



Raychem

SNOW MELTING FOR RAMPS,
ACCESS WAYS AND FOOTPATHS
TECHNICAL HANDBOOK 2015-2016

 @pentairTBS

WHY RAYCHEM?

Raychem Products and services simplify the design and specification of the highest quality products, broadest product portfolio and unrivalled customer support services.

Large technical support team

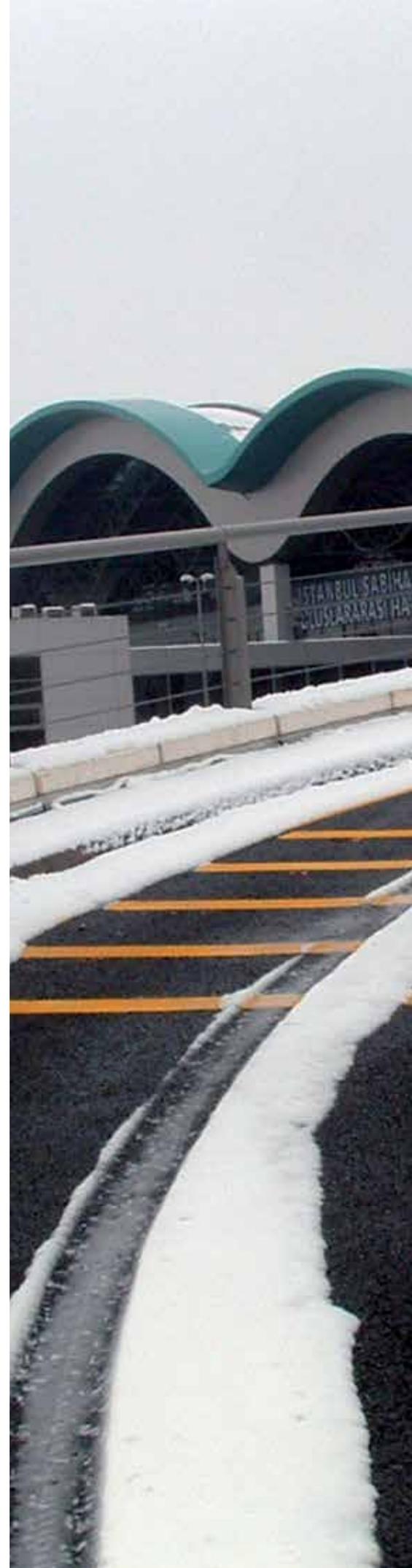
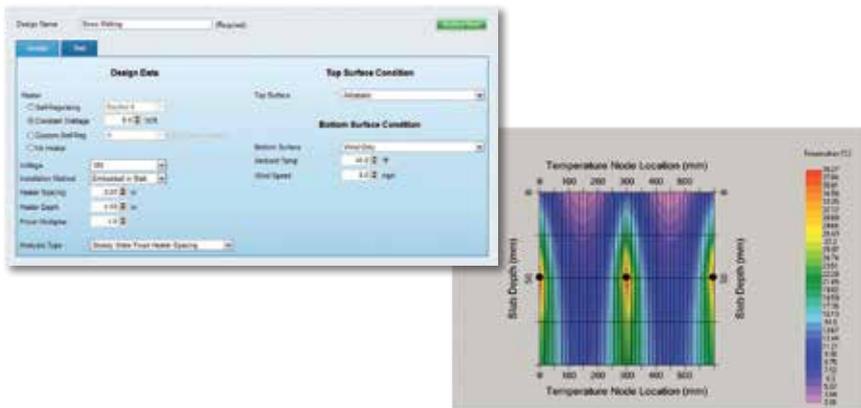
- Site services for efficient project execution.
- Building Information Modelling (BIM) content for system design, project execution, and asset management.
- “On demand” technical advice
- Free design and quotation
- Direct support to specifiers and installers
- Training support on request
- Complete after-sales service
- Also for non-standard applications our team can assist you in finding the right heating solution. Do not hesitate to get in touch with us: Free phone 0800 96 90 13 or Free fax 0800 96 86 24



Ensuring a snow & ice free surface with any ground profile

The ground profile of a heated surface can vary greatly from project to project. As a consequence, the system design and power requirements can also vary significantly.

To ensure the correct amount of power is installed in the ground surface for safety and energy efficiency, Raychem can provide a “Slabheat™” finite element analysis of the surface profile prior to installation. This allows the heater selection, spacing, and depth to be tailored to the precise needs of the ground profile.





OVERVIEW OF APPLICATIONS

Why ground heating systems?	4-5
Self Regulating systems	6-14
MI (mineral insulated) systems	15-22
Polymer solutions	23-36
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WHY SURFACE HEATING SYSTEMS?

Ice and snow on paths, loading bays, driveways, ramps, stairs and other access ways, can present a major problem causing accidents and delays. To help prevent this liability, Raychem provides a complete range of surface heating solutions to prevent snow and ice formation.

The Raychem range of products has been specifically designed to meet the requirements of commercial, industrial, and residential applications. Whether in concrete, sand, or asphalt, a Raychem system exists to provide a fast, reliable, and easy-to-install solution.

Each Raychem heating solution is complete with a Smart control and monitoring unit, providing useful user data and excellent energy efficient performance. The multi-sensor control and monitoring device (VIA-DU-20) is compatible with all ramp snow melting solutions.

Application in concrete

Ambient temperature sensor*
VIA-DU-A10 (incl.)

Temperature and moisture sensor
VIA-DU-S20

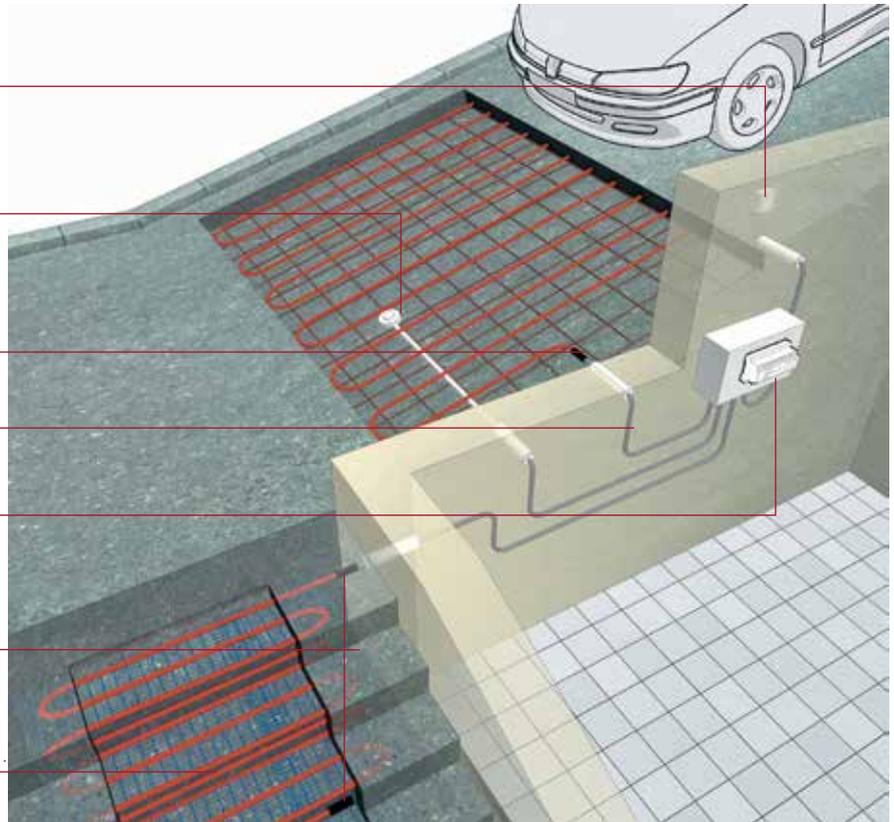
Connection and end seal kit
(VIA-CE1)

Connection cable (VIA-L1)

Control unit (VIA-DU-20)

Connection and end seal kit (VIA-CE1)

Self-regulating heating cable (EM2-XR),
constant wattage heating cable (EM4-CW),
and constant wattage heating mat (EM2-CM).

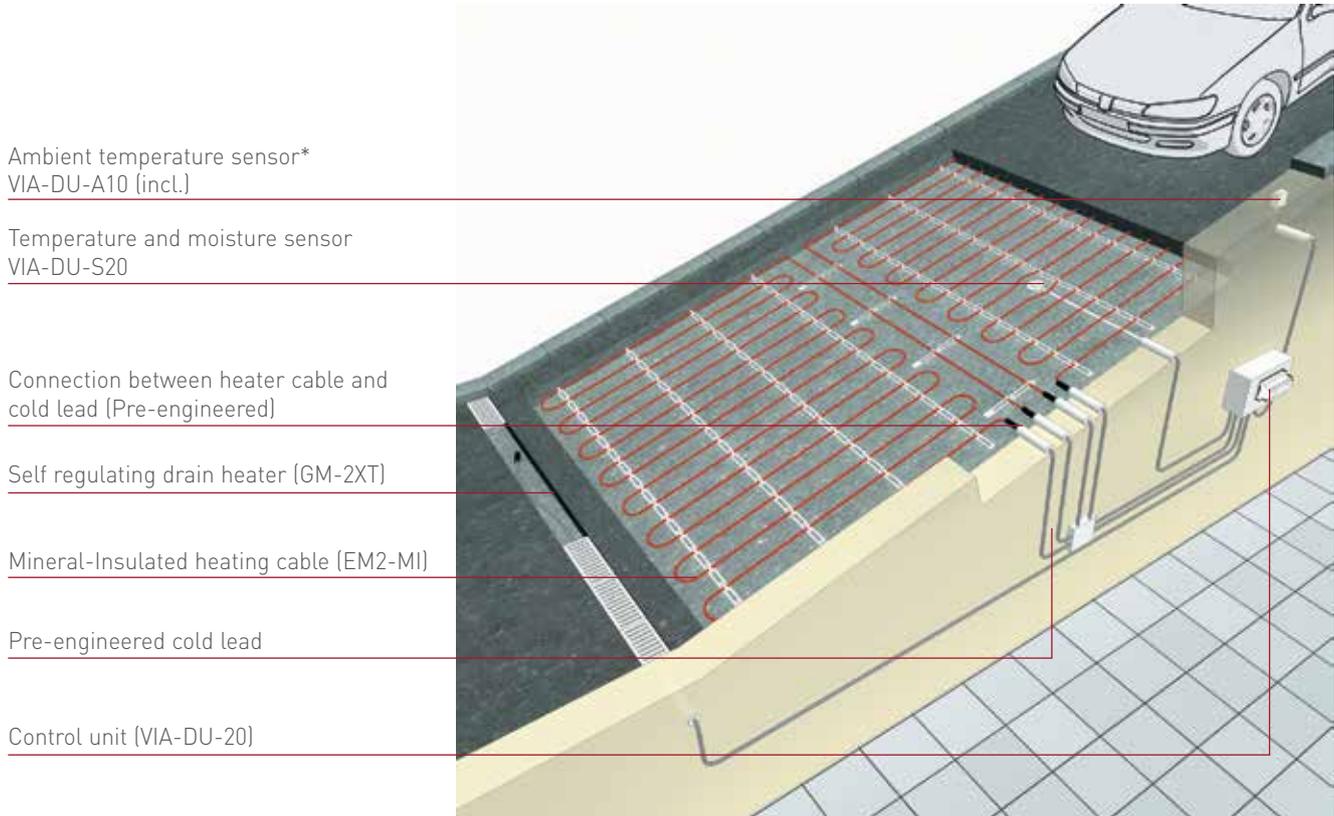


* Optional, only needed when "local detection" is selected.

Raychem Solutions for concrete

	Product	Description
Reinforced concrete ramp	EM2-XR	Self-Regulating heating cable for reinforced concrete ramps
Domestic/private garagetrack heating	EM2-CM	Pre-terminated constant wattage heating mat for ramp, pavement and track heating
Stairs; wheelchair access ramps	EM4-CW	400V Pre-terminated constant wattage heating cable solution for larger concrete areas and stairs

Application in asphalt



* Optional, only needed when "local detection" is selected.

Raychem Solutions for asphalt

	Product	Description
Loading bay and asphalt layer	EM2-MI	Mineral insulated, high temperature resistant heating cable for asphalt ramps

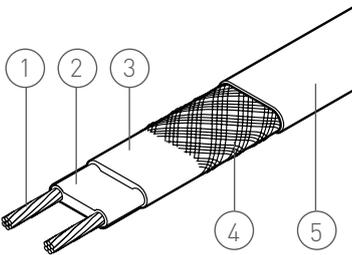
SELF-REGULATING SYSTEMS

1. APPLICATION

Footpaths, ramps, steps, basement garages, loading platforms.

Cable type	EM2-XR
Control	VIA-DU-20 / SBS-XX-VV -20 Control Panel / ACS-30
Power output	90 W/m @ 0°C.

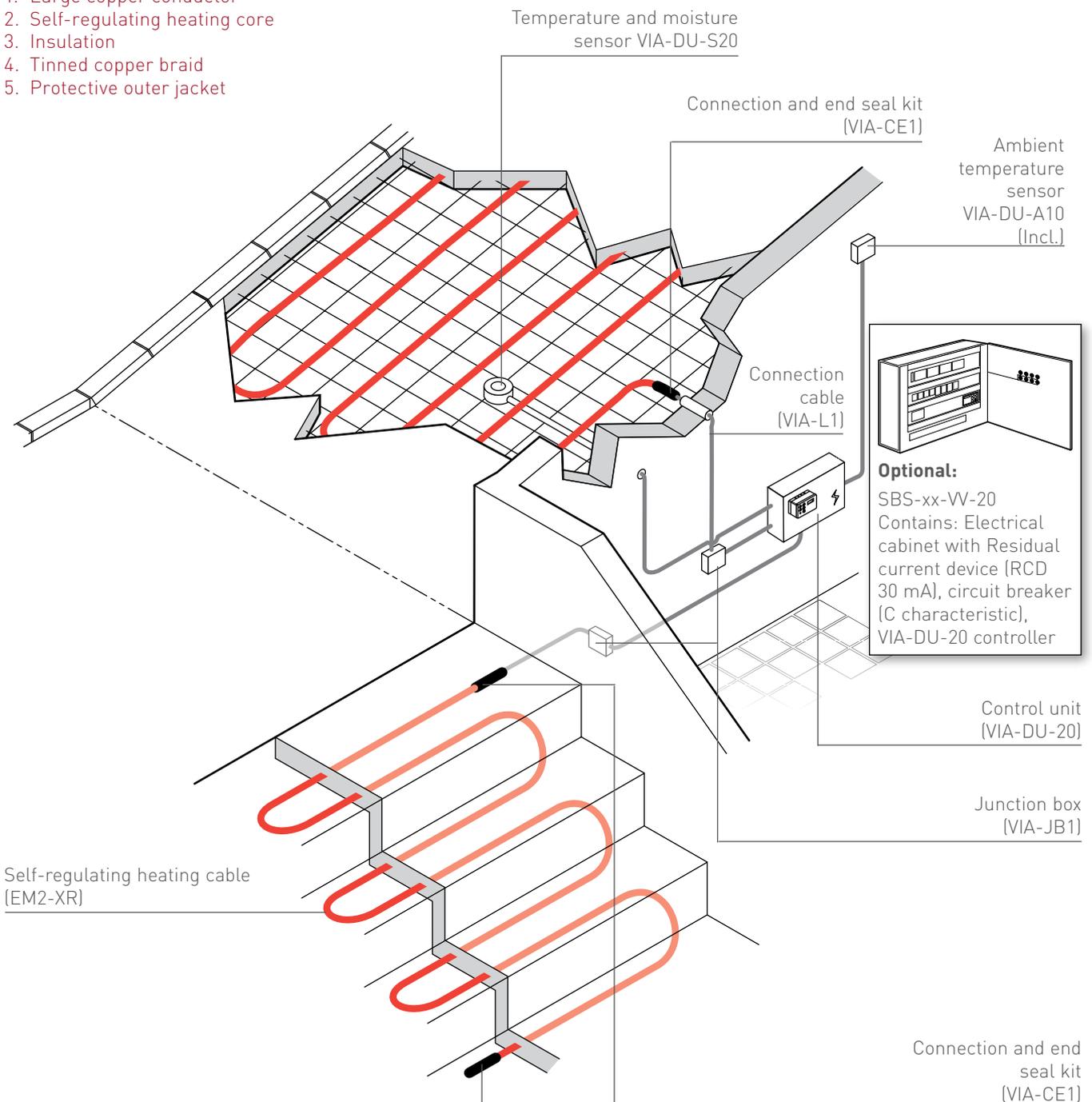
* At design stage: verify power at start-up temperature



Composition

1. Large copper conductor
2. Self-regulating heating core
3. Insulation
4. Tinned copper braid
5. Protective outer jacket

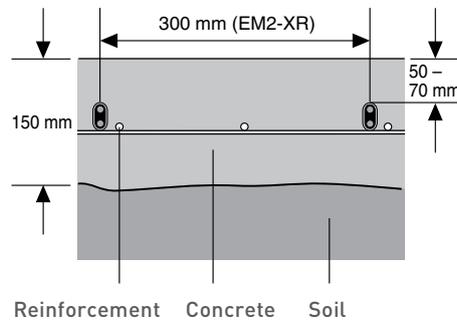
- Unsuitable for use in poured asphalt.
- When laying directly in concrete with a covering of at least 20 mm, an asphalt layer of max. 40 mm can be applied on the concrete surface (max. 250°C)



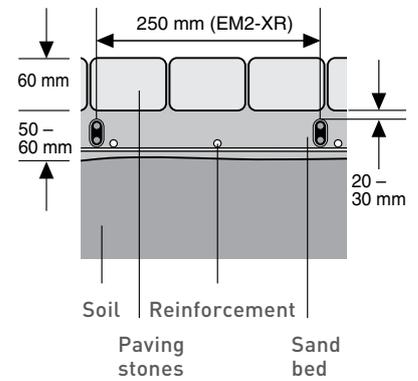


2. CABLE SPACING

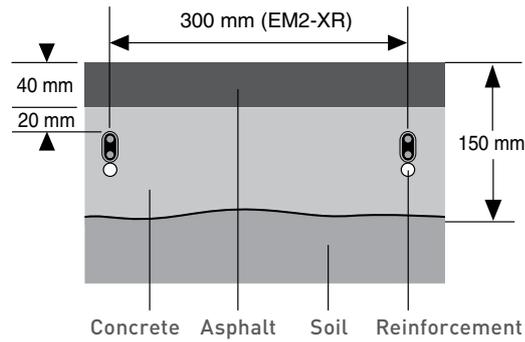
Concrete



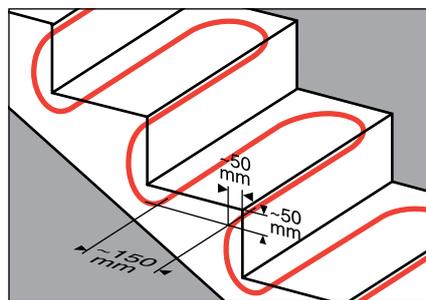
Sand bed



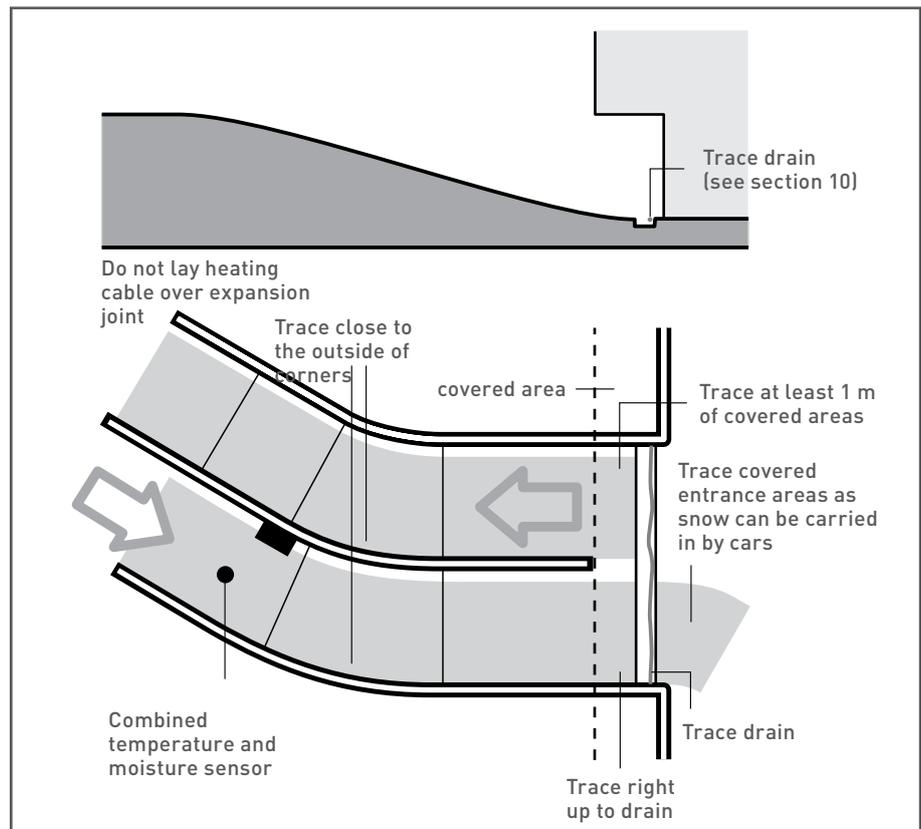
Asphalt



Concrete stairs



3. DETERMINE AREA TO BE HEATED



4. DETERMINE AREA TO BE HEATED

A. Ramps and paths

$$\text{Heating cable length (m)} = \frac{\text{Total surface to be heated}}{\text{heating cable spacing (m)}}$$

B. Stairs

$$\text{Heating cable length (m)} = [2 \times \text{stair width (m)} + 0.4] \times \text{number of stairs} + 1 \text{ m (connection)}$$

5. ELECTRICAL PROTECTION

Max. heating cable lengths

- According to local standards and regulations.
- Residual current device (rcd) 30 mA required, max. 500 m heating cable per rcd.
- Take into account the conductor size and max. permitted voltage drop. A higher voltage drop can occur at start-up of heating

Power at start-up

- To determine the installed power with the electrical system designer, the nominal current of the series connected fuse or the current value at the system start-up temperature must be taken into account (e.g. 32 A for 55 m of EM2-XR at -10°C).

Maximum circuit lengths

According to local standard and regulations

Residual current device (RCD) 30 mA required, max. 500 m heating cable length per RCD.

Take into account the conductor sizes and max. permitted voltage drop.

Circuit breaker sizing (MCBS to BS EN 60898, Type C)	Max. circuit length: EM2-XR (for start-up at -10°C)
10 A	17 m
16 A	28 m
20 A	35 m
25 A	45 m
32 A	55 m
40 A	Contact your Pentair Thermal Management representative for the most economical solution
50 A	

6. NUMBER OF CIRCUITS

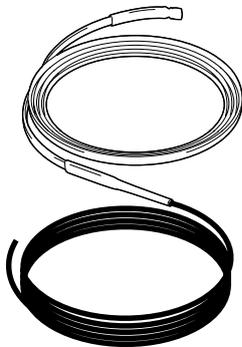
Min. number of heating circuits = $\frac{\text{Heating cable length (see section 4)}}{\text{max. length of heating circuit (see section 5)}}$

- The heating cable should not be laid over expansion joints.
- The heating cable should be distributed as symmetrically as possible.

7. ELECTRICAL CONNECTION

- According to local standards and technical regulations.
- The cross-section is determined according to the nominal current of the circuit-breakers and maximum permitted voltage drop.

8. PRE-CONFIGURED HEATING UNITS



- For faster on-site installation, we recommend using prepackaged EM2-XR kits
- A pre-configured kit includes.
 - X m (required length) of EM2-XR heating cable
 - X m connection cable, suited for heavy duty - VIA-L1 (Maximum of 5 m cold lead connection cable with heater cable lengths over 50 metres.)
 - Connection and end seal pre-installed

Product name	Order reference
Heating unit Raychem Viagard	1244-005360

9. INSTALLATION INSTRUCTIONS

1

The heating cable should not be applied over expansion joints. Lay a separate heating circuit on either side of the expansion joint.

For cornered ramps, always follow the curve (in this way, you ensure that the laying spacing is maintained). Trace as close as possible to the outside of corners

The heating cable should preferably be laid in long rather than in short runs.

Trace at least 1 m of covered areas

Heating of the drain

Trace right up to drain

Trace covered entrance areas as snow can be carried in by cars

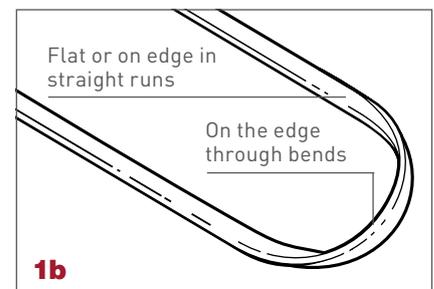
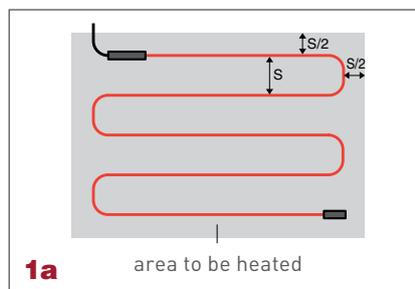
1a

1b

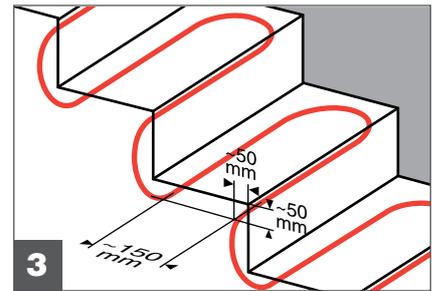
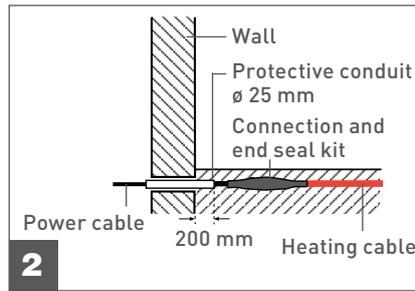
The ground temperature and moisture sensor is to be installed within the heated area at least 2.5 cm away from the heating cables (see diagram). The sensor must be able to directly detect weather conditions (rain, snow, melted snow and ice). The sensor may not be covered up (e.g. when clearing the snow).

Also heat areas in which vehicles can be expected to brake (e.g. in front of barriers, toll booths or magnetic card readers.)

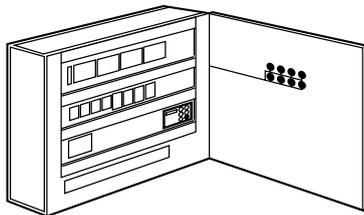
*** Take care that VIA-DU-S20 is NOT installed in an area which is continuously flooded with water (e.g. drain line), or in an area which is continuously under ice due to external parameters (e.g. freezing of condensation water in cool room).**



Spacing (S)	Concrete	Sand
EM2-XR	300 mm	250 mm



10. CONTROL PANELS



Steel enclosure in wall-mounted construction, equipped with master power switch. Combination(s) 30 mA / C32 A, circuit breaker(s), "On" and "Alarm" warning lights. Completely assembled, cabled ready connected and tested. Cable entry points in enclosure floor. Each cabinet is equipped with VIA-DU-20 multi-sensor controller.

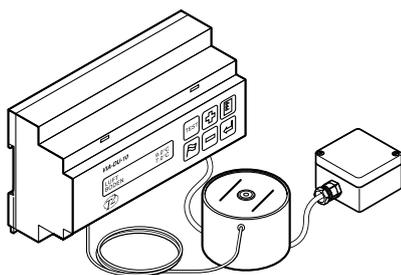
SBS-03-VV-20	Cabinet for 1 to 3 heating circuits (3 x 32 A)	PCN: 1244-000215
SBS-06-VV-20	Cabinet for 4 to 6 heating circuits (6 x 32 A)	PCN: 1244-000216
SBS-09-VV-20	Cabinet for 7 to 9 heating circuits (9 x 32 A)	PCN: 1244-000217
SBS-12-VV-20	Cabinet for 10 to 12 heating circuits (12 x 32 A)	PCN: 1244-000218

* For ACS-30 Control & Monitoring system, please contact us.

11. CONTROL UNITS

The electronic control unit ensures that the surface heating only starts when the temperature falls below a certain threshold and moisture is detected on the relevant surfaces, ensuring efficient energy use.

VIA-DU-20

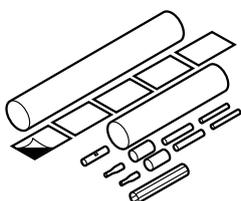


Control unit with combined moisture and temperature sensor and optional ambient temperature sensor.

- DIN-rail mounting
- Sensor cable length: 15 m
- Freezing rain precaution
- Optional BMS connection
- Alarm relay contacts

12. COMPONENTS AND ACCESSORIES

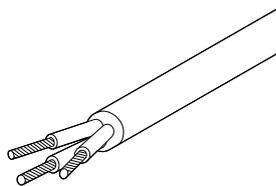
VIA-CE1



Waterproof connection and end seal

- Sealing compound and heat-shrinkable sleeve
- One kit required per heating cable circuit
- Connection of the heating cable and cold lead cable VIA-L1

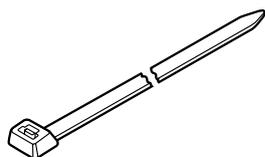
VIA-L1



Temperature-resistant cable (cold lead), 3 x 6 mm² copper conductors

- To be installed in conduit
- Maximum length of cold lead for standard connection boxes: 65 m
- Maximum length of cold lead with C 40 A and C 50 A circuit breakers: 5 m (VDE standard)

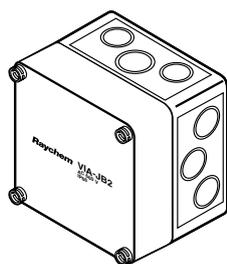
KBL-09



Cable ties for fixing heating cable to reinforced mesh

- One pack required for 30 m of self-regulating heating cable
- Pack of 100 pc
- Length 200 mm

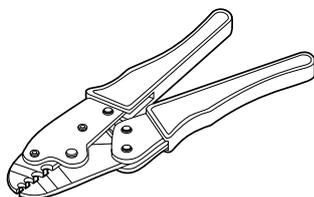
VIA-JB2



Temperature-resistant junction boxes

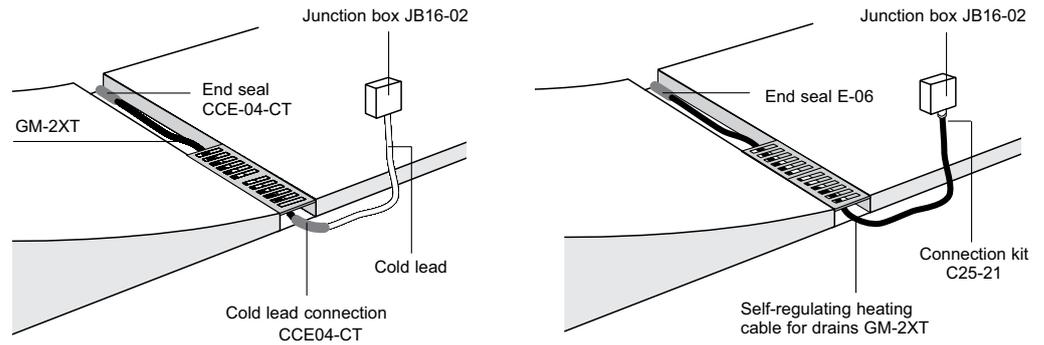
- For heating circuits up to C 50 A circuit-breakers
- Dimensions: 125 x 125 x 100 mm
- Terminals 3 x 16 mm²
- IP 66
- 4 x M20/25 + 2 x M32 at opposite sides and 6 x M20/25 at opposite sides

VIA-CTL-01

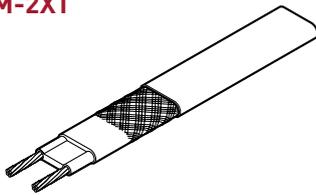


Crimping tool for connectors in VIA-CE1 connection and end seal kit

13. DRAIN TRACING

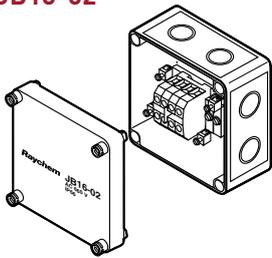


GM-2XT



Drain heating cable with oil- and UV-resistant fluoropolymer outer jacket

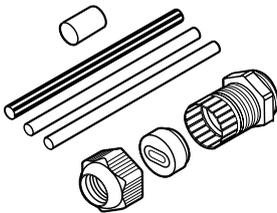
JB16-02



Temperature-resistant junction and connection box
Dimensions: 94 x 94 x 57mm

- IP66
- 6 x 4mm² terminals
- 4 Pg 11/16 and 4 M20/25 knock-out entries

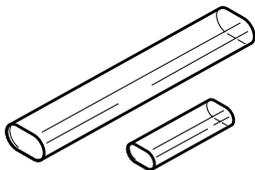
C25-21



Connection kit for GM-2XT

- Heat-shrink system (M25)

E-06



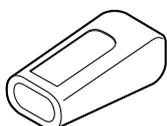
End seal kit for GM-2XT

- Heat-shrink system

The drain heating system can be switched via the same control unit as the surface heating system.

- Max. 70 m of GM-2XT can be connected to a 16 A C-type circuit-breaker.
- Residual current device (rcd) 30 mA required.

RayClic-E-02



Gel-filled end seal

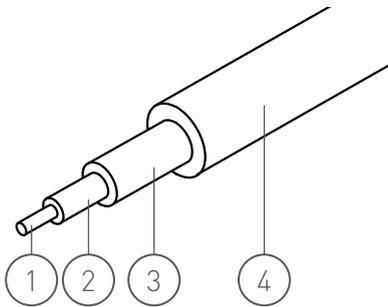
- For system extensions (to be ordered separately)
- IP 68



MINERAL INSULATED SYSTEMS

1. APPLICATION

Surface heating in asphalt applications.



- Extremely robust
- Long life expectancy
- Installation-ready heating cable
- Proven quality: high temperature withstand capabilities

	Small areas, Footpaths	Large areas, Garage entrances
Typical output requirement	180 W/m ² (50 W/m)	300 W/m ² (50 W/m)
Spacing	275 mm	165 mm

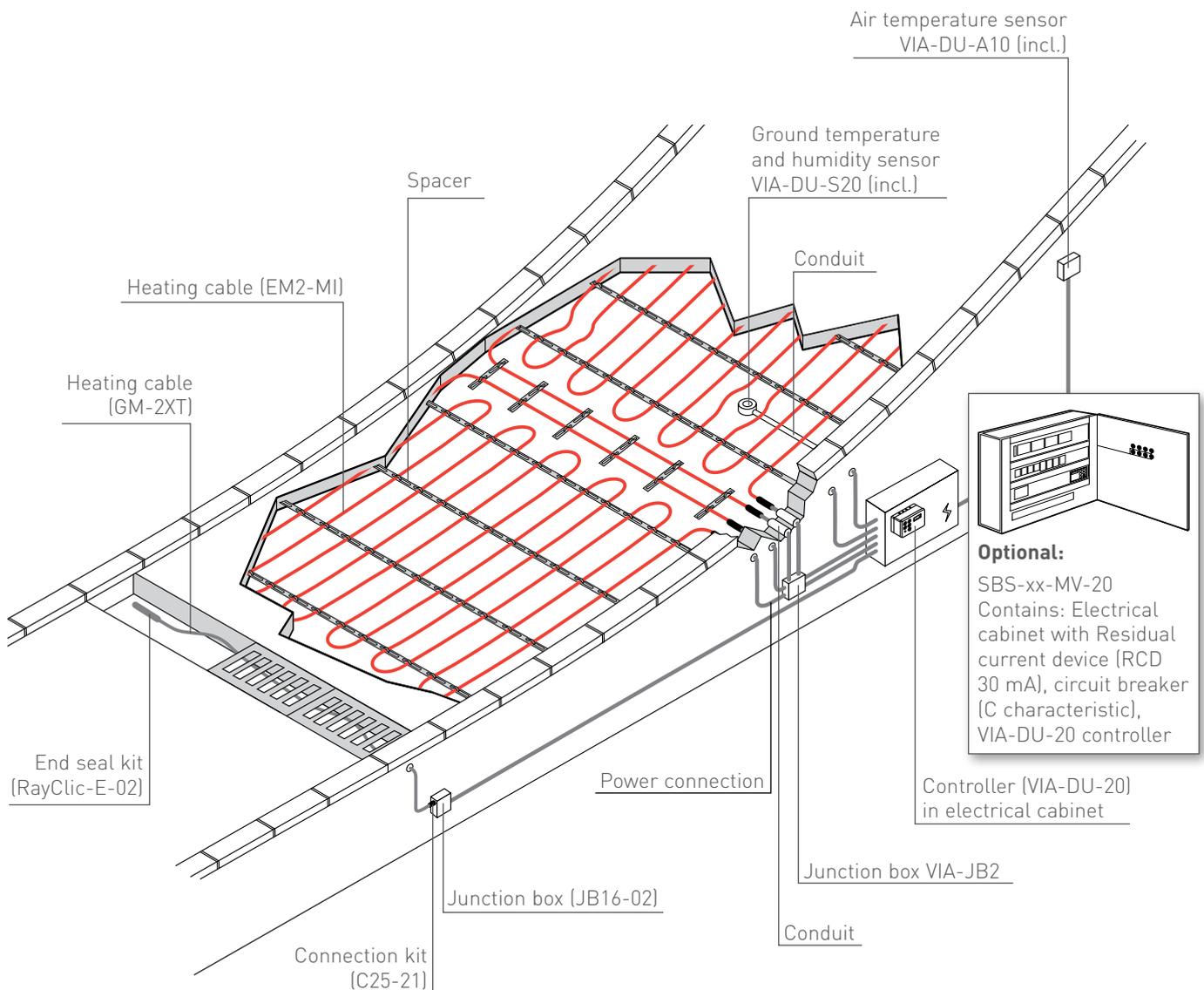
Construction:

1. Heating element
2. Mineral insulation
3. Protective jacket, copper alloy
4. Heat resistant outer jacket (PVC free)

Heating cable configuration from 26 m to 88 m.
Cable power output = 50W/m

Package contents

- Heating cable with pre-installed power cables (2 x 3 m)
- Installation instructions



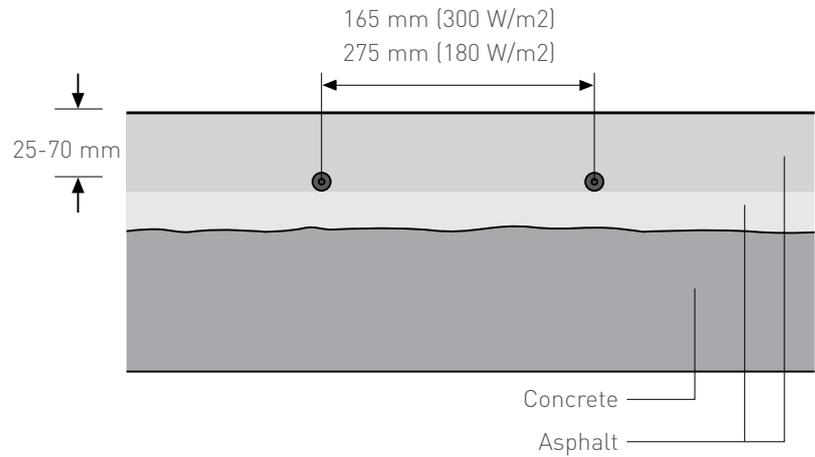
Optional:
SBS-xx-MV-20
Contains: Electrical cabinet with Residual current device (RCD 30 mA), circuit breaker (C characteristic), VIA-DU-20 controller

Controller (VIA-DU-20) in electrical cabinet



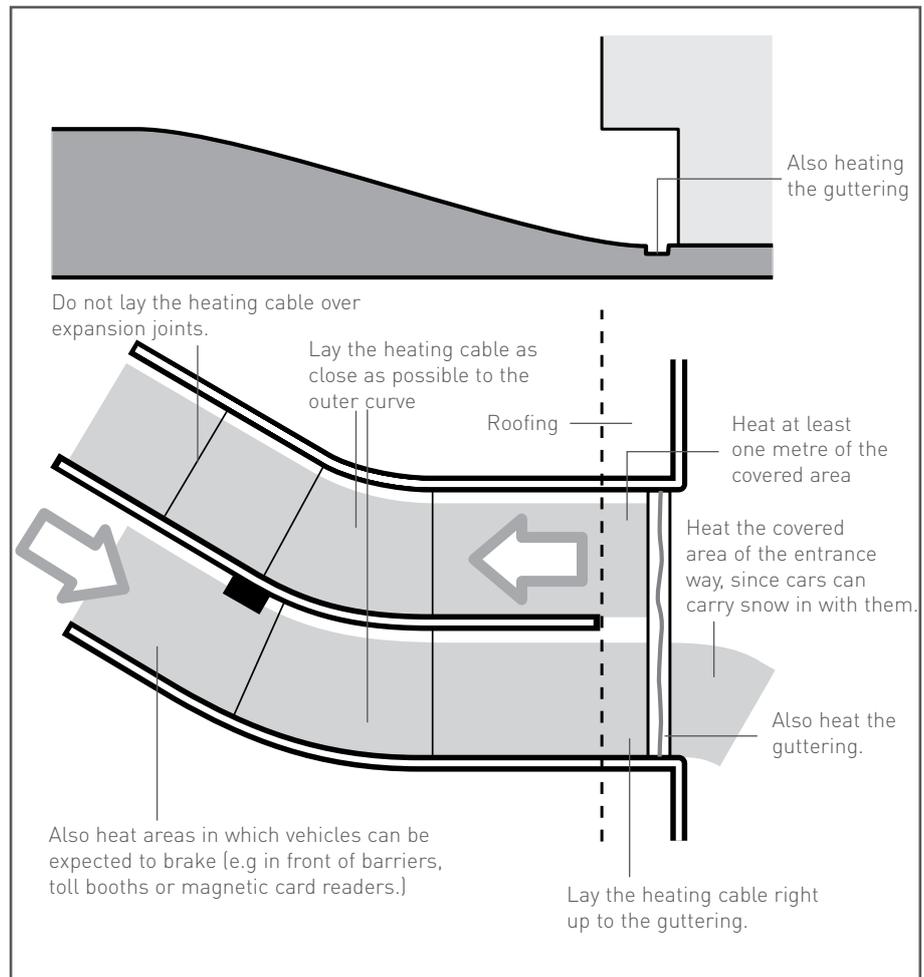
2. CABLE SPACING

Asphalt



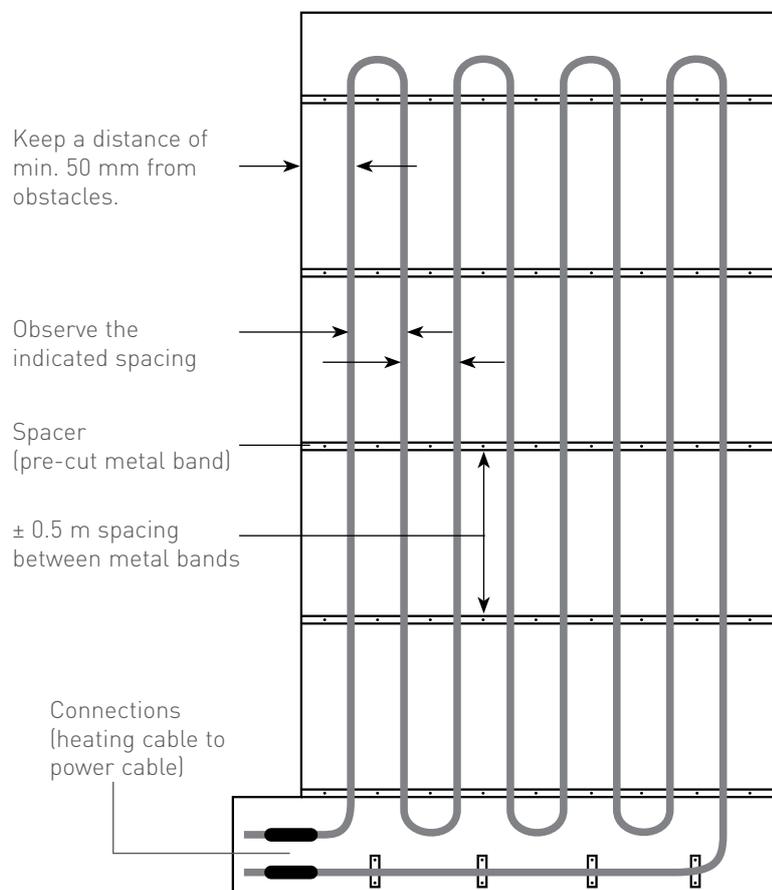
The VIA-SPACER enables correct and even spacing of the heater cable.

3. DETERMINE AREA TO BE HEATED



4. LAYING THE HEATING CABLE

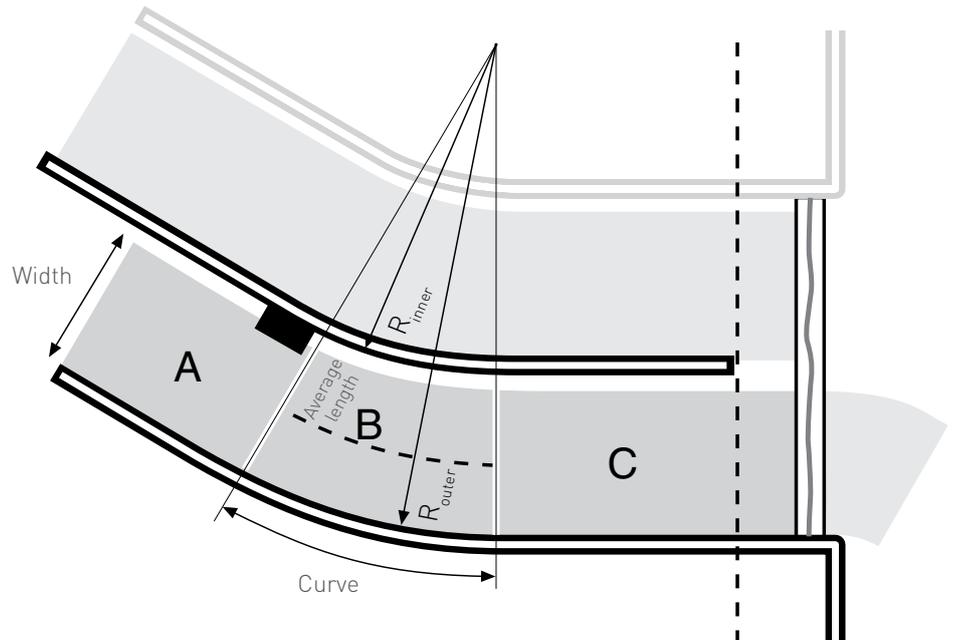
- The spacer rail should be secured to the substrate at 0.5 m intervals.
- The heating cable should be laid parallel to the direction of traffic.
- The spacing should be at least 50 mm. The heating cables must not overlap or crossed.
- Do not shorten or splice the heating cable.
- Do not lay the heating cable over expansion joints.
- Lay the cable in runs to allow both heating cable ends to connect to the same point.
- The heating cable must be completely covered with asphalt, while the power cable must not be in contact with asphalt (lay it in sand or with protective conduit).



5. PACKAGE SELECTION

- Divide the heated area into sections.
- Do not lay the heating cable over expansion joints.
- Calculate the surface area of the individual sections.
- Select one or more packages from the table according to the size of the surface.

Example



- Calculation of the area of sections A, B and C:

A: Length x width = 6 m x 3 m = 18 m²

C: Length x width = 8 m x 3 m = 24 m²

B: Average length x width = 3.53 m x 3 m = 10.6 m²

- Determine the number of strips for a nominal output of 300 W/m²

Spacing = 0.165 m

Ramp width = 3 m

Number of strips = 3 / 0.165 => 18 strips

- Selecting the package size

Rectangular areas: Necessary min. length = length x number of strips

A = 6 m x 18 = 108 m (EM-MI-PACK-48M + EM-MI-PACK-60M)

C = 8 m x 18 = 144 m (EM-MI-PACK-60M + EM-MI-PACK-48M +

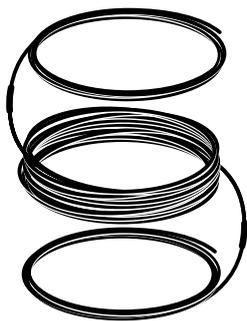
EM-MI-PACK-36M or EM-MI-PACK-60M + EM-MI-PACK-88M

(if the area is not broken up by expansion joints))

Curves:

B = EM-MI-PACK-60M oder EM-MI-PACK-26M + EM-MI-PACK-36M

6. ELECTRICAL PROTECTION



- Observe local standards and regulations.
- Residual current device required. (RCD)
- Take the cable cross-section and max. permitted voltage drop into account.

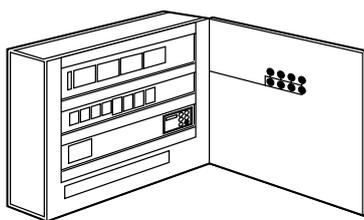
Order references

	300 W/m ² spacing 165m		180 W/m ² spacing 275m		Circuit breaker switch (C Characteristic)	Connection cable Cross section (mm ²)
	Nominal power (W)	Area (m ²)	Required spacer *(m)	Area (m ²)		
EM-MI-PACK-26M	1270	4,5	10	7,0	10 A	2,5
EM-MI-PACK-36M	1835	6,0	10	10,0	10 A	2,5
EM-MI-PACK-48M	2450	8,0	25	13,0	13 A	2,5
EM-MI-PACK-60M	2800	10,0	25	15,0	16 A	2,5
EM-MI-PACK-70M	3435	11,5	25	19,0	20 A	2,5
EM-MI-PACK-88M	4290	14,5	25	24,0	25 A	6,0

Min. Activation temperature -10°C, AC 230 V.

When using standard electrical cabinets, use only EM-MI-PACK 26M to 70M (for circuit breaker up to 20A, C characteristic).

7. CONTROL PANELS



Steel enclosure in wall-mounted construction, equipped with master power switch. Combination(s) 30 mA / C32 A, circuit breaker(s), "On" and "Alarm" warning lights. Completely assembled, cabled ready connected and tested. Cable entry points in enclosure floor. Each cabinet is equipped with VIA-DU-20 multi-sensor controller.

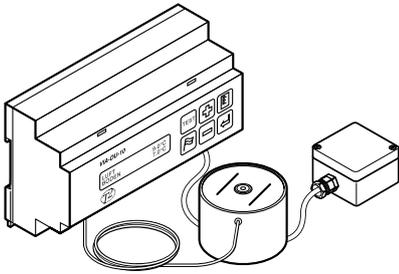
SBS-03-MV-20	Cabinet for 1 to 3 heating circuits (3 x 20A)	PCN: 1244-000219
SBS-06-MV-20	Cabinet for 4 to 6 heating circuits (6 x 20 A)	PCN: 1244-000220
SBS-09-MV-20	Cabinet for 7 to 9 heating circuits (9 x 20 A)	PCN: 1244-000221
SBS-12-MV-20	Cabinet for 10 to 12 heating circuits (12 x 20 A)	PCN: 1244-000222
SBS-15-MV-20	Cabinet for 13 to 15 heating circuits (15 x 20 A)	PCN: 1244-000223
SBS-18-MV-20	Cabinet for 16 to 18 heating circuits (18 x 20 A)	PCN: 1244-000224

* For ACS-30 Control & Monitoring system, please contact us.

8. CONTROL UNITS

The electronic control unit ensures that the surface heating only starts when the temperature falls below a certain threshold and moisture is detected on the relevant surfaces, ensuring efficient energy use.

VIA-DU-20

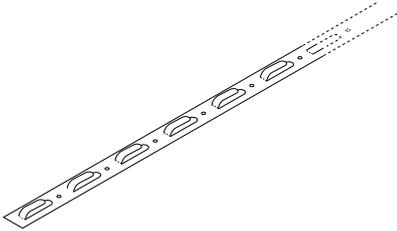


Control unit with combined moisture and temperature sensor and optional ambient temperature sensor.

- DIN-rail mounting
- Sensor cable length: 15 m
- Freezing rain precaution
- Optional BMS connection
- Alarm relay contacts

9. COMPONENTS AND ACCESSORIES

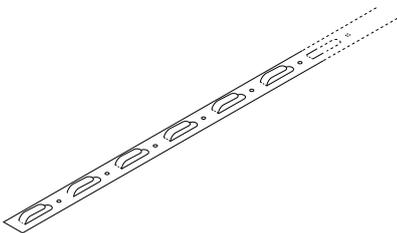
VIA-SPACER-10 M



Spacer and mounting band (10 m)

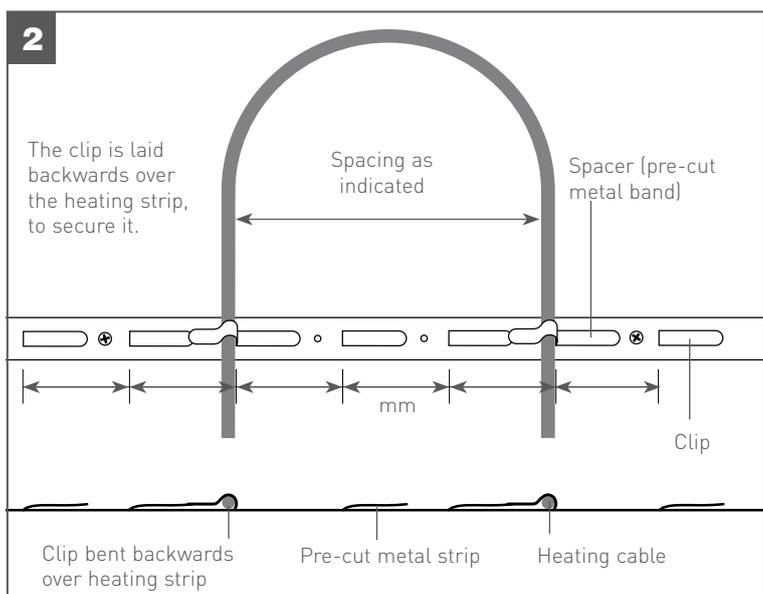
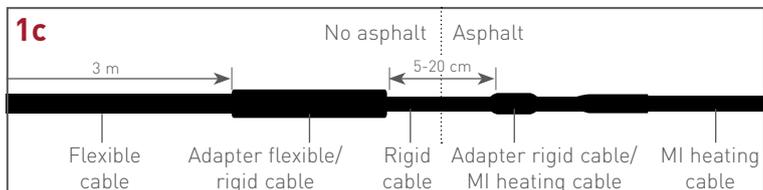
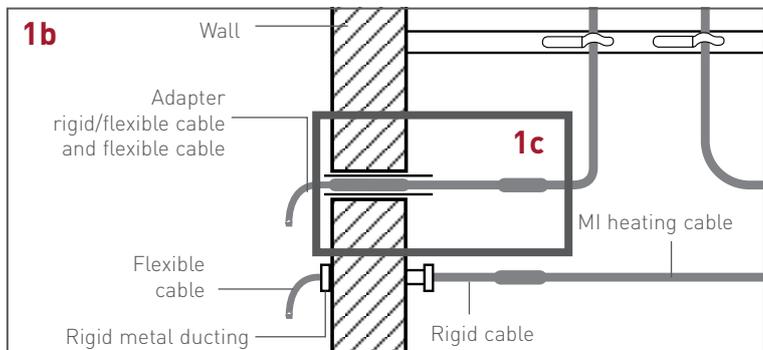
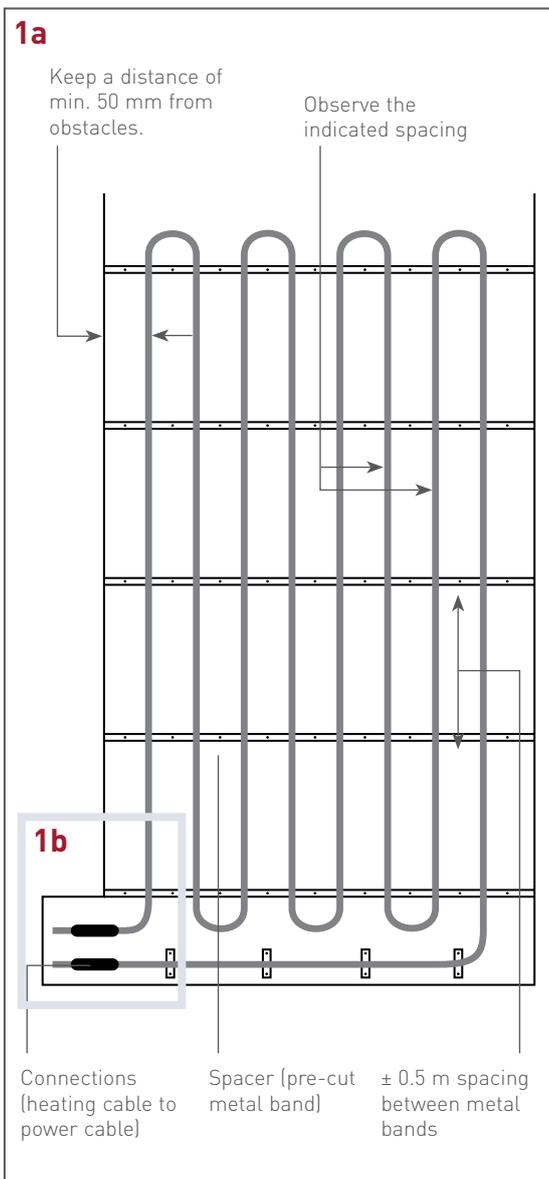
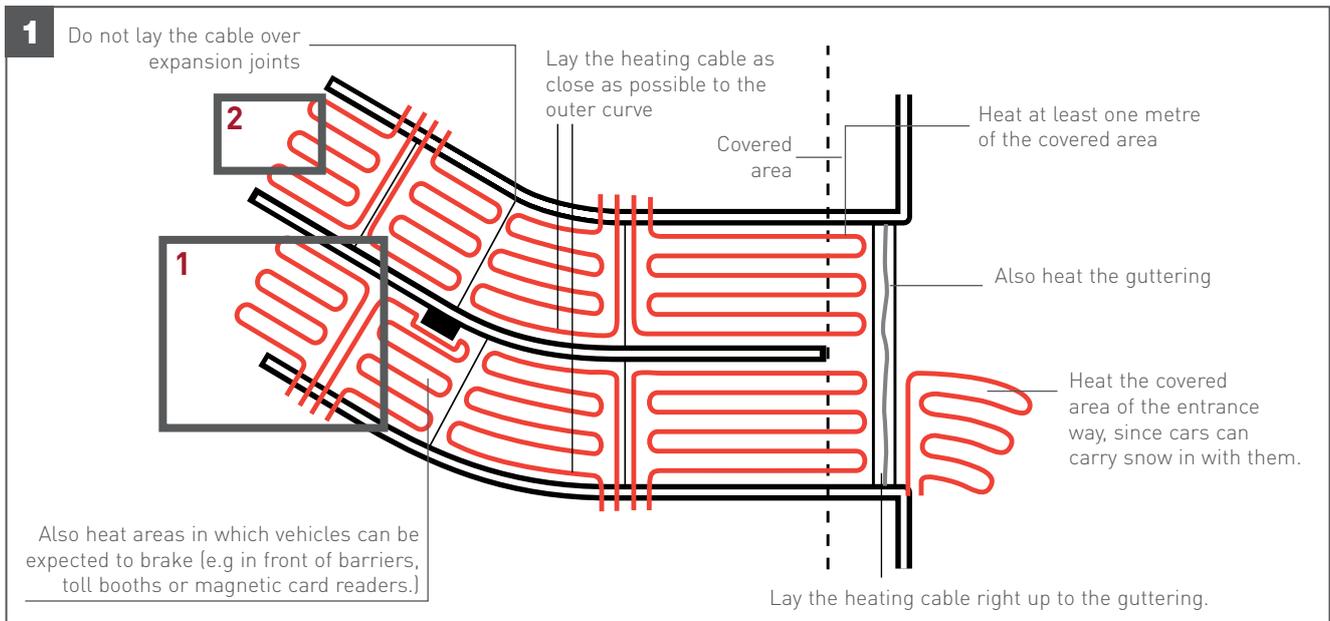
- Required for:
EM-MI-PACK-26M
EM-MI-PACK-36M
- Requirement: 2 m/m²
- Pre-cut metal strip

VIA-SPACER-25 M



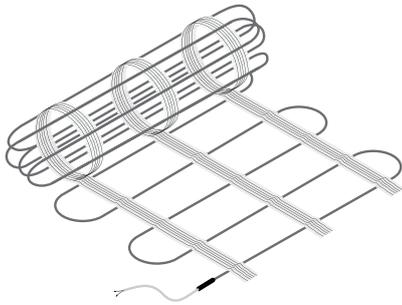
Spacer and mounting band (25 m)

- Required for:
EM-MI-PACK-48M
EM-MI-PACK-60M
EM-MI-PACK-70M
EM-MI-PACK-88M
- Requirement: 2 m/m²
- Pre-cut metal strip



POLYMER SOLUTIONS HEATING MAT EM2-CM

1. APPLICATION



EM2-CM is a constant wattage heating mat for simple, fast, and effective ramp and accessway heating to prevent snow and ice formation. The EM2-CM mat is particularly suited for track heating of ramps, loading bays, and driveways, but also emergency escape routes and pedestrian walkways.

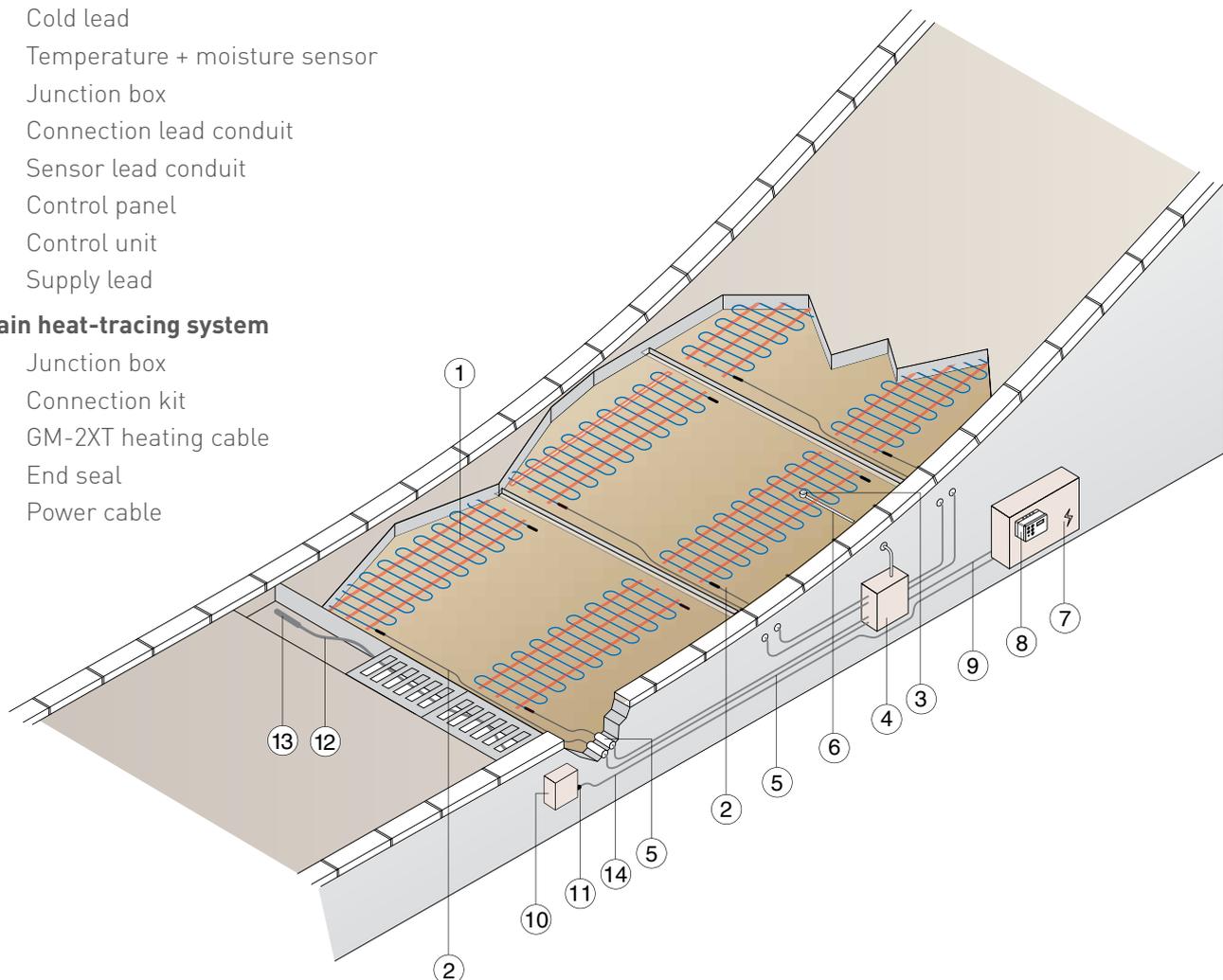
Nominal power	300 W/m ²
Voltage	230 Vac
Maximum exposure temperature	65°C
Cable construction	Twin core, constant wattage heating mat, 1 cold lead (4 m)
Control unit	VIA-DU-20
Certification	CE, VDE

2. DETERMINE AREA TO BE HEATED - TRACK HEATING

1. Surface heating mat
2. Cold lead
3. Temperature + moisture sensor
4. Junction box
5. Connection lead conduit
6. Sensor lead conduit
7. Control panel
8. Control unit
9. Supply lead

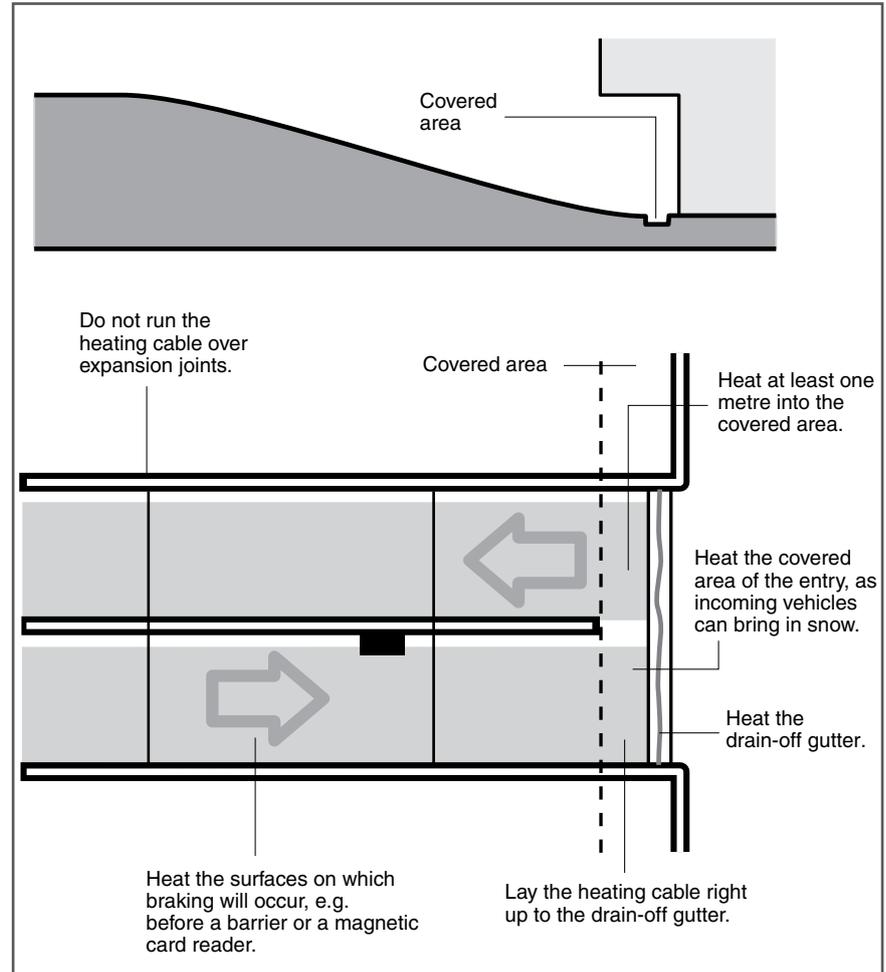
Drain heat-tracing system

10. Junction box
11. Connection kit
12. GM-2XT heating cable
13. End seal
14. Power cable

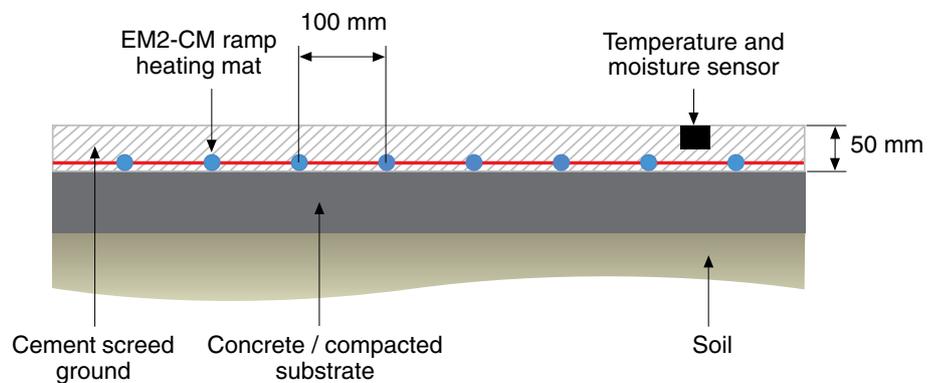


3. AREA TO BE HEATED

Determine the exact area to be heated, e.g. wheel tracks. Consider following factors:

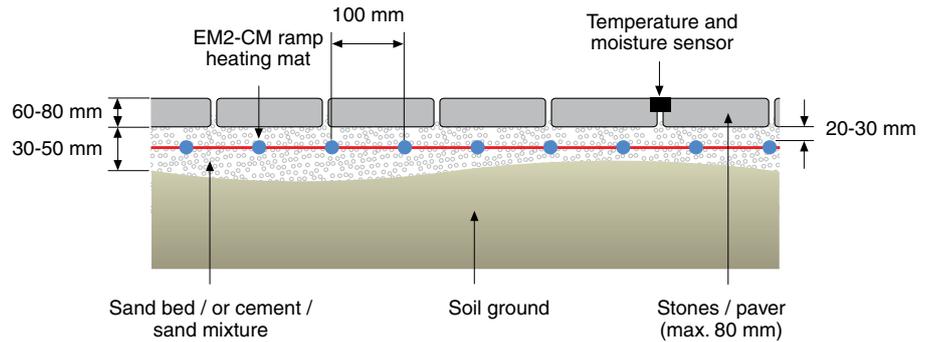


4. EMBEDDING IN SCREED OR CONCRETE

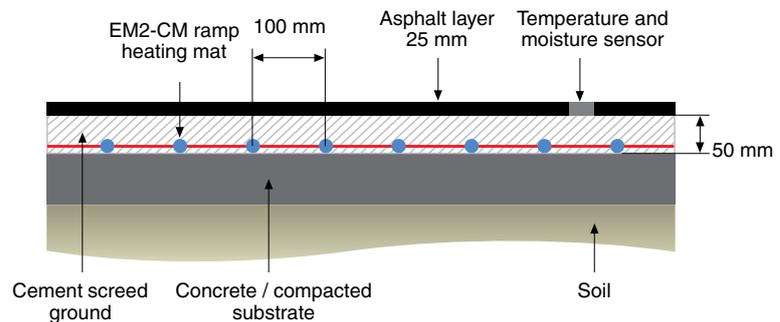


When laying in concrete with a covering of least 25 mm

5. EMBEDDING IN SAND BED/PAVERS



6. EMBEDDING IN CONCRETE / CEMENT SCREED UNDER ASPHALT LAYER



- An asphalt layer of min. 25 mm can be applied on the concrete surface (max. 300 W/m²)
- The product is unsuitable for direct use in poured asphalt or on reinforcement in concrete

7. PACKAGING AND ORDERING REFERENCES

EM2-CM ramp heating mat is available in the sizes given below.

- For a quick and easy installation on site
- the pre-terminated kit contains:
 - X m (heating mat length)
 - 4 m power cable
 - Installation manual; commissioning report

Product name	Mat size	Surface	Power output	Order reference
EM2-CM-Mat-2m	2 m x 0.6 m	1.2 m ²	400 W	1244-004887
EM2-CM-Mat-3m	3 m x 0.6 m	1.8 m ²	520 W	1244-004888
EM2-CM-Mat-4m	4 m x 0.6 m	2.4 m ²	670 W	1244-004889
EM2-CM-Mat-5m	5 m x 0.6 m	3.0 m ²	930 W	1244-004890
EM2-CM-Mat-7m	7 m x 0.6 m	4.2 m ²	1140 W	1244-004891
EM2-CM-Mat-10m	10 m x 0.6 m	6.0 m ²	1860 W	1244-004892
EM2-CM-Mat-13m	13 m x 0.6 m	7.8 m ²	2560 W	1244-004893
EM2-CM-Mat-16m	16 m x 0.6 m	9.6 m ²	2890 W	1244-004894
EM2-CM-Mat-21m	21 m x 0.6 m	12.6 m ²	3730 W	1244-004895

Ramp lanes and footpaths

Track heating: Determine the length of the lanes and select the closest (but smaller) size

8. ELECTRICAL PROTECTION

Maximum heating mat sizes

- According to local standard and regulations
- Residual current device (RCD) 30 mA required, max. 50 m heating mat length per RCD.
- Take into account the conductor sizes and max. permitted voltage drop.

Circuit breaker sizing (MCBS to BS EN 60898, Type C)	Max. mat length per heating circuit
10 A	10 m
16 A	16 m
20 A	21 m

9. NUMBER OF CIRCUITS

$$\text{Min. number of heating circuits} = \frac{\text{Total heating mat length}}{\text{Max. mat length of heating circuit}}$$

Selection of the mat size

- The heating mat should not be laid over expansion joints
- The heating mat should be distributed as symmetrically as possible
- Calculate the obstacle-free length and select the mat or a combination of mats with the closest, but a smaller length size

Example 1

16 m track heating for 2 tracks = 2 x 8 m; Circuit breaker size 16 A Max:

$$\text{Min. number of heating circuits} = \frac{16 \text{ m}}{16 \text{ m}} = 1 \text{ heating circuit}$$

Selection heating mats:

Track 1 + 2: EM2-CM-Mat-16 m

Example 2

Circuit breaker sizes 20 A

50 m track heating for 2 tracks = 2 x 25 m

$$\text{Min. number of heating circuits} = \frac{50 \text{ m}}{21 \text{ m}} = 3 \text{ heating circuits}$$

Selection heating mats:

Heating circuit 1 Track 1+2: 2 x EM2-CM-Mat-4m = 8 m

Heating circuit 2 Track 1: EM2-CM-Mat-21 m = 21 m

Heating circuit 3 Track 2: EM2-CM-Mat-21 m

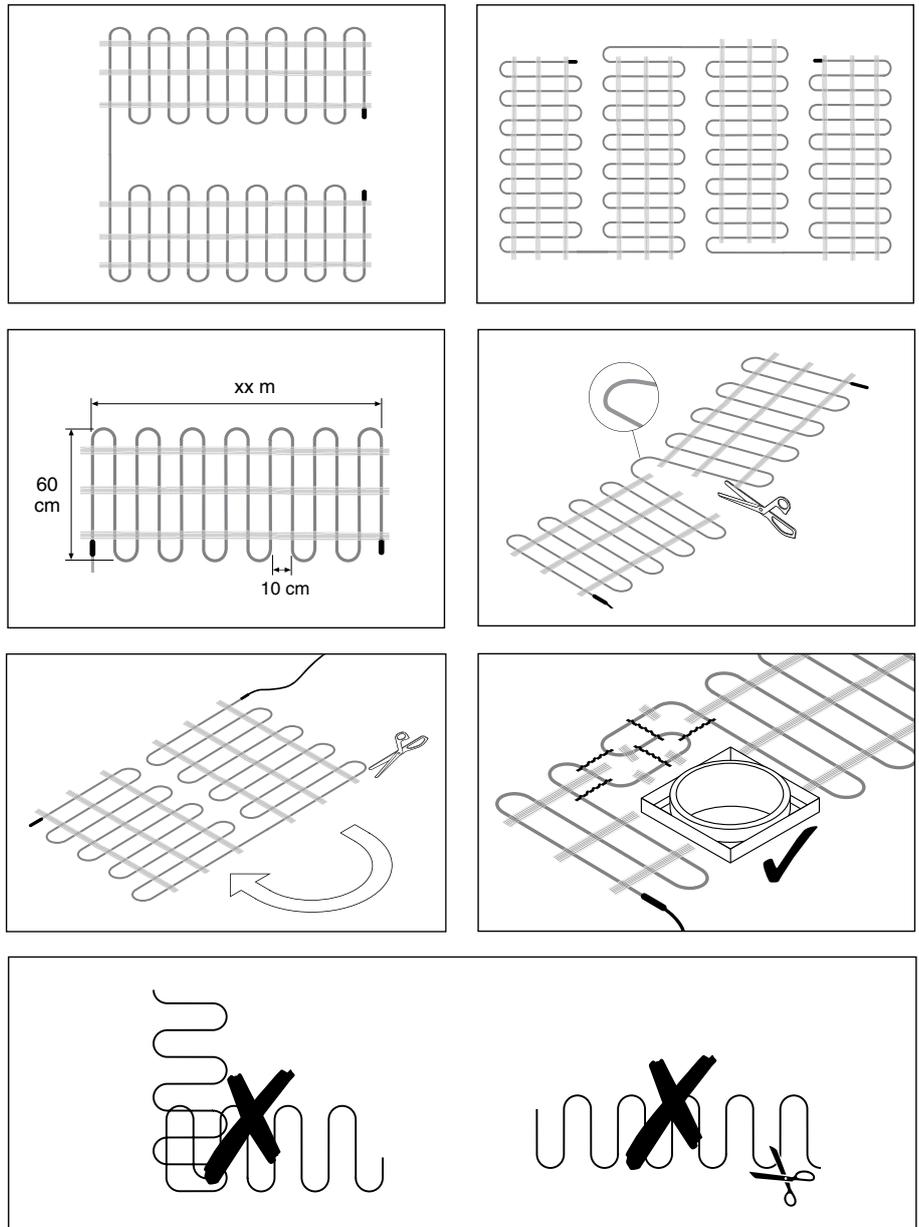
Total: 50 m

10. ELECTRICAL CONNECTION

- According to local standards and electrical regulations.
- The cross-section of the power cable conductors is determined according to the nominal current of the circuit breaker and max. permitted voltage drop.

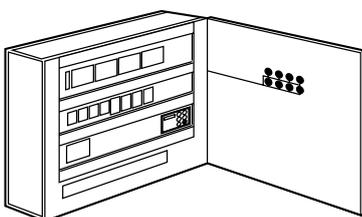
11. INSTALLATION

If the heating cable has to be loosened from the mat it is recommended to use the plastic spacer to keep the cable spacing consistent.



12. CONTROL PANELS

Steel enclosure in wall-mounted construction, equipped with master power switch. Combination(s) 30 mA / C32 A, circuit breaker(s), "On" and "Alarm" warning lights. Completely assembled, cabled ready connection and testing. Cable entry points in enclosure floor. Each cabinet is equipped with VIA-DU-20 multi-sensor controller.

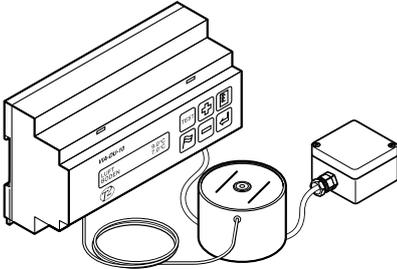


SBS-03-CM-20	Cabinet for 1 to 3 heating circuits (3 x 20 A)	PCN: 1244-006430
SBS-06-CM-20	Cabinet for 4 to 6 heating circuits (6 x 20 A)	PCN: 1244-006431
SBS-09-CM-20	Cabinet for 7 to 9 heating circuits (9 x 20 A)	PCN: 1244-006432
SBS-12-CM-20	Cabinet for 10 to 12 heating circuits (12 x 20 A)	PCN: 1244-006433

13. CONTROL UNITS

The electronic control unit ensures that the surface heating only starts when the temperature falls below a certain threshold and moisture is detected on the relevant surfaces, ensuring efficient energy use.

VIA-DU-20

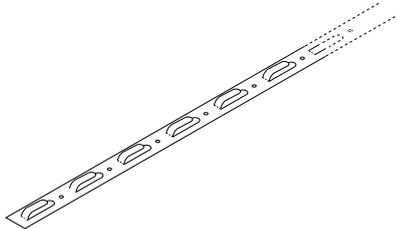


Control unit with combined moisture and temperature sensor and optional ambient temperature sensor.

- DIN-rail mounting
- Sensor cable length: 15 m
- Freezing rain precaution
- Optional BMS connection
- Alarm relay contacts

14. COMPONENTS AND ACCESSORIES

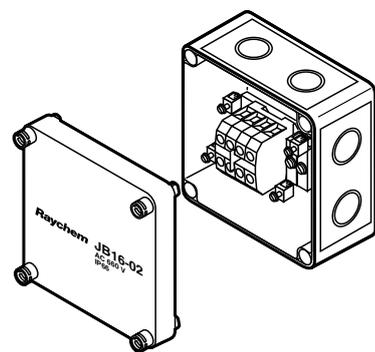
EM-SPACER-PL



Heating cable spacer

- Length: 5 m; 25 mm grid
- Plastic

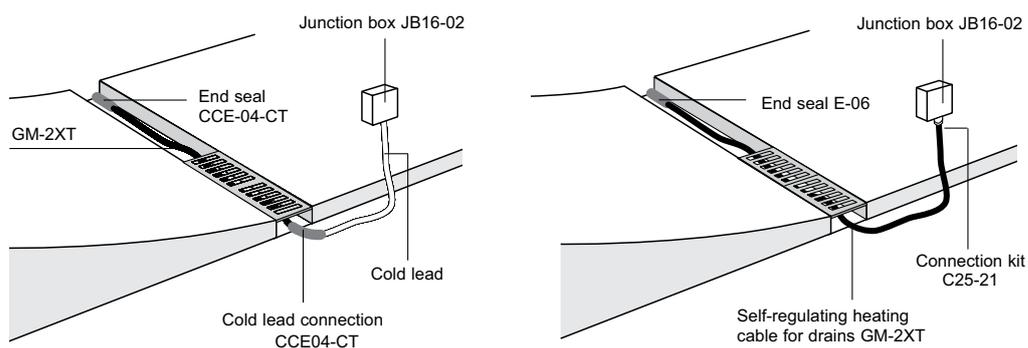
JB16-02



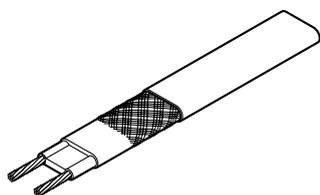
Temperature-resistant junction and connection box
Dimensions: 94 x 94 x 57 mm

- IP66
- 6 x 4 mm² terminals
- 4 Pg 11/16 and 4 M20/25 knock-out entries

15. DRAIN TRACING

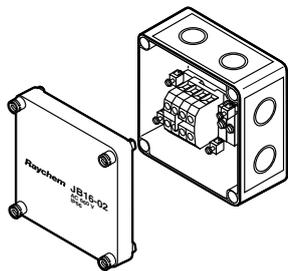


GM-2XT



Drain heating cable with oil- and UV-resistant fluoropolymer outer jacket

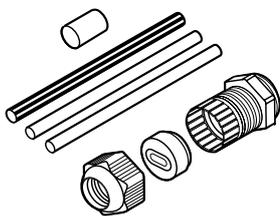
JB16-02



Temperature-resistant junction and connection box
Dimensions: 94 x 94 x 57mm

- IP66
- 6 x 4mm² terminals
- 4 Pg 11/16 and 4 M20/25 knock-out entries

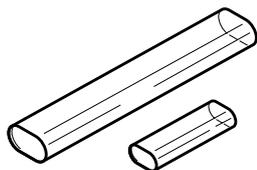
C25-21



Connection kit for GM-2XT

- Heat-shrink system (M25)

E-06



End seal kit for GM-2XT

- Heat-shrink system

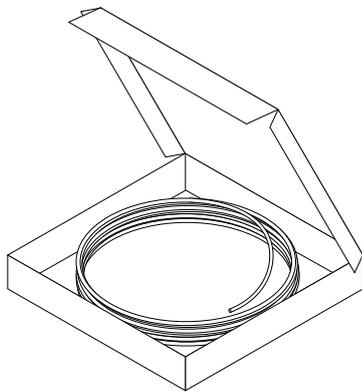
The drain heating system can be switched via the same control unit as the surface heating system.

- Max. 60 m of GM-2XT can be connected to a 16 A C-type circuit-breaker.
- Residual current device (rca) 30 mA required.

POLYMER SOLUTIONS

HEATING CABLE EM4-CW

1. APPLICATION



EM4-CW is a constant wattage heating cable for simple, fast, and effective ramp and accessway heating to prevent snow and ice formation. Simply install the heater over the required area and connect the cold lead to the power junction box and "Smart" control unit.

The EM4-CW heating cable is designed for applications where a 3 phase (400V) supply is available.

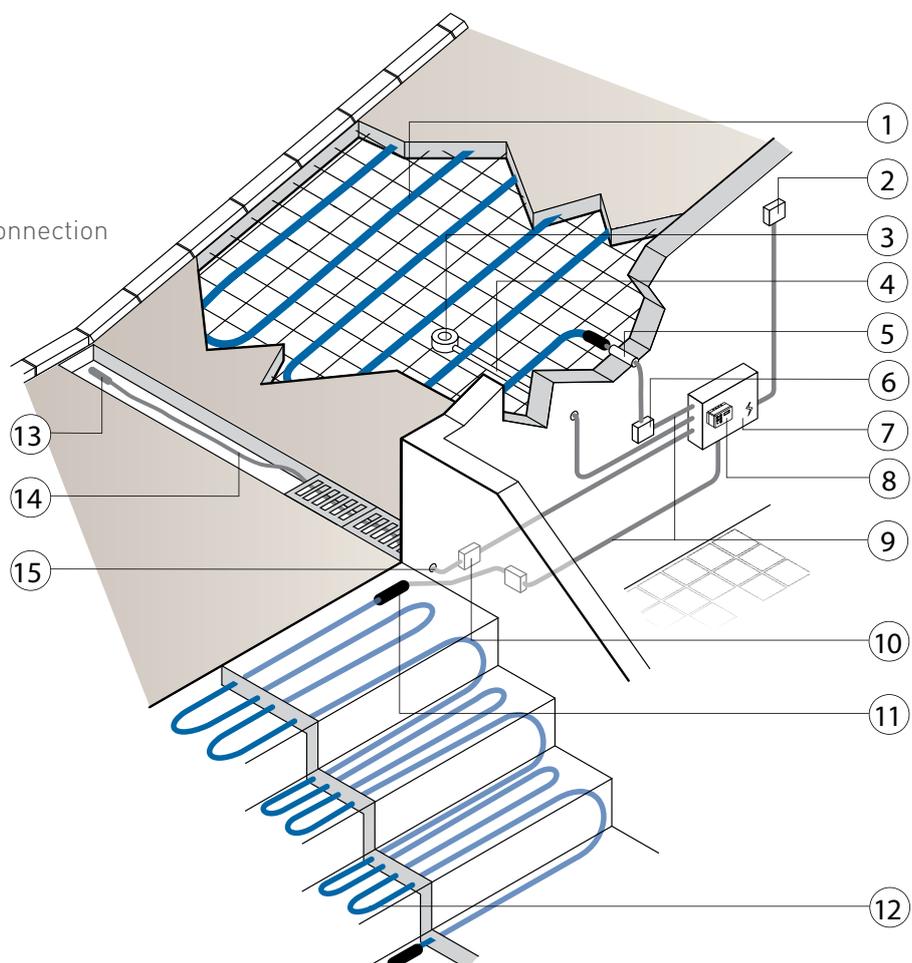
Nominal power	25 W/m
Voltage	400 V AC
Maximum exposure temperature	65°C
Cable construction	Twin core, constant wattage heating cable. Pre-terminated with a 4 m 3 core cold lead cable.
Control unit	VIA-DU-20
Certification	CE, VDE

2. DETERMINE AREA TO BE HEATED - TRACK HEATING

1. Surface heating cable
2. Junction box
3. Temperature + moisture sensor
4. Sensor lead conduit
5. Power cable conduit
6. Junction box
7. Control panel
8. Smart control unit
9. Supply lead
10. Junction box
11. Power cable - heating cable connection
12. EM4-CW heating cable

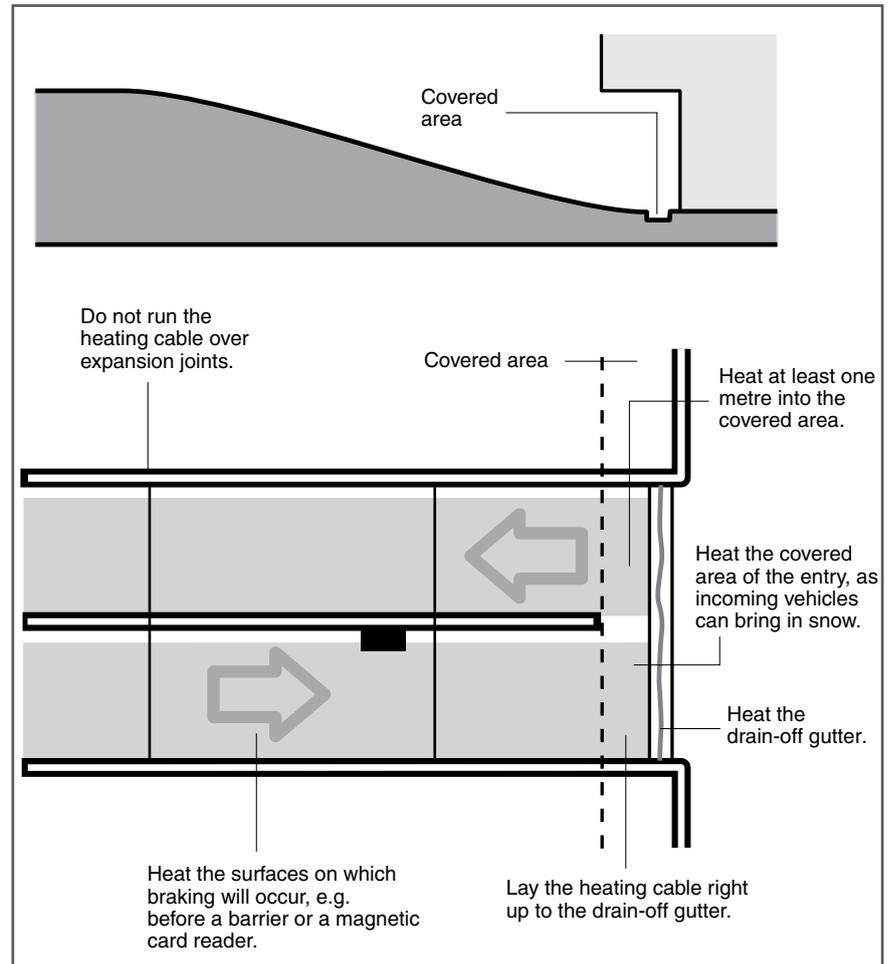
Drain trace heating system

13. End seal
14. GM-2XT heating cable
15. Connection kit

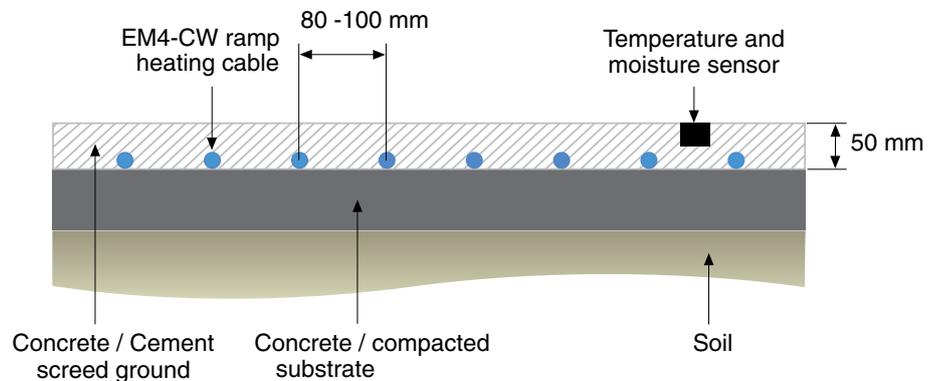


3. AREA TO BE HEATED

Determine the exact area to be heated, e.g. wheel tracks. Consider following factors:

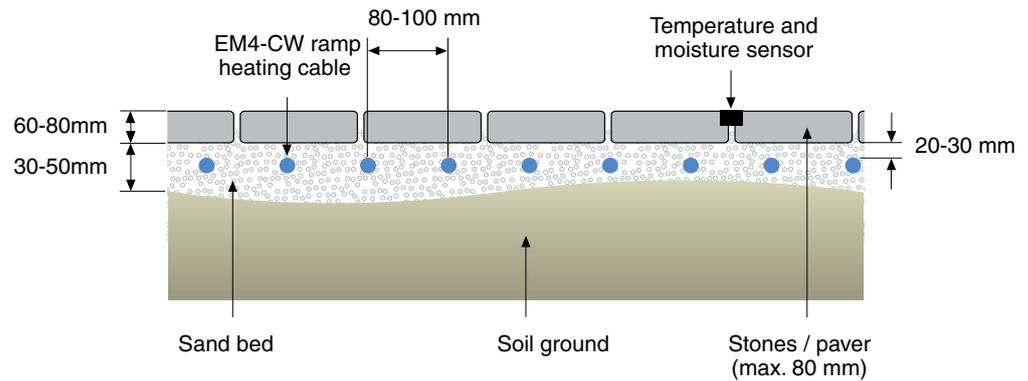


4. EMBEDDING IN SCREED OR CONCRETE

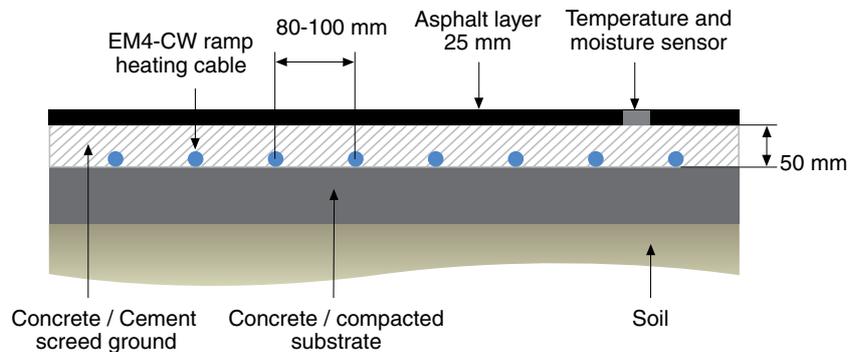


When laying in concrete with a covering of least 25 mm

5. EMBEDDING IN SAND BED/PAVERS



6. EMBEDDING IN CONCRETE / CEMENT SCREED UNDER ASPHALT LAYER



- An asphalt layer of min. 25 mm can be applied on the concrete surface [max. 300 W/m²]
- The product is unsuitable for direct use in poured asphalt or on reinforcement in concrete

7. PACKAGING AND ORDERING REFERENCES

EM4-CW ramp heating cable is available in the sizes given below.

- Supply voltage 400 V
- Pre-terminated kit contains:
 - heating cable length;
 - cold lead length;
- Installation manual; commissioning report.

Product name	Cable length	Power output	Order reference
EM4-CW-26M	26 m	650 W	1244-005182
EM4-CW-35M	35 m	875 W	1244-005184
EM4-CW-62M	62 m	1525 W	1244-005188
EM4-CW-121M	121 m	3050 W	1244-005191
EM4-CW-172M	172 m	4325 W	1244-005194
EM4-CW-210M	210 m	5275 W	1244-005196
EM4-CW-250M	250 m	6250 W	1244-005198

8. HEATING CABLE LENGTHS

Tracks and footpaths

$$\text{Heating cable length (m)} = \frac{\text{Total surface to be heated (m}^2\text{)}}{\text{Heating cable spacing (m)}}$$

Calculate the obstacle-free area and select the cable or a combination of cables with a smaller length, but closest in size.

Stairs

- Heating cable length per step = $300 \text{ W/m}^2 / 25 \text{ W/m} \times \text{width} \times \text{length}$
- Total heating cable length = Number of steps x heating cable lengths per step + number of steps x step height

9. ELECTRICAL PROTECTION

Product name	Conductor Resistance +/-10%	Rated Power (400 Vac)	Circuit Breaker (400 Vac)
EM4-CW-26M	246 Ω	650 W	10 A
EM4-CW-35M	183 Ω	875 W	10 A
EM4-CW-62M	105 Ω	1525 W	10 A
EM4-CW-121M	52 Ω	3050 W	10 A
EM4-CW-172M	37 Ω	4325 W	16 A
EM4-CW-210M	30 Ω	5275 W	20 A
EM4-CW-250M	26 Ω	6250 W	20 A

10. NUMBER OF CIRCUITS

$$\text{Min. number of heating circuits} = \frac{\text{Total heating cable length}}{\text{Max. cable length of heating circuit}}$$

Example 1

20 m² ramp with 250 W/m² output requirement

Cable Spacing = $250 \text{ W} / 25 \text{ W/m} = 10 \text{ m}$ of cable per $1 \text{ m}^2 = 100 \text{ mm}$ cable spacing
10 metres of cable per m² means $10 \times 20 \text{ m}^2 = 200 \text{ m}$ of cable required = 5 kW

Therefore cables required: 1 x 172 m cable
1 x 26 m cable (or optional 35 m cable)

Total cable length 198 m (or 208 m if 35 m cable option is taken)

Example 2

15 m² walkway with 300 W/m² output requirement

Cable Spacing = $300 \text{ W} / 25 \text{ W/m} = 12 \text{ m}$ of cable per m² of ramp = 80 mm (approx.) cable spacing

12 m per m² means $12 \times 15 \text{ m}^2 = 180 \text{ m}$ of cable = 4.5 kW

Therefore cables required: 3 x 62 m cable = 186 m

11. ELECTRICAL CONNECTION

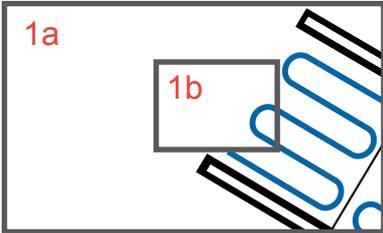
- According to local standards and electrical regulations.
- The cross-section of the power cable conductors is determined according to the nominal current of the circuit breaker and max. permitted voltage drop.

12. INSTALLATION

Minimum cable spacing is 8 cm. The heating cable must be secured to the underlying surface to prevent movement during the installation. The cold lead cable should be protected in a conduit. The entire length of heating cable should be covered by wet sand-cement mixture, screed, or dry sand depending on the selected top surface.

1

The heating cable should not be applied over expansion joints. Lay a separate heating circuit on either side of the expansion joint.



For cornered ramps, always follow the curve (in this way, you ensure that the laying spacing is maintained). Trace as close as possible to the outside of corners

The heating cable should preferably be laid in long rather than in short runs.

The ground temperature and moisture sensor is to be installed within the heated area at least 2.5 cm away from the heating cables (see diagram). The sensor must be able to directly detect weather conditions (rain, snow, melted snow and ice). The sensor may not be covered up (e.g. when clearing the snow).

Also heat areas in which vehicles can be expected to brake (e.g. in front of barriers, toll booths or magnetic card readers.)

Covered area

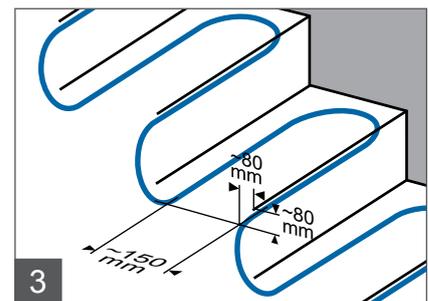
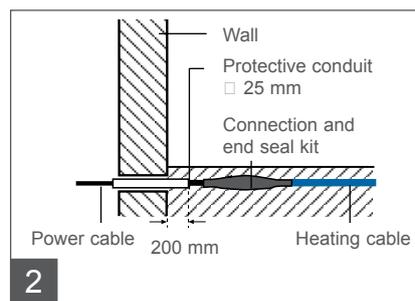
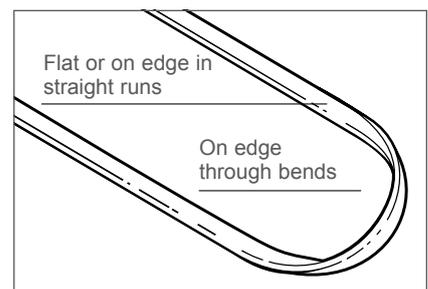
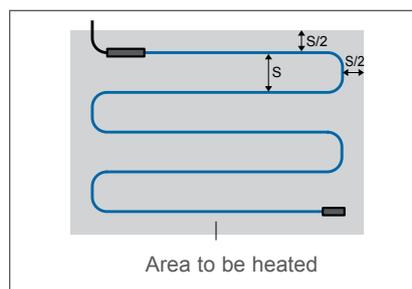
Trace at least 1 m of covered areas

Heating of the drain

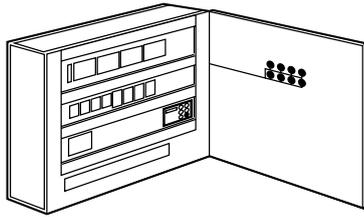
Trace right up to drain

Trace covered entrance areas as snow can be carried in by cars

*** Take care that VIA-DU-S20 is NOT installed in an area which is continuously flooded with water (e.g. drain line), or in an area which is continuously under ice due to external parameters (e.g. freezing of condensation water in cool room).**



13. CONTROL PANELS



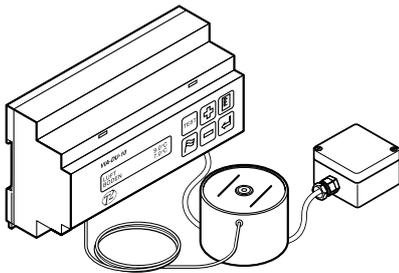
Steel enclosure in wall-mounted construction, equipped with master power switch. Combination(s) 30 mA / C20A, circuit breaker(s), "On" and "Alarm" warning lights. Completely assembled, cabled ready connected and tested. Cable entry points in enclosure floor. Each cabinet is equipped with VIA-DU-20 multi-sensor controller.

SBS-03-CW-40	Cabinet for 1 to 3 heating circuits (3 x 20 A)	PCN: 1244-006434
SBS-06-CW-40	Cabinet for 4 to 6 heating circuits (6 x 20 A)	PCN: 1244-006435
SBS-09-CW-40	Cabinet for 7 to 9 heating circuits (9 x 20 A)	PCN: 1244-006436
SBS-12-CW-40	Cabinet for 10 to 12 heating circuits (12 x 20 A)	PCN: 1244-006437
SBS-15-CW-40	Cabinet for 13 to 15 heating circuits (15 x 20 A)	PCN: 1244-006438
SBS-18-CW-40	Cabinet for 16 to 18 heating circuits (18 x 20 A)	PCN: 1244-006439

14. CONTROL UNITS

The electronic control unit ensures that the surface heating only starts when the temperature falls below a certain threshold and moisture is detected on the relevant surfaces, ensuring efficient energy use.

VIA-DU-20

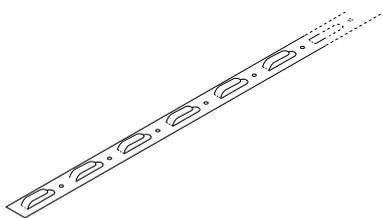


Control unit with combined moisture and temperature sensor and optional ambient temperature sensor.

- DIN-rail mounting
- Sensor cable length: 15 m
- Freezing rain precaution
- Optional BMS connection
- Alarm relay contacts

15. COMPONENTS AND ACCESSORIES

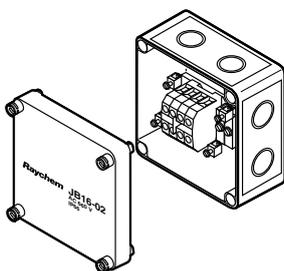
VIA-SPACER-10M, VIA-SPACER-25M



Heating cable spacer

- 2 lengths: 10 m and 25 m [2 m/m²]
- Metal band

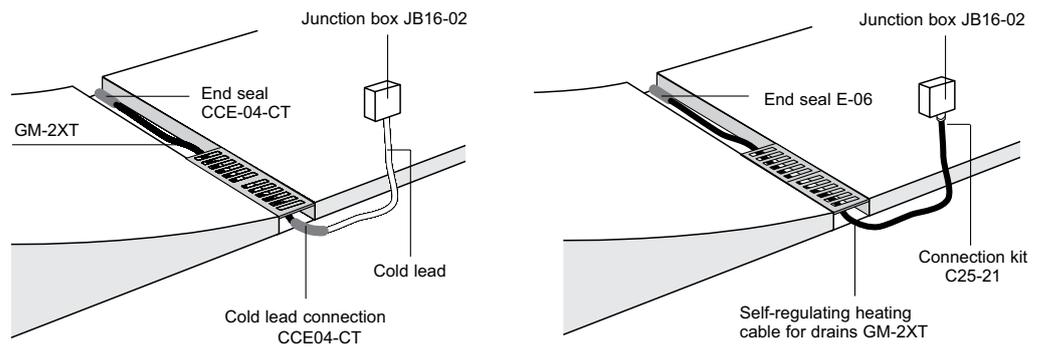
JB16-02



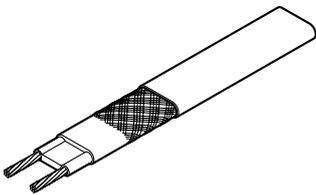
Temperature-resistant junction and connection box
Dimensions: 94 x 94 x 57mm

- IP66
- 6 x 4mm² terminals
- 4 Pg 11/16 and 4 M20/25 knock-out entries

16. DRAIN TRACING

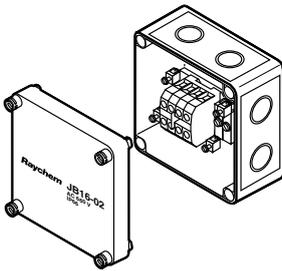


GM-2XT



Drain heating cable with oil- and UV-resistant fluoropolymer outer jacket

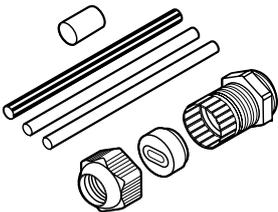
JB16-02



Temperature-resistant junction and connection box
Dimensions: 94 x 94 x 57mm

- IP66
- 6 x 4mm² terminals
- 4 Pg 11/16 and 4 M20/25 knock-out entries

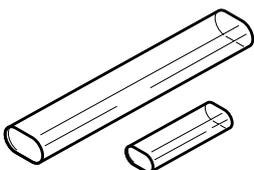
C25-21



Connection kit for GM-2XT

- Heat-shrink system (M25)

E-06



End seal kit for GM-2XT

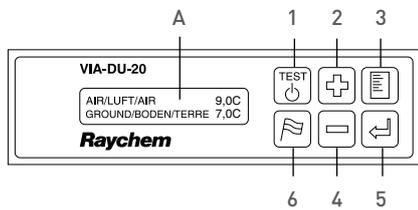
- Heat-shrink system

The drain heating system can be switched via the same control unit as the surface heating system.

- Max. 60 m of GM-2XT can be connected to a 16 A C-type circuit-breaker.
- Residual current device (rcd) 30 mA required.

CONTROL UNIT VIA-DU-20

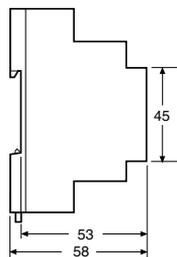
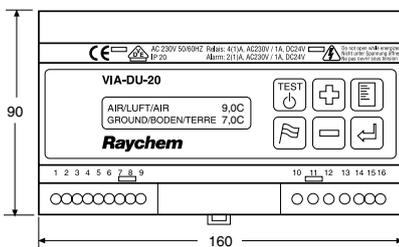
1. LAYOUT



A. Display, illuminated (parameter and fault conditions)

1. Testing the device / switch on the heating output
2. Increasing the value selected, changing settings (forwards)
3. Selecting a menu
4. Selecting a language
5. Reducing the value selected, changing settings (backwards)
6. Confirm the value selected, select the next value and responding to fault messages

1. TECHNICAL DATA



(Dimensions in mm)

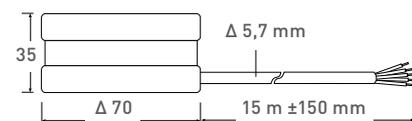
Operating voltage	230 Vac, ±10 %, 50/60 Hz
Power consumption	14 VA max.
Main relay (heating)	I_{max} 4(1)A, 250 Vac SPST, voltfree
Alarm relay	I_{max} 2(1)A, 250 Vac SPDT, voltfree
Switching accuracy	±1 K
Display	Point matrix, 2 x 16 places
Assembly	DIN rail
Housing material	Noryl
Terminals	0.5 mm ² to 2.5 mm ²
Protection	IP20/class II (Panel mounted)
Weight	750 g
Temperature resistance	0°C to +50°C

Main parameters

Temperature at which device comes on	1°C to +6°C
Moisture at which device switches on	Off, 1 (moist) to 10 (very wet)
Post-heating period	30 to 120 min. (heating on)
Base temperature	Off, -15°C to -1°C
Freezing rain warning	Local detection, weather service, off
Overruling	Off, on, BMS

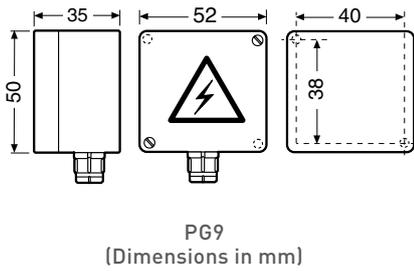
If there is a power failure, all parameters remain saved in the memory

2. GROUND TEMPERATURE AND MOISTURE SENSOR VIA-DU-S20



Voltage	8 Vdc (via control device)
Type of sensor	PTC
Protection	IP65
Diameter of lead	5 x 0.5 mm ² , 5.7 mm diameter.
Length of lead	15 m, can be extended to 50 m (5 x 1.5 mm ²)
Temperature resistance	-30°C to +80°C

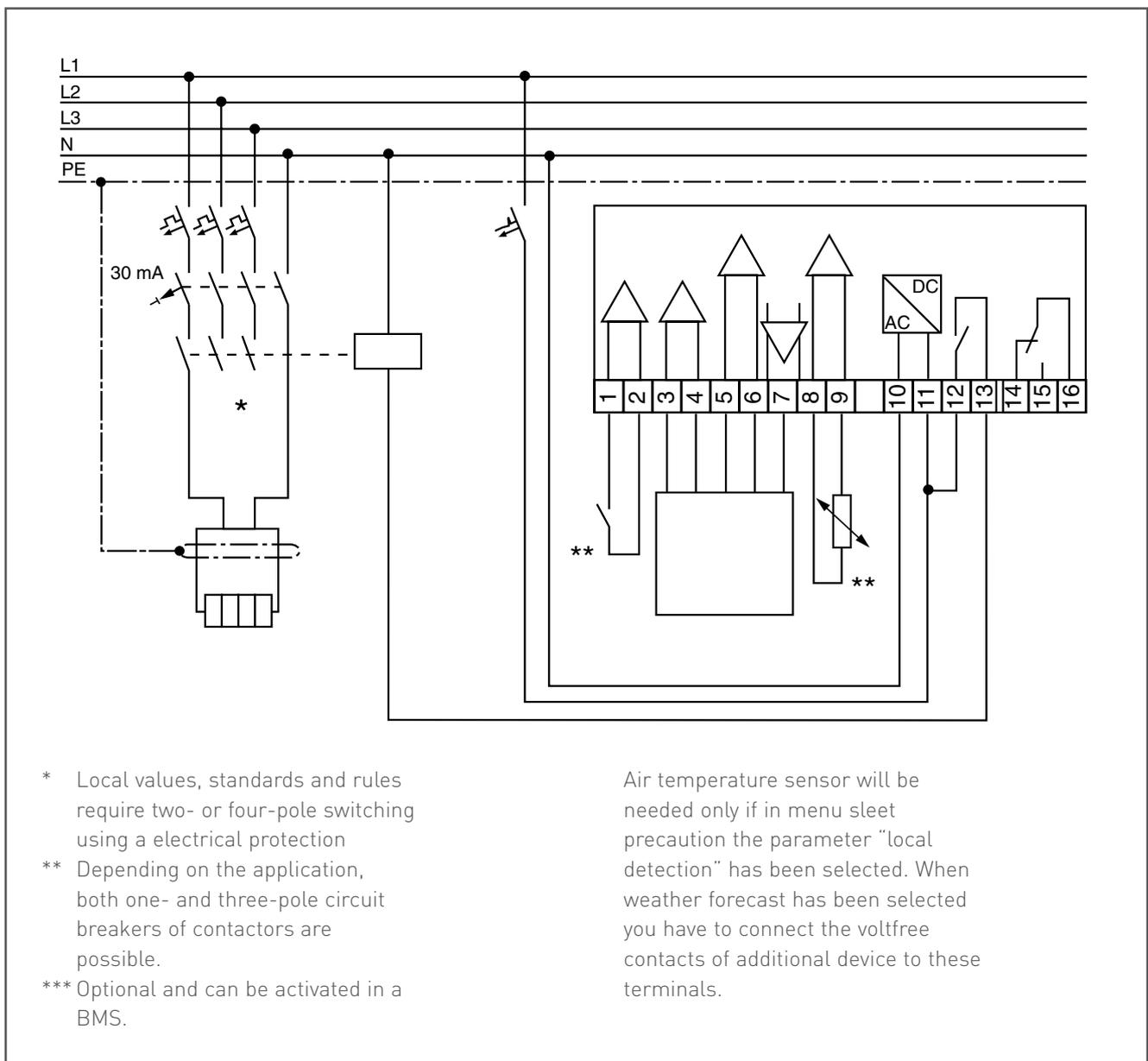
3. AMBIENT TEMPERATURE SENSOR* VIA-DU-A10



Sensor type	PTC
Ingress protection	IP54
Terminals	1.5 to 2.5 mm ²
Sensor cable	2 x 1.5 mm ² , max. 100 m (not included)
Exposure temperature	-30°C to +80°C
Mounting	Wall mounting

* Installation not mandatory if "Sleet precaution" is not set to "Auto".

4. VIA-DU-20 WITH CONTACTOR



CONTROL PANELS SBS-XX-VV-20

1. DESCRIPTION



The SBS-XX-VV-20 control panel for ice and snow prevention systems provides a totally integrated electrical safety, connection and control solution for Raychem EM2-XR self regulating heating in reinforced concrete surfaces.

The control panel comprises the VIA-DU-20 multisensor control unit for energy-efficient ground surface heating, and integrated electrical safety devices. The SBS-xx-VV-20 panels can switch up to 12 maximum circuits of EM2-XR.

The panel also includes electrical circuit protection devices (C-type circuit breakers) and residual current devices for safety and peace of mind.

The panels need only be connected to the 400Vac (3 phase) supply.

2. ADVANTAGES

Fast connection of multiple circuits directly into the control panel

- No need for additional connections terminals.

3-12 maximum circuit lengths can be connected and switched by a single panel.

Circuit protection and safety devices integrated into the panel.

- No need for separate safety devices.

Complete system from the manufacturer

- System and components specifically selected for high performance ice and snow prevention system control.

3. TECHNICAL DATA

Control	VIA-DU-20 multi-sensor control unit
Power	230Vac 50/60Hz
Set temp.	Variable at first set-up
Sensor	Ground temperature, moisture, and ambient temperature sensors
Approval	CE (Approved to IEC 60204-1 and IEC60439-1)
Supply	Dependent on selected panel (63A-160A)
RCD	30mA
Line Circuit breakers	32A (Type C) per 3 heater circuit group
Approvals	CE marked

4. RELATED PRODUCTS

The SBS-xx-VV-20 control panel is compatible with the Raychem pipe frost protection cables:

Raychem EM2-XR Self-regulating heater cable (90W/m @ 0°C.)

GM-2XT (For drain line heating.)*

* The SBS-XX-VV-20 panel includes an additional circuit connection for drain wire heating capabilities at the edge of heated surfaces or at the lower end of ramps using GM-2XT heating cable. (Maximum drain line circuit length of 15 m.)

CONTROL PANELS SBS-XX-CM-20

1. DESCRIPTION



The SBS-XX-CM-20 control panel for ice and snow prevention systems provides a totally integrated electrical safety, connection and control solution for Raychem EM2-CM constant wattage heating mats for surface snow melting applications. The control panel comprises the VIA-DU-20 multi-sensor control unit for energy efficient ground surface heating, and integrated electrical safety devices. The SBS-xx-CM-20 panels can switch up to 18 maximum circuits of EM2-CM mats. The panel also includes electrical circuit protection devices (C-type circuit breakers) and residual current devices for safety and peace of mind. The panels need only be connected to the 400Vac (3 phase) supply.

2. ADVANTAGES

Fast connection of multiple circuits directly into the control panel

- No need for additional connections terminals.

3-18 maximum circuit lengths can be connected and switched by a single panel.

Circuit protection and safety devices integrated into the panel.

- No need for separate safety devices.

Complete system from the manufacturer

- System and components specifically selected for high performance ice and snow prevention system control.

3. TECHNICAL DATA

Control	VIA-DU-20 multi-sensor control unit
Power	230Vac 50/60Hz
Set temp.	Variable at first set-up
Sensor	Ground temperature, moisture, and ambient temperature sensors
Approval	CE (Approved to IEC 60204-1 and IEC60439-1)
Supply	Dependent on selected panel (32A-125A)
RCD	30mA
Line Circuit breakers	20A (Type C) per 3 heater circuit group
Approvals	CE marked

4. RELATED PRODUCTS

The SBS-xx-CM-20 control panel is compatible with the Raychem EM2-CM heating mats:

Raychem EM2-CM heating mats

- (300W/m²)

GM-2XT (For drain line heating.)*

* The SBS-XX-CM-20 panel includes an additional circuit connection for drain wire heating capabilities at the edge of heated surfaces or at the lower end of ramps using GM-2XT heating cable. (Maximum drain line circuit length of 15m.)

CONTROL PANELS SBS-XX-CW -40

1. DESCRIPTION



The SBS-XX-CW-40 control panel for ice and snow prevention systems provides a totally integrated electrical safety, connection and control solution for Raychem EM4-CW constant wattage heating cables for surface snow melting applications. The control panel comprises the VIA-DU-20 multi-sensor control unit for energy efficient ground surface heating, and integrated electrical safety devices. The SBS-xx-CW-40 panels can switch up to 18 maximum circuits of EM4-CW cables. The panel also includes electrical circuit protection devices (C-type circuit breakers) and residual current devices for safety and peace of mind. The panels need only be connected to the 400Vac (3 phase) supply.

2. ADVANTAGES

Fast connection of multiple circuits directly into the control panel

- No need for additional connections terminals.

3-18 maximum circuit lengths can be connected and switched by a single panel.

Circuit protection and safety devices integrated into the panel.

- No need for separate safety devices.

Complete system from the manufacturer

- System and components specifically selected for high performance ice and snow prevention system control.

3. TECHNICAL DATA

Control	VIA-DU-20 multi-sensor control unit
Power	400Vac
Set temp.	Variable at first set-up
Sensor	Ground temperature, moisture, and ambient temperature sensors
Approval	CE (Approved to IEC 60204-1 and IEC60439-1)
Supply	Dependent on selected panel (32A-250A)
RCD	30mA
Line Circuit breakers	20A (Type C) per 3 heater circuit group
Approvals	CE marked

4. RELATED PRODUCTS

The SBS-xx-CW-40 control panel is compatible with the Raychem EM4-CW heating cables:

Raychem EM4-CW heating cable

- (25W/m)

GM-2XT (For drain line heating.)*

* The SBS-XX-CW-40 panel includes an additional circuit connection for drain wire heating capabilities at the edge of heated surfaces or at the lower end of ramps using GM-2XT heating cable. (Maximum drain line circuit length of 15m.)

CONTROL PANELS SBS-XX-MV-20

1. DESCRIPTION



The SBS-XX-MV-20 control panel for ice and snow prevention systems provides a totally integrated electrical safety, connection and control solution for Raychem EM2-MI Mineral Insulated heating for surface snow melting applications. The control panel comprises the VIA-DU-20 multi-sensor control unit for energy efficient ground surface heating, and integrated electrical safety devices. The SBS-xx-MV-20 panels can switch up to 18 maximum circuits of EM2-MI. The panel also includes electrical circuit protection devices (C-type circuit breakers) and residual current devices for safety and peace of mind. The panels need only be connected to the 400Vac (3 phase) supply.

2. ADVANTAGES

Fast connection of multiple circuits directly into the control panel

- No need for additional connections terminals.

3-18 maximum circuit lengths can be connected and switched by a single panel.

Circuit protection and safety devices integrated into the panel.

- No need for separate safety devices.

Complete system from the manufacturer

- System and components specifically selected for high performance ice and snow prevention system control.

3. TECHNICAL DATA

Control	VIA-DU-20 multi-sensor control unit
Power	230Vac 50/60Hz
Set temp.	Variable at first set-up
Sensor	Ground temperature, moisture, and ambient temperature sensors
Approval	CE (Approved to IEC 60204-1 and IEC60439-1)
Supply	Dependent on selected panel (32A-125A)
RCD	30mA
Line Circuit breakers	20A (Type C) per 3 heater circuit group
Approvals	CE marked

4. RELATED PRODUCTS

The SBS-xx-MV-20 control panel is compatible with the Raychem EM2-MI cables:

Raychem EM2-MI Mineral-insulated heater cable

- (50W/m)

GM-2XT (For drain line heating.)*

* The SBS-XX-MV-20 panel includes an additional circuit connection for drain wire heating capabilities at the edge of heated surfaces or at the lower end of ramps using GM-2XT heating cable. (Maximum drain line circuit length of 15m.)

PRODUCT SELECTION

Product Features & Selection Guide

Product Features	EM2-XR 	EM2-MI 	EM2-CM 	EM4-CW 
Product Description	Self-regulating heating cable	Mineral Insulated constant wattage heating cable	Constant wattage polymeric pre-terminated ramp heating mat system	Constant wattage polymeric pre-terminated heating cable system
Features	Extremely robust self-regulating heating cable for flexible installation under severe site conditions.	Pre-terminated heating cable with exceptional resistance to high temperature asphalt surfaces.	Pre-terminated ramp, walkway, and track heating (roll-out) mat for fast and simple installation.	Pre-terminated constant power heating cable for larger areas & 400 V power supplies.
Voltage Rating	230 Vac	230 Vac	230 Vac	400 Vac
Nominal power output	90 W/m @ 0°C.	50 W/m	300 W/m ²	25 W/m
Maximum circuit length	85 m	136 m	12.6 m ² (Mat size = 21 m x 0,60 m)	250 m
Maximum exposure temperature	100°C	250°C	65°C	65°C
Connections & termination	Cut-to-length system for flexible field termination (using Raychem heat-shrink components). Pre-terminated cable lengths (fixed or configured) available. Contact us.	Factory pre-terminated	Factory pre-terminated	Factory pre-terminated
Compatible Controller / Control Panel	SBS-xx-WV-20/ACS-30	SBS-xx-MV-20/ACS-30	SBS-xx-CM-20/ACS-30	SBS-xx-CW-40
Approvals	VDE / CE	VDE / CE	VDE / CE	VDE / CE
Suitable for installation on reinforcement bar	Highly recommended	Recommended		Recommended
Suitable for installation in direct contact with hot poured asphalt		Highly recommended		
Suitable for embedding in sand sub-level	Recommended	Recommended	Highly recommended	Highly recommended
Cold lead included	When ordered as a pre-configured heating unit. See Page 10 for more information.	3 m (at each end of heater cable)	4 m	4 m
Dual Wire / Single Wire construction	Dual	Single	Dual	Dual



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