SAN
Electro Heat

RAILWAY

BLUE POINT

AUTOMATIC – WEATHER FORECAST

POINT HEATING CONTROL

Up to 70% Energy Saving
Intelligent use of weather forecast, local weather station and temperature feed-back.

Rock Solid Modular Control System
30 years record of successful installations in railway environment. No electronics at the track side.

Reliable Winter Railway Traffic
Get instant error messages about missing heating in critical switches and react in time.

Energy Management
Energy counters for every operation mode makes analysis for optimization easy.

Reduce Maintenance Cost
Bundle and prioritize service and maintenance calls based on online switch point information.

Save Installation Cost
Use existing communication installations or wireless GPRS or WiMax.

Energy efficient power control of electrical switch point heating. Control system that secures reliable railway traffic through switch points during icing or snow conditions.

System Blue Point offers a wide range of different control cubicles ranging from small stand alone heating systems to large intelligent weather controlled solutions with a complete SCADA software package.

The heart in all offered control solutions is a rock solid RTU (Remote Terminal Unit – advanced PLC). This intelligent device is programmed to control the power, based on individually parameter settings and multiple inputs such as the local weather, weather forecast, rail temperatures etc.

The RTU is also collecting information about power consumption and statistic performance data. Finally the RTU takes care of all communication to other control cubicles and/or to the SCADA software.

To make the system easy to maintain, a self diagnostic routine will report any errors that might occur. E.g. communication error, heating element failure, power loss, sensor errors etc. This makes it possible to respond proactively.

Several fail-safe modes are incorporated to secure the main target – keep the switch points free from snow…

WEATHER INPUT FOR ENERGY SAVING

Heating up a big amount of iron – placed outside on the ground – will, no matter what, use energy. It will use a big amount of expensive energy. Therefore it is evident to make sure that the installation uses the right amount of energy and only when needed and still not jeopardize the reliability of the railway traffic.

The key to minimize the energy is to use an intelligent system to control the switch point heating.

The system BLUE POINT uses multiple information to control the heating process. Some information are collected locally other information is coming from the server (supervision system/SCADA).

All Master Cubicles can be configured to measure these values.

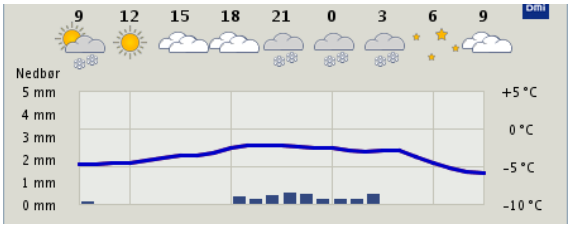
Cold Rail Temperature
Heated Rail Temperature
Air Temperature
Snow Fall Detection
Wind Speed

WEATHER FORECAST

Additionally, the System BLUE POINT also handles electronic incoming weather forecasts from a weather forecast organisation (Weather forecast feed). The forecast is very reliable because it is very local and only foreseen +1, +2 and +3 hours ahead.

System BLUE POINT is operating with the following forecast:

Snow warning
White frost warning
Dew point forecast



MULTI-MODE OPERATION

The BLUE POINT operates with multiple different modes. Each mode is made to one particular weather situation. Every mode is optimized for the best possible compromise between performance and energy saving. Here is some of the more important modes:

NO SNOW FORECAST
The weather forecast does not predict snow and the local weather snow detector doesn't either - The system is OFF.

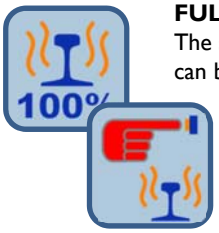
SNOW FORECAST
The weather forecast predicts snow. All switches are now pre-heated, ready for snow.

SNOW
The snow-detector has detected snow. All switches are now heated to a higher temperature for melting snow.

SNOW STORM
The snow-detector has detected snow and the wind-speed sensor has detected high heavy wind. All switches are now heated to an even higher temperature (typically max. power).

WHITE FROST RISK
The weather forecast combined with the local rail and air temperature have calculated a risk of white frost. The rail is heated just enough to avoid problems.

MINIMUM RAIL TEMPERATURE
The system can be set so the rails never get colder than this limit. This will prevent that the rail temperature response time gets too long.



FULL HEATING
The system can be set to heat maximum. This can be done remotely or by the "service-switch" in the control cubicle.

SCALABLE SYSTEM

The BLUE POINT system is a modular scalable system to cover installations from a single stand alone installation on a small station to a whole country.

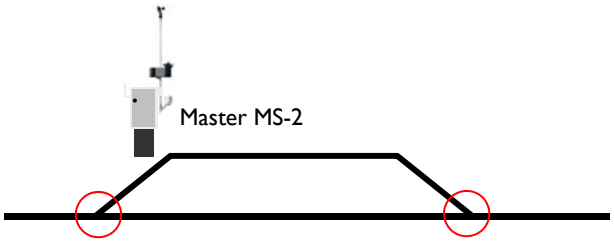
The illustration shows a small station installation. Every station will run as a stand alone system. It will use measured weather conditions and rail temperature as parameters for controlling the switch heating.

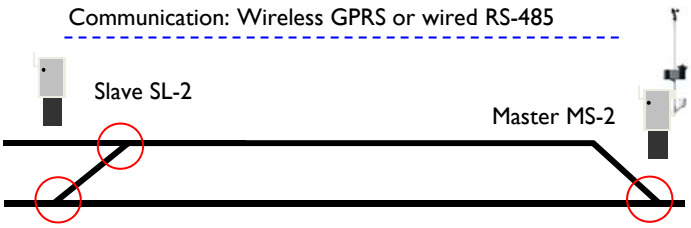
Using wireless communication between Master and Slave will reduce the installation cost.

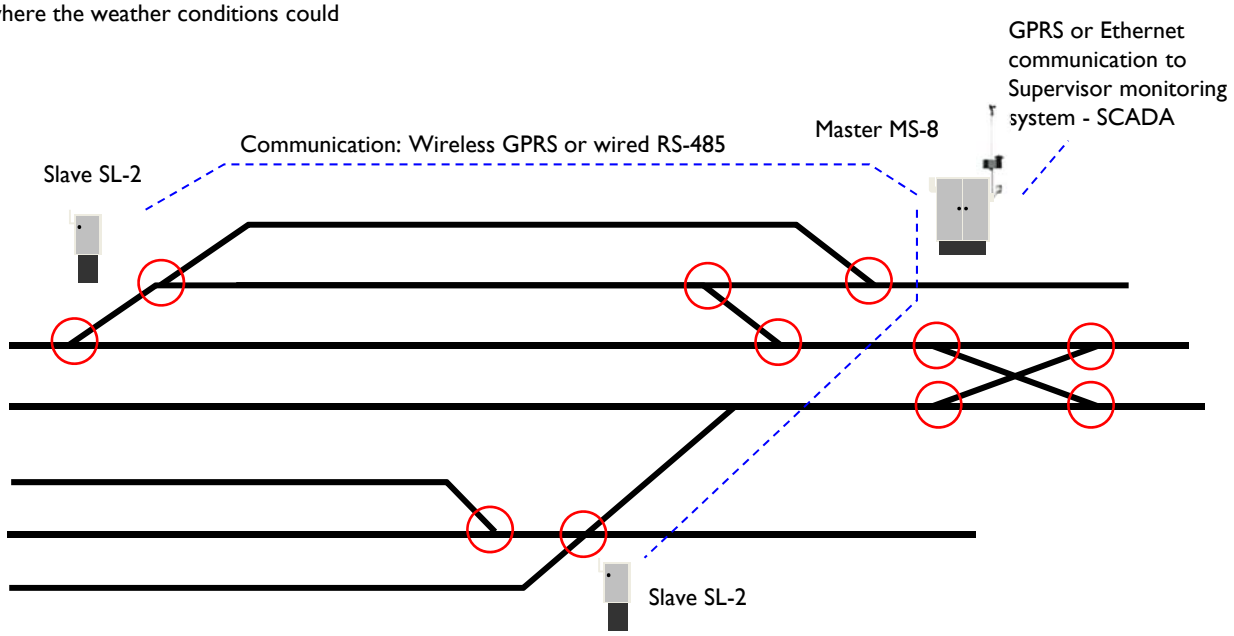
All installations can be upgraded to communicate with a SCADA system and to receive weather forecast feeds. Upgrade can be done at any time.

Large stations will need more control cubicles. Typically one Master and a number of Slave cubicles.

Any cubicle can have snow detectors and rail temperature sensors. This is important for large station areas where the weather conditions could vary a lot.



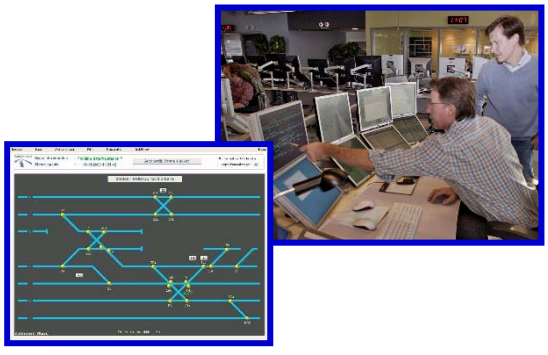




TERRITORY SOLUTION

Multiple stations connected to BLUE POINT SCADA supervision system. The SCADA system is broadcasting weather forecast to supplement the local measured weather and rail temperatures. This extra feature will reduce the energy consumption for the stand-alone controllers by additional 40%.

System BLUE POINT Control Cubicles can be interfaced to almost any SCADA systems.



MASTER & SLAVE CUBICLES

The System BLUE POINT operates with a concept of Master and Slave control cubicles (MS and SL).

The Master Cubicle handles all control functions including weather information.

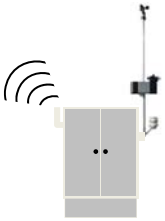
If the system contains SCADA supervision software all communication is done through a Master Cubical.

The Master Cubicle is talking to all connected Slaves wired or wireless. One Master can talk to up to 7 Slaves

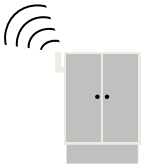
The Slave Cubicle contains the same switch gear components as the Master but without weather station and rail temperature sensors. The slave turns the heat on and off dictated by the Master Cubicle.

The System BLUE POINT range covers different sizes of Master and Slave cubicles. Master and Slave cubicles can be combined as shown in the table.

A Master Cubicle can control any number of switch points from 1 to 64 (64 = 1x MS-8 + 7x SL-8)



MASTER CUBICLE	NUMBER OF POINTS	NUMBER OF SLAVES
MS-8	up to 8	up to 7
MS-4	up to 4	up to 7
MS-2	up to 2	up to 1
MS-LT	No power*	No



SLAVE CUBICLE	NUMBER OF POINTS
SL-8	up to 8
SL-4	up to 4
SL-2	up to 2

*(No power) All –LT units has no power source output, but is built to control existing power circuits.

CONTROL CUBICLE

The control cubicle handles all control for the switch point heating. The cabinet is made for the railway environment and contains all necessary electrical components to source power and protect the system. This includes anti condensation heater in the control cabinet. The list shows the different in- and outputs from a Master Cubicle.

Internally the Master handles all following functions both for the Master and all connected Slave cubicles:

Self diagnostics:
- Power failure
- Power phase failure
- Communication error
- Switch point heating element error
- Temperature sensor error

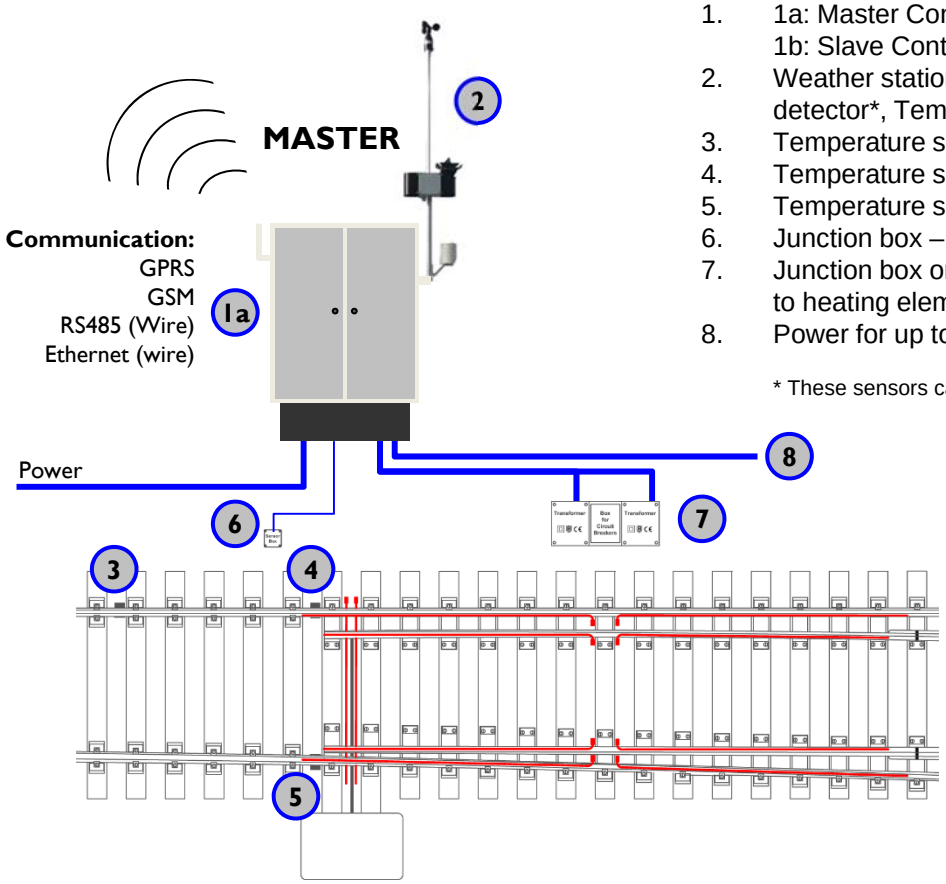
Energy statistics:
- Power hour counter
- Energy consumption
- In/Out cycles
- Operation time in all operation modes

Switch Heating Control based on:
- Customer settings
- Measured cold rail temperature
- Measured hot rail temperature
- Measured weather inputs
- Received weather forecast

Communication:
- Communication with all connected Slave cubicles
- Communication with SCADA supervision system
- Communication with connected PC (Maintenance)

- Current sensor for every phase and every switch point
- Wireless or wired communication
- Hydraulic-Magnetic Circuit Breakers
- Electronic earth leakage detection
- Battery back-up
- Isolated 230 VAC power for:
  - Outlet socket (PC, tools etc.)
  - Cabinet light
  - Cabinet anti-condensation heating
- Thermal Magnetic MCCB
- Weather measurements
- Sensor input modules
- Industrial high-end RTU
- Power Hour counter
- Lightning protection
- Phase follower meter
- Current-draw-change detectors
- Power supply

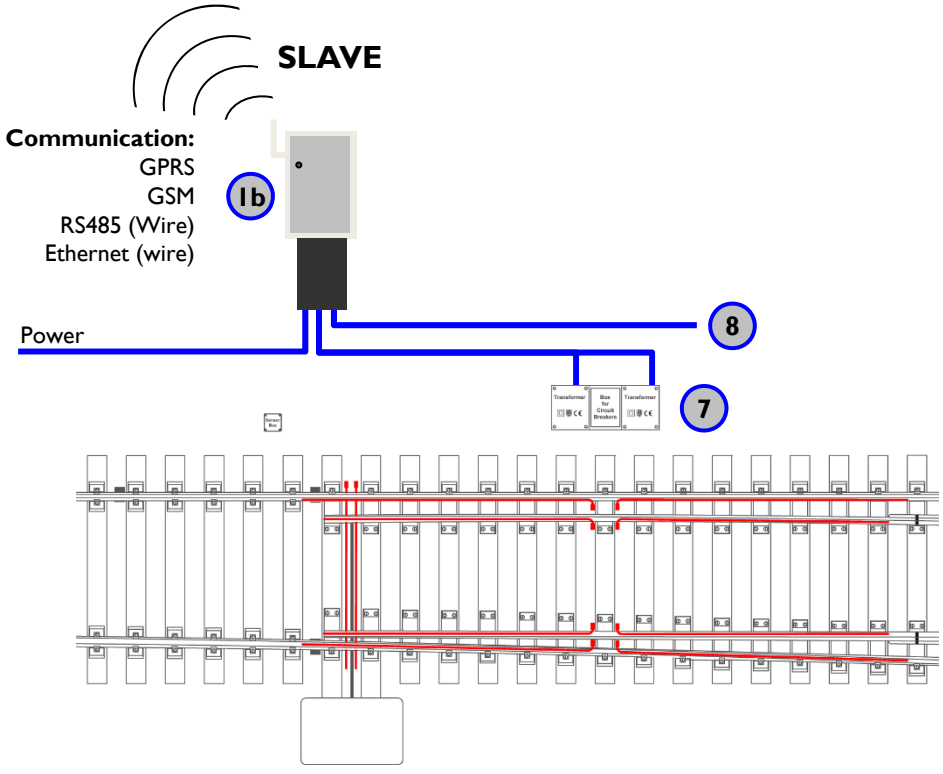
MASTER CUBICLE & MASTER SWITCH INSTALLATION



1. 1a: Master Control Cubicle
   1b: Slave Control Cubicle
2. Weather station: Wind speed, Snow detector*, Temperature and Humidity.
3. Temperature sensor – Cold Rail (reference)
4. Temperature sensor – Hot Rail 1 *
5. Temperature sensor – Hot Rail 2 *
6. Junction box – Temperature sensors/tx
7. Junction box or safety transformers – power to heating elements
8. Power for up to 7 more switch points

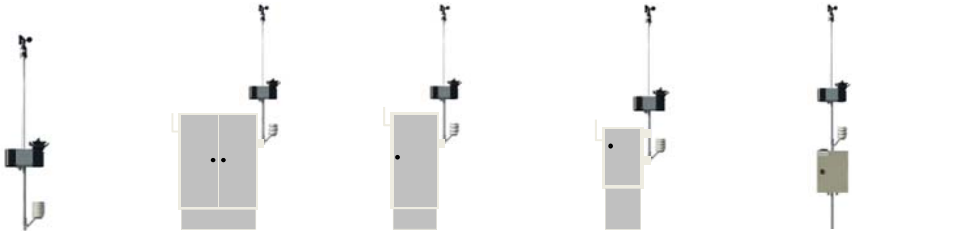
* These sensors can also be added to slave cubicles.

SLAVE CUBICLE - INSTALLATION



Both illustrations show a 1:9 radius 190 switch point. Heating on both stock rail and switch blade. Additional lock heating is also shown.

PHYSICAL SIZE & POWER SPECIFICATIONS



Model		MS-8 / SL-8	MS-4 / SL-4	MS-2 / SL-2	MS-LT
Height*	-	1100 mm	1100 mm	860 mm	380 mm
Width	250 mm	1140 mm	806 mm	585 mm	280 mm
Depth	150 mm	336 mm	336 mm	315 mm	220 mm
Weight	6,5 Kg	75 Kg	55 Kg	35 Kg	11 Kg
Weather station height	2000 mm				
Base over ground level	-	230 mm	230 mm	270 mm	Wall mounted
Base under ground level	-	620 mm	620 mm	600 mm	-

* Exclusive weather station pole and exclusive base

Max. supply fuse	250 A	125 A	64 A
Maximum output power	160 kVA	80 kVA	40 kVA

Terminal – Input power	Cu: solid 185 mm^2 wire 150 mm^2 Alu: solid 95 mm^2 wire 70 mm^2
Terminal – Output power	Cu: 2,5 – 50 mm^2 Alu: 6 – 50 mm^2
Earthing requirement	Maximum 150Ω, Safety protection: TT System (IT System on request)

System also available including Overhead wire transformers. 50 Hz or 16,6 Hz.
Input to cubicles 3x400V, 2x230V, 1x230V

RTU – INTELLIGENT CONTROLLER

The Intelligent RTU unit stands up to very harsh environments. The specially developed, proprietary alloy enclosure provides noise immunity, vide temperature range, impact/vibration resistance and DIN-rail mounting without special tools.
The RTU is programmed to control all communication and input/output for the switch point heating.

Software, Input/Output, communication and SCADA interface can be customized to fit into existing installations or to meet special demands.

Alarm handling:	Smart alarm management with embedded calendar
Battery back-up:	Intelligent battery charger
Ambient temperature storage:	-40°C to +80°C
Ambient temperature operation:	-10°C to +50°C
Humidity:	5-95% non condensing
Approvals:	CE, UL/CSA
EMC:	EN61326-1 EN61000-4-2,3,4,6
EMI emissions:	EN55022 EN61326-1
MTBF	>400.000 hours

CUBICLE - CABINET

The cubicle cabinet is an important protective part of the system. The cabinet is designed for the demanding requirement in the out door railway environment.
The cabinet is installed on DIN sized base, made from the same material.
(Other cabinets or materials are available on request)

Cable access:	Bottom
Protection level:	IP34D (IP43/IP44)
Standard:	EN 60529
Material:	Glassfibre, reinforced polyester
Elec. & mech. Req standard:	DIN EN 60439-1
Bursting safety:	10 kA arc-over time >0,3 sek
Door lockers:	Three-point lock
Built according to:	EN/IEC 60439-1

RAIL TEMPERATURE SENSORS

Cold and Hot (heated) Rail Temperature sensors
Special Bracket for actual Rail. Side-rail mounted or Bottom-rail mounted.

Measuring Range:	-50°C to +50°C
Accuracy:	± 0,1°C
Resolution:	0,1°C
Measuring principle:	Pt100 3 wire
Measurement aluminum block (without Bracket):	150 x 30mm
Protection:	IP65

AIR TEMPERATURE

Measuring Range:	-50° C to +50°C
Accuracy:	±0,1°C
Resolution:	0,1°C
Measuring principle:	Pt1000 2 wire
Protection Covering:	130 x dia. 100mm
Mounting:	Pole diameter 38mm
Protection:	IP65

WIND SPEED ANEMOMETER

Wind detection in horizontal direction.
Used to detect snow storm or drifting snow (strong wind). Strong wind will increase the chill effect of the rail. A "wind alert" will ask the controller to increase the temperature target.

Measuring Range:	0.5 - 50 m/s
Accuracy:	± 0,5 m/s, 3% of M.V.
Resolution:	< 0,1 MS
Ambient Temperature:	- 30°C to + 70°C
Measurement:	165 x dia. 67mm
Protection:	IP65
Mounting:	Pole diameter 38mm

SNOW DETECTOR

The maintenance free snow detector is specially developed for Railway application and has been used in connection with switch point heating for many years. The capacitive double sensor in the detector is made for long time use without maintenance. The special wind catch secures detection of drifting snow.

Primary supply:	42 – 48V AC
Primary fuse:	1.6 AT 5 x 20mm
Power:	42V/55VA, 48V/62VA
Dual Snow sensor: 15 cm² capacitive	
Output relay Moisture:	NO: 0.4/125VAC 2A/30VDC
Ambient temperature:	-30°C to +40°C
Housing:	IP65/DIN 40050
Fixing:	200 x 300 mm
Weight:	1 kg

LOCATION FOR THE WEATHER STATION

The weather station pole is normally mounted on the cubicle. In cases where the cubicle is placed so the weather measurements are not representative (against a wall, under a bridge etc.) we recommend to place the weather station on a stand-alone pole and draw a cable to the cubicle. Big yards or long stations might need more than one snow detector. In these cases an extra snow detector can be connected to any slave cubicle. The same counts for extra hot-rail temperature sensors. They can be connected to any slave cubicle.

TRAM LINE – POINT HEATING

Heating elements designed for the big corrosion challenges the street embedded switches gives. Complete city systems including control and weather forecast service.

25% ENERGY SAVING – POINT HEATING

Rail insulation to boost the system or save energy. Easy to install. No conflict with the tampering machines.

HEATING ELEMENTS – POINT HEATING

Designed for long life time. Dual layer electrical insulation. Vibration resistant technology. On-site bending for optimal mechanical solution

OVERHEAD LINE DE-ICING

Permanent de-icing solution on bridges, in depots, up-hill lines etc. Special heating wire for all light rail and trolley OHL 600-1500 V systems. Complete systems.

METRO 3rd RAIL DE-ICING

Heating cable solutions for all light-rail with an open 3rd power rail. Complete systems including controllers and SCADA for supervision.

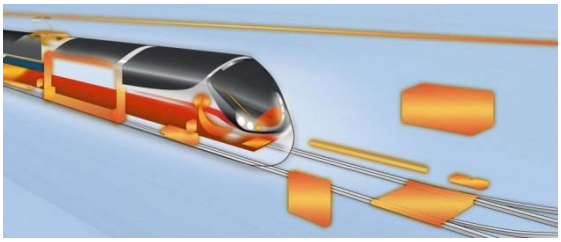
SCADA SOFTWARE

Supervision of the entire system. Access via internet. Provides hosted solutions, no IT investments needed.

OTHER CUSTOM DESIGNED PRODUCTS

- Cover for drifting snow in switch points
- Portable GPRS Rail Temperature monitor for risk of suncurves
- Plat Form Heating and Stairs Heating
- Safety Transformers for track side

SAN Electro Heat A/S (Member of the NIBE group)
Danish located international company offering more than 50 years of experience in development and manufacture of advanced technical electric heating solutions and components. Products are highly cost and energy optimized, and developed together with our customers. Our focus and know-how is divided into four business areas: Railway Systems, Wind Power, Process Heating and Heating Cables.



SAN - Railway (Part of NIBE Railway Components)
Supply of complete systems, which secure optimum operation under any winter weather situations: Switch point heating, overhead wire de-icing and third rail de-icing. Our aim is to supply highly efficient systems that reduce energy consumption as well as the total cost of ownership. From heating elements through intelligent controllers to advanced server based computer monitor programs. Including all necessary fittings, power transformers, weather stations etc. Rolling stock comfort heating, door step de-icing, heating of hydraulic systems, toilet/waste water systems and test load resistors.
Our design has proven its reliability through thousands of installations all over Europe.

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