	Ex	II	2	G	Ex	d	IIC	T4 Gb
↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
*Européenne compliance	*Notified body number	*Specific marking for explosion protection	*Equipment category	*Equipment group	*Environment	Protection against explosions	Type of protection	Gaz group	Temperature class (T1-T6)
									Level of equipment protection

*ATEX only



MARS Ex-e D



TYPE OF PRODUCTS

Recessed and compact cleanroom luminaire with LED modules, IP65, access from the top, suitable for use in areas where an explosive atmosphere due to dust is unlikely and for a short time. ATEX classification : II 3D Ex tc IIIC T85°C De.

MECHANICAL CONSTRUCTION

Luminaire structure made of 1 mm steel, LaserWeld waterproof assembling technology, powder coated with KilBac white RAL9003, certified qualicoat class 1 and antibacterial. Upper clamping frame in lacquered steel of 1,5 mm. Upper cover in aluminium of 2 mm red lacquered.

LED MODULES

White light : Zagha LED modules Book7, L28W6, with an energy efficiency until 185 Lm/W, rated AA+. Assembled on a 2 mm aluminium plate to ensure an optimal heat dissipation for the lifespan of the LEDs. 3SDCM. Colour rendering index 85. Expected luminous flux : L80 at 70.000 h.

Inactinic light : amber (590 nm) or red (620 nm), specific led's PCB in aluminium with Zagha Book7, L28W6, made in France.

OPTICS

- OPVR : laminated glass 2+2 opal.

CONTAMINATION CONTROL

Reduced risk of microbial growth :

>> **KilBac** technology, broad spectrum antibacterial finish with silver ions (BioCote, validated according to ISO 22196).

The mechanical construction of the luminaire ensures a particle emission class 3 according to ISO 14644-14. This range is made without silicone.

WALKABLE

Luminaires designed and tested to withstand the application of a 100 kg mass on the top cover corresponding to accidental feet pressure on the luminaire in the walkable plenum.

H₂O₂ RESISTANCE

The components that may come into contact with hydrogen peroxide during the decontamination process were tested by cyclic, direct and prolonged contact with a 35% H₂O₂ solution, see resistance in the reference table.

TEMPERATURE AND HUMIDITY

Reference ambient temperature: 20°C / 68°F. Operating temperature range: 5 to 25°C / 41 to 77 °F (the temperature affects the lifetime of the LEDs).

POWER SUPPLY

Luminaires supplied with European-branded EPF electronic driver. Rated voltage 220-240 V. DALI dimming (GDA) available in option Access from the top of the luminaire, without breaking the room classification.

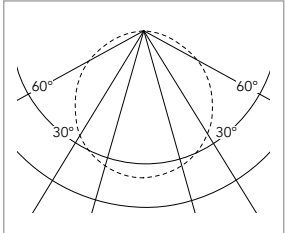
INSTALLATION

Installation in sandwich panels from 15 to 100 mm. Adaptations for different thicknesses are possible on request. Quick installation without opening the luminaire. The sealing between the false ceiling and the lower frame must be applied at the installation.

WIRING

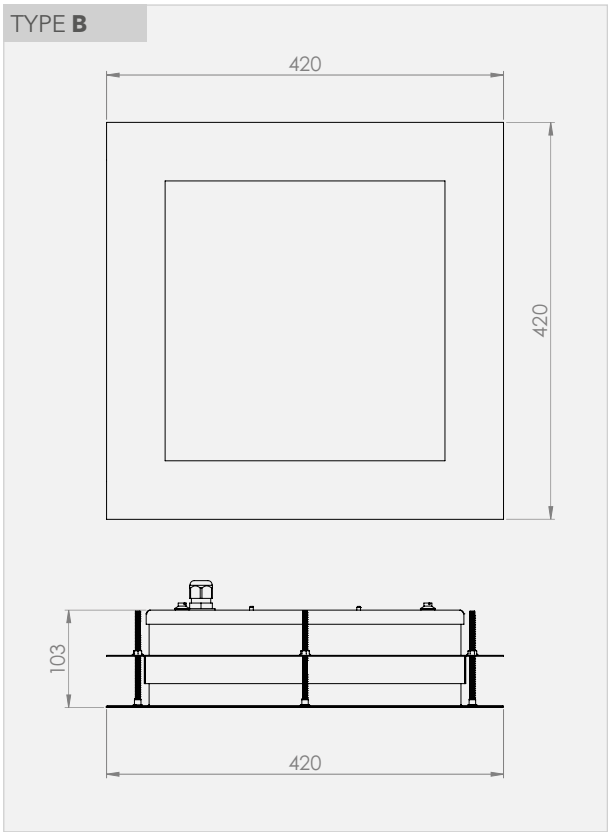
With an ATEX cable gland, mounted on the top of the luminaire.

PHOTOMETRY



Opal

DIMENSIONS (mm)



REFERENCES AND FEATURES

CODE	REFERENCE	Type	Cut-out (mm)	P (W)	Emitted flux (Lm)	Weight (Kg)	H ₂ O ₂
OPVR optics - PMMA opal diffuser							
EUP2224EPF	MARS Ex-e D OPVR LED 390/390 3500/3 28/840 EPF	B	367x367	28	3500	6	●
Hybrid - 590 nm amber inactinic light and white Light - OPVR optics							
EUP2225EPF	MARS Ex-e D OPVR LED 390/390 2400/3500/3 75/590/840 EPF	B	367x367	75	2400 (590nm) + 3500 (4000K)	6	●

Light and power output tolerance ± 10%



DRACO Ex_D



TYPE OF PRODUCTS

Recessed and compact cleanroom luminaire with LED modules, IP65, access from below, suitable for use in areas where an explosive atmosphere due to dust is unlikely and for a short time. ATEX classification : II 3D Ex tc IIIC T85°C De.

MECHANICAL CONSTRUCTION

Luminaire structure made of 0.8 mm steel, LaserWeld waterproof assembling technology, powder coated with KilBac white RAL 9003, certified qualicoat class 1 and antibacterial. White lacquered aluminium frame fixed to the housing by 4 stainless steel screws, closed by overlapping.

LED MODULES

Zagha LED modules Book7, L28W6, with an energy efficiency until 185 Lm/W, rated AA+. Assembled on a 2 mm aluminium plate to ensure an optimal heat dissipation for the lifespan of the LEDs. Low chromatic distortion: 3SDCM. Colour rendering index over 90. Expected luminous flux : L80 at 70.000 h.

Light spectra : white 4000 K, white gradation (TW), inactinic amber 590 nm, inactinic red 640 nm.

OPTICS

- OPVR : laminated glass 2+2 opal.

CONTAMINATION CONTROL

Reduced risk of microbial growth :

>> **KilBac** technology, broad spectrum antibacterial finish with silver ions (BioCote, validated according to ISO 22196).

>> **CleanSeal** technology, use of two-component antimicrobial seals according to VDI-6022 and DIN EN ISO 846.

The mechanical construction of the luminaire ensures a particle emission class 3 according to ISO 14644-14. This range is made without silicone.

H₂O₂ RESISTANCE

The components that may come into contact with hydrogen peroxide during the decontamination process were tested by cyclic, direct and prolonged contact with a 35% H₂O₂ solution.

TEMPERATURE AND HUMIDITY

Reference ambient temperature: 20°C / 68°F. Operating temperature range : 5 to 25°C / 41 to 77 °F (the temperature affects the lifetime of the LEDs).

POWER SUPPLY

220-240V / 50-60Hz.

INSTALLATION

Recessed in cut-out ceiling, mounted through a clamping plate.

WIRING

Inside the luminaire with an ATEX cable gland and a 3- or 5-pole terminal strip, without the possibility of re-plugging.

OPTIONS

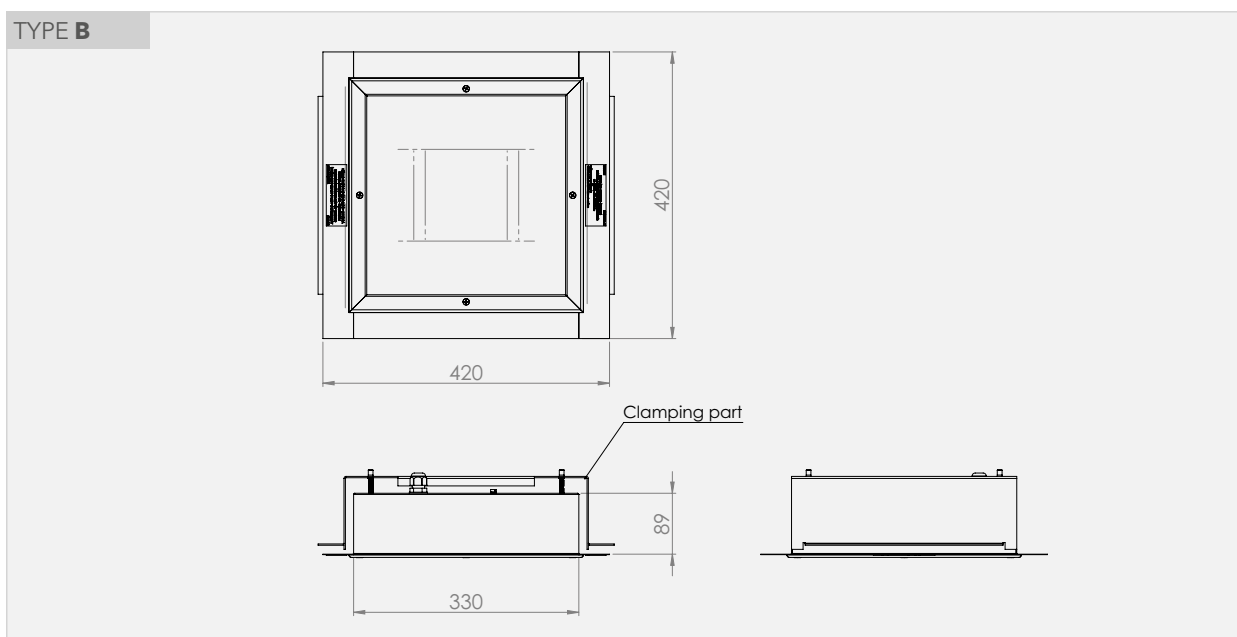


KS3 emergency kit

Philips Trustsight BASIC kit, 3.6 V 4000 mAh
NiMH battery, power supply 3 W for 3 h,
approx. 300 Lm.

DIMENSIONS (mm)

TYPE B



REFERENCES AND FEATURES

CODE	REFERENCE	Cut-out (mm)	P (W)	Emitted Flux (Lm)	Weight (Kg)
OPVR optics - II 3D Ex tc IIIC T85°C De					
EDO2330EPF	DRACO Ex-e D OPVR 420/420 3500/3 28/840 EPF	350x350	28	3500	6
Hybrid - 590nm amber inactinic light and white Light - OPVR optics					
EDO2331EPF	DRACO Ex-e D OPVR 420/420 2400/3500/3 75/590/840 EPF	350x350	75	2400 (590nm) +3500 (4000K)	6

Light and power output tolerance +-10%



FEL_G



TYPE OF PRODUCT

Compact luminaires with LED modules for hazardous areas **II 2 G Ex db eb mb IIC T6 Gb**, in accordance with directive 2014/34/EU, zones 1, 21.

MECHANICAL CONSTRUCTION

Extruded body in aluminium alloy with grey RAL 7037 polyester powder coating. End caps and closing frame in aluminium alloy (copper-free). Stainless steel screws and accessories.

LED MODULES

Optimised LED modules to ensure 110 Lm / W output and extended lifetime at 25°, L70 to 150,000 hours.

OPTICS

Polycarbonate diffuser with integrated optics, 110° opening angle in standard version.

TEMPERATURE

Operating temperature T_a : 25°C.
Temperature range : from -20°C to +40°C (with variation of the lifetime).

POWER SUPPLY

Luminaires with integrated 220-240 V electronic power supply (EPF).

INSTALLATION

Depending on the accessories ordered (to be ordered separately), the luminaire can be surface mounted, suspended or on a 40 to 62 mm diameter arm.

WIRING

Mains connection inside the luminaire, possibility of transplanting (input-output on the same side), through 4 cable glands M25.



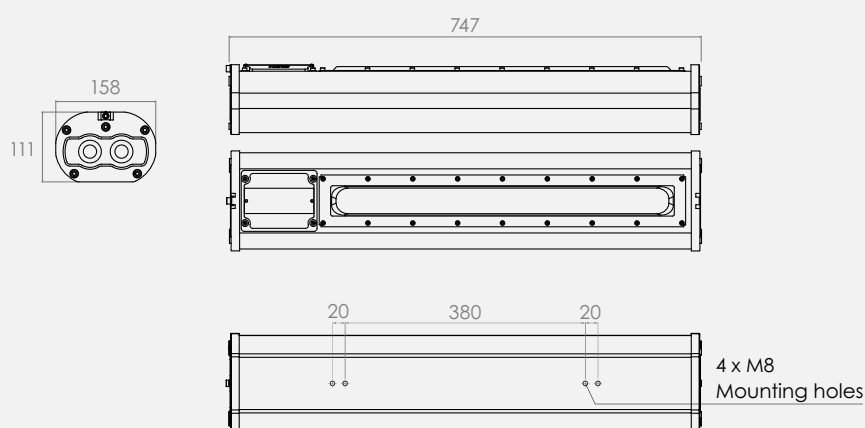
OPTION



KS3 emergency kit

Philips Trustsight BASIC kit, 3.6 V battery
4000 mAh NiMH battery, power supply
3 W for 3 h, approx. 300 Lm.

DIMENSIONS (mm)



REFERENCES AND FEATURES

CODE	REFERENCE	L (mm)	H (mm)	P (W)	Emitted flux (Lm)	Efficiency (Lm/W)	Colour temperature (K)
ATEX - II 2 G Ex db eb mb IIC T6 Gb							
SUR1158EPF	FEL G-40 LED 747/158 4400/1 40/740 EPF	747	111	40	4400	110	4000

Light and power output tolerance +/-10%

MOUNTING ACCESSORIES

CODE	REFERENCE
Bracket for surface mounting (SFS)	
A1115ACC	FEL SFS (2u.)
M8 suspension hook (CRS)	
A1116ACC	FEL CRS (2u.)
Swivel bracket for surface mounting (SFA)	
A1117ACC	FEL SFA (2u.)

CODE	REFERENCE
Arm for wall mounting (BDM)	
A1118ACC	FEL BDM (1u.)
Eyelet for clamping on a tube (OST)	
A1119ACC	FEL OST 40-51 mm (2u.)
A1120ACC	FEL OST 52-64 mm (2u.)



HOUSING FOR RECESSED MOUNTING

CODE	REFERENCE
Access from the top	
A1121ACC	FEL ENC H
Access from below	
A1122ACC	FEL ENC D



FEL_B



TYPE OF PRODUCT

Projectors with LED modules for hazardous areas II 2 G Ex d IIB T5 Gb and II 2D Ex tb IIIC 95° Max Db IP66, according to the directive 2014/34/EU. Zones 1, 21 and 2,22.

MECHANICAL CONSTRUCTION

Housing in aluminium with grey polyester powder coating RAL 7037, 1000 h salt fog resistance according to ASTM B117-11. Stainless steel screws and accessories.

LED MODULES

Optimised LED modules to ensure 100 Lm/W efficiency and extended lifetime at 25°, L70 to 100.000 hours.

OPTICS

Tempered glass diffuser, 110° opening angle as standard.

TEMPERATURE

Reference ambient temperature Ta : 25°C.

Operating temperature range : from -30°C to +50°C (with impact on the lifetime).

POWER SUPPLY

Luminaires with integrated 100-277 V electronic power supply (EPF).

INSTALLATION

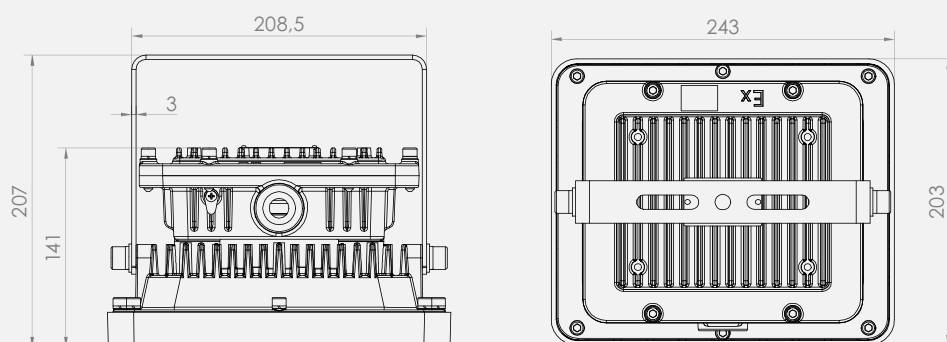
Lighting supplied with a mechanical clamp without angle mark.

WIRING

Connection inside the luminaire, without possibility of transplanting.



DIMENSIONS (mm)



REFERENCES AND FEATURES

CODE	REFERENCE	P (W)	Emitted flux (Lm)	Efficiency (Lm/W)	Colour temperature (K)
<u>ATEX - II 2 G Ex d IIB T5 Gb and II 2D Ex tb IIIC 95° Max Db IP66</u>					
SUR1159EPF	FEL B-60 LED 203/243 6000/1 60/740 EPF	60	6000	100	4000

Light and power output tolerance +-10%

DÉTAILS PHOTOGRAPHIQUES



P - THE POWER (W)

The power consumed by the luminaire (in Watts - W) is the total of the consumption of the LEDs and of the electronic supply.

EMITTED FLUX (Lm)

The emitted flux means the flux leaving the luminaire, which results from the nominal flux installed and the losses caused by the diffuser. We always indicate the emitted flux in our documentation. In Lumens (Lm).

EFFICIENCY (Lm/W)

Efficiency (Energy Efficiency), in Lumen per Watt (Lm/W). The result is obtained by dividing the emitted flux with the power consumed. Currently this value is generally higher than 100 Lm/Watt.

LIGHT INTENSITIES

The distribution of light intensities. Represented as a polar curve, it represents the way in which the luminaire lights up, like, intensive, extensive, asymmetric, or double asymmetric.

THE COLOUR TEMPERATURE (K)

The colour temperature in Kelvin (K) indicates the resulting total white. A cool white (bluish) colour will be obtained at 6500 K while a « warm white » colour (yellow/orange) is obtained at 2700 K.

IRC ou CRI - COLOUR RENDERING INDEX

This value indicates if the colour rendering will be more or less similar to the colour obtained when exposed to outdoor daylight. Currently the standard value is 80. With the continuous improvement of the quality of LEDs, values of 90 will become more common.

TA - THE AMBIENT TEMPERATURE

The ambient temperature is the temperature at the lighting location and at the temperature that the luminaire can work normally.



Evolution of luminaire flux

It should be noted here that the extremely long lifetime of LEDs does not allow real studies of the evolution of the fluxes. This is why we will speak about flux maintenance or expected failure because they are the result of extrapolations.

LXX : median flux maintenance value on a defined period of time : L80 at 70.000 h means that after 70.000 h of use, we expect a median emitted flux value equal to 80% of the initial flux.

NOTE : we report the median value corresponding to B50 because the difference in flux observed between B50 and B10 at 100.000 h is only about 1%. So, the lighting industry's regulatory agencies recommend to simplify the readability and comparison of the features by communicating only the median L value (B50) without indicating the B.

FAILURE RATE : We work with components that allow us to expect a statistical failure rate of less than 5% at 50.000 h. In fact, we observe rates close to 0.

THE CONSTRUCTIVE FEATURES OF THE PRODUCT



THE CE MARKING

The CE mark is mandatory on luminaires. It assumes the electrical and photobiological safety of the luminaires, as well as electromagnetic compatibility. It is thanks to compliance with the requirements of the CE mark requirements that the products on the European market are safe.



IP PROTECTION RATINGS

FIRST CHARACTERISTIC NUMBER

Protection of equipment against the intrusion of solid foreign bodies. Protection of persons against contact, or approach to live parts and against contact with moving parts (other than rotating smooth shafts and the like) under enclosure.

1 st CHARACTERISTIC NUMBER	SHORT DESCRIPTION
0	Unprotected
1	Protected against solid objects bigger than 50 mm
2	Protected against solid objects bigger than 12 mm
3	Protected against solid objects bigger than 2,5 mm
4	Protected against solid objects bigger than 1 mm
5	Protected against dust
6	Dustproof

SECOND CHARACTERISTIC NUMBER

Protection of equipment against water penetration.

2 nd CHARACTERISTIC NUMBER	SHORT DESCRIPTION
0	Unprotected
1	Protected against vertically falling drops of water
2	Protected against falling water until an inclination of 15°
3	Protected against light rain
4	Protected against splashing water
5	Protected against water sprays
6	Protected against sea breezes
7	Protected against the effects of immersion
8	Protected against prolonged immersion



IK PROTECTION RATINGS

IMPACT RESISTANCE OF THE LUMINAIRE HOUSING

Degrees of protection provided by enclosures of electrical materials against harmful external mechanical impacts. Standard EN 50102.

IK NUMBER	SHOCK ENERGY (Joules)	TEST THAT THE LUMINAIRE MEETS	
		Weight of	Released from a height of
IK01	0,15 J	200 g	2,5 cm
IK02	0,20 J	200 g	10 cm
IK03	0,35 J	200 g	17,5 cm
IK04	0,50 J	200 g	25 cm
IK05	0,70 J	200 g	35 cm
IK06	1 J	500 g	20 cm
IK07	2 J	500 g	40 cm
IK08	5 J	1700 g	29,5 cm
IK09	10 J	5000 g	20 cm
IK10	20 J	5000 g	40 cm

PROTECTION AGAINST ELECTRIC SHOCK

The luminaires are classified into 4 classes which guarantee the protection of persons against accidental contact with electric shock.

CLASSIFICATION	SYMBOL	DEFINITION
0	-	Luminaire without a device which allow to connect accessible metal parts to an earth conductor.
I		Luminaire having at least one functional insulation in all its parts and having an earth terminal marked with a symbol.
II		Luminaire with double and/or reinforced insulation in all its parts and without any device for earthing.
III		Luminaire designed for very low safety voltages and having no internal or external circuit operating at any voltage other than safety extra-low voltage, at not more than 50 V.

GLOW-WIRE TEST

The parts of a luminaire made of insulating material holding the current-carrying parts or SELV parts in place, and the external parts made of insulating material providing protection against electric shock must be flame and ignition resistant. The standard NF EN 60695-2-10 defines a common test method, applicable to electronic equipment such as luminaires.



EMISSION CLASS

TYPICAL PARTICLE CLEANLINESS CLASS OF THE AIR IN CLEAN ROOMS AND CLEAN AREAS

Cleanliness class, according to ISO 14644-1, in which the luminaire is suitable for installation.

N° DE CLASSE ISO (N)	Maximum allowable concentrations (particles/m ³) of particle sizes equal to or greater than those given below					
	0,1 µm	0,2 µm	0,3 µm	0,5 µm	1 µm	5 µm
1	10 ^b	d	d	d	d	e
2	100	24 ^b	10 ^b	d	d	e
3	1 000	237	102	35 ^b	d	e
4	10 000	2 370	1 020	352	83 ^b	e
5	100 000	23 700	10 200	3 520	832	d. e. f.
6	1 000 000	237 000	102 000	35 200	8 320	293
7	c	c	c	352 000	83 200	2 930
8	c	c	c	3 520 000	832 000	29 300
9 ^a	c	c	c	35 200 000	8 320 000	293 000



PHOTOBIOLOGICAL RISKS

Photobiological safety refers to the potential risk of photochemical damage to the eye caused by electromagnetic radiation from light sources. RG0 and RG1 do not present any risk.



SDCM

Colorimetric variation between LEDs of the same batch. The production method of an LED can possibly lead to variations between the products of the same batch and or a between different batches. By a more or less precise selection it is possible to make these variations invisible for our eyes. For this, a value of less than or equal to 3 SDCM is required, which is the case for all components which we are using.

STANDARDS AND WARRANTY

Compliance :

Information on the compliance of our products with the relevant standards and directives is available on our website.

Warranty :

Our warranty conditions are indicated in our general terms and conditions of sale. There are special conditions depending on the product range.

These conditions can be checked on our website :

www.isoone-cleanroom-lighting.com/conditions-generales-de-vente/

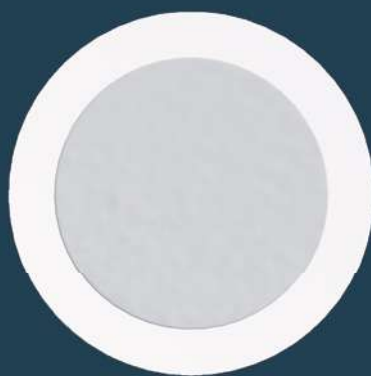
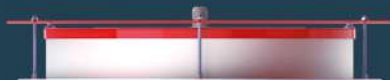
Temperature and switches on :

The operating temperature and the number of daily switches have an influence on the lifetime of the products. Our luminaires are designed to withstand at least 15.000 switches on following EU 1194/2012. Please consult us for more information.

NOTE

ISOONE reserves the right to modify or update this document at any time within the framework of the technological evolution and the updating of our technical documentation. Despite the care taken in the design and the updating of this card, it can not under any circumstances constitute a contractual document.

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A1000ACC	56	EDO2208EPF	52	EDO2303EPF	25	EUP2114EPF	47	EUP2225EPF	97	SUR1199EPF	70
A1001ACC	56	EDO2209EPF	52	EDO2305EPF	59	EUP2115EPF	38	SUR1003EPF	86	SUR1200EPF	70
A1009ACC	70	EDO2215EPF	59	EDO2306EPF	59	EUP2116EPF	38	SUR1028EPF	74	SUR1201EPF	70
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A1015ACC	70	EDO2228EPF	59	EDO2312EPF	59	EUP2123EPF	38	SUR1054EPF	78	SUR1208EPF	89
A1017ACC	70	EDO2229EPF	59	EDO2313EPF	59	EUP2124EPF	38	SUR1055EPF	78	SUR1209EPF	89
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A1022ACC	56	EDO2239EPF	55	EDO2315EPF	59	EUP2154EPF	41	SUR1076EPF	86	SUR1211EPF	89
A1079ACC	74	EDO2240EPF	55	EDO2330EPF	99	EUP2162EPF	34	SUR1078EPF	86	SUR1212EPF	89
A1115ACC	101	EDO2243EPF	65	EDO2331EPF	99	EUP2163EPF	43	SUR1080EPF	86	SUR1213EPF	89
A1116ACC	101	EDO2244EPF	65	EUP2010EPF	41	EUP2164EPF	34	SUR1082EPF	81	SUR1214EPF	89
A1117ACC	101	EDO2245EPF	65	EUP2019EPF	41	EUP2165EPF	34	SUR1083EPF	81	SUR1215EPF	89
A1118ACC	101	EDO2246EPF	81	EUP2020EPF	41	EUP2166EPF	43	SUR1084EPF	86	SUR1216EPF	89
A1119ACC	101	EDO2249EPF	65	EUP2021EPF	41	EUP2167EPF	34	SUR1119EPF	86	SUR1217EPF	89
A1120ACC	101	EDO2250EPF	65	EUP2022EPF	41	EUP2168EPF	34	SUR1128EPF	86	SUR1218EPF	89
A1121ACC	101	EDO2251EPF	65	EUP2023EPF	41	EUP2169EPF	43	SUR1132EPF	86	SUR1219EPF	89
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EDO2093EPF	52	EDO2285EPF	55	EUP2082EPF	41	EUP2200EPF	47	SUR1188EPF	70		
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