

Operating Manual

Electrically Heated Chamber Kiln

Kiln Models

N200, N200/H

N300, N300/H

N440, N440/H

You can obtain the operating instructions in Spanish or French via the following link or by scanning this QR code: Apps to scan QR codes can be downloaded from the corresponding sources (app stores).



Spanish

<https://nabertherm.com/es/descargas/manuales-de-instrucciones>



French

<https://nabertherm.com/fr/telechargements/manuels-dutilisation>

M01.9038 ENGLISH

Original instructions

■ Made
■ in
■ Germany

www.nabertherm.com

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Ceramics Creates Passion.

Trust in Nabertherm!

Nabertherm kilns are the right choice for your hobby, your workshop and your professional use. All of our kilns are hand-made in Germany, using the best available materials.

Our family-owned company has experience in the manufacture of kilns since 1947. We use our valuable earth resources as sparingly as possible to produce your reliable companions in outstanding quality.

Our kilns are characterized by:

- Excellent firing results
- Energy efficiency and economy
- Reliability
- Special ergonomics
- Durability
- 36 months warranty
- Innovation

With Nabertherm, you can be sure of quality, safety and excellent firing results. And with our long-standing network of partners throughout the world, you can rely on specialized customer service when you need it.

For many years, the name Nabertherm has stood for the highest quality standards and durability in kiln construction. To secure that it maintains this position in the future, Nabertherm not only provides a top-quality spare parts service, but also guarantees outstanding customer service. Benefit from our experience in kiln construction.



All the best and enjoy your kiln.

Timm Grotheer
CEO of the Nabertherm Group

1 Safety Information and Intended Use

1.1 General Safety Information

This section contains an overview of the most important safety information. Please also observe the detailed descriptions and other safety information in the subsequent sections.

Installation location and constructional requirements

1. For safe operation, your kiln must be placed in a dry place that is protected against the weather but that is also well ventilated. The temperatures 41 °F to 104 °F (5 °C to 40 °C) must be maintained all year round.
2. Kilns radiate heat when they are operated. Ensure an all-round gap of 40 inches (100 cm) between the kiln and flammable and temperature-sensitive objects. The floor must not be made from flammable material. All flammable materials, such as drapes, plastics, furniture, rugs, etc. must be removed from the area around the kiln.
3. If an automatic extinguishing system is installed at the kiln installation location, ensure that it cannot be activated by the radiated heat. In this regard, also consider whether to open the kiln while it is hot. Observe local construction and fire prevention regulations.
4. The floor must have an adequate load-bearing capacity and be suitable so that the kiln has a secure footing.
5. Access to the kiln must be restricted if the installation location can be accessed by unauthorized persons, children or pets.
6. Do not use an extension cable to connect the kiln. The power cable must be laid so that it does not touch hot parts of the kiln and so that no one can trip over it.
7. The workplace must be properly ventilated. Harmful vapors must be directed from the work room outdoors via professionally installed exhaust air piping.

Operation

1. Check the kiln before switching it on. If there are external changes that could indicate a fault, the kiln must not be operated. If, during operation, changes take place or the kiln makes strange noises, switch the kiln off for safety reasons.
2. It is important to take care when working with the kiln. During operation, areas on and around the kiln can become hot and cause burns if they are touched accidentally.
3. The kiln is not suitable for drying. Place only almost dry materials and furniture in the kiln. Objects with a high level of residual moisture can crack, split and cause corrosion on the kiln housing.
4. Do not place flammable materials in the kiln. Remove paper, wood and plastics. Materials that melt, produce flammable gases, explode or release harmful vapors must not be placed in the kiln.
5. Opening a hot kiln at temperatures above 390 °F (200 °C) is not permitted and will lead to increased wear of the insulation, heating elements and the kiln housing. There is also a risk of burning injuries. For your safety and to protect the kiln and your ceramics, we recommend that you do not open the kiln until the program has finished and the kiln has cooled down completely.
6. If the kiln has to be opened before it has cooled completely, you must wear suitable, heat-resistant protective clothing. Make sure that your clothing does not come into contact with hot surfaces. There is a risk that your clothing may catch fire or stick to the surface.
7. The door can be closed with a lockable star knob (accessory). This is highly recommended if the installation location is accessible to unauthorized persons (such as children).
8. If a serious natural disaster is announced, such as storms, flooding or an earthquake, unplug the kiln or use the circuit breaker to disconnect the kiln from the power supply.

Cleaning, maintenance and repair

1. Before carrying out any repair or maintenance work, pull the plug or use the circuit breaker to disconnect the kiln from the power supply.
2. Work on the electrical equipment may be carried out only by a licensed electrician.
3. Original parts are designed specifically for Nabertherm kilns. Only Nabertherm original parts may be used when replacing components.

4. If a protective device is faulty (no switchgear cover, a faulty door contact switch, for example), do not switch the kiln on; instead, pull the plug or use the circuit breaker to disconnect the kiln from the power supply.

1.2 Key to the Symbols and Terminology Used in Warnings

SAFETY INFORMATION	Draws attention to certain safety-relevant instructions or procedures.
NOTICE	Indicates a hazard that could damage the equipment.
CAUTION	Indicates a hazardous situation that could result in minor or moderate injury.
WARNING	Indicates a hazardous situation that could result in death or serious or irreversible injury.
DANGER	Indicates a hazardous situation that will result in death or serious injury.

Information Symbols in the instructions



General

This symbol draws attention to important rules that must be observed. Mandatory action signs protect people against injury and show what needs to be done in certain situations.



Important information for operators

This symbol draws the operator's attention to important information in the operating instructions that must be observed.



Disconnect the kiln from the power supply by using the circuit breaker

This symbol tells the operator to disconnect the kiln from the power supply by using the circuit breaker (depends on the model – no plug installed).



Wear appropriate protective gloves

This symbol tells the operator to wear appropriate protective gloves.
To be worn when installing the kiln.



Wear appropriate protective footwear

This symbol tells the operator to wear appropriate protective footwear.
To be worn when installing the kiln.



Wear appropriate protective clothing

An apron protects your clothing and also prevents burns.



Lift with several people

This symbol draws the personnel's attention to the fact that this equipment may only be lifted and moved to its final destination by several people.



Maintain a safe distance

This symbol tells personnel to maintain an all-round distance to flammable or temperature-sensitive objects.



Operate the kiln only with base frame

This symbol tells personnel that the kiln must not be operated until it has been assembled on the frame that is part of the delivery.



General hazards

This symbol draws the operator's attention to a general hazard.



Danger from hot surfaces and burns

You may not always realize that surfaces, such as system components, kiln walls, or materials, are hot. Do not touch the surface.



Danger from hot surfaces and burns

You may not always realize that surfaces, such as system components, kiln walls, or materials, are hot. Do not touch the surface.



Warning – electric shock

This symbol warns the operator that there is a risk of an electric shock if the following warnings are ignored.



Danger when lifting heavy loads

This symbol warns the operator of the potential dangers when lifting heavy loads. Ignoring this can lead to injury.



Fire hazard

This symbol warns operators of the danger of fire if the following information is not followed.



Warning about sharp objects

This symbol warns the operator about the risks of cutting injuries due to sharp or pointed objects to prevent minor or serious injuries.



Risk of explosion

This symbol warns about explosive substances. Caution is required when working with or near explosive substances.



Danger of asphyxiation

This symbol warns of the risk of asphyxiation if the installation location of the kiln is not sufficiently ventilated.



Do not clean with water

This symbol warns the operator that water or cleaning products must not be poured over the kiln. A high-pressure cleaning device must also not be used.



Important information for operators

This symbol tells the operator that small parts are NOT suitable for children under 3 years of age or for persons who tend to put inedible things in their mouth. There is a risk of suffocation.



Important information for operators

This symbol tells the operator that the kiln or attached parts, such as the controller, must NOT be exposed to direct sunlight or hot surfaces.



Important information for operators

This symbol warns the operator that the surface must NOT be walked upon. There is a risk of it caving in or components can break or be damaged if they are walked upon.

1.3 Intended Use

Kilns in the N ... series are electrically heated chamber kilns for firing ceramics. Firings are started when the kiln is cool and the kiln is opened at the end of the program once it is cool again. The swing door may be opened only at temperatures below 390°F (200°C).



Target group

The instructions are intended for operators and professionals. Repairs and maintenance work on the electrical equipment may be carried out only by a licensed electrician.

This kiln may be used by children aged 8 years and above and by persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge, provided they are supervised or have received instructions in using the kiln safely and they understand the hazards involved.

The following are not intended use:

- Deviating use, such as the processing of products other than those intended and the handling of hazardous substances or materials or substances that are hazardous to health.
- Drying any objects. Only almost dry material and aids may be placed in the kiln.
- Heating food, wood, grains, animals, etc.
- Operating the kiln with removed or modified safety equipment. Improper modifications can pose a risk to people, the environment and the kiln.
- Ignoring installation information and safety regulations.
- Operation with power sources, products, operating materials, auxiliary materials, etc., which are subject to hazardous substance regulations or which may in any way harm the health of the user.

	<div data-bbox="858 1037 1029 1070"> WARNING</div> <p>Materials that contain solvents, that melt, explode or release toxic vapors must not be used.</p>
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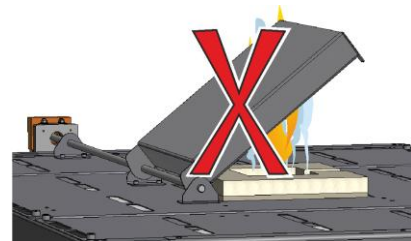
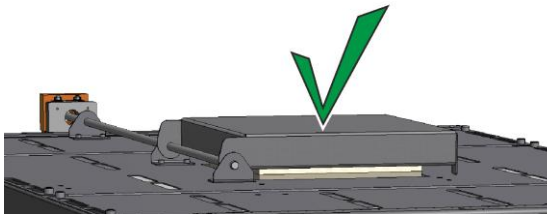
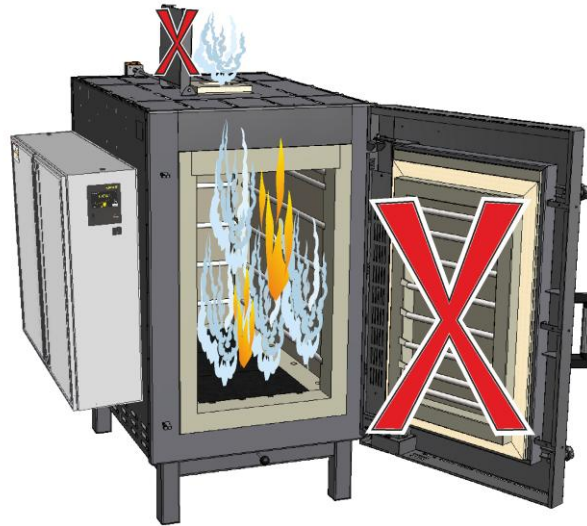
The operator must ensure the following:

- All required measures have been taken to ensure safe operation.
- Harmful gases released during firing are removed from the installation location in a suitable manner. Harmful gases can occur from firing the clay or glaze.
- The properties of materials used in the kiln are known and the materials do not create a hazard. Materials that could damage the insulation include: alkalis, alkaline earths, metal vapors, metal oxides, chlorine compounds, phosphorous compounds, and halogens. If ignored, harmful gases can be released and damage the kiln.
- The kiln is operated in a perfect, working condition and, in particular, the safety equipment (lid switch that switches the heating off if the lid is opened, for example) is checked regularly to ensure that it works as intended.
- Required protective equipment is available. Example: protective gloves, suitable apron, etc.
- These operating instructions are to be kept near the kiln. These instructions must be available at all times for anyone working with or on the kiln.
- Signs and stickers are easily legible. Damaged or unreadable signs must be replaced immediately.
- Persons who operate the kiln are instructed in all issues associated with safety and environmental protection, they know the content of the operating instructions and understand the safety information.

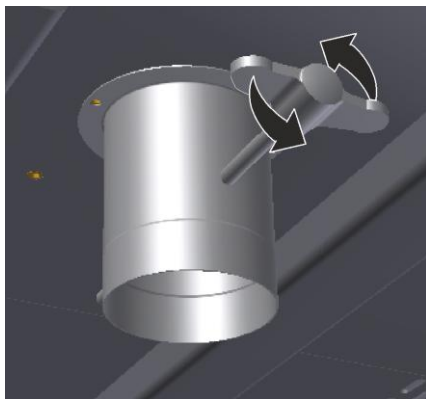
1.4 Basic Measures in Case of Emergency

In case of unexpected incidents in the kiln (for example, a lot of smoke), switch the kiln off immediately and keep the door closed. Allow the kiln to cool with the power disconnected.

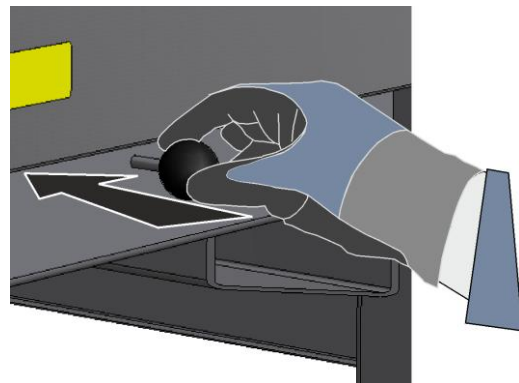
Immediately de-energize the kiln via the mains isolator switch.



Exhaust air flaps (if present) must remain closed

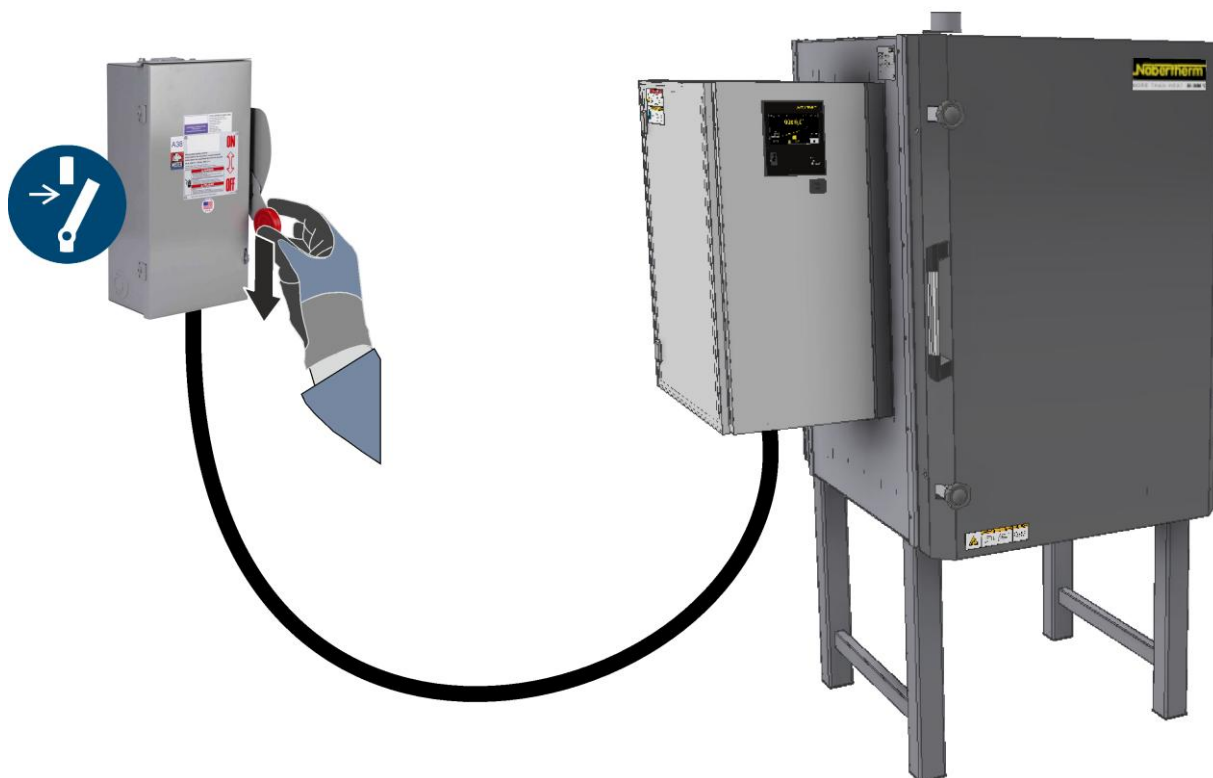


Air inlet flap





Air inlet slider

Close the air inlet flap or slider



De-energize the kiln via the mains isolator switch (not included in the scope of delivery)

	<p style="text-align: center;">CAUTION</p> <p>Do not restart the kiln. Open the door only when the kiln has cooled completely. Before restarting the kiln, check the content of the kiln and the kiln itself for faults.</p>
	<p style="text-align: center;">WARNING</p> <p>In case of fire, keep the kiln door closed. Keep doors and windows closed. Immediately notify the fire department, regardless of the extent of the fire. Leave the installation location.</p>

2 Product Description

This electrically heated kiln is a high-quality product. With good care and maintenance, reliable operation is guaranteed for many years. One basic requirement is that the kiln is used for the purposes for which it was intended.

During development and production of the kiln, high priority was placed on safety, functionality, and economy.

Kilns in the N ... series are electrically heated chamber kilns for firing ceramics.

Chamber kilns are ideal for firing temperatures up to 2300 °F (1260 °C) and can be fired up to 2408 °F (1320 °C).

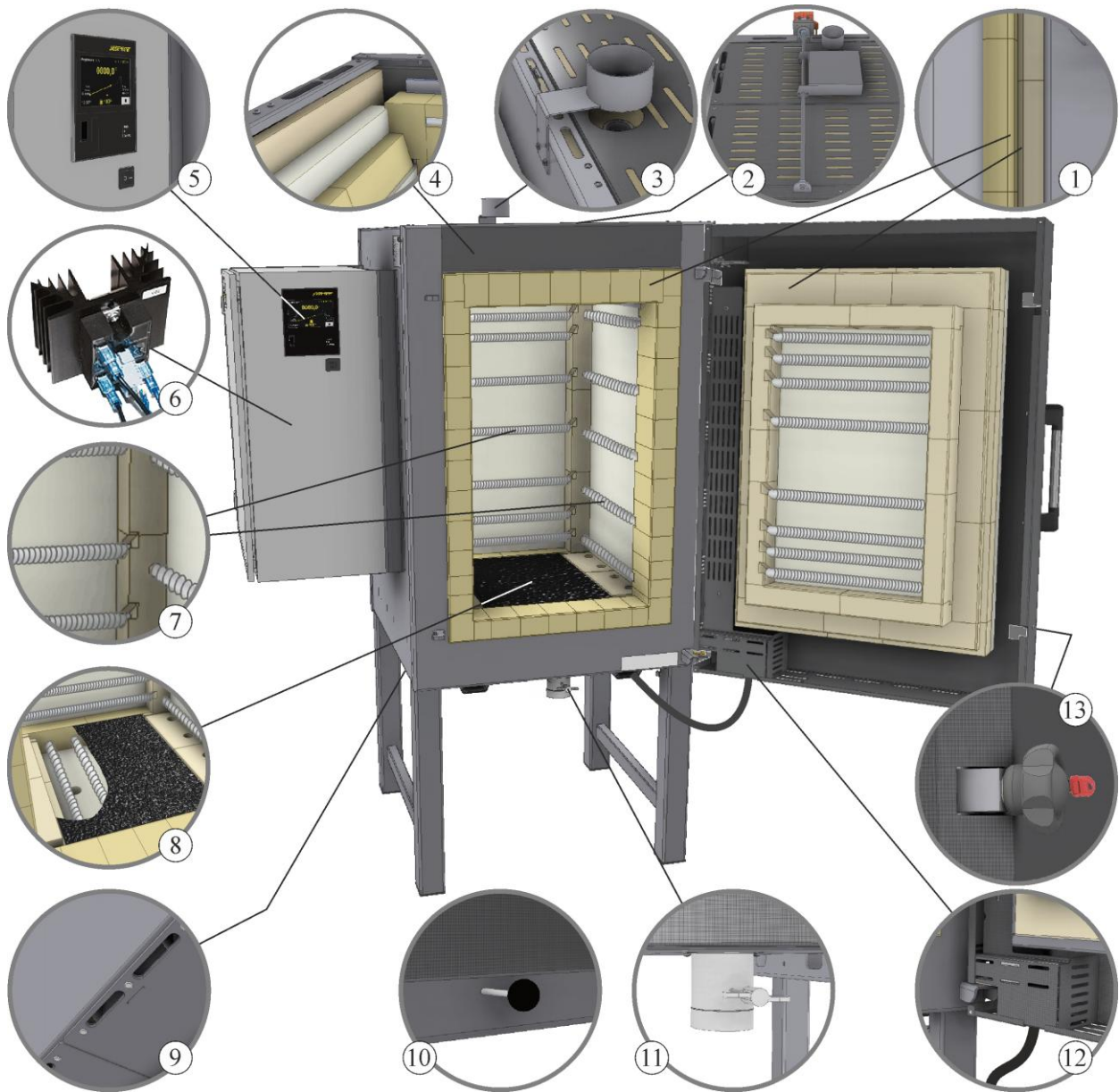
Other features of this product are:

- Heating elements on support tubes ensure uninterrupted heat radiation
- Heating from five sides and a special arrangement of the heating elements ensure optimum temperature uniformity
- SiC shelves protect the floor heating and provide a level setting surface
- Frame
- Door cover made from structured stainless steel
- Manual air inlet flap on chamber kilns up to 300 liters, which can be closed manually after the drying phase
- Manual base slider on chamber kilns from 440 liters, which can be closed manually after the drying phase
- Exhaust air opening with connections for piping, 3.2 inches (80 mm) diameter on models up to 300 liters
- Motorized exhaust air flap in the middle of the kiln roof for optimum ventilation of the kiln with chamber kilns from 440 liters
- Swing door with quick-release fasteners, locks as an accessory
- Controller AC590 with touch operation (50 programs, each with 40 segments) and ceramics wizard to help you create programs easily
- Solid state relays ensure low-noise heater switching
- Long-life S thermocouple with protective tube, protected against mechanical damage
- Door contact switch for safety shutoff
- Multi-layer, energy-saving insulation
- Wear-free door seal
- Very good access for maintenance
- Only insulation materials that are not classified according to Regulation (EC) No. 1272/2008 (CLP) are used. This means that no aluminum-silicate wool, also known as RCF fiber, is used, which is classified and may be carcinogenic.

Additional Equipment

- Automatic air inlet flap and fresh-air fan
- Motor-driven exhaust air flap in the middle of the kiln roof for optimum ventilation of the kiln with chamber kilns N200 – N300
- Stainless steel extraction flue
- Potential-free contact to control the customer's exhaust air system
- Set of furniture

2.1 Complete Overview of the Kiln



No.	Name
1	Long-life door seal “brick on brick”
2	Motorized exhaust air flap for chamber kilns from 440 liters
3	Exhaust air opening for chamber kilns up to 300 liters
4	Multi-layer refractory insulation
5	Controller and power switch on switch box
6	Solid state relays ensure low-noise heater operation
7	Heating from five sides on support tubes and a special arrangement of the heating elements ensure optimum temperature uniformity
8	SiC base plate protect the floor heating and provide a level setting surface
9	Dual shell housing for low outer wall temperatures

No.	Name
10	Manual air inlet slider for chamber kilns from 440 liters.
11	Manual air inlet flap for chamber kilns up to 300 liters.
	Option – automatic air inlet flap with fresh-air fan
12	Protected door contact switch
13	Lockable door (accessory) as kit consisting of two lockable door latches and 2 keys

2.2 Specifications

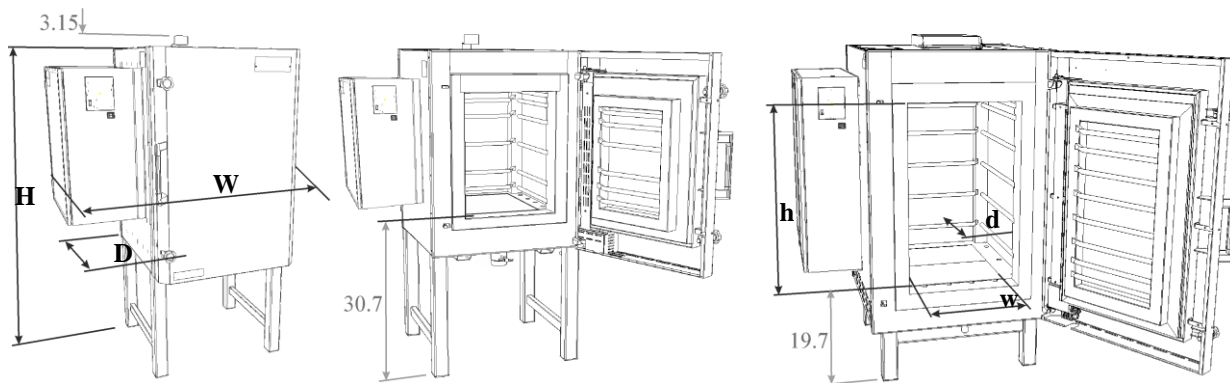
Model	Max. D	Inner dimensions in inches			Volume	Outer dimensions ² in inches			Weight	Max. charge weight	Power	Electrical connection	Current (Amps ³)	Fuse (Amps breaker)	Cable AWG (American Wire Gauge)	NEMA plug
	°F	w	d	h	cu ft	W	D	H ¹	lbs	lbs	kW		A	A		
N 200	2372	18.5	20.9	30.7	07:06	46.7	44.5	69.3	837.8	220	15	208 V 3/PE	41.6	60	6	F
												240 V 3/PE	36.1	50	8	F
N 300	2372	21.7	27.6	30.7	10:59	49.8	51.2	69.3	992	330	20	208 V 3/PE	56.6	80	4	F
												240 V 3/PE	49.1	80	4	F
N 440	2372	23.6	29.5	39.4	15:53	53.2	55.5	72.0	1807.8	485	30	208 V 3/PE	84.4	110	2	F
												240 V 3/PE	73.1	100	3	F
N 200/H	2444	19.7	20.9	28.3	07:06	49.4	45.3	67.0	1080	220	20	208 V 3/PE	56.6	80	4	F
												240 V 3/PE	49.1	80	4	F
N 300/H	2444	21.7	27.6	30.7	10:59	51.4	52.0	69.3	1190.5	330	27	208 V 3/PE	76.1	100	3	F
												240 V 3/PE	65.9	100	3	F
N 440/H	2444	23.6	29.5	39.4	15:53	53.2	55.5	72.0	1984	485	40	208 V 3/PE	112.1	150	1/0	F
												240 V 3/PE	97.2	125	1	F

¹ Including base frame

² External dimensions vary when kiln is equipped with additional equipment. Dimensions on request

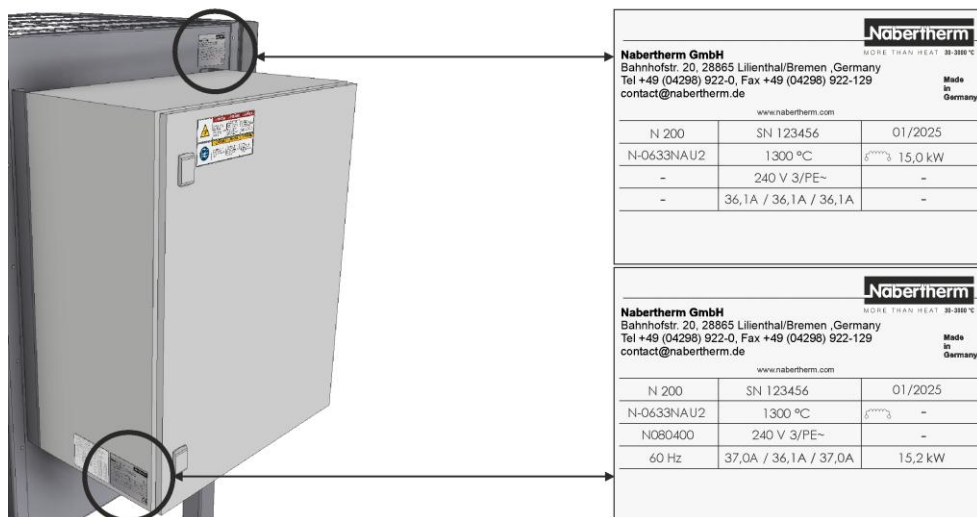
³ The amperage varies when the kiln is equipped with additional equipment.

F: Fixed connection










Electrical data		
	Voltage (V):	See type plate on kiln
	Frequency (Hz):	60 Hz
	Amperage (A):	See type plate on kiln
Protection type	Kiln:	IP20
	Switchgear:	IP40
Ambient conditions for electrical equipment	Temperature:	+41 °F (+5 °C) to +104 °F (+40 °C)
	Humidity:	Max. 80% non-condensing
Emissions		Continuous sound level <60 db(A)
Tolerance	Temperature:	1832 °F (1000 °C) ±3 Kelvin



Name of model	Explanation
N 200/H	N = Chamber kiln
N 200/H	200 = 7.06 cft kiln chamber
	300 = 10.59 cft kiln chamber
	400 = 15.53 cft kiln chamber
N 200/H	H = High temperature







Type plate on the kiln and on the switchgear (example)

2.3 Scope of Delivery

	Components	Quantity
	Chamber kiln N ...	1
	Bypass connection	1
	Manual air inlet flap	1
	SiC base plate	1
	Allen key	1
	Installation support 691600185	3
	Kiln operating instructions	1
	Controller operating instructions	1

	Accessories	Quantity
	Base frame	See shipping documents
	Shelves/props	See shipping documents

3 Transportation, Assembly, Installation Location and Initial Start-Up

	<p style="text-align: center;">⚠ CAUTION</p> <p>When the kiln is being lifted, parts of the kiln or the kiln itself could topple over, slip, or fall down. Wear suitable protective gloves and safety footwear.</p>	
	<p style="text-align: center;">⚠ CAUTION</p> <p>Risk of injury from lifting heavy loads. You could injure your back. Have several people carry the kiln or use a suitable pallet truck.</p>	

3.1 Delivery and Transportation

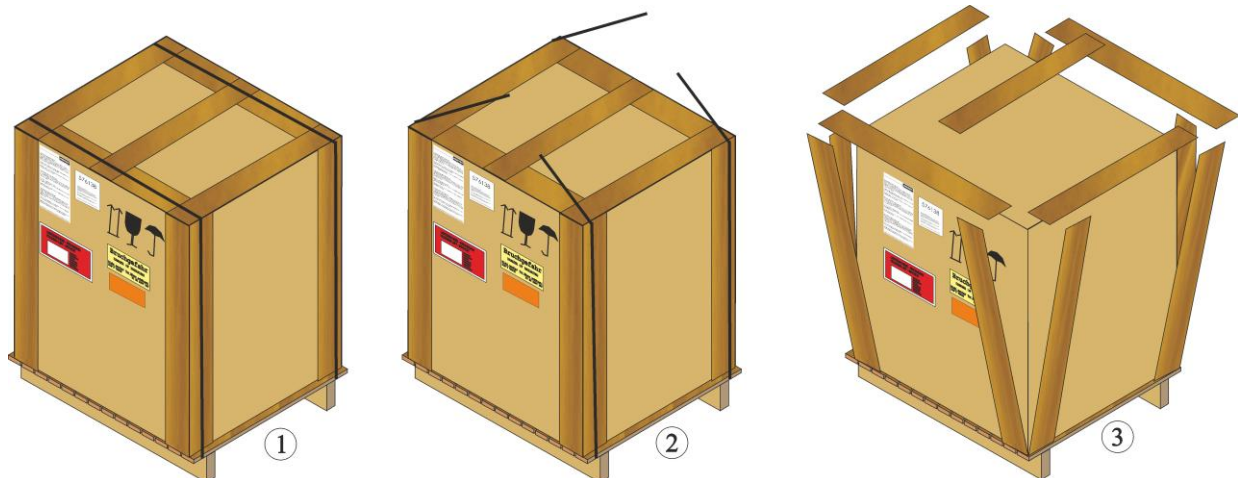
Check that everything is complete

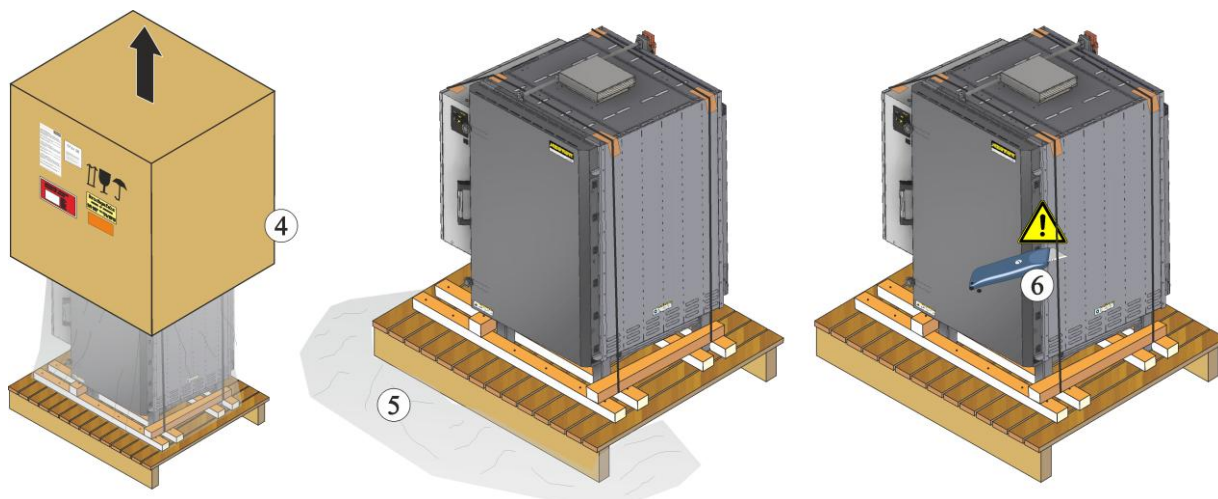
Transportation with a pallet truck

1. Observe the permitted load-carrying capacity of the pallet truck.
2. Our kilns are delivered ex works on wooden pallets to facilitate unloading. Kilns may be transported only in packaging and with suitable equipment to prevent any damage. Remove the packaging only when the kiln is at its final location. When transporting the kiln, make sure it is secured against sliding, toppling over, and damage. The kiln should be transported and installed by at least two persons.
3. Push the pallet truck beneath the pallet. Make sure that the pallet truck is pushed completely beneath the pallet.
4. Carefully raise the pallet, paying attention to its center of gravity.
5. Check that the pallet sits securely, use transport aids if required. Move the pallet truck carefully, slowly and with forks in the lowest position. Special care is required on sloping routes.
6. At the installation location, carefully lower the pallet.


Unpacking

The kiln is packaged carefully to prevent damage during transportation. Make sure that you remove all packaging material (also inside the kiln chamber). Keep the packaging and transportation securing equipment in case it is needed for future transportation or storage.





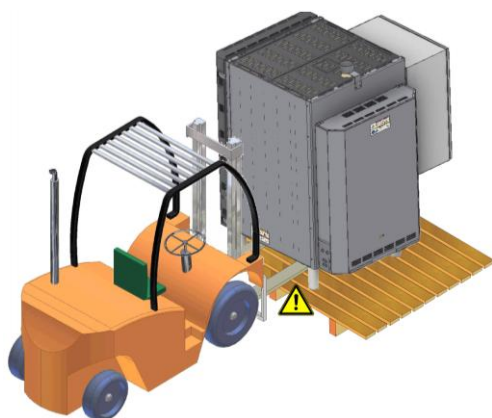


7. Check the transport packaging for possible damage.
8. Remove straps from the transportation packaging.
9. Undo screws and remove wooden packaging.
10. Lift the cardboard box and remove it from the pallet. Compare the delivered items with the delivery note and the purchase order documents.
11. The pallet contains additional accessories in separate packaging.
12. Remove the protective film from the kiln.

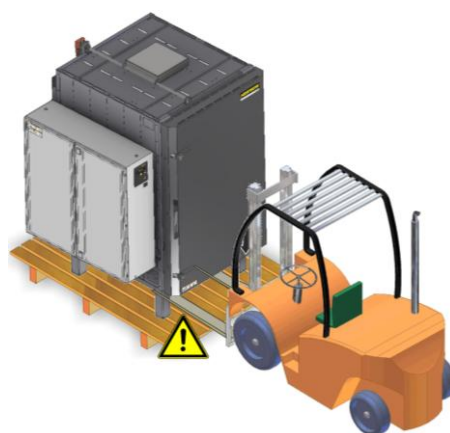
	⚠ WARNING
	<p>Do not allow children to play with packaging parts. There is a risk of suffocation from plastic films and plastic parts. Small parts are not for children under 3 years of age or persons who tend to put inedible things in their mouth.</p>

Transporting the kiln

⚠ CAUTION		
	<p>Risk of injury from lifting heavy loads. You could injure your back. Have several people carry the kiln or use a suitable pallet truck.</p>	






N 200– N 300



N 440

13. The frame of the kiln consists of thick-walled sectional steel. Drive the forks of the truck beneath the kiln.
14. Make sure that the forks of the forklift are **completely** beneath the frame.
15. Lift the kiln carefully from below and pay attention to its center of gravity.

3.2 Constructional and Connection Requirements

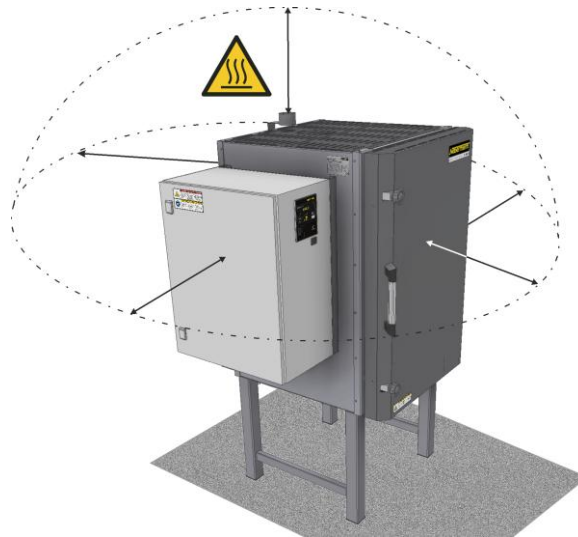
	<p>Notice</p> <p>Before starting the kiln for the first time, allow it to acclimatize at its installation location for 24 hours.</p>
	<p style="text-align: center;"> DANGER</p> <p>Risk of fire, danger to health. If the installation recommendations are ignored, materials in the surroundings may catch fire.</p>



3.3 Installation Location

When installing the kiln, observe the following safety instructions:

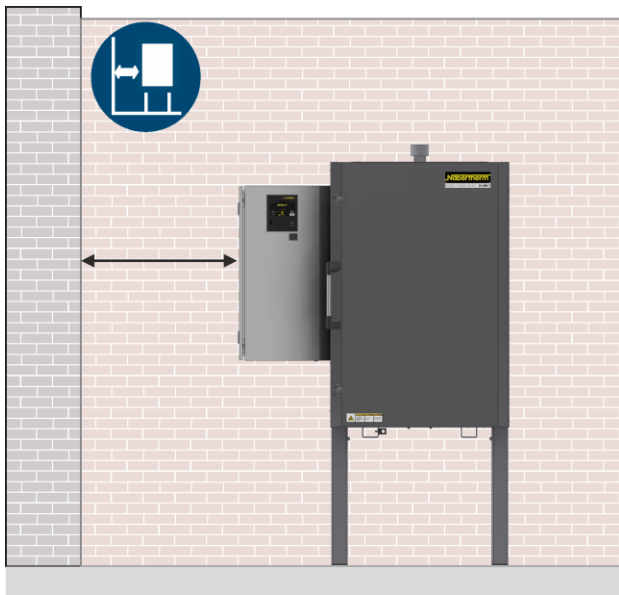
Install the kiln in a dry place protected from the weather. If this is not observed, the housing can corrode and the electrical equipment may be damaged. Salty air accelerates this type of damage.

Kilns can radiate a lot of heat. Ensure a 40-inches (100 cm) gap (S) between the sides and top of the kiln and flammable and temperature-sensitive objects. The floor must not be made from flammable material. All flammable materials, such as drapes, plastics, furniture, rugs, etc., must be removed from the area around the kiln.

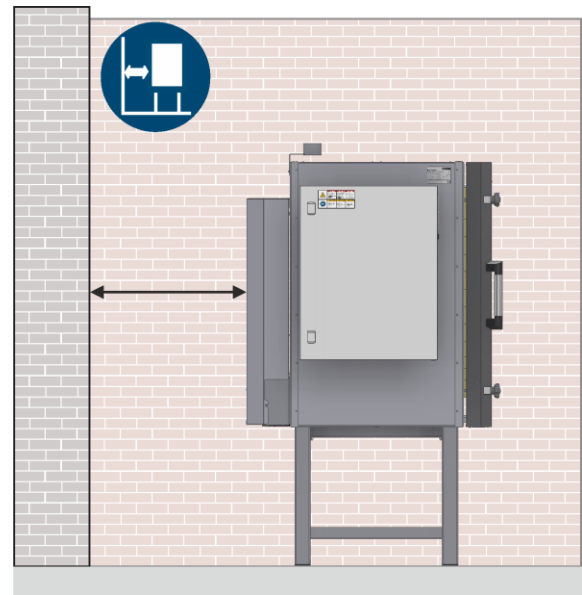


	<p style="text-align: center;"> CAUTION</p> <p>Do not place the kiln closer to a wall made of flammable materials than specified below: Sides 40 inches (100 centimeters) Rear 40 inches (100 centimeters)</p>
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For maintenance and repair work, leave a 40 inch (100 cm) gap between the back wall of the kiln and the building wall and the switchgear.



Distance from control cabinet



Distance from back wall

The floor must have an adequate load-bearing capacity and must be level so that the kiln has a secure footing.

Access to the kiln must be restricted if the installation location can be accessed by unauthorized persons, children or pets.

If several kilns are installed in one room, make sure that the controllers and switchgears do not face neighboring kilns. Radiated heat from neighboring kilns can damage the controls.



Keep temperatures between +41 °F (+5 °C) and +104 °F (+40 °C) and maximum humidity 80% non-condensing.

Ventilation



To ensure a healthy working environment and appropriate room temperature, the work room must be well ventilated.

Harmful vapors must be directed from the work room outdoors via professionally installed exhaust air piping.

In small rooms, especially if several kilns are installed in one room, make sure that the room temperature does not exceed 104 °F (40 °C).

Sprinkler system



If an automatic extinguishing system is installed at the kiln installation location, ensure that it cannot be activated by the radiated heat. In this regard, also consider whether to open the kiln while it is hot. Observe local construction and fire prevention regulations.

Fire prevention regulations



Local fire prevention regulations take precedence over the information in these operating instructions.

If you are not sure which regulations apply regarding the installation of a kiln, ask your local building inspector or your insurance company.

It must be ensured that the electrician who connects the kiln observes all local fire prevention and safety regulations.

4 Assembly and Installation

Removing the transportation protection

During transportation, the kiln collar and door insulation are protected against mechanical effects all round with foil or cardboard strips (depending on the model).

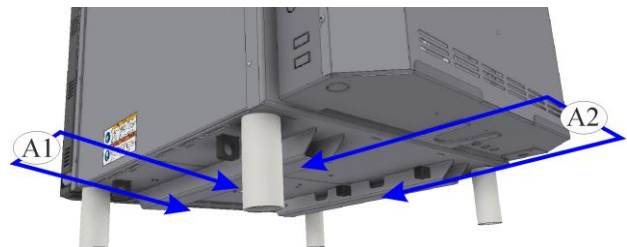
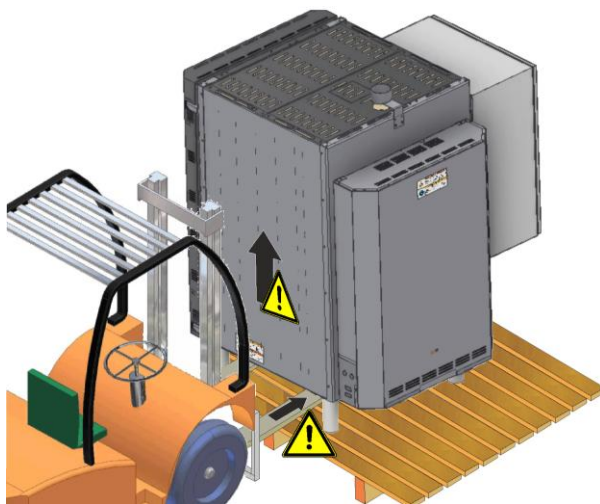
We recommend that you remove this protection only when the kiln is installed and set up.



Assembling the base frame extension with chamber kilns N 200(H) – N 300(H) (accessories)

	<p>WARNING</p> <p>Do not operate this kiln until it has been assembled on the frame that is part of the delivery.</p>
--	--

1. Remove the frame extension from its packaging.
2. To assemble the base frame extension, we recommend that you use a suitable pallet truck (refer to “Transportation with a Pallet Truck”).
3. The forks of the pallet truck should be completely inserted under the kiln, either from the side (A1) or from (A2). Only the floor profiles (3) of the kiln floor may rest on the forks of the pallet truck. The kiln must not be lifted by its attachments, pipes or cable conduits.

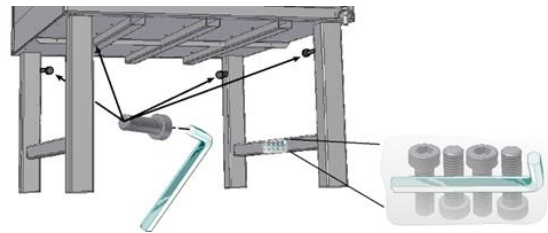


Carefully lift the kiln.

4. Lower the kiln carefully onto the base frame and make sure that it sits securely.
5. Secure the base frame with the screws included in the scope of delivery.



Carefully place the kiln on the base frame.

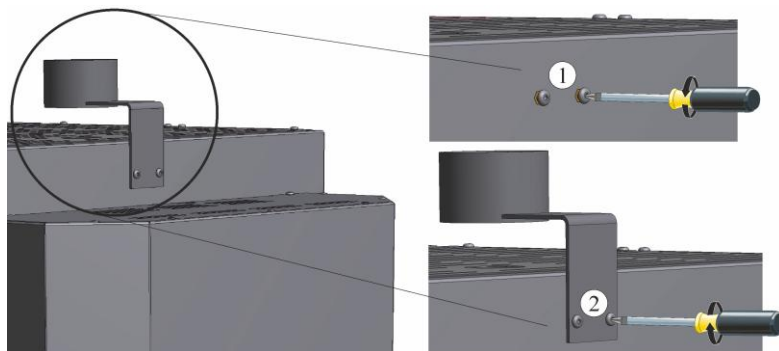


Scope of delivery: 4x screws M10x30 mm
1x Allen key 8 mm

Installing the exhaust air connection (models up to 300 liters)

Attach the exhaust gas connection that is part of the delivery to the back of the kiln.

1. connection; these must be loosened beforehand.
2. Place the bypass connection (2) with the screws loosened at the correct position on the kiln and fasten it with suitable tools.



Installing the air inlet flap after assembling the base frame (N 200– N 300)

1. When the kiln has been carefully placed on the base frame and been secured in place with the screws, the air inlet flap can then be installed under the floor of the kiln.
2. The air inlet flap (1) is delivered in a box (2) on the switchgear or on the pallet on which the kiln is delivered.



3. At the position where the air inlet flap is to be installed, there are two screws (3) which must be undone beforehand.



4. Place the air inlet flap with the screws at the correct position on the kiln floor and fasten with a suitable tool . Check that the connection (screws) between the air inlet flap and the kiln floor is firm.



Exhaust air recommendations for piping for kilns N200 – N300 with bypass connection

SAFETY INFORMATION

Harmful vapors must be directed from the workroom outdoors via exhaust air piping. Contact a specialist company for correct installation.

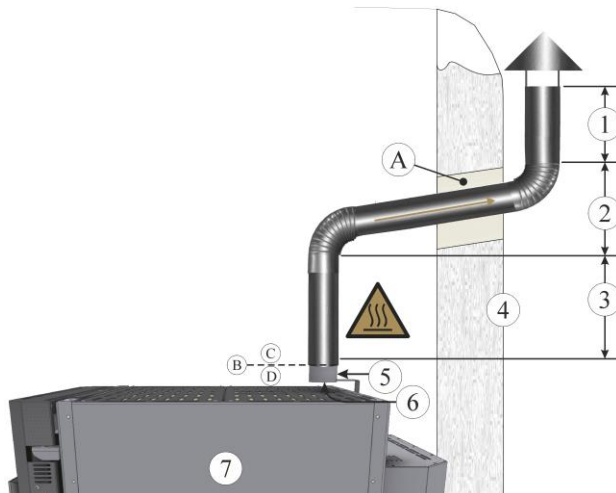
For the exhaust air system, customer-side masonry and roofing work is necessary. The size and design of the exhaust air system must be defined by a specialist company. It must be ensured that the electrician who connects the kiln observes all local fire prevention and safety regulations.

When ceramics are fired, depending on the quality of the clay and/or glaze, they can emit gases and vapors that are harmful to health. It is therefore necessary to make sure that the “exhaust air” emitted from the exhaust air opening is directed outdoors in a suitable manner and that the location is well ventilated. If adequate ventilation cannot be ensured at the installation location, the “exhaust air” must be removed specifically via a pipe.

The heat occurring during firing may make additional room ventilation necessary depending on the room size and conditions of the installation location. 1/3 of the heating capacity of the respective kiln can be used as a guide for dimensioning the room ventilation.

If the kiln is installed in a “passive house”, it must be ensured that the room has an adequate fresh-air supply. Because of potential aggressive vapors, we do not recommend connecting it to the house ventilation system. We recommend a separate kiln room that can be ventilated adequately.

The exhaust air pipe must be fitted to the exhaust air connection starting with a rising bend so that the cover can be opened easily.



1	min. 20 inches (50 cm)	2	Install pipe in an upward direction (approx. 7°)
3	min. 40 inches (100 cm)	4	Outside wall
5	Bypass connection	6	Bypass effect
7	Kiln	8	Exhaust air piping
A	Wall duct	B	Supply limit
C	Customer	D	Bypass connection

SAFETY INFORMATION

Active ventilation of the installation room must not cause underpressure in the room, as this would affect extraction of the exhaust air from the room via the exhaust-air connection.

Recommendations for pipework for kilns with exhaust air flue and fresh-air fan

When dimensioning the exhaust air system, the following must be considered:

- Volumetric flow rate and temperature of the exhaust air
- Constructional conditions, pipe lengths, and number of elbows
- Permissible temperatures and corrosion resistance of the exhaust air system
- Hazards caused by malfunctions or operating errors with the kiln or the exhaust air system, such as fire hazards
- Pressure conditions at the installation location
- Driving rain and wind pressure at the outlet of the pipe
- It must be easy to separate the exhaust air flue and the piping for maintenance and cleaning purposes
- The building must be able to handle the weight of the piping. The exhaust air flue is not suitable for bearing the weight of the piping.

Condensate deposits should be avoided. Certain condensates can cause additional hazards (such as fire hazards) or can damage the kiln. Condensate deposits can be prevented with insulation, collection systems, maintenance flaps, and regular cleaning.

Due to the high volumetric flow rates, passive removal of the exhaust air in connection with the cooling function of the kiln is possible only under ideal conditions. For the exhaust air to be removed properly via natural draft, the following must be considered:

- Wind pressure, kiln and outdoor temperatures have a lot of influence on the function.

- Unfavorable pressure conditions, such as additional extraction systems at the installation location, reduce or prevent the function. Backflows must be prevented. If the system is installed in a “passive house”, it must be ensured that the pressure conditions to the outside are balanced, such as with forced ventilation of the rooms.
- The pipe cross-sections must be adequately dimensioned.
- Adequate pipe lengths outside the building (1). Longer vertical pipe sections support the function.
- Long horizontal pipe sections (also sloping ones) and elbows reduce the function.
- Driving rain and condensation must be considered.

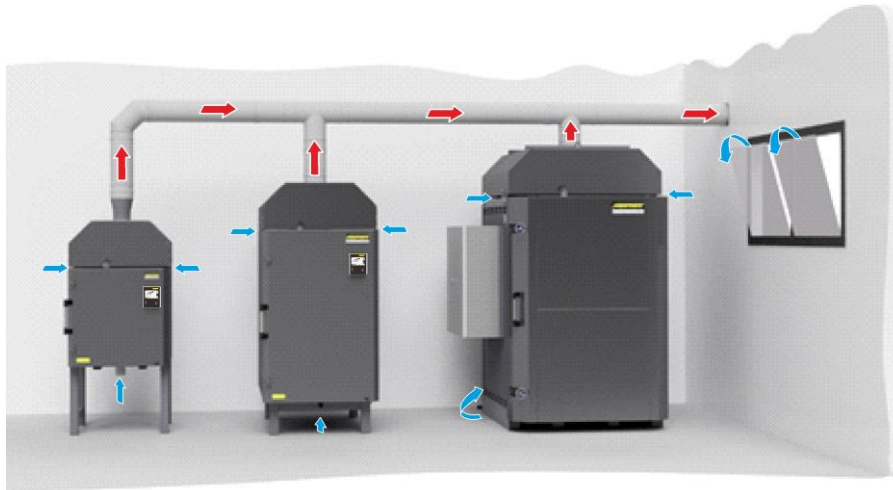
Active extraction (for example a fan in the piping) enables targeted removal of the exhaust air and also removes some of the waste heat from the kiln.

If several kilns are operated with the same exhaust air system, the air volumes at the removal points of the kiln can be influenced by the operating conditions. The extraction system must be able to handle the entire air volumes from the kiln at all times.

Adjustable throttle valves at the removal points allow precise adjustment of the volumetric flow rate.

High underpressure beneath the exhaust air flue has an effect on natural cooling without using the fresh-air fan. Very high underpressures can have an effect on the temperature distribution inside the kiln.

The air that is removed from the room by the exhaust air system must be replenished by a ventilation system.



Malfunctions and operating errors with the exhaust air system

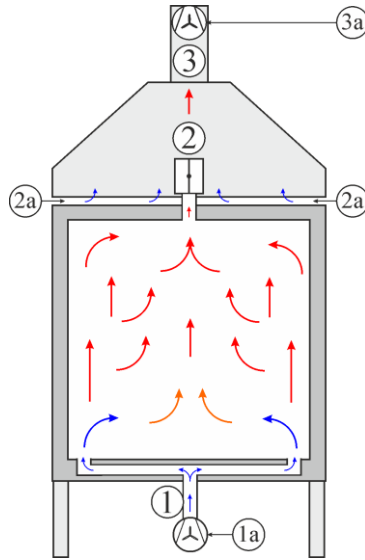
When the kiln is in operation, the extraction system must function perfectly.

Before and after the process, high temperatures may occur and the atmosphere inside the kiln may be polluted. Therefore, the exhaust air system must be operated in relation to conditions inside the kiln.

A breakdown of the exhaust air system must not cause additional hazards. In the event of a malfunction, suitable rules of conduct and measures must be defined, e.g. emergency ventilation of the room, switching off the kiln, special fire protection measures.

Volumetric flow rates and temperatures

The interfaces to the room and the ducting are described below.



Fresh-air inlet (1)

Depending on the kiln model, fresh air can be fed to the kiln chamber in different ways. Opening the bottom slider or the fresh-air flap causes air to flow through the kiln. The volumetric flow rate is low and is dependent on the temperature and how exhaust air is removed outside the kiln.

A fresh-air fan (option) considerably increases air flow through the kiln. In the cooling function, the volumetric flow rate can be constant or can be variable in relation to the temperature. As the temperature falls, the volumetric flow rate of fresh air generally increases to achieve the required cooling.

Exhaust air flap/exhaust air flue (2)

When the exhaust air flap is opened, this creates an exchange of air with the kiln atmosphere.


Use of the fresh-air fan above 1475 °F (800 °C) is not recommended. Therefore, this temperature can be used for general dimensioning. However, due to special requirements with regard to the process or because of an operating error, malfunction in the kiln or extraction system, high temperatures up to the maximum temperature can occur. From a technical aspect, the following components must be able to handle the process requirements. In case of an operating error or malfunction, the exhaust air system must not cause any additional hazards.

The current temperature of the kiln can be expected near the outlet (2). At a kiln temperature of 70 °F (20 °C), the volumetric flow rate of the fresh-air fan (1) is present at (2). The volumetric flow rate varies in relation to the temperature inside the kiln. An exhaust air flue (accessory) allows cold air to be added (2a).

Exhaust flue flange (3)





The mixture of the two volumetric air flows produces a mixed temperature at the flange of the exhaust flue (3). The flow rate of the customer's exhaust air system (3a) and the adjustable gap on the exhaust flue (2, 2a) influence the mixed temperature that has to be dimensioned for the following components. The lower the permitted temperature of the exhaust air system, the higher the volumetric flow rate required for mixing and cooling the exhaust flue. The total of the volumetric flow rates from the kiln (2) and (2a) is the volume that the exhaust air system must be capable of handling.

Exhaust air without discharge piping

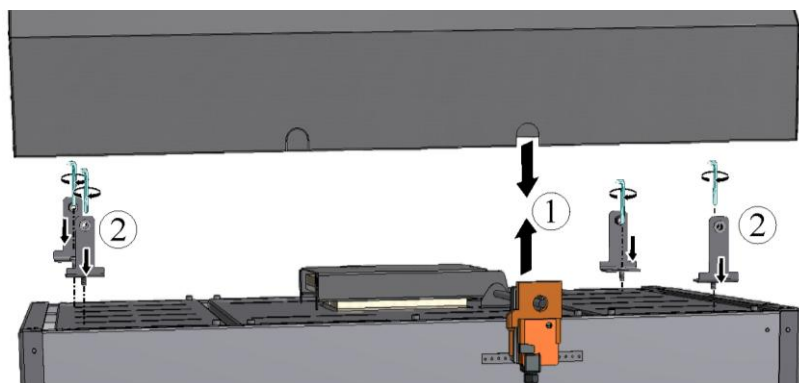
	! WARNING
	<p>Inadequate ventilation of the room where the kiln is installed. There is a risk of suffocation. The installation location of the kiln must be well ventilated when the kiln is operating.</p>

Reliable removal of harmful gases is not ensured without direct extraction through a ducting system. If the kiln is operated without exhaust ducting, make sure that the installation location is well ventilated and that the exhaust air is removed.

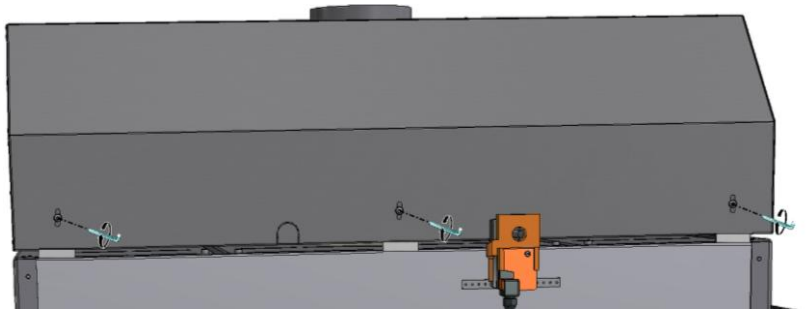
Assembling the exhaust air flue (accessory)

	<p>⚠ CAUTION</p> <p>There is a risk of cutting injuries to the hand at the bottom edge of the housing. Wear cut-resistant gloves.</p>
	<p>⚠ WARNING</p> <p>Risk of falling while installing the exhaust air flue. Risk of falling when using steps and ladders. Ignoring this can lead to fatal injury. Use suitable steps and ladders and, if necessary, have a second person hold them steady to prevent them falling over, sliding or toppling.</p>
	<p>⚠ WARNING</p> <p>Fire hazard If the hot exhaust air is not removed adequately (cooling phase, for example), there is a risk of fire at the installation location and the kiln may be damaged.</p>
	<p>⚠ WARNING</p> <p>The kiln roof is NOT designed to be walked upon There is a risk of it collapsing. Components can break or be damaged if they are walked upon.</p>

1. When positioning the flue, make sure it faces the right direction. Place the recess of the flue on the side of the shaft (1) of the exhaust air flap (if present)



2. The screws (2) for fixing the flue are on top of the kiln. Position the exhaust air flue where the preinstalled screws are located. The number and position of the screws may differ depending on the model. The exhaust air flap beneath the exhaust air flue must be able to move freely.

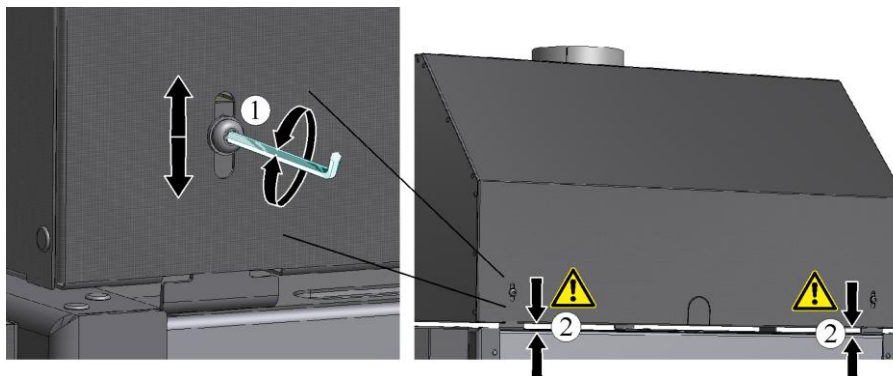


Installing the ducting

The exhaust hood is not suitable for bearing the weight of the ducting. It should be easy to separate the ducting from the exhaust air flue for adjustment and maintenance work.

Adjusting the height of the exhaust air flue

1. When the cooling fan beneath the exhaust air flue (if present) is switched on, the pressure should always be slightly lower than the ambient pressure. Therefore, with active extraction, the extraction capacity should be adjustable (e.g., with a throttle valve). A mixed volumetric flow rate is adjustable through the distance (2) between the exhaust air flue and the kiln.
2. The height of the flue can be infinitely adjusted using the screws (1) on the surrounding brackets. Make sure that there is an even gap between the flue and the kiln.



4.1 Connecting the Kiln to the Power Supply



⚠ DANGER


Working with electrical equipment can cause serious injuries or death. Danger from electric current. Work on the power supply and kiln may be carried out only by a licensed electrician.



NOTICE

Notice: connected to wrong voltage. Damage to the device. Check voltage before connecting and initial start-up and compare the voltage with the details on the type plate.

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mailto:info@robtherm.de	
www.robtherm.de	


	<p>Notice</p> <p>The regulations applicable in the country where the equipment is installed must be observed.</p>
---	--

It must be ensured that the electrician who connects the kiln observes all local fire prevention and safety regulations. In the US, electrical installations must be carried out in accordance with the National Electrical Code (NEC) and in Canada according to the Canadian Electrical Code (CEC).

These codes define specific requirements for the installation and operation of electrical equipment. These regulations are intended to ensure the safety and reliability of electrical systems.

Kilns with a high current are delivered without a plug and must be hard-wired to a connection box with circuit breaker. Section 2.2. "Specifications" contains an overview of electrical connections and plugs for the individual models (Electrical Overview). Special attention must be paid that the correct type of plug is used. It must be suitable for the prepared socket.

With fixed connections and wall sockets, make sure that the ground wire is connected correctly. If it is not connected correctly or if the wall socket does not have a ground wire connection, there is a risk of electric shock.

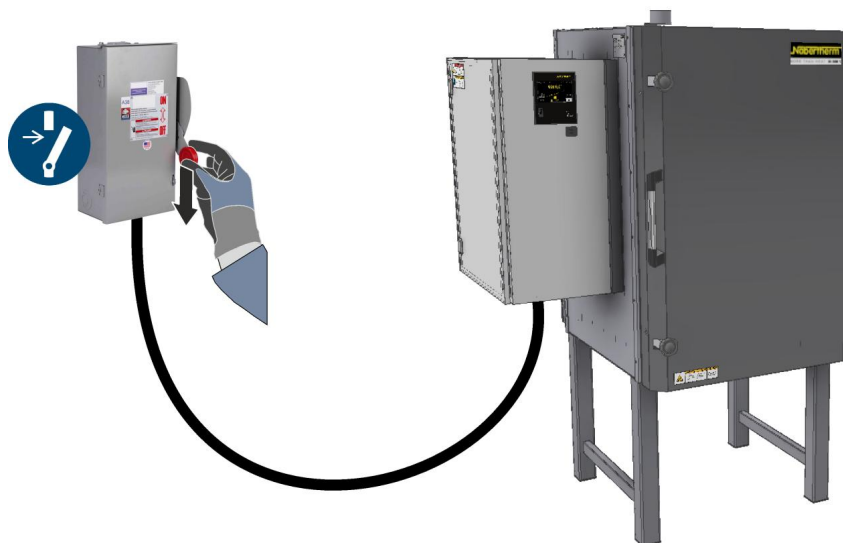
	<p>CAUTION</p> <p>To ensure permanent protection against electric shock, use only a properly grounded socket.</p>
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The power cable cross-sections to be used are described in "Specifications". We recommend the use of copper wire power cables. The insulation must be suitable for temperatures ≥ 167 °F (75 °C).

Hard-wired kiln (without plug)

Kilns that are hard-wired must have a circuit breaker visible from the kiln which disconnects the kiln from the power supply. This can be implemented by hard-wiring the kiln with a connection box with circuit breaker or by installing the kiln in an area with a line of sight to the fuse box.

The wire cross-section from the fuse box or connection box to the kiln must be adequate to carry the current of the kiln over a certain distance even in continuous operation and to reduce the voltage drop (see "Specifications"). If the wire cross-section is increased, this loss is reduced.



De-energize the kiln via the mains isolator switch (not included in the scope of delivery)

Model	Electrical connection	Screw connection	Clamping range	Hose
			in mm	in inches
N 200	208 V 2/PE	M32	16.0 – 24.7	1"
	240 V 2/PE			
N 300	208 V 2/PE	M40	22.0 – 32.0	1.1/4"
	240 V 2/PE			
N 440	208 V 2/PE	M50	29.5 – 38.0	1.1/2"
	240 V 2/PE			
N 200/H	208 V 2/PE	M40	22.0 – 32.0	1.1/4"
	240 V 2/PE			
N 300/H	208 V 2/PE	M50	29.5 – 38.0	1.1/2"
	240 V 2/PE			
N 440/H	208 V 2/PE	M50	29.5 – 38.0	1.1/2"
	240 V 2/PE			

Kilns with a fixed connection have a preinstalled cable-hose fitting to hold the power cable and an optional protective hose. Assembly may differ depending on the kiln model and the screw connection that is used.

Overview of the individual parts of the screw connection for the power supply:



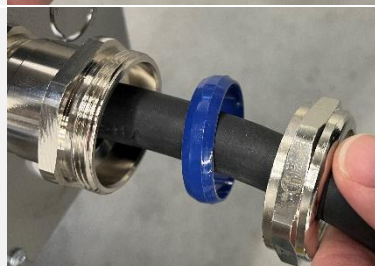
Power supply without conduit:

Strip the end of the cable. The ground wire must be slightly longer than the other wires.

Pull the screw connection and the plastic ring over the stripped cable.



Feed the wire into the screw connection.

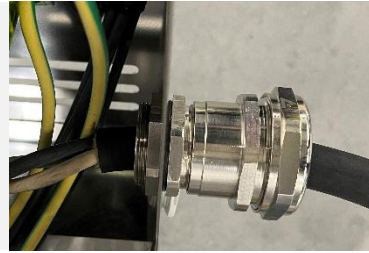


Tighten the strain relief by tightening the nut over the rubber grommet.

Hold the screw fitting with a 2nd pair of pliers.



Check tightness by tightening all nuts, retighten loose nuts if necessary.



Power supply with conduit:

Pull the screw connection and the plastic ring over the conduit.

Screw the conduit fitting into the conduit by turning it.

Strip the end of the cable. The ground wire must be slightly longer than the other wires.



Feed the wire into the screw connection.



Tighten the strain relief by tightening the nut over the rubber grommet.
Hold the screw fitting with a 2nd pair of pliers.



Check tightness by tightening all nuts, retighten loose nuts if necessary.



4.2 Initial Start-Up

Read the section on “Safety”. When using the kiln for the first time, it is very important that you pay attention to the following safety instructions.

Make sure that the instructions and information in the operating manual and the controller instructions are observed and followed.

Before starting the kiln for the first time, make sure that all tools, parts that do not belong in the kiln and transportation securing equipment have been removed from the kiln.

Before you switch on the kiln, make sure that you know what to do in case of faults or emergencies.

Recommendations for heating the kiln for the first time

Heat the kiln without a charge to dry out the insulation and to get a protective oxide coating on the heating elements. The life of the heating elements is dependent on obtaining a good oxide coating. There may be some unpleasant odors while the kiln is heating. Ventilate the installation location of the kiln well during the first heating phase.

1. Open the fresh-air slider/flap.
2. Close the door.
3. Switch on the kiln/controller at the power switch.
4. Open the exhaust air flap (if present).
5. Heat the empty kiln or kiln containing new furniture (for example shelves and props).
6. Use “Program 01” from the preset programs the first time you heat up the kiln.
7. For kilns with Tmax. 2552 °F (1400 °C), the following heating program should be executed without furniture.
8. Heat the empty kiln to 2012 °F (1100 °C) over 10 hours, keep it at this temperature for 12 hours and then let it cool naturally.
9. Read the controller instructions for how to enter temperatures and times.
10. After the heating phase, allow the kiln to cool naturally.

The insulation materials and furniture have natural residual moisture. During the first firings, condensation may accumulate and drip from the housing.

Program 01

First firing (“FIRST FIRING”)

Segment	Start	Target	Time	Air inlet slider/ air inlet flap ¹
1	32 °F (0 °C)	932 °F (500 °C)	360 min	The air inlet slider/flap must be completely open
2	932 °F (500 °C)	1652 °F (900 °C)	180 min	
3	1652 °F (900 °C)	1652 °F (900 °C)	240 min	-
4	Keep the door closed until the kiln has cooled completely.			

¹ Fresh-air slider / flap is opened manually.

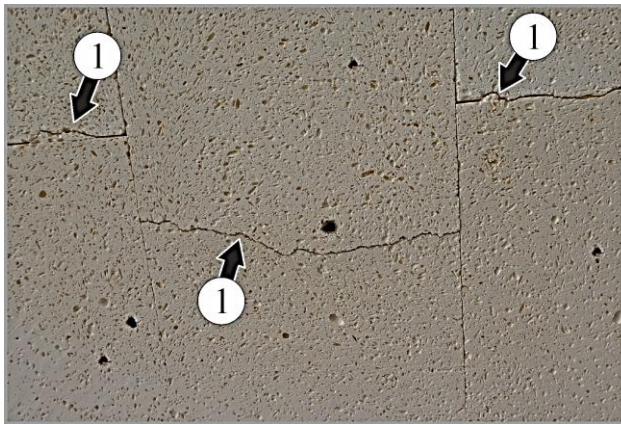
² The kiln is heated to the set temperature as quickly as possible.

³ In the case of kilns with a motorized air inlet flap, the flap is opened when the extra function (Extra 1) is activated.

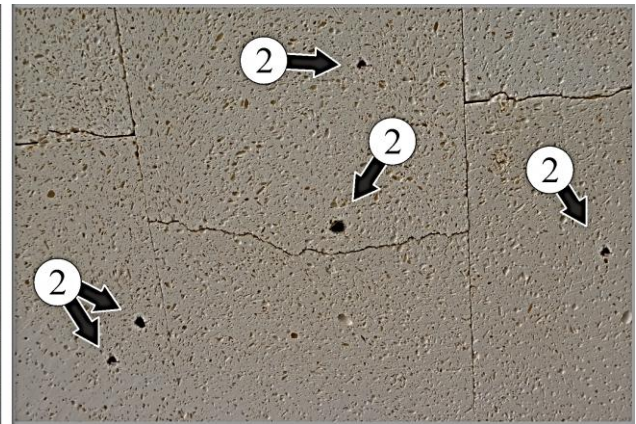
4.3 Information about the Insulation

The kiln insulation is made from high-grade refractory material. Due to thermal expansion and material shrinkage, cracks will appear in the insulation after a few heating cycles. These have no influence on the function, safety or quality of the kiln.

Due to the manufacturing process of the insulation material, small holes or cavities may appear. These are quite normal and underline the quality features of the bricks.



Cracks (1)






Holes (2)

	<p>Notice</p> <p>New kiln furniture (e.g. shelves and props) should be heated once to dry them out (as described above). Heating elements are very brittle. Take great care when filling, emptying and cleaning the kiln.</p>
--	--

5 Operation



	<p> CAUTION</p> <p>Hot surface. Risk of burning. Do not touch the surface.</p>
--	---



	 CAUTION	
	<p>Do not open when hot</p> <p>Opening the kiln when it is hot above 390 °F (200 °C) can cause burns.</p> <p>Appropriate protective gloves must be worn.</p>	




1. Check the kiln before switching it on. If there are external changes that could indicate a fault, the kiln must not be operated. If during operation, changes take place or the kiln makes strange noises, switch the kiln off for safety reasons.
2. It is important to take care when working with the kiln. During operation, areas on and around the kiln can become hot and cause burns if they are touched accidentally.
3. The kiln is not suitable for drying. Place only almost dry materials and furniture in the kiln. Objects with a high level of residual moisture can crack, split and cause corrosion on the kiln housing
4. Do not place flammable materials in the kiln. Remove, paper, wood and plastics. Materials that melt, produce flammable gases, explode or release harmful vapors must not be placed in the kiln.
5. For your safety and to protect the kiln and your ceramics, we recommend that you do not open the kiln until it has cooled down completely. Opening a hot kiln at temperatures above 390 °F (200 °C) will lead to increased wear of the insulation, heating elements and the kiln housing.
6. The door can be closed with a lockable star knob (accessory). This is highly recommended if the installation location is accessible to unauthorized persons (such as children).
7. If the kiln has to be opened when it is still hot, you must wear suitable, heat-resistant protective clothing. Make sure that your clothing does not come into contact with hot surfaces. There is a risk that your clothing may catch fire or stick to the surface.
8. If a serious natural disaster is announced, such as storms, flooding or an earthquake, unplug the kiln or use the circuit breaker to disconnect the kiln from the power supply.
9. If a protective device is faulty (no switchgear cover, a faulty door contact switch, for example), do not switch the kiln on; instead, pull the plug or use the circuit breaker to disconnect the kiln from the power supply.

5.1 Controller






No.	Name
1	Display
2	USB interface

	<p>Notice</p> <p>For operation of the controller, please refer to the separate operating instructions.</p> <div data-bbox="571 347 694 474">  </div> <p>Watch the tutorials on our website. To access the operating instruction quickly, scan the QR code with your smartphone or enter the URL in your browser: www.nabertherm.com/en/downloads/video-tutorials</p> <p>Apps to scan QR codes can be downloaded from the corresponding sources (app stores).</p>
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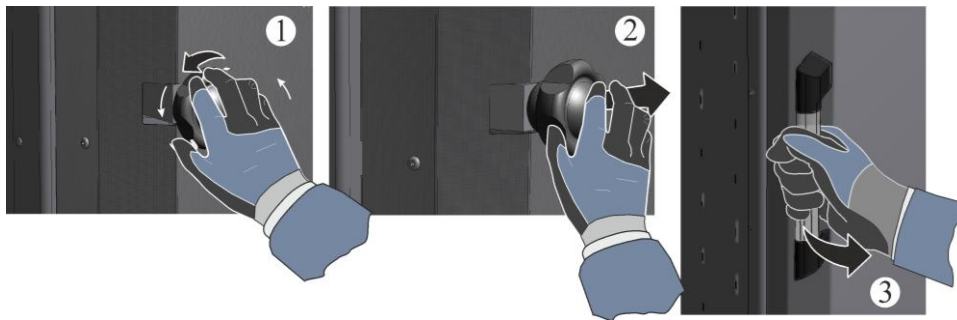
Switching the controller/kiln on		
Switch on the power switch		Set power switch to “I”. The switch is located on the rear of the kiln.
<p>The kiln status is displayed.</p> <p>After a few seconds, the temperature is displayed.</p>		Once the temperature is shown on the controller, the controller is ready for operation.
Switching the controller/kiln off		
Switch off the power switch		Switch the power switch to the “O” position. The switch is located on the rear of the kiln.

5.2 Opening and Closing the Door

	<p>CAUTION</p> <p>For your safety and to protect the kiln and your ceramics, we recommend that you do not open the kiln until it has cooled down completely.</p> <p>There is a risk of burning.</p> <p>Opening a hot kiln at temperatures above 392 °F (200 °C) will lead to increased wear of the insulation, heating elements and the kiln housing.</p>	
	<p>CAUTION</p> <p>If the door has to be opened and the kiln has not completely cooled down, wear heat-resistant gloves to protect your hands.</p> <p>Make sure that your clothing is not close to kiln openings and does not touch hot surfaces, as there is a risk that your clothing could catch fire.</p>	

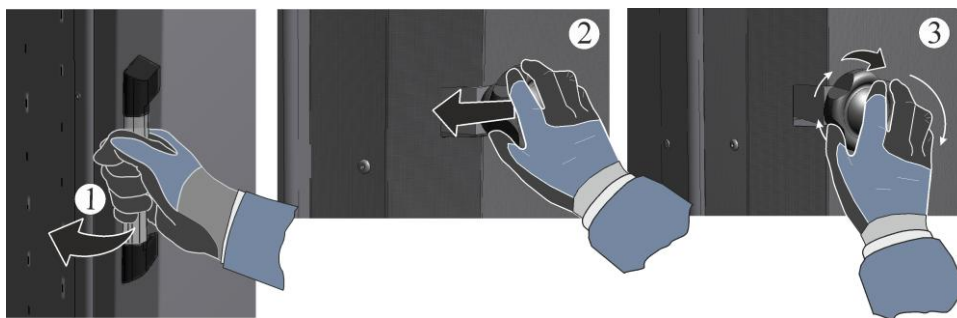
Opening the door

1. Loosen the locks (1) on the swing door in an anticlockwise direction and swing them towards the door hinge (2).
2. Pull the handle (3) to open the swing door. To load the kiln, open the swing door completely.



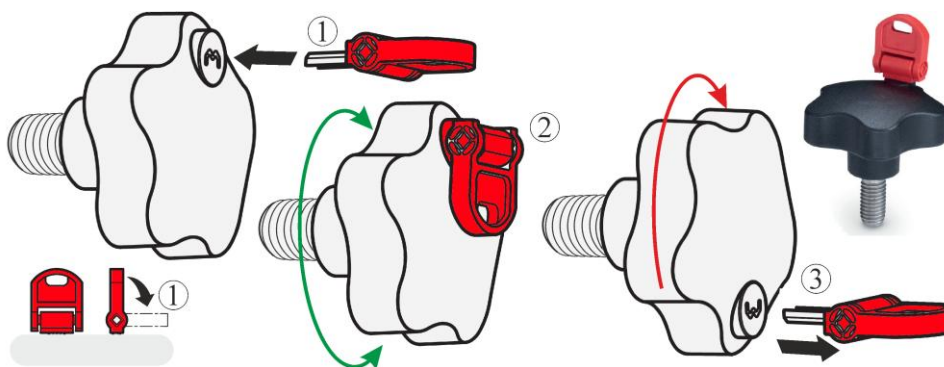
Closing the door

1. Close the door in the reverse order. Carefully press the swing door against the kiln collar (do not bang it closed). The weight of the swing door could damage the kiln and/or door collar.




Safety star knobs – actuation with key (accessories)

1. The safety start knob prevents the door being opened by unauthorized persons. The key (1) can be folded down so that the release or tensioning is less obstructed when the key is inserted. A latching mechanism holds the key handle in the respective position.
2. When the key (2) is inserted (turning is not necessary), the normal function of a star knob (clamping/unclamping) is enabled.
3. Without the key (3) inserted, the star knob can only be used for clamping, i.e. only clockwise rotation is possible. When turned (released) to the left, a latching mechanism interrupts the connection between the handle body and the threaded bushing.



5.3 Loading/Charging

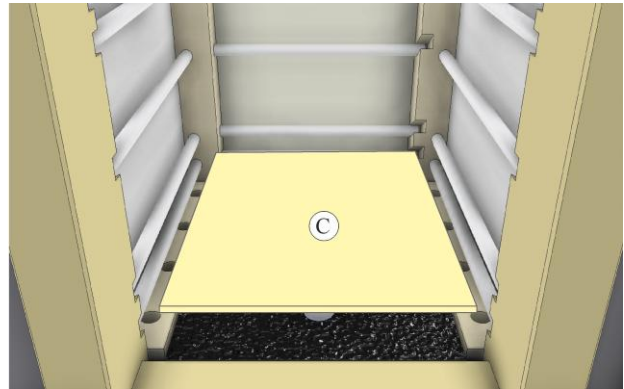
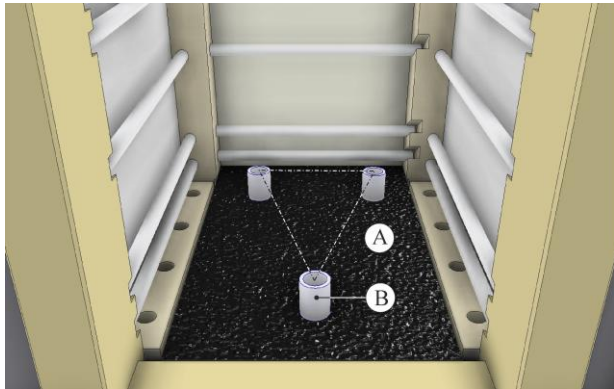
	<p>In areas where work is carried out, such as pottery making or operating the kiln, we recommend that you wear a suitable protective apron. This apron protects your clothing and also prevents burns.</p>
---	---

Loading the kiln

Arrange the props (A), which are supplied as accessories, on the SiC base plate (B) of the kiln in a triangular pattern.

Carefully place the supplied shelf (C) centrally on the props.

The distance between the props depends on the size of the shelves and should be as large as possible to ensure stability.

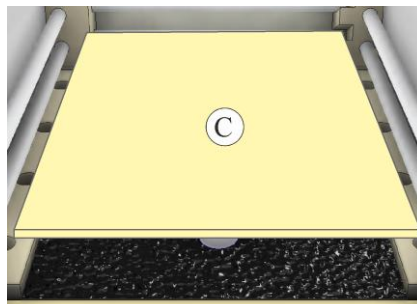
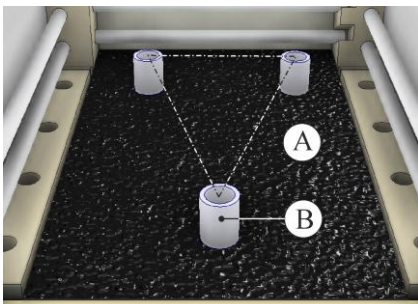


Arranging the shelves and props (accessories)

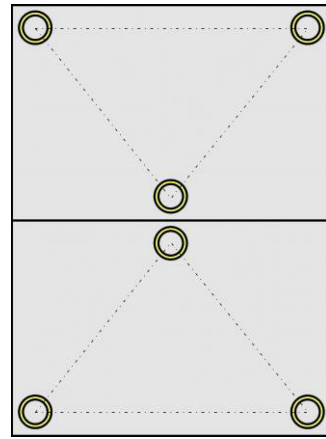
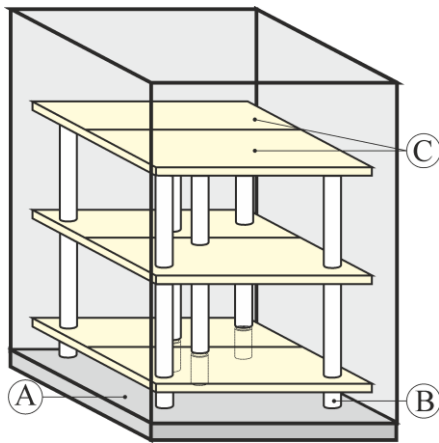
1. With shelves to size 21.25 x 17.32 inches (540 x 440 mm) we recommend that the props be arranged in a triangular pattern to ensure stability.
2. First, arrange three props (B) in a triangular pattern on top of the SiC base plate (A). The distance between the props (B) depends on the size of the shelves and should be as large as possible to ensure stability.
3. Place the shelf (C) on top of the props. Now place the ware that is to be fired in the kiln and distribute it as evenly as possible. If a second level is required, place props on the shelf to get the required distance between the shelves.

Note: When inserting the shelves, make sure that the door collar and the heating elements are not damaged. Avoid touching the heating elements when inserting the shelves as otherwise the elements could be destroyed.

The kiln bottom is made of high-quality refractory material, but this material is extremely sensitive to impact and pressure.



In the case of kiln models with several individual shelves (C) in one level, we recommend that props (B) be arranged in a triangular pattern for each shelf to ensure stability.



We recommend that you do not place ceramics directly on the SiC base plate (A) to improve temperature uniformity. The shelves can be coated to prevent ceramics sticking to them. This coating is not possible on the SiC base plate, as it would destroy the ceramics.



5.4 Potter Tips

	Notice The temperature specifications given by clay and glaze producers must be observed.
	Notice Long-term operation at maximum temperature can lead to increased wear of the heating elements and insulation material. We recommend that you work to approximately 158 °F (70 °C) below the maximum temperature.

So that the pottery that you have made with a lot of effort and passion is not destroyed, the following principles should be observed:

- Allow pottery to dry slowly – not in the kiln, the boiler room or in the sun.
- Dry pottery away from drafts – drafts cause uneven drying and drying cracks.

- Loosely cover projecting parts (e.g. handles) with paper or plastic film, as they dry faster than the rest of the pot. If you don't do this, cracks may occur at the joints.
- Clay shrinks when it dries; in other words, the volume is reduced due to the loss of water. Objects that stick to a surface, crack when they shrink – therefore, always place your pottery on fresh, clean surfaces.
- Turn your pottery often as the top dries quicker than the bottom.
- Handle dry pottery carefully with both hands and don't lift it by the edges. Pottery is very fragile in this state.
- Fire only completely dry objects in the kiln.

Bisque firing

When the green ware is completely dry, it is bisque fired; that is, it is fired in the kiln at approx. 1652 °F to 1742 °F (900 °C to 950 °C). The first firing – the only firing for unglazed pottery – changes the physical and chemical properties of the clay. It becomes hard and insoluble in water.

During bisque firing, the ceramic pieces in the kiln can touch each other. They can be stacked (also inside each other), as long as they are not too heavy and do not prevent each other shrinking. Tiles or flat plates should be placed directly on the shelves to prevent distortion. It really depends on the size of the objects whether they are stacked on several shelves or if a few larger pieces fill the entire kiln. However, the kiln chamber should not be “overloaded” or be packed too densely.

For the firing it is important that you know what happens to the pottery. It loses a lot of chemically bonded water and shrinks. If the kiln temperature is raised too quickly, the steam does not have enough time to escape and objects can crack and damage the kiln. Therefore, it is important to heat the kiln slowly. Nabertherm controllers handle this task fully automatically. From this time, you can heat the kiln to the final temperature at full power. During the evaporation phase, open the fresh-air flap of the kiln, as this creates a draft effect and the moisture is discharged upwards out of the kiln via the exhaust air connection. After the evaporation phase, close the fresh-air flap again to improve temperature uniformity at higher firing temperatures.

Because of the kiln's large mass and good insulation, it takes several hours for the kiln to cool; be patient. You should open the lid a little only when the temperature in the kiln has fallen to about 392 °F (200 °C).

When you open the kiln, you will see that the bisque ware has shrunk. It makes a different sound when you touch it and the clay is a different color.

Glaze firing

Usually, glaze firing is the highest temperature firing. The temperature range for earthenware is 1868 °F to 2012 °F (1020 °C to 1100 °C). For a stoneware firing, the kiln must reach at least 2282 °F (1250 °C). The glazes must be adapted to suit the temperature range.

The top of the shelves should be painted with a separating agent before a glaze firing. This coating should be renewed from time to time.

Check the areas where the pottery is to stand – they must be free of glaze. Pottery with a glazed base must be placed on stilts or triangular rods for the firing. Glazed pottery should be handled very carefully and should not be touched at the edges. The pieces must not touch each other in the kiln, as the glazes would melt together. There must also be a gap of at least 1 inch to the heating elements. Unsintered glazes must not touch the heating elements.

Use only glazes in one melting range in a firing. For the firing, heat the kiln slowly (approx. 356 °F (180 °C) per hour) to about 932 °F (500 °C). Glaze water may escape during this phase. Then heat the kiln to the end temperature at full power. Hold this temperature for about 30 minutes so that the glaze melts evenly on the ceramics in all areas of the kiln.

Only open the lid or door when the temperature has dropped below 122 °F (50 °C). Many glaze cracks are the result of opening the lid too soon.

You can grind any glaze drops on the bottom of the pottery or the shelves with a grinding stone or an angle grinder, paying attention to all the safety regulations.

Do not use very runny glazes to avoid damaging the shelves, the kiln insulation or the heating elements and the kiln itself.

Cooling

With a kiln, “natural cooling” is the process in which, after a firing process, the kiln cools slowly to room temperature without forced cooling (for example, opening the door) and without active heating.

Natural cooling ensures that the temperature is evenly distributed, which ensures the structural integrity of the ceramic and helps conserve the kiln furniture.

This process can take several hours or even days, depending on the size of the kiln, the weight of the charge and the density of the charge.

The rate of natural cooling varies. At high temperatures, the kiln cools quickly. As the temperature falls, the rate of cooling slows down.

Natural cooling is a universal recommendation that promises success with most applications.


For example, workpieces with thicker walls require much slower cooling rates than the natural cooling rate of the kiln. In these cases, cooling is accompanied by active heating.

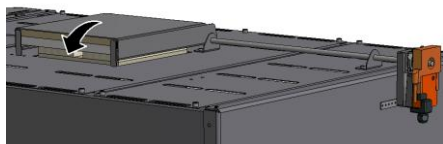
5.5 Exhaust-Air Flap (Depending on the Model)

Motor-driven exhaust air flap(s) (additional equipment)

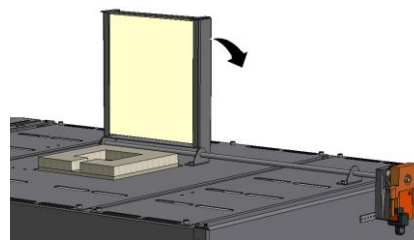
This kiln has an adjustable exhaust air flap. The exhaust air flap is used to extract process-related exhaust gases safely from the kiln. The kiln is also supplied with fresh air via the air inlet slider/flap or a fresh-air fan (additional equipment).

Constant air exchange is ensured when the air inlet slider/flap and the exhaust air flap are opened.

	<p>Notice</p> <p>Operating the kiln with the flaps open can change the temperature conditions and the rate of heating in the kiln chamber.</p> <p>If the charge is sensitive to temperature fluctuations, it may be advisable to run a test for temperature uniformity to optimize the process.</p>
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Exhaust air flap closed



Exhaust air flap open

5.6 Air Inlet Valve/Flap (Model-Related)

The volume of air fed to the kiln can be adjusted with the air inlet valve or flap (model-related). The air inlet valve/flap is located on the base of the kiln.

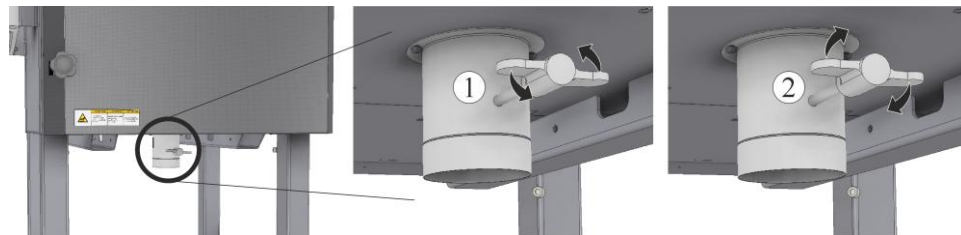
After the chemically bound water has been expelled from the ceramics during the firing (maximum 1112 °F (600 °C), the air inlet flap or slider (model-related) of the kiln must be closed to prevent drafts and to ensure good temperature uniformity in the upper temperature range.

With this function it is possible to dry the ceramics at low temperatures before the actual firing begins with the air inlet flap closed (good temperature distribution in the kiln).

A manual air inlet flap must be manually opened and closed before the start of the program and during the firing.

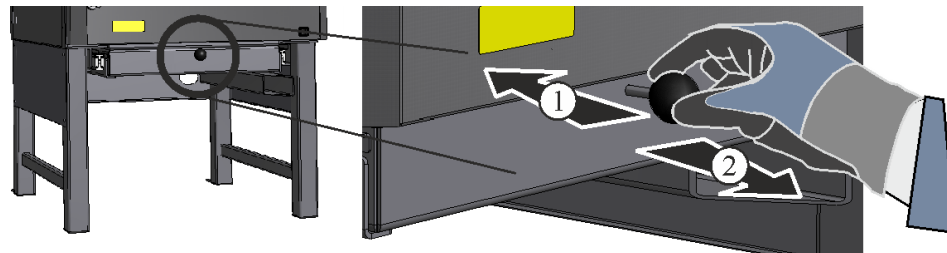
Air inlet flap

1 = close
2 = open



Fresh-air flap

1 = close
2 = open



5.7 Schematic Description of Fresh Air Supply

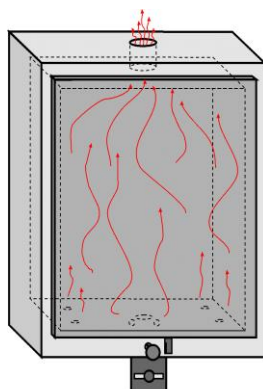
When ceramics are being fired, gases, vapors, and moisture occur that may cause corrosion on the kiln. To ensure optimum removal of the exhaust air to the atmosphere, ideally the inlet air opening and exhaust air flap (if present) should remain open to 1202 °F (650 °C) and then be closed to achieve good temperature distribution.

To reduce the cooling phase after a firing, the inlet air opening (and the exhaust air flap if present) may be opened.

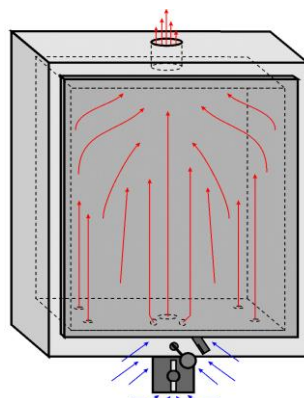
Exhaust air (open) is extracted from the kiln (low air flow)

Exhaust air (open), constant air exchange (high air flow)

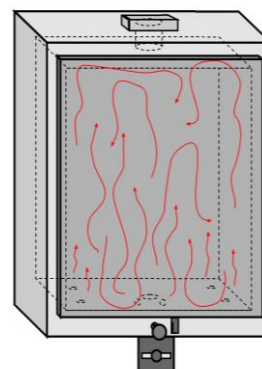
Exhaust air flap (if present) closed. No air exchange



Air inlet closed



Air inlet open



Air inlet closed

5.8 Fresh-Air Fan with Air inlet Flap (Additional Equipment)

Switching on the fresh-air fan and opening the exhaust air flap will cool the kiln faster.




- Before switching on active cooling, consider the properties of the charge; activation at T_{max}. is not permitted and will endanger the kiln and charge.
- We recommend that the exhaust air flaps remain closed at kiln temperatures >1830 °F (1000 °C).
- From temperatures below 1475 °F (800 °C), active cooling can be used at a low setting.
- Rapid cooling resulting from opening the exhaust air flaps or switching on the fresh-air fan at high temperatures causes increased wear and tear of the insulation and the kiln furniture.



Fresh-air fan with air inlet flap (additional equipment)

6 Servicing, Cleaning, and Maintenance

6.1 Basic Measures


	<p>⚠ DANGER</p> <p>Dangerous voltages can cause serious injuries or death. Disconnect the power supply before commencing maintenance work</p>
	<p>⚠ CAUTION</p> <p>Work on the electrical equipment may be carried out only by a licensed electrician.</p>
	<p>⚠ WARNING</p> <p>The kiln roof is NOT designed to be walked upon There is a risk of it collapsing. Components can break or be damaged if they are walked upon.</p>

The kiln must be cooled to room temperature. When maintenance or repair work has been completed, ensure the following before recommencing production:

- Check that loosened screw connections have been re-tightened.
- Reinstall protective equipment, such as switchgear covers.
- Remove all materials, tools, and other equipment used for maintenance or repair work from the working area of the kiln.
- Remove processing residue in the switchgear, inside the kiln and on the heating elements.
- Power cables may be replaced only with similar, approved cables and by a licensed electrician.

6.2 Working on the Insulation

Repairs to the insulation or replacement of components inside the kiln must be carried out by persons who have been trained with regard to potential hazards and protective measures and who are able to apply this knowledge on their own.

	<p>Notice</p> <p>When working on the insulation or when replacing components inside the kiln, observe the following: During repair or demolition work, silica dust may be released. Depending on the materials being heat-treated in the kiln, the insulation may contain other contamination. To exclude health hazards, keep dust to a minimum when working on the insulation.</p>
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Dust emissions should be kept to a minimum. Dust should be removed with extraction equipment or a vacuum cleaner with a high-performance filter (HEPA – category H). Swirling, for example due to drafts, must be prevented. Compressed air and brushes must not be used for cleaning. Moisten accumulations of dust.

If work is carried out on the insulation, breathing protection with FFP2 or FFP3 filters must be used. Work clothing should cover the whole body and sit loosely. Gloves and safety glasses must be worn. Before removing contaminated clothing, clean it with a vacuum cleaner with HEPA filter.

Avoid contact with skin and eyes. The effects of fibers on the skin or in the eyes can cause mechanical irritation, which can, in turn, lead to redness and itching. After work and after direct contact, wash skin with soap and water. If there is contact with the eyes, rinse the eyes thoroughly for several minutes. Consult an ophthalmologist if necessary.


When disposing of the materials, observe national and regional regulations. Possible contamination from the kiln processes must be taken into account.

6.3 Regular Maintenance of the Kiln


If regular maintenance work is not performed, all warranty and liability claims for personal injury and material damage are excluded.

Component/ item/ function and action	Comment	A	B	C
Door switch (switches the heating off when the door is opened) Function check (correct switching point)	Is located beneath the door	3	Y	X1
Kiln chamber, extraction holes and extraction tubes Clean and inspect for damage, vacuum carefully			Q	X1
Heating elements Visual inspection		3	Q	X1
Thermocouple Visual inspection		3	Q	X1
Heating elements Visual inspection: oxidation, cracks, distortion, coil unwinding, uneven distribution		1	Q	X1
Heating elements Replace		-	Y	X2
Heating element ducts Clean	Recommended at the latest when replacing the heating elements	-	Y	X2
Heating element ducts Replace	At the latest when replacing the heating elements	-	Y	X2
Heating element connections Wiring to the connections, corrosion tendency on twisted ends (traces of burning)		-	Y	X2
Support tubes Visual inspection: correct position, bending, cracks		2	q	X2
Support tubes Replace	As required	-	Y	X1

Component/ item/ function and action	Comment	A	B	C
Supporting bricks Visual check: correct position, cracks		3	Y	X1
SiC base plate Visual check: correct position, cracks	Replace every 3-5 years	3	W	X1
Electricity, heating elements Check for even load of heating groups		-	Y	
Electrical fuses in the kiln (depends on the model)	Check in case of insufficient or no heating power	1		X2
Type plate Legible condition		3	Y	X1
Operating instructions Ensure they are kept near the kiln		3	Y	X1
A = Spare parts stock	1 = Stock urgently recommended 2 = Stock recommended 3 = As required, not relevant			
B = Maintenance interval	D = Daily, before each start of the kiln W = Weekly M = Monthly Q = Quarterly Y = Yearly			
C = Responsible	X1 = Operating personnel X2 = Specialist personnel			

	Notice Since SiC plates expand continuously, they should be replaced after about 3-5 years. Otherwise, there is a risk that the collar bricks will be pushed outwards.
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Cleaning – vacuuming the kiln

SAFETY INFORMATION	
Follow the procedure to switch off the kiln (see “Operation”). Pull out the plug or disconnect the kiln from the power supply via the circuit breaker (depends on the model)	
	Notice Use a vacuum cleaner with a HEPA filter to prevent dust getting into the surroundings.

We recommend that you clean the kiln chamber and the insulation brick regularly and after repairs with a vacuum cleaner. Use the soft brush nozzle of the vacuum cleaner. Take care when vacuuming and avoid touching the heating elements and thermocouple with hard objects.

Deposits in the heating elements and support tubes can considerably reduce the service life of the heating elements.



Metal and glass surfaces can be cleaned with a lint-free cloth. You may also use the following cleaning products:

Component and position	Cleaning product
Metal surface	Stainless steel cleaner
Instrument field on the controller	Wipe the surface with a damp, lint-free cloth. Do not use aggressive cleaning products.
Interior (pay attention to the heating elements and thermocouple)	Carefully clean with a vacuum cleaner

	NOTICE
	<p>The kiln, kiln chamber and attached components must NOT be cleaned with a high-pressure cleaner.</p> <p>Pouring water over the kiln or using a high-pressure cleaner will destroy the kiln.</p>
	CAUTION
	<p>Do not use water or other liquid cleaning products to clean the insulation.</p> <p>Cleaning with water or other liquid cleaning products will destroy the insulation.</p>


Checking the door switch

The door switch ensures that the heating switches off when the door is opened. Proper functioning of the door switch can be checked as follows:

1. Close the kiln door
2. Start a program and wait 10 seconds
3. Open the door (max. 1.5 inches) until you hear a click from the switchgear
4. Close the door and stop the program

If you do not hear a click, have a licensed electrician check and adjust the function. The kiln must not be used until the cause has been rectified.

7 Malfunctions



	<p>Notice</p> <p>Refer to the separate instruction manual for a description of the error messages of the controller and switchgear.</p>
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Electrical work on kilns must be carried out by a licensed electrician. Operators may only rectify faults that are obviously due to operating errors.





8 Spare Parts/Wearing Parts

Ordering spare parts

Our Nabertherm Service team is available worldwide. Due to our high level of vertical integration, we supply most spare parts from stock. Nevertheless, it may be advisable to stock up on the most important spare and wearing parts.

	<p>Notice</p> <p>Original parts and accessories are designed specifically for Nabertherm kilns. Only Nabertherm original parts may be used when replacing components. Otherwise, the warranty will be void. Nabertherm accepts no liability for damage caused by using parts that are not original Nabertherm parts.</p>
	<p>Notice</p> <p>Since SiC plates expand continuously, they should be replaced after about 3-5 years. Otherwise, there is a risk that the collar bricks will be pushed outwards.</p>

8.1 Replacing the Heating Elements

	<p>⚠ DANGER</p> <p>Work on the electrical equipment may be carried out only by a licensed electrician. Danger of electric shock. Pull out the plug or disconnect the kiln from the power supply via the circuit breaker (depends on the model)</p>	
	<p>⚠ CAUTION</p> <p>The pointed ends of the wires are a potential injury hazard. Cuts. Wear appropriate protective gloves.</p>	
<p>SAFETY INFORMATION</p> <p>Make sure that no cables are protruding or trapped. Pay attention to sharp surfaces. Tighten all screws on the connection terminals after one week of operation and then once each year. Avoid all stress or twisting of the heating wire. If this advice is not followed, the heating wire may be damaged.</p>		
	<p>Caution – Damage to components!</p> <p>Heating elements are extremely fragile. Avoid all stress or twisting of the heating elements. If you do not follow this advice, you may damage the sensitive heating elements.</p>	

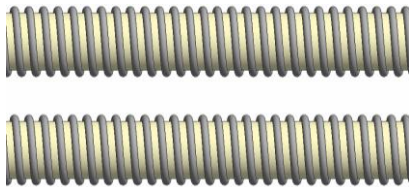


Notice

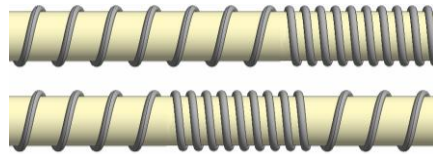
The pictures contained in the instruction manual may differ in terms of function, design and kiln model.

We recommend that two people replace heating elements.

Uneven spacing is a natural process and no correction is required. However, if this is too pronounced, it may have an effect on temperature distribution.

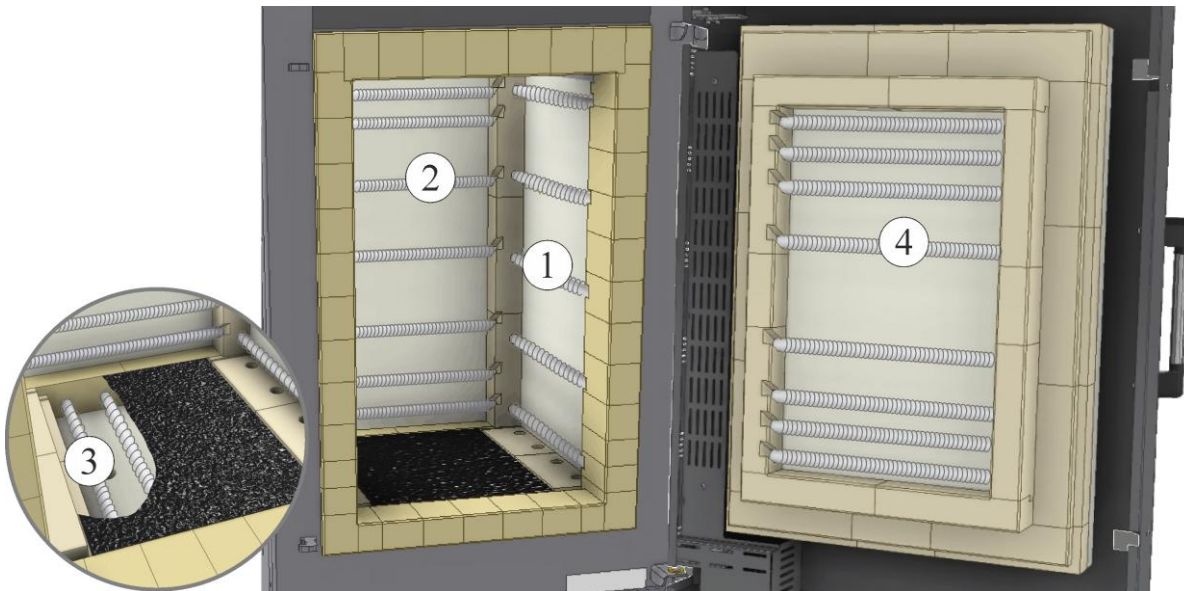


Before



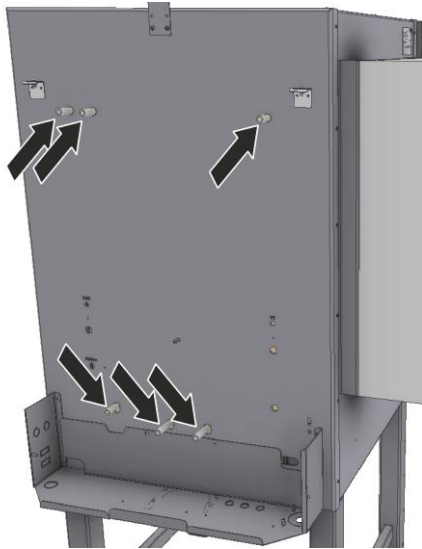
After (uneven spacing)

Arrangement of the heating elements (model-related)



- 1 Heating elements, side wall
- 2 Heating elements, back wall
- 3 Heating elements, floor (remove SiC base plates)
- 4 Heating elements, door

Position of the terminals (model-related)



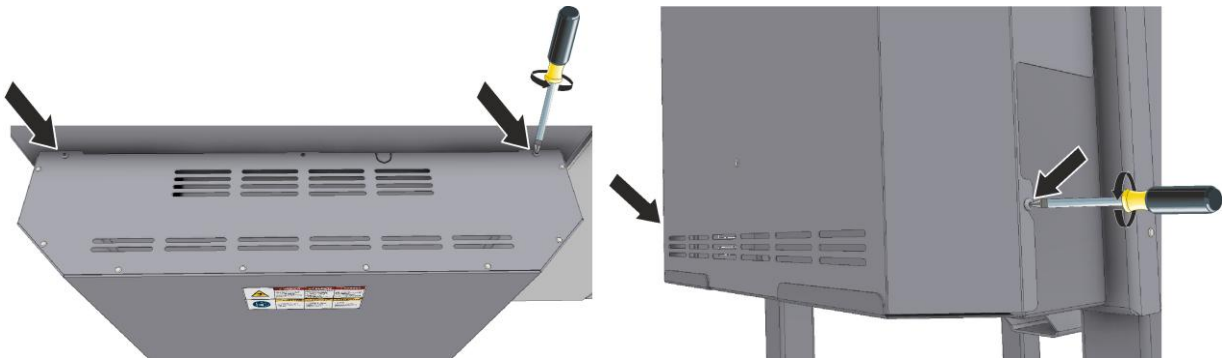
Example: Heating element connection terminals, side and back walls and floor.



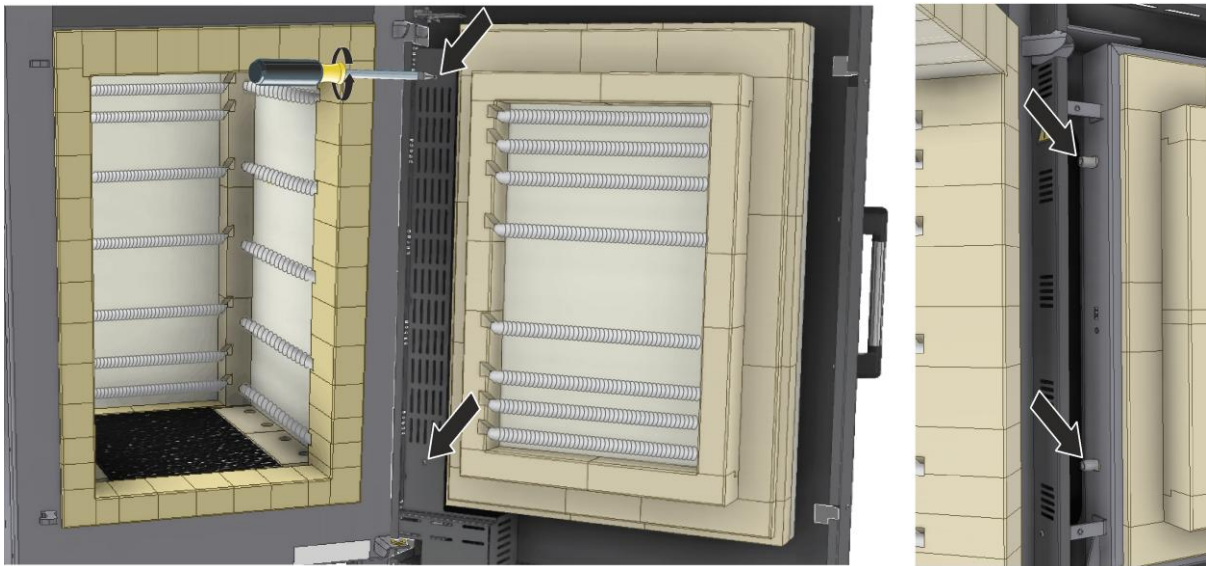
Example: Heating element terminals on door

Removing the covers

To replace the heating elements, remove the covers on the kiln. Undo the screws of the respective covers with a suitable tool and keep them in a safe place for future use.



Example: Cover for heating element connections, side and back walls and floor.



Example: Cover for heating element connections in the door

Removing the heating elements

1. Remove the protective cladding from the electrical connections (lift and carefully remove the base plates from the floor).
2. Undo the terminals on the ends of the heating coil. Remove the ceramic ducts and replace if necessary.
3. Remove the clamps and/or ceramic tubes holding the heating elements from the brickwork (old clamps are very brittle; if a clamp breaks, remove the remainder).
4. Carefully remove the heating coils with the support tubes. (Caution: older heating elements are very brittle)

Installing the new heating elements

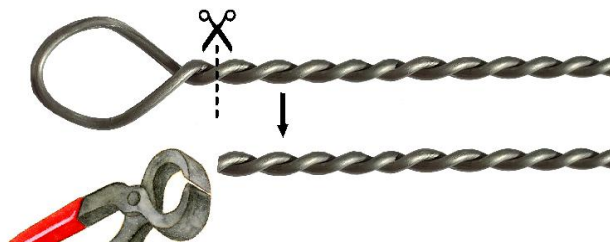
Check the supplied heating elements for damage before installation. With multi-zone kilns, pay attention to the specific arrangement of the heating elements.



Notice

We recommend that you install new support tubes, terminals and ceramic ducts. Contaminated contact surfaces will cause premature failure of the new heating element. Replace very bent or broken support tubes.

The (twisted) ends of the heating elements have a loop as protection. This has to be removed with a suitable tool before installation.

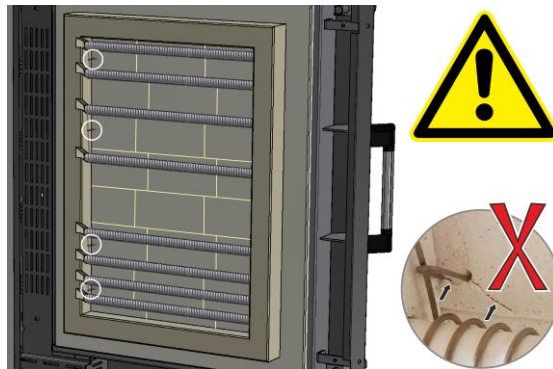


Procedure:

1. Install the heating element together with the support tube. The bent end of the twisted wire must have contact with the insulation.

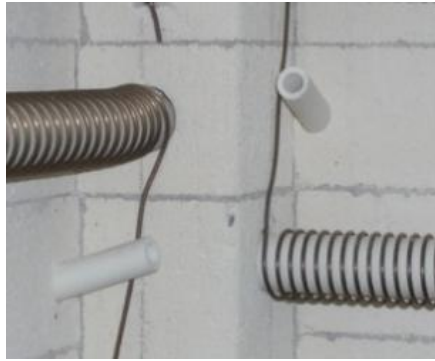


2. Insert the supplied fasteners into the wall brickwork. They are used to fix the heating elements in the grooves. Do not insert the fasteners into the holes of the previous fasteners. We recommend moving the new fasteners approx. 1 inch (2.5 cm).

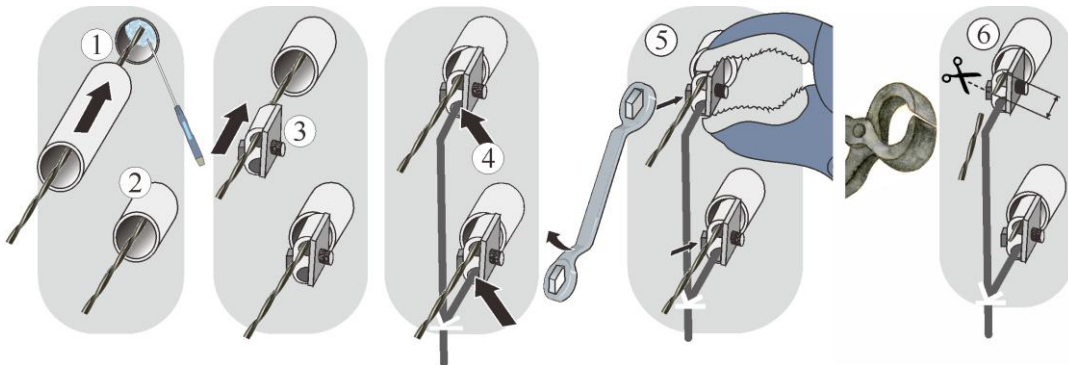


	<p>Notice</p> <p>Distance X of the supplied fasteners must not be changed. X ~ 0.55 inches (14 mm)</p>
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3. Depending on the kiln model, ceramic tubes may be installed as holders rather than clamps.



4. Seal the gaps in the ceramic feedthrough tubes from outside with a small amount of fiber wadding (included with delivery). To do this, distribute the fiber wadding around the end of the heating element with a small screwdriver (1) and push this from outside to the back of the small feedthrough hole. Do not use too much fiber wadding so that the ceramic feedthrough tubes (2) can still be inserted until they engage.
5. Slide the ceramic feedthrough tube (2) onto the ends of the heating elements until they engage.
6. Slide the connection terminals (3) up to the ceramic feedthrough tube.
7. Use the terminals to create technically correct electrical connections (4).
8. Tighten the screws (5) of the connection terminals (the correct tightening torque can be seen in the table below). So as not to damage the connection terminal or the ceramic feedthrough tube, we recommend the use of a suitable pipe wrench, for example, as a brace when tightening the screws of the connection terminal.
9. Shorten the projecting twisted heating element ends with suitable pincers (6). We recommend that you leave approx. 0.20 inches (0.5 cm) between the edge and the connection terminal.



10. Clean the kiln chamber thoroughly with a vacuum cleaner, for example. Pay attention to the heating elements and the thermocouple.
11. The switchgear cover is assembled in the reverse order.

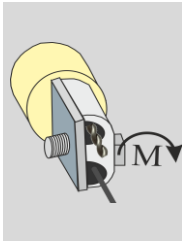


Notice





Inadequate sealing can cause the terminals to overheat. Unsuitable fiber material can cause vitrification and damage.

Heating element screw tightening torque

Tighten screw connections on the heating elements with a defined torque. If this advice is not followed, the heating elements may be damaged.

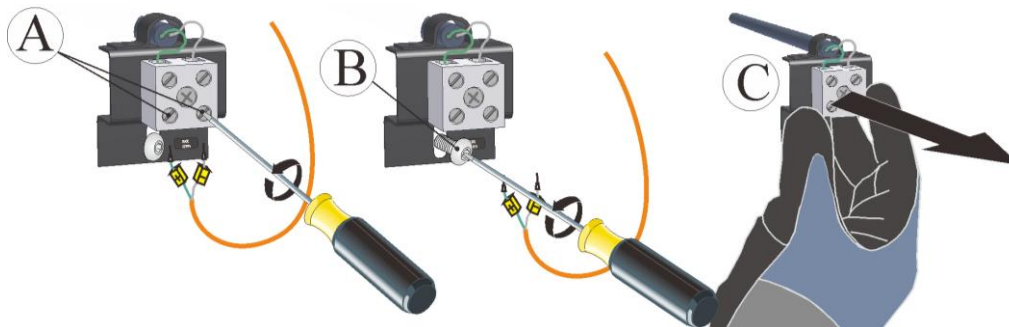
	Thread diameter of metric thread	Torque (M) in Nm
	M5	6 Nm
	M6	8 Nm
	M7	8 Nm
	M8	14 Nm
	M10	20 Nm

8.2 Replacing a Thermocouple


	 DANGER	 
	Work on the electrical equipment may be carried out only by a licensed electrician. Danger of electric shock. Pull out the plug or disconnect the kiln from the power supply via the circuit breaker (depends on the model)	

Open the switchgear cover. A description of dismantling and installing the cover(s) and the associated safety instructions can be found in “Replacing the Heating Elements”.



1. First loosen the two screws (A) from the thermocouple connection, then the screw (B) and then pull out the thermocouple (C).
2. Insert the new thermocouple carefully into the thermocouple duct, then assemble and connect in the reverse order. Ensure correct polarity of the electrical connections.



The cable connections from the thermocouple to the controller are marked with \oplus and \ominus . \oplus to \oplus \ominus to \ominus

	Notice The correct assignment of the connections is essential for the kiln to function correctly.
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8.3 Replacing Electrical Fuses on the Kiln

	 CAUTION
	Disconnect the power supply before replacing fuses.

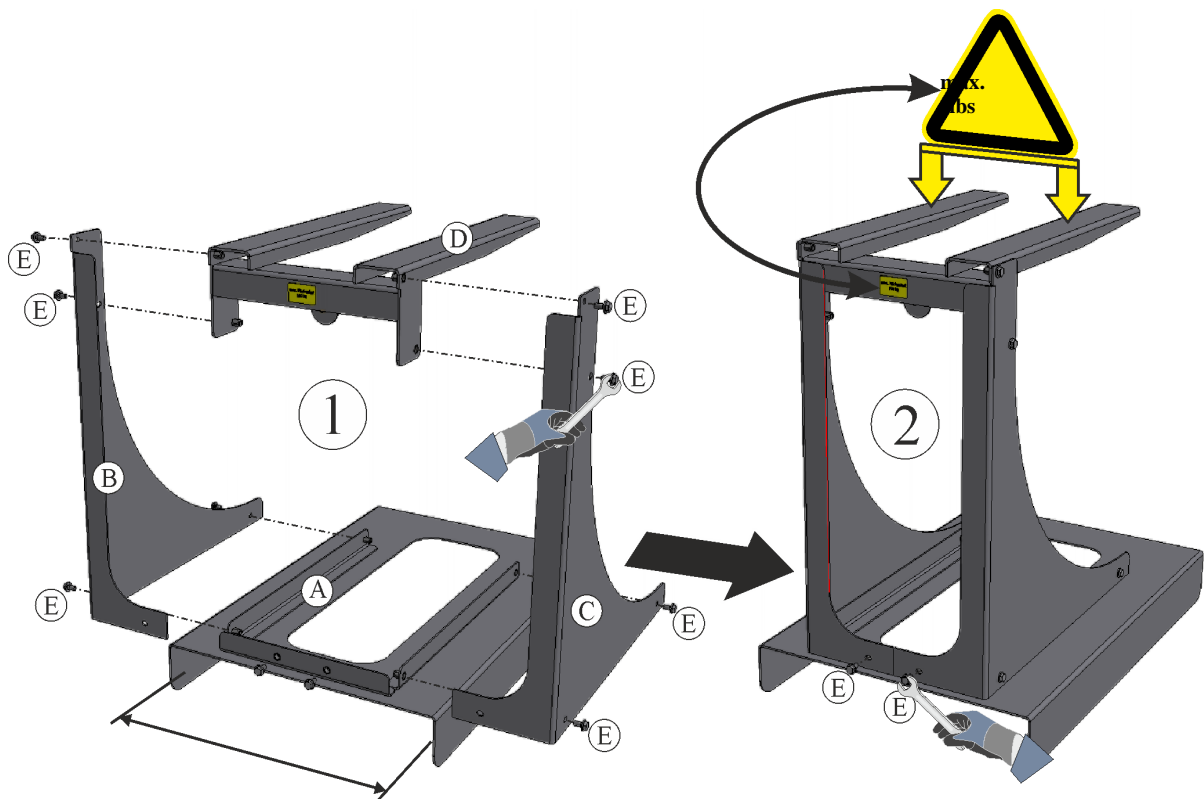
All kilns with power consumption greater than 48 amps are equipped with internal fuses. If the kiln stops heating or is not heating properly, first check the fuses and replace them if necessary.

9 Accessories

9.1 Assembling the charging frame (accessory)

The stacked frame is moved into the kiln with a pallet truck (option) and lowered carefully. Suitable for trucks with fork widths to a maximum of 20.47 inches (520 mm).

No.	Quantity	Name
A	1	Base plate
B	1	Side panel, left
C	1	Side panel, right
D	1	Load-bearing fork
E	10	Bolt M8 x 16 mm (SW13)
F	max. pallet truck width = 20.47 inches (520 mm)	



Assembling the charging frame (accessory)

Place the base plate (A) on even ground.

Insert the left (B) and right (C) side panels and fix them in place with three bolts (E) (M8 x 16 mm, SW 13) each.

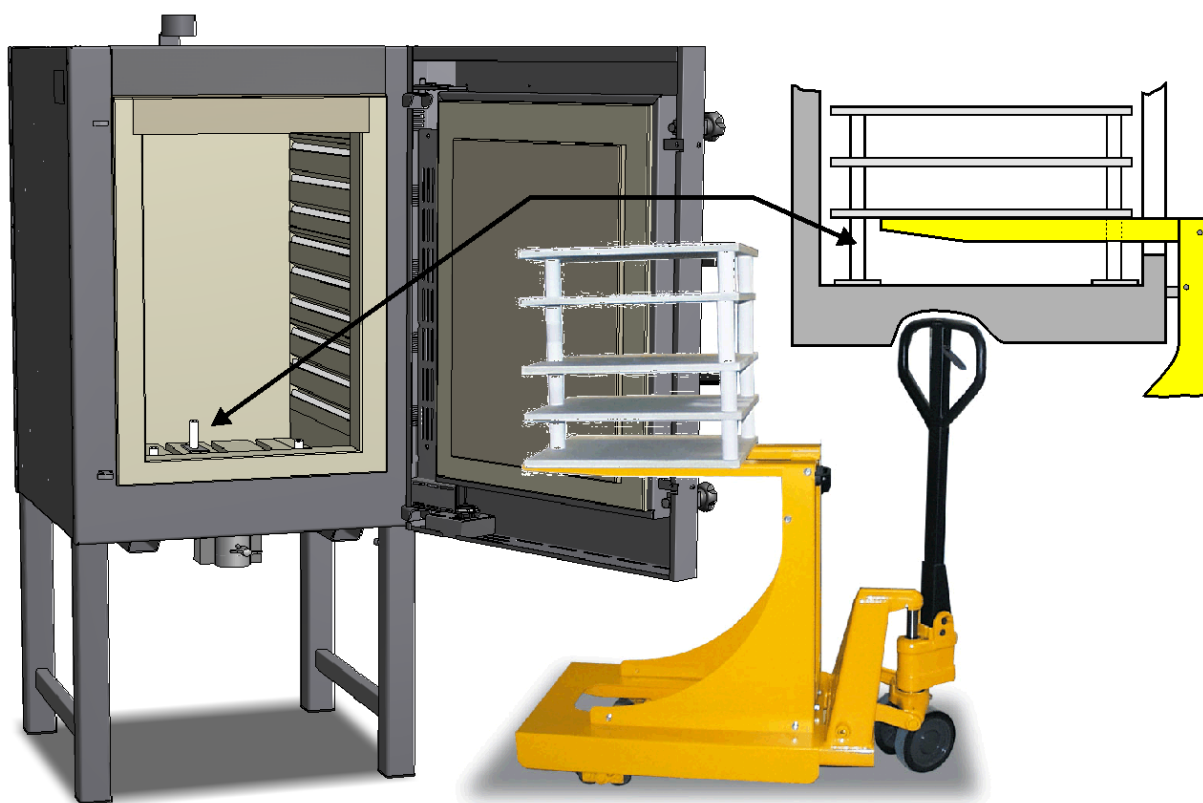
Insert the load-bearing fork (D) and fix in place with four bolts (E).

Make sure that it is horizontal; it can be adjusted by means of the slotted hole for the bottom bolts.





Notice

Observe the maximum distributed load of the charging frame (refer to the label on the frame).



Charging frame with optional pallet truck

	Dimensions in inches	Part number	
N 200	Shelf 19.29x16.53x0.66	691 602 197	
N 200/H	Shelf 19.29x17.71x0.66	691 602 198	
N 300 / N300/H	Shelf 19.68x12.59x0.70	691 600 966	
N 440 / N440/H	Shelf 21.65x14.17x0.70	691 600 836	
Prop	Ø 1.96x1.57	691 600 185	
	Ø 3.93x1.57	691 600 951	

10 Nabertherm Service

The Nabertherm Service team is available at all times for kiln maintenance and repair.

If you have any questions, problems, or requirements, contact Nabertherm Inc. by mail, phone or e-mail

Nabertherm Inc.

64 Reads Way

New Castle, DE 19720


United States

Phone +1 302 322 3665

Fax: +1 302 322 3215

contact@nabertherm.com

When contacting us, please have the details on the type plate of the kiln ready.

		
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Made in Germany		
①	②	④
③		



- ① Kiln model
- ② Serial number
- ③ Article number
- ④ Month and year of manufacture

11 Shut-Down, Dismantling, and Storage

Environmental regulations

When it is delivered, the kiln contains no substances that require a hazardous waste classification. However, residues of process materials may accumulate in the kiln insulation during operation. These may be hazardous to health and/or the environment.

- Dismantle the electronic components and dispose of them as electric scrap.
- Remove the insulation and dispose of it as hazardous waste/hazardous material
- Dispose of the housing as scrap metal.
- Contact the responsible disposal company to dispose of the materials listed above.

	SAFETY INFORMATION Separate the power cable and dispose of this together with the plug. This ensures that it cannot be reused and prevents potential hazards.
	Notice The regulations applicable in the country where the equipment is installed must be observed.

12 NABERTHERM LIMITED PRODUCT WARRANTY

All Nabertherm Products ("Products") sold by Nabertherm, except as provided below, are warranted by Nabertherm for a period of (i) 36 months for Products and (ii) 6 months for Spare Parts, other than Consumables, which period will commence upon date of shipment or invoicing to the reseller whichever occurs first, to be free from any defects in material and workmanship under normal use and service, provided such Products have been properly installed, maintained and operated in accordance with Nabertherm's specifications for such Product. Any Products repaired or exchanged under Warranty shall be warranted for the longer of the then remaining warranty period or six (6) months. If the Buyer, within such period, notifies Nabertherm in writing of any claimed defect in any Product delivered by Nabertherm and such Product is found by Nabertherm after appropriate test and inspection not to be in conformity with this warranty, Nabertherm will at its option and expense either repair the same or provide a replacement for installation at the Buyer's expense or refund the purchase price of the Product. Such replacement, repair, or refund shall be the sole and exclusive remedy available to the Buyer. With respect to services performed, if any, Nabertherm's sole liability for any defect therein shall be to perform again at Nabertherm's expense, such services, which shall be the sole and exclusive remedy available to the Buyer.

EXCEPT AS AFORESAID, NABERTHERM MAKES NO WARRANTY, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY IMPLIED WARRANTY AS TO MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER USE OF ANY OF THE PRODUCT REFERRED TO HEREIN OR ANY WARRANTY AS TO THE ABSENCE OF LATENT DEFECTS, OR AS TO THE ABSENCE OF ANY INFRINGEMENT OF ANY PATENT, TRADEMARK, OR COPYRIGHT, AND LIABILITY FOR ANY WARRANTY MADE HEREIN SHALL IN NO EVENT EXCEED THE COST OF CORRECTING DEFECTS IN THE PRODUCT SOLD OR, AT NABERTHERM'S OPTION, OF REPLACING SAME WITH NONDEFECTIVE PRODUCT. NABERTHERM SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, CONTINGENT OR INCIDENTAL DAMAGES WHATSOEVER INCLUDING, WITHOUT LIMITATION, BACK CHARGES.

WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, THE FOREGOING WARRANTY DOES NOT COVER, AND NO WARRANTY IS MADE WITH RESPECT TO:

- A. Failure or defect not reported within the warranty period above specified.
- B. Failures or damage due to negligence (other than that of Nabertherm), accident, abuse, improper installation (other than installation made by Nabertherm), improper operation or abnormal conditions of temperature, moisture, dirt or corrosion.
- C. Products, which have been tampered with, repaired or altered by anyone other than an authorized representative of Nabertherm.
- D. Product damaged in shipment or otherwise without the fault of Nabertherm.
- E. Expense incurred by the Buyer in an attempt to correct or repair any alleged defect, unless approved by Nabertherm in writing.
- F. Components and other materials purchased by Nabertherm from other manufacturers and resold to Buyer either in the form acquired by Nabertherm or in assembly with other components and materials. As an accommodation to the Buyer, Nabertherm will, upon request of the Buyer, assign to the Buyer any rights it may have arising out of warranties given by any manufacturer of such components, materials or standard equipment purchased by Nabertherm and so resold to the Buyer.
- G. Any Product manufactured by Nabertherm in response to the Buyer specifications therefore which go beyond the existing state of the art. Nabertherm assumes no liability for any failure of such Product so to meet such specifications.
- H. Failure or defects attributable to design or specifications requested by the Buyer.
- I. Specifications and dimensions shown in this quotation, proposal or order confirmation which are approximate and are subject to minor devaluations or tolerance in accordance with industry standard.

J. Such components, which by their nature in normal usage of the Product in accordance with Nabertherm's specifications therefore, have a life expectancy shorter than the warranty period, and are referred to as "Consumables" which include thermocouples, heating elements, gloves, seals, o-rings, sight glasses, and pump fluids.

K. Nabertherm's scope of supply includes only the Products sold by Nabertherm and describes specifically herein. Any additional safety procedures and/or equipment that may be required or recommended by federal, state, or local codes, your insurance policies or for your intended use is not included within this warranty. You are responsible for providing any and all such additional procedures and equipment as necessary.

If you need warranty service please contact and initiate your claim with the dealer that installed and sold the Products. All warranty claims must be initiated prior to the lapse of the warranty period. Nabertherm does not assume any responsibility for claims initiated after the lapse of the warranty period. This warranty is conditioned upon your reasonably cooperating with Nabertherm (and any dealer or other party Nabertherm designates) in the evaluation of your warranty claim and the implementation of any remedy. Reasonable cooperation includes, without limitation, your providing pictures of the claimed defect upon request. This warranty is further conditioned upon Nabertherm and its designee having the opportunity to evaluate the Products at the location of its installation. Nabertherm also reserves the right to decline a claim if you are unable or unwilling to provide proof of purchase, the date of purchase and installation, the name of the builder, contractor or dealer that installed and sold the Products, and a written confirmation that you are the original end-user purchaser of the Products.

Some States do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you. This warranty gives you specific legal rights, and you may also have other rights that vary from State to State.

13 For Your Notes

