

## SON-R - Energy-saving street lighting cabinets



### APPLICATION

- Advanced and remote control and supervision for street lighting installations executed with a comprehensive management system.
- Reduction of consumption of energy in lighting.
- Metering and distribution of electricity and protection of lighting circuits for streets, traffic lanes, public use areas, motorways, industrial plants.
- For LV networks in TN-S, TN-C, TN-C-S types.

### EQUIPMENT

#### Enclosure

##### Thermosetting plastic

SMC enclosure with IP 44 or 54 rating. Built to Class II protection standard, with HB to V0 flammability rating, painted in RAL 7035, with the possibility of additional painting to ensure temporary resistance to environmental factors and UV radiation.

#### Metal OU-1S

The enclosure made of aluminium or steel sheet (welded or riveted). Powder painted in any colour. The size matching the type and range of devices and individual needs of the Client. The enclosure is highly resistant to degradation, environmental factors and UV radiation. The enclosure is executed in the Class I and II appliance protection standard. Class II appliance protection rating of the enclosure is achieved with an additional insulation layer permanently applied on the internal surfaces of the enclosure. The thickness of the layer ensures the required insulation. Labyrinth ventilation allows continuous flow of air with simultaneous elimination of penetration of pollutants and accumulation of water and moisture.

The door with internal hinges with anti-burglary lock and multiple bolts, an espag lock with a padlock or a system cylinder.

#### Accessories

##### A. Incoming and metering section

- Protection before the meter: fuse switches, overcurrent circuit breakers up to 63 A (1P, 3P), other protection devices compliant with the requirements of the Recipient.
- The incoming terminal block with the cross section up to 4/5 x 35 mm<sup>2</sup> (TN-S, TN-C), screw or Allen clamp.
- Protection against overvoltage.
- The metering board for installation of one- or three-phase active energy meters.
- Space for a modem, a tariff time switch.

- Covers ready for sealing.
- Document holder.
- V (VLM) or M (screw) type cable terminals, for the incoming cable - 2x 4 x 240 mm<sup>2</sup>, for the outgoing cable 4 x 120 mm<sup>2</sup>.
- Cable clamps.

##### B. Control and outgoing section

- Fuse switch disconnecter as protection of the main control and outgoing section, which allows setting the break necessary for maintenance works.
- Low voltage current transformers: metering parameters (A, V, P, Q, S, cos), on the terminals of the controller.
- The street lighting controller and the control system of the producer of choice: advanced control and remote supervision of the lighting installation and control over reduction of consumption of power.
- Control circuit overcurrent signalling and protection ensures visualisation of presence of voltage on the incoming side and correctness of control operations.
- Mode switch (automatic, manual, cascade).
- Service socket 230 V, overcurrent protection of the socket.
- Protection against overvoltage.
- Cabinet lighting: controlled with limit switches connected to the controller.
- Cabinet heating controlled with a thermostat with temperature setting.
- 1/3-pole contactor with the current rating matching the load, installed on each outgoing circuit or group of outgoing circuits for switching on and off the lighting circuits in various configurations.
- The mode switch for activation of energy saving mode: a bypass

- that allows switching the cabinet in the no-saving mode (central operation).
- Outgoing circuits: fuse switches up to 160 A (D01, D02, 00) or overcurrent circuit breakers up to 63 A (1P, 3P).
- Outgoing terminals with the cross section up to 5 x 120 mm<sup>2</sup> with Allen / screw connection.
- Cable clamps.

The devices for SON-R cabinets are customised to meet the requirements of lighting administration entities and the expectations of the Client.

##### C. The power consumption reduction part (central reduction)

- The power consumption regulator in the 3-phase version, load range 3.5 kVA to 120 kVA. Reduction voltage and time are freely regulated.

##### Cabling

- Cabling of the cabinets is provided with flexible insulated cables (LgY) with cross section matching the required current load and types of devices.
- The PEN busbar with PE + N separation.

##### Accessories

- **Pole clamp:** for any type of power poles.
- **Thermosetting foundation block:** matching the dimensions of the thermosetting enclosure.
- **FM aluminium foundation block:** matching the dimensions of the enclosure, fitted with removable front and back covers.
- **FB concrete foundation block:** built of reinforced concrete slabs, screwed with the aluminium or thermosetting enclosure.
- **Cable base.**



## CONTROL AND REDUCTION SYSTEM CHARACTERISTICS

### Advantages of the system

The system allows to reduce consumed energy due to the application of independent types of wide-area and central reduction, maintaining all lighting parameters set forth in the standards. The solution is suitable for all types of light sources (mercury, sodium, metal halide, fluorescent, LED). The system ensures advanced control and remote supervision over the lighting installation with the LIS controller and additional modules expanding its functionality.

### Methods of electricity reduction

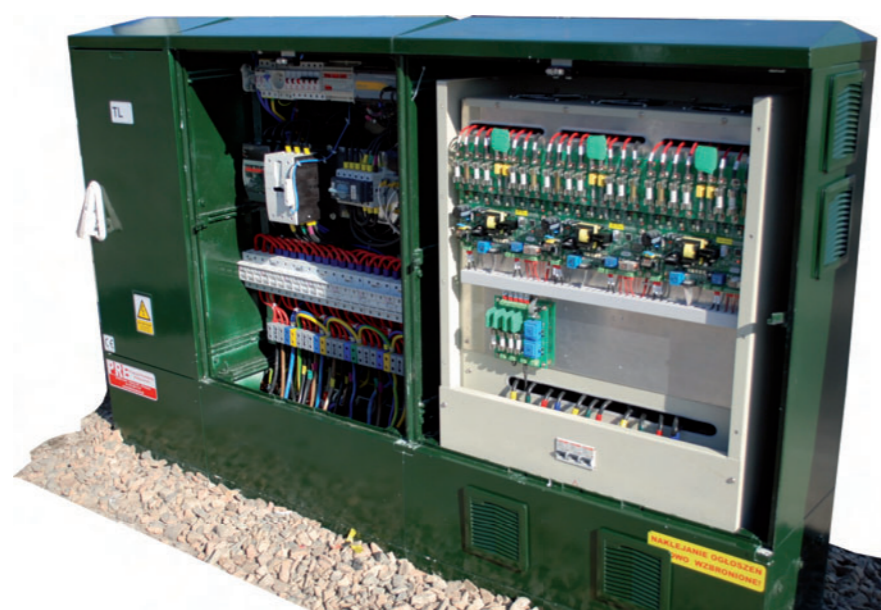
We offer two methods of reduction of electricity consumption in the proposed control system.

- **Wide-area reduction:** with a reduction controller powered from 1 phase, installed in the bay in the lighting pole or on it, with the power rating matching the light source performance. The regulator reduces consumption of electricity at 30 and 60% thresholds in the existing lighting network with traditional starters and magnetic ballasts. Modernisation does not require any interference with the fittings. The system is suitable for mercury, sodium, metal halide and LED lamps. In case of LED lamps, additional control systems (SC and PLC) and regulators (DV) make it possible to achieve reduction in excess of 60%. Wide-area reduction enables independent control over each fitting unit, which is impossible with the central reduction. Motion sensors can be integrated with LED fittings for smooth reaction to changes in the traffic.
- **Central reduction:** with a single 3-phase autotransformer or transformer regulator installed in the SON-R street lighting cabinet. With the load range from 3.5 kVA to 120 kVA, the regulator reduces consumption of electricity by 40% (depending on the configuration of the given lighting network structure). The system is suitable for mercury, sodium, metal halide, and fluorescent lamps. It allows smooth change of the outgoing voltage, stabilisation of its level and independent control for each phase in the circuit. The regulator allows individual or cascade working modes. The level and time of reduction is determined remotely. Modernisation does not require any interference with fittings and poles. Each fitting cannot be operated independently.

The system and the presented methods of reduction are configured and selected individually to the needs of the Recipient.

### Characteristics of the controller

- Switching on and off according to the sunrise and sunset table (the table and the differences and breaks in activation of the individual circuits may be modified).
- It enables smooth control and setting of the level of the central reduction (a single regulator in the SON-R cabinet) or of the wide-area reduction (with regulators in poles and/or fittings).
- It allows to define differences in the time of switching on, night brakes for the individual circuits, modifications of the table of lighting operation.
- Remote communication with a GSM modem, in the GPRS technology (generating alarms and information about events in the network), with the possibility of sending and receiving text messages.
- The integral GPS module responsible for synchronisation of satellite time, it enables location of a cabinet in maps.
- Communication with the controllers installed in the 230 V network fittings in accordance with the LonWorks standard (PLC) and/or with radio communication.
- Measurements of voltage, current, active power, energy consumed and  $\cos \varphi$ .
- Recording measured values for the particular phases every 1 minute for 30 days.
- Verifies operation of protection circuits by metering power (detection of blown fuses).
- With the enclosed configuration program and online access, full reading of and control over controller parameters are possible.



## BASIC TECHNICAL DATA

Rated operational voltage:	230 V / 400 V
Insulation rated voltage:	500 V
Rated frequency:	50 Hz
Impulse withstand voltage:	2,5 kV
Busbar rated continuous current:	do 910 A
Rated short-time withstand current:	20 kA (1 s.)
Rated peak withstand current:	40 kA
Internal arc short-circuit current:	16 kA
IP protection level:	44 - 54
IK level of protection against mechanical impact:	10
Appliance class:	I / II
Dimensions of incoming / outgoing terminals:	240 mm <sup>2</sup> / 16 mm <sup>2</sup>
Network arrangements:	TN-S, TN-C, TN-C-S
Height / width / depth:	without limitations for aluminium enclosures built to Class II protection standards

## COMPLIANCE WITH STANDARDS

- **PN-EN 61439-1**  
„Low-voltage switchgear and controlgear assemblies. Part 1: General rules.”;
- **PN-EN 61439-2**  
„Low-voltage switchgear and controlgear assemblies - Part 2: Power switchgear and controlgear assemblies.”;
- **PN-E-05163**  
„Enclosed low-voltage switchgear and controlgear assemblies. Guide for testing under conditions of arcing due to internal fault.”;
- **PN-EN 50274**  
„Low-voltage switchgear and controlgear assemblies - Protection against electric shock - Protection against unintentional direct contact with hazardous live parts.”;
- **PN-EN 62208**  
„Empty enclosures for low-voltage switchgear and controlgear assemblies - General requirements.”;
- **PN-EN 60529**  
„Degrees of protection provided by enclosures (IP Code)”;
- **PN-EN ISO 4628**  
„Paints and varnishes - Evaluation of degradation of coatings - Designation of quantity and size of defects, and of intensity of uniform changes in appearance - Part 6: Assessment of degree of chalking by tape method.”;
- **PN-EN ISO 2409**  
„Paints and varnishes - Cross-cut test.”;
- **PN-EN 62262**  
„Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code) (IDT PN-EN 50102:2001)”.

