FAG

HEATER600, HEATER1200

Induction Heating Devices
User manual

SCHAEFFLER

Foreword

The induction heating devices HEATER600 and HEATER1200 give rapid, clean operation. Their high efficiency level allows energy-efficient heating and shorter heating times. This reduces the operating costs. The uniform, controlled heating allows consistently good quality of mounting.

Operation is simple and user-friendly, in addition to which the fitter does not need to remove his gloves. The touch keyboard is oil-resistant, dustproof and waterproof.

When heating by induction is used, there is no need at all to use oil – this gives particularly good environmental compatibility. The scope of application is very extensive. They can be used to heat the loose inner rings of cylindrical or needle roller bearings as well as sealed and greased bearings. Compared with previous models, they show further improvements in performance capacity and safety.

In order to ensure durability in demanding industrial operation, the devices are extremely robust and reliable. This is also the reason that the warranty of 3 years can be extended to 5 years – free of charge!

Contents

About the user manual

This user manual is part of the device and contains important information.

Symbols

The warning and hazard symbols are defined in accordance with ANSI Z535.6-2006.

DANGER In case of non-compliance, death or serious injury will occur.◁

WARNING In case of non-compliance, death or serious injury may occur.◁

NOTICE In case of non-compliance, damage or malfunctions in the product or the adjacent construction will occur.◁

Signs

The warning, prohibition and instruction signs are defined in accordance with DIN 4884-2 and DIN EN ISO 7010.

Warning, prohibition and instruction signs

Signs and descriptions	
	Warning of magnetic field
	Warning of non-ionising, electromagnetic radiation
	Warning of hot surface
	Prohibited for persons with heart pacemaker
	Prohibited for persons with metallic implants
	Carrying of metallic parts or watches prohibited
	Wear safety gloves
	Wear safety shoes

Availability

This user manual is supplied with each device and can also be ordered retrospectively.

WARNING

If the user manual is missing, incomplete or illegible, the user may make errors.

The Safety Officer must ensure that this user manual is always complete and legible and that any persons using the device have the user manual available. ◁

Legal guidelines

The information in this manual corresponded to the most recent status at the close of editing. The illustrations and descriptions cannot be used as grounds for any claims relating to devices that have already been delivered. Schaeffler Technologies AG & Co. KG accepts no liability for any damage or malfunctions if the device or accessories have been modified or used in an incorrect manner.

Original user manual

The original user manual is taken to be a user manual in the German language. A user manual in another language is to be taken as a translation of the original user manual.

General safety guidelines

It describes how the device may be used, who may use the device and what must be observed when using the device.

Usage for the intended purpose

Correct usage of the induction heating device is defined as the industrial heating of rolling bearings and other rotationally symmetrical, ferromagnetic workpieces. Sealed and greased rolling bearings can also be heated.

Usage not for the intended purpose

The heating device may not be used for the heating of parts that are not ferromagnetic or not rotationally symmetrical. Do not use the heating device in an environment with an risk of explosion.

Usage not for the intended purpose can lead to the injury or death of persons or damage to the device.

Qualified personnel

For safety reasons, the heating device may only be operated by qualified personnel.

A person defined as qualified personnel:

- has all the necessary knowledge
- is aware of all the hazards and safety guidelines
- is authorised to use the heating device by the safety co-ordinator
- has fully read and understood this user manual.

Working on electrical and electronic equipment

Work on electrical and electronic devices may only be carried out by an electrically skilled person. An electrically skilled person is in a position, on the basis of his technical training, knowledge and experience as well as his knowledge of the appropriate regulations, to carry out work on electrical and electronic devices correctly and recognise possible hazards.

Hazards

During operation, the device always generates an electromagnetic field. The electromagnetic field heats ferromagnetic parts and can disrupt or destroy electronic components. Examples include watches, clocks, mobile telephones, credit cards and other data carriers as well as electronic circuits.

DANGER

Danger of heart stoppage in persons fitted with a pacemaker due to the strong electromagnetic field.

Ensure that persons fitted with a pacemaker remain outside the hazard area of the heating device, see page 19.◁

WARNING

Risk of burns due to heating of implants by the electromagnetic field.

Ensure that persons with ferromagnetic implants remain outside the hazard area of the heating device, see page 19.◁

Safety equipment

In order to protect the user and the heating device, the following safety equipment is present:

- The temperatures of the cooling element, coil and housing and continuously monitored. The thermal protection system will switch off the heating device before any component is overheated. Once the thermal protection system has been triggered, the heating device can be put back into operation once the error has been eliminated and the device has been checked.
- The heating of the rolling bearing is continuously monitored. If the specified increase in temperature is not achieved within a certain period, the heating device is switched off by the software.

Operation

In order that the user can move out of the hazard area before the electromagnetic field is generated, the following operating options are available:

- The heating device can be operated by remote control. If remote control is activated in the menu, the user starts the heating process when he presses the START/STOP key on the heating device, leaves the hazard area and then presses the Start key on the remote control. In this way, he can thus move out of the hazard area before the electromagnetic field is generated.
- If the remote control is not available, the user can set the heating device so that the electromagnetic field is not generated until several seconds have elapsed after pressing the START/STOP key. The user can then move out of the hazard area within the countdown time.

WARNING

Risk of damage to health from remaining in a strong electromagnetic field, since the device starts the heating operation unexpectedly.

Avoid a countdown time setting = 0 seconds. ◁

Activity display

During the heating operation, the ACTIVE LED is lit. The user can thus recognise when the electromagnetic field is being generated.

Protective equipment

Personal protective equipment is intended to protect operating personnel against health hazards. This comprises safety shoes and heat-resistant gloves and these must be used in the interests of personal safety.

Safety specifications

The following safety specifications must be observed when working with the heating device.

Further guidance on hazards and specific guidelines for action can be found, for example, in Operation, page 32.

Transport

The hot heating device must not be moved directly after the heating process.

Storage

The heating device must always be stored under the following ambient conditions:

- humidity max. 90%, non-condensing
- protected against sunlight and UV radiation
- no explosion risk in the environment
- no aggressive chemicals in the environment
- temperature from –15 °C to +40 °C.

If the heating device is stored under unsuitable ambient conditions, this can have consequences such as damage to the electronic unit, corrosion of the ground contact surfaces and deformation of the plastic housing.

First operation

The heating device must not be modified.

The heating device may only be commissioned if it fulfils the regulations to be adhered to at the place of use.

Only original accessories and replacement parts may be used.

The heating device may only be used in well ventilated rooms.

Do not feed the mains connection cable through the U-shaped core.

Operation

The heating device may only be operated under the following ambient conditions:

- closed room
- subsurface flat and capable of supporting loads
- humidity min. 5%, max. 90%, non-condensing
- no explosion risk in the environment
- no aggressive chemicals in the environment
- temperature from 0 °C to +40 °C.

If the heating device is stored under unsuitable ambient conditions, this can have consequences such as damage to the electronic unit, corrosion of the ground contact surfaces and deformation of the plastic housing.

The heating device may only be operated at the correct supply voltage.

Rolling bearings must not be heated under the cover.

During the heating process, the user must maintain a distance of at least 2 m from the heating device.

Objects made from ferromagnetic material must be kept at a distance of at least 1 m from the heating device.

The heating device must not be converted, vertical ledges must not be produced independently.

The heating device may only be switched on if the vertical ledge is correctly positioned.

The vertical ledge must never be removed during the heating process.

Any smoke or vapour occurring during the heating process must not be inhaled.

The heating device must be switched off using the main switch if it is not in use.

WARNING

Back injuries due to incorrect handling of heavy rolling bearings.
In the case of heavy rolling bearings, use suitable lifting gear. ◁

Maintenance

The heating device must be switched off before maintenance is carried out.

Disposal

Locally applicable regulations must be observed.

Conversion

The heating device must not be converted.

Scope of delivery

The scope of delivery comprises the heating device, standard accessories and user manual, see *tables*, *Figure 1* and *Figure 2*.

Scope of delivery Heating device HEATER600

Component	Designation	d[1) mm
Heating device	**HEATER600**	–
Vertical ledge	**HEATER600.LEDGE-150**	150
Temperature sensor	**HEATER.SENSOR-1500MM**	–
Remote control	**HEATER.REMOTE-CONTROL**	–
Sliding table	**HEATER600.SLIDING-TABLE**	–
Grease, Arcanol MULTI3, 250 g	**ARCANOL-MULTI3-250G**	–
Insulating gloves, heat-resistant up to +200 °C	**GLOVE-PRO-TEMP**	–
Cover	**HEATER600.COVER**	–
User manual	–	–

1) Minimum inside diameter of rolling bearing.

① Heating device
② Vertical ledge 150
③ Temperature sensor, magnetic
④ Remote control
⑤ Sliding table
⑥ Grease
⑦ Gloves
⑧ Cover
⑨ User manual

Figure 1
Scope of delivery
Heating device HEATER600

Scope of delivery Heating device HEATER1200

Component	Designation	d[1] mm
Heating device	**HEATER1200**	–
Vertical ledge	**HEATER1200.LEDGE-225**	225
Temperature sensor	**HEATER.SENSOR-1500MM**	–
Remote control	**HEATER.REMOTE-CONTROL**	–
Sliding table	**HEATER1200.SLIDING-TABLE**	–
Grease, Arcanol MULTI3, 250 g	**ARCANOL-MULTI3-250G**	–
Insulating gloves, heat-resistant up to +200 °C	**GLOVE-PRO-TEMP**	–
Cover	**HEATER1200.COVER**	–
User manual	–	–

1) Minimum inside diameter of rolling bearing.

① Heating device
② Vertical ledge 225
③ Temperature sensor, magnetic
④ Remote control
⑤ Sliding table
⑥ Grease
⑦ Gloves
⑧ Cover
⑨ User manual

Figure 2
Scope of delivery
Heating device HEATER1200

Accessories

The heating device is supplied with standard accessories.

Special accessories such as vertical ledges in other sizes are available, see page 50.

Damage during transit

Any damage during transit must be reported as a complaint to the carrier.

Defects

Any defects must be reported promptly to Schaeffler Technologies AG & Co. KG.

Description

The heating device is robust and is operated by means of a control panel and remote control.

Overview

The components are made from the most suitable material for the particular function, *Figure 3*.

① Housing of heating device
② U-shaped core
③ Support block
④ Support rail
⑤ Vertical ledge
⑥ Main switch
⑦ Nameplate
⑧ ACTIVE LED
⑨ Control panel
⑩ UP key
⑪ START/STOP key
⑫ DOWN key
⑬ TEMP key
⑭ TEMP LED
⑮ TIME key
⑯ TIME LED
⑰ Remote control receiver
⑱ Temperature sensor
⑲ Remote control housing
⑳ Start key
㉑ Stop key

Figure 3
Overview
Heating device and remote control

Housing of heating device	It is made from polyurethane and encloses the electronic unit, parts of the U-shaped core and the primary coil.
U-shaped core	This is made from steel and protrudes partially from the housing. In the housing, the primary coil is axially arranged symmetrically around the U-shaped core, *Figure 4*, page 14.
Vertical ledge	This is made from the same material as the U-shaped core. The vertical ledge is guided at the top end of the U-shaped core and can be lifted and changed.
Support blocks	These consist of heat-resistant plastic and prevent the rolling bearing to be heated from coming into contact with the housing.
ACTIVE LED	This LED lights as soon as the electromagnetic field is generated. In this way, the user can see when the device is active and observe the appropriate safe distance.
Main switch	This is used to switch the heating device on and off.
Control panel	The heating device is adjusted, started and stopped by means of the control panel integrated in the housing. The control panel has five keys. The operating mode is displayed by means of two LEDs. If both LEDs are lit, the operating mode is set to ramp control. Above the keys are the display and the receiver for the signal from the remote control.
Temperature sensor	This is magnetic, interchangeable and transmits the measured value to the temperature measuring unit located in the heating device.
Housing of remote control	The housing contains the circuit board, the emitter and the battery. If the battery is dead or the remote control is defective, the heating device can also be operated without a remote control.

Function

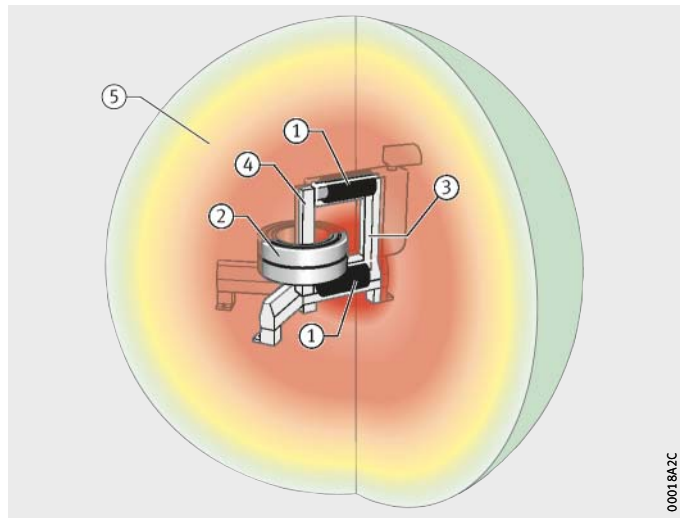
An induction heating device generates a strong electromagnetic field and can thus be used to heat a ferromagnetic workpiece. Due to heating, the workpiece expands, which makes mounting easier. A typical application is the heating of a rolling bearing. This manual therefore considers the heating of a rolling bearing.

Functional principle

The primary coil generates an electromagnetic alternating field. This electromagnetic field is transmitted via the iron core to the secondary coil, for example a rolling bearing. In the secondary coil, a high induction current at low voltage is induced.

The induction current causes rapid heating of the rolling bearing. Any parts that are not ferromagnetic, as well as the heating device itself, remain cold.

When the heating device is switched on, an electromagnetic field is generated. The electromagnetic field is very strong directly at the heating device. The electromagnetic field becomes weaker with increasing distance from the heating device, *Figure 4*.



① Primary coil
② Secondary coil, in this case a rolling bearing
③ U-shaped iron core
④ Vertical ledge
⑤ Electromagnetic field

Figure 4
Function

Operating mode

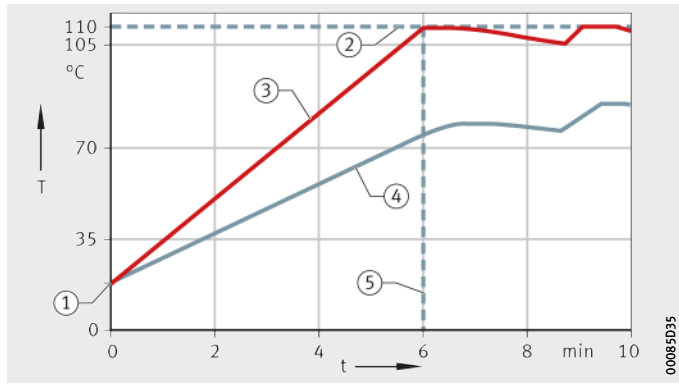
The user sets which of the three operating modes the heating device should use.

Temperature control

In the case of temperature control, the heating temperature is set, *Figure 5*.

The heating device indicates when the heating temperature is reached. If the heating device is not stopped using the remote control, the rolling bearing is brought to the preselected heating temperature up to five times.

Each time the heating temperature is reached, the heating device automatically starts the demagnetisation of the rolling bearing. After heating for the fifth time, demagnetisation is carried out for the last time and dONE will then appear in the display.



① Initial temperature
② Heating temperature
③ Temperature of inner ring
④ Temperature of outer ring
⑤ Heating time

Figure 5
Temperature control

Heating time

The heating time is the time taken until the heating temperature is reached. The heating time depends on the size of the rolling bearing and the cross-section of the vertical ledge.

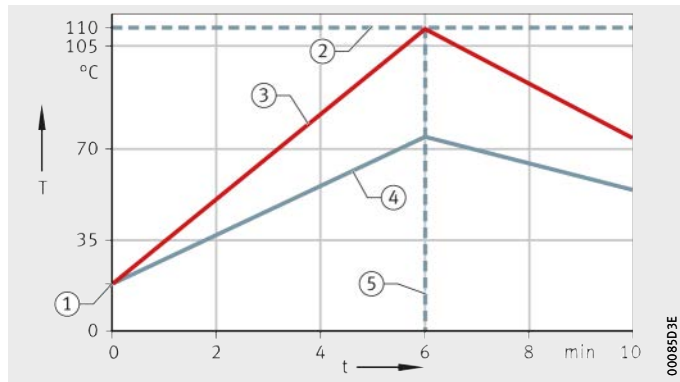
Time control

In the case of time control, the heating time is set, *Figure 6*.

In order to determine the heating time for a rolling bearing, temperature control is used to heat the rolling bearing to the required temperature. The time required is noted as the heating time.

The advantage of time control compared to temperature control is that the temperature sensor is not necessary. Time control is therefore particularly suitable for the batch mounting of identical rolling bearings. When determining the heating time, it must be ensured that the initial temperature present is also maintained in the case of batch mounting.

Each time the heating temperature is reached, the heating device automatically starts the demagnetisation of the rolling bearing. After demagnetisation, dONE is shown in the display.



① Initial temperature
② Heating temperature
③ Temperature of inner ring
④ Temperature of outer ring
⑤ Heating time

Figure 6
Time control

Ramp control

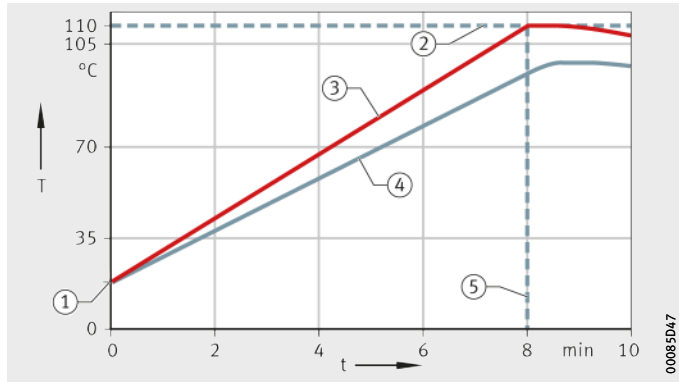
In the case of ramp control, the heating temperature and heating time are set, *Figure 7*.

Ramp control is primarily suitable for rolling bearings with reduced internal clearance and very thick-walled workpieces.

The advantage compared to temperature control is that the rolling bearing can be heated more slowly. The controller checks the temperature continuously and regulates the power level.
The temperature difference between the inner ring and outer ring remains small, preventing stress and damage to the raceway due to the indentation of the rolling elements.

The heating device indicates when the heating temperature is reached. If the heating device is not stopped using the remote control, the rolling bearing is brought to the preselected heating temperature up to five times.

Each time the heating temperature is reached, the heating device automatically starts the demagnetisation of the rolling bearing. After heating for the fifth time, demagnetisation is carried out for the last time and dONE will then appear in the display.



① Initial temperature
② Heating temperature
③ Temperature of inner ring
④ Temperature of outer ring
⑤ Heating time

Figure 7
Ramp control

Transport and storage

Transport

The heating device cannot be carried. For transport, a device with sufficient load capacity must be used.

WARNING

Damage to or separation of the fixed mains connection cable hanging down.

Ensure that the mains connection cable is secured against hanging down for transport. ◁

Storage

The heating device should be stored with protection against dust and UV radiation using the cover supplied.

NOTICE

Damage to or destruction of the cover due to contact with a hot heating device.

Only fit the cover to the heating device if the temperature of the heating device is less than +50 °C. ◁

Commissioning

The heating device can be put into operation at the mounting area.

Hazard area

The hazard area of the heating device can represent a danger of death.

DANGER

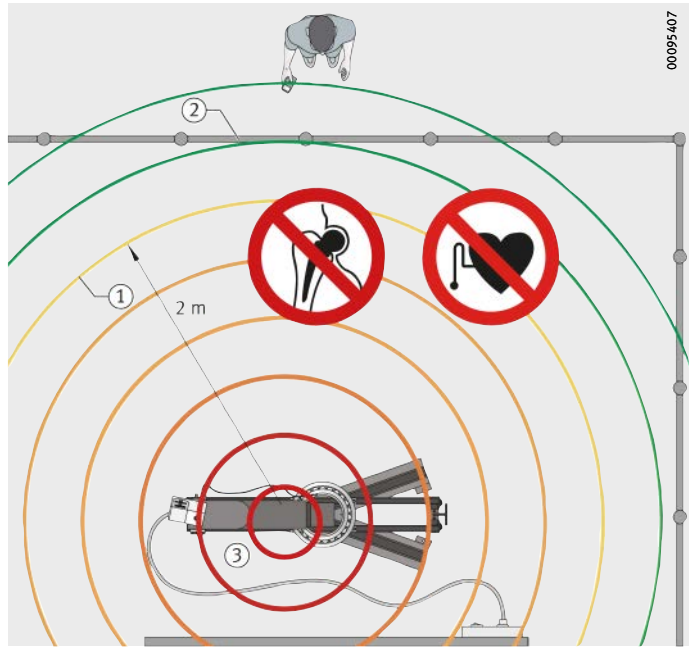
Danger of heart stoppage in persons fitted with a pacemaker due to the strong electromagnetic field.

Ensure that persons fitted with a pacemaker remain outside the hazard area of the heating device. If necessary, put clearly visible signs or barriers in place, *Figure 8*.◁

WARNING

Risk of burns due to heating of implants by the electromagnetic field.

Ensure that persons with a ferromagnetic implant remain outside the hazard area of the heating device. If necessary, put clearly visible signs or barriers in place, *Figure 8*.◁



① Hazard area, 2 m
② Barrier
③ Flat work surface capable of supporting load

Figure 8
Hazard area

Mounting area

A suitable mounting area has the following characteristics:

- flat and horizontal
- distance from ferromagnetic parts at least 1 m
- capable of supporting the total mass of the heating device and rolling bearing.

Carrying out commissioning

Commissioning is carried out as follows:

- ▶ Remove packaging.
- ▶ Check the scope of delivery of the heating device.
- ▶ Place the heating device in a suitable mounting area.
- ▶ Check the heating device and mains connection cable for visible damage.

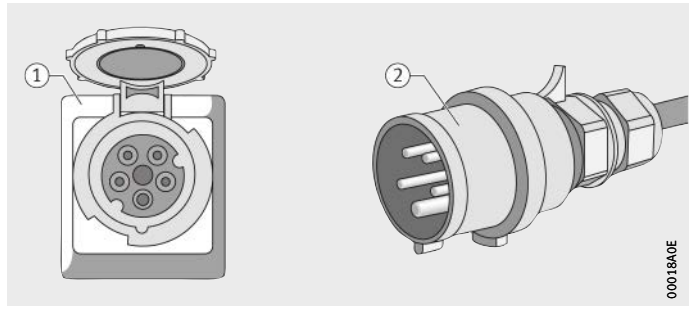
⚠WARNING

Electrocution due to exposed wires as a result of melted cable sheathing.

Feed the mains connection cable around the U-shaped core. ◁

- ▶ Connect the heating device to the voltage supply, *Figure 9*. For specification of the voltage supply, see nameplate, *Figure 3*, page 12, and page 50.
- ▶ If necessary, connect a temperature sensor, see page 45.
- ▶ If necessary, start the configuration procedure in order to set the values for the heating operation, see page 21.

The parameters for the heating operation are set and the heating device is ready for use.



① Socket, 400 V
② Three-phase plug, 400 V

Figure 9
Power supply

Configuration

The heating device is supplied in a default configuration and is ready for immediate operation. The user can, however, configure the heating device at any time, see *table*. During configuration, the heating device is set to user mode.

Overview of parameters

Parameter	Definition
U00	Setting to default setting
U01	Changing the default setting for the heating temperature
U02	Changing the temperature differential
U03	Switching the buzzer on or off
U04	Changing the temperature unit
U05	Changing the countdown time
U06	Ramp control
U07	Ramp angle
U08	Remote control
U09	Calibrating the heating device
U10	End user mode

Setting to default setting

The heating device can be restored to the default setting at any time. The default setting does not correspond to the setting at the time of delivery.

U00 Default setting:

- Sets all parameters to the default settings.

Set all parameter settings to the default setting:

▶ Switch off the heating device using the main switch.

▶ Press the UP and DOWN keys simultaneously, hold the keys down and switch on the heating device using the main switch.

▷ The heating device is in user mode and U00 is shown in the display.

▶ Press the START/STOP key.

▷ The display will read NO.

▶ Press the UP key as often as necessary until YES is displayed.

▶ Press the START/STOP key.

▷ The new value will be stored and the display will read U00.

▶ Press the UP key as often as necessary until U10 is displayed.

▶ Press the START/STOP key.

All the parameters with the exception of U05 and U08 will have the same settings as at the time of delivery.

Changing the default setting for the heating temperature

The heating temperature is the temperature to which the rolling bearing is heated. If the operating mode of the heating device is temperature control, the heating temperature is shown in the display when it is switched on.

U01 Heating temperature:

- +40 °C, +104 °F Minimum value
- +110 °C, +230 °F Default setting
- +240 °C, +464 °F Maximum value
- 1 Step size.

Change the default setting for the heating temperature:

▶ Switch off the heating device using the main switch.

▶ Press the UP and DOWN keys simultaneously, hold the keys down and switch on the heating device using the main switch.

▷ The heating device is in user mode and U00 is shown in the display.

▶ Press the UP key as often as necessary until U01 is displayed.

▶ Press the START/STOP key.

▷ The display will read the value for the parameter U01.

▶ Change the value using the UP or DOWN key.

▶ Press the START/STOP key.

▷ The new value will be stored and the display will read U01.

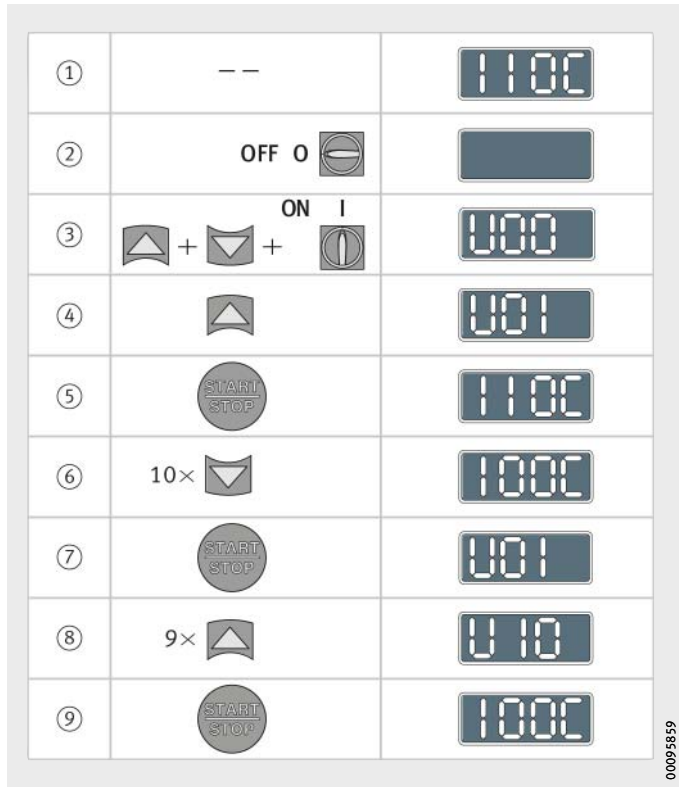
▶ Press the UP key as often as necessary until U10 is displayed.

▶ Press the START/STOP key.

The heating temperature has been changed.

Example

When the heating device is delivered, it is set to a heating temperature of +110 °C. If a different heating temperature will always be required for the heating operation, the default setting for the heating temperature can be changed, *Figure 10*.



① Heating device in standby mode
② Switch off the heating device
③ Switch on the heating device, user mode
④ Default setting for heating temperature
⑤ Activate setting
⑥ Change heating temperature to +100 °C
⑦ Store +100 °C
⑧ Exit user mode
⑨ Switch heating device to standby mode

Figure 10
Changing the default setting for the heating temperature

Changing the temperature differential

The temperature differential is the difference in temperature relative to the heating temperature at which the device restarts heating.

U02 Temperature differential:

- 0 °C, +32 °F Minimum value
- +5 °C, +41 °F Default setting
- +50 °C, +122 °F Maximum value
- 1 Step size.

Change the temperature differential:

▶ Switch off the heating device using the main switch.

▶ Press the UP and DOWN keys simultaneously, hold the keys down and switch on the heating device using the main switch.

▷ The heating device is in user mode and U00 is shown in the display.

▶ Press the UP key as often as necessary until U02 is displayed.

▶ Press the START/STOP key.

▷ The display will show the value for the parameter U02.

▶ Change the value using the UP or DOWN key.

▶ Press the START/STOP key.

▷ The new value will be stored and the display will read U02.

▶ Press the UP key as often as necessary until U10 is displayed.

▶ Press the START/STOP key.

The temperature differential has been changed.

Switching the buzzer on or off

If the buzzer is switched on, a buzzer tone will sound when the heating temperature is reached. After demagnetisation, a longer buzzer tone is emitted.

U03 Buzzer:

- 0 Switched off
- 1 Switched on, default setting.

Switch the buzzer on or off:

▶ Switch off the heating device using the main switch.

▶ Press the UP and DOWN keys simultaneously, hold the keys down and switch on the heating device using the main switch.

▷ The heating device is in user mode and U00 is shown in the display.

▶ Press the UP key as often as necessary until U03 is displayed.

▶ Press the START/STOP key.

▷ The display will show the value for the parameter U03.

▶ Change the value using the UP or DOWN key.

▶ Press the START/STOP key.

▷ The new value will be stored and the display will read U03.

▶ Press the UP key as often as necessary until U10 is displayed.

▶ Press the START/STOP key.

The buzzer has been switched on or off.

Changing the temperature unit

The measured temperature is shown in the selected temperature unit in the display of the heating device.

U04 Temperature unit:

- 0 Display in °C, default setting
- 1 Display in °F.

Change the temperature unit:

▶ Switch off the heating device using the main switch.

▶ Press the UP and DOWN keys simultaneously, hold the keys down and switch on the heating device using the main switch.

▷ The heating device is in user mode and U00 is shown in the display.

▶ Press the UP key as often as necessary until U04 is displayed.

▶ Press the START/STOP key.

▷ The display will read the value for the parameter U04.

▶ Change the value using the UP or DOWN key.

▶ Press the START/STOP key.

▷ The new value will be stored and the display will read U04.

▶ Press the UP key as often as necessary until U10 is displayed.

▶ Press the START/STOP key.

The temperature unit has been changed.

Changing the countdown time

In the appropriate setting, the heating device does not start the heating operation immediately after the START/STOP key is pressed. If remote control is switched on, the Start key must be pressed within the countdown time in order to start the heating device. If remote control is switched off, the countdown time is the time that elapses between pressing the START/STOP key and the heating device starting.

U05 Countdown time:

- 0 s Minimum value
- 5 s Default setting
- 30 s Delivered condition
- 99 s Maximum value
- 1 Step size.

Change the countdown time:

▶ Switch off the heating device using the main switch.

▶ Press the UP and DOWN keys simultaneously, hold the keys down and switch on the heating device using the main switch.

▷ The heating device is in user mode and U00 is shown in the display.

▶ Press the UP key as often as necessary until U05 is displayed.

▶ Press the START/STOP key.

▷ The display will show the value for the parameter U05.

▶ Change the value using the UP or DOWN key.

▶ Press the START/STOP key.

▷ The new value will be stored and the display will read U05.

▶ Press the UP key as often as necessary until U10 is displayed.

▶ Press the START/STOP key.

The countdown time has been changed.

Switching ramp control on or off

If ramp control is switched on, the rolling bearing is heated consistently. Temperature control and time control can only be switched on if this parameter is set to 0.

U06 Ramp control:

- 0 Switched off, default setting
- 1 Switched on.

Switch ramp control on or off:

▶ Switch off the heating device using the main switch.

▶ Press the UP and DOWN keys simultaneously, hold the keys down and switch on the heating device using the main switch.

▷ The heating device is in user mode and U00 is shown in the display.

▶ Press the UP key as often as necessary until U06 is displayed.

▶ Press the START/STOP key.

▷ The display will read the value for the parameter U06.

▶ Change the value using the UP or DOWN key.

▶ Press the START/STOP key.

▷ The new value will be stored and the display will read U06.

▶ Press the UP key as often as necessary until U10 is displayed.

▶ Press the START/STOP key.

Ramp control has been switched on or off.

Changing the ramp angle

If a rolling bearing is heated using ramp control, the rate of heating can be set. This is carried out by changing the angle of the ramp. A steeper ramp (larger ramp angle) leads to more rapid heating.

U07 Ramp angle:

- 1 °C/min Minimum value
- 50 °C/min Default setting
- 240 °C/min Maximum value
- 1 Step size.

Change the ramp angle:

▶ Switch off the heating device using the main switch.

▶ Press the UP and DOWN keys simultaneously, hold the keys down and switch on the heating device using the main switch.

▷ The heating device is in user mode and U00 is shown in the display.

▶ Press the UP key as often as necessary until U07 is displayed.

▶ Press the START/STOP key.

▷ The display will read the value for the parameter U07.

▶ Change the value using the UP or DOWN key.

▶ Press the START/STOP key.

▷ The new value will be stored and the display will read U07.

▶ Press the UP key as often as necessary until U10 is displayed.

▶ Press the START/STOP key.

The ramp angle has been changed.

Switching remote control on or off

If remote control is switched off, the device can only be operated using the keys on the control panel.

U08 Remote control:

- 0 Switched off
- 1 Switched on, default setting.

Switch remote control on or off:

▶ Switch off the heating device using the main switch.

▶ Press the UP and DOWN keys simultaneously, hold the keys down and switch on the heating device using the main switch.

▷ The heating device is in user mode and U00 is shown in the display.

▶ Press the UP key as often as necessary until U08 is displayed.

▶ Press the START/STOP key.

▷ The display will read the value for the parameter U08.

▶ Change the value using the UP or DOWN key.

▶ Press the START/STOP key.

▷ The new value will be stored and the display will read U08.

▶ Press the UP key as often as necessary until U10 is displayed.

▶ Press the START/STOP key.

Remote control has been switched on or off.

Calibrating the heating device

The heating device can be calibrated at any time. If the temperature sensor is changed, the heating device must then be calibrated. The heating device should be calibrated annually.

U09 Calibrate the heating device:

- The temperature measuring unit is set, the heating device then displays the exact temperature.

Calibrate the heating device:

- ▶ Heat a rolling bearing by means of temperature control to +120 °C.
- ▶ Switch off the heating device using the main switch.
- ▶ Press the UP and DOWN keys simultaneously, hold the keys down and switch on the heating device using the main switch.
- ▷ The heating device is in user mode and U00 is shown in the display.
- ▶ Press the UP key as often as necessary until U09 is displayed.
- ▶ Press the START/STOP key.
- ▷ The temperature measured by the temperature sensor will be shown in the display.
- ▶ Measure the temperature of the rolling bearing directly next to the temperature sensor using a calibrated temperature gauge.
- ▶ Press the UP or DOWN key until the temperature displayed on the calibrated temperature measuring device is also shown in the display of the heating device.
- ▶ Press the START/STOP key.
- ▷ The new value will be stored and the display will show U09.
- ▶ Press the UP key as often as necessary until U10 is displayed.
- ▶ Press the START/STOP key.

The heating device has been calibrated.

End user mode

At the end of the configuration process, the user mode is exited by selecting this menu item.

U10 Exit user mode:

- The heating device is switched to standby mode.

Operation

It is recommended that only one rolling bearing should ever be heated at one time.

Suitable rolling bearings

Not all rolling bearings are suitable for these heating devices. The mass and dimensions must fulfil certain values, see *table*.

Rolling bearings

Designation	HEATER600	HEATER1200
Mass, minimum	30 kg	60 kg
Mass, maximum	600 kg	1 200 kg
Inside diameter, minimum	145 mm[1)]	215 mm[2)]
Outside diameter, maximum	900 mm	1 500 mm

1) 45 mm when using a vertical ledge from the range of accessories.

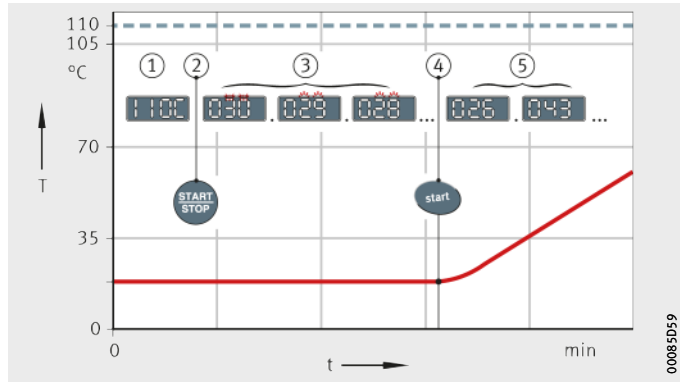
2) 85 mm when using a vertical ledge from the range of accessories.

Remote control

The remote control can be used to start the heating device from a safe distance. Remote control can be activated or deactivated, see page 21. At the time of delivery, the remote control is switched on and the countdown time is set to 30 s. We recommend that remote control should be left switched on and the countdown time should be left at 30 s.

Remote control activated

After the START/STOP key (on the control panel) is pressed, the countdown time is counted down. If remote control is activated, the heating device will start within the countdown time immediately after pressing the Start key (on the remote control), *Figure 11*. After heating, the temperature holding mode can be stopped at any time by pressing the Stop key (on the remote control).



① Display of heating temperature
② START/STOP key (control panel)
③ Display of countdown time
④ Start key (remote control)
⑤ Display of current temperature

Figure 11
Remote control activated

Standby mode

If remote control is activated and the Start key (on the remote control) is not pressed within the countdown time, the heating device will switch to standby mode and the display on the control panel will show four dashes, *Figure 12*. After the START/STOP key (on the control panel) is pressed again, the countdown time is counted down once more.

① Display:
Start key was not pressed
② Display
③ Control panel

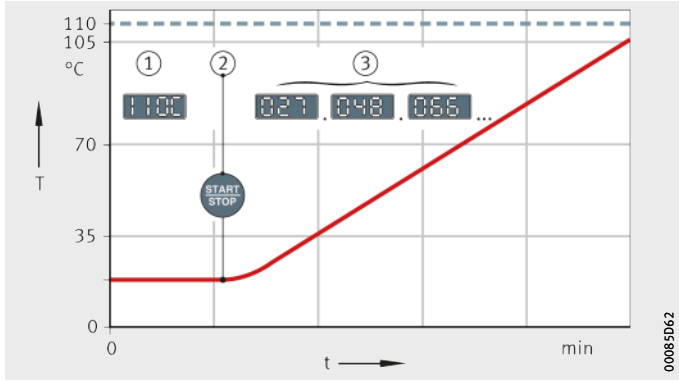
Figure 12
Countdown time expired

Remote control deactivated

If remote control is deactivated, the heating device is started using the control panel:

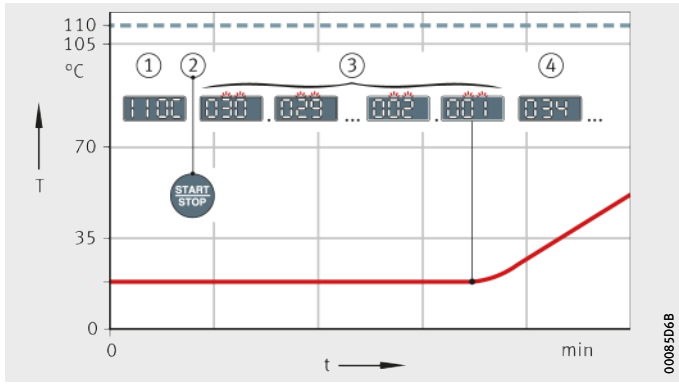
- If the countdown time = 0 s
  the heating device will start immediately after pressing the START/STOP key, *Figure 13*.

  With this setting, the user will be in the hazard area when the electromagnetic field is generated. This setting should be avoided.
- If the countdown time is > 0 s
  the heating device will start once the countdown time has expired after pressing the START/STOP key, *Figure 14*.



① Display of heating temperature
② START/STOP key
③ Display of current temperature

Figure 13
Countdown time = 0 s



① Display of heating temperature
② START/STOP key
③ Display of countdown time
④ Display of current temperature

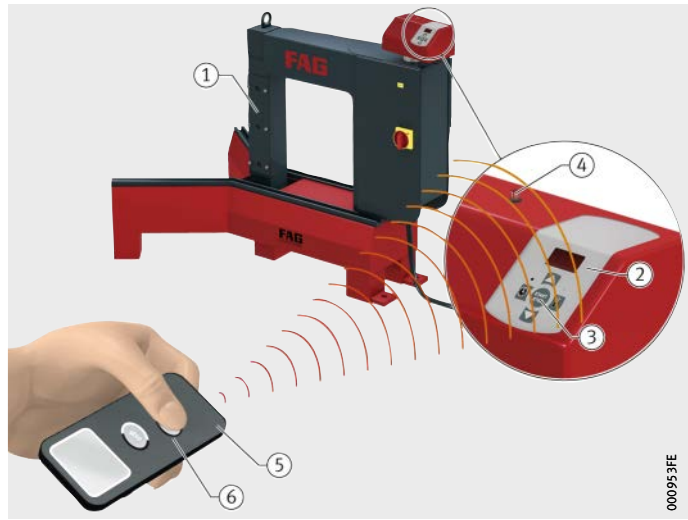
Figure 14
Countdown time > 0 s

Teaching the remote control

After the button cell (CR 2035) has been changed, the heating device will often not respond immediately to signals from the remote control. The remote control must then be taught, *Figure 15*.

- ▶ Commission the heating device.
- ▶ Press the START/STOP key.
- ▶ Point the remote control at the control panel.
- ▶ Press the Start key as often as necessary within the countdown time until the ACTIVE LED on the heating device lights.

▷ The remote control has been taught.



① Heating device
② Control panel
③ START/STOP key
④ ACTIVE LED
⑤ Remote control
⑥ Start key

Figure 15
Teaching the remote control

Temperature holding mode

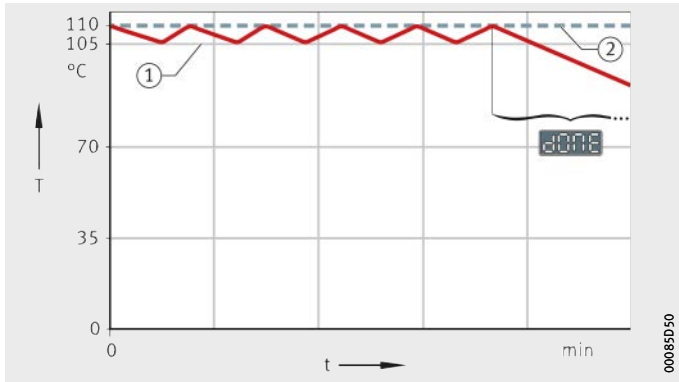
This function of the heating device is only active in the control modes:

- temperature control
- ramp control.

Once the heating temperature is achieved, the heating device demagnetises the rolling bearing. If the temperature of the rolling bearing falls below the limit temperature, the heating device will again heat the rolling bearing to the heating temperature. During this time, the temperature of the rolling bearing will flash in the display.

After the fifth heating cycle, the temperature holding mode will be stopped, the display will show dONE and the rolling bearing will cool down again, *Figure 16*.

The temperature holding mode can be stopped at any time by pressing the Stop key.



① Heating temperature
② Limit temperature

Figure 16
Temperature holding mode

Heating of rolling bearings

The heating operation can be controlled by means of:

- temperature control
- time control
- ramp control.

Temperature control

For temperature control, the following conditions apply:

- The maximum heating temperature for standard rolling bearings is +120 °C.

The heating operation is divided into the four subsections of preparation, setting, heating and removal.

Preparation

▶ Check whether the rolling bearing can be heated, see page 32.

⚠ DANGER

Strong electromagnetic field. Cardiac arrest due to failure of the pacemaker.

Avoid the hazard area, see page 19.◁

▶ Switch off the heating device using the main switch.

▶ Position the rolling bearing on the heating device so that it is not in direct contact with the housing of the heating device, see page 44.

▶ Attach the temperature sensor in the vicinity of the inside diameter, in the case of rolling bearings to the end face of the inner ring that is free from grease and oil, see page 45.

Setting

▶ Switch on the heating device using the main switch.

▶ Press the TEMP key.

▷ The TEMP LED will light and the preset heating temperature will appear on the display.

▶ Set the required heating temperature using the UP or DOWN key.

Heating

▶ Press the START/STOP key.

▷ The countdown time is counted down.

▶ Move out of the hazard area of the heating device and observe the safe distance while the heating device is heating the rolling bearing.

▶ If remote control is activated, press the Start key within the countdown time. If remote control is deactivated, wait for the end of the countdown time.

▷ The ACTIVE LED will light red, the electromagnetic field will be generated and the heating operation will start.

▶ Wait until a longer buzzer tone is emitted and the temperature of the rolling bearing is displayed.

▶ If remote control is switched on, press the Stop key in order to end the temperature holding mode. If remote control is switched off, wait until the temperature holding ends automatically.

Removal

▶ From a safe distance, check whether the heating temperature is shown in the display. If remote control is switched off, check from a safe distance whether dONE is shown in the display.

▶ Remove the temperature sensor, see page 45.

⚠WARNING

Hot rolling bearing. Serious burns.

Wear heat-insulating gloves.◁

▶ Remove the rolling bearing from the heating device, see page 46.

▶ Lay the rolling bearing on the work surface.

The heated rolling bearing can now be mounted.

Time control

For time control, the following conditions apply:

- The longest heating time is 99 min, 59 s.

The heating operation is divided into the four subsections of preparation, setting, heating and removal.

Preparation

▶ Check whether the rolling bearing can be heated, see page 32.

⚠DANGER

Strong electromagnetic field. Cardiac arrest due to failure of the pacemaker.

Avoid the hazard area, see page 19.◁

▶ Switch off the heating device using the main switch.

▶ Position the rolling bearing on the heating device so that it is not in direct contact with the housing of the heating device, see page 44.

Setting

▶ Switch on the heating device using the main switch.

▶ Press the TIME key.

▷ The TIME LED will light and 00:00 will appear on the display.

▶ Set the required heating temperature (minutes) using the UP or DOWN key.

▶ Press the TIME key.

▶ Set the required heating temperature (seconds) using the UP or DOWN key.

Heating

▶ Press the START/STOP key.

▷ The countdown time is counted down.

▶ Move out of the hazard area of the heating device and observe the safe distance while the heating device is heating the rolling bearing.

▶ If remote control is activated, press the Start key within the countdown time. If remote control is deactivated, wait for the end of the countdown time.

▷ The ACTIVE LED will light red, the electromagnetic field will be generated and the heating operation will start.

Removal

▶ From a safe distance, check whether dONE is shown in the display.

⚠WARNING

Hot rolling bearing. Serious burns.

Wear heat-insulating gloves. ◁

▶ Remove the rolling bearing from the heating device, see page 46.

▶ Lay the rolling bearing on the work surface.

The heated rolling bearing can now be mounted.

Ramp control

For ramp control, the following conditions apply:

- The shortest heating time is 5 min.
- The smallest workpiece mass is 30 kg.

The heating operation is divided into the four subsections of preparation, setting, heating and removal.

Preparation

Heating of rolling bearings:

▶ Check whether the rolling bearing can be heated, see page 32.

⚠ DANGER

Strong electromagnetic field. Cardiac arrest due to failure of the pacemaker.

Avoid the hazard area, see page 19.◁

▶ Switch off the heating device using the main switch.

▶ Position the rolling bearing on the heating device so that it is not in direct contact with the housing of the heating device, see page 44.

▶ Attach the temperature sensor in the vicinity of the inside diameter, in the case of rolling bearings to the end face of the inner ring that is free from grease and oil, see page 45.

Setting

▶ Switch on the heating device using the main switch.

▶ Press the TEMP key and TIME key simultaneously.

▷ The TEMP LED and TIME LED will light.

▶ Press the TEMP key.

▶ Set the required heating temperature using the UP or DOWN key.

▶ Press the TIME key.

▶ Set the required heating temperature (minutes) using the UP or DOWN key.

▶ Press the TIME key.

▶ Set the required heating temperature (seconds) using the UP or DOWN key.

Heating

- ▶ Press the START/STOP key.
- ▷ The countdown time is counted down.
- ▶ Move out of the hazard area of the heating device and observe the safe distance while the heating device is heating the rolling bearing.
- ▶ If remote control is activated, press the Start key within the countdown time. If remote control is deactivated, wait for the end of the countdown time.
- ▷ The ACTIVE LED will light red, the electromagnetic field will be generated and the heating operation will start.
- ▶ Wait until a longer buzzer tone is emitted and the temperature of the rolling bearing is displayed.
- ▶ If remote control is switched on, press the Stop key in order to end the temperature holding mode. If remote control is switched off, wait until the temperature holding ends automatically.

Removal

- ▶ From a safe distance, check whether the heating temperature is shown in the display. If remote control is switched off, check from a safe distance whether dONE is shown in the display.
- ▶ Remove the temperature sensor, see page 45.

⚠WARNING

Hot rolling bearing. Serious burns.

Wear heat-insulating gloves.◁

- ▶ Remove the rolling bearing from the heating device, see page 46.
- ▶ Lay the rolling bearing on the work surface.

The heated rolling bearing can now be mounted.

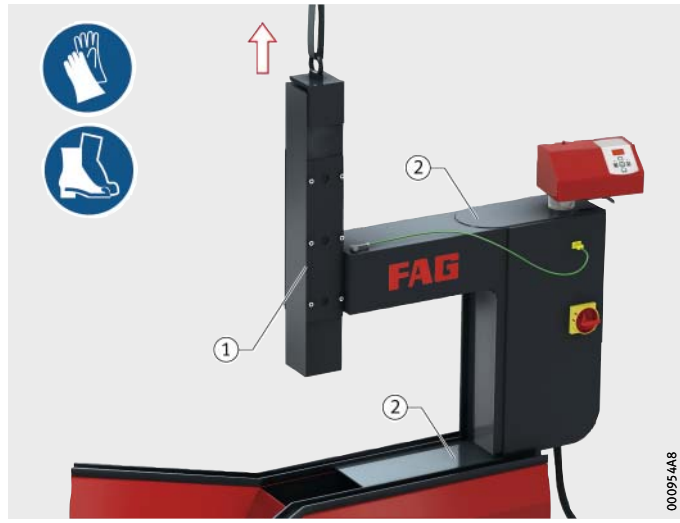
Changing the vertical ledge

Before heating, the vertical ledge with the largest possible cross-section is used.

Removing the vertical ledge

Remove the vertical ledge, *Figure 17*:

- ▶ Switch off the heating device using the main switch.
- ▶ Lift the vertical ledge away from the ledge guide using a suitable lifting device.
- ▶ Place the vertical ledge on the work surface next to the heating device.



① Vertical ledge
② Locating stud

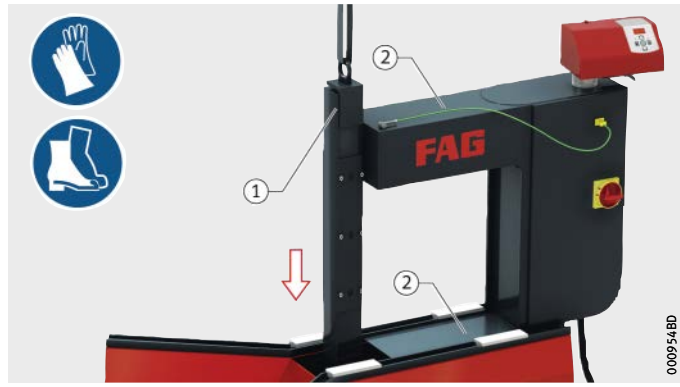
Figure 17
Removing the vertical ledge

Mounting the vertical ledge

Mount the vertical ledge, *Figure 18*:

- ▶ Mount the vertical ledge from above in the ledge guide using a suitable lifting device.

The vertical ledge has been changed.



① Vertical ledge
② U-shaped core

Figure 18
Mounting the vertical ledge

Positioning the rolling bearing

The rolling bearing is always positioned lying flat.

Position the rolling bearing, *Figure 19*:

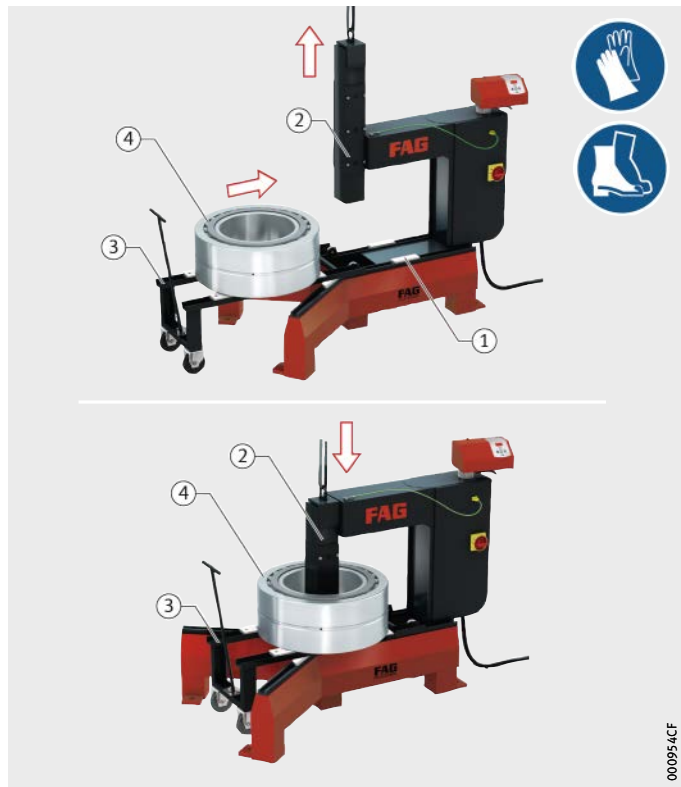
⚠WARNING

Risk of injury due to tilting of heating device and falling rolling bearing.

For rolling bearings and other heavy workpieces, always use the sliding table. Use a suitable carrying sling and a suitable lifting device for the vertical ledge.◁

- ▶ Move the support blocks so that the outer ring of the rolling bearing is lying on the support blocks.
- ▶ Lift the vertical ledge using a suitable lifting device.
- ▶ Move the rolling bearing by means of the sliding table so that the vertical ledge can be lowered through the inner ring onto the U-shaped iron core.
- ▶ Lower the vertical ledge and remove the carrying sling.

The rolling bearing is positioned.



① Support block
② Vertical ledge
③ Sliding table
④ Rolling bearing

Figure 19
Positioning the rolling bearing

Temperature sensor

If the operating mode of the heating device is temperature control or ramp control, the temperature sensor must be attached before a heating operation. The heating device will indicate an error if the temperature sensor is not detected.

Connecting and attaching the temperature sensor

Connect and attach the temperature sensor, *Figure 20*:

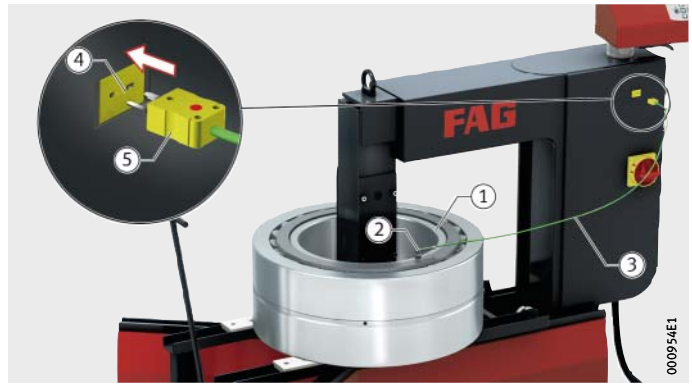
NOTICE

Destruction of temperature sensor through heating of cable, resulting in melting of cable sheathing.

Feed the temperature sensor cable around the U-shaped core. ◁

- ▶ Insert the plug of the temperature sensor with the red mark facing upwards in the yellow socket.
- ▶ Place the magnetic temperature sensor on the end face of the inner ring that is free from grease and oil.

The temperature sensor is connected and attached and the temperature can be measured.



① Inner ring of rolling bearing
② Temperature sensor
③ Cable of temperature sensor
④ Socket for temperature sensor
⑤ Plug of temperature sensor

Figure 20
Connecting and attaching the temperature sensor

Removing the temperature sensor

Remove the temperature sensor, *Figure 21*, page 46:

- ▶ Grip the temperature sensor by the black sheathing.
- ▶ Detach the temperature sensor from the end face of the inner ring.
- ▶ Where necessary, pull the plug of the temperature sensor out of the yellow socket.

① Inner ring of rolling bearing
② Temperature sensor
③ Cable of temperature sensor
④ Socket for temperature sensor
⑤ Plug of temperature sensor

Figure 21
Removing
the temperature sensor

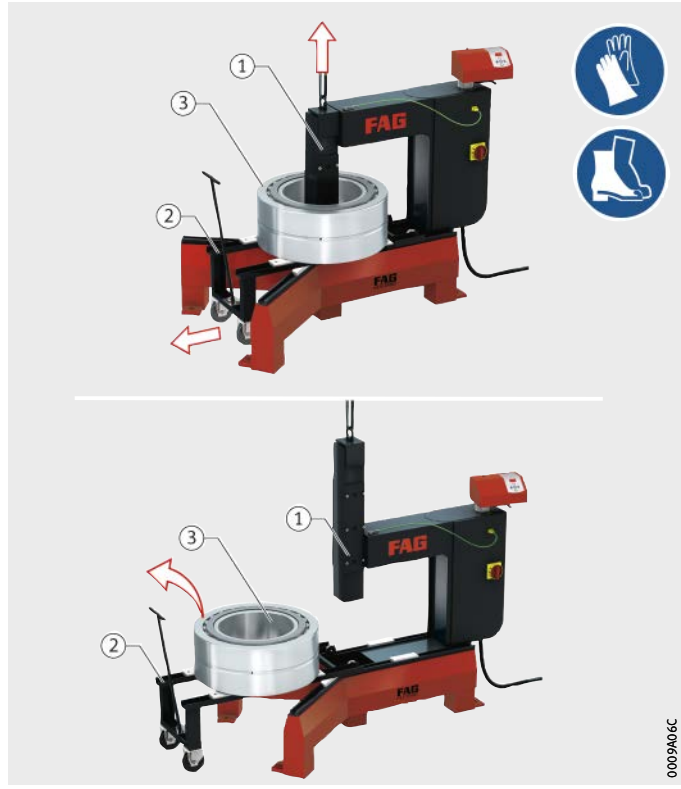
Removal of rolling bearings

Once the temperature sensor has been detached, the rolling bearing can be removed.

Remove the rolling bearing, *Figure 22*:

- ▶ Lift the vertical ledge using a suitable lifting device.
- ▶ Remove the rolling bearing from the heating device by means of the sliding table.
- ▶ Lower the vertical ledge.
- ▶ Lift the rolling bearing off the sliding table.

The rolling bearing can now be mounted.



① Vertical ledge
② Sliding table
③ Rolling bearing

Figure 22
Removing the rolling bearing

Troubleshooting

A malfunction is indicated by a long buzzer tone and a flashing error number in the display. Once the malfunction has been eliminated, the heating device is ready for use again.

Eliminating malfunctions

If a malfunction occurs, the heating device will switch itself off. Before the heating device is switched on again, the cause of the malfunction must first be identified and eliminated.

You can eliminate a malfunction as follows:

- ▶ Read off the error number on the display.
- ▶ Determine the cause of the malfunction, see *table*.
- ▶ Rectify the malfunction if you have authorisation to do so.
- ▶ Press the START/STOP key to cancel the error message.

The heating device can now be put back into operation.

Error messages

Display	Error	Possible cause	Remedy
E01	The heating device does not detect the temperature sensor	The temperature sensor is not connected	Connect the temperature sensor
		The temperature sensor is incorrectly connected	Connect the temperature sensor correctly. **The red dot (on the plug) must face upwards**
		The temperature sensor has a broken cable	Use a new temperature sensor
E02	The specified temperature was not achieved in the specified time	The temperature sensor is incorrectly positioned	Attach the temperature sensor over its full surface to a flat area of the inner ring
		The rolling bearing is too heavy	Contact Customer Service
			Use a more powerful heating device
E04	The temperature of the coil or housing is too high	The temperature monitoring system has been triggered, the heating device has been switched off	Allow the heating device to cool down for 30 min
			Use a more powerful heating device
E06	No zero-cross	The terminal connections to the circuit board are defective or the circuit board itself has a defect	Arrange for an electrically skilled person to change the electronic unit

If the error cannot be eliminated, please contact Customer Service at Schaeffler Technologies AG & Co. KG.

Maintenance

Before every use, a visual and functional inspection must be carried out. If necessary, maintenance must be carried out on the device.

Maintenance plan

The maintenance items are stated in the maintenance plan, see *tables*.

Before every use

Subassembly	Activity
Heating device	Visual inspection: ☐ Check the housing for damage ☐ Check the plug and cable for damage to the insulation ☐ Check that the support blocks and vertical ledge are present and free from damage
	☐ Check the function of the display

As necessary

Subassembly	Activity
Heating device	☐ Clean with a soft, dry cloth
Contact surfaces on the U-shaped core	☐ Cleaning of contact surfaces ☐ For optimum contact and to prevent corrosion, regularly grease with an acid-free grease, see label “Grease contact surfaces”

Decommissioning

If the heating device will no longer be used regularly, it should be decommissioned.

Temperature

When decommissioning the heating device, its temperature must be observed.

NOTICE

Damage to or destruction of the cover due to contact with a hot heating device.

Only fit the cover to the heating device if the temperature of the heating device is less than +50 °C.◁

Decommissioning:

▶ Switch off the heating device using the main switch.

▶ Disconnect the heating device from the voltage supply.

▶ Fit the cover to the heating device.

Disposal

The device can be returned to Schaeffler for disposal.

The heating device can be dismantled in order to dispose of the subassemblies separately.

The heating device may only be dismantled by an electrically skilled person.

WARNING

Electrocution due to sudden discharge of capacitors.

Before dismantling of the heating device, wait at least 24 h after disconnection from the voltage supply. ◁

WARNING

Cutting injuries to the hands when working on sharp-edged components located in the interior of the heating device.

In dismantling, use cut-resistant safety gloves. ◁

Regulations

Disposal must be carried out in accordance with locally applicable regulations.

Technical data and accessories

Technical data, standard accessories and special accessories, see *tables*.

Technical data HEATER600

Designation	HEATER600
Dimensions	1300×820×1080 mm
Mass	350 kg
Power supply	AC 400 V
Frequency	50 Hz
Power consumption	23 kVA
Rated current	60 A
Residual magnetism, maximum	2 A/cm
IP protection class	54
Mains connection cable	3 pin, length 3,5 m, rigidly connected to heating device
Mains connection plug	Three-phase plug to CEE-3P+N+E-32A

Standard accessories HEATER600

Component	Designation	Dimensions mm	d[1] mm	Mass kg
Vertical ledge	**HEATER600.LEDGE-150**	100×112×700	150	61,6
Sliding table	**HEATER600.SLIDING-TABLE**	–	–	40
Temperature sensor	**HEATER.SENSOR-1500MM**	–	–	0,05
Remote control	**HEATER.REMOTE-CONTROL**	–	–	0,2
Grease	**ARCANOL-MULTI3-250G**	–	–	0,28
Gloves	**GLOVE-PRO-TEMP**	–	–	0,17
Cover	**HEATER600.COVER**	–	–	–

[1] Suitable for rolling bearings with minimum inside diameter as stated.

Special accessories HEATER600

Component	Designation	Dimensions mm	d[1] mm	Mass kg
Vertical ledge	**HEATER600.LEDGE-55**	30×42×700	55	4,9
	HEATER600.LEDGE-65	40×52×700	65	8,4
	HEATER600.LEDGE-80	50×62×700	80	13,8
	HEATER600.LEDGE-95	60×72×700	95	19,5
	HEATER600.LEDGE-110	70×82×700	110	26,9
	HEATER600.LEDGE-125	80×92×700	125	35,7
	HEATER600.LEDGE-140	90×102×700	140	44,5

[1] Suitable for rolling bearings with minimum inside diameter as stated.

Technical data HEATER1200

Designation	HEATER1200
Dimensions	1660×1400×1245 mm
Mass	850 kg
Power supply	AC 400 V
Frequency	50 Hz
Power consumption	46 kVA
Rated current	100 A
Residual magnetism, maximum	2 A/cm
IP protection class	54
Mains connection cable	3 pin, length 3,5 m, rigidly connected to heating device
Mains connection plug	Three-phase plug to CEE-3P+N+E-32A

Standard accessories HEATER1200

Component	Designation	Dimensions mm	d[1)] mm	Mass kg
Vertical ledge	**HEATER1200.LEDGE-225**	150×162×850	225	105,7
Sliding table	**HEATER1200.SLIDING-TABLE**	–	–	60
Temperature sensor	**HEATER.SENSOR-1500MM**	–	–	0,05
Remote control	**HEATER.REMOTE-CONTROL**	–	–	0,2
Grease	**ARCANOL-MULTI3-250G**	–	–	0,28
Gloves	**GLOVE-PRO-TEMP**	–	–	0,17
Cover	**HEATER1200.COVER**	–	–	–

1) Suitable for rolling bearings with minimum inside diameter as stated.

Special accessories HEATER1200

Component	Designation	Dimensions mm	d[1)] mm	Mass kg
Vertical ledge	**HEATER1200.LEDGE-95**	60×72×850	95	28,8
	HEATER1200.LEDGE-125	80×92×850	125	49,1
	HEATER1200.LEDGE-150	100×112×850	150	74,7

1) Suitable for rolling bearings with minimum inside diameter as stated.

Original accessories

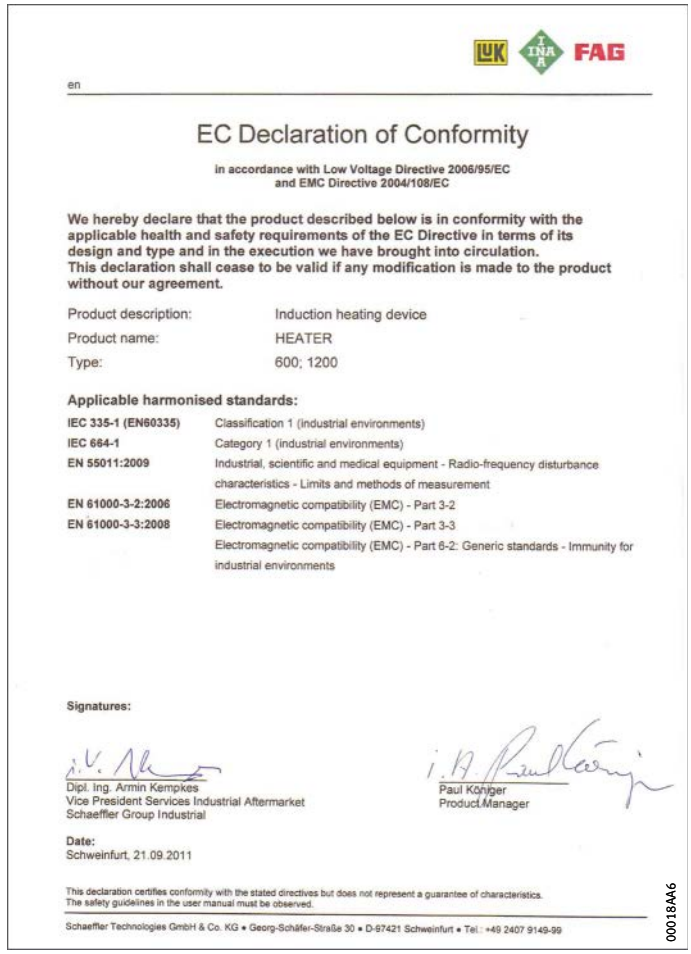
Only use FAG original accessories.

Appendix

This appendix contains the Declaration of Conformity for heating devices HEATER600 and HEATER1200.

EC Declaration of Conformity

Declaration of Conformity for heating devices HEATER600 and HEATER1200, *Figure 23*.



en

EC Declaration of Conformity

in accordance with Low Voltage Directive 2006/95/EC and EMC Directive 2004/108/EC

We hereby declare that the product described below is in conformity with the applicable health and safety requirements of the EC Directive in terms of its design and type and in the execution we have brought into circulation. This declaration shall cease to be valid if any modification is made to the product without our agreement.

Product description:	Induction heating device
Product name:	HEATER
Type:	600; 1200

Applicable harmonised standards:

IEC 335-1 (EN60335)	Classification 1 (industrial environments)
IEC 664-1	Category 1 (industrial environments)
EN 55011:2009	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement
EN 61000-3-2:2006	Electromagnetic compatibility (EMC) - Part 3-2
EN 61000-3-3:2008	Electromagnetic compatibility (EMC) - Part 3-3
	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments

Signatures:

i.V.
Dipl. Ing. Armin Kempkes
Vice President Services Industrial Aftermarket
Schaeffler Group Industrial

i.A. Paul Königer
Paul Königer
Product Manager

Date:
Schweinfurt, 21.09.2011

This declaration certifies conformity with the stated directives but does not represent a guarantee of characteristics.
The safety guidelines in the user manual must be observed.

Schaeffler Technologies GmbH & Co. KG • Georg-Schäfer-Straße 30 • D-97421 Schweinfurt • Tel.: +49 2407 9149-99

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Figure 23
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Schaeffler Technologies
AG & Co. KG

Postfach 1260
97419 Schweinfurt
Germany

Georg-Schäfer-Straße 30
97421 Schweinfurt
Germany

Phone +49 2407 9149-66
Fax +49 2407 9149-59
E-mail support.is@schaeffler.com
Internet www.schaeffler.com/services

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