TATAREK®
Zakład elektroniczny TATAREK Jerzy Tatarek

USER MANUAL
v.3.5 (02.02.2015 program version from 3.5)

FIREPLACE OS/COMBUSTION OPTIMIZER

RT-08os TITANIUM

1.Basic technical parameters

Power	230V/50Hz
Auxiliary power source	Rechargeable battery 4,8V/60mA
Power consumption without load	5W
Maximum connection power	250W
Operation conditions	0-40°C, humidity 10-90%
	(no condensation)
Housing protection class	IP41
Fuse	6,3A/250V
Number of outputs to control the flap drive	1 * 250W/230V/50Hz
Number of nonvoltage control outputs	1 * NO and NC contacts
Number of outputs to control the choke valve drive	1 * 5V/500mA/DC
Number of temperature sensors	1 * Thermocouple type K(0...+1300°C)
Temp. measurement precision	5°C
Temp. measurement resolution	1°C

2. Principle of operation

With the air choke valve the regulator controls the combustion process and maintains the embers phase.

By lowering the combustion curve in the phase of increasing temperature and by raising it in the phase of decreasing temperature the regulator extends the combustion process.

The ragulator starts operating as the furnace door closes (opening sensor of the door), supervises the combustion process (temperature sensor of combustion, air choke valve), shuts off air supply as there's the embers phase in the furnace. Additionally the regulator can increase the chimney draught in the heating phase(flap drive of the by-pass of the heat accumulation module).

In emergency situations (power decrease as well) the choke valve opens, enabling a full burn-out of the fuel. The special input for connecting any external control device of CO concentration increases the safety of a fireplace user.

The regulator is equipped with its own emergency power supply. The pause in power supply up to 8secs doesn't affect regulator operation because during that time the buffer power supply switches on. If the pause is longer the choke valve opens up in emergency and then the regulator switches off.

Advantages of the combustion optimizer:
-lowering the maximum combustion temperature
-extending the combustion process
-decreasing fuel consumption
-extending the exploitation time of fireplace inputs
-shutting off air supply after ending the combustion (preventing the furnace cool-off)
-optimal use of the heat accumulation module
-cooperation with CO sensors (opening up the fresh airing in emergency)

The regulator can control a fireplace without the opening sensor of the door. In that case the buttons on the front panel are used.

Fig.1 Basic operation scheme of the regulator

T1   Temperature sensor of the combustion
D1   Opening sensor of the furnace door (option)
PP   Controlled air choke valve

Admission date	Realization date	Signature	Remarks

CE CONFORMITY DECLARATION
Ref. No. 58.RT.01.2007/1/B

We, **ZAKŁAD ELEKTRONICZNY TATAREK Jerzy Tatarek**
75 Swieradowska St. , 50-559 Wroclaw

declare under our sole responsibility that
the product: **Regulator of heating system with solar collector**

model: **RT-08, RT-08K, RT-08P, RT-08os**

is in conformity with the basic requirements included in Directive EMC 2004/108/WE of 15.12.2004 (the electromagnetic compatibility law of 13.04.07) and Directive LVD 2006/95/WE of 21.08.07 (Laws Journal of 2007 No. 155 pos. 1098) regarding the requirements for electric devices.

To the conformity evaluation the following harmonized standards were used:

PN-EN 60730-2-1: 2002 - Automatic electric regulators for house usage and the like. Part 2-1: Specific requirements regarding electric regulators for electric house devices

PN-EN 60730-1: 2002 - Automatic electric regulators for house usage and the like. Part 1: General requirements.

PN-EN 55022: 2000 - Electromagnetic compatibility (EMC)- IT devices Characteristics of radioelectric noises. Acceptable levels and measurement methods

Complementary information:
Laboratory IASE 51-618 Wroclaw, 1 Wystawowa st.

Test report No. **39/DL/I/07 of 22.06.2007**
41/DL/I/07 of 03.07.2007

Electronic Engineering Plant TATAREK
has initiated management system and complies with the following standard :
ISO9001: 2000 CERTIFICATE No. 133/2004 of 01.2004
Polish Foreign Trade Chamber

The last two digits of the year in which the CE marking was affixed: 07
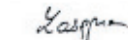
Place of issue: Manufacturer representative:

Wroclaw Mirosław Zasępa

Date of issue: Position:

08.2007 Konstruktor

2.1 Operation phases of the regulator
The regulator controls the combustion process as a cycle of the following phases:
1. F0/STOP - Standby phase. The regulator awaits opening the door and preparing the fuel for the next heating. F0 is a temporary state to STOP. In the STOP state the choke valve is closed.
2. F1 - Start phase. After loading the fuel and its lighting you close the furnace door. It's a signal for the regulator that the combustion cycle has begun. The choke valve is fully open.
3. F2 - Heating-up phase. After reaching the limit temperature the pass to the phase F3 follows.
4. F3, F4 - Phase of increasing temperature. The choke valve is gradually closed.
5. F5 - Burning phase. Awaiting the maximum temperature of the process
6. F6 - Phase of decreasing temperature. The choke valve is again gradually closed
7. F7 - Embers phase. Signalling the demand for replenishing the fuel
8. F8 - Phase of removing the exhaust gases. The choke valve first opens up and then closes and there's the pass to the standby phase.

2.2 Air choke valve
The choke valve regulates air inflow to the combustion chamber dependent on the phase.
During the flap move of the choke valve the diode (9) lights. The blinking means a temporary overload of the drive affected by met resistances.

2.3 Restricting the maximum temperature of the combustion
Exceeding the temperature defined by the parameter "T.max" causes closing the air choke valve within the range of 10%...50% (Parameter "ChokeVTH") and the alarm turns on. The closing process begins with 50°C before reaching this limit. Cancelling the alarm and the return to the standard operation of the air choke valve occur if the temperature falls to T.max - 50°C.

2.4 Programs-Variants of the operation of the regulator
The basic function of the regulator is to optimize the combustion process by controlling the air choke valve. The regulator can control a distribution of produced heat in the following variants (Fig.3 presents the right operation diagrams):

Program 1 "MAC"
1. During the normal operation heated exhaust gases pass through the heat accumulation module (MAC), where they give back heat, cooling off.
During the heating-up when the fireplace is cold , its draught can be insufficient. The regulator sets the flap "K1"in the position of bypassing the MAC and directs the exhaust gases into the chimney. After reaching the preset temperature (chimney is heated up) tha flap position is changed and the exhaust gases are directed into the MAC
2. To the regulator you can connect an external control device of CO concentration. In emergency the choke valve opens up improving a room ventilation, additionally the alarm switches on.
3. The regulator turns on the output ALARM in case of damage of the temperature sensor of the furnace (T1) or exceeding the limit concentration of CO2.

Program 2 "WATER"
1. The fireplace is equipped with the water attachment. If water temperature in the attachment reaches the preset value (sensor T2) and is higher than the buffer temperature (T3) then the pump "P1" , which loads the buffer, switches on.
2. The controlled flap "K1" directs warm exhaust gases into the water attachment when there's a demand for warm water.

PROGRAM 3 „MIX"

1. The fireplace is equipped with the water attachment. If water temperature in the attachment reaches the preset value (sensor T2) then the pump "P1", which receives heat (it loads the buffer), switches on.
2. To the regulator you can connect an external control device of CO concentration. In emergency the choke valve opens up improving a room ventilation, additionally the alarm switches on.
3. The regulator turns on the output ALARM in case of damage of the temperature sensor of the furnace (T1) or exceeding the limit concentration of CO_2.

! CHOICE OF THE PROGRAM AND ITS SETTINGS ARE AVAILABLE IN THE PARAMETERS OF LEVEL 3

3 Service of the regulator

There are elements on the control panel (Fig. 2). In the standby state only the green diode (7) lights indicating the standby mode. The turn-on of the regulator follows after opening the furnace door. After closing the door the combustion cycle starts, which is signaled by the green diode (8).
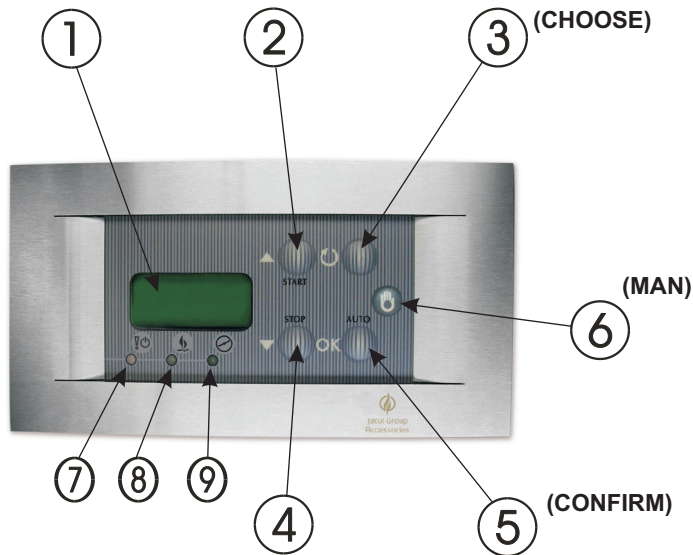
Fig.2 Control panel view

1. Text display
2. Increase button "+" (or START)
3. Choice button of parameter
4. Decrease button „-" (or STOP)
5. Confirm button (or AUTO)
6. Manual operation button "MAN"
7. Status LED-diode of the regulator: emergency(red), standby (green)
8. LED-diode of combustion cycle (the green one)
9. LED-diode of choke valve operation (blinking means the overload of the drive)

RT08os

Combustion curve with the marked parameters of the control
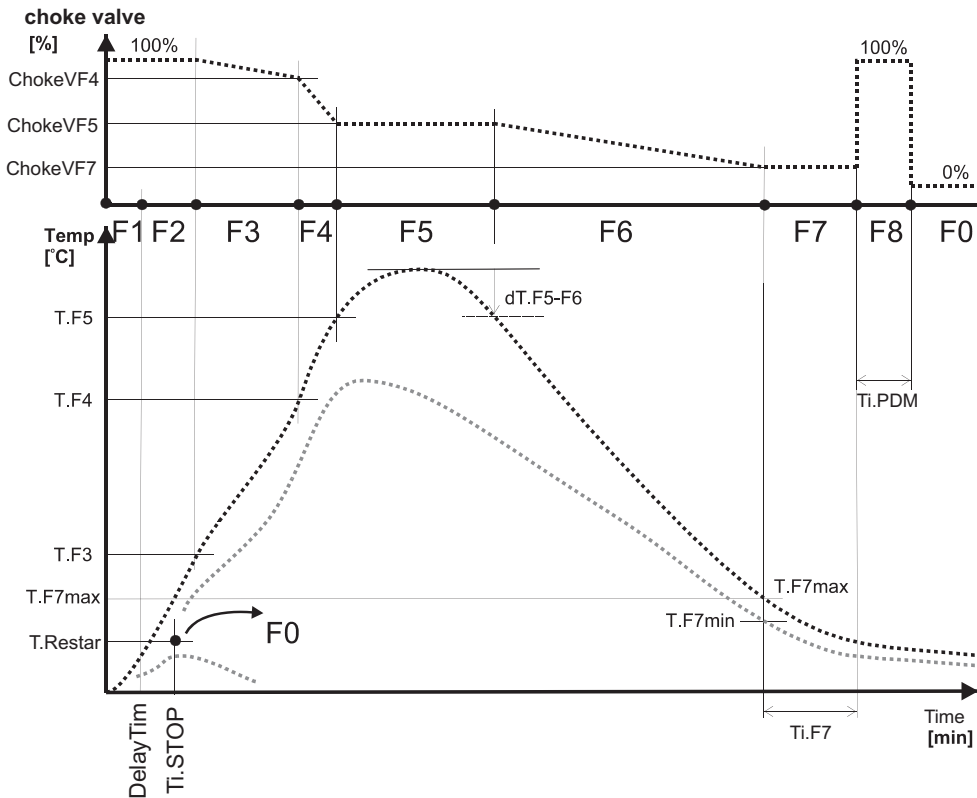
The operation state is presented on the text display (1). The screens inform about the operation of devices, temperature of the furnace; they make it possible to change the parameters etc..The change of screen is done by pressing the CHOOSE button (3). If this is a screen that is able to change a parameter, press the CONFIRM button(5), which causes blinking of the parameter field to be changed. By pressing "+" (2) or "-" (4) one can alter its value.

By clicking the CONFIRM button (5) one confirms the changes - the parameter field stops blinking. The changed parameter not confirmed for 10 secs is not accepted by the regulator and it recalls a previous value of the parameter.
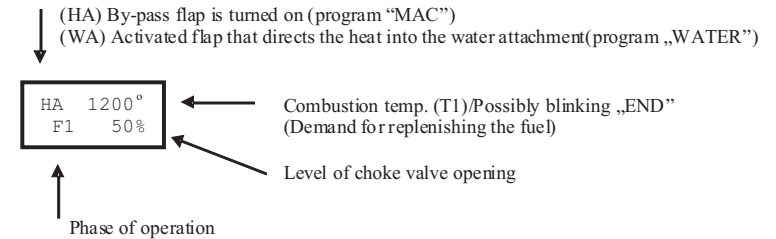
3.1 Screens

Alarm screens is not seen till the following emergency situation takes place:

1. Damage of the sensor T1 . "T.Firep" shows up.
2. Damage of the internal sensor of the reference temperature. "Ref.Temp" shows up.
3. Exceeding of the limit concentration of CO by short-circuiting the contacts X1. "Gas" shows up.

```
ALARM !!
T.Firep
```

Emergency situation is accompanied both by a broken sound alarm that can be turned off by pressing any button and a blinking of the red diode(7).

Screen of the regulator operation shows actual temperature of fireplace, level of choke valve opening, phase of operation and possibly combustion error

(HA) By-pass flap is turned on (program "MAC")
(WA) Activated flap that directs the heat into the water attachment(program „WATER")

```
HA  1200°
 F1   50%
```
Combustion temp. (T1)/Possibly blinking „END"
(Demand for replenishing the fuel)

Level of choke valve opening

Phase of operation

Reaching the embers phase F7 is accompanied by a broken sound signal (switch-off with the button (6)), text *"FuelOUT"* and blinking of the green diode (8), which indicates the need for replenishing the fuel in case of continuing the heating.

The regulator can run in the automatic or manual mode. The longer pressing "MAN" (6) about 2secs causes the pass to the manual mode. That's signalled by blinking status diode (7). The choke valve opens 100%. From now on you can manually control the choke valve: "-"(4) causes the shutting (one step-10%) and "+"(2) the opening. The comeback to the automatic mode occurs after pressing "AUTO" (5).

In the automatic mode each opening of the door causes the choke valve to be set at 100% and each shutting of the door causes the combustion process started and the diode (8) lights.

If the furnace is cold then after the time *"DelayTim+Ti.STOP"* (see parameters of level 2) the regulator closes the choke valve and passes to the standby state.

Likewise the regualtor acts when the power turns on.

During the operation without the opening sensor of the door the panel buttons are used for controlling. Pressing "START" (2) causes opening the choke valve and starting the cycle. Before opening the door the choke valve should also be open by pressing "START"(2) or passing to the MAN mode. After lighting the fuel and closing the door you must again press "START" (2) or "AUTO"(5) if the regulator is in the manual mode "MAN".

! In the MAN mode you must not close the choke valve completely before reaching the embers phase because there can be a dangerously increased concentration of CO (poisonous carbon monoxide)!!

<u>**The screen of the water circuit (for the program "WATER" and "MIX")**</u> shows actual temperature of the water attachment and the buffer, operation of the pump and the water attachment flap

```
WATER
>66°  >50°
```
← Water temperature in the buffer (T3)

↑ Water temperature in the attachment (T2)
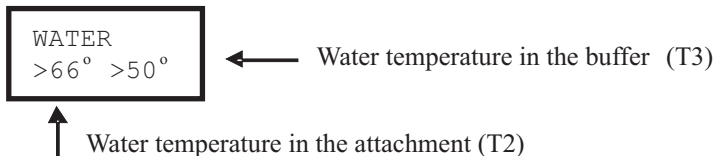
The arrows before the temperatures show the heat flow:

-The arrow before T2 indicates the switch-on of the flap that directs warm exhaust gases into the water attachment (the attachment is feeded by heat)
-The arrow between T2 and T3 indicates the switch-on of the pump that receives the heat from the attachment and directs it to the buffer.

<u>**Screen of setting the parameters**</u>

```
Menu
        0
```

Normally the level of parameter setting (Menu) equals to "0", which means the parameters aren't available.
After changing the level to "1", "2" , or "3" the successive screens show the values of parameters.
The last screen contains "****" after which it comes back to the above mentioned screens.

! PARAMETERS ADAPT THE REGULATOR TO THE PROPERTIES OF THE FIREPLACE. THEIR CHANGE SHOULD BE CONSULTED WITH THE PRODUCER OF THE FIREPLACE. INCAUTIOUS CHANGES CAN CAUSE UNSTABLE AND INEFFICIENT OPERATION OF THE SYSTEM.

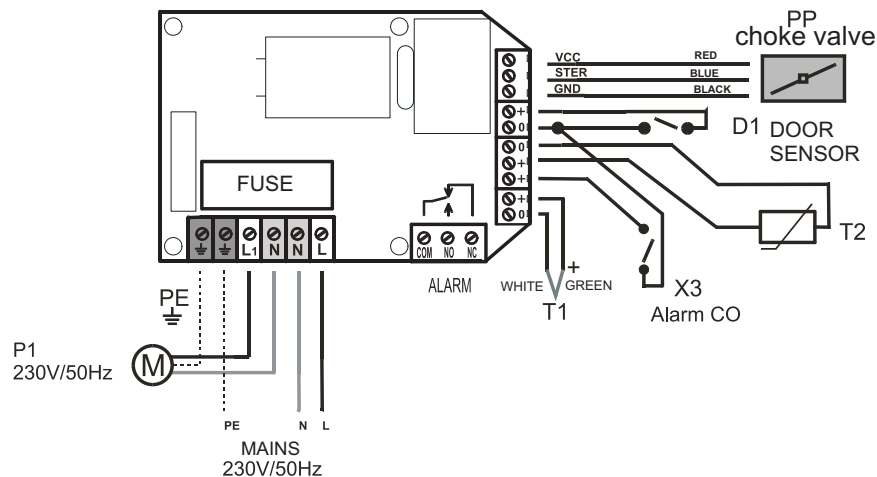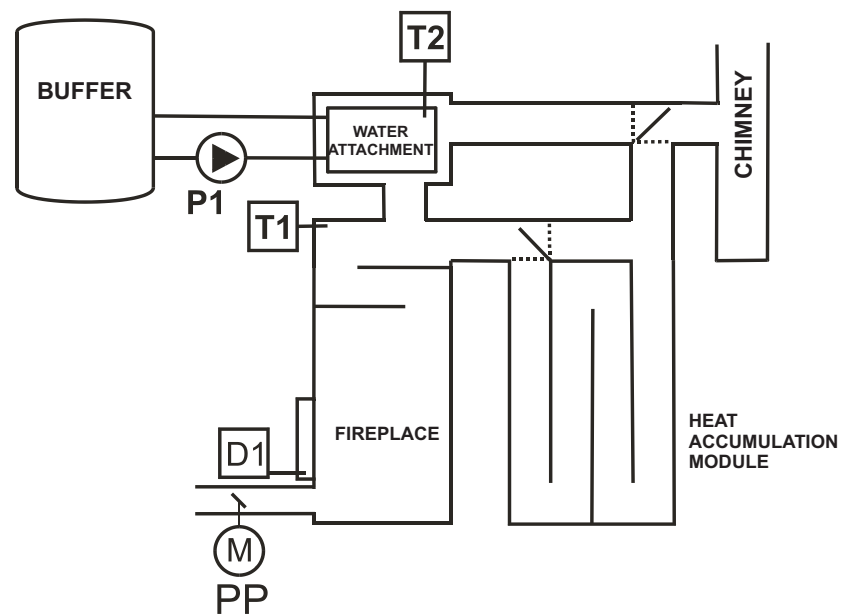| PARAMETRS OF LEVEL 1				
NAME	RANGE	FACTORY SETTING	SETTING	FUNCTION
Signal	OFF/ON	ON		Switch-on/Switch-off of the sound alarms

Fig.3C System scheme in the version of program 3 „MIX"

PP-   Electronically controlled air choke valve
X3-   Input to connect a control device of CO concentration. The input "+" has higher potential (it's important for Open Collector Systems). Schort-circuit of the contacts means the exceeding of permitted CO concentration. At the lack of CO control you leave the contacts not connected.
D1-   Opening sensor of the furnace door. The type of the sensor is defined by the parameter "DoorMode".
       -Short-circuit sensor applied (at the door closed the contact D1 shorted), set "DoorMode"=2
       -Open-circuit sensor applied (at the door closed the contact D1 opened), set "DoorMode"=1
       -Without the door sensor leave the contact D1 unconnected and set "DoorMode"=1 or
       short the contact D1 and set "DoorMode"=2
T1-   Sensor of combustion temperature. Thermocouple type K (the wire of higher potential is green, of lower one is white)
T2-   Temperature sensor in the water attachment
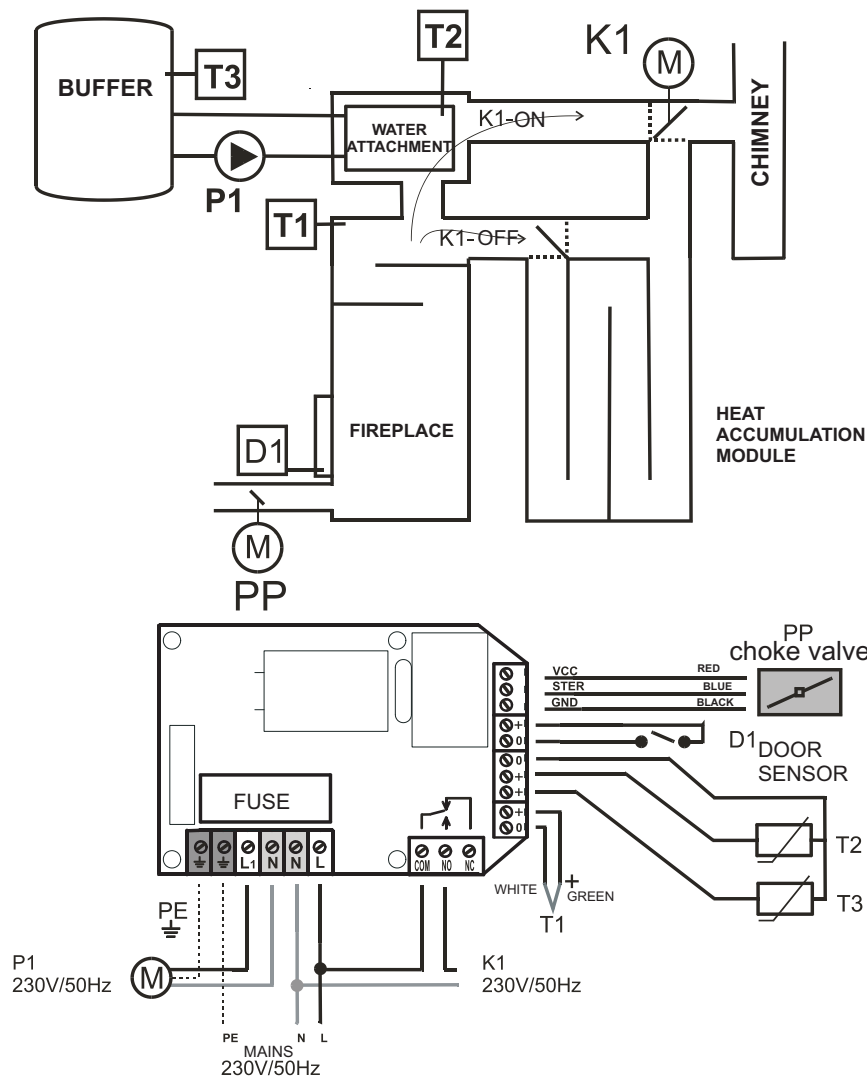P1-   Pump receiving the heat from the water attachment

Fig.3B System scheme in the version of program 2 „WATER"

PP	Electronically controlled air choke valve
X1	Input to connect a control device of CO concentration. The input "+" has higher potential (it's important for Open Collector Systems). Schort-circuit of the contacts means the exceeding of permitted CO concentration. At the lack of CO control you leave the contacts not connected.
D1	Opening sensor of the furnace door. The type of the sensor is defined by the parameter "DoorMode". -Short-circuit sensor applied (at the door closed the contact D1 shorted), set "DoorMode"=2 -Open-circuit sensor applied (at the door closed the contact D1 opened), set "DoorMode"=1 -Without the door sensor leave the contact D1 unconnected and set "DoorMode"=1 or short the contact D1 and set "DoorMode"=2
T1	Sensor of combustion temperature. Thermocouple type K (the wire of higher potential is green, of lower one is white)
T2	Temperature sensor in the water attachment
T3	Temperature sensor of the buffer (option)
P1	Pump receiving the heat from the water attachment
K1	Flap drive of the by-pass of the heat accumulation module (option)

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PARAMETERS OF LEVEL 2
THE PARAMETERS CAN BE ALTERED BY DEACTIVATED PASSWORD

NAME	RANGE	FACTORY SETTING	SETTING	FUNCTION
DelayTim	15…600secs	60secs		Delay of regulation start (period of the phase F1)
T.Restar	10…1250 °C	45 °C		Restart temperature after switching on. If after switching on the regulator temperature in the furnace is higher than "T.Restar" then automatic start follows.
Ti.STOP	0…600secs	120secs		After this time the transition to the standby phase (STOP) takes place if the temperature "T.Restar" is not reached.
T.F3	30…1250 °C	120 °C		start temperature of the phase F3
T.F4	50…1250 °C	270 °C		start temperature of the phase F4
T.F5	50…1250 °C	370 °C		start temperature of the phase F5
dT.F5-F6	-10…-300 °C	-30 °C		Temperature drop in relation to the maximum temperature (start of the phase F6)
T.F7max	50…1250 °C	220 °C		start temperature of the phase F7
T.F7min	50…1250 °C	120 °C		start temperature of the phase F7 in case the maximum temperature is reached in F3 or F4 (There wasn't the phase F5)
Ti.F7	1…60 mins	20 mins		Period of the phase F7
Ti.PDM	0…10 mins	1 mins		Period of the phase F8. Scavenge time.Opening the choke valve and burning out exhaust gases
ChokeVF4	0…100 %	70 %		Level of choke valve opening at the start of F4
ChokeVF5	0…100 %	50 %		Level of choke valve opening at the start of F5
ChokeVF7	0…100 %	5 %		Level of choke valve opening at the start of F7
TypChoke	1…2	1		Control type of the choke valve 1 Continuous control - servomotor of the choke valve always active 2 Dynamic control - servomotor of the choke valve active only if a position change of the choke valve is needed.
T.max	400…1300 °C	800 °C		Maximum temperature of the fireplace
ChokeVTH	10...50%	30%		Opening level of the choke valve after exceeding T.max
DoorMode	1..2	1		Type of the door sensor 1 open-circuit sensor (at the door closed the contact D1 open) or no door sensor 2 short-circuit sensor (at the door closed the contact D1shorted)

PARAMETERS OF LEVEL 3
THE PARAMETERS CAN BE ALTERED BY DEACTIVATED PASSWORD

NAME	RANGE	FACTORY SETTING	SETTING	FUNCTION
Program	1…3	1		PROGRAM 1 „MAC"　Fig. 3A 2 „WATER" Fig. 3B 3 „MIX"　Fig. 3C
TFlapOff	200…1000°C	700 °C		Combustion temperature that closes the bypass flap. Activation of the module MAC (Program 1 "MAC")
T1FlapON	200…1000°C	440 °C		Combustion temperature that turns on the flap, directing exhaust gases through the water attachment. The higher temperature activates the water attachment. (Program 2 "WATER")
T1FlapOF	200…1000°C	370 °C		Combustion temperature that turns off the flap - Exhaust gases don't pass through the water attachment. The lower temperature deactivates the water attachment. (Program 2 "WATER")
T2FlapON	20…100°C	70 °C		Water temperature in the attachment that turns on the flap, directing exhaust gases through the water attachment. The lower temperature activates the water attachment. (Program 2 "WATER")
T2FlapOF	20…100°C	85 °C		Water temperature in the attachment that turns off the flap - Exhaust gases don't pass through the water attachment. The higher temperature deactivates the water attachment. (Program 2 "WATER")
T2PmpON	20…100°C	55 °C		Above this water temperature in the attachment the pump feeding the buffer turns on (Program 2 & 3 :WATER"&"MIX")
T2PmpOFF	20…100°C	50 °C		Below this water temperature in the attachment the pump feeding the buffer turns off (Program 2 & 3 :WATER"&"MIX")
dT2-T3	1…20°C	3 °C		Difference of water temperature between the attachment and the buffer that activates the feeding pump (Program 2 "WATER")
T2 MAX	80…99°C	95 °C		Water temperature in the attachment that switches on the alarm (Program 2 & 3 "WATER" &"MIX")

Demonstration change of the "TFlapOFF" parameter that defines the temperature at which the flap of the MAC by-pass (parameter of level 3) switches over.
Press:

*press CHOOSE till the "ServNo 0" parameter setting screen appears
*„CONFIRM" button > „0" starts blinking
*threefold button "+" -> „3" blinks
*„CONFIRM" button -> „3" stops blinking (Parameters of level 3 were chosen)
*„CHOOSE" button -> „ TFlapOFF" shows up(actual value)
*„CONFIRM"button -> actual value to be changed begins blinking
*„+"/"-„ -> setting a new value
*„CONFIRM" -> confirming the new value
*repeatedly "CHOOSE" button till the „***" parameter end setting screen appears.

PARAMETERS OF LEVEL 4				
NAME	RANGE	FACTORY SETTING	SETTING	FUNCTION
NoProd	0…n	0		Number of the parameters set-dependent on the fireplace producer. PARAMETERS READONLY
Password	0…20	0		0-PASSWORD DEACTIVATED 1…20-PASSWORD ACTIVATED
Reset	-1…0…n	0		Setting the value "n" (0..n) calls back all the factory settings linked to the "n-th" parameters set and causes the restart of the regulator. PARAMETER ONLY AVAILABLE WITH THE ACTIVATED PASSWORD

Password
The changes of important parameters are possible only at unlocked password. To unlock thepassword you need to input proper sequence of digits with the buttons "+/-".With the CHOOSE button (3) to change the digits position and CONFIRM button (5) to acknowledge all and finish the procedure of changing the password. The unlocked password is set to "0000".
Once again entering into the password change procedure causes a new password to be set.
!PASSWORD „9999" HAS CONSIDERABLE MEANING. IT CAUSES THE REACTIVATION OF THE PREVIOUS PASSWORD IF PRESENT WITHOUT IT BEING EXPOSED.
! PASSWORD OF PRODUCER'S SERVICE IS UNIQUE AND IS NOT DEPENDENT ON THE USER'S PASSWORD- IT SHOUDN'T BE EXPOSED TO THE USER. INSTEAD OF THAT THE SERVICE CAN SET THE USER HIS OWN PASSWORD.

Examples of passwords:
1.The control unit is installed with the unlocked password. The user can enter his own password e.g. "1234". From this moment the important parameters cannot be altered without the password being unlocked (that is, resetting the password "1234"). After changing essential parameters the user can leave the controller unlocked, set any new password or enter "9999", which activates the password "1234"
2. Producer gives the controller with the set password. The user cannot alter the important parameters.
The servic can change the settings with its own secret password. At the end a serviceman enter the secret password or "9999", the user still hasn't access to the important parameters.
3. Producer gives the controller with the set password. The user cannot alter the important parameters.
The servic can change the settings with its own secret password. At the end a serviceman leaves the controller unlocked, the user now has access to the important parameters. He can enter his own password like in example No. 1.
4. Producer gives the controller with the set password. The user cannot alter the important parameters. The servic can change the settings with its own secret password.At the end a serviceman sets the password e.g. "1234" and tells it to the user, the user has access to the important parameters but without knowing the password the other persons cannot make the changes.
5. The user has the unlocked controller or his own password. Serviceman decides, the user though oughtn't have access to the important parameters. The serviceman locks the control unit with his secret password, which removes the user's password and locks the controller.
6. Serviceman doesn't have to know the user's password. Always he can use his own secret password and at the end lock with the "9999", which reactivates the user's password.

4 Installing the regulator
!   THE REGULATOR IS SUPPLIED BY 230V/50HZ . ANY MOVES REGARDING INSTALLATION SHOULD BE MADE AT THE DISCONNECTED MAINS.
!   THE REGULATOR HAS TO BE CONNECTED TO THE MAINS WITH THE ZERO-PIN.
!   THE REGULATOR SHOULD NOT BE EXPOSED TO WATER AFFECTING. ITS ENVIRONS OUGHT TO BE CLEAN.
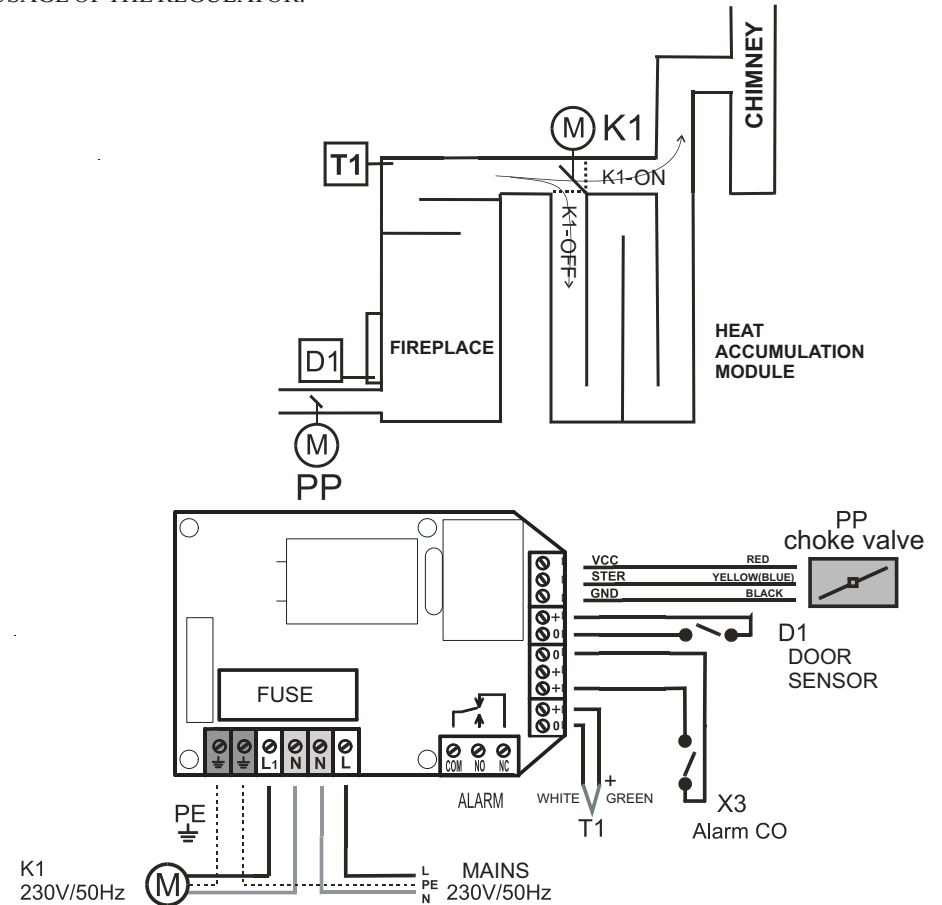!   THE PRODUCER DOESN'T TAKE ANY RESPONSIBILITY FOR DAMAGES CAUSED BY WRONG USAGE OF THE REGULATOR.

Fig.3A System scheme in the version of program 1 „MAC"

PP   Electronically controlled air choke valve
X3   Input to connect a control device of CO concentration. The input "+" has higher potential (it's important for Open Collector Systems). Schort-circuit of the contacts means the exceeding of permitted CO concentration. At the lack of CO control you leave the contacts not connected.
D1   Opening sensor of the furnace door. The type of the sensor is defined by the parameter "DoorMode".
             -Short-circuit sensor applied (at the door closed the contact D1 shorted), set "DoorMode"=2
             -Open-circuit sensor applied (at the door closed the contact D1 opened), set "DoorMode"=1
             -Without the door sensor leave the contact D1 unconnected and set "DoorMode"=1 or
             short the contact D1 and set "DoorMode"=2
T1   Sensor of combustion temperature. Thermocouple type K (the wire of higher potential is green, of lower one is white)
K1   Flap drive of the by-pass of the heat accumulation module (option)