SAN
Railway Systems

SYSTEM
BLUE POINT

CONTROL CUBICLES
RAILWAY SWITCH POINT HEATING – SYSTEM BLUE POINT

Rock Solid Modular Control System
Thousands of successful installations in railway environment.

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

Up to 60% Energy Saving
Fast return on investments. Intelligent controller heats only when needed.

Energy management
Energy counters for every switch combined with stored weather information makes 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. No need for new installations.

Easy adoption
Install as a Stand alone application or make it integrate with the existing SCADA system.

Energy efficient power control of electrical switch point heating. Control system that secure 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). This intelligent device is programmed to control the power based on individually parameter settings and multiple inputs such as the locale 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. Makes it possible to respond proactive.

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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 elements.

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

All Master Cubicles can be configured to measure these values.

Cold Rail temperature	**X**
Heated Rail temperature	**X**
Air Temperature	**X**
Snow Fall Detection	**X**
Wind Speed	**X**
Humidity	**X**

In addition the System BLUE POINT also handles electronic incoming weather forecasts from a weather forecast organisation (Weather forecast feed).

Snow warning
White frost warning
Dew point forecast
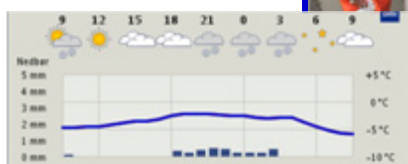
DISTURBING WEATHER CONDITIONS

The BLUE POINT system dividing the weather into 4 catagories of "disturbing" weather conditions that needs attention.

White Frost Warning

(Dew Point Heating)
In this mode the weather is below freezing point. The metrological institute has a warning out about white frost and report an expected dew point at a certain freezing level or the locale weather station calculates the dew point based on humidity and temperature of the cold rail.
   The controller heats all switches to stay a few degrees above the dew point temperature. This will prevent the white frost to make any disturbances in the switch functionality.
(Humidity sensor and/or weather forecast is needed)

Snow Warning

(Pre-Heating)
In this mode the locale temperature is low enough for snow and The weather forecast organisation has a warning out about coming snow or snow showers. The controller pre-heats all switches to a temperature a few degrees above freezing point. The switches are now hot enough to melt the first snow and they are ready to heat further when the snow fall begins.
(Weather forecast information is needed)

Snow / Ice Rain

(Heating)
In this mode the locale temperature is low enough for snow and the locale weather station has detected snow or ice-rain. The point switches are now heated to a higher temperature level than the pre-heating temperature. The falling snow will melt. This mode is followed by an "After snow" mode to maintain rail temperature above freezing point for some hours.
The switch point heating will then either return to pre-heating or turn the heat off depending on the weather forecast.

Snow Storm

(**Heating**)
As the name clearly indicates this mode is when a snow storm is present. Snow fall + strong wind. The switches are heated with maximum power. The upper temperature limit is high. The trigger to this mode is the same as for the mode: "Snow / Ice Rain" and the locale wind detector measures strong wind conditions.
(Wind speed (anemometer) is needed)

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SCALABLE SYSTEM

The Control Cubicles are an important component in the System BLUE POINT. The System is a complete system to operate, control, monitor and analyze all switch point heaters in a territory.

The system covers all needed components from heating elements to complete SCADA software solution.

The system is a modular scalable system to cover applications from a single stand alone installation on a small station to cover a hole country.

The illustration shows a small station application. 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 it will reduce the installation cost.

All installations can be upgraded to communicate with a SCADA system at any time.

SMALL STATION SOLUTION

Master MS-2

Communication: Wireless GPRS or wired RS-485

Slave SL-2

Master MS-2
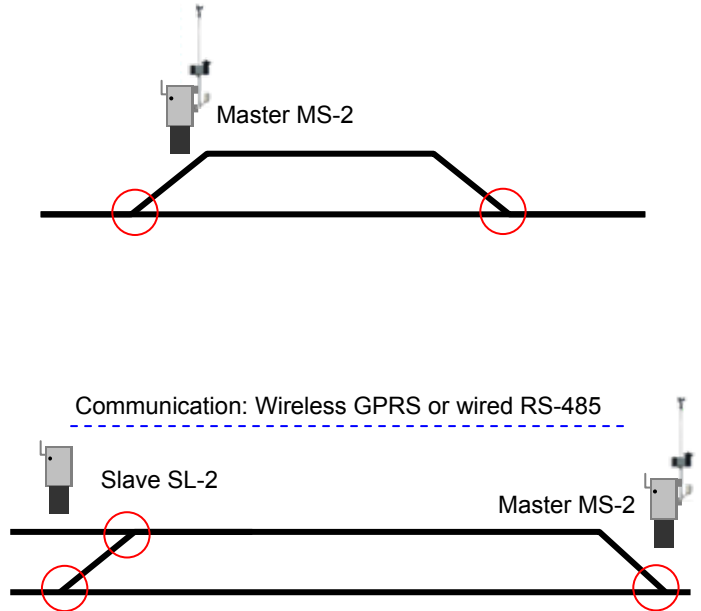
TERRITORY SOLUTION

Multiple stations connected to BLUE POINT SCADA supervision system. The SCADA is broadcasting weather forecast to supplement the locale measured weather and rail temperatures.

In case of no communication, Every station will run as a stand alone system.

System BLUE POINT Control Cubicles can be interfaced to all almost any SCADA systems.
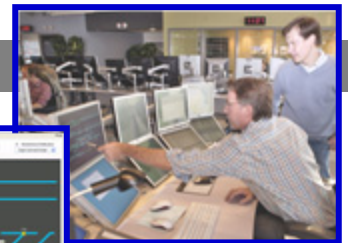
GPRS or Ethernet communication to Supervisor monitoring system - SCADA

Master MS-8

Communication: Wireless GPRS or wired RS-485

Slave SL-2

Slave SL-2

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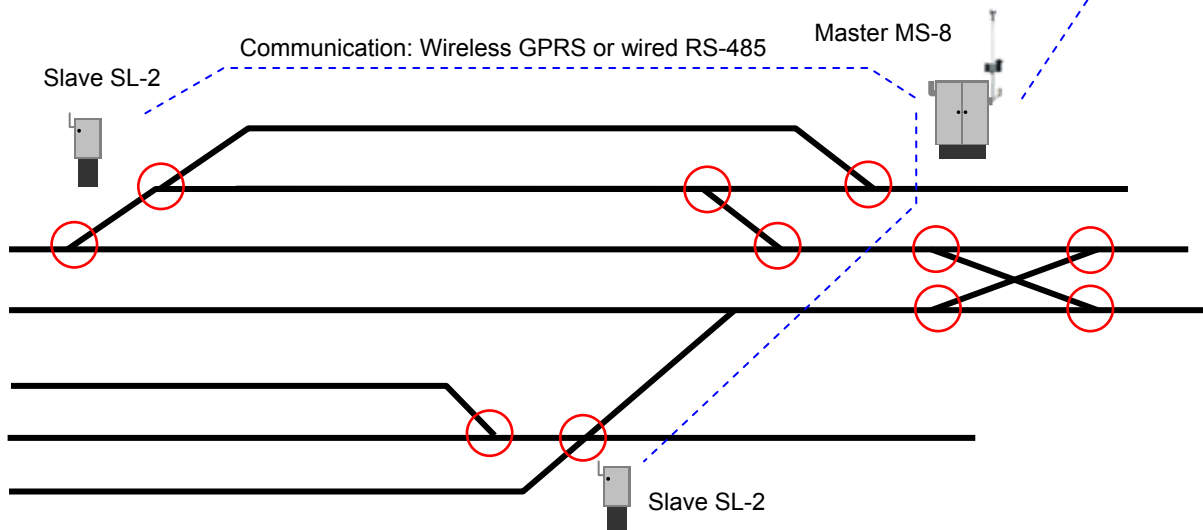
MASTER & SLAVE CUBICLES

The System BLUE POINT operates with a concept of Master and Slave control cubicles. To cover an area with multiple switch points it is most practical to place more than one cubicle, and make them talk to each other.

The Master Cubicle handles all control functions including weather information. If the system contains SCADA supervision software all communication is done through this Master Cubical.

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

The Slave Cubical 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 Cubical.

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

MASTER CUBICAL	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 CUBICAL	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 can control existing power circuits.

CONTROL CUBICLE

The control cubicle handles all control task regarding 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 a small heater to keep the moisture level low in the 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 in different 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
- Wireless Communication Module
- Hydraulic-Magnetic Circuit Breakers
- Electronic earth leakage module
- Battery back-up
- Isolated 230 VAC power for:
   - Outlet socket (PC, tools etc.)
   - Cabinet light
   - Cabinet thermo controlled 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

Communication:
GPRS
GSM
RS485 (Wire)
Ethernet (wire)

Power

SLAVE

Communication:
GPRS
GSM
RS485 (Wire)
Ethernet (wire)

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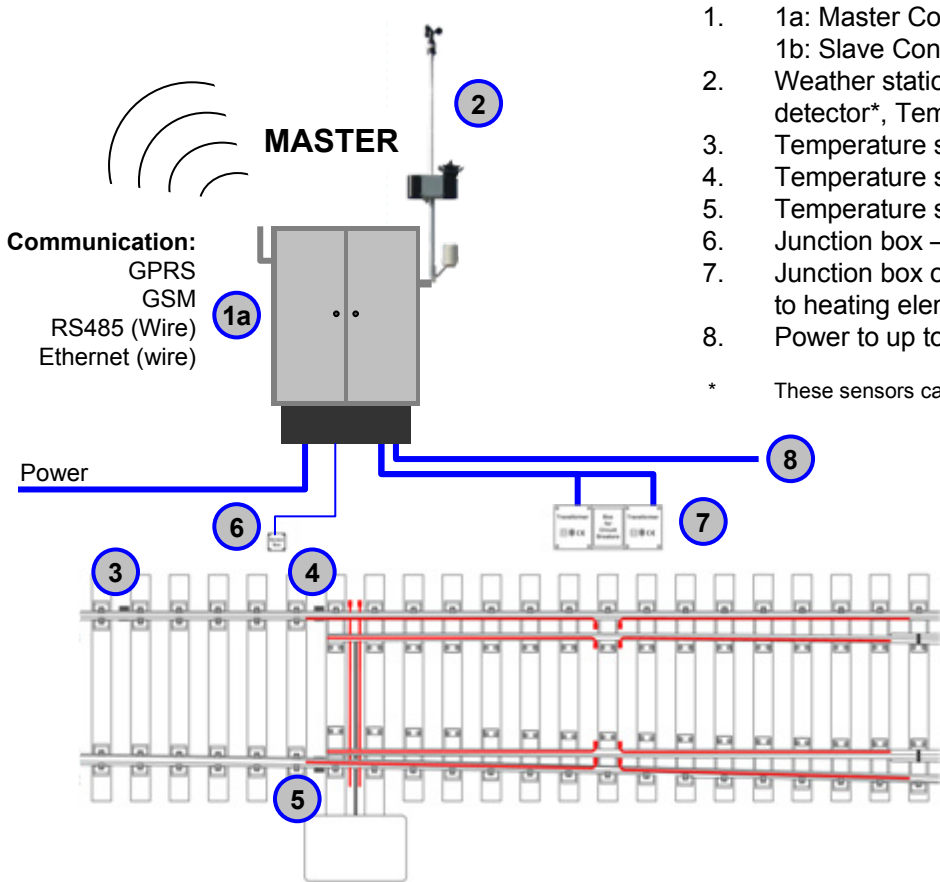
1.   1a: Master Control Cubicle
     1b: Slave Control Cubicle
2.   Weather station: Wind speed, Snow detector*, Temperature and Humidity.
3.   Temperature sensor – Cold Rail (reference)
4.   Temperature sensor – Hot Rail 1 *
5.   Temperature sensor – Hot Rail 2 *
6.   Junction box – Temperature sensors/tx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

*   These sensors can also be added to any slave cubicles.
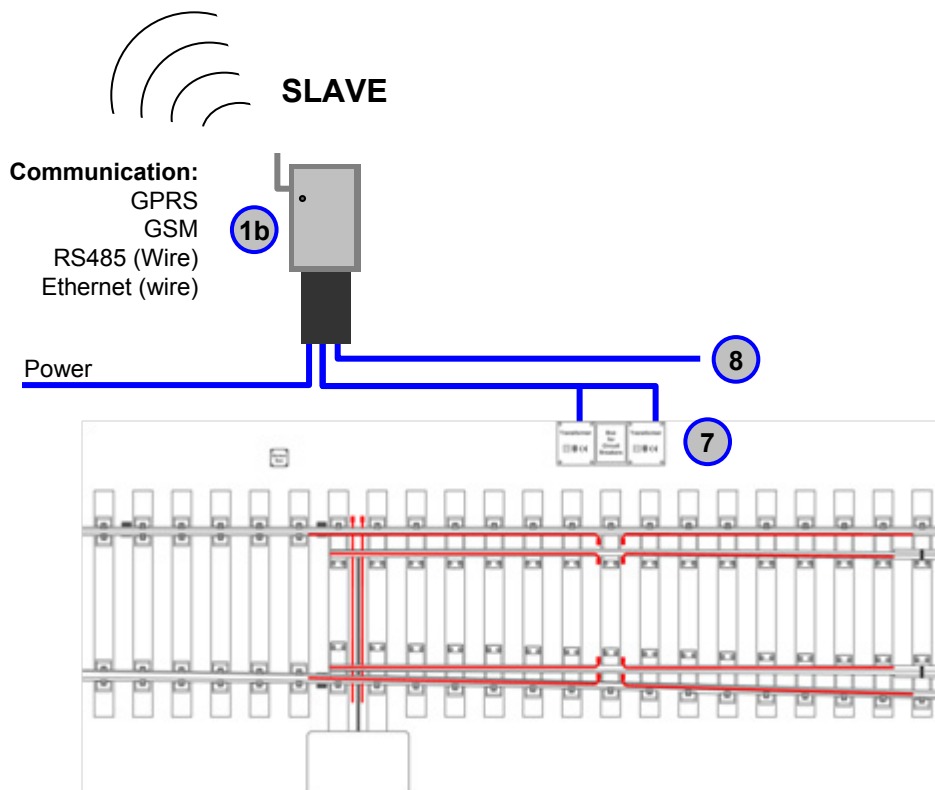
Both illustrations shows a 1:9 radius 190 switch point. Heating on both stock rail and switch blade. Additional lock heating is also shown.

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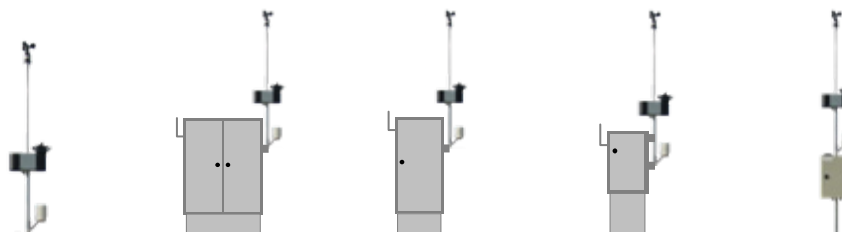
Model		MS-8 / SL-8	MS-4 / SL-4	MS-2 / SL-2	MS-LT
Height*	-	1100 mm	1100 mm	860 mm	380 mm
Width	250 mm	1140 mm	806 mm	585 mm	280 mm
Depth	150 mm	336 mm	336 mm	315 mm	220 mm
Weight	6,5 Kg	75 Kg	55 Kg	35 Kg	11 Kg
Weather station height	2000 mm				
Base over ground level	-	230 mm	230 mm	270 mm	Wall mounted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

RTU – INTELLIGENT CONTROLLER

The Intelligent RTU unit stands up to the harshest 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 pre-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.

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 are an important protective part of the system. The cabinet are designed for the demanding requirement in the out door railway environment.
The cabinet are installed on DIN sized base, made from the same material.

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

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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

RELATIVE HUMIDITY

Measuring Range:	0 – 100/0 rel. H.
Accuracy:	± 3% of rel. H.
Ambient Temperature:	-30°C to +70°C
Protection Covering*:	130 x dia. 100mm
Mounting*:	Pole diameter 38mm

*Mounted together with air temperature - if selected

SNOW DETECTOR
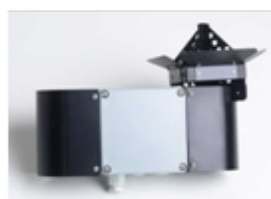
The snow detector is specially developed for Railway application and has been used in connection with switch point heating for many years. The capacitive double sensor in the detector is made for long time use without service and the special wind catch secure operation with drifting snow.

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

PLACING THE WEATHER STATION

The weather station pole is normally mounted on the cubicle. In cases where the cubicle is placed so the weather measurements is 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 cubicles. The same counts for extra hot-rail temperature sensors. They can be connected to any slave cubicle.

MASTER CUBICLE ORDER SPECIFICATION

```
MS-8 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -    MS-8 Master Control Cubicle prepared for 8 Point Switches
   |                                                                       MS-4
   |                                                                       MS-2
   |                                                                       MS-LT (no power output – dry contact output for heating only)
   |   /6 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -      Number of installed Switch Point Outputs  (/0 for the MS-LT version)
   |    -W - - - - - - - - - - - - - - - - - - - - - - - - - - - -         Weather station pole with:
   |     |                                                                 Wind speed anemometer, Snow detector, Air temperature
   |     |    -E - - - - - - - - - - - - - - - - - - - - - - - -           E: Standard Ethernet + RS485 communication
   |     |     G - - - - - - - - - - - - - - - - - - - - - - -             G: + GPRS IP-modem communication
   |     |     S                                                           S:  + GSM modem communication
   |     |     I                                                           I :  + ISDHN IP broadband wire communication
   |     |     I
 MS-8/6-W-EG - - - - - - - - - - -    SAMPLE: Complete MS-8 Control Cubicle prepared for 8 switch points, but only
                                      power components for 6 is installed + Weather station with Wind speed, Snow
                                      detector, Air temperature, Relative Humidity. Communication to SCADA is GPRS
```

SLAVE CUBICLE ORDER SPECIFICATION

```
SL-8 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -    SL-8 Master Control Cubicle prepared for 8 Point Switches
   |                                                                       SL-4
   |                                                                       SL-2
   |                                                                       SL-LT (no power output – dry contact output for heating only)
   |   /6 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -      Number of installed Switch Point Outputs  (/0 for the MS-LT version)
   |    -E - - - - - - - - - - - - - - - - - - - - - - - - - - -          E: Standard Ethernet + RS485 communication
   |     G - - - - - - - - - - - - - - - - - - - - - - - -                G: + GPRS IP-modem communication
   |     S                                                                S:  + GSM modem communication
   |     I                                                                I :  + ISDHN IP broadband wire communication
   |     I
 SL-4/3-E G - - - - - - - - - - - - -    SAMPLE: Complete SL-4 Slave Cubicle prepared for 4 switch points, but only
                                         power components for 3 is installed. Communication to Master is GPRS
```

SAN Electro Heat A/S (Member of the NIBE group)
(Formerly known as Svend A. Nielsen A/S) a Danish international company offer you more than 50 years of experience in developing and manufacturing of advanced, technical electric heating solutions and components. Not only standard products but also highly optimized customer solutions. Our focus and know-how is divided into four business divisions: Wind Power, Industrial Process, Comfort Heating and Rail Way Systems.

SAN - Railway Systems
(Formerly known as Lübcke Rail) Offer complete systems to secure optimal operation of switch points under any winter weather situations. Our focus is to deliver systems that reduces energy consumption and reduces the total cost of ownership. Our design has proven its reliability trough thousands of installations all over Europe.

Complete system delivery covers everything from the heating elements through intelligent controllers to the advanced server based computer monitor program. Including all necessary fittings, safety and power transformers, weather stations etc.

50 years know-how also gives you access to advisory regarding financial, technical and maintenance issues.