



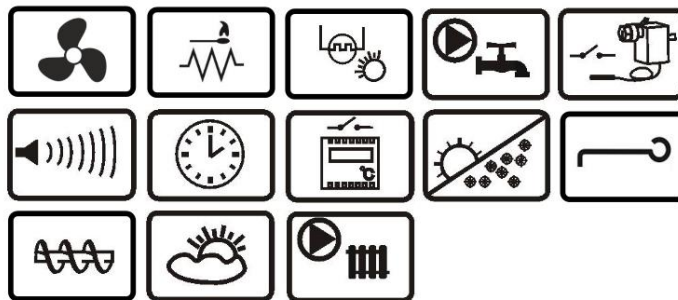
BOILER REGULATOR

ecoMAX350P

FOR SOLID FUEL BOILERS



ecoSTER200*



functions available in the additional module B

* - room panel ecoSTER200 are not part of standard equipment regulator.



USER MANUAL AND INSTALLATION

ISSUE: 1.0

SOFTWARE:

MODULE
v.01.XX.XX

PANEL
v.01.XX.XX

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1 SAFETY

Requirements concerning safety are described in detail in individual chapters of this manual. Apart from them, the following requirements should in particular be observed.



- Before starting assembly, repairs or maintenance, as well as during any connection works, please make sure that the mains power supply is disconnected and that terminals and electric wires are devoid of voltage.
- After the regulator is turned off using the keyboard, dangerous voltage still can occur on its terminals.
- The regulator cannot be used at variance with its purpose.
- Additional automatics which protect the boiler, central heating (CH) system, and domestic hot water system against results of malfunction of the regulator, or of errors in its software, should be applied.
- Choose the value of the programmed parameters accordingly to the given type of boiler and fuel, taking into consideration all the operational conditions of the system. Incorrect selection of the parameters can cause malfunction of the boiler (e.g. overheating of the boiler, the flame going back to the fuel feeder, etc.),
- The regulator is intended for boiler manufacturers. Before applying the regulator, a boiler manufacturer should check if the regulator's mating with the given boiler type is proper, and whether it can cause danger.
- The regulator is not an intrinsically safe device, which means that in the case of malfunction it can be the source of a spark or high temperature, which in the presence of flammable dusts or liquids can cause fire or explosion. Thus, the regulator should be separated from flammable dusts and gases, e.g. by means of an appropriate body.
- The regulator must be installed by a boiler manufacturer in accordance with the applicable safety standards.
- The programmed parameters should only be altered by a person familiarized with this manual.
- The device should only be used in heating systems in accordance with the applicable regulations.
- The electric system in which the regulator operates must be protected by means of a fuse, selected appropriately to the applied loads.
- The regulator cannot be used if its casing is damaged.
- In no circumstances can the design of the regulator be modified.
- Electronic isolation of the connected devices is applied in this regulator.
- The regulator consists of two subassemblies. In the case of replacing one subassembly, make sure to maintain compatibility with the other one. More information on that issue can be found in the documentation intended for fitters
- Keep the regulator out of reach of children.

2 General information

Boiler regulator ecoMAX350P controls the operation of the solid fuel boiler using an flame optical sensor brightness.

The regulator is a one module construction.

It performs the following functions:

- it automatically maintains a preset boiler temperature by controlling the fuel combustion process,
- it controls timing of feeding screw and fan,
- it automatically stabilizes a preset temperature of the domestic hot water container.

The preset temperature of boiler can be set on the basis of weather sensor readouts.

Possibility of cooperation with a room thermostat allows providing thermal comfort in the heated rooms.

The regulator can cooperate with an additional room panel ecoSTER200 located in a residential area.

It can be used in a household and similar facilities, as well as in light industrialized facilities.

3 Information about documentation

The regulator manual is a supplement for the boiler manual. In particular, except for this manual, the boiler manual should also be observed.

The regulator manual is divided into two parts: for user and fitter. Yet, both parts contain important information, significant for safety issues, hence the user should read both parts of the manual.

We are not responsible for any damages caused by failure to observe these instructions.

4 Storage of documentation

This assembly and operation manual, as well as any other applicable documentation, should be stored diligently, so that it was available at any time. In the case of removal or sale of the device, the attached documentation should be handed over to the new user / owner.

5 Applied symbols



- useful information and tips,



- important information, failure to observe these can cause damage of property, threat for human and household animal health and life.

Caution: the symbols indicate important information, in order to make the manual more lucid. Yet, this does not exempt the user from the obligation to comply with requirements which are not marked with a graphic symbol.

6 Directive WEEE 2012/19/UE

Act on electrical and electronic equipment



- Recycle the product and the packaging at the end of the operational use period in an appropriate manner.
- Do not dispose of the product together with normal waste.
- Do not burn the product.

USER MANUAL

ecoMAX350P

7 USER MENU

Main menu
Information
Boiler settings
HUW settings*
Night time decrease
Summer/Winter
Work acc. schedule
<ul style="list-style-type: none"> • Off • Schedule
General settings
Manual control
Alarm
Service settings

Boiler settings
Preset boiler temp.
Weather boiler control *
<ul style="list-style-type: none"> • Boiler heating curve • Curve shift
Output modulation
<ul style="list-style-type: none"> • Max boiler output • Max blow-in output • MED hysteresis H2 • MED boiler output • MED blow-in output • MIN hysteresis H1 • MIN boiler output • MIN blow-in output • Boiler hysteresis • Min boiler output FL • Max boiler output FL • Feeder efficiency • Feeder test • Fuel mass in the test • Blow-in output-grate*
Boiler oper. mode
<ul style="list-style-type: none"> • Pellet • Grate
Regulation mode
<ul style="list-style-type: none"> • Standard • Fuzzy Logic
Fuel level
<ul style="list-style-type: none"> • Fuel level • Fuel level calibration
Burner cleaning
Cleaning intensity

HUW settings
HUW preset temp.
HUW operat. mode
<ul style="list-style-type: none"> • Off • Priority • No priority
HUW hysteresis
HUW disinfection

Night time decrease
Boiler
<ul style="list-style-type: none"> • Off • Reduction value • Schedule
HUW container*
Circulation pump*

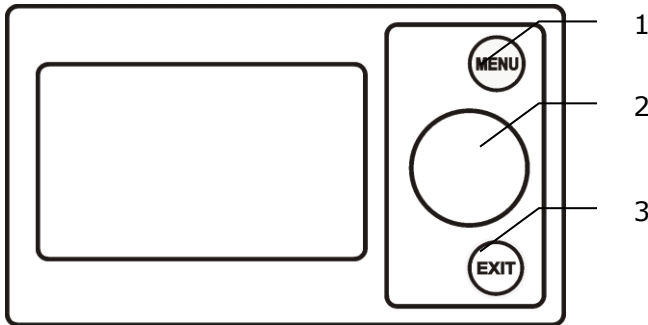
Summer/Winter
SUMMER mode
<ul style="list-style-type: none"> • Off • On • Auto
Activ. temperature SUMMER
Deactv. temperature SUMMER

General settings
Clock
Screen brightness
Screen contrast
Sound
Language
WiFi*

* Not available if proper sensor or additional module not connected or the parameter is hidden.

8 Operating the regulator

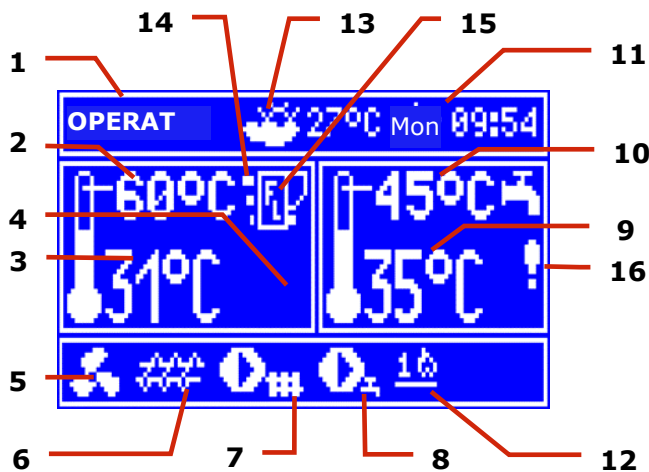
8.1 Buttons description



1. MENU button
2. „TOUCH and PLAY“ knob
3. EXIT button

Turning the “TOUCH and PLAY” knob increases or decreased the edited parameter. This is an element of quick operation of the regulator. Pushing this knob allows to enter the given parameter, or to confirm the selected value.

8.2 Main window



1. Regulator working modes: FIRING UP, OPERATION, SUPERVISION, BURNING OFF, CLEANING, STOP
2. Boiler preset temperature,
3. Boiler measured temperature,
4. Functions having influence on preset boiler temperature. Following symbols signal respectively:
 „T” Preset boiler temperature decrease due to thermostat disconnection;
 „S” Preset boiler temperature decrease due to activated time spans;
 „C” Boiler preset temperature during loading the hot water boiler (HWU);
 „P” weather control switch on for boiler circulation,
5. Symbol signalling blowing operation,

6. Symbol signalling fuel feeder operation,
7. Symbol signalling central heating (CH) pump operation,
8. Symbol signalling central heating pump operation (HWU),
9. Measured temperature of hot water boiler (HWU),
10. Preset hot water (HWU) boiler temperature,
11. Clock and weekday
12. Part of the screen coshared between two icons: match – symbolizes operating heater, and the digit next to it stands for a number of Firing-upattempts;
 Rake – symbolizes activating automatics of furnace cleaning,
13. External (weather) temperature,
14. Current boiler power level,
15. Symbol signalling activating regulating mode *Individual Fuzzy Logic*,
16. Symbol signalling disinfection of the hot water boiler.

Right window on the main screen is configurable, allows on changing information displayed there. It is possible to choose a configuration displaying by twisting the “TOUCH and PLAY” knob.

Right window on the main screen may also display the fuel level view, providing that this parameter is set correctly. Attention: fuel level can be seen in room panel ecoSTER200.

8.3 Switching on the regulator

After connecting the power the regulator shows the settings put before connecting the electricity. If the regulator has not operated before – it will start up in STAND-BY. In this mode the screen is dimmed, actual time and information: *Boiler ON* is displayed.

In this mode protecting pumps against going stale function is in operation. It is executed by temporary switching them on. Therefore it is advised to keep the electrical power to the controller on when the boiler is not in use. And the regulator should be in STAND-BY. It is possible to start up the boiler (pressing the encoder knob and selecting „Switch on”) or setting parameters of its operation (MENU button) without connecting it to the electrical power. After making sure that fuel is in the silo, and the hatch is closed – the boiler can be switched on.

8.4 Boiler preset temp. setting

The preset boiler temperature can be set in the menu (Possible temperatures are restricted with range of respective service parameters of the controller).

Boiler settings → Preset boiler temperature

The parameter value: *Preset boiler temperature*, is by controller bypassed when the preset boiler temperature is controlled by weather sensor. Regardless of that, the preset boiler temp. is automatically increased to load the HUW container.

8.5 FIRING UP

The FIRING UP mode is for automatic firing up of furnace in boiler. Total time of firing up process is dependant on controller's settings (feeder operation time, heater operation time, etc.) and on boiler's condition before firing up. Parameters influencing firing up process are in the menu:

Service settings → Boiler settings → Firing up

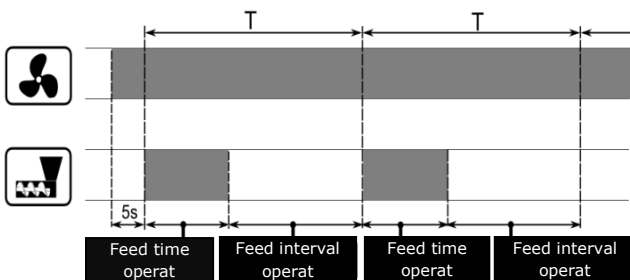
In case of failed attempt of firing up the furnace, another attempts are taken during which amount of fuel (feeding time) is reduced to 10% of first attempt's dose.



After three failed firing up attempts an alarm Failed firing up attempt is reported. Boiler's operation is then stopped. It is not possible to automatically continue boiler's operation. Service intervention is required. After finding and solving the cause of firing up failure the boiler should be fired up again.

8.6 OPERATION

The fan operates constantly. Fuel feeder is engaged periodically. One period consists of feeder operating time and pause in feeding time:



Cycle time operation parameter is located in:

Service Settings → Burner settings

Feeder operation time is calculated automatically depending on the required current power of the burner, feed efficiency and calorific value of the fuel.

Parameters of blow-in output for different power levels of the burner are available in:

Boiler settings → Output modulation

Can choose between two adjustment modes responsible for stabilizing the boiler preset temperature STANDARD and Fuzzy Logic. This mode changes in:

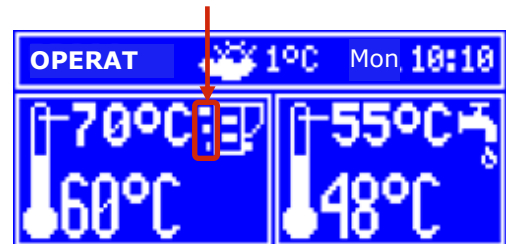
Boiler settings → Regulation mode

- **STANDARD mode operation**

If the boiler's temperature reach preset one then the controller switches of to SUPERVISION mode.

Regulator is equipped with boiler's power modulation mechanism – which allows for gradual power reduction when approaching the preset temperature.

There are three power levels: MAX/MED/MIN boiler power. Current power level is displayed on the screen as 3 segmented indicator at the left side of boiler's icon.

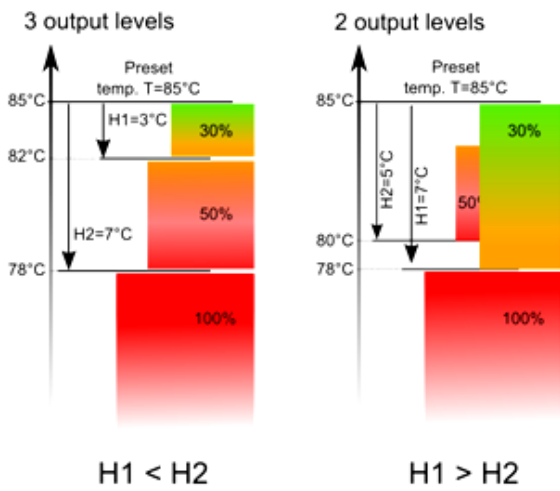


Each level can be allocated with separate blow-in output intensity which influence on actual boiler's power level. Power levels parameters are available in the menu:

Boiler settings → Output modulation

The regulator regulates burner's power with which it operates depending on preset temperature and defined hysteresis *MED Hysteresis H2* and *MIN Hysteresis H1*.

It is possible to configure volumes H1 and H2 in such a way that modulation is done without intermediate position. That means switching from MAX to MIN with omission of MED power.



• **Operation in Fuzzy Logic mode**

In Fuzzy Logic mode the controller automatically regulates burner power to allow boiler operation in such a way to maintain its temperature on preset level. The regulator uses power levels defined in STANDARD mode. In this mode the parameters *MAX Hysteresis H2* and *MIN Hysteresis H1* do not have to be set.

The Fuzzy Logic mode unlike the STANDARD mode is not faulty in respect of failing to reach the preset boiler temperature due to incorrect adjustment of *MAX Hysteresis H2* and *MIN Hysteresis H*. It also allows for quicker reach the preset temperature. In addition, can adjust the boiler output in FL mode by the parameters *Min/Max power boiler FL*.

Attention: If the boiler operates without heat buffer and controller is switched into SUMMER mode than Standard mode operation of the controller is recommended.



After exceeding the preset temperature by 5° C the regulator switches into SUPERVISION mode.

8.7 SUPERVISION

The SUPERVISION mode is applicable either in regulation in STANDARD and Fuzzy Logic mode.

The regulator switches into SUPERVISION mode automatically without user's intervention:

- in STANDARD regulation mode – after reaching the boiler preset temperature,
- in Fuzzy Logic steering – after exceeding boiler preset temperature by 5°C.

In SUPERVISION mode the regulator oversees the furnace, keeping it from burning off. To do

so, the burner operates with very low power, what together with properly adjusted parameters do not cause further increase in temperature. Burner's power in SUPERVISION mode and other parameters of Supervision are grouped in menu:

Service settings → **Boiler settings** → **Supervision**

Parameters of SUPERVISION mode are to be set in accordance to burner/boiler producer's recommendations. They should be so chosen to prevent the furnace from burning off during boiler's pauses (the furnace should not at the same fire up to too high a temperature, because it will cause too high a temperature of the boiler). Operation and pause time of the feeder in SUPERVISION mode is set using following parameters: *Boiler output-SUPERVISION*, *Cycle time-SUPERVISION* and *Blow-in output-SUPERVISION*.



The parameters in this mode must be so chosen as to make the boiler temperature gradually decreasing. Incorrect settings can cause boiler overheating.

Maximum time of boiler's operating in supervision mode is defined in parameter *Supervision time*. If after this time (in Supervision mode) there is no need to restart the boiler then the controller starts the process of boiler's burning off.



For setting *Supervision time* = 0 the controller omits SUPERVISION mode and goes directly to BURNING OFF.

8.8 BURNING OFF

In burning off mode the leftovers of pellet are burnt and the boiler is prepared to pause or deactivation.

All the parameters influencing burning off process are grouped in menu:

Service settings → **Boiler settings** → **Burning off**

The controller stops feeding fuel and makes periodical blowings to burn off remnants of fuel. After decrease of flame brightness or maximum time of burning off expiration the controller turns into STOP mode.

8.9 CLEANING

The regulator is used for cleaning the furnace of ashes generated in the combustion process. For this purpose, the regulator uses a fan. The

parameters affecting the cleaning are on the menu: **Boiler settings**

and

Service settings → **Burner settings** → **Cleaning**

Purification of the furnace is made during FIRING UP and BURNING OFF. In the event that the boiler stays for a long time in OPERATION mode or SUPERVISION mode it is possible to start cleaning the furnace with adjustable intensity parameter *Cleaning intensity*.

8.10 STOP

In STOP mode the boiler is being burnt off and awaits the signal to start operation. The following can be a signal to start operation:

- decrease of preset boiler temperature below preset temperature diminished by boiler hysteresis (*Boiler hysteresis*),
- by boiler operation configuration with the buffer decrease of top buffer temperature below preset value (*Loading start temperature*).

8.11 Grate

Some boilers have an additional grate to burn other fuels such as wood waste, etc. To activate the grid, move the parameters available in the:

Boiler settings → **Boiler oper. mode**

from "pellet" to "grate". In the grid mode fuel feeder is turned off. The combustion process is regulated by the fan. Fan power, when working with grid, is set in:

Boiler settings → **Output modulation** → **Blow-in output – grate**

The values of parameters such as:

Boiler settings → **Preset boiler temperature**

Boiler settings → **Output modulation** → **Boiler hysteresis**

Service Settings → **Burner settings** → **Fuel detection time**

are individually adjusted for the "grate". This allows you to define different properties of boiler operation for operation modes "grate" and "pellets".

When using the grid an alarm "No fuel" can appear. This alarm occurs when a temperature drops below the value of the parameter:

Service settings → **CH and HUW settings** → **CH activation temp.** and then for a period of 10 minutes there has been no growth.

8.12 Hot water settings

The controller regulates temperature of the HUW container, providing that the temperature sensor is connected. When the sensor is disconnected – the information about it is displayed in the main window. By selecting:

HUW settings → **HUW Pump mode** the user is able to:

- deactivate feeding the silo, parameter *Off*,
- setting HUW priority, by parameter *Priority* – then CH pump is deactivated to feed the HUW boiler quicker,
- set simultaneous operation of CH and HUW pump with the parameter *No priority*.

8.13 Hot water temperature settings

Preset temperature HUW is defined by parameter:

HUW settings → **HUW preset temperature**

8.14 HUW container hysteresis

Below temperature *HUW preset temperature* – *HUW hysteresis* the HUW pump will activate to feed the HUW container.



By small hysteresis value HUW pump will activate faster after HUW temperature decrease.

8.15 Activating SUMMER function

o activate SUMMER function which allows feeding the silo during summer, without necessity to activate CH installation and mixers periods, it is required to set the:

Summer/Winter → **SUMMER mode** for *On*.



Attention: when boiler operates without heating buffer and the controller is switched into SUMMER mode, than Standard mode operation is recommended.



It is not allowed to activate function summer when HUW pump is disconnected or damaged.

Function SUMMER can be activated automatically, on the basis of readings from weather sensor. Use following parameters to activate this function:

Summer/Winter → **SUMMER Mode** → **Auto**

If the automatic detection of summer mode is switched on, you can set the parameters: *Activ. temperature SUMMER*, so outdoor

temp. above which the summer mode will be switched on and *Deactiv. temperature SUMMER*, so outdoor temp. below which the SUMMER mode will be switched off. The parameters are grouped in menu: **Summer/Winter.**

8.16 Disinfection of HUW container

The regulator can automatically, periodically make HUW container warm up to 70°C. It is done to remove bacterial flora.



It is absolutely important to inform all the inmates about activating the disinfection function. There is a danger of scalding with hot water.

Once a week at night, in Monday at 2 a.m. the regulator increases temperature of HUW container. After 10 minutes of keeping the silo at 70°C the HUW pump is deactivated and the silo returns to its normal operation. It is not advisable to activate disinfection function while the service of HUW is deactivated.

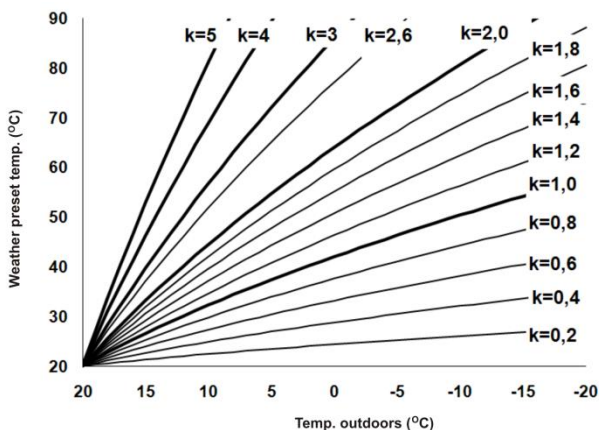
8.17 Weather control

Depending on measured outside temperature, automatically controlled can be either preset boiler temperature. By correct adjustment of heating curve temperature of boiler is counted automatically depending on value of outside temperature. Thanks to that by choosing proper heating curve for given building, room temperature remains approximately the same – no matter what outside temperature.

Attention: in the process of experimental adjustment of proper heating curve it is necessary to exclude influence of room thermostat on controller work (irrespectively if room thermostat is connected or not).

Guidelines for correct heating curve settings:

- Radiator heating 1,0 - 1,6
- Boiler 1,8 - 4



Tips for choosing proper heating curve:

- If by falling outer temperature room temperature is increasing, then value of chosen heating curve is too big,
- If by decreasing outer temperature, room temperature is also decreasing, then value of chosen heating curve is too low,
- by frosty weather room temperature is appropriate and in warmer time is too low – it is recommended to increase parameter *heating curve shift* and then choose lower heating curve
- If by frosty weather room temperature is too low and in warmer time too high – it is recommended to reduce *parameter heating curve shift* and choose higher heating curve.

Buildings which are poorly isolated require setting heating curve with higher values, and for better isolated buildings heating curve will have lower value.

Preset temperature, counted according to heating curve can be decreased or increased by controller when it goes beyond scope of limits of temperatures for given cycle.

8.18 Night time decrease settings description

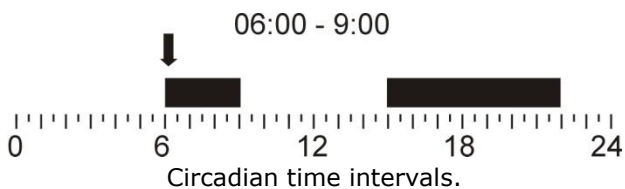
In the regulator introduced the ability to set time periods for the boiler, HUW container and circulation pump. Time periods allow setting temperature reduction in given time period – i.e. at night or when user leaves the heated room. Thanks to it preset temperature can be reduced automatically, without loss of heating comfort by reducing fuel consumption. This is indicated by the symbol „S”.

To activate time intervals, set the parameter: *Night time decrease* for the boiler and HUW container to *ON*.


The parameter *Reduction value* sets the temperature reduction, one for all time intervals.


Night time decreases can be defined separately for every day of the week at the *Schedule*.

Select temperature reduction and beginning and end of respective time interval. The time intervals for 24 hours are fixed at 30min.



Above are examples of night-time decrease the preset temperature lasting from 22:00 till 06:00 and the reduction from 09:00 to 15:00.

 Attention, defining time periods during one day must be started at 00:00!

 Time period is omitted by setting period reduction for value "0" even if scope of hours is set in it.

8.19 Working according to schedule

In the regulator is possible to switch on and switch off the boiler at defined intervals. In the absence of demand for heat, eg. in summer, one can disable the operation of the boiler at a certain time and thus reduce fuel consumption.

To activate the time intervals must set the parameter Off, in menu **Work acc. schedule** at **YES**.

Switching on and off the boiler in the time interval can be set for all on separate days of the week in the *Schedule*.

Work according to the schedule is the same as that night time decrease.

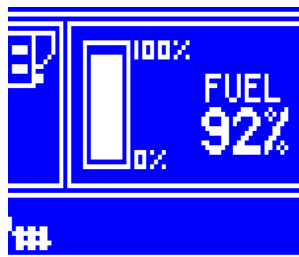
8.20 Fuel level configuration

- **Fuel level indicator activating**

To activate displaying fuel level following parameters are to be set:

Boiler setting → **Fuel level** → **Alarm level** on value bigger than "0", i.e. 10%.

Twisting "TOUCH and PLAY" knob in main window fuel level is displayed in main window. Tip: fuel level can also be seen in room panel ecoSTER200.



- **Fuel level indicator service**

Each time when fuel silo is filled to required level it is necessary to press and keep the

knob in main window. Following info will appear:



After choosing and accepting **YES** fuel level will be set for 100%.

Fuel can be refilled anytime, that means it is not needed to wait till the silo is empty. However fuel should be filled up to the level corresponding to 100% and set the controller level by pressing knob.

- **Description of activity**

The regulator measured fuel level on the basis of its current consumption. Factory settings will not always correspond to actual fuel consumption, so to work correctly this method needs level calibration by controller's user. No additional fuel sensors are required.

- **Calibration**

Fill the silo to the level which corresponds to full level of fuel, then set value of parameter: **Boiler settings** → **Fuel level** → **Fuel level calibration** → **Fuel level 100%**

In main window the indicator will be set on 100%. The calibration process is marked with a pulsating fuel level indicator. The indicator will pulsate until programming point referring to minimum fuel level. Decreasing level of fuel in the silo should be monitored constantly. When fuel level reaches expected minimum, parameter value should be set this way:

Boiler settings → **Fuel level** → **Fuel level calibration** → **Fuel level 0%**

8.21 Information

Menu information enables view to measured temperatures and allows to check which of devices are currently activated. Switching between following screens is done by twisting "TOUCH and PLAY" knob.

8.22 Manual control

In the regulator it is possible to manual activate devices like i.e. pumps, feeder engine, or blower engine. It enables to check if the device is operating correctly and if it is connected properly.

OFF – the device is turned off, ON – the device is turned on.



Entering manual control is possible only in STAND-BY, when boiler is switched off.

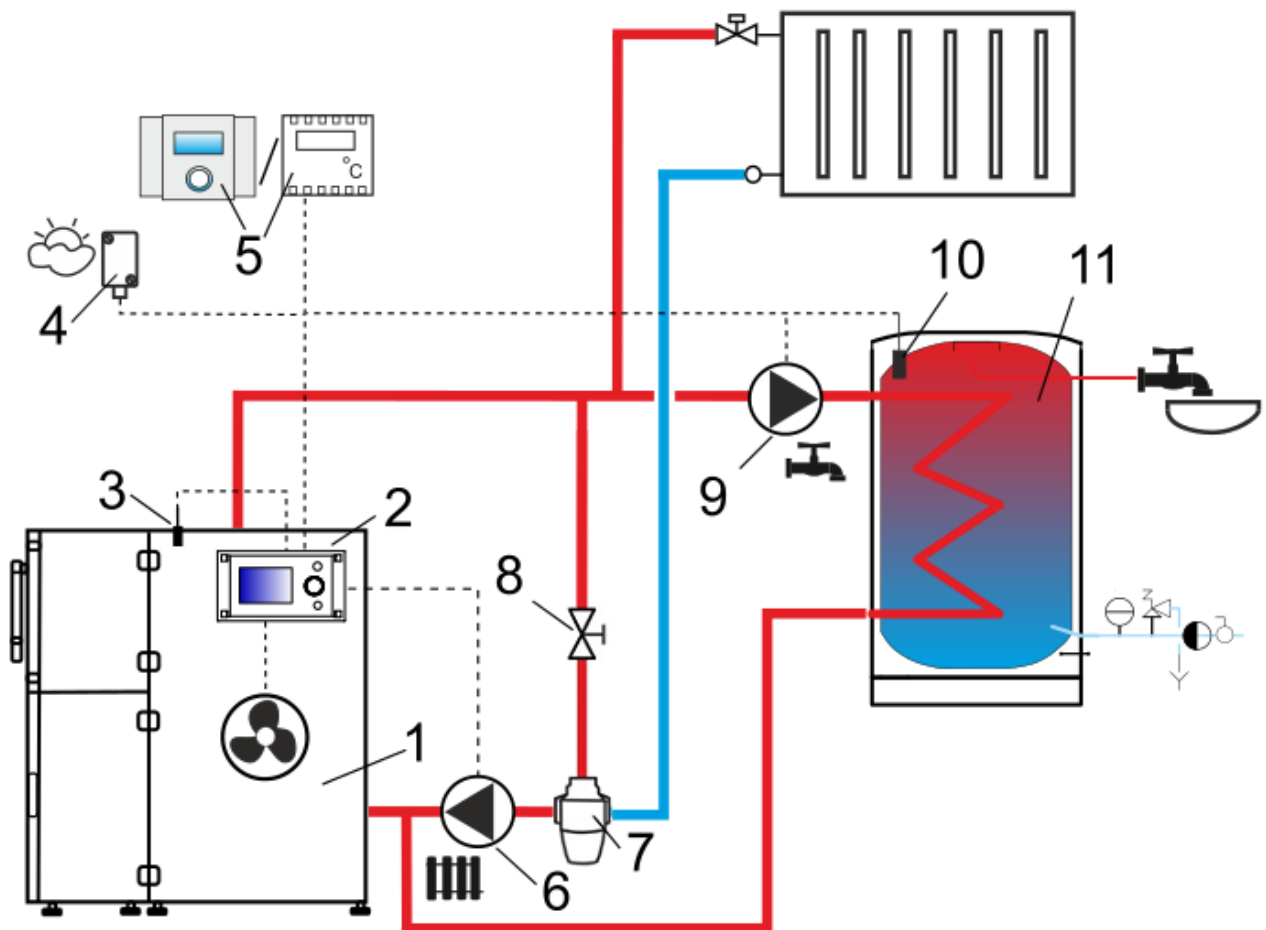


Attention: long lasting activating of fan, feeder or other device may cause danger.

INSTALLATION AND SERVICE SETTINGS

ecoMAX350P

9 Hydraulic scheme



Scheme with thermostatic 3-way valve which protects the temperature of return water

¹: 1 – boiler, 2 – regulator, 3 – boiler temp. sensor type CT4, 4 – weather temp. sensor (outside) type CT4-P, 5 – room thermostat (NO-NC) or room panel ecoSTER200, 6 – boiler pump, 7 – thermostatic 3-way valve (manually operated), 8 – throttle (poppet) valve, 9 – HUW pump, 10 – HUW temp. sensor type CT4, 11 – HUW container.

¹ The presented hydraulic diagram does not replace central heating engineering design and may be used for information purposes only!

10 Technical Data

Power supply	230V~, 50Hz
Current consumption by the regulator	0,2 A
Max. rated current	3 (3) A
IP rating of the regulator	IP40, IP00
Ambient temperature	0...50°C
Storage temperature	0...65°C
Relative humidity	5 - 85% without steam condensation
Temperature measurement range of sensors CT4	0..100 °C
Temperature measurement range of sensors CT4-P	-35..40°C
Accuracy of temperature measurement using sensors CT4 i CT4-P	2°C
Connectors	Screw terminals at supply voltage side - 2.5mm ² Screw terminals at control voltage side - 1.5mm ²
Graphical display	Graphic: 128x64
Overall dimensions	160x90x80 mm
Total weight	0,5 kg
Standards	PN-EN 60730-2-9 PN-EN 60730-1
Software class	A
Protection class	suitable to built-into Class I devices

11 Storage and transport conditions

The controller can not be exposed to immediate effects of atmospheric conditions i.e. rain or sunrays. Temperature of storage and transport should be within scope -15...+60°C.

12 REGULATOR INSTALLATION

12.1 Environmental conditions

Due to fire risk it is forbidden to use the controller in proximity of explosive gases or dust (e.g. Coal dust). In such cases, it is necessary to apply additional protection against the regulator penetration by flammable dust and gases (tight enclosure) or to prevent their emergence. On account of risk of shock, the regulator has been designed

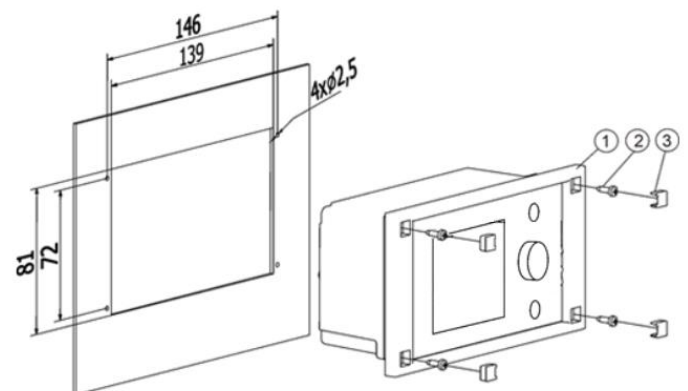
to be used in an environment marked as pollution level 3, acc. to PN-EN 60730-1. Moreover the controller cannot be used in conditions of water steam condensation or be exposed to effects of water.

12.2 Mounting requirements

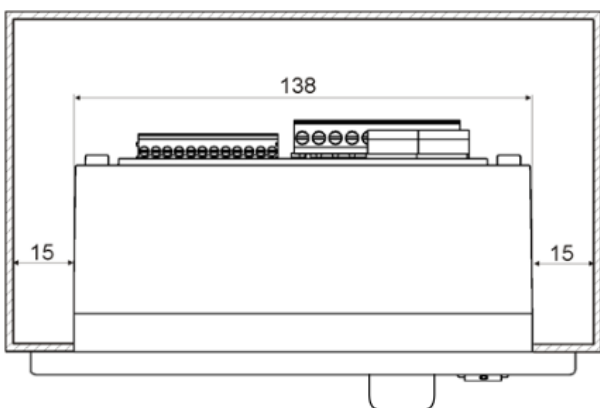
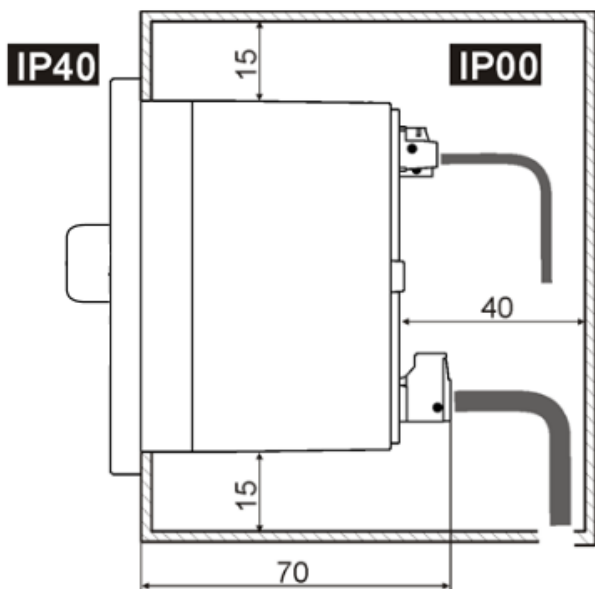
Regulator should be installed by qualified and authorized technician with observance of applicable standards and regulations. The manufacturer disclaims any liability for damage caused by non-observance of instructions specified in this manual. Regulator is intended to build into other equipment, and may not be used as a stand-alone device.

Ambient temperature and temperature of mounting base should be within the range of 0...+50°C.

The control panel is to be enclosed on a mounting plate. Proper thermal insulation between hot boiler walls and the panel and the connecting tape must be provided. The space required for the control panel is shown in fig. 16. During installation, follow the guidelines below.



Fitting the regulator in a mounting plate: 1 - control panel, 2 - sheet metal screw 2.9x9.3, 3 - hole plug.



Conditions of enclosing the regulator.

The module casing must meet protection rate appropriate for environmental conditions in which the regulator will be used. Moreover, it must prevent the user from accessing hazardous, live parts, e.g. terminals. The module's casing is not water or dust resistant. To assure water and dust protection, appropriate casing must be installed.

Due to safety requirements, a safe distance between active parts of the module and the conductive (metal) elements of the enclosure has to be kept. Metal elements of the regulator enclosure must be connected with the power cord protective cable.

Connecting wires have to be protected against being torn out, loosened, or they must be enclosed in a way which prevents any tensions in relation to the wires.

12.3 IP protection rate

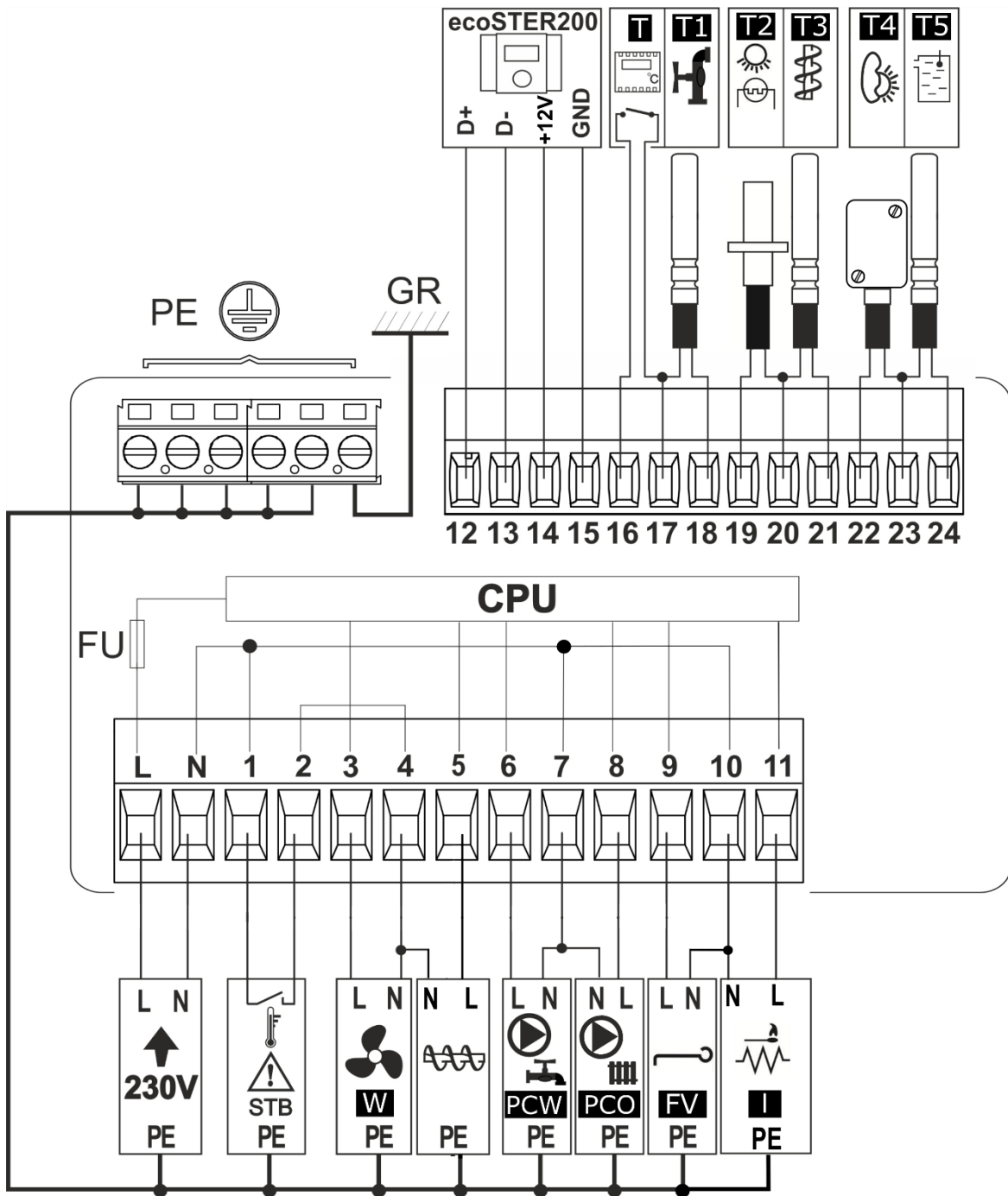
Enclosure of the regulator's executive module provides various IP protection rates, depending on the method of installation. After enclosing in accordance with this drawing, the device has protection rate IP 40 from the front side of the executive module enclosure (specified on the rating plate). From the side of the terminals, the casing has protection rate IP00, thus the terminals of the executive module must unconditionally be enclosed, in order to prevent access to this part of the casing.

12.4 Protection wiring

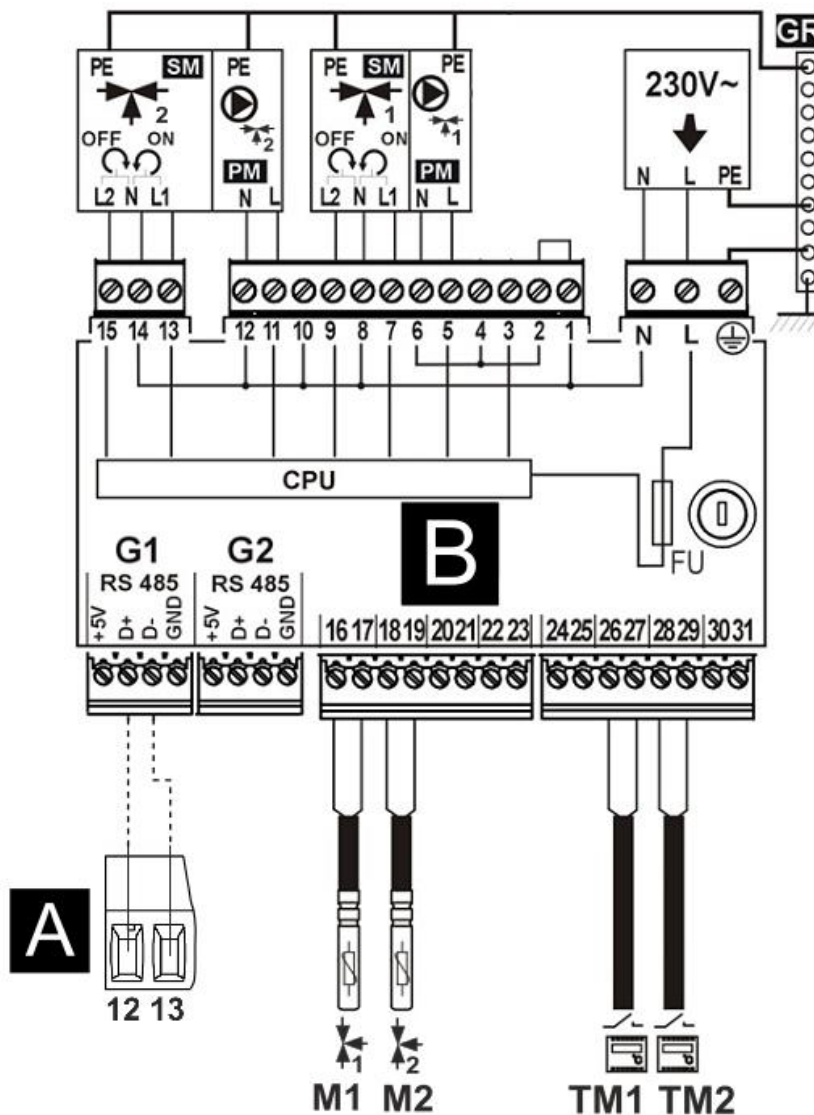
Protection lead of the power supply cable and protection leads of connected devices should be connected to the grounding strip placed inside the casing of the regulator marked with



12.5 Electric scheme



Scheme of electric connections with external devices: ecoSTER200 – room panel (room thermostat), T – room thermostat (NO-NC), T1 – HUW temperature sensor (type CT4), T2 – flame optical sensor, T3 – fuel feeder temperature sensor (type CT4), T4 – weather temp. sensor (type CT4-P), T5 – boiler temp. sensor (type CT4), FU – regulator main fuse, CPU – controlling, STB – safety temperature limiter (disconnects feeder and blow-in), GR - ground strip, 230V – power supply 230V, PE – connecting wires to grounding strip, W – fan, PO – fuel feeder motor, PCW – HUU pump, PCO – boiler pump or central heating circuit, FV – rotary motor of burner cleaning, I – igniter.



Scheme of electric connections with additional module B: B – additional module B, A – regulator main module (A), M1, M2 – mixer 1,2 temp. sensor (type CT4), TM1, TM2 – mixer 1,2 room thermostat (NO-NC), CPU – controlling, FU – regulator main fuse, GR – ground strip, 230V – power supply 230V, PE – connecting wires to grounding strip, PM1, PM2 – mixer 1,2 pump, SM1, SM2 – mixer servomotor.

12.6 Electric connection

The regulator is designed to be fed with 230V~, 50Hz voltage. The electrical system should be:

- three core (with protective wire PE),
- in accordance with applicable regulations.

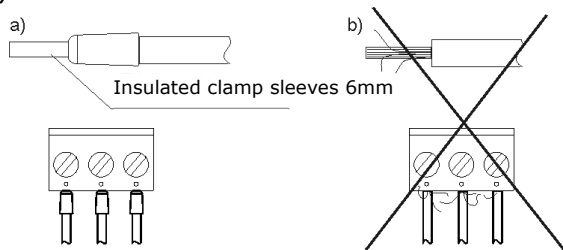
The connection wires should not have contact with surfaces temperature of which exceeds the nominal temperature of their operation. Terminals L, N and number 1-11 are intended only for connecting devices with mains supply 230V~.

Terminals 12-24 are intended for cooperation with low voltage devices (below 12V).



Connecting mains supply 230V~ to terminals 12-24 damages the regulator and creates risk of an electric shock.

Tips of the connected wires, especially power leads, must be secured against splitting by means of insulated clamp sleeves: a) correct b) incorrect.



The power supply cable should be connected to the terminals marked with an arrow.

In the regulator there is applied electronic disconnection of connected devices:

- electronic for fan output, terminals 1-2 (2.Y type of operations according to PN-EN 60730-1), does not provide safe isolation – despite the disconnection on the terminals can occur a dangerous voltage,
- micro-disconnection for the HUW and boiler pump – terminals 5-6 and 7-8 (2B type of operation according to PN-EN 60730-1).

12.7 Connection of room control panel

Main functions of the panel are following:

- room thermostat,
- boiler control,
- alarm annunciator.

Room control panel can be connected by two or four wire cable. Two-wire connection

requires an use of additional power supply, which is not standard equipment of the controller. The room panel should be connected to controller terminals numbered 12-15, according to the wiring diagram. The room panel can decrease temperature of the boiler or temporarily block the central heating pump.

12.8 Temperature sensors connection

The regulator is compatible only with CT4 sensors. The use of other sensors is prohibited!

Wires of the sensors can be extended by wires with diameter not smaller than 0,5mm². Total length of wires in each sensor should not exceed 15m.

Boiler temperature sensor should be installed in thermostatic pipe installed in boiler. The feeder temperature sensor must be installed on the surface of the feeder screw pipe. Temperature sensor of hot water container should be installed in thermostatic pipe welded into the container.



Sensor must be protected from getting loose from the surfaces to which they are connected.

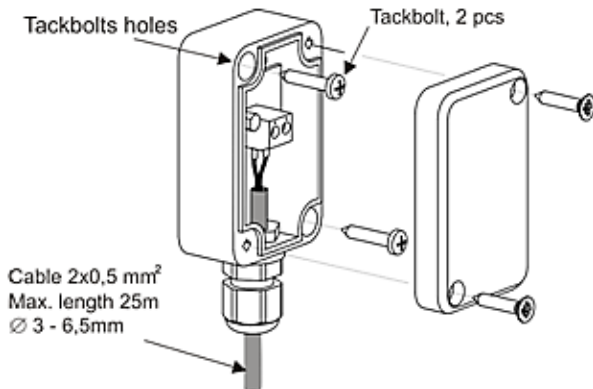
Good thermo contact should be maintained between sensors and measured surface. To this purpose thermal grease should be used. It is not acceptable to lubricate sensors with water or oil. Wires of sensors should be separated from network electrical wires. In such a case wrong readings of temperature may be shown. Minimum length between those wires should be 10 cm. It is not acceptable to allow for contact between wires of the sensors and hot parts of the boiler and heating installation. Wires of the sensors are resistant to temperature not exceeding 100°C.

12.9 Weather sensors connection

The controller cooperates solely with weather sensor type CT4-P. The sensor should be installed on the coolest wall of the building. Usually it is the northern wall, under the roof. The sensor should not be exposed to direct sunrays and rain. The sensor should be installed at least 2m above the ground far away from windows, chimneys and other sources of heat (min.1,5 m).

To connect use wire with diameter at least 0,5mm² up to 25m long. Polarization of wires is not essential. Second end should be connected to terminals of controller or properly to used kind of controller.

The sensor should be screw to the wall. Access to assembly holes is possible after unscrewing the cover of the sensor.



12.10 Testing of temperature sensors

The CT4, CT4-P temperature sensor may be tested by measuring its resistance at the given temperature. In case of significant differences between measured resistance and the values indicated in the table below - replace the sensor.

CT4			
Temp. °C	Min. Ω	Nom. Ω	Max. Ω
0	802	815	828
10	874	886	898
20	950	961	972
25	990	1000	1010
30	1029	1040	1051
40	1108	1122	1136
50	1192	1209	1225
60	1278	1299	1319
70	1369	1392	1416
80	1462	1490	1518
90	1559	1591	1623
100	1659	1696	1733

CT4-P (weather)			
Temp. °C	Min. Ω	Nom. Ω	Max. Ω
-25	901,6	901,9	902,2
-20	921,3	921,6	921,9
-10	960,6	960,9	961,2
0	999,7	1000,0	1000,3
25	1096,9	1097,3	1097,7
50	1193,4	1194,0	1194,6
100	1384,2	1385,0	1385,8
125	1478,5	1479,4	1480,3

12.11 Connection of boiler's room thermostat

The regulator may work with mechanical or electronic room thermostat, which opens the contacts once the preset temperature has been achieved.

Set-up the operation of room thermostat in:

Boiler Settings → **Room thermostat** → **Thermostat Selection** → **Universal**

Once the preset room temperature has been reached, thermostat opens its contacts and the display shows:

Once the temperature in the room, in which the room thermostat is installed, has reached the preset value, regulator reduces the preset boiler temperature by the value set in *Inc. p. b. temp. thermostat* and the display shows This will cause longer breaks in boiler operation (the boiler will remain in SUPERVISION mode) and the same, temperature in heated rooms will drop.

12.12 Connection of temperature limiter STB

To avoid boiler overheating in case of regulator failure, provide STB or other appropriate safety temperature limiter. Connect STB limiter to terminals 1-2. Once the limiter has tripped, fan and fuel feeder motor are OFF.



Safety temperature limiter should be suitable to operate at rated voltage min. 230V AC and hold required certificates of approval.

In case the limiter is not installed- bridge the terminals 1-2 using wire of cross-section area of min. 0,75 mm² and with insulation enough thick to meet safety requirements for the boiler.



Current regulations demand the use of a safety temperature limiter.

13 Service menu

Service settings
Burner settings
Boiler settings
CH and HUW settings *
Show advanced setup
Service counters
Restore the default settings

Burner settings
Firing up
<ul style="list-style-type: none"> • Ignition test time • Fuel dose • Flame detection • Firing up airflow • Firing up time • Blow-in after infl. • Blow-in p. after infl. • Heating up time • Worktime with min power
Operation
<ul style="list-style-type: none"> • Thermostat mode • Cycle time OPERATION • Fuel calorific • Capacity of tank
Burning off
<ul style="list-style-type: none"> • Max time burning off • Min time burning off • Blowing power • Blowing time • Blowing pause • Blowing start • Blowing stop
Cleaning
<ul style="list-style-type: none"> • Cleaning time firing up • Cleaning time burning off • Cleaning blowing • Rotary cleaning cycle
Supervision
<ul style="list-style-type: none"> • Supervision time • Boiler output • Cycle time • Fan output
Grate *
<ul style="list-style-type: none"> • Blowing power - supervision • Blowing pause - supervision
Min. airflow output

Fuel detection time
Max. burner temp.

Boiler settings
Thermostat select
Min. boiler temp.
Max. boiler temp.
Boiler cooling temperature
Parameter A,B,C FL
Pump Off by thermostat

CH and HUW settings*
CH pump activation temperature
CH standstill when loading HUW *
Minimum HUW temperature*
Maximum HUW temperature*
Boiler inc. by HUW, Mixer
HUW operation extension*
Exchanger *

* Not available if proper sensor not attached, extension module or parameter is hidden.

14 SERVICE SETTINGS

14.1 BURNER

Firing up	
<ul style="list-style-type: none"> Ignition test time 	Time to check whether the burner is already firing up. Only fan is operating.
<ul style="list-style-type: none"> Fuel dose 	Fuel dose during firing up. Concerns first testing firing up. Next tests fuel dose is reduced (20% of basic dose).
<ul style="list-style-type: none"> Flame detection 	Threshold of flame detection in % of light, when the controller deems the furnace as hot. It is also used for detection of lack of fuel and end of burning off.
<ul style="list-style-type: none"> Firing up airflow 	% of airflow when firing up. Too big value prolongs the firing up process or causes failed attempt of firing up.
<ul style="list-style-type: none"> Firing up time 	Time of following firing up attempts (3 attempts). After that time the controller goes to another firing up attempt.
<ul style="list-style-type: none"> Blow-in after inflame 	% of fan blowing after flame detection.
<ul style="list-style-type: none"> Blow-in p. after inflame 	Fan operation time with power <i>Blowing after firing up</i> .
<ul style="list-style-type: none"> Heating up time 	Igniter warming up time before engaging the fan. It should not be too long as to not damage the heater. After this time the heater works still until detecting the flame.
<ul style="list-style-type: none"> Worktime with min power 	Burner operation time with minimum power after firing up. Power is determined by parameter <i>Min blow-in output</i> .
Operation	
<ul style="list-style-type: none"> Thermostat mode 	Switches the burner into THERMOSTAT mode, i.e. for working in bakery. The burner operates with maximum power without modulation of power. The burner deactivates with disconnecting thermostat joints. Boiler temperature sensor does not influence feeder operation.
<ul style="list-style-type: none"> Cycle time OPERATION 	Time of whole fuel feeding cycle in OPERATION mode. <i>OPERATION mode time = feeding time OPERATION + feeder pause time</i> .
<ul style="list-style-type: none"> Fuel calorific 	Fuel calorific in kWh/kg.
<ul style="list-style-type: none"> Capacity of tank 	Fuel silo capacity for counting fuel level. When correct amount is put, the user is not obliged to calibrate fuel level. The controller process this data if calibration process of fuel level was not done. After successful calibration of fuel level the controller does not process this value.
Burning off	
<ul style="list-style-type: none"> Max. time burning off 	After this time the controller goes to STOP mode, in spite of the fact that the controller detects flame.
<ul style="list-style-type: none"> Min. time burning off 	Burning off will last at least this time in spite of the fact that flame sensor indicated lack of flame.
<ul style="list-style-type: none"> Blowing power 	Fan power during blowing while BURNING OFF mode in %.
<ul style="list-style-type: none"> Blowing time 	Duration of blowing when burning off fuel and burning off.
<ul style="list-style-type: none"> Blowing pause 	Break between airflows while burning off the fuel in burning off process.
<ul style="list-style-type: none"> Blowing start 	Flame brightness with which airflow starts while burning off the fuel.
<ul style="list-style-type: none"> Blowing stop 	Flame brightness with which airflow starts when burning off the fuel in burning off process
Cleaning	
<ul style="list-style-type: none"> Cleaning time firing up 	Fan operation time during cleaning the furnace while firing up.
<ul style="list-style-type: none"> Cleaning time burning off 	Fan operation time during furnace burning off.
<ul style="list-style-type: none"> Cleaning blowing 	Fan power in % during furnace cleaning in burning off and firing up.

• Rotary cleaning cycle	Rotary cleaning cycle period / time (basic)
Supervision	
• Supervision time	After this time, when the controller is in SUPERVISION mode, the controller automatically starts burner burning off. By settings = 0, SUPERVISION mode is deactivated.
• Feeding time	Fuel feeding in SUPERVISION mode. It has influence on burner power by operating in SUPERVISION mode. Attention: the value should be as small as possible, just to keep the flame burning. Too big value may cause to boiler overheating.
• Cycle time	Feeder operation time in SUPERVISION mode. <i>Supervision cycle time = Supervision feeding time + feeder pause time in Supervision.</i>
• Fan output	Fan power in % during operation in Supervision mode. Adjust value in such a way to burn feeding fuel in Supervision mode with low fumes emission.
Grate	
• Blowing power - supervision	The duration of the fan blow in the supervision in grate mode.
• Blowing pause - supervision	Interval between blows in the supervision in grate mode.
Min. airflow output	Minimum fan power in % which can be chosen by the user. It is only used to limit the accessible scope of fan power. It is not used in algorithm of controlling the fan. It should be possibly small to allow the fan to rotate slowly, without buzzing.
Fuel detection time	Time is measured after decrease in brightness of flame below value <i>flame detection %</i> . After deducting this time the controller switches into firing up attempt. After 3 failed attempts, it reports alarm: "failed firing up attempt"
Max. burner temp.	Max temperature of the burner by which the alarm of exceeding the max. temp of burner will be switched on.

14.2 BOILER

Thermostat select.	Options to choose from: <ul style="list-style-type: none"> • Off - deactivates room thermostat influence on boiler operation, • Universal - activates room thermostat for boiler, • ecoSTER T1 - option available after connecting room panel ecoSTER, boiler operation is dependant on room thermostat No1 in ecoSTER, • ecoSTER T2 - option available after connecting room panel ecoSTER, boiler operation is dependant on room thermostat No 2 in ecoSTER – on sensor CT7, • ecoSTER T3 - option available after connecting room panel ecoSTER, boiler operation is dependant on room thermostat No3 in ecoSTER – on sensor CT7,
Min boiler temperature	Minimum preset boiler temperature which can be set in user menu and minimum temp. which can be set automatically by controller, i.e. from night reductions etc.
Max boiler temperature	Maximum preset boiler temperature which can be set in user menu and minimum temp. which can be set automatically by controller, i.e. from night reductions etc.
Boiler cooling temperature	Temperature of boiler cooling off. Above this temperature the controller activates HW pump and opens mixer cycles to allow boiler cooling off. The controller activates HW pump if this temperature exceeds maximum value. The controller will not open mixer cycle when <i>mixer setting = floor on.</i>
Pump Off by thermostat	Options available: <ul style="list-style-type: none"> • NO - CH boiler pump is not activated when room thermostat starts operation, • YES - CH boiler pump is deactivated when room thermostat starts operating

14.3 CH and HUW

CH activation temperature	Parameters determines the temperature at which CH boiler pump is activated. It protects the boiler against watering due to cooling off with cold water returning from installation. Attention: Deactivating boiler pump only does not guarantee boiler protection against watering and consequently corrosion. Additional automatics should be used, i.e. 4 way valve or 3 way thermostatic valve.
CH stand. load. HUW	Available after connecting HW sensor. Prolonged feeding of HW silo during priority HW deactivated may cause to overcooling of the CH installation, because CH pump is deactivated. Parameter CH pump pause during feeding HW prevents against periodical activating CH pump during feeding HW silo. CH pump after this time will activate on constant, programmed time of 30s.
Min. HUW temp.	Available after CH sensor connecting. It is a parameter by which it can be reduced setting too low preset HW temperature.
Max .HUW. temp.	Available after connecting HW sensor. Parameter determines to what maximum temperature HW silo will be heated during cooling the boiler in alarm situations. It is a very important parameter, because setting too high value of it may cause risk of scalding with HW. Too low value of parameter will cause that during boiler overheating it will not be possible to cool off the boiler to the HW silo. During design of HW installation, it is necessary to take into account risk of damaging the controller. Due to breakdown of the controller water in the silo can heat up to dangerous temperature. It is necessary to use additional protection in the form of thermostatic valves.
Boiler inc. by HUW and Mixer	Parameter determines how high the boiler temperature will be increased to load HW silo, buffer and mixer cycle. Temperature increase is only realizing when it is necessary. When preset boiler temperature is at sufficient level then controller will not change it due to the fact of feeding the HW silo, buffer or mixer cycle. Increasing preset boiler temperature during feeding HW silo is signaled with letter "C" in main window of displayer.
HUW operation extension	Available after connecting HW sensor. After feeding HW silo and deactivating HW pump may be a risk of boiler overheating. It happens in case when preset HW temperature was higher than boiler preset temperature. This issue is exceptionally important in HW pump operation in SUMMER mode, when pump is deactivated. To cool off the boiler HW pump operation can be prolonged by <i>HUW operation extension</i> .
Exchanger	Parameter available after activating option Show advanced setup = YES. It only refers to hydraulic installation with heat exchanger between open and closed circuit. Available options: <ul style="list-style-type: none"> • YES - boiler pump operates constantly in short circuit boiler – exchanger, it is not excluded i.e. from SUMMER function or HW priority, • NO - pump operates normally.

14.4 OTHER PARAMETERS

Show advanced setup	Options available: <ul style="list-style-type: none"> • YES - displays hidden parameters which edition is not recommended, • NO - hides hidden parameters.
Default settings restoring	Restoring service settings settings from main menu are restored.

15 Alarms descriptions

15.1 Boiler max. temp. exceeding

Protection against boiler overheating is done in 2 steps. In the first step, after exceeding *Boiler cooling off temperature*, the controller tries to reduce boiler temperature by dropping excess of heat to the HW silo and by opening mixer servomotors (only when *mixer service = activated CH*). If temperature measured by HW sensor exceeds value *Max. temp. of HUU* then HW pump is deactivated, what is done to protect users against scalding. If boiler temperature decreases, then the controller returns to normal operation. If the temperature will still increase (reaches 95°C) then constant alarm will be activated of boiler overheating joined with sound signal. The alarm can be deleted by pressing „TOUCH and PLAY“ button or activating and deactivating power to the regulator.



Locating temperature sensor outside water coat of burner i.e. on exhaust pipe is not beneficial, because it may cause delay in detecting boiler overheating state!

15.2 Feeder max. temp. exceeding

Alarm appears after exceeding feeder temperature above service parameter *Max. burner temp.*

If the feeder temperature increases above this value the controller will begin burning off procedure. Alarm is deleted automatically after feeder temperature decrease by 10°C. The alarm can be deleted by pressing „TOUCH and PLAY“ button or activating and deactivating power to the regulator



Function which protects against back fire does not work when feeder sensor is disconnected or damaged.



Function which protects against back fire does not work when The controller has no electrical power. The regulator can not be used as sole protection of boiler against back fire. Additional protecting automatics is to be used.



15.3 Boiler temp. sensor damage

Alarm appears by boiler sensor damage and by exceeding measuring scope of this sensor.

When alarm appears the boiler is activated. Deleting is done by pressing “TOUCH and PLAY” button or by deactivating and activating the regulator.



Checking the temperature sensor is described in point 12.10.

15.4 Feeder temp. sensor damage

Alarm appears when feeder sensor is damaged or by exceeding measuring scope of this sensor. After alarm the boiler is burnt off. It is necessary to check the sensor and replace it if necessary.

Deleting is done by pressing “TOUCH and PLAY” button or by deactivating and activating electrical power to the regulator.



Checking temperature sensor is described in point 12.10.

The regulator can operate by disconnected feeder temperature sensor, after setting parameter *Max. feeder temp. = 0*.



However it is not recommended, because it causes deactivation of boiler protection function against back-firing to fuel silo.

15.5 Firing up failed attempt

Alarm will appear after third failed attempt of automatic furnace firing up. In case of alarm all pumps are deactivated in order to not cause excessive cooling of the boiler.

Deleting is done by pressing “TOUCH and PLAY” button or by activating or deactivating the controller. The cause of these alarms can be broken igniter or lack of fuel in the silo.

16 ADDITIONAL FUNCTIONS

In addition to the foregoing functions, the regulator performs also various other functions.

16.1 Power supply decay

In the cases of power supply failure, the regulator will resume the operation mode in which it was before the failure.

16.2 Protection against freezing

If the boiler temperature drops below 5°C, the CH pump will be enabled, thus forcing circulation of the boiler water. This will delay the process of water freezing, yet in the case

of great frost or shortage of power, it will not protect the system against freezing.

16.3 Preventive cooling down

Using this function, the regulator attempts to cool down the boiler before entering permanent boiler overheating alarm.

16.4 Protection of pumps against locking

HUW and mixer pumps and servo protection from locking caused by scale deposit. To do this, these components are periodically switched on for few seconds. In this way the pumps are protected from immobilization caused by scale deposits. Therefore, during boiler shut-down, power supply to the regulator should be on, and the regulator should be in STOP mode.

16.5 Replacement of mains fuse

Mains fuse is located in Operating Unit. It protects the regulator and other equipment. Time-lag, porcelain fuses 5x20mm with nominal current 6,3A should be used.

Registry changes:



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