EN

Installation instructions for heating elements

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1. Scope of delivery

Item No.	Part	Remark
1	Heating element	Type varies depending on the version
2	Fixing pins	Type and number vary depending on the version
3	Connection terminals	Type and number vary depending on the version
4	Ceramic protection tube	Type and number vary depending on the version
5	Installation instructions	

2. Safety instructions

DANGER

Danger of serious personal injury or death and material damage to the kiln by touching live parts when replacing the heating elements. Before working on electrical components, the kiln must be disconnected from the power supply.

⇒ Only replace the heating elements when the kiln is in a safe and de-energized state.
⇒ Pull out the mains plug or switch off the electrical power to the kiln.
⇒ Let hot kiln components cool down before starting work.
⇒ After completing the work, check all loosened connections and check that the cables are firmly seated and that the protective devices are functioning properly.

WARNING

Risk of serious personal injury and property damage due to improper work or improper handling of electricity.

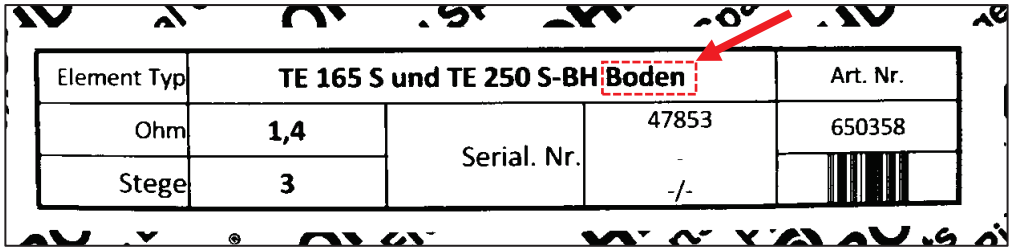
⇒ Only have work on electrical components and electrical circuits carried out by qualified electricians.
⇒ Observe the 5 safety rules for working on electrical equipment!

NOTE

Check the delivered order with the enclosed delivery note and the information on the label on the packaging of the heating elements.

3. Identification of the installation position

See packing label or delivery papers for the exact installation position of the delivered heating element.



Installation position	Explanation
No indication	No specific installation position - heating element for anywhere in the kiln
Deckel	Heating element for kiln lid
Tür(e)	Heating element for kiln door
Tür oben	Heating element for kiln door – Upper installation position
Tür mitte	Heating element for kiln door – Middle installation position
Tür unten	Heating element for kiln door – Lower installation position
Boden	Heating element for kiln floor
Boden aussen	Heating element for kiln floor – Outer installation position
Boden innen	Heating element for kiln floor – Inner installation position
Seite(n)	Firing chamber heating element – Sidewall installation position
Seite oben	Firing chamber heating element – Upper sidewall installation position
Seite mitte	Firing chamber heating element – Middle sidewall installation position
Seite unten	Firing chamber heating element – Lower sidewall installation position
Seite li / re	Firing chamber heating element - Left & right sidewall installation positions
Seite / Boden	Firing chamber heating element – Sidewall & floor installation positions
Rückwand	Firing chamber heating element – Back wall installation position
Rückwand oben	Firing chamber heating element – Upper back wall installation position
Rückwand mitte	Firing chamber heating element – Middle back wall installation position
Rückwand unten	Firing chamber heating element – Lower back wall installation position
Ring	Toploader heating element – Ring installation position
Ring 1 / 2 / 3 / X / Y	Toploader heating element – Ring No. 1 / No. 2 / No. 3 / No. X / No. Y
Zwischenring	Toploader heating element - Additional intermediate ring installation position
* Variations of the specified installation positions are possible!	

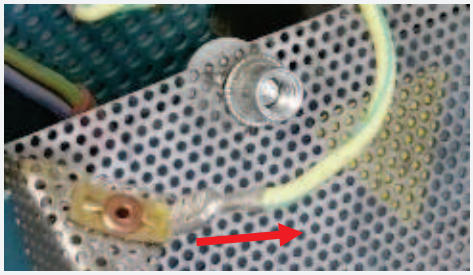
4. Preparation of the heating element

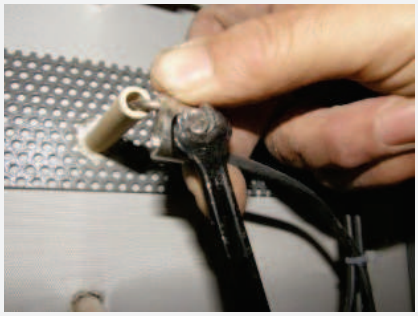
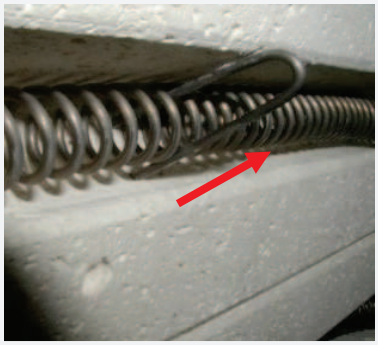
1) Remove the heating element from the packaging.
2) Lay out the heating element on a flat and clean surface.
   Note: The heating element is not packed in its final position, but rather rolled up a little due to the packaging.
3) Lay out the heating element carefully according to its final position.
   Note: The heating element consists of wire windings combined with bars. This determines the final appearance of the heating element.

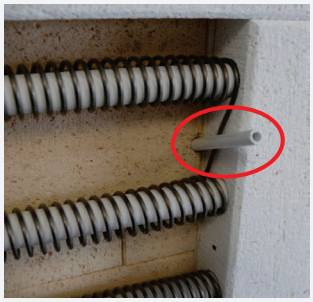
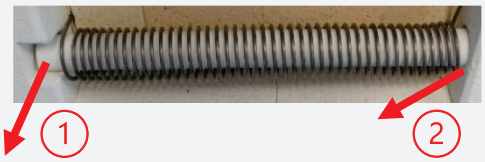
4) When installing, note if the heating element does not immediately fit the installation position:

Abnormality	Action	Additional action
Heating element too long	Carefully compress the heating element	The bar can be carefully screwed in at the first wire winding ⇒ Bar spacing becomes shorter
Heating element too short	Carefully uncompress the heating element	The bar can be carefully screwed out at the first wire winding ⇒ Bar spacing becomes longer

5. Heating element removal

No.	Activity	Remarks	Heating element	
			Grooved brick	Support rod
1	Remove the housing cover from the heating element connections. Attention: ⇒ On toploaders, the connections for the heating elements are located in the electrical box. ⇒ On frontloaders, the connections for the heating elements are located at the rear. ⇒ In frontloaders, the connections for the heating elements are also located under a cover (perforated plate) on the kiln door. 	Tools required: Use appropriate tools for the fastening material. Keep the fastening material captive. Tip: Loosely screw the fastening material back into the corresponding thread for storage.	X	X
2	Disconnect the protective conductor connection of the housing cover. 	Always pull off the flat contact (cable lug) of the protective conductor cable on the housing cover.	X	X

No.	Activity	Remarks	Heating element	
			Grooved brick	Support rod
3	Loosen the connection terminal on the heating element (anticlockwise). 	Tools required: • Overhead line clamp without insulation, with a wrench or 8 mm socket wrench • Porcelain terminal with insulation up to 10 mm^2, with a 5.5 mm standard screwdriver • Porcelain terminal with insulation up to 16 mm^2, with a 7 mm standard screwdriver	X	X
4	If several heating elements are replaced and connection terminals are loosened, note the connections for the cables for re-installation.	Take a photo of the initial state or take notes.	X	X
5	Remove the connection terminal together with the connection cable from the end of the wire.	Dispose of the connection terminal and replace it with the new terminal supplied.	X	X
6	Cut the end of the wire flush with the ceramic protection tube. 	Tools required: Wire cutters	X	X
7	Immediately remove any cable scraps in the work area.	Attention: Falling objects can cause short circuits in the electrical system.	X	X
8	Remove ceramic protection tube. 	Replace ceramic protection tube if damaged!	X	X
9	Remove the fixing pins. 	Tools required: Needle-nose pliers Discard used fixing pins. If the heating element is on the support rod, please continue with step 13.	X	–

No.	Activity	Remarks	Heating element	
			Grooved brick	Support rod
10	Remove the heating element from the grooved brick.		X	–
11	Divide the heating element into approx. 20 cm pieces so as not to damage the firing chamber insulation, to make it easier to remove the heating element and for easier disposal.	Tools required: Wire cutters	X	–
12	Remove the divided heating element from the firing chamber.	Immediately remove any leftover heating elements in the work area.	X	–
13	Remove the ceramic tube by the element bars. 	Replace ceramic tube, if damaged!	–	X
14	Remove heating element with rod. 	Procedure: 1) Carefully pull the support rod out of the open recess until it is out of it. 2) Then pull the support rod forward to the side so that it can be pulled out of the rear bracket. Note: • When pulling forward to the side, avoid excessive transverse load on the rear insulating firebrick. • High transverse loads cause breakouts in the insulating firebrick due to the high leverage.	–	X
15	Separate the heating element from the support rod.	Replace support rod if damaged!	–	X
16	For easier disposal, divide the heating element into pieces approx. 20 cm in size.	Tools required: Wire cutters Immediately remove any leftover heating elements in the work area.	–	X

6. Cleaning the kiln

NOTE

Heating elements that have already been fired are brittle and therefore at great risk of breaking.

⇒ Subsequent correction of the heating elements is prohibited.
⇒ When cleaning the firing chamber, avoid touching the heating elements with a broom or vacuum cleaner.

- Remove any glaze residues, burn-in and charring by carefully scratching with a plastic spatula - be careful not to damage the insulating firebricks.

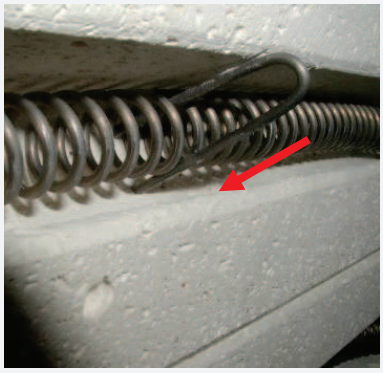
- Other loose particles should be removed from the kiln with a clean broom or vacuum cleaner.
- When cleaning the firing chamber with a broom or vacuum cleaner, avoid touching the remaining heating elements.
- All glaze residues must be removed from the grooved bricks or supports of the support rods.
- Check the kiln regularly for cleanliness and clean it at regular intervals.
- Glaze residues and contamination, which are not removed immediately, can lead to immediate damage or to heating elements blowing during the next firing.
- If major damage to the kiln is found, the insulation or other kiln components during cleaning, the local specialist or the manufacturer should be contacted if in doubt.

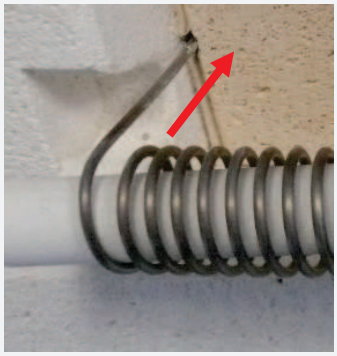
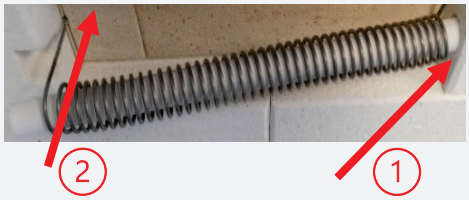
7. Heating element installation

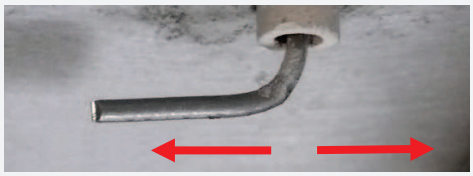
NOTE

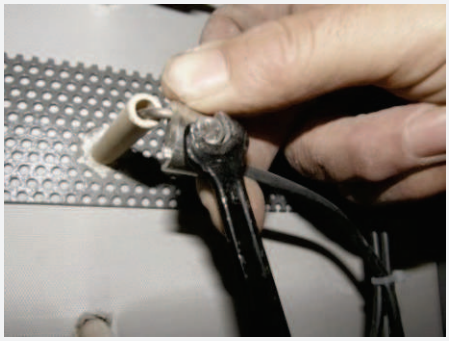
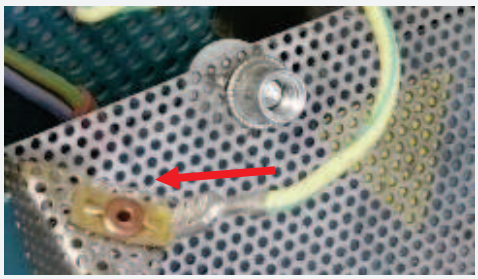
Install heating elements without mechanical tension if possible.

⇒ During the next few firings, heating elements can move out of the grooved brick or tighten on the support rod and possibly break.

No.	Activity	Remarks	Heating element	
			Grooved brick	Support rod
1	Push the end of the wire from the heating element through the bushing in the grooved brick to the connection terminal.	If the heating element is on the support rod, please continue with step 7.	X	–
2	Insert the heating element in the grooved brick.	Make sure the grooved brick is clean!	X	–
3	Insert fixing pins. ⇒ First, pin once into the groove by the bushing to the connection terminal.   If the heating element is on the support rod, please continue with step 10.	Tools required: Needle-nose pliers Notes on fixing pins: • Use only the new and supplied fixing pins. • Do not use any other material such as wire or nails for fastening. • The fixing pins should be installed at an angle greater than 45°, sloping downwards. • The holes at the positions of the old fixing pins are used for orientation. • Never install the new fixing pins into the existing holes of the old fixing pins. • Install new fixing pins 1 cm to 2 cm apart from the old position. • The fixing pins must be spread open slightly on the open side and the wire ends should be tapered. • The fixing pins must be completely countersunk and the heating elements should lie evenly deep in the groove over its entire length. • Be careful not to damage the kiln insulation.	X	–

No.	Activity	Remarks	Heating element	
			Grooved brick	Support rod
4	Insert 1x fixing pin at the other end of the groove.	Tools required: Needle-nose pliers	X	–
5	Insert further fixing pins with even spacing.	Tools required: Needle-nose pliers	X	–
6	If the new heating element is not evenly deep in the groove or if something protrudes from the groove, an additional fixing pin can be used at this position.	Tools required: Needle-nose pliers	X	–
7	Slide the heating element onto the support rod.	Replace support rod if damaged! If the heating element is on the support rod, please continue with step 11.	–	X
8	Push the wire end from the heating element up to 5 cm through the bushing to the connection terminal. 		–	X
9	Insert the heating element on the support rod into the insulating firebricks. 	Procedure: 1) Insert the heating element on the support rod into the closed recess. 2) Push the heating element on the support rod into the open recess. Note: • When inserting from the side, avoid excessive transverse load on the insulating firebrick with the closed recess. • High transverse loads cause breakouts in the insulating firebrick due to the high leverage.	–	X
10	Insert ceramic tube by the element bars. 	Replace ceramic tube, if damaged!	–	X

No.	Activity	Remarks	Heating element	
			Grooved brick	Support rod
11	Insert ceramic protection tube on the back at the end of the wire. 	Replace ceramic protection tube if damaged!	X	X
12	Push in ceramic protection tube until resistance can be felt.		X	X
13	Bend the end of the wire. 	Tools required: Round nose pliers Permissible: • Bending by 90° • horizontally left or right to the side ⇒ When bending, a minimum bending radius of 5 mm must be observed. Prohibited: Never bend the end of the wire vertically up or down. Caution: • Do not damage the ceramic protection tube. • Make sure there is sufficient distance to other conductive components. Always replace damaged ceramic protection tubes!	X	X
14	Place the connection terminal with the connection cable on the end of the wire.	Use a new connection terminal! The used connection cable can be re-used. Attention: Make sure there is sufficient distance to other conductive components. In the case of porcelain clamps with 2 clamping screws, the wire end of the heating element and the wire end of the connection cable must always be fixed by both clamping screws at the same time.	X	X
15	Make sure that the end of the wire and the connection cable are pushed into the connection terminal over their full length to avoid contact errors.		X	X

No.	Activity	Remarks	Heating element	
			Grooved brick	Support rod
16	Tighten the connection terminal (clockwise). Torque: 7 Nm 	Tools required: • Overhead line clamp without insulation, with a wrench or 8 mm socket wrench • Porcelain terminal with insulation up to 10 mm^2, with a 5.5 mm standard screwdriver • Porcelain terminal with insulation up to 16 mm^2, with a 7 mm standard screwdriver Attention: Make sure there is sufficient distance to other conductive components. Caution: • Do not damage the ceramic protection tube or the porcelain clamp. • Make sure there is sufficient distance to other conductive components. Always replace damaged ceramic protection tubes and connection terminals!	X	X
17	Seal all heating element bushings with high-temperature silicone, if they had already been sealed with silicone! 	Warning, this process only applies to the following kilns: - Semi-gas-tight kilns - Dewaxing frontloaders - Regeneration kilns - Kilns with cooling fans Bushings must be tightly sealed with high temperature silicone! Manufacturer recommendation for high temperature silicone: • Large tube (300 ml) ROHDE item no.: 706906 • Small tube (21 ml) ROHDE item no.: 706907	X	X
18	Reconnect the separated protective conductor connection to the housing cover. 	When attaching the housing cover, be careful not to damage any cables. Make sure that the protective conductor cable on the kiln casing is also correctly connected to the riveted earth connection	X	X
19	Check the work area for cleanliness and remove cable scraps, tools or other objects that could have fallen.	Attention: Falling objects can cause short circuits in the electrical system.	X	X

No.	Activity	Remarks	Heating element	
			Grooved brick	Support rod
20	Fit the housing cover of the heating element connections.	Tools required: Use appropriate tools for the fastening material. Replace lost fastening material! Obey the tightening torques for the fastening material: Thread: M3 M4 M5 M6 M8 Nm: 1.5 3 6 10 25	X	X
21	Carry out the initial firing process for the element in the empty kiln.	Procedure: See Section 8	X	X

8. Heating element initial firing

The renewed heating element must be burned in the kiln after being replaced.

Setting parameters for the initial firing:

- Heat up at 100 °C/h
- End temperature 1050 °C
- Dwell time 1 hr. 30 min.
  (applies to kilns with a maximum temperature of 1100 °C and higher; for kilns with a maximum temperature below 1100 °C, the final temperature = T_{max} - 50 °C)
- Ventilation Supply air and exhaust air open
- Furniture The kiln must be empty
- Cooling Normal cooling with the kiln door/lid closed

9. Disposal

Disposal of heating elements and fasteners	Disposal of packaging
Recycling in scrap metal	Recycling in paper waste
Alternatively, disposal in household waste	Recycling in plastic waste

10. Important information

- Heating elements and support rods are wearing parts and are excluded from the guarantee.
- Only use original spare parts.
- The electrical resistance of the heating elements increases with every firing and over time leads to delays in the firing curve due to a drop in output, especially in the upper temperature range.
- We recommend replacement of all heating elements in the kiln when they are worn out.
  Individually replaced heating elements lead to temperature differences within the kiln and to unsatisfactory firing results.
- Heating elements that only have to heat up to 1100 °C usually last significantly longer than heating elements that are used for firings at temperatures up to 1300 °C.
- The service life of the heating elements is significantly extended if the heating rate (heating ramp) does not exceed 250 °C/h and the "FULL/SKIP" function for the heating rate is avoided in the control unit.
- Avoid rapid cooling after firing by opening the kiln door or kiln lid, as the natural cooling process of the heating elements is disturbed and the heating elements can move out of the groove.
- Keeping firing logs helps to make even minor changes in the behaviour and operation of the kiln visible and they help to make wear and tear transparent.