

Effect of ecoBright® T5 Adaptors (Save It Easy®) on a Lighting System's efficiency

Application

This Product Technical Bulletin (PTB) explains what effect the ecoBright® T5 Adaptor Save It Easy®, has on the efficiency of a fluorescent lighting system.

What is a Fluorescent Lighting System (FLS)?

An FLS has three components: lamp, ballast and starter system - a capacitor is part of the starter system.

Capacitors and Power Factor



For a non-technical explanation of Power Factor (P_f) see PTB: *Power Factor-The Plain & Simple facts*. Capacitors are electronic devices that store charge and assist in the start up of fluorescent lamps. Capacitors improve the P_f from 0.5 to approximately 0.85–0.90, however like all electronic components, capacitors will progressively fail and therefore current draw will progressively increase.

The effect of Capacitors on Current

Power (Watts) is calculated by multiplying Voltage x Current. In the physical world however:

$$\text{Power (W)} = \text{Volts} \times \text{I (Amps)} \times \text{Power factor (P}_f\text{)}$$

The current (Amps) used by a twin 36W lamp luminaire ($P=84W$) supplied with 240V, both with and without a capacitor installed, is calculated as follows:

When a Capacitor is installed:

$$P = V \times I \times P_f \Rightarrow I \text{ (Amps)} = P / (V \times P_f)$$

$$\Rightarrow I = 84 / (240 \times 0.85) = 0.41 \text{ Amps}$$

When a Capacitor fails:

$$I = 84 / (240 \times 0.50) = 0.70 \text{ Amps (An increase of 71%!)}$$

When a capacitor fails, current loads can increase by as much as 70%.

It is therefore good practise to ensure that a lighting circuit is never loaded to the maximum permissible current load to allow for failures in capacitors over time.

For example, a 20Amp circuit would be typically loaded to around 70% of circuit capacity (16Amp).

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Page 1 of 1 page

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ecoBright® T5 Adaptors and Capacitors

There is no need to remove capacitors when upgrading to T5 fluorescent lamps using Save It Easy®. As Save It Easy® has a P_f of 0.97, a twin lamp 36W FLS will therefore show a current load of only 0.36Amps (that's 0.18Amps per lamp!!)

How to check the loading on lighting circuits

An electrician can quickly determine current load (Amps) on a circuit with a Tong Tester. Then, reconcile Amps measured with the number of fluorescent lamps on the circuit.



For example, a 16A circuit shows a 12A current draw for a circuit of 36W electromagnetically ballasted lamps. If one 36W lamp draws 0.205Amps with a working capacitor installed, we expect therefore that this circuit will have $12A / 0.205 = 58 \times 36W$ lamps.

If however, only 30 lamps are counted it is certain that a number of capacitors have failed. Installing Save It Easy® will reduce current draw in the FLS from 12Amps as Save It Easy® improves the efficiency of those luminaires where capacitors have failed.

If current draw and lamps predicted are as expected, chances are the circuit is well within the limits required.

For lighting circuits loaded above 70% of capacity

If a 16A circuit is loaded to 15A with all capacitors functioning (as per lamp count), then remove some of the capacitors (speak to ecoBright® on qty. to remove) before installing Save it Easy®. Whilst unlikely, it is still important to plan for just such a scenario.

Problem free installation and service

Installing Save it Easy® in an office environment with other inductive loads will reduce the current load of the whole circuit board due to it correcting P_f .

Save it Easy® upgrades are unlikely to cause any difficulty however, should you need further information or simply want to discuss your own unique setup, contact your local ecoBright® office.

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