

Telemetrics and Remote Control System for Nuclear Industry

The economic and political stability of the industrially developed countries is highly depending on the continuous growth of the economy. The two main factors of economic growth are technological development and the productivity enhancement of existing technologies. Both factors bring new environmental risks in both the nuclear, chemical, energy and oil&gas industry.

measurements of the sensor are digitized by the system, then compared to the set warning and alarm thresholds. The incidental warnings and alarms are transported to control room application.

One of the most effective mitigation technique is to implement an electronic environment control integrated with an early warning system in the affected settlements.

The essence of the electronic control for the nuclear industry is round the clock gamma background radiation measurement installed between the nuclear facility and the endangered settlements. Meteorological information is also continuously collected in the surroundings of the facilities to be able to detect an incidental emission. Knowing the radiation level resulting by an emission and the meteorological environment, the professional supervising personnel of the system is able to influence the behavior of the population by alarm signals and speech instructions.



Monitoring System

The most important component of the system – the monitoring device measuring the background radiation – is installed with BNS-98 and a BNS-98S dose rate transmitters, one of them measuring the air kerma dose rate in Gy/h, while the other is measuring the ambient dose equivalent rate $H^*(10)$ in Sv/h. The analogous



Measurement frequency:	Customizable, by default: normal status: 10 min. alarmed status: 1 min.
Measured meteorological parameters:	Temperature -40...+60°C, ±0,2°C Humidity 0...100% RH, ± 2% Wind direction 0...360°, ± 5° Wind speed 0,4...40m/s, ± 3% over 5m/s Calculated vertical stability
Radiation measurement:	According to IEC 1017-1 and IEC 60846-1 Measurement range: BNS-98: 50 nGy/h....500 mGy/h 15% BNS-98S: 30 nSv/h....1 Sv/h 15% Indication range: BNS-98: 10-50 nGy/h, 500 mGy/h..... 10 Gy/h BNS-98S: 10-30 nSv/h, 1 Sv/h..... 10 Sv/h Energy range: 55 keV....1,5 MeV
Configurations	Radiation only – Radiation & Meteo Battery powered – Without battery Redundant – Non redundant
Communication options	Fiber – Ethernet – Microwave – GSM – TETRA

The monitoring stations are electronically and mechanically constructed according to military standards, as well as the galvanic, chemical, lacquer coatings and paints meet military standard requirements.

Control Room Application

The meteorological and background radiation measurement data is transported to a computing center – formed by highly reliable servers and network devices – serving the control room clients. The computer center has professional physical protection formed by access control system, video surveillance, flooding protection, electromagnetic shielding, highly reliable air conditioning, redundant power with multiple inline and manned security.

The control room client application provides an integrated interface to the supervisor personnel to control the whole system or several instances of the system deployed in different locations:

Displays the measurement data and the alarms	
Supports the personnel with	action plans dispersion modeling
Provides a possibility to operate the public alarm system	

Alarm system

The remote control of the public alarm system enables issuing alarms and providing information by speech instructions.

Sound sources	Pre-defined signal-alarms
	Pre-defined speech stored in the siren
	Speech pre-defined by the supervisor personnel
	Live speech
Variations	Standalone pole
	Flat roof
	Individual desing (e.g. tent roof)
Communication options	Microwave – TETRA

Reliability

All parts of the system are designed to allow a full-extent in-depth system monitoring via standard system management tools from application memory usage through server fans to even the membrane of the sirens pressure chamber.

This high extent of monitoring allows defect repairs before actual outage would happen, resulting a very high system availability.

The system design allows all system components to be implemented redundantly increasing the reliability even more.



Potentials

The system – thanks to its flexible design – optionally equipped with other sensors (gas detectors, water or soil contamination, water level etc.) or other controlled devices (e.g. energetic or traffic control) is ready to be adopted to several other telemetric and remote control applications.