



Induction Heater **IH 070/090**

**Bedienungsanleitung
Instructions for use
Mode d'emploi
Manuale d'istruzioni
Manual de instrucciones**



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EU Declaration of conformity

simatec ag
Stadthof 2, CH-3380 Wangen a. Aare, Switzerland

declares that the

Induction Heaters simatherm IH 070/090

are designed and manufactured in accordance with

Directive 2006/95/EC of the European Parliament and of the Council relating to electrical equipment designed for use within certain voltage limits

Directive 2004/108/EC of the European Parliament and of the Council relating to electromagnetic compatibility and repealing Directive 89/336/EEC

The following standards have been applied:

EN 60519-1
EN 60519-3
EN 55011
EN 61000-3-3
EN 61000-6-2

Wangen a. Aare, 2013-10-01

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Managing Director / CEO

Safety recommendations

- Because the IH 070/090 generates a magnetic field, people wearing a pacemaker must not be within 5m (16ft) of the IH 070/090 during operation. Electronic equipment, such as wristwatches, may also be affected.
- Follow the operating instructions at all times.
- Be certain that the voltage supply is correct.
- Electrical arcing may occur when a potential difference exists between the IH 070/090 and the workpiece. This is not dangerous to human beings and will not cause damage to the IH 070/090 or the workpiece. However, the IH 070/090 must never be used in areas where there is a risk of explosion.
- Do not expose the heater to high humidity.
- Never operate the IH 070/090 without a yoke in position.
- Do not modify the IH 070/090.
- Use proper handling equipment when lifting heavy workpieces.
- Avoid contact with hot workpieces. Wear the supplied heatresistant gloves to handle hot workpieces.

1 Introduction

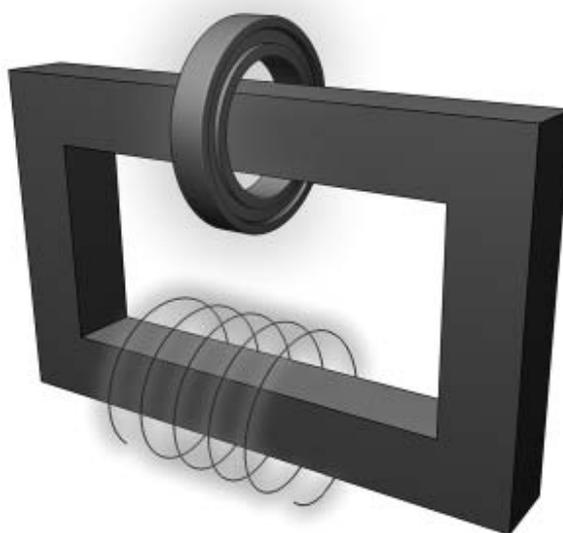
The simatec IH 070/090 induction heater is designed to heat bearings that are mounted with an interference fit onto a shaft. The heat causes the bearing to expand, which eliminates the need to use force during installation. A 90°C (194°F) temperature difference between the bearing and shaft is generally sufficient to enable installation. At an ambient temperature of 20°C (68°F), the bearing must therefore be heated to 110°C (230°F).

1.1 Intended use

The IH 070/090 has been designed to heat rolling bearings. However, other metal workpieces that form a closed circuit can also be heated. Examples of acceptable workpieces include bushings, shrink rings, pulleys, and gears. All bearings that fit over the inductive coil and between the vertical supports with the top yoke in place can be heated using the IH 070/090. In addition, smaller bearings can be placed over either of the three standard yokes. See the illustrations at the beginning of this manual for examples.

1.2 Principle of operation

The IH 070/090 generates heat by means of a large electrical current that is magnetically induced in the workpiece by a coil within the heater. The high voltage, low current electricity flowing through the large number of windings in the inductive coil induces low voltage, high current electricity in the workpiece. Because the workpiece has the electrical characteristics of a coil with a single, short-circuited winding, the high current generates heat within the workpiece. Because the heat is generated within the workpiece, all of the heater components remain cool.



1.3 Distinguishing feature

The distinguishing feature of the IH 070/090 induction heater is the location of the workpiece at the same position on the core as the inductive coil. This design improves efficiency, resulting in less power consumption and faster heating, which reduces the cost to heat each bearing.

2 Description

The operation of the heater is controlled by the internal electronics in either of two modes. The operator can either select the desired temperature of the bearing in TEMP MODE or set the length of time that the bearing will be heated in TIME MODE. The power level can be adjusted in steps of 20% for slower heating of sensitive workpieces (for example, bearings with C1 or C2 clearance).

2.1 Components

The IH 070/090 induction heater contains a U-shaped iron core with an inductive coil surrounding one of the vertical supports. Internal electronics control the operation of the heater. A removable yoke on the top of the vertical supports allows the workpiece to be placed onto the heater. The top yoke of the IH 090 is mounted on a swivel. To accommodate smaller workpieces, two smaller yokes are also provided. A temperature probe is also included with the heater. Heat-resistant gloves are also included.

2.2 Technical data

IH 070

Voltage ($\pm 9\%$):	100 V / 50-60Hz 110–120 V / 60Hz 220–240 V / 50–60Hz
Recommended circuit protection	20A circuit breaker
Power consumption (maximum)	1.5kVA (100 V / 50-60Hz) 3.7kVA (110–120 V / 60Hz) 3.7kVA (220–240 V / 50–60Hz)
Temperature control	0–250°C (32–482°F) in steps of 1°
Probe maximum temperature	250°C (482°F)
Time mode	0–60 minutes in steps of 0.1 minute
Power range	20–100% in steps of 20%
Demagnetisation, automatic	Residual magnetism < 2A/cm
Overall dimensions	420 x 280 x 345mm
Area between supports (wxh)	145 x 205mm
Coil diameter	115mm
Weight (with yokes)	35kg
Workpiece maximum weight	Bearing 80 kg, solid component 40 kg
Maximum heating temperature	approx. 400°C (752°F)
Standard yoke dimensions	55 x 55 x 275mm (for \varnothing of 78mm) 28 x 28 x 275mm (for \varnothing of 40mm) 14 x 14 x 275mm (for \varnothing of 20mm)

IH 090

Voltage ($\pm 9\%$):	400 V / 50 Hz 440–480 V / 60 Hz 575 V / 60 Hz
Recommended circuit protection	20A circuit breaker
Power consumption (maximum)	6,4kVA (400 V / 50 Hz) 7,4kVA (440–480 V / 60 Hz) 9,2kVA (575 V / 60 Hz)
Temperature control	0–250°C (32–482°F) in steps of 1°
Probe maximum temperature	250°C (482°F)
Time mode	0–60 minutes in steps of 0.1 minute
Power range	20–100% in steps of 20%
Demagnetisation, automatic	Residual magnetism < 2A/cm
Overall dimensions	420 x 280 x 420mm
Area between supports	145 x 205mm
Coil diameter	115mm
Weight (with yokes)	38kg
Workpiece maximum weight	Bearing 120kg, solid component 60kg
Maximum heating temperature	approx. 400°C (752°F)
Standard yoke dimensions	55 x 55 x 275mm (for \varnothing of 78mm) 28 x 28 x 275mm (for \varnothing of 40mm) 14 x 14 x 275mm (for \varnothing of 20mm)

3 Installation of mains plug

Due to the many types of mains plugs, no mains plug is supplied with the IH 070/090. A qualified electrician must install a suitable mains plug. The correct supply voltage is shown in section 2.2.

The wires should be connected as follows:

IH 070

Colour of IH 070 wire	Mains supply terminal
yellow/green	Protection earth (PE)
brown	Phase 1 (L1)
blue	Neutral (N)

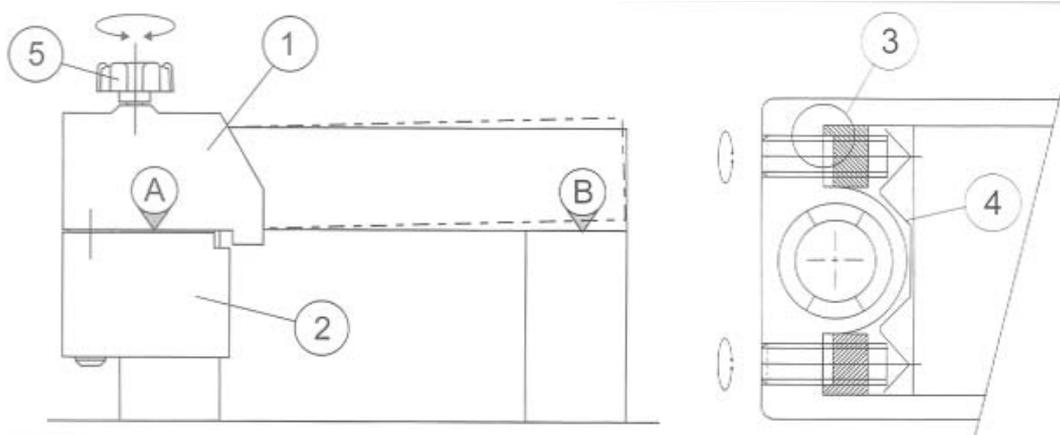
IH 090

Colour of IH 090 wire	Mains supply terminal
yellow/green	Protection earth (PE)
brown	Phase 1 (L1)
bluw	Phase 2 (L2)

Connect the IH 090 to only two of the three phases. Verify that the correct circuit breaker is installed. See section 2.2 for circuit breaker specifications.

4 Preparation for use

- Place the IH 070/090 in the horizontal position on a stable surface.
- Connect the mains plug to a suitable mains supply.

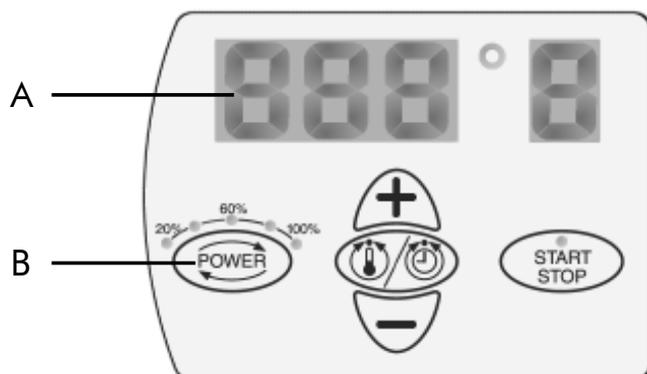


- For the IH 090 only, follow these steps to install the swivel arm:
 - Attach the protection plate (4) to the side post to prevent damage.
 - Install the swivel head (1) and the swivel body (2) on the lefthand side post of the heater.
 - Install the large top yoke (55 x 55mm) in the swivel head. Adjust the swivel body so that there is no visible gap (A) between the side post and the yoke.
 - Tighten the four screws (3) of the swivel body (maximum torque 5Nm).
 - Turn the screw (5) on top of the swivel head to position the top yoke. The top yoke must contact as much of the upper surface of the right-hand side post (B) as possible. Noise during operation could indicate that the top yoke is not positioned properly.
- Special notes for the IH 090:
 - The yoke support is required when either of the smaller yokes (28 x 28mm or 14 x 14mm) is installed. Install the yoke support and the yoke together in the swivel head. If necessary, rotate the swivel head to provide better access.

- Heavy workpieces (≥ 10 kg/22 lbs) that must be installed on the top yoke should be supported until the yoke is in the correct position on the right-hand side post. The heater may tip over if the workpiece is not supported.
- The swivel body (2) can remain on the heater at all times.
- For workpieces with an internal diameter large enough to fit over the inductive coil, follow these steps:
 - Place the workpiece over the inductive coil using appropriate lifting equipment.
 - For best performance, adjust the position of the workpiece so that the inductive coil is in the centre.
 - Remove the protective film from the bright underside of the top yoke before the first use.
 - Position the top yoke so that it completely covers the top of both vertical supports.
- For workpieces that do not fit over the inductive coil, follow these steps:
 - Choose the larger of the three yokes that fit through the internal diameter of the workpiece.
 - If necessary, remove the top yoke from the IH 070/090.
 - Verify that the protective film has been removed from the underside of the small or medium yoke if it is to be used for the first time.
 - Slide the workpiece onto the yoke that you have selected.
 - Position the yoke on the IH 070/090 with the bright underside resting evenly on the two vertical supports.
- If you will use TEMP MODE, plug the temperature probe into the connector on the left side of the heater. Place the magnetic end of the probe on the inner ring of the bearing or on the innermost surface of the workpiece.
- Use the power switch on the left side to switch on the IH 070/090.
- Observe the self-test of the display and signal tone.

5 Operation

5.1 Function of displays



A. The main display shows the selected time or temperature for heating.

Display	Indication
t	time in minutes
°C	temperature in degrees Celsius
°F	temperature in degrees Fahrenheit

B. The power display shows the selected power setting.

Display	Indication
•	20% power
••	40% power
•••	60% power
••••	80% power
•••••	100% power

5.2 Function of buttons

Button	Function
POWER	Press to adjust the power in steps of 20%. The selected power is indicated on the power display.
MODE	Press to switch between TIME MODE and TEMP MODE.
UP (+)	Press to increase the value shown on the main display.
DOWN (-)	Press to decrease the value shown on the main display.
START/STOP	Press to start or stop the heater. The LED on the START/STOP button is lit when the heater is heating and flashes during temperature measurement.

5.3 Temp mode

- If the main display shows ,t', press MODE to select TEMP MODE. The main display shows °C or °F in TEMP MODE.
- The selected temperature is shown on the main display. The default temperature for bearings is 110°C (230°F). If a different temperature is desired, press UP or DOWN to adjust the temperature in steps of 1°.
- It may be desirable to heat bearings to temperatures above 110°C (230°F) for increased mounting time. Consult the bearing specifications to determine the maximum permitted temperature. Always ensure the bearing does not lock due to an excessive expansion of the inner ring compared to outer ring. See section 5.8.
- All Spherical Roller Bearings (SRBs) are subjected to a special heat treatment. These bearings can be operated at temperatures as high as 200°C (392°F). Heating these bearings above 110°C (230°F) will not cause any damage as long as the bearing is still able to rotate. For other bearings, a temperature of 125°C (257°F) must not be exceeded unless otherwise specified.
- Press POWER to select the power level. Use the guidelines in section 5.8 to determine the correct power setting.
- Make sure the temperature probe is mounted on the bearing inner ring.
- Press START/STOP to start the heater. The main display shows the current temperature of the workpiece.
- When the selected temperature has been reached, the heater demagnetises the workpiece, switches off, and generates an acoustic signal for 10 seconds or until START/STOP is pressed.
- Press START/STOP to stop the heater.
- Remove the workpiece with proper handling equipment.
- If the workpiece remains on the heater, the heater will start again when the temperature of the workpiece drops 10°C (18°F). Press START/STOP to stop the heater and demagnetise the workpiece.
- The IH 070/090 is now ready to heat another workpiece with the same settings.

5.4 Time mode

- If the main display shows °C or °F, press MODE to select TIME MODE. The main display shows ,t' in TIME MODE.
- Press UP or DOWN to adjust the time in steps of 0.1 minute.
- Press POWER to select the power level. Use the guidelines in section 5.8 to determine the correct power setting.
- Press START/STOP to start the heater. The main display shows the time that remains.
- When the time has elapsed, the heater demagnetises the workpiece, switches off, and generates an acoustic signal for 10 seconds.
- Press START/STOP to cancel the acoustic signal and stop the heater.
- Remove the workpiece with proper handling equipment.
- The IH 070/090 is now ready to heat another workpiece with the same settings.

5.5 Temperature measurement

When the heater is not operating, the temperature of the workpiece can be measured by pressing MODE and START/STOP at the same time. The LED on the START/STOP button flashes during temperature measurement. Press START/STOP to cancel temperature measurement.

5.6 Change of temperature unit

Press MODE and UP at the same time to switch between °C and °F. The temperature unit setting remains the same even after disconnection from mains power.

5.7 Demagnetisation

The workpiece is automatically demagnetised when heating is complete. Demagnetisation will not occur if the power is interrupted or the main switch is switched off. To use the IH 070/090 for demagnetisation only, select TIME MODE and set the time to 0.1 minute (6 seconds).

5.8 Power level selection

When heating bearings with an induction heater, most of the heat will be generated in the inner bearing race. The heat will then be transferred through the bearing. It is therefore important that bearings with small internal clearance or slight preload are heated slowly. Slow heating ensures that the bearing expands evenly, thereby preventing damage to the bearing.

The shape, weight, size, and internal clearances all affect the amount of time required to heat a bearing. The large variety of bearing types precludes the possibility of providing a specific power level setting for each type. Instead, the following guidelines are provided:

- For sensitive bearings (including bearings with C1 or C2 internal clearance) or bearings with brass cages, do not exceed 20% power when using the small yoke, 40% power when using the medium yoke, or 60% power when using the large yoke.
- When using the small yoke, never exceed 40% power.
- When using the medium yoke, never exceed 60% power.

6 Safety features

The IH 070/090 is equipped with the following safety features:

- Automatic overheating protection
- Automatic current control
- In the TEMP MODE the heater will switch off if the temperature probe does not register a temperature increase of 1° every 15 seconds. To increase the interval to 30 seconds, press MODE and DOWN at the same time.
- Additionally, the IH 090 is equipped with a main switch with over-current circuit breaker.

7 Troubleshooting

A system fault will be indicated by an acoustic signal and one of the following fault codes on the main display:

Display	Fault	Action
E01 E	General system failure	Return IH 070/090 for repair.
E02 E	Memory failure	Return IH 070/090 for repair.
E03 E	Overheated coil	Wait until the inductive coil cools.
E04 E	not in use	
E05 E	Temperature increase of less than 1° every 15 seconds (or 1° every 30 seconds)	Check the temperature probe connection. If the connection is OK, select the 30 second interval as described in section 6 or operate the heater in TIME MODE.
E06 E	Temperature probe not connected (or defective)	Check the temperature probe.
E07 E	Failure during current measurement	Return IH 070/090 for repair.
E08 E	Failure during communication with power printed circuit board	Return IH 070/090 for repair.
E09 E	Overheated printed circuit board	Wait until the printed circuit board cools.

8 Spare parts

Art. No.		Description
190.1311	IH 070-P	Power print 100-240V/50-60Hz
190.1314	IH 090-P/200V	Power print 200V/50-60Hz
190.1005	IH 090/210-P	Power print 400-575V/50-60Hz
190.1309	IH 070-C110V	Coil 100-115V/50-60Hz
190.1310	IH 070-C230V	Coil 200-230V/50-60Hz
190.1313	IH 090-C	Coil 400-460V/50-60Hz
190.7302	IH 070-CP/100V	Control print IH 070/100V
190.7303	IH 070-CP/110V	Control print IH 070/110V
190.7402	IH 210-CP	Control print 200V for IH 090
190.7304	IH 070/090-CP	Control print IH 070/230V Control print IH 090/400-460V
190.7301	IH 070/090-H	Heating pad incl. sealing
190.1008	IH 025/030/070-S	Main switch 100-230V/20A
190.1301	IH 090-S	Main switch 400-460V/16A
190.1308	IH 070/090-Y8	Yoke 55 x 55 x 275mm (for bearings with minimum 80mm bore)
190.1307	IH 070/090-Y6	Yoke 40 x 40 x 275mm (for bearings with minimum 60mm bore)
190.1306	IH 070/090-Y4	Yoke 28 x 28 x 275mm (for bearings with minimum 40mm bore)
190.1305	IH 070/090-Y3	Yoke 20 x 20 x 275mm (for bearings with minimum 30mm bore)
190.1304	IH 070/090-Y2	Yoke 14 x 14 x 275mm (for bearings with minimum 20mm bore)
190.1004	IH 030/070/090-YS	Set support yoke 55 x 55 x 100mm
190.1302	IH 070/090-SA	Swivel arm
190.1001	IH P2	Temperature probe, K type

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