

The Cave Lighting Product Catalog

LIGHT UP YOUR SHOW CAVE



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**GOOD MORNING
MR. CHRAPKO**

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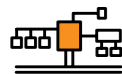
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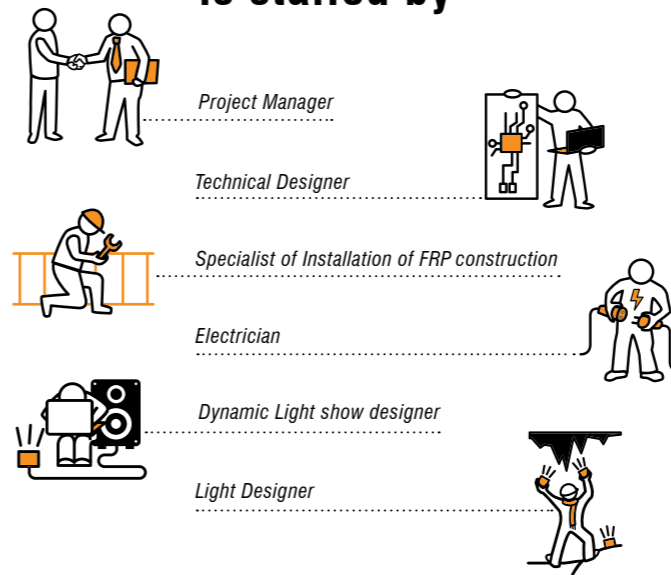
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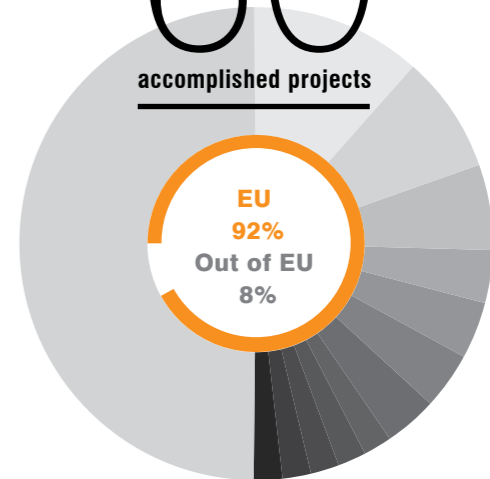


The main specialty of the company is the **complete setting up** of modern show caves

Our team is staffed by



More than **60** accomplished projects



Country	%
DEU	50.0
AUT	11.5
ROU	8.0
BEL	5.8
FRA	3.8
ITA	3.8
SVN	3.8
CZE	1.9
SVK	1.9
CHE	1.9
GEO	1.9
RUS	1.9
CYM	1.9

BUSINESS AREA

ILLUMINATION SYSTEMS



LIGHT & SOUND SHOW



CONSULTING



MONITORING & SENSING



MESSAGING & COMMUNICATION



EMERGENCY SYSTEMS



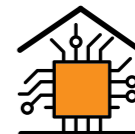
POWER SUPPLY SYSTEMS



SERVICE



CONTROL SYSTEM



MECHANICAL DESIGN



HELLO,
ПРИВЕТ,
BONJOUR,
HOLA,
AHOJ!
WELCOME
TO OUR
WORLD
OF LIGHT.

INTERVIEW

GOOD MORNING MR. CHRAPKO. YOU ARE A CO-FOUNDER OF CAVE LIGHTING. WHAT GAVE YOU THE IDEA TO START A COMPANY THAT ILLUMINATES CAVES??

A.C.: In 2005 we visited a very poorly lit show cave in Hasel and afterwards a group of us cavers were sitting around talking about how much more pleasurable the experience would be if a more suitable system could be developed for lighting the caves.

IN WHAT WAY IS THE SERVICE OF CAVE LIGHTING DIFFERENT FROM OTHER COMPANIES IN THE BUSINESS?

A.C.: Unlike all the other companies supplying cave lighting we are a full service company. By that I mean we offer a total package, not just lighting. Based on our research and experience we offer a complete service to operators of underground tourist attractions. From initial consulting to creating the overall concept, to planning the installation and designing the actual lighting to the scenography, then to the installation of all materials and then on to the programming and everything else associated with creating the total show cave experience.

WHAT ARE THE SPECIFIC FACTORS THAT PROMPT SHOW CAVE OPERATORS TO INITIALLY SEEK YOUR ASSISTANCE.

A.C.: Typically it is the age of their electrical equipment: All lighting devices deteriorate with time and most become obsolete. This is particularly true of devices used underground. So operators are always looking for more efficient equipment. So naturally, we let them know that their attractions can look so much better if they take advantage of all the modern materials and design that we offer. The efficiency and economy of LED's are welcomed by cave operators because of the positive impact on economy and the reduction of CO2 emissions. The LED's and the systems that control them are simply more friendly to the environment. And then, of course the multimedia component that we offer has an enormous impact on the show cave experience.

SHARE WITH US THE TYPICAL «CAVE LIGHTING» EXPERIENCE.

A.C.: After the initial consultation which might be by phone or in person, our staff visits the site for an inspection of the general look of the entire cave area. This is important because many of these systems were designed years ago and most of the equipment available at the time was quite primitive, and had limited function. And also, the aesthetics of the design was not high on their list of priorities back when it was all installed originally. A lot of the underground attractions have an old fashioned look to them. So, of course, it is usually desirable to modernize the overall concept. You know, to bring it all into the twenty first century. Then through the use of our Travel Kit (that's our mobile lighting system), we test all the lights. In most cases we do all of that at our own expense. It is then that we begin to discuss our new suggested concepts with the customer to see if our designs are feasible and within the parameters of the budget. They might need to be



adjusted to accommodate a more modest cost. Once a design and budget are agreed on a plan of implementation is decided upon. Though it all sounds fairly simple and it seems that it can happen very quickly, it's actually quite complex. In fact it's quite possible that some time could pass between the signing of contracts and the actual completion of the project.

8.126

Fixtures were installed by Cave Lighting™ [*]

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AS IN ANY INDUSTRY THE QUALITY AND DURABILITY OF THE ITEMS USED IN YOUR INSTALLATIONS IS AN IMPORTANT CONSIDERATION. WHAT ARE THE CHARACTERISTICS THAT YOU TYPICALLY PAY SPECIAL ATTENTION TO?

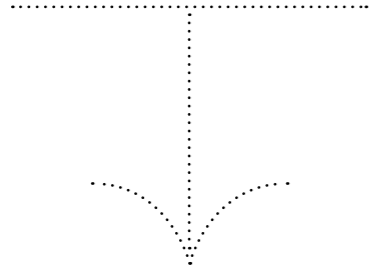
A.C.: We offer two distinctly different types of products in our installations. Items that we design and manufacture ourselves, and others that we outsource. In both cases we use only the highest quality products. All of the objects that we use in our installations are subjected to the most rigorous testing and we insist on using only those devices that are exceedingly robust and have proven to our testing facility to be extremely water and impact resistant as well as resistant to all possible forms of corrosion.

We also insist that all of the products in our systems have a good deal of flexibility. In light of their underground location we feel that our products should have a certain amount of flexibility so that when called upon they can serve to their fullest capacity. Whether designed and manufactured in house or sup-

plied to us by others we are convinced that all of our systems will be capable of providing our clients with many long years of uninterrupted service.

488,700

watt of energy total power is consumed by obsolete lighting systems [*]



93%

energy savings. Through the newly installed Cave Lighting products our customers were able to reduce up to 31,930 watt total power. Cave Lighting fixtures are up to 15x more economical than incandescent lighting sources. [*]

«CAVE LIGHTING TECHNICIAN» DOESN'T SEEM TO BE A VERY COMMON JOB DESCRIPTION. HOW DO YOU FIND EMPLOYEES WHO ARE SUITABLE FOR THE TYPE OF WORK YOU REQUIRE. WHERE DO THEY GET THEIR EXPERIENCE?

A.C.: All of our employees are long time cavers. Many of them have spent more time underground than they have spent in their own bedrooms. In fact a few of them were present when we first explored the possibility of pursuing cave lighting as a business. The people who help us with our work love and understand caves and enjoy making them reachable and attractive to all who visit. Of course there are always plenty of electricians who can do adequate and safe electrical installations, but most don't understand the esthetics of a show cave or even what the visitor expects or would be hoping to experience. But for us to find a competent electrician who is also sensitive to the cave environment is not an easy task; so we are always on the lookout for appropriately gifted personnel to help us.

WHAT IS OF CRUCIAL IMPORTANCE IN CAVE LIGHTING?

A.C.: I guess I would say above all that the visitors enjoy a safe and pleasurable experience. And that they leave the cave happy and a little bit in awe of what they have just witnessed. From a technical perspective it is of crucial importance that our systems are of top quality and that they function to their highest capability, with no breakdowns or service requirements. We have been very successful in our all of our endeavors. In fact our oldest installation has been up and running for over eight years with only very minimal service .

WHAT DO YOU SEE AS THE FUTURE OF CAVE LIGHTING?

A.C.: I would love to see cave lighting used above ground. In fact, our goal is to see cave lighting techniques used for all sorts of surface based projects. There are so many potential uses for our systems on the surface. The possibilities are endless: illumination of churches and castles and so many other facilities of that nature for example. We are sure that our facilities are ready to become world market leaders in these areas as well as in underground attractions.

14,961

meter of path ways were lighted in different show caves by Cave Lighting™. [*]

YOUR WORK SEEMS REALLY FASCINATING. I'M SURE THAT YOU'VE MET SOME INTERESTING PEOPLE IN THE YEARS THAT YOU'VE BEEN LIGHTING CAVES. DO YOU RECALL ANY FUNNY OR UNUSUAL EXPERIENCES.

A.C.: A few years ago while I was visiting some caves in France the operator requested some lights for his staff to evaluate. He assured me that he'd return the samples within a couple of months. After six months went by and still no lights I sent him a bill. A short while after I got a check in full payment and and since I never heard from him again I assumed that he wasn't to thrilled with our product. Three years later I bumped into him at a show and he greeted me enthusiastically. He told me that when his cave flooded every light went out except the ones that I'd sent him, and he wanted me to come to France and light his whole project. <<<

95%

of energy is being transformed into light through Cave Lighting™'s equipment, only 5% into warmth. Incandescent lamps, in contrast, emit 95% of warmth and 5% of light.

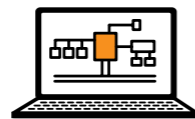
[*] Projects that were carried out by Cave Lighting™ between 2006 and 2016.



CONSULTING

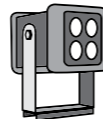
We offer our customers a complete package of flexible, fast and reliable services: from our high quality products and cutting-edge technology to maintenance services after the project ends.

For us each project site is unique and is treated as such. As we work with the most developed project management systems, and we deliver only the highest quality products, we begin each project by providing individual support for project planning and detailed advice to our clients. We make a detailed on-site evaluation of the local initial situation. In accordance with the customer wishes, we establish the overall objectives of the project, and provide a detailed analysis of the infrastructure, electrical power needs, natural conditions and much more.



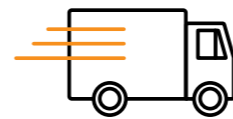
ELECTRICAL PLANNING

Our specialists can design and install control and lighting systems, music and DMX shows and surveillance systems, which can be programmed depending on the desired acoustic and the on-site visual components.



LIGHTING DESIGN

Our company offers a very large selection of LED-light solutions, and their price and design can be adapted to the customer requirements. After the desired light effects are agreed upon, they are programmed as light scenes into the system and presented.



DELIVERY

We can react with flexibility to spontaneous orders because we operate our own development and production facility. Timeliness at the construction site is a top priority for us.



INSTALLATION

We care deeply about the conservation of natural sites, and for this reason we only work with environmentally friendly tools and materials that do not further degrade the natural environment. As an exclusive solution, our company offers the installation of pathways and viewing platforms made of FRP (fiberglass reinforced plastic), which offers many advantages for underground and outdoor sites.



TECHNICAL DOCUMENTATION

We provide our customers with a complete set of technical documentation for each project.



MAINTENANCE

We also offer extended support and maintenance services to our customers, even after the end of the 5-year warranty period that our products and services carry.

CORRELATED COLOR TEMPERATURE

The correlated color temperature [CCT] describes the color appearance of light emitted by a lamp, by relating its color to that of a reference source heated to a particular temperature measured in kelvins (K).

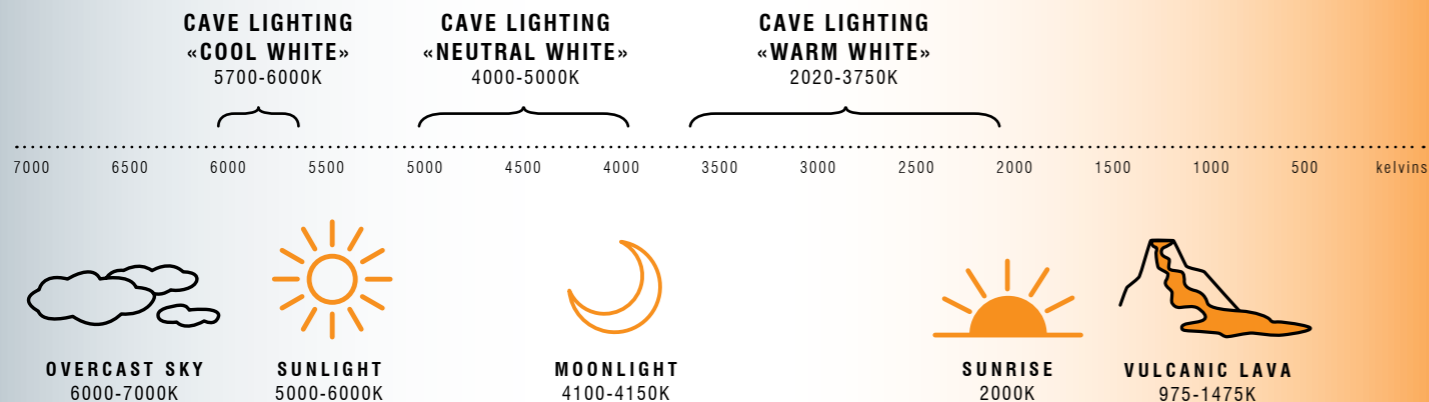
In general, the CCT rating for a lamp is a measure of its «warm» or «cool» appearance.

However, opposed to the temperature scale, lamps with a CCT rating below 3200 K are usually considered «warm» sources, while those with a CCT above 4000 K are usually considered «cool» in appearance.

The correlated color temperature designation for a light source gives a good indication of

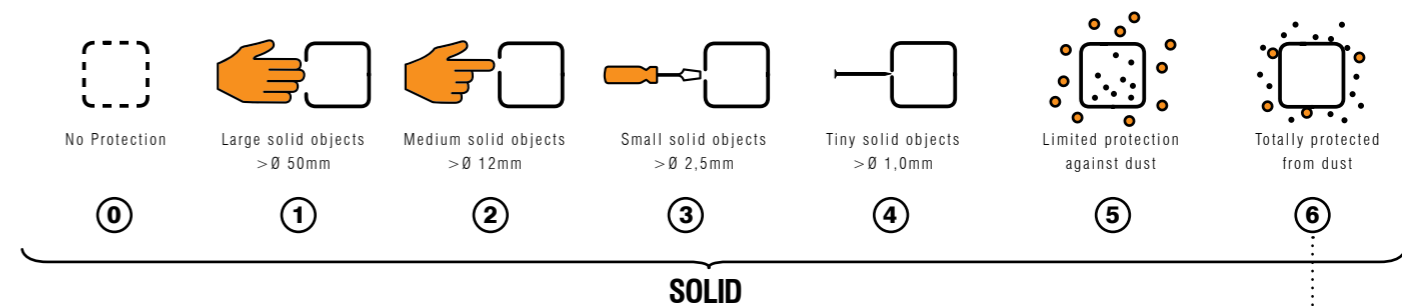
the lamp's general appearance, but does not give information on its specific spectral power distribution. Therefore, two lamps may appear to have the same color, but their effects on the color of illuminated objects can be quite different.

Some typical color temperatures are: ↓



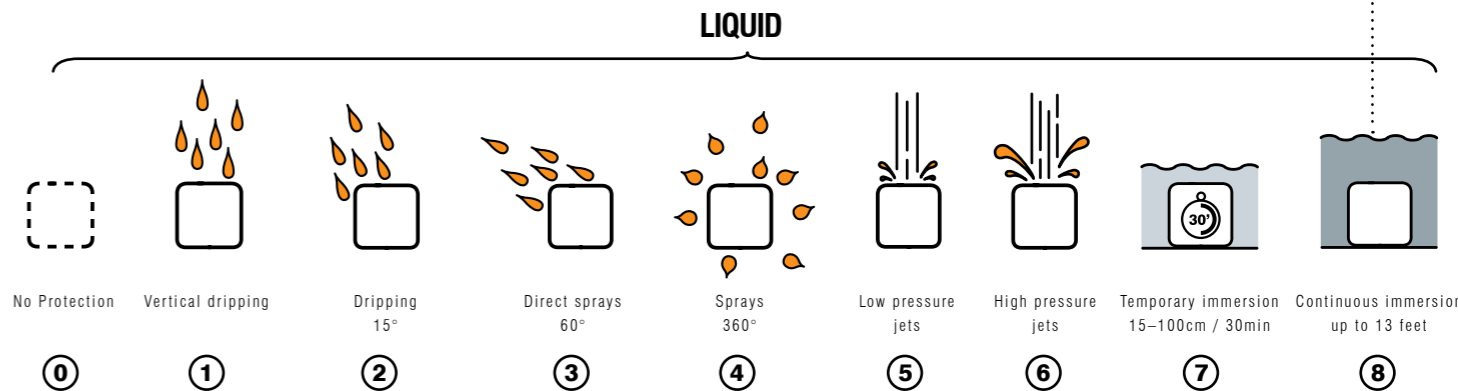
* Information by Lighting Research Center <http://www.lrc.rpi.edu>

IP RATING CHART



IP stands for or «International Protection Rating», sometimes also interpreted as «Ingress Protection». An IP number is used to specify the environmental protection of enclosures around electronic equipment. These ratings are determined by specific tests. The IP number is composed of two numbers, the first referring to the protection against solid objects and the second against liquids. The higher the number, the better the protection.

FOR EXAMPLE: **IP 68**



The following pages of the CaveLighting™ catalog are illustrated with icons for an easier identification of specific categories & products.

As listed below there are: ↓



LIGHT SOURCE

- LED type
- number of LED's
- maximum luminous flux
- CCT and colors
- beam angle



ELECTRICAL

- rated power
- voltage range
- nominal voltage
- protection
- connection
(connector, cable glands)



CONTROLS

- dimming method, mode
- control unit option
- control interface
- light control
- climate control
- specific features
- number of scenes
- number of scenarios
- frames per scenario



OPERATIVE CONDITIONS

- temperature
- humidity



PHYSICAL

- housing
- IP rating
- weight
- dimension
- material
- color
- cable length
- mounting
- number of cores, cross sections and external diameters



SUPPORTED LUMINARIES

- specific product names



PROTECTION

- fuse protection



OUTPUT

- dimming (luminary) outputs
- supported luminaries
- connector
- audio output
- audio connector
- output (secondary) voltage
- number of outputs
- total electrical load per channel
- maximum power load per channel



INPUT

- pushbutton
- interface
- special features
- input (primary) voltage
- protocol & configuration software



SOUND OPTIONS

- maximum output power
- frequency range
- audio input



INTERFACE

- control interface
- connector
- special features
- protocol & configuration software



CABLE FEATURES

- cable type
- material

LED-Luminaries



CL-ESQ



CL-LSQ



CL-EQP



CL-LQP



CL-EQP9



CL-LMT



CL-LB3 / CL-LB6

CL-ESQ

The Cave Lighting™ CL-ESQ is a rugged LED-luminary especially designed for show-cave applications, requiring high quality color mixing possibilities for flood or spot illumination. Sophisticated technology allows the integration of advanced functionality within a compact and rugged housing. The luminary contains one full color RGBW high-power LED, which allows the creation of a wide color palette from saturated shades to subtle pastels. The integration of electronics with standard DMX drivers lead to a very easy installation.



LED TYPE	High Power LED
NUMBER OF LED'S	1
MAX LUMINOUS FLUX	500 lm [power rated at 100% light intensity for cool white]
BASIC COLORS	full color (RGBW)
OTHER COLORS	cool white, neutral white, warm white
BEAM ANGLE	medium(26°), wide(40°)



RATED POWER	7W [rated at 100% light intensity]
VOLTAGE RANGE	DC 18V...32V
NOMINAL VOLTAGE	DC 30V
BUILD-IN CABLE	4×0,5mm ² ; length 3m, 6m [could be customer defined]



DIMMING METHOD, MODE	DMX, SA (stand alone)
SUPPORTED CONTROL OPTION	CL-MMC or any DMX control unit



TEMPERATURE	-25°C...+45°C
HUMIDITY	100%



HOUSING	polycarbonate front cover, alu housing covered with polymer thermoconductive paint, stainless steel brackets
IP RATING	IP68
DIMENSION	130×87×117mm
WEIGHT	660g

CL-LSQ

The Cave Lighting™ CL-LSQ LED luminary series is the ideal lighting unit for show-cave applications, as well as for other extreme outdoor and underwater environments.

The extra-compact and extremely rugged housing allows to better camouflage the luminary so it disappears in the surroundings. The varied options of light color, beam and barndoor types, and mounting possibilities allow the creation of a wide range of glowing light scenes with excellent control.



LED TYPE	High Power LED
NUMBER OF LED SOURCES	1 or 2
MAX LUMINOUS FLUX	240 lm (rated at 100% light intensity for cool white)
COLORS	cool white, neutral white, warm white
OTHER COLORS	red, blue, green, amber
BEAM ANGLE	narrow(10°), medium(30°), wide(40°), very wide(60°), flood(90°), ellipse(10°×45°)



RATED POWER	1,5 W or 3 W
VOLTAGE RANGE	DC 15V...36V
NOMINAL VOLTAGE	DC 24V
BUILD-IN CABLE	3×0,5mm ² ; length 3m, 6m (could be customer defined)



DIMMING METHOD, MODE	PWM
SUPPORTED CONTROL OPTION	CL-CN2



TEMPERATURE	-25°C...+45°C
HUMIDITY	100%



HOUSING	polycarbonate front cover, alu housing covered with polymer thermoconductive paint, stainless steel brackets
IP RATING	IP68
DIMENSION	82×83×99mm
WEIGHT	600g

CL-EQP



The Cave Lighting™ CL-EQP is a powerful, compact and rugged LED lighting fixture designed for show-cave applications that require high quality color mixing possibilities and colored illumination of big structures and wide areas. It is also suitable for the illumination of outdoor environments, such as landscapes or landmarks. The luminaire contains 4 high-power LEDs with full-color RGBW, allowing the operator to create a wide color palette from saturated shades to subtle pastels. The electronics are integrated with standard DMX drivers thus allowing for a very easy installation.



LED TYPE	High Power LED
NUMBER OF LED SOURCES	4
MAX LUMINOUS FLUX	1200 lm (rated at 100% light intensity for cool white)
COLORS	full color (RGBW)
OTHER COLORS	cool white, neutral white, warm white
BEAM ANGLE	wide(40°)



RATED POWER	17W
VOLTAGE RANGE	DC 18V...32V
NOMINAL VOLTAGE	DC 30V
BUILD-IN CABLE	4×0,5mm ² ; length 3m, 6m (could be customer defined)



DIMMING METHOD, MODE	DMX, SA (stand alone)
SUPPORTED CONTROL OPTION	CL-MMC or any DMX control unit



TEMPERATURE	-25°C...+45°C
HUMIDITY	100%



HOUSING	polycarbonate front cover, alu housing covered with polymer thermoconductive paint, stainless steel brackets
IP RATING	IP68
DIMENSION	165×127×166mm
WEIGHT	1390g

CL-LQP

The Cave Lighting™ CL-LQP is another powerful, compact and rugged LED lighting fixture designed to illuminate big cave areas and structures. The wide choice of light colors, light beams, barndoors, mounting and light control options make this fixture ideal for show-cave applications, but it can also be used for the illumination of outdoor environments, such as landscapes or landmarks.



LED TYPE	High Power LED
NUMBER OF LED SOURCES	9
MAX LUMINOUS FLUX	1000 lm (rated at 100% light intensity for cool white)
COLORS	cool white, neutral white, warm white
OTHER COLORS	red, blue, green, amber
BEAM ANGLE	narrow(10°), medium(30°), wide(40°), very wide(60°), flood(90°), ellipse(10°×45°)



RATED POWER	12W
VOLTAGE RANGE	DC 15V...36V
NOMINAL VOLTAGE	DC 24V
BUILD-IN CABLE	3×0,5mm ² or 4×0,5mm ² , length 3m, 6m or customer defined



DIMMING METHOD, MODE	PWM or DMX (integrated control unit)
SUPPORTED CONTROL OPTION	CL-CN2



TEMPERATURE	-25°C...+45°C
HUMIDITY	100%



HOUSING	polycarbonate front cover, alu housing covered with polymer thermoconductive paint, stainless steel brackets
IP RATING	IP68
DIMENSION	165×127×166mm
WEIGHT	1390g

CL-EQP9

The Cave Lighting™ CL-EQP9 is a powerful, compact and rugged LED lighting fixture suited for show-cave applications, which require high quality color mixing possibilities or the possibility to combine white light with DMX control.

A wide choice of light colors, light beams, barndoors, mounting and light control options make this fixture ideal not only for show-cave applications, but for other outdoor environments, such as landscapes or landmarks. The electronics are integrated with standards DMX drivers, thus allowing for a very easy installation.



LED TYPE	High Power LED
NUMBER OF LED SOURCES	9
MAX LUMINOUS FLUX	1000 lm (rated at 100% light intensity for cool white)
COLORS	cool white, neutral white, warm white
OTHER COLORS	red, blue, green, CNWA
BEAM ANGLE	narrow(10°), medium(30°), wide(40°)



RATED POWER	12W
VOLTAGE RANGE	DC 18V...32V
NOMINAL VOLTAGE	DC 30V
BUILD-IN CABLE	4×0,5mm ² ; length 3m



DIMMING METHOD, MODE	DMX, SA (stand alone)
SUPPORTED CONTROL OPTION	CL-MMC or any DMX control unit



TEMPERATURE	-25°C...+45°C
HUMIDITY	100%



HOUSING	polycarbonate front cover, alu housing covered with polymer thermoconductive paint, stainless steel brackets
IP RATING	IP68
DIMENSION	165×127×166mm
WEIGHT	1390g

CL-LMT

The CL-LMT is a linear LED light fixture, rated IP67, designed for the illumination of objects that don't actually need much light, such as pathways, small formations, info-panels, showcases etc. The housing consists of a plastic tube with transparent internal potting. It provides an excellent protection rate and stable light output. The CL-LMT can be used in a wide variety of indoor and outdoor applications and can be installed in minutes using standard plastic clips and a number of brackets. An adjustable light slot allows the configuration of the light output conditions.



LED TYPE

Low Power LED

NUMBER OF LED SOURCES

10

MAX LUMINOUS FLUX

60 lm (rated at 100% light intensity for cool white)

COLORS

cool white, neutral white, warm white

OTHER COLORS

-

BEAM ANGLE

adjustable up to 90°



RATED POWER

1W

VOLTAGE RANGE

DC 15V...36V

NOMINAL VOLTAGE

DC 24V

BUILD-IN CABLE

3×0,5mm²; length 3m, 6m or customer defined



DIMMING METHOD, MODE

PWM

SUPPORTED CONTROL OPTION

CL-CN2



TEMPERATURE

-25°C...+45°C

HUMIDITY

98%



HOUSING

polycarbonate clear tube potted with transparent compound

IP RATING

IP67

DIMENSION

287mm × Ø24

WEIGHT

200g

CL-LB3 / CL-LB6

The Cave Lighting™ LED spotlight series CL-LB is the ideal solution for accent illumination of different objects in a show-cave, or in architectural surroundings. A combination of very narrow light beams, different color options and very flexible mounting possibilities allows the creation of impressive illumination solutions.


LED TYPE

High Power LED

NUMBER OF LED SOURCES

1

MAX LUMINOUS FLUX

180 lm

COLORS

cool white, neutral white, warm white

OTHER COLORS

red, blue, green

BEAM ANGLE

CL-LB3: very narrow(2°) / CL-LB6: very narrow(3°)


RATED POWER

CL-LB3: 3W / CL-LB6: 6W

VOLTAGE RANGE

DC 15V...36V

NOMINAL VOLTAGE

DC 24V

BUILD-IN CABLE
3×0,5mm²; length 3m
DIMMING METHOD, MODE

PWM

SUPPORTED CONTROL OPTION

CL-CN2


TEMPERATURE

-25°C...+45°C

HUMIDITY

98%


HOUSING

anodised aluminium housing, forced glass at front cover, double-part brackets for flexible mounting

IP RATING

IP66

DIMENSION

187×100×69mm

WEIGHT

640g



Multimedia Units



CL-MMC-02



CL-SPK-01



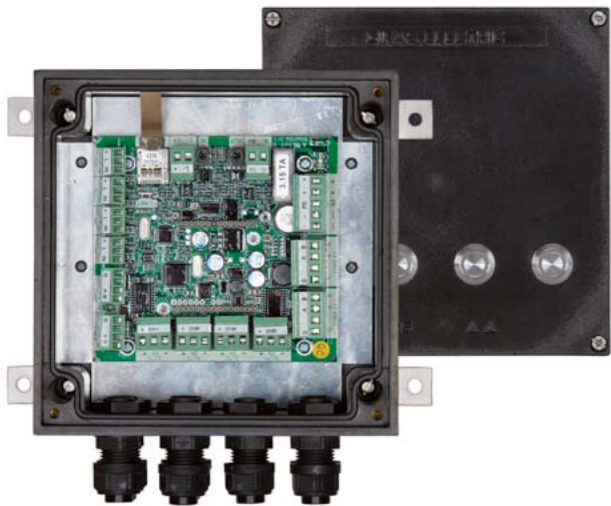
CL-SPK-02

CL-MMC-02

The Multimedia Control Unit provides the audio signal source for sound and music management in a show-cave.

The unit has an MP3 audio player inside which can control the internal Cave Lighting™ bus or the external DMX-512 interface.

The unit supports the creating, storing and playing of the data for light-music shows. The 8 digital input/output ports can be configured for providing player functions. The unit supports versatile programming for launching light-and-audio shows. The internal micro-SD memory card stores the audio and light-show sequences.



DIMMING (LUMINARY) OUTPUTS

4× (optional)

SUPPORTED LUMINARIES

CL-LSQ, CL-LQP, CL-ESQ, CL-EQP, CL-EQP9, CL-LMT

TOTAL ELECTRICAL LOAD PER OUTPUT CHANNEL

max 1A

CONNECTOR

screw terminals, RM 5,0mm

AUDIO OUTPUT

2 (stereo)

AUDIO CONNECTOR

2× 2 pole screw terminals, RM 5.0mm



PUSHBUTTON

4 (optional)



INTERFACE

2× RS485, isolated

CONNECTOR

2× 3 pole terminal RM 5,0mm, 2× 3 pole terminal RM 3,8mm

PROTOCOL & CONFIGURATION SOFTWARE

CaveLighting™, DMX-512 / CaveScenes™

SPECIAL FEATURES

Micro-SD-card memory, Aux audio IN/OUT, supported files: *.mp3, *.dmx



NOMINAL VOLTAGE

24VDC

VOLTAGE RANGE

15VDC ... 32VDC

PROTECTION

overvoltage, overcurrent (fuse 3,15A)



TEMPERATURE

-25°C... +45°C

HUMIDITY

98% (+25°C)



HOUSING

solid rubber box, black color

IP RATING

IP65

HOUSING- / EXTERNAL DIMENSION

160×160×90mm / 213×189×102mm

WEIGHT

1600g

CL-SPK-01

The CL-SPK-01 is a rugged active loudspeaker unit that provides the mono sound and music playback over the MP3-player from the CL-MMC unit. Its unique design is completely waterproof.”



MAXIMUM OUTPUT POWER	50W
FREQUENCY RANGE	55 Hz...20kHz
AUDIO INPUT	CL-MMC compatible balanced audio line



NOMINAL POWER SUPPLY VOLTAGE	24VDC
POWER SUPPLY VOLTAGE RANGE	20VDC ... 32VDC
CONNECTION (CABLE GLANDS)	2x M16
PROTECTION	internal fuse T10A
CONNECTOR	internal screw terminals



TEMPERATURE	-25°C.... +45°C
HUMIDITY	98% (+25°C)



HOUSING	Hard polypropylene, barrel-type; blue housing, black covers
IP RATING	IP65
DIMENSION (HOUSING)	517×323mm
WEIGHT	5200g



CL-SPK-02

The CL-SPK-02 is an active loudspeaker unit that provides the mono sound and music playback over the MP3-player from the CL-MMC unit.



MAXIMUM OUTPUT POWER	10W
FREQUENCY RANGE	55 Hz...20kHz
AUDIO INPUT	CL-MMC compatible balanced audio line



NOMINAL POWER SUPPLY VOLTAGE	24VDC
POWER SUPPLY VOLTAGE RANGE	20VDC ... 32VDC
CONNECTION (CABLE GLANDS)	2x M16
PROTECTION	internal fuse T10A
CONNECTOR	internal screw terminals



TEMPERATURE	-25°C.... +45°C
HUMIDITY	98% (+25°C)



HOUSING	Solid rubber box, black color
IP RATING	IP65
DIMENSION (HOUSING)	160×160×90mm
EXTERNAL DIMENSIONS	213×189×102mm
WEIGHT	3300g



Control Units



CL-CN2



CL-CP2



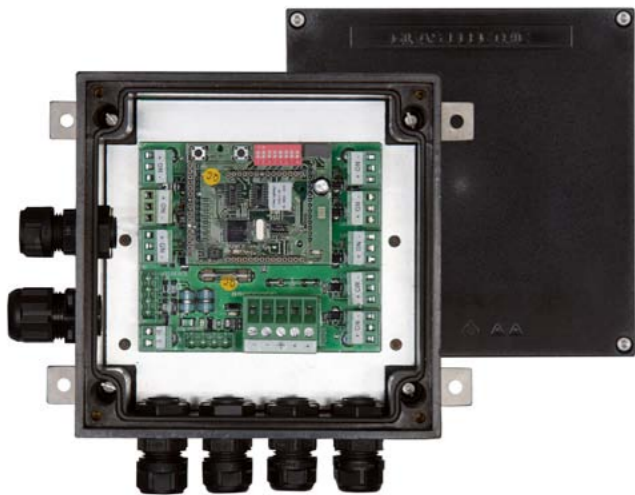
CL-RR



CL-GP

CL-CN2

The CL-CN2 is the Control Unit for powering, brightness adjustment and order of light scenes for LED luminaires equipped with PWM dimming. It receives commands via the Cave Lighting™ system interface and controls connected luminaires with regard to internal scenes, and configuration of scenarios.


NUMBER OF SCENES

255

NUMBER OF SCENARIOS

2

FRAMES PER SCENARIO

255


DIMMING LUMINARY OUTPUTS

8 × (PWM-200Hz)

SUPPORTED LUMINARIES

CL-LSQ, CL-LQP, CL-LMT

TOTAL ELECTRICAL LOAD PER OUTPUT CHANNEL

max 1A

CONNECTOR

3 pole screw terminal, RM 5,0mm


INTERFACE

Connector 2×3 pole terminals RM 5,0mm, RS485, isolated

PROTOCOL & CONFIGURATION SOFTWARE

CaveLighting™, DMX-512 (optional) / CaveScenes™

SPECIAL FEATURES

1x configurable input


NOMINAL POWER SUPPLY VOLTAGE

24VDC

POWER SUPPLY VOLTAGE RANGE

15VDC ... 32VDC

PROTECTION

overvoltage, overcurrent (Fuse 10A)


TEMPERATURE

-25°C... +45°C

HUMIDITY

98% (+25°C)


HOUSING

solid rubber box, black color

IP RATING

IP65

HOUSING- / EXTERNAL DIMENSION

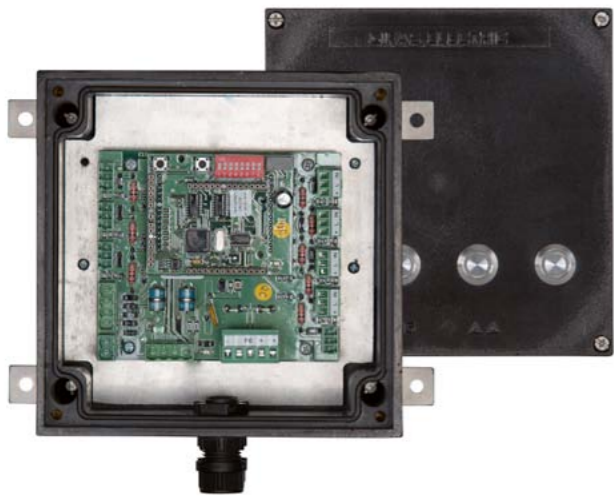
160×160×90mm / 213×189×102mm

WEIGHT

1600g

CL-CP2

The Switching point Control Unit provides the user interaction control function within lighting installations. It sends commands to the Control Units of LED luminaries to change light scenes, which are stored in the internal memory. This unit is usually mounted in an accessible location for easy operation. The user can manually change light scenes over local buttons or execute light scenarios.



NUMBER OF SCENARIOS

2

FRAMES PER SCENARIO

255



PUSHBUTTONS

2, 4, 8

INTERFACE

RS485, isolated

PROTOCOL & CONFIGURATION SOFTWARE

CaveLighting™, DMX-512 (optional) / CaveScenes™

SPECIAL FEATURES

1x configurable input



NOMINAL VOLTAGE

24VDC

VOLTAGE RANGE

15VDC ... 32VDC

PROTECTION

overvoltage, overcurrent



TEMPERATURE

-25°C... +45°C

HUMIDITY

98% (+25°C)



HOUSING

solid rubber box, black color

IP RATING

IP65

HOUSING- / EXTERNAL DIMENSION

160×160×90mm / 213×189×102mm

WEIGHT

1600g

CL-RR1

The Radio Receiver unit receives commands from a remote control and then relays them to the system interface.



PUSHBUTTONS	8×32 virtual buttons
INTERFACE	Connector 2×5 pole terminals RM 5,0mm
PROTOCOL & CONFIGURATION SOFTWARE	CaveLighting™ / CaveScenes™



NOMINAL POWER SUPPLY VOLTAGE	24VDC
POWER SUPPLY VOLTAGE RANGE	15VDC ... 32VDC



TEMPERATURE	-25°C... +45°C
HUMIDITY	98% (+25°C)



IP RATING	IP65
HOUSING	PC plastic, light gray or black
HOUSING- / EXTERNAL DIMENSION	80×80×52mm / 142×80×59mm
WEIGHT	200g

CL-GP

The Radio Remote Control (Guide Pilot) is used to provide inter-activity between the visitors and the show-cave, to switch between light scenes, to start and display light shows etc.



PUSHBUTTONS	8
INTERFACE	RF connection 433MHz
PROTOCOL & CONFIGURATION SOFTWARE	—



NOMINAL VOLTAGE	3V battery
VOLTAGE RANGE	—

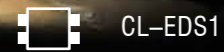


TEMPERATURE	0°C... +45°C
HUMIDITY	98% (+25°C)



IP RATING	IP54
HOUSING	—
HOUSING DIMENSION	105×41×21mm
WEIGHT	30g

Interface Units



CL-EDS1



CL-RSU



CL-WF1



CL-IRC

CL-EDS1

The CL-EDS1 is the power and DMX signal splitter device housed in an IP65-rated junction box. The junction box can be waterproofed to IP68 by applying a sealing compound available from Cave Lighting™. Splitter units are used to connect power cables as well as DMX and RDM data cables to two CL-EQP/ESQ luminaires and to other splitters.



INTERFACES

IN: 2×DMX+Power (Hybride cable)

OUT: 2×DMX+Power (Luminary cable)



SUPPORTED LUMINARIES

CL-EQP, CL-ESQ



NOMINAL POWER SUPPLY VOLTAGE

30VDC

POWER SUPPLY VOLTAGE RANGE

15VDC ... 32VDC

CONNECTION (CABLE GLANDS)

4×M20

PROTECTION

Fuse 2,5A



TEMPERATURE

-25°C... +45°C

HUMIDITY

98% (+25°C)



HOUSING

PC plastic, light gray or black

IP RATING

IP65, IP68 with gel CL-FS

HOUSING DIMENSION

80×80×52mm

EXTERNAL DIMENSION

142×80×59mm

WEIGHT

200g

CL-RSU

The CL-RSU unit provides connection between the Cave Lighting™ interface and a PC for testing, servicing and configuring. The unit works as a converter from USB to RS485 interfaces.



INTERFACES

IN: 1 × RS485, nonisolated

OUT: 1 × USB



NOMINAL POWER SUPPLY VOLTAGE

24VDC

POWER SUPPLY VOLTAGE RANGE

15VDC ... 32VDC

CONNECTION (CABLE GLANDS)

1 × M12



TEMPERATURE

-25°C... +45°C

HUMIDITY

98% (+25°C)



HOUSING

PC plastic, light gray

IP RATING

IP65

HOUSING DIMENSION

93 × 65 × 55mm

EXTERNAL DIMENSION

116 × 65 × 72mm

WEIGHT

150g

CL-WF1

The CL-WF1 adapter unit provides a wireless interface connection into the Cave Lighting™ system over WiFi networks. It can be used for the remote control, servicing and configuring of lighting control systems.



INTERFACES

IN: 1 × RS485, nonisolated

OUT: WiFi



NOMINAL POWER SUPPLY VOLTAGE

24VDC

POWER SUPPLY VOLTAGE RANGE

15VDC ... 32VDC

CONNECTION (CABLE GLANDS)

1 × M12



TEMPERATURE

-25°C... +45°C

HUMIDITY

98% (+25°C)



HOUSING

PC plastic, light gray

IP RATING

IP65

HOUSING DIMENSION

93 × 65 × 55mm

EXTERNAL DIMENSION

116 × 65 × 55mm

WEIGHT

150g



CL-IRC

The CL-IRC is an infrared remote control unit for the CL-ESQ/EQP luminaires used to provide testing, servicing and configuring. It's available as an accessory for the Cave Lighting™ systems. The CL-IRC remote control unit allows the setting of DMX address, the checking of functionality, to program startup scenes etc.



POWER SUPPLY

2×AAA Battery



TEMPERATURE

0°C.... +45°C

HUMIDITY

95% (+25°C)



HOUSING

PC plastic, light gray

IP RATING

IP44

HOUSING DIMENSION

146×49×25mm

WEIGHT

50g

Power supplies



CL-EPS1



CL-PB

CL-EPS1

The Power Supply Unit CL-EPS1 converts the AC high voltage input power to DC power for powering LED fixtures and other units. It is a Power Supply Unit in an IPX7-rated housing that supplies the Cave Lighting™ system with 30 VDC power. The PSU relays also DMX and RDM (Remote Device Management) data from a controller console.


INPUT (PRIMARY) VOLTAGE

100 ... 240VAC; 50/60 Hz


OUTPUT (SECONDARY) VOLTAGE

30VDC

NUMBER OF OUTPUTS

2

MAXIMUM POWER LOAD PER CHANNEL

100W (Class 2)


CONTROL INTERFACE

DMX512 / RDM

SPECIFIC FEATURES

internal DMX splitter with 2 isolated channels


CONNECTION (CABLE GLANDS)

IN: 2x M20, OUT: 2x M20, DMX: 2x M16


TEMPERATURE

-25°C... +45°C

HUMIDITY

98% (+25°C)


HOUSING

stainless steel cover

IP RATING

IPx7

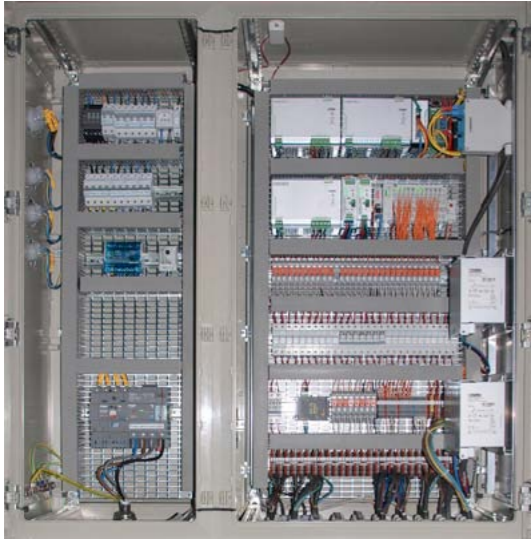
HOUSING DIMENSION

355 × 146 × 83mm

WEIGHT

2800g

CL-PB



The installation of a LED lighting system in a show cave requires a stable and safe power supply system. Cave Lighting™ offers custom design, the assembly and installation of a variety of Power Control or distribution cabinets including all the relevant operational equipment for an easy implementation into show-caves.

FUNCTIONS AND FEATURES:

- main power distribution throughout the cave
- provides safe low voltage DC power for the LED lighting system at local section (electrical zone)
- surge and lightning protection
- control of the Cave Lighting™ system: power up, shut down, emergency
- provides power for emergency lighting
- operation control of DC power lines
- remote monitoring of the power system
- status of internal fuses and breakers



INPUT (PRIMARY) VOLTAGE

1x 230VAC, 3x 400VAC; 50/60Hz



OUTPUT (SECONDARY) VOLTAGE

24VDC, 30VDC

NUMBER OF OUTPUTS

customer requirements

MAXIMUM POWER LOAD PER CHANNEL

240W, 480W, 960W



CONTROL INTERFACE

fiber optic, RS-485

LIGHT CONTROL

relays over DIM signal;

CLIMATE CONTROL

thermos- or hydrostatic, heater

SPECIFIC FEATURES

Control unit: PLC, CL-CN2, CL-MMC



PROTECTION

overload, overvoltage, surge (lightning)



TEMPERATURE

-25°C... +45°C

HUMIDITY

98% (+25°C)



HOUSING

stainless steel, PC

IP RATING

IP65, IP66

HOUSING DIMENSION

customer requirements

Electrical connections



CL-CABLES



CL-FS



CL-AB-025 / CL-AB-040

Cables for low voltage installation

CL-OR-x x x x x



Outstanding weather, ozone and UV resistance together with the wide temperature range enable versatile use for indoor and outdoor applications; Resistant to contact with plant, animal or synthetic-based organic oils, greases, waxes and the related emulsions; Good resistance to ammonia compounds and bio-gases; Good resistance to water.

Used for end sections or the electrical connection of luminaries, in-system interface.

Hybride cables

CL-HYBRIDE



The hybrid DMX Power cable is used in the DMX luminaries. It transmits power for the light and signals for the lighting control. The cable is compact, flexible and easy to process.

Hybrid cable used for the connections of DMX luminaries and interfaces.

Cables for DC & AC power connections

CL-NYY-x-x x x x x



Power cables for energy supply that can be installed in open air, underground, in water, in concrete, indoors, in cable ducts, power stations, and are made for industrial and distribution boards, as well as for subscriber networks, where mechanical damages are not to be expected.

They are used for powering electrical connections within big sections and for long distances.

Special cables

CL-AUDIO



This type of cable is used to connect audio signals from a CL-MMC to a loud-speaker. It can also be used as a DMX cable over short distances.



CABLE TYPE

Lappkabel Ölflex Robust 210

MATERIAL

Outer sheath of TPE, black

NUMBER OF CORES,
CROSS SECTIONS AND
EXTERNAL DIAMETERS3 × 0,50 mm² / 5,50 mm3 × 1,00 mm² / 6,10 mm7 × 0,50 mm² / 6,90 mm

Helukabel DMX-POWER

PVC, black

(1 × 2 × 0,24 mm²) + 2 × 1,00 mm² / 7,4 mm

Helukabel NYY-O, NYY-J

Outer sheath of PVC, black

3 × 2,50 mm² / 12,50 mm4 × 4,00 mm² / 15,00 mm3 × 6,00 mm² / 15,00 mm

SCHULZ-KABEL MK-1

PVC, black

2 × 0,22 mm² / 6 mm

CL-FS

The Gurosil Gel (CL-FS) filler is used to protect electrical connections from the ingress of water at high humidity conditions. It also provides reliable protection against humidity, mechanical shock, and vibration. Material is a soft-elastic hardening, amber cold casting compound that is based on hydrocarbon resins. Quick and clean casting is simple with the help of customary caulking guns, so no special tools are required. It is easy to remove, repairable and self-resealing. Electrical connections can be tested and repaired quickly where required, even after installation had been finished.

PACKING	250ml cartridge incl. mixer
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

CL-AB-025 / AB-040

Junction box with connecting terminals for encapsulating, weather-resistant and shockproof, for the assembly in flooded areas and in the ground without traffic loads, soft inlet membranes, M20, seal range 2-16 mm, with the set of cable glands and terminals



	CL-AB-025	CL-AB-040
DIMENSION	82×82×51mm	94×94×56mm
PROTECTION RATING	IP65 (IP68 with gel CL-FS)	
MATERIAL	polycarbonate, membrane out of TPE	
COLOUR	light gray or black	

Barndoors

-  CL-BL1-01
-  CL-BL1-02
-  CL-BL1-03
-  CL-BL3-05
-  CL-BL3-06
-  CL-BL3-07

Barndoors are light accessories mounted onto luminaries to provide correct beam shaping and avoid the creation of light distress to people.

These parts are delivered separately at the customer request. The plastic barndoors can be adapted to shape the light beam during installation.



CL-BL1-01



CL-BL1-02



CL-BL1-03



CL-BL3-05



CL-BL3-06



CL-BL3-07

**SUPPORTED LUMINARIES**

CL-LSQ, CL-ESQ

**LENGTH**

105mm

150mm

75mm

DIMENSION

70×60mm

MATERIAL

PVC-U, dark gray

MOUNTING

4x screws M3x10, delivered separately

CL-LQP, CL-EQP, CL-EQP9

71mm

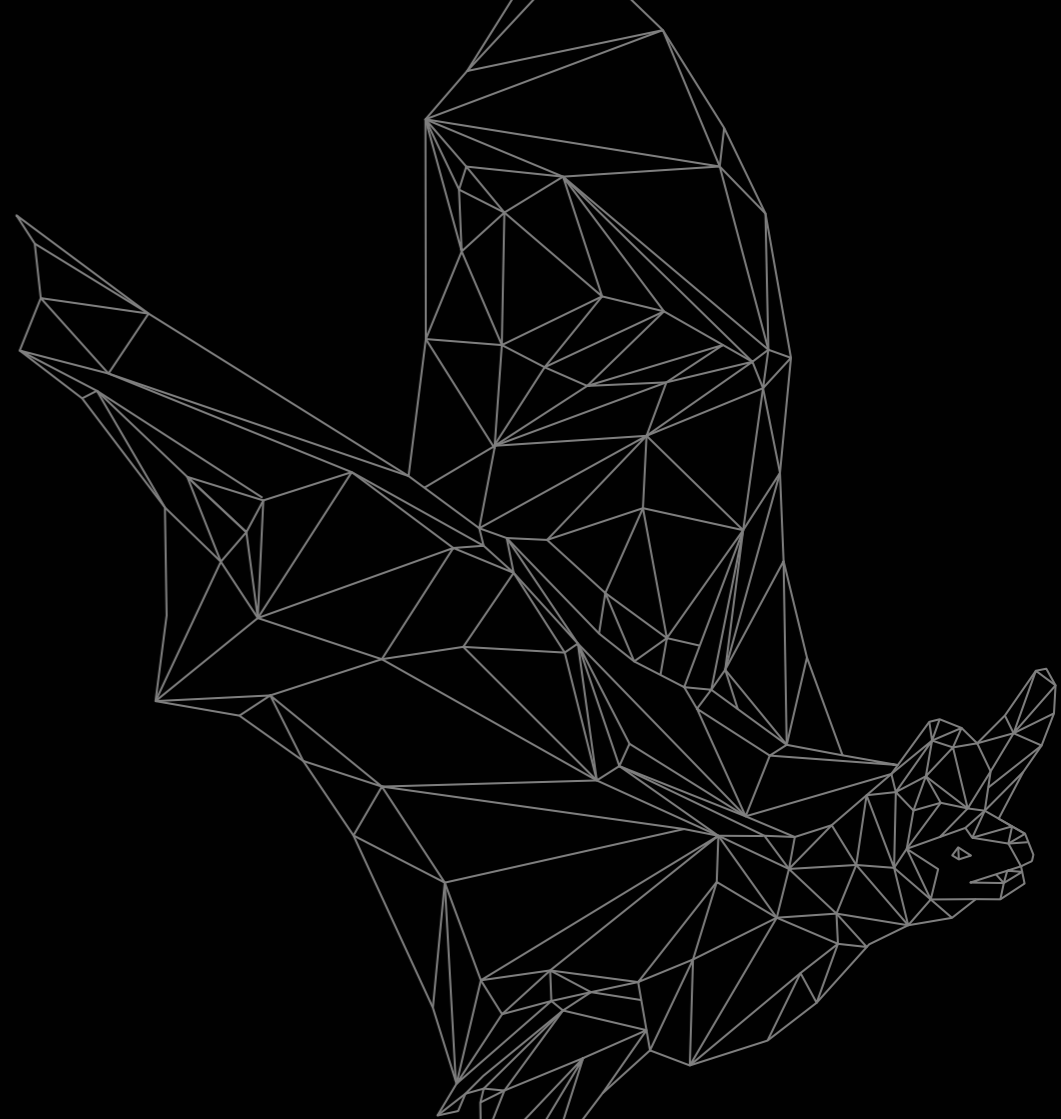
56mm

31mm

106×104mm

stainless steel

4x screws M3x10, delivered separately

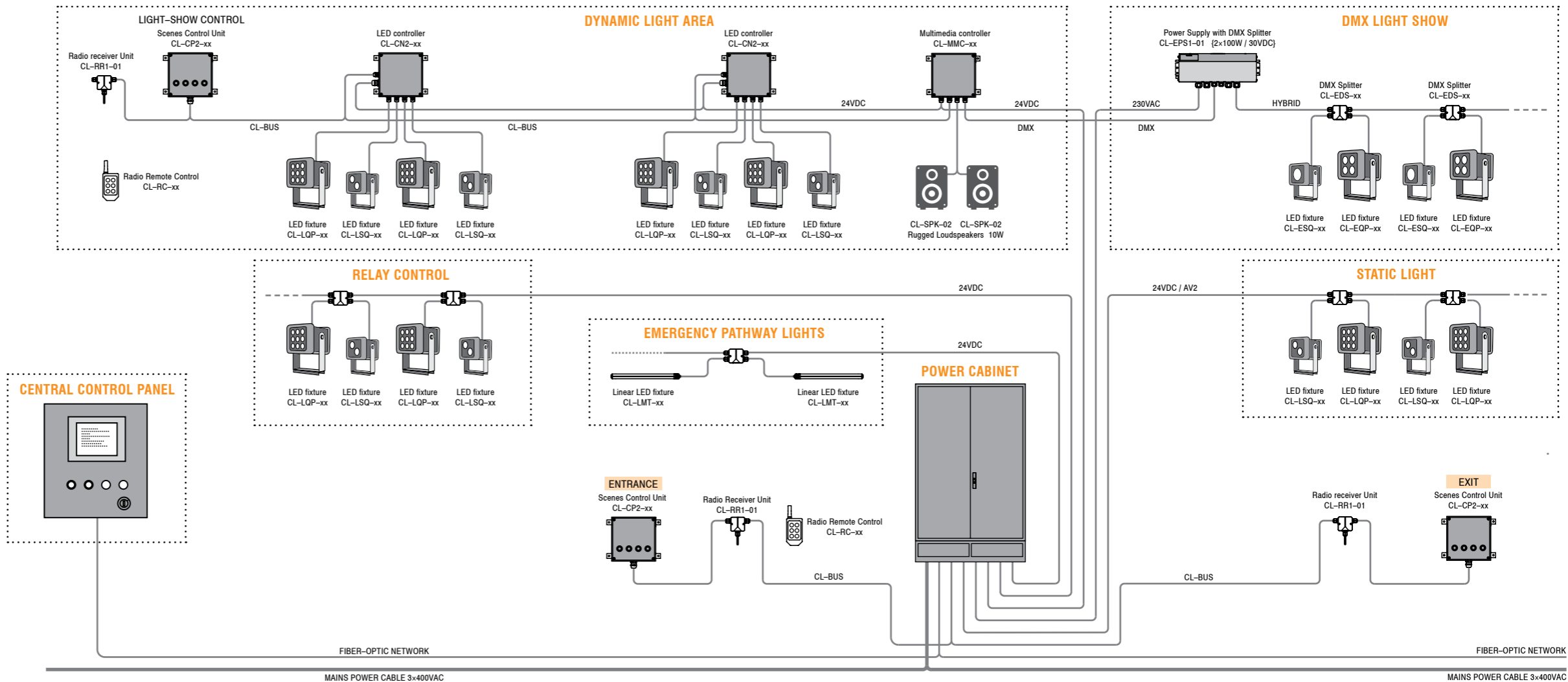


The Cave Lighting System Overview

The Cave Lighting™ LED light system can be built up using a combination of the following system layouts:

- Static lights (with or without control)
- Relay control (power control)
- Easy guide control
- Dynamic guide control (easy show)
- DMX light show (with or without sound)
- Emergency lights

The desired layout is chosen during system design and development according to customer requirements.



«CAVE SCENES»

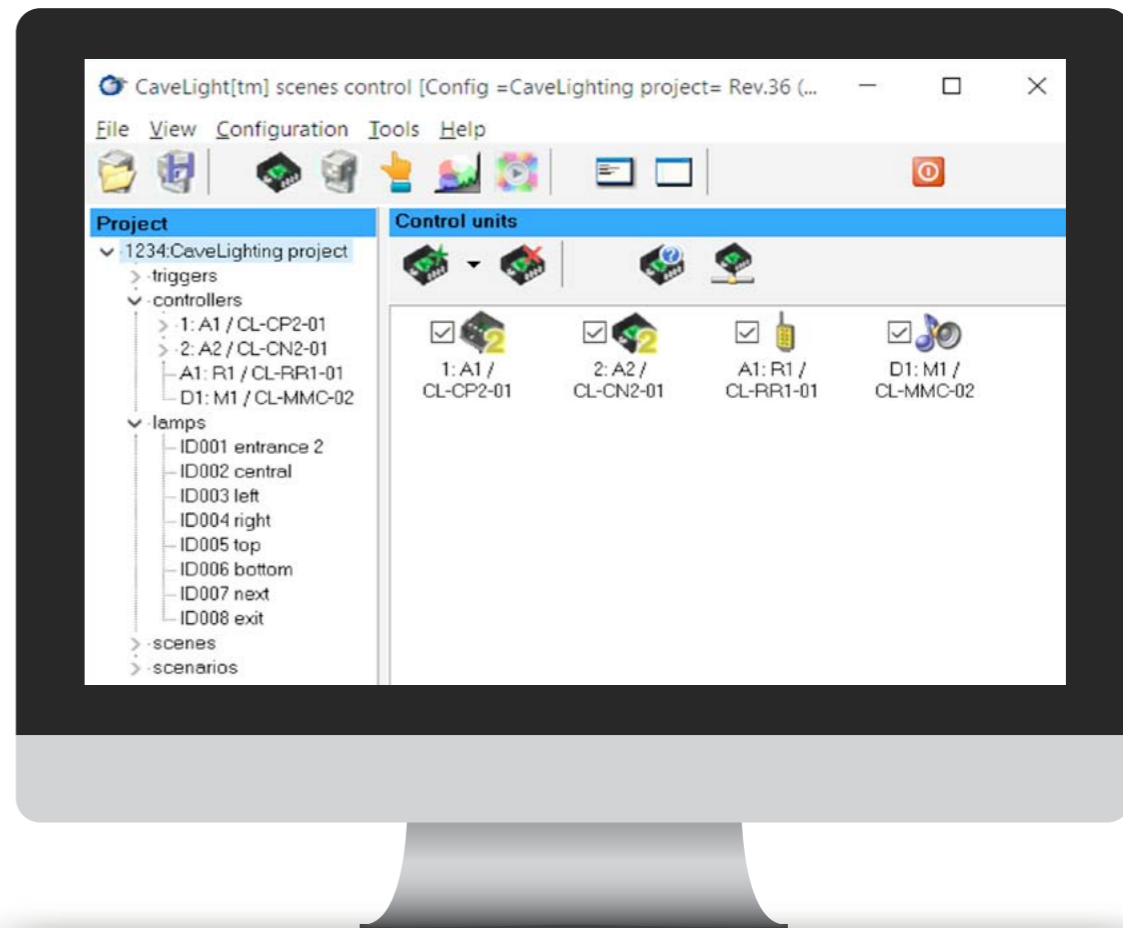
«Cave Scenes» is a user-friendly software that integrates many tools to create and support the configuration the Cave Lighting™ system for implementation in show caves and for other applications.

The Cave Lighting™ light control system using the «Cave Scenes» software offers a fully flexible and powerful possibility to create user controllable light installations for show caves, architecture or exterior lighting systems. The software allows the creation and editing of light scenes and their synchronization with internal events.

The Cave Scenes software operates with the Cave Lighting™ control units which provide easy and user-friendly possibilities to build different types of lighting systems.

- ① **OPEN NEW PROJECT**
- ② **ADD CONTROL UNITS TO THE PROJECT**
- ③ **UPDATE PARAMETERS OF CONTROL UNITS**
- ④ **ADD LUMINARIES INTO THE PROJECT**
- ⑤ **CHECK AND TEST INSTALLED EQUIPMENT**
- ⑥ **CREATE SCENES**
- ⑦ **CREATE SCENARIOS**
- ⑧ **CREATE LIST OF SYSTEM TRIGGERS**
- ⑨ **CONFIGURE EVENT-TRIGGERS-FUNCTION**
- ⑩ **CHECKING AND MONITORING OF INSTALLATION**
- ⑪ **READY !**

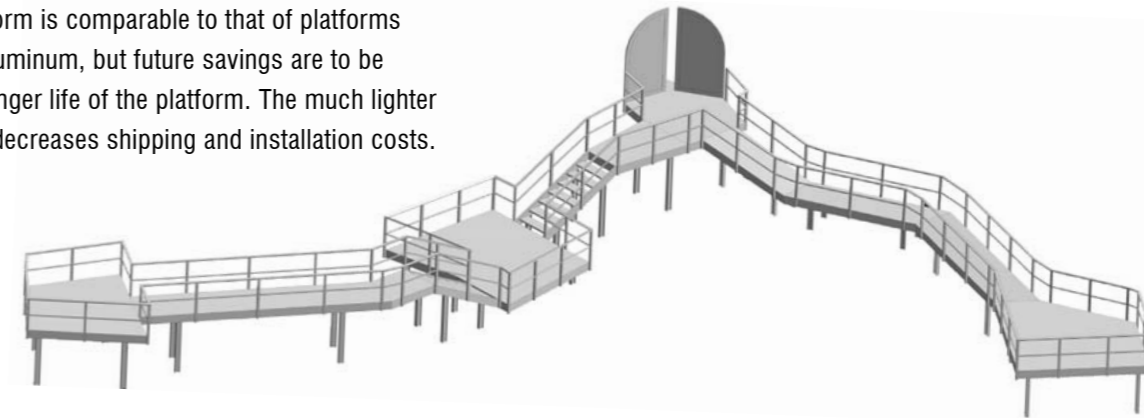
R E M A R K : The accurate system configuration and programming procedures depends on system specific and can vary for different cases.



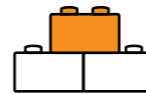


MODULAR PLATFORMS, STAIRWAYS AND PATHS

Fiberglass Reinforced Plastic (FRP) construction material is the ideal solution for implementation in show-caves. The cost of the platform is comparable to that of platforms made of steel and aluminum, but future savings are to be expected from the longer life of the platform. The much lighter weight dramatically decreases shipping and installation costs.



FEATURES



EASY TO DESIGN,
TO ASSEMBLE AND USE



SLIP RESISTANT
AND SAFE WALKWAY



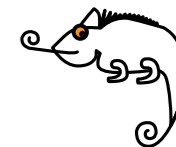
CORROSION RESISTANT



EASY SERVICING



LONG LIFE



UNREMARKABLE,
DARK GRAY COLOR

REFERENCE LIST

NAME	COUNTRY	WORLD WIDE WEB	NAME	COUNTRY	WORLD WIDE WEB		
Domaine des Grottes de Han	Belgium	www.grotte-de-han.be	Gemstone Mine Idar-Oberstein	Germany	www.edelsteinminen-idar-oberstein.de	}	
Grotte de Clamouse	France	www.clamouse.com	Hochfeld Mine	Austria	www.wildkogel-arena.at/en/mine-hochfeld		} SHOW MINES
Belijanska Cave	Slovakia	www.ssj.sk/en/jaskyna/2-belianska-cave	Neubulach Mine	Germany	www.bergwerk-neubulach.de		
Punkevná Cave	Czech Republic	www.jeskyne.cz/en/caves/punkva-caves	Marble Mine Ruskeala	Russia	www.ruskeala.info/en		
Lurgrotte Semriach	Austria	www.lurgrotte.at	Historical Casemates Dillenburg	Germany	www.museumsverein-dillenburg.de	}	
Höllgrotten Baar	Switzerland	www.hoellgrotten.ch	Historical Casemates Gotha	Germany	www.kultourstadt.de		} HISTORICAL UNDERGROUND OBJECTS
Grotta Nuaova di Villanova	Italy	www.grottedivillanova.it	Underground Monastery Divnogorje	Russia	www.divnogor.ru		
Cayman Crystal Caves	Cayman Island	www.caymancrystalcaves.com	Church Rabenscheid	Germany	www.gemeinde-breitscheid.de	}	
Postojna Cave	Slovenia	www.postojnska-jama.eu	Monastery Vladimir	Russia	www.advantour.com/russia/vladimir		} ARCHITECTURAL PROJECTS
Prometheus Cave	Georgia	www.georgia.travel/en/prometheus-cave	Church Ploska Brest	Belarus	www.serafim.by		
Dechen Cave	Germany	www.dechenhoehle.de					
Erdmann Cave	Germany	www.gemeinde-hasel.de					

SHOW
CAVES



CAVE LIGHTING CL GMBH & CO. KG
HOHE STRASSE 700 GEBAEUDE 5B
[DE] 35745 HERBORN-SEELBACH

PHONE 0049 (0) 27 72 . 57 52 18
FAX 0049 (0) 27 72 . 57 52 20
MOBILE 0049 (0) 171 . 7 22 82 01
EMAIL ac@cavelighting.de
WEB www.cavelighting.com
WEB www.cavelighting.de

GRAPHIC DESIGN BY
IRINA & SEBASTIAN WIELAND
WWW.CARGOCOLLECTIVE.COM
