ASTRO

SMART LIGHTING SYSTEM

INCOTEX ELECTRONICS GROUP

ASTRO

A breakthrough in lighting control

A breakthrough in lighting control

SLMS – Street Lighting Management System representing a set of software and hardware means ensuring lighting fixtures switching on and off as well as dimming of their luminous flux according to a preset schedule.

Remote controller - a device designed to control light flux of an LED luminaire including signal transmission by a radio channel. The module is installed directly inside the luminaire housing or in a special connector on the luminaire housing. The control module includes radio modems.

Modem - a device for data receiving and transmission over the radio channel standard IEEE 802.15.4 (868 MHz) and ensures an LED luminaire communication with a controller, personal computer or smartphone.

SLCC – Street Lighting Control Cabinet an outdoor lighting control cabinet used for lighting fixtures electric power supply circuits switching and protection and containing a controller for data receiving and transmission between the control center and luminaires providing remote control of power supply to separate groups of luminaires as well as data collection and processing from electricity meters and ensuring complex algorithms for system operation.

Control unit – a control device controlling operation of a network segment formed by luminaire control modules. The controller functionality includes data collection, processing, storage and transmission from LED luminaires and devices enclosed in an Street Lighting Control Cabinet (SLCC) as well as control signals transmission from a control center to all specified devices.

Mesh network - a distributed, peer-to-peer, self-organizing network with a mesh topology. Mesh networks differ from usual centralized networks because all their nodes are peers and each node is both a provider, router and bridge.

Introduction

Incotex Electronics Group presents ASTRO – the innovative lighting control software and hardware platform (SLMS) which will help you to create a modern, efficient, safe and favorable atmosphere for life in an city, town or the country.

ASTRO allows LED luminaires to become truly intelligent and in some modifications provides an opportunity to monitor status of each luminaire, set switching on and off schedules, adjust light levels for different time of day and also receive various information on both the system status and various environmental parameters. To do this, you just need to use a control program installed on your computer, smartphone or tablet. The luminaires manufactured by Incotex can be easily integrated with the ASTRO system and automatically networked in a matter of seconds*. Communication protocols used to transmit data to ASTRO provide reliable communication with minimum costs.

The software supplied with the system allows you not only to obtain complete data on the luminaires status but also be able to manage the system maintenance, instantly receive Information requiring to carry out repairs of a particular device thus significantly reducing the costs associated with visual monitoring.

The data collected by the system on energy consumption and state of the environment can be used by you to further improve efficiency, residential area safety and create a favorable living environment.

The ASTRO system is designed in accordance with the most stringent security standards, including the use of data encryption, access control and two-factor user authentication.

ASTRO is built on the open system principals and will allow you to easily integrate it with other intelligent platforms and IoT devices which guarantees you ample opportunities for system development in the future.

Depending on the task complexity level for lighting control you can choose one of three ASTRO modifications.

Differences between **ASTRO** and other solutions on the market

Real mesh network

ASTRO – is virtually the only solution on the market built on the basis of this mesh network* providing access to the luminaires regardless of urban lay of land which allows implementing of control systems in tunnels, underground parkings and other sites without the need for widespread installation of base stations. The solution comparative table is presented in the section “Technical specifications”.

The best parameters

Minimum power consumption, unlimited range, no traffic charges, minimum number of controllers or modems for the system control* make ASTRO the market leader in the field of SLMS.

The optimal solution for everyone

Due to the principle of an individual approach to solving our partners problems, we have developed three ASTRO modifications with an optimal set of functions, determined by the necessary level of complexity of the system which allows the most flexible approach to pricing.

***- for modifications ASTRO-2 and ASTRO-3**

ASTRO-1

Designation

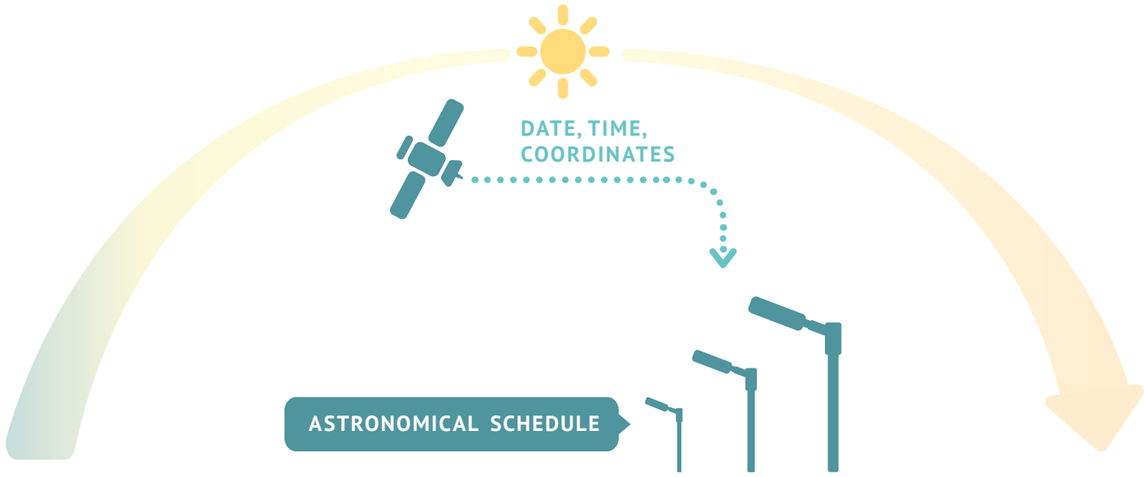
The modification is designed for autonomous operation of lighting fixtures.

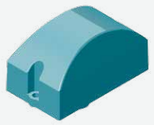
System composition

ASTRO-1 basically consists only of a remote controller which can have a built-in or external modification.

Field of application

- Cottages estates, villages, small urban settlements;
- Separate infrastructure facilities (kindergartens, schools, territories of private and municipal enterprises, roads) which do not require the use of operational control and complex operation algorithms.



System element	Designation and functionality
Remote controller **ASTRO 1** 	Designed for installation inside or outside a luminaire housing, provides automatic control of switching on/off as well as luminaire power dimming from 20 to 100% according to a preprogrammed schedule.

How ASTRO - 1 operates

When power is supplied to the luminaire, the remote controller placed inside independently determines the current date and time, geographical coordinates of its location in accordance with which it calculates the luminaire operating schedule depending on the duration of the darkness hours for the entire service life.

If necessary, the luminaire operating schedule can be adjusted according to user requirements at the stage of presale preparation.

Operational features. When a lighting fixture is connected to the mains, its sets to 100% of brightness and it stays switched on for one hour. Then the lighting fixture will be operating in accordance with the its self-generated schedule. This operating mode is provided for installation works of the lighting fixture as well as to ensure a possibility for its forced switching on in exceptional cases.

Advantages

Full autonomy

User does not need to do any settings! The luminaire itself determines the current date and time, location and operating schedule.

Maximum simplicity

Only power supply to the luminaire is required for ASTRO-1 operation based on the astronomical schedule.

Minimum cost

ASTRO-1 is the lowest cost solution on the market and fulfils its main task which is energy saving. This goal is achieved by controlling switching on/off luminaires as well by dimming.

Possibility of functional extension

In case if the preinstalled schedule has to be quickly changed, the user can contact the manufacturer to upgrade the system to the ASTRO-2 modification.

ASTRO-2

Designation

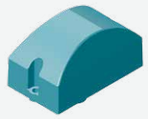
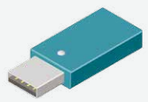
The system is designed to control luminaires with a possibility to integrate them into a network and implement operating schedule control.

System composition

To create a lighting fixtures network it is necessary, additionality to remote controllers, to have a separately located modern or router. The luminaires are controlled by the free of charge software included in the standard package.

Field of application

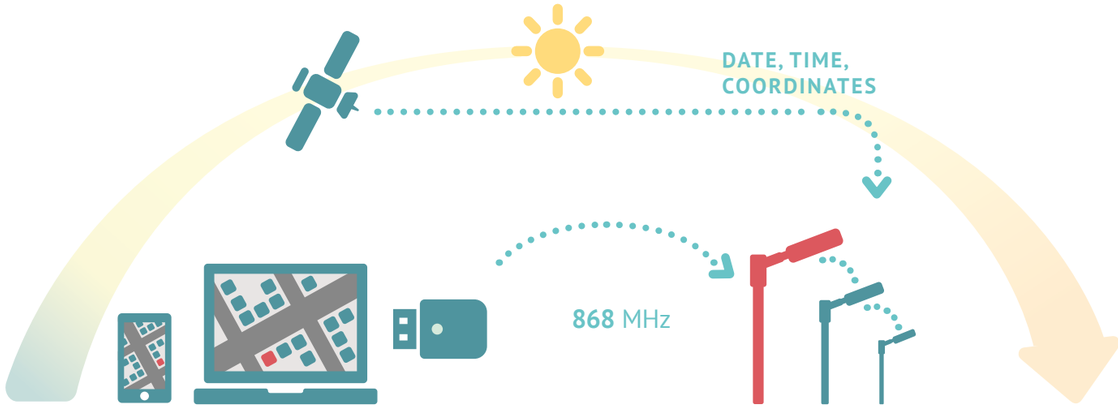
- Cities, small urban settlements;
- Regional and local roads;
- Separate infrastructure facilities (railway stations, freight terminals, industrial areas, workshops etc.) where operating control and complex algorithms must be used.

System element		Designation and functionality
Remote controller **ASTRO 2**		Designed for installation inside or outside a luminaire housing, provides automatic control of switching on/off as well as luminaire power dimming from 20 to 100% in operating mode or according to a preprogrammed schedule.
ASTRO Modem		Designed for connection to a personal computer or smartphone via USB to control luminaires via the 868 MHz frequency radio channel and range not less than 150 m.
Software **ASTRO Manager**	ANDROID APP ON Google Play Available on the App Store	Designed for installation on a personal computer or smartphone to control luminaires operating schedule. Available free of charge on Google Play and App Store. See description in the “Software” section.

How ASTRO-2 operates

The radio network which does not require any professional settings and automatically generated when power is supplied to luminaires. In this way the user has a possibility to carry out the operating control of individual luminaires (or some independently created luminaire groups), collect data on the status of all system elements. The control is directly carried out using the modem with its installed software.

The luminaires in the ASTRO-2 system also support operation in the autonomous mode which is similar to the ASTRO-1. The maximum duration of the user schedule is 60 days. When this periods expires, the luminaire returns to its operation according to the factory settings (the ASTRO-1 mode). This feature increases the system reliability when there is a threat of communication disruption.



Advantages

Optimal cost

ASTRO-2 is an ideal combination of functionality that provides extensive user operating features and low material costs for its implementation.

Cost saving operation

The use of unlicensed radio frequency 868 MHz for data transmission does not require any transmission fees for data traffic during the system operation.

High reliability

The automatically generated radio network ensures a steady signal transmission in even in case when up to 5 poles (150 m) fail in the chain. The control is carried out via secure data channels. In case of loss of communication, the system goes to autonomous mode.

Possibility of functional extension

There is a possibility to upgrade the system to ASTRO-3 in the case of phased implementation of SLMS.

ASTRO-3

Designation

The modification is designed to control luminaires with a possibility to integrate them into a network and implement operating schedule control.

Field of application

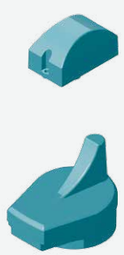
- Megalopolises, big cities, districts;
- Federal motorways and motorway networks;
- Separate infrastructure facilities which require professional control and parameter metering.

System composition

The remote controllers used in this modification, as a rule, have enhanced functionality which allows receiving data on electricity consumption separately for each luminaire.
Additionally the remote controllers can have temperature, light and ecological monitoring sensors etc. The remote controllers can have not only embedded but also external modification types.

Additional functionality is provided by the use of outdoor lighting control cabinets (SLCC), an integral part of which are control units.

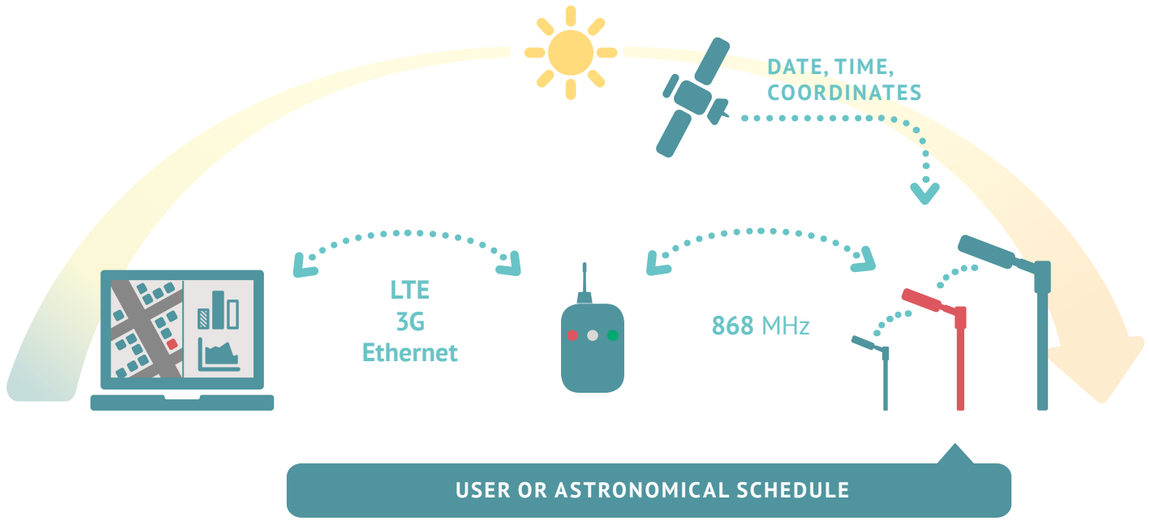
Professional software is used to control SLMS which provides organization of multi-level control for device networks, the maximum level of automation for technological processes, such as notification of emergency situations, preparation of various analytical reports on system operation, drawing up applications requesting arrival of a maintenance team etc.

System element		Designation and functionality
Remote controller **ASTRO 3** or Remote controller **ASTRO 3N**		Designed for installation inside of outside a luminaire housing, provides automatic control of switching on/off as well as luminaire power dimming in operating mode or according to a preprogrammed schedule, can have a power meter, light or temperature sensor etc. Designed for installation into a NEMA type specialized connector on the luminaire housing, provides automatic control of switching on/off as well as luminaire dimming according to a preprogramed schedule, can have a power meter, light, temperature sensor etc.
SLCC **ASTRO Box**		Designed to control a network segment of luminaires. Ensures data reception and transmission from the dispatcher's automated workplace (AWP) to a luminaire. Consists of the contol unit, modem, magnetic starters, input and output breakers, manual controls etc. The detailed SLCC specifications are determined by functional requirements for a particular project. It is installed at a remote (up to 300m) distance from the luminaires.
Software **ASTRO Manager**		Designed for installation on the dispatcher's personal computer (AWP) for luminaires operating control and requires professional installation and setting. See description in the “Software” section.

How ASTRO-3 operates

The radio network is automatically generated when power is supplied to luminaires, however it requires some professional settings. As a result of the system commissioning, the user gets the possibility to quickly control individual luminaires or some groups of luminaires he can create, wide functionality for automation of all technological processes (see section “Software”).

The luminaires in the ASTRO-3 system can operate in an autonomous mode similar to the ASTRO-2 system.



Advantages

Maximum functionality

Comprehensive data on each element of the system as well as extensive analytical capabilities allow to achieve maximum economic effect.

Individual approach

ASTRO-3 allows to have a flexible approach to the selection and configuration of hardware and software systems, providing the optimal solution to each specific task of a project.

Openness for integration

SLMS can be integrated with almost any other data collection and processing system as a part of the IoT concept which is widely developing today.

Cost saving operation

The use of unlicensed radio frequency 868 MHz for data transmission does not require any transmission fees for data traffic during the system operation.

High reliability

The automatically generated radio network ensures a steady signal transmission in even in case when up to 10 poles (300 m) fail in the chain. The control is carried out via secure data channels. In case of loss of communication, the system goes to autonomous mode.

Software

ASTRO Manager

Designation

Designed to control luminaires with a possibility to integrate them into a network and implement operating schedule control.

Features

The ASTRO Manager application allows to control each individual luminaire or some luminaire groups. Using the application it is possible to monitor and set up any luminaire just using a few clicks . The program provides convenient control including:

Luminaires operating control

The system operator can quickly respond to changing demand for lighting by switching on/off or changing luminaires brightness in the operation mode.

Luminaire status monitoring

ASTRO Manager allows to remotely monitor your lighting system status without the need for costly direct visual inspection. You can get information on luminaires status with one click of your computer mouse.

Power consumption metering

ASTRO Manager provides the possibility to monitor and meter power consumption of both individual luminaires and their groups.

Advantages

Usability

Simple and intuitive interface allows to quickly start of the system control without the need for training.

Optimal functionality

In spite of its simplicity, the program allows operating all basic parameters necessary to achieve high energy efficiency of the lighting system.

Universality

ASTRO Manager is designed in two versions: for stationary and mobile devices and available in both Google Play and Apple Store.

Software

ASTRO Professional

Designation

Designed for dispatcher control of the ASTRO-3 system and includes complex automation of technological processes related to lighting.

Features

Technical metering and registration processes

The program provides technical metering and registration of outdoor lighting elements and equipment life cycle (poles, luminaires, SLCC, control unit, electricity meters).

Lighting control processes

ASTRO Professional supports the system operation both in fully automatic and manual operation modes allowing to carry out the following:

- setting up typical operating schedules and lighting templates;
- luminaire grouping and classification ;
- connecting lighting operating schedules and templates with luminaires;
- keeping a calendar;
- periodic and automatic dispatching of schedules and templates by luminaire groups;
- collecting data on the status of all system elements.

Failure monitoring and diagnostics

The program allows to monitor all system devices operation and instantly report problems to the dispatch centre drawing up applications for a maintenance team.

Drawing up analytical reports and graphs

ASTRO Professional allows to receive all possible reports on the control system operation including failure statistics, power consumption for individual and group luminaires, graphs with data received from all sensor types etc.

Budgetary control processes

Optionally the program provides integrated billing operating approximate to real time to convert data on electricity consumption into monetary terms taking into account a power supply company tariff plans and notiy the person in charge about exceeding the preset budget limits.

Advantages

Professional solution

A wide range of features ASTRO Professional provides a full-function centralized control of the most complex lighting systems, allowing both cloud and local deployment.

Flexibility

The software product is designed to provide an individual approach to the requirements of each individual project, as well as integration with any other system operating within the scope of “Smart city”.

Extended possibilities for development

ASTRO Professional is based on the latest web technologies and takes into account the current trends in designing of IoT information systems allowing to guarantee the user constant expansion of functionality and improved usability.

Technical specifications

ASTRO MODIFICATIONS

SLMS modification	ASTRO-1	ASTRO-2	ASTRO-3
Operation 24 / 7	✓	✓	✓
Luminaire autonomous operation	✓	✓	✓
Operation according to astronomical schedule or other factory settings	✓	✓	✓
Operation according to user settings	-	✓	✓
Remote control via the Internet	-	✓	✓
Application for mobile devices	-	✓	✓
Professional software	-	-	✓
Two-way communication with the luminaire	-	✓	✓
Telemetry data collection	-	-	✓
Control unit (as a part of SLCC)	-	-	✓
Modem	-	✓	-
Available remote controllers	ASTRO **1**	ASTRO **2** ASTRO **2N**	ASTRO **3** ASTRO **3N**
Upgrade to the next modification	✓	✓	-

Remote controllers

Parameters	ASTRO X	ASTRO XN
Compatibility with the luminaire model range	MAG2 – MAG6	MAG3 – MAG6
Module dimensions LxWxH, mm	25x15x45	85x85x60
Supply voltage, V	5-12VDC	10.5 ... 15VDC
Power consumption from AC mains, no more than, W	0.5	0.5 - 1
Communication range in the open space not less than, m	150 (except ASTRO 1)	
Operating temperature range, °C	-45 to +50	
Ingress protection	IP66	
Relative humidity, %	0 ... 99	
Luminaire driver control protocol	PWM	
Module control channel	IEEE 802.15.4 868MHz (except ASTRO 1)	
Server communication protocol	JSON (except ASTRO 1)	
Current sensor (power meter)	-	Optional
Light sensor	-	Optional
Temperature sensor	-	Optional
Resistance to electromagnetic interference	According to EN 301 489	

Control unit

Parameters	Values
Module dimensions LxWxH, mm	40x80x120
Supply voltage, V	12-48VDC
Power consumption from AC mains, no more than, W	5
Operating temperature range, °C	up -45 to +50
Ingress protection	IP20
Relative humidity, %	0 ... 99
Main communication standards	IEEE 802.15.4, Ethernet (wired and optical (SFP module))
Additional communication standards	Wi-Fi, GSM (GPRS), 3G, LTE or others by installing modems
Interfaces	Ethernet 100/1000 Mb, SFP, RS-485, USB 2.0x4
Communication range in the open space, m	not less than 150
Resistance to electromagnetic interference	According to EN 301 489

Modem

Parameters	ASTRO Modem
Module dimensions LxWxH, mm	45x10x17
Supply voltage, V	USB 5VDC
Power consumption from AC mains, no more than, W	0.5
Data exchange interface	USB-UART
Communication range in the open space not less than, m	30

Performance comparison of wireless data transmission technologies

Technology/parameters	GSM (LTE/4G/NBIoT)	LPWAN	868 MHz ASTRO
Communication type	Star	Star	Mesh
Maximum remote distance of luminaires relative to base station/modem	up to 6 km	up to 10 km	Unlimited
Remote controller power consumption	⩽ 1W	⩾ 1W	⩾ 0.7W
Payment for traffic during operation	Payment to communication service provider	Payment to provider/ purchase of base stations	no

ASTRO

GERMANY
INCOTEX Deutschland GmbH
Am Moebelhof 5-7
14478 Potsdam
Tel: +49 (0) 331 550 495 020
E-mail: s.golyshkov@incotex.ru

RUSSIA
DS Trade Ltd.
26, 16-th Parkovaya st., Moscow
Russian Federation, 105484
Tel.: +7 (495) 468 57 74
E-mail: pdp@incotex.ru

BULGARIA
INCOTEX GROUP
Sofia, BG-1528
2A Nedelcho Bonchev St.
Tel: +359 2 902 5880
Fax: +359 2 968 6034
E-mail: sales@incotex.bg

www.incotex.com