



# frost protection



Constant wattage heating cables



Self-regulating heating cables



Temperature controllers

solutions  
for everyone



Heating systems protect pipes, valves, actuators and other elements vulnerable to harmful influence of low temperatures, against the coldest winter conditions. Financial losses incurred due to damaged pipes and valves may even exceed investment costs of entire heating systems.



**These heating systems are used for:**  
**preventing frozen**

- water fixtures,
- sewage systems,
- sprinkler systems,
- hydrants,
- air conditioning and ventilating pipe systems.

All metal (steel, copper, iron) and plastic pipes and tubes can be heated.



**For pipe and pipeline heating, the following can be applied:**

- **constant wattage heating cables**  
**ELEKTRA VCD10 and ELEKTRA FreezeTec®**,  
with constant heat output  
per 1 cable metre,
- **self-regulating heating cables**  
**ELEKTRA SelfTec®**,  
with heat output matching the outside  
temperature variations.



**Systems will fulfill their protective functions even in the coldest of winters**

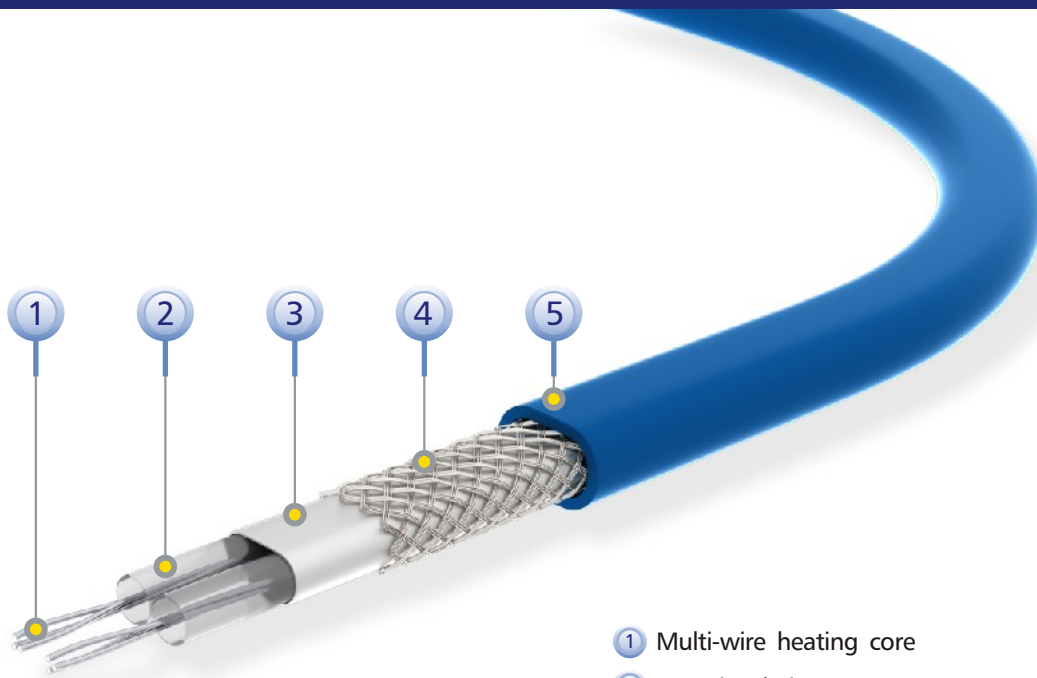
**1. ELEKTRA VCD10 heating cables** are ready-made sets consisting of a 10 W/m heat output cable, terminated with a 2.5 m-long power supply conductor. When designing your heating system, account for the cable lengths available in sets. ELEKTRA VCD10 cable heating systems require temperature controllers. They are meant to be used in heating systems with precise temperature control.

## Constant wattage cables

- Single-side supplied **ELEKTRA VCD10** heating cables, in ready-made sets
- **ELEKTRA FreezeTec®** heating cables with built-in temperature controllers, in ready-made sets



**ELEKTRA VCD heating cable**



**ELEKTRA VCD** heating cable structure

- ① Multi-wire heating core
- ② XLPE insulation
- ③ PET covered aluminum foil shield
- ④ Tinned copper braiding
- ⑤ Heat resistant PVC outer sheath

## 2. ELEKTRA FreezeTec® heating cables

are ready-made sets of specified lengths, consisting of a 12 W/m heat output cable, terminated with a 1.5 m-long power supply conductor with a sealed plug at one side, and a thermostat at the other side. The thermostat will automatically commence the system's operation at +3°C and terminate at +10°C.

**No additional controls are required for the operation of ELEKTRA FreezeTec® heating cables.**

These cables are especially designed for the simple heating systems – with actuators or pipes of max. 50 mm diameter.

The installation can be performed on the DIY basis, an installer's assistance is not required.



**ELEKTRA FreezeTec®** heating cable



## Self-regulating cables

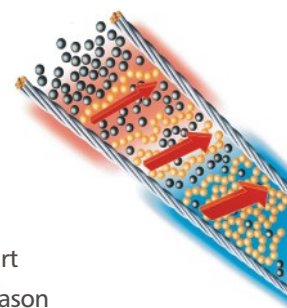
- **ELEKTRA SelfTec®PRO self-regulating heating cables** are available on spools, with lengths to match those of pipelines, directly on building sites. These cables require termination and power supply connection.
- **ELEKTRA SelfTec® self-regulating heating cables** are ready-made sets of specified lengths, terminated with a 1.5 m-long power supply conductor with a sealed plug. They are also alternatively available on spools.
- **ELEKTRA SelfTec®DW self-regulating heating cables** are available on spools and are designed for the in-pipeline operation.

Self-regulating cables are made up from two copper wires positioned in parallel, interconnected with a core composed of cross-linked polymer with addition of graphite.

The core constitutes a self-regulating heating element whose resistance will alter depending on temperature.

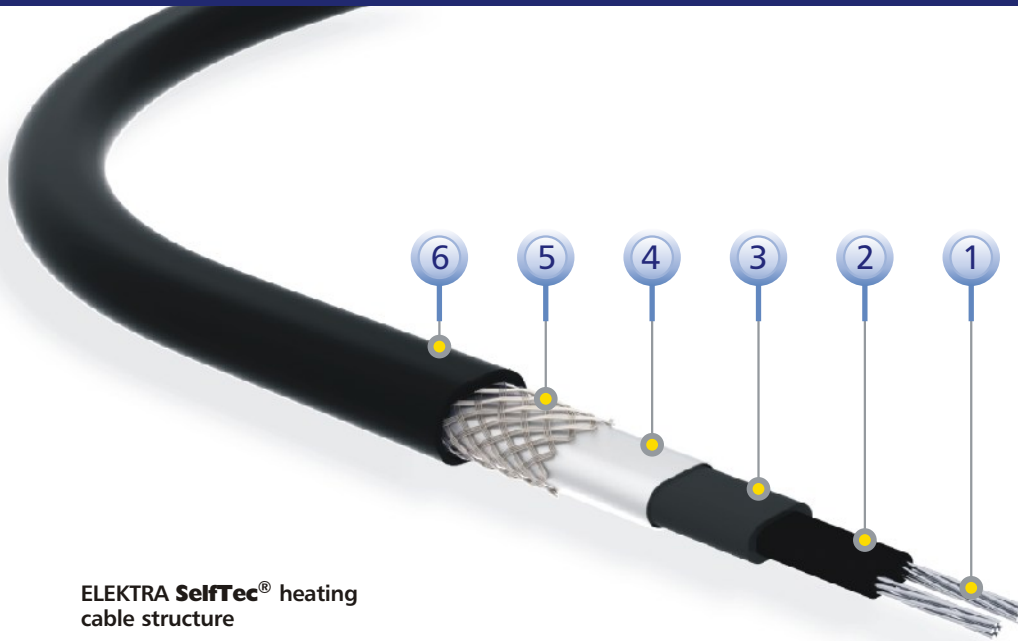
Thanks to this property, the cables will increase their heat output with the decrease of the heated item's temperature, and – respectively – decrease it with the temperature increase.

Heat output variations will occur only in those places where the temperature change is noticeable and will not influence the heat output of the remaining part of the cable – that is the reason why the cables are not in danger of overheating and they can even touch or cross freely.



### Advantages of self-regulating cables

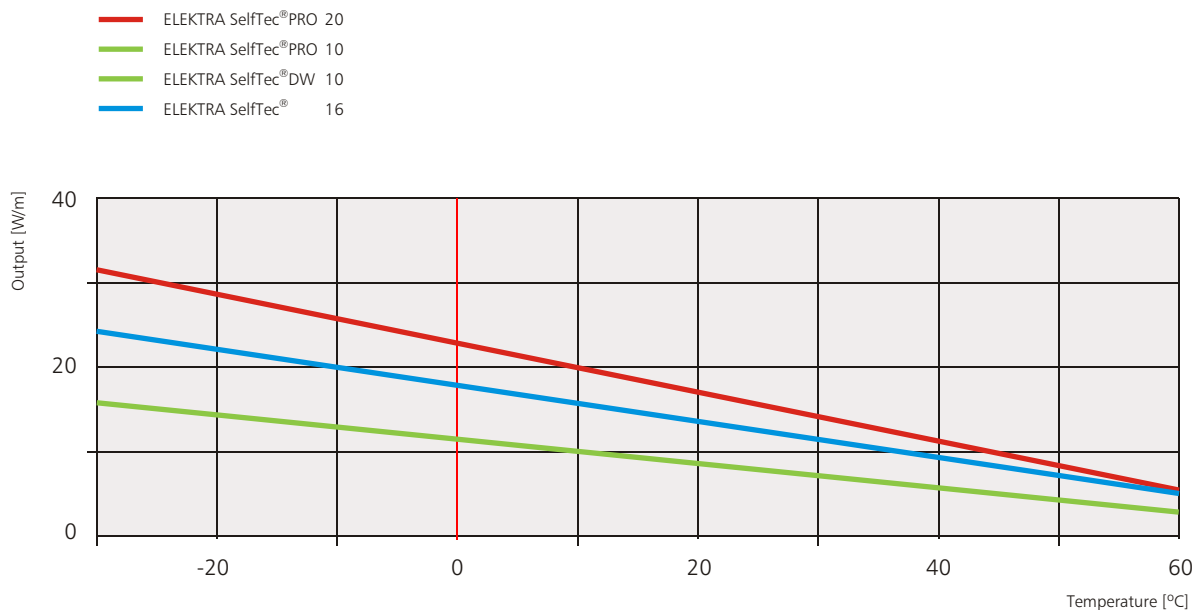
- Trimming directly on a building site possible, to match the required length (max. cable lengths shown in the table). This option facilitates matching the heating cable's length to that of the heated element on the design-, as well as installation stage.
- Cable crossing possible, which enables easy positioning on valves and flanges.
- Ambient temperature drop will automatically increase the cable's heat output.



**ELEKTRA SelfTec®** heating cable structure

Only ELEKTRA SelfTec® cables can freely cross and touch

- ① Tin-coated multi-wire copper conductor
- ② Self-regulating conductive core
- ③ Modified polyolefin insulation
- ④ PET covered aluminum foil shield
- ⑤ Tinned copper braiding
- ⑥ UV resistant halogen free polyolefin outer sheath



Heating power of the ELEKTRA SelfTec® self-regulating cables in the function of temperature



**ELEKTRA SelfTec®  
heating set**



**ELEKTRA SelfTec®PRO  
heating cable**

| Type/power output<br>(+10°C)                                 | SelfTec®DW<br>10 W/m                                  | SelfTec®<br>16 W/m<br>(set)           | SelfTec®PRO<br>10 W/m | SelfTec®PRO<br>20 W/m |
|--------------------------------------------------------------|-------------------------------------------------------|---------------------------------------|-----------------------|-----------------------|
| Power supply                                                 | 230 V ~ 50/60 Hz                                      |                                       |                       |                       |
| External dimension of cable                                  | ~ 6 x 8mm                                             |                                       | ~ 6 x 11mm            |                       |
| Min. installation temperature                                | -25°C                                                 |                                       |                       |                       |
| Max. working temperature                                     | 65°C                                                  |                                       |                       |                       |
| Max. exposure temperature<br>(power-on, 1000 h – cumulative) | 65°C                                                  |                                       | 85°C                  |                       |
| Type of heating cable                                        | self-regulating, conductor screen, single-side supply |                                       |                       |                       |
| Conductor, tin-coated copper                                 | 0.6mm²                                                |                                       | 1mm²                  | 1mm²                  |
| Insulation                                                   | modified polyolefin                                   |                                       |                       |                       |
| Outer sheath                                                 | LDPE certified for<br>drinking water<br>applications  | UV-resistant, halogen free polyolefin |                       |                       |
| Min. bending radius                                          | 3.5 D                                                 |                                       |                       |                       |
| Protection                                                   | IPX7                                                  |                                       |                       |                       |
| Max. cable length per circuit<br>(+10°C, protection, C-type) | 60m (10A)                                             | 72m (10A)                             | 150m (16A)            | 110m (16A)            |

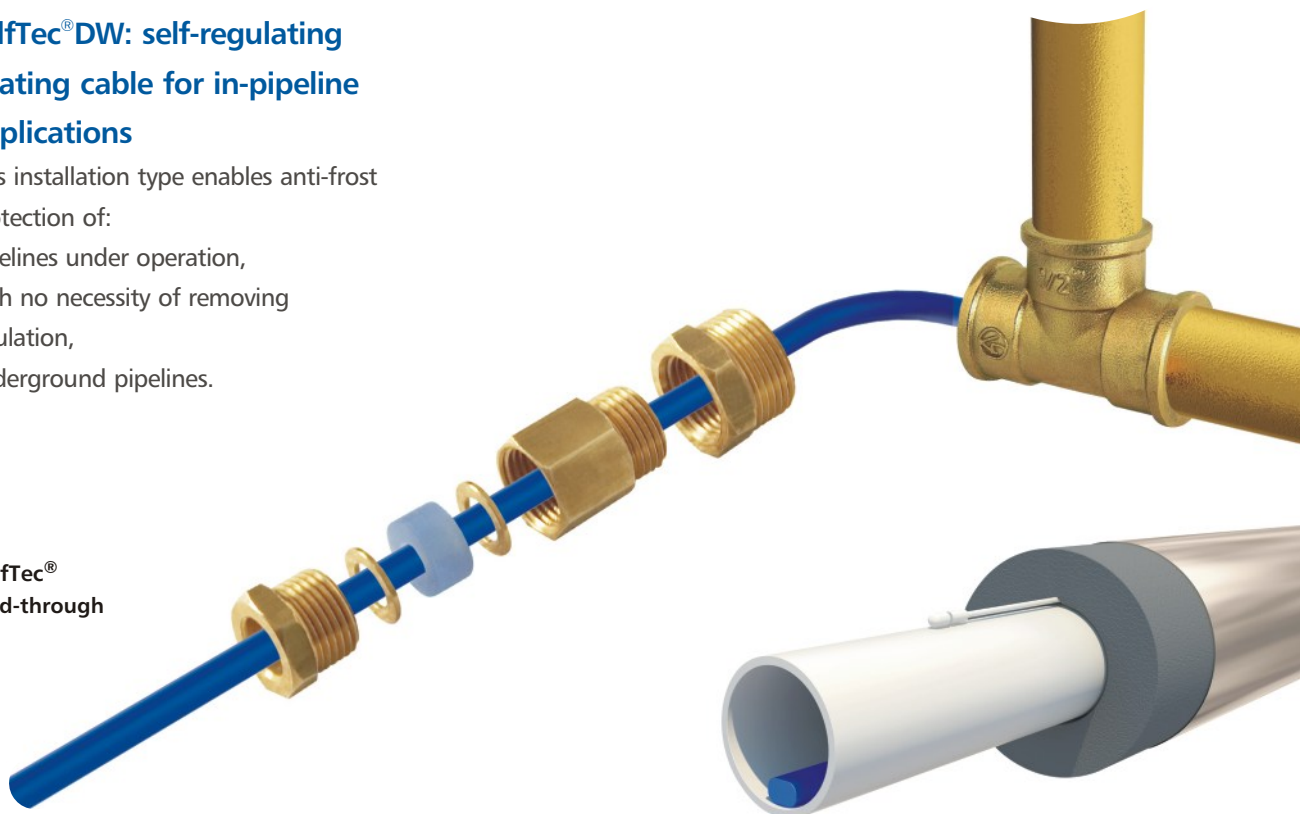


## SelfTec® DW: self-regulating heating cable for in-pipeline applications

This installation type enables anti-frost protection of:

- pipelines under operation, with no necessity of removing insulation,
- underground pipelines.

SelfTec®  
lead-through



**ELEKTRA SelfTec® DW**  
heating cable

### Features

The 10 W/m cable output (at +10°C) was especially selected to account for the water heat capacity.

ELEKTRA SelfTec® DW heating cables feature LDPE polyethylene sheath certified for food contact applications, allowing for the in-drinking water pipelines applications.

The cables feature IPX7 protection rating, which will guarantee anti-shock protection when connected to the power circuit protected with a RCD.

# Heating cable's selection

Proper selection of the heating cable adequate for the pipe heating purposes, requires estimation of the pipeline's heat losses. If detailed calculation won't be made, the table below can be used for general estimation.

**Heat losses in the function of pipeline's diameters and thermal insulation's thickness**

| Insulation thickness<br>$\lambda = 0.035\text{W/mK}$ | [mm] | $\Delta T$<br>[°C] | Pipeline's diameter |     |      |      |       |       |      |  |
|------------------------------------------------------|------|--------------------|---------------------|-----|------|------|-------|-------|------|--|
|                                                      |      |                    | 1/4                 | 1/2 | 3/4  | 1    | 1 1/4 | 1 1/2 | 2    |  |
|                                                      |      |                    | 8                   | 15  | 20   | 25   | 32    | 40    | 50   |  |
| 10                                                   |      | 30                 | 5.8                 | 8.6 | 10.5 | 12.3 | 14.9  | 17.9  | 21.6 |  |
| 13                                                   |      |                    | 5.0                 | 7.2 | 8.7  | 10.2 | 12.2  | 14.5  | 17.3 |  |
| 16                                                   |      |                    | 4.5                 | 6.4 | 7.6  | 8.8  | 10.5  | 12.3  | 14.7 |  |
| 19                                                   |      |                    | 4.1                 | 5.7 | 6.8  | 7.9  | 9.3   | 10.9  | 12.8 |  |
| 20                                                   |      |                    | 4.1                 | 5.6 | 6.6  | 7.6  | 8.9   | 10.5  | 12.3 |  |
| 25                                                   |      |                    | 3.7                 | 4.9 | 5.8  | 6.6  | 7.7   | 8.9   | 10.5 |  |
| 30                                                   |      |                    | 3.4                 | 4.5 | 5.2  | 5.9  | 6.9   | 7.9   | 9.2  |  |
| 32                                                   |      |                    | 3.3                 | 4.4 | 5.1  | 5.7  | 6.6   | 7.6   | 8.8  |  |
| 40                                                   |      |                    | 3.0                 | 3.9 | 4.5  | 5.1  | 5.8   | 6.6   | 7.6  |  |

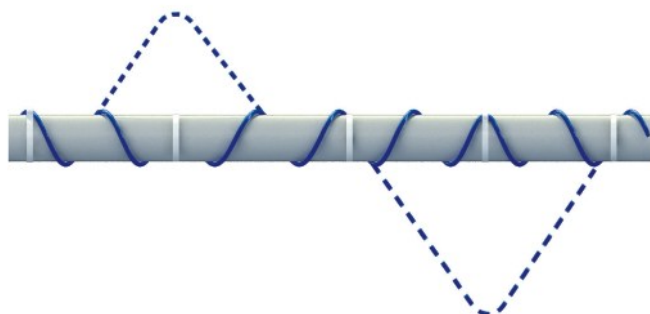
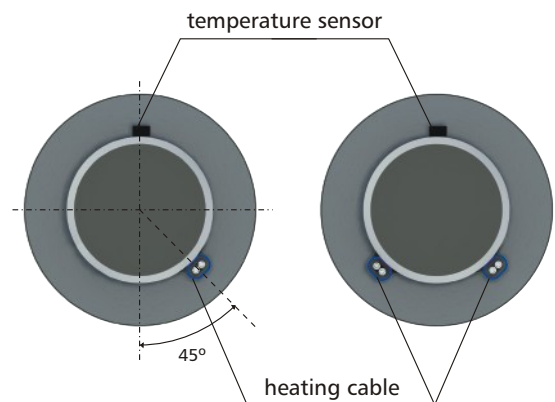
The table data has been estimated under the following assumptions:

- polyurethane foam insulation of the given thickness (from 10 to 40 mm),
- $\Delta T - 30^\circ\text{C}$ : temperature difference between the in-pipeline set temperature and minimum external temperature.

After heat losses will have been determined, the heating cable's selection can commence. The heating cable should provide the system with the heat output at least equal or higher to estimated heat losses. When selecting the heating cable's length, it is necessary to account for the cable positioning options.

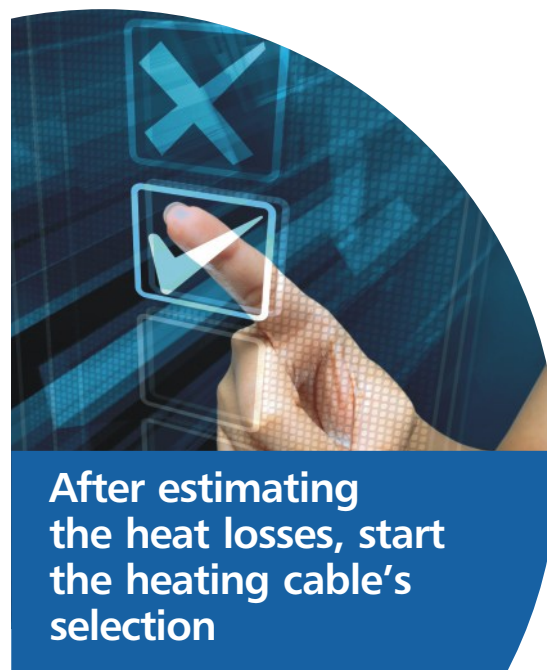
Heating cables can be positioned along pipelines:

- in a single run,
- in a double (or multiple) run,
- spirally.



## Heating cable's selection method

- for simple systems with max. diameter of 50 mm:
  - ELEKTRA FreezeTec® ready-made sets,
  - ELEKTRA SelfTec® ready-made sets,
  - ELEKTRA VCD10 ready-made sets,
- for extended pipelines:
  - ELEKTRA VCD10 ready-made sets,
  - ELEKTRA SelfTec®PRO self-regulating heating cables,
- for extended pipelines with branches, valves and flanges:
  - ELEKTRA SelfTec®PRO self-regulating heating cables.



ELEKTRA SelfTec®PRO self-regulating heating cables are available on spools. When the required length will have been matched, these cables require termination and power supply connection. Connections will need the cable length margin of total 0.5 m.

Power for self-regulating cables can be supplied in either of the two following ways:

- with a power supply conductor ("cold tail")
  - connecting joint must be positioned on the heated pipeline, under insulation.
 For self-regulating cable's termination and "cold tail" power supply connection, ELEKTRA EC-PRO joint set will be required,
- by direct connection to the power supply domestic circuit, via ELEKTRA KF 5045-PRO junction box, with ELEKTRA ECM 25-PRO joint set.



**ELEKTRA EC-PRO joint set**



**ELEKTRA ECM 25-PRO joint set**



**Halogen-free thermoplast junction box, protection rating IP 66**

## Heating system's control

Pipeline heating with constant wattage ELEKTRA VCD10 cables and self-regulating ELEKTRA SelfTec®PRO and SelfTec®DW cables require installation of temperature controllers supporting temperature sensors.

Recommended ELEKTRA temperature controllers for DIN bus installation: ETV-1991, ETN-1441, ETI-1544, ETI-1522, as well as UTR 60-PRO for the wall surface installation.

ELEKTRA FreezeTec® heating cables with built-in thermostat do not require additional controls.

ELEKTRA SelfTec® self-regulating cable sets do not require installation of thermostats, but manual system switch off when ambient temperatures exceed 0°C.

| Type                           | ETV-1991      | ETN-1441        | ETI 1544        | ETI 1522        | UTR 60-PRO             |
|--------------------------------|---------------|-----------------|-----------------|-----------------|------------------------|
| Temperature control range [°C] | from 0 to +40 | from 0 to 35    | from 0 to +50   | from 0 to +50   | from 0 to +60          |
| Operation temperature [°C]     | from 0 to +50 | from -20 to +50 | from -20 to +50 | from -20 to +50 | from -20 to +50        |
| Max. load [W]                  | 3600          | 3600            | 2300            | 2300            | 3600                   |
| IP protection rating           | 20            | 20              | 20              | 20              | 65                     |
| Installation                   | DIN bus       | DIN bus         | DIN bus         | DIN bus         | wall surface, on-board |
| Temperature sensor             | ETF-144/99    | ETF-144/99      | ETF-144/99      | ETF-622         | F 892 002              |

## ELEKTRA ETV

DIN bus installation. Temperature controller with temperature sensor. Compact dimensions (2 modules). LED on for system operation.



ELEKTRA ETV-1991  
temperature  
controller

## ELEKTRA ETN

DIN bus installation. Temperature controller with temperature sensor. Adjustable hysteresis allowing to assess in detail temperature measurement precision. LED on for system operation. On/off switch.



ELEKTRA ETN-1441  
temperature  
controller

## ELEKTRA ETI

DIN bus installation. Temperature controller with temperature sensor. Adjustable hysteresis allowing to assess in detail temperature measurement precision. Compact dimensions (2 modules). LED on for system operation. In special cases (greasy pipes or temporary in-pipe temperature exceeding +70°C e.g. while flushing or washing), ELEKTRA ETI-1522 temperature controller is recommended, which features especially designed sensor with safe operation temperature range from -40°C to +120°C.



ELEKTRA ETI-1544  
temperature  
controller

## UTR 60-PRO

Switchboard mounting. Temperature controller especially designed for ELEKTRA SelfTec®PRO self-regulating cable pipe heating systems. Features temperature sensor for on-pipe installation, with safe operation temperature range for -40°C to +120°C. Adjustable hysteresis allowing to assess in detail temperature measurement precision. LEDs on for system operation.



ELEKTRA ETI-1522  
temperature  
controller  
(temperature  
sensor  
with installation  
opening)

ELEKTRA UTR 60-  
1544 temperature  
controller

**ELEKTRA®**

## ELEKTRA VCD

single side powered heating cables 10 W/m

| Type        | Length<br>[m] | Power output<br>[W] |
|-------------|---------------|---------------------|
| VCD 10/70   | 7             | 70                  |
| VCD 10/90   | 9             | 90                  |
| VCD 10/110  | 11            | 110                 |
| VCD 10/130  | 13            | 130                 |
| VCD 10/170  | 17            | 170                 |
| VCD 10/200  | 20            | 200                 |
| VCD 10/230  | 23            | 230                 |
| VCD 10/260  | 26            | 260                 |
| VCD 10/310  | 31            | 310                 |
| VCD 10/360  | 36            | 360                 |
| VCD 10/410  | 41            | 410                 |
| VCD 10/460  | 46            | 460                 |
| VCD 10/550  | 55            | 550                 |
| VCD 10/710  | 71            | 710                 |
| VCD 10/900  | 90            | 900                 |
| VCD 10/1100 | 110           | 1100                |
| VCD 10/1220 | 122           | 1220                |
| VCD 10/1470 | 147           | 1470                |
| VCD 10/1560 | 156           | 1560                |
| VCD 10/1730 | 173           | 1730                |
| VCD 10/1900 | 190           | 1900                |
| VCD 10/2070 | 207           | 2070                |
| VCD 10/2250 | 225           | 2250                |



# ELEKTRA®

## ELEKTRA FreezeTec®

single side powered heating cables

| Type             | Length [m] | Power output [W] |
|------------------|------------|------------------|
| FreezeTec® 12/2  | 2          | 24               |
| FreezeTec® 12/3  | 3          | 36               |
| FreezeTec® 12/5  | 5          | 60               |
| FreezeTec® 12/7  | 7          | 84               |
| FreezeTec® 12/10 | 10         | 120              |
| FreezeTec® 12/15 | 15         | 180              |
| FreezeTec® 12/21 | 21         | 252              |
| FreezeTec® 12/30 | 30         | 360              |
| FreezeTec® 12/42 | 42         | 504              |

## ELEKTRA SelfTec®

self-regulating heating cables



| Type           | Length [m] | Power output [W]    |
|----------------|------------|---------------------|
| SelfTec® 16/1  | 1          | 16                  |
| SelfTec® 16/2  | 2          | 32                  |
| SelfTec® 16/3  | 3          | 48                  |
| SelfTec® 16/5  | 5          | 80                  |
| SelfTec® 16/7  | 7          | 112                 |
| SelfTec® 16/10 | 10         | 160                 |
| SelfTec® 16/15 | 15         | 240                 |
| SelfTec® 16/20 | 20         | 320                 |
| SelfTec® 16/X  | up to 72 m | at individual order |

| Type | Info |
|------|------|
|------|------|

|                |                                                                                       |
|----------------|---------------------------------------------------------------------------------------|
| SelfTec®PRO 10 | self-regulating heating cable for advanced applications, 10 W/m (+10°C)               |
| SelfTec®PRO 20 | self-regulating heating cable for advanced applications, 20 W/m (+10°C)               |
| SelfTec®DW     | self-regulating heating cable for <b>drinking water applications</b> , 10 W/m (+10°C) |

# Product selection guide

selection guide

|                                          |                                                               |                                                       |               |                   |                    | Heating Cables               |                 |             |                      |                       |                 |
|------------------------------------------|---------------------------------------------------------------|-------------------------------------------------------|---------------|-------------------|--------------------|------------------------------|-----------------|-------------|----------------------|-----------------------|-----------------|
|                                          |                                                               |                                                       |               |                   |                    | Constant wattage             | Self-regulating |             |                      |                       |                 |
|                                          |                                                               |                                                       |               |                   |                    | Basic applications           |                 |             |                      | Advanced applications |                 |
| Application                              | Systems                                                       | Cable output (Q)                                      | Pipe material | Cable positioning | Pipe diameter [mm] | VCD10                        | FreezeTec®      | SelfTec® DW | SelfTec® 16 (zestaw) | SelfTec® PRO 10       | SelfTec® PRO 20 |
| Protection of pipelines against freezing | Hydrant, sprinkling, cold water, rain drain, sanitary, sewage | According to the formula result, or the table reading | Steel         | Outside the pipe  | ≤50                | +                            | +               | -           | +                    | +                     | +               |
|                                          |                                                               |                                                       |               | Inside the pipe   | ≤50                | -                            | -               | +           | -                    | -                     | -               |
|                                          |                                                               |                                                       | Plastic       | Outside the pipe  | ≤50                | +                            | +               | -           | +                    | +                     | -               |
|                                          |                                                               |                                                       |               | Inside the pipe   | ≤50                | -                            | -               | +           | -                    | -                     | -               |
|                                          |                                                               |                                                       |               |                   |                    | ETI-1544, ETN-1441, ETV-1991 |                 |             |                      | ETI-1522 UTR 60-PRO   |                 |
|                                          |                                                               |                                                       |               |                   |                    | Control                      |                 |             |                      |                       |                 |

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