



DIDACTIC MANUAL

FAMILY: Wall-hung boilers

GROUP: Instantaneous type and forced draught heating only

MODELS: *Itaca*

VERSIONS: For indoor and outdoor installation

PART NO.: AST 14 C 255/00

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**SECT. 1****TECHNICAL CHARACTERISTICS****1.1 MODELS**

ITACA RTFS 24 - 28
ITACA CTFS 24 - 28 - 32
ITACA CTFS 24 - 28 - 32 for outdoor installation

ABBREVIATION KEY:

R: heating only
C: combi
TFS: forced draught

MAIN CHARACTERISTICS :

- **ITACA RTFS 24 - 28:**
atmospheric boiler for indoor installation, **heating only**, sealed chamber, forced draught, mono-thermal.
- **ITACA CTFS 24 - 28 - 32:**
atmospheric boiler for indoor installation, **combined instantaneous**, with production of domestic hot water + heating, sealed chamber, forced draught, mono-thermal with plate exchanger;
- **ITACA CTFS 24 - 28 - 32 for outdoor installation:**
atmospheric boiler for indoor installation, **combined instantaneous**, with production of domestic hot water + heating, sealed chamber, forced draught, mono-thermal with plate exchanger;

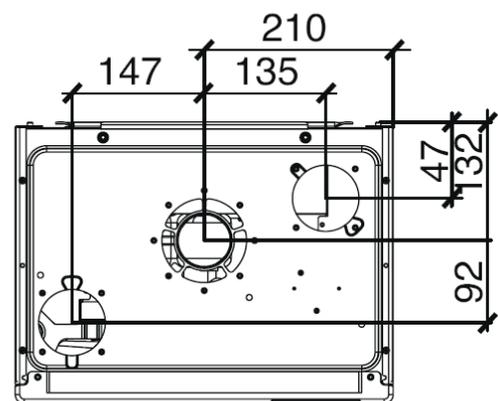
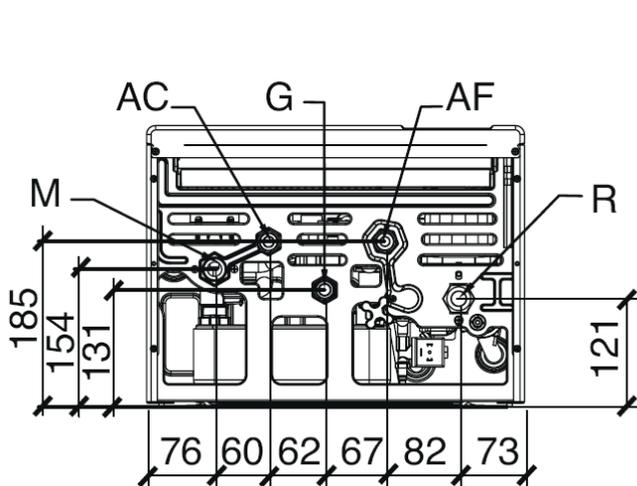
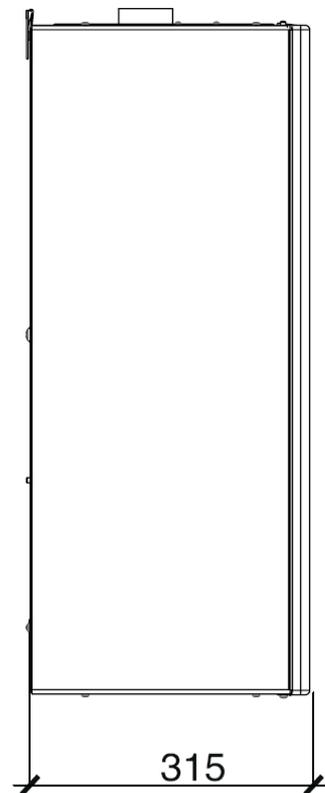
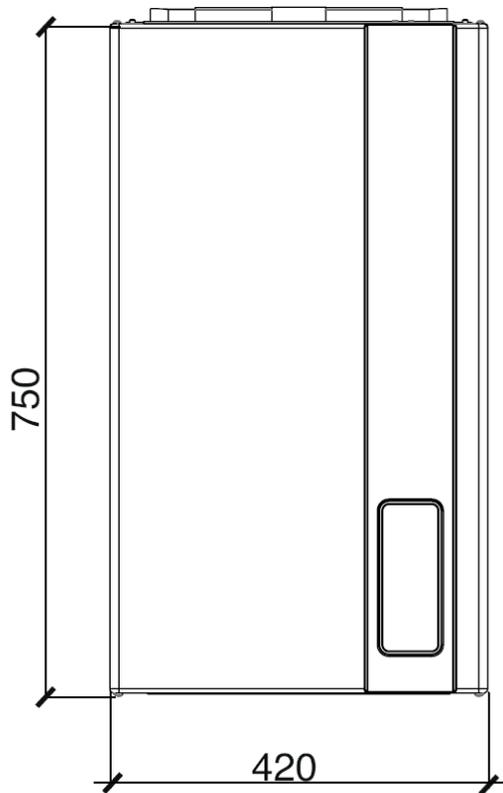
1.2 OVERALL DIMENSIONS

Height H = 750 mm

Width L = 420 mm

Depth D = 315 mm

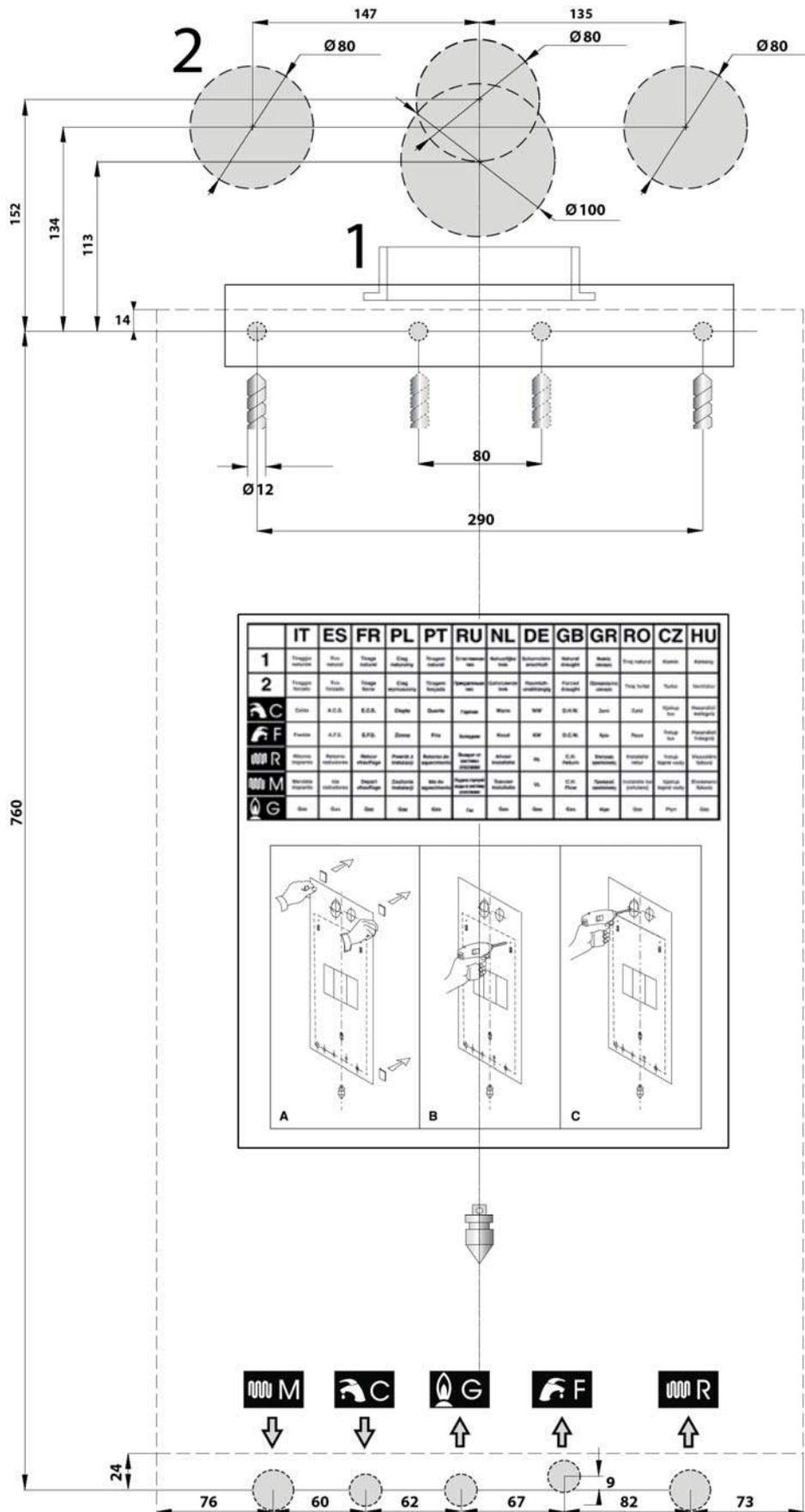


**RTFS and CTFS VERSIONS**

- G** Gas inlet (1/2")
- M** CH system flow (3/4")
- R** CH system return (3/4")
- AF** Cold water inlet (1/2")
- AC** Domestic hot water outlet (1/2") only for CTFS



INSTALLATION TEMPLATE





1.3 TECHNICAL SPECIFICATIONS

General Characteristics

		RTFS		CTFS		
		24 kW	28 kW	24 kW	28 kW	32 kW
Operating parameters						
Equipment category		II2H3+				
Burner nozzles	no.	11	13	11	13	15
CH circuit max. and min. pressure	bar	3 - 0.5				
DHW circuit max. and min. pressure (KC)	bar	-		6 - 0.5		
DHW specific flow rate Δt 30°C	l/min	-		11.6	14.2	15.1
Double flow probe triggering temperature OFF	°C	105				
Double flow probe triggering temperature ON	°C	90				
Standard central heating setting range	°C	35 ÷ 78				
Standard max. operating temperature range	°C	78 + 5				
Reduced central heating setting range	°C	35 ÷ 45				
Reduced max. working temperature range	°C	45 + 2				
Plate DHW setting range	°C	-		35 ÷ 57		
Plate maximum DHW operating temperature	°C	-		57 + 5		
Boiler DHW setting range	°C	35 ÷ 65		-		
Nominal capacity of expansion tank	l	7				
Maximum recommended system capacity (**)	l	150				
Nominal electrical data						
Power supply: Voltage/Frequency	V / Hz	230-50				
Power mains supply fuse	A	2				
Electric cabinet protection degree	IP	X5D				
Max. absorbed power	W	122	134	122	134	134
Electric power in standby condition	W	2.3				
Overall dimensions and connections						
Height	mm	750				
Width	mm	420				
Depth	mm	315				
Gas connection	-	G ½				
Flow and return connection	-	G ¾				
Cold water and hot domestic water connection / boiler	-	G ½				
Net weight	Kg	26	33.5	28	35.5	35.5
Consumptions at maximum flow rate						
Natural gas consumption (*)	m ³ /h	2.72	2.70	2.72	2.70	3.23
Butane gas consumption	kg/h	2.02	2.01	2.02	2.01	2.40
Propane gas consumption (LPG)	kg/h	1.99	1.98	1.99	1.98	2.36
Operating characteristics						
Type of ignition	-				Electronic	
Flame surveillance	-				Ionisation	
Type of detection	-				Non-polarised	

(*) Value related to 15°C - 1013 mbar condition

(**) Maximum water temperature at 83°C, vessel preloaded at 1 bar.

**Design data and chimney sizing****RTFS - CTFS 24**

		<i>P_{max.}</i>	<i>P_{min.}</i>	<i>Load at 30 %</i>
Casing heat loss with burner off	%	0.26		-
Casing heat loss with burner on	%	1.05	0.63	-
Flue system heat loss with burner on	%	5.97	10.37	-
Flue system mass capacity	g/s	15.44	16.38	-
Flue gas temp. – air temp.	°C	95	77	-
Residual head available	Pa	105	105	-
CO ₂ value	%	6.6	2.9	-
Heat output efficiency rating (60/80°C)	%	93.0	89.0	90.2
Heat output efficiency rating (30/50°C)	%	-	-	-
Efficiency rating (according to 92/42/EC)	-	★★★		
Nox emission class	-	2		

RTFS - CTFS 28

		<i>P_{max.}</i>	<i>P_{min.}</i>	<i>Load at 30 %</i>
Casing heat loss with burner off	%	0.2		-
Casing heat loss with burner on	%	0.76	1.01	-
Flue system heat loss with burner on	%	5.54	10.09	-
Flue system mass capacity	g/s	17.29	17.75	-
Flue gas temp. – air temp.	°C	101	87	-
Residual head available	Pa	70	70	-
CO ₂ value	%	7.1	2.9	-
Heat output efficiency rating (60/80°C)	%	93.7	88.9	90.6
Heat output efficiency rating (30/50°C)	%	-	-	-
Efficiency rating (according to 92/42/EC)	-	★★★		
Nox emission class	-	2		

CTFS 32

		<i>P_{max.}</i>	<i>P_{min.}</i>	<i>Load at 30 %</i>
Casing heat loss with burner off	%	0.2		-
Casing heat loss with burner on	%	1.37	1.40	-
Flue system heat loss with burner on	%	5.23	9.20	-
Flue system mass capacity	g/s	17.8	19.7	-
Flue gas temp. – air temp.	°C	105	73	-
Residual head available	Pa	78	78	-
CO ₂ value	%	7.5	3.1	-
Heat output efficiency rating (60/80°C)	%	93.4	89.4	91.0
Heat output efficiency rating (30/50°C)	%	-	-	-
Efficiency rating (according to 92/42/EC)	-	★★★		
Nox emission class	-	2		



Settings

RTFS - CTFS 24

	<i>Heat output</i>	<i>Heat Output MIN-MAX</i>	<i>Supply pressure</i>	<i>Nozzle Diameter</i>	<i>Burner pressure MIN-MAX</i>
	(kW)	(kW)	(mbar)	(mm)	(mbar)
<i>Natural gas G20</i>	25.5	11.1 – 23.7	20	1.35	3.2 – 12.2
<i>butane gas G30</i>	25.5	11.1 – 23.7	29	0.78	7.5 – 28.3
<i>propane gas G31</i>	25.5	11.1 – 23.7	37	0.78	7.6 – 34.2

RTFS - CTFS 28

	<i>Heat output</i>	<i>Heat Output MIN-MAX</i>	<i>Supply pressure</i>	<i>Nozzle Diameter</i>	<i>Burner pressure MIN-MAX</i>
	(kW)	(kW)	(mbar)	(mm)	(mbar)
<i>Natural gas G20</i>	30.5	12.0 – 28.6	20	1.35	2.7 – 12.4
<i>butane gas G30</i>	30.5	12.0 – 28.6	29	0.78	6.0 – 29.3
<i>propane gas G31</i>	30.5	12.0 – 28.6	37	0.78	8.1 – 36.3

CTFS 32

	<i>Heat output</i>	<i>Heat Output MIN-MAX</i>	<i>Supply pressure</i>	<i>Nozzle Diameter</i>	<i>Burner pressure MIN-MAX</i>
	(kW)	(kW)	(mbar)	(mm)	(mbar)
<i>Natural gas G20</i>	33.0	14.3 – 30.8	20	1.35	2.84 – 11.11
<i>butane gas G30</i>	33.0	14.3 – 30.8	29	0.77	7.1 – 28.7
<i>propane gas G31</i>	33.0	14.3 – 30.8	37	0.77	9.5 – 35.3



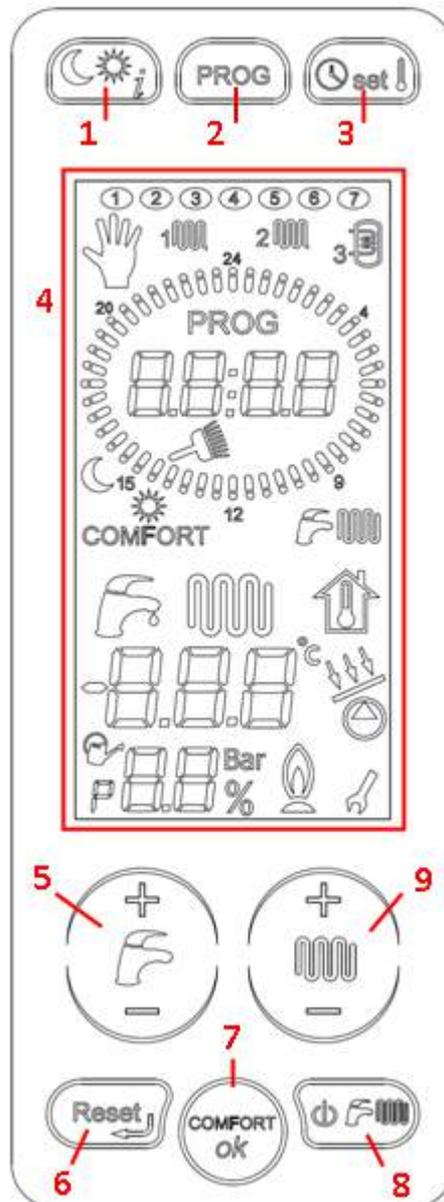
SECT. 2

TOUCH SCREEN CONTROL PANEL AND DIAGNOSTICS

2.1 USER'S INTERFACE

The interface features a capacitive keyboard to access the setting by simply touching the keys on the interface key-area. This is the only way to enable back-lighting (keys + LCD) and access the various functions. Only "active" keys will be backlit, thus guiding the user to proper use.

One minute after the last key has been touched, interface is disabled and back-lighting is turned off.



NB: back-lighting has different operating modes which can be enabled by means of parameter P78 (default 0), depending on the needs:



0 = standard, **1** = LCD always on **2** = LCD + keys always on

1. Temperature selection or recall information

This key enables switching from “day” to “night” temperature (and reverse) during the automatic programming of heating times. When not programming, this key enables to scroll in sequence the parameter values for displaying purposes only.

2. Programming key

During standard operation, it is possible to switch from manual to automatic programming and reverse by pressing this key (then pressing “OK” key to confirm). By repeatedly pressing in sequence, it will be possible to display and edit the desired program: zone 1, zone 2 or boiler (only for the RTFS version).

3. Time and ambient temperature setting key

This key enables the setting of time (hour and minutes), day of the week, ambient “day” and “night” operating temperatures for the automatic programming mode (each value must be confirmed with the “OK” key).

Warning: in case temperature probes are used for ambient management, “day” temperature represents the desired ambient temperature.

4. LCD Display

The LCD shows the boiler status and operation information (see following paragraph).

5. Domestic hot water temperature setting key

These keys are used to set (increase or decrease) the domestic hot water temperature from a minimum value of 35°C to a maximum value of 57° or 65°C, depending on boiler type (instantaneous type or with water heater respectively).

6. Boiler reset key

This key enables to resume boiler operation after a shut-down (only for resettable faults), or to return to the main page during the parameter selection.

7. COMFORT and parameter confirmation key

This key is used to enable and disable the COMFORT function in order to maintain the pre-heated plate exchanger at a specific temperature (*CTFS version*) or to enable heating of water heater outside the set programming (*RTFS version with water heater*).

Besides, this key is used to confirm the new settings while editing.

8. Boiler status selection key

Press this key to set the following functions:

SUMMER : Boiler produces domestic hot water only.

WINTER : Boiler provides both central heating and domestic hot water.

CENTRAL HEATING ONLY : Boiler provides central heating only

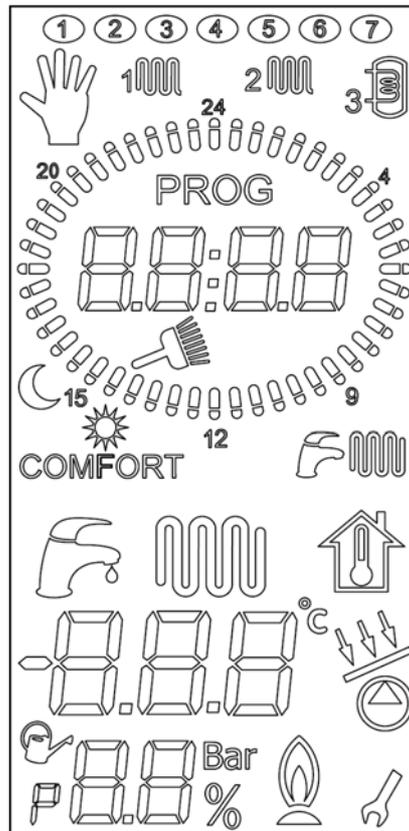
STAND-BY **OFF**: Boiler in standby mode: central heating and DHW functions are disabled.

9. Central heating water temperature setting key

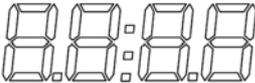
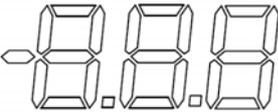
Without external probe, this key is used to set the water temperature value of the heating system between a minimum value of 35°C and a maximum value of 45°C (*reduced range*) or 78°C (*standard range*). With external probe, instead, it is used to set the fictitious temperature (see paragraph about thermoregulation).



2.2 LCD



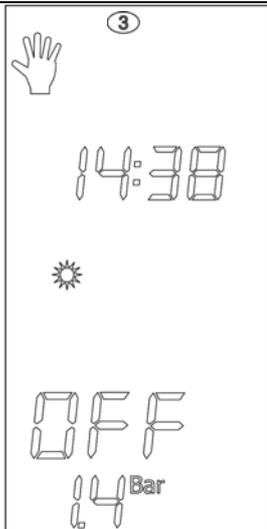
Symbol	Description
	<p>Day of the week indicator During boiler standard operation, the icon steady on indicates the current day of the week; during the automatic programming, it indicates the day(s) in which the time slots are modified. The flashing icon indicates the programming of the day of the week during the setting phase.</p>
	<p>Manual operation indicator It shows that the boiler operation in heating mode is active 24 h a day. The zones are switched on and off only as a result of the signals from the ambient thermostats, or according to the "day" temperature in case ambient probes are used. Instead, the boiler programming (RTFS) is maintained.</p>
	<p>Zone 1 heating programme indicator During standard operation, the icon steady on indicates that zone 1 heating programme is active. It will light in a steady way also while displaying the relevant programme, and will flash during programming.</p>
	<p>Zone 2 heating programme indicator During standard operation, the icon steady on indicates that zone 2 heating programme is active. It remains on steady also while displaying the relevant programme, and it will flash during programming.</p>
	<p>Boiler programme indicator During standard operation, the icon steady on indicates that the boiler programme is active. It remains on steady also while displaying the relevant programme, and it will flash during programming.</p>

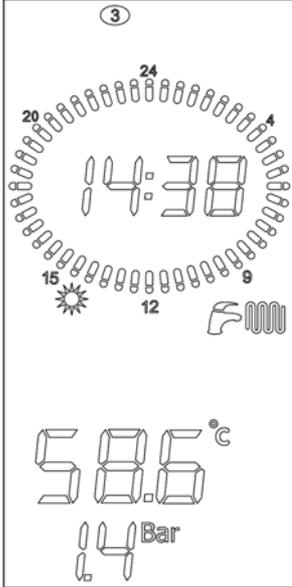
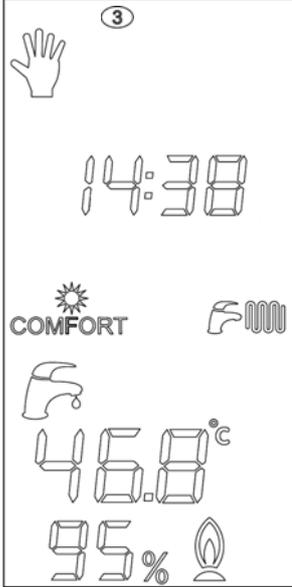
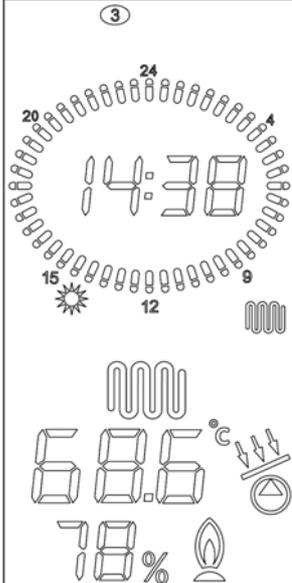
	<p>Programming indicator It is displayed only in the automatic programming mode, indicating the possibility to edit the time slot of both the CH circuit and of the boiler.</p>
	<p>First alphanumeric indicator Alphanumeric values indicating the current time during standard operation, or the specific time during automatic programming of both the CH circuit and of the boiler. It indicates the fan speed (in rpm) during the "flue cleaning" function.</p>
	<p>Flue cleaning function indicator It flashes when the flue cleaning function is started (by pressing the <i>reset</i> key for three seconds) and then remains steady on once the function is active. During such function, the fan rpm is displayed by the first <i>alphanumeric indicator</i>, while the flow temperature is displayed by the second indicator.</p>
	<p>Temperature indicator Respectively: sun=<i>day or comfort</i>, moon=<i>night or reduced</i> temperature. When the automatic programming operation is active, the single indicators are lit in a steady way to indicate the current temperature. They will flash during the setting of the relevant temperatures.</p>
	<p>Daytime temperature indicator Daytime temperature time slot (sun) during the programmed operation.</p>
	<p>Night-time temperature indicator Night-time temperature time slot (moon) during the programmed operation.</p>
	<p>COMFORT function indicator Icon on, steady = function enabled; Icon off = function disabled.</p>
	<p>Boiler status indicator Icons indicate the operating modes enabled:</p> <ul style="list-style-type: none"> - instantaneous DHW; - heating.
	<p>DHW indicator It turns on while the boiler is fulfilling a DHW request. It flashes when setting the DHW temperature with the key 5 (see previous paragraph).</p>
	<p>Central heating indicator It turns on while the boiler is fulfilling a CH request. It flashes when setting the CH water temperature with the key 9 (see previous paragraph).</p>
	<p>Fictitious ambient temperature indicator In case an external probe is installed, this indicator flashes when the fictitious ambient temperature is set with the key 9 (see previous paragraph).</p>
	<p>Second alphanumeric indicator This shows the following:</p> <ul style="list-style-type: none"> - flow water temperature during "<i>heating</i>" function; - central heating water temperature setting; - domestic hot water temperature during the "<i>DHW</i>" function; - domestic hot water temperature setting; - parameter value display - boiler diagnosis.
	<p>Centigrade degree indicator When displayed simultaneously with the <i>second alphanumeric indicator</i>, it shows the value expressed in centigrade degrees.</p>

	<p>Solar indicator It turns on when the solar function of pump or solar valve activation (depending on the system to be managed) is performed.</p>
	<p>Automatic filling and SUPER-TECHNICAL parameter indicator It indicates that automatic filling is in progress after a pressure drop in the system. When displayed simultaneously with the <i>parameter display indicator</i>, it shows that the "super-technical parameter" programming mode has been reached. An access code is needed to access the display or editing mode.</p>
	<p>Installation parameter indicator When displayed simultaneously with the <i>parameter display indicator</i>, it shows that the "parameter programming" mode has been entered.</p>
	<p>Parameter display indicator Depending on the operating status, it indicates the parameter or the system pressure or the burner output rate percentage, expressed in numeric value.</p>
Bar	<p>Pressure indicator When displayed simultaneously with the <i>parameter display indicator</i>, it shows the system pressure only with the boiler waiting for a request.</p>
%	<p>Percentage indicator When displayed simultaneously with the <i>parameter display indicator</i>, it shows the output rate percentage at which the boiler is operating following a request.</p>
	<p>Flame lighting indicator It turns on upon detecting burner flame lighting.</p>
	<p>Parameter editing indicator During the programming of any parameter, it shows the possibility to edit the associated parameter value.</p>

2.3 BOILER STATUS AND FAULT CODES

Normal operation

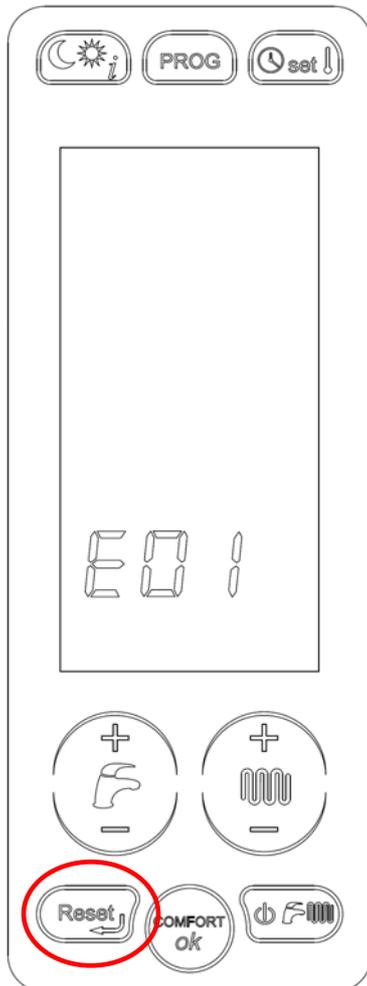
<p>Boiler in STANDBY mode with forced heating circuit in manual mode. System pressure and current time are displayed.</p>	
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<p>Boiler in SUMMER or WINTER mode with forced heating circuit in automatic mode.</p> <p><i>No active function.</i></p> <p>Flow water temperature, system pressure and current day and time are displayed.</p>	
<p>Boiler in SUMMER or WINTER mode with forced heating circuit in manual mode and “comfort” function enabled.</p> <p><i>DHW function active with flame lit.</i></p> <p>Hot domestic water temperature, burner output rate percentage and current time are displayed.</p>	
<p>Boiler in ONLY WINTER mode with forced heating circuit in automatic mode and “solar” function enabled.</p> <p><i>CH function active with flame lit.</i></p> <p>Flow water temperature, burner output rate percentage and current day and time are displayed.</p>	



Malfunction, errors to be reset by user and self-resettable faults

The display indicates the fault through the relevant error code (see following table). Some faults can be reset by pressing the "reset" key (r), some others are self-resettable (a) and reset only when the fault is resolved:



Warning: in case of self-resettable faults, only back-lighting of the LCD will remain active while the relevant error code will flash. In case of resettable faults, instead, the error is displayed in a steady way, and the "reset" key is enabled as well to reset boiler shut-down condition. In either case, once the fault has been resolved, back-lighting of all keys is enabled and after one minute (no other key being pressed) the interface is disabled.

Boiler shut-down due to missing flame (r)	E01
Boiler shut-down due to double flow probe triggering (r)	E02
Boiler shut-down due to air pressure switch triggering (r)	E03
Boiler shut-down due to too low system pressure (a)	E04
Boiler shut-down due to double flow probe fault (a)	E05



Boiler shut-down due to DHW probe fault (<i>only for CTFS version</i>) (a)	E06
Automatic filling failed (<i>only for CTFS version</i>)	E08
System pressure too high	E09
Boiler shut-down due to boiler probe fault (<i>RTFS combined with boiler</i>) or DHW inlet probe (<i>CTFS</i>) (a)	E12
External probe fault (a)	E23
Solar collector probe fault (SCS) (a)	E24
Solar valve probe fault (SVS) (a)	E27
Solar water heating probe fault (SBS) (a)	E28
Remote control connection fault (<i>signalled only by remote control</i>) (a)	E31
Triggering of safety thermostat in mixed zone 2 (a)	E35
Mixed zone 2 flow probe fault (a)	E36 02
Mixed zone 3 flow probe fault (a)	E36 03
Mixed zone 4 flow probe fault (a)	E36 04
Communication failure between peripheral devices: interface or supplementary board (a)	E41
Hydraulic configuration not allowed	E42
Zone configuration error (<i>remote, thermostat and ambient probes</i>)	E43



Ambient probe 1 (a) fault	E44
Ambient probe 2 (a) fault	E45
Pressure transducer fault (a)	E46
Communication error between main board and interface board	E49
Shut-down due to safety circuit hardware fault	E51
	E52
	E53
Air pressure switch recognition failure	E72
Incompatibility between boiler board and interface board	E73
Modulation coil fault (a)	E76
Max. number of reset attempts from interface reached (r)	E98
Max. number of reset attempts reached (<i>signalled both by remote control and interface</i>) (r)	E99

NB: The board is able to count and store the boiler's latest five faults (both resettable and self-resettable). View them by scrolling super-technical parameters from P01 to P05.

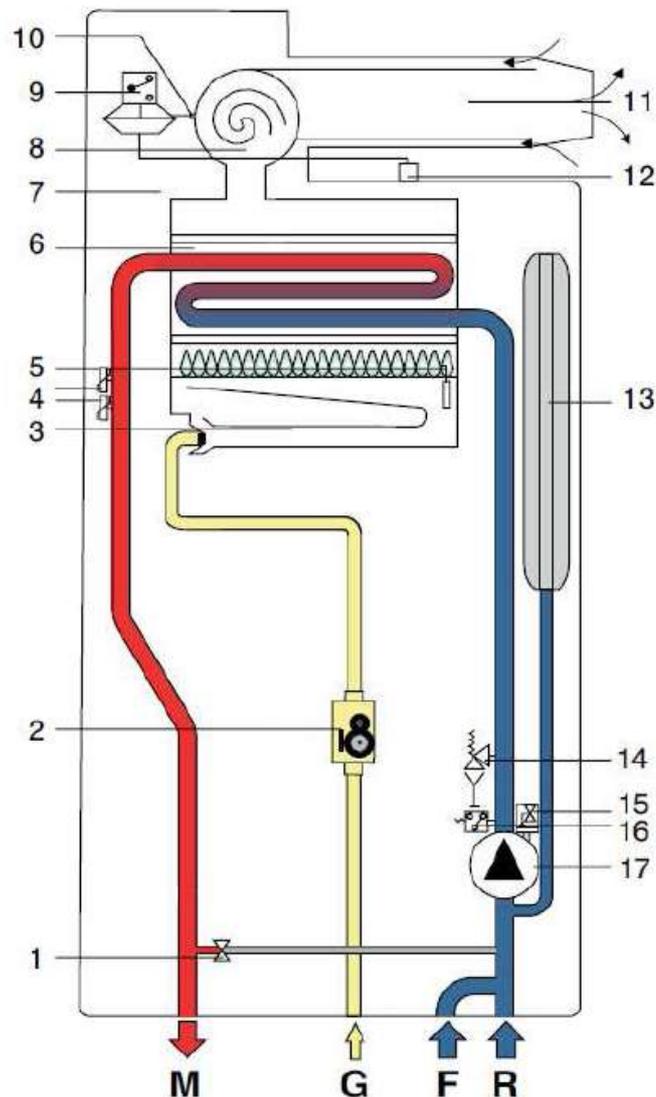


SECT. 3

HYDRAULIC DIAGRAMS AND COMPONENTS

3.1 HYDRAULIC DIAGRAMS

RTFS



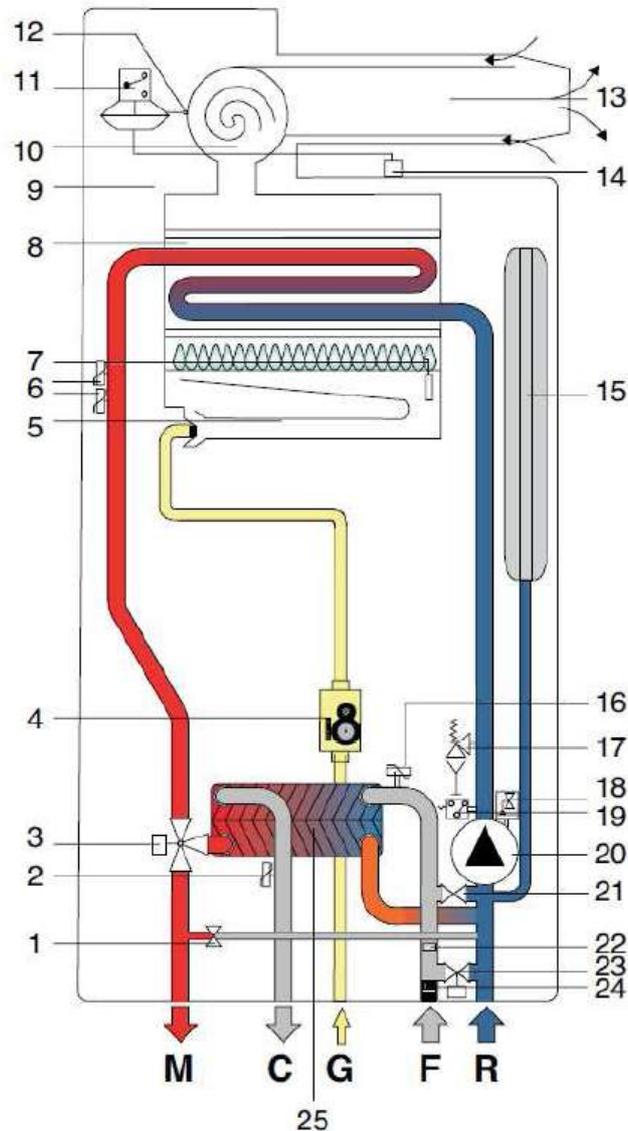
- | | |
|--|---|
| 1. Automatic by-pass | 10. Pressure measurement point on flue gas duct |
| 2. Modulation gas valve | 11. Air intake and venting duct |
| 3. Burner | 12. Pressure measurement point on flue gas duct |
| 4. Double flow probe | 13. Expansion tank |
| 5. Ignition/detection electrode | 14. 3-bar safety valve |
| 6. Mono-thermal exchanger | 15. Deaerator |
| 7. Sealed combustion chamber | 16. Pressure transducer |
| 8. Flue gas extractor fan | 17. 3-speed circulation pump |
| 9. Flue gas circuit safety pressure switch | |

M CH system flow
G Gas inlet

F Cold water inlet
R CH system return



CTFS



1. Automatic by-pass
2. Domestic hot water temperature sensor
3. Motorised 3-way valve
4. Modulation gas valve
5. Burner
6. Double flow probe
7. Ignition/detection electrode
8. Mono-thermal exchanger
9. Sealed combustion chamber
10. Flue gas extractor fan
11. Flue gas circuit safety pressure switch
12. Pressure measurement point on flue gas duct
13. Air intake and venting duct
14. Pressure measurement point on flue gas duct
15. Expansion tank
16. Cold water temperature sensor
17. 3-bar safety valve
18. Deaerator
19. Pressure transducer
20. 3-speed circulation pump
21. Automatic filling solenoid valve
22. Flow rate limiting device
23. Filler cock
24. Cold water flowmeter with filter
25. Insulated secondary plate exchanger

M CH system flow
G Gas inlet
R CH system return

C Domestic hot water outlet
F Cold water inlet

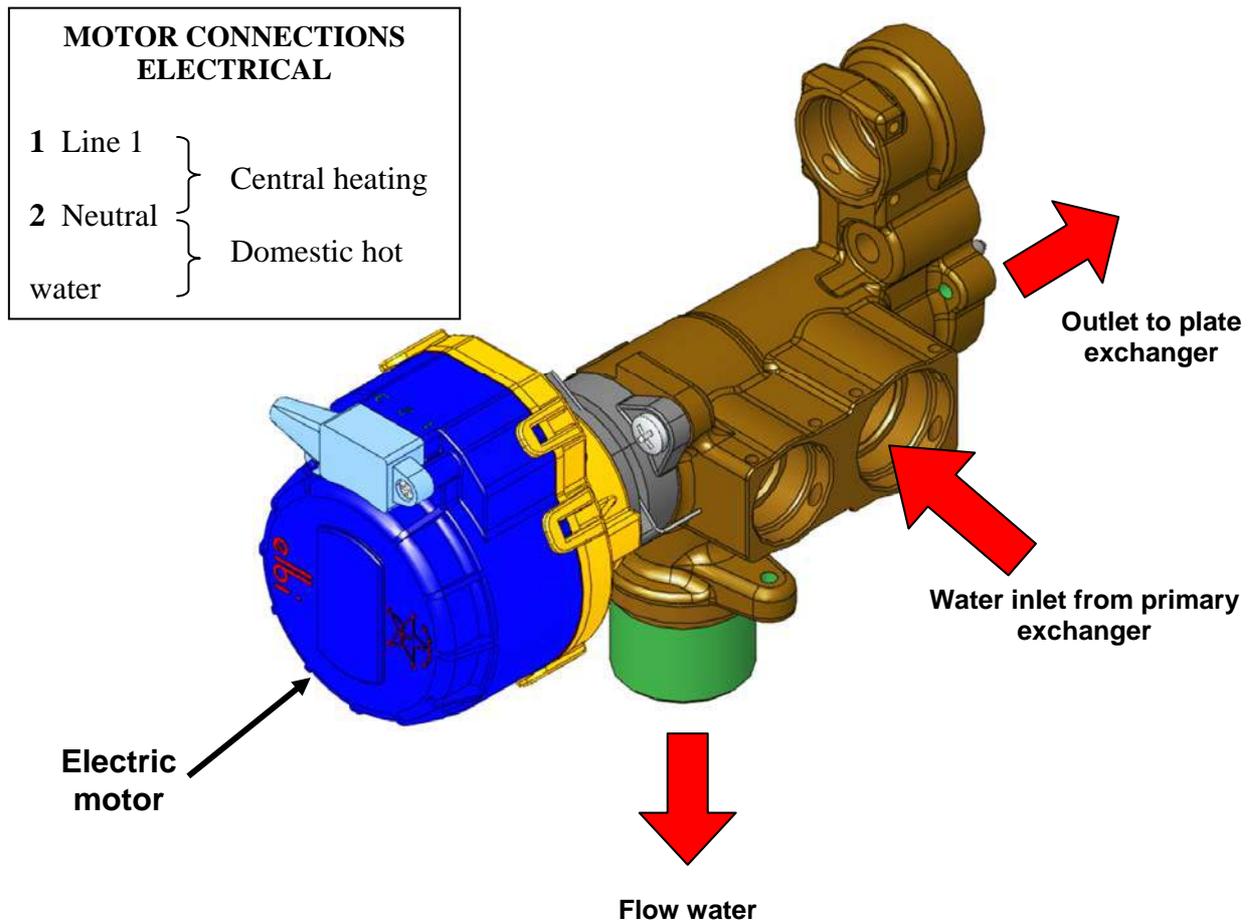


3.2 HYDRAULIC UNIT

MOTORISED THREE-WAY VALVE (only for CTFS version)

The boiler uses a three-way valve to divert the water flow coming from the primary exchanger into another pipe, in particular it diverts the water into the secondary (plate) exchanger, where heat will be transferred to the DHW.

This valve consists of one main brass three-way body, one plastic (thermosetting polymers) cartridge, and one electric motor (actuator) to move the internal shutter.

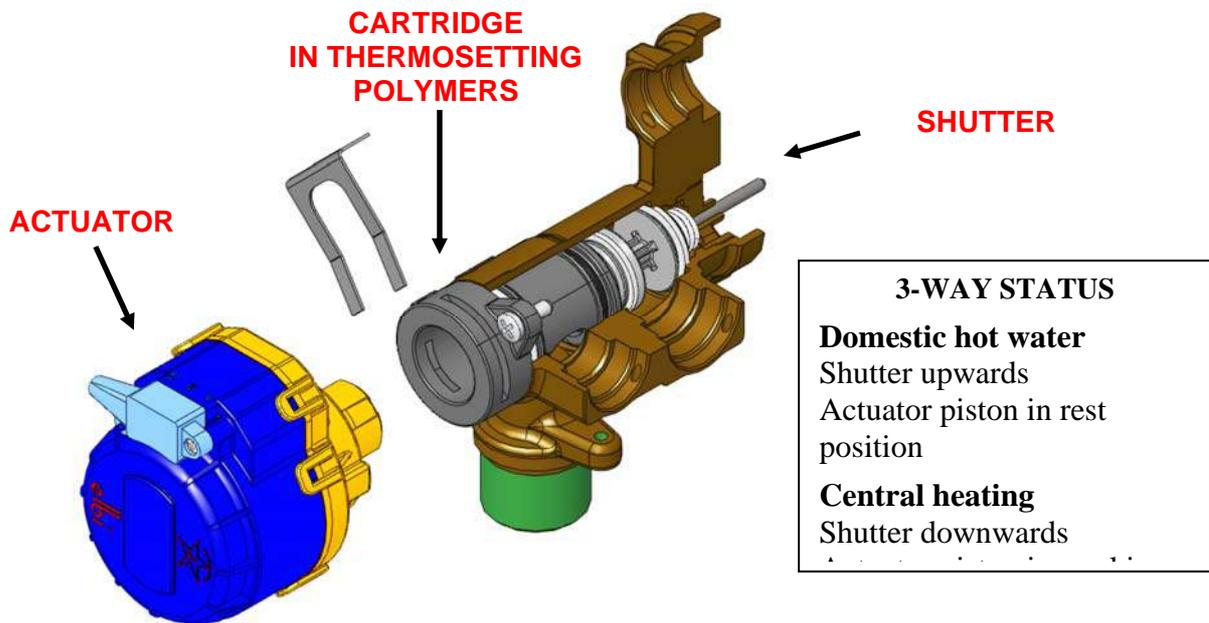


The secondary exchanger is fixed by the three-way valve and another unit made of thermosetting polymers connecting the cold water inlet pipe to the rest of the hydraulic system.

The stainless steel plate exchanger consists of 26 plates for all versions: 24, 28 and 32 kW.

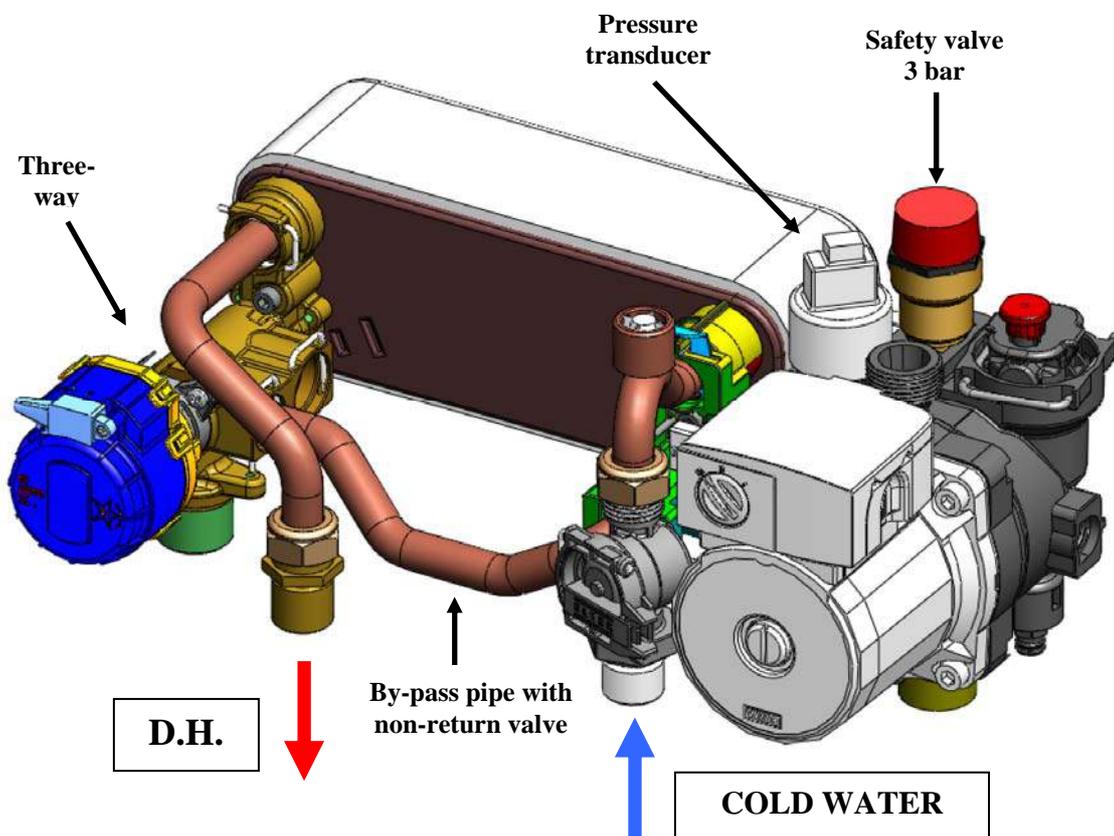
When domestic hot water is required, the cold water coming from the domestic water system passes through the flowmeter, setting the boiler to "DHW" mode. Then the three-way valve diverts the hot water coming from the primary exchanger into the secondary one so that it can transfer its heat to the plates for the instantaneous production of domestic hot water.

N.B. In rest condition, the three-way valve is in DHW mode position.

Three-way valve section:

The boiler is fitted with an internal automatic by-pass with non-return valve, whose opening threshold is 400 mBar.

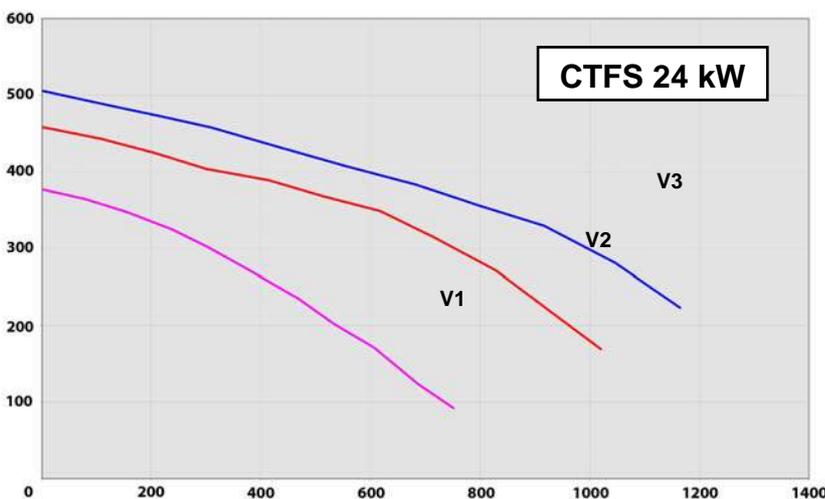
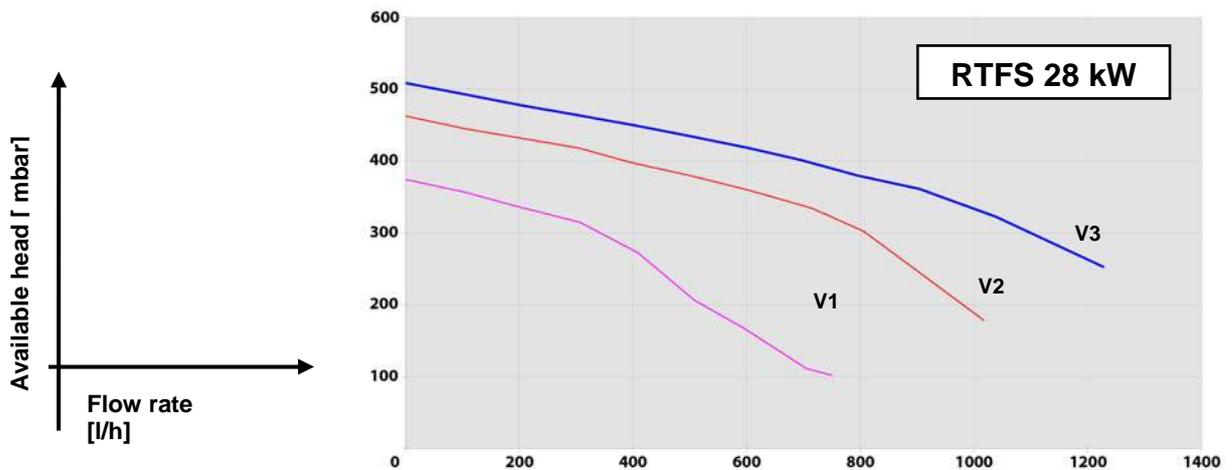
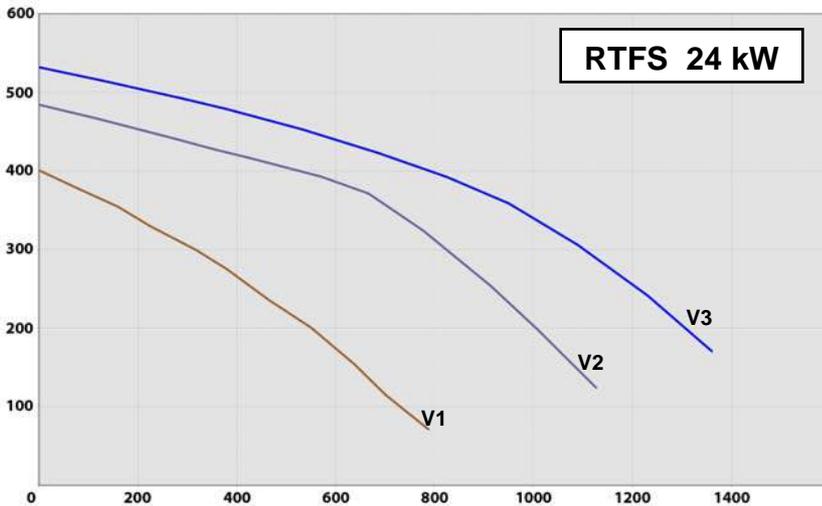
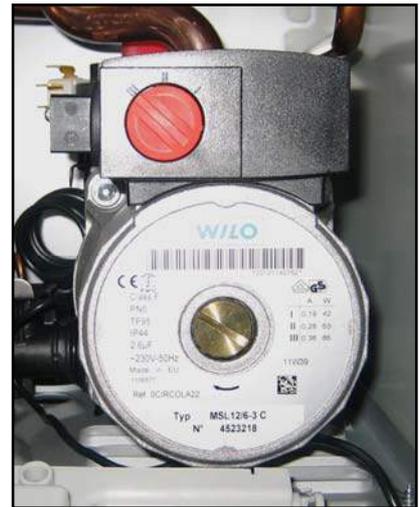
In case of load losses in the system due to thermostatic valve triggering, the by-pass ensures a minimum flow rate inside the primary exchanger. The function of the by-pass is to protect the primary exchanger from overtemperatures due to poor water flow.





The circulation pump end block features one 3-position selector to set the motor rotation speed and thus the head to the system.

The circulating pump is the same for all output rates, what varies (depending on the hydraulic circuit of the boiler) is the residual head curve:

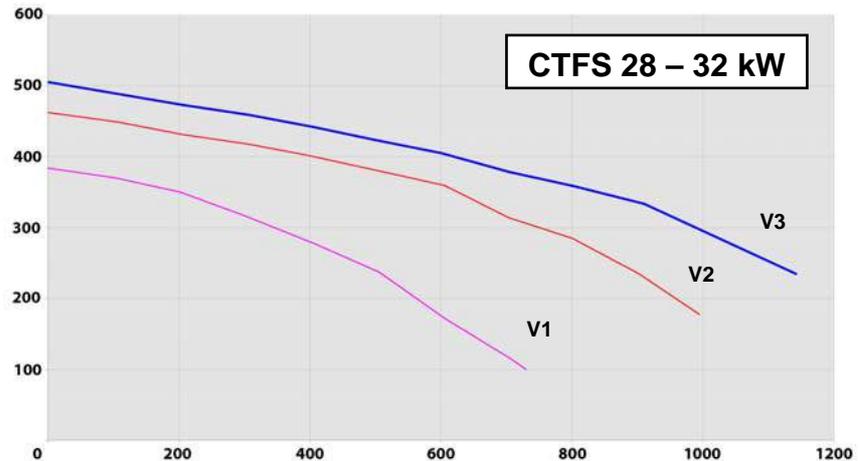


CIRCULATION PUMP TECHNICAL SPECIFICATIONS

- Maximum head: 6 m
- Max. operating pressure: 6 bar
- Max. circulation temperature: 95 °C

**KEY**

- V1** Pump speed I (min)
V2 Pump speed II
V3 Pump speed III (max)

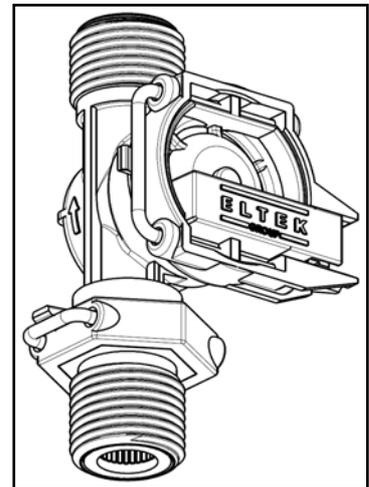
**DHW FLOWMETER (only for CTFS version)**

The DHW flowmeter is fitted with an internal turbine for metering the volume while DHW is being drawn.

Besides determining the minimum quantity of DHW needed to start the boiler (2.5 l/min ON and 2 l/min OFF), it calculates the necessary output to be developed in DHW mode at that particular moment, taking into consideration:

- the temperature difference between set temperature and inlet cold water temperature;
- drawn water flow rate.

This improves the production of domestic hot water, benefiting both user and efficiency (three-star efficiency instead of the 2-star efficiency obtained with the standard flow switch).



The flowmeter transmits a pulse signal which is received and utilised by the electronic board as the frequency used to determine the litres to be drawn:

l/min	imp/l	Imp/l MIN	Imp/l MAX	Hz	Hz MIN	Hz MAX
2	410	377	443	13.7	12.6	14.8
4	443	408	478	30	27.6	32.4
6	452	416	488	45.2	41.6	48.8
8	457	420	494	61	56.1	65.9
10	459	422	496	76.4	70.3	82.5
12	463	426	500	92.6	85.2	100

Warning: it is not possible to simulate any DHW request with the flowmeter, however it is possible to delay the reading of the signal with the parameter P15.

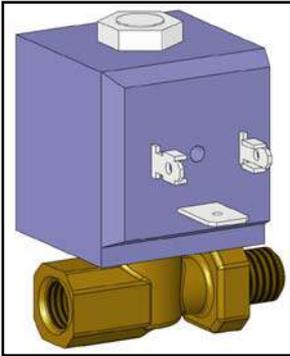
Depending on the different output rates, the difference between one flowmeter and another lies in the flow rate limiting device (flow regulator) which determines the litres/minute that can be drawn at Δt 30K: 10 l/min for 24 kW models, 13 l/min for 28 kW models and 14 l/min for 32 kW models.



AUTOMATIC FILLING SOLENOID VALVE (only for CTFS version)

Besides the standard filler cock, the boiler features an automatic filling valve, directly controlled by the boiler electronic board.

A specific parameter (P94) can be used to enable the solenoid valve and to change the operating logic values (refer to paragraph “Automatic filling function” on page 80 for more details).



Technical characteristics:

Operating voltage: **230 Vac, 50 Hz**

Resistance: **1.142 K Ω**

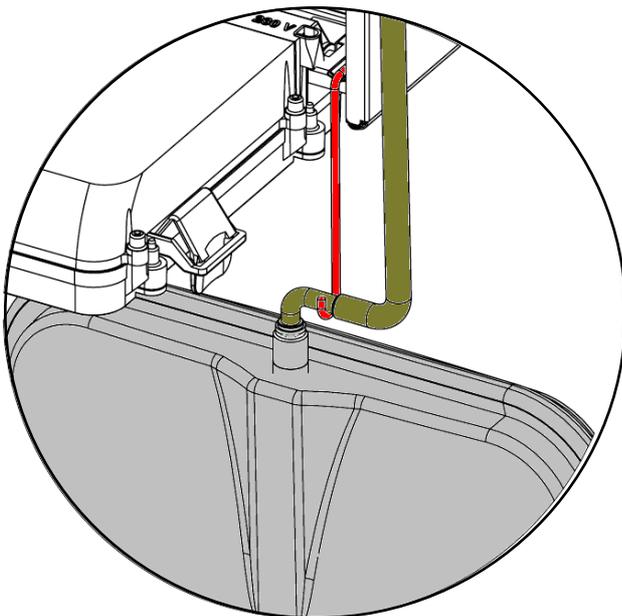
3.3 EXPANSION TANK

An increase in heating water temperature inside a closed circuit corresponds to an increase in the water volume. As no further space is available, the increase will affect the pressure and not the volume. If pressure value exceeds safety valve triggering point, this latter will open and discharge water from the system. To prevent such occurrence an expansion tank is positioned inside the circuit; the vessel houses an air diaphragm used to balance overpressure.



Vessel capacity:

7 litres



WARNING: the expansion tank is in front of the combustion chamber within a containment tank.

The boiler is provided with an internal hook to support the vessel during maintenance (see picture on the side); it does not need to be disconnected from the hydraulic line.

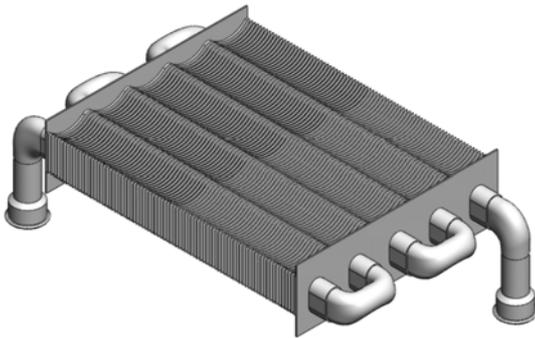


3.4 HEAT EXCHANGERS

PRIMARY EXCHANGER

It is made up of a set of copper pipes, connected to each other in a way to create a "coil". The finning improves the efficiency of the heat exchange between the water flowing inside, the heat developed by the burner flame and the hot combustion flue gases. The number of fins determines the type of exchanger used for the different output rates.

Heat exchanger and the pipes are connected by means of special clips. Hydraulic sealing by pressure is ensured by O-rings applied to the specific pipes.



98 fins for **24 kW** models

106 fins for **28 and 32 kW**

Warning: to replace the heat exchanger, proceed as follows:

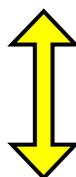
- remove boiler front casing;
- release the expansion tank (*place it as shown in previous paragraph*);
- remove combustion chamber panel;
- remove fan and flue gas hood;
- release the sealing clips;
- pull the exchanger upward to replace it;
- refit all components, lubricate O-ring with care.

SECONDARY EXCHANGER (*only for CTFS version*)

It is made up of a number of overlaying metal plates. In the spaces between the plates, the hot water coming from the CH circuit and the DHW system cold water flow simultaneously in separate circuits.

The hot water will transfer its heat to the DHW system cold water. Therefore, at the outlet, the DHW will be warmer and the CH water (primary circuit) will be cooler. To prevent heat losses, particularly in the "COMFORT" mode (see paragraph on page 48), the heat exchanger is wrapped in a special insulating casing.

26 plates
FOR ALL
POWER RATES

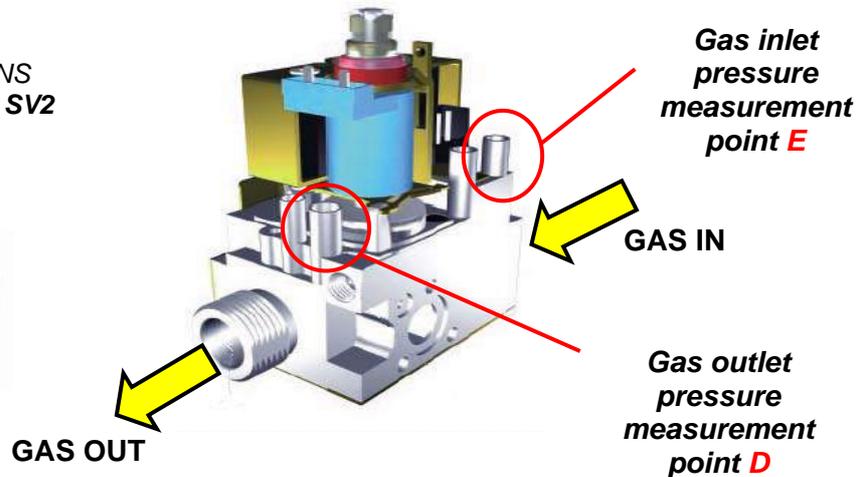
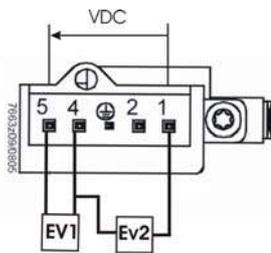




3.5 GAS VALVE

The boiler is approved for operating with gas valve, model SIT 845:

*ELECTRICAL CONNECTIONS
SOLENOID VALVES SV1 and SV2*



Gas valve characteristics	
EV1 and EV2 safety coil operating power supply	230 VAC 50 Hz
EV1 operating current	40 mA
EV2 operating current	12 mA
EV1 supply pin	4 - 5
EV2 supply pin	4 - 1
Modulation coil operating power supply	17 Vdc
Max. operating pressure	60 mbar
Working temperature	-15 / 60°C
Modulation parameters	
Current of gas modulation coil at maximum output	120 (natural gas) / 170 (LPG) mADC
Current of gas modulation coil at minimum output	20 (natural gas) / 30 (LPG) mADC
Current of gas modulation coil at the end of the ignition ramp for CTFS boilers	80% of maximum current
Current of gas modulation coil at the end of the heating rising ramp	At maximum CH output (P7)
Coils	
Safety coil interchangeability	Yes
EV1 resistance value	~ 1600 Ohm
EV2 resistance value	~ 6.77 KOhm
Modulating coil resistance value	~ 78 Ohm

The valve features a compensation pressure point connected to the combustion chamber through a silicone pipe.

Valve thus knows the pressure on nozzles and can supply the correct quantity of gas even in case of overpressure or vacuum inside the chamber.

For example, upon ignition when fan is activated, a vacuum develops inside the combustion chamber. Thanks to this pressure point, valve decreases nozzle pressure so as to balance any exceeding gas supply due to vacuum.



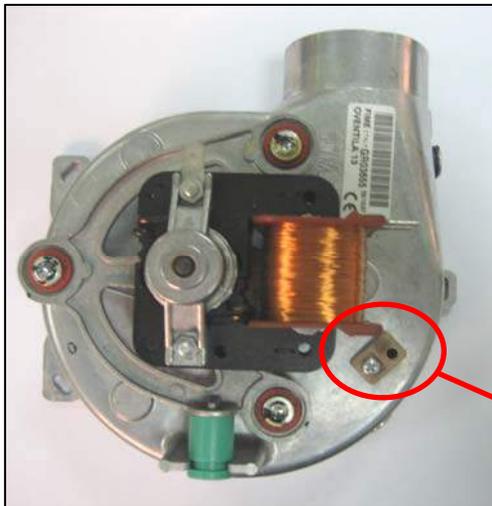
3.6 FLUE GAS FAN

Flue gas fan is of asynchronous type (fixed speed) and is used to purge flue gases generated by combustion during boiler operation. The fan features a Pitot plastic pipe to limit the condensate build up on the fan pressure measurement point to which a control device (air pressure switch) is connected to ensure correct ventilation. This device ensures that the difference between the pressure generated by the fan and the pressure detected in the boiler is at least equal to the minimum value needed for the boiler to work properly. Power of flue gas fan, as well as pressure switch for ventilation control, vary depending on boiler model.

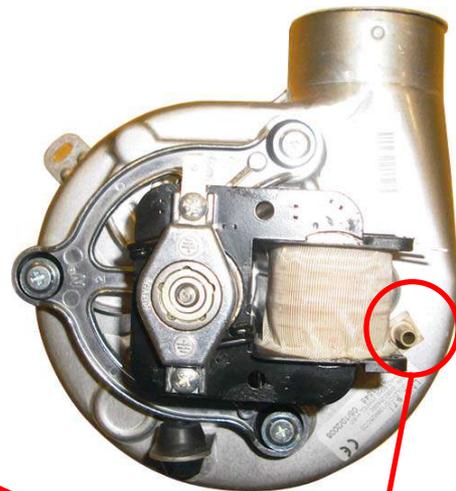
A double fan, interchangeable depending on the supplier (FIME or NATALINI), is available only for the 24kW boiler, whereas only one version (FIME) is available for the 28 and 32 kW models.

The differences between the two models are listed below:

FIME



NATALINI



Fan technical characteristics:

Boiler output	24 kW		28 - 32 kW
Supplier	Fime	Natalini	Fime
Power supply	230 Vac, 60 Hz		
Power [W]	38	35	60
Type of worm screw	Die-cast	Sheet metal	Die-cast

Air pressure switch technical characteristics:

Boiler output	24 kW	28 - 32 kW
Working scale [Pa]	45 - 32	125 - 112
Reference colour	white	yellow



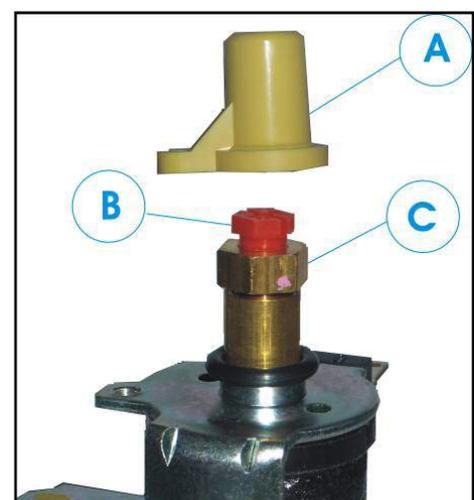
SECT. 4

GAS SETTING AND PARAMETERS

4.1 GAS VALVE SETTING

To set the gas valve, proceed as follows:

- **check supply static pressure** by means of the inlet pressure measurement point **E** referring to the "setting" table on page 9, according to the type of fuel used (pressure values lower than requested do not guarantee proper boiler operation);
- check that the **heating maximum output** set with the parameter **P7** is **100%** (to view or edit this parameter, refer to the sequence described in the "parameter editing" paragraph, on page 33);
- switch heating system on with the ambient thermostat;
- ignite boiler in the "**flue cleaning**" mode (see following paragraph);
- with the pressure gauge in the inlet pressure measurement point **E**, check **supply dynamic system pressure** while the boiler is working (in case the pressure is too low, boiler proper operation is not guaranteed);
- remove the plastic cover protecting the adjustment screws at the top of the modulation coil;
- then connect the pressure gauge to the gas outlet pressure measurement point **D** after closing the inlet pressure measurement point;
- turn the maximum output screw **C** to increase (screw in) or decrease (loosen) the **maximum pressure**, making reference to the "setting" on page 9;
- electrically disconnect one of modulation coil connectors to operate the boiler at the minimum output;
- adjust the **minimum pressure** by turning the screw **B** of the gas valve (keep the external screw **C** fixed). Make reference to the "setting" table as usual;
- re-connect connector to modulation coil and check maximum pressure again;
- disconnect the pressure gauge and check for any gas leakage both on the pressure measuring points and on the gas valve connection fly nuts;
- refit protection cover;
- quit the "flue cleaning" function by pressing the "**reset**" key;
- in case parameter **P7** has been edited, set the correct value again;
- switch the heating system off with the ambient thermostat.

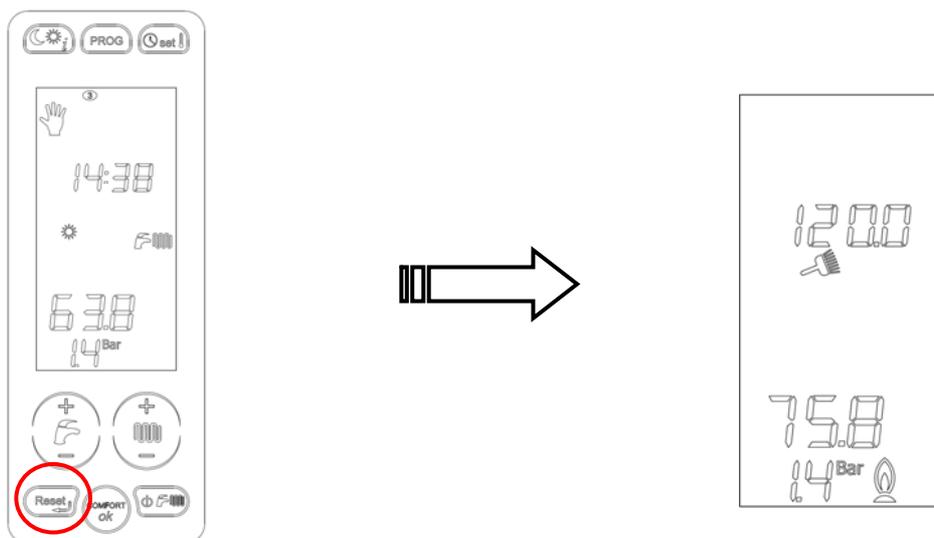




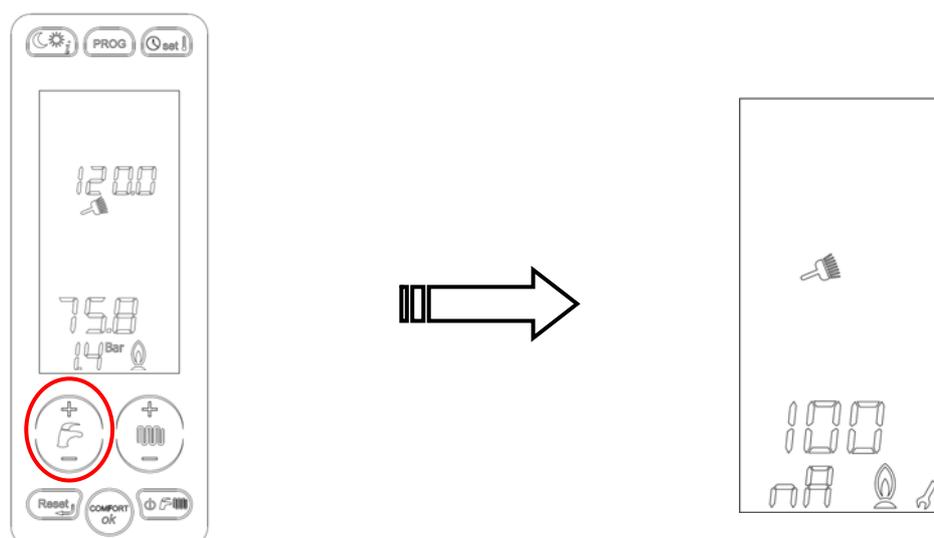
4.2 FLUE CLEANING FUNCTION

The boiler features a flue cleaning function which must be used to measure combustion efficiency during operation and to set the burner.

This function can be enabled only in the HEATING + DOMESTIC HOT WATER operating mode. To enable it, **press “reset” key** and keep it pressed for more than **three seconds**. Now the boiler will perform the ignition sequence and then operates at the burner **maximum output** set by parameter **P7**. The display will show simultaneously the current (mA) supplied to the modulation coil, the flow temperature, the system pressure, the lit flame symbol with burner on, the "broom" symbol to indicate that the flue cleaning function is active:



Use the “+” or “- *DHW*” keys to change the value of the **current supplied to the modulation coil**, from the minimum to the maximum value according to parameter P7. In this case, the display will show the wrench symbol (parameter editing indicator) and the value of the current supplied to the modulation coil being edited:



This operation is useful when setting the boiler combustion with closed casing. The desired output is set by pressing the DHW keys.



The current supplied to the modulation coil at the minimum and at the maximum output values according to the gas used are given below:

	max [mA]	min [mA]
Natural gas	120	20
LPG	170	30

Release the “+” or “- DHW” keys to return to the previous page showing the current at the modulation coil and the flow temperature.

The burner is switched off when the temperature detected by the flow probe exceeds 90°C and switched on again when reaching 70°C.

During such function the pump is supplied with power, the three-way valve switches to the heating position, and the multifunction relay is energised with parameter P17=1 (*remote relay*) or P17=3 (*heating relay*).

The function automatically stops after 15 minutes, or by pressing the “reset” key, or setting a mode different from the “CH+DHW” one.

WARNING: the connected zone boards, if any, will also transfer the heat as a result of mixing valve setting, thus enabling the zone pump to maintain the flow set-point.

4.3 GAS CONVERSION

Boilers are manufactured to run on the type of gas (natural gas or LPG) specifically required upon purchase order placing, and any conversion shall be made by qualified personnel.

During gas conversion, proceed as follows:

- make sure to work with the boiler disconnected from the electric power supply;
- remove combustion chamber front panel;
- remove burner upper part concerning gas ramps;
- remove burner nozzles and replace them with new ones having a diameter suitable for the new gas type (see “setting” paragraph on page 9).

WARNING: it is mandatory to fit the copper gaskets supplied along with the conversion kit;

- refit burner and combustion chamber;
- supply the boiler with power;
- access parameter setting page, and set parameter P0 to the value suitable for the type of gas used (refer to the sequence described in the “parameter editing” on page 33):

P0 → 1 = 24 kW natural gas

P0 → 3 = 28 kW natural gas

P0 → 5 = 32 kW natural gas

P0 → 0 = 24 kW LPG

P0 → 2 = 28 kW LPG

P0 → 4 = 32 kW LPG

- gas valve can now be set (paragraph 4.1).

N.B. “Polidoro” burners feature as a standard nozzles without copper washers. It is mandatory to fit them during conversion. Failure to do so may affect the proper sealing.

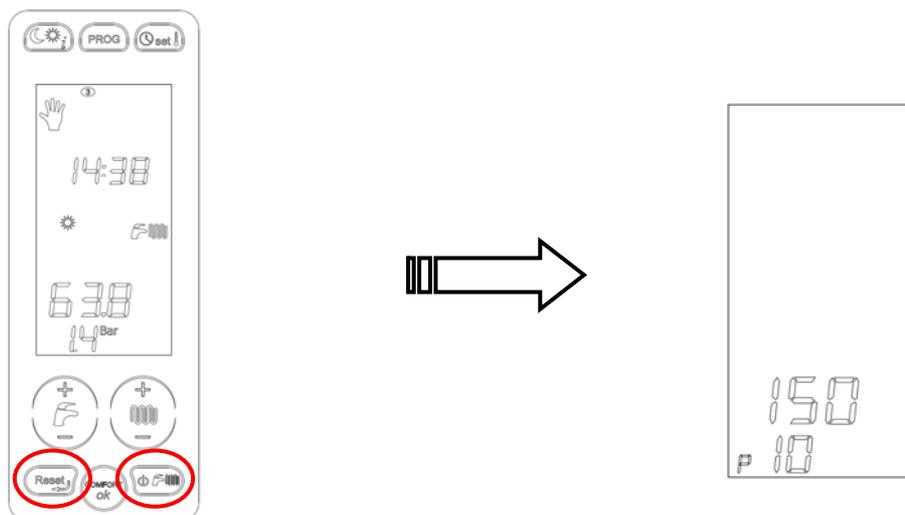


4.4 PARAMETERS

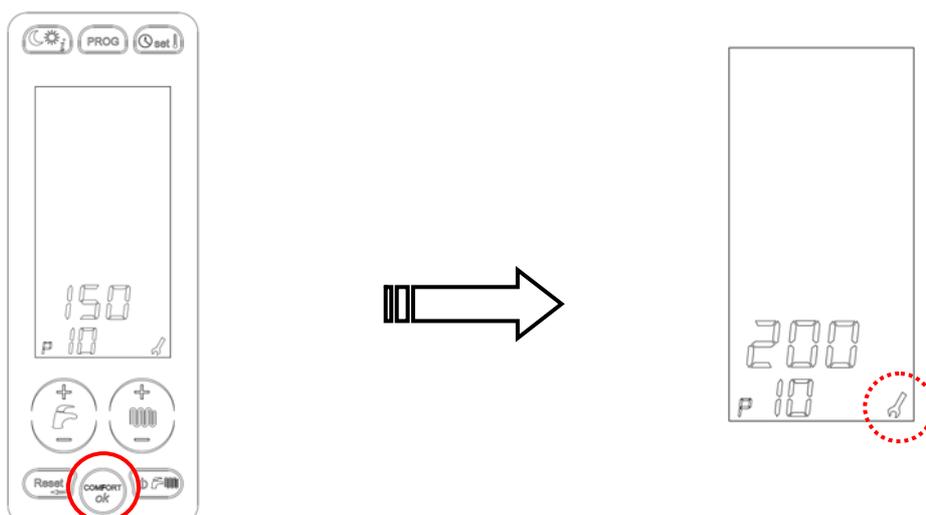
The boards feature a memory with a series of parameters that can be accessed for displaying purposes only. They can as well be edited for boiler perfect configuration depending on the system used. These parameters can be directly accessed from user's interface, or through the remote control. In the latter case, it is possible to access only up to the 29th parameter.

TECHNICAL parameter editing

To access the parameter setting mode, press “reset” and “boiler status” keys simultaneously for three seconds. Then use the “+/- heating” keys to select the desired parameter (see list at the following paragraphs).



Press “OK” to confirm that parameter value has to be edited; the wrench symbol indicates that parameter value can be edited using “+/- heating” keys:



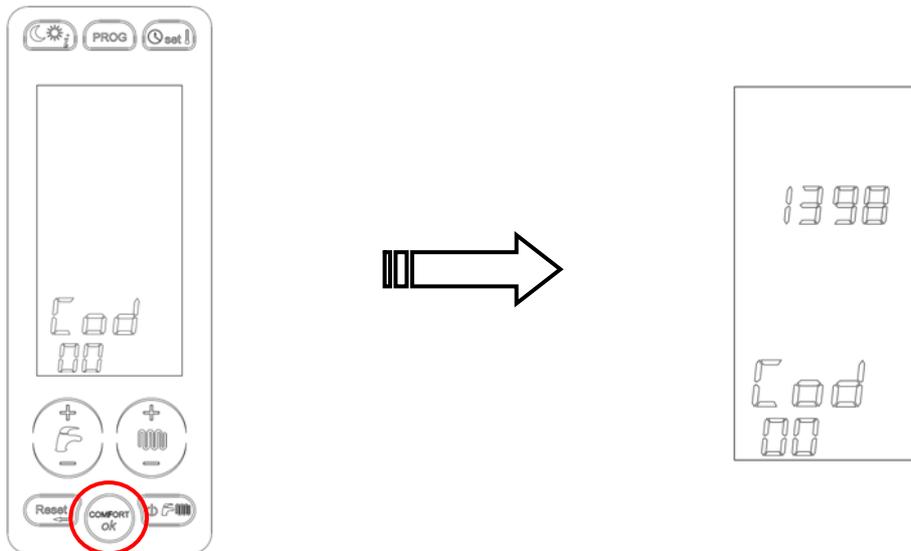
Then confirm the modification of the parameter value by pressing the “ok” key again and scroll the list to edit more parameters, or quit the setting with the “reset” key.



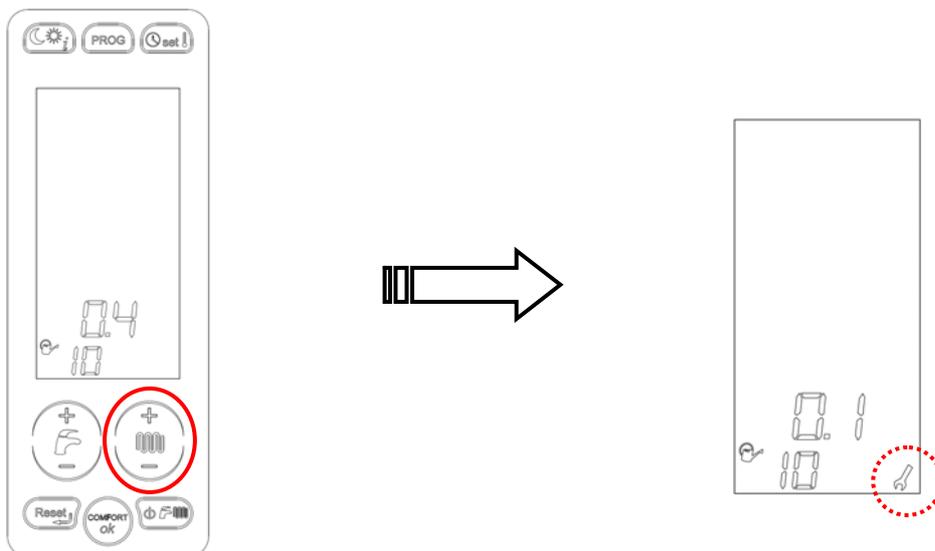
SUPER-TECHNICAL parameter editing

To access the super-technical parameter programming, proceed as described in the previous paragraph (press “reset” and “boiler status” keys simultaneously for three seconds). Super-technical parameters are in sequence after the 90th parameter.

The message “Cod” shows that a **code** must be entered (default **1398**) with the “+ and – heating” keys (confirm each single number with the “ok” key).



After entering the correct entry code, an icon will be displayed, showing  that the super-technical parameter area has been accessed. It is now possible to select and edit the desired parameters following the same procedure described in the previous paragraph (“ok” key to access the parameter and “+/- heating” key to change its value).



Then confirm the modification of the parameter value by pressing the “ok-info” key again and scroll the list to edit more parameters, or quit the setting with the “reset” key.

**Parameter display (read-only)**

Press the “info” key several times to scroll in sequence the values of the parameters for displaying purposes only (from P30 to P50), such as the temperatures detected by the connected probes.

To quit the displaying function, simply press “reset”. The start page will be displayed anyway 60 seconds after the last time the key has been pressed.

TECHNICAL parameter list

<i>Parameter</i>	<i>Range</i>	<i>Default values</i>	<i>Notes</i>
P0 Boiler output selection (<i>selection of "current-output" curve</i>)	0 ÷ 5	1	0 = 24 kW LPG 1 = 24 kW natural gas 2 = 28 kW LPG 3 = 28 kW natural gas 4 = 32 kW LPG 5 = 32 kW natural gas
P2 Selection of pressure control type	0 ÷ 1	0	0 = pressure transducer 1 = low water pressure switch
P3 Boiler type selection	1 ÷ 3	1	1 = combined instantaneous 2 = heating only 3 = with water heater
P6 Ignition output setting	0 to 100 %	0	0 = operation with ignition ramp; ≠ 0 , ignition output identical to set output
P7 CH maximum output	10 to 100 %	100	10 = minimum output 100 = maximum output
P10 Heating curve	0 ÷ 3 (1=100)	1.5	<u>With external probe:</u> <i>Low temp. from 0 to 0.8</i> <i>High temp. from 1 to 3</i> <u>Without external probe:</u> Value < 1, reduced range for low temperature, from 35° to 45°C.
P11 Heating thermostat timing	0 to 10 min	4	
P12 CH output rising ramp timing	0 to 10 min	1	
P13 Timer for CH post-circulation, anti-freeze and flue cleaning function	30 to 180 s	30	
P14 "Solar" DHW thermostat setting	0 ÷ 1	0	0 = normal 1 = solar
P15 Water hammer protection delay, configurable	0 to 10 s	0	
P16 Ambient thermostat reading delay / OT	0 to 199 s	0	
P17 Multifunction relay setting	0 ÷ 3	0	0 = shut-down and fault 1 = remote relay/TA1 2 = solar relay 3 = request TA2

Solar par. (with P17=2 or with supplementary board)	P18 Solar plant selection (with P17=2P3=1)	0 ÷ 1	0	0 = solar valve 1 = solar pump
	P19 Water heater set-point setting range	10 to 90 °C	60 °C	<i>Only with forced circulation solar plant</i>
	P20 ΔT ON (diff. for solar pump switch-on)	1 to 30 °C	6 °C	
	P21 ΔT OFF (diff. for solar pump switch-off)	1 to 30 °C	3 °C	
	P22 Maximum collector temperature	80 to 140 °C	120 °C	
	P23 Minimum collector temperature	0 to 95 °C	25 °C	
	P24 Solar collector anti-freeze	0 ÷ 1	0	0 = anti-freeze not enabled 1 = anti-freeze enabled
	P25 Solar charge forcing (from multif. relay)	0 ÷ 1	0	0 = automatic operation 1 = always enabled
	P26 Enabling of water heater cooling	0 ÷ 1	0	0 = disabled 1 = enabled
P27 Heating timer reset temperature	35 ÷ 78 °C	<i>P10<1 (low temp.) = 35°C</i> <i>P10≥1 (high temp.) = 40°C</i>		
P28 Selection of hydraulic control (only for heating-only version)	0 ÷ 1	0	0 = pump + deviating valve 1 = double pump	
P29 Default parameters setting except for P0, P2, P17 and P28	0 ÷ 1	0	0 = OFF 1 = default parameters	
Display only	P30 Display of external temperature			It can be displayed with connected external probe only
	P31 Flow temp. displaying			
	P32 Display of calculated nominal flow temperature			It can be displayed with connected external probe only
	P33 Display of flow temperature set-point for zone 2			It can be displayed with a connected zone board only
	P34 Display of current flow temperature for zone 2			It can be displayed with a connected zone board only
	P36 Display of flow temperature set-point for zone 3			It can be displayed with two connected zone boards
	P37 Display of current flow temperature for zone 3			It can be displayed with two connected zone boards
	P39 Display of flow temperature set-point for zone 4			It can be displayed with three connected zone boards

Display only	P40 Display of current flow temperature for zone 4			It can be displayed with three connected zone boards
	P42 Display of plate DHW temperature			
	P44 Display of boiler temperature			RTFS = temp. boiler CTFS = temp. Cold water inlet
	P46 Display of solar collector temperature			Visible only with connected solar collector probe
	P47 Display of temperature of water heater or solar valve from boiler			Visible only with connected water heater probe or solar valve
	P48 Display of water heater or solar valve temperature from solar card			As above, but visible only with connected supplementary board
	P49 Display of ambient probe SA1 temperature			Visible only with connected ambient probe
	P50 Display of ambient probe SA2 temperature			Visible only with connected ambient probe
P51 Triggering temperature difference, OFF ambient probe SA1	0.0 ÷ 1.0 °C	0.0 °C		
P52 Triggering temperature difference, ON ambient probe SA1	-1.0 ÷ -0.1 °C	-0.5 °C		
P53 Ambient probe SA1 correction range	-5.0 ÷ 5.0 °C	0 °C		
P54 Triggering temperature difference, OFF ambient probe SA2	0.0 ÷ 1.0 °C	0.0 °C		
P55 Triggering temperature difference, ON ambient probe SA2	-1.0 ÷ -0.1 °C	-0.5 °C		
P56 Ambient probe SA2 correction range	-5.0 ÷ 5.0 °C	0 °C		
P57 Type of modulation with connected ambient probes (SA) <i>(visible only with P61 set between 03 and 07)</i>	0 ÷ 4	4	0 = on/off 1 = ambient probe modulation; 2 = external probe modulation; 3 = ambient probe and external probe modulation; 4 = no ambient probe connected.	
P58 Ambient temperature influence <i>(constant K)</i>	0 ÷ 20 °C	8 °C	Constant used for thermoregulation with P57=3 <i>(see paragraph on page 55)</i>	



<p>P59 Type of temperature visualisation on display</p>	0 ÷ 7	0	<p>0 = flow temperature 1 = amb. probe temp. 1 2 = amb. probe temp. 2 3 = external temperature 4 = water heater temp. 5 = solar collector temp. 6 = solar valve temp. 7 = solar valve temp. from supplementary board</p>
<p>P60 Number of supplementary boards connected to the mother board (zone + solar)</p>	0 ÷ 4	0	Max. 4 boards, three zone boards and a solar card
<p>P61 Association of remote control, thermostat and ambient probe for the control of zone1 and zone2</p>	00 ÷ 07	00	<p>00 = remote control zone2; Ta2 zone1; 01 = Ta1 zone2; Ta2 zone1; 02 = Ta2 zone2; remote control zone1; 03 = SA1 zone1; Ta2 zone2; 04 = SA1 zone1; SA2 zone2; 05 = remote control zone1; SA2 zone2; 06 = zone1 not controlled; SA2 zone2; 07 = Ta1 zone1; SA2 zone2;</p>
<p>P62 Selection of zone 2 curve</p>	0 ÷ 3 (1=100)	0.6	It can be set only with connected zone board. <u>Without external probe:</u> value < 1, reduced range (low temperature)
<p>P63 Zone 2 set-point selection (fictitious temp.)</p>	5 ÷ 30 °C	20°C	It can be set only with connected zone board. <u>Without external probe:</u> Fixed flow set-point
<p>P66 Selection of zone 3 curve</p>	0 ÷ 3 (1=100)	0.6	It can be set only with two connected zone boards <u>Without external probe:</u> value < 1, reduced range (low temperature)
<p>P67 Zone 3 set-point selection (fictitious temp.)</p>	5 ÷ 30 °C	20°C	It can be set only with two connected zone boards <u>Without external probe:</u> Fixed flow set-point
<p>P70 Selection of zone 4 curve</p>	0 ÷ 3 (1=100)	0.6	It can be set only with three connected zone boards <u>Without external probe:</u> value < 1, reduced range (low temperature)
<p>P71 Zone 4 set-point selection (fictitious temp.)</p>	5 ÷ 30 °C	20°C	It can be set only with three connected zone boards <u>Without external probe:</u> Fixed flow set-point
<p>P74 Low temperature zone mixer valve</p>	0 to 300 s	140 s	It can be set only with connected zone board.



opening time			
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P75 Rise in nominal boiler temperature with zone board	0 ÷ 35 °C	5 °C	Useful to balance thermal shocks at the circuit breaker	
P76 Thermal discharge enabling with solar card	0 ÷ 1	0	0 = disabled 1 = enabled	
P78 Interface back-lighting switching on	0 ÷ 2	0	0 = standard (off) 1 = LCD always on 2 = LCD + keys always on	
System check	P80 Multifunction relay forcing	0 ÷ 1	0	0 = standard function 1 = relay energised
	P81 Zone 2 pump relay forcing	0 ÷ 1	0	0 = standard function 1 = relay energised
	P82 Zone 2 mixing valve forcing	0 ÷ 2	0	0 = standard function 1 = force opening 2 = force closing
	P84 Zone 3 pump relay forcing	0 ÷ 1	0	0 = standard function 1 = relay energised
	P85 Zone 3 mixing valve forcing	0 ÷ 2	0	0 = standard function 1 = force opening 2 = force closing
	P87 Zone 4 pump relay forcing	0 ÷ 1	0	0 = standard function 1 = relay energised
	P88 Zone 4 mixing valve forcing	0 ÷ 2	0	0 = standard function 1 = force opening 2 = force closing
	P90 Solar card pump relay forcing	0 ÷ 1	0	0 = standard function 1 = relay energised
	P91 Solar card valve relay forcing - opening	0 ÷ 1	0	0 = standard function 1 = relay energised
	P92 Solar card valve relay forcing - closing	0 ÷ 1	0	0 = standard function 1 = relay energised
P93 DHW 3-star function with connected remote control (<i>currently unavailable</i>)	0 ÷ 1	0	0 = OFF 1 = ON	
P94 Automatic filling enabled	0 ÷ 1	1	0 = disabled 1 = enabled	
P95 Maximum current to modulation coil (<i>point C of curve</i>)	0 to 170 mA	According to P0	See modulation diagram on page 42	
P96 Minimum current to modulation coil (<i>point B of curve</i>)	0 to 170 mA	According to P0		


SUPER-TECHNICAL parameter  **list (code 1398)**

<i>Parameter</i>		<i>Range</i>	<i>Default values</i>	<i>Notes</i>
P0 Display of boiler type		XYZ		X = P0 technical parameters Y = P2 technical parameters Z = P18 technical parameters
Boiler faults	P1 Boiler last shut-down displaying			Fault code
	P2 Boiler second last shut-down displaying			Fault code
	P3 Boiler third last shut-down displaying			Fault code
	P4 Boiler fourth last shut-down displaying			Fault code
	P5 Boiler fifth last shut-down displaying			Fault code
	P6 Shut-down display reset	0 ÷ 1	0	1 = shut-down reset
	P7 Display of total alarm counting			
P8 Display of board usage in months		Counting based on the board micro-switch reset. 30 reset operations correspond to one month.		
Automatic filling (with P94=1)	P10 Filling pressure ON and low water alarm E04	0.4 ÷ 1 Bar	0.4 Bar	
	P11 Filling pressure OFF	1 ÷ 2 Bar	1 Bar	
	P12 Filling time	10 ÷ 150 sec	60 sec	When this time has elapsed, the boiler triggers E08 alarm
	P13 Indicates that the pressure is too high (error E09)	2 ÷ 4 Bar	2.8 Bar	
	P14 Alarm E09 reset	1.8 ÷ 3.8 Bar	2.6 Bar	
	P15 Alarm E04 disappeared	0.6 ÷ 2 Bar	0.8 Bar	
	P16 Max. number of filling attempts in 24h	1 ÷ 10	3	After successful attempts
COMFORT Function	P20 Plate exchanger maintenance differential	0 ÷ 25 °C	14°C	With respect to set DHW set-point
	P21 Minimum time between maintenance cycles	0 to 30 min	10 min	
	P22 Pump circulation time prior to burner ignition	0 ÷ 180 sec	30 sec	Pre-circulation performed at the start of each maintenance cycle
	P23 Flow differential for burner OFF	0 ÷ 25 °C	6°C	With respect to set flow set-point



P24 Post-circulation time at the end of maintenance cycle	0 ÷ 180 sec	30 sec	
P25 Flame propagation time on TFS boiler with ramp enabled	0 to 4 s	2	
P26 DHW water flow measurement	0 ÷ 2	2	0 = flow switch 1 = flowmeter 2 = automatic: mid-interface, flow switch, top interface: flowmeter
P27 Gas valve modulation coil short-circuit control enable	0 ÷ 1	0	0 = disabled 1 = enabled
P91 Boiler overtemperature control	0 ÷ 1	0	0 = double probe 1 = limit thermostat
P92 Post-ventilation timer for TFS boilers after burner switching off	0 to 60 s	10	

**SECT. 5****OPERATING LOGIC****5.1 MAIN GENERAL CHARACTERISTICS**

- Function priority;
- Boiler type selection;
- Automatic flame control;
- Ignition with ramp or at pre-set output;
- DHW control;
- Plate DHW modulation;
- Boiler DHW modulation;
- DHW COMFORT function;
- CH control;
- Temperature range pre-selection;
- Ambient thermostat timer (antifast);
- Adjustable CH maximum output;
- Heating without ambient probe;
- Heating with ambient probe;
- Automatic operation;
- Heating modulation;
- Thermoregulation with ambient probe;
- Thermoregulation with external probe;
- Presetting for Remote Control;
- Programmable multifunction relay;
- Presetting for connection to supplementary boards;
- Temperature probe integrity check;
- Anti-shut-down function;
- Post-ventilation function;
- Pump post-circulation function;
- Anti-freeze function;
- Automatic filling function;
- Anti-legionella function;
- Gas proportional modulation coil integrity check;
- Safety devices and functions;

FUNCTION PRIORITY

The following table shows main function enabling priorities in case of simultaneous request of two or more functions.

Priority	Status
1	Shut-down status (<i>anti-freeze and anti-shut-down functions in pump only mode can anyway be carried out</i>)
2	Flue cleaning
3	Boiler anti-legionella (<i>only for R version with water heater</i>)
4	DHW request
5	Plate maintenance (<i>COMFORT function</i>)
6	DHW anti-freeze
7	Heating request in "DHW + CH" mode
8	Heating anti-freeze both in "DHW" and "DHW + CH" modes
9	Post-circulation
10	Pump anti-shut-down
11	Waiting for a request



BOILER TYPE SELECTION

Boiler type configuration;

This board is preset to manage 3 different types of boiler configurations, depending on the setting of parameter P3:

P3 = 1 → *combi instant plates* (model CTFS)

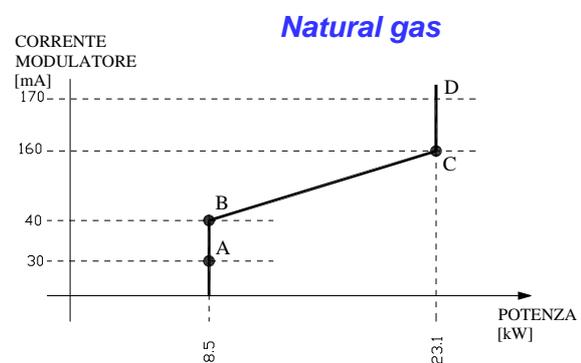
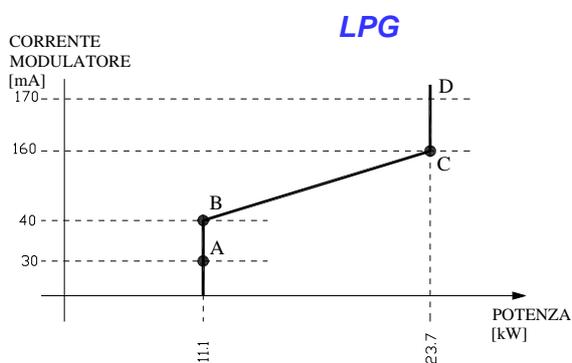
P3 = 2 → *heating only* (model RTFS)

P3 = 3 → *with water heater* (model RTFS with boiler management)

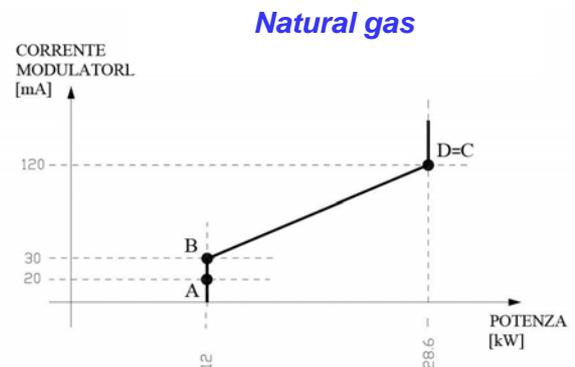
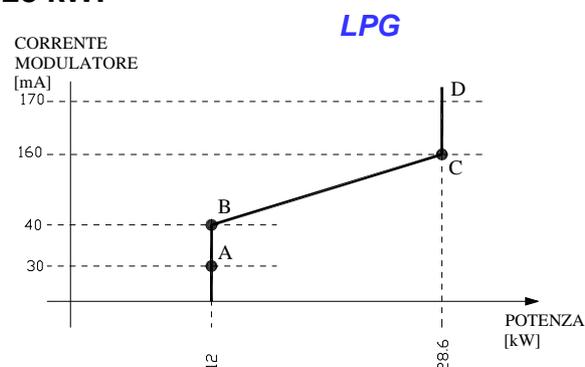
Natural gas or LPG configuration

This selection is obtained by setting parameter P0 (see previous section) to select the "current-output" curve to be applied to the gas proportional modulation coil in order to achieve the correct modulation:

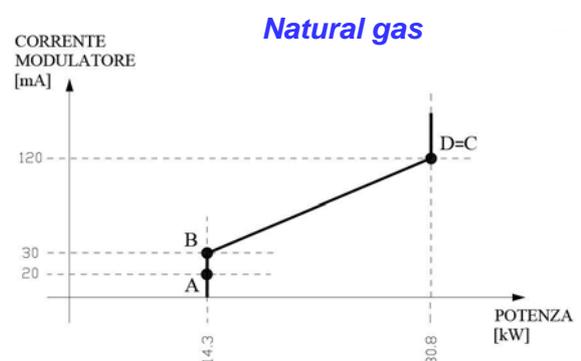
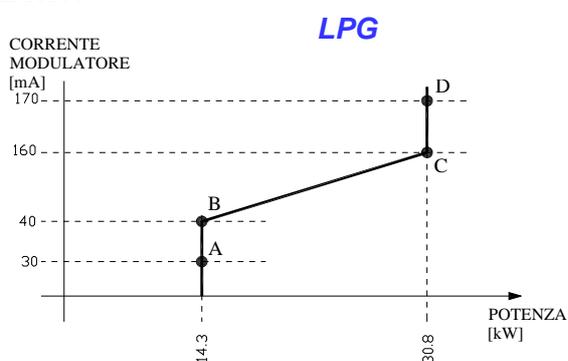
24 kW:



28 kW:



32 kW:



Warning: the "current-output" curve can be modified by moving point B through parameter P96 and point C through parameter P95.



CTFS Configuration (forced draught)

The type of boiler (sealed chamber or open chamber) is automatically recognised each time the board is supplied with power. The board attempts to read the inlets dedicated to the air pressure switch. During such phase, “CHA” will appear on the boiler display and upon the following recognition (which must take place within the first two minutes) **C** (sealed chamber) will be displayed for 5 seconds.

No request will be performed during boiler type recognition.

In case of wrong self-recognition, see the specific paragraph on page 82.

Boiler hydraulic configuration (with P3=3)

For heating-only boilers to which a DHW system is combined, the board is able to manage different hydraulic configurations through parameter P28 (default setting is 0) depending on system type.

The two configurations allowed are listed below:

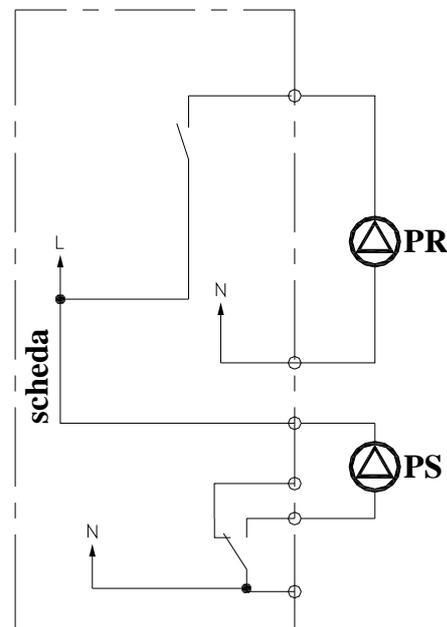
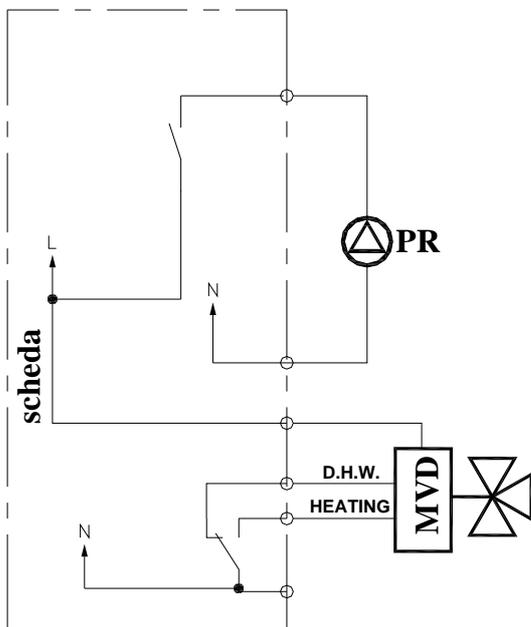
P28=0, boiler pump + deviating valve: DHW system is managed by the operation of both the boiler pump and of the three-way deviating valve. The latter should be of spring return type and is to be connected to terminals 24 and 25 of the boiler.

Warning: respect the priority toward the DHW system when installing the valve (valve normally open to the domestic hot water heating circuit).

P28=1, double pump: the DHW system is managed by a dedicated external pump to be connected to the terminals 24 and 25.

Boiler pump is off during domestic hot water heating.

Reference wiring diagrams are given below:



PR: boiler pump

MVD: three-way deviating valve

PS: DHW pump

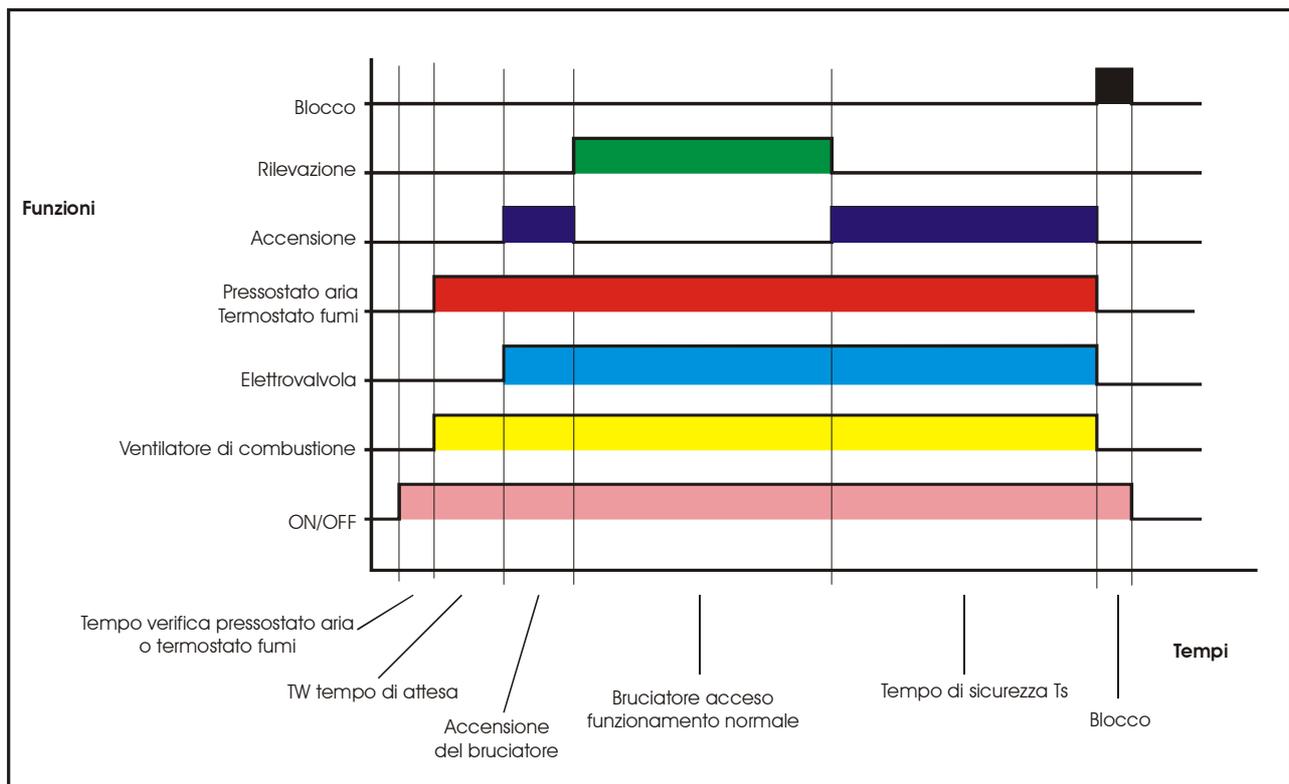


AUTOMATIC FLAME CONTROL

The device is always enabled and constantly performs self-check functions.

Upon an operation request, the fan is supplied with power after checking that the air pressure switch (C type) is in rest condition. As soon as the air pressure switch enabling is output, the flame control device starts measuring the waiting time TW (1.5 seconds); after such time, gas valve and igniter will be energised for a maximum safety time TS (10 seconds). If a flame is detected within such time, the gas valve is kept open (energised) and the igniter is cut-out.

Hereinafter is boiler operation logical diagram:



In case no flame is detected during an **ignition** attempt, the automatic flame control will repeat the ignition sequence, performing up to **5 ignition attempts**, with a 10-second ventilation cycle to flush the chamber after each attempt.

In case of flame detection, even if just for a moment, only one ignition attempt will be performed.

The *flame control shut-down* will be activated if no flame is detected within the TS safety time since the last ignition attempt, or if a parasitic flame (while the gas valve is not energised) is detected for over one minute.

After 5 seconds, reset the shut-down status by pressing the “reset” key on the boiler board or on the remote control.

WARNING: maximum 5 reset attempts are allowed, both from remote control and from the boiler interface. After such attempts, the error E98 or E99 will be displayed (*no more shut-down-reset attempts allowed*).

Alarm counting is reset each time the board detects a flame or its power supply is interrupted.



IGNITION WITH RAMP OR AT PRE-SET POWER

Boiler ignition mode is selected with parameter P6 (default setting is 0):

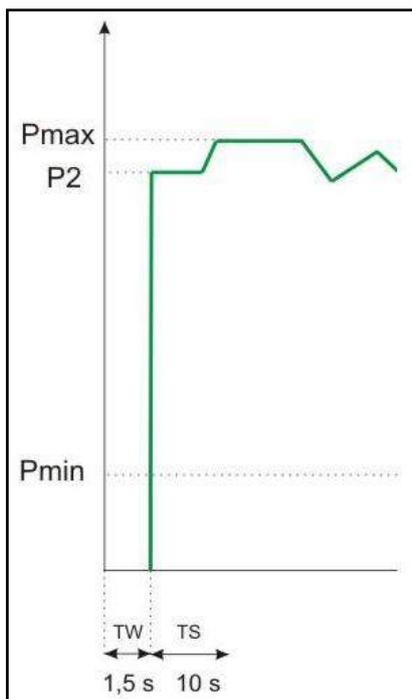
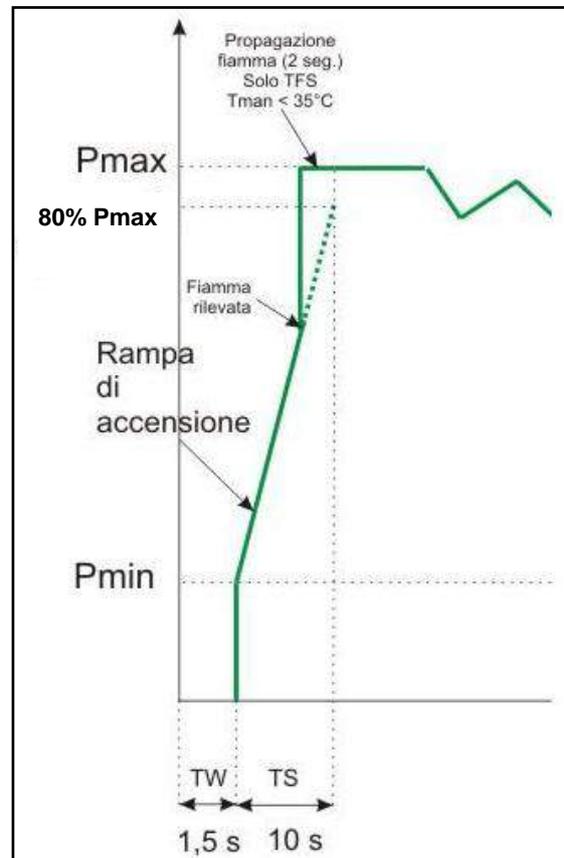
P6=0 → Ignition with ramp

Upon every operation request entailing burner ignition, burner will be ignited with a current ramp to modulation coil changing from the initial to the final value within 10 seconds. The initial value corresponds to the minimum current supplied to the modulation coil (30 mA for LPG and 20 mA for natural gas), whereas the final value is 80% of the maximum current (170 mA for LPG and 120 mA for natural gas).

The ignition ramp ends one second after the flame control has detected the flame.

Flame propagation will now take place if temperature is below 35 °C, i.e. the modulation coil will be supplied with current for maximum two seconds (super-technical parameter P25).

At the end of the flame propagation phase, boiler will start operating normally and igniter will be cut out two seconds after flame detection or one second before TS safety time runs out.



P6≠0 → Ignition at pre-set and adjustable output

Upon every operation request entailing burner ignition, burner will be ignited by supplying the modulation coil with a pre-set current, equal to parameter P6 value. Once flame is detected, the following flame propagation phase, which lasts 2 seconds, will be started (super-technical parameter P25), proceeding then with the modulation output.

Igniter will be cut out two seconds after flame detection or one second before TS safety time runs out.



DHW CONTROL

With boiler running in "DHW" or "DHW + CH" mode, a flow rate exceeding 2.5 litres/minute within the flowmeter (CTFS version) or boiler programme enabling (RTFS version with water heater), generates a DHW operation request, thus starting "*DHW modulation*".

The operation request in DHW mode has the priority over all other requests, and finishes when the previously mentioned electric contacts are opened again.

WARNING: only for combined instantaneous versions (CTFS), with parameter P15, it is possible to delay the flowmeter reading for the DHW mode (from 0 to 10 seconds).

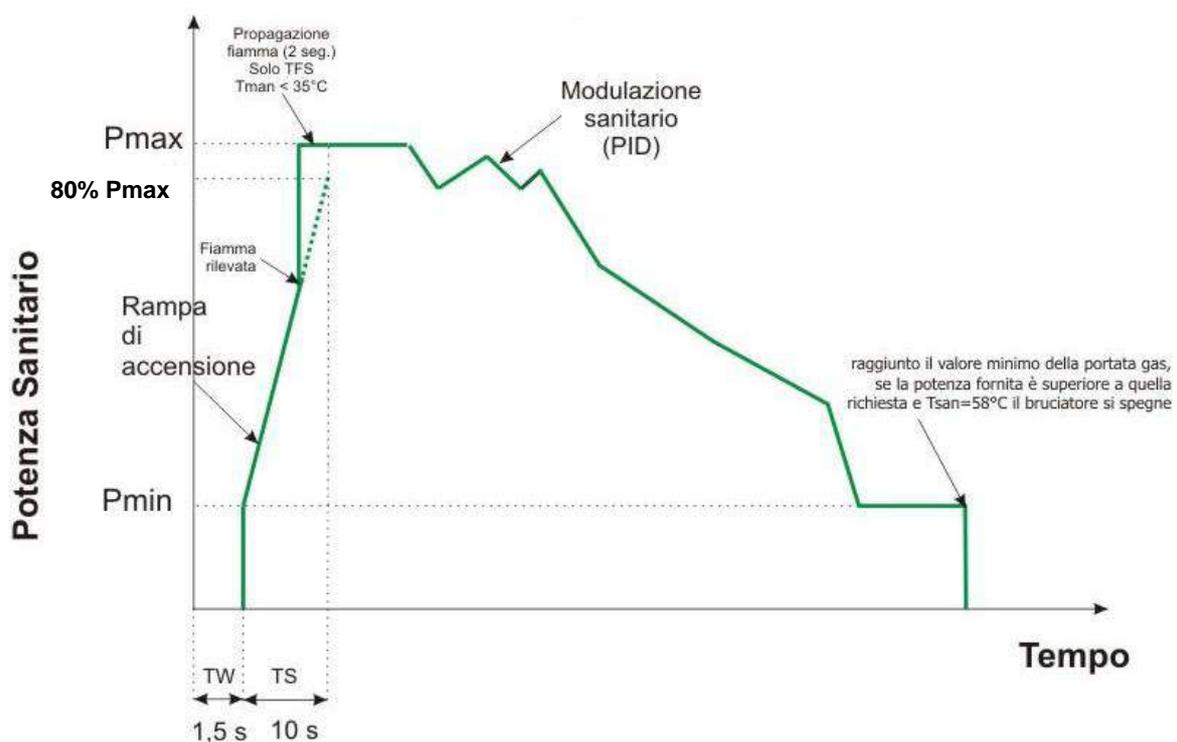
PLATE DHW MODULATION *(only for combined version, P3=1)*

Upon an operation request in plate DHW mode, if the water temperature read by the domestic hot water NTC probe is lower than the set-point value + 3°C (*plate DHW thermostat triggering temperature ON*), the burner ignition sequence is started with the automatic flame control enabling.

Immediately after burner ignition, gas flow rate corresponds to flame modulation value which, thanks to a PID-type action, allows to reach and maintain the set DHW temperature.

In case of poor heat output by the plate exchanger due to possible clogging and consequent overtemperature of the primary body, another PID-type setting on the flow line is added to the DHW modulation. Such operation occurs at a flow temperature higher than 81°C and disables when the flow temperature falls below 75°C. In presence of double modulation, the gas flow rate supplied to the burner corresponds to the lowest modulation value.

Modulation with P6=0





During DHW modulation, once the min. gas flow rate is reached and with the supplied output above the required one, the burner is switched off when DHW temperature reaches the + 5°C set-point value. After burner switching off, whilst the operation request is still present, burner will be ignited again when the temperature falls below the + 3°C set-point. During the first 20 seconds when the DHW is being drawn, to avoid boiler continuous "switch on/off", the maximum temperature allowed by the DHW probe to switch off the burner is set to 15°C higher than the set-point, whereas to switch it on again the temperature must fall below the + 8°C set-point.

During the plate DHW modulation mode, the boiler pump is supplied with power and the deviating valve is in DHW position, whereas the multifunction relay is in the rest condition.

Warning: the burner is switched off also in case the flow probe detects a value of 85°C and then ignited again (with the request still present) only upon reaching 80°C.

Plate DHW modulation temperatures:

- DHW temperature setting range: **35 °C ÷ 57 °C**
- DHW thermostat triggering temperature OFF = set point + 5°C
- DHW thermostat triggering temperature ON = set point + 3°C
- DHW thermostat triggering temp. initial draw (first 20 sec) OFF = *set point + 15° C*
- DHW thermostat triggering temp. initial draw (first 20 sec) ON = *set point + 8° C*
- Flow water thermostat triggering temperature with plate DHW mode: *OFF 85° C*
- Flow water thermostat triggering temperature with plate DHW mode: *ON 80° C*
- Flow water PID triggering temperature with DHW mode: *81° C*
- Flow water PID deactivating temperature with DHW mode: *75° C*

N.B. In case the boiler is combined with a solar plant with instantaneous-type integration, it is recommended setting parameter P14 to 1. This increases the modulation range, avoiding boiler hunting (start and stop) with inlet temperature very close to the set-point. In such case, the limit temperatures are as follows:

- DHW thermostat triggering temp. OFF with instantaneous solar integr.: *set-point + 10° C*
- DHW thermostat triggering temp. ON with instantaneous solar integr.: *set-point + 9° C*

BOILER DHW MODULATION (only for RTFS version with water heater, P3=3)

With boiler running in "DHW" or "DHW + CH" mode, the boiler programme enable time generates a request in DHW mode.

If the water heater temperature read by the NTC probe is lower than the *boiler priority thermostat ON* triggering temperature (set-point - 3°C) set either through boiler or through remote control and the flow temperature is lower than 70°C, the burner ignition sequence is started with the automatic flame control section enabling.

At the end of this sequence, the power supplied to the burner corresponds to the flame modulation value which, thanks to a PID-type action, allows to reach and maintain the **flow modulation temperature** in boiler mode. Such temperature is calculated according to the requested boiler temperature and of the current temperature read by the probe, and shall in any way lie within a lower value (corresponding to "*requested boiler temperature + 10°C*") and a higher value (85°C). Max. flow modulation occurs when the difference between *requested boiler temperature* and *current boiler temperature* is higher or equal to 10°C.



During boiler heating phase:

- with **P28 = 0** (*pump and deviating valve*), the boiler pump is supplied with power whereas the deviating valve is in DHW position;
- with **P28 = 1** (*heating pump and DHW pump*), the heating pump is off whereas the DHW pump is supplied with power;

while the multifunction relay is in the rest condition.

Boiler DHW modulation temperature:

- DHW temperature setting range: **35 °C ÷ 65 °C**
- Boiler priority thermostat triggering temperature OFF = *set-point* + 0 °C
- Boiler priority thermostat triggering temperature ON = *set-point* - 3 °C
- Max. flow modulation temperature in boiler mode = 85° C
- Minimum temperature difference between requested boiler and flow modulation temperatures = 10° C
- Temperature difference between requested and current boiler temperatures for max. flow modulation = 10° C
- Temperature difference between requested and current boiler temperatures for min. flow modulation = 0° C
- Flow water thermostat triggering temperature in DHW mode - boiler OFF = 86° C
- Flow water thermostat triggering temperature in DHW mode - boiler ON = 70° C

DHW COMFORT FUNCTION

In the CTFS version (*combined instantaneous*) with P3=1, plate exchanger maintenance function can be enabled and disabled with the "COMFORT-ok" key to achieve the three-star efficiency when the boiler is in DHW mode.

When this function is enabled, "COMFORT" will appear on the boiler display and the maintenance cycle described below is limited by the super-technical parameters (from P20 to P25).

Operating logic:

maintenance comes into operation only if the temperature read by the DHW probe is lower than the set hot water temperature (Tset_san) minus the value of super-technical parameter P20 (default 14°C) and in case the time elapsed since the last maintenance cycle is longer than the time set by P21 (default 10 min):

$$Tset_San < (Tset_San - P20st) \text{ and } Temp_maintenance > P21$$

If this condition occurs, a pump pre-circulation cycle is performed for a time equivalent to P22st (default 30 seconds). After this pre-circulation, the burner will ignite if the temperature read by the flow probe (Tman) is lower than Tset_san + P20st.

In case of burner ignition, burner will be switched off as soon as Tman flow temperature exceeds Tset_san + P23st value, with the subsequent pump post-circulation for a time equivalent to P24st (default 30 seconds).

For the RTFS versions (*heating only fitted with a boiler*), the COMFORT function enabled with P3=3 allows to bypass the programming reserved to water heater, thus allowing for domestic hot water heating also outside set time slots.

When said function is disabled, the boiler will resume the programme-managed control of water heater.



CH CONTROL

The boiler electronics features a "timer" function for the weekly programming of heating times (automatic operation). This function can be used to manage separately up to two zones and the relevant signals are connected to the boiler board, which features two inputs for the connection of the standard ambient thermostats and one remote control. The interface board features two inputs to manage the climate control of each zone using the specific ambient probes.

Use parameter P61 to associate the zone with the relevant climate control device (thermostat or remote control or ambient probe).

Use of an ambient probe (even just one) must be enabled with parameter P57 (probe presence).

To use two ambient probes, it is necessary to add a zone board (enter the number of supplementary boards present using parameter P60), as the multifunction relay integrated in the board can manage one single circuit.

Using parameters P57, P60 and 61 it is therefore possible to manage different solutions, depending on the requirements. In case of wrong parameter configuration, the error E43 will be displayed.

Warning: in case of particularly "complex" zone systems, refer to instruction manual supplied along with the zone board kit. In any case, it is not possible to manage more than four zones (taking into account boiler board and supplementary boards). It should also be pointed out that the automatic programming from the boiler is allowed only for the first two circuits (zones).

TEMPERATURE RANGE PRE-SELECTION

With parameter P10, without any external probe, it is possible to set two ranges (standard or reduced) in order to adjust the flow water by means of the boiler keys or the remote control:

$P10 < 1 \rightarrow$ heating temperature reduced range: $35 \div 45^{\circ}\text{C}$

$P10 \geq 1 \rightarrow$ heating temperature standard range: $35 \div 78^{\circ}\text{C}$

Using an external probe, instead, such parameter corresponds to the thermoregulation curve selection (see paragraph "Thermoregulation with external probe").

AMBIENT THERMOSTAT TIMER (ANTIFAST)

During modulation in heating mode, after burner switching off, wait 240 sec (parameter P11). After that, if the flow temperature is lower than the "set-point", the burner is switched on again.

Besides, the heating thermostat timer is reset:

- upon a DHW request;
- at the end of a heating request;
- selecting the "standby" or "DHW" mode or resetting the boiler;
- if the flow water temperature value falls below the parameter P27 (40°C with standard range, or 35°C with reduced range).



ADJUSTABLE HEATING MAXIMUM OUTPUT

During operation in heating mode, the maximum output supplied to the burner is equal to the one set by parameter P7.

This parameter represents the percentage (default 100%) of maximum admissible current supplied to the modulation coil (120 mA for natural gas and 170 mA for LPG).

CH WITHOUT AMBIENT PROBES (P57=4)

With the boiler set on the "DHW + CH" or "Heating only" operating mode, the closing up of ambient thermostat electric contact (or the enabling signal from the remote control) will result in a request in the heating mode, making heating modulation start.

It is possible either to manage the heating zones with the relevant control devices only (manual operation), or to set the heating times (automatic operation) of zones 1 and 2 directly from the boiler. In the latter case, the "timer" function is logically connected in series with the inputs of the climate control devices.

WARNING: with parameter P16 it is possible to delay the ambient thermostat reading to allow the zone valves (if available) to open before the boiler pump starts (from 0 to 199 seconds).

CH WITH AMBIENT PROBES (P57≠4)

To allow for managing the heating zones using the ambient probes, they have to be enabled, i.e. value of parameter P57 must be different from 4.

Ambient probe 1 (SA1) is associated with zone 1 and with heating programme 1, whereas ambient probe 2 (SA2) is associated with zone 2 and with heating programme 2.

WARNING: it is possible to connect two ambient probes only if a zone supplementary board is present, otherwise it is not possible to manage ambient probe 2 (SA2).

Operating logic

The CH function is enabled only if the boiler is in the "DHW + CH" or "Heating only" mode. The "Ambient set-point" setting is on two levels: daytime temperature and night-time temperature, represented respectively by the symbols ☀ and 🌙. During manual operation, only the daytime level is taken into account, while in the automatic operation (weekly programming) the levels correspond to the enable/disable times.

Ambient probe requests heat when ambient temperature is lower than or equal to "Ambient set-point" minus "triggering differential ON" value (parameter P52 for SA1 and P55 for SA2). Request stops when ambient temperature is higher than or equal to "Ambient set-point" plus "triggering differential OFF" value (parameter P51 for SA1 and P53 for SA2).

Example:

$T_{set-point\ SA1}=20^{\circ}C$; $P51=0.2$; $P52=-0.3$

Heating is enabled when ambient temperature SA1 ≤ 19.7
Heating is disabled when ambient temperature SA1 ≥ 20.2



In case of probes not correctly set or installed in an improper position, the ambient probe reading can be corrected with the parameters P53 (for SA1) and P56 (for SA2). Ambient probe value is the result of the value read by ambient probe plus or minus the value of the two parameters given above (from -5°C to +5°C).

WARNING: *in case the probes are damaged (short-circuit, open circuit or out of range value) error E44 will be displayed for SA1 and error E45 for SA2. Any active heating circuit(s) will be interrupted.*

In case two ambient probes are used, the setting of daytime and of night-time temperatures must be the same for both probes. To set different temperatures, it is necessary to correct the reading with the specific parameters.

Modulation types with ambient probe

By setting parameter P57, it is possible to use the ambient probes and have the boiler work in CH mode using the type of modulation which is most suitable for the system.

The differences are given below, pre-condition being that the two zones must be managed at the same temperature, with ambient probe (zone1) and heating thermostat (zone2) respectively. According to the above described condition, parameters P17, P60 and P61 must be set to 1, 0 and 03 respectively.

P57=0 Modulation on-off

In this case, an external probe is not necessary and flow temperature is set with "+/- heating" key at fixed point (35-45°C or 35-78°C) for both circuits.

P57=1 Ambient probe modulation

External probe is not necessary.

Zone 2 works at a fixed temperature selected with "+/- heating" key (35-45°C or 35-78°C) and follows programme 2. Instead, the set-point requested by zone1 (ambient probe) is calculated according to the temperature detected by the probe, and of the "Sun or moon temperature" selected in the heating programme 1.

In case both zones request heat, the flow set-point calculated will be the highest of the two requested.

P57=2 External probe modulation

In this case, it is necessary to use the external probe with the relevant thermoregulation curve setting (P10).

Zone 2 works at sliding temperature, calculating the set-point as a function of the external temperature, of the set curve and of the "Fictitious ambient temperature" set with "+/- heating" key, according to the specific programme.

Instead, the set-point requested by the ambient probe (zone1) is calculated as a function of the external temperature, of the set curve and of the "Day and night temperatures" selected in the heating programme 1.

In case both zones request heat, the flow set-point calculated will be the highest of the two requested.

P57=3 Ambient probe and external probe modulation

Also in this case, the use of the external probe is necessary, with the relevant setting of the thermoregulation curve (P10).



Zone 2 works at sliding temperature, calculating the set-point as a function of the external temperature, of the set curve and of the "Fictitious ambient temperature" set with "+/-heating" key, according to the specific programme.

Instead, the set-point requested by the probe (zone1) is calculated as a function of the external temperature, of the ambient temperature, of the set curve, of the constant "K" (P58) and of the "Day and night temperatures" selected in the heating programme 1.

In case both zones request heat, the flow set-point calculated will be the highest of the two requested.

N.B: For set-point calculation according to modulation of external probe, of ambient probe or of both, refer to the specific paragraphs on page 55 and 56.

Ambient probe configuration errors

In case of a wrong connection of the probes to the relevant inputs and particularly in the case of not allowed configuration between parameters P57, P60 and P61, the fault is signalled with the relevant error code **E43**, resulting in heating circuit disabling (if operating).

The most common errors that can lead to this fault are connected with the use of the supplementary zone board and of the remote control.

A summary of the allowed configurations is listed below:

SA1	SA2	REMOTE CONTROL	ZONE BOARD	P57	P60	P61	NOTES
0	0	0	0	4	0	Not displayed	
0	0	0	1	4	1 ÷ 4	01 - 02	
0	0	1	0	4	0	Not displayed	
0	0	1	1	4	1 ÷ 4	01 - 02	
0	1	0	0	configuration not allowed			E43
0	1	0	1	≠ 4	1 ÷ 4	06	
0	1	1	0	configuration not allowed			E43
0	1	1	1	≠ 4	1 ÷ 4	05	
1	0	0	0	≠ 4	0	Not displayed	
1	0	0	1	configuration not allowed			
1	0	1	0	configuration not allowed			E43
1	0	1	1	configuration not allowed			E43
1	1	0	0	configuration not allowed			E43
1	1	0	1	≠ 4	1 ÷ 4	04	
1	1	1	0	configuration not allowed			E43
1	1	1	1	configuration not allowed			E43

Key: 1 = present
0 = absent

Warning: the use of a supplementary zone board is mandatory when using a double ambient probe or when adding a remote control.

AUTOMATIC OPERATION

The interface features a weekly hour programming for maintaining the water heater (RTFS version) and for activating the heating at the desired times in association with each single zone: one for the TA1 input and one for the TA2 input.

The "sun" symbol (with indication of the lit bars) indicates that heating is enabled; whereas the "moon" symbol (bars off) indicates disabling periods.

The hour programming is logically in series with the ambient thermostat inputs. This means that the boiler will perform heating only if the TA contact is closed and if the programming is in the enabled periods (sun).

Programmes and zones are associated by parameter P61.

In presence of the remote control and without supplementary boards, the associated zone is always zone1. When a remote control is connected, the hour programming of the associated zone (and of the water heater if available) will not be shown by the boiler display as it is set directly through remote control.

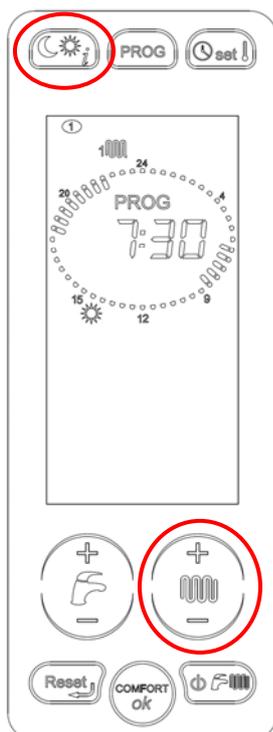
Programming procedure

To access programme display or editing mode, press "PROG" key repeatedly:

- 1 , press twice to access heating programme for zone 1;
- 2 , press three times to access heating programme for zone 2;
- 3 , press four times (only for RTFS with P3=3) to access the programme for maintaining water heater.

Each time the "PROG" key is pressed, its icon flashes displaying the programme to which access is required (displaying the current operation period). Press the "ok" key to access actual programming.

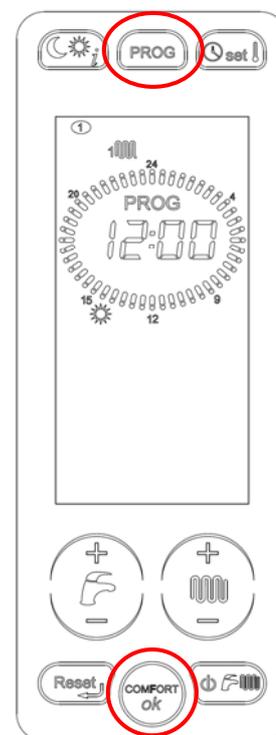
Then select the day(s) of the week to be edited using the "+/- heating" key and confirming as usual with the "ok" key (the icon associated to the day(s) will stop flashing and will remain on steady).



It is now possible to associate the day/night level (by means of the "sun/moon" key) with the desired time, using the "+/- heating" key:

In case single days are programmed, when exceeding the 24 h use the "+/- heating" key and the system will automatically switch to the next day without having to repeat the whole sequence.

Press the "reset" key to change day or programme immediately. Press it twice repeatedly to quit the programme completely and return to the main page.





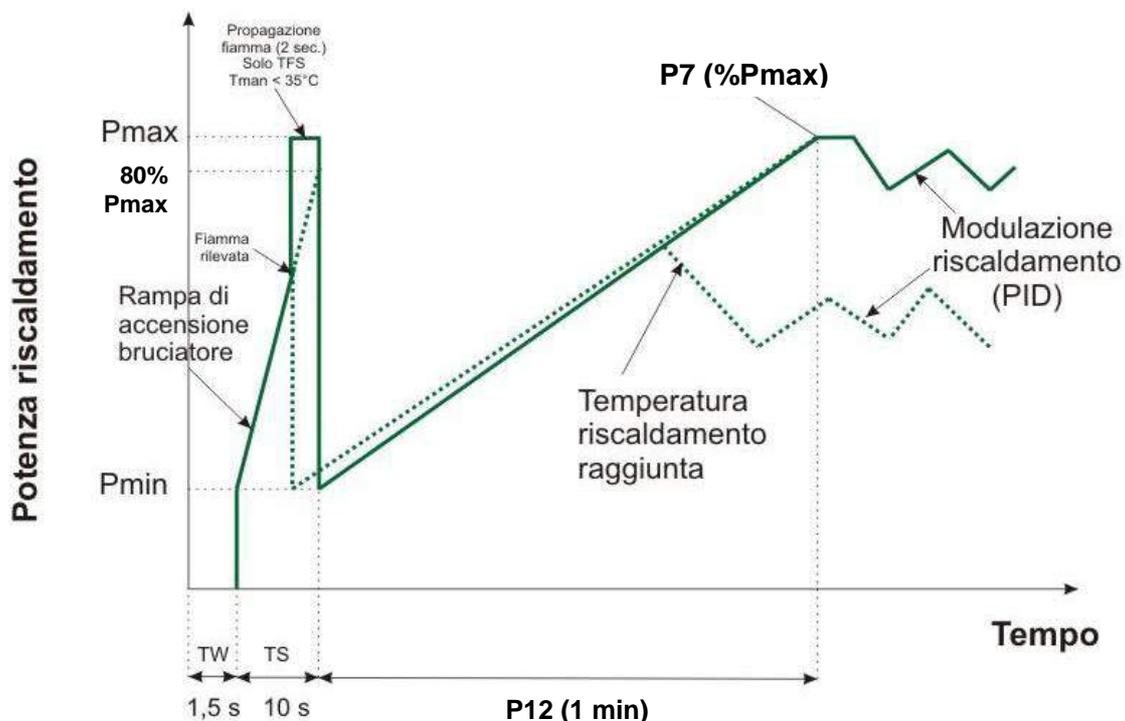
HEATING MODULATION

Upon an operation request in heating mode by thermostat or ambient probe or remote control, burner ignition sequence is started with the automatic flame control section enabling, if the water temperature read by the flow NTC probe is lower than the set temperature value.

At the end of the ignition sequence, gas flow rate goes to its minimum value and then reaches the value set by parameter P7 (maximum heating output) with a ramp duration equal to the heating output rising ramp timing which can be set by parameter P12 (default - one minute).

From now on, the flow water temperature will constantly be read and the rising ramp will be stopped with a PID-type action upon reaching the set temperature, in order to maintain the selected flow temperature.

Modulation with P6=0



Upon reaching the minimum gas flow rate (P_{min}), if the output supplied is still higher than requested, the burner will be switched off as soon as a flow temperature higher than the set temperature is reached (set-point $+5^{\circ}C$ in case of a standard range and set-point $+2^{\circ}C$ at a reduced range). The burner is switched off and measuring of burner deactivation time starts (see section about "Ambient thermostat timer").

During the heating phase:

- with **P28 = 0** (*pump and deviating valve*), the pump is supplied with power and the deviating valve is in DHW position;
- with **P28 = 1** (*heating pump and DHW pump*), the heating pump is supplied with power whereas the DHW pump is off;



- with **P17 = 1** (multifunction relay in *remote relay/TA1*), the relay is energised in response to a request from the remote control or from TA1 and returns to the rest condition upon a DHW request or in case the boiler is switched OFF or to DHW ONLY mode;
- with **P17 = 3** (multifunction relay in *TA2 request*), the relay is energised in response to a request from TA2 and returns to the rest condition upon a DHW request or in case the boiler is switched OFF or put into DHW ONLY mode;

During the operation in heating mode, upon any DHW request, the latter has higher priority and forces the interruption of the function in progress.

CH modulation temperature - standard range (P10≥1):

- CH temperature setting range: 35÷78°C
- CH thermostat triggering temperature OFF = *set-point* + 5° C
- CH thermostat triggering temperature ON = *set-point* + 0° C
- Heating thermostat timer (antifast) - can be set through P11: 0÷10 min, default 4 min with $T_{flow} > P27$
- CH thermostat timer reset temperature through parameter P27: 35÷78°C, default 40°C
- Heating output rising ramp timing by means of parameter P12: 0÷10 min, default 1 min

Heating modulation temperature reduced range (P10<1):

- Heating temperature setting reduced range: 35÷45°C
- Reduced CH thermostat triggering temperature OFF = *set-point* + 2° C
- Reduced CH thermostat triggering temperature ON = *set-point* - 2° C
- Heating thermostat timer (antifast) - can be set through P11: 0÷10 min, default 4 min with $T_{flow} > P27$
- CH thermostat timer reset temperature through parameter P27: 35°C fixed
- Heating output rising ramp timing by means of parameter P12: 0÷10 min, default 1 min

The **set-point** depends on the setting of the heating temperature through the boiler keys or the temperature set through remote control.

THERMOREGULATION WITH AMBIENT PROBE

Flow water temperature value is set differently depending on the type of ambient modulation to be set

With **P57=0** (*on - off-type modulation*) flow set-point is set with the “+/- heating” keys;

With **P57=1** (*ambient probe modulation*) flow set-point is calculated according to parameter P10 according to the following formula:

$$P10 \geq 1 \rightarrow T_{set_flow} = 45^{\circ}\text{C} + [20^*(\text{ambient } T_{set_point} - T_{current_ambient})]$$

$$P10 < 1 \rightarrow T_{set_flow} = 30^{\circ}\text{C} + [20^*(\text{ambient } T_{set_point} - T_{current_ambient})]$$

With **P57=2** (*external probe modulation*) refer to next section;



With **P57=3** (*ambient probe and external probe modulation*) flow set-point value is calculated according to the external probe and to the selected curve (as with P57=2), plus the following value:

$$\Delta T_{\text{flow}} = \text{Curve} * K * \Delta T_{\text{ambient}}$$

where,

ΔT_{flow} = value to be added to the calculation of flow with external probe;

Curve = curve set value (P10)

K = constant indicating ambient probe weight given by parameter P58 (default 8)

$\Delta T_{\text{ambient}}$ = difference between set temperature and temperature read by the ambient probe.

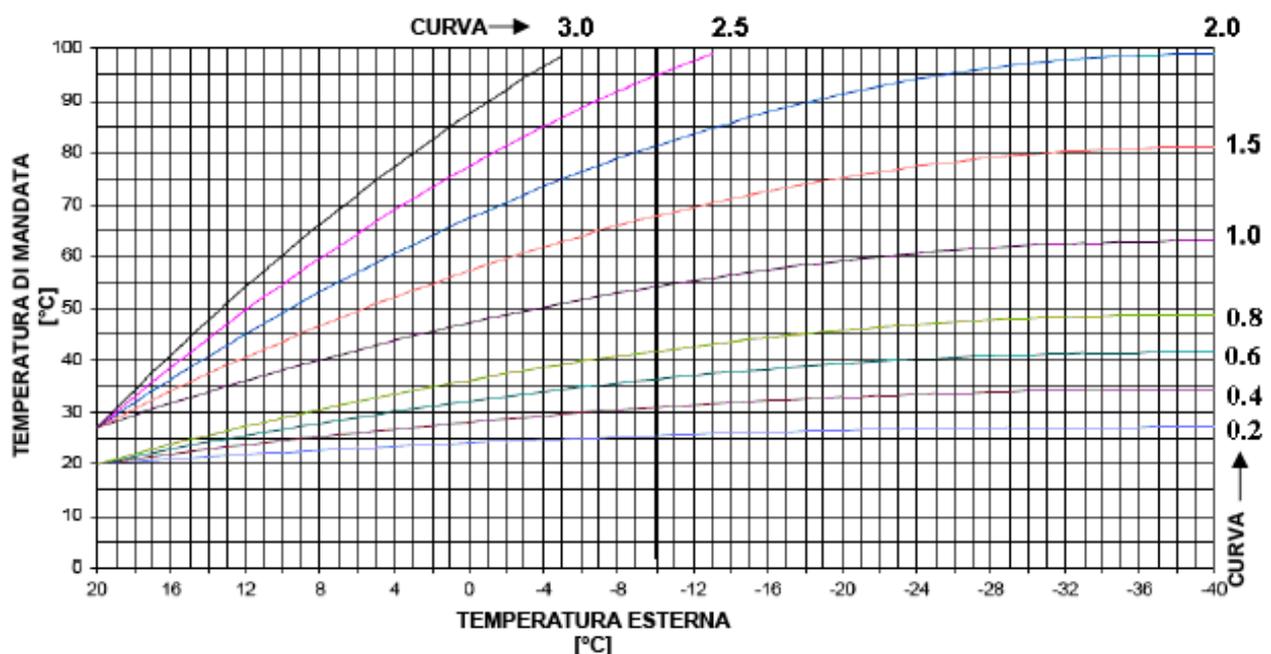
WARNING: flow temperature value will anyway be limited within the maximum limit, whatever the result of the calculation may be: 78°C (standard range) or 45°C (reduced range).

THERMOREGULATION WITH EXTERNAL PROBE

The external temperature probe to be connected will automatically modify the heating flow water temperature according to:

- the measured *external temperature*;
- the selected *thermoregulation curve* (parameter P10);
- the *fictitious ambient temperature* setting (for the zones not managed by the ambient probe);
- the *day/night temperature* selected by the heating programme (for the zones not managed by the ambient probe).

The thermoregulation **curve** is selected by means of parameter **P10** (value from 0 to 3), whereas the **fictitious room temperature** is selected with the “heating” keys.





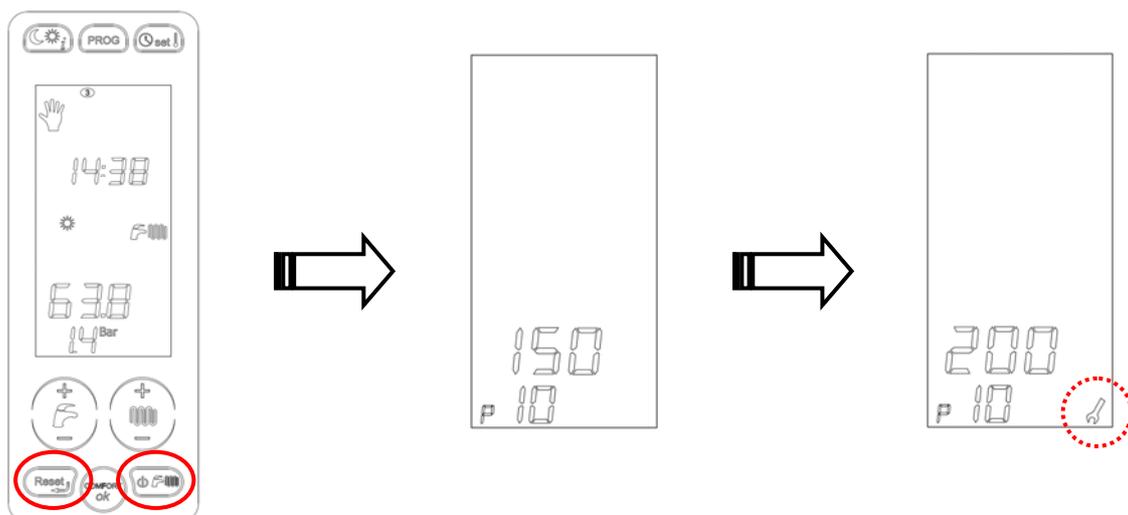
The board independently detects the presence of the external temperature probe and enables the thermoregulation function, by keeping the flow temperature within the heating temperature pre-selection range (35 °C ÷ 78 °C or 35 °C ÷ 45 °C).

If both the external probe and the remote control are present, assuming that the remote control is able to set and carry out its own thermoregulation, the modulation board transmits the external temperature value to the remote control, and if the heating request is determined by the same control, this will determine the flow temperature according to its thermoregulation curve and to the room temperature previously set.

Otherwise, if the heating request comes simultaneously from the remote control and the amb. T. contact closing on the board, both the remote control and the modulation board independently calculate the flow temperature according to relevant thermoregulation curves and set ambient temperatures. The highest of the two flow temperature values will be used.

Thermoregulation curve setting

To access the parameter setting mode, press “reset” and “boiler status” keys simultaneously for three seconds.



Use “+/- heating” keys, to select parameter P10. Press “OK” to confirm that parameter value must be edited (the wrench symbol indicates that parameter value can be edited using keys “+/- heating”):

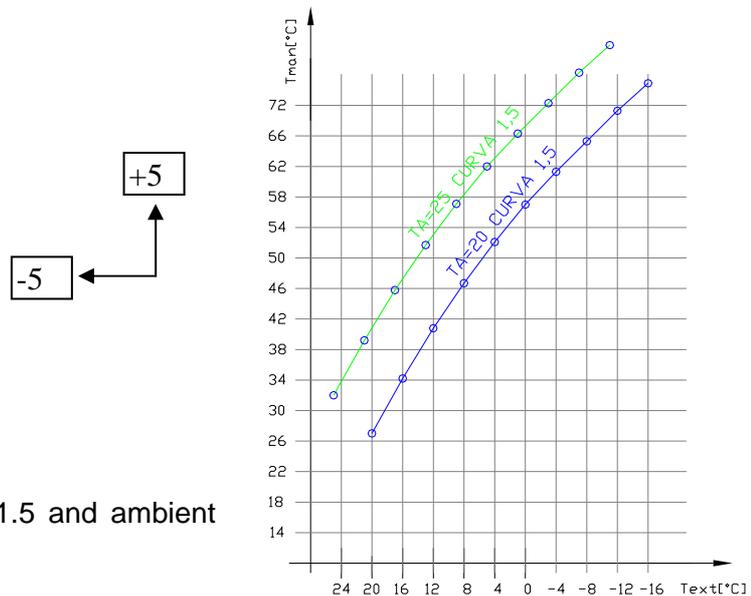
- **For high temperature systems**, it is recommended to set parameter P10 to a value between 1 and 2.
- **For low temperature systems**, it is recommended to set parameter P10 to a value between 0.2 and 0.8.

Then confirm the modification of the parameter value by pressing the “ok-COMFORT” key and quit programming with the “reset” key.



The curves given in the above diagram refer to a request of a “fictitious ambient temperature” of 20°C.

In case of different fictitious temperature, all curves are shifted in a parallel translation:



Example of curve shifting with P10=1.5 and ambient fictitious temperature from 20 to 25°C.

Curves can be chosen proceeding either roughly and approximately or using a simple mathematical formula. In either case, it will be necessary to check the temperature changes so as to correct and choose the proper curve accurately.

In the former case you will simply need to take an actual value of external temperature and associate the desired flow value to it. Then choose the closest curve.

Example:

at an external temp. of -4°C, a flow of 62°C is required; **curve: 1.5**

In the latter case use the following formula:

$$\text{CURVE} = \frac{T_{\max} - 20}{20 - T_{\text{extmin}}}$$

Where, T_{max} is the maximum flow temperature and T_{extmin} is the minimum external temperature.

Example:

Low temperature:

T_{max} = 44°C
T_{ext} = -10°C

$$\text{CURVE} = \frac{44 - 20}{20 - (-10)}$$

P10 curve = 0.8

High temperature:

T_{max} = 70°C
T_{ext} = -10°C

$$\text{CURVE} = \frac{70 - 20}{20 - (-10)}$$

P10 curve = 1.7



Checking the thermoregulation curve setting

It takes time to choose the best curve. Consider the following suggestions:

- if upon external temperature decrease the room temperature increases, it is necessary to set a curve with a lower slope, i.e. a lower curve;
- if upon external temperature decrease the room temperature decreases, it is necessary to set a curve with a higher slope, i.e. a higher curve;
- Lastly, if the room temperature remains constant upon changing of the external temperature, the curve is correct.

If the room temperature is constant but different from the desired value it is necessary to translate the curve.

This occurs automatically by pressing the “+/- heating” keys on the boiler panel. In fact, with an external probe installed, such keys do not adjust the flow temperature as usual but the desired fictitious temperature ranging from 5°C to 30°C.

It is recommended to set a value between 20°C and 25°C, or at least similar to the value set by the ambient thermostat.

REMOTE CONTROL PRE-SETTING

The board is provided with an internal interface that allows the connection of an OpenTherm protocol-based remote control. This latter, besides serving as an ambient thermostat for its zone, allows to set some of the boiler main parameters. Connect the remote control to the board with two non-polarised conductor. When the connection is done, “Con” will appear on the boiler LCD display. **Instead of the remote control, an ambient thermostat connection** (clean contact) is arranged: when closed for more than 10 seconds, it generates a heating request for the zone managed by the remote control. The request stops when the contact remains open for more than one second. When the remote control is not connected and/or does not communicate, all settings are made from the boiler. Board and remote control communicate in each operating mode: DHW, DHW+CH, CH or STANDBY.

A communication loss will entail the continuous attempt to restore it but, after 1 minute, the board will resume operation in local mode until connection is restored. In this case the system temporarily ignores the heating request that could be generated by a possible contact connected on opentherm. When the connection is active, remote control has a priority over boiler switch, and it enables/disables DHW and CH functions.

The remote control can request the boiler and display the flow, DHW, external probe temperatures, the temperatures set for DHW and heating, the current modulation level, as well as the error code. It can also display the different operation states (DHW, heating, flame lighting, fault presence or shut-down) and it can reset the boiler after a shut-down for a limited number of times and period (no more than 3 times in 24 hours).

Warning: the remote control allows access only to the first 29 parameters.



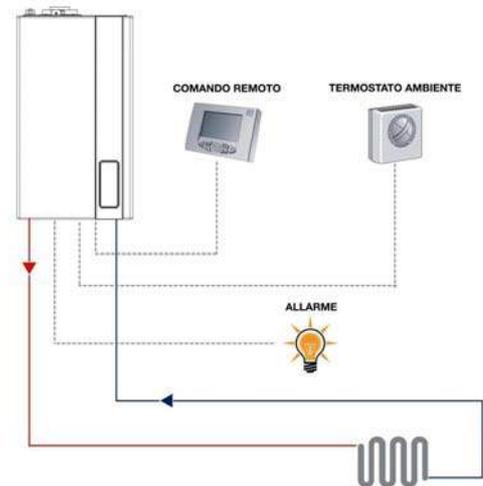
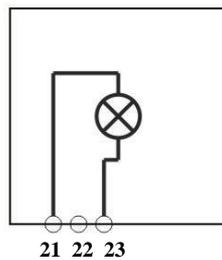
PROGRAMMABLE MULTIFUNCTION RELAY

The boiler is fitted with a multifunction relay (230 Vac, 10A $\cos\phi 1$) which can be associated to a different function by setting parameter P17:

- **P17=0 Alarm reference**

Upon each shut-down or fault the relay is energised:

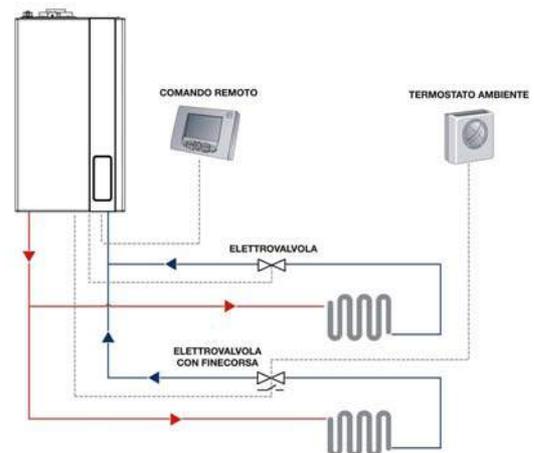
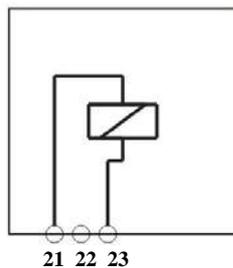
Electrical connections:



- **P17=1 Remote control reference**

Upon each request from the remote control (or TA1), the relay is energised:

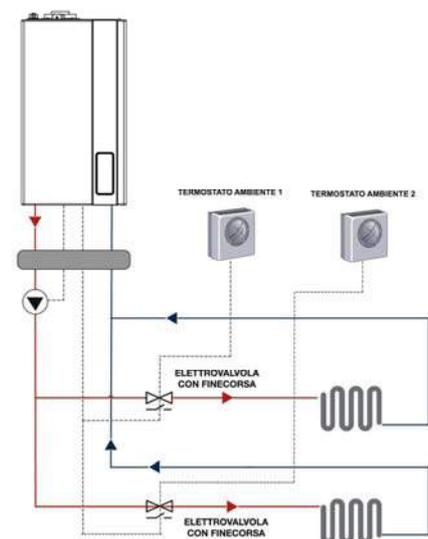
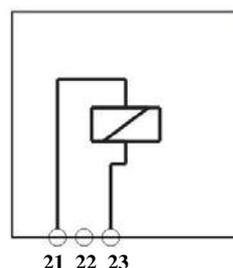
Electrical connections:



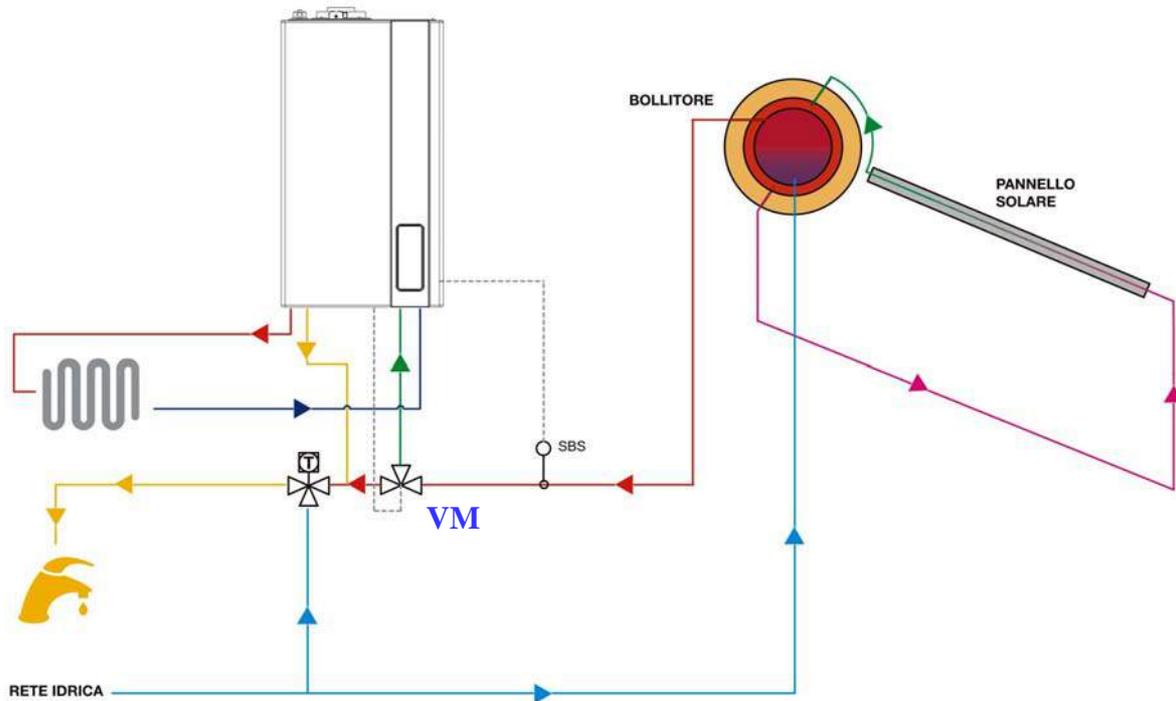
- **P17=3 Ambient thermostat reference**

Upon each request from the ambient thermostat TA2, the relay is energised:

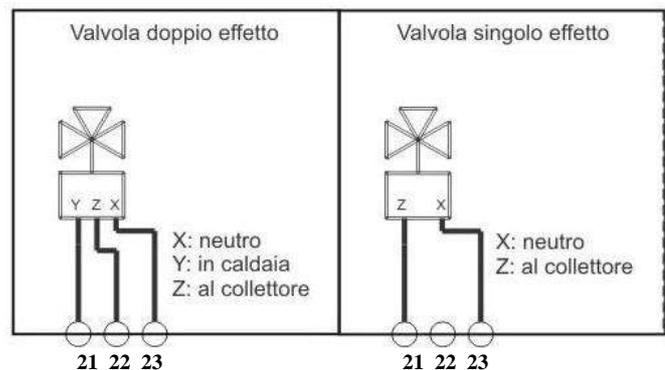
Electrical connections:



- **P17=2 Solar plant reference: *BOILER INTEGRATION (P18=0) only for CTFS***
Management of a solar plant deviating valve (VM):



Electrical connections:



The function consists in properly controlling the motorised valve VM by means of the multifunction relay and **in activating the boiler burner only if the solar water heater temperature is sufficient to fulfil the request for operation.**

This valve is controlled by a **solar water heating probe (SBS)** located at the water heater output.

The VM valve remains in the rest condition (boiler integration) when the temperature detected by the SBS probe is lower than the DHW set-point temperature - 2°C. Instead, it is supplied with power (solar-only mode) when the solar water heating probe temperature reaches the DHW set-point set in the boiler, or in case of probe fault.

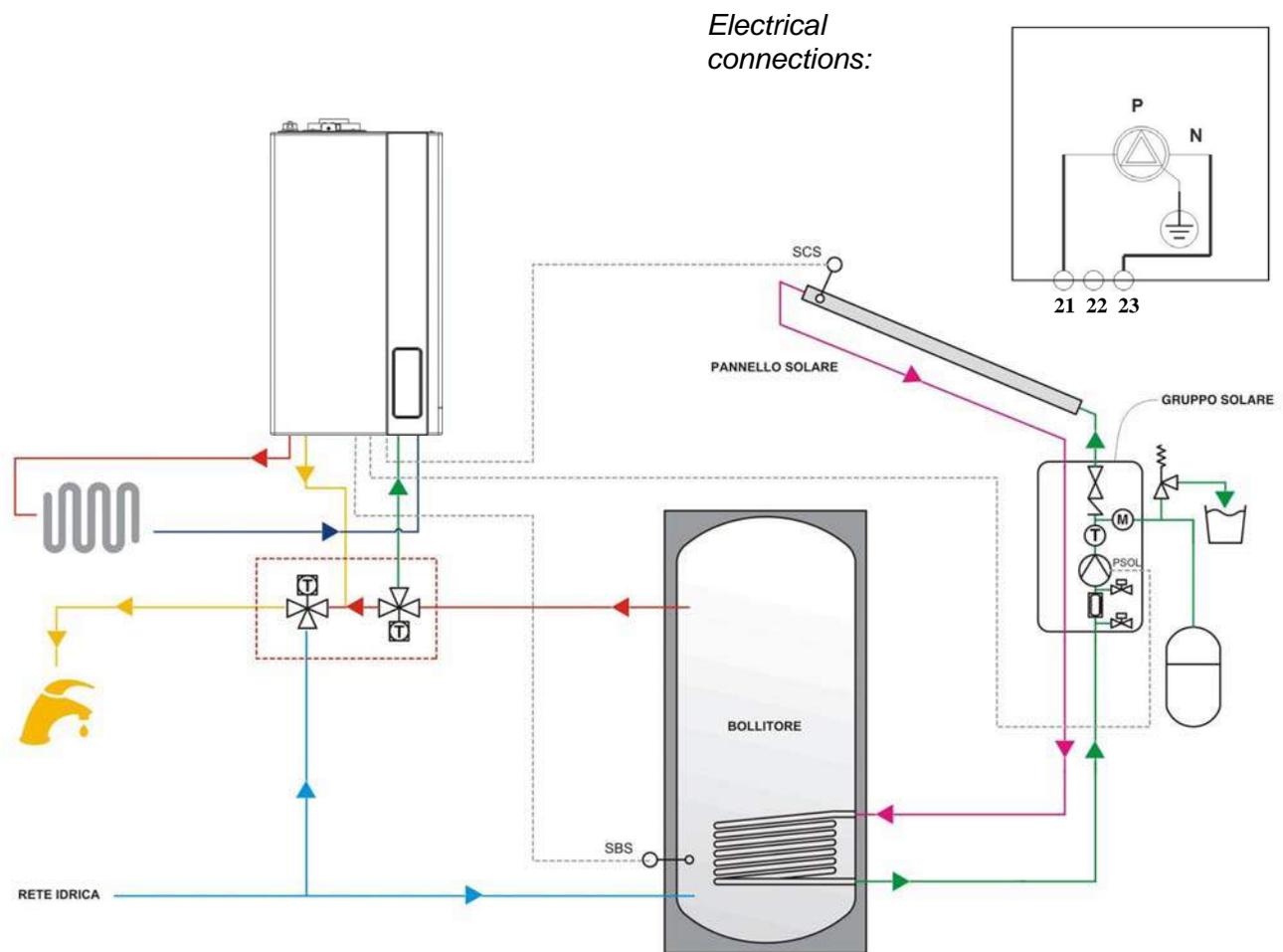
When the VM valve is in solar-only mode, the boiler will not perform the DHW function.

Warning: said function is active only if either the DHW + CH, or the CH ONLY or DHW ONLY mode is selected in the boiler. With boiler in OFF or ANTI-FREEZE mode, the VM valve is constantly supplied with power.

Any probe faults are reported in the boiler interface or on the remote control through the relevant error code (E28).

- P17=2 Solar plant reference **WATER HEATER FILLING (P18=1)**

Management of a forced-type solar plant pump (PS):



The function consists in controlling, on specific conditions, the solar pump through the multifunction relay to heat a water heater. This is achieved by controlling two **probes** located respectively on the **solar collector (SCS)** and at the bottom of the **solar water heater (SBS)**.

Water heater filling conditions (*pump ON*):

Boiler temperature is set with parameter P19, which corresponds to a value ranging from 10 to 90°C (default 60°C).

Solar pump PS is enabled in the following conditions:

- $T_{sbs} < P19 - 2^{\circ}\text{C}$
and
- $T_{scs} - T_{sbs} > \Delta T \text{ ON (P20)}$
and
- $T_{scs} > T_{min \text{ pump collector ON (P23)}}$
and
- $T_{scs} < T_{max \text{ pump collector ON (P22 - } 5^{\circ}\text{C)}$

Where T_{sbs} is the temperature detected by the solar water heater probe and T_{scs} is the temperature detected by the solar collector probe.

**Water heater filling condition (pump OFF):**

Solar pump PS is disabled in the following conditions:

- $T_{sbs} > P19$
or
- $T_{scs} - T_{sbs} < \Delta T \text{ OFF (P21)}$
or
- $T_{scs} < T_{min \text{ solar collector OFF (P23 - 5}^\circ\text{C)}$
or
- $T_{scs} > T_{max \text{ solar collector OFF (P22)}$

Where T_{sbs} is the temperature detected by the solar water heater probe and T_{scs} is the temperature detected by the solar collector probe.

Special solar function (only for water heater filling with P17=2 and P18=1)**➤ Collector heat transfer function**

This function prevents solar collectors from remaining in a stagnation state for a long time, which would expose them to high risk of thermal stress, when solar water heater temperature is reached. For this reason solar pump PS is reactivated according to the following logic:

$$\begin{aligned} &T_{scs} > (P22 - 10^\circ\text{C}) \\ &\text{and} \\ &T_{sbs} \leq 93^\circ\text{C} \\ &\text{and} \\ &T_{scs} \leq (P22 - 5^\circ\text{C}) \end{aligned}$$

The function stops when the PS is switched off at the following conditions:

$$\begin{aligned} &T_{scs} \leq (P22 - 12^\circ\text{C}) \\ &\text{or} \\ &T_{sbs} > 95^\circ\text{C} \\ &\text{or} \\ &T_{scs} > (P22) \end{aligned}$$

➤ Water heater cooling function

This function consists in cooling water heater down to the set-point value by transferring excess heat from the boiler to the solar collector. This occurs only if the solar water heater exceeds the set-point temperature following the activation of the "collector heat transfer" function.

If the remote control is not connected, the "water heater cooling" function is always enabled, otherwise it is enabled only from 00.00 to 6.00.

Solar pump (PS) enabling condition for water heater cooling:

$$\begin{aligned} &T_{sbs} > P19 + 2^\circ\text{C} \\ &\text{and} \\ &T_{scs} < T_{sbs} - \Delta T \text{ ON (P20)} \end{aligned}$$

The function stops when the PS is switched off at the following conditions:



$T_{sbs} < P19$
or
 $T_{scs} > T_{sbs} - \Delta T \text{ OFF (P21)}$

If solar water heater temperature probe (SBS) is faulty, the function is not performed.

WARNING: the water heater cooling function is normally disabled. Set parameter P26 to 1 to enable it. Besides it is enabled only if either the "DHW ONLY", or the "DHW + CH" or the "CH ONLY" mode is selected in the boiler.

➤ Solar collector anti-freeze

When the temperature read by the collector probe is lower than 4°C, the solar pump PS is activated until the temperature reaches 5°C.

WARNING: the collector anti-freeze function is enabled only if parameter P24 is set to 1, whereas the boiler mode has no impact over said function.

Solar plant characteristics with P17=2 and P18=1

Each time the solar pump becomes operational, its active state will be signalled by the icon on the boiler display.



In case of fault of the solar water heating probe (SBS) or of the solar collector probe (SCS), the solar pump is immediately switched off and the fault is reported through the boiler board interface and the remote control (if connected) with the relevant error codes (E28 and E24 respectively).

It is moreover possible to force solar charge during maintenance by setting parameter P25 to 1. In this way, the multifunction relay is energised until such parameter is restored.

PRESETTING FOR CONNECTION TO SUPPLEMENTARY BOARDS

One or more supplementary board(s) (max 4) can be connected to the boiler board for the management of a zone system and of a solar plant.

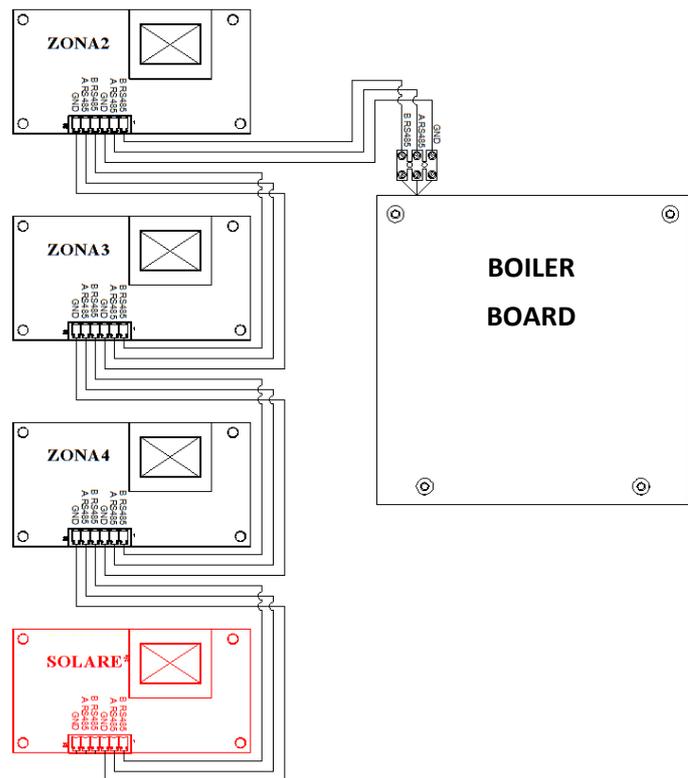
In particular, besides the multifunction relay that can control the high temperature direct zone (TA1), it is possible to install up to three supplementary boards for controlling the equivalent number of mixed zones and one more board for managing a solar plant (available in two configurations).

WARNING: the electric panel of the boiler is preset for housing up to two supplementary boards (management of max. a three-zone system, or of a two-zone system plus a solar plant). In the case of complex plants, where several boards need to be installed, these must be located outside the boiler, arranging a special electric panel.



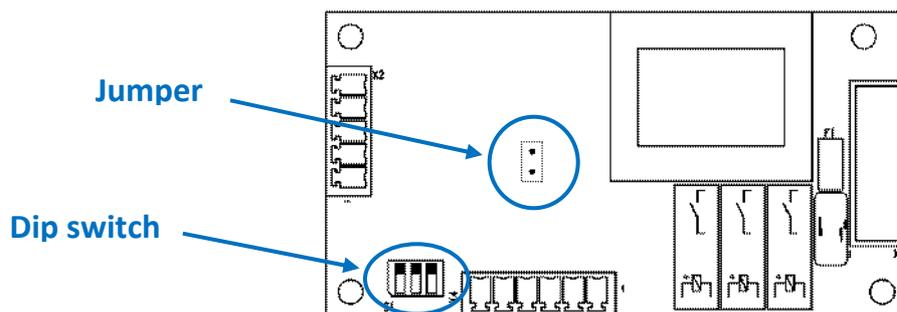
RS 485 Connection and setting

Regardless of the number of boards used, each of them must be connected to the boiler board in a cascade-type connection through a RS485 connection as shown in the image on the side:



Both boiler board and relevant supplementary boards are fitted with a **jumper** whose function is to close the RS 485 communication line in case of problems in the transmission of data between the boards due to very long connection lines or to electromagnetic disturbances.

Leave only the jumper on the last board in the cascade. All the other jumpers must be removed, including the jumper on the boiler board.



	OFF-OFF-OFF: ZONA MISCELATA2
	OFF-ON-OFF: ZONA MISCELATA3
	ON-OFF-OFF: ZONA MISCELATA4
	ON-ON-OFF: SOLARE COMPLESSO

Each supplementary board must be addressed with dip switches on it, so as to associate the supplementary board to the relevant zone or solar plant to be managed. Of the three dip switches, only the first two are used for the setting (the third one must be left "down", i.e. OFF):

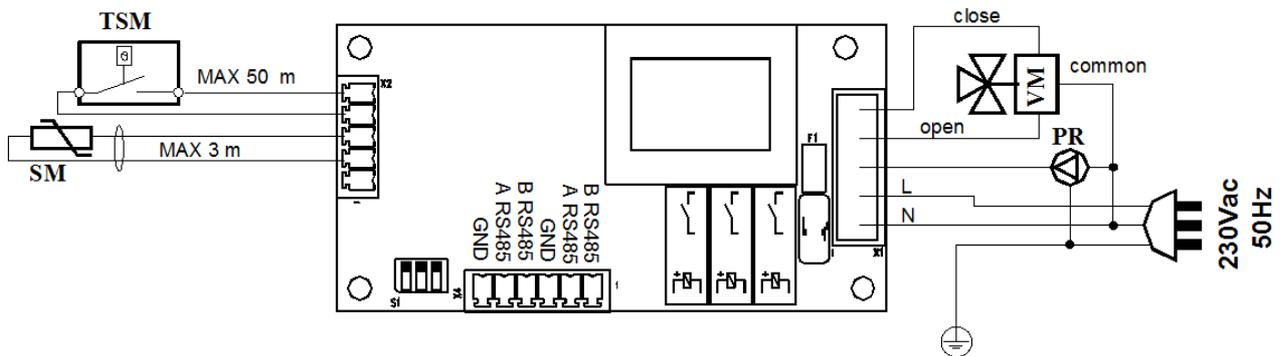


Wiring diagrams

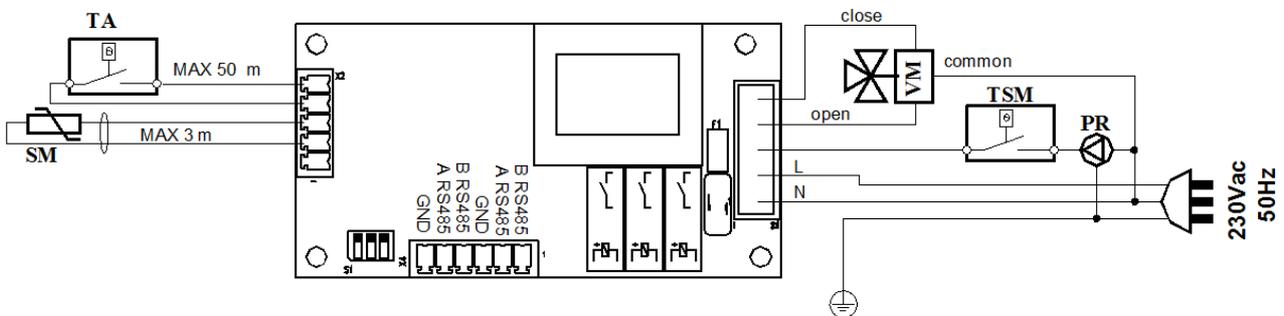
The heating zones 1 and 2 can be controlled by remote control (TA1) or ambient thermostat (TA2) that can be connected to the boiler boards, whereas zones 3 and 4 are activated by the ambient thermostat directly connected to the relevant zone board. Zones 3 and 4 can not manage the safety thermostat on flow line (TSM) which therefore is to be connected in series to the pump power supply and cannot be signalled as a fault.

Whereas, as far as solar plant connections are concerned, the solar collector probe (SCS) and the solar water heater probe (SBS) are on the boiler board, while the connection of the solar valve probe (SVS) is on the supplementary board.

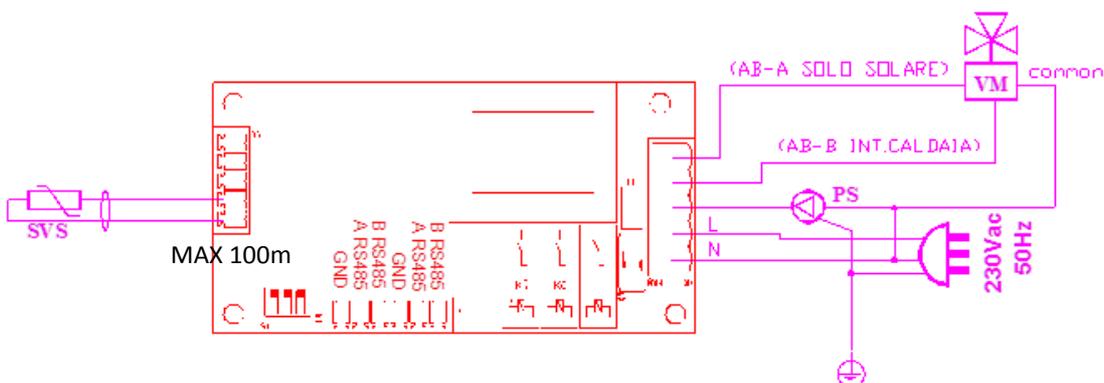
Zone 2



Zone 3 and 4



Solar





The zone board is further supplied with a bi-colour LED with the following indications:

- *Green steady* → pump enabled;
- *Red quick flashing* → valve opening;
- *Red slow flashing* → valve closing;
- *Green flashing* → boards with no request;
- *Red flashing slow-slow (1s on, 1s off)* → faulty communication with boiler board;
- *Red steady* → zone 2 safety thermostat open;
- *Red steady + green steady* → flow probe fault with error E36 on the boiler display;

Zone setting

The zones are set with the relevant zone configuration by means of the dip switches on the zone board (see previous paragraph), and then indicating on the boiler board how many supplementary boards are connected through parameter P60 setting (max. 4).

In case of zone 1 and 2 management different than the standard one (remote control associated with zone 2 and ambient thermostat with zone 1), change the coupling using parameter P61.

It is now possible to access the parameter programming for each single zone:

Zone 1:

parameter P10 setting to set the thermoregulation curve (with external probe) or the operation range (without external probe).

Adjustment, through heating key, of the fictitious ambient temperature (with external probe) or of the flow value at fixed point (without external probe) according to the selected range. Parameter P32 displays the calculated flow temperature, whereas parameter P31 the current one detected by the boiler probe.

Zone 2:

parameter P62 setting to set the thermoregulation curve (with external probe) or the operation range (without external probe).

Adjustment through parameter P63 of the fictitious room temperature (with external probe) or of the flow value at fixed point (without external probe) according to the selected range. Parameter P33 displays the calculated flow temperature, whereas parameter P34 the current one detected by the boiler probe.

Warning: *with remote control for managing zones 1 or 2, the boiler board communicates to the remote control the minimum and maximum flow limit according to the curve set by the relevant parameter (reduced or standard range), whereas the setting at fixed point (without external probe) or of the fictitious temperature (with external probe) must be carried out with the remote control.*

Zone 3:

parameter P66 setting to set the thermoregulation curve (with external probe) or the operation range (without external probe). Adjustment through parameter P67 of the fictitious ambient temperature (with external probe) or of the flow value at fixed point (without external probe) according to the selected range. Parameter P36 displays the calculated flow temperature, whereas parameter P37 the current one detected by the boiler probe.

Zone 4:

parameter P70 setting to set the thermoregulation curve (with external probe) or the operation range (without external probe). Adjustment through parameter P71 of the fictitious ambient temperature (with external probe) or of the flow value at fixed point

(without external probe) according to the selected range. Parameter P39 displays the calculated flow temperature, whereas parameter P40 the current one detected by the boiler probe.

NB: with heat requests from different zones at the same time, the boiler flow set-point corresponds to the highest of the calculated values. The flow set-point required by the mixed zones is equal to the value calculated by the thermoregulation plus the value set by parameter P75 (default 5°C).

When domestic hot water is drawn, heating requests are interrupted and then re-activated when domestic hot water draw is finished.

Heating functions are disabled when the boiler is in the OFF or SUMMER ONLY modes.

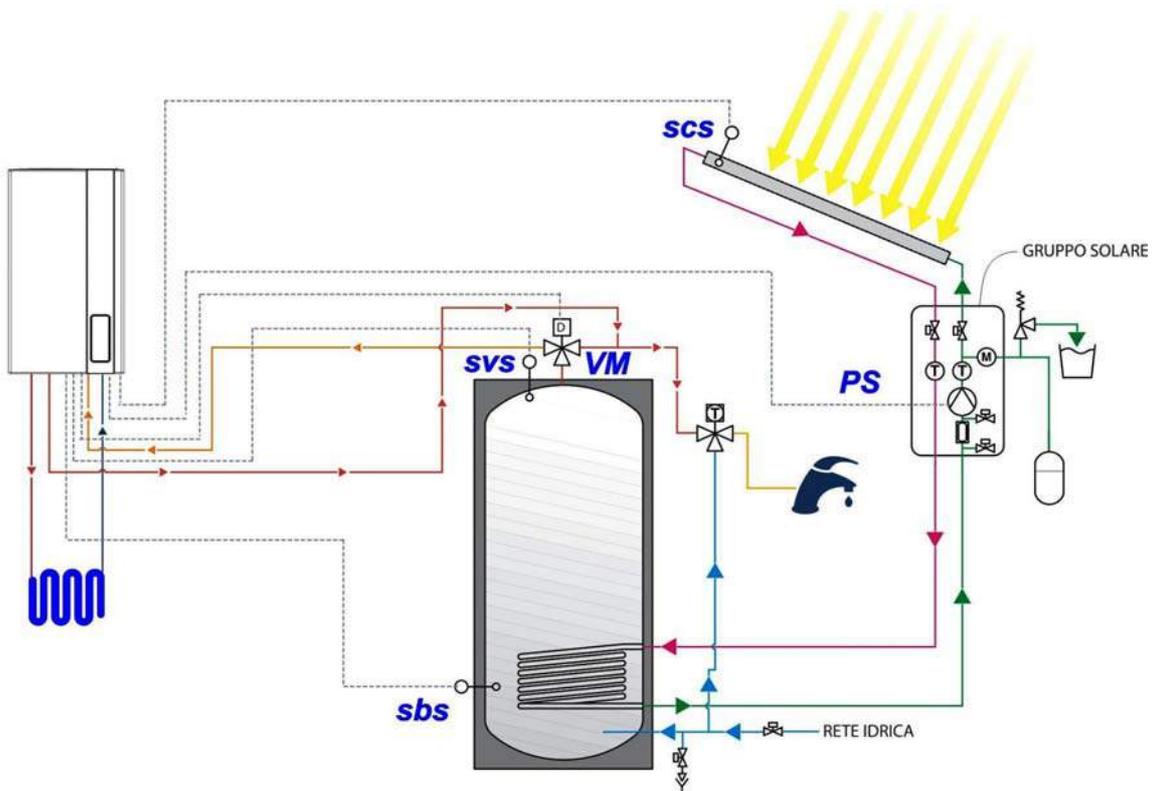
Solar mode programming

The solar card allows for managing "complex" solar plants when two solar loads (pump + deviating valve) are to be controlled, or when the multifunction relay is already used for managing one zone of the system.

CONFIGURATION 1:

suitable only for "instantaneous"-type boilers (P3=1), where the "complex" solar plant to be managed is designed for heating the solar storage in a forced circulation system through the pump **PS** and for the instantaneous integration in the boiler for DHW through the deviating valve **VM**.

Plant diagram is shown below:



Water heater filling function (pump ON)

Boiler temperature is set with parameter P19, which corresponds to a value ranging from 10 to 90°C (default 60°C).

Solar pump PS is enabled in the following conditions:

- $T_{svs} < P19 - 2^{\circ}\text{C}$
and
- $T_{scs} - T_{sbs} > \Delta T \text{ ON (P20)}$
and
- $T_{scs} > T_{min \text{ pump collector ON (P23)}}$
and
- $T_{scs} < T_{max \text{ pump collector ON (P22 - } 5^{\circ}\text{C)}$

Where T_{svs} is the temperature detected by the upper solar water heater probe, T_{sbs} by the lower one, and T_{scs} is the temperature detected by the solar collector probe.

Water heater filling function (pump OFF)

Solar pump PS is disabled in the following conditions:

- $T_{svs} > P19$
or
- $T_{scs} - T_{sbs} < \Delta T \text{ OFF (P21)}$
or
- $T_{scs} < T_{min \text{ solar collector OFF (P23 - } 5^{\circ}\text{C)}$
or
- $T_{scs} > T_{max \text{ solar collector OFF (P22)}$

Warning: in case of solar valve probe SVS fault, the deviating valve is enabled in solar-only mode, while the water heater filling is managed according to the same logic, taking into account the solar water heating probe SBS instead of the faulty one.

Boiler integration function

The function consists in properly controlling the motorised valve VM and in activating the boiler burner only if the solar water heater temperature is not sufficient to fulfil the request for operation.

The VM valve remains in the rest condition (boiler integration) when the temperature detected by the SVS probe is lower than the DHW set-point temperature - 2°C. Instead, it is supplied with power (solar-only mode) when the solar water heating probe temperature reaches the DHW set-point set in the boiler, or in case of probe fault.

When the VM valve is in solar-only mode, the boiler will not perform the DHW function.

Warning: said function is active only if either the DHW + CH, or the CH ONLY or DHW ONLY mode is selected in the boiler. With boiler in OFF mode, the VM valve remains constantly supplied with power.

Collector heat transfer function

This function prevents solar collectors from remaining in a stagnation state for a long time, which would expose them to high risk of thermal stress, when solar water heater temperature is reached. For this reason solar pump PS is reactivated according to the following logic:

$$T_{scs} > (P22 - 10^{\circ}\text{C})$$

and

$$T_{svs} < 95^{\circ}\text{C}$$

and stopped when one of the following conditions occurs:

$$T_{scs} < (P22 - 12^{\circ}\text{C})$$

or

$$T_{svs} \geq 95^{\circ}\text{C}$$

Besides, the function is disabled with $T_{scs} > P22$ and re-activated with $T_{scs} < P22$ minus 5°C .

Warning: *said function is active only if either the DHW + CH, or the CH ONLY or DHW ONLY mode is selected in the boiler, whereas it is not active in case of solar valve probe SVS fault.*

Water heater cooling function

This function consists in cooling water heater down to the set-point value by transferring excess heat from the boiler to the solar collector. This occurs only if the solar water heater exceeds the set-point temperature following the activation of the "heat transfer" function.

If the remote control is not connected, the "water heater cooling" function is always enabled, otherwise it is enabled only from 00.00 to 6.00.

Solar pump (PSOL) enabling condition for water heater cooling:

$$T_{svs} > P19 + 2^{\circ}\text{C}$$

and

$$T_{scs} < T_{sbs} - \Delta T \text{ ON (P20)}$$

The function stops when the PSOL is switched off at the following conditions:

$$T_{svs} < P19$$

or

$$T_{scs} > T_{svs} - \Delta T \text{ OFF (P21)}$$

Warning: *said function is active only if either the DHW + CH, or the CH ONLY or DHW ONLY mode is selected in the boiler, whereas it is not active in case of solar valve probe SVS fault.*

To enable the function, it is moreover necessary to set parameter P26 to 1.

Solar collector anti-freeze function

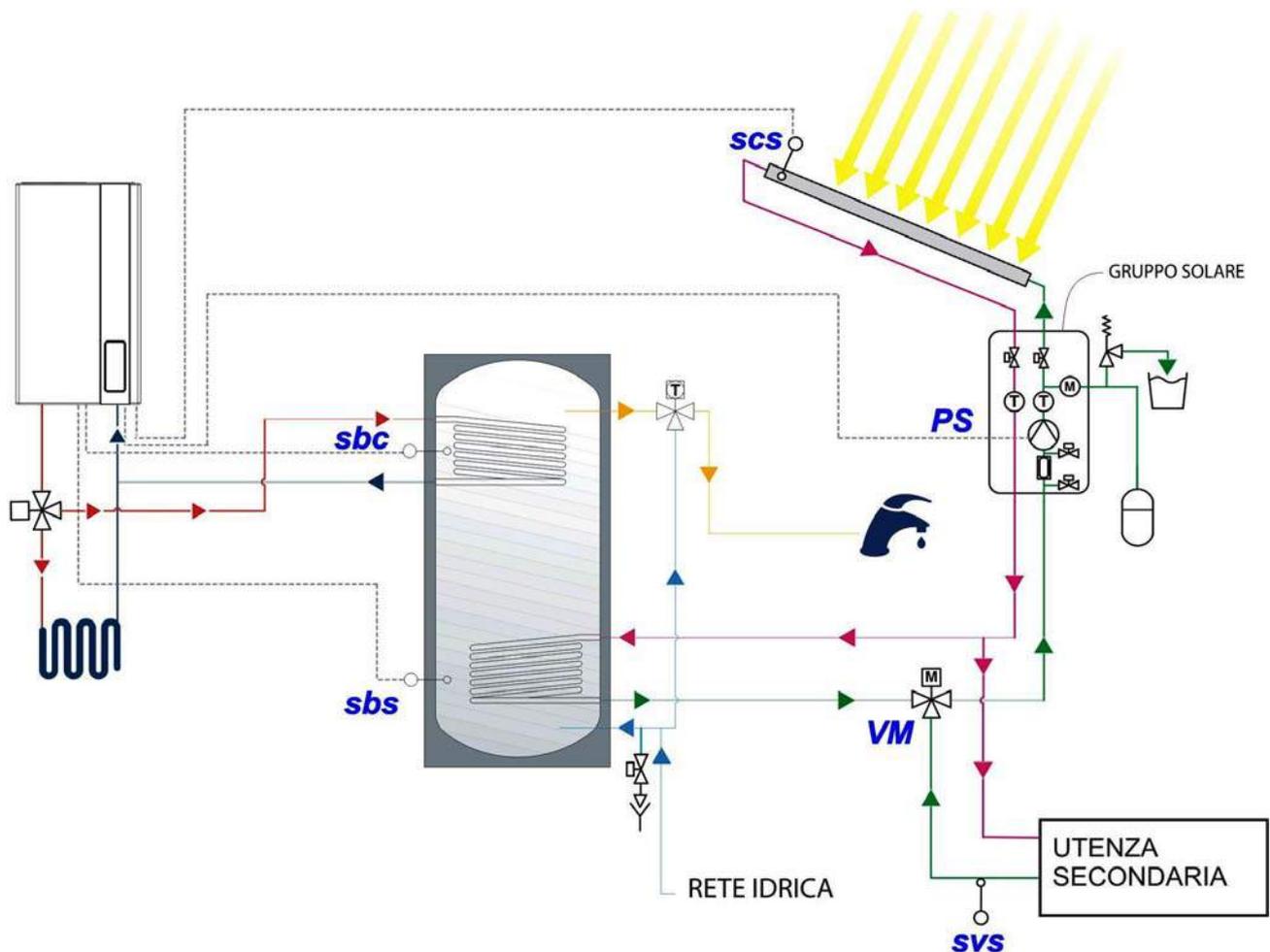
The function is enabled by setting parameter **P24 to 1**. In this way, when the temperature read by the collector probe is lower than 4°C , the solar pump PSOL is activated until the temperature reaches 5°C .



CONFIGURATION 2:

suitable for boilers with integrated water heater (P3=3), where the "complex" solar plant to be managed is designed for heating the solar storage in a forced circulation system through the *pump PS* with the option of transferring the excess solar energy to a secondary item through the *deviating valve VM*.

Plant diagram is shown below:



Water heater filling function (*pump ON*)

Boiler temperature is set with parameter P19, which corresponds to a value ranging from 10 to 90°C (default 60°C).

Solar pump PS is enabled in the following conditions:

- $T_{sbc} < P19 - 2^{\circ}\text{C}$
and
- $T_{scs} - T_{sbs} > \Delta T \text{ ON } (P20)$
and
- $T_{scs} > T_{min \text{ pump collector ON } (P23)}$
and
- $T_{scs} < T_{max \text{ pump collector ON } (P22 - 5^{\circ}\text{C})}$

Where T_{sbc} is the temperature detected by the upper solar water heater probe, T_{sbs} by the lower one, and T_{scs} is the temperature detected by the solar collector probe.



Water heater filling function (pump OFF)

Solar pump PS is disabled in the following conditions:

- $T_{sbc} > P19$
or
- $T_{scs} - T_{sbs} < \Delta T \text{ OFF (P21)}$
or
- $T_{scs} < T_{min \text{ solar collector OFF (P23 - 5}^\circ\text{C)}$
or
- $T_{scs} > T_{max \text{ solar collector OFF (P22)}$

Warning: in case of boiler water heater probe SBC fault, the water heater filling is managed according to the same logic, taking into account the solar water heating probe SBS instead of the faulty one.

Collector heat transfer function

This function prevents solar collectors from remaining in a stagnation state for a long time, which would expose them to high risk of thermal stress, when solar water heater temperature is reached.

Therefore, the solar pump PS is reactivated (with valve VM in "boiler filling" mode) according to the following logic:

$$T_{scs} > (P22 - 10^\circ\text{C})$$

and

$$T_{sbc} < 95^\circ\text{C}$$

and stopped when one of the following conditions occurs:

$$T_{scs} < (P22 - 12^\circ\text{C})$$

or

$$T_{sbc} \geq 95^\circ\text{C}$$

Besides, the function is disabled with $T_{scs} > P22$ and re-activated with $T_{scs} < P22$ minus 5°C .

Warning: said function is active only if either the "DHW ONLY", or the "CH ONLY" or "DHW + CH" mode is selected in the boiler, whereas it is not active in case of boiler water heater probe SBC fault.

Heat discharge function

This function can be enabled only with **P76=1**. It allows for controlling a solar motorised valve VM in order to discharge the solar energy on a secondary actuator. This occurs only if the *collector heat transfer* function can no more be enabled since the maximum temperature inside the water heater (95°C) has been reached.

The valve VM is supplied with power in the "heat discharge" mode according to the following logic:

$$T_{scs} > (P22 - 10^\circ\text{C})$$

and
 $T_{sbc} > 95^{\circ}\text{C}$

The solar pump PS (with the VM in "heat discharge" mode) is now supplied with power when:

$T_{scs} > T_{svs}$

The function stops when the PS is switched off at the following conditions:

$T_{scs} < (P22 - 12^{\circ}\text{C})$

or

$T_{scs} > P22$

Warning: the function is not performed in case of boiler water heater probe SBC fault, as well as in case the "CH ONLY" or the "DHW ONLY" or the "DHW + CH" mode is selected.

Water heater cooling function

This function consists in cooling water heater down to the set-point value by transferring excess heat from the boiler to the solar collector. This occurs only if the solar water heater exceeds the set-point temperature following the activation of the "heat transfer" function.

If the remote control is not connected, the "water heater cooling" function is always enabled, otherwise it is enabled only from 00.00 to 6.00.

Solar pump (PSOL) enabling condition for water heater cooling:

$T_{sbc} > P19 + 2^{\circ}\text{C}$

and

$T_{scs} < T_{sbs} - \Delta T \text{ ON } (P20)$

The function stops when the PSOL is switched off at the following conditions:

$T_{sbc} < P19$

or

$T_{scs} > T_{sbs} - \Delta T \text{ OFF } (P21)$

Warning: said function is active only if either the DHW + CH, or the CH ONLY or DHW ONLY mode is selected in the boiler, whereas it is not active in case of solar valve probe SVS fault.

To enable the function, it is moreover necessary to set parameter **P26 to 1**.

Solar collector anti-freeze function

The function is enabled by setting parameter **P24 to 1**. In this way, when the temperature read by the collector probe is lower than 4°C , the solar pump PSOL is activated until the temperature reaches 5°C .



Solar functions characteristics

Each time the solar pump becomes operational, its active state will be signalled by the icon on the boiler display.



In case of fault of the solar water heating probe (SBS) or of the solar collector probe (SCS), the solar pump is immediately switched off and the fault is reported through the boiler board interface and the remote control (if connected) with the relevant error codes (E28 and E24 respectively).

It is moreover possible to force the solar charges during maintenance by setting parameters P90, P91 and P92. In this way, the supplementary board relays are energised until such parameter is restored.

Supplementary board characteristics

Power supply	230 Vac -15/+10% 50Hz
Load output	230 Vac, 1° max
Flow probe	NTC 10 kOhm @25°C B3435 Max. 3 metres
Solar probe	PT1000 Max. 100 metres
Flow probe operation correct range	-5°C +120°C
Solar probe operation correct range	-40°C +290°C
Mixing valve disabling range for reached set-point	Set+1.5°C / Set-2°C
Mixing valve opening total timer	From 0 to 300 s (P74)
Initial closing timer with powered board	P74 + 40 s
Request end closing timer	P74 + 20 s
Post-circulation timer	From boiler with P13
Circulation pump anti-shut-down timer	3 s each 24 hours
Anti-freeze function timer	15 min
Anti-freeze triggering temperature	< 5 °C

TEMPERATURE PROBE INTEGRITY CHECK

The system checks for any faults in the probes connected to the modulation board, signalling any detected faults with the relevant error code. The failure condition occurs when probe is not supplied with power (except for the external probe), or when it detects a temperature value outside probe correct operating range:

- **Double flow probe (E05)** fault: the burner is immediately switched off whereas the fan is still supplied with power.

The pump circulates water until the fault is reset, with deviating valve in heating position, if before the fault a heating, flow-return anti-freeze, flue cleaning request was present, or if the boiler does not feature any request.

The pump circulates with deviating valve in DHW position only if before the fault there was a request in DHW or DHW anti-freeze mode.

With P17=1 and P17=3 (multifunction relay), the relay remains energised until the fault is reset in case a heating, flow-return anti-freeze, flue cleaning request, or no requests were present.

- **Plate DHW probe (E06):** fault: with a request in DHW mode, the burner is not activated (if it was ON it is switched OFF) and the pump is activated as long as the request persists. At the end of the request, if no other requests are present, the system performs a 30-second post-circulation cycle. This circulation occurs even without operating request.

With operating request in heating, flow anti-freeze, or flue cleaning function, the standard management operations of the request are ensured.

If the fault is reset, the system restores the standard operation.

Resistance values (Ω) of NTC flow probe and of plate DHW at the different temperatures:

Probe calibration: 10k Ohm at 25°C

T°C	0	2	4	6	8
0	27203	24979	22959	21122	19451
10	17928	16539	15271	14113	13054
20	12084	11196	10382	9634	8948
30	8317	7736	7202	6709	6254
40	5835	5448	5090	4758	4452
50	4168	3904	3660	3433	3222
60	3026	2844	2674	2516	2369
70	2232	2104	1984	1872	1767
80	1670	1578	1492	1412	1336
90	1266	1199	1137	1079	1023

Correct operating range: from -20 to +120°C, general tolerance: +/- 3°C

- **Solar probe (E24, E27, E28)** fault: in case of fault of the solar water heating probe (SBS) or of the solar collector probe (SCS), the solar pump is immediately switched off.

In case of fault of the solar valve probe (SVS), the deviating valve is enabled in "solar-only" mode and the "heat transfer" and "water heater cooling" functions are disabled. In such case, the "boiler filling" function is anyway ensured, taking into consideration the water heating probe SBS.

The usual management operations are guaranteed for all requests made, except for requests referring to "solar" operation.

Resistance values (Ω) of the solar probes PT1000 at the different temperatures:

Probe calibration: 1KOhm at 0°C

Temperature °C	Resistance Ω	Temperature °C	Resistance Ω
-20	922	60	1232
-10	961	70	1270
0	1000	80	1309
10	1039	90	1347
20	1078	100	1385
30	1118	110	1422
40	1155	120	1460
50	1194	130	1499

Correct operation range: from -40°C to +290°C, general tolerance: +/- 3°C.



- **External probe fault (E23):** each operation request in heating mode entailing the burner ignition is carried out ignoring the calculation algorithm: the curve value is used to determine the operation range (standard or reduced) with set-point corresponding to the set one.

Correct operating range: *from -40 to +50°C, general tolerance: +/- 3°C.*

- **Ambient probe (E44, E45) fault:** each operation request in heating mode entailing the burner ignition is carried out ignoring the calculation algorithm. Flow set-point is the one available in the configuration with P57=4.

Correct operating range: *from -40 to +50°C, general tolerance: +/- 3°C.*

Warning: if the boiler or the remote control is in "OFF" mode, the fault is only signalled, whereas all the other boiler control elements (gas valve, fan, pumps, three-way valve, multifunction relay) remain in the rest position.

ANTI-SHUT-DOWN FUNCTION

Boiler pump, deviating valve, and DHW pump

The electronic board calculates the time elapsed since boiler pump disabling; if this time is equal to 24 hours, the pump along with the deviating valve (P28=0) or the DHW pump (P28=1) will be enabled again for 30 seconds.

During the pump anti-seizing function the burner remains off and upon each activation of the pump for any request the timer is reset.

Any operation request in CH, DHW or anti-freeze mode will have higher priority, and thus the function in progress will be forced to end in order to carry out such request.

Multifunction relay

The multifunction relay carries out the anti-shut-down operation as indicated in the previous paragraph only if it is set as pump or valve (P17=1, P17=2 and P17=3).

In case it is set to signal faults and errors (P17=0) the relay does not carry out the anti-shut-down operation.

POST-VENTILATION FUNCTION.

Upon burner switching off, the fan is still supplied with power for **10 seconds** (*super-technical parameter P94*), regardless of boiler operating mode.

Moreover, a post-ventilation cycle is started when the temperature read by the flow probe reaches 95°C and is stopped when the temperature falls below 90°C.

Any operation request during CH, DHW, anti-freeze, flue cleaning functions will have higher priority and thus the ventilation function in progress will be forced to end in order to carry out such request.



PUMP POST-CIRCULATION FUNCTION

At the end of a heating, anti-freeze or flue cleaning request, the burner (if ON) is immediately switched off, whereas the pump continues to be supplied with power for 30 seconds (time that can be set by means of parameter P13). The same applies to the multifunction relay with P17=1 or P17=3 at the end of each request by the remote control or the associated ambient thermostat.

At the end of an operation request in plate DHW mode, the pump is still supplied with power for 30 seconds, with deviating valve switched to DHW mode.

With no operation request, if the water temperature detected by the flow NTC probe is higher than 78 °C, the pump remains supplied with power until the flow temperature falls below such value. In this case the deviating valve is switched to heating mode.

Any operation request during CH, DHW, anti-freeze, flue cleaning mode will have higher priority, and thus the post-circulation function in progress will be forced to end in order to carry out such request.

ANTI-FREEZE FUNCTION

Flow water

A flow NTC probe measures the water temperature inside the boiler and if it falls below 5°C it generates an operation request in flow anti-freeze mode, resulting in burner ignition. At the end of the ignition sequence, the output rate supplied to burner will be forced to the minimum value.

The operation request in flow anti-freeze mode ends when the flow temperature exceeds 30°C or when reaching an operation time of 15 min with flow temperature above 5°C.

Any operation request in heating mode or DHW has higher priority, and forces the interruption of the function in progress.

During a flow anti-freeze operation the boiler pump is activated, whereas the three-way valve switches to heating position.

With P17 equal to 1 or 3, also the multifunction relay is energised.

In case of flame control shut-down and impossibility to ignite the burner, the anti-freeze function activates a pump circulation cycle with active multifunction relay (if P17=1 or P17=3).

Warning, the anti-freeze function does not protect the heating system but the boiler only.

Summary of operation thresholds:

DESCRIPTION	ON	OFF
Flow anti-freeze function	5°C	30°C (or after 15' of operation)
Temperature general tolerance	± 3°C	



Plate DHW (*only combined instantaneous*)

The DHW NTC probe measures the DHW temperature and if it falls below 5°C it generates an operation request in DHW anti-freeze mode. The pump is activated and after a 30 sec waiting time, the burner ignites with output forced to the minimum value.

During a DHW anti-freeze operation the temperature detected by the flow probe is constantly checked, and in case it reaches 60°C the burner is switched off. The burner ignites again if the operation request in anti-freeze mode is still present and the flow temperature is lower than 60°C.

The operation request in DHW anti-freeze mode ends when the DHW temperature exceeds 10°C or when reaching an operation time of 15 min with DHW temperature above 5°C.

Any operation request in DHW mode has higher priority, and forces the interruption of the function in progress.

During a DHW anti-freeze operation, the pump is supplied with power, the electric deviating valve is in DHW position and the multifunction relay is in rest condition.

In case of flame control shut-down and impossibility to ignite the burner, the DHW anti-freeze function will anyway carry out a pump circulation cycle.

Boiler (*Heating only with water heater*)

The water heater NTC probe measures the DHW boiler temperature and if it falls below 5°C it generates an operation request in boiler anti-freeze mode. The pump is activated and after a 30 sec waiting time, the burner ignites with output forced to the minimum value. Moreover, during a boiler anti-freeze operation the temperature detected by the flow probe is constantly checked, and in case it reaches 60°C the burner is switched off. The burner is switched on again if the operation request in anti-freeze mode is still present and the flow temperature is lower than 60°C.

The operation request in boiler anti-freeze mode ends when the boiler temperature exceeds 10°C or when reaching an operation time of 15 min. Any operation request in heating mode or DHW has higher priority, and forces the interruption of the function in progress.

The anti-freeze function is enabled with any boiler setting, besides, in case of flame control shut-down and impossibility to ignite the burner, the anti-freeze function activates a pump circulation cycle with the three-way valve in the DHW position.

Room

When the boiler is in "off", or "DHW ONLY" mode, and the temperature measured by the probes is below 5°C, a heating request to heat the probe-controlled room is launched. The function ends when the probe ambient temperature reading reaches 6°C.

When this function is on, the flow temperature is calculated with the standard thermoregulation set by P57.

If supplementary boards are available for the management of zones, also the zones associated with the ambient probes have a heating function.



AUTOMATIC FILLING FUNCTION

Automatic filling is enabled only if parameter **P94** is set to **1**.

When the function is disabled, only the system pressure is controlled (with proper signalling in case the pressure is too low), whereas, when it is enabled, the filling will be carried out according to the following values given in the super-technical parameters:

SUPER-TECHNICAL PARAMETER	RANGE	DEFAULT VALUE	NOTES
P10 Filling pressure ON and low water alarm (E04)	0.4 ÷ 1 Bar	0.4 Bar	
P11 Filling pressure OFF	1 ÷ 2 Bar	1 Bar	
P12 Filling time	10 ÷ 150 sec	60 sec	When this time has elapsed, the boiler triggers E08 alarm
P13 Indicates that pressure is too high (E09)	2 ÷ 4 Bar	2.8 Bar	
P14 Alarm E09 reset	1.8 ÷ 3.8 Bar	2.6 Bar	
P15 Alarm E04 disappeared	0.6 ÷ 2 Bar	0.8 Bar	
P16 Max. number of filling attempts in 24h	1 ÷ 10	3	After successful attempts

Activation condition

The function is automatically activated in case the system pressure (as read by the pressure transducer) falls below the threshold set by parameter P10 and at the same time there is no signalling of the errors (respectively E04 and E08) relevant to the max. number of filling attempts reached within the 24 hours (P16) or to the exceeding of the maximum time for each single filling cycle (P12).

After checking the activation status, the solenoid valve is supplied with power for a time equal to P12. To avoid disturbances during this operation, the boiler pump (if operating) is stopped and the three-way valve is set to the "DHW" mode. Any request function is left in stand-by mode.

Switching off condition

The function is completed successfully when the system pressure reaches the pressure set by P11 within the time set by P12. If this is not the case, the "false attempt" is memorised to avoid any further filling and the error E08 will appear on the boiler display.

WARNING: when the boiler is in the error E08 condition, the standard operation requests can anyway be fulfilled provided that the system pressure has reached the pressure set by P15.

Faults

The faults relevant to automatic filling, according to their priority, are listed below:

- 1) **E04:** too low pressure (pressure lower than P10 or max. number of filling attempts reached within 24 hours);
- 2) **E08:** filling failed (failure to reach the filling pressure in a single attempt);
- 3) **E09:** too high system pressure (higher than P13).



ANTI-LEGIONELLA FUNCTION (only for RTFS with water heater)

The anti-legionella function is available in the boiler-version systems (P3=3) and is always enabled. This function is enabled whenever a time interval of 15 days elapses. Once such this time interval has run out, a boiler heating phase, having a fixed set-point of 65 °C and a maximum duration of 30 minutes, is started.

The anti-legionella function has higher priority over any DHW, CH or anti-freeze mode that might be in progress when such function is activated.

Warning: this function is performed only using the boiler probe for DHW management.

GAS PROPORTIONAL MODULATION COIL INTEGRITY CHECK.

The system checks the gas proportional modulation coil for faults (*error E76*) in case of modulation coil not being supplied with power or short-circuited. If this fault occurs, all the standard boiler functions are anyway performed with the burner working at minimum output.

The faulty modulation coil signal is interrupted when its electric parameters return within the preset limits.

SAFETY DEVICES AND FUNCTIONS

Double flow probe (E02 shut-down)

The overtemperature check is carried out by the double probe placed on the flow pipe in place of the standard safety contact thermostat.

When reaching 105°C, the gas valve power supply is immediately interrupted, with consequent indication of error E02 on the display.

Use the "reset" key to reset when the flow temperature reaches 90°C.

In case of E02 shut-down:

The fan performs a 10 second post-ventilation cycle and the boiler can be reset within that time.

The pump performs a post-circulation cycle with deviating valve in heating position if before the shut-down there was a heating, flow-return anti-freeze, or flue cleaning function request. Instead, the post-circulation cycle with deviating valve in DHW mode is performed if a DHW request or a DHW anti-freeze request had been launched before the shut-down.

With P17=1 or P17=3, the multifunction relay performs a post-circulation cycle only if it was energised before the shut-down.



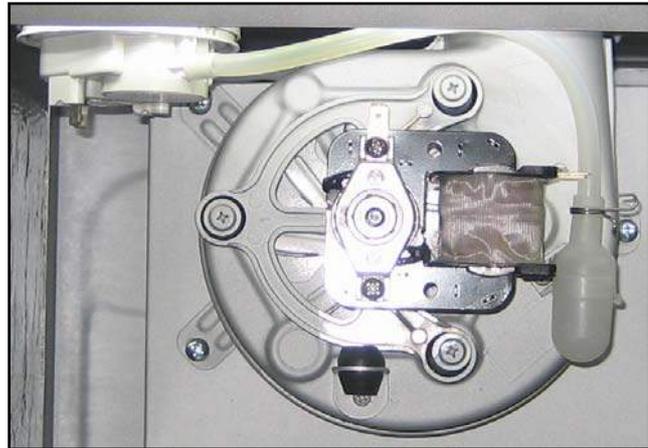
Air pressure switch (E03 shut-down for CTFS version)

The air pressure switch, fitted only in the forced draught models, is a normally open contact connected in series with the gas valve, and is directly managed by the automatic flame control. Its function is to detect a proper pressure difference in two different points of the boiler and is directly managed by the electronic board.

The pressure switch contact must be open before fan is supplied with power, and closed when it starts working. At the end of the request, when the fan is no more supplied with power, the contact must re-open. Therefore, the board double-checks the contact opening, one check is performed at the initial and one at the final phase.

When the pressure switch is open, the gas valve cannot be supplied with power.

After 10 seconds since powering the combustion fan, if the pressure switch contact is still open, a volatile shut-down signal is generated. Said signal does not need to be reset. The same shut-down signal is generated if the pressure switch is in a wrong position or in a waiting status. The boiler will enter a non-volatile shut-down mode only if the pressure switch is in a wrong position for more than one minute and must be reset.



Differential pressure switch CTFS 24 kW: **35/45 Pascal** P_{max}=1500 Pa
Differential pressure switch CTFS 28-32 kW: **125/112 Pascal** P_{max}=1500 Pa

Pressure transducer (shut-down E04 and E09)

Its function is to constantly check the system pressure. If pressure is equal to or lower than 0.4 bar, a low pressure signal (error code E04) is generated. Besides, all requests of operation with the pump will be ignored. Pump will be switched off. Also the multifunction relay is de-energised if selection is P17=1 or 3. Signalling will be reset upon reaching 1 bar during the filling phase.

The transducer checks as well that the system does not reach a too high pressure. Therefore, if pressure is equal to or higher than 2.8 bar, the E09 fault is signalled without interrupting any functions in progress. The error is reset when pressure is lower than 2.6 bar.

WARNING: all pressure limit values can be edited through the super-technical parameters (see parameter list on page 37).

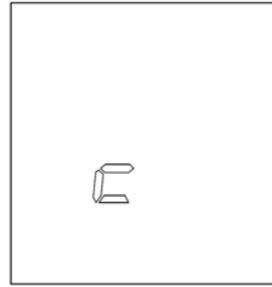
Boiler combustion chamber automatic recognition (E72 shut-down)

The type of boiler (forced draught or natural draught) is automatically recognised each time the board is supplied with power. The board attempts to read the inputs dedicated to the air pressure switch or to the flue gas thermostat.

During such phase, "CHA" will appear on the boiler display and upon the following recognition (which must take place within the first two minutes) the following message will be displayed for 5 seconds:



FORCED DRAUGHT =



If for any reason the board is not able to detect the presence of the air pressure switch, the E72 fault will be signalled. To reset this shut-down status, power off and back on to start a new self-recognition cycle.

Warning: during the boiler type recognition step, no request is performed.

3-bar safety valve

This valve is installed on CH water pipe, and checks that pressure does not exceed 3 bar as this condition would entail boiler internal faults.

Should valve read a pressure higher than the allowed limit, it will open to discharge water outside.



SECT. 6

ELECTRICAL SYSTEM

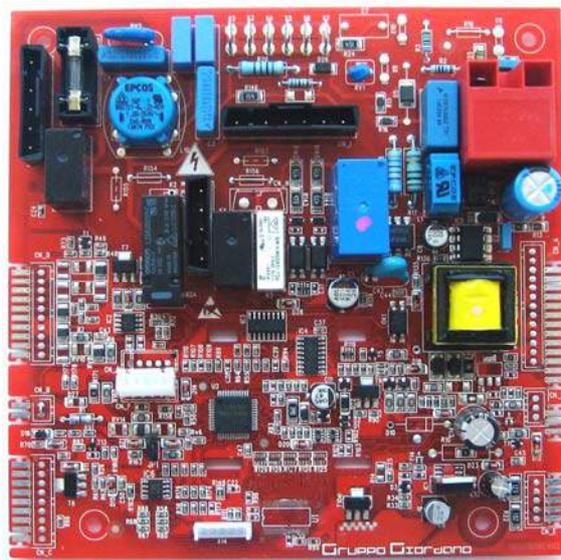
6.1 ELECTRONIC BOARD

Boiler is managed by means of two electronic boards, a main board and an interface board. The former is the boiler hardware in which also the ignition transformer is integrated. The latter enables the user to control the boiler through a touch screen interface and an LCD display. Besides, it allows for controlling the filling solenoid valve and the ambient probes for the management of the heating zones.

The communication between the two boards is made through a cable with a RS485 connection and 24V power supply.

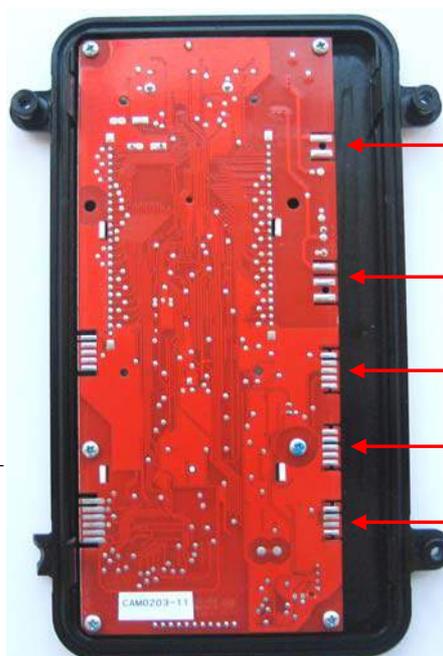
Main board characteristics

<i>Operating voltage:</i>	from 170Vac to 300 Vac
<i>Power supply frequency:</i>	45 – 66 Hz
<i>Operation ambient temp.:</i>	-20°C ÷ +60°C
<i>Protection class:</i>	IP00
<i>Max absorpt. in stand-by:</i>	1.2 W
<i>Protection fuse:</i>	5x20 2AF
<i>Ionisation current:</i>	2 µA
<i>Max. multifunct. relay charge:</i>	230VAC 100VA power factor 0.7
<i>Flame detection method:</i>	ionisation
<i>Type of detection:</i>	non-polarised



Interface board characteristics

<i>Operating voltage:</i>	24 Vdc
<i>Operation ambient temp.:</i>	-20°C ÷ +60°C
<i>Type of communication:</i>	RS485
<i>Protection class:</i>	IP00
<i>No. of LCD digits:</i>	9 (4 + 3 +)
<i>Back-lighting:</i>	yes
<i>Background:</i>	white



Alimentazione

Elettrovalvola

Ingresso RS485

Uscita RS485

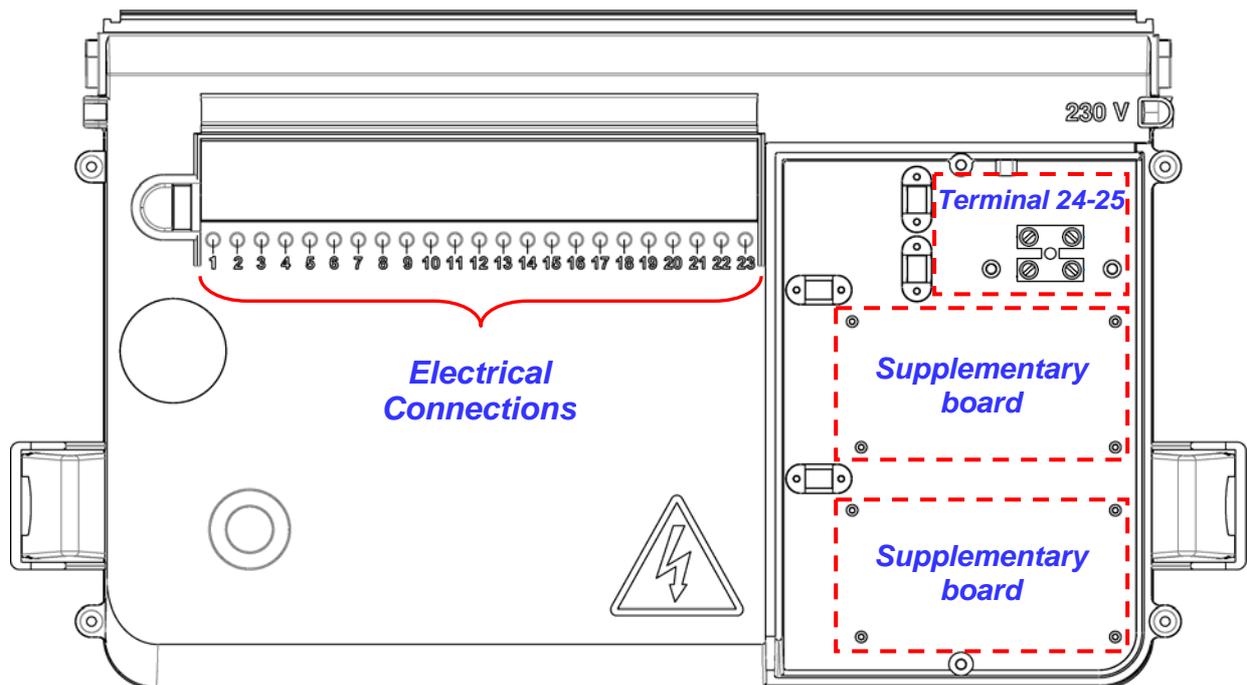
Sonde ambiente



WARNING: removing the plastic front part of the interface board is not allowed (spare part is supplied pre-assembled).

6.2 OUTER TERMINAL BOX ELECTRICAL CONNECTIONS

All the electrical connections are ensured through the terminal box located on the back side of the electric panel. The supplementary boards (used to manage the zones or complex solar plants) are housed outside, on the panel back side. A supplementary terminal is housed there as well (only for RTFS version):

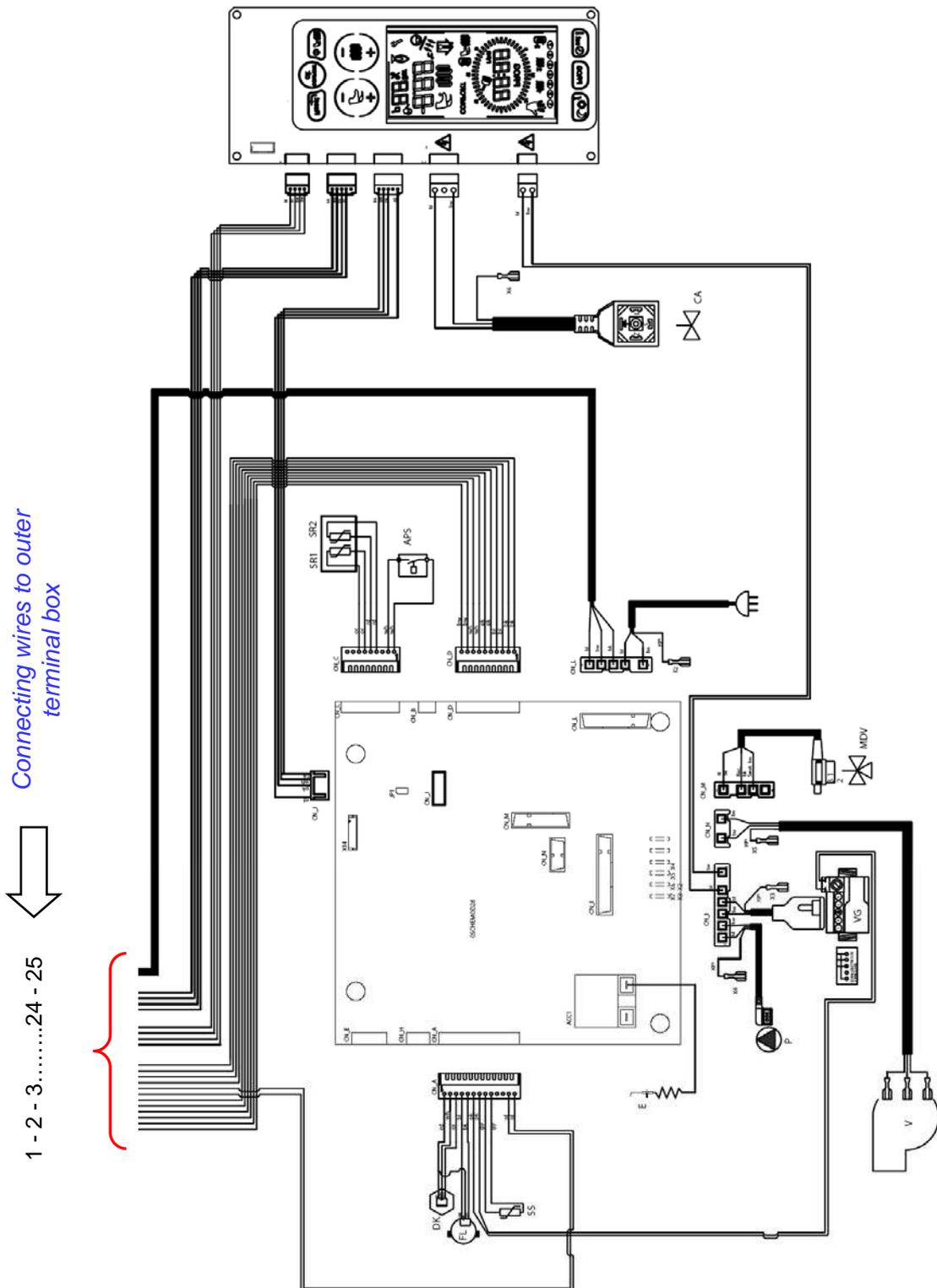


Key to connections:

- 1-2** ambient thermostat 2
- 3-4** ambient thermostat 1 or Remote Control ($L \leq 30m$)
- 5-6** external probe (10K Ohm at 25°C B3977 $L \leq 100m$)
- 7-8** cold water inlet probe S3S for CTFS version (*already connected*) or **boiler water heater probe SBC for RTFS version** (10K Ohm at 25°C B3435 $L \leq 3m$)
- 9-10** solar water heating probe SBS (PT1000 $L \leq 3m$)
- 11-12** solar collector probe SCS (PT1000 $L \leq 100m$)
- 13-14** ambient probe SA1 (10K Ohm at 25°C B3977 $L \leq 100m$)
- 15-16** ambient probe SA2 (10K Ohm at 25°C B3977 $L \leq 100m$)
- 17** serial connection GND
- 18** serial connection 485A
- 19** serial connection 485B
- 20** serial connection +5V
- 21** "normally open" relay phase (NA)
- 22** "normally closed" relay phase (NC)
- 23** multifunction relay neutral
- 24-25** **spring return type motorised valve (P28=0) or DHW pump (P28=1) only for RTFS version**

Warning: in case of complex solar plants, the solar valve probe (SVS) must be connected to the supplementary board.

6.3 WIRING DIAGRAM



Key:

- | | |
|---|---|
| <p>DK: pressure transducer</p> <p>FL: flowmeter</p> <p>SS: DHW probe OUT, NTC 10K Ohm</p> <p>S3S: DHW probe IN, NTC 10K Ohm</p> <p>APS: air pressure switch</p> <p>SR1 SR2: double flow probe NTC 10K Ohm</p> | <p>E: ignition and detection electrode</p> <p>MVD: motorised deviating valve</p> <p>VG: gas valve</p> <p>P: boiler modulation circulation pump</p> <p>V: fan</p> <p>CA: automatic filling valve</p> |
|---|---|

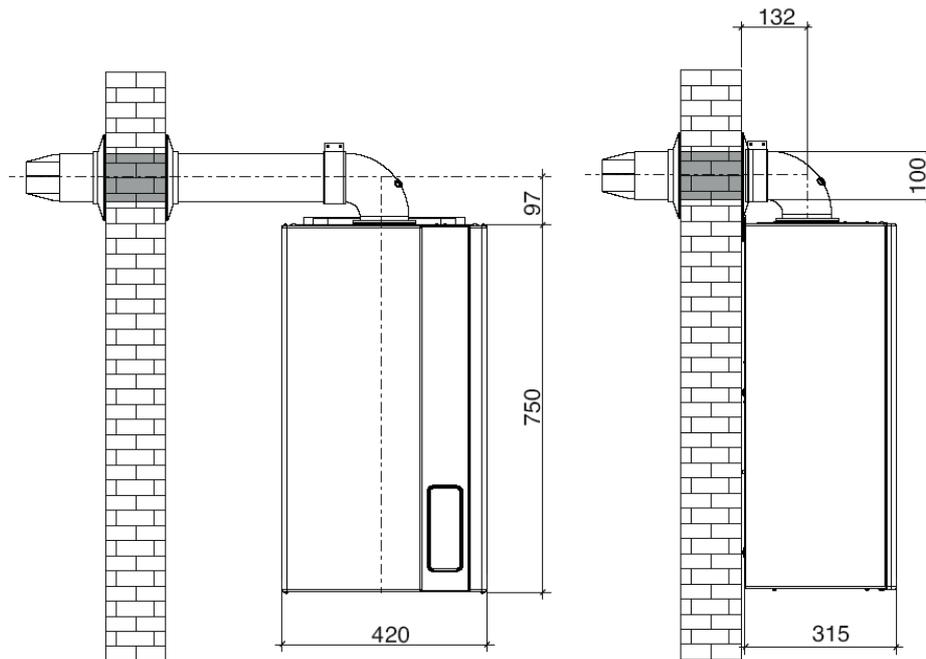


SECT. 7

VENT DUCTS AND PIPES

For intake/flue gas vent lines use only original ducts designed for the specific boiler (as per manufacturer's specifications).

7.1 100/60 CO-AXIAL AIR/VENT DUCTS

Dimensions for connection of flue gas duct to co-axial pipes**Type C12 horizontal vent**

The minimum permissible length of horizontal coaxial pipes is 0.5 metres, including the first elbow connected to the boiler.

The maximum permissible length of horizontal coaxial pipes is 6 metres for 24 kW models, 7 metres for 28 kW models and 5 metres for 32 kW models, excluding the first elbow connected to the boiler.

For each additional 90° elbow, maximum permissible length is to be reduced by 1 metre, whereas for the 45° one by 0.5 metres. The duct is to be tilted down by 1% toward its outlet, to prevent rain water from entering it.

Flue gas vent diaphragms:

Pipe length [m]	Flue gas vent diaphragm diameter [mm]		
	CTFS 24	CTFS 28	CTFS 32
$0.5 \leq L \leq 2^*$	39.8	39	39.8
$2 < L \leq 3^*$	42	41	41
$3 < L \leq 4^*$	45		44
$4 < L \leq 5^*$	49	47	47
$5 < L \leq 6^*$	-		Not allowed
$6 < L \leq 7^*$	Not allowed	-	

* Excluding the first elbow



Type C32 vertical vent

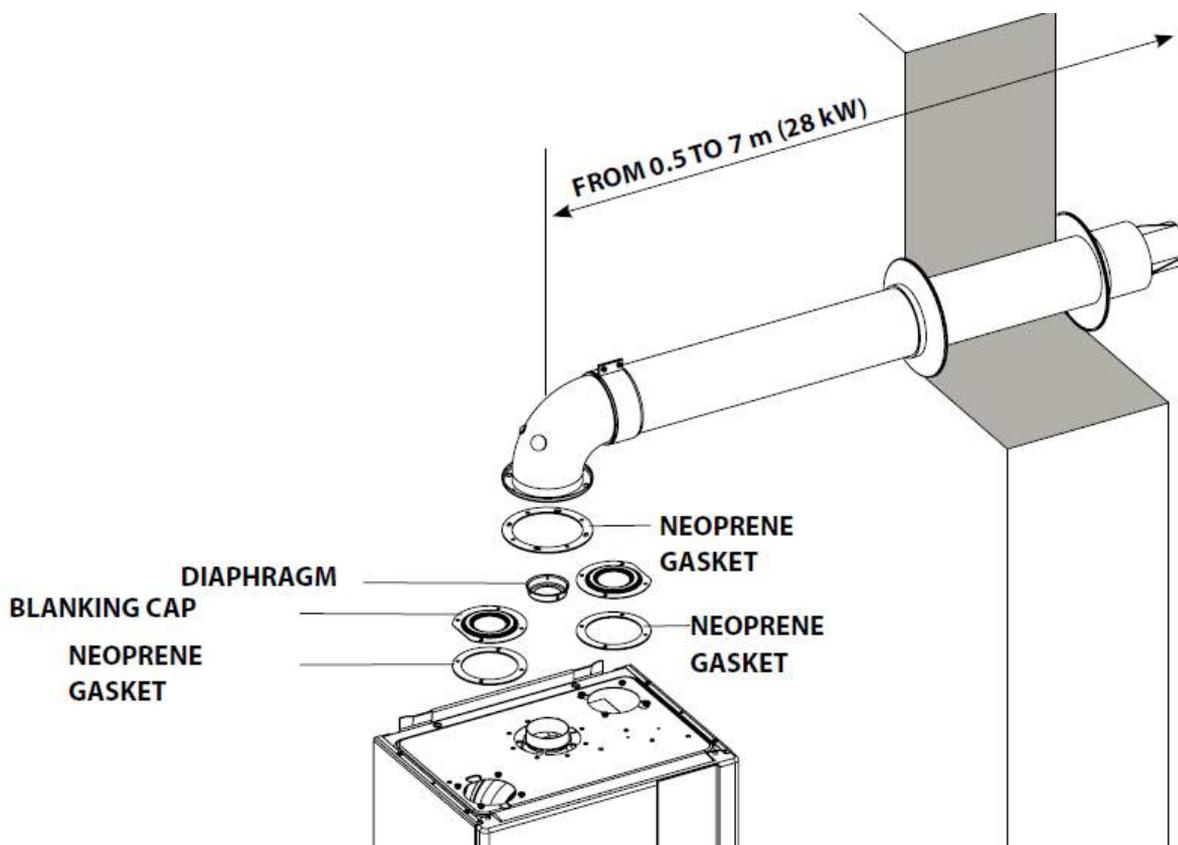
Minimum permissible length for vertical coaxial pipes is 1 metre, equal to the length of the chimney.

The maximum permissible length of horizontal coaxial pipes is 6 metres for 24 kW models, 7 metres for 28 kW models and 5 metres for 32 kW models, including the chimney.

For each additional 90° elbow, maximum permissible length is to be reduced by 1 metre, whereas for the 45° one by 0.5 metres. Roof vent terminal is equivalent to 1.5 metres of pipe.

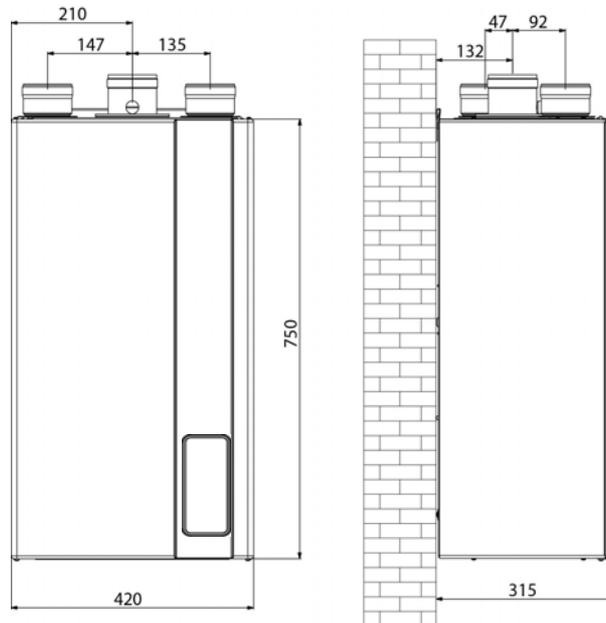
Flue gas vent diaphragms:

Pipe length [m]	Flue gas vent diaphragm diameter [mm]		
	24 kW	28 kW	32 kW
$0.5 \leq L \leq 2$	39.8	39	39.8
$2 < L \leq 3$	42	41	41
$3 < L \leq 4$	45		44
$4 < L \leq 5$	49	47	47
$5 < L \leq 6$	-		Not allowed
$6 < L \leq 7$	Not allowed	-	





7.2 80/80 SPLIT AIR/VENT DUCTS



Type C12 - C32 - C42 – C52 – C82

24 kW flue gas vent diaphragms:

Pipe length [m]	Diaphragm diameter flue gas vent [mm]
$1 \leq L < 3$	39.8
$3 \leq L < 14$	42
$14 \leq L < 26$	45
$26 \leq L < 34$	49
$34 \leq L < 42$	-

28 kW flue gas vent diaphragms:

Pipe length [m]	Diaphragm diameter flue gas vent [mm]
$1 \leq L \leq 18$	45
$18 < L \leq 23$	47

32 kW flue gas vent diaphragms:

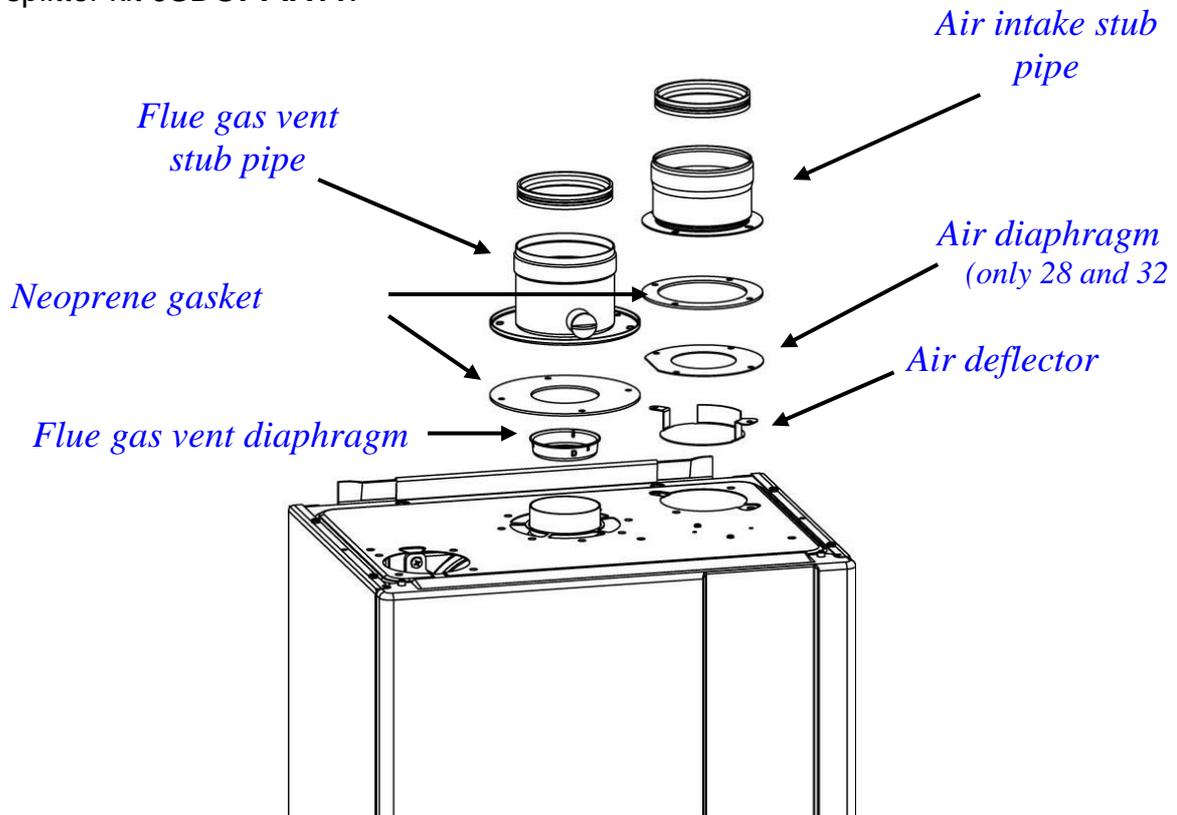
Pipe length [m]	Diaphragm diameter flue gas vent [mm]
$1 \leq L \leq 5$	44
$5 < L \leq 12$	45
$12 < L \leq 19$	47
$19 < L \leq 24$	49

WARNING: in the 28 and 32 kW version the 55.5 mm diaphragm (supplied along with the boiler) must always be fitted on the intake

80/80 split duct load loss table

Part	Vent			Intake		
	24 kW	28 kW	32 kW	24 kW	28 kW	32 kW
1m extension	1			0.6		
0.5m extension	0.5			0.3		
90° elbow	1.4			0.8		
90° elbow - narrow radius	2.8			1.7		
45° elbow	2.3	2.4		1.4		
Elbow with flue gas measurement point	2.8			1.7		
Wall vent terminal	4.4	4.5		-		
Roof vent terminal	4.4	4.5		-		
Vertical stub pipe	0.1			0.1		
Vertical condensate drain	2.8	2.9		-		
Horizontal condensate drain	0.3			-		
Chinese-type vertical vent terminal	4.8	4.9	5	-		
Suction opening	-			2.6	2.7	2.6
Split vent duct chimney	5.7	5.9		4.2	4.3	4.2

Base splitter kit **OSDOPPIA11**:



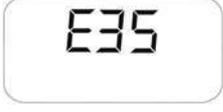
WARNING: the air deflector is supplied along with the splitter kit, whereas the air diaphragm is supplied along with the boiler.

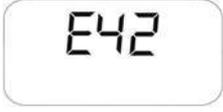
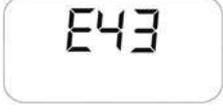


TABLE OF TECHNICAL FAULTS

Boiler Status	Malfunction	Probable cause	Solution
Boiler shut-down, picture flashes: 	Burner does not ignite	Gas supply fault	Check gas pressure. Check gas supply cock or gas network safety valve intervention.
		Gas valve is disconnected	Re-connect it
		Gas valve is faulty	Replace it
		The board is faulty	Replace it
	Burner does not ignite: no spark.	Ignition relay is faulty.	Replace the electrode.
		Ignition transformer faulty.	Replace the ignition transformer.
		Electronic board does not ignite. It is faulty	Replace electronic board.
	Burner ignites for a few seconds and goes off	Electronic board does not detect flame: inverted phase and neutral	Verify correct neutral and phase connection sequence.
		Detection electrode cable interrupted	Re-connect or replace cable
		Flame detection electrode is faulty	Replace the electrode.
		Electronic board does not detect flame: it is faulty	Replace the board
		Ignition heat input setting is too low	Increase it
Minimum heat input is not set correctly		Check burner setting	
Boiler shut-down, picture flashes: 	Flow double probe check has been triggered	Water does not flow in the system (thermostatic valves shut, system shut-off cocks closed) and the by-pass valve does not trigger	Check system status and by-pass valve
		Circulation pump is blocked or faulty	Check the circulation pump.
	Double flow probe faulty.	Check probe values.	
Boiler shut-down, picture flashes: 	Flue gas pressure switch triggering <i>(only CTFS)</i>	Combustion air intake is insufficient or flue gas vent is difficult	Check air intake/flue gas vent ducts: clean or replace as necessary
		Flue gas exhaust pressure switch is faulty	Check flue gas pressure switch: replace it if faulty.
		Silicone pipe of flue gas pressure switch clogged or not connected	Connect or clean pipe as necessary
		Fan is faulty	Replace it
	Flue gas thermostat triggering <i>(only CTN or RTN)</i>	Poor flue draught	Check flue draught and suction openings
		Flue gas thermostat is faulty	Replace it

Boiler shut-down, picture flashes: 	CH system water pressure is low	Low water inside heating system	Fill up system
		Leaks in the CH system	Check system
Boiler shut-down, picture flashes: 	Double flow probe fault	One of the two probes is disconnected or in short-circuit	Reconnect or replace it
		The difference between the temperatures detected by the double probe is higher than 5°C	Replace the probe
Boiler shut-down, picture flashes: 	DHW probe is not working <i>(only CTFS)</i>	Disconnected or short-circuited probe	Reconnect or replace it
Boiler is not supplying DHW	No triggering of DHW flowmeter	System insufficient pressure or flow rate	Check system Check condition of flowmeter filter
		Flowmeter sensor is faulty or disconnected	Connect or replace it
	DHW probe does not output enabling	Probe not correctly set	Replace the probe
Boiler shut-down, picture flashes: 	Automatic filling failed (filling pressure not reached within the valve opening time)	Oversized heating system	Increase opening time
		Too low system pressure	Reduce filling threshold
		Fouled filling solenoid valve	Clean it
		Solenoid valve is not working	Check coil integrity
The boiler is working but the image is flashing: 	Too high system pressure	System overload	Check pressure when the system is not heated
		Expansion tank discharged or faulty	Check pressure when the system is empty
		Undersized expansion tank	Add a supplementary vessel
Boiler shut-down, picture flashes: 	Boiler probe fault <i>(only for RTFS with water heater)</i>	Disconnected or short-circuited probe	Reconnect or replace it
	Cold water inlet probe fault <i>(CTFS)</i>		

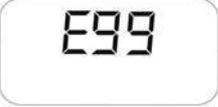
Boiler shut-down, picture flashes: 	External probe is not working (<i>error signalling occurs only when a heating request is active</i>)	Disconnected or faulty probe	Reconnect or replace it
Boiler shut-down, picture flashes: 	Solar collector probe SCS fault (<i>connected to boiler board</i>)	Disconnected or faulty probe	Reconnect or replace it
		Probe detects a value lying outside the admissible range	Make sure the probe is of PT1000 type
Boiler shut-down, picture flashes: 	Solar valve probe SVS fault (<i>connected to the supplementary solar card</i>)	Disconnected or faulty probe	Reconnect or replace it
		Probe detects a value lying outside the admissible range	Make sure the probe is of PT1000 type
Boiler shut-down, picture flashes: 	Solar water heating probe SBS fault (<i>connected to the boiler board</i>)	Disconnected or faulty probe	Reconnect or replace it
		Probe detects a value lying outside the admissible range	Make sure the probe is of PT1000 type
Boiler shut-down, on remote control picture flashes: 	The boiler does not communicate with the Remote Control	The connection with the Remote Control is interrupted.	Check the Remote Control connections (wiring longer than 5 meters must be shielded)
		Remote control is faulty	Replace the Remote Control
Boiler shut-down, picture flashes: 	Safety thermostat triggering in mixed zone 2	Faulty or disconnected safety thermostat	Replace it or reconnect cables
		Too high flow temperature	Check boiler settings or mixing valve correct operation
Boiler shut-down, picture flashes: 	Flow probe fault in mixed zone (<i>with indication of the zone number</i>)	Disconnected or faulty probe	Reconnect or replace it
		Probe detects a value lying outside the admissible range	Make sure the probe is of NTC type

Boiler shut-down, picture flashes: 	Communication failure between main board and supplementary boards	The main board does not find all supplementary boards or finds more than the ones actually connected	Check parameter P60 value. It must correspond to the number of supplementary board(s) used
Boiler shut-down, picture flashes: 	Hydraulic configuration not allowed	The main board does not recognise the probes for correct operation	Check the P3 board configuration parameter.
Boiler shut-down, picture flashes: 	Configuration error between ambient probe, remote control or supplementary zone board	The main board does not recognise the settings matched with the zones	Check the system configuration parameter values (P60 and P61).
Boiler shut-down, picture flashes: 	Ambient probe 1 (SA1) fault	Disconnected or short-circuited probe	Reconnect or replace it
Boiler shut-down, picture flashes: 	Ambient probe 2 (SA2) fault	Disconnected or short-circuited probe	Reconnect or replace it
Boiler shut-down, picture flashes: 	Pressure transducer fault	Faulty transducer	Replace it
		Disconnected transducer	Connect it
Boiler shut-down, picture flashes: 	Communication failure with the interface board	Disconnected communication cable RS485	Check connections
		Interface board or mother board fault	Replace faulty board



<p>Boiler shut-down, picture flashes:</p> <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: fit-content; margin: 5px auto;">E51</div> <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: fit-content; margin: 5px auto;">E52</div>	<p>Safety circuit hardware fault (<i>fan relay</i>)</p>		<p>Replace main board</p>
<p>Boiler shut-down, picture flashes:</p> <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: fit-content; margin: 5px auto;">E53</div>	<p>Safety circuit hardware fault (<i>gas valve relay</i>)</p>		<p>Replace main board</p>
<p>Boiler shut-down, picture flashes:</p> <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: fit-content; margin: 5px auto;">E72</div>	<p>Boiler combustion chamber recognition failure <i>(to reset the boiler, the power supply must be cut)</i></p>	<p>Combustion air intake is insufficient or flue gas vent is difficult</p>	<p>Check air intake/flue gas vent ducts: clean or replace as necessary</p>
		<p>Flue gas exhaust pressure switch is faulty</p>	<p>Check flue gas pressure switch: replace it if faulty.</p>
		<p>Silicone pipe of flue gas pressure switch clogged or not connected</p>	<p>Connect or clean pipe as necessary</p>
		<p>Fan is faulty</p>	<p>Replace it</p>
<p>Boiler shut-down, picture flashes:</p> <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: fit-content; margin: 5px auto;">E73</div>	<p>Incompatibility between boiler board and interface board</p>	<p>Boiler board and interface board don't belong to the same type: atmospheric / condensing</p>	<p>Check boiler board and interface board type</p>
<p>Boiler shut-down, picture flashes:</p> <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: fit-content; margin: 5px auto;">E76</div>	<p>Gas valve modulation coil fault</p>	<p>Connection of electronic board to the gas valve modulation coil non correct or missing</p>	<p>Check electric connections</p>
		<p>Gas valve modulation coil is faulty</p>	<p>Replace the gas valve</p>
<p>Boiler shut-down, picture flashes:</p> <div style="border: 1px solid black; border-radius: 10px; padding: 5px; width: fit-content; margin: 5px auto;">E98</div>	<p>Max. number of reset attempts from interface reached <i>(to reset the boiler, the power supply must be cut)</i></p>	<p>Presence of one error that can not be reset</p>	<p>Work directly on the boiler</p>



Boiler shut-down, picture flashes: 	Max. number of reset attempts from remote control reached <i>(to reset the boiler, the power supply must be cut)</i>	Presence of one error that can not be reset	Work directly on the boiler
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IF NONE OF THESE HYPOTHESIS IS VALID, FAILURE IS ORIGINATED BY MAIN ELECTRONIC BOARD. YOU CAN JUST CHECK CONNECTIONS OR CHANGE THE BOARD.

WARNING

The touch screen interface performs a keyboard self-calibration each time the boiler is connected to the power supply line. Keyboard sensitivity depends on the pressure detected upon power supply

After completing the maintenance operations, it is recommended to **power off and on again while the casing is closed**, to avoid any key operation failure.



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