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# frost protection



Constant wattage heating cables

Self-regulating heating cables



Temperature controllers



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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<sup>®</sup>, with constant heat output per metre,
- self-regulating heating cables
  ELEKTRA SelfTec<sup>®</sup>,
  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 mlong 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<sup>®</sup> heating cables with built-in temperature controllers, in ready-made units



ELEKTRA VCD heating cable





2. ELEKTRA FreezeTec<sup>®</sup> 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  $+3^{\circ}$ C and off at  $+10^{\circ}$ C. No additional controls are required for the operation of ELEKTRA FreezeTec<sup>®</sup> 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.



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## Self-regulating cables

- ELEKTRA SelfTec<sup>®</sup>PRO self-regulating heating cables are the cables available on spools, dedicated to advanced systems, with lengths to match those of pipelines, directly on building sites. These cables require termination and power supply connection.
- ELEKTRA SelfTec®16 and ELEKTRA
  SelfTec®16 ready2heat self-regulating
  heating cables are optimal for simple systems.
  The ELEKTRA SelfTec®16 heating cables are available on spools and enable trimming to desired length directly on a building site. The ELEKTRA SelfTec®16 ready2heat heating cables are ready-made units of specified lengths, terminated with a 1.5 m-long power supply conductor with a sealed plug.
- ELEKTRA SelfTec<sup>®</sup>DW / DW F and ELEKTRA SelfTec<sup>®</sup>DW ready2heat are designed for the applications both outside as well as inside water pipelines. The ELEKTRA SelfTec<sup>®</sup>DW / DW F cables are available on spools and enable trimming to desired length directly on a building site, while the ELEKTRA SelfTec<sup>®</sup>DW ready2heat are ready-made units of specified lengths, terminated with a 1.5 m-long power supply conductor with a sealed plug.

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.

Heating cables designed for trimming on a building site require correct termination of the cable and connecting with the power supply conductor.

## 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.





## Only ELEKTRA SelfTec<sup>®</sup> cables can freely cross and touch

ELEKTRA SelfTec®PRO

ELEKTRA SelfTec<sup>®</sup>PRO

ELEKTRA SelfTec®DW / DW F 10

- 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<sup>®</sup> self-regulating cables in the function of temperature

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ELEKTRA SelfTec<sup>®</sup>16 ready2heat heating cable



ELEKTRA SelfTec<sup>®</sup>DW ready2heat heating cable



ELEKTRA SelfTec<sup>®</sup>PRO heating cable



ELEKTRA SelfTec<sup>®</sup>16 heating cable



ELEKTRA SelfTec<sup>®</sup>DW heating cable

Type/power output (+10°C)	SelfTec®DW / DW ready2hea 10 W/m	SelfTec <sup>®</sup> DW F 10 W/m	SelfTec <sup>®</sup> DW F 16 W/m	SelfTec <sup>®</sup> 16 / 16 ready2heat 16 W/m	SelfTec <sup>®</sup> PRO 10 W/m	SelfTec <sup>®</sup> PRO 20 W/m	
Power supply	230 V ~ 50/60 Hz						
External dimension of cable	~ 7x10mm ~ 6x9mm ~ 7x11mm						
Min. installation temperature	-25°C -30°C						
Max. working temperature	65°C						
Max. exposure temperature		65°	85°C				
Type of heating cable	self-regulating, conductor screen, single-side supply						
Conductor	tin-coated copper 0.6mm <sup>2</sup> tin-co					tin-coated copper 1.1mm <sup>2</sup>	
Insulation	modified polyolefin						
Outer sheath	double-layer, halogen free polyolefin + external LDPE, certified for drinking water applications	single layer, f certifi drinking wate	luoropolymer, ed for er applications	hal	UV-resistant, halogen free polyolefin		
Min. bending radius	3.5 D						

	SelfTe SelfTec 10 \	c <sup>®</sup> DW <sup>®</sup> DW F <i>N</i> /m	SelfTe SelfTec 16 \	ec <sup>®</sup> 16 .®DW F <i>N</i> /m	Se	elfTec®PR 10 W/m	0		SelfTe 20 \	c <sup>®</sup> PRO N/m	
	Circuit-breaker, C-type										
	10A	16A	10A	16A	10A	16A	20A	10A	16A	20A	32A
Min. installation temperature	≥ -25°C -30°C										
Min. turn-on temperature	Max. cable length per circuit [m]										
-20°C	75	110	55	75	85	125	180	45	65	90	120
-15°C	80	115	60	80	100	145	190	50	75	105	125
0°C	95	120	70	90	115	170	205	60	90	120	135
+10°C	100	125	80	100	130	205	-	80	110	135	-
0°C in ice water	55	65	40	55	-	-	-	40	55	70	85



## SelfTec<sup>®</sup>DW / DW F: self-regulating heating cables 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<sup>®</sup> H-LT lead-through



ELEKTRA SelfTec<sup>®</sup>DW / DW F heating cable

#### Features

The 10 W/m cable output (at  $+10^{\circ}$ C) was especially selected to account for the water heat capacity. When necessary, it is possible to install the SelfTec<sup>®</sup>DW F heating cable of the 16 W/m heat output.

ELEKTRA SelfTec<sup>®</sup>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.

ELEKTRA SelfTec<sup>®</sup>DW F heating cables have a single fluoropolymer layer certified for drinking water applications.

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

		ΔT	Pipeline's diameter						
	["]	[°C]	1⁄4	1/2	3⁄4	1	<b>1</b> ½	<b>1</b> ½	2
	[mm]		8	15	20	25	32	40	50
ess K	10		5.8	8.6	10.5	12.3	14.9	17.9	21.6
र्ड ह	13		5.0	7.2	8.7	10.2	12.2	14.5	17.3
ic S	16		4.5	6.4	7.6	8.8	10.5	12.3	14.7
35 35	19		4.1	5.7	6.8	7.9	9.3	10.9	12.8
D.O.	20	30	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
nsr 🗸	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),
- △T 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
  - LEKTRA FreezeTec<sup>®</sup> ready-made heating cable units
  - ELEKTRA SelfTec®16 heating cables
  - ELEKTRA ELEKTRA<sup>®</sup>SelfTec 16 ready2heat ready-made heating cable units
  - ELEKTRA SelfTec®DW heating cables
  - ELEKTRA SelfTec<sup>®</sup>DW ready2heat ready-made heating cable units
- for extended pipelines:
  - ELEKTRA VCD 10 ready-made heating cable units
  - ELEKTRA SelfTec<sup>®</sup>PRO self-regulating heating cables
- for extended pipelines with branches, valves and flanges:
  - ELEKTRA SelfTec<sup>®</sup>PRO self-regulating heating cables

ELEKTRA SelfTec<sup>®</sup>PRO, ELEKTRA SelfTec<sup>®</sup>16 and ELEKTRA SelfTec<sup>®</sup>DW 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 0404-PRO junction box, with ELEKTRA ECM 25-PRO joint set.



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



ELEKTRA EC-PRO joint set



ELEKTRA S-TWIN-PRO twin splice connection



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 VCD 10 cables and self-regulating ELEKTRA SelfTec<sup>®</sup>PRO, SelfTec<sup>®</sup>16 and SelfTec<sup>®</sup>DW / DW F 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<sup>®</sup> heating cables with built-in thermostat do not require additional controls.

ELEKTRA SelfTec<sup>®</sup>16 ready2heat and ELEKTRA SelfTec<sup>®</sup>DW ready2heat self-regulating cable do not require installation of temperature controllers, but manual system switch off when ambient temperatures exceed 0°C.

Туре	ETV-1991	ETN4-1999			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**

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

#### **ELEKTRA ETN4**

<u>DIN bus installation.</u> 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 ETV-1991 temperature controller



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.



Switchboard mounting. Temperature controller especially designed for ELEKTRA SelfTec<sup>®</sup>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-1544 temperature controller



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



ELEKTRA UTR 60-1544 temperature controller

## ELEKTRA VCD

single side powered heating cables 10 W/m

Туре	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**<sup>®</sup>

single side powered heating cables

Туре	Length [m]	Power output [W]
FreezeTec <sup>®</sup> 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<sup>®</sup> self-regulating heating cables

Туре	Info
SelfTec <sup>®</sup> 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 <sup>®</sup> 16	self-regulating heating cable for simple systems 16 W/m (+10°C)
SelfTec®DW / DW F10	self-regulating heating cable for <b>drinking</b> water applications, 10 W/m (+10°C)
SelfTec <sup>®</sup> DW F16	self-regulating heating cable <b>for drinking</b> <b>water applications</b> , 16 W/m (+10°C) (with high heat loss)

## ELEKTRA SelfTec®16 ready2heat

## self-regulating heating cables

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

## ELEKTRA SelfTec®DW ready2heat

self-regulating heating cables

Туре	Length [m]	Power output [W]
SelfTec®DW 10/1	1	10
SelfTec®DW 10/2	2	20
SelfTec®DW 10/4	4	40
SelfTec®DW 10/6	6	60
SelfTec®DW 10/8	8	80
SelfTec®DW 10/10	10	100
SelfTec®DW 10/12	12	120
SelfTec®DW 10/15	15	150
SelfTec®DW 10/20	20	200
SelfTec®DW 10/X	up to 80 m	at individual order



#### **Product** selection guide **Heating Cables** Constant Self-regulating wattage Advanced Basic applications applications SelfTec®DW F 16 SelfTec®DW 10 ready2heat SelfTec®DW F 10 SelfTec®PRO 10 20 SelfTec®DW 10 SelfTec<sup>®</sup>16 ready2heat **FreezeTec<sup>®</sup>** SelfTec<sup>®</sup>16 SelfTec<sup>®</sup>PRO Cable Pipe VCD10 Systems Pipe Cable Application output diameter positioning material (Q) [mm] + + + + \_ + ≤50 + +++Outside the pipe Hydrant, >50 -+ + -+ ---+ + Protection According Steel of pipelines sprinkling, to the ≤50 ---+-+ -+ -\_ Inside against cold water, formula the pipe freezing rain drain, result, >50 ----+ ----sanitary, or ≤50 ++++++ + +-sewage the table Outside reading the pipe >50 -+ + + + ++ ---Plastic ≤50 -\_ + $^{+}$ +-----Inside the pipe -->50 -\_ + --\_ \_ -ETI-1544, ETN4-1999, ETI-1522 ETV-1991 UTR 60-PRO Control

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