ENERGY SAVING
POINT HEATING – LIGHT RAIL

50-80% Energy saving
Heating controlled by weather conditions and weather forecast

Long life heating elements
Monel® corrosion resistant to salty road conditions

Increase traffic reliability
Get instant information as status, locale conditions, alarms and errors from the point heating system

No investments in new cabinets
Control boards customer made to fit existing point heating installations

No new cables or wires
Full wireless communication using proven secure GPRS technology.

Expand step-by-step
Full scalable system, increase step by step. Installations from few switch points and weather station to thousands of switch points.

Access the system from anywhere
Use existing IT infrastructure or use our hosted internet system.

Complete line of products to an integrated Smart City Solution

Heating elements, heating control boards/cubicles, weather station, weather forecast and supervision software for monitoring and control the system. Delivery as single components or as a complete integrated solution.

SAN Railway System BLUE POINT avoids point heating burning 6-7 month a year. Many winter days are cold but no ice and no snow. System BLUE POINT save energy. Uses only energy when needed. Focus on long lifetime and energy optimised/saving solutions.

- **Point heating elements** special designed to stand the extra harsh tramline conditions specially the salty water from de-icing the roads.
- **Heating control** boards or cubicles to fit existing installation or as complete new installations. Wired or wireless communication
- **Weather Forecast – Control** Big energy savings and still prepared for snow. Weather forecast every hour analysed by the BLUE POINT Supervision system, prepares all points for snow.
- **Weather stations**: snow, air temperature, wind speed etc. to control heating as a function of the weather conditions.
- **BLUE POINT SCADA Supervision software** to monitor and control complete city installations.
- **HOSTED supervision system** offered by SAN. Access the installation from the internet. No need for investing in IT hardware. High level of security is part of the system.

SMART WEATHER CONTROL™ PRINCIPLE OF THE SYSTEM

Each Point heating control cabinet are located close to the points. In the cabinet is the BLUE POINT controller board and a GSM antenna (for GPRS wireless communication).

Strategically around in the city is mounted a small number of weather stations measuring: Snowfall, air temperature, rail temperature, wind speed* and Air humidity* (*=optional). All weather stations also have GSM (GPRS) antenna.

All point heating control cabinets and all weather stations are in wireless contact with the BLUE POINT server (Secure GPRS network).

The BLUE POINT SCADA server retrieve weather data from weather stations and receive weather forecast every hour for the locale area. Based on these informations the decision is made, whether or not to heat and how much.

Any errors or alarms that occurs in any point heating controller or weather station are immediately reported to the BLUE POINT SCADA server. Critical alarms are also send via e-mail to relevant persons.

The operators can control and monitor the system from anywhere. The operator just need access to the internet.

The System gives an overview of the entire system, shows in witch mode every controller operates, shows locale weather conditions, shows any error or alarms.

The system is fully automatic, but inside every cubicle there is a manual service switch. This switch could force the heating ON.

The operator also has the possibility to remotely force the system to heat.
BLUE POINT SCADA - SCREEN VIEWS EXAMPLES

Easy table over view of all Cubicles in a city or territory. Information about locale weather conditions, last update time and information about which heating mode is active. Cubicles with faults and errors changes colour and an error message is displayed.

This screen also gives access to any of the listed cubicles for a closer look.

CUBICLE OVER VIEWS

Easy table over view of all Cubicles in a city or territory. Information about locale weather conditions, last update time and information about which heating mode is active. Cubicles with faults and errors changes colour and an error message is displayed.

This screen also gives access to any of the listed cubicles for a closer look.

WEATHER STATION & CUBICLE – CITY MAP

Easy over view of an entire geographical area. The map contains easy to see symbols for each cubicle and weather station. Weather data is displayed where they are measured. If an error occur the colour of the icon changes and/or is flashing.

SINGLE CUBICLE OR WEATHER STATION - DATA

Behind every cubicle or weather station there is a more detailed information screen. All energy, and mode counters are displayed and light is showing status for every heating element for each switch point. Weather station information contain online weather data for this specific weather station.

ADVANCED DATA & SETTINGS

The advanced data & settings screen makes it possible to adjust all triggers that brings the system into the different weather modes.

These settings can be done for the entire system or individually cubicle by cubicle.

Individual settings will optimize the system to match different weather pattern from area to area in the same city.

DATA ANALYSIS

All data is stored in a database. The “Analysis” tap provides information about how power is distributed in the different weather modes, Historical temperature curves and event log about errors and modes.

These analysis is a great tool to fine tune the system settings for saving energy without compromising traffic interruptions.

The analysis can also show irregularities e.g. manual operation of the heat.
SAN Electro Heat has two different designs. Both designs share the same weather station:

**CONTROL BOARD:**
A fixed physical layout for up to two switch points.

**CONTROL CUBICLE:**
Complete cubicles in a flexible design from 1 to 16 switches on one board.

**CONTROL BOARD**
Stainless steel board with handle for two switch points (4 heating elements). Visual status indication for each heating element. The “one board” design makes it very easy to replace broken boards and reduce time consuming on-site repair work.

Power: 600-750 VDC or City Power

**CONTROL BOARD FAMILY:**
1. Master board (with µ-controller and GSM antenna)
2. Slave board (hard wired to a Master board)
3. Manual control board (can be upgraded to Master board)

All share the same physical size and electrical connection points.

**CONTROL CUBICLE – MULTIPLE POINTS**
Complete control cubicles including cabinet in steel or reinforced fibre glass. Individual test of each heating element. Control by temperature feedback or Duty-cycle control.

Power: 600-750 VDC or City Power

**CONTROL CUBICLE FAMILY:**
1. Master board (with µ-controller and GSM antenna)
2. Slave board (hard wired to a Master Cubicle)

**WEATHER STATION**
Remote weather station placed on 2-4 different locations in the city. Reads the actual weather conditions:
- Air temperature
- Snow detection
- Cold rail (Ground) temperature
- Barometric pressure (Optional)
- Type and volume of snow fall (Optional)
- Relative humidity (Optional)
- Wind speed (Optional)
- Wind direction (Optional)

Data is measured and sent to the SCADA software by wireless GPRS (GSM)
Cross-section A – B

Junction and mounting box for heating element for an imbedded switch point
The SL series of heating element has the following key features:

- **Resistant to mechanical chocks and vibrations**
  Long lifetime – good return on investment

- **High Power**
  High heating capacity for very challenging winter weather conditions

- **Corrosion resistant outer shield**
  MONEL® 400 restrain the salty water from the de-icing of the roads

- **Completely sealed connection**
  No risk of malfunction due to moisture and termination corrosion problems.

- **Flexible length and shape**
  Made to fit the individual embedded points best possible

- **Optional: Multi zone heating**
  Increase the efficiency and saves energy

The SL series of flat-oval point heating element is designed to meet the extreme environment of a city road in white winter dress. The demand is a rugged, long life, reliable element.

The element jacket is made of Monel 400. This Nickel-Copper alloy is resistant to sea water and steam at high temperatures as well as to salt and caustic solutions. Conditions that are present when de-icing roads in a city.

Moisture intrusion is eliminated by the design: Connection head is soldered to the heating element. The PE barrel is thermo compatible with the resin. This is to prevent internal thermo cracking between to materials expanding differently to temperature. A final hot-shrink sleeve covers the hole connection head from the beginning of the cable to the first part of the heating element.

The heating wire is a solid wire wounded in a spiral. The spiral is completely encapsulated in highly compressed ultra pure magnesium oxide. The heating element has been through a thermo cycle to reduce fragility.

The element can be bended on-site or can be delivered pre bended.

NOTE:
SL can be delivered with multi-zone power output. E.g. first half of the elements makes 300 W/m and the rest makes 500 W/m. This Has been delivered for switch points where higher power was wanted at the toe of the point. But the total available power was limited.
Shape: S2 (Straight)

Model: SL - S2 - ______ - ______ - ______ - ______ - ______

Heating Element Specification:

MODEL: SL - S2 - L - XW - V - CZ - Y

SL ______ Type of heating element
S2 ______ Shape of the heating element
L ______ mm ± 2% Length of the heating element
X ______ W/m Power per meter (heated length)
V ______ V Supply voltage
Z _______ m Cable length in meters
Y _______ Y=Yes if something special apply

TotalPower: _______ W ±5%
Cable dimension: _______ mm²
OD cable size: _______ mm
Label LBL: _______

Barrel type: Water tight PE-LD ø28x76 Black / Shrink on sleeve
Cable type: PUR-cable
Element profile: SAN SL 13x5.5
**SPECIFICATIONS TYPE SL**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Power</td>
<td>Up to 500 Watt/meter</td>
</tr>
<tr>
<td>Supply voltage</td>
<td>40 to 900 V</td>
</tr>
<tr>
<td>Cold zone 1</td>
<td>Typical 150 mm</td>
</tr>
<tr>
<td>Cold zone 2</td>
<td>Typical 20 mm</td>
</tr>
<tr>
<td>Physical size</td>
<td></td>
</tr>
<tr>
<td>Heating element</td>
<td>13 x 5,5 mm</td>
</tr>
<tr>
<td>Connection head</td>
<td>OD 26 mm</td>
</tr>
<tr>
<td>Heating element length</td>
<td>Up to 6000 mm</td>
</tr>
<tr>
<td>Cable length</td>
<td>To be specified</td>
</tr>
<tr>
<td>Cable connection</td>
<td>Permanent molded</td>
</tr>
<tr>
<td>Cable type</td>
<td>PUR H07BQ-F</td>
</tr>
<tr>
<td>Electrical isolation</td>
<td>&gt;10 M Ohm</td>
</tr>
<tr>
<td>Outer shield</td>
<td>MONEL® 400</td>
</tr>
<tr>
<td>Extra protection</td>
<td>Hot-shrink sleeve</td>
</tr>
</tbody>
</table>

**SHAPES**

The heating elements are pre-bended in 2 different shapes: S1 straight with offset and S2 straight. Special pre-bended elements are available for a number of specific switch point types.

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**MODEL SPECIFICATION - TRAMLINE POINT HEATING ELEMENT**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SL</td>
<td>Type of heating element</td>
</tr>
<tr>
<td>SL (5x13 mm MONEL®400)</td>
<td></td>
</tr>
<tr>
<td>-S2</td>
<td>Shape of the element</td>
</tr>
<tr>
<td>S1, S2, S3...straight element as per drawing</td>
<td></td>
</tr>
<tr>
<td>-3100</td>
<td>Length in mm (up to 6000 mm)</td>
</tr>
<tr>
<td>-300W</td>
<td>Power output in Watt per meter (max 500W)</td>
</tr>
<tr>
<td>-600</td>
<td>Supply voltage</td>
</tr>
<tr>
<td>-2</td>
<td>2 wire or 3 wire (earth connected to the element shield)</td>
</tr>
<tr>
<td>-C1</td>
<td>Cable length in meters</td>
</tr>
<tr>
<td>-Y</td>
<td>Y..... Yes, something special to add about this heating element</td>
</tr>
<tr>
<td>SL - S2-3100 - 300W-600-2-C1</td>
<td></td>
</tr>
</tbody>
</table>

**SAMPLE MODEL:** SL-S2 type heating element, Straight element 3100mm length, power output of 300 Watt per meter, 600 V AC/DC supply voltage, 2 wire cable, 1 meter of cable.

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**SAN Electro Heat a/s (Member of the NIBE group)**

Danish located international company. More than 60 years of experience in development and manufacturing of advanced technical electric heating solutions and components. Our focus and know-how is divided into four business areas: Railway, Wind Power, Process Heating and Heating Cables.

**SAN Electro Heat - Railway (Part of NIBE Railway Components)**

Rail Infrastructure: Focus on complete systems to secure optimum operation under any winter weather situations e.g. Switch point heating, overhead wire de-icing, third rail de-icing and platform de-icing.

Rolling stock: Comfort heating, door step de-icing, heating of hydraulic systems, toilet/waste water systems and test load resistors.

We supply highly efficient systems that reduces energy consumption and total cost of ownership. Our design has proven its reliability through thousands of installations all over Europe, Canada and USA.

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SAN Electro Heat a/s - Railway
Gillelejevej 30b
3230 Graested, Denmark

san@san-as.com
www.san-as.com

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