

TFLEX LINE



The complete solution for tunnel continuous lighting

TFLEX LINE has been developed in the continuity of the TFLEX tunnel solution, offering a continuous LED line designed to provide perfect visual guidance in the most complex tunnel zones with maximum efficiency.

With its slim-line design and linear-shaped light sources, TFLEX LINE is the perfect replacement for fluorescent tubes. Its improved photometric engines lead to unrivalled visual performance, creating perfect light uniformity everywhere in the tunnel while significantly reducing energy consumption.

This continuous LED line is available in various lengths with multiple photometric distributions, making it suitable for any kind of tunnel project.

Thanks to its remotely connected driver box, TFLEX LINE allows great flexibility in its control features.

TFLEX LINE is a complete solution, available with integrated connectors and deliverable with a set of preassembled cables in custom lengths to fit any tunnel length and geometry.



Concept

TFLEX LINE is a linear optical unit consisting of an extruded anodised aluminium profile closed with die-casted end caps and a flat glass protector. A silicone gasket placed all around the glass and embedded in the end caps ensures an IP66 tightness level. Various levels of anti-corrosion treatment make TFLEX LINE a reliable lighting solution for a wide range of tunnel conditions.

The end caps can integrate straight or angle connectors, with a single or double circuit, allowing great flexibility for tunnel lighting configuration.

The TFLEX LINE is remotely connected to its driver box using preassembled custom-length cables. This solution offers various tunnel lighting control options while providing even more flexibility to suit any kind of tunnel project.

The TFLEX LINE photometric engines have been designed to enhance tunnel lighting and provide perfect visual guidance, ensuring high visibility in any tunnel zone. As every tunnel is unique, the TFLEX LINE optic range has been specifically developed to suit the most specific types of tunnel environment.

TFLEX LINE has been designed to be mounted on ceilings or side walls with quick-mount clips, reducing the number of fixation points, or fixed L-shaped brackets.

Developed in the continuity of the TFLEX range, TFLEX LINE provides a complete tunnel lighting solution offering different length lighting units, cables, connectors, driver boxes and control features to enhance the tunnel experience.



The TFLEX LINE's linear slim shape makes it the perfect replacement for fluorescent tubes.



TFLEX LINE can be mounted on ceilings and side walls with clip-type brackets or fixed L-shaped brackets.

TYPES OF APPLICATION

- TUNNELS & UNDERPASSES

KEY ADVANTAGES

- High visual comfort through continuous line lighting
- Various lengths for continuous line installation
- Excellent uniformity and significant energy savings
- Two electrical circuits for enhanced dimming possibilities, optimised power factor and longer lifespan
- Designed for long-lasting performance



The TFLEX LINE photometric engines have been designed to enhance tunnel lighting and provide perfect visual guidance.



TFLEX LINE is a complete tunnel lighting solution, providing different length optical units, driver boxes, custom-length cables and connectors, and broad control functionality.

TFLEX LINE | 60



TFLEX LINE | 120



TFLEX LINE | 200





ContiFlex™

ContiFlex™ is a linear photometric engine with high-power LEDs designed to meet the need for a perfect uninterrupted lighting effect.

This platform relies on Schröder expertise in providing highly efficient lighting distributions with various dedicated optics, quantities of LEDs and driving currents.



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.



Sensors and cameras

The ATS 4 can be connected to various sensors and cameras to permanently adjust the lighting levels to indoor and outdoor conditions and avoid any visual adaptation problems.



Tunnel Control System 4 (TCS 4)

The Tunnel Control System 4 (TCS 4) is a gateway ensuring the connection/control of the multiple ATS 4 controllers as well as the communication with the central management system of the tunnel infrastructure (SCADA) if applicable.

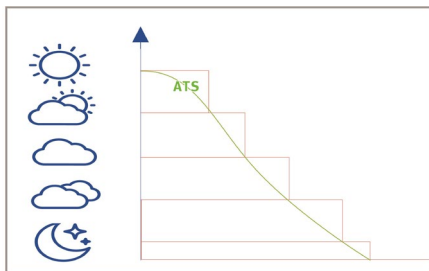




Jointly developed by Schröder and Phoenix Contact, the Advanced Tunnel System 4 (ATS 4) has been designed to control every lighting point or clusters of luminaires to perfectly adapt the lighting level according to conditions in the tunnel, to monitor the power consumption and to report the burning hours 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

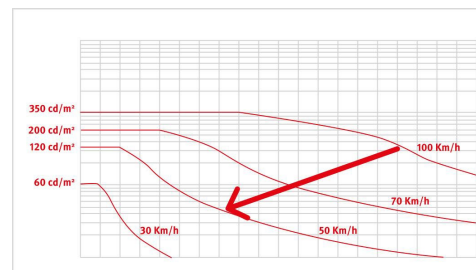
Every command or signal sent to or coming from a tunnel component (emergency exit, smoke extraction system, traffic management system...) can be used to trigger a responsive lighting scenario. All of the tunnel equipment can be controlled through the same bus command.

MAXIMISED SAFETY

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

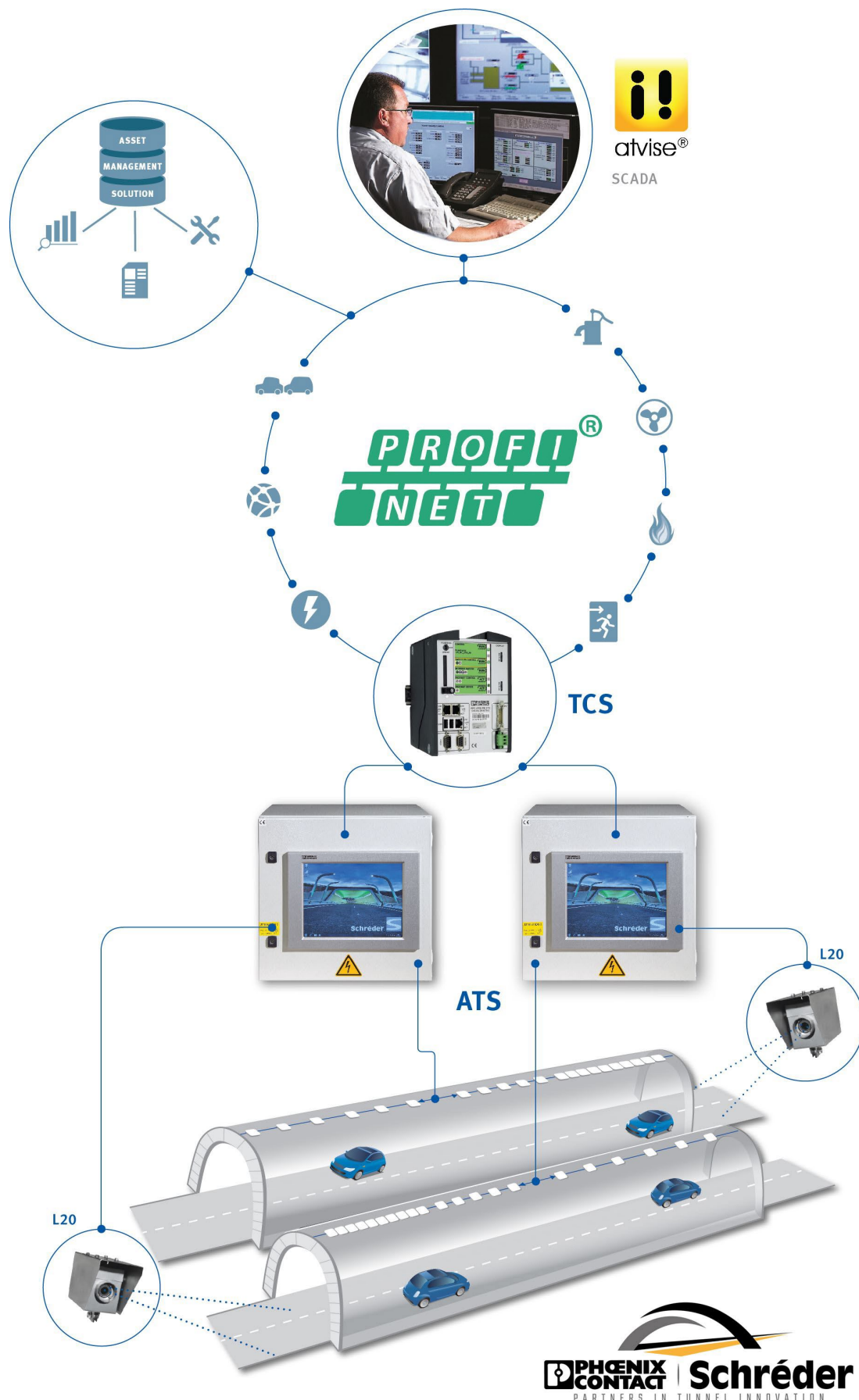
ADAPTIVE LIGHTING ACCORDING TO SPEED

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

Circle Light label	Score between 60 and 90 - The product meets most of circular economy requirements
CE mark	Yes
ENEC certified	Yes
ENEC+ certified	Yes
UL certified	Yes
UKCA marking	Yes

HOUSING AND FINISH

Housing	Aluminium
Optic	PMMA
Protector	Tempered glass
Housing finish	Standard polyester powder coating (C2-C3 according to the ISO 9223-2012 standard) Optional "seaside" 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)
Tightness level	IP66/IP69
Impact resistance	IK 08

OPERATING CONDITIONS

Operating temperature range (Ta)	-30°C up to +45°C / -22°F up to 113°F
----------------------------------	---------------------------------------

· Depending on the luminaire configuration. For more details, please contact us.

ELECTRICAL INFORMATION

Electrical class	Class I EU, Class II EU, Class 1US
Nominal voltage	120-277V – 50-60Hz 220-240V – 50-60Hz 347-480V – 50-60Hz
Surge protection options (kV)	10 20
Electromagnetic compatibility (EMC)	EN 55015 / EN 61000-3-2 / EN 61000-3-3 / EN 61547
Control protocol(s)	1-10V, DALI
Control options	Lumgate, Remote management
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 (NW 740)
Colour rendering index (CRI)	>70 (NW 740)
ULOR	0%
ULR	0%

LIFETIME OF THE LEDS @ TQ 25°C

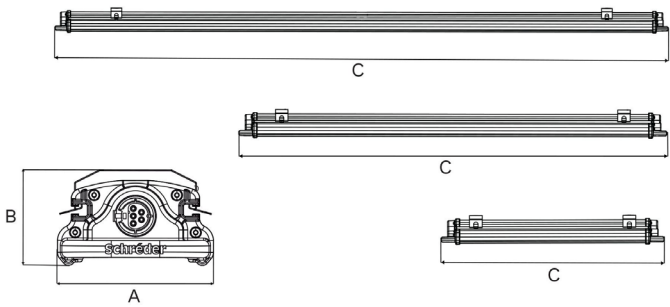
All configurations	100,000h - L95
--------------------	----------------

· Lifetime may be different according to the size/configurations. Please consult us.

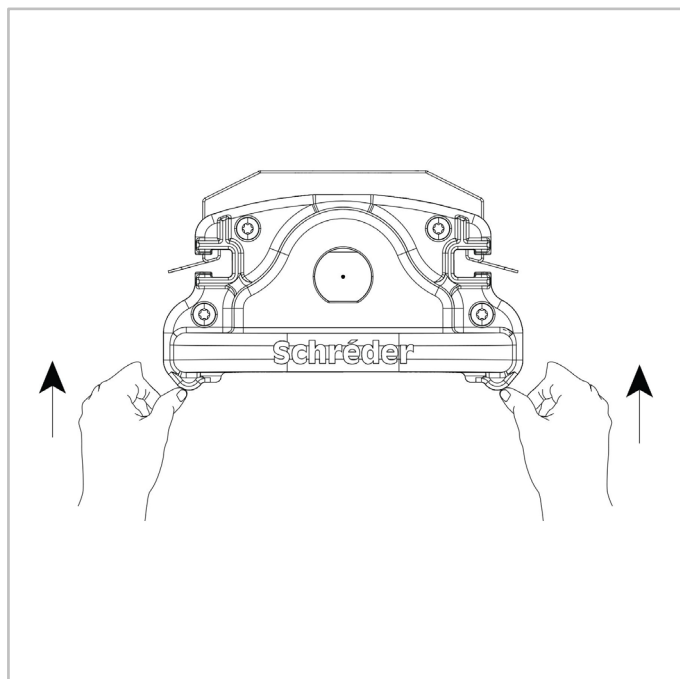
DIMENSIONS AND MOUNTING

AxBxC (mm inch)	TFLEX LINE 60 : 130x76.6x611 5.1x3.0x24.1 TFLEX LINE 120 : 130x76.6x1200 5.1x3.0x47.2 TFLEX LINE 200 : 130x76.6x2000 5.1x3.0x78.7
Weight (kg lbs)	TFLEX LINE 60 : 3.4 7.5 TFLEX LINE 120 : 5.9 13.0 TFLEX LINE 200 : 9.55 21.0
Mounting possibilities	Surface mounting Clips for surface/wall mounting Wall-mounted

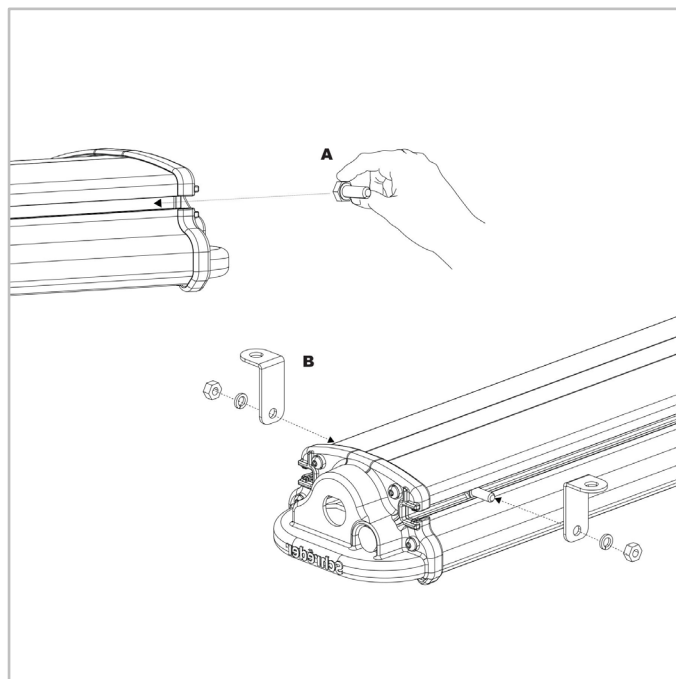
· For more information about mounting possibilities, please consult the installation sheet.



TFLEX LINE | Clip mounting



TFLEX LINE | L-shaped brackets





			Luminaire output flux (lm) Neutral White 740		Power consumption (W)	Luminaire efficacy (lm/W)	
Luminaire	Number of LEDs	Current (mA)	Min	Max		Up to	Photometry
TFLEX LINE 60	8	200	700	700	4.7	161	
	8	300	1000	1100	7.2	152	
	8	400	1300	1400	9.8	146	
	8	500	1600	1700	12.4	140	
	8	600	1800	2000	15	135	
	8	700	2100	2300	17.6	131	
	12	200	1000	1100	7	161	
	12	300	1500	1600	10.9	152	
	12	400	1900	2100	14.7	146	
	12	500	2400	2600	18.6	140	
	12	600	2800	3000	22.5	135	
	12	700	3200	3400	26.5	131	
	16	200	1400	1500	9.4	161	
	16	300	2000	2200	14.5	152	
	16	400	2600	2800	19.6	146	
	16	500	3200	3400	24.8	140	
	16	600	3700	4000	30	135	
	16	700	4200	4600	35.3	131	

Tolerance on LED flux is $\pm 7\%$ and on total luminaire power $\pm 5\%$



			Luminaire output flux (lm) Neutral White 740		Power consumption (W)	Luminaire efficacy (lm/W)	
Luminaire	Number of LEDs	Current (mA)	Min	Max		Up to	Photometry
TFLEX LINE 120	16	200	1400	1500	9,4	164	
	16	300	2000	2200	14,5	154	
	16	400	2600	2800	19,6	147	
	16	500	3200	3500	24,8	142	
	16	600	3700	4000	30	137	
	16	700	4200	4600	35,3	132	
	24	200	2100	2300	14,1	164	
	24	300	3000	3300	21,8	154	
	24	400	3900	4300	29,4	147	
	24	500	4800	5200	37,2	142	
	24	600	5600	6100	45	137	
	24	700	6400	6900	53	132	
	32	200	2800	3000	18,8	164	
	32	300	4000	4400	29	154	
	32	400	5300	5700	39,3	147	
	32	500	6400	7000	49,5	142	
	32	600	7500	8100	60	137	
	32	700	8500	9300	71	132	

Tolerance on LED flux is $\pm 7\%$ and on total luminaire power $\pm 5\%$



			Luminaire output flux (lm) Neutral White 740		Power consumption (W)	Luminaire efficacy (lm/W)	
Luminaire	Number of LEDs	Current (mA)	Min	Max		Up to	Photometry
TFLEX LINE 200	16	200	1400	1500	9.4	165	
	16	300	2000	2200	14.5	155	
	16	400	2600	2900	19.6	149	
	16	500	3200	3500	24.8	143	
	16	600	3800	4100	30	138	
	16	700	4300	4700	35.3	133	
	24	200	2100	2300	14.1	165	
	24	300	3000	3300	21.8	155	
	24	400	4000	4300	29.4	149	
	24	500	4800	5300	37.2	143	
	24	600	5700	6200	45	138	
	24	700	6400	7000	53	133	
	32	200	2800	3100	18.8	165	
	32	300	4100	4500	29	155	
	32	400	5300	5800	39.3	149	
	32	500	6500	7100	49.5	143	

Tolerance on LED flux is $\pm 7\%$ and on total luminaire power $\pm 5\%$



			Luminaire output flux (lm) Neutral White 740		Power consumption (W)	Luminaire efficacy (lm/W)	
Luminaire	Number of LEDs	Current (mA)	Min	Max		Up to	Photometry
TFLEX LINE 200	32	600	7600	8200	60	138	
	32	700	8600	9400	71	133	
	36	200	3200	3400	21.1	165	
	36	300	4600	5000	32.6	155	
	36	400	6000	6500	44	149	
	36	500	7300	7900	55.5	143	
	36	600	8500	9300	67.5	138	
	36	700	9700	10600	79	133	
	48	200	4200	4600	28.1	165	
	48	300	6100	6700	43.5	155	
	48	400	8000	8700	59	149	
	48	500	9700	10600	74	143	
	48	600	11400	12400	90	138	
	48	700	12900	14100	106	133	

Tolerance on LED flux is $\pm 7\%$ and on total luminaire power $\pm 5\%$

