

LEISTER

Leister Technologies AG

Repair instructions Ghibli AW Revision: B

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REPAIR INSTRUCTIONS



Hot Air Tool GHIBLI AW

Serial number from 1411191700 (dc1448)
Software version from 3.02

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1 Scope of applicability

These repair instructions are reserved exclusively for Leister service centres. Only experienced and qualified personnel trained by Leister Technologies AG, CH-6056 Kaegiswil, are allowed to do repair work on Leister tools. Additional national requirements relative to personnel carrying out repair work are to be observed by each service centre.

2 Safety precautions

A well-equipped ESD-protected working place (see chapter 16 "Equipment required for Leister repair service") is essential for doing qualified work. For safety reasons use only identical original Leister replacement parts for each type of tool when servicing.

Warning!



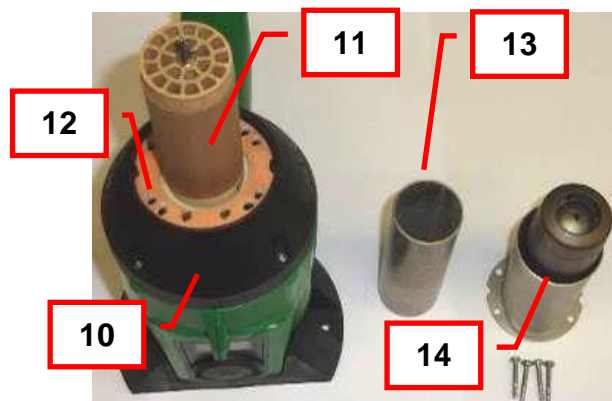
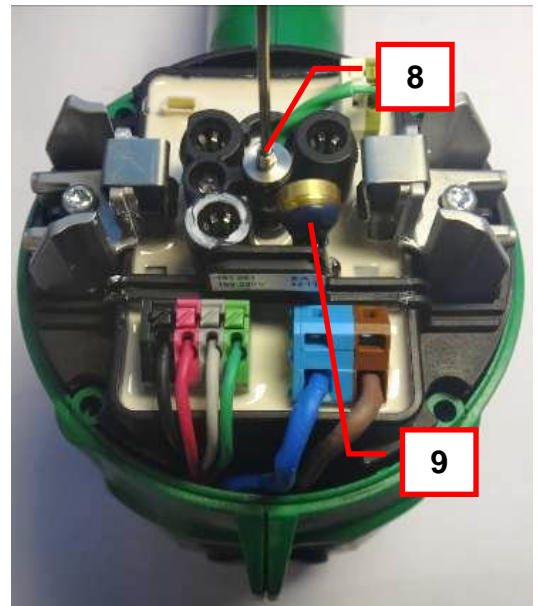
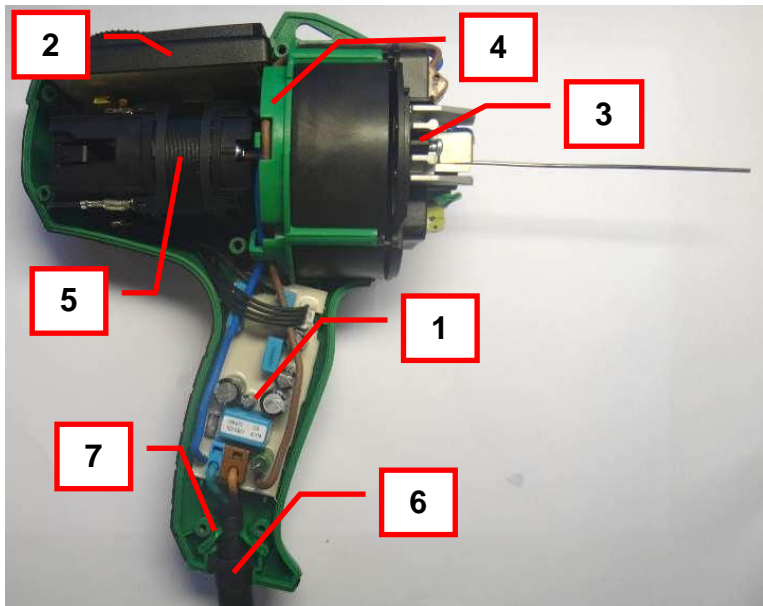
If you open the tool or remove its parts, except the ones they are accessible without using a tool, some live parts could appear. Its contact can cause danger to life! Insure tool is **disconnected from the line/mains** before any work is commenced!

Repaired tools must pass the Leister **test procedure** (see chapter 14 "Test procedure") and any additional local requirements! Check with your local Statutory Authority for testing requirements.

3 Remarks


- If it is impossible to repair a tool, it should be returned immediately to the manufacturer, Leister Technologies AG, CH-6056 Kaegiswil, Switzerland, carriage paid to Kaegiswil. Leister will repair the tool within 24 hours after its arrival.
- When ordering spare parts use the order numbers of the spare parts list. When servicing use only identical original Leister replacement parts!

4 Components naming



Legend

1. Electronic circuit board PTU
2. Electronic circuit board HMI
3. Electronic circuit board HCU (Print adapter front)
4. Attachment ring
5. Motor with blower unit (impellers, deflector)
6. Power supply cord with cord guard
7. Strain relief clamps
8. Thermocouple
9. Temperature limit switch
10. Blower housing top
11. Heating element
12. Gasket
13. Mica tube
14. Heater tube

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5 Errors and possible causes

5.1 No function





Error	Possible causes	Repair methods
No function No display, tool does not heat and motor does not run	1. No power supply	Check line/mains voltage
	2. Break of power supply cord	Replace power supply cord (chapter 9.1)
	3. Wiring error	Check internal wiring and contacting (chapter 9.2) If the flex wires for power supply (blue and brown) are inverted at the print adapter front terminal, the electronic circuitry was destroyed. Then, replace electronic circuit board PTU (chapter 10.4) and/or electronic circuit board HMI (chapter 10.5) and/or electronic circuit board HCU (chapter 10.3)
	4. Electronic circuit defective	Replace electronic circuit board PTU (chapter 10.4) and/or electronic circuit board HMI (chapter 10.5) and/or electronic circuit board HCU (chapter 10.3)


5.2 Operation not properly possible

Error	Possible causes	Repair methods
Manipulation impossible (switch the tool on)	1. Control knob e-Drive blocked, push-button defective	Replace electronic circuit board HMI (chapter 10.5)
No feedback on manipulations (temperature or air flow altering)	1. BossMode is activated → Indication: Key symbol flashes permanently or if altering a value	Check BossMode adjustment (chapter 7); this behaviour might be desired
	2. Control knob e-Drive blocked, encoder defective	Replace electronic circuit board HMI (chapter 10.5)

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5.3 Tool does not heat (correctly), motor runs



Error	Possible causes	Repair methods
Tool does not heat Warning "Heating element defective" is displayed  	1. Heating element not correctly plugged into the socket	Check heating element and its installation (chapter 9.3)
	2. Heating element defective	Replace heating element (chapter 9.3)
Temperature limit switch is activated or defective Warning "Overheating" is displayed  	1. Overheating: Ghibli AW air flow is too low	Clean air filters (according to operating manual) Check nozzle for clogging (clean or replace)
	2. Overheating: Motor does not run or runs too slowly	Check motor and perform maintenance (chapter 11)
	3. Temperature limit switch defective	Replace electronic circuit board HCU (chapter 10.3)
Air temperature not achieved	1. Undervoltage	Check line/mains voltage
	2. Heating power is possibly not sufficient to achieve temperature at high air flow without using a nozzle	No solution possible Check function by using a round nozzle \varnothing 5/8mm (chapter 14.2)
	3. Thermocouple defective	Replace thermocouple (chapter 9.4)
	4. Heating element with incorrect voltage rating	Replace heating element (chapter 9.3)
	5. Mica tube is missing	Assemble mica tube
Air temperature exceeds range	1. Thermocouple defective	Check/replace thermocouple (chapter 9.4)
	2. Incorrect temperature measurement	Replace electronic circuit board HCU (chapter 10.3)

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5.4 Motor does not run (correctly), tool heats

Error	Possible causes	Repair methods
Motor does not run	1. Connection to motor interrupted (flex wires, plug)	Establish correct connection
	2. Carbon brushes worn out or blocked	Replace carbon brushes (chapter 11.3)
	3. Motor or its control defective	Check motor and perform maintenance (chapter 11) Replace electronic circuit board PTU (chapter 10.4) and/or electronic circuit board HMI (chapter 10.5), if motor is not defective
Motor runs with excessive or unsteady noise (jolting, loose contact)	1. Bearing defect, commutator defective, carbon brushes worn out or blocked	Check motor and perform maintenance (chapter 11)

5.5 Indication of warnings

Warning	Possible causes	Repair methods
"Service recommended" announcement 	1. Timer "Service recommended" elapsed	Check carbon brushes (chapter 11.3)
"Voltage error" announcement  (Display shows actual voltage by pushing e-Drive two times shortly)	1. Line/mains voltage too low or too high (warning displayed at -20%, resp. +15% from nominal voltage)	Check line/mains voltage
	2. Wrong configuration of nominal voltage	Check nominal voltage (service menu, chapter 6.4)
	3. Line/mains voltage ok, but incorrectly measured	Replace electronic circuit board HCU (chapter 10.3)

5.6 Indication of error numbers Exxxh

Error number	Possible causes	Repair methods
	1. Ghibli AW displays an error message	Error correction according to error list (chapter 17)

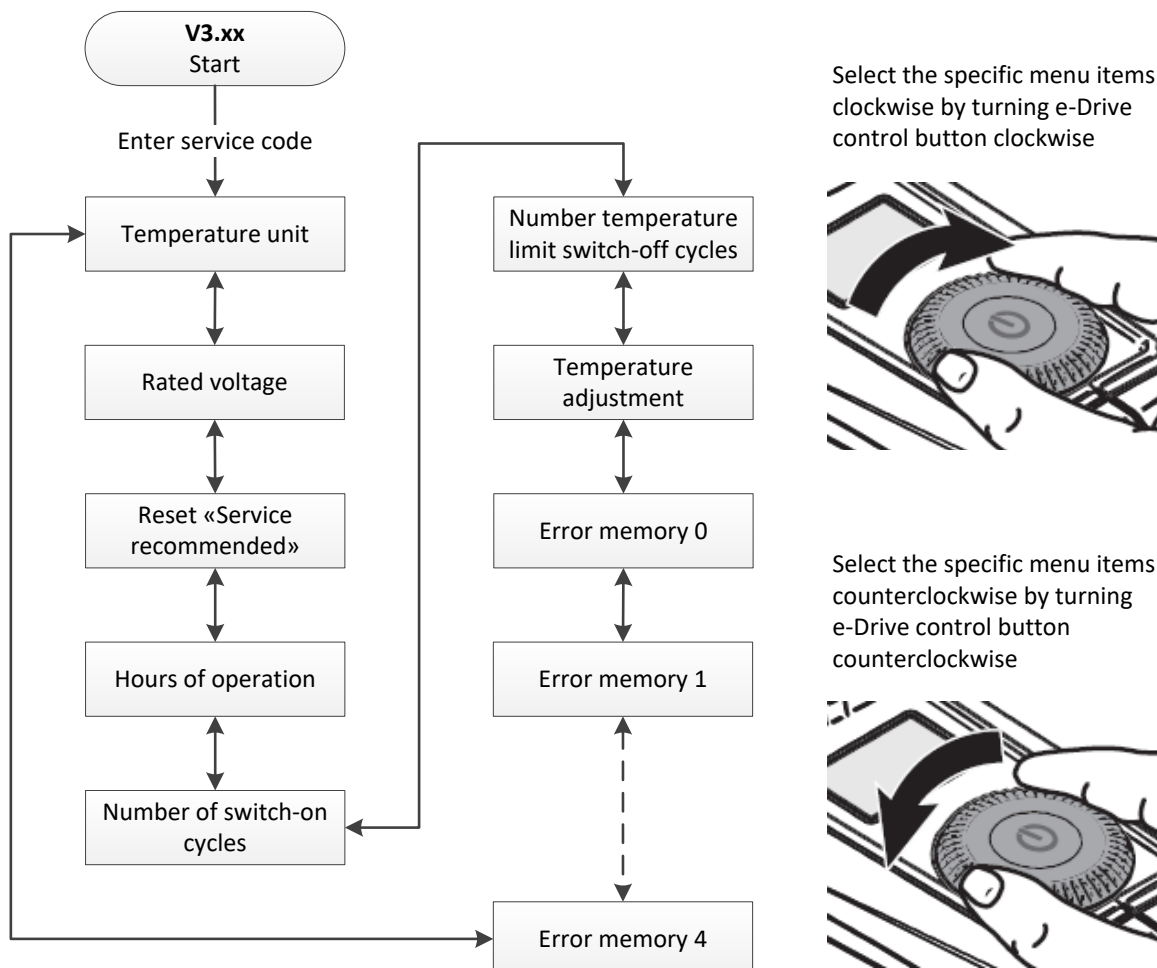
6 Service menu




Caution: Service menu requires the tool to be connected to line/mains voltage!

Service menu enables altering of temperature unit, nominal voltage and maximum temperature adjustment as well as reset of the announcement "Service recommended". In addition the service menu offers a readout of operating hours, number of switching on cycles and error memory.

After entering service code the specific menu items can be selected by turning e-Drive control button clock- (cw) or counterclockwise (ccw). Display and setting options will be described in the following chapters.

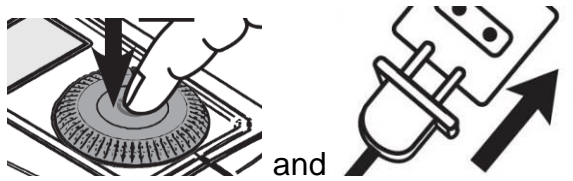
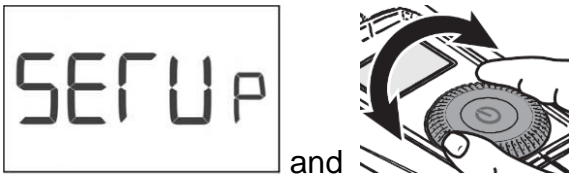



- No heating output as long as Ghibli AW is in the service mode menu
- Numbers of more than 4 digits are displayed as scrolling text
- Quit service menu by disconnecting tool from the line/mains voltage only (unplug the tool)

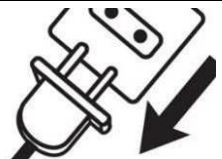
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6.1 Select service menu (enter service code)

Requiring a service code prevents the user to enter the service menu accidentally.

	<p>Push e-Drive control button and connect tool to line/mains at the same time</p>
	<p>For 3 seconds "Setup" appears. Within this time release e-Drive control button and turn it 360° in both directions</p>
	<p>After correct manipulations first menu item pops up</p>

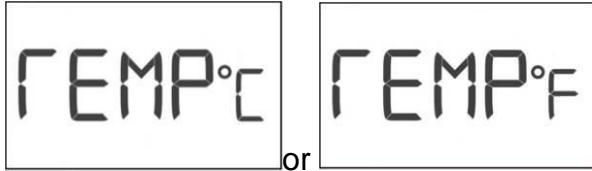
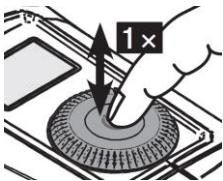
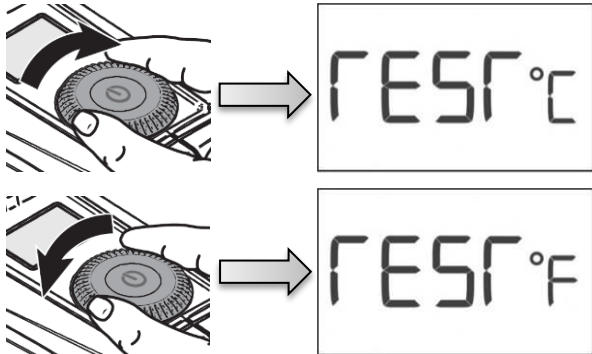
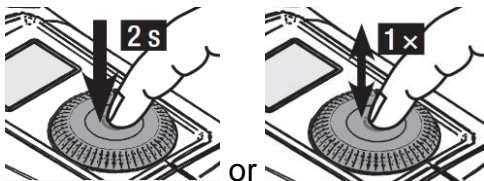
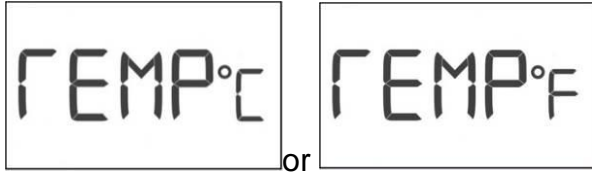
6.2 Quit service menu


	<p>There is no e-Drive control button manipulation to quit the service menu; disconnect tool from the line/mains (unplug the tool)</p>
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6.3 Temperature unit


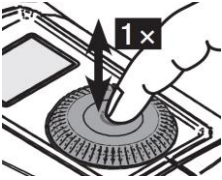
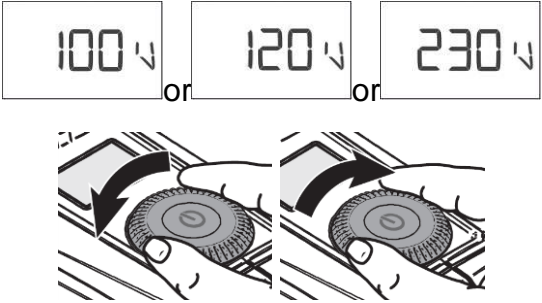
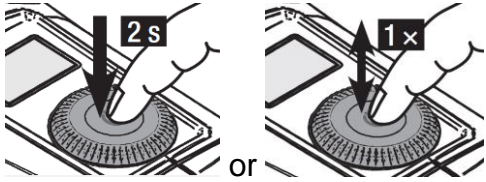

Ghibli AW enables to display temperatures in °C or °F units. Select °C or °F unit in the service menu.

	Menu item "Temperature unit" indicates the currently selected temperature unit
	Push e-Drive control button shortly to alter the temperature unit
	Select desired temperature unit by turning e-Drive control button <ul style="list-style-type: none"> • clockwise → unit °C • counterclockwise → unit °F
	Quit menu item: <ul style="list-style-type: none"> • Save temperature unit selection by pushing e-Drive control button for a long time • Not save temperature unit selection by pushing e-Drive control button shortly
	Then menu item "Temperature unit" indicates the currently selected temperature unit again

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6.4 Nominal voltage

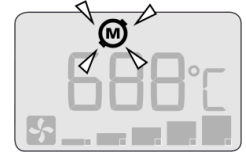
Ghibli AW enables nominal voltage selection. The service menu offers nominal voltages of **100V**, **120V** and **230V**. Nominal voltage input defines the limits for under- and overvoltage announcements from line/mains voltage.

	Menu item "Nominal voltage" indicates the currently selected nominal voltage
	Push e-Drive control button shortly to alter the nominal voltage
	<p>Displayed nominal voltage flashes</p> <p>Select requested nominal voltage according to rated voltage on the nameplate by turning e-Drive control button</p> <ul style="list-style-type: none"> • clockwise → increase voltage • counterclockwise → decrease voltage
	Quit menu item: <ul style="list-style-type: none"> • Save nominal voltage selection by pushing e-Drive control button for a long time • Not save nominal voltage selection by pushing e-Drive control button shortly
	Then menu item "Nominal voltage" indicates the currently selected nominal voltage again

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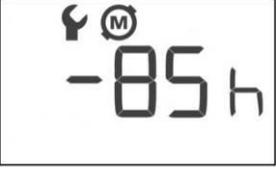
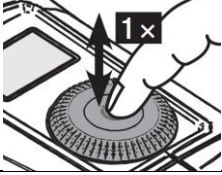

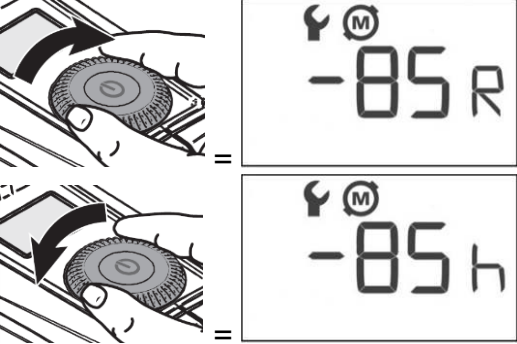
6.5 Carbon brushes operating time (reset "Service recommended")

The carbon brushes operating time counts back from a recommended operating time to zero. After expiration of this recommended operating time the display shows the announcement "Carbon brushes nearing end of life". The icon "Motor" flashes, but the Triac AT hot air tool may be used further on with no restrictions.

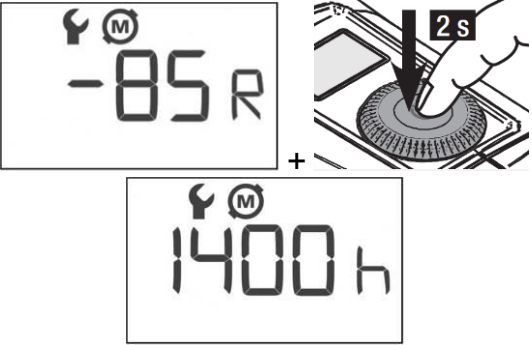
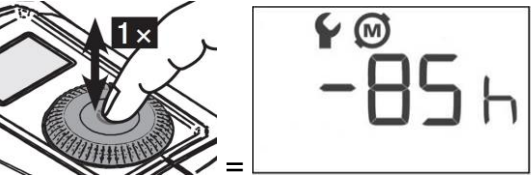


Menu item "Reset service recommended" offers a readout of the remaining operating time until warning notice (positive prefix). If the recommended carbon brushes operating time is expired, a warning notice is displayed. From then the number of hours is shown with a negative prefix.

If either carbon brushes or motor are to be replaced, the operating hours must be reset to the recommended operating time using this menu item.


	<p>Menu item "Reset service recommended" indicates the number of hours until warning notice "Service recommended" will appear; if the number is shown with a negative prefix, service is recommended since then</p>
	<p>Reset carbon brushes operating time, respectively warning notice "Service recommended", by pushing e-Drive control button shortly</p>
	<p>Unit "h" for hours is flashing</p>
	<p>Select clearance for reset</p> <ul style="list-style-type: none"> • Select clearance for reset by turning e-Drive control button clockwise; this is indicated with a flashing "R" • By turning e-Drive control button counter-clockwise the clearance for release will be cancelled

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	<p>Quit menu item with reset:</p> <p>Pushing e-Drive control button for a long time while clearance for reset ("R") is activated generates a reset of the carbon brushes operating time and the warning notice "Service recommended"; new preset carbon brushes operating time is displayed</p>
	<p>Quit menu item without reset:</p> <p>Not save the input by pushing e-Drive control button shortly; previous carbon brushes operating time is displayed</p>


6.6 Tool operating hours

The operating hours counter indicates the tool (blower unit) operating time in hours.

	<p>Menu item "Operating hours counter" indicates the operating hours</p>
---	--


6.7 Number of operation activations


Ghibli AW increases the number of operation activations with each connection of the tool to the line/mains (and pushing e-Drive control button for a long time → blower motor runs).

	<p>Menu item "Number of operation activations" indicates the number of operation activations</p>
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6.8 Number of temperature limit switch activations

Ghibli AW increases the number of temperature limit switch activations if it acts.



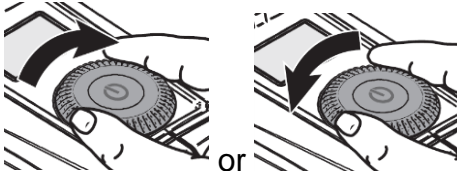
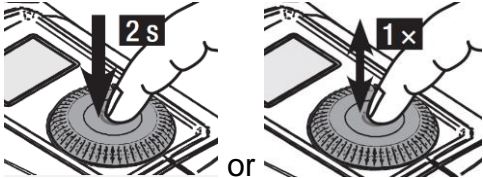
	<p>Menu item "Number of temperature limit switch activations" indicates the number of temperature limit switch activating cycles</p>
---	--


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6.9 Maximum temperature adjustment

Ghibli AW offers the possibility to adjust the maximum temperature. This is an **optional procedure** and not compulsory during service work.

Adjustment procedure is described in chapter 14.3.


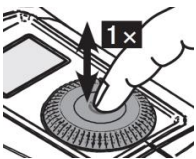
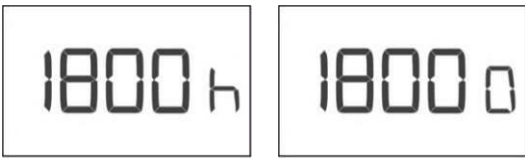
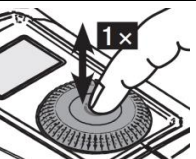

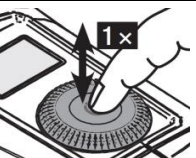

	Menu item "Temperature adjust" (Adjust) offers the possibility to adjust the maximum temperature optionally
	Push e-Drive control button shortly to display, respectively adjust the value for maximum temperature
	Adjustment of maximum temperature <ul style="list-style-type: none"> • Measured temperature is too low: Turning e-Drive control button clockwise temperature increases (to max. +10°C / +18°F) • Measured temperature is too high: Turning e-Drive control button counter-clockwise temperature decreases (to max. -20°C / -36°F)
	Quit menu item: <ul style="list-style-type: none"> • Save input by pushing e-Drive control button for a long time • Not save input by pushing e-Drive control button shortly


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6.10 Error code memory

The error code memory enables a previous history access for analysis purposes. Detailed descriptions of the error codes are given in chapter 17 "Error codes and repair methods".

The error code memory records the latest 5 errors in register positions 0 to 4. If the same error iterates, the number of iterations (repetitions) will be recorded as well. A maximum of 255 iterations may be recorded. If this number exceeds the counter reading remains on 255.

	<p>Menu item "Error code memory" indicates recorded error code (see chapter 17) Note: The error code is three-digit; lower-case digit indicates position in the error memory (5 menu items, numbered 0-4)</p>
	<p>To display timestamp push e-Drive control button shortly</p>
	<p>Display shows last occurrence of an error; unit "h" for hours and position number in the error memory are displayed alternating</p>
	<p>Push e-Drive control button shortly to display the number of error iterations</p>
	<p>The number of iterations (repetitions) of this specific error code is displayed; "R" for repetition and position number in the error memory are displayed alternating Note: Number of 1 means, error occurred once (etc.)</p>
	<p>Push e-Drive control button shortly to return to menu item "Error code memory"</p>
	<p>Menu item "Error code memory" indicates recorded error code again</p>

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7 BossMode menu



Caution: BossMode menu requires the tool to be connected to line/mains voltage!

BossMode menu is intended to limit user adjustments (temperature and/or air flow).




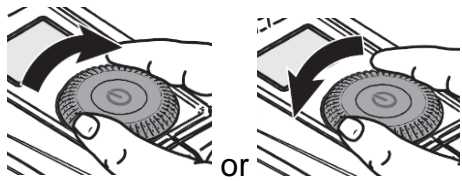
Disable possible limitations during repair and service work to operate and check the tool correctly (set to mode 0). Ship the tool back to customer in mode 0 as well.

Detailed description of BossMode menu is given in the appropriate application note. This is just a brief instruction how to enter the menu and to alter the mode:

- | | | |
|---------------------------|---|-------------------------------|
| Mode 0: free operation | ➔ | no limitations |
| Mode 1: limited operation | ➔ | definition of operating range |
| Mode 2: fixed operation | ➔ | definition of operating point |

7.1 Select BossMode menu (enter BossMode code)

Requiring a BossMode code prevents the user to alter the limitations accidentally. BossMode limitations may be altered after entering code.

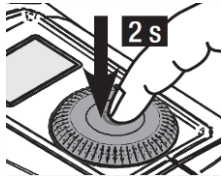
	<p>Push e-Drive control button and connect tool to line/mains at the same time</p>
	<p>For 3 seconds "Setup" appears. Within this time release e-Drive control button and then push it shortly for 4 times</p>
	<p>After correct manipulations display indicates selected BossMode ("M" and mode number, not flashing)</p>
	<p>Modes 0-2 may be selected by turning e-Drive control button; not active modes are indicated flashing</p> <p>During repair and service work make sure mode 0 is selected (no limitations)</p> <p>Ship the tool back to customer in mode 0</p>

Repair instructions

Ghibli AW

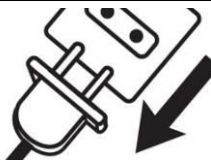
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Save selected mode by pushing e-Drive control button for a long time (flashing display changes to static display).

If e-Drive control button is mistakenly pushed shortly, the configuration of the appropriate mode could be entered. Do not turn e-Drive control button then (because this would alter the selection); push e-Drive control button for a long time.



There is no e-Drive control button manipulation to quit the BossMode menu; disconnect tool from the line/mains (unplug the tool)

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8 Tool opening / assembling



Caution! Disconnect tool from the line/mains before any work is commenced!

Following tools will be needed for repair work:






- Screw driver Torx Size T15 (housing screws)
- Screw driver slotted Size 0 (opening terminals)
- Socket wrench Size 8 (blower unit nut)
- Needle-nosed pliers (motor connections)

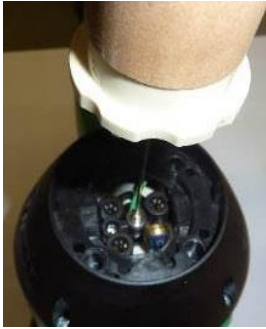
8.1 Tool opening

	<p>Disconnect tool from the line/mains!</p>
	<p>Loosen PT pan head cap screws KA35x20 (4x), remove heater tube and mica tube</p> <p>Heating element may be removed now; gasket will be extracted with heating element from blower housing top</p> <p>Caution: Do not damage thermocouple!</p>
	<p>Loosen PT pan head cap screws KA35x20 (4x) and remove blower housing top</p>
	<p>Loosen PT pan head cap screws KA35x20 (6x) at top housing shell</p> <p>Remove top housing shell</p>

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8.2 Tool assembling

	<p>Check mechanical parts for abrasion before assembling (chapter 12)</p>
	<p>Fix 4 black flex wires (interconnection of electronic circuit board PTU and electronic circuit board HMI) in their supports</p> <p>Fix power supply (blue and brown flex wire) to attachment ring</p>
	<p>Fix 2 black flex wires to motor in their supports</p>
	<p>During assembling make sure, the attachment ring is correctly positioned in the guiding rails of the housing shells</p>
	<p>Assemble all components and motor to the bottom housing shell</p> <p>Cover with top housing shell and tighten PT pan head cap screws KA35x20 (6x)</p>
	<p>Assemble blower housing top to print adapter front</p> <p>Make sure groove and cam fit properly</p> <p>Tighten PT pan head cap screws KA35x20 (4x) to cross</p>



Assemble heating element over thermocouple; during insertion in blower housing top make sure, the electrical contacts fit properly to the receptacles (bushings)

Caution: Do not damage thermocouple!



Check heating element position: Heating element groove must fit in blower housing top cam



Insert gasket; make sure both grooves fit in blower housing top cams

Assemble mica tube over heater tube; ensure by turning mica tube is guided by gasket



Assemble heater tube over heating element and mica tube; make sure both grooves fit in blower housing top cams

Tighten PT pan head cap screws KA35x20 (4x) to cross

Notes

- If the electronic circuit board HMI was replaced, perform an initial operation test [TEST 2] of the electronics after tool assembling (chapter 10.5.1)
- **Tool must successfully pass test procedure after tool assembling (chapter 14)**

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9 Electric components



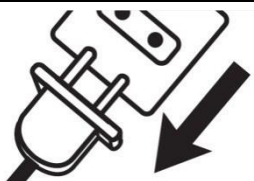


Caution! Disconnect tool from the line/mains before any work is commenced!


9.1 Power supply cord






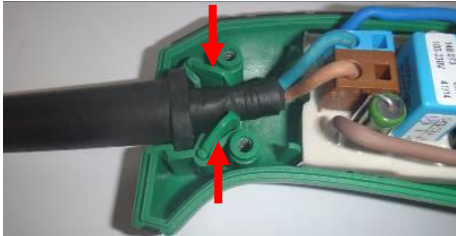
- Check power supply cord for mechanical damages (jacket insulation, sharp kink, plug)
- Check cord guard, strain relief and terminals
- Check power supply cord for short circuit/break by using a continuity checker/buzzer

Visual inspection, continuity checker/buzzer

Replace power supply cord if it shows mechanical damage, short circuit or break; replace cord guard as well if necessary.

	<p>Disconnect tool from the line/mains!</p>
	<p>Loosen PT pan head cap screws KA35x20 (2x) at blower housing top</p> <p>Loosen PT pan head cap screws KA35x20 (6x) at housing shell</p>
	<p>Remove top housing shell</p>

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	Extract power supply cord from strain relief clamps
	Disconnect power supply cord from terminals: Push slotted screw driver size 0 in terminal, extract flex wires
	Extract cord guard from power supply cord
	Insert replacement power supply cord to cord guard
	Push slotted screw driver size 0 in terminal, connect flex wires Observe color code!
	Push power supply cord in strain relief clamps
	Terminate tool assembling in reverse order

Notes

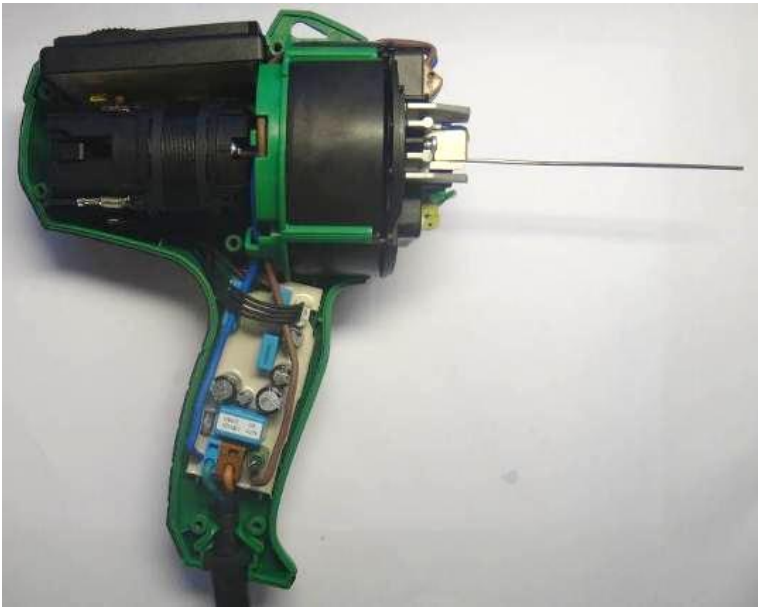
- Do not shorten the power supply cord! If the customer did so or if a third-party cord is used, replace the power supply cord
- **Tool must successfully pass test procedure after tool assembling (chapter 14)**

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9.2 Internal wiring


- Check correct wiring; terminals and flex wires are of the same color (compare with illustrations)
- Check all flex wires for breaks, short circuits and mechanical damage

Visual inspection, continuity checker/buzzer



Notes

- Incorrect flex wires connection causes destruction of the electronic circuit boards!
- **Tool must successfully pass test procedure after tool assembling (chapter 14)**

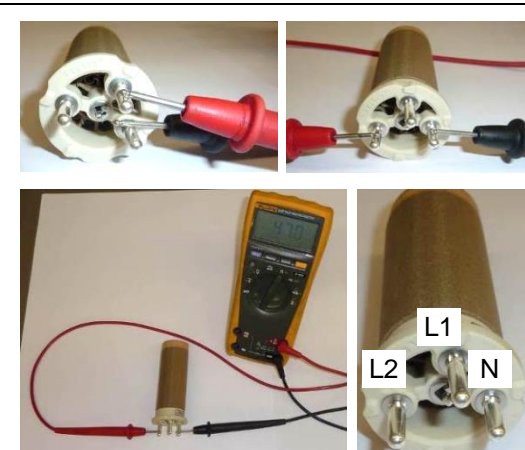
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9.3 Heating element

- Check ceramic parts for mechanical damages and overheating indications
- If heating channels are clogged, try to clear them by using compressed air
- Check heating element type and resistance


Visual inspection, compressed air, multimeter

Replace the heating element if it is either mechanically damaged or if any heating channels are clogged. If type or resistance are incorrect replace heating element as well.

	Open tool according to chapter 8.1																
	Check heating element for mechanical damage and clogged heating channels																
	<p>Check resistance of heating element by using an ohmmeter</p> <p style="text-align: right;"><i>Multimeter</i></p> <table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>Voltage [V]</th> <th>Power [W]</th> <th>Resistance [Ω] L1 → N</th> <th>Resistance [Ω] L2 → N</th> </tr> </thead> <tbody> <tr> <td>100</td> <td>1450</td> <td>ca. 13.0</td> <td>ca. 13.0</td> </tr> <tr> <td>120</td> <td>1700</td> <td>ca. 15.6</td> <td>ca. 15.6</td> </tr> <tr> <td>230</td> <td>2200</td> <td>ca. 45.5</td> <td>ca. 45.5</td> </tr> </tbody> </table>	Voltage [V]	Power [W]	Resistance [Ω] L1 → N	Resistance [Ω] L2 → N	100	1450	ca. 13.0	ca. 13.0	120	1700	ca. 15.6	ca. 15.6	230	2200	ca. 45.5	ca. 45.5
Voltage [V]	Power [W]	Resistance [Ω] L1 → N	Resistance [Ω] L2 → N														
100	1450	ca. 13.0	ca. 13.0														
120	1700	ca. 15.6	ca. 15.6														
230	2200	ca. 45.5	ca. 45.5														
	Reassemble tool in reverse order, terminate assembling according to chapter 8.2																

Note

- Tool must successfully pass test procedure after tool assembling (chapter 14)

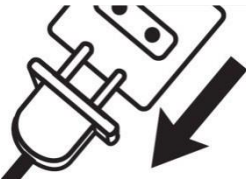


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9.4 Thermocouple

- Check thermocouple for mechanical damage and correct connection
- Check function of thermocouple

Visual inspection, thermometer, hot air tool, continuity checker/buzzer

Replace thermocouple if it is mechanically damaged or shows a malfunction.

	<p>Disconnect tool from the line/mains!</p>
	<p>Loosen PT pan head cap screws KA35x20 (4x), remove heater tube and mica tube</p> <p>Heating element may be removed now; gasket will be extracted with heating element from blower housing top</p> <p>Caution: Do not damage thermocouple!</p>
	<p>Loosen PT pan head cap screws KA35x20 (4x) and remove blower housing top</p>

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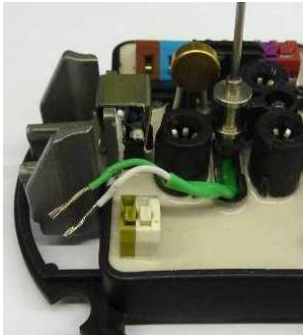
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- Check thermocouple for mechanical damage
- Check correct connection of thermocouple (observe color code; short circuits caused by untwisted ends of flex wires)



Check correct function of thermocouple

- Disconnect thermocouple flex wires from terminal (push terminal levers with screw driver; extract flex wires)
- Connect thermocouple to thermometer (calibration: Type K
→ Ambient temperature ($\pm 5^{\circ}\text{C}$ / $\pm 9^{\circ}\text{F}$))
- Heat thermocouple by using a hot air tool
→ Temperature must increase
- Short-circuiting both thermocouple flex wires (green and white)
- Measure resistance between short circuited flex wires and thermocouple jacket
→ Resistance $> 1\text{M}\Omega$




- Extract thermocouple from its support
- Replace thermocouple when necessary
- Connect thermocouple flex wires (observe color code), push terminal levers with screw driver; **Hint:** push both terminal levers at the same time → simplifies insertion of short and stiff flex wires
- Insert thermocouple in support until it snaps in

Reassemble tool in reverse order, terminate assembling according to chapter 8.2

Note

- Tool must successfully pass test procedure after tool assembling (chapter 14)

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10 Electronic circuit boards



Caution! The following measurement sometimes requires the tool to be connected to line/mains. Insure tool is disconnected from line/mains before any work is commenced!

10.1 Function check

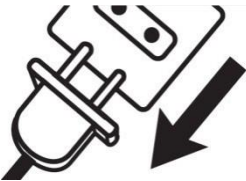

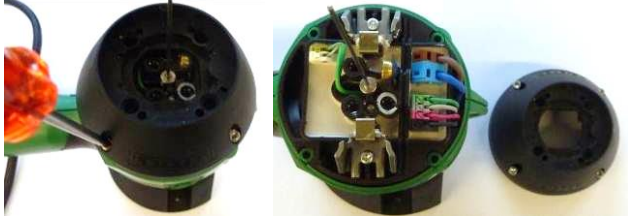
According to test procedure (chapter 14)

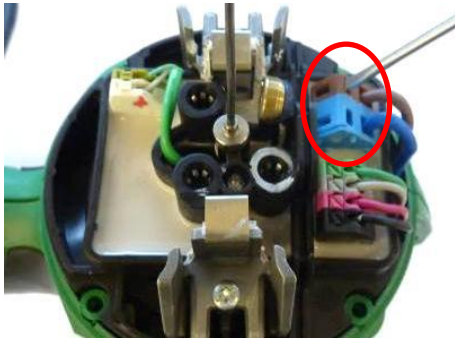
10.2 Visual inspection

Check electronic circuit boards for visual error indications:

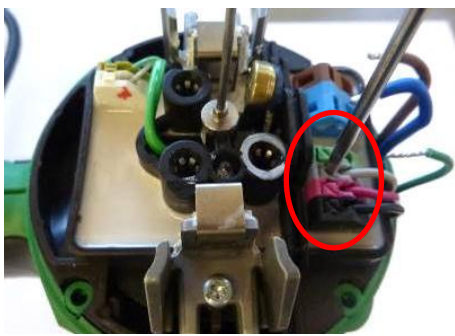
- Scorch marks, destroyed components
- Expanded/swelled parts

10.3 Replacement of electronic circuit board HCU

	Disconnect tool from the line/mains!
	Loosen PT pan head cap screws KA35x20 (4x), remove heater tube and mica tube Heating element may be removed now; gasket will be extracted with heating element from blower housing top Caution: Do not damage thermocouple!
	Loosen PT pan head cap screws KA35x20 (4x) and remove blower housing top

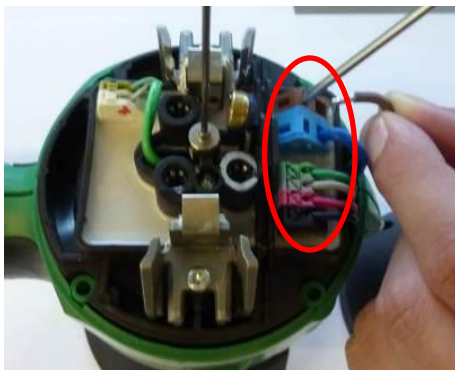


Disconnect power supply (blue and brown flex wire): Push slotted screw driver, size 0, in terminals; extract flex wires



Disconnect signal lines: Push terminal levers with a screw driver; extract flex wires

Remove thermocouple according to chapter 9.4 and reassemble it to replacement electronic circuit board



Connect power supply (blue and brown flex wires): Push slotted screw driver, size 0, in terminals, insert flex wires




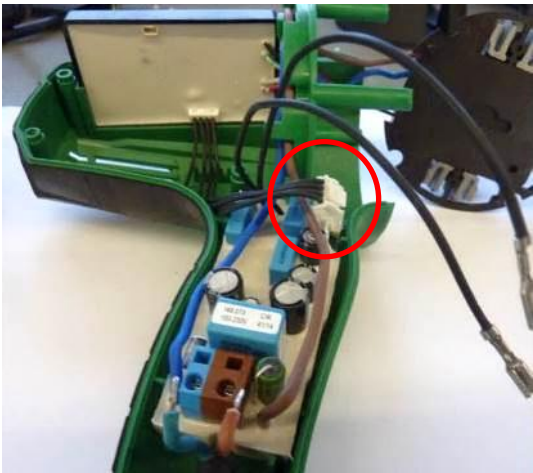
Connect signal lines: Connect flex wires without operating terminal levers; make sure terminal color corresponds with flex wire color

Reassemble tool in reverse order; terminate assembling according to chapter 8.2

Note

- Tool must successfully pass test procedure after tool assembling (chapter 14)

10.4 Replacement of electronic circuit board PTU

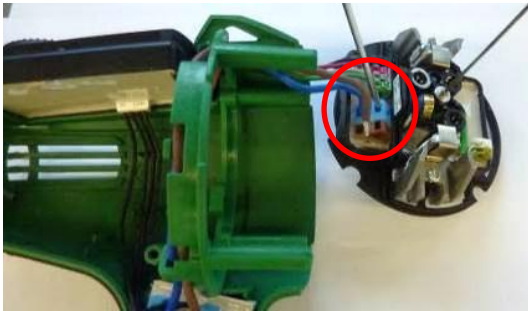
	Open tool according to chapter 8.1
	Turn print adapter front up Extract motor from attachment ring
	Loosen motor flex wires from its terminals by using needle-nosed pliers Put motor aside
	Disconnect power supply cord from terminals: Push slotted screw driver size 0 in terminal, extract flex wires
	Unplug white connector from electronic circuit board PTU

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Disconnect power supply (blue and brown flex wire): Push slotted screw driver, size 0, in terminals; extract flex wires



Extract power supply (blue and brown flex wire) from attachment ring





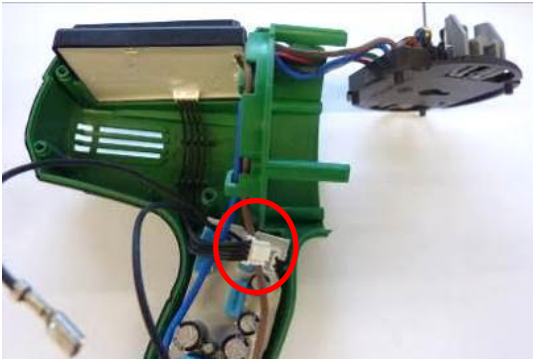

Extract electronic circuit board PTU from housing shell

Reassemble tool in reverse order; terminate assembling according to chapter 8.2


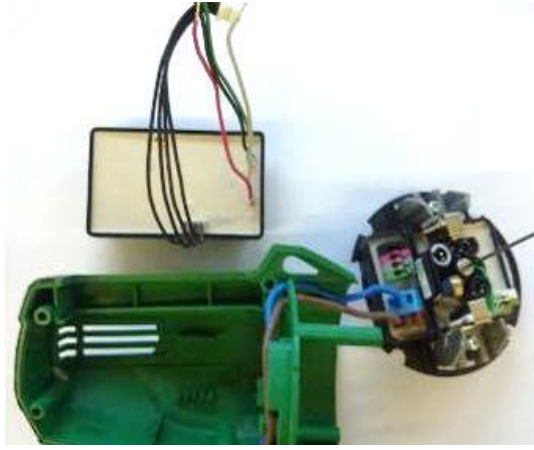
Note

- Tool must successfully pass test procedure after tool assembling (chapter 14)

10.5 Replacement of electronic circuit board HMI


	Open tool according to chapter 8.1
	Turn print adapter front up Extract motor from attachment ring
	Loosen motor flex wires from its terminals by using needle-nosed pliers Put motor aside
	Unplug white connector from electronic circuit board PTU
	Disconnect signal lines: Push terminal levers with a screw driver; extract flex wires

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	<p>Extract signal lines between housing shell and attachment ring</p>
	<p>Extract electronic circuit board HMI from housing shell</p>
	<p>Reassemble tool in reverse order; terminate assembling according to chapter 8.2</p>

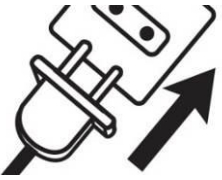

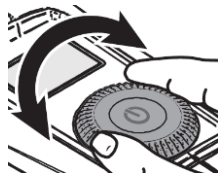
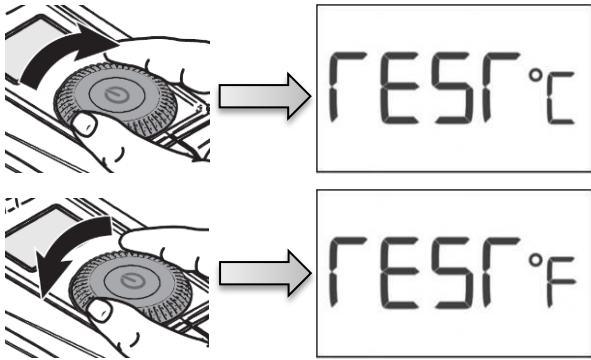
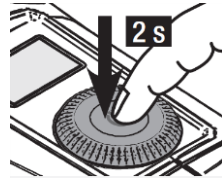
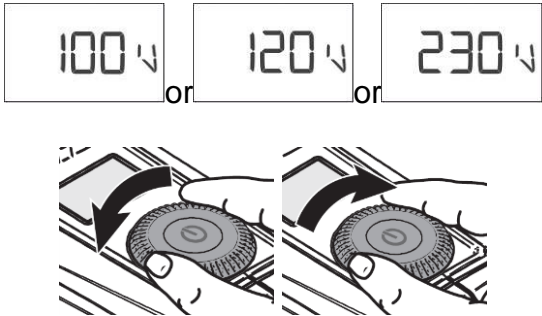
Notes

- If the electronic circuit board HMI was replaced, perform an initial operation test [TEST 2] of the electronics after tool assembling (chapter 10.5.1)
- **Tool must successfully pass test procedure after tool assembling (chapter 14)**

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10.5.1 Initial operation test [TEST 2]

When switching on the tool for the first time after replacement of the electronic circuit HMI, its software requires an initial operation test [TEST 2].

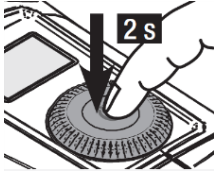

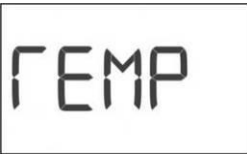



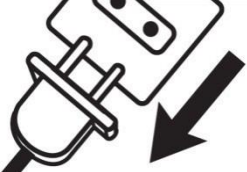
	<p>No nozzle attached!</p> <p>Connect Ghibli AW to rated voltage (according to nameplate)</p>
	<p>Display shows "TEST 2" (initial operation); tool must not heat, motor does not run</p>
	<p>Turn e-Drive control button for at least one position clockwise and counterclockwise</p>
	<p>Select requested temperature unit by turning e-Drive control button</p> <ul style="list-style-type: none"> • clockwise → unit °C • counterclockwise → unit °F
	<p>Save temperature unit selection by pushing e-Drive control button for a long time (temperature unit may be altered later on in service menu according to chapter 6.3)</p>
	<p>Nominal voltage will be suggested according to detected line/mains voltage</p> <p>Select requested nominal voltage according to rated voltage on the nameplate by turning e-Drive control button</p> <ul style="list-style-type: none"> • clockwise → increase voltage • counterclockwise → decrease voltage


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	By pushing e-Drive control button for a long time nominal voltage will be saved and tool starts heating
	Ghibli AW heats with maximum power (possibly reduced by heating element protection), blower unit runs on position 4, display shows thermocouple temperature with no respect to ambient temperature; so, temperatures with negative prefix could occur during starting procedure
	After temperature test is terminated; acknowledge "TEMP" will be displayed
	Attach covering cap to heater tube (block air outlet) From a specific threshold display changes to detected "brightness value" of the heating element protection
	After maximum "brightness value" is exceeded; acknowledge "HEP" (Heating Element Protection) will be displayed
	The initial operation test is successfully completed if no errors and no warnings are reported; this will be saved and the display indicates "IO"
	Remove covering cap, let the tool cool down – then disconnect it from the line/mains

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11 Blower unit (motor)

11.1 Commutator

Check commutator:

- Worn out lamella
- Bluish discoloration
- Deep groove (U-shaped)

If a commutator defect is detected, replace motor (see chapter 11.4)

11.2 Function check



Caution! The following measurement sometimes requires the tool to be connected to the line/mains. Insure tool is disconnected from line/mains before any work is commenced!

1. Carefully disconnect both flex wires from motor by using needle-nosed pliers
2. Connect motor to rated voltage (nameplate)
 - Motor must run steadily and its power consumption may not exceed 100W

Rated voltage [V]	Motor current [A]
100	< 1.0 A
120	< 0.8 A
230	< 0.4 A

3. Disconnect motor from rated voltage!

Multimeter

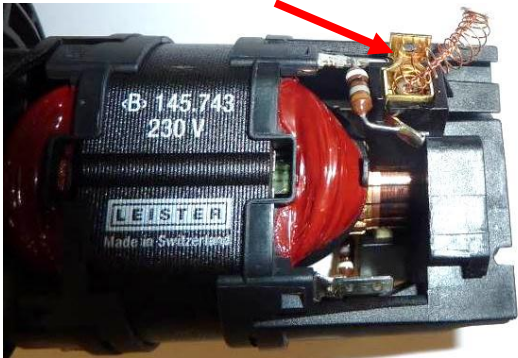


Notes

- Power consumption > 100W indicates a commutator defect
 - Replace motor (chapter 11.4)
- Excessive noise indicates a bearing defect
 - Replace motor (chapter 11.4)
- Unsteady noise (jolting, loose contact)
 - Check/replace carbon brushes (chapter 11.3)
- Vibrations
 - Adjust/replace impellers (see chapter 11.5)

11.3 Carbon brushes





Remove carbon brushes, measure its length and replace them if their length measures 4mm or even less. Check both carbon brushes! If the carbon brushes are to be replaced reset timer "Service recommended" in the service menu (see chapter 6.5). If the carbon brushes are not to be replaced make sure to re-insert the same way (same carbon brush holder, same fitting position) due to abrasion.

Calliper gauge/scale

	Open tool according to chapter 8.1
	<p>Carefully bend up the flap of the brush holder and remove carbon brush</p> <p>Caution, spring is compressed!</p> <p>Notice fitting position for re-inserting</p>
	<p>Measure length of carbon brushes; replace carbon brushes if their length is 4mm or even less</p> <p>Check contact surface for scorch marks (if a "carbon brush jam" is detected replace carbon brushes as well as carbon brush holders)</p> <p>Check both carbon brushes!</p>
	<p>Insert replacement or re-insert checked carbon brushes (in same fitting positions) and close the brush holders by carefully bending the flaps</p>
	<p>If carbon brushes were replaced, reset timer "Service recommended" in the service menu (chapter 6.5)</p>
	<p>Function check according to chapter 11.2</p>

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11.4 Motor

	Open tool according to chapter 8.1
	Turn print adapter front up Extract motor from attachment ring
	Loosen motor flex wires from its terminals by using needle-nosed pliers
	Assemble replacement motor Motor voltage must correspond with rated voltage of the nameplate
	Recessed area for flex wires must face to the top
	Reassemble tool in reverse order; terminate assembling according to chapter 8.2
	Reset timer "Service recommended" in service menu (chapter 6.5)

Note

- Tool must successfully pass test procedure after tool assembling (chapter 14)


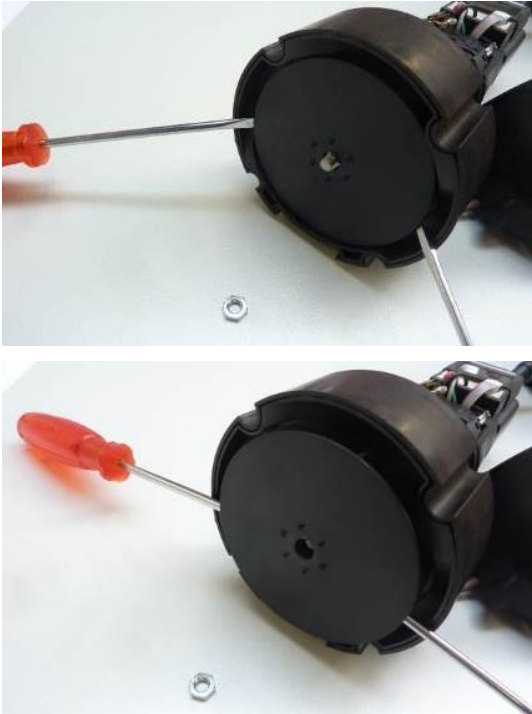
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11.5 Impellers

Cleaning: Clean **polluted** impellers by using compressed air (not in direction of motor bearing)

Positioning: If **vibrations** occur, slightly loosen hexagon nut, rotate impellers against each other and fasten hexagon nut; repeat procedure until the unbalance is cancelled (function check according to chapter 11.2)

Replacement: Replace impellers if they are either **damaged** or **essentially deformed**; we recommend polluted impellers to be replaced rather than to be cleaned


	Open tool according to chapter 8.1
	Disassembling impellers Loosen hexagon nut by using a socket wrench (no. 8)
	Extract upper impeller by using two screw drivers as far as removal by hand is possible

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	<p>Remove deflector</p>
	<p>Push the lower impeller to the top by using two slim screw drivers; as soon as it is enough far from the bottom it may be removed the same way as the upper impeller.</p> <p>Clean impellers and check for damages; damaged impellers are to be replaced!</p>
	<p>Assembling impellers</p> <p>Assemble impellers and deflector in reverse order</p> <p>Note: The deflector is asymmetrically shaped; there is just one fitting position</p>
	<p>Function check according to chapter 11.2</p>
	<p>Reassemble tool in reverse order; terminate assembling according to chapter 8.2</p>

 **Note**

- Tool must successfully pass test procedure after tool assembling (chapter 14)

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12 Mechanical parts

12.1 Housing parts: Housing shells, air filter and blower housing top

Replace housing shells and/or blower housing top if these parts are fairly worn out (abrasion, mechanical damage), respectively if the rubber is rough or extremely soaked (sticky)

Replacement of handle requires a replacement nameplate!

Inscribe serial and article number inside the replacement housing shell by using a waterproof marker; if the nameplate is not readable any more, take production code (yyww) stamped inside the original housing shell

Replace defective or missing air filters

12.2 Operating parts: e-Drive control button

Replace electronic circuit board HMI (chapter 10.5) if e-Drive control button is fairly worn out (abrasion, mechanical damage), respectively if the rubber is rough or extremely soaked (sticky)

12.3 Metal parts: Heater tube, screws

Replace dented heater tube (mechanical stress for mica tube and heating element, nozzles do not fit any more)

Replace fairly worn out screws (screw heads)

13 Cleaning


Clean the tool when doing service and repair work!

- Air filter → by compressed air, small brush
- Plastic parts (handle and blower housing top) → by ordinary cleaning agent
- Impeller housing → by compressed air (not in direction of motor bearing)
- Heating element → blow off heating channels by compressed air

Note

If clogged air filters were cause of an error, give a message to the customer like as follows:

Clean the air filters at the end of the handle with a small brush if polluted!

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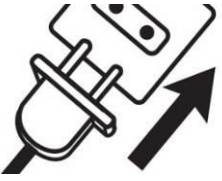

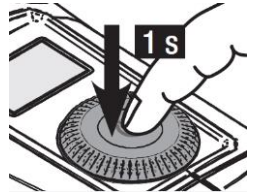

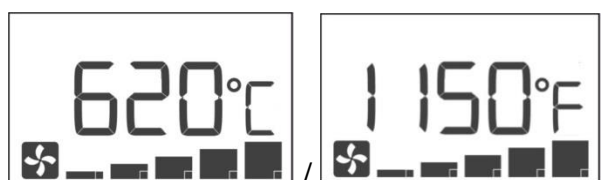
14 Test procedure for Ghibli AW (protection class II)

14.1 Insulation test

- Function test of the high voltage tester:
Short-circuiting tips → Signal lamp illuminates and horn sounds
- Apply a high voltage of 2500V (release current < 30mA) for 1 second between line/mains plug and protection tube of the heater tube; no flashover or breakdown must occur



14.2 Function test

		Attach tubular nozzle \varnothing 5/8mm to heater tube and connect Ghibli AW to rated voltage (nameplate)
		Check display (tool does not heat, blower motor does not run)
		Switch the tool on (push e-Drive control button for at least 1 second)
		Check function of e-Drive control button (turning/pushing): Turn e-Drive control button at least one step clock- and one step counterclockwise (temperature setting) Push e-Drive control button shortly and turn it at least one step clock- and one step counterclockwise (airflow setting)
		Set temperature to 620°C (1150°F) and airflow to step 5
Rated voltage [V]	Rated current [A]	Check maximum power consumption, respectively maximum current during heating up procedure (according to nameplate)
100	15	
120	15	
230	10	

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Wait for 5 minutes until set temperature is achieved; no error or warning message may occur



Check air output temperature: Insert external thermocouple 5mm into the center of the tubular nozzle and ensure it does not touch the nozzle

Temperature must achieve the values given in the table (tolerance $\pm 30^{\circ}\text{C}$ / $\pm 54^{\circ}\text{F}$)

Voltage [V]	230	230	120	100
Software	≤ 3.04	≥ 3.05	≥ 3.02	≥ 3.02
Temperature [$^{\circ}\text{C}$]	620	570	620	620
Temperature [$^{\circ}\text{F}$]	1150	1060	1150	1150

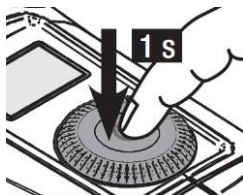
If temperature is not achieved, the mica tube is possibly not assembled



Check heating element protection (without using a nozzle)

Attach covering cap to heater tube (block air outlet); after a few seconds the heating element protection circuitry must act \rightarrow current/power consumption will be reduced within 30 seconds

Remove covering cap

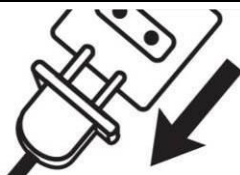


Switch the tool off (push e-Drive control button for at least 1 second)




Let the tool cool down

Tool switches off automatically after termination of the cooling down procedure (check display)



Disconnect tool from the line/mains!

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14.3 Maximum temperature adjustment (optional)

Note: This chapter describes the possibility to do a maximum temperature adjustment. This procedure is optional!

Keep test setup unchanged during entire adjusting procedure if possible! Reasonably perform just a broad adjustment, because the test setup in itself has a wide tolerance.

1. Maximum temperature is determined as described in the function check (chapter 14.2)
 → *external thermocouple into center of tubular nozzle \varnothing 5/8mm, temperature setting 620°C (1150°F), air flow setting step 5, temperature measurement after 5 minutes*
2. If measured temperature deviates essentially from indicated temperature, the maximum temperature may be adjusted within the range of -20°C..+10°C (-36°F..+18°F); service menu (chapter 6.9)
3. Verify new maximum temperature (item 1) and iterate adjusting procedure (item 2) if necessary

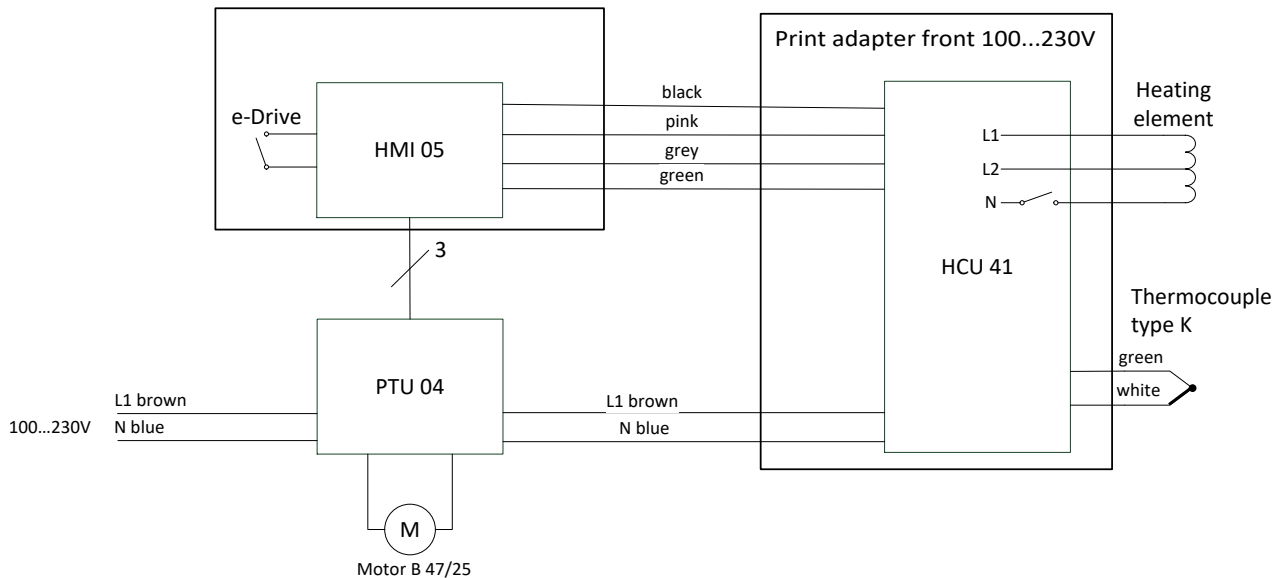
14.4 Checking completeness

- Check printed details on the nameplate: Type, voltage, current, power consumption (must correspond with the above measurements!)
- Check serial number (yymmdd0000) and production code (yyww)

yy: year of production	yy: year of production
mm: month of production	ww: week of production
dd: day of production	
0000: consecutive number	
- Company label LEISTER must be neatly printed on the handle
- Check power supply cord mechanically and electrically (correct plug type for country, conductor cross-section as per rated current)
- Both air filters must be fitted
- All screws must be tightened
- Check for cleanliness and possible damage
- Shake tool: Heating element may not hit heater tube (otherwise mica tube is missing)

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15 Wiring diagram




16 Equipment required for Leister repair service

16.1 Mobile equipment

- 1 protective earth conductor tester (e.g. Elabo)
- 1 high voltage tester up to 4000V (e.g. Elabo, Korntal)
- 1 temperature meter with temperature measurement probe (e.g. Fluke, Testo)
- 1 multimeter with following measurement options: (e.g. Fluke)
 - Current
 - Voltage
 - Resistance
 - Continuity (test buzzer)
- 1 rotational speed meter
- 1 water column
- 1 soldering iron
- 1 complete set of tools (screw drivers etc.)

16.2 Installed equipment

- ESD-protected working environment
- Transformer, possibly separated into variable and isolating transformer
 - Data: 3 x 0..500V
 - 3 x 30A
- 3 built-in voltmeters (500V)
- 3 built-in ammeters (30A) or wattmeters



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17 Error messages and repair methods


Ghibli AW display indicates error messages as hex codes. They are saved in the error code memory (select error code memory see chapter 6.10).


Several error codes are not displayed as hex codes, but with special views (see column "Reason").

Note regarding error detectability: In standby not all errors are detectable. Several errors will be detected not before approx. 30 seconds after switching the tool on (electronic control, heating up).

Error no.	Reason	Description / Repair method(s)
E000h	No error	Indicates a blank error code memory entry
E001h	Thermocouple interrupt / short circuit	Thermocouple defective or incorrectly connected 1.) Check thermocouple connection (chapter 9.4) 2.) Replace thermocouple (chapter 9.4) 3.) Replace electronic circuit board HCU (chapter 10.3)
E002h Displayed as warning only	Heating element interrupt 	Heating element defective or not assembled 1.) Check heating element connection (chapter 9.3) 2.) Replace heating element (chapter 9.3) 3.) Replace electronic circuit board HCU (chapter 10.3)
E003h	Short circuit/interrupt of power switch (triac) Line/mains voltage too low	Triac defective, line/mains voltage below defined range 1.) Check line/mains voltage 2.) Replace electronic circuit board HCU (chapter 10.3)
E004h	General electronics error on electronic circuit board HCU	Print adapter front defective 1.) Replace electronic circuit board HCU (chapter 10.3)
E007h	Line/mains frequency incorrect	Line/mains frequency out of range or not detectable (print adapter front defective) 1.) Check line frequency, respectively make sure tool is connected to line/mains frequency of 50/60Hz ± 10%; there is no hardware defect if this error does not occur any more when operating tool with correct line/mains frequency 2. If error occurs when operating tool with correct line/mains frequency, replace print adapter front (chapter 10.3)
E008h Displayed as warning only	Electronics temperature exceeded 	Temperature print adapter front > 105°C (>221°F) <i>Temperature in blower housing top may exceed ambient temperature up to 25°C (45°F) because of motor waste heat</i> 1.) Check motor/blower unit (motor runs, air flow exists?) 2.) Ambient temperature too high 3.) Clean air filters (clogged?) 4.) Check heating element (clogged?) 5.) Replace electronic circuit board HCU (chapter 10.3)

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Error no.	Reason	Description / Repair method(s)
E009h <i>Displayed as warning only</i>	Heating element protection was activated (heating element temperature exceeded for too long time) 	Heating element temperature exceeded for too long time <i>Electronics detected exceeding of thermal radiation for a longer time. Airflow below limit, maybe caused by blocked air outlet, could be a reason; electronics defect could be a reason as well</i> 1.) Check nozzle (clogged, squeezed?) 2.) Check motor/blower unit (motor runs, air flow exists?) 3.) Ambient temperature too high 4.) Clean air filters 5.) Heating element clogged 6.) Replace electronic circuit board HCU (chapter 10.3)
E00Ah	Invalid hardware identifier (incorrect HW key assembly)	Unknown hardware version of printed circuit board 1.) Replace electronic circuit board HMI (chapter 10.5)
E00Dh	Communication interrupt / communication error between electronic circuit boards HCU and HMI	No or incorrect communication between electronic circuits 1.) Check internal wiring and contacting (chapter 9.2) 2.) If wiring/contacting is correct, one or even both electronic circuit boards could be defective a) Replace electronic circuit board HCU (chapter 10.3) b) Replace electronic circuit board HMI (chapter 10.5)
E00Fh <i>May occur during initial operation test [TEST 2] only</i>	During initial operation test [TEST 2] (chapter 10.5.1): Initial thermocouple temperature out of range	Thermocouple defective or incorrectly connected <i>Initial temperature is < -50°C or > 50°C (< -58°F or > 122°F); this error is indicated during initial operation test [TEST 2] only</i> 1.) Tool too hot, let tool cool down and repeat [TEST 2] 2.) Check thermocouple connection 3.) Replace thermocouple (chapter 9.4) 4.) Replace electronic circuit board HCU (chapter 10.3)
E010h <i>May occur during initial operation test [TEST 2] only</i>	During initial operation test [TEST 2] (chapter 10.5.1): Final thermocouple temperature out of range	Thermocouple defective or incorrectly connected <i>Final temperature is < 50°C or > 150°C (< 122°F or > 302°F) after 10 seconds; this error is indicated during initial operation test [TEST 2] only</i> 1.) Line/mains voltage too low, check line/mains voltage 2.) Check heating element connection (chapter 9.3) 3.) Heating element defective, replace it (chapter 9.3) 4.) Check thermocouple connection 5.) Replace thermocouple (chapter 9.4) 6.) Replace electronic circuit board HCU (chapter 10.3)
E011h	Missing calibration of electronic circuit board HCU	No calibration of print adapter front ➔ report with error code to Leister Switzerland 1.) Replace electronic circuit board HCU (chapter 10.3)
E013h	Missing configuration of electronic circuit board HCU	No configuration of print adapter front ➔ report with error code to Leister Switzerland 1.) Replace electronic circuit board HCU (chapter 10.3)

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Error no.	Reason	Description / Repair method(s)
E014h	Missing synchronisation with line/mains voltage, zero crossing detection failed	Zero crossing detection of line/mains voltage failed 1.) Check line/mains voltage 2.) Check internal wiring and contacting (chapter 9.2) 3.) Replace electronic circuit board HCU (chapter 10.3) 4.) Replace electronic circuit board HMI (chapter 10.5)
E016h <i>May occur during incoming goods test [TEST 1] only</i>	During incoming goods test [TEST 1] of printed circuit board: Incoming goods test [TEST 1] already passed	Printed circuit board does not repeat incoming goods test [TEST 1], because it was already successfully passed → report with error code to Leister Switzerland 1.) Replace electronic circuit board HMI (chapter 10.5)
E017h <i>May occur during incoming goods test [TEST 1] only</i>	During incoming goods test [TEST 1] of printed circuit board: Initial operation test [TEST 2] already passed	Printed circuit board does not perform incoming goods test [Test 1], because initial operation test [TEST 2] was already successfully passed → report with error code to Leister Switzerland 1.) Replace electronic circuit board HMI (chapter 10.5)
E018h	Printed circuit board was not tested, [TEST 0] was not successfully passed	Printed circuit board HMI was not tested, function test [TEST 0] not performed or not successfully passed → report with error code to Leister Switzerland 1.) Replace electronic circuit board HMI (chapter 10.5)

Notes

- Following errors may occur during initial operation test [TEST 2] of electronic circuit board HMI (chapter 10.5.1):
 - E00Fh (initial value of thermocouple temperature)
 - E010h (final value of thermocouple temperature)
- Please report following errors (including error code) to Leister Switzerland service centre:
 - E011h (missing calibration print adapter front)
 - E013h (missing configuration print adapter front)
 - E016h (incoming goods test: [TEST 1] already passed)
 - E017h (incoming goods test: [TEST 2] already passed)
 - E018h (function test [TEST 0] not performed or not passed)