

TFLEX



The all-rounder powerful tunnel lighting platform

TFLEX is a new, revolutionary, modular-based platform for enhanced road tunnel lighting experience.

TFLEX provides optimised, energy-efficient solutions for the various typical tunnel zones from entry to exit, taking into account all design factors and traffic conditions that affect safety, notably traffic characteristics, type of users, tunnel length and geometry. An advanced, fully integrated system with lighting and control, it guarantees the lowest energy consumption while respecting the most stringent tunnel lighting requirements and standards.

With the latest digital and optical technology, TFLEX ensures high visual performance for an improved driving experience.



IP 66

IP 69

IK 10

IK 09



Concept

The TFLEX platform was developed to maximise efficiency and flexibility in tunnels. This unique modular system offers design, mounting, cabling, photometrical and control consistency for three options: optical units (TFLEX MODULE) with remote gears (TFLEX DRIVE), complete assemblies with LED engine and gears in a whole pack (TFLEX COMBI) and dedicated luminaires (TFLEX BASE).

This flexible portfolio provides a homogeneous platform that meets all tunnel lighting requirements, irrespective of the zone (access, threshold, transition, interior and exit), the preferred lighting concept, the mounting requirements or the tunnel geometry.

Made of robust and sustainable materials (aluminium, steel and glass), the TFLEX range ensures long-lasting performance in the harshest tunnel environments. With a tool-free philosophy for the opening/closing and smart cabling, TFLEX facilitates installation and maintenance operations to minimise costs and traffic disruption.

The TFLEX range combines the energy efficiency of LED technology with the photometric performance of the latest LensoFlex®4 platform developed by Schröder. It integrates specific tunnel optics for symmetrical, pro-beam or counter-beam (CBL) lighting distributions to optimise lighting levels on road and wall surfaces while providing high visual comfort.

The TFLEX range has been developed to enable constant dimming with an optimised power factor. Designed with two electronic circuits, each TFLEX BASE or MODULE can either be dimmed completely, partially or even have 50% of its LEDs switched off. This possibility not only maximises energy savings. It also extends the lifetime of the complete installation and reduces the need for disruptive maintenance.

TFLEX is part of Schröder's complete tunnel solution that includes robust luminaires, smart cabling with quick-on QPD connectors and advanced control systems to improve safety for drivers and to provide major operational benefits for tunnel managers.



The TFLEX platform is built around a tool-free philosophy for the opening/closing as well as the power, control and internal cabling.



Preassembled tool-free fire rated cables and connectors used for TFLEX reduce the installation time and improve quality and reliability.



Designed with two electronic circuits, TFLEX enables constant dimming with an optimised power factor.



The TFLEX range offers various mounting options for ceiling or wall mounting with fixed or tiltable fixations.

TYPES OF APPLICATION

- TUNNELS & UNDERPASSES

KEY ADVANTAGES

- Flexibility: modular approach with wide range of lighting distributions
- Compact, lightweight and easy to install
- Two electrical circuits for enhanced dimming possibilities, optimised power factor and longer lifespan
- High-power LED solution to replace HID luminaires in the entrance and interior zones
- Separate housings for gear (DRIVE) and optical units (MODULE/COMBI) for optimised thermal management in high-power applications
- Designed for long-lasting performance
- Tool-free access for easy maintenance

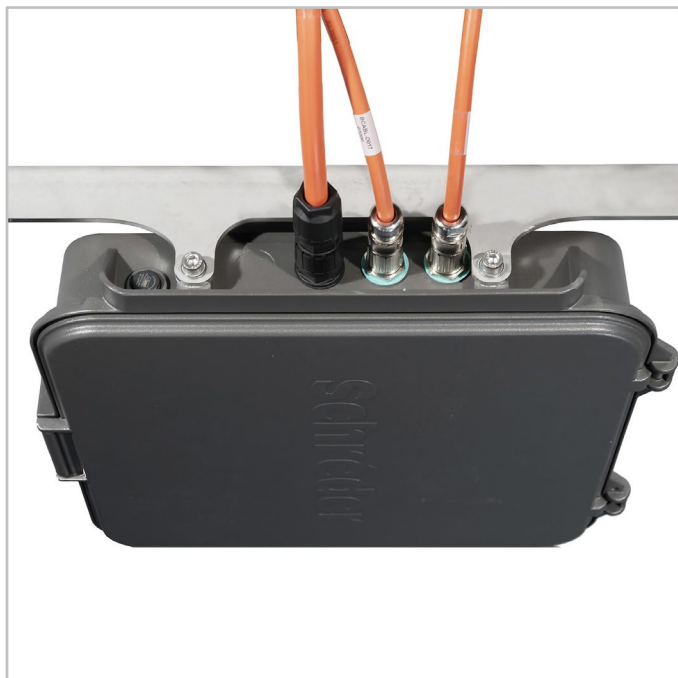
TFLEX | BASE (IP 66/69 / IK 10)



TFLEX | MODULE (IP 66/69 / IK 10)



TFLEX | DRIVE (IP 66/69 / IK 09)



TFLEX | MODULE 1 (with DRIVE)



TFLEX | MODULE 2 (with DRIVE)



TFLEX | MODULE 3 (with DRIVE)



TFLEX | COMBI 1 (IP 66/69 / IK 09)



TFLEX | COMBI 2 (IP 66/69 / IK 09)



TFLEX | COMBI 3 (IP 66/69 / IK 09)



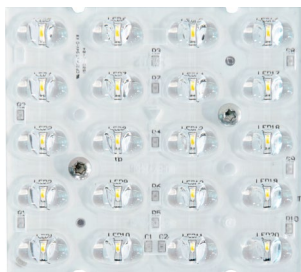
TFLEX | COMBI 1 + 1 remote module

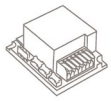




LensoFlex® 4

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.

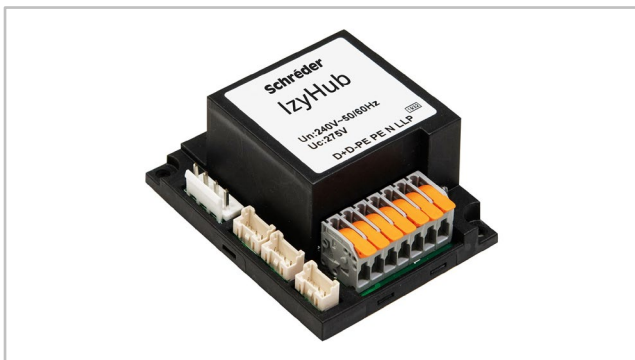




IzyHub

IzyHub is an innovative device that aims to keep luminaire installation and maintenance hassle-free. This single central connection hub distributes electricity and control information to all parts of the luminaire, ensuring that all components work together and offering reliable, long-term performance.

Its compact size and error-proof connections enable smaller and lighter luminaires that are easier to maintain and upgrade.



Surge Protection

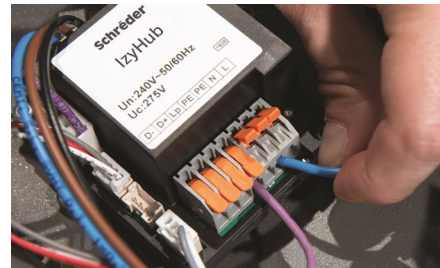
IzyHub features a built-in surge protection device. This prevents electrical surges resulting from lightning strikes and other transient voltages that originate from the mains network from damaging the luminaire, even in the most demanding conditions. The protective device also includes an end-of-life LED warning light, indicating that the luminaire is protected correctly.

User-friendly

Installing a luminaire has never been easier. IzyHub features tool-free connector as the main connection terminal. It enables 30% shorter installation times compared with standard solutions. Lever actuated spring-loaded electrical connectors provide optimal contact throughout the entire life of the product.

Easy maintenance

On the rare occasion that a component needs to be replaced in the luminaire, IzyHub makes sure that operations are carried out quickly and easily. Luminaire component connections are keyed so that mixing up electrical connections is physically impossible. Installers do not need to trace wires individually: plug it in, and it works straight away.



Versions and upgrades

IzyHub has several versions featuring different connectivity options. IzyHub can include an SPD, can work with external dimming and operate with all type of control sockets. It is also able to provide bi-power control and to include fuse options.

These options provide flexibility for future upgrades by only having to replace the IzyHub to connect the new equipment. No complicated re-wiring needed.

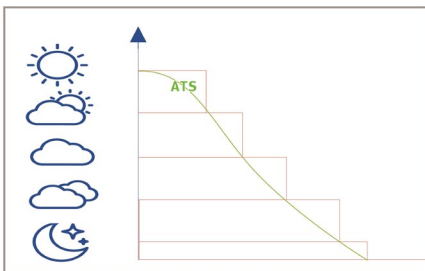




Jointly developed by Schröder and Phoenix Contact, the Advanced Tunnel Solution (ATS) has been designed to control every lighting point or clusters of luminaires to perfectly adapt the lighting level according to conditions in the tunnel, to monitor the power consumption and to report the burning hours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

The tunnel lighting study can be directly imported into the ATS control system.

This unique feature, in combination with the auto-addressing of the Lumigates, leads to an extremely short commissioning time once the fixtures have been installed.

Each luminaire or cluster of luminaires is attributed the precise dimming profile linked to its position and characteristics.

INTERACTION WITH THIRD PARTY SYSTEMS

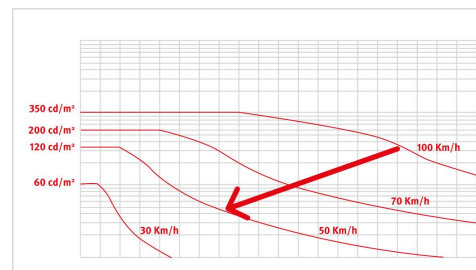
Every command or signal sent to or coming from a tunnel component (emergency exit, smoke extraction system, traffic management system...) can be used to trigger a responsive lighting scenario. All of the tunnel equipment can be controlled through the same bus command.

MAXIMISED SAFETY

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

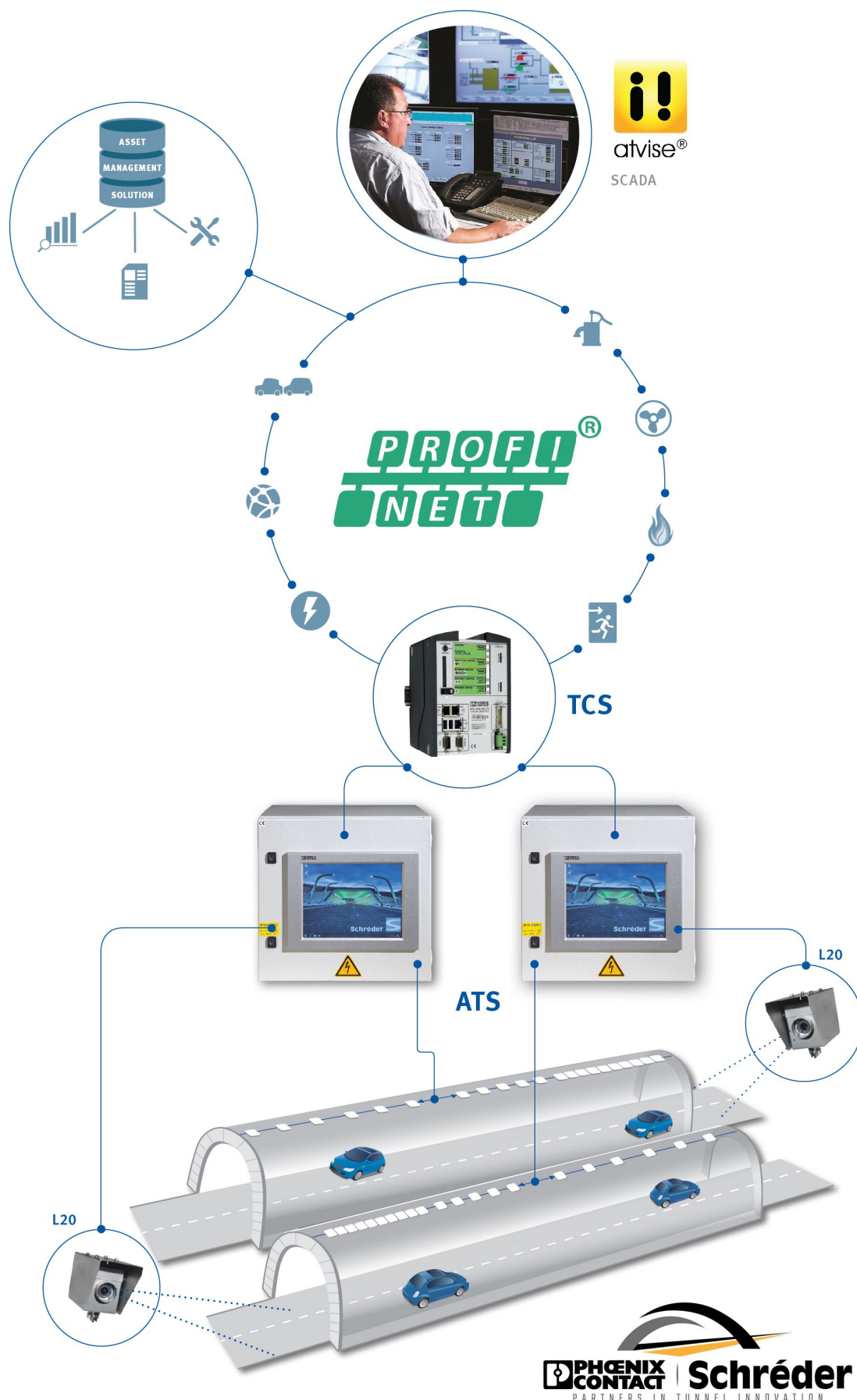
ADAPTIVE LIGHTING ACCORDING TO SPEED

The ATS 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 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.



Advanced Tunnel Solution (ATS)

The ATS (Advanced Tunnel Solution) is a control system that manages luminaire controllers (Lumgates) to deploy pre-defined lighting scenarios or to take charge of the lighting installation at any moment.

The ATS controller can operate as a standalone unit or can be linked to the main tunnel control system to interact with features not directly related to lighting (traffic management, ventilation, fire detection etc.).



Luminance meter (L20)

The luminance meter measures the luminance provided by natural light in the access zone from the safe stopping distance. It sends the data to the ATS control system that adjusts the lighting levels to avoid any visual adaptation problems.



Lumgate

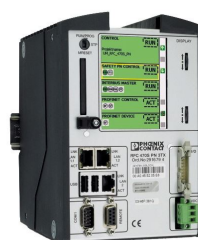
The Lumgate is an RS485 closed-loop device connected to the luminaire drivers to control the light intensity and provide command/reporting features.

One Lumgate can control several luminaires.



Tunnel Control System (TCS)

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



GENERAL INFORMATION

Circle Light label	Score >90 - The product fully meets circular economy requirements
CE mark	Yes
ENEC certified	Yes
ENEC+ certified	Yes
ROHS compliant	Yes
Testing standard	LM 79-08 (all measurements in ISO17025 accredited laboratory)

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) TIKAL Tef-Gel® antigelvanic corrosion treatment for screws
Standard colour(s)	AKZO grey 900 sanded
Tightness level	IP 66, IP69
Impact resistance	IK 09, IK 10
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 I EU
Nominal voltage	220-240V – 50-60Hz
Power factor (at full load)	0.9
Surge protection options (kV)	10
Electromagnetic compatibility (EMC)	EN 55015 / EN 61000-3-2 / EN 61000-3-3 / EN 61547
Control protocol(s)	RS422 Closed Loop, 1-10V, DALI
Control options	Lumgate, Bi-power
Associated control system(s)	Advanced Tunnel Solution (ATS)

· Electrical information given for the gear box

OPTICAL INFORMATION

LED colour temperature	4000K (Neutral White 740)
Colour rendering index (CRI)	>70 (Neutral White 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 BASE - 415x244x488 | 16.3x9.6x19.2
 TFLEX MODULE 1 - 389x69x385 | 15.2x2.7x15.3
 TFLEX MODULE 2 - 788x69x385 | 31.0x2.7x15.3
 TFLEX MODULE 3 - 1177x69x385 | 46.3x2.7x15.3
 TFLEX COMBI 1 - 786x117x440 | 30.9x4.6x17.3
 TFLEX COMBI 2 - 1175x117x440 | 46.3x4.6x17.3
 TFLEX COMBI 3 - 1564x117x440 | 61.6x4.6x17.3

Weight (kg | lbs)

TFLEX BASE - 11 | 24.2
 TFLEX MODULE 1 - 8 | 17.6
 TFLEX MODULE 2 - 15 | 33.0
 TFLEX MODULE 3 - 23 | 50.6
 TFLEX COMBI 1 - 16 | 35.2
 TFLEX COMBI 2 - 23 | 50.6
 TFLEX COMBI 3 - 32 | 70.4

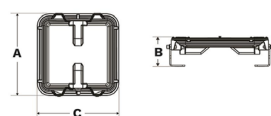
Mounting possibilities

Bracket enabling adjustable inclination
 Suspended mounting
 Surface mounting

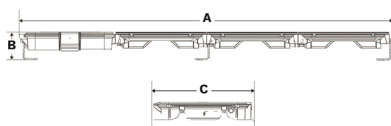
TFLEX BASE



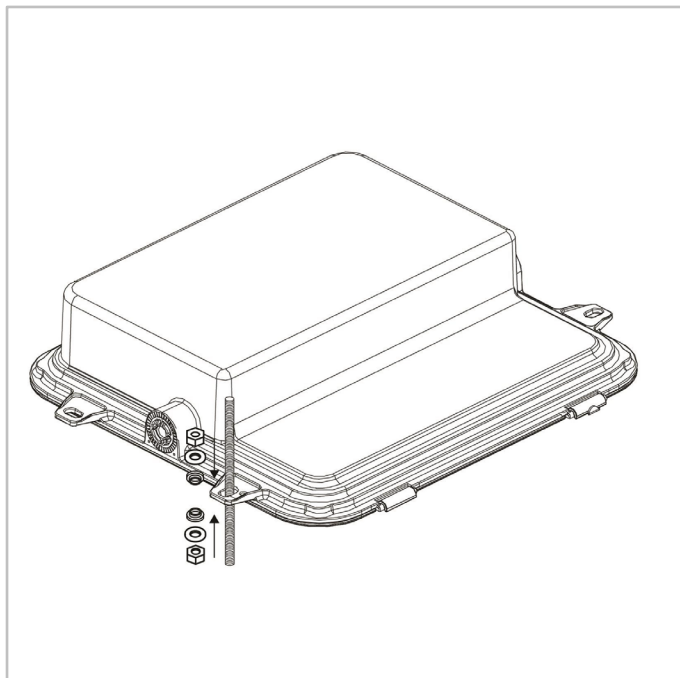
TFLEX MODULE



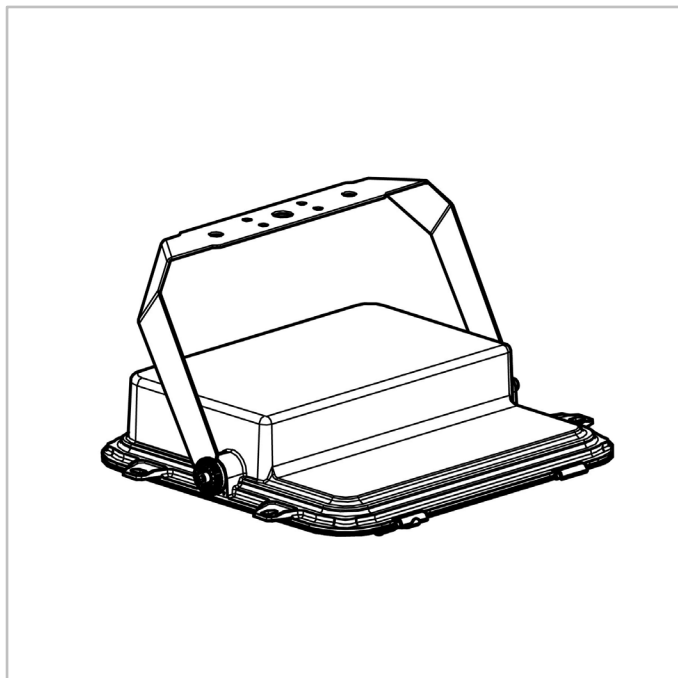
TFLEX COMBI



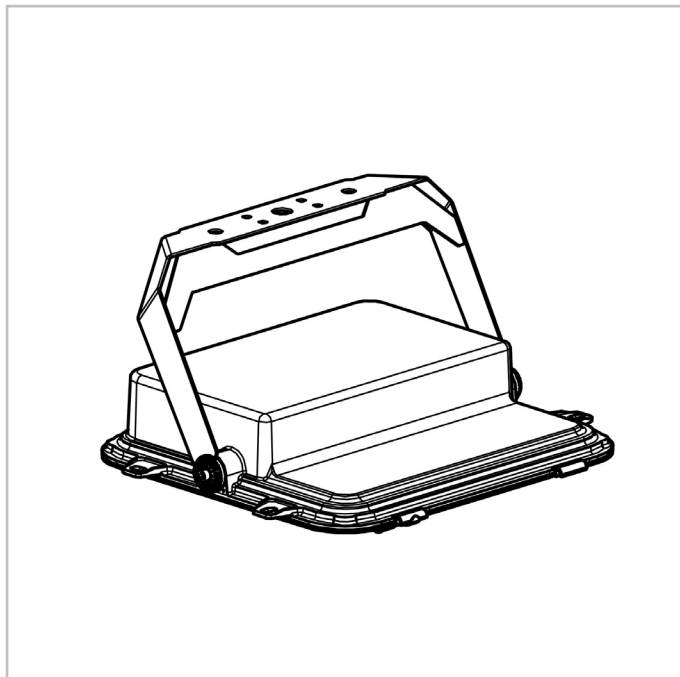
TFLEX | BASE - 4 slots for tie-rod mounting - more details in the TFLEX BASE installation sheet.



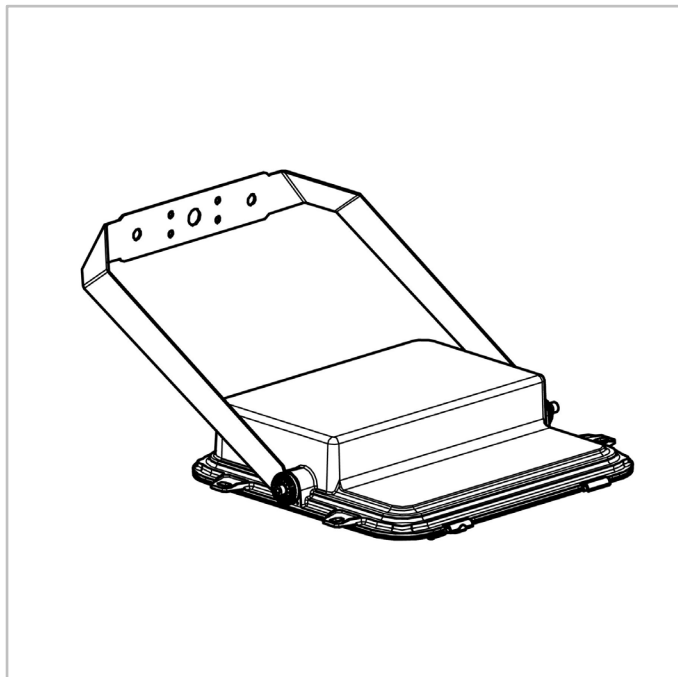
TFLEX | BASE - short bracket - more details in the TFLEX BASE installation sheet.



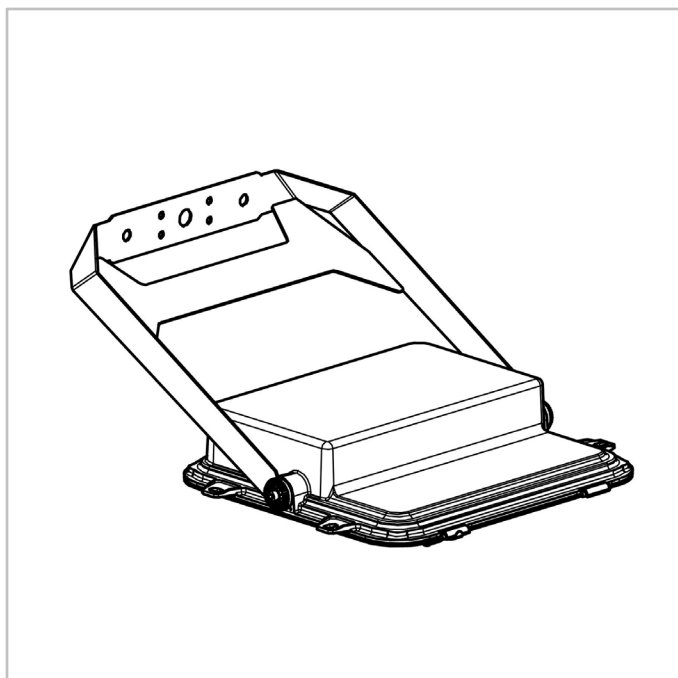
TFLEX | BASE - short bracket, ANSI 3G certified - more details in the TFLEX BASE installation sheet.



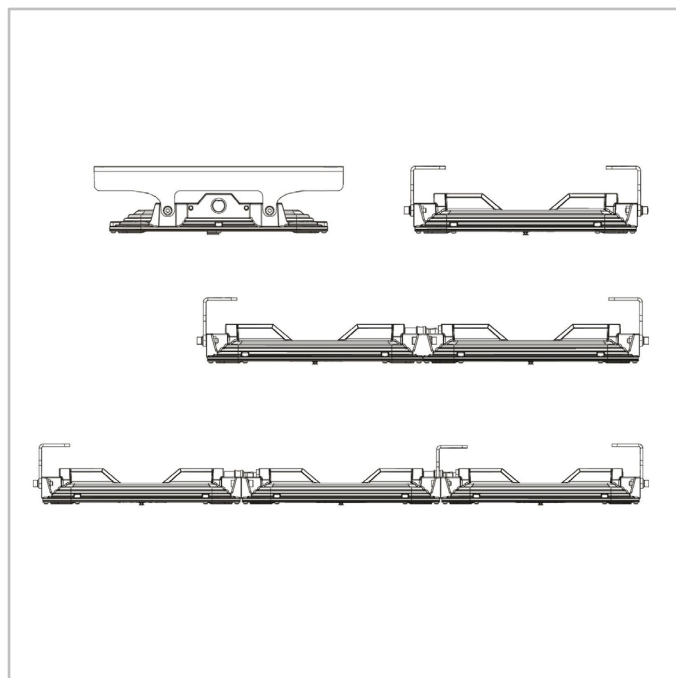
TFLEX | BASE - long bracket - more details in the TFLEX BASE installation sheet.



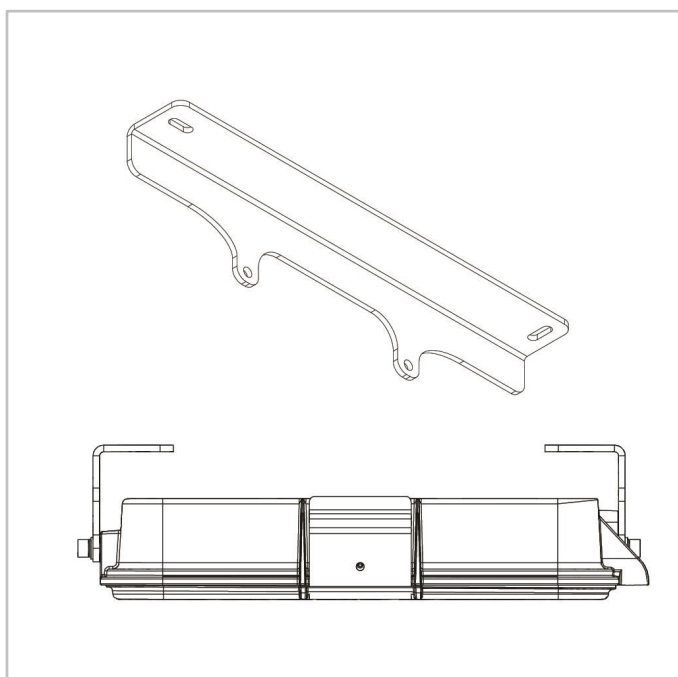
TFLEX | BASE - long bracket, ANSI 3G certified - more details in the TFLEX BASE installation sheet.



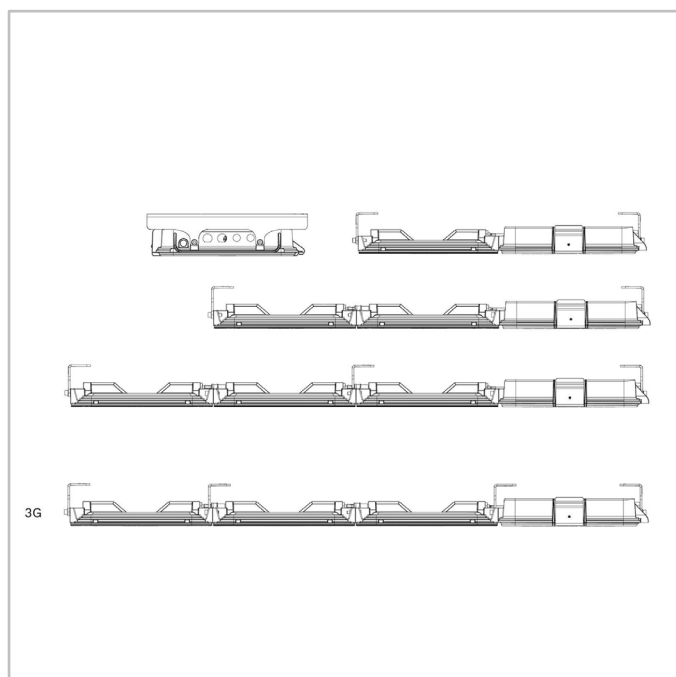
TFLEX | MODULE - standard fixed brackets DRIVE - more details in the TFLEX MODULE installation sheet.



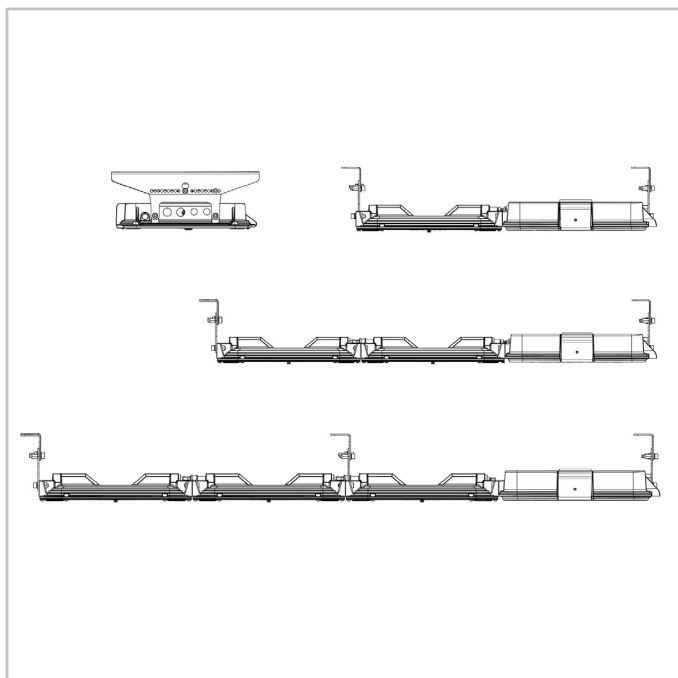
TFLEX | DRIVE - standard fixed brackets - more details in the TFLEX DRIVE installation sheet.



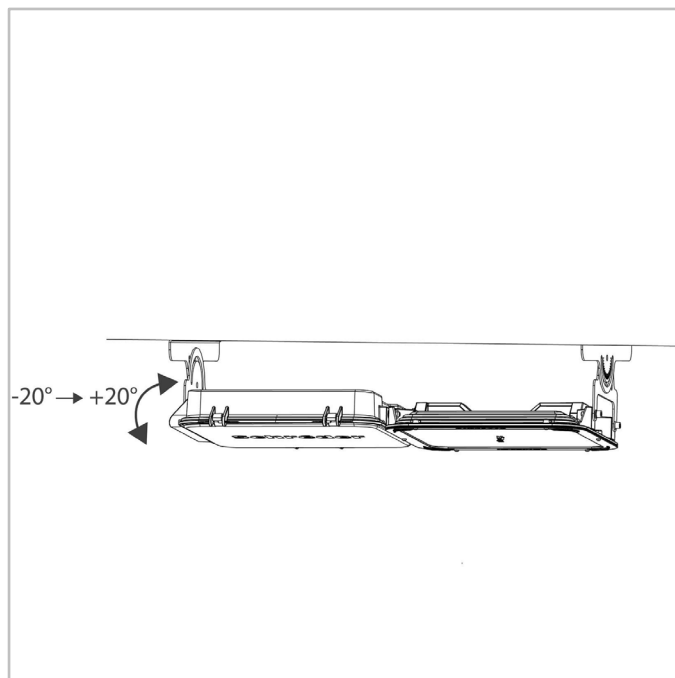
TFLEX | COMBI - standard brackets (ANSI 1G and 3G options) - more details in the TFLEX COMBI installation sheet.



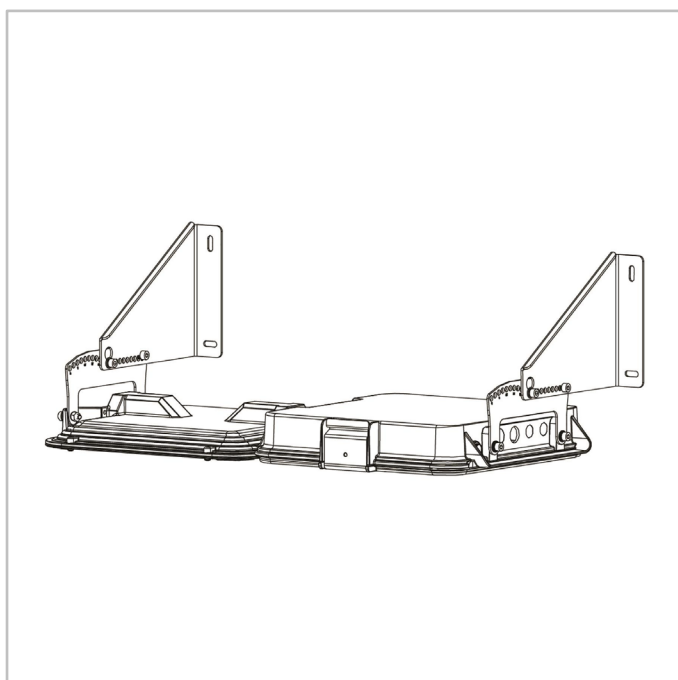
TFLEX | COMBI - pull-out swivelling mounting - more details in the TFLEX COMBI installation sheet.



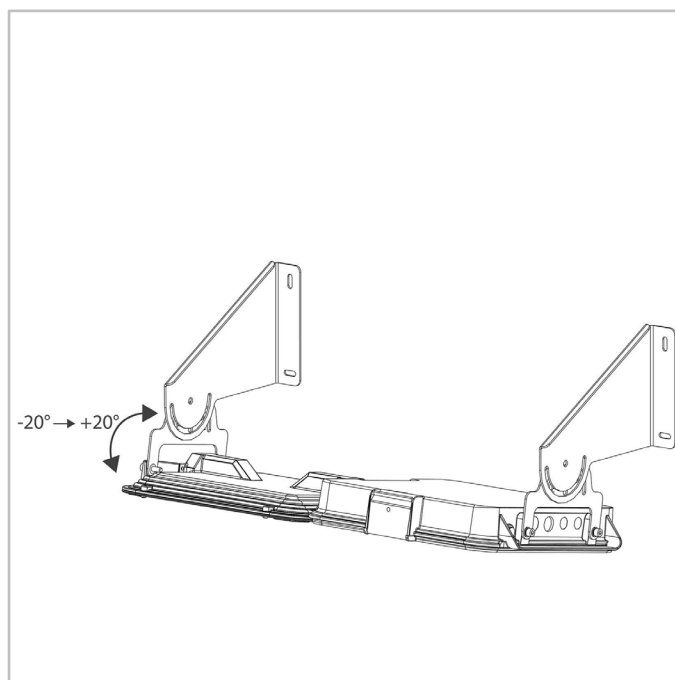
TFLEX | COMBI - adjustable swivelling mounting - more details in the TFLEX COMBI installation sheet.



TFLEX | COMBI - pull-out swivelling wall mounting - more details in the TFLEX COMBI installation sheet.



TFLEX | COMBI - adjustable swivelling wall mounting - more details in the TFLEX COMBI installation sheet.





			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 BASE	20	350	3000	3200	22.9	140	
	20	400	3400	3600	26.1	138	
	20	500	4200	4400	32.7	135	
	20	600	4800	5100	39.2	130	
	20	670	5300	5600	44	127	
	20	700	5500	5800	45.5	127	
	40	350	6100	6400	46	151	
	40	400	6900	7200	52	145	
	40	500	8300	8700	65	139	
	40	630	10100	10600	82	132	
	40	670	10600	11100	88	131	
	40	700	10900	11500	91	131	
	60	350	9200	9800	64	156	
	60	400	10400	11000	73	151	
	60	500	12600	13300	93	145	
	60	610	14800	15700	114	138	
	60	700	16500	17400	135	134	

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 MODULE 1	80	350	12300	12800	87	152	
	80	400	13800	14400	99	145	
	80	500	16700	17400	125	144	
	80	600	19400	20200	152	134	
	80	630	20200	20900	160	131	
	80	700	21900	22700	178	129	
	80	880	25700	26700	224	119	
	80	900	26100	27100	230	118	
	80	1000	27800	28900	264	112	

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 MODULE 2	120	350	18500	19300	128	153	
	120	400	20800	21600	146	148	
	120	500	25000	26000	186	141	
	120	610	29500	30700	228	135	
	120	700	32800	34100	266	131	
	120	800	36200	37600	304	124	
	120	900	39200	40700	342	119	
	120	1000	41800	43400	388	112	
	160	350	24700	25700	172	153	
	160	400	27700	28800	198	145	
	160	500	33400	34700	248	143	
	160	600	38800	40400	302	134	
	160	700	43800	45500	356	128	
	160	880	51500	53500	448	119	
	160	900	52200	54300	456	119	
	160	1000	55700	57900	518	112	

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 MODULE 3	240	700	65700	68300	524	130	

Tolerance on LED flux is ± 7% and on total luminaire power ± 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 COMBI 1	80	350	12400	12800	87	152	
	80	400	14000	14400	99	145	
	80	500	16900	17400	125	144	
	80	600	19600	20200	152	134	
	80	630	20400	21000	160	132	
	80	700	22100	22800	178	130	
	80	800	24400	25200	204	124	
	80	880	26100	26900	224	120	
	80	900	26500	27300	228	120	
	80	1000	28300	29200	264	113	

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



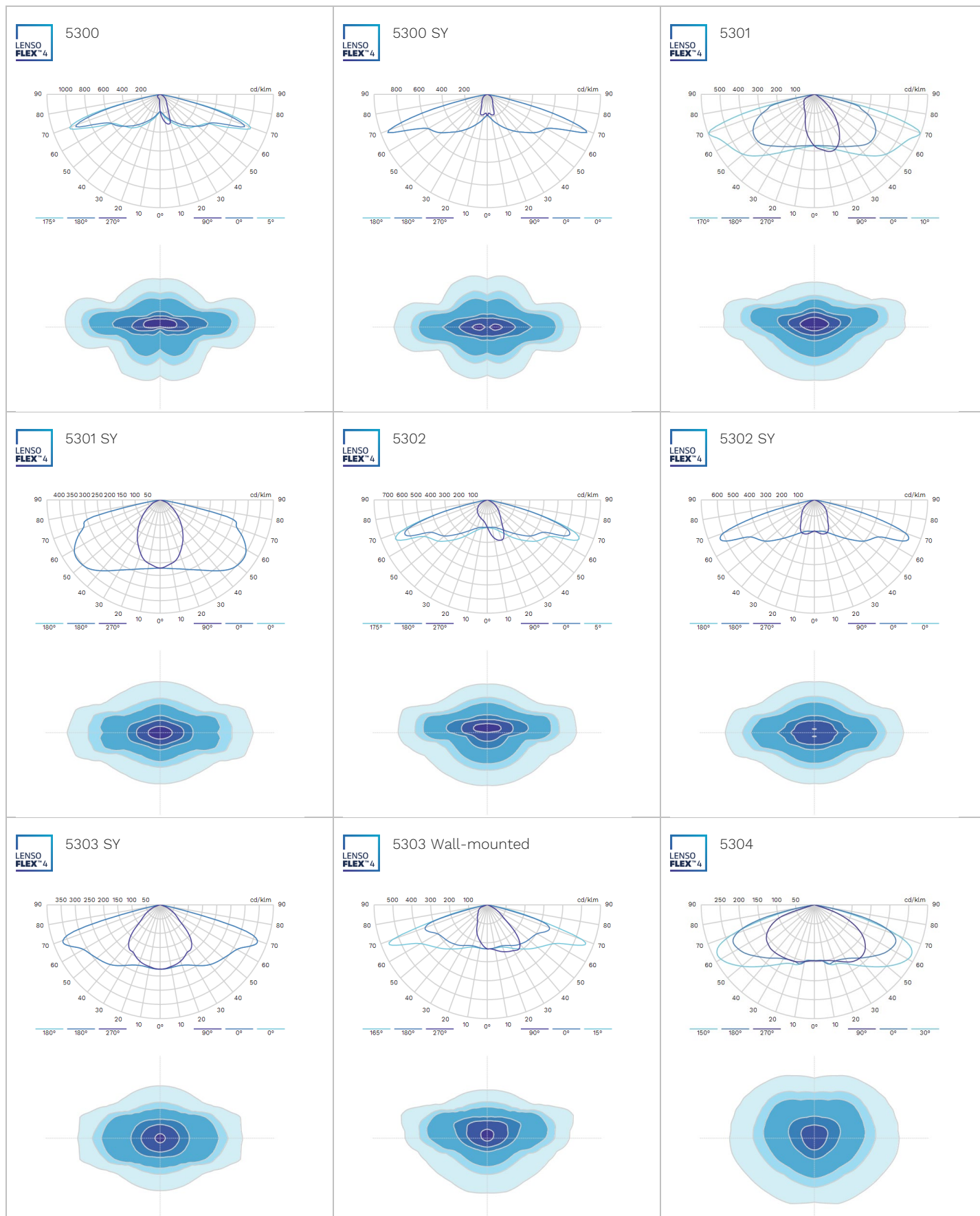
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Luminaire	Number of LEDs	Current (mA)	Min	Max		Up to	Photometry
TFLEX COMBI 2	120	350	18700	19300	128	153	
	120	400	20900	21600	146	148	
	120	500	25400	26200	186	142	
	120	600	29600	30500	224	136	
	120	610	29900	30800	228	135	
	120	700	33300	34300	266	132	
	120	800	36700	37800	304	124	
	120	900	39700	40900	342	120	
	120	1000	42500	43800	388	113	
	160	350	24900	25700	172	153	
	160	400	27900	28800	198	145	
	160	500	33900	35000	248	145	
	160	600	39400	40600	302	134	
	160	700	44400	45800	356	129	
	160	800	48900	50400	408	124	
	160	880	52200	53800	448	120	
	160	900	52900	54500	456	120	
	160	1000	56700	58400	518	113	

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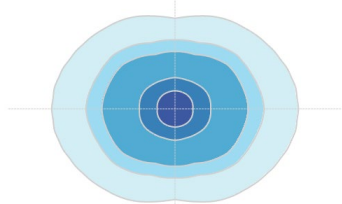
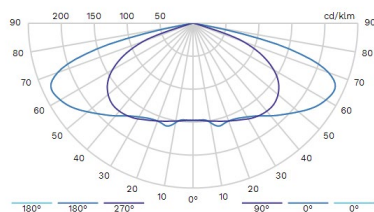
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Luminaire	Number of LEDs	Current (mA)	Min	Max		Up to	Photometry
TFLEX COMBI 3	240	700	66700	68700	524	131	

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

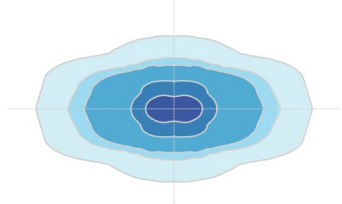
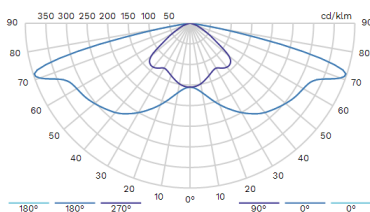




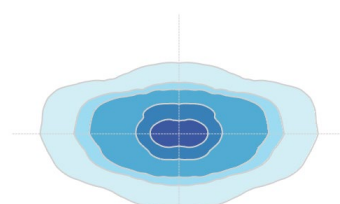
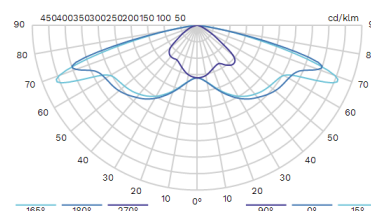
5304 SY



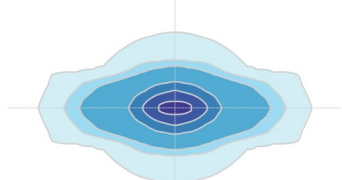
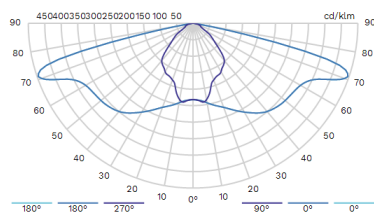
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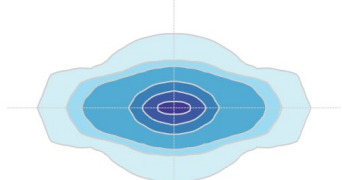
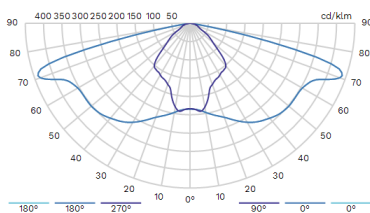
5305 Wall-mounted 2/3 Front 1/3 Rear



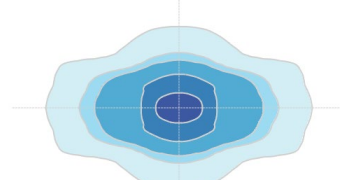
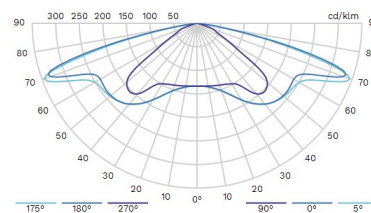
5306 SY



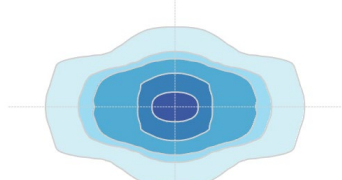
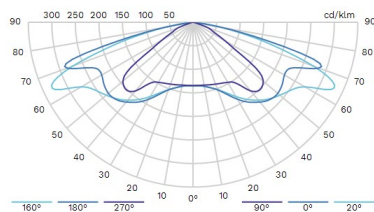
5306 Wall-mounted + Symmetrical



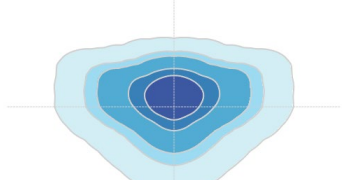
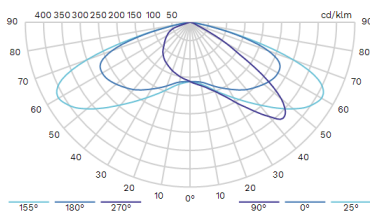
5307 SY



5307 Wall-mounted + Symmetrical



5308



5308 SY

