

Operating Manual

Laboratory tilting melting furnaces K 1/10 - K 4/13

Read the operating manual before commissioning the furnace.



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General information

This electrically heated tilting furnace is used to melt non-ferrous metals. The multi-layer heat insulation is of exceptionally high quality and energy-saving. The practical tilting aid of the table top model facilitates the exact dosing when the melted mass is casted. The furnace is equipped with a Controller that provides extensive protection against incorrect operation.

Model without tilting structure

The furnace stands on four feet so that tilting is not possible. The furnace is furnished with a crucible without pouring spout; this crucible is provided - dependant on the model - for scooping or being pulled out of the furnace.

A long-life thermocouple is used for measuring and controlling the furnace chamber temperature.

Model	Width* mm	Depth* mm	Height* mm	Weight kg
K 1/..	520	680	660	80
K 2/..	520	680	660	82
K 4/..	570	755	705	110

*outer dimensions (the model with 1300 °C is supplied with transformer housing)

Technical specifications:

Furnace ratings: see the rating plate on the left side of the furnace
Dimensions and weights: see table
Protection class: 1
Enclosure rating of the furnace: IP 20

Thermal safety according to EN 60519-2, 1993:

Class: 0

Ambient conditions:

Temperature: 5 - 40 °C

Humidity: max. 95%, non-condensing

Safety



CAUTION! Hot surface
- Risk of burns -

- In case of improper manipulation working with liquid metals can be extremely dangerous. The furnace may only be operated or used by competent personnel.
- Only use materials components of which are perfectly dry. The humidity which gets in contact with the melted mass will evaporate instantaneously, so that liquid metal may be pitched out of the furnace. Humidity can collect on e.g. scrap metals, cuts (cooling water), foundry ladles and other objects.
- Break up the crust on the melted mass with extreme care. An over-pressure may have built up between the melted mass and the crust which may result in the ejection of liquid metal parts if the pressure is relieved all of a sudden.
- The heat outlet of the housing surface must not be obstructed.
- Do not bring any flammable materials close to the furnace.
- Operating the furnace with explosive gasses or mixtures, or with explosive gasses or mixtures created in the process is not permitted.
- Only use materials of which the properties are known.
- Operate the furnace model K ..13 only with the additional transformer supplied.

Ventilation:

- Depending on the type of material used, there is the possibility of hazardous gasses or fumes being released. Therefore, the room where the furnace is installed must be ventilated appropriately.
- If lead-containing metals are melted or hazardous additives are used, make sure that a suction system is installed.

Electrical safety:

- The crucible is not grounded. Wear insulating gloves (DIN VDE 0721, part 1) or isolated/grounded tools when operating the furnace.
- If a crucible made of gray cast iron or steel is used, the crucible is to be grounded (ground connection from the crucible to the furnace housing).

Crucibles:

- Only use suitable crucibles to avoid damaging the furnace.
- Before switching off the furnace heating remove the

melted mass out of the crucible. Otherwise the crucible will get damaged.

- Observe the recommendations of the manufacturers regarding maintenance and handling of the crucibles.

Working area:

- Always start out from the assumption that all materials even if they do not seem to be hot any more can still have temperatures that cause burns if touched.
- There is a risk of burns at several places of the furnace surface as well as in the area of the crucible spout and the melted mass.
- Wear heat-resistant gloves to protect your hands.
- Wear protective goggles which are resistant against metal splashes when working close to the furnace.
- Wear a face protecting mask when casting the melted mass.
- Wear well-fitting work clothes. Take off any ties and jewels before starting work.
- Do not keep any food or food receptacles close to the furnace.

Mounting the furnace

Please inform us immediately of any transport damages or incomplete deliveries!

- Place the furnace on a fireproof support.
- The bearing capacity of the support must be designed for the weight of the furnace plus the charge.
- Keep a free space of 0.5 m on all sides when installing the furnace.
- The heat outlet of the housing surface must not be obstructed.

Commissioning the furnace

ISO graphite crucible

- During start-up heat the furnace up to a temperature of 200 °C over a period of 2 hours.
- Then heat the furnace up to a temperature of 600 °C within one hour.
- When this temperature is reached heat up the furnace as quickly as possible to 950 °C (or the later working temperature if > 950 °C).

Thus the drying time is not required any more for further heating processes. If the furnace is not used for several

days, proceed as described above when heating up in order to dry the humidity which has been absorbed by the slag.

Crucibles made of gray cast iron or steel

No special heating up instructions must be adhered to.

Operation

Tilting the furnace:

- Open the cover
- Tilt the furnace carefully and slowly.
- Remove the melting residues out of the spout after every tilting action.

Exchanging the crucible:

- Switch off the furnace and pull the mains plug
- Remove the crucible
- Clean the furnace chamber
- Attach the spout to the crucible according to the instructions
- Insert new crucible
- First heating up of the crucible, please refer to Chapter „Commissioning“

Note:

The Controller indicates the furnace temperature and not that of the molten mass.

Maintenance/errors

In the case of commercial use:

Please observe the safety regulations applicable to your country.

According to a regulation of the German employer's liability insurance association the furnace must be checked by a qualified electrician at specified intervals.

Use the error search list (Troubleshooting), the repair instructions and the circuit diagram (see the following pages) to identify and eliminate errors.

Only a qualified electrician may carry out work on the electrical system.

Cracks in the insulation:

The insulation of the furnace consists of very high-quality fire-resistant material. As a result of heat expansion, cracks appear in the insulation after a few heating cycles. However, these cracks have no influence on the function or quality of the furnace.

At regular intervals:

- Clean the furnace
- Check the crucible
- Operate the test key of the earth leakage circuit breaker, if installed, once a month and check whether the voltage supply is interrupted
- Check the cover lock

Troubleshooting

Error	Cause	Error elimination
Controller does not switch on	No voltage or Controller is defective	<ul style="list-style-type: none">• Check/replace fuse(s) of the connection• Check/replace the fuse of the Controller• Check plug connection
Controller indicates error	See Controller instructions	
No heating of the furnace chamber after the program has started	Error while entering the program	Check heating program (see Controller instructions)
	Fuse(s) of the connection is (are) defective	Check fuse(s) of the connection, replace if necessary. Inform Nabertherm service if the new fuse blows as soon as it is screwed in.
	Heating element is defective	Have checked by Nabertherm service.
Very slow heating of the furnace chamber or selected final temperature is not reached	Fuse(s) of the connection is (are) defective	Check fuse, replace it if necessary. Inform Nabertherm service if the new fuse blows as soon as it is screwed in.
	Heating element is defective	Have checked by Nabertherm service.
	No heating power as a result of undervoltage	Have checked by Nabertherm service.

Repair instructions

Only a qualified electrician may carry out work on the electrical system!

Ordering spare parts

In writing, by phone or via the Internet:

www.nabertherm.com

State the following information from the rating plate:

- Furnace model
- Production or serial number
- Year of construction

Safety advice

This furnace contains ceramic fibre material in the insulation. In the Federal Republic of Germany actively handling this fibre (e.g. replacing the insulation) is subject to the regulations of the German ordinance concerning hazardous materials, Annex V No. 7 "Artificial mineral fibres" of June 12, 1998. In the other territories of the European Community ceramic fibres are classified by the Directive 98/69/EC of the Commission of December 5, 1997 as follows: CARC. Cat. 2; R 49; Xi R 38. Working on the fibre insulation must therefore be executed in such a way that the fibre dusts released are kept at a minimum.

We recommend wearing a breathing mask (P2 or higher), gloves as well as a protective suit.

Replacing the heating element

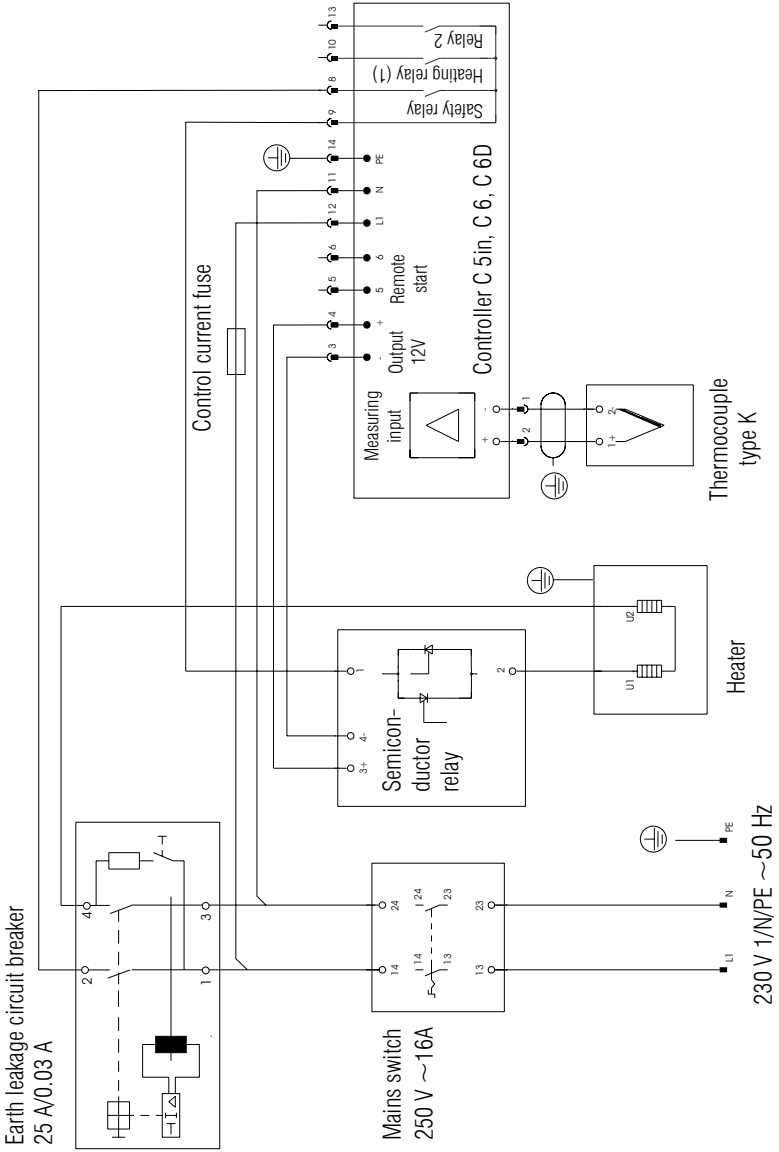
Removal

- Pull mains plug
- Dismantle the crucible (see „Exchanging the crucibles“)
- Take off the cover of the rear wall
- Remove the electric connections of the heating element
- Remove the ceramic protecting tubes
- Remove the fibrous cotton wool in the bore hole, if necessary
- Take out the defective heating element

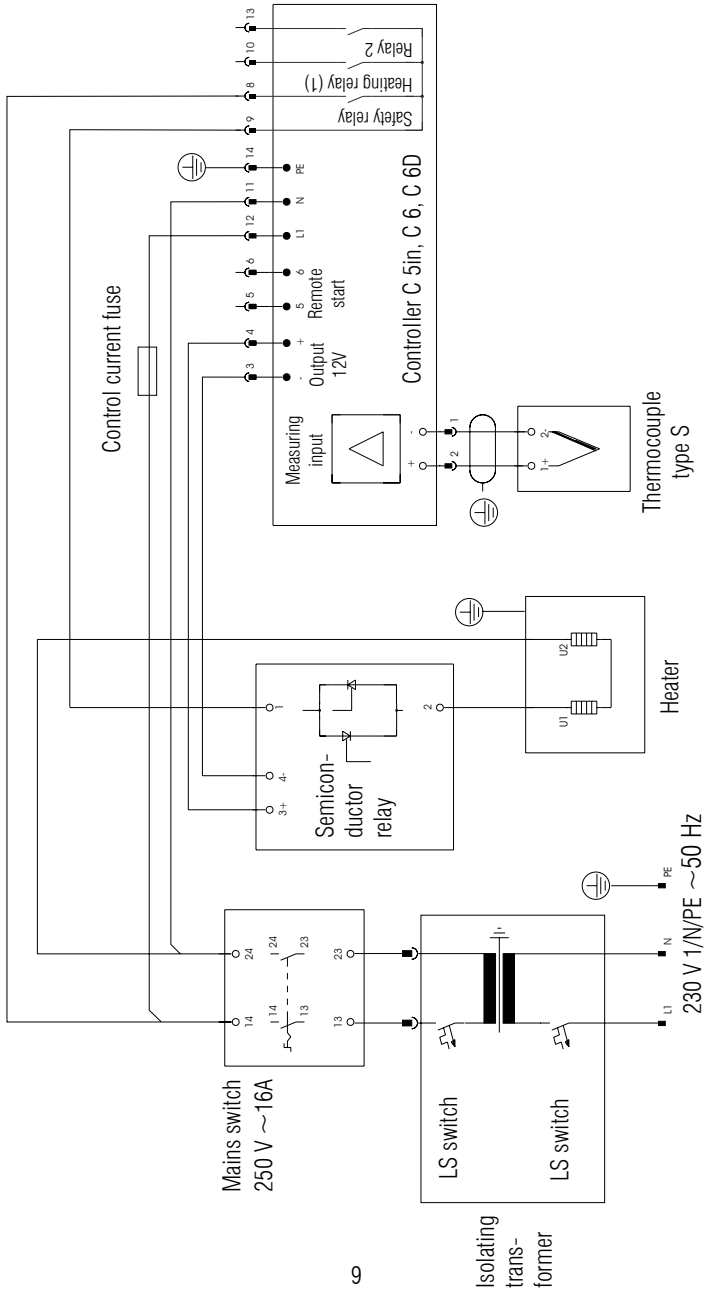
Installation is done in reverse order of the disassembly.

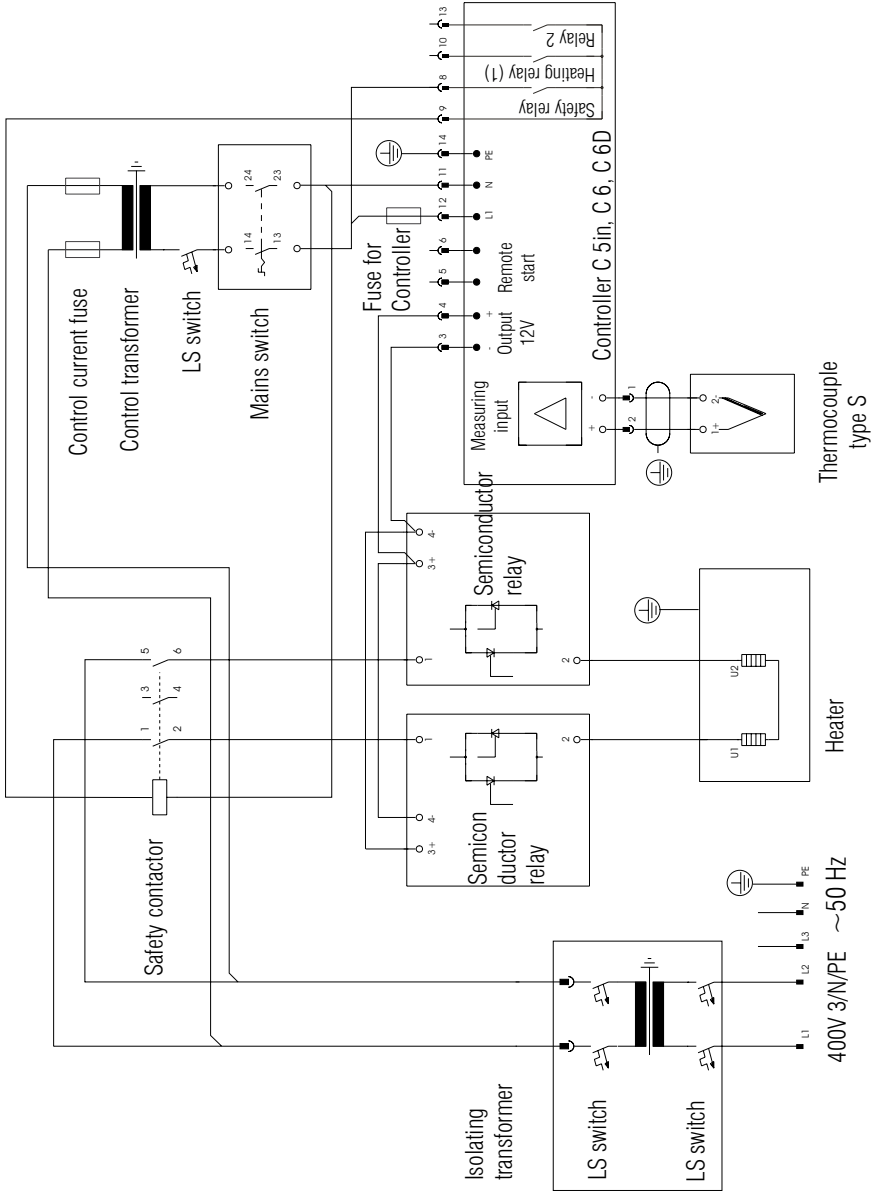
Circuit diagrams

K 1/10 - K 4/10



K 1/13 - K 2/13





Declarations of conformity

for furnace and Nabertherm switchgear including Controller



EC Declaration of Conformity
in accordance with EC directives 2006/95/EEC and
EMC directive 2004/108/EEC

Hereby

Nabertherm GmbH
Bahnhofstr. 20, 28865 Lilienthal, Germany

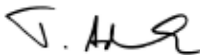
declares that the product specified below conforms to the relevant fundamental safety and health requirements of the appropriate EU Directive both in its basic design and construction as well as in the version marketed by us. The declaration will cease to be valid if any modifications are made to the machine without our approval.

Product	Electrically Heated Crucible Furnace		
Type	K 1/10	K 2/10	K 4/10
	K 1/13	K 2/13	K 4/13

The following harmonized standards were applied:

- DIN EN 746-1 (02.2010)
- DIN EN 61010-1 (07.2011)
- DIN EN 60519-1 (10.2011), DIN EN 60519-2 (05.2007)
- DIN EN 61000-6-2 (03.2006), DIN EN 61000-6-4 (09.2011)

Lilienthal, 07.02.2013



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Headquarters:

No responsibility is accepted for the correctness of this information, we reserve the right to make technical alterations