GE
Lighting

WORLDWIDE PARTNER

DATA SHEET

Lucalox™ Standard

High Pressure Sodium lamps
Tubular Clear & Elliptical Diffuse
70W, 100W, 150W, 250W, 400W and 1000W

Product information

From GE's invention of HPS lighting in 1965 to today's advanced sources, GE Lucalox™ High Pressure Sodium lamps have led the way in quality and innovation. GE's exclusive amalgam reservoir design works to increase life expectancy and improve lumen maintenance.

With efficiencies approaching 137 lumens per watt, GE Lucalox™ Standard lamps are the most efficient light source available with acceptable colour rendering. High efficiency results in lower operating costs and thus a lower electricity bill.

Most Lucalox™ lamps have an average rated life of up to 28,500 hours. Long life means lower replacement and maintenance costs.

Applications areas

- Road and Tunnel
- Car Park
- Street and Pedestrian
- Commercial areas / city beautification / architectural
- Industrial

*Non EU product

GE imagination at work

Basic data

Lucalox™ Standard – Tubular Clear

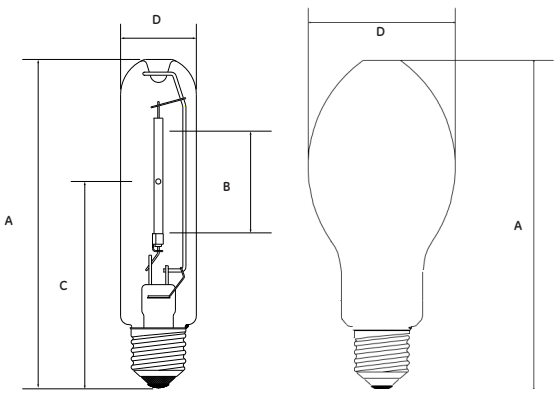
Product Code	46221	93767	44244*	97241	22453*	93010296	11678*	97240	45751	85886
Product Description	LU 70/90/ MO/T/E27 1/25	LU100/100/ MO/T/40	LU150/100/ 100/40	LU150/100/ HO/T/E40	LU250T/40	LU250/HO/T/ E40	LU400/T/40	LU400/HO/	LU1000/110/ T/40 4pk	LU1000/40
Nominal Wattage [W]	70	100	150	150	250	250	400	400	1,000	1,000
Rated Wattage [W]	71	99	149	157	252	258	393	404	970	1,000
Weighted Energy Consumption [kWh/1000 hrs]	77.98	107.57	163.71	172.70	276.78	283.42	431.83	444.40	1067.10	1100
Volts [V]	90	100	100	100	100	100	100	100	110	250
Cap	E27	E40	E40	E40	E40	E40	E40	E40	E40	E40
Nominal Lumen [lm]	6,000	9,600	15,300	17,500	28,500	32,500	48,000	56,200	13,000	130,000
Rated Lumen [lm]	6,420	9,880	15,490	17,600	28,750	33,270	48,300	56,200	133,340	127,590
Rated Lamp Efficacy [lm/W]	91	100	104	110	114	129	123	135	137	128
Energy Efficiency Class [EEC]	A+	A+	A+	A+	A+	A+	A+	A++	A++	A+
Mercury Content [mg]	10	13.3	16.4	12	16.4	20,0	15.8	20	21.1	24.8
Rated Average Life [h]	28,500	28,500	28,500	24,000	28,500	24,000	28,500	24,000	24,000	24,000
CCT [Ra]	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
Ambient Temperature [°C]	25	25	25	25	25	25	25	25	25	25
Bulb	Soft	Hard	Hard	Hard	Hard	Hard	Hard	Hard	Hard	Hard
Mass Weight (g)	65	155	155	140	155	165	200	177	445	368
Operating Position	Universal	Universal	Universal	Universal	Universal	Universal	Universal	Universal	Universal	Universal
Minimum Starting Temperature [°C]	-40	-40	-40	-40	-40	-40	-40	-40	-40	-40

Lucalox™ Standard – Elliptical Diffuse

Product Code	46217	93766*	44245*	44052*	44057*
Product Description	LU 70/90/MO /D/E27 1/12	LU100/100/MO /D/40	LU150/100 /D/40	LU250/ D/40	LU400/ D/40
Nominal Wattage [W]	70	100	150	250	400
Rated Wattage [W]	71	104	149	251	404
Weighted Energy Consumption [kWh/1000 hrs]	77.79	114.72	163.68	276.44	444.01
Volts [V]	90	100	100	100	100
Cap	E27	E40	E40	E40	E40
Nominal Lumen [lm]	5,800	9,200	14,500	26,000	48,000
Rated Lumen [lm]	6,180	9,230	14,620	26,690	48,090
Rated Lamp Efficacy [lm/W]	87	89	98	106	119
Energy Efficiency Class [EEC]	A	A+	A+	A+	A+
Mercury Content [mg]	10.0	13.3	16.4	16.4	15.8
Rated Average Life [h]	28,500	28,500	28,500	28,500	28,500
CCT [Ra]	2,000	2,000	2,000	2,000	2,000
Ambient Temperature [°C]	25	25	25	25	25
Bulb	Soft	Hard	Hard	Hard	Hard
Mass Weight (g)	65	130	175	195	250
Operating Position	Universal	Universal	Universal	Universal	Universal
Minimum Starting Temp. [°C]	-40	-40	-40	-40	-40

*Non EU product

Dimensions



Lucalox™ Standard - Tubular Clear

Product Code	46221	93767	44244	97241	22453	93010296	11678	97240	45751	85886
Wattage [W]	70	100	150	150	250	250	400	400	1,000	1,000
A Length [mm]	156	211	211	211	260	260	278	283	374	383
B Arc Gap [mm]	35,5	40	55	47	65	-	86	81	150	233
C LCL [mm]	97	132	132	132±5	158	163	175	175±5	240	220±2
D Diameter [mm]	39	48	48	48	48	48	48	48	68	79

Lucalox™ Standard - Elliptical Diffuse

Product Code	46217	93766	44245	44052	44057
Wattage [W]	70	100	150	250	400
A Length [mm]	156	186	227	227	292
D Diameter [mm]	72	76	91	91	122

Survival rate and lumen maintenance

Average lamp life & lumen maintenance is based on laboratory tests of a large number of representative lamps under controlled conditions, including operation at 11 hours per start on ballasts having specified electrical characteristics.

The following conditions can reduce average lamp life and lumen maintenance:

- Frequent on/off switching
- High line voltage
- Vibration
- High ambient temperature within the fixture
- Ballast and ignitor characteristics

Average rated life

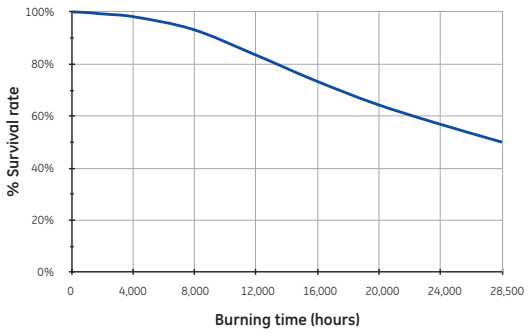
The survival of individual lamps or particular groups of lamps depends on these system conditions, and actual data may fall dependent upon the lamp operating conditions even below the lower limit (see Lamp survival graphs).

For cost-of-light calculations involving these lamps, the following estimated operating times are suggested for 50% survival:

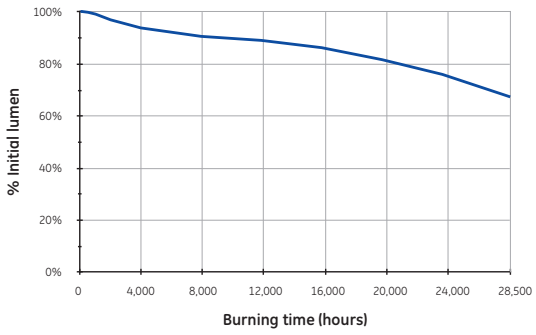
Lumen maintenance

Under the same controlled conditions, initial reference lumens refer to the lamp lumen output after 100-hours burning. Due to variations in systems and service conditions (in particular the burning cycle), actual lamp performance can vary from the reference lumen ratings. **The lumen maintenance (light output during life) of individual lamps or particular groups of lamps may fall dependent upon the lamp operating conditions even below the line (see lumen maintenance graphs).**

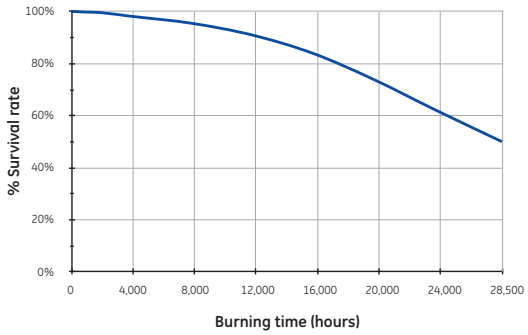
Survival rate of HPS Lucalox™ Standard lamps (70-100W)



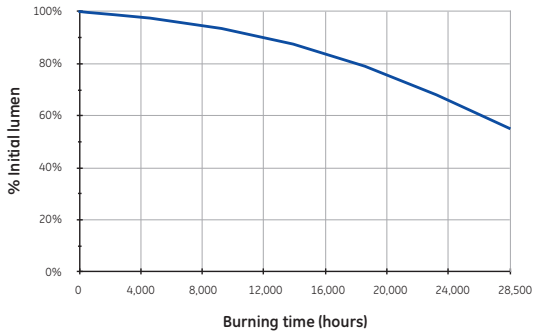
Lumen maintenance of HPS Lucalox™ Standard lamps (70-100W)



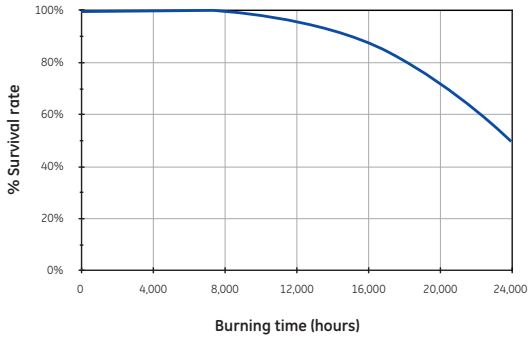
Survival rate of HPS Lucalox™ Standard lamps (150-400W)



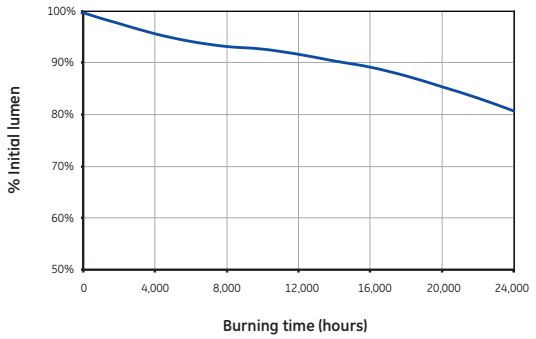
Lumen maintenance of HPS Lucalox™ Standard lamps (150-400W)



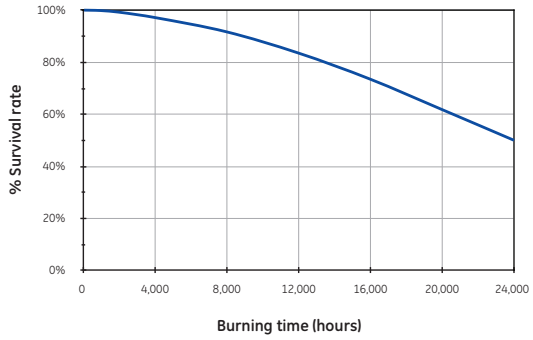
Survival rate of HPS Lucalox™ HO lamps (150-400W)



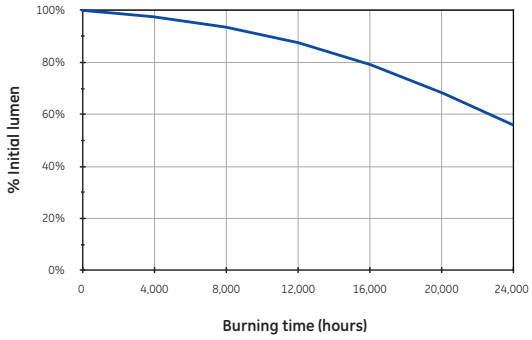
Lumen maintenance of HPS Lucalox™ HO lamps (150-400W)



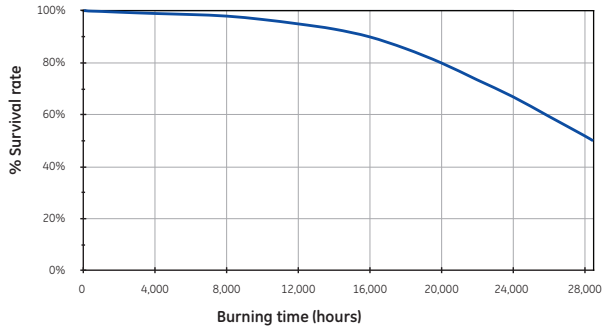
Survival rate of 1000W/110 standard HPS lamps



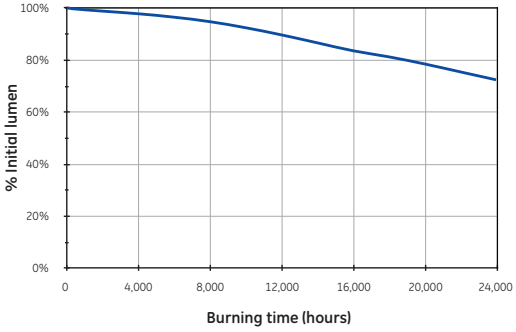
Lumen maintenance of 1000W/110 standard HPS lamps



Survival rate of 1000W/40 standard HPS lamps



Lumen maintenance of 1000W/40 standard HPS lamps



Electrical data

Data is based on a nominal lamp operating from a nominal choke (reactor) ballast with power factor correction. Supply power is based on a typical commercially available ballast.

Lamp data

Wattage	Volts ±15 [V]	Nominal Current [A]	Nominal Power [W]	Current Crest Factor
70	90	0.98	70	1.45
100	100	1.2	100	1.45
150	100	1.8	150	1.45
250	100	3.00	250	1.45
400	100	4.6	400	1.45
1000	110	10.60	960	1.45

Circuit data (typical data of lamps with nominal voltage)

Wattage	Supply Current (A)		Supply Power (W)		Power Factor Lagging		Percentage 3rd Harmonic	PFC Capacitor [µF]	Max. Supply Current During Run-up (A)		Max. Supply Current Failed/ Hot Lamp (A)	
Supply	230V	240V	230V	240V	230V	240V	230V/240V	230V/240V	230V	240V	230V	240V
All Types												
70	0.40	0.40	83	86	0.90	0.90	14	10	0.45	0.42	0.72	0.75
100	0.54	0.52	113	114	0.91	0.91	15	12	0.64	0.60	0.87	0.90
150	0.83	0.80	171	172	0.90	0.90	15	20	0.91	0.84	1.45	1.50
250	1.35	1.30	275	276	0.89	0.89	15	30	1.58	1.48	2.17	0.30
400	2.20	2.10	426	427	0.84	0.85	12	40	2.80	2.60	2.79	3.00
1000	5.66	5.40	1,092	1,090	0.84	0.84	15	85	6.46	6.00	6.14	6.40

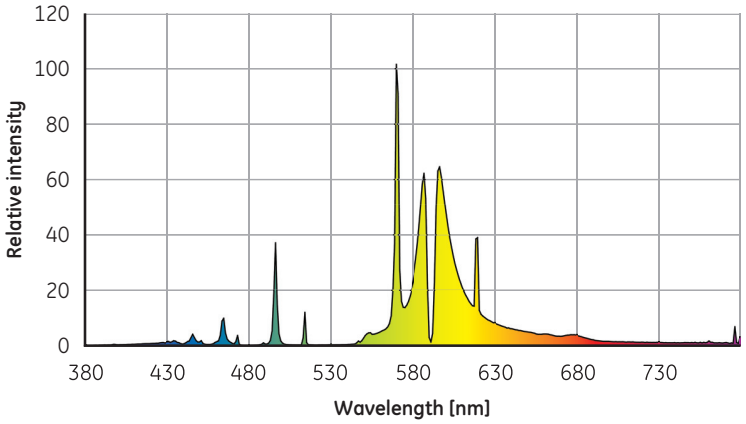
Circuit data (typical data of lamps with nominal voltage)

Wattage	Supply Current (A)		Supply Power (W)		Power Factor Lagging		Percentage 3rd Harmonic	PFC Capacitor [µF]	Max. Supply Current During Run-up (A)		Max. Supply Current Failed/ Hot Lamp (A)	
Supply	230V	240V	230V	240V	230V	240V	230V/240V	230V/240V	230V	240V	230V	240V
All Types												
70	0.40	0.40	83	86	0.90	0.90	14	10	0.45	0.42	0.72	0.75
100	0.54	0.52	113	114	0.91	0.91	15	12	0.64	0.60	0.87	0.90
150	0.83	0.80	171	172	0.90	0.90	15	20	0.91	0.84	1.45	1.50
250	1.35	1.30	275	276	0.89	0.89	15	30	1.58	1.48	2.17	0.30
400	2.20	2.10	426	427	0.84	0.85	12	40	2.80	2.60	2.79	3.00
1000	5.66	5.40	1,092	1,090	0.84	0.84	15	85	6.46	6.00	6.14	6.40

Photometric data

Wattage	100 Hours Lumens	CCT [K]	CRI [Ra]	DIN5035 Class.
70	6,000	2,000	25	4
100	9,600	2,000	25	4
150	15,300	2,000	25	4
150 (HO)	17,500	2,000	21	4
250	27,000	2,000	25	4
250 (HO)	32,500	2,000	21	4
400	48,000	2,000	25	4
400 (HO)	56,200	2,000	21	4
1000	130,000	2,000	25	4

Spectral power distribution

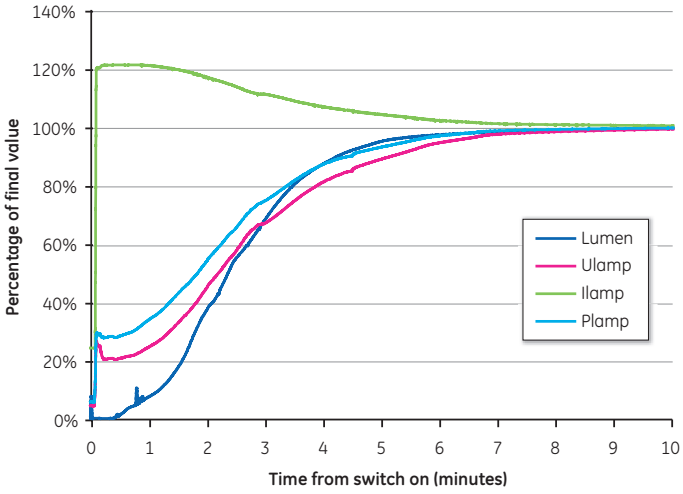


Run-up characteristics

The graph shows typical run-up characteristics for a 250W Lucalox™ lamp. Time for the light output to reach 90% of the final value is determined by supply voltage and ballast design. Typical values are:

Wattage	70	100	150	250	400	1,000
Run-Up (Mins)	<4	4	4	5	3	6

Typical run-up characteristics



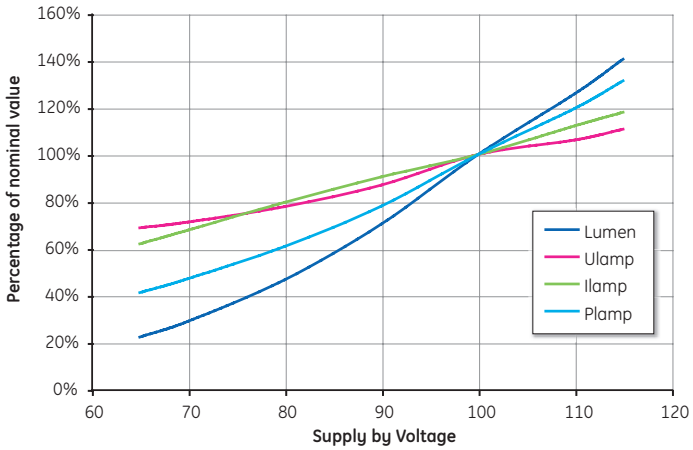
Hot re-strike time

All ratings re-strike within 1 minute following a short interruption in the supply. Actual re-strike time is determined by ignitor type, pulse voltage and cooling rate of the lamp.

Supply voltage

Lamps are suitable for supplies in the range 220V to 250V 50/60Hz for appropriately rated series choke (reactor) ballasts. Supplies outside this range require a transformer (conventional, high reactance or CWA) to ensure correct lamp operation. Lamps start and operate at 10% below the rated supply voltage when the correct control gear is used. However, in order to maximize lamp survival, lumen maintenance and colour uniformity the supply voltage and ballast design voltage should be within ±3%. Supply variations of ±5% are permissible for short periods only. This may be achieved by measuring mean supply voltage at the installation and selecting ballasts with appropriate settings.

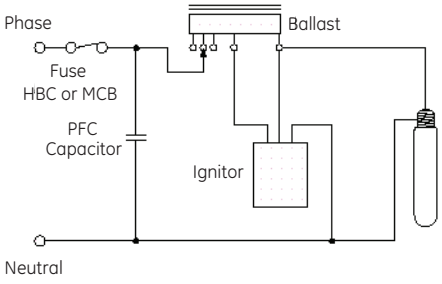
Effect of supply voltage variations on performance



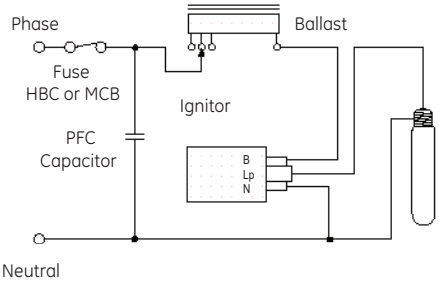
Control gear

It is essential to use a ballast appropriate to the supply voltage at the luminaire. Typical wiring diagrams for control circuits incorporating “superimposed” or “impulser” ignitor and choke (reactor) ballasts are shown. Refer to actual choke and ignitor manufacturers data for terminal identification and wiring information.

Typical impulser ignitor circuit



Typical superimposed ignitor circuit



Lamp operating temperature limits

	70W	100-1,000W
Maximum cap temperature	210°C	400°C
Maximum bulb temperature	250°C	250°C

Luminaire voltage rise

To maximise lamp life it is essential that luminaires are designed so that when lamps are enclosed lamp voltage rise does not exceed the following values:

Wattage	70	100	150	250	400	1,000
Luminaire voltage rise (tubular)	5	7	7	10	12	20

Ballasts

Lamps are fully compatible with ballasts manufactured for high pressure sodium lamps to IEC 60662. Ballasts should comply with specifications IEC 60922 and IEC 60923.
Ballast Thermal Protection — Use of ballasts incorporating thermal cut-out is not a specific requirement but is a good optional safety measure for installation.
Ballast Voltage Adjustment — Series choke (reactor) ballasts incorporating additional tappings at ±10V of the rated supply voltage are recommended. Alternatively a single additional tapping 10V above the rated supply voltage will ensure lamps are not overloaded due to excessive supply voltage.

Ignitors

Both Superimposed and Impulser type ignitors are suitable. It is recommended that only GE approved ignitors are used. Ignitors should comply with specifications IEC 60926 and IEC 60927 and have starting pulse characteristics as follows.

Wattage	Min. Pulse Voltage [kV][1]	Max. Pulse Voltage [kV][2]	Min. Pulse Width [µs][3]	Min. Pulse Repetition Rate[4]	Min. HF Peak Current [A]
70	1.8	2.3	1.95	1/1/2 Cycle	0.2
100	2.8	4.5	1.95	1/Cycle	0.2
150	2.8	4.5	1.95	1/Cycle	0.2
250	2.8	4.5	0.95	1/Cycle	0.2
400	2.8	4.5	0.95	1/Cycle	0.2

(1) When Loaded with 100 pF.
(2) When loaded with 20pF.
(3) At 90% peak voltage.
(4) From ignitor into lamp during starting.
Pulse Phase Angle: 60-90° el and/or 240-270° el.

Timed ignitors

Use of a "timed" or "cut-out" ignitor is not a specific requirement, but it is a good optional safety feature for installation. The timed period must be adequate to allow lamps to cool and restart when the supply is interrupted briefly

(see "Hot re-strike time").

Safety warnings

The use of these products requires awareness of the following safety issues:

Warning

During the production process, GE Lucalox lamps are start tested according to the requirements of the IEC 60662 Standards and will therefore be compatible with ignitors designed for lamps to this standard and which comply with the relevant ignitor Standards (IEC 60926 & 60927). Examples of commercial ignitor manufacturers are:

BAG Turgi	MZN 70S (50/70W), MZN150S, MZN150SE-C (100/150W), MZN250SE (100/150/250W),	MZN400S(R) (100/150/250/400W) MZN400SU (100/150/250/400W) MZN1000S (1000W)
ERC	ERC 640006 (100-400W)	
May & Christe	May & Christe ZG1.0SE (50/70W) ZG2.0SE (100/150W) ZG4.5SE (100/150/250/400W)	
Parry	Parry PB070#, PBE070, PXE070 (50/70W) PBO19#, PTH150# (150W) PB404# (250W/400W)	PAE400, PXE400, PWE400(150/250/400W)
Thorn	G53503#, G53353.4#, G53353.2#, G53434 (50/70W) G53504#, G53511, G53476, G53455,	G53250 (100/150/250/400W) G53282/B# (150/250/400W) G53316 (1000W)
Tridonic	ZRM2-ES, ZRM2-IS (50/70W) ZRM1.8ES/2 (100/150W) ZRM6-ES (100/150/250/400W)	ZRM12-ES (1000W)

Impulser type - approved only when used with a suitable ballast.

Cable between ignitor and lamp – The cable connected between the lamp and a superimposed ignitor "Lp" terminal, or the ballast when using an impulser ignitor, must be rated at a minimum 50/60Hz voltage of 1000V. Mineral-insulated cables are not suitable for connecting the lamp to the control gear. To achieve good starting superimposed ignitors must be adjacent to the luminaire. Cable capacitance of wiring between the ignitor "Lp" terminal and the lamp should not exceed 100pF (<1 metre length) when measured to adjacent earthed metal and/or other cables, unless otherwise stated by the ignitor manufacturer. When using impulser type ignitors longer cable lengths between ballast and lamp are normally permissible. Limits for particular ignitors are available on request from GE Lighting or directly from the ignitor manufacturer.

PFC capacitors for choke (reactor) circuits

Power Factor Correction is advisable in order to minimise supply current and electricity costs. For 220-250V supplies 250V±10% rated capacitors are recommended as follows:

Wattage	70	100	150	250	400	1,000
PFC Capacitor	10µF	12µF	20µF	30µF	40µF	85µF