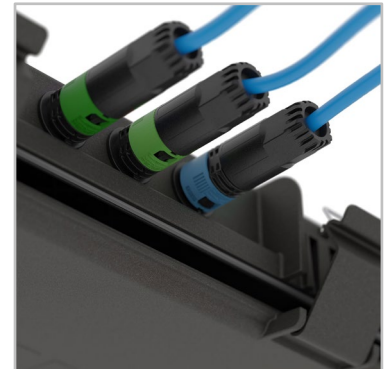
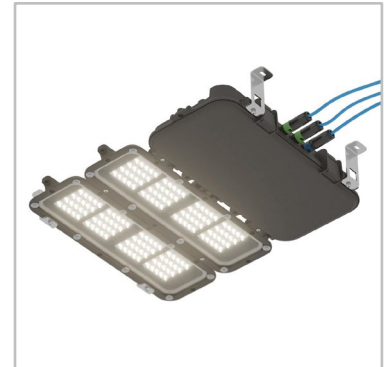
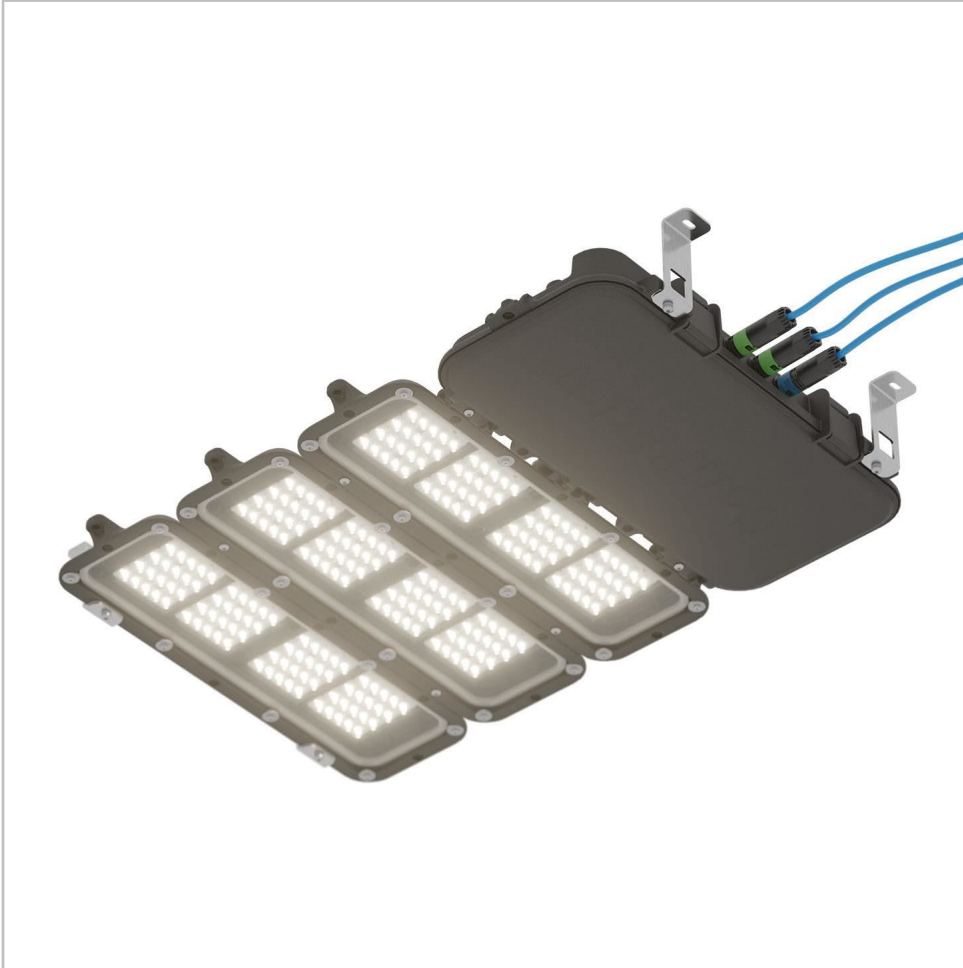


TFLEX GEN2 COMBI

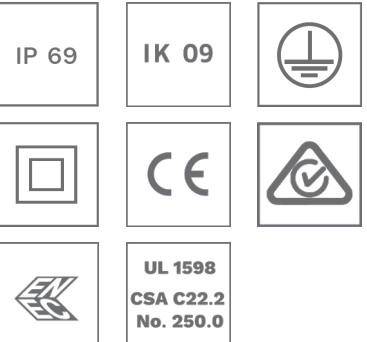


Fully integrated, modular tunnel lighting solution for tailored, high-performance illumination

Building on the proven experience of the first TFLEX range, the TFLEX GEN2 luminaires take tunnel lighting to a new level of modularity and precision.

While retaining the core strengths of the original concept, this second generation features a redesigned, streamlined architecture. The optical units and driver box can be configured to match the exact geometry and operational constraints of each tunnel, ensuring that the optimal solution is delivered. This optimised design also reduces material consumption and environmental impact, without compromising on photometric performance.

More than a tunnel lighting range, TFLEX GEN2 is a complete, end-to-end solution, providing lighting units, power supply, tailored cabling, quick connectors, remote control, commissioning and lifecycle support. With TFLEX GEN2 solutions, you benefit from comprehensive expertise that ensures compliance, operational continuity and maximum durability throughout the lifecycle of your tunnel lighting infrastructure.



Concept

TFLEX GEN2 COMBI delivers a modular approach to address the varying lighting requirements of specific tunnel zones, including the threshold, transition, interior and exit zones. Manufactured from robust, corrosion-resistant materials, it ensures long-term performance across a wide range of environments. Its optimised design reduces raw material usage, achieving a 35% weight reduction and lowering its environmental footprint compared to the first generation.

A modular solution, TFLEX GEN2 COMBI allows connection of up to three optical units to its driver box, TFLEX GEN2 DRIVE, enabling tailor-made lighting configurations that support a wide variety of tunnel geometries.

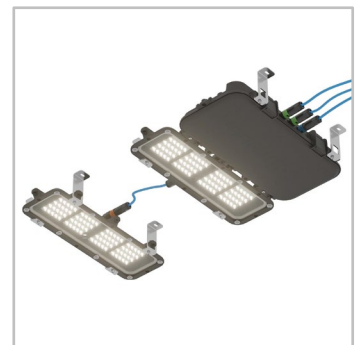
The TFLEX GEN2 COMBI optical units combine high-performance photometric engines with versatile optics developed to deliver uniform, low-glare lighting on both the road surface and tunnel walls, meeting the most demanding tunnel safety standards.

TFLEX GEN2 COMBI features tool-free connectors compatible with fire-retardant cables of custom lengths. This design makes installation fast and straightforward, significantly reducing operational costs and maintenance time.

TFLEX GEN2 DRIVE integrates advanced remote lighting control technologies and is fully compatible with the Advanced Tunnel System 4 management system. This system enables remote, individual adjustment of each luminaire's light levels. When combined with sensors and cameras, it dynamically adapts lighting intensity to traffic flow and weather conditions. This integrated control approach ensures a rapid response to any external or internal tunnel event, significantly enhancing user safety and visual comfort. Furthermore, by integrating the photometric study directly into the ATS 4 control system, TFLEX GEN2 DRIVE guarantees that tunnel illumination levels are perfectly aligned with CIE curve standards.



End-to-end, fully integrated tunnel lighting system simplifying installation, accelerating project delivery and ensuring reliable, future-ready operation.



Highly modular solution adapting effortlessly to any tunnel layout or constraint.



TFLEX GEN2 COMBI leverages advanced tunnel optic technology to deliver precise light distribution, optimal visibility and superior visual comfort.

TYPES OF APPLICATION

- TUNNELS & UNDERPASSES

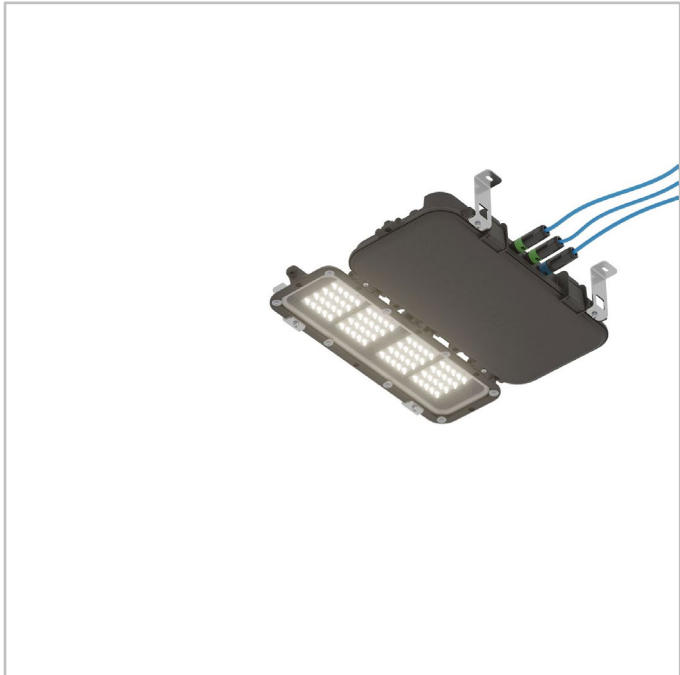
KEY ADVANTAGES

- Flexibility: modular approach with wide range of lighting distributions
- High quality and robust materials
- Designed for long-lasting performance
- Tool-free access for easy maintenance
- LensoFlex®4 versatile solutions for high-end photometries maximising comfort and safety
- Intelligent lighting via remote control
- Two electrical circuits for enhanced dimming possibilities, optimised power factor and longer lifespan

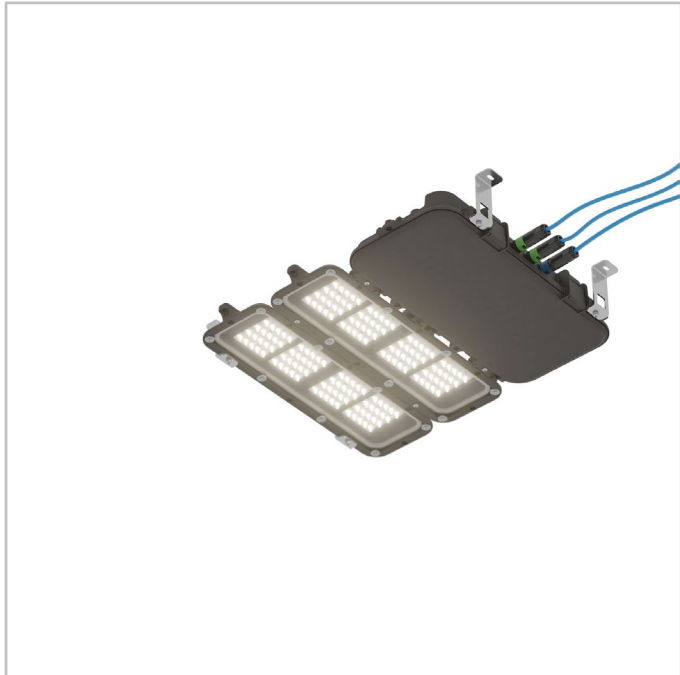


Fully compatible with the latest tunnel lighting control systems, enabling rapid response to incidents and changing conditions inside or outside the tunnel.

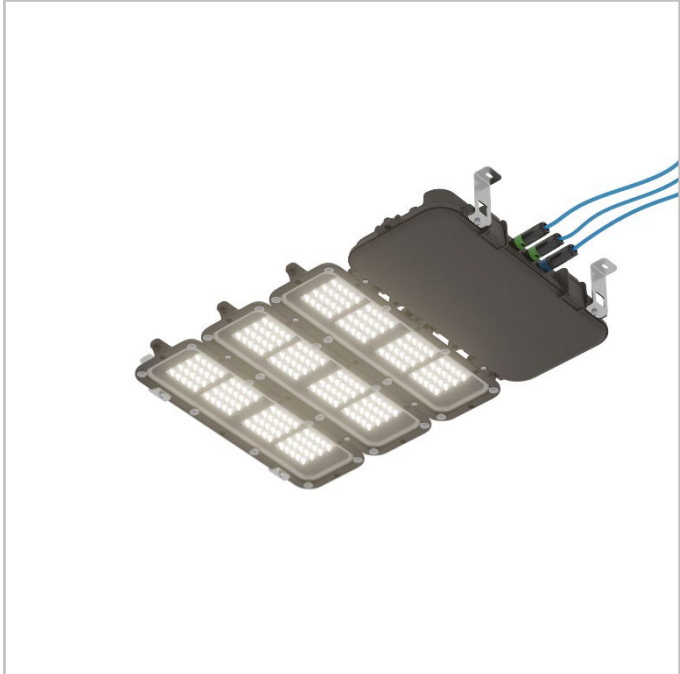
TFLEX GEN2 COMBI | TFLEX GEN2 COMBI 1



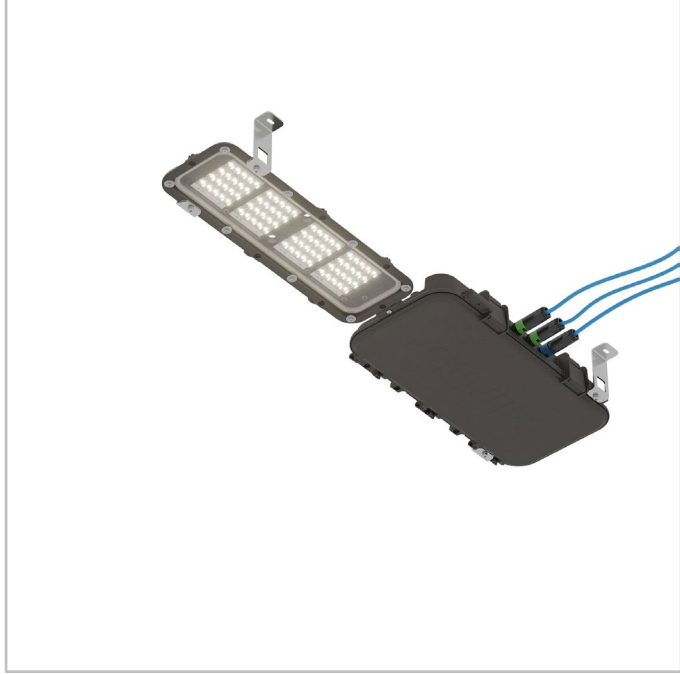
TFLEX GEN2 COMBI | TFLEX GEN2 COMBI 2



TFLEX GEN2 COMBI | TFLEX GEN2 COMBI 3



TFLEX GEN2 COMBI | TFLEX GEN2 COMBI LINEAR

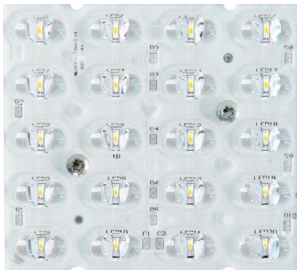




LensoFlex®4

LensoFlex®4 maximises the heritage of the LensoFlex® concept with a very compact yet powerful photometric engine based upon the addition principle of photometric distribution. The number of LEDs in combination with the driving current determines the intensity level of the light distribution. With optimised light distributions and very high efficiency, this fourth generation enables the products to be downsized to meet application requirements with an optimised solution in terms of investment.

LensoFlex®4 optics can feature backlight control to prevent intrusive lighting, or a glare limiter for high visual comfort.



Advanced Tunnel System 4 (ATS 4)

The ATS 4 (Advanced Tunnel System 4) is a powerful tunnel lighting control system for precise remote dimming and switching of each individual connected luminaire, based on various tunnel parameter inputs (emergency exits, smoke extraction system, traffic cameras, etc.).

The ATS 4 permanently communicates with the Lumgates, an RS422 closed-loop device connected to the luminaire drivers, to control the light intensity and provide command/reporting features.



Advanced Tunnel System 4 DALI (ATS 4 DALI)

The Advanced Tunnel System 4 DALI provides the essential functions of the ATS 4 over a DALI network protocol, enabling dimming of luminaire clusters to be controlled collectively.

The ATS 4 DALI is the ideal solution to implement a reliable and powerful tunnel lighting control system with streamlined features and optimised costs.



Lumgate V4

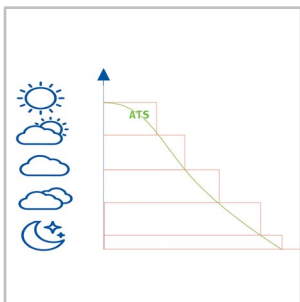
The Lumgate is a luminaire control unit that acts as an interface between the lighting management system and the tunnel luminaires or driver boxes. Connected to the luminaire drivers, it switches the drivers on/off, controls the light intensity and provides command/reporting features.

It is suitable for installation in driver boxes or directly in the luminaire. It communicates with the driver via 0-10V or DALI command. This brand new interface includes advanced Inrush Current Limitation Features and a 24 hour fail-safe repeat mode.



The Advanced Tunnel System 4 (ATS 4) has been designed to control every lighting point or clusters of luminaires to perfectly adapt the lighting level according to conditions in the tunnel, to monitor the power consumption and to report the burning hours or any failure to facilitate maintenance. The system includes a self-commissioning feature and enables scenarios to be adapted remotely at any moment.

PRECISE AND CONTINUOUS DIMMING



ATS 4 provides 25 different dimming levels to precisely adapt the lighting to the real needs. Without any over-lighting, the energy consumption is limited to what is absolutely necessary to ensure safe and comfortable driving conditions.

FLEXIBILITY

Flexible redundancy offers security on multi-level applications, not only for the lighting.

PLUG AND PLAY COMMISSIONING

This control system is easy to install and configure. The tunnel lighting study can be directly imported into the ATS 4 control system. This unique feature, in combination with the auto-addressing of the Lumgates, leads to an extremely short commissioning time once the fixtures have been installed. The ATS 4 benefits from a complete set of toolless smart cables and connectors, allowing installers to speed up cabling and save valuable time on-site.

INTERACTION WITH THIRD PARTY SYSTEMS

Every command or signal sent to or coming from a tunnel component (emergency exit, smoke extraction system, traffic management system...) can be used to trigger a responsive lighting scenario. All of the tunnel equipment can be controlled through the same bus command.

MAXIMISED SAFETY

The system enables the easy set-up of emergency and disaster management scenarios.

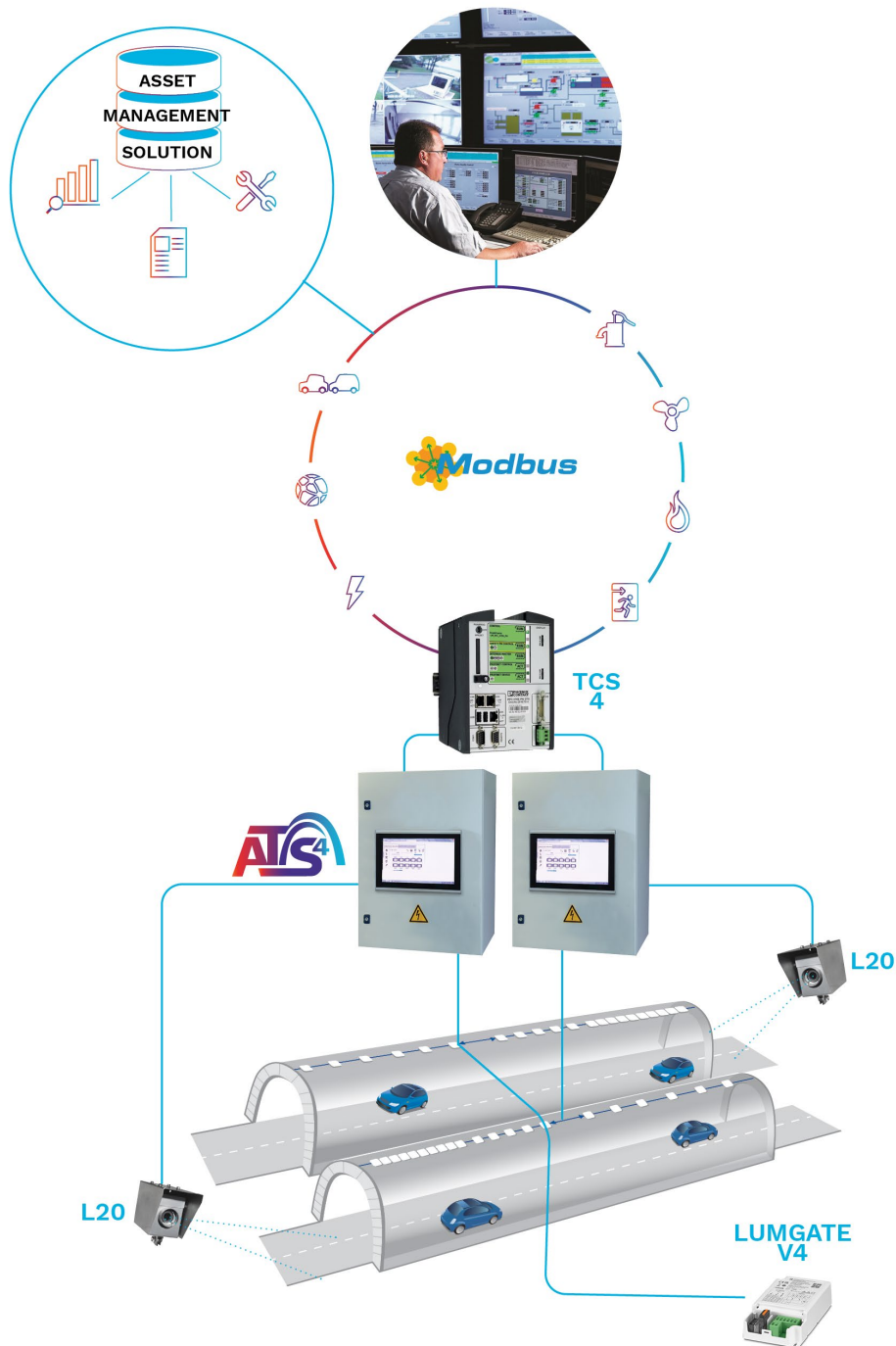
ADAPTIVE LIGHTING ACCORDING TO SPEED

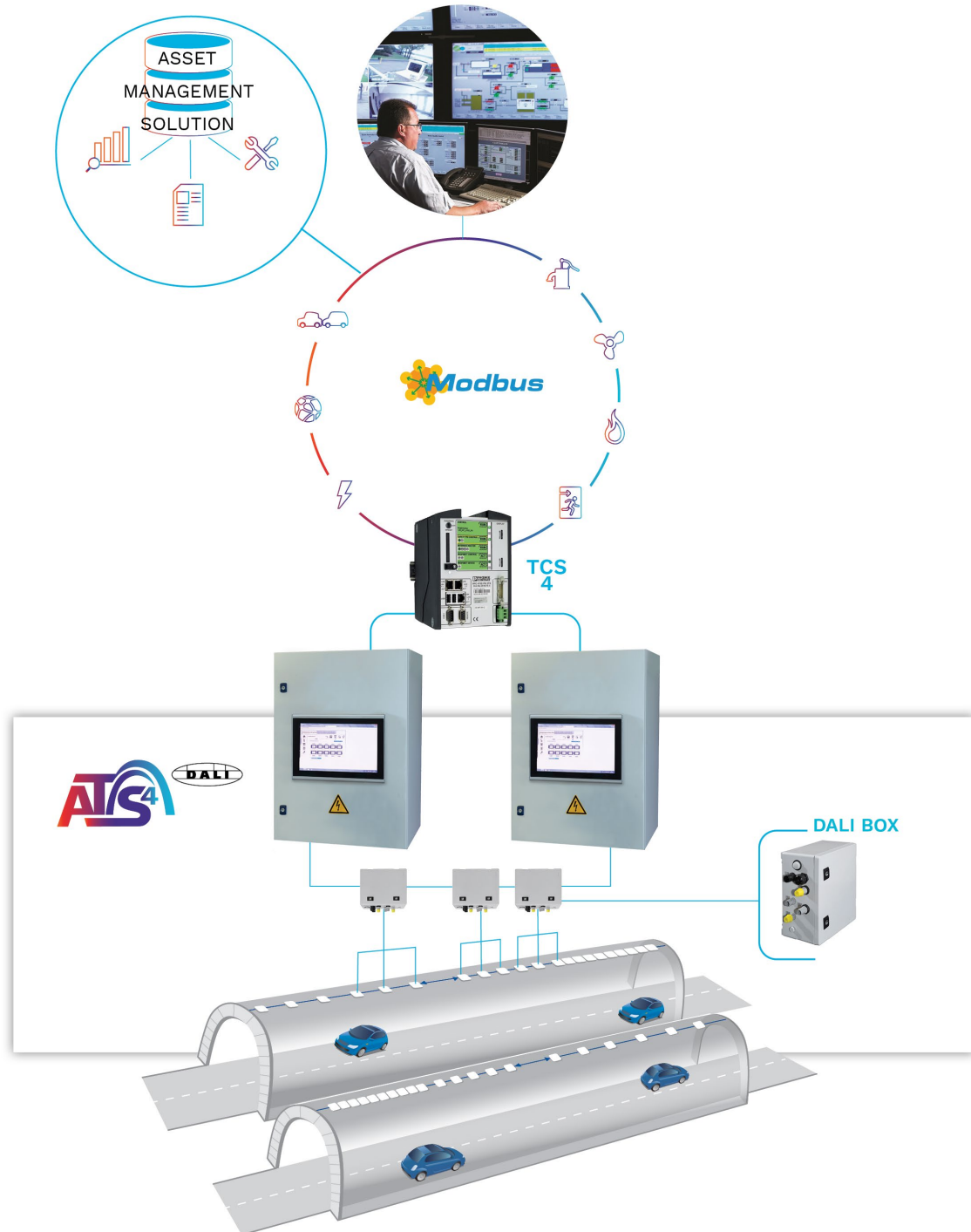


The ATS 4 can be linked to a traffic monitoring system to obtain data regarding speed or density to adapt the lighting level according to safety standards. This option further reduces energy consumption and increases the lifetime of the installation while ensuring the best driving conditions for motorists.

ADAPTIVE LIGHTING ACCORDING TO POLLUTION

Based on cleaning cycles, the ATS 4 can take into account the depreciation of the flux due to dirt accumulation to continuously provide the requested lighting level in the tunnel. No more, no less. This feature offers additional energy savings while providing safety and comfort for users.





GENERAL INFORMATION

CE mark	Yes
ENEC certified	Yes
UL certified	Yes
RCM mark	Yes

HOUSING AND FINISH

Housing	Aluminium
Optic	PMMA
Protector	Tempered glass
Housing finish	Standard polyester powder coating (C4 according to the ISO 9223-2012 standard) Optional "seafront" polyester powder coating with anodisation (C5-CX according to the ISO 9223-2012 standard)
Standard colour(s)	AKZO grey 900 sanded
Tightness level	IP69
Impact resistance	IK09
Vibration test	Compliant with ANSI C 136-31 standard, 3G load
Access for maintenance	Tool-less access to gear compartment

OPERATING CONDITIONS

Operating temperature range (Ta)	-40 °C to +55 °C / -40 ° F to 131 °F
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· Depending on the luminaire configuration. For more details, please contact us.

ELECTRICAL INFORMATION

Electrical class	Class 1 US, Class I EU, Class II EU
Nominal voltage	220-240V – 50-60Hz 347-480V – 50-60Hz 277V – 50-60Hz
Surge protection options (kV)	10 20
Control protocol(s)	DALI-2, RS422 Closed Loop, 1-10V
Control options	Lumgate
Associated control system(s)	Advanced Tunnel System 4 (ATS 4) Advanced Tunnel System 4 DALI (ATS 4 DALI)

· Electrical information given for the gear box

OPTICAL INFORMATION

LED colour temperature	4000K (Neutral White NW 740)
Colour rendering index (CRI)	>70 (Neutral White NW 740)

LIFETIME OF THE LEDS @ TQ 25°C

All configurations	100,000h - L95
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· Lifetime may be different according to the size/configurations. Please consult us.

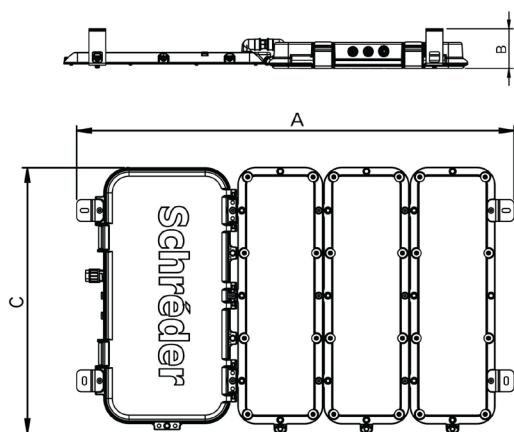
DIMENSIONS AND MOUNTING

AxBxC (mm inch)	TFLEX GEN2 COMBI 1 : 593x115x600 23.3x4.5x23.6 TFLEX GEN2 COMBI 2 : 785x115x600 30.9x4.5x23.6 TFLEX GEN2 COMBI 3 : 978x115x600 38.5x4.5x23.6
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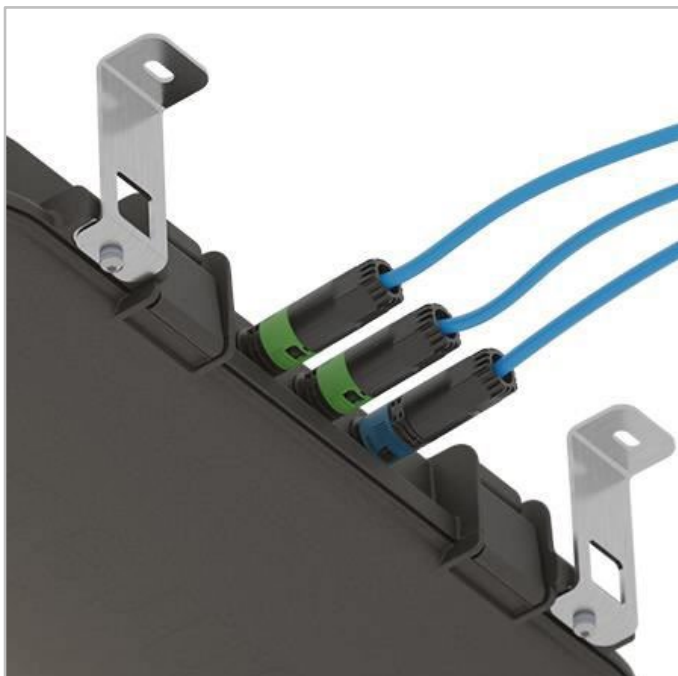
Weight (kg lbs)	TFLEX GEN2 COMBI 1 : 13.7 30.1 TFLEX GEN2 COMBI 2 : 18.3 40.3 TFLEX GEN2 COMBI 3 : 22.8 50.2
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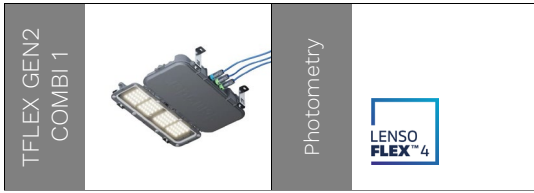
Mounting possibilities	Surface mounting Wall-mounted
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· For more information about mounting possibilities, please consult the installation sheet.



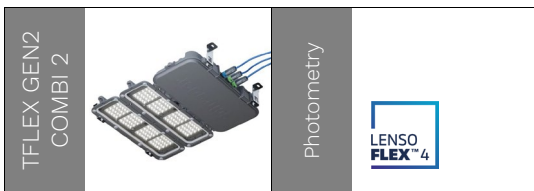
TFLEX GEN2 COMBI | Fixed brackets - more details in the installation sheet





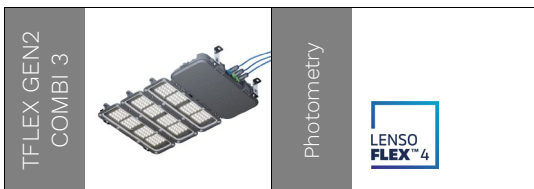
	Luminaire output flux (lm)		Power consumption (W)		Luminaire efficacy (lm/W)
	Neutral White NW 740		Min	Max	
Number of LEDs	Min	Max	Min	Max	Up to
80	12800	33200	85	232	172

Tolerance on LED flux is ± 7% and on total luminaire power ± 5 %



	Luminaire output flux (lm)		Power consumption (W)		Luminaire efficacy (lm/W)
	Neutral White NW 740		Min	Max	
Number of LEDs	Min	Max	Min	Max	Up to
120	19200	49800	126	351	174
160	25600	66400	170	464	172

Tolerance on LED flux is ± 7% and on total luminaire power ± 5 %



	Luminaire output flux (lm)		Power consumption (W)		Luminaire efficacy (lm/W)
	Neutral White NW 740		Min	Max	
Number of LEDs	Min	Max	Min	Max	Up to
240	70800	90900	500	623	161

Tolerance on LED flux is ± 7% and on total luminaire power ± 5 %