GE
Lighting

WORLDWIDE PARTNER

DATA SHEET

LongLast™

Biax™ T and T/E

Compact Fluorescent Lamps Non-Integrated
13W, 18W, 26W, 32W and 42W

Product information

Ultra compact energy saving CFL lamps with triple-tube design give an ideal light source for small fixtures and downlighters. Biax™ T lamps allow more compact fixture designs with the same lumen output as Biax™ D lamps. They can also be used to deliver higher lumen output from existing designs.

The Biax™ T&T/E lamps are electrically interchangeable with Biax™ D and D/E lamps. They are available in 13, 18, 26, 32 and 42W. Light output ranges between 900 and 3200 lumens. Biax™ T/E lamps with a 4-pin electrical connection and without an internal starter are designed for high-frequency electronic ballasts. The use of separate electronic ballasts makes them suitable for almost every kind of energy supply: high and low voltages, accumulators, batteries, solar cells and systems that can be dimmed.

The Amalgam technology makes the Biax™ T and T/E lamps suitable for use in any burning position with same light output. They can be used in enclosed luminaires and outdoor applications too without significant light loss.

In certain circumstances (with very low probability), a traditional CFL lamp may smoke and emit a melting plastic-like odour at the end of its life, an incident which is not generally dangerous. It may happen because the lamp voltage is increased, and the ballast still sustains the discharge, thus overheating the lamp. Even though most commercial ballasts are equipped with End-of-Life protection, the T/E lamps are designed to eliminate the above-mentioned issue by itself. A small portion of titanium-hydride is placed near the cathode, and in case of critical overheat, the evaporating hydrogen quenches the arc.

Features

- Fits inside most luminaires
- Same light output in any burning position
- Up to 80% energy savings
- Lasts up to 20,000 hours (electronic gear)
- High colour rendering index – 82Ra
- Full range of colour temperatures – 2700, 3000, 3500, 4000, 5000K (only 32W and 42W)
- 4-pin lamps may be used with dimmable electronic gear
- Built-in end-of-life protection
- Reduced mercury content: 1.3mg

Application areas

- Outdoor luminaires
- Enclosed luminaires
- Post lighting, downlighting
- Table lamps
- Residential applications
- Offices
- Hotels/motels/restaurants
- Corridor lighting, wall sconces
- Industrial and retail

GE imagination at work

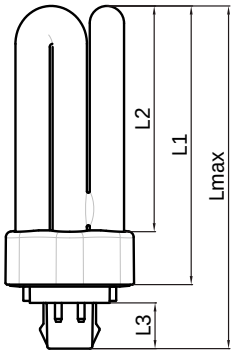
Basic data

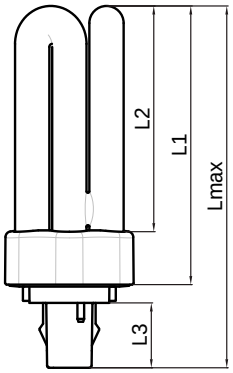
Nominal Wattage [W]	Rated Wattage on Standard Gear [W]	Volts on Standard Gear [V]	Cap	Product Description	Product Code	Nominal Lumen [lm]	Rated Lumen [lm]	Rated Lamp Efficacy on Standard Gear [lm/W]	CCT [K]	CRI [Ra]	Mercury [mg]	Life on Standard Gear 3h* [h]	EEC	Pack Qty
Biax™ T 2-pin with Amalgam, Internal Starter														
13	13	91	GX24d-1	F13TBX/827/A/2P	35940	900	900	69	2700	82	3.0	12,000	A	10
13	13	91	GX24d-1	F13TBX/SPX30/830/A/2P	35966	900	900	69	3000	82	3.0	12,000	A	10
13	13	91	GX24d-1	F13TBX/SPX41/A/2P	35941	900	900	69	4000	82	3.0	12,000	A	10
18	18	100	GX24d-2	F18TBX/SPX27/827/A/2P	35945	1200	1200	67	2700	82	3.0	12,000	B	10
18	18	100	GX24d-2	F18TBX/SPX30/830/A/2P	35944	1200	1200	67	3000	82	3.0	12,000	B	10
18	18	100	GX24d-2	F18TBX/SPX35/835/A/2P	35937	1200	1200	67	3500	82	3.0	12,000	B	10
18	18	100	GX24d-2	F18TBX/SPX41/840/A/2P	35939	1200	1200	67	4000	82	3.0	12,000	B	10
26	26.5	105	GX24d-3	F26TBX/SPX27/827/A/2P	35959	1800	1800	68	2700	82	3.0	12,000	B	10
26	26.5	105	GX24d-3	F26TBX/SPX30/830/A/2P	35952	1800	1800	68	3000	82	3.0	12,000	B	10
26	26.5	105	GX24d-3	F26TBX/SPX41/840/A/2P	35964	1800	1800	68	4000	82	3.0	12,000	B	10
26	26.5	105	GX24d-3	F26TBX/SPX65/865/A/2P	35965	1710	1710	65	6500	82	3.0	12,000	B	10

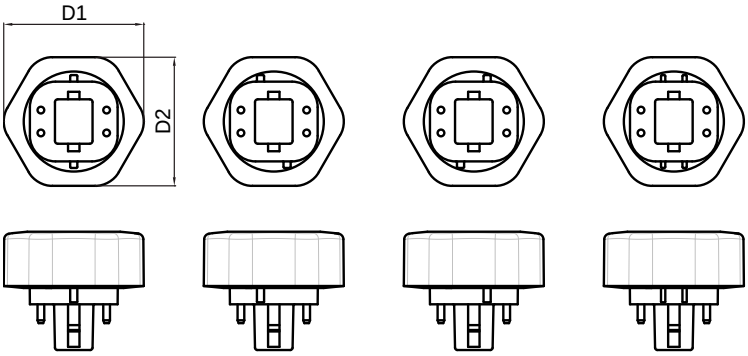
Nominal Wattage [W]	Rated Wattage on Standard Gear [W]	Rated Wattage on electronic gear [W]	Volts on standard gear [V]	Volts on electronic gear [V]	Cap	Product Description	Product Code	Nominal Lumen [lm]	Rated Lumen [lm]	Rated Lamp Efficacy on Standard Gear [lm/W]	Rated Lamp Efficacy on Electronic Gear [lm/W]	CCT [K]	Life on Standard Gear 3h [h]	EEC
Biax™ T/E LongLast™ 4-pin with Amalgam, External Starter Required														
13	13	12.5	91	77	GX24q-1	F13TBX/SPX27/827/A/4P	34391	900	900	69	72	2700	12,000	A
13	13	12.5	91	77	GX24q-1	F13TBX/SPX30/830/A/4P	34395	900	900	69	72	3000	12,000	A
13	13	12.5	91	77	GX24q-1	F13TBX/SPX35/835/A/4P	34400	900	900	69	72	3500	12,000	A
13	13	12.5	91	77	GX24q-1	F13TBX/SPX41/840/A/4P	34387	900	900	69	72	4000	12,000	A
18	18	16.5	100	80	GX24q-2	F18TBX/SPX27/827/A/4P	34392	1200	1200	67	73	2700	12,000	B
18	18	16.5	100	80	GX24q-2	TU F18TBX/SPX30/830/A/4P GX24Q-2 GE MIH	34396	1200	1200	67	73	3000	12,000	B
18	18	16.5	100	80	GX24q-2	F18TBX/SPX35/835/A/4P	34405	1200	1200	67	73	3500	12,000	B
18	18	16.5	100	80	GX24q-2	F18TBX/SPX41/840/A/4P	34385	1200	1200	67	73	4000	12,000	B
26	26.5	24	105	80	GX24q-3	F26TBX/SPX27/827/A/4P	34393	1800	1800	68	75	2700	12,000	B
26	26.5	24	105	80	GX24q-3	F26TBX/SPX30/830/A/4P	34397	1800	1800	68	75	3000	12,000	B
26	26.5	24	105	80	GX24q-3	F26TBX/SPX35/835/A/4P	34406	1800	1800	68	75	3500	12,000	B
26	26.5	24	105	80	GX24q-3	F26TBX/SPX41/840/A/4P	34381	1800	1800	68	75	4000	12,000	B
32	-	32	-	100	GX24q-3	F32TBX/SPX27/827/AP4P	39377	2400	2400	-	75	2700	-	B
32	-	32	-	100	GX24q-3	F32TBX/SPX30/830/AP4P	39378	2400	2400	-	75	3000	-	B
32	-	32	-	100	GX24q-3	F32TBX/SPX35/835/A/4P	39379	2400	2400	-	75	3500	-	B
32	-	32	-	100	GX24q-3	F32TBX/SPX41/840/A/4P	39380	2400	2400	-	75	4000	-	B
42	-	43	-	135	GX24q-4	F42TBX/827/A/4P/EOL	46312	3200	3200	-	74	2700	-	B
42	-	43	-	135	GX24q-4	F42TBX/830/A/4P/EOL	46313	3200	3200	-	74	3000	-	B
42	-	43	-	135	GX24q-4	F42TBX/835/A/4P/EOL	46314	3200	3200	-	74	3500	-	B
42	-	43	-	135	GX24q-4	F42TBX/841/A/4P/EOL	46315	3200	3200	-	74	4000	-	B

All the lamps in the table have:
- CRI[Ra]: 82
- Mercury [mg]: 1.3
- Life [h] on electronic gear 3 hours: 17,000 and 42w 10 000 hours
- Life [h] on electronic gear 12 hours: 20,000 and 42w 10 000 hours
- Pack Qty: 10

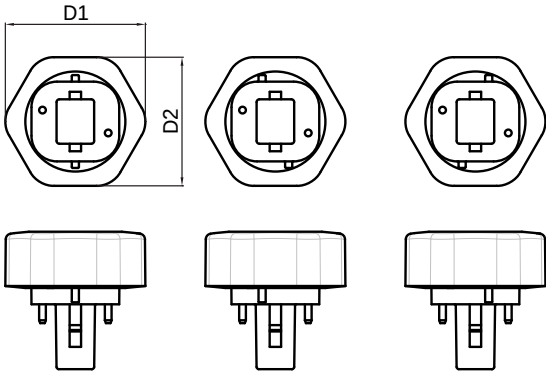
Dimensions







GX24q-1 GX24q-2 GX24q-3 GX24q-4



GX24d-1 GX24d-2 GX24d-3

Nominal Wattage [W]	L1 [mm]	L2 [mm]	L3 [mm]	Lmax [mm]	D1 [mm]	D2 [mm]
Biax™ T 2-pin with Amalgam, Internal Starter						
13	83	64.5	22.5	112.9	49	45
18	97.5	79	22.5	127.4	49	45
26	110	91.5	22.5	139.9	49	45
Biax™ T/E LongLast™ 4-pin with Amalgam, External starter required						
13	83	64.5	16	106.2	49	45
18	97.5	79	16	120.7	49	45
26	110	91.5	16	133.2	49	45
32	118	99.5	16	141.2	49	45
42	140	121.5	16	163.2	49	45

Lamp life

Rated average life for Biax™ T LongLast™ is 12,000 hours (switching cycle: 2 hours 45min ON/15min OFF, see Graph A) & T/E LongLast™ is 20,000 hours (switching cycle: 11 hours ON/1 hours OFF, see Graph A and B). Cathodes of a fluorescent lamp lose their electron-emissivity during life due to the evaporation of emission mixture. When the deterioration reaches a certain level, the cathode breaks. Typical lifetime characteristics are based on GE Lighting's measurements according to the relevant IEC standards. The declared lamp life is the median life, which is when 50% of the lamps from a large sample batch would have failed. Real lifetime figures may depend on actual application. For instance improper cathode preheat, too high operating current, or too low operating current without additional cathode heating reduces the expected life.

Lumen maintenance

Lumen Maintenance curve presented for Biax™ T&T/E lamps is based on lumen readings in a photometric sphere under laboratory conditions, in cap up position. In actual use, lumen output is a function of burning hours and lamp operating watts throughout life. See Graph A and B.
Lumen maintenance graph shows how the luminous output decreases throughout life. The main causes of the light depreciation are the deterioration of phosphor coating and the lamp blackening due to the deposition of evaporated emission mixture on the glass tube. These effects are unavoidable. Lumen maintenance curve presented here for Biax™ T/E LongLast™ lamps is based on lumen readings under laboratory conditions.

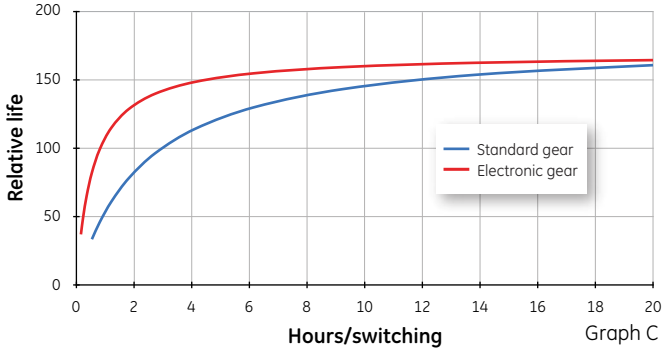
Test conditions:

- Photometric sphere
- Vertical, cap up burning position
- Switching cycle: 165 min on – 15min off and 11 hours on – 1 hour off
- Standard gear or high frequency operation
- 25°C ambient temperature

Life versus frequency of switching

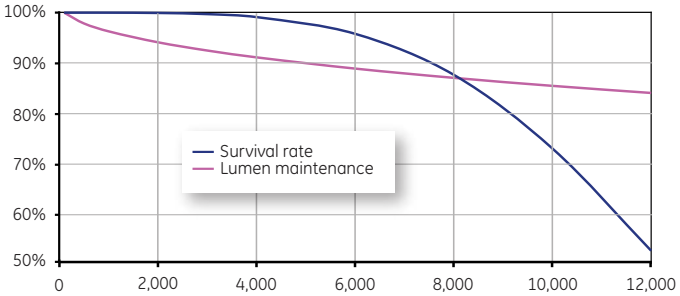
For impact on life of alternative switching cycles refer to the Graph C. For applications where a fast switching cycle is required it is possible to minimise the effect of switching on lamp life with the use of a suitable electronic gear with a 4-pin lamp.

Life versus frequency of switching



Graph C

Biax™ T on standard gear

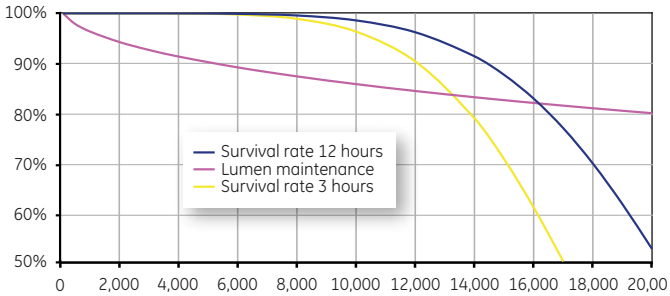


Graph A

Hours	Survival rate	Lumen maintenance
2,000	1.00	0.94
4,000	0.99	0.91
6,000	0.96	0.89
8,000	0.88	0.87
12,000	0.53	0.84

Biax™ T/E on electronic gear

13-32W

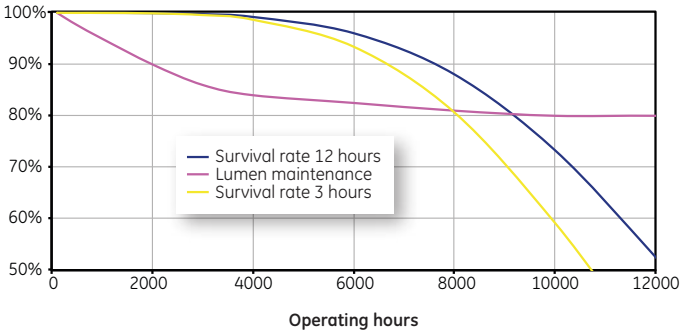


Graph B

Hours	Survival rate 12 hours	Lumen maintenance	Survival rate 3 hours
2,000	1.00	0.94	1.00
4,000	1.00	0.91	1.00
6,000	1.00	0.89	1.00
8,000	1.00	0.87	0.99
12,000	0.96	0.84	0.90
16,000	0.83	0.82	0.61
20,000	0.53	0.80	

Biax™ T/E on electronic gear

42W



Hours	Survival rate 12 hours	Lumen maintenance	Survival rate 3 hours
2,000	1.00	0.90	1.00
4,000	1.00	0.84	0.99
6,000	0.96	0.83	0.93
8,000	0.88	0.81	0.80
10,000	0.73	0.80	0.59
12,000	0.53	0.80	0.34

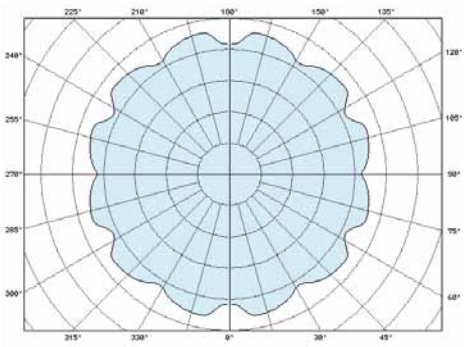
Luminous intensity distribution

The luminous intensity distribution describes the quantity of light that is radiated in a particular direction.

Graph D shows Luminous Intensity Distribution curve of Biax™ T&T/E lamps. Tests were taken with lamps burning in vertical cap up position. The left plot of Graph D1 shows horizontal while the right Graph D2 shows the vertical light intensity distribution plots.

Disclaimer: graphs show typical lamp behavior. Individual lamps and groups can show different values.

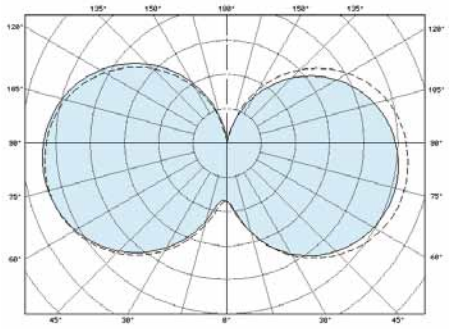
Radial luminous intensity distribution (horizontal)



Burning position: cap up

Graph D1

Radial luminous intensity distribution (vertical)



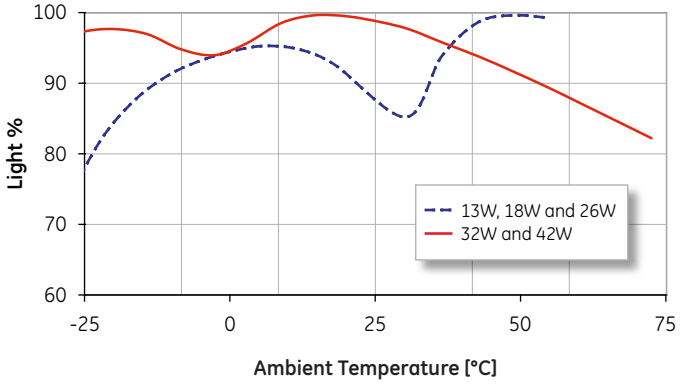
Burning position: cap up

Graph D2

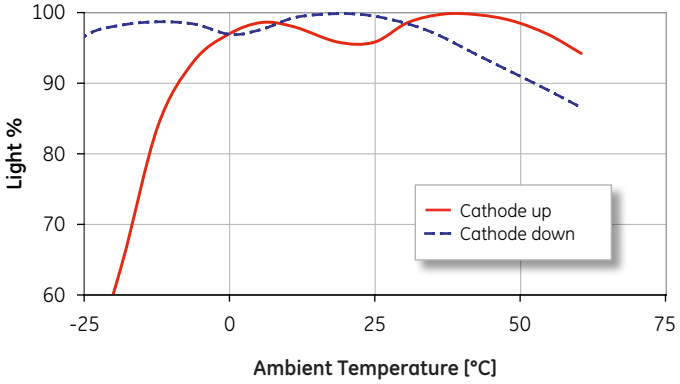
Relative luminous flux vs. ambient air temperature

The lamp luminous output depends on the mercury vapour pressure in the discharge tube. The mercury vapour pressure is a function of the thermal conditions around the glass tubes and the amalgam. The burning position, air flow, and radiated heat sources have an effect on these conditions. Graph E shows the relative luminous output as function of the ambient temperature in vertical base-up position. Tests were performed in draught-free air under thermally controlled conditions.

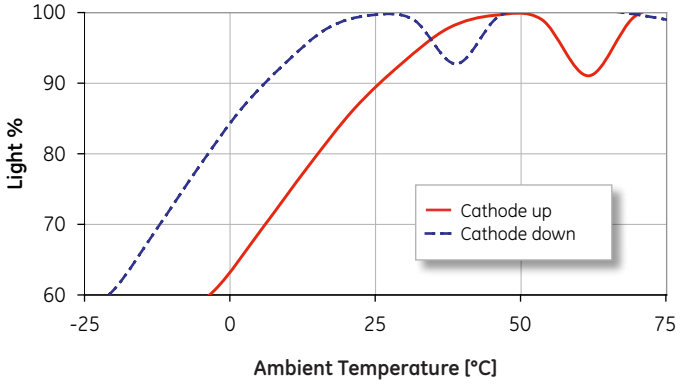
Light output vs. ambient temperature
vertical base up burning



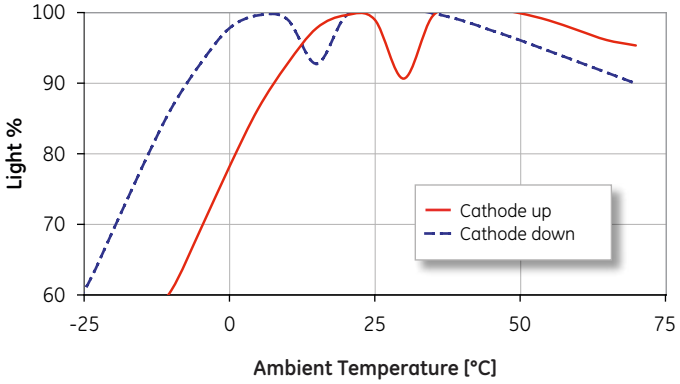
Light output vs. ambient temperature
in air TBX26W horizontal burning



Light output vs ambient temperature in airflow
TBX 32W horizontal burning



Light output vs ambient temperature in airflow
TBX 42W horizontal burning

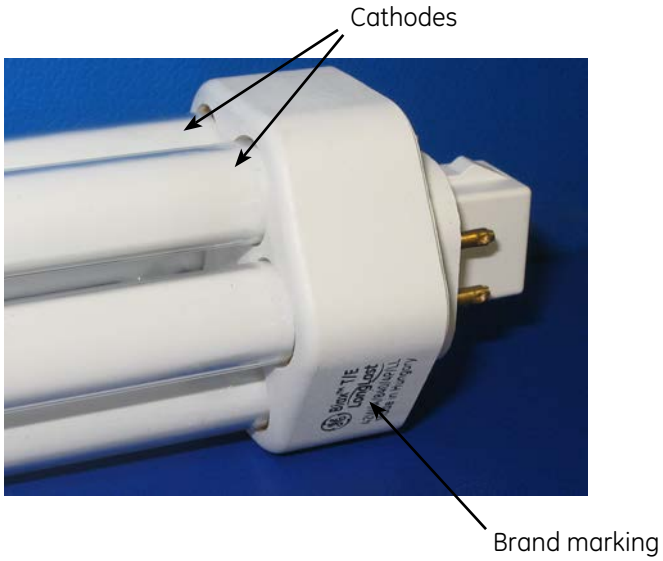


Note: lamps may dim under excessive airflow, adding a lens to the fixture can correct the problem.

Cathode position

The performance of Biax™ T/E 32 and 42W lamps in horizontal burning position depends if the cathode is up or down position.

See Graph F and G. Tests were performed in thermal chamber with moderate airflow under thermally controlled conditions. For cathode position identification please find “Cathode position” drawing on the right.



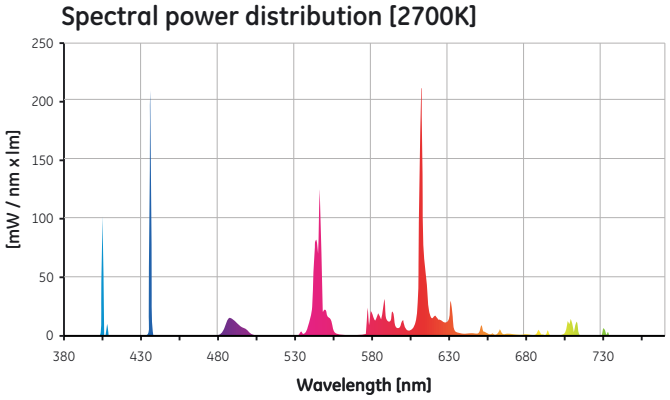
Environmental aspect

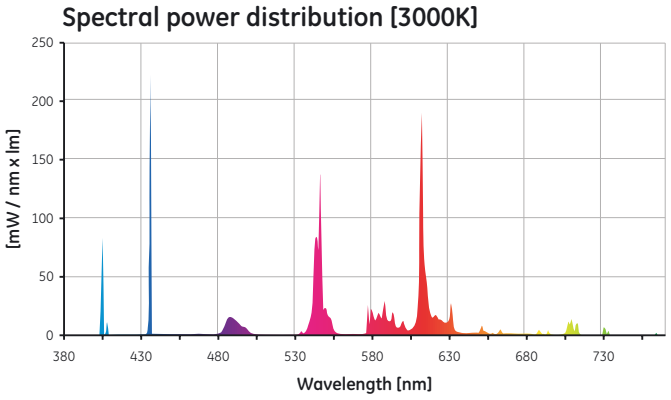
The mercury content of the Biax™ T&T/E lamps is maintained at 3mg per lamp without any performance issue, supporting GE Lighting’s commitment to environmental issues.

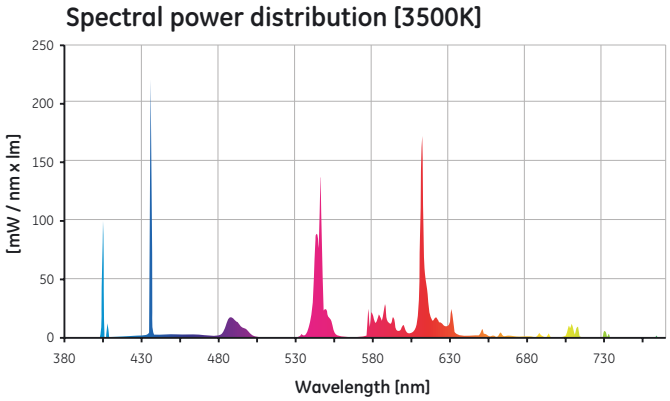
Standards

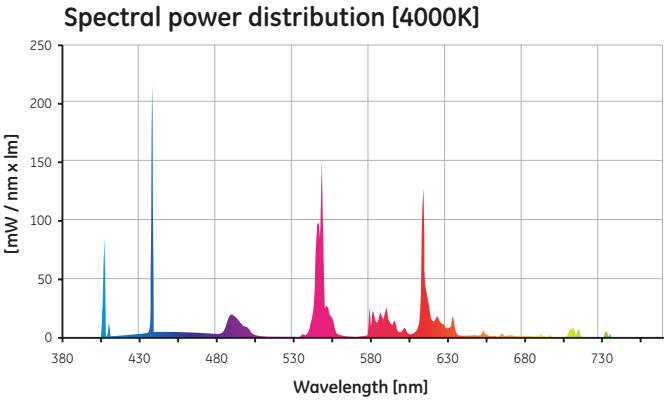
Biax™ T&T/E lamps comply with the relevant clauses of all applicable safety and performance specifications including IEC 61199 Single-capped fluorescent lamps – Safety specifications and IEC 60901 Single-capped fluorescent lamps: Performance specifications.

Spectral distribution









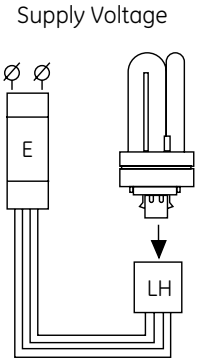
Biax™ T compatibility with other 2 pin cap lamps

2 pin Biax™ T (triple)		2 pin Biax™ D (double)			2 pin Biax™ S (single)
		F13DBX	F18DBX	F26DBX	F5BX/4P F7BX/4P F9BX/4P F11BX
		GX24d-1	GX24d-2	GX24d-3	GX24d-4
F13TBX	G24d-1	YES			
F18TBX	G24d-2		YES		
F26TBX	G24d-3			YES	

Circuit diagram

LH = Lamp Holder
E = Electronic gear

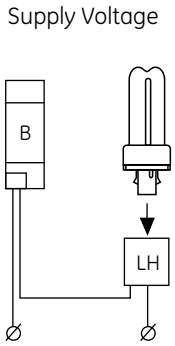
Biax™ T/E 13W, 18W, 26W, 32W, 42W



Parallel compensated

B = Ballast (50Hz)
LH = Lamp Holder

Biax™ T 13W, 18W, 26W



Recommended light colour applications

Warm; Warm White 2700K
Specialty retailers, restaurants, hotel lobbies, residential applications

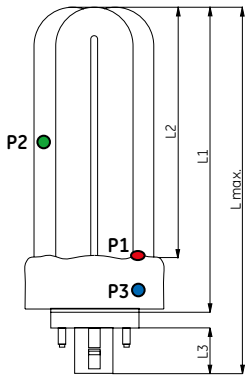
Neutral; Neutral White 3000-3500K
Grocery stores & produce markets, retail stores, bank lobbies

Cool; Cool White 4000K
Offices, manufacturing, schools, hospitals

Daylight; Daylight Plus; Full Spectrum 6500K
Printers, paint studios, art galleries, car dealerships

Operating temperature limits for Biax™ T&T/E

Lamp surface temperatures in any application shall not exceed maximum temperature values that are given in page 4. The exact location where the relevant temperature appears, depends on the lamp burning orientation, e.g. VBU, horizontal, etc. Portion 2 (P2) and P3 temperatures are measured on the hottest surfaces of the indicated lamp portion. (This is normally on the uppermost suface of the lamp in horizontal burning.) P1 is always measured on the surface of the plastic housing between the cathodes.



Operating temperature limits

Lamp portion		Description	Maximum temperature
P1		Plastic housing between cathodes	180 °C
P2		Mid part of the bulb	180 °C
P3		Plastic housing along the circumference	140 °C

Gear specification

Cathode resistances

Nominal Power	Cap	Standard Data Sheet 60901-IEC	Test Current [A]	Cathode Resistance @ Itest		
				Rated [ohm]	Min. [ohm]	Max. [ohm]
13	GX24q-1	-3413	0.1	50	37.5	62.5
18	GX24q-2	-3418	0.2	26	19.5	32.5
26	GX24q-3	-3426	0.3	13	9.7	16.3
32	GX24q-3	-7432	0.3	13	9.7	16.3
42	GX24q-4	-7442	0.3	13	9.7	16.3

Resistance values measured a test current
Values conform IEC 60901 related datasheets

Cathode preheat requirements

Nominal Power	Cap	Standard Data Sheet 60901-IEC	Emin = Qmin + Pmin*ts			Emax = Qmax + Pmax*ts		
			Q_{min} [J]	P_{min} [W]	$R_{sub,min}$ [ohm]	Q_{max} [J]	P_{max} [W]	$R_{sub,max}$ [ohm]
13	GX24q-1	-3413	1	0.7	30	2	1.4	40
18	GX24q-2	-3418	0.9	0.7	18	1.8	1.4	24
26	GX24q-3	-3426	1	0.8	9	2	1.6	12
32	GX24q-3	-7432	1	0.8	9	2	1.6	12
42	GX24q-4	-7442	1	0.8	9	2	1.6	12

Preheat time shall be longer than 0.4 s and shorter than 3s
Ballast preheat energy shall be measured with substitution resistance of above table
Values conform IEC 60901 related datasheets

Dimming requirements

Nominal Power	Cap	Standard Datasheet 60901-IEC	Id_{min} [A]	Id_{max} [A]	X [A^2]	Y [A]
13	GX24q-1	-3413	0.015	0.115	0.035	0.26
18	GX24q-2	-3418	0.020	0.16	0.07	0.35
26	GX24q-3	-3426	0.030	0.25	0.175	0.57
32	GX24q-3	-7432	0.030	0.25	0.175	0.57
42	GX24q-4	-7442	0.030	0.25	0.175	0.57

In the dimming range of the lamp operating current Idmin — Idmax
Minimum SoS = $I_{LH}^2+I_{LL}^2=X-Y*Id$
Target SoS = $I_{LH}^2+I_{LL}^2=X-0.3*Y*Id$
Idmax for dimming operation = Idmin for normal operation
Values conform IEC proposal

Starting requirements

Nominal Power	Cap	Standard Data Sheet 60901-IEC	Ignition Voltage [V_{rms}]	Non-ignition Voltage [V_{rms}]	R_{sub} [ohm]
13	GX24q-1	-3413	400	190	30...90
18	GX24q-2	-3418	550	250	18...54
26	GX24q-3	-3426	550	265	9...27
32	GX24q-3	-7432	560	265	9...27
42	GX24q-4	-7442	600	265	9...27

Ballast open circuit voltage shall be measured with substitution resistance of above table
Values conform IEC 60901 related datasheets

When the new fluorescent lamp is installed into dimming system, it is advised to operate lamps for period of 100 hours at full light output.

Recommended list of ballasts*

	Wattage	Lamp description	Ballast manufacturer	Single ballast description	Twin ballast description
Biax™ T/E LongLast™ 4-pin	13W	F13TBX/SPX27/827/A/4P	Tridonic Atco	PC 1/10/13 TCD PRO	PC 2/10/13 TCD PRO
			Helvar	EL 1/2x9-13TCs	EL 1/2x9-13TCs
Biax™ T/E LongLast™ 4-pin	18W	F18TBX/SPX27/827/A/4P	Tridonic Atco	PC 1/18 TCD PRO	PC 2/18 TCD PRO
			Helvar	EL1/2x18TCs	EL1/2x18TCs
			Vossloh-Schwabe	ELXc.118.831	
Biax™ T/E LongLast™ 4-pin	26W	F26TBX/SPX27/827/A/4P	Tridonic Atco	PC 1x26/32/42 TCT PRO	PC 2/26/32 TCT PRO
			Helvar	EL 1/2x18-42TCs	EL 1/2x18-42TCs
			Vossloh-Schwabe	ELXc.142.872	ELXc 242.836
Biax™ T/E LongLast™ 4-pin	32W	F32TBX/SPX27/827/AP4P	Tridonic Atco	PC 1x26/32/42 TCT PRO	PC 2x26-32 TCT PRO
			Helvar	EL 1/2x18-42TCs	EL 2x32/42TCs
			Vossloh-Schwabe	ELXc.142.872	ELXc 240.863
Biax™ T/E LongLast™ 4-pin	42W	F42TBX/827/A/4P	Tridonic Atco	PC 1x26/32/42 TCT PRO	PC 2/32/42 TCT PRO
			Helvar	EL 1x42CHF	EL 2x32/42TCs
			Vossloh-Schwabe	ELXc.142.872	ELXc 242.836

*Ballast manufacturers have the right to change ballast specification without prior notification or official announcement so these data based on GE measurement 2010/2011.