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ЗАО «АЛЬФА-БАНК» 220013 Республика

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The railroad switch is the most widely used track junction device, which is designed to transfer rolling stock from one track to another. In other words, the turnout allows rolling stock to move from the main track to one (or more) adjacent track.

When setting low temperatures in winter, snow and ice can cause the arrow not to move to the desired position (insufficient fit of the wit to the frame rail), which leads to the operation of the electric motor on the friction (increasing the current of the electric motor of the pointer electric drive), which in turn can lead to to blow the fuse or burning the engine and ultimately to the impossibility of transferring the arrow from the control panel (the control of the arrow is preserved). In modern systems, when obstacles occur during translation, the arrow returns to its original state. The attendants urgently leave for the facility to eliminate an emergency situation, which leads to additional financial and labor costs. One of the solutions to the problem is to heat the transfer for melting snow and ice. One way to deal with this problem is to use electricity.

The product of our activity is the control system, monitoring and analytics of heating of railroad switches.

The software and hardware complex includes:

- Control cabinet. It includes a controller that collects and transfers data developed by our company.
- Software and Analytical Center (SCADA), built using the cloud.

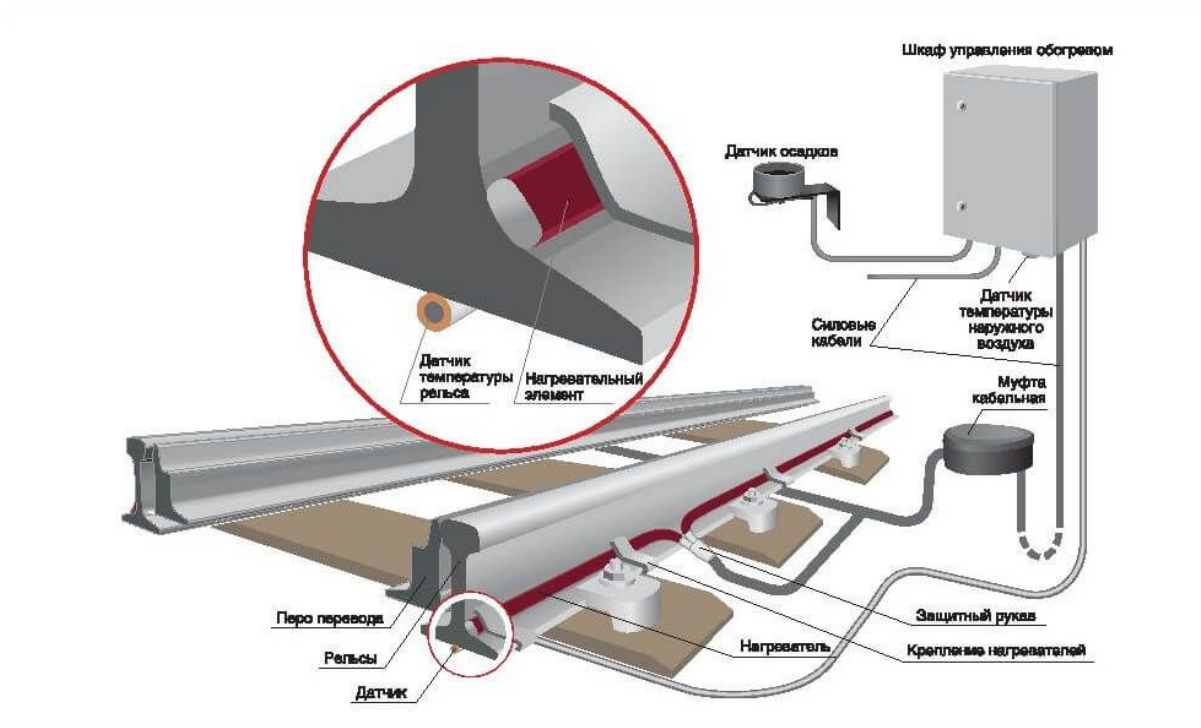
Control cabinet

We designed and manufactured a programmable logic controller that provides data transfer and process control.

PLC provides the following functions:

- monitoring the status of sensors (temperature, precipitation, future wind development) and collecting data for analytical processing.
- remote reading of electricity meters on schedule or on demand in real time.
- control of on / off electric heaters. The control is carried out using semiconductor switches, which are switched by the developed special mathematical algorithm taking into account the power of the heaters, weather conditions, etc., which makes it possible to effectively calculate the operation of the heating element. Thanks to this algorithm, heating efficiency is increased, which saves energy and money. Semiconductor keys are more reliable and durable than electromechanical keys, especially at low temperatures.
 - overcurrent protection.
 - leak detection on the ground.
 - detection of breaks in the heater
 - indication of the included heater
 - detailed diagnostics of the sensors, each heating element, the entire system with detailed status registration in real time.

- notification of accidents in the event of a break in communication between the control cabinets and the program-analytical center



Program Analytical Center (SCADA).

The software and analytical center is located at the data center facilities to ensure the reliability and fault tolerance of the system.

The data center is a high-level data center Tier III Facility, certified by the Uptime Institute (UI). The user interface certificate in terms of Tier III Facility's resiliency testifies to the high degree of reliability and security of the center's data processing.

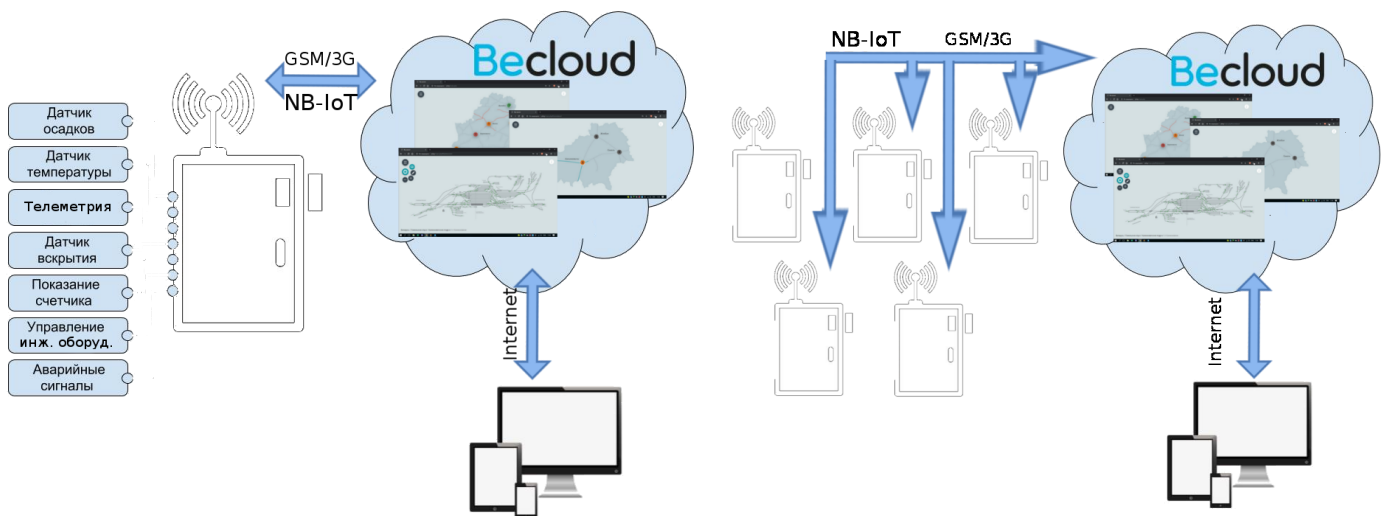
Ranked access to the software allows differentiating rights depending on the level of staff skills. This system provides:

- data collection from all control cabinets in one center

- Access is provided from any device with access to the Internet.
- collection of weather data (air temperature, precipitation, wind speed in the future) into a single system. Analysis of weather conditions throughout the Republic of Belarus allows for pre-heating in limited power mode when a strong snow front is detected. This solution allows for the safe and uninterrupted movement of rolling stock, especially when operating high-speed rolling stock.

- simple and flexible addition of units to the SCADA system
- collection and display of data on electricity consumption from all systems. Reliable and complete information about the consumed electricity for a period of time per unit of the system online. In the future, data on electricity consumption can be superimposed on the time interval and weather conditions on the graphs for reporting and analysis, with further adjustment of the system algorithm to ensure energy saving.

Our specialists are doing a great job in creating a software and analytical center, and we are ready to present an alpha version of the software.



Data transfer from the control cabinet to the software data center is carried out using the latest NB-IoT data transfer technology. To date, certain agreements have been concluded with companies providing telecommunication services, and joint work is underway to deploy and test new generation networks.

Data transfer from the control cabinet to the software analysis center is carried out using the latest NB-IoT data transmission technology. To date, certain agreements have been concluded with companies providing telecommunications services and joint work is being carried out to deploy and test new generation networks.

NB-IoT (Narrow Band Internet of Things) is a cellular standard for low-exchange telemetry devices.

Working with these technologies, we get a truly innovative project, and we will get a number of ready-made devices for working with the latest standards and technologies without lagging behind world leaders with these developments over the entire software and hardware complex. Use of developments in such areas as electricity metering (as a single data center), oil production (collecting information on oil production and the operation of process equipment), collecting weather information for weather services (for further data analysis and more accurate forecasting of weather conditions, which is positive will be reflected in agriculture), analysis of weather conditions on the highways (prevention of an emergency situation due to a sharp change in weather conditions), etc.

The project is aimed at the railway, but all information (electricity consumption, weather conditions, etc.) can be provided to the relevant services upon request from a single database via the Internet.

