

System100_Burner_STD5

Burner

Temperature Controller for Policombustible Burner

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1 INTRODUCTION

- Installing and use simplicity
- Simple and direct user's functions
- Reliable and flexible functioning software with well-established TiEmme elettronica technology
- Advanced functions available for the builder to adapt to different Burners and installations

Product composition:

- Control Board with 4 fixing points, solid and sure.
- Extractable connectors
- Photo resistance or Exhausting Temperature Probe
- Boiler Probe
- Connection cable Main Board-Control Panel
- Control Panel with antistatic cover
- Connector RS232 for the Modem/Computer connection

Safety rules

Before working on the system make follow:

- The accident prevention and Room prevention rules
- The National Institute rules against the work accidents
- The legal safety rules
- These instructions are only for technical personnel only



Conformity declaration

Applied rules: EN 60730-1 50081-1 EN 60730-1 A1 50081-2

For compliance with the CEI EN 55014 you must install upstream a filter EMI properly sized.

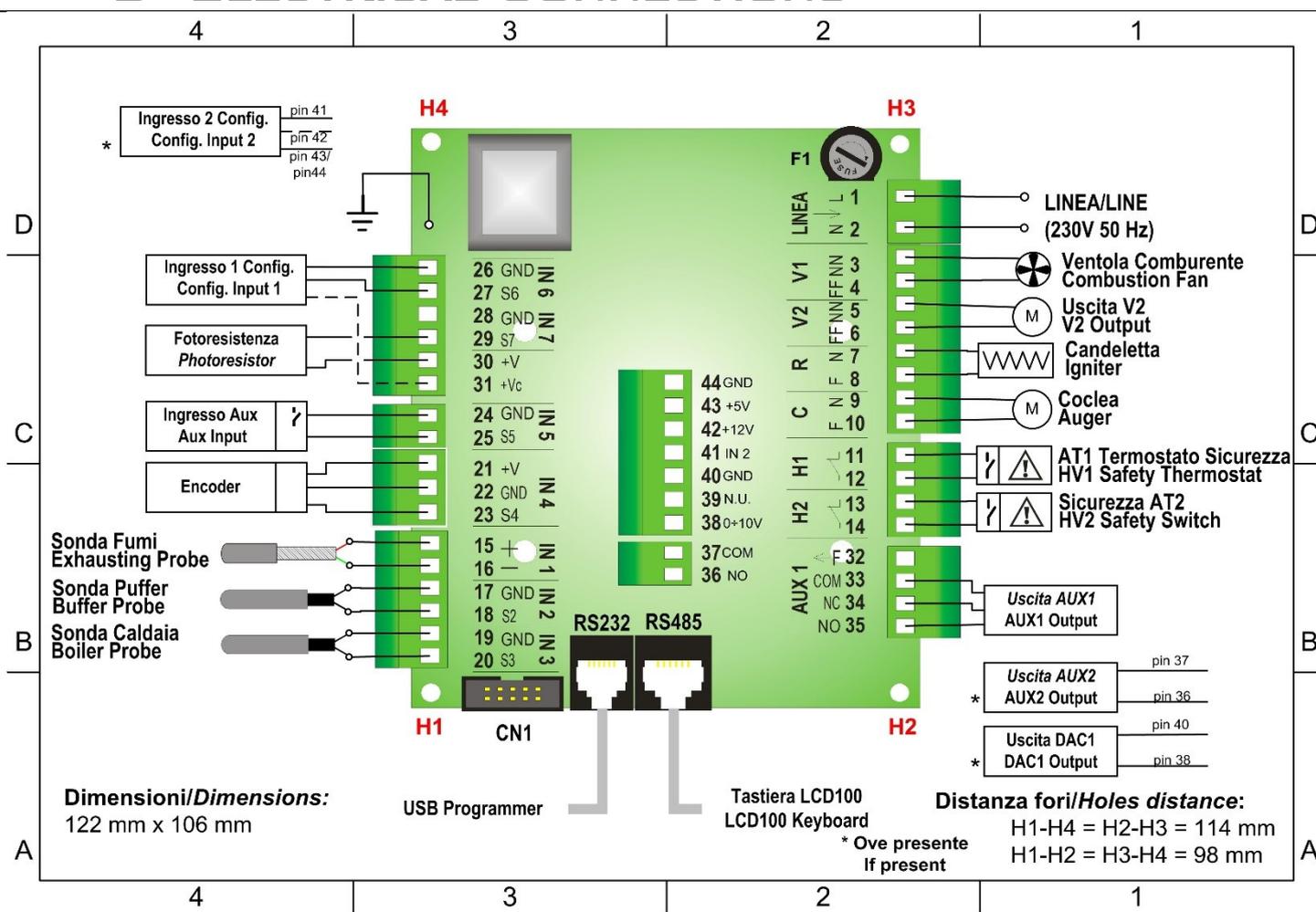
This manual is done with care and attention, but the information could be incomplete, not comprehensive or could have mistakes. For this reason the design, the information could be modified without advance notice according to the model.

TiEmme elettronica is not responsible for the incomplete or not correct information

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2 ELECTRICAL CONNECTIONS

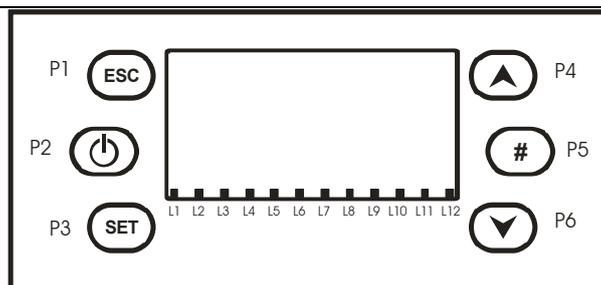


PIN		Function	Characteristics
1	L	Mains power line	230 Vac ± 10% 50/60 Hz F1 = Fuse T5,0 A
2	N		
3	N	Combustion Fan	Triac Regulation max 1A
4	L		
5	N	Configurable V2 Output (see par.9.9)	Triac ON-OFF max 1A
6	L		
7	N	Igniter Resistance	Relais 3 A max
8	L		
9	N	Pellet Auger	Triac ON-OFF 1A max
10	L		
11		Safety Thermostat Input HV1	Contact ON/OFF Normally closed Bypass if not used
12			
13		Safety Thermostat Input HV2	Contact ON/OFF Normally closed Bypass if not used
14			
15	Red +	Exhausting Temperature Probe	Thermocouple K: 500 °C Max
16	Green -		
17		Water Buffer Tank Temperature Probe	NTC 10K @25 °C: 120 °C Max
18			
19		Boiler Temperature Probe	NTC 10K @25 °C: 120 °C Max
20			
21	+5V	Encoder Signal	Signal TTL 0 / 5 V
22	GND		
23	S4		
24		AUX Input: Chrono/Room Thermostat	Contact ON/OFF
25			
26	GND	Configurable Input 1 (see par.9.10)	Signal 0 / 5 V
27	S6		
28	GND	Photoresistor	Analog input
29	S7		
30	+5V		
31	+12V		
32	F	Live Phase	Max current 5 A
33	COM	Configurable AUX1 Output (see par.9.9)	Relais 3 A max
34	NC		
35	NO		
RS485		Keyboard	
RS232		Connector RS232	Connection to Modem/Computer

If Auxiliary module is present (**A32** = 1):

PIN		Function	Characteristics
36	COM	Configurable AUX2 Output (see par.9.9)	Relais 3 A max
37	NO		
38	0-10V	DAC1 Output	Output DC 0÷10V
39	N.U.	Not Used	
40	GND	Ground	
41	IN2	Configurable Input 2 (see par.9.10)	Signal 0 / 5 V
42	+12V		
43	+5V		
44	GND	Ground	

3 CONTROL PANEL: USE AND FUNCTIONS



3.1 LED	
L1	Igniter output ON
L2	Auger output ON
L3	Configurable V2 output ON
L4	Configurable Aux1 output ON
L5	Configurable Aux2 output ON* (only if Auxiliary module is present)
L9	ON Limit Switch open ON
L10	Level Pellet sensor
L11	Aux Input Open

3.2 BUTTONS		
Button	Click [P click]	Long pressing [P long] (about 3 seconds)
P1	Exit from Menu or Sub-Menu	-
P2	Enable/Disable Chrono mode in Chrono Menu	ON/OFF and Unblock function.
P3	Enter in menu/submenu, save data, enable chrono time slot	Enter in User Menu(2)
P4	Visualisation / Increase parameter value	-
P5	-	Block keyboard
P6	Visualisation / Decrease parameter value	-

3.3 ALARMS		
Description	State System	Code
Safety Thermostat HV1: always signalled	Block	Er01
Safety Thermostat HV2: signalled in case of Combustion Fan is ON: For the connection to Pressure Switch or Pellet Thermostat	Block	Er02
Extinguishing for Lack of Flame	Block	Er03
Extinguishing for Boiler over Temperature	Block	Er04
Extinguishing for Exhaust gas over Temperature	Block	Er05
Encoder Error: No Encoder Signal (in case of P25=1 or 2)	Block	Er07
Encoder Error: Combustion Fan regulation failed (in case of P25=1 or 2)	Block	Er08
Real Time Clock (RTC) Error	Block	Er11
Failed Ignition	Block	Er12
Lack of Main Power Supply	Block	Er15
RS485 link error	Block	Er16
Lack of fuel	Block	Er18
Limit switch error	Block	Er52
Anomaly in probe control during Check Up phase		Prob

The reset of the BLOCK Condition is done by the Long pressing of the button P2

3.1 AUTO LEARNING MENU
At the first power on of the board it is possible that the keyboard (after 10 seconds) starts to learn Menu. Please, do not remove main power supply to control board during this phase. It is possible to stop the procedure by pressing P1 button. Please note that until keyboard doesn't complete the procedure, it is not possible to navigate into the menu. For this reason, if user stop the procedure, keyboard will start a new learning procedure after 10 seconds. This process will stop when keyboard has a valid menu structure.

3.2 VISUALIZATIONS	
Browse with click of P3 and/or P4 buttons.	
Exhaust Temp: 103	Exhaust temperature [°C]
Boiler Temp: 25	Boiler temperature [°C]
Buffer Temp: 25	Buffer temperature [°C]
Fan Speed : 1000	Fan speed [RPM]
Flame Light 0	Flame Light
Recipe [nr] 1	Pellet Recipe number
Product Code: 488: 1234	Product code

4 USER MENU(1)

All this items are accessible from main screen by **P3** button click

4.1 COMBUSTION POWER SETTING

In this menu is possible to modify the heating power. It can be set in modality automatic or manual. In the first case the system chooses the combustion power, in the second case the user selects the desired power.

Pellet powers: 1-2-3-4-5-Auto

Wood powers: 0-1-2-3-4-5-Auto

4.2 THERMOSTATS

Menu used to modify the value of the main thermostat.

Boiler thermostats

Buffer thermostats (only visible if **P26** = 1 and **P42** = 0)

4.3 OPERATION MODE

This item is visible only if **A31**=0 and the user can choose Wood or Pellet combustible.

This item can be changed only in **OFF** state.

4.4 RECIPE

This item is visible only if **A31** = 0,1. The user can choose Pellet Recipe 1 or 2.

4.5 CHRONO

Used to program and activate the ignitions/extinguishing of the system.

4.5.1 MODALITY

Allows to select the desired modality or disable all programs set.

- enter edit mode pressing **P3** button
- select the desired modality (Daily, Weekly or Weekend)
- enable/disable the chrono modality pressing **P2** button
- save your settings pressing **P3** button

Disabled
Daily
Weekly
Week End

4.5.2 CHRONO PROGRAM

The system allows to do three types of programs: Daily, Weekly and Week-End. After selected the desired type of programming:

- select the time to program with buttons **P6** or **P4**
- enter the modality modify (the selected time blinks) with button **P3**
- modify the times with button **P6** or **P4**
- save with button **P3**
- activate (appears "V") or deactivate the time band (there is no "V") pushing the button **P5**

Monday
ON OFF
09:30 11:15 ↙
00:00 00:00
00:00 00:00

Daily

Select the day of the week to program and set the ignition and extinguishing times.

Programs around midnight

Set the clock On of the previous day at the desired time: Ex. 20:30

Set the clock of OFF of the previous day at: 23:59

Set the clock On of the following day at 00:00

Set the clock of OFF of the following day at the desired time: Ex. 6:30

The system turns on at 20.30 on Tuesday and turns off at 6.30 on Wednesday

Monday
Tuesday
Wednesday
Thursday
Friday

Weekly

The programs are the same for all days of the week.

Week-end

Choose between 'Monday-Friday' and 'Saturday-Sunday' and then set the switching on and off times.

Mon-Fri
Sat-Sun

4.6 LOAD

This item activates Pellet manual loading turning on continuously Auger engine.

The loading is stopped automatically after 600 seconds. This function is available only if the system is in OFF state.

4.7 CALIBRATION

It allows to modify the ON times set values of the Auger. The values are in the range - 7 ÷ 7.

5 USER MENU(2

All this items are accessible from main screen by **P3** button long press.

5.1 KEYBOARD SETTINGS

5.1.1 TIME AND DATE

Used to set the day, month, year and current time.

5.1.2 LANGUAGE

Menu to modify the language of the LCD board. The highlighted is the language in use.

5.2 KEYBOARD MENU

5.2.1 LEARN MENU

Menu to learn user and system menu from control board. This menu force the learn of the menu from control board. Anyway in case of firmware upgrade that involves a menu change, the keyboard ask periodically menu to the control board so generally is not necessary to learn menu manually. This item is protected by password that is the same as System Menu

5.2.2 SET CONTRAST

Menu to set contrast of display.

5.2.3 SET MIN LIGHT

Menu to set minimum backlight value when keyboard is in standby mode (no button pressed for at least 20 seconds).

5.2.4 KEYBOARD ADDRESS

Menu protected by password **1810** (not editable) to change keyboard address. The address must be set to **16**, otherwise control panel cannot communicate with control board.

5.2.5 NODE LIST

Menu to visualize RS485 node information. The information available are:
Node Firmware code, Node type (master, keyboard,..), Node Address.

5.2.6 ACOUSTIC ALARM

Menu to Enable/Disable acoustic beep in case of System Errors.

5.3 SYSTEM MENU

The System menu is protected by Password (0000 is default) and will be discussed in the next chapter.

6 SYSTEM MENU

This menu, protected by password, contains all the parameters that define the functioning of the system and should be accessible only to the manufacturer or installer.

6.1 AUGER MENU

Only in Pellet Modality: The Auger TimeON defined for each phase/power in the Auger Period P05

If a TimeON value is set = 0 the Auger is disabled for the corresponding Power/Phase; if a TimeON value is set \geq **P05** the Auger works continuously for the corresponding Power/Phase. The TimeON regulation possible set as steps of 0.1 seconds. The set or calculated values are automatically limited in the threshold **P05** and **P27**.

Code	Description	Min	Max	U	Def.
C01	Auger TimeON Ignition	0	60	[s]	
C02	Auger TimeON Stabilization	0	60	[s]	
C03	Auger TimeON Power 1	P27	60	[s]	
C04	Auger TimeON Power 2	P27	60	[s]	
C05	Auger TimeON Power 3	P27	60	[s]	
C06	Auger TimeON Power 4	P27	60	[s]	
C07	Auger TimeON Power 5	P27	60	[s]	
C08	Auger TimeON during Periodic Cleaning	0	60	[s]	
C10	Auger TimeON Second Ignition	0	60	[s]	
C11	Auger TimeON Modulation	P27	60	[s]	
P05	Total Time Auger Period	4	60	[s]	
P15	Correction Step value of the value Auger TimeON	1	20	[%]	
P27	Minimum Auger TimeON	0	60	[s]	

6.2 COMBUSTION FAN MENU

Setting of the Combustion fan speed for each power/phase of functioning; the value are referred to the current combustion recipe or combustible. The set or calculated values are automatically delimited between in the thresholds **P14** and **P30**. If **P25**=1,2: Encoder version (values are in RPM); if **P25**=0,3: No Encoder version (values are in VOLT).

Code	Pellet Modality	Wood Modality	Min	Max	U	Pellet	Wood
U01	Ignition Speed	---	0	230	Volt		--
			300	2800	RPM		--
U02	Stabilization Speed	---	0	230	Volt		--
			300	2800	RPM		--
U03	Power 1 Speed	Power 1 Speed	0	230	Volt		
			300	2800	RPM		
U04	Power 2 Speed	Power 2 Speed	0	230	Volt		
			300	2800	RPM		
U05	Power 3 Speed	Power 3 Speed	0	230	Volt		
			300	2800	RPM		
U06	Power 4 Speed	Power 4 Speed	0	230	Volt		
			300	2800	RPM		
U07	Power 5 Speed	Power 5 Speed	0	230	Volt		
			300	2800	RPM		
U08	Speed during the Periodic Cleaning	---	0	230	Volt		--
			300	2800	RPM		--
U09	Speed during the Extinguishing	---	0	230	Volt		
			300	2800	RPM		
U10	Second ignition Speed	---	0	230	Volt		--
			300	2800	RPM		--
U11	Modulation Speed	Modulation Speed	0	230	Volt		
			300	2800	RPM		
P14	Combustion Fan Minimum Speed	Combustion Fan Minimum Speed	0	230	Volt		
			300	2800	RPM		
P30	Combustion Fan Maximum Speed	Combustion Fan Maximum Speed	0	230	Volt		
			300	2800	RPM		
P25	0 =Combustion Fan without Encoder; 1 = Combustion Fan with Encoder; 2 = Combustion Fan with Encoder with automatic change to P25 =0 in case of no signal Encoder: alarm Er07 3 = Combustion Fan without Encoder and DAC Output management (if auxiliary module present)		0	3	[nr]		

6.3 THERMOSTATS' MENU						
Code	Description	Probe	Min	Max	U	Def.
L00	Burner OFF Light Value	Photo	0	100	[nr]	
L01	Light Value to Bypass Ignition	Photo	0	100	[nr]	
Th01	System OFF Thermostat	Exhausting	5	900	[°C]	
Th02	Deactivation Igniter Resistance Thermostat	Exhausting	5	900	[°C]	
Th03	Pre-Extinguishing Thermostat for no flame	Exhausting	5	900	[°C]	
Th06	Thermostat to go in Stabilization from Variable phase	Exhausting	5	900	[°C]	
Th07	Modulation Thermostat for Exhausting Over Temperature	Exhausting	5	900	[°C]	
Th08	Safety Thermostat for Exhausting Over Temperature	Exhausting	5	900	[°C]	
Th09	Ignition Bypass Thermostat	Exhausting	5	900	[°C]	
Th18	Antifreeze Thermostat	Boiler	5	10	[°C]	
Th19	Enable Pump Thermostat	Boiler	20	110	[°C]	
Ih19	Th19 Thermostat Hysteresis	Boiler	1	20	[°C]	
Th21	Unblock Pump Thermostat (used if A07 = 3)	Boiler	30	85	[°C]	
Ih24	Th24 Thermostat Hysteresis	Boiler	1	20	[°C]	
Th25	Boiler Safety Thermostat	Boiler	20	110	[°C]	
Th26	Minimum Range of Boiler Thermostat	Boiler	20	110	[°C]	
Th27	Maximum Range of Boiler Thermostat	Boiler	20	110	[°C]	
Th28	System OFF Thermostat in Standby	Exhausting	5	900	[°C]	
Th29	Boiler Minimum Temperature, in case Wood Modality, goes in the OFF after T21	Boiler	30	85	[°C]	
Ih29	T21 Thermostat Hysteresis	Boiler	1	20	[°C]	
Th47	Boiler Probe – Buffer Probe Differential Thermostat	Buffer	1	30	[°C]	
Ih47	Th47 Thermostat Hysteresis	Buffer	1	5	[°C]	
Ih48	Th48 Thermostat Hysteresis	Buffer	1	20	[°C]	
Th56	Output Enable Thermostat	Boiler	30	85	[°C]	
d01	Increasing Delta Temperature in Stabilization	Exhausting	0	100	[°C]	
d08	Delta Boiler Temperature for automatic combustion [A]	Boiler	1	30	[°C]	
d23	Delta Boiler Temperature over Boiler Thermostat to go from Modulation to Standby at the end of T43 if A13=1	Boiler	0	50	[°C]	

6.4 EXTINGUISHING THERMOSTATS MENU

Settings for each Combustion Phase/Power of the Exhausting Temperature under which, after the Pre-Extinguishing time **T14**, the stove goes in Extinguishing for no flame. **These values occur with the Th03 Thermostat.**

Code	Description	Probe	Min	Max	U	Def.
Th35	Power 1	Exhausting	5	900	[°C]	
Th36	Power 2	Exhausting	5	900	[°C]	
Th37	Power 3	Exhausting	5	900	[°C]	
Th38	Power 4	Exhausting	5	900	[°C]	
Th39	Power 5	Exhausting	5	900	[°C]	
Th43	Modulation Power	Exhausting	5	900	[°C]	

6.5 TIMER MENU

Code	Description	Min	Max	U	Def.
T01	Ignition: Cleaning Time	0	900	[s]	
T02	Ignition: Igniter Resistance Pre-heating Time	0	900	[s]	
T03	Ignition: Pre-Load Time	0	900	[s]	
T04	Ignition: Fixed Time	0	3600	[s]	
T05	Ignition: Variable Time	1	3600	[s]	
T06	Ignition: Stabilization Time	0	900	[s]	
T07	Interval Periodic Cleaning Repetition	15	600	[min]	
T08	Periodic Cleaning Time	0	900	[s]	
T09	Delay time HV1 Safety intervention	1	900	[s]	
T10	Delay time HV2 Safety intervention	1	900	[s]	
T11	Delay time for Standby Exit	0	900	[s]	
T13	Minimum Period Time of Extinguishing	0	900	[s]	
T14	Waiting time Pre-Extinguishing for no flame	0	900	[s]	
T15	Waiting time Pre-Extinguishing in Safety	0	900	[s]	
T16	Final Cleaning Time	0	900	[s]	
T17	Delay time Combustion Power Change	0	900	[s]	
T18	Delay time Combustion Power Change in exit from Ignition	0	900	[s]	
T21	Time after which the Burner in case of Wood Modality goes in OFF if the Boiler Temperature < Th29	0	600	[min]	

T22	Delay time for Standby Input	0	900	[s]	
T23	Timer tank filling	0	3600	[s]	
T24	Lack of Pellet signalling or control tank filling	0	3600	[s]	
T27	Delay to disable Auger 2	1	900	[s]	
T30	Work time of Cleaning Engine	0	9600	[s]	
T31	Wait time of Cleaning Engine	1	600	[min]	
T40	Delay to enable Auger	0	900	[s]	
T41	Work time of Pump in De-Block function	0	3600	[s]	
T42	Maximum time of inactivity of Pump in De-Block Function	1	900	[h]	
T43	Time, after which the Burner goes from Modulation to Standby if boiler Temperature > [Boiler Thermostat + d23] and A13 =1	0	9600	[s]	
T85	Max waiting time for Cleaning Engine 2 limit switch	1	60	[s]	
T86	Cleaning Engine 2 ON time	0	9600	[s]	
T87	Cleaning Engine 2 Waiting time	1	900	[min]	
T88	Maximum time of supply voltage lack for the system to go back to the previous state	10	900	[s]	
T89	Maximum time of supply voltage lack for the system to go in Recover Ignition state	1	1400	[min]	
TM13	Durata accensione Candeletta in Stabilizzazione se il sistema prevede l'uso della fotoresistenza	0	900	[s]	

6.6 ENABLE'S MENU

Code	Description	Min	Max	U	Def.
A06	0 In Modulation the system uses Power 1: C03, U03	0	1	[nr]	
	1 In Modulation the system uses Modulation Power: C11, U11				
A07	0 The input Aux is disable	0	4	[nr]	Only in Pellet
	1 The input Aux is used for Modulation/Normal functioning				
	2 The input Aux is used for Standby/Normal functioning				
	3 The input Aux is used to block the Pump until water temperature < Th21 (P26 =0)				
	4 The input Aux is used for ON/OFF functioning				
A13	0 Reached the Boiler Thermostat the Burner goes in Modulation	0	1	[nr]	
	1 Reached the Boiler Thermostat the Burner goes in Modulation, then if d23 is satisfied and T43 is finished it goes in Standby				
A26	0 The immediate Exit from Standby is allowed	0	1	[nr]	Only in Pellet
	1 Exit from Standby is allowed only in the phase Standby OFF				
A28	0 Auger brake not activated	0	1	[nr]	
	1 Auger brake activated				
A31	0 Pellet/Wood Management	0	2	[nr]	
	1 Only Pellet Management				
	2 Only Wood Management				
A32	0 Auxiliary Module Disable (not present)	0	1	[nr]	
	1 Auxiliary Module Enable (present)				
A53	0 System in Block state with Er15 if there was a supply voltage lack for a time greater than T89 minutes	0	1	[nr]	
	1 System in Recover Ignition if there was a supply voltage lack for a time greater than T89 seconds				
P02	Maximum number ignition attempts	1	5	[nr]	
P03	Work Combustion Powers' number	1	5	[nr]	
P09	Pellet Sensor configuration: 0=N.C., 1=N.O., 2=Not Available	0	2	[nr]	
P26	Plumbing system management (see section 9.9.7)	0	1	[nr]	
P37	Only Thermocouple (P37 =0); Only Photoresistor (P37 =1); Photo+Thermocouple (P37 =2)	0	2	[nr]	
P42	Hydro/Air configuration P42 = 0 >> Hydro P42 = 1 >> AIR	0	1	[nr]	
P44	Output V2 Configuration	0	16	[nr]	
P45	Output Aux1 Configuration	0	16	[nr]	
P48	Output Aux2 Configuration	0	16	[nr]	
P49	Cleaning Engine 2 max Cycle Number on Run Mode	0	100	[nr]	
P50	Cleaning Engine 2 max Cycle Number on Extinguishing	0	100	[nr]	
P60	Input 1 Configuration	0	2	[nr]	

P61	Input 2 Configuration	0	2	[nr]	
PA20	Ignition phases management if the system has a photoresistor: 0 =if light flame > L01 thermostat and system is in Check-Up, Preload or Preheating, it goes in Normal state 1 =if light flame > L01 thermostat and system is in Check-Up, Preload or Preheating, it goes in Stabilization	0	1	[nr]	

6.7 MENU COUNTERS

Submenu	Description
Total time	Total time system feeding
Functioning time	Activity time system: time at least one Fan works
Run mode time	System real heating time: time in which heating is effectively produced (Run/Modulation)
Ignitions' Numbers	Number of done ignition attempts
Failed Ignitions' Numbers	Number of failed ignition attempts
Errors' Numbers	Number of errors occurred.
Counters Reset	Reset all counters: set to zero all counters

6.8 OUTPUTS MENU TEST

It allows the test of the single management outputs with the connected devices. The function is available in **OFF** state.

Code	Description	Min	Max	U
Combustion Fan	Combustion Fan Test	0	230	[Volt]
		300	2800	[RPM]
During the Combustion Fan Test, the display shows the set value [Volt] o [RPM] and the RPM of the fan detected by the encoder if it is present: so it is possible to create a conversion table [RPM]/[Volt] to use for the passage from encoder Mode P25 =1 to not encoder Mode P25 =0 in case of encoder breakage				
Output V2	Output V2 Test	Off	On	-
Auger	Auger Test	Off	On	-
Igniter	Igniter Test	Off	On	-
Output Aux1	Output Aux1 Test	Off	On	-
Output Aux2	Output Aux2 Test (only if Auxiliary module is present)	Off	On	-

7 FUNCTIONING STATES IN PELLET MODALITY

7.1 OFF

Timer	Controls		Combustion Fan	Auger	Igniter
		If Boiler Temperature > Th25			
		→ goes in Block			
	Photoresistor P37=1 or 2	If Flame Light > L00	OFF	OFF	OFF
		→ goes in Extinguishing			
	Thermocouple P37=0	If Exhaust Temperature > Th01 Thermostat and the last functioning modality was pellet			

7.2 CHECK UP

Timer	Controls		Combustion Fan	Auger	Igniter
		If Boiler Temperature > Boiler Thermostat and A13=1			
		→ goes in Standby			
T01	Photoresistor P37=1 or 2	If Flame Light > L01 and PA20=0	Max Speed	OFF	OFF
		→ goes in Normal			
	If Flame Light > L01 and PA20=1	→ goes in Stabilization			
	Thermocouple P37=0	If Exhaust Temperature > Th01 Thermostat and the last functioning modality was wood			
		If Exhaust Temperature > Th09 Thermostat and the last functioning modality was pellet	→ goes in Normal		

7.3 PRE-HEATING

Timer	Controls		Combustion Fan	Auger	Igniter	
		If Flame Light > L01 and PA20=0				
		→ goes in Normal	U01	OFF	ON	
T02	Photoresistor P37=1 or 2	If Flame Light > L01 and PA20=1				→ goes in Stabilization
		Thermocouple P37=0				If Exhaust Temperature > Th09 Thermostat

7.4 PRE-LOADING

Timer	Controls		Combustion Fan	Auger	Igniter	
		If Flame Light > L01 and PA20=0				
		→ goes in Normal	U01	ON	ON	
T03	Photoresistor P37=1 or 2	If Flame Light > L01 and PA20=1				→ goes in Stabilization
		Thermocouple P37=0				If Exhaust Temperature > Th09 Thermostat

This phase doesn't start if a configurable output is set as Safety Valve and **T40** isn't finished

7.5 FIXED PHASE

Timer	Controls		Combustion Fan	Auger	Igniter
		If Exhaust Temperature > Th09 Thermostat			
T04	Thermocouple P37=0	→ goes in Normal	U01	C01	ON

This phase is present only if the system works with the Thermocouple.

7.6 VARIABLE PHASE						
Timer	Controls			Combustion Fan	Auger	Igniter
T05	Photoresistor P37=1 or 2	If Flame Light > L01	→ goes in Stabilization	I Ignition: U01 II Ignition: U10	I Ignition: C01 II Ignition: C10	ON
		At the end of T05 if Flame Light < L01	→ tries again Ignition from Variable phase			
			→ goes in Extinguishing with error Er12 in case of finished number of attempts			
	Thermocouple P37=0	If Exhaust Temperature > Th09 Thermostat	→ goes in Normal			
		If Exhaust Temperature > Th06 Thermostat	→ goes in Stabilization			
		If Exhaust Temperature < Th06 Thermostat at the end of T05	→ tries again Ignition from Variable phase → goes in Extinguishing with error Er12 in case of finished number of attempts			

7.7 STABILISATION						
Timer	Controls			Combustion Fan	Auger	Igniter
T06	Photoresistor P37=1 or 2	If Flame Light < L01	→ Tries again Ignition from Variable phase	U02	C02	ON for TM13, then OFF
			→ Goes in Extinguishing phase with error Er12 in case of finished number of attempts			
		At the end of T06 if Flame Light > L01	→ goes in Normal			
	Thermocouple P37=0	If Exhaust Temperature > Th09 Thermostat	→ goes in Normal			
			→ tries again Ignition from Variable phase			
		If Exhaust Temperature < Th06 Thermostat	→ goes in Extinguishing phase with error Er12 in case of finished number of attempts			
At the end of T06 if Exhaust Temp. > Th06+d01	→ goes in Normal					

7.8 RECOVER IGNITION						
The system goes in Recover Ignition :						
<ul style="list-style-type: none"> After a Power failure (see par. 9.2) or If the System is in Extinguishing and you want restart the Burner pushing the button ON/OFF. 						
Timer	Controls			Combustion Fan	Auger	Igniter
T16	Photoresistor P37=1 or 2	If Flame Light > L01	→ goes in Ignition	U09	OFF	OFF
		If Flame Light > L00	→ waits			
		If Flame Light < L00	→ starts Timer T16			
		At the end of T16 if Flame Light < L00	→ goes in Check Up			
	Thermocouple P37=0	If Exhaust Temperature > Th01	→ waits			
		If Exhaust Temperature < Th01	→ starts Timer T16			
At the end of T16 if Exhaust Temperature < Th01	→ goes in Check Up					

7.9 NORMAL						
Param.	Controls			Combustion Fan	Auger	Igniter
A07=1		If Boiler Temperature > Boiler Thermostat	→ goes in Modulation	User's Power	User's Power	OFF
		If Input Aux open				
	P37=0 or 2	If Exhausting Temperature > Th07 Thermostat				
A07=2		Buffer Temp. > Buffer Thermostat and P26=1 and P42=0 and P44, P45, P48=14	→ goes in Standby			
		If Input Aux open				
T15		If Boiler Temperature > Th25 Thermostat	→ starts Timer T15			
		At the end of T15 if Boiler Temperature > Th25	→ goes in Extinguishing with error Er04			
	P37=0 or 2	If Exhaust Temperature > Th08 Thermostat	→ starts Timer T15			
		At the end of T15 if Exhaust Temperature > Th08	→ goes in Extinguishing with error Er05			
T14	Photoresistor P37=1 or 2	If Flame Light < L00	→ starts Timer T14			
		At the end of T14 if Flame Light < L00	→ goes in Extinguishing with error Er03			
	Thermocouple P37=0	If Exhaust Temp. < Th03 Thermostat or If Exhaust Temp. < Extinguishing Thermostat for the used power	→ starts Timer T14			
		At the end of T14 if exhaust temperature is low	→ goes in Extinguishing with error Er03			
7.10 MODULATION						
Param.	Controls			Combustion Fan	Auger	Igniter
A13=1		If for the time T43 Boiler Temperature > Boiler Thermostat+d23	→ goes in Standby	If A06=1 → Power U11 If A06=0 → Power U03	If A06=1 → Power C11 If A06=0 → Power C03	OFF
		Buffer temp > Buffer Thermostat and P26=1 and P44, P45, P48=5				
A07=2		If Input Aux open				
T15		If Boiler Temperature > Th25 Thermostat	→ starts Timer T15			
		At the end of T15 if Boiler Temperature > Th25	→ goes in Extinguishing with error Er04			
	P37=0 or 2	If Exhaust Temperature > Th08 Thermostat	→ starts Timer T15			
		At the end of T15 if Exhaust Temperature > Th08	→ goes in Extinguishing with error Er05			

T14	Photoresistor P37=1 or 2	If Flame Light < L00	→ starts Timer T14				
		At the end of T14 if Flame Light < L00	→ goes in Extinguishing with error Er03				
	Thermocouple P37=0	If Exhaust Temp.< Th03 Thermostat or If Exhaust Temp.< Extinguishing Thermostat for the used power	→ starts Timer T14				
		At the end of T14 if exhaust temperature is low	→ goes in Extinguishing with error Er03				

7.11 STANDBY

Param.	Controls			Combustion Fan	Auger	Igniter
T13 (Extinguishing phase)	Photoresistor P37=1 or 2	If Flame Light > L00	→ starts Timer T13	U09		
		At the end of T13 if Flame Light > L00	→ wait			
	Thermocouple P37=0	If exhaust temp.> Th28 Thermostat	→ starts Timer T13			
		At the end of T13 exhaust temp.> Th28	→ wait			
T16 (Final Cleaning phase)	Photoresistor P37=1 or 2	If Flame Light < L00	→ starts T16	Max Speed	OFF	OFF
	Thermocouple P37=0	If Exhausting Temp. < Th28 Thermostat				
(Standby OFF phase)		At the end of T16	→ goes in Standby OFF	OFF		

7.12 EXTINGUISHING

Param.	Controls			Combustion Fan	Auger	Igniter
T13 (Extinguishing phase)	Photoresistor P37=1 or 2		→ starts Timer T13	U09		
		At the end of T13 if Flame Light > L00	→ wait			
	Thermocouple P37=0	If exhaust temp.> Th01 Thermostat	→ starts Timer T13			
		At the end of T13 exhaust temp.> Th01	→ wait			
T16 (Final Cleaning phase)	Photoresistor P37=1 or 2	If Flame Light < L00	→ starts T16	Max Speed	OFF	OFF
	Thermocouple P37=0	If Exhausting Temp. < Th01 Thermostat				
		At the end of T16	→ goes in Block if there are errors, otherwise goes in Off	OFF		

This phase doesn't stop if P44, P45, P48=16 and T27 isn't finished

7.13 BLOCK

Controls				Combustion Fan	Auger	Igniter
To exit: Push for 3 seconds button P2 . With no more block conditions the system goes in Off				OFF	OFF	OFF

8 FUNCTIONING STATES IN WOOD MODALITY

The system has the Wood modality only if **A31=0**.

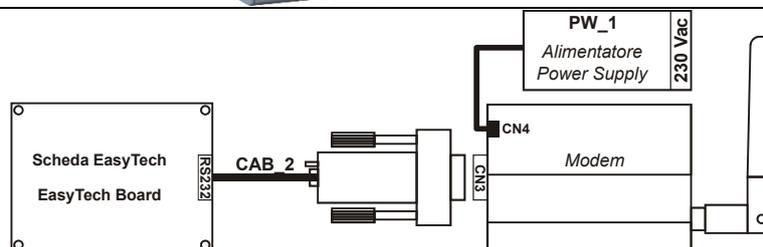
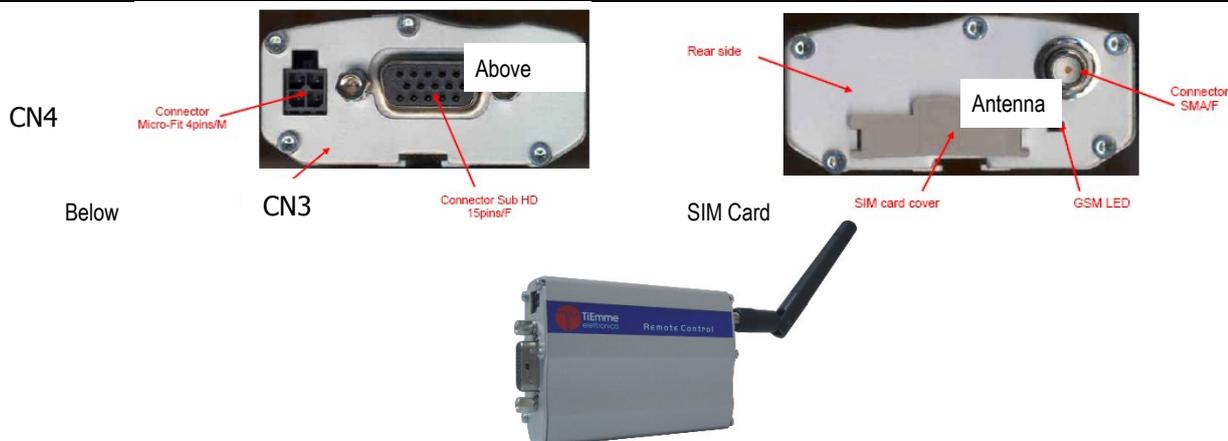
8.1 OFF					
Timer	Controls		Combustion Fan	Auger	Igniter
			OFF	OFF	OFF
8.2 NORMAL					
Param.	Controls		Combustion Fan	Auger	Igniter
T21	If Boiler Temperature < Th29	→ starts Timer T21	User's Power	OFF	OFF
	At the end of T21 if Boiler Temperature < Th29	→ goes in Block with error Er03			
	If Boiler Temperature > Boiler Thermostat	→ goes in Modulation			
	Buffer Temp. > Buffer Thermostat and P26=1 and P42=0 and P44, P45, P48=14	→ goes in Standby			
	If Water Temperature > Th25 Thermostat	→ goes in Security			
8.3 MODULATION					
Param.	Controls		Combustion Fan	Auger	Igniter
	If Boiler Temperature > Th25 Thermostat	→ goes in Security	If A06=1 → Power U11 If A06=0 → Power U03	OFF	OFF
A13=1	If for time T43 the Boiler temperature > Boiler Thermostat+d23	→ goes in Standby			
8.4 STANDBY/ SECURITY					
Param.	Controls		Combustion Fan	Auger	Igniter
			OFF	OFF	OFF
8.5 BLOCK					
Param.	Controls		Combustion Fan	Auger	Igniter
To exit: Push for 3 seconds button P2 . With no more block conditions the system goes in Off			OFF	OFF	OFF

9 FUNCTIONS

9.1 MODEM MANAGEMENT

The system manages a modem module (given on demand) for the dialogue with the Burner through SMS to operate the Ignition, Extinguishing, State's request and have information about the Block/Alarms conditions. The Modem is connected to the Control Board's port RS232 with cables and connectors given; it is supplied with a AC/DC Power Supply unit.

- Use a SIM card in the Modem enabled to the traffic GSM data
- Disable the PIN request from the SIM
- The insertion and removal of the SIM card MUST be done with the Modem NOT supplied



The user can send an SMS to the Modem's SIM with a command word written both capital and small:

Start	To start Ignition from Burner OFF in case of Pellet Modality. The Modem sends back a message to the number from which it received the command with the status, Boiler Temperature and a possible alarm error code.
Stop	To start Extinguishing from Burner ON in case of Pellet Modality. The Modem sends back a message to the number from which it received the command with the status, Boiler Temperature and the alarm error code.
Status	To ask the Burner's State. The Modem sends back a message to the number from which it received the command with the status, Boiler Temperature and a possible alarm error code.
Learn	To Learn the number to send an SMS in case of Block. If there is a Block condition, the Modem automatically sends a message to the learnt number with the Boiler status, Boiler Temperature and the alarm error code.
Reset	To unblock the system in case of block state because of an error occurs. This function works only for those errors that no need a user interaction.

9.2 SUPPLY VOLTAGE LACK MANAGEMENT

In case of supply voltage lack, the system saves the most important functioning data. With the return of the supply voltage, the system evaluates the saved data and, according to parameter **A53** we have:

- **A53=0**
 - If the lack is less than **T88** the system returns to the state in which it was previously
 - If the system was in a On state and the lack of voltage is between **T88** and **T89** the system goes in Recover Ignition if it is in Pellet modality; it goes in Run Mode if in Wood modality
 - In case of lack of Supply Voltage for a time greater than **T89** the system goes in Block with error message **Er15**
- **A53=1**
 - If the lack is less than **T88** the system returns to the state in which it was previously
 - If the system was in a On state and the lack of voltage is greater than **T88** the system goes in Recover Ignition, if it is in Pellet modality; it goes in Run Mode if in Wood modality

9.3 COMBUSTION POWER CHANGE DELAY MANAGEMENT

When the system exits from the Ignition and goes in **Normal**, the Combustion Power, starting from the Combustion Power 1, reaches the target one increasing the value with the delay time as the timer **T18**.

The other manual or automatic power changes are managed and actuated with the delay time as timer **T17**.

9.4 HYDRO/AIR FUNCTION

If **P42** = 0 the system manage a HYDRO product.

If **P42** = 1 the system manages an AIR product.

9.5 BRAZIER PERIODIC CLEANING

When the Burner is activated in Pellet Modality, the system automatically starts the brazier's periodic cleaning. With intervals as Timer **T07** (minutes) the Combustion is taken to Periodic Cleaning Power according to parameters **C08** and **U08** for the Timer **T08** (seconds).

9.6 AUTOMATIC COMBUSTION POWER MANAGEMENT

In the Combustion Power setting, the user can set the Automatic modality [A]. The work power is automatically selected according to the Boiler Temperature and the value of the selected Boiler Thermostat:

- Boiler Temperature \leq **Boiler Thermostat-d08** \rightarrow The system goes to the maximum available Combustion Power
- Boiler Thermostat-d08** < Boiler Temperature < **Boiler Thermostat** \rightarrow The Combustion Power decreases reaching the Boiler Thermostat
- Boiler Temperature \geq **Boiler Thermostat** \rightarrow The system goes to Combustion Power 1 if **A06=0** or to Modulation Power if **A06=1**

Example: **A06** = 1, Modality = [A], **Boiler Thermostat** =75 °C, **d08** = 5 °C, **P03** = 5

Water Temperature °C	≤ 70	71	72	73	74	≥ 75
Work Combustion Power	Power 5	Power 4	Power 3	Power 2	Power 1	Power 1

9.7 PELLET LOAD CORRECTION MANAGEMENT

The user could correct the Auger's times ON of Pellet Loading in Step - 7 ÷ 7

P15 is the percentage value of the single correction Step and is applied on the Work default values.

Example:	P15 =10%	C03 =2,0	C04 =3,0	C05 =4,0	C06 =5,0	C07 =6,0	C11 =1,0
	Step=-1	C03 =1,8	C04 =2,7	C05 =3,6	C06 =4,5	C07 =5,4	C11 =0,9

The defined values are within the defined range **P27 ÷ P05**

9.8 SPEED COMBUSTION FAN MANAGEMENT

The parameter **P25** sets the regulation modality of the Exhausting Fan Speed

P25=0	Exhausting Fan without Encoder: the speed is defined by the set voltage value [Volt].
P25=1	Exhausting Fan with Encoder: the speed is defined by the set number of turns [RPM]. In case of signal presence but regulation failed, the system goes in BLOCK with Er08 alarm. In case of sensor break with absence of the signal, the system goes in BLOCK with Er07 alarm.
P25=2	Exhausting Fan with Encoder: the speed is defined by the set number of turns [RPM]. In case of signal presence but regulation failed, the system goes in BLOCK with Er08 alarm. In case of sensor break with absence of the signal, the system goes in BLOCK with Er07 alarm. After the reset of the BLOCK done by the button P2 , the system goes Automatically to P25=0
P25=3	Exhausting Fan without Encoder: the speed is defined by the set voltage value [Volt]. If auxiliary module is present at pin 38-40 will be present a 0÷10 V DC to manage a combustion fan with DC control. Please note that the 0÷10V DC value is related to the set value in the range 0÷230V. At pin 3-4 it is present 230 V AC when fan is On.

9.9 CONFIGURABLE OUTPUT

It's possible to configure V2, Aux1 and Aux2 (if auxiliary module is present) outputs based on respectively **P44**, **P45**, **P48** parameters.

Value Parameter	Output Type	Output		
		V2 (P44)	AUX1* (P45)	AUX2** (P48)
0	Output not used	√	√	√
1	Pellet Safety Valve (see par.9.9.1)	√	√	√
2	Pellet Load Engine (see par. 9.9.2)	√	√	√
3	Output Under Thermostat (see par.9.9.3)	√	√	√
4	Cleaning Engine 1(see par.9.9.4)	√	√	√
7	Air valve (see par.9.9.5)	√	√	√
13	Cleaning Engine 2(see par.9.9.6)	√	√	√
14	Exchanger Management (see par.9.9.7)	√	√	√
16	Auger 2 (see par.9.9.8)	√	√	√

√ = Function implemented

× = Function not implemented (Output deactivates)

— = Value not available for the parameter

NOTE:

V2 Output is a supplied output.

***AUX1 is a clean contacts output and need to be supplied. Connect pin 32-33 to supply.**

**** if auxiliary module is present, AUX2 is a clean contacts output and need to be supplied. Connect pin 32-37 to supply.**

If parameter's value is different from the table above, the corresponding output will be always off.

9.9.1 PELLET SAFETY VALVE

It works in Check Up, Ignition, Stabilisation, Run Mode, Modulation and Safety. When the output is activated, the Auger will be on only when the timer **T40** is finished.

9.9.2 PELLET LOAD ENGINE

When the Pellet Level Sensor signals a lack of fuel, the output is switched on. If after **T24** seconds is not reached the minimum level of pellets, the system goes in Extinguishing and the display shows the message **Er18**. If you fill the tank manually, you can reset the error and restart the system. However if the level is reached, the loading of the material continues for the time **T23**.

9.9.3 OUTPUT UNDER THERMOSTAT

The output is managed by **Th56** Thermostat. If water temperature is greater than **Th56** the output is On, otherwise is Off.

9.9.4 CLEANING ENGINE

The output is On for the time **T30** when the system reaches the operation time **T31** in Run Mode and Modulation. In Wood modality it work only if water temperature is greater than **Th29** Thermostat.

9.9.5 AIR VALVE

The output is On both in Wood and Pellet modality if Combustion Fan is On

9.9.6 CLEANING ENGINE 2

The Cleaning Engine 2 is enabled to work only if the system is in Pellet modality and it's on in:

- Off, Recover Ignition, Standby-Extinguishing before the Final Cleaning. Fans and augers are off; the cleaning is repeated **P50** times. To disable the cleaning in these phases, set **P50**=0.
- periodically when the operating time in Run Mode, Modulation is greater than parameter **T87**. The combustion parameters don't change; the cleaning is repeated **P49** times. To disable the cleaning, when the system has reached the final power, set **P49**=0.

The Brazier Cleaning Engine management can be done using a limit switch or no:

- management with limit switch (set **P60**, **P61** (only if Auxiliary module is present), equal to 2)

Phase	Description
Phase 1	The system activates the Engine and checks the state of the limit switch: when it opens it goes to Phase 2. If, when the T85 timer expires, the limit switch is still close the system goes in Block with error Er25 .
Phase 2	The maximum duration of this phase is T86 seconds: in this time the Engine has to be done his cycle and be repositioned in the start position (the limit switch has to be close). At the end the system goes to Phase 3. If, at the end of T86 the limit switch is open the system goes to Block state with error Er25 .
Phase 3	If the number set as cleaning cycles is greater than 1, it starts a new cleaning cycles otherwise the engine is disabled.

If during the normal operation the thermo-regulator reads the limit switch as open, the Brazier Engine is activated to try to close the contact; if it doesn't do it within the **T86** time, the system goes in Block state with the error message **Er25**.

In Off and Block state, for safety concerns, the Engine is always still.

- management without limit switch

Phase	Description
Phase 1	The system switches on the engine for a time equal to T86 seconds, in this time, the engine have to completed its cycle and have to place itself in the starting position. At the end system goes to Phase 2.
Phase 2	If the number of cleaning cycles set is greater than one starts another cycle of cleaning, otherwise the motor is switched off.

In Off and Block state, for safety concerns, the Engine is always still.

9.9.7 EXCHANGER MANAGEMENT

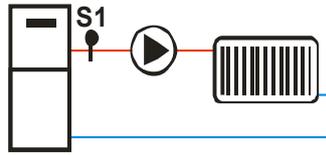
If **P42** = 0 system manages a Pump (see par 9.9.7.1)

If **P42** = 1 system manages an Air fan (see par. 9.9.7.2).

9.9.7.1. PUMP

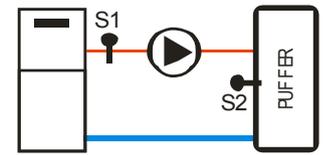
It is possible to choose 2 plumbing plants:

Ex. **P26=0**
 Th18= 5 °C
 Th19= 50°C
 Th21= 80°C



System pump is used to supply heating plant.
 Pump is enabled if S1 temperature is greater than **Th19** Thermostat.
 Pump is always ON if S1 temperature is greater than **Th21** Thermostat and lower than **Th18** Thermostat.

Ex. **P26=1**
 Th18= 5 °C
 Th19= 40 °C
 Th48= 80 °C
 Th47= 8 °C



Pump is used as Buffer charge.
 It is ON if differential temperature S1-S2 is greater than **Th47** and S1 temperature is greater than **Th19**.
 If Buffer Thermostat **Th48** is satisfied, system goes in Standby. Pump is always ON if S1 temperature is lower than **Th18** Thermostat.

Unblock Pump

If Pump is OFF for a time greater than **T42**, it is activated for **T41** seconds, to avoid Pump block for inactivity.

9.9.7.2. AIR FAN

Air fan output will be On when Boiler temperature is over **Th19**.

If **A07** = 3 (block exchanger) and Aux input is open, output will be Off unless Boiler temperature is greater than **Th25**.

9.9.8 AUGER 2

The Auger 2 carries the fuel into the brazier; if the Auger is enabled, the Auger 2 is always on; when the Auger is turned off, the Auger 2 remains on until the timer **T27** expire.

9.10 CONFIGURABLE INPUT

It's possible to configure Input1 and Input2 (if auxiliary module is present) input based on respectively **P60**, **P61** parameters.

Value Parameter	Input Type	Input	
		Input1 (P60)	Input2* (P61)
0	Input not used	√	√
1	Level Pellet Sensor (see par.9.10.1)	√	√
2	Limit switch (see par.9.10.2)	√	√

√ = Function implemented

× = Function not implemented (Output deactivates)

— = Value not available for the parameter

NOTE:

**** if auxiliary module is present, Input2 is available.**

9.10.1 LEVEL PELLET SENSOR MANAGEMENT

If the no configurable outputs isn't set as Pellet Engine the Pellet Level Sensor has the following functioning: when pellet is under the fixed level, after a signalling for a time **T24**, the system goes in Extinguishing with error **Er18**. If the pellet is put in the tank, the system stops every signal and it is possible to restart it. If don't use the sensor set **P09=2**.

Pellet sensor electrical connection:

Input 1 (**P60** = 1): Pin 26-27-31

26 Gnd

27 Signal

31 +12V

Input 2 (**P61** = 1): Pin 40-41-42 (only if Auxiliary Module is present)

40 Gnd

41 Signal

42 +12V

9.10.2 LIMIT SWITCH MANAGEMENT

Limit switch is used in combination with Cleaning Engine 2 (see par.9.9.6).

Control board read this input as closed when if limit switch is closed connect the input to +5V.

Limit switch electrical connection:

When Input 1 is configured as limit switch (**P60** = 2) connect limit switch to pin 27-30

When Input 2 is configured as limit switch (**P61** = 2) connect limit switch to pin 41-43