Rail, Track and Switch Point Heating

eltherm®

Contents

“It is our pledge to understand your technical requirements and to find the solution that brings you the greatest possible advantage.“

eltherm in Burbach, Germany

1. Production facility I
2. Administration, application engineering
3. R&D, international sales, eltherm Academy
4. Production facility II

From Process to Product
The eltherm Story

Founded in 1991 in Burbach, Germany, eltherm has developed into a global engineering solution provider with own production facilities and a one-stop-shop for electrical heat tracing products and systems. The company has attained worldwide recognition as a turn-key partner for engineering, design, installation and commissioning of electrical heat tracing for complex industrial plants and facilities.

With its own comprehensive production facilities for all types of heating cables and accessories eltherm has built up the engineering expertise to become one of the leading manufacturers of electrical heat tracing systems in the world.

Besides frost protection and temperature maintenance applications up to 900 °C, eltherm is the competent partner for complete system solutions like heating whole chemical or other industrial plants. eltherm proved its potential and expertise in different industries such as oil and gas, power plant, construction, automotive and food.

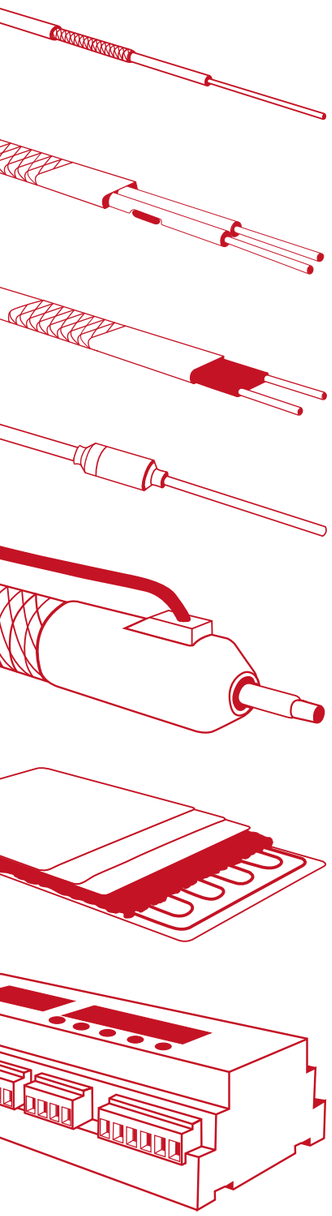
› Portfolio Focus
We provide a comprehensive range of electrical heat tracing products, systems and solutions from A to Z. Your One-Stop-Shop.

› Customer Focus
Our focus on the benefits to our clients sets us apart from competitors. We understand and solve our clients' needs with technological passion.

› Technical Focus
We specialise in electrical heat tracing. That is our core competence and inspiration.

› Global Focus
We are a global engineering company with our own production facilities, serving international markets and projects from 13 locations on 5 continents – and with a staff force of 270.

From A to Z
Your One-Stop-Shop



› Serial Resistance Trace Heaters
for freeze prevention and process temperatures in industrial plants and facilities.

› Parallel Resistance Trace Heaters
Parallel trace heaters with constant wattage output and a single end power input.
For applications in hazardous and non-hazardous locations.

› Self-Regulating Trace Heaters
for freeze prevention and temperature maintenance in industry and building & construction.
Applications up to 250 °C.

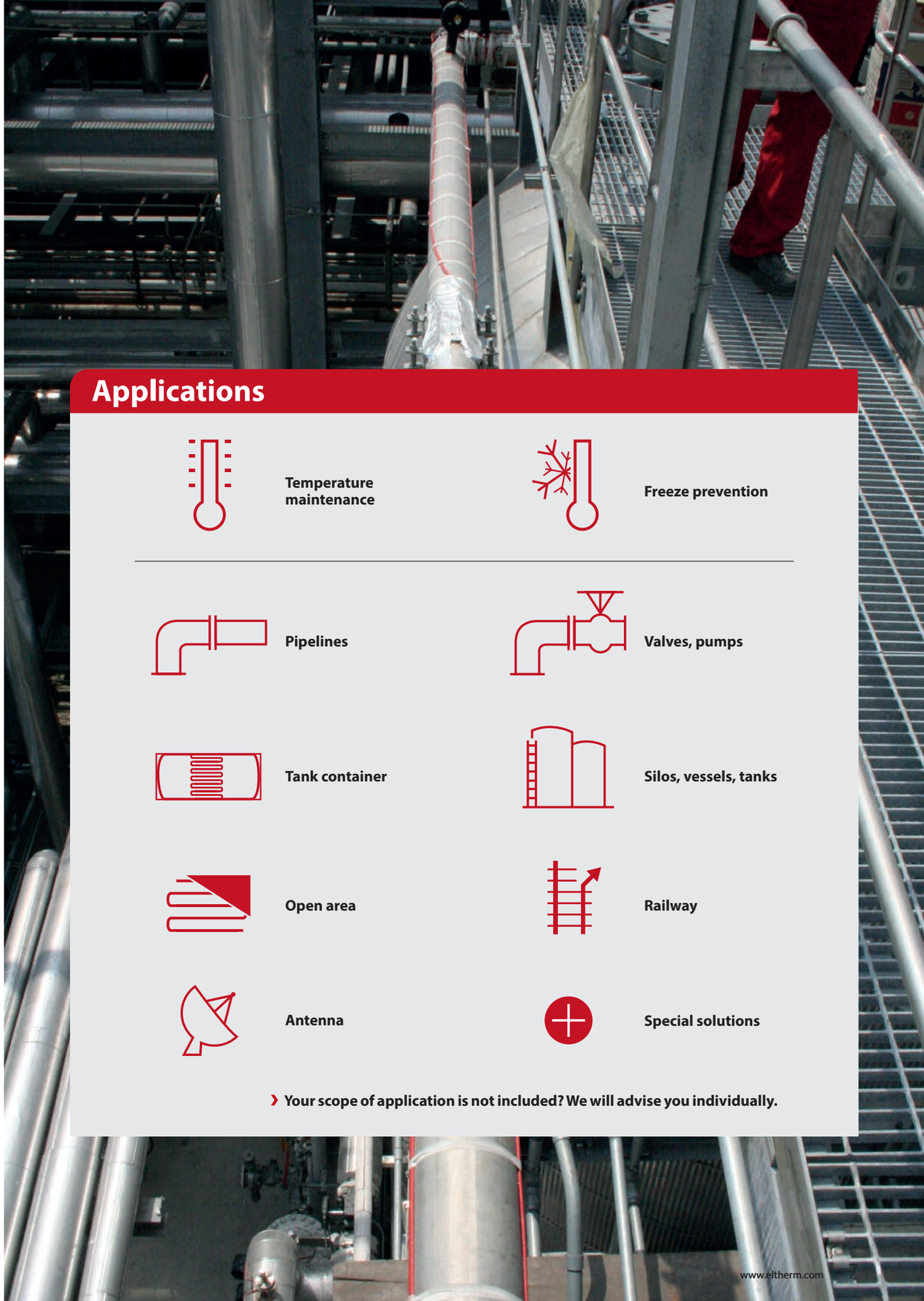
› Mineral-Insulated Trace Heaters
exclusively manufactured and finished from Alloy 825 or high-quality stainless steel. The unique "Clean Laser Seal" Technology (CLS) guarantees a homogenous, 100% stable system and reliable function up to 700 °C.

› Heated Analytic, Pressure and Loading Systems
for reliable and safe transport of pressurised or non-pressurised fluids and gases without temperature loss, up to 450 °C.

› Heating Mats and Jackets
custom-engineered and tailor-made, for heating valves, pumps, drums, barrels, hobbocks and flange covers, up to 450 °C.

› Power and Control Panels
including temperature sensors, display and operating devices, monitoring and controls plus accessories for reliable, safe functioning.

› Accessories
for safe and effective assembly and operation of complete heat tracing systems in facilities from small to large.



Applications

- **Temperature maintenance**
- **Freeze prevention**
- **Pipelines**
- **Valves, pumps**
- **Tank container**
- **Silos, vessels, tanks**
- **Open area**
- **Railway**
- **Antenna**
- **Special solutions**

› Your scope of application is not included? We will advise you individually.

At a Glance

Applications

- Rail tracks and switch points

System Design

- **El-Rail:** 6 series resistance trace heaters, fluoropolymer insulated and embedded in silicone jacket plus thermally insulating cover profile and holding bracket for freeze prevention on railway tracks.
- **El-Point:** Parallel resistance trace heater with constant wattage (W/ft) power output, fluoropolymer insulation and thermally insulating cover profile and holding bracket for freeze prevention on switch points.
- **El-Track:** Parallel resistance trace heater with constant wattage (W/ft) power output, fluoropolymer insulation and thermally insulating cover profile and fast assembly clip for freeze prevention on power rails.

Rail, Track and Switch Point Heating

The operators of public and private commuter and freight railway networks require smooth, safe traffic, wherever winters are cold with frequent ice and snow. Freeze prevention on tracks and switch points to keep them free from ice keeps trains safely on track and on time.

A reliable, energy efficient electrical trace heating system with intelligent control achieves just that and assures you of several technical and economic advantages:

Benefits

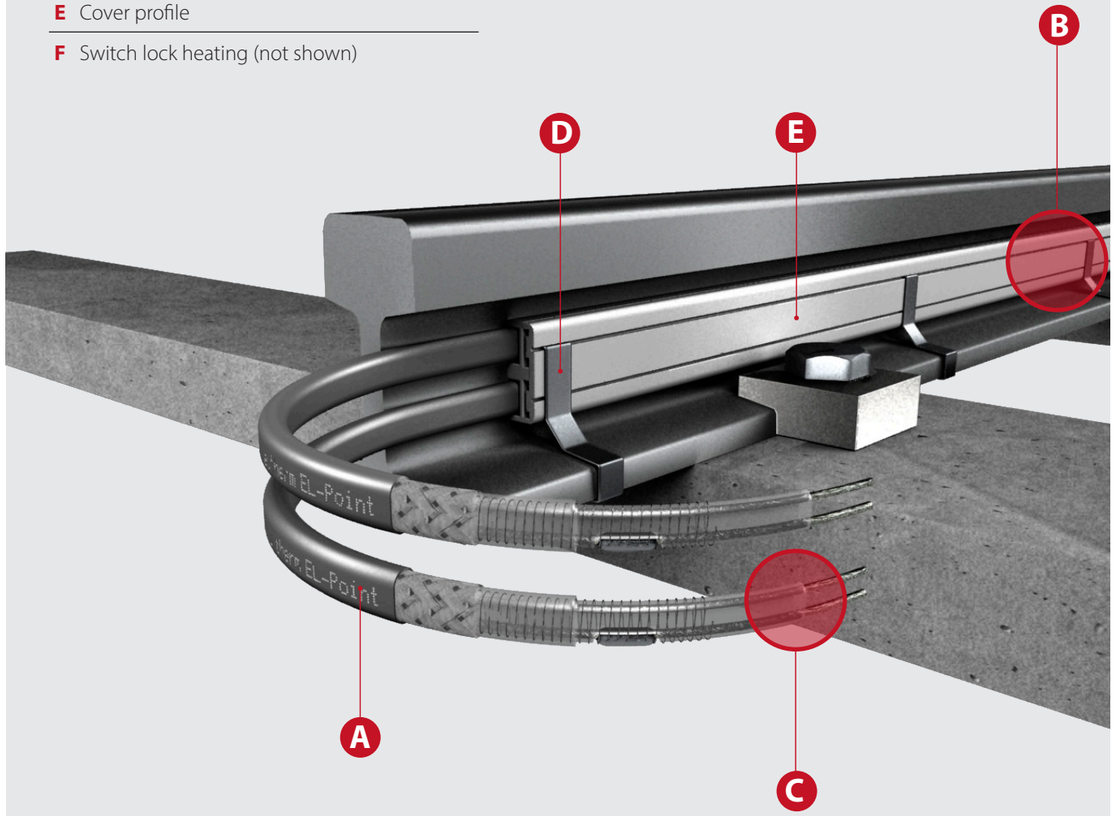
- Optimised heat transfer from the trace heater to the railway track or switch point
- Best possible energy efficiency and cost saving operations
- Simple, fast assembly for quick installation and easy maintenance
- Low maintenance effort
- Prevention of damages or short-circuits through moisture thanks to fluoropolymer insulation
- Easy access to the trace heater thanks to attachment to the outside of the rail or switch point
- Protection and prevention of heat loss thanks to thermally insulating cover profile

Example of a swith point heating being tested in Burbach, Germany.

Checklist

Rail,Track and Switch Point Heating

- **A** Trace Heater
- **B** Power connection
- **C** Termination
- **D** Holding bracket
- **E** Cover profile
- **F** Switch lock heating (not shown)



The checklist is a schematic illustratoin of rail, track and switch point heating. This is just a schematic overview, not an installation instruction.
For detailed information, please contact our engineers.

At a Glance

Applications

- Rail heating

Benefits

- Lowest possible number of power supply points
- Continuous heat transfer
- Resistant to moisture
- Additional protection against aggressive substances
- Suited for stock rails, switch points and power rails
- Robust design
- Optimised heat transfer
- Fast, simple assembly
- Low maintenance effort

EL-Rail
up to 150 °C

1	**Bus wire**	Copper, nickel plated
2	**Insulation**	Fluoropolymer
3	**Outer jacket**	Silicone

Heater in accordance with the specifications of EN 62395-1, but without proctective conductor due to connection typicals in rail networks.

Checklist EL-Rail

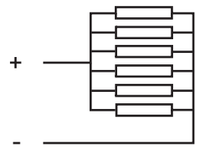
B + C Power Connection & Termination		
ELVB-EL-Rail	Connecting set, 2 pole 16 AWG 6R	091RA02
ELVB-EL-Rail	Termination set, 2 pole 16 AWG 6R	091RE02
ELVB-EL-Rail	Universal set for one power connection or termination 2 pole 16 AWG in 6R or 3P2R	091RUNI
D Holding Brackets		
ELFC	Holding bracket UIC60 SFK EL-Point/Rail for flat cover profile	4027000103
ELFC	Holding bracket S54 SFK EL-Point/Rail for flat cover profile	27230RS540
ELFC	Holding bracket S49 SFK EL-Point/Rail for flat cover profile	27230RS490
E Cover Profile		
ELCP-F	EL-Rail cover profile	4027000002

Technical Information

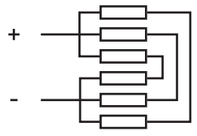
Max. maintain temperature	50 °C
Max. exposure temperature (de-energized)	150 °C
Maximum nominal voltage	1000 V
Minimum bending radius	2" / 50 mm
Power output	50 - 150 W/m
Dimensions	8 x 34 mm
Minimum installation temperature	– 40 °C

Connection Options

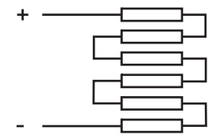
- 6 Parallel



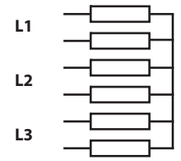
- 3 Parallel 2 Rows

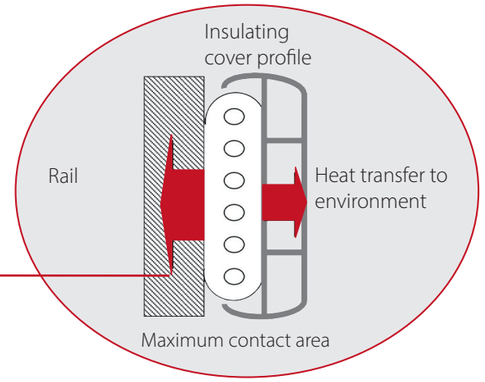


- 6 Rows



- Star





Additional power outputs and custom-designed holding brackets on request!

At a Glance

Applications

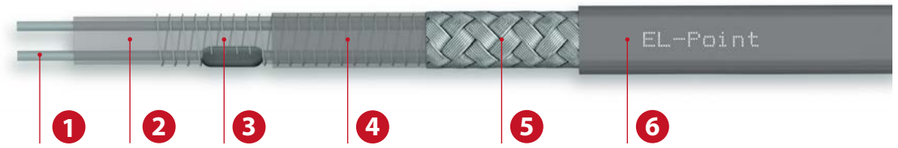
Freeze Prevention | Switch Points

- Switch point heating

Benefits

- High power output
- Optimised heat transfer
- Fast, simple assembly
- Low maintenance effort
- Simplified storage and handling of spare parts
- Can be cut to size

EL-Point
up to 200 °C



1	**Bus wire**	
2	**Core**	Silicone
3	**Heating conductor**	
4	**Insulation**	Fluoropolymer
5	**Protective braid**	Cu, nickel plated
6	**Outer jacket**	Fluoropolymer

Checklist EL-Point

B + C Power Connection & Termination

ELVB-EL-Point	Connection and termination set, 2 pole+PE up to AWG 14	0911748
ELVB-EL-Point	Connection and termination set, 2 pole+PE up to AWG 12	0911751

D Holding Brackets

ELFC	Holding bracket UIC60 SFK EL-Point corner cover profile	27230RS602
ELFC	Holding bracket 49/54/60E1A1 ASK EL-Point flat cover profile	27230RS491
ELFC	Holding bracket 60E1A4 ASK EL-Point corner cover profile	27230RS603

E Cover Profiles

ELCP-F	Flat cover profile EL-Point	4022P00002
ELCP-E	Corner cover profile EL-Point with cutout	4022P00005
ELCP-E	Corner cover profile EL-Point	4022P00004

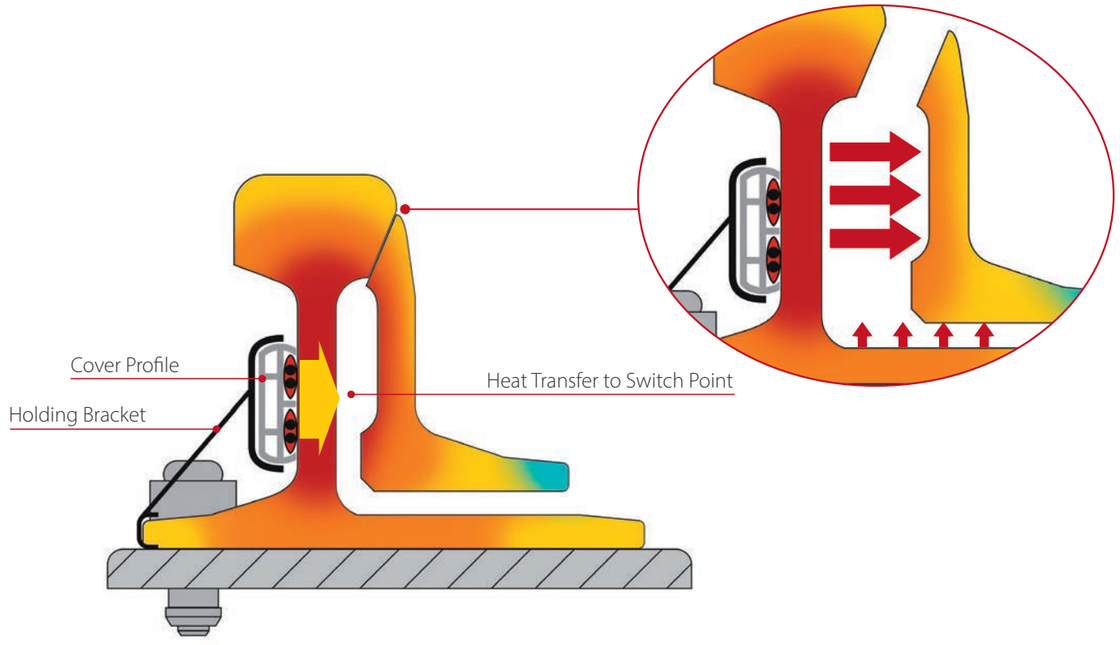
F Switch Lock Heating

ELLB	Switch lock heating 230 V / 900 W	ZAC0011
ELLB	Switch lock heating 230 V / 500 W	ZAF0009
ELLB	Switch lock heating 230 V / 2 x 250 W	ZAG0003

Technical Information

Max. maintain temperature	50 °C
Max. exposure temperature (de-energized)	200 °C
Maximum nominal voltage	750 V
Minimum bending radius	50 mm
Power output	50 - 150 W/m
Dimensions	15 x 7 mm
Minimum installation temperature	– 50 °C

Type	Output	Power Supply Point Spacing	Part No.
Switch point trace heater EL-Point	50 V / 150 W/m	500 mm	022P050
Switch point trace heater EL-Point	110 V / 150 W/m	500 mm	022P110
Switch point trace heater EL-Point	230 V / 150 W/m	500 mm	022P230
Switch point trace heater EL-Point	400 V / 150 W/m	750 mm	022P400
Switch point trace heater EL-Point	750 V / 150 W/m	1250 mm	022P750



Additional power outputs and custom-designed holding brackets on request

At a Glance

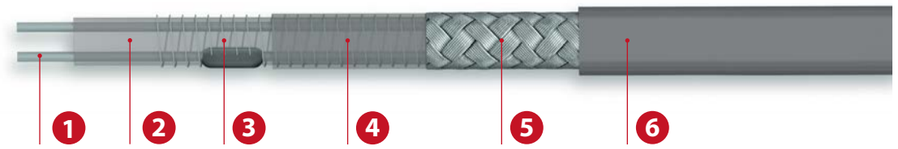
Applications

- Power Rail Heating

Benefits

- High heat transfer directly to the top of the power rail
- Fast, easy installation on long tracks thanks to innovative assembly clip
- Efficient, energy saving thanks to thermal insulation
- No interference with signalling devices
- Moisture proof
- Low maintenance effort

EL-Track
up to 200 °C



1	**Bus wire**	
2	**Core**	Silicone
3	**Heating conductor**	
4	**Insulation**	Fluoropolymer
5	**Protective braid**	Cu, nickel plated
6	**Outer jacket**	Fluoropolymer

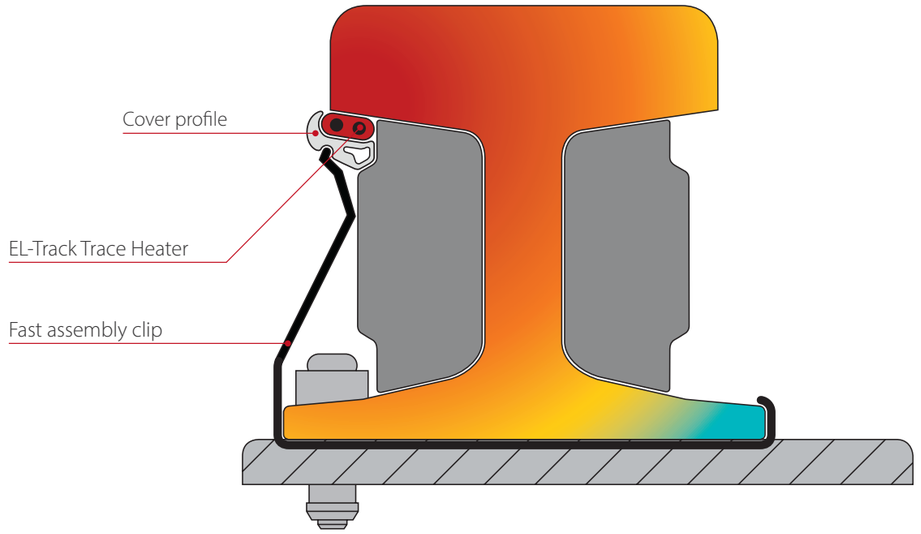
Checklist EL-Track

B + C Power Connection & Termination		
ELVB-EL-Point	Connection and termination set, 2 pole+PE up to AWG 14	0911748
ELVB-EL-Point	Connection and termination set, 2 pole+PE up to AWG 12	0911751
ELVB-EL-Point	Connection and termination set, 2 pole+PE up to AWG 12	0911754
D Holding Brackets		
ELFC	Holding bracket UIC60 SFK EL-Point corner cover profile	27230RS602
ELFC	Holding bracket 49/54/60E1A1 ASK EL-Point flat cover profile	27230RS491
ELFC	Holding bracket 60E1A4 ASK EL-Point corner cover profile	27230RS603
E Cover Profiles		
ELCP-F	Flat cover profile EL-Point	4022P00002
ELCP-E	Corner cover profile EL-Point with cutout	4022P00005
ELCP-E	Corner cover profile EL-Point	4022P00004
ELCP-E	Corner profile EL-Track	4027000005

Technical Information

Max. maintain temperature	50 °C
Max. exposure temperature (de-energized)	200 °C
Maximum nominal voltage	750 V
Minimum bending radius	50 mm
Power output	50 - 150 W/m
Dimensions	15 x 7 mm
Minimum installation temperature	- 50 °C

Type	Output	Power Supply Point Spacing	Part No.
Power rail heating EL-Track	50 V / 150 W/m	500 mm	022P050
Power rail heating EL-Track	110 V / 150 W/m	500 mm	022P110
Power rail heating EL-Track	230 V / 150 W/m	500 mm	022P230
Power rail heatingEL-Track	400 V / 150 W/m	750 mm	022P400
Power rail heating EL-Track	750 V / 150 W/m	1250 mm	022P750



Additional power outputs and custom-designed holding brackets on request

At a Glance

Applications

Freeze prevention

Switch Points

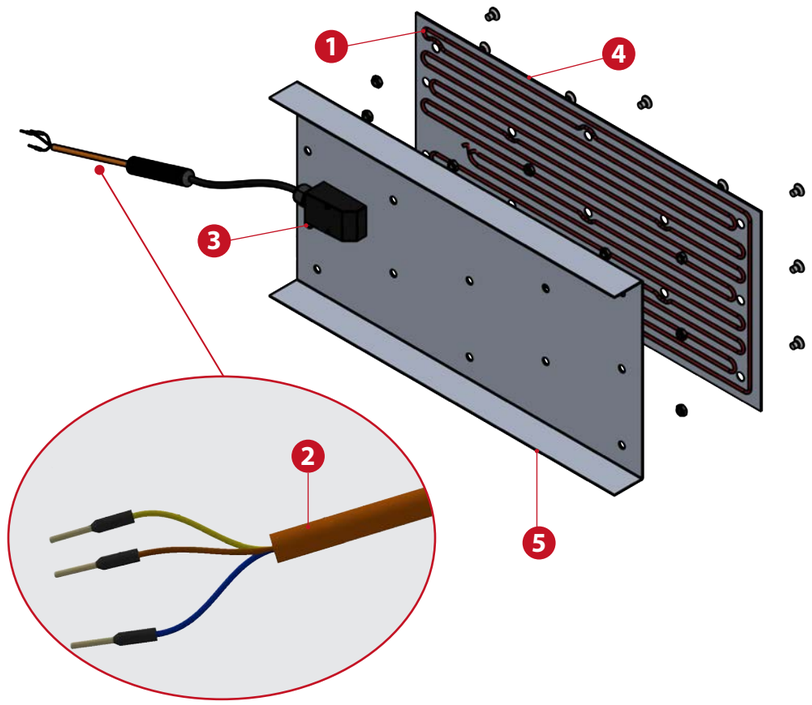
- Switch Point Heating

Benefits

- Robust design
- Limitation of surface temperature to 60° C
- Prevents debris and leaves catching fire

Switch Lock Heating

up to 60 °C

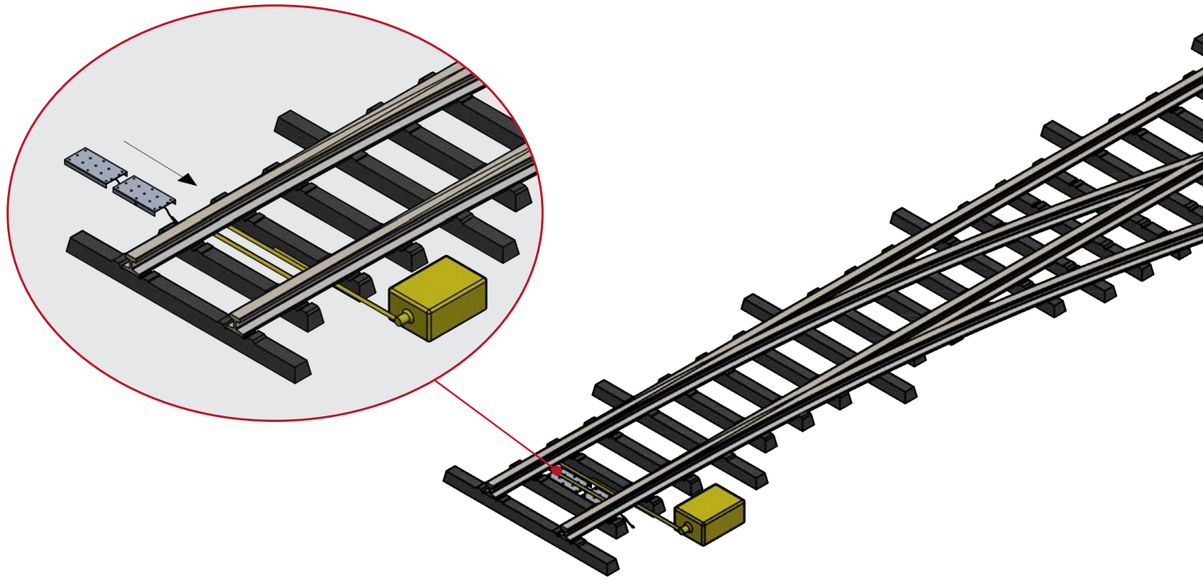


1	**Trace heater**
2	**Power connection H07BQ-F**
3	**Temperature controller**
4	**Cover of switch lock**
5	**Base plate**

Technical Information

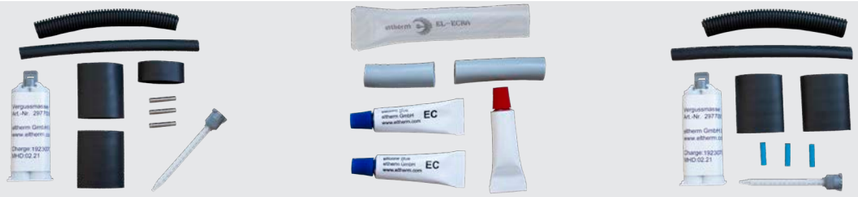
Ambient temperature	+ 60 °C surface temperature limited
Maximum nominal power	230 V
Power output	500 - 900 W
Temperature controller	ELTC-mini
Material	AlMg3 - black reflector surface
Trace heater	ELKM-AG-L (Fluoropolymer)
Power connection	8,0 m H07BQ-F 3G 1,5 mm²

Type	Power Output	Dimensions (L x W x H)	Part No.
Switch lock heating	230 V / 900 W	2000 x 300 x 57 mm	ZAC0011
Switch lock heating	230 V / 500 W	2000 x 300 x 57 mm	ZAF0009
Switch lock heating	230 V / 2 x 250 W	600 x 300 x 57 mm (2x)	ZAI0000



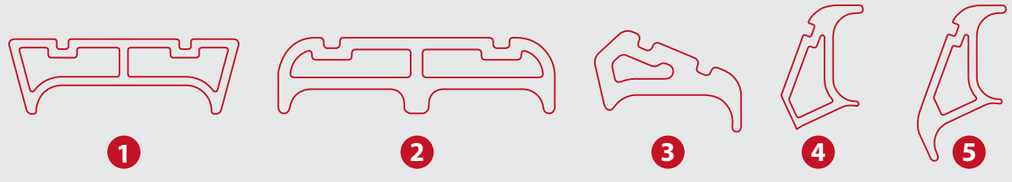
Accessories
Rail, Track and Switch Point Heating

B* + C – Power Connection & Termination



Suitable for	Type	Description	Part No.
EL-Rail	ELVB-EL-Rail	Power connection 2 pole 16 mm² 6R	091RA02
EL-Rail	ELVB-EL-Rail	Power connectio 2 pole 16 mm² 3P / 2S	091RA01
EL-Rail	ELVB-EL-Rail	Termination set 2 pole 16 mm² 6R	091RE02
EL-Rail	ELVB-EL-Rail	Termination set 2 pole 16 mm² 3P / 2S	091RE01
EL-Rail	ELVB-EL-Rail	Universal set for 1 power connection and 1 termination 2 pole 16 mm² in 6R or 3P 2R	091RUNI
EL-Point, El-Track	ELVB-EL-Point	Power connection / termination set 2 pole+PE up to 2,5mm²	0911748
EL-Point, El-Track	ELVB-EL-Point	Power connection / termination set 2 pole+PE up to 4 mm²	0911751
EL-Point, EL-Track	ELVB-EL-Point	Power connection / termination set 2 pole+PE up to 4 mm²	0911754

E – Cover Profile

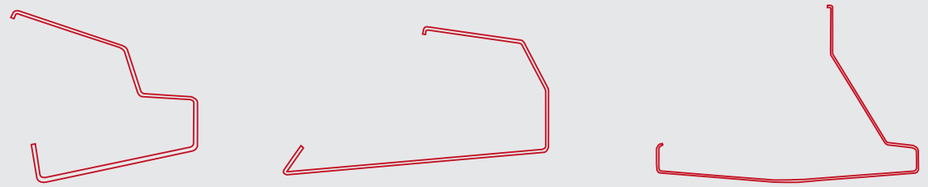


Suitable for	Type	Description	Refers to	Part No.
EL-Rail, El-Track	ELCP-F	Flat cover profile EL-Rail	1	4027000002
EL-Point	ELCP-F	Flat cover profile EL-Point	2	4022P00002
EL-Point, El-Track	ELCP-E	Corner cover profile EL-Track	3	4027000005
EL-Point, El-Track	ELCP-E	Corner cover profile EL-Point with cutouts	4	4022P00005
EL-Track	ELCP-E	Corner cover profile EL-Track	5	4022P00004

*Refer to the Checklist on page 9 and the respective data sheet.

D – Holding Brackets

Examples



Suitable for Cover Profile	Type	Description	Rail Specification	Rail Type	Part No.
1 + 2	ELFC	Holding bracket EL-Point/Rail flat cover profile	UIC60 SFK	Stock rail	4027000103
4 + 5	ELFC	Holding bracket EL-Point corner cover profile	UIC60 SFK	Stock rail	27230RS602
1 + 2	ELFC	Holding bracket EL-Point/Rail cover profile	S54 SFK	Stock rail	27230RS540
1 + 2	ELFC	Holding bracket EL-Point/Rail cover profile	S49 SFK	Stick rail	27230RS490
1 + 2	ELFC	Holding bracket EL-Point cover profile	49/54/60E1A1 ASK	Switch rail	27230RS491
4 + 5	ELCF	Holding bracket EL-Point/Rail corner cover profile	S49 SFK	Switch rail	27230RS603
3	ELCF	Fast assembly clip EL-Track cover profile	xxxxxxx	Switch rail	0000000000

Additional custom-designed holding brackets on request

EL-Track
The System Solution

Washington Metropolitan Area Transport Authority

Washington / USA

Freeze Prevention

Power and control system, the complete electrical rail trace heating and easy-to-fit clamps constitute an integrated system for safe operation covering many miles of rail network: It was this eltherm solution that convinced Washington's Metropolitan Area Transport Authority (WMATA). The task: freeze prevention on the power rails to avoid interruptions to the power supply caused by ice and snow. It started with the building of yard and maintenance facilities for the Dulles Corridor Metrorail project. This is part of a 37 km extension to the Washington Metrorail system that links the suburbs of Washington with the city centre. Washington Metro is the second largest metro network in the USA. An integrated solution with an extensive power and control monitoring system was developed together with the renowned US specialist M.C. Dean.

The compact, flexible constant wattage heater adapts easily to any rail profile. Fitted easily with assembly clips, the system minimizes gaps and provides maximum heat transfer to the rail. A specially developed, unique thermal insulating cover profile reduces heat loss and improves heat transfer directly to the top of the power rail.

Technical benefits

- All-in-one power and control plus heating system
- Optimised heat transfer
- Fast and easy assembly
- Low maintenance

Scope of Supply

- Approx. 38 km of power rail heating
- Approx. 10 km of power rail heating in the yard
- 695 Heating circuits (507 on the rail network, 188 in the yard)

EL-Rail
The Network Solution

Network Rail

South Western England, UK

Freeze Prevention

Railway tracks and switch points must be kept free from ice and snow in order to ensure safe railway traffic when entering and leaving stations and on the open track.

The British Operator Network Rail decided to test electrical heat tracing on 29 km of track on their rail network south of the River Thames, in Kent and Sussex. In focus at first were the entry and departure tracks on all railway stations, answering to increased demands on passenger safety. The EL-Rail system delivered and installed by eltherm worked so reliably, that the test project was extended to include 106 km of heated tracks throughout the country.

Scope of Supply

- Engineering
- Calculation and design
- Documentation for installation and operation
- EHT Material supply
- Accessories for power connection and termination

- Length of heated rails: 106 km
- Constand wattage: 150 W/m

FAQ
to Thomas Stuff

What is the difference between EL-Rail, EL-Point and El-Track?

The EL-Point system was developed to answer to the in demand for increased power output on short lengths as is typical with switch points. It relies on a parallel resistance trace heater with 2 heating cables with 150 W/m fixed wattage, a total of 300 W/m per rail. EL-Track is a fixed wattage solution for short and long rail networks. El-Rail uses a series resistance heater with max. 150 W/m, suited for long distances and heating circuits up to 300 m.

What do eltherm engineers need to know for an optimised design?

We need to know the following parameters: radius and length of switch point or rail to be heated, the rail geometry, operating voltage and the required power output.

What can influence the design?

Various rail geometries and specifications for switch points involve a range of devices attached to the rail that may require special attention. The design engineer will check how to overcome these obstacles on the outside of the stock rail.

How do eltherm solutions differ with different track geomtries?

Custom designed solutions are often required to adapt the cover profile to the shape and design of the rail, combined with the holding bracket. The trace heating solution itself does not vary.

When does a Switch Point Lock heating make sense?

Heating the switch point lock makes sense wherever the quantity of snow and ice may interfere with the mechanical setting of the switch point. This is a valuable safety feature.

What benefits does a Switch Point Lock heating offer?

Heating the switch point lock with a power output of 500 - 900 W activates heat transfer to the switching mechanism through reflection from the black surface on the inside. The heat is thus distributed evenly. At the same time, the surface temperature of the switch point lock is limited to 60 °C. This avoids debris and leaves catching fire.

Which accessories are needed?

The hating system includes a cover profile and suitable holding brackets and may be extended to include junction boxes, protective hoses or complete power and control systems.

Which applications are not suitable for EL-Rail, EL-Point or EL-Track?

This may be the case when the heating system cannot be installed on the outside of the stock rail because of devices or obstacles that disrupt heat transfer for a long stretch.

Energy Efficiency
Flat Heating Elements vs. El-Point

Why compare flat heating elements with EL-Point?

The use of flat heating elements for freeze protection on switch points is widespread and has been so for many years. It is our endeavour to offer an innovative, cost-effective alternative.

What are the most important differences between the two options?

EL-Point is attached to the outside of the stock rail with a thermally insulating cover profile. In this way, the rail neck is used fully to radiate the heat directly onto the switch rail and keep the space in between free from ice and snow. The flat heating element lies on the rail foot on the inside. Heat radiation is not guided, which means much more power is needed to achieve the same freeze prevention effect.

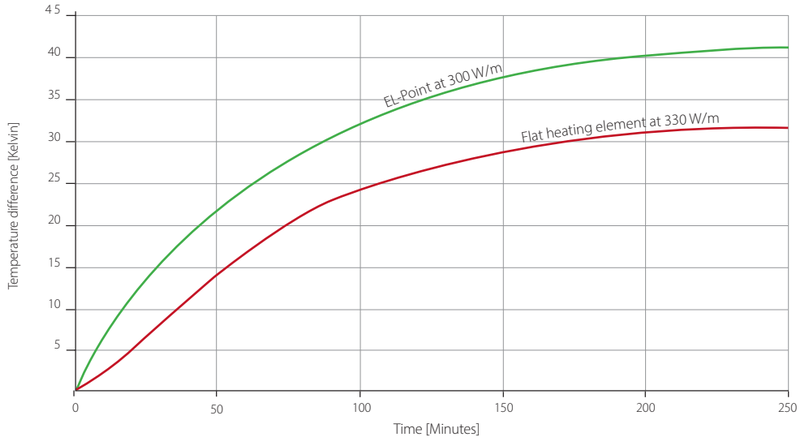
How is the energy saving achieved?

The power output per length is identical in both cases and specified by the operator. The biggest energy saving is achieved in combination with an intelligent power control system. It takes account of the rail temperature. Because the eltherm solution leads to a much faster heating up of the rail, the system can be switched off much sooner. Additional options such as a weather station or control systems with online control can increase this saving effect even more.

When does a switch to this technology make sense?

Basically anytime. The advantages add up to considerable cost-saving in operation, effective and easy to control freeze protection with intelligent, energy saving mechanisms, fast assembly, low maintenance, easy handling of spares all the way to simple logistics. The only obstacles to overcome are installations on the outside of the stock rail.

Heat up effect and energy saving: El-Point vs. flat heating elements



	Temperature difference between stock rail and environment							
	>5 K	>10 K	>15 K	>20 K	>25 K	>30 K	>35 K	>40 K
Heating element	20 min	36 min	53 min	73 min	102 min	172 min	never	never
EL-Point	8 min	18 min	29 min	42 min	60 min	83 min	119 min	179 min
Time advantage	**60 %**	**50 %**	**45 %**	**42%**	**41 %**	**52 %**	-	-

Up to 30 % Energy Saving!
Compared to conventional rail heating systems

Questionnaire

Rail, Track and Switch Point Heating

eltherm®

Switch Point

Type	EW ☐	ABW ☐	IBW ☐	DW ☐	Kr ☐	EKW ☐
	DKW ☐	other _____				
Profile stick rail	S49 ☐	S54 ☐	UIC54 ☐	UIC60 ☐	R65-2 ☐	_____
Profile switch rail	Zu2-49 ☐	Zu2-54 ☐	ZuUIC54B ☐	ZuA60UNI ☐	Zu1-60 ☐	OR65 ☐
	Other _____					
Switch point radius	25 m ☐	50 m ☐	100 m ☐	140 m ☐	190 m ☐	300 m ☐
	500 m ☐	760 m ☐	1200 m ☐	2500 m ☐	6000 m ☐	7000 m ☐
	Other _____					
Heated length	according to VDV ☐	according to DB Ril 954.9101 ☐				
Length [m] from nose	_____					
Switch lock heating	Yes ☐	No ☐				
Track gauge	600 mm ☐	762 mm ☐	914 mm ☐	1000 mm ☐	1067 mm ☐	1372 mm ☐
	1435 mm ☐	1520 mm ☐	1600 mm ☐	1668 mm ☐	1676 mm ☐	_____
Type of drive / close mechanism	_____					

Power Connection

Protection class	SK I (protective conductor) ☐	SK II (protective insulation) ☐				
Integrated power supply	1,5 mm² ☐	2,5 mm² ☐				
Integrated power supply length in m	_____					
Type	H07BQ-F ☐	H07RN-F ☐	Andere _____			
Supply voltage	230 / 231 AC/DC ☐	400 AC/DC ☐	462 AC/DC ☐	600 AC/DC ☐	630 AC/DC ☐	
	690 AC/DC ☐	750 AC/DC ☐	750 AC/DC ☐	Andere _____		
Electrical system	TN-C ☐	TN-S ☐	TT ☐	IT ☐		
Grounding (only with SK I)	Grounding via track ☐	Grounding via junction box / power panel ☐				

Accessories

Junction box	_____	
With gravel rod	Yes ☐	No ☐
With assembly set for wall assembly	Yes ☐	No ☐
With assembly set for pole assembly	Yes ☐	No ☐

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NOTES

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