



Combi-Steam Cooker
EKDG 6800.0
EKDG 6800.0-75

Service Manual: H3-72-01

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1. Safety



Danger!

Repairs may only be carried out by a qualified electrician! Inexpert repairs may lead to risks and damages for the user!

To prevent electric shocks, please observe the following tips:

- In the event of faults, housing and frame may be live!
- Touching live components inside the appliance may cause dangerous currents to flow through your body!
- Prior to repairs, disconnect the appliance from the mains!
- When inspecting live parts, a residual current operated device must be used at all times!
- The ground wire resistance must not exceed that specified in the standard! It is of vital importance for ensuring the safety of people and the functioning of the appliance.
- On completion of repairs, an inspection must be carried out in accordance with VDE 0701 [Association of German Electrical Engineers] or the corresponding regulations for your country!
- On completion of repairs, a function and impermeability inspection must be carried out.



Caution!

Make sure you observe the following instructions:

- The appliances must be disconnected from the mains prior to all repairs. If inspections must be carried out on live appliances, make sure you use a residual current operated device.



Sharp edges: Use protective gloves.



Components may be electrostatic!
Observe handling precautions!

2. General

Depressurised steam cooking involves cooking food with a combination of steam and hot air. Gentle steam cooking at temperatures of between 40 °C – 100 °C optimally preserves vitamins and minerals as well as maintaining colours and natural aromas. Food does not dry out and nor will it burn or stick.

Since only a relatively small amount of water needs to be heated, steam cooking means that a great deal of time and energy can be saved.

Depressurised steam cooking takes place at temperatures of between 40 °C and 100 °C, thus making it easy to cook food just as it is required. The climatic sensor steams the food in just the right conditions, irrespective of the quantity of food being cooked. Instead of being destroyed, vitamins and minerals are largely preserved. Flavour, colour and consistency are maintained – food does not lose its structure. There is therefore almost no need to add salt and spices.

To sum up: cooking with steam makes conscious, healthy eating possible without any extra effort. The steam cooker provides excellent possibilities in combination with the ökotherm® cooker or oven.

It is particularly when meat is being cooked that the oven becomes dirty due to squirting juices. Dirt which has become dried can be removed more easily if the cooker, prior to cleaning, is operated with the “steam” cooking mode at a temperature of 100 °C for approximately 30 minutes, thus softening any soiling. After being used for some time the oven will take on a golden colour.

2.1 Technical data

	Appliance dimensions	Oven dimensions	Niche dimensions
Height:	37.8 cm	25.0 cm	38.0 cm
Width:	59.6 cm	35.9 cm	at least 58.0 cm
Depth:	56.7 cm	39.0 cm	at least 55.0 cm
Weight:		35 kg	
Oven:		34 l	
Water tanks:		removable, for approx. 1.25 litres of water	

Electrical connection

Connection voltage:	230 V ~ 50 Hz or 400 V 2N ~ 50 Hz
Connected wattage:	3.5 kW (230 V)
Power:	connected wattage: 3.5 kW
Electrical voltage:	16 A (230 V) or 10 A (440 V)

Attention! Modification from 2003 on

It is new that the appliance can be operated if the connection of the zero conductor (N) and the polar conductor (P) is interchanged. The connection type 230V 2~ (without zero conductor), which can occur in electric networks in Belgium, is also possible.

Heating power

Hot air power:	2.2 kW
Steam generator:	1.4 kW
Floor heater:	0.14 kW

2.2 Technical features

- Clear text display for indicating programs
- Climatic sensor
- Limestone sensor
- Permanent regulation of oven air conditions
- External steam generator
- Electronic temperature control and indicator
- Electronic timer with a clock, cooking time indicator, end of cooking programmable
- Minute minder
- Roast thermometer with a temperature setting and display
- Green display indicators
- Glide rack and oven door removable
- Oven lighting

2.3 Features

Depressurised steam	40°C - 100°C
Hot air	30°C - 230°C
Regeneration	100°C - 130°C
Baking like professionals	-230°C
Hot air with steam vapours	- 230°C

Defrosting

No water connection required

Water tank for approx. 2 hours of uninterrupted steam operation at 100°C.

Safety concept

The appliance will be continuously monitored by the electronic controls as long as the power supply is guaranteed. Any faults which may occur will be indicated in the clear text display.

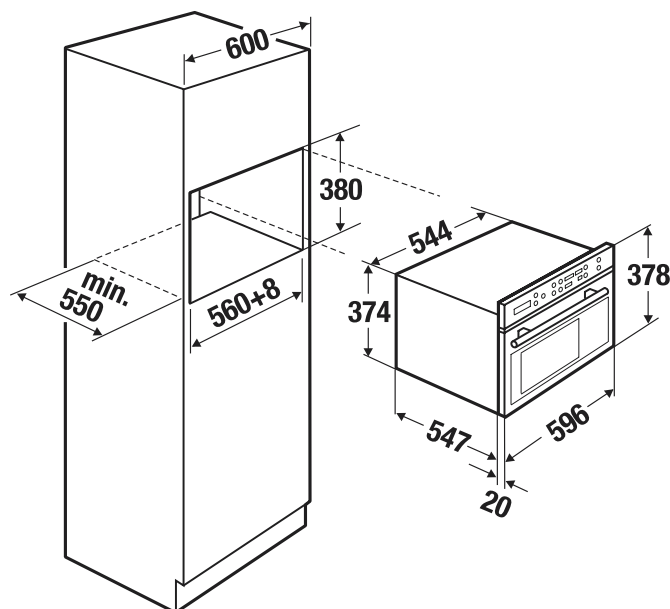
3. Installation

3.1 Safety instructions for technicians

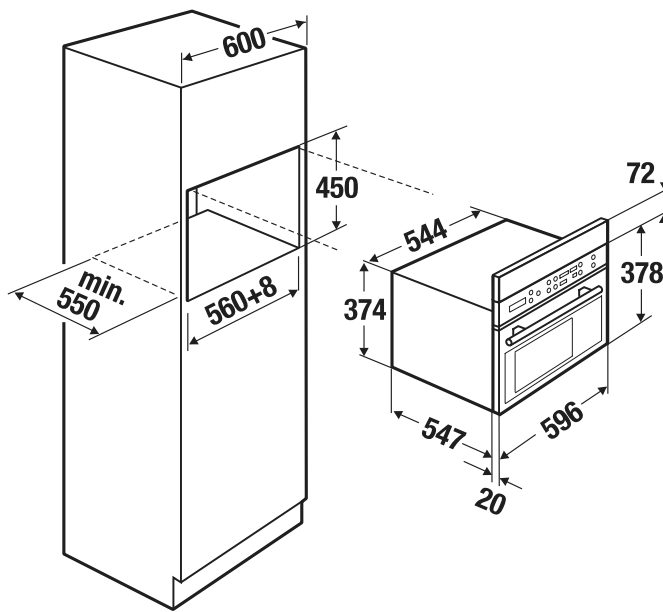
- Local electricity suppliers' statutory regulations and conditions for connection are to be fully observed.
- The appliance must be disconnected on being connected, on carrying out repairs and when changing a bulb. Disconnect the shock-proof plug or switch off the safety fuse.
- Full protection against accidental contact must be guaranteed on instalment.
- The appliance is ready to be plugged in and may only be connected to a shockproof socket which has been installed according to specifications. Plug installation, the exchanging of terminal wires and zero conductors or replacement of the connecting wire may only be carried out by a qualified electrician under observance of the relevant regulations.
- Should the plug not be accessible subsequent to installation, a universal disconnection device with a contact clearance of at least 3 mm must be available at the installation point in order to fulfil relevant safety regulations.
- The built-in cupboard for the combi-steam cooker must be heat resistant up to 100 °C. This applies in particular to veneers, overlapping edge bands, plastic surfaces, adhesives and varnishes. Adjacent kitchen unit front panels must be heat resistant up to at least 70 °C.
- It is essential to instal the appliance horizontally on a board which is level and stable. The board may not bend.
- Should the kitchen unit not be attached to the wall it must be screwed on with a standard commercial angle.

3.2 Installation

in a suitable niche



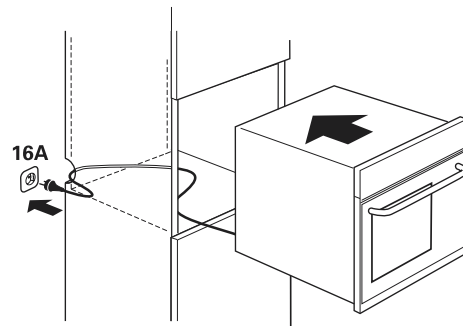
in a standard niche (with a levelling panel, ZUB. 736 (in preparation))



Installation in kitchen units

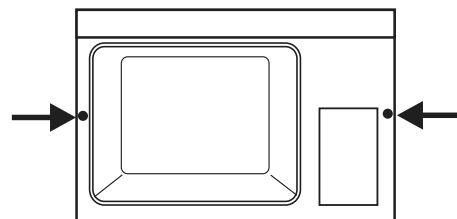
Installing the appliance

- Put the plug into the socket.
- If “U2” is indicated on the display, the plug must be turned. Should this not be possible, a qualified electrician must exchange the zero conductor and the terminal wire in the socket.
- Push the appliance right into the unit niche. On doing so, make sure that the appliance connection is not squeezed!



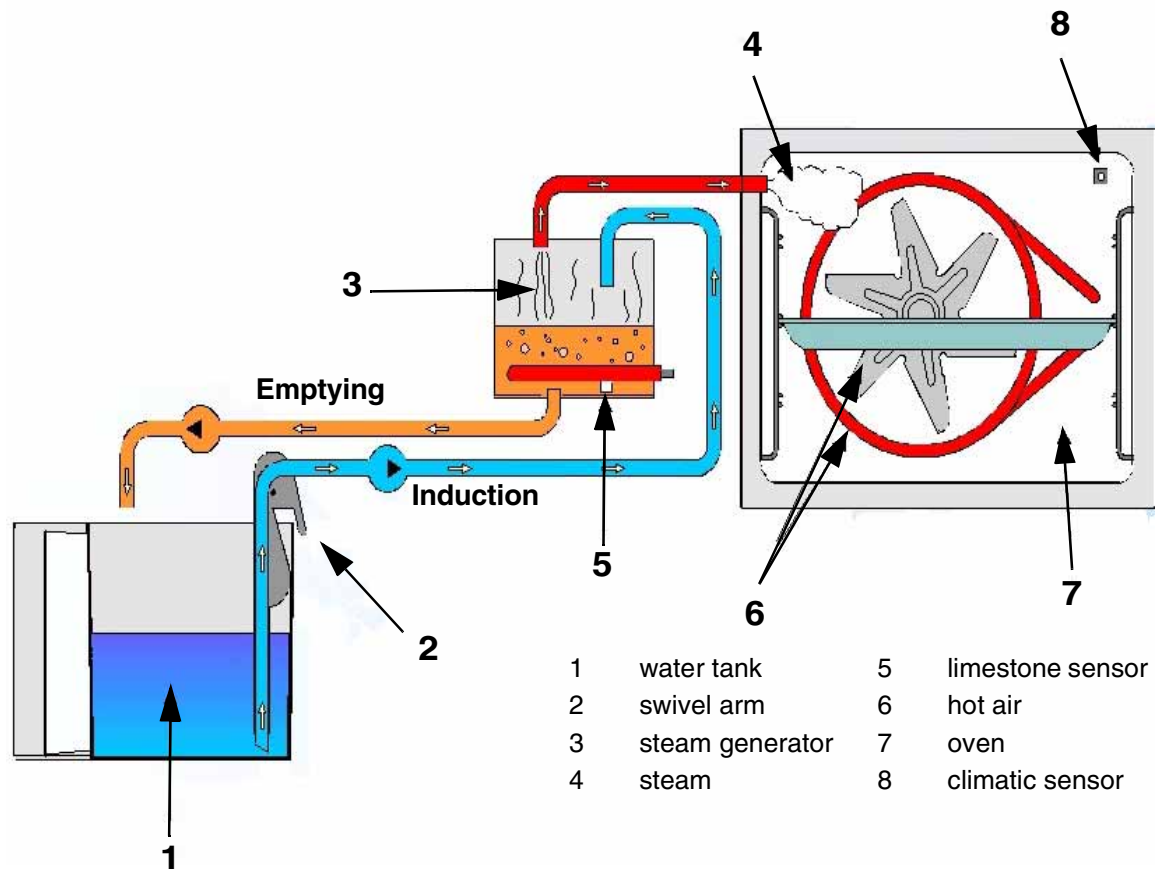
Attaching the appliance

- Open the oven door and screw the appliance to the kitchen unit with the screws supplied – screw them in at an angle – from the inside to the outside.

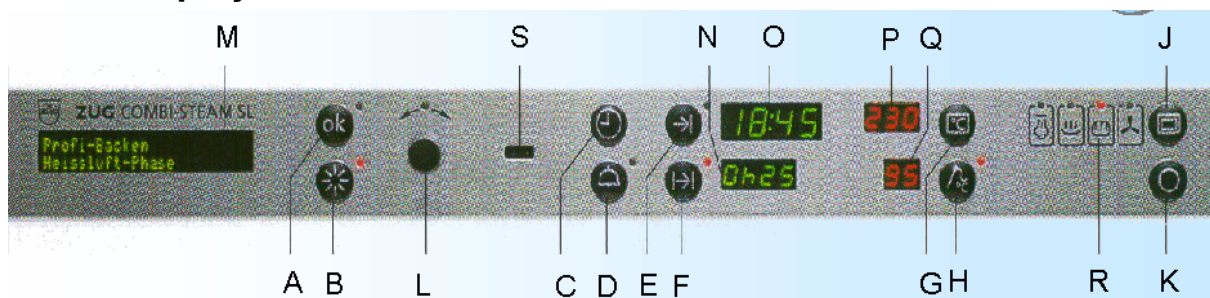


4. Fittings and operation of the EKDG 6800.0

4.1 Appliance structure



4.2 Display and control elements



Controls

A ok	K appliance off
B oven lighting	L button for setting
C time	M clear text display
D timer	N operation time / timer
E switch-off time	O time / switch-off time
F operation time	P oven display
G oven temperature	Q core temperature
H core temperature	R operational mode symbol
J operational mode	S ZUG eye

General information on operation

Settings can be made with the rotary switch once the button for the respective operational mode has been pressed lightly.

Settings can subsequently be made for a certain period of time.

Should you, after the final setting has been made, not wish to wait for the setting time to expire, you may also start the function selected immediately by means of the button.

4.3 Acoustic signals

Short double acoustic signal (once)

- Start not possible due to activated childproof lock
open door
- No water tank EAT: Start not possible?
- Food sensor not inserted
- Time not set on selecting switch-off time
- Time set rejected due to activated switch-off time

Short single acoustic signal

- Required oven temperature for hot air mode reached

Short interrupted acoustic signal (up to a max. of 1 min.)

- Timer time expired


Long interrupted acoustic signal (up to a max. of 1 min.)

- End of operation reached
- Required core temperature reached
- What the user must do in order to descale

4.4 User settings

Language:	select the required language (German, French, Italian or English)
Childproof lock:	on - off
Utilisation of residual heat:	on - off
Time:	visible - not visible
Acoustic signal:	soft - medium - loud
Switch-off time:	short - medium - long
Oven lighting:	with button only - automatic with door

Display indicates “please wait, water is being pumped off”

Water is being pumped off Remaining water in the boiler will be pumped back into the water tank after the appliance has been switched off by means of pressing the  button.

Display indicates “descale”

Every time steam is generated, limestone deposits are formed in the appliance, irrespective of the degree of hardness of local water. A system in the appliance automatically recognises when descaling becomes necessary. In the clear text display, “descale” is indicated.

Suitable descaling agent!

A standard commercial descaling agent on a sulfamic acid basis or citric acid basis should be used for descaling.

Display indicates “residual heat”

The clear text display will indicate “residual heat” as long as the oven temperature exceeds 80 °C. In the case of long baking times, the oven can be switched off 10 to 15 minutes before the end of the baking time in order to save energy.

Exception: soufflés, sponges, choux pastries and puff pastries, since these all react sensitively to changes of temperature in the oven.

Operational modes

The five operational modes (steaming, regenerating, baking like professionals, hot air and hot air with steam vapours) are divided into five different procedures. Each procedure comprises several steps, during which the functions are activated by means of one or more commands.

The operational modes are distinguished as follows:

Procedure	Steaming	Regenerating	Baking like professionals	Hot air	Hot air with steam vapours
Filling in water	X	X	X	—	X
Altitude adjustment	X	X	X	—	X
Steam heating	X	X	X	—	X
Hot air heating	X	X	X	X	X
Continued steam heating	X	X	X	—	(X)
Continued hot air heating	—	X	X	X	X
Steam dissipation	X	X	—	—	X (if required)
Empty	X	X	X	—	X
Floor heating	X	—	—	—	—

Legend: — not used
 X is being executed
 (X) adjustable vaporisation

4.5 Steaming

Recommended oven temperature: 100 °C (equivalent to the maximum possible boiling temperature)

Area of application: 40 °C to 100 °C

During the steaming mode, steam flows into the oven from an external steam generator. At the same time hot air facilitates the heating up process of the appliance. The steam operational mode is suitable for:

- cooking any type of vegetable,
- as well as for steaming meat
- with the addition of liquid (stock), for steaming rice,
- cereal products, pulses
- and fish at approx. 80°C

4.5.1 Program sequence

1. Filling in water
2. Altitude adjustment
3. Continued heating with hot air and steam
4. Continued heating with steam
5. Steam dissipation
6. Empty

1. Filling in water

The filling procedure is carried out in the following steps:

On commencement of the operational mode, the presence of the water tank is monitored by means of a Reed switch. If the Reed switch is not activated, operation is discontinued, an acoustic signal sounds and "insert water tank and press OK" is indicated in the clear text display.

Closing the door is also monitored by means of a Reed switch. If the Reed switch is not activated, operation is discontinued, an acoustic signal sounds and "close the door and press OK" is indicated in the clear text display.

The level of water in the evaporator is monitored by means of a level sensor (metal pin / "point gauge"), which measures the electrical susceptance of the water in the evaporator. The supply pump pumps water into the evaporator until the level sensor recognises water and then also for a certain follow-on time above the level of the level sensor. If the water content of the evaporator falls below a certain level, a topping up procedure is initiated by the level sensor. The water is filled up as described above.

On commencement of the filling up procedure, the ventilation fan is switched on at a certain setting. After the filling procedure the vent flap and the air inlet flap are closed and the hot air fan is activated.

2. Altitude adjustment

Automatic altitude adjustment enables the hot air temperature to be regulated with a certain difference in temperature below the maximum possible steaming temperature. This ensures that the condition of the air in the oven is always sufficiently moist and that there are no drying effects on the food. Altitude adjustment is carried out in the following steps:

- The water in the evaporator is heated up with the evaporator heater operating at full power.
- If, during a certain period of time, the temperature sensor, on measuring the water temperature in the steam generator, does not register any change in temperature, this temperature will be taken as the maximum possible water temperature and therefore also as the maximum possible steam temperature.

3. Heating with hot air and steam / continued steam heating

Subsequent to altitude adjustment, the hot air heater will be switched on. When the hot air heater is switched on, the power of the evaporator heater is reduced in order not to exceed the fuse-protected power supply of the single-phase appliance connection.

The hot air heater is regulated with a certain difference in temperature below the recommended or self-installed oven temperature by means of an oven temperature sensor. If the required temperature set is higher than the maximum temperature resulting from altitude adjustment, this temperature will be accepted. However, the hot air must not reach the oven temperature level.

Water will evaporate until the oven temperature sensor has reached the recommended oven temperature or the oven temperature set. If the required temperature set is higher than the maximum temperature resulting from altitude adjustment, this temperature will be accepted.

Exception: from a certain temperature setting on, steam production is only regulated by the steam outlet temperature of the climatic sensor and is thus detached from the oven temperature control. This ensures an optimal and sufficient supply of steam for cooking.

(A setting of 100°C would enable the proportion of hot air to become too high, since the steam at the altitude of Zug only reaches a temperature of approx. 98°C)

After completion of altitude adjustment, the floor heater is clocked at reduced power. On initial actuation of the climatic sensor, the floor heater is switched on at full power after a certain delay.

4. Continued steam heating

Once a slight degree of excessive pressure has been reached, the surplus steam exits the oven in a controlled manner through an opening. The temperature at the exit opening is measured with a climatic sensor (ceramic NTC temperature sensor). The production of steam is interrupted if the temperature of escaping steam exceeds an empirically deducted threshold value. If the temperature falls short of this threshold value, the evaporator heater will be re-activated.

The water in the evaporator is constantly monitored by the level sensor and if it falls below a certain level, water from the water tank is transported to the evaporator by means of the supply pump.

5. Steam dissipation

Steam dissipation is designed as a possibility for steam in the oven to be led to the surrounding areas in a controlled manner over a certain period. The procedure is carried out in the following steps:

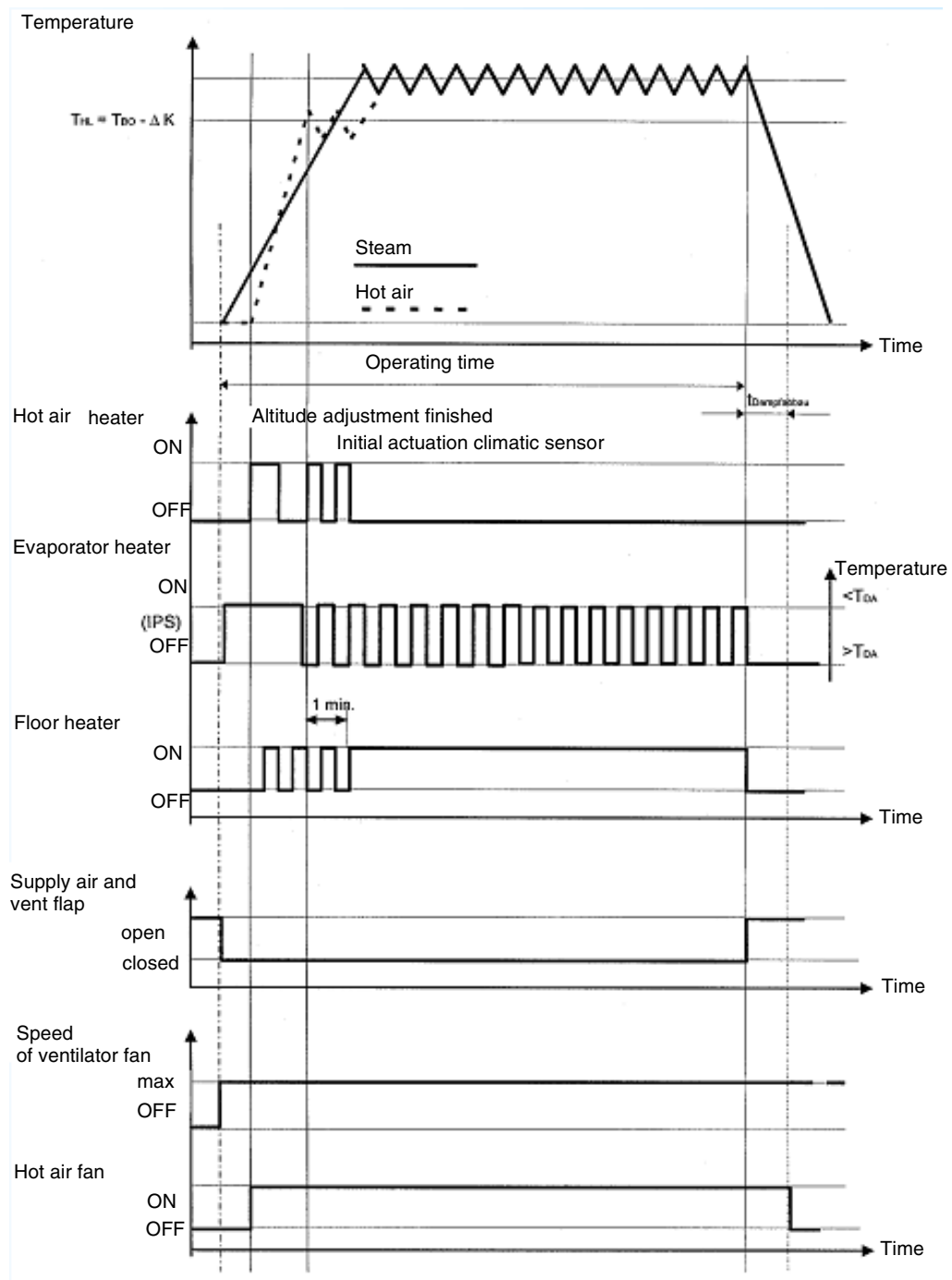
- Subsequent to completion of a steaming process by means of the OFF button, the hot air fan and the ventilator fan remain switched on for a certain period. If the door is opened immediately, the steam dissipation time is greatly reduced.
- At the same time the supply air flap and the vent flap are opened. This extracts the steam from the oven, mixes it with air and transports it through an air duct into the room.
- The process of emptying commences after steam has been dissipated.

6. Emptying

Emptying the evaporator is carried out in the following steps:

- Firstly a check is made to ensure that the water tank has been installed. The process of emptying will not be carried out should this not be the case.
- During this process, the clear text display indicates “water is being pumped off”.
- Irrespective of the level, the supply pump transports water to the evaporator until the temperature of the water has reached a certain level; however, this occurs with a limit in time. This addition of cold water serves the purpose of lowering the temperature of the water in the evaporator, thus reducing the thermal load in the drain pump and ensuring safety for the user from a thermal point of view.
- The drain pump pumps water in the evaporator back into the water tank at a temperature of 70 °C. Emptying is carried out with a maximum time limit from water level recognition on, plus a certain follow-on time.
- Subsequent to emptying “residual heat” is indicated in the clear text display above a certain oven temperature.

4.5.2 Sequence diagram: Steaming



4.6 Regenerating

Recommended oven temperature: 130°C

Area of application: 100°C to 130°C

On regeneration, the oven is heated with steam and hot air. This ensures fast, consistent heating up of the food without any drying out.

The regeneration operational mode is suitable for:

- semi-cooked or pre-cooked products
- re-heating food on a plate
- gently defrosting frozen food

4.6.1 Program sequence

1. Filling in water
2. Altitude adjustment
3. Heating up and continued heating, hot air and steam
4. Steam dissipation
5. Emptying

1. Filling in water

See “1. Filling in water” on page 13.

2. Altitude adjustment

See “2. Altitude adjustment” on page 13.

3. Heating up and continued heating, hot air and steam

Heating up is carried out in the following steps:

- The hot air heater is switched on at full power.
- The recommended oven temperature or the self-set oven temperature mean that the hot air heater is regulated by an oven temperature sensor (range: 100°C to 150°C).
- During the heating process with hot air the evaporator heater is also operated. However, due to fuse protection 16 A, 230 V, it heats at a reduced power level.
- The climatic sensor interrupts the production of steam if the steam temperature at the outlet exceeds the threshold value. If the temperature falls short of this threshold value the evaporator heater will be re-activated. However, the power output of the steam generator remains reduced in the case of simultaneous operation of the hot air heater.
- The floor heater is not activated on regeneration due to the fact that operation time is normally shorter.
- At the same time the level of water in the evaporator is monitored and water is transported by means of the supply pump.

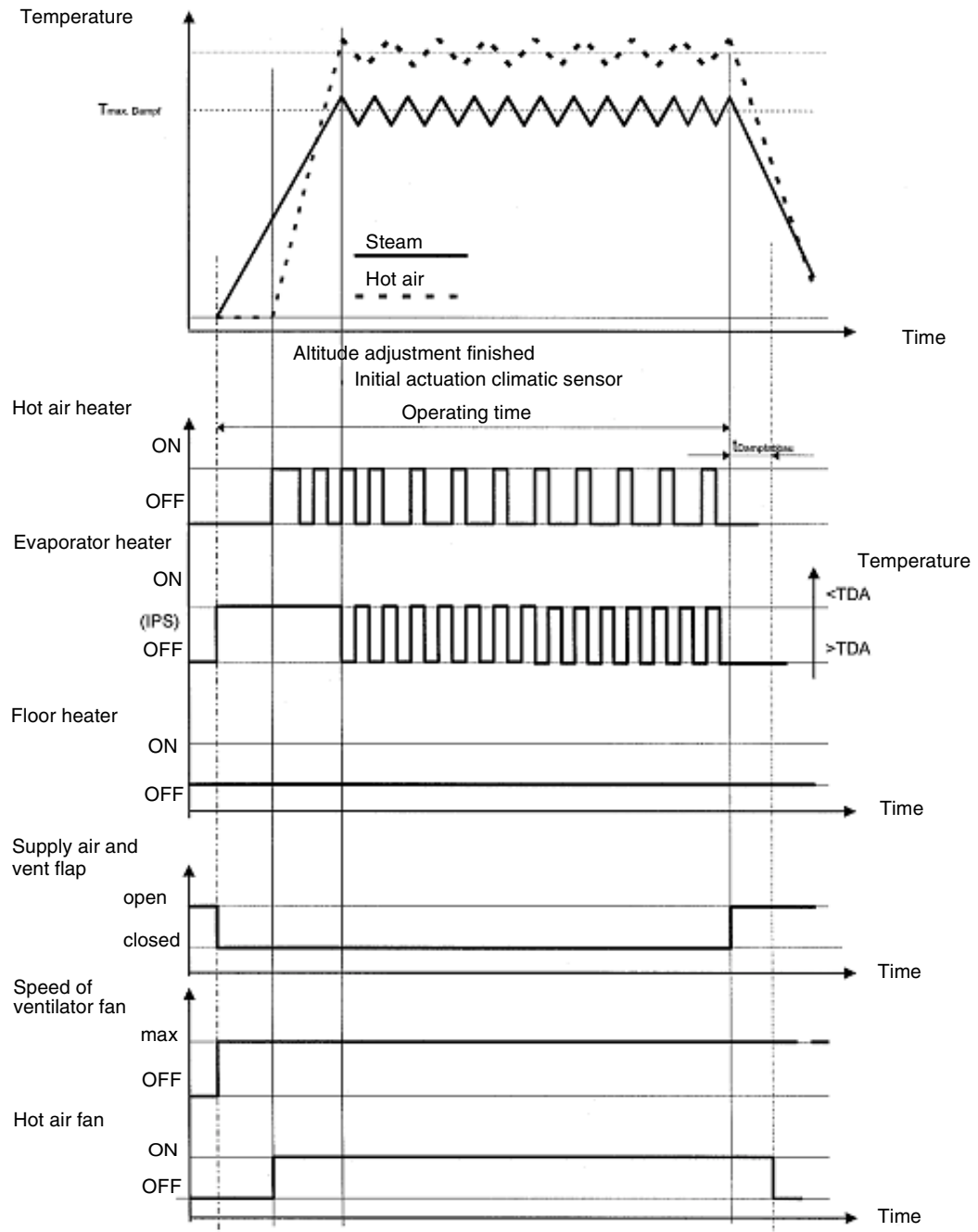
4. Steam dissipation

See “5. Steam dissipation” on page 14.

5. Emptying

See “6. Emptying” on page 14.

4.6.2 Sequence diagram: Regenerating



4.7 Baking like professionals

Recommended oven temperature: 210°C

Area of application: 100°C to 230°C

During the baking like professionals mode the food is firstly vaporised in an initial phase and operation is then automatically adjusted for the second “hot air phase” subsequent to a steaming period which depends on the quantity of food in the oven. The baking like professionals operating mode is suitable for:

- any kind of baked products made from yeast dough or sour dough,
- wholegrain bread, rolls made with white flour and yeast gughupf as well as
- flaky pastry products

For the baking like professionals operating mode only the stainless steel baking sheet supplied or baking tins made of glass or porcelain should be used.

4.7.1 Program sequence

1. Filling in water
2. Altitude adjustment
3. Heating with hot air and steam / continued steam heating (steam phase)
4. Continued heating with hot air (hot air phase)
5. Emptying

1. Filling in water

See “1. Filling in water” on page 13.

2. Altitude adjustment

See “2. Altitude adjustment” on page 13.

3. Heating with hot air and steam / continued steam heating (steam phase)

Subsequent to altitude adjustment, the hot air heater will be switched on at full power. When the hot air heater is switched on, the power of the evaporator heater is automatically reduced in order not to exceed the fuse-protected power supply of the single-phase appliance operation.

During the steam phase, the hot air heater heats up the oven to a certain temperature and the oven temperature is regulated by means of an oven temperature sensor.

The production of steam is interrupted if the temperature of steam at the outlet exceeds an empirically deducted threshold value. If the temperature falls short of this threshold value the evaporator heater will be re-activated.

The floor heater is not activated during the baking like professionals operating mode.

The water in the evaporator is constantly monitored by the level sensor and if it falls below a certain level water from the water tank is transported to the evaporator by means of the supply pump.

The period of operation of the steam phase is stipulated and commences after initial actuation of the climatic sensor. (In trial-and-error tests, this is the period of time in which the best results were achieved as far as volume, shape and gloss of the baked products is concerned.)

4. Continued heating with hot air (hot air phase)

The hot air phase commences after the steam phase. The heater in the evaporator is switched off.

The heater remains switched on at full power until the T_{BO} pre-set oven temperature or given oven temperature is reached.

The recommended or pre-set oven temperature is maintained by means of a regulating cycle, which switches the hot air heater on and off respectively.

The supply air flap and the vent flap are opened when the T_{BO} is reached.

The hot air heater and the hot air fan are switched off once the baking like professionals operating mode has been completed by means of pressing the OFF button or when the operation time has expired.

Steam dissipation is not carried out, since the flaps are already opened during the process of continued heating with hot air.

5. Emptying

Emptying is carried out when the hot air phase has been completed.

Emptying the evaporator is carried out in the following steps:

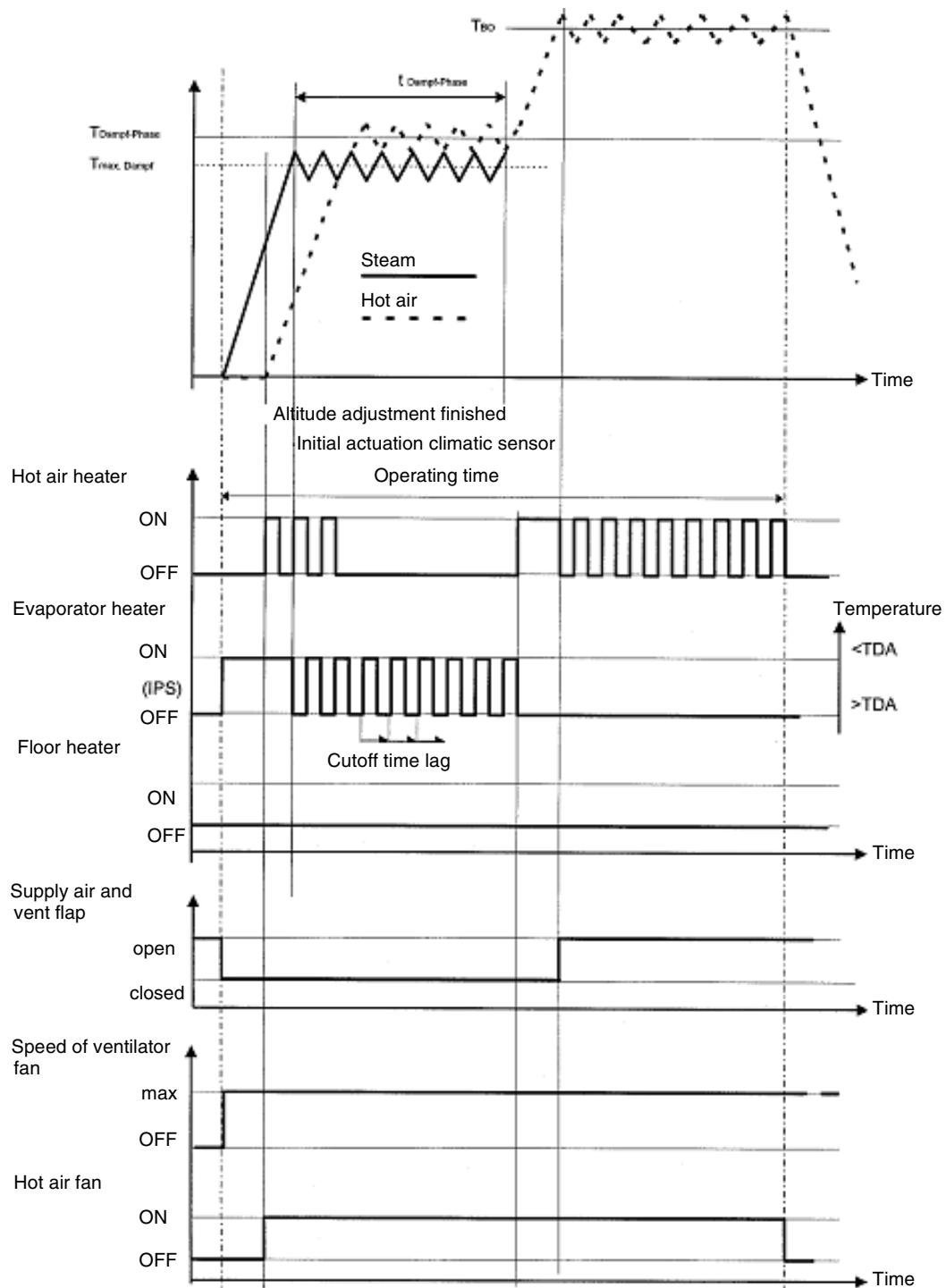
Firstly a check is made to ensure that the water tank has been installed. The process of emptying will not be carried out should this not be the case. During the process of emptying, the clear text display indicates "water is being pumped off".

Irrespective of the water level, the supply pump transports water to the evaporator until the temperature of the water has reached a certain level; however, this occurs with a limit in time. This addition of cold water serves the purpose of lowering the temperature of the water in the evaporator, thus reducing the thermal load in the drain pump and ensuring safety for the user from a thermal point of view.

The drain pump pumps water in the evaporator back into the water tank at a temperature of 70°C. Emptying is carrying out from water level recognition plus a certain follow-on time with a maximum time limit.

Subsequent to emptying "residual heat" is indicated in the clear text display above a certain oven temperature.

4.7.2 Sequence diagram: Baking like professionalsi



4.8 Hot air

Recommended oven temperature: 180°C

Area of application: 30°C to 230°C

On heating with hot air, the air in the oven is heated up by a heater located behind the back wall of the oven and is then circulated evenly throughout the oven by means of the hot air fan. The baked products are therefore heated up from all sides, enabling simultaneous baking at two or three levels. Baking with hot air is suitable for:

- cake mixtures and sponges as well as for meringues.

4.8.1 Program sequence

1. Heating up with hot air
2. Continued hot air heating

1. Hot air heating

The vent flap and the supply air flap remain open. This ensures a sufficient flow of fresh air (approx. 0.7 m/s).

The hot air fan and the hot air heater remain switched on until the pre-set oven temperature has been reached. The ventilator fan is switched on. The clear text display indicates "oven is being heated up".

2. Continued hot air heating

The pre-set oven temperature is maintained by means of a regulating cycle, which switches the hot air heater on and off respectively. The hot air heater and the hot air fan are switched off once the OFF button has been pressed or when the operation time has expired. The clear text display indicates "residual heat" until the temperature falls below a certain level. The ventilator fan also runs for this period of time.

4.9 Hot air with steam vapours

Recommended oven temperature: 180°C

Area of application: 30°C to 230°C

On heating with hot air, the air in the oven is heated up by a heater located behind the back wall of the oven and is then circulated evenly throughout the oven by means of the hot air fan.

The hot air with steam vapour mode is suitable for:

- meat, which remains tender and juicy by means of an initial process of steam vapourisation.

Subsequent to the heating-up phase it is possible to feed additional steam into the oven at any time.

4.9.1 Program sequence

1. Filling in water and hot air heating
2. Altitude adjustment at the same time as heating up with hot air
3. Continued heating with hot air (hot air with vapourisation possible)
4. Steam dissipation
5. Emptying

1. Filling and heating with hot air

See “1. Filling in water” on page 13 and then as follows: simultaneously with activating the supply pump, the hot air fan and the ventilator fan are switched on at a certain setting and the hot-air heater is activated at full power.

As soon as the filling procedure has been completed, the heater in the evaporator is activated at a reduced power due to the safety fuse 16 A, 230 V.

The vent flap and the supply air flap remain open.

2. Altitude adjustment during the procedure of heating up with hot air

Altitude adjustment is carried out during the further procedure of heating up the oven with the hot air heater to the oven temperature set (see “2. Altitude adjustment” on page 13).

A single acoustic sound can be heard once the pre-set oven temperature has been reached. The clear text display indication then changes from

hot air + steam vapours	to	hot air + steam vapours
oven heating up		steam ON and OK

3. Continued hot air heating

The pre-set oven temperature is maintained by means of a regulating cycle, which switches the hot air heater on and off respectively.

4. Steam vaporising

Steam vapours enable an individual supply of steam into the oven in order to improve cooking and baking results. It is only possible to vaporise once the oven has been heated up to the pre-set temperature.

The process of vaporising can then be manually activated or inactivated by means of the OK button. When the process of vaporising is activated, the supply air flaps and the vent flaps are closed.

During the process of vaporising, steam is supplied into the oven until the steam exit temperature (TDA) at the outlet is higher than a certain threshold value. If the temperature falls short of this threshold value the evaporator heater will be re-activated.

Should vapourisation not be activated, the heater in the evaporator will be switched off. The heater will only be switched on again once the water in the evaporator has fallen below a certain temperature. The water temperature in the evaporator is then maintained at this standby level.

5. Steam dissipation

Steam dissipation is only carried out if the climatic sensor has been actuated at a certain point in time prior to completion of cooking (see “5. Steam dissipation” on page 14).

6. Emptying

See “6. Emptying” on page 14.

5. Structure – subassembly – structural components

5.1 Limestone sensor

Limestone sensor and heat protection NTC 25°C/10 k Ω



Heater installed



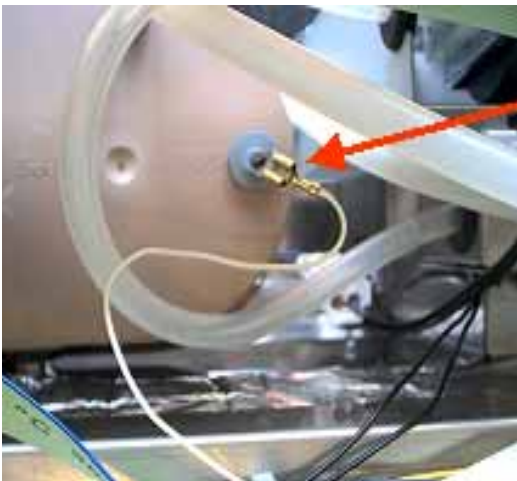
Heater with limestone



Heater dismantled

The amount of scaling is determined as two measured variables, namely the temperature of the heating spiral and the conductance of the level sensor. Scaling on the tubular heating element of the evaporator increases the readings taken on the heating spiral temperature sensor. Scaling is tolerated up to a maximum degree with some difference above the boiling temperature of the water. Until the clear text display gives an indication the permissible maximum degree of scaling must have been exceeded for some time (5 times or approx. 200 operating hours).

5.2 Level sensor (point gauge)



Scaling, initially primarily at the top of the level sensor, lowers the gauged conductance level of the water. Scaling is tolerated up to a maximum degree of conductance. Until the clear text display gives an indication, the permissible maximum degree of scaling must have been exceeded for some time (5 times or approx. 200 operating hours).

If one of the measured variables exceeds the maximum permissible reading, the clear text display will indicate “descale”.

Once the indication has appeared the appliance can continue to operate with steam. However, the effect of the evaporator is minimized when scaling increases.

Since soft water or a domestic descaling device may result in the limestone sensor not actuating, after a certain number of hours of operation and for reasons of hygiene the clear text display will require the user to descale the system.

In order to be able to recognise the water level in the evaporator by means of the level sensor, the average result of 80 readings during a period of 2 sec. (software) is deducted.

5.3 Descale

Program duration: approx. 35 minutes

The “descal” program can be selected with the OK button (menu of the OK button back – user settings – descale).

Descaling comprises the following steps:

- The water tank, which is filled with 0.5 litres of a mixture of equal proportions of descaling agent and water, is recognised.
- For reasons of safety the evaporator is firstly emptied. To do so, the discharge pump is operated for 12 seconds (software).
- The supply pump transports the mixture into the evaporator until the level sensor recognises water, with a certain follow-on time (slightly longer than in the standard function). The mixture is circulated several times and is pumped in and out again.
- After the evaporator has been filled, the mixture in the evaporator is heated up to a certain temperature, thus speeding up the descaling process. The mixture is maintained at this temperature for some time.
- After which the evaporator is emptied until the level recognition is actuated, with a certain follow-on period.

The first rinse is carried out in the following steps:

- The water tank must be removed, emptied and filled with fresh water up to the MAX mark and then reinstalled. On doing so, unauthorised utilisation is secured against by means of a minimum period of 5 seconds (software) between detection, removal and installation of the water tank.
- The rinsing liquid is transported into the evaporator up to the level recognition with a certain, longer, follow-on time. The rinsing liquid is circulated several times.
- Subsequent to circulation the rinsing liquid is heated up to a certain temperature [60°C] (EEPROM) for a certain period [0 sec.] (virtually no heating up!)
- Subsequent to heating up, the rinsing liquid is pumped off until the level recognition is actuated, in addition to a certain follow-on time. Should the rinsing liquid exceed the permissible temperature, the “Empty” program is started.

The second rinse is carried out in the following steps:

- The water tank must be removed, emptied and filled with fresh water up to the MAX mark and then reinstalled. On doing so, unauthorised utilisation is secured against by means of a minimum period of 5 seconds (software) between detection, removal and installation of the water tank.
- The rinsing liquid is transported into the evaporator up to the level recognition with a certain follow-on time. The rinsing liquid is circulated several times.

-
- Subsequent to circulation the rinsing liquid is heated up to a certain temperature [105°C] for a certain period [120 sec.] (time-controlled heating up!).
 - After having been heated up the rinsing liquid is cooled down to a certain temperature at the same time as emptying takes place (see Descale on page 24).
 - The cooled-down rinsing liquid is pumped out of the evaporator into the water tank until the level recognition is actuated, in addition to a certain follow-on time.
 - The process of descaling is only completed when the water tank is removed after two rinsing phases have been fully implemented.

In the event of a power cut during the descaling process, the descaling program will be repeated or will continue with operation from the procedure step (Descale, 1. or 2. Rinse) in which the power was cut off. In addition, all of the indications, apart from the time, will be deleted. The time blinks at 12:00.

Attention! Modification from 2003 on

There are three new setting ranges for the water hardness (soft, medium, hard) among the user adjustment. The medium water hardness is pre-adjusted, covering the usual range from 9 to 20°C German hardness (resp. 16 to 35° C French hardness).

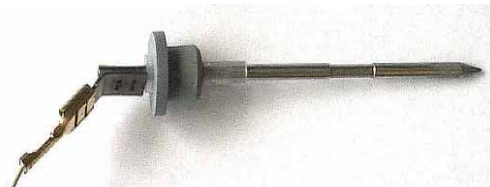
The descaling interval depends from the respective water hardness. For this reason it will be automatically displayed in the clear text display, if descaling is necessary.

5.4 Water system



Water tank, 1.25 litres

Ignition solenoid



5.4.1 Water inlet

If, during a certain period, no water is recognised in the evaporator on filling, the supply of water is discontinued and the clear text display will indicate "Fill up with water". The following may be the cause of a faulty water supply:

- no water or too little water in the water tank
- a faulty supply pump or hoses which are kinked or defect
- a defect or scaled level sensor

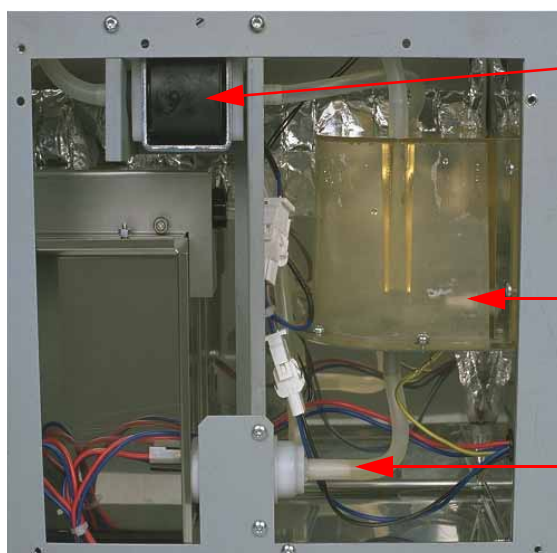
5.4.2 Emptying

In the case of all of the operating modes, emptying is carried out automatically after the OFF button has been pressed or after the cooking time has expired or after completion of steam dissipation, apart from during pure hot air operation.

Firstly the water temperature in the evaporator is determined, and if this exceeds a certain level, water is then pumped out of the water tank into the evaporator by means of the supply pump, up to level recognition by the level sensor, plus a certain follow-on time. This procedure is carried out for the purpose of thermal protection of the discharge pump. Pumping off the water with the discharge pump is also regulated by means of level recognition by the level sensor and a certain follow-on time. Should emptying of the evaporator not be carried out within this maximum period of time, two more attempts will be made. Should it still not be possible to pump off water, the clear text display will indicate "contact F8 service" (emptying faulty).

An essential marginal condition for pumping off the water in the evaporator is a water temperature below a certain level. Should it not be possible to cool the water in the evaporator down to this temperature – because there is insufficient water in the water tank or because the water in the water tank is too warm – the water will not be pumped off. It will only be pumped off when it has cooled itself down to this temperature (this may well take more than 30 minutes!). The appliance is still ready for operation during this period. During this cooling-down process, the clear text display will indicate "water is being pumped off".

Should, shortly before completion of steam operation, a completely full water tank be supplied with more water, the water tank may become overfilled on pumping off.

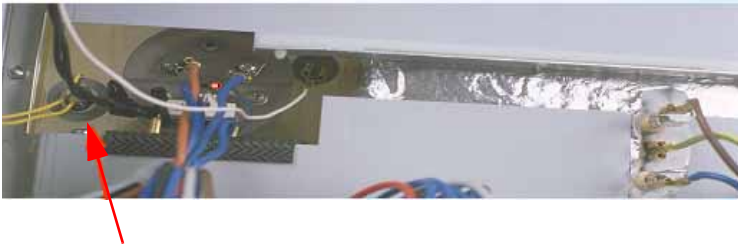


Water pump "Cotec" 230 V~ (lighting)

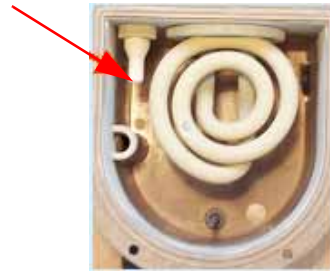
Sensor for altitude adjustment and water
NTC 25°C/100 k Ω

Water pump "Hella" 12 V = (empty)

5.5 Automatic altitude adjustment



Sensor for altitude adjustment and water NTC 25°C/100 kΩ



Altitude adjustment is carried out automatically for the steaming, regenerating, baking like professionals and hot air with steam vapour modes. Automatic altitude adjustment enables the hot air temperature to be regulated with some difference in temperature below the maximum possible steaming temperature. This ensures that the air in the oven is always sufficiently moist and that there are no drying effects on the food.

This maximum possible steam temperature is contingent on the ambient pressure of the appliance. The ambient pressure is primarily affected by the altitude above sea level and by atmospheric pressure and therefore by the weather.

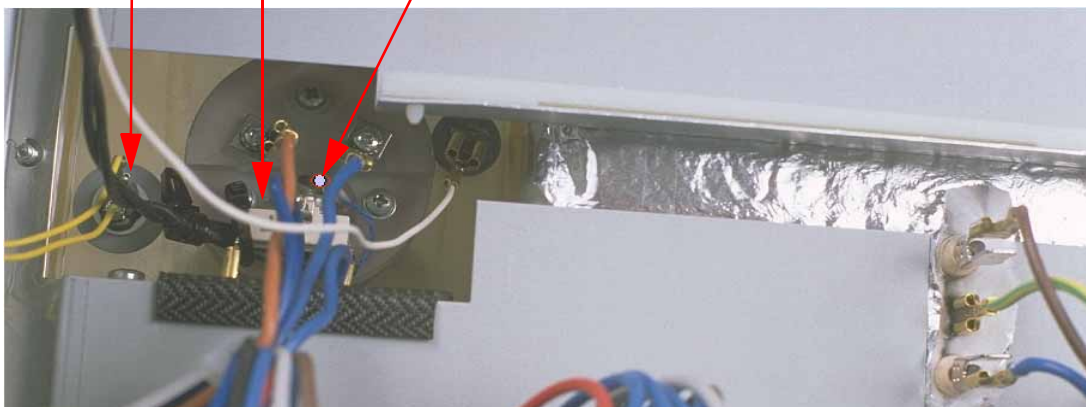
Altitude adjustment is carried out in the following steps:

- The water in the evaporator is heated up with the evaporator heater operating at full power.
- If, during a certain period of time and for the purpose of measuring the temperature in the steam generator, the temperature sensor does not register any change in temperature, this temperature will be taken as the maximum possible water temperature and therefore also as the maximum possible steam temperature.
- Should, during the process of altitude adjustment and within a certain period of time, the water temperature not rise above a certain level, the clear text display will indicate "F7: call service" (evaporator heater defect).

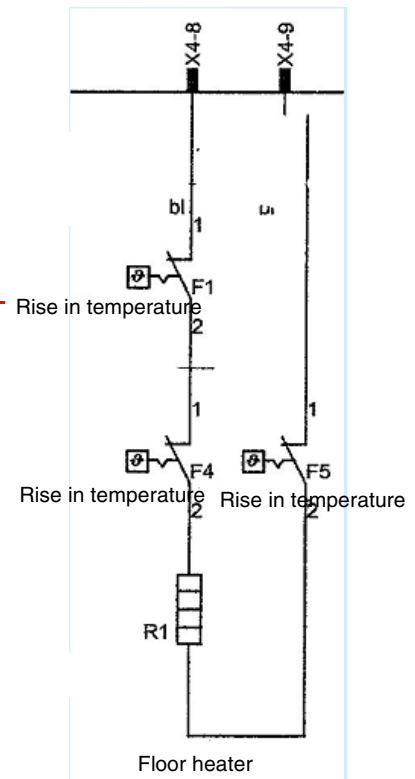
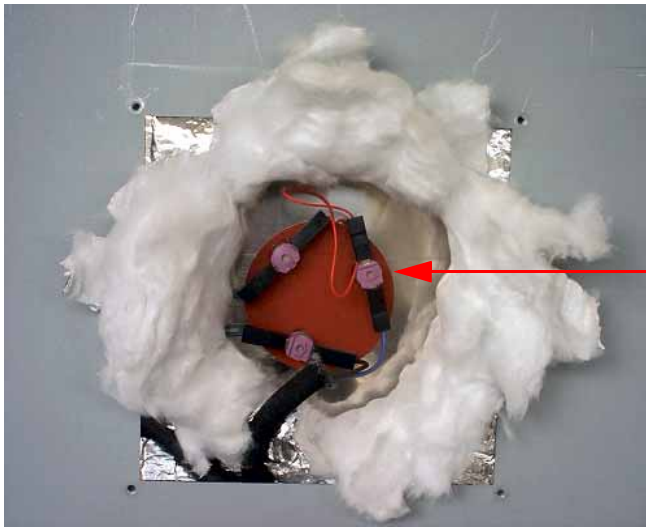
Sensor for altitude adjustment and water NTC 25°C/100 kΩ

Evaporator heater with protection against an excessive rise in temperature

Limestone sensor and heater protector NTC 25°C/10kΩ



5.6 Floor heater 140 W with protection against an excessive rise in temperature



The floor heater serves the purpose of reducing the quantity of condensate on the floor of the oven. The quantity of water required during the cooking process can also be reduced by means of repeated evaporation.

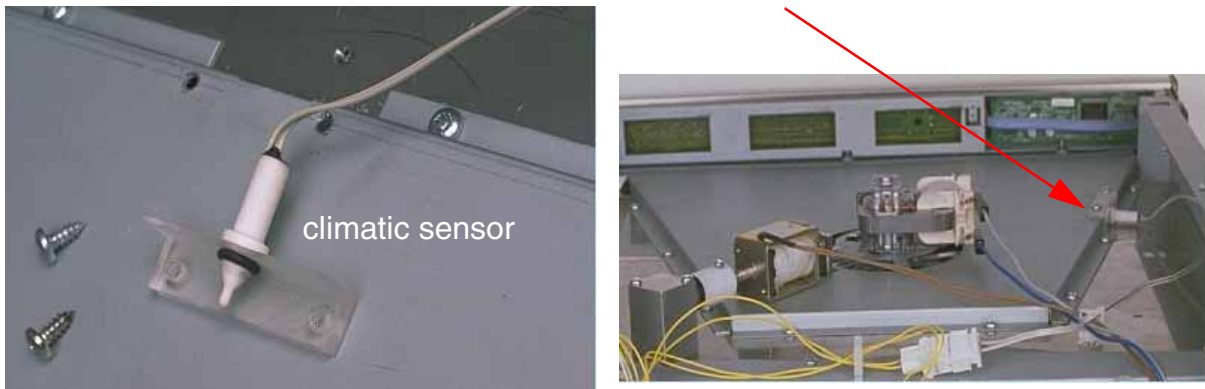
The floor heater is only activated in the steam cooking mode.

After completion of altitude adjustment, the floor heater is clocked at reduced power. On initial actuation of the climatic sensor, the floor heater is switched on at full power after a certain delay.

Should the door of the oven be opened during a cooking mode, the floor heater will commence heating at a reduced rate. The heater only works at full power again after a certain delay subsequent to initial actuation of the climatic sensor.

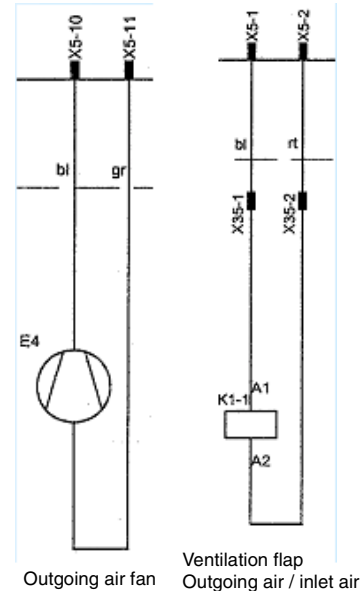
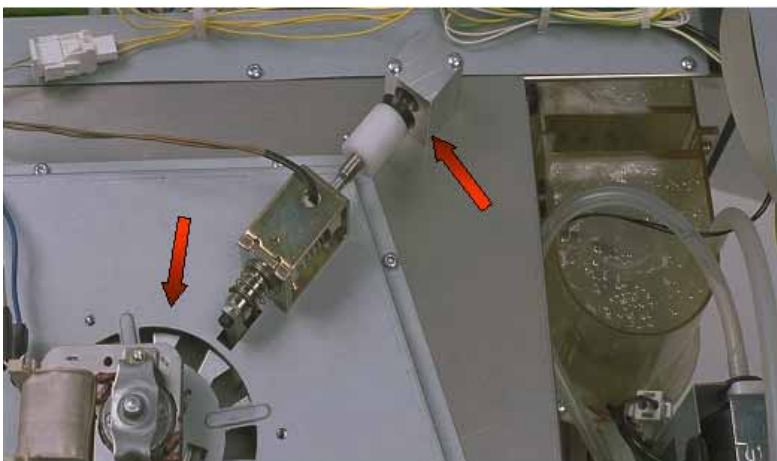
The floor heater is equipped with a cutoff time lag which reacts to non-actuation of the climatic sensor by switching off the floor heater. This occurs with some delay. The following switch-on of the evaporator or the resulting actuation of the climatic sensor means that the floor heater is switched on again, initially with reduced power and then, as described above, at full power.

5.7 Recognising a steam leak with the climatic sensor



Leaks, such as those caused by damaged or dirty door sealing, insufficient sealing of the hot air motor shaft, open vent flaps, blocked steam emissions, climatic sensors which are full of water or anything similar, will distort the temperature reading of the climatic sensor. A possible distortion of this nature is determined by monitoring the measurement of the temperature on the climatic sensor. Should, over a certain period, the steam temperature fall below the threshold value for the climatic sensor, the difference between the maximum and minimum temperature of the climatic sensor is determined. Should this reading fall below a certain reading, the F9 fault indication: “contact service” (steam leakage monitor actuated) will be shown on the clear text display.

5.8 Fan, follow-on time and steam dissipation



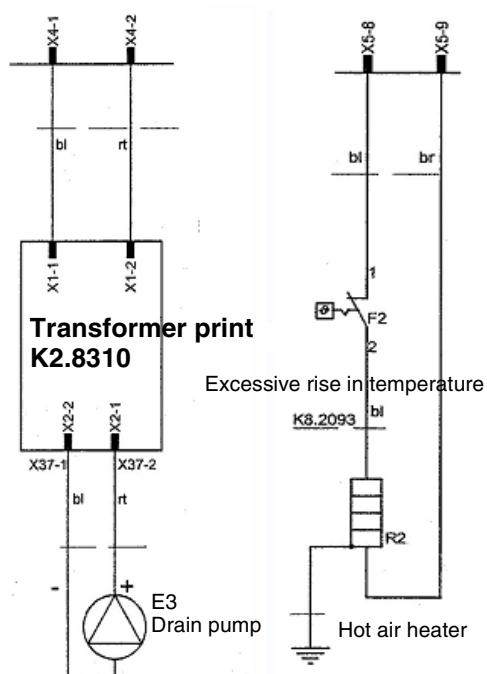
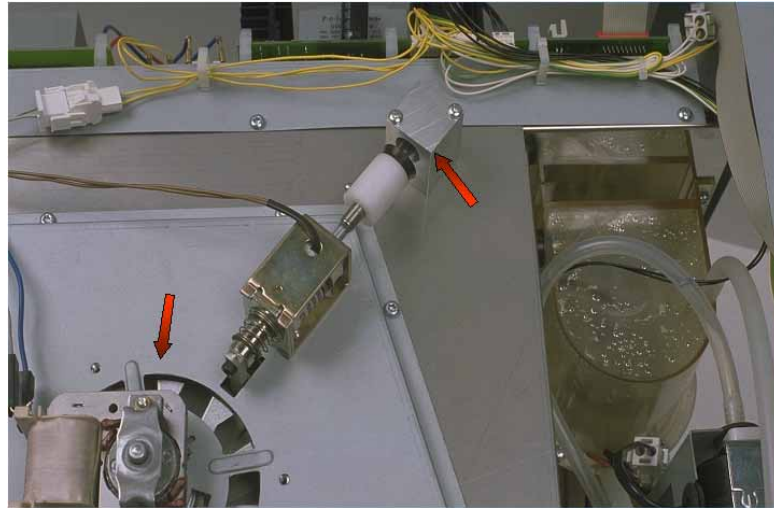
By means of air circulation, the temperature-regulated follow-on time of the ventilator fan serves the purpose of achieving a certain drying effect in the oven and on the ventilating system.

This involves the ventilator fan and the hot air fan being operated with opened inlet air flaps and vent flaps at a certain setting until the oven temperature has fallen below a certain level.

During the operating modes steaming, regenerating and, if so required, hot air with steam vapours, an additional active process of steam dissipation takes place.

5.9 Slide with a magnetic lifting cylinder

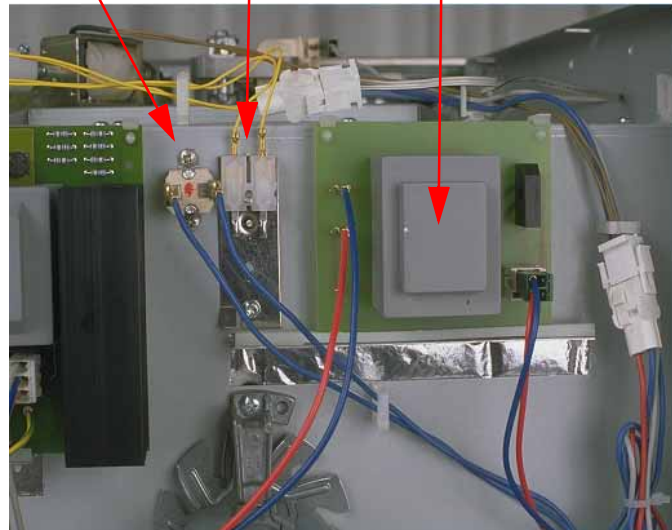
Please note! On steaming, inlet air and outgoing air of the oven are closed.



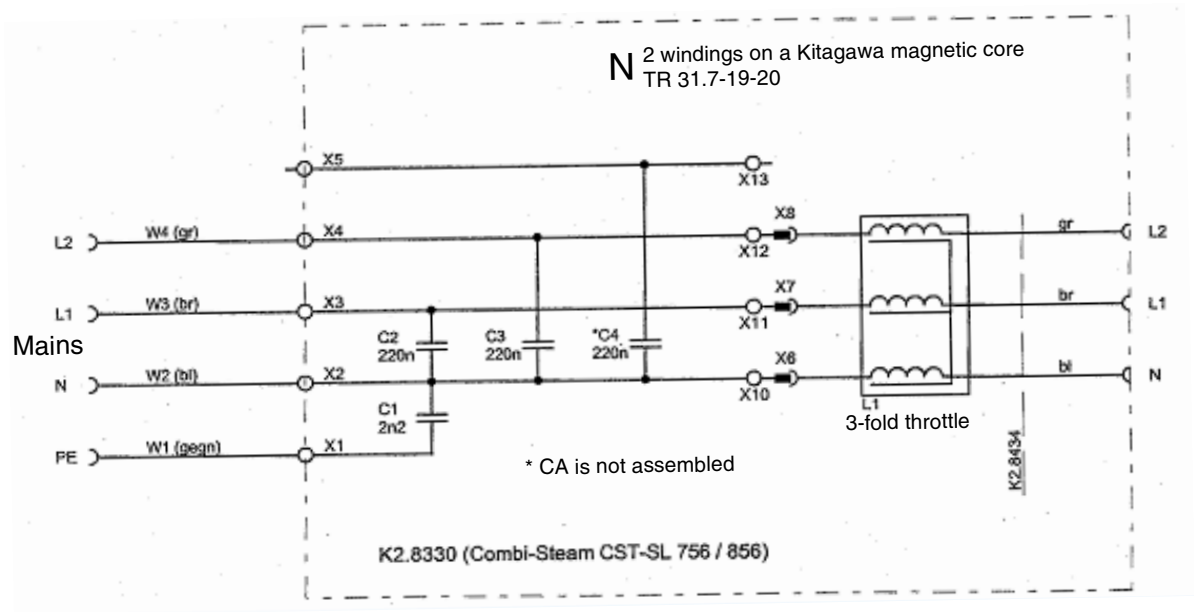
Protection against an excessive rise in oven temperature

PT 500

12 V transformer for the water pump (return)



5.10 Electric connecting box



Breakdown

In the event of a breakdown, for example, on opening the door, settings such as operational mode, oven temperature and core temperature, operating time and switch-off time are maintained. Timing comes to a halt.

Breakdown	Press	Baking like professionals	Regenerating	Hot air	Hot air with steam vapours
on opening the door the watertank must be filled up	all heaters off, hot air fan off	steam phase: all heaters off, hot air fan on hot air phase: hot air heater and fan off	all heaters off, hot air fan off	hot air heaters and hot air fan off should $T_{\text{required}} \geq 100^{\circ}\text{C}$	all heaters off, hot air fan off, flaps open

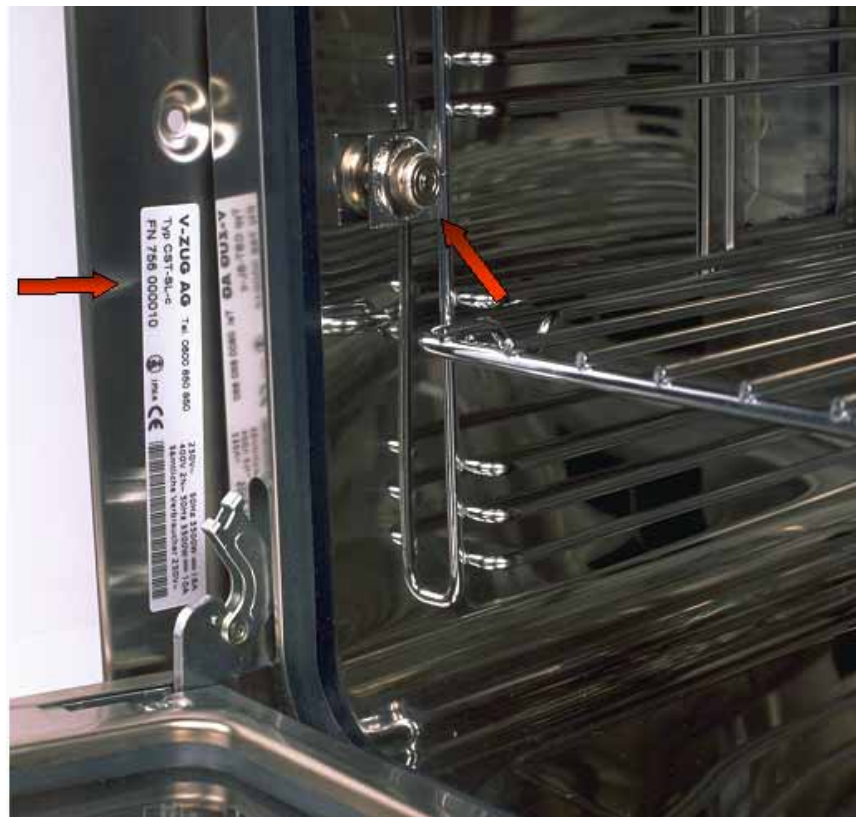
Termination of operation

Terminating operation with the OFF button immediately results in the operating mode, oven temperature and core temperature, operating time and switch-off time settings being deleted and the emptying of the evaporator being indicated on the clear text display and being carried out, should it have been possible to reduce the water temperature down to a certain level. At the end of time-regulated operation, settings such as operating mode, oven temperature and core temperature are maintained on standby for 3 minutes (software), so that it is possible to extend the cooking time individually. In the case of baking like professionals only the hot air phase is extended. After the standby time has lapsed, the appliance will be emptied and switched off automatically.

5.11 Removing the guide rack

Pull to hook out the locking devices at the front of the guide racks.

Name plate



6. Modifications to the electronic packaged circuits

General

The following is a brief description of the most important modifications.

Identification

Electronic packaged circuits are indicated by means of an article no. and an additional version index which is separated by a hyphen. (Identification example: W1.2345-6, i.e. the version or the latest modification = 6). Marking is in the form of a stamp or an adhesive plate and is found on the visible side of the printed circuit board.

Replacement maxim

On replacement, the index of the newly-installed electronic packaged circuit may never be lower than the index of the packaged circuit which has been replaced (at least the same level). The adjusted reference inputs of the predecessor are also to be adopted.

Calculator versions

In the case of electronic packaged circuits with micro-controllers, the circuit model identification will **also include the software version and the process data, indicated separately.**

- a) The packaged circuit version indicates the electronic circuit version. Significant changes to the software or to the process data will also have an effect on the packaged circuit index. Identification is carried out by means of an adhesive plate or a stamp. In the service test mode it will **not** be possible to see the version.
- b) The **software version** indicates the software version that has been permanently "burnt into" the micro-controller. Identification is carried out by means of lettering on the micro-controller. The version can also be seen in the test mode.
- c) The **process version** is the process data version which has been loaded onto the erasable data storage. The process version can only be seen in the service test mode; there is **no** identification on the data storage medium.

Calculator as a series:

- K2.8460-0** Available as of approx. Dec. 2002, series installation
 - a) Contains software version -0 (note: computers as of Feb. 03 supply 110mA of electricity for the slider motor, while older versions only supply 80mA).
- K2.8460-1** Available as of approx. March 2003.
Changes in comparison to the previous model:
 - a) Comprises software version-1
 - b) Has an RC module in order to be able to better clear the discharge pump of faults
- K2.8460-2** Available as of approx. July 2003.
Changes in comparison to the previous model:
 - a) Hardware has been modified: electricity for the slider motor has once again been raised from 110mA to 160mA

Calculator in the customer service model:**K2.84601 (for V-ZUG service), K2.84602 (for partner service), K2.84603, K2.84604**

- 0 Available as of approx. Jan. 2002
Series comprises software version -0 and process version -1.
(Note: calculators as of Feb. 2003 supply 110mA of electricity for the slider motor, while older versions only supply 80mA).
- 1 Available as of approx. April 2003
 - a) Comprises software version -1.
(Process still version 1)
 - b) Has an RC module in order to be able to better clear the discharge pump of faults
- 2 Available as of approx. July 2003.
Changes in comparison to the previous model:
 - a) Hardware has been modified: electricity for the slider motor has once again been raised from 110mA to 160mA.

Software versions

- K2.8469-0** Available as of approx. Dec. 2002
Series installation
- K2.8469-01** Available as of approx. March 2003
Changes in comparison to the previous model:
 - a) Floor heating is switched on during the process of "recovery".

Process versions:**K2.8413 (for V-ZUG), K2.8483 (for partners), K2.8484, K2.8485**

- 0 Available as of approx. Dec. 2002
Series installation
- 1 Available as of approx. Jan. 2003
Changes in comparison to the previous model:
 - a) Settings for the slider motor controls improved.

Control versions:

- K2.8470-0** Available as of Dec. 2003
Series installation

7. Error and alarm messages

Should the control system have recognized a fault, it will firstly switch off all of the consumers and indicate a corresponding A-alarm message or F or U-fault message.

There are four groups of fault messages which, depending on the reason for the fault, can be rectified by users themselves or by skilled customer service staff only:

- **Reference messages**

are usually not an indication of a defect in the appliance; instead, they request that the user takes some kind of action. A procedure in operation is only interrupted if this becomes necessary. Reference messages are indicated by a respective test on the display, e.g. "fill up water", "close the door", etc.).

Acknowledging an A-alarm message

In the case of the "install the water tank", "fill up water" and "please close the door" messages, the current program will be discontinued until the fault has been rectified and the OK button has been pressed. The "water is being pumped off" message goes off by itself once the pumping procedure has been completed or a new program has been selected.

- **A-alarm messages**

are faults which users can rectify themselves and which would have a negative effect on the appliance or put it out of working order if not rectified. The EKDG 6800.0 only has one A-alarm message, which can only occur at the end of a procedure and which is indicated by means of the text "Boiler scaled. Please descale!" on the clear text display. An "A10" fault, unlike U and F fault messages, is not indicated.

Acknowledging an A-alarm message

A-alarm messages can always be acknowledged by pressing any button. Should the fault still occur, the next procedure will be followed by a renewed alarm message.

- **F-fault messages**

indicate defects which can usually only be rectified by the KÜPPERSBUSCH customer service and which would put the appliance out of working order if not rectified (defect sensors or actuators, etc.). They can occur at any time and will immediately interrupt any procedure which is in operation. F-fault messages are shown in the clear text display as "call Fx Service", with "Fx" blinking and "x" being a number between 0 and 9. With the ZUG eye, customer service can find out exactly why the fault occurred.

Acknowledging F-fault messages

F-fault messages are acknowledged by pressing any button. The acknowledgement will only be accepted when the fault no longer occurs. Otherwise the fault message will be indicated again, either immediately or during the next procedure.

- **U-fault messages**

indicate defects in the network which can usually only be rectified by customer service or by an electrical technician. They are only indicated when the controls have been reset (for example, a power cut or connection to the mains). Mains interruptions during operation are not indicated.

U-fault messages are shown in the clear text display as "Ux El. connection error", with "Ux" blinking and "x" being a number between 1 and 4. With the ZUG eye, customer service can find out exactly why the fault occurred.

Acknowledging U-fault messages

U-fault messages cannot be acknowledged; they disappear by themselves as soon as the fault has been rectified.

Depending on the cause of the fault, there are two principle possibilities to reset:

- resetable: Users can acknowledge the fault message by pressing a button. If there is still reason for the fault, there will be a renewed fault indication, either immediately or during the next program. The cause of the fault must be firstly be removed (F-fault messages / A-alarm messages).
- self-resetting: The fault message will be independently reset by the appliance controls once there is no longer any reason for the fault to occur (U-fault messages, reference messages).

7.1 Overview of reference messages

Reference message on the display	Description
Insert the water tank	There is no water tank or it has been incorrectly inserted
Fill up with water	The water tank is empty
Please close the door	The door is open
Water is being pumped off	The boiler will be emptied as soon as the water temperature is below 70°C

7.2 Overview of the F-fault messages (procedure faults)

7.2.1 EKDG 6800.0

Fault	Description
F 0	Oven temperature gauge defect (Pt500)
F 1	Food temperature gauge defect (NTC)
F 2	Water temperature gauge defect (NTC)
F 3	Steam temperature gauge defect (NTC)
F 4	Heating spiral temperature gauge defect (NTC)
F 5	Data security (EEPROM) defect
F 7	Boiler heater defect
F 8	Emptying defect
F 9	Steam leakage monitor actuated

7.2.2 EKDG 6800.0-75

Fault	Description
F 0	Oven temperature gauge defect (Pt500)
F 1	Food temperature gauge defect (NTC)
F 2	Water temperature gauge defect (NTC)
F 3	Air temperature gauge defect (NTC)
F 4	Motor current
F 5	Data security (EEPROM) defect
F 7	Water temperature incorrect
F 8	Water resistance defect
F 9	Air temperature

7.3 Overview of information, alarm and error signals for the EKDG 6800.0-75

Signal	Faulty diagnosis of the micro-controller	Possible causes of the fault
Add water	Water resistance remains high although the pump is switched on (level pin does not conduct).	Besides a lack of water in the tank, the following may also be the cause: <ol style="list-style-type: none"> 1. The supply pump does not transport sufficiently (swivel arm/hose blocked or crushed) 2. Wiring to the level pin faulty (interruption, loose contact, etc.) 3. Earth circuit on the evaporation heater or on the calculator interrupted.
Evaporator calcified	Water resistance only becomes low on additional pumping (level pin conduction delayed) or the maximum number of heating hours has been reached.	Besides calcification the following may also be the cause: <ol style="list-style-type: none"> 1. The supply pump does not transport sufficiently (swivel arm/hose blocked or crushed). Note: signal only after 5 occurrences. 2. Water insufficiently conductive (demineralised water used?) 3. Insulation layer on the pin (unsuitable descaler used or residues?)
F0	Resistance of the oven temperature gauge (Pt500) beyond the permissible range	<ol style="list-style-type: none"> 1. Short in the oven temperature gauge, interruption 2. Faulty wiring (interruption, short-circuit, loose contact, etc.) 3. Calculator defect, possibly as a result of moisture
F1	Resistance of the food temperature gauge (NTC) beyond the permissible range.	<ol style="list-style-type: none"> 1. Food temperature gauge short-circuit, interruption, seeping in of moisture, etc., or the socket defect. 2. Faulty wiring (interruption, short-circuit, loose contact, etc.) 3. Calculator defect, possibly as a result of moisture
F2	Resistance of the water temperature gauge (NTC) beyond the permissible range	<ol style="list-style-type: none"> 1. Water temperature gauge short circuit, interruption, seeping in of moisture, etc. 2. Faulty wiring (interruption, short-circuit, loose contact, etc.) 3. Calculator defect, possibly as a result of moisture

Signal	Faulty diagnosis of the micro-controller	Possible causes of the fault
F3	Resistance of the air temperature gauge (NTC) beyond the permissible range	<ol style="list-style-type: none"> 1. Air temperature sensor short circuit, interruption 2. Faulty wiring (interruption, short-circuit, loose contact, etc.) 3. Calculator defect, possibly as a result of moisture
F4	Motor current of the exhaust air slider does not rise sufficiently in the final position.	<ol style="list-style-type: none"> 1. The motor exhaust air slider races, mechanism defect 2. Faulty wiring (interruption, loose contact, etc.) 3. Calculator defect, possibly as a result of moisture
F5	Data backup faulty (EEPROM)	<ol style="list-style-type: none"> 1. Calculator defect (component faulty, EMC influences, moisture, dirt, etc.)
F7	Water temperature does not rise sufficiently	<ol style="list-style-type: none"> 1. Heater defect, interruption in the Strix flange (overheating protection device), etc. 2. Faulty wiring (interruption, loose contact, etc.) 3. Water temperature gauge does not react (probe plug dirty, etc.) 4. Calculator defect (relay, etc.)
F8	Water resistance remains low although water is being pumped off (level pin remains conductive).	<ol style="list-style-type: none"> 1. Discharge pump transports insufficiently (tube blocked or crushed) 2. Level pin wiring short circuit 3. Foam in the evaporator casing (unsuitable descaling agent) 4. Calculator defect, possibly as a result of moisture.
F9	Air temperature does not rise sufficiently	<ol style="list-style-type: none"> 1. Too much cold food put into the oven (for steaming a max. of 2 kg frozen food allowed) 2. Exhaust air slider/motor stuck or defect (in the case of initial series appliances with a rated frequency of below 300, replace the calculator too; as of Feb. 2003 the calculators supply 110 mA instead of only 80 mA). 3. Steam hole blocked. 4. Oven has a leak (loss of steam, door not closed properly?) 5. Air temperature probe gauges temperature incorrectly, "gets stuck". 6. Faulty wiring (interruption, loose contact, etc.) 7. Calculator defect, possibly as a result of moisture.

Signal	Faulty diagnosis of the micro-controller	Possible causes of the fault
No signal	Heater for hot air does not heat up.	<ol style="list-style-type: none"> 1. There is no supply on the L2 terminal of the calculator (instructions for installation observed?) 2. Heater defect, interruption 3. Thermostat F6 activated (manual resetting) 4. Faulty wiring (interruption, short-circuit, loose contact, etc.) 5. Calculator defect (relay, etc.)

For further details on the error signals, see the K2.8425 functional description “safety and monitoring functions”. Error signals are acknowledged by pressing any button. Acknowledgement is only accepted if the error no longer occurs. Otherwise there will be another error signal, either immediately or during the next process.

Demo mode

Function: In the demo mode no heaters are switched on and there are no error signals.

Switching on or off: Keep the “**lighting**” button pressed and then press the buttons “**time**” + “**timer**” + “**switch-on duration time**” + “**switch-off time**” simultaneously. Acknowledgement will be carried out by means of “**demo mode on**” or “**demo mode off**” in the display for 3 seconds.

7.4 Overview of the U-fault messages (power supply faults)

Fault	Description
U 1	PE faulty (no earthed conductor or one of a poor quality?)
U 2	Supply voltage too high (N-L1 mixed up?)
U 3	L1 voltage too low
U 4	L1 voltage too high

7.5 Wrong behaviour

7.5.1 Functional description of the power supply

The power supply is only monitored when the appliance has been RESET (for example, after a power cut). In the case of a connection error, the fault is indicated accordingly and the appliance will not work. If individual half-waves are interrupted (power failure), the EEPROM data storage will be write-protected.

Please note! The entire system of voltage monitoring resets itself, i.e. as soon as there is no longer any cause for a fault to occur, the appliance will be ready for operation.

Fault mechanisms of the power supply monitoring system

The power supply monitoring system checks the following power supply criteria:

- is the PE earthed conductor connected?
- has a terminal wire been connected instead of the N zero conductor (excessive voltage on N)?
- is there any under-voltage or excessive voltage on the terminal wire L1? The supply voltages of the terminal wire L1 and the zero conductor N are balanced on the basis of summation in the microcontroller. Every 1.64 ms, the momentary values of the voltage inputs are added up to one sum total. After 256 readings the sum totals are stored and calculation recommences. A measuring cycle therefore lasts for approximately 420 ms (21 power cycles).

Should the earthed conductor PE not be connected, approximately 0 volt will be gauged on all of the voltage inputs. The sum total of the terminal wire L1 is checked at a minimal limiting value for this criteria. The exact limiting values of the power supply monitoring system are summarised, and the algorithms for calculation of the summation are deducted from the respective hardware documents.

The controls of the appliance will react as follows in the case of a problem:

- After a RESET (connection to the power supply, power cut) the connection to the power supply is checked. In the event of a fault all of the actuators remain switched off and one of the U1 to U4 fault messages - depending on the cause of the fault - is indicated on the display. The controls remain blocked until the power supply is in order (self-resetting) or until the appliance has been disconnected from the power supply and the fault has been rectified.

In order to be able to recognise power cuts at an early stage, the power supply of the terminal wire L1 is checked every 1.64 ms. Should the power fall below a certain threshold value over approximately 23 ms or should the power exceed a certain threshold value twice in a row, the control system will presume a half-wave failure, which would be an indication of an imminent power cut. In this case, writing in the EEPROM data storage is then immediately inhibited. However, a writing procedure which had already been commenced can still be completed properly. When the half-waves have once again been correctly detected, the EEPROM storage access will automatically be released after approx. 32 ms.

Recognising a power cut has no influence on the carrying out of the procedures.

The controls will continue until the RESET switch is actuated in the event of a genuine power cut.

Possible causes of faults

- PE earthed conductor not connected
- Terminal wire L1 connected to the zero conductor N
- Under-voltage or excessive voltage on the terminal wire L1
- Electromagnetic faults

7.5.2 Oven temperature sensor PT 500

The oven temperature recording is monitored for short circuits and interruptions in the sensor and in the reference resistance. In the case of a malfunction, an error is indicated.



RESISTANCE DEPENDING ON THE TEMPERATURE

Temperature (°C)	Resistance(Ω)
0	500
200	539.7
40	579.2
100	696.15
200	886.4
250	979.35
280	1034.45
500	1422.45

Fault mechanisms

A meter is incremented every 200µs in order to calculate the discharge time.

If the time for discharging the reference resistance is lower than 400* 200µs (metre reading ■ 400 is an indication of a resistance short circuit) or if it is higher than 1500* 200µs (metre reading ■ 1500 means a resistance interruption), the error message F0 will be indicated on the display.

If the time for discharging the Pr500 resistance is lower than 150* 200µs (metre reading ■ 150 is an indication of a resistance short circuit) or if it is higher than 1500* 200µs (metre reading ■ 1500 means a resistance interruption), the error message F0 will be indicated on the display.

In the event of a fault, the appliance control system switches off all of the actuators and switches over to fault mode. It is not possible to start up a program until the fault has been rectified.

Please note! The stability of the PT 500 characteristic is guaranteed by the manufacturer within the tolerance levels and is not monitored by the software.

Possible causes of faults

- PT500 or reference resistance defect (short circuit, interruption)
- Discharge capacitor defect (short circuit, discontinuity)
- Wiring defect (plug connections, cable discontinuity, cable short circuit).
- Wiring on the control device defect (filter capacitor defect, strip conductors excessively resistant).

7.5.3 Food temperature sensor



RESISTANCE SEQUENCE

T (°C)	R (kΩ)	R _{TOL} (± %)	T _{TOL} (± %)
25	50.0		
30	40.3		
35	32.7		
40	26.6	6.1	
45	21.9	5.9	1.5
50	18.0	5.7	
55	14.9	3.7	
60	12.4	3.6	
65	10.4	3.5	
70	8.76	3.4	1.0
75	7.40	3.3	
80	6.28	3.2	
85	5.35	2.2	
90	4.58	4.6	
95	3.93	4.5	1.5
100	3.39	4.4	

Fault mechanisms

As soon as the output voltage of the temperature sensor wiring is below approx. 0.07 V (binary data ■ 4 “means a sensor short circuit”), or as soon as the voltage exceeds approx. 4.9 V (binary data ■ 252 means a “sensor interruption”), the display will show the fault indication F1. The mean value of the binary data checked is taken in the appliance software over 16 readings.

In the event of a fault, the appliance control system switches off all of the actuators and switches over to fault mode. It is not possible to start a procedure with a food sensor inserted until the fault has been rectified or the food sensor has been removed.

Please note! The stability of the temperature sensor characteristic is guaranteed by the manufacturer within the tolerance levels and is not monitored by the software.

Possible causes of faults

- NTC temperature sensor defect (short circuit, discontinuity, etc.)
- Wiring defect (plug connections, cable discontinuity, cable short circuit)
- Plug-in mechanism defect

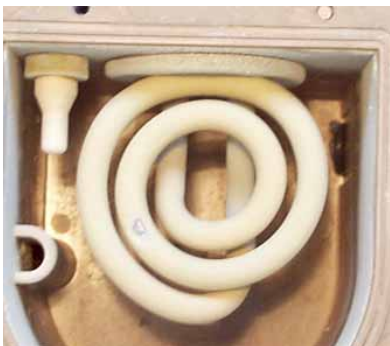
Technical data

Sensor element	resistance NTC
Resistance at + 25 °C	50k Ω
Temperature gauging range	+40 °C... + 100 °C
Accuracy of measurement	see table
Temperature stability	-10 °C... +250 °C for the sensor element (up to +260 °C short-term) -10 °C... +270 °C for cables and handles (distance to the infrared heater \geq 100 mm)
Electric strength between connections and casing ¹⁾	casing electrically connected with connection 2
Thermal time control ²⁾	approx. 6 sec.
Cable and handle colour	approx. RAL 8019 /grey-brown

- 1) It is absolutely essential that the sensor casing (connection 2) be earthed, depending on the safety category of the electronics system connected.
- 2) Definition "thermal time control": response time to 63 °C (0 - 63% of the terminal value) in the case of a sudden change in temperature from 25 to 85 °C, sensor fully immersed in liquid (in this case 50 mm test immersion depth).

7.5.4 Water temperature sensor

Gauging the water temperature is monitored for sensor short cuts and sensor interruptions. In the case of a malfunction, an error is indicated.

**Fault mechanisms**

As soon as the output voltage of the temperature sensor wiring is below approx. 0.2 V (binary data \geq 10 "means a sensor short circuit"), or as soon as the voltage exceeds approx. 4.9 V (binary data \geq 252 means a "sensor interruption"), the display will show an F2 fault. The mean value of the binary data checked is taken in the appliance software over 16 readings.

In the event of a fault, the appliance control system switches off all of the actuators and switches over to fault mode. It is not possible to start up a program until the fault has been rectified.

Please note!

The stability of the temperature sensor characteristic is guaranteed by the manufacturer within the tolerance levels and is not monitored by the software.

Possible causes of faults

- NTC temperature sensor defect (short circuit, discontinuity)
- Wiring defect (plug connections, cable discontinuity, cable short circuit)
- Wiring on the control device defect (filter capacitor defect, strip conductors excessively resistant)

7.5.5 Heating spiral sensor and steam temperature sensor

The gauging of the heating spiral temperature and the steam temperature is monitored for sensor short cuts and sensor interruptions respectively. In the case of a malfunction, an error is indicated. The boiler is also switched off if the heating spiral temperature is excessively high.



Fault mechanisms

As soon as the output voltage of the temperature sensor wiring is below approx. 0.2 V (binary data ■ 10 “means a sensor short circuit”), or as soon as the voltage exceeds approx. 4.9 V (binary data ■ 252 means a “sensor interruption”), the display will indicate an F3 fault. The mean value of the binary data checked is taken in the appliance software over 16 readings.

In the event of a fault, the appliance control system switches off all of the actuators and switches over to fault mode. It is not possible to start up a program until the fault has been rectified.

If the heating spiral temperature exceeds a maximum level (EEPROM parameter), the boiler heater is switched off in order to protect the heater (no fault indication).

Please note! The stability of the temperature sensor characteristic is guaranteed by the manufacturer within the tolerance levels and is not monitored by the software.

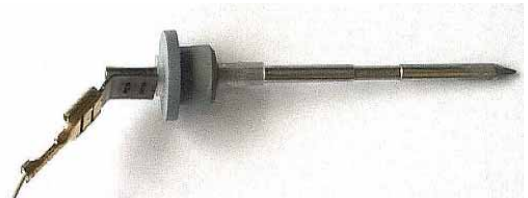
Possible causes of faults

- NTC temperature sensor defect (short circuit, discontinuity)
- Wiring defect (plug connections, cable discontinuity, cable short circuit)
- Wiring on the control device defect (strip conductors are excessively resistant)

7.5.6 Water level pin

The water level pin is only indirectly monitored for short circuits. If, on emptying the boiler (see chapter «Emptying» beginning page 27), the level pin still detects water after pumping has been carried out several times (e.g. short circuit), a fault message will appear. An interruption of the level pin will be recognised indirectly on filling up the boiler.

In addition the water level pin is monitored for scaling.



Should the water level pin detect water all the time (e.g. short circuit), this will be recognized on emptying the boiler. Subsequent to several attempts to pump off (reading in EEPROM), an F8 fault will be indicated.

If the water level pin does not detect any water on filling up the boiler (for example, because of an interruption) the control system will presume that the water tank is empty and will indicate “fill up with water”. **When the user fills up with water and presses the OK button the boiler will be filled until it overflows and the water will seep into the oven!**

If, during standby operation or after a program has been completed, the level pin still recognizes water, the emptying function of the monitoring system will pump the remaining water out of the boiler.

The indication “water is being pumped off” will be shown. It is possible to restart a program at any time. Once the boiler has been filled up at the beginning of the procedure, the conductance of the water level pin is checked. If it exceeds a certain level (EEPROM parameter), this is an indication that the pin is scaled and the limestone metre in EEPROM is raised by one level. Once the metre has reached a certain level (EEPROM reading) the alarm message “Boiler scaled. Please descale” will appear at the end of the procedure.

Please note! The process of emptying is influenced by water level measurement limiting values stipulated in the EEPROM data storage.

7.5.7 Boiler heater

When the boiler heater is switched on the water temperature is monitored during the process of altitude adjustment. A fault is indicated if the water temperature no longer rises and if it has not reached a certain level within a stipulated period of time.



The boiler heater is checked during altitude adjustment, which is carried out prior to each respective steaming phase. If, with the boiler heater switched on, the water temperature no longer rises within a period of approx. 6 minutes and if it has not reached a temperature of at least 88°C, an F7 fault is indicated.

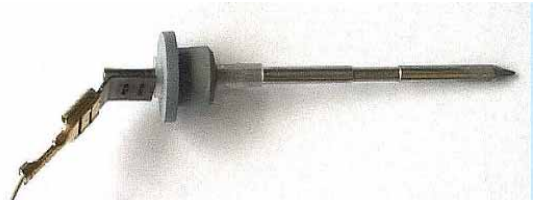
In the event of a fault, the appliance control system switches off all of the actuators and switches over to fault mode. The fault can be acknowledged with any button. It will occur again during the next steam operation mode if the fault is not rectified.

Possible causes of faults

- Heater defect (protection against an excessive rise in temperature of the heater, etc.)
- Water temperature measurement devices defect (NTC temperature sensor, wiring, etc.)
- Trigger switch defect (all-or-nothing relay, driver setting, etc.)
- Wiring defect (plug connections, cable discontinuity, cable short circuit, etc.)
- Undervoltage

7.5.8 Emptying

The maximum pumping off time during the process of emptying is monitored. If, after a certain period of time, the water level pin still detects water, a fault will be indicated.



Fault mechanisms

The pumping-off procedure will be repeated if the water level pin still recognises water (EEPROM parameter) subsequent to the emptying time (EEPROM parameter) during the process of emptying. If, after several pumping-off procedures (EEPROM parameter) the water level pin still recognises water, the display will indicate an F8 fault.

In the event of a fault, the appliance control system switches off all of the actuators and switches over to fault mode. The fault can be acknowledged with any button. It will, however, re-occur if the cause of the fault is not rectified.

Please note! The process of emptying is influenced by process parameters of the systems function "Empty" stipulated in the EEPROM data storage.

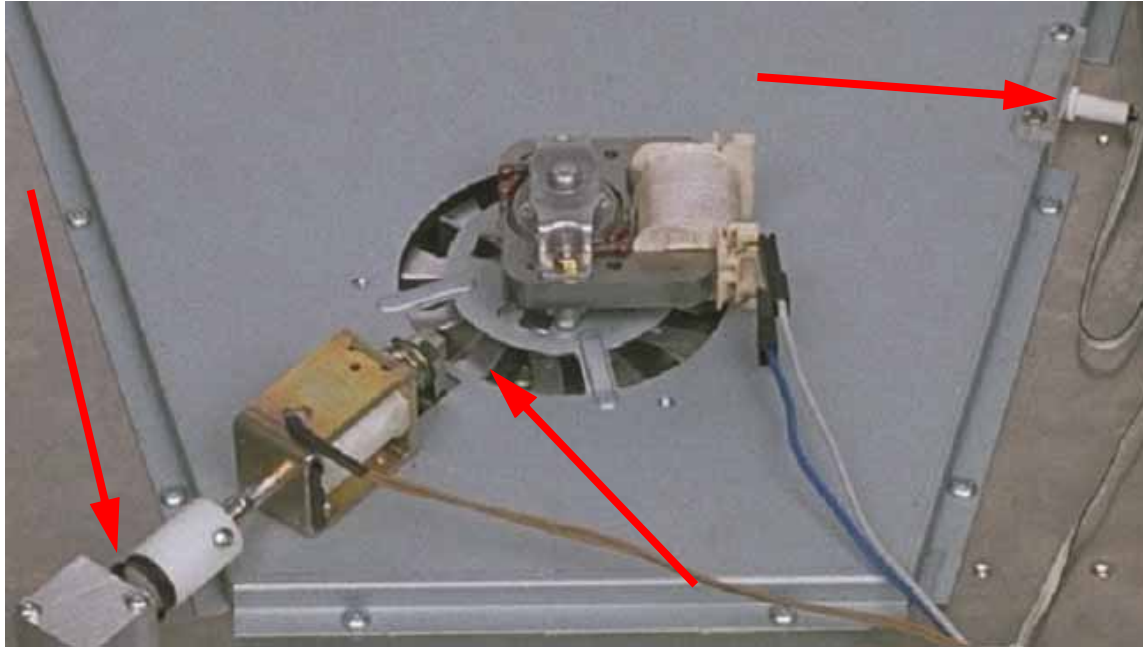
Possible causes of faults

- Discharge pump defect or blocked
- Wiring defect (plug connections, cable discontinuity, cable short circuit, etc.)
- Water level gauging disturbed / faulty (water level pin dirty, wiring, bridge between the water level pin and the earth)
- The water temperature exceeds 70°C

7.5.9 Steam leak

Fault mechanisms

A fault will be indicated if, during a stipulated period of time, a certain degree of lifting in the case of the steam temperature is not reached.



The steam leakage monitoring system is active if the boiler is switched on and the operating mode “hot air with vaporisation” has not been selected. The temperature of the steam must reach a certain temperature lifting within a stipulated period of time (EEPROM parameter), otherwise an F9 fault will be indicated. The steam temperature measured fluctuates quite greatly if there is no steam leakage. In the event of a fault, the appliance control system switches off all of the actuators and switches over to fault mode. The fault can be acknowledged with any button. It will, however, re-occur if the cause of the fault is not rectified.

Please note! The process of monitoring steam leakages is influenced by process parameters stipulated in the EEPROM data storage.

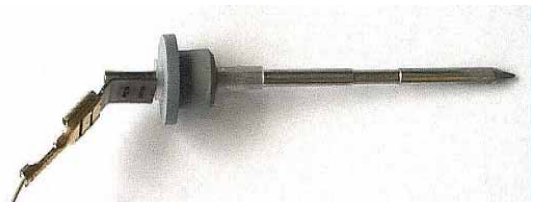
Possible causes of faults

- NTC temperature sensor defect (short circuit, discontinuity, etc.)
- Wiring defect (plug connections, cable discontinuity, cable short circuit)
- Wiring on the control device defect (filter capacitor defect, strip conductors excessively resistant)
- Outgoing air flap defect or the oven has a leak (loss of steam)

7.5.10 Boiler and water level pin scaled

Fault mechanism

Scaling of the boiler is detected during the process of altitude adjustment. If the difference between the temperatures of the heating spiral and the water, taken with several measurements, is too great, or if the water level pin has been recognized as being scaled several times, an alarm message will be indicated.



If the temperature no longer rises on altitude adjustment, the maximum recorded heater spiral temperature and water temperature are compared. Should the heater spiral temperature be higher by a certain level (EEPROM parameter), the boiler will be recognised as being scaled. The boiler is also considered to be scaled if, subsequent to initial filling of the boiler, the conductance of the water shortly before altitude adjustment is above a certain level (water level pin scaled, EEPROM value). If the boiler has been recognized as being scaled several times (EEPROM parameter), an **alarm message "A10"** will be indicated at the end of the current program.

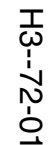
Possible causes of faults

- Boiler and water level pin scaled
- Boiler scaled
- Water level pin scaled
- The appliance is located at an altitude of more than 3,500 m above sea level

8. Circuit diagrams

See next pages.

For internal use only



Circuit diagram legend

Anschlusskasten	Connecting box
VFD-Display	VFD display
Netzfilter	Power filter
Bedienteil	Control
Prog. Gerät	Prog. appliance
Rechner	Calculator
Treiber	Drive
Drehgeber	Shaft encoder
ZUG Auge Sender	ZUG eye transmitter
ZUG Auge Empfänger	ZUG eye receiver
Tasteneingang	Key input
Heizung Boiler	Boiler heater
Trafoprint	Transformer print
Ablaufpumpe	Drain pump
Einlaufpumpe	Inflow pump
Garraum Beleuchtung	Oven lighting
Heizung Bodenmatte	Floor heater
Übertemperatur	Over temperature
Lüfterklappe Zuluft / Abluft	Inlet air / outgoing air ventilation flap
Heissluftventilator	Hot air fan
Heizung Heissluft	Hot air heater
Abluftventilator	Outgoing air fan
Türkontakt	Door contact
Wasserbehälter	Water tank
Oven temperature	Oven temperature
Heizwendeltemperatur	Heating spiral temperature
Wassertemperatur	Water temperature
Wasserniveau	Water level
Dampfsensor	Steam sensor
Gargutsensor	Food sensor
Rechner	Calculator