

# Geothermal point heating

## Requirements

About 64,000 points in Germany belonging to the German railway company Deutsche Bahn AG are heated. Some of them are heated with gas but most of them are kept ice- and snow-free electrically. The energy consumption of the electrical point heatings cumulates to about 230 GWh per winter. This means almost problem-free operation during winter but causes high energy costs. In the course of the progressing increase of efficiency, it is also desired to develop energy-saving systems in the field of point heatings. The integration of renewable energies enables the reduction of the energy consumption and thus of the costs and the CO2 emissions. The use of the soil as freely available heat storage combined with a heat pump is an alternative with good prospects compared to the common technical standard.

## Our solution

The point heating control developed by ESA Elektroschaltanlagen Grimma GmbH combines proven components from the heating engineering with especially developed components for the heating of railway points. The geothermal heat is extracted using a probe drilling and a heat pump. The main principle of geothermal heating that low flow temperatures lead to high efficiency is obtained by the special geometry of the radiators.

## Your advantage

### Advantages:

- low electrical connected load
- less maintenance
- use of energy efficient components
- annual energy saving of appr. 75 %
- high availability by optimized rail recuperators
- possibility to timely limited adapting of the flow temperature (short-time heating)

## Consideration of economic efficiency

### Example:

#### Geothermal point heating for 3 points of the type EW 49-300

Basis:	
heating hours per year:	300 h
heating hours per EW 49 300:	7,5kW, total: 22,5 kW
capacity of the heat pump:	5,8 kW
energy costs of Energie:	0,516€/kWh

	geothermal	electrical
energy costs per year	897.84 €	3,483.00 €

energy saving of 2,585.16€ per year  
reduction of the CO2 emission by 2.756 kg per year

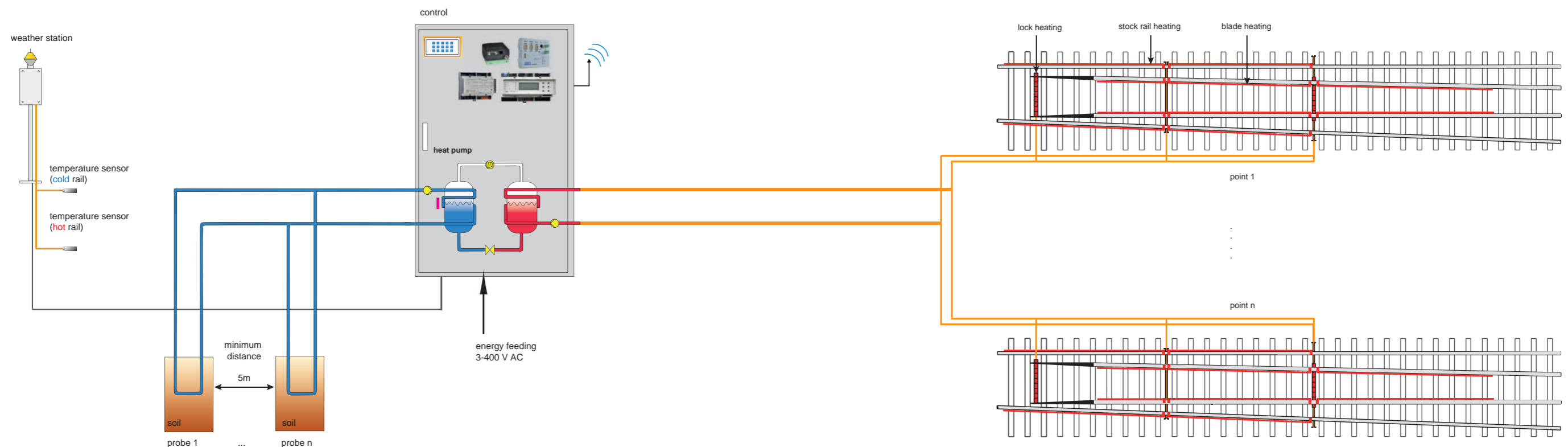
## Geothermal probe

The number and length of the geothermal probes depends on the needs of power of the points and thus by the point type (e. g. S49-190; 300; 500). The higher the need of power, the more energy has to be extracted from the soil and the longer the probe must be. The extraction capacity also depends on the condition of the soil. Bad thermal conductivity of the soil (e. g. gravel, sand, ...) means the probe has to be lengthened to extract the needed power. The probe length can be reduced in soils with good thermal conductivity e. g. water-conducting layers. Here, a mixture of water and glycol, the so-called brine, is used as water carrier medium. The mixture ratio is 70/30 (water/glycol) which ensures frost protection to -14°C. The system pressure is a maximum of 3 bar.

## Heat pump

high efficient brine/water heat pumps (middle temperature)

housing color	white (similar RAL 9003)
flow temperature max.	62°C
lower limit of the heat source (heating operation)	-5°C
upper limit of the heat source (heating operation)	up to 25°C
heating capacity	project specific
refrigerant	R410A
heat source through put min.	project specific
supply voltage	3/PE ~400 V, 50 Hz
connection heating	1 ¼ Zoll
connection heat source	1 ¼ Zoll

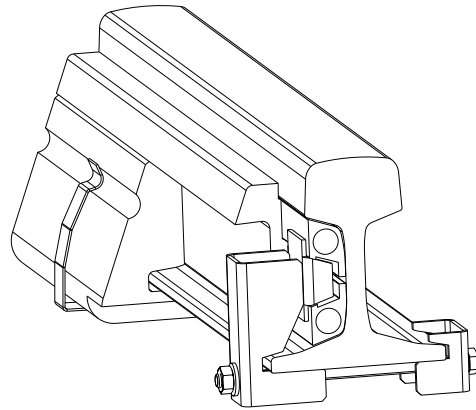


## Recuperator

available for rail profiles S49/54 and UIC 60

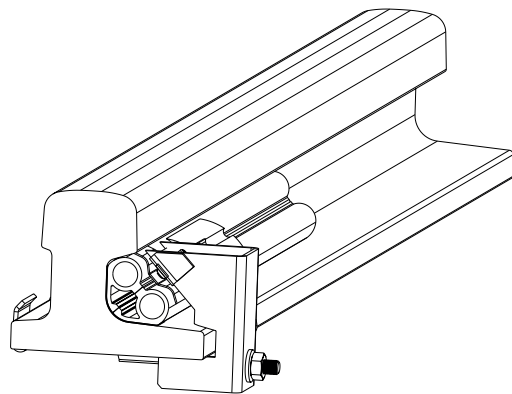
### stock rail

length	capacity
900 mm	252 W
2300 mm	644 W
3600 mm	1008 W
4000 mm	1120 W
4300 mm	1204 W
4500 mm	1260 W



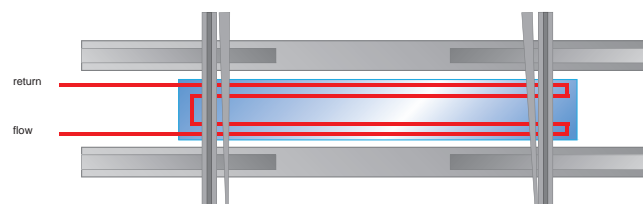
### Blade rail

length	capacity
4000 mm	1000 W
4300 mm	1075 W
4500 mm	1125 W
4600 mm	1150 W
5000 mm	1250 W
4500 mm	1260 W



### Lock heating

The lock heating is realized with an extra loop of a non-isolated connection line in the lock. These connection lines are mounted to a radiating plate to ensure the dewing of snow fallen into the lock.



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ESA Elektroschaltanlagen Grimma GmbH • Broner Ring 30 • 04668 Grimma  
 Phone: +49 3437 9211-0 • Fax: +49 3437 9211-26  
 E-Mail: [info@esa-grimma.de](mailto:info@esa-grimma.de) • Web: [www.esa-grimma.de](http://www.esa-grimma.de)

