

Conversion Instructions

Replacing the Heating Elements

Furnace Models LE 1 to LE 24/11-12

M06.0017 ENGLISCH

■ Made
■ in
■ Germany

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

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1 Introduction

These instructions are intended for replacing heating elements.

These instructions contain all the information you need to replace the heating elements and start up the furnace.

These instructions are intended for laboratory furnaces in the LE series from 1 to 24 liters and a working temperature of 1100 °C.

The following assembly instructions explain the handling of this system in a few steps. The figures show all the basic steps of assembly. Nevertheless, before starting the assembly you should read the entire assembly instructions. Follow the safety instructions in the assembly instructions and in the furnace operating instructions.



Note

The pictures contained in the instruction manual may contain inaccuracies in terms of the function, design and furnace model.

2 Scope of Delivery

Spare parts package (heating element) for the respective furnace model							
Quantity	Furnace model	Heating element / number	Bag of insulation fiber / number	Fastener / number	Comment		
1	L, LT 5/13				2	1	6
1	L, LT 9/13				2	1	6
1	L, LT 15/13				2	1	6
1	L, LT 5/14				2	1	-
1	L, LT 9/14				2	1	-
1	L, LT 15/14				2	1	-

Compare the delivered items with the delivery note and the purchase order documents.

Immediately notify the carrier and Nabertherm GmbH of any missing or damaged parts, as complaints received at a later date cannot be acknowledged.



Note

The documents included do not always contain the electrical schematics. If you need the respective schematics they can be ordered from Nabertherm Service.

3 Safety

3.1 Information Symbols in the Instructions



Rule - Rule Sign

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



Rule – Pull Out the Power Plug

This symbol tells the operator to pull out the power plug.



Warning – Danger from electric voltage

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



Warning – Danger from electric voltage

Work on the electrical equipment may be done only by qualified, authorized electricians. During work it must be ensured that the furnace and the switching equipment cannot be activated by mistake (pull out the power plug) and that all moving parts in the furnace are secured. DGUV V3 or corresponding national regulations of the respective country of use must be observed. Wait until the furnace and the connected parts have cooled to room temperature.

! DANGER		
	<ul style="list-style-type: none"> • Danger of electric shock. • Risk of fatal injury. • Work on electrical equipment may be carried out only by qualified electricians or by trained personnel authorized by Nabertherm. • Before starting work, pull out the power plug 	

The safety advisories in the repair instructions and in the furnace operating instructions must be observed.

3.2 Personal Safety Equipment (PSA)



Wear protective clothing



Sharp edges – wear suitable gloves to prevent cuts on sharp edges.



Wear goggles to protect your eyes.



Wear a respirator (P2 or higher) to protect your respiratory tract e.g. when working on the fiber insulation.

3.3 General Information for Servicing and Maintenance

- All maintenance work should be carried out in a clean environment.
- Note: Protect your eyes and hands while cleaning.
- Always handle the product with care.
- Do not use in environments where corrosive gases, chemicals, saltwater or vapors are present.
- In explosive environments, use only within the specified operating values.
- Do not use at locations that are subject to vibrations or impacts. Check the technical specifications of the product.
- Do not use the product at locations where it is subject to radiant heat.
- The surfaces to be cleaned may be cleaned with a soft, clean, lint-free cloth. Many household and industrial cleaning products contain abrasive substances and chemical concentrates and may not be used for cleaning.



Warning – General Hazards!

If installed improperly, functioning and safety of the system can no longer be guaranteed. The connection must be properly installed and put into operation by qualified personnel.

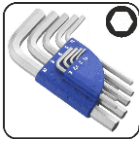


Caution

Nabertherm assumes no liability for damages caused by improper installation.

4 Preparation

4.1 Tools Required for Assembly:



Allen keys in various sizes



Slotted screwdriver 0.5x3,0



Phillips screwdriver PH1

Fig. 1: Tools

4.2 Turning off the Controller/Furnace

Turn off the controller		
Steps	Display	Comments
Turn off the power switch		Turn off the power switch by setting it to "O" (power switch type differs depending on features/furnace model)

4.3 Separate the Snap-In Coupling (Plug) from the Furnace Housing

With a small flat blade screwdriver carefully push the locking latch (2) upward while pulling the plug (3) out of the coupling (4).

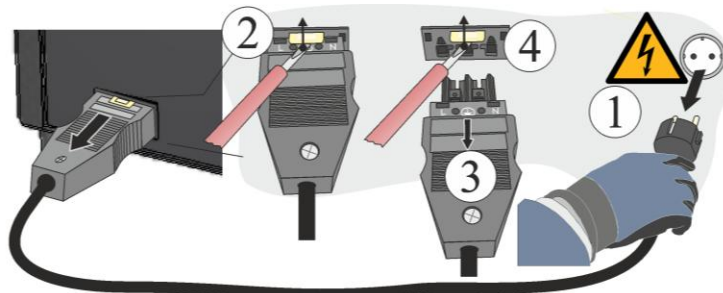


Fig. 2: Separate the snap-in coupling (plug) from the furnace housing (similar to picture)

4.4 Dismantling the Rear Panels on the Furnace



Note

Because of the many different furnace models, we recommend that you take several photos of the initial condition, the installed heating elements and the switchgear. This will simplify subsequent installation and wiring of new heating elements.

Use an appropriate tool to remove the screws all around the cover and keep them in a secure place for later use. The cover must be lowered onto a soft material (such as foam rubber). The number and position of the screws may differ from one furnace model to the next. The furnace may look different than the picture depending on the furnace model and additional equipment.

If present, pay attention to the protective ground cable of the back wall to the clamp. If necessary, disconnect the cable from the clamp.

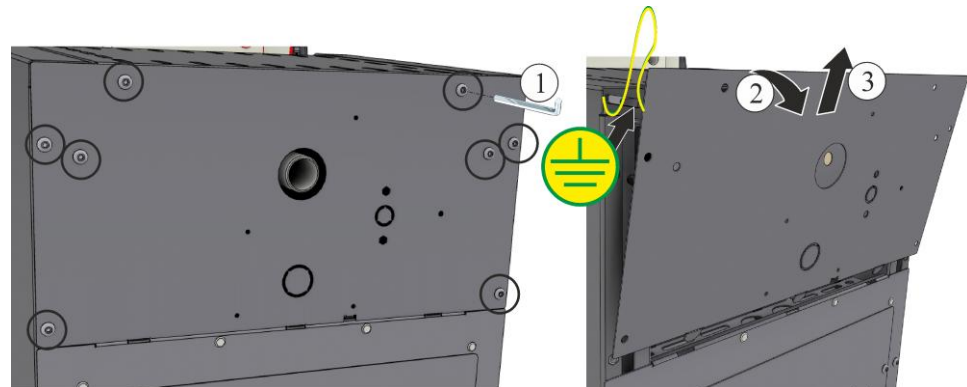
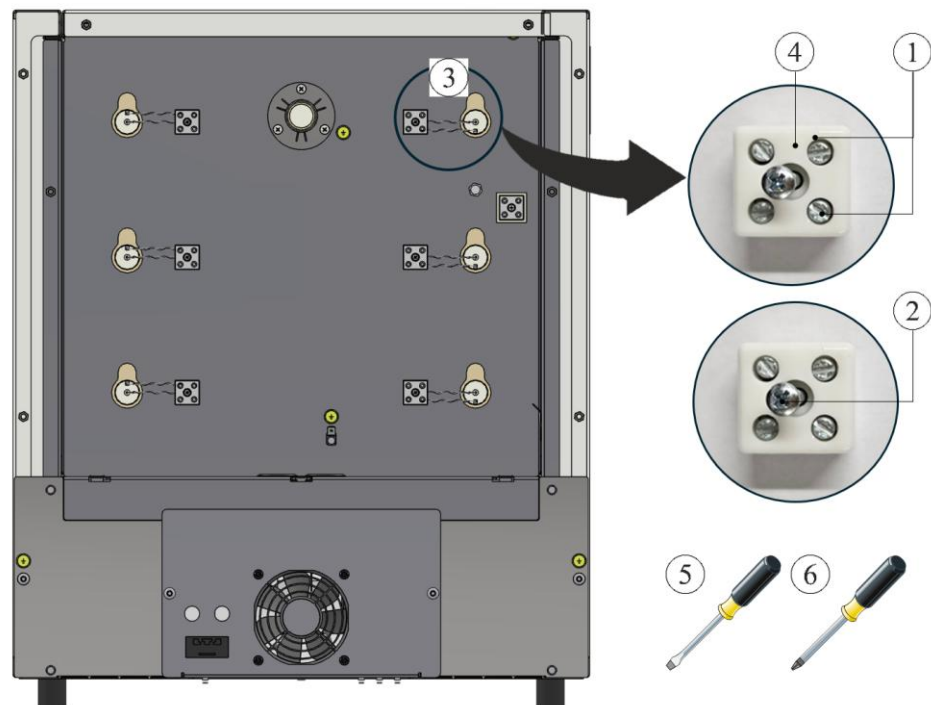


Fig. 3: Dismantling the rear panel (similar to picture)

4.5 Undoing the Electrical Connections

Undo screws (1, 2) with screwdrivers (5, 6) from the connection terminal (4). Then, remove the heating wire (3) from the terminal.

Caution: The pointed ends of the wires are a potential injury hazard.

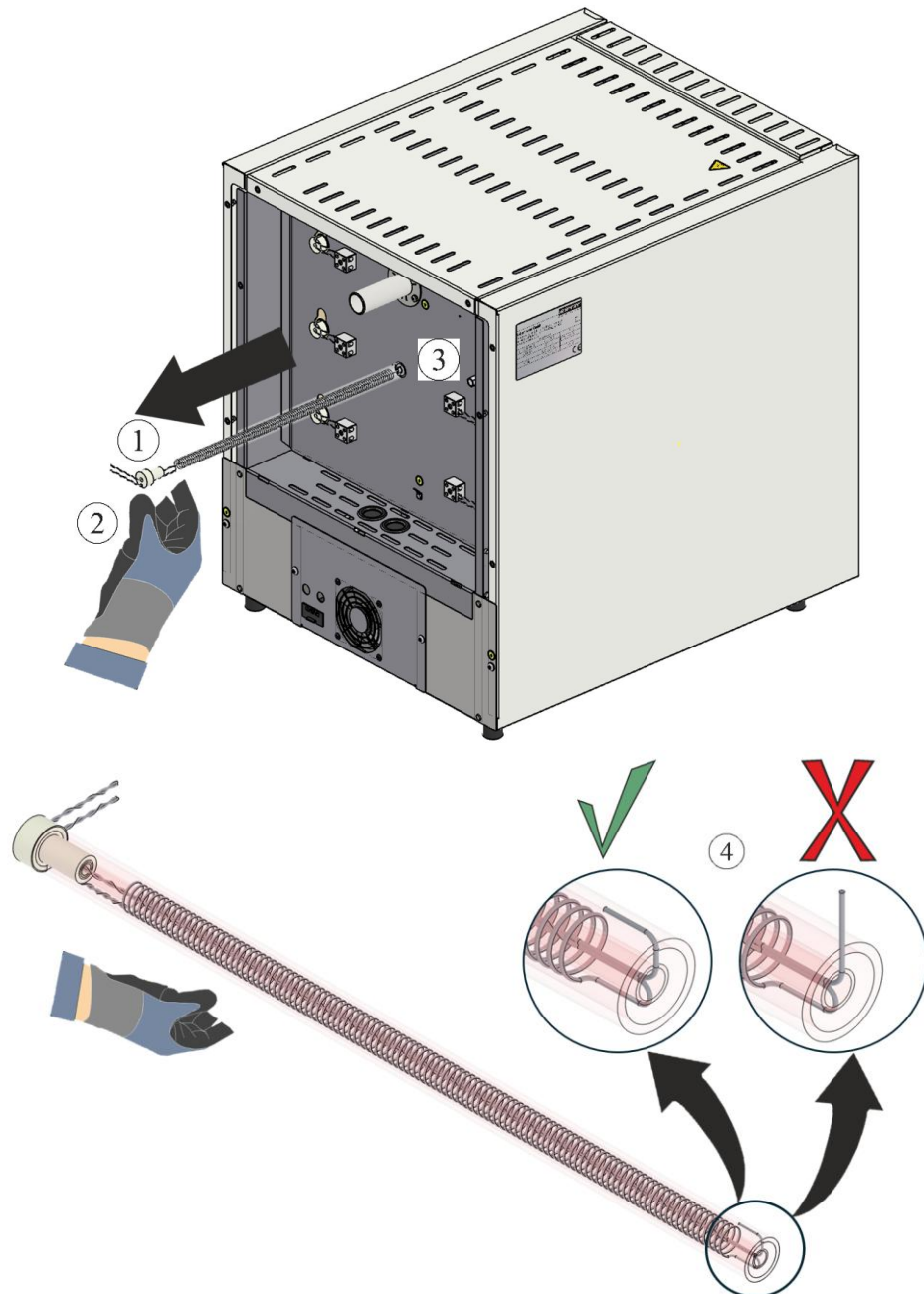


1 Slotted screw / 2 PH screw / 3 Heating wire
4 Connection terminal / 5 Screwdriver 0.5x3/ 6 PH 1 screwdriver

Fig. 4: Undoing the electrical connections (similar to picture)

5 Removing the heating elements

When the electrical connections have been dismantled, the heating elements (1) can be pulled out through the back wall (3). It is important that you wear gloves (2). Make sure that the end of the heating wire does not stick up (4). If the heating wire sticks up, this will damage the insulation when you pull out the element.



1 Heating elements / 2 Gloves / 3 Back wall / 4 Heating wire sticking up
Fig. 5: Removing the heating elements (similar to picture)

6 Installing the New Heating Elements

We recommend that two people replace heating elements.

Before installing heating elements, we recommend that you clean the furnace chamber thoroughly, with a vacuum cleaner, for example.

Check the supplied heating elements for damage before installation.

Compare the delivered items with the delivery note and the purchase order documents.

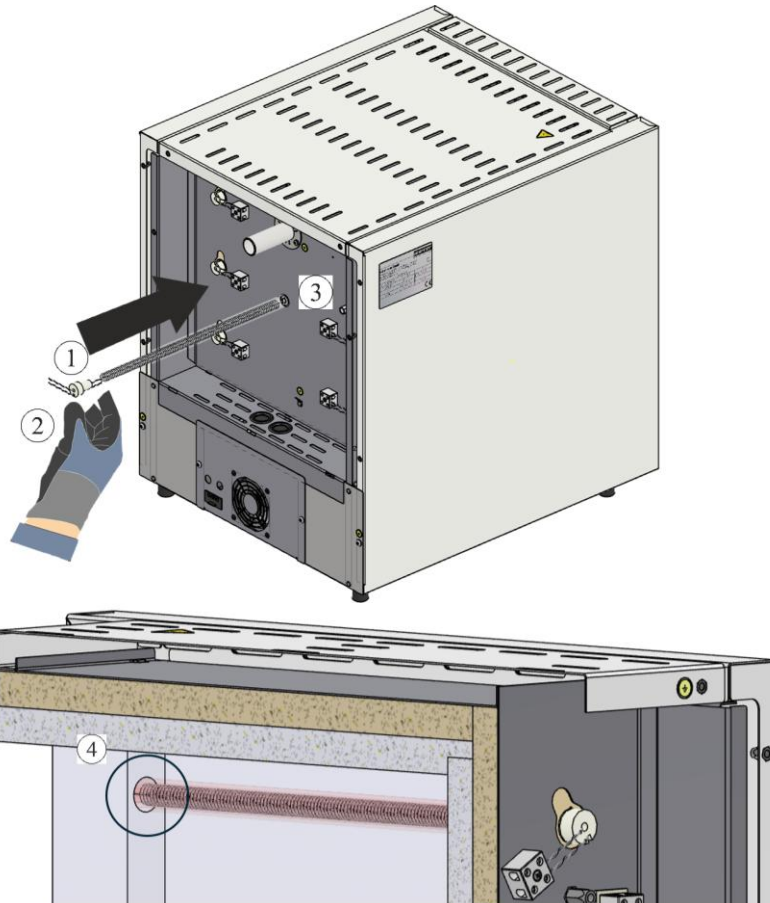
Immediately notify the carrier and Nabertherm GmbH of any missing or damaged parts, as complaints received at a later date cannot be acknowledged.

Remove combustion residues from the heating chamber and terminals.

Note

When installing and handling the new elements, wear the supplied cotton gloves.

Feed the new heating elements (1) through the opening in the back wall (3). Make sure that you do not damage the insulation and that you feed the heating elements (1) correctly into the mounting hole in the collar (4).



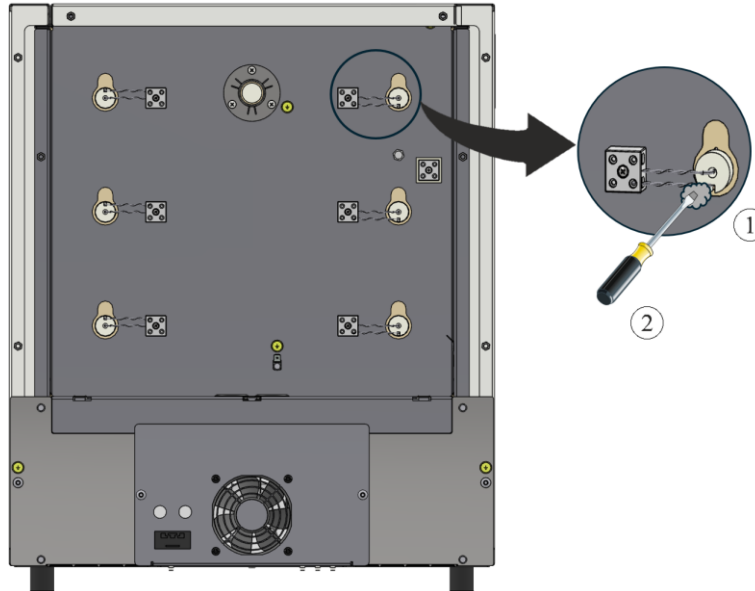
1 Heating elements / 2 Gloves / 3 Back wall / 4 Mounting hole in collar

Fig. 6: Installing the heating elements (similar to picture)

Caution: The pointed ends of the wires are a potential injury hazard.

6.1 Filling the Gaps with Fiber Wadding

Fill the gaps in the insulation between the pipe and the hole with the supplied fiber wadding (1). Use a small screwdriver (2) to push the fiber wadding (1) into the gaps.

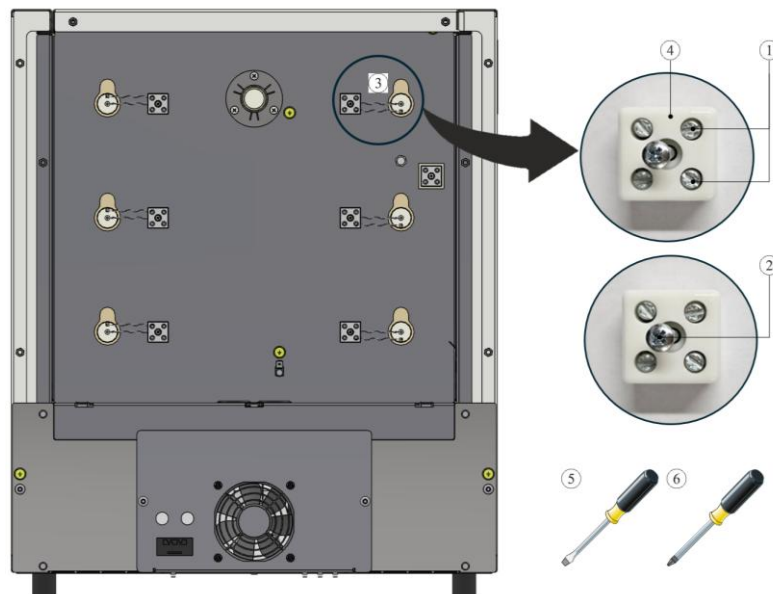


1 Fiber wadding / 2 Screwdriver

Fig. 7: Filling gaps with fiber wadding (similar to picture)

6.2 Electrical Connections

The electrical connections are made in the reverse order from dismantling. Feed the heating elements into the connection terminal (4). Then secure the heating elements with the screws (1). Make sure that they cannot loosen accidentally. Finally, fasten the connection terminal (4) to the back wall with the screw (2).



1 Slotted screw / 2 PH screw / 3 Heating wire
 4 Connection terminal / 5 Screwdriver 0.5x3/ 6 PH 1 screwdriver

Fig. 8: Electrical connections (similar to picture)



Warning – General Hazards!

If installed improperly, functioning and safety of the system can no longer be guaranteed. The connection must be properly installed and put into operation by qualified personnel.



Note:

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 element. If this advice is not followed, the heating elements may be damaged.

We recommend that you clean the switchgear and furnace chamber thoroughly afterwards with a vacuum cleaner, for example.

The covers are replaced in reverse order. The previously disconnected grounding cable between the terminal and cover must be properly reconnected. The cables behind the cover must be routed freely and must not be laid over components that are subjected to heat or that come into contact with them.



Note

Make sure that all screwed and plugged connections are in working order.



Caution

Make sure that no cables poke out or are caught. Beware of sharp edges.

7 Operation

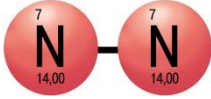
Insert the mains power connector, then switch on the power switch and check the function of the furnace.

7.1 Turning on the Controller/Furnace

Turning on the controller		
Procedure	Display	Comments
Turn on the power switch		Set power switch to “I”. (Power switch type varies according to design/furnace model)
The furnace status is displayed. After a few seconds, the temperature is displayed.		When the temperature is shown on the controller, the controller is ready for operation.



Using protective gases



An oxide coating must form for the heating elements to function properly. To regenerate the heating elements, we recommend a **monthly** oxidation firing in an oxidizing atmosphere to create a protective oxide coating

For the duration of the oxidation firing, please refer to “Recommendations for Heating the Furnace for the First Time”.

Carry out this procedure when using the furnace for the first time and repeat **every time** a heating element is replaced.

The oxidation firing is carried out without any furnace furniture or load. Non-flammable protective gases prevent oxidation. Gas supply equipment must be blocked during the oxidation firing.

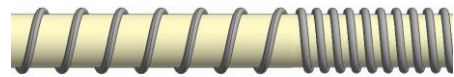
Oxidizing atmospheres (e.g. air or oxygen) help oxidize the heating elements.

Non-flammable protective gases (reducing atmosphere, e.g. argon, helium) prevent oxidation.

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)



Note

The power plug is to be pulled out to stop the furnace in case of an emergency.

Therefore, the power plug must be accessible at all times when the furnace is operating so that it can be pulled out quickly in case of an emergency.

7.2 Environmental Regulations

- The removal of electronic components and their disposal as electronic junk.
- Disposal of the metals that are neither hazardous to health nor the environment as recyclable metal.
- Please contact the responsible waste disposal company to have the above listed materials properly disposed of.



Note

Observe the national regulations of the country in which the furnace will be used.

8 Nabertherm Service

The Nabertherm Service team is available at all times for furnace maintenance and repair. If you have any questions, problems, or requirements, contact Nabertherm GmbH. By mail, phone, or the Internet.

Mail
 Nabertherm GmbH
 Bahnhofstrasse 20
 28865 Lilienthal
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 Fax: +49 (4298) 922-129

Web or e-mail
 www.nabertherm.com
 contact@nabertherm.de

When you contact us, please have the type plate details of the furnace or controller at hand.

Provide the following details from the type plate:

Nabertherm MORE THAN HEAT 33-3000 °C		
Nabertherm GmbH Bahnhofstr. 20, 28865 Lilienthal/Bremen, Germany Tel +49 (04298) 922-0, Fax +49 (04298) 922-129 contact@nabertherm.de www.nabertherm.com		
①	②	④
③		⚡

- ① Furnace model
- ② Serial number
- ③ Article number
- ④ Year of construction

Fig. 9: Example (type plate)

9 For Your Notes



MORE THAN HEAT 30-3000 °C

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