



the creation of dangerous dark areas, caused by the lamps that are kept off, in order to save energy. The stabilization and the regulation of the voltage combined with the possibility to program the switching-up and the power reduction cycles according to the different installations, assure the correct powering of every kind of light installation. The microprocessor based control unit allows the gradual variation of the voltage and permits a custom use of lighting systems. The system can be programmed:

- directly using the keyboard;
- with remote management system.

It's possible to control the installation by using a light sensor to obtain a lighting flux in relation to day-light intensity level. For example at the entrance or at the exit of tunnels it becomes a necessity to regulate the level of light of the lamps according to the outside light intensity avoiding in that way dangerous dazzlings.

This system has a large range of applications, it is extremely flexible and suitable both for simple plants and sophisticated installation connected to a remote control system.

The lighting flux regulator "ELIGHT" series is a power supply system for lighting installations which permits the control and the regulation of the power rates in lighting system. In order to optimise costs and performances daily energy. The main advantage is an uniform level of light, by avoiding

TABLE: SAVING ON DIFFERENT KIND OF LAMPS (IN PERCENT)			
KIND OF LAMP	ENERGY SAVING	MINIMUM VOLTAGE VALUES IN REDUCED RATE	
		Lamp without anti-turning off	Lamp with anti-turning off
INCANDESCENT	40÷50%	170V	
HALOGEN INCANDESCENT	40÷50%	170V	
MERCURY	20÷25% 30÷35%	195V	185
H.P. SODIUM	35÷40%	175V	
H.P. SODIUM WITH HG BALLAST	25÷30% 33÷38%	190V	180V
SODIUM LOW PRESSURE	20÷30%	180	
METAL HALIDE	25÷30%	195	

## R

EDUCING OF THE MANAGEMENT COSTS

Using the flux regulator, the duration of the lamps is more than doubled.

Several tests have been conducted on different installations and the average life of lamps is resulted to be 16/18000 hours.

We will have:

- Reduction of the costs for energy up to 50% thanks to the regulation and stabilization of the voltage.
- Reduction of the costs for maintenance more than 50% thank to the extended life of the lamps.

## O

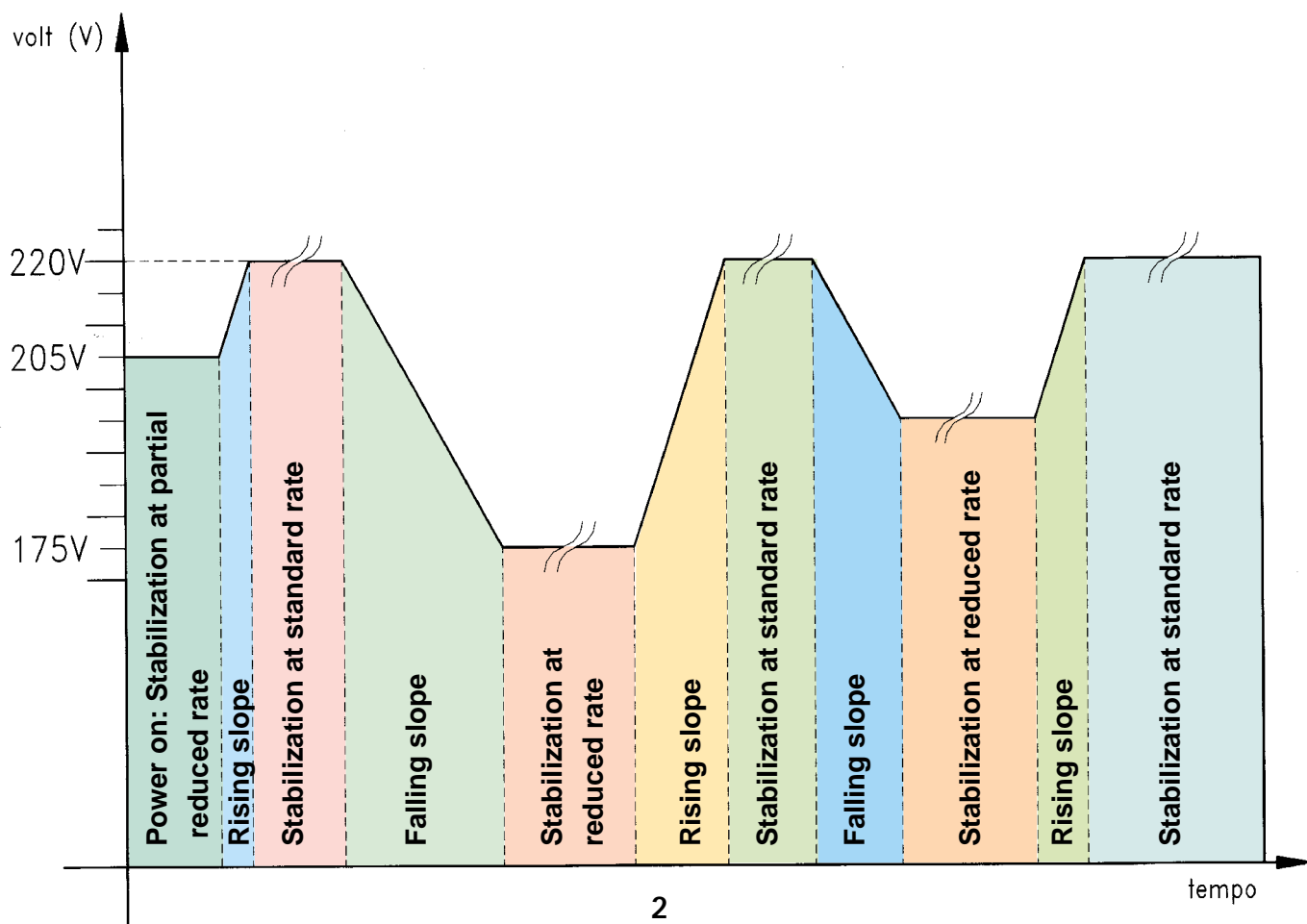
PERATING CYCLE

Upon the power-on of the system, the regulator "ELIGHT" automatically starts the switching up cycle to a voltage of 210V in order to avoid the initial thermal shock on the lamps and to have an optimum and lineal warming up of the light bulbs for a time of 10 minutes (programmable from 0 up to 20 minutes).

Once the initial phase is completed, the regulator will power the system at the nominal preset voltage (normally 220V).

The shift to reduced power can be programmed or can be activated by an external control. During all day (24h) it is possible to program 4 different phases of powering reduction all with different voltages programmable from the 210V to 175V. In all the phases the output voltages are always stabilized with extreme accuracy: maximum 1,5% of the programmed voltage.

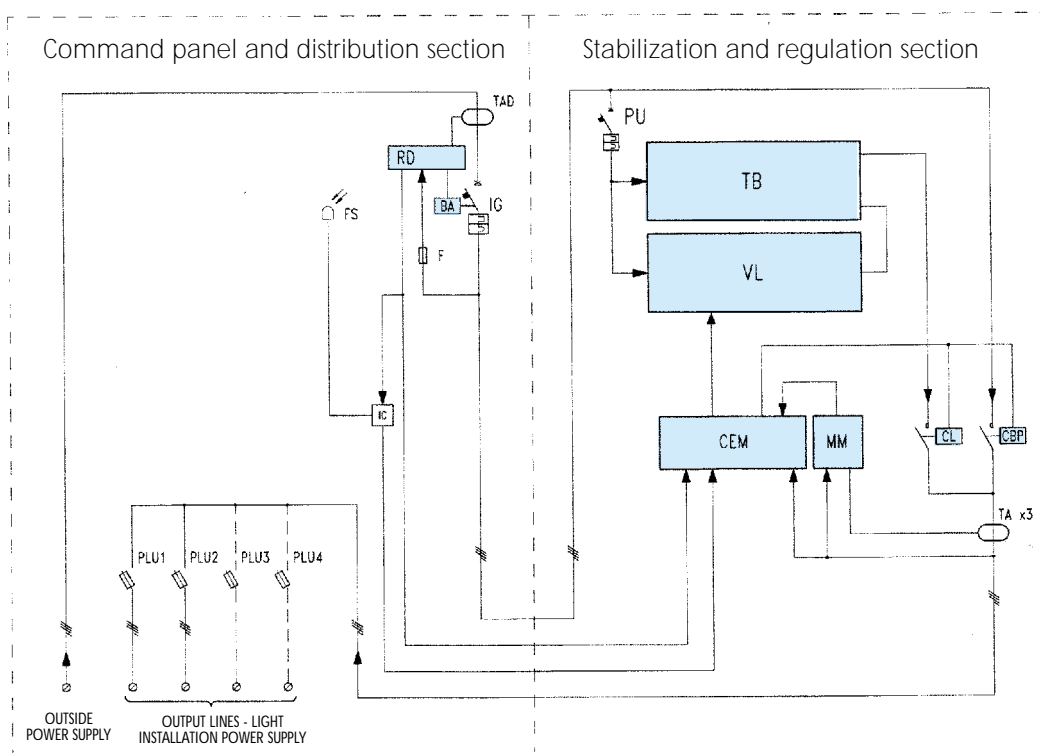
### DIAGRAM OF THE OPERATING CYCLE



The power regulator "ELIGHT" can be used on an existing installation with existing panel, or they can be supplied on a new installation,

in this case the regulator will be completed by the control panel.

## REGULATOR WITH ELECTRICAL PANEL BLOCK DIAGRAM



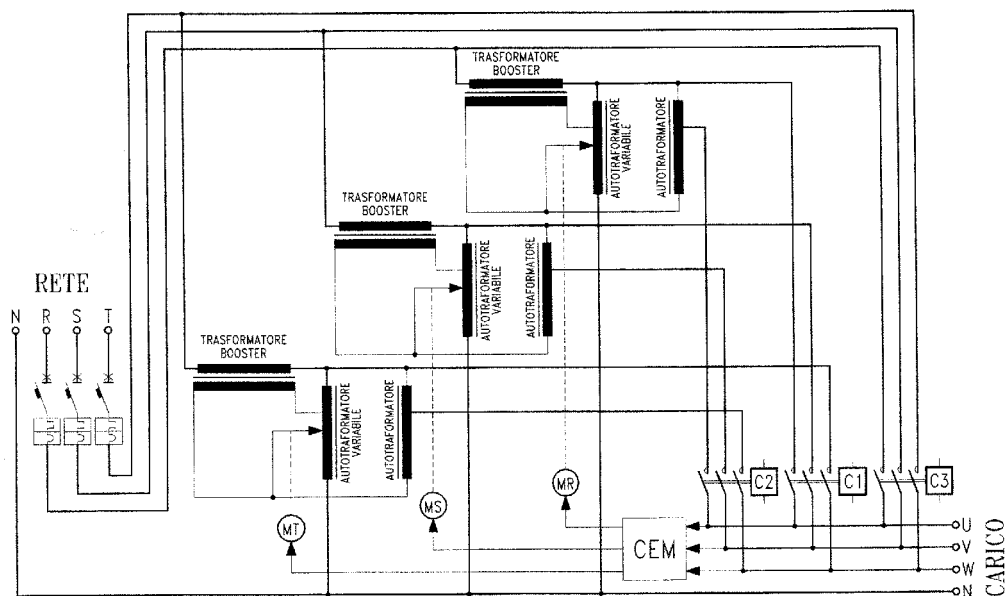
## LEGEND

IG	Main switch
BA	Dropping current disconnecter
RD	auto resetable differential relay
TAD	Toroidal current transformer for differential relay
IC+FS	Crepuscular switch with external photo sensor
PU	Protection of the regulator power circuit
PLU..	Protection of the output lines
VL	Variable auto-transformer
TB	Booster transformer
CEM	Microprocessor electronic control
CL	Operating contactor with included regulator
CBP	Operating contactor with excluded regulator (by passed)
MM	Multimeter (only on "ELIGHT PLUS" version)

## P OWER CIRCUIT

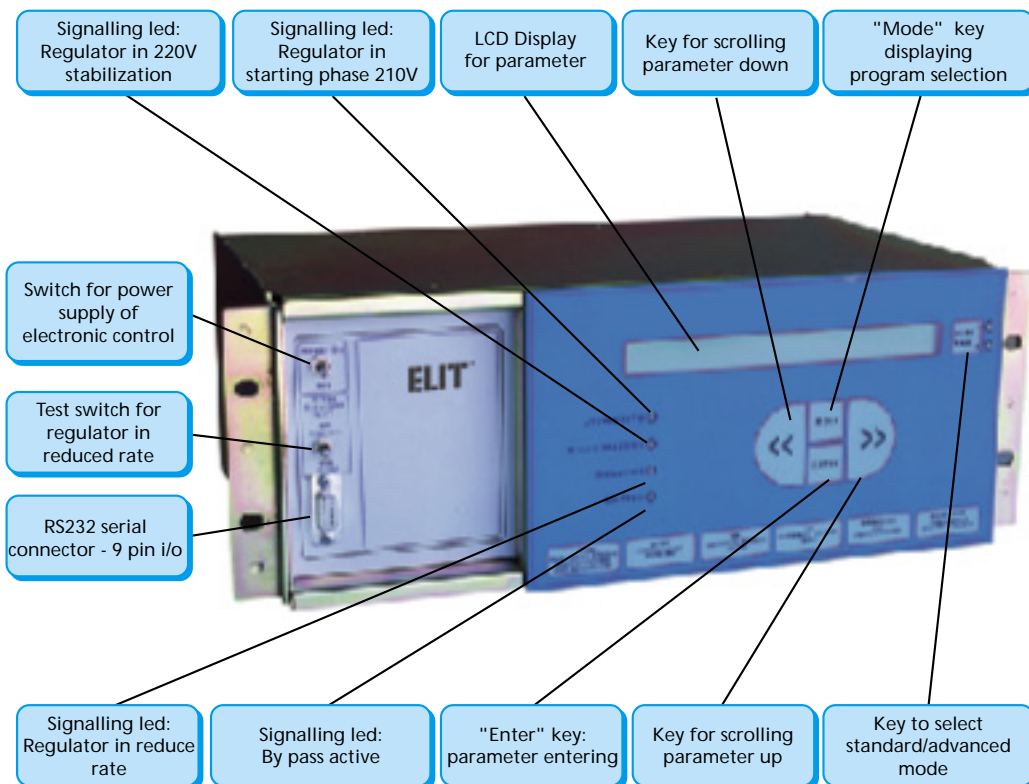
The stabilization is obtained by means of motorized variators with brush contact coupled with Booster transformers connected in series with each power supply circuit and independently controlled for each single phase on the model up to 45kVA and with unique motorization on the models over 45kVA.

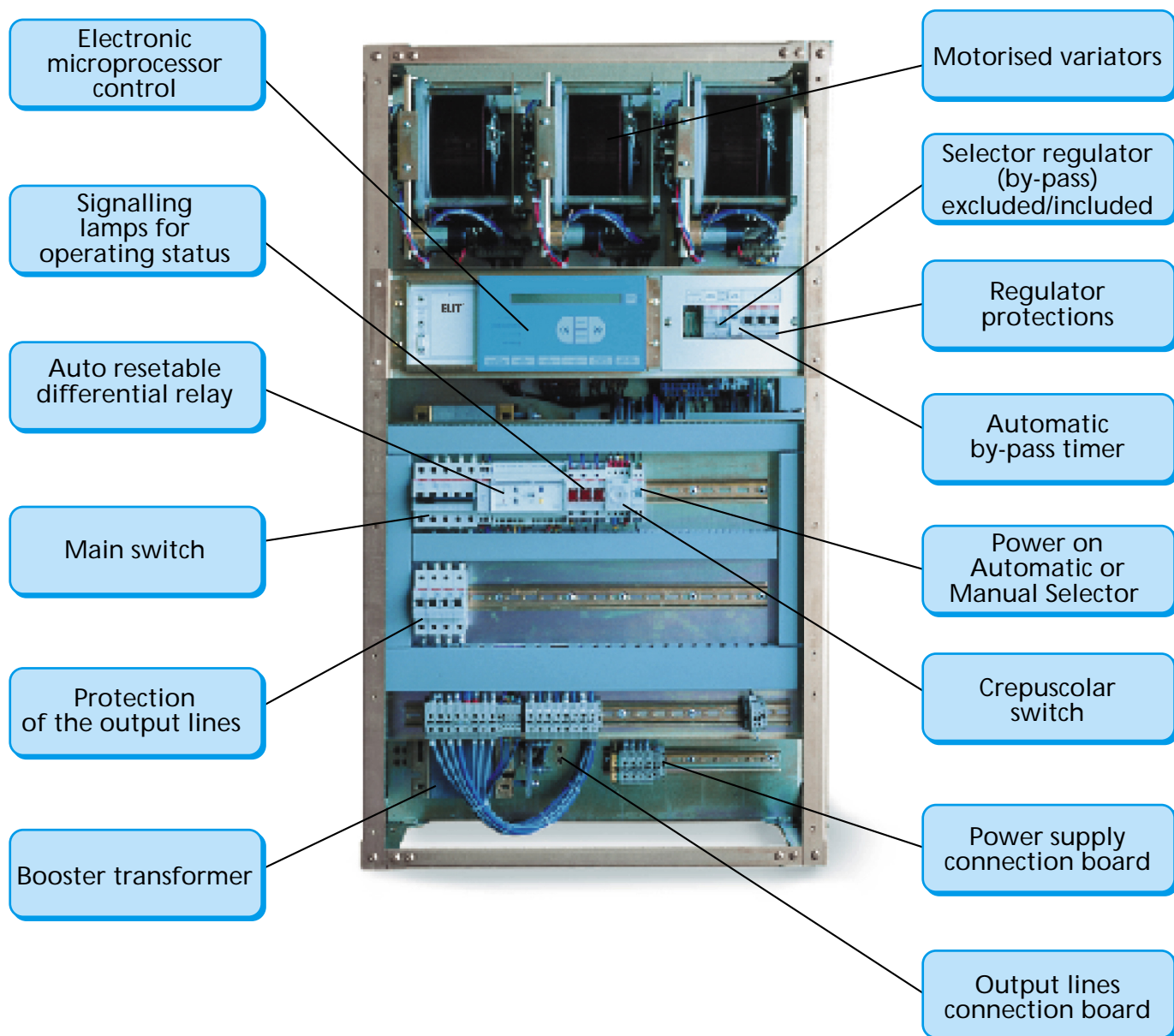
### POWER CIRCUIT ELECTRICAL SCHEMATIC



## M ICROPROCESSOR ELECTRONIC CONTROL

The flux regulators "ELIGHT" are voltage stabilizer controlled by a microprocessor that manages all the functions of stabilization and regulation of the voltage according to preset or custom programs.





The microprocessor electronic control is made on a standard RACK container with 4 electronic board in EURO standard and connected to the system by means of a pcb and plug connectors on the back side of the container. The four pull-out boards have the following function:

- POWER board with d.c. stabilized power supply;
- MAIN board (CPU) with the microprocessor for the management and the control of the different functions of the regulator and of the timer.
- DRIVERS board for the control of the voltage variators motors.
- SERVICE board with transformers for the continuous monitoring of the input/output voltage levels.

On the panel of the RACK there are the membrane keypad for the programming of the different functions, the liquid crystal display, the control leds, the main switch, the switch for the manual command of the reduction and the RS232 connector for the remote control.

The internal timer allows the programming of 4 different cycles of reduction during the 24h, is also present a device that automatically by-pass the regulator in case of irregular operation. The RACK is connected to the system by means of pull out connectors to allow the complete removing without disconnecting the screwed connections.

## R

### EGULATOR STANDARD PROGRAMMING

It is possible to display all the stored parameters by means of the keypad on the microprocessor electronic control. It is also possible to modify the programming to customize the regulator for all the specific user requirements.

REGULATORS FOR INSTALLATIONS OF PUBLIC LIGHTING "ELIGHT"			
TECHNICAL/FUNCTIONAL CHARACTERISTICS		ELETTRONIC CONTROLLER CHARACTERISTICS	
Nominal Input voltage	380V+N Three phases	Management	Programmable logic microprocessor
Nominal frequency	48/52Hz	Selection	5 function key membrane keypad
Input voltage	350/420V	Displaying	2 rows 80 chars LCD display
Type of regulation	independent on the three phases R, S, T	Communication	RS232 serial connector
Nominal output voltage	380V+N stabilized (3x220V)	Communication protocol	MODBUS
Stabilization tolerance	+/- 1,5%	Installation power on	Selection from command external/internal
Load variation	from 0 to 100%	Reduced rate starting	Selection from command external/internal
Load power factor	Any	Output voltage controlling by mean of the signals	Analogue 4-20mA Analogue 0-6V Digital from 1 to 8 levels
Maximum unbalance between the phases	100% not influence	Possibility to display and program	Operating parameters Voltage before the average of the three phases Voltage after of the three phases
Total harmonic distortion	less than 0,2%	Power on lamps voltage	200-220V Stabilized (programmable)
Efficiency at full load	greater than 97%	Standard rate voltage	210-230V Stabilized (programmable)
Operating temperature	-20°C - +40°C	Reduced rate voltage	165-210V Stabilized (programmable)
Storing temperature	-20°C - +75°C	Power on cycle duration	0/20 minutes (programmable)
Cooling	natural air	Falling down cycle duration	0/20 minutes (programmable)
Relative humidity	</=95%	Rising cycle duration	0/20 minutes (programmable)
Stabilization	Variable auto transformer (variac)	Operating daily cycles	4
Transformer	Booster	Available preset programs 4	To set the parameter accorded to the kind of lamp; To set the parameter according to the different areas of the installation such is urban centre, industrial zones, tourist zones, etc.
Regulator by pass	Automatic or manual	Seasonal setting	Enabled or disabled
Applicable rules	EN 60439-1 EN 50081-1 EN 50082-2		
Complied directives	BT 72/23 CEE e 93/68 CEE EMC 89/336 CEE, 92/31 CEE e 93/68 CEE		



**T**he microprocessor electronic control is made on a standard RACK container with 4 electronic board in EURO standard and connected to the system by means of a pcb and plug connectors on the back side of the container.

The four pull-out boards have the following functions:

- POWER board with d.c. stabilized power supply;
- MAIN board (CPU) with the microprocessor for the management and the control of the different functions of the regulator and of the timer;
- DRIVERS board for the control of the voltage variations motors;
- SERVICE board with transformers for the continuous monitoring of the input/output voltage levels.

On the panel of the RACK there are the membrane keypad for the programming of the different functions, the liquid crystal display, the control leds, the main switch, the switch for the manual command of the reduction and the RS232 connector for the remote control. The internal timer allows the programming of 4 different cycles of reduction during the 24h, is also present a device that automatically by-pass the regulator in case of irregular operation. The RACK is connected to the system by means of pull-out connectors to allow the complete removing without disconnecting the screwed connections.

## **R**EGULATOR STANDARD PROGRAMMING

It is possible to display all the stored parameters by means of the keypad on the microprocessor electronic control. It is also possible to modify the programming to customize the regulator for all the specific user requirements.

**T**he "ELIGHT" flux regulator, besides the standard mode, can have advanced functions in advanced mode "ELIGHT PLUS". In this case the regulator has the possibility to manage the lighting installation with different communication systems: on site using the keypad; or with a remote control (via radio or over the telephone network).

The management in advanced mode of the regulator and of the installation is supported by a measuring devices (multimeter) to sense and measure the following parameters:

The voltage of the three phases;  
The line current of the three phases ;  
The power factor of the three phases;  
The total apparent power of the three phases;  
The apparent power for each phase;  
The active power of the three phases;  
The active power for each phase;  
The reactive power of the three phases;  
The reactive power for each phase;  
The consumption of total active energy;  
Hours counter of operating in regulation;  
Hours counter of operating in By-pass.

These parameters besides to be sensed and measured by the devices are also sent to the microprocessor electronic control.

It will use the data in the following ways:

- Displaying of the data on the LCD on the panel;
- Generating alarm thresholds for each single measure;
- Storing the sampling of the data choosing the measures;
- Giving the possibility to display the stored sampling;
- Giving the possibility to read the data using a P.C., remote control.

## REGULATORS FOR INSTALLATIONS OF PUBLIC LIGHTING "ELIGHT PLUS"

TECHNICAL CHARACTERISTICS	
Nominal Input voltage	380V+N Three phases
Nominal frequency	48/52Hz
Input voltage	50/420V
Type of regulation	independent on the three phases R, S, T
Nominal output voltage	380V+N stabilized (3x220V)
Stabilization tolerance	+/- 1,5%
Load variation	from 0 to 100%
Load power factor	Any
Maximum unbalance between the phases	100% not influence
Total harmonic distorsion	less than 0,2%
Efficiency at full load	greater than 97%
Operating temperature	-20°C ÷ +40°C
Storing temperature	-20°C ÷ +75°C
Cooling	natural air
Relative humidity	</=95%
Stabilization	Variable auto transformer (variac) Booster transformer
Regulator by pass	Automatic or manual
Applicable rules	EN 60439-1 EN 50081-1 EN 50082-2
Complied directives	<b>BT</b> 72/23 CEE e 93/68 CEE <b>EMC</b> 89/336 CEE, 92/31 CEE e 93/68 CEE
FUNCTIONAL CHARACTERISTICS	
Management	Programmable logic microprocessor
Selection	5 function key membrane keypad
Displaying	2 rows 80 chars LCD display
Communication	RS232 serial connector
Communication protocol	MODBUS
Installation power on	Selection from command external/internal
Reduced rate starting	Selection from command external/internal
Output voltage controlling by mean of the signals	Analogue 4-20mA Analogue 0-6V Digital from 1 to 8 levels
Possibility to	Displaying and programming of the operating parameters Displaying and storing of the following measured values: -Phase current -Phase voltage -Phase power factor -Total apparent power and phase apparent power -Total active power and phase active power -Counter of consumption of energy; -Hours counter of operating in regulation; -Hours counter of operating in By-pass. -Alarm signalling for out of range values -RAM storage of the alarms and of the measured values
Power on lamps voltage	200 ÷ 220V Stabilized (programmable)
Standard rate voltage	210 ÷ 230V Stabilized (programmable)
Reduced rate voltage	165/210V Stabilized (programmable)
Power on cycle duration	0/20 minutes (programmable)
Falling down cycle duration	0/20 minutes (programmable)
Rising cycle duration	0/20 minutes (programmable)
Operating daily cycles	4
Available preset programs 4	To set the parameter accorded to the kind of lamp;  To set the parameter according to the different areas of the installation such is urban centre, industrial zones, tourist zones, etc.
Seasonal setting	Enabled or disabled





### Installation on all existing systems

**L**uceconomy is able to complete every single pre-existing installation using all kind of lamps.

### Reducing of energy consumptions

**L**uceconomy allows the timing and the operating mode of the lighting system to be programmed, hence allowing to operate at nominal values when it is required and to be driven at a "reduced rate" at other times. This causes an estimated saving in energy consumption up to 50%.

### Remote control and remote monitoring

**T**he connection between the remote control/monitoring station is through telephone line, optical fibres or via radio modem.

### Strong reducing of maintenance costs

**T**he stabilization and the regulation of voltage reduce the thermal stress on the lamps and their average life will result extended. The economical benefit comes obviously out.

### Working security of installations

**I**n case of anomalous working the system cuts itself out (By-pass condition).

### High security for the street users

**C**ommon installation often create dangerous dark areas in streets if some lamps are kept off in order to reduce energy consumptions. Using Luceconomy all lamps will be constantly on and the street will be uniformly lighted everywhere.

**T**he Luceconomy remote monitoring is a telecontrol system, that allows the management of the public lighting installation. It assures a high quality service with high grades of security and continuity in service.

**L**uceconomy remote monitoring allows:

- Reducing of servicing costs;
- Automatic adjust of the service according to the seasonal demand;
- Real time signalling of the faults on the installations;
- Possibility to quick intervention to restore the standard operation;
- Programmability of the intervention of regular and special maintenance;
- Optimization of the human resource and of the equipment at disposal of emergency teams.