



MAGUS

ELECTRICAL HEATING AND CONTROL OF RAILWAY SWITCHES

NEW GENERATION

ELECTRICAL HEATING AND CONTROL OF RAILWAY SWITCHES

REDUCTION OF ENERGY CONSUMPTION



**saving
26%**

The system is set so that the use of energy is as economical as possible = lower operating costs

PREVENTION OF EXCESSIVE HEATING



Integrating weather forecasting together with smart sensors gives the system the ability to react earlier and more meaningfully

AUTONOMOUS FUNCTIONALITY AND SAFETY OF OPERATION



The combination of multi-stage sensors, machine learning and monitoring guarantees trouble-free operation

REMOTE MONITORING AND SERVICE



Remote control
Status monitoring
Ensuring service

FEATURES AND FUNCTIONALITIES OF THE SYSTEM



Multiple sensors

Cold and hot rail sensor
Precipitation sensor
Thermometer
Humidity meter

Local weather forecast

Increasing the efficiency of heating control based on expected conditions

Calculation of dew point

The heating system works with the dew point value

Data monitoring and analysis

Autonomous monitoring and assessment services
Fault archiving

Multi-faceted heating control

Automatic
Manual
Testing

Innovative operation algorithm

Meteorological profiles for heating
User change of algorithm

Regulation of the maximum consumption

Support for heating control within the technical maximum regulation

Multiple communication

Remote control
Integration with 3rd systems
API | Modbus
Email | SMS

Full autonomy of operation

Operation without maintenance and local management

Switch control with possible extension

Public lighting
Person detection

PRODUCT DESCRIPTION

The new generation presents a sophisticated solution for heating and controlling railway switches. This device is designed with an emphasis on energy efficiency, through an advanced algorithm and a unique combination of used sensory elements. Each solution is custom designed to meet specific requirements in the private or public segment of rail transport.

KEY PROPERTIES

Multi-faceted heating control: The system provides three heating control modes – automatic, manual and test. The automatic mode is optimized for maximum energy efficiency, the manual mode allows the user to start heating according to the current need for up to 60 minutes, while the test mode ensures an easy check of the functionality of the entire system, including self-test functions.

Sensors: Each track switch is equipped with two temperature sensors to obtain the reference and current temperature of the railway track. The system also includes its own precipitation sensor, thermometer and humidity meter for comprehensive monitoring of the environment.

Local weather forecast: Weather forecast increases the efficiency of heating control based on expected conditions.

Communication: Flexible remote communication options through a secure interface API or or through standard industry communication protocols.



HEATING REGULATORY SYSTEM

The control system consists of a precipitation sensor, a cold rail temperature sensor, a heated rail temperature sensor, a humidity and air temperature sensor, and a control unit, including a terminal communication device. The control system ensures automatic control, while the degree of automaticity directly depends on the climatic conditions of the given place.

Climate sensors (precipitation sensor and temperature and humidity sensor) indicate rain, snowfall and dew point value. In combination with the local weather forecast, the control system is able to appropriately choose the degree of heating and thus reduce the energy consumption of the system. Climatic condition sensors are placed in such a way that the sensed values correspond to the real condition in the space of the heated switches.

The cold rail temperature sensor is located at a sufficiently far distance from the heated switch so that its values are not affected by heating. Thanks to this sensor, it is possible to accurately determine the temperature of the rail outside of heating. The temperature sensor of the heated rail is located at the rod of the heated turnout in such a way as to ensure the transfer of heat to the sensor and to limit its cooling outside of contact with the rail.

The control unit can be placed in the LV switchboard or in a separate cabinet.

DATA MONITORING AND ANALYSIS

Fault monitoring system: When a fault occurs, such as a sensor failure, the system automatically detects the problem and informs the user. The state of the heating circuit is regularly monitored and any errors are clearly indicated.

Datalogger: This tool regularly collects and stores data about system performance and health, making it easy to monitor and analyze its function.

External screen: The system can be expanded with an external screen (integrated into the switchboard or located in the station building) that displays current data and allows logged-in users to change modes, parameters and view the book.

HEATING CABLES

Heating cables from Türk & Hillinger type RKW are used. RKW type flat tube heaters are suitable for all types of railway profiles and consist of a RKF-24 type flat heater and a waterproof junction box.

The number and power of heating cables is determined by the type of switch and local climatic conditions.

The power cables for the heating cables are routed from the low voltage switchboard to the individual switches by means of cables to junction boxes on the tracks located in close proximity to the switches. Cables then come out of these cabinets directly to the individual heating cables.

SELECTION OF POWER SUPPLY

The heating medium is electrical energy. The power supply can be implemented from different power levels. Standard solutions include power supply from the traction line AC 25kV 50Hz or power supply from the local distribution network with a voltage of 400V AC.

CONNECTION BOXES AND DISTRIBUTION LV

Connection boxes are made of durable plastic that is resistant to mechanical damage. They meet the standards of devices with class II protection and their protection reaches the degree of protection IP 65.

The low voltage (LV) switchgear complies with Class II protection equipment standards and provides IP 44/20 protection level. Its location may be on a separate pedestal within the track or it may be located in a separate building such as a transformer station.

The electrical supply is protected by a fuse switch in the function of the main switch. The switchboard contains an electricity meter used to measure energy consumption, but also to check the functionality of the heating elements of the circuit. Three outlets are added for each replacement – one for each of the struts and one for heating the tie rod. Each outlet is equipped with a circuit breaker, a contactor and a combined current protector. In addition, there is a control unit (PLC) in the switchboard, which includes communicating with superior systems or third-party systems. The switchboard can be equipped with a control screen for control option or the location of the screen can be chosen in the adjacent transport office / railway station.

INNOVATIVE SMART CONTROL SYSTEM

The system is equipped with an advanced control system that includes three heating modes. These allow users to adapt to different needs:

The automatic mode dynamically evaluates external conditions and, based on this information, adjusts the degree of heating in order to achieve optimal energy efficiency. At the same time, the automatic mode is adapted for driving within the technical maximum.

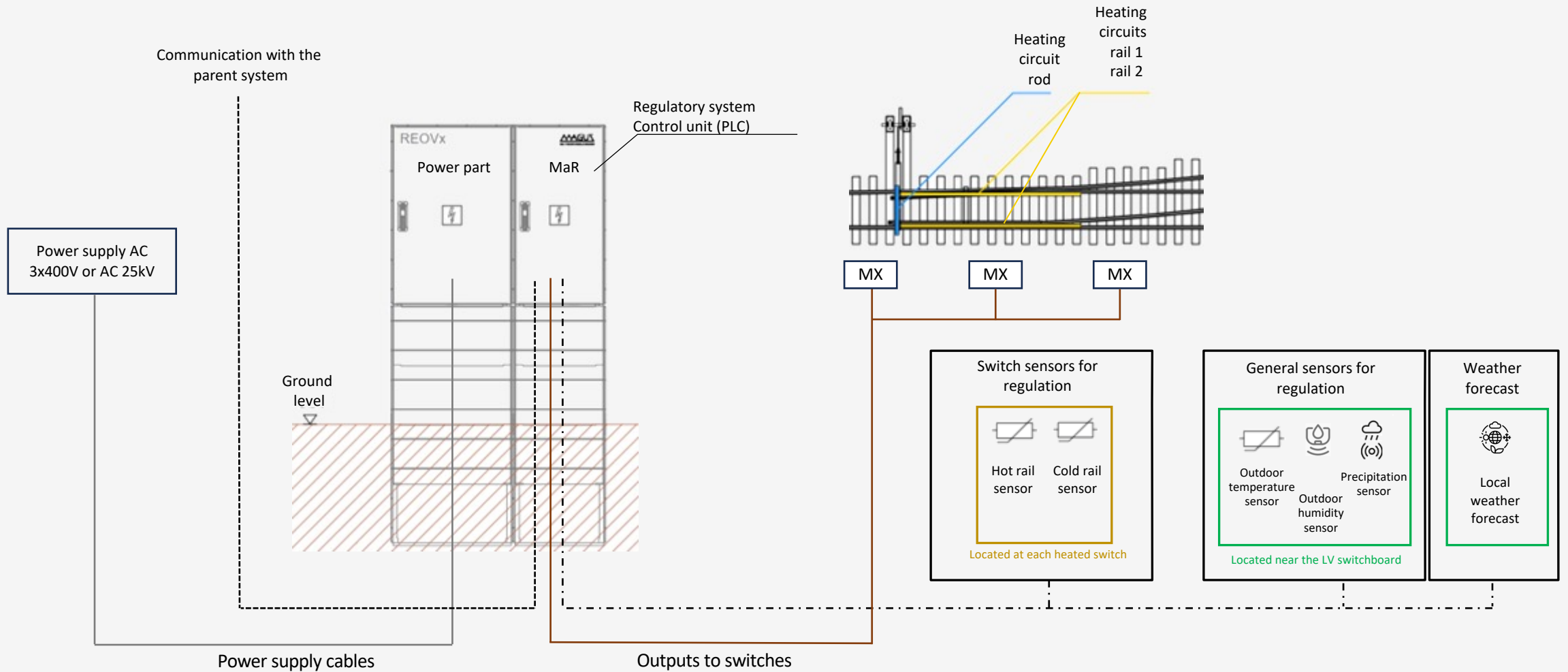
Manual mode allows users to directly control the system when automatic mode is insufficient or inoperative

The test mode provides an easy and efficient method to check the functionality of the entire system, allowing for quick detection and resolution of any problems. The test mode is also used for self-testing of system components.

Flexible algorithm settings: Users have the option to adjust the parameters of the heating algorithm to achieve the best possible performance in the given conditions.

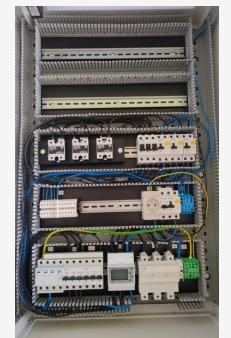
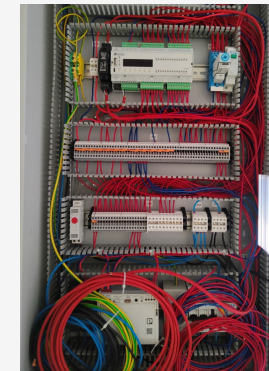
For graphical display, remote control, access to the fault archive, the system can also be expanded with an output monitoring and control unit. This will also allow you to clearly monitor the status of individual parts of the system, such as the current status of each sensor, adjust temperature thresholds, etc. Thanks to the possibility of keeping a book of changes in this system, it is also possible to find each mode change and the data that the user made this change.

BLOCK DIAGRAM OF THE SYSTEM



THE SYSTEM IS CREATED WITH THE FOLLOWING COMPONENTS

- + Transformation station (*in case of power supply from the traction line*)
- + LV switchboard, control switchboard
- + Connection boxes near the adapter and the outlet of the heating rods of the supports
- + Connection boxes for the output of power cables to individual heating cables
- + Sensor of air temperature, precipitation, Humidity meter
- + Cold and heated rail temperature sensor
- + Smart electricity meter
- + Heating rods and wiring
- + Regulatory system
 - + control unit
 - + terminal communication device with security
- + Touch control panel, cameras (*optional*)



REMOTE MONITORING AND SERVICE

This is a service that ensures remote supervision and operation of the system via a data connection via the Internet. System monitoring takes place independently of the operator and enables continuous monitoring or control of the system. Remote monitoring and servicing can be obtained separately or as part of a service / partnership agreement.

Basic service parameters:

- ✓ Monitoring 24 hours / 7 days a week
- ✓ The service center is immediately informed of any event
- ✓ Periodic sending of device status statements
- ✓ A number of alarm causes can be solved remotely by our technician without visiting the end customer
- ✓ The system is constantly under the control of the supervisory center





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We are market leaders in the provision of innovative solutions and the development of new technologies for the use of data in transport, the development and production of control and management technologies for railways, transformer technology, electric heating of exchanges, cable distribution, substations and power systems including storage.

We have rich references, professional experience and can thus offer stable quality of our services at a high level.
We build long-term relationships with our customers based on professionalism and mutual trust.