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Electronic Applications for Thermoregulation

SY325

SOLID FUEL BOILER CONTROL STANDARD 2

(VERSION 1.0)

SUMMARY

INTRODUCTION

The Temperature Controller SY325 can be used to regulate Boilers functioning. It can manage automatic ignition and automatic fuel load.

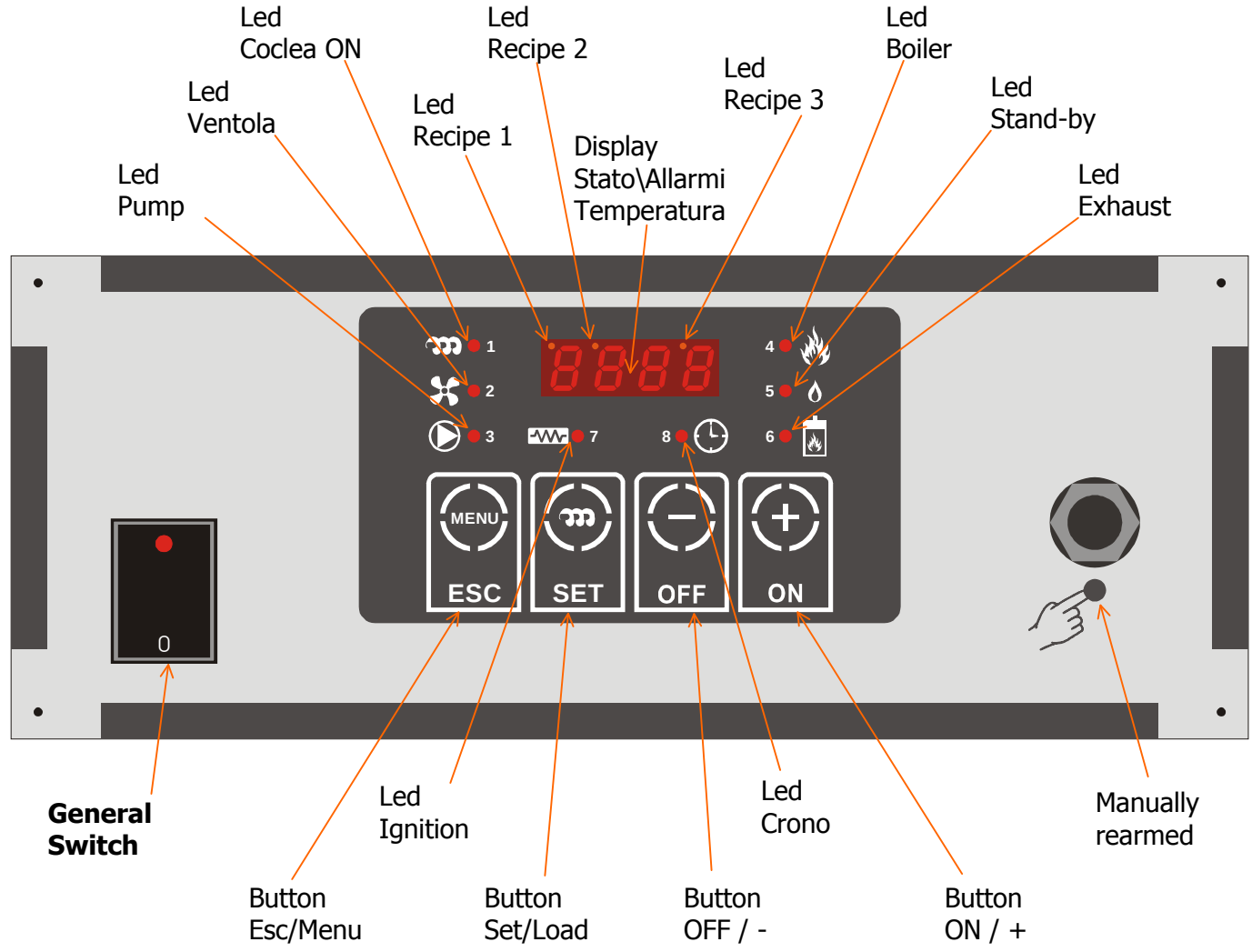
Its functions are regulated by reading flame light, exhaust temperature, water temperature and they depend on the Parameters' setting.

Parameters can be set using the Menu.

Changing Parameters' setting it's possible to:
⇒ Adjust the system functioning according to your own needs.
⇒ Adjust the system functioning according to the specific type of Boiler that you use.

1 CONTROL PANEL

The picture below is the image of the Control Panel.



Panel Dimensions: 274 x 108 mm

2 BUTTONS

- **ON / + :** If pushed for five seconds it switches on the system.
  If pushed in **Menu** it increments a parameter's value.
- **OFF / - :** If pushed for five seconds it switches off the system.
  If pushed in **Menu** it decrements a parameter's value.
- **SET/Coclea :** If you keep this button pushed when the system si **Off** it activates a manual load of the auger. During this procedure you will see "***LoAd***" on the Display. The manual load procedure ends when you release the button.
  If pushed in **Menu** it changes the visualization from parameter's code to parameter's value and it permits to save a new setting.
- **ESC/Menu :** This button permits to enter/exit the Menu. If you are changing a setting and you push this button you will exit without saving the new value.

NOTE:

- In **Off** or **Extinguishing** state you can reset an Alarm visualization by pushing **button +** or **button -,** but if the alarm were still there you would visualize it again.

3 LED

1. **Led Auger :** This Led is ON when the Auger Output is ON.
2. **Led Fan :** This Led is ON when the Fan1 Output is ON.
3. **Led Pump :** This Led is ON when the Pump Output is ON, it blinks when the Pump is switched OFF by the Room Thermostat input.
4. **Led Boiler:** This Led is ON when the water temperature is under the value **BOILER-TH[A03] – ModulationDelta[A05]**. It blinks when the water temperature is over that value and it is OFF when the temperature is over the **BOILER-TH[A03]**.
5. **Led Stand-by :** This Led is ON when the system in **Stand-by** state.
6. **Led Exhaust :** This Led is ON when exhaust temperature is over the **ON-TH[F18]**, It blinks during the pre-extinguishing phase.
7. **Led Ign.Resistance :** This Led is ON when the Ignition Resistance Output is ON.
8. **Led Chrono :** This Led is ON when the Chrono input contact is closed.
9. **Led Recipe 1 :** This Led is ON if Recipe1 is selected.
10. **Led Recipe 2 :** This Led is ON if Recipe2 is selected.
11. **Led Recipe 3 :** This Led is ON if Recipe3 is selected.

4 DISPLAY

- **Display\Temperature\State\Alarms:** The 4 digit Display visualizes water temperature, the functioning State of the system and eventual alarms.
  States' Codes:

= Off

= Check UP

= Ignition

= Stabilization

= Recover Ignition

= Modulation

 **=** Stand-by

 = Safety

 = Extinguishing

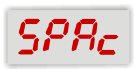
 = System Off with Alarms

If there are alarms the Display will show alternatively ALt / ErrorCode.
Errors' Codes:

 = Manually rearmed Safety Thermostat contact is open

 = Over Boiler Temperature

 = Failed Ignition

 = Accidental Extinguishing

 = Probe reading out of range

NOTE:

- Switching on the control board by the General Switch, Product Code and Firmware Version are displayed for 2 seconds.

 Product Code

 Program Version

5 MENU'

There are two level of Menu:

- **User Menu**
- **Secret Menu**

5.1 USER MENU:

Push **Menu Button** to enter the User Menu. In the Menu you can scroll the parameters with **+** and **–** **buttons**. You can recognize the parameter looking at what Led is blinking, while the parameter's value will be readable on the display. The list of parameters could change if you disable some output.
Procedure to modify the parameters' values:

- Scroll until the parameter you would like to modify by pushing **+** or **– buttons**
- Push **Set Button** to enter into modify modality (you'll see the value blinking)
- Change the value by pushing **+** or **– buttons**. Keep the button pushed in order to have a faster changing of the values.
- Push **Set Button** to save the new value.
- Push **Esc Button** to exit without saving the new value
- Push **Esc Button** to manually exit the Menu
- Wait 15 seconds to exit automatically the Menu

NOTE: Se il parametro visualizzato è il valore della temperatura letta da una sonda del Sistema, sul Display comparirà la sigla di riconoscimento della stessa. Pigiando il **Tasto SET** verrà visualizzato il valore della temperatura.

User Menu Parameters:

LED	Sigla	Description	Default Value	Minimum Value	Maximum Value
1. Auger 1	**Normal Power**	Work Time Auger in Normal	10 sec.	0 sec.	300 sec.
2. Fan 1	**Normal Power**	Combustion Fan Speed in Normal	70 %	**Uc20**	99 %
3. Pump	**PUMP-TH [A01]**	Pump enable Thermostat	50 ℃	20 ℃	80 ℃
4. Boiler	**BOILER-TH [A03]**	Boiler Thermostat to enter Stand-by mode	70 ℃	**A 12**	**A 13**
5. Stand-by	**Manual Functioning**	Enable Manual Functioning	**Auto**	**Auto**	**MAnu**
6. Exhaust	**Combustion Recipe**	Selezione ricetta di combustione	1	1	3
	FuMi	Reading Exhaust Temperature	**Temperature in ℃**		

NOTE:

- The parameter **Uc20** , **A12** and **A13** are in the Secret Menu.

5.2 SECRET MENU:

Keep pushed at the same time, for 5 seconds, both **Menu Button** and **– Button** to enter the Secret Menu. In Menu you can scroll the parameters by pushing **+** or **– buttons**. Every parameter has its own code that you can visualize on the display. Push Set Button to visualize the parameter's value. The list of parameters could change if you disable some output.

Procedure to modify the parameters' values:

- Scroll until the parameter you would like to modify by pushing **+** or **– buttons**
- Push **Set Button** to enter into modify modality (you'll see the parameter's value)
- Change the value by pushing **+** or **– buttons**. Keep the button pushed in order to have a faster changing of the values.
- Push **Set Button** to save the new value.
- Push **Esc Button** to exit without saving the new value
- Push **Esc Button** to manually exit the Menu
- Wait 15 seconds to exit automatically the Menu
-

Secret Menu Parameters:

CODE	NAme	Description		Default Value	Minimum Value	Maximum Value
CL00	**Ignition Power Phase 1 - Preload**	Working time of the Auger1 during Ignition - Phase 1	Recipe 1	1 sec.	0 sec.	300 sec.
			Recipe 2	1 sec.		
			Recipe 3	1 sec.		
CL01	**Ignition Power Phase 2**	Working time of the Auger1 during Ignition - Phase 2	Recipe 1	0 sec.	0 sec.	300 sec.
			Recipe 2	0 sec.		
			Recipe 3	0 sec.		
CL04	**Stabilization Power**	Working time of the Auger1 during Stabilization	Recipe 1	10 sec.	0 sec.	300 sec.
			Recipe 2	10 sec.		
			Recipe 3	10 sec.		
CL07	**Modulation Power**	Working time of the Auger1 during Modulation	Recipe 1	5 sec.	0 sec.	300 sec.
			Recipe 2	5 sec.		
			Recipe 3	5 sec.		
CL09	**Stand-by Power**	Working time of the Auger1 in Stand-by Maintenance phase	Recipe 1	2 sec.	0 sec.	300 sec.
			Recipe 2	2 sec.		
			Recipe 3	2 sec.		

CP00	**Ignition Power Phase 1 - Preload**	Pause time of the Auger1 during Ignition - Phase 1	Recipe 1 Recipe 2 Recipe 3	0 sec. 0 sec. 0 sec.	0 sec.	300 sec.
CP01	**Ignition Power Phase 2**	Pause time of the Auger1 during Ignition - Phase 2	Recipe 1 Recipe 2 Recipe 3	1 sec 1 sec 1 sec	0 sec.	300 sec.
CP04	**Stabilization Power**	Pause time of the Auger1 during Stabilization	Recipe 1 Recipe 2 Recipe 3	10 sec. 10 sec. 10 sec.	0 sec.	300 sec.
CP05	**Normal Power**	Pause time of the Auger1 during Normal State	Recipe 1 Recipe 2 Recipe 3	10 sec. 10 sec. 10 sec.	0 sec.	300 sec.
CP07	**Modulation Power**	Pause time of the Auger1 during Modulation	Recipe 1 Recipe 2 Recipe 3	15 sec. 15 sec. 15 sec.	0 sec.	300 sec.
CP09	**Stand-by Power**	Pause time of the Auger1 during Stand-by	Recipe 1 Recipe 2 Recipe 3	0 sec. 0 sec. 0 sec.	0 sec.	300 sec.
CL20	**Ignition Power Phase 1 - Preload**	Working time of the Auger2 during Ignition - Phase 1	Recipe 1 Recipe 2 Recipe 3	1 sec. 1 sec. 1 sec.	0 sec.	300 sec.
CL21	**Ignition Power Phase 2**	Working time of the Auger2 during Ignition - Phase 2	Recipe 1 Recipe 2 Recipe 3	0 sec. 0 sec. 0 sec.	0 sec.	300 sec.
CL24	**Stabilization Power**	Working time of the Auger2 during Stabilization	Recipe 1 Recipe 2 Recipe 3	10 sec. 10 sec. 10 sec.	0 sec.	300 sec.
CL25	**Normal Power**	Working time of the Auger2 during Normal	Recipe 1 Recipe 2 Recipe 3	10 sec. 10 sec. 10 sec.	0 sec.	300 sec.
CL27	**Modulation Power**	Working time of the Auger2 during Modulation	Recipe 1 Recipe 2 Recipe 3	5 sec. 5 sec. 5 sec.	0 sec.	300 sec.
CL29	**Stand-by Power**	Working time of the Auger2 in Stand-by Maintenance phase	Recipe 1 Recipe 2 Recipe 3	2 sec. 2 sec. 2 sec.	0 sec.	300 sec.
CP20	**Ignition Power Phase 1 - Preload**	Pause time of the Auger2 during Ignition - Phase 1	Recipe 1 Recipe 2 Recipe 3	0 sec. 0 sec. 0 sec.	0 sec.	300 sec.
CP21	**Ignition Power Phase 2**	Pause time of the Auger2 during Ignition - Phase 2	Recipe 1 Recipe 2 Recipe 3	1 sec. 1 sec. 1 sec.	0 sec.	300 sec.
CP24	**Stabilization Power**	Pause time of the Auger2 during Stabilization	Recipe 1 Recipe 2 Recipe 3	25 sec. 25 sec. 25 sec.	0 sec.	300 sec.
CP25	**Normal Power**	Pause time of the Auger2 during Normal	Recipe 1 Recipe 2 Recipe 3	25 sec. 25 sec. 25 sec.	0 sec.	300 sec.
CP27	**Modulation Power**	Pause time of the Auger2 during Modulation	Recipe 1 Recipe 2 Recipe 3	25 sec. 25 sec. 25 sec.	0 sec.	300 sec.
CP29	**Stand-by Power**	Pause time of the Auger2 during Stand-by	Recipe 1 Recipe 2 Recipe 3	5 sec. 5 sec. 5 sec.	0 sec.	300 sec.

Uc00	**Ignition Power Phase 1 - Preload**	Fan1 Speed during Ignition - Phase 1	Recipe 1	70 %	**Uc20**	99 %
			Recipe 2	70 %		
			Recipe 3	70 %		
Uc01	**Ignition Power Phase 2**	Fan1 Speed during Ignition - Phase 2	Recipe 1	70 %	**Uc20**	99 %
			Recipe 2	70 %		
			Recipe 3	70 %		
Uc04	**Stabilization Power**	Fan1 Speed during Stabilization	Recipe 1	60 %	**Uc20**	99 %
			Recipe 2	60 %		
			Recipe 3	60 %		
Uc07	**Modulation Power**	Fan1 Speed during Modulation	Recipe 1	40 %	**Uc20**	99 %
			Recipe 2	40 %		
			Recipe 3	40 %		
Uc09	**Stand-by Power**	Fan1 Speed during Stand-by Maintenance phase	Recipe 1	70 %	**Uc20**	99 %
			Recipe 2	70 %		
			Recipe 3	70 %		
Uc10	**Extinguishing Power**	Fan1 Speed during Extinguishing	Recipe 1	70 %	**Uc20**	99 %
			Recipe 2	70 %		
			Recipe 3	70 %		
Uc20	**Fan1 minimum Speed**	Fan1 minimum settable Speed		30 %	0 %	99 %
UA00	**Ignition Power Phase 1 - Preload**	Fan2 Speed during Ignition - Phase 1	Recipe 1	70 %	**UA20**	99 %
			Recipe 2	70 %		
			Recipe 3	70 %		
UA01	**Ignition Power Phase 2**	Fan2 Speed during Ignition - Phase 2	Recipe 1	70 %	**UA20**	99 %
			Recipe 2	70 %		
			Recipe 3	70 %		
UA04	**Stabilization Power**	Fan2 Speed during Stabilization	Recipe 1	60 %	**UA20**	99 %
			Recipe 2	60 %		
			Recipe 3	60 %		
UA05	**Normal Power**	Fan2 Speed in Run Mode	Recipe 1	70 %	**UA20**	99 %
			Recipe 2	70 %		
			Recipe 3	70 %		
UA07	**Modulation Power**	Fan2 Speed during Modulation	Recipe 1	40 %	**UA20**	99 %
			Recipe 2	40 %		
			Recipe 3	40 %		
UA09	**Stand-by Power**	Fan2 Speed during Stand-by Maintenance phase	Recipe 1	70 %	**UA20**	99 %
			Recipe 2	70 %		
			Recipe 3	70 %		
UA10	**Extinguishing Power**	Fan2 Speed during Extinguishing	Recipe 1	70 %	**UA20**	99 %
			Recipe 2	70 %		
			Recipe 3	70 %		
UA20	**Fan2 minimum Speed**	Fan2 minimum settable Speed		30 %	0 %	99 %
F 16	**TH-SMOKE-OFF**	Exhaust Thermostat to declare the system OFF		70°C	30°C	**Hi**
F 18	**TH-SMOKE-ON**	Exhaust Thermostat to declare the system ON		70°C	30°C	**Hi**
F 21	**TH-SMOKE-FAST**	Exhaust Thermostat to bypass the Ignition state		100°C	30°C	**Hi**
F 22	**TH-SMOKE-MOD**	Exhaust Thermostat to start Modulation		230°C	30°C	**Hi**
F 24	**TH-SMOKE-STBY**	Exhaust Thermostat to go into Stand-by state		250 ℃	30°C	**Hi**

A 04	**SAFETY-BOILER-TH**	Boiler Thermostat to go into Safety state		86°C	86°C	95°C
A 05	**Modulation Delta**	Degrees before BOILER-TH to start Modulation		0°C	0°C	15°C
A 06	**TH-SAFETY**	Boiler Thermostat Activation OUTPUT SAFETY		90°C	20°C	95°C
A 12	**Min-BOILER-TH**	BOILER-TH minimum settable value		40°C	30°C	60°C
A 13	**Max-BOILER-TH**	BOILER-TH maximum settable value		80°C	60°C	85°C
IA01	**PUMP-TH-Hysteresis**	PUMP TH Hysteresis		2°C	1°C	10°C
IA06	**BOILER-TH-Hysteresis**	BOILER-TH Hysteresis		2°C	1°C	10°C
t 00	**Pre-heating-TIME**	Pre-heating phase time		60 sec.	0 sec.	900 sec.
t 01	**Ignition-Phase1-TIME**	Ignition phase1 time	Recipe 1	40 sec.	0 sec.	900 sec.
			Recipe 2	40 sec.		
			Recipe 3	40 sec.		
t 02	**TIME-Acc-Fase2**	Ignition phase 2 time	Recipe 1	15 min.	1 min.	300 min.
			Recipe 2	15 min.		
			Recipe 3	15 min.		
t 03	**TIME Stabilizzazione**	Stabilization time	Recipe 1	1 min.	0 min.	300 min.
			Recipe 2	1 min.		
			Recipe 3	1 min.		
t 04	**TIME Auto**	Stand-by pause phase time	Recipe 1	30 min.	1 min.	300 min.
			Recipe 2	30 min.		
			Recipe 3	30 min.		
t 05	**TIME Mant**	Stand-by maintenance phase time	Recipe 1	10 sec.	0 sec.	900 sec.
			Recipe 2	10 sec.		
			Recipe 3	10 sec.		
t 06	**Pre-extinguishing-TIME**	Waiting time before the automatic extinguishing		3 min.	1 min.	300 min.
t 08	**Check-up-TIME**	Check-up time (Starting Cleaning)		30 sec.	0 sec.	900 sec.
t 09	**Final-Cleaning-TIME**	Final Cleaning time		40 sec.	0 sec.	900 sec.
P 02	**Ignition attempts**	Ignition attempts		1	1	5
P 03	**Chrono-Function**	Chrono input function selection		1	0	1
P 04	**Room-TH Function**	Room-Th input function selection		0	0	2
P 08	**Enable Extinguishing**	Enable extinguishing phase		1	0	1
P 30	**Enable Fan1**	Enable Fan1	Recipe 1	1	0	1
			Recipe 2	1		
			Recipe 3	1		
P 31	**Enable Fan2**	Enable Fan2	Recipe 1	0	0	1
			Recipe 2	0		
			Recipe 3	0		

P 32	**Enable Auger1**	Enable Auger1	Recipe 1	1	0	1
			Recipe 2	1		
			Recipe 3	1		
P 33	**Enable Auger2**	Enable Auger2	Recipe 1	0	0	1
			Recipe 2	0		
			Recipe 3	0		
P 34	**Enable Ignition Resistance**	Enable Ignition Resistance	Recipe 1	1	0	1
			Recipe 2	1		
			Recipe 3	1		

NOTE:

- Auger functioning with separated times of ON/OFF:
  - Every functioning state of the system, the auger will be cyclically ON for CLxx seconds, and OFF for CPxx seconds.
  - If working time is set "0" seconds, Auger will be always OFF.
  - If pause time is set "0" seconds, Auger will be always ON.
- **Uc20** is the minimum settable speed of the Fan1. Every Fan1's parameter set over **Uc20** will be automatically set as **Uc20**(only "**0**" won't be modified).
- **UA20** is the minimum settable speed of the Fan2. Every Fan2's parameter set over **UA20** will be automatically set as **UA20**(only "**0**" won't be modified).
- Exhaust thermostats can be set up to **Hi** (**901° C**), that means that they would never have any effect.
- Exhaust thermostats can be set up to **Hi** (**901° C**), that means that they would never have any effect.
- The parameter **A05** is the temperature value to subtract to the Boiler Thermostat **TH_BOILER**, for the input in **MODULATION**. If the value is set to 0° C, the **MODULATION** State by Boiler Temperature is not effected.
- The parameter **A12** is the minimum value of the Thermostati TH_BOILER programmable in the USER MENU.
- The parameter **A13** is the maximum value of the Thermostat TH_BOILER programmable in the USER MENU.
- The parameter **P02** is the number of repetitions of the IGNITION in case of failed ignition. If the value is = '1' , the ignition is not repeated.
- Parameter **P03** manages Chrono input:
  - P03 = 0 – Chrono input manages Ignition/Extinguishing of the system.
  - P03 = 1 – Chrono input manages the Stand-by of the system.
- Parameter **P04** manages Room-Th input:
  - P04 = 0 – Room-Th stops the pump.
  - P04 = 1 – Room-Th manages the Stand-by of the system.
  - P04 = 2 – Room-Th manages Ignition/Extinguishing of the system.
- Parameter **P08** enables the Extinguishing state:
  - P08 = 0 – The extinguishing state won't be managed
  - P08 = 1 – The extinguishing state will be managed with the possibility to do a final Cleaning.
- **P30**, **P31**, **P32**, **P33**, **P34**, enable/disable some outputs of the system:
  - P30 = 0 disables Fan1, its parameters will become invisible
  - P31 = 0 disables Fan2, its parameters will become invisible
  - P32 = 0 disables Auger, its parameters will become invisible
  - P34 = 1 enables the ignition resistance
  - P34 = 0 disables the ignition resistance and enables an error signaler

5.3 NOT PROGRAMMABLE PARAMETERS:

These parameters are not programmable using the control panel:

Not programmable parameters

Name [Code]	Description	Value
ICE-TH [A00]	Anti-Ice Thermostat	5°C
ALARM-TH [A07]	Alarm Thermostat	95°C

Not programmable HYSTERESYS

Name [Code] of the Thermostat	Description	Hysteresis Value
TH-SMOKE-OFF[F16]	Exhaust Thermostat to declare the system OFF	2°C
TH-SMOKE-ON[F18]	Exhaust Thermostat to declare the system ON	2°C
TH-SMOKE-FAST[F21]	Exhaust Thermostat to bypass the Ignition state	2°C
TH-SMOKE-MOD[F22]	Exhaust Thermostat to start Modulation	10°C
TH-SMOKE-STBY[F24]	Exhaust Thermostat to go into Stand-by state	10°C
ICE-TH [A00]	Anti-Ice Thermostat	0°C
SAFETY-BOILER-TH [A04]	Boiler Thermostat to go into Safety state	2°C
ALARM-TH [A07]	Alarm Thermostat	2°C
TH-SICUREZZA[A06]	Boiler Thermostat to SAFETY-BOILER OUTPUT activation	2°C

NOTE:

- Every Thermostat has its own Hysteresis:
  - **During Temperature Increasing:**
    The system reads **Thermostat's value** (Example: **TH-SMOKE-OFF[F16] = 40° C**)
  - **During Temperature Decreasing:**
    The system reads **Thermostat's value – Its Hysteresis**
    (Example: **TH-SMOKE-OFF[F16] = 40° - 2° = 38° C**)

6 INSTALLATION

The picture below shows the connection for the inputs and output of the system.corretta installazione.

WARNINGS:

⚠ **Always connect earth cable.**

⚠ **Follow carefully the connection described in order to avoid damages**

⚠ **Low voltage signals (Probes, Digital inputs, etc) should be separated from High voltage signals (Power Supply, Outputs, etc.) in order to reduce the interferences.**

Wiring NOTES:

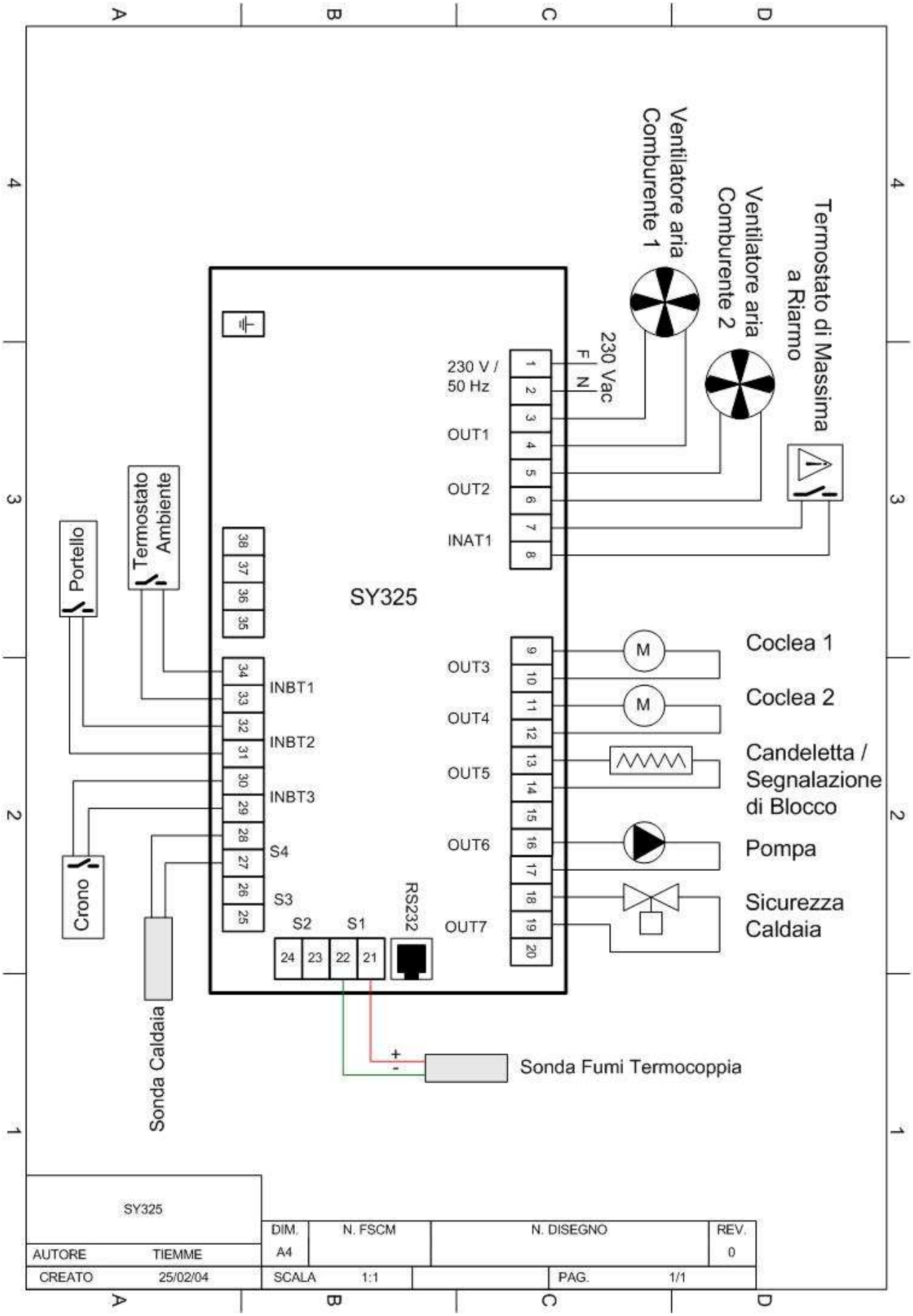
7-8: to the contact of a manually rearmed safety thermostat
Short-circuit if not used

21-22: to the Exhaust probe, Thermocouple K, connecting **Red Wire(+)** to the **21** and the **Green Wire(-)** to the **22.**

29-30: to the contact of an external time clock (Chrono)
Read the paragraph "Chrono input" if not used

31-32: to the contact of a fire door
Short-circuit if not used

33-34: to the contact of an external Room-Thermostat
Short-circuit if not used


SY325
230 V / 50 Hz
230 Vac
F
N
OUT1
OUT2
INAT1
OUT3
OUT4
OUT5
OUT6
OUT7
INBT1
INBT2
INBT3
S4
S3
S2
S1
RS232
Ventilatore aria Comburente 1
Ventilatore aria Comburente 2
Termostato di Massima a Riarmo
Portello
Termostato Ambiente
Crono
Sonda Caldaia
Sonda Fumi Termocoppia
Coclea 1
Coclea 2
Candeletta / Segnalazione di Blocco
Pompa
Sicurezza Caldaia
M
M
SY325
AUTORE TIEMME
CREATO 25/02/04
DIM. A4
N. FSCM
N. DISEGNO
REV. 0
SCALA 1:1
PAG. 1/1

7 FUNCTIONING STATES

Temperature Control Board **SY325** is composed by two parts:

- **Basic Board**
- **Control Panel**

SY325 functioning is managed by functioning **States,** each state is characterized by its own conditions depending by water temperature, exhaust temperature, inputs, etc.

Every state has its own **Functioning Power**. Each Power is composed by the following:

- **Fan1 speed**
- **Fan2 speed**
- **Auger1 Pause/Work time**
- **Auger2 Pause/Work time**

All the parameters regarding the functioning powers can be saved with different values for each **Combustion Recipe**.

Functioning States:

1	***OFF***
2	***CHECK UP***
3	***IGNITION***
4	***RECOVER IGNITION***
5	***STABILIZATION***
6	***NORMAL***
7	***MODULATION***
8	***STAND-BY***
9	***SAFETY***
10	***EXTINGUISHING***

7.1 OFF State

Only the hydraulic plant is managed in the OFF state. The system goes into OFF state after the **EXTINGUISHING** phase with:

- Exhaust Temperature < **TH-SMOKE-OFF[F16]**

Display	OFF	Temperatura in caldaia alternata al messaggio **OFF** Eventuali messaggi di allarme
Fan 1	OFF	
Fan 2	OFF	
Auger 1	OFF	
Auger 2	OFF	
Ignition Resistance	OFF	
Pump	**ON**	On if water temperature > **PUMP-TH**
Boiler Safety	**ON**	On if water temperature > **PUMP-TH -SAFETY**

If Exhaust Temperature > **TH-FUMI-OFF[F16]**:

- The system goes into **EXTINGUISHING.**

7.2 LO STATO *CHECK UP*

Programmable phase of cleaning before the Ignition (**Check-up TIME[t08]**).
The system goes into Check-up state:

- Pushing **ON-Button** in **OFF** or **EXTINGUISHING** State

WARNING: Switching on the system is not possible if there are alarms or door open.

Display	ChC Sond	Water Temperature / ChEc Message Prob Message in case of Probes reading out of Range
Fan 1	**ON**	**Maximum Speed (99 %)**
Fan 2	**ON**	**Maximum Speed (99 %)**
Auger 1	OFF	
Auger 2	OFF	
Ignition Resistance	OFF	
Pump	**ON**	On if water temperature > **PUMP-TH**
Boiler Safety	**ON**	On if water temperature > **PUMP-TH -SAFETY**

In This phase the Controller tests the Probes Temperature. If the read values are over the maximum or under the minimum on the display appears the message **Sond.**
This error doesn't stpo the Boiler but it is a warning to verify the correct reading of the Probes.
If you don't want the system to do the Check-up State set Check-up TIME[t08] = 0.
End of CHECK-UP state:

- When the time t08 is over:
  The system goes into **IGNITION**
- If Water temperature > **SAFETY-BOILER-TH [A04]**
  The system goes into **SAFETY**

7.3 *IGNITION* STATE

The system goes into Ignition State if:

- **CHECK-UP** state is ended
- At the end of **STAND-BY** state

IGNITION state is composed by 3 phases, each one programmable:

- ***Pre-heating***

Programmable timer **Pre-heating TIME [t00]**.

Display	Acc	Water Temperature / **Acc** message
Fan 1	**ON**	**Ignition Power 1** speed
Fan 2	**ON**	**Ignition Power 1** speed
Auger 1	OFF	
Auger 2	OFF	
Ignition Resistance	**ON**	
Pump	**ON**	On if water temperature > **PUMP-TH**
Boiler Safety	**ON**	On if water temperature > **PUMP-TH -SAFETY**

If you don't want the system to do the Phase set Pre-heating TIME [t00]= 0.

- ***Phase 1 (Preload)***

Programmable timer **Ignition-phase1 TIME [t01]**.

Display	Acc	Water Temperature / **Acc** message
Fan 1	**ON**	**Ignition Power 1** speed
Fan 2	**ON**	**Ignition Power 1** speed
Auger 1	**ON**	Pause/Work according to **Ignition Power 1**
Auger 2	**ON**	Pause/Work according to **Ignition Power 1**
Ignition Resistance	**ON**	
Pump	**ON**	On if water temperature > **PUMP-TH**
Boiler Safety	**ON**	On if water temperature > **PUMP-TH -SAFETY**

If you don't want the system to do the Phase set TIME-Acc-Fase 1-PreCarico[t01] a 0.

♦ ***Phase 2***

Programmable timer **Ignition-phase2 TIME [t02]**.

Display		Water Temperature / **Acc** message
Fan 1	**ON**	**Ignition Power 2** speed
Fan 2	**ON**	**Ignition Power 2** speed
Auger 1	**ON**	Pause/Work according to **Ignition Power 2**
Auger 2	**ON**	Pause/Work according to **Ignition Power 2**
Ignition Resistance	**ON**	
Pump	**ON**	On if water temperature > **PUMP-TH**
Boiler Safety	**ON**	On if water temperature > **PUMP-TH -SAFETY**

End of IGNITION state:

- **For first Ignition (**pushing **ON-Button)**
  - If Exhaust Temperature > **TH-SMOKE-FAST[F21]** during whatever Ignition phase:
    The system goes into **NORMAL** state
  - If Exhaust Temperature > **TH-SMOKE-ON[F18]** during Ignition Phase2:
    The system goes into **STABILIZATION** state
- **For further Ignitions (**at the end of **STAND-BY** state):
  - If Exhaust Temperature > **TH-SMOKE-FAST[F21]** in whatever Ignition phase:
    The system goes into **NORMAL** state
  - If Exhaust Temperature > **TH-SMOKE-ON[F18]** during Ignition Phase2:
    The system goes into **NORMAL** state
- **For all the Ignitions**
  - If Exhaust Temperature < **TH-SMOKE-ON[F18]** at the end of all Ignition phases:
    The system tries again the Ignition until the maximum number of Ignition attempts is over (parameter **Ignition Attempts [P02]**)
  - If the number of attempts is over:
    The system goes into **OFF** state and it signals the message **ALt/Acc**
  - If Water Temperature > **SAFETY-BOILER-TH [A04]**

The system goes into **SAFETY** state

7.4 STABILIZATION State

The system goes into Stabilization state at the end of Ignition. It is programmable by the parameter **Stabilization TIME [t03]**.

Display		Water Temperature / Stb message
Fan 1	**ON**	**Stabilization Power** speed
Fan 2	**ON**	**Stabilization Power** speed
Auger 1	**ON**	Pause/Work according to **Stabilization Power**
Auger 2	**ON**	Pause/Work according to **Stabilization Power**
Ignition Resistance	OFF	

Pump	**ON**	On if water temperature > **PUMP-TH**
Boiler Safety	**ON**	On if water temperature > **PUMP-TH -SAFETY**

End of STABILIZATION state:

- If Exhaust Temperature > **TH-SMOKE-FAST[F21]**
  The system goes into **NORMAL** state
- If Exhaust Temperature > **TH-SMOKE-ON[F18]** at the end of Stabilization time
  The system goes into **NORMAL** state
- If Water Temperature > **BOILER-TH[A03]**
  The system goes into **STAND-BY** state
- If Exhaust Temperature < **TH-SMOKE-ON[F18]** during Stabilization
  The system tries again the Ignition until the maximum number of Ignition attempts is over (parameter **Ignition Attempts [P02]**)
- If the number of attempts is over:
  The system goes into **OFF** state and it signals the message **ALt/Acc**
- If Water Temperature > **SAFETY-BOILER-TH [A04]**
  The system goes into **SAFETY** state

7.5 RECOVER IGNITION State

The system goes into this state in case of **Lack of Voltage.**

Display Display	rEc	Water temperature / rEc message

In case of lack of voltage, when the system is switched on again, it follows this procedure:

- **ANALYSIS OF THE LAST SYSTEM STATE** (5 seconds)
- **IGNITION STATE** if **Enable Ignition Resistance [P34] = 1**
- **LAST SYSTEM STATE** if **Enable Ignition Resistance [P34] = 0**

7.6 NORMAL State

The system goes into Normal state if:

- At the end of IGNITION/STABILIZATION states
- At the end of MODULATION state

Display		Water Temperature
Fan 1	**ON**	**Normal Power** speed
Fan 2	**ON**	**Normal Power** speed
Auger 1	**ON**	Pause/Work according to **Normal Power**
Auger 2	**ON**	Pause/Work according to **Normal Power**
Ignition Resistance	OFF	
Pump	**ON**	On if water temperature > **PUMP-TH**
Boiler Safety	**ON**	On if water temperature > **PUMP-TH -SAFETY**

End of NORMAL state:

- If Exhaust Temperature > **TH-SMOKE-MOD[F22]**
  The system goes into **MODULATION** state
- If Water Temperature > **BOILER-TH[A03]** – **Modulation Delta[A05]**
  The system goes into **MODULATION** state
- If Water Temperature > **BOILER-TH[A03]**
  The system goes into **STAND-BY** state
- If Exhaust Temperature < **TH-SMOKE-OFF[F16]**
  The system waits for **TIME Pre-extinguishing[t06]** and then goes into **EXSTINGUISHING** state (**Automatic Extinguishing ALt / SPA**).

7.7 *MODULATION* State

The system goes into Modulation state if:

- Exhaust Temperature > **TH-SMOKE-MOD[F22]**

Water Temperature > **BOILER-TH[A03]** – **Modulation Delta[A05]**

Display	Mod	Water Temperature / Mod message
Fan 1	**ON**	**Modulation Power** speed
Fan 2	**ON**	**Modulation Power** speed
Auger 1	**ON**	Pause/Work according to **Modulation Power**
Auger 2	**ON**	Pause/Work according to **Modulation Power**
Ignition Resistance	OFF	
Pump	**ON**	On if water temperature > **PUMP-TH**
Boiler Safety	**ON**	On if water temperature > **PUMP-TH -SAFETY**

End of MODULATION State:

- If Exhaust Temperature < **TH-SMOKE-MOD[F22]**
  The system goes into **NORMAL** state
- If Water Temperature < **BOILER-TH[A03]** – **Modulation Delta[A05]**
  The system goes into **NORMAL** state
- If Water Temperature > **BOILER-TH[A03]**
  The system goes into **STAND-BY** state
- If Exhaust Temperature < **TH-SMOKE-OFF[F16]**
  The system waits for **TIME Pre-extinguishing[t06]** and then goes into **EXSTINGUISHING** state (**Automatic Extinguishing ALt / SPA**).

7.8 ***STAND-BY*** STATE

The system goes into Stand-by if:

➢ Water Temperature > **BOILER-TH[A03]**

STAND-BY state is composed by two different programmable phases that cyclically come one after the other.

♦ ***Pause Phase***

Programmable timer **Stand-by-Pause-Phase TIME[t04]**.

Display		Water Temperature / MAn message
Fan 1	OFF	
Fan 2	OFF	
Auger 1	OFF	
Auger 2	OFF	
Ignition Resistance	OFF	
Pump	**ON**	On if water temperature > **PUMP-TH**
Boiler Safety	**ON**	On if water temperature > **PUMP-TH -SAFETY**

♦ ***Maintenance Phase***

Programmable timer **Stand-by-Mant-Phase TIME[t05]**.

Display		Water Temperature / MAn message
Fan 1	**ON**	**Stand-by Power** speed
Fan 2	**ON**	**Stand-by Power** speed
Auger 1	**ON**	Pause/Work according to **Stand-by Power**
Auger 2	**ON**	Pause/Work according to **Stand-by Power**
Ignition Resistance	OFF	
Pump	**ON**	On if water temperature > **PUMP-TH**
Boiler Safety	**ON**	On if water temperature > **PUMP-TH -SAFETY**

If you don't want the system to do the Phase set TIME Mant[t05] a 0.

End of STAND-BY state:

➢ If Water Temperature < **BOILER-TH[A03]**

The system goes into **IGNITION** state if **Enable Ignition Resistance [P34] = 1**

The system goes into **NORMAL** state if **Enable Ignition Resistance [P34] = 0**

➢ If Water Temperature > **SAFETY-BOILER-TH[A04]**

The system goes into **SAFETY** state

7.9 *SAFETY* State

The system goes into Safety state if:
Water Temperature > **SAFETY-BOILER-TH[A04]**

Display	nAn Sic	Water Temperature / **Man** and **Sic** message
Fan 1	OFF	
Fan 2	OFF	
Auger 1	OFF	
Auger 2	OFF	
Ignition Resistance	OFF	
Pump	**ON**	**Always On**
Boiler Safety	**ON**	On if water temperature > **PUMP-TH -SAFETY**

If Water Temperature is over **SAFETY-BOILER-TH[A04]** the functioning is the one described for this state, but the Display shows StbY. If Water Temperature is over **ALARM-TH[A07]**, the Display shows SAFE and an acoustic alarm is activated.
End of SAFETY state:

- If Water Temperature < > **SAFETY-BOILER-TH[A04]**
  The system goes into **STAND-BY** state

7.10 *EXTINGUISHING* State

The system goes into Extinguishing state if:

- **OFF-Button** is pushed
- Exhaust Temperature < **TH-SMOKE-OFF[F16]** (**Automatic Extinguishing**)
- Due to eventual Alarms

Extinguishing is composed by two phases:

- ***Extinguishing phase***

Until Exhaust Temperature is under **TH-SMOKE-OFF[F16]**

Display	SPE	Water Temperature / **SPE** eventual Alarms messages
Fan 1	**ON**	**Extinguishing Power** speed
Fan 2	**ON**	**Extinguishing Power** speed
Auger 1	OFF	
Auger 2	OFF	
Ignition Resistance	OFF	
Pump	**ON**	On if water temperature > **PUMP-TH**
Boiler Safety	**ON**	On if water temperature > **PUMP-TH -SAFETY**

♦ ***Final cleaning phase***

Programmable timer **Final Cleaning TIME[t09]**.

Display	SPE	Water Temperature / **SPE** eventual Alarms messages
Fan 1	**ON**	**Maximum Speed (99 %)**
Fan 2	**ON**	**Maximum Speed (99 %)**
Auger 1	OFF	
Auger 2	OFF	
Ignition Resistance	OFF	
Pump	**ON**	On if water temperature > **PUMP-TH**
Boiler Safety	**ON**	On if water temperature > **PUMP-TH -SAFETY**

WARNING: if Water Temperature is over **BOILER-TH[A03]** the Fans will be OFF
If you want the system not to do the Final Cleaning phase set Final Cleaning TIME[t09] = 0.
If you want the system not to do the whole Extinguishing state and you want it to go directly into OFF state set Enable Extinguishing[P08] = 0.
End of EXTINGUISHING State:
At the end of Final Cleaning phase the system goes into **OFF state**

8 Digital Inputs

8.1 Manually Rearmed Safety Thermostat:

If the contact between the pin 7-8 is open, in whatever functioning state, the system switches off the Auger, the Fans, the Refilling Engine, and then goes into Extinguishing state.
The Display shows **Alt / Er01**
The default value of the manually rearmed thermostat is 100° C, but it is settable from 90° C to 110° C.
Short-circuit **Pin 7-8** if not used.

8.2 Chrono Input :

You can connect an external time clock (Chrono) to **pin 29-30**. Its functioning can be programmed by the parameter **Chrono Functioning [P 03]**.

1. **Chrono Functioning [P 03] = 0**
   Contact open:
   - The system goes into EXTINGUISHING state

   Contact closed:
   - The system goes into CHECK-UP state

   The contact is normally open.
2. **Chrono Functioning [P 03] = 1**
   Contact open:
   - The system, if into NORMAL or MODULATION state, goes into STAND-BY

   Contact closed:
   - The system goes into IGNITION

   The contact is normally closed.

- If not used: Short-circuit **Pin 29-30** if **P03 = 1,** otherwise leave them not connected.

8.3 Door Input :

You can connect a door switch to **pin 31-32**, the contact is normally closed.

If the contact is open:

- **Display shows door**
- **Fan 1** **OFF**
- **Fan 2** **OFF**
- **Auger 1** **OFF**
- **Auger 2** **OFF**
- **Ignition Resistance** **OFF**

- Short-circuit **Pin 31-32** if not used.

8.4 Room-Thermostat input :

You can connect an external Room-Thermostat to **pin 33-34**.
Its functioning can be programmed by the parameter **Room-Th Functioning [P 04]**.

1. **Room-Th Functioning [P 04] = 0**
   Contact open:
   - Pump OFF

   Contact closed:
   - Pump ON as described for every state

   This function doesn't work in case of Ice Alarm or Over-temperature Alarm.
   The contact is normally closed.
2. **Room-Th Functioning [P 04] = 1**
   Contact open:
   - The system, if into NORMAL or MODULATION state, goes into STAND-BY

   Contact closed:
   - The system goes into IGNITION

   The contact is normally closed.
3. **Room-Th Functioning [P 04] = 2**
   Contact open:
   - The system goes into EXTINGUISHING state

   Contact closed:
   - The system goes into CHECK-UP state

   The contact is normally open.

- If not used: Short-circuit **Pin 33-34** if **P04 = 0 o 1**, otherwise leave them not connected.

9 Other Functions

9.1 Anti-Ice Function

➢ If Water Temperature < **ICE-TH[A00]**
- **Pump** **ON**

9.2 Automatic/Manual Function

The automatic/manual function can be set by the parameter **Manual Functioning** of the User's Menu.

Parameter Manual Functioning = Auto :
- The system functioning is the one previously described for each state.

Parameter Manual Functioning = Manu :
- There's not any Ignition State, you can only manually ignite into Normal state
- The system manages only **NORMAL**, **STAND-BY**, **SAFETY** states according to Water Temperature only. Exhaust probe is not managed.

9.3 Ignition Resistance / Error Signaler Function

Ignition Resistance / Errors Signaler Output can be configured to manage two different devices by the parameter **Enable Ignition Resistance [P34]**:

Parameter Enable Ignition Resistance [P34] = 1 :

- The Output is configured as an **Ignition Resistance,** its functioning is the one previously described for each state.

Parameter Enable Ignition Resistance [P34] = 0 :

- The Output is configured as an **Errors Signaler**, it will be ON in case of:
  Manually rearmed Safety Thermostat contact is open (ALt Er01)
  Failed Ignition (ALt Er12)
  Automatic Extinguishing (ALt Er13)
- It will be OFF without any error.

9.4 Outputs Enables

Questa funzione ci da la possibilità di Abilitare/Disabilitare il funzionamento delle uscite: Ventola Comburente 1, Ventola Comburente 2, Coclea 1, Coclea 2 e Accenditore per ogni singola ricetta, senza modificare nessun altro parametro. Il suo funzionamento si basa sulla programmazione dei seguenti parametri:

Enable Fan 1	**(P30)**	**0**	OFF Fan	**1**	Fan ON in according the Phase
Enable Fan 2	**(P31)**	**0**	OFF Fan	**1**	Fan ON in according the Phase
Enable Auger 1	**(P32)**	**0**	OFF Auger 1	**1**	ON Auger 1 In according the Phase
Enable Auger 2	**(P33)**	**0**	OFF Auger 2	**1**	ON Auger 2 In according the Phase
Enable Resistance	**(P34)**	**0**	OFF Resistance Output as Block Signaling	**1**	ON Resistance In according the Phase

9.5 Self-Test Function

You can activate the Self-Test function only with the system OFF, by pushing simultaneously for 5 seconds, **Menu Button** and **+ Button**.
Procedure to verify all inputs and outputs:

1. Before activating Self-Test Function, verify the probes reading:
   - **Water Probe** always visible on the Display
   - **Exhaust Probe** enter User Menu (TEMP)
2. Activate Self-Test procedure.
3. All led will be on. Display shows **tESt.**
4. **Inputs' Test**:
   - The controller can normally closed or normally open contacts. Connect on each input of the controller a switch and then open or close one by one.
   - The controller visualizes on the Display the name of the involved input alternated to **tESt**. The names that could appear are the following:

Num.	Name	Type	Description
1	In02	Normally Closed	Room Thermostat
2	In03	Normally Closed	Door
3	In04	Normally Closed	Chrono
4	In09	Normally Closed	Manually rearmed Safety Thermostat

   NOTE: it is possible to show on the Display only one input each time and if they are activated together, it is visualized only the one with more priority. described in the column **Num**.
5. After the input test it starts **Outputs' Test**:
   - To start the modality push button **SET**.
   - The controller tests the first output and shows the name on the Display. The names are the following:

Num.	Nome	Tipo	Descrizione
1	Ou01	Speed Regulation	Fan 1
2	Ou02	Speed Regulation	Fan 2
3	Ou03	ON/OFF fed	Auger 1
4	Ou04	ON/OFF fed	Auger 2
5	Ou05	ON/OFF fed	Ignition Resistance
6	Ou06	ON/OFF fed	Pump
7	Ou07	ON/OFF fed	Boiler Safety

   - Pushing again the button **SET** it is possible to visualize all the outputs.
   - Testing the outputs with **Regulation of the speed**, the Display shows alternatively the output name and the speed that at the beginning is **0% (Off)**.
   - With buttons **+** and **-**, it is possible to increase or decrease the speed.
   - Testing **ON/OFF** outputs, the display shows alternatively the name of the tested output and the current output's state that at the beginning is **OFF**.
   - Pushing button **+** it is possible to turn on the output and on the display **OFF** is replaced by **ON**.
   - Pushing button **–** it is possible to turn the outputs off again.
   - After visualizing all them with button **SET**, the controller turn all them off and the Display shows again **tESt**.

     NOTE:
     - During the test of the **Auger** output, if it is off but the display shows **ON**, check that the **Manually rearmed Safety Thermostat** contact is closed, because this stops physically the Auger output from the feeding.
6. To stop the **Self Test** functioning:
   - Pushing **ESC Button.**
   - Wait **60 seconds** without pushing any button.
   - If the water temperature is over **BOILER-TH**.

TECHNICAL DATA

Cod. Thermoregulator: SY325
Revision: 1.0
Dat2: 28/02/2008

- 230Vac 50Hz power supply with fuse protection 6,3A Delayed
- Multifunction control board Display 4 Digit
- Ignition and extinguishing Boiler management
- Regulation SMOKE Thermostats
- Regulation WATER Thermostats
- Auger1 activation
- Auger1 activation
- Ignition Resistance activation
- Pump activation
- Fan1 and Fan2 regulation
- Modulation function
- Stand-by function
- Safety and Alarms Functions
- System's state signaling
- Exhaust Probe Thermocouple K to read the smoke combustion temperature
- Water Probe to read water temperature
- Contacts for rearmed Thermostat, Chrono, Door, Room-Thermostat

INPUTS				
Exhaust Probe	**Termocoppia K**	**Temp. = 0° – 500 °C**		**2 Connectors**
Water Probe	**Analogica NTC 10K**	**Temp. = 0° – 110 °C**		**2 Connectors**
Room-Thermostat Contact	**ON/OFF**	**Secondo Configurazione**		**2 Connectors**
Door Contact	**ON/OFF**	**Normally Closed**		**2 Connectors**
Chrono Contact	**ON/OFF**	**Configuration depending**		**2 Connectors**
Manually rearmed Safety Thermostat		**Normally Closed**		**2 Connectors**
OUTPUTS				
FAN 1	**Triac Regulation**	**Fed LINE Max 1,3A**	**Outputs under fuse 6,3A**	**2 Connectors**
FAN 2	**Triac Regulation**	**Fed LINE Max 1,3A**		**2 Connectors**
AUGER 1	**TRIAC ON/OFF**	**Fed LINE Max ½ Hp**		**2 Connectors**
AUGER 2	**RELE ON/OFF**	**Fed LINE**		**2 Connectors**
ACCENDITORE	**RELE ON/OFF**	**Fed LINE**		**2 Connectors**
POMPA	**RELE ON/OFF**	**Fed LINE**		**2 Connectors**
SICUREZZA CALDAIA	**RELE ON/OFF**	**Fed LINE**		**2 Connectors**