Maximum luminous efficacy – minimum dimensions

The new FH® fluorescent lamp system

THERE IS LIGHT. AND THERE IS OSRAM.

OSRAM

The FH® system has a diameter of only 16 mm. And the highest luminous efficacy of all fluorescent lamps.

In terms of economy, OSRAM FH® (Fluorescent High Efficiency) fluorescent lamps are setting new standards. Their luminous efficacy, as high as 104 lm/W, is 5% higher than that of conventional three-band fluorescent lamps. But that's not all.

Here are just some of the many other advantages of the OSRAM FH® system:
– lamp diameter of only 16 mm (T5)
– optimum luminous flux shifted from 25°C to 35°C for more light in the luminaire
– reduced length to suit ceiling modules; no need for complex luminaire designs
– minimal drop in luminous flux over the life of the lamp thanks to the new LUMILUX® PLUS coating
– ECG operation to protect the lamp.

This system therefore offers luminaire designers a choice of two approaches:

1. Maximum economy

2. Minimum luminaire dimensions for maximum design

1. Maximum economy: up to 20% energy savings with FH® luminaires

Maximum economy can be achieved by using the FH® system in luminaire arrangements based on T8 lamps (26 mm). The following factors add up to a reduction in electricity costs of 20%:

– the luminous efficacy of the FH® system (T5) is 5% higher than that of T8 lamps
– the 40% reduction in tube diameter results in a 5% increase in luminaire efficiency thanks to a much reduced shadowing effect from the lamp itself
– the shift in optimum luminous flux from 25° C to 39° C results in considerably more light from the luminaire.

Potential energy savings from switching from T8/26 mm ECG luminaires to T5/16 mm ECG-luminaires

CAUSE	POTENTIAL ENERGY SAVINGS
Reduction in lamp diameter from 26 mm to 16 mm	**4% increase in luminaire efficiency**
Shift in optimum luminous flux fom 25° C to 35° C only with cut-off technology	**10% increase in luminaire efficiency**
New ECG circuitry from T8 ECG to T5 ECG with cut-off technology	**7% energy savings**
Improved luminaire reflector technology from specular louvre to high-quality lamellar reflector	**15–19% increase in luminaire efficiency**

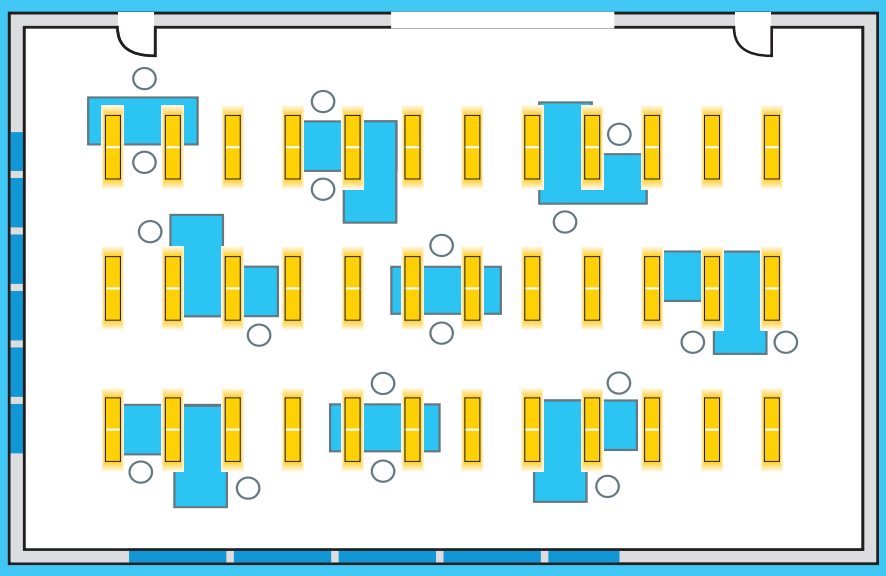
36–40% potential energy savings

Potential energy savings with T5 FH/ECG/specular louvre luminaires

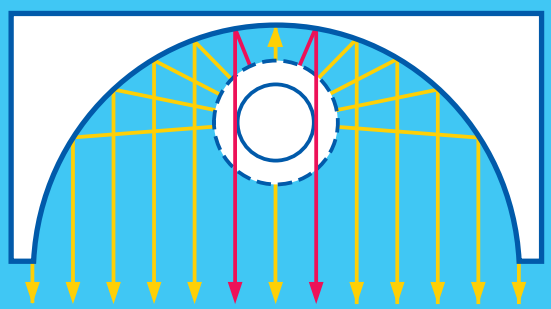
open-plan office: 21.8 x 12.5 x 3.0 m (surface-mounted luminaires, illuminance > 500 lux)

T8 Ø 26 mm, L36/21 3200 lm = max. Ø	T5 Ø 16 mm, FH 35/840 3650 lm = max. Ø
2 x 1200 mm	2 x 1449 mm
48 luminaires	36 luminaires
3365 W	**2736 W**

20% energy savings

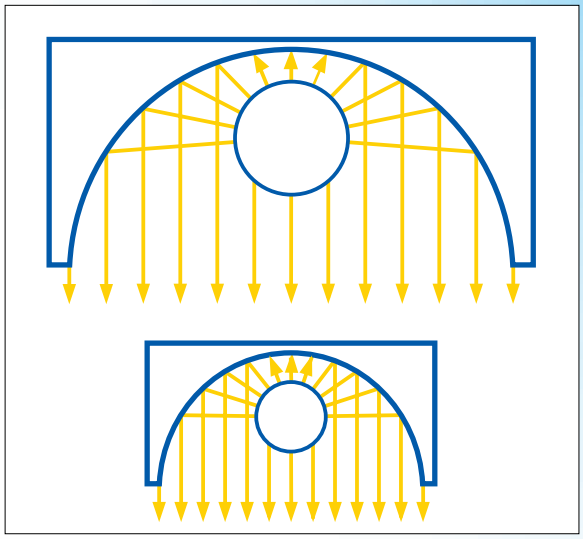


FH 35/840 3650 lm

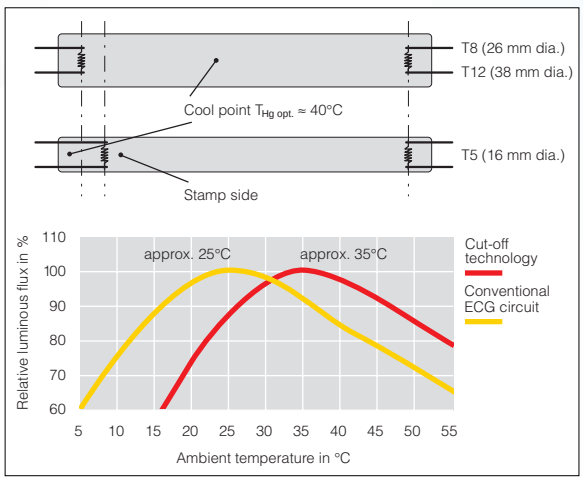


The diagram compares the shadowing effects caused by T8 and T5 lamps in a T8 reflector. The new FH® lamp with its diameter of only 16 mm represents a much smaller obstruction to the light rays than the 26 mm lamp, so less light remains trapped in the luminaire.

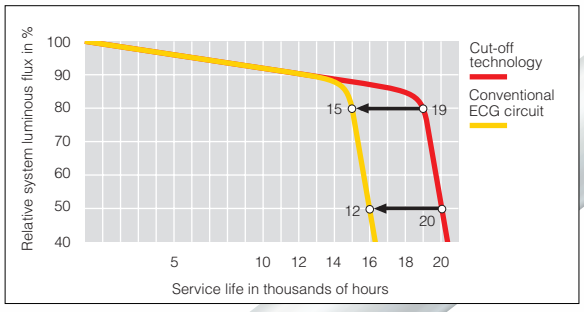
2. Minimum luminaire dimensions – maximum design



With the luminaire reflector reduced in proportion to the reduction in tube diameter, the shading effect remains the same. With the same luminaire efficiency, this gives designers enormous freedom to create new systems.



Luminous flux and temperature behaviour of T8 (26 mm dia.) and T5 (16 mm dia.) with cut-off technology
Optimum luminous flux at 35°C in the case of T5 (16 mm dia.) lamps can only be achieved with cut-off technology.



Only cut-off technology guarentees stated lamp life

The OSRAM FH® system enables luminaire designers to create much more compact units. An FH® luminaire can be made less than half the size of a T8 luminaire and still offer the same high efficiency.

Small elegant luminaires, greatly favoured by architects, lighting designers and users alike, can be created thanks to the following factors:
– the same shadowing effect despite a reduction in the size of the reflector by 40% (compared with T8 luminaires)
– a shift in optimum luminous flux from 25° C to 35° C to allow even smaller reflectors
– slimline OSRAM control gear is available to complement the small luminaire dimensions; the two-lamp ECGs are as slim as single-lamp units.

New LUMILUX® PLUS coating for minimal loss of luminous flux and longer service life

Thanks to the new LUMILUX® PLUS fluorescent material, the drop in luminous flux over the life of the lamp is only around 5%. Compared with fluorescent lamps with the conventional three-band LUMILUX® coating, this gives a much longer service life and much longer relamping intervals.

– 6 to 8% more light
– longer lamp life
– minimal losses

In the past, manufacturers of recessed ceiling luminaire had to resort to costly "rucksack" arrangements that were difficult to install. FH® lamps are 50 mm shorter than T8 lamps, which makes installation a great deal simpler.

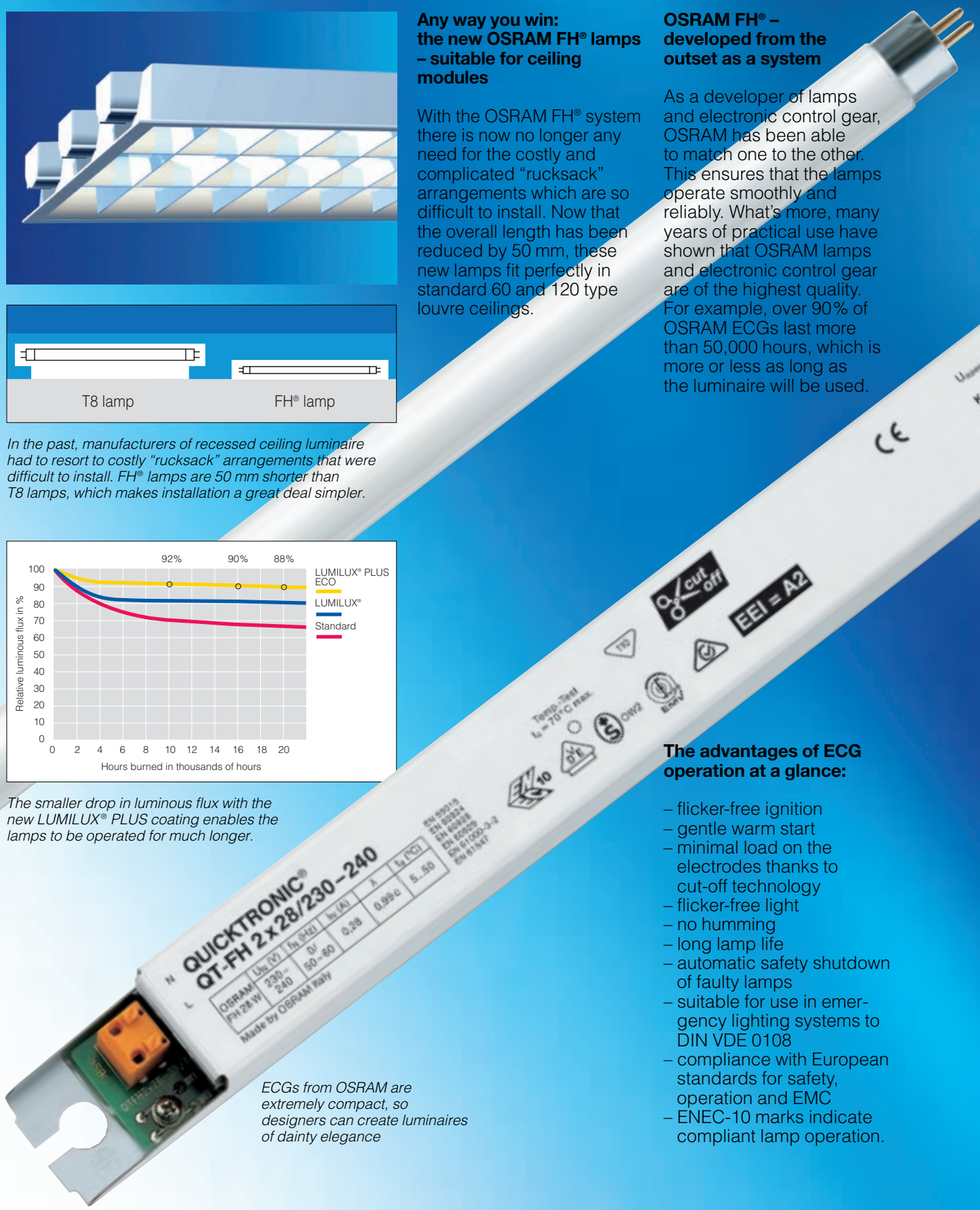
The smaller drop in luminous flux with the new LUMILUX® PLUS coating enables the lamps to be operated for much longer.

Any way you win: the new OSRAM FH® lamps – suitable for ceiling modules

With the OSRAM FH® system there is now no longer any need for the costly and complicated "rucksack" arrangements which are so difficult to install. Now that the overall length has been reduced by 50 mm, these new lamps fit perfectly in standard 60 and 120 type louvre ceilings.

OSRAM FH® – developed from the outset as a system

As a developer of lamps and electronic control gear, OSRAM has been able to match one to the other. This ensures that the lamps operate smoothly and reliably. What's more, many years of practical use have shown that OSRAM lamps and electronic control gear are of the highest quality. For example, over 90% of OSRAM ECGs last more than 50,000 hours, which is more or less as long as the luminaire will be used.

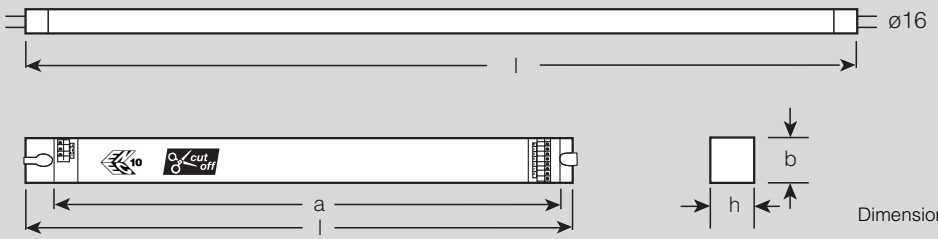


ECGs from OSRAM are extremely compact, so designers can create luminaires of dainty elegance

The advantages of ECG operation at a glance:

– flicker-free ignition
– gentle warm start
– minimal load on the electrodes thanks to cut-off technology
– flicker-free light
– no humming
– long lamp life
– automatic safety shutdown of faulty lamps
– suitable for use in emergency lighting systems to DIN VDE 0108
– compliance with European standards for safety, operation and EMC
– ENEC-10 marks indicate compliant lamp operation.

Technical Data



Lamp	FH® 14 W	FH® 21 W	FH® 28 W	FH® 35 W
Wattage	14 W	21 W	28 W	35 W
Rated luminous flux (25° C)[1])	1270 lm	1970 lm	2720 lm	3430 lm
Max. luminous flux (35° C)	1350 lm	2100 lm	2900 lm	3650 lm
Colour rendering	R_a 85	R_a 85	R_a 85	R_a 85
Light colour	830 = 3000 K, 840 = 4000 K, 860 = 6000 K			
Lamp length l	550 mm	850 mm	1150 mm	1450 mm
Lamp base	G5	G5	G5	G5
ECG reference 1-lamp	QT-FH 1x14/ 230–240	QT-FH 1x21/ 230–240	QT-FH 1x28/ 230–240	QT-FH 1x35/ 230–240
Mains voltage	230/240 V	230/240 V	230/240 V	230/240 V
Mains frequency	0/50–60 Hz	0/50–60 Hz	0/50–60 Hz	0/50–60 Hz
System wattage	16 W	23.5 W	30.5 W	38.5 W
Length l	280 mm	280 mm	360 mm	360 mm
Distance between holes a	273 mm	273 mm	350 mm	350 mm
Width b	30 mm	30 mm	30 mm	30 mm
Height h	30 mm	30 mm	30 mm	30 mm
Ambient temperature range	–15° to + 50°C	–15° to +50°C	–15° to +50°C	–15° to +50°C
ECG reference 2-lamp	QT-FH 2x14/ 230–240	QT-FH 2x21/ 230–240	QT-FH 2x28/ 230–240	QT-FH 2x35/ 230–240
Mains voltage	230/240 V	230/240 V	230/240 V	230/240 V
Mains frequency	0/50–60 Hz	0/50–60 Hz	0/50–60 Hz	0/50–60 Hz
System wattage	30,5 W	46 W	62 W	76 W
Length l	360 mm	360 mm	360 mm	360 mm
Distance between holes a	350 mm	350 mm	350 mm	350 mm
Width b	30 mm	30 mm	30 mm	30 mm
Height h	30 mm	30 mm	30 mm	30 mm
Ambient temperature range	–15° to +50°C	–15° to +50°C	–15° to +50°C	–15° to +50°C

[1]) Lighting plans and luminaire measurements should be based on the rated luminous flux.

QUICKTRONIC® for FH fluorescent lamps (T5, 16 mm dia.)

- Fully electronic hum-free control gear for OSRAM FH® (T5) lamps
- Optimised warm start, high resistance to switching transients
- Cut-off priciple for low electrode loading
- Extremely slim ECG cross-section: 30 x 29 mm
- Tested in accordance with general and safety-related requirements for ECGs to EN 60928 for ac supply and EN 60924 for dc supply; tested in accordance with ECG operating guidelines to EN 60929
- Active harmonic filter to protect against mains pollution to EN 61000-3-2
- Radio interference suppressed to EN 55015 and DIN VDE 0875
- Immune to external noise to EN 61547
- Protective shutdown in the event of an overvoltage
- Integrated safety shutdown of defective lamps
  – if lamp electrodes cease to emit
  – if there is an unusual temperature rise at the lamp electrodes
  – if the lamp output increases
- Approval marks:
- Failure rate: per 1000 hours 1–2‰ at a measuring point temperature of 70°C
- ECG life: 10% failure after 50,000 hours at a measuring point temperature of 70°C
- Can be used in emergency lighting to VDE 0108 (EN 60924 and EN 60928)
  – dc voltage range: 176 V to 254 V
  – ac voltage range: 198 V to 254 V
- For luminaires with F and F F or W and W W symbols to EN 60598/DIN VDE 0710