

ILS

Intelligent Lighting Solution

Technical Description

Contents

ILS Technology applicability	2
Configuration procedure.....	3
Technical installation procedure.....	5
ILS network diagram	5
ILS device configuration	6
Technical specifications	7
Useful information	8
Contacts	8
Important notice.....	8

ABSTRACT

This technology was developed in 2011

It is fully certified and in accordance with the requirements of EC

Its operation is proven technically and functionally.

Is typically used to manage equipment and energy consumption in buildings, with a special focus on lighting.

Validated and supported by:



2011 - 1st prize energy



Climate-KIC is supported by the
EIT, a body of the European Union



2015 - 1st prize smart ventilation



2017 - 1st prize smart buildings

ILS Technology applicability

ILS technology Intelligent Lighting Solution is designed to perform real-time analysis of the environment where it is installed with various sensors:

- ambient light,
- movement or presence,
- ambient noise,
- temperature and humidity
- power consumption

Each device can be equipped with different sets of sensors depending on the site and its application purpose.

The main function common to all applications is the management of lighting.

In addition to lighting the ILS technology can manage other equipment such as turning on and off air conditioners, heaters or power distribution circuits.

Some examples of application are:

- Daylighting, providing the right amount of light depending on the occupation of the space and ambient lighting,
- Connecting heating equipment to maintain a comfort temperature according to the occupation of the space or of existing operation rules,
- Connecting or disconnecting power distribution circuits or individual equipment, on the basis of predetermined consumption targets,
- Functioning as a smart load shedding system, shutting down equipment when consumption levels are high, avoiding the achievement of maximum load, or during peak tariff periods,
- Detecting anomalous conditions of presence, noise, ambient light or consumption at unexpected times and, in this case, sending notifications, warnings and alerts.

Brief description

Each ILS controller can be used to manage equipment or to manage the use of lighting equipment, depending on the configuration and the drivers under control.

Such different applications are possible as the so-called environment variables, available at the installation site,

are pretty much the same needed to manage these resources.

Applicability

These equipment are designed to analyse the usability of the site and manage the equipment installed on it. Each of the ILS controllers can manage one or more lamps or LED panels simultaneously, as well as connecting or disconnecting equipment. In case it manages more than one equipment the behaviour of each one, that is, the its luminous flux will be the same for all of them, since the command system of the luminous flux is the same for all of them at a given time.

External information from the installation location

In order to properly manage the installation space, the ILS controller receives many environment data that will indicate if the site is occupied, or not, namely from presence and movement inputs.

Other data, as temperature and humidity, ambient noise and light, provide information about the environmental conditions of the installation site and all of these inputs are combined and analysed algorithmically. When presence or noise are detected, the ILS controller autonomously takes the decision to turn-on lighting at a certain level of light, to top the difference between the existing natural lighting level and the one to be achieved, remaining connected at this level until ambient light changes, adjusting the light output of the lamps, or by them turning off in the case users abandon the site.

Other situations defined by the site specific operation rules may occur, such as ILS controller turning on lighting at a given time period to a previously set level of luminosity, remaining so until presence or noise is detected and, if so, adjusting the desired brightness level. This criterion is considered to be a level of comfort or courtesy.

Operating rules

Because the ILS controllers always provide just the most appropriate amount of light, they generate high

Intelligent Lighting System - ILS

savings. These can be compounded with LED lighting lower wattage, as lamps don't necessarily must always be at full power.

Other functional rules also contribute to harvest savings without jeopardizing the comfort of users setting predetermined maximum brightness levels, as in the case of underground car parks or other places without daylight, without affecting user comfort, and thus reducing power consumption. This is possible as the human eye can hardly detect this difference between 100% and 80% of the full luminous output.

Comfort and safety

As the ILS Controller continuously analyses in real time the site ambient conditions, i.e., if the site is occupied or not, security events can be created that determine if certain conditions happen during a time period when they should not occur.

Should this happen, a beep on the console is triggered and the one in charge can receive a notification in an APP or a warning by email.

Monitoring and privacy

All monitored activity is stored in a data structure organized and properly catalogued with a date and time stamp without violating the privacy of the users of the site as image or voice recording or personal identifiers are not captured and the indiscriminate data is stored only for the purposes described herein.

Analysis

The received data helps to explain or clarify certain consumptions as well as to understand why two or more different spaces have distinct consumption. Furthermore, one can predict, with an accuracy dependent on the amount of previous collected data, future consumption, always assuming the future behaviour is in principle identical to the previous one. Better predictive analytics can be obtained by processing the existing data with a more specialized software.

Composition of the ILS network

The ILS solution is a distributed command and control system managed by the "ILS Solid State Embedded

Server" and various control devices named "ILS" Controllers.

Each solution is composed of at least one ILS Solid State Embedded Server and up to 253 ILS controllers.

Each ILS controller acts independently and autonomously according to its set of parameters, and with a parametrized frequency sends to the ILS Solid State Embedded Server, the log of the actions taken, the collected sensor data and the computed consumption of each controlled equipment.

Even if communications are disrupted the controllers continue to perform properly.

Configuration procedure

ILS network boot procedure

Install, connect to the internet and power the Solid State Embedded Server.

Open the ILS site landing page in a web browser. And login with the user ID and password with administrative level permission. Verify which controllers are already installed.

If the controllers are not be installed, they must be linked in the order by which they was associated in order to keep them chronologically ordered.

After the controllers are installed – see the technical installation section – they should be parameterized in order to change the default settings.

Frequency of data transmission

The parametrization of each of the controllers mainly sets the data transmission frequency to the Solid State Embedded Server. During the testing stage test this period should be in the order of a few seconds so that the good operation of each controller can be checked.

After verifying the proper operation of the controllers, these can be parameterized for a longer transmit interval. For lighting solution controllers every 300 or 600 seconds is an ideal period.

Consumption values of lamps

Intelligent Lighting System - ILS

The other parameters to set are related to the power of the current and previous lamps so harvested savings can be computed.

Another useful parameterization, not required under the system normal functioning, relates to the specification of the operation periods, by setting the start hour of the working, nocturnal and other operation periods.

Levels of comfort

Comfort levels can be parameterized by setting a minimum and maximum values of brightness for a particular lighting fixture for each operation period.

The maximum level prevents the device to increase brightness beyond a set upper value, avoiding higher consumption during that time period.

The minimum level, or comfort or courtesy level, enables a given area of installation to always maintain a lower brightness level even in the absence of occupancy. When presence or movement is detected the controller resumes its normal operation.

Active safety.

If the controllers do manage safety and comfort in given site, the parameterization of the data transmission frequency must be of the order of seconds so that the alerts and or warnings arrive at a faster pace and may be dealt sooner.

Events

The events parameterization relates directly to the activity to be monitored. For example, events can be set dependent on changes on temperature or humidity, power consumption, movement or presence, ambient noise, ambient light, etc.

Event settings should focus on a few variables so that the result can be easily interpreted. For example, movement or presence in a given time period.

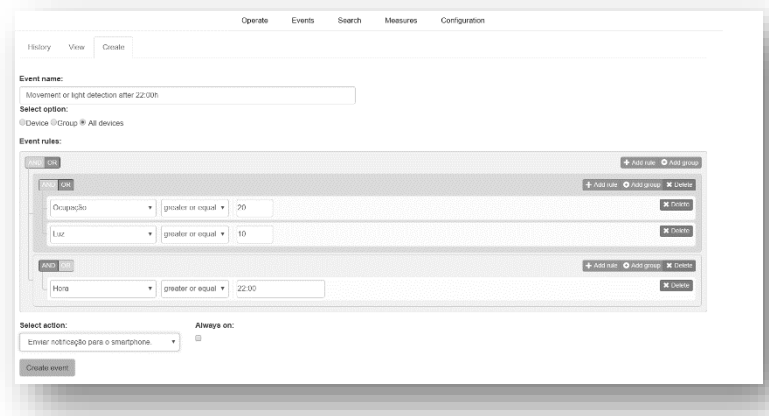


Fig.1 Rules and Boolean operators

Thresholds for upper and lower power consumption can be set to trigger notifications on a smart-phone and / or warnings on the console of the equipment connected to the Solid State Embedded Server, with a very small delay.

After receiving the notification or warning the user is able either to disarm the event, or to keep it active in order to receive new detections.

Users

The users must be created by the Admin user.

The users are the following type:

Name and password

Must belong to a group

Energy manager user

Technical installation procedure

The installation of an ILS controller requires its connection to the light fixtures, to the selected sensors and to power both the device and powered sensors.

This device is usually installed into the false ceiling with the set of sensors.

In the simplest practical version a controller can be connected to the following equipment:

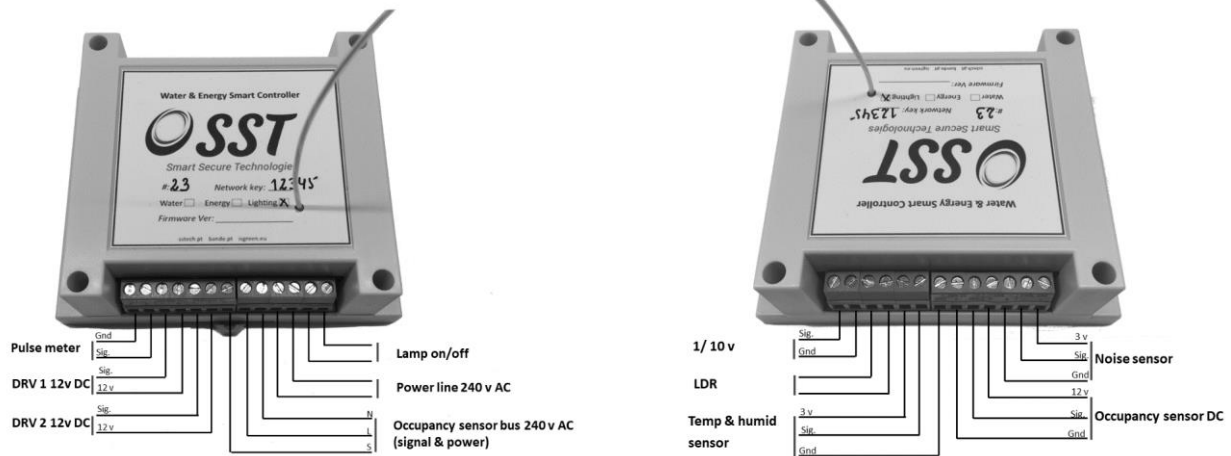


Figure 4 - ILS controller connections

ILS network diagram

The ILS network can use one or several ILS devices. Each one can control one or several equipment,

depend the level of precision demanded and also the local configuration.



Sub-Giga 868 MHz wireless network



Device 1
ILS network diagram

Device 2

Device 253

ILS device configuration

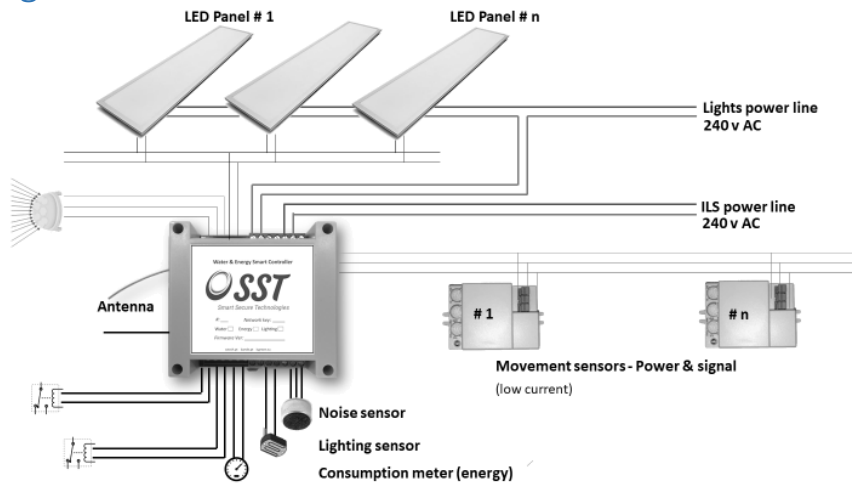


Figure 6 – Device connectivity

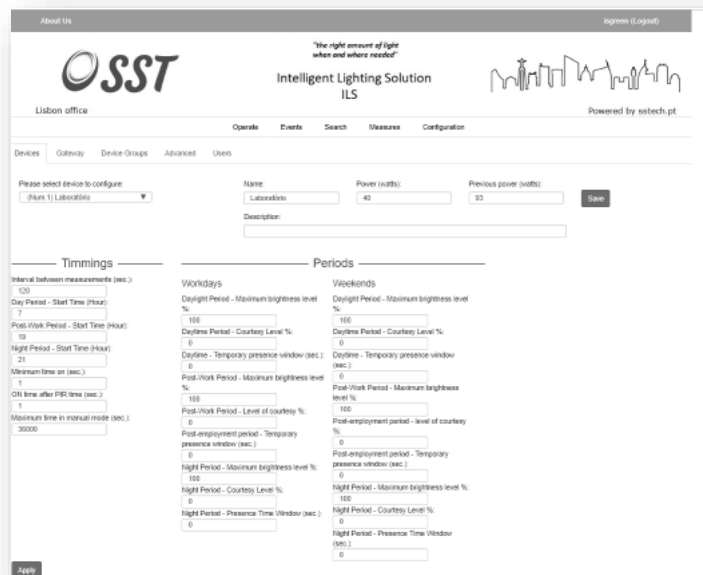


Figure 7 – Device configuration

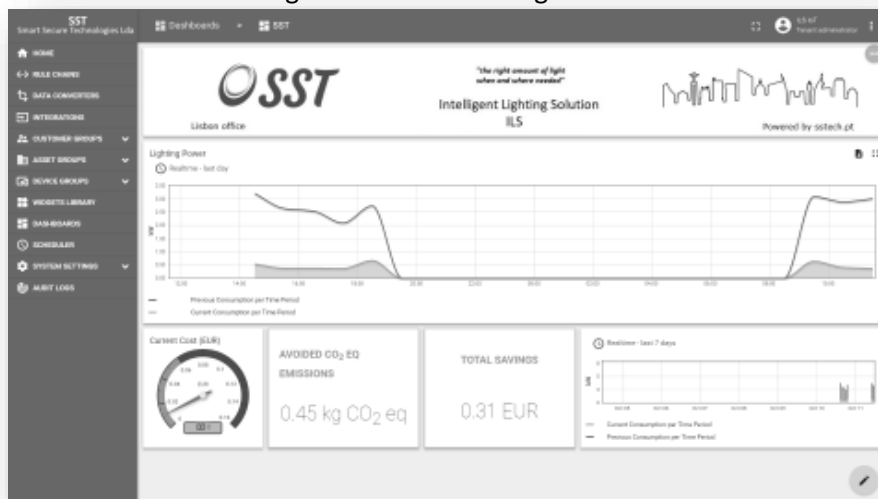


Figure 8 – Users dashboard

Technical specifications

Description

The ILS, Intelligent Lighting System, is a solution specially prepared to monitor the usability of a given space, to properly manage lighting and control the consumption of equipment.

The ILS reduces lighting energy consumption, greenhouse gases emissions, improves the comfort of users and lowers maintenance costs.

The light points, consisting of a light bulb, lamp or lighting fixture, are controlled fully automatically and can be switched on/off and dimmed, if possible, or set manually if necessary, according to the needs of users and the ambient light conditions, as well as by the business rules established for that particular site.

The operating status, energy consumption and lighting levels are reported in real time and stored in a database, with a date/time/location "stamp" for later analysis and improvement of the settings and business rules.

The ILS helps the energy managers of buildings to ensure the correct levels of lighting, where and when necessary, and at the same time reduces operating costs.

It is a fully wireless solution that creates its own network with an internet connection to ensure it can be used at any time and location.

ILS management, control and analysis can be carried out using a web-based system or a smartphone APP.

Applicability (buildings in General)

- Warehouses,
- Sport pavilions
- Exterior or underground parking,
- Factories,
- Schools and swimming pools
- Open Space offices,

Features

- Communications Wireless
Link between Access Point and Controllers over a Sub-GHz star network with proprietary protocol
- Communications Wired
Access Point RJ45 for connection with server
- Sensors Presence detector
Motion detector
Luminosity
Temperature and humidity
Ambient noise level
- Control of light fixtures On/Off
1-10V
- Power metering % global consumption
Connector to pulsed power meter

Specifications

- Inputs **1** x AC sensor for connection to 230 VAC sensor bus
2 x PIR DC connections
1 x LDR brightness sensor
3 x pulsed power meter connections
1 x 12 VDC power supply
- Outputs **1** x *Open Drain* for connection to 12 VDC relay
1 x Bus 240 VAC to power sensors
1 x Bus 1-10V
2 x 12 VDC
4 x *Ground*

NOTE: All inputs support voltages up to 3.3 VDC

Useful information

To install this technology, it's not necessary a engineer, just a trained technician.

The management is also a simple to use solution and all information is based at the SSES accessed by the building manager.

Contacts

Lisbon Office

Rua Alexandre Ferreira, 38 B
Lumiar 1750-012 Lisboa – Portugal
(+351) 21 755 0223 – (+351) 21 131 2842
mail@sstech.pt

Headquarters – SST Lda.

Edifício B do Convento do Carmo
Av. Dr. João Martins de Azevedo s/n
2350-748 Torres Novas
Portugal

Estonia Office – SST OÜ

Smart Secure Technologies OÜ
Narva mnt 5 Kesklinna linnaosa
Tallinn 10117, Estónia

Madeira Office - SST Inovation

Rua Princesa D. Amélia
Edifício D. Amélia, nº 20
R/C, Sala N
9000-019 Funchal

[sstech.pt](mailto:mail@sstech.pt) [bande.pt](mailto:mail@bande.pt) [isgreen.eu](mailto:mail@isgreen.eu)

Important notice

This document was produced by SST.

The document may change without prior notice.

The all responsibilities of SST are limited to the contents of the accepted proposals.