



# T5 Watt-Miser™

Linear Fluorescent lamps

T5 Watt-Miser™ High Efficiency 13W, 20W, 26W, 33W

T5 Watt-Miser™ High Output 21W, 36W, 46W, 51W, 76W

## Product information

T5 Watt-Miser™ lamps are energy saving triphosphor fluorescent lamps with 16mm outer diameter for general T5 lighting applications.

## Features

T5 Watt-Miser™ lamps with a long life of 25,000 and 30,000 hours consume 5% less energy compared with today's standard-wattage T5 lamps on the market, without compromising lumen output – as verified also by independent test-house.

5% energy saving is achieved based on test procedures using current controlled ballasts. When power controlled ballasts are used, these lamps will run at ballast rated wattage and lamps will give additional light – no adverse effect would be experienced on lamp life. Full energy saving will be reached after lamps have been seasoned for 100 hours.

Similarly to all other T5 lamps performance of the T5 Watt-Miser™ lamps are optimised for ambient temperature between 34-38°C, typically 35°C, offering up to 111lm/W luminous efficacy. The elevated optimum temperature results in additional energy saving versus T8 lamps in typical indoor lighting applications.

Standard T5 lamps can easily be replaced with the new T5 Watt-Miser™ lamps in the existing lighting applications, since new electronic control gears are not required. These new lamps from GE enable even less than 6 months payback time!

GE is committed to fight against climate change. The T5 Watt-Miser™ lamps will contribute to the global effort to reduce CO<sub>2</sub> emission. One lamp can save 1.2-6.9kg carbon dioxide per year depending on the type. So in addition to the lower energy bill, millions of tons of CO<sub>2</sub> could potentially be saved with this new lamp technology in Europe.



## Application areas

T5 Watt-Miser™ lamps are recommended for general T5 lighting applications, such as:

- Retail
- Offices
- Schools
- Commercial
- Industrial

## Product range

T5 Watt-Miser™ lamps are available in 9 wattages; offering an energy saving version for all T5 lamps. The new product descriptions refer to the more economic nominal wattages of these products compared to standard T5 lamps. For easy identification, the stamping colour is green.

E.g. a luminaire having the already known F14W LongLast™ T5 lamps inside, can be relamped with the new F13 Watt-Miser™.

The entire range consists of the following models:

- 2-ft F13, F21
- 3-ft F20, F36
- 4-ft F26, F51
- 5-ft F33, F46, F76

Available colour temperature:

- 3000K warm white
- 4000K cool white

## Compliance

The T5 Watt-Miser™ linear fluorescent lamps comply with IEC/EN 60061 and IEC/EN 61195 and IEC/EN 62471.



## Basic data – T5 Watt-Miser™ High Efficiency

Lamp Type	13W	20W	26W	33W
<b>General</b>				
Nominal Wattage [W]	13	20	26	33
Weighted Energy Consumption (kWh/1000h)	14	22	29	36
Cap	G5	G5	G5	G5
Operation	high frequency	high frequency	high frequency	high frequency
Cathode	preheated	preheated	preheated	preheated
Design Temperature [°C]	35	35	35	35
Recommended Burning Position	horizontal	horizontal	horizontal	horizontal
Energy Efficiency Class	A+	A+	A+	A+
Average Mercury Content [mg]	2.5	2.5	2.5	2.5
<b>Ordering Information (30-way sleeve pack)</b>				
830 – CCT 3000K – Warm White	79418	-	-	79417
840 – CCT 4000K – Cool White	61080	61079	61078	61077
<b>Electrical and Photometric Characteristics at 25°C</b>				
Rated Wattage [W]	13.3	19.6	26.5	33.7
Rated Lamp Voltage [V]	82	120	158	195
Rated Lamp Current [A]	0.165	0.165	0.170	0.175
Operating Frequency [kHz]	> 20	> 20	> 20	> 20
Rated Luminous Flux [lm]	1230	1910	2640	3320
Nominal Luminous Flux [lm]	1230	1910	2640	3320
Rated Efficacy [lm/W]	92	97	100	99
Colour Rendering Index [Ra]	85	85	85	85
Optical Radiation Safety Class	Exempt	Exempt	Exempt	Exempt
<b>Electrical and Photometric Characteristics at 35°C</b>				
Rated Wattage [W]	13.0	19.7	26.4	33.0
Rated Lamp Voltage [V]	78	117	159	199
Rated Lamp Current [A]	0.170	0.170	0.170	0.170
Rated Luminous Flux [lm]	1350	2100	2900	3650
Nominal Luminous Flux [lm]	1350	2100	2900	3650
Rated Efficacy [lm/W]	104	107	110	111
<b>Lifetime Performance</b>				
Rated Median Life – Preheat, 3 Hours Cycle [h]	25,000	25,000	25,000	25,000
Median Life – Preheat, 12 Hours Cycle [h]	30,000	30,000	30,000	30,000
Operating Mode for LSF and LLMF Data	HF preheat, 3h cycle	HF preheat, 3h cycle	HF preheat, 3h cycle	HF preheat, 3h cycle
<b>Lamp Survival Factor</b>				
LSF 2,000 Hours	99%	99%	99%	99%
LSF 4,000 Hours	99%	99%	99%	99%
LSF 6,000 Hours	99%	99%	99%	99%
LSF 8,000 Hours	99%	99%	99%	99%
LSF 12,000 Hours	97%	97%	97%	97%
LSF 16,000 Hours	92%	92%	92%	92%
LSF 20,000 Hours	79%	79%	79%	79%
<b>Lamp Lumen Maintenance</b>				
LLMF 2,000 Hours	96%	96%	96%	96%
LLMF 4,000 Hours	95%	95%	95%	95%
LLMF 6,000 Hours	94%	94%	94%	94%
LLMF 8,000 Hours	93%	93%	93%	93%
LLMF 12,000 Hours	91%	91%	91%	91%
LLMF 16,000 Hours	90%	90%	90%	90%
LLMF 20,000 Hours	89%	89%	89%	89%
Service Life – Preheat, 3 Hours Cycle [h]	17,000	17,000	17,000	17,000
Service Life – Preheat, 12 Hours Cycle [h]	20,000	20,000	20,000	20,000
<b>Measuring conditions</b>				
Frequency [KHz]	20-26	20-26	20-26	20-26
Calibration current [A]	0.170	0.170	0.170	0.170
Voltage of HF generator [V]	163	240	321	403
Reference resistor [ohms]	500	725	950	1200

Lumen maintenance may vary for lamps with colour temperature  $\geq 5000\text{K}$

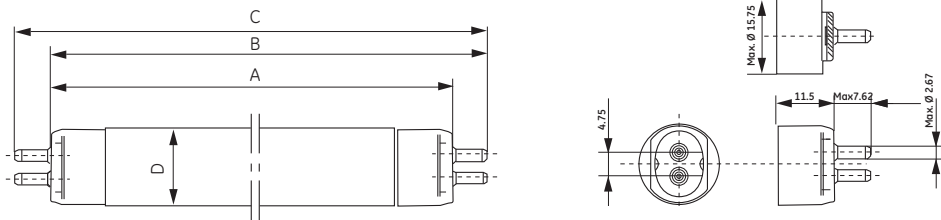
## Basic data – T5 Watt-Miser™ High Output

Lamp type	21W	36W	46W	51W	76W
<b>General</b>					
Nominal wattage [W]	21	36	46	51	76
Weighted Energy Consumption (kWh/1000h)	23	39	51	56	83
Cap	G5	G5	G5	G5	G5
Operation	high frequency	high frequency	high frequency	high frequency	high frequency
Cathode	preheated	preheated	preheated	preheated	preheated
Design Temperature [°C]	35	35	35	35	35
Recommended Burning Position	horizontal	horizontal	horizontal	horizontal	horizontal
Energy Efficiency Class	A+	A+	A+	A+	A+
Average Mercury Content [mg]	2.5	2.5	2.5	2.5	2.5
<b>Ordering Information (30-way sleeve pack)</b>					
840 – CCT 4000K – Cool White	61076	61075	61073	61074	61072
<b>Electrical and Photometric Characteristics at 25°C</b>					
Rated Wattage [W]	21.4	36.1	46.7	51.4	75.8
Rated Lamp Voltage [V]	73	112	185	114	144
Rated Lamp Current [A]	0.295	0.325	0.255	0.455	0.53
Operating Frequency [KHz]	> 20	> 20	> 20	> 20	> 20
Rated Luminous Flux [lm]	1750	3200	4450	4460	6150
Nominal Luminous Flux [lm]	1750	3200	4450	4460	6150
Rated Efficacy [lm/W]	82	89	95	87	81
Colour Rendering Index [Ra]	85	85	85	85	85
Optical Radiation Safety Class	Exempt	Exempt	Exempt	Exempt	Exempt
<b>Electrical and Photometric Characteristics at 35°C</b>					
Rated Wattage [W]	21.4	36.1	46.8	51.1	76.0
Rated Lamp Voltage [V]	71	106	181	112	138
Rated Lamp Current [A]	0.300	0.340	0.260	0.460	0.555
Rated Luminous Flux [lm]	2000	3500	4900	5000	7000
Nominal Luminous Flux [lm]	2000	3500	4900	5000	7000
Rated Efficacy [lm/W]	93	97	105	98	92
<b>Lifetime performance</b>					
Rated median life - preheat, 3h cycle [h]	25,000	25,000	25,000	30,000	25,000
Median life - preheat, 12h cycle [h]	30,000	30,000	30,000	36,000	30,000
Operating mode for LSF and LLMF data	HF preheat, 3h cycle	HF preheat, 3h cycle	HF preheat, 3h cycle	HF preheat, 3h cycle	HF preheat, 3h cycle
<b>Lamp survival factor</b>					
LSF 2,000 Hours	99%	99%	99%	99%	99%
LSF 4,000 Hours	99%	99%	99%	99%	99%
LSF 6,000 Hours	99%	99%	99%	99%	99%
LSF 8,000 Hours	99%	99%	99%	99%	99%
LSF 12,000 Hours	97%	97%	97%	97%	97%
LSF 16,000 Hours	92%	92%	92%	92%	92%
LSF 20,000 Hours	79%	79%	79%	79%	79%
<b>Lamp lumen maintenance</b>					
LLMF 2,000 Hours	96%	96%	96%	96%	96%
LLMF 4,000 Hours	95%	95%	95%	95%	95%
LLMF 6,000 Hours	94%	94%	94%	94%	94%
LLMF 8,000 Hours	93%	93%	93%	93%	93%
LLMF 12,000 Hours	91%	91%	91%	91%	91%
LLMF 16,000 Hours	90%	90%	90%	90%	90%
LLMF 20,000 Hours	89%	89%	89%	89%	89%
Service life - preheat, 3h cycle [h]	17,000	17,000	17,000	17,000	17,000
Service life - preheat, 12h cycle [h]	20,000	20,000	20,000	20,000	20,000
<b>Measuring conditions</b>					
Frequency [kHz]	20-26	20-26	20-26	20-26	20-26
Calibration current [A]	0.300	0.340	0.255	0.460	0.550
Voltage of HF generator [V]	146	218	380	229	282
Reference resistor [ohms]	250	330	765	255	260

Lumen maintenance may vary for lamps with colour temperature  $\geq 5000\text{K}$

## Dimensions

Cap-G5  
IEC 60061 Data sheets 7004-52-5



Dimensions measured on finished lamps

		F13, F21	F20, F36	F26, F51	F33, F46, F76
A Max - Base to Base	[mm]	549	849	1149	1449
B Min - Pin to Base	[mm]	553,7	853,7	1153,7	1453,7
B Max - Pin to Base	[mm]	556,1	856,1	1156,1	1456,1
C Max - Pin to pin	[mm]	563,2	863,2	1163,2	1463,2
D Max - Outer Diameter	[mm]	17	17	17	17

## Influence of ambient air temperature on light output

T5 Watt-Miser™ lamps are designed to reach their maximum luminous flux at an ambient air temperature of 34-38°C, typically 35°C under reference conditions.

The light output and the electrical characteristics of a low-pressure mercury vapour lamp are determined by the saturated mercury vapour pressure inside the tube.

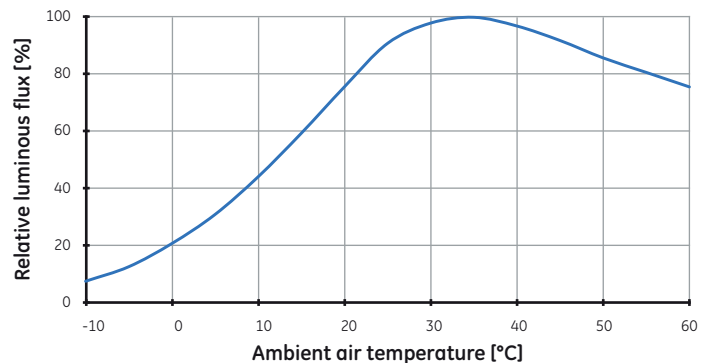
As the cold spot is near the metal cap, the cap temperature is a good indication how close the Hg vapour pressure is to the optimum. A cap temperature of approximately 42-46°C corresponds to conditions resulting in maximum light output in a stabilized T5 lamp. The mercury vapour pressure is related to the temperature of the so called cold spot, the coldest part of the lamp where the excess liquid mercury is deposited.

The cold spot is behind the electrode on the monogrammed side in a T5 lamp. The diagram below shows the typical relative luminous output of a long T5 lamp as function of ambient air temperature in horizontal burning position under reference conditions. Please note, burning position, air flow, radiating heat sources, characteristics of the control gear, etc also affect the thermal conditions.

Test conditions:

- thermal chamber with  $\pm 2^\circ\text{C}$  accuracy
- draught-free air
- constant lamp current
- horizontal burning position

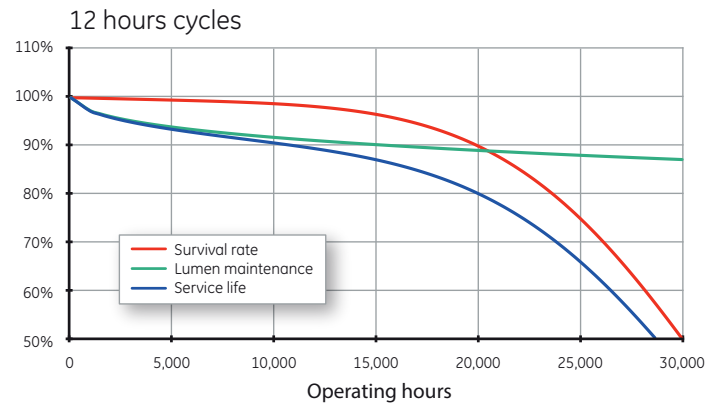
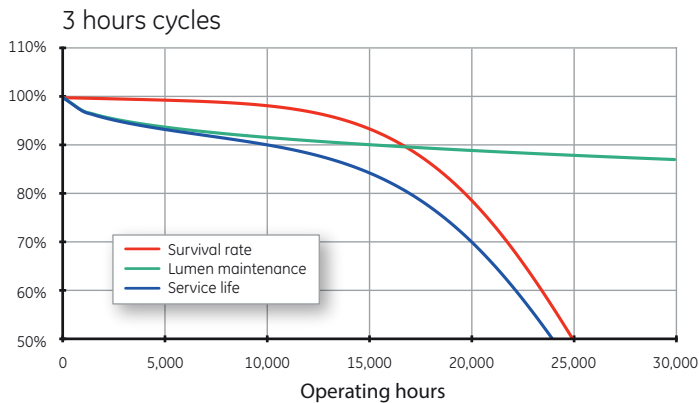
Ambient Air Temperature [°C]	Relative Luminous Flux [%]
-10	9
-5	14
0	22
5	32
10	45
15	60
20	76
25	91
30	98
35	100
40	97
45	92
50	86
55	81
60	76



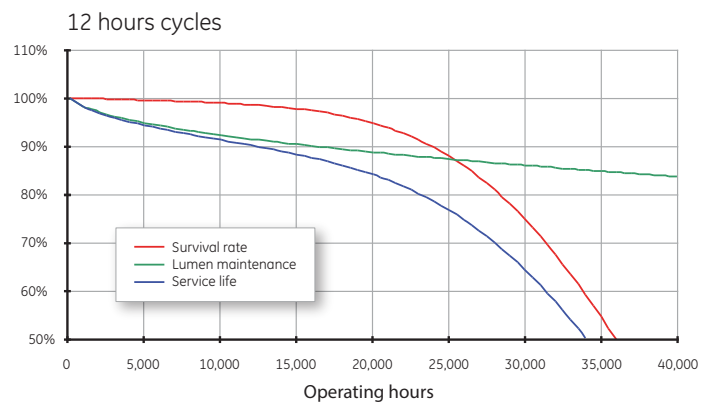
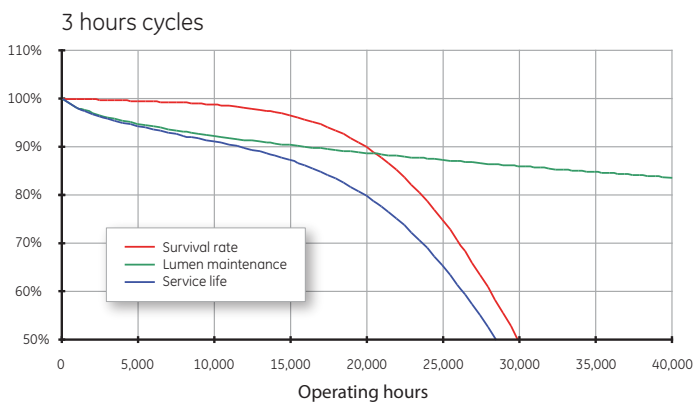
## Lamp life and lumen maintenance

Cathodes of a fluorescent lamp lose their electron-emissivity during life due to various degradation processes like evaporation and sputtering. When the deterioration reaches a certain level, the cathode fails. Typical lifetime characteristics given below are based on GE Lighting's data. The declared lamp life is the median life defined by the time when 50% of the lamps from a large sample batch would have failed. Real lifetime figures may depend on the actual application. For instance improper cathode preheat, too high operating current, or too low operating current without additional cathode heating might reduce the expected life. The lumen maintenance graph below shows the luminous output throughout life. The main causes of the light depreciation are deterioration of phosphor coating and lamp blackening due to the deposition of evaporated emission mixture on the glass tube. These effects are unavoidable. Service life is reached when the light level in an installation drops down to 80% of the initial value. The service life curve is drawn as the product of the survival and the lumen maintenance curves.

### Life expectancy and lumen maintenance for all types except 51W



### Life expectancy and lumen maintenance for 51W type



## Recommendations for measuring T5 Watt-Miser™ lamps

For initial readings, the lamps shall be aged for 100 hours. Before measurement, conditioning is also required. Conditioning is completed when the excess mercury has been collected at the cold spot. Such conditioning may take up to 20 hours which can be part of the 100 hour aging. Avoid touching the hot glass surface, rotating or shaking the lamp. During handling and transportation keep the cold chamber (monogrammed side) at the lowest point. If the lamps are switched off for more than 12 hours, they shall be burnt for at least 4 additional hours with cold chamber down. Place the lamp into the test system in horizontal position.

Before measuring the luminous flux, the lamp shall be continuously burnt for one hour. Stability shall be checked by monitoring the luminous flux. The measured luminous flux can be considered stable if the relative change is less than 0.5% over a 5 minute period.

## Dimming

Dimming is done by the control of the discharge current. In dimming mode, the optimum cathode temperature shall be maintained by additional cathode heating current. All GE T5 lamps are given a seasoning burn-in at the end of the assembly line. This is sufficient cathode preparation for dimming, no additional burn-in at full power is required before using the lamp for the first time.

Please note that after transportation and installation, the mercury is scattered in the tube. For stabilized operation, the excess mercury should be migrated to the cold spot. This may take up to 20 hours of full-power operation. The stabilization time becomes even longer if the lamps are dimmed.

## Emergency operation

In emergency operation, lamps are typically underdriven running at low power. To save battery life, emergency inverters may not apply additional cathode heating which would be necessary to maintain the proper cathode temperature.

Such unfavourable conditions result in accelerated blackening and shorter life over a longer period in emergency mode.

In a typical application, the emergency lighting system is tested for a short period on a regular basis. The cumulative impact on lamp life can generally be considered low.

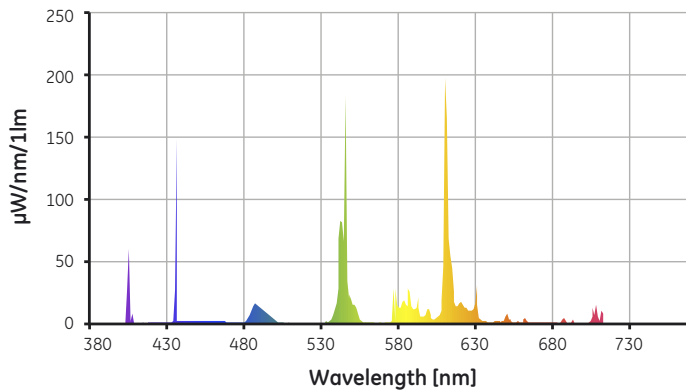
## Ballast compatibility

Ballasts produced by reputable control gear manufacturers meeting the relevant IEC standards would be considered as suitable.

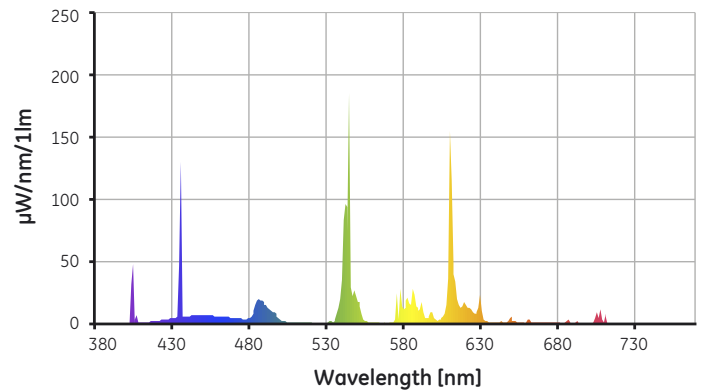
List of recommended ballasts available on request.

## Spectral power distribution

Spectral power distribution 3000K



Spectral power distribution 4000K



## Colour specification according to CIE 1931

CCT [K]		X	Y	CRI [Ra]
Nominal	Rated			
3000	2940	0.440	0.403	85
4000	4040	0.380	0.380	85