

- D** Steuergerät
- GB** Control box
- E** Caja de control

CODE - CÓDIGO

MODEL  
MODELO

20137658

MG569-BWZG

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## 1 General warnings

### 1.1 Guarantee and responsibility

The rights to the guarantee and the responsibility will no longer be valid in the event of damage to things or injury to people, if such damage/injury was due to any of the following causes:

- intervention of unqualified personnel;
- carrying out of unauthorised modifications on the equipment;
- powering of the burner with unsuitable fuels;
- faults in the fuel supply system;
- repairs and/or overhauls incorrectly carried out;
- use of non-original components, including spare parts, kits, accessories and optionals;
- force majeure.

The manufacturer furthermore declines any and every responsibility for the failure to observe the contents of this manual.

- Personnel must always use the personal protective equipment envisaged by legislation and follow the indications given in this manual.
- Personnel must observe all the danger and caution indications shown on the machine.
- Personnel must not carry out, on their own initiative, operations or interventions that are not within their province.
- Personnel must inform their superiors of every problem or dangerous situation that may arise.

### 1.2 Installation safety notes



It is obligatory to carry out all installation, maintenance and dismantling operations with the electrical supply disconnected.



The installation must be carried out by qualified personnel, as indicated in this manual and in compliance with the standards and legal requisites in force.



Isolate the fuel supply.



After removing all the packaging, check the integrity of the contents. If in doubt, do not use the spare part; contact the supplier.

## General warnings

### 1.3 Notes on safety for the electrical wiring



- The electrical wiring must be carried out with the electrical supply disconnected.
- Electrical wiring must be carried out by qualified personnel and in compliance with the regulations currently in force in the country of destination. Refer to the wiring diagrams.
- The manufacturer declines all responsibility for modifications or connections different from those shown in the wiring diagrams.
- Do not invert the neutral with the phase in the electrical supply line.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- The burners have been set for intermittent operation. This means they should compulsorily be stopped at least once every 24 hours to enable the control box to perform checks of its own start-up efficiency. Normally the boiler's thermostat/pressure switch ensures the stopping of the burner.  
If this is not the case, you must apply a time switch to L-N in series, to stop the burner at least once every 24 hours. Refer to the wiring diagrams.
- The electrical safety of the device is obtained only when it is correctly connected to an efficient earthing system, made according to current standards. It is necessary to check this fundamental safety requirement. In the event of doubt, have the electrical system checked by qualified personnel. Do not use the gas tubes as an earthing system for electrical devices.
- The electrical system must be suitable for the maximum input power of the device, as indicated on the label and in the manual, checking in particular that the section of the cables is suitable for the input power of the device.
- For the main power supply of the device from the electricity mains:
  - do not use adapters, multiple sockets or extensions;
  - use an omnipolar switch, as indicated by the current safety standards.
- Do not touch the device with wet or damp body parts and/or in bare feet.
- Do not pull the electric cables.
- Check proper insertion of connection connectors according to the symbols shown on the bottom of the flame control equipment: make sure that the connectors are fully inserted by pushing them all the way in, each in its relevant position. All connectors must have the connection cables facing towards the inside of the burner (See Fig. 2).



Condensation, the formation of ice and the entry of water are prohibited!

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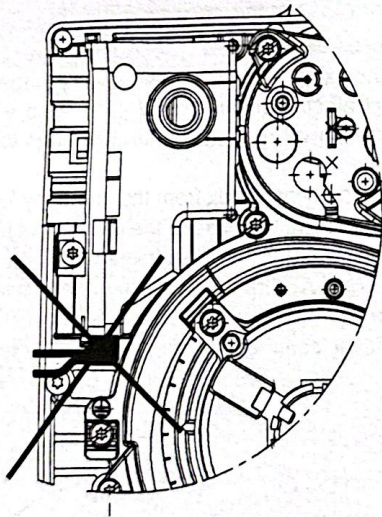


Fig. 1

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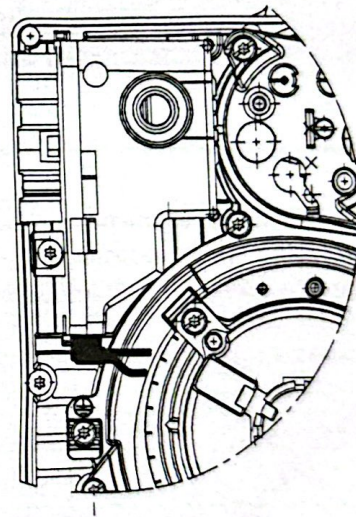


Fig. 2



Connectors inserted with the cables facing outwards the burner can damage the flame control equipment!



Insert connectors with the cables facing towards the inside of the burner.


**2 Installation**

The MG569-BWZG control box is installed on one-stage and two-stage burners.

**Burner equipment**

Control box .....	No. 1
Safety lockout device V2 .....	No. 1
Connection RS .....	No. 1
Connection SO .....	No. 1
Instruction .....	No. 1

To install the new MG569 - BWZG control box, it is necessary to use the diagram below.

MG569		
MG569 - MWZG		
MG569 - BWZG		MG569 - BWZG
568 - 569		
566SE Rev. 3		



All the installation, maintenance and dismantling operations should be performed voltage free.

The replacement of the control box must be performed by qualified personnel, as indicated in this manual and in accordance with standards and regulations in force.

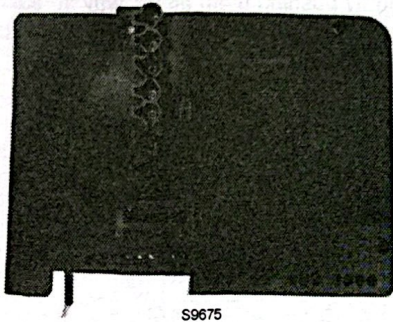


Fig. 3



**Connecting the remote reset**  
cut the existing socket-connection.

Make the connection with the RS lead supplied with the burner.

Connect a button at a max. distance of 20 metres.

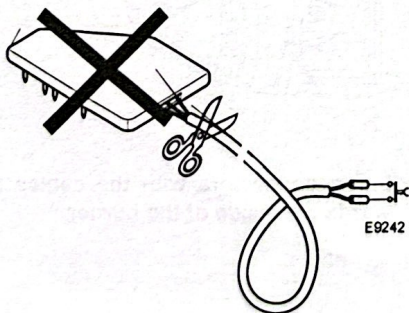


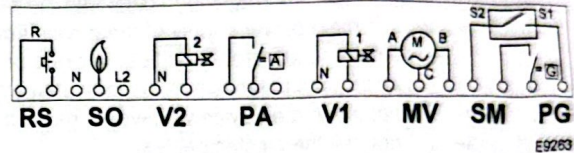
Fig. 4



The control box replaces the spare part code 3002967.



S9674



E9263

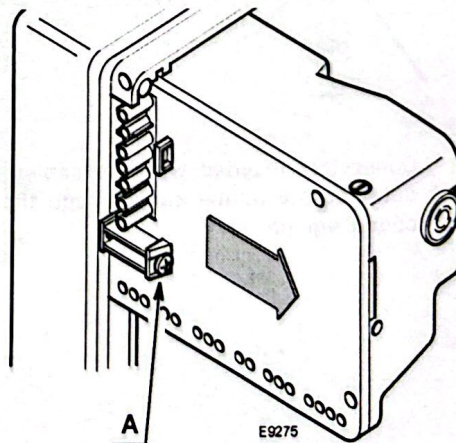
Fig. 5

Key to layout (Fig. 5)

- MV - Fan motor
- PA - Min. air pressure switch
- PG - Gas pressure switch
- RS - Remote reset
- SM - Servomotor (for prepared burners)
- SO - Ionisation probe
- V1 - Gas valve 1<sup>st</sup> stage
- V2 - Gas valve 2<sup>nd</sup> stage

To install, proceed as follows:

- unscrew the fixing screws and remove the burner cover.
- Disconnect all connections, the 7-pin plug, the probe connector, the high voltage cables and the earth wire from the control box.
- Disconnect the control box from the burner by loosening the screw A)(Fig. 6) and pulling in the direction of the arrow.
- Install the new control box supplied, fixing it to the burner with the screw A)(Fig. 6) and using a tightening torque of 1 - 1.2 Nm.
- Reconnect all connections, the 7-pin plug and the earth wire.



E9275

Fig. 6

**3 Electrical data and operating times**

**3.1 Electrical characteristics**

Description	Unit of	Parameters
Rated power supply voltage (range), tolerance	V.A.C.	210...230, +10%, -15%
Rated power supply frequency (range), tolerance	Hz	50...60, +5%, -5%
Undervoltage protection:		
minimum voltage threshold	V.A.C.	< 170
restart threshold	V.A.C.	> 180
Minimum and maximum operating temperature	°C	-20...+70
Maximum humidity (without condensation, water input or ice formation)	U.R.	max 90%, 40 °C
Protection	IP	00
Auxiliary circuit voltage	V	230 AC, 48 DC, 5 DC
Electrical input power	VA	< 40
Internal protection	V	300 AC, D14
Integrated fuse of protection	-	4HV, 250V A.C.
Discharge voltage of the transformer in open circuit (30pF)	kV pk	18
Discharge current of the transformer in short circuit	mA rms	11
Maximum number of firing attempts per minute (70°C)	no./min	1
Extreme operating current:		
- gas valve V1 and V2 terminals:	A	0.2 (cos φ ≥ 0.4 at 230 Vac)
- terminals of fan motor MV	A	1.9 (cos φ ≥ 0.6 at 230 Vac)
- terminals of lockout alarm output S3	A	0.5 (cos φ = 1 at 230 Vac)
- output hour counter terminals B4	A	0.1 (cos φ = 1 at 230 Vac)
Max. length of connection cables:		
- for power supply L, N	m	< 20
- of heat request thermostat T1, T2	m	< 20
- of the SO flame sensor	m	< 1
- of fan motor MV	m	< 1
- of remote reset RS	m	< 20
- hour counter B4	m	< 3
- of lockout alarm output S3	m	< 20
- of gas pressure switch PG, air PA	m	< 1

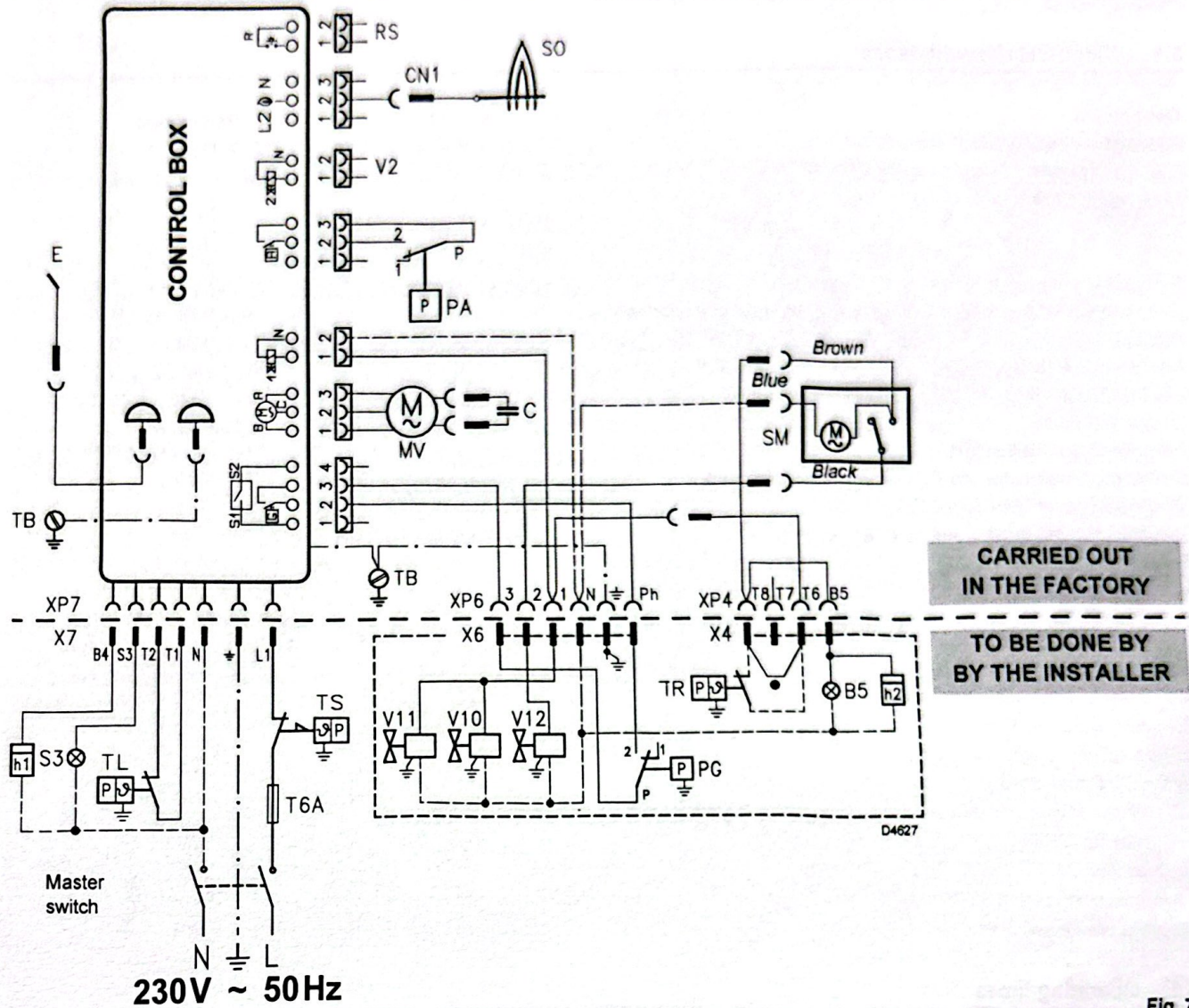
**3.2 Operating times**

Description	Unit of measurement	Value
Initialisation standby time	s	≤ 4.5
Standby time for an input signal	s	2
Pre-purging time	s	40
Post-purging time (programmed from the button)	s	0 + 360 (step 60s)
Total integrated transformer ignition time	s	3
V1 valve safety time:		
during start up	s	3
during operation (in the event of flame loss)	s	< 1
Valve V2 safety time during operation	s	< 1
Lockout time in the event of parasite flame	s	25
Control box reset requested time using built-in button	s	0,4 ÷ 5
Control box reset requested time using remote reset	s	0,8 ÷ 5
Delay of V2 valve turn on after V1	s	8
Lockout due to PA air pressure switch not closing	s	15
Lockout time due to PA air pressure switch closed before the heat request	s	120
Lockout time due to loss of air pressure during operation with flame	s	1

**3.3 Flame sensor characteristics**

Description	Parameters
Functioning principle	Detection of flame ionisation effect

3.3.1 Wiring diagram for two-stage version with servomotor for air damper



**CARRIED OUT IN THE FACTORY**

**TO BE DONE BY THE INSTALLER**

Fig. 7

Key to layout

- B5 Signal 2nd stage operating
- C Capacitor
- CN1 Probe connector
- E Electrode
- h.. Hour counter (230V - 0.1A max.)
- MV Fan motor
- PA Minimum air pressure switch.
- PG Minimum gas pressure switch
- RS Remote reset
- SM Air damper servomotor
- SO Ionisation probe
- S3 Lockout signal (230V - 0.5A max.)
- T6A Fuse
- TB Burner earth
- TL Heat request thermostat
- TR Adjustment thermostat (1st and 2nd stage)
- TS Safety thermostat
- V10 Safety valve
- V11 1st stage valve
- V12 2nd stage valve
- X.. Plug
- XP.. Socket



- Do not invert the neutral with the phase in the electrical supply line.
- Check that the electrical supply of the burner corresponds to that shown on the identification label and in this manual.
- The section of the conductors must be at least 1mm<sup>2</sup>. (Unless requested otherwise by local standards and legislation).
- Connect the 2nd stage thermostat (TR) to the terminals T6 - T8 removing the jumper.



Check the burner stops by opening the thermostats and check it locks out by opening the connector (CN1)(Fig. 7) inserted in the probe's red wire, located on the outside of the control box.



If the cover is still on, remove it and proceed with the electric wiring following the wiring diagrams. Use flexible cables in compliance with EN 60 335-1 standards.



In case of applications that use the connections of the heat request thermostat TL (T1, T2), it is necessary to insert a decoupling relay (230 Vac) with the clean contact connected to inputs T1 and T2 of this wiring diagram.

3.4 Operating programme

Normal operation

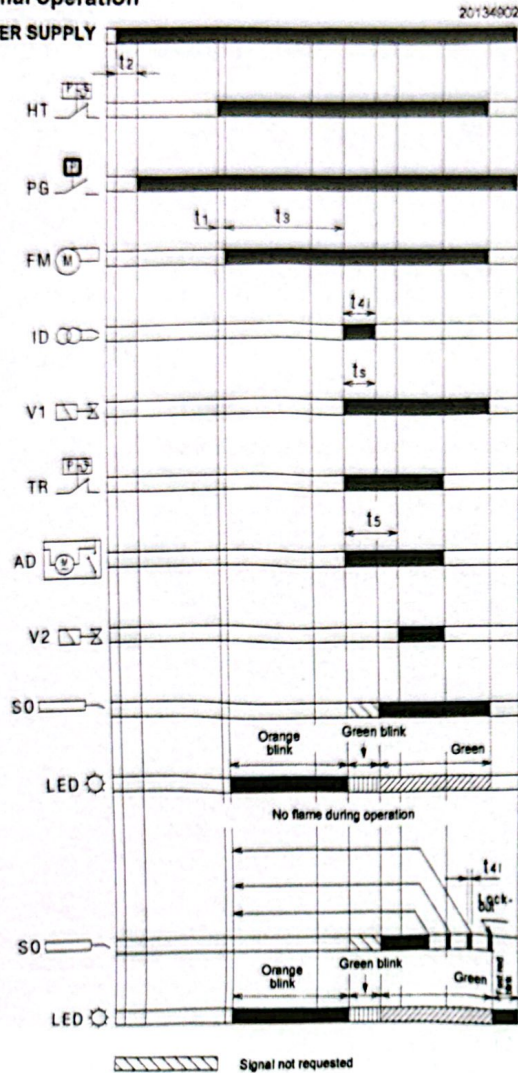


Fig. 8

Lockout due to ignition failure

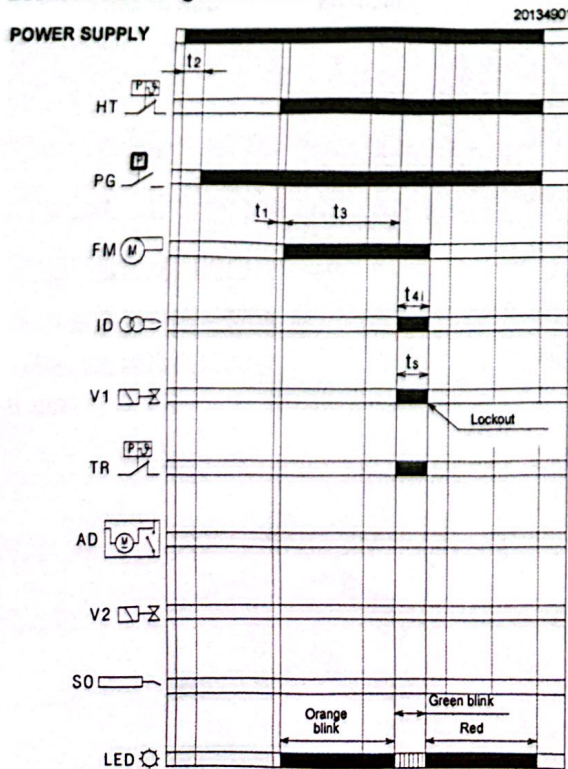


Fig. 9

Lockout due to extraneous light during pre-purging

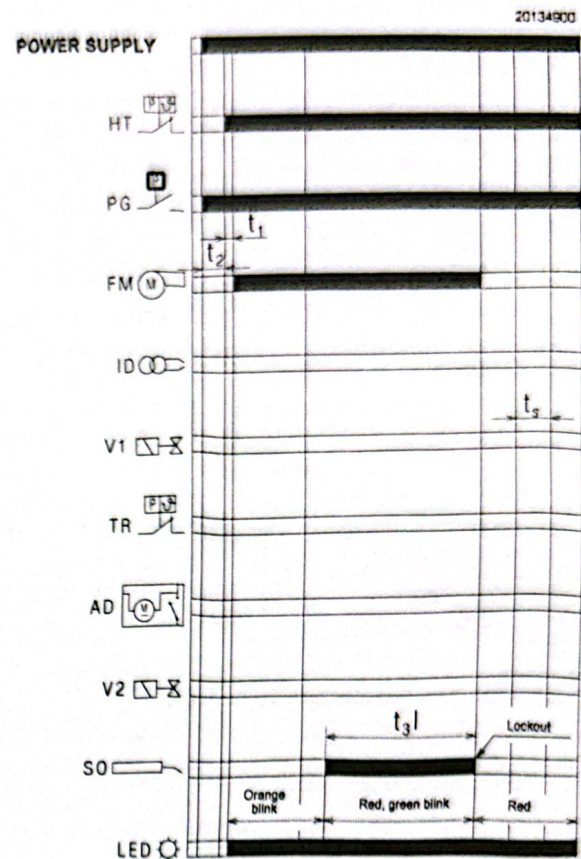


Fig. 10

Key to layout

- AD - Air damper servomotor
- FM - Fan motor
- HT - Heat request
- ID - Integrated ignition device
- LED - LED colour inside the button
- PG - Low gas pressure switch
- SO - Ionisation probe
- TR - Adjustment thermostat
- t1 - Standby time
- t2 - Initialisation time for checking
- t3 - Pre-purging time
- t3l - Checks for presence of extraneous light during pre-purging phase
- t4i - Total ignition time
- t4l - Reaction time to achieve safety lockout due to lack of failure
- t5 - Delay time between the 1st and 2nd stage
- ts - Safety time
- V1 - 1st stage valve
- V2 - Valve 2nd stage

## Electrical data and operating times

### 3.5 Table of times

Symbol	Description	Value (sec.)
t0	Standby: the burner is waiting for the heat request, the closure of the gas pressure switch, the opening of the air pressure switch	-
t1	Standby time for an input signal: reaction time, control box remains in waiting mode for t1	2
t1l	Flame or flame simulation detected before demand for heat: the control box remains idle.	25
t2	Initialisation standby time: checking time following the main power start-up	< 4.5
t2l	Checks extraneous light or parasite flame during t2: waiting mode for t2l, then lockout: the motor does not start	25
t2a	Check whether the air pressure switch has already been moved to the work position before the required heat: the control box remains in standby status, a lockout follows if the air pressure switch remains switched for the T2a time.	max 120
t3	Pre-purging time: the fan motor is running, then the gas valve is activated	40
t3l	Checks extraneous light or parasite flame during pre-purging: control box goes into lockout at the end of t3l	1
t3a	Time for checking the switching of the air pressure switch in the operating position during the pre-purging time: if the pressure switch does not change over within t3a there is a lockout.	max 15
t3r	A recycle attempt is made if there is an air pressure drop during the pre-purging stage: there is then a lockout in the event of a second loss of air pressure between the 16th second and the 29th; is a loss of pressure between the 30th second and the 40th, the control box goes immediately into lockout mode.	-
ts	Safety time	3
t4i	Total spark ignition time	3
t4a	Air pressure drop checking time during the ts time and the normal operation: the control box locks out immediately.	< 1
t4l	Reaction time to achieve safety deactivation due to flame loss	< 1
t5	Delay time between the 1st and 2nd stage: opening time of 2nd stage valve after opening of 1st stage, depends on the opening time of the air damper servomotor	5 - 25
-	Minimum time to reset the control box using reset button	0.4
-	Minimum time to reset the control box using remote reset	0.8
tr	Re-cycles: max. 3 repeats of the complete start-up sequence in the case of flame loss during operation; the final action at the last attempt following flame failure is a lockout	3 re-cycles

Tab. A

#### 3.5.1 Operating status indication

Status	Reset button colour	Seconds	Colour code
Awaiting a heat request, awaiting the closure of the gas pressure switch, awaiting the opening of the air pressure switch	-	- -	-
Awaiting heat request with continuous purging	ORANGE Blink	0.5 2.5	●○●○●○●○●○
Pre-purging, or awaiting air pressure switch closure, or long pre-purging	ORANGE Blink	0.5 0.5	●○●○●○●○●○
Safety time without flame	GREEN Blink	0.5 0.5	■□■□■□■□■□
Safety time with flame	GREEN	- -	■■■■■■■■■■■■■■■■
Normal operating position	GREEN	- -	■■■■■■■■■■■■■■■■

Tab. B

#### Key to layout

ON	OFF	Colour code
▲	△	RED
●	○	ORANGE
■	□	GREEN

Tab. C

## Electrical data and operating times

### 3.5.2 Fault diagnostics - lockouts

Fault description	Reset button colour	Seconds		Colour code
Extraneous light (false flame signal)	GREEN, RED blinking alternately	0.5	0.5	■▲■▲■▲■▲■▲■▲
Gas pressure switch not opening fault or contact open of the electric air damper opener, after 2 minutes from the heat request	ORANGE blinking inverted	2.5	0.5	●○●○●○●○●○●○
Electrical power voltage fault	ORANGE slow blinking	2.5	2.5	●○●○●○●○●○●○
Electrical power frequency fault	ORANGE	-	-	●●●●●●●●●●●●
Flame control voltage fault	ORANGE, GREEN fast blinking alternately	0.2	0.2	●■●■●■●■●■●■
Reset button / Remote reset fault	GREEN, RED fast blinking alternately	0.2	0.2	■▲■▲■▲■▲■▲■▲
Lockout for no flame after Ts	RED	-	-	▲▲▲▲▲▲▲▲▲▲▲▲
Lockout for extraneous light signal or for parasite flame	RED blink	0.5	0.5	▲▲▲▲▲▲▲▲▲▲▲▲
Lockout for maximum number of cycle repetitions (flame loss during operation)	RED Fast blinking	0.2	0.2	▲▲▲▲▲▲▲▲▲▲▲▲
Lockout due to loss of air pressure after the repetition of the pre-purging that occurred due to a previous lack of air, or 10 sec before the end of the pre-purging, or during the safety time, or during normal operation	RED Blink	0.5	2.5	▲▲▲▲▲▲▲▲▲▲▲▲
Lockout for fan motor error	RED, ORANGE blinking inverted	2.5	0.5	▲●▲●▲●▲●▲●▲●
Lockout for fault with the circuit within the 1st stage valve control	RED, GREEN blinking inverted	2.5	0.5	▲■▲■▲■▲■▲■▲■
Lockout for fault with the circuit within the 2nd stage valve control	RED blinking inverted	2.5	0.5	▲▲▲▲▲▲▲▲▲▲▲▲
Lockout for eeprom error	ORANGE, GREEN blinking alternately	0.5	0.5	●■●■●■●■●■●■
Lockout due to air pressure switch not closing after a heat request or after a recycle due to flame loss during operation	RED, GREEN slow blinking	2.5	2.5	▲■▲■▲■▲■▲■▲■
Lockout due to air pressure switch already switched to closing of the heat request thermostat or after a recycle due to flame loss during operation	RED, ORANGE slow blinking	2.5	2.5	▲●▲●▲●▲●▲●▲●
Lockout for maximum number of cycle repetitions due to gas pressure switch intervention during flame operation	ORANGE	2.5	0.5	●○●○●○●○●○●○

Tab. D

#### Key to layout

ON	OFF	Colour code
▲	△	RED
●	○	ORANGE
■	□	GREEN

Tab. E

### 3.5.3 Checking the gas pressure switch

When the gas pressure switch is open the motor is not powered. If, after a heat request, the gas pressure switch opens, the motor stops and:

- if the gas pressure switch stays open for more than 2 minutes, the fault is displayed by the diagnostic LEDs.
- if the gas pressure switch stays open for less than 2 minutes, the fault is not displayed.
- when the gas pressure switch closes again, the motor is restarted if also the air pressure switch is open.
- when the gas pressure switch is closed the motor is powered for about one second (to acknowledge the signal) and then it is shut off for 2 seconds to be then restarted and start the operation cycle.

If the gas pressure switch opens during normal flame operation, the motor stops immediately, the gas valves are closed and the full ignition cycle is repeated.

Up to 3 attempts are possible, at the fourth opening of the gas pressure switch, the burner reaches the lockout condition.

The number of possible attempts to open the gas pressure switch during flame operation is reset at every heat request, every lockout, every power supply fault (see paragraph "Monitoring the power supply voltage" on page 11) and every shut-down test.

If the gas pressure switch opens during post-purging or during continuous purging (if set), the motor stops and stays off for the whole time that the gas pressure switch is open and the fault is displayed immediately by the diagnostic LEDs.

### 3.5.4 Checking the air pressure switch

When the burner receives the heat request the air pressure switch is checked and if it is closed (bonded) the motor does not start and after 2 minutes the lockout condition is reached.

If the motor starts after a heat request, the air pressure switch does not close within 15 seconds of pre-purging, the burner reaches the lockout condition.

If there is a loss of air pressure after the first 15 seconds of pre-purging but before the last 10 seconds, a recycle occurs (the pre-purging time starts from when the air pressure switch closes in a stable manner).

If after a recycle after a loss of air pressure there is a new loss, the burner reaches an immediate lockout condition due to lack of air.

If the loss of the air pressure switch occurs in the last 10 seconds of the pre-purging time (before the start of the safety time) the burner reaches an immediate lockout condition due to lack of air.

If there is a loss of the air pressure switch after the opening of the 1st stage valves or during normal operation with flame, the burner reaches the lockout condition within 1s.

The state of the air pressure switch does not influence the post-purging time.

Se If continuous purging is set, the motor is powered even if the air pressure switch is sealed but only in a condition without a heat request or after 2 minutes if the lockout occurred after the heat request.

### 3.5.5 Shut-down test

If the reset button or the remote reset is pressed during operations for more than 5 seconds and less of 10 seconds, (to not go to the successive menu) the burner switches off, the gas valve closes, the flame goes out and the start-up sequence restarts.

If the switch off test is enabled, the number of repetitions of the start up sequence (see paragraph "Recycle and limit of repetitions" on page 10) and the number of possible resets (see paragraph "External lockout signal (S3)" on page 11), are reset.

### 3.5.6 Intermittent operation

After 24 hours of continuous operation, the control box starts the automatic switch-off sequence, followed by a restart, in order to check for a possible fault with the ionisation probe.

This automatic switch-off can be fixed at 1 hour, (see paragraph "Programming menu" on page 14).

The modification of the parameter setting for intermittent operation takes effect if:

- during the heat request, the switching off test function is enabled;
- there is a flame loss;
- the heat request switches off and then later restarts;
- the control box switches off and restarts;
- the automatic restarting of the intermittent function occurs (1hour/24hours).

### 3.5.7 Recycle and limit of repetitions

The control box allows a recycle function, i.e. complete repetition of the start-up sequence, making up to 3 attempts, in the event the flame failure during operation.

If the flame failure 4 times during operations, this will cause a burner lockout. If there is a new heat request during the recycle, the 3 attempts are reset when the limit thermostat (TL) switches.

By disconnecting the power supply, when a new heat request occurs (power supply is applied to the burner) all possible attempts at re-ignition are reset (maximum 3).

### 3.5.8 Presence of an extraneous light or parasite flame

The presence of a parasite flame or extraneous light can be detected in the stand-by state after a heat request.

If the presence of a flame or extraneous light is detected also in the "t2" stage, the motor does not start until the flame signal has disappeared or until lockout has been reached.

If after the fan motor starts, during the pre-purging, an extraneous light or parasite flame is detected, the burner reaches the lockout condition in 1 second.

If, during the recycle due to flame disappearance while operating and the consequent repetition of the start-up sequence, the parasite flame or the extraneous light is detected before the motor starts, the 25 seconds control countdown starts (for checking for the presence of the parasite flame or the extraneous light) otherwise the lockout occurs within 1 second.

The fault is indicated by the blinking LED (see paragraph "Fault diagnostics - lockouts" on page 9).

When the heat request is finished, if the parasite flame stays on the burner reaches the lockout condition due to parasite flame after 25 seconds (regardless of the presence or otherwise of the post-purging or the continuous purging).

The parasite flame control is active even when there is a fault with the mains voltage, the frequency, the internal voltage, the condition with gas pressure switch open.

The parasite flame control is not active only in lockout conditions.

### 3.5.9 Duration of ignition transformer discharge

The spark ignition is present during all safety time.



WARNING

In the event of continuous recycling or heat requests that are close together, the maximum allowed number of cycle repetitions for the ignition transformer is one every minute.

### 3.5.10 Reset by button and remotely of the burner

The burner can be released by pressing, for at least 0.4 seconds, the reset button integrated in the control box and the unlocking occurs only when the button is released.

The burner can also be reset using an external button (remote reset) connected to the R terminals (see RS connector wiring diagram) on the burner by pressing for at least 0.8 seconds.



WARNING

If the reset button is pressed for more than 5 seconds, the control box will not be reset.

### 3.5.11 Protection reset

The burner can be reset only 5 times consecutively, then power supply has to be disconnected for a new 5 reset possibilities. The burner can only be reset if power supply is applied to the control box.

### 3.5.12 Reset button/Remote reset fault

If the reset button is faulty or is kept pressed for more than 60 seconds, the fault is indicated by the blinking of the LED (see paragraph "Fault diagnostics - lockouts" on page 9) as long as it is present.

- This fault is only displayed and the LED stops blinking when the fault disappears.
- If the fault is detected during pre-purging or safety time, the burner does not stop (the start-up sequence will continue).
- If the fault is detected during operation, the burner does not stop.
- If the fault is detected during a lockout, the fault is not signalled and the burner cannot be reset.

### 3.5.13 External lockout signal (S3)

The burner is equipped with an external locking signal function, i.e. to signal (together with the integrated reset button) a burner locking alarm.

The control box provides a command of an external lamp using the S3 output (230Vac-0.5Amp max).

### 3.5.14 Hour counter function (B4)

The burner has an hour counter function that is active as long as the 1st stage oil valve is open and therefore as long as fuel is being consumed.

The control box allows you to control an external meter through the Hour\_Counter outlet (230V AC-0.1Amp max.) of the control box connected to pin B4 of the 7-pole socket coming from the boiler power supply connection to the burner.

### 3.5.15 Monitoring the power supply voltage

The control box automatically measures the mains voltage. If the voltage is less than 170V or more than 280V, the burner stops, interrupts the operating cycle and remains in stand-by, signalling a fault. The fault is indicated by the blinking LED (see paragraph "Fault diagnostics - lockouts" on page 9). The burner restarts when the voltage exceeds approx. 180V or if it goes below 270V.

- If the fault is detected with flame operation, the valve is immediately closed and the motor stops.
- If the anomaly is detected during pre-purging, the motor stops.
- If the mains voltage stays within the intermediate values (170+180V or 270+280V) when the main power supply switch is closed or after a power failure, the burner does not start.
- If the burner is in lockout, the mains voltage is monitored but not signalled as there is a lockout signal and cannot be reset.

During the ignition time the mains voltage monitoring is deactivated.

### 3.5.16 Frequency supply error

The control box automatically detects the value of the frequency of the main supply in the range of 50 - 60 Hz, in both cases working times are verified. The fault is indicated by way of the blinking LED (see paragraph "Fault diagnostics - lockouts" on page 9).

- If the fault is detected before heat request the burner does not start.
- If the fault is detected during the pre-purging, the burner remains in purge condition and the fault is appropriately signalled.
- The fault is not detected during normal running, the burner remains in this state.  
When the fault disappears, the burner restarts.

### 3.5.17 Internal voltage fault

The control box automatically detects if the internal voltage works correctly. The fault is indicated by way of the blinking LED (see paragraph "Fault diagnostics - lockouts" on page 9).

- If the fault is detected during the initialisation check time, the burner does not start.
- If the fault is detected after a lockout the burner does not start.
- If the fault is detected after a shut-down test, the burner does not start.
- The fault is not detected during normal running, the burner remains in this state.  
When the fault disappears, the burner restarts.

### 3.5.18 Checking the fan motor

The control box automatically detects the presence of the fan motor and, if disconnected, it performs a lockout. The lockout is indicated by the blinking of the LED (see paragraph "Fault diagnostics - lockouts" on page 9).

### 3.5.19 Checking the faults of the 1st and 2nd stage valve and the motor

The control box detects the presence of a fault in the controls of the valves and the motor, the fault is indicated by the blinking LED (see paragraph "Fault diagnostics - lockouts" on page 9):

- if the anomaly is detected during the initialisation, the burner goes into lockout.
- If the anomaly is detected during the pre-purging, the burner goes into lockout.
- During a recycling, if the fault is detected, the burner does not start and goes into lockout.

The fault is not detected if the burner is in lockout.

The sealing of the contact of the relay inside the motor's control box is intercepted if the gas pressure switch is closed and the motor is connected to the board.

The sealing of the contact of the relay inside the 1st stage valve control is intercepted only with the motor running.

The sealing of the contact of the relay inside the 2nd stage valve control can only be intercepted when the motor is on and the 1st stage valve is controlled.

### 3.5.20 EEprom check

The control box automatically detects if EEprom memory of micro-controller has failed and will perform a lockout. The lockout is indicated by the blinking of the LED (see paragraph "Fault diagnostics - lockouts" on page 9).

### 3.5.21 Ionisation current

The recommended minimum for operating the burner is 5  $\mu$ A. The burner normally supplies a higher current value, so that no check is needed.

In any event, if you want to measure the ionisation current, you need to open the connector (CN1)(Fig. 11) on the red wire and insert a microammeter.

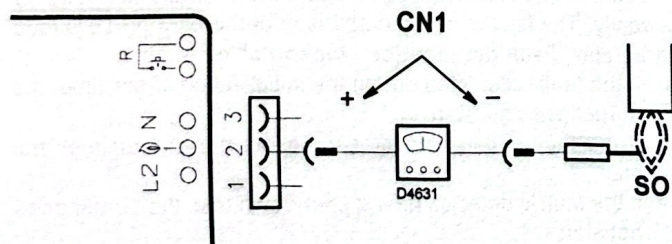


Fig. 11

### 3.5.22 Post-purging

Post-purging is a function that allows you to maintain the air purging even after the burner is switched off in the absence of the heat request for a pre-set time. The burner switches off the flame when the heat request thermostat opens, cutting off the fuel supply to the valves.

The post-purging function is not performed:

- after a lockout of the motor or valves;
- if the heat request is interrupted during pre-purging.

Post-purging occurs:

- if the heat request is interrupted during the safety time;
- if the heat request is interrupted during normal operation;
- with all types of lockout.

#### NOTE:

If during post-purging there is an extraneous light or a parasite flame the burner goes into lockout after 25 seconds and post-purging is not stopped.

If during post-purging there is a new heat request, the post-purging time is halted, the fan motor stops and a new burner operating cycle starts.

### 3.5.23 Continuous purging

Continuous purging is a function that maintains the air ventilation independently of the request for burner ignition.

From the moment when it is set, the motor remains in operation both when the limit thermostat (TL) is not switched over (burner switched off), and when the burner is in lockout.

With the commutation of the limit thermostat (TL) the motor stops for the standby time of 2 seconds, the successive control of the air pressure switch and the start of a new burner operation cycle.

- If during continuous purging when there is no heat request a parasite flame is detected, the motor stays on and a fault is signalled. The burner reaches the lockout condition after 25 seconds.
- If during continuous purging a parasite flame is detected, the motor stays on but if a heat request occurs the motor is switched off, the motor is not started after the standby (2sec) if the parasite flame persists; the burner reaches the lockout condition after 25 seconds. After the lockout has been reset the motor is restarted.
- The motor stays on even in a lockout.
- The continuous purging is interrupted if an internal fault is detected that brings the burner to the lockout condition (eeprom, motor, 1st and 2nd stage valves).

## Electrical data and operating times

### 3.5.24 Lockout log

The control box allows the logging of the type and number of lockouts that have occurred and keeps them even without the electrical power supply.

The logs of the lockouts allows you to access the last 10 lockouts (see paragraph "Programming menu" on page 14).

Once the programming menu page has been reached by pressing the reset button the last lockout is displayed, pressing 10 times displays the least recent lockout (each time the burner reaches the lockout condition the oldest one is removed).

5 seconds after the last pressing of the buttons, the type of lockout is displayed, see paragraph "Fault diagnostics - lockouts" on page 9).

### 3.5.25 Logging of burner operating parameters

The control box allows you to log the operating time of the opening of the 1st stage gas valve.

In this way it is possible to establish how much fuel has been consumed during the operation.

The frequency of the count is 1 second.

Saving to memory (eeprom) of the data occurs every 30 minutes if the burner is on.

Saving to memory is carried out even if in the previous 30 minutes the control box was operating only for a short period of time.

If the control box is cut off from the mains power supply between one saving and the next (after 30 minutes) the information about this interval is lost.

If in the interval between one saving and the next a lockout is set, there is writing to memory that involves also the logging of the operating hours.

Together with the operating hours also the number of the burner's 1st stage valve openings is saved.

In the menu (see paragraph "Programming menu" on page 14) it is possible to independently reset both the operating hours meter and the meter for the number of openings of the 1st stage valve that occurred.

- The number of openings of the 1st stage valve is a maximum of: 16.777.215 (after which it is reset).
- The meter for the number of openings of the first stage valve is a maximum: 65,535 days (after which it is reset).

### 3.5.26 Admissible lengths of the external connections to the burner

Outlet cables of the burner	Identification	Maximum length permitted (metres)
Mains electric power supply	L1 (L), N	20
GAS pressure switch	PG	1
Heat request thermostat	TL (T1, T2)	20
Adjustment thermostat 1° - 2° stage	TR	1
Hour counter	B4	3
External lockout indicator	S3	20
Remote reset	R (RS)	20

Tab. F



In the event of burner applications with remote control commands greater than those indicated in Tab. F, insert the relay command devices (230Vac) with contacts placed near or not more than the maximum indicated lengths.

### 3.5.27 Long pre-purging

If a long pre-purging is enabled, an initial pre-purging of 1 min and 20 sec beyond the default pre-purging time (40 sec) is carried out.

In recycles due to flame loss when operating, the long pre-purging is not carried out but only the pre-purging with the default time (40 sec).

If there is a loss of air pressure during the long pre-purging, the recycle involves a repetition of the pre-purging that in this case is 1 min and 20 sec added to 40 sec.

## Electrical data and operating times

### 3.6 Programming menu

#### 3.6.1 General notes

The programming menu can be accessed via the integrated reset button, or by remote reset during OPERATION and in STAND-BY.

If in page menu the reset or remote reset button is not pressed within 10 seconds the page will be automatically be exited and there will be a green LED blinking for the time set.

If the number of presses on the reset or remote reset button exceeds the maximum allowable, the value that stays in memory will be the maximum one.

If the reset or remote reset button is pressed for more than 60 seconds, a reset button error will be displayed.

#### 3.6.2 Block diagram for entering the menu

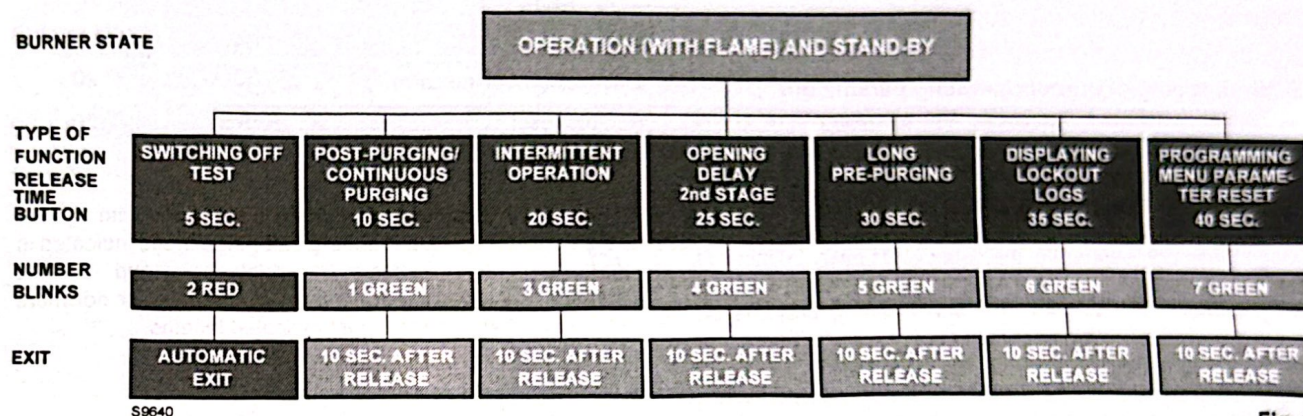


Fig. 12

Function	Button release time	No. of blinks of the LED per menu page	No. of pressings of the reset button	No. of blinks of the LED (green)	Quitting the menu
Switching off test	$5s \leq t < 10s$	2 blinks RED	/ none	/ none	Automatic, at the end of the blink
Post-purging/ Continuous purging	$10s \leq t < 15s$	1 GREEN blink	1 = 1 minute 2 = 2 minutes 3 = 3 minutes 4 = 4 minutes 5 = 5 minutes 6 = 6 minutes 7 = continuous purging 8 = 0 m (deactivated) (default)	1 blink 2 blinks 3 blinks 4 blinks 5 blinks 6 blinks 7 blinks 8 blinks	10 sec. after the release of the button
Intermittent operation	$20s \leq t < 25s$	3 blinks GREEN	1 = 1 hour 2 = 24 hours (default)	1 blink 2 blinks	10 sec. after the release of the button
Opening delay 2nd stage	$25s \leq t < 30s$	4 blinks GREEN	1 = 8 sec (default) 2 = 20 sec 3 = 35 sec	1 blink 2 blinks 3 blinks	10 sec. after the release of the button
Long pre-purging	$30s \leq t < 35s$	5 blinks GREEN	1 = activated 2 = deactivated (default)	1 blink 2 blinks	10 sec. after the release of the button
Display lockout logs	$35s \leq t < 40s$	6 blinks GREEN	1 = last lockout 2 = 9th lockout 3 = 8th lockout 4 = 7th lockout 5 = 6th lockout 6 = 5th lockout 7 = 4th lockout 8 = 3rd lockout 9 = 2nd lockout 10 = less recent lockout	Displaying the type of lockout according to Tab. D	10 sec after the release of the button (if at level 1). When at level 2, 10 sec after the display of the type of lockout or else pressing the button again before 10 sec you return to level 1 from where, 10 seconds after nothing has been done to the buttons, you exit the menu
Parameter reset programming menu	$40s \leq t < 45s$	7 blinks GREEN	1 = reset of the lockout logs 2 = reset of the no. of lockouts 3 = reset of hours of operation 4 = reset of the no. of heat requests 5 = restoration of default values of the menu parameters	/	10 sec. after the release of the button

Tab. G

### 3.6.3 Shut-down test

#### Sequence for shut-down test programming

- Programming allowed in OPERATING mode and in STAND-BY.
- Press button for 5 sec.  $\leq t < 10$  sec.
- RED led Blinking 2 times (0.2s. ON; 0.2s. OFF).
- Release the button.
- The burner will begin a shutdown, followed by a restart.

After shut-down, the burner restarts automatically and the no. of attempts of recycle are restored.

At the exit of shut-down test page menu there are no blinking led.

### 3.6.4 Post-purging and continuous purging

The post-purging time can be set for a maximum of 6 minutes, proceeding as follows:

#### Programming sequence

- Programming allowed in OPERATING mode and in STAND-BY.
- Press button for 10 sec.  $\leq t < 15$  sec.
- GREEN led blinking 1 time
- Release the button
- GREEN led OFF
- Press the button 1 - 6 times (\*) = 1 - 6 minutes  
7 times = continuous purging
- GREEN led ON and OFF every time press and release
- After 10 sec. GREEN led blinking for the programmed times (0.5s. ON; 0.5s. OFF)

#### Disabling sequence

- Reset allowed in OPERATING mode and in STAND-BY.
- Press button for 10 sec.  $\leq t < 15$  sec.
- GREEN led blinking 1 time
- Release the button
- GREEN led OFF
- Press the button 8 times (\*)
- GREEN led ON and OFF every time press and release
- After 10 sec. the GREEN led blinks for 8 times (0.5s ON; 0.5s OFF)

If heat request stops during programming of post-purging function, the exit menu occurs without saving the setting value.

If heat request stops during the LED blinking occur exit menu, but the setting value is stored.

### 3.6.5 Intermittent operation

#### Sequence for enable/disable

- Programming allowed in OPERATING mode and in STAND-BY.
- Press button for 20 sec.  $\leq t < 25$  sec.
- GREEN led blinking 3 times
- Release the button
- GREEN led OFF
- Press the button 1 time to enable a shut-down every hour (\*)
- Press the button 2 times to enable a shut-down every 24 hours (\*)
- GREEN led ON and OFF every time press and release

- After 10 sec. GREEN led blinking for the programmed times (0.5s. ON; 0.5s. OFF).

The modification of the parameter setting for Intermittent operation takes effect:

- after the next heat request by the thermostat (HT)
- after the activation of a switch-off test
- after flame disappearance during operation
- after disconnecting and reconnecting the electrical supply

### 3.6.6 Setting the opening delay of the 2nd stage

The control box allows you to set the opening delay of the 2nd stage from the 1st stage, see paragraph "Block diagram for entering the menu" on page 14.

#### Sequence for setting the opening delay of the 2nd stage

- Programming allowed in OPERATING mode and in STAND-BY.
- Press button for 25 sec.  $\leq t < 30$  sec.
- The GREEN LED blinks 4 times.
- Release the button.
- GREEN LED OFF
- Press the button 1 time to enable a delay of 8 sec (\*)
- Press the button 2 times to enable a delay of 20 sec (\*)
- Press the button 3 times to enable a delay of 35 sec (\*)
- GREEN LED ON and OFF every time press and release
- After 10 sec., the GREEN Led will blink for the number of programmed times (0.5 sec. ON; 0.5s. OFF).

### 3.6.7 Setting a long pre-purging

The control box allows you to set the long pre-purging, see paragraph "Block diagram for entering the menu" on page 14.

#### Sequence for setting a long pre-purging

- Programming allowed in OPERATING mode and in STAND-BY.
- Press button for 30 sec.  $\leq t < 35$  sec.
- The GREEN LED blinks 5 times.
- Release the button.
- GREEN LED OFF
- Press the button 1 time to enable the long pre-purging (\*)
- Press the button 2 times to disable the long pre-purging (\*)
- GREEN LED ON and OFF every time press and release
- After 10 sec. GREEN led blinking for the programmed times (0.5s. ON; 0.5s. OFF).

### 3.6.8 Displaying the lockout log

The control box allows you to display the last 10 lockouts that occurred and were logged, accessing the Programming menu.

Access to this page is possible both in STAND-BY, as well as in the OPERATING status.

#### Display sequence of the last lockout that occurred

- Keep the button pressed for 35 sec.  $\approx t < 40$  sec.
- The GREEN led blinks 6 times.
- Release the button.
- Displaying the type of lockout memorised for 10 sec.

The time displaying the type of lockout can be extended by re-pressing the reset button during the display of the lockout (the lockout display continues for another 10s).

#### NOTE:

(\*) Always wait 1 sec. with each pressing and release of the button to ensure the command is logged correctly.

### 3.6.9 Resetting the programming menu parameters and the lockout log

The control box allows you to reset the log and the number of lockouts, the operating hours, the number of ignitions and recover the menu's default, see paragraph "Block diagram for entering the menu" on page 14.

#### Sequence for setting and restoring the parameters

- Programming allowed in OPERATING mode and in STAND-BY.
- Press button for 40 sec.  $\leq t < 45$  sec.
- The GREEN LED blinks 7 times.
- Release the button.
- GREEN LED OFF
- Press the button 1 time to reset the lockout log (\*)
- Press the button 2 times to reset the number of lockouts (\*)
- Press the button 3 times to reset the number of hours operating with flame (\*)
- Press the button 4 times to reset the number of heat requests (\*)
- Press the button 5 times to reset all the default values of the parameters of the PROGRAMMING MENU (\*)
- GREEN LED ON and OFF every time press and release
- After 10 sec. GREEN led blinking for the programmed times (0.5s. ON; 0.5s. OFF).

## 3.7 Lockout types

Whenever a lockout occurs, the control box shows the reasons for the fault (and the reasons can be identified by the reset button colour). The sequence of pulses issued by the control box of the LED in the reset button identifies the possible types of fault, which are listed in the table below:

Lockout description	Lockout time	Led colour (*)	Possible cause
Presence of parasite flame during stand-by or the post-purging	After 25 seconds	▲▲▲▲	- presence of a false flame after heat request or during post-purging
Detection of parasite flame during pre-purging	After 1 second	▲▲▲▲	- presence of false flame signal during pre-purging
The flame is not detected after the safety time	3 seconds after the activation of the gas valve	▲▲▲▲	- ionisation probe faulty or not connected - gas valve - faulty ignition transformer - badly regulated burner
Flame failure during operation	After 3 recycles	▲▲▲▲	- burner not calibrated correctly - ionisation probe faulty
Fan motor error	Immediate	▲●▲●	- faulty fan motor - fan motor not connected
Fault with the internal control of the 1st stage gas valve	Immediate	▲■▲■	- gas valve - internal control circuit of the 1st stage gas valve faulty
Eeprom error	Immediate	●■●■	- faulty internal memory
Lockout due to air pressure switch not closing after a heat request or after a recycle due to flame loss during operation	After 15 seconds	▲■▲■	- the air pressure is too low, (the head has been poorly adjusted) - The air pressure switch is defective: change it
Lockout for loss of air pressure or after repetition of the pre-purging due to loss of air, or 10 sec before the end of the pre-purging, or during the safety time, or during normal operation	After 1 second	▲▲▲▲	- the air pressure is too low, (the head has been poorly adjusted) - the air pressure switch is defective: change it
Lockout due to air pressure switch already switched to closing of the heat request thermostat or after a recycle due to flame loss during operation	After 120 seconds	▲●▲●	- the air pressure switch is changed over to the operational position, change the pressure switch - the fan motor continues to be powered, check the lockout of the flame control
Fault with the internal control circuit of the 2nd stage gas valve	Immediate	▲▲▲▲	- internal control circuit of the 2nd stage gas valve faulty

Tab. H

(\*) For the blinking frequency of the reset button see paragraph "Fault diagnostics - lockouts" on page 9.



To reset the control box after visual diagnostics have been displayed, you must press the reset button.



In the event the burner stops, in order to prevent any damage to the installation, do not unblock the burner more than twice in a row. If the burner locks out for a third time, contact the customer service.



In the event there are further lockouts or faults with the burner, the maintenance interventions must only be carried out by qualified, authorised personnel, in accordance with the contents of this manual and in compliance with the standards and regulations of current laws.

**4** Faults - Possible causes - Solutions

Here below you can find some causes and the possible solutions for some problems that could cause a failure to start or a bad working of the burner.

In most cases, an operating fault leads to the lighting up of the signal inside the reset button of the control box.

When lock out lamp lights the burner will attempt to light only after pushing the reset button. If ignition is then normal, the lockout can be attributed to a temporary fault.

However, if lockout continues, you must determine the cause of the problem and take the action illustrated in Tab. I and Tab. J.



In the event the burner stops, in order to prevent any damage to the installation, do not unblock the burner more than twice in a row. If the burner locks out for a third time, contact the customer service.



In the event there are further lockouts or faults with the burner, the maintenance interventions must only be carried out by qualified, authorised personnel, in accordance with the contents of this manual and in compliance with the standards and regulations of current laws.

**4.1** Start-up problems

Faults	Possible Causes	Solution
The burner does not start when the heat request thermostat closes.	Lack of electrical supply.	Check presence of voltage in the L1-N clamps of the 7 pin plug. Check the conditions of the fuses. Check that safety thermostat (TS) is not in lockout.
	Lack of gas.	Check the gate opening. Check that the valves change over to the opening position and there are not short circuits.
	The gas pressure switch does not close its contact.	Adjust them.
	The connections in the control box are wrongly inserted.	Check and connect completely all the plugs.
	The air pressure switch is changed over to the operational position.	Replace the pressure switch.
Burner runs normally in pre-purging and ignition cycle and locks out after the safety time.	The phase-neutral connection is inverted.	Invert them.
	The earth connection lacks or is inefficient.	Make the earth connection efficient.
	The ionisation probe is earthed or not in contact with the flame, or its wiring to the control box is broken, or there is a fault on its insulation to the earth.	Check the right position and if necessary set it according to the instructions of this manual. Reset the electrical connection. Replace the faulty connection.
Burner starts with an ignition delay.	The ignition electrodes is wrongly positioned.	Adjust it according to the instructions of this manual.
	Air flow rate is too high.	Set the air output according to the instructions of this manual.
	Valve brake is too close with insufficient gas output.	Adjust it.
The burner does not switch to the 2nd stage.	The air damper opener is jammed.	Check that it is working properly. Check the precise electrical connection.
	The 2nd stage gas valve does not energise.	Valve broken: replace it. Check the air damper opener works properly.
The burner locks out after the pre-purge phase due to flame-failure.	The solenoid valves is passing too little gas.	Check the pressure in the network and/or adjust the solenoid valve according to the instructions of this manual.
	The solenoid valves are defective.	Change them.
	The ignition arc is irregular or has failed.	Check the right insertion of the connectors. Check the right position of the electrode according to the instructions of this manual.
	The pipe has not been purged from the air.	Carry out a complete breathing of the line of gas-supply.

## Faults - Possible causes - Solutions

Faults	Possible Causes	Solution
The burner locks out during the pre-purge phase.	The air pressure switch does not change over to the operational position.	The pressure switch is faulty, replace it. The air pressure is too low, (the head is bad adjusted).
	The flame exists.	Faulty valves: replace them.
The burner continues to repeat the starting cycle without going on lockout.	The gas pressure in the gas-mains lies very close to the value to which the gas pressure switch has been set.	Lower and set the pressure switch.
	The sudden drop in pressure when the valve is opened provokes the opening of the pressure switch itself, so the valve closes again immediately and the motor stops.	
	The pressure then starts to increase again, the pressure switch closes, the start-up cycle begins again and so on.	

Tab. I

### 4.2 Operating faults

Fault	Possible Causes	Solution
The burner locks out during operation.	Earth probe.	Check the right position and if necessary set it according to the instructions of this manual. Clean or replace the ionisation probe.
	The flame disappears 4 times.	Check the gas pressure in the network and/or adjust the solenoid valve according to the instructions of this manual.
	Air pressure switch opening.	The air pressure is too low, (the head is bad adjusted). The air pressure switch is defective: change it.
The burner tends to lose the flame in the passage from the 1st to 2nd stage.	Burner output ratio between the 1st and 2nd greater than 1:2.	Restore the correct maximum ratio of 1:2 checking that the burner output of the 1st stage is not less than the minimum of the firing rate.
	High air excess in 1st stage.	Restore the correct air excess value (l min. = 1.3) see paragraph "4.4 combustion control".
Burner shut down.	Gas pressure switch opening.	Check the pressure in the network and/or adjust the solenoid valve according to the instructions of this manual.

Tab. J