

# Section 4

## Air heating elements for incorporation



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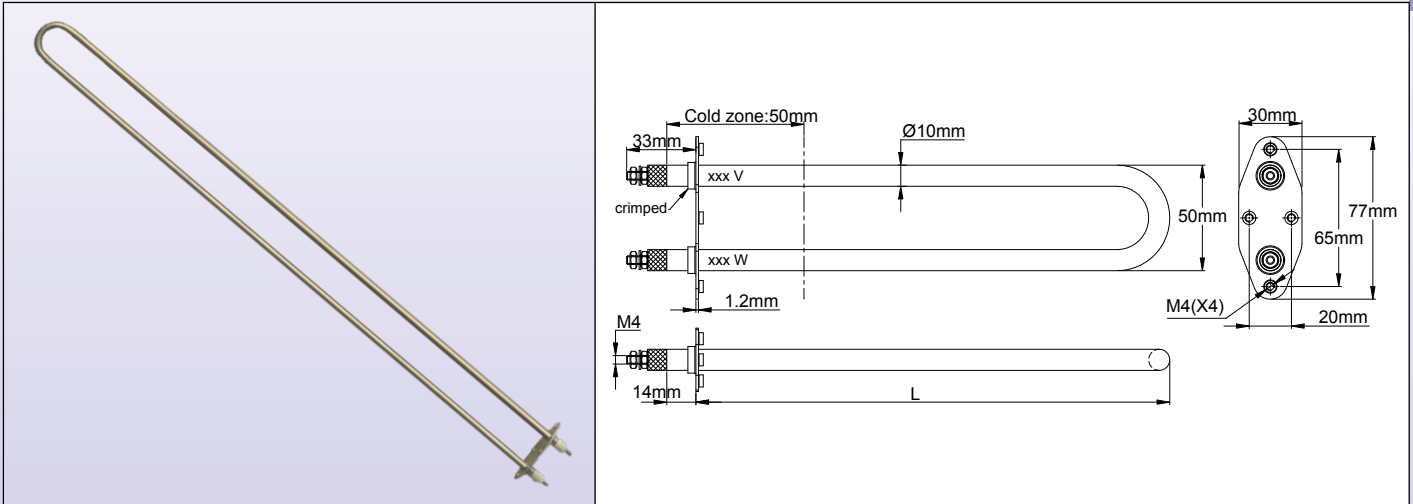
Cat24-2-4-1



# Air heating elements for incorporation

Bracket mounting sheathed tubular heaters,  
dia. 10mm, for convection heaters or fan heaters

## Type 9SR



### Description

These U shape sheathed heaters, designed for professional OEM are crimped on a light stainless steel flange, and are easy to integrate through metal wall. **They have an exceptional insulation resistance and outstanding humidity resistance. They are designed for** heating of air by natural convection or fans

### Main Features

**Heating elements material:** 10mm dia. 304L stainless steel sheath. Optional: SS 201, 316, 321, or Incolloy 800.

**Connection:** M4 stainless steel terminals screws with stainless steel M4 nuts and stainless washer, ceramic bead output.

**Insulation resistance:** > 3 GOhms (new), and > 1 GOhms (after following climatic test):

1000 hours at 100°C followed by 1000 hours at 60°C and 95% relative humidity, followed by 90 cycles of one hour from -20°C to +70°C, followed by 240 hours at -30°C.

**Dielectric strength:** > 1800 volts, 0.2mA (100% tested in production) and after climatic tests carried out by sampling.

**Bracket:** crimped, 304 stainless steel, 1.2 mm thickness, with 4 M4 threaded holes, distances 65mm and 20mm.

#### Surface load:

For safe use, we recommend a maximum surface load of 1.2 W/cm<sup>2</sup> (7.8 W/in<sup>2</sup>) for applications in natural convection (heating element surface temperature ~ 300°C), and 3 W/cm<sup>2</sup> (19.5 W/in<sup>2</sup>) for applications in forced convection (heating element surface temperature ~ 300°C for an air velocity ~ 2.5m/s).

See P11 of section 2 of this catalog tables providing surface temperatures and air temperature vs load with and without fans

**Voltage:** 230V. Other values on request

**Tolerances on power:** +5/-10%

**Options:** Other surface load, other lengths, metal or plastic junction box, thermostat control with housing, special brackets with one or more heating elements.

### Main references

1.2W/cm <sup>2</sup> (7.8W/in <sup>2</sup> )			3W/cm <sup>2</sup> (19.5W/in <sup>2</sup> )		
References	Length L (mm)	Power (W)	References	Length L (mm)	Power (W)
9SRC250A2316050A	250	160	9SRC250A2340050A	250	400
9SRC400A2327550A	400	275	9SRC400A2367550A	400	675
9SRC500A2335050A	500	350	9SRC500A2387550A	500	875
9SRC600A2342550A	600	425	9SRC600A23A0550A	600	1050
9SRC700A2350050A	700	500	9SRC700A23A2550A	700	1250
9SRC800A2357550A	800	575	9SRC800A23A1550A	800	1500
9SRC900A2360050A	900	650	9SRC900A23A1650A	900	1650



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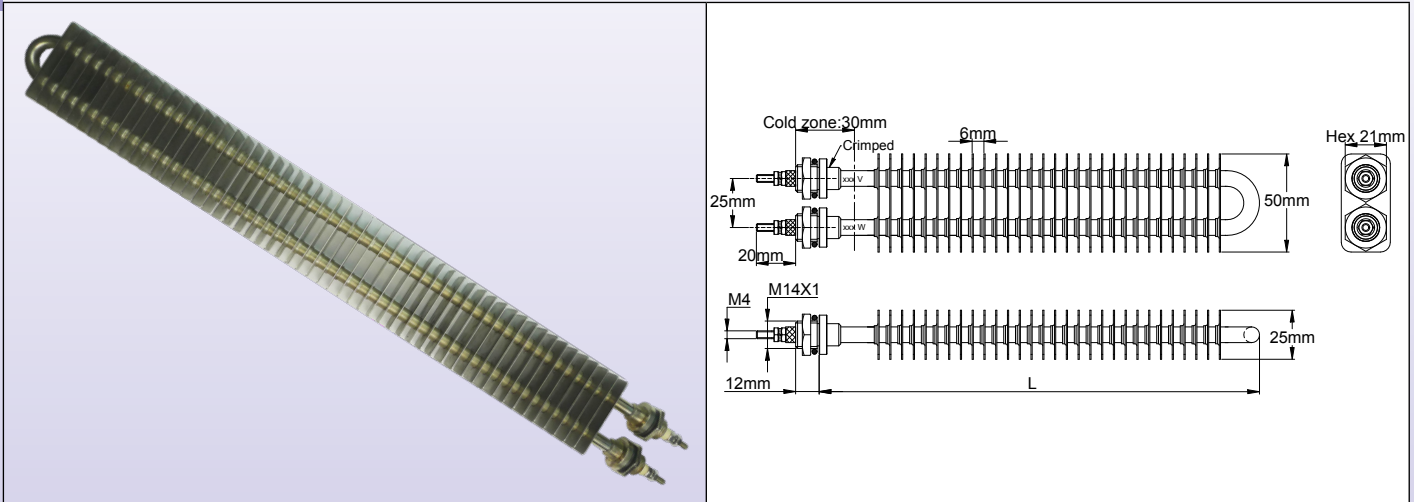
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Cat24-2-4-3

# Air heating elements for incorporation

Finned tubular heaters, for incorporation, with M12 threaded fitting, load  $3\text{W}/\text{cm}^2$  and  $4.5\text{W}/\text{cm}^2$ , for convection heaters or fan heaters

## Type 9SX



### Description

These U shape finned sheathed heaters, designed for professional OEM are crimped on a light stainless steel flange, and are easy to integrate through metal wall. They have an exceptional insulation resistance and outstanding humidity resistance. They are designed for heating of air by natural convection or fan.

### Main Features

**Heating element material:** 8mm dia. 304L stainless steel sheath. Optional: SS 201, 316, 321, or Incolloy 800.

**Fins size:**  $25 \times 50$  mm, 25 mm distance between tube axis.

**Fins material:** SS304 (Zinc plated steel fins on request, MOQ apply)

**Connection:** M4 stainless steel terminal screws with stainless steel M4 nuts and stainless washer, ceramic bead output.

**Fittings:** crimped, M14x1mm thread, in 304SS, with nickel plated brass nuts and fiber gaskets. Waterproof version with TIG welded fittings or economical version with nickel plated steel fittings are available on request (MOQ apply)

**Insulation resistance:**  $> 3$  GOhms (new), and  $> 1$  GOhms (after following climatic test):

1000 hours at  $100^\circ\text{C}$  followed by 1000 hours at  $60^\circ\text{C}$  and 95% relative humidity, followed by 90 cycles of one hour from  $-20^\circ\text{C}$  to  $+70^\circ\text{C}$ , followed by 240 hours at  $-30^\circ\text{C}$ .

**Dielectric strength:**  $> 1800$  volts, 0.2mA (100% tested in production) and after climatic tests carried out by sampling.

#### Surface load:

For safe use, we recommend a maximum surface load of  $3\text{ W}/\text{cm}^2$  ( $19.5\text{ W}/\text{in}^2$ ) for applications in natural convection (heating element surface temperature  $\sim 300^\circ\text{C}$ ), and  $4.5\text{ W}/\text{cm}^2$  ( $30\text{W}/\text{in}^2$ ) for applications in fan heating (heating element surface temperature  $\sim 300^\circ\text{C}$  for an air velocity  $\sim 2.5\text{m}/\text{s}$ ).

See P11 of section 2 of this catalog tables providing surface temperatures and air temperature vs load with and without fans

**Voltage:** 230V. Other values on request

**Tolerances on power:**  $\pm 5\%$  /  $-10\%$

**Options:** other surface load, other lengths, metal or plastic junction box, wall mounting legs, nickel or zinc plated fins, or SS201 fins

### Main references

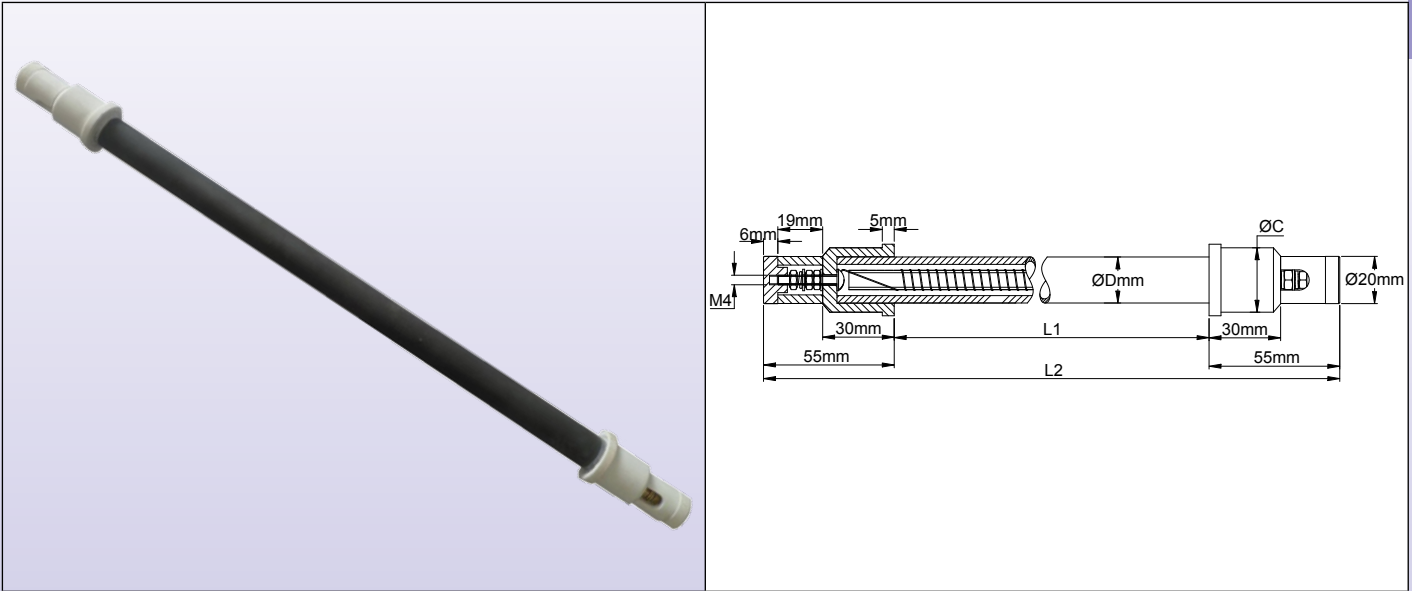
$3\text{W}/\text{cm}^2$ ( $19.5\text{W}/\text{in}^2$ )			$3\text{W}/\text{cm}^2$ ( $19.5\text{W}/\text{in}^2$ )		
References	Length L (mm)	Power (W)	References	Length L (mm)	Power (W)
9SXC175A232103C3	175	210	9SXC175A233103C3	175	310
9SXC300A2324003C3	300	400	9SXC300A236003C3	300	600
9SXC415A233503C3	415	550	9SXC415A238503C3	415	850
9SXC500A237003C3	500	700	9SXC500A23A053C3	500	1050
9SXC750A23A073C3	750	1070	9SXC750A23A603C3	750	1600
9SXCA00A23A503C3	1000	1500	9SXCA00A23B203C3	1000	2200



# Air heating elements for incorporation

Last generation of infrared tubular heaters, for assemblers

## Type 9MN



### Main features

Designed to be used by assemblers, these tubes radiate in the infrared between 3 and 6 $\mu$ . They are characterized by an emissivity close to 100% within this range, they show a low surface temperature, a high mechanical strength, and high corrosion resistance.

They are particularly suited for heating, drying, or polymerization of a large part of usual materials where they heat faster than the traditional convection heating. It is recommended to install them on a reflector.

### Applications

- Drying at low temperature leather, wood, prints and dyes, paints, ceramic email, food, fish.
- Varnish Polymerization on metal in automotive, appliances and similar industries
- Maintain temperature of products displayed or waiting in fast food and restaurants
- Heating of plastics before forming
- Sterilization of medical devices and equipment or food
- Outdoor ambient warming
- Reheating workstation in workshop
- Heating of stables, poultry

### Specifications

#### RadiatingTube:

**Material:** sintered silicon carbide, 3mm thickness.

**Corrosion resistance:** higher than tungsten carbide and alumina, particularly at high temperature

**High mechanical resistance to bending in 3 points:** 550 MPa at room temperature (on 3 x 4 x 45mm rod)

**Low-thermal expansion:** 4.10-6 mm/MMK

**High thermal-conductivity at 200°C:** >100 W/mK

This high thermal conductivity guarantees outstanding temperature uniformity over the entire length of the tube, resulting in a well-focused wavelength of infrared radiation.

#### Heater assembly

##### **Insulation resistance:**

- Measured between outer tube and live part: >100Gohm (cold-state)
- Measured at 450°C between ceramic brackets and live parts: >20 Gohms

**High-pot insulation:** >2500V

**Outside standard diameters:** 12mm and 20mm. 14 and 17mm on request (MOQ apply)

**Power density:** 3 W/cm<sup>2</sup>. (Other values on request if the wavelength must be modified)

**Warm up time:** less than 5 minutes (From room temperature to stabilization)

**Heater wire:** 80/20 Nickel Chrome wounded on quartz rod

**Surface temperature:** 400 to 450°C @ 25°C.

**Electrical connections:** screw-in ceramic cap, stainless steel M4 screws

**Mounting:** both ends of the tubes have an alumina ceramic section for fixing by clamps

**Voltage:** 230V standard. Other voltages on request (MOQ apply)

**Options:** several tubes grouped side by side on the same surface, or on a cylindrical surface to achieve radiant panels.



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Cat24-2-4-5

# Air heating elements for incorporation

## References for tubes with 12mm OD, loaded at 3W/cm<sup>2</sup>.

Overall length (L2)	Effective length (L1)	Mounting diameter (C)	Power (Watts)	Reference
310	200	19 mm	225	9MNP200E232255A0
410	300	19 mm	340	9MNP300E232340A0
510	400	19 mm	450	9MNP400E232450A0

## References for tubes with 12mm OD, loaded at 3W/cm<sup>2</sup>.

Overall length (L2)	Effective length (L1)	Mounting diameter (C)	Power (Watts)	Reference
310	200	27mm	375	9MNP200H232375D0
400*	280*	27mm	525	9MNP280H235255D0
510	400	27mm	750	9MNP400H237505D0
610	500	27mm	950	9MNP500H239505D0
700*	580*	27mm	1100	9MNP580H23A105D0
910	800	27mm	1500	9MNP800H23A505D0
1110	1000	27mm	1900	9MNPA00H23A905D0
1310	1200	27mm	2250	9MNPA20H23B255D0

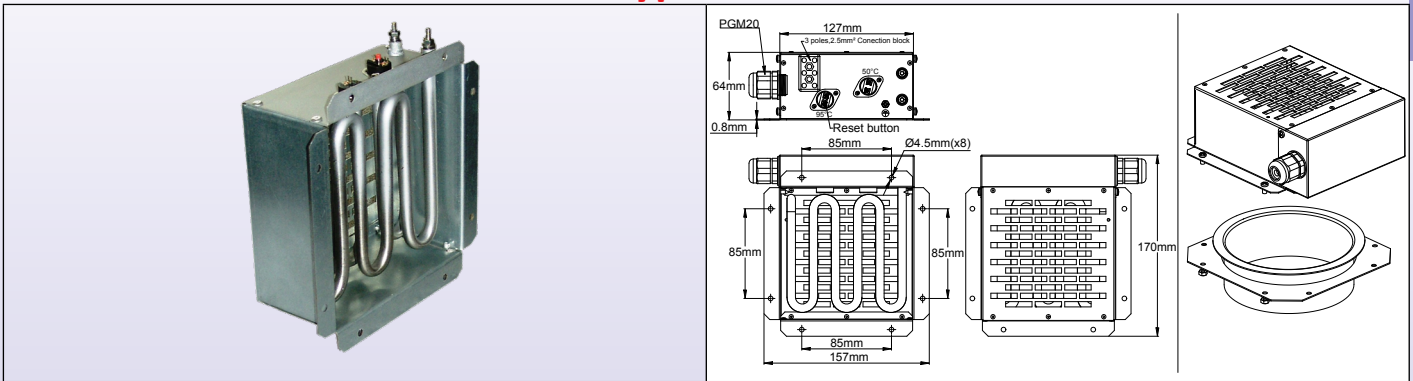
\* For use in reflectors of products page 16

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# Air heating elements for incorporation

## Small size air duct square heaters, for incorporation, 400 to 1200W Type 9NN



### Typical applications

Thin and compact air duct heaters, designed to be used in industrial or commercial air conditioning systems. Their design allows to mount them at the end of 125mm dia. air duct on existing circuits. One of their applications is to allow, without costly work, to boost air/air type heat pumps whose power is insufficient in extreme weather conditions. They are intended to be used by integrators in ventilated air ducts.

They are made of a stainless steel sheathed tubular heating element, mounted on an electro-galvanized steel or stainless steel frame. They can be supplied with or without electrical connection box.

They are supplied with 2 levels of temperature overheat protection.

### Main features

**Frame:** Galvanized steel sheet or 304 stainless steel

**Safety thermostat N°1:** automatic reset, open at 50°C, reset at 40°C

**Safety thermostat N°2:** Open at 95°C. Manual reset

**Heating element:** 8mm diameter sheathed tubular heating element, stainless steel 304L. (Other features, see P3 of section 4)

**Power vs Heater surface loads and minimum flow \*:**

- For 400W the surface load is 1.2W/cm<sup>2</sup>, and minimum air velocity must be 0.5 m/s, i.e. a rate equal to or greater than 28m<sup>3</sup>/h in a dia. 125mm duct.

- For 600W the surface load is 1.8W/cm<sup>2</sup>, and minimum air velocity must be 1.5 m/s, i.e. a rate equal to or greater than 84m<sup>3</sup>/h in a dia. 125mm duct.

- For 1200W the surface load is 3.6W/cm<sup>2</sup>, and minimum air velocity must be 2.5 m/s, i.e. a rate equal to or greater than 140m<sup>3</sup>/h in a dia. 125mm duct.

\* Indicative values. Calculated so that the surface temperature of the heating elements does not exceed 300°C. It is up to the integrator to perform the appropriate checks on flow and temperatures reached in the application, so that they conform to the regulations and safety standards.

**Voltage:** 220/240V, 50/60Hz (110-120V on request)

**Connection box**(in models supplied with it): IP40 with M20 cable gland in PA66

**Connection:** ceramic terminal block 3 × 2.5mm<sup>2</sup>

**Mounting:** on flat surface, with 8 screws. Also allows the mounting on a 125mm dia. metal duct with a collar lip diameter 144mm to 150mm. (See accessories hereunder)

**Options:** other surface load, other thermostat set point temperatures (MOQ apply)

### Main references

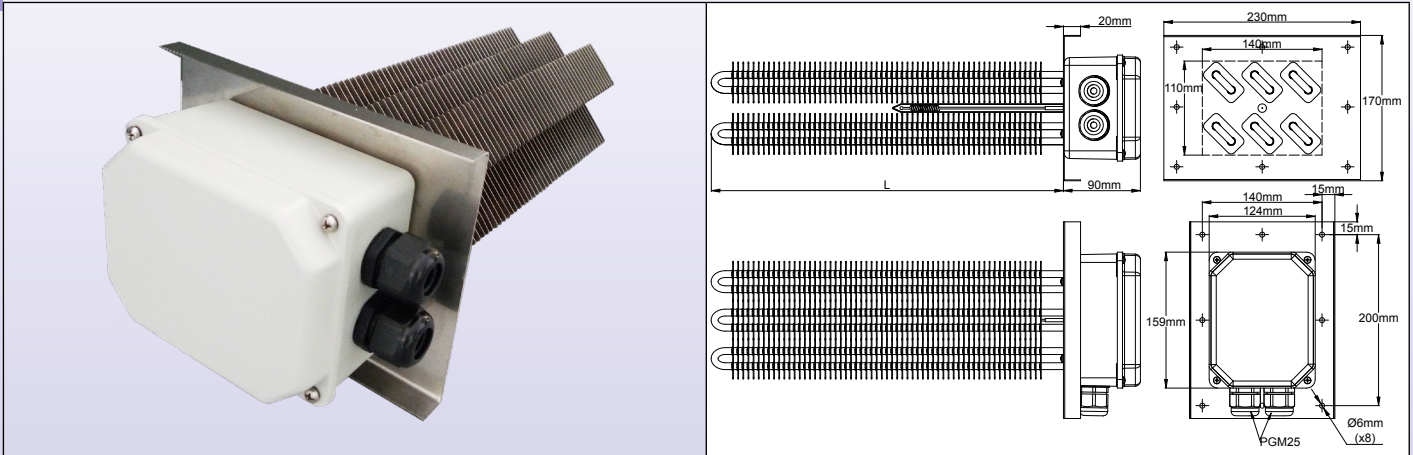
References with zinc plated steel enclosure	References with SS304 enclosure	Power (W)	Connection box	Surface load (W/cm <sup>2</sup> )	Surface load (W/in <sup>2</sup> )	Accessory	
9NNL128G23400BJ0	9NNL128423400BJ0	400	No	1.2	7.7		
9NNL188G23600BJ0	9NNL188423600BJ0	600	No	1.8	11.6		
9NNL368G23A20BJ0	9NNL368423A20BJ0	1200	No	3.6	23.2		
9NNL188G23600BJC	9NNL188423600BJC	400	Yes	1.2	7.7	Bracket and collar tube for 125mm dia. duct (zinc plated steel)	
9NNL368G23A20BJC	9NNL368423A20BJC	600	Yes	1.8	11.6		
9NNL188G23600BJC	9NNL188423600BJC	1200	Yes	3.6	23.2		
						Reference	9NNCT125



# Air heating elements for incorporation

Medium power duct heaters, with finned stainless steel heaters,  
3.5W/cm<sup>2</sup>, for air speed ≥ 2m/s

## Type 9NF



### Main applications

These medium duct heaters are mainly used in air ducts, upstream vents, for heating industrial premises, in closed hot air circuit (recirculating air) or open circuit, with a mini air speed of 2m/s.

They are also used for drying, for heat treatment, dehydration, or cooking, in industrial processes.

They can be used on square or rectangular ducts. They consist of finned stainless steel heating elements, mounted on a stainless steel flange. Their installation in existing pipes requests cutting a 140 × 110mm rectangular hole, and drill 8 holes for 6mm dia. screws. The electrical connections are made in an IP65 aluminum housing. These devices are equipped with a 3 pole manual reset failsafe limiter.

### Main features

**Assembly:** The finned tubes are oriented at 45° from the axis of the mounting bracket, thereby it is possible to position the duct heater along or perpendicular to the duct upon available spacing.

**Ducts minimum sizes:**

170mm heating element references: 200 × 170mm

320mm heating element references: 350 × 170mm

420mm heating element references: 450 × 170mm

**Duct opening:** 140 × 110mm rectangular hole, plus 8 holes for dia.6mm screws (or equivalent size).

**High limit thermostat:** 3 poles, failsafe, manual reset, capillary thermostat, calibrated at 120°C (other values on request). Bulb mounted inside a waterproof pocket.

**Connection box:** in gray epoxy paint aluminum housing, IP65, 160 × 124 × 92mm, fitted with two M25, PA66 cable glands.

**Minimum air velocity:** ≥ 2m/s

**Mounting bracket:** 304 stainless steel, 150 × 235mm, 1.2 mm thick, with 8 holes for M6 screws (undrilled version on request). IP65 sealing between the heating elements, connection box and bracket

**Heating elements:** 3 or 6, non-removable, finned heaters, surface load 3.5W/cm<sup>2</sup>, 304L stainless steel, with internal connection on M4 screw terminals. The power of each element is 250 watts in 170mm, 500W in 320mm and 700W in 420mm (Other features, see P4 of section 4)

**Voltage:** 230V, 50/60Hz (110-120V on request). Wiring is possible in 230V single phase, or in 400V three-phase with neutral.

**Power, surface load, air flow:**

See section 2 of this catalog tables providing surface temperatures and air temperature vs load with and without fans. However, it is up to the integrator to perform the appropriate checks of flow and temperatures reached in the application, and insure that they comply with the local regulations and safety standards.

### Main references

3 finned heating elements			6 finned heating elements		
References	Total power (W)	Length L	References	Total power (W)	Length L
9NFL170C230753NC	750	170	9NFL170C231506NC	1500	170
9NFL320C231503NC	1500	320	9NFL320C233006NC	3000	320
9NFL420C232103NC	2100	420	9NFL420C234206NC	4200	420

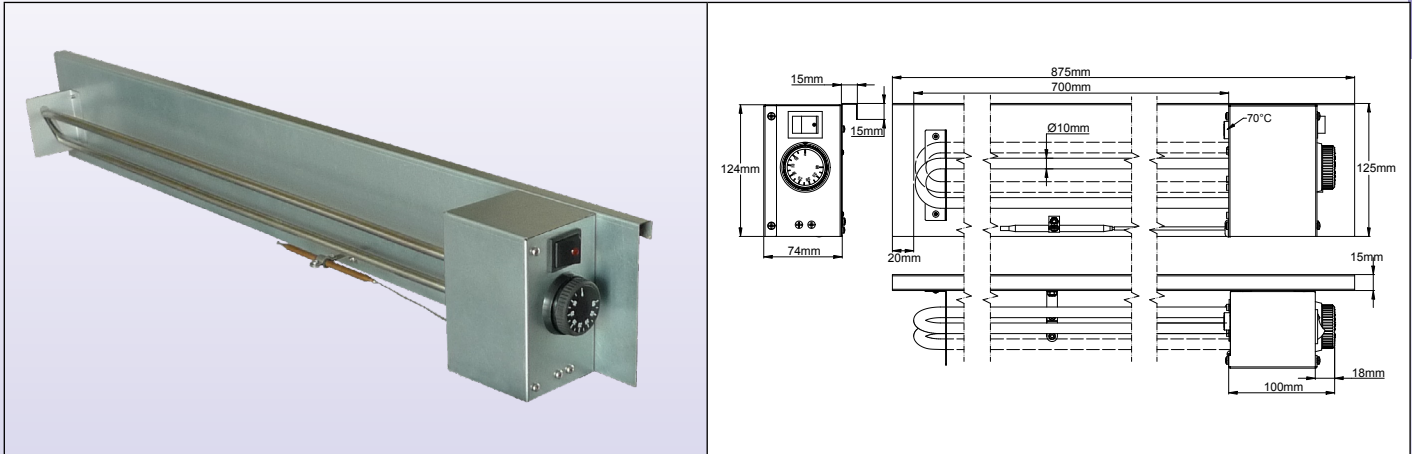




# Air heating elements for incorporation

Type with tubular sheathed heating element, thermostat and high limit.

## Type 9SQ



### Main applications

These heavy duty sub-assemblies are designed to allow remodeling operations in existing buildings and apartments, replacing old generation of electric heating convectors while preserving the existing locations and frames. Wall mounting by a U-rail at the rear allows easy positioning. The use of a sheathed stainless steel heating element gives an outstanding life span.

They are equipped with an adjustable thermostat, allowing local control of temperature. Their control circuit can also be controlled by a centralized control. A safety thermostat protects against the air flow outlet covering. They exist in a version for natural convection heating and a fan assisted convection heating.

### Main features

**Dimensions:** 875 × 124 × 74mm

**Frame material:** electro-galvanized steel

**Heating elements:** one or two sheathed elements, 10mm diameter, stainless steel 304L, length 700mm (Optional: 321 stainless steel).

**On-Off switch:** 2 poles rocker switch, illuminated

**High limit thermostat:** disc, manual reset, open at 70°C, used to protect against obstruction of air inlet or outlets.

**Temperature control thermostat:** bulb and capillary, temperature range 4-40°C

**Electrical connection:** ceramic terminal block

**Surface load:**

For safe use, we recommend a maximum surface load of 1.2 W/cm<sup>2</sup> (7.8 W/in<sup>2</sup>) for applications in natural convection (surface temperature resistance ~ 300°C), and 2.4 W/cm<sup>2</sup> (15.6W/in<sup>2</sup>) for applications in forced convection (surface temperature resistance ~ 250°C for an air velocity ~ 2.5m/s).

See section 2 of this catalog tables providing surface temperatures and air temperature vs load with and without fans.

**Voltage:** 230V. Other values on request

**Tolerances on power:** +5/-10%

**Warning:** heating element surface can reach high temperature and may cause burns or ignition of flammable materials. The integrator must ensure that in its application, these heaters cannot be touched by the final user, and cannot come into contact with combustible materials. For this purpose he must follow the installation specification requested by local and applicable standards.

**Options:**

This product can be produced on demand with different lengths. (MOQ apply).

### Main references

One heating element				Two heating elements			
References	Total power (W)	W/cm <sup>2</sup>	W/in <sup>2</sup>	References	Total power (W)	W/cm <sup>2</sup>	W/in <sup>2</sup>
9SQL12GA123050EC	500	1.2	7.8	9SQL12GA223100EC	1000	1.2	7.8
9SQL24GA123100EC	1000	2.4	15.6	9SQL24GA223200EC	2000	2.4	15.6



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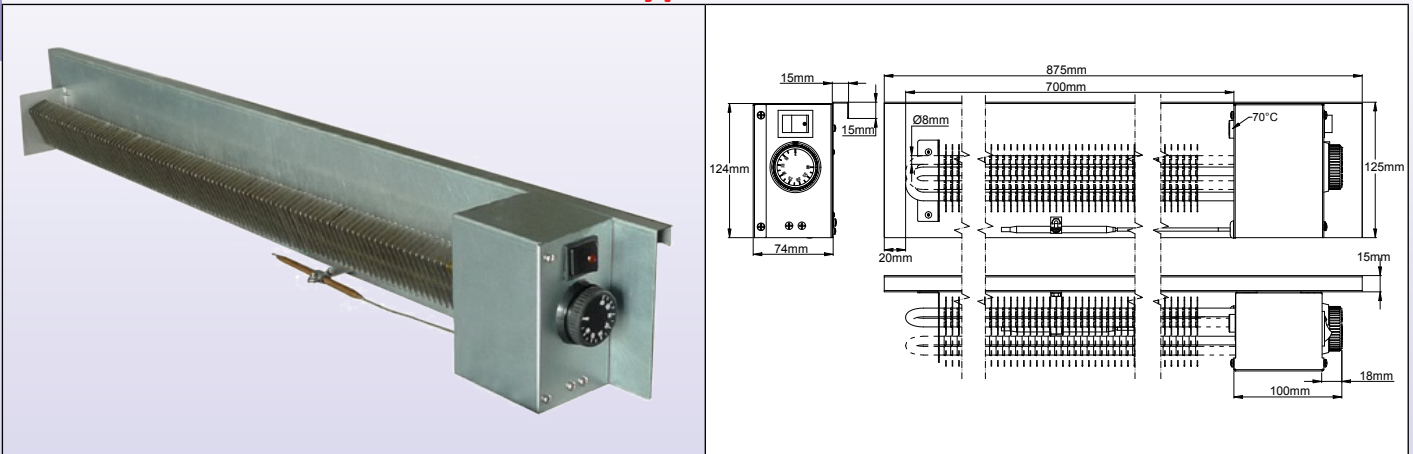
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Cat24-2-4-9

# Air heating elements for incorporation

Type with finned sheathed heating element, thermostat and high limit.

## Type 9SY



### Main applications

These heavy duty sub-assemblies are designed to allow remodeling operations in existing buildings and apartments, replacing old generation of electric heating convectors while preserving the existing locations and frames. Wall mounting by a U-rail at the rear allows easy positioning. The use of a sheathed stainless steel heating element gives an outstanding life span.

They are equipped with an adjustable thermostat, allowing local control of temperature. Their control circuit can also be controlled by a centralized control. A safety thermostat protects against the air flow outlet covering.

These models with fins allow a bigger power than the tubular sheathed models, and their surface temperature is lower.

### Main features

**Dimensions:** 875 × 124 × 74mm

**Frame material:** electro-galvanized steel

**Heating elements:** one or two finned elements, stainless steel 304L, length 700mm.

**On-Off switch:** 2 poles rocker switch, illuminated

**High limit thermostat:** disc, manual reset, open at 70°C, used to protect against obstruction of air inlet or outlets.

**Temperature control thermostat:** bulb and capillary, temperature range 4-40°C

**Electrical connection:** ceramic terminal block

**Surface load:**

For safe use in this application, we recommend a maximum surface load of 2.4 W/cm<sup>2</sup> (15.5 W/in<sup>2</sup>) for applications in natural convection (heating element surface temperature ~ 300°C), and 3.6 W/cm<sup>2</sup> (23.2W/in<sup>2</sup>) for applications in fan heating (heating element surface temperature ~ 300°C for an air velocity ~ 2.5m/s).

See, in last section of this catalog, surface temperatures and air temperature vs surface load, with and without fan.

**Voltage:** 230V. Other values on request

**Tolerances on power:** +5/-10%

**Warning:** heating element surface can reach high temperature and may cause burns or ignition of flammable materials. The integrator must ensure that in its application, these heaters cannot be touched by the final user, and cannot come into contact with combustible materials. For this purpose he must follow the installation specification requested by local and applicable standards.

**Options:**

This product can be produced on demand with different lengths. (MOQ apply).

### Main references

One heating element				Two heating elements			
References	Total power (W)	W/cm <sup>2</sup>	W/in <sup>2</sup>	References	Total power (W)	W/cm <sup>2</sup>	W/in <sup>2</sup>
9SYL24GA123085EC	850	2.4	15.5	9SYL12GA223170EC	1700	2.4	15.5
9SYL36GA123125EC	1250	3.6	23.2	9SYL24GA223250EC	2500	3.6	23.2

