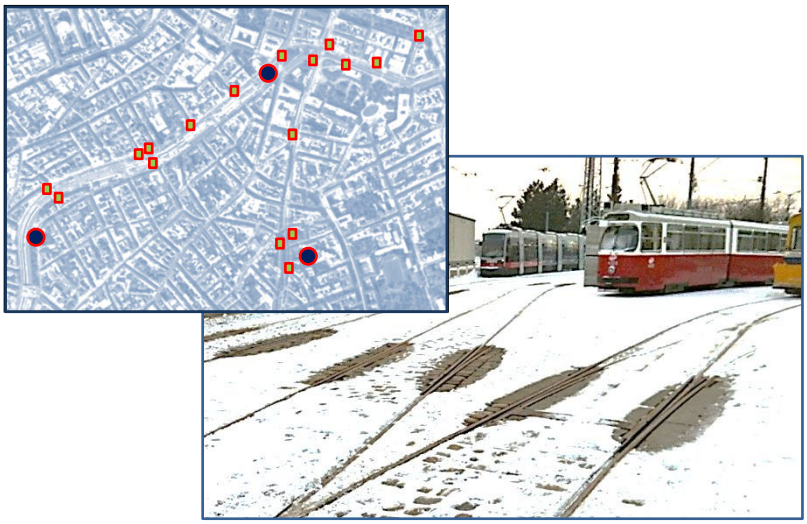
SAN
Electro Heat

BluePoint



# POINTS HEATING TRAMLINE/LIGHT RAIL

## ENERGY SAVING & FULLY AUTOMATIC

**Complete city solution with full remote control and monitoring. Energy saving and massive CO2 footprint reduction.**

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

### Long life time – Heating elements
Monel® 400 resistant to salty road conditions. Resist the extreme vibration and shock conditions on a rail. EN-50125 3:2003

### Increase traffic reliability
Remote monitoring - Get instant information as status, locale conditions, alarms and errors from the points heating system

### Multiple communication options
Wireless 4G, wired Ethernet or RS485, Fiberoptic and multiple protocols

### Customized design
All solutions are adjusted to the specific needs of each customer. Integration to existing SCADA software and/or specific hardware needs

### Safe choice
SAN has 40 years of experience in points heating and control systems. We will be happy to share our world wide experience

### Complete City Solution or components to improve existing installation

Heating elements, heating control boards/cubicles, weather station, weather forecast and supervision software for monitoring and control of the system. Delivery of single components to improve and supplement existing installations or delivery of a complete energy saving city solution.

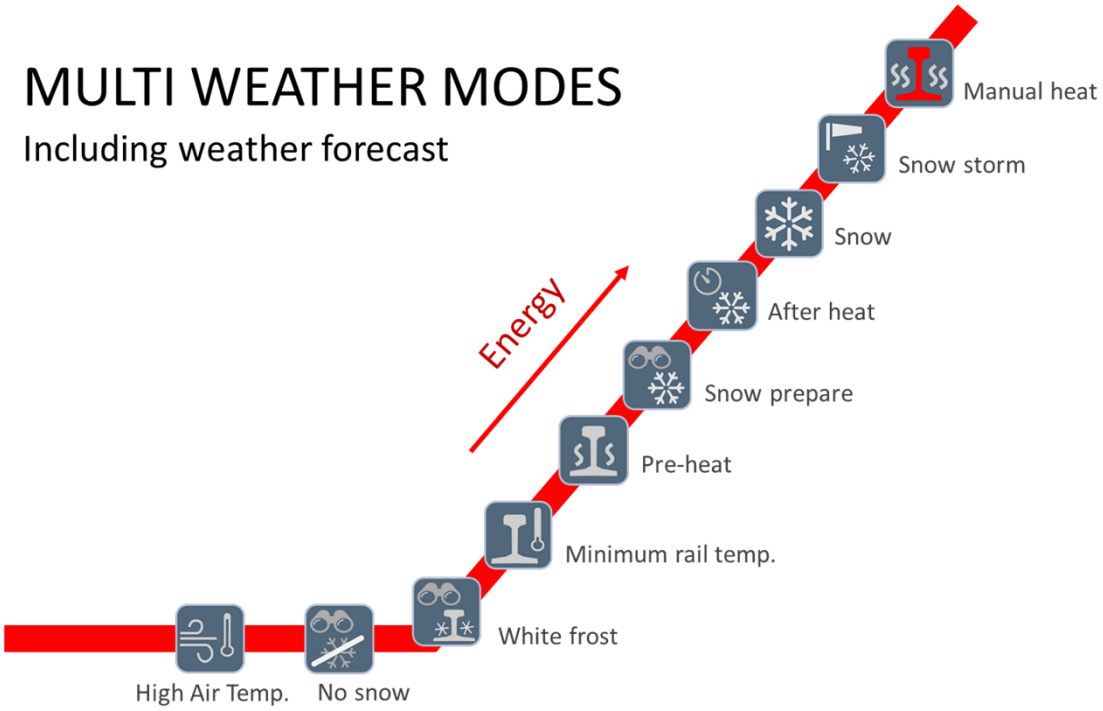
- **Point heating elements** special designed to stand salty water and vibrations
- **Heating contro**l boards or cubicles to fit existing installation or as complete new installations
- **Weather Forecast:** Locale forecast to prepare the turnouts for incoming snow and whitefrost
- **Weather stations:** snow, air temperature, wind speed etc. Control the heating as a function of weather conditions
- **BluePoint SCADA Supervision software** to monitor and control complete city installations
- **Cloud supervision system** offered by SAN. Access the installation from the internet

## ONLY HEATING WHEN NEEDED

The turnout is made of steel – a lot of steel. Heating up the critical switch point part means heating a lot of steel using expensive energy.
It is therefore evident to make sure that the installation uses the right amount of energy and only when needed. At the same time it is important not to jeopardize the reliability of the railway traffic.

## MULTI WEATHER MODES

The BluePoint operates with multiple modes. Each mode is made to one particular weather situation. Every mode is optimized for the best possible compromise between performance and energy saving. Below shows some of the control modes sorted after energy use. Modes with the little binocular icon is driven by weather forecast.




## WEATHER FORECAST

An important part of the energy saving in System BluePoint is the use of electronic incoming weather forecasts.
The weather forecast is specific for each location. It is highly reliable because it only covers a little local area and is only foreseen +1, +2 and +3 hours ahead.

System BluePoint is primary operating with the following forecast:

**Snow warning**
**White frost warning**
**Dew point forecast**

More weather information can be provided to strengthen weather intelligence like: Rain, Rain volume, Temperature at different heights, sun probability and many more

ForCity Smart Artic X34 in common Helsinki winter weather

## SMART WEATHER CONTROL™ PRINCIPLE OF THE SYSTEM

Each Point heating control cabinet are located close to the points. In the cabinet is the BluePoint controller board and a GSM antenna (for 4G 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 4G communication.

All point heating control cabinets and all weather stations are in wireless contact with the BluePoint server.

The BluePoint 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.

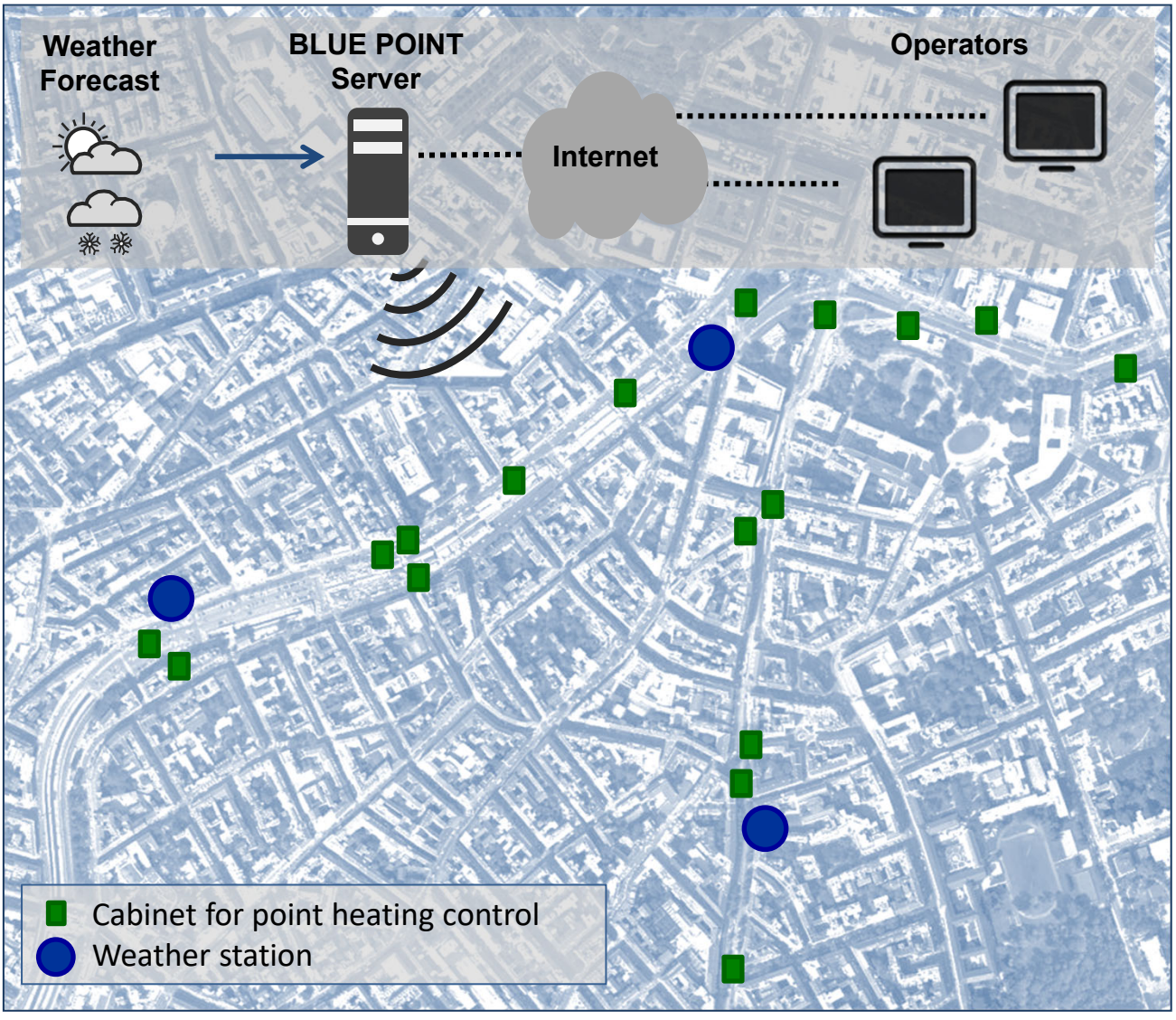
Any errors or alarms that occurs in any point heating controller or weather station are reported to the BluePoint SCADA server. Critical alarms will be send via e-mail to relevant persons.

The operators can remote 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 which 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.



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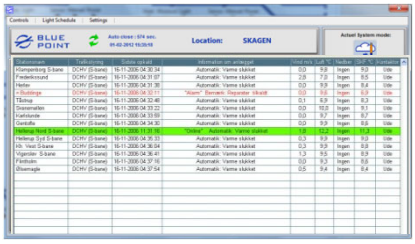
## BluePoint SCADA - SCREEN VIEWS EXAMBLES

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.

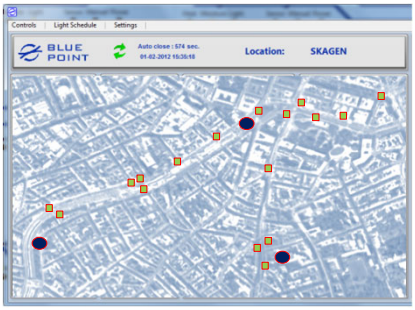
This screen also gives access to any of the listed cubicles for a closer look.



## CUBICLE OVER VIEWS

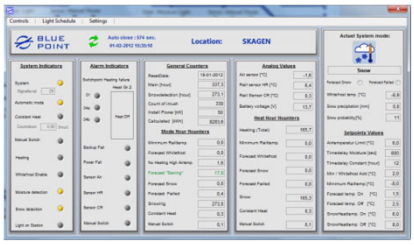
Easy table over view of all Cubicles in a city or territory. Information about locale weather conditions, last update time and information about which heating mode is active. Cubicles with faults and errors changes colour and an error message is displayed.

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



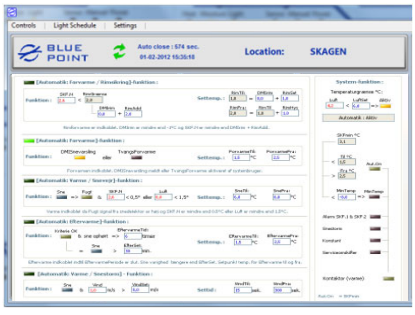
## WEATHER STATION & CUBICLE – CITY MAP

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.

## CONTROL HARDWARE

The control of the heating is designed as a full scalable system. Start from a simple manual system and upgrade to a full automatic and remote controlled network.

## CONTROL CUBICLE

| | |
|---|---|
| Size: | 2-18 switch points (4-36 heating elements) |
| Power source: | OHL – 600 to 850 VDC or<br>City Power 230/400 VAC |
| Internal power supply: | Yes, to run the controller |
| Output for heater: | OHL voltage or<br>City Power 230VAC |
| ON/OFF heat: | Build in electromechanical contactor – Full ON or Full OFF |
| Control modes: | Automatic, OFF, ON (service mode) |
| Automatic: | Duty cycle control 0-100% energy or<br>Rail temperature feedback.<br><br>Multiple weather modes depending on available weather information<br>Remote control via communication |
| Heating error: | Yes, individual detection for each heater |
| Output fuse: | Yes, individual fuse for each heater |
| Power fuse: | Yes, Automatic Circuit Breaker |
| Communication: | Yes, RS485 and Ethernet - Modbus protocol<br>Optional: 4G wireless communication |
| Service WEB page | Yes, A build in web page.<br>Get service access directly on the unit |

**OPTIONS:**


| | |
|---|---|
| Failsafe Air temperature sensor | Run the controller by air temperature if all other communications are down |
| Rail temperature feedback | Temperature feedback from heated rail<br>(Alternative to the rail-sensor-free duty cycle control) |
| LED lamps in cabinet door | Indicates unit is running ok or error condition. Easy to see for loco driver and report back if problems |
| Wireless communication | GSM 4G communication. As part of a complete network or just point to point. Use the web page directly from the internet. |
| Wireless WiFi communication | Can be used in depot installation for easy local communication without cables or SIM card |

## WEATHER STATION

The weather station gives the BluePoint system information about the actual weather in a specific part of the city.
The information is part of the system to decide when to heat and how much to heat.
Weather information is important to optimize the energy saving of the point heating system.

### WEATHER STATION - ON CONTROLLER CUBICLE

Weather station to be connected to a control cubicle.

The weather station is hardwired to the controller

W1 Reads the actual weather conditions:

- Air temperature
- Snow detection
- Cold rail (Unheated rail) temperature
- Wind speed (Optional)

- Data is measured and send to the SCADA software.

### WEATHER STATION - STAND ALONE UNIT

Weather station to be mounted on a pole anywhere in the city.

The unit is a stand alone unit in a stainless steel cabinet.

The unit contains both power supply and wireless communication interface.

The unit reads the actual weather conditions:

- Air temperature
- Snow detection
- Cold rail (Unheated rail) temperature
- Wind speed (Optional)


Data is measured and send to the SCADA software by request or pushed if the weather situation suddenly changes.

For more details please see separate Product Specification Sheet.

## SL – HEATING ELEMENT TECHNIC

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 (termination head “C”) is thermo compatible with the resin. This is to prevent internal thermo cracking between to materials expanding differently to temperature. A final black heat-shrink tube 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.

Outer shield Stainless steel (Monel 400)

Ultra pure Magnesium Oxide for insulation and stabilisation

Solid robust heating wire

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.

## KEY FEATURES

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

## RAILWAY STANDARDS

**Vibrations:** EN 50125-3:2003, Section 4.13.1 – On rail (test method according to IEC 60068-2-64)

**Shock:** EN 50125-3:2003, Section 4.13.2 – On rail (test method according to IEC 60068-2-27)

**IP68:** (protection against ingress of dust and water)
EN/IEC 60529:2013

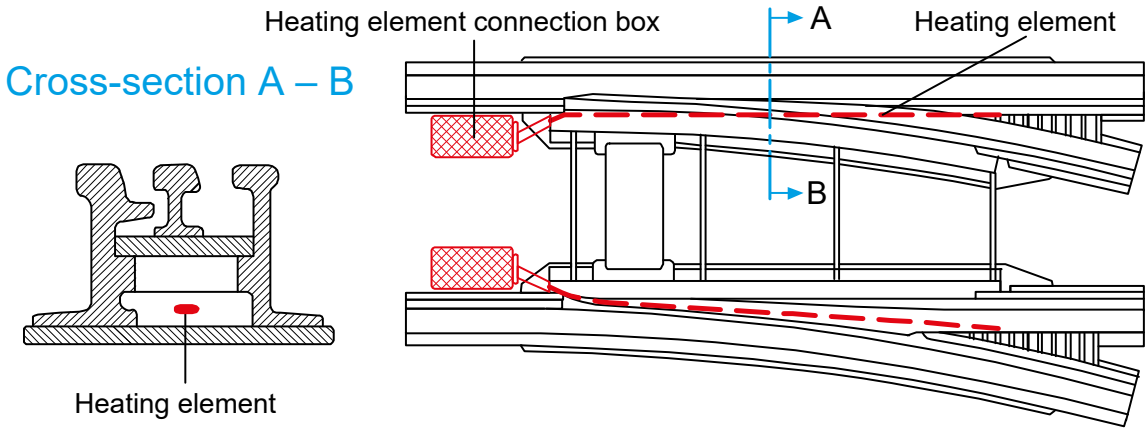
**Dielectric strength:** (high voltage test)
EN 60335-1:2012, Section 13.3 and Section 16.3

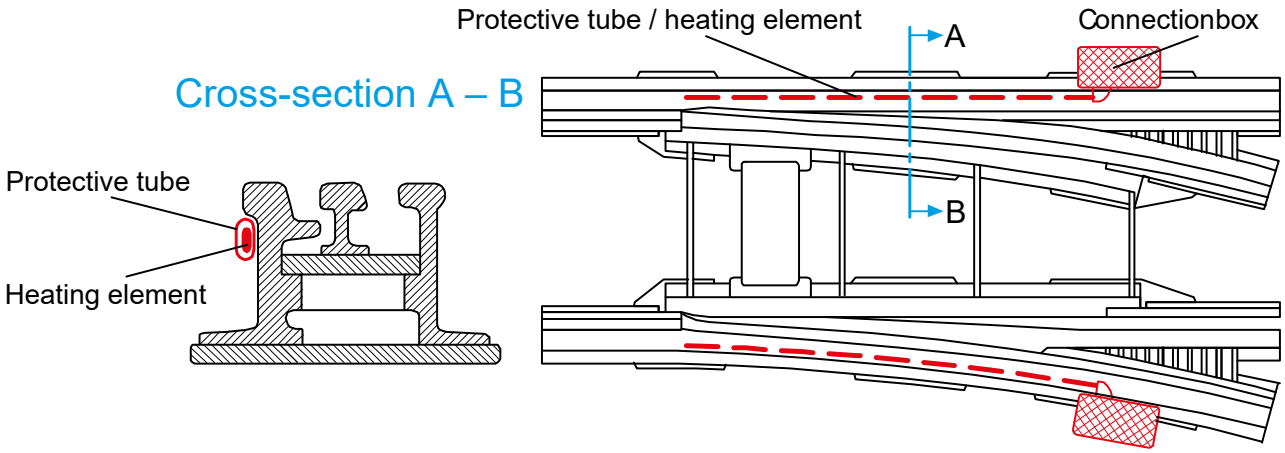
**Leak current:** EN 60335-1:2012, Section 16.2

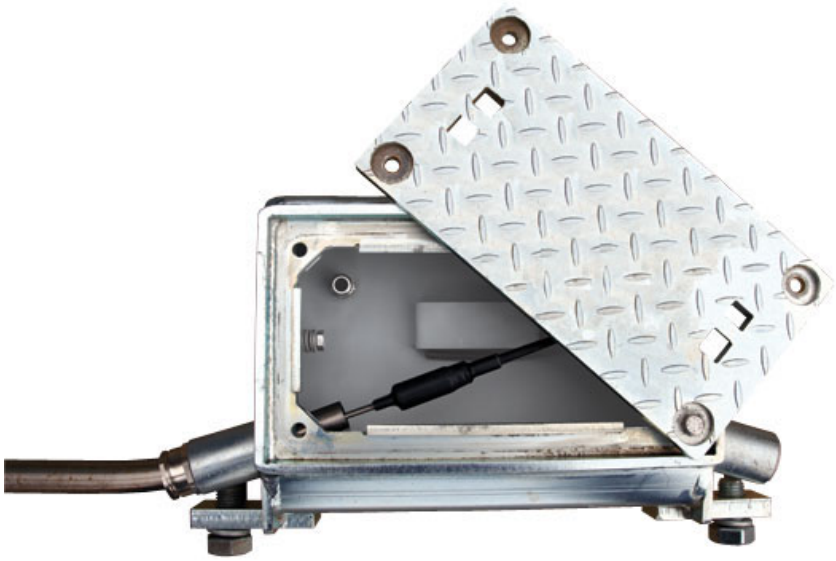
**Icing/freezing rain:** IEC 60068-2-1, Test Ad: Cold test for heat-dissipating specimens with gradual change of temperature that are powered after initial temperature stabilization.

**Composite temperature / humidity cyclic test**
IEC 60068-2-38, Test Z/AD (test method according to ISO 16750-4, Section 5.6.2.3)

## EMBEDDED SWITCH POINT HEATING



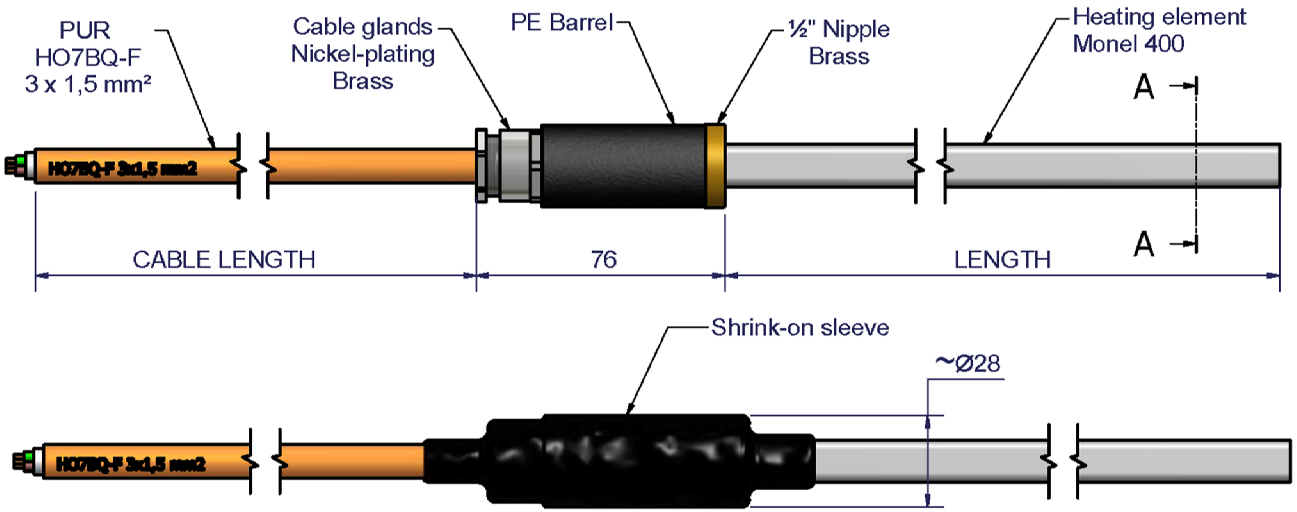



Junction and mounting box for heating element for an imbedded switch point

MODEL : SL - S2 -_____ - _____ - _____ - _____ - _____

# Shape : S2 (Straight)

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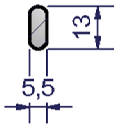



Heating Element Specification

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 somthing 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 |



CHANGE REV.: A,B,C... Internal Review 0A Issued for Review 0B, 0C... Re-issued for Rev. 01 Issued for Construction 02,03... Re-Issued for Construction

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Tolerance: Machined ISO 2768 m; Welded ISO 13920 BF | Material | Mass | | | | | |
| | | | Alteration | | Rev. | Date | Made by |
| Drawn by | | Checked by | | Approved by | TA / SAN | Dwg. no. | |
| Date | | Date | | Date | | | |

Item: Heating element for embedded switch points type SL

SAN Electro Heat
www.san-as.com

Project

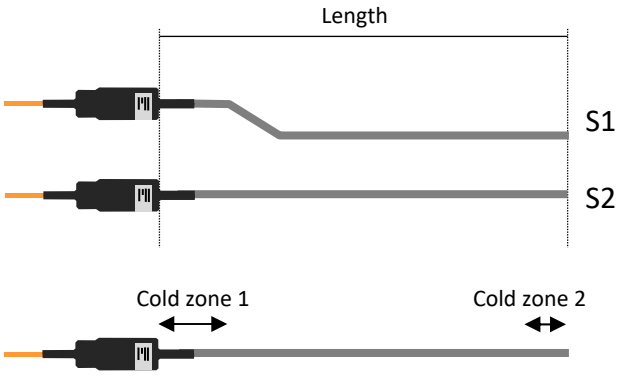
1 / 1

CHANGE REV. A

## SPECIFICATIONS TYPE SL - Standard

| | |
|---|---|
| Output Power: | Up to 500 Watt/meter |
| Supply voltage: | 40 to 900 V |
| Cold zone 1: | Typical 150 mm |
| Cold zone 2: | Typical 20 mm |
| Physical size: | |
| Heating element: | 13 x 5,5 mm |
| Connection head: | Type C: OD 26 mm<br>Length 76 mm |
| Heating element length: | Up to 6000 mm |
| Cable length: | To be specified |
| Cable connection: | Permanent molded |
| Cable type: | CP: PUR H07BQ-F 3-wire |
| Protection class: | IPx7 |
| Electrical isolation: | > 10 M Ohm |
| Outer shield: | MONEL® 400 |
| Extra protection: | Hot-shrink sleeve |

## 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.

## MODEL CONFIGURATION - TRAMLINE POINT HEATING ELEMENT

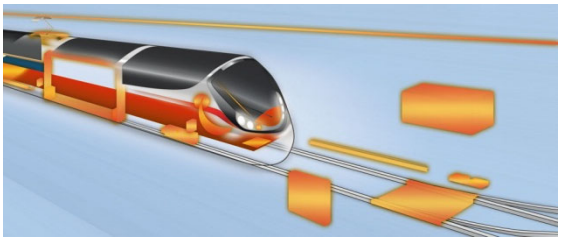
| | |
|---|---|
| SL | Type of heating element<br>S: Size 13x5,5 mm L: MONEL®400 |
| -S2 | Shape of the element<br>S1, S2, S3….straight element as per drawing |
| -C | Termination head<br>A: PE head B: Stainless steel + press nipple C: Brass + PE head |
| -3100 | Length in mm (up to 6000 mm) |
| -900W | Total power output in Watt |
| -600V | Supply voltage |
| -CP | Cable type CP: PUR CR: Rubber |
| 3 | Number of wires 2: 2 wire 3: 3 wire cable |
| -1M | Cable length in meter |
| -Y | Y: Yes, something special to add about this heating element<br>e.g: - Black heat shrink to cover termination head |

**SL-S2-C-3100-900W-600V-CP3-1M-Y -------**

OBS! Not all combinations are available

**SAMPLE MODEL: SL-S2 type heating element, Straight element w. brass-plastic head, 3100mm length, power 900 Watt, 600 V supply voltage, 3 wire PUR Cable 1 meter. Y:Black heat shrink**

**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.

**SAN Electro Heat a/s - Railway**
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