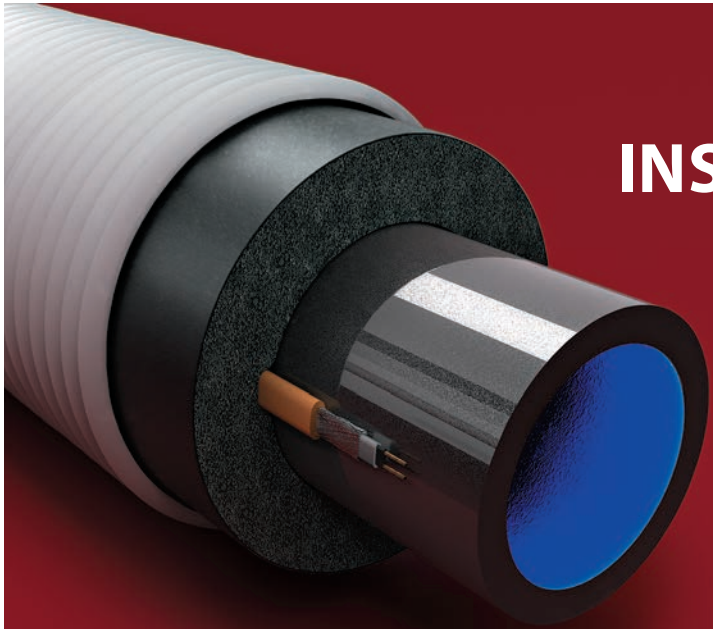
FROSTSTOP

ARCHITECTURAL DE-ICING
AND PIPELINE HEATING



MANUAL INSTRUCTION

FROSTSTOP
SELF-LIMITING
CABLE SECTION

THANK YOU VERY MUCH FOR PURCHASING FROSTSTOP CABLE SYSTEM. WE HOPE THAT OUR PRODUCT QUALITY WILL BE ENLIGHTNING YOU EVERY DAY!

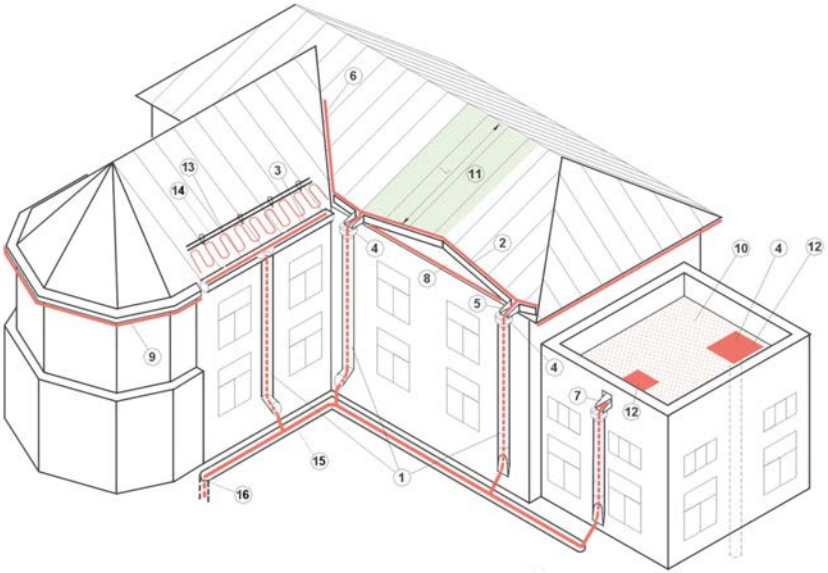
FROSTSTOP SYSTEM BENEFITS:

- Safety
- Low power consumption
- Simple installation and connection
- Cable life expectancy over 25 years

PURPOSE

Froststop Self-Limiting Heating Cable Section (hereinafter referred to as Heating Section) is designed to protect architectural elements from icing, as well as pipelines from freezing. The main purpose is to maintain the protected components' integrity and to extend their service life.

FROSTSTOP IS YOUR BEST PIPE PROTECTION



1 - downspouts
2 - gutters
3 - spouting
4 - roof drains
5 - guide chutes
6 - neck gutters
7 - water outlet
8 - cornice
9 - water drip
10 - flat roofing
11 - gutter catchment area
12 - input heating area
13 - roof edge
14 - snow retention
15 - ground drainage chute
16 - drainage well

SAFETY

BELOW ARE THE HEATING CABLE SECTION BASIC SAFETY PRECAUTIONS THAT ARE IMPORTANT FOR MAINTAINING THE WARRANTY.

1. The heating section should be used strictly for its intended purpose in accordance with the manufacturer's recommendations.

2. Installation and connection of the heating section must be carried out with power disconnected.

3. It is prohibited to apply power to the heating section that is different from what specified in this document.

4. It is forbidden to apply power to the coiled heating section.

5. In order to avoid mechanical damage to the heating section, installation should be carried out on clean, cleared surface, free from sharp corners and edges, free from dirt and rust, welding droplets, cement splashing or other substances that could damage the heating section.

6. The heating section should not be subjected to mechanical loads, stretching and twisting in the longitudinal plane during installation and operation.

7. When installing and operating the heating section, the cable should not be bent by a radius smaller than specified this document.

8. Operation of the heating section with external mechanical damage is not allowed.

9. It is forbidden to make any changes to the design of the heating section e.g. changing its length.

10. The heating section should not be exposed to temperatures above the maximum operating temperature indicated in this document.

11. It is prohibited to carry out welding and fire work in the immediate vicinity of the heating section, in order to prevent unacceptable external temperature impacts.

12. It is prohibited to operate the heating section immersed in liquid.

THE MANUFACTURER IS ENTITLED TO WAIVING THEW WARRANTY OBLIGATIONS IN CASE OF ANY OF THE CONDITIONS LISTED ABOVE WAS NOT OBSERVED.

3. FROSTSTOP HEATING SECTION DESIGN

The design of the heating section * is a piece of self-limiting heating cable, equipped with a three-meter installation "cold" lead wire on one end, and the end clutch on the other. Self-limiting cable consists of two parallel copper conductors, the gap between them is filled with a special semiconducting compound a.k.a. matrix, changing its resistance depending on the heated object temperature (Fig. 1).

For electrical safety and protection, the matrix is insulated with thermoplastic elastomer (TPE), on top of which a tinned copper braid and a TPE sheath are applied. The length and power of the heating section is selected based on the length of the pipe and the thickness of the insulation. Connection and end termination couplings are manufactured in factory conditions, sealed for reliability.

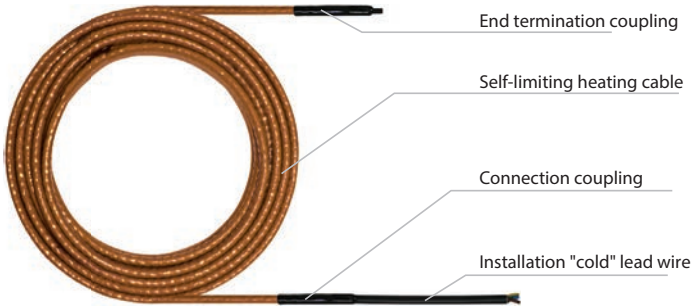


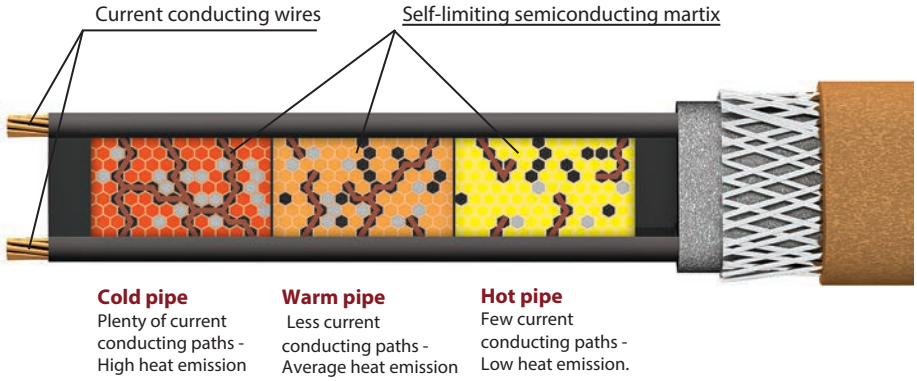
Fig. 1. Heating section design

* ATTENTION! The manufacturer is entitled to alter heating section design without notice, provided these changes do not compromise its quality and consumer properties.

OPERATION PRINCIPLE

Heat release occurs in a semiconducting matrix. Its resistance depends on the surface temperature, which creates a self-limiting effect: as the temperature rises, the matrix resistance increases and the heat release drops, and vice versa (Fig. 2).

Power is supplied from the mains voltage of 230VAC and is supplied from the cold lead end. The end termination coupling is installed at the heating section other end.



Fic. 2. Self-limiting effect

TECHNICAL SPECIFICATIONS

5.1	Section length	1 to 20 m
5.2	Cold lead length / cross section	3 m / 3×1.5 mm^2
5.3	Power supply	~ 230VAC, 50 Hz
5.4	Maximal operation temperature	+65 °C
5.5	Lowest installation temperature	-15 °C
5.6	Linear output	At least 25W/m
5.7	One-time bending radius at installation	35 мм
5.8	Insulation electrical resistance	10^3 MOhm•m
5.9	Shielding braid electrical resistance	less than 10 Ohm/km
5.10	External temperatures range	-50°C to +50°C
5.11	Electric protection standard	IP67

ARCHITECTURAL APPLICATIONS

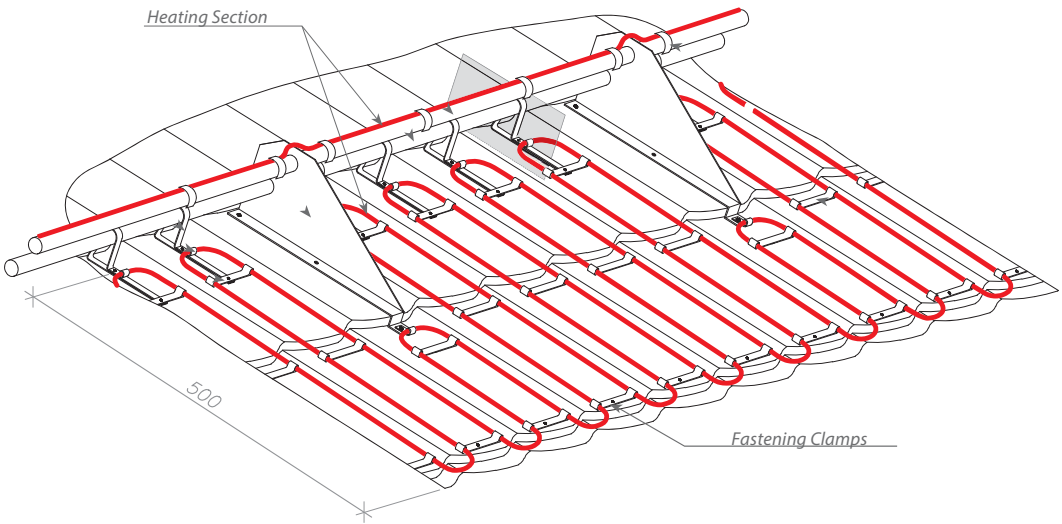
Shopping Centers

Office Buildings & Hotels

Glazing Roofs

Residential Complexes

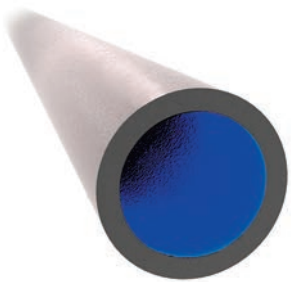
EXAMPLE:
LAYING THE HEATING SECTION ON THE TILE ROOF



HEATING SECTION INSTALLATION ON THE PIPELINE

IT IS RECOMMENDED TO REVIEW THE HEATING SECTION INSTALLATION AND OPERATION INSTRUCTION MANUAL BEFORE INSTALLATION.
SYSTEM OPERATION PERFORMANCE AND EFFICIENCY DEPENDS ON INSTALLATION QUALITY.

1 Prepare the pipeline for installation: clean the pipe from dirt and rust



ATTENTION!

- **It is important to ensure the cable adherence to the pipe. In case of spiral laying pattern, the heating part is laid with the same step.**
- **Heating cables must not be installed on moving parts.**
- **The minimum radius of a single bend during installation is 35 mm.**

2 Install the heating section on the pipe: either along the pipe (Fig. 3) or using spiral winding (Fig. 4). Select stacking step in accordance with Table. 1 (p. 12) or Table 2 (p. 13).

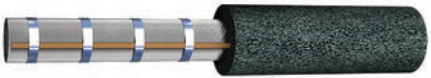


Fig. 3

Fig. 4

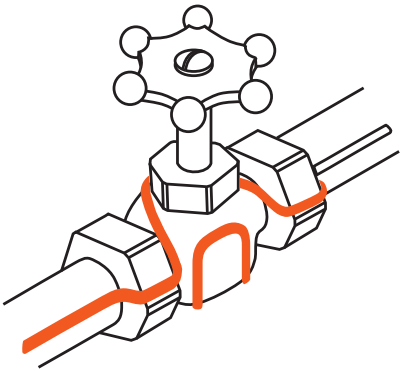
3 Fasten the heating section to the heated pipe bottom with a mounting tape (*not included*) and away from the flanges' low side as well as from other connections that could splash or drop liquids on the heating section while in operation.

4 Install insulation. Please make sure that the Installation "cold" lead wire remains outside insulation.

! For reliable and safe operation of the product it is recommended to use RCD - protective device cutting off at 30 mA leakage current, operating when the heating section insulation resistance is reduced. The device is mounted on a DIN rail in an electrical panel.

! It is recommended to use thermostats in order to save electricity

5 Install the junction box near the heating section. It is recommended to install the box away from the elements and direct sunlight.

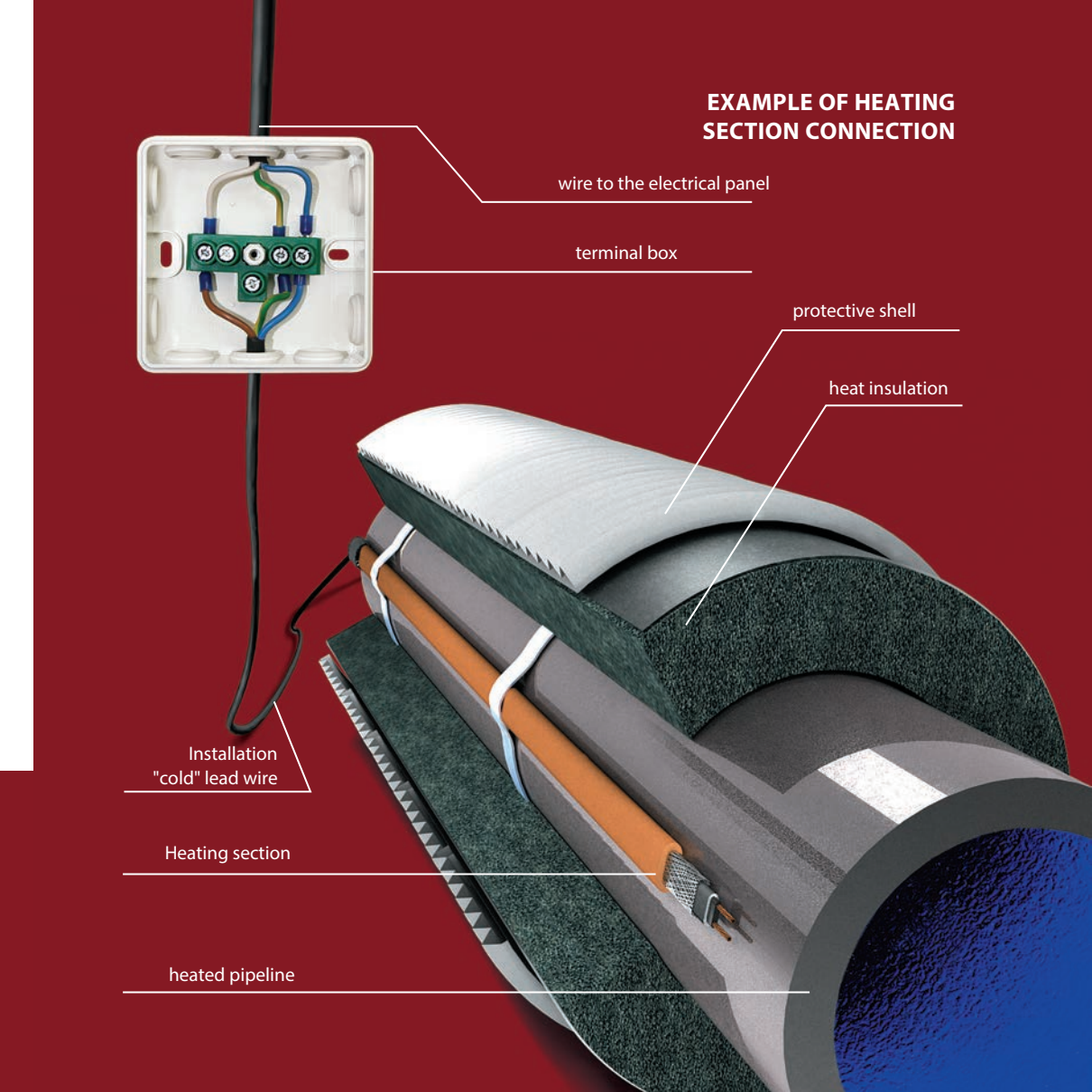


6 Lead the power cable to the terminal box from the electrical panel.

7 Make electrical connections according to the wiring diagram (see the example of connecting the heating section)

! It is recommended to use thermostats in order to save electricity

EXAMPLE OF HEATING SECTION CONNECTION



HEATING SECTION

For installation on pipelines, the heating section length should be selected according to Table 1 (for metal pipes) and Table 2 (for plastic pipes).

TABLE 1

Insulation thickness	Cable consumption for metal pipes, m / m (loop pitch, m)						
	t_{surf} \ D, mm	25	32	57	76	89	108
20 mm	-10	1.0	1.0	1.0	1.0	1.0	1.0
	-20	1.0	1.0	1.0	1.0	1.1 (0.6)	1.2 (0.6)
	-30	1.0	1.0	⊗	⊗	⊗	1.7 (0.3)
	-40	1.0	1.0	⊗	⊗	⊗	⊗
30 mm	-10	1.0	1.0	1.0	1.0	1.0	1,0
	-20	1.0	1.0	1.0	1.0	1.0	1.0
	-30	1.0	1.0	1.0	1.0	1.1 (0.6)	1.2 (0.6)
	-40	1.0	1.0	1.0	⊗	2.0	1.5 (0.3)
40 mm	-10	1.0	1.0	1.0	1.0	1.0	1.0
	-20	1.0	1.0	1.0	1.0	1.0	1.0
	-30	1.0	1.0	1.0	1.0	1.0	1.0
	-40	1.0	1.0	1.0	1.0	1.1 (0.6)	1.2 (0.6)
50 mm	-10	1.0	1.0	1.0	1.0	1.0	1.0
	-20	1.0	1.0	1.0	1.0	1.0	1.0
	-30	1.0	1.0	1.0	1.0	1.0	1.0
	-40	1.0	1.0	1.0	1.0	1.0	1.1 (0.8)

IMPORTANT!

- The crossed-out cells indicate the spots where it is not recommended to twist the cable, as it can be damaged.
- The pipeline must be insulated.
- The tables indicate the length of the cable that must be laid on 1 m of the pipe. In those cases when it is necessary to wind the cable, the step of laying the cable in meters is given in brackets.

SELECTION RECOMMENDATION

TABLE 2

Insulation thickness	Cable consumption for metal pipes, m / m (loop pitch, m)						
	D, mm / t_{surf}	25	32	57	76	89	108
20 mm	-10	1.0	1.0	1.0	1.0	1.0	1.2 (0.6)
	-20	1.0	1.0	⊗	⊗	2,0	2,0
	-30	1.0	1.0	⊗	⊗	⊗	⊗
	-40	1.0	⊗	⊗	⊗	⊗	⊗
30 mm	-10	1.0	1.0	1.0	1.0	1.0	1.0
	-20	1.0	1.0	1.0	1.0	1.2 (0.5)	1.5 (0.3)
	-30	1.0	1.0	1.0	⊗	2.0	2.0
	-40	1.0	1.0	⊗	⊗	2.0	⊗
40 mm	-10	1.0	1.0	1.0	1.0	1.0	1.0
	-20	1.0	1.0	1.0	1.0	1.0	1.1 (0.8)
	-30	1.0	1.0	1.0	1.0	2.0	1.5 (0.3)
	-40	1.0	1.0	1.0	1.0	⊗	2.0
50 mm	-10	1.0	1.0	1.0	1.0	1.0	1.0
	-20	1.0	1.0	1.0	1.0	1.0	1.0
	-30	1.0	1.0	1.0	1.0	1.0	1.5 (0.3)
	-40	1.0	1.0	1.0	1.0	1.2 (0.5)	2.0

! For those pipe diameters where cable consumption values are not specified, it is recommended to use thicker insulation.

! ections length are valid for thermal insulation withf thermal conductivity not exceeding 0.05 W/(m•K).

FROSTSTOP

DISTRIBUTOR

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