SON-R – Street Lighting Cabinets with Remote Control and Power Limitation System

APPLICATION

- advanced and remote control and supervision of street lighting through a comprehensive management system;
- reducing energy consumption in lighting;
- measurement and distribution of electricity and protection of lighting circuits of streets and traffic routes, public places, highways, industrial plants;
- for low-voltage networks of the following types: TN-S, TN-C, TN-C-S.

EQUIPMENT

Enclosure

Thermosetting plastic

The enclosure is made of SMC plastic with IP 44 or 54. In the II protection class, with a flammability class from HB to V0, in RAL 7035 color, with the possibility of additional varnishing for temporary resistance to environmental effects and UV radiation.

Aluminum OU-1S/OU-2S

Housing made of aluminum sheet (joining by welding or riveting). Powder coated in any color. Dimensions adapted to the type, amount of equipment and individual customer needs. The housing has a high resistance to degradation, environmental impact and UV radiation.

The housing is made in protection class I or II. Protection class II of the housing is achieved by applying an additional insulating layer, permanently lined on the inner and outer surfaces of the housing. The thickness of the layer ensures the proper degree of insulation.

Ventilation allows constant air flow using a ventilation labyrinth, while eliminating the ingress of dirt and the accumulation of water and moisture. Doors having internal hinges with anti-burglary catch and multi-point locking, basquil lock lockable with padlock or system cylinder.

Equipment

A. Power supply and measurement part

- Pre-metering protection – fuse disconnectors, overcurrent circuit breakers up to 63A (1P, 3P) other protections selected according to the requirements of the Recipient;
- power terminal strip with cross-section up to 4/5 x 35mm2 (TN-S, TN-C), screw or allen clamp;
- surge protection;
- metering board suitable for installation of single or three-phase active energy meters;
- space for modem, tariff timer;
- cover plates suitable for sealing;
- documentation pocket;
- V-type (VLM) or M-type (screw) cable clamps for power cable – 2x4x240mm2, receiving cable – 4x120mm2;
- cable holders.

B. Control and drainage part

- Box fuse disconnector – the main protection of the control and drainage part, allowing to obtain a visible break necessary for maintenance work;
- low-voltage current transformers – measurement of parameters (A, V, P, Q, S, cos), plugged into the terminals of the controller;
- astronomical timer / controller / twilight switch;
- signaling and control overcurrent protection – provides visualization of the presence of voltage on the power supply and the correctness of the control;
- mode switch (automatic, manual, cascade);
- 230 V service outlet, outlet overcurrent protection;
- surge protection;
- cabinet lighting – controlled by limit switches connected to the controller;
- cabinet heating – controlled by a thermostat with temperature setting;
- single/triple-pole contactor with current adapted to the load, installed on each drain circuit or group of drain circuits – switching on and off lighting circuits in different configurations;
- outlet circuits – fuse disconnectors up to 160A (D01, D02, 00) or overcurrent circuit breakers up to 63A (1P, 3P);
- drain clamps up to 5x120mm2 for allen/screw key;
- cable holders.

The equipment of SON cabinets is selected according to the requirements of the lighting management units and at the request of the customer.

C. Part of the power reduction (central reduction)

- Three-phase version power consumption reducer, load power range: 3.5 kVA to 120 kVA; reduction voltage and reduction time are freely adjustable.

Wiring

- Wiring of cabinets made by insulated flexible cables (LgY) with cross sections selected for current carrying capacity and type of apparatus;
- PEN bus with division into PE and N.

Accessories

- Socket mount – to fit any type of power pole;
- thermoset foundation – matched to the dimensions of the thermoset housing;
- FM aluminum foundation – matching the dimensions of the housing, equipped with removable front and rear covers;
- FB concrete foundation – constructed of reinforced concrete slabs, bolted together with aluminum or thermo casing;
- cable pocket.

SON-R

SON-R – Street Lighting Cabinets with Remote Control and Power Limitation System

CHARACTERISTICS OF THE CONTROL AND REDUCTION SYSTEM

System capabilities

The system makes it possible to reduce the amount of energy consumed through the use of independent types of diffuse and central reduction, while maintaining all the lighting parameters specified by the standards. The solution works with all types of light sources (mercury, sodium, metahalogen, fluorescent, LED). The system provides advanced control and remote supervision of lighting by means of the LIS controller and additional modules that expand its functionality.

Ways to reduce electricity

The proposed control system offers two ways to reduce electricity consumption.

- **Distributed reduction** – is carried out through the use of a reducing controller, powered from 1 phase, mounted in a recess in or on a lighting pole, the power range is adapted to the power of the light source. The reducer reduces electricity consumption in leaps of 30 and 60% on the current lighting network with traditional ignition systems and magnetic ballasts. The retrofit does not require any interference with the luminaire. It makes it possible to work with mercury, sodium, metahalide and LED lamps. In

the case of LED lamps, by using additional control systems (SC and PLC) and control systems (DV), we can achieve a reduction of more than 60%. Distributed reduction allows independent control of each luminaire, which is impossible with central reduction. With LED luminaires, it is possible to use motion sensors that will respond smoothly to changes in traffic.

- Central reduction – is carried out by using a single 3-phase autotransformer or transformer reducer, mounted in the SON-R street lighting cabinet. Load power range: 3.5 kVA to 120 kVA, the reducer reduces electricity consumption by 40% (depending on the configuration of the specific lighting network structure), allows to work with mercury, sodium metahalogen, fluorescent lamps. It allows smooth change of output voltage, stabilization of its level and control independently for each phase on the circuit. The reducer allows you to work in individual or cascade mode. The level of reduction and the time of reduction is set remotely. The retrofit does not require any interference with the luminaire and pole. No independent control of each luminaire.

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

Controller characteristics

- Switching on and off according to the sunrise and sunset table (possibility to modify the table and the difference and intervals of switching on individual circuits);
- allows smooth adjustment and setting of the level of central reduction (single reducer in the SON-R cabinet) or distributed reduction (reducers in the pole and/or in the luminaire);
- allows you to define the difference in switch-on time, night breaks for individual circuits, modify the lighting switch-on and switch-off table;
- remote communication, via GSM modem, in GPRS technology (generating alarms and information about network events), has the ability to send and receive SMS;
- built-in GPS module responsible for synchronizing time from satellite and allowing the cabinet to be located on maps;
- communication with controllers installed in luminaires over 230V network according to LonWorks standard (PLC) and / or radio;
- measures voltages, currents, active power consumed and cos fi;
- records the measured values for each phase every 1 minute for 30 days;
- controls the operation of circuit protection by measuring power (fuse blown detection);
- the included configuration program and access through the website allow from a computer workstation to fully read and control the parameters of the controller.

RATED PARAMETERS

Rated switching voltage:	230 V / 400 V
Rated insulation voltage:	500 V
Rated frequency:	50 Hz
Surge voltage withstanding:	2,5 kV
Rated continuous current of the main rails:	up to 910 A
Rated short-term withstand current:	20 kA (1 s.)
Rated peak withstand current:	40 kA
Short-circuit current of internal arc discharge:	16 kA
IP rating:	44 - 54
IK degree of mechanical resistance:	10
Protection class:	I/II
Dimensions of the supply/receiving terminals:	240 mm^2 / 16 mm^2
Network layouts:	TN-S, TN-C, TN-C-S
Height/Width/Depth:	unlimited for aluminum enclosures in protection class II

COMPLIANCE WITH STANDARDS

- **PN-EN 61439-1**
  „Low-voltage switchgear and controlgear – Part 1: General provisions”;
- **PN-EN 61439-5**
  „Low-voltage switchgear and controlgear – Part 2: Switchgear and controlgear for power distribution”;
- **PN-E-05163**
  „Shielded low-voltage switchgear and controlgear. Guidelines for testing under arc discharge conditions resulting from an internal short circuit”;
- **PN-EN 50274**
  „Low-voltage switchgear and controlgear – Protection against electric shock – Protection against unintentional direct contact of hazardous live parts”;
- **PN-EN 62208**
  „Empty enclosures for low-voltage switchgear and controlgear. General requirements”;
- **PN-EN 60529**
  „Degrees of protection provided by enclosures (IP Code)”;
- **PN-EN 62262**
  „Degrees of protection against external mechanical impact provided by enclosures of electrical equipment (IK code) (IDT PN-EN 50102:2001)”;
- **PN-EN ISO 4628**
  „Paints and varnishes – Evaluation of deterioration of coatings – Determination of the amount and extent of damage and intensity of uniform changes in appearance – Part 6: Evaluation of the degree of chalking by the tape method”;
- **PN-EN ISO 2409**
  „Paints and varnishes – Testing by the notch grid method”.