

DESIGN GUIDE

This step-by-step guide provides the tools necessary to design a nVent RAYCHEM constant wattage heating cable system for snow melting and de-icing of roofs, gutters and drain pipes.

HEATING CABLE SELECTION

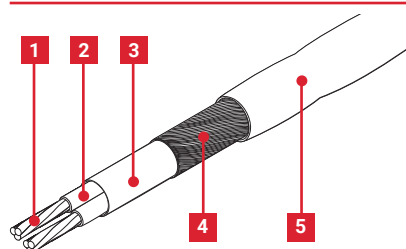
nVent RAYCHEM GM-2CW, GM-4CW

Constant wattage heating cables for snow melting and de-icing of roofs, gutters, drain pipes and roof surfaces.

The heating cable is a UV-resistant, double conductor cable with shielding according to IEC EN 62395 and will be delivered pre-terminated with a cold lead and end seal. The heating cable can be installed in a drain pipe up to 30 m lengths self-supporting.

- Power output: 30 W/m
- Voltage range:
 - 230 Vac → GM-2CW
 - 400 Vac → GM-4CW

COMPOSITION OF GM-CW



- 1** Conductor
- 2** Insulation made of ETFE
- 3** Inner jacket HDPE
- 4** Braid made of thin copper wires
- 5** Protective jacket (UV-resistant) LSZH

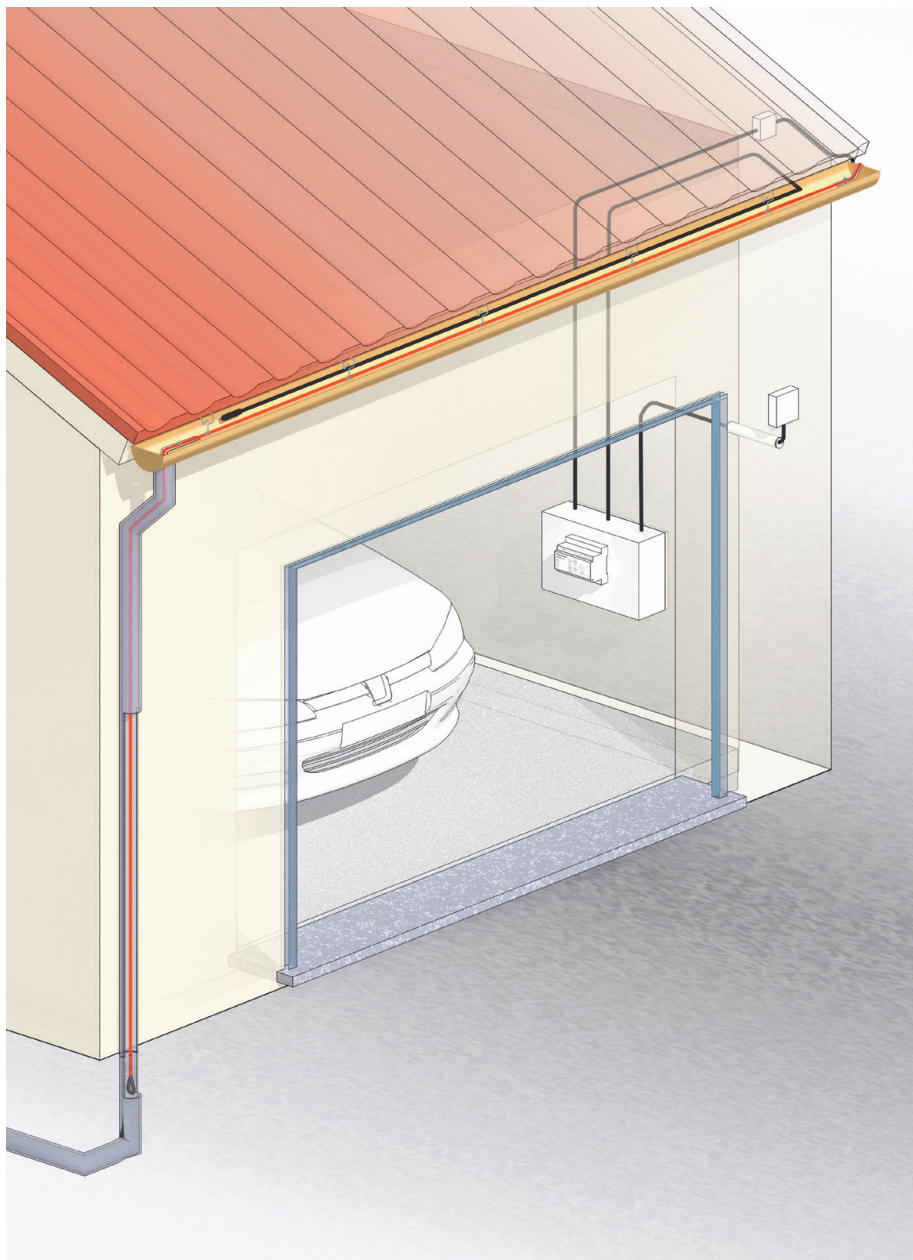
TECHNICAL DATA:

Voltage:	GM-2CW: 230 VAC	GM-4CW : 400 VAC
Power Output	30 W/m	30 W/m
Maximum exposure temperature	80°C	80°C
Outer diameter	Max. 6,9 mm	Max. 6,9 mm
Cold lead	length: 5 m; 3x 1.5 mm ² , <= 3000 W 3 x 2.5 mm ² >3000 W	length: 5 m; 3x 1.5 mm ² , <=4350 W 3 x 2.5 mm ² >4350 W
Minimum installation temperature	–5°C	–5°C
Approvals	CE, IEC EN 62395 Ed 2; EAC	

CABLE LENGTH SELECTION

A: sloped roof –standard (Gutter and down pipe)

Determine area to be heated:



- The heating cable should be installed in a straight line in the gutter
- The cable lengths should be adjusted according to the geographical situation and the gutters

Gutter length

+ drainpipe length
+ 1 m in the soil (frost line - depth is depending on region)
= required heating cable length

More than one cable should be laid in a wide valley, parapet or gutter
(width > 200 mm)

Note: Constant wattage heating cables cannot be shortened, crossed or cut. A distance of 10 cm should be kept between two heating cables by using GMK-RC or GM-RAKE. Select the cable or a combination of cables with a bigger length, but closest in size, if the heating cable can be installed as a loop. If this is not possible select a cable with a smaller length, but closest in size, by using GMK-RC or GM-RAKE.

B: Sloped roof with overhang (Gutter and down pipe)

Determine area to be heated:

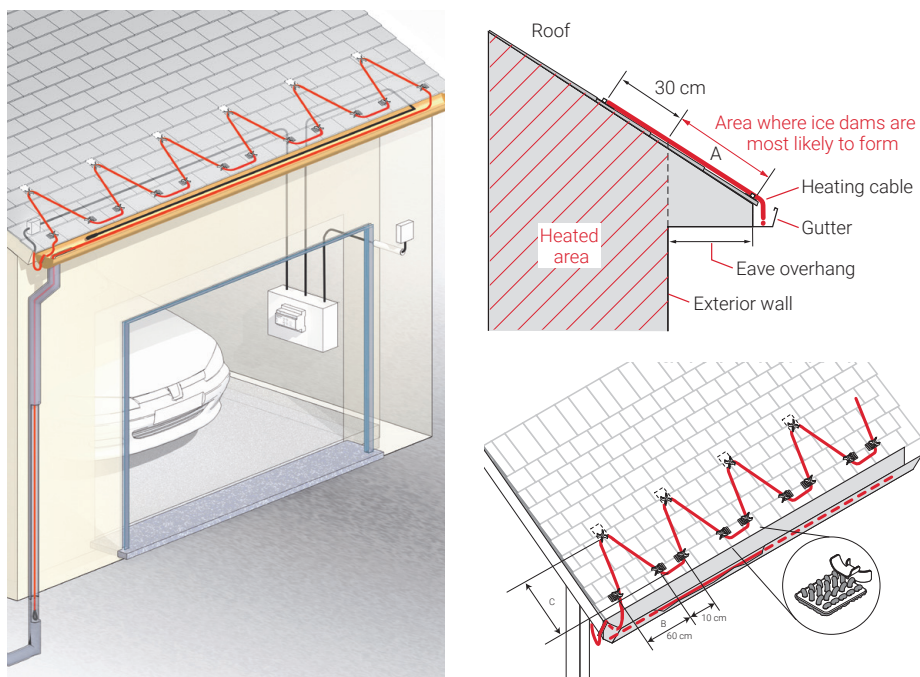


Fig. 1 Roof with zig-zag pattern heating cable installation

Eave overhang distance (A)	Heat tracing width (B)	Heat tracing height (x +30 cm) (C)	Meters of heating cable per meter of roof edge
0 cm	60 cm	30 cm	2,5 m
30 cm	60 cm	60 cm	3,1 m
60 cm	60 cm	90 cm	4,2 m
90 cm	60 cm	120 cm	5,2 m

Determine eave overhang distance - see table above

Gutter length x meter of heating cable per meter of roof edge (see table above)

+ drain pipe length

+ 1 m in the soil (frost line)

= required heating cable length

Note: Constant wattage heating cable cannot be shorten, crossed or cut.

A distance of 10 cm shall be kept between two heating cables, by using GMK-RC or GM-RAKE. Select the cable or a combination of cables with a bigger length, but closest in size, if the heating cable can be installed as a loop. If this is not possible select a cable with a smaller length, but closest in size.

A mechanical barrier needs to be foreseen if designing a zig zag installation.

C: Sloped roof with seams

Determine area to be heated:

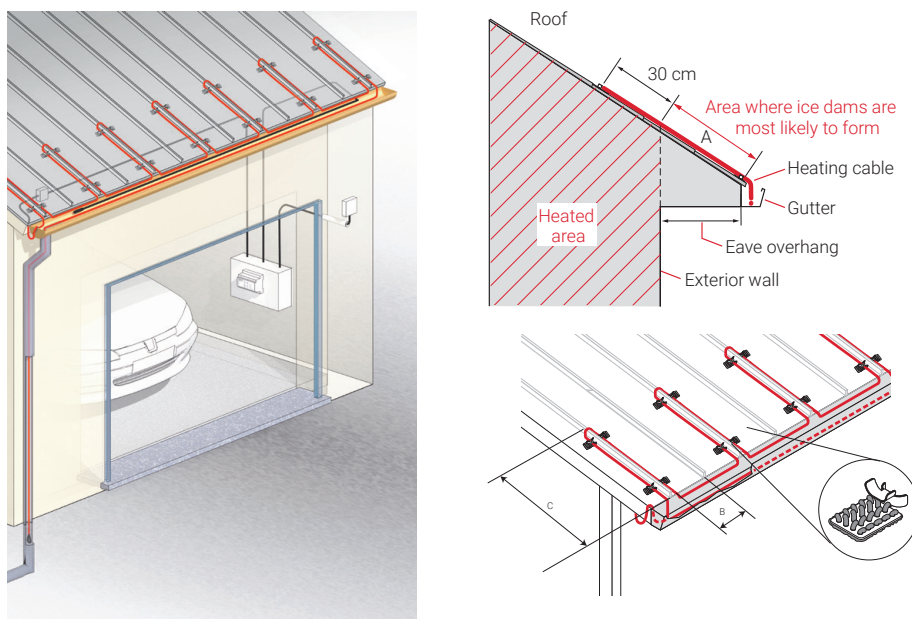


Fig. 2 Heating cable installed on seams

Eave overhang distance /(A)	Standing seams spacing (B)	Heat tracing height (C)	Meters of heating cable per meter of roof edge
30 cm	45 cm	60 cm	2,8 m
60 cm	45 cm	90 cm	3,6 m
90 cm	45 cm	120 cm	4,3 m
30 cm	60 cm	60 cm	2,4 m
60 cm	60 cm	90 cm	2,9 m
90 cm	60 cm	120 cm	3,6 m

Determine the eave overhang distance to get the number of meters of heating cable required per meter of roof edge.

Gutter length x meters of heating cable per meter of roof edge

+ drain pipe length

+ 1 m in the soil (frost line)

= required heating cable length

Note: Constant wattage heating cable cannot be shorten, crossed or cut.

A distance of minimum of 10 cm shall be kept between two heating cables.

D: Special Cases

a. Roof valley

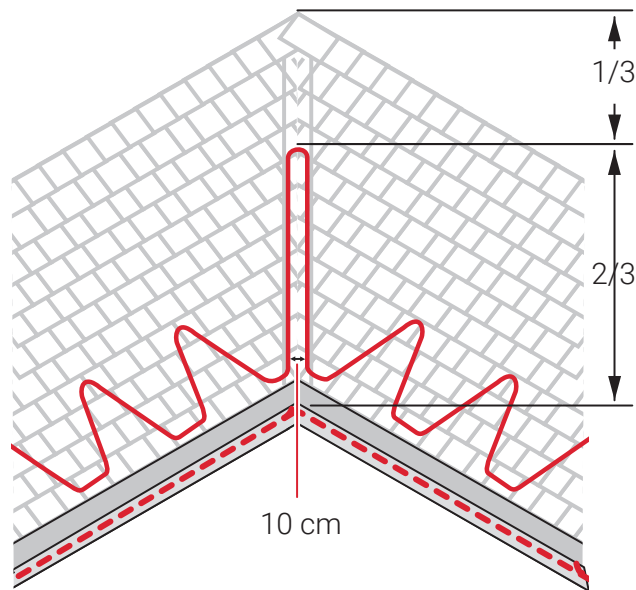


Fig. 3 Roof/wall - intersection

- Ice dams may form at the valley on a roof where two different slopes meet. To maintain a continuous path for melt water:
- Trace two-thirds of the way up each valley with a double run of heating cable (loop up and back once by using GMK-RC)

Add this length to the required heating cable length

b. Roof/wall - intersection

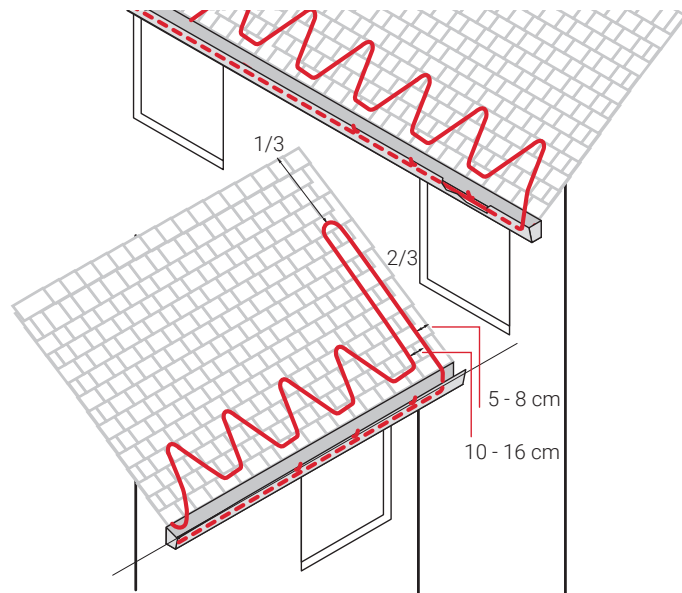


Fig. 4 Roof/wall - intersection

Snow has a tendency to collect at the interface between roof and wall.

- Providing a loop of heating cable two-thirds of the way up the slope will provide a path for the additional melted water in this area to escape.
- Position the closest heating cable approximately 5 to 8 cm from the wall. Position the second heating cable 10 to 16 cm from the first.
- Keep the minimum distance between the heating cables of 10cm. Heating cable should not be overlapped by using GM-Rake or GMK-RC.

Add this length to the required heating cable length

PACKAGING AND ORDERING REFERENCES

GM2-CW or GM-4CW Constant wattage heating cable is available in the sizes given below.

Pre-terminated kit contains:

- Heating cable length;
- Cold lead length;
- Installation manual; commissioning report.

Select the cable or a combination of cables with a bigger length, but closest in size, if the heating cable can be installed as a loop by using GM-RAKE, GM-clips, GMK-RC. If this is not possible select a cable with a smaller length, but closest in size.

Product description 230 Vac	Heating cable length in m	Power Output in W	Part number
GM-2CW-10m	10	300	SZ18300097
GM-2CW-15m	15	450	SZ18300098
GM-2CW-20m	20	600	SZ18300099
GM-2CW-25m	25	750	SZ18300100
GM-2CW-30m	30	900	SZ18300101
GM-2CW-35m	35	1050	SZ18300102
GM-2CW-40m	40	1200	SZ18300103
GM-2CW-45m	45	1350	SZ18300104
GM-2CW-50m	50	1500	SZ18300105
GM-2CW-60m	60	1800	SZ18300106
GM-2CW-70m	70	2100	SZ18300107
GM-2CW-80m	80	2400	SZ18300108
GM-2CW-90m	90	2700	SZ18300109
GM-2CW-100m	100	3000	SZ18300110
GM-2CW-125m	125	3750	SZ18300111
GM-2CW-150m	150	4500	SZ18300112
GM-2CW-180m	180	5400	SZ18300113

Product description 400 Vac	Heating cable length	Power Output in W	Part number
GM-4CW-20m	20	600	SZ18300114
GM-4CW-35m	35	1050	SZ18300115
GM-4CW-70m	70	2100	SZ18300116
GM-4CW-110m	110	3300	SZ18300117
GM-4CW-145m	145	4350	SZ18300118
GM-4CW-170m	170	5100	SZ18300119
GM-4CW-190m	190	5700	SZ18300120
GM-4CW-215m	215	6450	SZ18300121

ELECTRICAL PROTECTION AND CONNECTION

Type	Rated Power (230 VAC)	Breaker
GM-2CW-10M	300	
GM-2CW-15M	450	
GM-2CW-20M	600	
GM-2CW-25M	750	
GM-2CW-30M	900	
GM-2CW-35M	1050	10A
GM-2CW-40M	1200	
GM-2CW-45M	1350	
GM-2CW-50M	1500	
GM-2CW-60M	1800	
GM-2CW-70M	2100	
GM-2CW-80M	2400	
GM-2CW-90M	2700	16A
GM-2CW-100M	3000	
GM-2CW-125M	3750	20A
GM-2CW-150M	4500	
GM-2CW-180M	5400	25A

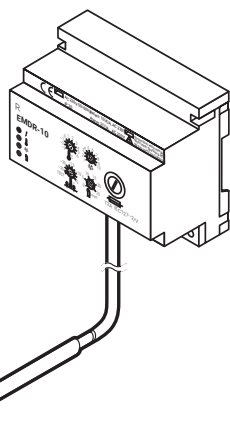
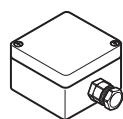
Type	Rated Power (400 VAC)	Breaker
GM-4CW-20M	600	
GM-4CW-35M	1050	10A
GM-4CW-70M	2100	
GM-4CW-110M	3300	
GM-4CW-145M	4350	16A
GM-4CW-170m	5100	16A
GM-4CW-190m	5700	16A
GM-4CW-215m	6450	16A

The length of heating cable determines the number and size of the circuit breakers

- Residual current device (RCD): 30 mA required, max. 500 m heating cable per RCD
- Installation according to local regulations
- The power connections must be carried out by an approved electrical installer
- Use B type circuit-breakers

CONTROL UNITS

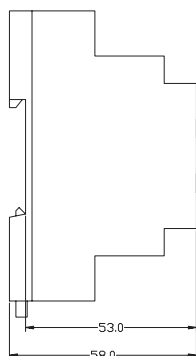
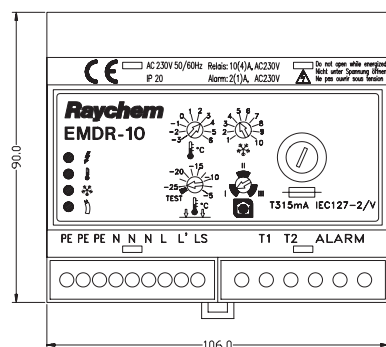
EMDR-10



Smart control unit

- With temperature and moisture sensor
- User-friendly control
- Saves up to 80% energy
- Max. switching capacity 10 A (otherwise switching by contactor(s))
- Potential free alarm for sensor break age, sensor short and power loss

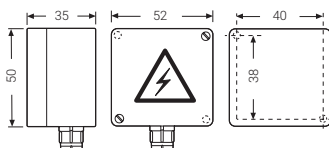
Technical Data



(Dimensions in mm)

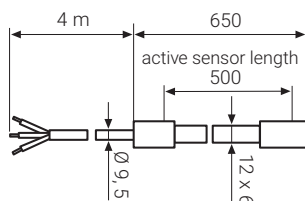
Housing

Ambient temperature sensor (VIA-DU-A10)



PG9 (Dimensions in mm)

Moisture sensor (HARD-45)

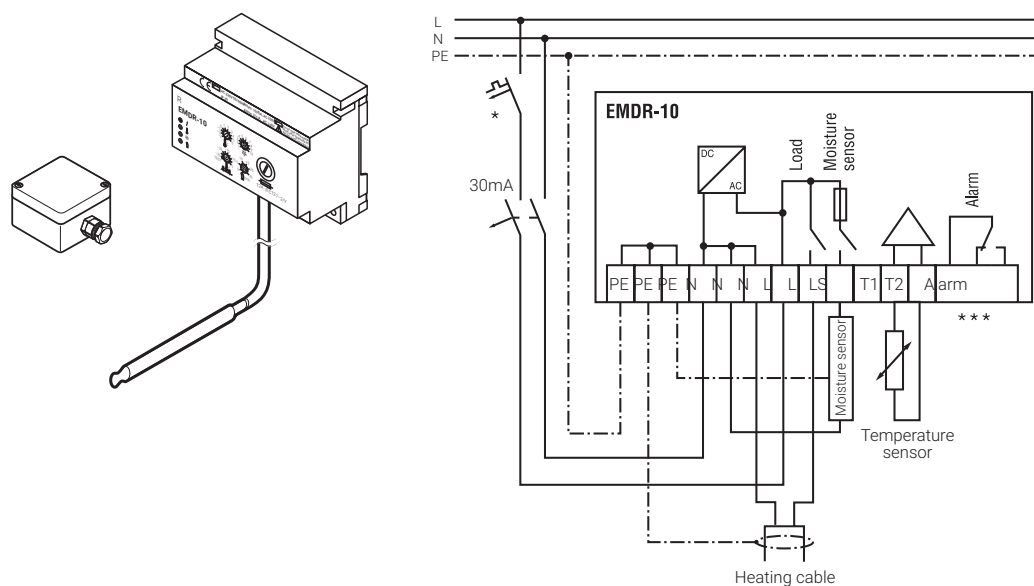


(Dimensions in mm)

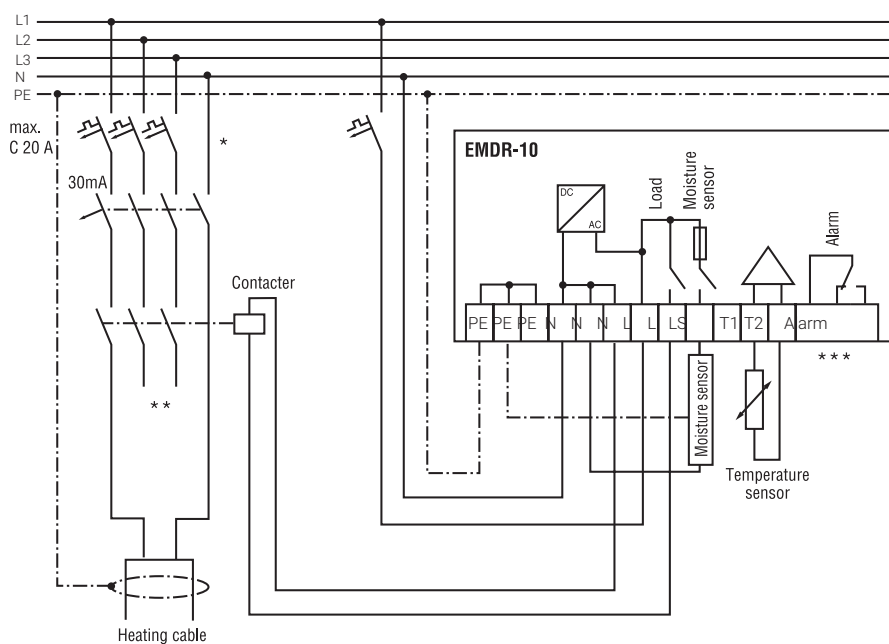
Supply voltage	230 VAC, $\pm 10\%$, 50Hz
Power consumption	max. 4 VA
Max. switching capacity	I _{max} 10(4)A / 230 VAC, SPST, potential 230 VAC
Temperature adjustment range	-3°C to +6°C (factory setting +2°C)
Lower limit temperature	test, -25°C to -5°C (factory setting adjustment range -15°C)
Operating differential	± 0.5 K
Measuring accuracy	± 1.5 K
Moisture adjustment range	1 (max. sensibility) to 10 (min. sensibility) (factory setting 5)
Post heating time	60 min for temperature range $\leq +1.5^\circ\text{C}$
Alarm relay	I _{max} 2(1)A / 230 VAC, SPDT, potential-free
Moisture sensor (output)	I _{max} 315mA / 230 VAC, with fuse 5 x 20mm T 315mA according to IEC127-2/V
Mounting	DIN rail according to DIN EN 50022-35
Low voltage directive	EN 60730
EMC	EN 50081-1 (emission) and EN 50082-1 (immunity)
Terminals	2.5 mm ² (stranded conductors), 4 mm ² (solid conductors)
Protection class	II (panel mounted)
Ambient temperature range	0°C to +50°C
Ingress protection	IP20
Housing material	Noryl (self-extinguishing according to UL 94 V-0)
Weight	approx. 350 g
Energy saving mode:	Duty cycle active; ON =70%; Result is: 30% energy will be saved at temperature $\geq +1.5^\circ\text{C}$ (Position II) or permanent (Position III)
Sensor type	PTC (FL 103)
Ingress protection	IP54
Terminals	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
Sensor type	PTC
Power consumption	9 W to 18 W
Ambient temperature range	-30°C to +65°C continuous
Supply voltage	230 VAC, $\pm 10\%$, 50Hz
Connection cable	3 x 1.5 mm ² , 4 m, the connection cable can be extended to max. 100 m at 3 x 1.5 mm

WIRING DIAGRAM FOR EMDR-10

EMDR-10 without contactor



EMDR-10 WITH CONTACTOR



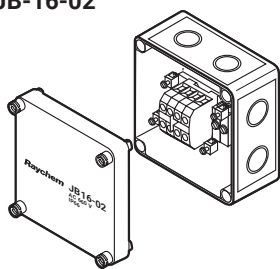
- * Two- or four-pole electrical protection by circuit breakers may be needed for local circumstances, standards and regulations
- ** Depending on the application, one or three-pole circuit breakers or contactors may be used
- *** Potential-free alarm contacts for connection to the BMS

ACCESSORIES FOR GM-2CW/ GM-4CW

JB-16-02

Junction box

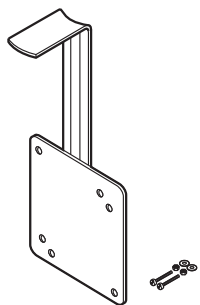
946607-000



JB-SB-08

Bracket for JB-16-02

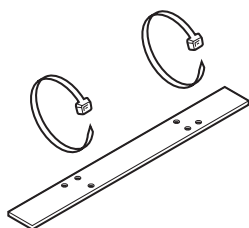
084799-000



GM-RAKE

Fixing bracket/edge protection for drainpipes

912791-000

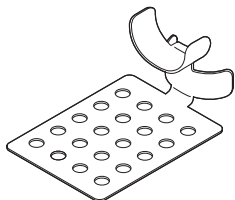


- Spacer for use in wide channels or gutters where more than one run of cable is required (a spacer is placed every 100 cm)
- VA steel with UV-resistant cable ties

Icestop GMK-RC

Roof clip to secure heating cables to roofs and gutters and keep cable distance

153651-000

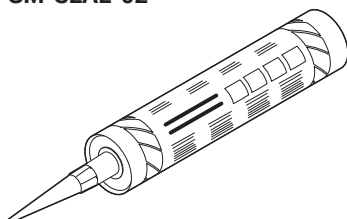


- Adhesive can be applied on the underside of the roof clip.
- After curing of the adhesive the heating cable can be clipped between the clamps.

GM-SEAL-02

for GMK-RC;

1244-012310

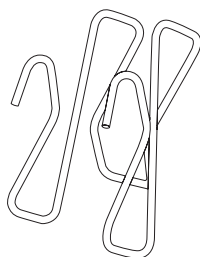


- Adhesive for sticking and sealing common construction materials with a base of
- Polyurethane perfectly suitable for metal or plastic gutters, roofing tiles and even

GM-Clip-S

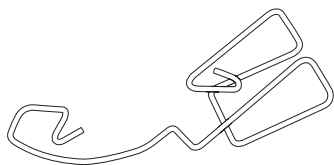
Smart Clip for fast and reliable installation of heating cables

1244-013849



GM-2CW; GM-4CW; GM-2X, GM-2XT and Frostop Black in on wide down pipe funnel.

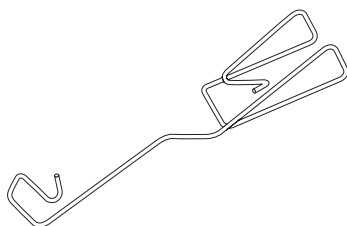
- Material: Stainless steel EN 1.4310
- Wire: Ø 2,5 mm
- Height: 55 mm
- Gutter type: wide funnel with max.
- Frame size of 10 mm
- Box content: 10 Clips/box
- PCN: 1244-013849
- Patent: 001357560-0003

GM-Clip-M

Smart Clip for fast and reliable installation of heating cables GM-2CW; GM-4CW; GM-2X, GM-2XT and Frostop Black in U-shaped gutters on half round gutters.

1244-013850

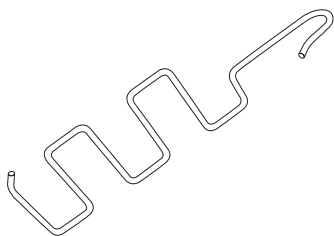
- Material: Stainless steel EN 1.4310
- Wire: Ø 2,5 mm
- Height: 100 mm
- Gutter type: gutters half-round;
- Width: 100-150 mm
- Depth: 65-80 mm
- Height with max. 17 m frame size
- Box content: 10 Clips/box
- PCN: 1244-013850
- Patent: 001357560-0002

GM-Clip-L

Smart Clip for installation of heating cables GM-2CW; GM-4CW; GM-2X, GM-2XT and Frostop Black in L-shaped gutters

1244-013851

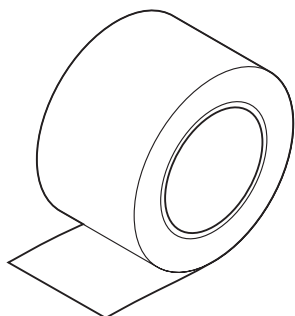
- Material: Stainless steel EN 1.4310
- Wire: Ø 2,5 mm
- Height: 150 mm
- Gutter type: gutters with L-Profile
- 140-150 mm height with max.
- 15 m frame size
- Box content: 10 Clips/box
- PCN: 1244-013851
- Patent: 001357560-0001

GM-Hanger

Load bearing hanger for wide funnels
Structural support for wide roof inlet funnel
for fast and easy heating cable installation

1244-013852

- Material: Edelstahl EN 1.4301
- Wire: Ø 4,0 mm
- Hight: 225 mm
- Gutter type: wide funnel with max.
- Frame size of 20 mm
- Suitable for: GM-2X, GM-2XT
- Content box: 5 pcs/box

ATE-180

ALU tape for fixing GM-2/4CW in gutter; Length: 55m; 63,5 mm wide

846243-000

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