

HELP REFERENCE S-HR

ATAG

Blauwe Engel^{II}



ATAG

8G.53.20.01/02.07

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1 Foreword

This help reference has been put together to make detecting and rectifying errors easier. In composing this document every effort has been made to present as much information as possible and to simulate comparable situations to attain positive results. Of course, it is impossible to describe let alone simulate all situations so that it may be possible that situations occur, which are not described or are not described in full in this help reference. It is important for ATAG that it contains this important information to be able to inform your fellow fitters in full.

2 Description of the boiler

The ATAG Blauwe Engel is a sealed, condensing and modulating central heating boiler supplied or not supplied with integrated hot water supply.

The built-in fan sucks in the combustion air from outside and is responsible for complete pre-mixing of gas and air. The gas mix is fed through the ceramic burner, which is positioned above the heat exchanger. Thanks to the low flame height, a compact construction is possible. After the combustion gases have passed the stainless steel heat exchanger, they are vented outside. The condensation, which has formed, is drained through the assembled siphon.

The boiler is approved in accordance with the valid CE standards and has the CE certificate.

The operating efficiency of the boiler is higher than 98 % at its upper value and 109 % at its lower value. The radiation, convection and standby losses are very low due to its compact design.

The emission of harmful substances lies far below the standard, which is set for boilers with the Gaskeur Schone Verbranding (*Gas Approved Clean Combustion*).

The boiler is fitted with an automatic venting program. This program ensures that for an installation which has just been filled (up) any available air is removed from the boiler. In this way, the controller will check the water pressure and if it is too low will indicate this on the display.

The boiler anticipates the heat requirement of the central heating installation or the hot water supply. This means that the boiler will gear its output to the installation and will start up less often, which means that the boiler will be in operation for longer and at a low level. It is possible that the boiler will only need to switch itself on once an hour. In so doing it seeks to attain maximum attainable comfort and efficiency.

To be able to anticipate installation sounds, the boiler has a so-called gradient controller. This controller ensures that after coming into operation the boiler does not immediately start burning at full power, but stimulates a gradual increase in power. If the installation does require full power, this controller will be regulated to realise this. As a result a gradual increase in the water temperature is achieved. If an outside sensor is connected, weather-dependent control is possible. This means that the controller measures the outside temperature and the flow water temperature in the installation.

An boiler with integrated hot water supply is equipped on the right hand side with a boiler with a thermostatically controlled hot water temperature which makes sure that there is a constant hot water temperature of 60°C (factory setting).

3 Control the boiler

The boiler is fitted with a self-regulating controller called the Control Tower. This controller takes over a large proportion of the manual settings, which means that putting it into operation is greatly simplified.

The relevant status is indicated on the display. It is possible to read out the status in two ways.

The first method is a simple reading called the Good status. The boiler will only indicate the **Good** indication. The boiler can usually be in operation during this read-out without this being visible in any other way. If a message is necessary, this will be indicated on the display.

The second method is a more technical method which indicates a more comprehensive read-out, with, amongst other things, the state in which the boiler is active with the flow water temperature and the water pressure of the central heating installation.

The second level is attained from the **Good** indication after the Step key has been pressed for 5 seconds. Return to the **Good** indication takes place in the same way.

For a heat requirement, which arises for the central heating or hot water, a particular flow water temperature will be calculated. This calculated water temperature is called the T-set value. This value becomes active for a room thermostat making the request, to which the boiler output will be controlled. For an boiler, which has just been switched on, the gradient controller of the T-set value is active. The main objective of this is to prevent the boiler from coming into operation at full power, which can result in obtrusive noises and unnecessary temperature peaks from occurring. For the heat requirement at the hot water supply, the T-set value is controlled to the central heating return water temperature. The gradient controller is no longer active. Depending upon the quantity of sanitary water, which is taken from the boiler, the central heating return water temperature will vary according to which the load on the boiler is controlled.

3.1 Boiler pump

The boiler has a self-regulating and fail-safe control system for the load and the pump capacity. The temperature difference between the flow and return water is thus checked. The boiler pump will be able to supply the stipulated water displacement at an installation resistance of up to 20 kPa. If the installation resistance is higher than the indicated value, the pump will start to operate at maximum pump capacity and the load will be adapted until an acceptable temperature difference between the flow and return water for the controller is reached. If subsequently the temperature difference continues to be great, the boiler will switch itself off and wait until the excessively large temperature difference between the flow and return temperature has reduced again.

If an unacceptable temperature difference has been detected, the controller will repeatedly try to switch on the water flow. If this is not successful, the boiler will lock up.

The S-HR 60 boiler has a boiler pump, which has a residual working head for the installation of 12 kPa. This means that the boiler is normally able to function for installations which have an installation resistance of up to 12 kPa and for cascade installations.

If the installation resistance is higher than 12 kPa, the boiler will automatically reduce in power.

If the capacity of the boiler pump is insufficient, an extra external pump can be installed in series with the boiler. This external boiler pump can have an electrical connection to the Control Tower, which means that this pump will switch at the same times as the boiler pump. The recorded load of the external boiler pump may be up to a maximum of 1 Amp (230 V). It is also possible to select an application with an open distributor. For this, you should take into consideration the greater secondary water delivery so that the level of the water temperature is affected. The boiler is fitted as standard with a water filter in the return pipe of the boiler.

This prevents any contaminated central heating water from getting into the boiler. The boiler is also fitted with an 3 bar internal overflow valve. This is jointly connected with the condensation drainage to the outlet structure into the drainage system.

If all or a large proportion of the radiators are fitted with thermostatic radiator valves, a pressure difference controller should be used to prevent flow problems in the installation.

3.2 Expansion tank

All ATAG Blauwe Engel S-HR-T Combi boilers are fitted with an expansion connection. This connection pipe is connected between the three-port valve and the boiler pump. This prevents the expansion water, when operating from the hot water supply, from being shut off from the expansion tank, if the thermostatic valves on the radiators are fully closed. A second expansion tank in the installation does not represent a problem.

Not all of the ATAG Blauwe Engel S-HR Solo boilers are fitted with their own expansion tank connection. The expansion tank should therefore be connected into the return pipe directly below the boiler.

The ATAG Blauwe Engel S-HR Solo boilers, which are put in combination with an ATAG Comfort cylinder have an expansion tank connection incorporated into the pipework for the ATAG Comfort cylinder, to which the expansion tank must be connected. If another boiler is used one should take into account that the expansion tank is connected between the three-port valve and the boiler boiler pump.



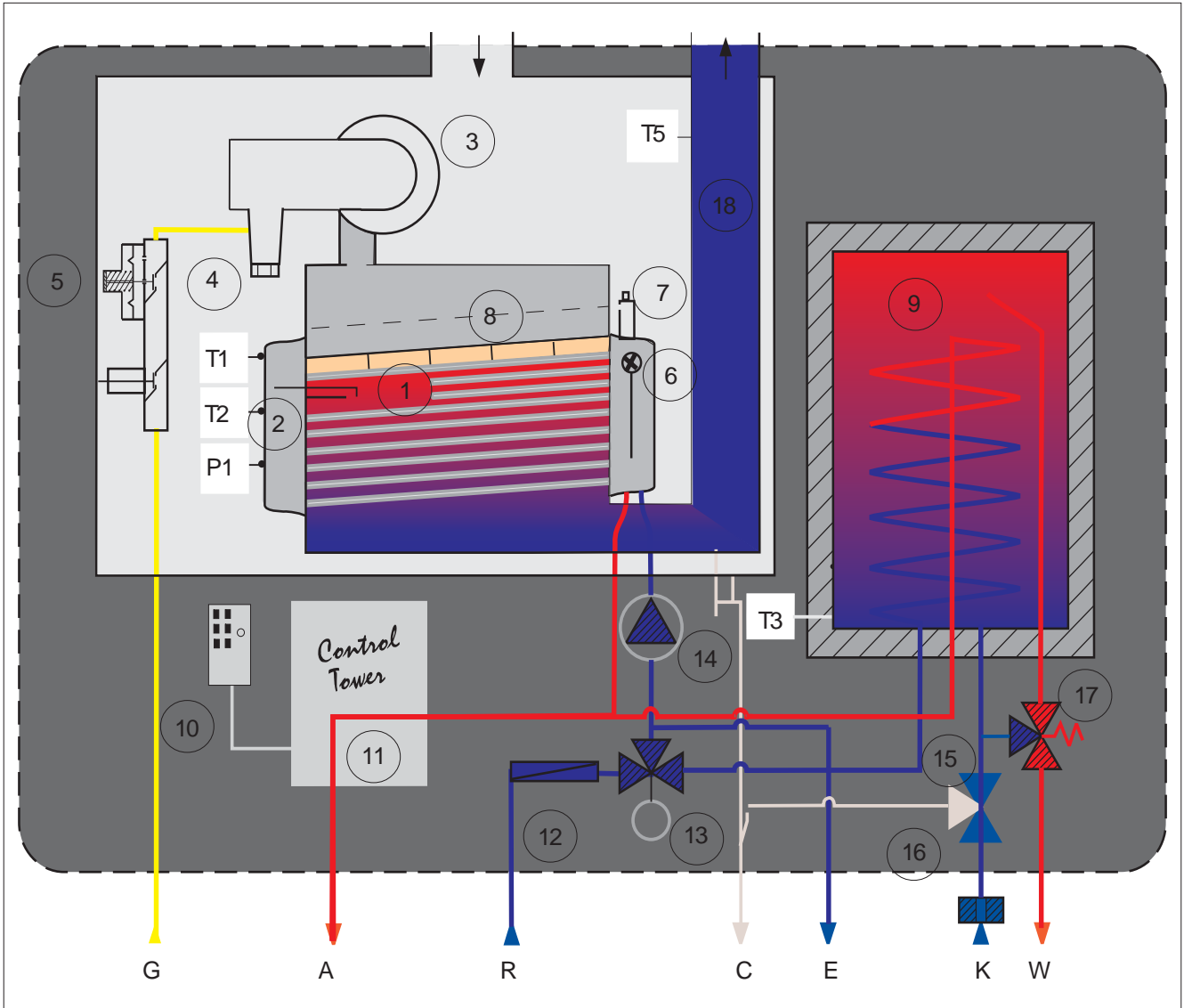
To ensure that the boiler functions correctly, it is essential that the expansion tank always is within range of the expanding central heating water.

3.3 Room thermostat

The ATAG Brain thermostat and controls should be connected to the intended connections. All other types or makes of room thermostats or controls, which are used, should have a potential-free contact.

When using an on/off thermostat or controller it is possible that a pre-emptive resistor should be positioned to prevent excessive swings in temperature. Generally, mercury thermostats are intended here. This resistance wire is present in the Control Tower cabinet and should be fitted to terminals 23 and 27. The pre-emptive resistor in the room thermostat should be set to 0.11 A.

3.4 Diagram of the various parts of the boiler



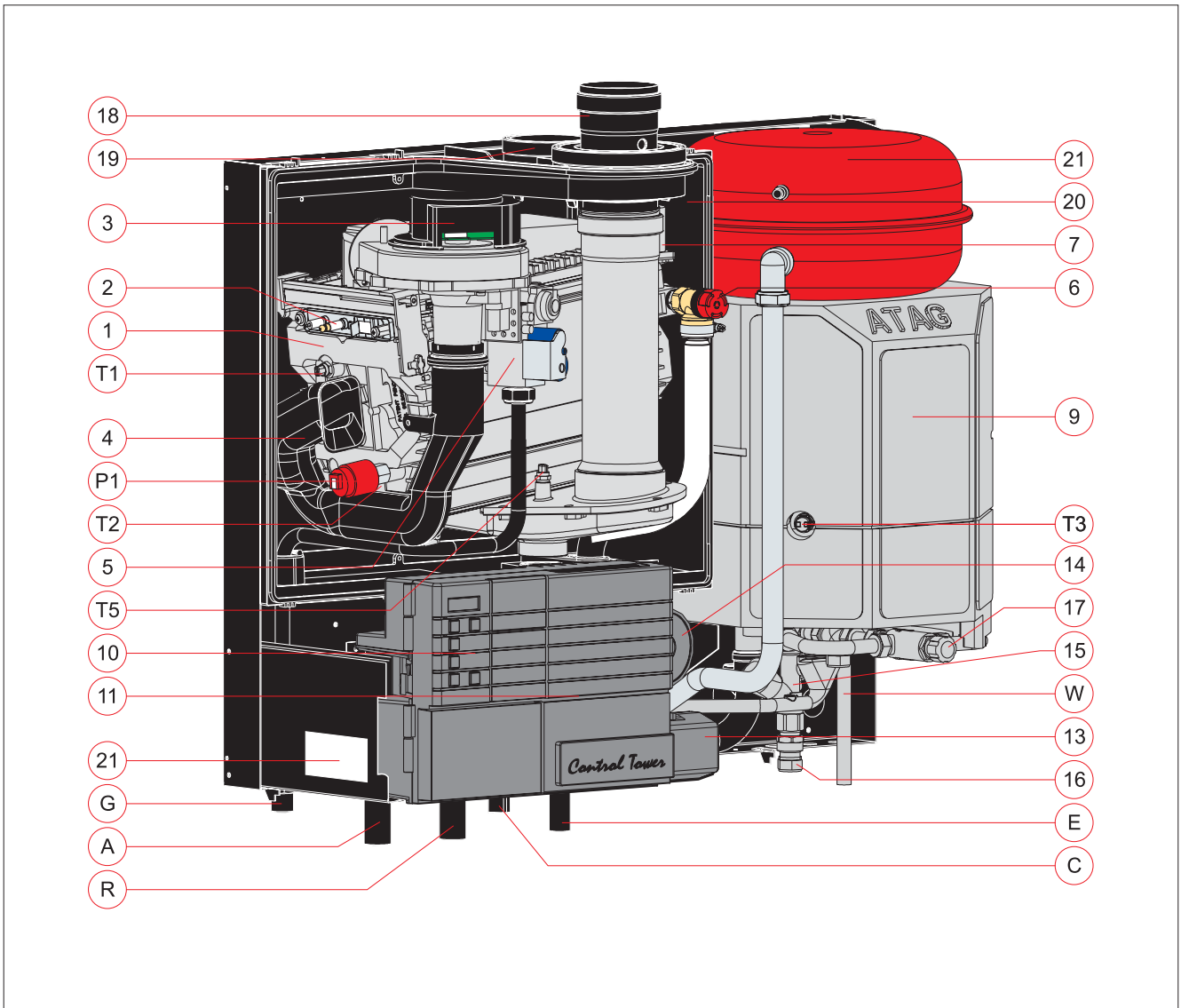
boiler diagram

figure 1

- G gas line
- A flow line CH
- R return line CH
- C condense line
- E expansion vassle line
- K cold water line
- W hot water line

- T1 flow sensor
- T2 return sensor
- T3 cylinder sensor
- T5 flue gas sensor

- P1 water pressure sensor



boiler description

figure 2

- | | | | |
|----|-----------------------|----|------------------------------------|
| 1 | heat exchanger | 11 | Control Tower |
| 2 | ignition electrode | 12 | water filter return CH |
| 3 | fan | 13 | three-port valve |
| 4 | silencer | 14 | boilerpump |
| 5 | gas valve | 15 | safety valve (S-HR-T) |
| 6 | safety valve | 16 | dosing valve (S-HR-T) |
| 7 | automatic fan | 17 | thermostatic mixing valve (S-HR-T) |
| 8 | ceramic burner | 18 | flue gas discharge |
| 9 | DHW cylinder (S-HR-T) | 19 | combustion air supply |
| 10 | control panel | 20 | air box |
| | | 21 | type plate |

4 Technical specifications (up to May 1998)

appliance type		S-HR 15	S-HR 24	S-HR 24T	S-HR 35	S-HR 35T	S-HR 51	S-HR 51T	S-HR 60
load on upper value	kW	15,0	24,0	24,0	35,0	35,0	51,0	51,0	60,0
load on lower value	kW	13,5	21,6	21,6	31,5	31,5	45,9	45,9	54,0
modulation range (capacity 80/60°C)	kW	6,4-13,3	6,4-21,2	6,4-21,2	4,9-30,9	4,9-30,9	8,8-45,0	8,8-45,0	8,8-52,9
modulation range (capacity 50/30°C)	kW	7-14,4	7-23,0	7-23,0	5,3-33,6	5,3-33,6	9,5-48,7	9,5-48,7	9,5-57,2
efficiency (80/60°C at full load)	%	98	98	98	98	98	98	98	98
efficiency (50/30°C at full load)	%	107	107	107	107	107	106	106	106
efficiency in accordance with EN677	%	109	109	109	109	109	109	109	109
Yearly emission of NOx	ppm	12	12	12	12	12	12	12	12
Yearly emission of CO	ppm	11	11	11	11	11	11	11	11
CO ₂	%	9	9	9	9	9	9,5	9,5	9,5
flue gas temperature (at 80/60°C at full load)	°C	65	65	65	67	67	68	68	68
flue gas temperature (at 50/30°C at low load)	°C	31	31	31	31	31	31	31	31
burner control		stepless modulation							
gas consumption (at 1013 mbar/0°C) G20	m³/h	1,32	2,10	2,10	3,07	3,07	4,47	4,47	5,26
burner type		ceramic							
current type	V/Hz	230/50	230/50	230/50	230/50	230/50	230/50	230/50	230/50
maximum electric power recorded	W	122	122	122	145	145	190	190	190
standby electric power recorded	W	5	5	5	5	5	5	5	5
degree of protection according to EN60529		IP 40	IP 40	IP 40	IP 40	IP 40	IP 40	IP 40	IP 40
weight (net)	kg	50	50	73	53	76	63	86	63
water capacity CH-based	l	3,5	3,5	3,5	5	5	7	7	7
water capacity DHW-based	l			14		14		13	
pump overrun time CH	min	15	15	15	15	15	15	15	15
pump overrun time DHW	min			1		1		1	
minimum water pressure	bar	1	1	1	1	1	1	1	1
maximum water pressure	bar	3	3	3	3	3	3	3	3
maximum flow water temperature	°C	90	90	90	90	90	90	90	90
tap flow rate at 60°C	l/min			6		8,5		12,5	
tap flow rate at 45°C	l/min			8,5		12,5		17,5	
pump type	Wilo	ARS 25/70	ARS 25/70	ARS 25/70	ARS 25/70	ARS 25/70	ARS 25/75	ARS 25/75	ARS 25/75
available pump head	kPa	35	25	25	20	20	20	20	12
expansion vessel content	l			12		12			
expansion vessel pre-pressure	bar			1		1			

boiler specifications

table 1

4.1 Technical specifications (from May 1998)

appliance type		S-HR 15	S-HR 24	S-HR 24T	S-HR 35	S-HR 35T	S-HR 51	S-HR 51T	S-HR 60	
load on upper value	kW	15,0	24,0	24,0	35,0	35,0	51,0	51,0	60,0	
load on lower value	kW	13,5	21,6	21,6	31,5	31,5	45,9	45,9	54,0	
modulation range (capacity 80/60°C)	kW	3,5-13,3	3,5-21,2	3,5-21,2	4,9-30,9	4,9-30,9	8,8-45,0	8,8-45,0	8,8-52,9	
modulation range (capacity 50/30°C)	kW	3,9-14,4	3,9-23,0	3,9-23,0	5,3-33,6	5,3-33,6	9,5-48,7	9,5-48,7	9,5-57,2	
efficiency (80/60°C at full load)	%	98	98	98	98	98	98	98	98	
efficiency (50/30°C at full load)	%	107	107	107	107	107	106	106	106	
efficiency in accordance with EN677	%	109	109	109	109	109	109	109	109	
Yearly emission of NOx	ppm	12	12	12	12	12	12	12	12	
Yearly emission of CO	ppm	11	11	11	11	11	11	11	11	
CO ₂	%	9	9	9	9	9	9,5	9,5	9,5	
flue gas temperature (at 80/60°C at full load)	°C	65	65	65	67	67	68	68	68	
flue gas temperature (at 50/30°C at low load)	°C	31	31	31	31	31	31	31	31	
burner control		stepless modulation								
gas consumption (at 1013 mbar/0°C) G20	m³/h	1,32	2,10	2,10	3,07	3,07	4,47	4,47	5,26	
burner type		ceramic					foam ceramic			
current type	V/Hz	230/50	230/50	230/50	230/50	230/50	230/50	230/50	230/50	
maximum electric power recorded	W	122	122	122	145	145	190	190	190	
standby electric power recorded	W	5	5	5	5	5	5	5	5	
degree of protection according to EN60529		IP 40	IP 40	IP 40	IP 40	IP 40	IP 40	IP 40	IP 40	
weight (net)	kg	50	50	73	53	76	63	86	63	
water capacity CH-based	l	3,5	3,5	3,5	5	5	7	7	7	
water capacity DHW-based	l			14		14		13		
pump overrun time CH	min	15	15	15	15	15	15	15	15	
pump overrun time DHW	min			1		1		1		
minimum water pressure	bar	1	1	1	1	1	1	1	1	
maximum water pressure	bar	3	3	3	3	3	3	3	3	
maximum flow water temperature	°C	90	90	90	90	90	90	90	90	
tap flow rate at 60°C	l/min			6		8,5		12,5		
tap flow rate at 45°C	l/min			8,5		12,5		17,5		
pump type	Wilo	ARS 25/70	ARS 25/70	ARS 25/70	ARS 25/70	ARS 25/70	ARS 25/75	ARS 25/75	ARS 25/75	
available pump head	kPa	35	25	25	20	20	20	20	12	
expansion vessel content	l			12		12				
expansion vessel pre-pressure	bar			1		1				

boiler specifications

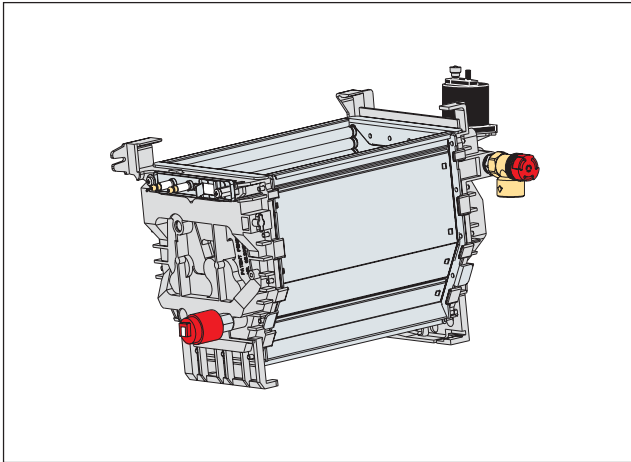
table 2

5 Specific components

The following components are specific ATAG parts or applications and can only be replaced with ATAG parts when it comes to replacing them.

5.1 The heat exchanger group

The stainless steel heat exchanger is made up of several components, which go to make up a complete heat exchanger group.



view of heat exchanger group S-HR 35 / S-HR 35T figure 3

The parts belonging to the heat exchanger group are:

- heat exchanger
- baffle plates
- automatic de-aerator
- temperature sensors
- water pressure sensor
- ignition and ionisation electrode

The material design of the heat exchanger is RBS 316 Ti. The pipes are flat and are subdivided into two diameters. The outside row of thinner pipes are intended for cooling the combustion space, whereas the middle pipes are responsible for the output.

The internal cleaning of the pipes is not necessary and is not recommended. Neither is it recommended to remove the aluminium baffle plates from the exchanger.



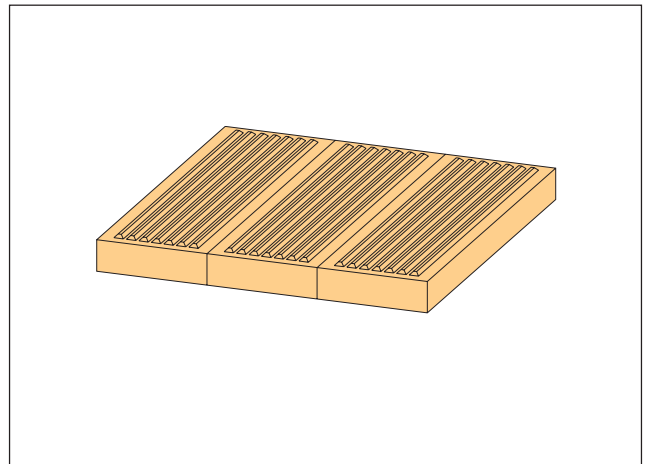
The pipes can be externally cleaned using a hard brush (not a steel brush) and water.

5.2 The burner

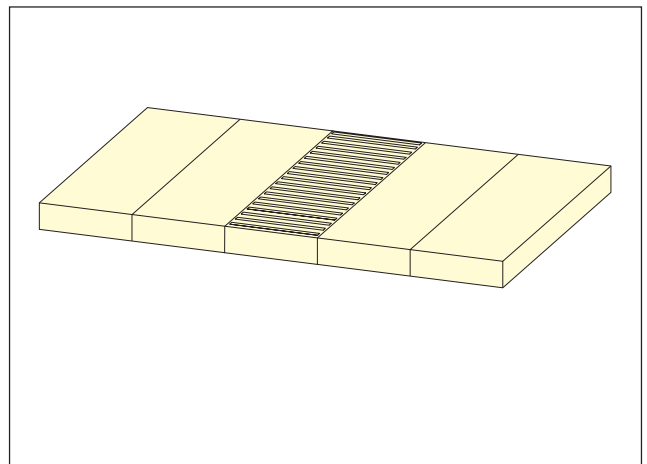
The boilers are dependant upon the power, supplied from ceramic burner. Due to the different resistances for the various types of boiler, it is important that each boiler has its own set of burner bricks, which have been chosen for the boiler. It is only therefore possible to replace these burner bricks with those of the same design.

In addition, individual burner bricks have a so-called profiled side (the side with grooves running the length or width). This profile side should always be located upwards as illustrated in the diagrams.

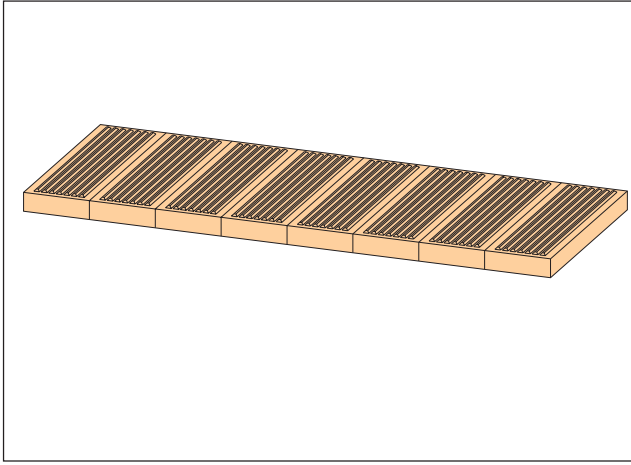
The flame side will be darkly coloured after first use. In contrast, the foam ceramic burner bricks for the S-HR 51 and 60 are black on the flame side from the factory.



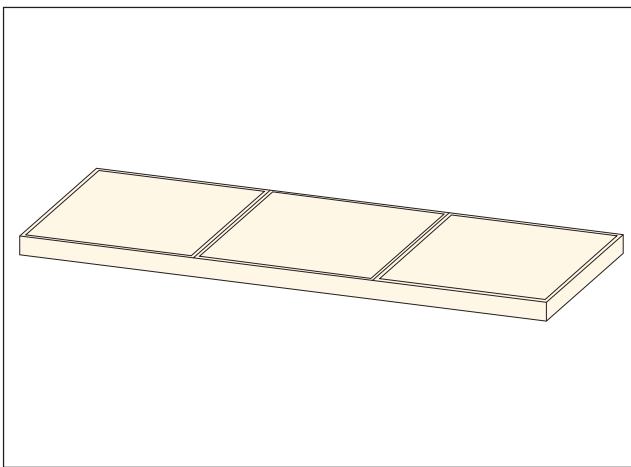
top view of burner bricks S-HR 15 / S-HR 24/24T figure 4



top view of burner bricks S-HR 35 / S-HR 35T figure 5



top view of burner bricks S-HR 51/51T / S-HR 60 (up to April 1998) **figure 6**



top view of burner bricks S-HR 51/51T / S-HR 60 (from April 1998) **figure 7**



The burner bricks can best be cleaned using compressed air (max. 6 bar and blow in the opposite direction) and if applicable using a soft brush. Never use water to clean the burner stones.

5.3 The fan

The fan is positioned at the top of the heat exchanger.

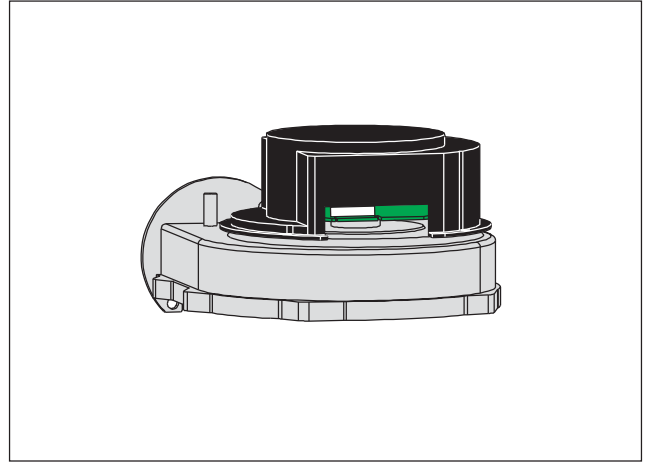
There are two designs of heat exchanger:

For the types S-HR 15; S-HR 24/24T and S-HR 35/35T

- only 24 volt power supply and control (identifiable by the individual plug connection)

For the types S-HR 51/51T and S-HR 60

- 24 volt control and 230 volt supply voltage (identifiable by the twin plug connection)



view of fan **figure 8**

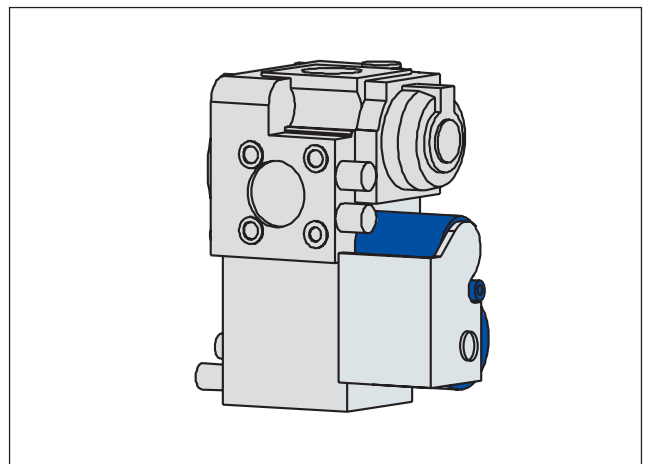
When replacing the motor the whole fan, as illustrated, should be replaced.

Cleaning of the plastic fan impeller is only recommended using compressed air (max. 6 bar).

5.4 The gas valve

The gas valve is the same for all types of ATAG Blauwe Engel S-HR boilers. They are driven using 24 volts. This gas valve is adjusted using a so-called zero pressure adjustment. As a result of making this adjustment, it will no longer be possible to read the burner pressure.

For more information see chapter 8 "Checking and commissioning".



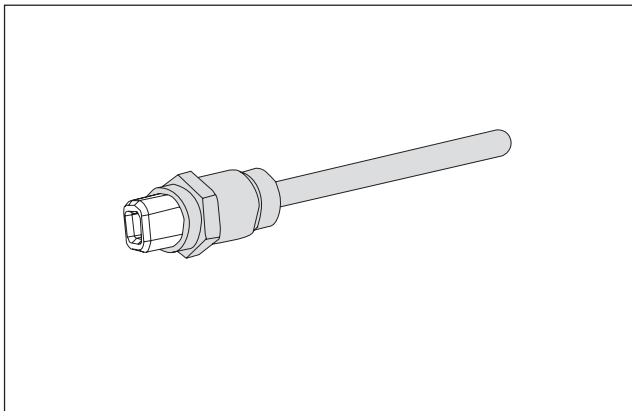
view of gasblock **figure 9**

5.5 The temperature sensors

The boilers are fitted with several temperature sensors (NTC). The following sensors are present:

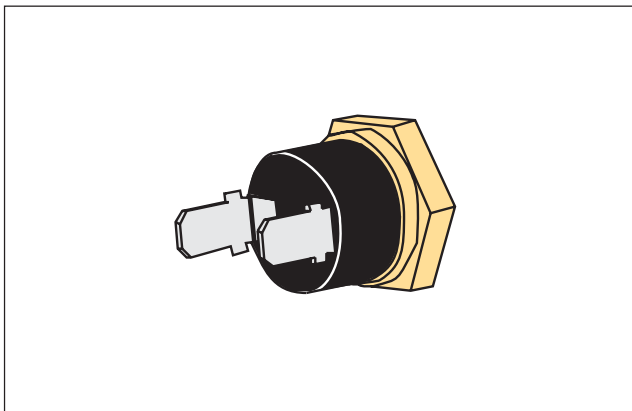
- T1 flow sensor
- T2 return sensor
- T3 DHW cylinder sensor
- T4 outside temperature sensor (optional)
- T5 flue gas sensor (optional)

The controller independently checks and corrects the temperature of the flow and return sensor. In a non-burning situation, these should correspond with one another.

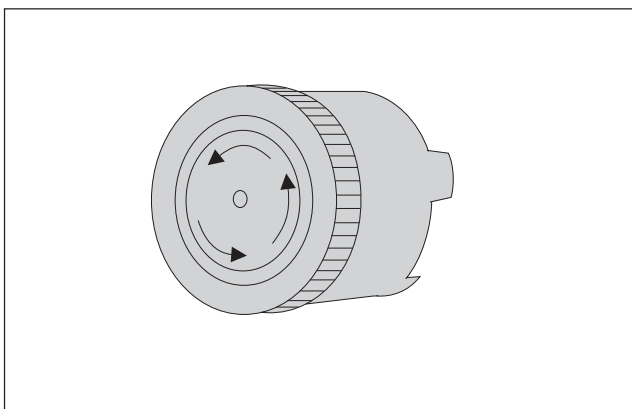


view of flow sensor T1

figure 10

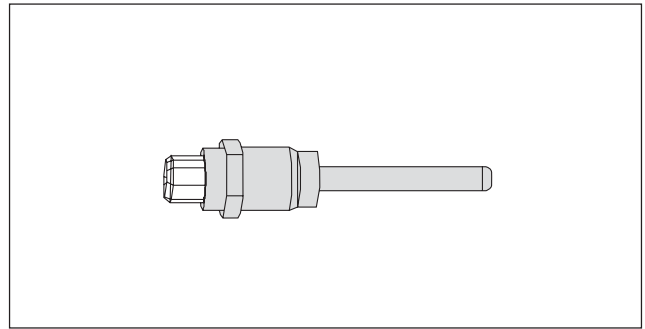


view of return sensor T2 and DHW cylinder sensor T3 figure 11



view of outside temperature sensor T4

figure 12



view of flue gas sensor T5

figure 13

All temperature sensors which are connected to the boiler are NTC sensors (12 kOhm at 25°C). This means that if the temperature increases, the resistance will fall.

Temp °C	NTC 12 K (12 kΩ / 25°C) flow sensor T1 return sensor T2 DHW cylinder sensor T3 outside temperature sensor T4 flue gas sensor T5
-20	98.900
-18	88.950
-16	80.100
-14	72.200
-12	65.150
-10	58.900
-8	53.300
-6	48.250
-4	43.750
-2	39.750
0	36.150
2	32.900
4	29.950
6	27.350
8	24.950
10	22.800
12	20.850
14	19.100
16	17.500
18	16.100
20	14.750
22	13.600
24	12.500
25	12.000
26	11.500
28	10.600
30	9.800
32	9.100
34	8.350
36	7.750
38	7.200
40	6.650
45	5.525
50	4.600
55	3.850
60	3.250
70	2.325
80	1.700
90	1.275
100	950

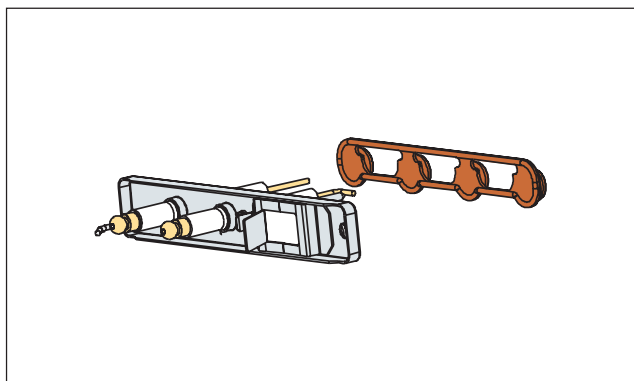
recistance table NTC-sensoren

table 3

5.6 The ignition electrode

ATAG has combined the ignition electrode, ionisation electrode and the inspection glass section into one part. This electrode should only be exchanged if visible wear and tear can be observed.

It should be replaced as a complete unit and it is advisable also to replace the packing. When locating the electrode with the packing remember that the packing should be fitted correctly.



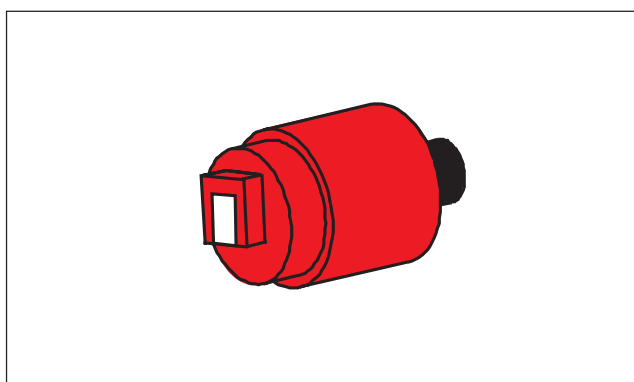
view of ignition electrode

figure 14

5.7 The water pressure sensor

The water pressure sensor is an electronic sensor which indicates water pressures based upon the resistance. The water pressure sensor ensures that the boiler responds to water pressure, which is excessively low or high.

The water pressure sensor also checks whether the boiler pump is working properly. This is done using the pressure difference between a pump on standby and one which is running. Make sure therefore when fitting a second boiler pump that it is connected to connection 4, 5 and 6 of the connecting block in the Control Tower. As a result, this pump will be electrically switched in parallel with the boiler pump.



view of water pressure sensor

figure 15

The water pressure sensor responds in the event of the following water pressures:

00 Water pressure is too low (between 0.0 and 0.3 bar), **FILL** text remains visible and alternates with the water pressure designation. The boiler is put out of operation. The pump comes into operation if there is any risk of frost. The installation should be filled up.

03 Water pressure is too low (between 0.3 and 0.7 bar), **FILL** text remains visible and alternates with the water pressure designation. The boiler is put out of operation. The pump comes into operation if there is any risk of frost or when the pump continuous program is active. The installation should be filled up.

07 Water pressure is too low (between 0.7 and 1.0 bar), flashing **FILL** text alternates with the water pressure designation, 50 % boiler power possible.

The installation should be filled up.

When a water pressure of 1.5 bar has been attained, for a short time the display **Stop** will be shown alternating with the water pressure designation to indicate to stop filling. The de-aeration program will then automatically be started if one of the three program keys is switched on.

P 3.5 Water pressure is too high (> 3.5 bar), **HIGH** text remains continuously visible, the boiler is put out of operation.

The installation pressure should be reduced by bleeding off water.

The operating pressure of the boiler normally lies between the minimum 1.0 bar (in its cold state) and the maximum 2.5 bar (in its warm state).


5.8 The automatic de-aeration program

The 15 minute automatic de-aeration program is independently started if the controller see that the press is getting high again after it has been filled up. When an boiler is put into operation for the first time using one of three program keys, the 15 minute automatic de-aeration program is also started. **A 20** appears on the display, whereby the **A** indicates the automatic de-aeration program and the figure indicates the flow water temperature (T1).

If one of the programs had been switched off prior to a power failure, then the boiler will automatically start the 15 minute de-aeration program. The de-aeration program can only be interrupted after entering the access code by briefly pressing the reset key. The de-aeration program can be started by holding the reset key down for 5 seconds.

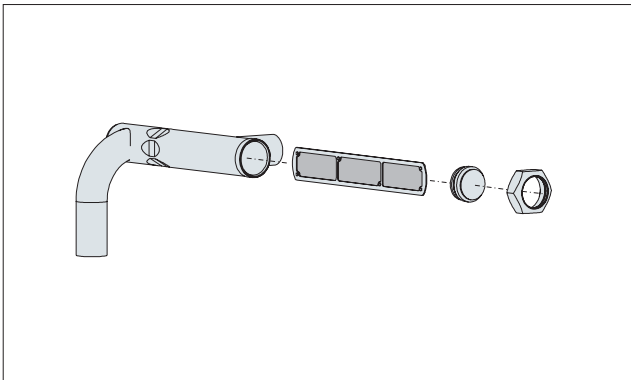
5.9 The water filter

All S-HR boilers have a water filter located in the return. It is not necessary to clean this water filter when servicing. The boiler will itself indicate if a water filter is contaminated due to the fact that insufficient flow will be detected via the boiler.

 **The central heating installation should be filled with drinking water.**



If after some time the temperature difference between the flow and the return water is too great or there are flow problems or the installation is not hot enough, the water filter may be blocked. Put the boiler out of operation, bleed the boiler and clean the filter.



view of the waterfilter

figure 16

5.10 The boiler pump

The S-HR boilers have a modulating boiler pump, which is located in the return pipe of the boiler. There are two different types of pumps to be distinguished:

The ARS 25/70 type pump appears in the boilers:

- S-HR 15;
- S-HR 24/24T;
- S-HR 35/35T.

The ARS 25/75 type pump appears in the boilers:

- S-HR 51/51T;
- S-HR 60.

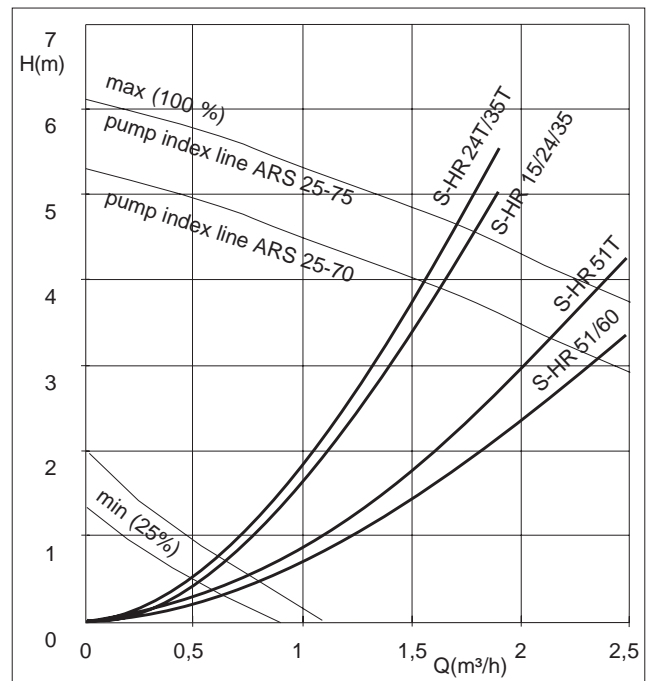
type of unit	water flow rate ΔT 20°C		permissible installation resistance	
	l/min	l/h	kPa	mbar
S-HR 15	9,9	600	35	350
S-HR 24/24T	15,1	980	25	250
S-HR 35/35T	22,1	1324	20	200
S-HR 51/51T	32,1	1929	20	200
S-HR 60	37,9	2271	12	120

available water flow on full load

table 4

It is set out in table 4 what the pump yield is at an average ΔT of 20°C and given a capacity of the boiler pump of 100%. The residual working head of the boiler pump corresponds with the permissible installation resistance. If this installation resistance is exceeded, the average ΔT controller responds to this by setting the boiler pump to maximum rpm and if necessary to reduce the burner power. The possible consequence of this is that the installation will not come up to temperature or not sufficiently.

If the installation resistance is such that the average ΔT controller causes the boiler to switch off as a result, a Block 11 (for central heating) occurs temporarily. After some time, the controller will try again to start to create an acceptable average ΔT . If this error occurs 3 times, a longer Block 11 occurs. If this takes place via the boiler circuit, this is called Block 12. If this Block occurs it is recommended to reduce the installation resistance using a pressure difference controller (see the installation instructions for the boiler).



pump index line

grafic 1

5.11 The three-port valve

All S-HR-T Combi boilers are designed with a sliding three-port valve. The hot water always has priority and the controller will always cause the three-port valve to be set to the hot water supply, whilst hot water is being used.

Depending upon the size of the boiler and the quantity of hot water, which is bled from the boiler, it is possible, if the boiler has sufficient power, for the Combi program to become active. This Combi program ensures that at the same time heat goes both to the boiler and to the central heating installation. A detection system in the controller ensures that the sanitary water in the boiler does not cool down too much thus preventing a temperature drop. In this way comfort is increased by also having warm radiators whilst showering.

The Combi program can only be active if:

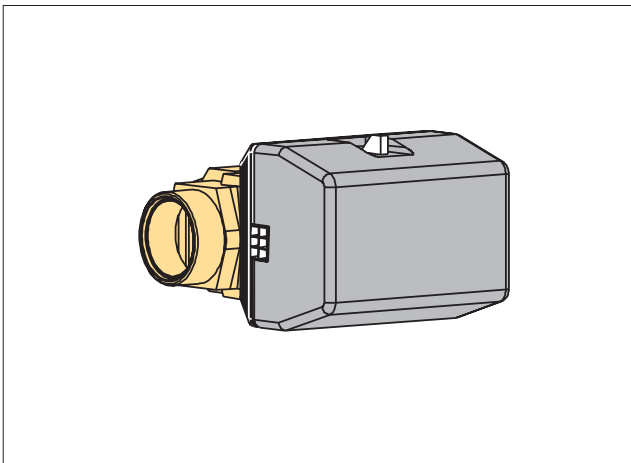
- both the boiler and the central heating installation have a heat requirement;
- the VC6940 type three-port valve is present
- the power has sufficient power
- the temperature difference between the requested central heating water and the water produced in the boiler is not greater than 15°C.

There are two different types of three-port valves which can be distinguished:

- The VC2010 design is an open / close three-port valve and appears in the S-HR 24T boiler.
- The VC6940 is a modulating three-port valve and appears in the S-HR 35T and the S-HR 51T boilers.

The modulating drive is supplied by the Control Tower. The drive is stepped.

The three-port valves are always voltage-free in the last selected state, which means that it never has an automatic back-flow mechanism (spring). To flow back to the other position, the three-port valve receives voltage again (for electrical connections see the connection diagram for the boiler).



view of the three-port valve

figure 17

5.12 The condense collection device

The condensation and overflow water are jointly drained into a drainage pipe.

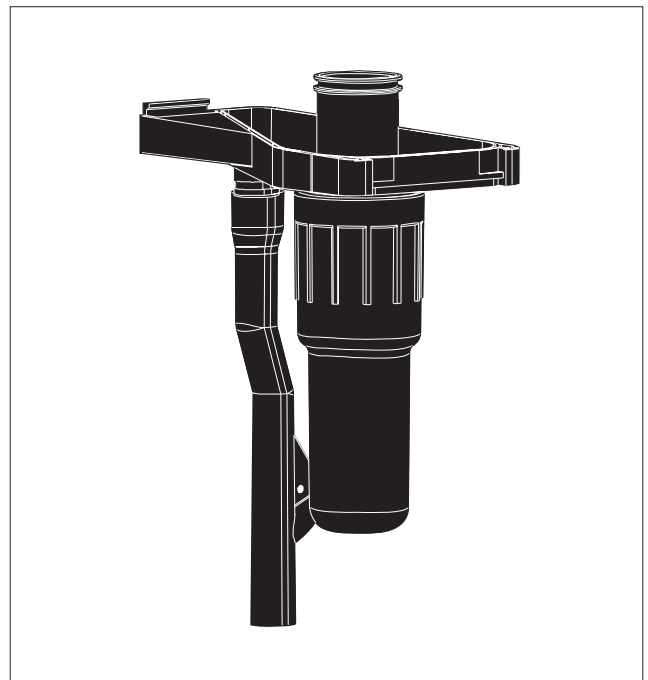
Overflow or condensation water is released into the drainage pipe by the following components:

- the heat exchanger
- the flue gas venting system
- the 3 bar overflow
- the automatic de-aerator
- the inlet combination (S-HR-T)

The drainage of condensation should be connected to the sewage system by means of an open connection. To avoid any excess build-up of stench, the connection, to which the condensation drainage is connected into the sewage system, must be fitted with a siphon. The siphon present in the boiler is not intended for this. This namely should prevent any flue gases from escaping into the room in which it is set up. The siphon beaker underneath the condense collection device is sealed by means of an O-ring assembly. It is not necessary to pack the wire connection neither is it recommended.



A seal is quickly made by the O-ring, as a result of which it is neither necessary nor recommended to tighten the siphon beaker with force. If necessary, the O-ring can be greased with acid-free Vaseline when servicing.

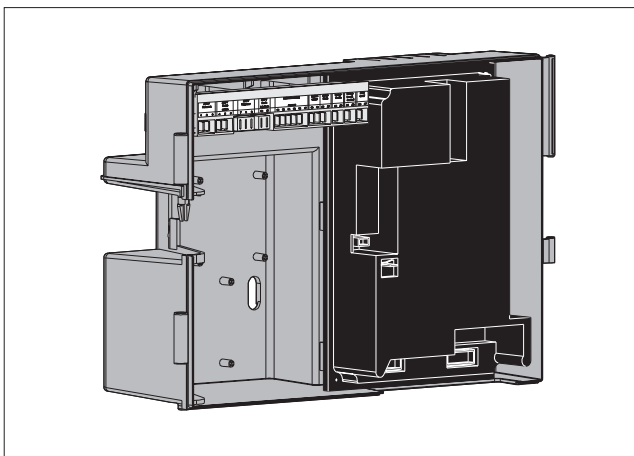


view of the condense collection device

figure 18

5.13 The control unit

All devices have the same ATAG control unit type 1415D. The group of control unit, display, terminal strip and any installed interface (which is responsible for communication between the control unit and the ATAG Brain) is called the Control Tower. All of these components can be individually replaced. The power supply for the control unit is provided by an externally located transformer (behind the Control Tower).



view of the control unit

figure 19

Differences in parameter settings, which are loaded in the control unit, mean that the devices are type-specific. The power for an S-HR 15 is different to that of an S-HR 60. Which program is loaded in the boiler and which type of boiler it is, is displayed when the control unit is powered up. The display first of all indicates the type of device **24.1** followed by the software version **01.1**.

The memory for the control unit is great, which means that a large number of settings can be programmed. Settings which can be boiler-, installation- and even customer-specific. These settings are stored in the memory of both the control unit and the display. When replacing one of these two components, the newly installed component will be loaded with the available memory. This procedure can be seen from the **copy** text. It may sometimes occur that the controller requests a confirmation to this procedure by indicating **A--d** or **d--A**. The confirmation can be given by briefly pressing the "Store" button. It is then necessary to re-enter the programmed settings, as they are already stored.

Control units which are replaced, can only be replaced using ATAG specific components.

The control unit has its own internal controller. For both the central heating and the hot water program, for example, separate temperatures and power settings can be set.

What is more, the controller makes the boiler fail-safe. This is achieved thanks to the average ΔT controller. This controller continuously checks whether there is an acceptable temperature difference between the flow and return water. If this is too great, which can be harmful for the boiler, the pump rpm is automatically increased, which results in more water being circulated. If this does not have sufficient effect, the pump will be set to its maximum rpm, after which, if necessary, the power from the boiler will be reduced. When an acceptable average ΔT has once again been measured, the power will attempt to adopt the old modulation level. This prevents the boiler from suffering irreparable damage and unnecessary fouling.

connection block in the Control Tower

230V~ Power Supply			230V~ External pump			230V~ External Controller			230V~		Calorifier connection						Outside sensor		Brain		Room therm. On / Off		External safety contact		24V~ 100 mA	
N	F	⊥	N	F	⊥	N	F	⊥	N	F	○	○	○	○	○	○	○	○	A	B	○	○	○	○	○	○
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
main power supply			230 Volts for external pump			230 Volts for external control			230 Volts for Brain interface		internal or external three-port valve motor and DHW cylinder sensor						ATAG outside sensor		ATAG Brain room thermostat		on / off thermostat or controller		external safety contact		24 Volts maximum 100 mA	

connection diagram

figure 20

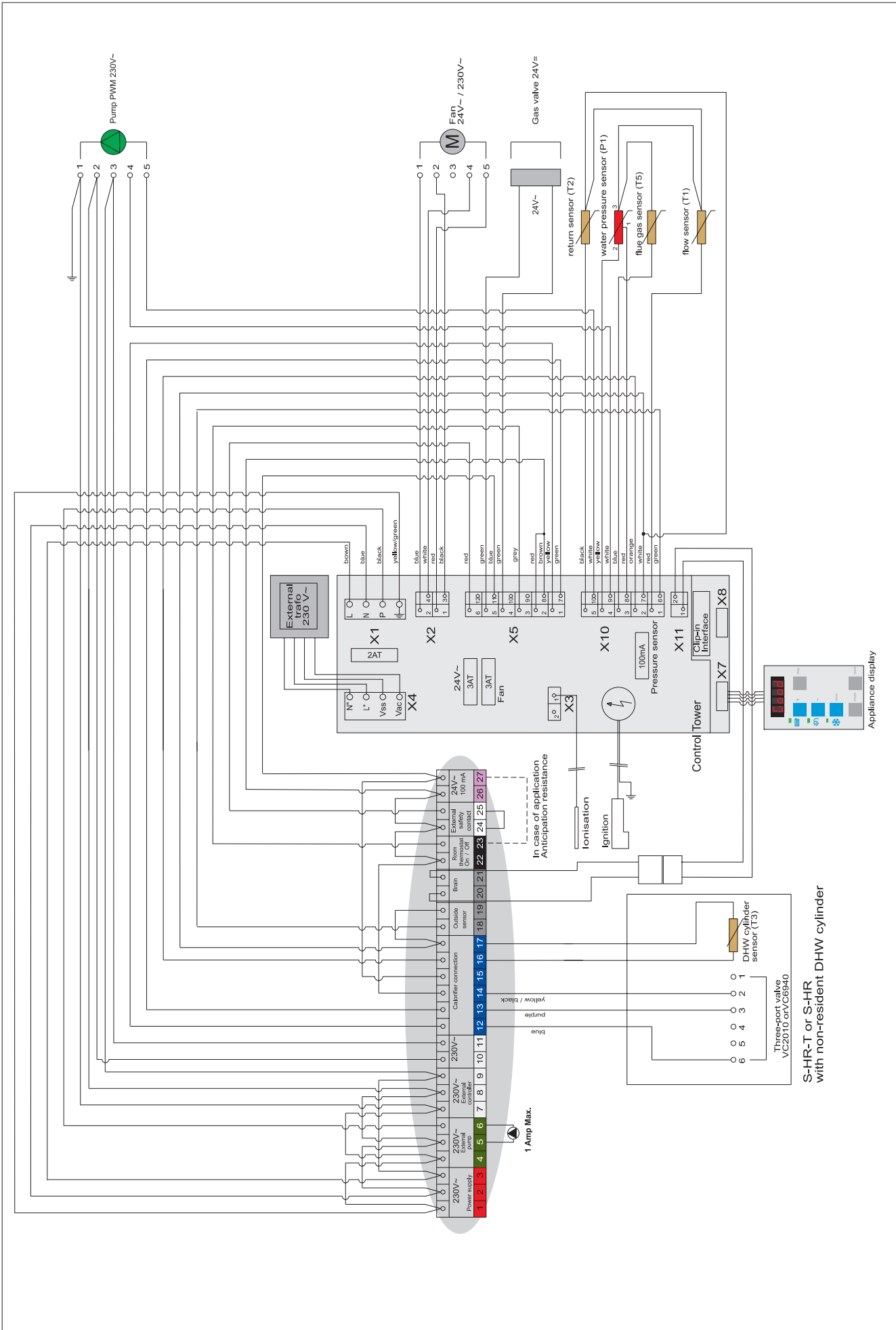






figure 21

5.14 The display

As indicated, all boilers have the same design display. The difference is in the programmed software, which differs per type of boiler. The memory for the software is present in the control unit and the display. The display has various push buttons, which have different functions. What is more, the keys can be divided into so-called user keys and service keys.




User key functions

The following keys have the following functions in the "Standby" mode (see chapter 6):

-  (central heating) program key, for switching the heating program on or off;
-  (hot water) program key, for switching the hot water program on or off;
-  (pump) program key, circulating the pump continuously through the central heating installation, or according to the overrun times of the relevant programs;
- Mode key, after pressing it briefly, a chapter can be selected;
- Step key, after pressing it briefly, the water pressure can be requested. After holding it pressed down for 5 seconds, it switches over from  indication to the technical indication and back again;
- Reset key, after pressing it briefly an error is restored.

Service key functions

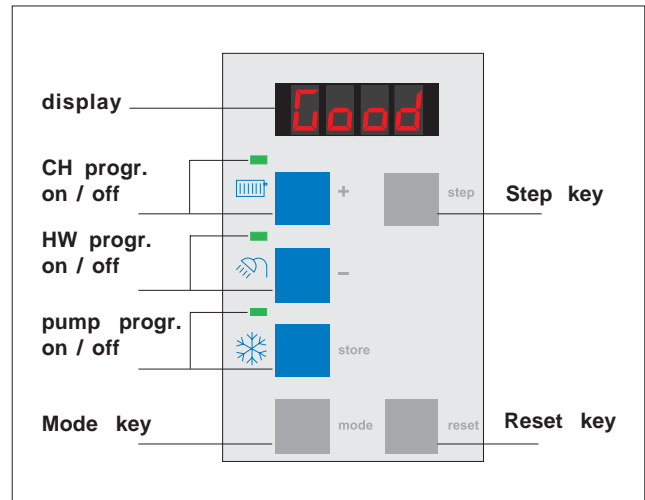
The following keys have the following functions in the other modes (see chapter 6):

-  (central heating) key has the + function;
-  (hot water) key has the - function;
-  (pump) key has the store function, which means that using this key a modified setting is confirmed, or an instruction can be confirmed;
- Mode key, after pressing it for 5 seconds the option is given to enter the access code. In addition, it is possible to select between the different chapters;
- Step key for scrolling through the chapters;
- Reset key, after pressing it briefly the entered access code is completed.

After pressing for 5 seconds a complete operational shutdown occurs, for example, for activating the automatic de-aeration program.

Completing the automatic de-aeration program is only possible after the access code has been entered, after which the program is stopped after briefly pressing the reset key.

The two chapters "Standby" and "Para" can be accessed after pressing the mode key.



view of the display

figure 22

Operation indication (in the first display position)

0	No heat requirement
1	Ventilation phase
2	Ignition phase
3	Burner active on central heating
4	Burner active on hot water
5	Fan check
6	Burner off when room thermostat is demanding
7	Pump overrun phase for central heating
8	Pump overrun phase for hot water
9	Burner off because of too high flow water temperature
R	Automatic venting programme

6 Settings and information

Settings can be programmed into the Control Tower and information about the boiler and the controller can be requested. Overall operation takes place using the keys present on the boiler in combination with the display.

The structure of the Control Tower can be considered to be like a book with 5 chapters. Each chapter, which is selected using the Mode key, has a number of pages and these are requested using the Step key. The 5 chapters are displayed after entering the access code and pressing the Mode key.

Standby mode **5664**

Chapter during normal use. The normal operating functions such as the simple **Good** read-out or the technical **P 1.9** with the **0 49** read-out are displayed.

Parameter mode **PARA**

Chapter in which settings can be programmed.

Info mode **INFO**

Chapter in which information can be requested.

Service mode **SERU**

Chapter in which manual settings can be entered for servicing purposes.

Error mode **ERRO**

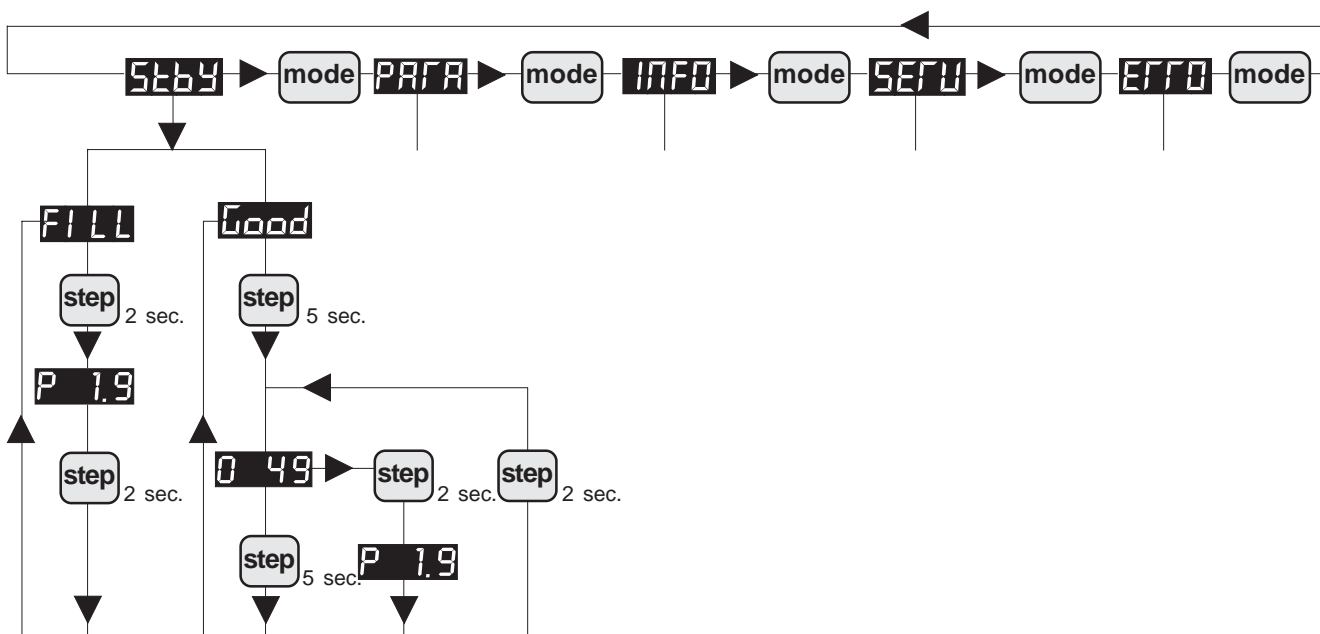
Chapter in which error data can be requested.

ATAG has integrated a number of levels to prevent "unauthorised" persons from being able to request too many settings and too much information. The levels can be accessed using a code. A user only has access to the "Standby" (operational status) chapter and very limited access to the "Para" (settings) chapter.

To gain access to the settings at fitter level, first of all the access code has to be entered. For this, the following procedures should be executed:

- Press the Mode key for 5 seconds. The text **CODE** is briefly displayed, after which a random number appears on the display
- Using the + or the - key, the code **123** can be entered.
- After pressing the Store key, the code is confirmed. In this way access is gained to the fitter level.

6.1 Standby Mode

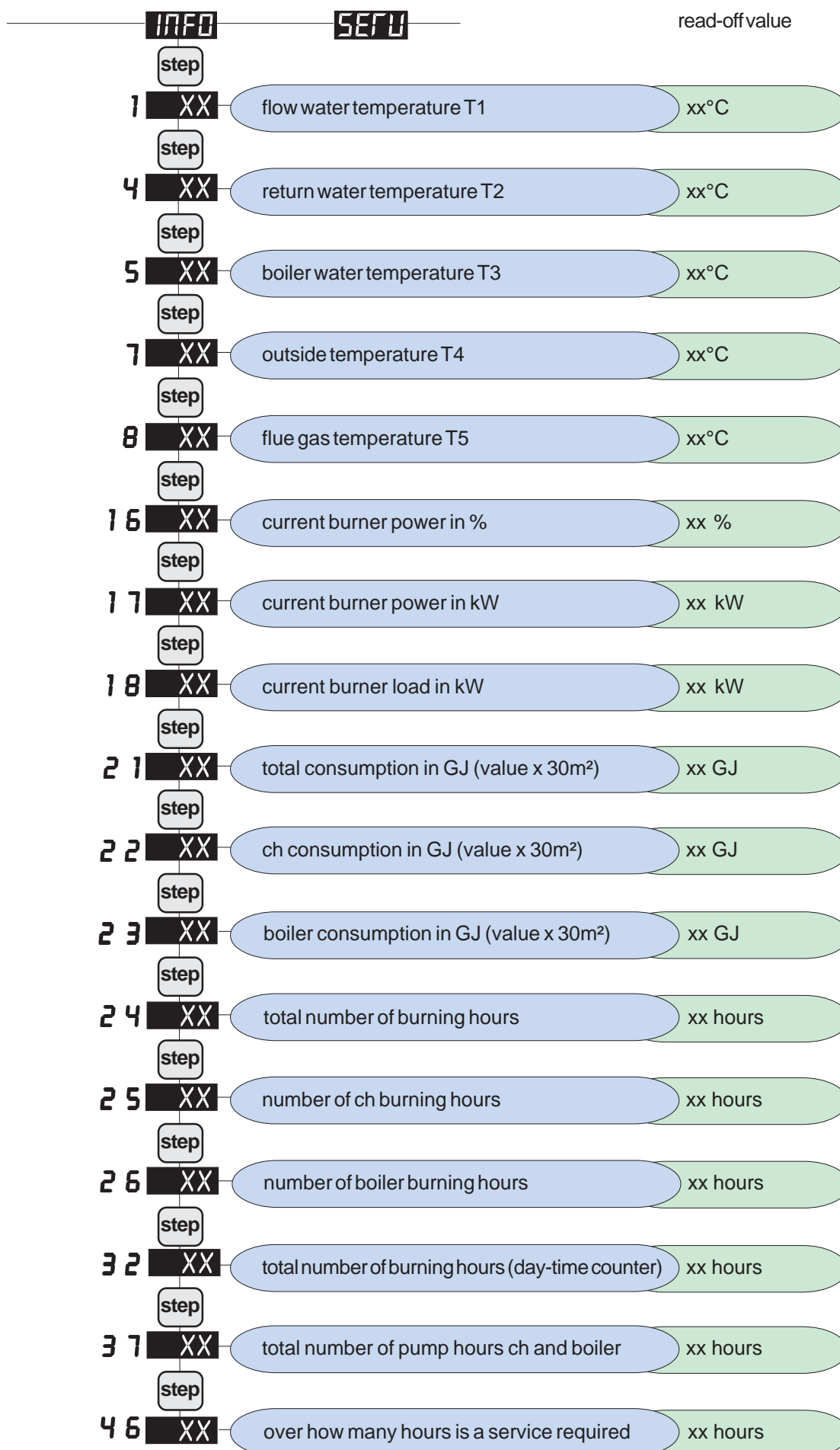


6.2 Parameter Mode

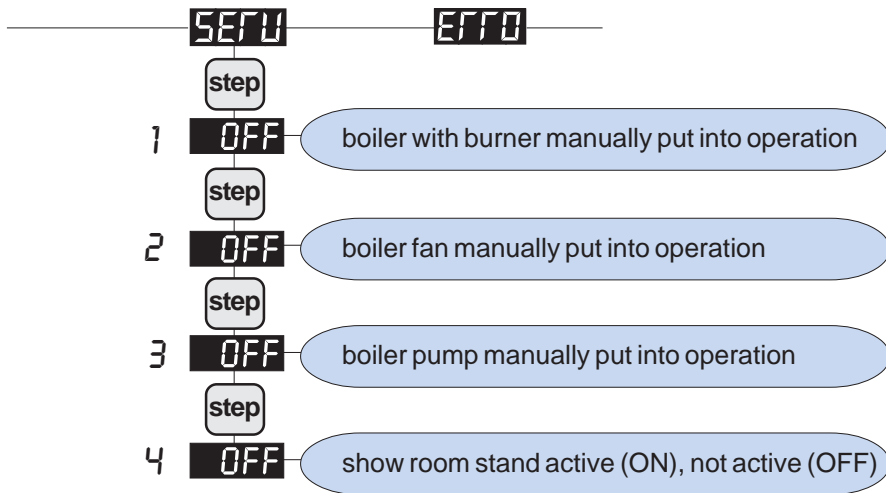
	PARA	INFO	factory setting	setting range
	step			
	1	85	maximum flow water temperature CH	85°C / 20 tot 90°C
	step			
	2	01	preference type ch installation	01 / 01 tot 04
	step			
following code 123	3	XX	maximum ch power in kW maximum	maximum / min to max
	step			
following code 123	4	00	guiding principle for on / off thermostat with outside sensor*	00 / 00 = on/off 01 = on/night-time operation
	step			
following code 123	5	23	K-factor (vertical angle) of the heating line*	2.3 / 0.2 to 3.5
	step			
following code 123	6	14	exponent (curvature) of the heating line*	1.4 / 1.1 to 1.4
	step			
following code 123	7	-10	climatic zone of heating line (lowest outside temperature)*	-10°C / -20 to 0°C
	step			
	10	00	fine adjustment of heating for day-time temperature*	00°C / -5 to 5°C
	step			
	11	00	fine adjustment of heating for night-time temperature*	00°C / -5 to 5°C
	step			
following code 123	14	07	gradient speed	07°C / 0 to 15 / per minute
	step			
following code 123	15	00	booster following night-time drop*	00 / 00 = no 01 = yes
	step			
	23	-03	frost protection temperature	-03°C / -20 to 10°C
	step			
	31	63	boiler temperature of external boiler sensor	63°C / 40 to 80°C
	step			
following code 123	36	00	type of boiler three-port valve	00=VC2010, VC8010 and VC8610 01= VC6940
	step			
following code 123	43	XX	maximum boiler power in kW	maximaal / min to max
	step			
	48	25	minimum pump capacity CH	25 % / 25 to 100 %
	step			
following code 123	49	100	maximum pump capacity CH	100 % / 40 to 100 %

*no effect for Brain application

6.3 Info Mode (following code 123)

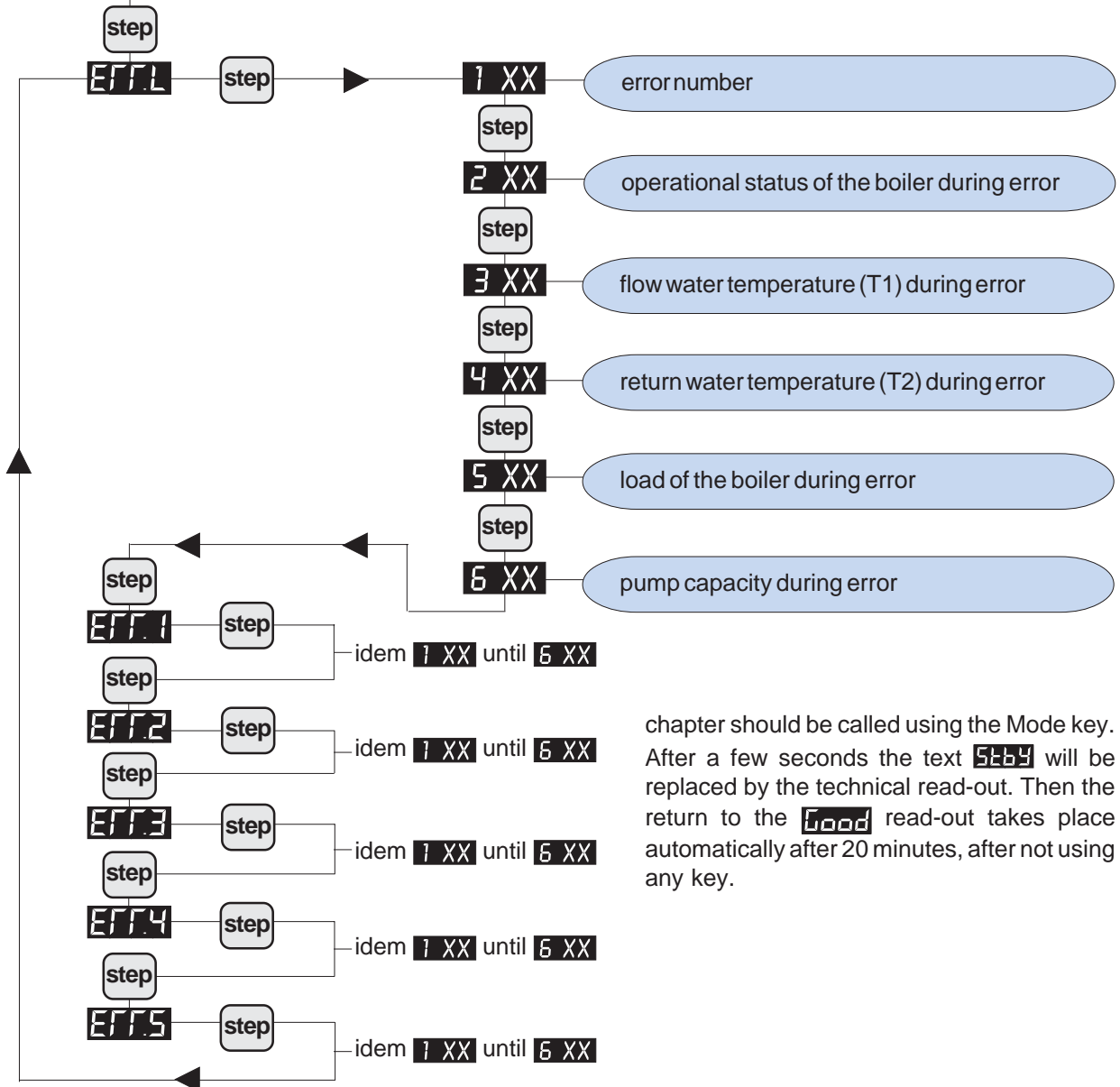


6.4 Service Mode (following code 123)



6.5 Error Mode (following code 123)

To return to the **ERR0** technical read-out for which the water temperature and water pressure is displayed, the **5554**



chapter should be called using the Mode key. After a few seconds the text **5554** will be replaced by the technical read-out. Then the return to the **ERR0** read-out takes place automatically after 20 minutes, after not using any key.

6.6 Green key function

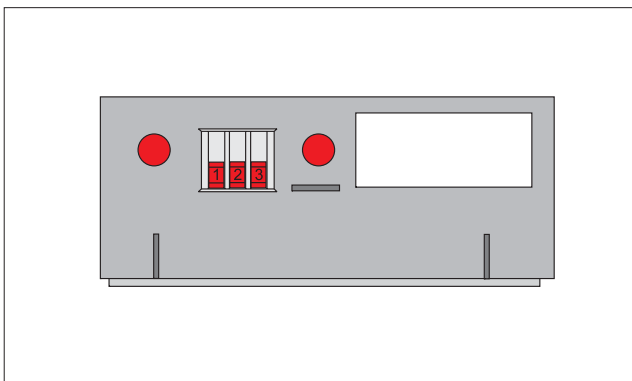
The "green key function" can be used to activate the factory settings. The modified settings will be cancelled as a result. The following procedures will have to be carried out:

- Using the Mode key make sure that chapter **PARA** is on the display.
- then press the Store key. The word **LOPY** is displayed and the factory settings will once again be activated.

6.7 The Brain interface

The ATAG Brain and the control unit work on the basis of a so-called bus structure. This bus structure means that information can repeatedly be sent via a cable. That is not only sending a heat request, but for instance also a particular water temperature being calculated. The bus structures of the Brain and of the control unit are different and do not speak the same "language". This is made possible by the Brain interface. This communication printed circuit board sends the instructions from the ATAG Brain to the control unit. This interface is positioned in the Control Tower on the control unit.

The interface is a plug-in module, which should be plugged directly into the slot at the bottom of the control unit.



view of interface

figure 23

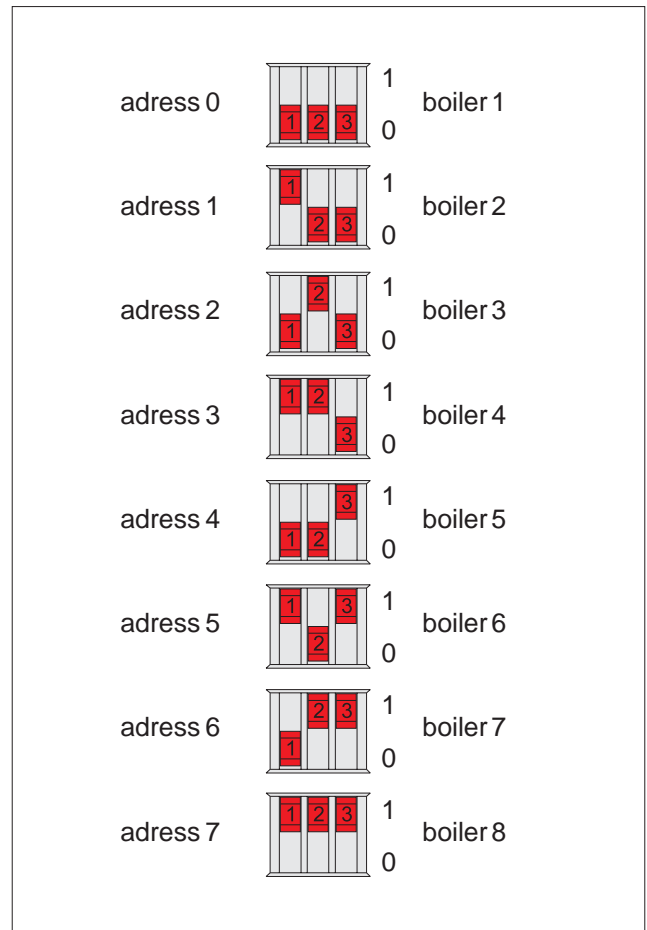
The interface should be plugged without power, otherwise there would be a risk that the control unit is not able to "find" the interface.

On the bottom of the interface there are two LED's. These LED's flash off and on, this means that information is being sent between the control unit and the ATAG Brain.

If a lamp is illuminated continuously (a few minutes) this means that the information has not been received or is not recognised. Restarting the boiler by means of a power break will usually rectify such an error.

The interface and therefore also the boiler, have an address for the ATAG Brain. An address of this kind ensures that the ATAG Brain knows from which S-HR boiler a message is coming.

For an boiler located alone this information is superfluous and the switches should be set so that address 0 is current. For cascade applications this address selection is necessary.

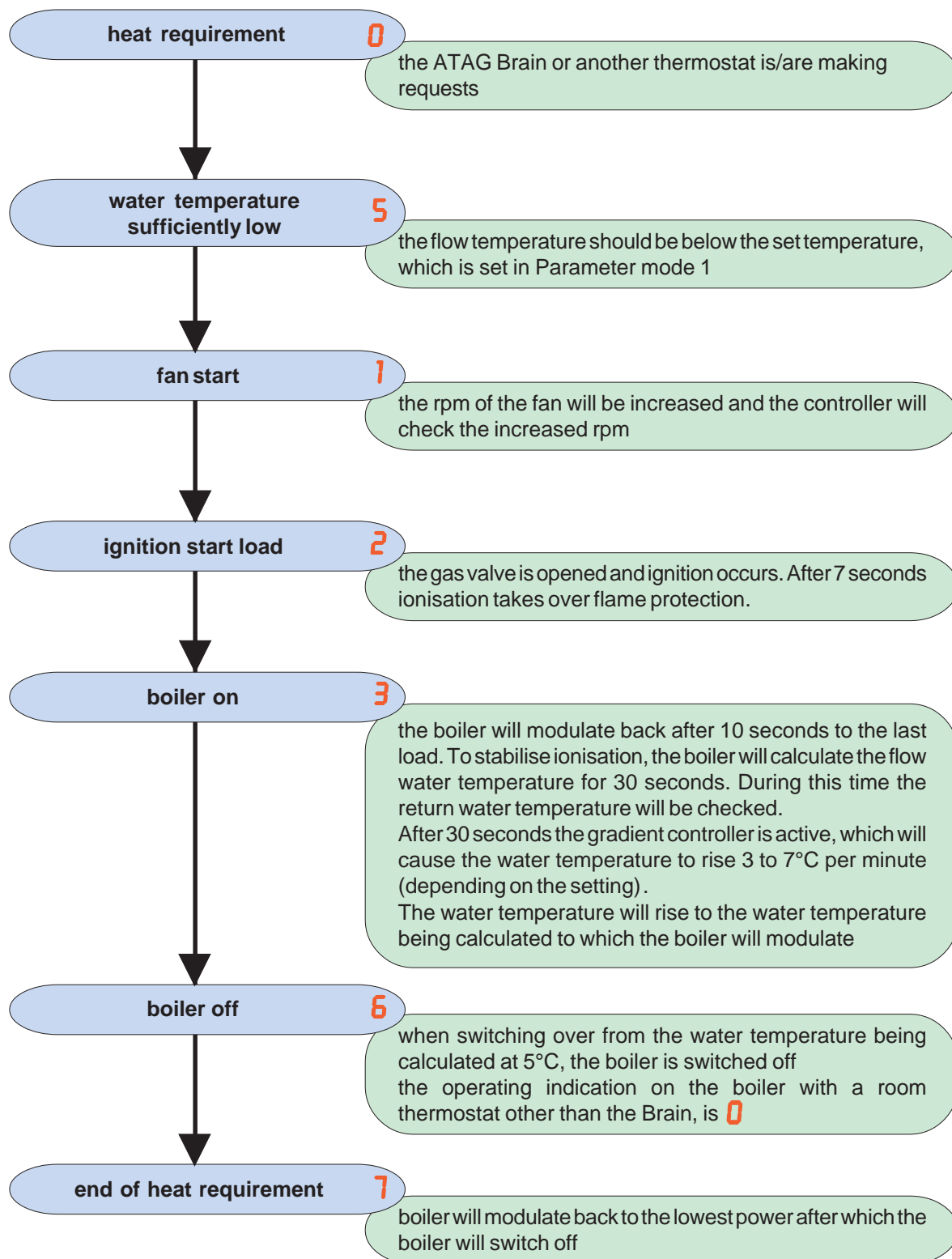


address choice selection interface

figure 24

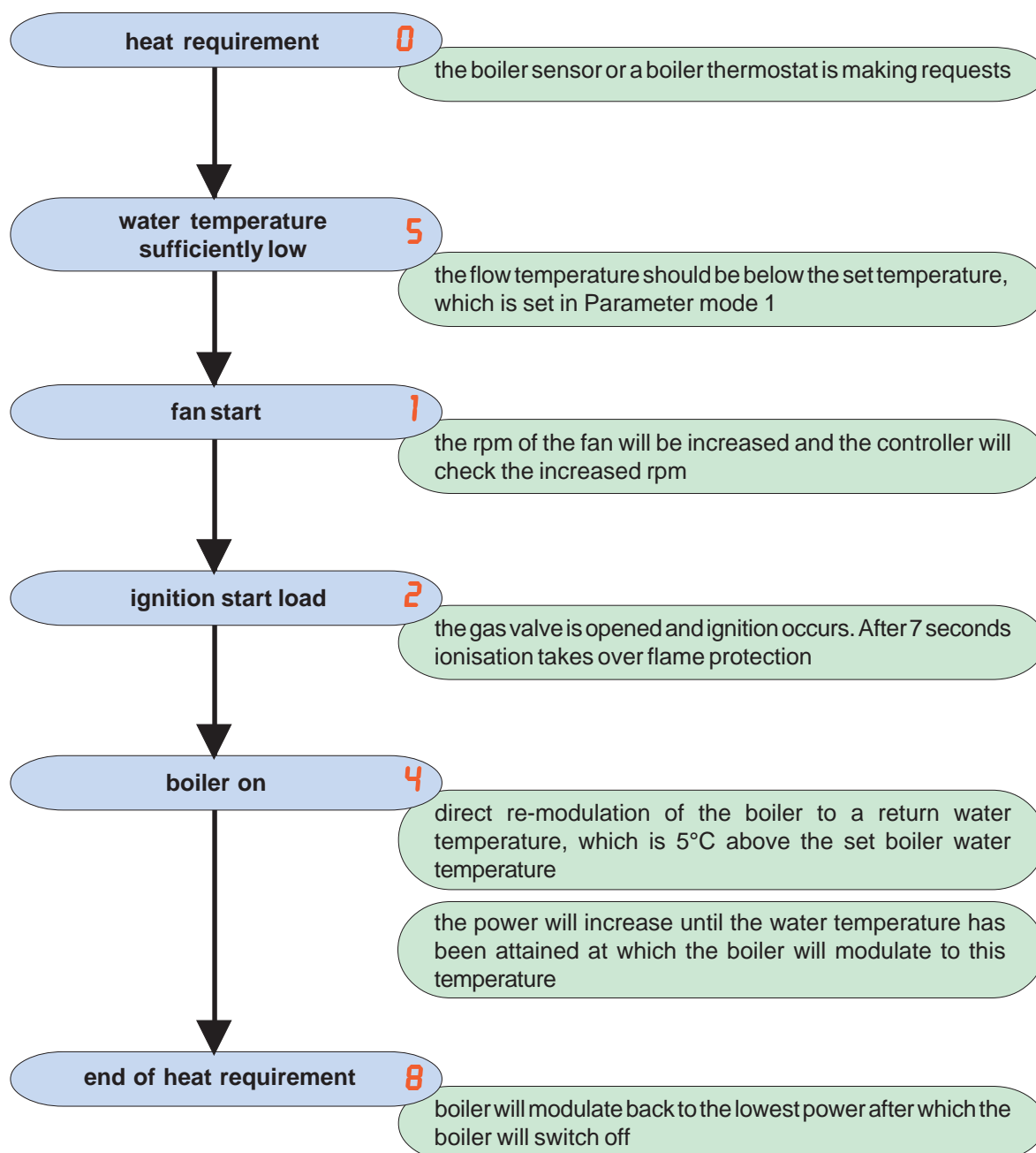
7 Starting the boiler and operating the central heating

After checking that the boiler is functioning, the best results will come from the technical read-out in "Standby" mode. Indeed in "Good" mode only the text **Good** can be seen which provides insufficient information about the start of the boiler and its operation.



7.1 Starting the boiler and functioning of the DHW supply

After checking that the boiler is functioning, the best results will come from the technical read-out in "Standby" mode. Indeed in "Good" mode, that is, only the text **Good** can be seen which provides insufficient information about the start of the boiler and its operation.



8 Checks and commissioning

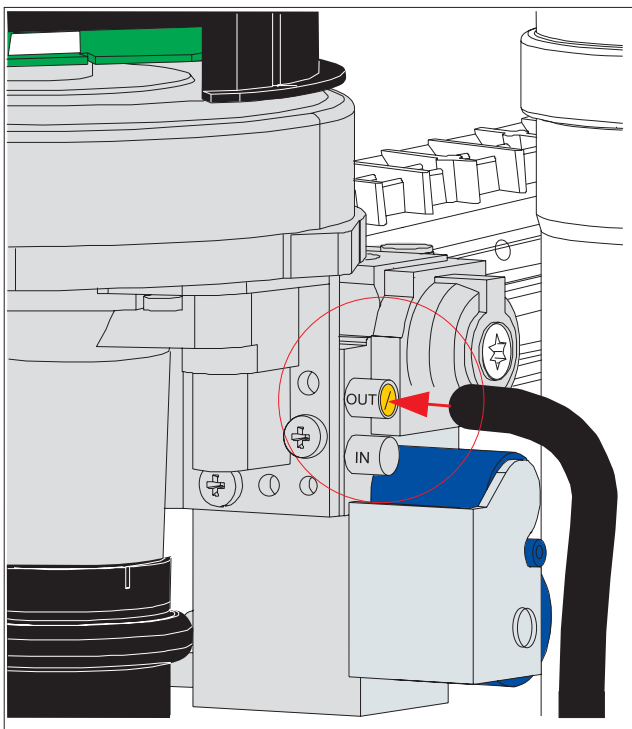
8.1 Checking for contamination



To be able to check the boiler for contamination over the coming operating years it is advisable to measure the maximum air displacement throughout the boiler when putting the boiler into operation. This value can be different per type of boiler.

To be able to measure this value, the following procedures should be completed:

- enter the access code as set out on page 19 to gain access to the service chapter;
- Using the Step key select the manual fan setting without burner action **2**, which will indicate that the fan is off **OFF**;
- connect the hose from the digital pressure gauge to the uppermost measuring nipple on the gas valve in accordance with figure 25 (first unscrew it before fitting the hose);



measuring point for air pressure

figure 25

- increase the fan using the + key to the maximum rpm;
- measure the pressure difference and note down this value;
- at the following service on the boiler the value of the air pressure difference may have dropped by a maximum of 20 % in relation to the value when the boiler was commissioned. If this value has dropped by less than 20 % the boiler does not require any maintenance.

8.2 Checking the zero pressure controller

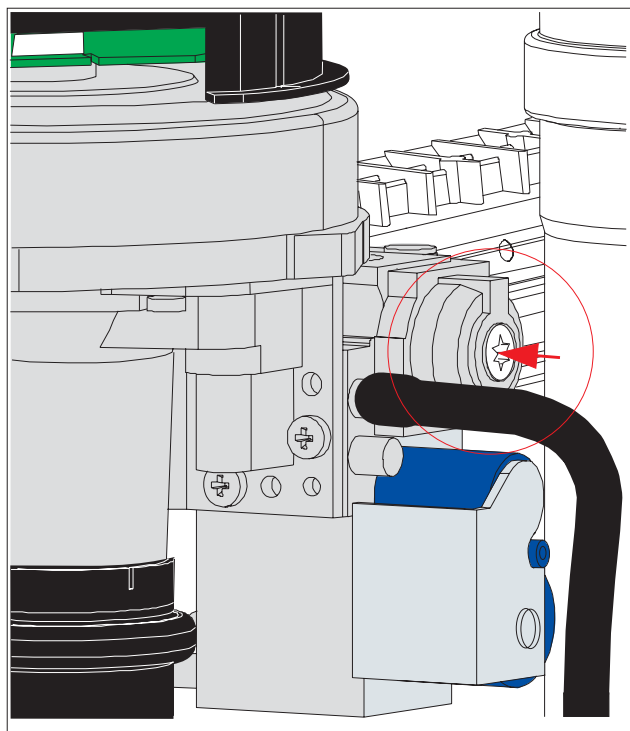


The zero pressure controller is factory set. This should be checked when servicing, during maintenance and in the event of an error to the gas valve and fan.

This can be checked using the following procedure:

- make sure that the boiler is in operation and the heat which it is producing can escape;
- enter the access code as set out on page 19 to gain access to the service chapter;
- using the Step key select the manual fan setting with burner action **1**, which will indicate that manual operation is off **OFF**;
- connect the hose from the + connection on the digital pressure gauge to the uppermost measuring nipple on the gas valve in accordance with figure 25 (first unscrew it before fitting the hose);
- activate manual operation by briefly pressing the + key;
- increase the fan using the + key to its maximum load, after which the measure pressure difference must be between 0 and -4 Pa (SH-R 51/51T and S-HR 60 between -10 and -13 Pa).
- the manual selection is completed by holding the - key pressed down until the minimum load is displayed. After pressing this key again the text **OFF** is displayed from which it can be deduced that manual selection is set to off.

When it has been established that the zero pressure controller is deviating too much, this can be corrected using the setting screw on the gas valve (see figure 26)



zero pressure controller adjusting screw

figure 26

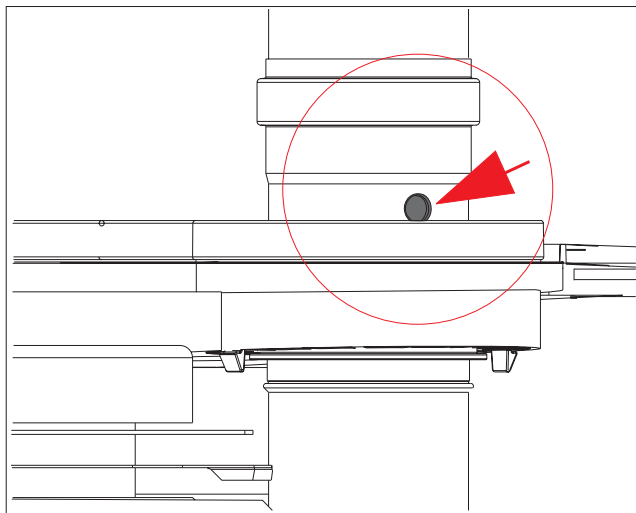
8.3 Checking the CO₂



The CO₂ percentage is factor set. This should be checked when servicing, during maintenance and in the event of an error.

This can be checked using the following procedure:

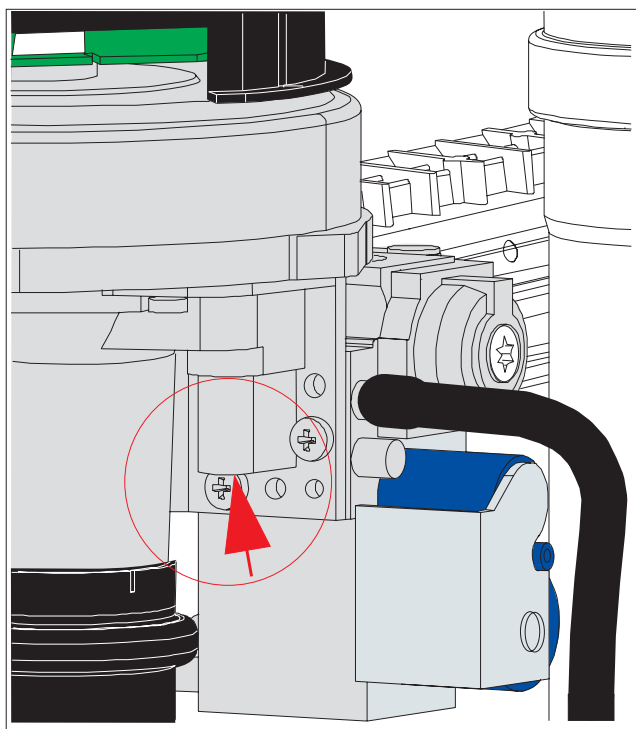
- set the boiler into operation using the service chapter as set out in chapter 8.2;
- place the lance of the CO₂ meter in the place as illustrated in figure 27;



measuring point for CO₂

figure 27

- using the + key set the maximum load;
- The CO₂ percentage at full load should be in accordance with table 1 and 2 (pages 8/9). The correct CO₂ percentage can be set using CO₂ the setting screw (see figure 28).



CO₂ setting screw

figure 28

- the manual selection is completed by holding the - key pressed down until the minimum load is displayed. After pressing this key again the text **OFF** is displayed from which it can be deduced that manual selection is set to off.

8.4 Maintenance

If the boiler has to be cleaned, the following procedures should be carried out on the following components:

The air box

Dirt, which is drawn through the air feed pipe will get down into the air box. This dirt can be removed using a cloth together with a simple (non-abrasive) detergent.



Do not use an abrasive when cleaning the air box, as this causes damaging cracks to the air box.

The burner and heat exchanger

These components should only be cleaned if it has been obvious that the maximum number of Pascal is no longer attained as set out in chapter 8.1.



To be able to inspect the heat exchanger, the fan boiler should be removed.

The following procedures should be carried out:

- close the gas valve and remove the plug from the wall socket;
- turn the Control Tower around its left-hand hinge to face forwards and remove the plastic air box;
- loosen the connection from the gas pipe under the gas valve;
- remove the electric connection from the gas valve;
- pull out the electric connecting plug from the fan motor;
- unscrew the front Phillips screw on the black air damper;
- next turn the two clamping bars one quarter turn and remove them by pulling them forwards;
- slightly tilt the fan boiler upwards and take it out in front of the heat exchanger;
- the fan boiler and the air damper can be checked for dirt and if applicable should be cleaned (keep them dry!);
- now remove the burner by tilting them upwards and removing them in the same direction as the fan boiler for the heat exchanger;
- the burner and the heat exchanger can be cleaned using a soft brush or compressed air (blow in the opposite direction);
- if necessary, rinse the heat exchanger with tap water.

Reassembling the components is done in the reverse order.

The following components should be given extra attention when refitting them:

- make sure that the packing for the burner is correctly positioned in relation to the heat exchanger;
- make sure that the clamping bars for the fan boiler are pressed far enough back and that they have been turned back one quarter turn;
- make sure that the gas connection under the gas valve has been tightened.

The siphon

To check the siphon for contamination, the following procedures should be carried out:

- make sure that the boiler is off by taking the plug out of the wall socket;
- turn the Control Tower around its left-hand hinge to face forwards;
- undo the siphon beaker by turning in an anti-clockwise direction until it is no longer held in place by the screw thread;
- remove the condensation tray from the heat exchanger. To do this, remove the clip from the flue gas vent at the top of the air box. Slide the flue gas vent upwards slightly;
- Turn the clamping bars below the heat exchanger one quarter turn and take them out forwards. Take out the condensation tray with packing forwards and clean them.



Do not use a pair of pliers or a spanner to loosen or tighten the siphon beaker

Re-assembly takes place in the reverse order.

- Place the condensation tray with packing (if applicable a new one) below the heat exchanger. Be careful to position the packing correctly. Place the clamping bars and turn them one quarter turn. Press the flue gas vent back into the condensation tray and replace the clip.
- Assemble the siphon and make sure that the packing remains in the correct position. Turn the siphon beaker so that it is hand-tight, after which it should be loosened one quarter turn.

8.5 Further checks

A check by taking a ionisation measurement.

- The ionisation indicates whether a flame is present. The measurement is taken by connecting a microammeter in series with the ionisation wire. The minimum permissible ionisation is $2\mu\text{A}$. The boiler will otherwise adapt its load when the ionisation reaches the lower limit of $2\mu\text{A}$.

A check by making a visual inspection.

A visual inspection means that a number of components are viewed and checked to be functioning properly:

- The overflow valve may not show any signs of leakage traces.
- The siphon should be clean.
- The central heating water filter should only be cleaned if the boiler pump is set to maximum rpm and as a result the average ΔT is continually being exceeded.

8.6 Frequency of maintenance

ATAG advises carrying out an inspection every two years and servicing every four years on the boiler. In so doing, however, the circumstances should be taken into account in which the boiler is located. It will be evident from this whether there have been any deviations from this advice.

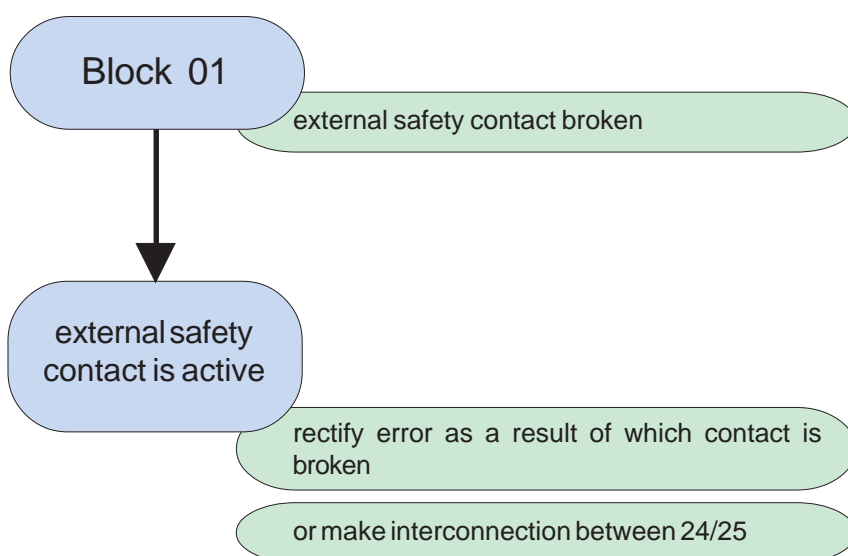
9 Blocks

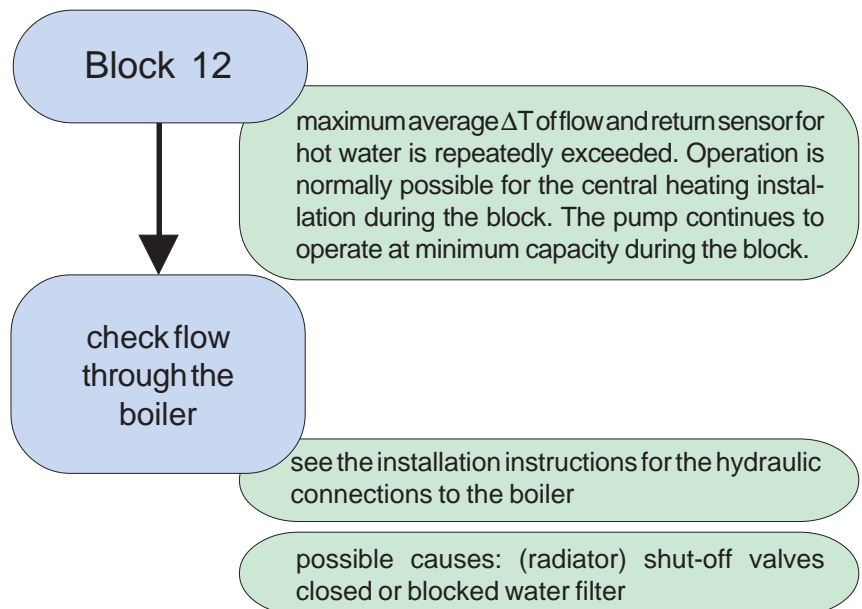
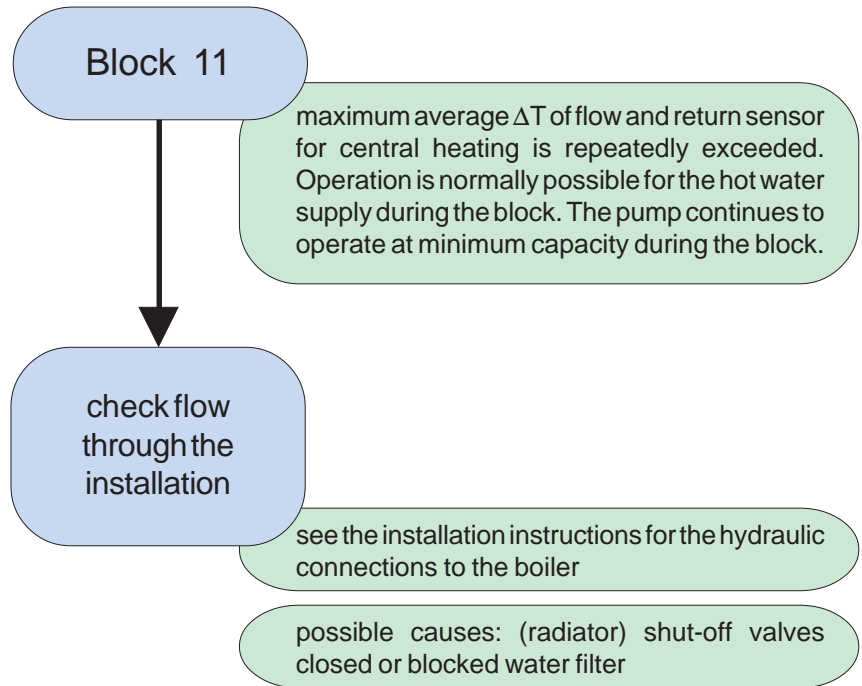
An error, which has been detected, is indicated on the display by a block message. Blocks can be temporary in nature. The controller will do everything possible to prevent a system lock and temporarily switching off the boiler as a result of a block. Please see below for a summary of blocks.

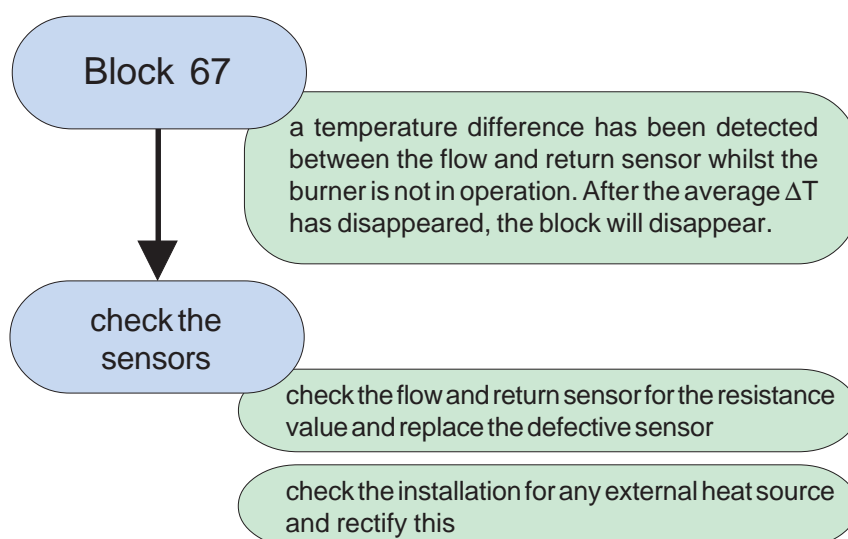
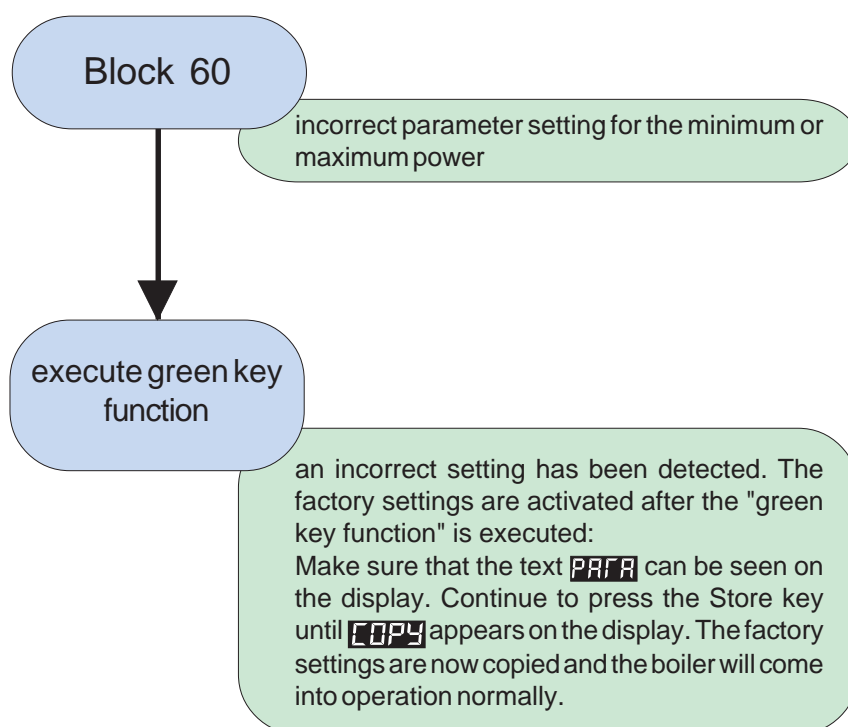
Blocks **bL** with a figure on the last 2 characters.

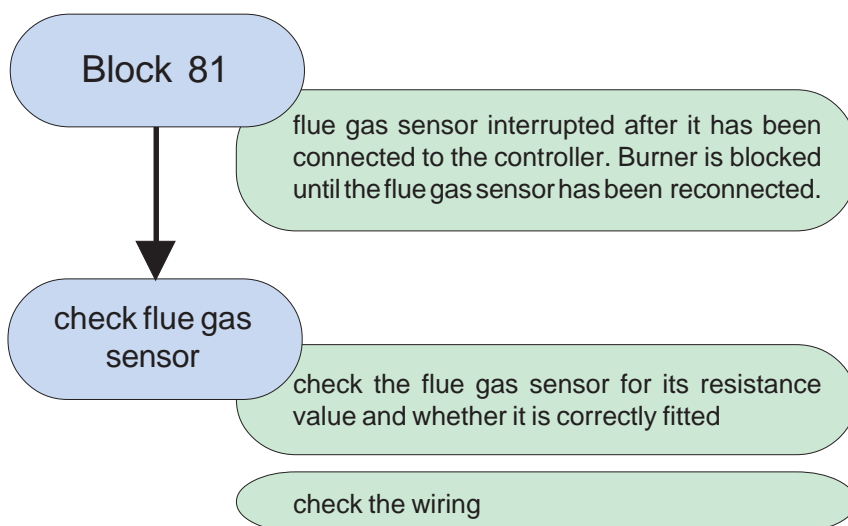
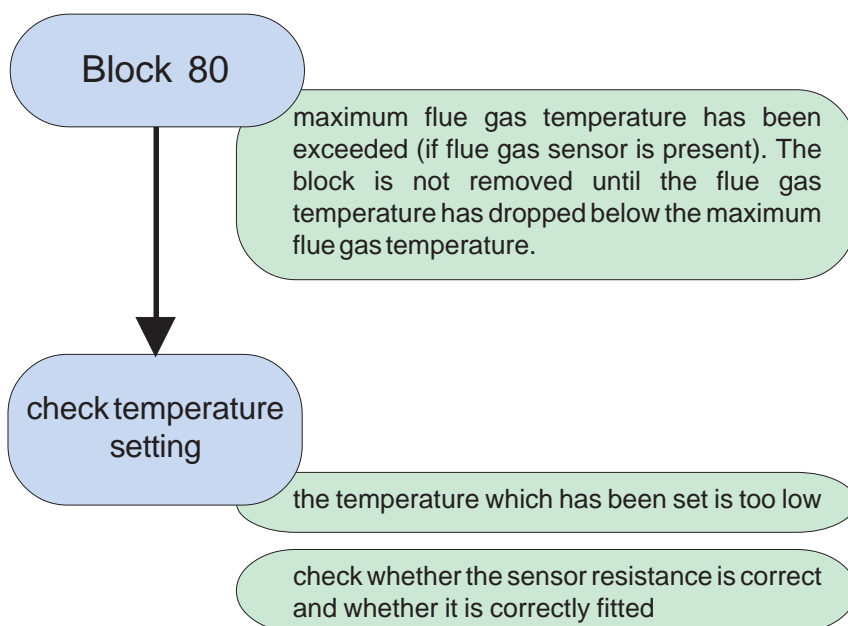
9.1 Block

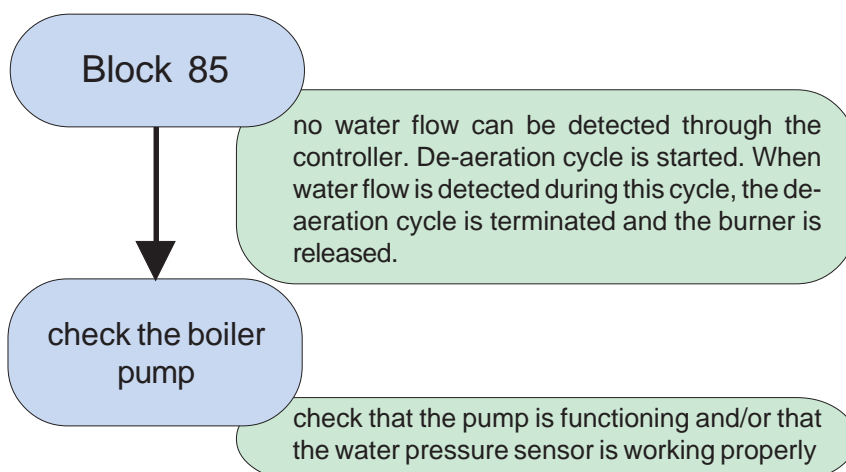
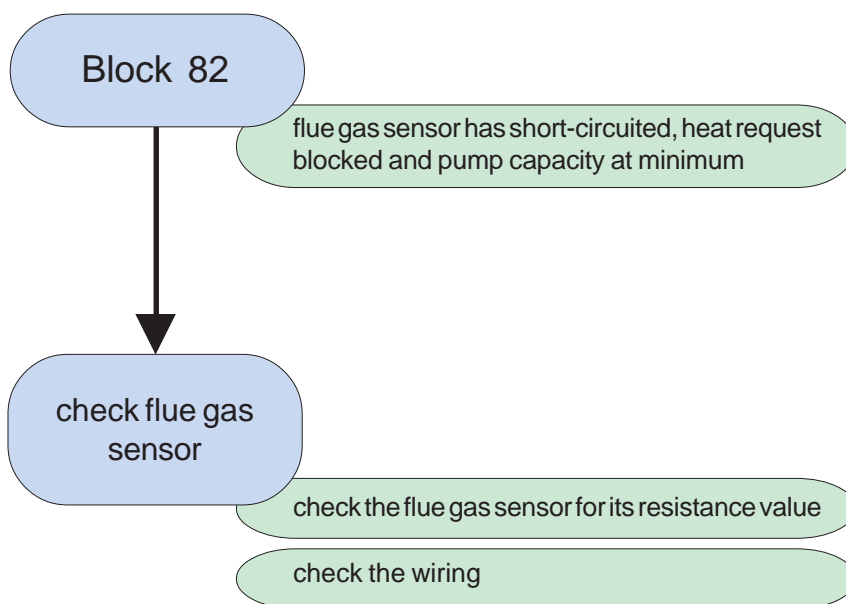
bL01











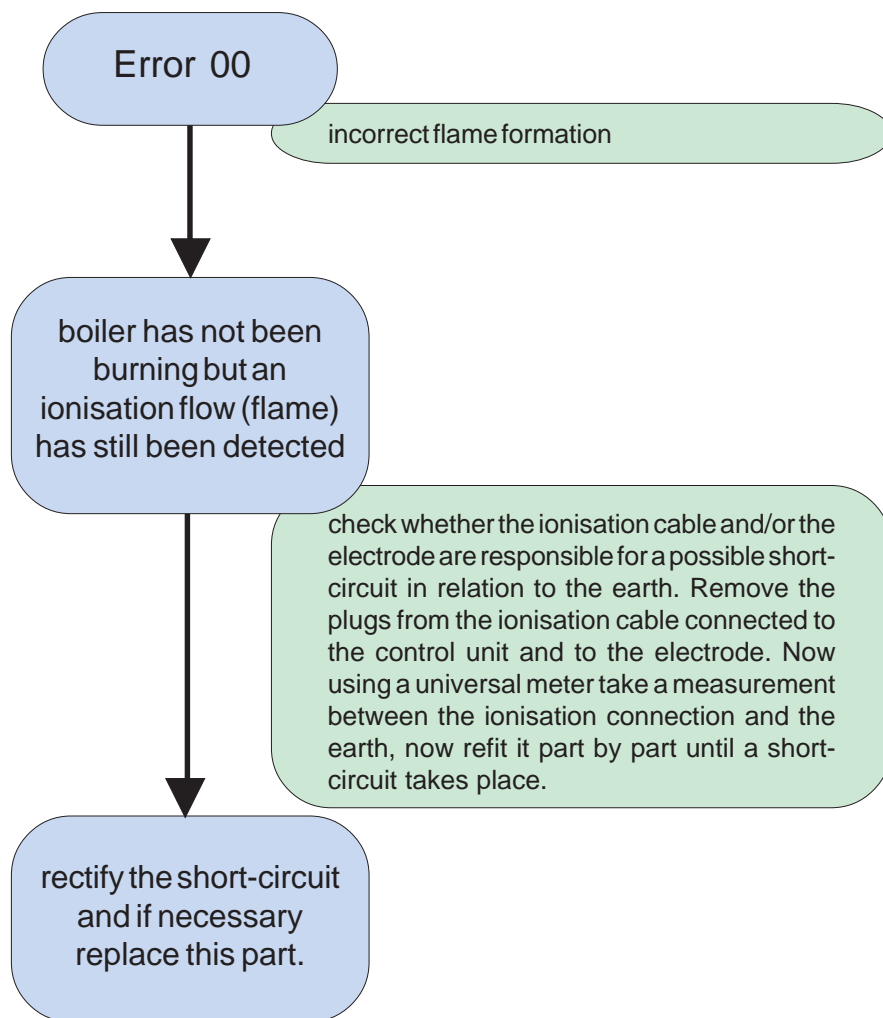
10 System lock boiler Errors

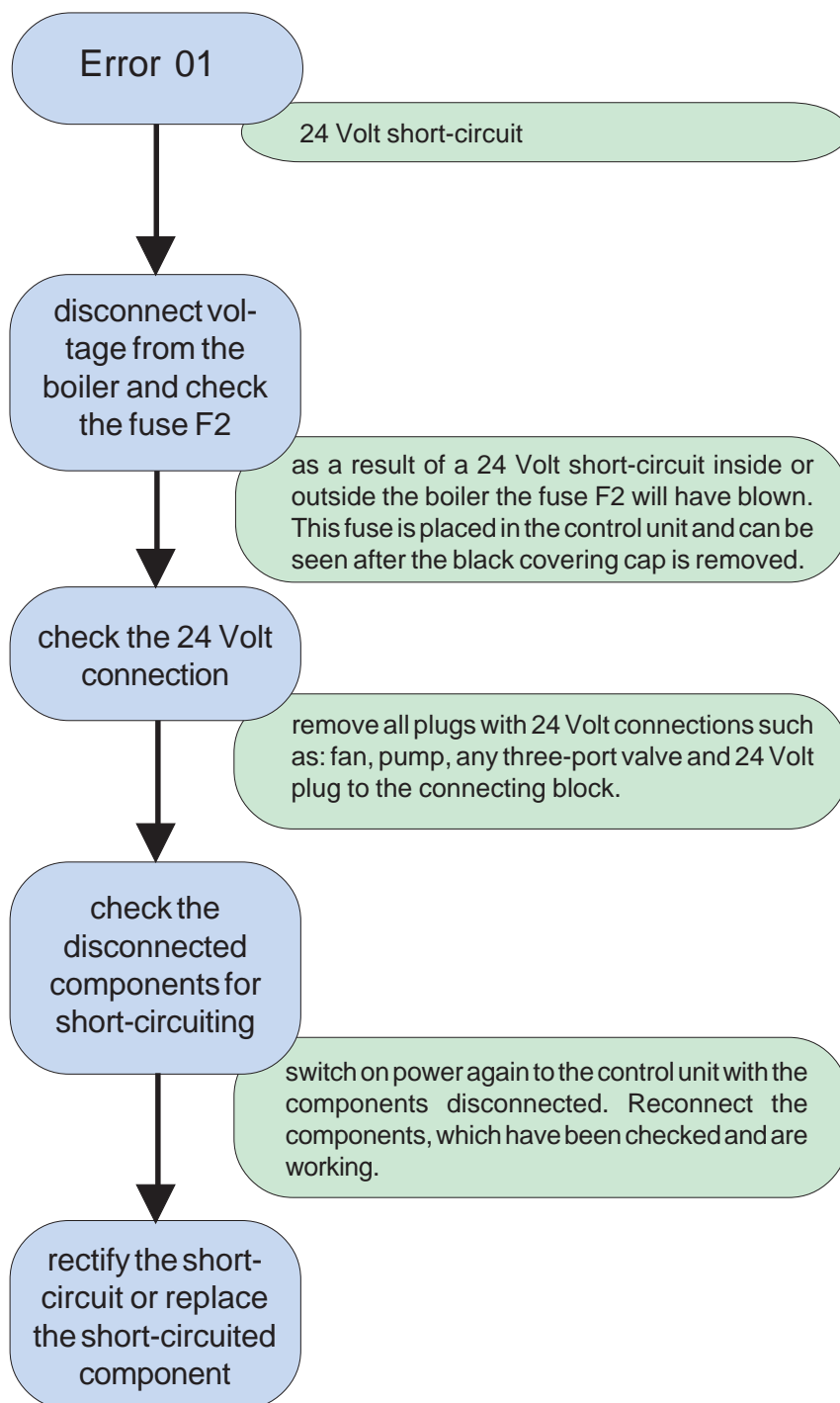
A detected error is indicated on the display by an Error message. Error messages are permanent locks which can only be removed by pressing the reset key. The controller will make every possible attempt to prevent the lock. Below is a summary of the Errors.

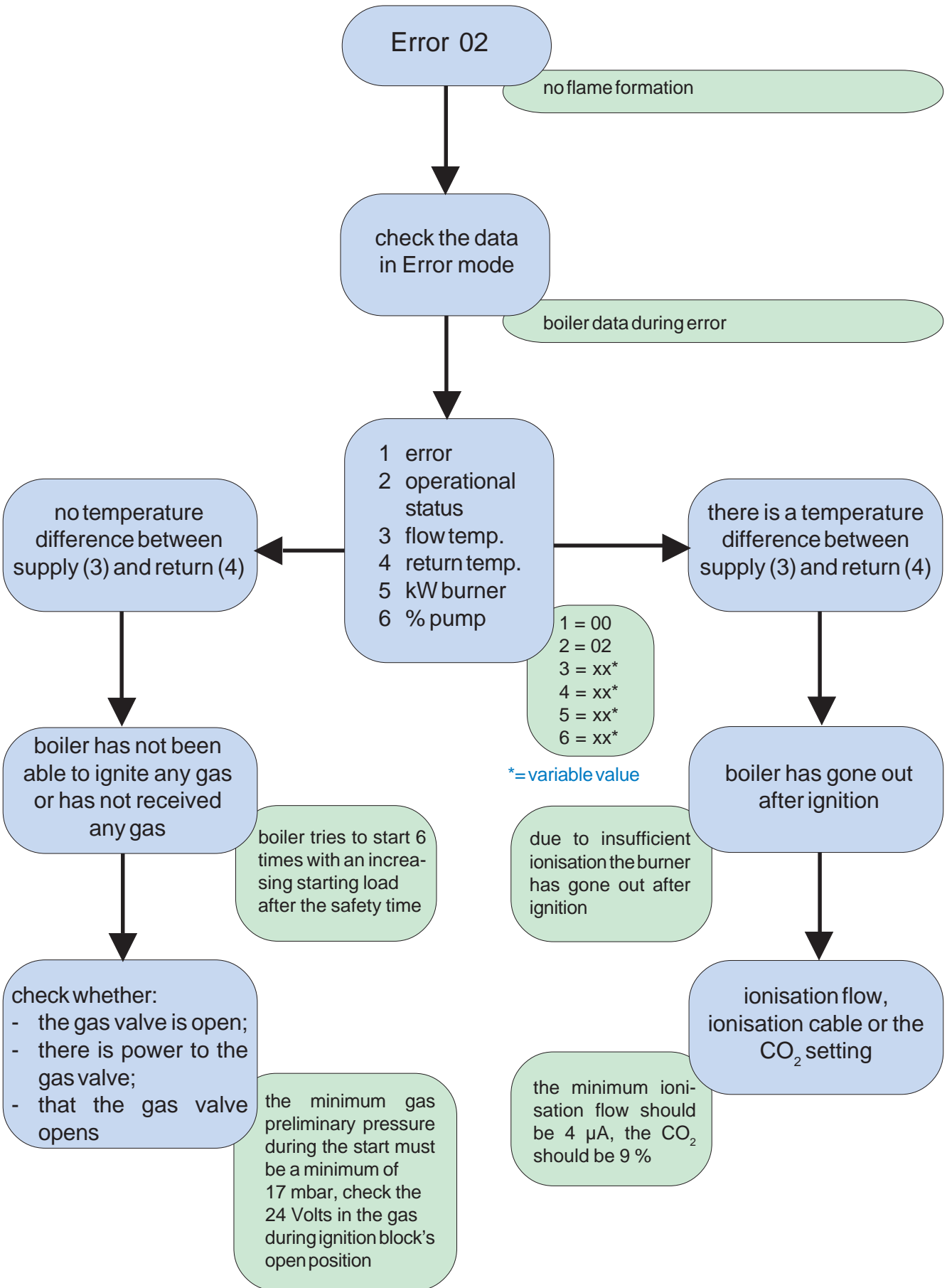
Error **E** with one figure on the last 2 characters.

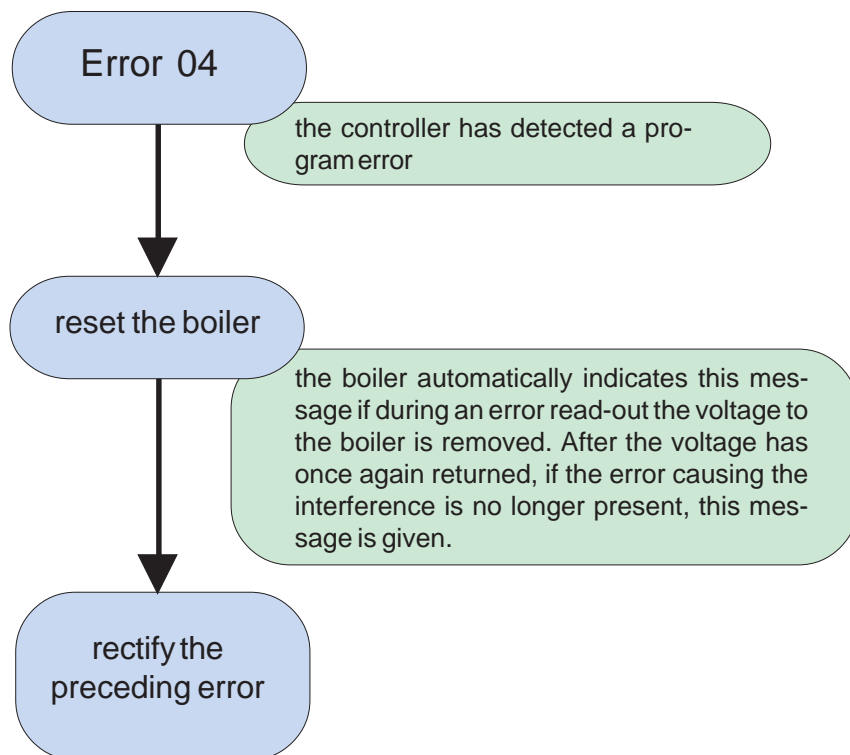
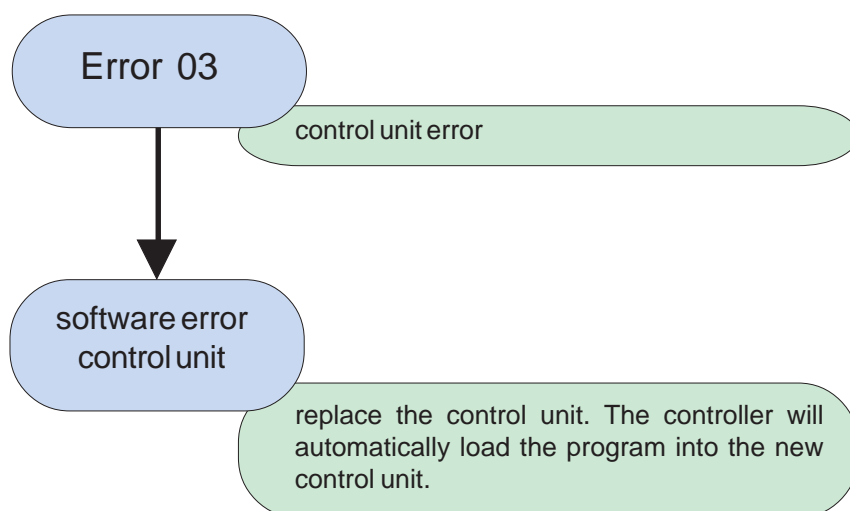
10.1 Error

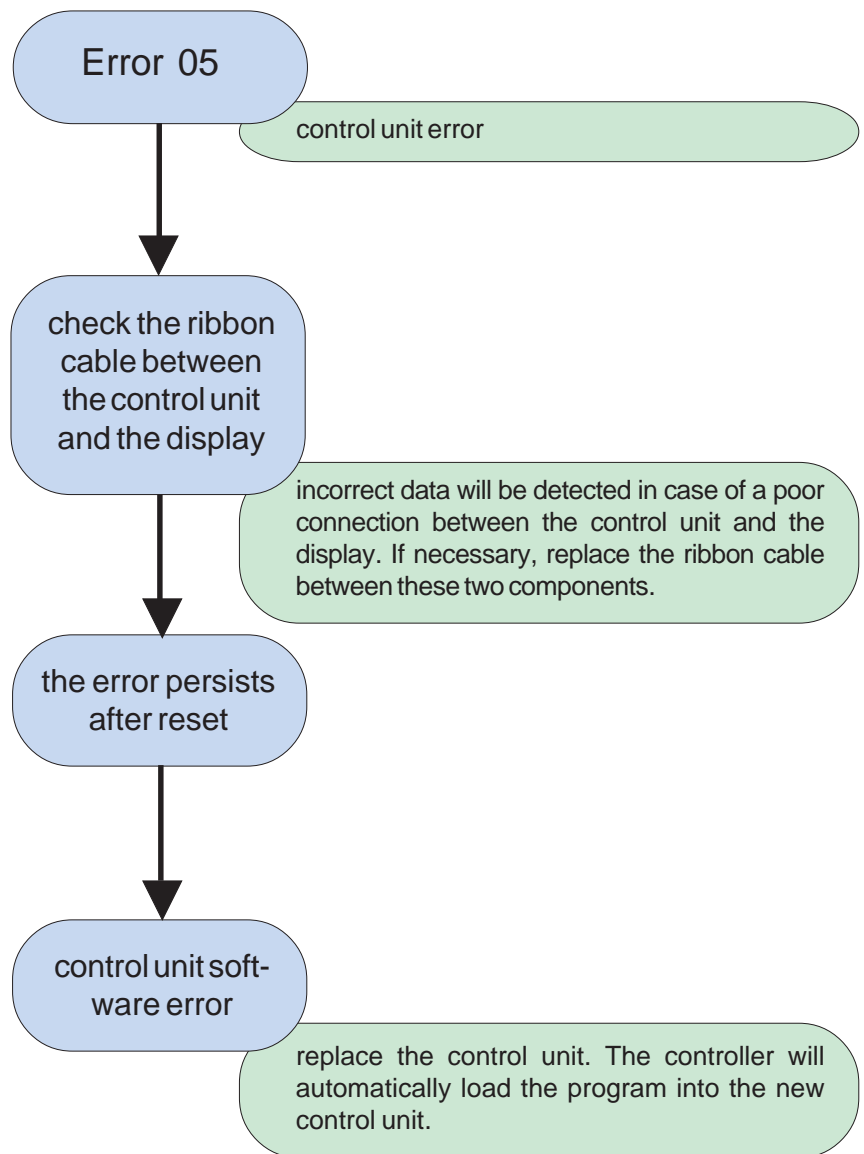
E 00

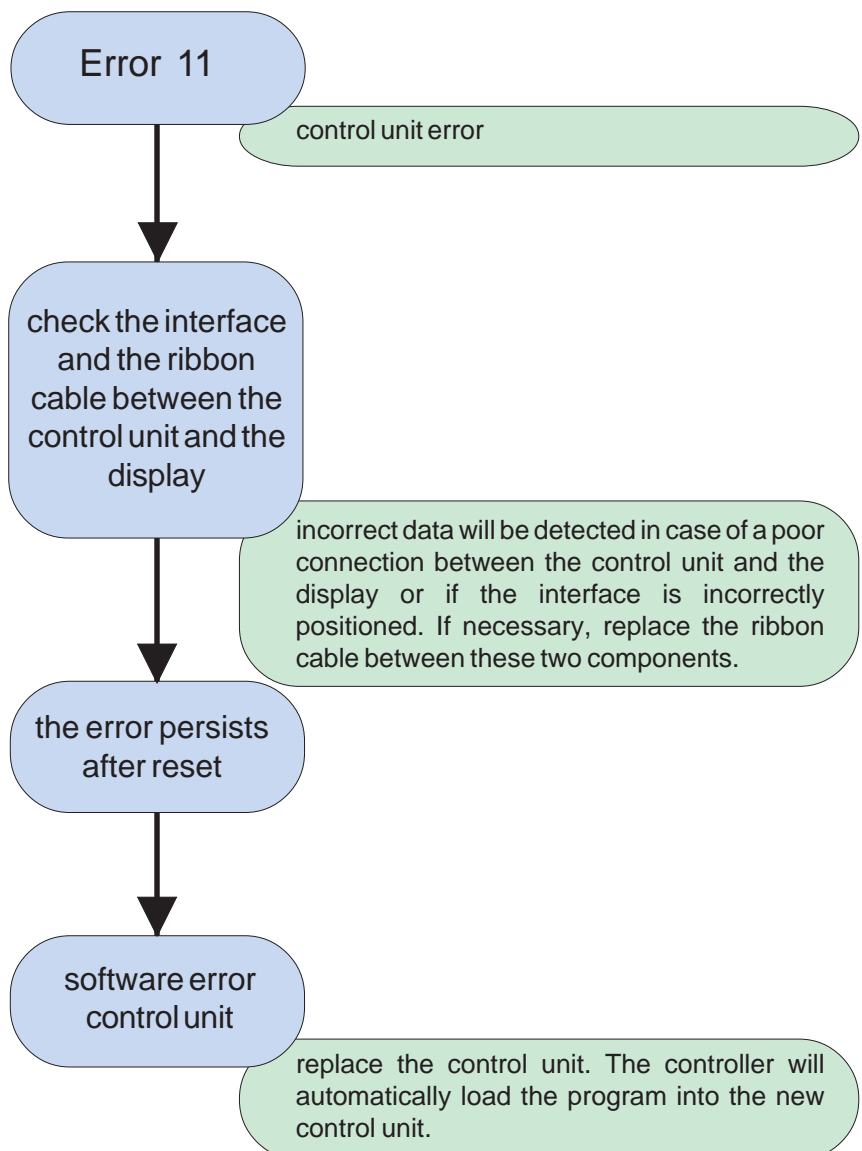
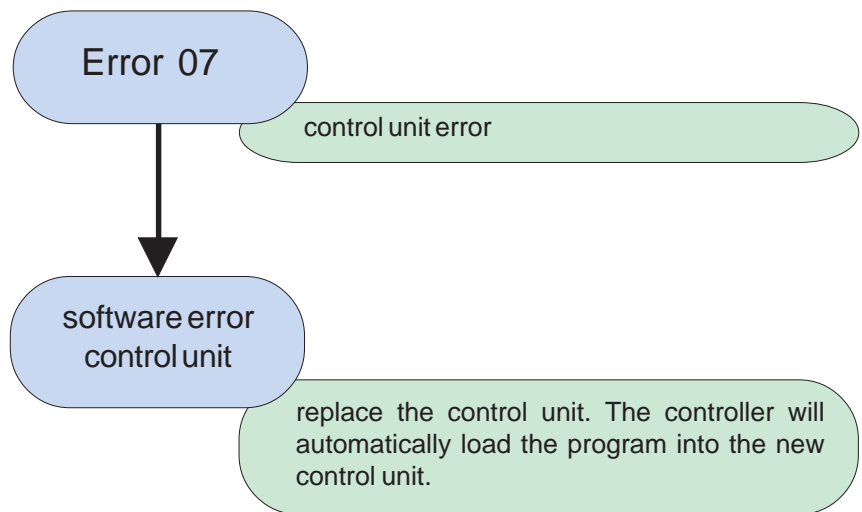


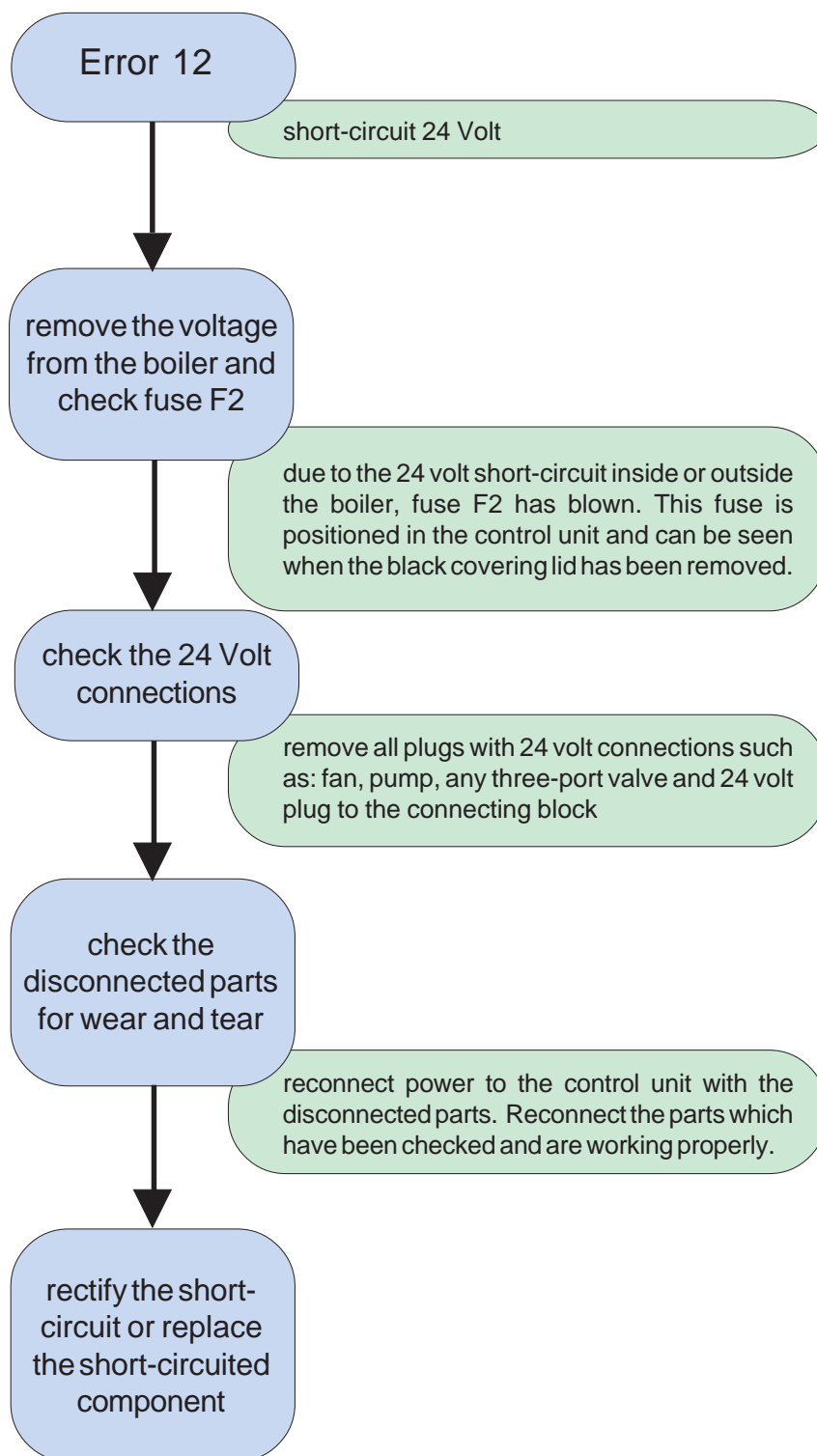


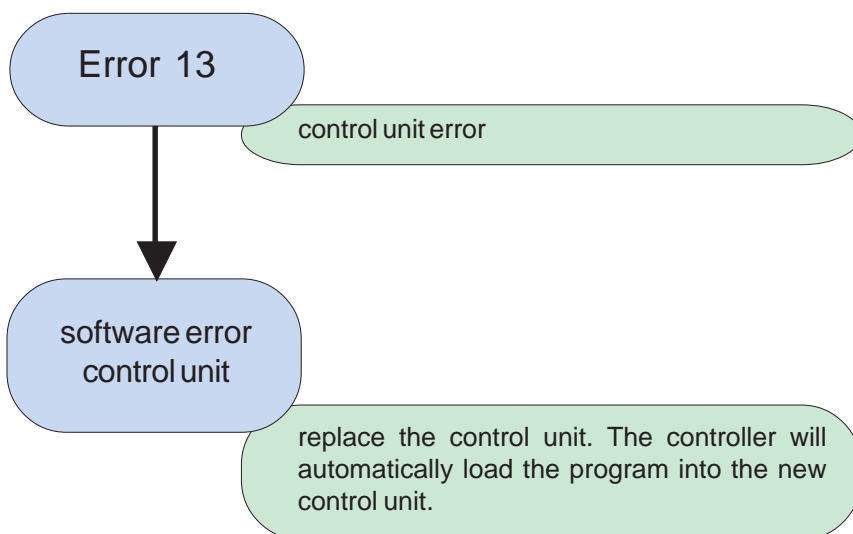


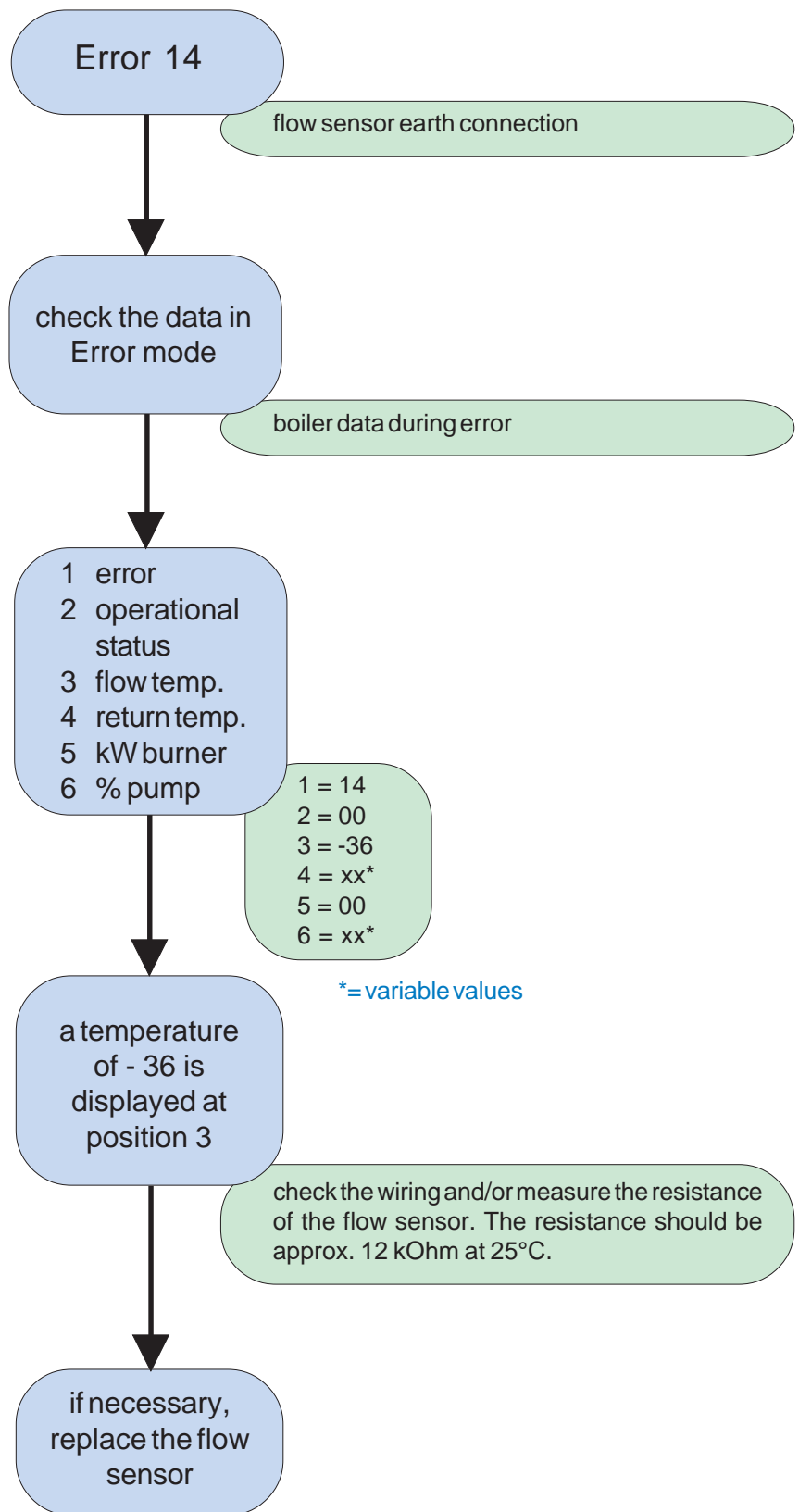


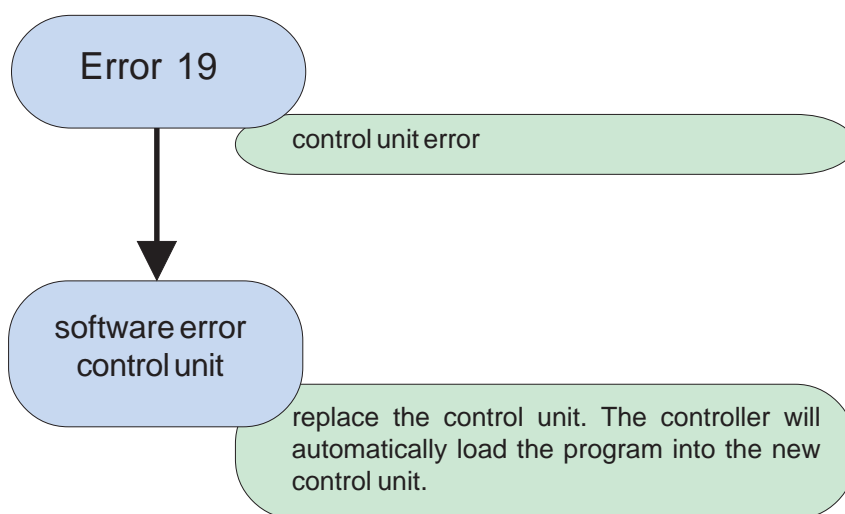


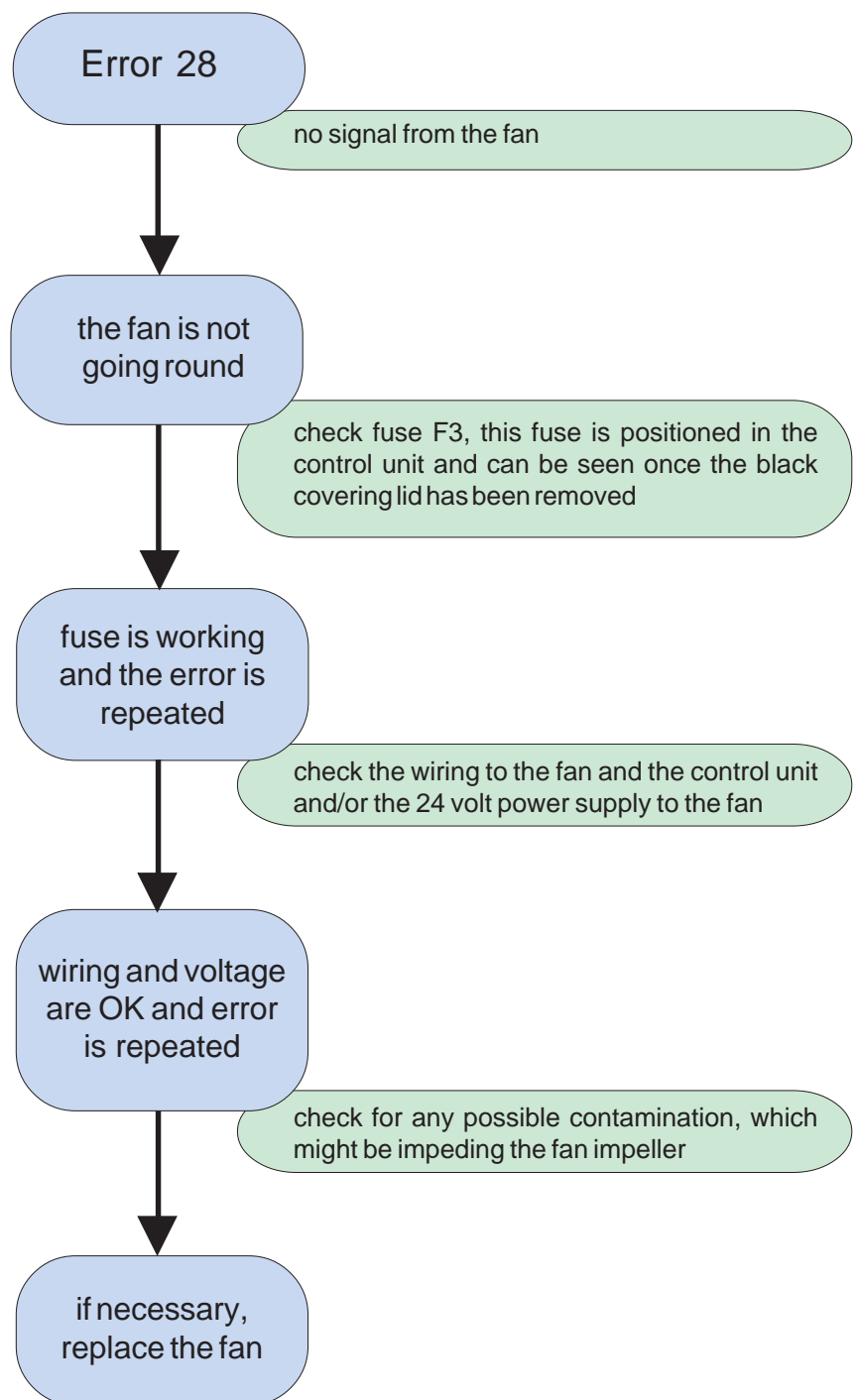


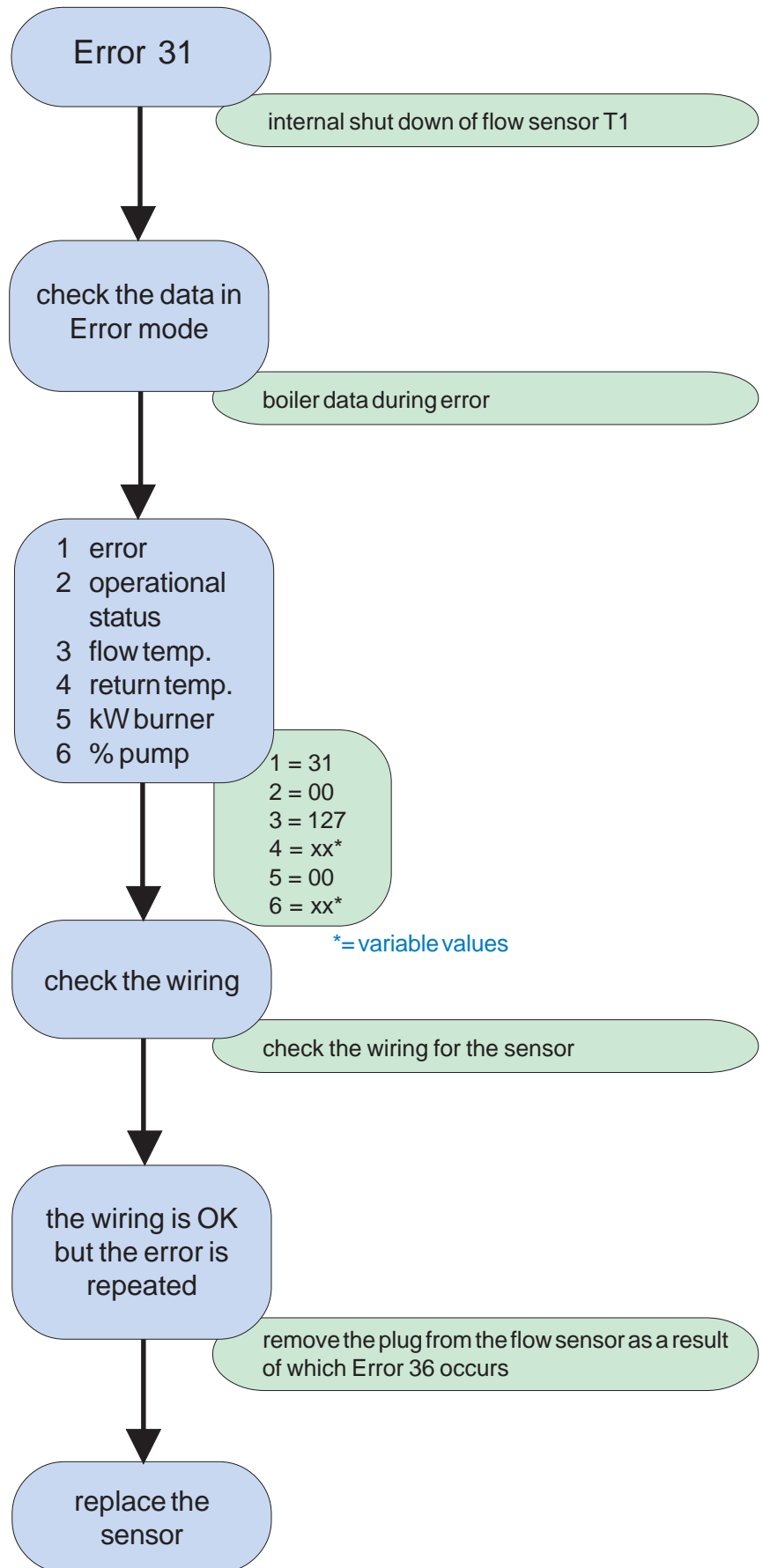


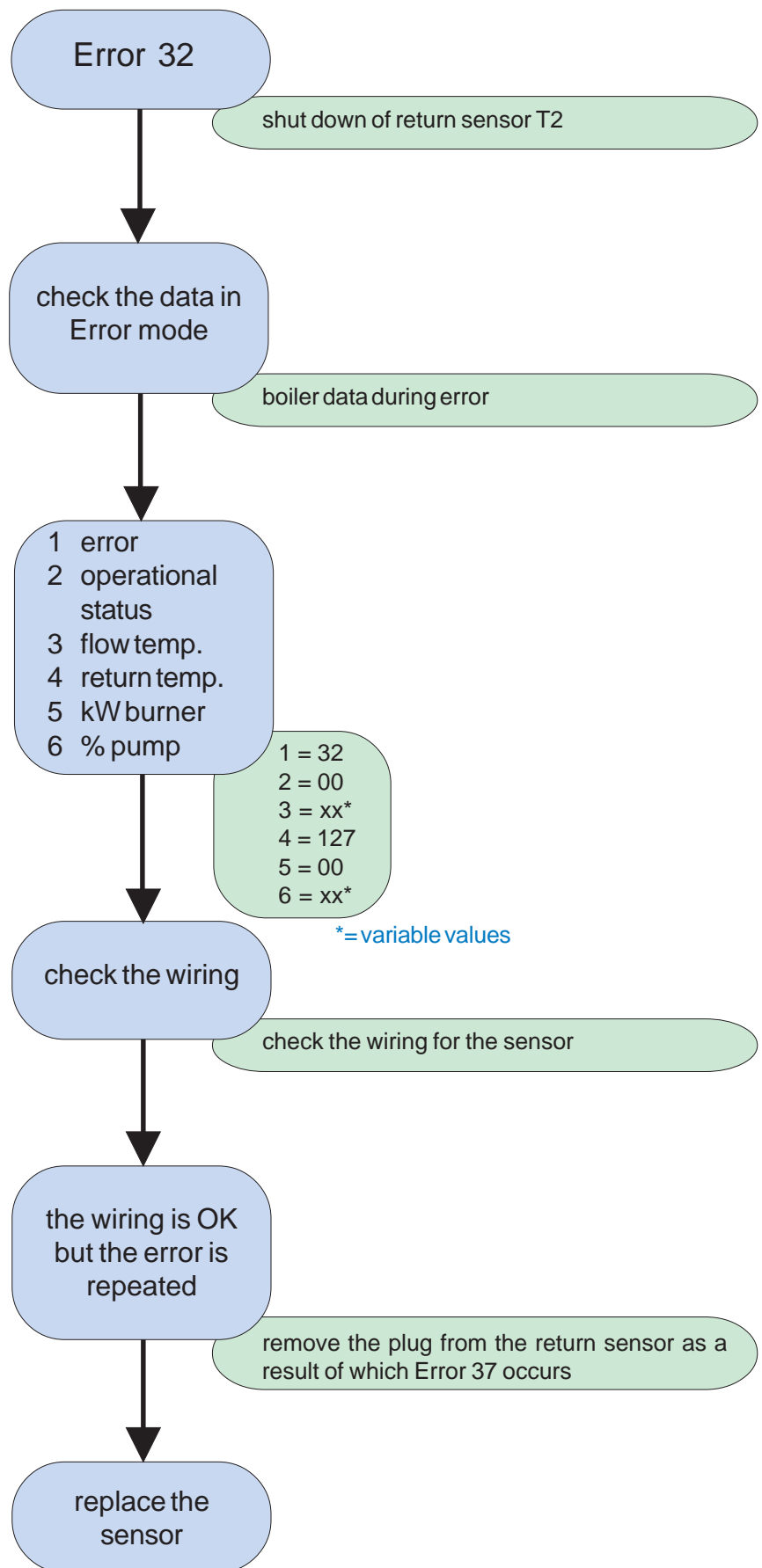


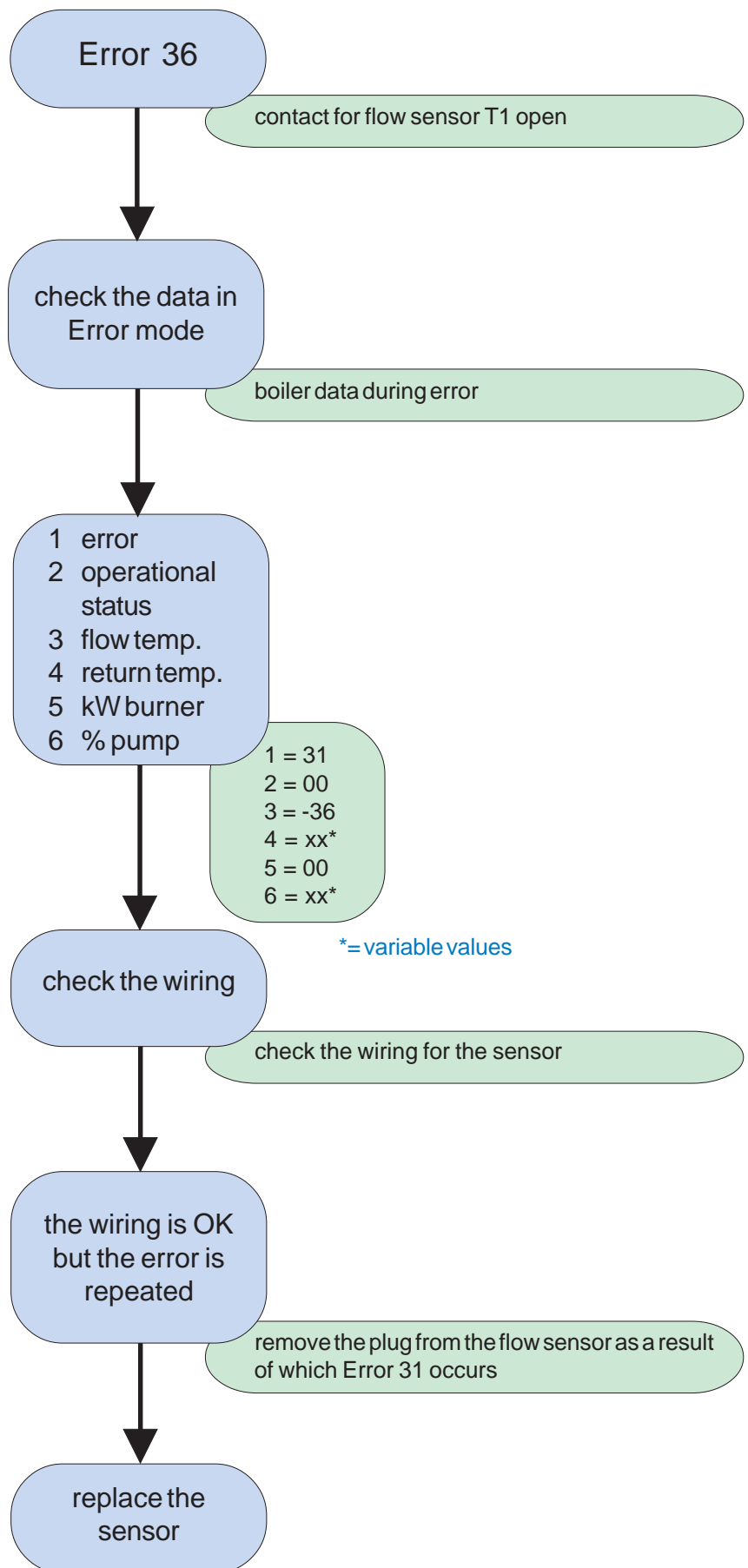


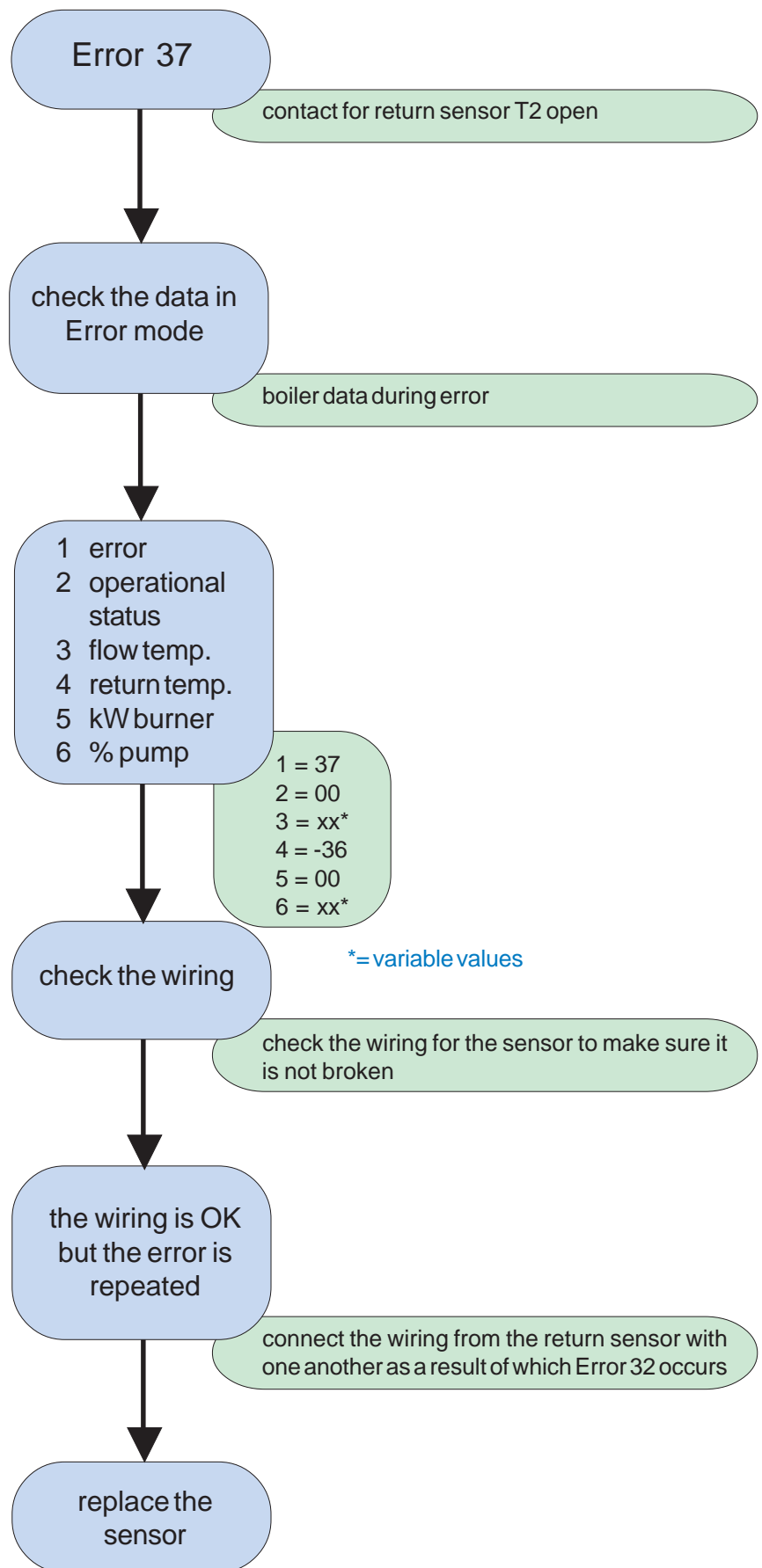


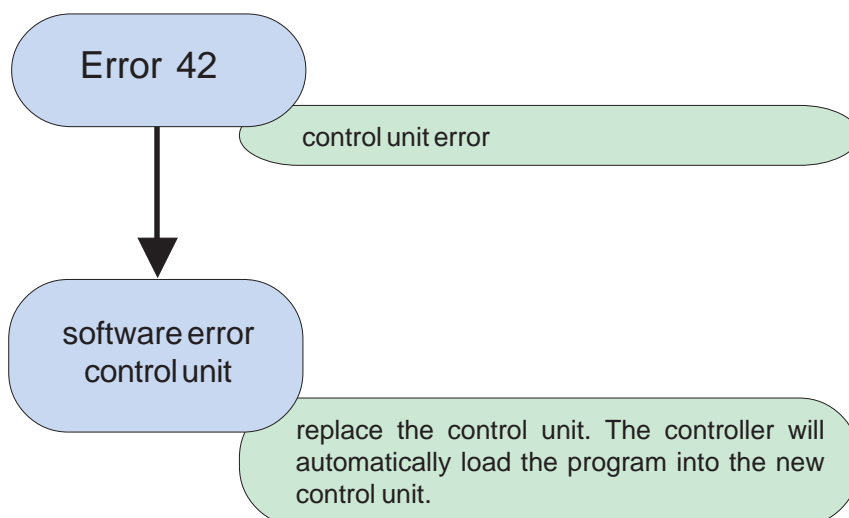
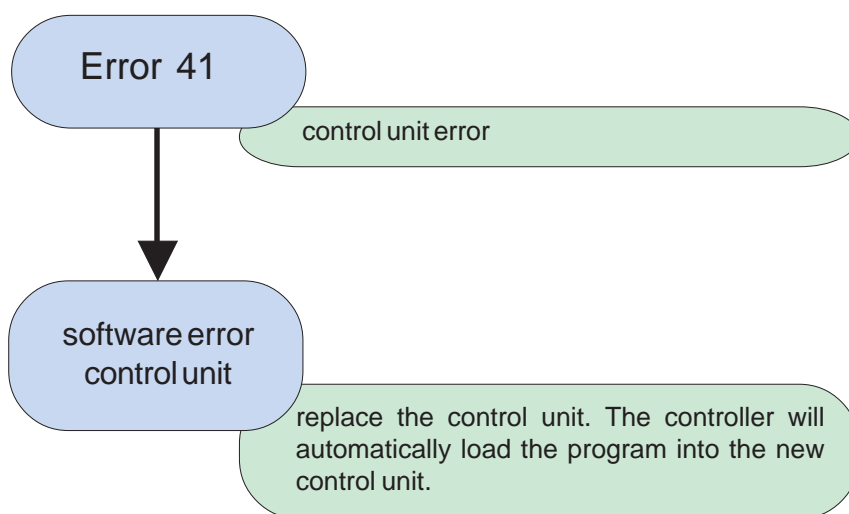


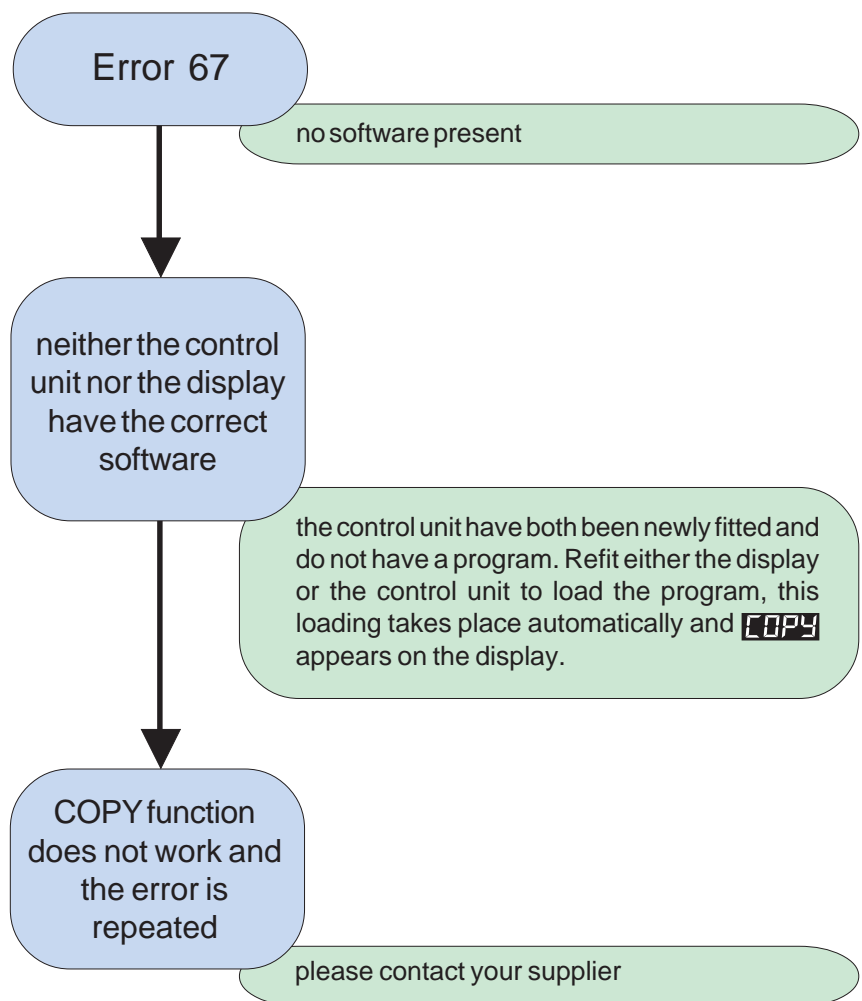


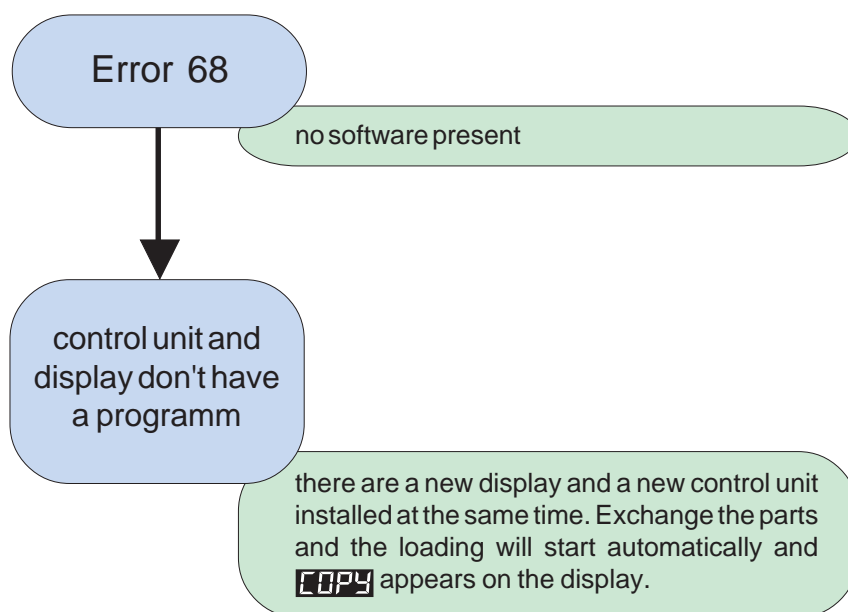






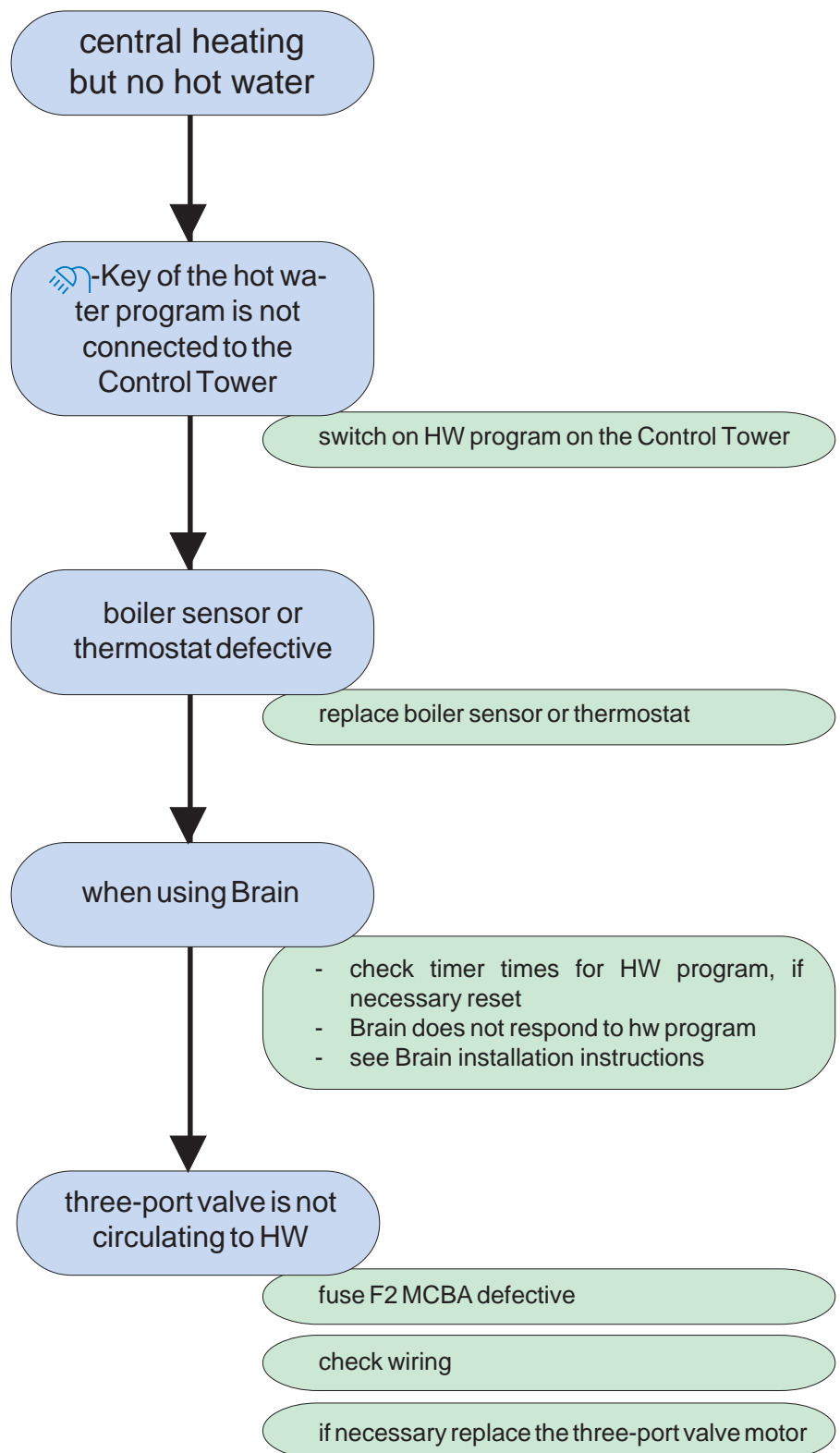


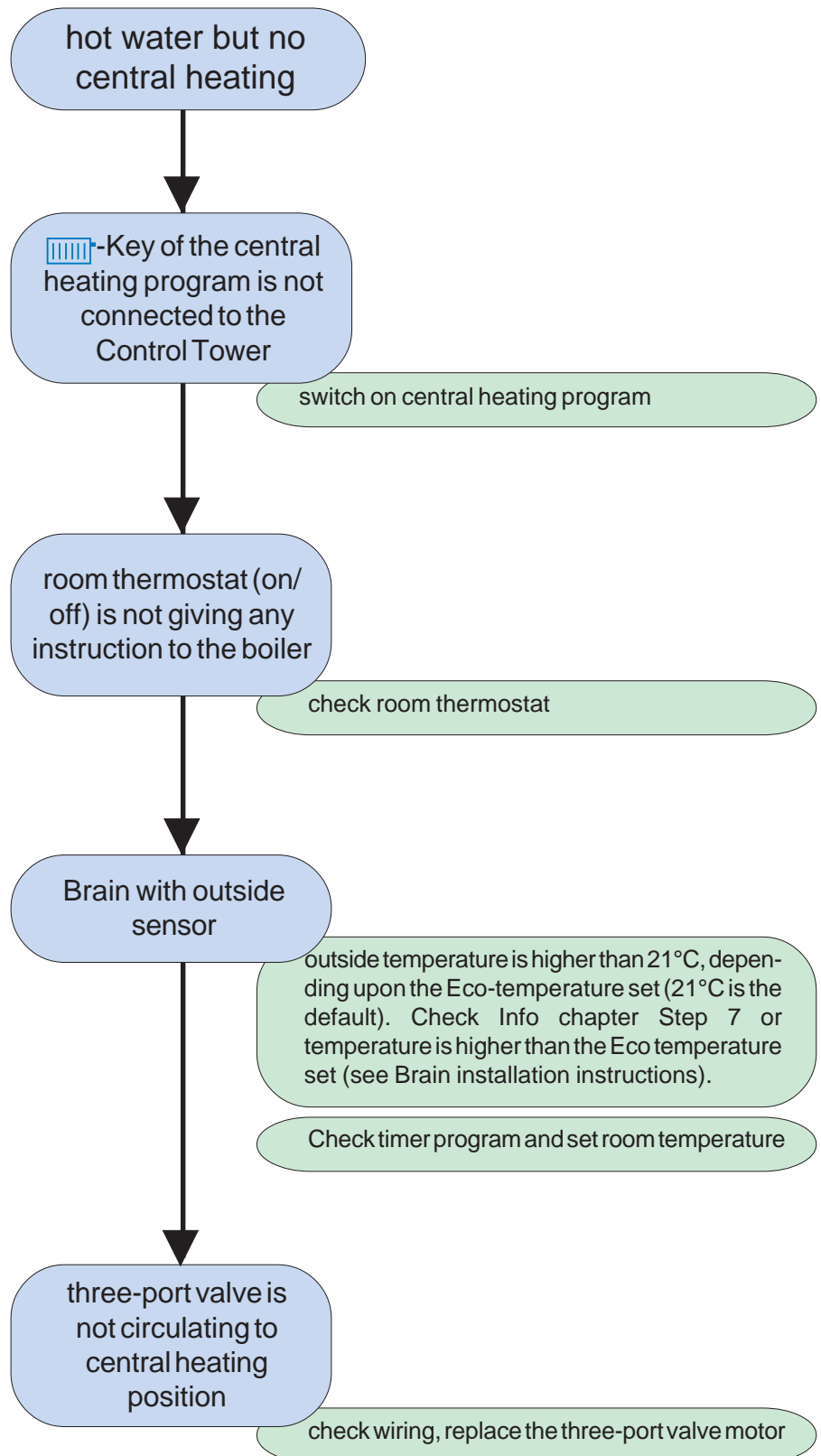




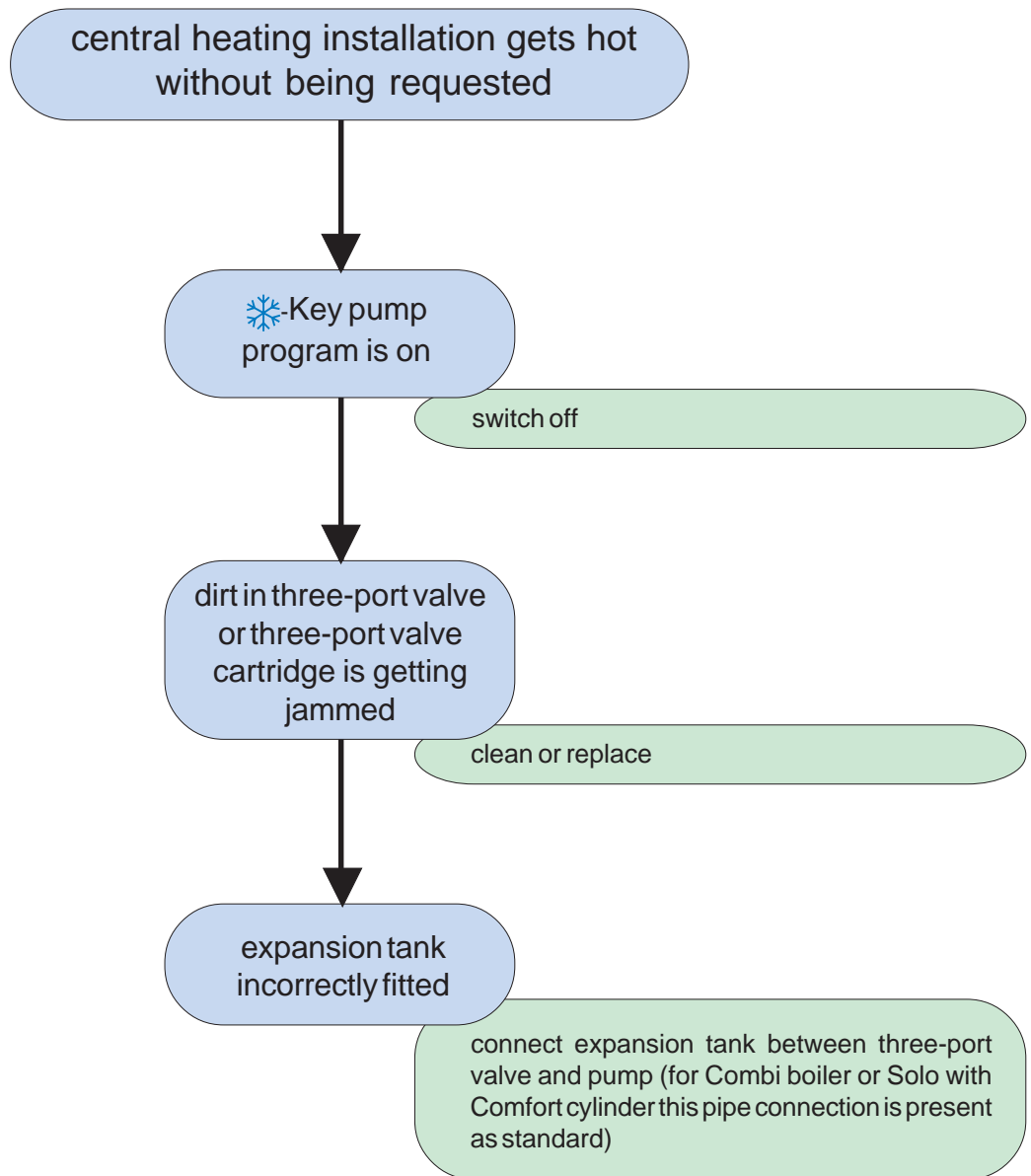
11 Other errors

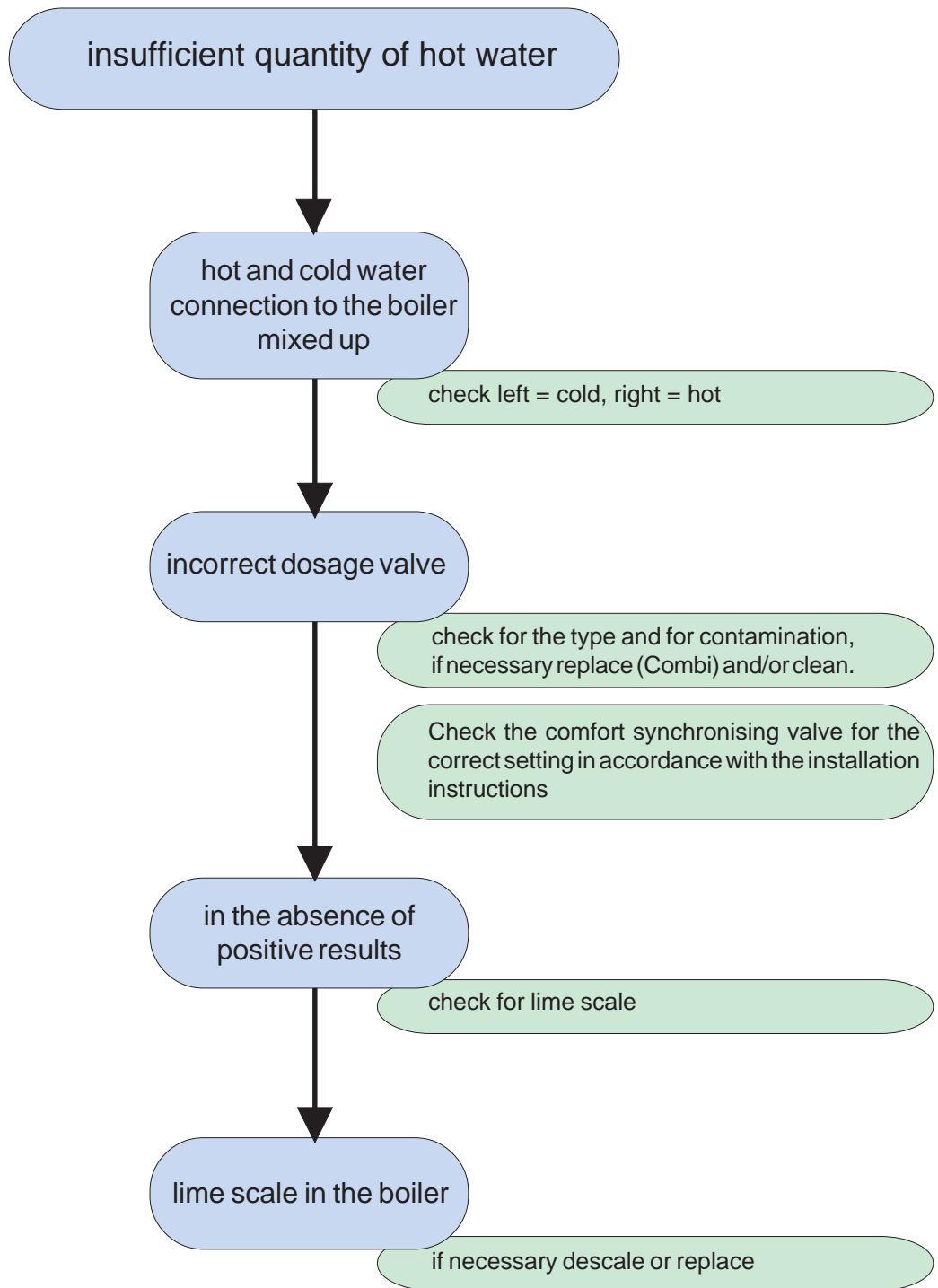
11.1 Central heating but no hot water

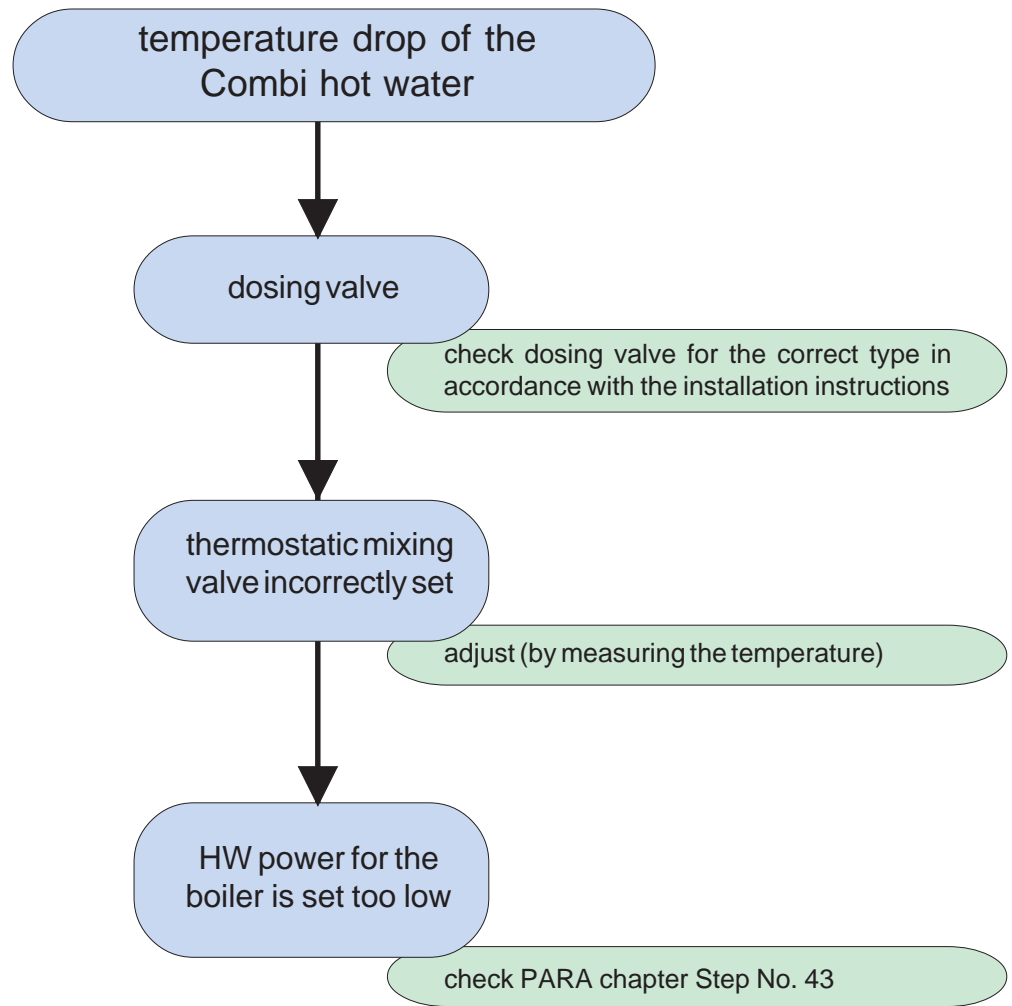




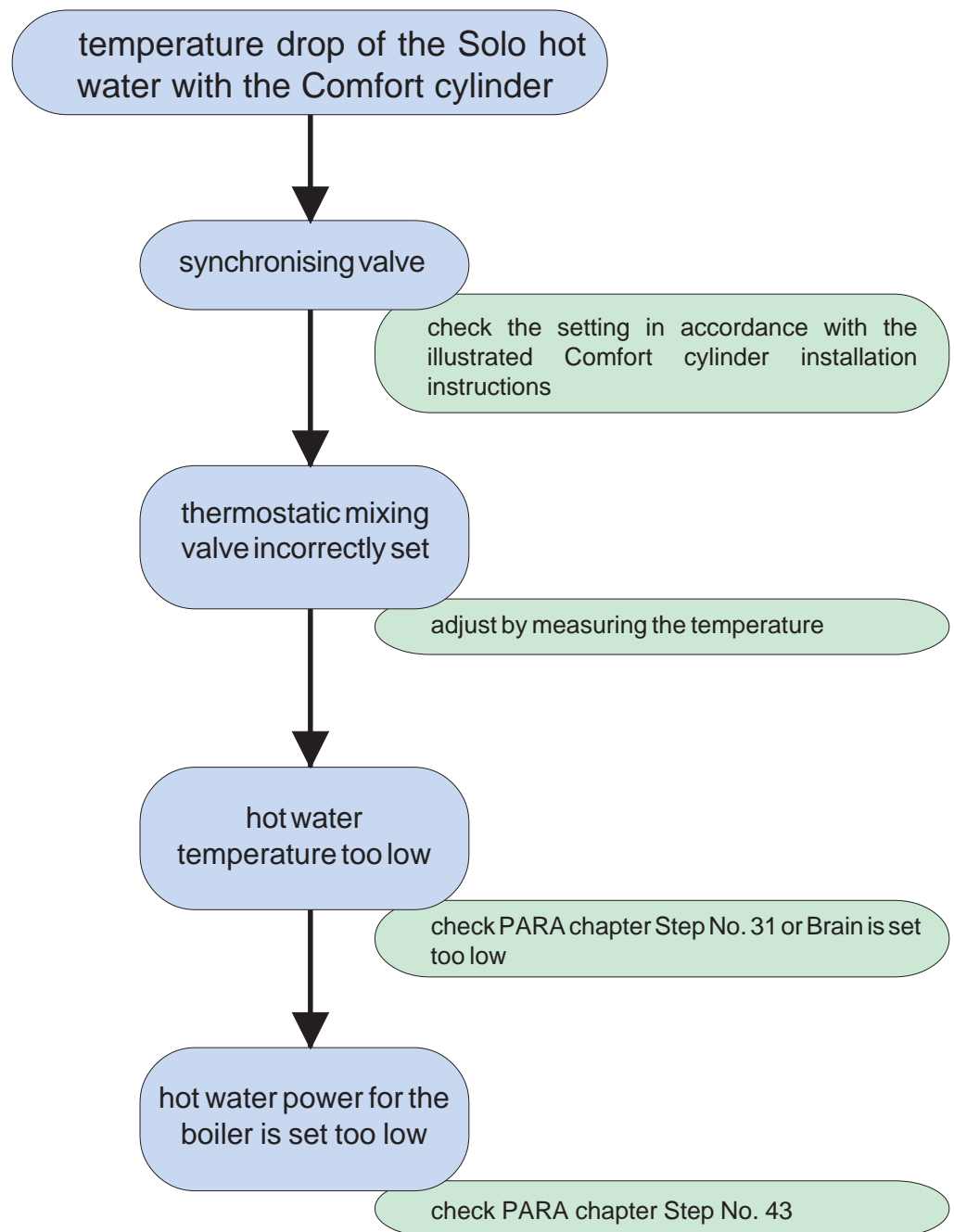
11.3 Central heating installation gets hot without being requested



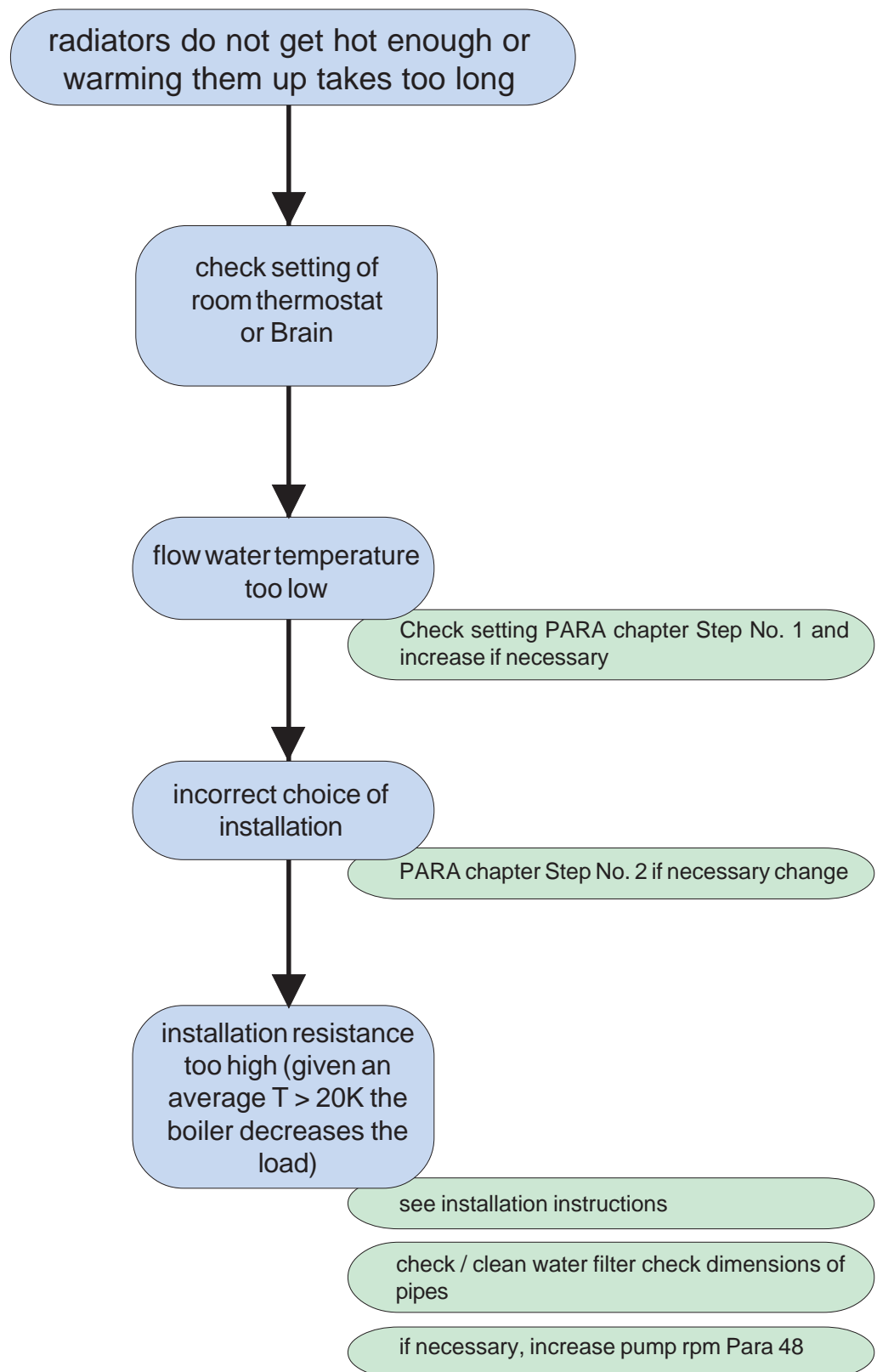




11.5.1 Temperature drop of the Solo hot water with the Comfort cylinder



11.6 Radiators do not get hot enough or warming them up takes too long



Notes

Distributor for UK

ATAG Heating UK Ltd.
Unit 3, Beaver Trade Park
Quarry Lane
Chichester
West Sussex PO19 8NY

Phone: 01243 815 770

Fax: 01243 839 596

Email: info@atagheating.co.uk

Internet: www.atagheating.co.uk

Distributor for Ireland

Total Energy Management Ltd.
Unit 9, Ballybritt Industrial Estate,
Monivea Road,
Galway, Ireland.

Tel. (091) 769174

Fax. (091) 769485

Email: info@tem.ie

Internet: www.tem.ie

This updated publication supersedes all previous help references.