

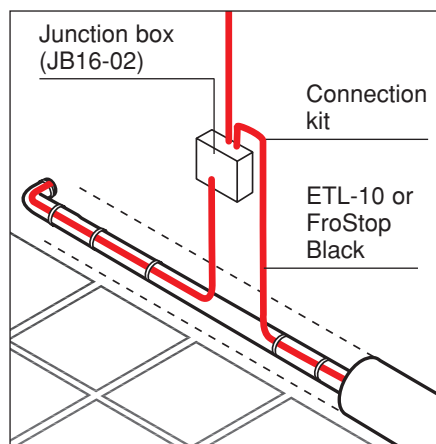
# Raychem

## Frost protection system for pipes

- Reliable, self-regulating products
- Easy design and installation
- Efficient energy use
- No overheating possible
- Maintenance-free

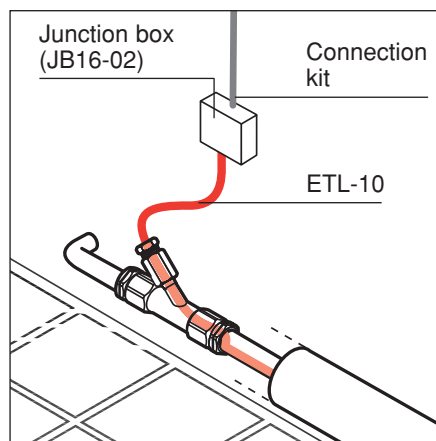
### On pipes Cut-to-length

- ETL-10  
10W/m at 5°C on metal pipe
- FroStop Black  
18W/m at 5°C on metal pipe



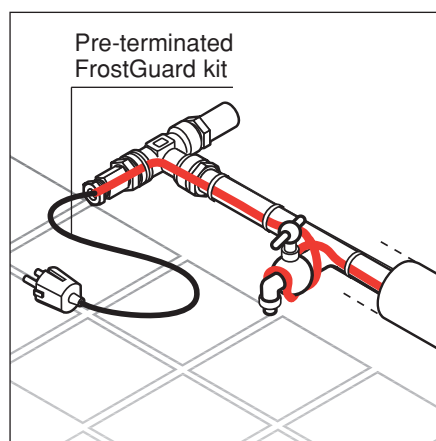
### In pipes Cut-to-length

- ETL-10  
20W/m at 5°C in water

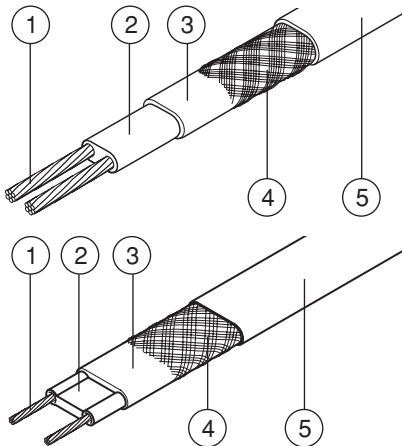


### On and in pipes Pre-terminated ready-to-use kit

- FrostGuard  
10W/m at 5°C on metal pipe;  
20W/m et 5°C in water

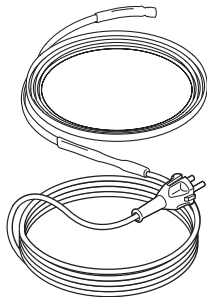


### 1. Cable selection



#### Composition

1. Copper conductor (0,5 mm<sup>2</sup> for ETL-10/ FrostGuard and 1,2 mm<sup>2</sup> for FroStop)
2. Conductive core
3. Insulation
4. Braid
5. Outer jacket (fluoropolymer for ETL-10/FrostGuard and modified polyolefin for FroStop)



### Application

#### ETL-10

- on and in pipes
- 10 W/m at 5°C on metal pipe; 20 W/m at 5°C in water
- cut-to-length

#### FroStop Black

- on pipes only
- 18 W/m at 5°C on metal pipe
- cut-to-length

#### FrostGuard kit

- on and in pipes
- 10 W/m at 5°C on metal pipe; 20 W/m at 5°C in water
- preterminated 2 m cold lead with universal plug
- available in different lengths:

Description	SSTL:n nro	LVI-nro
FrostGuard 2 m	81 693 02	184 70 76
FrostGuard 4 m	81 693 04	184 70 77
FrostGuard 6 m	81 693 06	184 70 78
FrostGuard 8 m	81 693 08	184 70 80
FrostGuard 10 m	81 693 10	184 70 81
FrostGuard 13 m	81 693 13	184 70 82
FrostGuard 16 m	81 693 16	184 70 84
FrostGuard 19 m	81 693 19	184 70 85
FrostGuard 22 m	81 693 22	184 70 86
FrostGuard 25 m	81 693 25	184 70 87

### Insulation selection

FrostGuard, ETL-10 and FroStop Black Frost protection down to -20°C.

Insulation thicknesses	Pipe diameter										
	mm	15	22	28	35	42	54	67	76	108	150
	Inches	1/2"	3/4"	1"	5/4"	11/2"	2"	21/2"	3"	4"	5"
10 mm		ETL-10 FrostGuard	Black	Black	Black	Black	Black	Black	Black		
15 mm		ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	Black	Black	Black	Black	Black	Black	
20 mm		ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	Black	Black	Black	Black	Black
25 mm		ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	Black	Black	Black	Black
30 mm		ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	Black	Black	Black
40 mm		ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	Black	Black
50 mm		ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	Black

## FrostGuard, ETL-10 and FroStop Black Frost protection down to $-40^{\circ}\text{C}$ .

Pipe diameter		15	22	28	35	42	54	67	76	108	150
Insulation thicknesses	mm	15	22	28	35	42	54	67	76	108	150
	Inches	1/2"	3/4"	1"	5/4"	1 1/2"	2"	2 1/2"	3"	4"	5"
10 mm		Black	Black	Black							
15 mm		ETL-10 FrostGuard	Black	Black	Black	Black					
20 mm		ETL-10 FrostGuard	ETL-10 FrostGuard	Black	Black	Black	Black				
25 mm		ETL-10 FrostGuard	ETL-10 FrostGuard	Black	Black	Black	Black	Black			
30 mm		ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	Black	Black	Black	Black	Black		
40 mm		ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	Black	Black	Black	Black	
50 mm		ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	Black	Black	Black	
60 mm		ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	ETL-10 FrostGuard	Black	Black	Black	Black

### 2. Cable length ETL-10 and FroStop Black

The heating cable should be installed in a straight line on the pipework. Cable loops instead of T-connections can be made on short stubs (up to approx. 3 m)

Total length of pipe to be traced  
 + approx. 0.3 m per connection  
 + approx. 1.0 m per T-connection  
 + approx. 1.2 m per 4-way connection  
 Additional amount required for increased heat sinks at valves from 2" and uninsulated pipe supports (approx. 1 m)  
 = required heating cable length

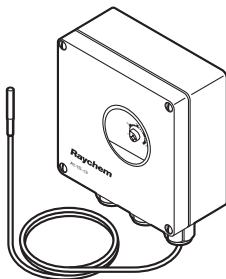
### 3. Electrical protection

- The total length of heating cable determines the number and size of the fuses
- Residual current device (rcd): 30 mA required
- Installation according to local regulations
- The mains 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 start-up temperature of  $0^{\circ}\text{C}$ , 230 V ac.**

	FroStop Black	ETL-10	
		IN PIPES	ON PIPES
10 A	100 m	60 m	100 m

### 4. Thermostats

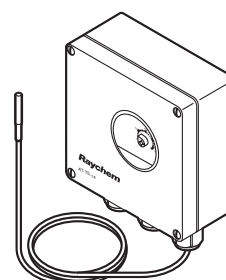


#### AT-TS-13

Thermostat

- Adjustable temperature range:  $-5^{\circ}\text{C}$  to  $+15^{\circ}\text{C}$
- Line-sensing control thermostat or ambient thermostat
- Max. switching current 16 A 250 Vac
- PCN: 728129-000

Technical data: see page 18  
 Wiring diagram: see page 50

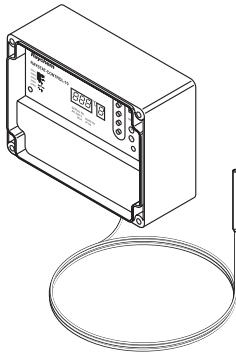


#### AT-TS-14

Thermostat

- Adjustable temperature range:  $-0^{\circ}\text{C}$  to  $+120^{\circ}\text{C}$
- Line-sensing control thermostat or ambient thermostat
- Max. switching current 16 A 250 Vac
- PCN: 648945-000

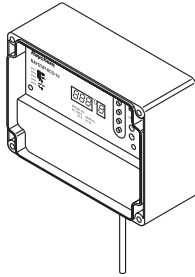
Technical data: see page 18  
 Wiring diagram: see page 50



## RAYSTAT-CONTROL-10

- Line-sensing thermostat
- Adjustable temperature range: 0°C to 150°C
  - Max. switching current 25 A 250 Vac
  - Alarm relay: 2 A voltfree
  - Indication of sensor errors, voltage errors and low or high temperature alarm
  - Display for visual indication of parameters
  - PCN: 828810-000

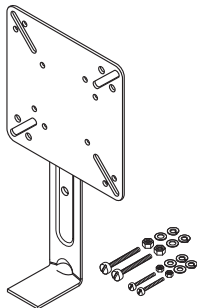
Technical data: see page 19  
Wiring diagram: see page 51



## RAYSTAT-ECO-10

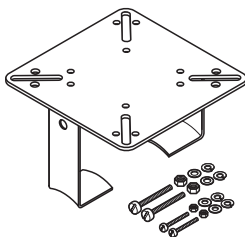
- Ambient temperature thermostat
- Adjustable temperature range: 0°C to 30°C
  - Max. switching current 25 A, 250 Vac
  - PASC (Proportional Ambient Sensing Control) for energy saving
  - Alarm relay: 2 A voltfree with indication of sensor errors, voltage errors and low or high temperature alarm
  - Display for visual indication of parameters
  - PCN: 145232-000

Technical data: see page 20  
Wiring diagram: see page 52



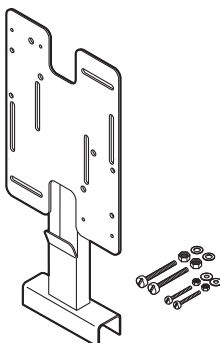
## SB-110

- Support bracket, stainless steel
- Height leg: 100 mm
  - For use with AT-TS-13, AT-TS-14, and JB16-02
  - PCN: 707366-000



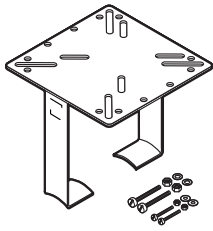
## SB-111

- Support bracket, stainless steel
- Height leg: 100 mm
  - For use with AT-TS-13, AT-TS-14, and JB16-02
  - PCN: 579796-000



## SB-100

- Stainless steel support bracket specially constructed to provide heating cable protection between pipe and junction box via a tubular leg.
- For use with AT-TS-13, AT-TS-14, JB16-02 and RAYSTAT-CONTROL-10
  - PCN: 192931-000



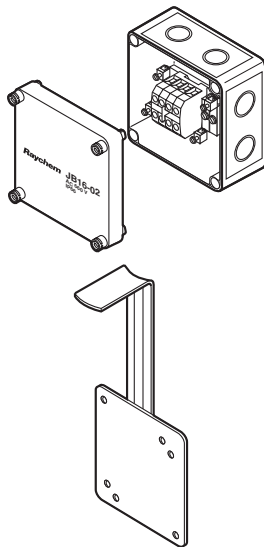
## SB-101

Dual-leg support bracket, stainless steel, height: 160 mm.

- For use with AT-TS-13, AT-TS-14, JB16-02 and RAYSTAT-CONTROL-10
- PCN: 990944-000

## 5. General accessories

		FroStop Black	ETL-10
Power connection	1 JB16-02 +	1 CE16-05 +	CE20-03 or KLP + 1 JB-SB-08
Splice	1 JB16-02 +	2 CE16-05 +	CE20-03 or KLP + 1 JB-SB-08
Powered splice	1 JB16-02 +	2 CE16-05 +	CE20-03 or KLP + 1 JB-SB-08
T-connection	1 JB16-02 +	3 CE16-05 +	CE20-03 or KLP + 1 JB-SB-08
Powered T-connection	1 JB16-02 +	3 CE16-05 +	CE20-03 or KLP + 1 JB-SB-08
Four way connection	1 JB16-02 +	4 CE16-05 +	CE20-03 or KLP + 1 JB-SB-08



## JB16-02

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

- PCN: 946607-000

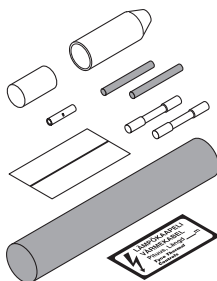
## JB-SB-08

Single-leg support bracket for junction and connection boxes

- PCN: 084799-000

## 6. Accessories for use in pipes

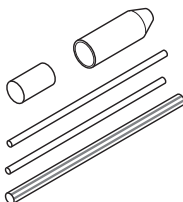
	Description
Connection and end seal kit	JLP
T-coupling 25 mm pipe	T-25 mm
T-coupling 32 mm pipe	T-32 mm
Watertight connection	ETL-R20
Y-coupling 25 mm pipe	Y-25 mm
Y-coupling 32 mm pipe	Y-32 mm



## JLP

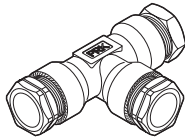
Cold lead connection and end seal kit

- Heat-shrink technique
- PCN: 139433-000



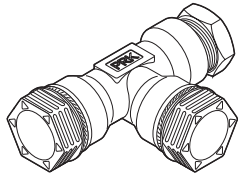
## CE-T2Red/ETL

- E-no: 8949005
- PCN: 323608-000



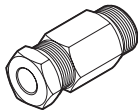
**T-25 mm**

- T-coupling
- SSTL:n nro: 0430995
  - LVI-nro: 1847091
  - PCN: 295334-000



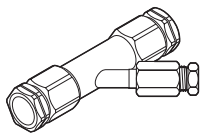
**T-32 mm**

- T-coupling
- SSTL:n nro: 0430996
  - LVI-nro: 1847092
  - PCN: 106700-000



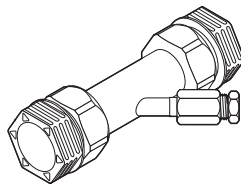
**ETL-R20**

- Watertight connection
- SSTL:n nro: 0430999
  - LVI-nro: 1847029
  - PCN: 519626-000



**Y-25 mm**

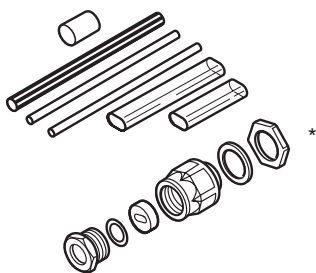
- Y-coupling
- SSTL:n nro: 0430997
  - LVI-nro: 1847027
  - PCN: 546848-000



**Y-32 mm**

- Y-coupling
- SSTL:n nro: 0430998
  - LVI-nro: 1847028
  - PCN: 033925-000

## 7. Accessories for use on pipes



**CE16-05**

- Connection and end seal kit
- Heat-shrink technique
  - Gland PG16
  - PCN: 249987-000

**Use on pipes only**

**CE 20-03**

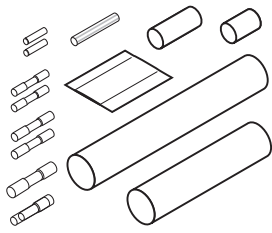
- Connection and end seal kit
- Heat-shrink technique
  - Gland M20
  - PCN: 331368-000

**Use on pipes only**

**KLP**

- Connection and end seal kit
- Heat-shrink technique
  - No gland included\*
  - SSTL:n nro: 0430990
  - LVI-nro: 1847016
  - PCN: .....

**Use on pipes only**

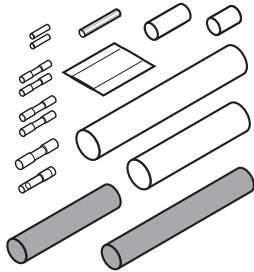


## CCE-03-CR

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

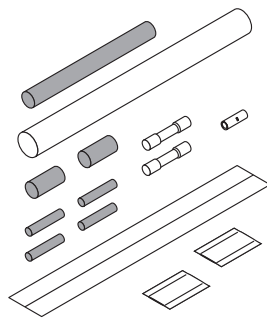
*Use on pipes only*



## CCE-04-CT

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 ETL-10
- PCN: 243676-000



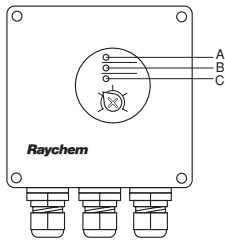
## T2 JATKO

Splice from heating cable to heating cable

- SSTL:n nro: 0430993
- PCN: 397408-000

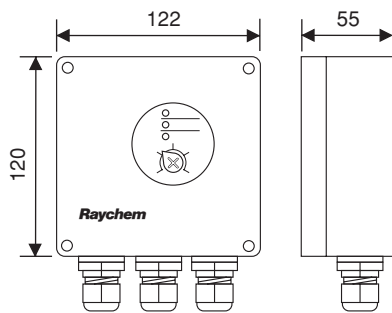
## Line-sensing control and ambient thermostats (AT-TS-13 and AT-TS-14)

### Unit layout



A	Green LED	Heating cable on
B	Red LED	Sensor break
C	Red LED	Sensor short-circuit

### Technical data



(Dimensions in mm)

Supply voltage	230 VAC +10% -15% 50/60 Hz	
Approval	CE	
Max. switching current	16 A, 250 Vac	
Max. conductor size	2.5 mm <sup>2</sup>	
Switching differential	0.6 to 1 K	
Switching accuracy	AT-TS-13	± 1 K at 5°C (calibration point)
	AT-TS-14	± 2 K at 60°C (calibration point)
Switch type	SPST (normally open)	
Adjustable temperature range	AT-TS-13	-5°C to +15°C
	AT-TS-14	0°C to +120°C

### Housing

Temperature setting	inside
Exposure temperature	-20°C to +50°C
Ingress protection	IP65 according to EN 60529
Entries	1 x M20 for supply cable 1 x M25 for connection heating cable 1 x M16 for sensor
Weight (without sensor)	approx. 440 g
Material	ABS
Lid fixing	nickel-plated quick release screws
Mounting	On wall or on support bracket SB-110/SB-111

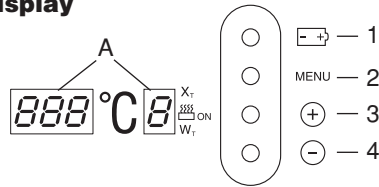
### Temperature sensor (HARD-69)

Type	PTC KTY 83-110
Length sensor cable	3 m
Diameter sensor cable	5.5 mm
Diameter sensor head	6.5 mm
Max. exposure temperature sensor cable	160°C

The sensor cable may be extended up to 100 m using a cable with a cross-section of 1.5 mm<sup>2</sup>.  
The sensor cable should be shielded if it is laid in cable ducts or in the vicinity of high-voltage cables.

## Line-sensing thermostat with alarm relay RAYSTAT-CONTROL-10

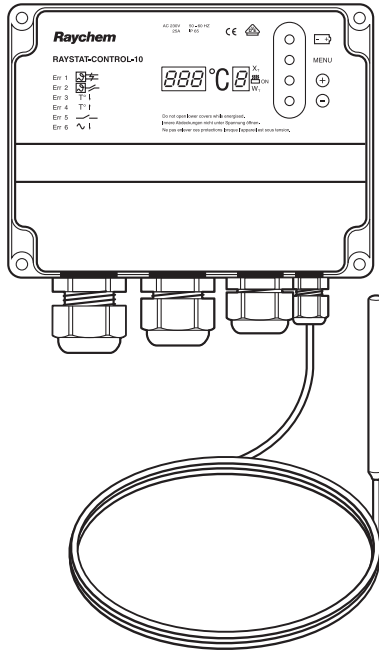
### Display



#### A. LED Display (parameter and error indications)

1. Battery activation
2. Parameter menu selection
3. Increase value
4. Decrease value

### Technical data



Operating Voltage	230 VAC, +10%/-10%, 50/60 Hz
Power Consumption	≤ 14 VA
Main Relay (heating)	I <sub>max</sub> 25 A, 250 VAC, SPST
Main Terminals	3 x 0.75 mm <sup>2</sup> to 4 mm <sup>2</sup>
Alarm Relay	I <sub>max</sub> 2 A, 250 VAC, SPDT, voltfree
Alarm Terminals	(3 ± ½) x 0.75 mm <sup>2</sup> to 2.5 mm <sup>2</sup>
Accuracy	±0.5 K at 5°C
Ambient temperature	-40°C to +40°C

#### Parameter settings

Temperature Setting	0°C to +150°C
Hysteresis	1 K to 5 K
Low Temperature Alarm	-40°C to +148°C
High Temperature Alarm	+2°C to +150°C or switched OFF
Heater Operation if Sensor Error	ON or OFF
Voltage Free Operation	YES or NO

#### Diagnosed errors

Sensor Errors	Sensor short / Sensor open circuit
Temperature Extremes	High temperature / Low temperature
Voltage Errors	Low supply voltage / Output fault

Parameters can be programmed without power supply and parameters are stored in non-volatile memory.

### Housing

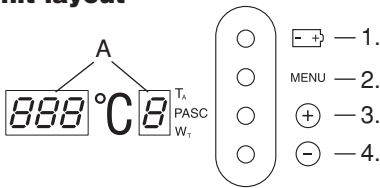
Size	120 mm x 160 mm x 90 mm
Material	Grey polycarbonate
Ingress Protection	IP 65
Entries	2 x M25, 1 x M20, 1 x M16
Weight	Approx. 800 g
Lid	Transparent with 4 captive screws
Mounting	On wall or on support bracket SB-100/SB-101

### Temperature sensor

Sensor Type	3-wire Pt100 according to IEC Class B
Sensor Head	50 mm x Ø 6 mm
Sensor Cable Length	3 m x Ø 4 mm
Cable Exposure Temperature	-40°C to +150°C (+215°C, 1000 h max.)

Sensor cable can be extended up to 150 m when a cross-section of 3 x 1.5 mm<sup>2</sup> is used.  
The sensor cable should be shielded if it is laid in cable ducts or in the vicinity of high-voltage cables.

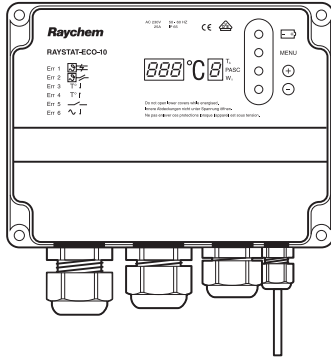
### Unit layout



### A. LED Display (parameter and error indications)

1. Battery activation
2. Parameter menu selection
3. Increase value
4. Decrease value

### Technical data



Operating Voltage	230 VAC, +10%/–10%, 50/60 Hz
Power Consumption	≤ 14 VA
Main Relay (heating)	I <sub>max</sub> 25 A, 250 VAC, SPST
Main Terminals	3 x 0.75 mm <sup>2</sup> to 4 mm <sup>2</sup>
Alarm Relay	I <sub>max</sub> 2 A, 250 VAC, SPDT, voltfree
Alarm Terminals	(3 ±) x 0.75 mm <sup>2</sup> to 2.5 mm <sup>2</sup>
Accuracy	±0.5 K at 5°C

### Main parameter settings

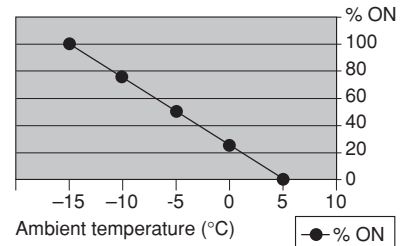
Energy Saving Algorithm	Proportional Ambient Sensing Control (PASC) active below setpoint
Temperature Setpoint	0°C to +30°C (switch off temperature)
Minimum Expected Ambient Temperature	–40°C to –10°C (heating 100% powered)
Heater Operation if Sensor Error	ON (100%) or OFF
Voltage Free Operation	YES or NO

### Energy saving with Proportional Ambient Sensing Control (PASC)

Duty cycle (power to heater on) depends on the ambient temperature. For example: If minimum temperature = –15°C and if maintain temperature (set point) = +5°C

ambient t°	% ON
–15	100
–10	75
–5	50
0	25
5	0

Min. Ambient  
Set point



Result: At ambient temperature of –5°C, 50% energy is saved

### Diagnosed alarms

Sensor Errors	Sensor short / Sensor open circuit
Low Temperature	Min. expected ambient temperature reached
Voltage Errors	Low supply voltage / Output voltage fault

Parameters can be programmed without power supply and parameters are stored in non-volatile memory.

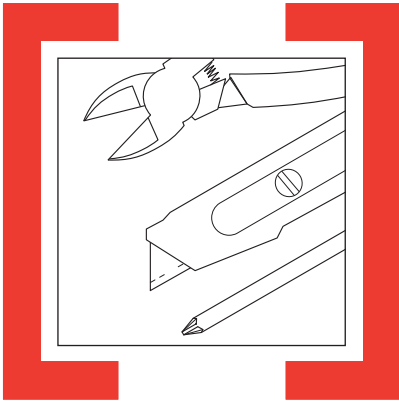
### Housing

Size	120 mm x 160 mm x 90 mm
Material	Grey polycarbonate
Exposure Temperature	–40°C to +80°C
Ingress Protection	IP 65
Entries	2 x M25, 1 x M20, 1 x M16
Weight	Approx. 800 g
Lid	Transparent with 4 captive screws
Mounting	On wall or on support bracket SB-100/SB-101

### Temperature sensor

Sensor Type	3-wire Pt100 according to IEC Class B
Sensor Head	∅ 6 mm

Sensor cable can be extended up to 150 m when a cross-section of 3 x 1.5 mm<sup>2</sup> is used. The sensor cable should be shielded if it is laid in cable ducts or in the vicinity of high-voltage cables.



# Raychem

## Assembly and mode of operation

### Self-regulating heating cables

#### Tested service life

Intensive tests according to recognized scientific procedures  
Results: self-regulating heating cables have a service life of at least 20 years.

#### Approvals

- Stringent production monitoring
- Approved BS 6351
- VDE, Fimko, Nemko, Semko, Demko approved



#### Robust construction

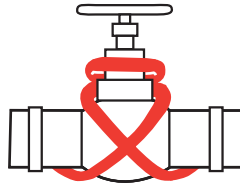
- Long service life assured through electrical polyolefin or fluoropolymer insulation

#### Energy-saving

- Power output is always adjusted to the amount of heat required at any given time
- Self-regulating heating cables save energy and operating costs

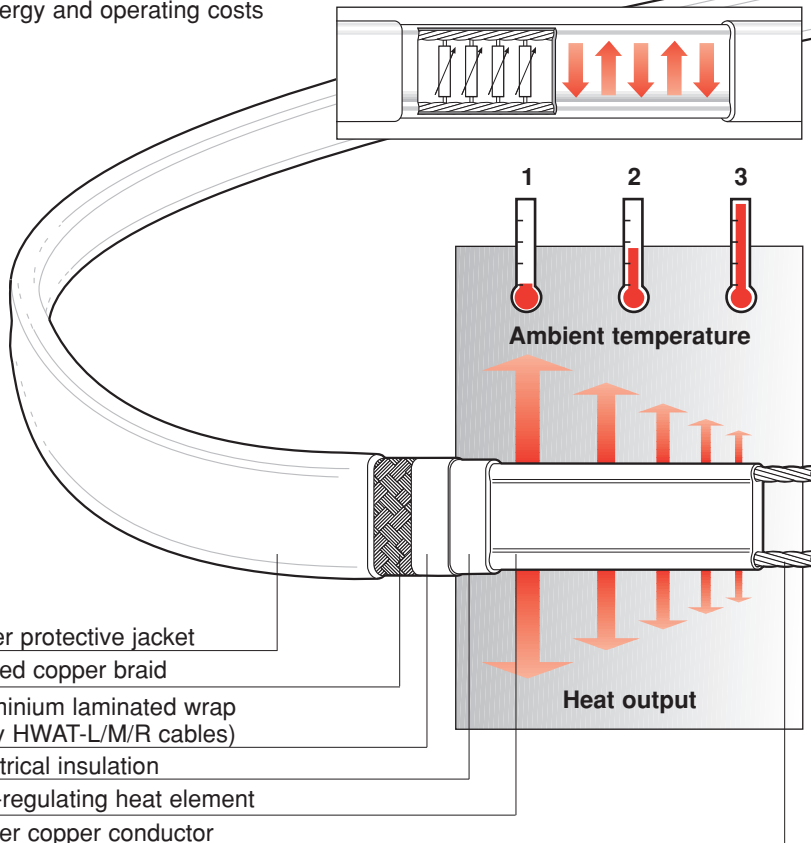
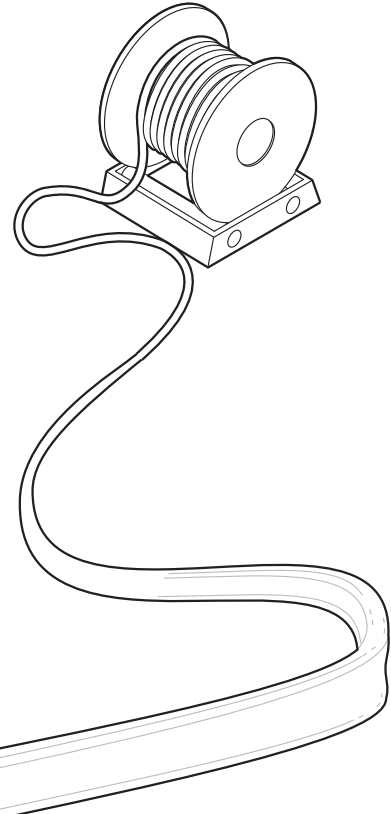
#### Safe and reliable

- Thanks to self regulation, no risk of overheating or burnout even where cables overlap
- Safe for use on plastic pipes or gutters



#### Parallel circuit

- Current conduction between two parallel copper conductors across the semiconducting, crosslinked heating element. The cable can therefore easily be cut to length on site.



#### 1. Cold ambient = High power output

If the temperature in the immediate vicinity of the self-regulating temperature maintenance heating cable is cold, the heat output from the heating cable is increased.

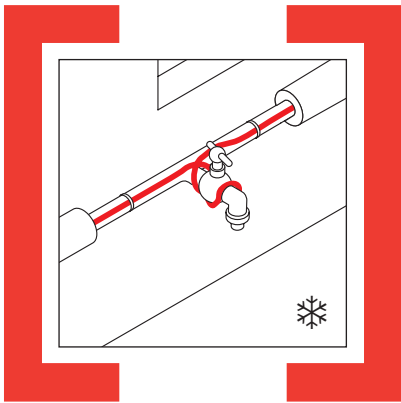
The polymeric core of the cable contracts, which creates many electrical paths across the integrated, carbon particles.

#### 2. Warm ambient = Low power output

In response to a warmer environment, the heat output of the self-regulating cable is reduced. The polymeric core of the cable expands, reducing the electrical paths.

#### 3. Hot ambient = Virtually no output

If the temperature in the environment of the self-regulating heating cable reaches a high temperature, the heat output is practically cut off. Due to the maximum expansion of the polymeric core of the cable, almost all the electrical paths are cut off.

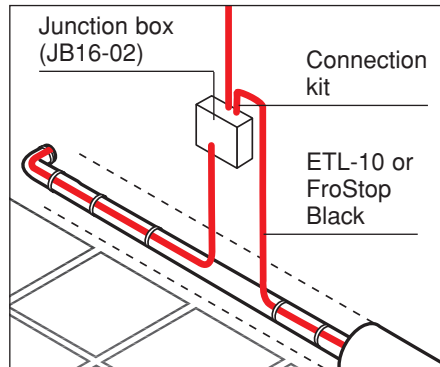


# Raychem

## Frost protection system for pipes

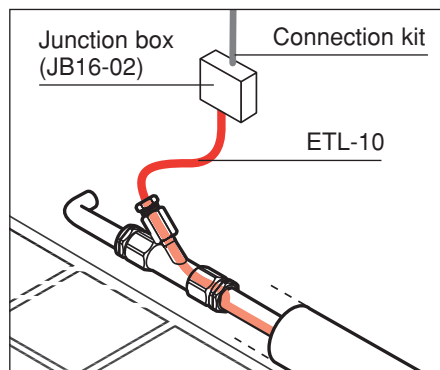
### On pipes Cut-to-length

- ETL-10  
10W/m at 5°C on metal pipe
- FroStop Black  
18W/m at 5°C on metal pipe



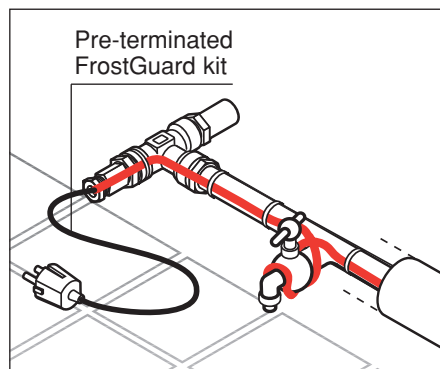
### In pipes Cut-to-length

- ETL-10  
20W/m at 5°C in water

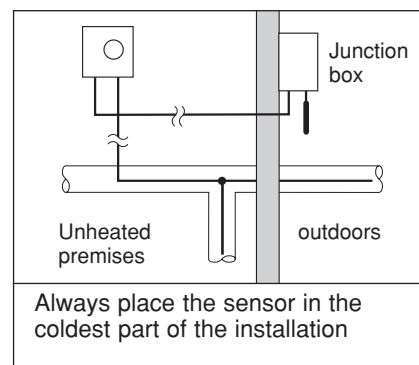
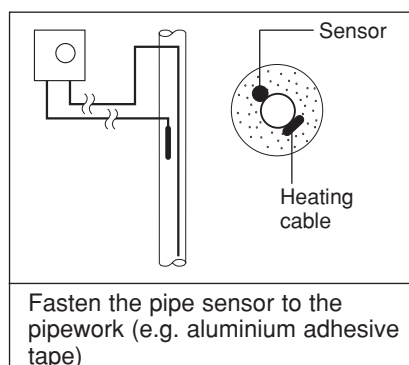
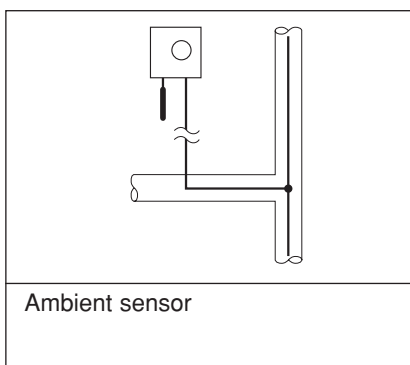


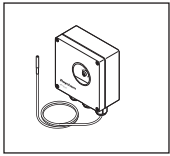
### On and in pipes Pre-terminated ready-to-use kit

- FrostGuard  
10W/m at 5°C on metal pipe;  
20W/m at 5°C in water



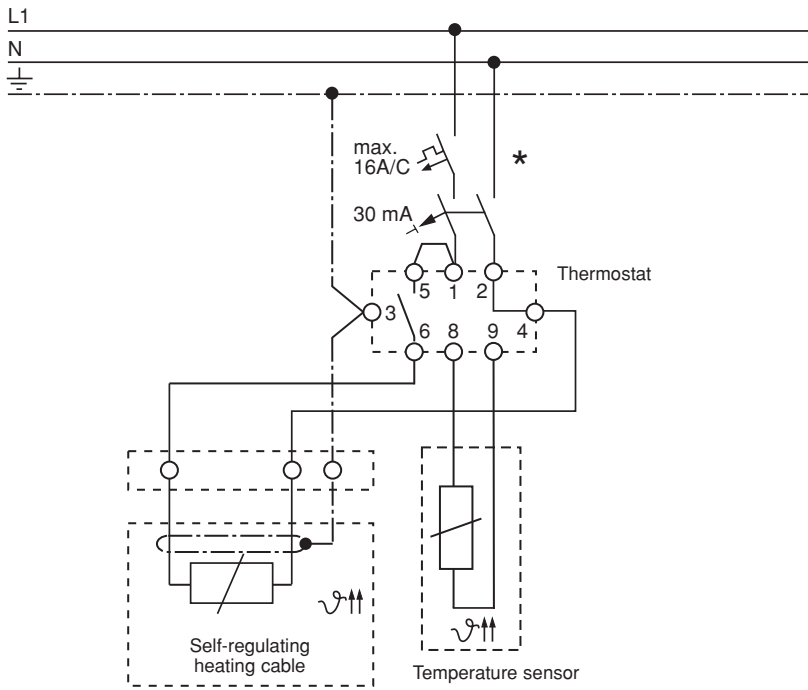
### Placing of sensor



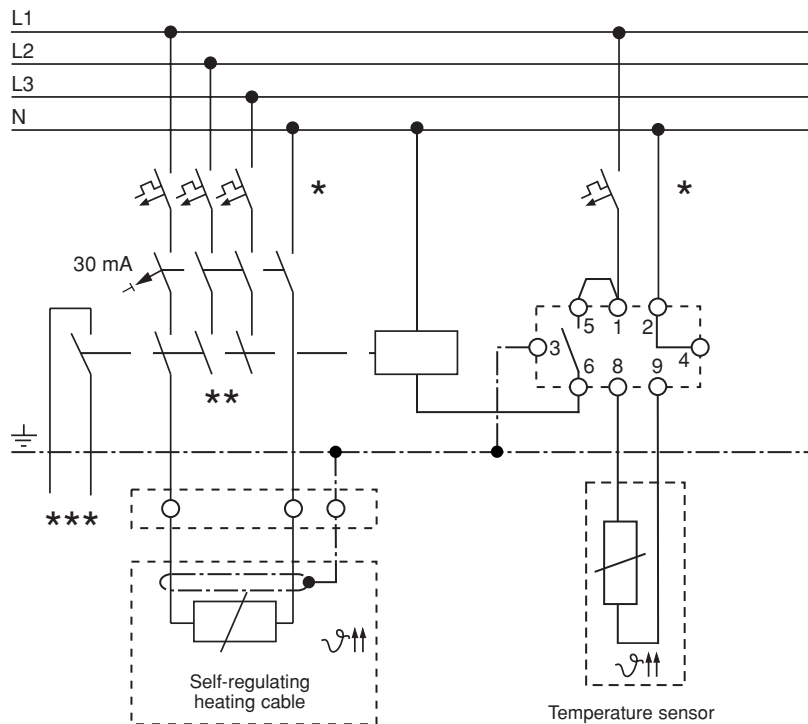


## Wiring diagram for thermostat AT-TS-13 or AT-TS-14

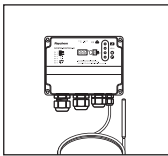
### AT-TS-13/14 direct



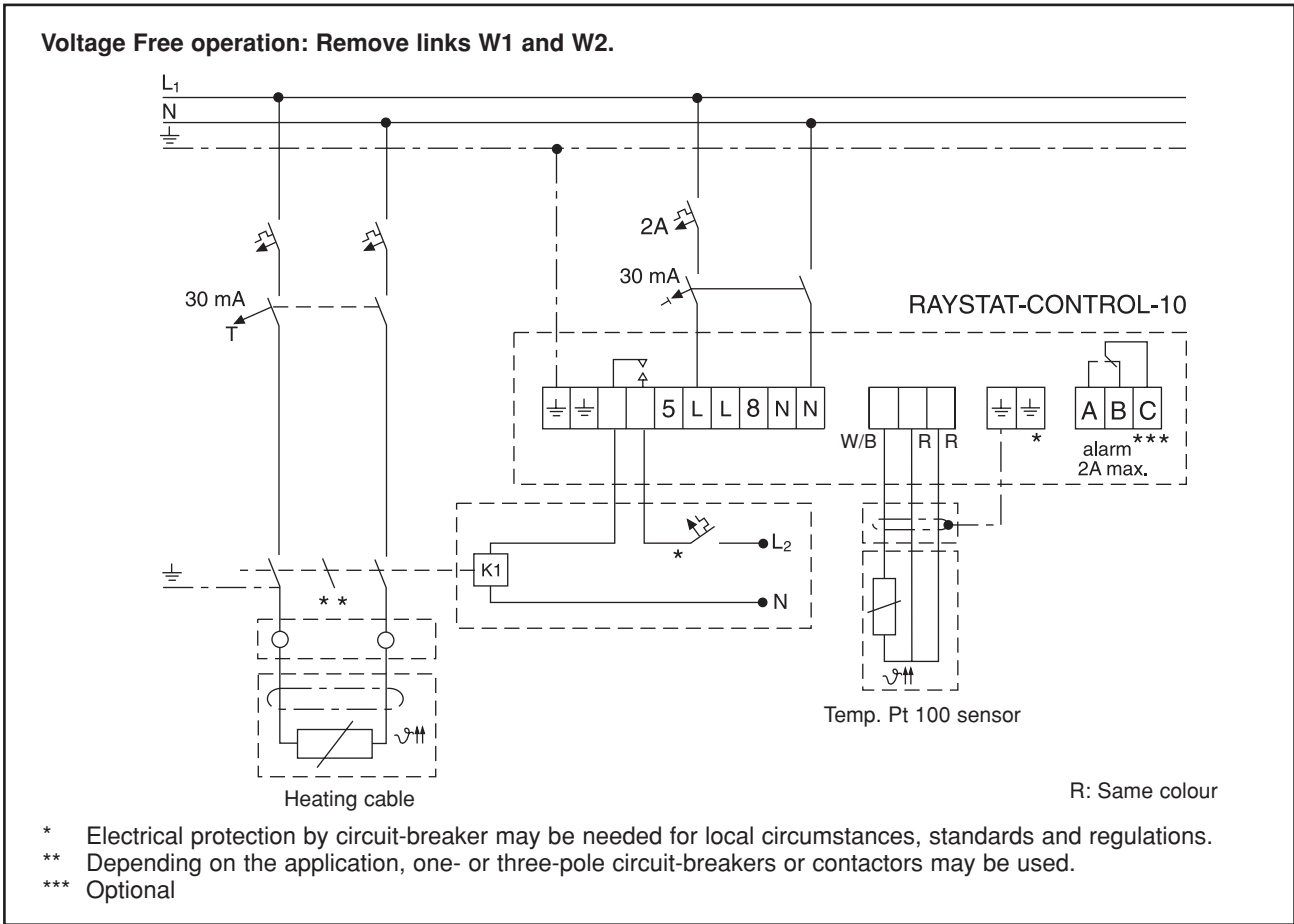
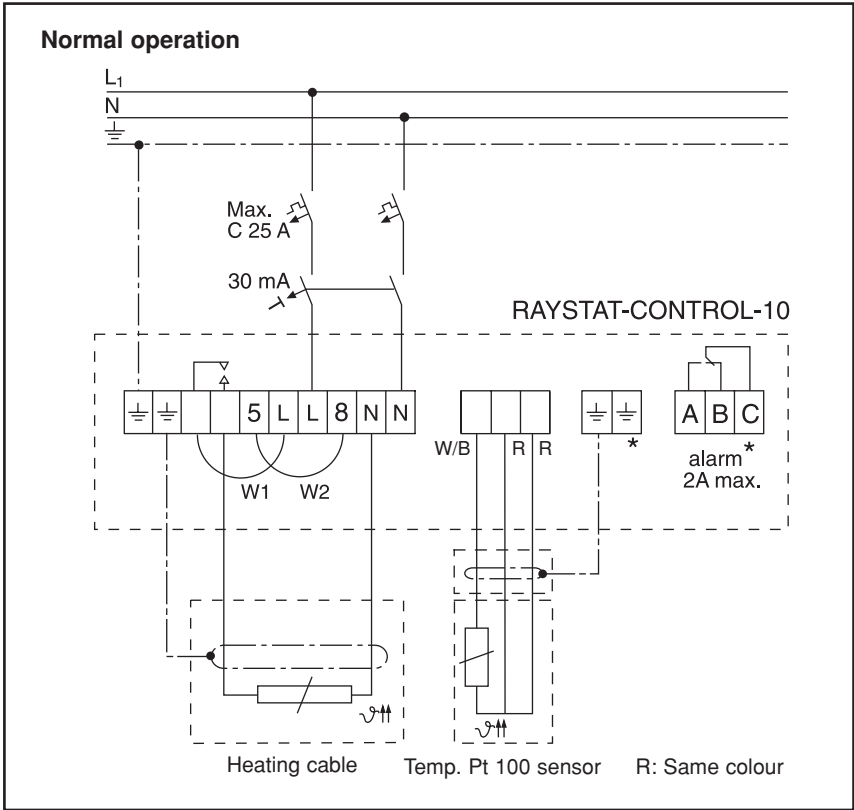
### AT-TS-13/14 with contactor



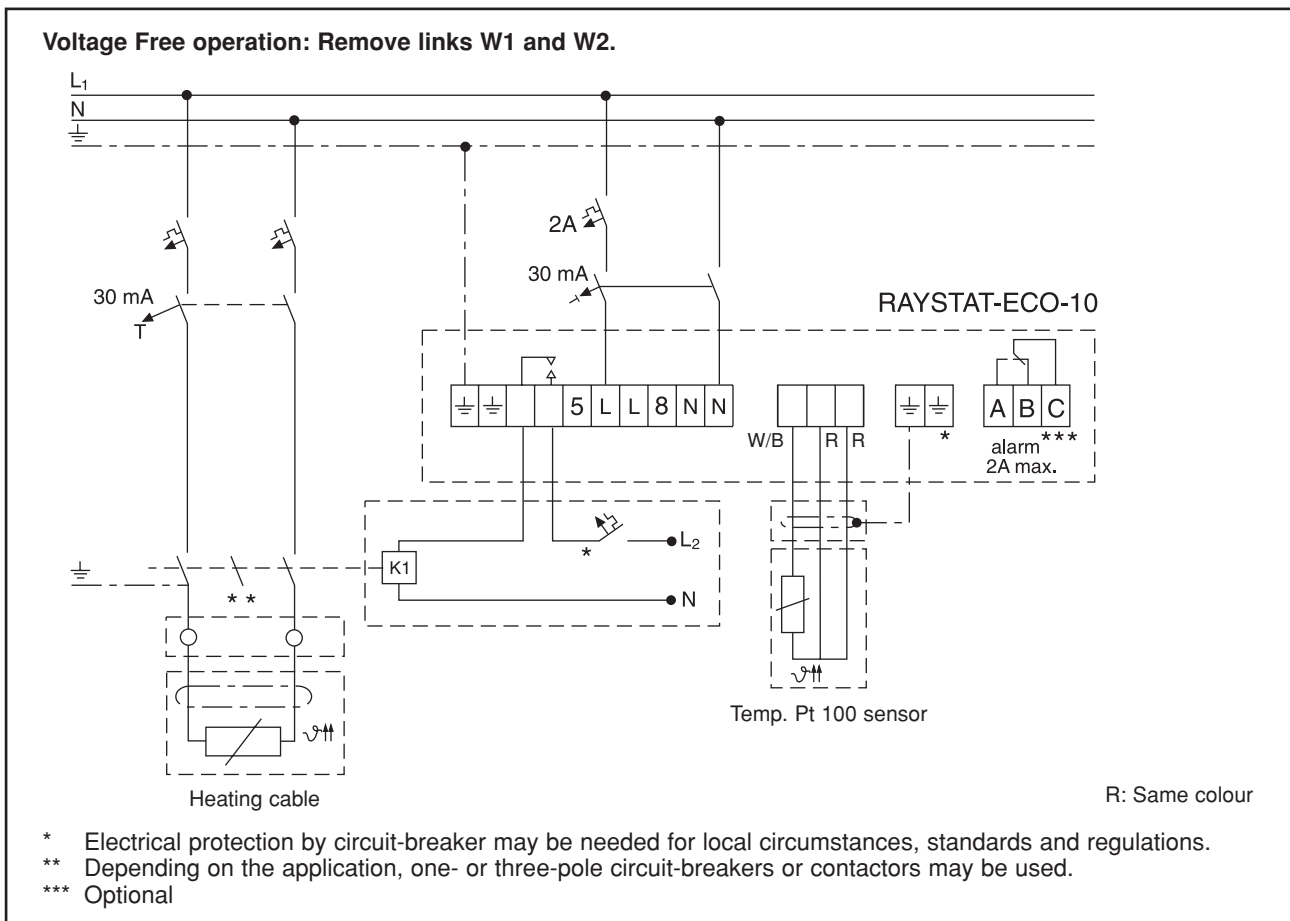
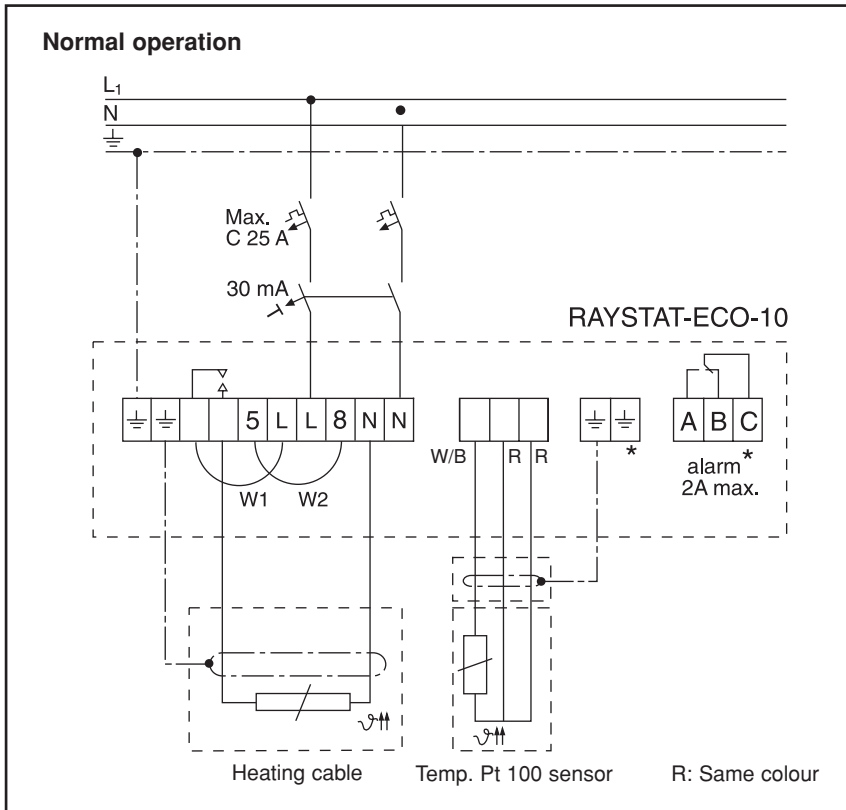
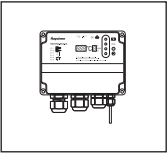
- \* Two- or four-pole electrical protection by circuit-breaker may be needed for local circumstances, standards and regulations
- \*\* Depending on the application, one- or three-pole circuit-breakers or contactors may be used
- \*\*\* Optional: Potential-free circuit-breaker for connection to the BMS



Wiring diagram for RAYSTAT-CONTROL-10















## Wiring diagram for RAYSTAT-ECO-10



- \* Electrical protection by circuit-breaker may be needed for local circumstances, standards and regulations.
- \*\* Depending on the application, one- or three-pole circuit-breakers or contactors may be used.
- \*\*\* Optional

## 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	KLP/JLP	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	–	–