

LEVEL ALARM EQUIPMENT SYSTEM (LAES)

Level alarm equipment system (LAES) is designed to control the limit levels of various liquid types at nuclear power plants as well as in other industries where LAES parameters comply with current industry regulatory requirements.

Level Alarm Modules (LAM), as a part of LAES, according to Regulations 306.2.245-2024 belongs to Safety Class 3, elements of normal operation, control and safety systems elements. LAM can be used as additional stationary hardware and have Class identification 3H, 3HK, 3HKO, 3HKOД. According to Regulations 306.2.202-2015, SOU NAEK 100, LAM can perform functions B and C. According to Regulations 306.2.237-2022, LAM have a cybersecurity level K2.

LAES includes the following components:

► Level Alarm Module (LAM) ►

Level Alarm Crate (LAC) ►

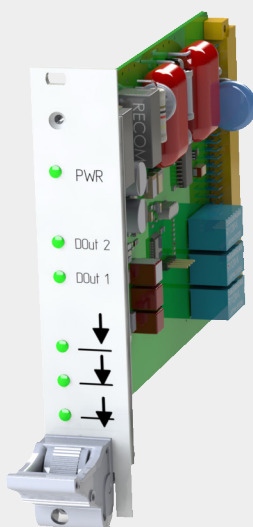
Level Alarm Cabinet (LAC)

LEVEL ALARM MODULE

Level Alarm Module (LAM) measures the medium resistance and generates discrete threshold signals when the set resistance levels are reached. All LAM settings (threshold levels, operating modes, additional parameters) are made using the upper-level program (upper-level software) via the RS-485 digital interface.

In addition, LAM produces a discrete signal "Failure" in the case of:

- loss of LAM power supply;
- violation of the program code integrity;
- violation of the installation parameters integrity;
- achievement of the measured resistance less than established values (sensor short circuit monitoring);
- reaching a measured resistance of more than 106 Ohms (line break control)

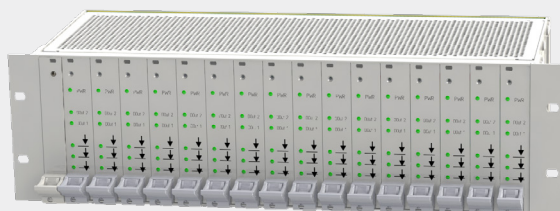


LAM technical characteristics

Number of measurement channels:	1
Range of the measured medium resistance:	0..10 ⁶ Ohm
The output voltage amplitude on the change channel at idle: no more than	12 V
Current in the circuit of the change channel during the "short circuit:" no more than	6 mA
Number of discrete threshold outputs:	2
Number of discrete signal outputs:	1
The maximum switching power for each discrete channel at a voltage of 24 V: no more than	20 W
Supply voltage:	(24 ± 1,5) V
Power consumption: no more than	2 W
Overall dimensions: no more than	210x130x25
Weight: no more than	0,5 Kg

LEVEL ALARM CRATE

Level Alarm Crate is designed for installing up to sixteen LAMs, providing power to all LAMs, connecting cables of external level sensors and discrete output signals, and connecting the RS 485/422 information bus according to the installed LAMs to a common interface for connecting to upper-level equipment or programming settings.

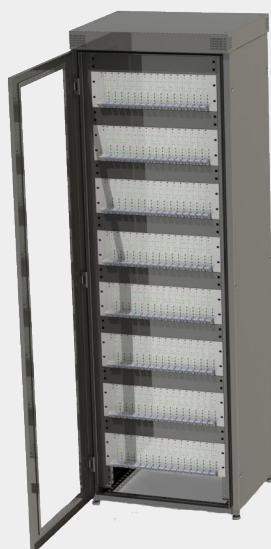


Level Alarm Crate technical characteristics

Number of slots for LAM installation:	16
Supply voltage:	$(24 \pm 1,5) \text{ V}$
Power consumption: no more than	40 W
Overall dimensions: no more than	490x140x230
Weight: no more than	15 Kg

LEVEL ALARM CABINET

Level Alarm Cabinet is designed to install up to eight Level Alarm Crates. The Level Alarm Cabinet provides power to all Level Alarm Crates with two independent power inputs. It provides access control to control elements and settings of Level Alarm Crates.



Level Alarm Cabinet technical characteristics

Number of slots for Level Alarm Crate installation:	8
Supply voltage (per each input):	$(220 + 20-33) \text{ V}$
Power consumption: no more than	350 W
Overall dimensions: no more than	620x1870x500
Weight: no more than	130 Kg

LAES distinctive features

- ▶ A wide range of the controlled medium resistance (from 0 to 1 000 000 Ohms).
- ▶ Monitoring the status of the line to the level sensors and identifying "break" of the line or "short circuit" of the line.
- ▶ Setting the thresholds through the upper-level software via the RS 485/422 information bus.
- ▶ Flexibility of equipment configuration.

Design Solutions of Physical Process Analysis Design Bureau

Physical Process Analysis Design Bureau of RPC Radiy is set up for development of seismic protection systems, calibration equipment and qualification of product data at NPP. The bureau designs and implements the Seismic Sensor that is the source of seismic data for the seismic protection equipment. Other successfully designed and implemented product is the vibration measuring system for periodic calibration of seismic sensors in semi-automatic mode. Besides nuclear products the design bureau has developed the Information Acquisition and Display Unit that is the basic item in any monitoring system design including the Automatic System for Early Diagnostics of Emergencies. Additionally, the design bureau develops the angel precision gages for the wide scope of measurement.