
Signify
FlowStar gen2
Keep traffic moving safely
in critical conditions
LEDgine

Contents

Corrosion-resistant and robust lighting for extremely demanding tunnel environments

The more crowded road networks become, the more tunnels are needed to keep the traffic moving. Tunnels offer quicker connections through mountains or under water and help protect urban areas from exposure to the dangers of cars and fumes. Lighting is essential for tunnel traffic, but tunnel lighting is a complex and demanding field. The safety and comfort of road users depends on the lighting performance, but the physical restraints of tunnels and their limited access place high demands on the maintenance of the system. Energy consumption and efficiency are also important considerations.

Why switch?

There has never been a better time to switch to the next generation of tunnel lighting. Public authorities are under increasing pressure to meet environmental targets through reducing their energy consumption while at the same time complying with tunnel lighting norms and standards. The new generation FlowStar gen2 from Signify will not only help you to achieve your energy-saving targets, but it will also ensure you comply with safety and industry regulations – for the most demanding tunnel environments.

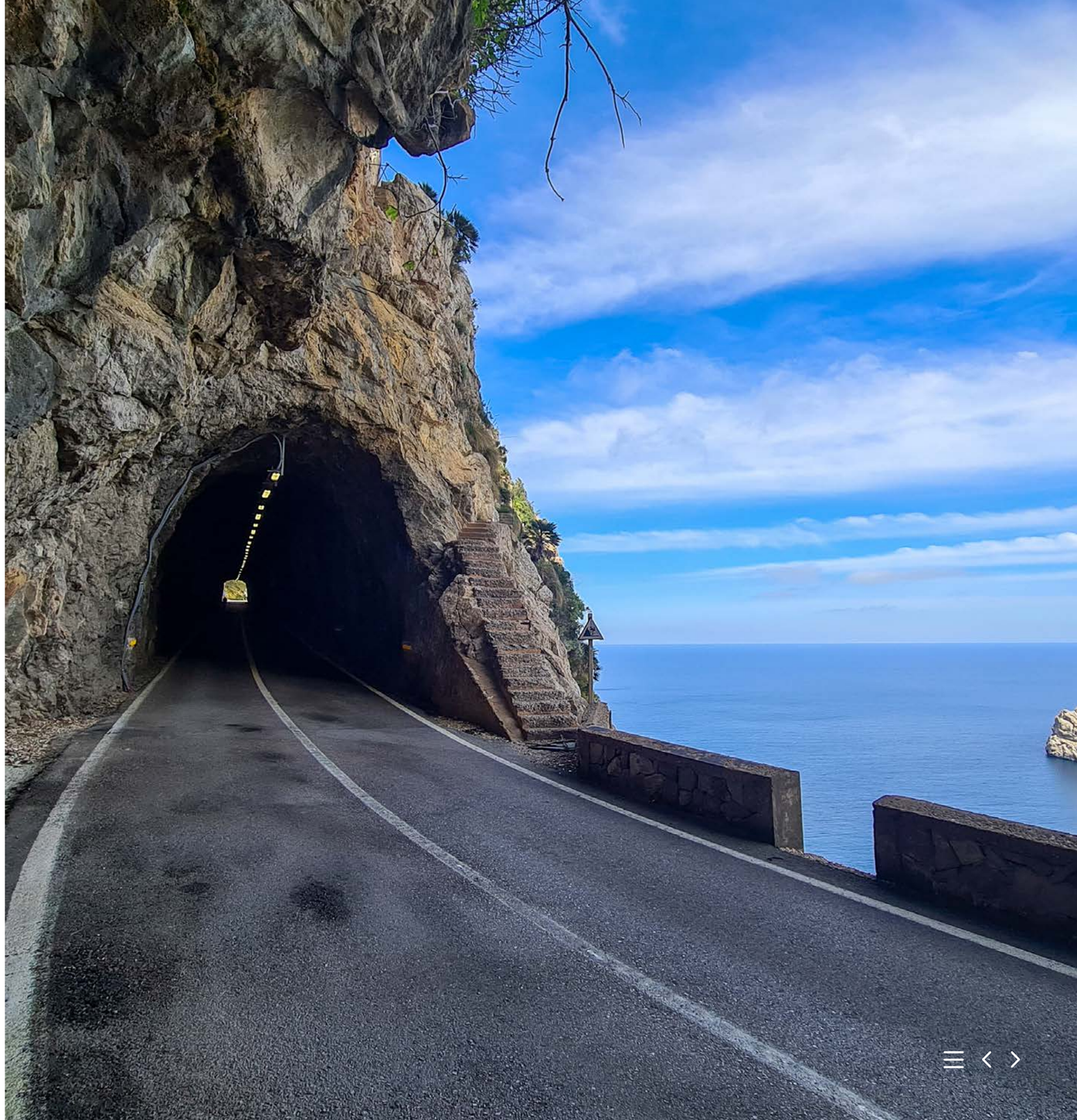
Robust

Easy to install

Industry compliant

Future-proof investment

Performance & efficiency



Meet FlowStar gen2

Robust, stainless steel tunnel lighting for every environment.

Features and benefits

FlowStar gen2 offers several benefits - for all types of projects:

- Increased max flux
- Mini and Small: integrated driver version
- Full stainless-steel housing - no exposed aluminum components - offering an easy-to-install and superior corrosion-resistant solution for all focus areas
- Corrosion resistance guaranteed by C5 compliance
- Extremely easy setup and maintenance with Signify Service tag
- Seamless integration with TotalTunnel
- Full compliance with national and international requirements
- Optimum cleanability (no ribs)
- Multiple mounting bracket options

FlowStar gen2 tunnel lighting solutions offer the best value-for-money and quality lighting for end users, both for renovated and new tunnels.

Renovation only

In this case, only the luminaires, cabling and controls will be renewed in existing tunnels. The installer is often the main contractor for these projects and instrumental in sourcing and choosing luminaires appropriate for the project and environmental demands.

Built from scratch

This concerns projects for recently constructed tunnels and M&E installations. Here, everything will be built from scratch. The main contractors in these projects are often a consortium together with a builder, system integrator, installer, and participants. Ultimately, the installers will source the luminaires. To meet the needs of a variety of situations and offer solutions for all dimensions of both renovated and recently built tunnels, FlowStar gen2 is available in four sizes: mini, small, medium and large. FlowStar gen2 is available in an array of mounting options.

Family range

To meet the needs of a variety of situations and offer solutions for all dimensions of both renovated and recently built tunnels, FlowStar gen2 is available in four sizes: mini, small, medium and large with an array of mounting options.

Full range overview

Mini

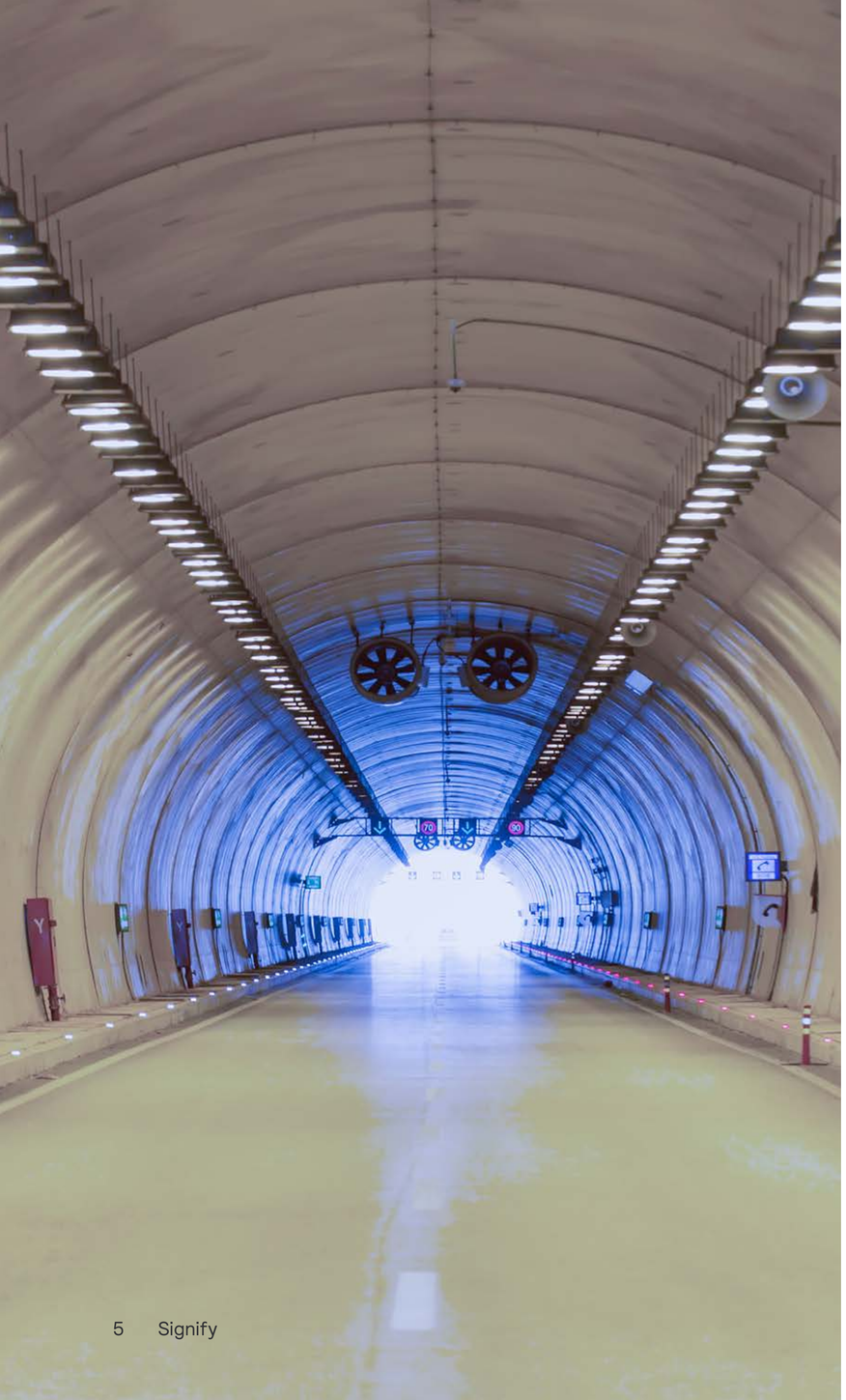
Small

Medium

Large

FlowStar gen2

Application	Size	Product family code Luminaire or LED unit	Product family code driver unit
Entrance & interior	Mini	BGB305	–
Entrance & interior	Small	BGB306	–
Entrance & interior	Medium	BGB307	EGB307
Entrance & interior	Large	BGB308	EGB308



Principles of tunnel lighting

Tunnel lighting contributes to road safety by helping motorists to adapt from daylight to the light level in the tunnel interior. At night the opposite is true, as the tunnel interior can be up to three times as bright as the access road. Between these two extremes, lighting must provide the right degree of comfort and safety for road users.

Entrance lighting

As motorists approach a tunnel during daylight, the entrance will appear black (black hole effect). This is because the light levels inside the tunnel are much lower than those outside. Our eyes cannot bridge extreme differences in levels of light and automatically adjust to the dimmer light, limiting the visibility of obstacles in a tunnel entrance. To compensate for this effect, sufficient lighting must be provided at the tunnel entrance. This ensures that drivers can see objects in time for them to stop before entering the tunnel. It also assists their vision, giving them confidence to enter the tunnel without slowing down unnecessarily, which is important in maintaining optimum traffic flow.

The level of light required for avoiding the black hole effect depends on the levels of brightness outside the tunnel (e.g. sunny or cloudy weather). The L20 portal luminance measurement is employed as standard for regulating the different stages in light levels that are required. It takes time for our eyes to adapt from the entrance lighting level to the interior lighting level. So that drivers can proceed through the tunnel without slowing down, the entrance lighting level must be reduced gradually over their travelling time when driving through the tunnel in accordance with the CIE curve to the so-called transition zone lighting (see next page).

Interior lighting

Once the driver's eyes have adapted to the lower levels, sufficient lighting is needed within the tunnel for safe passage. This is usually provided by luminaires, spaced at regular intervals, throughout the full length of the tunnel. During the day, typical luminance levels of 1–12 cd/m2 are required, depending on the traffic speed and volume, etc. At night, light levels should be approximately twice as high as the levels on adjoining roads.

Tunnel exits

Although the tunnel exit zone is less critical, as the eye adapts more rapidly to increased brightness, additional lighting may be desirable for long tunnels. Exit lighting is mainly deployed to provide drivers with sufficient rear mirror vision as they leave the tunnel. Exit lighting is only activated during the day.

Long versus short tunnels

Tunnel lighting requirements also vary in accordance with tunnel lengths. Short tunnels (< 25 m) with a fully visible exit, or those with good daylight penetration, high wall reflectance (> 0.4) and limited traffic, do not normally require lighting. Tunnels that fall between the definition of a short and long tunnel (25–200 m), can either be lit in accordance with the "long tunnels" principles or with limited daytime lighting (e.g. 50%). Long tunnels (> 200 m) always require tunnel lighting.

Application areas

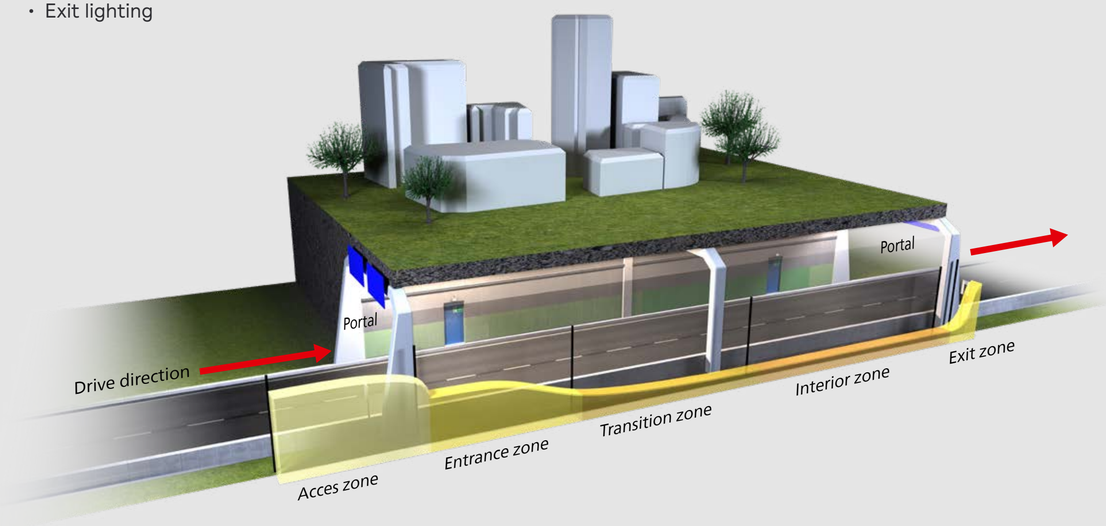
FlowStar gen2 is designed for demanding and tough tunnel traffic lighting applications. The various sizes and optics mean it can be deployed for any given tunnel geometry and lighting level. Each zone within a tunnel has its own requirements, in terms of lighting design and performance. For example, tunnel entrances require high levels of light with little or no luminaire spacing. In contrast, the lighting inside the tunnel needs to be lower in level with a larger luminaire spacing. FlowStar gen2 and the rest of the tunnel luminaires from our portfolio always offer the right balance of visibility, safety and costs.

Tunnels and underpasses

From entrance to exit

From entrance to exit, through combining the various optics with the full lumen package range, all tunnel applications can be accommodated. FlowStar gen2 can also be used for lighting traffic underpasses. FlowStar gen2 has many applications:

- Traffic tunnel lighting
- Fast traffic underpass lighting
- Reinforced entrance lighting
- Point source interior lighting
- Exit lighting



Tunnel standards

Most countries have their own standards and requirements. This makes tunnel consultancy a very local business. We endeavor to support you as a partner with local experience, yet offering the benefits of global scale.

Lighting performance

FlowStar gen2 is suitable for many different applications thanks to its outstanding flexibility in lighting distribution and luminous flux.

Portfolio of optics

DN10
DTA-NB

- Entrance & interior lighting
- Typical 2 lane tunnel/ cornice configuration

DM12
DTA-MB

- Entrance lighting
- Typical 2 lane tunnel/ cornice configuration

DW10
DTA-WB

- Entrance & interior lighting
- Typical 3 lane tunnel/ cornice configuration

DM33
DTA-WBC

- Interior lighting
- Typical 2 lane tunnel/ cornice configuration

DSM12
DTS-MB

- Entrance lighting
- Typical 2 lane tunnel/ central configuration

DSM30
DTS-C

- Interior lighting
- Typical 2 lane tunnel/ central configuration

DSM31
DTS-WBC

- Interior lighting
- Typical 2 lane tunnel/ central configuration

DSW10
DTS-WB

- Entrance & interior lighting
- Typical 3 lane tunnel/ central configuration

DX10
DTA-WB

- Entrance & interior lighting
- Typical 3 lane tunnel/ cornice configuration

DSM35
DTS-WBC

- Interior lighting
- Typical 2 lane tunnel/ central configuration

DSM11
DTS

- Entrance & interior lighting
- Typical 2 lane tunnel/ cornice configuration

DSN11
DTS-NB

- Entrance & interior lighting
- Typical 2 lane tunnel/ central configuration

DTX1 BTLB
Counterbeam with louvre

- Entrance lighting
- Typical 2 lane tunnel/ central configuration

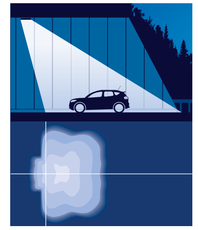
DTX2
Counterbeam without louvre

- Entrance lighting
- Typical 2/3 lane tunnel/central configuration

DTX2 BLTB
Counterbeam with louvre

- Entrance lighting
- Typical 2/3 lane tunnel/central configuration

DTCB



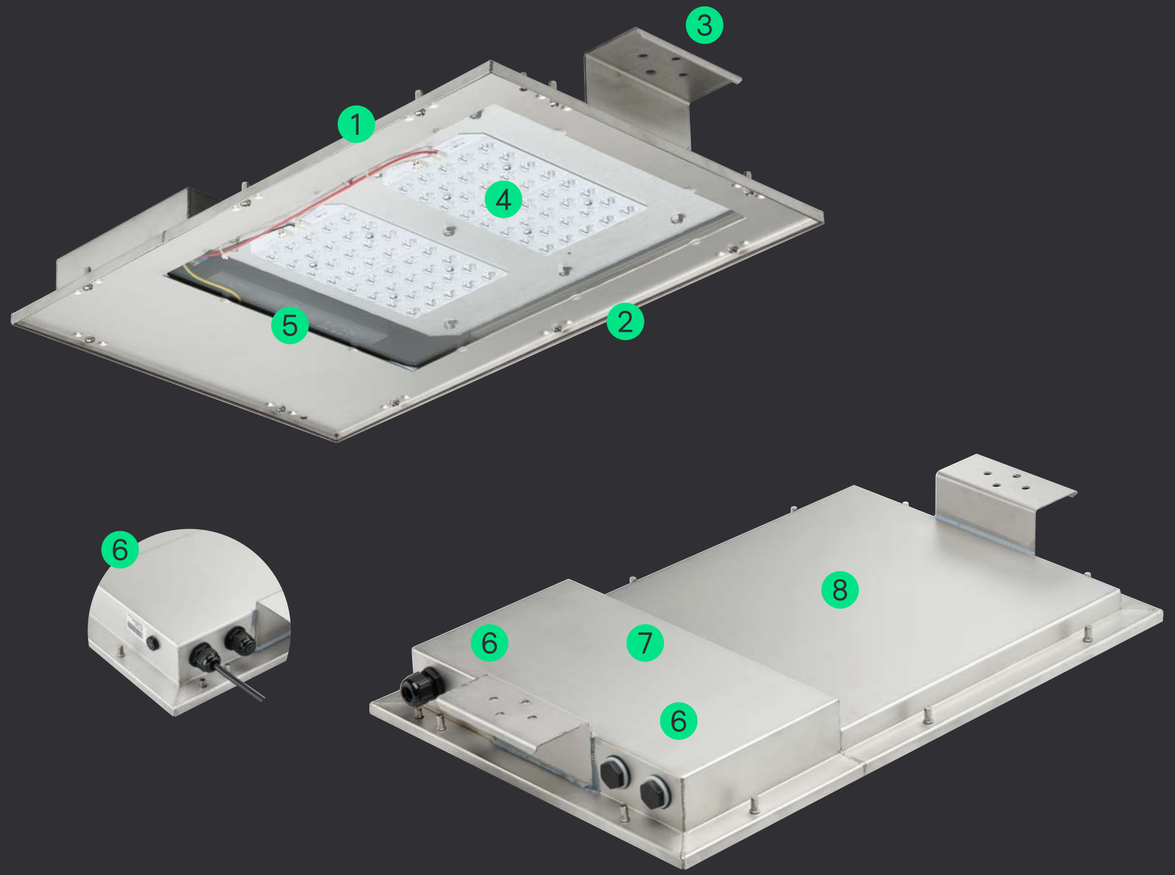
- Entrance lighting
- Typical 3 lane tunnel/ central configuration

DTX1
Counterbeam without louvre

- Entrance lighting
- Typical 2 lane tunnel/ central configuration

Please note that this is a non-exhaustive list of all available optics. For more information, please contact your local sales representative.

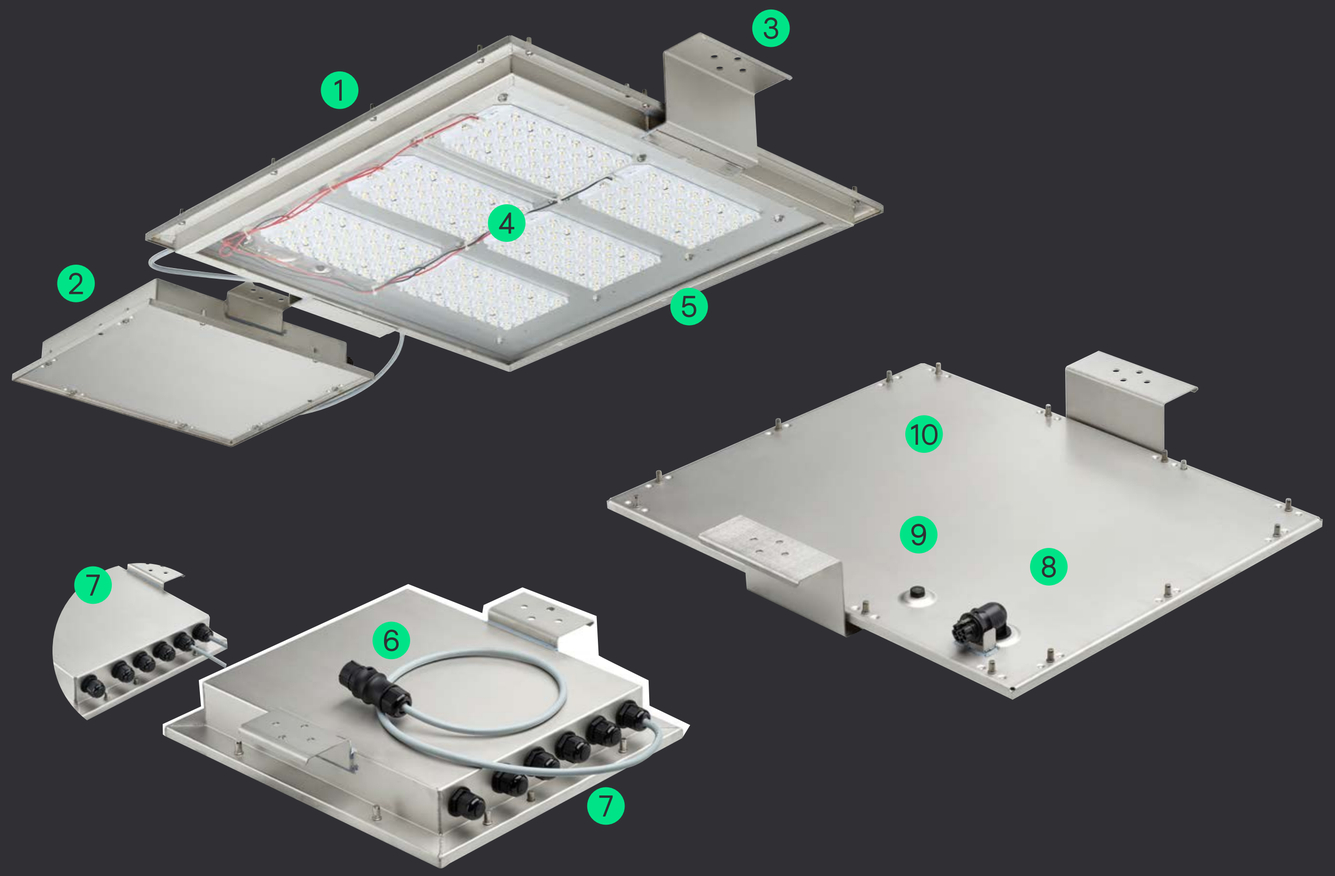
Components
FlowStar gen2 mini and small



Components

1. Housing: luminaire with integrated driver. Made entirely of pickled and passivated stainless steel sheet material (316L). No exposed aluminum components
2. Serviceability: LEDs and driver can be serviced by removing the cover
3. Mounting: baseplate interface for mounting brackets (BA)
4. LEDs: LEDgine optimized platform
5. Cover: thermally toughened glass cover fitted in frame
6. Connectivity: cable strain relief connectors, various options for electrical/control connection
7. Filter: filter to prevent under- and overpressure accumulation
8. Cleaning: flat surface for easy cleaning

Components
FlowStar gen2 medium and large



Components

1. Housing: two separate units (LED unit and driver unit). Made entirely of pickled and passivated stainless steel sheet material (316L). No exposed aluminum components.
2. Driver unit: up to 3 x 150 W drivers, serviceable
3. Mounting: baseplate interface for mounting brackets (BA)
4. LEDs: LEDgine optimized platform
5. Cover: thermally toughened glass cover
6. LED connector: output connector to power the LED unit
7. Connectivity: various options for electrical/control connection
8. LED socket: protected socket for connecting the driver unit
9. Filter: filter to prevent under- and overpressure accumulation
10. Cleaning: flat surface for easy cleaning

Luminaire features

The FlowStar gen2 LED design is based on an integrated non-compromised approach. Both thermal and optical management form an integral part of this philosophy. For entrance lighting, high lumen packages are required to limit the number of project luminaires. For interior lighting, the focus is on the efficiency of the system.

This requires a different design to suit the different applications:

- Entrance luminaires (medium and large) have a separate driver unit, which also helps with optimizing the heat management
- Interior luminaires (mini and small) have an integrated driver as thermal issues are less critical, which allows for a more efficient design concept

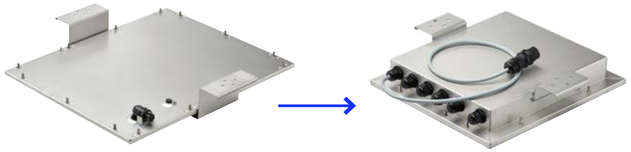
Optimized cooling concept for stainless steel luminaires

To achieve the highest degree of corrosion resistance, stainless steel is used exclusively for the luminaire housing. No aluminum components are exposed that could potentially compromise the integrity of the unit. As the thermal conductivity of stainless steel is low, this poses a challenge for the thermal management. However, the internal heat spreader design allows the luminaire to operate at a high lumen output without compromising its performance.

Both the integrated (mini and small) and the non-integrated (medium and large) designs are equipped with the internal heat spreader to boost maximum performance. Furthermore, the large and medium units have separate driver and LED compartments, which helps boost the maximum output.

As a result of the balanced thermal design for both applications, the FlowStar gen2 range offers best-in-class performance and allows you to use the luminaires safely in an ambient temperature of up to 50°C.

Locally positioned driver unit



Remotely positioned driver unit

The right solution for outdoor applications: LEDgine

Our latest generation LEDgine optimized light engine offers the flexibility to further optimize your preferences for luminaire efficacy and cost aspects. The LEDgine optimized light engine covers a wide range of standard fluxes and a full range of standard optics is available to cover a wide range of applications. Moreover, where needed we can support you to tune and optimize your project solutions as to fluxes and light distributions further with our exclusive tools. The three pillars that characterize the light engines are standardized optics, standard engines and tailor-made solutions.

Luminaire efficacy optimization: LEDgine optimized

LED count and glass options optimizing system lm/W supporting high energy savings.
High flux per area enabling use of compact lower cost luminaire sizes.

Standardized optics
A perfect application fit.
A wide range of light distributions ensure a perfect fit for many applications.

The optics offer flexibility, enabling standardization over applications with a good performance across a wide range of geometries – as well as design parameters such as tilt and overhang. The optics comply with national and European road lighting standards.

Standard engine
High performance across portfolios.

Using a standard engine across different luminaire ranges means you can optimally benefit from the latest LED upgrades without changing light distributions, so design continuity is assured. Standard flux packages are pre-defined across product ranges. Flux and thereby energy minimization is achieved by using best possible lumen maintenance (up to L98 or CLO solutions). The LEDgine optimized engine benefits from more LEDs per area contributing to more compact and cost effective solutions. Standard engines minimize spare components which are easy to configure by using our Service tag application.

Tailor-made solutions
Tuning to project preferences.

We can support you with our exclusive Lucia tool to customize solutions which of course can become your standard! Using a variety of LED counts it enables to build the exact required flux in a perfect balance between energy consumption, luminaire cost/type and operational life. Based on project parameters the best optical fit can be selected and when required light distributions can be customized for best application fit and to maximize energy savings.

FlowStar gen2 – in control

Through adding controls to your tunnel lighting, you optimize the entire lighting system, ensuring you get the greatest value from your FlowStar gen2 investment.

One of the advantages offered by lighting controls is that they continuously adapt the lighting to the changing brightness outside the tunnel, so that the driver experiences a smooth transition when entering, passing through and exiting the tunnel. In addition, lighting controls provide valuable status and health information about the tunnel lighting system.

TunneLogic

FlowStar gen2 can be connected to TunneLogic, Signify´s advanced tunnel control and monitoring system designed specifically for LED technology. The control system, which is easy to install, commission, operate and maintain, provides safe lighting control and information on the health of the installed lighting system.

BaseLogic

FlowStar gen2 can be connected to BaseLogic, a retrofit entry-level adaptive control lighting system. BaseLogic communicates via powerline carrier and incorporates enterprise server software and a photometer, a tunnel control unit, a data transmitter and a monitoring module.

TotalTunnel, the end-to-end solution

FlowStar gen2 is also offered as part of the TotalTunnel program, Signify´s holistic approach to tunnel lighting that combines a networked lighting system with a full set of services. This intelligent and integrated tunnel lighting solution delivers benefits for tunnel owners and operators, tunnel users, and installation and maintenance companies through completing a safe, energy-efficient, and compliant tunnel design.

TotalTunnel comprises five key building blocks:

Luminaires

Our LED luminaires are designed to deliver functional tunnel lighting that ensures a safe journey and excellent efficiency, supporting all main tunnel lighting techniques.

Guidance lighting

Our state-of-the-art guidance lighting solution keeps traffic moving, providing increased driver comfort and maximum safety.

Dynamic control systems

From basic controls to elaborate monitoring systems, our lighting control systems give you full control over your entire lighting system.

Architectural lighting

Helps reduce the feeling of monotony, improve awareness and add to the driving experience.

Services

From concept design and commissioning to lifecycle servicesincluding maintenance and performance optimization, Signify can deliver you a turnkey project. It’s the surest way to protect your investment.

Signify Service tag

Service tag from Signify is a unique QR code-based LED luminaire asset identification system that provides detailed information on specification and spare parts. The system simplifies the installation and maintenance of lighting infrastructure by utilizing cloud technology. Service tag also plays a key role in the circular design of our lighting solutions, as it extends their service life and reduces maintenance efforts, ensuring efficient servicing and avoiding waste.

How it works

Every luminaire is equipped with a unique QR code. All relevant asset data is stored in the service cloud, including detailed luminaire specification, User data (geo location, project-location, external ID, notes, etc.) and information on spare parts and accessories. By scanning the QR code on the packaging or luminaire with the Signify Service tag app, this information becomes instantly accessible, offering invaluable benefits.

During installation

#1. Download the app

Download the Service tag app from the App store or Play store on your mobile device (iOS or Android).

Download on the App Store · GET IT ON Google Play

#2. Register the luminaire

Register the luminaire by simply scanning the QR code on the packaging or luminaire. The system automatically identifies the type of each luminaire.

#3. Create a group QR code

If you have multiple luminaires, it's possible to use the Service tag app to combine individual luminaires into a group. Each group will have its own unique group QR code.

#4. Luminaire information

Scan the QR code on your luminaire for easy access to the installation manual.

Learn more at signify.com/global/service-tag

During service/maintenance

#1. Spare parts identification

Use the Service tag app to view a luminaire's spare parts, which contains all necessary information for quick ordering.

#2. Spare parts programming

Quickly program a spare driver using the Service tag app—without needing a faulty driver on hand. Scan the QR code of a luminaire with your device, put your mobile device on the spare driver, press "Program" and the spare driver receives the right settings for this specific luminaire.

Your benefits at a glance

Easy installation and commissioning

- Access to product details, manuals and spare parts
- Helps avoid errors

Simplified maintenance

- Detailed information on products
- Quick access to relevant information means less time required for repairs or replacements

Asset management

- Real-time tracking of assets
- Simplified management of replacements, upgrades and warranty information

Lifetime maintenance service concept

Standard long lifespan

The standard lifespan expectancy of all FlowStar gen2 versions is 100,000 hours. This applies irrespective of how the luminaire is used and does not take into account any extension of lifespan due to switching off or dimming, which is common in tunnel applications.

Extended long life

Upon request, Signify can provide an extended warranty or lifecycle service package. Extended warranties ensure your product functionality for a longer period and guarantee delivery of replacement products in the event of failures. Based on specific customer needs or project requirements, we can provide full lifespan support and service packages. Signify guarantees product functionality and supports system functionality over the agreed lifespan of the project, which can comprise the following elements:

- Replacement products for corrective and preventive maintenance at discounted price
- Preventive group replacement
- Preventive system check to ensure system functionality
- Professional system support (system scans, optimization, and updates)
- Training on the system functionality, usage, maintenance, and commissioning
- Service parts kit on site

Our tunnel services

Our complete services package will help you deliver the project and protect your investment.

Advisory services

Often, complete project design criteria information is not available, which can result in non-compliance and misinterpretation of design requirements. As part of our service program, we offer advisory services to maximize the benefits of the installation design and specification compliance.

Project services

With our turnkey project supply approach, we can deliver projects from concept to completion to meet the demands of the project stakeholders. The scope of our involvement can range from requirement-specific requests to taking complete responsibility for an end-to-end solution. Realization of the key areas in a project is important. We can provide several project services.

Lifecycle services

With our lifecycle services, our customers and channel partners are covered by a variety of contracts that guarantee long-lasting, cost-effective warranty and hassle-free performance from our lighting solutions.

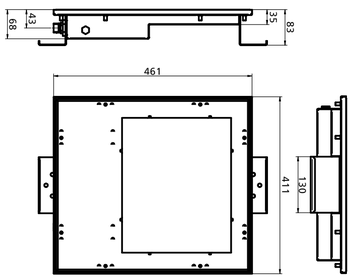
Lighting Capital

Signify Lighting Capital links financing to the costs savings that your lighting system will deliver. So you can acquire a state-of-the-art solution now, with little or no upfront capital investment. Keeping your cash flow positive from day one.

Dimensional drawings

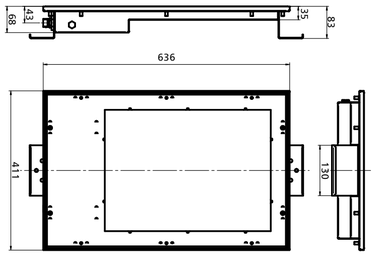
BGB305

FlowStar gen2 mini



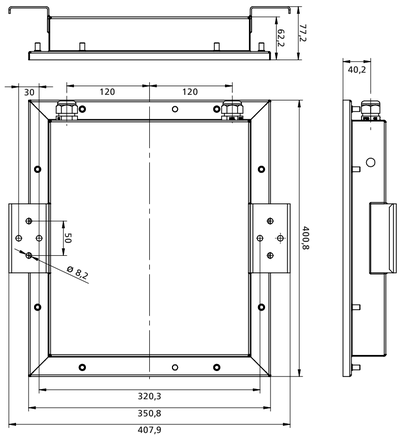
BGB306

FlowStar gen2 small



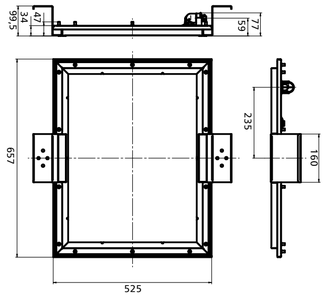
EGB307/8

FlowStar gen2 driver medium/large



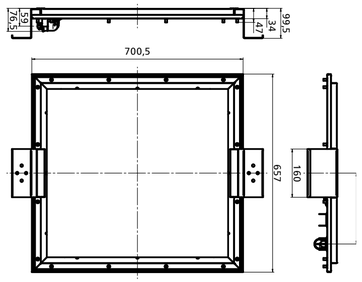
BGB307

FlowStar gen2 medium

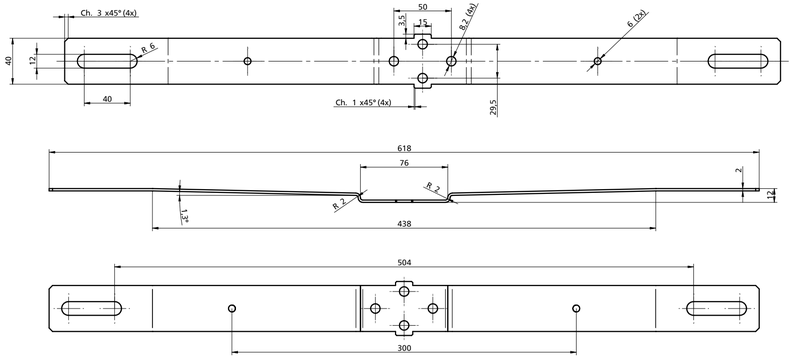


BGB308

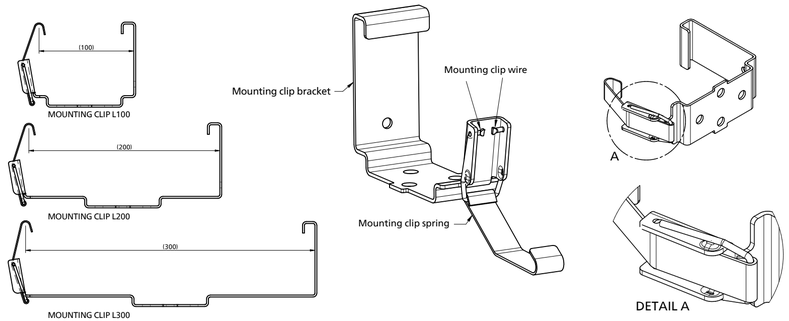
FlowStar gen2 large



MB ceiling bracket



MB Quick-release bracket (S, M, L)



Product specifications

Type	FlowStar gen2 mini (BGB305) • small (BGB306) • medium (BGP307) • large (BGB308)
IP rating	IP66
IK rating	IK09
Light source	Integral LED-module
Power	up to 421 W
Luminous flux	up to 76,500 lm
Color temperature	Warm white/3000 K, Neutral white/4000 K and Cool white/5700 K
Color rendering index	CRI > 70
Electrical class	Class I or Class II
Light distributions	Large range of tunnel lighting distributions: counterbeam, symmetrical and asymmetrical
Optical cover	Tempered flat glass 6 mm thick with glass screening print
Luminaire efficacy	up to 160 lm/W
Lumen maintenance output	Min L95 = 100.000 hours (See LPT for accurate value per type)
Operating temperature range	-30 °C to +50 °C
Driver	Full prog or SR drivers

Fusing	Optional
Mains voltage	230V (see driver datasheet)
Surge protection	Drivers are rated standard 6kV with option for 10kV
Control system input	DALI control (D9), coded mains control (D28)
Connection	Flying lead options: cable IN with plug (Wieland 5P) Socket options: power-IN/OUT & DALI IN/OUT or Power & Control IN/OUT Gland options: power-IN/OUT & DALI IN/OUT or Power & Control IN/OUT
Accessories	Mounting brackets: stainless steel (316L) Base bracket (BA), suitable for additional ceiling (MB), wall (MBA) or quick release (MBQ) brackets
Materials/Finish	Housing: stainless steel AISI316L pickled and passivated Color: natural stainless steel Optic cover: tempered flat glass Brackets of stainless steell AISI316L
Maintenance	FlowStar gen2 is fully serviceable. The mini, small and separate driver unit are serviceable when mounted in the tunnel to access the drivers. The LED units of the medium and large need to be taken down for servicing at the local workshop
Installation	The luminaires can be mounted on various tunnel structures by means of the brackets. Ceiling, wall, cable tray or customer specific brackets can be mounted onto the luminaire bracket interface (BA)
Weight	Mini BGB305: 8 kg • small BGB306: 10 kg • medium BGB307: 20 kg • large BGB308: 25 kg

You and Signify – a reliable partnership

Signify is the world leader in connected LED lighting systems, software and services. We proudly bring to market the best lighting brands in the world, including Signify, Philips and Interact.

We believe in close cooperation before, during, and after every project. Our local teams provide the support and information you need—with flexible, on-time delivery and reliable product availability.

To help you stay ahead, the Signify Lighting Academy offers a comprehensive range of educational resources to grow your expertise and earn certification.

Our global brands

signify

Signify represents our commitment to sustainable innovation. As our leading brand for connected lighting systems, luminaires and components for the specification project business, Signify solutions serve the segments where we collaborate most closely with our customers.

signify interact

Signify Interact is our IoT software platform for managing smart lighting systems and unlocking the value of the data they collect. Easy to install and configure, Interact supports a wide range of applications—from small offices to entire cities.

PHILIPS

Philips stands for quality and energy efficiency in lighting. It is our leading brand for innovative, off-the-shelf lighting products for professionals and consumers alike.

Get more info on our products, services and tools:

signify.com/installers

signify.com/specifier

Driven by responsible innovation

Signify and the Mercedes-AMG PETRONAS F1 Team share a passion for technology and a desire to push the boundaries of what is possible.

Our innovations in lighting serve the well-being and performance of the team, deliver powerful experiences, both trackside and at home, and help the team pursue its ambition to become one of the most sustainable in sport.

Learn more at

signify.com/partnership

Signify is Official Lighting Partner of Mercedes-AMG PETRONAS F1 Team

Official Lighting Partner

signify | AMG PETRONAS FORMULA ONE TEAM

the meaning of light

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