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Electrics for rolling stock

Air and water heaters for rail vehicles

Catalogue F195.en

more information here: schaltbau-gmbh.com
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.

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 up to 9 kV cold!

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

<table>
<thead>
<tr>
<th>Series</th>
<th>Example:</th>
<th>Ordering code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air heaters, tubular element</td>
<td>IA008</td>
<td>straight</td>
</tr>
<tr>
<td>IA108</td>
<td>straight</td>
<td></td>
</tr>
<tr>
<td>IA109</td>
<td>U-shape</td>
<td></td>
</tr>
<tr>
<td>IA114</td>
<td>U-shape</td>
<td></td>
</tr>
<tr>
<td>Water heaters, tubular element</td>
<td>ZH301</td>
<td>ZH081, ZH381</td>
</tr>
<tr>
<td>ZH581</td>
<td>and ZH881 Series</td>
<td></td>
</tr>
<tr>
<td>Radiators</td>
<td>ZH001</td>
<td>ZH024, ZH242, ZH254,</td>
</tr>
<tr>
<td>ZH449, ZH481, and ZH485 Series</td>
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<td></td>
</tr>
</tbody>
</table>

Nominal voltage

- 250 V example, dependent on variant *

Nominal load

- 500 W example, dependent on variant *

Length

- 450 mm example, dependent on variant *

Diameter, finish, terminal type

- Ø 22 mm, all air heaters
- Ø 25 mm, water heaters only
- Ø 28 mm

Finish

- Chrome nickel steel (INOX), air heaters only
- coated
- chromium plated, water heaters only

Terminal type

- Tag, 90° (Type A)
- Tag, 15° (Type B)
- Tag, straight (Type C)
- Threaded pin (M5 bolt) (Type S)

* 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

![Fig. 1: Tubular heaters](image1)

![Fig. 2: Tubular heaters, ribbed](image2)

**IA108 Series** Tubular heaters

![IA108 Series Tubular heaters](image3)

**ZH1037 Series** Tubular heaters, ribbed

![ZH1037 Series Tubular heaters, ribbed](image4)

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*Reduced scale diagrams / dimensions in mm*

**Air heaters**

**Series** | **L** | **Stock items** | **Fig.**
---|---|---|---
IA008 | 405 | IA008-125-167-L0405-A | 1
IA008 | 450 | IA008-250-167-L0450-A | 1
IA008 | 490 | IA008-250-175-L0490-A | 1
IA008 | 750 | IA008-500-333-L0750-A | 1
IA008 | 950 | IA008-500-333-L0950-A | 1
IA008 | 1098 | IA008-600-1500-L1098-S-R | 2

**IA108 Series** Tubular heaters

**Series** | **L** | **Stock items**
---|---|---
IA108 | 1180 | IA108-125-1000-L1180-B
IA108 | 548 | IA108-400-200-L0548-B
IA108 | 505 | IA108-500-200-L0505-C
IA108 | 710 | IA108-500-200-L0710-B
IA108 | 945 | IA108-500-200-L0945-C
IA108 | 1080 | IA108-500-250-L1080-B
IA108 | 1260 | IA108-500-250-L1260-B
IA108 | 1470 | IA108-500-250-L1470-B
IA108 | 1260 | IA108-500-375-L1260-B
IA108 | 1470 | IA108-500-375-L1470-B
IA108 | 1115 | IA108-500-1000-L1115-A
IA108 | 548 | IA108-600-200-L0548-B

**ZH1037 Series** Tubular heaters, ribbed

**Series** | **L** | **Stock items**
---|---|---
ZH1037 | 470 | ZH1037-750-300-L0470

*Cold length*
**IA109 / IA114 Series** Tubular heaters

Air heaters

<table>
<thead>
<tr>
<th>Series</th>
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<tbody>
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<td>IA109</td>
<td>418</td>
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<td>512</td>
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<td>586</td>
<td>IA109-250-1100-L0586-S</td>
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<td>IA109-500-1100-L0586-S</td>
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<td>410</td>
<td>IA109-750-300-L0410-S</td>
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<td>532</td>
<td>IA109-1000-293-L0532-A</td>
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<tr>
<td>IA114</td>
<td>568</td>
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<tr>
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<td>454</td>
<td>IA114-500-500-L0454-S</td>
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**ZH081, ZH381, ZH881 Series** Tubular heaters

Water heaters

<table>
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<th>Series</th>
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<tr>
<td>ZH081</td>
<td>433</td>
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<td>ZH381</td>
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<td>ZH581</td>
<td>430</td>
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<td>ZH881</td>
<td>392</td>
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<td>433</td>
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<td>773</td>
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<td>841</td>
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<td>ZH881-880-2400-L841-28</td>
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**ZH1040 Series** Mounting brackets for tubular heaters

Accessories air heaters

<table>
<thead>
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<th>Bracket</th>
<th>Suitable for series</th>
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<tbody>
<tr>
<td>ZH1040</td>
<td>IA008-vvv-xxx-Lyyy-z</td>
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<td>IA108-vvv-xxx-Lyyy-z</td>
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<td>IA109-vvv-xxx-Lyyy-z</td>
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<td>IA114-vvv-xxx-Lyyy-z</td>
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<td></td>
<td>ZH485</td>
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</table>

**Fig. ZH881, special design without flange**

**Fig. ZH881**

*Cold length

Reduced scale diagrams / dimensions in mm
**Series resistors**

Air heaters, brake resistors

<table>
<thead>
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<td>IA109-710</td>
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**ZH242 Series** Radiator

Air heater

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<td>ZH242</td>
<td>1650</td>
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**ZH254 Series** Radiator

Air heater

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<th>Series</th>
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<td>ZH254</td>
<td>996</td>
<td>ZH254-500-1000-0996</td>
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</table>

Reduced scale diagrams / dimensions in mm

*Cold length*
**ZH449 Series Radiators**

**Air heaters**

**Reduced scale diagrams / dimensions in mm**

<table>
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<tr>
<th>Series</th>
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<th>Stock items</th>
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<tr>
<td>ZH449</td>
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<td>1260</td>
<td>ZH449-1000-1000-L1260</td>
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<tr>
<td></td>
<td>1440</td>
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<tr>
<td></td>
<td>1650</td>
<td>ZH449-1000-1250-L1650</td>
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</tbody>
</table>

**Fig. 1:** Radiator with two tubular heaters

**Fig. 2:** Radiator with one tubular heater

**ZH485 Series Radiators**

**Air heaters**

**Series | L   | Stock items         |
---------|-----|---------------------|
ZH485    | 635 | ZH485-500-750-L0635 |
        | 660 | ZH485-1000-1000-L0660|

Reduced scale diagrams / dimensions in mm
**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. **Sheath temperature dependent on amount of power which a heater produces.**

   Watt density is the amount of power in watts which a heater produces per square centimetre of heated surface area (W/cm²).

   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 = U² / 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 heating element necessary for a specific heat output**

   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.
### 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 disconnect switches
- Special contactors to suit customer requirements

### Electrics for rolling stock
- Equipment for driver's cab
- Equipment for passenger use
- High-voltage switchgear
- High-voltage heaters
- High-voltage roof equipment
- Equipment for electric brakes
- Design and engineering of train electrics to customer requirements

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**Schaltbau GmbH**

For detailed information on our products and services visit our website – or give us a call!

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The production facilities of Schaltbau GmbH have been IRIS certified since 2008.

**RoHS 2011/65/EC**

Schaltbau GmbH manufactures in compliance with RoHS.

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Certified to DIN EN ISO 14001 since 2002. For the most recent certificate visit our website.

**Located in**

Certified to DIN EN ISO 9001 since 1994. For the most recent certificate visit our website.

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Issued 10-2014