

Gradilux

The ideal solution for lighting up your city



GE imagination at work

Public lighting

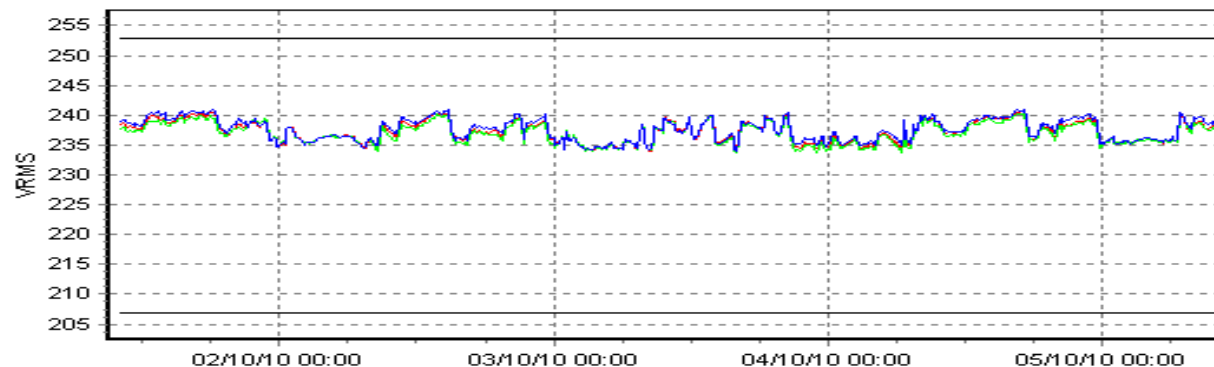
► Imperfections

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

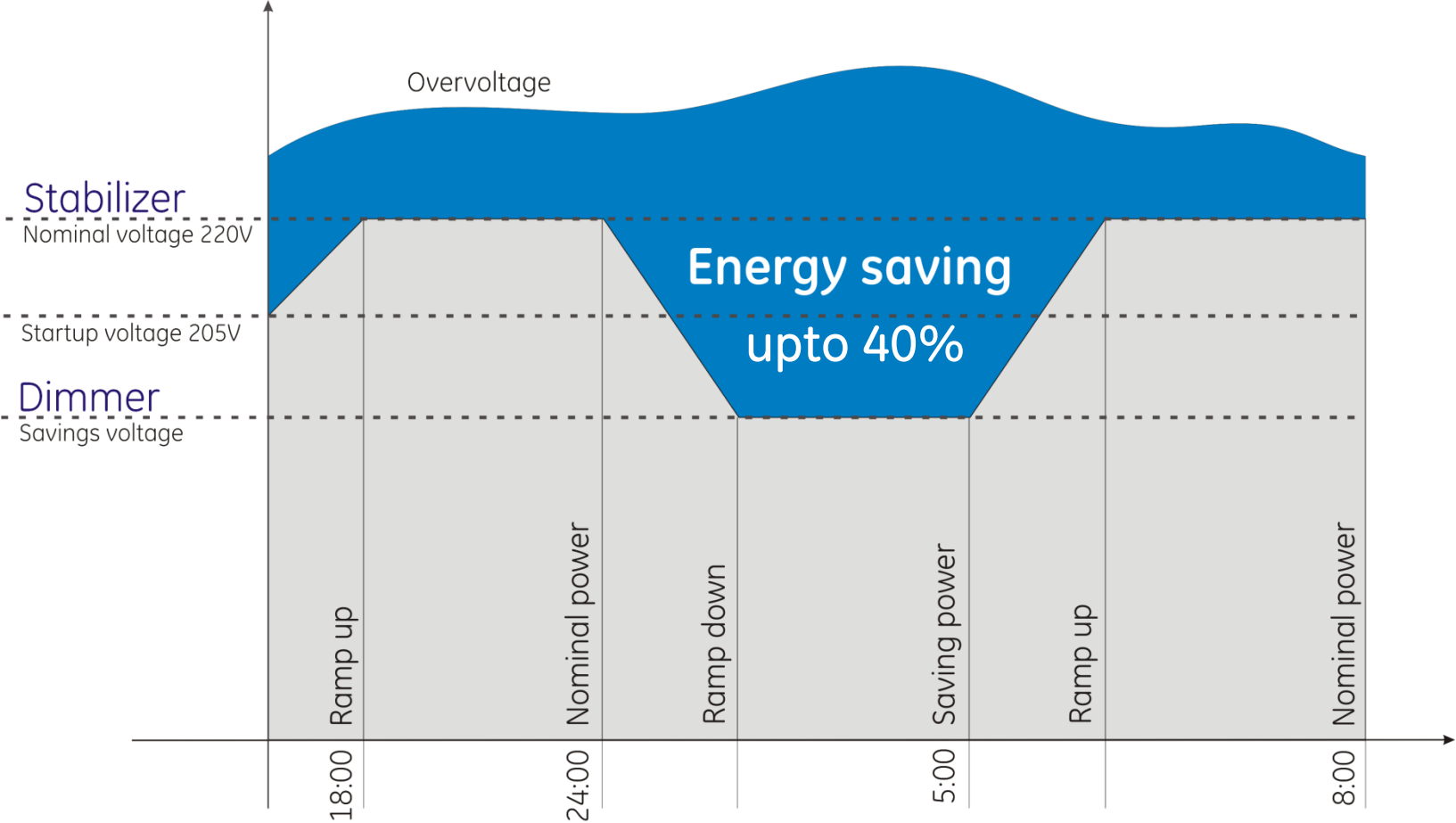
► Lamps



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

Operation

▶ Operating principle



Operation

▶ Operating modes

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

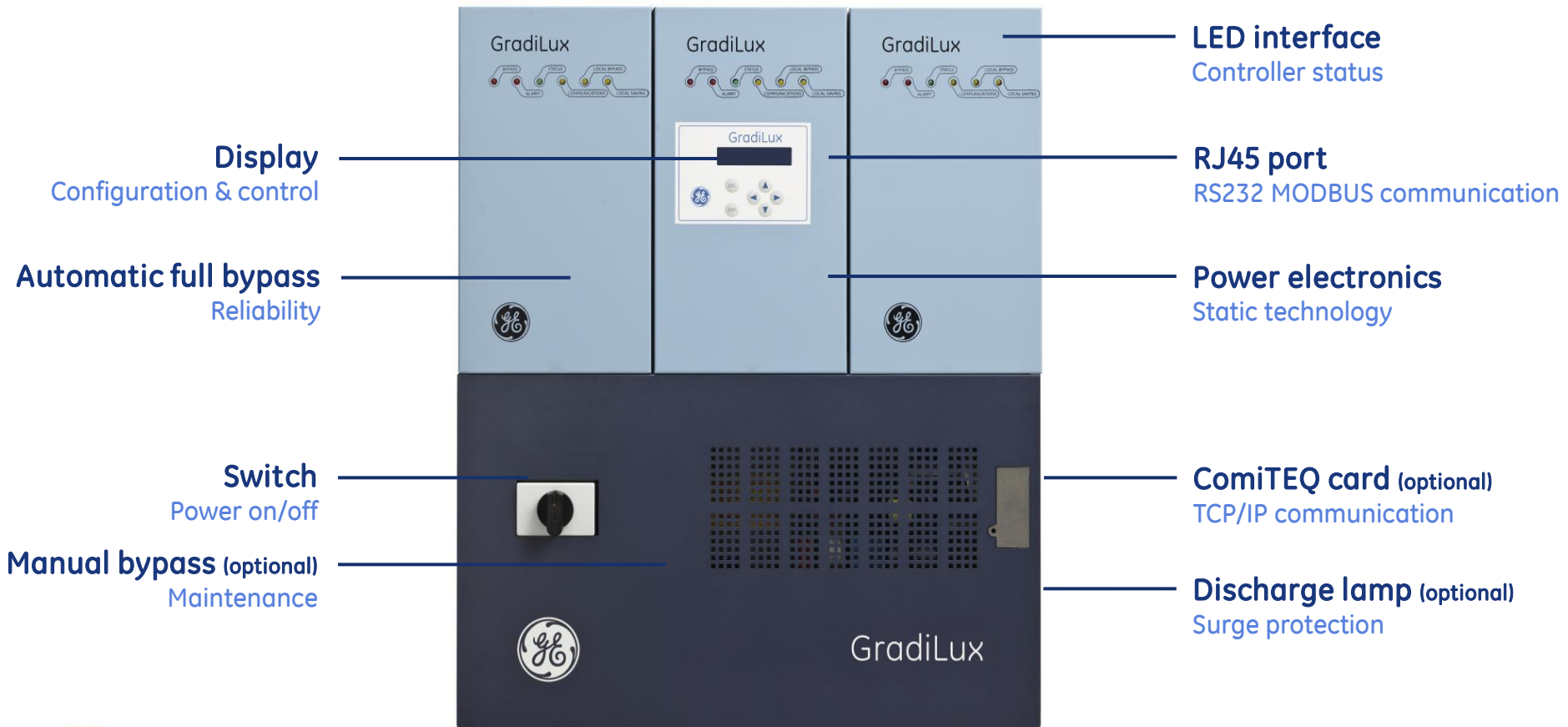
- Tunnels
- Subway



GE imagination at work

GradiLux

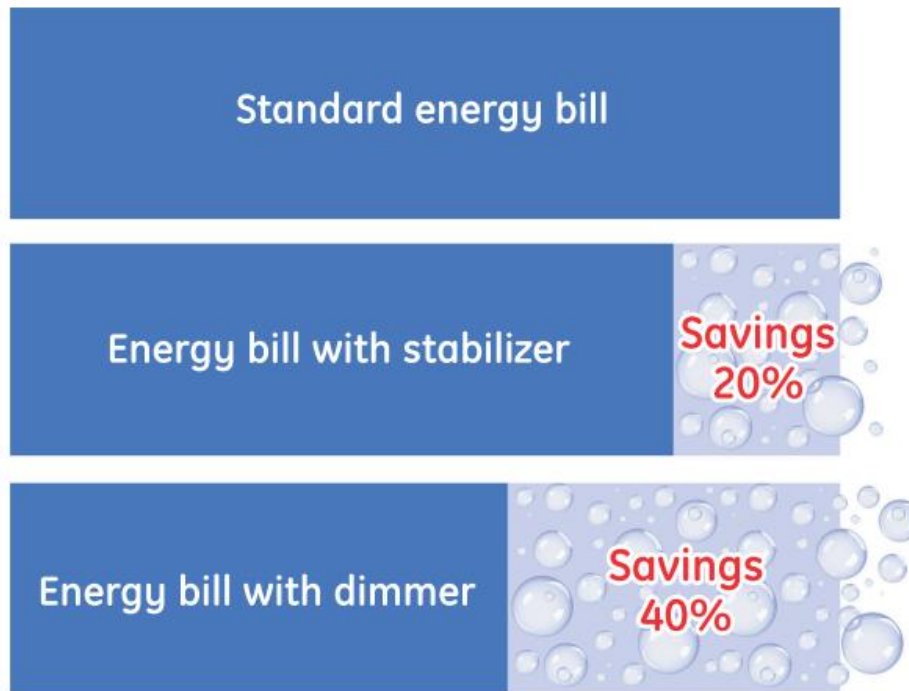
► Standalone



Benefits

► Fast payback

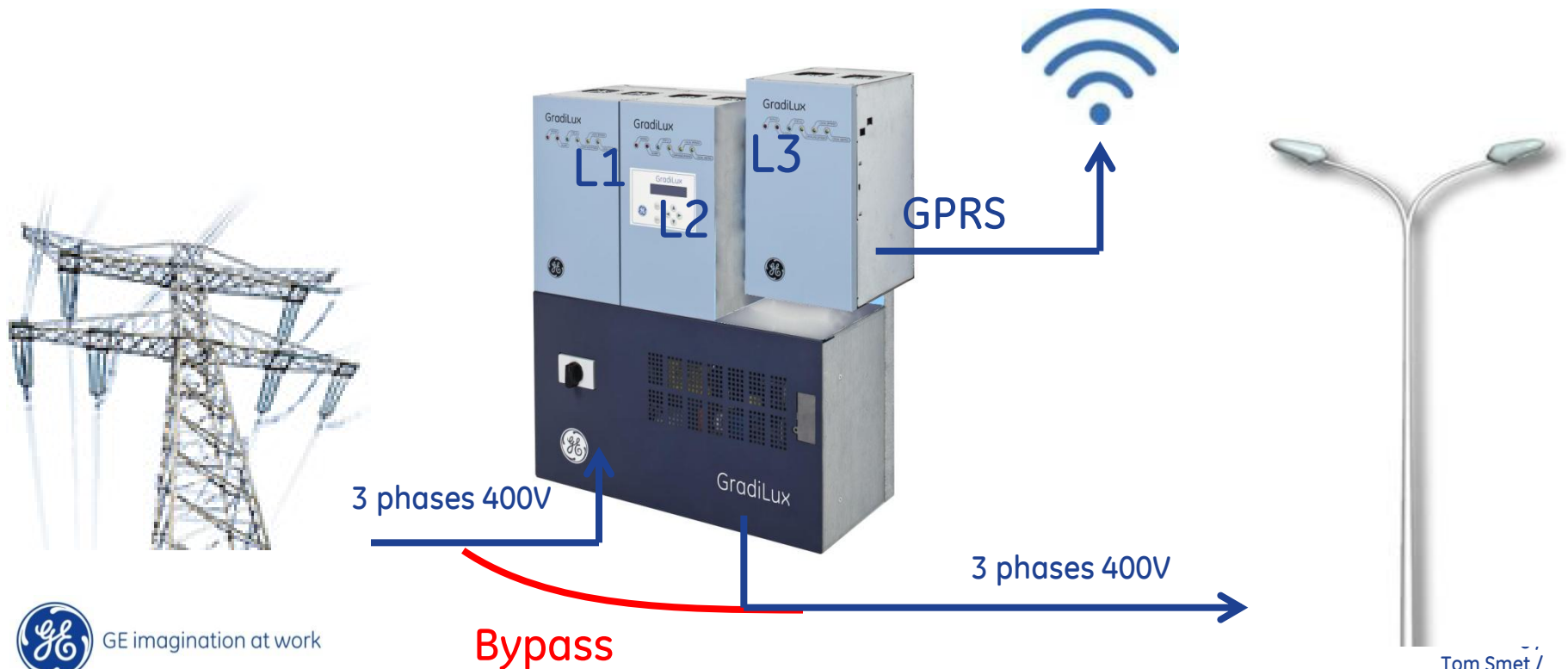
- Low maintenance costs.
- Savings in consumption upto 40%.
- Increased lamp lifetime.



Benefits

► Ease of use

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



Benefits

► Versatile applications

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



Modular

3,5kVA - 15kVA

Single phases



Standalone

7,5kVA - 45kVA

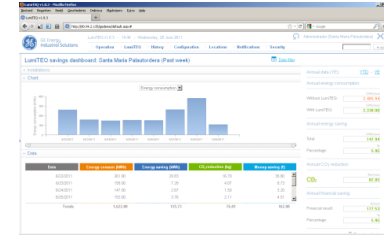
Three phases

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



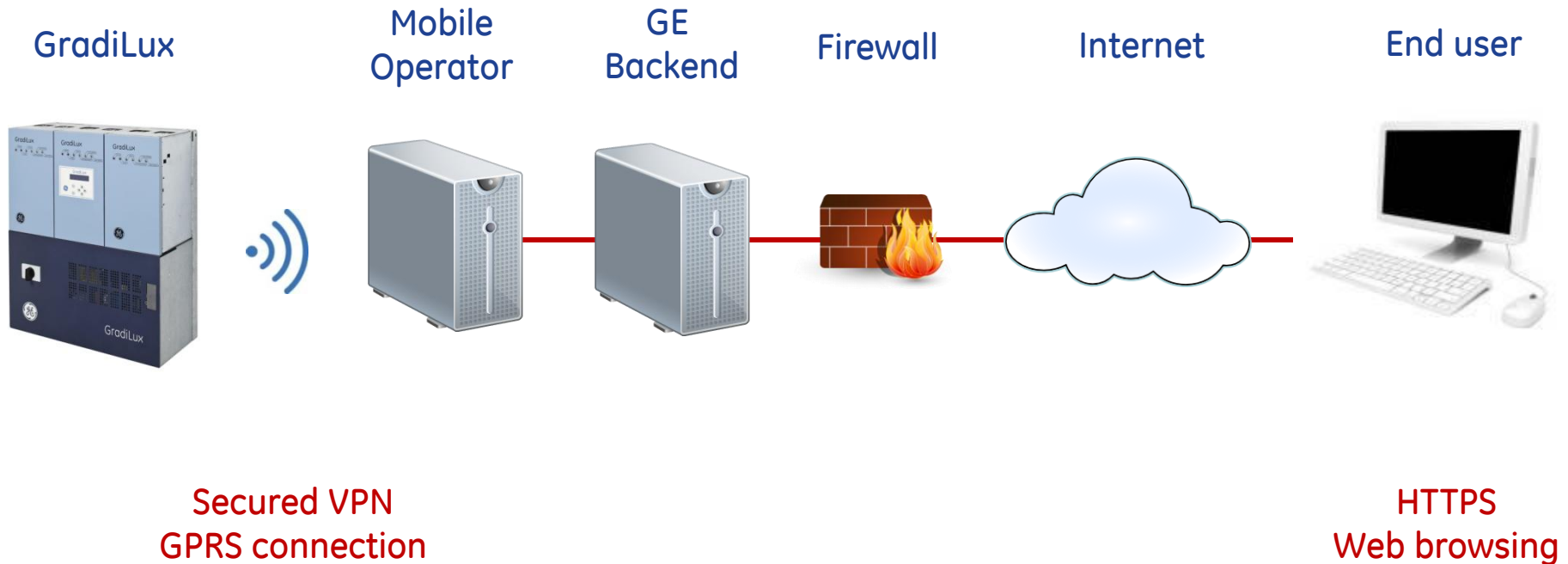
Savings

- 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



Communication

▶ Remote control

LumiTEQ v1.0.3 - Mozilla Firefox

Bestand Bewerken Beeld Geschiedenis Delicious Bladwijzers Extra Help

LumiTEQ v1.0.3

http://80.94.2.135/gedemo/default.aspx#

GE Energy Industrial Solutions

GradiLux .3 - 10:48 - Wednesday, 29 June 2011

Administrador (Santa Maria Palautordera)

Operation GradiLux History Configuration Locations Notifications Security

GradiLux savings dashboard: Santa Maria Palautordera (Past week) [Date filter](#)

Installations:

Chart:

Energy consumption

Date	Energy consum (kWh)	Energy saving (kWh)	CO ₂ reduction (kg)	Money saving (€)
6/22/2011	261.00	29.83	16.70	35.80
6/23/2011	158.00	7.28	4.07	8.73
6/24/2011	147.00	2.67	1.50	3.20
6/25/2011	153.00	3.76	2.11	4.51
Totals	1,622.00	135.73	76.01	162.88

Data:

Date	Energy consum (kWh)	Energy saving (kWh)	CO ₂ reduction (kg)	Money saving (€)
6/22/2011	261.00	29.83	16.70	35.80
6/23/2011	158.00	7.28	4.07	8.73
6/24/2011	147.00	2.67	1.50	3.20
6/25/2011	153.00	3.76	2.11	4.51
Totals	1,622.00	135.73	76.01	162.88

Annual data (YE): [YTD](#) - [YE](#)

Annual energy consumption:

Without GradiLux kWh/year

With GradiLux kWh/year

Annual energy saving:

Total: kWh/year

Percentage: %

Annual CO₂ reduction:

Ton/year

Annual financial saving:

Financial result: €/year

Percentage: %

Communication

▶ Remote control

LumiTEQ v1.0.3 - Mozilla Firefox

Bestand Bewerken Beeld Geschiedenis Deliculous Bladwijzers Extra Help

LumiTEQ v1.0.3

http://80.94.2.135/gedemo/default.aspx#

GE Energy Industrial Solutions

GradiLux 0.3 - 10:51 - Wednesday, 29 June 2011

Administrador (Santa Maria Palautordera)

Operation GradiLux History Configuration Locations Notifications Security

Municipalities / Distrito 3 GradiLux Test - Sota Escalles

GradiLux

GradiLux

GradiLux

29/06/2011 10:51:29 - (20") (Dev. OK)

ALARMS

MEASURES

Output Voltage Phase 1.:	221 V
Output Voltage Step 2.:	220 V
Output Voltage Phase 3.:	220 V
power level of phase 1:	57 %
power level of phase 2:	77 %
power level of phase 3:	80 %
Total Active Power:	9,2 KW
Phase 1 Output Current:	12,8 A

Parameters Time scheduler

Measures MODBUS® data

kWh

The screenshot displays the LumiTEQ v1.0.3 web interface. At the top, there is a browser window with the URL http://80.94.2.135/gedemo/default.aspx#. The main content area features a GE Energy Industrial Solutions logo and navigation tabs for Operation, GradiLux, History, Configuration, Locations, Notifications, and Security. The current view is for 'Municipalities / Distrito 3 GradiLux Test - Sota Escalles'. A large graph shows a voltage profile (V) over time (T). The profile starts at a nominal level, drops to a lower level (E1) during a period labeled 'Arranque', and then returns to the nominal level. Key points on the graph are labeled RP1, PL1, RP2, PL2, and RP3. Below the graph are four bar charts: 'Output V' (showing values around 220V for R, S, T phases), 'Output I' (showing values around 12.8A, 17.4A, 18.4A for R, S, T phases), and two 'Load %' charts (showing values around 56%, 77%, 81% for R, S, T phases). On the right side, there is a sidebar with 'GradiLux' information, including a device image and a table of 'ALARMS' and 'MEASURES'. The 'MEASURES' table shows output voltages of 221V, 220V, and 220V for phases 1, 2, and 3 respectively, and power levels of 57%, 77%, and 80% for phases 1, 2, and 3. Total active power is 9.2 KW and phase 1 output current is 12.8 A. At the bottom of the sidebar, there are buttons for 'Parameters', 'Time scheduler', 'Measures', 'MODBUS® data', and 'kWh'.

Communication

▶ Remote control

LumiTEQ v1.0.3 - Mozilla Firefox

Bestand Bewerken Beeld Geschiedenis Deliculous Bladvijzers Extra Help

LumiTEQ v1.0.3

http://80.94.2.135/gedemo/default.aspx


GE Energy Industrial Solutions GradiLux 0.3 - 11:02 - Wednesday, 29 June 2011 Administrador (Santa Maria Palautordera)

Operation GradiLux History Configuration Locations Notifications Security

Operation

Municipalities / Santa Maria Palautordera

Units: 7



Santa Maria Palautordera

Seek

- Parking Pol. de la Serra
- Can Bosch
- Mondejar 1
- GE
- Mondejar 2
- Pau Cas Mondejar 2 - LumiTEQ
- Sota Escalles

Move units

29/06/2011 11:02:21

http://80.94.2.135/gedemo/WFCallejeroUnitLuest.aspx?unit=38&unittype=12

Payback

► Calculation example

City of 25.000 inhabitants

$$25.000 \times \text{person icon}$$

Every lamp equals 7 inhabitants

$$7 \times \text{person icon} = \text{lightbulb icon}$$

Total of 3.600 installed lamps

$$3.600 \times \text{lightbulb icon}$$

Lamp is type HPS 150W

$$1 \times \text{lightbulb icon} = 150W$$

Total installed power is 540kW

$$\text{lightning bolt icon} = 540kW$$

Sizing factor for losses and grid distortion

$$540kW \times 1,5 = 810kVA$$

810 kVA equals 18 GradiLux of 45kVA

$$810kVA / 45kVA = 18 \text{ units}$$

Total cost

= 126.000€


* Does not include installation cost

Payback

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

► Calculation example

Lighting operates 4000 annual hours

 = 4000h

Total installed power is 540kW

= 540kW

Overtoltage is 10% on average

$\Delta V = 10\%$  $\Delta P = 21\%$

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

► Calculation example



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

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



Gradilux

► Complete solution



Gradilux

► 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