NIKE Star 24 3 E

Instantaneous wall-hung with open chamber boilers

IMMERGAS

NIKE Star 24 3 E

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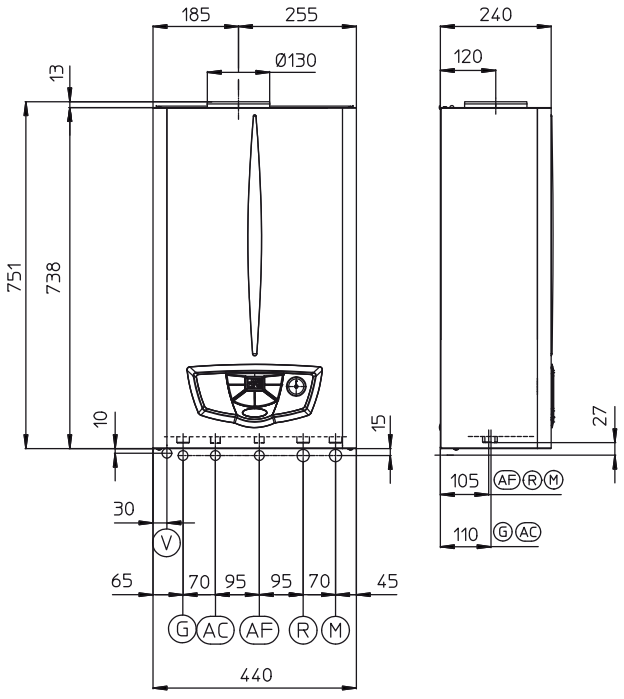
Small wall-mounted open chamber, conventional flue instant boiler.

NIKE Star 24 3 E

General features.

NIKE Star 24 3 E is a wall-mounted, open combustion chamber, conventional flue generator for the heating and production of domestic hot water.
The boiler distinguishes itself for its extremely small dimensions H=751 mm, L=440 mm, D=240 mm) and useful heat output of 23.6 kW (20,296 kcal/h).
Adjustment and control of the appliance *(burner ignition, temperature adjustment, flame modulation and diagnostics)*, are entrusted to an electronic P.C.B. with microprocessor that by means of a digital interface complete with display and buttons, allows the visualisation and adjustment of the functioning parameters.
The hydraulic circuit is equipped with a bithermal water-gas copper heat exchanger for the production of hot water for central heating and domestic hot water use, an automatic by-pass of the system and a flow switch for the cut-off of DW withdrawal.
The appliance has IPX4D electrical insulation rating: this means that the boiler is protected against jets of water and high humidity levels.

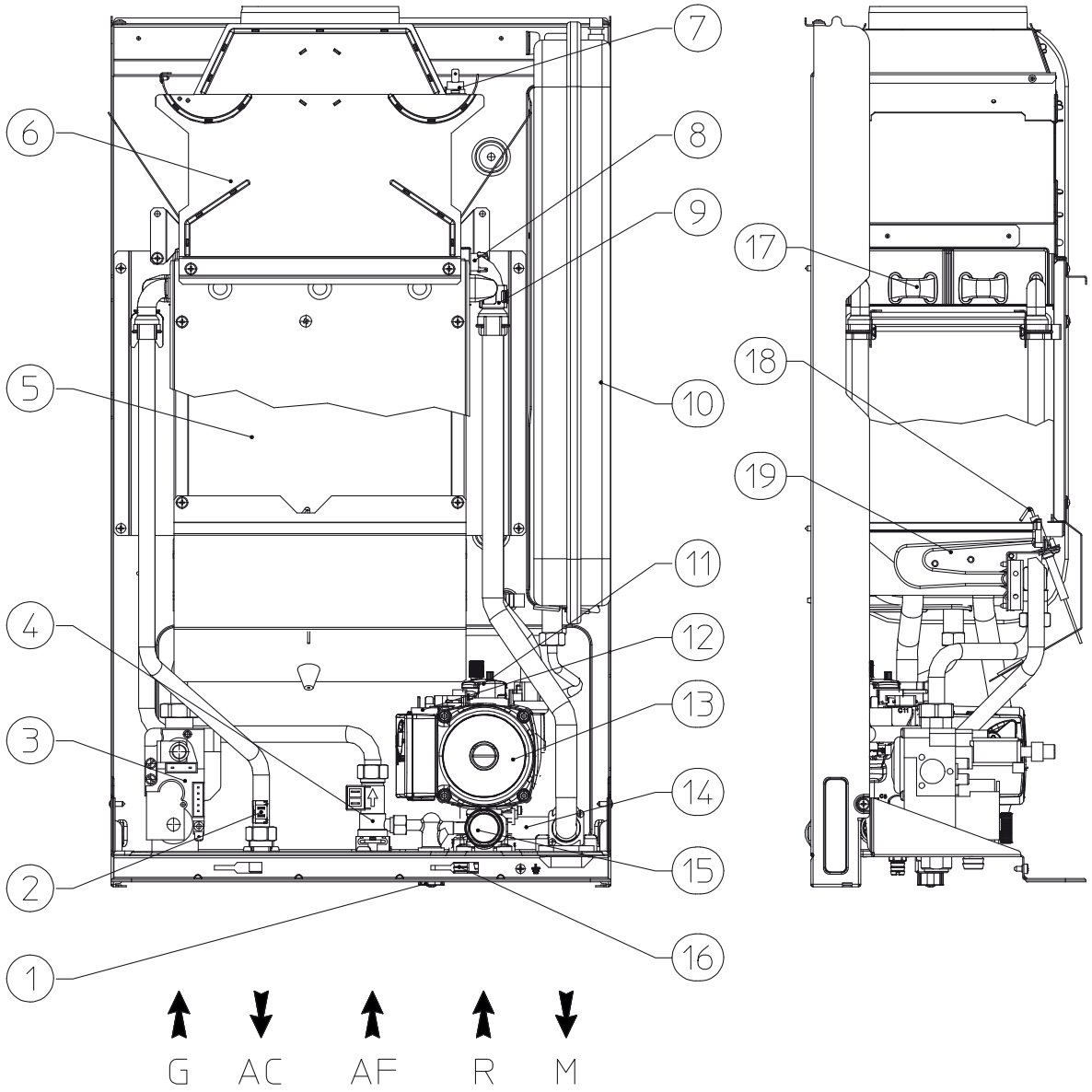
Main dimensions and connections.



Height (mm)	Width (mm)		Depth (mm)	
751	440		240	
CONNECTIONS				
GAS	DOMESTIC HOT WATER		SYSTEM	
G	AC	AF	R	M
3/4"	1/2"	1/2"	3/4"	3/4"

Key:
G - Gas supply
AC - Domestic hot water outlet
AF - Domestic cold water inlet
R - System return
M - System flow
V - Power supply connection

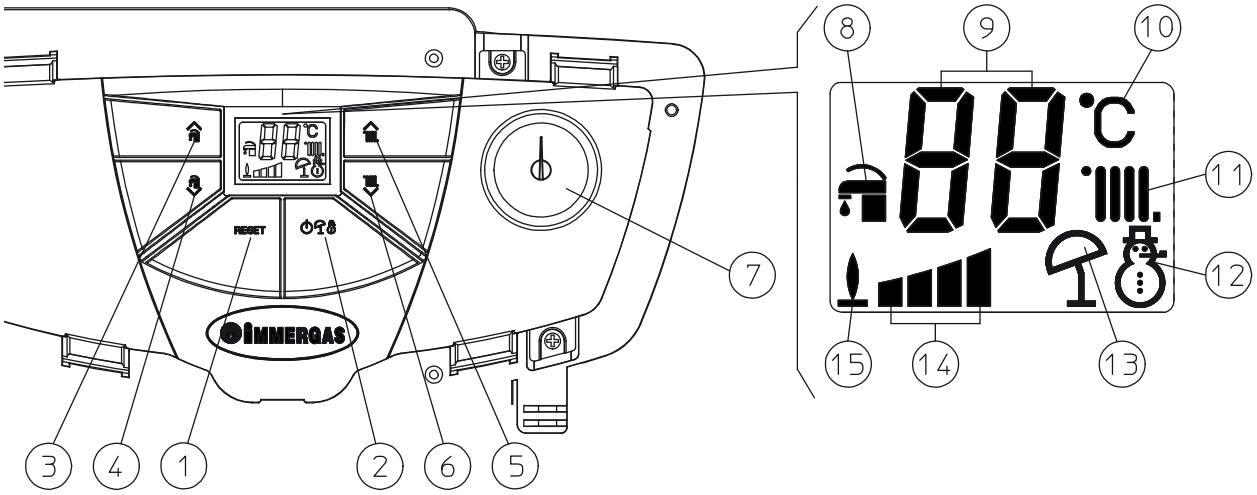
Main components.



Key:

1 - *System filling valve*
2 - *Domestic hot water probe*
3 - *Gas valve*
4 - *Domestic hot water flow switch*
5 - *Combustion chamber*
6 - *Flue hood*
7 - *Flue safety thermostat*
8 - *Safety thermostat*
9 - *Flow probe*
10 - *System expansion vessel*
11 - *Air vent valve*
12 - *System pressure switch*
13 - *Boiler pump*
14 - *Manifold*
15 - *3 bar safety valve*
16 - *System draining valve*
17 - *Rapid heat exchanger*
18 - *Ignition and detection electrodes*
19 - *Burner*

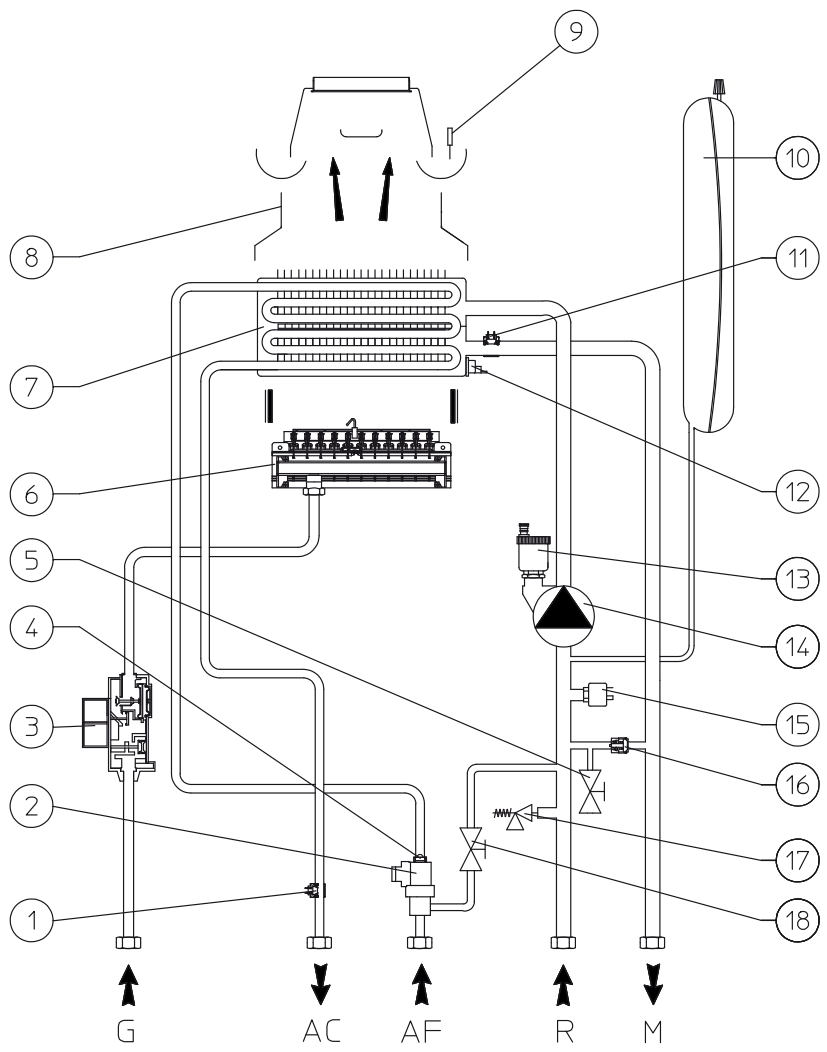
Control panel.



Key:

1 - Reset button
2 - Stand-by/summer/winter button
3 - Button (+) to increase the domestic hot water temperature
4 - Button (-) to reduce the domestic hot water temperature
5 - Button(+) to increase the system water temperature
6 - Button (-) to reduce the system water temperature
7 - Boiler manometer
8 - Domestic hot water functioning
9 - Temperatures and error code display
10 - Unit of measurement
11 - Central heating functioning
12 - Winter
13 - Summer
14 - Power distributed
15 - Flame presence

Hydraulic circuit.



Key:

1 - Domestic hot water probe
2 - Domestic hot water flow switch
3 - Gas valve
4 - Flow limiter
5 - System draining valve
6 - Burner
7 - Rapid heat exchanger
8 - Flue hood
9 - Flue safety thermostat
10 - System expansion vessel
11 - Flow probe
12 - Safety thermostat
13 - Air vent valve
14 - Boiler pump
15 - System pressure switch
16 - Automatic by-pass
17 - 3 bar safety valve
18 - System filling valve

G - Gas supply
AC - Domestic hot water outlet
AF - Domestic cold water inlet
R - System return
M - System flow

The hot water used for central heating and domestic hot water is produced thanks to two distinct circuits that are affected according to necessity.

Primary circuit (Boiler Circuit).

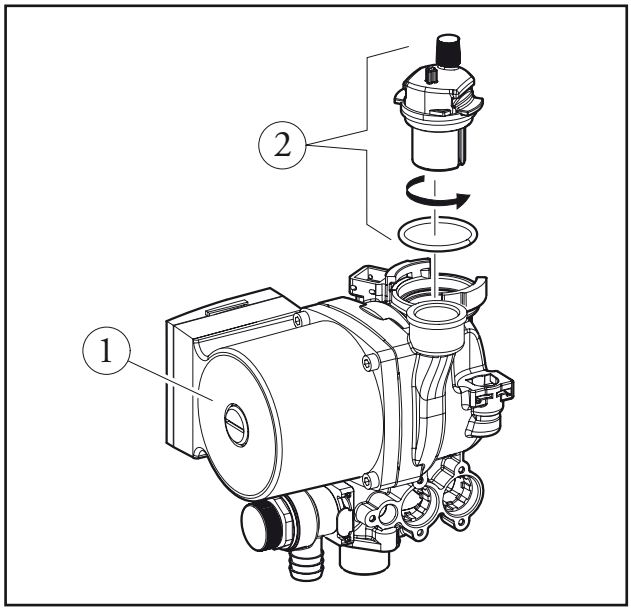
The central heating circuit, with relative control and safety devices, is started **every time there is a central heating request.**

Operation.

The heat contained in the combustion products is absorbed by the copper blades of the water-air heat exchanger (7) which then gives the heat up to the water made to circulate inside the boiler pump.
The hot water is introduced directly into the central heating system through flow (M) and return (R) pipes.

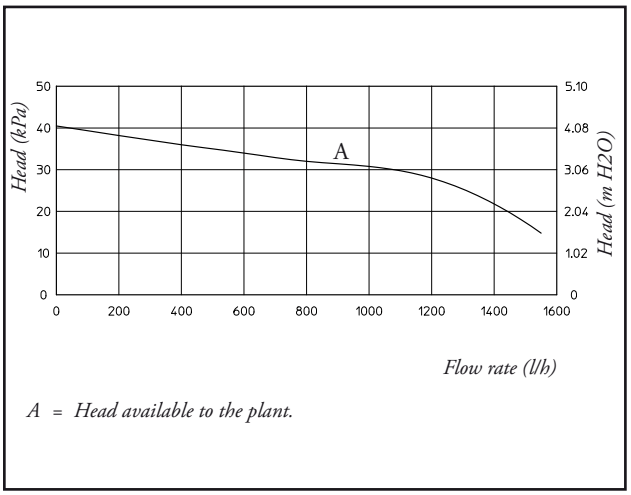
Boiler pump (1).

Operates on the primary circuit return. It is part of the pump body unit realised in composite material.
There is a seat where the automatic air vent valve (2) is housed with O-ring sealing.
To remove the air vent valve from the pump body, turn the valve by a quarter turn in an anti-clockwise direction.



Head flow rate graphics.

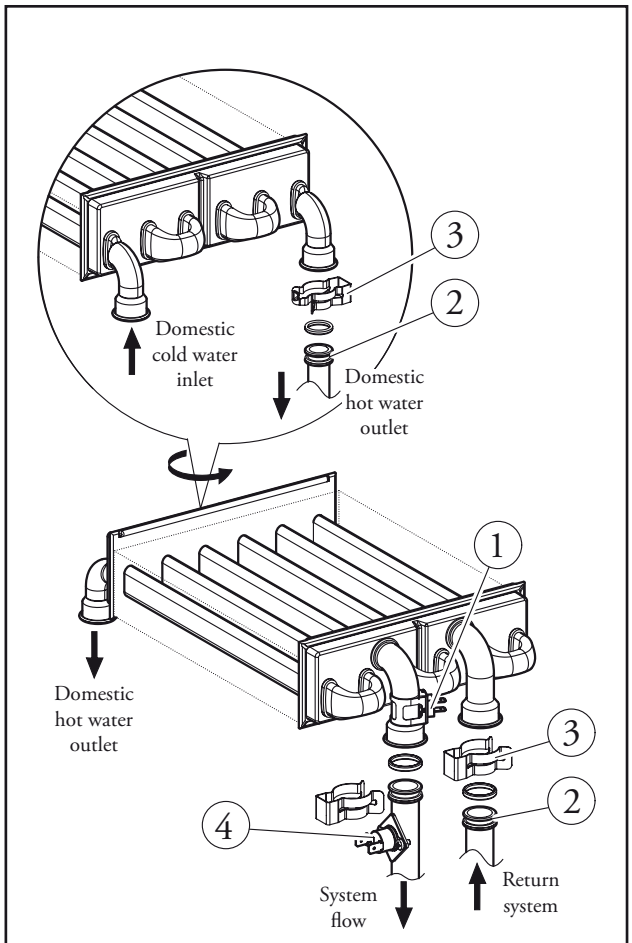
In central heating mode the generator guarantees available head to the system depending on the flow rate, which s represented by the following graphics that show the characteristic curve.



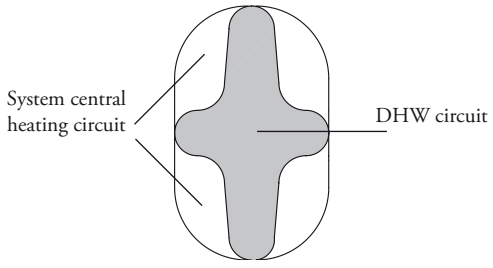
A = Head available to the plant.

Primary heat exchanger.

It is a bithermal water-air blade-type heat exchanger with copper pipes and fins (N° 72 fins) that produce hot water for central heating and domestic hot water.
It therefore operates directly in both circuits *(DHW or CH)* to which it is connected directly by push fitting pipes (2) with O-ring sealing and blocked using relevant clips (3).
The 6 oval pipes of which it is formed and through which CH circuit water runs, contain just as many "cross-wise" pipes that are affected by the direct passage of the DHW *(see figure below).*
These pipes are hydraulically connected in parallel three by three onto the CH circuit and in series in the DHW circuit.
At the heat exchanger outlet (central heating flow) find the NTC flow probe (1) and the over-heating safety thermostat (4).



Heat exchanger pipe section



Safety devices and controls.

System automatic by-pass (3).
Guarantees circulation in the CH circuit also when the high resistance of the system does not allow it.
It operates between the flow and the return of the CH circuit and is inserted inside the by-pass fitting (4) that connects the pump unit (2) to the flow.

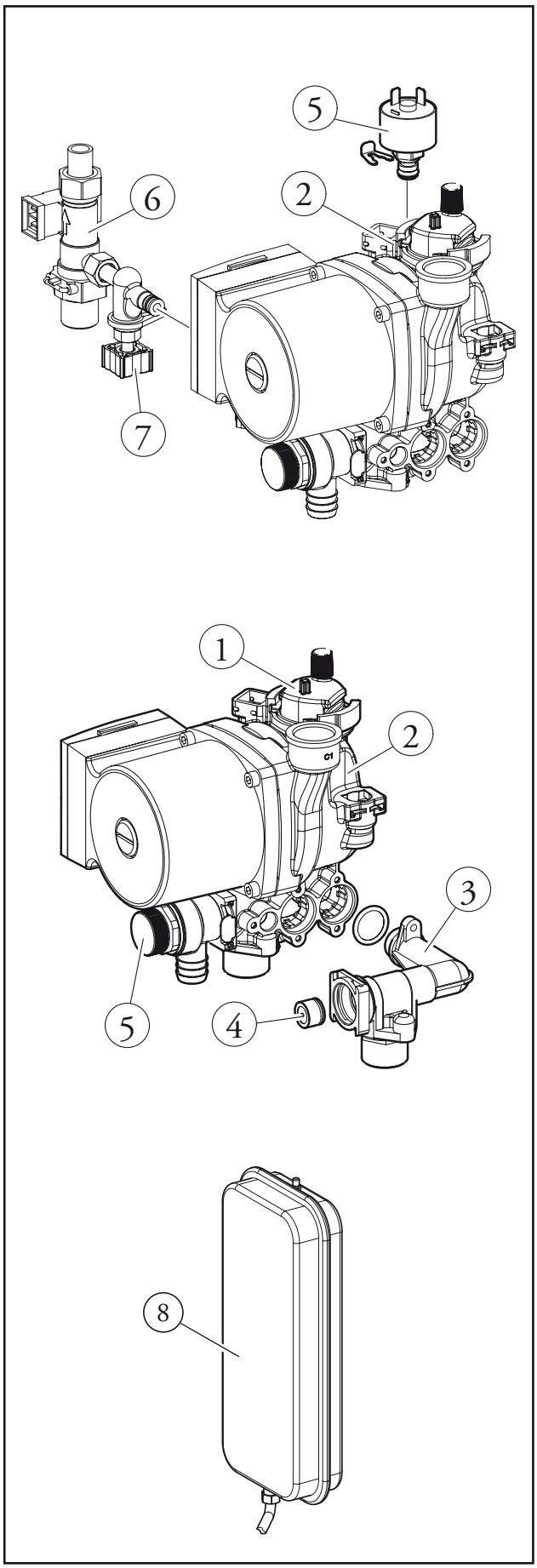
System filing unit (7).
It is a cock positioned between the boiler circuit and the domestic cold water inlet that allows to pressurise the CH system.
The filling unit is connected to the DHW flow switch (6) by a threaded fitting and is connected to the pump unit (2) by O-ring gaskets.

System pressure switch (5).
Detects the pressure inside the primary circuit.
Its seat is on the pump body (2) and is coupled to a micro switch that prevents functioning of the burner when the pressure detected is below 0.3 bar.
Prevents overheating of the primary heat exchanger.

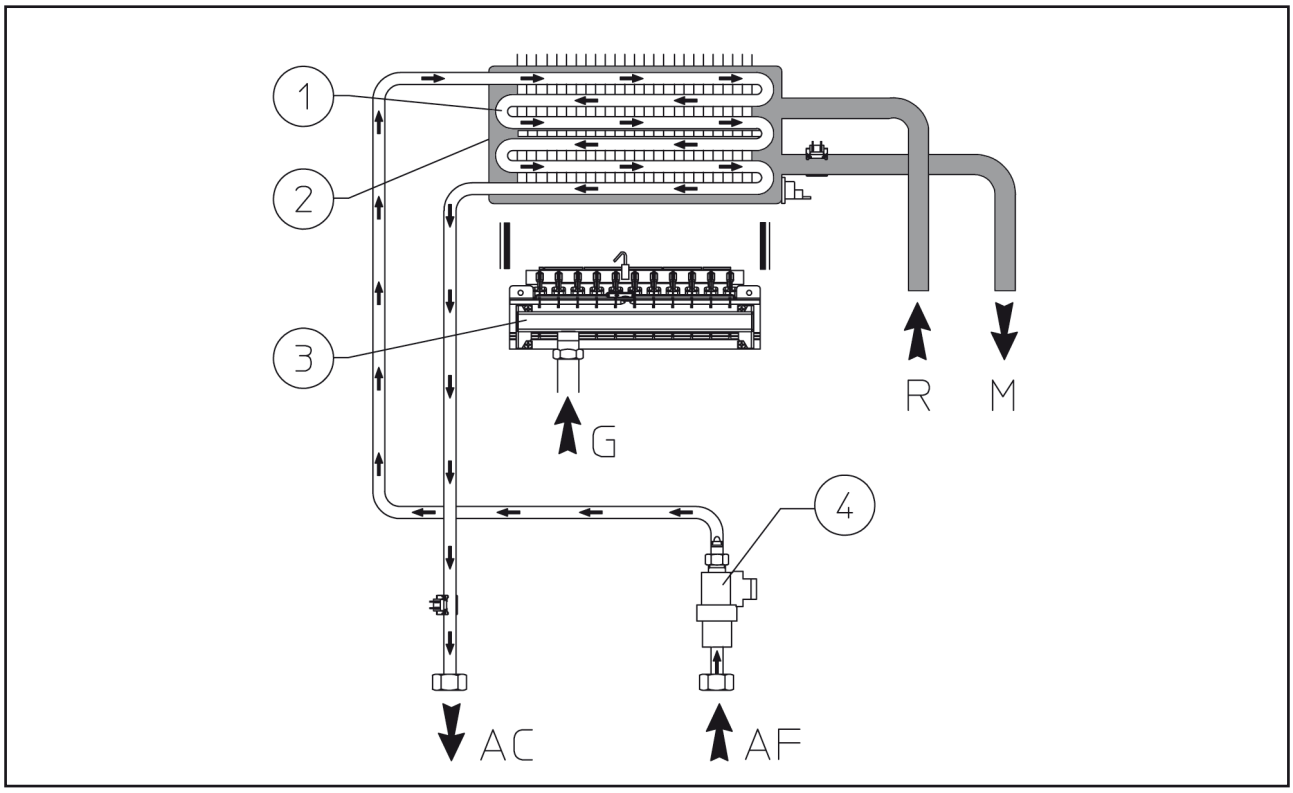
Automatic air vent valve (1).
Allows the automatic expulsion of the gaseous substances that may be present in the boiler circuit.
It is mounted on the pump directly on the body (2).

3 bar safety valve (5).
Prevents the safety pressure in the primary circuit from being exceeded (3 bar).
It is engaged into the front part of the pump body (2) and is fixed using a clip.
Its intervention causes water to escape from the boiler return.

System expansion vessel (8).
It compensates the volume variation consequent to heating the water, thus limiting the pressure variations.
It has a capacity of 6 litres (useful 4.2 litres) and a factory/set pressure of 1.0 bar.
It is positioned on the right side of the boiler at the side of the sealed chamber and is connected to the pump body (2) by means of a copper pipe.



Secondary circuit (Domestic Hot water Circuit).

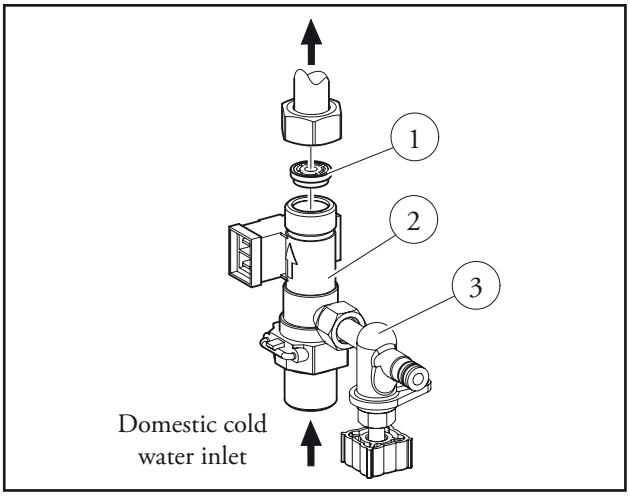


Operation.

A DHW withdrawal leads to the passage of cold water inside the flow switch (4) and the consequent closure of the electric contact coupled to it *(see electric circuit).*
Following this, the adjustment circuit starts the DHW priority functioning mode, which leads to burner ignition (3) and, when a CH request is in progress, switch off of the boiler pump.
In this way, the heat contained in the combustion products is absorbed by the copper blades of the bithermal heat exchanger (2) is given up to the water in the central heating circuit which, then transmits it to the domestic cold water that flows through the "cross-wise" DHW pipes (1).

Domestic hot water flow switch.

With respect to a withdrawal of DHW with a flow rate of at least 1.7 l/min and a dynamic pressure of 0.3 bar, the flow switch (2) enables the boiler functioning in DHW mode.
This takes place by means of a magnet which, lifting when it is hit by the flow of domestic cold water, approaches an electric contact *(reed relay)* and causes shifting due to the magnetic effect.
The closure of the contact, which is positioned out of the pipe where the water passes, allows the integrated P.C.B. to start the priority DHW functioning mode.
It is made up from two parts *(one in brass and one in plastic)* that are coupled and blocked by a pin.
A G1/4" thread is present on the body to which the system filling unit is connected (3).
A 7.1 l/min flow limiter is inserted at the outlet of the flow switch (1) *(at 2 bar)*.



Bithermal heat exchanger *(see central heating circuit).*

N.B.: *to preserve the duration and efficiency of the heat exchanger it is recommended to install the "polyphosphate dispenser" kit in the presence of water whose characteristics can give rise to scale deposits (for example, the kit is recommended when water hardness is higher than 25 French degrees).*

Gas circuit.

The circuit is composed of an atmospheric burner and a modulating gas valve, which respectively allow the combustion of the gas and the adjustment of its flow rate.

Operating.

The electric power supply of the main coils (3) causes the opening of both internal shutters of the valve, thus allowing the passage of gas towards the burner. The outlet flow rate/pressure is then adjusted by acting on the gas valve stabiliser by means of the modulation coil (1).

The fuel is injected, by means of the burner nozzles (6), into the horizontal Venturi pipes (*ramps*). Here, an optimal air-gas mixture is obtained that is ignited by the spark of the ignition electrode (4).

Modulating gas valve (VK 4105 M).

The gas valve is equipped with two main coils (3) and a modulation coil (1) controlled by the integrated P.C.B.
The maximum and minimum outlet pressure values are calibrated on the valve *(see gas adjustments)*.

Main electric coils (3).
They are two ON-OFF coils that are powered (230 V AC) by the integrated P.C.B. when burner ignition is necessary.
They are connected in series and powered at network voltage rectified by means of a diodes jumper (U1) positioned inside connector (2) *(see wiring diagram)*.

COIL	POWER SUPPLY	RESISTANCE
EV1 + EV2	230 V AC	EV1 = 2,85 kΩ EV2 = 1,35 kΩ
Modulation coil (Blue)	250mA DC (G20) 320mA DC (L.P.G.)	28 Ω

Reference values with boiler at maximum power

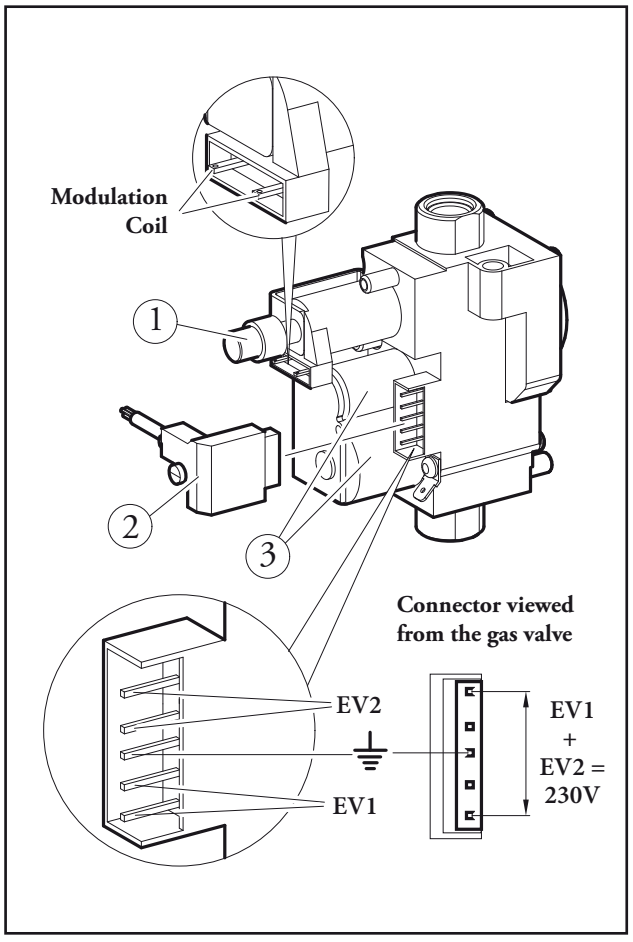
Modulation coil (1).
It is a low voltage coil that is controlled by the integrated P.C.B.
It acts on the gas valve stabiliser and allows the variation of the outlet pressure proportionally to the direct current that passes through it.

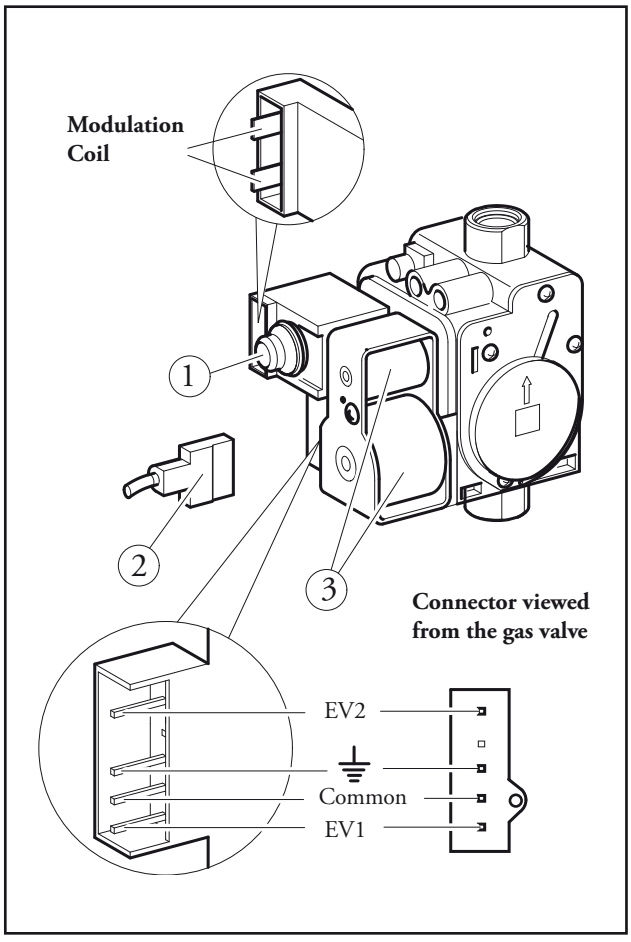
Modulating gas valve (SIT 845).

The gas valve is equipped with two main coils (3) and a modulation coil (1) controlled by the integrated P.C.B.
The maximum and minimum outlet pressure values are calibrated on the valve *(see gas adjustments)*.

Main electric coils (3).
They are two ON-OFF coils that are powered (230 V AC) by the integrated P.C.B. when burner ignition is necessary.
They are connected electrically in parallel and powered from the mains voltage via a relevant connector (2).

Modulation coil (1).
It is a low voltage coil that is controlled by the integrated.





It acts on the gas valve stabiliser and allows the variation of the outlet pressure proportionally to the direct current that passes through it.

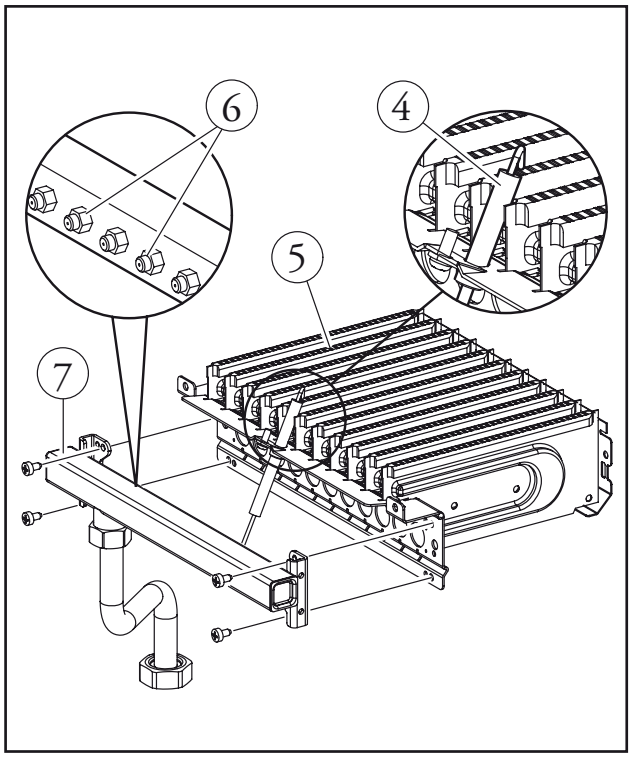
COIL	POWER SUPPLY	RESISTANCE
EV1	230 V AC	6,25 kΩ
EV2	230 V AC	860 Ω
Modulation coil	250mA DC (G20) 320mA DC (L.P.G.)	22 Ω

Reference values with boiler at maximum power

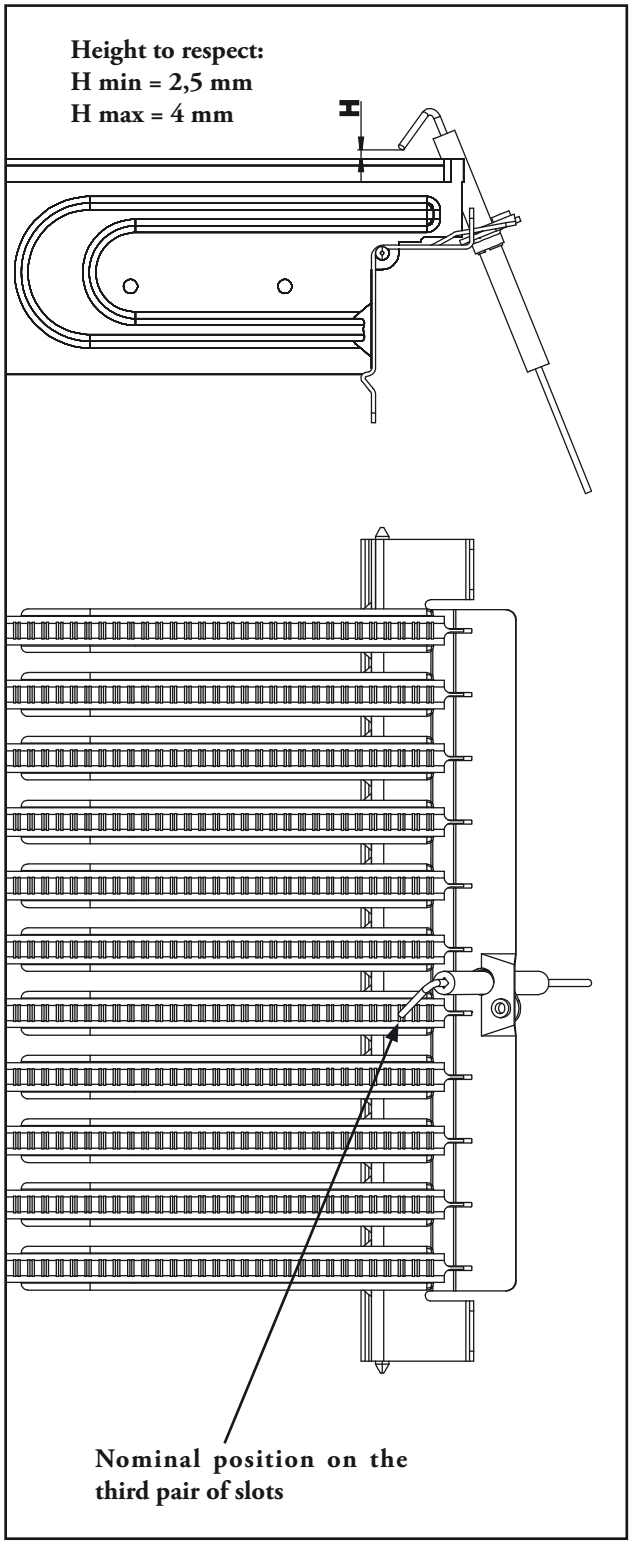
Burner.

The burner is made up from 11 horizontal Venturi pipes (5) into which the gas is injected by just as many nozzles (6) mounted on the relevant collector (7), whose diameter varies according to the type of gas used *(see technical data)*.
Ignition takes place thanks to an integrated P.C.B. that controls the ignition and detection electrode (4).

Ignition and detection electrode (4).
In the ignition mode, it is controlled by the integrated P.C.B. that causes an electric spark between its ends and the surface of the burner on the contact of which the air-gas mix ignites.
Once the burner is on, it detects flame presence on the burner allowing the integrated P.C.B. to conclude the ignition cycle and to vary the gas pressure as required.
It is positioned on the front of the burner in correspondence with the central ramp.

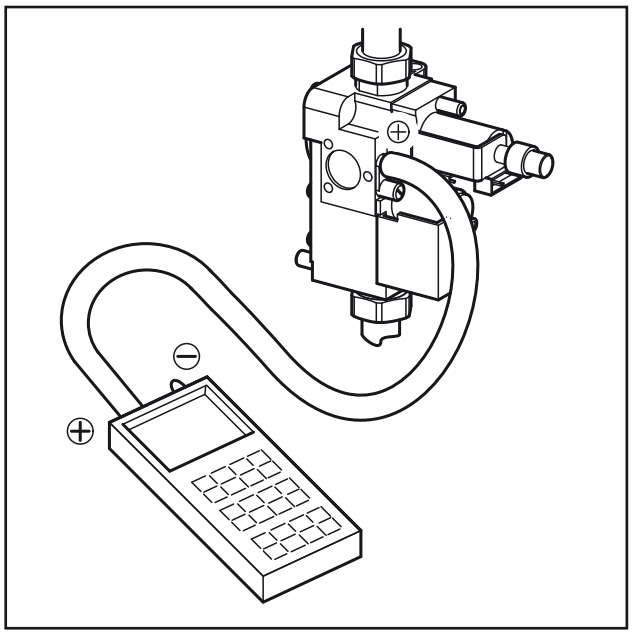


Note: for correct ignition and detection of the boiler always respect the quotes stated in the figure below.

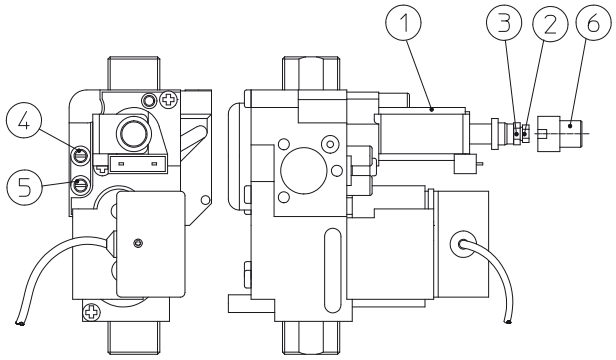


Gas adjustments.

The minimum and maximum pressure adjustments are performed by acting on the gas valve and must be carried out respecting the values stated in the tables relative to each generator for the corresponding type of gas *(see technical data)*.
The features of this appliance **allow to differentiate the minimum pressure adjustments during functioning in the CH and DHW functioning modes.**
The minimum pressure adjustment made on the gas valve, **in fact corresponds to the minimum pressure in the DHW mode (7.0 kW = 6,020 kcal/h) while, for that which concerns central heating, the minimum pressure (9.5 kW = 8,170 kcal/h) can be adjusted by means of the "Minimum heating output" parameter.** This can be programmed on the integrated P.C.B. *(see integrated P.C.B. programming).*
The measurements are taken using a differential manometer, whose pressure point is connected to the vas valve outlet (4) *(see figure).*



Valvola VK 4105



Key:
1 - Coil
2 - Minimum power adjustment nut
3 - Maximum power adjustment nut
4 - Gas valve outlet pressure point
5 - Gas valve inlet pressure point
6 - Protection hood

Honeywell VK 4105 gas valve.

Maximum pressure adjustment.
Withdraw DHW after having adjusted *(using the keys on the control panel)* the temperature at maximum.
Act in a clockwise direction on the brass nut (3) to increase the pressure to the burner and in a clockwise direction to decrease it.

Minimum pressure adjustment
(to be carried out after the maximum pressure adjustment).
After having removed the electric power supply to the modulating coil, act in a clockwise direction on the brass nut (2) to increase pressure to the boiler and in an anti-clockwise manner to decrease it, making sure the brass nut is blocked (3).

SIT 845 gas valve.

Maximum pressure adjustment.

Withdraw DHW after having adjusted (*using the keys on the control panel*) the temperature at maximum.

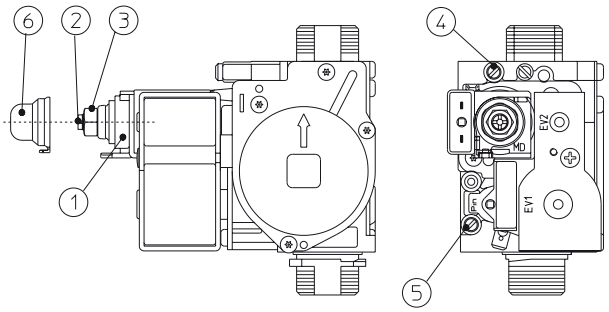
Act in a clockwise direction on the brass nut (3) to increase the pressure to the burner and in a clockwise direction to decrease it.

Minimum pressure adjustment

(to be carried out after the maximum pressure adjustment).

After having removed the electric power supply from the modulation coil, act in an anti-clockwise direction on the screw (2) to increase the pressure to the burner and in an anti-clockwise direction to decrease it.

SIT 845 valve



Key:

1 - Coil
2 - Minimum power adjustment screws
3 - Maximum power adjustment nut
4 - Gas valve outlet pressure point
5 - Gas valve inlet pressure point
6 - Protection hood

Gas transformation.

The adaptation to the type of gas different to that for which the boilers are prepared as per standard is performed using the relevant kit *(methane or LPG).*

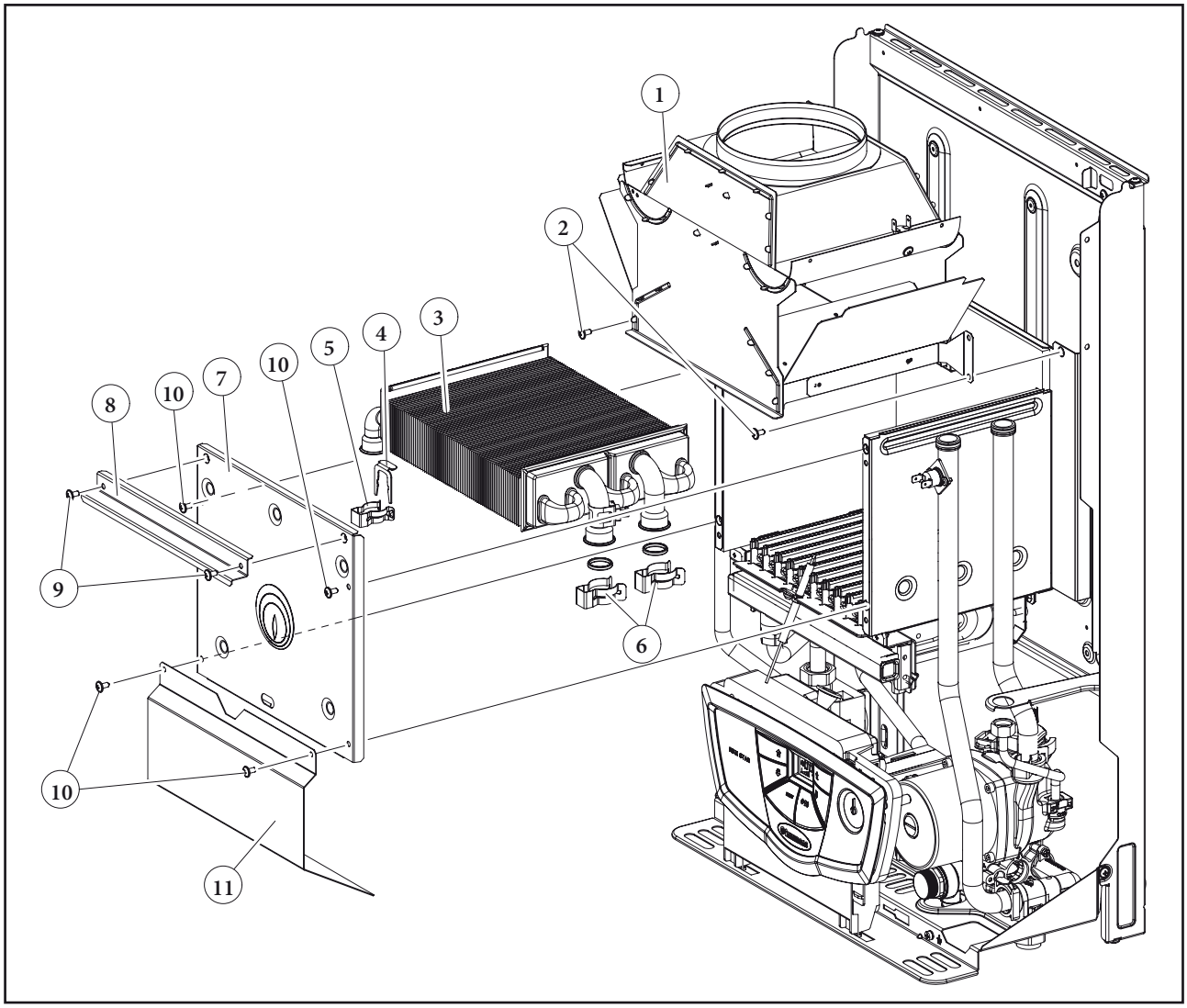
The transformation consists in the replacement of the burner nozzles and the modification of the parameter "P1", programmable on the integrated P.C.B. *(see integrated P.C.B. programming).*

The maximum and minimum DHW pressures are adjusted on the gas valve in the above-described way.

The adjustments of the minimum and maximum outputs in CH mode can be set using parameters *(see integrated P.C.B. functioning).*

The burner ignition pressure is not adjusted as the particular functioning of the P.C.B. **does not require this type of calibration** *(see integrated P.C.B. functioning).*

Disassembly of bithermal heat exchanger and flue hood.

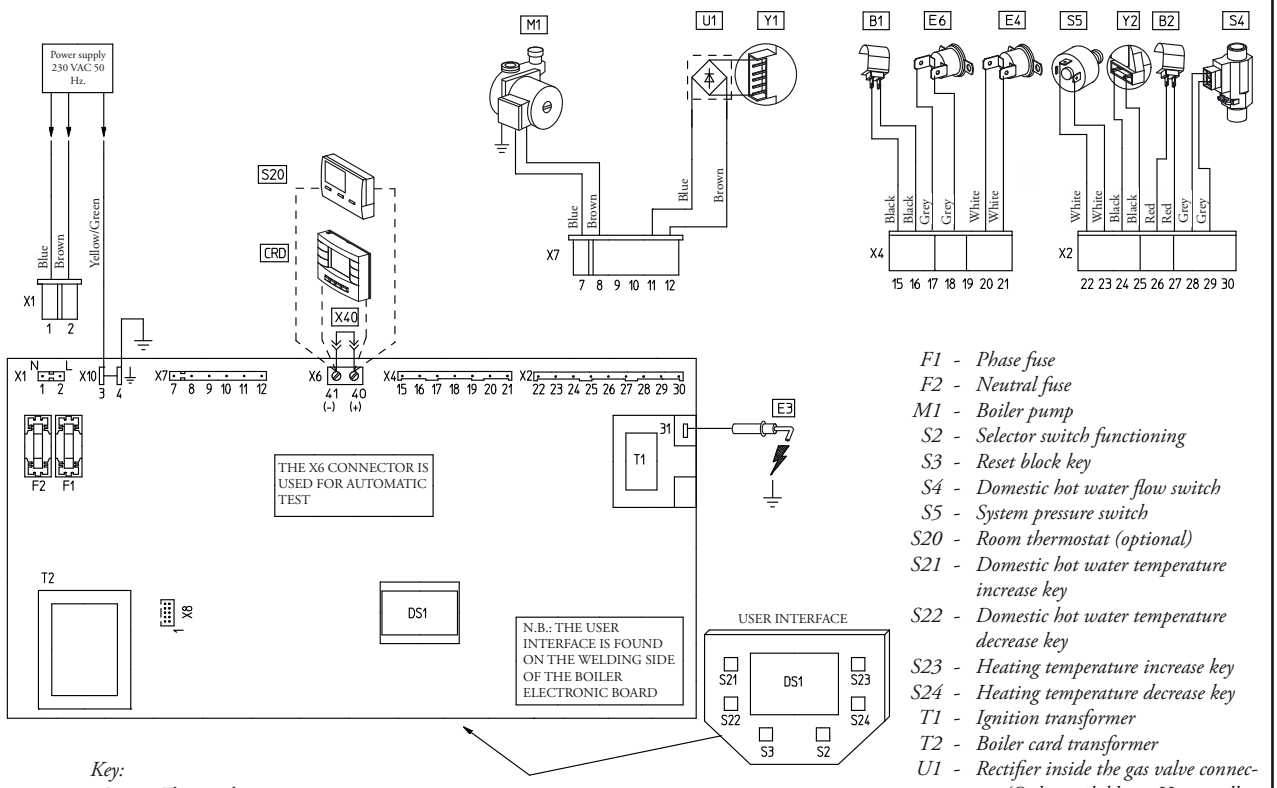


Before disassembling the components, make sure that the gas cock is closed and empty the CH system and the DHW circuit.

Flue hood disassembly (1).
Loosen the two screw fasteners (9) of the cross-member (8), then loosen the two screws (2) that fix the flue hood (1) to the combustion chamber support.

Disassembly of the bithermal heat exchanger (3).
Loosen the four screw fasteners (10) of the combustion chamber face (7) and the anti-reflection sheet steel (11), then loosen the two screws (2) that fix the flue hood (1) to the combustion chamber support.
Extract the locking clips (6) in a way to free the heat exchanger (3) flow and return pipes *(system side)*, the safety clips (4) and successively the other locking clips (5) in a way to free the heat exchanger (3) inlet and outlet pipes *(DHW side)*.
At this point it is possible to lift the heat exchanger in a way to free it from the coupling with the relative pipes.
N.B.: when restoring the connection between bithermal heat exchanger and pipes, pay particular attention to the correct positioning of the O-ring and make sure the pipe locking clips are fitted correctly, in a way to prevent their undermining.

Electric circuit.



Key:

- *B1 - Flow probe*
- *B2 - Domestic hot water probe*
- *CRD - Digital Remote Control (optional)*
- *DS1 - Display*
- *E3 - Ignition and detection electrode*
- *E4 - Safety thermostat*
- *E6 - Flue safety thermostat*
- *F1 - Phase fuse*
- *F2 - Neutral fuse*
- *M1 - Boiler pump*
- *S2 - Selector switch functioning*
- *S3 - Reset block key*
- *S4 - Domestic hot water flow switch*
- *S5 - System pressure switch*
- *S20 - Room thermostat (optional)*
- *S21 - Domestic hot water temperature increase key*
- *S22 - Domestic hot water temperature decrease key*
- *S23 - Heating temperature increase key*
- *S24 - Heating temperature decrease key*
- *T1 - Ignition transformer*
- *T2 - Boiler card transformer*
- *U1 - Rectifier inside the gas valve connector (Only available on Honeywell gas valves)*
- *X40 - Room thermostat jumper*
- *Y1 - Gas valve*
- *Y2 - Gas valve modulator*

The electric circuit of the NIKE Star 24 3 E is completely interlocked to a P.C.B. with integrated microprocessor, which controls the functions of the generator.
The control and safety devices partly operate at network voltage (230 V AC) and partly at low voltage.

230 V AC circuit.

Safety devices and controls.

Detection electrode (E3)	It detects burner ignition from where the flame is hit. It is connected to the integrated P.C.B. **The electrode also acts as an ignition electrode.**	
Phase fuse (F1) **Neutral (F2)**	They cut off the power supply to the circuit when the current absorbed exceeds 3.15A. They are mounted on the integrated P.C.B.	Fuse 3.15 AF 250 V

Loads.

Ignition electrode (E3)	It is controlled by the integrated P.C.B. that causes an electric spark between its ends and the surface of the burner on the contact of which the air-gas mix ignites. **The electrode also acts as a detection electrode.**
Boiler pump (M1)	It is powered by the integrated P.C.B. when there is a CH or anti-freeze request. Allows circulation in the primary circuit.
Integrated P.C.B.	The board is always powered independently from the functioning selector switch position (S2) *(see integrated P.C.B. functioning).*
Gas valve (Y1) ***(main coils)***	It is powered by the integrated P.C.B. when burner ignition is necessary. For the SIT 845 gas valve it is powered by the mains voltage. For gas valve VK 4105 it is powered at network voltage rectified by means of a diodes jumper (U1) contained inside the gas valve connector. Allows the passage of gas to the burner.

Low voltage circuit.

Safety devices and controls.

Digital Remote Control (CRD) ***(optional)***	Allows long distance control of the generator *(SUM/WIN mode selection, temperature adjustment and indication, alarms display, reset, etc.)* and acts as weekly timer thermostat. If the CRD is installed, the pre-existing X40 jumper must be eliminated.	**See Digital Remote Control functioning (CRD)**
Domestic hot water flow switch (S4)	Following withdrawal of DHW it acts on the integrated P.C.B. causing functioning in DHW mode. In stand-by it enables functioning in CH mode.	Contact in cut-off
System pressure switch (S5)	When the pressure of the boiler circuit is below 0.3 bar it determines burner switch-off.	Contact in cut-off
Reset Button (S3)	Allows to unblock the boiler after ignition block safety intervention or over-heating, it allows to activate the chimney sweep function. If pressed together with the functioning mode selector switch (S2), it allows to set boiler parameters.	Button

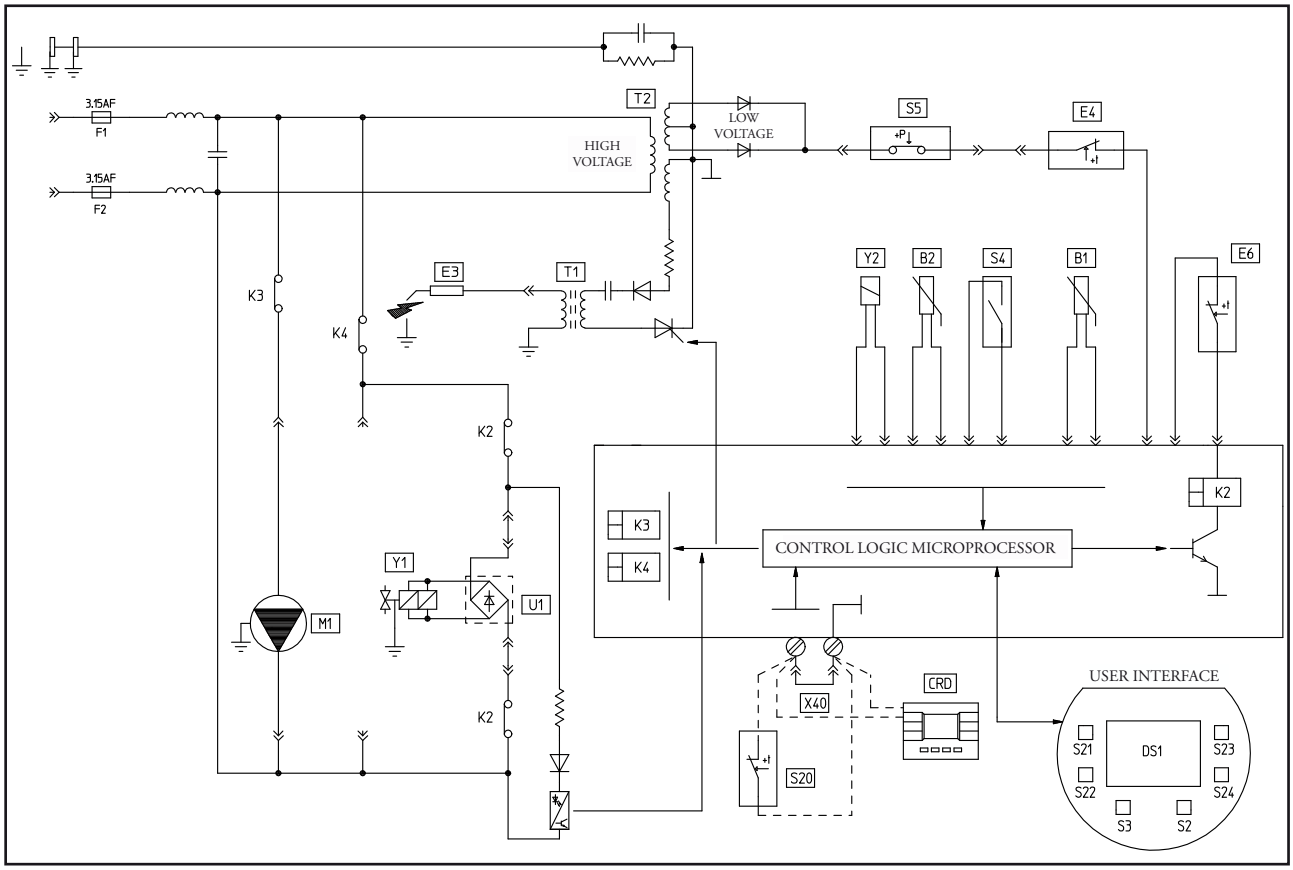
Functioning mode selector switch (S2)	The possible functioning mode selections are: ⏻ = Circuit powered, the anti-freeze and anti-block functions remain active, the post-circulation function is terminated. ( ) = Boiler functioning in SUMMER mode. ( ) = Boiler functioning in WINTER mode.	Button
Flow probe (B1)	Allows the integrated P.C.B. to detect the temperature of the primary circuit flow water. Its breakage blocks burner functioning both in central heating and domestic hot water modes. It is positioned on the bithermal heat exchanger flow pipe.	NTC probe 10 kΩ 25 °C
Domestic hot water probe (B2)	It allows the integrated P.C.B. to detect the temperature of the exiting domestic hot water. Its breakage blocks functioning in DHW mode but functioning is allowed in DHW phase. It is inserted onto the DHW outlet pipe connected to the bithermal heat exchanger.	NTC probe 10 kΩ 25 °C
Room thermostat (S20) ***(external optional)***	Enables functioning in CH mode when the room temperature is below that requested. If the room thermostat is installed the pre-existing X40 jumper must be eliminated.	Contact in cut-off
Flue safety thermostat (E6)	If there is only little flue draught, act on the integrated P.C.B. blocking boiler functioning for 30 minutes. It is positioned on the right side of the flue hood.	Klixon thermostat with normally closed contact
Safety thermostat (E4)	When the safety thermostat is exceeded (100 °C) the burner is switched off. It is positioned at the exit of the main heat exchanger.	Klixon thermostat with normally closed contact

Loads.

Gas valve modulator (Y2)	It is powered by the integrated P.C.B. with variable direct current. It allows to vary the gas pressure at the burner.

Electric circuit.

CH mode.



Operating with room thermostat.

By using the button (S2) to select (Winter) functioning, boiler functioning in the CH mode is enabled.
On closure of the room thermostat (S20), if the contact of the system pressure switch (S5) is closed *(pressure detected in the primary circuit exceeding the minimum value)* the integrated P.C.B. powers the boiler pump (M1) by means of relay K3.
With the consent of the safety thermostat (E4), the flue safety thermostat (E6) and if the temperature detected by the NTC flow probe (B1) is lower than the setting made on the boiler control panel, the integrated P.C.B. excites the requested relay K2. This causes the closure of the two contacts, allowing to start the ignition cycle, first controlling the ignition/detection electrode (E3) and simultaneously, both the coils of the gas valve (Y1).
The ignition of the burner is detected by the integrated P.C.B. by means of the ionisation electrode (E3).

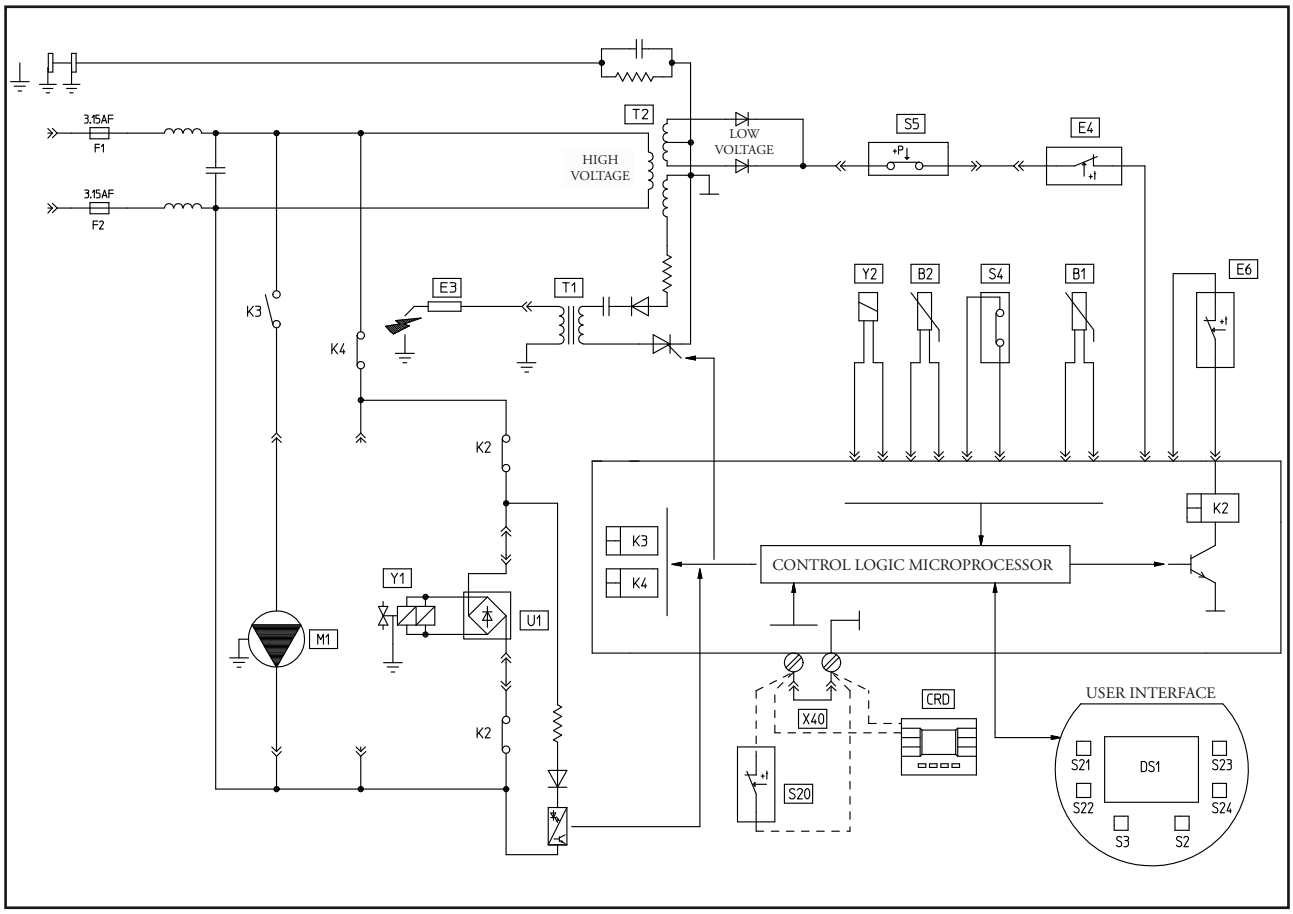
Operation with Digital Remote Control (Optional).

By selecting the functioning in Winter mode on the Digital Remote Control on the panel (CRD), boiler functioning in CH mode is enabled.
If the conditions detected CRD require ignition in CH mode, the integrated P.C.B. powers the boiler pump (M1) through relay K3 and burner ignition takes place as described above.

N.B.: every time switch off occurs when temperature is reached, the integrated P.C.B. blocks burner functioning in CH mode for a period of time equal to that set with board parameters *(see integrated P.C.B. functioning).*

Electric circuit.

DHW mode.



Operation.

By using the button (S2) to select (Summer) (Estate) or (Winter) functioning, boiler functioning in the CH mode is enabled.

A withdrawal of DHW causes the closure of the DHW flow switch contact (S4) and enables functioning in DHW mode.

The board checks closure of the system pressure switch contact (S5) *(pressure detected in the primary circuit exceeding minimum value).*

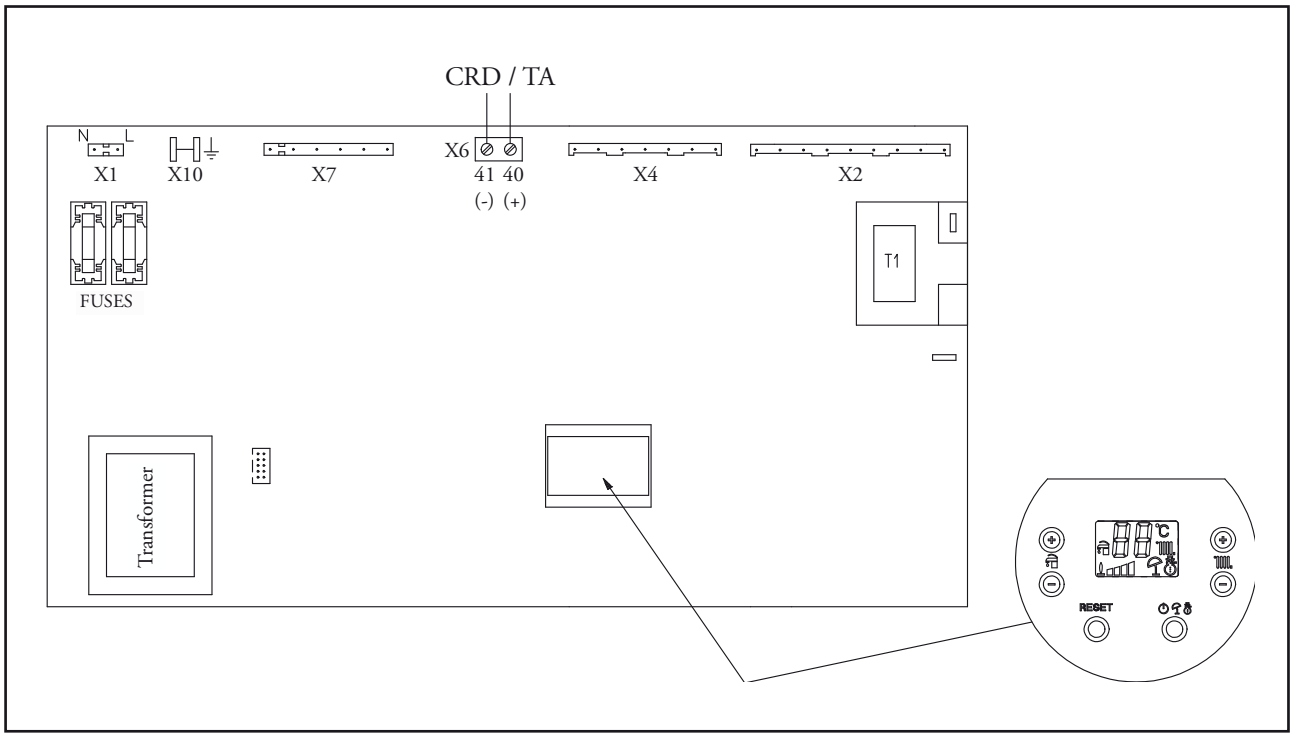
The boiler pump (M1) is not made to function in DHW or is switched off when there is a CH request in progress following the opening of relay K3.

If the temperature detected by the DHW NTC probe (B2) is below the setting on the boiler control panel *(or on the CRD if mounted)* boiler ignition is requested.

With the consent of the safety thermostat (E4) and the consent of the flue safety thermostat (E6), the board closes the contact of relay K4 and requested relay K2. This causes the closure of the 2 contacts, allowing to start the ignition cycle, first controlling the ignition electrode (E3) and successively, both coils of the gas valve (Y1).

The ignition of the burner is detected by the integrated P.C.B. by means of the ionisation electrode (E3).

Integrated P.C.B. (Printed Circuit Board).



Inside the control panel the boiler is equipped with a P.C.B. with microprocessor for control of the appliance's electric devices, which takes care of linear modulation of burner power.
A display shows the functioning status of the appliance, indicating any intervention of the safety devices, with which it is supplied.
The board that equips all models, whether conventional flue or sealed chamber *(NIKE/EOLO Star 24 3 E)* is the same. Recognition of the different types of boiler functioning takes place automatically by means of the electric wiring of the appliance.
The integrated P.C.B. is always powered independently from the functioning position determined by the functioning mode selector switch (S2).
The board carries out a periodical self-check to control its correct functioning. During functioning in CH mode or with boiler in stand-by, the function activates every 18 hours from the last check/powering of the boiler. If functioning in DHW mode, the self-check starts within 10 minutes after the end f the withdrawal in progress for the duration of about 10 seconds.
N.B.: during self-check the boiler remains off, including signalling.

Operation.

Central heating request.

By using the button (S2) to select (Winter) functioning, boiler functioning in the CH mode is enabled.
On closure of the room thermostat (S20), if the contact of the system pressure switch (S5) is closed *(pressure detected in the primary circuit exceeding the minimum value)* the integrated P.C.B. powers the boiler pump (M1) by means of relay K3.
With the consent of the safety thermostat (E4), the flue safety thermostat (E6) and if the temperature detected by the NTC flow probe (B1) is lower than the setting made on the boiler control panel, the integrated P.C.B. excites the requested relay K2. This causes the closure of the two contacts, allowing to start the ignition cycle.
In the first seconds after the gas valve has been powered (Y1), the current to the modulation coil (Y2) is limited to the pre-set soft ignition current.
Successively, the burner goes to the minimum value set by setting the "Central heating minimum output*" parameter, to then reach the maximum value set *(if requested)* by setting the "Central heating maximum output*" parameter, in a time determined by the setting of the " Central heating ramp timing*" parameter.
Successively, flame modulation takes place with reference to the difference between the temperature set on the boiler control panel and that detected by the DHW probe (B1).
On exceeding (+5°C) the temperature set, the contact of relay K2 is opened with consequent burner switch off, whose switch/on time depends on the setting of the "Central heating ignition timer*" parameter.
Every time the burner switches off the pump functions for another 30 seconds.

* see integrated P.C.B. programming.

DHW request.

A withdrawal of DHW causes the closure of the DHW flow switch contact (S4) and enables functioning in DHW mode.

When the boiler functions in DHW mode, the boiler pump (M1) is not made to function or is switched off when there is a CH request in progress following the opening of relay K3.

Successively, burner ignition takes place in the same way as the CH mode.

In the first seconds after the gas valve has been powered (Y1), the current to the modulation coil (Y2) is limited to the pre-set soft ignition current.

When the flame has been detected, the modulation coil signal is increased in a way to immediately reach *(if requested)* the maximum output adjusted on the gas valve.

Successively, flame modulation takes place with reference to the difference between the temperature set on the boiler control panel and that detected by the DHW probe (B2).

Relay K2 contact is opened when the value of 65 °C is exceeded. This is closed again as soon as the temperature drops back below 64 °C.

An increase of the flow temperature beyond the limitation intervention point (80 °C) causes a reduction of the modulation current in a proportional manner, in a way to limit this temperature.

Central heating anti-freeze request.

When the temperature detected by the CH flow probe (B1) falls below 4 °C, the board gives consent for ignition and keeps the generator working with the burner at minimum output until a boiler temperature equal to 42 °C is reached *(radiators anti-freeze).*

The function is always active independently from the selection made on the functioning mode selector switch.

DHW anti-freeze request.

If the temperature detected by the DHW probe (B2) falls below 4 °C, the board gives consent for boiler ignition and keeps the generator working with the burner at minimum output until a temperature of 8 °C is detected by the DHW probe. Post-circulation is then activated in the central heating mode with duration of 30 seconds.

During functioning, the water in the primary circuit remains below 42 °C as on reaching this temperature the board switches the burner off.

The function is always active independently from the selection made on the functioning mode selector switch.

"Chimney sweep" request.

Press the "Reset" button (S3) for at least 10 seconds. On its release the board gives consent for ignition of the generator and keeps it functioning at maximum heating output set for 15 minutes.

During this period only the limit thermostat function is respected (90 °C), which is performed by the central heating flow probe (B1).

The function is signalled on the boiler display by the flashing symbols (and). It cannot be inserted if a DHW request is in progress.

It can be cut-off by removing the power supply to the circuit, taking the boiler to the (Stand-by), position, making a DHW request or after 15 minutes.

Inputs.

Digital Remote Control (CRD) ***(optional)***	It sends the board the signals relative to the functioning mode *(Stand-by/Summer/Winter)*, to temperature adjustments *(domestic hot water and central heating)* and central heating requests *(times, room temperature, etc...).*	
Domestic hot water flow switch (S4)	Indicates that a DHW request is in progress. Following withdrawal of DHW it enables boiler functioning in the DHW mode, which is given priority with respect to the system CH mode.	Closed = DHW request
System pressure switch (S5)	When the pressure of the primary circuit is lower than 0.3 bar remove the power supply to the K3 relay, thus preventing burner ignition.	Open = no pressure Closed = pressure OK
Flame detection (E3)	It is a signal that indicates that the flame has been detected. It allows the board to increase the current to the modulation coil (Y2) after having limited it during the ignition phase. It keeps the gas valve open (Y1).	
Flow probe (B1)	It is a resistance that can be varied in an inversely proportional manner to the temperature of the primary circuit flow water. It is also used as a limit thermostat (90 °C).	NTC probe 10 kΩ 25 °C
Domestic hot water probe (B2)	It is a resistance that can be varied in an inversely proportional manner to the output temperature of the DHW.	NTC probe 10 kΩ 25 °C
Room thermostat (S20) ***(external optional)***	It is a clean contact switch that sends a signal *(in low voltage)* to the board enabling functioning in the CH mode when the room temperature is lower than that requested.	Open = Central heating OFF Closed = Central heating ON
Flue safety thermostat (E6)	It enables the burner ignition by powering the relay K2 when flue evacuation takes place correctly. If there is only little flue draught, act on the integrated P.C.B. blocking boiler functioning for 30 minutes.	Closed = request ON Open = request OFF

Outputs.

Gas valve power supply (Y1)	It is a 230 V AC signal that indicates the power supply of the main coils of the gas valve (Y1).	230 V AC = coils powered 0 V AC = coils not powered
Ignition electrode (E3)	It is a high voltage signal *(greater than 16 kV)* which determines an electric spark at the ends of the ignition electrode, positioned on the burner.	
Digital Remote Control (CRD) ***(optional)***	It is a signal (BUS) that allows to display boiler temperature, functioning in DHW and CH mode, the alarm codes that have intervened on the remote control display.	
Gas valve modulator (Y2)	It is a direct current signal that controls the modulation coil and allows to vary the gas pressure at the burner, depending on the output requested.	
Relay (K4)	It is a unipolar relay that is excited in concomitance with relay request K2 when its functioning is requested.	
Pump Relay (K3)	It is a unipolar relay for pump control (M1) that is excited when its functioning is requested.	
Relay Request (K2)	It is a bipolar relay that is excited when burner ignition is necessary. The boiler is ignited by means of its contact.	

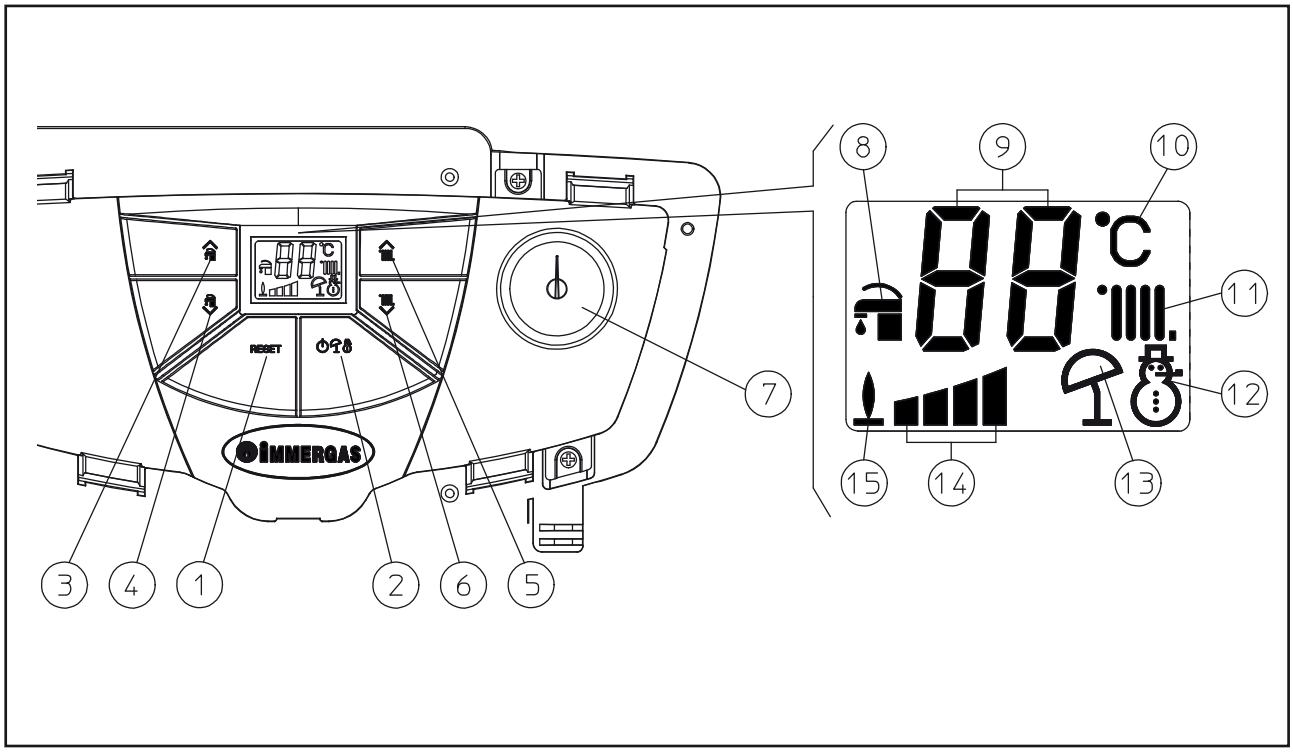
Safety devices.

Pump anti-block device	The boiler pump (M1) is made to function for 30 seconds after: - 24 hours of inactivity with the boiler in SUMMER ( ) mode. - 3 hours of inactivity with the boiler in WINTER ( ) mode.
Periodical self-check	The P.C.B. carries out a periodical self-check to control its correct functioning. During functioning in heating mode or with boiler in stand-by, the function activates every 18 hours after the last boiler check/power supply. In case of functioning in domestic hot water mode the self-check starts within 10 minutes after the end of the withdrawing in progress, for duration of approx. 10 seconds. **N.B.:** The boiler remains inactive during the self-check and then re-starts normal functioning.
Electro-mechanical contacts block ***(system pressure switch, flue safety thermostat and safety thermostat)***	In the case of high resistance of the system pressure switch contact, the safety thermostat or the flue safety thermostat *(contact not perfectly closed or worn)*, the integrated P.C.B. carries out a reset and starts a new contact control cycle; if the problem persists after 6 control cycles, boiler functioning is interrupted. To re-start the appliance, press the "Reset" button (S3) and then make a central heating or domestic hot water request.

Parasite flame block	In the case of dispersion of the detection circuit or anomaly in the flame control that generates a correct ionisation current *(without the gas valve being open)* with the duration of at least 20 seconds, boiler functioning is blocked. To re-start the appliance, press the “Reset” button (S3) and then make a central heating or domestic hot water request.
No ignition block	If within 10 seconds from the start of the ignition cycle, the detection electrode (E3) has not detected flame presence on the burner, boiler functioning is blocked. The integrated P.C.B. makes 2 ignition attempts with duration of 10 seconds, intervalled by a time of 30 seconds, after which it blocks. To re-start the appliance, press the “Reset” button (S3) and then make a central heating or domestic hot water request. **N.B.:** it is possible to reset the anomaly up to 5 consecutive times, after which the function is prevented for at least one hour and one attempt is gained after every hour. Five attempts can be gained by taking the boiler to the ⏻ (Stand-by) position or removing the power supply to the circuit.
Flue safety thermostat block (E6)	If the flue safety thermostat contact is opened *(little flue draught)* boiler functioning is blocked for 30 minutes. If normal conditions are restored the boiler restarts without having to be reset. To re-start the appliance before the end of this timing *(30 minutes)* the power supply must be removed from the boiler by temporarily disconnecting the electric power supply plug. If the flue safety thermostat should intervene three times in less than two hours, boiler functioning is blocked. To re-start the appliance, press the "Reset" button (S3).
Thermostat safety block (E4)	If the over-heating safety thermostat contact is opened, boiler functioning is blocked. To re-start the appliance, press the “Reset” button (S3) and then make a central heating or domestic hot water request.
Insufficient circulation	To prevent overheating of the water-gas heat exchanger if the pump is blocked or due to little circulation in the primary circuit, when the CH NTC flow probe (B1) detects an increase in the temperature exceeding 5 °C per second, the burner is switched off. Re-start takes place when the flow temperature falls below 42 °C.
Pump post-circulation	To prevent overheating of the water-gas heat exchanger, at the end of CH, anti-freeze or "chimney sweep" request, the pump (M1) is kept working for a period of 30 seconds.
NTC probe breakage (B1 and B2)	Breakage of the central heating flow probe (B1) is signalled with the display of the error code 05 on the boiler display and prohibits functioning both in central heating and domestic hot water modes. Breakage of the domestic hot water probe (B2) is signalled with the display of the error code 06 on the boiler display and prohibits functioning in domestic hot water mode, but functioning in central heating mode is allowed.

User digital interface.

The adjustment and control of the appliance *(burner ignition, temperature adjustment, flame modulation and diagnostics)*, are entrusted to a P.C.B. with microprocessor which, by means of a digital interface complete with display and buttons, allows the visualisation and adjustment of the functioning parameters.



Functioning signal.

During normal functioning, the display indicates the status and functioning mode of the boiler using the appropriate symbols.

Functioning signal	Symbol
Boiler powered without flame presence	Display powered
Boiler in CH mode	Symbol 11 on
Boiler in DHW mode	Symbol 8 on
Burner on	Symbol 15 on
Chimney sweep function in progress	Symbols 8 and 11 flash simultaneously

Functioning anomalies signalled.

In the case of breakdown or anomaly, independently whether in presence of electric or manual re-arm anomalies, the orange light on the display flashes. The relative error codes, given in the table below, also flash at the same time.

Functioning anomaly signalled	Code displayed Flashing	Digital remote control display
No ignition block	01	01
Over-heating safety thermostat block, flame control anomaly	02	02
Flue thermostat intervention	03	03
Electro-mechanical contacts	04	04
NTC flow probe anomaly	05	05
Domestic hot water NTC probe anomaly	06	06
Insufficient system pressure	10	10
Parasite flame	20	20
Insufficient circulation	27	27
Domestic hot water leakage	28	28
CRD offline or not compatible anomaly	31	31

Control and adjustment buttons.

The NIKE Star 24 3 E boiler has buttons that allow to select the function status of the boiler, adjust the water temperature in CH and DHW mode and to set the boiler functioning parameters. See the following table for association of the buttons:

List of Buttons	Description
1	Reset button
2	Stand-by/ summer/winter button
3	Button (+) to increase the domestic hot water temperature
4	Button (-) to reduce the domestic hot water temperature
5	Button (+) to increase the CH system water temperature
6	Button (-) to reduce the CH system water temperature

Programming the integrated P.C.B.

The NIKE Star 24 3 E boiler is prepared for programming of several functioning parameters.
By modifying these parameters it will be possible to adapt the boiler according to requirement.
To access the programming phase, proceed as follows:

- press buttons (1) and (2) at the same time for approximately 15 seconds;
- Using buttons (3) and (4), select the parameter to be changed indicated in the following table:

List of parameters	Description
P0	Solar panels selection
P1	Gas type selection
P2	Special gas type G110 selection
P3	Activation of anti-leak function
P4	Activation of domestic hot water post circulation
P5	Minimum CH output
P6	Maximum CH output
P7	Central heating ignitions timer
P8	Central heating ramp timer

- adjust the corresponding value consulting the table using buttons (5) and (6);
- confirm the value set by pressing the Reset button (1) for about 5 seconds;

- by pressing buttons (3) + and (4) at the same time - of the DHW temperature adjustment, the operation is annulled.

  N.B.: after a period of 30 seconds without touching any buttons, the operation cancels automatically.

Solar panels selection. The setting of this function is used to set the boiler in order to function with the use of solar panels. By setting the parameter P0 in "solar" **on** mode, the switching off of the burner is correlated to the adjustment of the domestic hot water temperature. In **OFF** mode, the burner is switched off at the maximum value.

N.B.: together with a solar valve kit, set the parameter P0 in "solar" **on** mode *(correlated)*.

Solar panels selection	
Range of values which can be set	**Parameter**
on "solar" - **OFF** *(Standard settings)*	P0

Gas type selection. The setting of this function is used to adjust the boiler in order to function with LPG gas or Methane gas.

Gas type selection	
Range of values which can be set	**Parameter**
LG (LPG) **or nG** (Methane) *(Standard setting)*	P1

Town Gas G110 – Industrial gas. The setting of this function is used to adjust the boiler in order to function with gases from the first family.
With "on" set these settings prevail over the settings of parameter "P1".

Town Gas G110 - Industrial gas (first family gas)	
Range of values which can be set	**Parameter**
on - **off** *(Standard setting)*	P2

Anti-leakage function. This function reduces the heating temperature to 57 °C if a DHW leak is detected *(leakage)* in CH mode.

Activation of anti-leak function	
Range of values which can be set	**Parameter**
on *(Standard setting)* - **off**	P3

Domestic hot water post circulation function. With the Post-circulation function active after domestic hot water withdrawal, the pump remains on for 2.5 seconds in winter time and 1.5 seconds in summer time to reduce the formation of lime scale.

Activation of domestic hot water post circulation	
Range of values which can be set	**Parameter**
on *(Standard setting)* - **off**	P4

Heating output. The NIKE Star 24 3 E boiler is fitted with electronic modulation, which adapts the power of the boiler to effective heat requests of the home. Then the boiler works normally in a variable gas pressure field between the minimum heating power and the maximum heating power depending on the system's heating load.

N.B.: The NIKE Star 24 3 E boiler is produced and calibrated in the central heating mode at nominal heat output. Approximately 10 minutes are needed to reach the nominal heat output, which can be changed using the parameter (P6)

N.B: the selection of the "Minimum heating output" and "Maximum heating output" parameters, in the presence of a central heating request, allows switch-on of the boiler and power supply of the modulator with current equal to the value of the respective set value.

Minimum CH output	
Range of values which can be set	**Parameter**
from **0** % Imax. to **63** % Imax *(pre/set in the factory at 9.5 kW equivalent to 8170 kcal/h).*	P5

Maximum CH output	
Range of values which can be set	**Parameter**
from I Min. Central heating output set (=Imin.) to **99** % Imax. *(Standard setting)*	P6

Timer setting. The boiler has electronic timing, which prevents the burner from igniting too often in central heating mode. The boiler is supplied as per standard with a timer adjusted at 3 minutes.

Central heating ignitions timer	
Range of values which can be set	**Parameter**
from**1** to**10** 3 = 3 minutes *(Standard setting)* 1 = 30 seconds	P7

Central heating ramp timing. The boiler performs an ignition ramp of about 10 minutes to arrive from minimum power to nominal heating power.

Central heating ramp timer	
Range of values which can be set	**Parameter**
from **1** to **10** 10 = 10 minutes *(Standard setting)* 1 = 30 seconds	P8

Technical Data.

NIKE Star 24 3 E technical data.

Nominal heat input	kW (kcal/h)	25,9 (22279)
Minimum heat input	kW (kcal/h)	8,1 (6968)
Nominal heat output (useful)	kW (kcal/h)	23,6 (20296)
Minimum heat output (useful)	kW (kcal/h)	7,0 (6020)
Efficiency at 100% heat output	%	91,1
Efficiency at 30% nominal heat output load	%	90,3
Heat loss at case with burner On/Off	%	2,1 / 1,05
Heat loss at flue with burner On/Off	%	6,8 / 0,47
Central heating circuit max. operating pressure	bar	3
Central heating circuit max. operating temperature	°C	90
Adjustable central heating temperature	°C	35 - 80
System expansion vessel total volume	l	4,2
Expansion vessel factory-set pressure	bar	1
Water content in generator	l	0,7
Total head available with 1000/h flow rate	kPa (m H_2O)	30,8 (3,14)
Hot water production useful heat output	kW (kcal/h)	23,6 (20296)
Domestic hot water adjustable temperature	°C	35 - 55
Domestic hot water circuit flow limiter at 2 bar	l/min	7,0
Min. pressure (dynamic) domestic hot water circuit	bar	0,3
Domestic hot water circuit max. working pressure	bar	10
Minimum D.H.W. flow rate	l/min	2,0
Specific flow rate (ΔT 30°C)	l/min	10,4
Drawing capacity in continuous duty (ΔT 30°C)	l/min	11,1
Weight of full boiler	kg	25,3
Weight of empty boiler	kg	24,6
Power supply connection	V/Hz	230/50
Power input	A	0,45
Installed electric power	W	105
Pump consumption	W	85
Equipment electrical system protection	-	IPX4D
NO_X Class	-	3
Weighted NO_X	mg/kWh	137
Weighted CO	mg/kWh	53
Type of appliance	$B11_{BS}$	
Category	II2H3+	

- Flue temperature values refer to an air inlet temperature of 15 °C.
- The data relevant to domestic hot water performance refer to a dynamic inlet pressure of 2 bar and an inlet temperature of 15 °C; the values are measured directly at the boiler outlet considering that to obtain the data declared mixing with cold water is necessary.
- The maximum sound level emitted during boiler operation is < 55dBA. The sound level value is referred to semianechoic chamber tests with boiler operating at max. heat output, with extension of fume exhaust system according to product standards.

NIKE Star 24 3 E combustion parameters.

		G20	G30	G31
Gas nozzle diameter	mm	1,30	0,80	0,80
supply pressure	mbar (mm H_2O)	20 (204)	29 (296)	37 (377)
Flue flow rate at max heat output	kg/h	68	65	69
Flue flow rate at min heat output	kg/h	60	60	69
CO_2 a Q. Nom./Min.	%	5,35 / 1,80	6,50 / 2,10	6,10 / 1,80
CO a 0% di O_2 a Q. Nom./Min.	ppm	79 / 86	151 / 100	95 / 137
NO_x a 0% di O_2 a Q. Nom./Min.	ppm	58 / 12	110 / 15	97 / 12
Flue temperature at nominal output	°C	101	106	102
Flue temperature at minimum output	°C	85	85	76

NIKE Star 24 3 E variable heat output.

			METHANE (G20)			BUTANE (G30)			PROPANE (G31)		
HEAT OUTPUT	HEAT OUTPUT		BURNER GAS FLOW RATE	PRESS. UGELLI BRUCIATORE		BURNER GAS FLOW RATE	PRESS. BURNER NOZZLES		BURNER GAS FLOW RATE	PRESS. BURNER NOZZLES	
(kW)	(kcal/h)		(m^3/h)	(mbar)	(mm H_2O)	(kg/h)	(mbar)	(mm H_2O)	(kg/h)	(mbar)	(mm H_2O)
23,6	20296	CENTRAL HEATING + DHW	2,74	14,00	142,8	2,05	28,00	285,5	2,01	35,60	363,0
23,0	19780		2,67	13,32	135,8	1,99	26,56	270,8	1,96	33,95	346,2
22,0	18920		2,55	12,22	124,6	1,91	24,26	247,4	1,87	31,29	319,1
21,0	18060		2,44	11,19	114,1	1,82	22,09	225,3	1,79	28,75	293,2
20,0	17200		2,32	10,21	104,1	1,73	20,05	204,4	1,71	26,32	268,4
19,0	16340		2,21	9,28	94,6	1,65	18,12	184,8	1,62	24,00	244,7
18,0	15480		2,10	8,40	85,7	1,57	16,31	166,3	1,54	21,78	222,1
17,0	14620		1,99	7,57	77,2	1,48	14,60	148,9	1,46	19,65	200,4
16,0	13760		1,87	6,79	69,3	1,40	13,00	132,6	1,38	17,61	179,6
15,0	12900		1,76	6,06	61,7	1,31	11,50	117,3	1,29	15,67	159,8
14,0	12040		1,65	5,36	54,7	1,23	10,10	103,0	1,21	13,81	140,8
13,0	11180		1,54	4,71	48,1	1,15	8,80	89,8	1,13	12,03	122,6
12,0	10320		1,43	4,11	41,9	1,06	7,60	77,5	1,05	10,33	105,3
11,0	9460		1,31	3,54	36,1	0,98	6,49	66,2	0,96	8,71	88,8
10,0	8600		1,20	3,02	30,8	0,90	5,47	55,8	0,88	7,17	73,1
9,5	8170		1,14	2,77	28,3	0,85	5,00	51,0	0,84	6,43	65,5
8,0	6880	DHW	0,97	2,10	21,4	0,73	3,73	38,0	0,71	4,31	44,0
7,0	6020		0,86	1,70	17,3	0,64	3,00	30,6	0,63	3,00	30,6

List of accessories and optionals.

Digital weekly timer-thermostat cod. 3.014438	**Radio timer-thermostat (wireless)** code 3.014439
Digital Remote Control cod. 3.016362	**Wall-mounted boiler connection unit kit** cod. 3.015229
Cut-off cocks kit cod 3.4297	**Polyphosphate dispenser kit** cod 3.013860
Telephone control cod. 3.013305	**GSM telephone control kit** cod. 3.017182
"Plantilla" connection plate kit cod. 3.017364	

NIKE Star 24 3 E troubleshooting.

Before every intervention:
Check that the gas, water and electricity are correctly connected to the boiler, according to that indicated in the data plate and the instruction manual.
Also make sure that:
- the gas valve and boiler parameters are correctly adjusted;
- all devices outside the boiler function and are appropriately adjusted;
- the external and internal fuses are integral.

Before maintenance interventions or replacement of components, remove the electric power supply upstream from the appliance.
For correct use of the troubleshooting table, on intervention it is recommended to reset any errors, switch the boiler off and remove voltage from the appliance for at least 5 seconds.
This is to allow the boiler to start a new ignition cycle.

Ignition cycle

Apply voltage to the boiler.		
The display lights up	No ►	**See section A**

▼ Yes

The error 05 appears on the display	Yes ►	**See error section 05**
The error 06 appears on the display	Yes ►	**See error section 06 (the boiler functions however in the CH mode)**
The error 10 appears on the display	Yes ►	**See error section 10**
The error 20 appears on the display	Yes ►	**See error section 20 (for correct display of the error , wait for 1 minute)**

▼ No

CENTRAL HEATING MODE		
Functioning selector switch in summer position ( ) .		
Take (using the keys) heating to a maximum and interrupt and DHW requests.		
The pump starts.	► No	Check the presence of the TA jumper on clamps 40-41 of the P.C.B. ***N.B.: the jumper must not be present when external devices are installed such as TA, CRD, clock programmer, etc...***
		Check effective request (the), symbol is displayed, from any external devices (TA, CRD, programmer clock).**See error section 31.**
	► No	**See section B**

DOMESTIC HOT WATER MODE		
Functioning selector switch in summer position ( ).		
Take (using the keys) the domestic hot water selector switch to maximum and open the cock. The anti-freeze and chimney sweep functions must not be active.		
The symbol is displayed ( )	► No	**See section D**

▼ Yes

The ignition electrode discharges.	No ►	The error 01 appears on the display (wait for the board to make 2 ignition cycles).	►	**See error section 01 - a**
	No ►	The error 02 appears on the display.	►	**See error section 02 - a**
	No ►	The error 03 appears on the display.	►	**See error section 03 - a**

▼ Yes

The burner ignites.	No ►	The error 01 appears on the display (wait for the board to make 2 ignition cycles).	►	**See error section 01 - b**
	No ►	The error 04 appears on the display (wait for the board to make several ignition cycles).	►	**See error section 04.**

▼ Yes

The burner stays on after the first 10 seconds.	No ►	Check correct functioning, check the correct positioning of the electrode and replace it if necessary. If the anomaly persists, replace the P.C.B.

▼ Yes

The error 27 appears on the display	Yes ►	**See error section 27**
The error 02 appears on the display	Yes ►	**See error section 02 - b**
The error 03 appears on the display	Yes ►	**See error section 03 - b**

▼ No

The boiler reaches and maintains the set central heating temperature.	► No	Check the maximum heating output and adjust it to maximum.	►	**See section C**
	► No	The display shows error 28.	► Yes	**See section error 28**

▼ Yes

The central heating request is satisfied.

The boiler reaches and maintains the set DHW temperature.	► No	**See section C**
	► No	Check that, - the withdrawal of domestic hot water is not greater than the amount the boiler can distribute (see technical data, output, flow rate, ΔT); - the bithermal heat exchanger is clean and replace it, if necessary.

▼ Yes

The domestic hot water request is satisfied.

Error codes.

	ERROR 01	No ignition block	
01 a	The ignition transformer discharges.	No ►	Replace the P.C.B.
	▼ Yes		
	The wiring between the ignition/detection electrode and P.C.B. is OK.	No ►	Restore/replace the ignition/detection electrode and relative cable.
01 b	230 V AC are present on clamps 11-12 of connector X7. *N.B: measure the voltage within the safety time (8-10 s)*	No ►	Replace the P.C.B.
	▼ Yes		
	The connector and relative wiring between gas valve and P.C.B. are OK.	No ►	Restore the electric connection/replace the wiring.
	▼ Yes		
	The main coils of the gas valve are OK.	No ►	Where possible, replace the main coils of the gas valve.
	▼ Yes		
	Is the position and distance of the ignition/detection electrode correct with respect to the burner? *(see gas circuit chapter).*	No ►	Restore the correct position and distance of the ignition/detection electrode with respect to the burner.
	▼ Yes		
	Replace the gas valve. ***N.B.: before replacing the valve make sure that there is enough gas inlet dynamic pressure and that the minimum and maximum output adjustment are correctly regulated.***		

	ERROR 02	Over-heating safety thermostat block	
02 a	The wiring between the safety thermostat and P.C.B. is OK.	No ►	Restore the electric connection/replace the wiring.
	▼ Yes		
	Check/replace the safety thermostat. If the anomaly persists, replace the P.C.B.		
02 b	The safety thermostat functions regularly (intervention temperature higher than 100°C).Replace the over-heating safety thermostat.	No ►	The pump functions correctly.
	▼ Yes		
	The pump functions correctly.	No ►	**See section B**
	▼ Yes		
	Any CH system zone valve or cut-off cocks are open.	No ►	Restore circulation in the CH system by acting on the closed devices and also check: - the correct functioning of the boiler by-pass; - the opening times of any zone valves; - the correct functioning of any thermostatic valves.
	▼ Yes		
	The NTC flow probe is OK (10 kΩ at 25°C).	No ►	Replace NTC probe.
	▼ Yes		
	Check/clean/replace the bithermal heat exchanger.		

	ERROR 03	Flue safety thermostat block	
03 a	The wiring between the flue safety thermostat and P.C.B. is OK.	No ►	Restore the electric connection/replace the wiring.
	▼ Yes		
	Check/replace the flue safety thermostat. If the anomaly persists, replace the P.C.B.		
03 b	Flue evacuation takes place correctly.	No ►	Check: - the correct flue draught using the relative tools (micro-manometer, chromate mirror); - the suitability of the flue exhaust pipes (measurements, pathways, position on the roof, etc...). Both checks must be performed with respect to local regulations.
	▼ Yes		
	Replace the flue safety thermostat. If the anomaly persists, replace the P.C.B.		

ERROR 04		Contacts resistance block	
04	The system pressure switch, the over-heating safety thermostat and the flue safety thermostat function regularly.	No ►	Check the wiring, cleaning of the electric connection, continuity of the pressure switch contact, the safety thermostat and the flue safety thermostat and replace them if necessary.
	▼ Yes		
	Replace the P.C.B.		

ERROR 05		Flow probe anomaly	
05	The wiring between the flow probe and the board (connector X4 terminals 15-16) is OK.	No ►	Restore the electric connection/replace the wiring.
	▼ Yes		
	Replace the NTC flow probe. If the anomaly persists, replace the P.C.B.		

ERROR 06		Domestic hot water probe anomaly	
06	The wiring between the DHW probe and the board (connector X2 terminals 26-27) is OK.	No ►	Restore the electric connection/replace the wiring.
	▼ Yes		
	Replace DHW NTC probe. If the anomaly persists, replace the P.C.B.		

ERROR 10		Insufficient system pressure	
10	The boiler manometer displays a pressure exceeding 0.8 bar.	No ►	Restore the correct pressure by acting on the system filling valve. ***N.B.: in this case it is always advisable to ensure that there are no leaks in the central heating plant and check the correct factory-set value of the expansion vessel.***
	▼ Yes		
	The wiring between the absolute pressure switch and the board is OK.	No ►	Restore the electric connection/replace the wiring.
	▼ Yes		
	Check/replace the system pressure switch. If the anomaly persists, replace the P.C.B.		

ERROR 20		Parasite flame block	
20	The ignition/detection electrode and the relative wiring are integral.	No ►	Check/replace the ignition/detection electrode and relative cabling.
	▼ Yes		
	Replace the P.C.B.		

ERROR 27		Insufficient circulation	
27	The pump functions correctly.	No ►	**See section B**
	▼ Yes		
	Any CH system zone valve or cut-off cocks are open.	No ►	Restore circulation in the CH system by acting on the closed devices and also check: - the correct functioning of the boiler by-pass; - the opening times of any zone valves; - the correct functioning of any thermostatic valves.
	▼ Yes		
	The NTC flow probe is OK (10 kΩ at 25°C).	No ►	Replace NTC probe.
	▼ Yes		
	Check/clean/replace the bithermal heat exchanger. If the anomaly persists, replace the P.C.B.		

ERROR 28		Leakage presence anomaly	
28	Water leaks from the cocks are present or from the DHW circuit/ system.	Yes ►	Close/replace the cocks or eliminate leaks from the DHW circuit/ system.
	▼ No		
	The DHW NTC probe is OK (10 kΩ at 25°C).	No ►	Replace DHW NTC probe.
	▼ Yes		
	Replace the P.C.B.		

ERROR 31		Off-line Remote Control anomaly	
31	The Remote Control is connected correctly. ***N.B.: it is possible to use only remote controls supplied by Immergas.***	No ►	Check the connection between remote control and P.C.B. (clamps 40-41). The remote control connection must be made using a dedicated line in order to prevent interference.
	▼ Yes		
	Replace the remote control. If the anomaly persists, replace the P.C.B.		

Sections

A	230 V AC are present on the L-N terminals of the P.C.B.	No ►	Check the electric power supply upstream from the boiler and restore it.
	▼ Yes		
	The P.C.B. fuses are integral.	No ►	**See section E**
	▼ Yes		
	Replace the P.C.B.		

B	230 V AC are present on clamps 7-8 of connector X7 on the P.C.B.	No ►	Replace the P.C.B.
	▼ Yes		
	230 V AC are present on the pump clamps.	No ►	Restore the electric connection/replace the wiring.
	▼ Yes		
	The motor shaft turns freely.	No ►	Release the pump by acting on the shaft after having loosened the front cap.
	▼ Yes		
	The start-up condenser is integral.	No ►	Replace the condenser.
	▼ Yes		
	Replace the pump.		

C	At least 28 V DC are present on the gas valve modulation coil cables. ***N.B.: make the measurement by disconnecting the cables from the coil (see gas circuit chapter).***	No ►	Check wiring and replace the PC.B. if necessary.
	▼ Yes		
	The gas valve modulation coil has a resistance of 26-30 Ohm (VK 4105 M) or 20-25 Ohm (SIT 845). ***N.B.: make the measurement by disconnecting the cables from the coil (see gas circuit chapter).***	No ►	Replace the gas valve.
	▼ Yes		
	The gas valve is calibrated correctly.	No ►	Adjust Minimum and Maximum values of the gas valve in agreement with that state din the instruction book. *N.B.: Set parameter P6 at maximum (maximum central heating)*
	▼ Yes		
	The NTC flow probe is OK (10 kΩ at 25°C). In DHW functioning mode, also check the DHW NTC probe.	No ►	Replace NTC probe.
	▼ Yes		
	Replace the P.C.B.		

D	The withdrawal (flow rate) of the DHW is at least 1.5 l/min.	No ►	On the DHW system, check the correct opening of any cocks, cleanliness of the pipes, filters, flow rate limiters etc.
	▼ Yes		
	The flow switch functions correctly.	No ►	Check/clean/replace the flow switch.
	▼ Yes		
	The wiring between the flow switch and the board is OK.	No ►	Restore the electric connection/replace the wiring.
	▼ Yes		
	Replace the P.C.B.		

E	The operations stated below are indispensable for checking the quality of the relay electric contacts positioned on the board.
	Replace the fuses checking that there are no short circuited components *(pump, gas valve, etc...).* Check safety device times and the complete power removal from the gas valve, operating as follows: - close the gas supply and make a functioning request; - check that, after 2 ignition attempts, the display shows error "01"; - with the help of the single wire wiring diagram, use a tester to check that there is no voltage on either power supply cables of the gas valve main coils ***(see gas circuit chapter).***