Simple, Efficient, Low Maintenance Lighting for Hazardous Locations

Appleton™ FELED Series Linear Luminaire

Technology and Application Guide.

EMERSON™

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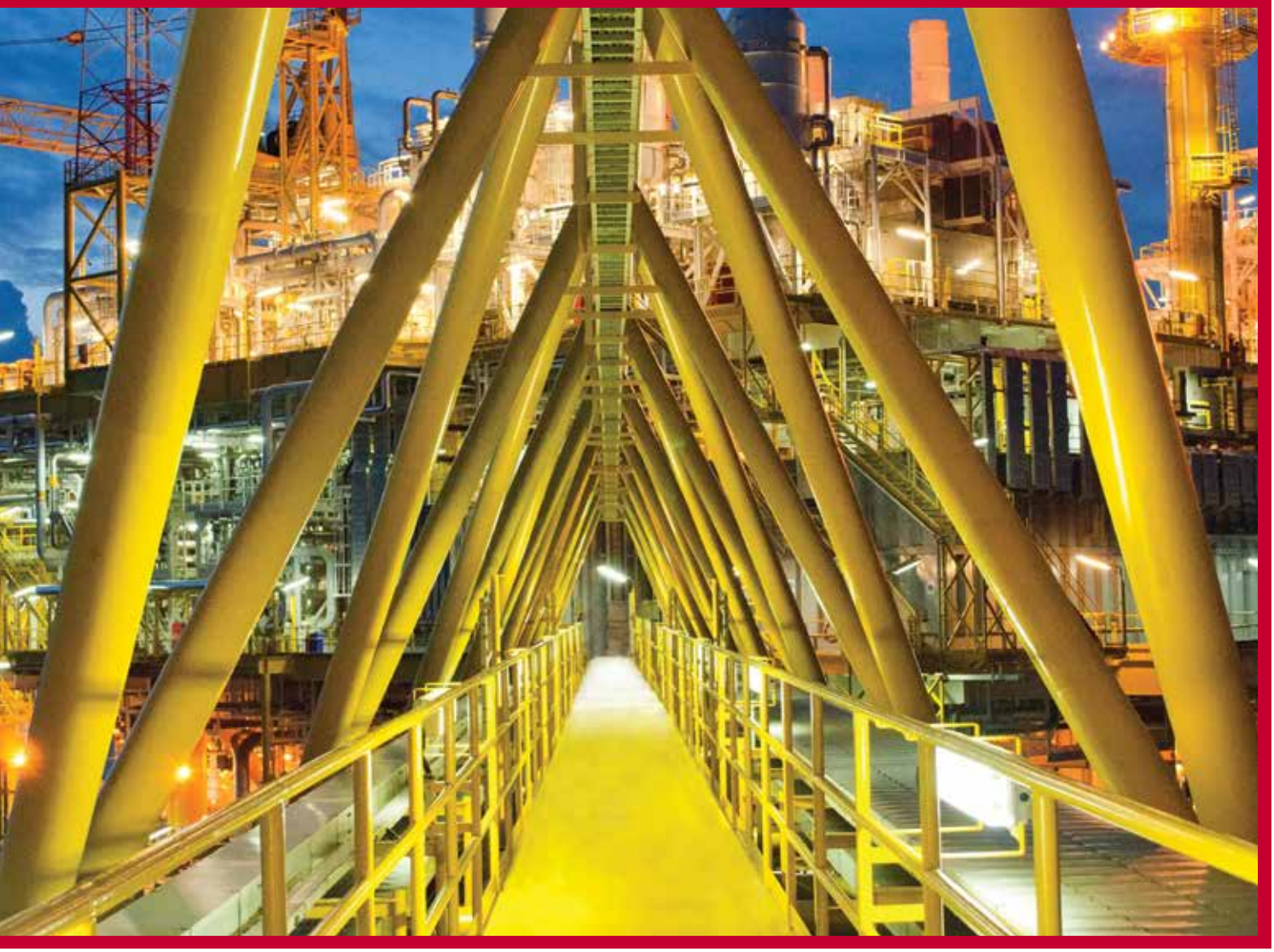


See the future of nonmetallic explosionproof linear lighting.

The luminaires you choose today will make the difference in plant safety, worker comfort and maintenance costs for years to come. Emerson™ lights your way forward with the Appleton™ FELED Series of linear LED luminaires for rugged Zone 1 and 21 applications.

Certified for use in IECEx and ATEX installations, these nonmetallic explosionproof luminaires equal or exceed the lighting output, quality and distribution of our FE Series fluorescent luminaires, already the proven industry standard. Using the same footprint and mounting hardware as the FE Series, with a wide range of lumen outputs that allow for an easy retrofit of any fluorescent installation, the FELED Series' low profile design and functional simplicity suit practically any task or general purpose application requirement and mounting height.

For best-in-class corrosion resistance, durability and performance, look to the brand you trust. Appleton™ FELED Series luminaires, only from Emerson™.

The Simple Way To Light Your Way Forward

FELED Luminaires make it easy to replace existing fluorescent fixtures because they feature the same housing and mounting accessories as original FE fluorescent luminaires. Luminaires are available in light output from 2,500 to 7,000 lumens. In the rare event maintenance is needed, the lens can be quickly removed to access the internal components, while the specially designed hinged cover speeds up the process of replacing drivers, or diffusers.

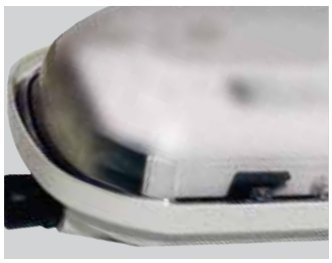
Fiberglass reinforced polyester body — lightweight, corrosion resistant and impact resistant (IK10, the highest rating)

Central hex key opening with unique patented release system to prevent damage

Field replaceable LED driver and lens

Contemporary, low profile design suitable for use in tight spaces and high wind zones

Fixture easily accessed with a standard hex key



Latch assembly and elastomer gasket seals against water and dust ingress (IP66)

Hinged polycarbonate lens for easy maintenance

Easy To Specify

FELED luminaires are available in a wide range of lumen outputs to suit a variety of Zone 1 and 21 task and general purpose lighting requirements. Compared to fluorescent luminaires, they deliver increased energy efficiency, lower maintenance costs and greater operational uptime. With a 3-hour emergency option available on the FELED5 versions, the FELED Series provides assurance that your hazardous locations will be safely illuminated.

Easy To Install

For sites that already have Appleton™ Zone 1 fluorescent installations, the FELED Series retrofits into the existing mounting hardware. Luminaires can be mounted vertically or horizontally, using pole, wall, ceiling, hinged or chain mount options. The terminal block provides ample working room, with screw type terminals for simple, secure wiring.

Easy To Maintain

Maintenance access requires only a hex key and straight blade screwdriver. The patented release mechanism and hinged cover are designed to ensure hassle-free maintenance and installation. Positive safety switch disconnects power to LED's and driver upon unlocking the lens to allow maintenance in hazardous locations. Our LEDs are rated for 60,000 hours of operation at 55 °C (131 °F), and last far longer at lower temperatures. Field-replaceable parts are available to extend performance even further.

The Illumination You Need, The Quality You Expect

Retrofitting Made Easy

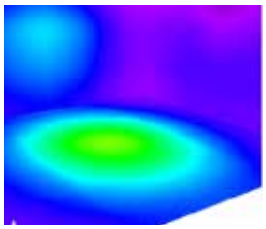
The FELED Series includes models that provide illuminance and lighting distribution comparable to our FE Series fluorescent luminaires, with additional models that offer even more application possibilities. Choose the diffuser option for the greatest uniformity, least amount of glare, best vertical illumination and safest photobiological rating.

Light Distribution Comparison

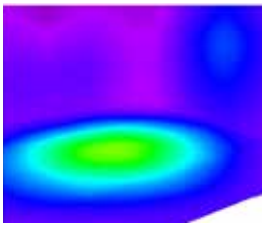
The lighting simulation below compares three rooms, each with a single luminaire mounted at 4.5 m (15 ft); a fluorescent 1.39 m (4.56 ft), a 0.79 m (2.58 ft) FELED4, and a 1.39 m (4.56 ft) FELED5. The photometric simulated color rendered images below demonstrate the seamless transition with either size luminaire.

Fluorescent | **LED**

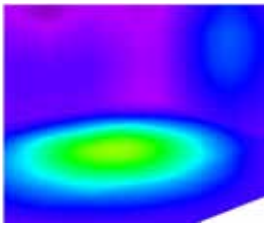
FEB236 Fluorescent



FELED4 (Diffused)



FELED5 (Diffused)



The FELED Series saves energy while maintaining equivalent required illuminance levels and uniformity to the FE Series fluorescent luminaires.

Lighting Performance

Luminaire	Size (Meters)	Size (Feet)	Power Consumption (Watts)	Light Output (Lumens)	Eav (Lux) Floor	Emin (Lux) Floor	Emax (Lux) Floor	Emin / Emax
FEB236BUSA	1.39	4.56	72	4423	31	16	55	0.53
FELED4CBDSAD	0.79	2.58	32	3600	28	11	73	0.40
FELED5CBDSAD	1.39	4.56	38	4650	30	12	77	0.41

The table below provides a cross reference between the FE Series fluorescent luminaires and the FELED Series luminaires.

Fluorescent to LED Retrofit Guide

FE Series Fluorescent	Lamp Used	Lamp Output (Lumens)	System Efficiency	System Output (Lumens)	Effective LED Output Required for Replacement (Lumens)	Normalized Output (Lumens)	FELED Series	FELED Series (Lumens)
FEB218BUSA	2X 18 W	2400	85%	2040	1836	1800	FELED3C	2850
FEB318BUSA	3X 18 W	3600	68%	2448	2203	2200	FELED3C	2850
FEB136BUSA	1 X 36 W	2750	89%	2448	2203	2200	FELED3C	2850
FEB236BUSA	2 X 36 W	5500	80%	4400	3960	4000	FELED4C / FELED5C	3600 / 4650
FEB158BUSA	1 X 58 W	4325	87%	3763	3386	3300	FELED5C	4650
FEB258BUSA	2 X 58 W	8650	77%	6661	5994	6000	FELED7C	7050
FEB358BUSA	3 X 58 W	12975	66%	8564	7707	7500	FELED7C	7050

Fluorescent To LED: The Smart Upgrade

Energy Savings
LED luminaires provide far greater lighting efficacy compared to traditional lighting sources, including fluorescent luminaires, the previous efficiency leader.

Maintenance Savings
Fluorescent lamps last an average of 13,000 hours, or 1.48 years, in continuous use. By contrast, LED luminaires are rated for 60,000 hours and can exceed 200,000 hours depending on ambient temperature.

Safety
LED luminaires provide instant-on and cold-start capabilities without end-of-life degradation or premature failures due to frequent cycling, with a photobiological safety rating of RG0.

Energy Comparison

Compared to the FE Series fluorescent luminaires, the FELED Series saves as much as 57% in energy costs.

FE Series Fluorescent to FELED Series Energy Comparison

FE Series Fluorescent	Lamp Used	Power Consumption (Watts)	FELED Series	Power Consumption (Watts)	% Energy Savings
FEB218BUSA	2 x 18 W	36	FELED3	27	25%
FEB318BUSA	3 x 18 W	54	FELED3	27	50%
FEB136BUSA	1 x 36 W	36	FELED3	27	25%
FEB236BUSA	2 x 36 W	72	FELED5	38	47%
FEB158BUSA	1 x 58 W	58	FELED5	38	34%
FEB258BUSA	2 x 58 W	116	FELED7	63	46%
FEB358BUSA	3 x 58 W	174	FELED7	63	64%

Dramatically Reduce Your Lighting Costs

When retrofitting a 2 lamp FEB236BUSA, you can achieve break even on your investment in approximately 8 months. When evaluating lighting systems, consider both the total system power consumption and the expected luminaire life, in order to evaluate energy and maintenance costs and savings.

5 Year Cumulative

Luminaire	Power Consumption (Watts)	Light Output (Lumens)	Yearly Energy Costs	Lamp Life (Hours)	Yearly Maintenance Costs	Yearly Total Costs	Yearly LED Savings	Yearly Savings Percentage
FEB236BUSA	72 W	4423	35 €	13,000	23 €	58 €	—	—
FELED5	38 W	4650	18 €	100,000	0 €	18 €	40 €	69%

Energy Costs =
Watts x 24 (hr / day) x 365 (days / yr) / 1000 (kWh / yr) x 0.055 (Euro / kWh)
Maintenance Costs =
[[2 (fluorescent lamps) x 8 (euro each)] + 22.5 (euro for installation cost for one worker)] x 3 (replacements in 5 years) / 5 (years)
Labor cost =
45 euro / hour/worker

Walkways: Ensure Optimal and Uniform Light Dispersion

Use Appleton™ FELED in any application where you would have specified explosionproof linear fluorescent lighting in the past.

Walkway lighting is a common application in almost every industry. These heavily trafficked areas must be illuminated evenly and sufficiently to ensure safe passage, especially with regard to changes of direction, level, stairs or any obstructions that may be present. Vertical illumination is an important consideration in process areas that require monitoring of instrumentation. Walkway lighting must also be designed with adequate overhead clearance for safe passage of people and equipment. In the event of a power disruption, an emergency backup system provides for safe egress. FELED Series luminaires provide:

- A wide range of lumen outputs, meeting or exceeding the output of FE Series fluorescent luminaires
- Pole and other mounting options to suit any walkway configuration and luminaire height
- A low profile design to maximize headroom even in confined spaces
- Rugged, corrosion resistant durability to withstand harsh onshore and offshore environments
- A 3-hour emergency version is available in the 5000 lm, 1.39 m (4.56 ft) luminaire

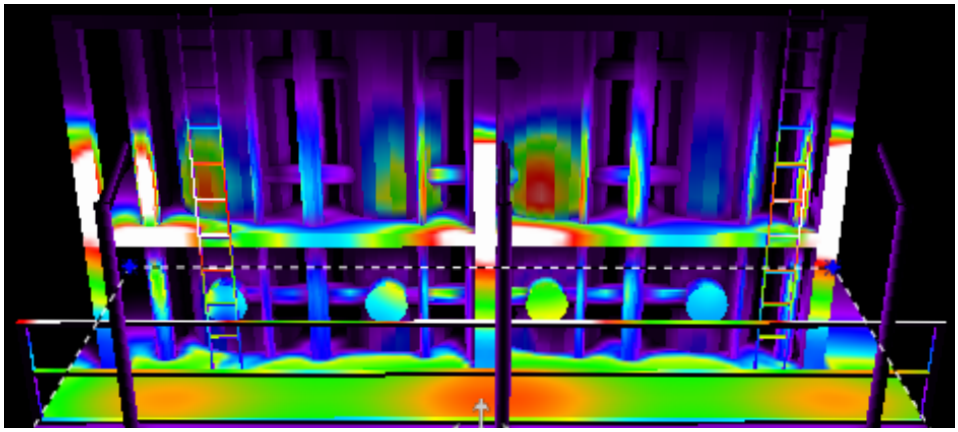
Walkway Application Simulation

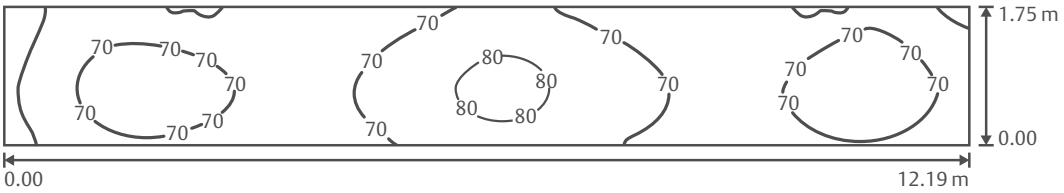
FELED Series luminaires provide similar or higher lumen output and greater lighting uniformity compared to FE Series fluorescent luminaires. In walkway applications, they offer the potential to achieve illumination targets with fewer luminaires, higher mounting heights or reduced wattage luminaires.

In the application simulation below, three FELED5 luminaires provide sufficient illumination for the walkway with good uniformity and vertical illumination.

Single FELED Luminaire

Sample Application	Luminaire Height	Type Of Mount	Luminaire Spacing	Targeted Illumination
Walkway 1 m (3 ft) Wide	3 m (10 ft)	15° Pole Mount	5 m (16 ft)	50-75 Lux





Lighting Performance

Luminaire	Size (Meters)	Size (Feet)	Power Consumption (Watts)	Light Output (Lumens)	Eav (Lux) Floor	Emin (Lux) Floor	Emax (Lux) Floor	Emin / Emax
FEB236BUSA	1.39	4.56	72	4423	70	51	82	0.62
FELED5CBDSAD	1.39	4.56	38	4650	74	52	86	0.65

Optical Radiation and Photobiological Safety Requirements in Lighting

Photobiology is the study of the interaction of optical radiation with living organisms. Optical radiation, another term for light, can be visible and invisible and is comprised of UV, IR and blue light emissions. It is strongly absorbed in tissue, with the skin and eyes of the human body most at risk of exposure. All visible light (380 nm to 780 nm) can, in principle, only damage the eye by thermal or photochemical effects.

The purpose of photobiological safety standards is to protect users from the harmful effects caused by optical radiations emitted by lighting devices. Within the European Union, the standards in the field of photobiological safety are IEC / EN 62471 and the more recent Technical Report IEC / TR 62778. The American standard in the field of photobiological safety is ANSI IESNA RP 27. These standards define values for levels of risk ranging from Risk Group Exempt (RG0) (lamp / LED does not pose any photobiological hazard) to Group 3 (high risk) (lamp / LED may pose a hazard even for momentary or brief exposure). Appleton™ FELED diffused luminaires are rated RG0, Risk Group Exempt.

Area Illumination: Safe, Efficient Lighting

For proper illumination in extreme conditions, you need a lighting manufacturer who engineers their luminaires to ensure optimal light dispersion, creating more usable light.

Upgrading from our fluorescent to LED is seamless with a one-to-one installation retrofit. Effective lighting is critical for worker safety and productivity; particularly when flammable gases, vapors and dusts are present. Midstream natural gas compressor stations are a prime example. Appleton™ FELED Series luminaires provide:

- Certification for use in Zone 1 and 21 hazardous locations
- Easy retrofitting to the FE fluorescent mounting hardware and footprint already in extensive use in these facilities
- A lumen output range suitable for everything from task, tunnel and walkway lighting to expansive spaces and higher mounting requirements
- A low profile that provides clearance in confined spaces and withstands high winds and jets of water in weather-exposed installations
- 60,000+ hours of operation with no lamps to change, minimizing maintenance costs and maximizing operational uptime

Compressor Room Application Simulation

Oil and gas facilities incorporate both expansive areas and confined spaces, requiring a wide range of lumen outputs and mounting options to provide optimum lighting in every workspace. FELED Series achieves these goals with a single luminaire that is easy to retrofit into the existing fluorescent footprint.

Compressor Room Comparison

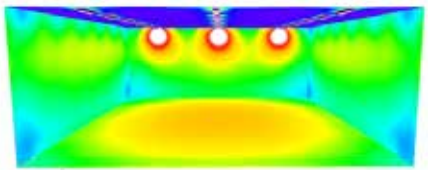
In the application simulation below, 18 symmetrically spaced luminaires were ceiling mounted at 3.5 meters (12 feet). The targeted illumination is 300 lux with maximum uniformity and minimum glare.

FE Fluorescent and FELED, Single Luminaire

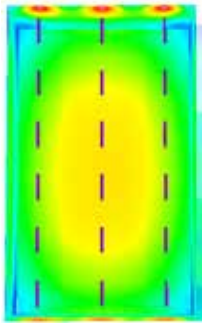
Sample Application	Luminaire Height	Type Of Mount	Luminaire Spacing	Targeted Illumination
15m x 9 m (50 ft x 30 ft)	3.5 m (12 ft)	Ceiling	18 Luminaires Symmetrically Spaced	300 Lux

Fluorescent

FEB236 Fluorescent



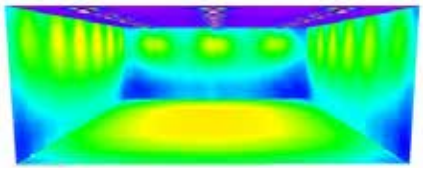
Side view



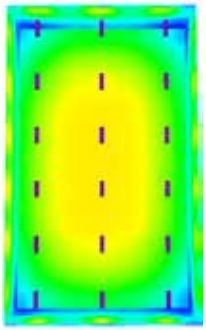
Top down view

LED

FELED4 (Diffused)

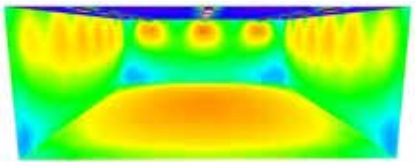


Side view

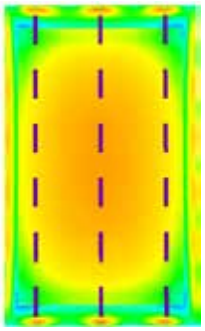


Top down view

FELED5 (Diffused)



Side view



Top down view

This simulation shows that the FELED4 diffused and FELED5 diffused provides a very similar light output, spread and uniformity to the FE Series fluorescent luminaires. In addition, glare was reduced with the diffused LED solutions. This provides two options depending on luminaire length requirements.

Lighting Performance

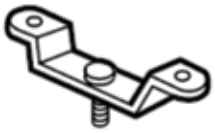
Luminaire	Size (Meters)	Size (Feet)	Power Consumption (Watts)	Light Output (Lumens)	Eav (Lux) Floor	Emin (Lux) Floor	Emax (Lux) Floor	Emin / Emax
FEB236BUSA	1.20	3.94	72	4431	330	231	389	0.70
FELED4CBDSAD	0.60	1.97	32	3600	294	188	343	0.64
FELED5CBDSAD	1.20	3.94	38	4650	351	223	412	0.64

Mounting Options

Easy To Retrofit

Appleton™ FELED Series luminaires use the same footprint and mounting accessories as our FE Series fluorescent luminaires. Mounting accessories are available in gray painted aluminum, zinc plated steel, galvanized steel and 316 stainless steel.

Mounting Hardware Available

Fixing Bracket for Surface Mounting	Brackets for Surface Mounting	M8 Ring Bolts	Half Clamp Brackets for Pole Mounting	Hinged Brackets for Adjusting the Luminaire
				
FEFBZ (Zinc Plated Steel)	FESBS (316 Stainless Steel)	FERBM8Z (Zinc Plated Steel)	FEHC49Z (42 mm - 49 mm; Zinc Plated Steel) FEHC49S (42 mm - 49 mm; 316 Stainless Steel) FEHC60Z (60 mm; Zinc Plated Steel) FEHC60S (60 mm; 316 Stainless Steel)	FEHBA (Aluminum) FEHBS (316 Stainless Steel)

Mounting Heights, Lumen Outputs and Lux ①

Luminaire	Lens	Mounting Height (Meters)	Max Lux on Ground	Vertical Throw in Meters (along length of luminaire)					Horizontal Throw in Meters (along width of luminaire)				
				2 Lux	5 Lux	10 Lux	25 Lux	50 Lux	2 Lux	5 Lux	10 Lux	25 Lux	50 Lux
FELED3CBDXXD	Diffused	10	7	9.0	4.0	-	-	-	8.0	3.0	-	-	-
FELED4CBDXXD			9	11.0	6.0	-	-	-	10.0	5.0	-	-	-
FELED5CBDXXD			11	12.0	7.0	2.0	-	-	11.0	6.0	2.0	-	-
FELED7CBDXXD			18	15.0	10.0	6.0	-	-	15.0	10.0	6.0	-	-
FELED3CBDXXD	Diffused	5	27	8.0	6.0	4.0	2.0	-	7.5	6.0	4.0	2.0	-
FELED4CBDXXD			35	10.0	7.0	5.0	2.0	-	8.0	6.0	4.5	2.5	-
FELED5CBDXXD			44	10.0	7.0	5.0	2.5	-	9.0	6.0	5.0	2.5	-
FELED7CBDXXD			70	14.0	9.0	7.0	4.0	2.5	12.0	8.0	7.0	4.0	2.5
FELED3CBDXXD	Diffused	3	78	7.5	5.0	4.0	2.5	1.5	6.0	5.0	4.0	2.5	1.5
FELED4CBDXXD			98	8.0	6.0	4.5	3.0	2.0	7.0	5.0	4.0	3.0	2.0
FELED5CBDXXD			121	8.5	6.5	5.0	3.5	2.0	7.0	5.0	4.5	3.0	2.0
FELED7CBDXXD			195	10.0	7.5	6.0	4.0	3.0	9.0	7.0	6.0	4.0	3.0
FELED3CBDXXD	Diffused	2	175	7.0	5.0	4.0	3.0	2.0	5.0	4.0	3.0	2.5	2.0
FELED4CBDXXD			221	7.0	5.5	4.0	3.0	2.0	5.5	4.2	3.5	2.5	2.0
FELED5CBDXXD			273	7.5	5.5	4.5	3.0	2.3	6.0	4.5	3.5	2.5	2.2
FELED7CBDXXD			436	8.0	6.0	5.0	4.0	3.0	7.0	6.0	5.0	4.0	3.0

① All values displayed reflect 5000K CCT.

Specifications

	Standard Versions								Emergency Version	
	FELED3		FELED4		FELED5		FELED7		FELED5	
Voltage Range	BD: 100 to 240 Vac, 50/60 Hz									
Power Consumption (Watts)	27		32		38		63		44	
Correlated Color Temperature (CCT)	5000K	4000K	5000K	4000K	5000K	4000K	5000K	4000K	5000K	4000K
Color Rendering Index (CRI)	>70	>80	>70	>80	>70	>80	>70	>80	>70	>80
Lumen Output	2850	2500	3600	3200	4650	4150	7050	6550	980	810
Efficacy (lm / w) (clear lens)	105	95	114	101	122	110	111	103	—	—
T-Rating (in horizontal position)	T5 @ 55 °C		T6 @ 55 °C		T6 @ 55 °C		T6 @ 55 °C		T6 @ 50 °C	
Ambient Temperature	–30 °C to +55 °C (–22 °F to +131 °F)		–30 °C to +55 °C (–22 °F to +131 °F)		–30 °C to +55 °C (–22 °F to +131 °F)		–30 °C to +55 °C (–22 °F to +131 °F)		–20 °C to +50 °C (–4 °F to +122 °F)	
Luminaire Length	0.8 m (2.6 ft)		0.8 m (2.6 ft)		1.4 m (4.6 ft)		1.4 m (4.6 ft)		1.4 m (4.6 ft)	
Luminaire Weight	6 kg (13.2 lbs)		6 kg (13.2 lbs)		9 kg (19.8 lbs)		11 kg (24.3 lbs)		11.5 kg (25.4 lbs)	
Standard Materials	Housing: Fiberglass Reinforced Polyester Lens: Polycarbonate Gasket: Elastomer Internal Reflector: Highly Reflective White Powder Coated Aluminum									
Options	Emergency (5K Lumen Versions)									
Field-Replaceable Components	Diffuser / Lens / LED Driver / Inverter									
Luminaire Lifetime (LM-79)	60,000+ Hours									
Warranty	5 Years									

Note: All values typical +/- 10%

ATEX and IECEx Certifications

- EU Declaration of Conformity: 50317
- ATEX Certificate: LCIE 16 ATEX 3048X
- IECEx Certificate: IECEx LCIE 16.0038X
- Ingress Protection, EN / IEC 60529: IP66/67
- Impact Resistance (Shock): IK10
- Photobiological Safety, IEC 62778 & IEC 62471: RG0
- Gas: Zones 1 and 2
  - — Conforming to ATEX 2014/34/EU: Ⓔx II 2 G
  - — Type of Protection: Ex db eb mb IIC
  - — Temperature Class: T6 to T5
- Dust: Zones 21 and 22
  - — Conforming to ATEX 2014/34/EU: Ⓔx II 2 D
  - — Type of Protection: Ex tb IIIC Db
  - — Surface Temperature: +63 °C to 85 °C (145 °F to 185 °F)
  - — Ambient Temperature: –30 °C / -20 °C to +50 °C / +55 °C (–22 °F / -4 °F to 122 °F / +131 °F)

Product Ordering Guide

FELED	3	C	BD	S	A	D
Series: **FELED** Series Zone 1, 2, 21, 22 ATEX / IECEx Certified	Lumen Output ①: **3**- 3K Lumen Output **4**- 4K Lumen Output **5**- 5K Lumen Output **7**- 7K Lumen Output	Color Temperature: **C** - Cool, 5000K **N** - Neutral, 5000K	Voltage: **BD** - 100 to 240 Vac 50/60 Hz	Mounting Version: **S** - Surface / Suspension Mount Standard Wiring (single Phase) **L** - Surface / Suspension Mount Dual Loop In / Out Through Wiring (Single Phase)	Cable Entry Type: **A** - Armored M20 ② **N**- Unarmored M25 ③	Options: **D** - Diffused **E**- 3H Emergency (Combined) ④

① *All values displayed reflect typical values.*
② *Must order armored cable glands separately.*
③ *Cable glands provided in luminaires with unarmored hub entries.*
④ *Available for 5K lumen models only.*
Example: ***FELED3CBDSAD*** *FELED Series luminaire, 3K lumen output, universal voltage, surface mount, armored cable entry, diffused lens.*

LEARN MORE. The future is reliable LED lighting that saves energy and maintenance costs while delivering superior illumination. The future is FELED. See it clearly. Contact your local Appleton™ representative or visit www.masteringled.com today.

Maximize usable light enabling you to comfortably and safely work in harsh or hazardous environments.

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