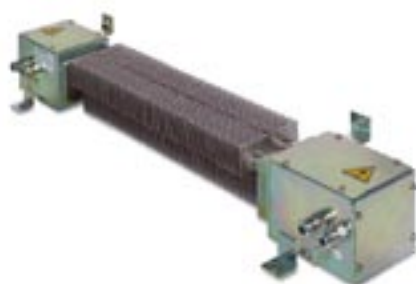
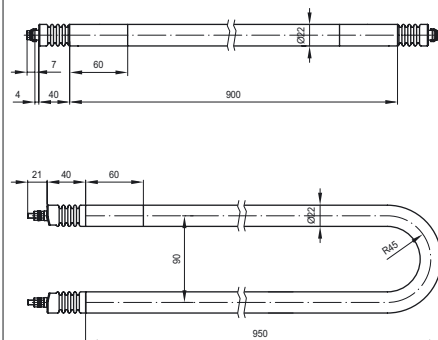


## Air and water heaters for rail vehicles



**F 195.en**

## Heaters for rail vehicles

Development and manufacture of heaters for rail vehicles has a tradition for decades with Schaltbau.

Schaltbau's radiators and tubular elements for air and water heaters are the backbone of the air conditioning system and supply of warm water in rail vehicles all over

Europe. To meet different demands we developed a great variety of products - our standard product line.

Do you need a special variant? Do not hesitate to contact us. We also manufacture to customer requirements. In this case, however, minimum order quantities apply.

### Features

- Fully qualified for railway service
- Long life owing to special design
- Corrosion-resistant heaters made of chrome nickel steel (INOX)
- High dielectric strength, resistor wire embedded in watertight sheath
- Suitable for nominal voltages of 3 kV DC max.; dielectric strength 8 kV<sub>cold</sub> min.!

### Applications

**Heaters in air conditioning systems of European rail vehicles - also used for cross-border traffic**

#### • Tubular elements for air heaters

Schaltbau tubular elements are designed for use in electric convection heaters and heaters in ventilation and air conditioning systems of rail vehicles. When connected in series the nominal voltage over all serial elements is 3 kV.

#### • Radiators

Our radiators are used where in addition to the air conditioning system of a rail vehicle further convection heaters become necessary as, for instance, in vestibules, corridors, sanitary facilities, and driver's cabs of multiple unit trains. They are also applied in rolling stock for commuter service where there is no central heating and air conditioning system.

**Heaters for the supply of warm water in European rail vehicles, also used for cross-border traffic**

#### • Tubular elements for water heaters

In water heaters of air conditioning systems and for heating tanks of drinking and service water, tubular elements are used. They serve a double function: they heat the water and protect the tank against freezing. The operating voltage of a tubular heater system is 3 kV max.

#### Special purpose heaters

Do you need a special variant? Do not hesitate to contact us! Maybe the heater you are looking for is among our many **special designs**. If not, we also supply heaters **manufactured to customer requirements**. In this case, however, minimum order quantities apply.

### Ordering code

Example: **IA108-250-500-L0450-A**

#### Series

Air heaters, tubular element

IA008	straight
IA108	straight
IA109	U-shape
IA114	U-shape

Water heaters, tubular element

ZHx81	ZH081, ZH381 ZH581, and ZH881 Series
-------	-----------------------------------------

Radiators

ZHxxx	ZH024, ZH242, ZH254, ZH449, ZH481, and ZH485 Series
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#### Nominal voltage

250	250 V example, dependent on variant *
-----	------------------------------------------

#### Nominal load

500	500 W example, dependent on variant *
-----	------------------------------------------

#### Length

L0450	450 mm example, dependent on variant *
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#### Diameter, finish, terminal type

Diameter

none	Ø 22 mm, all air heaters	} water heaters only
25	Ø 25 mm	
28	Ø 28 mm	

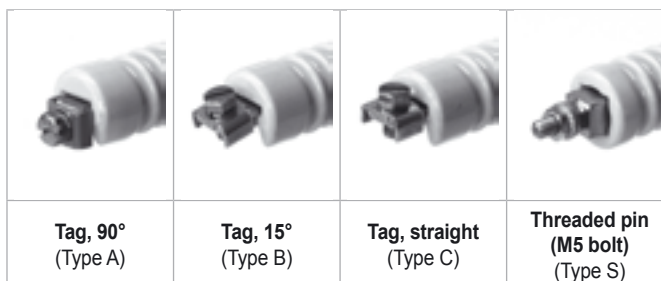
Finish

none	Chrome nickel steel (INOX), air heaters only	} water heaters only
L	coated	
V	chromed	

#### Terminal type

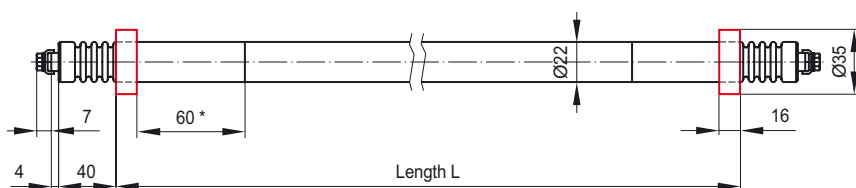
A	Tag, 90°
B	Tag, 15°
C	Tag, straight
S	Threaded pin (M5 screw)

\* Value dependent on variant manufactured to customer requirements (nominal voltage, sheath temperature, nominal load), see also page 7 »How to choose the heater of the right size«.



## IA008 Series Tubular heaters

Air heaters

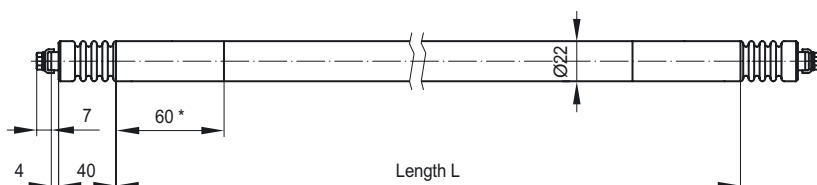


### IA008 Stock items

IA008-125-167-L0450-A
IA008-250-167-L0450-A
IA008-500-333-L0750-A
IA008-500-333-L0950-A

## IA108 Series Tubular heaters

Air heaters

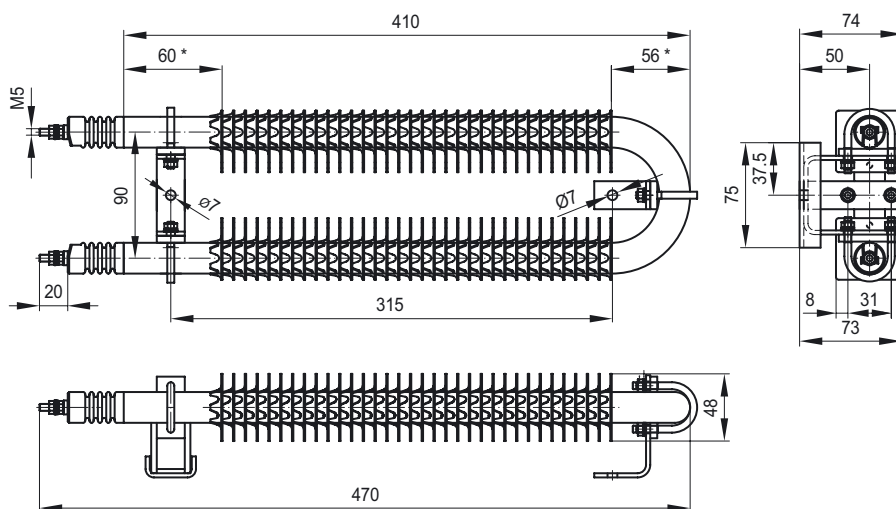


### IA108 Stock items

IA108-125-1000-L1180-S
IA108-150-400-L0900-S
IA108-500-200-L0505-C
IA108-500-500-L0710-B
IA108-500-200-L0945-C
IA108-500-250-L1080-B
IA108-500-250-L1260-B
IA108-500-250-L1470-B
IA108-500-375-L1260-B
IA108-500-375-L1470-B
IA108-500-1000-L1115-A
IA108-600-200-L0548-B

## ZH1037 Series Tubular heater, ribbed

Air heater

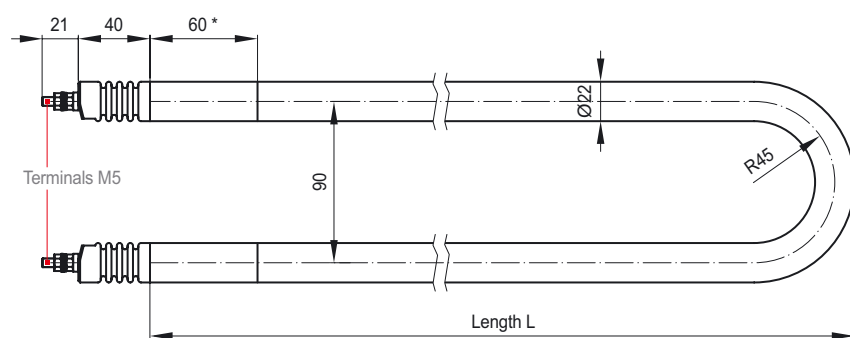


### ZH1037 Stock item

ZH1037-750-300-L0470
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## IA109 / IA114 Series Tubular heaters

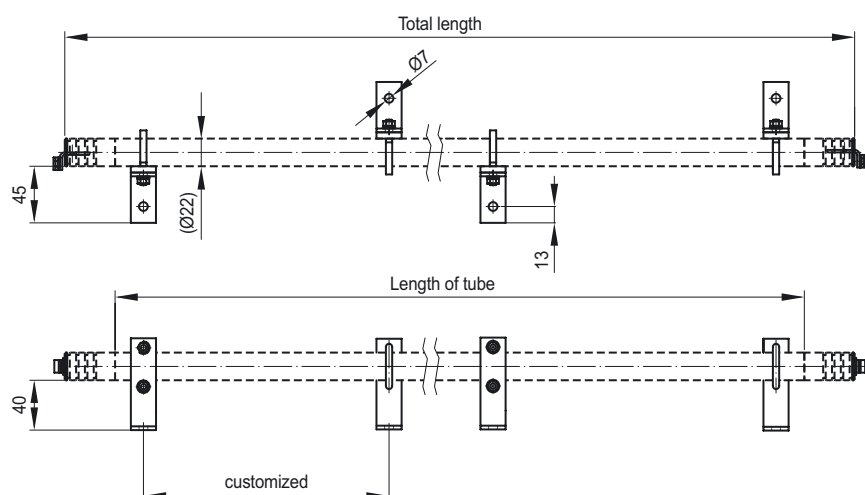
Air heaters



Series	Stock items
IA109	IA109-150-300-L0418-S
	IA109-150-400-L0512-S
	IA109-250-1100-L0568-S
IA114	IA114-500-500-L0454-S

## ZH1040 Mounting brackets for tubular heaters

Accessories air heaters

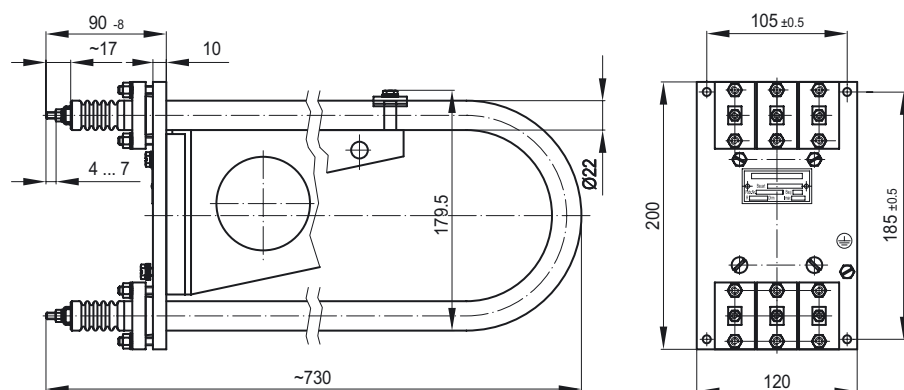


### ZH1040 Mounting brackets for

IA008-vvv-xxx-Lyyy-z
IA108-vvv-xxx-Lyyy-z
IA109-vvv-xxx-Lyyy-z
IA114-vvv-xxx-Lyyy-z
ZH485

## Series resistors

Air heaters, brake resistors

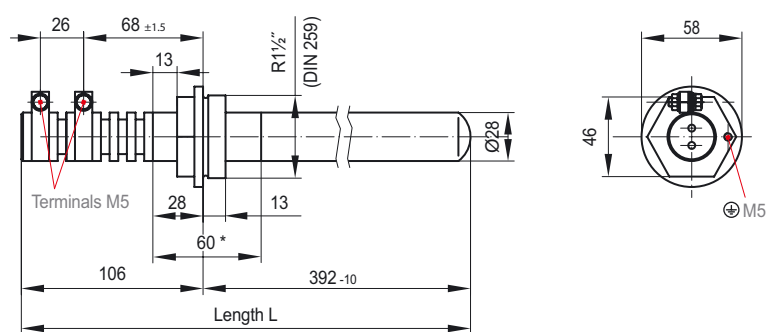


### IA109-xxx Stock items

IA109-4,5
IA109-4,5/4,5
IA109-4,5/4,5/4,5
IA109-4,5/7/7
IA109-7
IA109-7/4,5/4,5
IA109-7/7/4,5
IA109-15
IA109-15/15/15
IA109-250
IA109-250/250
IA109-710
IA109-710/710

**ZH081, ZH381, ZH581, ZH881 Series** Tubular heaters

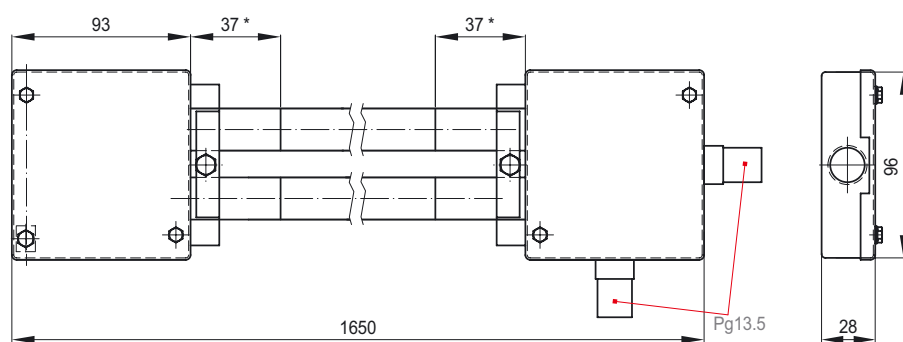
Water heaters



Series	Stock items
ZH081	ZH081-167-500-L433-25-L
	ZH081-500-500-L433-25-L
	ZH081-500-500-L433-25-V
ZH381	ZH381-250-1300-L499-28
ZH581	ZH581-250-930-L430-28
ZH881	ZH881-250-900-L392-28
	ZH881-500-500-L4332-28
	ZH881-500-750-L433-28
	ZH881-500-1600-L773-28
	ZH881-500-2000-L770-28

**ZH242 Series** Radiator

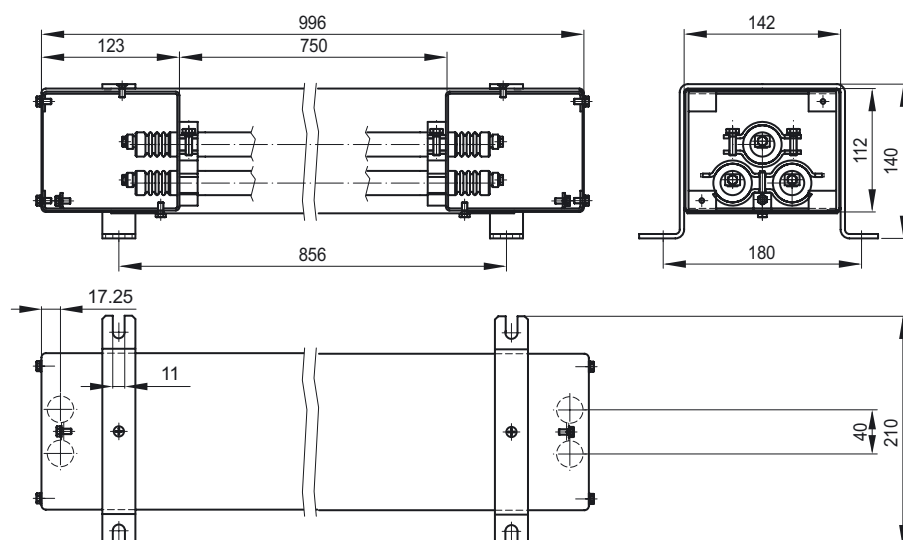
Air heater


**ZH242** Stock item

ZH242-1000-750-L1650

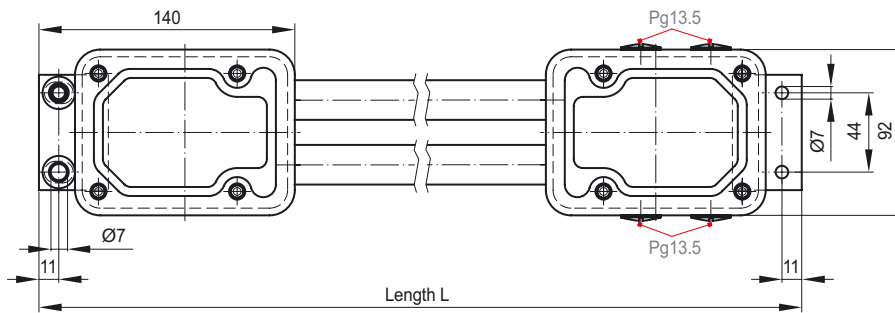
**ZH254 Series** Radiator

Air heater


**ZH254** Stock item

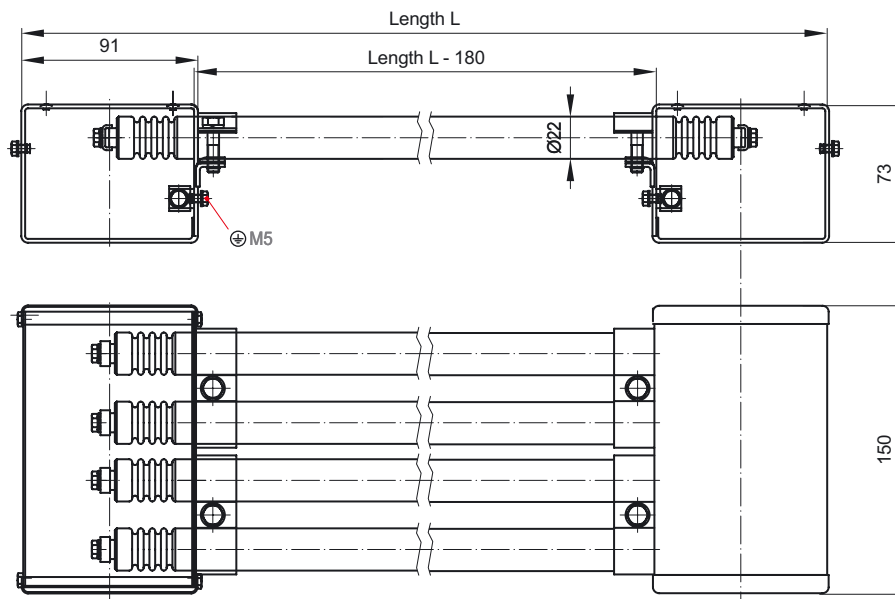
ZH254-500-999-L0996

## Air heaters



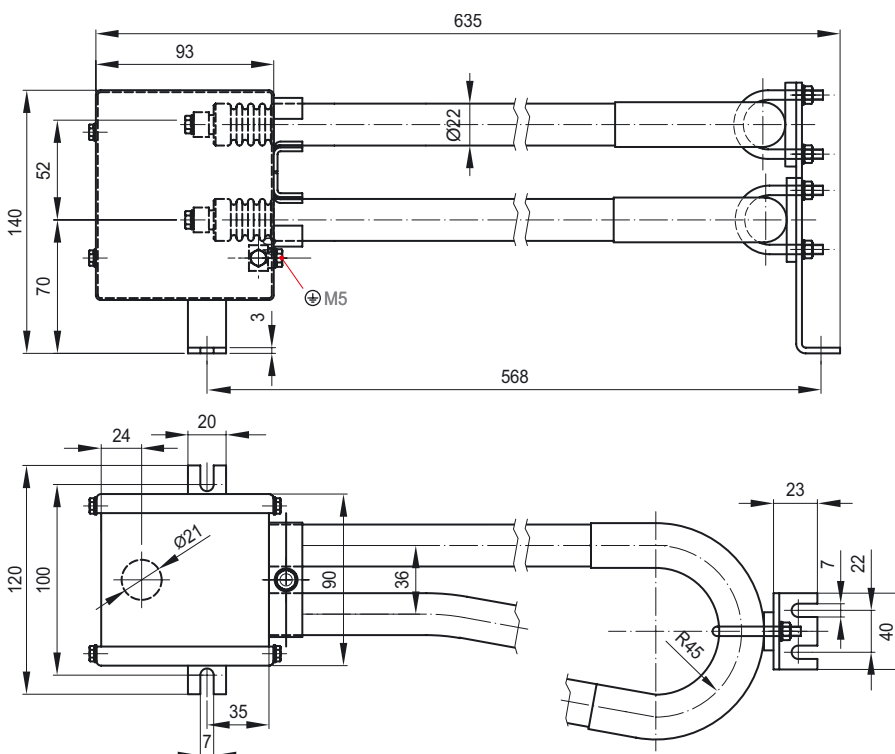
ZH024-1000-400-L1170

## Air heaters



ZH449-1000-1250-L1650

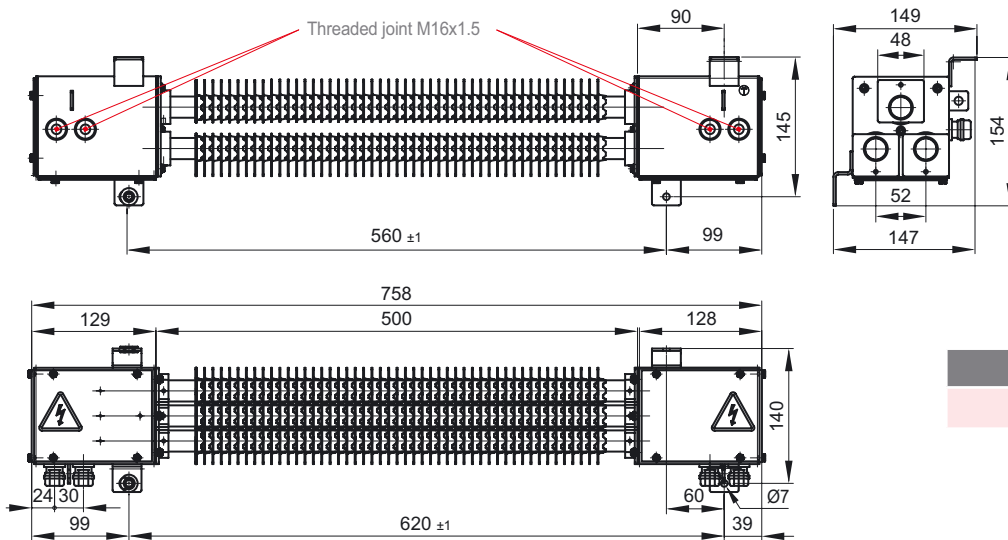
Air heater



ZH485-500-750-L0635

## ZH1039 Series Radiator

Air heater



ZH1039 Stock item

ZH1039-1800-600-L0758

## How to choose the heater of the right size

For choosing the heater with the proper dimensions the following instructions should be observed. The right size of a heater

depends on the minimum length of its coiled resistor wire and the maximum permissible sheath temperature.

### 1. Maximum sheath temperature

Watt density is the amount of power in watts which a heater produces per square centimetre of heated surface area ( $W/cm^2$ ). In accordance with UIC 550 the supply voltage may vary between -30 % and +25 %. With line voltage 3 kV DC a range of -40 % up to +35 % is tolerated including voltage peaks of 5 kV for 20 msec. duration. The wattage rating of the heater ( $P = U^2 / R$ ) is, therefore, increased by the operating voltage squared. This means that with an overvoltage of 25 % the wattage rating of the heater goes up 56.25 % (+35 % overvoltage even results in a 82 % increase of the wattage rating!).

Notice that the wattage rating of the heater directly impacts the watt density. Consequently, the size of the surface area of the heating elements must be large enough to cope with this „worst case“ and prevent the elements from burning through.

### 2. Minimum length of coiled resistor wire

The resistance element of an electric heater is usually in the form of a wire which is wound on an insulator in such a way that the individual coils are separate and do not touch. The wire has a specific diameter to be capable of carrying the current required. This results in a maximum resistance per cm of coiled wire. And from this the minimum length of a heating element necessary for a specific heat output can be derived.

So the minimum length of the coiled resistor wire and the maximum sheath temperature should be taken into consideration in selecting the right size of a heater element.

Sheath temperature can also be reduced by using ribbed tubular heater elements such as ZH1037 and ZH1039 Series ones.

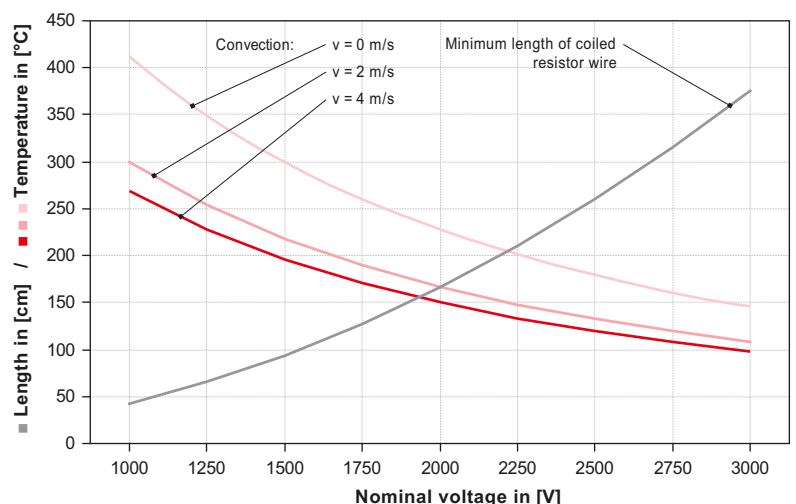
Heater power required for heating rooms or service water is dependent on the following parameters:

- the volume of the medium to be heated (air or water)
- the specific heat of the medium
- the difference in temperature
- the time available

Sheath temperature of the heating element plays no part in this. It is, however, important for deciding on the size of the heating element.

Fire protection requirements specify the maximum permissible sheath temperature which is influenced by the coiled resistor wire and the size of the heating element!

The diagram on the right shows the dimensioning of a 500 W air heater.





Schaltbau GmbH has an environment management system that has been certified since 2002.



Schaltbau GmbH has a quality management system that has been certified since 1994.

## Electrical Components and Systems for Railway Engineering and Industrial Applications

### Connectors

- Connectors manufactured to industry standards
- Connectors to suit the special requirements of communications engineering (MIL connectors)
- Charging connectors for battery-powered machines and systems
- Connectors for railway engineering, including UIC connectors
- Special connectors to suit customer requirements

### Snap-action switches

- Snap-action switches with positive opening operation
- Snap-action switches with self-cleaning contacts
- Enabling switches
- Special switches to suit customer requirements

### Contactors

- Single and multi-pole DC contactors
- High-voltage AC/DC contactors
- Contactors for battery powered vehicles and power supplies
- Contactors for railway applications
- Terminal bolts and fuse holders
- DC emergency stop switches
- Special contactors to suit customer requirements

### Control devices

- Master controllers and reversers for railway applications
- Toggle switch devices
- Handles and foot switches for railway applications (dead-man equipment)
- Switching elements with high breaking capacity
- Emergency brake handles
- Signal devices

### Transportation system equipment

- Power supplies for passenger coaches (electric equipment)
- Battery chargers for locomotives and passenger coaches
- High-voltage equipment for single and multi-phase operation
- Heating devices and heating controls
- Design and engineering services for high-voltage equipment
- Special equipment to suit customer requirements

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with compliments: