



# SKF TIH L MB



Figure 1: TIH L MB as delivered



Figure 2: TIH L MB after bearing supports assembly



Figure 3: TIH L MB with open yoke



Figure 4: TIH L MB with horizontal workpiece heating

|                                     |    |
|-------------------------------------|----|
| EC Declaration of conformity.....   | 4  |
| Safety recommendations.....         | 5  |
| 1. Introduction .....               | 6  |
| 1.1 Intended use.....               | 6  |
| 1.2 Principle of operation.....     | 6  |
| 1.3 Distinguishing features .....   | 7  |
| 2. Description.....                 | 7  |
| 2.1 Components .....                | 7  |
| 2.2 Technical data.....             | 8  |
| 3. Installation of mains plug ..... | 10 |
| 4. Preparation for use .....        | 10 |
| 5. Operation .....                  | 11 |
| 5.1 Function of displays.....       | 11 |
| 5.2 Function of buttons .....       | 11 |
| 5.3 TEMP MODE.....                  | 11 |
| 5.4 TIME MODE .....                 | 12 |
| 5.5 Temperature measurement .....   | 12 |
| 5.6 Change of temperature unit..... | 12 |
| 5.7 Demagnetisation.....            | 12 |
| 5.8 Power level selection.....      | 13 |
| 6. Safety features .....            | 13 |
| 7. Troubleshooting .....            | 14 |
| 8. Spare parts .....                | 15 |

Original instructions

## EC Declaration of conformity

We,  
SKF Maintenance Products  
Kelvinbaan 16  
3439 MT Nieuwegein  
The Netherlands

herewith declare that the following product:

### SKF Induction Heater TIH L MB Series

has been designed and manufactured in accordance with:  
EUROPEAN LOW VOLTAGE DIRECTIVE 2006/95/EC  
EMC DIRECTIVE 2004/108/EC as outlined in the harmonized norm for  
EN61000-6-4:2007 /A1:2011  
EN61000-6-2:2005  
EN61000-4-2  
EN61000-4-3  
EN61000-4-4  
EN61000-4-5  
EN61000-4-6  
EN61000-4-8  
EN61000-4-11

"With the exception of Conducted Immunity in accordance with EN61000-4-6 in  
the frequency range of 17 - 30 MHz"

EUROPEAN ROHS DIRECTIVE 2011/65/EU

Nieuwegein, The Netherlands,  
July 2015



Sébastien David  
Manager Product Development and Quality



### Safety recommendations

- Because the TIH L MB generates a magnetic field, people wearing a pacemaker must not be within 5 m (16 ft) of the TIH L MB during operation. Electronic equipment, such as wristwatches, may also be affected.
- Risk of electrical hazard. Only qualified electrician should open the heater electrical cabinet.
- Follow the operating instructions at all times.
- Never touch the TIH L MB coil, core, yoke or workpiece during heating.
- During the heating process observe a safety distance of 1 m (3,3 ft) with the workpiece, the heater coil or the core.
- Use proper handling equipment when lifting heavy workpieces. Secure the workpiece with appropriate lifting and handling equipment while heating.
- Make sure the voltage supply is correct.
- Avoid contact with hot workpieces. Wear the supplied heat resistant gloves to handle hot workpieces.
- Never operate the TIH L MB with the cable of the remote control between the heater core.
- Never operate the TIH L MB without a yoke in position.
- Electrical arcing may occur when a potential difference exists between the TIH L MB and the workpiece. This is not dangerous to human beings and will not cause damage to the TIH L MB or the workpiece. However, the TIH L MB must never be used in areas where there is a risk of explosion.
- Ensure the yoke is applied with the ground faces pointing downward, and in proper contact with the core uprights.
- Do not modify the TIH L MB.
- The TIH L MB must not be exposed to condensing humidity or direct contact with water.



## 1. Introduction

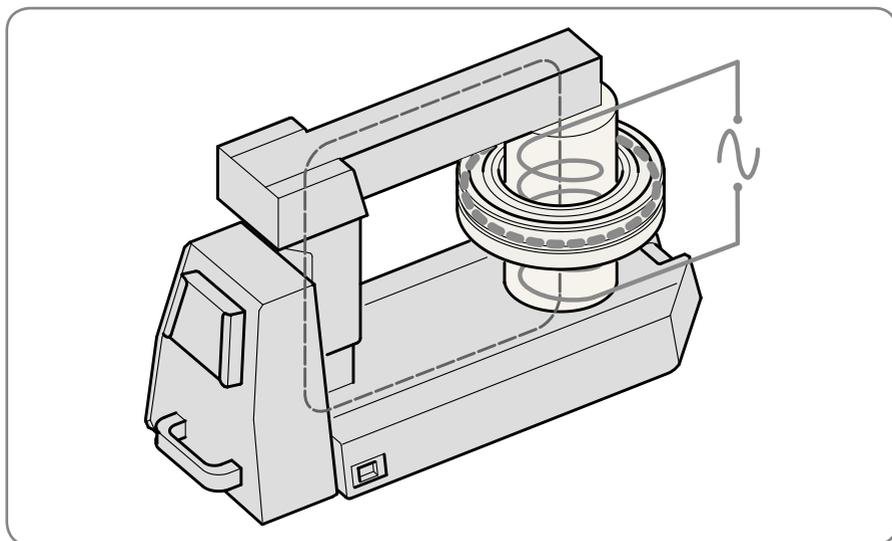
The SKF TIH L MB induction heaters are designed to heat work pieces others than bearings such as gears, couplings, bushings, pulleys, etc. The heat causes the workpiece to expand, which eliminates the need to use force during installation. A 90 °C (162 °F) temperature difference between the workpiece and shaft is generally sufficient to enable installation. At an ambient temperature of 20 °C (68 °F), the workpiece must therefore be heated to 110 °C (230 °F).

### 1.1 Intended use

The TIH L MB has been designed to heat metal workpieces that form a closed circuit. Examples of acceptable workpieces include housings, bushings, shrink rings, pulleys, and gears. All workpieces that fit over the yoke and between the induction coils can be heated using the TIH L MB. In addition, other workpiece can also be placed over the outermost induction coil. See the illustrations at the beginning of this manual for examples.

### 1.2 Principle of operation

The principle of operation of the TIH L MB can be compared to a transformer. The high voltage, low electrical current flowing through a large number of windings in the TIH L MB's induction coils 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 features

- **Inductive coil**  
When heated the workpiece is located at the same position on the core as the inductive coil. This design improves efficiency, resulting less power consumption and faster heating which reduces the costs to heat each workpiece.
- **High efficiency**  
With its advance power electronics and induction coils design, the TIH L MB has a low power consumption which represents a high energy savings.
- **Remote control panel**  
To improve the ease of use and to help reduce the risk of contact with the hot workpiece during operation, the TIH L MB heater is supplied with a remote control panel which can be detached from the heater.
- **Sliding yoke**  
To facilitate the handling of the yoke while placing the workpiece around it or around the induction coil, the TIH L MB is fitted with a sliding arrangement for the yoke. See the illustrations at the beginning of this manual.
- **Folding workpiece supports**  
To support large workpiece when positioned horizontally around the induction coil, the TIH L MB induction heater is provided with two supports.  
See the illustrations at the beginning of this manual.

## 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 workpiece in TEMP MODE or set the length of time that the workpiece will be heated in TIME MODE. The power level can be adjusted to 100% or 50% for slower heating of sensitive workpieces (for example, materials like aluminum or brass).

### 2.1 Components

The TIH L MB induction heater contains a U-shaped iron core with one induction coil. Workpiece supports are delivered to be mounted on the heater. A detachable remote control panel is included. The remote control electronics and the internal electronics, control the operation of the heater. A sliding yoke allows the workpiece to be placed onto the heater. A temperature probe is included with the heater. Heat-resistant gloves are also included.

| Designations type |             |   |   |    |
|-------------------|-------------|---|---|----|
| TIH L             | 3           | 3 | MB /  | LV |
| TIH L             | 3           | 3 | MB /  | MV |
| TIH L             | 4           | 4 | MB /  | LV |
| TIH L             | 4           | 4 | MB /  | MV |
| TIH L             | 7           | 7 | MB /  | LV |
| TIH L             | 7           | 7 | MB /  | MV |
| Operating area    |             |   | Voltage   |    |
| Width (dm)        | Height (dm) |   | LV: 200-240 V (Low Voltage)<br>MV: 400-460 V (Medium Voltage) |    |

| Technical data                                       |   |
|--|---|
| Voltage ( $\pm 10\%$ )                               | MV: 400-460V / 50-60Hz<br>LV: 200-240V/50-60Hz  |
| Recommended line protection                          | TIH L33/MV: 32 A and TIH L33/LV: 63 A<br>50 A fuse rating for TIH L44 and TIH L77 MV execution<br>100 A fuse rating for TIH L44 and TIH L77 LV execution  |
| Power consumption (maximum)                          | TIH L33: MV & LV: 15 kVA<br>TIH L44 & TIH L77: MV: 20,0-23,0 kVA, LV: 20,0-24,0kVA  |
| Temperature control                                  | 0-250 °C (32-482 °F); in steps of 1°  |
| Probe type   | thermocouple, K type  |
| Probe maximum temperature                            | 250 °C (482 °F)   |
| Time mode  | 0-99,9 minutes; in steps of 0,1 minute<br>100-120 minutes; in steps of 1 minute   |
| Power range  | 100% - 50%  |
| Demagnetisation                                      | automatic; residual magnetism <2A/cm  |
| Overall dimensions with bearing supports (w x d x h) | TIH L 33 MB:<br>Exc. legs 400 x 743 x 550 mm (15.75 x 29.25 x 21.65 in.)<br>Inc. legs 795 x 1 123 x 550 mm (31.3 x 44.21 x 21.65 in.)<br>TIH L 44 MB:<br>Exc. legs 1 200 x 600 x 850 mm (47.3 x 23.6 x 33.5 in.)<br>Inc. legs 1 550 x 1 330 x 850 mm (61 x 52.4 x 33.5 in.)<br>TIH L 77 MB:<br>Exc. legs 1 320 x 600 x 1 150 mm (52 x 23.6 x 45.3 in.)<br>Inc. legs 1 850 x 1 330 x 1 150 mm (72.8 x 52.4 x 45.3 in.) |

|  |   |
|--|---|
| Area between supports (width × height) | TIH L 33 MB: 330 × 320 mm (13 × 12.6 in.)<br>TIH L 44 MB: 465 × 492 mm (18.31 × 19.4 in.)<br>TIH L 77 MB: 765 × 792 mm (30.1 × 31.2 in.)  |
| Coils diameter                         | TIH L 33 MB: 150 mm (5.9 in.)<br>for minimum workpiece bore diameter of 160 mm (6.3 in.)<br>TIH L 44 MB & TIH L77 MB: 175 mm (6.9 in.)<br>for minimum workpiece bore diameter of 185 mm (7.3 in.)               |
| Weight with bearing supports           | TIH L 33 MB: 140 kg (309 lb)<br>TIH L 44 MB: 324 kg (714 lb)<br>TIH L 77 MB: 415 kg (914 lb)  |
| Workpiece maximum weight               | Bearing TIH L 33 MB: 700 kg (1 543 lb)<br>Bearing TIH L 44 MB & TIH L 77 MB: 1 200 kg (2 600 lb)<br>Solid component: consult SKF  |
| Maximum heating temperature            | approx. 400 °C (752 °F)   |
| Standard yoke cross section            | TIH L 33 MB: 80 × 80 mm (3.15 × 3.15 in.)<br>for minimum workpiece diameter of 115 mm (4.5 in.)<br>TIH L 44 MB & TIH L77 MB: 100 × 100 mm (3.9 × 3.9 in.)<br>for minimum workpiece diameter of 150 mm (5.9 in.) |

### 3. Installation of mains plug

A qualified electrician must install a suitable mains plug. The correct supply voltage is shown in the designations in section 2.2.

The wires should be connected as follows:

TIH Lxx MB/MV, TIH Lxx MB/LV with 200V-3 phases, and all other three phases supply execution

| Colour of TIH Lxx MB/MV wire | Mains supply terminal |
|------------------------------|-----------------------|
| yellow / green               | ground                |
| blue                         | phase 1               |
| brown                        | phase 2               |

Connect the TIH L MB to only two of the three phases.

TIH Lxx MB/LV with single phase supply

| Colour of TIH Lxx MB/LV | Mains supply terminal |
|-------------------------|-----------------------|
| yellow / green          | ground                |
| blue                    | neutral               |
| brown                   | phase                 |

### 4. Preparation for use

- Place the TIH L MB in the horizontal position on a stable surface.
- Assemble the workpiece support with the supplied bolts.
- Connect the mains plug to a suitable mains supply.
- Plug the remote control into the connector on the heater electrical cabinet.
- Slide the sliding yoke in open position. See the illustrations at the beginning of this manual.
- For workpieces heated over the sliding yoke, follow these steps:
  - Lift the workpiece over the heater operating area using appropriate lifting equipment.
  - Slide the yoke through the workpiece bore diameter.
  - Close the sliding yoke so that it completely covers the top of both vertical supports
- For workpieces heated around the induction coil, follow these steps:
  - Place the workpiece over the induction coil using appropriate lifting equipment.
  - For best performance, adjust the position of the workpiece so that the induction coil is in the centre.
  - Close the sliding yoke so that it completely covers the top of both vertical supports.
- If you will use TEMP MODE, plug the temperature probe into its socket on the heater electrical cabinet. Place the magnetic end of the probe on the innermost surface of the workpiece.
- Switch on the TIH L MB with the main switch of the heater electrical cabinet
- Observe the self-test of the remote control display and signal tone.

## 5. Operation

### 5.1 Function of displays

- The remote control display shows the selected time or temperature for heating.
- The power LED's show the selected power setting.



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

### 5.2 Function of buttons

| Button       | Function   |
|--------------|--|
| POWER        | Press to adjust the power. The selected power is indicated with an LED   |
| MODE         | Press to switch between TIME MODE and TEMP MODE  |
| UP (+)       | Press to increase the value shown on the remote control display  |
| DOWN (-)     | Press to decrease the value shown on the remote control 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 remote control display shows 't', press MODE to select TEMP MODE. The remote control display shows °C or °F in TEMP MODE.
- The selected temperature is shown on the remote control display. The default temperature 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 workpieces to temperatures above 110 °C (230 °F) for increased mounting time. Consult the workpiece specifications to determine the maximum permitted temperature.
- If needed, 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 as close to the bore as possible.
- Press START / STOP to start the heater. The remote control display shows the current temperature of the workpiece.
- During heating the selected temperature can be displayed for 1 second by pressing MODE.
- 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 cancel the acoustic signal and 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 TIH L MB is now ready to heat another workpiece with the same settings.

## 5.4 TIME MODE

- If the remote control display shows °C or °F, press MODE to select TIME MODE. The remote control display shows 't' in TIME MODE.
- Press UP or DOWN to adjust the time in steps of 0,1 minute (up to 99,9 minutes) and 1 minute (100 - 120 minutes).
- 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 remote control display shows the time that remains.
- During heating, the temperature measured by the probe can be displayed for a couple of seconds by pressing MODE.
- 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 TIH L MB 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 TIH L MB for demagnetisation only, select TIME MODE and set the time to 0,1 minute (6 seconds).

## 5.8 Power level selection

When heating workpieces with an induction heater, the most of the heat will be generated in the bore and then transferred through the workpiece. Slow heating ensures that the workpiece expands more evenly, thereby preventing damage. The large variety of workpieces precludes the possibility of providing a specific power level setting for each type. Instead, the following guidelines are provided:

- For sensitive workpieces, with a combination of different materials (such as aluminum, brass), do not exceed 50% power.
- When using accessory smaller yoke, never exceed 50% power.

## 6. Safety features

The TIH L MB is equipped with the following safety features:

- Automatic overheating protection.
- Automatic current control.
- Over-current circuit breaker.
- In the TEMP MODE the heater will switch off if the temperature probe does not register a temperature increase of 1 °C (1.8 °F) every 1 minute (1.00 minute). To increase the interval to 2 minutes (2.00 minute), press MODE and DOWN at the same time.
- Flashing warning light indicates ongoing heating process in the heaters TIH L44MB and TIH L77MB.

## 7. Troubleshooting

| Display | Fault   | Action  |
|---------|---|---|
| E03E    | Overheated coil   | Wait until the induction coil cools. Switch the heater OFF and then back ON   |
| E05E    | Temperature increase of less than 1 °C (1.8 °F) every 1 minute (or every 2 minutes) | Check the temperature probe connection. If the connection is OK, select the 2 minutes interval as described in section 6 or operate the heater in TIME MODE |
| E06E    | Temperature probe not connected (or defective) or excessive temperature drop        | Check the temperature probe   |
| E10E    | Electronics communication problem   | Switch the heater OFF and then back ON. If problem remains return the TIH to SKF for repair   |
| E11E    | Electronics communication problem   | Switch the heater OFF and then back ON. If problem remains return the TIH to SKF for repair   |
| E12E    | Electronics communication problem   | Switch the heater OFF and then back ON. If problem remains return the TIH to SKF for repair   |

| Designation | Description   |
|-------------|---|
| TIH L33-PMV | Power print 400-460V, 50-60 Hz  |
| TIH L33-PLV | Power print 200-240V, 50-60 Hz  |
| TIH L33-Y12 | Yoke 80 × 80 mm (3.15 × 3.15 in.) cross section, complete with sliding rails for TIH L33 heater type        |
| TIH L33-Y8  | Yoke 55 × 55 mm (2.17 × 2.17 in.) cross section (not included)  |
| TIH L33-Y6  | Yoke 40 × 40 mm (1.57 × 1.57 in.) cross section (not included)  |
| TIH RC3     | Remote control for TIH L33 type   |
| TIH L-PMV   | Power print 400-460V, 50-60 Hz  |
| TIH L-PLV   | Power print 200-240V, 50-60 Hz  |
| TIH L44-Y15 | Yoke 100 × 100 mm (3.9 × 3.9 in.) cross section, complete with sliding rails for TIH L44 heater type        |
| TIH L44-Y10 | Yoke 70 × 70 mm (2.7 × 2.7 in.) cross section, complete with handles for TIH L44 heater type (not included) |
| TIH L77-Y15 | Yoke 100 × 100mm (3.9 × 3.9 in.) cross section, complete with sliding rails for TIH L77 heater type         |
| TIH CP      | Control print   |
| TIH RC2     | Remote control for TIH L44 & TIH L77 type   |
| TIH CB50A   | Circuit breaker 50A for TIH L44/MV and L77/MV   |
| TIH CB100A  | Circuit breaker 100A for TIH L44/LV and L77/LV  |
| TIH CB32A   | Circuit breaker 32A for TIH L33/MV  |
| TIH CB63A   | Circuit breaker 63A for TIH L33/LV  |
| TIH P20     | Temperature probe K type incl. cable and plug   |

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