



**KNX Association**  
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## Central Control of the Public Lighting System with KNX

### The City of Salzburg Saves a lot of Power



**Picture 1.** The city center of Salzburg at night, photographed from the Gaisberg.

The City of Salzburg covers an area of 65,65 km<sup>2</sup> and has 150,269 inhabitants (as of 2007). The public lighting system (street lights) of the City of Salzburg includes 19,000 luminaires with a total of 2.9 megawatt combined power and a network of 600 km length. The switching of zones is done with control signals through the 230/240 V power network and with radio frequency transponders. The energy costs for an hour of operation (at 11 cent per kW/h) are 319 Euro. The system will significantly reduce the annual operating costs of the public lighting system.

The new KNX system switches lights on at exactly 180 lux luminance on a nice day and off at 40 lux in the morning. Short term switching due to bad weather (thunderstorms, snow clouds) is suppressed by the system through a so-called long time mode. The algorithms of the KNX system check the light development over Salzburg and only allow the lights to switch on after an extended period of darkness. This saves a lot of energy. The high system stability of the KNX system ensures the safety of the citizens in Salzburg as the public lighting system prevents injuries, hold-ups and accidents.

### Benefit of KNX for this Project

- Automatic switching of the public lighting system saves a lot of energy and increases service intervals for changing lights.
- The automation was implemented with this stable KNX system because equivalent industrial SPS systems would have cost a multitude of what the KNX system ended up costing. The investment for components and engineering were only 10250 Euro.

**Project-Nr.: S2-08-D**

**Country: Austria**

### Type of Building

- RESIDENTIAL
  - Single Family Home
  - Apartment Building
  - Senior citizen home
  - Assisted living
- COMMERCIAL
  - Office / Public Administration Building
  - Business
  - Entertainment (Cinema, Theater, Museum, etc.)
  - Health Care
  - Educational (School, University, etc.)
  - Recreational (Sport, Wellness, etc.)
  - Industrial
- OTHER

### Trade / Systems

- Lighting
  - Shading / Daylighting Control
  - Heating, Ventilation, Air-Conditioning
  - Household appliances
  - Alarm Systems
- Monitoring
- Energy Management System
  - Smart Metering
  - Audio/Video
  - Visualization
- Interface to other Systems
  - RemoteControl and Administration
  - Other Application

### Size

- Number of Areas / Lines: 1/1
- Number of KNX Devices: approx. 15



Picture 2: The heated metering box with light sensor

### Numerous complex functions were cost efficiently implemented with KNX:

The KNX system is built up with resilience. Two identical systems run in parallel whereby the first system runs as the primary system. If this system goes into error mode, the second system takes over. Each system monitors itself through the cyclic transmittal of messages from all KNX components to detect malfunctions.

The control algorithms were implemented with KNX function modules. Two light sensors are located in a heated and temperature controlled metering box. The circuit of the light sensing equipment outputs a four minute pre-warning to the power company. The pre-warning at night is necessary so that the power company has the opportunity to start-up and synchronize a 4 MW power generator. All following switching commands are delayed for 10 minutes to prevent short term power outages and to prevent re-switching of hot lights.



Picture 3: KNX components in the metering room of the attic.

### Manual Override Possible and Monitored

Every system allows a manual override during maintenance or special circumstances. The normal mode is access through the "auto" button, and algorithms are programmed as described above. The street lights can be switched on or off manually if necessary in case of maintenance. The manual switching off overrides the automatic mode of the central systems and keeps the system turned off. These states are transmitted over switching actuator outputs to the control system of the Salzburg AG for safety reasons.

Light curves were measured for several months before the system was put into operation to reach an optimum of energy efficiency, protection of lights and the safety demands of the citizens. A wired setup with industrial automation components would have been too elaborate. KNX could take advantage of an already existing bus connection from the metering room in the attic and control operating room with a 300m long wire.

## Sophisticated Features

- Short time delay for the first switching in the morning and at night.
- Additional switching commands are covered in the so-called long time mode.
- The long time mode is extended based on the luminance across Salzburg.
- Short switching on of public street lights is prevented.
- The number of hot light switching operations on the 19,000 lights is minimized to increase their lifespan.

## Involved Parties

### Operator:

Magistrat Salzburg,  
Public Lighting System,  
A-5024 Salzburg

### Designer / System integrator:

Schäcke GmbH,  
A-5020 Salzburg



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## Award



**KNX Award 2008**  
Category Special