



# TECHNICAL MANUAL



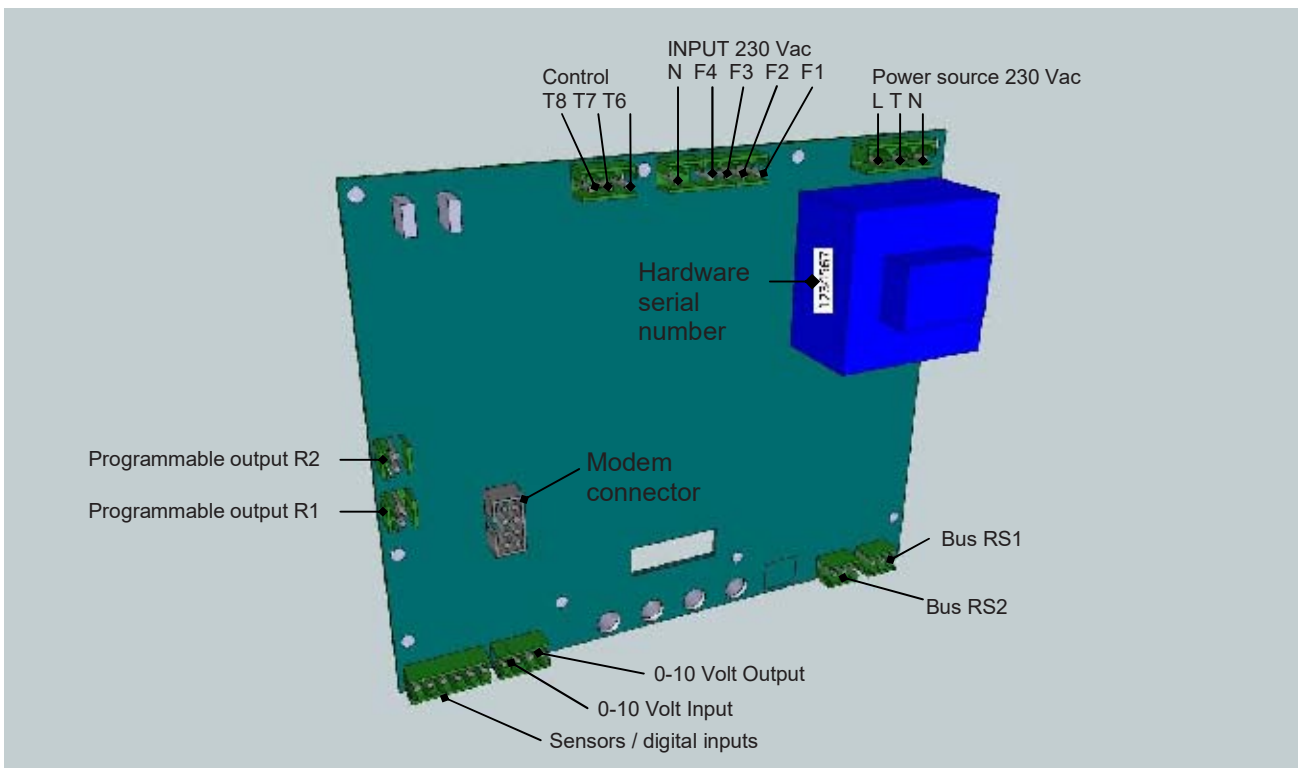
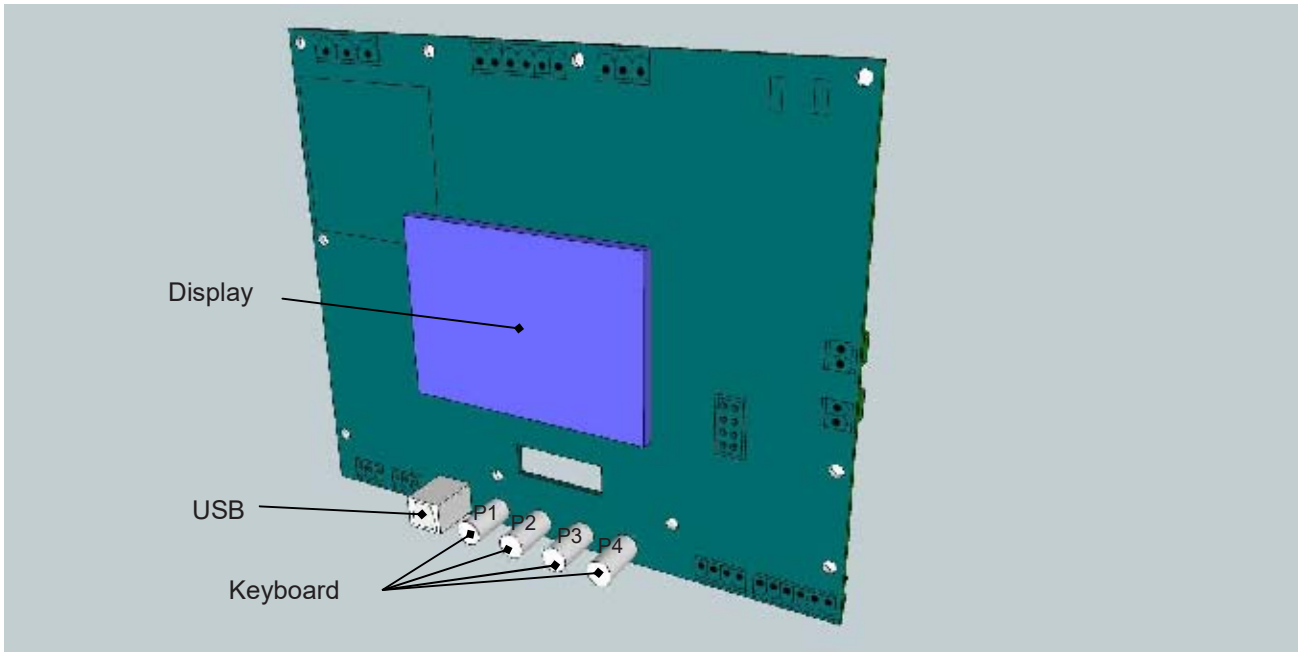
## BOILER MANAGEMENT SYSTEM ELECTRONIC BOARD ETERM-01



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# 1 WIRING DIAGRAM



## 2 TECHNICAL FEATURES

**POWER SOURCE** L T N 230 Vac

### OPTO-ISOLATED INPUTS

**F1** Programmable input provided for:

Safety intervention signals (when they are not lit it means that the safeties are on)

**F2** Programmable input provided for:

Modulating burners, when lit it means that the burner is turned on (standard burner plug B4)

Two-stage burner, when lit it means that the burner is on at main flame (standard burner plug B4)

**F3** Programmable input provided for:

Two-stage burner, when lit it means that the burner is on at second flame (standard burner plug B4)

**F4** Programmable input provided for:

Each type of burner, when lit it means that the burner is stopped (standard burner plug S3)

### CONSENT FOR OUTPUT / BURNER MODULATION

**T1-T2** Contact consent for burner start up (standard burner plug T1-T2)

Maximum load 230 Vac / 6.5 A

**T6-T7 / T6-T8** Contact burner modulations / mixing valves

Maximum load 230 Vac / 1 A

For single-stage burners:

Contacts not used

Two-stage burner:

Main flame T6-T7 closed - T6-T8 open

Second flame T6-T7 closed - T6-T8 closed

For progressive burners:

Main flame T6-T7 closed - T6-T8 open

Second flame T6-T7 open - T6-T8 closed

For modulating burners:

Linear decrease of power - T6-T7 closed - T6-T8 open

Linear increase of power - T6-T7 open - T6-T8 closed

Steady state power - T6-T7 open - T6-T8 open

For burners with three stages:

Main flame - T6-T7 open - T6-T8 open (T1-T2 closed)

Second flame - ended T6-T7 - T6-T8 open

Third flame - T6-T7 closed - T6-T8 closed

**If there is a single-stage or modulating burner with a 0-10 Volt signal, T6-T7-T8 can be used to control a mixing valve actuator with three points.**

Linear closure of the valve - T6-T7 closed - T6-T8 open

Linear opening of the valve - T6-T7 open - T6-T8 closed

Steady opening - T6-T7 open - T6-T8 open

If the mixing valve is in service for a system with a floor, an external security system is provided to prevent the circulation of water that is too hot, in case of a malfunction and/or power failure to the system.

### PROGRAMMABLE OUTPUTS

**R1 - R2** Programmable Outputs

Maximum load 230 Vac / 2 A

The various programmable outputs can be configured for

Boiler pump consent

Header pump consent (for cascade)

System pump consent

Cylinder pump consent

Alarm signal

**OUTPUTS T1-T2, R1, R2 ARE MADE WITH TRIAC; TO ACTIVATE THE CONTACT THERE MUST BE AT LEAST 24 Vac BETWEEN THE ENDS  
THEN USE THE CONTACTS TO CONTROL UTILISERS AND/ OR AUXILIARY POWER WITH AT LEAST 24 Vac UP TO 230 Vac**

#### **SENSOR INPUTS - DIGITAL**

**PT1** Input PT 1000 provided for the boiler probe  
**PT2** Programmable input PT 1000 / Digital  
**PT3** Programmable input PT 1000 / Digital  
**NTC** Programmable input NTC / Digital

The various programmable inputs can be configured for the  
Cylinder probe

Header sensor (for cascade)

Flow sensor system

Return sensor

Flue probe

Cylinder thermostat - free contact

External sensor (NTC)

Control for climate operation or with set point

INPUT 0-10 Volt / DIGITAL

Programmable input configurable for:

Modulation of boiler temperature

Modulation of header temperature (for cascade)

Control for climate operation or with set point

CO2 sensor

Other inputs from transducers 0-10 Volt

OUTPUT 0-10 Volt

Programmable output configurable for:

Mixing valve system control

Burner modulation control

#### **COMMUNICATION**

Modem connector

USB socket

**RS1** - Connection RS485 for connecting the system via bus to its own Master (other boiler system or MASTER NEREIX)

**RS2** - Connection RS485 for connecting the system via bus to its own slaves (other boiler systems or system management boards)

The boiler board can work alone to control a single burner; in this case, it can be directly connected to a modem for remote management.

More boiler boards (maximum 16) can be connected together using a special bus connection; in this case one of the boards will be set as Master and it can be connected to the modem.

If the system has a Master Nereix board, it can be connected to a boiler board at the special input; in this case the boiler board will become a slave like a satellite module of NEREIX use.

If there are more boards in cascade, the Master Nereix will be connected to the boiler board that will be set as Master.

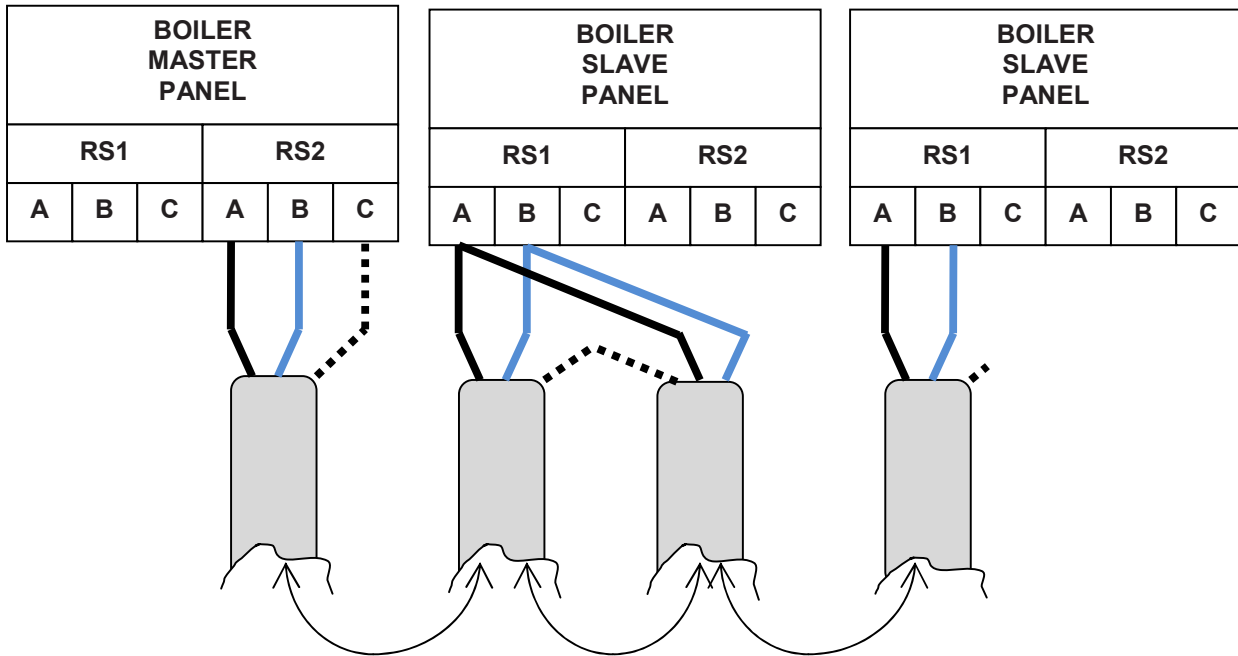
The system management boards can be slaves of the boiler board or the Master Nereix board

**WARNING: THE FUNCTIONS OF THE BOARD DEPEND ON THE FIRMWARE LOADED  
WHICH MAY BE UPDATED WITH SPECIFIC APPLICATIONS  
FOR THE PURPOSE OF IMPROVING THE PRODUCT, ICI CALDAIE SPA RESERVES THE RIGHT TO  
MAKE CHANGES TO THE SOFTWARE AND FIRMWARE AND IMPLEMENTATIONS THAT IT CONSIDERS  
APPROPRIATE**

## BUS BETWEEN BOILERS IN CASCADE

Use shielded cable 2 x 0.35 mm<sup>2</sup> for connecting the bus.

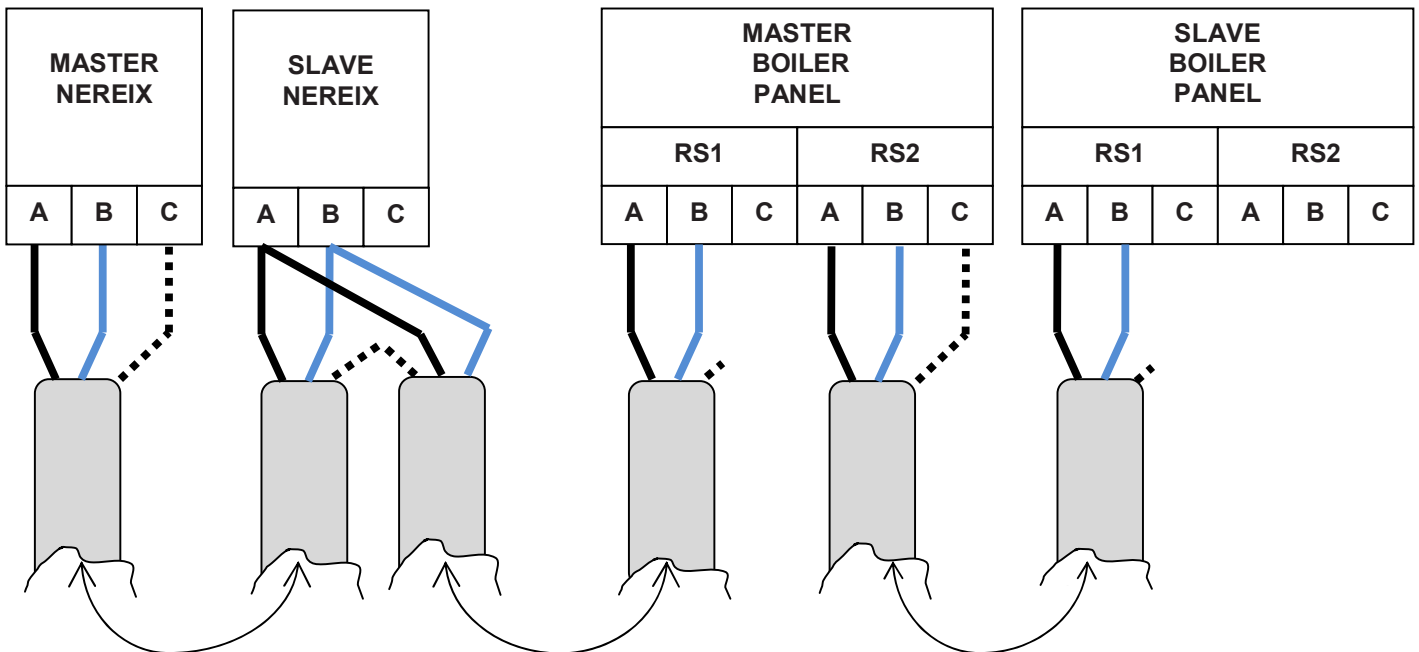
The RS1 C contact (corresponding to terminal 34) is only for support of the cable shield; it is not necessary to connect it to the last slave.



## BUS BETWEEN MASTER NEREIX AND BOILERS IN CASCADE

The RS1 C contact (corresponding to terminal 34) is only for support of the cable shield; it is not necessary to connect it to the last slave.

In wiring the slave panels there must be continuity between the shields.



### 3 DISPLAY

When the board is powered up, the display indicates the following:

Board Type (Device: .....)

Board serial number (M:... 7-digit number is needed for addressing by PC)

Firmware Version (Rev. FW....)

BURNER OUTPUT STATUS		BOILER TEMPERATURE
MODULATION IN RISE		DAYS / HOURS / MINUTES / SECONDS
EXTERNAL SAFETY CONSENT		BOILER SET POINT
MODULATION IN FALL		
OFF / MANUAL / AUTO / FORCING		
		DISPLAY FUNCTION LOWER KEYS

#### BURNER OUTPUT STATUS

STANDBY = No request for heat in progress

READY = set point reached burner off but request still in progress.

POWER ON: Consent to start of the active burner

#### EXTERNAL SAFETY CONSENT:

If the external safeties are closed, and if the auxiliary burners are then turned on, the symbol appears



OFF / MANUAL / AUTOMATIC / FORCING:



OFF: The burner never had the consent to start.



MANUAL: The burner starts by reaching the set temperature manually.



AUTOMATIC: The burner starts by reaching a set point set automatically.

**THE CHANGE BETWEEN ONE STATUS AND THE OTHER IS MADE BY PUSHING THE BUTTON FOR A FEW SECONDS  
A SHORT PRESSURE WILL NOT HAVE ANY EFFECT**

KEY TO ACCESS MENU:

SETTING KEYS FOR MANUAL SET POINT:

BOILER SET POINT:

This can be set manually or decided automatically depending on the configuration of the equipment.

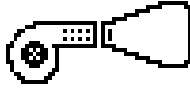
BOILER TEMPERATURE: **48.0°C**

Value measured by PT1 sensor.

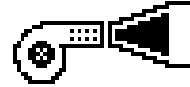


## BURNER STATUS

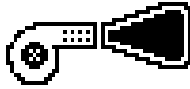
Burner running at minimum power:



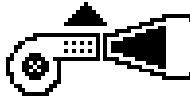
Burner running at medium power:



Burner running at maximum power:



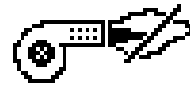
Burner running with increasing power:



Burner running with decreasing power:



Burner stopped:



## 4 MENUS AND PARAMETERS



Pressing the key  displays the available menus

The default configuration allows access to **level 2 (SERVICE)**

- User parameters
- General setup
- Addressing
- Burner parameters
- Operative settings
- Times and temperatures
- Domestic hot water
- Output configuration
- Mixing valve
- Overrides
- Boiler status
- Date / Time / Season
- Time schedules
- Current Alarms
- Historical Alarms
- Quick setup


To prevent access to the configuration parameters you can set **level 1 (USER)**


Below level 1 menus:

- User parameters
- Boiler status
- Date / Time / Season
- Time schedules
- Current Alarms
- Historical Alarms


**To change the level:**


- Enter the menu "Boiler Status"
- Holding the right button simultaneously press both middle buttons
- Left the keys and type the access code
- Type 1 - 2 - 3 - 4 - 2 - 4 for level 1
- Type 4 - 3 - 2 - 1 - 4 - 3 for Level 2

The menus scroll with the arrow keys 

To get into the menus and view the available parameters, press the key 


To return to the previous screen press 

Once the parameters are displayed you can scroll with the arrow keys 

Select the parameter you want to modify and press the key 

This will select the value corresponding to the parameter and it will go into "change" mode.

Use the keys   to change the value.

Once you set the desired value press  to confirm.

At this point, remaining in "change" mode, the value of the next parameter will be shown.

To exit "change" mode, press the key 

**DISPLAY IN AUTOMATIC MODE:**

The set point depends on the active function, if there are multiple active functions, the reading is the highest among those programmed.




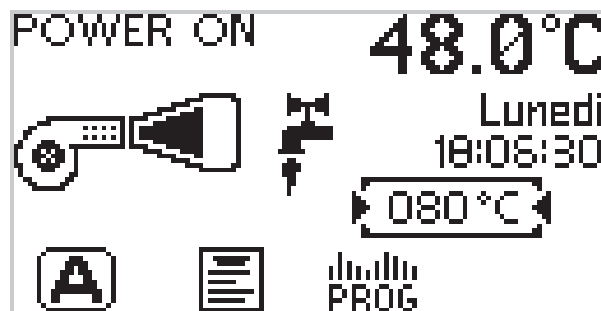
The symbol  shows that a request for the production of domestic hot water is active.



The symbol  shows that a request for the mixing circuit is active.



Pressing the button  you go directly to the menu schedules .



BOILER TEMPERATURE

DAY / HOUR / MINUTES

BOILER SET POINT

## 5 BRIEF LIST OF PARAMETERS AND ABBREVIATIONS

### USER PARAMETERS

- Language
- Fix target 1 temperature
- Fix target 2 temperature
- Program comfort setpoint
- Program reduced setpoint
- Boiler climatic curve
- Comfort room temperature
- Reduced room temperature
- Cylinder set point temperature
- Mix circuit comfort temperature
- Mix circuit reduced temperature
- Mixing circuit climatic curve

The parameters are available depending on configuration

### 01.xx GENERAL CONFIGURATION

01.01		Language
01.01		Location (only by PC)
01.03		Primary bus address
01.04		Secondary bus address
01.05		Boiler mode
01.06		External probe
01.07	<b>CB</b>	Base load
01.08	<b>DCC</b>	Boiler / collector differential
01.09	<b>TIC</b>	Cascade reverse time
01.10	<b>RON</b>	Cascade switch on delay
01.11	<b>ROF</b>	Cascade switch off delay
01.12	<b>ICB</b>	Time increase base load
01.13	<b>DCB</b>	Time decrease base load
01.14	<b>AC</b>	Collector adjustment period
01.15	<b>CAC</b>	Collector adjustment ratio
01.16	<b>AIC</b>	Collector initial adjustment
01.17		Contrast (display)

### ADDRESSING

### 03.xx BURNER PARAMETERS

	<b>TC</b>	Actual boiler temperature
	<b>TSC</b>	Boiler setpoint temperature
03.01		Burner type
03.02	<b>Tmin1</b>	Minimum power on time (operation of the burner)
03.03	<b>D1H</b>	Higher modulation range
03.04	<b>D1L</b>	Lower modulation range
03.05	<b>D2H</b>	Higher hysteresis modulation
03.06	<b>D2L</b>	Lower hysteresis modulation
	<b>DH</b>	= D1H D2H +
	<b>DL</b>	= D1L + D2L
03.07	<b>TST</b>	Stabilisation time
03.08	<b>PCB</b>	PID burner sampling period
03.09	<b>FPB</b>	PID burner proportional factor
03.10	<b>FIB</b>	PID burner integral factor
03.11	<b>FDB</b>	PID burner derivative factor
03.12	<b>CMB</b>	Time going from minimum to maximum burner power
03.13	<b>IMB</b>	Minimum 3pt pulse
03.14	<b>D3</b>	Start differential
03.15	<b>D3</b>	Flue probe
03.16	<b>D3</b>	Maximum flue temperature

#### **04.xx OPERATIVE SETTINGS**

04.01		Fix target 1 consent
04.02	TF1	Fix target 1 temperature
04.03		Fix target 1 program
04.04		Fix target 2 consent
04.05	TF2	Fix target 2 temperature
04.06		Fix target 2 program
04.07		Program function
04.08	TCO	Program comfort setpoint
04.09	TRO	Program reduced setpoint
04.10	CCC	Boiler climatic curve
04.11		Climatic program
04.12		Climatic consent
04.13		0-10 Volt Operation
04.14	TV	10 Volt Temperature
04.15		0-10V Program
04.16		0-10V Consent
04.17		Name input 0-10 Volt (only by PC)
04.18		Unit of measure input 0-10 Volt (only by PC)
04.19		0 Volt input value
04.20		10 Volt input value

#### **05.xx TIMES AND TEMPERATURES**

05.01	TMS	Maximum setpoint temperature (calculated and/ or set)
05.02	TMS	Boiler minimum temperature (calculated and / or set)
05.03	TMC	Boiler maximum temperature
05.04	TAG	Antifreeze temperature
05.05	TMP	Pump minimum temperature
05.06	TPC	Pump post-circulation functions
05.07	TAC	Comfort room temperature
05.08	TAR	Reduced room temperature
05.09		NTC Probe Offset
05.10		PT1 Probe Offset
05.11		PT2 Probe Offset
05.12		PT3 Probe Offset

#### **06.xx DOMESTIC HOT WATER**

06.01		DHW (Domestic Hot Water) request mode
06.02		Cylinder sensor
06.03	TB	Cylinder set point temperature
06.04	TMB	Boiler / Cylinder differential
06.05		Cylinder program
06.06		Domestic Hot Water priority
06.07		Cylinder inertial unload
06.08		Anti-Legionnaire (treatment) day
06.09		Anti-Legionnaire (treatment) start time
06.10		Anti-Legionnaire (treatment) duration
06.11		Anti-Legionnaire (treatment) temperature

#### **07.xx OUTPUTS CONFIGURATION**

07.01		R1 running mode
07.02		System configuration 1
07.02		R2 running mode
07.04		System configuration 2
07.05		R1 Pump anti-lock function
07.06		R2 Pump anti-lock function
07.07		Solar pump differential
07.08		Maximum puffer temperature

## **08.xx MIXING VALVE**

08.01		Type of mixing valve
08.02		Running mode
08.03		Mixing program
08.04		Mixing consent
08.05	<b>PFC</b>	Lowered fixed target
08.06	<b>PFR</b>	Comfort fixed target
08.07	<b>CCV</b>	Mixing climatic curve
08.08	<b>TMSM</b>	Max mixing temperature
08.09	<b>TmSM</b>	Min mixing temperature
08.10		Mixing temperature probe
08.11	<b>PCV</b>	PID sampling time
08.12	<b>FPV</b>	PID Proportional factor
08.13	<b>FI3V</b>	PID Integral factor
08.14	<b>FDV</b>	PID Derivative factor
08.15	<b>CMV</b>	Min to max open time
08.16	<b>IMV</b>	Minimum 3pt pulse
08.17	<b>DCM</b>	Boiler / mixing differential
<b>TSM</b>		Temperature set point mixed area

## **09.xx OVERRIDES**

09.01	T1/T2 Switch
09.02	T6/T7 Switch
09.03	T6/T8 Switch
09.04	R1 Switch
09.05	R2 Switch
09.06	0-10 V
09.07	Forcing enable
09.08	Forcing duration

## **BOILER STATUS**

### **10.xx DATE / TIME/ SEASON**

10.01	Year
10.02	Month
10.03	Day of month
10.04	Weekday
10.05	Hour
10.06	Minutes
10.07	Seconds
10.08	Seasonal configuration (manual/ automatic)
10.09	Current season
10.10	Month beginning of winter
10.11	Day beginning of winter
10.12	Month end of winter
10.13	Day end of winter
10.14	Month beginning of summer
10.15	Day beginning of summer
10.16	Month end of summer
10.17	Day end of summer

### **TIME SCHEDULES**

### **CURRENT ALARMS**

### **HISTORY ALARM**

### **QUICK SETUP**

### **ADVANCED SETTINGS**

## 6 GENERAL CONFIGURATIONS

### **Parameter: 01.01** Language

Unit of measure: /

Adjustment range: Italian / English / Spanish / Russian

Factory value: Italian

Description:

Language setting.

### **Parameter: 01.02** Location

Unit of measure: /

Adjustment range: Alpha numeric value

Factory value: Boiler Management

Description:

It is possible to freely write a reference to the boiler/ system.

### **Parameter: 01.03** Primary bus address

Unit of measure: /

Adjustment range: 1-250

Factory value: 0

Description:

Field cannot be changed, this is the address assigned to the board by any Master Nereix.

### **Parameter: 01.04** Secondary bus Address

Unit of measure: /

Adjustment range: 0-15

Factory value: 0

Description:

This is the address of the board in any cascade.

If the board is single or master of the cascade, the value should be 0

### **Parameter: 01.05** Boiler mode

Unit of measure: /

Adjustment range: Single / Cascade Controller / Slave

Factory value: Single

Description:

If the secondary address is 0, the boiler can be a single or a cascade controller

If the secondary address is not 0, the boiler can be a single or a slave cascade

If the boiler is set as the cascade controller, the boiler set point TSC becomes the set point of the cascade header.

The probe will be automatically associated with a cascade at input PT2.

If the boiler is set as a single TSC, it will refer to PT1.

### **Parameter: 01.06** External probe

Unit of measure: \

Adjustment range: None / NTC / From System (from master of cascade or master Nereix)

Factory value: No

Description:

Any input or reference to the external temperature.

### **Parameter: 01.07** Base Load (CB)

Unit of measure: %

Adjustment range: 0-100 %

Factory value: 30%

Description:

When, in a cascade, a burner reaches this level of power, it goes up to the next one.

Parameter set only for the cascade master.

**Parameter: 01.08 Boiler / collector differential (DCC)**

Unit of measure: °C

Adjustment range: OFF / 0 - 30° C

Factory value: 10° C

Description:

Differential that limits the temperature of the boiler in relation to the set point of the cascade header.

Parameter is set only for the cascade master; the setting also applies to other boilers in the sequence.

**Parameter: 01.09 Cascade reverse time (ICT)**

Unit of measure: Hours

Adjustment range: OFF / 0 - 100 hours

Factory value: 10 hours

Description:

Parameter set only for the cascade master.

The time after which the sequence for turning on the boilers is scaled (the last becomes first, the first becomes the second, the second becomes the third and so on).

The sequence is changed after the time has elapsed and after turning off all the burners; then the first restart appears.

OFF = the sequence of starting the boilers never changes

0 = the sequence of starting the boilers varies with each new restart.

**Parameter: 01.10 Cascade switch on delay (RON)**

Unit of measure: Seconds

Adjustment range: 1 to 600 Seconds

Factory value: 120 Seconds

Description:

Parameter set only for the cascade master. For details, see "CASCADE MANAGEMENT"

**Parameter: 01.11 Cascade switch off delay (ROF)**

Unit of measure: Seconds

Adjustment range: 1 to 600 Seconds

Factory value: 120 Seconds

Description:

Parameter set only for the cascade master. For details, see "CASCADE MANAGEMENT"

**Parameter: 01.12 Time increase in base load (ICB)**

Unit of measure: Seconds

Adjustment range: 1 to 600 Seconds

Factory value: 60 Seconds

Description:

Parameter set only for the cascade master. For details, see "CASCADE MANAGEMENT"

**Parameter: 01.13 Time decrease in base load (DCB)**

Unit of measure: Seconds

Adjustment range: 1 to 600 Seconds

Factory value: 60 Seconds

Description:

Parameter set only for the cascade master. For details, see "CASCADE MANAGEMENT"

**Parameter: 01.14 Collector adjustment period (AC)**

Unit of measure: Minutes

Adjustment range: 1 to 120 Minutes

Factory value: 3 minutes

Description:

Parameter set only for the cascade master. For details, see "CASCADE MANAGEMENT"

**Parameter: 01.15**    **Collector adjustment ratio (CAC)**

Unit of measure: -

Adjustment range: 0.1 – 20.0

Factory value: 0.5

Description:

Parameter set only for the cascade master. For details, see "CASCADE MANAGEMENT"

**Parameter: 01.16**    **Collector initial adjustment (AIC)**

Unit of measure: K

Adjustment range: 0 - DCC K

Factory value: 6 K

Description:

Parameter set only for the cascade master. For details, see "CASCADE MANAGEMENT"

**Parameter: 01.17**    **Display contrast**

Unit of measure: -

Adjustment range: 0 – 16

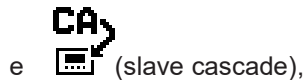
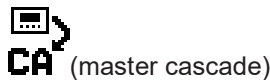
Factory value: 6

Description: Consent to adjust the display contrast (change if visibility is poor)

**CASCADE MANAGEMENT**

When a board is the master of the cascade, the temperature "set point", determined automatically or manually, is no longer the "set point" of the boiler, rather it is the "set point" of the cascade header.

The home screen, at the left of the target temperature, shows the symbols:



If slave boiler can't communicate with master, in order to bus problem or not correct configuration, the display show icon:



At the beginning of the request, the first burner starts with the "set point" corresponding to the header of the cascade plus any "Initial header Adjustment", and modulates to the maximum allowed by the "base load".

After reaching the "Base Load" power, the counter for the time "Cascade Delay On" starts.

After the delay time, which is cleared when the adjustment requires a reduction in power with respect to the base load, the next burner turns on.

When given the command to turn on, the next burner after the burner that is already on goes to minimum power.

By the same logic, all the burners will light up in the sequence.

When all the burners are on, the "base load" of all the burners will be increased or decreased depending on the parameters "Time Increase of Base Load" and "Time Decrease of Base Load."

The power of the lit burners will be between the "Base Load" and non "Base Load" minus 20%.

When all the lit boilers have reached the setpoint minus the power differential, if the target temperature of the cascade header is not reached, the system will increase the set point of all the boilers depending on the "Header Adjustment Time" and the "Header Adjustment Coefficient."

Turning off the burners in sequence takes place as a function of the "Cascade Delay Off" when all the burners are lit at a minimum.

The setpoint of the boiler may not exceed:

- Maximum temperature of the boiler
- Temperature setpoint of the cascade plus "Boiler header Differential".

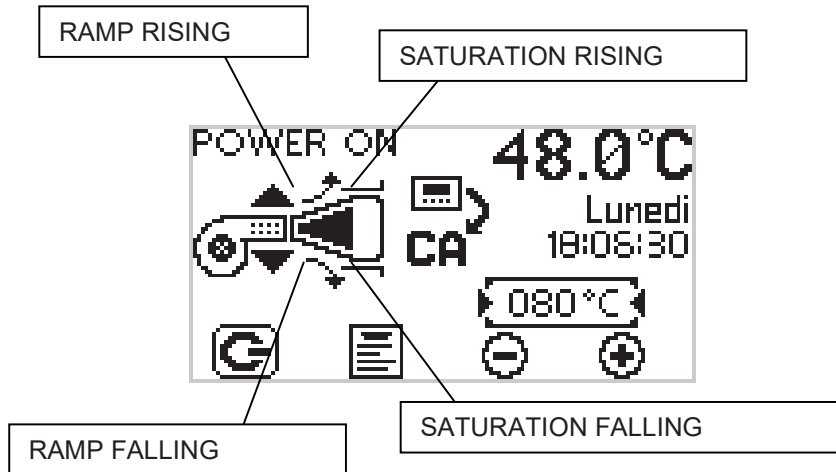
In case a burner shuts down, the same shall be excluded from the cascade until a possible reset.

After resetting the burner, it will be the last in the sequence.



In a cascade the master shows two letters "CA" that blinks every 5 seconds to the left of the temperatures. When the letters "CA" are on, the temperature above is the actual temperature of the cascade header and that at the bottom represents the set point of the header. When the letters "AC" are off, the temperature above is the actual temperature of the boiler and that at the bottom is the setpoint of the boiler. When you press the "+" or "-" to adjust the manual header setpoint, the letters "CA" immediately appear which remain on for 10 seconds after the last key is pressed, to account for the actual temperature and the new manual set point of the header.

**CAUTION: PROLONGED PRESSURE CAUSES A CHANGE IN THE STATUS OF THE EQUIPMENT: MANUAL - AUTO - OFF**



During operation, other symbols may also appear with the following meaning:

**RAMP RISING** = The burner is increasing in power regardless of the PID it will stop at the base load maximum (in case of cascades) or at the absolute maximum.

**RAMP FALLING** = The burner is declining in power regardless of the PID it will stop at the minimum base load (in case of cascades) or at the absolute minimum.


**SATURATION RISING** = The burner has reached the base load (in a cascade) or maximum power if single. If it's a cascade, before the power rises further, the next boilers will start.


**SATURATION FALLING** = The burner has reached the calculated minimum load (in a cascade) or the minimum power if single. If this is a cascade, the burner power will decline further only when the master has recalculated the minimum load.

## 7 ADDRESSING

The menu is active only if the board has a secondary address equal to "0".

Selecting this option will display a list of the boards identified on the bus (if you previously performed a scan or if addressing a PC was performed).

To perform an addressing, configure the other boards connected on the bus with secondary addresses from 1 to 15 (without duplication), enter the addressing menu and press for 5 second .

During the addressing the display show the icon .

The master will search for the boards in a bus and will display a list of those found.

If the boards are set to a cascade device, the burners are placed in sequence after the addressing.

If you find that the burners were not recognized in the sequence, repeat the addressing.

## 8 BURNER PARAMETERS

### **Parameter: 03.01** Burner type

Unit of measure: /

Adjustment range:

Stage / Two-stage / two stage progressive / STAGE / Modulating 3 pt / Modulating 0-10 V

Factory value: Modulating 3 pt

Description: The parameter used to select the type of burner to be controlled.

#### Single stage

The burner is controlled exclusively by contacts T1/T2 T6/T7 the contacts T6/T8 are not active (except if controlling a mixing valve with three point actuator).

The burner starts (make T1/T2) when the temperature is lower than **TSC** minus the differential set **D3**. The boiler temperature **TC** extends to the value **TSC**.

To reach **TSC** the burner stops (open contact T1/T2) provided that the minimum time has passed for the burner operation **Tmin1**. The burner will stop anyway if it reaches the maximum temperature of the boiler **TMC**.

#### Three Point Modulating

The burner is started (closing contact T1/T2) when the temperature of the boiler **TC** (Set point) is less than **TSC** minus the differential set **D3** (*point 4 or start on the left of the graph of Figure 1*).

Upon starting, the contacts T6/T7 are closed and the contacts T6/T8 are open (minimum power).

After the stabilisation period **TST** activates the control system:

If the difference between **TC** and **TSC** is less than **D1L**, the power begins modulating on the basis of a PID system.

If the difference between **TC** and **TSC** is greater than **DL** the burner goes to maximum power in 120 seconds.

When the difference between **TC** and **TSC** falls below **D1L** (*point 1 of the graph in Figure 1*) the power goes to a minimum in 120 seconds and starts PID modulation.

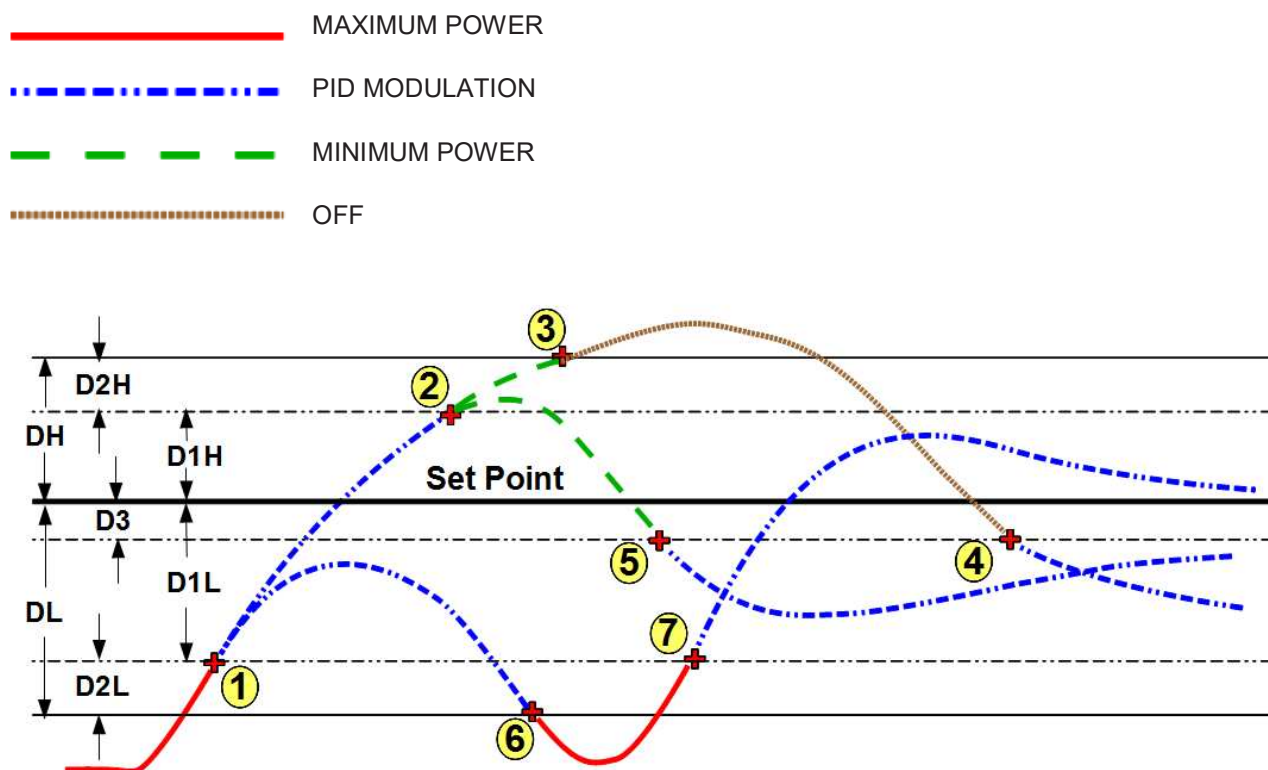
The power will go back to maximum (120 seconds) if the temperature of the boiler **TC** again falls below **TSC** minus **DL** (*point 6 of the graph in Figure 1*).

The PID modulation is thus maintained up to reaching the temperature **TC+D1H** (*point 2 of the graph*), reaching this threshold the burner goes to minimum power and however remains on until the **TC** passes the threshold **TSC + DH** (*point 3 of the graph – shutdown*) or until **TC** is lower than **TSC** minus **D3** (*point 5 of the graph*) when the PID modulation starts again.

The system is optimized for the purpose of keeping the burner on as little as possible while maintaining a constant temperature **TC** at the set point value **TSC**; the burner going off (reaching the temperature **TSC+DH**) takes place provided that the minimum time has passed for the burner operation **Tmin1**.

The burner will stop anyway if it reaches the maximum permissible temperature of the boiler **TMC**.

Figure 1



Modulating 0-10 V

The operation is similar to that of modulating the burner with three points.

The modulation system will not act on the contacts T6-T7-T8, but on the analog output 0-10 Volt.

Two-stage / Two stage progressive / Three stage

If the difference between **TC** and **TSC** is less than **D1L**, the power begins to modulate on the basis of PID system.

If the difference between **TC** and **TSC** is greater than **DL** the burner goes to maximum power (second/ third stage) in 120 seconds.

When the difference between **TC** and **TSC** falls below **D1L** (point 1 of the graph in Figure 1) the power goes to a minimum (first stage) in 120 seconds and starts PID modulation.

The power will go back to the maximum (in 120 seconds) if the temperature of the boiler **TC** again falls below **TSC** minus **DL** (point 6 of the graph in Figure 1).

The PID modulation is thus maintained up to reaching the temperature **TC+D1H** (point 2 of the graph); reaching this threshold the burner goes to minimum power (first stage) and however remains on until the **TC** passes the threshold **TSC + DH** (point 3 of the graph – shutdown) or until **TC** is lower than **TSC** minus **D3** (point 5 of the graph) when the PID modulation starts again.

The PID modulation, used for two-stage/ two-stage progressive / three stage burners, provides that the proportional and integral factors equal zero.

### Operating stages:

- Two-stage burner / Two-stage progressive
  - o First stage for power demand up to 50%
  - o Second stage for power demand by 50% to 100%
  
- For three-stage burners
  - o First stage for power demand up to 33%
  - o Second stage for power demand from 34% to 66%
  - o Third stage for power demand by 67% to 100%

### Status of electrical contacts:

- For two-stage burners
  - o First stage T1-T2 = closed / T6-T7 closed / T6-T8 open
  - o Second stage T1-T2 = closed / T6-T7 closed / T8-T6 closed
  
- For two-stage progressive burners
  - o First stage T1-T2 = closed / T6-T7 closed
  - o Second stage T1-T2 = closed / T6-T7 open / T6-T8 closed
  
- For three-stage burners
  - o First stage T1-T2 = closed / T6-T7 open / T6-T8 open
  - o Second stage T1-T2 = closed / T6-T7 closed / T6-T8 open
  - o Third stage T1-T2 = closed / T6-T7 closed / T8-T6 closed

#### **Parameter: 03.02** Minimum power on time (Tmin1)

Unit of measure: Minutes

Adjustment range: 0-10 minutes

Factory value: 4

Description:

Represents the minimum time of burner working, after turning on, the burner is always on unless it exceeds the maximum temperature of the boiler (TMC)

#### **Parameter: 03.03** Higher range modulation (D1H)

Unit of measure: K

Adjustment range: 20 to 20 °K

Factory value: 5 °K

Description:

Temperature range, above the set point, in which the PID system is active.

(See diagram Figure 1)

Not for single stage burners.

#### **Parameter: 03.04** Lower range modulation (D1L)

Unit of measure: K

Adjustment range: 20 to 20 °K

Factory value: 10 K

Description:

Temperature range, below the set point, where the PID system is active.

(See diagram Figure 1)

Not for single stage burners.

**Parameter: 03:05 Higher hysteresis modulation (D2H)**

Unit of measure: K

Adjustment range: 0 to 10 °K

Factory value: 2 °K

Description:

Temperature range, above **D1H** within which the burner is brought to minimum power (*point 2 of the graph in Figure 1*)

Above this range the burner stops if the minimum time for burner operation has passed **Tmin1** (*point 3 of the graph in Figure 1*)

If the burner is turned off, it will restart when the temperature reaches the value of **TSC** minus **D3** (*point 4 of the graph in Figure 1*)

This parameter is not for single-stage burners.

**Parameter: 03:06 Lower hysteresis modulation (D2L)**

Unit of measure: K

Adjustment range: 0 to 10 °K

Factory value: 2 °K

Description:

Temperature range, below **D1L** that determines the thresholds of passing between maximum power and PID modulation (*Section 1 of the graph in Figure 1*) and vice versa (*Section 6 of the graph in Figure 1*).

Above this field the burner modulates with the PID system.

This parameter is not for single-stage burners.

**Parameter: 3:07 Stabilization time (TST)**

Unit of measure: Seconds

Adjustment range: 0-300 seconds

Factory value: 90 / 2

Description:

Time that starts when the burner starts up during which the power is kept to a minimum.

This parameter is not for single-stage burners.

**Parameter: 03:08 PID Sampling period (PCB)**

Unit of measure: Seconds

Adjustment range: 1-300 seconds

Factory value: 20 / 2

Description:

Time interval which is taken as a reference from the PID system burner.

This parameter is not for single-stage burners.

**Parameter: 03:09 PID Proportional factor (FPB)**

Unit of measure: /

Adjustment range: 0-20

Factory value: 10

Description:

Weight of the proportional factor which is taken as a reference from the PID system burner.

The proportional contribution is used to speed up / slow down the speed of approaching the set point.

Determining the correct speed stabilizes the system because it prevents approaching the set point too fast which can cause subsequent overshooting because of inertia.

The proportional contribution also increases the responsiveness of the control.

This parameter is only suitable for modulating burners (3 points or 0-10 Volt)

**Parameter: 03.10 PID Integral factor (FIB)**

Unit of measure: /

Adjustment range: 0-20

Factory value: 2.5

Description:

Weight of integral factor which is taken as reference by the PID system of the burner.

The integral contribution is required for the precision at steady state. However, if too much weight can cause excessive overshooting before reaching the set temperature.

It can also cause swings around the set point.

This parameter is not for single-stage burners.

**Parameter: 03.11 PID Derivative factor (FDB)**

Unit of measure: /

Adjustment range: 80-120 $\mu$ l

Factory value: /5

Description:

Derivative weight factor which is taken as reference by the PID system of the burner.

The derivative contribution, suitably dimensioned, contributes to the stability (i.e., protection from excessive overshooting), but does not contribute to the accuracy of the system. The derivative component tends to mitigate overly abrupt changes in direction in temperature change due to any excessive action of the integral and proportional components.

It also increases the responsiveness of the control to rapid changes in the boiler load.

This parameter is only suitable for modulating burners (3 points or 0-10 Volt)

**Parameter: 03.12 Min to Max power time (CMB)**

Unit of measure: Seconds

Adjustment range: 0 - 300 seconds

Factory value: 60 / 2

Description:

Insert the time required for the burner used to go from minimum to maximum power.

This parameter is only for modulating 3 point burners.

**Parameter: 03.13 Minimum 3pt pulse (ImB)**

Unit of measure: Seconds

Adjustment range: 0.1 to 3.0 seconds

Factory value: 0.2 seconds

Description:

Minimum duration for the impulse by which the adjustment system of the burner reacts.

This parameter is only for modulating 3 point burners.

**Parameter: 03.14 Differential of starting (D3)**

Unit of measure: K

Adjustment range: 1°C - D1

Factory value: 1°C

Description:

Determines the threshold below which the burner relights (*point 5 of the graph in Figure 1*) or the limit below which the burner goes from minimum power to modulation (*PID point 4 of the graph in Figure 1*).

**Parameter: 03.15 Flue probe**

Unit of measure: -

Adjustment range: OFF - PT2 - PT3

Factory value: OFF

Description: Determines which input is connected to flue probe

**Parameter: 03.16 Maximum flue temperature**

Unit of measure: °C

Adjustment range: OFF – 0-300 °C

Factory value: OFF

Description: Determines the cut-off threshold of the burner according to the flue temperature.

In case of probe failure the burner stops.

## 9 OPERATIVE SETTINGS

### **Parameter: 04.01** Fix target 1 consent

Unit of measure: /

Adjustment range: OFF / NTC / PT2 / PT3

Factory value: OFF

Description:

If an input is selected and this input is electrically closed, the boiler will be brought to the set point temperature **TF1**. Of all the set points active (required) the boiler will take the highest loaded.

### **Parameter: 04.02** Fix target 1 temperature (TF1)

Unit of measure: °C

Adjustment range: 0°C - TMC

Factory value: 0°C

Description:

Set point of outlet set point 1

### **Parameter: 04.03** Fix target 1 program

Unit of measure: /

Adjustment range: OFF / Prog. 1 / Prog. 2 / Prog. 3

Factory value: OFF

Description:

If the value is OFF the set point will be taken into consideration always when the contact is closed.

If a program is set, the set point will be considered if it is in a comfort time.

### **Parameter: 04.04** Fix target 2 consent

Unit of measure: /

Adjustment range: OFF / NTC / PT2 / PT3

Factory value: OFF

Description:

If an input is selected and this input is electrically closed, the boiler will be brought to the set point temperature **TF2**. Of all the set points active (required) the boiler will take the highest loaded.

### **Parameter: 04.05** Fix target 2 temperature (TF2)

Unit of measure: °C

Adjustment range: 0 °C - TMC

Factory value: 0 °C

Description:

Set point of outlet set point 2

### **Parameter: 04.06** Fix target 2 program

Unit of measure: /

Adjustment range: OFF / Prog. 1 / Prog. 2 / Prog. 3

Factory value: OFF

Description:

If the value is OFF the set point will be taken into consideration always when the contact is closed.

If a program is set, the set point will be considered if it is in a comfort time.

### **Parameter: 04.07** Program function

Unit of measure: /

Adjustment range: OFF / Prog. 1 / Prog. 2 / Prog. 3

Factory value: OFF

Description:

If a program is set, the comfort or reduced set points will be considered according to the times set.

**Parameter: 04.08** program comfort setpoint (TCO)

Unit of measure: °C

Adjustment range: 0 °C - TMC

Factory value: 0 °C

Description:

Comfort set point for operating with time schedule.

**Parameter: 04.09** Program lowered setpoint (TRO)

Unit of measure: °C

Adjustment range: 0 °C - TMC

Factory value: 0 °C

Description:

Reduced set point for operating with time schedule.

**Parameter: 04.10** Boiler climatic curve (CCC)

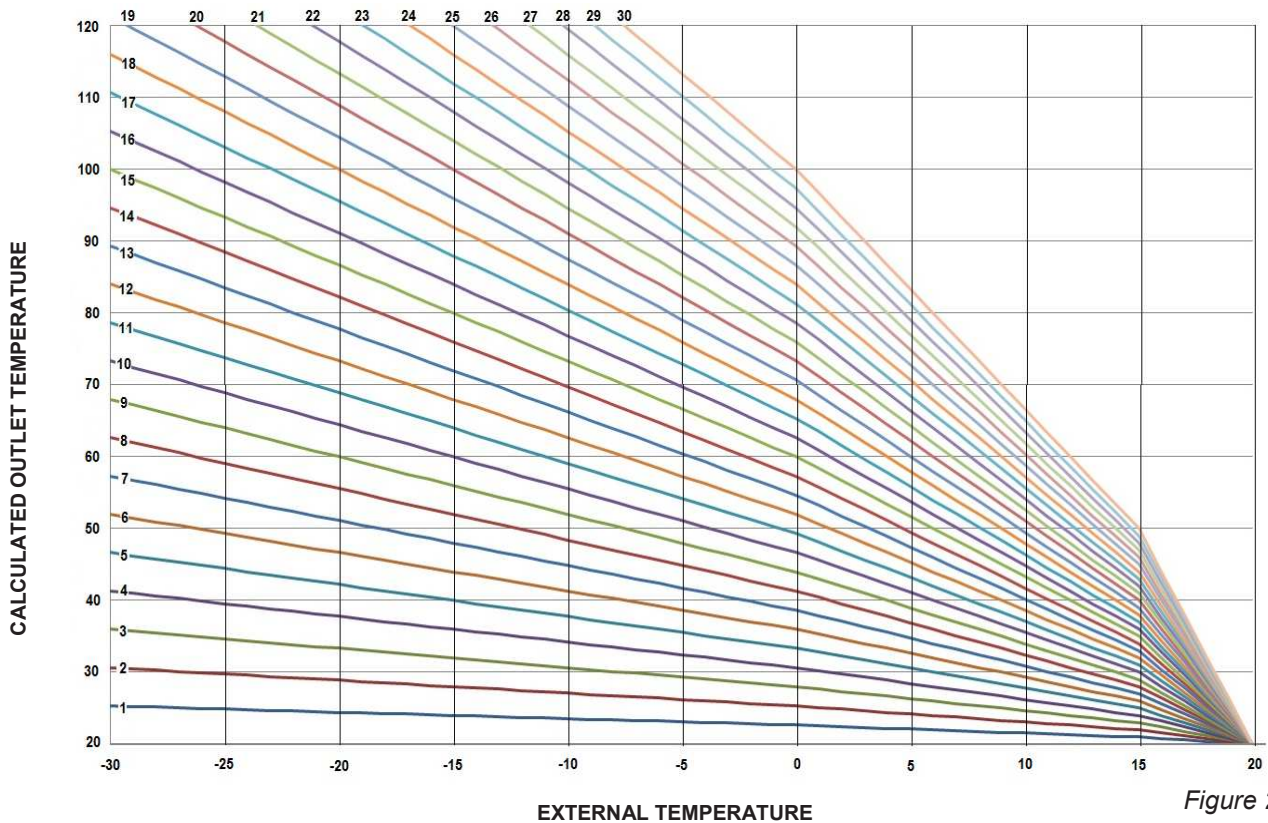
Unit of measure: /

Adjustment range: OFF / 0 to 30

Factory value: OFF

Description:

Setting the curve on the basis of the graph. If OFF the function is not active.



The outlet temperature will be calculated according to the graph above based on the temperature and the selected curve.

The graph is based on a theoretical temperature of 20°C.

If the room temperature theoretically set is different from 20°C the value of the outlet temperature will be different:

- Higher if the room temperature is set to more than 20°C
- Lower for room temperature set lower than 20°C



**Parameter: 04.11 Climatic Program**

Unit of measure: /

Adjustment range: OFF / Prog. 1 / Prog. 2 / Prog. 3

Factory value: OFF

Description:

If the value of this parameter is OFF, the set point curve is considered with the theoretical ambient temperature of comfort.

If a time schedule is set, the theoretical temperature varies between OFF, Comfort and Reduced.

**Parameter: 04.12 Climatic consent**

Unit of measure: /

Adjustment range: OFF / NTC / PT2 / PT3 / 0-10V

Factory value: OFF

Description:

If an input is selected, the climate set point is considered if the contact is closed.

**Parameter: 04.13 0-10 Volt Operation**

Unit of measure: /

Adjustment range: On / Off

Factory value: INACTIVE

Description:

If the function is activated the boiler set point is calculated based on the basis of the analog input signal and the value **TV** (Temperature at 10 Volts)

**Parameter: 04.14 10 Volt Temperature (TV)**

Unit of measure: °C

Adjustment range: 0 °C - TMC

Factory value: 0 °C

Description: Boiler set point value (**TSC**) with a 10 Volt input. The system interprets voltages below 0.5 V as a lack of a request, then the display is placed in STANDBY and any boiler pumps, / cascade associated with the request, turn off (after any post circulation).

**Parameter: 04.15 0-10V Programme**

Unit of measure: /

Adjustment range: OFF / Prog. 1 / Prog. 2 / Prog. 3

Factory value: OFF

Description: If the value of this parameter is OFF, the set point will always be proportional to the input voltage and **TV**. If a time schedule is set, the set point calculated from the analogue signal will be considered only in the Comfort range. If this parameter is active, even for voltages below 0.5 volts, the display is placed in STANDBY / READY depending on the programming, and any boiler pumps/ cascade associated are activated on the basis of the same timing.

**Parameter: 04.16 0-10V Consent**

Unit of measure: /

Adjustment range: OFF / NTC / PT2 / PT3

Factory value: OFF

Description: If an input is selected, the climate set point is considered if the contact is closed. If this parameter is active, even for voltages below 0.5 volts, the display is placed in STANDBY / READY depending on the status of the contact, and any boiler pumps/ cascade associated are activated depending on the status of the contacts.

**Parameter: 04.17 Name input 0-10 Volt**

Unit of measure: /

Adjustment range: Free field

Factory value: 0-10 Volt

Description:

A name can be written for the input.

**Parameter: 04.18** Measurement unit input 0-10 Volt

Unit of measure: /

Adjustment range: Free field

Factory value: Volt

Description:

The unit of measure for the quantity can be written.

**Parameter: 04.19** 0 Volt input value

Unit of measure: /

Adjustment range: -999.0 / +999.0

Factory value: 0

Description:

Value corresponding to 0 Volt input.

**Parameter: 04.20** 10 Volt input value

Unit of measure: /

Adjustment range: -999.0 / +999.0

Factory value: 10.0

Description:

Value corresponding to 10 Volt input.

## 10 TIMES AND TEMPERATURES

**Parameter: 05.01** Max setpoint temperature (TMS)

Unit of measure: °C

Adjustment range: TMS - TMC °C

Factory value: 70 °C

Description:

Maximum temperature manually settable and/ or calculable from the temperature curve and or that can be set as a set point and/ or settable on the basis of input 0-10 Volt.

**Parameter: 05.02** Heater minimum temperature (TMS)

Unit of measure: °C

Adjustment range: 0°C - TMS

Factory value: 0°C

Description:

Minimum temperature manually settable and/ or calculable from the temperature curve and or that can be set as a set point and/ or settable on the basis of input 0-10 Volt.

**Parameter: 05.03** Heater maximum temperature (TMC)

Unit of measure: °C

Adjustment range: TMS - 110°C

Factory value: 80°C

Description:

Maximum allowable temperature.

Above this value, the burner will shut down anyway.

**Parameter: 05.04** Antifreeze temperature (TAG)

Unit of measure: °C

Adjustment range: OFF / 0 - 20 °C

Factory value: 5 °C

Description:

Temperature at which the burner starts with set point of 30°C

When the boiler reaches 30°C the burner shuts down anyway.

The burner starts again when the temperature drops below TAG

**Parameter: 05.05 Pump minimum temperature (TmP)**

Unit of measure: °C

Adjustment range: 0°C - TMS

Factory value: 0°C

Description:

Temperature below which the boiler pump cannot start.

When this is exceeded **TmP** the pump can start, it will stop if the temperature drops below **TmP** minus 2°C.

**Parameter: 05.06 Pump post-circulation functions (TPC)**

Unit of measure: Minutes

Adjustment range: 0 - 20 minutes

Factory value: 5 minutes

Description:

Time for which the operation of the pumps will continue anyhow after the burner is turned off.

**Parameter: 05.07 Comfort room temperature (ACT)**

Unit of measure: °C

Adjustment range: 0 - 30 °C

Factory value: 20°C

Description:

Theoretical ambient temperature during the "comfort" stages.

The target temperature is used to determine the outlet temperature as a function of the temperature curve.

**Parameter: 05.08 Lowered room temperature (TAR)**

Unit of measure: °C

Adjustment range: 0 - 30 °C

Factory value: 16 °C

Description:

Theoretical ambient temperature during the "reduced" stages.

The target temperature is used to determine the outlet temperature as a function of the temperature curve.

**Parameter 05.09 Offset NTC**

**Parameter 05.10 Offset PT1**

**Parameter 05.11 Offset PT2**

**Parameter 05.12 Offset PT3**

Adjustment range: - 10.0 / + 10.0

Factory value: 0

Description: Represents the correction of the probe reading.

## 11 DOMESTIC HOT WATER

### **Parameter: 06.01** Means of requesting DHW

Unit of measure: /

Adjustment range: OFF / Probe / Thermostat

Factory value: OFF

Description:

Enables the heating function of one cylinder.

Probe = it is possible to use a temperature probe NTC / PT on the basis of the available input

= Thermostat, a thermostat (dry contact) can be used connected to an available digital input

Activating the DHW function uses the programmable output R2 for the cylinder pump consent.

### **Parameter: 06.02** cylinder sensor

Unit of measure: /

Adjustment range: NTC / PT2 / PT3

Factory value: PT2

Description:

Having activated the DHW mode parameter 05.01, the physical input used by the sensor or the thermostat is selected.

### **Parameter: 06.03** cylinder set point (TB)

Unit of measure: °C

Adjustment range: 0 - 110 °C

Factory value: 60°C

Description:

Setting the cylinder temperature, the parameter is active only if there is a temperature sensor on the boiler (no thermostat).

### **Parameter: 06.04** Boiler / Cylinder differential in DHW (TMB)

Unit of measure: K

Adjustment range: 0 °K - TMS

Factory value: 15 °C

Description:

Set the differential from boiler outlet temperature and cylinder setpoint.

### **Parameter: 06.05** Cylinder program

Unit of measure: /

Adjustment range: OFF / Prog. 1 / Prog. 2 / Prog. 3

Factory value: OFF

Description:

The heating of the cylinder is always active if it is set OFF, if you choose a schedule, the heating period depends on the time schedule set.

### **Parameter: 06.06** DHW priority

Unit of measure: \

Adjustment range: None / Absolute / Automatic

Factory value: No

Description:

None: parallel operation of heating and DHW

Absolute: when the heating cylinder starts, any pump of the system shuts down

Automatic: the heating operation works even after the start of the requested DHW; if the cylinder temperature does not rise at least 1°K every 2 minutes, the heating goes off until it reaches the set point in the cylinder. The automatic function is not possible if there is a thermostat (dry contact).

If the heating system is controlled by the output for the mixing valve, the DHW priority will not stop the pump set at "System - Climate valve mix", but it will make the mixing valve close.

**Parameter: 06.07** Cylinder inertial unload

Unit of measure: \

Adjustment range: YES / NO

Factory value: YES

Description:

If the boiler temperature **TC** exceeds the maximum allowed temperature **TMC** (despite the burner shutting down) it activates the loading pump of the cylinder.

The loading pump of the cylinder stops when the boiler temperature records 5°C under the threshold **TMC**.

To facilitate the discharge of the thermal inertia, turn on also output set as boiler pump.

In a boiler cascade, in the case of overheating of a boiler, turn on all boiler pumps, cascade pump and cylinder pump.

**Parameter: 06.08** Anti-Legionnaire day

Unit of measure: \

Adjustment range: OFF / Monday / Tuesday / Wednesday / Thursday / Friday / Saturday / Sunday / Daily

Factory value: OFF

Description:

Starting day of the germ removal function

**Parameter: 06.09** Anti-Legionnaire start time

Unit of measure: \

Adjustment range: 0:00 to 23:30 (30 minutes resolution)

Factory value: 0:00

Description: Starting time the germ-removal function

**Parameter 06:10:** Anti-Legionnaire duration

Measurement Units: Hours

Adjustment range: 0-12 hours (30 minutes resolution)

Factory value: 3 hours

Description:

Duration in hours of germ-removal function

**Parameter: 06.11** Anti-Legionnaire temperature

Unit of measure: °C

Adjustment range: 0 °C - TMC

Factory value: 65

Description:

Temperature of germ-removal function.

## 12 OUTPUTS CONFIGURATION

**Parameter: 07.01** R1 running mode

Unit of measure: /

Adjustment range: OFF / Boiler pump / System pump / Cascade pump / Alarm

Factory value: Boiler pump

Description:

Boiler pump

If the minimum temperature programmed for the pump is reached (**TmP**), the output is active in parallel to the operation of the burner.

After turning off the burner, the output remains active for the time of post circulation (**TPC**).

In a cascade one of the boiler pumps is always on when there is a request:

During the request - when Ready appears on the display - the boiler pump goes on which corresponds to the burner that must start when the header temperature is lower than the set point.

System pump

If the minimum pump temperature programmed (**TmP**) is reached, the output is activated in parallel to the request for operating a heating system for whose configuration parameter 06.02 is made available.

After the end of the request and the shutdown of the burner, the output remains active for the time of post circulation (**TPC**).

#### Cascade pump

The function is programmable when the boiler is set as master.

The output is active in parallel to any request in progress.

After the end of the request and the shutdown of the burner, the output remains active for the time of post circulation (TPC).

#### Alarm

If you set this parameter, the contact will close if there is an alarm condition ..

#### **Parameter: 07.02** System configuration 1

Unit of measure: /

Adjustment range:

Fixed target 1 / 2, daily program 1 / 2 / 3 /, climatic heater / climatic mixer

Factory value: climatic heater

Description:

A parameter that enables the choice of the operating strategy of the heating systems associated with output R1 set to "System pump".

#### **Parameter: 07.03** R2 running mode

Unit of measure: /

Adjustment range: OFF / Pump cylinder / Pump system / Cascade pump / Solar pump / Alarm

Factory value: OFF

Description:

#### Cylinder pump

The parameter is automatically set at this value and cannot be modified if the DHW function is enabled (see parameter 05.01).

The output is active in parallel to the request of cylinder heating according to the logic that can be set in the parameters 05.xx.

After the end of the request and the shutdown of the burner, the output remains active for the time of post circulation (TPC).

#### System pump

If the minimum pump temperature programmed (TMP) is reached, the output is active in parallel to the request for operating a heating system for whose configuration parameter 06.04 is made available.

After the end of the request and the shutdown of the burner, the output remains active for the time of post circulation (TPC).

#### Cascade pump

The function is programmable when the boiler is set as master.

The output is active in parallel to any request in progress.

After the end of the request and the shutdown of the burner, the output remains active for the time of post circulation (TPC).

#### Solar pump

The output activates the pump if the temperature read by the probe PT3 (Solar Probe) is greater than that of PT2 (lower puffer probe) + the "solar pump differential" see parameter **07.07**

The pump isn't enable if the temperature read by PT2 exceeds the limit set for the parameter **07.08**

#### Alarm

If you set this parameter, the contact will close if there is an alarm condition ..

#### **Parameter: 07.04** System configuration 2

Unit of measure: /

Adjustment range:

Fixed target 1 / 2, daily program 1 / 2 / 3 /, climatic heater / climatic mixer

Factory value: climatic heater

Description:

A parameter that enables the choice of the operating strategy of the heating systems associated with output R1 set as "System pump".

**Parameter: 07.05**    **Anti-lock pumps R1**

Unit of measure: /

Adjustment range: ON / OFF

Factory value: OFF

Description:

The output is activated for 10 seconds after 24 hours of inactivity.

The time counter is stopped in a case of power failure.

When given power the output is activated for 10 seconds.

**Parameter: 07.06**    **Anti-lock pump R2**

Unit of measure: /

Adjustment range: ON / OFF

Factory value: OFF

Description:

The output is activated for 10 seconds after 24 hours of inactivity.

The time counter is stopped in a case of power failure.

When given power the output is activated for 10 seconds.

**Parameter: 07.07**    **Solar pump differential**

Unit of measure: °C

Adjustment range: 0 - 110 °C

Factory value: 5 °C

Description:

Minimum differential for activation of the solar pump. If the differential between PT3 (Solar panel sensor) and PT2 (lower puffer probe) falls below this value, the pump stops, it restarts if the differential + 2° C is reached again.

**Parameter: 07.08**    **Maximum puffer temperature**

Unit of measure: °C

Adjustment range: 0 - 110 °C

Factory value: 80 °C

Description:

Temperature value above which the solar pump is still disabled.

**INERTIAL UNLOAD IN SINGLE BOILER**

When the boiler temperature exceeds the maximum set, even if the burner is turned off, in order to facilitate the discharge of the thermal inertia, turn on output set as boiler pump.

**INERTIAL UNLOAD IN BOILER CASCADE)**

When in one of the boiler temperature exceeds the maximum set, even if the burner is turned off, in order to facilitate the discharge of the thermal inertia, turn on all the boiler pump and the cascade pump.

## 13 MIXING VALVE

### **Parameter: 08.01** Mixing valve type

Unit of measure: \

Adjustment range: OFF / 0-10 Volt / 3 points

Factory value: OFF

Description:

Type of valve actuator, the valve actuator with three points is only possible if using a single-stage or modulating burner 0-10 Volt.

The valve 0-10 Volt is not possible when using a burner with a modulating 0-10 V input.

### **Parameter: 08.02** Running mode

Unit of measure: \

Adjustment range: Fixed target / climatic

Factory setting: set point

Description:

Type of setting of the temperature set point.

### **Parameter: 08.03** Mixing program

Unit of measure: /

Adjustment range: OFF / Prog. 1 / Prog. 2 / Prog. 3

Factory value: OFF

Description:

If the value of this parameter is OFF, the set point of mixing remains set at comfort (climate or at set point). If timer schedule is set, the set point will vary according to it.

### **Parameter: 08.04** Mixing consent

Unit of measure: /

Adjustment range: OFF / NTC / PT2 / PT3 / 0-10V

Factory value: OFF

Description:

If an input is selected, the climate set point is considered if the contact is closed.

### **Parameter: 08.05** Lowered fixed target (PFC)

Unit of measure: °C

Adjustment range: 0 °C - TMC

Factory value: 0

Description:

Temperature of lowered set point at a set point

### **Parameter: 08.06** Comfort fixed target (PFR)

Unit of measure: °C

Adjustment range: 0°C - TMC

Factory value: 0

Description:

Temperature of comfort set point at a set point if using a time schedule

### **Parameter: 08.07** Climate curve Valve (CCV)

Unit of measure: /

Adjustment range: 0 - 20

Factory value: 0

Description:

Setting the curve based on the graph in Figure 2 (section TYPE OF OPERATION)

### **Parameter: 08.08** Max mixing temperature (TMSM)

Unit of measure: °C

Adjustment range: TmSM - TMC °C

Factory value: 80 °C

Description:

Maximum temperature manually settable and/ or calculable from the temperature curve and/ or that can be set as a set point and/ or settable on the basis of input 0-10 Volt.



**Parameter: 08.09 Min mixing temperature (TmSM)**

Unit of measure: °C

Adjustment range: 0 °C - TMSM

Factory value: 0 °C

Description:

Minimum temperature manually settable and/ or calculable from the temperature curve and/ or that can be set as a set point and/ or settable on the basis of input 0-10 Volt.

**Parameter: 08.10 Mixing temperature probe**

Unit of measure: /

Adjustment range: NTC / PT2 / PT3

Factory value: PT3

Description:

Parameter to set the physical input of the temperature probe of the mixing zone.

**Parameter: 08.11 PID sampling time (PCV)**

Unit of measure: Seconds

Adjustment range: 1-300 seconds

Factory: xxx seconds

Description:

Interval of time which is taken as reference by the system PID from the mixing valve.

**Parameter: 08.12 PID Proportional factor(FPV)**

Unit of measure: /

Adjustment range: 0-20

Factory value: 10

Description:

Weight of the proportional factor which is taken as reference by the system PID of the mixing valve.

**Parameter: 08.13 PID Integral factor (IVF)**

Unit of measure: /

Adjustment range: 0-20

Factory value: 2.5

Description:

Weight of integral factor which is taken as reference by the system PID of the mixing valve.

**Parameter: 08.14 PID Derivative Factor (FDV)**

Unit of measure: /

Adjustment range: 0-20

Factory value: 5

Description:

Weight of derivative factor which is taken as reference by the system PID of the mixing valve.

**Parameter: 08.15 Min to max open time (CMV)**

Unit of measure: Seconds

Adjustment range: 0 - 300 seconds

Factory value: 60 / 2

Description:

Insert the time required for the valve to go from minimum to maximum opening.

**Parameter: 08.16 Minimum 3pt pulse (IMV)**

Unit of measure: Seconds

Adjustment range: 0.1 to 3.0 seconds

Factory value: 0.5 seconds

Description:

Minimum duration of impulse that is given to modulate the mixing valve

Parameter only suitable for mixing valve with 3 points

**Parameter: 08.17** Boiler / mixing differential (DCM)

Unit of measure: °C

Adjustment range: 0 - 30°C

Factory value: 10°C

Description:

When there is a request from the "mixing area" circuit, the set point **TSC** is calculated by adding this value to the mixing area temperature set point (**TSM**).

**TSC** may not exceed **TMS** (Maximum temperature of the boiler set point).

## 14 OVERRIDES

Entering the overrides parameter displays all the available outputs it is possible to set the desired status of each output and start the general forcing of the parameters selected.

Forcing blocks exiting from the menu unless you insert an additional duration, which begins the countdown to exit the menu.

Each time you enter the forcing menu the default parameters appear.

**Parameter: 09.01** T1/T2 Switch

Unit of measure: -

Adjustment range: ON / OFF / None

Factory value: None

Description: The forcing is activated by selecting YES to the parameter **09.07**.

**Parameter: 09.02** T6/T7 Switch

Unit of measure: -

Adjustment range: ON / OFF / None

Factory value: None

Description: The forcing is activated by selecting YES to the parameter **09.07**.

**Parameter: 09.03** T6/T8 Switch

Unit of measure: -

Adjustment range: ON / OFF / None

Factory value: None

Description: The forcing is activated by selecting YES to the parameter **09.07**.

**Parameter: 09.04** R1 Switch

Unit of measure: -

Adjustment range: ON / OFF / None

Factory value: None

Description: The forcing is activated by selecting YES to the parameter **09.07**.

**Parameter: 09.05** R2 Switch

Unit of measure: -

Adjustment range: ON / OFF / None

Factory value: None

Description: The forcing is activated by selecting YES to the parameter **09.07**.

**Parameter: 09.06** 0-10 V

Unit of measure: -

Adjustment range: 0-100% / None

Factory value: None

Description: The forcing is activated by selecting YES to the parameter **09.07**.

**Parameter: 09.07 Overrides enable**

Unit of measure: -

Adjustment range: YES / NO

Factory value: None

Description: Selecting YES will enable all the forcing selected. Leaving the forcing menu, forcing ceases unless it is set at a time out in parameter **09.07**

**Parameter: 09.08 Overrides Duration**

Unit of measure: Seconds

Adjustment range: 0-300 Seconds

Factory value: 0 Seconds

Description: Selecting a number other than zero, the forcing remains in effect for the selected time.

## 15 BOILER STATUS

### Screen "inputs"

<b>Parameter</b>	<b>Value</b>
PT1 probe	Temperature °C / OPEN-CLOSED
PT2 probe	Temperature °C / OPEN-CLOSED
PT3 probe	Temperature °C / OPEN-CLOSED
NTC probe	Temperature °C / OPEN-CLOSED
External temperature	External temperature °C - may coincide with or be taken from NTC system
Input 0-10 V	% / OPEN-CLOSED

### Screen "Input 0-10 Volt"

<b>Parameter</b>	<b>Value</b>
Input Labels	Labels set by PC
Measurement Units	Measurement Units set by PC
Value	xx.x
Value at 0 Volt	xx.x
Value at 10 Volt	xx.x

### Screen "output state"

<b>Parameter</b>	<b>Value</b>
R1 Output	ON-OFF
R2 Output	ON-OFF
Out 0-10 V	Volts
Out T6-T7	ON-OFF
Out T6-T8	ON-OFF

### Screen "domestic hot water"

<b>Parameter</b>	<b>Value</b>
Requested by cylinder	ON / OFF
Cylinder pump	ON / OFF
Temperature set point	xx.x °C
Cylinder temperature	xx.x °C

### Screen "mixed system"

<b>Parameter</b>	<b>Value</b>
System request	ON / OFF
System pump	ON / OFF
Set point temperature	xx.x °C
Actual temperature	xx.x °C
Mixing valve open	0-100%

### Screen "Counters"

<b>Parameter</b>	<b>Value</b>
Nr. burner start	xxxxx
Time ON burner	xxxxx hh
Time ON R1	xxxxx hh
Time ON R2	xxxxx hh

To reset the counters hold the "X" and press the center button (arrow).

## 16 DATE / TIME / SEASON

Local settings (changeable if not taken from the system - or from a master):


- 10.01 Year
- 10.02 Month
- 10.03 Day of month
- 10.04 Day of the week – given as read-only which depends on the date set
- 10.05 Hour
- 10.06 Minutes
- 10.07 Seconds
- 10.08 Configuring season (manual/ automatic)
- 10.09 Current season (summer / winter / intermediate) – given as read-only if the season is automatic
- 10.10 Month beginning of winter
- 10.11 Day beginning of winter
- 10.12 Month end of winter
- 10.13 Day end of winter
- 10.14 Month beginning of summer
- 10.15 Day beginning of summer
- 10.16 Month end of summer
- 10.17 Day end of summer

In the Summer and Intermediate modes, the request is not allowed on the basis of a time schedule and climate (heating and mixing valve operation in climate)


In Winter mode all requests are allowed.

## 17 TIME SCHEDULES

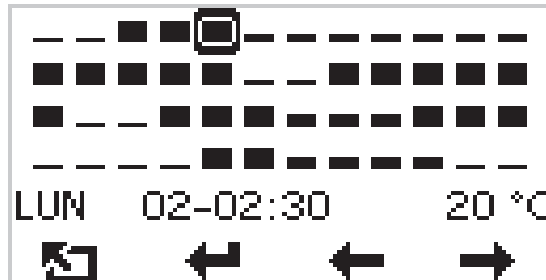
Menu displays the three schedules and shows the functions associated for each schedule

Select the program to view or edit using the arrow keys and press .

Entering each schedule displays the day of the week and the letters ESC.

With the arrow select the day or ESC and pressing  you enter the selected day or to return to the previous screen (if selecting ESC)

Once in the day to be programmed, you see 48 time slots (one for every 30 minutes).






The line  represents OFF;

the half square  represents "Reduced";

the solid square  represents "Comfort".

To change the function in a given selected time slot use the arrow keys.





Then press  which will then become .

Pressing the button several times  it cycles through the settings OFF, Reduced and Comfort.

Pressing an arrow key when the button is active , it copies the setting selected in the next or previous range.

To exit the function where changes are made, press . Press the same button again to return to the choice for the day.

The programming can be copied from one day to another:

- Choose the day from which to copy the settings and press . A balloon will show the day chosen to duplicate the settings.
- Choose the day to which to copy the settings and press .
- Instead of the  symbol, the symbol  will appear briefly to confirm the copy.
- Choose another day to which to copy the day that was shown in the balloon.

Select and press ESC several times  to return to the main screen.

## 18 ACTIVE ALARMS

Choosing the ALARMS menu displays the alarms currently active.

The possible alarms are:

Probes shorted or open (if the inputs are not provided as digital inputs)

Burner locked.

Lack of phase in safety input.

Temperature thresholds (programmed via PC)

Analog input thresholds value 0-10 Volt (programmed via PC)

Failure to communicate with the master of the cascade.

## 19 ALARMS HISTORY

Choosing this menu displays the alarms that are no longer active.

Alarms can be erased from memory by pressing the RESET button for 3 seconds

## 20 QUICK SET-UP

You can set all the parameters to the factory settings or choose from one of the standard configurations provided.

Select the configuration chosen and press the ENTER key for 5 seconds.

The system restarts configured as chosen.

Choosing the "General" set up loads the defaults in this technical manual.

The other configurations are published separately in the specific product manuals:

*Example "3PT MASTER BURNER ", "SLAVE1 3PT BURNER", etc.*

QUICK SET UP does not change the primary address bus or language.

The secondary address is changed to "0" if the configuration is for a master boiler or at "1" if it is a slave.

The time schedules are cleared.

**ATTENTION QUICK SET UPS IN THIS SYSTEM DEPEND ON THE FIRMWARE LOADED  
WHICH MAY BE UPDATED WITH SPECIFIC APPLICATIONS**

**FOR THE PURPOSE OF IMPROVING THE PRODUCT ICI CALDAIE SPA RESERVES THE RIGHT TO MAKE  
CHANGES TO THE SOFTWARE AND FIRMWARE AND IMPLEMENTATIONS THAT IT CONSIDERS  
APPROPRIATE**



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