

### CABINET HEATERS, "CAM" RANGE

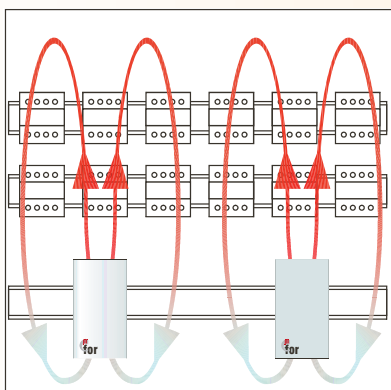
- The CAM electric cabinet heater is conceived to provide the necessary heat contribution in cabinets of electrical set-ups and electronic information boards, with the purpose of avoiding the formation of drops of water by condensation of the humidity.
- Among other factors, it stands out by its black anodized aluminium profile that provides a large surface of heat dissipation in relation to size.
- Assembly takes place on rail DIN of 35 mm. In order to facilitate its installation in the cabinet, the cabinet heater CAM incorporates a removable supply connector.
- The casing of the cabinet heater has a double function:
  - It avoids accidental contact with the heat radiator.
  - It causes the «chimney effect». This enables hot air convection upwards that facilitates the distribution and uniformity of temperature inside of cabinet.
- The CAM electric cabinet heaters are provided with a thermal cut-off that automatically disconnects the feeding of the appliance, avoiding overheating inside the cabinet that can affect the operation of the existing electronics.
- As a complement to the safety offered by the limiter already incorporated into the CAM heater, we recommend installation in the controls cabinet of control elements for distribution and control cabinet heaters models EFR, ETF, FZK, FTO and FTS (page nº 43), in order to maintain the required working temperature and humidity level. If you require other types or scales of ambient thermostats, please consult our general Forcosa Division catalogue nº 927.



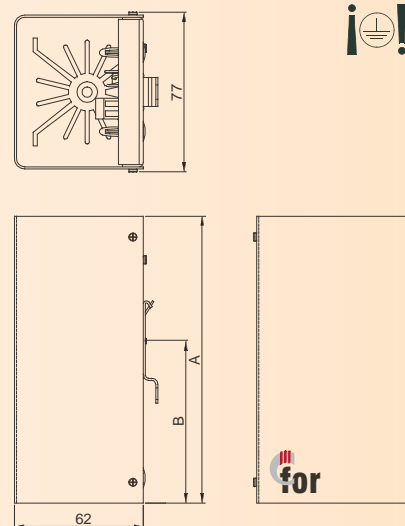
### General characteristics

- Heating element** Linear heating element
- Radiator** Black anodized aluminium
- Housing** Silver anodized aluminium
- Electrical class** Class I
- Connection** 2 x pressure clamps for wire 0'5 - 2'5 mm<sup>2</sup>
- Mounting** Clip for 35mm DIN rail
- Standard voltage** ~230 V

### Example of installation and performance of CAM electric cabinet heater



Code	Dimensions in mm		Watts	Weight in Kg
	A	B		
CAM50	98	58	50	0,35
CAM75	138	78	75	0,47
CAM100	178	98	100	0,58

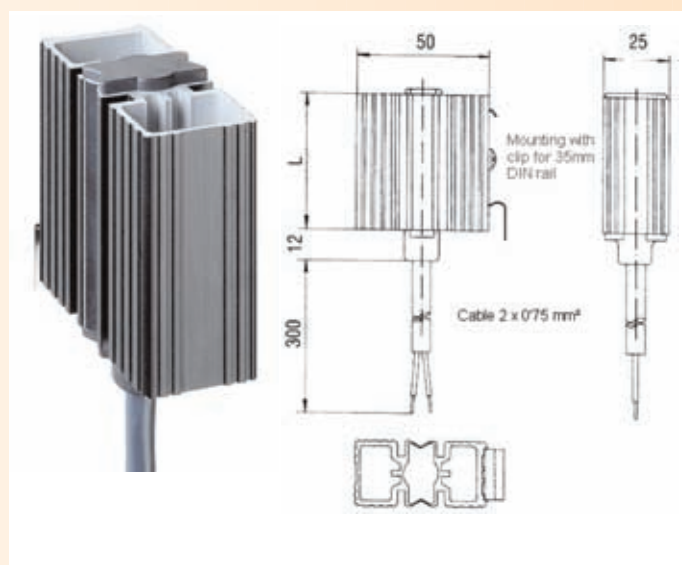


### SEMI-CONDUCTOR HEATER, HGK 047 RANGE

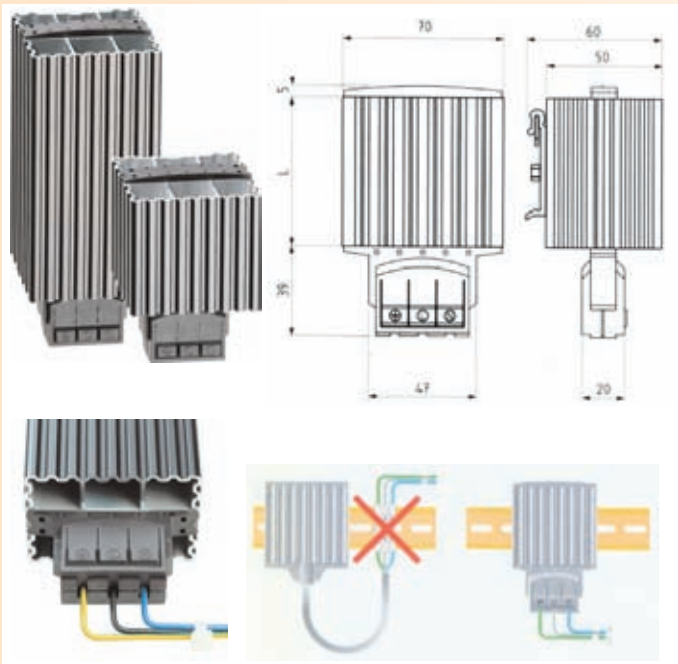
#### General characteristics

- Standard voltage** 150 - 250 V<sub>ac/dc</sub>· Max 265 V
- Heating element** PTC. Self regulating heating element
- Radiator** Anodized aluminium
- Electrical class** II. Test voltage 4000 V
- Degree protection against moisture** IP54
- Connection** Silicone cable 2x0'75 mm<sup>2</sup>. Length 300 mm
- Mounting** Clip for 35 mm DIN rail, EN 50022
- Fitting position** preferably vertical
- Storage temp** -45 °C (-49 °F) - 70 °C (158 °F)
- Accessories** screw fixing
- Miscellaneous** Operating with voltages below AC/DC 140V reduces heating performance by approx. 10%.
- Standards** VDE, CE

Code	Dim. L in mm	Heating power (T <sub>amb</sub> =20 °C)	Maximum current	Weight in Kg
HGK04700	50	10 W	approx. 1,0 A	0,10
HGK04701	60	20 W	approx. 2,5 A	0,20
HGK04702	70	30 W	approx. 3,0 A	0,25



SEMI-CONDUCTOR HEATER, HG 140 RANGE

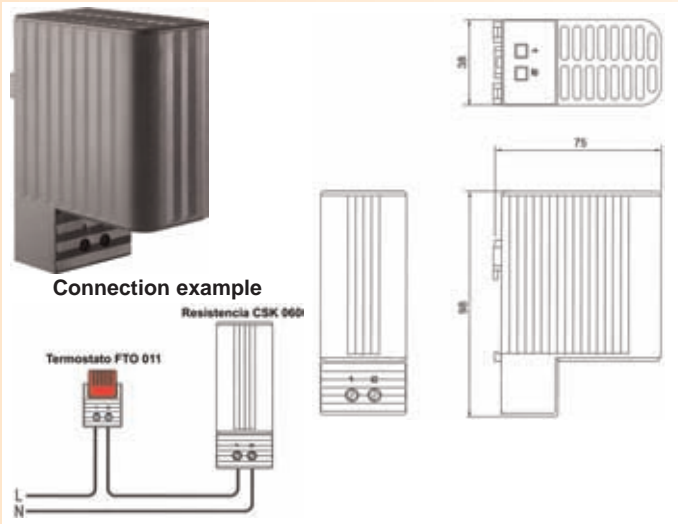


General characteristics

- **Standard voltage** 150 - 250 V<sub>ac/dc</sub>. Max 265 V
- **Heating element** PTC. Self regulating heating element
- **Housing** Anodized aluminium
- **Electrical class** I (earthed)
- **Degree protection against moisture** IP44
- **Connection** 3 pressure clamps for stranded/ rigid wire 0.5 – 2.5mm<sup>2</sup>
- **Mounting** Clip for 35 mm DIN rail, EN 50022
- **Fitting position** preferably vertical
- **Storage temp** -45 °C (-49 °F) - 70 °C (158 °F)
- **Standards** VDE, CE
- **Accessories** screw fixing
- **Miscellaneous** Operating with voltages below AC/DC 140V reduces heating performance by approx. 10%

Code	Dimension L in mm	Heating power (T <sub>amb</sub> =20 °C)	Maximum current	Weight in Kg
HG14000	65	15 W	aprox. 1,5 A	0,30
HG14001	65	30 W	aprox. 3,0 A	0,30
HG14003	65	45 W	aprox. 3,5 A	0,30
HG14005	140	60 W	aprox. 2,5 A	0,40
HG14006	140	75 W	aprox. 4,0 A	0,50
HG14007	140	100 W	aprox. 4,5 A	0,50
HG14008	220	150 W	aprox. 9,0 A	0,70

HEATERS FOR DISTRIBUTION CABINETS WITH PTC HEATING ELEMENT AND THERMOSTAT, CSK 060 RANGE.

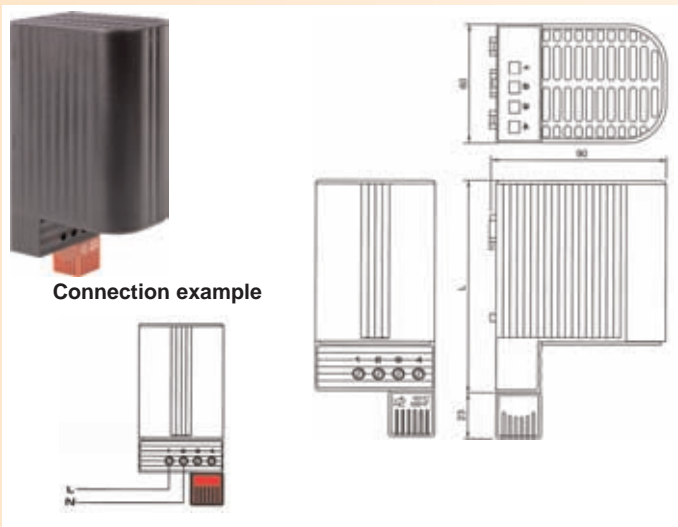


General characteristics

- **Heating element** self-regulating ptc heating element
- **Supply current** 150 - 250V ac/dc. Max 265V
- **Housing** <80 °C (According to VDE 0100), except over top grille
- **Connection** 2 poles, 2.5 mm<sup>2</sup> terminal
- **Fixing** clip for 35mm DIN rail, EN 60715
- **Mounting position** vertical
- **Storage temp.** -45 °C (-49 °F) - 70 °C (158 °F)
- **Protection degree / class** IP 20 / II (protective insulation)
- **Standardisations** VDE + UL File n° E150057
- **Other technical data** On current below 140V AC/DC, heating power is reduced by about 10%.

Code	Heating power (T <sub>amb</sub> =20 °C)	Maximum current	Weight in Kg
CSK06010	10 W	aprox. 1,0 A	0,20
CSK06020	20 W	aprox. 2,5 A	0,30

HEATERS FOR DISTRIBUTION CABINETS WITH PTC HEATING ELEMENT AND THERMOSTAT, CSF 060 RANGE



General characteristics

- **Heating element** self-regulating ptc heating element
- **Supply current** 120 - 240 V<sub>ac/dc</sub>. Max 265 V
- **Surface temperature** <80 °C (According to VDE 0100), except over top grille
- **Housing** Plástico según UL94 V-0, negro
- **Connection** 4 poles, 2.5 mm<sup>2</sup> terminal
- **Fixing** clip for 35mm DIN rail, EN 60715
- **Mounting position** vertical
- **Storage temp.** -45 °C (-49 °F) - 70 °C (158 °F)
- **Protection degree / class** IP 20 / II (protective insulation)
- **Standardisations** VDE + UL File n° E150057
- **Other technical data** On current below 140V AC/DC, heating power is reduced by about 10%

Code	Heating power (T <sub>amb</sub> =20 °C)	Maximum current	Thermostat operating temperatures		Weight in Kg
			Disconnection	Connecton	
CSF06001	50 W	aprox. 2,5 A	15 ± 5 °C	5 ± 5 °C	0,30
CSF06002	50 W	aprox. 2,5 A	25 ± 5 °C	15 ± 5 °C	0,30
CSF06011	100 W	aprox. 4,5 A	15 ± 5 °C	5 ± 5 °C	0,30
CSF06012	100 W	aprox. 4,5 A	25 ± 5 °C	15 ± 5 °C	0,30
CSF06021	150 W	aprox. 8 A	15 ± 5 °C	5 ± 5 °C	0,50
CSF06022	150 W	aprox. 8 A	25 ± 5 °C	15 ± 5 °C	0,50

HEATERS FOR DISTRIBUTION CABINETS WITH PTC HEATING ELEMENT AND FAN, CS/CSL RANGE

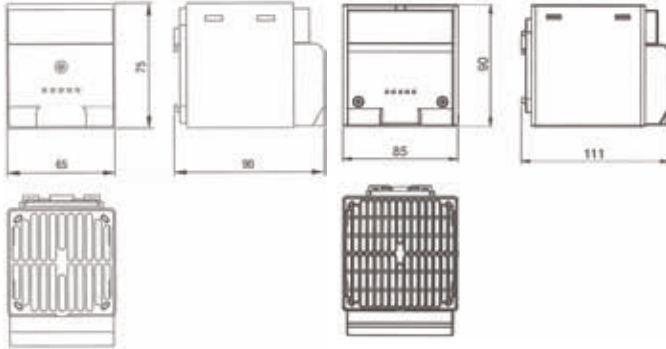


Connection example



Dimensions model CS 028

Dimensions model CSL 028

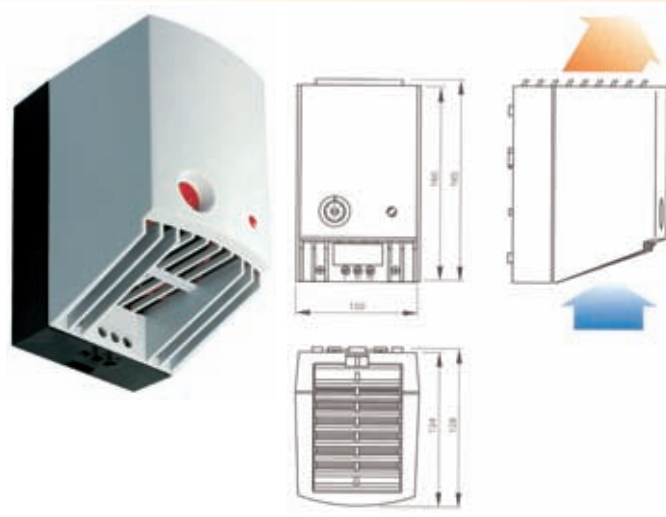


General characteristics

- Heating element: self-regulating ptc heating element
- Supply current: 230v - 50/60 Hz
- Surface temperature 250W: max 50oC except over top grille  
400W: max 65oC except over top grille
- Air flow: 45 m³/h at 230 Vac, free discharge
- Ball-bearing axial fan
- Housing: Plastic according to UL94 V-0, black
- Connection: 2 poles, 2.5mm2 terminal clip for 35mm DIN rail, EN 60715
- Fixing
- Mounting position: vertical
- Storage temp.: -45 °C (-49 °F) - 70 °C (158 °F)
- Protection degree / class: IP 20 / II (protective insulation)
- Standardisations: VDE + UL File nº E150057

Code	Heating power (T <sub>amb</sub> =20 °C)	Maximum current	Weight in Kg
CS02800	150 W	Approx 12 A	0,30
CSL02811	250 W	Approx. 9 A	0,50
CSL02810	400 W	Approx. 15 A	0,50

HEATERS FOR DISTRIBUTION CABINETS WITH PTC HEATING ELEMENT AND FAN, CR 027 RANGE.



General characteristics

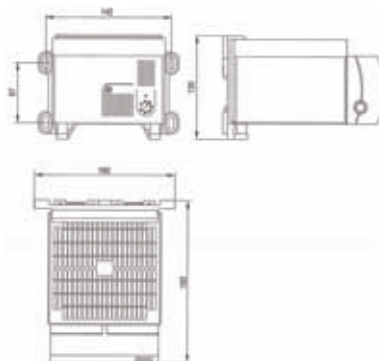
- Heating element: self-regulating ptc heating element
- Supply current: 220-240V ac - 50 Hz
- Temperature limiter: For protection in the event of fan breakdown
- Ball-bearing axial fan: Air flow according to model
- Housing: Plastic according to UL94 V-0, light grey
- Connection: 2 poles, 2.5mm2 terminal clip for 35mm DIN rail, EN 60715
- Fixing
- Mounting position: vertical
- Storage temp.: -45 °C (-49 °F) - 70 °C (158 °F)
- Protection degree / class: IP 20 / II (protective insulation)
- Standardisations: VDE + UL File nº E204590

Code	Heating power (T <sub>amb</sub> =20 °C)	Maximum current	Flow air (free discharge)	Range	Weight in Kg
CR02700	475 W	Approx. 11 A	35 m³/h	0 / 60 °C	0,9
CR02701	550 W	Approx. 13 A	45 m³/h	0 / 60 °C	1,1

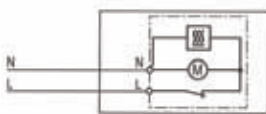
HEATERS FOR DISTRIBUTION CABINETS WITH PTC HEATING ELEMENT AND FAN, CS 130 RANGE.



Dimensiones modelo CS 028



Connection example



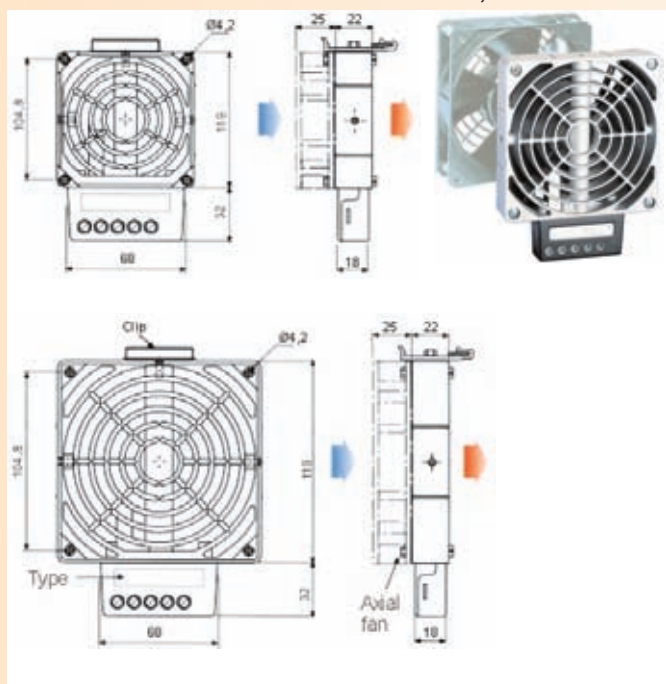
General characteristics

- Heating element: self-regulating ptc heating element
- Supply current: 230v - 50/60 Hz
- Temperature limiter: For protection in the event of fan breakdown
- Ball-bearing axial fan: Air flow according to model
- Housing: Plastic according to UL94 V-0, light grey
- Connection: 2 poles, 2.5mm2 terminal clip for 35mm DIN rail, EN 60715
- Fixing
- Mounting position: horizontal
- Storage temp.: -45 °C (-49 °F) - 70 °C (158 °F)
- Protection degree / class: IP 20 / II (protective insulation)
- Standardisations: VDE + UL File nº E204590

Code	Heating power (T <sub>amb</sub> =20 °C)	Maximum current	Flow air (free discharge)	Range	Weight in Kg
CS13000	1200 W	approx. 13 A	160 m³/h	0 / 60 °C	1,3
CS13001	1200 W	approx. 13 A	160 m³/h	Without thermostat	1,3



LINEAR HEATING ELEMENT WITH AXIAL FAN, HV 031 / HVL 031 RANGE

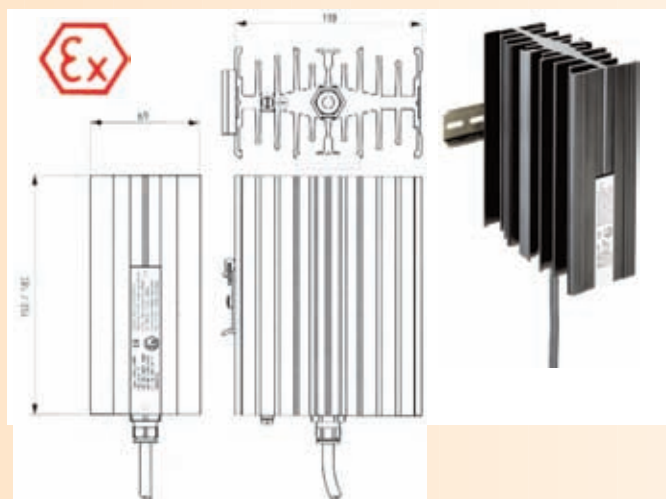


General characteristics

- **Standard voltage** 230 - 250 V<sub>ac</sub>
- **Heating element** high performance cartridge
- **Heater body** die-cast aluminium
- **Connection box** plastic UL94 V-0
- **Service life** (fan at 25 °C) 50.000 h
- **Connection** 3-pole terminal for 1,5mm<sup>2</sup>
- **Mounting** Clip for 35 mm DIN rail, EN 50022
- **Fitting position** preferably vertical
- **Storage temp** -45 °C (-49 °F) - 70 °C (158 °F)
- **Degree protection against moisture** IP20
- **Standards** CE UL
- **Miscellaneous** Temperature safety cut-out: to protect against overheating in case of fan failure
- **Axial fan** 5 m<sup>3</sup>/h free output. (100 and 150 W models) 108 m<sup>3</sup>/h free output. (200, 300 and 400 W models)
- **Connection for fan** 2 terminals 2'5 mm<sup>2</sup> (L2/N2)
- **Important:** Heater may only be operated together with fan. Danger of overheating!

Model	Code	External dimensions in mm	Watts	Weight in Kg
Heating element <b>WITHOUT</b> fan	HV03100	80 x 112 x 22	100 W	0,40
	HV03101	80 x 112 x 22	150 W	0,40
	HV03110	119 x 151 x 22	200 W	0,50
	HV03111	119 x 151 x 22	300 W	0,50
	HV03112	119 x 151 x 22	400 W	0,50
Heating element <b>WITH</b> fan	HVL03102	80 x 112 x 47	100 W	0,60
	HVL03103	80 x 112 x 47	150 W	0,60
	HVL03113	119 x 151 x 47	200 W	0,90
	HVL03114	119 x 151 x 47	300 W	0,90
	HVL03115	119 x 151 x 47	400 W	0,90

GROUP 3 - Electric process heating equipment suitable for hazardous areas



General characteristics

- **Standard voltage** 230 - 250 V<sub>ac</sub>
- **Heating element** high performance cartridge
- **Radiator** Anodized aluminium
- **Degree protection against moisture** IP65
- **Connection** Si HF-JZ 3 x 0.75mm<sup>2</sup> cable, length 1m
- **Mounting** Clip for 35 mm DIN rail, EN 50022
- **Fitting position** vertical
- **Storage temp** -45 °C (-49 °F) - 70 °C (158 °F)
- **Explosion protection** LCIE 01 ATEX 6073
- **Standards** EX CE
- **Miscellaneous** Connection PE: 4mm<sup>2</sup>

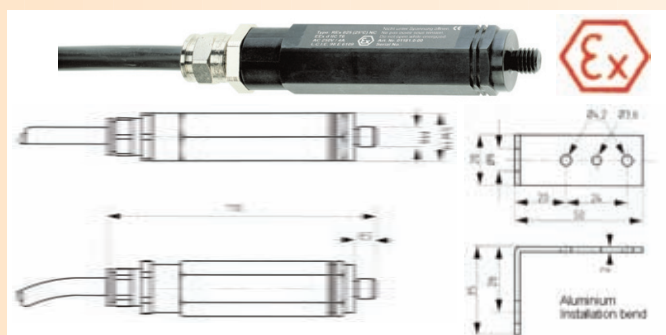
Code	EX protection class	T5 Surface temperature	Dimensions in mm	Watts	Weight in Kg
CREx50	EExd IIC T5	100 °C (vertical position)	150 x 118 x 69	50 W	1,3
CREx100	EExd IIC T4	135 °C (vertical position)	180 x 118 x 69	100 W	1,5

Ex THERMOSTAT, REX 0118 RANGE

General characteristics

- **Explosion protection** LCIE 01 ATEX 6074
- **Conformity certificate** 98.E 6109
- **Ex protection type** EExd IIC T6
- **Operating voltage** 250 Vac max. / 100 Vdc max.
- **Connections** Resistive: 4A 250 Vac  
Inductive 1A; (cos φ = 0'6) 250V<sub>ac</sub>
- **Service life** > 100,000 cycles
- **Sensor elements** thermostatic bimetal
- **Connection** Si HF - JZ 3 x 0.75mm<sup>2</sup>, length 1m
- **Mounting** mounting bracket with nut M8
- **Fitting position** variable
- **Degree protection against moisture** IP 65

Code	Operating temperature	Switch difference	Weight in Kg
REx015	15 °C ± 3	4 ± 1 °C	0,20
REx025	25 °C ± 3	4 ± 1 °C	0,20



## ELECTRONIC HYGROSTAT, EFR 012 SERIES

### General characteristics

- **Hysteresis (Humidity)** 5% RH ( $\pm 1$  RH tolerance) at 25 °C
- **Reaction time** Approx. 5 sec.
- **Contact class** Inverter contact
- **Connection capacity** 240 Vac, 8 (1.6) A  
120 Vac, 8 (1.6) A  
24 V dc, 4 A
- **Connection** 5 pole flanges, even max 0.5 Nm
- **Housing** plastic according to UL94 V-0, light grey
- **Fixing** clip for 35mm DIN rail, EN 50022
- **Mounting position** vertical
- **Protection class** IP 20

Code	Supply voltage	Range of humidity regulation
EFR01245	230 Vac ; 50/60 Hz	40 / 90 % RH
EFR01246	230 Vac ; 50/60 Hz	Preset adjustment at 65% RH



## ELECTRONIC HYGROSTAT, ETF 012 SERIES

### General characteristics

- **Hysteresis (Temperature)** 2 °C ( $\pm 1$  °C tolerance) at 25 °C / 50% RH
- **Hysteresis (Humidity)** 4% RH ( $\pm 1$ % RH tolerance) at 25 °C / 50% RH
- **Reaction time** Approx. 5 sec.
- **Contact class** Inverter contact
- **Contact resistance** <10 Mohm
- **Connection capacity** NC: 240 Vac, 6 (1) A  
NO: 240 Vac, 8 (1.6) A  
NC: 120 Vac, 6 (1) A  
NO: 120 Vac, 8 (1.6) A  
24 V dc, 4 A
- **Connection** 5 pole flanges, even max 0.5 Nm
- **Housing** plastic according to UL94 V-0, light grey
- **Fixing** clip for 35mm DIN rail, EN 50022
- **Mounting position** vertical
- **Protection class** IP 20

Code	Range of temperature regulation	Range of humidity regulation	Weight in Kg
ETF01230	+0 ... +60 °C	50 ... 90 % RH	0,20

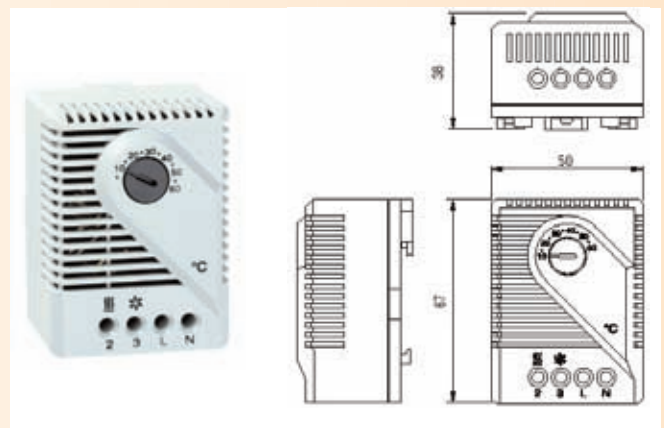


## MECHANICAL THERMOSTAT, FZK 011 SERIES

### General characteristics

- **Temperature range** 5 ... 60 °C adjustable
- **Temperature differential** 4 °C  $\pm$  1 °C
- **Sensor** Bimetallic
- **Supply current** 230 - 250 Vac, 50 - 60 Hz
- **Contact class** Commuted contacts
- **Connection capacity** Open contact  
Ohmic charge: 10A, 250 Vac  
Inductive charge (cos  $\phi$  = 0'6): 4 A; 250 Vac  
Closed contacts:  
Ohmic charge: 5A, 250 Vac  
Inductive charge (cos  $\phi$  = 0'6): 2 A; 250 Vac  
Flanges on the housing, 4 x 2'5 mm<sup>2</sup>
- **Connection** light grey plastic
- **Housing** clip for 35mm DIN rail, EN 50022
- **Mounting position** variable
- **Protection class** IP 20

Code	Temperature range	Dimensions in mm	Weight in Kg
FZK011	+5 ... +60 °C	67 x 50 x 38	0,10



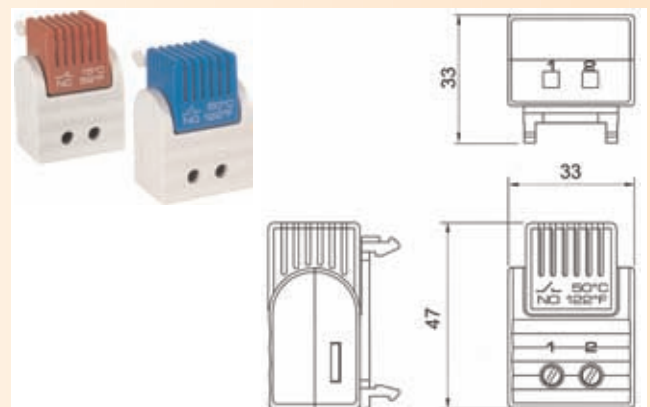
## FIXED THERMOSTAT, FTO 011/FTS 011 SERIES

### General characteristics

- **Probe** Thermostatic bimetal
- **Contact class** Exhaust contact
- **Contact resistance** <20 Mohm
- **Life length** >100,000 cycles
- **Connection capacity** 250 Vac, 5 (1.6)A  
120 Vac, 10 (2)A  
30 W dc
- **Connection** 2 poles, terminal 2.5 mm<sup>2</sup>, even 0,8Nm max.
- **Housing** plastic according to UL94 V-0, light grey
- **Fixing** clip for 35mm DIN rail, EN 60715
- **Dimensions** 47 x 33 x 33 mm
- **Mounting position** variable
- **Protection class** IP 20
- **Standardisations** VDE + UL File n° E164102

Code	Contact	Disconnection temperature	Connection temperature
FTO-01160-00	Normally closed	15 °C ( $\pm 5$ °C)	5 °C ( $\pm 5$ °C)
FTO-01160-01	Normally closed	25 °C ( $\pm 5$ °C)	15 °C ( $\pm 5$ °C)

Code	Contact	Connection temperature	Disconnection temperature
FTS-01161-00	Normally open	50 °C ( $\pm 6$ °C)	40 °C ( $\pm 7$ °C)
FTS-01161-01	Normally open	60 °C ( $\pm 6$ °C)	50 °C ( $\pm 7$ °C)
FTS-01161-02	Normally open	35 °C ( $\pm 6$ °C)	25 °C ( $\pm 7$ °C)



**General characteristics**

- Tubular elements in stainless steel AISI 321 or AISI 304L Ø8 mm tube for the AL and ALEC range and Ø10 mm tube for ALG range.
- Aluzinc or aluminized sheet fin of 25x50 mm AL and ALEC and 40x70 mm for ALG range.
- Zinc-plated steel crimped connectors
- Standard voltage ~230 V
- Options:
  - All in stainless steel.
  - Round welded fin of Ø30 mm.
  - Helicoidal fin:
    - \* For Ø8mm tube: stainless steel hoop → Ø18, Ø24 steel hoop → Ø23
    - \* For Ø10mm tube: st. steel hoop → Ø20, Ø26, Ø30 steel hoop → Ø25, Ø30
  - To order, other diameters, lengths, power and voltages

**Particular characteristics for AL and ALG range**

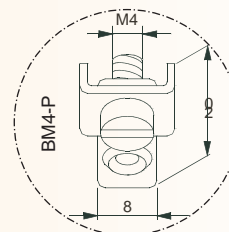
- Maximum temperature with  $v_{air} = 2 \text{ m/seg} \rightarrow 200 \text{ }^\circ\text{C}$
- Maximum temperature without forced air ( $v_{air} = 0 \text{ m/sec.}$ ):  $60 \text{ }^\circ\text{C}$
- For working temperatures over  $60 \text{ }^\circ\text{C}$  you need forced air.
- For working temperatures over  $125 \text{ }^\circ\text{C}$  you need to isolate the connection terminals of the heating zone.



Description	Code (1)	Dim. A in mm	Watts	W/cm <sup>2</sup> (*)	Electricfor's constructive thermic class	Weight in Kg
Aluzinc or aluminized steel sheet fin of 25x50. AISI 321 or 304L stainless steel Ø8 mm tube Zinc-plated steel M12x1,25 connectors (thread 8 mm long). Dim. C = 5 mm Dim. D = 25 mm	AL010	200	100	1,2	T-600-S	0,29
	AL012	200	150	1,8	T-600-S	0,29
	AL011	200	200	2,5	T-600-S	0,29

Description	Code	Dim. A in mm	Watts	W/cm <sup>2</sup> (*)	Electricfor's constructive thermic class	Weight in Kg
Aluzinc or aluminized steel sheet fin of 25x50. AISI 321 or 304L stainless steel Ø8 mm tube Zinc-plated steel M12x1,25 connectors (thread 8 mm long). Dim. C = 5 mm Dim. D = 25 mm	AL001	260	500	4,5	T-700-T	0,38
	AL002	300	600	4,6	T-700-T	0,45
	AL003	370	750	4,6	T-700-T	0,54
	AL004	430	850	4,4	T-700-T	0,62
	AL005	500	1000	4,4	T-700-T	0,71
	AL009	620	1250	4,3	T-700-T	0,88
	AL006	740	1500	4,3	T-700-T	1,1
	AL007	970	2000	4,3	T-700-T	1,4
AL008	1180	2500	4,4	T-700-T	1,5	

Models	Code	Dim A in mm	Watts	W/cm <sup>2</sup> (*)	Electricfor's constructive thermic class	Weight in Kg
Aluzinc or aluminized steel sheet fin of 40x70.	ALG01	325	1000	5,3	T-700-T	0,84
	ALG02	470	1500	5,5	T-700-T	1,2
AISI 321 or 304L stainless steel Ø10 mm tube	ALG03	620	2000	5,4	T-700-T	1,6
	ALG04	760	2500	5,4	T-700-T	2,0
Zinc-plated steel M14x1,25 connectors (thread 11 mm long). Dim. C = 5,5 mm	ALG05	910	3000	5,4	T-700-T	2,4
	ALG08 (2)	1090	3333	5,3	T-700-T	2,9
Dim. D = 40 mm	ALG06	1055	3500	5,5	T-700-T	2,8
	ALG07	1180	4000	5,4	T-700-T	3,2



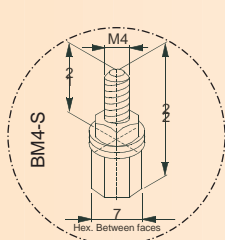
- (1) The finned heating elements range AL010, AL011 and AL012 are designed for electric cabinets and other applications with similar working temperature.
  - (2) Connection with BM6-S-L terminal (thread M6)
- (\*) W/cm<sup>2</sup> are calculated in respect of the element tube

**FINNED HEATERS WITH STAINLESS STEEL FINS AND CONNECTORS.**

On order, we can supply the AL and ALG elements with stainless steel fins and connectors. Their code is the same as for the AL and ALG ranges, followed by INOX. To calculate the price of stainless steel finned heaters, multiply the price of the required code by the factors listed below:

- Between 12 and 23 Units → x 2,4
- Between 24 and 59 Units → x 2,2
- Over 60 Units → x 1,9

**"ECONOMY RANGE" FINNED HEATING ELEMENTS**



**Particular characteristics for ALEC range**

- Only for air conditioning, maximum  $100 \text{ }^\circ\text{C}$  with  $v_{air} = 2 \text{ m/sec}$

Description	Code	Dim. A in mm	Watts	W/cm <sup>2</sup> (*)	Electricfor's constructive thermic class	Peso En Kg
Aluzinc or aluminized steel sheet fin of 25x50.	ALEC0,75	270	750	6,6	T-600-S	0,28
	ALEC1	370	1000	6,2	T-600-S	0,38
AISI 321 or 304L stainless steel Ø8 mm tube	ALEC1,5	500	1500	6,7	T-600-S	0,53
	ALEC2	640	2000	6,8	T-600-S	0,68
Zinc-plated steel M12x1,25 connectors (thread 8 mm long). Dim. C = 5 mm	ALEC1N	340	1000	6,7	T-600-S	0,35
	ALEC1,33N (3)	340	1334	9,1	T-600-S	0,46
Dim. D = 25 mm						



## GROUP 2 - Heating elements for air

2.2 - Finned heaters

## AL / ALG / ALEC

Models according to catalogue: 732 - 752

### CONNECTION PIVOT

#### Soldered pivot

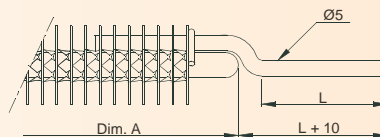
Stainless steel pivot soldered to the heating element:

- Ø5 x 13 mm
- Ø5 x 40 mm

#### New pivot anchoring system for finned heaters

- The pivot, made completely of stainless steel of useful Ø5x40, Ø5x50 or Ø5x60 mm, is fixed to the fins of the heating element by pressure.
- It eliminates soldering, possible breakage of soldered parts and possible rust risks.
- Easy, quick to mount, safer and cheaper.

Code	Reference	Suitable for range	Dim. L (in mm)	Weight in Kg
104113007	BR-ALE-5x40	AL - ALEC	40	0,02
128183000	Bag 24 units BR-ALE-5x40	AL - ALEC	40	0,48
104116007	BR-ALE-5x50	AL - ALEC	50	0,02
128204000	Bag 24 units BR-ALE-5x50	AL - ALEC	50	0,48
104040007	BR-ALE-5x60	AL - ALEC	60	0,02
128205000	Bag 24 units BR-ALE-5x60	AL - ALEC	60	0,48
104118007	BR-ALG-5x50	ALG	50	0,02
128213000	Bag 24 units BR-ALG-5x50	ALG	50	0,48



## GROUP 2 - Heating elements for air

2.3 - Spiral finned heaters

## AHR / AHU / AHM



### General characteristics

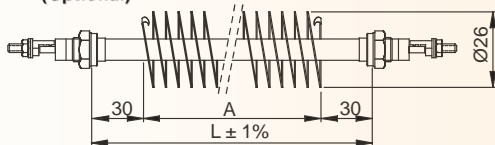
- Shielded heating elements in AISI 304 of Ø10 mm.
- Stainless steel AISI 430 fin of Ø26 mm. outer diameter
- Ni-Cr alloy resistive wire
- Zinc steel M14 crimped connectors
- Sealed with silicone (up to 200 °C on continuous)
- Threaded connection of M4 or M6 depending on models.
- Standard voltage ~230 V

### Options:

- All stainless steel.
- Spiral fin:
  - \* For Ø8mm pipe: stainless steel finning → Ø18, Ø24 iron finning → Ø23
  - \* For Ø10mm pipe: stainless steel finning → Ø20, Ø26, Ø30 iron finning → Ø25, Ø30
- Other dimensions, wattages and voltages available to order

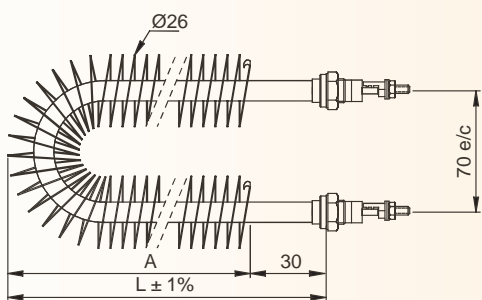
### Usual applications

- To heat forced circulation air for heating premises, closed drying circuits in heaters, charge benches, etc. In general, for any application of forced air heating up to 200°C (Maximum temperature with  $v_{air} = 4 \text{ m/sec} \rightarrow 200 \text{ °C}$ ) máxima con  $v_{air} = 4 \text{ m/seg} \rightarrow 200 \text{ °C}$ )



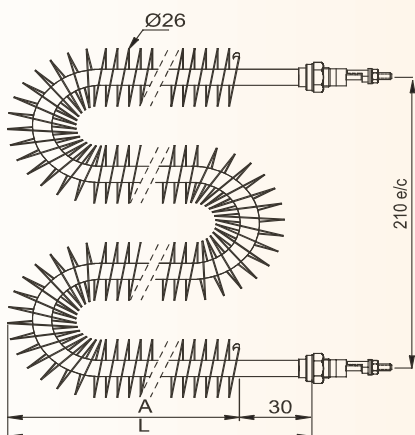
### CALEFACTORES ALETADOS HELICOIDALES EN RECTO, MODELOS AHR

Code	Dimensions en mm		Watts	W/cm²	Electricfor's constructive thermic class	Weight in Kg
	Length L	Active zone A				
AHR1000	470	410	1000	8,1	T-700-T	0,28
AHR2000	900	840	2000	7,7	T-700-T	0,53
AHR3000	1320	1260	3000	7,7	T-700-T	0,78
AHR4000	1750	1690	4000	7,6	T-700-T	1,03
AHR5000	2180	2120	5000	7,6	T-700-T	1,29
AHR6000	2600	2540	6000	7,6	T-700-T	1,54



### CALEFACTORES ALETADOS HELICOIDALES EN FORMA "U", MODELOS AHU

Code	Dimensions en mm		Watts	W/cm²	Electricfor's constructive thermic class	Weight in Kg
	Length L	Active zone A				
AHU1000	230	200	1000	8,1	T-700-T	0,28
AHU2000	445	415	2000	7,7	T-700-T	0,53
AHU3000	655	625	3000	7,7	T-700-T	0,78
AHU4000	870	840	4000	7,6	T-700-T	1,03
AHU5000	1085	1055	5000	7,6	T-700-T	1,29
AHU6000	1295	1265	6000	7,6	T-700-T	1,54

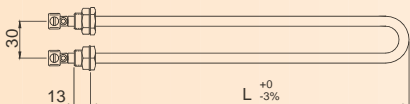


### CALEFACTORES ALETADOS HELICOIDALES EN FORMA "M4", MODELOS AHM

Code	Dimensions en mm		Watts	W/cm²	Electricfor's constructive thermic class	Weight in Kg
	Length L	Active zone A				
AHM2000	232	202	2000	7,7	T-700-T	0,53
AHM3000	337	307	3000	7,7	T-700-T	0,78
AHM4000	445	415	4000	7,6	T-700-T	1,03
AHM5000	552	522	5000	7,6	T-700-T	1,29
AHM6000	657	627	6000	7,6	T-700-T	1,54

General characteristics

- Tubular elements of stainless steel AISI 304L or AISI 321 Ø8 mm, insulated with electromelted and lamination-compressed magnesium oxide.
- M13 x 1,25 mm brass connectors, welded to the tube with silver alloy.
- Standard voltage ~230 V



Code	L in mm	Thread	Watts	W/cm <sup>2</sup>	Tube material	Electricfor's constructive thermic class	Weight in Kg
U002	260	M13	750	7,5	Stainles Steel	T-600-E	0,17
U003	350	M13	1000	7	Stainles Steel	T-600-E	0,21
U004	520	M13	1500	6,6	Stainles Steel	T-600-E	0,28
U005	680	M13	2000	6,5	Stainles Steel	T-600-E	0,35

Method of use

To ensure a correct functioning of these elements you must bear in mind the following parameters:

- Minimum air velocity: **6 m/sec.**
- Maximum air temperature: **40 °C.**

General characteristics

- Tubular elements of stainless steel AISI 304L or AISI 321 Ø8 mm, insulated with electromelted and lamination-compressed magnesium oxide.
- Terminals BM4-S (Thread M4).
- Standard voltage ~230 V



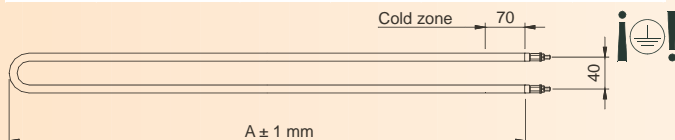
Applications

- Air conditioning.
- Due to the low watt density of maximum 3,6 W/cm<sup>2</sup> you can use these elements for heating air to a maximum temperature of 200 °C with an air velocity of v<sub>air</sub> = 2 m/seg over the heating zone.
- In attached table you can see the maximum working temperature according to the air velocity through the heating elements

W/cm <sup>2</sup>	Air at rest	Air at 1 m/seg In element area	Air at 2 m/seg In element area	Air at 3 m/seg In element area	Air at 4 m/seg In element area
3,6	NO	90 °C	200 °C	270 °C	325 °C
Maximum ambient temperature in element area					

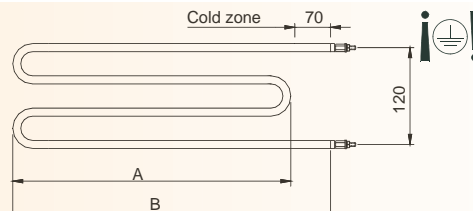
“U” Shape elements. UST Range

Code	Dim. A in mm	Watts	W/cm <sup>2</sup>	Electricfor's constructive thermic class	Weight in Kg
UST1	599	1000	3,6	T-600-S	0,26
UST1,5	936	1500	3,5	T-600-S	0,40
UST2	1134	2000	3,6	T-600-S	0,50



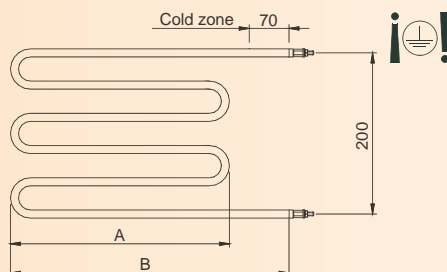
“M-4” Shape elements. M4ST Range

Code	Dimensions in mm		Watts	W/cm <sup>2</sup>	Electricfor's constructive thermic class	Weight in Kg
	A	B				
M4ST1	259	329	1000	3,6	T-600-S	0,26
M4ST1,5	425	500	1500	3,5	T-600-S	0,40
M4ST2	527	598	2000	3,6	T-600-S	0,50



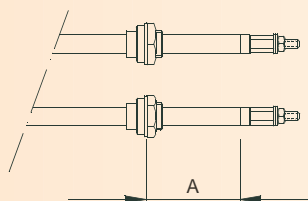
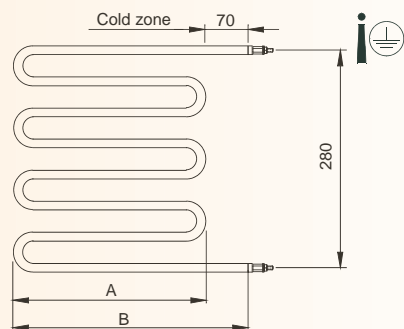
“M-6” Shape elements. M6ST Range

Code	Dimensions in mm		Watts	W/cm <sup>2</sup>	Electricfor's constructive thermic class	Weight in Kg
	A	B				
M6ST1	169	239	1000	3,6	T-600-S	0,26
M6ST1,5	275	365	1500	3,5	T-600-S	0,40
M6ST2	348	416	2000	3,6	T-600-S	0,50



“M” Shape elements. M8ST Range

Code	Dimensions in mm		Watts	W/cm <sup>2</sup>	Electricfor's constructive thermic class	Weight in Kg
	A	B				
M8ST1,5	205	288	1500	3,5	T-600-S	0,40
M8ST2	258	327	2000	3,6	T-600-S	0,50



Option: Loose elements with M12x1'25 crimped connectors.

If you require, we can also supply you with the different types of heating elements with crimped connectors of M12x1'25 mm. When ordering, please specify the dimension A you require, noting that the maximum A = 40 mm

M12 Fast mounting connectors that anchor the element when the coupling presses on the foil. Each connector is supplied with a M12 nut and a washer.

Code	Description
102101011	M12x1,25 Quick fit connectors
128182000	Bags of 24 units





**ELECTRIC BATTERIES WITH RECTANGULAR FIN HEATING ELEMENTS, ALBAT MODELS**

**General characteristics**

- Galvanized Fe plate frame. Optionally, and to order, stainless steel chassis.
- Dismountable connection box.
- Shielded tubular heating elements in AISI 304 stainless steel of Ø8 mm, heating element insulated with electro-smelted magnesium oxide and compressed by lamination
- Aluminised plate fin 25 x 50 mm.
- Crimped M12 zinc steel connectors.
- Maximum application temperature: air output 100 °C with v<sub>air</sub> = 2 m/sec
- Klixon thermostat included with 75°C protection. Optionally, with 120°C thermostat
- Possibility of connecting various modules.
- 1 or 2 power stages depending on models, both in single and three phase.
- Heating elements in single voltage ~230 V to enable different connection options.
- Standard voltage: 3~230 V Δ, 3~400 V λ

To order, we can supply other dimensions, wattages or voltages, as well as different rectangular finned heating element options.

- Options:
  - All stainless steel.
  - For Ø8mm tube: fin 25 x 50 mm  
fin 40 x 70 mm
  - For Ø10mm tube: fin 25 x 50 mm  
fin 40 x 70 mm



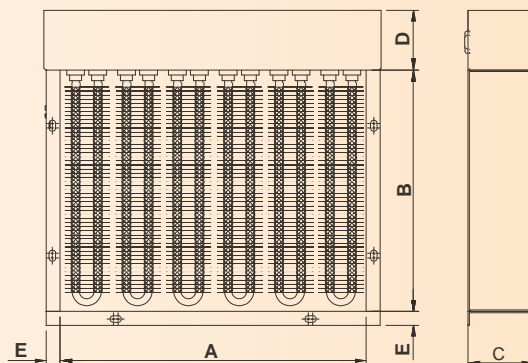
**Note:** : The batteries are supplied without being wired, for you to carry out the electrical assembly according to your requirements

**Normal applications**

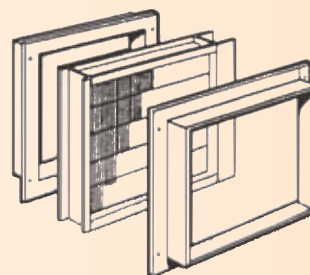
- To heat forced circulation air for heating premises, closed drying circuits in heaters, charge benches, etc. In general, for any application of forced air heating up to 100°C.

**Standard models**

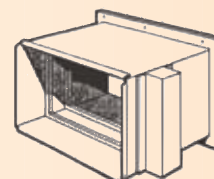
Code	Dimensions in mm					Watts	N° elements	N° steps
	A	B	C	D	E			
ALBAT3	200	400	50	75	25	3000	3	1
ALBAT6	200	400	75	75	25	6000	6	2
ALBAT3-2	450	400	50	75	25	3000	3	1
ALBAT6-2	450	400	75	75	25	6000	6	2
ALBAT9	450	400	75	75	25	9000	9	3
ALBAT12	450	400	100	75	25	12000	12	4
ALBAT15	450	400	100	75	25	15000	15	5
ALBAT18	450	400	100	75	25	18000	18	6
ALBAT21	450	400	100	75	25	21000	21	7
ALBAT24	450	400	100	75	25	24000	24	8
ALBAT4,5	200	500	50	75	25	4500	3	1
ALBAT9-2	200	500	75	75	25	9000	6	2
ALBAT9-3	450	500	50	75	25	9000	6	2
ALBAT13,5	450	500	75	75	25	13500	9	3
ALBAT18-2	450	500	75	75	25	18000	12	4
ALBAT22,5	450	500	75	75	25	22500	15	5
ALBAT27	450	500	100	75	25	27000	18	6



Front and back frames



Battery-rack



Fibre joint



Plate joint

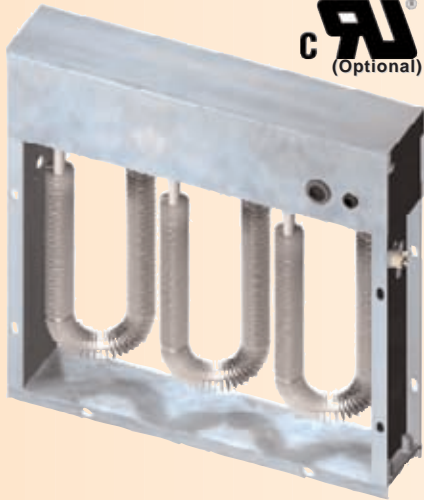


Bayonet joint



**Accessories for ALBAT battery standardised models**

Code	Description
517541075	Thermostat klixon 75 °C. Free
1017000000	Thermostat klixon 75 °C. Mounted with tube and connector
EC10001	Set of framework for batteries ALBAT with dim A x B = 500 x 250 mm
EC10002	Set of framework for batteries ALBAT with dim A x B = 500 x 500 mm
EC10003	Set of framework for batteries ALBAT with dim A x B = 600 x 250 mm
EC10004	Set of framework for batteries ALBAT with dim A x B = 600 x 500 mm
EC10111	Battery holder for batteries ALBAT with dim A x B = 500 x 250 mm
EC10112	Battery holder for batteries ALBAT with dim A x B = 500 x 500 mm
EC10113	Battery holder for batteries ALBAT with dim A x B = 600 x 250 mm
EC10114	Battery holder for batteries ALBAT with dim A x B = 600 x 500 mm



**ELECTRIC BATTERIES WITH SPIRAL FIN HEATING ELEMENTS, ALBAT MODELS**

**General characteristics**

- Galvanized Fe plate frame. Optionally, and to order, stainless steel chassis.
- IP40 damp protection rating
- New system of connection box with flap opening without removing the lid.
- Shielded tubular heating elements in AISI 304 stainless steel of Ø10 mm, heating element insulated with electro-smelted magnesium oxide and compressed by lamination
- Stainless steel AISI 430 fin of Ø26mm outside diameter
- Crimped M14 zinc steel connectors.
- M4 or M6 threaded connector depending on models
- Application temperature: air output 60 °C
- Air passage speed recommended for 60°C: with  $v_{air} = 3$  m/sec
- Klixon thermostat included with 85°C protection. Optionally, with 110°C thermostat
- Possibility of connecting various modules.
- 1 or 2 power stages depending on models, both in single and three phase.
- Heating elements in single voltage ~230 V to enable different connection options.
- Standard voltage: 3~230 V  $\Delta$ , 3~400 V  $\Delta$

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To order, we can supply other dimensions, wattages or voltages, as well as different spiral finned heating element options.

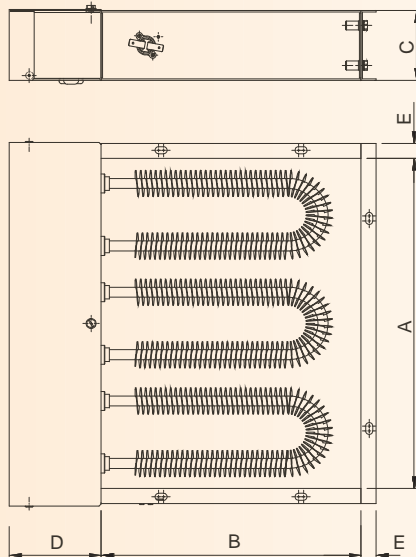
- Options:
  - All stainless steel.
  - Spiral fin:
    - \* For tube Ø8mm: stainless steel fin → Ø18, Ø24  
iron fin → Ø23
    - \* For Ø10mm tube: stainless steel fin → Ø20, Ø26, Ø30  
iron fin → Ø25, Ø30

**Normal applications**

- To heat forced circulation air for heating premises, closed drying circuits in heaters, charge benches, etc. In general, for any application of forced air heating up to 200°C (Maximum temperature with  $v_{air} = 4$  m/sec → 200°C).

**Normal models**

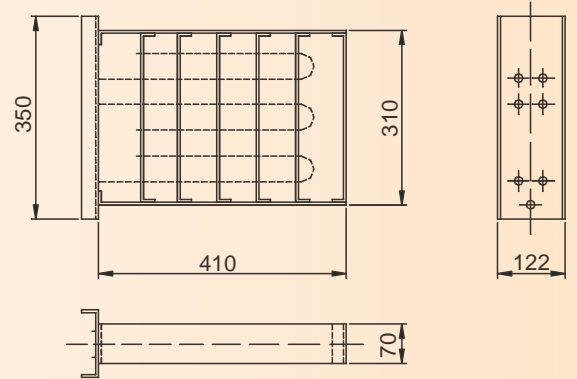
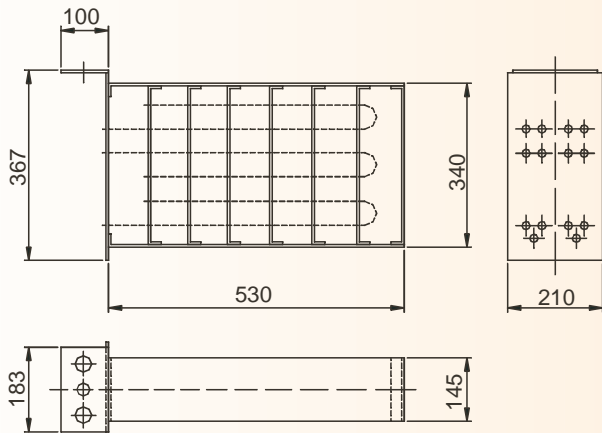
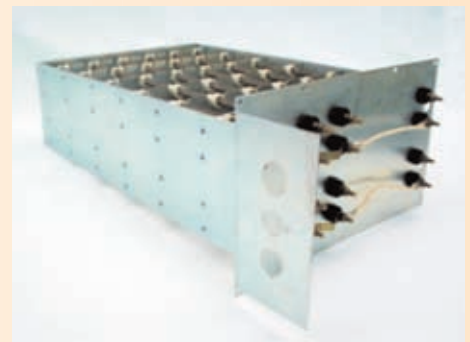
Code	Dimensions in mm					Watts	Nº elements	Shape	Nº steps
	A	B	C	D	E				
AHBAT3	330	260	70	92	15	3000	3	U	1
AHBAT6	330	475	70	92	15	6000	3	U	1
AHBAT9	330	700	70	92	15	9000	3	U	1
AHBAT12	550	475	160	92	15	12000	3	M4	1
AHBAT15	550	585	160	92	15	15000	3	M4	1
AHBAT18	550	700	160	92	15	18000	3	M4	1
AHBAT24	550	475	160	92	15	24000	6	M4	2
AHBAT30	550	585	160	92	15	30000	6	M4	2
AHBAT36	550	700	160	92	15	36000	6	M4	2



**ELECTRIC BATTERIES FOR AIR CONDITIONING TYPE "R", BRP and BRG RANGES**

**General characteristics**

- Chassis in gvanized steel. On order, chassis in stainless steel.
- Heating elements with exposed coil of quality 80-20 Nickel-Chrome, supported by steatite wall insulators.
- Maximum air discharge temperature of 60 °C
- Built-in thermostat of 60 °C. Optionally, with thermostat of 90 °C
- Standard voltage 3~230 V Δ, 3~400 V λ



Code	Volts	Watts	Nº Stages	Weight in Kg
BRG15	3~230 Δ 3~400 λ	15000	2	
BRG20	3~230 Δ 3~400 λ	20000	2	
BRG25	3~230 Δ 3~400 λ	25000	2	
BRG30	3~230 Δ 3~400 λ	30000	2	

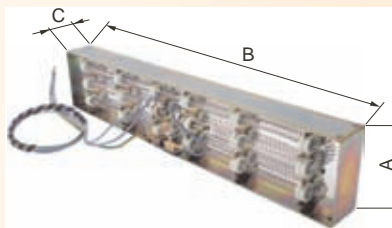
Code	Volts	Watts	Nº Stages	Weight in Kg
BRP5	3~230 Δ 3~400 λ	5000	2	
BRP10	3~230 Δ 3~400 λ	10000	2	
BRP15	3~230 Δ 3~400 λ	15000	2	

**ELECTRIC BATTERIES FOR AIR CONDITIONING MINI SOPOR, BSMC and MNS RANGES**

Small dimension batteries for window air conditioners or small ducts.

**General characteristics**

- Chassis in gvanized steel. On order, chassis in stainless steel.
- Heating elements with exposed coil of quality 80-20 Nickel-Chrome, supported by steatite wall insulators.
- Cable and earth connection of 500 mm long.
- They can work at minimum speeds of 2,5 m/sec.
- Built-in thermostat of 85 °C.
- Standard voltage ~230 V



Code	Dimensions in mm			Volts	Watts	Weight in Kg
	A	B	C			
BSMC2	160	260	30	~230	2000	0,6
BSMC2,5	160	260	30	~230	2500	0,6
BSMC3	160	260	30	~230	3000	0,6
MNS2,3	88	415	40	~230	2300	0,7
MNS3,1	88	415	40	~230	3100	0,7
MNSMRC4	88	680	25	~230	4000	0,8
MNSMRL3	88	755	25	~230	3000	0,8

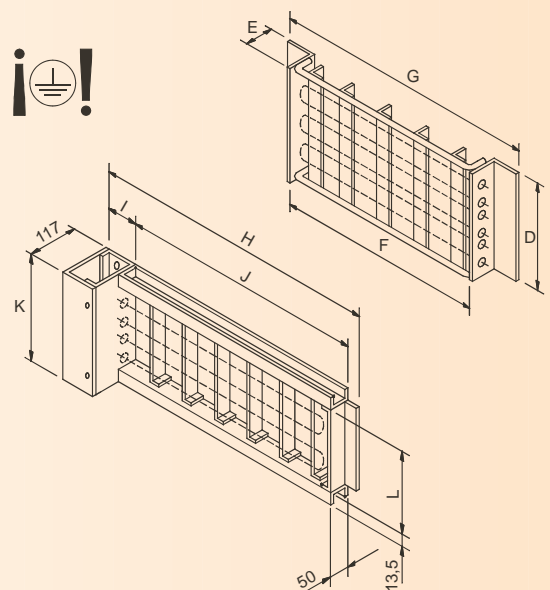
**ELECTRIC BATTERIES FOR AIR CONDITIONING, ST RANGE**

**General characteristics**

- Chassis in bichromatized steel. On order, chassis in stainless steel.
- Heating elements with exposed coil of quality 80-20 Nickel-Chrome, supported by steatite wall insulators.
- Connection cover with blind bottom.
- Built-in thermostat of 75 °C. Optionally, with thermostat of 92 °C
- Standard voltage 3~230 V Δ, 3~400 V λ

Code	Dimensions in mm				Volts	Watts	Nº Stages	Weight in Kg
	D	E	F	G				
ST6	350	40	340	420	3~230 Δ 3~400 λ	6000	1	
ST7,5	350	40	340	420	3~230 Δ 3~400 λ	7500	1	
ST9	350	40	340	420	3~230 Δ 3~400 λ	9000	1	
ST12	350	40	690	770	3~230 Δ 3~400 λ	12000	2	
ST15	350	40	690	770	3~230 Δ 3~400 λ	15000	2	
ST18	350	40	690	770	3~230 Δ 3~400 λ	18000	2	
ST24	350	40	690	770	3~230 Δ 3~400 λ	24000	2	
ST40	550	40	1300	1340	3~230 Δ 3~400 λ	40000	2	
ST401	800	40	1490	1570	3~230 Δ 3~400 λ	40000	3	

Code	Dimensions in mm					Volts	Watts	Nº Stages	Weight in Kg
	H	I	J	K	L				
ST241	1518	105	1400	480	450	3~230 Δ 3~400	24000	2	

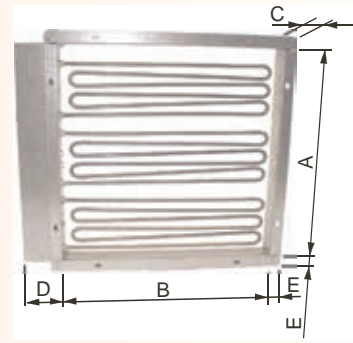




**ELECTRIC BATTERIES FOR AIR CONDITIONING, MODUL-BAT RANGE**

**General characteristics**

- Chassis in galvanized steel. On order, chassis in stainless steel.
- Tubular elements of stainless steel AISI 304L or AISI 321 Ø8 mm, insulated with electromelted and lamination-compressed magnesium oxide.
- Maximum air discharge temperature of 60 °C
- Built-in thermostat of 75 °C. Optionally, with thermostat of 110 °C
- From one to three modules may be coupled to provide from 4 to 30 kW. By combining these double or triple modules in a rack, a maximum of 120 kW may be attained.
- Standard voltage 3~230 V Δ, 3~400 V λ

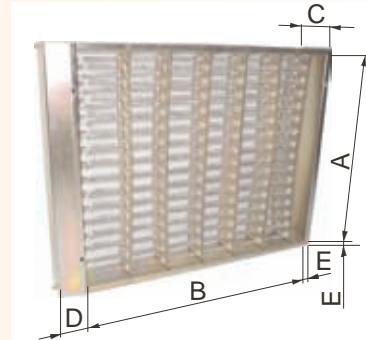


Code	Dimensions in mm					Watts	Nº Stages	Weight in Kg
	A	B	C	D	E			
MB4	450	450	50	82	25	4000	1	3,8
MB6	450	450	50	82	25	6000	1	3,8
MB8	450	450	50	82	25	8000	1	3,8
MB10	450	450	50	82	25	10000	1	4,3

**ELECTRIC BATTERIES FOR AIR CONDITIONING, MODUL-SOPOR and MODUL-SOPOR REINFORCED RANGES**

**General characteristics**

- Chassis, cover and dividers in galvanized steel. On order, chassis in stainless steel.
- Heating elements with exposed coil of quality 80-20 Nickel-Chrome, supported by steatite wall insulators.
- Maximum air discharge temperature of 60 °C.
- Built-in thermostat of 75 °C. Optionally, with thermostat of 110 °C.
- Standard voltage 3~230 V Δ, 3~400 V λ



**Models MODUL-SOPOR**

Code	Dimensions in mm					Watts	Nº Stages	Weight in Kg
	A	B	C	D	E			
MSP4	330	330	70	46	12	4000	3	2,6
MSP5	330	330	70	46	12	5000	3	2,6
MSP6	330	330	70	46	12	6000	3	2,6
MSPR9	330	330	70	46	12	9000	4	2,6
MSPR12	330	330	70	46	12	12000	4	2,7
MSM8	330	610	70	46	12	8000	3	3,6
MSM10	330	610	70	46	12	10000	3	3,6
MSM12	330	610	70	46	12	12000	3	3,6
MSG10	445	610	70	46	12	10000	4	4,5
MSG14	445	610	70	46	12	14000	4	4,5
MSG16	445	610	70	46	12	16000	4	4,5
MSC9	456	620	70	46	10	9000	1	5,6
MSC12	456	620	70	46	10	12000	1	5,6
MSC15	456	620	70	46	10	15000	1	5,6
MSI21	456	870	70	46	10	21000	1	7,9
MSL31,5	456	1200	70	46	10	31500	2	10,8
MSL36	456	1200	70	46	10	36000	2	10,8
MSL45	456	1200	70	46	10	45000	2	10,8

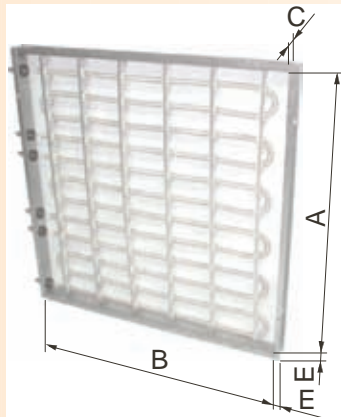
**Models MODUL-SOPOR REINFORCED**

Code	Dimensions in mm					Watts	Nº Stages	Weight in Kg
	A	B	C	D	E			
MSRP3	164	350	70	46	12	3000	2	1,8
MSRP4,5	164	350	70	46	12	4500	2	1,8
MSRP6	164	350	70	46	12	6000	2	1,8
MSRM15	387	470	70	46	12	15000	5	4,2
MSRM17	387	470	70	46	12	17000	5	4,2
MSRM20	387	470	70	46	12	20000	5	4,2
MSRG32	536	800	70	46	12	32000	7	7,5
MSRG40	536	800	70	46	12	40000	7	7,5
MSRG48	536	800	70	46	12	48000	7	8,5
MSRI4	250	310	70	46	10	4000	1	2,2
MSRI6	250	310	70	46	10	6000	1	2,2
MSRI9	250	310	70	46	10	9000	1	2,2
MSRI12	250	310	70	46	10	12000	1	2,3
MSRL15	320	420	70	46	10	15000	1	3,3
MSRL18	320	420	70	46	10	18000	1	3,3
MSRL21	320	420	70	46	10	21000	1	3,3

**ELECTRIC BATTERIES FOR AIR CONDITIONING, BACTI-SOPOR RANGE**

**General characteristics**

- Chassis, cover and dividers in galvanized steel. On order, chassis in stainless steel.
- Arranged in a single row, the heating elements are with exposed coil of quality 80-20 Nickel-Chrome, supported by steatite wall insulators.
- Maximum air discharge temperature of 60 °C.
- Built-in thermostat of 75 °C. Optionally, with thermostat of 110 °C.
- Aside from the usual combinations of one behind the other, one beside the other, or horizontally joined, it is also possible to combine 1 or 2 BTSM modules with 1 or more BTSL modules to obtain assemblies of 1, 2, 3, 4 or 4 stages. Request the Technical Notice NTC-681.
- Standard voltage 3~230 V Δ, 3~400 V λ



Code	Dimensions in mm				Watts	Nº Stages	Weight in Kg
	A	B	C	E			
BTSP2	228	478	27	11	2000	1	1,2
BTSP3	228	478	27	11	3000	1	1,2
BTSP4	228	478	27	11	4000	1	1,2
BTSP5	228	478	27	11	5000	1	1,2
BTSP6	228	478	27	11	6000	1	1,2
BTSM4	478	478	27	11	4000	1	1,6
BTSM6	478	478	27	11	6000	1	1,6
BTSM8	478	478	27	11	8000	1	1,6
BTSM10	478	478	27	11	10000	1	1,7
BTSM12	478	478	27	11	12000	1	1,8
BTSL2	228	678	27	11	2000	1	1,5
BTSL3	228	678	27	11	3000	1	1,5
BTSL4	228	678	27	11	4000	1	1,5
BTSL5	228	678	27	11	5000	1	1,5
BTSL6	228	678	27	11	6000	1	1,5
BTSL7,5	228	678	27	11	7500	1	1,6
BTSL9	228	678	27	11	9000	1	1,6

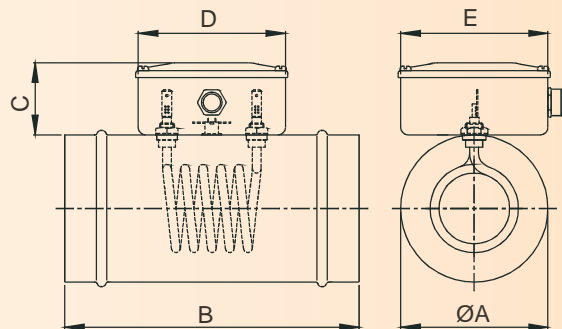
## General characteristics

- Class I electrical heater
- Steel painted connections box with degree protection against moisture IP44
- Cylindrical pipe galvanised steel sheet. On order, in stainless steel
- PG for power supply and control cables.
- From 1 to 6 tubular elements in stainless steel tube AISI 321 or AISI 304L of  $\varnothing$  6.4 mm for the single-phase models and  $\varnothing$  8 mm for the three-phase models.
- Built-in safety thermostat of 85°C. On order we can supply a safety thermostat of 110°C.
- 1 or 2 power stages according to models, in both single-phase and three-phase groups.
- Heating elements in unitary voltage ~230V in order to make the different connection options easier.
- High resistance to impacts and splashes of water.



## Mono-phase models. BMC

Code	Watts		Dimensions in mm					Weight in Kg
	Min.	Max.	$\varnothing A$	B	C	D	E	
BMC80-0,5		500	80	200	49	105	105	0,70
BMC100-0,5		500	100	200	49	105	105	0,82
BMC100-0,8		800	100	200	49	105	105	0,82
BMC125-0,75		750	125	250	49	105	105	0,97
BM2C125-1	500	1000	125	300	83	206	156	1,8
BM2C160-1,2	600	1200	160	300	83	206	156	2,1
BMC200-1,7		1700	200	250	49	105	105	1,4
BM2C200-2,25	1125	2250	200	300	83	206	156	2,4

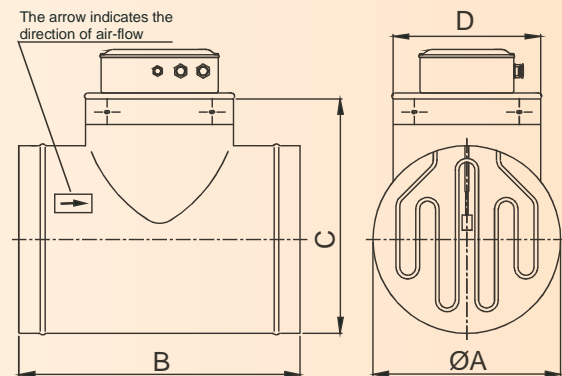


- Standard voltage: ~230 V

## Three-phase models. BTT

### Set of battery of heating elements + "T" of nominal $\varnothing$

Code	Watts		N° elements	Dimensions in mm				Weight in Kg
	Min.	Max.		$\varnothing A$	B	C	D	
BTT160-1,5	250	1500	6	160	340	260	160	3,5
BTT200-3	500	3000	6	200	390	300	200	5,1
BTT250-4,5	750	4500	6	250	440	350	250	6,1
BTT315-6	2000	6000	3	315	490	415	315	6,7
BTT315-9	1500	9000	6	315	490	415	315	7,6
BTT355-9	1500	9000	6	355	490	455	355	7,9
BTT355-12	4000	12000	3	355	490	455	355	8,2
BTT400-15	2500	15000	6	400	600	500	315	9,8



- Standard voltage 3~230 V  $\Delta$ , 3~400 V  $\Lambda$
- By a simple change in the connection box, we can obtain a wide range of power in each model, from the minimum to a maximum indicated

## Spare parts for the three-phase models BTT

### Batteries without "T"

Code	Watts		N° elements	For $\varnothing A$ in mm
	Maximum	Minimum		
BTCC1,5	1500	250	6	160
BTCC3	3000	500	6	200
BTCC4,5	4500	450	6	250
BTCC6	6000	2000	3	315
BTCC9	9000	1500	6	315
BTCC9A	9000	1500	6	355
BTCC12	12000	4000	3	355
BTCC15	15000	2500	6	400

### Unit elements

Code	Watts	W/cm <sup>2</sup>	For $\varnothing A$ in mm	Electricfor's constructive thermic class
130540003	250	3	160	T-600-S
130540002	500	3	200	T-600-S
130540001	750	3	250	T-600-S
130540004	2000	3	315	T-600-S
130540000	1500	4	315 355	T-600-S
130540005	4000	4	355	T-600-S
130540006	2500	5	400	T-600-S

### "T" of nominal $\varnothing$

Code	$\varnothing A$ in mm
130540104	160
130540103	200
130540102	250
130540101	315
130540100	355
130540105	400

**General characteristics**

- Heating of air to:

**250 °C**

**TFAN models**

**600 °C**

**Made to order**

NOTE: The above temperatures refer to recirculated air systems with thermal insulation. Note that the final heating temperature may vary in accordance with the system's operating conditions (recirculation of air or not, the material being heated, losses of heat, etc). Our technical department is at your service to assist in the selection of the most appropriate battery for any given situation.

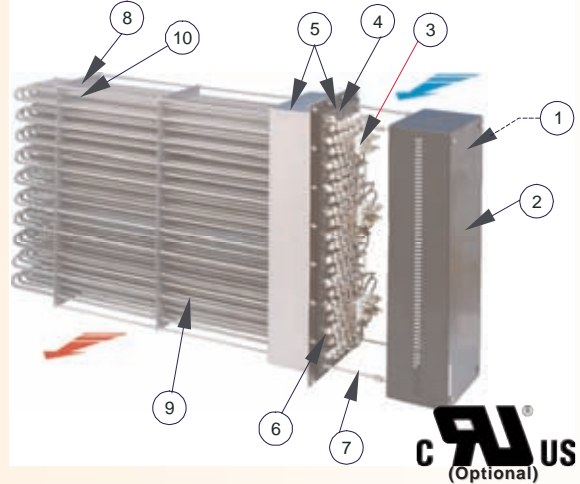
- Minimum air speed for all models: **2 m/sec**
- Easily interchangeable heating elements
- Other wattage, voltages, and dimensions are available on request.
- Manufactured in compliance with the EN 60335-1 standard.
- Triphase power supply 3 ~ 400 V Δ with earth connection (\*).

(\*) The TFAN batteries are supplied connected at the stated voltage. Optionally, they may be supplied connected for an operating voltage of 3 ~ 230 V Δ. If this is required, please state so in your order.

**Technical characteristics of construction**

- 1 From one to three stuffing boxes per heat stage, plus a stuffing box for control components.
- 2 Steel connection cover, with oven treated paint resistant to temperatures of up to 250 °C without deterioration.
- 3 From one to three steatite connection boards, one per stage. Nickel-plated internal connection bridges.
- 4 Bases for securing heating elements with tightening screws.
- 5 Mineral fibre insulation (in base box and drawer).
- 6 Steel base box for heating elements, with oven treated paint resistant to temperatures of up to 250 °C without deterioration, and stainless steel inner box.
- 7 Stainless steel bars for securing final guide base and tightening of cover.
- 8 Stainless steel final guide for supporting the heating elements.
- 9 Tubular elements in Ø10 mm AISI 321 or 304L. stainless steel tube, in alignments of 6 heating elements at ~230 V with wattage of 1000 W
- 10 Thermocouple probe Ø 6 Ni Cr / Ni Al (K type) with 3000 mm long compensating cables.

**Option all in stainless steel:** If you require, we can supply the TFAN models with connection cover (2), big box and base box for heating elements (5) all in stainless steel.

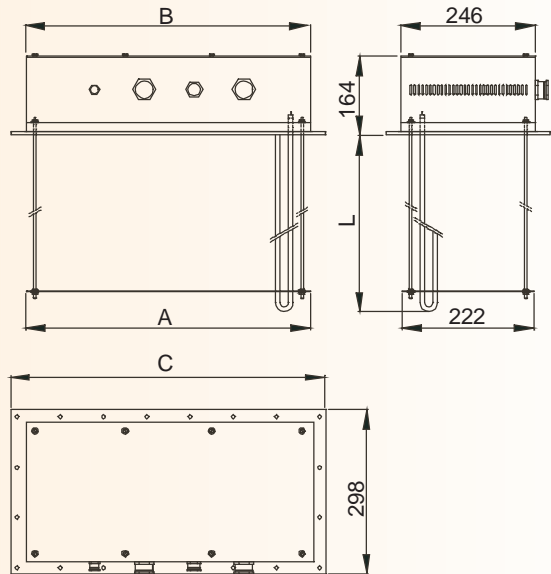


**MODELS TFAN**

Models available with elements in stainless steel tube AISI 321 Ø10 mm

Code	Power kW	Nº elements	Nº stages	Dimensions in mm				Weight in Kg
				A	B	C	L	
TFAN6	6	6	1 de 6 KW	90	118	162	440	6,3
TFAN12	12	12	1 de 12 KW	150	178	222	440	9,8
TFAN18	18	18	1 de 6 KW 1 de 12 KW	210	238	282	440	13,2
TFAN24	24	24	2 de 12 KW	270	296	343	440	16,7
TFAN30	30	30	1 de 6 KW 2 de 12 KW	330	352	404	440	20,1
TFAN36	36	36	3 de 12 KW	390	416	464	440	23,6
TFAN42	42	42	2 de 12 KW 1 de 18 KW	450	472	524	440	27,0
TFAN48	48	48	1 de 12 KW 2 de 18 KW	510	532	584	440	30,5
TFAN54	54	54	1 de 12 KW 1 de 18 KW 1 de 24 KW	570	592	644	440	33,9
TFAN60	60	60	1 de 12 KW 2 de 24 KW	630	652	704	440	37,4

**DIMENSIONS  
MODELS TFAN**



**Note:** Batteries TFAN incorporate a thermocouple type "K" with aerial male connector and female bayonet. Although for some applications they aren't necessary, Electricfor recommends to install always minimum a sobretemperature sensor (sensor-regulator) and a flow switch.

**Sensor temperature type "K" for TFAN batteries**

Code	Description	Dimensions in mm
517380000	Type "K" sensor with aerial male connector and female bayonet connector	Ø6 x 475



## General characteristics

- Heating of air to:

450 °C

TMAX and TMAXL models

600 °C

Made to order

NOTE: The above temperatures refer to recirculated air systems with thermal insulation. Note that the final heating temperature may vary in accordance with the system's operating conditions (recirculation of air or not, the material being heated, losses of heat, etc). Our technical department is at your service to assist in the selection of the most appropriate battery for any given situation.

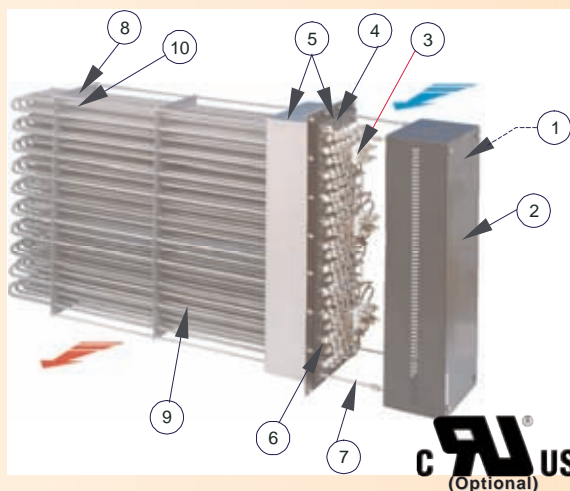
- Minimum air speed for all models: **2 m/sec**
- Easily interchangeable heating elements
- Other wattage, voltages, and dimensions are available on request.
- Manufactured in compliance with the EN 60335-1 standard.
- Triphase power supply 3 ~ 400 V Δ with earth connection (\*).

(\*). The TMAX and TMAXL batteries are supplied connected at the stated voltage. Optionally, they may be supplied connected for an operating voltage of 3 ~ 230 V Δ. If this is required, please state so in your order.

## Technical characteristics of construction

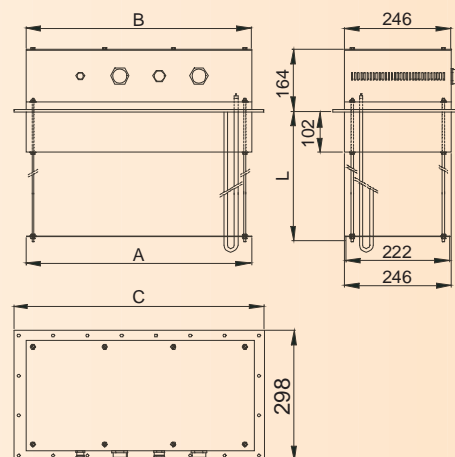
- From one to three stuffing boxes per heat stage, plus a stuffing box for control components.
- Steel connection cover, with oven treated paint resistant to temperatures of up to 250 °C without deterioration.
- From one to three steatite connection boards, one per stage. Nickel-plated internal connection bridges.
- Bases for securing heating elements with tightening screws.
- Mineral fibre insulation (in base box and drawer).
- Steel base box for heating elements, with oven treated paint resistant to temperatures of up to 250 °C without deterioration, and stainless steel inner box.
- Stainless steel bars for securing final guide base and tightening of cover.
- Stainless steel final guide for supporting the heating elements. In TMAXL models additional middle support.
- Tubular elements in Ø10 mm AISI 321 or 304L. stainless steel tube, in alignments of 6 heating elements at ~230 V with wattage 750 W (TMAX models) or 1500 W (TMAXL models) each. In stock for TMAX and TMAXL models with Ø10mm Incoloy®-800 stainless steel heating elements.
- Optional: thermocouple probe Ø 6 Ni Cr / Ni Al (K type) with 3000 mm long compensating cables.

**Option all in stainless steel:** If you require, we can supply the TMAX and TMAXL models with connection cover (2), big box and base box for heating elements (5) all in stainless steel.



## DIMENSIONS

### MODELS TMAX and TMAXL



MODELS TMAX	Code	Power kW	Nº elements	Nº stages	Dimensions in mm				Weight in Kg
					A	B	C	L	
Models available with elements in stainless steel tube AISI 321 Ø10 mm or Incoloy®-800 Ø10 mm	TMAX9	9	12	1 de 9 KW	172	172	222	542	12,4
	TMAX13,5	13,5	18	1 de 4,5 KW 1 de 9 KW	232	232	282	542	16,4
	TMAX18	18	24	2 de 9 KW	292	292	343	542	20,4
	TMAX22,5	22,5	30	1 de 4,5 KW 2 de 9 KW	352	352	404	542	24,3
	TMAX27	27	36	3 de 9 KW	412	412	464	542	28,3
	TMAX31,5	31,5	42	2 de 9 KW 1 de 13,5 KW	472	472	524	542	32,3
	TMAX36	36	48	1 de 9 KW 2 de 13,5 KW	532	532	584	542	36,3
	TMAX40,5	40,5	54	1 de 9 KW 1 de 13,5 KW 1 de 18 KW	592	592	644	542	40,2
	TMAX45	45	60	1 de 9 KW 2 de 18 KW	652	652	704	542	44,2
MODELS TMAXL	Code	Power kW	Nº elements	Nº stages	Dimensions in mm				Weight in Kg
Models available with elements in stainless steel tube AISI 321 Ø10 mm or Incoloy®-800 Ø10 mm	TMAXL18	18	12	1 de 18 KW	172	172	222	962	16,7
	TMAXL27	27	18	1 de 9 KW 1 de 18 KW	232	232	282	962	22,8
	TMAXL36	36	24	2 de 18 KW	292	292	343	962	28,9
	TMAXL45	45	30	1 de 9 KW 2 de 18 KW	352	352	404	962	35,0
	TMAXL54	54	36	3 de 18 KW	412	412	464	962	41,1
	TMAXL63	63	42	2 de 18 KW 1 de 27 KW	472	472	524	962	47,2
	TMAXL72	72	48	1 de 18 KW 2 de 27 KW	532	532	584	962	53,3
	TMAXL81	81	54	1 de 18 KW 1 de 27 KW 1 de 36 KW	592	592	644	962	59,4
	TMAXL90	90	60	1 de 18 KW 2 de 36 KW	652	652	704	962	65,5

**Note:** Batteries TMAX and TMAXL incorporates a thermocouple type "K" with aerial male connector and female bayonet. Although for some applications they aren't necessary, Electricfor recommends to install always minimum a sobretemperature sensor (sensor-regulator) and a flow switch.

## Sensor temperature type "K" for TMAX and TMAXL

Code	Desacription	Dimensions in mm
517381000	Type "K" sensor with aerial male connector and female bayonet connector. For TMAX models	Ø6 x 575
517382000	Type "K" sensor with aerial male connector and female bayonet connector. For TMAXL models	Ø6 x 975

# UTFAN / UTMAX / TMAXL

Models as per catalogue: NTC - 0112

# GROUP 2 - Heating elements for air

2.11 - Heating elements for ovens and furnaces

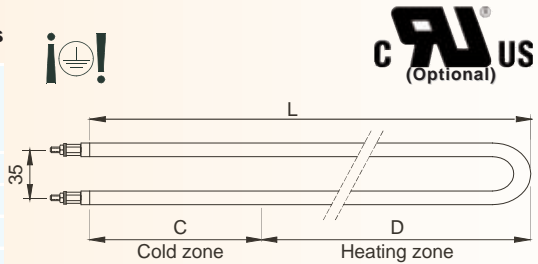
## General characteristics

- Heating of air to:
  - 250 °C UTFAN models
  - 450 °C UTMAX and UTMAXL models
  - 600 °C UTMAXIN and UTMAXLIN models
- Minimum air speed for all models: 2 m/sec

- Tubular elements in stainless steel tube AISI 321 or 304L of Ø10 mm. In stock for the TMAX and TMAXL models, tubular elements in Incoloy®-800 of Ø10 mm
- Standard voltage ~230 V
- Option: Stainless steel crimped connector of M14x1,25 mm

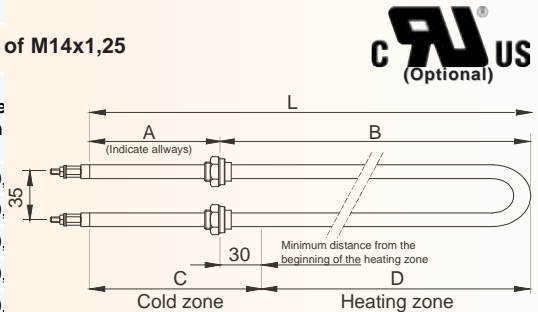
### Option WITHOUT crimped connectors

Code	Dimensions in mm			Watts	W/cm²	Tube material	Electricfor's constructive thermic class	Weight in Kg
	C	D	L					
UTFAN1	93	420	513	1000	3,9	AISI 321	T-700-T	0,45
UTMAX0,75	187	420	607	750	3,1	AISI 321	T-700-T	0,53
UTMAXL1,5	187	840	1027	1500	3	AISI 321	T-700-T	0,90
UTMAXIN0,75	187	420	607	750	3,1	Iy®-800	T-850-T	0,53
UTMAXLIN1,5	187	840	1027	1500	3	Iy®-800	T-850-T	0,90



### Option WITH stainless steel crimped connectors of M14x1,25

Code	Dimensions in mm					Watts	W/cm²	Tube material	Electricfor's constructive thermic class	We in
	A (*)	B	C	D	L					
UTFAN1RI	73	440	93	420	513	1000	3,9	AISI 321	T-700-T	0,
UTMAX0,75RI	167	440	187	420	607	750	3,1	AISI 321	T-700-T	0,
UTMAXL1,5RI	167	860	187	840	1027	1500	3	AISI 321	T-700-T	0,
UTMAXIN0,75RI	167	440	187	420	607	750	3,1	Iy®-800	T-850-T	0,
UTMAXLIN1,5RI	167	860	187	840	1027	1500	3	Iy®-800	T-850-T	0,



(\*) Dimension A according to your order. You must indicate it in all the orders of this material. The maximum value of the dimension A is the value indicate in the table.

# M8GRK

# GROUP 2 - Heating elements for air

2.12 - Heating elements for ovens and furnaces

## General characteristics

- Tubular elements in stainless steel tube AISI 321 or 304L of Ø10 mm, insulated with electromelted and lamination-compressed magnesium oxide
- Terminals BM4-P (Thread M4)
- Zinc-plated steel crimped connectors, thread M14x1'25 mm
- Standard voltage ~230 V

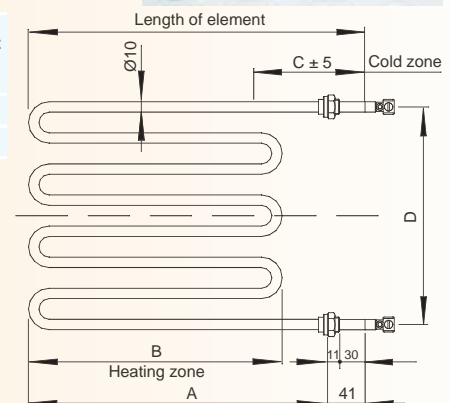
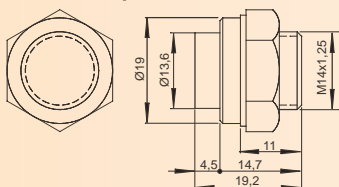
## Applications

- Air conditioning
- Recirculated air heaters
- Static air heaters
- Black heat
- Textile industrial heating
- Trichloroethylene vapor reheating
- Shrink plastic ovens
- Ovens in general
- Dryers
- Air heaters
- Hot air convectors
- Chemical reactors



Code	Dimensions in mm				Length of element	Watts	W/cm²	Electricfor's constructive thermic class	Weight in Kg
	A	B	C	D					
M8GRK1	250	236	100	170	291	1000	1,8	T-700-T	0,75
M8GRK1,5	251	237	100	175	292	1500	2,6	T-700-T	0,75

### Dimensions of the M14x1'25 crimped connector



Relationship between the maximum atmospheric temperature of the furnace or oven in the heating element area (where a safety sensor should be installed) and the load of the heating elements in W/cm².

Consult our temperature regulator: pages 116, 117, 118 and 119 of this catalogue.

W/cm²	Air at rest	Recirculated air at 1 m/sec. In heating element area	Recirculated air at 2 m/sec. In heating element area	Recirculated air at 3 m/sec. In heating element area	Recirculated air at 4 m/sec. In heating element area
1,8	450 °C.	500 °C	530 °C	560 °C	580 °C
2,5 to 3,1	350 °C.	380 °C	430 °C	470 °C	500 °C
4,1 to 4,7	Amb. Temp max. 80 °C.	175 °C	275 °C	340 °C	400 °C

Maximum ambiental temperature in heating element area

**IMPORTANT NOTE:** The atmospheric temperature inside the furnace or oven chamber will always be 25-350°C lower than in the heater element area depending on good air circulation, loads of material and frequency of loads.



**General characteristics**

- Tubular elements in stainless steel tube AISI 321 or 304L of Ø8 mm, insulated with electromelted and lamination-compressed magnesium oxide

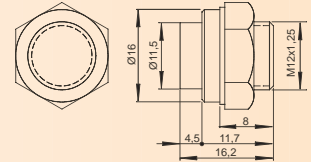
- Terminals BM4-P (Thread M4)
- Zinc-plated steel crimped connectors, thread M14x1'25 mm
- Standard voltage ~230 V

**Usual applications**

- Air conditioning
- Recirculated air heaters
- Static air heaters
- Black heat

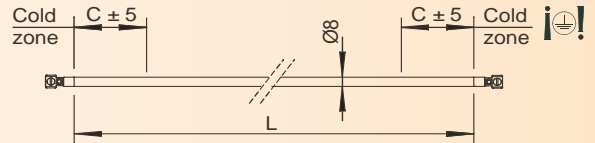
- Textile industrial heating
- Trichloroethylene vapor reheating
- Shrink plastic ovens
- Ovens in general
- Dryers
- Air heaters
- Hot air convectors
- Chemical reactors

**Dimensions of the M12x1'25 crimped connector**



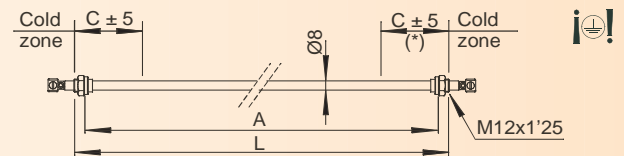
**Models REINF**

Code	Dimensions in mm		Watts	W/cm <sup>2</sup>	Electricfor's constructive thermic class	Weight in Kg
	C	L				
REINF460	50	460	500	5,7	T-700-T	0,10
REINF960	50	960	1000	4,7	T-700-T	0,20



**Models R**

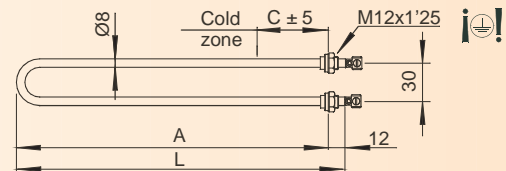
Code	Dimensions in mm			Watts	W/cm <sup>2</sup>	Electricfor's constructive thermic class	Weight in Kg
	A	C	L				
R762	738	45	762	500	3	T-700-T	0,20
R1092	1068	45	1092	750	3,1	T-700-T	0,26
R1422	1398	45	1422	1000	3,1	T-700-T	0,34
R2092	2068	45	2092	1500	3	T-700-T	0,49



(\* ) The connector of one of the ends is installed without being attached

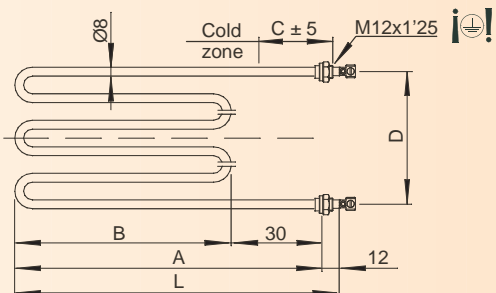
**Models U**

Code	Dimensions in mm			Watts	W/cm <sup>2</sup>	Electricfor's constructive thermic class	Weight in Kg
	A	C	L				
U365	365	45	377	500	3	T-700-T	0,20
U530	530	45	542	750	3,1	T-700-T	0,26
U695	695	45	707	1000	3,1	T-700-T	0,34
U1030	1030	45	1042	1500	3,1	T-700-T	0,49
U1365	1365	45	1377	2000	3,1	T-700-T	0,58



**Models Mx360**

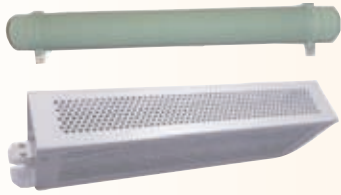
Code	Dimensions in mm					Watts	W/cm <sup>2</sup>	Electricfor's constructive thermic class	Weight in Kg
	A	B	C	D	L				
M4360	360	330	45	90	372	1000	3,1	T-700-T	0,34
M6360	360	330	45	150	372	1500	3,1	T-700-T	0,49
M8360	360	330	45	210	372	2000	3,1	T-700-T	0,58
M12360	360	330	45	330	372	3000	3	T-700-T	0,89





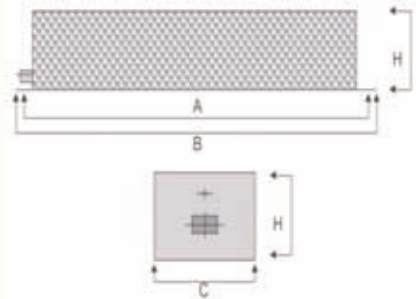
Braking heating elements work through dissipation of the energy generated by the electrical machine inside them or in braking units

**SAC/PR Models**



**General characteristics**

- SAC/PR model heating elements are designed for braking engines.
- They can be supplied with thermal protector.
- Ohmic value according to the client's request
- The heating element tolerance can also be supplied according to the client's specification.
- The manufacturing system enables adapting to the client's needs, both as far as specifications as well as in delivery terms (72 hours) and amounts.



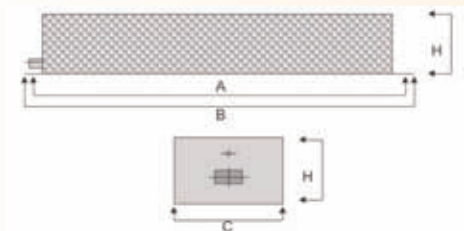
Code	Dimensions in mm				Watts
	A	B	C	H	
SAC/PR-600	405	420	55	98	600
SAC/PR-1000	412	430	70	116	1000
SAC/PR-1200	412	430	80	135	1200
SAC/PR-1500	490	512	80	135	1500
SAC/PR-2500	490	512	80	135	2500
SAC/PR-4000	490	510	174	143	4000
SAC/PR-4500	490	510	174	143	4500
SAC/PR-6000	490	510	350	140	6000
SAC/PR-10000	490	510	538	140	10000
SAC/PR-14000	490	510	696	140	14000

**SI/PR Models**



**General characteristics**

- SI/PR model heating elements are specially designed as braking loads for engines without reducer, minimising the noise level (gearless).
- They can be supplied with thermal protector.
- Ohmic value according to the client's request
- The heating element tolerance can also be supplied according to the client's specification.
- The manufacturing system enables adapting to the client's needs, both as far as specifications as well as in delivery terms (72 hours) and amounts.



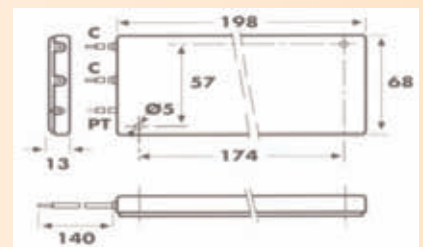
Code	Dimensions in mm				Watts
	A	B	C	H	
SI/PR-600	412	430	80	135	600
SI/PR-1000	412	430	80	135	1000
SI/PR-1500	412	430	80	135	1500
SI/PR-2400	412	430	80	135	2400
SI/PR-4800	412	430	180	140	4800
SI/PR-6000	412	430	265	140	6000
SI/PR-8000	412	430	350	140	8000
SI/PR-10000	412	430	535	140	10000
SI/PR-14000	412	430	696	140	14000

**RB/PL Model**

**General characteristics**

- The RB/PL flat armoured heating element model is designed for frequency converters (braking)
- Tolerance of ± 10%

Code	Watts
RB/PL-600	600
RB/PL-1300	1300 – With dissipater



**RB Model**

**General characteristics**

- The RB flat armoured boxed heating element model is designed for frequency converters (braking)
- Tolerance of ± 10%

Code	Watts
RB-250	250

