

How to save electrical power on lighting while continuing to use your own light fittings

Lighting Energy Controller LEC

Save up to 30% on lighting, without changing your light fittings or compromising your comfort.

Simple to install on the incoming supply to your light fittings, without requiring any modification to the premises concerned.



After choosing LEC for its street lighting six years ago, the town of Morges (VD) is now beginning to install it in its main school buildings

An initial test involving the lighting in the Grand'Rue, which reduced electrical consumption by 28%, convinced the Morges town engineering departments that they should continue to install LEC highway lighting equipment and extend it to include large public buildings. The "Energy City" likes to consider itself as being at the forefront for delivering energy savings.

The town's objectives are to reduce the electricity consumption of public services without investing in costly new lighting systems

Street lighting installation programme:

- 2000:** Grand'Rue lighting
- 2001:** rue de Couvaloup lighting
- 2002:** Vertou park lighting
- 2003:** lighting in the place de la Gare and the rue de la Gare
- 2004:** lighting at the Moulin roundabout and its access roads.

Extension of the use of LEC to public buildings

- 2005:** Collège de Beausobre 2

Results

Since LEC was installed in one building in the Collège de Beausobre and put into service on 14 September 2005, energy savings of 19% have been measured.

Users have noticed no difference in terms of comfort and security with respect to either the street lighting or the lighting in the Collège de Beausobre.



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The Grand Hotel Suisse-Majestic** saves electrical power on lighting, but continues to use its original light fittings**

Each year, the lighting costs for this Belle-Epoque style luxury hotel are in the region of 87'000 Swiss francs. Was it necessary to incorporate energy-saving bulbs in its century-old decor?

The building

Built in 1870, the Grand Hotel Suisse Majestic is one of the jewels of the Belle-Epoque on the Vaudois Riviera. As a meeting place for artists and celebrities, its comfort is on a par with its decor and location, in the heart of Montreux, facing lake Geneva and the Alps.

The results

In just over a year (exactly 1.15), the investment of 40,496 Swiss francs will be amortized, since the hotel's lighting costs will be reduced by 35'244 Swiss francs without any light fittings needing to be changed.

Thanks to the LEC, the average energy saving achieved on all the existing lamps amounts to 20.5%. Stabilizing the voltage reduces the likelihood of the bulbs overheating: their service life is at least doubled and the air-conditioning expenses reduced.

Annual electricity consumption for lighting	CHF	87 219
Total annual savings	CHF	35 244
• on electricity	20.5 %	CHF 17 880
• air-conditioning		5 364
• on lamp replacement	CHF	12 000
Capital expenditure excluding VAT	CHF	40 496
Return on investment	Year	1.15



The Lausanne public transport (tl) realizes considerable electricity savings on lighting
The tl achieve annual savings of 21'715 Swiss francs without changing their light fittings. 17'045 Swiss

Building equipped with an LEC
 Inaugurated in 1982, the La Borde bus depot serves as a garage. It houses 70 vehicles in an area of 7'440 m². Each of its 639 light fittings has a 58 Watt fluorescent lamp (commonly called a neon lamp) that is illuminated 20 hours a day, 365 days a year.

Annual electricity consumption for lighting a 70-vehicle bus depot		CHF	63 395
Total annual savings		CHF	21 715
on electricity	25.87%	CHF	16 401
on lamp replacement		CHF	5 314
Capital expenditure excluding VAT		CHF	17 045
Return on investment		Month	9.4



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Coca Cola Beverages (CCB) reduces its lighting costs in Bolligen (BE)

Thanks to the Lighting Energy Controller (LEC), the Swiss subsidiary of the American multinational saves 6'889 francs a year on its lighting costs for a capital investment of 12'200 francs. The return on investment (ROI) is less than 2 years.

The equipped building

The CCB Bolligen warehouse is located in a ground floor area that has no natural light. It is lit by 600 x 58 Watt fluorescent lamps for 18 hours on working days at an annual electricity cost in the region of 30'000 francs.

The results

Current consumption was reduced by 19.66%, which was even more impressive because 45% of the existing fluorescent lamps were already fitted with an electronic ballast (which is supposed to fulfill the same function as the LEC).

Annual electricity consumption for warehouse lighting		CHF	30 351
Total annual savings		CHF	6 889
• on electricity	19.66 %	CHF	5 967
• on lamp replacement		CHF	922
Capital expenditure excluding VAT		CHF	12 200
Return on investment		Year	1.77

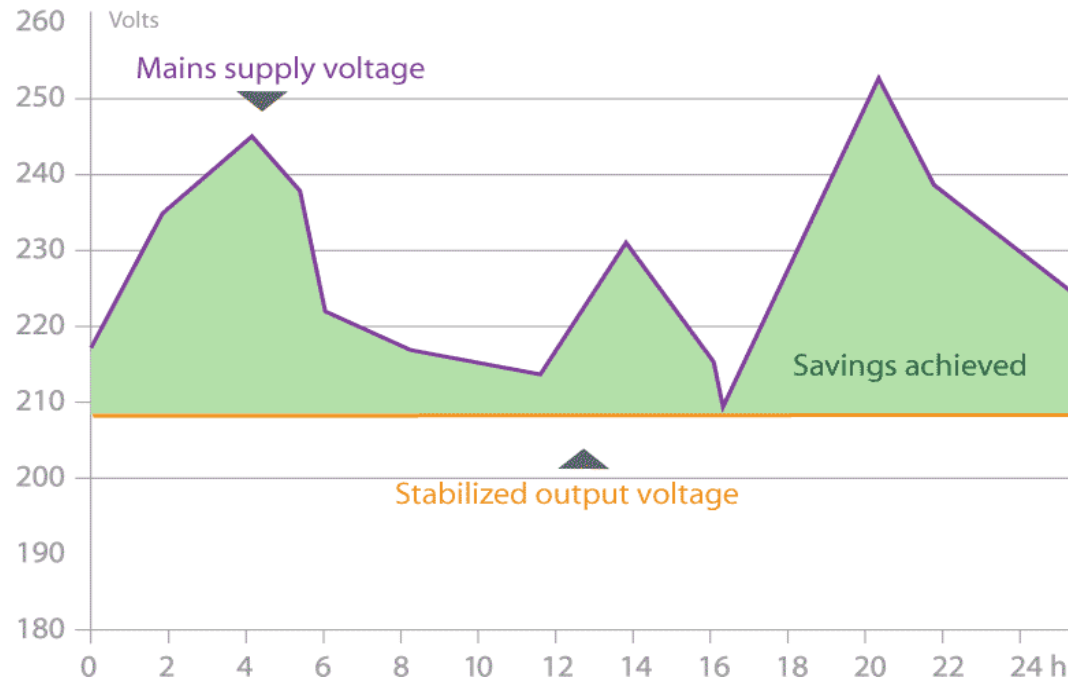


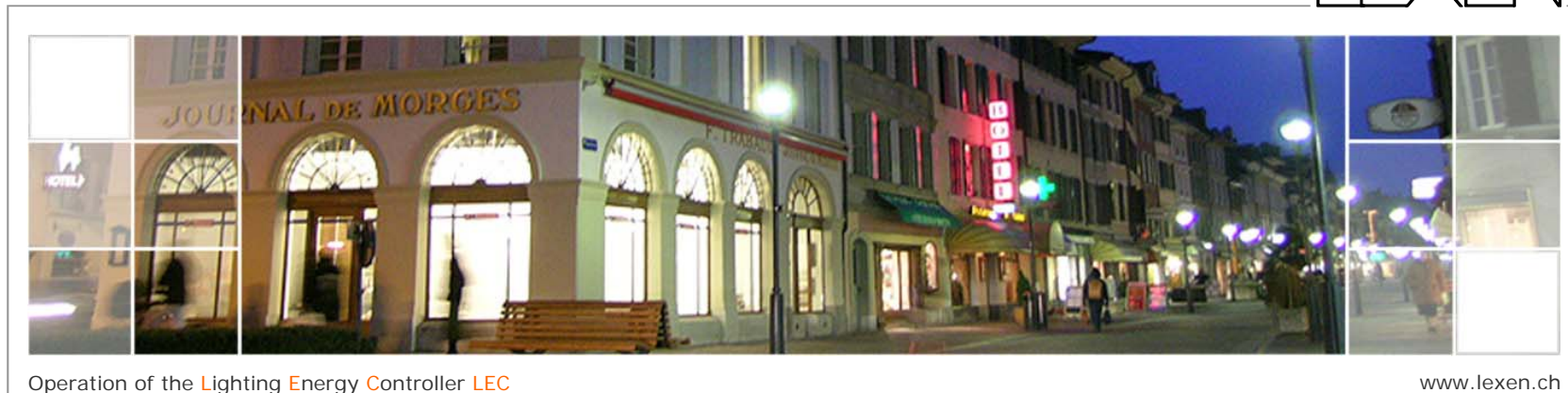
Elimination of high voltages and their variations that consume a lot of electricity.

**The mains supply voltage varies.
The voltage range is standardized
at 230 V ± 10%, i.e. 207 to 253 V.**

The lighting is dimensioned to meet your needs over the entire voltage range. The lamps consequently operate from 207 to 253 V. A stabilized output voltage therefore offers significant savings.

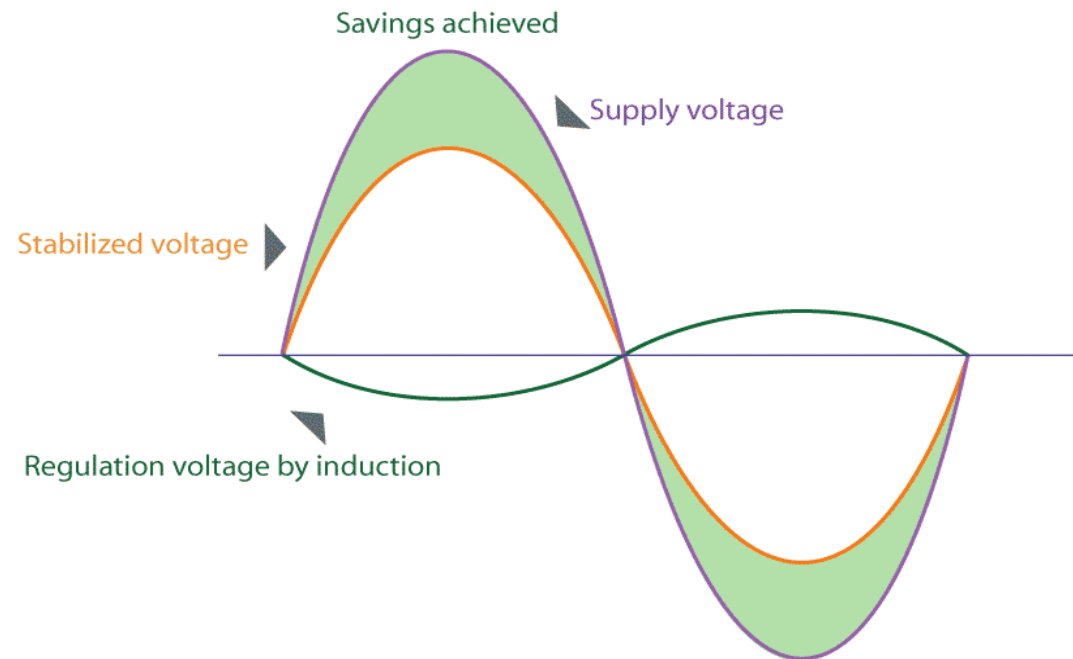
If 207 Volts provide sufficient lighting to meet your needs, why

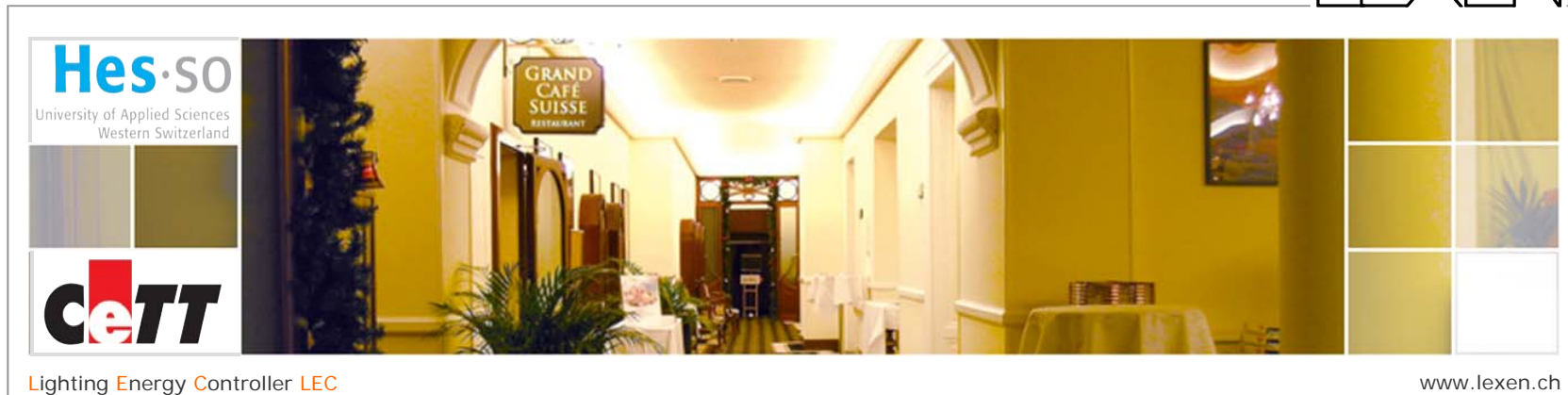




Induction voltage regulation (patented)

Voltage control by induction with a regulation voltage of 0-35 V is used to operate transformers that are 7 times less powerful than transformers that are part of a conventional solution. Although the LECs are smaller and lighter, they offer a distinctly





Achievable savings

Laboratory measurement of the reduction in the electricity consumption of different types of lamps by the Vaud School of Engineering.

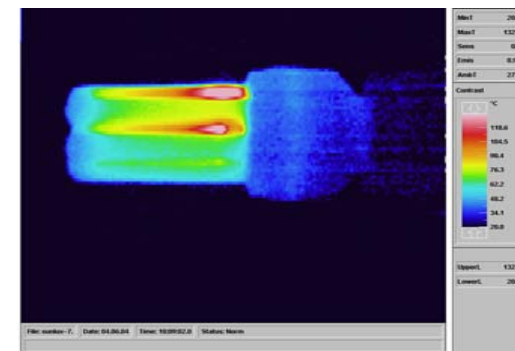
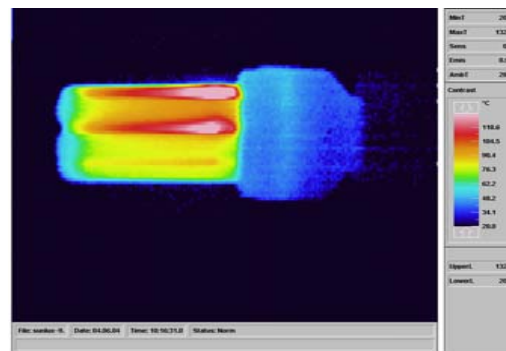
Lamp	Type of bulb	230 / 207 23 Volt	240 / 205 35 Volt
Incandescent	Osram Sunlux 100 W	15.3%	21.6%
	Osram 20 W Sunlux energy saving	11.0%	16.1%
HP mercury vapor	Osram HQL 125W ferromagnetic ballast	20.5%	28.8%
	Osram HQL 80W electronic ballast	21.6%	29.6%
HP Sodium	Osram NAV-E 110W	21.8%	29.2%
	Osram NAV-T 100W electronic ballast	12.2%	15.1%
Metal halides	Osram Powerstar HQI-T 250W/D	21.0%	21.0%
Fluorescent	Phillips TLD 38W/33 ferromagnetic ballast	18.4%	25.4%

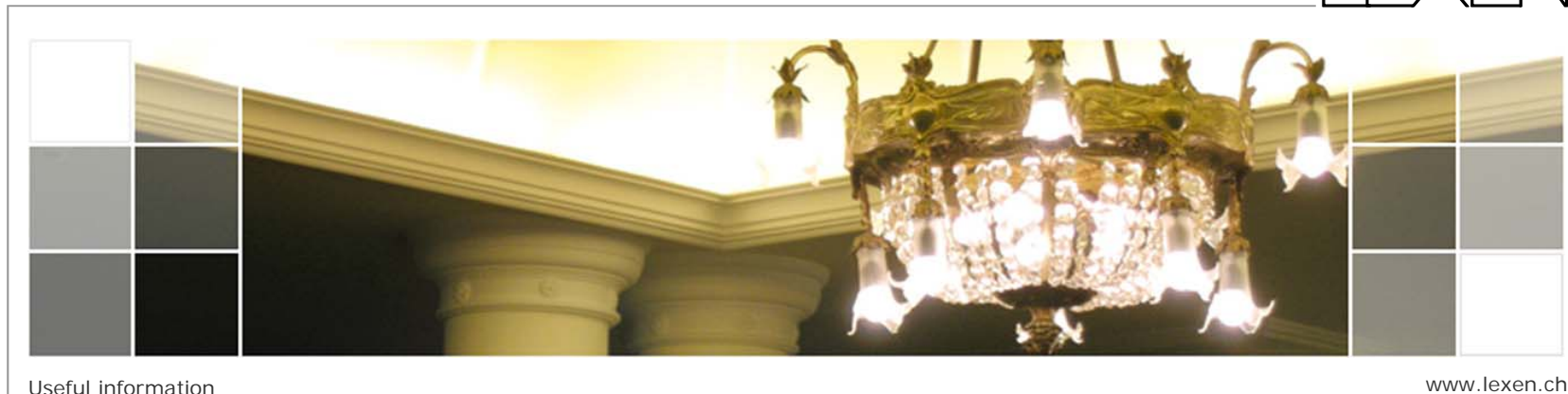


By stabilizing the voltage, the LEC lessens the heating the of lighting components

Stabilizing the lamp supply voltage not only reduces the consumption of electricity but also lessens the likelihood of overheating the lighting components. The result is a significant increase in the service life of the lamps and a reduction in overheated premises. On air-conditioned premises, it offers further savings, this time by reducing the energy re-

- The service life of the lamps is more than doubled
- The reduced heating of the lighting components offers considerable savings on air-conditioning





The lamps produce more heat than light

Stabilizing the lamp supply voltage reduces not only the consumption of electricity but also lessens the likelihood of overheating the lighting components. The result is a significant increase in the service life of the lamps, even more so in the case of light fittings that use a lot of electric-

Lamps	Efficiency light/heat in %	Service life in hours
Incandescent	5-10/90-95	1'000
Halogen	10-20 / 80-90	2'000-5'000
Fluorescent	50 / 50	5'000-17'000
Fluocompact	35-40 / 60-65	3'000-15'000



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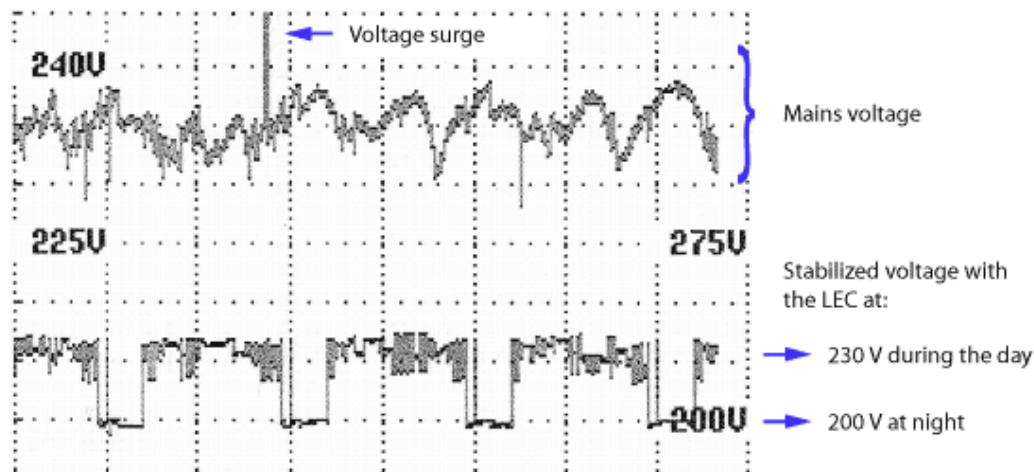
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Protect your investments with the LEC

Voltage stabilization increases the service life of electronic components

Variations in voltage and voltage surges in particular can damage electronic components. Such surges are eliminated when the LEC is used to stabilize the voltage.

Public lighting measures taken by Pully municipality.





Lighting Energy Controller LEC

LEC characteristics

- Output voltage, programmable from 195 to 230 V, irrespective of the load
- High power transfer ratio (18)
- Can be used for all types of lamps
- Does not cause interference (RFI/EMI)
- Does not cause voltage distortion
- Accepts unbalanced loads
- Device and line protection is included in the three-phase units

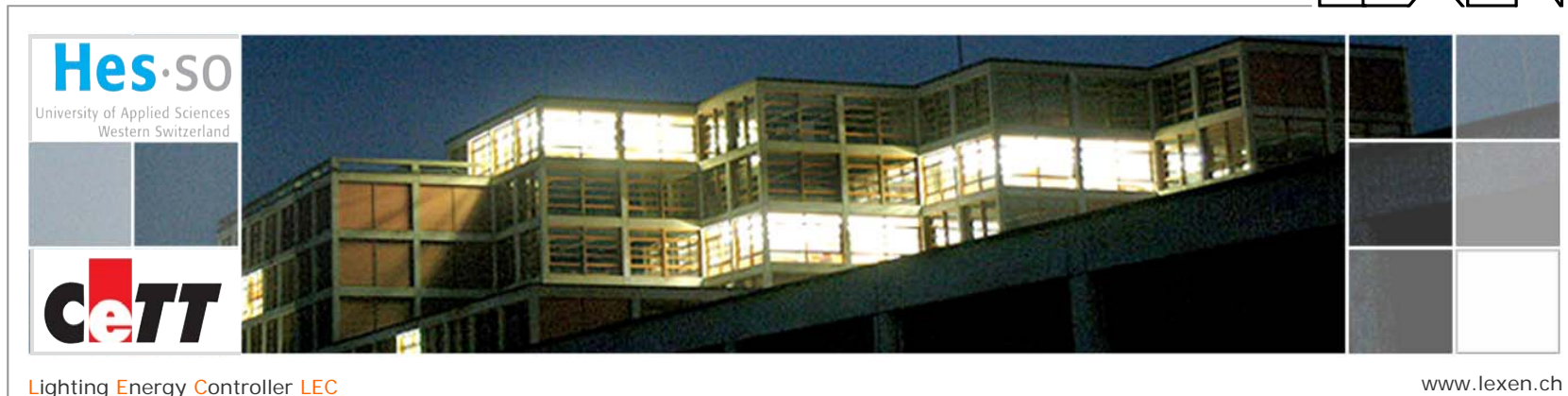
- An emergency short-circuit is included in the three-phase units
- Can be controlled by RS 485
- Time period and voltage programming

Protect your investment

- By stabilizing the voltage, the LEC also protects the electronic components, regulators and ballasts.
- Their service life is extended.

Other advantages

- Reduced voltage drop in the inductor
- Reduced voltage drop in the line ($dV=I \times R$)
- Reduced losses in the line ($dp=I^2 \times R$)
- Reduced losses in the inductor (iron and copper)
- Improved power factor due to reduced losses (iron) in the inductor
- No change to the existing infrastructure



Comprehensive report on the tested and approved LEC

Energy savings

Voltage limitation saves a great deal of energy.

- Reduced active power without compromising user comfort.
- Increase in the service life of the light source.
- Increase in the service life of the ballast.
- Less heat loss (improved air-conditioning).
- Improved cos phi and therefore reduced reactive power compensator capacity.
- Furthermore, the environmental impact should not be ignored.

Reliability

The originality of the LEC lies mainly in its design. Although it does not use capacitors or power semi-conductors, its reliability is not limited by its few sensitive components.

Efficiency

The efficiency of the LEC, which is estimated at 97%, is excellent, to the extent that its measurement is highly dependent on the accuracy of the power analyzers used.

Comfort

A reduction in the electrical output of a light source results in a decrease in the illumination level.

This phenomenon was carefully observed during the tests. A sudden variation in voltage is clearly seen.

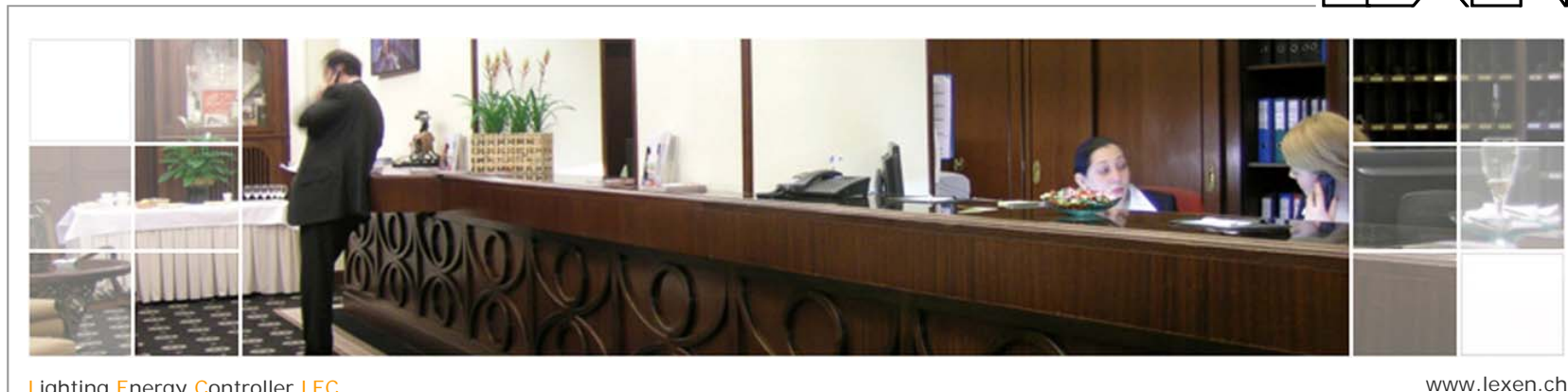
On the other hand, a slow variation, even in steps of 2 V to 5 V, is not visible under normal working conditions.

Vaud School of Engineering
Yverdon-les-Bains, 7 July 2004

André Perrenoud, Ing.-Phys. EPFL, Dr ès Sciences (PhD), Scientific Associate,

Professor Marc Correvon, Ing. Dipl. (graduate engineer of the EPFL), Professor

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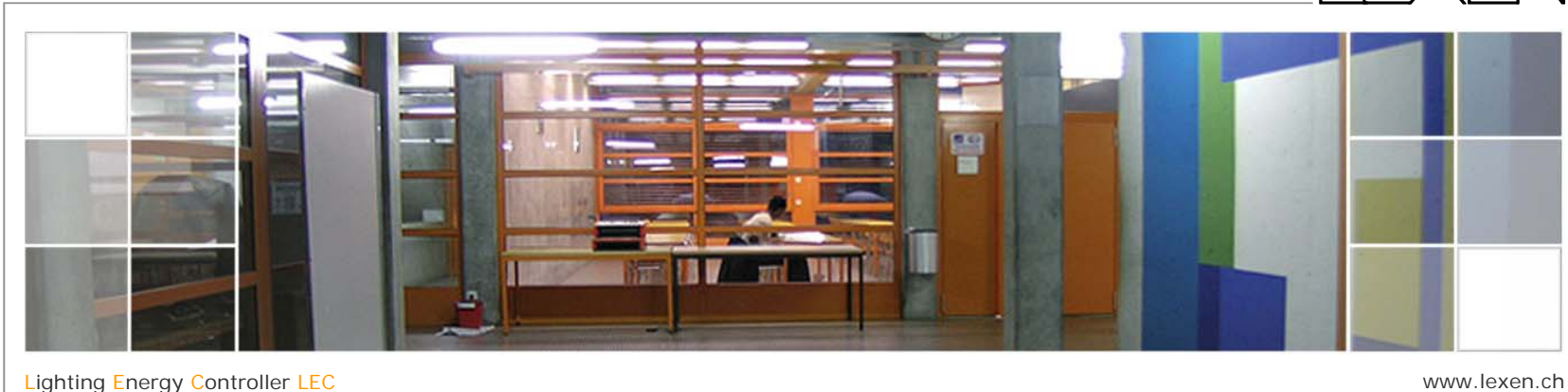
The LEC A range

LEC A sp single-phase
Three-phase facilities between 10 and 30 A are equipped with 3 single-phase

LEC A tree-phase
Three-phase devices are delivered above 30 A and include an power changeover switch (bypass/off/save)

Higher power on request

Current		Dimensions			Weight
Amperes		h	d	l	kg
1 x	10	422	152	120	8
1 x	16	422	152	120	8
1 x	20	422	152	120	13
1 x	25	422	152	120	13
1 x	30	422	152	120	13
3 x	50	612	258	396	44
3 x	80	643	295	530	65
3 x	125	720	285	585	128



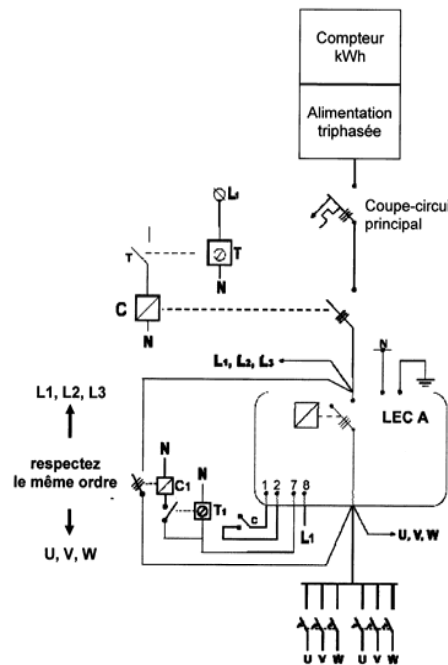
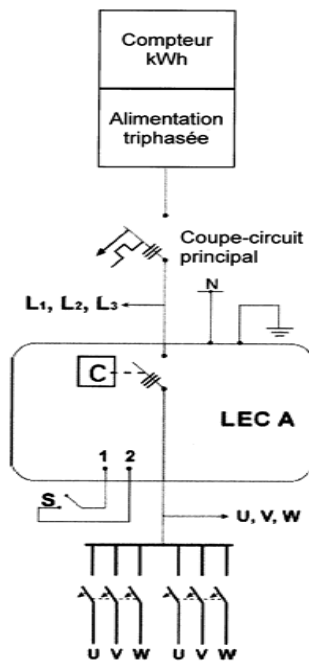
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Connection diagrams

... with external bypass

Conformity



Übereinstimmungserklärung
Statement of Compliance

Ausgestellt für: AS Testsysteme GmbH, Liebigstrasse 13, 85757 Karlsfeld
 Issued to:
 Fertigungsstätte(n): Power Electronic Ltd., P.O.B. 255 Or-Yehuda, 60200 Israel
 Place(s) of manufacture:
 Erzeugnis: Lighting Energy Controller LEC A and LEC B
 Product:
 Prüfnorm(en): EN 50178:1997, EN 60439-1
 Standard(s) used:

Das betreffende Erzeugnis ist in Übereinstimmung mit der(den) genannten Norm(en). Das Erzeugnis kann deshalb unter Berücksichtigung des vorausgegangenen Schriftverkehrs mit dem(der) ...
 The subject product complies with the referenced Standard(s). The product is therefore eligible to bear the

- VDE-Zeichen
VDE-Mark
- VDE-GS-Zeichen
VDE-GS-Mark
- VDE Gutachten
Certificate of conformity.
- VDE-EMV-Zeichen
VDE-EMV-Mark.

gekennzeichnet werden. Diese Berechtigung gilt für 60 Tage ab Ausstellungsdatum. Die Zeichengenehmigung wird innerhalb der nächsten Wochen ausgestellt, vorbehaltlich der abschließenden Beurteilung des Prüfberichtes.
 In accordance with instructions contained in previous correspondence. This authorization is effective for 60 days only from the date of this notice. The VDE-Mark Licence will be issued and sent out in the next few weeks subject to the final check of the test report.

Ausgestellt durch: VDE Prüf- und Zertifizierungsinstitut, Fachgebiet FG13
 Issued by department

Aktenzeichen: 5000834-1494-0001/35198
 Reference no.

Datum: 2004-04-07
 Date issued

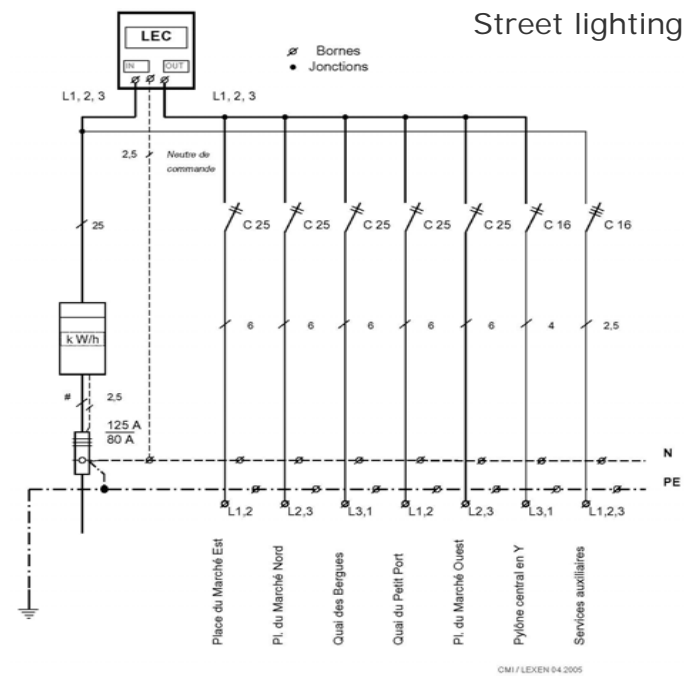
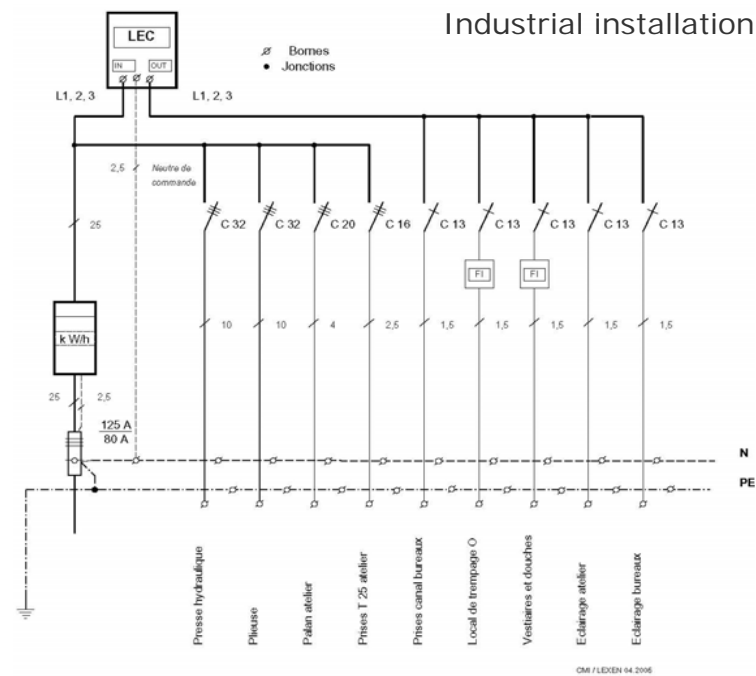
Unterschrift:
 Signature

A. Roth



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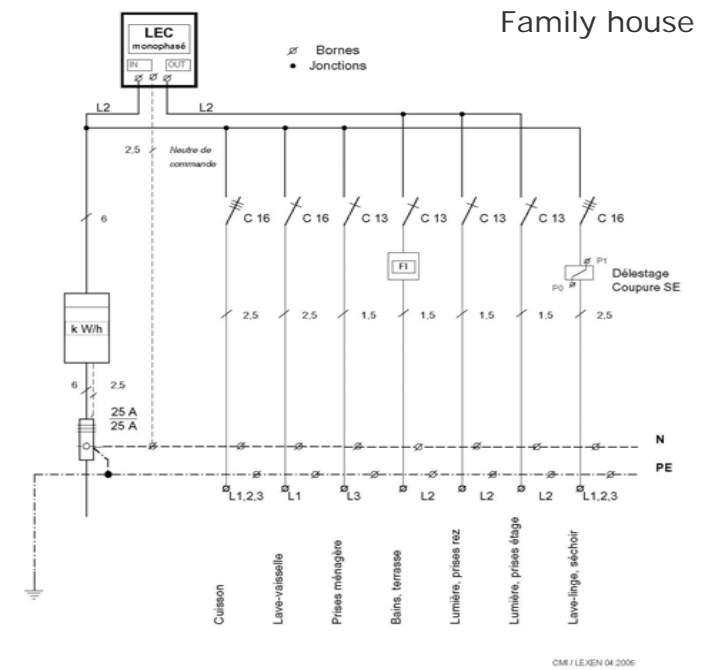
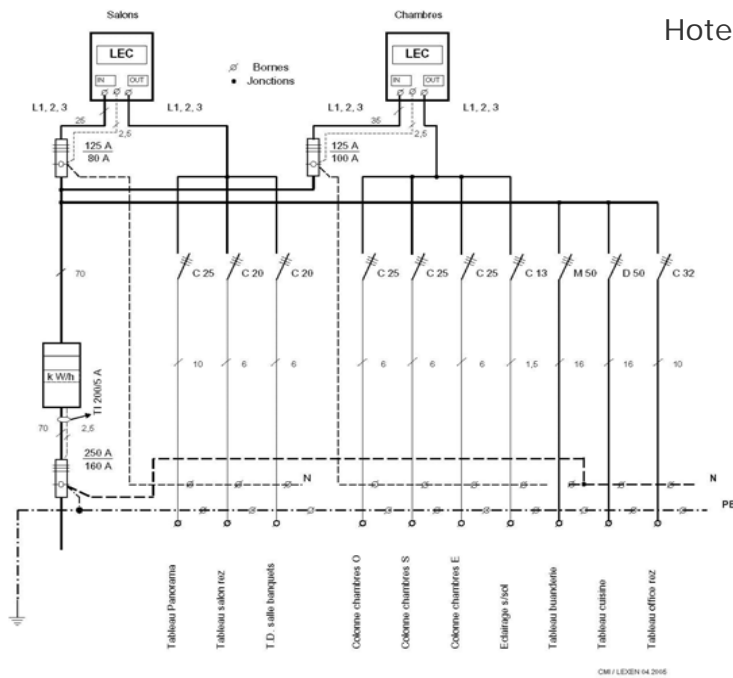
Block diagram of the facilities

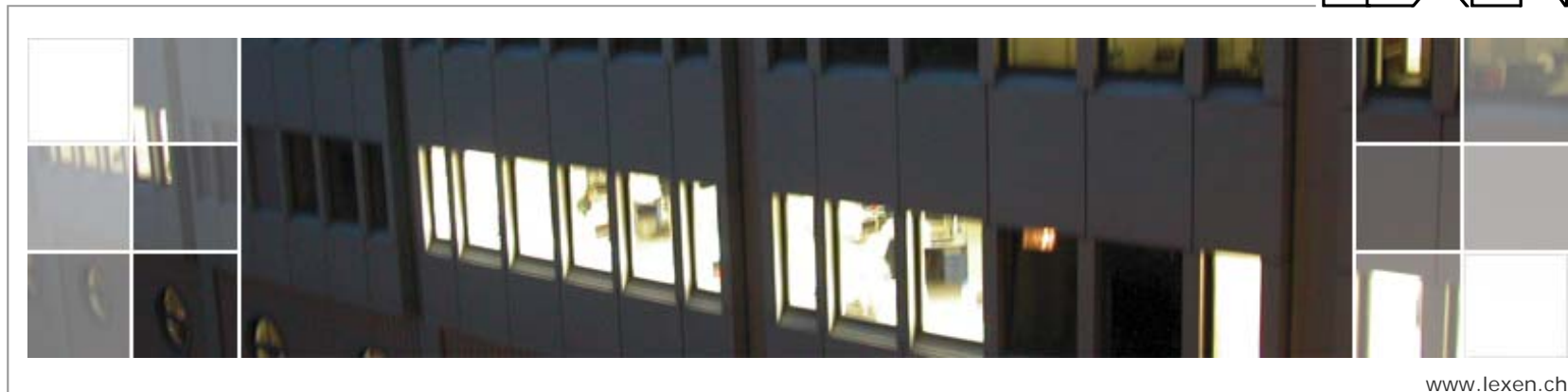




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Block diagram of the facilities





LEXEN provides practical energy saving solutions

LEXEN

... researches, develops and markets rational solutions that can immediately be put into practice in order to save energy and reduce users' operating costs.

... specializes in saving energy on electric motors and lighting, which can account for up to 70% of the electricity consumption.

Our solutions apply to tertiary, commercial and industrial buildings, as

LEXEN structure

Lexen Solutions SA

Markets practical energy saving so-

Lexen SA R&D

Researches and develops applications with the patented microbubble generator.

Lexen SA Services

Deals with the commissioning and after-sales service from stock of Danfoss frequency converters and energy savers on LEC lighting.