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ELEKTRA®

frost protection

solutions for everyone

- Constant wattage heating cables
- Self-regulating heating cables
- Temperature controllers

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.

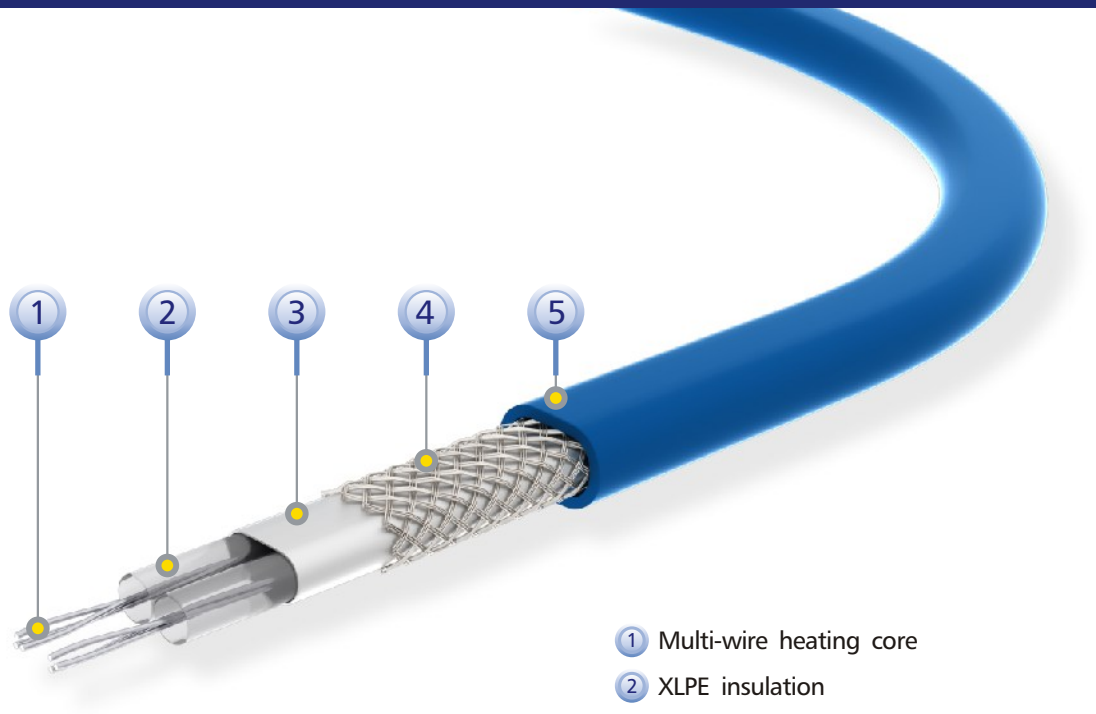
Systems will fulfill their protective functions even in the coldest of winters

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



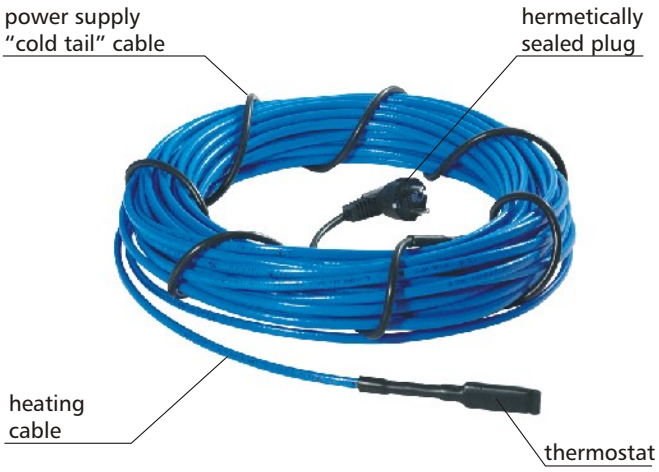
ELEKTRA **VCD** heating cable structure

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

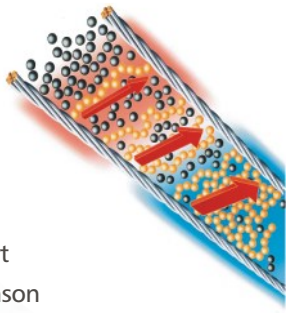
ELEKTRA FreezeTec® heating cable



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.

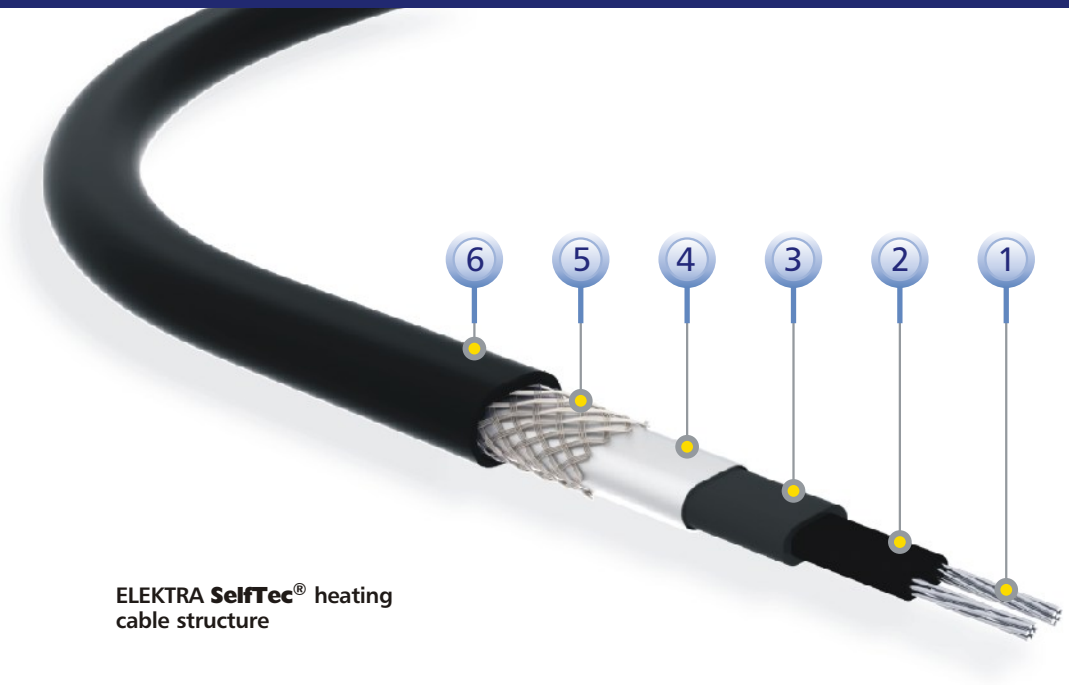
Self-regulating cables are made up from two copper wires positioned in parallel, interconnected with a core composed of cross-linked polymer with addition of graphite.
The core constitutes a self-regulating heating element whose resistance will alter depending on temperature.
Thanks to this property, 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

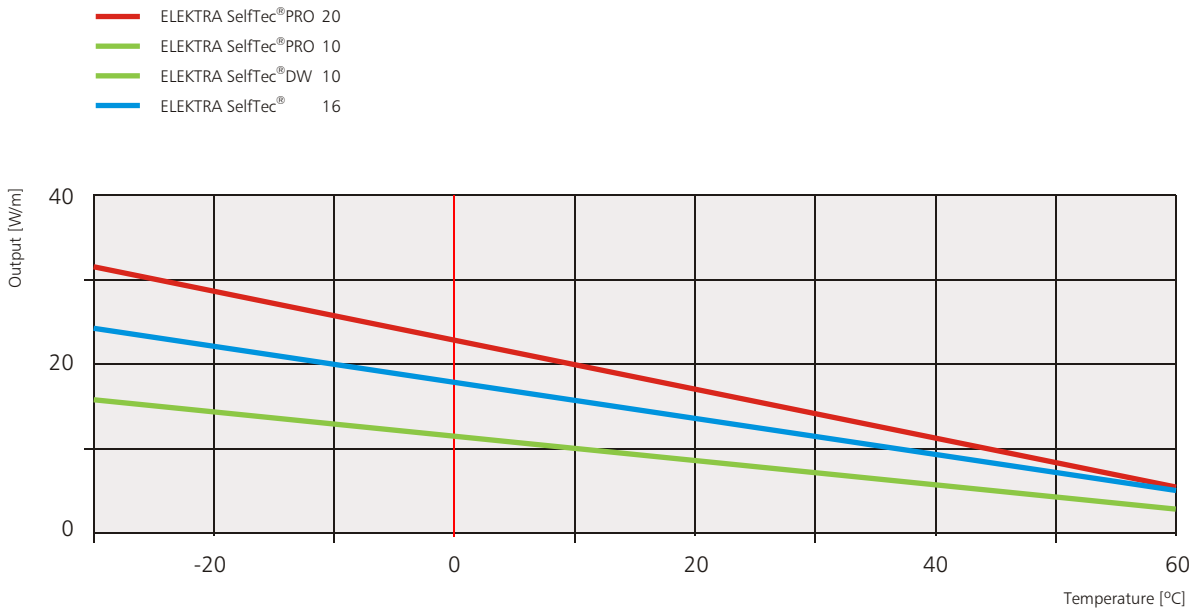
- Trimming directly on a building site possible, to match the required length (max. cable lengths shown in the table). This option facilitates matching the heating cable's length to that of the heated element on the design-, as well as installation stage.
- Cable crossing possible, which enables easy 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

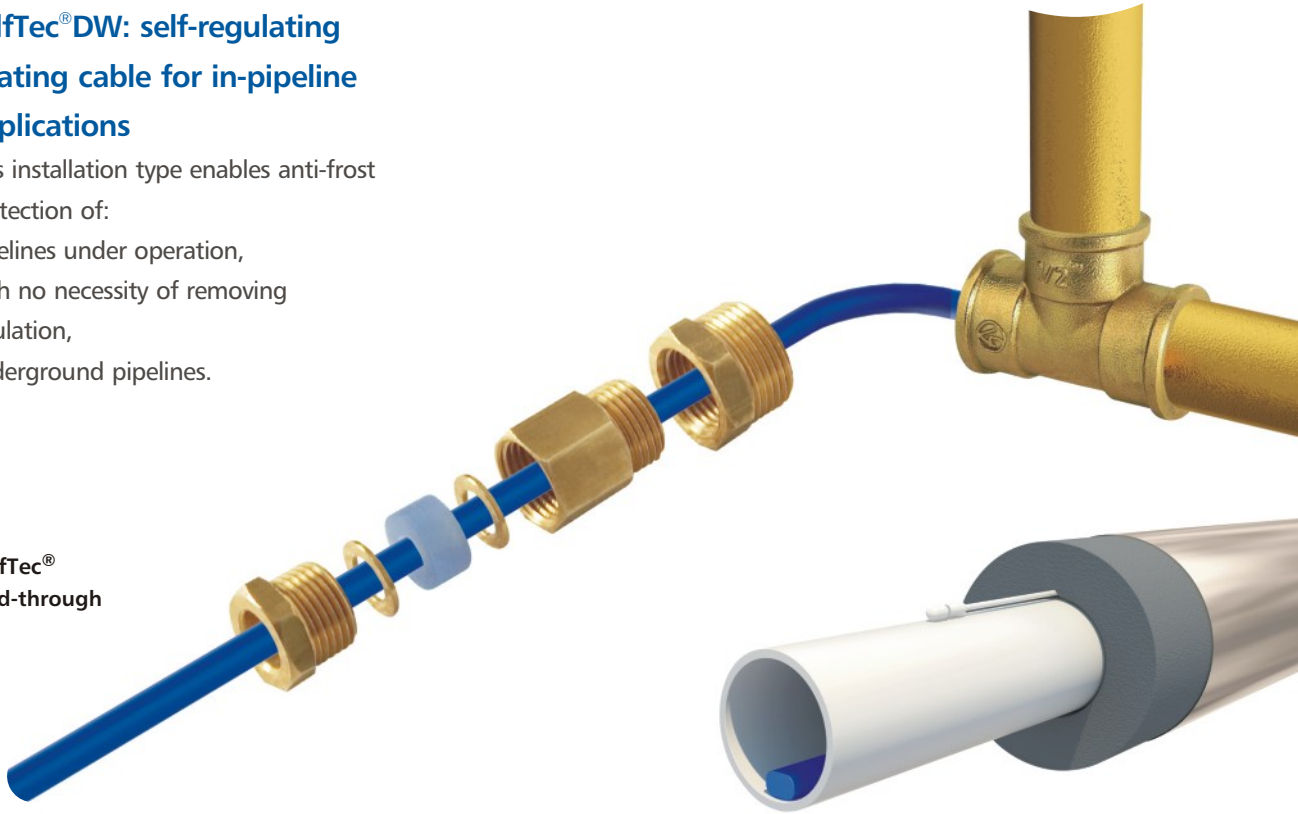
ELEKTRA SelfTec®PRO heating cable

Type/power output (+10°C)	SelfTec®DW 10 W/m	SelfTec® 16 W/m (set)	SelfTec®PRO 10 W/m	SelfTec®PRO 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 (power-on, 1000 h – cumulative)	65°C		85°C	
Type of heating cable	self-regulating, conductor screen, single-side supply			
Conductor, tin-coated copper	0.6mm^2		1mm^2	1mm^2
Insulation	modified polyolefin			
Outer sheath	LDPE certified for drinking water applications	UV-resistant, halogen free polyolefin		
Min. bending radius	3.5 D			
Protection	IPX7			
Max. cable length per circuit (+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 λ = 0.035W/mK	ΔT	Pipeline's diameter						
["]	[°C]	¼	½	¾	1	1¼	1½	2
[mm]		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

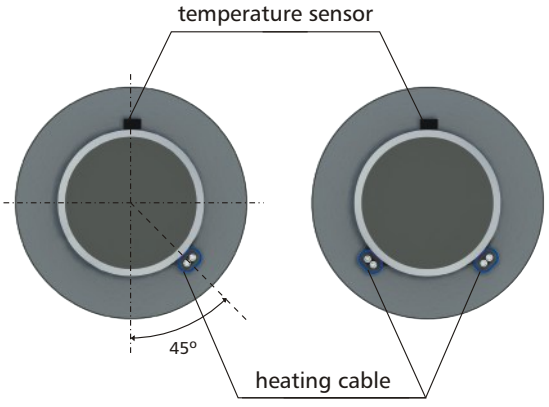
The table data has been estimated under the following assumptions:

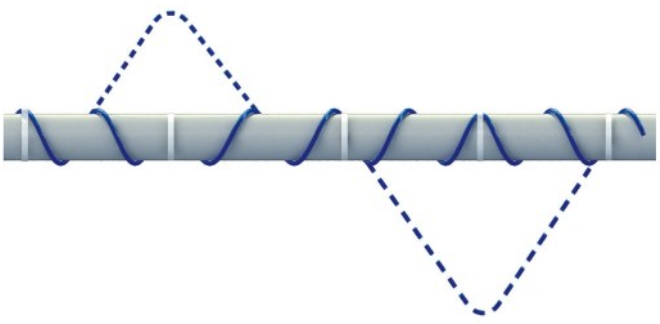
- polyurethane foam insulation of the given thickness (from 10 to 40 mm),
- ΔT - 30°C: temperature difference between the in-pipeline set temperature and minimum external temperature.

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:

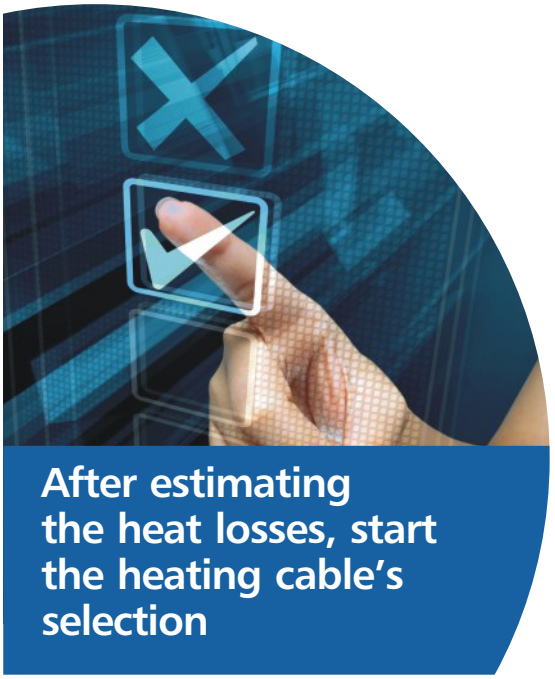
- in a single run,
- in a double (or multiple) run,
- spirally.





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.



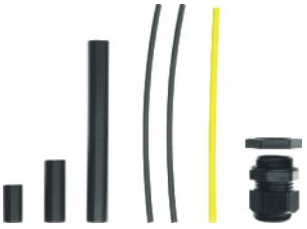
After estimating the heat losses, start the heating cable's selection

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

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

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 UTR 60-1544 temperature controller

ELEKTRA VCD

single side powered heating cables 10 W/m

Type	Length [m]	Power output [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 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 **drinking water applications**, 10 W/m (+10°C)

ELEKTRA®

Product 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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