www.elektra.eu

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 metre,
- **self-regulating heating cables ELEKTRA SelfTec®**, with heat output matching the outside temperature variations.

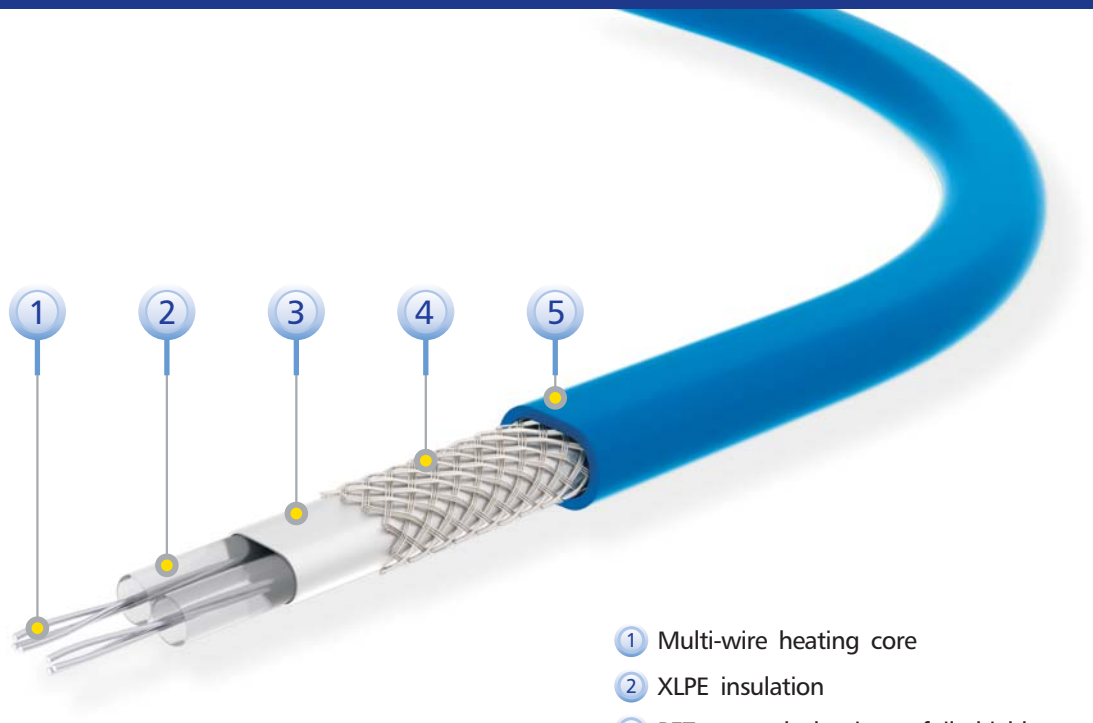
Systems will fulfill their protective functions even in the coldest of winters

1. ELEKTRA VCD10 heating cables
are ready-made units 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 available cable lengths.
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 units
- **ELEKTRA FreezeTec®** heating cables with built-in temperature controllers, in ready-made units

ELEKTRA VCD heating cable

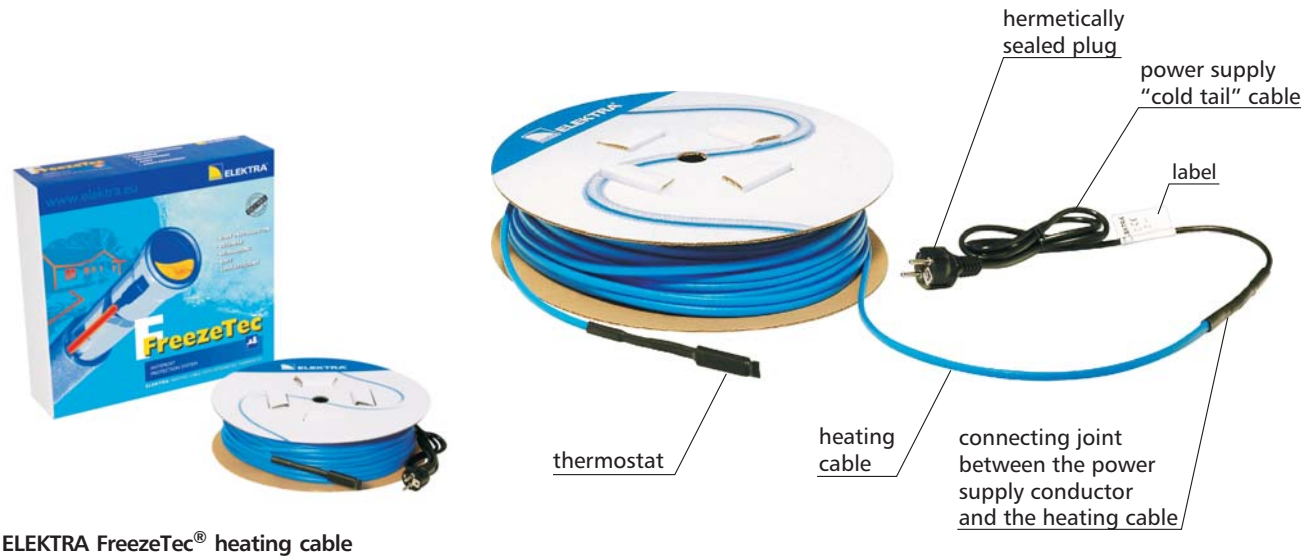


1. Multi-wire heating core
2. XLPE insulation
3. PET covered aluminum foil shield
4. Tinned copper braiding
5. Heat resistant PVC outher sheath

ELEKTRA VCD heating cable structure

2. ELEKTRA FreezeTec® heating cables
are ready-made units 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 end, and a thermostat at the other end.
The thermostat will automatically turn on the system's operation at +3°C and off 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 a DIY basis, an installer's assistance is not required.

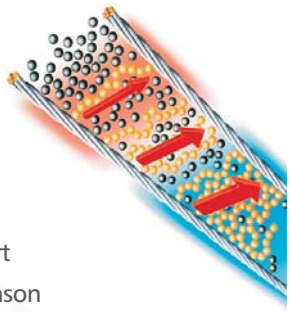


ELEKTRA FreezeTec® heating cable

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 units 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 applications both outside as well as inside water pipelines.

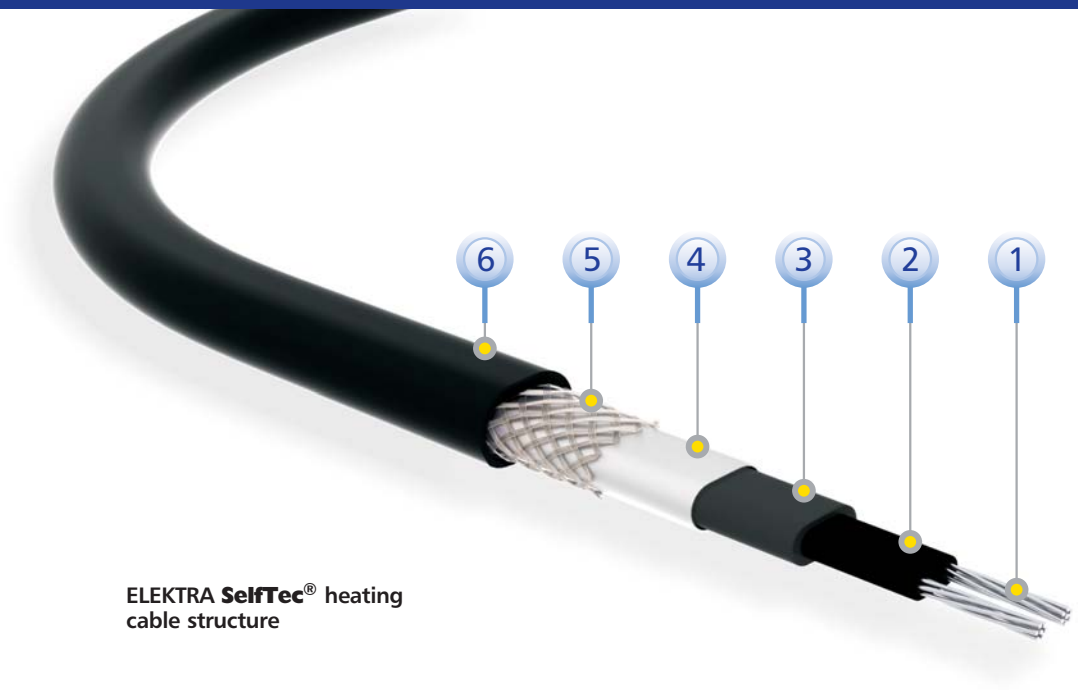
Self-regulating cables are made up from two copper wires positioned in parallel, interconnected with a core composed of cross-linked polymer with addition of graphite.
The core constitutes a self-regulating heating element whose resistance will alter depending on temperature.
Thanks to this property,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

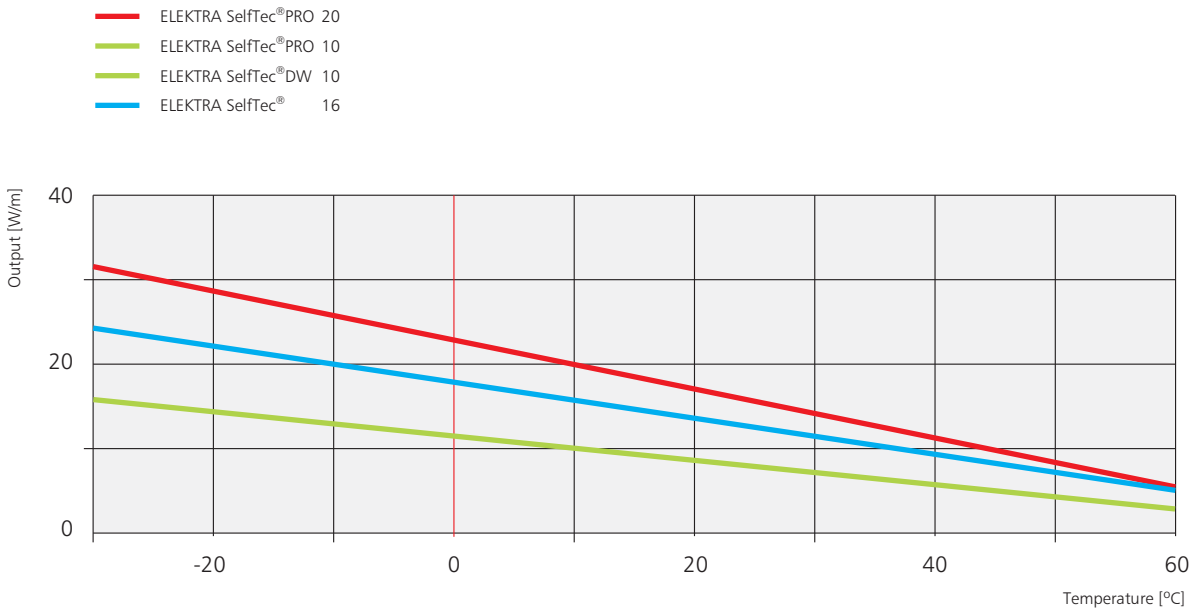
- Trimming directly on a building site possible, to match the required length (max. cable lengths shown in the table). This option facilitates matching the heating cable's length to that of the heated element on the design-, as well as installation stage.
- Cable crossing possible, which enables easy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

ELEKTRA SelfTec®PRO heating cable

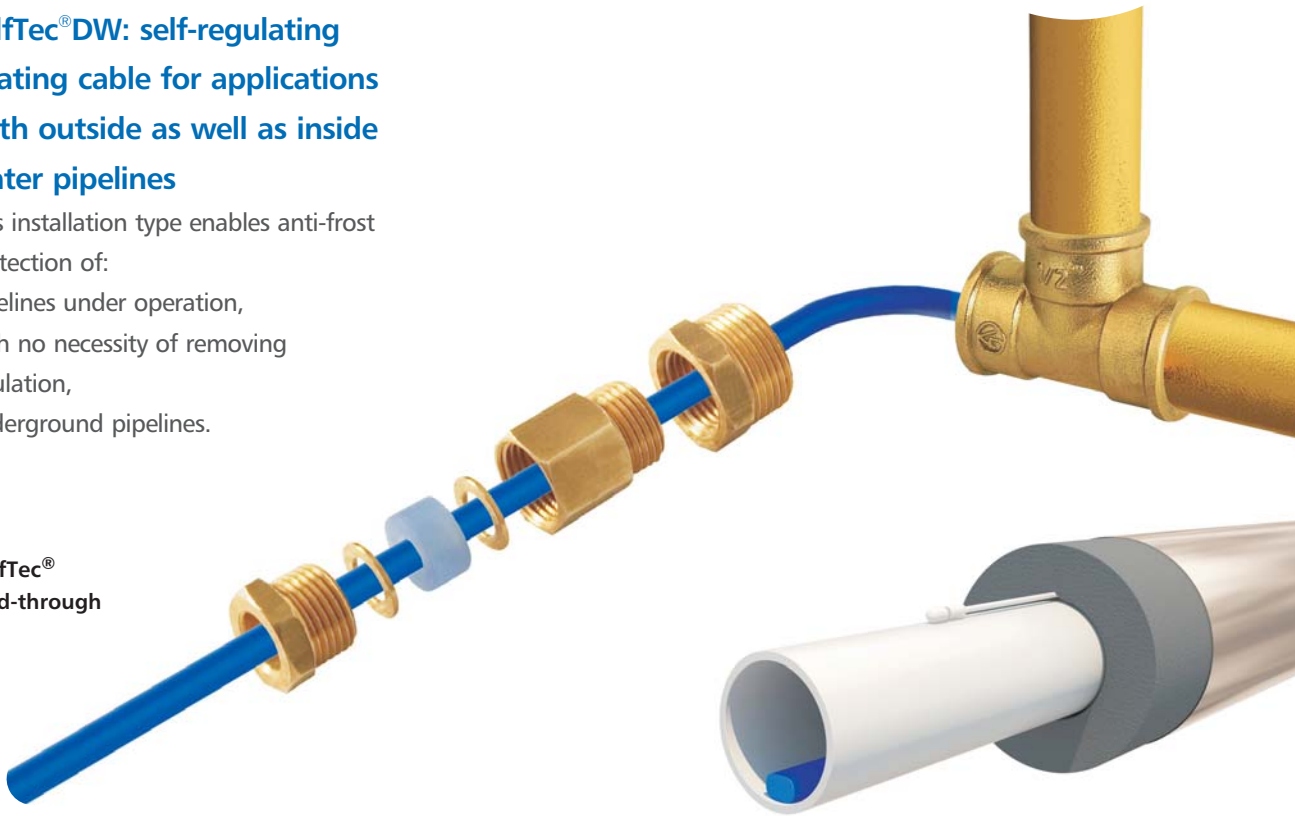
Type/power output (+10°C)	SelfTec®DW 10 W/m	SelfTec® 16 W/m	SelfTec®PRO 10 W/m	SelfTec®PRO 20 W/m
Power supply	230 V ~ 50/60 Hz			
External dimension of cable	~ 7 x 9mm	~ 6 x 9mm	~ 7 x 11mm	
Min. installation temperature	-25°C			
Max. working temperature	65°C			
Max. exposure temperature (power-on, 1000 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	double-layer, halogen free polyolefin + external LDPE, certified for drinking water applications	UV-resistant, halogen free polyolefin		
Min. bending radius	3,5 D			
Max. cable length per circuit	details in the table below			

Turn-on temperature	SelfTec®DW	SelfTec® 16	SelfTec®PRO 10		SelfTec®PRO 20	
	Circuit-breaker, C-type					
	10A	10A	10A	16A	10A	16A
	Max. cable length per circuit [m]					
-20°C	–	52	79	118	42	58
-15°C	–	55	90	136	49	71
0°C	95	66	100	145	55	85
+10°C	100 (60 in water)	72	118	154	79	110
0°C in ice water	55	36	–	–	42	45

SelfTec®DW: self-regulating heating cable for applications both outside as well as inside water pipelines

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 have double layer outer sheath - the first layer made of halogen-free polyolefin, and the additional one made of LDPE certified for food contact applications, allowing applications inside drinking water pipelines.

The power circuit protected with an RCD will guarantee anti-shock protection.

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

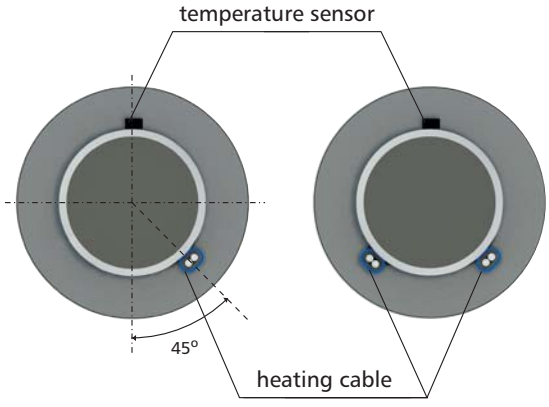
The table data has been estimated under the following assumptions:

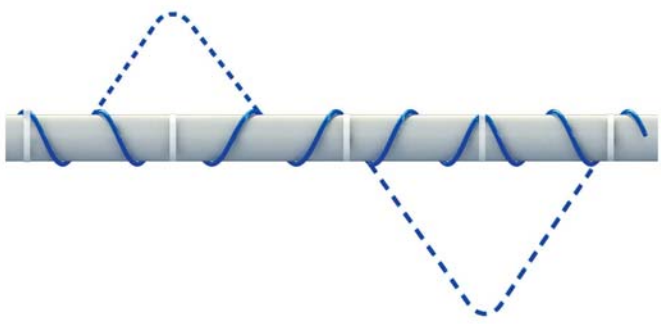
- polyurethane foam insulation of the given thickness (from 10 to 40 mm),
- ΔT - 30°C: temperature difference between the in-pipeline set temperature and minimum external temperature.

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:

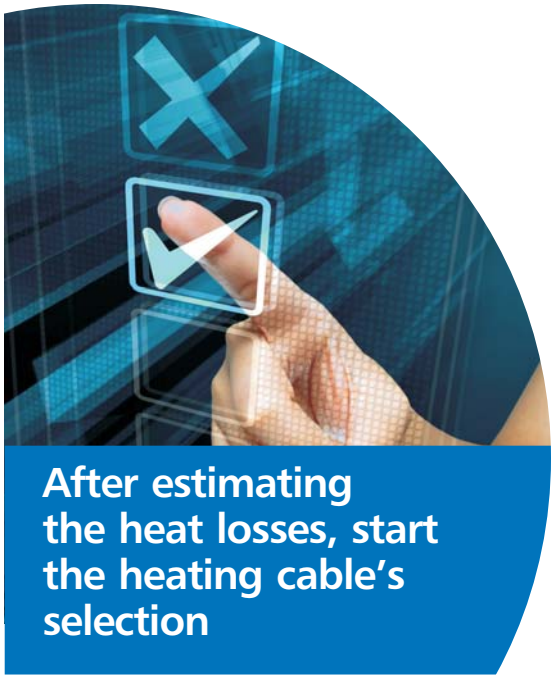
- in a single run,
- in a double (or multiple) run,
- spirally.





Heating cable's selection method

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



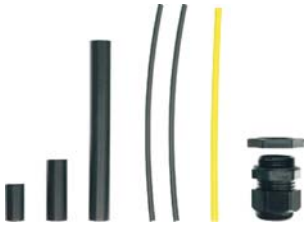
After estimating the heat losses, start the heating cable's selection

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, ETN4-1999, 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 units do not require installation of thermostats, but manual system switch off when ambient temperatures exceed 0°C.

Type	ETV-1991	ETN4-1999	ETI-1544	ETI-1522	UTR 60-PRO
Temperature control range [°C]	from 0 to +40	from -19.5 to +70	from -10 to +50	from -10 to +50	from 0 to +60
Operation temperature [°C]	from 0 to +50	from -20 to +55	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-144/99T	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 ETN4

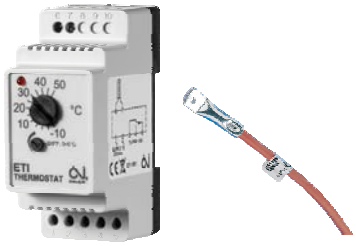
DIN bus installation. Temperature controller supporting two temperature sensors, including a limiting one. Large backlit display presents the operating parameters of the controller. Adjustable hysteresis allows to define precision of the temperature measurements.
Equipped with the on/off switch.

ELEKTRA ETN4-1999 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	7.5	70
VCD 10/90	9.0	90
VCD 10/110	11.0	110
VCD 10/135	13.5	135
VCD 10/170	16.5	170
VCD 10/200	20.0	200
VCD 10/235	23.5	235
VCD 10/265	27.0	265
VCD 10/315	32.0	315
VCD 10/370	36.5	370
VCD 10/415	42.0	415
VCD 10/460	46.0	460
VCD 10/570	57.0	570
VCD 10/700	70.0	700
VCD 10/910	92.0	910
VCD 10/1100	111.0	1100
VCD 10/1220	122.0	1220
VCD 10/1450	144.0	1450
VCD 10/1560	156.0	1560
VCD 10/1740	174.0	1740
VCD 10/1920	191.0	1920
VCD 10/2030	203.0	2030
VCD 10/2260	225.0	2260

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	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, ETN4-1999, ETV-1991			-	ETI-1522 UTR 60-PRO	
						Control					

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