Gradilux

## The ideal solution for lighting up your city

Public lighting

▶ Imperfections

Public lighting installations experience considerable voltage variations.

- Nightly overvoltages can be as high as 10%.
- Energy consumption increase by 21%.

Public lighting installations maintain constant lighting levels.

- Lighting levels are rarely adapted to vehicular traffic and pedestrians.
- The need to operate lighting at full power decreases after midnight.
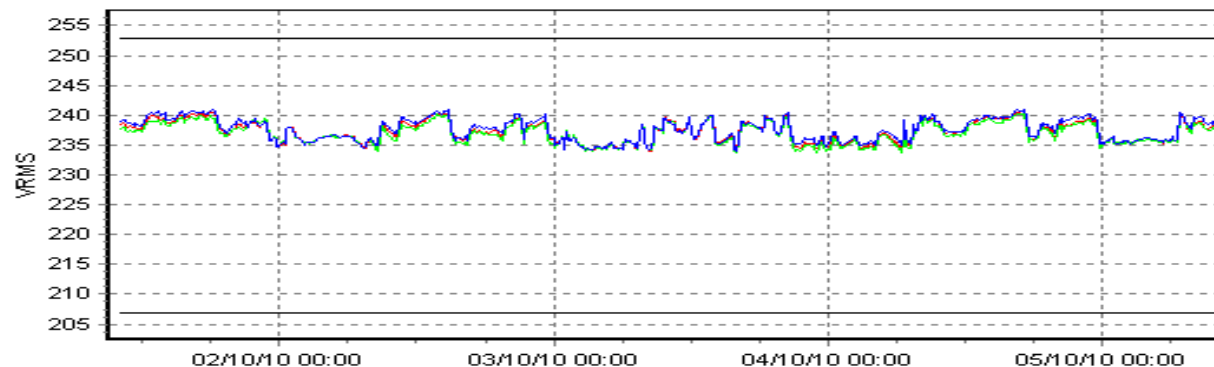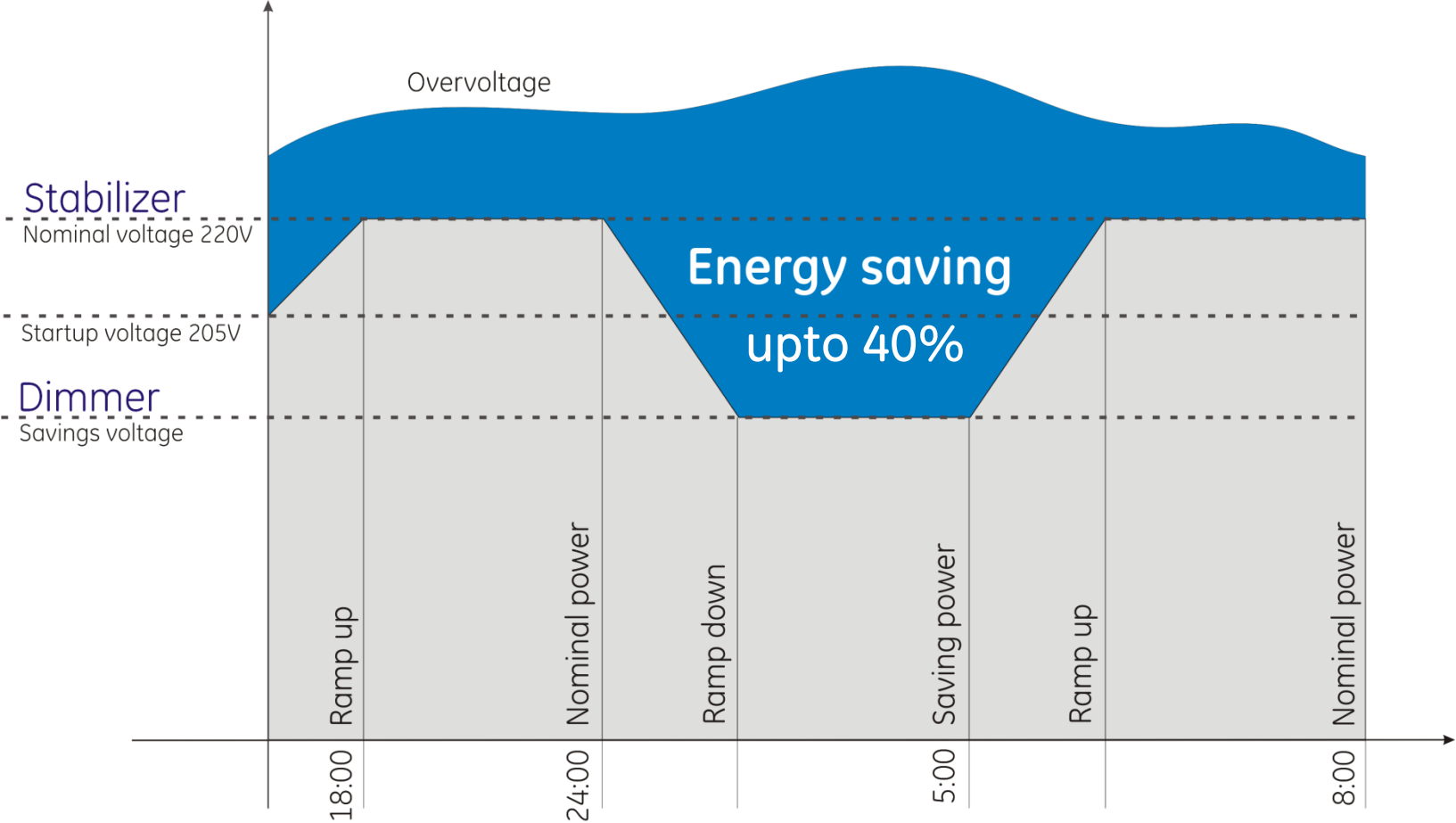
Lighting

▶ Lamps

Type of lamp	Color	Efficiency (lm/W)	Lifetime (h)	Saving (V)	Application
High Pressure Sodium	Pinkish orange	80-140	20.000-24.000	180	80% of outdoor installations
Low Pressure Sodium	Bright yellow	100-185	14.000-18.000	190	Being phased out Unpleasant color
Metal Halide	Bright white	60-110	6.000-20.000	180	Oldest technology
Mercury Vapor				200	Banned by 2015
Fluorescent	UV			205	Indoor installations

GE imagination at work

Operation

▶ Operating principle

Operation

MODE 0		**1 cycle, 1 saving voltage** • Parkings, industrial • Airports, railways
MODE 1		**1 cycle, 2 saving voltages** • Highways • Cities
MODE 2		**2 cycles, 1 saving voltage** • Tunnels • Subway

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GradiLux

▶ Standalone

LED interface
Controller status

Display
Configuration & control

RJ45 port
RS232 MODBUS communication

Automatic full bypass
Reliability

Power electronics
Static technology

Switch
Power on/off

ComiTEQ card (optional)
TCP/IP communication

Manual bypass (optional)
Maintenance

Discharge lamp (optional)
Surge protection
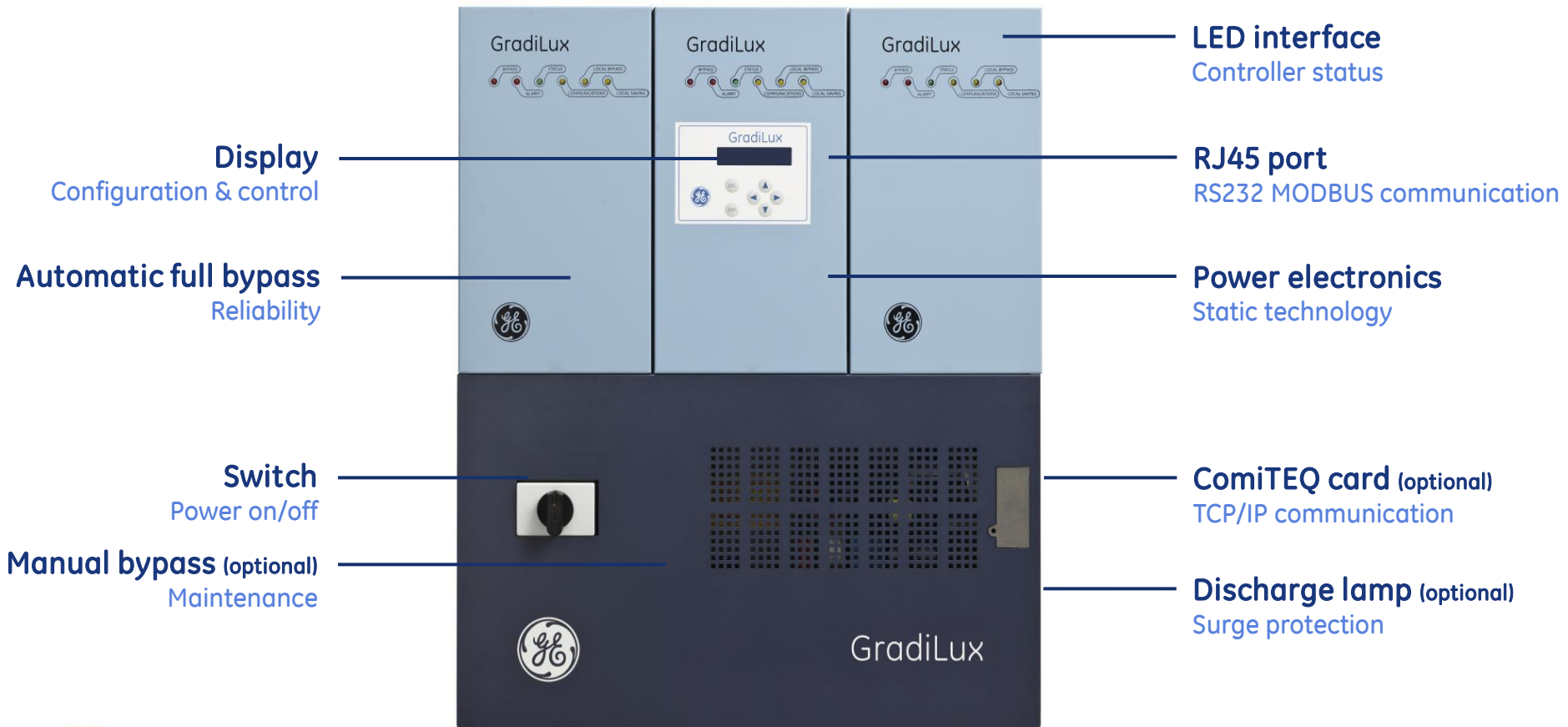
Benefits

▶ Fast payback

- Low maintenance costs.
- Savings in consumption upto 40%.
- Increased lamp lifetime.

Standard energy bill

Energy bill with stabilizer — Savings 20%

Energy bill with dimmer — Savings 40%

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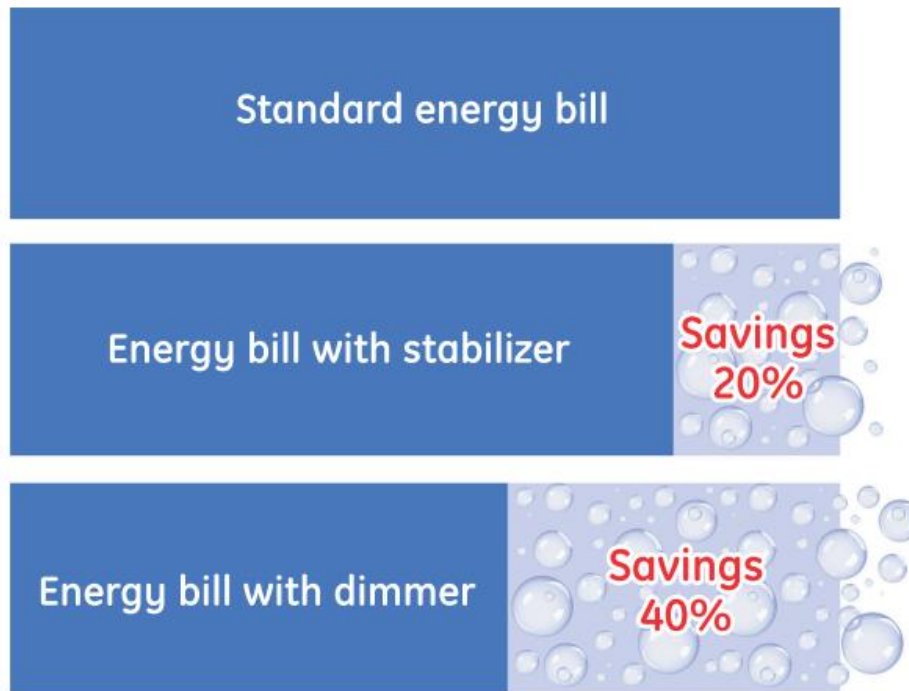
Benefits

▶ Ease of use

- Fast and simple upstream installation.
- Both for new and old installations.
- Compact design with independent phases.
- Remote monitoring and control.

L1   L3

L2

GPRS

3 phases 400V

3 phases 400V

Bypass
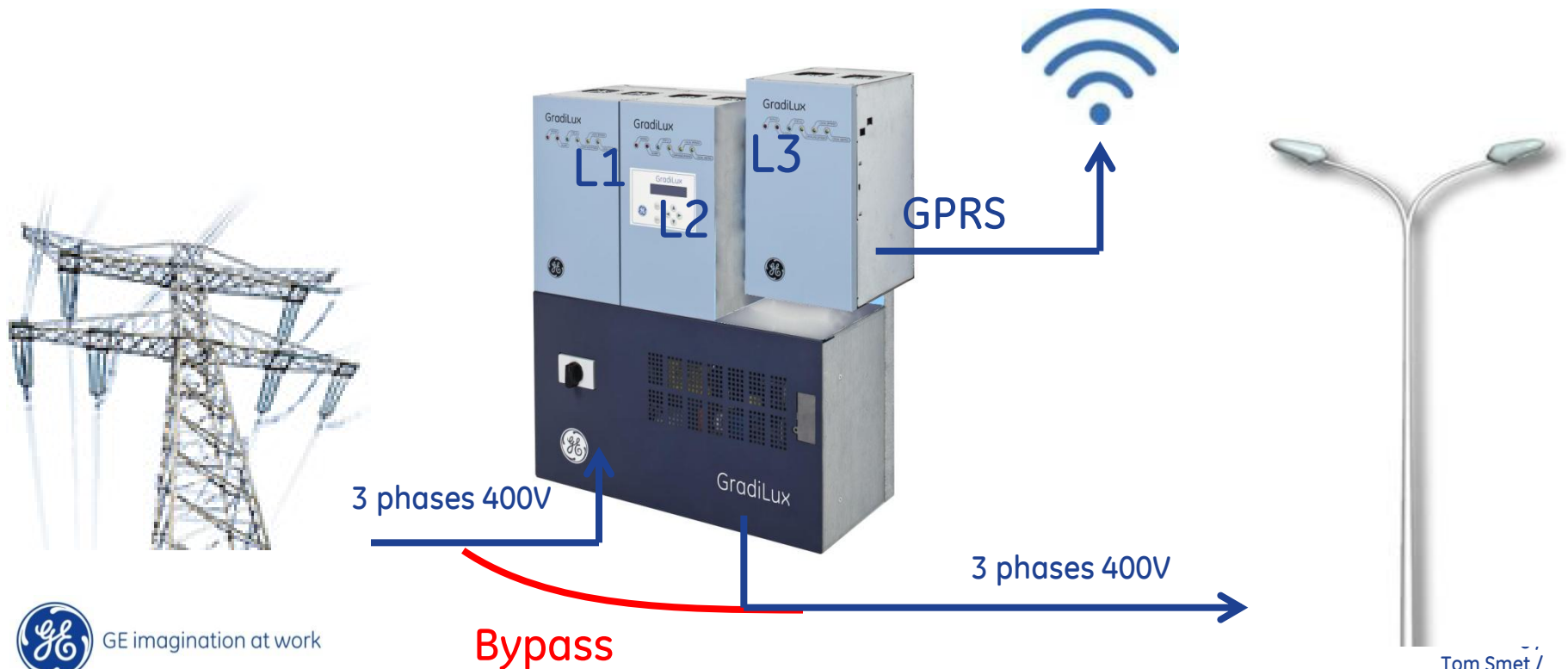
Benefits

▶ Versatile applications

- Suitable for use of all types of lamps.
- Available for wide range of powers.
- Stand alone unit or build in kit.

Standalone

7,5kVA - 45kVA
Three phases

Modular

3,5kVA - 15kVA
Single phases

Communication

▶ Remote control

Dashboard

- Summary based on different data
- Reports about your Gradilux community (different installations & cities)
- Visualize each Gradilux on detailed map or inside your device tree
- Wide range of analysis options (daily/monthly/annual graphs, energy and CO2 savings...)
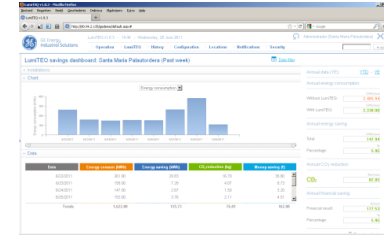
Safety

- Secured webserver
- Control your GradiLux in safe environment via VPN
- Configuration of your Gradilux community, where you can define other users with monitoring and control access

Savings

- Reduce maintenance costs by receiving alarms notifications
- Allows quick diagnostic on real time data from each Gradilux with status and measurement informations

Communication

▶ Remote control

GradiLux	Mobile Operator	GE Backend	Firewall	Internet	End user

Secured VPN
GPRS connection

HTTPS
Web browsing

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Communication

▶ Remote control

Communication

▶ Remote control

Communication

▶ Remote control

Payback

▶ Calculation example

City of 25.000 inhabitants   25.000 × 👤

Every lamp equals 7 inhabitants   7 × 👤 = 💡

- -

Total of 3.600 installed lamps   3.600 × 💡

Lamp is type HPS 150W   1 × 💡   = 150W

- -

Total installed power is 540kW   ⚡ = 540kW

Sizing factor for losses and grid distortion   540kW × 1,5 = 810kVA

810 kVA equals 18 GradiLux of 45kVA   810kVA / 45kVA = 18 units

| **Total cost** | **= 126.000€** |

* Does not include installation cost

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Payback

$$P = \frac{V^2}{R}$$

▶ Calculation example

Lighting operates 4000 annual hours	🕐	= 4000h
Total installed power is 540kW		= 540kW
Overvoltage is 10% on average	ΔV = 10% ➡ ΔP	= 21%

Consumption at 230V with overvoltage		= 2.613MWh
Stabilizing consumption at 220V		= 1.976MWh
Stabilizing savings	🐷	= 24%
Dimming for 6h per night	🕐	= 6h
Dimming consumption at 180V		= 1.700MWh
Dimming savings	🐷	= 34%

Total savings	= 91.300€

Payback

$$\text{ROI} = \frac{\text{Cost}}{\text{Savings}} = \frac{126.000€}{91.300€}$$

ROI = 17 months

Payback

▶ Calculation tool

GradiLux calculator

Operating parameters

Grid voltage	230
Overvoltage	10
Price	0,1

Savings

	Consumption	Cost	Saving	
Without control	248,29	24829,20		
Stabilizing	187,74	18774,44	6054,76	0,243856333
Dimming	155,94	15593,65	9235,55	0,371963318

ROI

ROI	7 months

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▶ Complete solution

Protection

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Web Portal

Mobile operator

ComiTEQ

Modem

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▶ Complete solution

- Upto 40% energy savings
- Increased lamp lifetime
- Low installation and maintenance cost
- ROI less than 2 years
- Remote control

- No individual lamp control
- Not compatible with electronic ballast

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