FROST PROTECTION FOR PIPES

Frozen pipes can be a costly problem. When pipes are exposed to sub-zero temperatures they can burst, leading to considerable damage and disruption. The Raychem frost protection system for pipes provides an efficient solution. The self-regulating heating cable, combined with an adequate insulation, prevents water pipes, fire mains, sprinkler systems and fuel oil lines from freezing.

EASY TO INSTALL

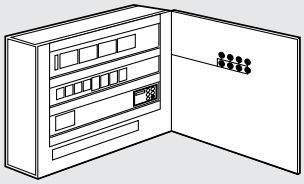
The heating cable is simply fixed onto the pipe – under the thermal insulation. Connections are quickly made with the fast RayClic connectors.

DURABLE AND RELIABLE

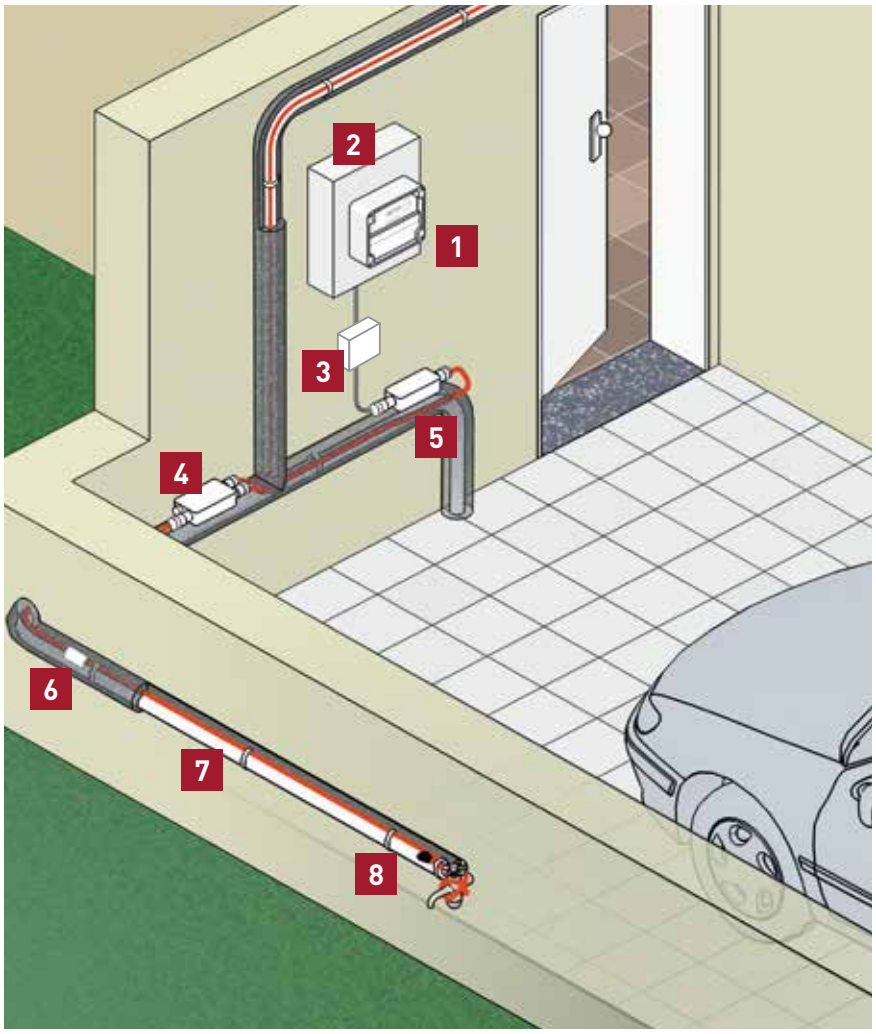
The cable's large copper conductors make it a reliable solution and its specially formulated outer jacket protects it from severe environmental conditions.

LOW POWER CONSUMPTION

The smart RAYSTAT -ECO control unit calculates a duty-cycle proportional to the expected minimum temperature. Where a simple ambient thermostat would energize the heating cable for 100%, the "smart" controller would energize for a fraction of the time, resulting in significant extra savings.



Optional: SBS-xx-SV control panel contains: RCD (30 mA), Circuit breaker (CB) (C characteristics) space available in switch cabinet for installation of a thermostat.



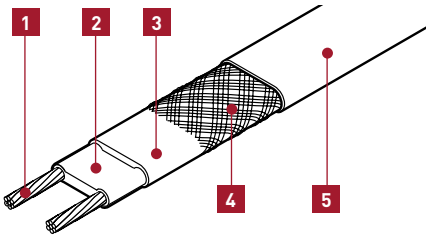
1. Thermostat with line or ambient temperature sensor
2. Residual current device (30 mA) Circuit-breaker (C type)
3. Junction box (JB16-02)
4. T-Connection (RayClic-T-02) (Not for FS-C-2X / FS-C10-2X)
5. Power connection (RayClic-CE-02) (Not for FS-C-2X / FS-C10-2X)
6. Electrical traced label (LAB-I-01)
7. Frost protection heating cable (FS-A-2X, FS-B-2X, FS-C-2X or FS-C10-2X)
8. End seal (RayClic-E-02) (Not for FS-C-2X / FS-C10-2X)

1 HEATING CABLE SELECTION

Application	
Frost protection for pipework at max. 65°C operating temperature	
FS-A-2X	10 W/m at 5°C
FS-B-2X	26 W/m at 5°C
Frost protection for pipework at max. 95°C operating temperature and temperature maintenance for metal waste pipes with fatty waste water	
FS-C-2X	31 W/m at 5°C
	22 W/m at 40°C
Frost Protection for pipework to maximum 90°C operating temperature. For long circuit applications and central heating pipework.	
FS-C10-2X	10 W/m at 5°C

TraceCalc.Net Construction is a software tool for product selection based on actual project data. Visit www.pentairthermal.com

2 COMPOSITION OF THE FS-A/B/C/C10-2X HEATING CABLE



1. Copper conductor (1.2 mm²)
2. Self-regulating heating element
3. Modified polyolefin insulation (FS-C-2X: Fluoropolymer)
4. Protective tinned copper braid
5. Modified polyolefin protective outer jacket.

Note: FS-C10-2X comprises copper conductors (1.4 mm²)

3 HEATING CABLE LENGTH

Frost protection down to –20°C.

	Pipe diameter												
Insulation thicknesses	mm Inches	15 1/2"	22 3/4"	28 1"	35 5/4"	42 11/2"	54 2"	67 21/2"	76 3"	108 4"	125 5"	150 6"	200 8"
10 mm		FS-**A**-2X FS-C10-2X	FS-**B**-2X	FS-**B**-2X	FS-**B**-2X	FS-**B**-2X	FS-**B**-2X	FS-**B**-2X					
15 mm		FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**B**-2X	FS-**B**-2X	FS-**B**-2X	FS-**B**-2X	FS-**B**-2X	FS-**B**-2X			
20 mm		FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**B**-2X	FS-**B**-2X	FS-**B**-2X	FS-**B**-2X	FS-**B**-2X		
25 mm		FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**B**-2X	FS-**B**-2X	FS-**B**-2X	FS-**B**-2X	FS-**B**-2X	
30 mm		FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**B**-2X	FS-**B**-2X	FS-**B**-2X	FS-**B**-2X	FS-**B**-2X
40 mm		FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**B**-2X	FS-**B**-2X	FS-**B**-2X	FS-**B**-2X
50 mm		FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**A**-2X FS-C10-2X	FS-**B**-2X	FS-**B**-2X	FS-**B**-2X

Frost protection cables FS-A-2X, FS-B-2X and FS-C10-2X are suitable for any pipe material (copper, threaded pipes, stainless steel pipes, plastic pipes and composite metal pipes without restriction).
For plastic pipes, please use aluminium adhesive tape ATE-180. The frost protection cable should be covered along its entire length. Heat insulation λ = 0.035 W/(m.K) or better.

Important note: frost protection heating cables with fluorpolymer protective jacket must be used for solvent-containing, mixed and/or bitumen-coated heat insulation.

40°C temperature maintenance on pipelines for fatty waste water

	Pipe diameter (mm)							
Insulation thicknesses	42 11/2"	54 2"	67 21/2"	76 3"	108 4"	125 5"	150 6"	200 8"
30 mm	FS-**C**-2X							
40 mm	FS-**C**-2X	FS-**C**-2X	FS-**C**-2X					
50 mm	FS-**C**-2X	FS-**C**-2X	FS-**C**-2X	FS-**C**-2X				
60 mm	FS-**C**-2X	FS-**C**-2X	FS-**C**-2X	FS-**C**-2X	FS-**C**-2X	FS-**C**-2X	FS-**C**-2X	FS-**C**-2X

Min. ambient temperature –10°C. Heat insulation λ = 0.035 W/(m.K) or better.

Cable type FS-C-2X should only be used in conjunction with pipework with a minimum continuous temperature resistance of 90°C. A line-sensing control thermostat (type AT-TS-14, RAYSTAT-CONTROL-10 or RAYSTAT-CONTROL-11-DIN) must be used on plastic pipework (setting approx. 40°C).

4 CABLE LENGTH

The heating cable should be installed in a straight line on the pipework.
Cable loops instead of T-connections can be made on short dead legs.
(up to approx. 3 m)
+ approx. 0.3 m per connection
+ approx. 1.0 m per T-connection
+ approx. 1.2 m per 4-way connection
Additional cable required for increased heat sinks at valves from 2"
and for uninsulated pipe supports (approx. 1 m)

= required heating cable length

5 ELECTRICAL PROTECTION

- The total length of heating cable determines the number and size of the fuses
- 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

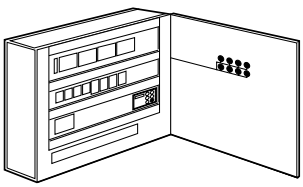
Max. length of the heating circuit is based on a minimum switch-on temperature of 0°C, 230 VAC.

	FS-A-2X	FS-B-2X	FS-C-2X	FS-C10-2X
4 A	45 m	25 m	20 m	45 m
6 A	70 m	35 m	30 m	70 m
10 A	110 m	65 m	55 m	110 m
13 A	130 m	85 m	70 m	130 m
16 A	150 m	105 m	90 m	150 m
20 A	–	–	–	180 m

Note: A splice can also be made using an S-06

6 TESTING OF THE INSTALLATION See page 64

7 CONTROL PANELS



Steel plate housing, wall-mounted version, equipped with mains isolator, RCD/CB combination(s), power contactor(s), indicators for, `Operation and Fault', operating mode selector switch, inlet and outlet terminals. Completely assembled, turnkey condition, wired and inspected. wiring schematics in panel housing An installation slot is provided for a RAYSTAT-CONTROL-11-DIN, RAYSTAT-CONTROL-10 and/or RAYSTAT-ECO-10 thermostat, each serving 3 heating circuits. Factory fitted. Please contact us for more information.

Technical data: See page 29