

# LINMAST

**Induction Heaters**



## INSTRUCTION MANUAL

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## **SAFETY INSTRUCTIONS**

**Please read the following before use.**

Before using this machine, basic safety precautions should always be followed.

### **DANGER!**

To reduce the risk of electric shock:

- Heater should be disconnected when not in use.
- Always unplug heater from the outlet before cleaning.
- Ensure the core arm is closed before beginning to heat.
- Check the supply voltage is correct.
- Intended use of this equipment is for industrial applications

### **WARNING!**

To reduce the risk of burns or injury:

- Personnel fitted with pacemakers must not operate the heater or stand within a 5m (16ft) proximity to the heater when it is in use. Wristwatches may also be affected.
- Wear suitable protection when handling the heated product.
- Use proper handling equipment when lifting heavy workpieces.
- Use only attachments recommended by the manufacturer.
- **DO NOT** use the machine for any purpose other than which it was originally intended.
- **DO NOT** operate the heater if found to have:
  - A damaged cord
  - Does not work properly
  - Has been dropped or damaged

## OPERATING INSTRUCTIONS



**LBH45D**



**LBH70D**



**LBH90D**



**LBH100D**



**LBH120D**



**LBH160D**

1. Apply power to the heater. All heaters are fitted with circuit breakers with the switch is located at the right hand side of the unit for the LBH45D and LBH70 and at the rear for all other models. The display will go through the introductory procedure;

**LINMAST....LIFT ARM....MOUNT PRODUCT....CLOSE ARM....FIT SENSOR**

then display “SET 110°C” or “SET 230°F”, which is the preset temperature.

2. Raise the hinged arm on LBH45D, LBH70D, LBH90D & LBH100D and place the bearing on the table with the vertical core passing through its centre. On the LBH120D & LBH160D) open the top arm by sliding the left-hand end of the top arm towards the rear of the unit. The top arm will lift as it moves away from the core
3. Close hinged arm on to the vertical core. On the LBH120D & LBH160D the top arm will lower as it approaches the vertical core.
4. Plug in sensor and place the temperature probe onto the inner ring of the bearing or work-piece. The sensor socket is located at the right hand side

of the unit for the LBH45D and LBH70D. For all other models it is located at the rear of the keypad enclosure.

5. The menu defaults settings are set to the following parameters:

Parameter	Default Value
Power Level	High
Temp/Time Mode	Temp
Temperature Units	° C
Preset Time	110°C
Temperature Hold	Off

6. OPERATION

- a) Press the START/STOP button – the heating cycle will start and the LCD display will show “RAMP UP” for approximately 10 seconds.
- b) The bearing is now heating and will automatically stop when the set temperature or time is reached. During heating, the display will show “TRUE \*\*\*°C” or “TRUE \*\*\*°F” in “TEMP” mode, which indicates the actual workpiece temperature.

Alternatively, the display shows the decaying time to completion of heating cycle in the “TIME” mode.

- c) When the set temperature is reached, demagnetising will occur automatically, as indicated by the word “DEMAGNETISING” on the LCD display. Demagnetisation will not occur if the power is interrupted or the unit is switch off during the heating cycle.
- d) A alarm will sound after demagnetising and set temperature will be displayed in the “TEMP” mode or set time will be displayed in the “TIME” mode to indicate the cycle is complete and the bearing is ready for fitting.
- e) If the “TEMP HOLD” is ON, the power to the unit will cycle low and then high, but always a small holding current. This power will change as required to maintain the temperature within the temperature hysteresis value set (default is  $\pm 3^{\circ}\text{C}$ ).
  - To stop the alarm when the “TEMP HOLD” cycle begins press the START/STOP button once.

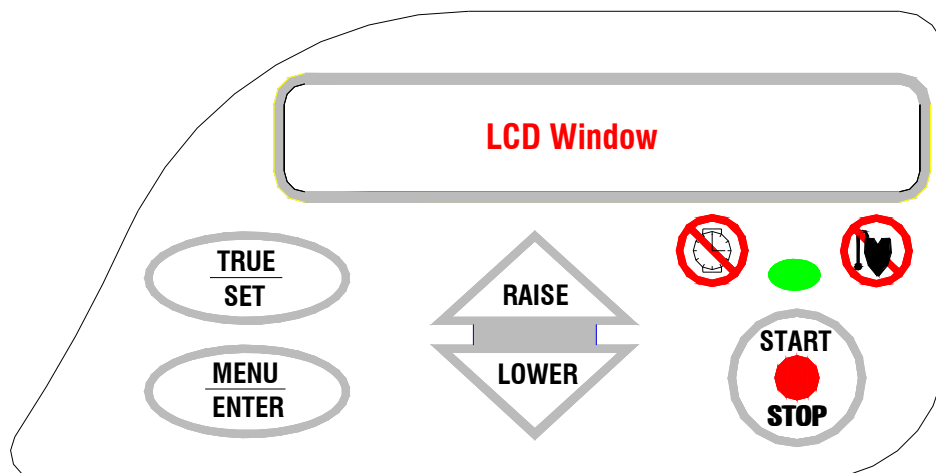
- To stop the “TEMP HOLD” cycle press the START/STOP button twice.
7. Remove the temperature probe and place it on the opposite vertical core.
  8. Open arm, remove the bearing and fit as soon as possible.

**WARNING!** Ensure adequate protection (thermal gloves) is worn when removing the hot bearing.

9. Lower arm and switch off power if no further bearings are to be heated.

**Note:** When fitting small bearings open arm, place small crossbar through the bearing, then place across the two vertical legs. Proceed from step 5 above

### KEYPAD



## LINMAST INDUCTION HEATER OPERATIONAL STEPS



### Step 1

- a) Open Core Arm
- b) Place Bearing on Heating Platform

### Step 2

- a) Close Core Arm
- b) Attach the Magnetic Temperature Sensor to Bearing Inner Race
- c) Press 'Start' and heating begins



### Step 3

- a) When set temperature is reached Automatic Demagnetisation will occur and an Audio Alarm will sound
- b) Lift Core Arm.

### Step 4

- a) Place Magnetic Temperature Sensor on opposite pole
- b) Use the Thermal Gloves provided to remove bearing from platform



### Heating Small Bearings using Cross Bar

- a) Open Core Arm
- b) Place Cross Bar through Bearing
- c) Place Cross on Vertical poles
- d) Place Magnetic Temperature Sensor on Bearing
- e) Press 'START' and heating begins

## MENU SELECTION

To access the Operator's Menu, press and hold down for 3 seconds the MENU/ENTER button, then release. Press the MENU/ENTER button to scroll to the next operation mode and the RAISE or LOWER buttons to change the operation mode setting.

The last menu setting remains stored when the unit power is turned off.

a) Power Level Mode:

There are three (3) selection of power level –High, Medium and Low. The factory default setting is HIGH. Lower power levels are selected when heating time is too quick, which occurs when heating copper or aluminium products. For example bearings with a brass cage or with small internal clearances a medium power level should be used, providing a slower heat hence the bearing expanding more evenly.

b) Temperature/Time Mode:

There are two (2) selections of operation mode, ie TEMPERATURE or TIME. The Temperature mode is the default setting.

In the “TEMP” mode (default setting) the bearing will stop heating at the set temperature. The temperature probe must be connected in this mode.

The recommended bearing manufacturers heating temperature is shown on the display as a default , ie “SET 110°C” or “SET 230°F”

OR

select a different temperature by pressing the arrow buttons

OR

set a different preset value by selecting the MENU button and scroll to “PRESET TEMP” using the raise and lower buttons.

The menu option in the “TEMP” (Temperature) mode are as follows: (Also see Table 3)



- c) Preset Temperature:  
The preset temperature allows you to set a heating temperature required. Use the RAISE or LOWER buttons to adjust. Each increment is one degree Celsius or Fahrenheit depending on the units selected.
- d) Temperature Units:  
A temperature units °Celsius or °Fahrenheit is selected by pressing the RAISE or LOWER buttons.
- e) Temperature Hold:  
Maintains the temperature at the end of the cycle for a period of 30 minutes (this time can be adjusted in the manufacturer's master menu, if required). The option "ON" engages the Temperature Hold function and "OFF" (default setting) disengages the Temperature Hold function. Selection is made by the RAISE and LOWER buttons.
- f) Time Mode:  
In the "TIME" mode the heating time in minutes can be set either in the menu option or by the RAISE and LOWER buttons from the heater's idle state. The temperature probe does not need to be fitted in this mode.

Select a different temperature by pressing the arrow buttons.

OR

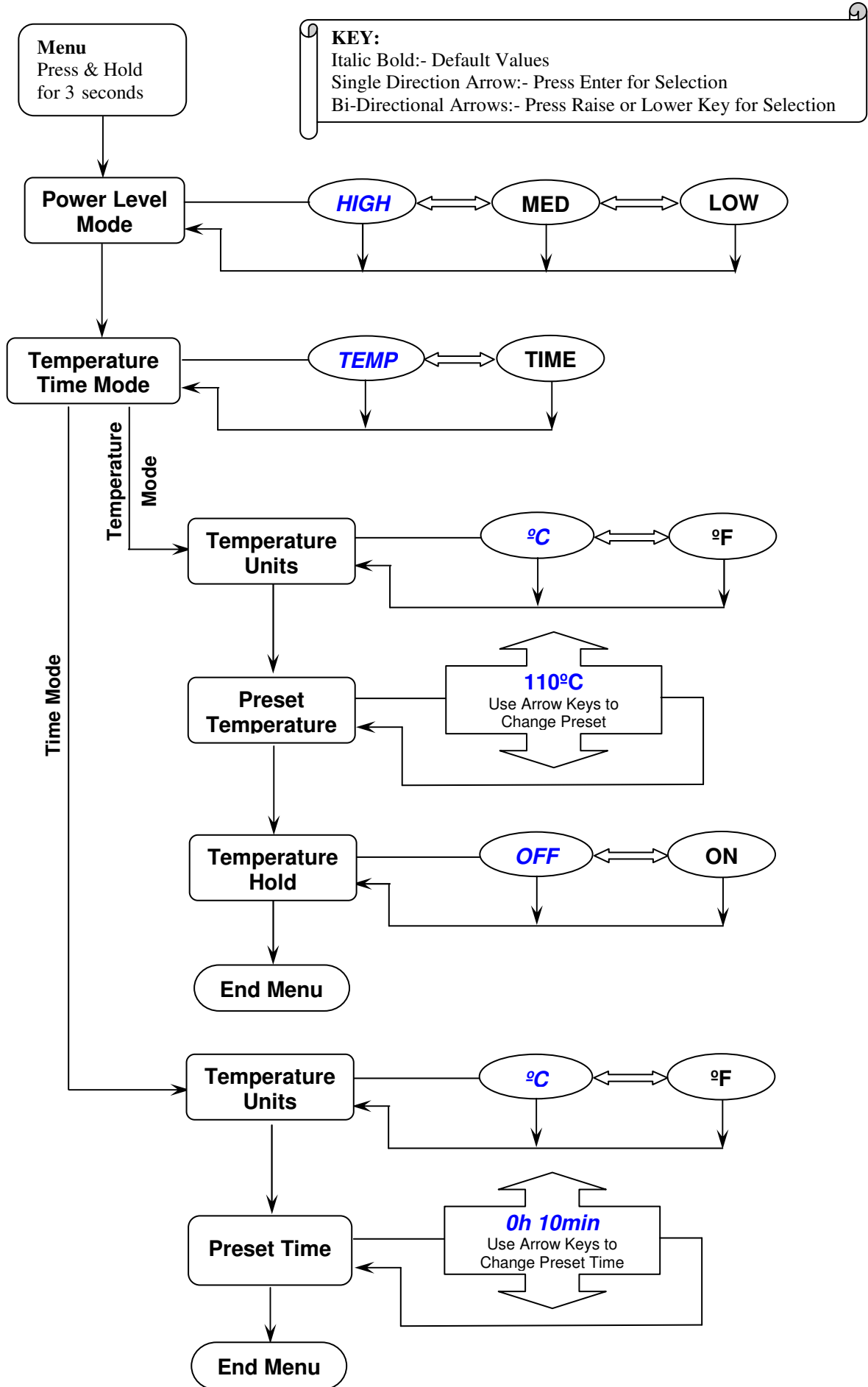
Set a different preset time by selecting the MENU button and scroll to "PRESET TEMP/TIME" and using the raise and lower buttons set to "TIME".

Press MENU again to select the "PRESET TIME". The preset time is adjusted by the RAISE or LOWER arrow buttons. For a time set above 10 minutes - each increment is a value of one minute. For a time set below 10 minutes – each increment is 10 seconds.

The temperature sensor can be used to measure the temperature of the product being heated in this mode by pressing the TRUE/SET button.

**WARNING!** It is not recommend to use the "TIME" mode for heating bearings since different temperature ambient condition may result in a bearing temperature higher than desired.

## OPERATOR'S MENU FLOWCHART



## MENU SETTINGS

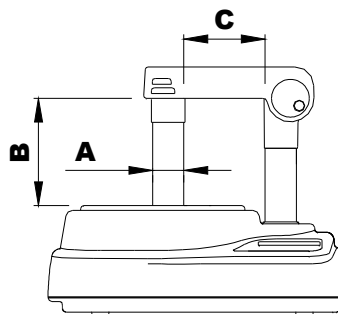
The operators menu settings is accessed by pressing the MENU/ENTER button on the keypad and holding down for 3 seconds. The options available are shown in Table 3 below.

**TABLE 3.1 – Operator’s Menu in Temperature Mode**

MODE	DEFAULT SETTINGS	COMMENTS
POWER LVL	HIGH	Selection for HIGH, MED or LOW power Levels.  <i>For low powers levels the input power is reduced to increase the heating time.</i>
TEMP /TIME	TEMP	Selection of Temperature or Time operation mode.
PRESET TEMP	110°C or 230°F	Preset Temperature – Increments of 1°C (or 1°F).  <i>This menu sets the preset temperature value used by the unit during normal run, when the preset key is activated. The maximum set temperature is 250°C or 450°F.</i>
TEMPERATURE	°C or °F	<i>Selection of temperature measurement units, ie degree Celsius or degree Fahrenheit.</i>
TEMP HOLD	OFF	The temperature hold options are “OFF” or “ON”.  <i>“OFF” - disengages the “TEMP HOLD” option, so at the end of the heating cycle the unit will automatically demagnetise the workpiece then stop.</i>  <i>“ON” – engages the “TEMP HOLD” option ,so at the end of the heating cycle the unit will automatically maintain the set temperature for a period up to 30 minutes.</i>

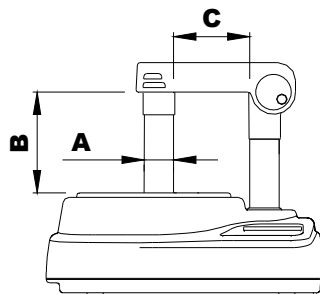
**Table 3.2 - Operator’s Menu in Time Mode**

MODE	DEFAULT SETTINGS	COMMENTS
POWER LVL	HIGH	Selection for HIGH, MED or LOW power Levels.  <i>For low powers levels the input power is reduced to increase the heating time.</i>
TEMP /TIME	TIME	Selection of Temperature or Time operation mode.
TEMPERATURE	°C or °F	<i>Selection of temperature measurement units, ie degree Celsius or degree Fahrenheit.</i>
PRESET	10 seconds	Preset Time – Increments of 1 minute or 10 seconds.  <i>This menu sets the preset time value used by the unit during normal run, when the preset key is activated. Time set above 10 minutes increments by 1 minute &amp; time set below 10 minutes increments by 10 seconds.</i>



**TABLE 1 - PRODUCT TABLE**  
**Metric Dimension (for 50Hz)**

MODEL	LBH45D	LBH70D	LBH90D	LBH100D	LBH120D	LBH160D
<b>Capacity</b>	1 kVA	3.6 kVA	3.6 kVA	8.5 kVA	12.5 kVA	25 kVA
<b>Duty</b>	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
<b>Voltage</b>	220/240 V	220/240 V	220/240 V	380/415 V	380/415 V	380/415 V
<b>Frequency</b>	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz	50 Hz
<b>Max. Temperature</b>	250 °C	250 °C	250 °C	250 °C	250 °C	250 °C
<b>Core Dimensions (A)</b>	30 x 30 mm	50 x 50 mm	60 x 60mm	60 x 60mm Coil Dia. 119mm	80 x 80 mm Coil Dia. 157mm	100 x 100mm Coils Dia. 190mm
<b>Cross Bars</b>	15 x 15mm (22φ)	15 x 15 mm (22φ) 25 x 25 mm (36φ)	20 x 20 mm (29φ) 30 x 30 mm (44φ)	20 x 20 mm (29φ) 30 x 30 mm (44φ)	40 x 40 mm (56φ) 60 x 60mm (86φ)	80 x 80 mm (117φ)
<b>Pole Height (B)</b>	80 mm	120 mm	185 mm	185 mm	270 mm	325 mm
<b>Pole Separation (C)</b>	65 mm	115 mm	200 mm	170 mm	260 mm	350 mm
<b>Efficient Heat Limit</b>	10kg	40 kg	70 kg	120 kg	300 kg	800 kg
<b>Unit Weight (Bench/Trolley Model)</b>	8 kg	23 kg	50 kg	52 / 58 kg	120 / 150 kg	330 / 350 kg
<b>Unit Dimensions Bench Model (l x w x h) mm</b>	310 x 210 x 230	420 x 300 x 310	650 x 360 x 420	650 x 360 x 420	860 x 400 x 580	1110 x 500 x 720
<b>Unit Dimensions Trolley Model (l x w x h) mm</b>	-	-	1000 x 450 x 1180	1000 x 450 x 1180	800 x 420 x 1040	1110 x 500 x 880



**TABLE 2 - PRODUCT TABLE**  
**Imperial Dimensions (for 60Hz)**

MODEL	LBH45DA	LBH70DAL	LBH70DA	LBH90DA	LBH100DA	LBH120DA	LBH160DA
<b>Capacity</b>	1 kVA	2.2 kVA	3.6 kVA	3.6 kVA	8.5 kVA	12.5 kVA	25 kVA
<b>Duty</b>	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous	Continuous
<b>Voltage</b>	110V	110V	220V	220V	440/460 V	440/460 V	440/460 V
<b>Frequency</b>	60 Hz	60 Hz	60 Hz	60 Hz	60 Hz	60 Hz	60 Hz
<b>Max. Temperature</b>	480 °F	480 °F	480 °F	480 °F	480 °F	480 °F	480 °F
<b>Core Dimensions (A)</b>	1 <sup>3</sup> / <sub>16</sub> " x 1 <sup>3</sup> / <sub>16</sub> "	2" x 2"	2" x 2"	2 <sup>3</sup> / <sub>8</sub> " x 2 <sup>3</sup> / <sub>8</sub> "	2 <sup>3</sup> / <sub>8</sub> " x 2 <sup>3</sup> / <sub>8</sub> " Coil Dia 4 <sup>11</sup> / <sub>16</sub> "	3 <sup>1</sup> / <sub>8</sub> " x 3 <sup>1</sup> / <sub>8</sub> " Coil Dia 6 <sup>3</sup> / <sub>16</sub> "	3 <sup>15</sup> / <sub>16</sub> " x 3 <sup>15</sup> / <sub>16</sub> " Coils Dia. 7 <sup>1</sup> / <sub>2</sub> "
<b>Cross Bars</b>	9 <sup>9</sup> / <sub>16</sub> " x 9 <sup>9</sup> / <sub>16</sub> "	9 <sup>9</sup> / <sub>16</sub> " x 9 <sup>9</sup> / <sub>16</sub> " 1" x 1"	9 <sup>9</sup> / <sub>16</sub> " x 9 <sup>9</sup> / <sub>16</sub> " 1" x 1"	1 <sup>13</sup> / <sub>16</sub> " x 1 <sup>13</sup> / <sub>16</sub> " 1 <sup>3</sup> / <sub>16</sub> " x 1 <sup>3</sup> / <sub>16</sub> "	1 <sup>13</sup> / <sub>16</sub> " x 1 <sup>13</sup> / <sub>16</sub> " 1 <sup>3</sup> / <sub>16</sub> " x 1 <sup>3</sup> / <sub>16</sub> "	1 <sup>9</sup> / <sub>16</sub> " x 1 <sup>9</sup> / <sub>16</sub> " 2 <sup>3</sup> / <sub>8</sub> " x 2 <sup>3</sup> / <sub>8</sub> "	3 <sup>1</sup> / <sub>8</sub> " x 3 <sup>1</sup> / <sub>8</sub> "
<b>Pole Height (B)</b>	3 <sup>3</sup> / <sub>16</sub> "	4 <sup>3</sup> / <sub>4</sub> "	4 <sup>3</sup> / <sub>4</sub> "	7 <sup>1</sup> / <sub>2</sub> "	7 <sup>1</sup> / <sub>4</sub> "	10 <sup>5</sup> / <sub>8</sub> "	12 <sup>3</sup> / <sub>4</sub> "
<b>Pole Separation (C)</b>	2 <sup>9</sup> / <sub>16</sub> "	4 <sup>1</sup> / <sub>2</sub> "	4 <sup>3</sup> / <sub>4</sub> "	7 <sup>7</sup> / <sub>8</sub> "	6 <sup>11</sup> / <sub>16</sub> "	10 <sup>1</sup> / <sub>4</sub> "	13 <sup>3</sup> / <sub>4</sub> "
<b>Efficient Heat Limit</b>	22 lbs	90 lbs.	90 lbs.	200 lbs.	265 lbs.	660 lbs.	1760 lbs.
<b>Unit Weight (Bench/Trolley Model)</b>	18 lbs.	50 lbs.	50 lbs.	110 lbs.	115 / 128 lbs.	264 / 330 lbs.	726 / 770 lbs.
<b>Unit Dimensions Bench Model (l x w x h) mm</b>	12 <sup>1</sup> / <sub>4</sub> " x 8 <sup>1</sup> / <sub>4</sub> " x 9"	16.5" x 11 <sup>7</sup> / <sub>8</sub> " x 12 <sup>1</sup> / <sub>4</sub> "	16.5" x 11 <sup>7</sup> / <sub>8</sub> " x 12 <sup>1</sup> / <sub>4</sub> "	25 <sup>1</sup> / <sub>2</sub> " x 14 <sup>3</sup> / <sub>16</sub> " x 16 <sup>1</sup> / <sub>2</sub> "	25 <sup>1</sup> / <sub>2</sub> " x 14 <sup>3</sup> / <sub>16</sub> " x 16 <sup>1</sup> / <sub>2</sub> "	33 <sup>7</sup> / <sub>8</sub> " x 15 <sup>3</sup> / <sub>4</sub> " x 22 <sup>13</sup> / <sub>16</sub> "	43 <sup>3</sup> / <sub>4</sub> " x 19 <sup>11</sup> / <sub>16</sub> " x 28 <sup>3</sup> / <sub>8</sub> "
<b>Unit Dimensions Trolley Model (l x w x h) mm</b>	-	-	-	39 <sup>3</sup> / <sub>8</sub> " x 17 <sup>3</sup> / <sub>4</sub> " x 46 <sup>1</sup> / <sub>2</sub> "	39 <sup>3</sup> / <sub>8</sub> " x 17 <sup>3</sup> / <sub>4</sub> " x 46 <sup>1</sup> / <sub>2</sub> "	33 <sup>7</sup> / <sub>8</sub> " x 15 <sup>3</sup> / <sub>4</sub> " x 41"	43 <sup>3</sup> / <sub>4</sub> " x 19 <sup>11</sup> / <sub>16</sub> " x 34 <sup>5</sup> / <sub>8</sub> "

## **MAINTENANCE**

There are a number of checks that may be done to ensure the long life of your Linmast Induction Bearing Heater. These include:

- Periodically checking the mains cable for defects
- Periodically checking the sensor for defects
- Checking all functions for normal operation
- Ensure bearing rests are always clean before heating bearings (lubricate with silicone grease or petroleum jelly)
- Check the top of the core for deformation

## **SAFETY FEATURES**

All Linmast Induction Heaters are equipped with the following safety features:

- Overcurrent protection (by fuse of the LBH45D and circuit breaker on all other units)
- Thermal protection on the main excitation coil.
- Low temperature rise cut-out, ie the heating cycle will terminate if the temperature rise does not increase by 2°C every 5 minutes.
- All units are hinged or swivel top arm for opening.
- Heat resistant gloves supplied.

## **CALIBRATION**

Linmast Induction Heater is factory calibrated with the temperature sensor fitted, allowing for errors due to surface measurements. The accuracy of measurement at 110°C is  $\pm 2^\circ\text{C}$ .

**TABLE 5 - SPARE PARTS & ACCESSORIES**

	<b>LBH45D</b>	<b>LBH70D</b>	<b>LBH90D</b>	<b>LBH100D</b>	<b>LBH120D</b>	<b>LBH160D</b>
<b>Temperature Sensor</b>	TS045D	TS070D	TS090D	TS090D	TS120D	TS160D
<b>Mains lead</b>	ML45	N/A	N/A	N/A	N/A	N/A
<b>Small Cross Bar *</b>	CB45-10	CB70-15	CB90-20	CB90-20	CB120-40	CB160-80
<b>Medium top bar</b>	N/A	CB70-25	CB90-30	CB90-30	CB120-60	N/A
<b>Gloves</b>	GL240	GL240	GL415	GL415	GL415	GL415
<b>Protective Case</b>	PC045	PC070	N/A	N/A	N/A	N/A

\* Other cross bar sizes are available on request.

## TABLE 6 - TROUBLESHOOTING

PROBLEM	CAUSE	REMEDY
Display does not register.	Check for blown fuse located in power inlet or Circuit breaker trip or Lead loose in connection.	Replace fuse or reset circuit breaker or check power lead.
Display shows E1 – Low Preset.	The temperature of the bearing is less than 3°C below the preset temperature.	Check the preset temperature
Display shows E2 – Probe Fault	There is a fault in the temperature probe or the probe is not connected.	Plug in probe or check for open circuit.
Display shows E3 – Slow Heat Rise	The temperature has risen less than 2°C in 5 minutes whilst the heater is running.	Check position of probe, which should be placed on the inner race of the bearing.
Display shows E4 – Coil Overheat	Coil thermal protection has operated.	Allow coil to cool.
Display shows E5 – T/H Overheat	Temperature continues to increase (above the set temperature plus 4 times the Temperature Hysteresis value) in the Temperature Hold mode due to holding current to high.	Contact manufacturer.
Noisy Operation	Pole seat is in poor condition, damaged or dirty.	Clean pole mating seats & apply a film of petroleum jelly to the surface or place a thin sheet of insulation between pole seat and top arm after cleaning, if pole is in poor condition.



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