Self-regulating heating cables with a non-heating service cable

ELSR-M-15-2-BO
ELSR-N-20-2-AO
ELSR-N-30-2-AO

GENERAL CONDITIONS

- The connector which connects the cold end and the heating circuit must not be installed in a bend. The radius of any bend in the cable must not be shorter than is set for the individual types. Bending should be applied to the flat side.
- If the heating cable or the supply cord is damaged, it must be replaced or repaired by the manufacturer, their service technician or a similarly-qualified person in order to avoid the occurrence of a hazardous situation. Do not install the cables using nails and screws! Connection of the cables must only be carried out by a qualified person.
- The heating cable must be fed through a Residual Current Device, with a nominal actuating current of $I \Delta n \leq 30mA$. We recommend that every heating unit/heating circuit should be equipped with an independent Residual Current Device.
- During operation, the cable must not be exposed to temperatures which are higher than is set for the individual types.
- The installation must enable the disconnection of the cables at both poles.
- Before the installation and after it, the measurement of insulating resistance between the heating conductor and the protective braiding must be carried out; the measured value must not be lower than 0.5 MΩ. Write down the measured values in the Certificate of Warranty.
- We will carry out a test of cable functionality at full line voltage after completion of the installation.
- Announce any discrepancies to the producer or supplier immediately and stop all work.
- Before the use of the heating cable, the label information must be checked to make sure that they are in accordance with the required product.
- The supplier must inform the other suppliers involved in the construction work about the placement of the heating unit and about the risks which arise from it.
- Any use of the cable other than what is described in these instructions needs to be consulted with the producer.
- The shielding of the heating cable must be connected with a protective conductor according to valid regulations.
- At low temperatures, if the cable is not flexible enough, it is possible to heat it. The temperature during the installation must not drop under -10°C or -30°C according to the type of cable.
- The surface where the heating cables will be installed must be clean and free of any sharp objects.
- The self-regulating heating cables won’t switch off completely, even during summer temperatures, and so we recommend their regulation with a thermostat.

FENIX

1. DESCRIPTION AND USE

Description:
The temperature of the self-regulating heating cable is regulated by a resistive material which is dependent on temperature and which is placed between two copper conductors. This self-regulation takes place along the whole length of the cable, in dependence on the surrounding temperature. When the surrounding temperature decreases, the heating performance of the cable increases and vice versa. This self-regulation prevents the heating cable from overheating also in the event of the cables touching each other.

Use:
ELSR – M- 10 – 2- BO and M-15-2-BO

- for the heating of pipes to prevent freezing

Technical parameters:
Supply voltage: 230 V
Max. operating temperature: 65°C
Min. installation temperature: -30°C
Min. radius of bend: 35 mm

A table of lengths and protection of self-regulating cables

Starting temperature (°C)	Circuit-breaker with characteristics C (A)	ELSR – M- 10 – 2- BO Max. length (m)	M-15-2-BO Max. length (m)
+5 °C	6	70	39
	10	100	60
	16	110	70
0 °C	6	65	37
	10	95	58
	16	105	65
-20 °C	6	44	25
	10	77	44
	16	90	50
-30 °C	6	38	23
	10	67	41
	16	90	47

ELSR – N-20-2-AO and N-30-2-AO

- for the technological heating of pipes to a set temperature
- for the defrosting of trays
- for the heating of outside areas (only for placing into concrete)

Technical parameters:

Supply voltage: 230 V
Max. operating temperature: 65°C
Max. temperature of covering layer: 80°C
Min. installation temperature: -10°C
Min. radius of bend: 20 mm

A table of lengths and protection of self-regulating cables

Starting temperature (°C)	Circuit-breaker with characteristics C (A)	ELSR – N- 20 – 2- AO Max. length (m)	ELSR – N- 30 – 2- AO Max. length (m)
+10 °C	6	47	29
	10	93	58
	16	120	84
	20	150	105
	25	187	131
0 °C	6	40	29
	10	80	58
	16	94	70
	20	116	87
	25	146	109
-10 °C	6	34	22
	10	68	44
	16	78	61
	20	96	76
	25	121	95
-20 °C	6	30	20
	10	60	40
	16	77	52
	20	83	64
	25	104	80

2. USE FOR THE DEFROSTING OF GUTTERS, STANDPIPES AND ROOFS WHERE THE SNOW CANNOT MELT AWAY FREELY

- ELSR – N- 20 – 2- AO and ELSR – N- 30 – 2- AO cables installed in gutters and standpipes provide protection against damage caused by freezing water at temperatures around 0°C. The heating cables will melt the ice and the water will be able to flow freely through the gutters and into the standpipes.
- Cables installed on the roof provide protection in the following cases:

a) when the snow cannot freely slide from the roof into gutters and it accumulates at anti-snow barriers or in hollows where the roofing is overburdened with accumulating wet snow.
b) when the snow cannot freely slide from the roof into gutters and the accumulating water under snow barriers rises through the roof covering and leaks into the building
c) when the snow which is sliding from the roof forms a cornice above the gutter and doesn't flow into the gutter spout.

These systems are always combined with the placement of the cable into the gutter spouts and standpipes.

2. a) Installation

- for smaller spouts and standpipes with diameters of up to 150 mm it is enough to lay the cables freely, without any further fixing. If more cables are used, we recommend placing the cables approximately 6 cm from one another; using copper C clamps to attach them.
- for the passage of the cable from the spout into the standpipe, it is necessary to fix the cable in such a way that it doesn't get damaged over the edge of the passage.

2. b) Regulation

As the self-regulating heating cable never switches off completely, not even during high summer temperatures, it is recommended that the cable be regulated with a thermostat, or switched off. For example, the regulator EBERLE EM 524 87 + the humidity probe ESD 524 003 + the temperature sensor TFD 524 004 or a differential regulator, EBERLE DTR-E 3102, OJ Elektronik ETR/F-1447 A, which is suitable for smaller applications and well-insulated roofs, can be used for this regulation. The recommended temperature setting is -5°C to + 3°C.

3. USE OF TEMPERATURE REGULATION TO PROTECT PIPES AGAINST FREEZING

- Heating cables placed on metal or plastic pipes provide protection against the freezing of liquids in the pipes when the surrounding temperature is lower then 0°C.

3. a) Dimensioning

The required performance of the cable per 1 m of length can be determined by a calculation using the following formula:
For the determination of the needed performance of the cable it is necessary to multiply the heat loss by the coefficient 1.3 and the length of the pipe.
EXAMPLE: a pipe with an inner radius of 25 mm, 13 m long, and insulated with 20 mm Mirelon needs to be protected against freezing according to the following calculation:

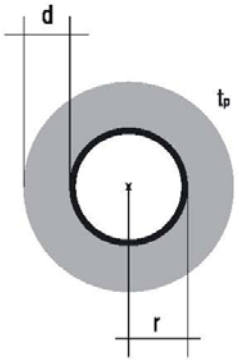
$$Q = \frac{2\pi * (r + r^2)}{d} * \lambda(t_m - t_p)$$

down to a lowest surrounding temperature of -20°C (we always consider the non-freezing temperature to be +5°C).

Interior diameter of pipe	
½″	15 mm
¾″	20 mm
1″	25 mm
1¼″	32 mm
1½″	40 mm
2″	50 mm
2½″	65 mm
3″	80 mm
4″	100 mm
6″	150 mm
8″	200 mm
10″	250 mm

Pk = Q*1.3*l

Pk – performance of the cable
l – length of the cable



Q – heat loss per 1 m of pipe (W/m)
l – coefficient of the heat conductivity of the insulation (W/m*K)
r – radius of the pipe (m)
d – thickness of the insulation (m)
tm – temperature of the medium (°C)
tp – temperature of the environment (°C)

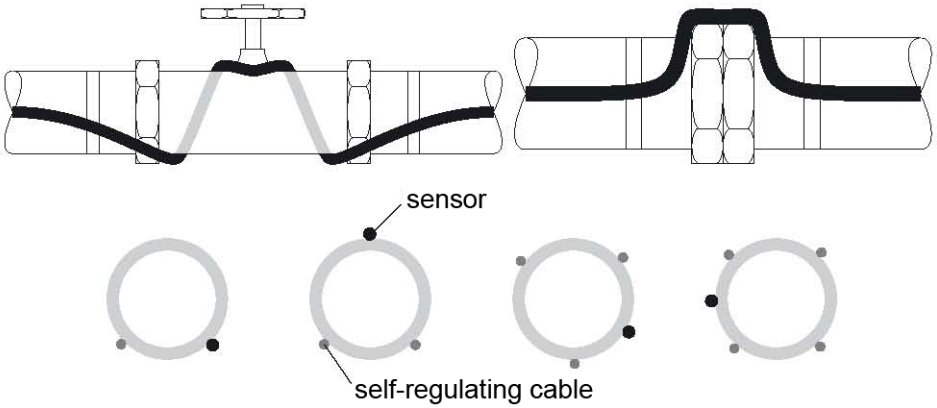
SOLUTION:
The total wattage of the heating cable must be 171 W or higher. We will use 13 m of self-insulating cable ELSR – M – M15-2-BO

$$Q = \frac{2\pi * (r + r^2)}{d} * \lambda(t_m - t_p) = \frac{2\pi * (0.025 + 0.025^2)}{0.02} * 0.05(5 - (-20)) = 10.1\ \text{W/m}$$

Pk – Q*1.3*l = 10.1*1.3*13=170.69 W

3. b) Installation

- The heating cable and the sensor must be attached to the pipe along the whole length with aluminium self-adhesive tape, which will ensure an even distribution of heat.
- In the case of the protection of plastic pipes, it is necessary to wind the self-adhesive aluminium tape along the pipe, and wind the aluminium tape around the whole length of the cable after laying as well.
- After the installation, it is necessary to wrap the whole pipe, including the heating cables, in insulation.
- During the installation, it is necessary to take into consideration that valves, connectors and flanges have higher heat loss. Therefore, it is necessary to wind the cable more densely in these parts.



3. c) Regulation

From the point of view of energy-saving operation, it is necessary to equip the installation with a thermostat with a distant probe placed on the pipe. From the current FENIX range, we recommend the KABLOREG A1-4, OJ ETV or EBERLE ITR3.

4. WARRANTY, COMPLAINTS

The supplier of the self-regulating cables provides a warranty of their functionality for a period of 24 months from the day of their installation confirmed on the certificate of warranty (the installation must be carried out within a maximum of 6 months after the date of purchase), if:

- the certificate of warranty and proof of purchase are available,
- the procedure described in these instructions is followed,
- information about the laying of the cable, its connection and the results of the measurements of the insulation resistance of the heating cable is available.

Any complaint shall be raised in writing with the company which carried out the installation, or directly with the manufacturer.
Providing that the above-mentioned conditions are fulfilled, and after the expiry of the warranty period, conditions set in the rules for complaints apply for the period of the next 8 years, point No. 5.
The rules governing complaints can also be found on http://www.fenixgroup.cz

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