

LongLast™

Biax™ D and D/E

Compact Fluorescent Lamps Non-Integrated
10W, 13W, 18W and 26W

DATA SHEET

Product information

Biax™ D & D/E LongLast™ lamps are available in 10, 13, 18 and 26 watt ratings, 10 and 13W in T3 tube size, 18 and 26W in T4 tube size and ranging from 101mm to 174mm in length. Five colours are available in two-pin and four-pin caps. A high colour rendering index (CRI) of 82 gives rich, vibrant colour. The lamps are available in warm and cool colour temperatures suitable for a wide variety of environments.



Features

- Up to 80% energy saving versus normal incandescent lamps
- Lasts 10 times longer than standard incandescent lamps
- High colour rendering index – 82Ra
- Full range of colour temperatures – 2700, 3000, 3500, 4000 and 6500K
- 4-pin lamps for use with electronic gear may be used with dimmers

Application Areas:



Hospitality



Retail



GE imagination at work

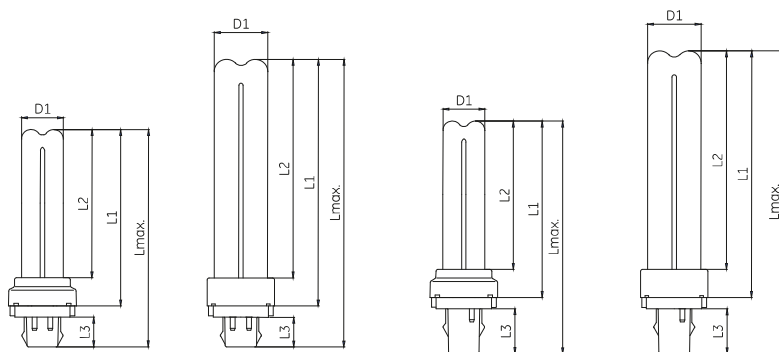
Basic data

| Nominal Wattage [W] | Rated Wattage on Standard Gear [W] | Energy consumption [kWh/1000h] | Voltson 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-cycle [h] | Diameter [mm] | Length [mm] | EEC | PackQty |
|--|------------------------------------|--------------------------------|---------------------------|--------|---------------------|--------------|--------------------|------------------|---|---------|----------|--------------|------------------------------------|---------------|-------------|-----|---------|
| Biax™ D 2-pin, Internal Starter | | | | | | | | | | | | | | | | | |
| 10 | 10 | 12.70 | 64 | G24d-1 | F10DBX/T3/827/2P | 78211 | 600 | 600 | 60 | 2700 | 82 | 1.3 | 12,000 | 34,4 | 108 | B | 10 |
| 10 | 10 | 12.70 | 64 | G24d-1 | F10DBX/T3/830/2P | 78212 | 600 | 600 | 60 | 3000 | 82 | 1.3 | 12,000 | 34,4 | 108 | B | 10 |
| 10 | 10 | 12.70 | 64 | G24d-1 | F10DBX/T3/835/2P | 78213 | 600 | 600 | 60 | 3500 | 82 | 1.3 | 12,000 | 34,4 | 108 | B | 10 |
| 10 | 10 | 12.70 | 64 | G24d-1 | F10DBX/T3/840/2P | 78214 | 600 | 600 | 60 | 4000 | 82 | 1.3 | 12,000 | 34,4 | 108 | B | 10 |
| 10 | 10 | 12.70 | 64 | G24d-1 | F10DBX/T3/865/2P | 78215 | 600 | 600 | 60 | 6500 | 82 | 1.3 | 12,000 | 34,4 | 108 | B | 10 |
| 13 | 13 | 16.18 | 91 | G24d-1 | F13DBX/T3/827/2P | 78221 | 900 | 900 | 69 | 2700 | 82 | 1.3 | 12,000 | 34,4 | 139 | A | 10 |
| 13 | 13 | 16.18 | 91 | G24d-1 | F13DBX/T3/830/2P | 78222 | 900 | 900 | 69 | 3000 | 82 | 1.3 | 12,000 | 34,4 | 139 | A | 10 |
| 13 | 13 | 16.18 | 91 | G24d-1 | F13DBX/T3/835/2P | 78223 | 900 | 900 | 69 | 3500 | 82 | 1.3 | 12,000 | 34,4 | 139 | A | 10 |
| 13 | 13 | 16.18 | 91 | G24d-1 | F13DBX/T3/840/2P | 78224 | 900 | 900 | 69 | 4000 | 82 | 1.3 | 12,000 | 34,4 | 139 | A | 10 |
| 13 | 13 | 16.18 | 91 | G24d-1 | F13DBX/T3/865/2P | 78225 | 900 | 900 | 69 | 6500 | 82 | 1.3 | 12,000 | 34,4 | 139 | A | 10 |
| 18 | 18 | 22.10 | 100 | G24d-2 | F18DBXT4/SPX27/827 | 12860 | 1200 | 1200 | 67 | 2700 | 82 | 1.3 | 12,000 | 34,4 | 154 | B | 10 |
| 18 | 18 | 22.10 | 100 | G24d-2 | F18DBXT4/SPX30/830 | 12861 | 1200 | 1200 | 67 | 3000 | 82 | 1.3 | 12,000 | 34,4 | 154 | B | 10 |
| 18 | 18 | 22.10 | 100 | G24d-2 | F18DBXT4/SPX35/835 | 12863 | 1200 | 1200 | 67 | 3500 | 82 | 1.3 | 12,000 | 34,4 | 154 | B | 10 |
| 18 | 18 | 22.10 | 100 | G24d-2 | F18DBXT4/SPX41/840 | 12864 | 1200 | 1200 | 67 | 4000 | 82 | 1.3 | 12,000 | 34,4 | 154 | B | 10 |
| 18 | 18 | 22.10 | 100 | G24d-2 | F18DBXT4/SPX65/865 | 13017 | 1200 | 1200 | 67 | 6500 | 82 | 1.3 | 12,000 | 34,4 | 154 | B | 10 |
| 26 | 26 | 31.35 | 105 | G24d-3 | F26DBXT4/SPX27/827 | 35250 | 1800 | 1800 | 69 | 2700 | 82 | 1.3 | 12,000 | 34,4 | 169.5 | B | 10 |
| 26 | 26 | 31.35 | 105 | G24d-3 | F26DBXT4/SPX30/830 | 35237 | 1800 | 1800 | 69 | 3000 | 82 | 1.3 | 12,000 | 34,4 | 169.5 | B | 10 |
| 26 | 26 | 31.35 | 105 | G24d-3 | F26DBXT4/SPX35/835 | 35251 | 1800 | 1800 | 69 | 3500 | 82 | 1.3 | 12,000 | 34,4 | 169.5 | B | 10 |
| 26 | 26 | 31.35 | 105 | G24d-3 | F26DBXT4/SPX41/840 | 35252 | 1800 | 1800 | 69 | 4000 | 82 | 1.3 | 12,000 | 34,4 | 169.5 | B | 10 |
| 26 | 26 | 31.42 | 105 | G24d-3 | F26DBXT4/SPX65/865 | 35305 | 1710 | 1710 | 66 | 6500 | 82 | 1.3 | 12,000 | 34,4 | 169.5 | B | 10 |

| Nominal Wattage [W] | Rated Wattage on Standard Gear [W] | Energy consumption [kWh/1000h] | Voltson 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 electronic gear 12h-cycle [h] | Diameter [mm] | Length [mm] | EEC | PackQty |
|---|------------------------------------|--------------------------------|---------------------------|--------|---------------------|--------------|--------------------|------------------|---|---------|----------|--------------|---------------------------------------|---------------|-------------|-----|---------|
| Biax™ D/E LongLast™ 4-pin, External Starter Required | | | | | | | | | | | | | | | | | |
| 10 | 10 | 10.45 | 64 | G24q-1 | F10DBX/T3/827/4P | 78217 | 600 | 600 | 60 | 2700 | 82 | 1.3 | 20,000 | 34,4 | 100.5 | A | 10 |
| 10 | 10 | 10.45 | 64 | G24q-1 | F10DBX/T3/830/4P | 78218 | 600 | 600 | 60 | 3000 | 82 | 1.3 | 20,000 | 34,4 | 100.5 | A | 10 |
| 10 | 10 | 10.45 | 64 | G24q-1 | F10DBX/T3/835/4P | 78219 | 600 | 600 | 60 | 3500 | 82 | 1.3 | 20,000 | 34,4 | 100.5 | A | 10 |
| 10 | 10 | 10.45 | 64 | G24q-1 | F10DBX/T3/840/4P | 78220 | 600 | 600 | 60 | 4000 | 82 | 1.3 | 20,000 | 34,4 | 100.5 | A | 10 |
| 10 | 10 | 10.45 | 64 | G24q-1 | F10DBX/T3/865/4P | 78231 | 600 | 600 | 60 | 6500 | 82 | 1.3 | 20,000 | 34,4 | 100.5 | A | 10 |
| 13 | 13 | 13.75 | 91 | G24q-1 | F13DBX/T3/827/4P | 78226 | 900 | 900 | 69 | 2700 | 82 | 1.3 | 20,000 | 34,4 | 131.5 | A | 10 |
| 13 | 13 | 13.75 | 91 | G24q-1 | F13DBX/T3/830/4P | 78227 | 900 | 900 | 69 | 3000 | 82 | 1.3 | 20,000 | 34,4 | 131.5 | A | 10 |
| 13 | 13 | 13.75 | 91 | G24q-1 | F13DBX/T3/835/4P | 78228 | 900 | 900 | 69 | 3500 | 82 | 1.3 | 20,000 | 34,4 | 131.5 | A | 10 |
| 13 | 13 | 13.75 | 91 | G24q-1 | F13DBX/T3/840/4P | 78229 | 900 | 900 | 69 | 4000 | 82 | 1.3 | 20,000 | 34,4 | 131.5 | A | 10 |
| 13 | 13 | 13.75 | 91 | G24q-1 | F13DBX/T3/865/4P | 78232 | 900 | 900 | 69 | 6500 | 82 | 1.3 | 20,000 | 34,4 | 131.5 | A | 10 |
| 18 | 18 | 18.15 | 100 | G24q-2 | F18DBX/SPX27/827/4P | 12865 | 1200 | 1200 | 67 | 2700 | 82 | 1.3 | 20,000 | 34,4 | 146.5 | A | 10 |
| 18 | 18 | 18.15 | 100 | G24q-2 | F18DBX/SPX30/830/4P | 12866 | 1200 | 1200 | 67 | 3000 | 82 | 1.3 | 20,000 | 34,4 | 146.5 | A | 10 |
| 18 | 18 | 18.15 | 100 | G24q-2 | F18DBX/SPX35/835/4P | 12869 | 1200 | 1200 | 67 | 3500 | 82 | 1.3 | 20,000 | 34,4 | 146.5 | A | 10 |
| 18 | 18 | 18.15 | 100 | G24q-2 | F18DBX/SPX41/840/4P | 12870 | 1200 | 1200 | 67 | 4000 | 82 | 1.3 | 20,000 | 34,4 | 146.5 | A | 10 |
| 26 | 26 | 26.40 | 105 | G24q-3 | F26DBX/SPX27/827/4P | 35247 | 1800 | 1800 | 69 | 2700 | 82 | 1.3 | 20,000 | 34,4 | 162 | A | 10 |
| 26 | 26 | 26.40 | 105 | G24q-3 | F26DBX/SPX30/830/4P | 35235 | 1800 | 1800 | 69 | 3000 | 82 | 1.3 | 20,000 | 34,4 | 162 | A | 10 |
| 26 | 26 | 26.40 | 105 | G24q-3 | F26DBX/SPX35/835/4P | 35248 | 1800 | 1800 | 69 | 3500 | 82 | 1.3 | 20,000 | 34,4 | 162 | A | 10 |
| 26 | 26 | 26.40 | 105 | G24q-3 | F26DBX/SPX41/840/4P | 35236 | 1800 | 1800 | 69 | 4000 | 82 | 1.3 | 20,000 | 34,4 | 162 | A | 10 |
| 26 | 26 | 26.40 | 105 | G24q-3 | F26DBX/SPX65/865/4P | 42798 | 1710 | 1710 | 66 | 6500 | 82 | 1.3 | 20,000 | 34,4 | 162 | A | 10 |

Biax™ D/E LongLast™ 4-pin average life with Standard Gear on 3 hours per start is 12,000 hours.

Dimensions



| Nominal Wattage [W] | L1 [mm] | L2 [mm] | L3 [mm] | Lmax [mm] | D1 [mm] |
|----------------------------------|---------|---------|---------|-----------|---------|
| Biax™ D 2-pin | | | | | |
| 10 | 78.7 | 64.5 | 22.4 | 108 | 21.5 |
| 13 | 109.7 | 95.5 | 22.4 | 139 | 21.5 |
| 18 | 124.7 | 110.5 | 22.4 | 154 | 27 |
| 26 | 140.2 | 126 | 22.4 | 169.5 | 27 |
| Biax™ D/E LongLast™ 4-pin | | | | | |
| 10 | 78.7 | 91.2 | 15 | 100.5 | 21.5 |
| 13 | 109.7 | 95.5 | 15 | 131.5 | 21.5 |
| 18 | 124.7 | 110.5 | 15 | 146.5 | 27 |
| 26 | 140.2 | 126 | 15 | 162 | 27 |

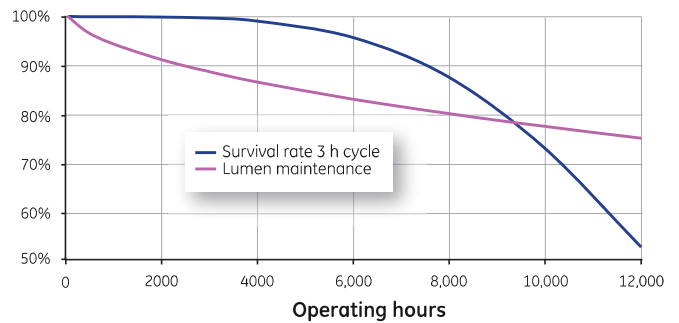
Lamp life

Rated average life for Biax™ D LongLast™ is 12,000 hours (switching cycle: 2hrs 45min ON/15min OFF, see Graph A) and D/E LongLast™ is 20,000 hours (switching cycle: 11hrs ON/1hrs OFF, see graph 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.

Biax™ D on standard gear

Graph A



| Hours | Survival rate 3h cycle | Lumen maintenance |
|-------|------------------------|-------------------|
| 100 | 1.00 | 1.00 |
| 500 | 1.00 | 0.97 |
| 1000 | 1.00 | 0.95 |
| 2000 | 1.00 | 0.91 |
| 3000 | 1.00 | 0.89 |
| 4000 | 0.99 | 0.87 |
| 6000 | 0.96 | 0.83 |
| 8000 | 0.88 | 0.80 |
| 10000 | 0.73 | 0.77 |
| 12000 | 0.53 | 0.75 |

Lumen maintenance

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™ D and D/E LongLast™ lamps are based on lumen readings under laboratory conditions.

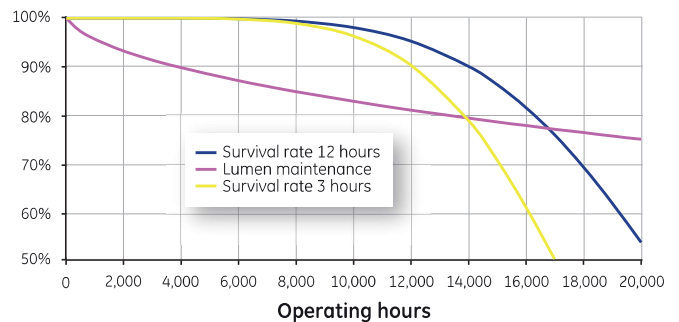
Test conditions:

- Photometric sphere
- Vertical, cap up burning position
- Switching cycle: 11 hours On – 1 hour Off
- High frequency operation 25°C ambient temperature

See graph A and B.

Biax™ D/E on electronic gear

Graph B



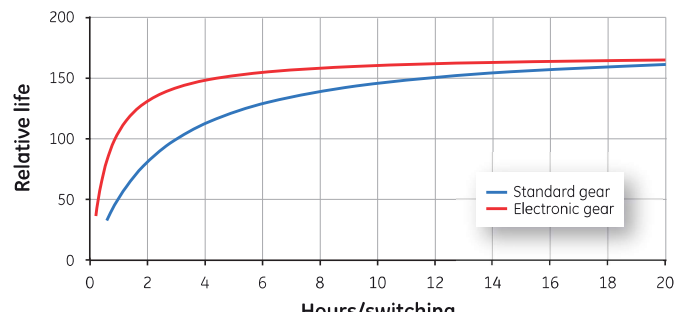
| Hours | Survival rate 12 hours | Lumen maintenance | Survival rate 3 hours |
|--------|------------------------|-------------------|-----------------------|
| 2,000 | 1.00 | 0.93 | 1.00 |
| 4,000 | 1.00 | 0.89 | 1.00 |
| 8,000 | 1.00 | 0.84 | 0.99 |
| 12,000 | 0.96 | 0.80 | 0.90 |
| 16,000 | 0.83 | 0.78 | 0.61 |
| 20,000 | 0.53 | 0.75 | |

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

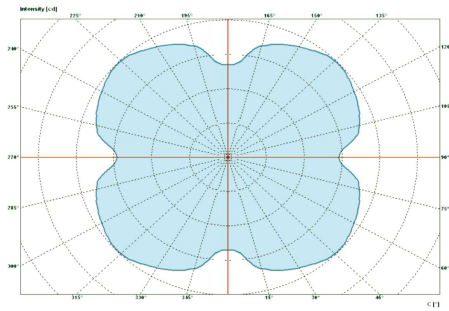


Luminous intensity distribution

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

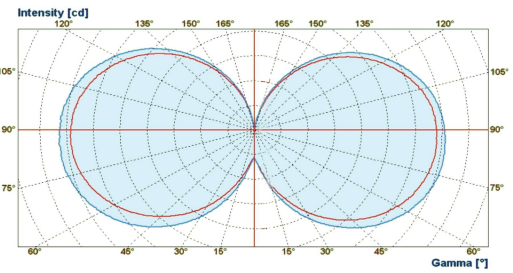
Graph D shows luminous intensity distribution curve of Biax™ D & D/E lamps. Tests were taken with lamps burning in vertical cap up position. The left plot of Graph D shows horizontal while the right plot shows the vertical light intensity distribution plots.

Radial luminous intensity distribution (horizontal)



Graph D

Radial luminous intensity distribution (vertical)



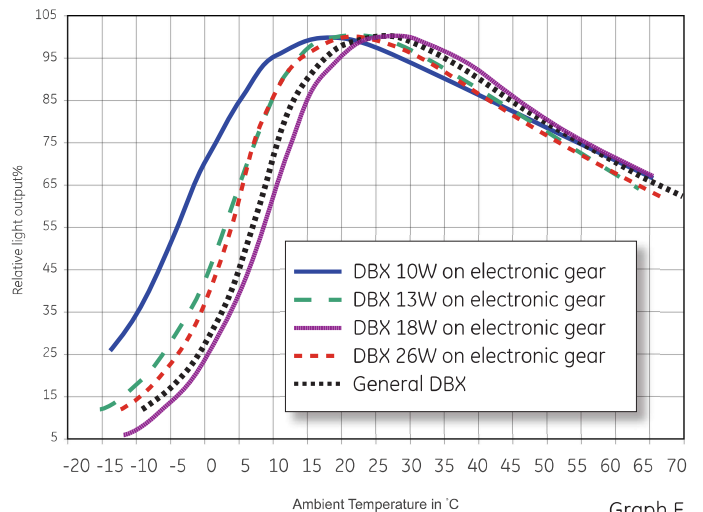
Burning position: cap up

Graph D

Lumen output vs. ambient air temperature

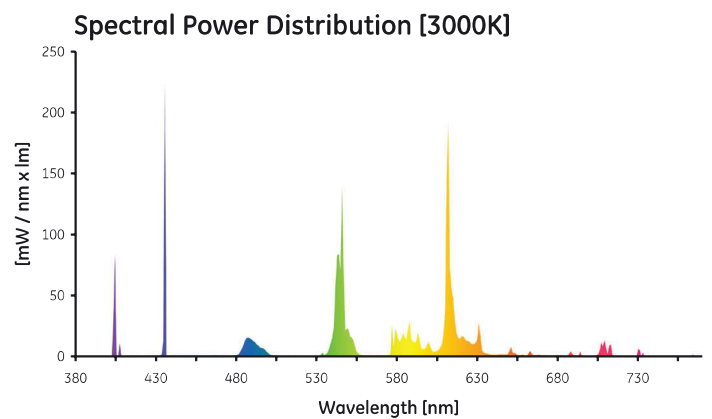
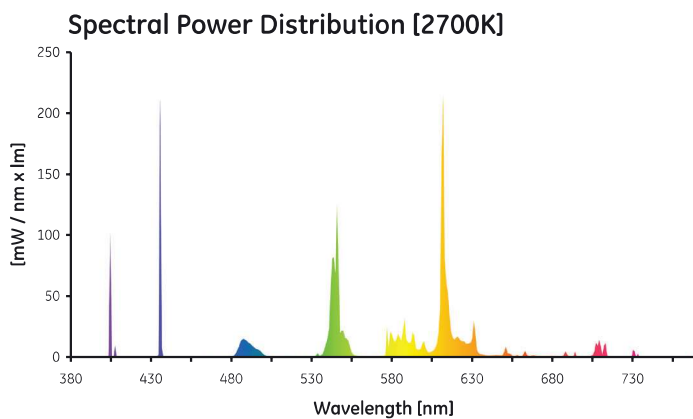
Photometrical and light parameters of a fluorescent lamp depend on the mercury vapor pressure inside the lamp. Mercury vapor pressure in turn is controlled by temperature. When installed in a luminaire, the temperature of the air surrounding the lamp cap changes and this can affect the light output of the lamp. The effects of changes in ambient temperature for a typical lamp are shown in Graph E.

Light output of DBX lamps vs ambient temperature vertical base up burning position

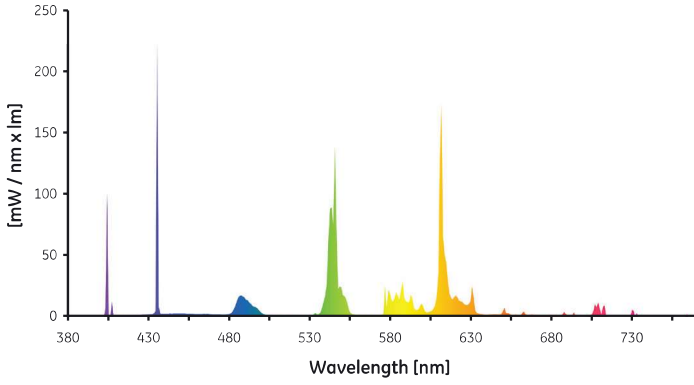


Graph E

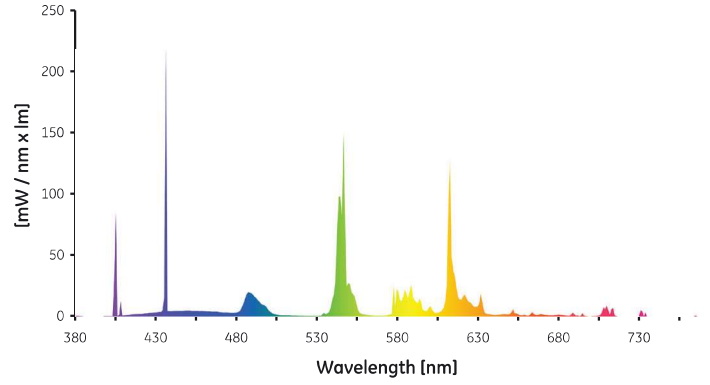
Spectral distribution



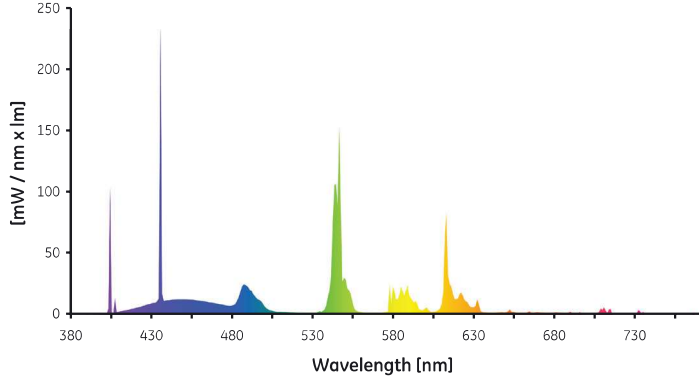
Spectral Power Distribution [3500K]



Spectral Power Distribution [4000K]



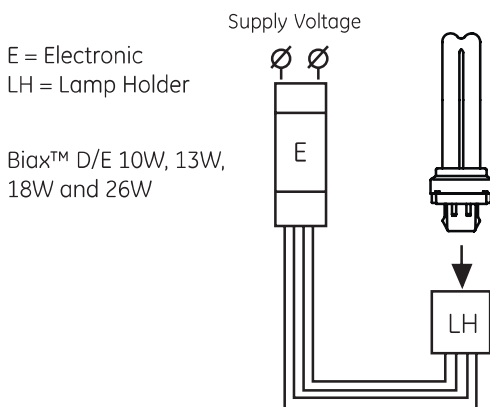
Spectral Power Distribution [6500K]



Biax™ D/E compatibility with other 4pin cap lamps

| Biax™ D Compatibility with Biax™ T 2pin Cap Lamps | | | | Biax™ D Compatibility with Biax™ T 4pin Cap Lamps | | | | | |
|---|--------|-----------------------|---------|---|-----------|-----------------------|-----------|-----------|-----------|
| 2pin Biax™ D (Double) | | 2pin Biax™ T (Triple) | | 4pin Biax™ D (Double) | | 4pin Biax™ T (Triple) | | | |
| | | F13TBX | F18TBX | | | F26TBX | F13TBX/4P | F18TBX/4P | F26TBX/4P |
| | | Gx24d-1 | Gx24d-2 | Gx24d-3 | | | Gx24q-1 | Gx24q-2 | Gx24q-3 |
| F10DBX | G24d-1 | yes | | | F10DBX/4P | G24q-1 | yes | | |
| F13DBX | | | | | F13DBX/4P | | | | |
| F18DBX | G24d-2 | | yes | | F18DBX/4P | G24q-2 | | yes | |
| F26DBX | G24d-3 | | | yes | F26DBX/4P | G24q-3 | | | yes |

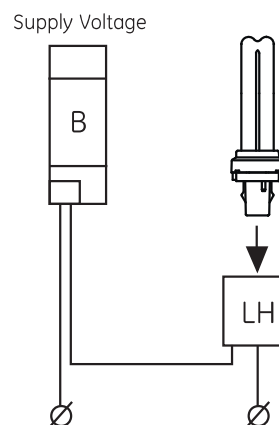
Circuit diagrams



Parallel Compensated

B = Ballast (50Hz)
LH = Lamp Holder

Biax™ D 10W, 13W, 18W and 26W



Light colour applications

Warm; Warm White 2700 K

Specialty retailers, restaurants, hotel lobbies, residential applications

Neutral; Neutral White 3000-3500 K

Grocery stores & produce markets, retail stores, bank lobbies

Cool; Cool White 4000 K

Offices, manufacturing, schools, hospitals

Daylight 6500 K

Printers, paint studios, art galleries, car dealerships

Gear specification

Cathode resistances

| Nominal Power | Cap | Standard Datasheet 60901-IEC | Test current [A] | Cathode resistance @ Itest | | |
|---------------|--------|---------------------------------|---------------------|----------------------------|---------------|---------------|
| | | | | Rated [ohm] | Min. [ohm] | Max. [ohm] |
| 10 | G24q-1 | -2510 | 0.1 | 50 | 37.5 | 62.5 |
| 13 | G24q-1 | -2513 | 0.1 | 50 | 37.5 | 62.5 |
| 18 | G24q-2 | -2518 | 0.2 | 26 | 19.5 | 32.5 |
| 26 | G24q-3 | -2526 | 0.3 | 13 | 9.7 | 16.3 |

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

Cathode preheat requirements

| Nominal Power | Cap | Standard Datasheet 60901-IEC | E _{min} = Q _{min} + P _{min} *t _s | | | E _{max} = Q _{max} + P _{max} *t _s | | |
|---------------|--------|---------------------------------|--|-------------------------|-------------------------------|--|-------------------------|-------------------------------|
| | | | Q _{min} [J] | P _{min} [W] | R _{sub,min} [ohm] | Q _{max} [J] | P _{max} [W] | R _{sub,max} [ohm] |
| 10 | G24q-1 | -2510 | 1 | 0.6 | 30 | 2 | 1.2 | 40 |
| 13 | G24q-1 | -2513 | 1 | 0.7 | 30 | 2 | 1.4 | 40 |
| 18 | G24q-2 | -2518 | 0.9 | 0.7 | 18 | 1.8 | 1.4 | 24 |
| 26 | G24q-3 | -2526 | 1 | 0.8 | 9 | 2 | 1.6 | 12 |

Preheat time shall be longer than 0.4s 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 | I _{dmin} [A] | I _{dmax} [A] | X [A ²] | Y [A] |
|---------------|--------|---------------------------------|--------------------------|--------------------------|------------------------|----------|
| 10 | G24q-1 | -2510 | 0.015 | 0.115 | 0.035 | 0.26 |
| 13 | G24q-1 | -2513 | 0.015 | 0.115 | 0.035 | 0.26 |
| 18 | G24q-2 | -2518 | 0.02 | 0.16 | 0.07 | 0.35 |
| 26 | G24q-3 | -2526 | 0.03 | 0.25 | 0.175 | 0.57 |

In the dimming range of the lamp operating current I_{dmin} – I_{dmax}
Minimum SoS = ILH²+ILL²=X-Y*I_d
Target SoS = ILH²+ILL²=X-0.3*Y*I_d
I_{dmax} for dimming operation = I_{dmin} for normal operation
Values conform IEC proposal

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.

Starting requirements

| Nominal Power | Cap | Standard Datasheet 60901-IEC | Ignition voltage [Vrms] | Non-ignition voltage [Vrms] | Rsub [ohm] |
|---------------|--------|---------------------------------|----------------------------|--------------------------------|---------------|
| 10 | G24q-1 | -2510 | 340 | 180 | 30...90 |
| 13 | G24q-1 | -2513 | 380 | 190 | 30...90 |
| 18 | G24q-2 | -2518 | 400 | 220 | 18...54 |
| 26 | G24q-3 | -2526 | 420 | 240 | 9...27 |

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

Recommended list of ballasts*

| | Wattage | Lamp description | Ballast manufacturer | Single ballast description | Twin ballast description |
|---------------------------|---------|---------------------|--|--|---|
| Biax™ D/E LongLast™ 4-pin | 10W | F10DBX/SPX27/827/4P | Tridonic Atco Helvar Vossloh-Schwabe | PC 1x10-13 TCD PRO EL 1/2x9-13TCs ELXc.113.402 | PC 2/10/13 TCD PRO EL 1/2x9-13TCs |
| Biax™ D/E LongLast™ 4-pin | 13W | F13DBX/SPX27/827/4P | Tridonic Atco Helvar Vossloh-Schwabe | PC 1x5-16 W Basic EL 1/2x9-13TCs ELXc.113.402 | PC 2/10/13 TCD PRO EL 1/2x9-13TCs |
| Biax™ D/E LongLast™ 4-pin | 18W | F18DBX/SPX27/827/4P | Tridonic Atco Helvar Vossloh-Schwabe | PC 1x18 TCD PRO EL1/2x18TCs ELXc.118.831 | PC 2/18 TCD PRO EL1/2x18TCs |
| Biax™ D/E LongLast™ 4-pin | 26W | F26DBX/SPX27/827/4P | Tridonic Atco Helvar Vossloh-Schwabe | PC 1x26/32/42 TCT PRO EL 1/2x18-42TCs ELXc.142.872 | PC 2x26/32 TCT PRO EL 1/2x18-42TCs ELXc.257.836 |

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

Compliance

Standards

| | |
|------------------|---|
| IEC 60061-1 | Lamp caps and holders together with gauges for the control of interchangeability and safety |
| IEC or EN 60901 | Single-capped lamps - performance requirements |
| IEC or EN 61199 | Single-capped lamps - safety requirements |
| CIE S 009/E:2002 | Photobiological safety of lamps and lamp systems |

European Directives

| | |
|------------------|---|
| CE mark | 93/68/EEC; LVD: 2006/95/EC; Ecodesign 2005/32/EC, ROHS 2011/65/EU |
| Energy Labelling | Directive 2010/30/EU, 874/2012/EU energy labelling of electrical lamps and luminaires |
| RoHS | Directive 2011/65/EU on Restrictions of the use of certain Hazardous Substances (RoHS) |
| WEEE | Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE) |
| REACH | Directive 2006/1907/EC on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) |
| ErP ecodesign | Directive 2005/32/EC, 2009/245/EC ecodesign requirements (of Energy-related Products) for tertiary sector lamps |
