

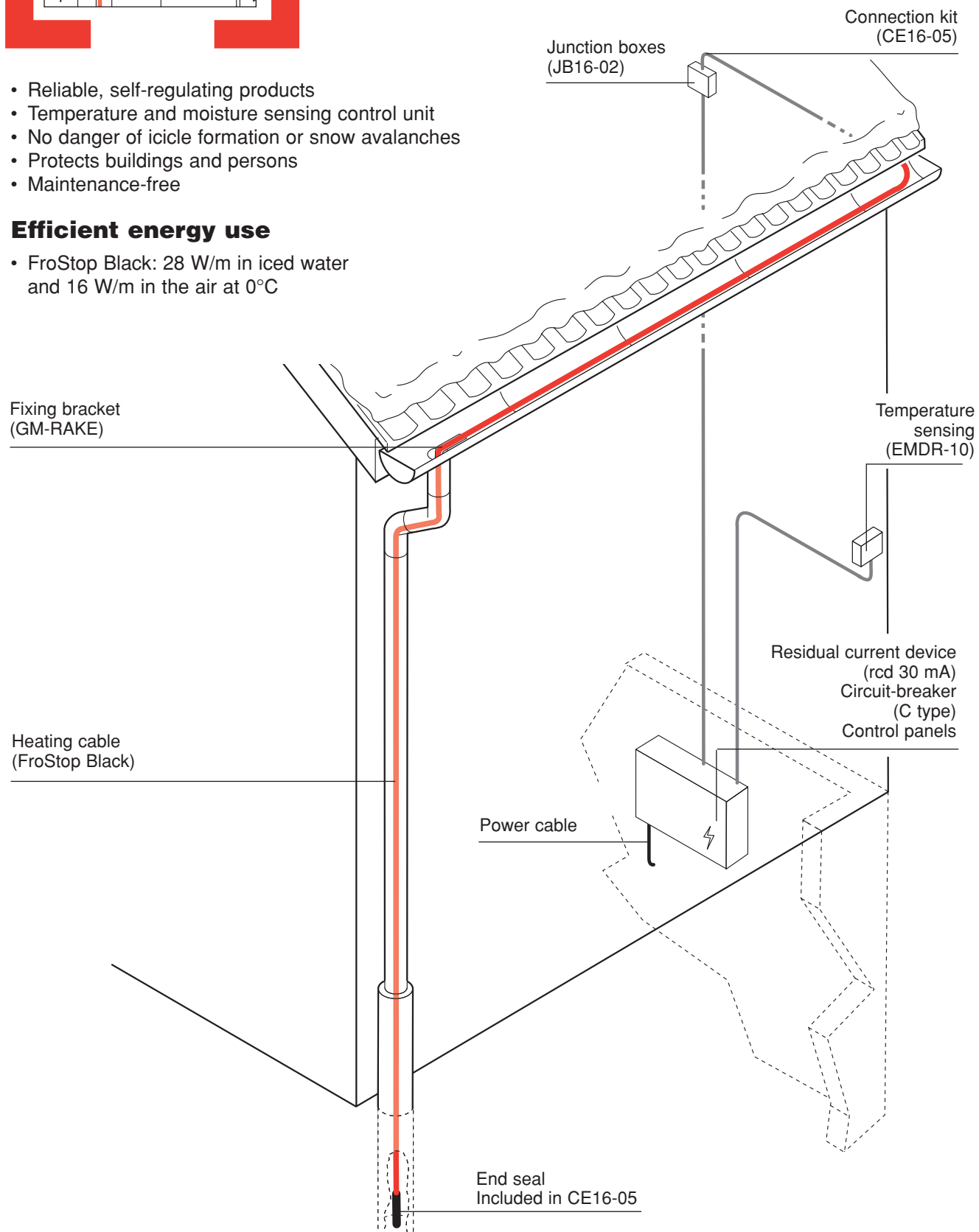
# Raychem

## Gutter protection system

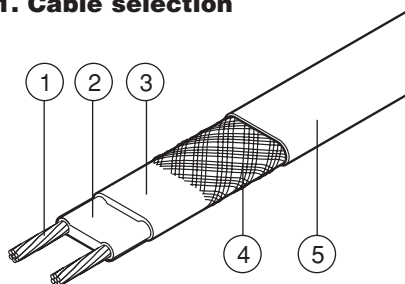
- Reliable, self-regulating products
- Temperature and moisture sensing control unit
- No danger of icicle formation or snow avalanches
- Protects buildings and persons
- Maintenance-free

### Efficient energy use

- FroStop Black: 28 W/m in iced water and 16 W/m in the air at 0°C



### 1. Cable selection



#### FroStop Black

Self-regulating heating cable for:

- Gutters
- Downpipes

**Important note:** When laying cables on asphalt, bitumen, roofing felt, etc., a cable with a special fluoropolymer jacket (8BTV- 2-CT) must be used.

Technical data: see page 58

#### Composition

1. Copper conductor (1.2 mm<sup>2</sup>)
2. Self-regulating heating element
3. Insulation made of modified polyolefin
4. Tinned copper braid
5. Protective jacket made of modified polyolefin (UV-resistant)

### 2. Cable length

- 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
- More than one cable should be laid in wide valley, parapet or box gutter

Gutter length  
 + drainpipe length  
 + 1 m per connection  
 + 1 m in the soil (frost line)  
 = required heating cable length

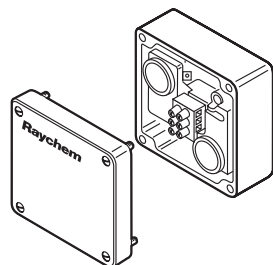
### 3. Electrical protection

- 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 C type circuit-breakers

**Max. length of the heating circuit is based on a minimum switch-on temperature of -10°C, 230 VAC.**

	FroStop Black	8BTV-2-CT
10 A	50 m	40 m
13 A	65 m	50 m
16 A	80 m	60 m

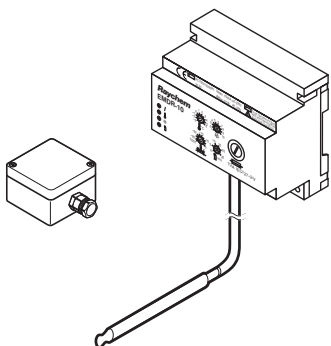
### 4. Control units



#### HTS-D

- Thermostat
- 2 independant switching points
  - Max. switching current: 16 A 230 VAC
  - Temperature adjustment range: -15°C to +15°C
  - Outdoor installation
  - Economical for circuit lengths up to 30 m
  - For lengths over 30 m use the EMDR-10 control unit (see p. 25)
  - PCN: C71431-000

Technical data: see page 24  
 Wiring diagram: see page 53



## EMDR-10

Control unit

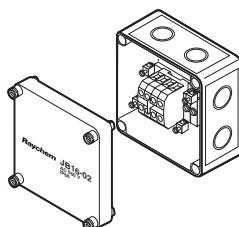
- With temperature and moisture sensor
- User-friendly control
- Saves up to 80% power
- Max. switching capacity 10 A (other wise switching by contactor)
- Alarm feature for sensor break, sensor short and power loss
- PCN: .....

Technical data: see page 25

Wiring diagram: see page 53

## 5. Accessories

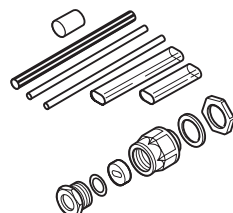
Power connection	1 JB16-02 + 1 CE16-05
Splice	1 JB16-02 + 2 CE16-05
Powered splice	1 JB16-02 + 2 CE16-05
T-connection	1 JB16-02 + 3 CE16-05
Powered T-connection	1 JB16-02 + 3 CE16-05
Four way connection	1 JB16-02 + 4 CE16-05



## JB16-02

Temperature-resistant junction box for power connection or T-connections

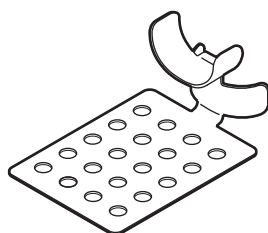
- PCN: 946607-000



## CE16-05

Connection and end seal kit

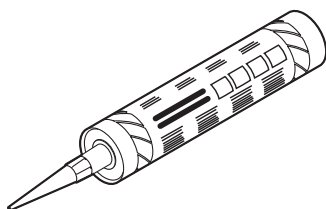
- Heat-shrink technique
- PG 16 glands
- PCN: 249987-000



## IceStop-GMK-RC

Roof clip to secure heating cables to roofs and gutters. 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.

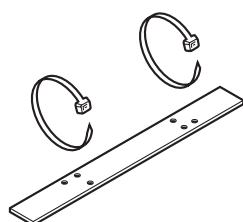
- PCN: 153651-000



## GM-Seal

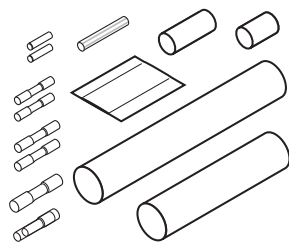
Adhesive designed for sticking and sealing common construction materials with a base of polyurethane

- 300 ml pack
- PCN: 431302-000



## GM-RAKE

- Fixing bracket/edge protection for drainpipes
- 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
- PCN: 912791-000



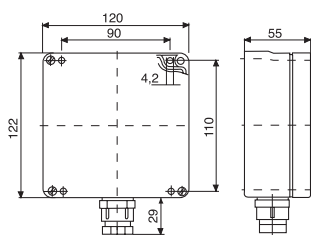
## CCE-03-CR

- Cold lead connection and end seal kit
- Connection of 3 x 1.5 mm<sup>2</sup> or 3 x 2.5 mm<sup>2</sup> cold lead cable to self-regulating heating cable FroStop Black
  - PCN: 568430-000

Accessories for 8BTV-2-CT see page 22

## Thermostat HTS-D

### Technical data

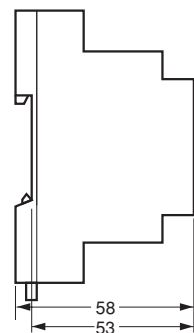
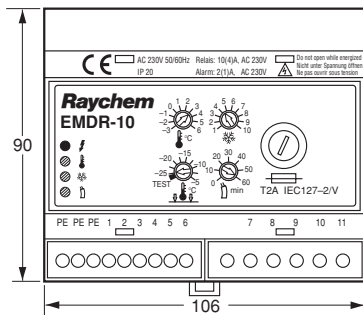


(Dimensions in mm)

Temperature adjustment range	-15°C to + 15°C
Supply voltage	230 VAC, 50 Hz
Contacts	potential-free
Ambient temperature	50°C
Switching hysteresis	1-3 K
Temperature setting	under housing cover
Ingress protection class	IP 65
Sensor	Bimetal

## Temperature and moisture control unit EMDR-10

### Technical data



(Dimensions mm)

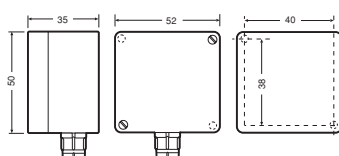
Supply voltage	230 VAC, $\pm 10\%$ , 50Hz
Power consumption	max. 4 VA
Max. switching capacity	$I_{max}$ 10(4)A / 230 VAC, SPST, potential 230 VAC
Temperature adjustment range	$-3^{\circ}\text{C}$ to $+6^{\circ}\text{C}$ (factory setting $+2^{\circ}\text{C}$ )
Lower limit temperature	test, $-25^{\circ}\text{C}$ to $-5^{\circ}\text{C}$ (factory setting adjustment range $-15^{\circ}\text{C}$ )
Operating differential	$\pm 0.5$ K
Measuring accuracy	$\pm 1.5$ K
Moisture adjustment range	1 (min. sensibility) to 10 (max. sensibility) (factory setting 5)
Min. heating time adjustment range	0 to 60 minutes (factory setting 60 minutes)
Alarm relay	$I_{max}$ 2(1)A / 230 VAC, SPDT, potential-free
Moisture sensor (output)	$I_{max}$ 1A / 230 VAC, SPST potential 230 VAC with fuse 5 x 20mm T1A according to IEC127-2/V
Mounting	DIN rail according to DIN EN 50022-35
Housing material	Noryl (self-extinguishing according to UL 94 V-0)
Low voltage directive	EN 60730
EMC	EN 50081-1 (emission) and EN 50082-1 (immunity)
Terminals	2.5 mm <sup>2</sup> (stranded wires), 4 mm <sup>2</sup> (solid wires)
Post-heating period	0 min to 60 min
Protection class	II (panel mounted)

### Housing

Ambient temperature range*	$0^{\circ}\text{C}$ to $+50^{\circ}\text{C}$
Ingress protection	IP20
Weight	approx. 350 g
Dimensions	106 x 90 x 58 mm

\* Continuous operation must be assured and the device must be protected from the penetration of moisture.

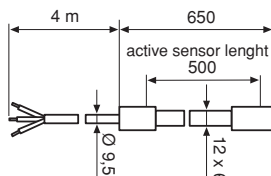
### Ambient temperature sensor VIA-DU-A10



PG9 (Dimensions mm)

Sensor type	PTC (FL 103)
Ingress protection	IP54
Terminals	2.5 mm <sup>2</sup>
Sensor cable	2 x 1.5 mm <sup>2</sup> , max. 100 m (not included)
Exposure temperature	$-30^{\circ}\text{C}$ to $+80^{\circ}\text{C}$
Mounting	Wall mounting

### Moisture sensor (HARD-45)



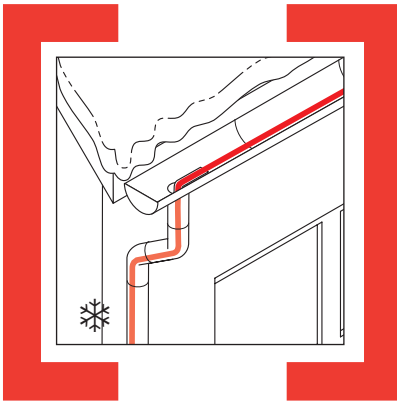
(Dimensions mm)

Sensor type	PTC
Power consumption	9 W to 18 W
Ambient temperature range	$-30^{\circ}\text{C}$ to $+65^{\circ}\text{C}$ continuous
Supply voltage	230 VAC, $\pm 10\%$ , 50Hz
Connection cable	3 x 1.5 mm <sup>2</sup> , 4 m

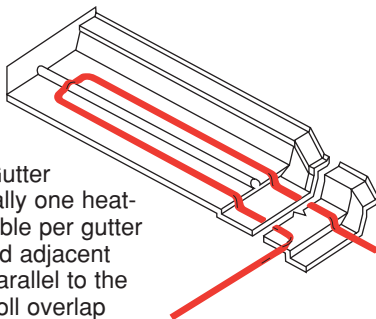
If necessary, the connection cable can be extended to max. 100 m at 3 x 1.5 mm<sup>2</sup>

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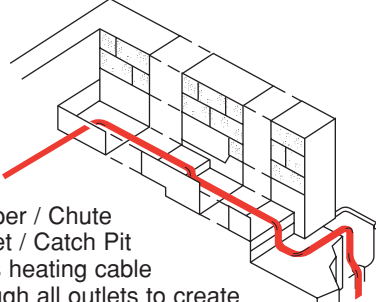
## Gutter protection system



- Tapered / Valley Gutter  
Wide gutters (> 300 mm) may require more than one flow path

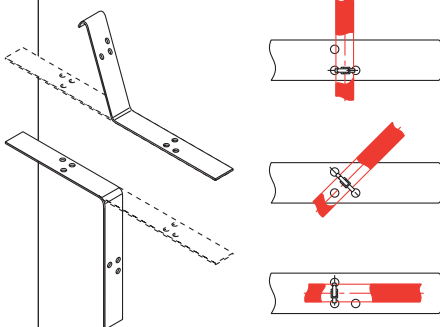


- Box Gutter  
Typically one heating cable per gutter located adjacent and parallel to the lead roll overlap

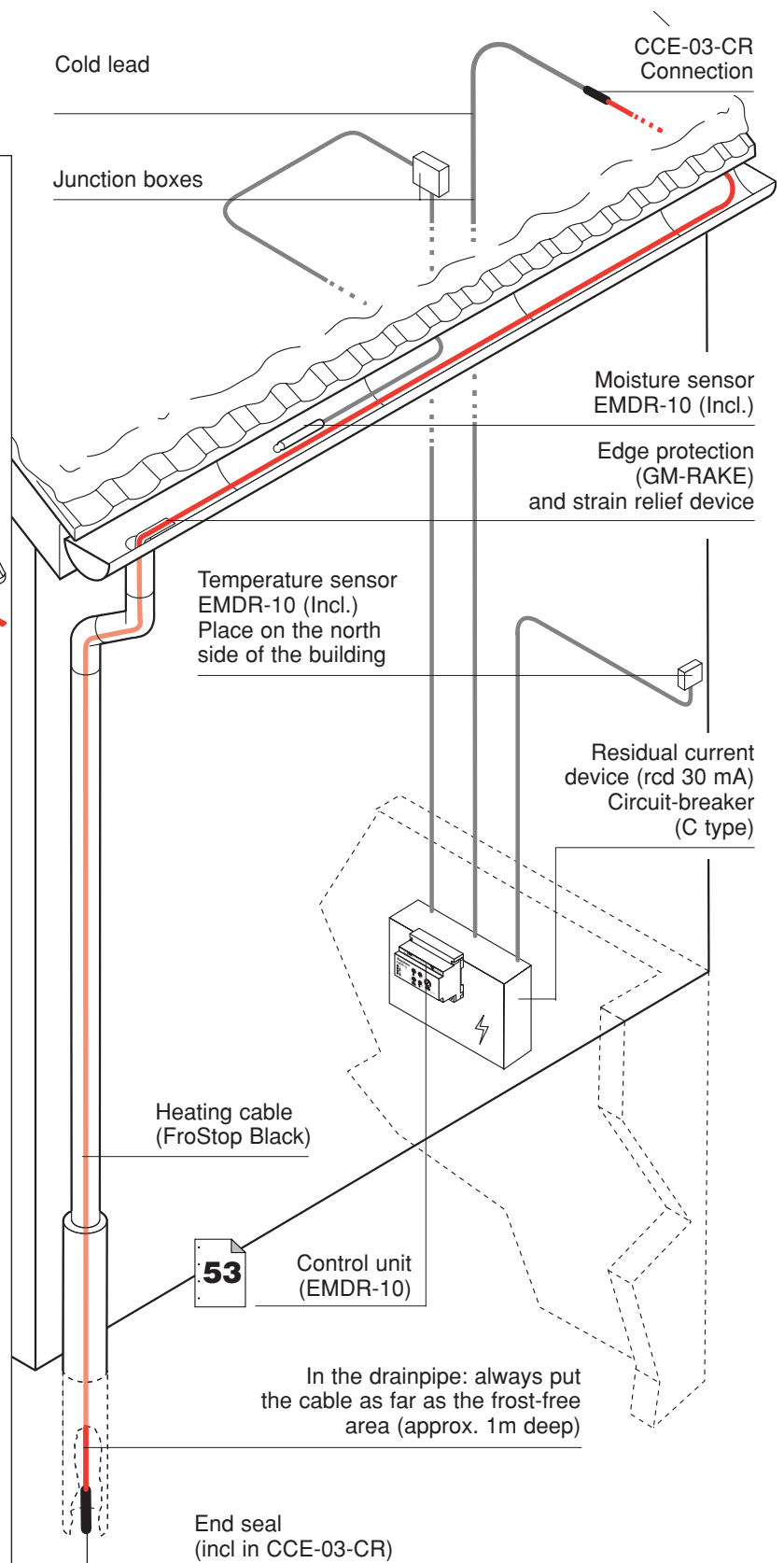


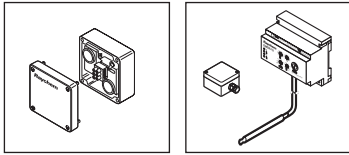
- Hopper / Chute Outlet / Catch Pit  
Pass heating cable through all outlets to create and maintain a continuous flow path. This avoids transferring the problem to another location

- Transition zones: GM-RAKE edge protection bracket prevents tilting

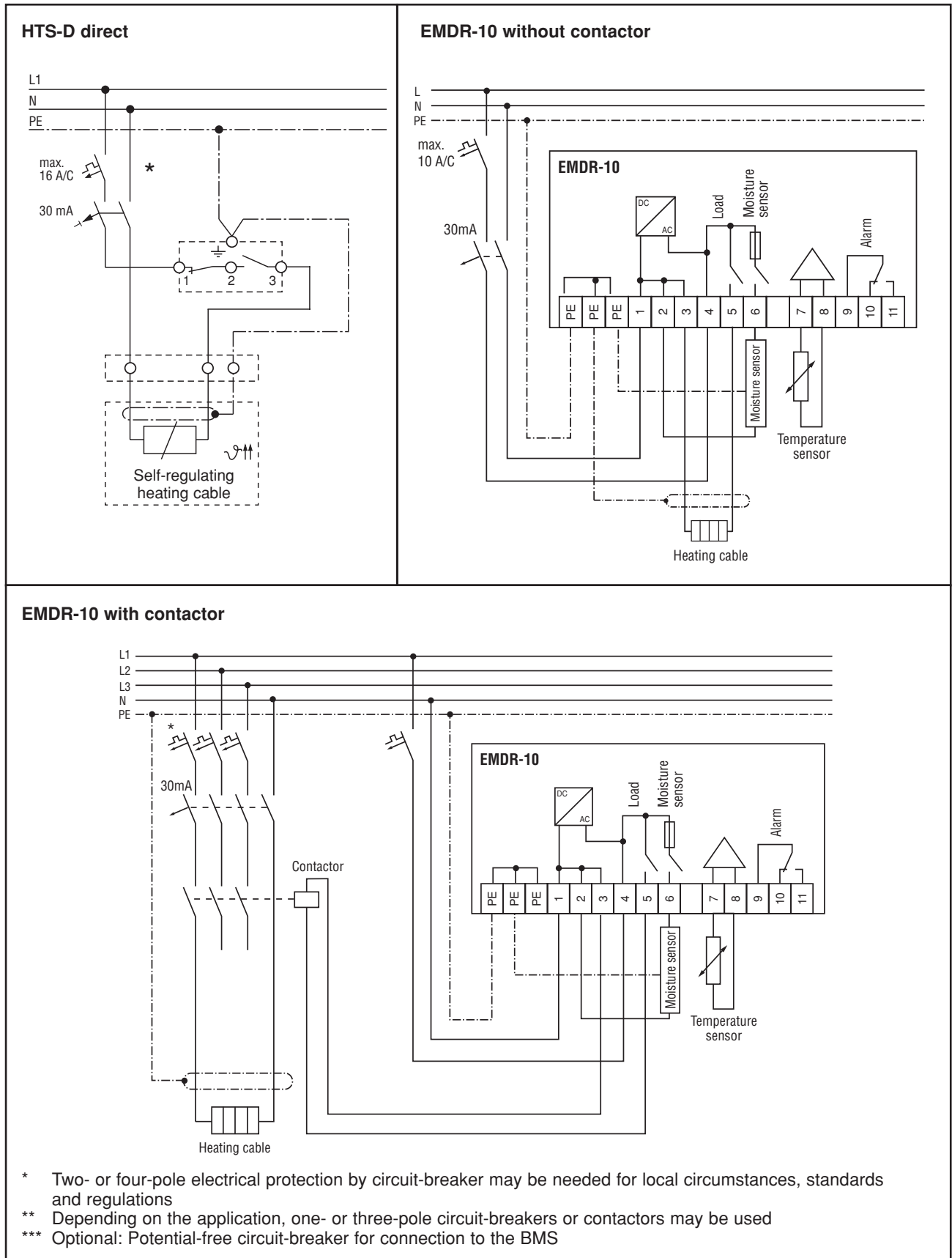


- Fastening of the gutter cables: on the roof, eaves bricks, gutter and drainpipe with GM-RAKE edge protection brackets (incl. cable ties)

















## Wiring diagram for HTS-D and EMDR-10



## Technical data - Choice of accessories

\*Approvals: Demtko: D - Nemko: N - Semko: S - Fimko: F - VDE: V - Sitac: Si

Application	Raychem			Raychem			Raychem					
	Hot water temperature maintenance	Frost protection system for pipes	Gutter protection system	Hot water temperature maintenance	Frost protection system for pipes	Gutter protection system	Hot water temperature maintenance	Frost protection system	Snow melting for ramps			
Cable type	HWAT-L	HWAT-M	HWAT-R	ETL	FS-A-2X	FS-B-2X	FS-C-2X	GM-2X	8BTV-2-CT	Frostop-Black	EM2-XR	EM2-MI
Colour												
Nominal voltage	230 VAC	230 VAC	230 VAC	230 VAC	230 VAC	230 VAC	230 VAC	230 VAC	230 VAC	230 VAC	230 VAC	230 VAC
Nominal power output (*on insulated metal pipes)	7 W/m at 45°C	9 W/m at 55°C	12 W/m at 70°C	10 W/m at 5°C	10 W/m at 5°C	26 W/m at 5°C	31 W/m at 5°C, 22 W/m at 40°C	36 W/m in ice and 18 W/m in air at 0°C	18 W/m in air at 0°C	18 W/m at 5°C	300 W/m <sup>2</sup> (90 W/m) at 0°C in concrete	max. 50 W/m
C-type circuit-breaker according to selected kit	max. 20 A	max. 20 A	max. 20 A	max. 10 A	max. 16 A	max. 16 A	max. 16 A	max. 20 A	max. 20 A	max. 16 A	max. 50 A	Specific kit
Max. circuit length	180 m	100 m	100 m	60/100 m	150 m	105 m	90 m	80 m	80 m	80 m	85 m	Specific kit
Min. bending radius	10 mm	10 mm	10 mm	10 mm	10 mm	10 mm	10 mm	10 mm	12,7 mm (at 20°C)	10 mm	50 mm	35 mm
Max. continous exposure temperature	65°C	65°C	80°C	50°C	65°C	65°C	95°C	65°C	65°C	65°C	100°C	90°C
Max. exposure temperature (power-on condition – 800 h. cumulative)	85°C	85°C	90°C	65°C	85°C	85°C	95°C	85°C	85°C	85°C	110°C	250°C (short term)
Max. dimensions in mm (W x H)	13.8 x 6.8	13.7 x 7.6	16.1 x 6.7	5.8 x 8.5	13.7 x 6.2	13.7 x 6.2	12.7 x 5.3	13.7 x 6.2	16.1 x 6.2	5.5 x 10.5	18.9 x 9.5	min. 4.8 max. 6.3
Weight	0.12 kg/m	0.12 kg/m	0.14 kg/m	0.10 kg/m	0.13 kg/m	0.13 kg/m	0.13 kg/m	0.13 kg/m	0.13 kg/m	0.13 kg/m	0.27 kg/m	Specific kit
Approvals	*D-N-S-F	*D-N-S-F-V	*D-N-S-F-V	*S-F-Si-V	*D-N-S-F-V	*D-N-S-F-V	*D-N-S-F-V	*D-N-S-F-V	*D-N-S-F	*D-N-S-F	*N-F-V	*V
Control units	QWT-04	HWAT-ECO	HWAT-ECO	AT-TS-13 AT-TS-14 HTS-D	R-CONTROL R-ECO	R-CONTROL R-ECO	R-CONTROL	EMDR-10	–	AT-TS-13 AT-TS-14	VIA-DU-10	VIA-DU-10

### Connection system

Junction box	–	–	–	JB16-02	–	–	JB16-02	–	JB16-02	JB16-02	VIA-JB1	–
Connection kit	RayClick	RayClick	RayClick	RayClick	RayClick	RayClick	CE16-05	RayClick	CE16-29	CE16-05	VIA-CE1	Produced previously
Support bracket	included in the kit	included in the kit	included in the kit	JB-SB-08	included in the kit	included in the kit	JB-SB-08	included in the kit	JB-SB-08	JB-SB-01	–	–