PHILIPS

Outdoor lighting

FlowLine

Product guide

Better visibility and less disturbance whilst driving

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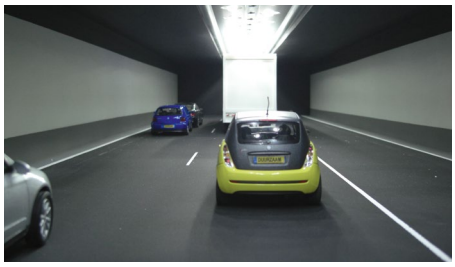
Optimized comfort from LED linear lighting

More and more road authorities are turning to LED linear lighting for their tunnel lighting needs. That's because, compared to point-source lighting, it's more comfortable on the human eye, and is therefore safer.

For example, with LED linear lighting there are no 'hard' shadows – this is especially important in a tunnel situation with vehicles travelling at different speeds, the shadows themselves move in position and in shape according to the relative position of the lamp. Point sources also cause reflective glare on the cars in front, and this glare also moves and flickers. All these dynamics can be distracting for drivers.

With LED linear lighting no such problems exist. LED linear lighting provides a diffuse light, creating smaller and softer-edged shadows. It's also highly uniform so there are no disturbing variations in light intensity and reflections. What's more, LED linear lighting creates clear bright white light, not yellowish, so that objects are illuminated in their true natural colors. This optimizes perception and minimizes the anxiety that can be caused when entering the tunnel.

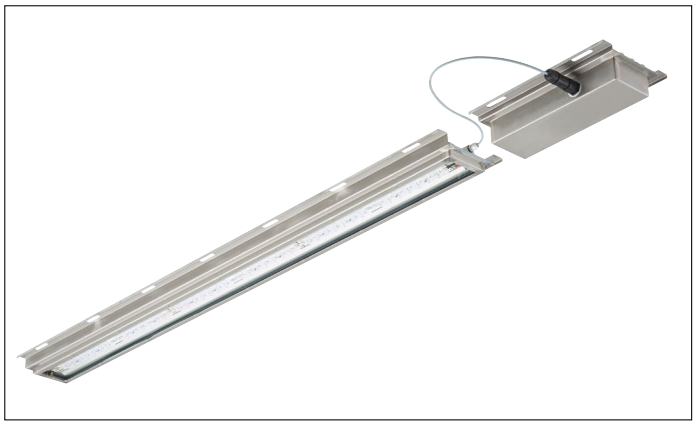
HPS point-source lighting



LED linear lighting

In total, LED linear lighting offers a more comfortable illuminated environment with increased visibility and less disturbance to the visual driving task – especially in a dynamic environment with moving vehicles. It enables earlier detection of speed changes, and reduces over-reaction.

And, thanks to its lower total cost of ownership over the full lifecycle, it is also the preferred choice over fluorescent linear lighting.



The FlowLine family

Design concept

FlowLine is designed around the different needs of tunnel owners and operators, end users and maintenance and installation companies. It provides a true life time solution.

FlowLine's modular optimized thermal design ensures the best possible performance of the LED technology. Plug and play connectivity facilitates fast installation with highly reliable connections. This also makes it easy to swap units if they need to be replaced and reduces the time that has to be spent in the tunnel driving envelope. Because of the increased use of electronics in our luminaires and the harsh tunnel environment, the units are sealed to provide the best and most reliable IP rating – a fundamental requirement for longevity of the electronics.

FlowLine has the same design concept and quality specifications as FlowStar. As such it can easily be combined in a project, with FlowStar providing the entrance lighting.

Benefits

FlowLine is designed specifically for tunnel applications, which require high standards of performance and availability. Because of the chosen design concept, the luminaire offers several unique benefits:

- High-quality LED alternative to fluorescent interior lighting
- Design based on the latest construction and lighting technology
- Highest rating for performance and longevity
- Lifetime maintenance service concepts, providing reliable and safe tunnel lighting solutions over the entire lifetime of the installation
- System-based concept, allowing seamless integration into our TotalTunnel approach and delivering the best possible performance at system level

These benefits enable owners, operators and installers, and maintenance engineers to create projects that offer the best value-for-money tunnel lighting solutions and provide quality lighting systems for the end-users.

Family range

The FlowLine luminaire is made up of an LED unit (BGB330) and a separate driver (EGB330), which must be ordered separately.

FlowLine LED unit

FlowLine driver unit

FlowLine luminaire

Full range overview

LED unit	Flux	Number of LEDs	Matching driver unit
BGB330 3K	3 klm	12	EGB330 1X3K
BGB330 6K	6 klm	24	EGB330 1X6K
BGB330 11K	11 klm	42	EGB330 1X11K

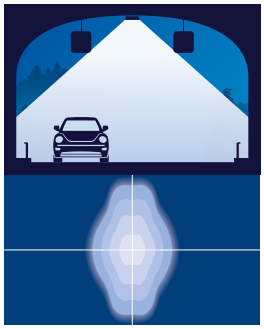
The EGB330 driver units are typically fitted in line with the LED units, without LED extension leads.

Lighting performance

Light distribution

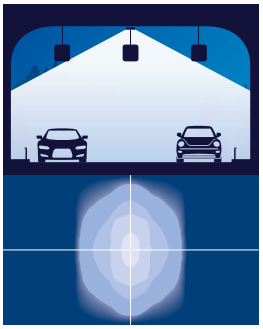
FlowLine offers a wide range of optics which can be used to light any tunnel geometry according to the project specifications. The high-performance lenses are fitted behind a toughened glass cover in a sealed enclosure to ensure reliable light performance over the full lifetime of the product. In cases where the luminaire is mounted flush with the ceiling, the correct choice of optic will ensure the correct light distribution for the tunnel.

DTS Distribution
Symmetrical Standard



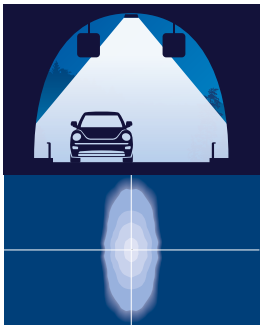
Typical 2 lane tunnel / central configuration

DTS-WB Distribution
Symmetrical Wide



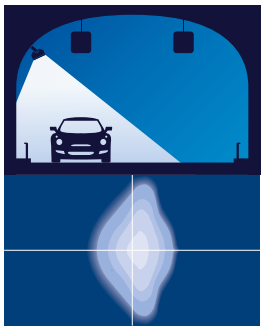
Typical 3 lane tunnel / central configuration

DTS-NB Distribution
Symmetrical Narrow



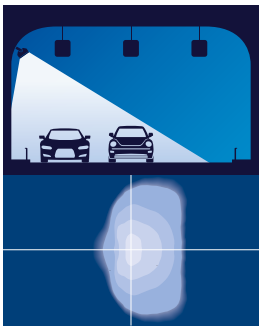
Typical 2 lane narrow tunnel / configuration

DTA Distribution
Asymmetrical Standard



Typical 2 lane tunnel / cornice configuration

DTA-WB Distribution
Asymmetrical Wide



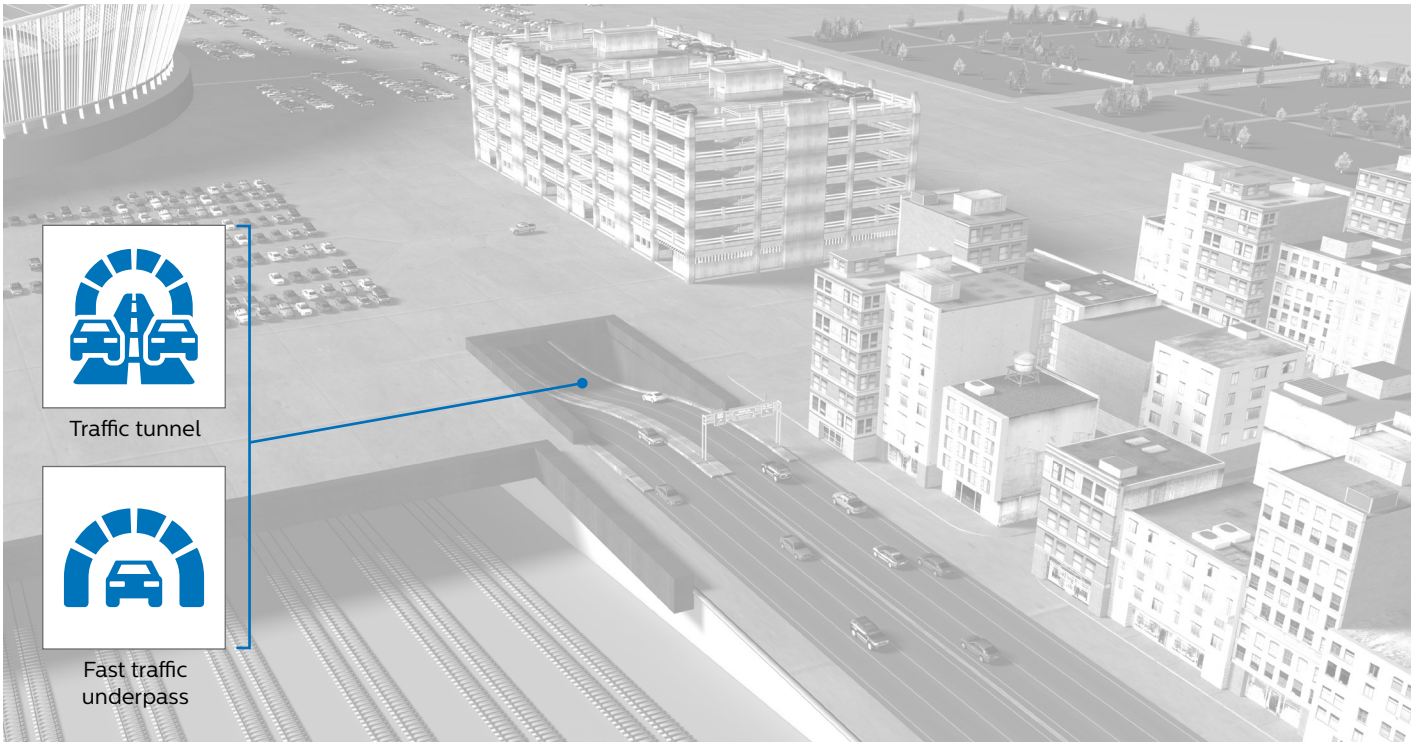
Typical 3 lane tunnel / cornice configuration

DTA-NB Distribution
Asymmetrical Narrow

Typical 2 lane narrow tunnel / cornice configuration

Applications

FlowLine is designed for harsh tunnel environments and in particular for traffic tunnel lighting. It can replace linear fluorescent lighting for interior lighting.



The various optics allow it to be used for any possible tunnel geometry and lighting level required.

In tunnels and underpasses FlowLine can be used for different purposes:

- Continuous linear lighting
- Spaced linear lighting
- Linear exit lighting

Components

1 **Housing:** two separate sealed units (LED unit and driver unit). The main body is made of stainless steel plate material (EN 1.4571) pickled and passivated in accordance with DIN EN 2516 / ASTM A380 / A967.

2 **Glass cover:** thermally toughened ultra-clear glass cover.

3 **Heatsink:** aluminum (EN-AW 6063) extruded part 25 µm anodized in accordance with EURAS/EEWA. Heatsink is mounted on top of the luminaire and not visible on the visual.

4 **Mounting flange:** allows clamp mounting or project-specific solutions.

5 **Mounting clamps:** set of 4 stainless steel (EN 1.4571) mounting clamps per unit, including washers (PA) for galvanic isolation from the tunnel construction (C-profiles).

6 **Flying lead:** flying lead (LS0H) and plug connection (IP66/68) to LED unit for easy replacement.

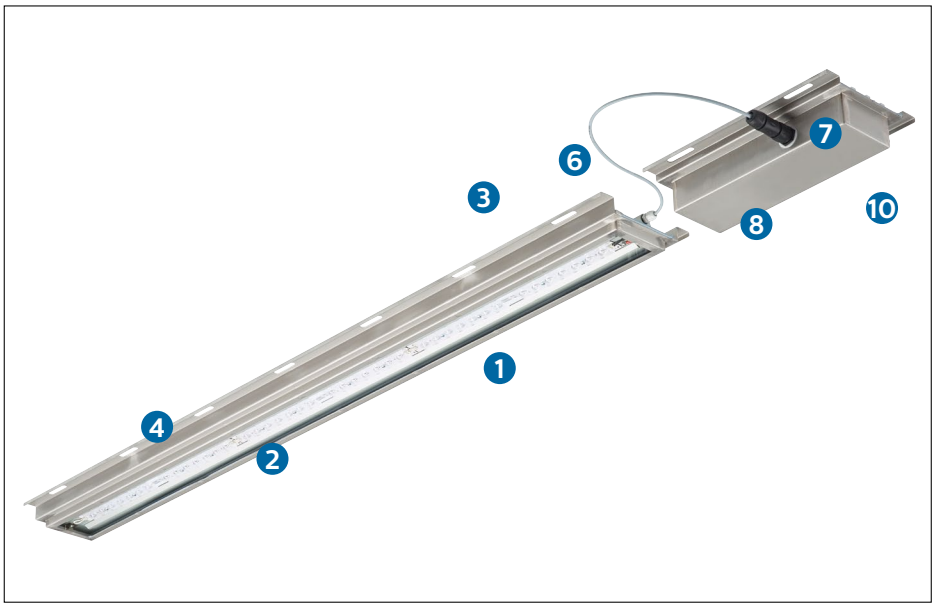
7 **Driver unit:** equipped with fuse accessible from the outside.

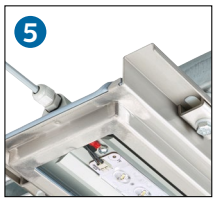
8 **Gear:** one LED driver in the driver unit. The drivers are programmable and fully compliant with our TunneLogic control and monitoring system.

9 **Connection:** sockets for DALI control and mains connection.

10 **Filter:** to prevent underpressure and overpressure.

11 **Galvanic separation:** frames and heatsinks separated by silicone sealing.





Mounting clamp: single-sided mounting

Plug & play connectivity (MDO): one mains connection, including DALI wire plug connection on the driver unit

Plug & play connectivity (MDD): one mains and two separate DALI plug connections on the driver unit

Flying lead connectivity (CFW): mains cable including two DALI wires

Galvanic isolation

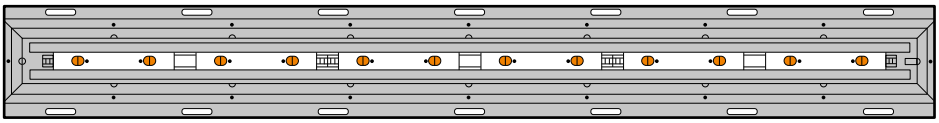
Luminaire features

Linear LED design for interior lighting levels

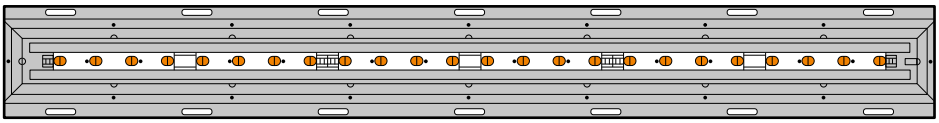
The FlowLine LED design is based on an integrated, non-compromized approach. Both thermal management and optical management form an integral part of that philosophy. Because of the linear design, LEDs are placed in one single string, evenly spread over the length of the LED unit.

Configurations

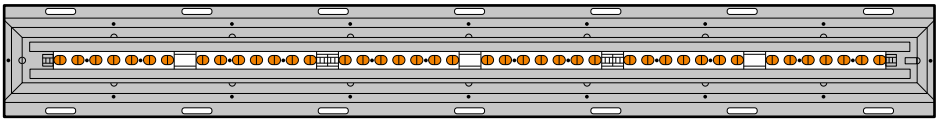
FlowLine comes in one size only. By spacing the LEDs further apart and thus changing the number of LEDs, different lumen packages can be created.



BGB330 3 klm (12 LEDs)



BGB330 6 klm (24 LEDs)



BGB330 11 klm (42 LEDs)

Luminaire features

Shallow, sealed modular build

Shallow build

- The FlowLine LED unit and local driver unit combined are less than 70 mm high. This shallow build allows either increased overhead height or a reduction in the tunnel height
- The length of the LED unit is standardized at approximately 1.6 meters, with a width of 0.2 meters. This means it can replace a conventional fluorescent luminaire of similar length, but with a considerably smaller cross section

Modular build

The modular build offers advantages in terms of both thermal behavior and maintenance:

- Thermal management: LEDs do not affect the thermal management of drivers and vice versa. This gives the best possible thermal solution for LEDs and drivers, thereby maximizing lifetime and efficiency ratings
- Maintenance/installation: the separate units allow for efficient repair. The LED and the driver unit can be replaced separately for incidental repairs or for group replacement in the event of different lifetime expectancy between the LED unit and the driver unit. This also reduces the required stock of spares and facilitates fitting because of the reduced weight of the single units. The units can easily be replaced thanks to the plug and play design

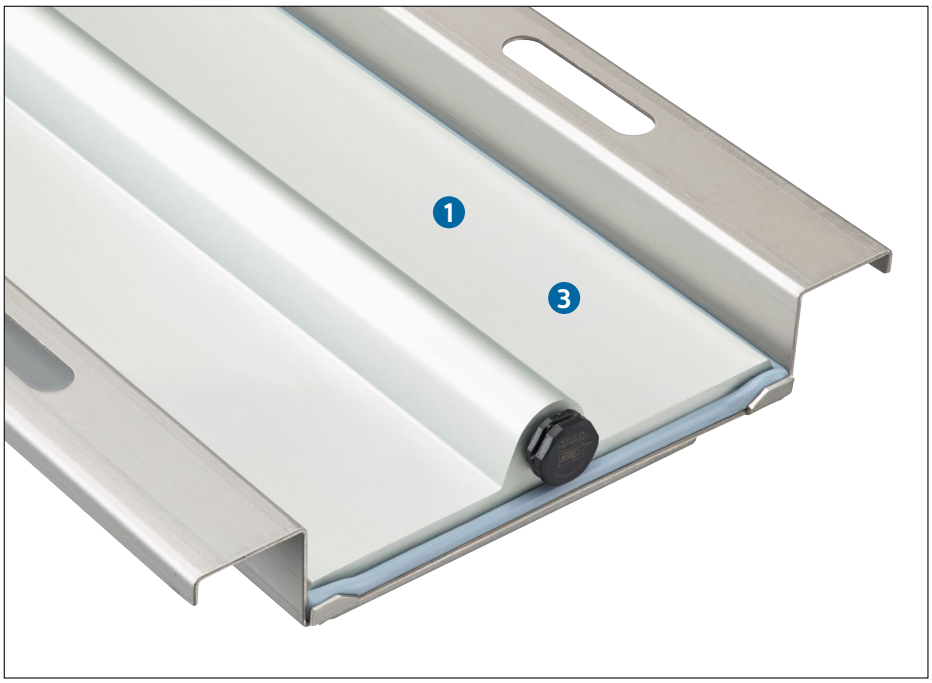
Sealed units

- Traffic closures in tunnels need to be avoided as much as possible. By providing sealed, easily exchangeable units, the time needed for repairs can be reduced to a minimum
- The use of LED technology and more electronics in the tunnel driving envelope means that the IP rating of the enclosures has to meet higher standards. Sealed units provide the ultimate reliable IP rating over their entire lifetime

Luminaire features

FlowLine cooling concept

The integrated design approach has resulted in the coolest and therefore the most efficient lighting solution possible.



The best LED heat sink design for the application

1 **Aluminum heat sink** anodized for optimum heat dissipation. Aluminum has the greatest capacity to spread and dissipate the heat to the surrounding area.
2 **A thermal interface layer** made of special heat-conducting material between the PCB and the luminaire housing further optimizes heat dissipation. (Not visible)
3 **Direct heat dissipation** from LEDs to the heat sink and to the outside.

Modular build: drivers and LEDs do not heat one another.

The technology is already in use in Philips' standard outdoor luminaires. For critical applications like tunnel lighting, only proven technology is used, ensuring reliability from the very start.

Luminaire features

Lens optic technology

Lenses are grouped in sets of 7 on a lens plate; as a result of this controllable compact size and the fact that the lens plates are always placed on the PCB, the pressure on the PCB is equalized, thereby optimizing heat dissipation.

Material follows function

The main (load-bearing) construction is made of stainless steel:
- Best corrosion-resistant material, meeting EU market standards
- High-grade finishing: pickled and passivated
- Different stainless steel material grades available to suit specific customer requirements

The heat sink is made of aluminum (non-structural part):
- Best material (and finish) properties for optimal thermal management
- High-grade protective finish: industrial-grade anodized

The luminaire is designed in such a way as to prevent galvanic corrosion. In addition, the mounting construction is such that there is no galvanic contact between the luminaire and the main tunnel-mounting construction.

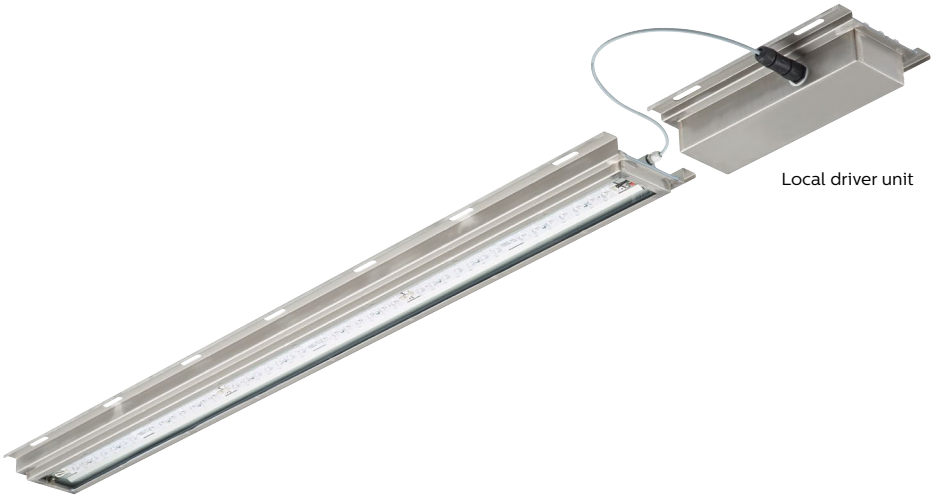
Luminaire features

Local or remote driver layout

For FlowLine, both local and remote driver solutions are available. The driver is normally fitted remotely, outside the driving envelope so as to facilitate maintenance activities.

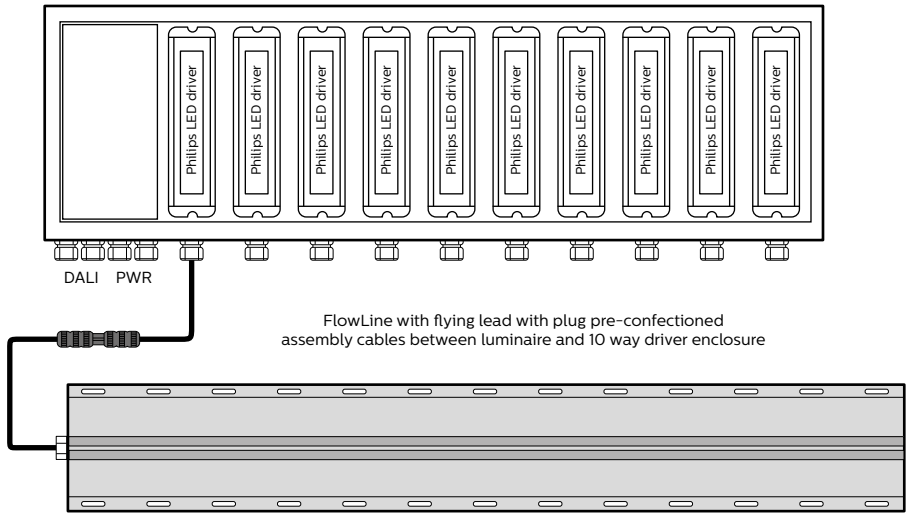
Local single-driver solution (EGB330)

The standard arrangement is that the FlowLine LED unit is powered by a local single-driver unit. It can be fitted in line with the LED unit because it has the same width for the mounting points.



Remote multi-driver solution

As an alternative to the local single-driver unit, the FlowLine LED unit can be powered by a remote multi-driver unit. Driver units are typically fitted remotely, outside the driving envelope. LED extension leads can be used to connect the LED units to the remote multi-driver unit.



Remote driver unit with LED extension leads

Luminaire features

Lifetime maintenance service concept

Standard long life

The standard lifetime expectancy (L80/B10) of all FlowLine versions is 100,000 hours. This applies irrespective of how the luminaire is used and does not take into account any extension of lifetime due to switching off or dimming, which is common in tunnel applications.

Extended long life

Upon request, Philips 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 lifecycle support and service packages.

Philips guarantees product functionality and supports system functionality over the agreed lifetime of the project, which can consist of 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 system functionality, use, maintenance and commissioning
- Service parts kit on site

Serviceability

FlowLine has a modular, sealed plug and play design. The LEDs and drivers are housed in separate enclosures. These units can be replaced easily.

The main reason for this design approach is that the lifetime expectancy is longer for the LEDs than for the drivers. The modular design allows optimization of the lifecycle maintenance concept. Both units can continue operating until they need to be replaced at the end of their life.

The remote multi-driver units are not sealed and can therefore be serviced. They can be opened for incidental or group driver replacement.

Accessory overview

Power cable & DALI communication cable

Mains and DALI cabling

FlowLine is equipped as standard with sockets on the driver unit. Philips supplies cabling with plugs fitted as an accessory. These are available in standard lengths to enable a full plug and play installation process.

- Power cable with plug fitted at one end
- DALI cable with plugs fitted at both ends

Sealing cap for unused socket connection

Socket sealing cap

In order to wire up the DALI network the DALI cabling is usually looped in and out from one luminaire to the next. At the end of the DALI network there is one socket left unused. To ensure a proper IP rating, a socket sealing cap must be fitted.

Spare mounting clamps

Spare mounting clamps

FlowLine and the separate units are supplied with sets of mounting clamps. If extra mounting clamps are required, two sets are available which include the isolation washers needed for full galvanic isolated mounting.

- Set of 4 mounting clamps including isolation washers for mounting each separate FlowLine unit

LED extension lead

LED extension lead

One of the reasons why the driver unit is often positioned remotely outside the driving envelope is that maintenance can be carried out without closing the tunnel.
For this, an extension cable that plugs into the LED unit flying cable at one end and into the driver unit at the other end is required.

- LED extension lead with plug fitted at one end. Separate plugs to connect to the driver unit are also available
- LED extension lead with plugs fitted at both ends

FlowLine in control

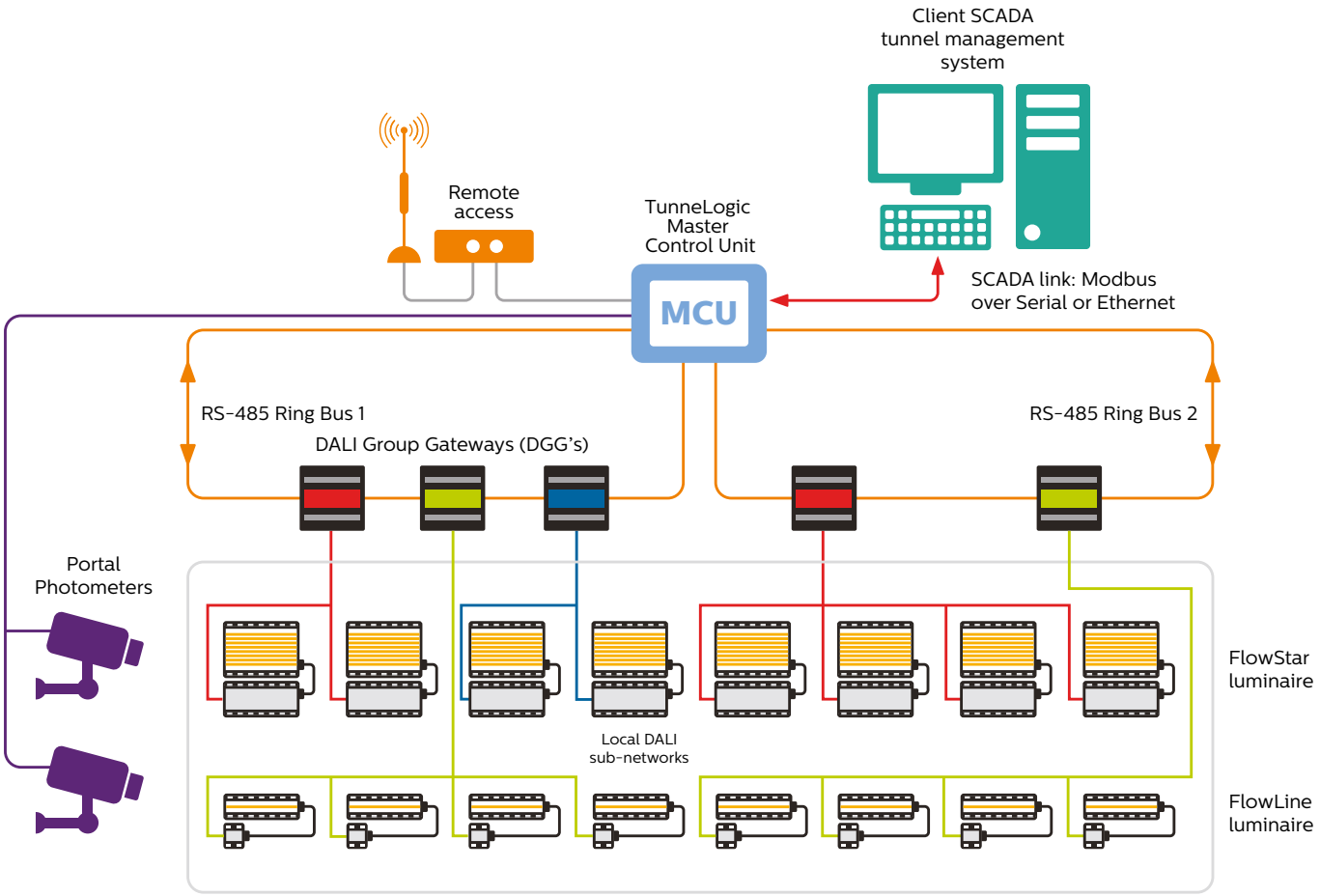
TunneLogic

TunneLogic, our dedicated tunnel control and monitoring system, ensures we get the best out of LED technology. This control system, which is easy to install, use and maintain, provides the customer with safe lighting control and health information relating to the lighting system. When used together with high-performance Philips tunnel LED luminaires, optimal system performance can be achieved.

FlowLine is an integral part of our TotalTunnel program. Providing the best design at luminaire level is only part of the story. At system performance level, TunneLogic control is required to get the best out of the luminaires. By combining a good luminaire design with a dedicated LED control system you will be assured of the best that is available at system level.

- FlowLine can easily be combined with other luminaires from the TotalTunnel program
- FlowLine is designed to work seamlessly with our TunneLogic control and monitoring system
- FlowLine is optimized for the lifetime maintenance service concept

Below is an example of a topology of our TotalTunnel system approach.



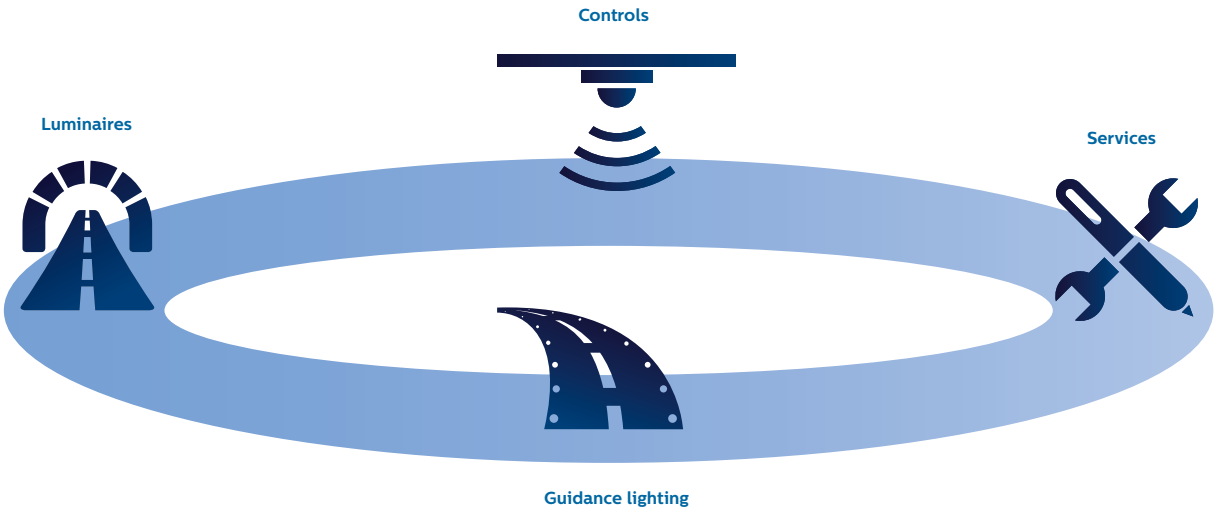
TotalTunnel approach

FlowLine has been developed as part of our TotalTunnel program, which embodies our holistic approach to tunnel lighting. TotalTunnel enables us to channel our expertise in LED lighting into bespoke solutions for our customers.

By combining our four building blocks for success we can create lighting solutions that offer precise levels of quality, guidance, control and service support.

Building blocks for success

The key building blocks for a tunnel lighting solution are:



- **Luminaires** - to support tunnel-specific lighting techniques
- **Guidance lighting** - to guide the traffic and to secure a safe exit
- **Controls** - from basic controls to elaborate monitoring systems to give you full control over the lighting system
- **Services** - from concept design and commissioning to lifecycle services

We take the strain by delivering the complete project and protecting your investment.

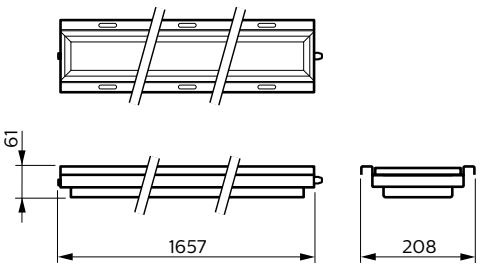
Within each building block Philips offers a range of products, from simple solutions that deliver unbeatable value to high-performance alternatives. We select the components according to your specific needs, and then combine them to create a total lighting system that is unique to your project. So, whether your focus is on the cost of the initial investment or on the total cost of ownership over the entire lifetime, Philips can build the right solution for you.

FlowLine specifications

FlowLine LED unit

LED unit	Specifictions
Type	FlowLine LED unit BGB330
IP rating	IP66
IK rating	IK08
Light source	Sealed separate LED unit
Power (lamp)	BGB330 – 3 klm = 25 W • BGB330 – 6 klm = 49 W • BGB330 –11 klm = 85 W
Luminous flux	3 klm, 6 klm or 11 klm depending on LED configuration
Color temperature (typical)	4000 K (neutral white); 5700 K (cool white)
Electrical class	Class I
Light distribution	• DTS Distribution Symmetrical Standard • DTS-WB Distribution Symmetrical Wide • DTS-NB Distribution Symmetrical Narrow • DTA Distribution Asymmetrical Standard • DTA-WB Distribution Asymmetrical Wide • DTA-NB Distribution Asymmetrical Narrow
Optical cover	Flat glass: ultra-clear, thermally toughened
Color Rendering Index	70
Lumen maintenance output	100,000 hours at L80B10
Operating temperature range	-25 °C < Ta< 40 °C
Connection	LED unit with flying lead and plug connection to driver unit
	All plug connections IP66/IP68
Materials/finish	Main construction: stainless steel EN 1.4571 (SH), pickled and passivated • Non-structural heat sink: aluminum, 6063, 25 µm anodized • Mounting clamps: stainless steel EN 1.4571 (SH), pickled and passivated • Cover: Extra-clear, thermally toughened flat glass, 5 mm thick
Maintenance	LED units are sealed. Units can easily be replaced by plug connections
Installation	Ceiling mounted on C-profiles. Four clamps and plastic washers included with the luminaire. Hammer bolts and nuts for C-profile not included
Weight	LED unit: max. 11 kg

LED-unit BGB330

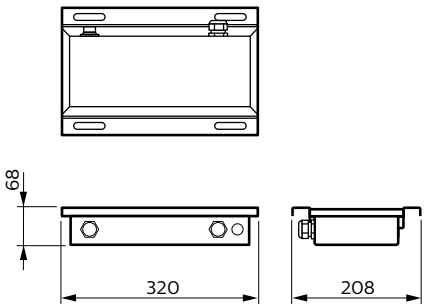


FlowLine driver unit specifications

FlowLine driver unit

Local single driver unit	Specifictions
Type	FlowLine local single-driver unit EGB330
IP rating	IP66
IK rating	IK08
Power (system)	EGB330 – 3 klm = 31 W • EGB330 – 6 klm = 56 W • EGB330 – 11 klm = 95 W
Electrical class	I (Class II pending)
Driver lifetime expectancy	100,000 hours at 10% failure rate
Operating temperature range	-25 °C < Ta< 40 °C
Driver	Philips Xitanium driver
Fusing	IP68 fuse holder accessible from the outside (size 6.3 x 32 mm)
Mains voltage	220-240 V / 50-60 Hz
Surge protection	4 kV
System input control	DALI control (D9) or 1 step phase DIM (D11)
Connections	MDD (two DALI sockets + mains socket) or MDO (mains socket including DALI) or CFW (flying lead for mains + DALI)
	LED unit can be plugged into the driver unit
	All plug connections IP66/IP68
Materials/finish	Main construction: stainless steel EN 1.4571 (SH), pickled and passivated • Non-structural heat sink: aluminum, 6063, 25 um anodized • Mounting clamps: stainless steel EN 1.4571 (SH), pickled and passivated
Maintenance	Driver unit is sealed. Units can easily be replaced by plug connections
Installation	Mounting on C-profiles. Clamps and plastic washers included with the luminaire. Hammer bolts and nuts for C-profile not included
Weight	Driver unit: max 3,5 kg

Driver-unit EGB330



FlowLine LED unit specifications

FlowLine LED unit

Product designation	LEDs (no.)	Source flux (lm)	Lamp power (W)
BGB330 3K/NW SH I DTS-NB C500C	12	3,000	25
BGB330 3K/NW SH I DTS C500C	12	3,000	25
BGB330 3K/NW SH I DTS-WB C500C	12	3,000	25
BGB330 3K/NW SH I DTA-NB C500C	12	3,000	25
BGB330 3K/NW SH I DTA C500C	12	3,000	25
BGB330 3K/NW SH I DTA-WB C500C	12	3,000	25
BGB330 6K/NW SH I DTS-NB C500C	24	6,000	49
BGB330 6K/NW SH I DTS C500C	24	6,000	49
BGB330 6K/NW SH I DTS-WB C500C	24	6,000	49
BGB330 6K/NW SH I DTA-NB C500C	24	6,000	49
BGB330 6K/NW SH I DTA C500C	24	6,000	49
BGB330 6K/NW SH I DTA-WB C500C	24	6,000	49
BGB330 11K/NW SH I DTS-NB C500C	42	11,000	85
BGB330 11K/NW SH I DTS C500C	42	11,000	85
BGB330 11K/NW SH I DTS-WB C500C	42	11,000	85
BGB330 11K/NW SH I DTA-NB C500C	42	11,000	85
BGB330 11K/NW SH I DTA C500C	42	11,000	85
BGB330 11K/NW SH I DTA-WB C500C	42	11,000	85

FlowLine Local single driver unit

Product designation	Number of LED units to connect	Number of LEDs / LED unit (no.)	System power (W)
EGB330 1x3K SH I D9 FU MDD	1	12	31
EGB330 2x3K SH I D9 FU MDD	2	12	56
EGB330 1x6K SH I D9 FU MDD	1	24	56
EGB330 1x11K SH I D9 FU MDD	1	42	95

FlowLine accessories

Description
Clamp set 4 (12NC)
Sealing cap for unused DALI socket (cable order form)
Power cable (cable order form)
DALI communication cable (cable order form)
LED extension lead (cable order form)

FlowLine LED unit specifications

FlowLine combination table LED units - driver units

Example of LED unit type	Number of LED units to connect	Compatible LED unit version
BGB330 3K/NW SH I DTS C500C	1	EGB330 1x3K
BGB330 3K/NW SH I DTS C500C	2	EGB330 2x3K
BGB330 3K/NW SH I DTS C500C	10	Options available*
BGB330 3K/NW SH I DTS C500C	20	Options available*
BGB330 6K/NW SH I DTS C500C	1	EGB330 1x6K
BGB330 6K/NW SH I DTS C500C	2	Options available*
BGB330 6K/NW SH I DTS C500C	10	Options available*
BGB330 6K/NW SH I DTS C500C	20	Options available*
BGB330 11K/NW SH I DTS C500C	1	EGB330 1x11K
BGB330 11K/NW SH I DTS C500C	2	Options available*
BGB330 11K/NW SH I DTS C500C	10	Options available*
BGB330 11K/NW SH I DTS C500C	20	Options available*

* Consult your local sales contact for more information.

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02/2015
Data subject to change.