P16

Electrical monitoring on construction sites in Russia

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The great amount of construction sites located throughout the huge territory of Russia requires a constant monitoring of the state of their constructions. First of all this is a requirement for oil and gas facilities in the North and East of the country. Sites for oil and gas well clusters, access roads, pipelines, temporary sites of civil engineering, frozen dams and reservoirs dams are built on permafrost containing high rates of ice in most of the cases. Very often the situation is aggravated through a dissected relief with landslides, heavy rain showers in the summer, slight snowfalls in winter, enormous temperature differences within the year (for example, in Yakutia the difference may be 80 – 100º C). In a number of Eastern Siberia regions, the depth of the seasonal soil freezing reaches 3 – 3.5 m. For objective reasons geoelectrical monitoring is the most suitable method for monitoring the state of the constructions. Years of experience with conventional devices, including electro-tomographic stations, has shown their low efficiency, for such climatic characteristics impose special requirements for the equipment in use.

The new generation of equipment for electric monitoring is based upon the following principles:

- the arbitrary geometry of the equipment is suited for investigation on a specific object;
- any number of current and measuring electrodes can be used;
- switches and electrodes are combined in one sealed enclosure;
- electrical signals are measured through multiple channels;
- the process is fully automated according to the chosen connection protocol between current and measuring electrodes and to the algorithm, that decides whether there is need to conduct further measurement for enhancing accuracy and reliability of data;
- prescribed accuracy and quality control measurement is possible due to rapid re-measurement;
- possibility of remote access to the measuring station via Internet;
- a high input impedance ensures a high quality of signals received;
- temperature variations do not affect main parameters of the device;
- measuring electrodes with built-in temperature sensors.

Currently, the station has passed factory and field-testing and is being installed at one of the oil and gas fields in Central Yakutia.