

SYSTEMATIC QUALITY

# Highway Products



**GIFAS**  
ELECTRIC

## Energy and safety

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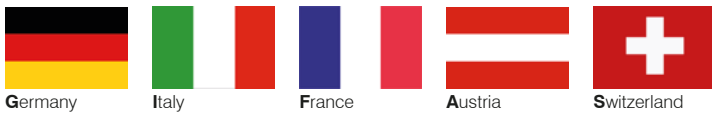


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GIFAS was founded in 1957 in Germany by Werner J. Gröninger .

The name GIFAS originated from his vision of the markets to reach:



Germany

Italy

France

Austria

Switzerland

In the course of economic success legally independent but networked with each other companies were established in the core markets.

This created our international knowledge sharing expertise, where the whole company GIFAS and especially you, our customers, benefit.

International movement - the logical progression.

Progress and dynamism is also true for the products and system solutions, which have been precisely developed and perfected for the needs of this market segment.



Germany



Italy



Austria



Switzerland

## Camera connection boxes

Solid rubber boxes



### Technical data of Series 3020

Width x height x depth	200 x 300 x 110 mm
Type of protection	IP65
Material	Cover: polycarbonate (black, grey, transparent) Cabinet: solid rubber halogen-free (black, grey)
Gasket	Foamed polyurethane gasket
Cover fixing	Stainless steel cross-head slotted screw

EDP No.	Description
121664	Solid rubber plug combination Series 3020
121663	Solid rubber plug combination Series 3020

All parts, including those provided by you, can be installed during the manufacturing process in the box of your choice.

## Emergency boxes

Solid rubber boxes



### Technical data of Series 7800 and 7900

Width x height x depth	Series 3900: 250 x 360 x 173 mm Series 7800: 500 x 360 x 133 mm Other depths on request.
Type of protection	IP65
Material	Cover: solid rubber halogen-free Cabinet: solid rubber halogen-free
Gasket	Foamed polyurethane gasket
Cover fixing	Stainless steel screw TORX T15 A4

EDP No.	Description
124341	Solid rubber junction boxes Series 3900
124342	Solid rubber junction boxes Series 3900
112894	Solid rubber junction boxes Series 7800
113687	Solid rubber junction boxes Series 7800

All parts, including those provided by you, can be installed during the manufacturing process in the box of your choice.



**Fire fighting niches Power Distribution**  
Power Distribution



**Technical data of Series 7300 and 7400**

Width x height x depth	Series 7300: 200 x 350 x 133 mm
Width x height x depth	Series 7400: 266 x 370 x 130 (117)
Type of protection	IP67
Housing Material	Solid rubber (vulcanised butyl rubber)
Specifications of the housing	Halogen-free, UV-resistant, resistant to oils and various acids and alkalis
Gasket	Foamed polyurethane gasket
Cover fixing	Stainless steel screw TORX T15 A4
Protective insulation	4-way wall mounting outside the wiring space partitioned off

EDP No.	Description
122588	Solid rubber safety wall distributors BR7400
113807	Solid rubber safety wall distributors BR7400

**Emergency-rectifier distributor**  
Power Distribution

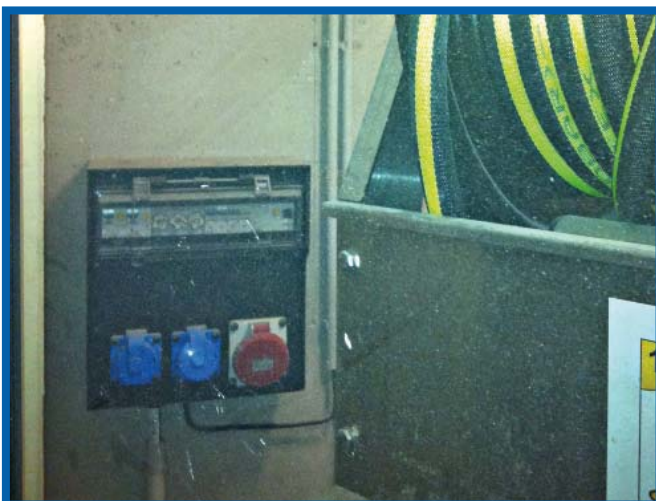


**Technical data**

Width x height x depth	360 x 500 x 173 mm
Housing Material	Solid rubber (vulcanized self-extinguishing butyl rubber)
Specifications of the housing	Halogen-free, UV-resistant, resistant to oils and various acids and alkalis - Insensitive to sweat and sparks. The safety material is installed under hinged Makrolon cover - shock-proof, splash-proof.
Protective insulation	4-way wall mounting outside the wiring space partitioned off, ensures full protection.

EDP No.	Description
111851	plug combination

Distributor wired - ready for connection.



## Isolation switch / jet fans



### Technical data

Width x height x depth	500 x 720 x 173 mm (Dimensions without installations)
Gasket	Solid rubber, Series 2x7900 with transparent Cover
Entry	2/ cable glands M20 (1x with blind plug) 2/ cable glands M50
Model	1 main power switch 3 pole, yellow / red handle (with maximum use of 3 padlocks) AC-21A 200A, AC-23 110kW 400V, AC-23 200kW 690V inclusive 2 auxiliary contact 1 S + 1 Ö 2/screen clamps für Ø20-37 mm
Type of protection	IP65

EDP No.	Description
840630	Distributor with switch OT200 400V/200A/110kW 500V/200A/132kW, 690V/200A/200kW AC-23A incl. stainless steel rail V4A
840629	Distributor with switch OT160 400V/160A/75kW 500V/160A/90kW, 690V/160A/132kW AC-23A incl. stainless steel rail V4A
840628	Distributor with switch OT100 400V/80A/37kW, 500V/60A/37kW, 690V/40A/37kW AC-23A incl. stainless steel rail V4A
840627	Distributor with switch OT63 400V/63A/22kW, 500V/45A/22kW 690V/20A/15kW AC-23A incl. stainless steel rail V4A

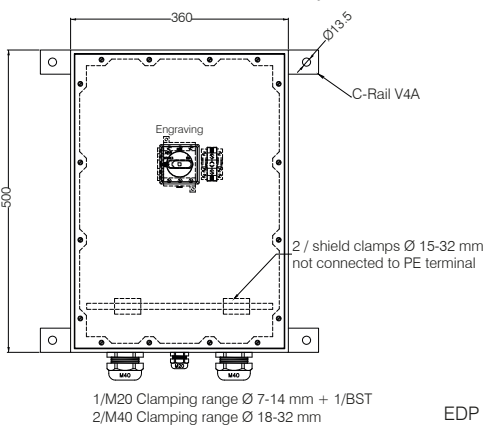
Other operating capacities on request.

Mounting equipment supplied by you can be incorporated into the selected box during production.

Engraving is possible.

### Isolation switch 15kW

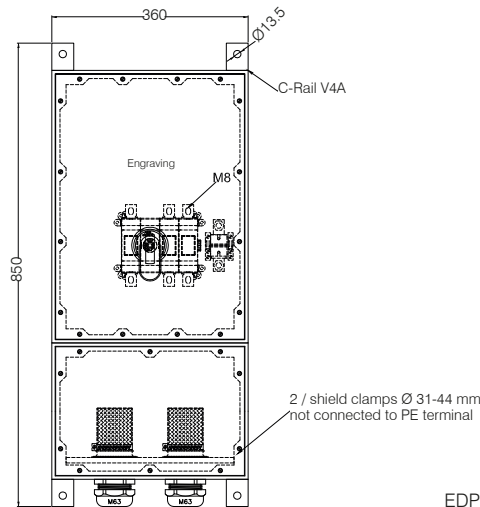
max. Cable diameter 4x16<sup>2</sup> directly at the counter



EDP No. 840627

### Isolation switch 90kW

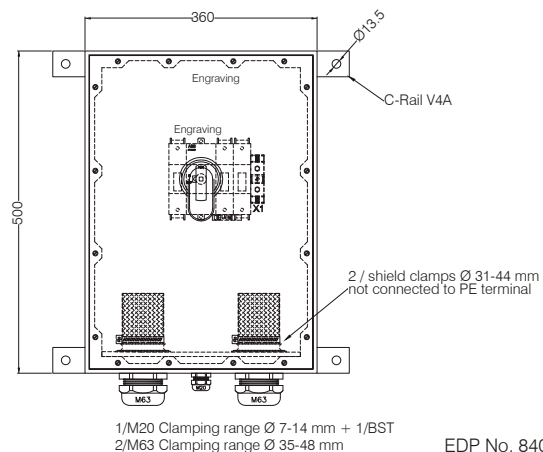
max. Cable diameter 4x120<sup>2</sup> directly at the counter



EDP No. 840630

### Isolation switch 60kW

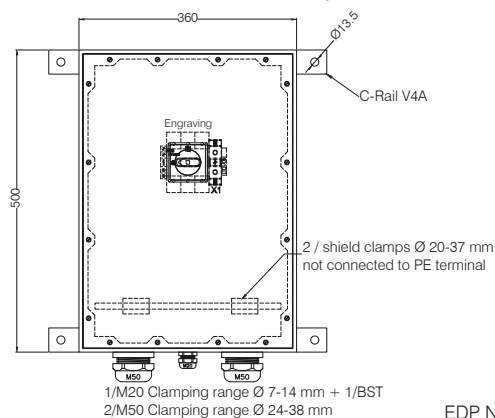
max. Cable diameter 4x70<sup>2</sup> directly at the counter



EDP No. 840629

### Isolation switch 30kW

max. Cable diameter 4x35<sup>2</sup> directly at the counter



EDP No. 840628

## Emergency call button



### Technical data of Series 2516

Width x height x depth	160 x 250 x 90 mm
Type of protection	IP65
Material	Cover: polycarbonate (black, grey, transparent) Cabinet: solid rubber halogen-free (black, grey)
Gasket	Foamed polyurethane gasket
Cover fixing	Stainless steel screw TORX T15 A4

EDV-Nr.	Beschreibung
115173	1 BLUE emergency call button, KST blue lens, without engraving, 8 blue LEDs, 24VDC, 1 NC contact, 5 m cable with cable sleeve, KTS blue front ring
101330	1 RED emergency call button, KST red lens, without engraving, 8 red LEDs, 24VDC, 1 NC contact, 5 m cable with cable sleeve, KTS red front ring

All parts, including those provided by you, can be installed during the manufacturing process in the box of your choice.





The MarkLED is a cable-guiding system with current carried through direct connections. This allows us to reach a very high efficiency factor (>80%) and to remain within the limits for electromagnetic compatibility (EMC). With the state-of-the-art LED technology, power consumption is so low that the desired line lengths can be usually realised without intermediate supply. The power consumption is extremely low because of the high energy efficiency. With those technical features we comply with regulations and expectation from public institutions and departments of international road engineering.

### The upper part – the MarkLED light module

The new top part is executed in an attractive and elegant form with a housing made of special transparent plastic. The outer surface is nano coated and antistatic for high dirt repellency. The electronics are installed from below and sealed with a neutral, white sealing compound. The brightness of the individual modes, such as dimming, blinking and flashing, are easily adjustable via the control units associated with the system and can also be influenced from the tunnel control centre or by overriding pulses.

### The lower part – the current collector

The «core» of this system is the current collector. It transfers the power from the system cable to the light module and offers it a fixed base for mounting. The cable need not be cut and therefore, continues to be fail-safe. The light module comes preassembled on the current collector (fast and safe installation on site).

1. Placement of the system cable in prepared groove
2. Power transfer from the system cable to the light module
3. Mounting base for light module

### The system cable

For the LED guidance systems you need a system cable as a feed line of every module.

### Control units

The new 4-channel control unit is used to control the GIFAS guidance systems. It can be integrated into existing control cabinets or also as a «stand alone» module.

### Accessories

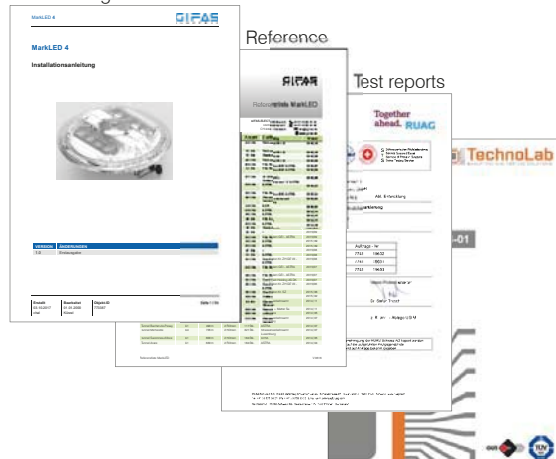
The diverse range of accessories allows different areas of application and fulfills complex customer requirements.

### Functionality

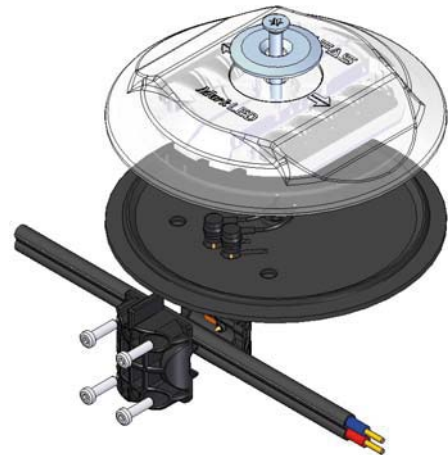
The guidance systems have a wide voltage range between 16-48VDC. This allows to realise very long line distances. In addition, all systems are tested to meet IP68 protection. Thanks to the modular design, the individual components can be replaced quickly in case of service.

### Product documents

Installation guide







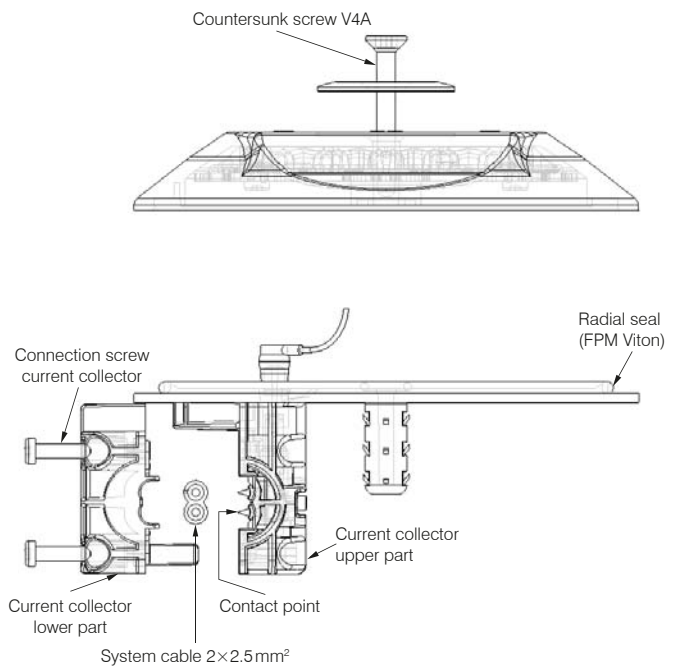
**Technical data**

Single or double-sided with 4 LEDs each

Light colour	white ~ 5.600 K
Light intensity	65 cd
L90/B10	100.000 h
Protection category	IP68/IP69
Protection class	III
Impact protection rating:	IK10
Operating voltage	24VDC (range 16 - 48VDC)
Power consumption	30 mA (double-sided LED white) 80 mA (double-sided LED colored)
Diameter	110 mm
Height:	
- without current collector	18 mm
- with current collector	20 mm
Upper part	polyketone, colourless, nano coated, dirt-repellent
Lower section	polyamide 12 black, glass fiber reinforced
System cable	system cable bipolar 2x2.5 mm <sup>2</sup>
Temperature resistance	-40° C to +55° C
Axle load	to 5t (slow traffic with air-filled tyres)

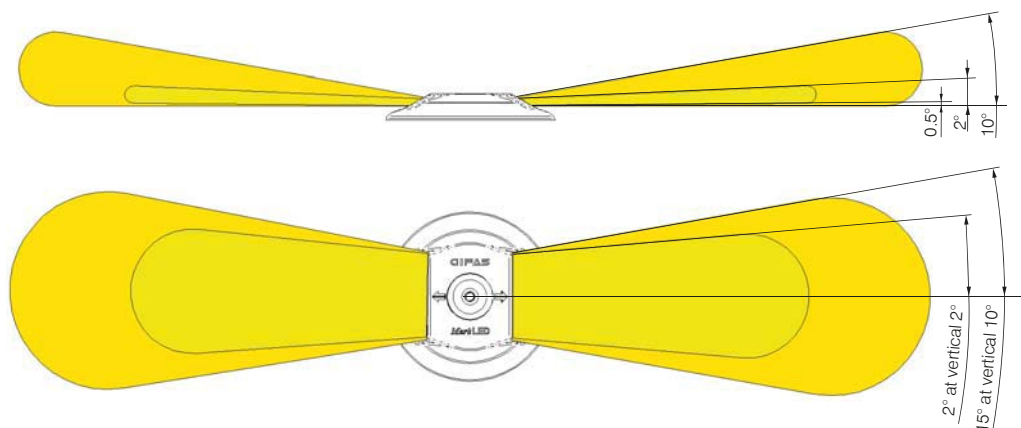
Certificates, reference lists on request.

**One-components MarkLED**



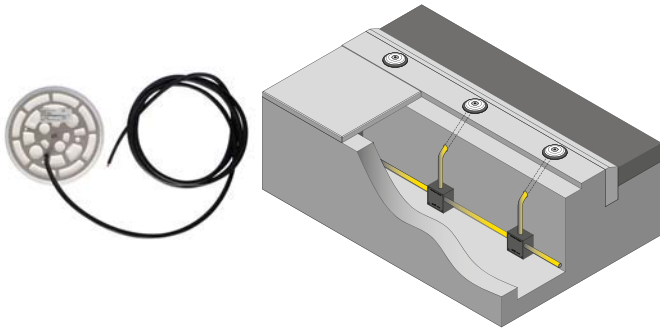
**Scheme light emission**

MarkLED the system meets the regulations of the Federal Road Authority (e.g. BAST-Germany, FEDRO Switzerland).



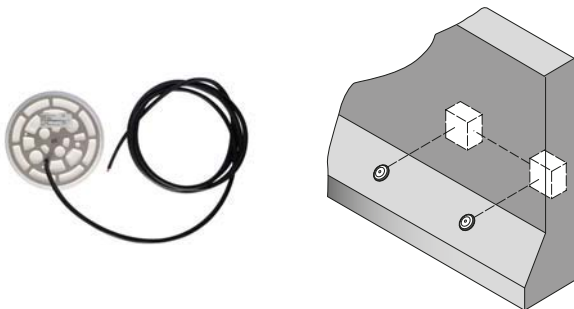
## Example 1 – wired

By default, the MarkLEDs are connected with current collector in a milled groove in the shoulder. If this is not possible, a conventional strand cabling with junction boxes/sleeves can be realised. Here, a strand cabling with FE180 cable is installed and connected to a box/sleeve.



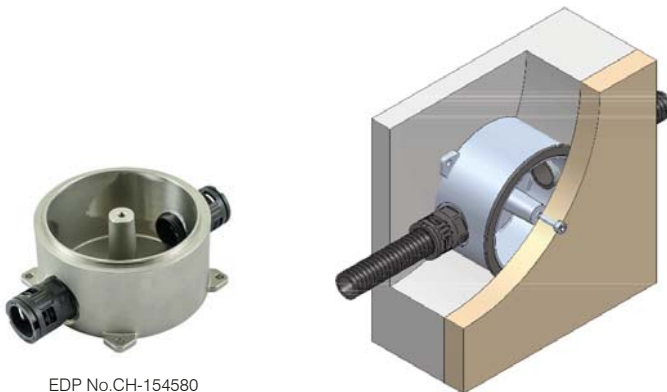
## Example 2 – New Jersey profile

If the MarkLED has to be mounted for example on a New Jersey profile then there should be made a cross drill through the profile. On the backside a junction box can be set or inserted directly in a existing cable tray.

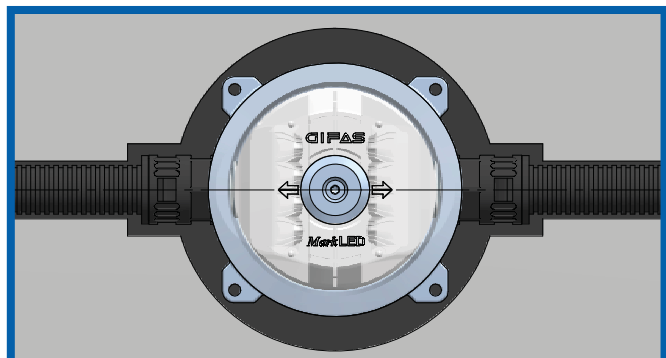
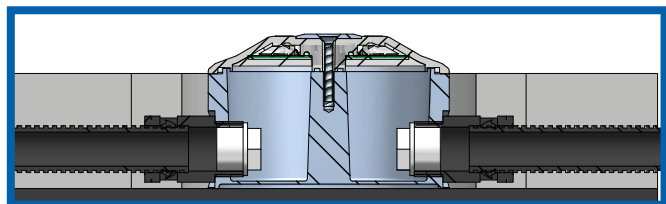


## Example 3 – recessed-mounted

With the recessed-mounted box for MarkLED we can offer a robust and easy solution for a recessed installation of MarkLED. On both sides, hose connection (M25) are prepared for the connection of a protective hose.



EDP No.CH-154580



**Example 4 – surface-mounted (casing V4A)**

A further possibility to mount the MarkLED is with surface-mounted solution. Here, the MarkLED is screwed onto a surface-mounted box, wherein the MarkLED has no current collector, but a direct outlet, which is connected to the feed line in the housing.



EDP No. CH-152744



EDP No. CH-144534



**Example 5 – surface-mounted (adaptateur matière synthétique)**

Simple and secure assembly of the MarkLED modules on the shoulder/wall by means of the surface mounted plastic adapter.



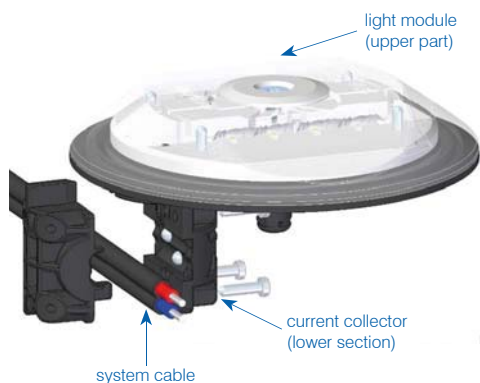
Surface-mounted adapter MarkLED 4  
made off PA6 GF30



Surface-mounted adapter with  
guard plate (EDP No.CH- 208653)



## Complete product module



### System cable light

The system cable MarkLED is a halogen-free EPR/EPR cable with tinned copper strands, high temperature resistance, bonding between the insulations of strands and the cable coating to increase water tightness.

#### Technical data

Material properties	halogen-free, no toxic and corrosive gases
Fire behavior	low smoke emission, flame-retardant, no fire spread, low fire load
Strand colors MarkLED	red, dark blue
Nominal section	2,5 mm <sup>2</sup>
Exterior dimensions	9,6 mm × 5,25 mm
Weight (kg/km)	approx. 80 kg/km
Cu-Number (kg/m)	48 kg/km (48 g/m)
Temporary temperature : resistance	< 10s: 200° C
Fire class	B2ca-s1-d1-a1

EDP No.	Description
107355	System cable light black – copper tinned flat cable EPR/EPR, 2×2,5 mm <sup>2</sup>
127674	System cable light red – copper tinned, flat cable EPR/EPR, 2×2,5 mm <sup>2</sup>
127675	System cable light blue – copper tinned, flat cable EPR/EPR, 2×2,5 mm <sup>2</sup>

### Drilling jig MarkLED 4

Drilling jig for mounting hole Ø9 mm and installation hole for current collector pin Ø40 mm.

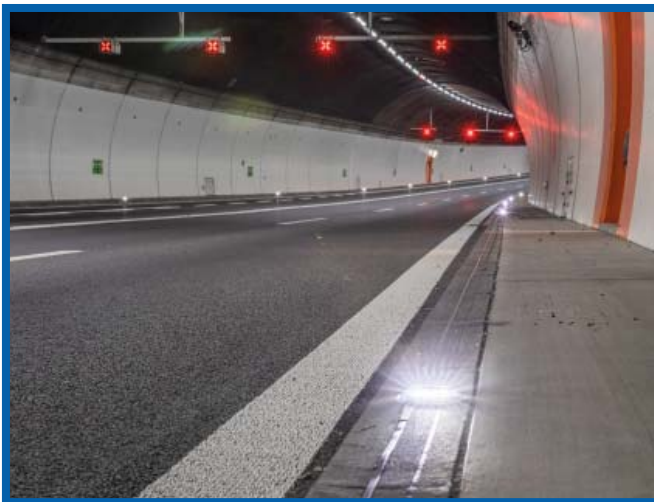


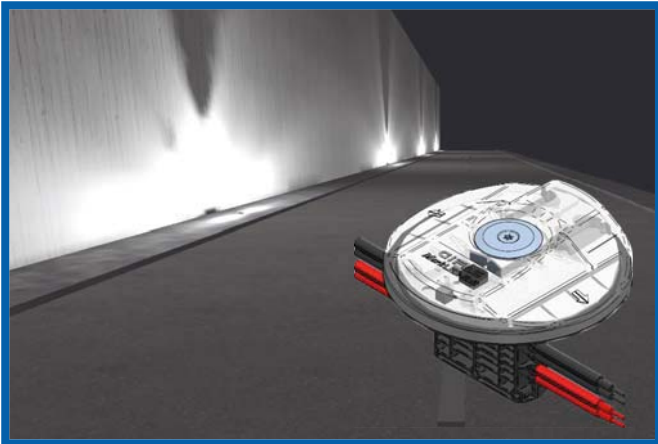
EDP No.	Description
860599	Drilling jig MarkLED 4

EDP No.	Description
860247	MarkLED 4 light module with current collector 30 mA/double-sided 4×white, 5.600 K
CH-860900	MarkLED 4 light module with current collector 30 mA/double-sided 4×white, 5.600 K, BAST switchable via dimming levels
CH-860560	MarkLED 4 light module with current collector 80 mA/double-sided 4×green, 525 nm
860561	MarkLED 4 light module with current collector 60 mA/4×white, 5.600 K/4×red, 625 nm
CH-860562	MarkLED 4 light module with current collector 80 mA/double-sided 4×yellow, 595 nm
CH-860563	MarkLED 4 light module with current collector 80 mA/double-sided 4×blue, 475 nm
CH-860567	MarkLED 4 light module with strands 2×0,5 mm <sup>2</sup> , 20 cm 30 mA/double-sided 4×white, 5.600 K for surface mounted applications
CH-860901	MarkLED 4 light module with strands 2×0,5 mm <sup>2</sup> , 20 cm 30 mA/double-sided 4×white, 5.600 K, BAST switchable via dimming levels
CH-860598	MarkLED 4 light module with cable 2×0,5 mm <sup>2</sup> , 2 m, with V4A mounting plate, 30 mA/double-sided 4×white, 5.600 K
CH-860246	MarkLED 4 light module with 2 NTQ plugs 30 mA/double-sided 4×white, 5'600 K
CH-860899	MarkLED 4 light module, connectable NTQ/30 mA double-sided 4×white 5.600 K
CH-860245	MarkLED 4 current collector
CH-152744	MarkLED casing V4A, 110×110×29 mm 2 KV M16×1,5 for cable Ø5-10 mm
CH-144534	MarkLED casing V4A, 115×115×46 mm 3 KV M25×1,5 for cable Ø9-16 mm
CH-154580	MarkLED casing V4A, 110×110×55 mm 2×M25 hose connection
CH-860724	Surface mounted MarkLED adapter, PA6 GF30 white incl. accessoires (VE=5 piece) without cable gland
CH-860725	Surface mounted MarkLED adapter, PA6 GF30 white incl. accessoires (VE=5 piece) with 1×cable gland M16×1,5
CH-860726	Surface mounted MarkLED adapter, PA6 GF30 white incl. accessoires (VE=5 piece) with 2×cable gland M16×1,5

Other versions on request

## Application examples MarkLED 4





The MarkLED EXIT combines two tunnel safety lighting systems. It is a combination of guidance and escape route light, and the road studs (optical guidance system) are typically installed at distances of 12.5m and 25 m respectively. The MarkLED EXIT is therefore equipped with two separate lighting areas with two different characteristics, usually installed at a distance of 25 m, using the same connection system, which in combination makes the system very economical.

In normal operation, only the part of the marker light (optical guidance system) is in operation. During an incident, the EXIT part is switched on so that the escape route is sufficiently lit. The MarkLED EXIT also has a wide voltage range of 18 - 48VDC. This allows lengths over 500m.

### The light module, MarkLED EXIT

The two lighting systems of the MarkLED EXIT are housed in the same size as the normal MarkLED 4. With the MarkLED 4, the MarkLED EXIT also shares the technology for the marker light (optical guidance system). The exact data of the marker light can be found on pages 4-7.

The EXIT part has 4 high-power LEDs, emitting on both sides. They come with a special optical coating for safe lighting of escape routes. Optionally, the MarkLED EXIT can be installed in the shoulder or on the wall.

### The current collector

It transfers the power from the system cable to the light module and offers it a fixed base for mounting.

The cable need not be cut and therefore, continues to be fail-safe. The light module comes preassembled on the current collector (fast and safe installation on site).

1. Placement of the system cable in prepared groove
2. Power transfer from the system cable to the light module
3. Mounting base for light module
4. Integrated replaceable fuse inserts (micro-fuse 20×5 mm) for safety separation in case of fire.

**The system MarkLED EXIT with functional maintenance E30/E60, tested according to DIN EN 1363-1:2012-10 and based on DIN 4102-12.**

### The system cable

The light system is connected by a double-guided system cable with a cross section of 2×2.5 mm<sup>2</sup>. This cable is embedded in a groove in the shoulder in the case of floor mounting.

### Control units

The 4-channel control unit is used to control the GIFAS guidance systems. It can be integrated into existing control cabinets or also as a «stand alone» module.

The EXIT part can be powered directly via its own power supply, as it is operated with full brightness in the case of an incident and a control makes little sense.

### Accessories

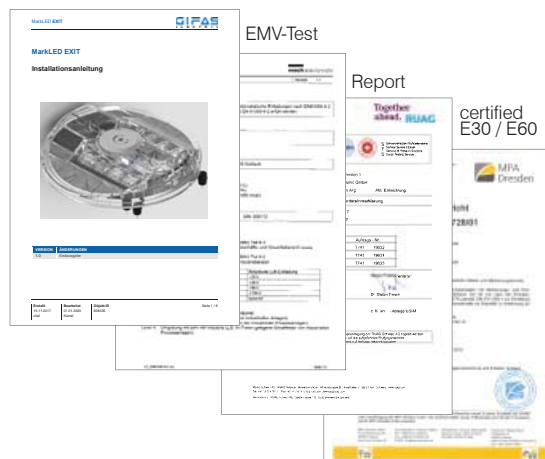
The diverse range of accessories allows different areas of application and fulfills complex customer requirements.

### Functionality

The MarkLED EXIT is a system that can be used as a guidance in the tunnel as well as the actual escape route lighting. Corresponding sample installations have been created and tested in cooperation with FEDRO. The application must be checked carefully for each project, depending on the structural conditions.

### Product documents

Installation guide

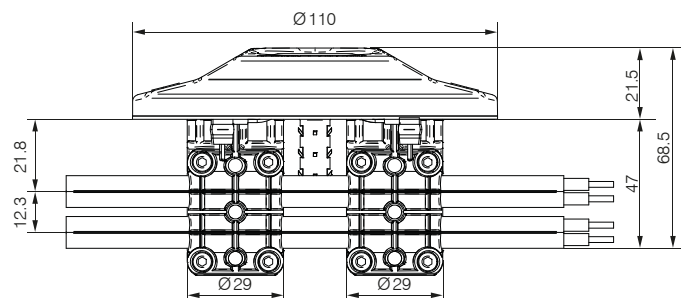
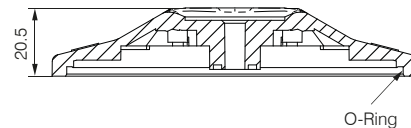




**Technical data**

Double-sided with four white LEDs (5'600K) as optical guidance system in direction of traffic and in opposite direction. Escape route lighting turned against the wall with four white LEDs (5'900K).

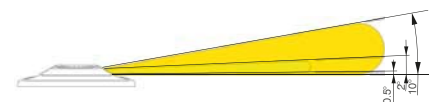
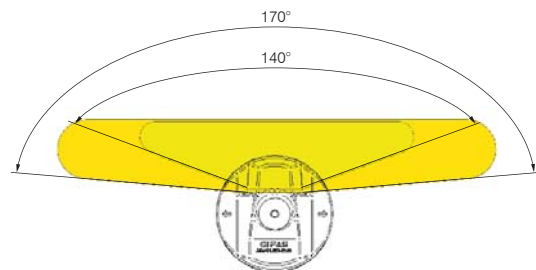
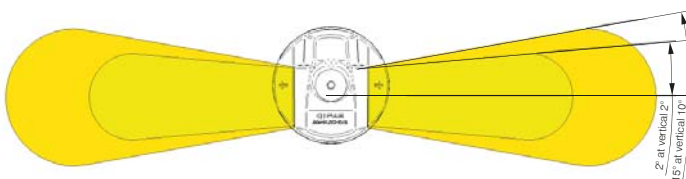
Light colour:	
– optical guidance system	5.600K
– escape route lighting	5.900K
Light intensity:	
– optical guidance system	65 cd
– escape route lighting	1.390 cd
Operating life LED:	
– L90/B10	100.000 h
– escape route lighting	min. 10.000h
Protection category	IP68/IP69
Protection class	III
Impact protection rating	IK10
Operating voltage	48VDC (18-48VDC, protected against polarity reversal)
Power consumption:	
– optical guidance system	30mA (double-sided LED white)
	80mA (double-sided LED colored)
– escape route lighting	180mA @ 48VDC
Diameter	110 mm
Upper part	polycarbonate, colourless, nano coated
Lower section	polyketone black, glass fiber reinforced
System cable	2x system cable bipolar 2x2,5 mm <sup>2</sup>
Height above carriageway level	21,5 mm
Temperature resistance	-40° C to +55° C
Axle load	< 5t (slow traffic with air-filled tyres)



Certificates, reference lists on request.

**Scheme light emission**

Optical guidance system  
(Light emission in the direction of traffic)



## MarkLED EXIT used for escape route lighting

In the FEDRO 13015 guideline, the function of the escape route lights is defined as follows: In the case of an incident, it must be ensured that the escape route in the traffic area is sufficiently visually perceived. A separate fire escape route lighting is not required if this function can be taken over by the optical guidance system.

With this pioneering new development of the MarkLED EXIT, which combines the optical guidance system and the escape route lighting in one, a new dimension of economy is achieved.

In this execution, a second light source with focused radiation is integrated into the proven guidance system. This is only activated in case of an incident and immediately reaches its full brightness.

The MarkLED EXIT modules are equipped with cold conductor monitoring (function monitoring of the EXIT area possible with the escape route lighting off).



Example: MarkLED EXIT on surface/recessed-mounted housing in standard mode  
Standard= optical guidance system



Example: MarkLED EXIT on surface/recessed-mounted housing in emergency event mode  
Emergency= escape route lighting switched on

### Example 1: Mounted on the floor

The luminaire is installed with the EXIT element in the direction of the wall when assembling the MarkLED EXIT on the shoulder (floor of the escape route). Part of the light is projected directly on the escape route. A large part of the light is also reflected onto the shoulder via the wall. This guarantees that the escape route is adequately illuminated.



### Example 2: Mounted on the tunnel wall

The luminaire is installed with the EXIT element in the direction of the floor when assembling the MarkLED EXIT on the wall. A large part of the light is projected directly on the escape route. Part of the light is also reflected onto the shoulder via the wall. This guarantees that the escape route is adequately illuminated.





**Example 4 – surface-mounted (casing V4A)**

A further possibility to mount the MarkLED is with surface-mounted solution. Here, the MarkLED is screwed onto a surface-mounted box, wherein the MarkLED has no current collector, but a direct outlet, which is connected to the feed line in the housing.



EDP No.CH-152744



EDP No.CH-144534



**Example 5 – surface-mounted (adaptateur matière synthétique)**

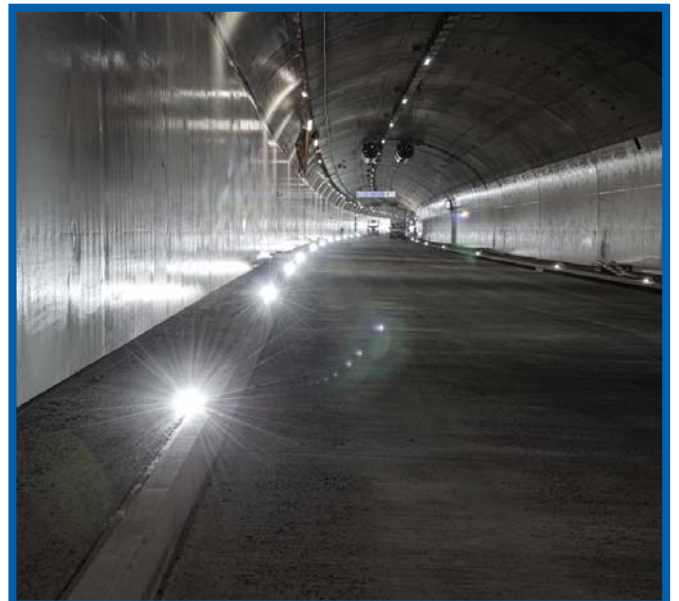
Simple and secure assembly of the MarkLED modules on the shoulder / wall by means of the surface mounted plastic adapter.



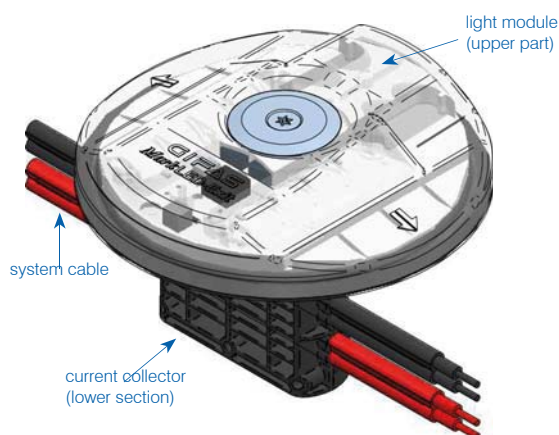
Surface-mounted adapter MarkLED EXIT  
made off PA6 GF30



Surface-mounted adapter with  
guard plate (EDP No.CH-208653)



## Complete product module



### System cable

The system cable MarkLED is a halogen-free EPR/EPR cable with tinned copper strands, high temperature resistance, bonding between the insulations of strands and the cable coating to increase water tightness.

### Technical data

Material properties	halogen-free, no toxic and corrosive gases
Fire behavior	low smoke emission, flame-retardant, no fire spread, low fire load
Strand colors MarkLED	red, dark blue
Nominal section	2.5 mm <sup>2</sup>
Exterior dimensions	9.6 mm × 5.25 mm
Weight (kg/km)	approx. 80 kg/km
Cu-Number (kg/m)	48 kg/km (48 g/m)
Fire load (kwh/m)	approx. 1'280 kJ/m
Temporary temperature: resistance	< 10 s: 200° C
Fire class	B2ca-s1-d1-a1

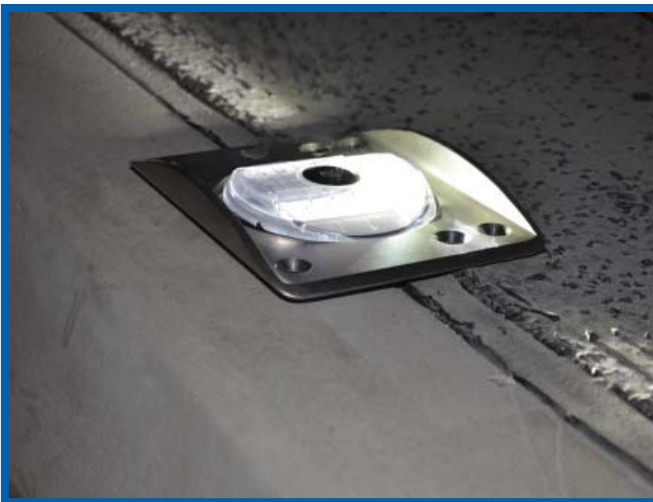
EDP No.	Description
115788	System cable light black – copper tinned, flat cable EPR/EPR, 2×2.5 mm <sup>2</sup>
127674	System cable light red – copper tinned, flat cable EPR/EPR, 2×2.5 mm <sup>2</sup>

### Product range MarkLED EXIT

EDP No.	Description
CH-860327	MarkLED EXIT light module with current collector Guidance: 30 mA/double-sided 4×white, 5.600 K Emergency: 180 mA@48 VDC/4×white, 5.900 K
CH-860467	MarkLED EXIT light module with current collector Guidance: 80 mA/double-sided 4×yellow, 595 nm Emergency: 180 mA@48 VDC/4×white, 5.900 K
CH-860597	MarkLED EXIT light module with current collector Guidance: 60 mA/4×white, 5'600 K/4×red, 625nm Emergency: 180 mA@48 VDC/4×white, 5.900 K
CH-860564	MarkLED EXIT light module with strands 4×0,25 mm <sup>2</sup> , 20 cm Guidance: 30 mA/double-sided 4×white, 5.600 K Emergency: 180 mA@48 VDC/4×white, 5.900 K
CH-860604	MarkLED EXIT light module with cable 4×0,25 mm <sup>2</sup> , 2 m, with V4A mounting plate, Guidance: 30 mA/double-sided 4×white, 5.600 K Emergency: 180 mA@48 VDC/4×white, 5.900 K
CH-860326	MarkLED EXIT light module with 4 NTQ plugs Guidance: 30 mA/double-sided 4×white, 5.600 K Emergency: 180 mA@48 VDC/4×white, 5.900 K
CH-860325	MarkLED EXIT current collector
CH-860890	Surface mounted MarkLED EXIT adapter, PA6 GF30 white incl. accessoires (VE=5 piece) without cable gland
CH-860891	Surface mounted MarkLED EXIT adapter, PA6 GF30 white incl. accessoires (VE=5 piece) with 1×cable gland M16×1.5
CH-860892	Surface mounted MarkLED EXIT adapter, PA6 GF30 white incl. accessoires (VE=5 piece) with 2×cable gland M16×1.5

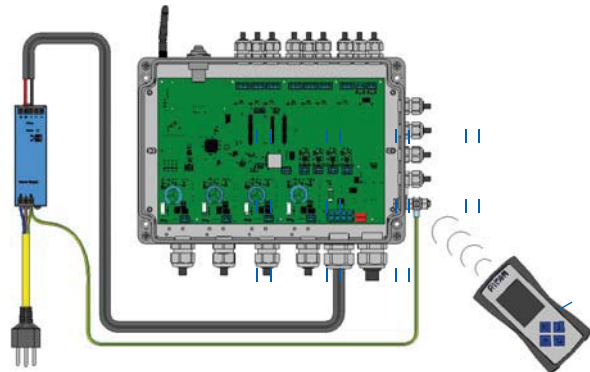
Other versions on request

Application examples  
MarkLED EXIT





## The system TrafficLED



### The permanent drive-over marker and warning lights with the latest LED technology!

By popular demand and as widely requested, we have developed a completely new light that covers a variety of needs. In particular, the main target during development was the ability to withstand constant traffic on streets, on squares, or in tunnels. It is also often used in the driveways of tunnels for improved visibility of the course of lane and pedestrians for improved active safety. Last, but not least, they can also be used to light roundabouts (also for heavy traffic).

Standard SN 640853 «Underfloor Marker Lights» served as the basis for development with the following specifications and requirements:

- drive-over marker lights that can withstand constant traffic and that cover the entire summer/winter temperature range (-30 to +75°C) and that can withstand mechanical stresses (40t truck)
- for safety reasons (slip hazard) matt, circular light
- protrude over road surface level max. 4.0mm
- resistant to sand, snow spikes and chains, street cleaning
- have no protruding corners or edges that could be touched by a snowplough
- surface and light emission areas are designed in such a way that as little dirt as possible is deposited
- waterproof, frostproof, and resistant to UV sunlight/chemicals/oil and road salt
- very good visibility in the dark, wet, and snow
- other applications: such as lane marking

The TrafficLED system complies with current regulations (e.g. BAST in Germany, FEDRO in Switzerland) and is one of the few EMC-tested systems, which means that the system works via wires, not induction.

### TrafficLED module

The TrafficLED is connected with the system cable. It lights on both sides. Due to its modular structure with an upper and lower part, it is very easy to install.

The different modes of the TrafficLED, such as dimmable, blinking, flashing, etc., can be set via the controller.

### Control

The 4-channel control unit is used to control the GIFAS control units. It can be integrated into existing control cabinets or also as a „stand alone“ module.

### Remote control

The remote control can be used for programming, operation and fault diagnosis. A single remote control can be used for multiple control units.

### Standard cable

The system cable is made specifically for the GIFAS recessed lighting systems to meet its demands; the cable is halogen-free, mechanically reinforced, and may come briefly into contact with hot substances such as bitumen.

### Junction box

The junction box is the control interface and the actual «front installation». Usually, the junction boxes are placed at the beginning or at the end of each line of TrafficLEDs, easy to assemble with prefabricated mounting tabs. We recommend our own standard junction boxes which meet all system requirements.

### Product documentation

#### Installation instructions

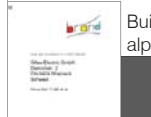


#### Reference list

High pressure steam-jet



#### Light distribution



Build in alpine area





**Technical data**

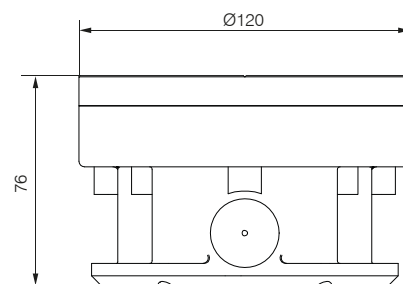
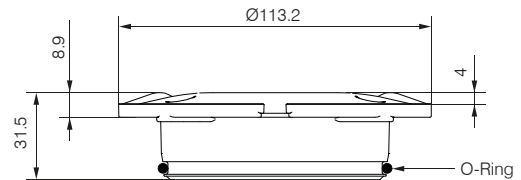
Double-sided with 6 LEDs on each side

Light colours	white (5.600K), orange (600nm), blue (470nm)
Luminous intensity	30 cd
Operating life LED	50.000 h
Protection category	IP68/IP69
Protection class	III
Impact protection rating	IK10
Operating voltage	24VDC (range 18-44VDC)
Power consumption	140mA@18-28VDC/ 85mA@28-44VDC
Diameter	120 mm
Height	80 mm
Upper part	chrome steel V4A
Lower section	IXEF glass fiber reinforced polyarylamide, black
Height over road surface level	4 mm
Temperature resistance	-30°C to +75°C
Drive-over resistance	D400 according to DIN EN124

**The TrafficLED**

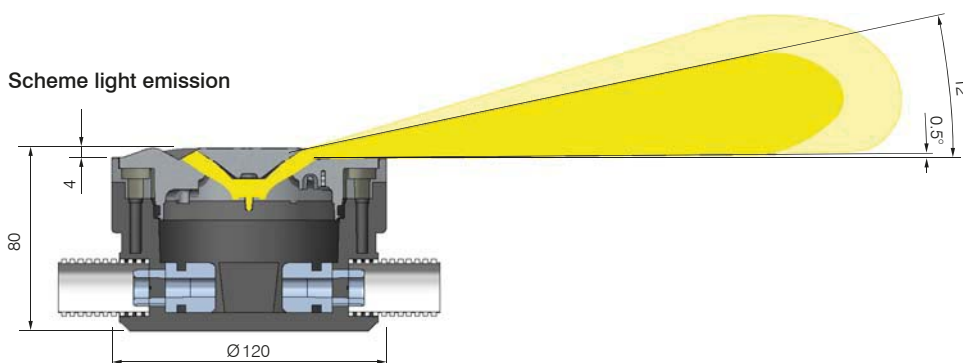
- floor pit made out of special IXEF plastic
- stainless steel V4A upper section
- electronics completely encapsulated
- both sides fitted with LEDs
- Brightness of the lighting modules can be easily adjusted via controller unit and changed from the tunnel control centre via automatic light control or direct control system.

**One-components TrafficLED**

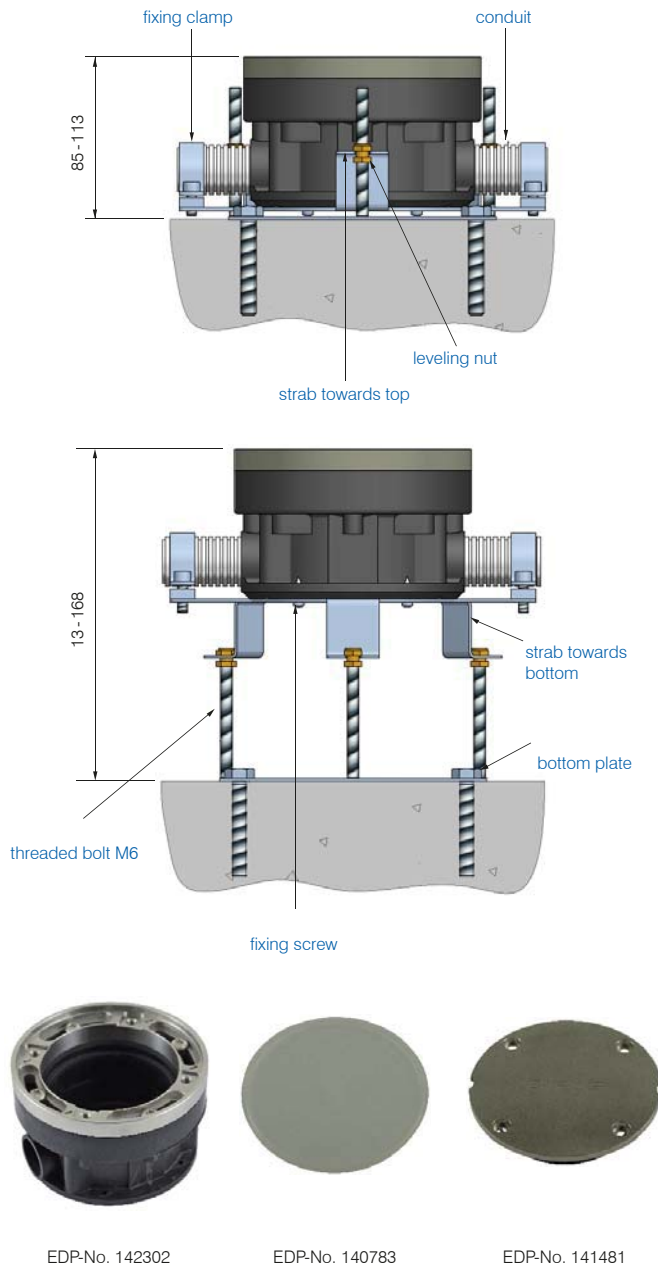


Certificates, reference lists on request.

**Scheme light emission**



## Leveling support EDP-No.CH-037712



## Product range TrafficLED

EDP-No.	Description
CH-139997	TrafficLED light module V4A, 18-28VDC, 140mA / 28-44VDC, 85mA, double-sided 6xLED blue, 470 nm
CH-136194	TrafficLED light module V4A, 18-28VDC, 140mA / 28-44VDC, 85mA, double-sided 6xLED orange, 600-609 nm
112400	TrafficLED light module V4A, 18-28VDC, 140mA / 28-44VDC, 85mA, double-sided 6xLED white, 5.700K
CH-213778	TrafficLED light module V4A, 18-28VDC, 140mA / 28-44VDC, 85mA, double-sided 6xLED white 5.700K, BAST switchable
CH-153147	TrafficLED light module V4A, 18-28VDC, 80mA / 28-44VDC, 50mA, single-sided 6xLED blue, 470 nm
123248	TrafficLED light module V4A, 18-28VDC, 80mA / 28-44VDC, 50mA, single-sided 6xLED orange, 600-609 nm
128445	TrafficLED light module V4A, 18-28VDC, 80mA / 28-44VDC, 50mA, single-sided 6xLED white, 5.700K
124938	TrafficLED lower section Ø120x65 mm, 1 KV M16 (Ø4-9) casing plastic anthracite with adjustment ring
124913	TrafficLED lower section Ø120x65 mm, 2 KV M16 (Ø4-9) casing plastic anthracite with adjustment ring
CH-148704	TrafficLED lower section Ø120x65 mm, 1 KV M16 (system cable flat), casing plastic anthracite with adjustment ring
CH-148705	TrafficLED lower section Ø120x65 mm, 2 KV M16 (system cable flat), casing plastic anthracite with adjustment ring
CH-167067	TrafficLED lower section Ø120x65 mm plastic IXEF 1521, 1 hose nipple M25
CH-167065	TrafficLED lower section Ø120x65 mm, 2 KV M16 (Ø4-9) casing plastic anthracite with adjustment ring, with 2 hose nipple M25
CH-215065	TrafficLED lower section 1xKV M16 (Ø4-9) 1 hose nipple - special
CH-212656	TrafficLED lower section Ø120x65 mm, 2 KV M16 (Ø4-9,5) casing plastic anthracite with adjustment ring, power distribution box mounted in the road surface
115075	TrafficLED blind cover V4A, Ø113,2x27,5 mm incl. sealing and screw
124477	TrafficLED blind cover PP, Ø113,8x4,9 mm plastic white (suitable for temporary cover only)
CH-037712	Leveling support V2A complete to TrafficLED/CircLED range 85-168 mm
128522	System cable TPE Traffic/CircLED black, halogen-free 2x2,5 mm², Ø8,2 mm, strands: red, black

Other versions on request

## Assembling jig for TrafficLED

GIFAS provides a suitable assembling jig for installing the TrafficLED on loan. This makes it possible to adjust to the ground level exactly and to optimise the relocation of the component.



EDP-No.	Description
131701	Assembling jig TrafficLED (on loan by GIFAS)

## Application examples TrafficLED





## CircLED recessed light

CircLED is used for specific applications, mounted as wall- or floorlamp. Main focus is the roundabout lighting, where it is used as security, control and design lighting. Used in addition to many other uses as path lighting (floor or wall mounting). The CircLED is available with integrated light optics as well as in several light colours. It should be noted that the CircLED is only partially suitable for permanent drive-over and snowplough operation.

## System description

The CircLED will be flush mounted. The casing is made of chrome steel and the assembly has to be effected directly in the subgrade (asphalt, concrete, gravel, ground or the like).

## Connection technology

The operating voltage is 20 - 48VDC (low voltage). The current is transmitted from the supply line ( $2 \times 2.5 \text{ mm}^2$ ) in a suitable installation pipe and is inserted in the lower part. A clamp is used to connect the upper part, which is filled reversibly and screwed together.

## Support in the fight against light pollution

Using CircLED helps to fight increasing light pollution. The light guidance is designed in such a way that the light output is only aimed at the defined and desired direction.

## High energy efficiency to reduce costs

Sophisticated electronics with latest LED technology is leading to a very low power consumption. The total power consumption for an average roundabout of 20 pieces CircLED is similar to a single 60W bulb.

## Sealing technology

The overall design of the individual components was based on a high degree of impermeability. Protection class IP68 is attained provided the assembly is performed by experts.

## Control units

The control units required for supplying and/or controlling the light modules are small and space-saving and can usually be integrated in existing distribution systems or control cabinets. A small distributor may be installed as needed.

## Product documentation

### Installation instructions



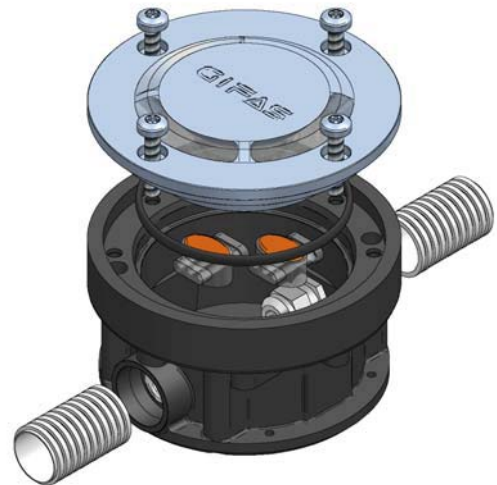
### Reference list



### Declaration of conformity







**Technical data**

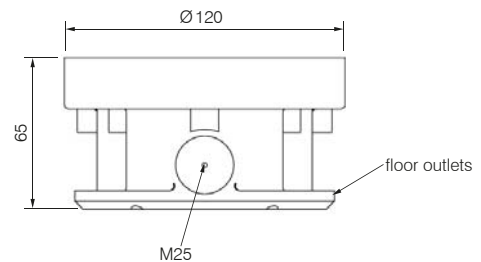
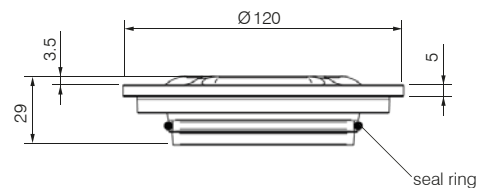
270° circular emission along a light strip (16 LED)

Light colour	white (5.600K/3.500K), blue (470 nm), orange (606 nm)
Light intensity	20 cd (white)
Illuminant	16 LED with integrated optic
Operating life LED	50'000h
Protection category	IP68
Protection class	III
Operating voltage	24VDC (range 20-48VDC)
Power consumption	130mA@24 VDC
Diameter	120 mm
Height with floor pit	73,5 mm
Upper part	chrome steel V4A
Lower section	IXEF glass-fibre reinforced polyarylamide, black
Height over road surface level	3,5 mm
Temperature resistance	-30° C to +55° C
Axle load	B125 according DIN EN124

**The CircLED**

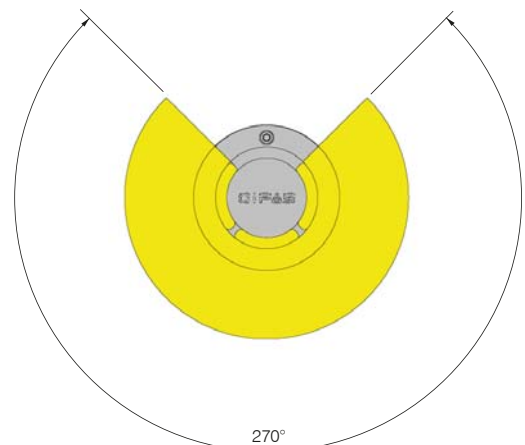
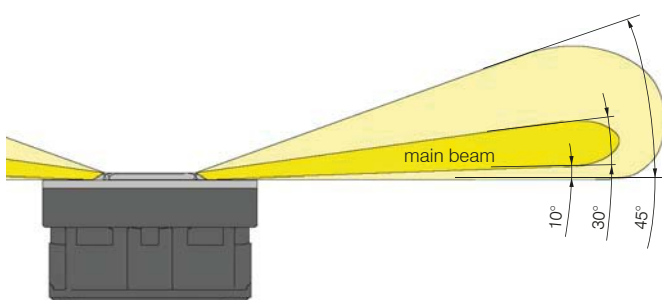
- lower part made of special plastic IXEF
- upper part made of stainless steel
- electronics completely sealed
- The lightness of the light modules is easily adjustable by the control unit and can be manipulated by the automatically light control or direct control from tunnel centre office.

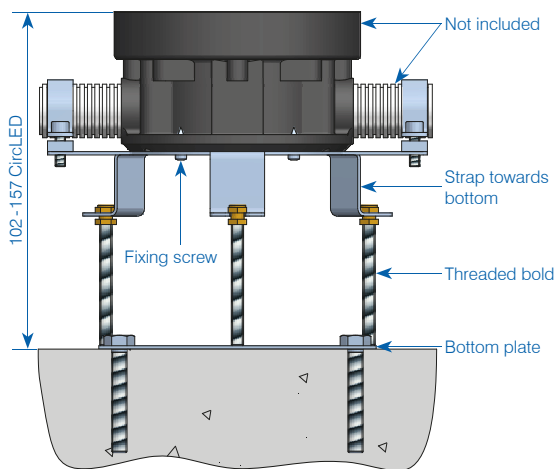
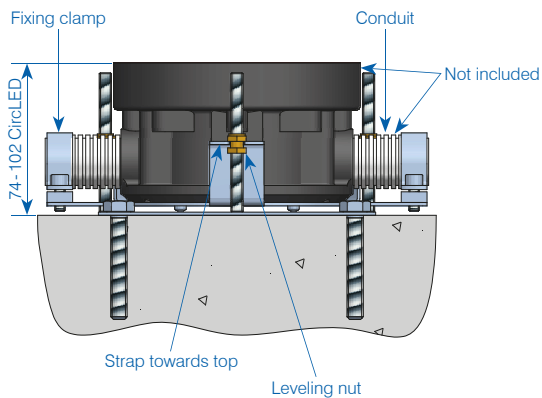
**One-components CircLED**



Certificates, reference lists on request.

**Diagram light emission**





EDP-No.CH-036106



EDP-No.CH-038311



EDP-No.CH-156537

### Assembling jig for CircLED

GIFAS provides a suitable assembling jig for installing the CircLED on loan. This makes it possible to adjust to the ground level exactly and to optimise the relocation of the component.



### Product range CircLED

EDP-No.	Description
860156	CircLED light module V4A, 130 mA @ 24VDC (20-48VDC), white, 5.600 K, 16 Power LED complete sealed
CH-860160	CircLED light module V4A, 130 mA @ 24VDC (20-48VDC), white, 3.500 K, 16 Power LED complete sealed
860157	CircLED light module V4A, 130 mA @ 24VDC (20-48VDC), blue, 470 nm, 16 Power LED complete sealed
860158	CircLED light module V4A, 130 mA @ 24VDC (20-48VDC), orange, 609 nm, 16 Power LED, complete sealed
CH-860346	CircLED lighting module, V4A, 24VDC, 130 mA, red 625 nm, 16 Power-LED, completely sealed
CH-031353	CircLED lower section Ø 120×65 mm, 1 KV M16 (Ø 4-9) casing plastic anthracite
CH-036106	CircLED lower section Ø 120×65 mm, 2 KV M16 (Ø 4-9) casing plastic anthracite
CH-153149	CircLED lower section Ø 120×65 mm, 1 KV M16 (system cable flat), casing plastic anthracite
CH-153150	CircLED lower section Ø 120×65 mm, 2 KV M16 (system cable flat), casing plastic anthracite
CH-185473	CircLED lower section 1×KV M16 (Ø 4-9) 1×hose nipple
CH-185482	CircLED lower section 2×KV M16 (Ø 4-9) 2×hose nipple
CH-190367	CircLED lower section Ø 120×65mm, 2 KV M16 (Ø 4-9) casing plastic anthracite
CH-190366	CircLED lower section Ø 120×65 mm, 2 KV M16 (Ø 4-9) casing plastic anthracite
CH-156537	CircLED blind cover V4A, Ø 120×20,2mm incl. sealing and screw
CH-038311	CircLED blind cover PP, Ø 120×7 / 12mm plastic white (suitable for temporary cover only)
CH-037712	Leveling support V2A complete to TrafficLED/CircLED range 85 - 168 mm
CH-173496	System cable TPE Traffic/CircLED black, halogen-free 2×2,5 mm², Ø 8,bb2 mm, strands: red, black

Other versions on request

EDP-No.	Description
CH-018821	Assembling jig CircLED (on loan by GIFAS)

Application examples

CircLED





In contrast to the interruption-free current transmission, as in the MarkLED system, the conventional wired system is used for the SecuLED product series. The modules can be wired directly and can be looped. The two-part construction facilitates the maintenance and repair effort massively.

When laying highly flammable and heat-resistant cables, grooves must be milled into the pavement or introduced in pipes designed for new plants for subsequent installation.

The lamp modules are installed on the kerb in the immediate proximity of the edge of the road. The brightness of the lamp modules can be easily adjusted using the control units and can be controlled in all areas via an automatic light control system or direct control from the tunnel monitoring and control complex.

### Mounting plate

The engineering design takes into account the various supply and mounting requirements.

Three enclosed cable sleeves, formed by way of injection moulding have been provided during manufacture for the cables to be fed through. The four attachment points have easily breakable seals over them.

The upper part of the mounting plate is sealed using two circular labyrinth seals. The upper part is attached in the threaded socket of the mounting plate using two captive screws.

### SecuLED – cable connection

Upper part made of polyamide, fully fitted in accordance with selection, electronics encapsulated with freely accessible 2.5mm<sup>2</sup> spring-type clamps, with direct looping. Mounting plate made of polyamide, two surrounding O-ring seals, sealed cable inlets (for 2x2.5mm<sup>2</sup> cables), four sealed mounting holes of diameter 5mm.

### Connection

The cables are connected by using spring-type clamps. A separate clamp is provided for the supply line and additional cables. The cables can be disconnected at any time by applying slight pressure to the release mechanisms.

### Seals

The individual components have been engineered to ensure a high level of leak-tightness. Professional installation assumed.

### Controls

The control units required for supplying and/or controlling the lamp modules are very small, require little space, and can usually be integrated into existing junction boxes or control cabinets. A small junction box can be mounted in a suitable location if required.

### Product documents

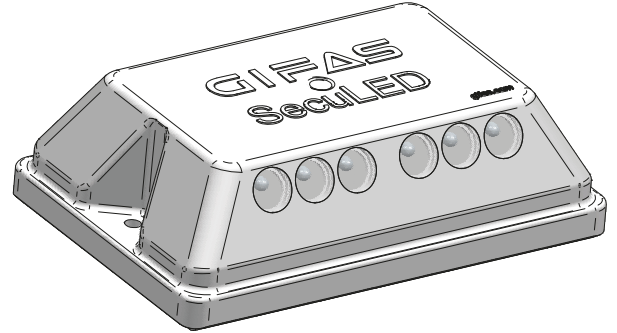
Installationguide



Declaration of conformity




Technical – SecuLED



**Technical data**

Light colour	white (5.100K)
Light intensity	30 cd
Illuminant	12 LED
Operating life LED	50.000h
Protection category	IP67
Protection class	III
Operating voltage	24VDC (range 16-40VDC)
Power consumption	40mA
Dimensions (L×W×H)	178,4x118,0x53,5mm
Upper part	polyamide, white
Lower part	polyamide, white

 A detailed datasheet from system components is available on request.

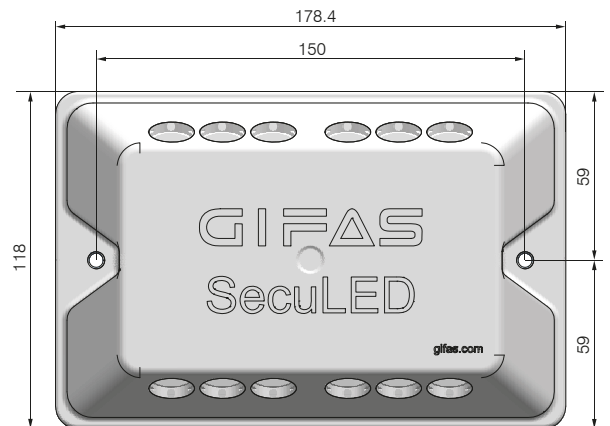
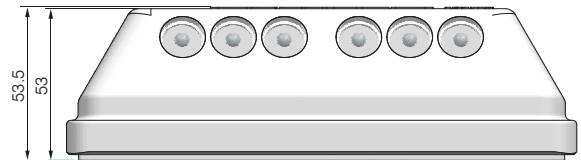
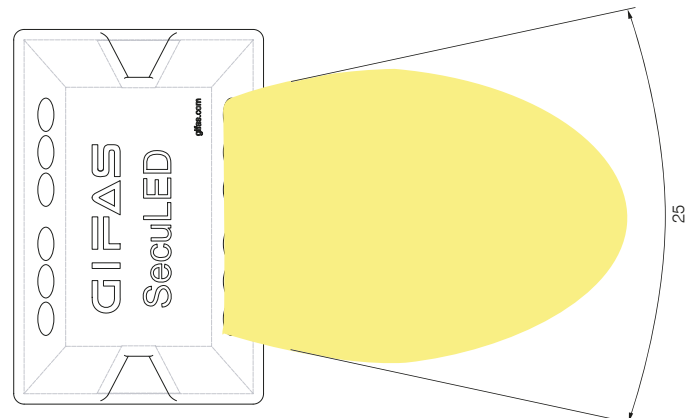
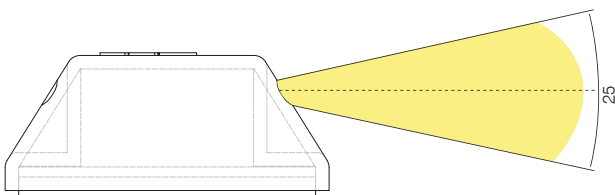


Diagram light emission

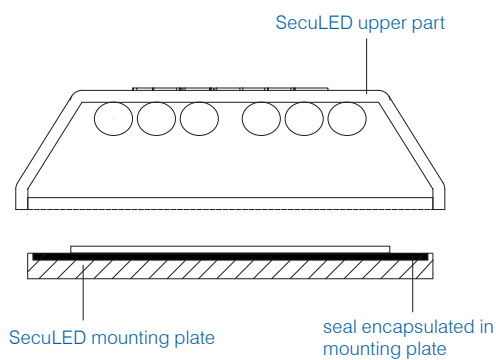




### Product range SecuLED

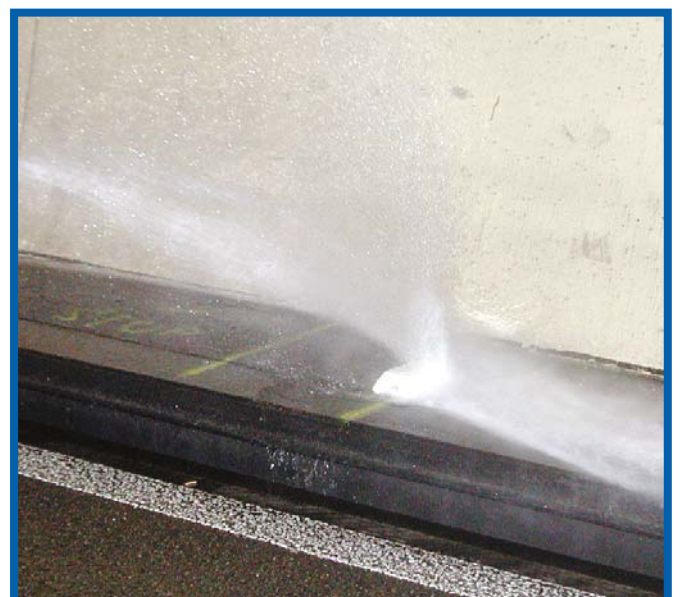
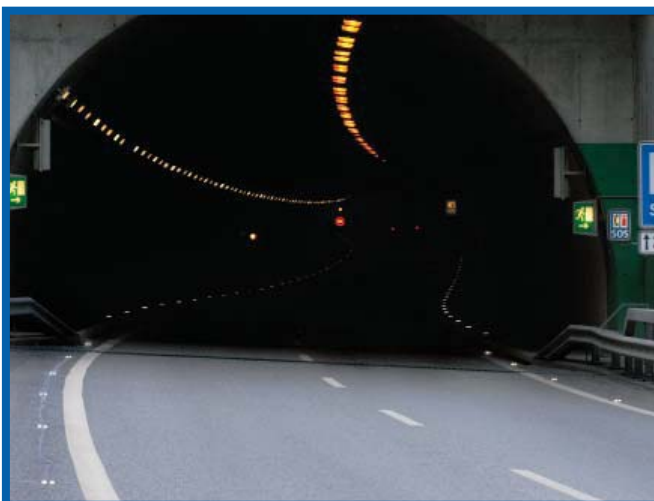
EDP No.	Description
CH-860462	SecuLED light module 40mA/double-sided 6×white, 5.100K
860463	SecuLED light module 60mA/6×white, 5.100K/6×red, 625nm
860464	SecuLED light module 80mA/double-sided 6×green, 525nm
CH-860465	SecuLED light module 80mA/double-sided 6×blue, 470nm
128522	System cable 2x2,5 mm <sup>2</sup> wire color red/black, longitudinal water-tight and flame-retardant

Other versions on request



Application examples

SecuLED



## 4-channel control unit

for MarkLED, CircLED, SecuLED, TrafficLED



The control unit for all GIFAS systems is designed for 4 output lines. Each channel can be loaded with up to 10A.

- Supply: A 230VAC/24-48VDC power supply device with a nominal output current of 40 A is installed upstream from the control unit.
- Error messages: Each channel has a relay with SPDT (potential free) assigned to the signaling of error messages.
- External blinking contacts: By default, two external flashing signals (24-60VDC) can be connected and transferred to the outgoing lines (synchronisation with flashing signal).
- Operating mode: The control unit has 8 or 31 different modes of operation.
- Failure rate: By failure rate detection, the lights can be tested for their functionality. The control unit measures the total power consumption of the respective channel. If the power consumption drops to a preset value, the fault message can be detected via a changeover contact (potential-free).
- Functions: One of the following functions can be assigned to each channel in each mode:
  - Continuous lighting: 100%
  - Dimming: adjustable from 1-99%
  - Flash: adjustable from 0.1-9.9Hz
  - Lightning: adjustable from 1-99ms
  - Running light: running light direction, dimming 1-99%, Light duty cycle 100ms-10sek, delay in lighting 100ms-10sek, Switch-on delay 0-999sek, duty cycle 0-999sek
  - Off
- Programming: the control unit can be optionally parametrised and read out via the web interface or the optionally available radio programming unit.
  - Web interface: if the control unit is connected to the network via RJ45 Cat. 6a, all parameters can be set and read out via a web browser.
  - Radio programming unit: The parameters can also be set by the radio programming unit.

### Technical data

Protection category	IP65
Rated power max.	1.920VA
Input voltage	18-48VDC
Supply current	40A, 4 channels à 10A
Power supply	external
Dimensions	330×230×110mm

EDP No.	Description
860594	Control unit 4-channel IP65, 18-48VDC, 4×10A ready for installation in housing of cast aluminium 330×230×110mm, excl. power pack

## Remote control to 4-channel control unit

for MarkLED, CircLED, SecuLED, TrafficLED



Programming device with menu guide for set-up, programming and status recognition of the control unit. Communication with the control unit occurs through radio.

All necessary functions can be set up and assigned through the menu structure. No special knowledge is required to operate it. The connection between the control unit and the programming device is bi-directional, i.e. the current settings can be transferred from one to the other.

The buttons «↑», «↓», «☒» and «✓» are used to navigate the system. The range is approx. 3m.

The menu is available in 4 languages: German, English, French and Italian.

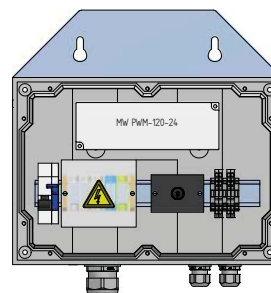
### Technical data

Material	ABS
Protection category	IP40
Protection class	III
Radio frequency	2.4-2.525GHz
Operating voltage	4.5VDC, 3 pcs. batteries type AAA
Life of battery	> 1 year in standby mode
Dimensions (WxHxD)	73×140×32mm
Colour	graphite grey similar to RAL 7024

EDP No.	Description
860460	Remote control complete for the control unit 4-channel

## Roundabout controller

for CircLED



The roundabout controller is the optimum control unit for simple applications, typically roundabout illumination. It is used to control the brightness and can be easily mounted on the wall thanks to the mounting plate.

EDP-No.	Description
CH-212639	Roundabout controller with rotary potentiometer



## Power pack for control unit 4-channel

for MarkLED, CirclLED, SecuLED, TrafficLED



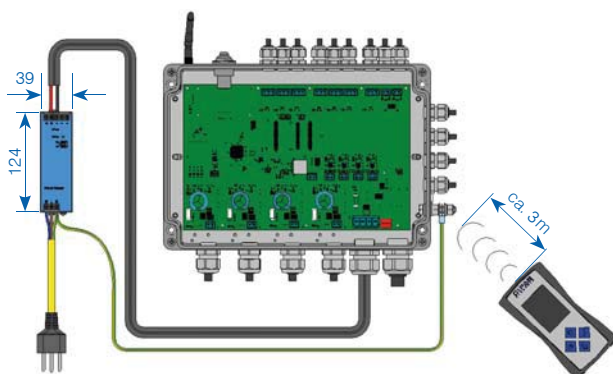
A 230VAC/24/36/48VDC power pack is installed upstream from the 4-channel control unit. The power pack is equipped with integrated protection against overloading and short-circuiting, with automatic or manual reset.

The power pack conforms to CEE regulations and also has UL and/or CSA approval.

### Technical data

Protection category	IP20 (with additional cover IP42)
Protection class	I
Input voltage	230VAC (range 100-240VAC)
Output voltage	24/36/48VDC
Output current	10/20A
Connections primary	screw terminals 4 mm <sup>2</sup>
Connections secondary	screw terminals 4 mm <sup>2</sup>
Status display	LED green
Installation	quick fastening for DIN rail 35 mm
Dimensions (W×H×D)	39×124×117 mm

A detailed datasheet on the power pack is available on request



EDP No.	Description
92297	Power pack 230VAC/24VDC-10A/240W 39×124×117 mm
CH-136629	Power pack 230VAC/24VDC-20A/480W 65×124×127 mm
CH-202595	Power pack 230VAC/48VDC-10A/480W 48×124×127 mm
CH-180867	Power pack 230VAC/48VDC-20A/960W 125×124×127 mm

Other versions on request

## Cold conductor monitoring

for MarkLED, CirclLED, TrafficLED



The cold conductor monitoring is used for detecting defective installations or lights that are not connected. The monitoring is automatically activated as soon as the lights are switched off.

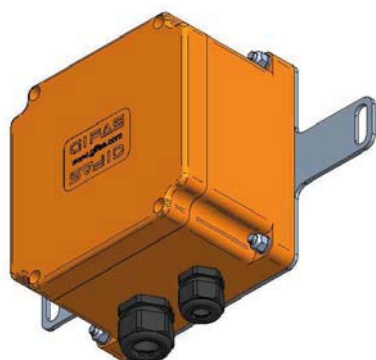
- Feeding: A power pack 230VAC/18-48VDC with a rated output current of max. 10A is connected upstream of the cold conductor monitoring. The level of the output voltage of the power pack depends on the marking light used in this case.
- Fault signal: The cold conductor monitoring has two relays with change-over contact (potential-free) to signal fault messages for voltage interruption (for example, failure of the power supply unit) and exceeding of the failure rate (for example defect in the control unit installation).
- Functions: In every cold conductor monitoring, the threshold for the max. failure rate detection can be set individually in percentage. The adjustment range is 10-70% and can be adjusted in 10% increments.
- Programming: Programming is done directly via the programming buttons on the control board or via the 4-channel control unit.

### Technical data

Protection category	IP66
Rated power max.	480VA
Input voltage	18-48VDC
Supply current	10A
Power supply	extern
Dimensions (W×H×D)	160×100×80 mm

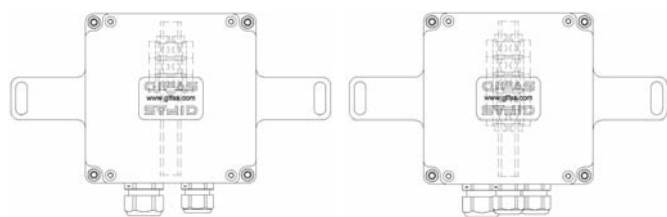
EDP No.	Description
CH-860603	Cold conductor monitoring, 18-48VDC, 10A ready for installation in housing of cast aluminium 160×100×80 mm, excl. power pack

## Fire-proof junction boxes



The safety cable must be connected from control center to the GIFAS system cable when connecting the signal units to the infrastructure. A special junction box is required for these connections. This can be installed in the cable trunks in the tunnel shoulder or at another suitable point. An E30/E60 junction box is usually required for this application. The size of junction box depends on the feed-in cable used as well as the number of outlets.

We will be pleased to advise you on a project-specific basis.



EDP No. CH- 207643

EDP No. CH- 208762

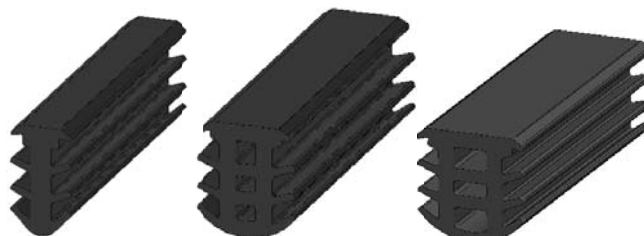
EDP No.	Description
CH-207643	Junction box polyester FE180/E30 type 3018, orange 160×160×100 mm, 7x10 mm <sup>2</sup> , IP66/68
CH-208762	Junction box polyester FE180/E30 type 3018, orange 160×160×100 mm, 7x10 mm <sup>2</sup> , IP66/68

## Protective hose

Depending on the type of installation, the system cable can also be conducted in a conduit (fluted, halogen-free).

EDP No.	Description
90187	Conduit PP, Ø25/19 mm, flexible VE=100 m
CH-128266	Protective hose PA6, Ø21.2/16.5 mm, flexible, VE=50 m UV resistance, operating range of temperature -40°C to 120°C, up to 150° for a short time 150°C

## System profile



EDP No. 107517

EDP No. CH-140862

EDP No. CH-155809

The milled groove of the optical guidance system must be sealed against environmental conditions. A simple and low-cost solution is to use the halogen-free GIFAS system profile made of EPDM. This is inserted in the slot. It is self-locking and available in three different widths. A stable and smooth slot with slot widths of 6 -15 mm is the prerequisite for use.

### Technical data

Material properties	halogen-free, no corrosive and toxic gases
Shore hardness A	70° ±5%
Special weight	1.23 kg/l
Elongation at break	237% DIN 53504
Breaking stress	11.2 MPa DIN 53504
<b>EDP No.107517:</b>	
Exterior dimensions	9,3 mm × 17,1 mm
Groove width	6 - 8 mm
Nominal section	89 mm <sup>2</sup>
Weight	109 kg/km
<b>EDP No.CH-140862:</b>	
Exterior dimensions	14,5 mm × 17,1 mm
Groove width	10 - 11,2 mm
Nominal section	146 mm <sup>2</sup>
Weight	177 kg/km
<b>EDP No.CH-155809:</b>	
Exterior dimensions	17,35 mm × 17,5 mm
Groove width	12 - 15 mm
Nominal section	171 mm <sup>2</sup>
Weight	254 kg/km

EDP No.	Description
107517	Joint profile EPDM 70° Shore, for groove 6 - 8 mm 9.3 × 17.1 mm, black
CH-140862	Joint profile EPDM 70° Shore, for groove 10 - 11.2 mm 14.5 × 17.1 mm, black
CH-155809	Joint profile EPDM 70° Shore, for groove 12 - 15 mm 17.35 × 17.5 mm, black



EDP No 90187

EDP No. CH-128266

### Joint sealing compound



The recommended system sealing compound is heated to 160° – 180° C while being constantly mixed. The compound is applied using a spouted container or grouting lance. Excess compound must be removed by scraping once it has fully cooled.

#### Technical Data

Colour	black
Form of delivery	1 box with 24×cubes à 700 g
Sealing temperature	160° C - 180° C
Weight per unit volume	1.2g/cm <sup>3</sup>

EDP No.	Description
CH-208907	Sealing compound TOK-Melt N2 (1 box with 24×cubes à 700g)

### Lime Mortar / Two-component mortar

for TrafficLED, CircLED

In order to install the lower part of the CircLED, you need lime mortar to fill in. For each lower part, you will need approximately 0.7l (~1.17kg).

If the luminaire is to be installed in an area of the road with constant heavy goods traffic, we recommend using a two-component repair and adhesive mortar such as Bücofix or similar.

EDP-No.	Description
CH-161035	Lime mortar Polifix Plus L, Container 25 kg
CH-184454	Bücofix SRV installation mortar, black (5 kg pail)

### Insulating gel

for TrafficLED, CircLED



When not mounted on the wall, the box must be cast with removable sealing compound, e.g. Bluegel (EDP-No.124870 1l container).

EDP-No.	Description
124870	Insulating gel, solvent-free, VE=bottle à 1 litre 0.15 litres are required for each LED module (CircLED / TrafficLED)

### Adhesive and sealant to module MarkLED



The current collector MarkLED is glued to the base with the help of the sealant and adhesive. Our adhesive is a single-component adhesive that vulcanises itself into an elastic compound as it reacts to the air humidity. It also has no silicone or solvents.

#### Technical data

Basis	MS-Polymer
Cross-linking system	polymerisation through air humidity
Temperature resistance	-40° C to +90° C
Processing temperature	approx. +5° C to +30° C
Color	pebble gray
Processing	using a hand spray gun
Packaging	cartridge of 290 ml

EDP No.	Description
76470	Adhesive and sealant hybrid pebble grey, 290 ml Permafrix 153

### Guard plate to system MarkLED



In winter, there is often the problem that the snowploughs touch the signal units when entering and exiting the tunnels. That entails that the MarkLED can be sheered off and should be exchanged. Against it we can offer a protective plate. That protects the first MarkLED's at the entrance and exit of the tunnels.

EDV-Nr.	Bezeichnung
CH-024446	Guard plate V4A to MarkLED, 190×150×24mm
CH-208653	Guard plate V4A to Surface-mounted adapter MarkLED 245×150×43mm
CH-024676	Countersunk screw V4A with I-6Kt. without shaft M8×70mm
CH-024677	Nylon plug Fischer M8-S×50mm
122615	Nylon plug Fischer Ø6×35mm, without surrounding
122614	Chipboard screw V4A, Ø5×80/50mm
211986	Screw A4-5.0×80mm Torx T25 (PU=200)
122615	Fischer nylon dowel Ø6×35mm, without edge

## Application examples Energy and safety



Klemmkasten - Kamera Anspeisung



Steckdosenverteiler



Revisionschalter / Strahlventilatoren



Klemmkasten Ansteuerung Parkplatzbeleuchtung



Revisionschalter - Steuerung Ampel

Application examples

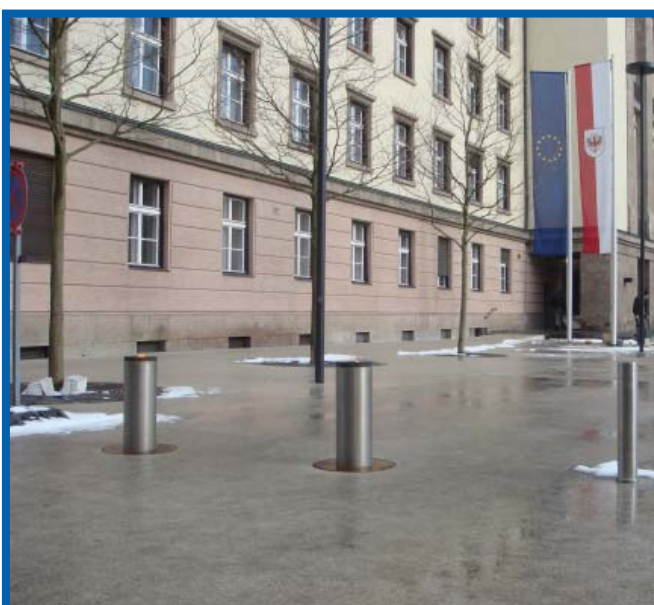
Energy and safety



Wandverteiler



Senkpoller



Senkpoller



Senkpoller Steuerung

## Application examples LED guidance systems



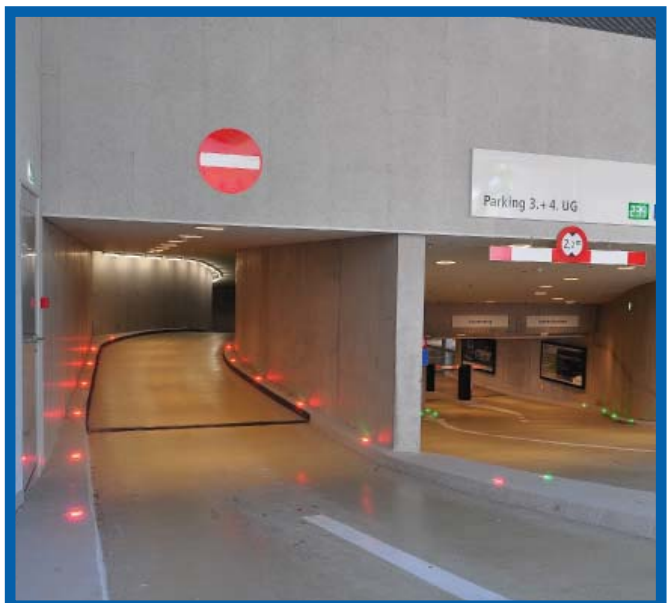
MarkLED



MarkLED Exit



TrafficLED



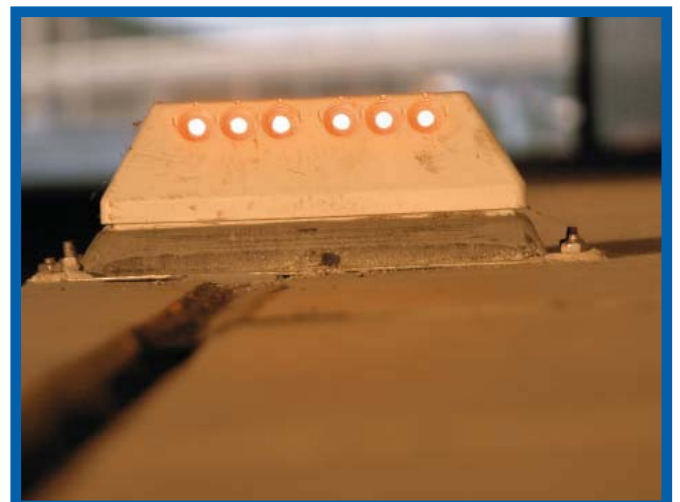
## Application examples LED guidance systems



CirceLED



SecuLED



SecuLED



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