TEIS Induction Module
4 cooking zones hob with TAP user interface
Introduction

- New development of a 3 zones or 4 zones Induction hob (for 3 zones the 140mm zone is not used)
- **TEIS** induction module = The **Electrolux Induction System**
- **TAP** touch user interface = **TEIS Application Project**
- Production start : February 2006
- Production begins in Rothenburg factory and will be displaced to Satumare factory later
Description

- 2 Induction modules, each one can provide a maximum power output of 3.6kW for 2 zones
- Key model is a 60cm independent induction hob
- Power function at each zone but time limited
- No boost functionality (automatic heating up)
- Fan with speed variation
- Factory programming / configuration will be necessary (no MACS bus communication)
- I/O user interface (up to 15 keys)
Technical Features

- Voltage: 220 – 240V AC, 50/60Hz
- Power: 2 x 1.8kW = 3.6kW
- Stand-by consumption <2W
- Timer (99min) for all zones, double 7-segm. Display
- Key lock / Child safety → 1 key
- Cooking levels: 9 steps + P, 7-seg. Display for each zone
- Acoustic signal: Beep for key and timer
- User interface: front right
Key Model

P=2800W for 8 min.
P=2800W for 5 min.

Pot detection:
140mm minimum 90mm
180mm minimum 110mm
210mm minimum 130mm
Pot Detection

Critical dimension is:

- Diameter of the pot bottom, not the outer diameter!

- For sandwich bottoms (e.g. ferromagnetic disc integrated in an aluminium pot bottom), the diameter of this disc is important
  → this diameter can be much smaller (e.g. some pots from Tefal)

Be Aware!!!
Pots and Pans

**Good for use:**
- Enamelled steel
- Aluminium with ferromagnetic bottom
- Stainless steel with ferromagnetic bottom
- Cast iron

**Don’t use!!!**
- Aluminium
- Copper
- Non-ferromagnetic stainless steel
- Glass
- Ceramic materials
The touch pad is glued directly to the glass ceramic and connected with a foil cable via connectors with the user interface.
The user interface is clipped into a plastic frame which is glued to the glass ceramic.
Touch Pad

- Touch pad
- Plastic frame for user interface
I/O User Interface

1: ON/OFF touch pad
2: Setting of cooking levels for zones
3: Booster/Power Function
4: Key lock/Child safety touch pad
5: Touch pad for timer select

A: ON/OFF indicator
B: Setting display
C: Display for timer
D: Indicator LED for zone of timer
User Interface With Touch Pad
Mechanical Concept

2 identical Induction modules with cooling fan
Induction Module
Cooling fan

Fan is driven by software, temperature is measured by a NTC sensor on heat sink

Variable speed

If temperature on heat sink about 50°C or cooking level > 0
→ fan ON at low speed

If temperature on heat sink increases
→ fan ON at higher speed

If heat sink cooled down below about 45°C and cooking level = 0
→ fan OFF
Hob Tray
Mechanical Concept
Mechanical Concept
Mechanical Concept
Mechanical Concept
Mechanical Concept And Layouts

- Glass ceramic
- 2 induction modules with cooling fan (1 spare part)
- Induction coils with temperature sensors
- Touch pad
- User interface
- Temperature sensor
- Temperature insulation
- Additional electrical insulation (1 part in future)
- 2 induction modules with temperature sensors
Opened Induction Hob
4 Induction Zones

Assembly marks
Temperature Sensor
## Cooking Levels

There are 9 cooking levels plus optional power function „P“.

<table>
<thead>
<tr>
<th>Display</th>
<th>Power Level</th>
<th>Ø 140mm</th>
<th>Ø 180mm</th>
<th>Ø 210mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.0%</td>
<td>42W</td>
<td>54W</td>
<td>66W</td>
</tr>
<tr>
<td>2</td>
<td>5.5%</td>
<td>77W</td>
<td>99W</td>
<td>121W</td>
</tr>
<tr>
<td>3</td>
<td>10.5%</td>
<td>147W</td>
<td>189W</td>
<td>231W</td>
</tr>
<tr>
<td>4</td>
<td>15.5%</td>
<td>217W</td>
<td>279W</td>
<td>341W</td>
</tr>
<tr>
<td>5</td>
<td>21.0%</td>
<td>294W</td>
<td>378W</td>
<td>462W</td>
</tr>
<tr>
<td>6</td>
<td>31.0%</td>
<td>434W</td>
<td>558W</td>
<td>682W</td>
</tr>
<tr>
<td>7</td>
<td>45.0%</td>
<td>630W</td>
<td>810W</td>
<td>990W</td>
</tr>
<tr>
<td>8</td>
<td>64.0%</td>
<td>896W</td>
<td>1152W</td>
<td>1408W</td>
</tr>
<tr>
<td>9</td>
<td>100.0%</td>
<td>1400W</td>
<td>1800W</td>
<td>2200W</td>
</tr>
<tr>
<td>P</td>
<td></td>
<td>2800W</td>
<td>2800W</td>
<td></td>
</tr>
</tbody>
</table>
Power Control

... induction cooking zone
Power Control

... for conventional cooking zone

Time

Power

100 %

64 %

45 %

25 %

mean power

ON OFF
Time-controlled Safety Switch-off

<table>
<thead>
<tr>
<th>Power level</th>
<th>Switch-off after</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 2.</td>
<td>6 hours</td>
</tr>
<tr>
<td>3 - 4</td>
<td>5 hours</td>
</tr>
<tr>
<td>4 - 5.</td>
<td>4 hours</td>
</tr>
<tr>
<td>6 - 9</td>
<td>1.5 hours</td>
</tr>
</tbody>
</table>
1. Switch on the hob
2. Touch the child lock pad (4) for 3 seconds
3. Touch any “+” or “-” (2) key of a zone for activation or deactivation of the child lock

In all 7 segments of cooking zones an “L” / “0” will be shown for 3 seconds

The child lock cannot be activated when the zones are on. If the child lock pad is touched while one or more zones are on, nothing will happen.
## Interrupt Child Lock

- Touch both the of the “+” and “-“ key (2) of a zone. In all 7Segments of cooking zones a “0” will be shown!

- The child lock will be off until the hob is switched off. When the hob is switched back on, the child lock will be on again.
Key Lock Function

- The hob is in cooking function (cooking level must be higher than level”0”)

- **Key lock on:** Touch the key lock pad (4) at any time
  In all 7 Segments of cooking zones an “L” will be shown for approx. 3 sec after that the adjusted cooking level will be shown.

- **Key lock off:** Touch the key lock pad (4) at any time
  In all 7 Segments of cooking zones the adjusted cooking level will be shown.
Power Management

- **Power management – actual status**

  This is due to the limited power on 1 phase (3,6kW for induction). The last selected cooking zone has priority. If the power is too high, the other zone is set to a lower level by the power board.

  The **user interface** displays flashing of the set value and the actual value (0.5Hz). During 1 min. the user interface changes the set value to the lower actual value.

- During active power management
  - with the “-” key the level is directly set to the lower power level
  - “+ and – together“ the zone is switched off.
Remark: The power function is switched off automatically after 8 Min. at the 210mm front left and after 5 Min. at the 180mm front right and the power level is set to „9“.

A power reduction is also possible due to a too low cooling performance of the induction module. This case is handled in the same way. Same procedure if there is a reduction due to a too high temperature at the coil sensor.
Ventilation

- minimum 5 mm gap for air outlet between worktop and oven
- ensure air inlet behind oven from below

min. 5 mm

min. 20 mm
Safety / Protection Against Unintended Switch ON

- If the key is pressed continuously for more than 10 sec. the electronic is switching OFF automatically. Before switching OFF the beeper is ringing 5 sec.

- If more than two touch keys are activated by water, food, dirt, or anything else the hob must not detect any of the inputs (not valid for the +/- pads). In this case the hob will keep the last registered setting.

- If the user interface is for more than 10 sec. in standby (all cooking levels =0, no timer setting) then the control is switched OFF.
The On/Off key has priority, so it’s always possible to switch the hob OFF, even some other keys are pressed.

 Alive routine if there is in ON mode (or cooking levels >0) no message for more than 30 seconds from the induction module then the display is switched off and an OFF message to the induction module will be sent.
The induction module has to have an overvoltage protection, which protects the module in the case of a connection error of the mains for 30 minutes. The overvoltage protection is able to handle 400VAC $\pm 10\%$ with a maximal ambient temperature of $T_u$ 30°C.

Possible errors:

- phase on ground connection
- missing neutral
The temperature of each cooking zone is measured with a suitable sensor below the glass ceramic. The self-ignition of oil or the destruction of an empty frying pan and the glass ceramic must be prevented.

If a burner has to be switched off because of high temperature (350°C), the zone is not switched on again automatically.

The user interface displays a “-“ and the user has to press the minus key to reset the zone when the temperature cooled down.
Hot Zone Detection

The hot-zone detection indicates a hot cooking zone after the zone is switched off (even if the whole hob is switched off). This is shown in the display with an „H“. Temperature sensor below glass ceramic.

Hot indicator on: T > 65°C

Hot indicator off: T < 60°C

„H“ is displayed even in OFF Condition.
Pot Detection

- If no pot is detected and the power level is set to a level > „0“ then a „F“ is shown in the relating display.

- If no pot is detected and the power level is set to a level > 0, the touch control switches the zone to level “0” after 2 min. if no pot is detected.

  Remark: in above case with active timer, zone is set to “0”, timer stays active, is not set to “0”.

With the “-”, “+” or “+ and – together“ the zone is switched off, if “F” is active.
1. Hob is off. Press main switch continuously until display is going off (without beep).
2. Press the "+" and " -" buttons (2a) of both front zones together (all 4 keys together) for about 3 seconds (-> short beep).
3. Press the timer selection key (5).
4. The display (C) shows a “d” for demo mode. If you press the timer select key again you switch to “S” for service mode, another press leads you to “E” the alarm menu.
5. By pressing the button “+” of a cooking zone you activate the menu.
6. By pressing the button “-” of a cooking zone you deactivate the menu.
Demo Mode

- If demo mode is activated the display with the „d“ shows additionally a dot.
- After selecting the demo mode, the electronic goes to off. Now it can be used like usual but only without heater activation.
- The deactivation of the demo mode is done in the same procedure as activating. After deactivating the demo mode the electronic must go off. Now the hob can be used in normal mode.
Service Mode

Routine:

1. Show user interface SW version
2. Show control SW version
3. Show power SW version
4. 400V detection test: “400U” blink on displays until 400V is not applied. When 400V is detected, the buzzer ring and “OU” is shown on display until 230V is not applied.
5. Test all LEDs / Displays for 7 sec; during this time, booster is set on rear zones to test sensors. When the time is elapsed, if the sensor are OK the test jump to the following step otherwise “S” is shown alternatively on zones where the error occurred.

6. Zone power test: a different power level is set on each zone for 2 seconds.

7. Pot detection: power level 9 is set on every zones for 10 seconds in order to check pot detection by removing the load
At the end of the test, the system go to alarm menu; if you touch one of the “+” keys you can check if some alarms have occurred during test.

The last 5 stored alarm codes (if >0) are displayed like an actual alarm, each for 5 sec., starting with the oldest to the newest.

In this test the verification of zone sensors mismatch is also made; if it happens, E1 is showed on the display.
If a key is pressed besides ON/OFF and when the child lock function is on, an acoustic feedback will appear.

At the end of PowerManagment (stop flashing between lower / higher level) a beep will come, also for pot detection if a pot is missing during cooking.

When the timer or the minute minder has finished the countdown an acoustic feedback will appear.
Procedure if a failure occurs during cooking: → display error

If the hob is switched on with the main switch and an alarm is still active the alarm is shown.

The error codes are shown in the timer 7 Segment displays.

It is possible that an alarm message involves the whole hob or only 1 zone or 2 zones (1 induction module). Only the related not functioning zones are blocked.

Special for this messages (E4 to E7) is that the “Ex” is shown for 10 sec. After this the zones without alarm can be used normal. On the zones with alarm an „E“ in the cooking level (B) is shown.
## Alarm Codes

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-0</td>
<td>Wrong or invalid configuration / checksum error</td>
</tr>
<tr>
<td>E-1</td>
<td>User interface temperature too high</td>
</tr>
<tr>
<td>E-2</td>
<td>Voltage Error 400V detection, Under Voltage</td>
</tr>
<tr>
<td>E-3</td>
<td>Temperature sensor coil 1 (open or shortcut)</td>
</tr>
<tr>
<td>E-4</td>
<td>Temperature sensor coil 2 (open or shortcut)</td>
</tr>
<tr>
<td>E-5</td>
<td>communication defect inside power board</td>
</tr>
<tr>
<td>E-6</td>
<td>Temp sensor heat sink/cooling block ind. module</td>
</tr>
<tr>
<td>E-7</td>
<td>No communication between user interface and power board</td>
</tr>
<tr>
<td>E-8</td>
<td>Communication defect inside user interface</td>
</tr>
</tbody>
</table>