



TRAINING MANUAL

FAMILY: Wall hang boilers

UNIT: Condensing Compact

MODELS: CARES S
INOA S



RELEASE: 1V2 25.06.2021

Pag. 2 di 61

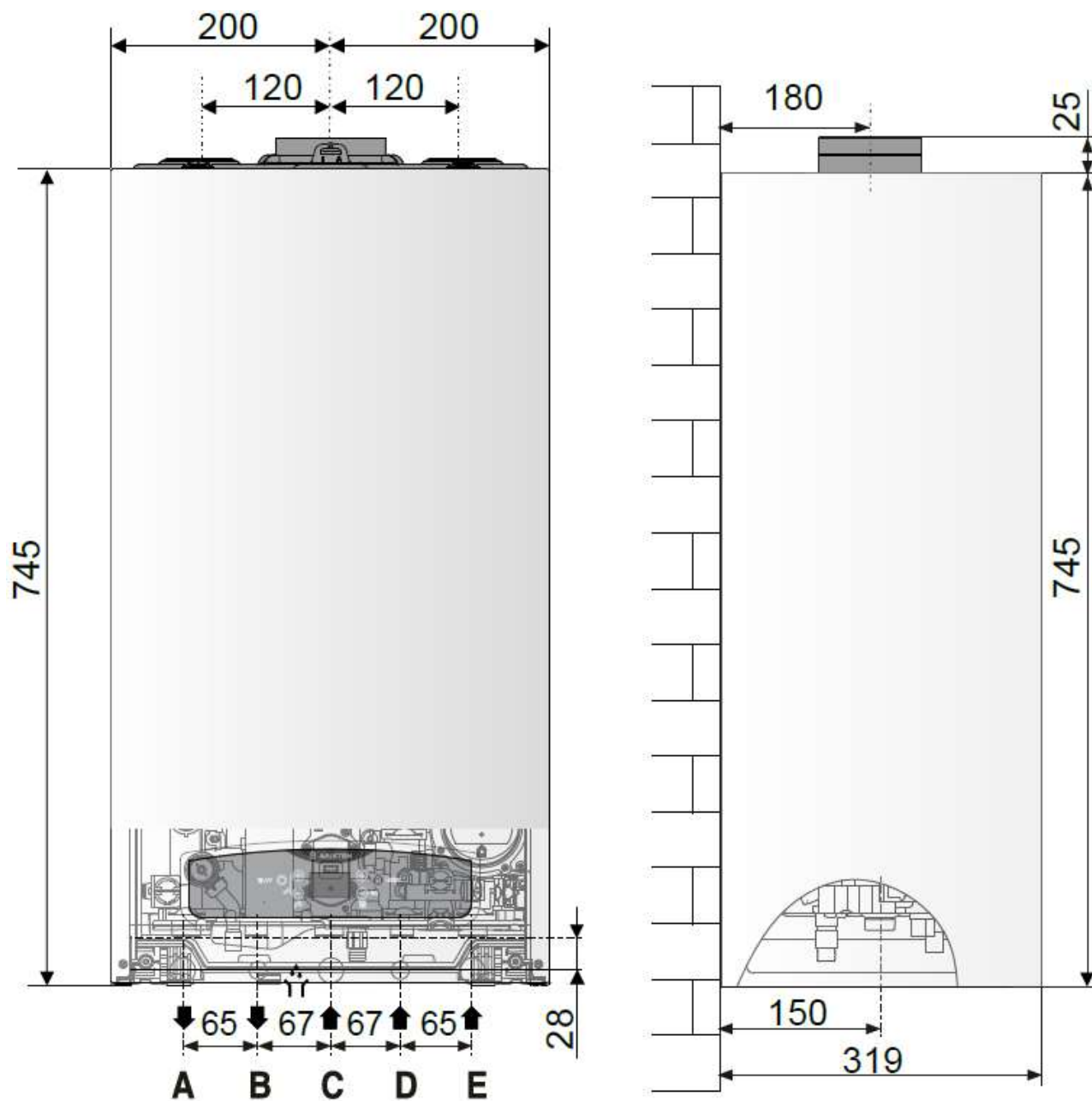
INDEX

1	GENERAL INFORMATION	5
1.1	SIZES AND DIMENSIONS	5
1.2	SEALED CHAMBER OVERALL VIEW - COMBI	6
1.3	HYDRAULIC DIAGRAMS	7
1.4	USER INTERFACE	8
1.5	DISPLAY	8
1.6	HEATING MODE: OPERATING LOGIC	9
1.7	SANITARY MODE: OPERATING LOGIC	12
2	SYSTEM VERSION	14
2.1	“TANK” MODE	14
2.2	“SYSTEM” MODE	14
2.3	ANTILEGIONELLA FUNCTION	14
2.4	HYDRAULIC SCHEME	15
3	SPECIAL FUNCTIONS	16
3.1	“FLUE CLEANER” FUNCTION	16
3.2	“ANTIFREEZE” FUNCTION	17
3.3	WATER FLOW CHECK	18
3.4	“AIR PURGE” FUNCTION	19
4	HYDRAULIC UNIT	20
4.1	HYDRAULIC UNIT – COMBI VERSION	20
4.2	HYDRAULIC UNIT – SYSTEM VERSION	21
4.3	3-WAY VALVE	22
4.3.1	Stepper motor	24
4.4	SECONDARY EXCHANGER	26
4.4.1	Antiscale limit temperature	26
4.5	PUMP UNIT	27
4.5.1	Types of post-circulation	28
4.6	HEATING PRESSURE SWITCH	29
4.7	FILLING TAP	29
4.8	DRAIN VALVE	29
4.1	HEATING FILTER	30
4.2	BY-PASS - SYSTEM	30
4.1	BY-PASS - COMBI	31
4.2	PRIMARY EXCHANGER	32
4.3	EXPANSION VESSEL	33
4.4	SANITARY FLOW SWITCH	34
4.5	SANITARY FLOW LIMITER (ACCESSORY)	35
4.6	TEMPERATURE PROBE	35
5	GAS UNIT	36
5.1	PREMIX BURNER	37
5.2	MIXER	37
5.3	SILENCER	38
5.4	EXHAUST SENSOR AND THERMO-FUSE	38
5.5	CONDENSATE DRAIN	39
5.6	GAS VALVE	40
5.6.1	The soft ignition power checking and setting	42
5.6.2	Maximum heating power setting	42
5.6.3	Gas table	43
5.7	GAS CHANGE	44
5.8	THE FUME DISCHARGE SYSTEM	44
5.9	IGNITION AND DETECTION ELECTRODE	45
5.10	SPARK GENERATOR	45
5.11	FAN	46
5.12	EXHAUST SYSTEMS	47
5.12.1	PIPE IN PIPE SPLIT DUCTS Ø50 or 60mm (only for Italy)	48

6	ELECTRIC AND ELECTRONIC SYSTEM.....	50
6.1	MAIN CARD.....	50
6.1.1	<i>ELECTRIC DIAGRAM COMBI.....</i>	<i>52</i>
6.1.2	<i>ELECTRIC DIAGRAM SYSTEM</i>	<i>53</i>
6.2	PERIPHERALS CONNECTION	54
6.3	MENU.....	55
6.3.1	<i>How to access to the “PARAMETERS”</i>	<i>55</i>
6.3.2	<i>Description of the parameters.....</i>	<i>56</i>
6.4	BOILER PROTECTION SYSTEMS.....	58
6.4.1	<i>Error codes</i>	<i>58</i>
7	TECHNICAL DATA TABLE	60

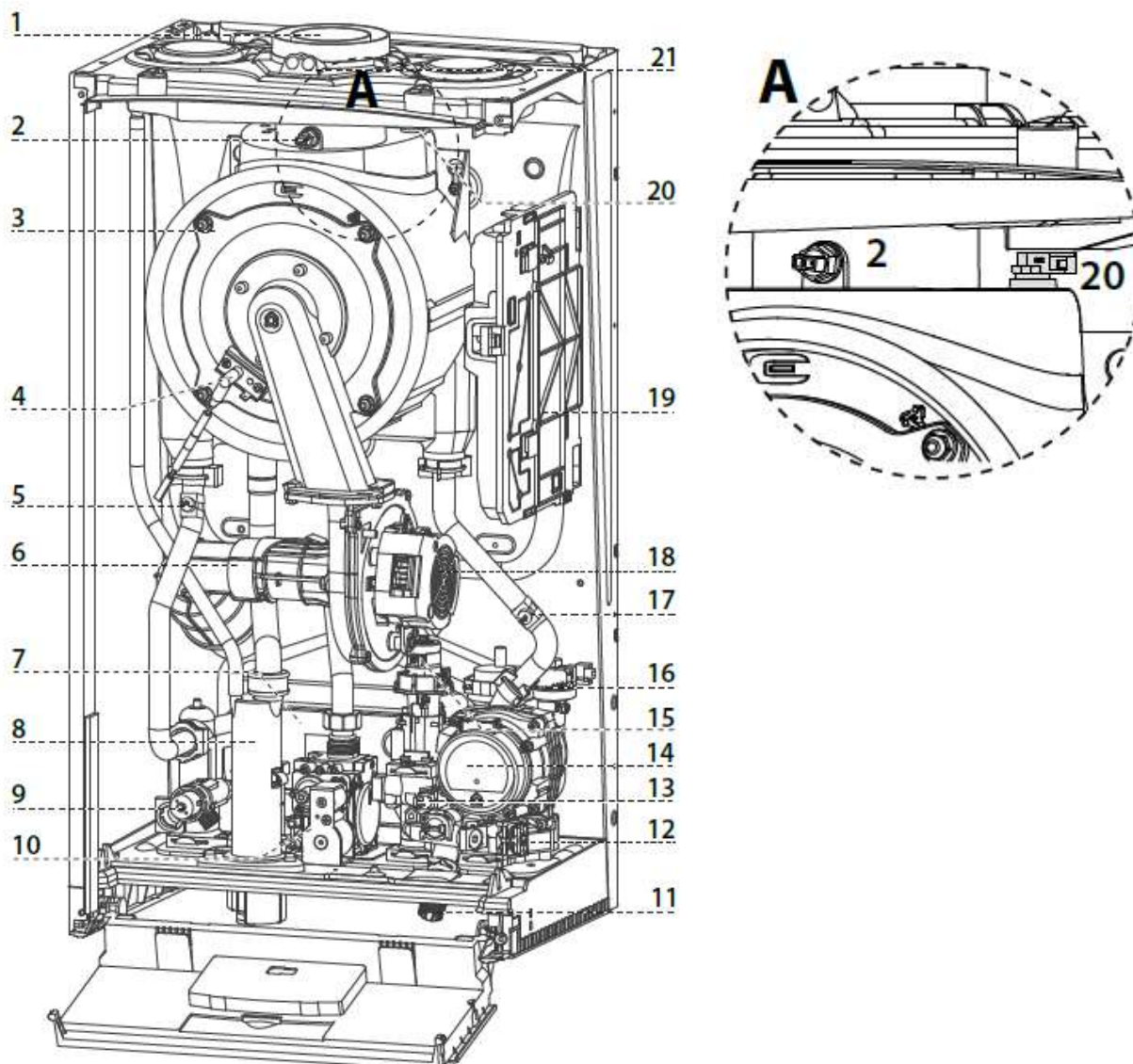
1 GENERAL INFORMATION

1.1 SIZES AND DIMENSIONS



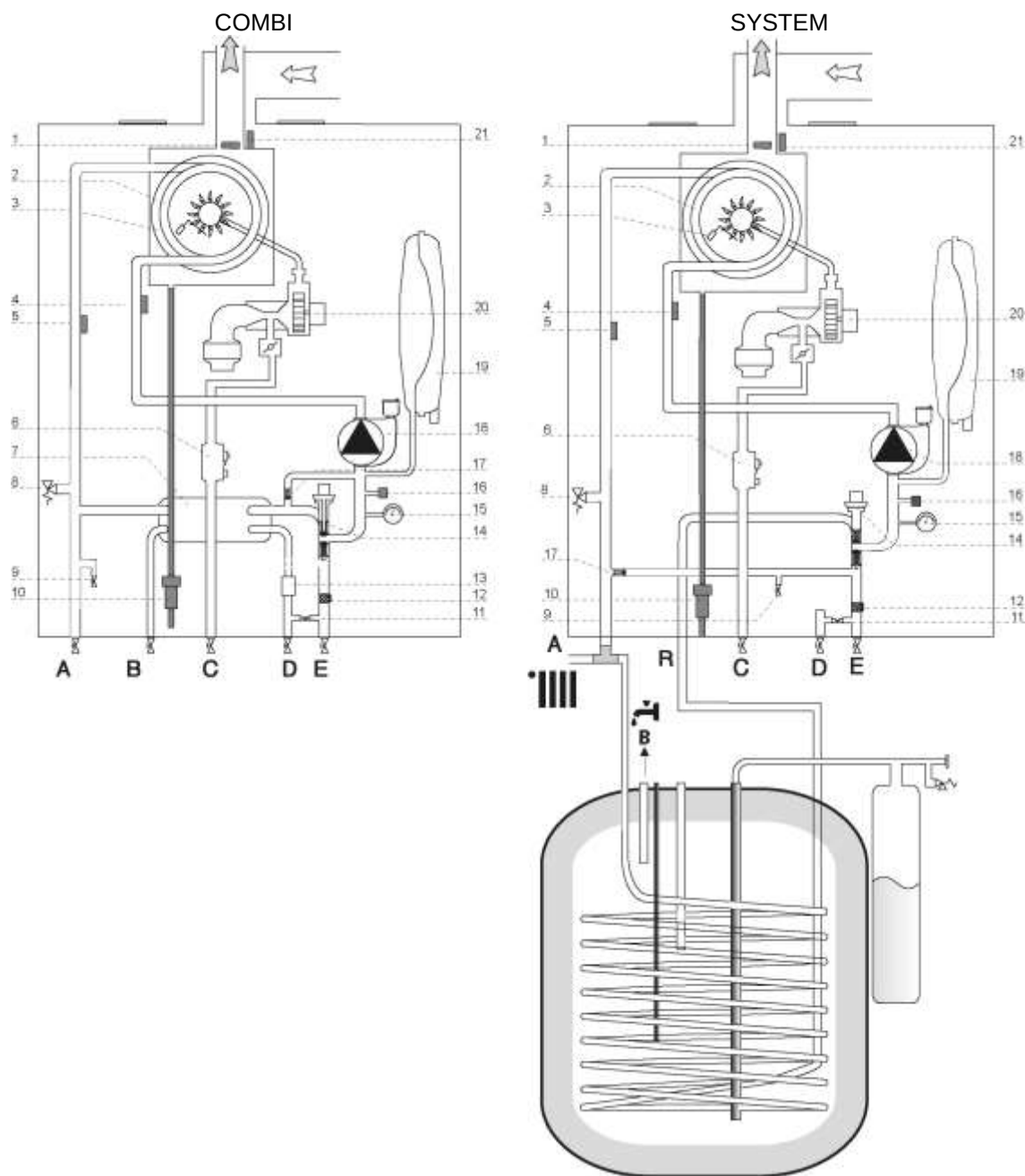
COMBI VERSION		SYSTEM VERSION	
A	CH delivery	A	CH and DHW tank delivery
B	DHW outlet	B	DHW tank return
C	Gas inlet	C	Gas inlet
D	DHW inlet	D	DHW inlet (only for boiler filling)
E	CH return	E	CH return
L	Condensate drain	L	Condensate drain

1.2 SEALED CHAMBER OVERALL VIEW - COMBI



CAPTION			
1	Exhaust connection	12	Heating filter
2	Exhaust sensor	13	DHW flow switch
3	Main heat exchanger	14	Pump
4	Electrode	15	3 way valve
5	Delivery NTC sensor	16	Minimum pressure switch
6	Silencer	17	Return NTC sensor
7	DHW plate heat exchanger	18	Fan
8	Syphon	19	Main PCB
9	3 bar safety valve	20	Main heat exchanger thermo-fuse
10	Gas valve	21	Exhaust analysis intake
11	Filling tap		

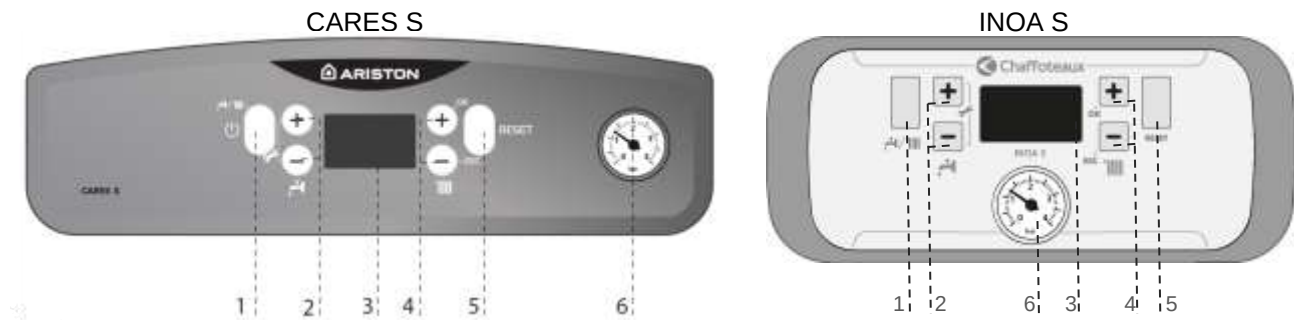
1.3 HYDRAULIC DIAGRAMS



CAPTION

1	Exhaust sensor	12	Heating filter
2	Main heat exchanger	13	DHW flow switch
3	Electrode	14	3 way valve
4	Return NTC sensor	15	Manometer
5	Delivery NTC sensor	16	Minimum pressure switch
6	Gas valve	17	By-pass
7	DHW plate heat exchanger	18	Pump
8	3 bar safety valve	19	Expansion vessel
9	Drain tap	20	Fan
10	Syphon	21	Exhaust Thermo-fuse
11	Filling tap		

1.4 USER INTERFACE



CAPTION	
1	Summer/Winter button
2	DHW temperature buttons
3	Display
4	CH temperature buttons
5	Reset button
6	Manometer



Display	Operating mode
	heating + hot water production for domestic use - winter
	hot water production for domestic use only - summer

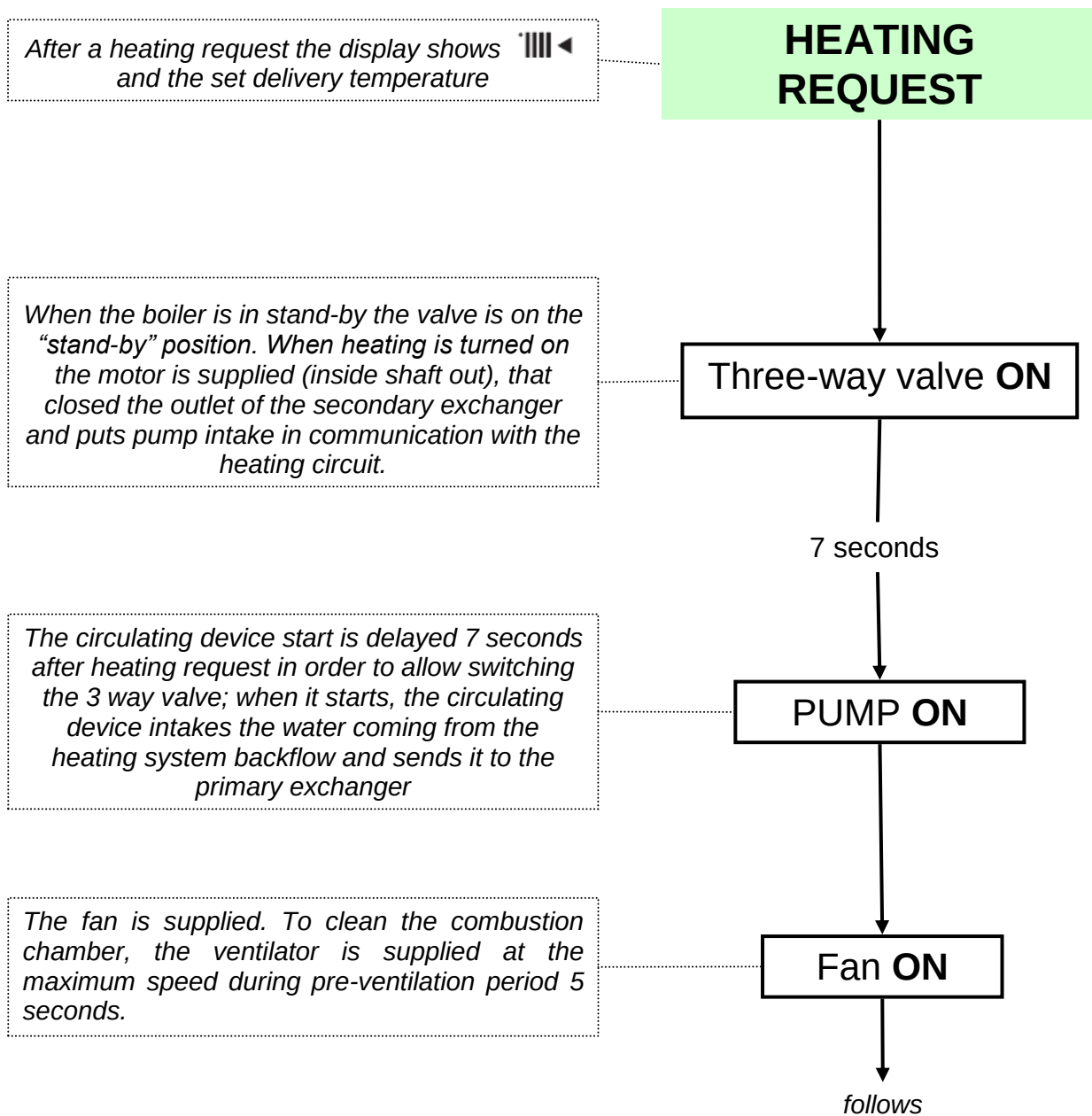
1.5 DISPLAY

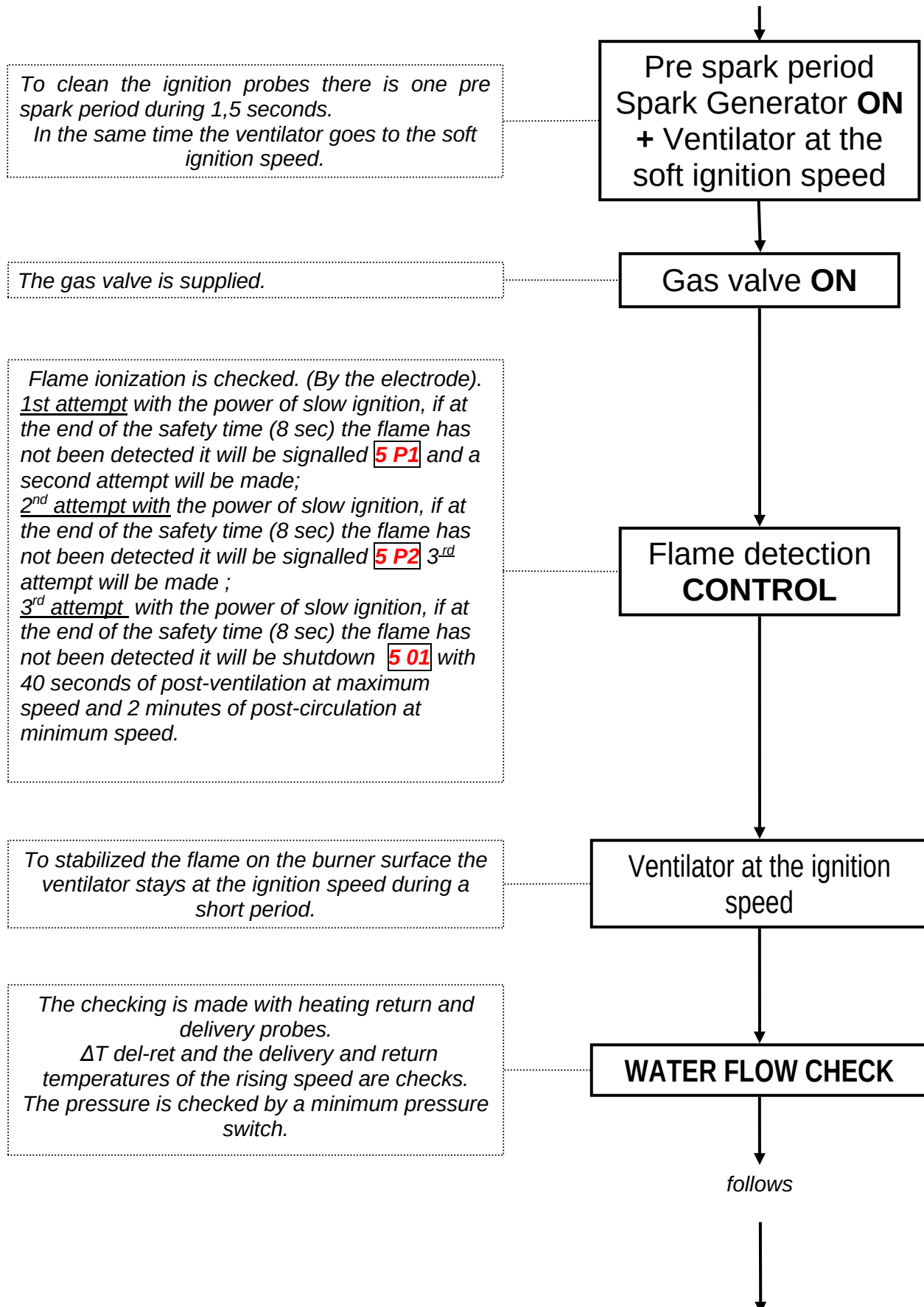


	Digits indicating: - set temperature - menu settings - error code signals
	Reset button request
	Technical assistance request
	Flame detected
	Heating operation set
	Heating operation active
	Hot water operation set
	Hot water operation active
	Anti-frost Function Active

1.6 HEATING MODE: OPERATING LOGIC

OPERATION RANGE		35°C 82°C	Pushing the button, the display shows /for 4 seconds) the temperature that you are setting.
------------------------	---	--------------	---





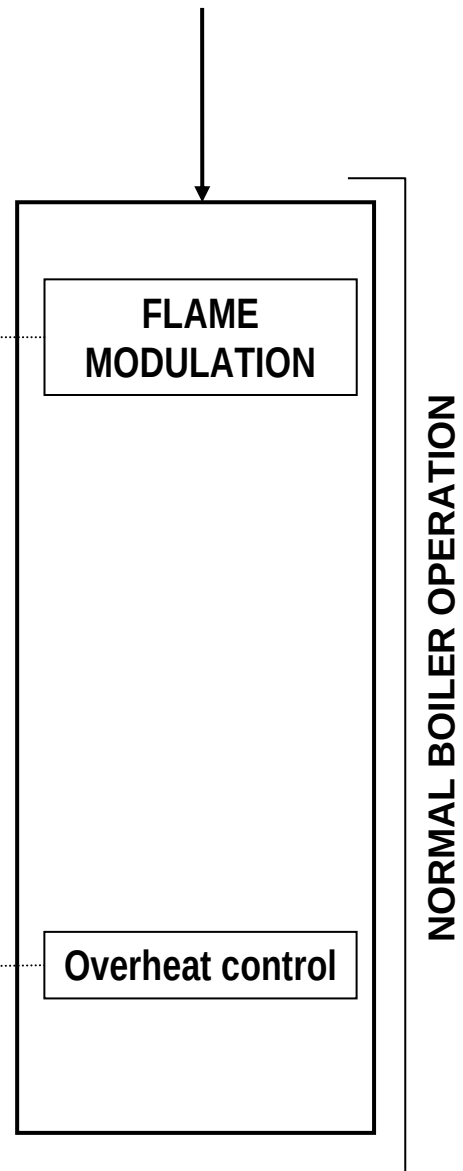
After flame detection the boiler is free to modulate the power according to the required thermal load. Modulation is carried out between the maximum heating power values (adjustable from the control panel with parameter **231**) and the minimum power value (fix valve). The shut down temperature of the burner is operated as follows:

- 1° min after flame detection:
 $T_{off} = T_{set-point} + 8^{\circ}\text{C}$
- 2° min after flame detection:
 $T_{off} = T_{set-point} + 6^{\circ}\text{C}$
- starting from the 3rd min after flame detection: $T_{off} = T_{set-point} + 4^{\circ}\text{C}$

This logic is used to prevent the burner from shutting down too quickly with the system at temperature.

Next ignition can be delayed from 0 to 7 minutes (default value = 2 min., adjustable from the control panel with parameter **236**)

Performed from delivery and return NTC sensor at 102°C (even while the burner is off). If the temperature became higher than 102°C there is a block shutdown of the boiler (non volatile), indicated on the display with **1 01**.

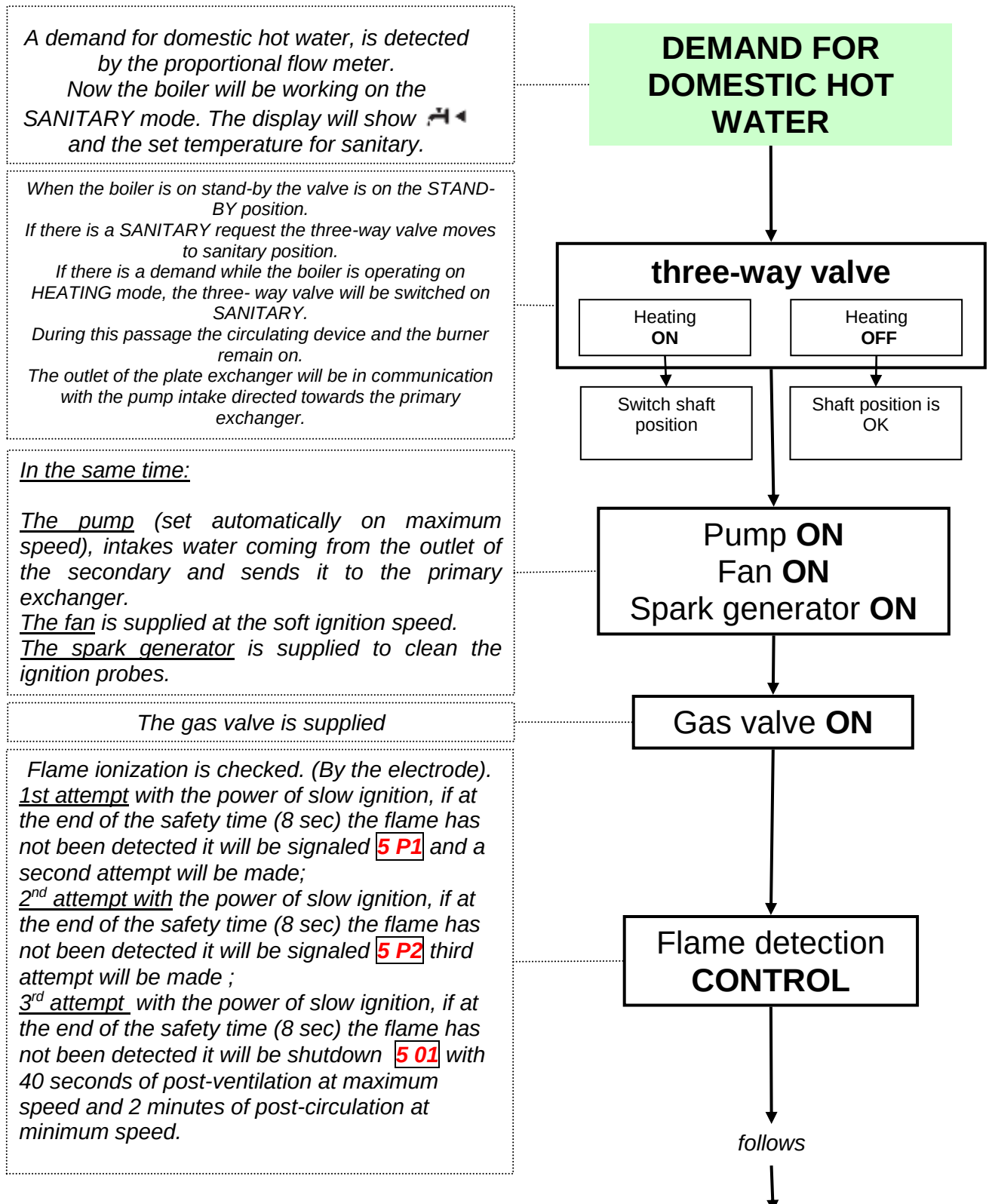


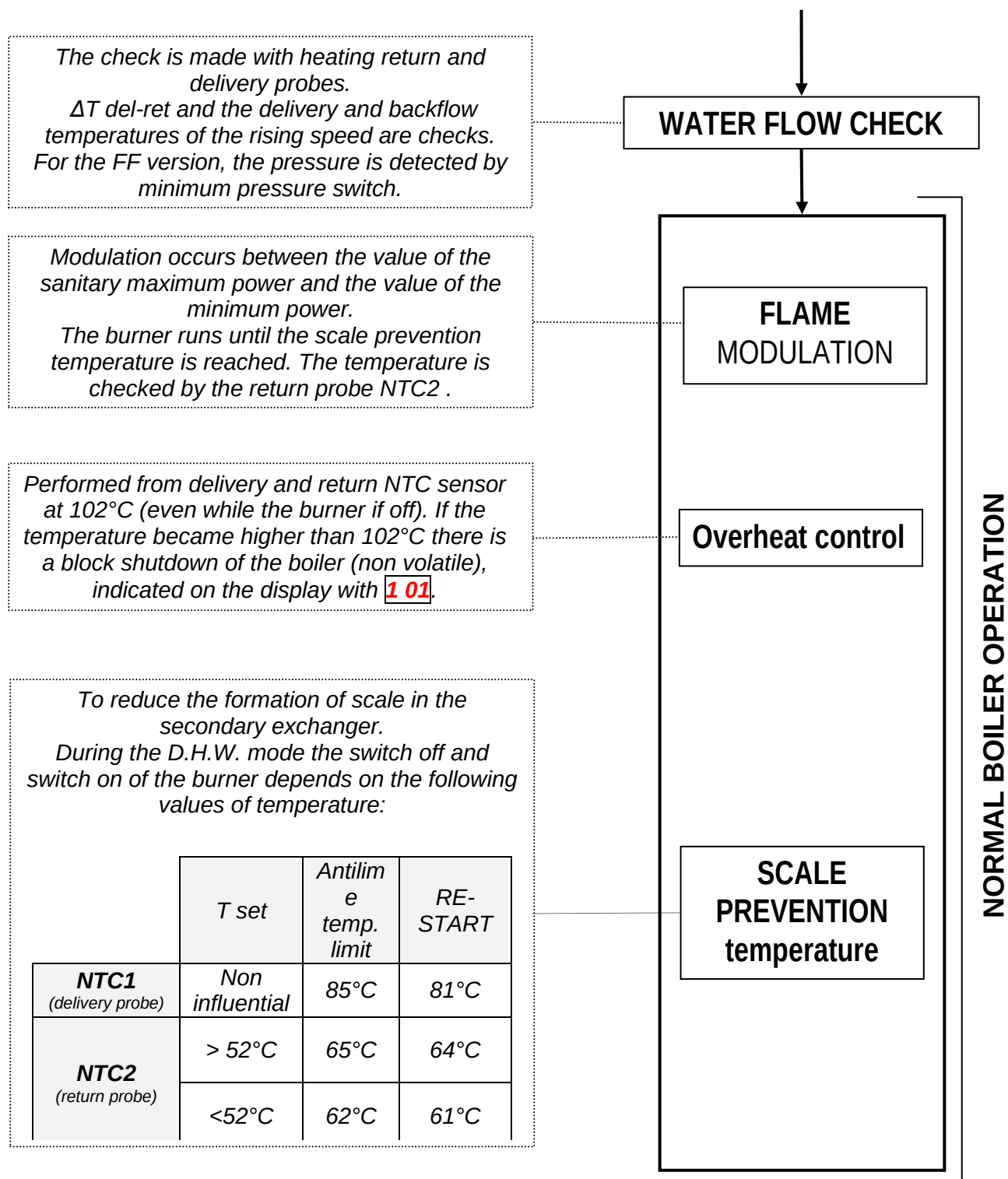
N.B. Starting from heating request, the “**limit temperature**” (88°C, not adjustable fixed value) remains on executed by the primary exchanger outlet probe (NTC 1).

If there is bad circulation through the heating system, the **automatic by-pass** can be opened (max capacity 350 l/h).

1.7 SANITARY MODE: OPERATING LOGIC

OPERATING RANGE		36°C 60°C	Pushing the button, the display shows /for 4 seconds) the temperature that you are setting.
------------------------	---	--------------	---





N.B.: The sanitary switch-off logic could be changed by the parameter **2 53**:

- 0 : Anti-scale (62 o 65°C) ⇒ default
- 1 : Set-point + 4°C

2 SYSTEM VERSION

2.1 “TANK” MODE

To select this typology of operation **set 1 on the parameter 228**. In this version the setting of the tank temperature (SET-POINT) is done through the buttons “+” and “-”.

DHW sensor (NTCs):

Temperature range 40-65°C.

The control of the temperature of the tank is managed in the following way:

- **T tank $\geq$ T set+2** : off burner, off pump
- **T tank $\leq$ T set – Thyst** : on burner, on pump where: Thyst=(T set/10)+3
- **T tank $\geq 80^\circ\text{C}$** : safety shut down **209**, that disappear when the temperature go down 75°C

Flow heating sensor (NTC1):

The PCB manages the flow temperature (NTC1) in the following way:

- **T flow $>$ T set + 20** : start modulation;
- **T flow $\geq 88^\circ\text{C}$** : burner off, pump on (on continuous)
- **T flow $\leq$ T set + 14** : burner on

2.2 “SYSTEM” MODE

To select this typology of operation **set 2 on the parameter 228**. In this version the tank temperature is manage thorough mechanical thermostat (ON/OFF).

Flow heating sensor (NTC1):

The PCB manages the flow temperature (NTC1) in the following way:

- **T flow $> 82^\circ\text{C}$** : start modulation;
- **T flow $\geq 86^\circ\text{C}$** : burner off, pump on (on continuous)
- **T flow $\leq 82^\circ\text{C}$** : burner on

2.3 ANTILEGIONELLA FUNCTION

This function is available only for boiler with external tank and tank NTC sensor (par.228=1).

The factory setting is with this function enabled (par.257= 1) and with the time set to 30 days (par.258).

In this situation the boiler starts to heat the tank till 60°C for 1 hour in the following condition:

- Each time that the boiler is supplied by electrical power;
- Each 30 days or after 30 days from the last time that the tank stays at 60°C at least for 60 minutes continuously.

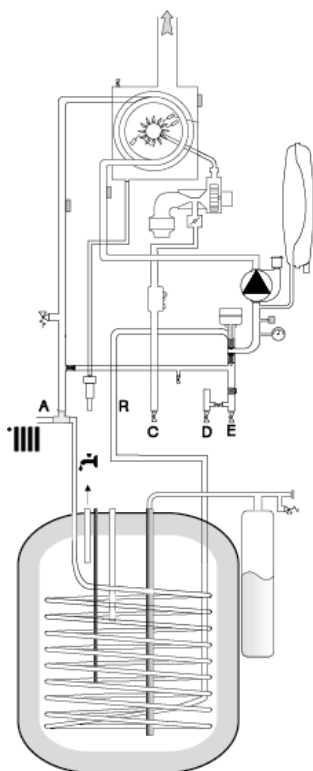
It is possible modify the frequency of this function through the parameter 258 from 25 hours to 480 hours (factory setting 30 days).

It is possible disable the function setting the parameter 257 to 0.

2	5	7	Antilegionella function (only for boilers with external tank and NTC sensor – par. 228 = 1)	0: disabled 1: enabled	1
2	5	8	Antilegionella time (only for boilers with external tank and NTC sensor – par. 228 = 1). The setting temperature is always 60°C (tank temperature).	24 ÷ 480 h and 30 days	30 day

It is advisable to install a thermostatic valve on the hot water outlet to prevent scalding.

2.4 HYDRAULIC SCHEME



CAPTION			
A	Heating and tank delivery	E	Heating return
C	Gas inlet	R	Tank return
D	Inlet cold water (for filling)		

3 SPECIAL FUNCTIONS

3.1 “FLUE CLEANER” Function

This function is used to perform proper boiler combustion analysis and maximum and minimum gas calibration.

Follow the instructions below to enable it:

PRESS	DISPLAY
	
<i>Press Reset button for 5 continuous seconds</i> <i>The display will show this indication</i>	

- With the boiler on “Winter” mode, the 3-way valves is positioned on “heating” and the burner turns on even without heating requested.
- With the boiler on “summer” mode:
 - without sanitary demand the burner turns on in heating;
 - with sanitary demand the burner turns on in sanitary.
- The delivery temperature (NTC1) is checked during the “Flue cleaner” function, as follows:
 - “summer” mode → Off: 86°C; On: 81°C;
 - “winter” mode → Off: 89°C; On: 84°C.

Three different powers can be selected when the function is enabled:

	PRESS	DISPLAY	POWER
<i>the pushbutton “+”</i>			Max heating
<i>the pushbutton “+”</i>			Max sanitary
<i>the pushbutton “+”</i>			Minimum

To exit the “Flue cleaner” function press the RESET button. However, after 10 minutes the function will be disabled automatically.

3.2 “ANTIFREEZE” Function

This function is enabled only if the ON/OFF selector is turned on position ON. It is operated by means of the temperature detected by the heating delivery probe (NTC1).

	CONDITION	EVENTS	TIME
1ST CASE	The temperature detected by probe NTC1: Ranges between 3°C and 8°C	- The PUMP is supplied on speed III - The 3-WAY VALVE alternatively switches the position of the shaft from 1 minute on “heating” to 1 minute on “sanitary” mode - The DISPLAY shows the icon 	Until the NTC1 temperature is $\geq 9^{\circ}\text{C}$
	 If, after 20 minutes, the CONDITIONS described in the 1st CASE are still present ($3^{\circ}\text{C} < \text{NTC1} < 8^{\circ}\text{C}$) automatically check the EVENTS of the 2nd CASE 		
	2nd CASE	- The BURNER turns on, supplied with minimum power; - The 3-WAY VALE is positioned on “sanitary” and switch every 30 s DHW/CH - When the temperature is $\geq 40^{\circ}\text{C}$ the burner turn OFF. For 15 minutes the boiler maintain the temperature between 35°C and 40°C - After 15 minutes there is 2 minutes of post circulation in heating - Into 90 minutes if the temperature decreases again less than 8°C the burner switch on immediately. - The DISPLAY shows the icon .	Until the NTC1 temperature is $\geq 40^{\circ}\text{C}$

If the NTC1 delivery probe is not working (open or short circuit) the “antifreeze” function check is followed by the NTC2 heating return probe but in these cases only the pump works (the burner doesn’t light). The display doesn’t show the antifreeze enabling code, but the error code of the NTC1 open or short circuit **1 10**. The antifreeze is enabled even if the NTC2 return probe is not working (open or short circuit) but only the pump works (the burner doesn’t light). In this case the display doesn’t show the antifreeze enabling code, but the error code of the NTC2 open or short circuit **1 12**.

The antifreeze is enabled even if the boiler is shut down due to no flame detection **5 01** or blocked for over heat **1 01**, but in these cases only the pump works (the burner doesn’t light), and the display shows the error code of blocking and not the antifreeze enabling one.

If there is an interruption of the power supply, the boiler maintains in memory all the setting and when the power supply is on the boiler returns in the condition that had before the turning off.

3.3 WATER FLOW CHECK

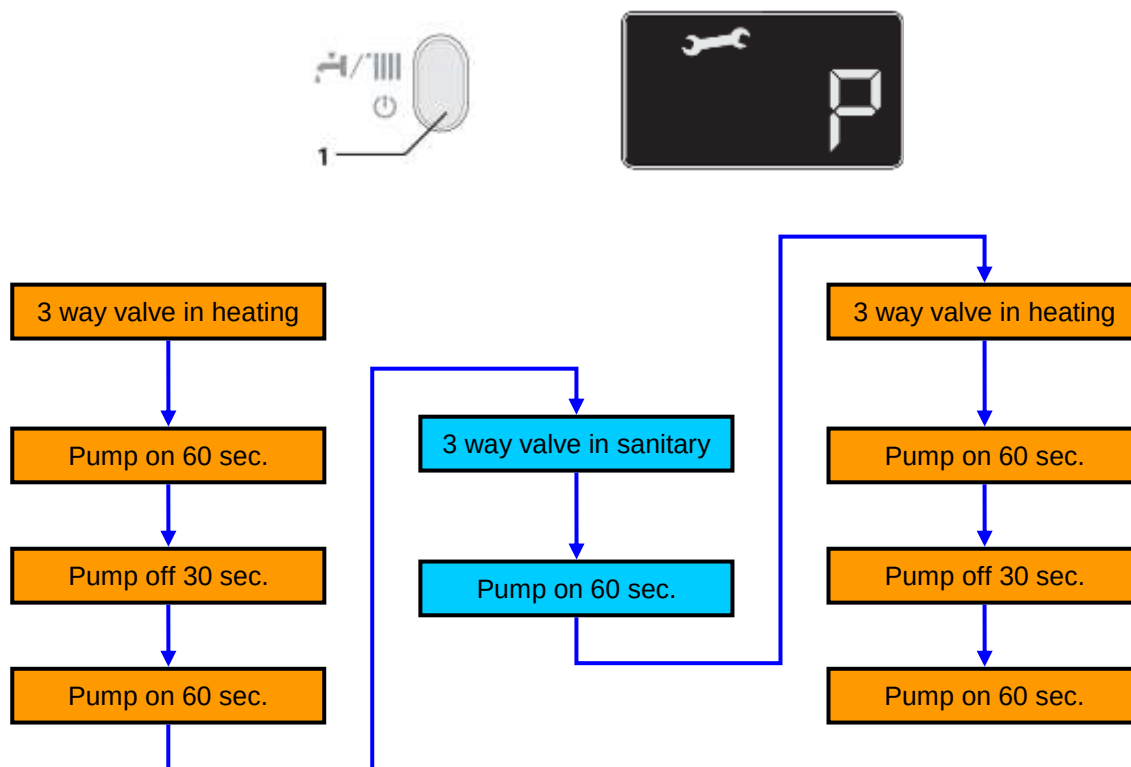
Check	When	What happens
Gradient Tman > 7°C/sec (checked every 100ms)	Check always with the flame on, except during the first 4 seconds after flame detection.	1. Immediate safety shutdown 1 P1 : <i>- 10sec of post-circulation</i> <i>- 10 sec of post-ventilation</i> The boiler restarts after 10sec. 2. If the error occurs other 2 times within the following 4 minutes it will be shutdown 1 03 : <i>- 20sec of post ventilation</i> <i>- 1min of post circulation.</i>
Gradient Tman > 20°C/sec or Gradient Trit > 20°C/sec (checked every 100ms)	Check always with the flame on, and up to 7 sec after each turn off for temperature set or safety shutdown.	1. Shutdown 1 04 : <i>- 20sec of post ventilation</i> <i>- 1min of post-circulation.</i>
Tman – Trit > 55°C	Check always with the flame on, and up to 7 sec after each turn off for temperature set or safety shutdown.	1. Immediate safety shutdown 1 P2 : <i>- 10sec of post-circulation;</i> <i>- 10sec of post ventilation.</i> After 10sec the boiler restarts. 2. If within 4 minutes from the first safety shutdown the defect occurs again there will be a safety shutdown 1 P2 : <i>- 10sec of post-circulation;</i> <i>- 10sec of post ventilation.</i> After 10sec the boiler restarts but the timer is zeroed. 3. If within 4 minutes from the first safety shutdown the defect occurs again it will be shutdown 1 05 : <i>- 20sec of post ventilation</i> <i>- 1min of post circulation.</i>
Trit > Tman + 10°C	Check always with the flame on.	1. If the defect occurs for 20 continuous seconds there will be a safety shutdown 1 P3 : <i>- 10sec of post-circulation;</i> <i>- 10sec of post ventilation.</i> After 10sec the boiler restarts. 2. If the defect occurs for 20 continuous seconds another 2 times within 4 minutes it will shut down 1 06 : <i>- 20sec of post ventilation;</i> <i>- 1min of post circulation.</i>
Trit > Tman + 30°C	Check always with the flame on.	Shutdown 1 07 : <i>20sec of post ventilation;</i> <i>- 1min of post circulation</i>

3.4 “AIR PURGE” Function.

This function can be activated by the installer by the parameter **2 71** or pressing of the mode button for 5 sec (continues till to the finish (about 6') or pressing of the mode button).

The air purge function is automatically activated after the first boiler electrical power supply on and after the errors 108 (remain the possibility to activate manually the function using the dedicated button and to stop it with the dedicated button.).

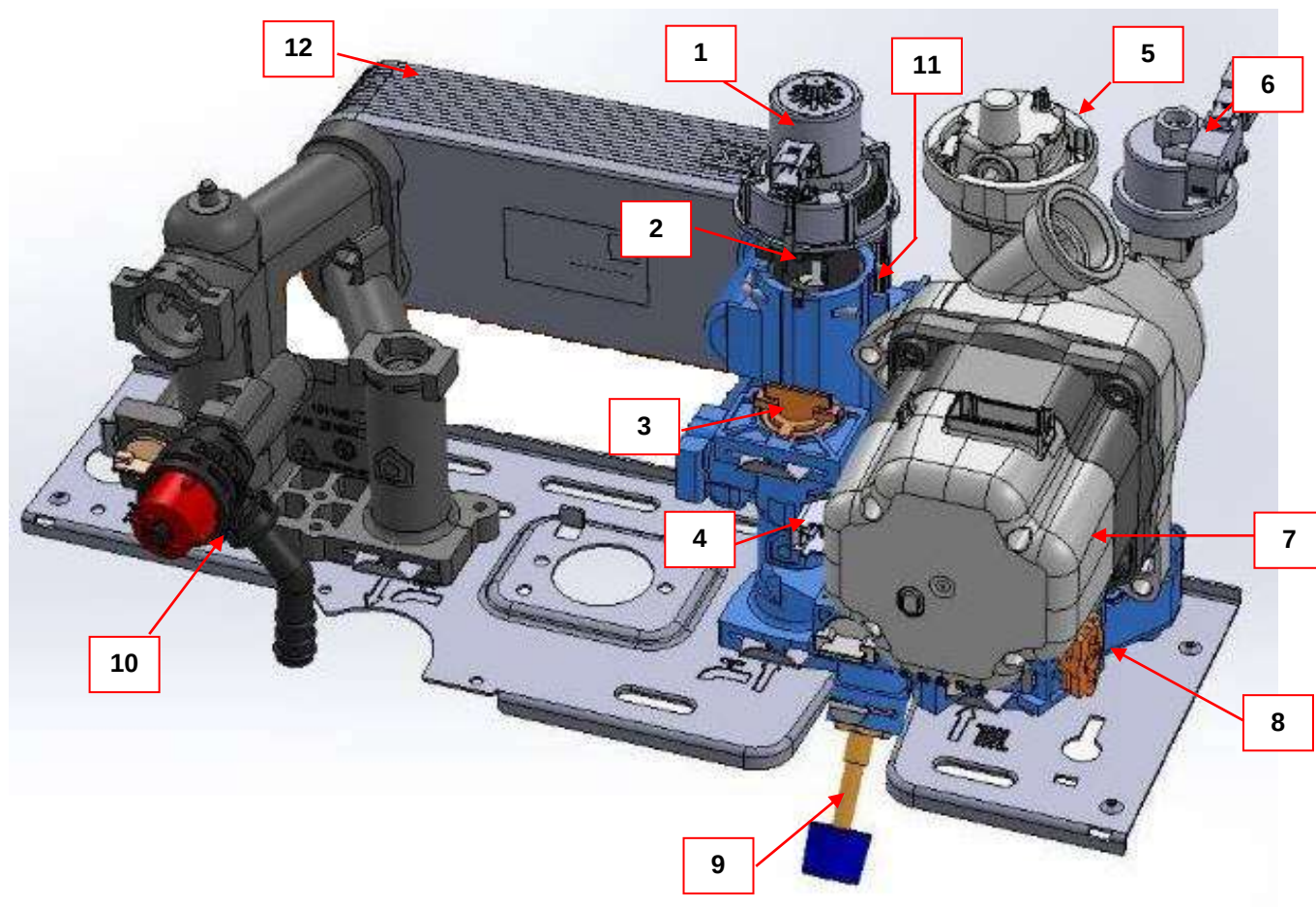
Its aim is to help to purge the residual air inside the primary circuit after a filling cycle. At the activation the following cycle is begun:



This cycle can be repeated several times, till the boiler and the heating system are completely purged from air.

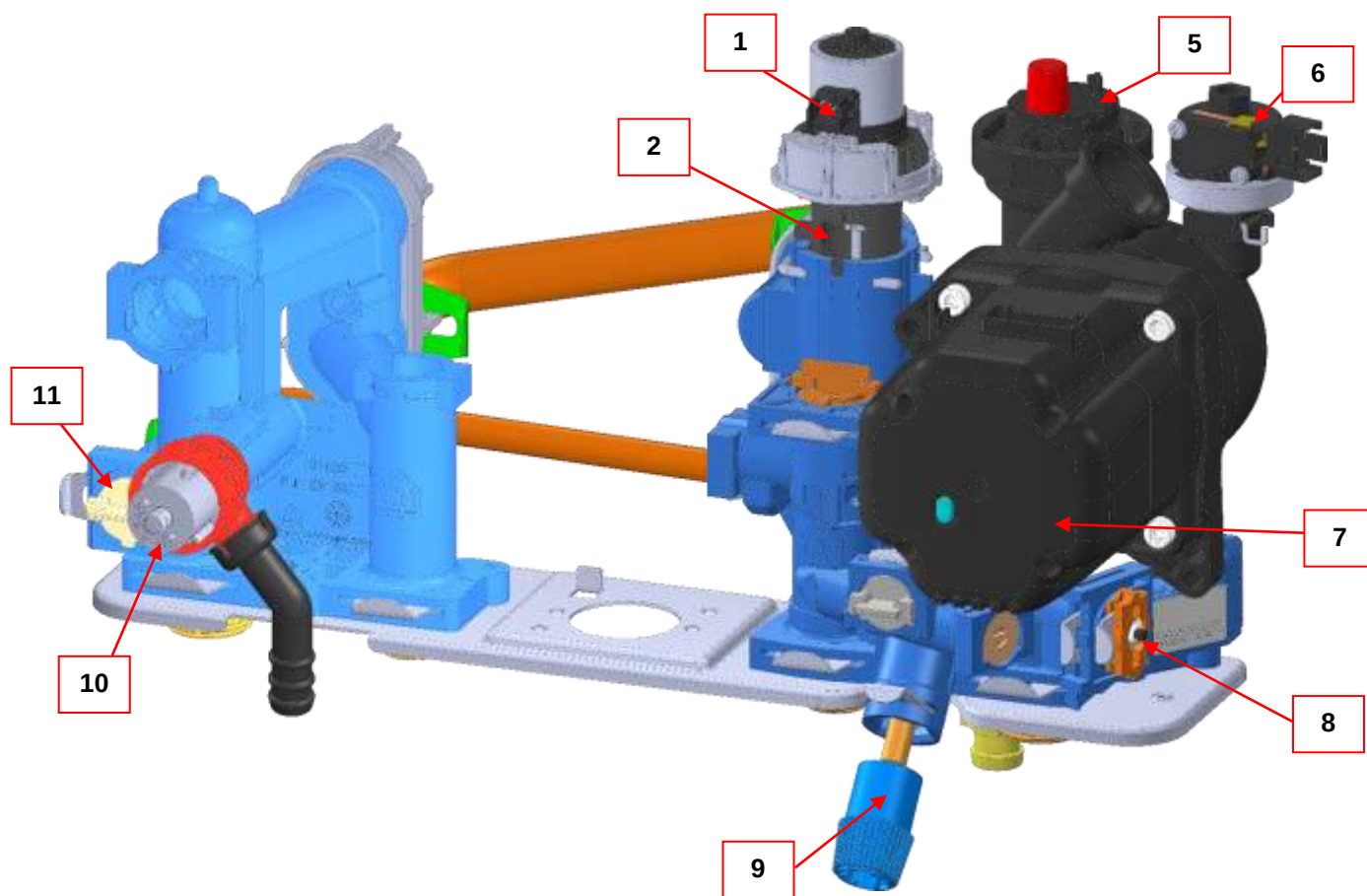
4 HYDRAULIC UNIT

4.1 HYDRAULIC UNIT – COMBI VERSION



LEGEND			
1	3 way valve motor	7	Pump
2	3 way valve	8	Heating filter and pressure gauge connection
3	DHW flow switch	9	Filling tap (no for France)
4	Reed sensor	10	3 bar safety valve
5	Automatic air valve	11	By-pass
6	Minimum pressure switch connection (till May 2019) Pressure sensor (from May 2019)	12	DHW plate heat exchanger

4.2 HYDRAULIC UNIT – SYSTEM VERSION



LEGEND			
1	3 way valve motor	8	Heating filter and pressure gauge connection
2	3 way valve	9	Filling tap (no for France)
5	Automatic air valve	10	3 bar safety valve
6	Minimum pressure switch connection (till May 2019) Pressure sensor (from May 2019)	11	By-pass
7	Pump		

4.3 3-WAY VALVE

The boiler uses a 3-way to change the water distribution (heating system side or secondary exchanger side). It's managed by the PCB that drive the stepper motor. It is formed by a composite material body and an electric stepper motor.

With the boiler on stand-by the 3-way valve is positioned on sanitary mode.

The 3-way valve can have 3 different positions:

- Heating;
- Domestic hot water (DHW);
- Stand-by (position similar to DHW, but with the gasket uncompressed).

Every time that the boiler is supplied the 3 way valve motor does a reset procedure, it does 3 complete switching (DHW → Heating → DHW), after that the position is related to the boiler working mode.

After DHW request (if there is not heating request), the e way valve remains in DHW position for 10 minutes, after that it goes in stand-by position.

At the end of the heating request (if there is not DHW request), after the post-circulation, the 3-way valve goes in stand-by position.

If the boiler is switched off through the ON/OFF button, the 3-way valve goes immediately in stand-by (if post-circulation is in progress, the 3-way valve goes in stand-by position at the end of the post-circulation).



HEATING POSTITION	DHW POSITION
	

The anti-sticking function of the 3 way valve is performed every 21 h after the last request.

3 WAY VALVE MOTOR DISASSEMBLY:

Before disassembly the 3-way valve is mandatory remove the stepper motor.

To remove the stepper motor the 3-way valve must be in DHW or stand-by position, otherwise it is not possible remove it. To do this it is enough switch off the boiler through the ON/OFF button.

- Remove the motor blocking ring, rotating clockwise.



- Unblock the stepper motor

BLOCKED



UNBLOCKED



- Remove the stepper motor.



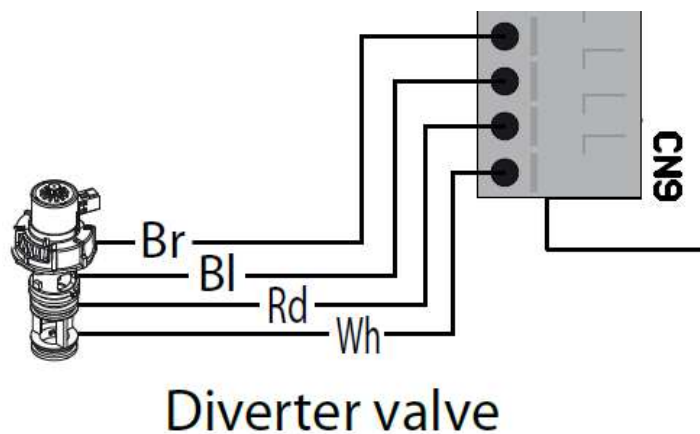
- Remove the 3 way valve (to do it easier it is possible use a flat screwdriver).



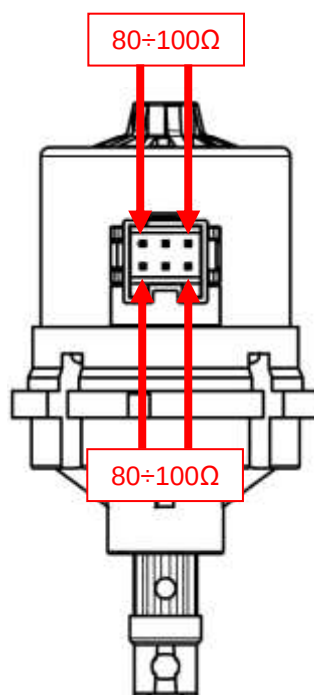
4.3.1 Stepper motor

The stepper motor is managed from the PCB.

Switching time (Heating → DHW or DHW → Heating) : about 3sec.,



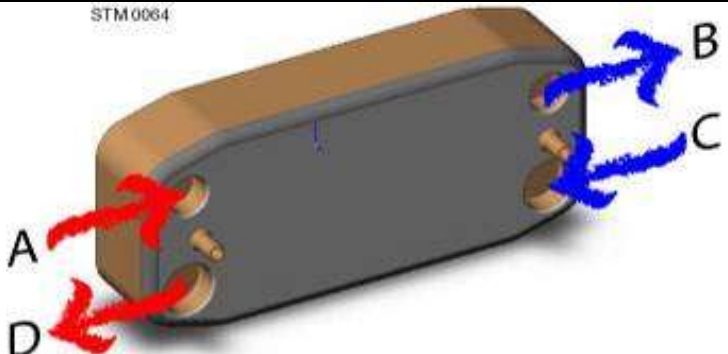
To check the stepper motor is possible measure the resistance between the following pins. If it is between 80 and 100 Ohm, it means that the coils of the stepper motor are ok.



4.4 SECONDARY EXCHANGER

The secondary exchanger is fixed to the hydraulic unit with two screws.

The two points where the screws are fixed are asymmetric with the body of the exchanger so that it can be assembled only in the proper position.

HEAT EXCHANGER Hot water from the main exchanger, flows into A, transferring its heat and flows out through B The cold water from the domestic hot water mains, passes through the domestic proportional flow meter (thus starting up the boiler in domestic hot water mode) flows into C, heat up and flows out through D, ready for use in the distribution network.	 Exchanger with 10 plates (24kW) Exchanger with 12 plates (30kW)
--	---

4.4.1 Antiscale limit temperature

Reduces the formation of scale in the secondary exchanger. During SANITARY MODE operation the burner turn off and restart depends on the temperature values detected by probes NTC1 and NTCs indicated here on the right.

	<i>T set</i>	<i>Antiscale limit temp.</i>	<i>START</i>
NTC1 (delivery probe)	Not influent	85°C	81°C
NTC2 (return probe)	> 52°C	65°C	64°C
	<52°C	62°C	61°C

4.5 PUMP UNIT

The pump is full modulating. The modulation is according to the boiler power in heating.
In sanitary the pump goes always at the maximum speed.
We can have 2 alternative pumps on this boiler:

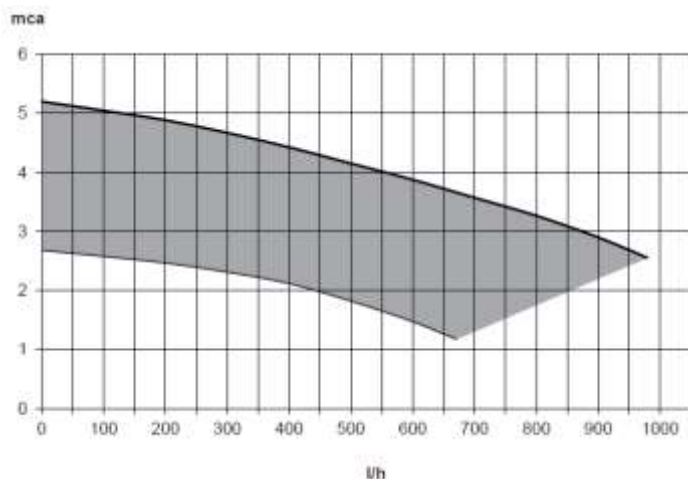
Pump model: ES 2PK/53-9A-C STEP2.
Electrical power supply: 325Vdc.
Electrical consumption: 52W (max speed).



Pump model: EUMEZECP2AE-C
Electrical power supply: 325Vdc.
Electrical consumption: 50W (max speed).

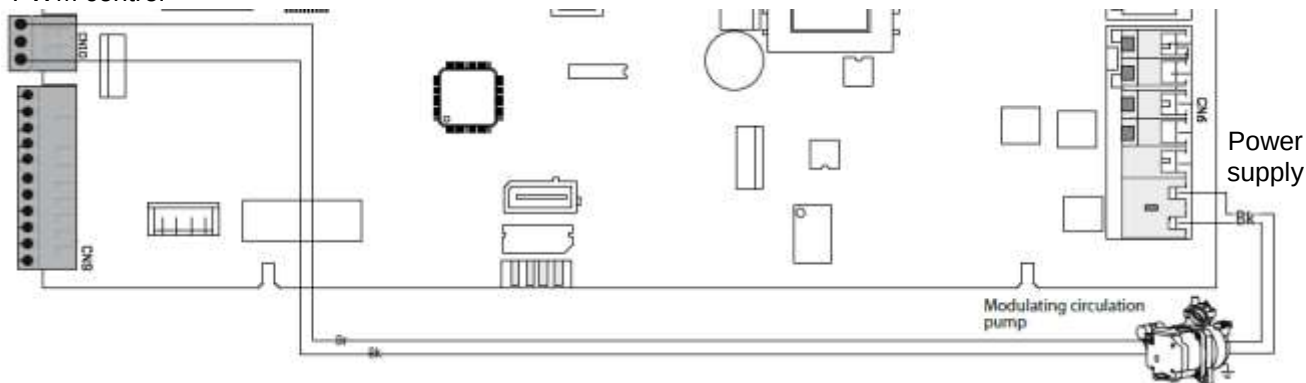


Setting the parameter 246 like the parameter 245 the pump works always at fixed speed.
Setting the parameter 245 and 246 to 75 the pump works at the speed that is like the low speed in the pump modulating in 2 step, at this speed is guaranteed the by-pass working.



PAR.	NOTE
245	Max pump speed (settable between 75 and 100)
246	Min pump speed (settable between 40 and par. 245)

PWM control



There is one bi-color led (green and red) in the frontal part of the pump:

- Led off: pump off or not supplied;
- Led green on fix: pump on with stable speed;
- Led green on blinking: pump on with speed changing;
- Led red on fix: pump blocked; with the system empty or with air inside the system switch-on alternatively the red led and the green blinking.



With the PWM wire disconnected (main PCB connector CN10) the pump goes at the maximum speed.

4.5.1 Types of post-circulation

Post-circulation after:	3 way valve position	Time of post circulation	Speed pump
Switching off due to:			
Room thermostat opening	Heating	3 min (set by parameter 237 beetwen 0 e 15')	Min/Mean
Heating Off by Summer/Winter button	Heating	3 min (set by parameter 237 beetwen 0 e 15')	Min/Mean
NTC delivery > T set +4	Heating	continuasly	Min/Mean
NTC return > 62°C or 67°C	Sanitary	continuasly	Max
End of sanitary demand	Sanitary	Par. 254=0 → 30 sec if: Tdel<75°C ; 3 min if Tdel>75°C; Post circulation: 30sec	Max
		Par. 254=1 → 3 min	
End of comfort cycle	Sanitary	30 sec	Max
End of antifreeze function	Heating / Sanitary	2 min	Max
End of chimney sweeping function	Heating	1 min	Min
Solar sensor	Sanitary	30 sec	Min
Errors			
Pressure sensor (102), Low pressure (108, 111)	Heating	40 sec	Min
No circulation (103, 104, 105, 106, 107)	Heating	1 min	Max
Flame missing, flame lift (501, 504)	Heating	2 min	Min
Overheat (101), Thermo fuse opening (610)	Heating	2 min	Min
No circulation (1P1, 1P2, 1P3)	Heating	10 sec	Max
Floor thermostat opened (116)	Heating	90 sec	Min

4.6 HEATING PRESSURE SWITCH

The minimum pressure switch verifies the pressure in the heating circuit, with micro-switch ON/OFF.
The setting are:

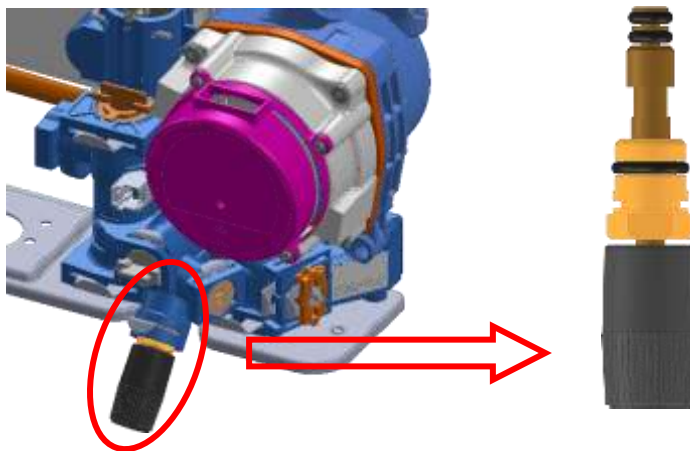
- OFF: 0,4 bar;
- ON: 0,6 bar.

When it opens there is the safety shout down **1 08**



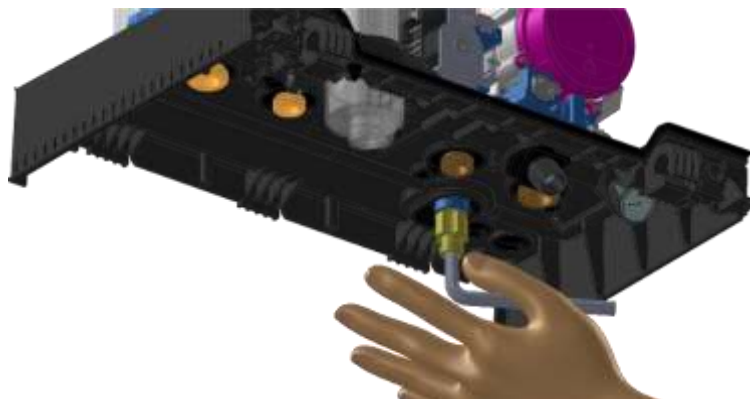
4.7 FILLING TAP

To fill the heating circuit, use the tap positioned under the hydraulic group support, rotate in anticlockwise.



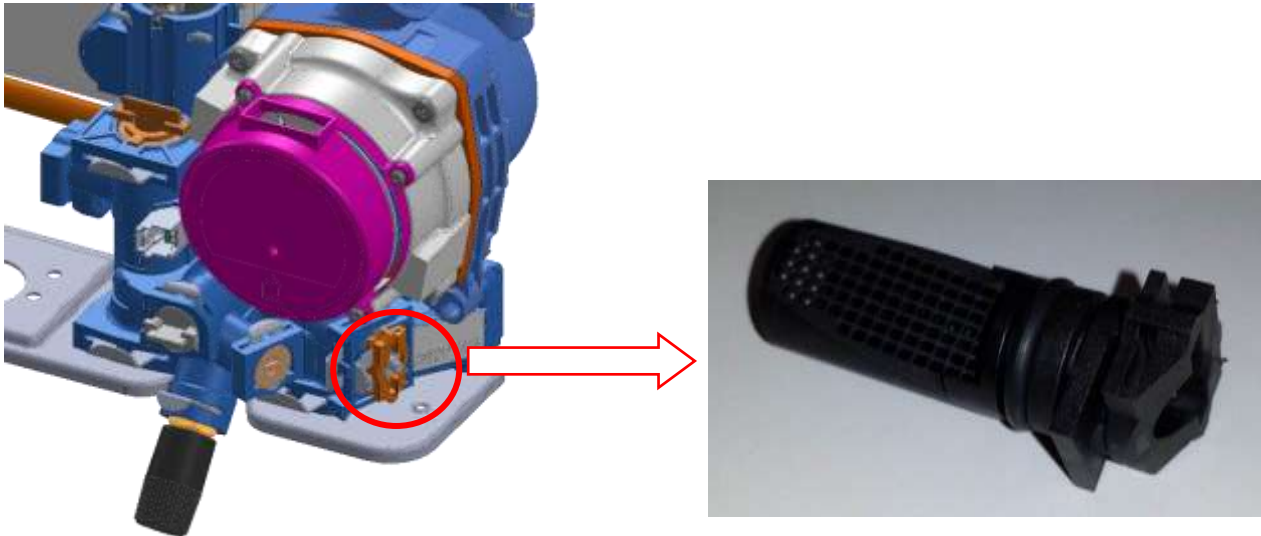
4.8 DRAIN VALVE

To empty the system, turn the proper tap positioned on the lower part of the boiler anti-clockwise.



4.1 HEATING FILTER

On the heating return unit there is a filter that can be reached from the front side of the boiler. To inspect and clean the filter follow the instructions shown below.

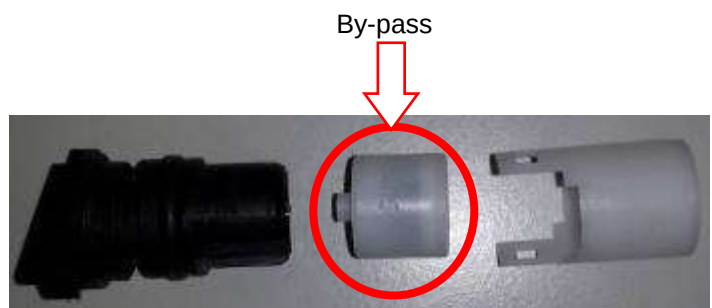
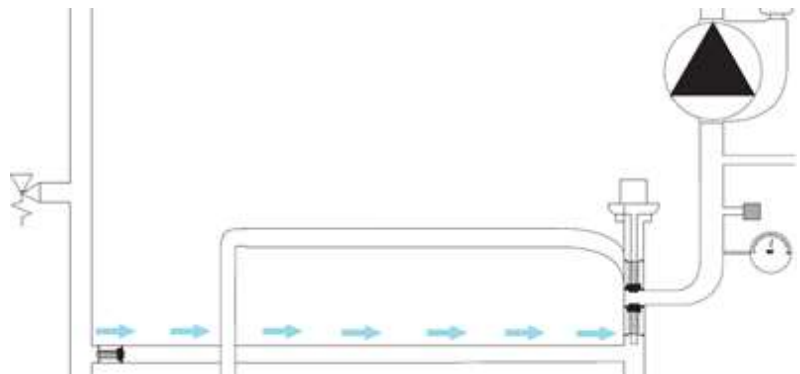
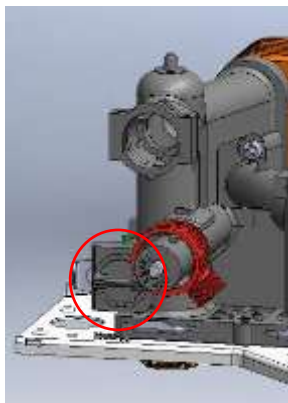


4.2 BY-PASS - SYSTEM

The boiler has an automatic by-pass and, therefore no regulation is required. In the case of load losses in the system caused for example by the intervention of thermostat or area valves, the by-pass guarantees a flow in the condensing main exchanger of at least 350l/h.

The by-pass is therefore designed to protect the condensing main exchanger from overheating in the case of poor or insufficient water circulation.

If this condition occurs, the system regulates the power normally and then switches off the main burner when the set-point temperature is reached.

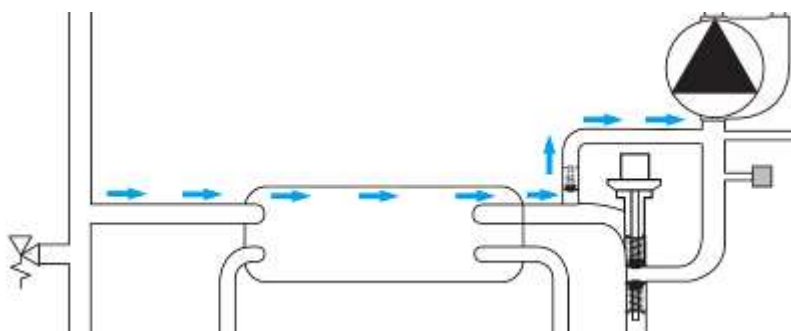


4.1 BY-PASS - COMBI

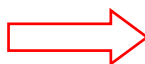
The boiler has an automatic by-pass and, therefore no regulation is required. In the case of load losses in the system caused for example by the intervention of thermostat or area valves, the by-pass guarantees a flow in the condensing main exchanger of at least 350l/h.

The by-pass is therefore designed to protect the condensing main exchanger from overheating in the case of poor or insufficient water circulation.

If this condition occurs, the system regulates the power normally and then switches off the main burner when the set-point temperature is reached.



In the Combi boiler to remove the by-pass it needs to remove before the ring that fix the 3 way valve motor.



By-pass

4.2 PRIMARY EXCHANGER

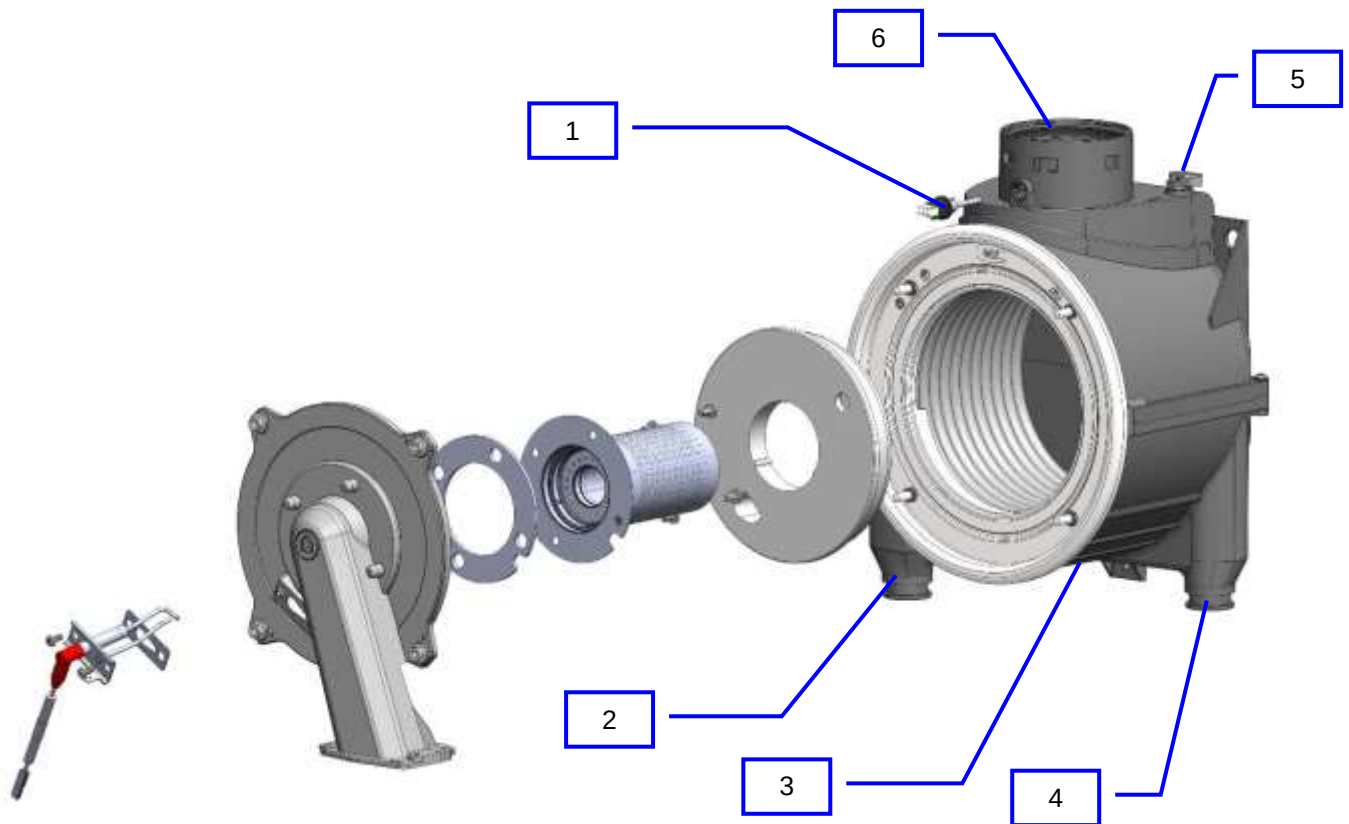
The primary exchanger is kept in position inside the combustion chamber by 4 points. It has integrated extra functions: flue box, drain condensate.

The heat exchanger is made with one pipe in stainless steel smooth (material: 441 / Diameter: 25,4mm / Thickness: 0,8mm). In order to have a maximum thermal exchange, the tubes are flattened.

Spacers are used to maintain the distance between each coil (0,6 mm).

Number of coils according to the burner power:

Burner power	Nb of coils	Internal coil diameter
24 KW	10,5	160 mm
29/30 KW	11,5	180 mm



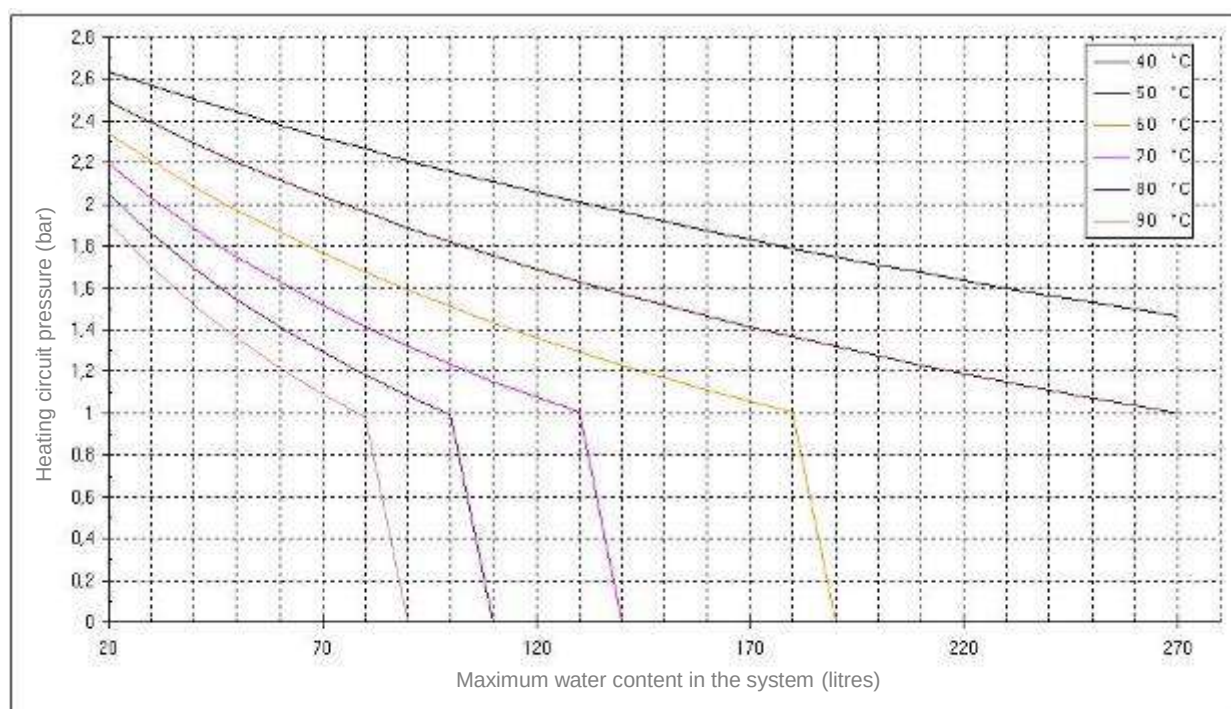
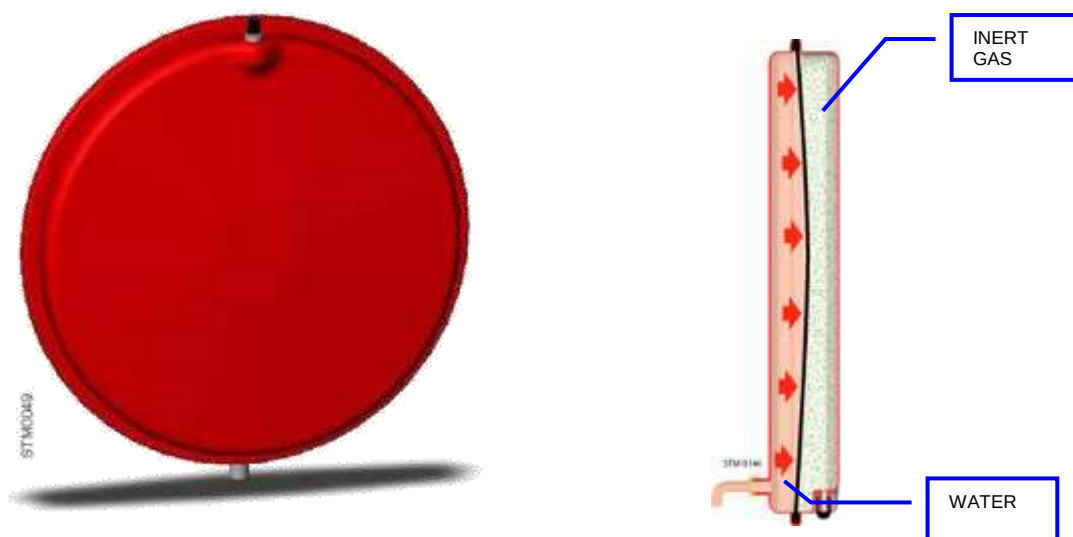
CAPTION			
1	Exhaust sensor	4	Return
2	Supply	5	Thermo-fuse
3	Condensate discharge	6	Exhaust discharge

4.3 EXPANSION VESSEL

The expansion vessel absorbs primary circuit water expansion when there is a boiler temperature raise. It is constituted by two parts separated by a SBR rubber membrane. On one side nitrogen on the other water of the primary circuit. The nitrogen chamber (which can be compressed) absorbs the water volume increased because of temperature raise.

The expansion vessel has been conceived for an approx. 175 litre heating system.

Technical features	
Capacity	8 litres
Maximum operating temperature	90°C
Nitrogen pressure	1 bar
Maximum operating pressure	3.0bar



4.4 SANITARY FLOW SWITCH

The DHW flow meter is positioned in front of e way valve.

When turned on sanitary mode, the flow of water passes through the flow switch (on/off), the float moves upwards and through the magnet close the reed sensor contact and the PCB know that the tapping is in progress.

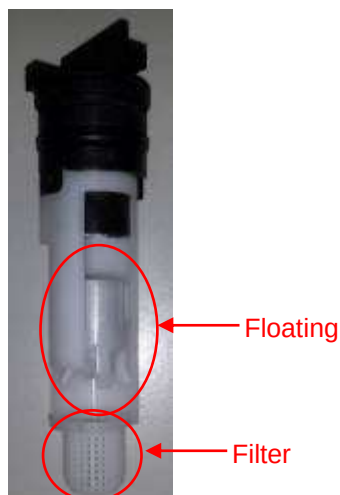
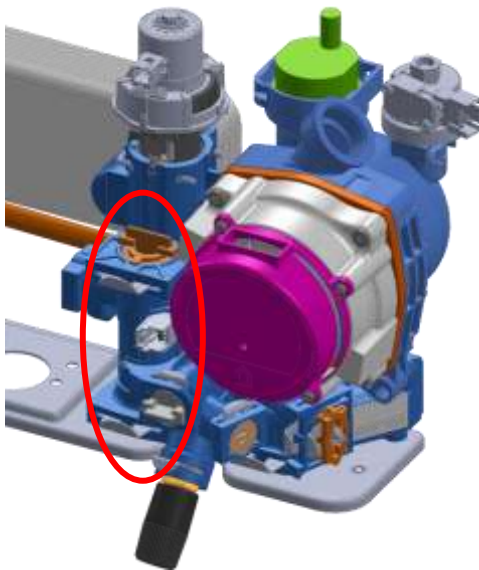
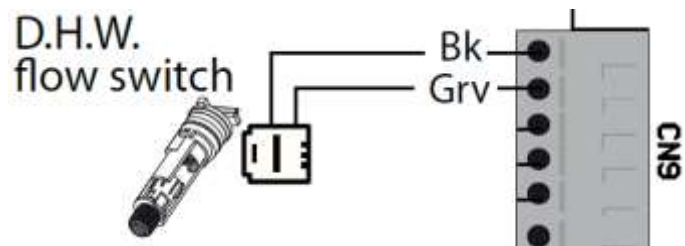
A cold water inlet filter is built-in the sanitary flow meter to stop impurities from getting in.

There is also an anti-hammer device (through the PCB) that can be set by parameter **2 52** between 0.5 sec and 20 sec (default 0.5 sec).

It is possible check if the contact is open or closed through the connector CN09.

Flow capacity on: 2 l/min

Flow capacity off: 1,4 l/min



4.5 SANITARY FLOW LIMITER (accessory)

If the sanitary flow rate is too high, it is possible assemble in the boiler the flow limiter. It is available in 3 different flow rate: 8l/min, 10l/min and 12l/min, it is possible identify them with the color:

8 l/min



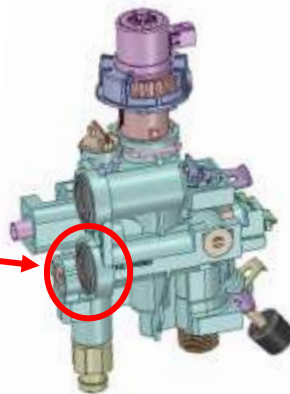
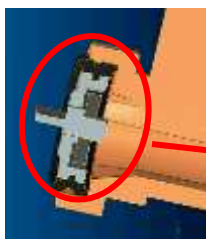
10 l/min



12 l/min



The flow limiter must be assembled in the connection between right hydraulic block and sanitary heat exchanger.



4.6 TEMPERATURE PROBE

To check the delivery and return temperature use the two contact sensor directly on the heat exchanger.

To read the sanitary water temperature is used the return sensor.

If the NTC1 sensor does not work properly the antifreeze function will be checked by sensor NTC2 (only pump circulation).

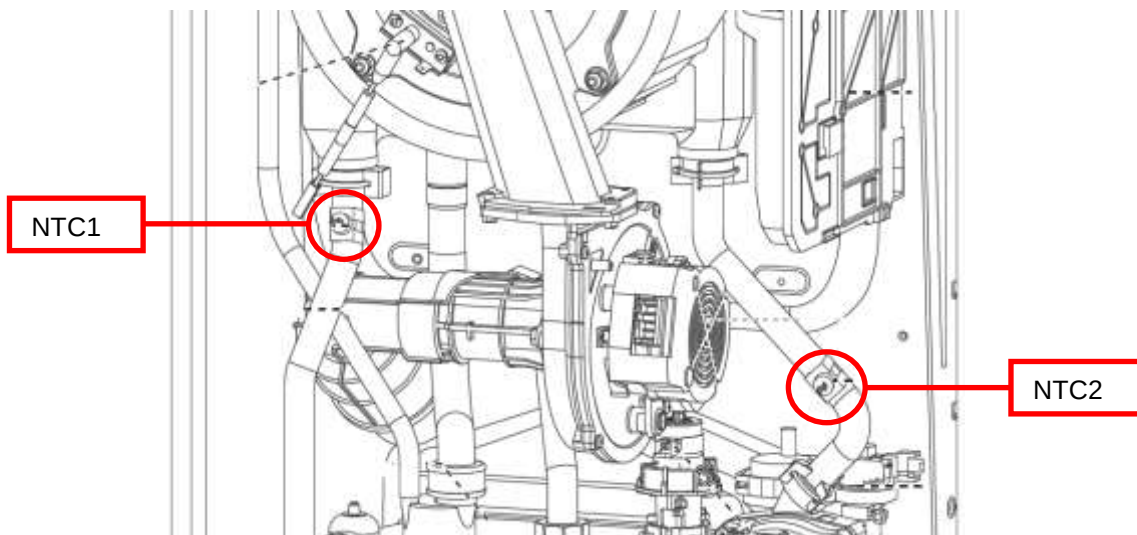
IMPORTANT!!!! Do not use conducting paste for the contact sensors because they alter the resistance value.

PROBE ERROR CODES

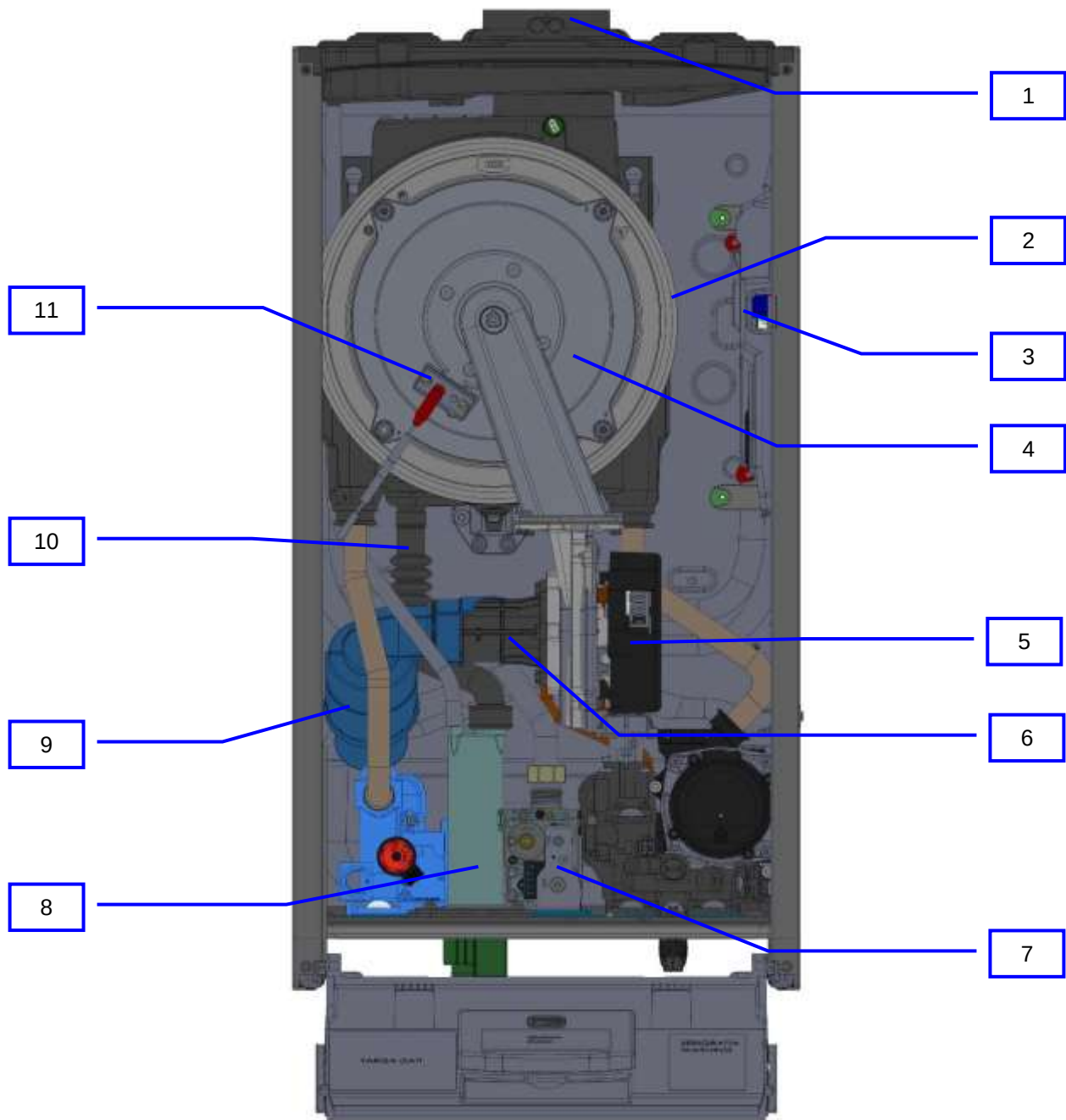
1 10 NTC1 heating delivery probe open or short circuit

1 12 NTC2 heating return probe open or short circuit

TEMPERATURE (°C)	RESISTANCE (kOhm)
0	27
10	17
20	12
30	8
40	5
50	4
60	3
70	2
80	1,5



5 GAS UNIT

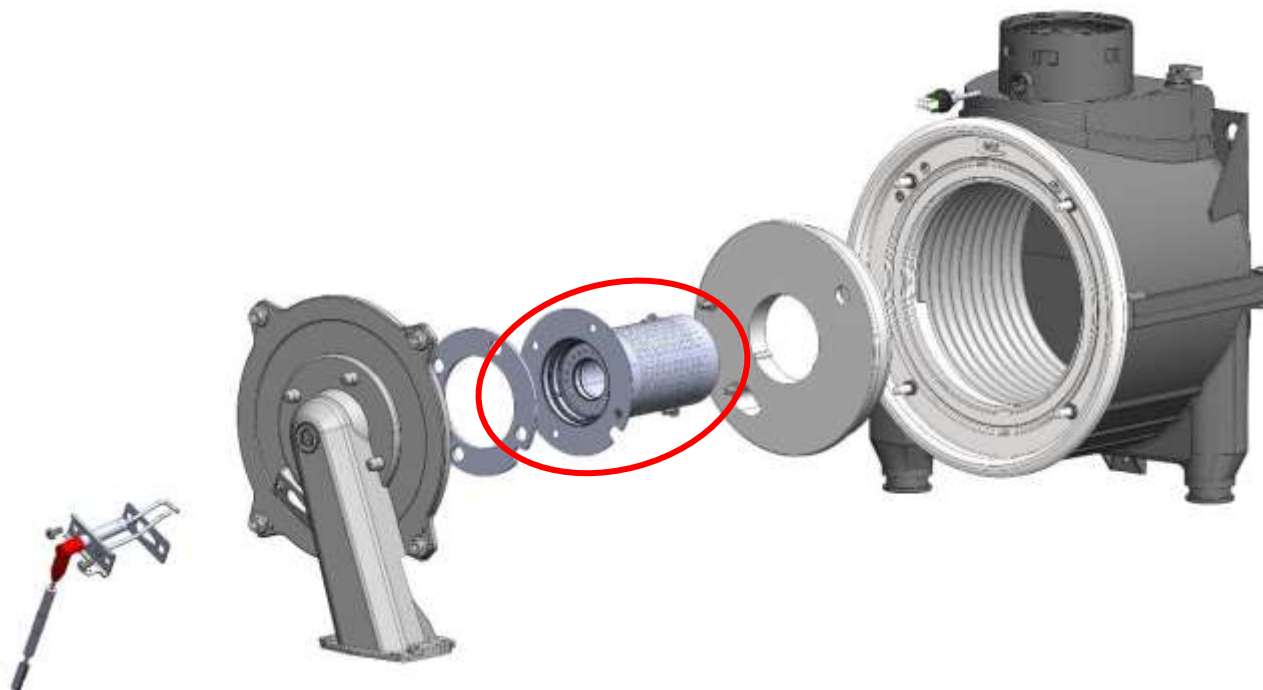


CAPTION			
1	Exhaust discharge	7	Gas valve
2	Primary heat exchanger	8	Condensate drain siphon
3	Spark generator (inside PCB)	9	Silencer
4	Burner door	10	Condensate drain pipe
5	Fan	11	Electrode
6	Mixer		

5.1 PREMIX BURNER

The cylindrical stainless steel premix burner pot Ø 63 mm (24 Kw) and Ø 70 mm (30Kw) is made up of a small-diameter perforated external casing on which the combustion occurs. a large-diameter perforated internal casing that balances the propagation of the gas.

This burner can be used with natural gas and LPG.



5.2 MIXER



Gas	24kW (ø mm)	29/30kW (ø mm)
All	17,5	21

5.3 SILENCER



5.4 EXHAUST SENSOR AND THERMO-FUSE

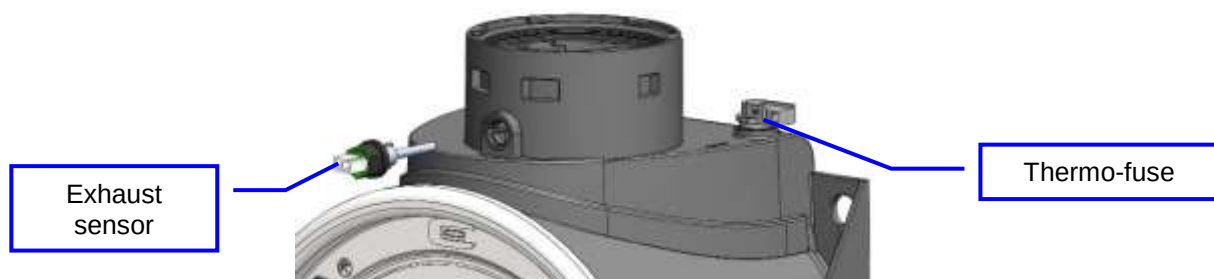
In the exhaust exit there is one sensor to avoid exhaust overheating. In the parameter 834 it is possible to see the temperature measured by this sensor.

The sensor is managed as follows:

- T exhaust > 91°C → Boiler forced to minimum power
- T exhaust < 86°C → Normal working
- T exhaust > 96°C → Boiler goes in error **602** with 40 seconds of post-ventilation and 2 minutes of post circulation with 3-way valve in heating mode
- To reset the error, it needs to wait 10 minutes after T exhaust < 86°C. The 10 minutes remain in memory also if there is electrical power interruption.

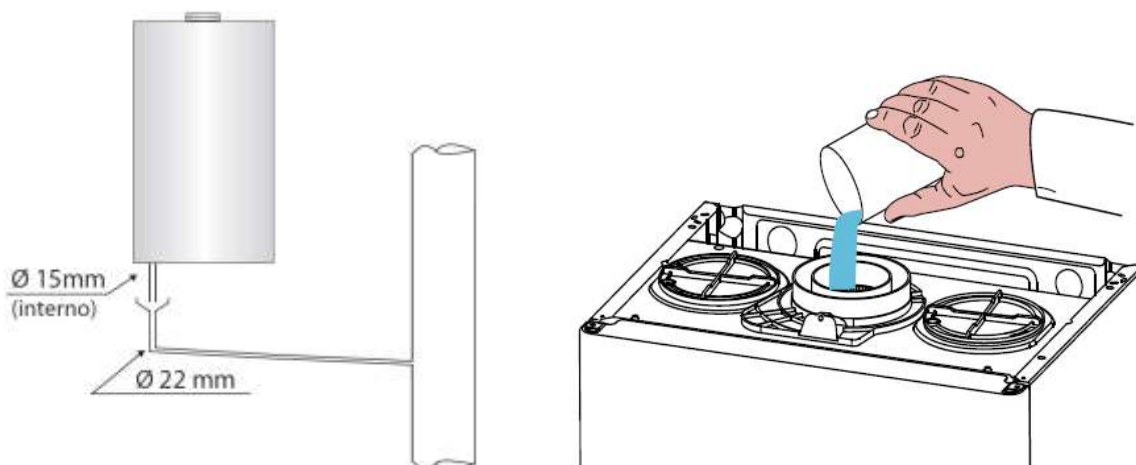
If the exhaust sensor is damaged (open or short-circuit) the display shows the error **605** (if it happens during heating request, there are 5 seconds of post-ventilation and 10 seconds of post circulation with 3-way valve in heating mode). The error disappears when the sensor restarts to work correctly.

There is also a thermo-fuse that opens if exhaust temperature is higher than 133°C and the boiler goes in error **101**. The thermo-fuse is available like a spare part.



5.5 CONDENSATE DRAIN

For the connection of the condensate drain respect the minimum diameter showed below.
Before switch on the boiler fill the siphon pouring approximately 0.25 liters of water in the exhaust fumes.
During the periodical maintenance clean the siphon, place in the bottom part of the boiler



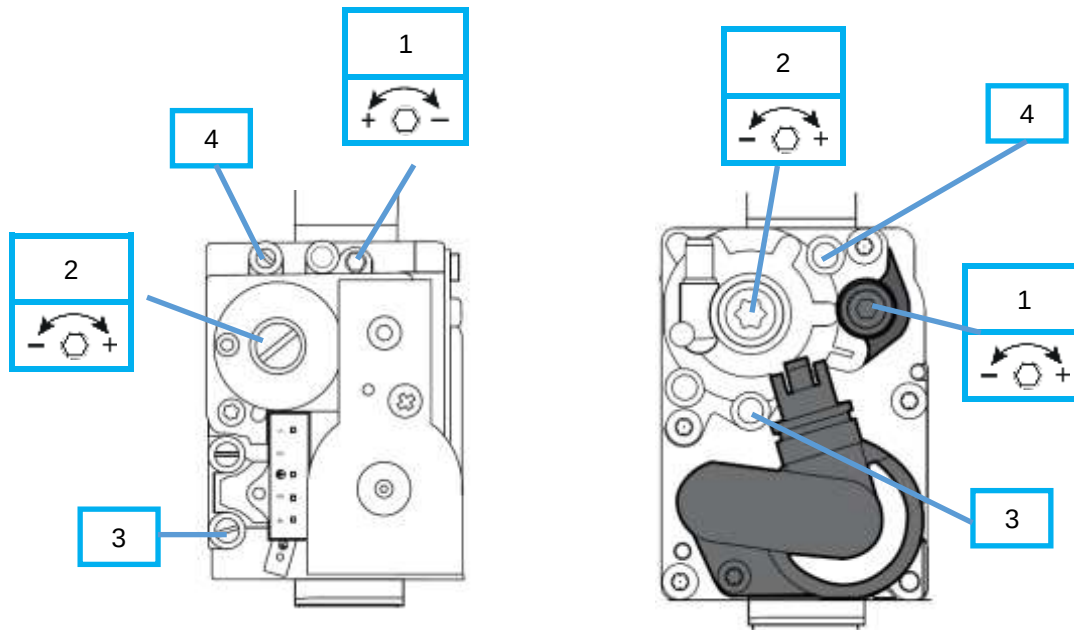
5.6 GAS VALVE

The gas valve can be:

- **SIT 848 SIGMA;**
- **HONEYWELL VK8205**

The valve fitted with two operators supplied at 230 VCA that consent or cut off the gas supply to the main burner. The speed of the ventilator regulates the outgoing gas pressure of the valve according to the readings detected by the electronic P.C.B. via the temperature probes.

The maximum inlet pressure is 60mbar.



LEGENDA	
1	Max power screw setting
2	Min power screw setting
3	Inlet gas pressure intake
4	Outlet gas pressure intake
	• Clockwise to increase CO2 level • Anti-clockwise to decrease the CO2
	• Clockwise to decrease CO2 level • Anti-clockwise to increase the CO2

Inlet pressure check

Force the boiler to the maximum power through the “Flue cleaner function”.
Through the pressure intake “3” check that the pressure is higher than:

MINIMUM INLET PRESSURE	
NATURAL GAS G 20	17mbar
LPG G31	30mbar

CO₂ adjustment - maximum power (gas/air)

It must be made during the “flue cleaner function”.

To set the screw, use only one hexagonal key CH 2,5 (⌀ x ↑).

ATTENTION: CO₂ at max power must be higher than 0,5 than the CO₂ level at min power (Ex.: CO₂ max power = 9,2%, CO₂ min power ≤ 8,9%).

CO₂ adjustment - minimum power (zero)

It must be made during the “flue cleaner function”.

To set the screw, remove the cap, and use only one hexagonal key CH 4 (⌀ x ↑).

CO₂ table

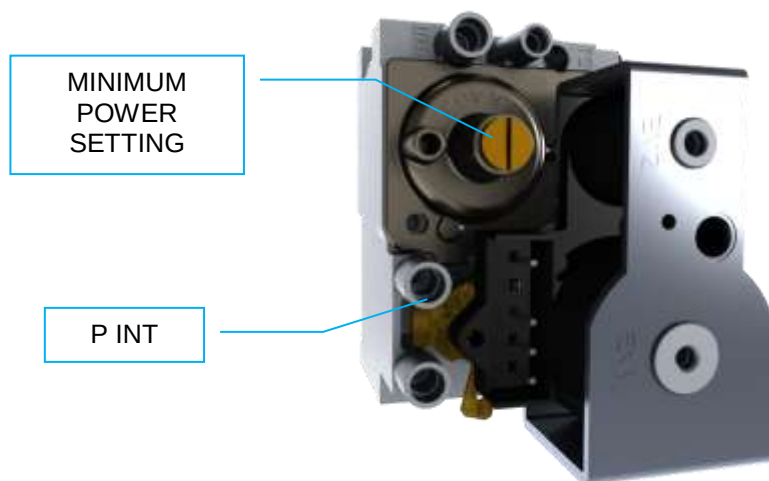
	CARES S 24 / INOA S 24 CARES S 24 SYSTEM CARES S 30 / INOA S 29	
Gas	CO ₂ (%) MAX	CO ₂ (%) MIN
G20	8,9% ÷ 9,9%	8,4% ÷ 9,4%
G25	8,9% ÷ 9,9%	8,4% ÷ 9,4%
G25.1	9,5% ÷ 10,5%	
G2.350	8,9% ÷ 9,9%	8,4% ÷ 9,4%
G27	8,9% ÷ 9,9%	8,4% ÷ 9,4%
G230	9,5% ÷ 10,5%	
G31	9,5% ÷ 10,5%	
ATTENTION! CO ₂ max – CO ₂ min > 0,5%		

After the check of the minimum power, if need to modify the setting, it is mandatory to check again the CO₂ at maximum power.

FOR GAS SIT GAS VALVE:

If there are difficulties to set the CO₂ at the minimum power, follow the procedure below:

- Connect the monometer at the gas valve pressure intake “P INT”;
- Force the boiler at the maximum power (through the chimney function);
- Through the minimum screw set the pressure to have the pressure near 0mbar;
- Force the boiler at the minimum power (through the chimney function);
- Set the CO₂ (see above).

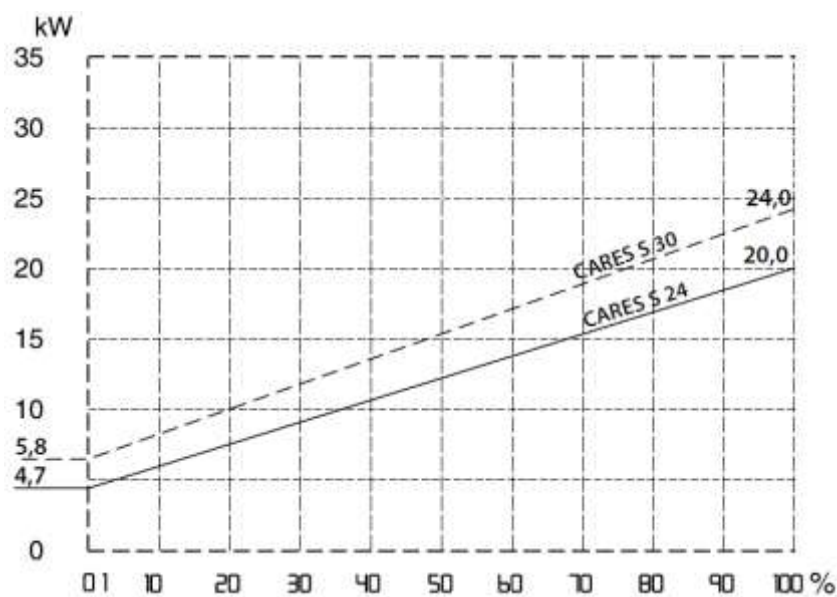


5.6.1 The soft ignition power checking and setting

To check and to set the soft ignition, it is possible in the parameter [2 20](#).
For the factory setting see the gas table.

5.6.2 Maximum heating power setting

To adapt the power to the real needs of the heating system there is the possibility to set the max heating power (adjustable between the minimum and maximum power) through the parameter [2 31](#).



5.6.3 Gas table

		parameter	CARES S 24 / INOA S 24						
			G20	G25	G25.1	G2.350	G27	G230	G31
Lower Wobbe index (15°C, 1013 mbar) (MJ/m ³)			45,67	37,38	35,25	29,67	35,17	38,9	70,69
Inlet Gas pressure -mbar			20	25	25	13	20	20	37
Slow ignition		220	57						
Maximum C. H.power Adjustable (%)		231	61						
Minimum power (%)		233	5						
Max CH power (%)		234	61						
Max DHW power (%)		232	73						
Gas diaphragm (Ø) mm			5,8 (*)	NO					4,0
Air / gas mixer replacement			NO	YES					NO
Gas flow max/min (15°C, 1013 mbar) (nat - m ³ /h) GPL - kg/h)	max D.H.W		2,49	2,89	2,89	3,45	3,03	1,93	1,83
	max C.H		2,12	2,46	2,46	2,94	5,28	1,64	1,55
	min		0,50	0,58	0,58	0,69	0,61	0,39	0,37
		parameter	CARES S 30 / INOA S 29						
			G20	G25	G25.1	G2.350	G27	G230	G31
Lower Wobbe index (15°C, 1013 mbar) (MJ/m ³)			45,67	37,38	35,25	29,67	35,17	38,9	70,69
Inlet Gas pressure - mbar			20	25	25	13	20	20	37
Slow ignition		220	59						
Maximum C. H.power Adjustable (%)		231	60						
Minimum power (%)		233	6						
Max CH power (%)		234	66						
Max DHW power (%)		232	78						
Gas diaphragm (Ø) mm			6,5 (*)	NO					4,3
Air / gas mixer replacement			NO	YES					NO
Gas flow max/min (15°C, 1013 mbar) (nat - m ³ /h) GPL - kg/h)	max D.H.W		3,07	3,57	3,56	4,26	3,74	2,38	2,25
	max C.H		2,54	2,95	2,95	3,53	3,10	1,97	1,86
	min		0,61	0,71	0,71	0,85	0,75	0,48	0,45
		parameter	CARES S 24 SYSTEM						
			G20	G25	G25.1	G2.350	G27	G230	G31
Lower Wobbe index (15°C, 1013 mbar) (MJ/m ³)			45,67	37,38	35,25	29,67	35,17	38,9	70,69
Inlet Gas pressure -mbar			20	25	25	13	20	20	37
Slow ignition		220	57						
Maximum C. H.power Adjustable (%)		231	61						
Minimum power (%)		233	5						
Max CH power (%)		234	61						
Max DHW power (%)		232	73						
Gas diaphragm (Ø) mm			5,8 (*)	NO					4,0
Air / gas mixer replacement			NO	YES					NO
Gas flow max/min (15°C, 1013 mbar) (nat - m ³ /h) GPL - kg/h)	max D.H.W		2,49	2,89	2,89	3,45	3,03	1,93	1,83
	max C.H		2,12	2,46	2,46	2,94	5,28	1,64	1,55
	min		0,50	0,58	0,58	0,69	0,61	0,39	0,37

*: Integrated in the mixer

5.7 GAS CHANGE

For gas G20 the diaphragm is integrated in the mixer.

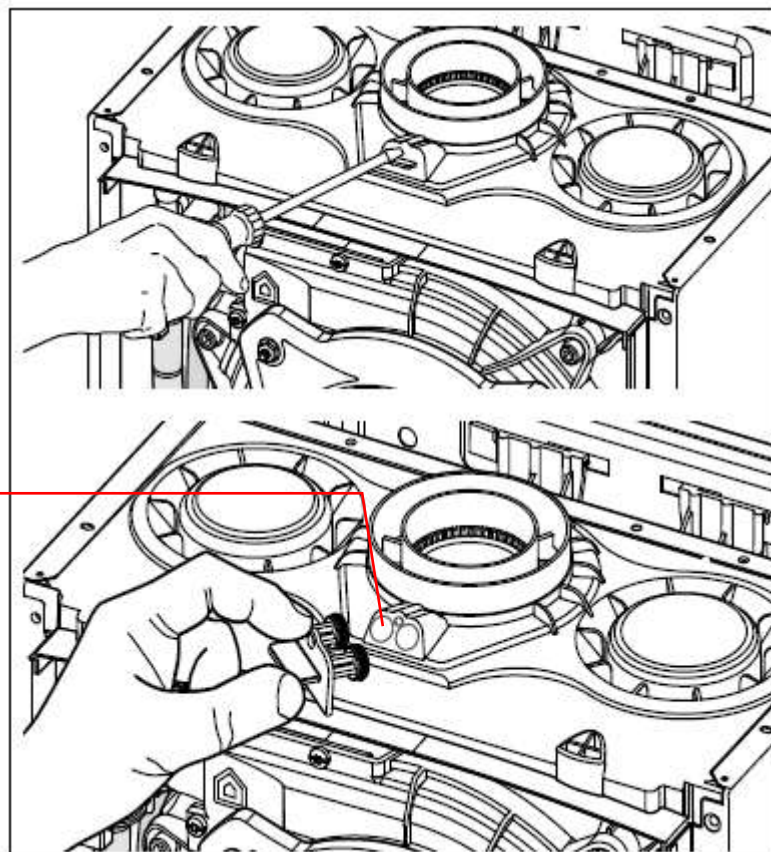
For G31 it needs to add a diaphragm (see table below), that is available in the dedicated kit.

For other gas types needs replace the mixer.

Gas	24kW (ø mm)	29/30kW (ø mm)
G20 (integrated)	5,8	6,5
G25 / G25.1	NO	NO
G2.350	NO	NO
G27	NO	NO
G230	NO	NO
G31	4,0	4,3

5.8 THE FUME DISCHARGE SYSTEM

On the external part of the boiler there is a fume discharge collector with two intakes used to detect the temperature of the combustion gas and of the fresh air inlet, concentrations of O₂, CO₂, etc.

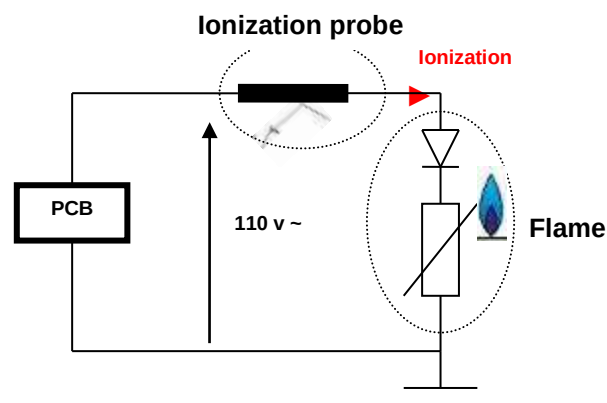
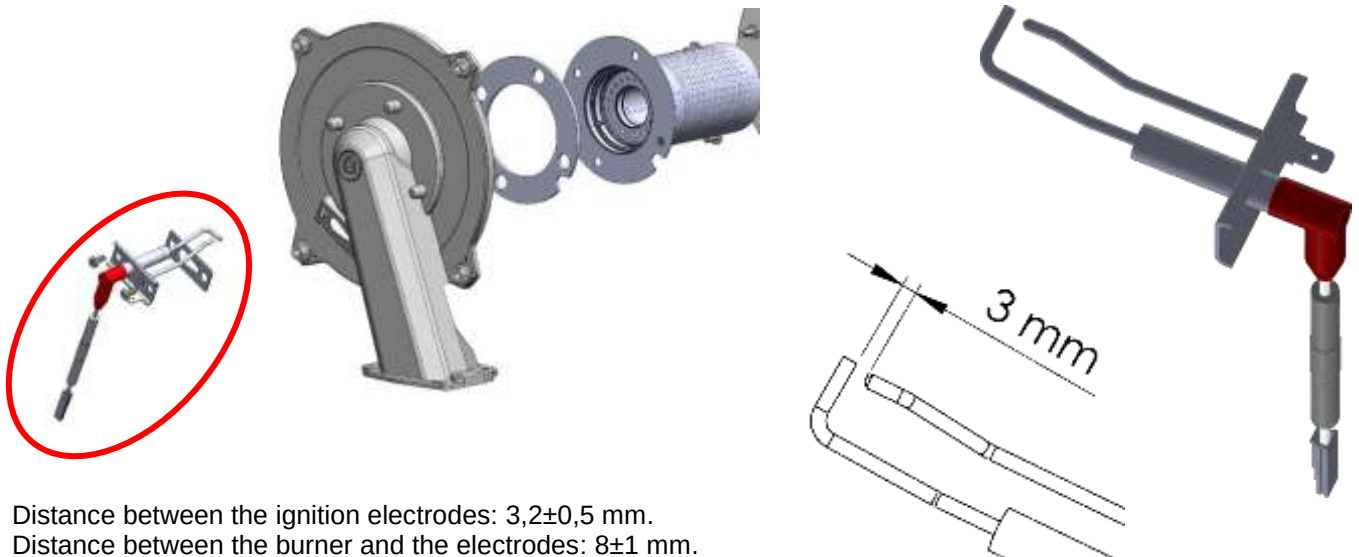


COMBUSTION
ANALYSIS INTAKE

5.9 IGNITION AND DETECTION ELECTRODE

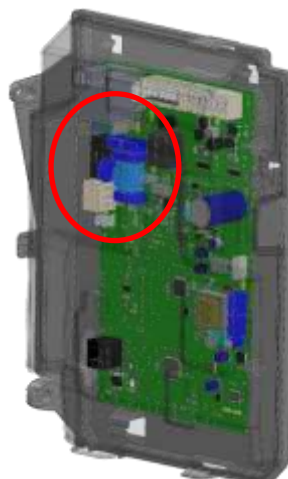
There is only one electrode that produces ignition and detects the presence of the flame in the burner if the ionization current is more than $1 \mu\text{A}$. If the signal disappears, three attempts are made to try to ignite the burner.

IONIZATION CURRENT MORE THAN $1 \mu\text{A}$



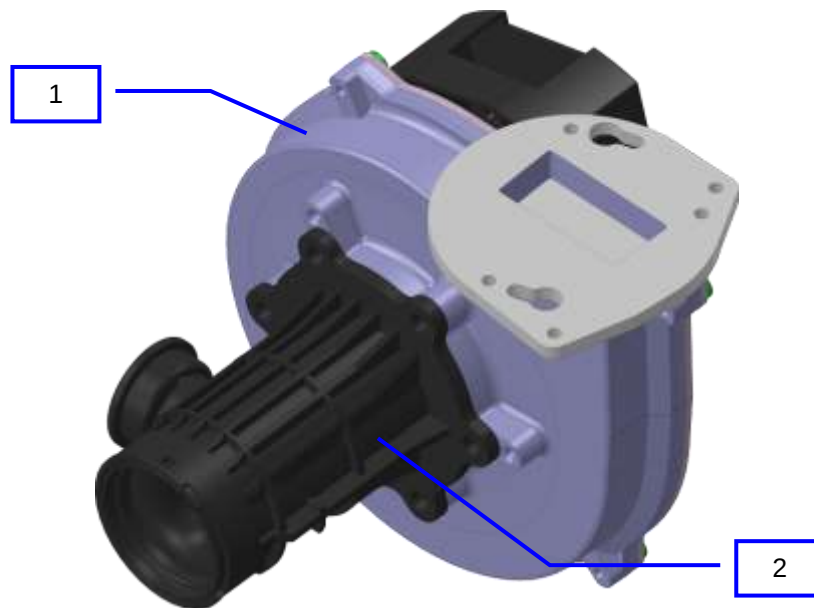
5.10 SPARK GENERATOR

Integrated in main PCB
Inlet power supply: 230 V



5.11 FAN

The fan has the dual purpose of expelling the fumes produced by the combustion and ensuring a consistent flow of excess air throughout the entire modulation range, from the maximum to the minimum heat output. As soon as heat is requested the ventilator is piloted by the electronic card if required on ignition speed. The tachymeter of the ventilator detects the right speed the gas valve is supplied. When the flame is detected by the detecting electrode the ventilator is free to modulate according to the thermal load requested by the boiler. The burner power is directly proportional to the speed of the ventilator. The HALL sensor, to detect the fan speed, is integrated inside the motor.



CAPTION	
1	Fan
2	Mixer

Fan and Mixer		
Power	Fan	Mixer diameter
24 KW	FIME PX 118 006 03 - 365Vdc EBM NRG 118/0800-3612 - 365Vdc	Ø 17,5 mm
29/30 kW	FIME PX 118 006 03 - 365Vdc	Ø 21 mm

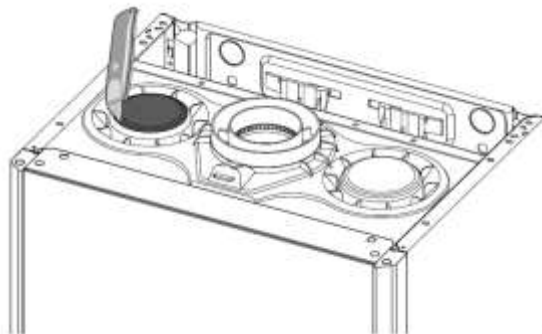
Combustion chamber clean-up routine:

Each 6 hours after the last fan activation there is a 60 seconds of ventilation at 1500Rpm.

It is possible to exclude this function setting the parameter 2.1.5 at 1 (factory setting 0, function enabled). This function is to clean the combustion chamber and to improve burner ignitions.

5.12 EXHAUST SYSTEMS

The boiler is set up for connection to a 60/100 coaxial air intake and flue gas exhaust ducting system. To use split types of suction and exhaust, one of the two air intakes must be used. Remove the top of the air intake by cutting it with a suitable knife.



Tipologia di scarico fumi		Lunghezza massima tubi aspirazione/scarico (m)		Diametro condotti (mm)
		CARES S / SYSTEM		
		24	30	
Sistemi Coassiali	C13	10	5	ø 60/100
	C33			
	C43			
	B33	10	5	ø 80/125
	C13	25	14	
	C33			
C43	25	14		
Sistemi Sdoppiati		S1 = S2		ø 80/80
	C13	37/37	23/23	
	C33	44/44	28/28	
	C43	37/37	23/23	
	C13	7/7	4/4	ø 60/60 (*)
	C33	8/8	4/4	
	C43	7/7	4/4	
		S1 + S2		
	C53	74	46	ø 80/80
	C83	14	8	ø 60/60 (*)
	B23	74	46	ø 80

S1: Air inlet - S2: Exhaust outlet

For configuration type C10 and C11 refer to the instruction manual.

CARES S / SYSTEM 24				
RPM	Parametro 232	Max length		
		Ø 60/60 S1-S2	Ø 60/60 S1+S2	ΔP 1-2
5015	73	6/6	12	0,68
	Factory setting			
5290	78	17/17	34	1,57

CARES S 30				
RPM	Parametro 232	Max length		
		Ø 60/60 S1-S2	Ø 60/60 S1+S2	ΔP 1-2
5290	78	4/4	8	0,70
	Factory setting			
5510	82	10/10	20	1,50

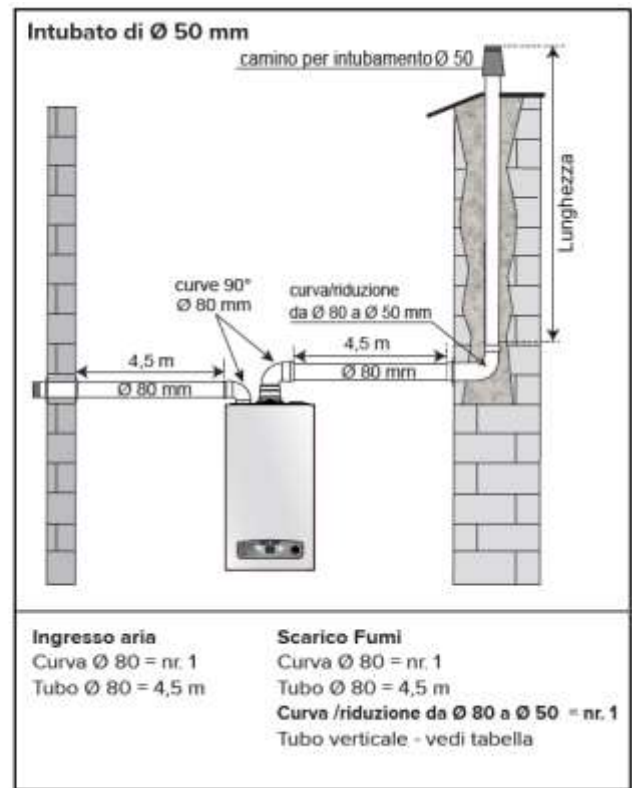
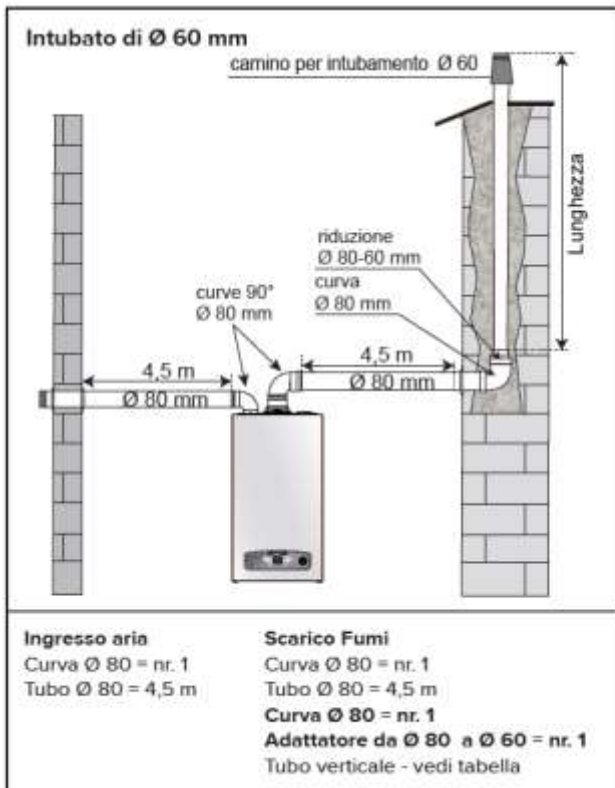
(*) Twin pipe system ø60/60:

In case needs longer lengths is possible increase the fan speed to compensate the loses (see table), to guarantee the nominal power declared.

In case of pressure higher than 200Pa is mandatory to use H1 pipes.

5.12.1 PIPE IN PIPE SPLIT DUCTS Ø50 or 60mm (only for Italy)

It is possible connect the boiler with pipe in pipe with diameter 50 and 60 mm. The base configuration allowed is indicated in the picture below.



In the table below are indicated the maximum lengths allowed.

Modello	RPM (giri ventilatore)	Parametro 232 (impostazione di fabbrica)	Lunghezza massima tratto verticale intubato (m)	
			60	50
CARES S 24 / INOA S 24	5015	73	13	4
CARES S SYSTEM 24	5015	73	13	4
CARES S 30 / INOA S 29	5290	78	8	3

If longer lengths are required, it is possible increase fan speed (RPM) to compensate for leaks of load, always guaranteeing the thermal capacity of the boiler indicated in the Character Plate.

CARES S 24 / CARES S 24 SYSTEM / INOA S 24				
RPM	Parametro 232	Lunghezza massima tratto verticale intubato (m)		
		60	50	ΔP_{1-2}
5290	78	33	9	1,57
5565	83		15	2,50 (*)
5840	88		21	3,55 (*)
6115	93		27	4,50 (*)

CARES S 30 / INOA S 29				
RPM	Parametro 232	Lunghezza massima tratto verticale intubato (m)		
		60	50	ΔP_{1-2}
5510	82	20	6	1,50
5730	86	32	10	2,30 (*)
5950	90		13	3,00 (*)
6170	94		18	3,90 (*)
6280	96		19	4,30 (*)
6390	98		22	4,80 (*)
6500	100		25	5,10 (*)

(*) It need to use H1 pipes.

ATTENTION:

- If the pressure inside the pipes are higher than 200 Pa it is mandatory use H1 class pipes.
- Do not modify the parameters of maximum and minimum heating power.
- It is mandatory respect the pipes configuration indicated in the previous page.
- If the pipes utilized are not Ariston, it is mandatory check the ΔP to calculate the maximum lengths.

6 ELECTRIC AND ELECTRONIC SYSTEM

6.1 MAIN CARD

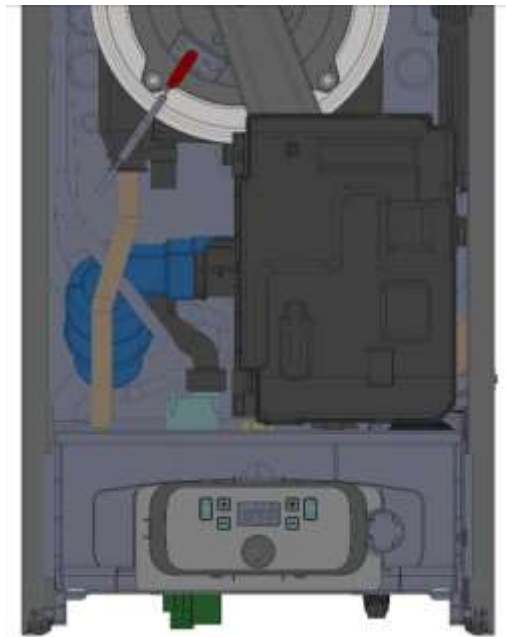
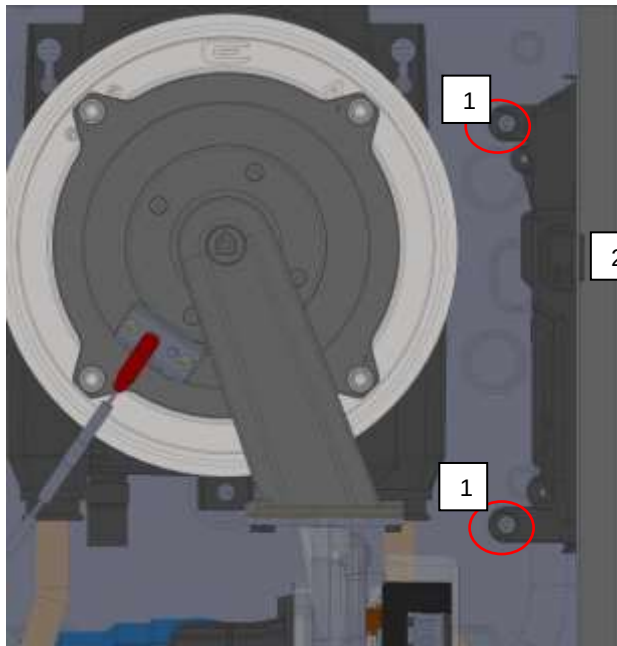
The P.C.B. controls the functions and safety systems of the boiler including the display-functions.

It is protected by 1 fuse at 2A 230 Vac.

Electrical power supply: 230 Vac +10% -15%.

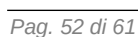
To access to the PCB, proceed as follows:

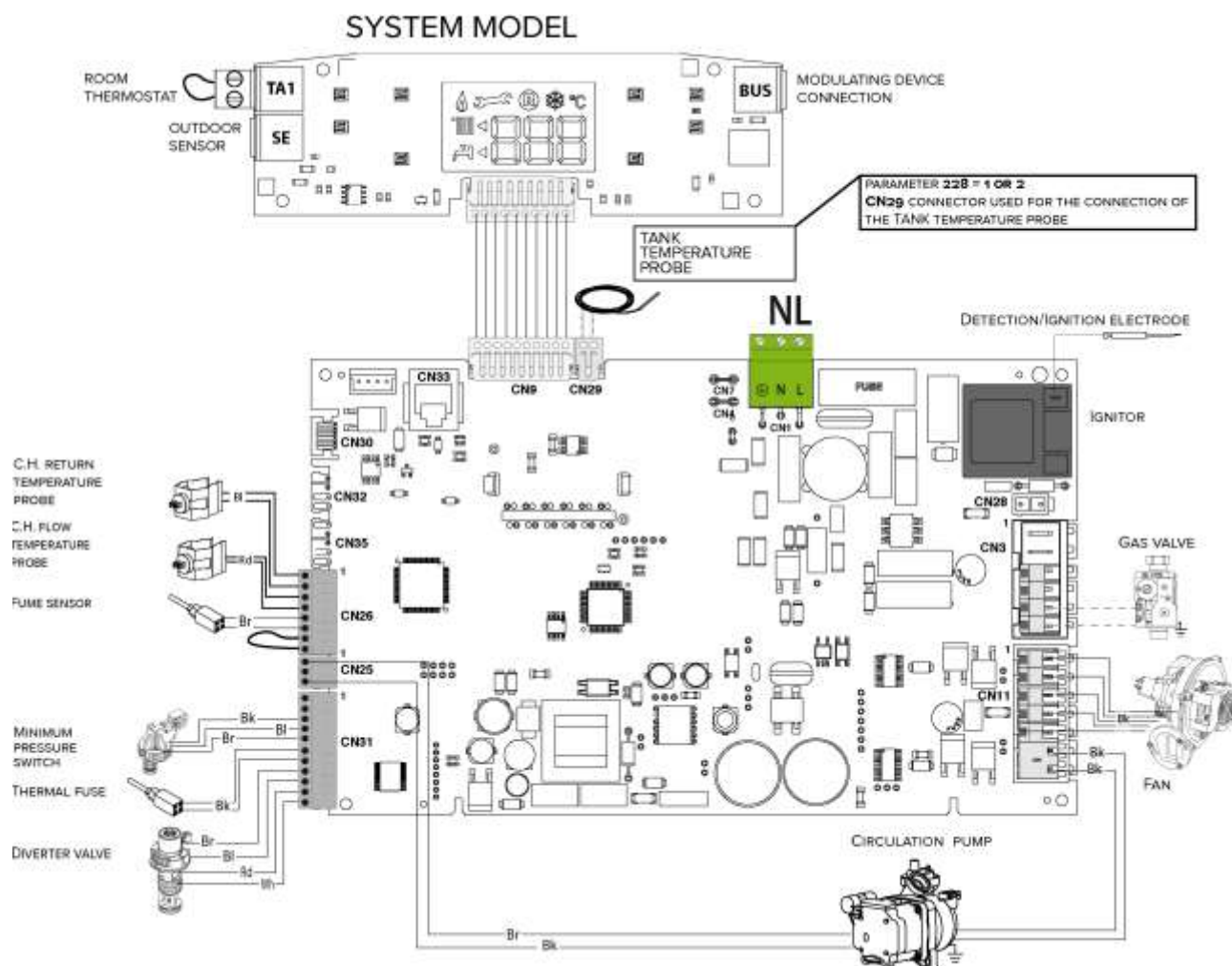
- Unscrew the 2 screws (1) and drop the clip (2)
- Extract control box
- Fix the control box in front of you through dedicated fixing point in the burner door (fan flange).





COMBI MODELS



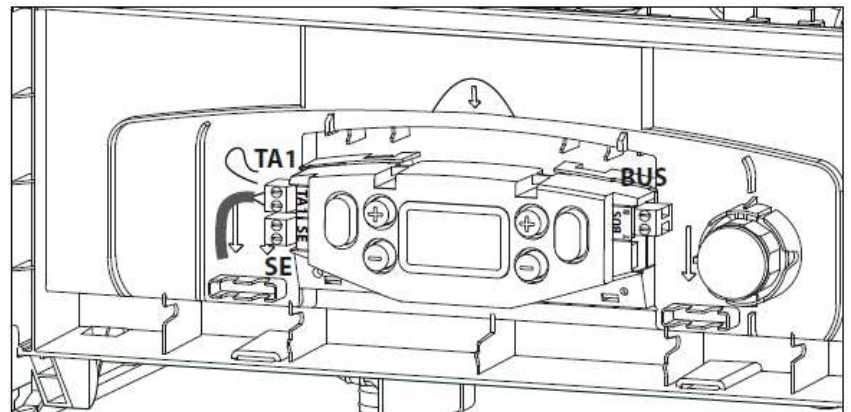
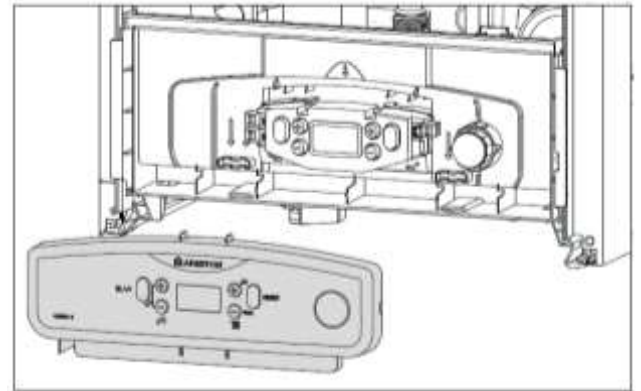
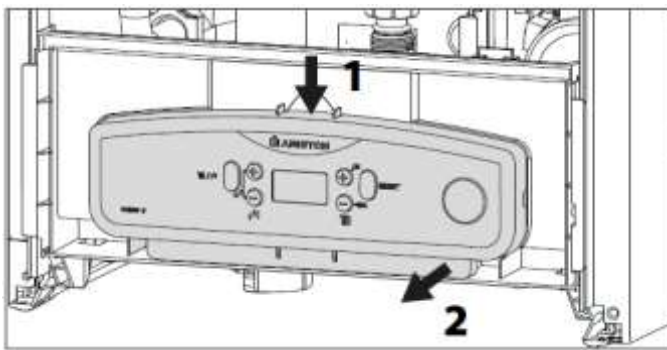


6.2 PERIPHERALS CONNECTION

It is possible to connect the peripherals below:

- **TA1:** Room thermostat;
- **BUS:** All Bus Bridgenet devices:
 - Sensys/Expert control
 - Room sensor
 - Crono-thermostat Bus
 - Hydraulic modules (MGM/MGZ) *
 - Zone manager *
 - Multifunctional kit *
 - Solar manager *
 - FWS *
- **SE:** Outdoor sensor;
- **CN29:** Par.228=0 (combi) → Inlet solar sensor;
- **CN29:** Par.228=1 or 2 (system or tank) → Tank sensor (supplied with the boiler in system version) or tank thermostat.

*: only with Sensys/Expert control



Termostato ambiente
Room thermostat



Termostato a pavimento
Underfloor heating thermostat



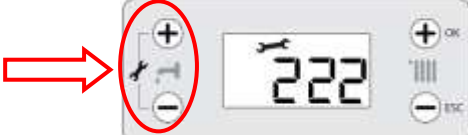
BUS

6.3 MENU

To set-adjust and visualize the parameters that regulate the operating logic, the CARES PREMIUM version boiler has different parameters all inside one menu.

6.3.1 How to access to the “PARAMETERS”

To access to the PARAMETERS follow the instructions below:

Push at the same time for 5 seconds the “+” and “-” buttons located in the left side.	
The display shows “222” and 	
With the “+” or “-” buttons located in the left side set the access code “234” and push the “OK” button	
The display shows the first parameter available: 220.	
With the “+” or “-” buttons located in the left side it is possible to select the desired parameter.	
To go inside the parameter push the “OK” button.	
To modify the parameter push the “+” or “-” buttons located in the left side.	
To save the new setting push the “OK” button or the “ESC” button to exit without save.	
To exit push the “ESC” button till came back in the standard visualization.	

6.3.2 Description of the parameters

Par.	Operation	Regulating range	Default value
201	DHW Pre-heating	0: off 1: on	1
214	Boiler circulation type	0: standard 1: high efficiency	1
215	Combustion chamber clean-up routine	0: enabled 1: disabled	0
220	Soft ignition as % of the maximum heating power	0 ÷ 99	See gas table
224	Thermoregulation	0: off 1: on	0
228	Boiler version	0: combi 1: Storage with NTC (tank) 2: only heating or storage with thermostat	Depend on boiler version
231	Maximum heating power (heating absolute maximum power percentage) (%)	0 ÷ 99	60
232	Max sanitary power	0 ÷ 99	See gas table
233	Min power	0 ÷ 99	See gas table
234	Absolute maximum heating power	0 ÷ 99	See gas table
236	Heating delay (min)	0 ÷ 7	3
243	Heating post-ventilation	0: 5 sec 1: 3 min	0
245	Max PWM Pump (%)	75 ÷ 100	100
246	Min PWM Pump (%)	40 ÷ par 245	40
247	Heating water pressure detection device	0: temperature probes only 1: pressure switch 2: pressure sensor	1
250	Comfort function	0: Disabled 1: Time based (30min) 2: Always active	0
252	Sanitary delay start (anti water hammering)	5 ÷ 200	5
253	Sanitary switch off logic	0: anti-scale (62 o 65°C). 1: set-point+4°C	0
254	Sanitary post-circulation and post-ventilation	0: Post-ventilation: Tflow<75°C = no post-ventilation; Tflow>75°C = 3 min (minimum speed); Post-circulation: 30sec 1: Post-ventilation: 3min Post-circulation: 3min	0
257	Anti-legionella function (only for boilers with external tank and NTC sensor – par. 228 = 1)	0: Off 1: On	1

258	Anti-legionella time (only for boilers with external tank and NTC sensor – par. 228 = 1). The setting temperature is always 60°C (tank temperature).	24 ÷ 720 h	720 h
270	Flue cleaning function	0: Off 1: On (select desired power)	0
271	Air Purge function	0: Off 1: On	0
293	Exhaust sensor type	0: Not present 1: Proportional 2: On/Off	1
420	Select high or low temperature for zone 1	0: low temperature 1: high temperature	1
421	Enabled thermoregulation by the sensors (only with par.224=1)	0: fixed delivery temperature (set the temperature through the heating temperature button "+" and "-" on the user interface) 1: basic thermoregulation 3: only outside probe	1
422	Select thermoregulation curve (only with par.224=1)	0_2 ÷ 3_5	0_5 (par 420=0) 1_5 (par 420=1)
423	Select thermoregulation curve parallel shifting (°C) (only with par.224=1)	-14 ÷ 14 (par 420=1 - HT) -7 ÷ 7 (par 420=0 - LT) Every step is equivalent to 1°C. Without goes inside this parameter is possible change the curve through the button "+" and "-" on the left the display between -7 and +7 (every step is 2°C for HT and 1°C for LT).	0
425	Zone 1 maximum heating temperature (°C)	35 ÷ 82 (par 420=1 - HT) 20 ÷ 45 (par 420=0 - LT)	82 45
426	Zone 1 minimum heating temperature (°C)	35 ÷ 82 (par 420=1 - HT) 20 ÷ 45 (par 420=0 - LT)	40 25
821	Fan state	0: Off ; 1: On (only visualization)	/
822	Fan speed	Fan speed X 100 (only visualization)	/
823	Pump speed	0: Low speed 1: High speed 2: Modulating	/
824	3-way valve position	0= sanitary; 1= heating (only visualization)	/
827	Pump Modulation (%)	(only visualization)	/
831	Temperature measured on heating delivery (°C)	(only visualization)	/
832	Heating return measured temperature (°C)	(only visualization)	/
834	Exhaust temperature (°C)	(only visualization)	/
842	DHW Inlet T	(only visualization)	/
874	Boiler Flow-switch	0: No flow rate (open) 1: Flow rate (closed)	/
876	SAFETY Flame sensor	0: no flame 1: flame	/

6.4 BOILER PROTECTION SYSTEMS

There are two types of errors for malfunctions:

- Shutdown (solved by resetting);
- Safety stop (No Reset: the boiler will start working again properly when the cause is removed).

There is a third type of error code that is used to indicate a malfunction that does not stop the boiler which continues to work properly (Indication).

The Shutdown and the Safety stop are alternatively signalled with the respective error code and the writing "Err."



6.4.1 Error codes

The error codes are divided in six different functional units, in other words the first figure indicates which functional unit of the boiler is involved in the error:

- 1 - Primary circuit;
- 3 - Electronic card;
- 5 - Ignition and detection;
- 6 - Air inlet / Smoke outlet.

Display	Description	Reset
PRIMARY CIRCUIT		
1 01	Overheat or Exhaust thermo-fuse open (T exhaust > 133°C)	Reset
1 03	Circulation or presence of water: Gradient Tman > 7°C/sec for 3 times	Reset
1 04	Circulation or presence of water: Gradient Tman > 20°C/sec or Gradient Trit > 20°C/sec	Reset
1 05	Circulation or presence of water: Tman – Trit > 55°C for 3 times	Reset
1 06	Circulation or presence of water: Trit > Tman + 10°C for 3 times	Reset
1 07	Circulation or presence of water: Trit > Tman + 30°C	Reset
1 08	Low heating pressure	No Reset
1 10	Heating delivery probe open or short circuit (NTC1)	No Reset
1 12	Heating return probe open or short circuit (NTC2)	No Reset
1 14	Outdoor probe open circuit or no signal	No Reset
1 P1	Circulation or presence of water: Gradient Tman > 7°C/sec	Signalling
1 P2	Circulation or presence of water: Tman – Trit > 55°C	Signalling
1 P3	Circulation or presence of water: Trit > Tman + 10°C	Signalling

<i>ELECTRONIC CARD</i>		
3 01	Eeprom display error	No Reset
3 02	GP – GIU communication error	No Reset
3 03	PCB internal error	No Reset
3 04	More than 5 resets executed in 15 minutes	No Reset
3 05	PCB internal error	Reset
3 06	PCB card internal error	Reset
3 07	PCB card internal error	Reset
3 09	Gas Relais check Failed	Reset
<i>IGNITION AND DETECTION</i>		
5 01	Flame missing	Reset
5 02	Flame detected with gas valve closed	No Reset
5 04	In lockout after 3 flame lifts	Reset
5 P1	First ignition attempt failed	Signalling
5 P2	Second ignition attempt failed	Signalling
5 P3	Flame detachment during operation	Signalling
<i>AIR INLET / FUME OUTLET</i>		
6 02	High exhaust temperature (T exhaust > 96°C)	Reset
6 05	Exhaust sensor open or short circuit	No Reset
6 12	Fan turns too slow or wire not connected	Reset

7 TECHNICAL DATA TABLE

GENERAL NOTE	Model:		CARES S / INOA S		
			24	30 / 29	24 System
	CE Certification (pin)		0085CU0394		
	Boiler type		C13(X)-C23-C33(X)-C43(X)-C53(X)-C63(X)-C83(X)-C93(X) B23-B23P-B33		
POWER SPECIFICATIONS	Max/min nominal calorific flow rate (Hi) Qn	kW	20,0 / 4,7	24,0 / 5,8	20,0 / 4,7
	Max/min nominal calorific flow rate (Hs) Qn	kW	22,2 / 5,2	26,7 / 6,4	22,2 / 5,2
	Domestic hot water max/min nominal calorific flow rate (Hi) Qn	kW	23,5 / 4,7	29,0 / 5,8	23,5 / 4,7
	Domestic hot water max/min nominal calorific flow rate (Hs) Qn	kW	26,1 / 5,2	32,2 / 6,4	26,1 / 5,2
	Max/min power output (80°C-60°C) Pn	kW	19,6 / 4,6	23,6 / 5,7	19,6 / 4,6
	Max/min power output (50°C-30°C) Pn	kW	21,0 / 4,9	25,6 / 6,1	21,0 / 4,9
	Domestic hot water max/min power output Pn	kW	23,0 / 4,6	28,5 / 5,7	23,0 / 4,6
	Combustion efficiency (of flue gas)	%	98,4	98,4	98,4
	Nominal calorific flow rate efficiency (60/80°C) (Hi)	%	98,0 / 88,2	98,2 / 88,5	98,0 / 88,2
	Nominal calorific flow rate efficiency (30/50°C) (Hi)	%	105,0 / 94,6	106,5 / 95,9	105,0 / 94,6
	Efficiency at 30% at 30°C	%	108,5 / 97,7	108,6 / 97,8	108,5 / 97,7
	Minimum calorific flow rate efficiency (60/80°C) (Hi)	%	97,1 / 87,4	97,6 / 87,8	97,1 / 87,4
	Efficiency rating (dir. 92/42/EEC)	stars	★★★★		
	Sedbuk class		A / 90,2	A / 90,4	A / 90,2
	Loss of burner gas when operating	%	1,6	1,6	1,6
EMISSIONS	Available air pressure	Pa	100	100	100
	NoX class	class	6		
	Flue gas temperature (G20) (80°C-60°C)	°C	54	53	54
	CO2 content (G20) (80°C-60°C) max / min	%	9,4 / 8,9		
	CO content (0%O2) (80°C-60°C)	ppm	178	181	178
	O2 content (G20) (80°C-60°C)	%	3,7	3,7	3,7
	Maximum flue gas flow (G20) (80°C-60°C)	kg/h	37,0	45,7	37,0
	Excess air (80°C-60°C)	%	21	21	21
HEATING CIRCUIT	Expansion chamber inflation pressure	bar	1		
	Maximum heating pressure	bar	3		
	Expansion chamber capacity	l	8		
	Min/max heating temperature (high temperature range)	°C	35 / 82		
	Min/max heating temperature (low temperature range)	°C	20 / 45		
DOMESTIC HOT WATER CIRCUIT	Domestic hot water min/max temperature	°C	36 / 60		40 / 60
	Specific flow rate of domestic hot water (ΔT=30°C)	l/min	11,0	13,3	
	Quantity of hot water ΔT=25°C	l/min	13,2	16,0	
	Quantity of hot water ΔT=35°C	l/min	9,4	11,4	
	Hot water comfort rating (EN13203)	stars	★★★		
	Hot water minimum flow rate	l/min	2,0	2,0	2,0
	Domestic hot water max/min pressure	bar	7 / 0,2		
ELECTRICAL	Power supply frequency/voltage	V/Hz	230 / 50		
	Total electrical power absorbed	W	62	65	62
	Pump energy efficiency index		> 0,23		
	Minimum ambient temperature for use	°C	+5		
	Protection level for the electrical appliance	IP	X5D		
	Weight	kg	24	25	24

Model: CLAS ONE		CARES S / INOA S		
		24	30 / 29	24 SYSTEM
Condensing boiler	yes/no	yes	yes	yes
Low-temperature boiler:	yes/no	no	no	no
B1 boiler	yes/no	no	no	no
Cogeneration space heater	yes/no	no	no	no
Combination heater	yes/no	yes	yes	no
Contact details (Name and address of the manufacturer or its authorised representative)	ARISTON THERMO S.p.A. Viale A. Merloni 45 60044 FABRIANO AN - ITALIA			
ErP HEATING				
Power output P_n	kW	20	24	20
Useful heat output at rated heat output and high-temperature regime P_4	kW	19,5	23,7	19,5
Useful heat output at 30 % of rated heat output and low-temperature regime (Return temperature 30°C) P_l	kW	6,0	7,2	6,0
Seasonal space heating energy efficiency η_s	%	93	93	93
Useful efficiency at rated heat output and high-temperature regime (60-80°C) η_4	%	88,2	88,5	88,2
Useful efficiency at 30 % of rated heat output and low-temperature regime (Return temperature 30°C) η_l	%	97,7	97,8	97,7
ErP D.H.W.				
Declared load profile		XL	XL	
Water heating energy efficiency η_{wh}	%	84	83	
Daily electricity consumption Q_{elec}	kWh	0,171	0,178	
Daily fuel consumption Q_{fuel}	kWh	23,161	23,751	
AUXILIARY ELECTRICITY CONSUMPTION				
At full load e_{lmax}	kW	0,024	0,030	0,024
At part load e_{lmin}	kW	0,013	0,015	0,013
In standby mode P_{SB}	kW	0,003	0,004	0,003
OTHER ITEMS				
Standby heat loss P_{stbu}	kW	0,043	0,045	0,043
Ignition burner power consumption P_{ign}	kW	0,000	0,000	0,000
Sound power level, indoors L_{WA}	dB	50	50	50
Emissions of nitrogen oxides NOx	mg/kWh	33	44	33