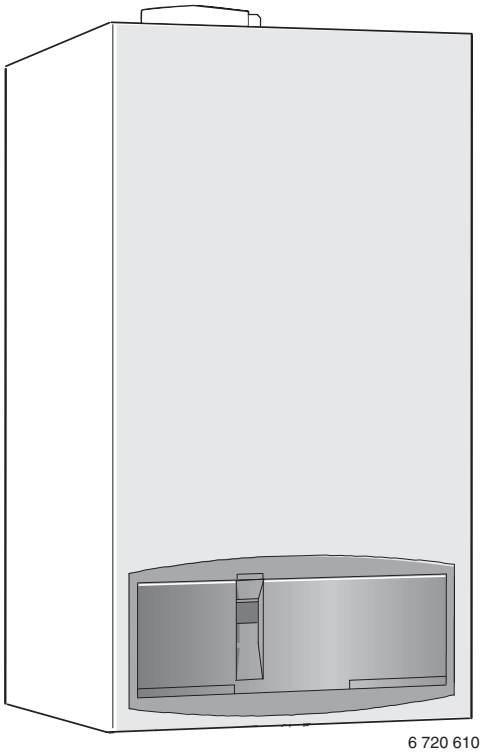
Service booklet for the Engineer for Gas Condensing Boilers



6 720 610 577-00.10

ZWB 7-29 CC1 GC-Number: 47 108 05
ZB 7-28 CS1 GC-Number: 41 108 02
ZWB 7-27 HE combi GC-Number: 47 311 55
ZWB 7-25 HE combi GC-Number: 47 311 73
ZWB 7-30 HE combi GC-Number: 47 311 74
ZB 7-27 HE system GC-Number: 41 311 49
ZB 7-28 HE system GC-Number: 41 311 58
Greenstar 29 HE Conventional GC-Number: Natural Gas: 41 311 56; LPG: 41 311 57

7 181 465 346 GB (03.02) OSW

WORCESTER
Bosch Group

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Warnings

Repairs

- ▶ Repairs may only be carried out by an approved installer!
- ▶ Before carrying out any work on the appliance, switch it off at the master switch!
- ▶ Even when the appliance is switched off at the master switch, some components on the PCB control board inside the control box are still live. Therefore:
- ▶ Before carrying out any work on the electrical parts of the appliance fully disconnect it from the power supply (e. g. by means of fuse or circuit breaker)!
- ▶ Flue ducting must not be modified in any way.
- ▶ Use only original spare parts!

Instructions to the customer

- ▶ Explain to the customer how the appliance works and how to operate it.
- ▶ Advise the customer that he/she must not make any modifications to the appliance or carry out any repairs on it.

Symbols

Safety instructions in this document are identified by a warning-triangle symbol and are printed on a grey background.

Signal words indicate the seriousness of the hazard in terms of the consequences of not following the safety instructions.

- **Caution** indicates that minor damage to property could result.
- **Warning** indicates that minor personal injury or serious damage to property could result.
- **Danger** indicates that serious personal injury could result. In particularly serious cases, lives could be at risk.

Notes are identified by the symbol shown on the left. They are bordered by horizontal lines above and below the text.

Notes contain important information in cases where there is no risk of personal injury or damage to property.

1 Layout of Appliance

1.1 combi

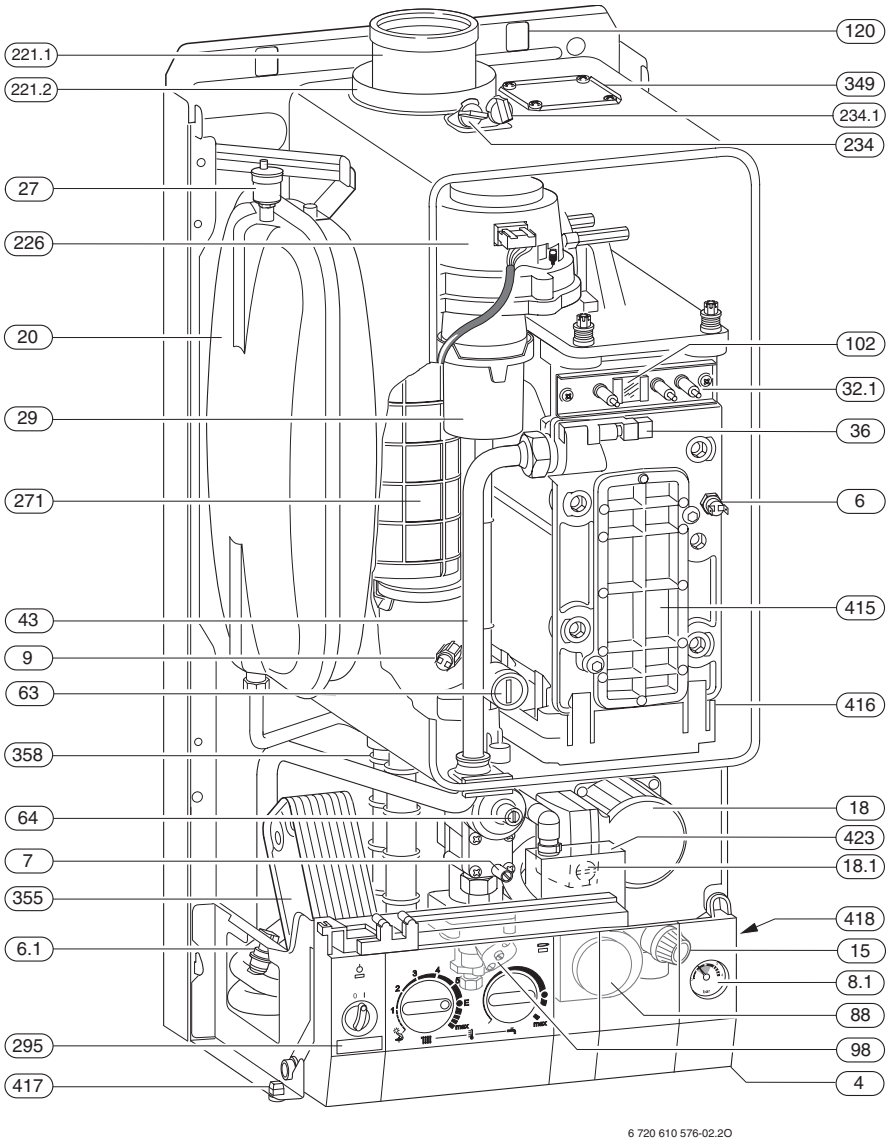

Fig. 1

4 Heatronic control
6 Heat exchanger safety temperature limiter
6.1 Hot water NTC sensor
7 Testing point for gas supply pressure
8.1 Pressure gauge
9 Flue gas temperature limiter
15 Relief valve
18 Pump
18.1 Pump speed selector switch
20 Expansion vessel
27 Automatic air vent
29 Air gas Mixer unit
32.1 Electrode assembly
36 Temperature sensor in CH flow
43 CH flow
63 Adjustable gas flow restrictor
64 Adjusting screw for min. gas flow volume
88 3-way valve (combi)
98 DHW flow switch (combi)
102 Inspection window
120 Fixing points
221.1 Flue duct
221.2 Combustion air intake
226 Fan assembly
295 Appliance type sticker
234 Testing point for combustion products
234.1 Testing point for combustion air
271 Flue duct
349 Cover plate for twin flue duct connection
355 Plate-type domestic hot water heat exchanger
358 Condensate trap
415 Cover plate for cleaning access
416 Condensate collector
417 Clip for fixing outer case
418 Data plate
423 Siphon

1.2 system

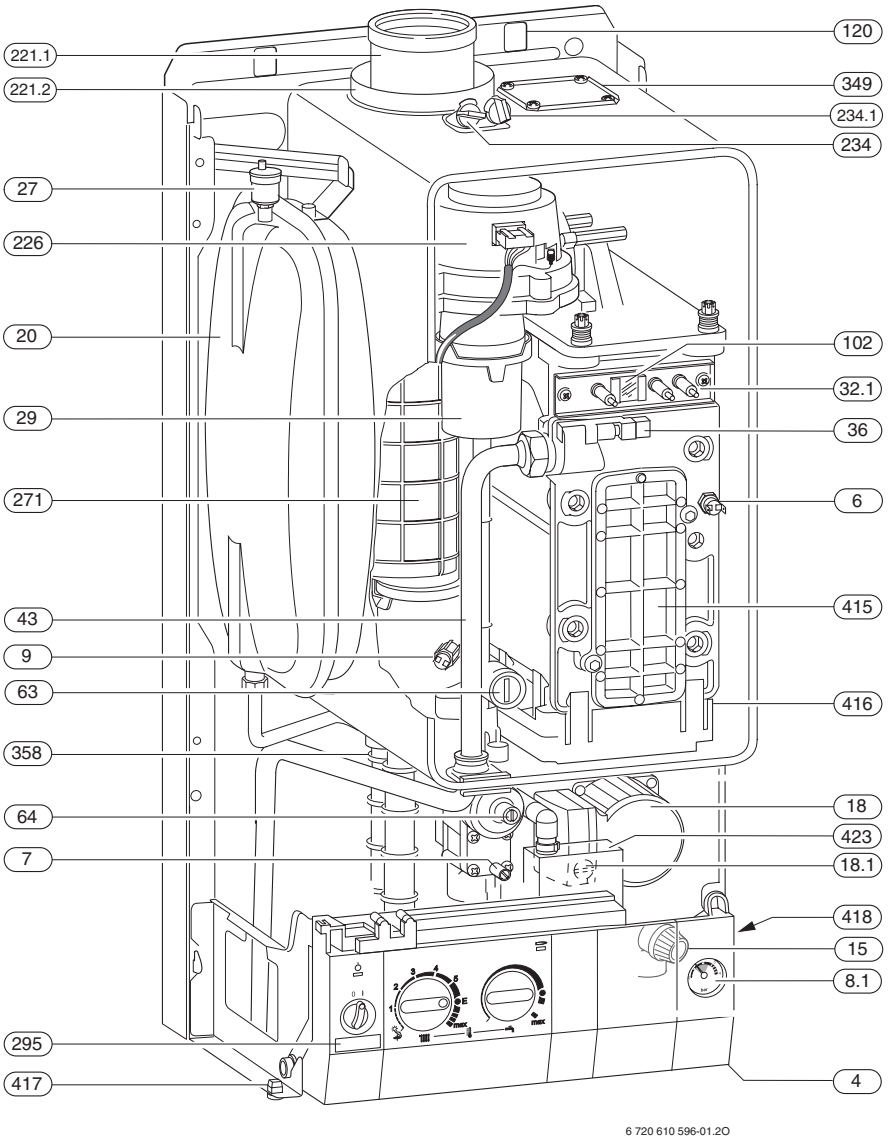

Fig. 2

4 Heatronic control
6 Heat exchanger safety temperature limiter
7 Testing point for gas supply pressure
8.1 Pressure gauge
9 Flue gas temperature limiter
15 Relief valve
18 Pump
18.1 Pump speed selector switch
20 Expansion vessel
27 Automatic air vent
29 Air gas Mixer unit
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415 Cover plate for cleaning access
416 Condensate collector
417 Clip for fixing outer case
418 Data plate
423 Siphon

2 Bosch Heatronic board functions

2.1 Initialisation

When it is switched on, the appliance performs a self-test which takes about 5 seconds. While the test is in progress, the display shows the following sequence of codes:

P1 -> **P2** -> **P3** -> **P4** -> **P5** -> **P6**

On completion of the test sequence the appliance is ready for operation.

2.2 Temperature display

The display shows the current flow temperature in central heating and hot water modes. The display range extends from 00 °C to 99 °C.

If a service function requires the display of a temperature greater than 99 °C, the display alternates between initially showing the first digit and then the remaining two digits.
E.g.: display showing **1.** followed by **69.** indicates **169°C**.

For outside temperatures, the display shows a minus sign followed by the negative temperature in alternation.

2.3 Indication of faults

Faults are indicated by a letter code. This helps to identify and eliminate the cause of the fault quickly and reliably.

The fault codes displayed are grouped into four categories:

- **Category 1:**
  The appliance is disabled until it has been switched off and then on again.
- **Category 2:**
  The appliance is disabled until the cause of the fault has been eliminated.
- **Category 3:**
  The appliance continues to operate with limited function.
- **Category 4:**
  The appliance is disabled and locked (⚠ flashes) until the cause of the fault has been eliminated and the appliance unlocked.

Unlocking the appliance:

▶ Press and hold the ⚠ button until the display shows **– –** .

2.4 Special programme visualisation

The display shows for example 45 _ _ 45 (continuous working at the minimum sanitary/heating power)

The display shows alternatively the temperature and _ _. The function is memorised in the Service mode.

- The appliance works continuously at the sanitary or heating minimum power.

▶ Press the button 🔧 until the symbol _ _ appears on the display.
The button 🔧 is lighted.

▶ Turn the temperature control until function **2.0** appears on the display.
After a short delay, the display shows **1** for minimum output.

▶ Turn the temperature control completely anti-clockwise until the display shows **0** .

▶ Press the button 🔧 until the symbol **[ ]** appears on the display.
The display shows the heating outlet temperature.

The display shows for example 55 ¯ ¯ 55 (continuous working at the maximum power)

The display shows alternatively the temperature and ¯ ¯. The function is memorised in the Service mode.

- The appliance works continuously at the maximum power.

▶ Press the button 🔧 until the symbol ¯ ¯ appears on the display.
The button 🔧 is lighted.

▶ Turn the temperature control until function **2.0** appears on the display.
After about 5 seconds the display will show **2** for the maximum power.

▶ Turn the temperature control completely anti-clockwise until the display shows **0** .

▶ Press the button 🔧 until the symbol **[ ]** appears on the display.
The display shows the heating outlet temperature.

Display shows 45 -II- 45 (trap filling programme)

The trap filling programme ensures that the condensation trap is filled after the appliance is first installed or if it has been switched off for a long period.

The trap filling programme is activated if:

- the appliance is switched on at the master switch
- the burner has not been in operation for at least 48 hours
- the appliance is switched from summer to winter mode.

The next time the central heating or heat store calls for heat, the appliance is held at a low heat output for 15 minutes. The display shows **-II-** in alternation with the CH flow temperature.The factory setting is **1** (enabled).

If the condensation trap is not filled with water, flue gas can escape!

- The trap filling programme should only be disabled in order to carry out servicing work.
- Always re-enable the trap filling programme after completing servicing work.

To switch off the trap filling programme to carry out servicing work:

- Press and hold the and buttons simultaneously until the display shows **= =**.
  The and buttons will light up.
- Turn the temperature control until the display shows **8.5**.
  After a short delay, the display then shows the trap filling programme setting (**1.** = Enabled).
- Turn the temperature control until the display shows **0.** (= Disabled).
  The display and the and buttons will flash.
- Press and hold the and buttons simultaneously until the display shows **[ ]**.
  The trap filling programme is now disabled.
- Regulate the temperature control and the temperature control on the previously set positions.
  The display shows the heating outlet temperature.

Display shows $_0{}^0$ (venting function)

The first time the appliance is switched on, it automatically activates a one-off venting sequence in which the heating pump switches on and off at intervals for about 8 minutes.

This function can be activated on Service Level 2, Service Code 7.3, if it is required at any other time.

2.5 Boiler service functions

2.5.1 First Service Level

Operating

In order to change or check the values of the service functions:

- Press the button until the symbol - - appears on the display.
  The button is lighted.
- Turn the temperature control until the desired function number appears on the display.

Once changed or checked the function value:

- Press the button until the symbol **[ ]** appears on the display.
  The display shows the heating outlet temperature.
- Regulate the temperature control and the temperature control on the previously set positions.

In order to reset the main menu function values to their default values:

- Power OFF the appliance.
- Press the button and keep it pressed.
- Switch on the appliance, press and hold the button until the
  display shows **r1** followed by **[ ]**.

Values that can be modified:

	Description	Display	Reset Value
.0	Show the last error code.	0 - FF	Clear only
2.0	Identification of the function mode (0 = normal, 1= min, 2 = max)	0 - 2	0
2.2	Identification of the pump function mode	1 - 3	2
2.3	Max. output in heat store heating mode	28 - 99	99
2.4	Anti-cycle time[1)]	0 - 15 min	3 min
2.5	Max. CH flow temperature	35 - 88°C	88°C
2.6	Minimum hysteresis in heating mode (ΔT)	0 - 30 K	0 K
2.7	Activation of automatic anti-cycle time (0 = Disabled; 1 = Enabled)	0, 1	1
3.4	Pump mode	0 - 3	2)

Table 1 First Service Level; Values that can be modified

1) If appliance is used in conjunction with type TA... programmer, only effective if Service Code 2.7 is set to “0” (= "Disabled")!
2) The reset value is dependent on the code plug.

Values that can only be read:

i	Description	Display	Reset Value
.1	Heating outlet temperature.	0 - 99°C	-
.2	Sanitary outlet temperature.	0 - 99°C	-
.3	Heat store NTC sensor (ZSB.)	0 - 99°C	
.4	Constant hot water NTC sensor (ZWB.)	0 - 99°C	-
1.2	Order no. for code plug: 8 714 411 XXX	0 - 255	-
1.4	Temperature voltage signal (Terminal 2) from room thermostat (eg. TRQ 21, TR 100)	5 - 22 VDC	-
1.5	Specified CH flow temperature from programmer	0 - 99°C	-
1.6	Outside temperature from TA 211 E or room temperature from TR 212 E	-20 +30°C	-
1.7	Status TR 2 (0 = Not present 1 = Frost protection 3 = Auto 4 = Day, Night 5=Error)	0 - 4	-
1.8	Terminal 2 on programmer interface module	0 - 24 VDC	-
1.9	Identification code for the external module: 0, 2, 4, 5 = no module connected, 3 = ADM, 6 = TA 211E, 53 = ADM, 56 = TR 212 E).	0 - 8, 53, 56	-
2.9	Instantaneous power.	0 - 99 %	-
3.0	Fan speed	0 - 105	-
3.3	Quality of the ionisation signal: 0 = no ionisation, 1 = weak ionisation, 2 = medium ionisation, 3 = high ionisation.	0 - 3	-
3.6	Software version	3 x 2 positions	-

Table 2 First Service Level; Values that can only be read

Values that can only be read - only left display digit:

i	Description	Display XY	Reset Value
3.9	External switch (points 8 - 9).	0 = closed 1 = Heating demand	-
4.1	External demand for heat via LSM	0 = closed 1 = Heating demand	-
4.2	Programmable clock: 1st channel (Heating).	0 = closed 1 = Heating demand	-
4.3	Automatic pump shut OFF with RAM module (point 5)	0 = closed 1 = Heating demand	-
4.4	Heating demand.	0 = closed 1 = Heating demand	-
4.5	Sanitary demand.	0 = closed 1 = Heating demand	-

Table 3 First Service Level; Values that can only be read - only left display digit

Values that can only be read - only right display digit:

i	Description	Display XY	Reset Value
3.9	External 2-point demand for heat via 230 V AC (Terminals Ls - Lr)	0 = closed 1 = Heating demand	-
4.0	Heat store demand for heat via heat store thermostat (Terminals 7-9)	0 = closed 1 = Heating demand	-
4.1	LSM Enable	0 = closed 1 = Heating demand	-
4.2	Programmable clock: 2nd channel (DHW – Maintaining).	0 = closed 1 = Heating demand	-
4.3	Heating demand from TA 211 E	0 = closed 1 = Heating demand	-
4.4	Heat store demand for heat via heat store NTC sensor	0 = closed 1 = Heating demand	-
4.5	Sanitary heat exchanger temperature maintaining.	0 = closed 1 = Heating demand	-
4.6	Anti-cycle time	0 = closed 1 = Heating demand	-

Table 4 First Service Level; Values that can only be read - only right display digit

2.5.2 Secondary Service Level

Operation

In order to change or check the values of the service functions:

- Press buttons and simultaneously until the symbol = = appears on the display.
  The buttons and are lighted.
- Turn the temperature control until the desired function number appears on the display.

Once changed or checked the function value:

- Press buttons and simultaneously until the symbol **[ ]** appears on the display.
  The display shows the heating outlet temperature.
- Regulate the temperature control and the temperature control on the previously set positions.

To reset all settings on Service Levels **1 and 2** to the factory setting:

- Power OFF the appliance.
- Press buttons and simultaneously and keep them pressed.
- Switch on appliance, press and hold the and buttons until the display shows **r2** followed by **[ ]**.

Values that can be modified:

	Description	Display	Reset Value
5.0	Reduced max. heating output	0 - 99 % and sealed	99
5.1	Continuous ignition (for testing ignition without gas)	0 = off 1 = on	0
5.5	Increased min. heating and heat store charging output	0 - 99 %	0
5.9	Starting speed option (if flame propagation is poor, set high starting speed)	0 = First start at low speed; 1 = First start at high speed)	0
6.7	Pump deactivation in HW mode, ZW only.	0 = off, 1 = on	1
6.8	Cycle time for heat exchanger constant hot water function on ZW model.	0 - 60 min	0
6.9	Constant hot water	0 - 30 min	3
7.3	Venting function	0 = off, 1 = On for 8 cycles then permanently off (i.e. set to 0) 2 = on	1
7.7	Temperature-dependent output reduction	0 = off; 1 = Heating on 2 = Hot water on 3 = Heating and hot water on	3
8.5	Trap filling programme	0 = off 1 = on	1

Table 5 Secondary Service Level; Values that can be modified

Values that can only be read:

i	Description	Display	Reset Value
5.2	Automatic gas igniter status and/or fault	00 - FF	-
9.3	Automatic gas igniter Asic fault code	00 - FF	-

Table 6 Secondary Service Level; Values that can only be read

3 Failure identification procedure

3.1 Notes on using the fault code tables

The procedure is best described with the aid of an example:

- Work through the table from top to bottom and from left to right.
- First make a note of the present settings and restore them before leaving the appliance.
- Read question **1.** (Check column)and depending on the answer (yes or no) read the action required from the relevant box and carry out the instruction given; ignore the other answer. **For example:** if the burner flame is visible, follow the instructions for **yes**, i.e. ↓5.!
- ↓5. means go to number 5., ignoring the steps in between.

In this example: check the flue is clear by testing the CO_2 level.

- If the appliance is locked (⚠ button is flashing), press the ⚠ button. **Important:** after unlocking the appliance, **always** restart it (i.e. switch off and then on again). Only then is it possible to say whether or not the fault has been eliminated.
- If the fault has been rectified, the appliance will then start up without indicating a fault and the fault isolation procedure is complete.
- If the fault is still present after performing the action specified and, if necessary, restarting the appliance, move on to the next step in the fault isolation procedure.
- If another fault code is displayed, work through the fault code table for that code.

EA and ⚠ flashing.

Flame not detected

	Check		Action
			▶ Note the setting of the temperature controls and .
1.	Is a burner flame visible?	**yes:**	↓ 5.
		no:	↓ 2.
2.	Is the gas cock turned on?	**yes:**	↓ 5.
		no:	▶ Open the gas cock. ▶ Press ⚠, restart the appliance. EA? ↓3.
3.	Has the thermal cut-out on the gas cock tripped?	**yes:**	...
		no:	↓ ...
4. ...	...		
5. ...	Problem with flue? ▶ Check CO_2 level in combustion air. Is CO_2 level above 0,2 % ?	**yes:**	Check flue.
		no:	↓ ...
			Return to normal operation: ▶ Press the button until the symbol **[ ]** appears on the display. ▶ Regulate the temperature control and the temperature control on the previously set positions.

Table 7

3.2 Summary

3.2.1 Appliance faults

Appliance faults	Category	ZB ...A	ZB ...A Conventional	ZWB ...A	Page
A5	3			X	15
A7	3			X	17
A8	3	X	X	X	19
AC	3	X	X	X	20
Ad	3	X			22
b1	2	X	X	X	24
C1	2	X	X	X	25
CC	3	X	X	X	26
d3	2	X	X	X	27
E2	2	X	X	X	28
E9	4	X	X	X	30
EA	4	X	X	X	32
F0	4/ 2	X	X	X	37
F7	4	X	X	X	38
FA	4	X	X	X	39
Fd	4	X	X	X	41

Table 8

3.2.2 Faults that are not displayed

Appliance faults	ZB ...A	ZWB ...A	Page
Excessive burner noise, rumbling noises	X	X	42
Flue gas levels incorrect, CO level too high	X	X	43
Ignition too harsh, ignition poor.	X	X	44
Boiler indicates P1, P2, P3 at start-up and then restarts with P1,...	X	X	46
Loose or broken contact on heat store NTC sensor	X	X	46
Specified CH flow temperature from TA... programmer exceeded	X	X	47

Table 9

Programmer faults	TR 2 and TR 212 E	TA 211E and DT 2	Page
Set room temperature not reached.	X		48
Set room temperature exceeded.	X		
Set room temperature not reached.		X	49
Set room temperature exceeded by large amount.		X	50
Excessive fluctuations in room temperature	X	X	50
Temperature rises instead of falling	X	X	51
Room temperature too high in Economy mode	X	X	50
Incorrect or no modulation	X	X	51
Heat store fails to heat up		X	

Table 10

3.3 Error codes on the display

A5 flashing.

Heat store NTC sensor 2 defective

	Check		Action
			▶ Note the setting of the temperature controls and .
1.	▶ Press button . ▶ Select service function **.3** . Is a temperature between **0.** and **5.** displayed?	**yes:**	▶ Flue gas connector corroded[1)], damaged or dirty?. Change relative parts. ↓2.
		no:	↓3.
2.	Heat store NTC: ▶ Unplug connector. ▶ Short circuit the connector. Display changes to temperature between **99.** and **95.**	**yes:**	▶ Power OFF the appliance. ▶ Change NTC sensor. ▶ Plug the connection wire. ▶ Turn ON the appliance. A5? ↓3.
		no:	▶ Change the 20-pin connector lead assembly. ↓3.
3.	Temperature between **95.** and **99.** is displayed. ▶ Unplug connector. After max. 60 sec.: Does the displayed code change to a value between **0.** and **5.**?	**yes:**	▶ Power OFF the appliance. ▶ Change NTC sensor. ▶ Plug the connection wire. ▶ Turn ON the appliance. A5? ↓4.
		no:	↓4.
4.	▶ Unplug 20-pin connector from PCB. After max. 60 sec.: Does the displayed code change to a value between **0.** and **5.**?	**yes:**	▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change the 20-pin connector lead assembly. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ↓5.
		no:	▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.

A5 flashing.

Heat store NTC sensor 2 defective

	Check		Action
5.			To return to normal function mode: ► Press buttons and simultaneously. ► Regulate the temperature control and the temperature control on the previously set positions.

1) For notes, refer to Appendix

A7 flashing.

Hot water NTC sensor defective

	Check		Action
			▶ Note the setting of the temperature controls and .
1.	▶ Press button . ▶ Select service function **.2** . Is a temperature between **0.** and **5.** displayed?	**yes:**	▶ Flue gas connector corroded[1)], damaged or dirty? Change relative parts. ↓2.
		no:	↓3.
2.	Hot water NTC sensor: ▶ Unplug connector. ▶ Short circuit the connector. Display changes to temperature **99.**	**yes:**	▶ Power OFF the appliance. ▶ Drain the hot water circuit. ▶ Disconnect the boiler electrical connection. ▶ Change NTC sensor. ▶ Plug the connection wire. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. A7? ↓3.
		no:	▶ Change the 20-pin connector lead assembly. ↓3.
3.	Temperature between **95.** and **99.** is displayed. ▶ Unplug connector. After max. 60 sec.: Does the displayed code change to a value between **0.** and **5.**?	**yes:**	▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change NTC sensor. ▶ Refill the hot water circuit. ▶ Check the built-in NTC sensor for leaks. ▶ Plug the connection wire. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. A7? ↓4.
		no:	↓4.

A7 flashing.

Hot water NTC sensor defective

	Check		Action
4.	▶ Unplug 20-pin connector from PCB. After max. 60 sec.: Does the displayed code change to a value between **0.** and **5.**?	**yes:**	▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change the 20-pin connector lead assembly. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ↓5.
		no:	▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down. ↓5.
5.			To return to normal function mode: ▶ Press buttons and simultaneously. ▶ Regulate the temperature control and the temperature control on the previously set positions.

1) For notes, refer to Appendix

A8 flashing.

No correct electrical connection

	Check		Action
1.	TR 2 connected?	**yes:**	A8? ↓2.
		no:	▶ Power OFF the appliance. ▶ Connect TR 2. ▶ Turn ON the appliance. A8? ↓2.
2.	Mode selector switch is between two settings		▶ Turn switch until it clicks into position. A8? ↓3.
3.	▶ Power OFF the appliance. Wiring between TR 2 and TR 212 E OK? • Terminal 3 on TR 2 connected to Terminal 3 on TR 212 E? • Terminal 4... Terminal 4....	**yes:**	▶ Turn ON the appliance. ↓4.
		no:	▶ Rewire correctly as specified in the installation instructions. ▶ Turn ON the appliance. After 90 sec.: A8? ↓4.
4.	TR 2 defective		▶ Power OFF the appliance. ▶ Change TR 2. ▶ Turn ON the appliance.

AC flashing.

Module not detected.
(Constant CH flow temperature according to CH temperature control on boiler.)

	Check		Action
			▶ Note the setting of the temperature controls and .
1.	▶ Press button . ▶ Select service function **1.9** . Code **0.**, **2.**, **4.**, **5.** is displayed.	**yes:**	No modul detected. ▶ Disconnect connecting lead between PCB control board and TA 211 E or TA 212 E. ▶ Re-connect connecting lead. AC? ↓3.
		no:	↓2.
2.	Are 24 V DC cables routed alongside 230 V AC cables?	**yes:**	▶ Ensure cable separation conforms to minimum requirements as per installation instructions and/or use shielded cable.
		no:	↓3.
3.	Connecting lead between PCB control board and TA 211 E or TA 212 E defective.		▶ Power OFF the appliance. ▶ Replace connecting lead between PCB control board and programmer interface module or TA 211 E. ▶ Turn ON the appliance. AC? ↓4.
4.	TA 211 E connected?	**yes:**	↓5.
		no:	↓8.
5.	▶ Select service function **1.6** . Outside temperature between -20 and +30 °C is displayed. Does temperature displayed match true outside temperature?	**yes:**	↓7.
		no:	▶ Power OFF the appliance. ▶ Replace outside temperature sensor. ▶ Turn ON the appliance. AC? ↓7.
6.	If remote control installed: ▶ Select service function **1.7** . Remote control status **0.** is displayed .	**yes:**	▶ Power OFF the appliance. ▶ Plug the connection wire. ▶ Turn ON the appliance. AC? ↓7.
		no:	↓7.

AC flashing.

Module not detected.
(Constant CH flow temperature according to CH temperature control on boiler.)

	Check		Action
7.	Remote control status still **0.**?	**yes:**	▶ Power OFF the appliance. Remote control: ▶ Replace top section. ▶ Turn ON the appliance. AC? ↓8.
		no:	↓8.
8.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.
			To return to normal function mode: ▶ Press buttons and simultaneously. ▶ Regulate the temperature control and the temperature control on the previously set positions.

Ad flashing.

Heat store NTC sensor 1 not detected (ZB...).

	Check		Action
			▶ Note the setting of the temperature controls and .
1.	Is connecting lead for heat store NTC sensor 1 correctly routed, i.e. **not** through cable grommet?	**yes:**	↓2.
		no:	▶ Route connecting lead for heat store temperature sensor as specified in installation instructions.
2.	▶ Press button . ▶ Select service function **.3** . Is a temperature between **0.** and **5.** displayed?	**yes:**	Is NTC sensor connector corroded, damaged or dirty? ▶ Power OFF the appliance. ▶ Change NTC sensor. ▶ Turn ON the appliance. ▶ Press button . Ad? ↓3.
		no:	↓4.
3.	Heat store -NTC 1: ▶ Unplug connector from PCB control board. ▶ Short circuit the connector using wire jumper. After max. 60 sec: Display changes to temperature between **99.** and **95.**	**yes:**	▶ Power OFF the appliance. ▶ Change NTC sensor. ▶ Turn ON the appliance. ▶ Press button . ↓4.
		no:	▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down. ↓4.

Ad flashing.

Heat store NTC sensor 1 not detected (ZB...).

	Check		Action
4.	Temperature between **99.** and **95.** is displayed. ▶ Unplug connector. After max. 60 sec.: Does the displayed code change to a value between **0.** and **5.**?	**yes:**	▶ Power OFF the appliance. ▶ Change NTC sensor. ▶ Turn ON the appliance.
		no:	▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.
			To return to normal function mode: ▶ Press buttons and simultaneously. ▶ Regulate the temperature control and the temperature control on the previously set positions.

b1 flashing.

The Heatronic does not recognise the code key.

	Check		Action
1.			▶ Power OFF the appliance.
2.	Code plug loose, incorrect or defective.		▶ Replace code plug, check code number is correct. ▶ Turn ON the appliance. b1? ↓3.
3.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.

C1 flashing.

Fan speed too low

	Check		Action
1.	Fan lead connector properly connected?	**yes:**	↓2.
		no:	▶ Power OFF the appliance. ▶ Plug in connector. ▶ Turn ON the appliance. C1? ↓2.
2.	Is fan lead defective? ▶ Is impedance reading between the two connectors for one of the cores infinity?	**yes:**	▶ Power OFF the appliance. ▶ Replace fan lead. ▶ Turn ON the appliance. C1? ↓3.
		no:	↓3.
3.	Are the differential pressure switch contacts closed? ▶ Press button 🔧. ▶ Select service function **3.8** . Is left digit of display showing **1**?	**yes:**	↓4.
		no:	↓4.
4.	Fan defective?	**yes:**	▶ Power OFF the appliance. ▶ Plug the connection wire. ▶ Replace fan. ▶ Plug the connection wire. ▶ Turn ON the appliance. C1? ↓5.
		no:	↓5.
5.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.

CC flashing.

Outside temperature NTC sensor not detected.
(Boiler heating as if outside temperature is -20°C)

	Check		Action
1.	Outside temperature sensor AF2 connected to Terminals A and F on TA 211 E?	**yes:**	↓2.
		no:	▶ Power OFF the appliance. ▶ Connect outside temperature sensor to Terminals A and F on TA 211 E. ▶ Turn ON the appliance. CC? ↓2.
2.	▶ Power OFF the appliance. ▶ Disconnect outside temperature sensor and test resistance R = ∞ or R = 0?		▶ Change the external sensor. ▶ Turn ON the appliance.

d3 flashing.

Wrong signal from pin 8-9 (open?).

	Check		Action
1.	▶ Turn ON the appliance. ▶ Measure voltage between Terminal 4 and Terminal 8. Voltage ≅ 24 V DC?	**yes:**	↓2.
		no:	↓3.
2.	Existing heat store thermostat connected to Terminals 7, 8 and 9?	**yes:**	▶ Power OFF the appliance. ▶ Fix the additional bridge 8-9 in the right position and close the screws. ▶ Turn ON the appliance. d3? ↓3.
		no:	↓4.
3.	Break in connecting lead?	**yes:**	▶ Power OFF the appliance. ▶ Plug the connection wire. ▶ Turn ON the appliance. d3? ↓4.
		no:	↓4.
4.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.

E2 flashing.

The heating outlet NTC sensor is damaged.

	Check		Action
			▶ Note the setting of the temperature controls and .
1.	▶ Press button . ▶ Select service function **.1** . Is a temperature between **0.** and **5.** displayed?	**yes:**	The heating outlet NTC sensor is in short circuit: ▶ Power OFF the appliance. ▶ Replace CH flow NTC sensor; observe fitting instructions for NTC sensor when doing so. ▶ Turn ON the appliance. E2? ↓2.
		no:	↓2.
2.	Temperature for heating outlet NTC sensor between **95.** and **99.** is displayed.	**yes:**	The CH flow NTC sensor is interrupted : ▶ Power OFF the appliance. ▶ Replace CH flow NTC sensor; observe fitting instructions for NTC sensor when doing so. ▶ Turn ON the appliance. E2? ↓3.
		no:	↓3.
3.	Check if the 20-pin connector lead assembly is damaged.		▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change the 20-pin connector lead assembly. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. E2? ↓4.
4.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.

E2 flashing.

The heating outlet NTC sensor is damaged.

	Check		Action
			To return to normal function mode: ▶ Press buttons and simultaneously. ▶ Regulate the temperature control and the temperature control on the previously set positions.

E9 and ⚠ flashing.

Safety temperature limiter has tripped.

	Check		Action
1.	Is the heating pressure between 1 and 2 bar?	**yes:**	↓2.
		no:	▶ Top up system. ▶ Vent appliance. ▶ Press ⚠, restart the appliance. E9? ↓2.
2.	Is the pump blocked?	**yes:**	▶ Unblock the pump. If pump won't start: ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change the pump. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. E9? ↓3.
		no:	↓3.
3.	Lead disconnected from safety temperature limiters?	**yes:**	▶ Power OFF the appliance. ▶ Connect lead. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. E9? ↓4.
		no:	↓4.
4.	▶ Power OFF the appliance. ▶ Unplug the connector from the cut-off device. ▶ Measure the NTC electrical resistance. R = ∞?	**yes:**	▶ Change the over heating cut-off device. ▶ Connect flue gas safety temperature limiter lead. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. E9? ↓5.
		no:	▶ Connect flue gas safety temperature limiter lead. ▶ Turn ON the appliance. ↓5.

E9 and ⚠ flashing.

Safety temperature limiter has tripped.

	Check		Action
5.	Is lead disconnected from CH flow safety temp. limiter?	**yes:**	▶ Power OFF the appliance. ▶ Reconnect lead. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. ↓6.
		no:	↓6.
6.	▶ Power OFF the appliance. ▶ Disconnect lead to CH flow safety temperature limiter. ▶ Measure the CH flow safety temperature limiter. R = ∞?	**yes:**	▶ Change CH flow safety temperature limiter. ▶ Connect CH flow safety temperature limiter lead. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. E9? ↓7.
		no:	▶ Connect CH flow safety temperature limiter lead. ▶ Turn ON the appliance. ↓7.
7.	▶ Power OFF the appliance. ▶ Remove fuse SI 3 from appliance PCB control board and test for continuity. R = ∞?	**yes:**	▶ Change the fuse. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. E9? ↓8.
		no:	▶ Remount the fuse. ▶ Turn ON the appliance. ↓8.
8.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.

EA and ⚠ flashing.

No flame ionisations signal

	Check		Action
			▶ Note the setting of the temperature controls and .
1.	Is the flame present?	**yes:**	↓6.
		no:	↓2.
2.	Is the gas cock open?	**yes:**	↓3.
		no:	▶ Open the gas cock. ▶ Press ⚠, restart the appliance. EA? ↓3.
3.	Is there air in the supply pipe?	**yes:**	▶ Vent supply pipe. ▶ Press ⚠, restart the appliance. EA? ↓4.
		no:	↓4.
4.	Did the thermal security of the gas cock lock out?	**yes:**	▶ Reset security. ▶ Press ⚠, restart the appliance. EA? ↓5.
		no:	↓5.

EA and ⚠ flashing.

No flame ionisations signal

	Check		Action
5.	**Natural gas models**: does the building have a supply pressure regulator?	**yes:**	▶ Check that it is fitted correctly and functioning properly and correct if necessary. ▶ Check supply pressure, inform gas company if outside correct range. ▶ Is correct code plug fitted? ▶ Press ⚠, restart the appliance. EA? ↓6.
		no:	↓6.
	LPG models: is the flow rate of the gas supply to the appliance correct?	**yes:**	↓6.
		no:	▶ Is there enough gas in the supply cylinder? ▶ Is there air in the supply pipe? ▶ Is the solenoid valve in the "meter cabinet" opening? ▶ Is the supply pressure OK? (if the supply pressure is too high, check the pressure regulator in the “meter cabinet” and on the LPG supply cylinder). ▶ Press ⚠, restart the appliance. EA? ↓6.
6.	Is the ground connection correct?	**yes:**	↓7.
		no:	▶ Correct the electrical ground connection. ▶ Press ⚠, restart the appliance. EA? ↓7.
7.	Two phase net: Is there a resistor fitted between Pe and N?	**yes:**	↓8.
		no:	▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Insert a 2 MΩ resistance between the ground and the N connection. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. EA? ↓11.

EA and ⚠ flashing.

No flame ionisations signal

	Check		Action
8.	Is diaphragm in the mixer unit correctly fitted and functional? ▶ Open mixer unit (29). ▶ Check diaphragm for correct orientation, soiling and splitting. Is diaphragm OK?	**yes:**	▶ Close mixer unit. ↓9.
		no:	▶ Insert diaphragm in the fan intake duct as per installation instructions so that the flaps open upwards. ▶ Close mixer unit. EA? ↓9.
9.	Is the condensation trap blocked?	**yes:**	▶ Clean out condensation trap discharge pipe. ▶ Press ⚠, restart the appliance. EA? ↓13.
		no:	↓10.
10.	Check the gas valve? ▶ Power OFF the appliance. ▶ Unplug the connectors from the gas valve. ▶ Measure the gas valve coils **I** and **II** electrical resistance. R = 164 ± 40Ω ?	**yes:**	▶ Reconnect the gas valve. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. EA? ↓11.
		no:	▶ Change the gas valve. ▶ Reconnect the gas valve. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. EA? ↓11.
11.	Problem with flue? ▶ Check CO_2 level in combustion air. Is CO_2 level above 0,2 % ? ▶ Open up heat exchanger - is it dirty?	**yes:**	▶ Check flue and clean if necessary. ▶ Press ⚠, restart the appliance. EA? ↓12.
		no:	↓12.
12.	Is flue gas CO_2 level incorrect[1)]?	**yes:**	▶ Adjust to correct level. ▶ Press ⚠, restart the appliance. EA? ↓13.
		no:	↓13.

EA and ⚠ flashing.

No flame ionisations signal

	Check		Action
13.	▸ Press buttons 🔧 and 🧹 simultaneously. ▸ Select service-function **5.1**. Continuous ignition (without gas) OK?	**yes:**	▸ Press buttons 🔧 and 🧹 simultaneously. ↓14.
		no:	▸ Press buttons 🔧 and 🧹 simultaneously. ↓17.
14.	Ignition lead connected to ignition electrodes?	**yes:**	↓15.
		no:	▸ Connect cable to ignition electrode. ▸ Press ⚠, restart the appliance. EA? ↓15.
15.	Ignition cable connector engaged in switchbox?	**yes:**	↓16.
		no:	▸ Power OFF the appliance. ▸ Engage ignition cable connector in switchbox. ▸ Turn ON the appliance. ▸ Press ⚠, restart the appliance. EA? ↓16.
16.	Is the ignition electrical wire damaged?	**yes:**	▸ Power OFF the appliance. ▸ Change the ignition electrical wire. ▸ Turn ON the appliance. ▸ Press ⚠, restart the appliance. EA? ↓17.
		no:	↓17.
17.	▸ Press button 🔧. ▸ Select service-function **3.3**. Is the ionisation quality **2.** or **3.** ?	**yes:**	↓19.
		no:	↓18.
18.	Electrode assembly defective? ▸ Power OFF the appliance. ▸ Remove electrode assembly. Electrodes worn out?	**yes:**	▸ Replace electrode assembly. ▸ Turn ON the appliance. ▸ Press ⚠, restart the appliance. EA? ↓19.
		no:	▸ Refit electrode assembly. ▸ Turn ON the appliance. ▸ Press ⚠, restart the appliance. EA? ↓19.

EA and ⚠ flashing.

No flame ionisations signal

	Check		Action
19.	Check if the 20-pin connector lead assembly is damaged.		▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change the 20-pin connector lead assembly. ▶ Turn ON the appliance. ▶ Reconnect the boiler electrical connection. ▶ Press ⚠, restart the appliance. EA? ▶ Power OFF the appliance. ↓20.
20.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.
			To return to normal function mode: ▶ Press buttons 🔧 and 🧹 simultaneously. ▶ Regulate the temperature control and the temperature control on the previously set positions.

1) See installation instructions

F0 (and possibly ⚠) flashing.

Internal failure

	Check		Action
			▶ Note the setting of the temperature controls and .
1.	▶ Press buttons and simultaneously. ▶ Select service function **9.3** . A service code is displayed.		▶ Enter figure displayed in customer service record. ↓2.
2.	▶ Select service function **5.2** . A service code is displayed.		▶ Enter figure displayed in customer service record. ↓3.
3.	⚠ flashing?	**yes:**	▶ Press button ⚠. ▶ Initiate demand for heat by pressing button and then press again after 30 seconds to cancel. ▶ Initiate two more demands for heat as above. F0? ↓4.
		no:	↓4.
4.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.
			To return to normal function mode: ▶ Press buttons and simultaneously. ▶ Regulate the temperature control and the temperature control on the previously set positions.

F7 and ⚠ flashing.

Although appliance switches off, flame still detected

	Check		Action
1.	Electrode(s) dirty or defective.		▶ Power OFF the appliance. ▶ Replace electrode assembly. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. F7? ↓2.
2.	▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Remove PCB control board. PCB control board damp?	**yes:**	▶ Dry PCB control board (e.g. with hair dryer). ▶ Look for point where damp is entering switchbox and seal as necessary (cable grommets properly fitted, ...?). ▶ Refit PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. F7? ↓3.
		no:	↓3.
3.	Problem with flue? ▶ Check CO_2 level in combustion air. Is CO_2 level above 0,2 % ?	**yes:**	▶ Check flue and repair or replace if necessary.
		no:	↓4.
4.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.

FA and ⚠ flashing.

Although appliance switches off, flame still detected

	Check		Action
			▶ Note the setting of the temperature controls and . ▶ Power OFF the appliance.
1.	Condensation trap blocked?	**yes:**	▶ Clean condensation trap discharge pipe. ▶ Press ⚠, restart the appliance. FA? ↓2.
		no:	↓2.
2.	Electrode assembly defective? ▶ Power OFF the appliance. ▶ Remove electrode assembly. Electrode assembly burnt out?	**yes:**	▶ Replace electrode assembly. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. FA? ▶ Power OFF the appliance. ↓3.
		no:	▶ Refit electrode assembly. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. FA? ↓3.
3.	Problem with flue? ▶ Check CO_2 level in combustion air. Is CO_2 level above 0,2 % ?	**yes:**	▶ Check flue and repair or replace if necessary. ▶ Press ⚠, restart the appliance. FA? ▶ Power OFF the appliance. ↓4.
		no:	↓4.
4.	The gas valve is damaged.		▶ Change the gas valve. ▶ Turn ON the appliance. ▶ Press ⚠, restart the appliance. FA? ▶ Power OFF the appliance. ↓5.

FA and ⚠ flashing.

Although appliance switches off, flame still detected

	Check		Action
5.	Check if the 20-pin connector lead assembly is damaged.		▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change the 20-pin connector lead assembly. ▶ Turn ON the appliance. ▶ Reconnect the boiler electrical connection. ▶ Press ⚠, restart the appliance. FA? ▶ Power OFF the appliance. ↓6.
6.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.

Fd and ⚠ flashing.

Button ⚠ pressed without necessity

	Check		Action
1.	Button ⚠ is flashing.		▶ Press ⚠, restart the appliance. Fd? ↓2.
2.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.

3.4 Faults that are not displayed

3.4.1 Appliance faults

Excessive burner noise, rumbling noises			
	Check		**Action**
			▶ Note the setting of the temperature controls and .
1.	Does the gas supply type match the specifications on the appliance identification plate?	**yes:**	↓2.
		no:	▶ Convert appliance to correct gas type. ↓2.
2.	▶ Test gas supply pressure - OK? Does pressure match figure specified in installation instructions?	**yes:**	↓3.
		no:	▶ Decommission appliance. For natural gas: ▶ Notify gas company.
3.	Problem with flue? ▶ Check CO_2 level in combustion air. Is CO_2 level above 0,2 % ?	**yes:**	▶ Check flue and repair or replace if necessary.
		no:	↓3.
4.	Cascade system: Is the appliance min. output high enough to open the shut-off device?	**yes:**	↓5.
		no:	▶ Press buttons and simultaneously. ▶ Select Service Function **5.5** . ▶ Increase min. output.
5.	Is appliance's internal air/flue channel leaking or blocked? ▶ Open up heat exchanger and inspect. ▶ Remove silencer, flue duct and air flow limit. ▶ Open trap and inspect. Air channels dirty/clogged, seals defective or not correctly fitted?	**yes:**	▶ Repair or replace components. ▶ Grease seal before fitting. ▶ Make sure it is fitted in correct position.
		no:	↓6.
6.	▶ Measure CO_2 levels. CO_2 levels in flue gas at min and max output do not match figures specified in installation instructions.	**yes:**	▶ Adjust CO_2 level as per installation instructions.
		no:	▶ Turn off gas cock. ▶ Power OFF the appliance. ▶ Change the gas valve. ▶ Open the gas cock. ▶ Turn ON the appliance. ▶ Check appliance for leaks.

Excessive burner noise, rumbling noises			
	Check		**Action**
7.	▶ Press buttons (wrench) and (chimney sweep) simultaneously. ▶ Select service-function **5.9**. **0** is displayed.		▶ Set to **1** for high start-up speed.

Flue gas levels incorrect, CO level too high			
	Check		**Action**
1.	Does the gas supply type match the specifications on the appliance identification plate?	**yes:**	↓2.
		no:	▶ Convert appliance to correct gas type. ↓2.
2.	▶ Test gas supply pressure - OK?	**yes:**	↓3.
		no:	▶ Decommission appliance. ▶ Notify gas company.
3.	Problem with flue? ▶ Check CO_2 level in combustion air. Is CO_2 level above 0,2 % ?	**yes:**	▶ Check flue and repair or replace if necessary.
		no:	↓4.
4.	Flue gas CO_2 levels measured at min. and max. load do not match specified levels? ▶ Measure CO_2 levels.	**yes:**	▶ Adjust CO_2 levels.
		no:	↓5.
5.	Gas volumetric flow too high when CO_2 level correctly set.	**yes:**	▶ Reduce gas volumetric flow rate by means of adjusting screw on gas valve and/or gas flow restrictor. ▶ Check CO_2 adjustment.
		no:	↓6.
6.			▶ Turn off gas cock. ▶ Power OFF the appliance. ▶ Change the gas valve. ▶ Open the gas cock. ▶ Turn ON the appliance. ▶ Check appliance for leaks.

Ignition too harsh, ignition poor			
	Check		**Action**
			▶ Note the setting of the temperature controls and .
1.	▶ Press buttons and simultaneously. ▶ Select service-function **5.1**. Continuous ignition (without gas) OK?	**yes:**	↓6.
		no:	↓2.
2.	Ignition lead connected to ignition electrodes?	**yes:**	↓3.
		no:	▶ Connect cable to ignition electrodes. ▶ Press button . Ignition poor? ↓3.
3.	Ignition cable connector engaged in switchbox?	**yes:**	↓4.
		no:	▶ Power OFF the appliance. ▶ Engage ignition cable connector in switchbox. ▶ Turn ON the appliance. ▶ Press button . Ignition poor? ▶ Power OFF the appliance. ↓4.
4.	Is the ignition electrical wire damaged?	**yes:**	▶ Power OFF the appliance. ▶ Change the ignition electrical wire. ▶ Turn ON the appliance. ▶ Press button . Ignition poor? ▶ Power OFF the appliance. ↓5.
		no:	↓5.
5.	Electrode assembly defective? ▶ Power OFF the appliance. ▶ Remove electrode assembly. Electrodes worn out?	**yes:**	▶ Replace electrode assembly. ▶ Turn ON the appliance. ▶ Press , restart the appliance. Ignition poor? ↓6.
		no:	▶ Refit electrode assembly. ▶ Turn ON the appliance. ▶ Press , restart the appliance. Ignition poor? ↓6.

Ignition too harsh, ignition poor			
	Check		**Action**
6.	Does the gas supply type match the specifications on the appliance identification plate?	**yes:**	↓7.
		no:	▶ Carry out gas type conversion as described in installation instructions.
7.	▶ Test gas supply pressure - OK?	**yes:**	↓8.
		no:	▶ Decommission appliance. ▶ Notify gas company.
8.	Problem with flue? ▶ Check CO_2 level in combustion air. Is CO_2 level above 0,2 % ?	**yes:**	▶ Check flue and repair or replace if necessary. ↓9.
		no:	↓9.
9.	Flue gas CO_2 levels measured at min. and max. load do not match specified levels. ▶ Measure CO_2 levels.	**yes:**	▶ Adjust CO_2 level as per installation instructions.
		no:	↓10.
10.	Burner not correctly fitted or defective? ▶ Remove burner. Cover fixings not tight or seal defective or not correctly fitted or burner defective!		▶ Replace burner and seal if necessary. ▶ Ensure seal is fitted in correct position.
			To return to normal function mode: ▶ Press buttons and simultaneously. ▶ Regulate the temperature control and the temperature control on the previously set positions.

Loose or broken contact on heat store NTC sensor			
	Check		**Action**
1.	Heat store NTC sensor lead is **not** fitted as described in the installation instructions (i.e. the cable does not pass through the cable grip in the switchbox).		▶ Record condition of appliance as found in customer service record. ▶ Route cable as specified in installation instructions.

Boiler indicates P1, P2, P3 at start-up and then restarts with P1..			
	Check		**Action**
1.	Fuse T 1,6 A (312) defective.	**yes:**	▶ Turn ON the appliance. ▶ Change the fuse. ▶ Power OFF the appliance. Start sequence not completed? ↓2.
		no:	↓2.
2.	The PCB control board is damaged.		▶ Make a note of the altered service settings (see table 1, "First Service Level; Values that can be modified" at page 8 and table 5, "Secondary Service Level; Values that can be modified" at page 11). ▶ Power OFF the appliance. ▶ Disconnect the boiler electrical connection. ▶ Change PCB control board. ▶ Reconnect the boiler electrical connection. ▶ Turn ON the appliance. ▶ Restore service settings previously noted down.

Specified CH flow temperature from TA... programmer exceeded			
	Check		**Action**
			▶ Note the setting of the temperature controls and .
	If outside-temperature controlled programmer (TA...) is connected to boiler: • The anti-cycle time is adjusted by the programmer to the suit the system. • The factory setting for the anti-cycle time (3 min.) and the heating mode hysteresis setting, if applicable, are deactivated. • In cyclic mode, the switching of the boiler on or off is subject to a time delay in order to prevent divergence between the average CH flow temperature and the specified CH flow temperature. As a result (depending on the heat draw), the specified CH flow temperature is briefly exceeded. In extreme cases, it can happen that the burner does not switch off until the maximum CH flow temperature is reached even though a lower CH flow temperature has been specified.		
1.	▶ Press button . ▶ Select service-function **2.7**. Read off status of automatic anti-cycle time (0 = Disabled, 1 = Enabled).		▶ Disable automatic anti-cycle time, i.e. change setting to 0.
2.	▶ Select service-function **2.4**. Read off anti-cycle time setting (0 ... 15 min).		▶ Set anti-cycle time as required, e.g. factory setting 3 min.
			To return to normal function mode: ▶ Press buttons and simultaneously. ▶ Regulate the temperature control and the temperature control on the previously set positions.

Hot water has unpleasant odour or is dark colour			
	Check		**Action**
This is generally caused by the formation of hydrogen sulphide by sulphate-reducing bacteria. Such bacteria are found in water which is very low in oxygen and live off the hydrogen produced by the anode.			
1.			▶ Clean the hot water cylinder. ▶ Replace the sacrificial anode. ▶ Heat cylinder to a temperature ≥60 °C
2.			▶ Replace magnesium sacrificial anode with impressed-current anode. The conversion costs are payable by the operator!

Condensation in the flue pipe			
	Check		**Action**
1.	Is diaphragm in mixer unit fitted correctly (see installation instructions)? ▶ Open mixer unit (29). ▶ Check diaphragm for correct orientation, soiling and splitting.		▶ Fit diaphragm as per installation instructions or replace. ▶ Close mixer unit.

3.4.2 Programmer faults

Set room temperature not reached (TR 2 and TR 212 E)			
	Check		**Action**
1.	Thermostatic valve(s) set too low?	**yes:**	▶ Turn up thermostatic valve(s). ↓2.
		no:	↓2.
2.	CH flow temperature control on boiler set too low?	**yes:**	▶ Turn up CH flow temperature control.
		no:	↓3.
3.	Air in the heating system.		▶ Power OFF the appliance. ▶ Check appliance and system for water leaks and repair as necessary. ▶ Top up system. ▶ Select Service Function **7.3** . Select **1** (on, automatically deactivated) and confirm. ▶ Vent appliance. ▶ Vent radiators. ▶ Turn ON the appliance.

Set room temperature not reached (TA 211 E und DT 2)			
	Check		**Action**
1.	Thermostatic valve(s) set too low?	**yes:**	▶ Turn up thermostatic valve(s). ↓2.
		no:	↓2.
2.	Heating characteristic set too low?	**yes:**	▶ Correct heating characteristic. ↓3.
		no:	↓3.
3.	CH flow temperature control on boiler set too low?	**yes:**	▶ Turn up CH flow temperature control. ↓4.
		no:	↓4.
4.	Is heat store temperature unreachable (CH flow temperature control set too low)?	**yes:**	▶ Turn up CH flow temperature control. ↓5.
		no:	↓5.
5.	Air in the heating system.		▶ Power OFF the appliance. ▶ Check appliance and system for water leaks and repair as necessary. ▶ Top up system. ▶ Select Service Function **7.3** . Select **1** (on, automatically deactivated) and confirm. ▶ Vent appliance ▶ Vent radiators. ▶ Turn ON the appliance.

Set room temperature exceeded by large amount

	Check		Action
1.	Do radiators get too hot?	**yes:**	TR 2: ▶ Decrease setting of “Heating” control TA 211 E: ▶ Correct heating characteristic. ↓2.
		no:	↓2.
2.	Bad choice of location for programmer, e.g. outside wall, near window, in draught, on hollow wall, etc.	**yes:**	▶ Select better installation location. **-or-** ▶ Fit external room thermostat. ↓3.
		no:	↓3.
3.			▶ Turn down thermostatic valve(s).

Excessive fluctuations in room temperature (TA 211 E)

	Check		Action
1.	Periodic effect of external heat on room, e.g. from sunshine, lighting, TV, separate stove, fire, etc.	**yes:**	▶ Eliminate external heat sources if possible. ↓2.
		no:	↓2.
2.	Bad choice of location for programmer, e.g. outside wall, near window, in draught, on hollow wall, etc.		▶ Select better installation location. **-or-** ▶ Fit external room thermostat.

Room temperature too high in Economy mode

	Check		Action
	Building retains heat well	**yes:**	▶ Set economy temperature lower . or ▶ Set to Frost Protection instead of Economy. or ▶ Set start time for Frost protection/Economy earlier.

Temperature rises instead of falling			
	Check		**Action**
	Timer clock (DT 2) incorrectly set		▶ Check setting and correct as necessary.

Incorrect or no modulation			
	Check		**Action**
	Programmer incorrectly wired		▶ Check wiring against wiring diagram and correct as necessary.

4 Appendix

4.1 NTC values

4.1.1 Outside temperature sensor

Outside temperature (°C) Measurement tolerance ±10%	Resistance (Ω)
-20	2 392
-16	2 088
-12	1 811
-8	1 562
-4	1 342
0	1 149
4	984
8	842
10	781
15	642
20	528
25	436

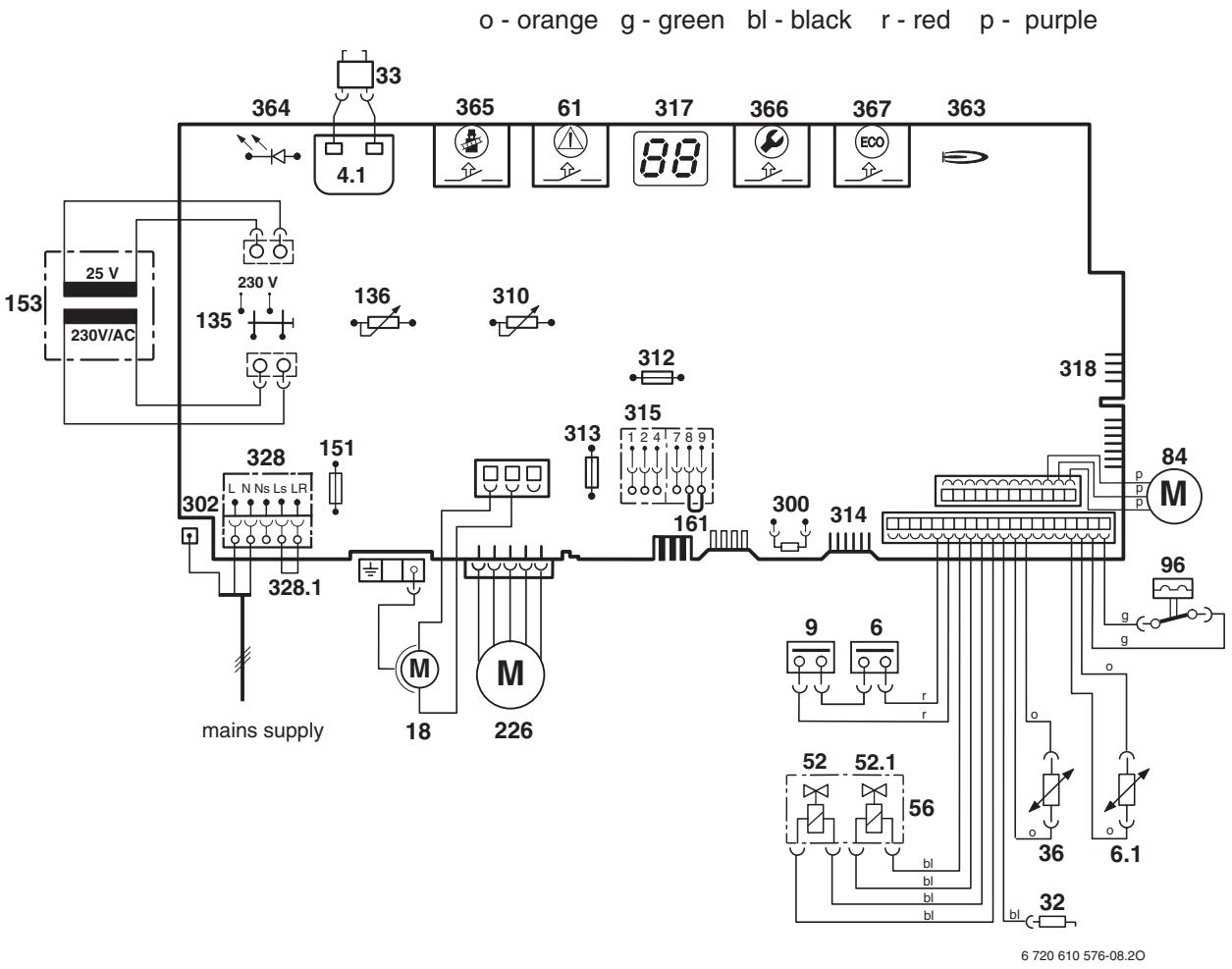
Table 11

4.1.2 CH flow NTC sensor, heat store NTC sensor, constant hot water NTC sensor and hot water NTC sensor

Temperature (°C) Measurement tolerance ±10%	Resistance (Ω)
20	14 772
25	11 981
30	9 786
35	8 047
40	6 653
45	5 523
50	4 608
55	3 856
60	3 243
65	2 744
70	2 332
75	1 990
80	1 704
85	1 464
90	1 262
95	1 093
100	950

Table 12

4.2 Electronic schemes



4.1 Ignition transformer
6 Heat exchanger overheat cut-out
6.1 Flue gas NTC sensor
6.3 Hot water sensor
18 Central heating pump
32 Flame sensing electrode
33 Spark electrodes
36 Temperature sensor in CH flow
52 Safety gas valve 1
52.1 Safety gas valve 2
56 CE 428 gas valve
61 Reset button
84 Motor (ZWB/ZB)
96 Microswitch, water switch (ZWB)
135 Main power switch
136 Heating outlet temperature potentiometer
151 Fuse T 2,5 A, 230 V AC
153 Transformer
161 Bridge
226 Fan
300 Code key
302 Ground electrical connection
310 Sanitary outlet temperature potentiometer
312 Fuse T 1,6 A, 24 V DC
313 Fuse T 0,5 A, 5 V DC
314 Strip connector for TA 211 E fitted programmer
315 Terminal block for programmer
317 Digital display
318 Internal programmable clock connection
328 230 V AC connection
328.1 Bridge
363 Flame presence led
364 Electrical power led (0/I)
365 Chimney cleaner button
366 Technique service button
367 ECO button

4.3 List of most important replacement parts

Component	Order no.	Remarks
Switchbox		
PCB control board	8 748 300 385	
Transformer	8 747 201 358	
Ignition lead	8 714 401 999	
20-pin connector lead assembly	8 714 402 087	ZB...
20-pin connector lead assembly	8 714 402 086	ZWB...
Fuse	1 904 552 730	T 0,5 A
Fuse	1 904 552 740	T 1,6 A
Fuse	1 904 521 342	T 2,5 A
Set of fuses	8 744 503 010	
Switchbox kpl.	8 717 207 514	with DT 2
Switchbox kpl.	8 717 207 513	without DT 2
Code plug included in		
Conversion kit G20 -> G31	7 710 149 048	ZWB 7/11-29 A
Conversion kit G31 -> G20	7 710 239 084	ZWB 7/11-29 A
Conversion kit G20 -> G31	7 710 149 049	ZB 7/11-28 A
Conversion kit G31 -> G20	7 710 239 085	ZB 7/11-28 A
Conversion kit G20 -> G31	7 710 149 044	ZWB 7/11-27 A
Conversion kit G31 -> G20	7 710 239 080	ZWB 7/11-27 A
Conversion kit G20 -> G31	7 710 149 045	ZB 7/11-27 A
Conversion kit G31 -> G20	7 710 239 081	ZB 7/11-27 A
Heat exchanger		
Temperature limiter	8 729 000 144	110°C

Table 13

Component	Order no.	Remarks
Temperature sensor, CH flow	8 714 500 087	NTC
Electrode assembly	8 718 107 077	
Gas valve		
Gas valve	8 747 003 516	CE 427
Other components		
Fan	8 717 204 343	
Gas supply pipe	8 710 725 500	
Plate-type heat exchanger	8 715 406 651	ZWB...
Overflow trap	8 710 725 328	
Diaphragm in the mixer unit	8 715 505 801	

Table 13

4.4 Approved corrosion inhibitors and anti-freeze fluids for central heating water

If any system water treatment is required then only products suitable for use with Aluminium shall be used i.e Fernox- Copal or Superconcentrate or Sentinal X100, in accordance with the manufacturers instructions. The use of any other substances will invalidate the guarantee. The pH value of the system water must be less than 8 or the appliance guarantee will be invalidated.

4.4.1 Frost protection

- Add a suitable anti-freeze fluid to the water in the central heating system.
  Suitable products are available from Betz-Dearborn Tel.: 0151 4209563, Fernox Tel.: 01799 550811 and Salamander Tel.: 0121 378 0952.

4.4.2 Sealing agents

- In our experience, the addition of sealing agents to the water in the central heating system can cause problems (deposits in the heat exchanger). For that reason we advise against their use.

4.5 Summary of BDH Information Sheet on Identifying Corrosion by CFCs

The presence of halogenated hydrocarbons in the combustion air causes surface corrosion on affected metals. Particularly susceptible is the combustion chamber and the heat exchanger surfaces (including stainless steel) as well as the metal components in the flue socket, flue pipe connections and in the chimney.

The halogen compounds present in the combustion air produce highly corrosive hydrochloric acid in the flame and in some cases - depending on the precise composition of the combustion air - hydrofluoric acid, both of which accumulate in the boiler and remain active over long periods.

In order to limit the damage, the source of the air contamination must be located and sealed off. If this is not possible, the combustion air must be drawn from an alternative clean source.

Halogens can occur in the following locations:

Commercial and industrial sources	
Dry cleaners	Trichloroethylene, tetrachloroethylene, fluorinated hydrocarbons
Degreasing baths	Perchloroethylene, trichloroethylene, methyl chloroform
Printers	Trichloroethylene
Hairdressers	Aerosol spray propellants, hydrocarbons containing fluorine and chlorine (freons)
Sources in the home	
Cleaning and degreasing agents	Perchloroethylene, methyl chloroform, trichloroethylene, methylene chloride, carbon tetrachloride, hydrochloric acid
Home workshops	
Solvents and thinners	Various chlorinated hydrocarbons
Spray cans	Chlorofluorohydrocarbons (freons)

Table 14

Worcester Heat Systems Ltd.
Cotswold Way
Warndon
Worcester WR4 9SW
Great Britain

www.thermotechnik.com